COMPARISON STUDY OF TRADITIONAL AND CONTEMPORARY HOUSING DESIGN WITH REFERENCE TO TRIPOLI, LIBYA

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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Declaration

I declare that the research contained in this thesis was carried out by me. It has not been previously submitted to this or any other Institution for the award of a degree of any other qualification.

ABBREVIATIONS

GDP	Gross Domestic Product
LD	Libyan Dinnar
MP	Ministry of Planning
MOH	Ministry of Housing
GHC	General Housing Corporation
SHU	Secretariat of Housing and Utilities
PBUH	Peace Be Upon Him
AEC	Architecture, Engineering and Construction
S.P.L.A.J.	Socialist People's Libyan Arab Jamahiriya(Official Name of Libya)
NCID	National Corporation for Information and Documentation
SOHU	Secretariat of Housing and Utilities
GHC	General Housing Corporation reports
GUPC	General Urban planning Corporation
ECOU	Engineering Consulting office for Utilities

GLOSSARY

Al-maskan: A dwelling unit or a house

Al-umah: The whole population, or the nation

Al-ailah: A family

Darb-El-Bab: A large timber framework for forming a concrete wall

Eid-Al- fitr: Islamic festival

Eid-Al-udha: Islamic festival

Ramadan: Fasting one month in the year

Gasr: The storehouse or a fortified granary

Ghibli: Hot dry and dusty winds that blow from the Sahara Desert

Hadith sharif: Prophet Mohammed sayings

Hammam: Public bath

Hujra or Dar: A Room

Iman: Faith or belief

Iwan: Large niche in the side of a courtyard

Jabel: A mountain

Madina: Urban complex or a city

Madina Qadimah: The old city

Madrasa: A school

Mahallah: Residential sector or a neighbourhood

Marbouah: Male quarter or reception room

Mushrabiya: A wooden lattice screen used on windows to provide privacy and reduce glare

Sadr-Al-Bait: The beginning of upper part of a house (reception room)

Sakinah: Calm

Sedda: Wooden platform used for bed at one end of a room

Sqiffah: The angled entrance space of courtyard house

Wadies': Valleys

Wast-El-hawsh: Middle of the house or the traditional courtyard

Zukhrufah: Ornamentation

AL-Alfa: Natural plants, which grow in the mountains

Hadith: The saying and tacit approvals of Prophet Mohammed

Sunnah: All the traditions and practice of Prophet Mohammed (peace be upon him)

Al-ustah: A chief builder

Bab: Gateway

Quran: The Holy book of Muslims

Hajj: Pilgrim

Hugrat El-Qabu: Living room

Sahih al-bukhari: Name of person who collected the saying and tacit approvals of Prophet Mohammed

Es-Stah: The accessible flat roof space of a courtyard house

El-Sabat: A volume bridging a street or an alleyway and connecting two houses on both sides of the street

Iwan: A covered sitting area that opens onto the courtyard

Suq: Market

Matbakh: A kitchen

Sardab: Basement level in Iranian or Iraqi courtyard houses

Shanashil: Protruding sections from the first floor rooms

Diwaniya: Men's reception area

El-Roshen: Window

Harem: A female

Selamlik: The guest's section in the courtyard house

ABSTRACT

Over the course of the last few decades, most developing countries, including Libya, have experienced a rapid economic growth and associated increase in population. This growth has led to a substantial increase in the implementation of contemporary housing programmes and urbanisation in the form of new districts, mainly influenced by western models, although the use of some traditional forms continues in hybrid designs.

Traditional housing gains its name due to its close relationship between the functional needs of the occupants, the culture, the climate, and other aspects of the living environment. In contrast contemporary designs of houses have appeared only recently in State development plans and projects, and have begun to show some shortcomings in functionality. Thus, this study aims to investigate and understand the reason for these shortcomings and to make recommendations for future housing policies in the state.

The design of traditional and contemporary housing in Tripoli-Libya is analysed in terms of suitability for cultural, social and climate conditions. This is explored through contextual research based on a review of the literature, concentrating on the development of housing design in Libya since 1885, including all the factors that have influenced Libyan housing design.

The satisfaction level of the occupants living within both types of housing has been explored in three representative case study areas in Tripoli. Residents' views on their satisfaction with their house were sought through questionnaires. Interviews were also conducted amongst government officials and design professional concerned with housing design and implementation programmes to understand professional opinion on the quality of traditional and contemporary housing.

The main conclusions drawn from the research emphasises the importance of social and cultural factors, climate conditions, and local building materials, as they all play an important role in designing any house and are important to the level of satisfaction of users. Regardless of the advantages of the contemporary housing used in the case study areas in terms of space and access for motor transport, most respondents were dissatisfied with their new houses in terms of privacy, climate condition, and building materials used in the construction. The research also illustrates the danger of not properly considering all these factors may result in dissatisfaction of users, and may lead them to alter or modify their houses. This may lead to illegal and possibly unsafe modifications, or at least to unsatisfactory visual appearance.

Finally, based on the study of both traditional and contemporary houses, the findings of the empirical study, and the opinions of experts, a set of guidelines for future house designs are presented. The guidelines inform and possibly assist designers, planners, academics and Libyan public policy makers to achieve the goals of providing new housing concepts and forms, which are appropriate to the requirements of residents, and which do not detract nor constrain their social and cultural activities.

Chapter 1: Overview of Research

1.1 Introduction

This study will explore one of the problems of modern architecture of recent times, where advanced industrial technology has been directly introduced into developing countries. This chapter will introduce this as illustrated in Figure 1.1.

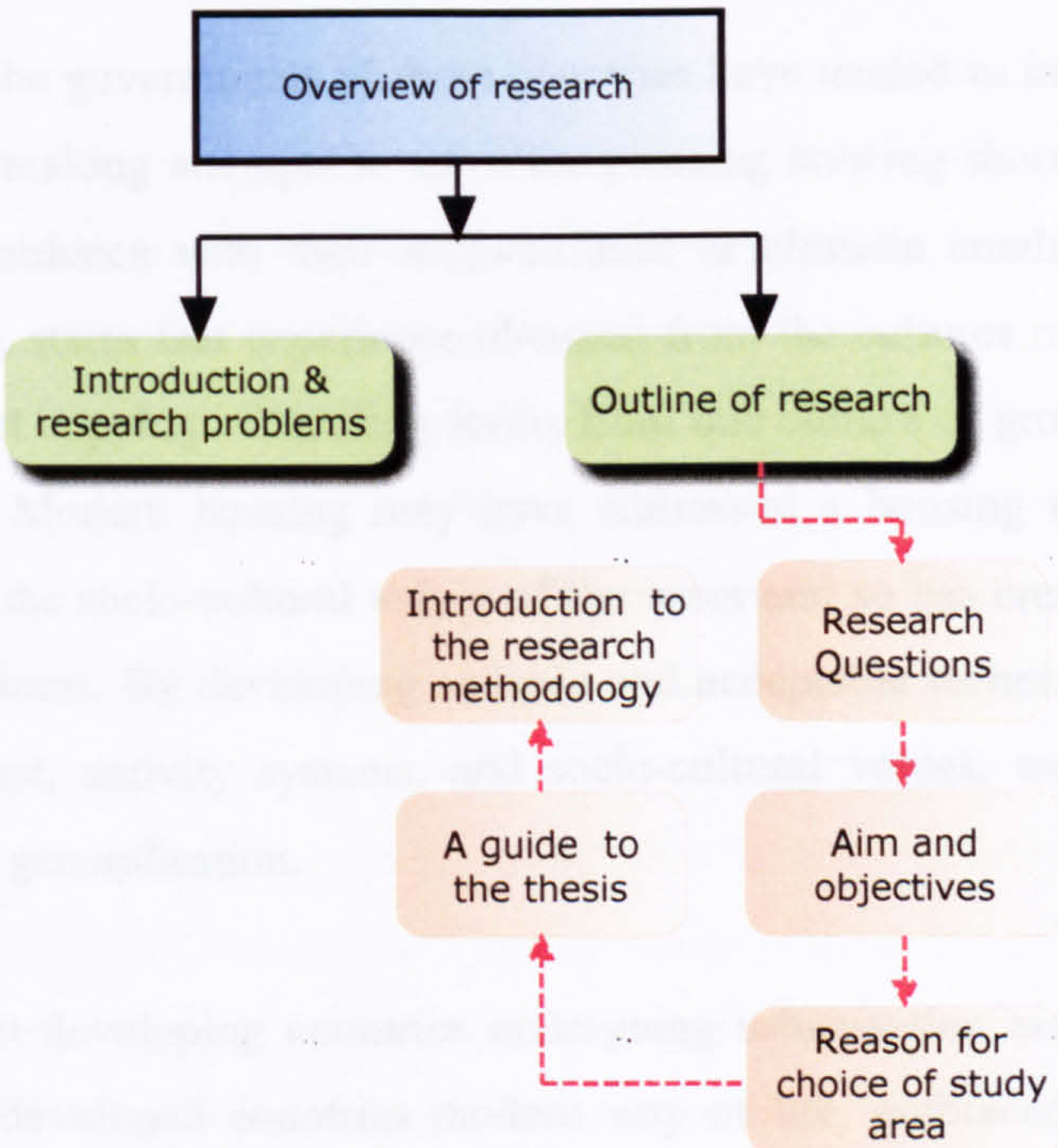


Figure 1.1 : Structure of the introduction and research methodology explored in chapter 1

Peter (1994) indicated in his book that the industrial revolution changed the way people thought about building. The new technology, defined as industrial or applied science, produced a multiplying group of new machines and materials.

The development of the housing design process in developed countries has been associated with industrialisation, rationalization efficiency, and new types of social organisation. The latter include a decrease in family size, looser kinship ties and expansion of non-family institutions, increase of participation in formal associations, and increase in social mobility and stratification of society based on new achievement criteria (income, education, and occupation). Such changes in developed societies produced new architecture, which we know today as modern architecture, designed through advanced technology, labour skills and building materials. However at the same time, in most developing countries, where there is an urgent need for housing, millions of people are living in inappropriate shelters or without housing at all (Habitat 2001). Modern architecture was a revolution. It destroyed the existing Beaux-Arts regime and replaced it with a new order. The face of the earth would never be the same. The architects came from different places (Peter 1994).

The policies of the governments of these countries have tended to introduce modern housing design, making attempts to solve the pressing housing shortage, whether or not it is in accordance with their socio-cultural or climatic conditions. Rapoport (1979 pp.23-35), states that experience obtained from the cultures of other societies proves that direct copying of housing forms from one culture or group to another is not practicable. Modern housing may have addressed a housing need, but it has failed to satisfy the socio-cultural values of the users and so has created a multitude of housing problems. By developing suitable and acceptable techniques, which suit local environment, activity systems, and socio-cultural values, we can avoid the problem of over generalisation.

At present, most developing countries undergoing urbanisation area have adopted features of the developed countries modern way of life, embraced their products, series and production processes designs and the building and construction industry, provide a vision of urbanisation expressed vividly through large, expensive, and luxurious buildings, which use imported building materials to create large internal spaces often not suitable for the indigenous society. However, evidence has shown the importance of socio-cultural aspects in housing design process; Rapoport (1969) has noted that:

"House form is not simply the result of physical forces or any single cause but is al factor, the consequence of a whole range of socio-cultural factors seen in their broadest terms. Form is in turn modified by climatic conditions (the physical environment which some things impossible and encourages) and by methods of construction, materials available, and the technology (the tools for achieving the desired environment) it will call the socio-cultural forces primary, and the others secondary or modifying".

Acceptable architecture takes into consideration the socio-cultural and environmental principles as well as way of life systems, especially in human settlements.

Traditional indigenous house design in these developing countries reflects man's interaction with his environment and socio-cultural values that have influenced people, their way of life, and their dignity. It reflects their values and own self-esteem. Even today, when entering traditional houses and settlements, a feeling of deep respect engendered by years of history and culture impresses one. These houses have simple design and construction suited to the limited resources available at the time of their construction.

Thus lessons can and should be learnt from traditional ways of design. If a building is to meet man's physical and socio-cultural needs, we must understand that man built his traditional dwelling by responding to his environment and the cultural forces that acted upon the design of such dwellings and settlements. Rapoport (1999) believes that the most viable way to deal with traditional architecture is to learn general lessons and principles from it rather than to copy its architectural form, superficial shapes and details. He argues that learning can also be about process (Ahmed 2002). Fathy (1969) pointed out that we should be shaping the houses to the "measure of the people's songs". This means knowing the people well in order to identify their needs. Cooper (2003) indicated that "Buildings and settlement patterns are material expressions of the cultures that construct them".

1.2 Statement of the Problem of the research

The home is a vitally important aspect of human life. All people need privacy, security, stability, comfort, and religion. If a residence fails to provide all these factors it can seriously affect the morale of the users. El-Fortea (1989 p.6) pointed out: "housing is essential, it is a basic human need and central component in our daily lives". For most cultural groups the dwelling is very central as most time is spent in one's most valuable possession. It has the highest effective meaning and it is increasingly the focus of much recreation previously occurring elsewhere. Thus, housing must be suited to the social-cultural values and attitudes of people and for climatic conditions. The main problems of this research can be described as follows:

- Libya, like many developing countries, has developed an ambitious plan for housing production in order to meet a fast growing demand. Millions of Libyan diners (LD3299.8 m) have been spent on housing and urban improvement projects in Libya.(MP Ministry of planning, 1996).

- Recent housing has generally been designed in the international style rather than with local characteristics.
- Since opening up to the world, the rapid changes in Libya have made it hard to determine priorities for its people and their changing way of life. For example, in the housing sector the government has been using new technology in the construction of large-scale housing schemes. The majority of these housing units were apartments in high-rise buildings, a form of housing questionable in Libyan family situations where there is a need for privacy and security (Shawesh 2000).
- Foreign companies, designing in the international style and using new technologies, have built a large number of schemes in Libya. Such schemes do not take into account the characteristics of the indigenous habitats and settlements (Essayed 1981).

This has raised the question of the suitability of most modern housing forms for the current needs of Libyan society. The ideologue of modern architecture has tended to deal with how people should live rather than they do live (Brolin 1976 p.61) Evidence of this is that large modifications have been and are being made to contemporary housing and the interior space, (i.e. the owners have closed in balconies, divided rooms, made new openings, built extra space on roofs, added steel fencing or mesh to the windows and doors).

The traditional residences of Tripoli worked as a major factor influencing the living environment in terms of supporting the social and economic interaction among the residents, preserving cultural and social traditions, providing children with play space, and the elderly with gathering places. At the same time, as a microclimate controller and security provider they provide the character of traditional Libyan cities and towns. As far as people are concerned, they are part of their community or neighbourhood.

The separation of the genders is one of the most important characteristics of Islamic culture. This fact is obvious in both the housing design and city plan (Nour, 1979). However, despite changes in family activities, structure, and way of life as a result of urbanisation and modernization, segregation between sexes has not been affected. The relationship between the interior and exterior spaces has also remained the same. The interior space is arranged in a way that allows male visitors and guests' easy access without disturbing the household particularly the female members. The family remains an important social institution and so determines many aspects of social interaction and the design of the urban environment.

The suitability of new housing schemes and traditional houses, in terms of socio-cultural and climatic aspects, needs deeper study. The developments of recent years provide a rich source of phenomena for evaluation and comparison with the past. For the present architecture it is necessary to formulate new guidelines for appropriate planning and design concepts that are suitable for the Libyan context.

1.3 Research questions

The research questions posed will guide and determine the research strategy and methodology. Robertson et al (1996, p.34) defined research questions as "the foundation on which you build your study. It helps decide upon the sort of data required, how best to collect that data and the particular focus analysis will take". According to previous profiles of traditional and contemporary housing design in Libya and its suitability for the resident's social life, it is necessary to study the nature of the user's influence over their housing design in terms of answering to their social needs (Yin 2003, p.7).

Therefore this research will seek answers to the following questions in the context of Libya:

- What do people feel about their home?
- Why do users alter the houses when they move in?
- Which type of housing is preferred by inhabitants and why?

The steps taken to answerer these questions are shown in the research methodology.

1.4 Aims and objectives of the research

The housing problems in Libya are similar to those in other developing countries, particularly Arab countries. The main aim of this research is therefore, to investigate traditional and contemporary housing in terms of suitability to the needs of residents and cultural and climatic conditions in order that future projects will benefit from the lessons learned. To achieve this aim and to answer the research questions, the following objectives have been addressed; to:

1. Investigate the traditional and contemporary housing characteristics in Tripoli and examine the degree of people's satisfaction with both traditional and contemporary housing in terms of socio–cultural and climate aspects;
2. Compare traditional and modern houses, in relation to their relative suitability for the socio-cultural and climatic conditions;
3. Investigate the opinions of design and construction professionals in terms of the positive and negative aspects of both traditional and contemporary dwellings as well as the suitability of building materials for Libyan society;
4. Provide the authorities with a set of guidelines for developing programme for designing new urban housing projects and present recommendations for the main stakeholders, which fulfil the requirements of different socio-economic groups.

1.5 Reason for choice of study area

This research has been carried out in a city of a developing country where relatively little is currently known about the housing of the city. Tripoli has been chosen as an appropriate target for this study because of the following points:

- It is the capital of Libya and its largest city and the national centre for society, administration and the arts. In addition, it represents an important example of the development of housing in Libya. Tripoli is a Libyan city where there is a living bridge between traditional and contemporary architecture consisting of many types of housing, both private and public, in which a diverse range of peoples and cultures is represented;

- The old city of Tripoli is one of the cities in North Africa where traditional buildings remain well maintained and lived in; it is an important international centre being one of the major centres in the Mediterranean Sea basin;
- The author has an interest in and knowledge of the city, having worked for several years for the ministry of housing on several housing projects. Through examination and review of housing projects, contracts and payments the author noticed the many adaptations by users of contemporary houses after occupation which led him to suspect that current designs did not fully meet user needs;
- The city of Tripoli is the most important commercial, educational, and administration centre in the country. Over the last 30 years there has been a large number of immigrants who have participated in the expansion of the city. As a result, the city has a wide range of housing problems. and a wide variety of people and cultures;

These reasons support Tripoli as an appropriate case study for this research and as a good example of Arabic/ Islamic culture. Recommendations based on the Tripoli case study are likely to be of benefit to other parts of the Middle East.

1.6 Introduction to the research methodology

In order to achieve the aims and objective of this study and build a foundation for the analysis of the problems, necessary information had to be collected and analysed as follows, see Figure(1.2).

1.6.1 Literature Review

This includes a review of the general background of Libya, brief discussion of the culture, society and religious influences on the Libyan house, a description of the traditional housing in Libya and identification of their components. Courtyard housing found in Iraq, Iran and Turkey will be discussed briefly to assess relevance outside Libya.

1.6.2 Case study design

In order to test their significance, the results from the literature review will be applied to case studies of traditional and contemporary housing in Tripoli.

1.6.3 Data collection and analysis

Multiple methods of data collection will be adopted for primary and secondary data, direct observation and a photographic survey. Analysis of data collected from householder questionnaires and professional actors' interviews will use a descriptive statistical approach.

The detailed rationale for the research methodology developed in the project is provided in chapter 6. First the background and nature of housing in Libya is explored. The overall structure of the thesis is shown in figure 1.3.

1.6.4 Design guidelines

The last part of the research deals with development of guidelines for housing design in Libya and countries with similar social culture and climate conditions. These guidelines will be based on the literature review, the outcome of case studies (interviews of householders and professional actors) and the direct observations of the researcher.

In order to ensure the validity and credibility of these guidelines they have been reviewed by a group of international and local experts selected on the basis of their knowledge of housing design and construction profession. This has led to the final recommendations providing the basis for a more successful formula for housing design for the future.

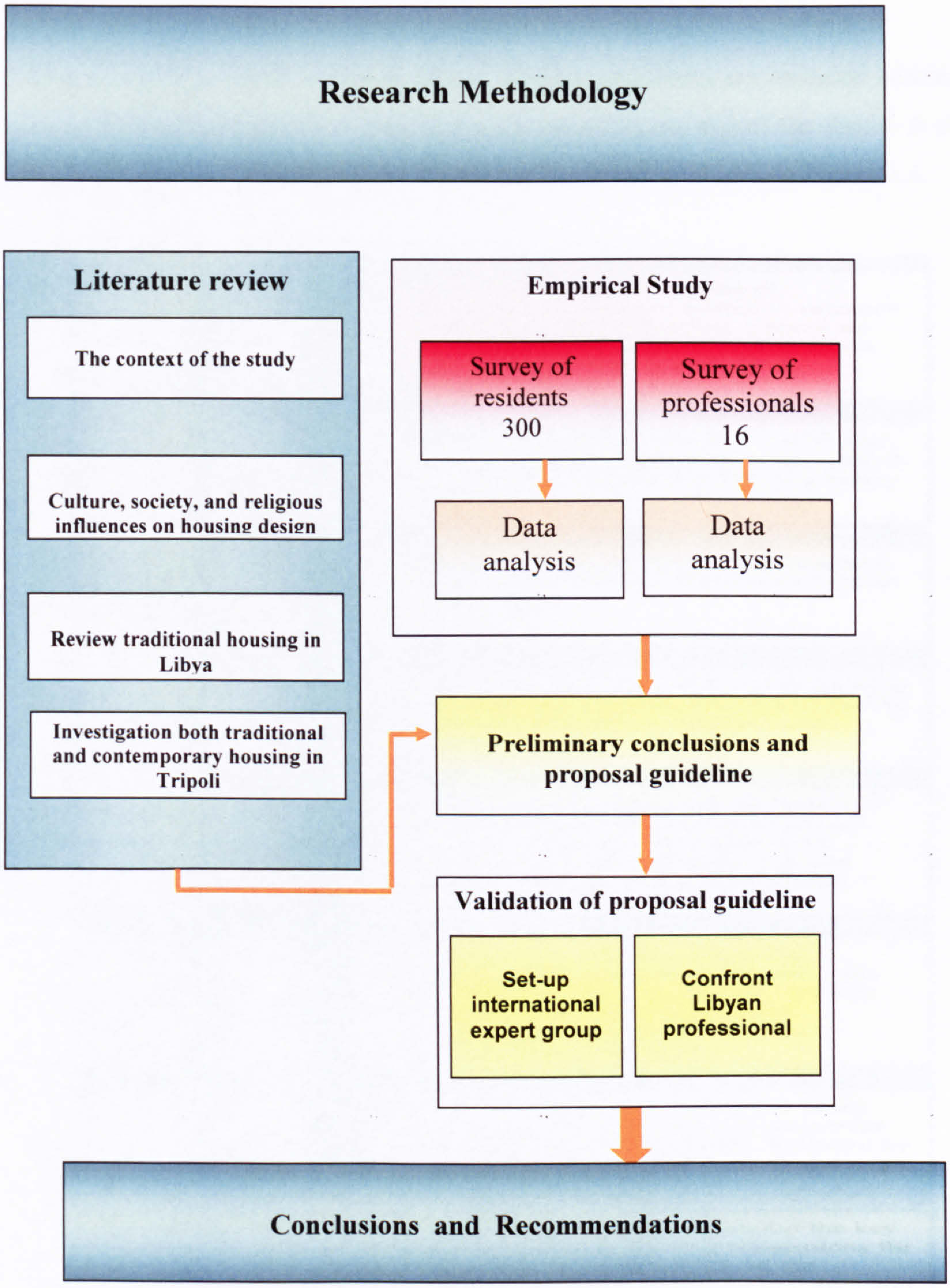


Figure 1.2 : Research methodology structure

1.7 A guide to the Thesis

This study is divided into eight chapters . Figures and tables are included within the text and all appendices and bibliography are placed at the end of the thesis. A short summary is provided below of the chapters of the thesis as shown in Figure 1.3.

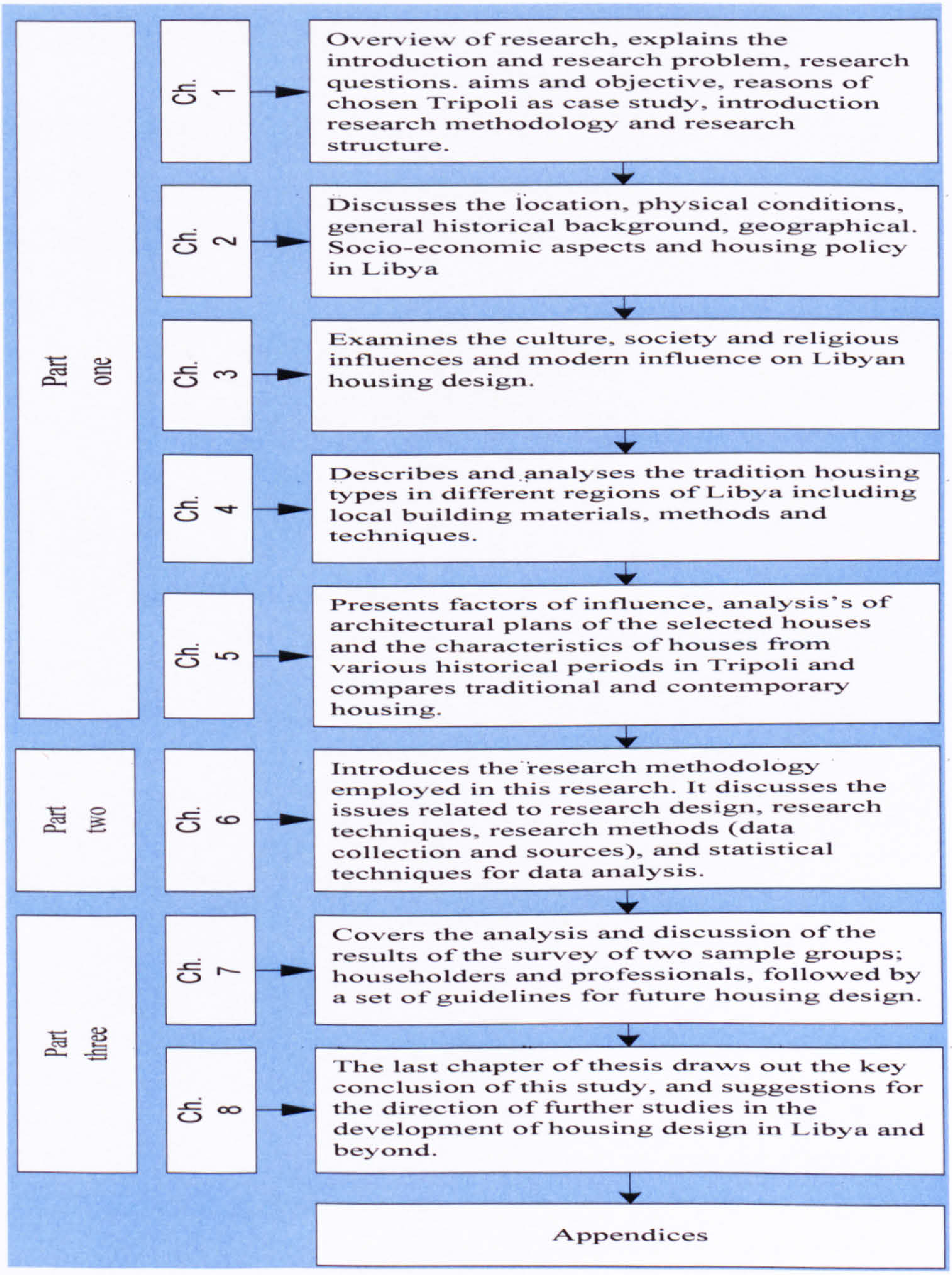


Figure 1.3 : The organization of the thesis

Chapter 2: The Context of the study

2.1 Introduction

Historically geographical location as well as economic and political development has played an important part in all sectors particularly in housing design, development and transmission of cultural life in Libyan society. On the other hand, the variety of economic conditions in Libya before the oil era has not been significant enough to establish many types of housing.

In order to understand these conditions this chapter explores the geographical location, historical background, climate conditions, economic conditions and housing policy in Libya as outlined in Figure 2.1.

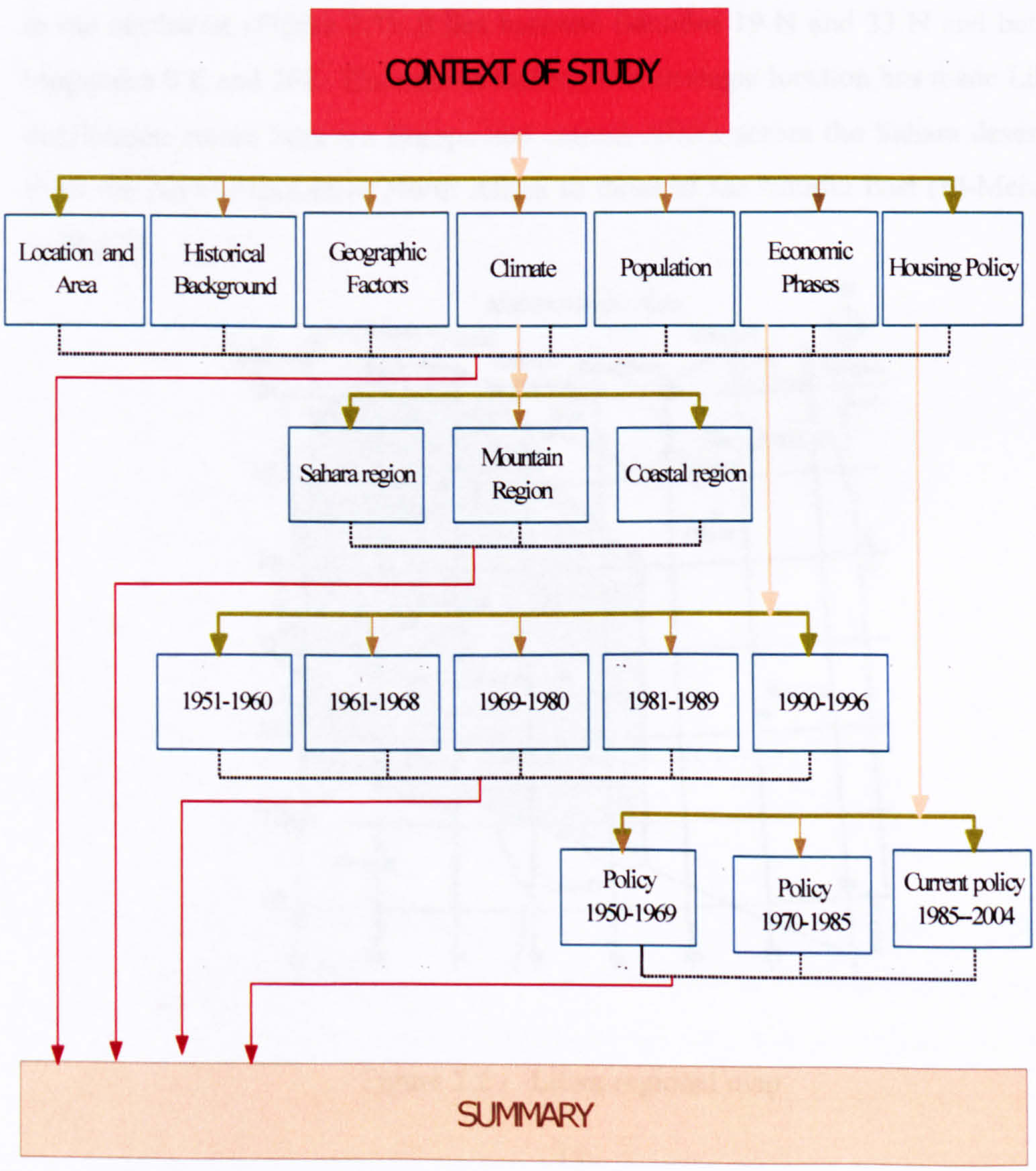


Figure 2.1 : Structure of chapter 2

2.2 Location and area

Libya is situated in North Africa and has a Mediterranean coast of about 1900 kilometres. It occupies an area of about 1,760,000 square kilometres and is fourth in size among the countries of Africa and fifteenth among the countries of the world. Figure (2.2) shows the main regions of Tripolitania, Benghazi and Fezzan which occupy about 360,000, 855,000, and 550,000 square kilometres respectively. Tripolitania in the northwest, (Berenice, present-day Benghazi) in the northeast and Fezzan in the south. Tripoli is the capital of Tripolitania and the whole of Libya, Benghazi is the capital of region of Berenice and Sabha is the capital of Fezzan.

The country is bounded by the Mediterranean Sea to the north. Egypt lies to the east, Sudan to the southeast, Chad and Niger to the south, Algeria to the west and Tunisia to the northwest (Figure 2.3). It lies between latitudes 19 N and 33 N and between longitudes 9 E and 26E. Throughout history, this strategic location has made Libya a distribution centre between Europe and central Africa across the Sahara desert and links the Arab countries of North Africa to those of the Middle East (El-Mehdawi, 1993 p.7).

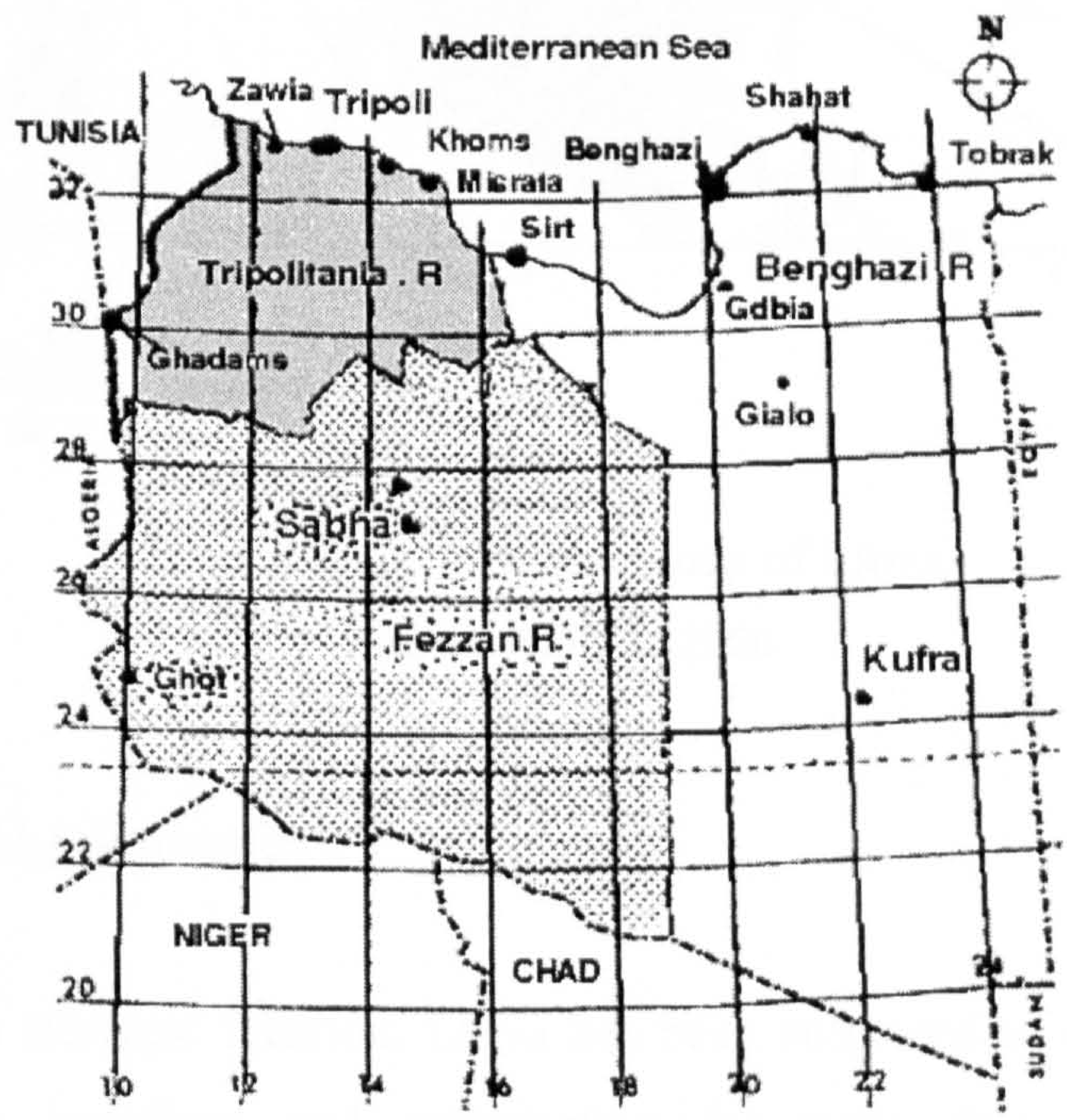


Figure 2.2 : Libya-regional map

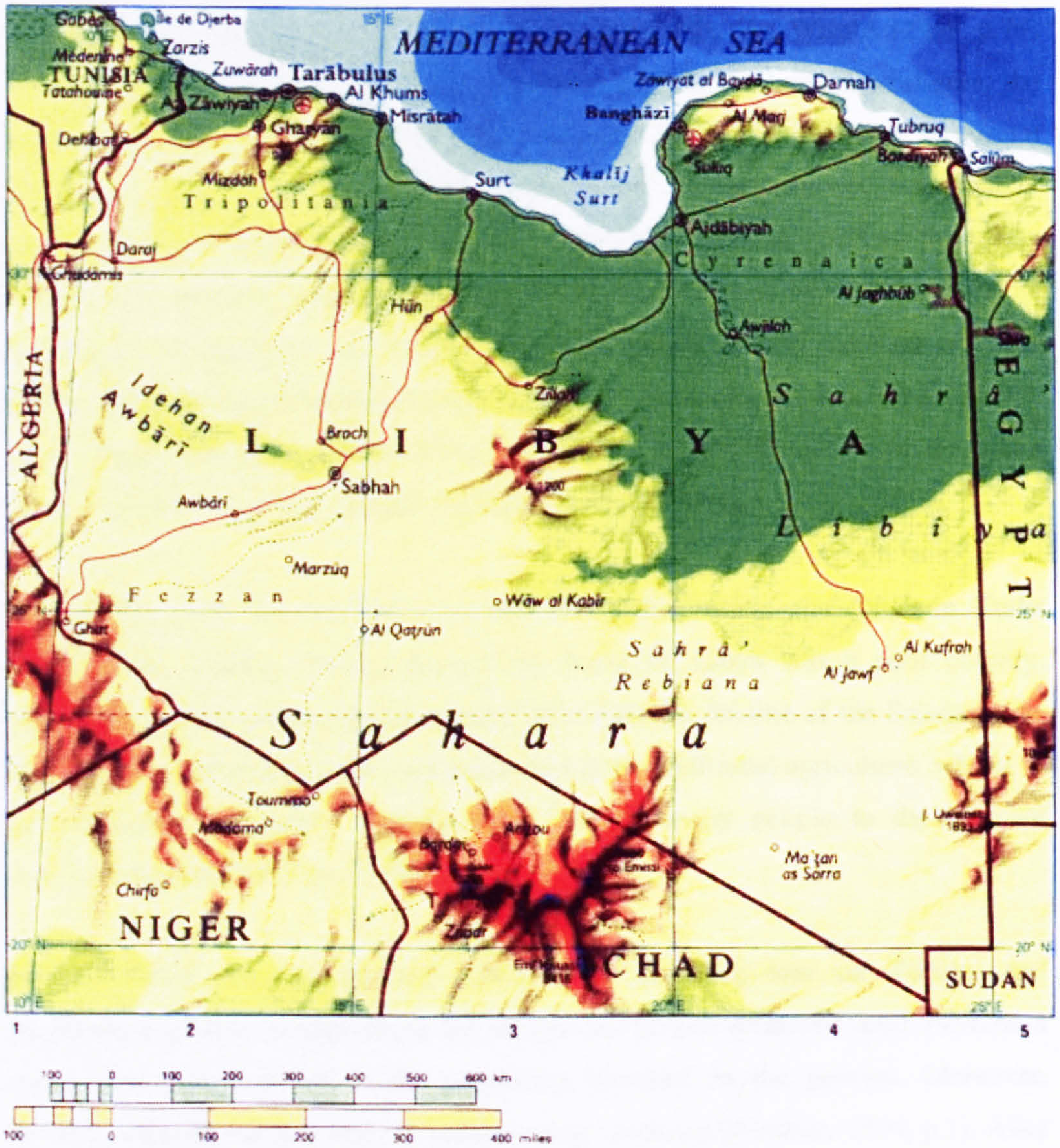


Figure 2.3 : Location map of Libya

Source: Philip's, 2000

2.3 Historical background

According to its strategic location, Libya has been subjected to varying degrees of foreign military invasions and colonisation for more than 2500 years. The Phoenician, Carthaginians, Greeks, Romans, Vandals and Byzantines, Arabs, Turks and most recently, Italians and a British – French administration, have ruled all or parts of the country (Birks and Sinclair 1980; Fisher, 1978).

The most significant cultural and historical changes occurred when the Arabs conquered Libya in 642 A.D (Warfelli, 1976). They brought with them their religion, language, architecture, cultural values and ways of life. As Wright (1969 p.79) pointed out: "The Arabs had brought with them little more than their religion, the language, and their influence on the people offered a faith and with it a social system and culture that they could completely absorb". Islam almost immediately established roots throughout the area and during this century, most of the cities, villages and oases had been influenced by the Islamic religion. Islam is more than a religion; it is a culture, a way of life. Over time, Libyan society has been nomadic and semi-nomadic (settlement) and was affected by the socio-religious aspects of the Arab culture and Islamic instructions that effected on the formation of the urban fabric of cities, towns and villages in Libya (Shawesh, 1996).

From 1551, until the beginning of the twentieth century, the Ottoman Turks occupied the country. During this period, however, Libya was a poor country, particularly in the late nineteenth century following the decline of the Sahara trade. The majority of the population was dependent upon traditional agriculture, which, in turn depends on rainfall. Drought years brought many people to the edge of starvation (Abbas, 1987 pp.52-60).

In 1911, Italian troops invaded Libya, after declaring war on Turkey, and encountered hard resistance from the indigenous people sustained until 1931.As a result, an estimated half of the population perished in the process. Moreover, 250,000 were forced into exile in neighbouring countries (Ahmida, 1994, p.1). After the Italians overcame the local resistance and approached their colonial objectives, they adopted the name "Libya" as the official name of the colony, which was comprised of the provinces of Cyrenaica, Tripolitania, and Fazzan. The Italians, who regarded Libya as Italy's fourth shore (Segre, 1974), began to encourage Italian efforts in Libya that were designed primarily to benefit Italian colonists, (Best and Deblij, 1977, p.587).

The modern period saw the beginning of new construction and transportation. Industries were started to serve the needs of the colonised. The Italian control ended during the Second World War, when the country divided into two parts Fazzan was put under the control of France, while Cyrenaica and Tripolitania were administrated by Great Britain from1943-1950. In 1951 the United Nations resolution declared Libya an independent nation, and approved the establishment of a federation of the three provinces named the United Kingdom of Libya, as a constitutional monarchy (ibid, p.587).

During this time, it was considered one of the poorest countries in the world, as indicated before. There was almost no skilled labour or indigenous entrepreneurship. In general the economic situation was very low (El-Babour, 1971, pp.1-2). As a result of its economic and financial difficulties, the Libyan Government signed a twenty year agreement with both Britain and the United States, which gave those countries permission to establish military bases in Libya in return for financial and economic aid (Abbas, 1987, p.65). The discovery and rapid exploitation of oil in the 1960s was another turning point in Libya's history, which assisted the process of consolidation towards a national state and extensively transformed the country's geographical and social profile (Fisher, 1978, p.539), which can be seen in more detail in terms of housing development in chapter five.

In 1969, political power was changed by the September revolution. The country was accordingly renamed the "Libyan Arab Republic" (Deeb, 1987). In 1977 Libya adopted a new constitution. The official name then changed to 'The Socialist People's Libyan Arab Jamahiriya' (meaning the state of the masses). During this period, evidence of many developments in all sectors, particularly in the housing sector can be seen in chapter five.

2.4 Geographical factors

Libya's environment conditions have influenced to a great extent its physical structure, land use, and distribution of its population. About 94% of the total area of Libya is desert, most of which is considered to be unproductive. About three-quarters of the population is in the major urban areas and most of the cultivated land is concentrated in less than 2% of the country's total area (Ministry of Municipalities, 1979) &(Abuarrosh, 1996).

The topographic features vary throughout the country and include plains, mountains and desert (Figure 2.4). The location of settlements is the along the coast in the North stretching from the east to the west borders of the country. This area is linked with the greatest cultivation in the country. The coastal strip varies in width from 15-45 km, tapering close to the green mountain (*Jabel-Akhder*) and expanding to 100 kilometres in width before the western mountain (*Jabel Nufusa*) forming the Jefara Plain of northwest Libya. The coast is also the most densely populated area (Figure 2.9). The vast majority of the population and economic activities are concentrated in this region.

The second topographic characteristic is the mountain areas, which are divided into two ranges: the western mountain (*Jabel Nufusa*) in the south of Tripoli, and the green mountain (*Jabel –AKhder*) in the northeast of Libya (Figure 2.4). The former has an average width of 20 km and a height of between 500 and 960 meter. The land is composed of basalt, volcanic rock, Limestone and Gypsum-marl. The other important mountain area is in the northeast part of the country *Jabal-Akhder* is between 300 and 830 m high. The area consists of limestone and red soil and contains cultivated stretches. Most of the mountain areas are covered with shrub forest consisting of pine and juniper bushes.

The third topographic area is the desert. This begins just behind the mountains and extends toward the South, to cover more than 90% of the land area. From the Egyptian border, a wedge of extreme desert extends westward with different soil types consisting of limestone, sand stone, and gypsum (Grifa 2006). In the desert, there are oases developed far apart from each other in shallow basins and valleys, where ground water reaches the surface. These Oases consist of forests of palm trees.

The land rises towards the south, reaching 2,286 m at a peak on the border with Chad (Philip's, 2000).

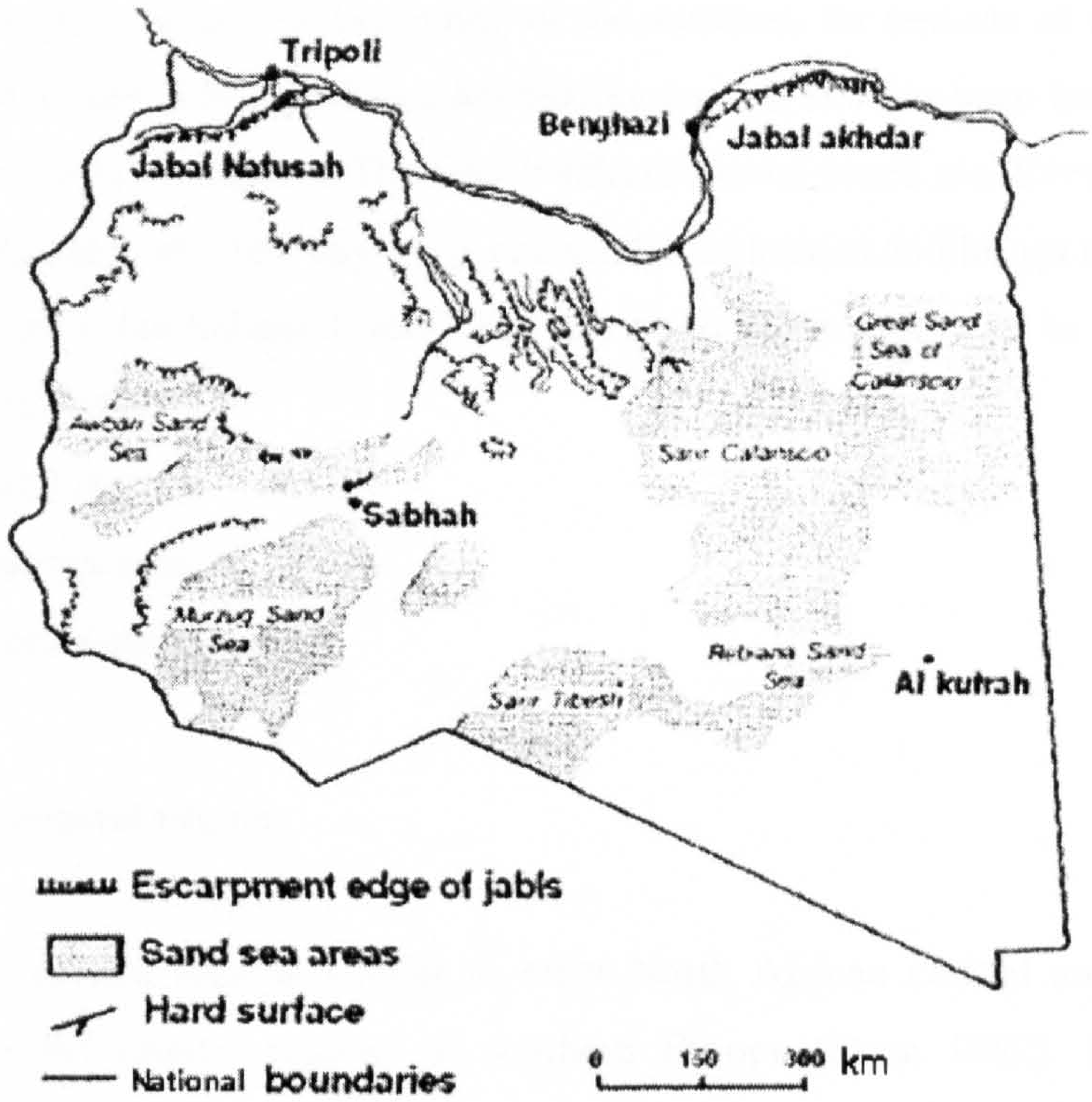


Figure 2.4 : Libyan topographic map

Source: Allan, A. (1989)

2.5 Climate

The climate of Libya is influenced by the Mediterranean climate, as well as the semi-Sahara and Sahara climate, see Figure 2.5 which make up the two climate conditions of Libya .The coastal regions, which come under the dominant influence of the Mediterranean climate, are characterised by cold, wet winters, and hot, dry summers. The inland mountain regions are also influenced by the Mediterranean climate and receive rain in winter because of the north westerly wind.

The second type is the Sahara desert's climate, which is characteristically dry, and has high temperature variations between day and night, and between summer and winter. Rghei, (1987) has pointed out that: "Generally in Libya, the winters are cold, especially at night, while summer days are hot and dry. There is a long period of the year when comfortable outdoor conditions exist for half of the daylight hours of the year. Shelter is required from the *Ghibli* the hot, dry and dusty winds that blow from the desert, mainly during the beginning of the summer, for periods of up to two or three days at a time. The *Ghibli* is a hot searing current and has been known to raise temperatures up to 40 degrees. The *Ghibli* affects coastal zones too. Even though this wind prevails only for a few days, it is extremely unpleasant and brings clouds of red dust with it from the Sahara desert." For this study the country can be divided into three climatic zones:

- The coastal region;
- The mountain region;
- The Sahara desert region.

2.5.1 The coastal region

The climate of this zone is similar to other North African coastal areas and also similar to some coastal regions of southern Europe (Daza 1982). Most of the population lives in this region, which contains many cities such as Tripoli, Khoms and Alzawia in the west and Benghazi, Shahat and Tubruq in the east. (Libya, National Housing Corporation, 1975 p.14). Great humidity and high temperatures categorize the climate during the summer months (Doxiadis, 1964).

Summer temperatures do not rise above 33-degrees centigrade for several months, but reach 45degrees centigrade in August. The winters are not very cold in this region. The lowest temperature, about 9 to10 degrees centigrade, occurs in January, which is the coldest month of the year (Figure 2.5 & 2.6).

It rains only during half of the year, from October to March. The maximum rainfall occurs during the months of December and January. The average rainfall is in excess of 70 mm per year (Figure 2.8).

The dominant winds in the coastal zone blow from the north and northwest in all seasons (Daze 1982). In summer the Mediterranean breezes are of great benefit to the coastal zone. In July and August this zone is affected for many days by wind from the south, the *Ghibli*, which as described above raises the temperatures in this region. (Libyan National Housing Corporation, 1975) and (Figure 2.7).

2.5.2 The mountain region

This region consists of the two major mountain areas of the country as mentioned in the geographical section. The mountain areas have the best summer climate, because the relative humidity is much lower than that in the coastal zone. (Ministry of Planning, 1964).

In addition, the main temperatures of this zone are lower than those in the other zones. In winter the temperature goes down to zero degrees centigrade, and snow appears on the tops of the mountain. Rainfall is more abundant than in the coastal zone because the north and northwest winds, from the Mediterranean rise over the hills, and are cooled, producing rainfall. This rain sustains the agricultural settlements, which enabled the people to settle in this area. An annual rainfall of 400 to 600 mm is recorded in *Jabal-Akhdar* region (Figure 2.8).

2.5.3 The Sahara desert region

In the Sahara climatic zone, sparsely populated permanent habitation is located in the oases, where underground water allows for modest vegetation and limited cultivation. As mentioned above, most of the country's land area is contained in this region. The climate is characterised by very high annual temperatures, which, are higher than the temperatures in other zones. It also has a large difference in temperature between day and night and between winter and summer; for example, the city of Ghadames reaches a minimum temperature of –3.6 degrees centigrade in the month of January and a maximum temperature of 47 degrees centigrade in the month of August, see Figure 2.6 & 2.7 (National Housing Corporation 1975).

Rainfall is almost non-existent; therefore extreme aridity is the common feature of this region (Daza 1982). The relative humidity is low throughout the year. The Ghibli and sand storms from the southeast are frequent during the summer. The north and north westerly winds are considered the most desirable winds for summer nights and their lower velocity also makes them less damaging during the winter months.

From this information about the climatic conditions prevailing in Libya, we can begin to understand how indigenous housing was affected and adapted to them. Through a process of trial and error over many generations, people have managed to produce simple and ingenious ways of coping with the environment, as explained more detail in chapter four, in terms of the type of houses in each region.

Figure 2.5 : The Libyan climatic regions
Source: Abulokma, et al 1985

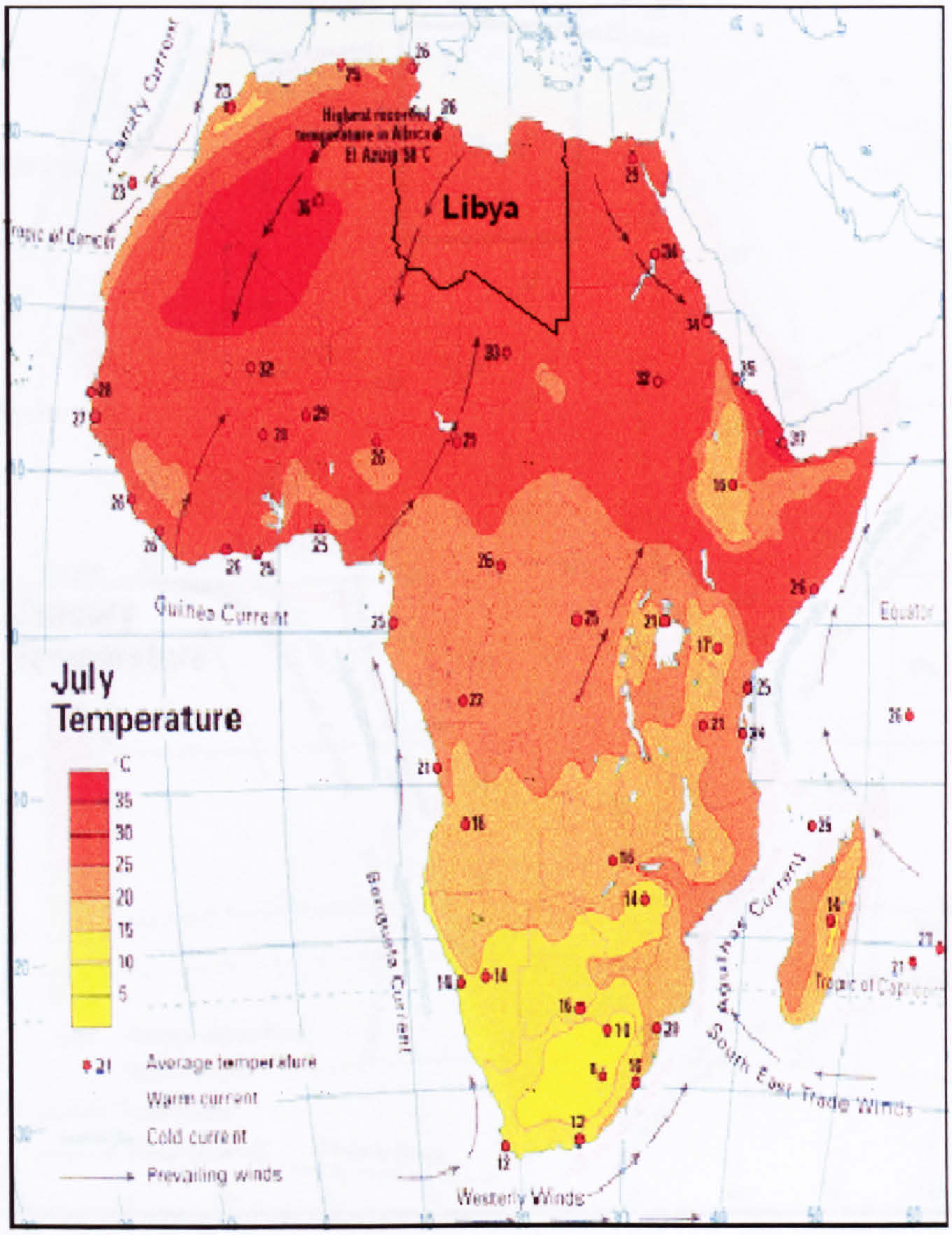


Figure 2.6 : The average temperature, warm and cold currents, and prevailing winds in July and August

Source: Philip's 2000

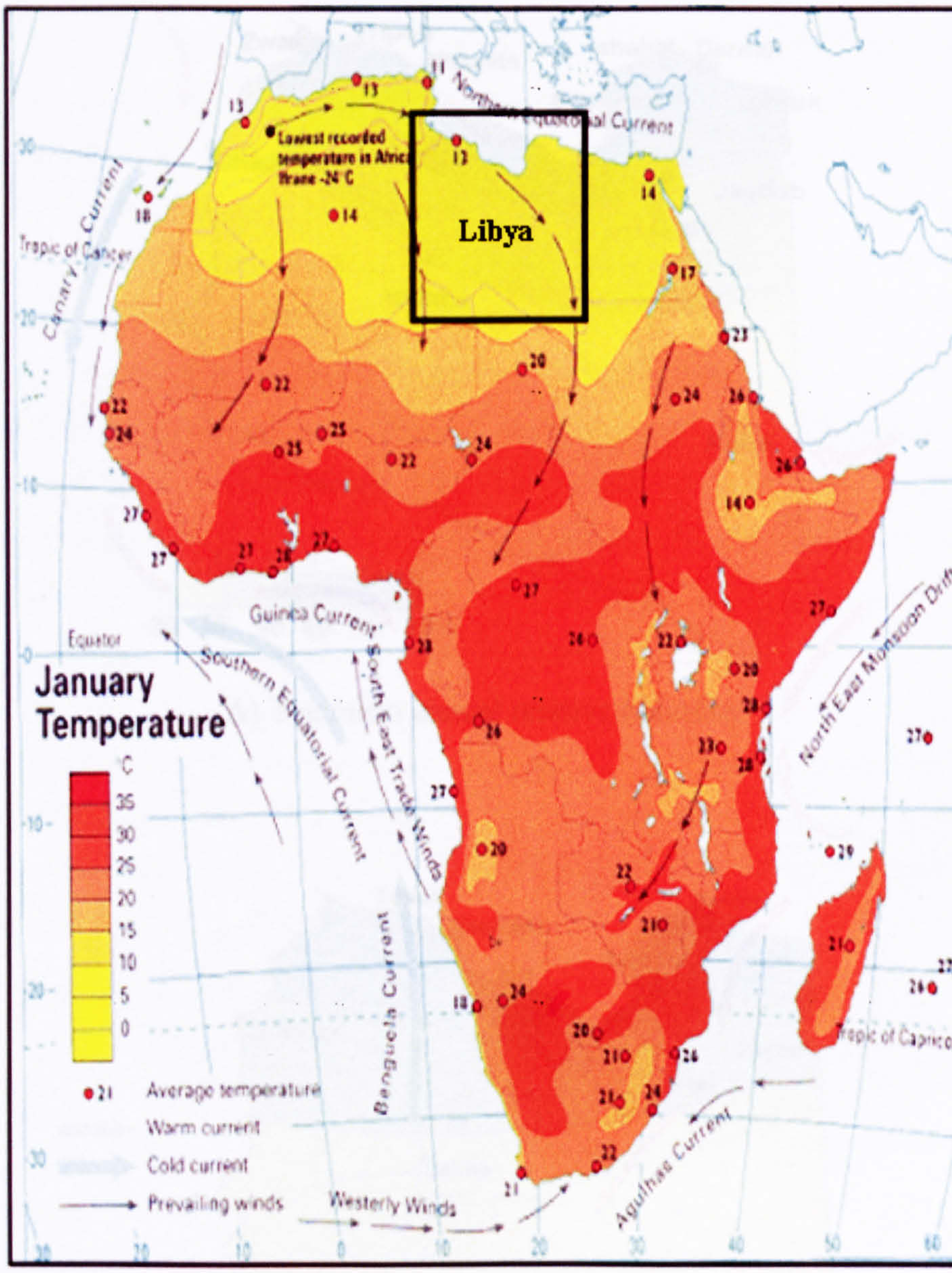
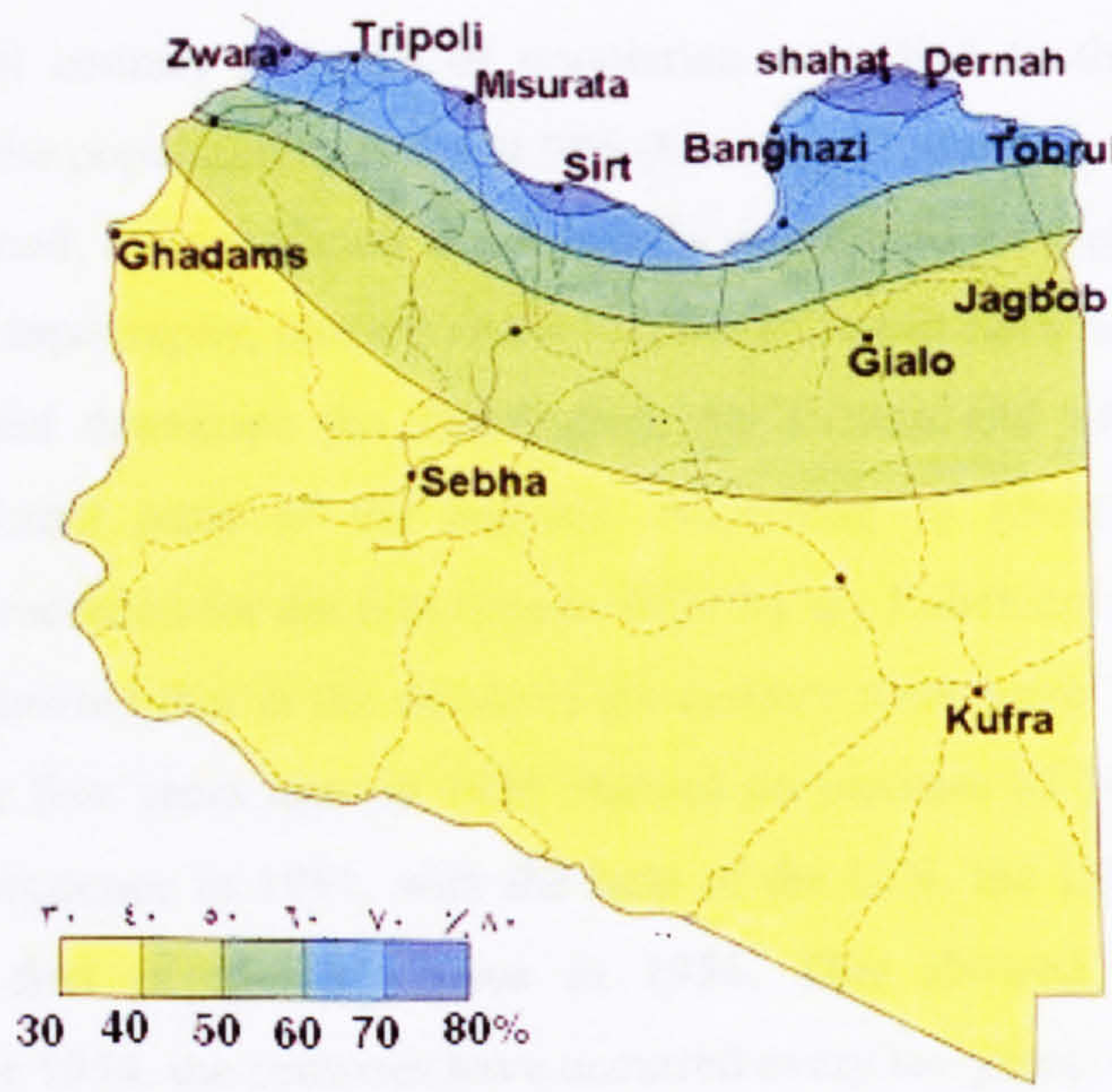
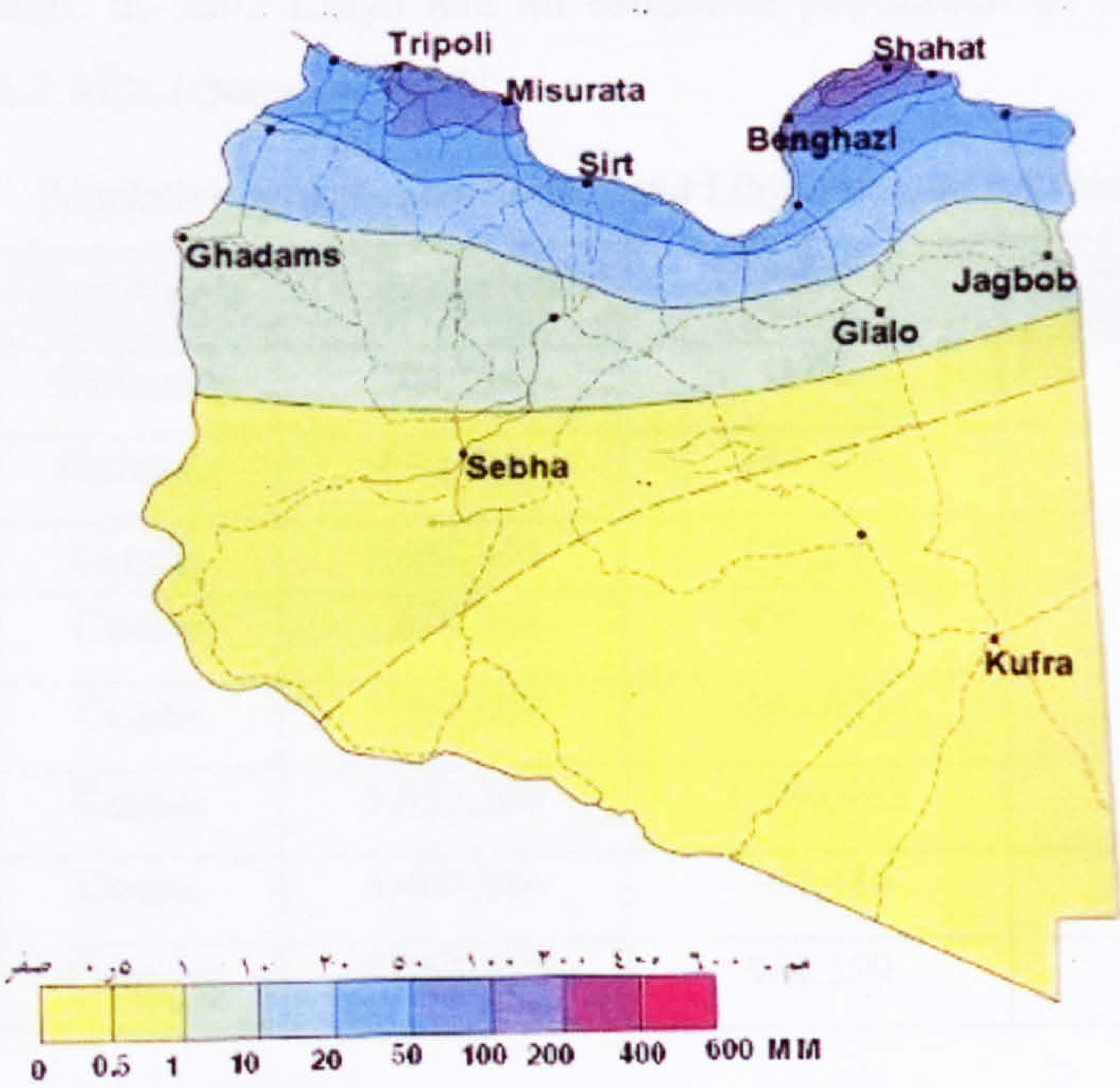


Figure 2.7 : The average temperature, warm and cold currents and the prevailing winds in July and August

Source: Philip's 2000



A) The mean annual relative humidity



B) The mean annual for rainfall

Figure 2.8 : The mean relative humidity (A) and the annual of rainfall (B)

Source: Abulokma, et al 1985

2.6 Population

Libya is a small country in terms of population according to the latest national census in 1995 the population was 4,404,986 (Ministry of planning 1995). However, as previously noted; the population is not equally distributed throughout the country. The varieties of topography, climate and economic activities have been major factors in population and determine the distribution, the culture and lifestyle of people located in different parts of the country. According to El-Azzabi (1975) the population was recorded for the first time in 1931 by the Italian colonial government when it was estimated that in the whole of the country there were 704,000. Another official estimate five years later in 1936 showed an increase of 144,417. After the country's independence in 1951, with the help of the U.N, the Libyan government undertook the first population census in 1954. This showed a population of 1,088,873. Since 1954, the censuses have occurred every ten years.

Table 2.1 shows the development of the population. The last census in 1995, showed an average growth of 2.86% during the period 1984-1995 and 2.23% during the period 1995-2000. In 2002 Libya had an estimated population of 5,368,585 with average growth 2.41% (Qusouda 2001).

Table 2.1 : Population growth rates for the total Libyan population from 1931-1995

Year	Type of data	Total population	Number of increase	Rata of increase %
1931	Estimate	704,124	0.00	0.00
1936	Estimate	848,600	144,476	3.8
1954	Census	1,088,873	240,237	1.4
1964	Census	1,564,364	475,491	3.7
1973	Census	2,257,037	692,673	4.21
1984	Census	3,637,500	1,380,463	2.86
1995	Census	4,404,986	768,486	2.23
2004	Estimate	5,368,585	964,599	2.41

Source: NCID (National Corporation for Information and Documentation 2000)

The high rate of growth is due to a lot of factors. The most significant of which appear to be, firstly, the improvements in general health standards resulting in lower infancy death rates and secondly, an increase in immigration into the country, especially Libyan returning émigrés. These factors caused a drift of people to the main cities and have had a major influence on population distribution, reinforcing the trend towards urbanisation.

In comparison to the country's total area, the population in Libya is very small; and the overall density is 2.88 person/square kilometres, which is one of the lowest in the world (NCID 2000). However 66% of population is concentrated in the coastal region, and half of those live in the largest city Tripoli, as can be seen in Table 2.2 & Figure 2.9.

Table 2.2 : The largest cities by population

Item	City	Population
1	Tripoli	987,713
2	Benghazi	523,188
3	Zawia	220,075
4	Komes	181,584
5	Misurata	178,295
6	Jabal-Akhdar	120,662
7	Gharian	117,073
8	Sirt	110,996
9	Derna	105,031
10	ELMarj	102,763
11	Ajdabia	100,54

Source: Country profile 2001

From Table 2.2: it is clear the Tripoli region is the largest in terms of population. It is located in the north west of the country. This region is considered as the most important in the country in terms of the concentration of the population and social and economic activities (Rasheed 2004 p.2) and Tripoli is the largest and fastest growing city in the country.

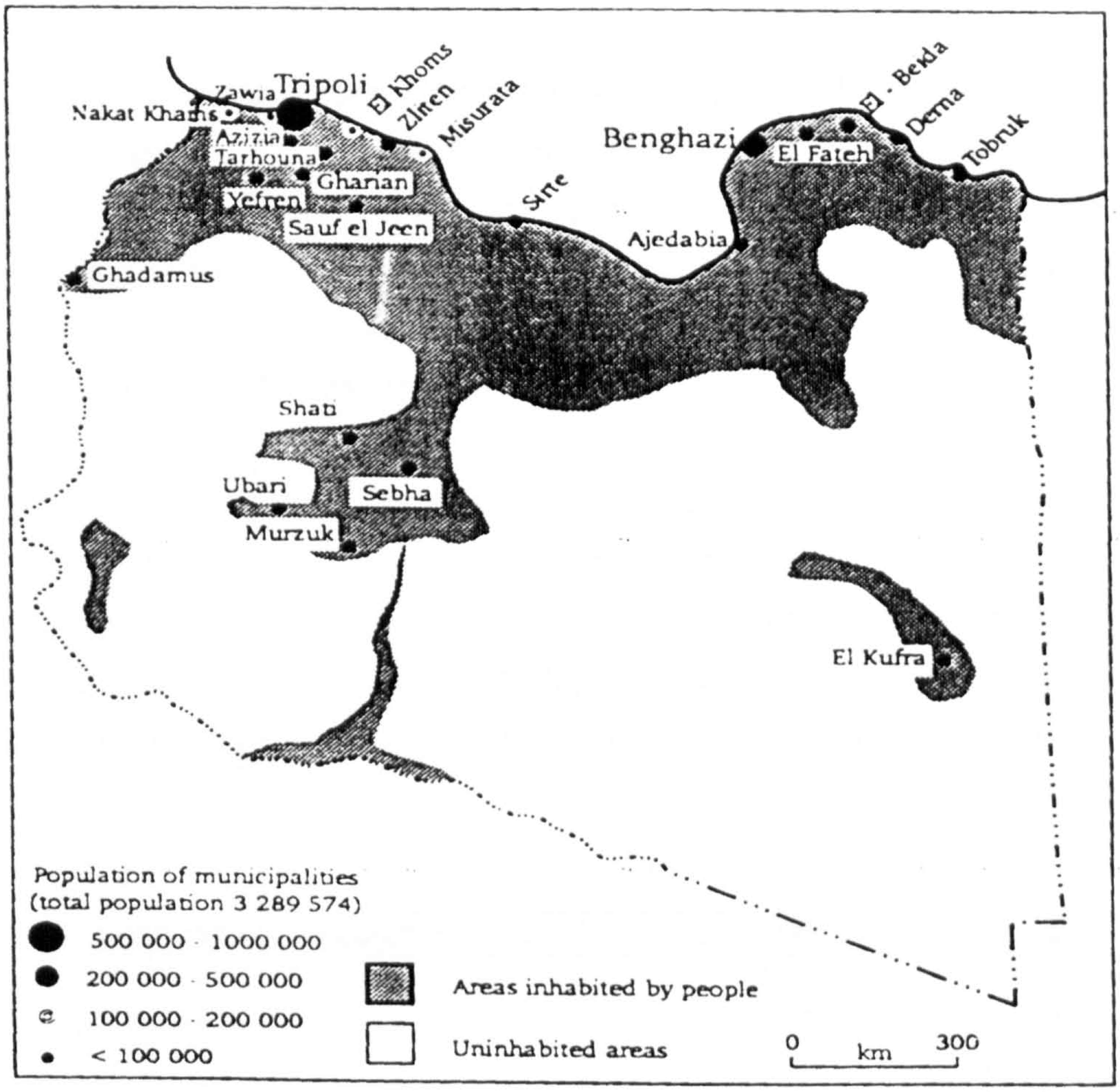


Figure 2.9 : The geography and the distribution of population (1984)
Source: Salem (1995, P.81)

2.7 Economic development phases

This section provides an idea of economic development and the background in which government economic policies developed. It can be divided in to five periods, from 1951-1960, the pre-oil period and the discovery of oil, 1960-1969 rising production of oil and re-revolution, 1969-1980, the revolution and the beginning of nationalisation, 1981-1989 completion of conversion to the public sector and the 1989-1996 re-emergence of the private sector.

2.7.1 The pre-oil period (1951-1960)

Before the discovery of oil in 1959 and the beginning of production in 1961, Libya was classified as one of the most poverty-stricken states in the world. (Vandewalle, 1998). In 1951 the average income per capita was less than $30 per year while by 1960 it rose to $100 per year. Gross domestic product (GDP) was LD15 million (LD Libyan dinar) in 1955, but by 1958 GDP had increased to LD52 million (Abuarroush, 1996, Giuranaz1985).

In July 1954, Libya and the United States signed an agreement under which the U.S.A obtained military base rights in return for economic aid to Libya. The total foreign aid in 1954-1955 was about 26 million dollars per year, more than half of the estimated national income (Higgins, 1957; p.321). The country became dependent on aid from foreign states and payments for the use of military bases, particularly by the U.S.A and U.K (Table 2.3).

Table 2.3 : Foreign assistance allocation to Libya during 1952-1960

Name of country	Total allocation	%
United states	41,138	56
United kingdom	28.740	39
France	893	1
Italy	1,070	1
United Arab republic	50	-
Turkey	50	-
Pakistan	10	-
Unethical assistance	1,964	3
Total	73,915	100

Source: The Economic Development of Libya. Published for the I.B.R.D by the John Hopkins press, Baltimore, 1960.p.48; Cited in (Abbas, 1987; 68).

It is difficult to describe any development of the Libyan economy prior to 1960 because of the poor qualification and shortage of skilled and educated manpower, the scarcity of water and other natural resources (El-Fathaly and Palmer 1980). During this period about 80% of the population was involved in agriculture. The industrial sector in this period was limited, due to lack of raw materials. Also the country was suffering from shortage of housing and lack of facilities. The housing conditions were very poor, as most of the people lived in tents and huts made of zinc sheets or palm tree leaves and wood.

2.7.2 The period from 1961-1968

In this period the economy was transformed from a primitive economy in to an oil-based economy. Oil production started in August 1961. In 1969 Libya was the second largest producer in the Middle East (Giurnaz, 1985). The Libyan economy had changed dramatically; oil production resources increased at a rate never before experienced by any oil producer. Per capita income increased as oil revenues increased (Table 2.4) "The national income changed from LDm131 in 1962 to LDm798 in 1968" (Fisher, 1990; p. 644).

As a result of the developments in the economy, the development policy mainly concentrated on the urban areas. Therefore, the big cities such as Tripoli and Benghazi had benefits from the economic developments, more than any other area in the country. Moreover, these developments encouraged the countryside population to move to these cities.

Various economic development plans have been implemented since 1963, for either three or five year periods. The first five year plan (1963-1968) was for economic and social developments. The main objectives of these developments were; to improve the standard of living, to consider the agriculture and also to permit the public sector to provide services such as; education, health, communication and housing (Omar; 2003).

The budget allocated LDm 169 to fund the plan. The plan was extended to LDm 625 when the oil revenues grew more than originally expected (Ghanem; 1987). The most notable aspect of the plan was that its first objective was to improve the standard of living. Housing did not figure in the plan.

Table 2.4 : Per capita incomes in Libya (Libyan Dinar)

Year	**1962**	**1963**	**1964**	**1965**	**1966**	**1967**	**1968**
Precipitate income	107	156	243	3o4	379	430	595

Source; Ministry of Planning of Libya 1980, p.11;

2.7.3 The period from 1969-1980

In 1969 the structure of the Libyan economy changed again. Steps were taken by the new government to reform the economic situation. For example, nationalisation of foreign banks, changing the oil price and participation in production (Vanewalle, 1998). The price of Libyan oil increased from \$2-3 per barrel in 1969 to \$25 per barrel in 1979 (Abbas, 1987 p.75). After 1973, the oil revenues increased from LD 2.4 billion to about LD 6.5 billion by 1980 (Giurnaz 1985). This growth in the revenues allowed an increase in spending on development in all sectors; the highest priority was for the agricultural and industrial sectors. In order to achieve the objectives of self-sufficiency and reducing dependency on the oil sector. The new government aimed to change and increase the objectives of development plans. It therefore, decided to abandon the five-year plan (1969-1974) prepared by the previous government.

During the period 1970-1972 the new government spent LDm 791 on economic and social development, the biggest amount on housing (19% of actual expenditure-LDm149) followed by the agricultural and industrial sectors, 17% and 13% respectively (LDm109). The first plan of socio-economic development by the new government covered the period 1973 to 1975. This plan's highest priority was housing followed by agriculture, electricity and water and the industrial sector. See Table 2.5.

Table 2.5 : Amount of money allocated to each sector (1973-75)

Sectors	Allocated budget (Libyan Dinar)	%
Housing	361,000,000	18.4
Agriculture	327,000,000	16.6
Electricity and water	257,400,000	13.1
Industrial	231,6000,000	11.8

The second socio-economic plan covered the period 1976-1980. In this plan, the highest priority was the total investment in the industrial sector. Many factories were established and run during this period. The next, in importance was transport and communication then the agricultural sector. Consideration was also given to public housing services, electricity and water. During this period, state intervention in the economy increased in accordance with the new system ideas of socialism (Table 2.6).

Table 2.6 : Amount of money allocated to each sector (1976-80)

Sectors	Allocated budget (Libyan Dinar)	%
Industrial	1515,400	21.1
Transport and communication	1197,.800	16.75
Agricultural	1030,100	14.4

Since mid-1979, the country has been based on socialist ideology controlling income and wealth. The fundamental changes in the Libyan economic structure were aimed at transforming the economy to a central socialist system. Therefore, the private sector was stopped (Vandewalle, 1998).

2.7.4 The period from 1981-1989

During the1980s, all private ownership in Libya was dissolved and restricted to one house per family. Business enterprises were replaced by government agencies, and workers took over private and public factories. The whole private sector was completely replaced by peoples committees and retail activity became controlled by state administered supermarkets. Libya's economy was, in the 1980s severely restricted by the effects of the low oil price. Oil revenue declined from LD 32.2 billion in 1980 to LD 5 billion in 1988 (Fisher 1990).

Decreasing revenues caused serious cash-flow problems and necessitated a major revision of the 1981-1985 development plans (Khader, et al 1987, Burgat 1987). In response to the new situation most of the economic sectors faced severe cuts, as Ghanem states: "While the value of projects signed in Libya as part of the five plan which was started before the sudden fall in oil resources was$11,827 billion in 1981, the value of projects signed in 1982 went to $1,374 billion or about 1/12 of the value of the projects signed in 1981" (Ghanem, 1985; p.228 cited in Abbas 1987.p.85).

This decline constrained government spending, reduced the level of imported goods, all of which led to lower standard of living (Abuarrosh 1996). In the period 1980-1986 G.D.P declined from $35.5billion to $24billion and average per capita income fell from $10,900 in 1980 to $6.404 in 1986. This shows the Libyan economy was seriously affected by decrease of the oil prices.

2.7.5 The period from 1989 -1996

An ambitious public sector and development investment programmes accompanied the increase in oil prices from $2.3 per barrel in 1969 to $25 per barrel in 1979, which continued until 1986, the average annual investment programme increased from $126 million in the 1960s, to $3 billion in the 1970s and over $6 billion in the 1980s" (African Development Bank Group, 1994).

This process was changed during the 1990-1993 period when annual development expenditures were estimated at about $ 2 billion. The Libyan economy is centrally planned. From 1970 until 1991 the government controlled both production and services sectors. However, the crises in the economy prompted the government to introduce a new economy at the beginning of 1988, when private shops were encouraged to reopen.

Since1988 the government proposed an increase in privatisation and announced that Libya would be able to import and export in complete freedom through the private sector (Fisher, 1990). Between 2000 and 2004, after the United Nations sanctions were lifted in 1999 and increases in oil prices, the Libyan economy has been improving rapidly. Consequently the new policy has been adopted to reform and reorganize the economy by open door to the world (Grifa 2006).

In general, the Libyan economy is completely dependent on oil (African Development Bank Group,1994). Economically, Libya ranked 58th out of 162 countries in the human development report index (UNDP united Nations Development Programme, 2005) http:// www.hdr.undp.org.

As result, the development of economy has had a great affect on the development of the type of the housing in both the private and public sectors. This development can be seen in more detail in chapter five.

2.8 Housing policies

A housing policy is a statement of what is(or is going) to be done to provide housing (Mumtaz1995, p.65). Housing is an important issue in social and economic development plans in Libya as in most developing countries. Therefore, it has been a high priority of the Libyan government since the country attained its political independence in 1951. As result more than 77% of physical built environment in Libya was residential buildings (NCID 1995, p.16) and a series of strategies have been adopted in order to deal with housing issues. These concern public housing programmes, slum clearance, establishment of new towns and cities, housing loan schemes, public housing investment (World Bank,1960; Doxiadis,1964; Awotona, 1990). In the following subsections, three periods in the progress of housing policies will be briefly reviewed.

2.8.1 Housing policy during 1950 -1969

Before Italian occupation of Libya in 1911, there was no planning in a modern sense. Planning was started in Italian period for housing Italian people. After independence in 1951, Libya had a severe shortage of housing. According to Awotona (1990) and (Doxiadis association 1964) the housing problems were the following:

- Shortage of private capital;
- High rate of population growth;
- Shortage of and expensive building materials;
- Severe shortage of technical and skilled labour for the construction industry;
- The proliferation of slums (the total housing stock around 189,000 dwelling units was classified as substandard) , unplanned development of cities;
- Lack of proper maintenance of existing stock;
- Massive urban migration.

The government was unable to deal with these problems, caused by the poor economic situation. As cited in Omar (2003), Allan (1981) stated that the first plan from 1952-1958 concentrated on the reconstruction of Second World War damaged areas, and the provision of public works and utilities. The limited housing construction was mostly built by private people. As a result of non-intervention by the government in housing sector, people used the cheapest materials.

Accordingly this period was characterised by a low level of construction and rapid population growth, which caused an increase in the housing shortage. Despite the poor economy in the 1950s and early of 1960s, the government tried to produce new housing schemes. The first schemes were constructed in Tripoli and Benghazi. These houses were small compared with the Libyan family size, which led people to extend using temporary building materials. Consequently, these projects subsequently became big shantytowns.

In the beginning of the 1960s the economic changes due to oil production started. As a result the first attempt to create a national housing policy was made in 1963, when the ministry of planning and development commissioned Doxiadis Associates to undertake an extensive study of the housing conditions and problems in Libya and on the basis of the study to devise the appropriate dwelling policies and programmes to be followed. The report in 1964 was entitled "Housing in Libya" (Doxiadis 1964).

According to the Doxiadis survey, policy should aim at achieving the following:

- The achievement of a reduction in the average occupancy density from 1.37 families per dwelling to 1.1 families per dwelling;
- The elimination of slum dwellings within 10 years;
- The provision of adequate community facilities.

Development programmes were aimed at a redirection of the Libyan economy and a reshaping of Libyan society. The first Five-Year Plan (1963-1968) devoted 10% of the National Income to economic and social development. Substantial shares of the rites were allocated to housing, with determined construction goals (MP Ministry of Planning, 1970).

Oil income has provided for generous housing budgets and ambitious development plans to compensate for the under development that existed previous to its discovery. The budget allocated in the plans was for housing construction by the government and also for loans to individuals. The government's efforts have been tremendous and goals already achieved are most encouraging, particularly when one considers the difficulties encountered. However, the housing situation would have been much improved had it included a framework for housing policy implementation.

During the period 1964-1970 the total number of housing constructed was 14,885 units divided into 11,553 units for low-income and 3,332 units for civil servants (Sharnanna 1976). Examples of public sector projects, which were planned and carried out were the Idris housing project. The types of housing, which were built during this period, in both public and private can be seen in chapter five.

From the above it can be noticed that Libya had no significant housing when it achieved its political independence and from the middle of the 1960s the state's direct intervention in housing was one of the main characteristics of this period.

2.8.2 Housing policy in the early 1970-1985

The new government gave a high priority to housing. In the early years of the 1970s Libya, particularly Tripoli witnessed huge development plans. The plans aimed to provide a large increase in new housing units to reduce the housing shortage, replace unsuitable dwelling units, and accommodate the increase in the number of families (El-Hawat 2003).

The housing sector was allocated more than 19 % of the total budget in the yearly plans of the 1970, 1971 and 1972. More importantly, there were changes in the organisation and financing of housing. Public housing provided a large number of units for different groups of people rather than to serve only the needs of government employees. More attention was given to the needs of poor people. The same standards in building materials and finishes were used in all housing projects. Hence, in Libya since 1970, there were no different standards in housing construction for

different groups of people, as was the case in other countries. The other important step was the establishment of a new public housing institution, the general housing corporation (GHC), which was established in 1970 to design, build, finance and follow up public housing construction.
During the 1973-1975 more than 88 % of the total dwelling units provided by the government, and about 96 % of these dwelling units were allocated to low-income groups (MP, 1973). Also, there was increase in the amount of co-operative housing. Large numbers of loans were allocated to the private sector, both developers and individuals, who built their own houses. These loans were interest free for low-income people and at low rates of interest for middle –income groups (MP,1999).

In the early 1970s, the government aimed to construct a large number of dwelling units for all families in different geographical areas and particularly for low-income people (MP,1973). To achieve this aim, the government established a housing programme in the 1973-75 plans, which comprised a number of elements:

1-The land

Land is a very important component in the housing plan. In the developing world cities the land market is controlled by private speculators in the absence of effective land management and legislation. Acquisition costs takes up a large part of the cost for low-income groups (Greeul,1979). Therefore the government adopted procedures to improve the availability of land. These procedures were:

a- Conducting surveys of vacant land in cities and towns in order to identify suitable land for housing construction.

b- Providing land for housing projects for both public and private sectors using the following methods:

- Selling land to low-income groups at a price not exceeding the value of the land and the cost of preparing it for development;
- Selling land to co-operatives at prices not exceeding ½ the value of the land and the cost of preparing it for development.

2-Development and enhancing existing areas

This was to be done by providing utilities and services or demolishing in cases where houses could not be redeveloped and building new housing projects.

3-Physical integration

The government aimed to build complete settlements comprising the houses and an infrastructure of utilities and services. To achieve this, the government created a budget for projects covering the cost of both the dwelling and infrastructure.

4-To encourage the private sector

To participate in housing construction by;

- Provide interest free or low interest loans to the people who need to build their own houses;
- Encouraging housing co-operatives by providing loans and land to build houses for their members;
- Providing design skills and building materials.

5-Reduce the construction cost

The government aimed to reduce the cost without changing the construction standard to be achieved by improving the construction framework, providing building materials, using new technology like prefabricated systems and encouraging self-built housing particularly in rural areas. The following steps were taken.

- Establish factories and workshops specialised in producing low cost building materials that offer people more choices in selecting suitable materials for building their houses;
- Relax the immigration laws to engage were foreign labour to enter and work easily which contributed to reducing the cost of building in terms of constructing and producing low cost building materials in factories;
- Establishing Techno-Colleges to provide proper training for skilful and specialised labour for the construction and building industries;
- The Government controlled importing and providing heavy machinery such as Mixers, Slings and Cranes for the local market and subsided the total cost to make it affordable for the industry. This action positively and directly affected the performance of the whole industry;

- The Government set strategies, targets and plans for the industry by issuing legislations, criteria and standards in order to monitor and control the processes and practices of producing building materials;
- Set price limits and standards for transporting building materials between regions, and between factories and building sites in order to prevent monopoly in transportation in the construction market and exploiting customers;
- The Government controlled the market in land, selling, allocation and distribution for cheap and affordable prices.

Thus, all the above factors participated in reducing the construction and building costs and kept the prices continuously low. However, in the last decade, unfortunately, the political situation and the outside pressure on the Government forced the construction and building industry and market to become unbalanced and destabilised. Therefore, the balance of maintaining the low cost and housing affordability vanished and the prices went up to very high level, MP 2000& 1995).

2.8.3 Housing Policies between 1985-2004

In 1985, the Ministry of housing was abolished. Furthermore the role of the state changed from being a provider of housing to a supporter or an enabler for citizens to build their own house. The state stopped its direct intervention in housing and construction activities (GCP grnal council for planning 2001) and (GHC 1995). According to the GHC (1999), in the enablement of the housing environment, the state is seen as a supporter rather than a provider in the housing and construction sector and its main role is to formulate a legal and economic environment, which enables people and private sector investors to participate in housing production and services. According to General Council for Planning(2001) and Gannous (1999) this sudden change in housing construction policies occurred, in general, for the following reasons:

- The economic crisis owing to the failure of oil revenues at the beginning of the 1980;

- The government realised that it could not fund all housing and infrastructure projects;
- The increase of public debt and the budget deficit;
- The failure of public housing construction programmes to meet national housing goals;
- The attitudes of citizens towards public housing and their complete reliance on the state to gain houses ;

The state began to provide encouragement of citizens, and public and private companies to increase their investment in housing production by creating an appropriate social and economic environment, offering land for building, offering access to building materials, housing loans and credit facilities (Secretariat of Services Affairs, 2002, p.10 & General Council for planning, 2002, p.8).

As a consequence of these changes, the state made intensive progress between 1985 and 1986 in reforming institutions and regulations to enable the housing market to work without its direct intervention and control. As a result, since then the construction of housing and its associated activities have relied on the following programmes:

- Housing loan schemes of commercial banks and the bank of Real Estate and saving ;
- Investment by public agencies such as the National Council for Real Estate, the Social insurance fund, the Libyan Insurance company and partnership companies in municipalities;
- Investments of citizens.
- The state's programmes for low-income groups (Secretariat of Services Affairs, 2002, p.9-10).

It is obvious that the state's direct spending and investment in housing was replaced by housing subsidies programmes, loans and private and public investments in housing (GHC 1999). However, the sudden and unplanned move toward the enabling strategy caused many bottlenecks and serious challenges to housing (Grafa 2006) .

The consequence was that the allocations for housing in development plans decreased dramatically, and the annual production of housing decreased sharply to very low rates. For example, in 1980 around LD 2551 million was spent in the housing sector; however, in 1991, only LD 486 million was spent, i.e. around 20% of the spending in 1980 (Gannous 1999). Added to this the annual spending in the housing sector was around 10-20 % less than in the 1970s. Moreover, in some years in the 1980s and 1990s, it was only around 8 % of the total allocation of the transformational budget. Furthermore, the average annual production of housing units decreased from 8551 units between 1988 and 1992 to 3650 units between 1993 and 1996 (MP 1996, pp.7-9).

As a result, the housing shortage rose from 73,387 dwelling units in 1995 to 134,000 in 1998 and to more than 142,000 in 2000 (MP 2001).

The figures above indicate that during the 1980s and 1990s housing and construction experienced a deep recession attributed, in general, to the following four key reasons:

- The sudden withdrawal of the state from housing and construction provision;
- The dramatic decline in housing allocation in development plans;
- The lack of an efficient national construction industry;
- Inefficient supply systems of financial services and land for the housing sector;
- Libya faced a series of economic and political sanctions in the 1980s and 1990s[1].

[1] According to UN Resolution No.748 of 1992 imposed the most influential sanctions. These sanctions extended from 1992 to 2003 when they were lifted by the UN Security Council's resolution No. 150 of 2003. The implementation of sanctions had a tremendous impact not only on the economy but also on the culture and attitude of Libyans. Tarbagaia (1995, p.190) argues that Libya's industries, including the construction and housing industry, as well as the overall performance of Libya's economy suffered from the United National sanctions. Serious damage and major financial losses were caused. For example, the annual rate of growth of GDP declined from 6.9% in 1990 to only 0.5% in 1997. Also, the rate of inflation increased sharply from 4.7% during the periods 1985-1990 to 14% in 1997 (General Council for planning 2000, p.19). In addition, the value of the Libyan Dinar against foreign currencies declined dramatically. Furthermore, the price of goods, spare-parts and services increased an extension black market developed. Many foreign companies boycotted Libya, complying to the UN sanctions No. 748. The departure of these companies led to many of their projects stopping, and the whole housing sector was affected. Some companies withdrew because of unavailability of hard currencies to pay on time. As a result completion of their contracts was delayed andhousing projects and some companies required to increase the price of their contracts to complete projects (General Corporation for Housing, 2003, pp.43-46).

Therefore, it is clear that the state lacked the administrative and management capability to create an enabling environment. In concluding this section, it can be said that following the sudden withdrawal of the state from housing and construction provision in 1985, house construction experienced a period of deep recession. Production declined and housing shortages increased. This indicates that the state should make greater efforts to establish an enabling environment for the housing sector and construction industry.

According to Omar (2003) and Mukhtar (1997) the main inadequacy in developing and implementing a housing policy and programme are as follows:

- Lack of responsiveness to housing need in terms of social life, cultural and environmental factors. As a result of this, most of the public housing has used foreign concepts in planning and designing projects;
- Deficiency of local specialised and technical personnel and building materials to complete the objectives of the housing sector. The result is a dependence on importing them from abroad. Consequently, the design of most houses is highly dependent on foreign skill and labour as well as on imported materials;
- The absence of private rented housing caused some deficit in housing supply;
- The public housing projects have not always included the necessary services. In some projects the basic infrastructure and services such as the schools, roads, and other civil services, were not constructed at the same time;
- The housing policy in Libya mostly concentrates on quantity not quality and suitability to occupants and environment.

2.9 Conclusion

The topographic features vary throughout the Libya, which, is characterised by plains, mountains, and desert. The climate of Libya is influenced by the Mediterranean Sea climate, which is characterised by cold wet winters and hot, dry summers as well as the Sahara desert's climate, which, is characterised by arid condition and high temperature variations between day and night. As a result these differences between topographic and climate conditions have created different types of house design as shown in chapter four.

Libya is a relatively small country in terms of population but large in terms of area. Therefore, limited human resources are one of the key features of the country. The high rates of population growth demand the establishment of new housing projects. The Libyan economy has evidence changed through the past three decades. During the 1950's Libya was classified one of the poorest countries in the world. In 1960's Libya has evidenced remarkable economic change. In this period the economy was transformed from a primitive economy to an oil-based economy.

In the 1970s the Libyan economy was rapidly developing resulting in the changing the oil price and participation in production. This growth in the revenues allowed an increase in spending on development in all sectors, particularly the housing sector. In the 1980s and 1990s the Libyan economy during these periods was severely restricted by the effects of the low oil price and sanctions. Decreasing revenues caused serious problems and necessitated revision of the development plans. Libya In 2000 and 2004 was witness to increased oil prices and partial lifting of sanctions. So the Libyan economy has been improving rapidly with an open door policy on the world that reformed the economy and introduced a huge plan for private sectors to invest.

Housing policies have been changed to reflect changes in the socio-economic situation of the country. During the 1950's the rate of economic development was low and the implementation of housing policy was unsuccessful. Since 1969 the new government has given more attention to the housing sector by adopting a new policy of providing dwelling for each family through the private and public sector. In 1990s the role of the state changed from being a provider of housing to a supporter or an enabler for citizens to build their own house and private sector investors to participate in housing production and services.

The next chapter is concerned with the cultural, societal and religious influences on Libyan housing.

Chapter 3: Culture, society and religious influences on Libyan housing

3.1 Introduction

In the previous chapter, the study has examined various aspects of the climatic, economic and housing policy in Libya. This chapter deals with the force of culture, society and religion on Libyan housing. In order to understand what effect these forces have on Libyan housing, it is necessary to understand Libyan society before investigating the Libyan social structure. See Figure 3.1.

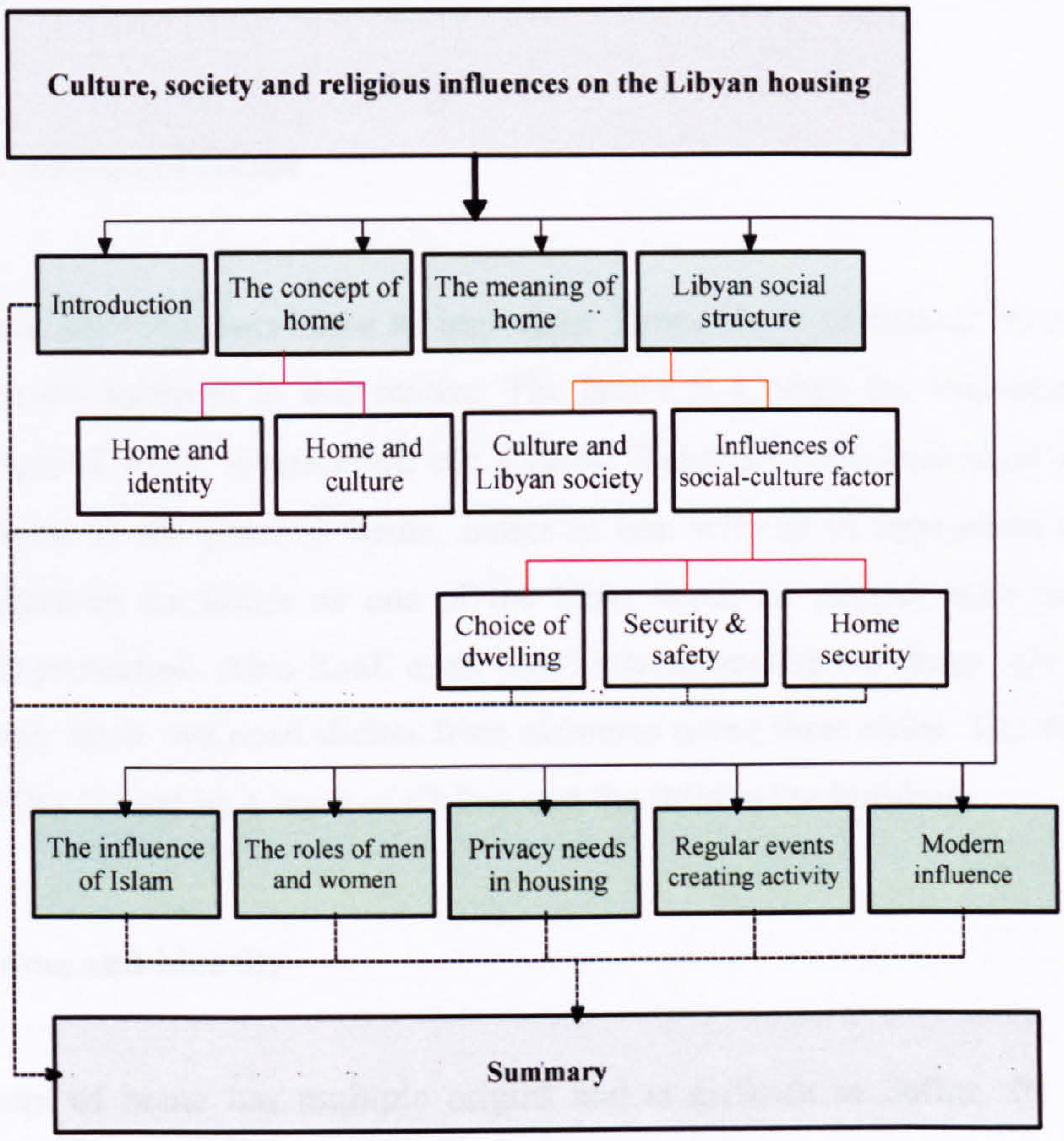


Figure 3.1 : Categorisation of culture, society, and religious influences on housing design explored in chapter 3

The concept of home and different perspectives should be reviewed for its importance of understanding the meaning of housing. Therefore this chapter first searches for the concept of home and reviews the different perspectives. Secondly, the Libyan social structure, culture and the influence of Islam on the Libyan culture is explored. Thirdly, the influences of socio-culture on the built environment include the choice of dwelling, security and safety and privacy is explored. Finally, the regular events and activities, in Libyan society, which shape the design of housing and modern influences are identified.

All these factors require a special use of space, within and without the dwelling, so particular attention will be given to the ways in which space is used, the daily and yearly timetables of use and movement between spaces. In this study new and traditional settlements will be examined so that we can see how people need to adapt when moving into new types of dwelling to ensure that their way of life remains unchanged.

3.2 The concept of Home

Most people see their own home as important. However, it is difficult to cope with the complexity inherent in this matter. The home is a place for important family rituals, practical work, discussions, etc. Crucial features of the individual's identity are developed in the parental home, either in line with or in opposition to it. Ali (2005) describes the house as one of the basic needs of people, built to provide shelter and protection. Also Roaf, et al. (2003) describes the buildings are our third skin. To stay alive we need shelter from elements using three skins. The first is our own skin, the second by a layer of clothes and the third is the building.

3.2.1 Home and identity

The concept of home has multiple origins and is difficult to define. Its symbolic charge is strong. People live in a world of symbols that they themselves have created. The objects they make, their artefacts, express their intentions and meanings. This is, of course also true of 'what is commonly viewed as mankind's greatest and most tangible artefacts' (Lantz, 1996, translation by Lewin 2000), the home. However, what do our homes and the things they contain actually mean to us? In answering this question, some scholars emphasise the relationship between the home and identity.

According to Lantz, the home is part of something he calls the personal sphere. A home is, he feels, an extension of an individual's very person (Lantz, 1996). According to the architect Redvall (1987), people seek three values in their regions, i.e. in their homes; identity, privacy and security. If this is the case-where the home is an integrated part of the individuals' identity-then it "can not be reduced to an apparatus for suiting a number of practical purposes. It is not a housing machine, but instead a complicated fabric of symbols, dreams, ideals and aspirations" (Lantz, 1996). Housing that secure and allows the individual and household to express their identity through the reshaping of the domestic environment (Svensson, et al. 2003).

3.2.2 Home and culture

When considering the relation between home and identity, it can be claimed that the concept of home is highly ideologically and culturally charged. As Gaunt & Lantz (1996) pointed out; "home is an ideological concept. It also has a personal existential charge" The individual's perception of the meaning of a home is, accordingly, a social and cultural construction. Thus, culture and lifestyle are probably the two most important components in the construction of the concept of home. Cooper (2003) confirmed that "building and settlement patterns are material expressions of the cultures that construct them".

Some forms of living, e.g. the extended family, are indeed, more common in certain non-Western societies, especially traditional societies. However, elderly immigrants from 'developing countries' have often already experienced half-modern forms in their homeland. In most non-Western societies, significant changes in traditional forms of living have taken place since the middle of the 20th century. Thus, many elderly immigrants from 'developing countries' have experienced sharply contrasting living conditions during different periods of their lives. During their childhood and youth, they lived under more traditional conditions, characterised by extended families and a hierarchical family structure.

3.3 The meaning of the home

In all cultures the concept of home has a number of meanings. Taking a perspective on defining and categorising the meaning of the home (Lewin, 2000) based this categorisation on several authors, (Baker et al., 1987; Csikszentmihalyi & Rochberg-Halton, 1981; (Hayward, 1977); (Rakoff, 1977 pp. 85-104) , Sebba & Churchman, 1986; Sixsmith, 1986 and Despres, 1991, pp. 97-99) definitions and concluded the following aspects:

- The home as a security and control;
- The home as a mirror of personal views and values;
- The home as a influence and place for change;
- The home as permanency and continuity;
- The home as a centre for family relationship;
- The home as a centre of activity;
- The home as a retreat from the surrounding world;
- The home as personal indicator;
- The home as a concrete structure;
- The home as a place to own.

3.4 Libyan social structure

3.4.1 Culture and Libyan society

The first task is to establish what we mean by the word "Culture" and then describe what has been found and what is the historical and social background that has shaped the present culture.

Several writers establish exactly what we mean by the word 'culture'. The word "culture" means that body of principles, cognitions, feelings and behaviour shared among a group of people in several ways" (Shawesh, 2000) cited from (Altman 1980). The word "Culture" as used in this study will refer to the ideals, ideas, emotions and expressions of behaviour common amongst people in one area.

The shared faith, aspirations, traditions and values are reflected in the ways in which their day-to-day life is organised and in their whole way of life. Every task they tackle, every time they greet a friend or see their family, their behaviour is learnt from a mixture of religious and social codes passed down from generation to generation so that it seems natural rather than learnt. Everyone in the area will be familiar with the patterns of behaviour and will conform to them. Non-conformity will be obvious, unpleasant and disturbing. Saxena (1996, pp.703-711) culture shapes the behaviour of individuals and groups in the society.

Rapoport (1977) has said that the cultural environment will indicate the reflection of people's value system, environmental attitudes and preferences. He believes that the physical form of the built environment results from people's behaviour patterns in society. Such a view would mean that a traditional way of life could dictate the shape of housing, allocation of space, orientation of buildings and form, in such a way that the physical structures would become symbolic of society's rules, values, beliefs and norms. The author will look particularly at these aspects of life in traditional villages, which have not been affected by the rapid changes in urban areas brought about after the oil boom. Reasons for the survival of these areas will be examined to establish why, when people have the means to move out into modern housing, they choose to stay put.

Religion and kinship were very strong forces and people built their own homes to reflect these feeling. They believed that God was responsible for all that happened and lived according to the teachings of the Quran. Superstitious feelings were also strong and this increased reluctance to change and strengthened conformity.

Symbolism was an important aspect of life along with belief in supernatural powers and holy men. The rooms built around a court, and houses around a square, reflect and symbolise the conservatism of the people and their need for security, privacy and co-operation of dwellers. This pattern is seen in Islamic communities throughout North Africa.

In traditional Libyan towns, the unique characteristics of society are underlined in the use of decorative addition to the space, such as stone benches for men to sit outside, special shaded coverings and use of vegetation. The positioning of key public buildings, Mosques and markets is also an important way of signalling cultural identity, in establishing the relationship between people, buildings and space.

The success of human activities requires correct and workable arrangements of space, whether open or enclosed. Almost every action is carried out in a specific space. The importance of the action and the method of performing it are factors that ought to be considered when discussing space. There is, therefore, a more complex relationship between man and space than simply the physical. Each space has certain significance depending on its purpose. Our activities are affected by space and they, in turn, affect it. It has been previously stated that society's values, ideas and aspirations are reflected in the built environment and we can now add that this environment can, in turn, influence the people who "use" it. In the traditional Libyan community people behave in the same way, share the same perception of life and prefer to conform for the sake of maintaining a pleasant and comfortable existence. Their built environment reinforces their way of life and helps preserve it by encouraging homogeneous behaviour. The mutually recognised, but unvoiced codes of behaviour, are therefore followed naturally, and as a result of coercion. As Rapoprt (1977) said: "There is a close fit between the organisation of space-time, meaning, communication and culture".

This chapter will look closely at the main aspects of the socio-cultural characteristic of Libyan society and identity the features, which affect most directly the design of houses. This will include the analysis of the relationship between people and their built environment, the influences, which are brought to bear on it and the need to maintain dignity whenever possible. Many outside cultures influenced the shaping of Libyan culture, which come from both East and West as indicated in chapter two. To build a picture of the background of important cultural factors, the study will highlight the influences of socio-cultural on the built environment and the Islamic influence.

3.4.2 Influences of socio-cultural factors on the built environment

Every society has a culture. No matter how simple this culture may be, people tend to feel strongly that their own cultural aspects are the correct ones. Each of us is born into a complex culture that strongly influences how we live and behave for the reminder of our lives (Ember, 1981). There is a tendency to regard those who do not share these patterns as immoral or inferior. This happens in a Muslim society like Libya. Rapoport (1977) has mentioned that the cultural environment reflects people's value system, environmental conditions, attitudes and preferences. He believes that the physical form of the built environment results from people. This view means that a traditional way of life could dictate the design of housing, space organization, orientation of buildings and shape, in such a way that the physical structures would become symbolic of society's rules, values, beliefs and norms.

Socio-cultural values such as religion, privacy, and so on are very strong forces and people built their houses to reflect these values. As Rapoport (1977) has said, there is a close fit between the organisation of space, time meaning, communication and culture. Moreover, a group of people have a set of values and beliefs, which are learned and transmitted: "these create a system of rules and habits, which reflect ideals and create a lifestyle". Cultural standards are transmitted from one generation to another through the process of socialising. Even when people migrate from one part of the world to another, they take many aspects of their own culture with them (Lang, 1987). For instance many societies such as Jewish and Pakistan in UK.

In order to build a picture of the theoretical background of important socio-cultural values, this study will highlight these values separately. The research author has experience of the selected case study area. The problems of the area and the living conditions are related to the experience of the researcher and the researchers exploratory discussion with key community figures and housing users. Three social aspects have been chosen for study; choice opportunity, security and privacy. It should be pointed out that the definitions below are those developed by the investigator through the literature review. The actual definitions of these concepts, as apparent by the people in the study area, will be presented in the following chapters.

3.4.2.1 The choice of the dwelling

People spend much of their time within the confines of the home, which also represents the socio-economic status of the individual in the eyes of the society. Thus the type and form of dwelling is central to well being. Moreover, they are also concerned about the neighbourhood and settlement in which they live, and where they prefer to live. The neighbourhood can be varied in its social and physical characteristics, such as density of development, types of people who live there, housing conditions, available community facilities, cleanliness, and maintenance levels. In order to feel a part of a neighbourhood a resident needs to know his neighbours and interact with them (Unterman and Small, 1977). There is great evidence to support this point as indicated in the Libyan popular proverb; that says "Ask about your neighbour before you build your house". The particular residential area that is chosen by an incoming family has important consequences on the type of neighbourhood and the settlement in which they live.

Rapoport (1980;) wrote; "In reality, a major effect of environment on behaviour is through habitat selection; given an opportunity, people select the environments that suit them, and that are congruent with psychological and socio-cultural aspects of their behaviour". Choice is the major influence of environment on behaviour. People leave an inappropriate environment and seek out an appropriate one, which satisfies their needs in life. Hence, not having a choice is a major environmental problem. Many housing projects in Libya are planned and designed before the site is decided and the same design may be used throughout the whole country. Different designs are needed for people living in different environments. One of the purposes of this study is to explore the problems of people who have moved from a traditional dwelling area to a new dwelling area and the negative effect of their house conditions and socio-cultural life.

This policy gives no opportunity for people to choose an environment to match their preferences. People who are compelled to select an unsuitable environmental setting will try to change it, if they can, to one more to their preference. According to Rapoport (1980) most environments can be equally desirable if they have been chosen on the basis of perceived environment quality, the meaning of various aspects, acceptable standard, suitability with ways of life, socio-cultural values and so on. Conversely, if no opportunity is given to choose, these environments may be equally undesirable. At the same time, built environments, even if chosen, do need to suit the ways of life, desires and images of the people concerned.

Spear et al (1975) examined the concepts of stress and satisfaction as determining factors in residential moves. He formulated a module, which emphasises that a household's change of residence is precipitated by the dissatisfaction or stress of changing needs internal to the household, or change in immediate environmental factors.

It is important in terms of design to give people the opportunity to choose the kind of housing and location in which they would like to live. Thus, it is necessary to know and understand people's preferences for housing, neighbourhoods and settlements in order to build valid foundations and formulate appropriate policies for planning and zoning of the residential environment and provide housing that meets people's wishes and needs. With such knowledge, it is also possible to predict the future demand for housing types as it is believed that it is important for family cohesion that a child should feel a member of the household even when absent (Madge, 1968). The fact that people move to a new home does not mean that they are dissatisfied with the old home.

3.4.2.2 Security and Safety

The lack of safety in some architectural environments has motivated some researchers to study the relationship between architecture and human need for security. Newman's (1972) research on defensible space promotes the idea that the design of interior and exterior space can play an important role in ensuring security and safety by enhancing the user's ability to control their surroundings. Lynch (1960) and Horney (1937) have also contributed to architectural theories in terms of security and safety needs. Security in the shelter could be defined as the idea of 'home', which implies at the same time personalisation and safety, and includes the concept of defensible space and territory.

3.4.2.3 House security and safety

House security is a vital element in the lives of people. Every nation regards the house as a sacred place and one cannot enter another's house without permission. People are deeply concerned with their dwelling because it reflects their security, personality, socio-cultural values and dignity. Fences and walls are efficient territorial markers that make their houses more secure and personal. "The more barriers you place in front of a home (such as fences and locked doors and windows), the less attractive your home will be" (Burton, 1995 p.7). Moreover, a shelter or house acts as a filter between the external environment and the comfort needs of the user within. The function of a home is to provide a place where human activities can take place without distraction from others, both human and animals. Porteous (1977;) states; "it is a refuge which we defend against the world". The same idea is suggested in 'every man's home is his castle and 'every dog is a lion at home'. Moreover he states that "home is where the heart is' and be it ever so humble, there's no place like home", it is the symbolic hearth and source of our being.

Security is the key to home, at the level of house or room. Security measures are understandable when one considers the vital importance of the home base for vulnerable activities such as sleeping, grooming and reproductive behaviour (Porteous, 1977).

Rapoport (1969) suggested that home-based security involves recognition of the sanctity of the threshold. Figure 3.2 illustrates the relationship between cultural norms, physical structure, and permeability of the home base, comparing the Moslem house, surrounded by high walls with few, small openings, with the British house with low walls or fences, and finally, the North America house that consists of a suburban plot, lacking fences and with large picture windows, as three different attitudes toward the transition from the private to the public.

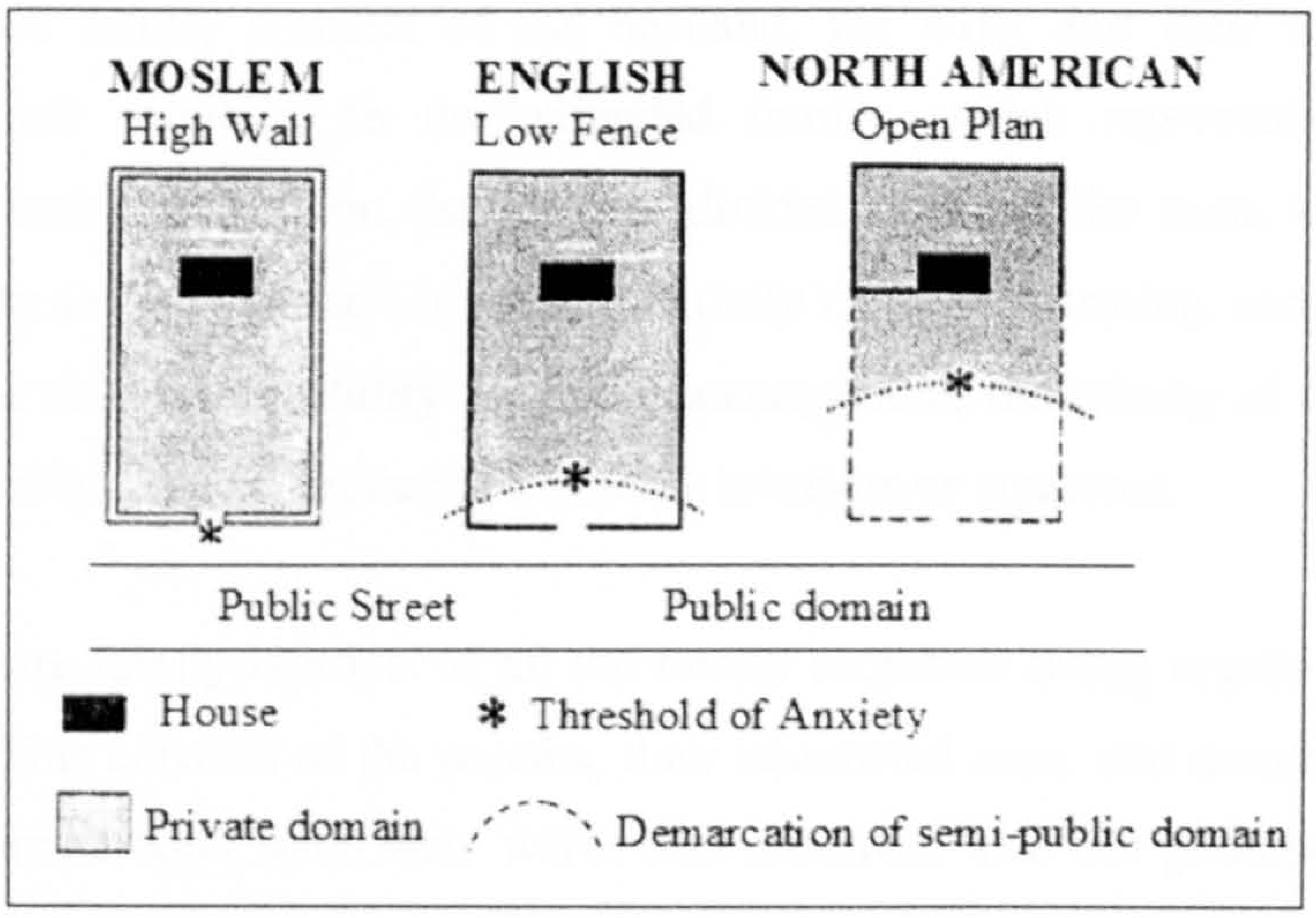


Figure 3.2 : Cultural variability in the sanctity of the threshold
Source: Shawesh 1996 cited in After Proteous 1977

3.5 The influence of Islam on the Libyan social structure

In the world particularly in the Islamic world, the factor of religion is important for maintaining social order. The social organization is a control mechanism for individual behaviour. The centre of social organization in the Islamic world is kinship. The traditional social structure of Libya consists of a system of units of allegiance. A strong tribe or clan membership and family ties still persists today. The homogeneous Islamic community is still structured around, first, the nuclear family, then the extended family, the sub-clan, the clan, the sub-tribe and then, at the top of the hierarchy, the tribe itself and the composite of several tribes (Daza 1982).

In Islamic culture, the Quranic guidelines are the primary determining factors in the formation of a domestic unit. The term "Al-Ailah" means family or household. This is the primary unit, which consists of the husband, his wife, and their children. The Islamic religion instructs its followers, to achieve the basic social units. The importance of a strong relationship between the two partners of the basic unit is emphasized (Rghei 1987).

The extended family consists of the husband, his wife, and their married sons including their families. In the extended family, which represents a unit of production and consumption, labour was divided between the men, who had the responsibility for the outside commercial activity including farming, and the women, who had the sole responsibility for home management, the raising of children and some types of household production of some artefacts or tapestries.

The composite family consists of all the family members living together under the same roof. This consists of the parents, their unmarried sons, and daughters as well as their married sons with their wives and children, and the grandparents, who traditionally spend the latter part of their lives in one of their son's homes. In typical households each marital couple occupies a separate room, unconnected with the rest of the house but opening onto a central courtyard. The Quran clearly states as follows:

"We have enjoyed on man kindness to parents"
Quranic (Al- Anqabut 29; 8) translated by Ali.

Consequently, the house is an enclosure within the residential sector, or (mahallah) and, on a larger scale, the mahallah forms an enclosure within the Islamic city enclosure. "This forms a special space organization for different purposes according to the different rules, needs, and values of various groups or individuals (Daza 1982)

3.6 The different roles of men and women in and the influence on housing design

Another very inferential aspect of life, which will require careful examination, is the role of women and men in Libyan society. In an Islamic society, women are not permitted to mix freely with men but they must be allowed to carry out their daily activities in comfort and without feeling exposed. Each yearly cycle is broken up with various important social and religious festivals. These are the things that distinguish one society from another and every effort must therefore be made to ensure that they can continue to be celebrated so that society does not lose its identity (Al-Forthya 1989).

The typical Islamic family is patriarchal in accordance with the Quran's sayings. "The senior male member of the household is the head of the extended family and makes the major decisions affecting its activities and welfare". In this male oriented and male dominated society, the women have a subordinate role. According to the Qurean, the women are advised as follows; "Stay quietly in your houses, and make not a dazzling display, like that of the former times of ignorance''. Quran book (Al-Ahzaab 33; 33)

The Quran also advises the Muslim women to be conservative in their appearance, but it doesn't suggest that women cannot work outside their homes. They are permitted to help their husbands in their work. The privacy of women is physically obvious in various forms of barriers, through which women can see but not be seen. Men and women in the Arab and Muslim worked are in two separate domains; the women's activities are clearly centred on the private life of the family. The immediate result of such practices was the separation of the house into two distinct parts. "The need to separate the women was reflected in the design of the typical house" (Toulan 1980). According to Showdhury (1992) the Islamic religion and position of woman in Islamic society played a significant role in shaping housing and the built environment.

This form of separation by genders existed even with the nomads with their minimal portable dwelling or tent. See Figure 3.3. A clear separation between sexes was obtained by the use of dividing partitions, which would separate the tent into two sections, and each part would furthermore be provided with its own entrance. The old Islamic houses have the same spacial design. House design was based on the need to protect the domestic life of the family, the women and her children. Although these houses are built under different conditions, in larger spaces, the rules to ensure privacy are strictly enforced (Bayazit; 1976).

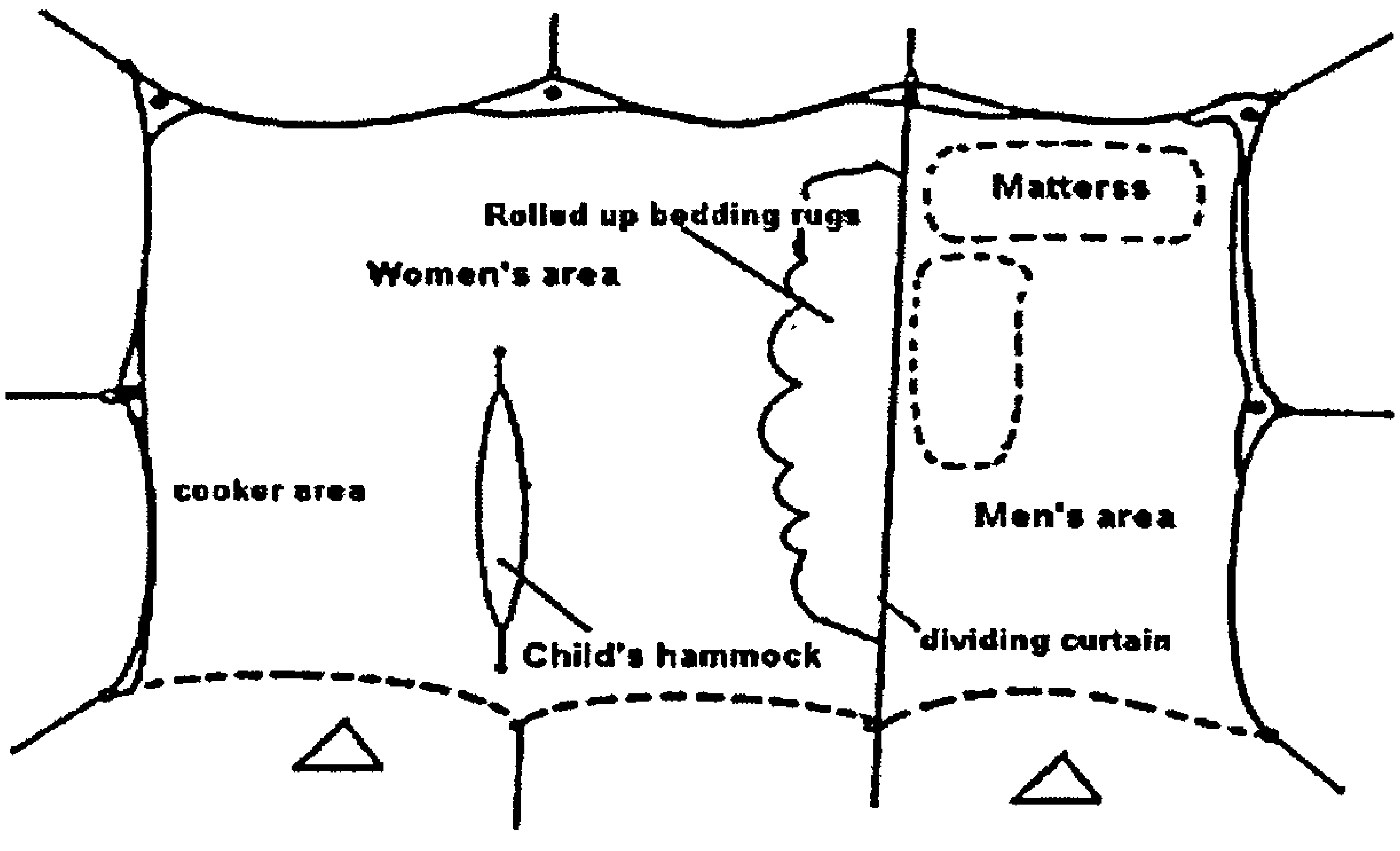


Figure 3.3 : How genders were segregated

3.7 Privacy needs in Housing

Several writers define privacy: Bahammam (2006) "the desire for privacy is a significant social-cultural factor influencing housing design in almost every society. The form of privacy is translated into reality in many built forms and public actions". Alexender (1977) wrote "privacy is most urgently needed and most critical in the place where people live". He was speaking in general terms but the previous two sections on the Quran and the role of women clearly indicate that, for a Muslim society such as Libya, this is a particularly important housing need. It is necessary to consider three levels of privacy; individual, family and community. Individual privacy is becoming a more common need than previously known. The changing patterns of life, leading to nuclear rather than extended family living, has given young people the urge to have their own homes separate from a large group of relatives.

The most significant concept in this context, emphasized by Allah, and explained by the Prophet (Pbuh), is privacy. It is emphasized in many ways to eliminate crime and to keep the relationship among the members of society as strong as Allah describes it and explained by his Prophet (Pbuh). Privacy is emphasized in the way of order and obligation. Muslims are ordered to achieve privacy starting from the member of the family themselves discussed more fully in chapter five.

Altman, et al (1980) describes privacy as "selective control of access to the self". Selective is another vital element that modern designers appear not to have taken into account, which is to be explored in this study. Individuals, families and communities should be in a position of choice as regards their level of social interaction. Do new housing designs have the effect of enforcing openness on people?. The level of privacy provided in an area can greatly affect the activities of the inhabitants. In a space where people feel comfortable and unexposed, activity is high. Where too open to view, people will avoid staying long.

Privacy is for all, and the arrangement of space in traditional cities and villages ensured that people using public outdoor space or their own courtyards did not encroach on the privacy of neighbours. This makes the planning and arrangement of houses, public buildings and public space as important an issue as the interior layout of the house. The modern housing illustrates the potential unease produced by overlooking. Privacy is an interpersonal boundary-control process, which paces and regulates interaction with others (Altman, 1975).

As will be shown indigenous housing in Libya provided physical fences to prevent anyone accidentally overstepping the limits into private spaces. When these barriers are not provided people are likely to feel uncomfortable and activity levels diminish.

This chapter so far has provided background information on the cultural and behaviour patterns of Muslim societies in general and Libya in particular. Development of indigenous housing produced a harmonious arrangement of space, which matched the timing and nature of activities with the socio-culture. The case study will concentrate on these factors to evaluate how spatial arrangement in traditional and modern housing fits the present day needs of society. The next section gives examples of activities for which space should be supplied.

3.8 Regular events creating activity

- **Weddings;**

Traditionally, and still in some parts, the first step towards marriage was for the mother or grandmother of a young man to enquire after marriageable girls in the local area, visiting homes and talking (that is, when arrangements of long standing do not exist). Following the agreement to marry, the groom's house (or his room) is painted white as a sign of the forthcoming event. Much visiting to give congratulations follows and animals are slaughtered and shared out. The bridal procession to take her from her family home to her new house is a very grand affair;

- **Ramadan;**

During this holy month there is continual activity, visiting and celebrating. The last three days of the month are particularly busy to mark the end of fasting. This is called "Eid-Elsagheer" and is followed seventy days later by "Eid Al-Adha", another religious festival marked by the slaughter of animals, visiting friends, neighbours and relatives and sharing food;

- **Hajj;**

The occasion of a person going on holy pilgrimage to Mecca is a time for family and friends to gather and celebrate for the weeks of their absence. All gather to give thanks and greet the return. The event is so important in their life that on return they have the addition of 'Haj' to their own name to especially mark the event;

- **Death;**

The body of the dead is carried in a coffin on the shoulders of the male relatives to the nearest cemetery. Friends, relatives and neighbours join this mournful procession. After the burial people return to the family's home to read the Quran. The surrounding houses provide food for several days so that the bereaved family is not required to cook for the guests.

All these important social activities have additional influence in the design of houses in terms of the provision of space.

3.9 Modern influences

At the beginning of the twentieth century the Italian occupation of Libya from 1911-1945 brought great changes in the traditional way of life of the inhabitants' .by the development urban and architectural features. In the middle of the 1960s and the early1970s, Libya had been going through rapid economic, social, and political changes. The developments carry broad repercussions, coming and going at great speed.

The changes affect all aspects of local life, which is reflected in the cultural transformation of the Libyan society. An expression of the changes can, for instance, be seen in the emerging new model of life, and this in turn triggers the inflow of fundamental changes into the existing residential environment. The trends usually follow achievements of the western civilisation or echo it in the peculiar way it is perceived. The same is true for an individual house and for larger urban complexes. More details can be seen in chapter five.

Urbanisation

According to Li, et al (2005, p.323) "Urban development directly leads to the increase of construction and demolition waste". According to previous studies, the urban proportion of the total population in Libya has increased from 25% in 1951 and to 45 % in 1970, to 69 % in 1980. In 2003, it reached more than 88 % (World Bank, 1960; NCID, 2003). As a result, Kezeiri (1982, p.355) argued that; Libya is one of the most urbanized of the developing countries. The level of urbanization in Libya is one of the highest in the Arabic countries (Al-Farrisee 2004).

The major reasons behind the rapid Urbanization are attributed, in general, to political, social and economic changes. However, Elshukri (2000, p.103) argues that the concentration of administrative departments and services in the major cities such as Tripoli and Benghazi has resulted in the problem of over-urbanization.

As a consequence of the impact of the concentrated urbanization process, particularly in the 1960s, 1970s and 1980s Libya has witnessed an increase in demand for new buildings and infrastructure projects, particularly in major cities as Tripoli. In addition, crucial changes have occurred in construction housing projects and the physical built environment. There are many recorded examples in Libya of which housing projects were used to establish o new towns and cities (such as Zintan town in mountain zone, Sirt city in coastal zone and Morzak town in desert zone that were constructed in the 1970s- 1980s) to attract rural people to become urbanized. In short, urbanisation is one of the most significant social physical forces in fluency housing design in Libya.

3.10 Conclusion

The main purpose of this chapter was to review the literature relevant cultural, societal and religions factors. The concept of home and meaning of the house has been defined and the influence of socio-cultural factors on the built environment an choosing of the dwelling to the owners meet needs for security and safety.

This chapter has highlighted the importance of religious values and their influence on the way of life and on housing design and the regular events have played an important role in determining the provision of space. Furthermore the modern aspects that how influence the way life in Libyan society were identified.

The following chapter will explore traditional housing in Libya in terms of types and building material in different regions, and look at how indigenous people deal with the environmental and cultural factors they face.

Chapter 4: Traditional Houses in Libya

4.1 General background

The phrase traditional or vernacular means buildings produced by a cultural group for itself and serving as a frame-work for its daily life, it has been described as architecture without architect (Rudofsky 1964).

From ancient times, Libya was over-run by successive waves of conquerors and invaders who occupied the country and shaped its recorded history. It has been established that the Phoenicians who in 800BC, established three commercial centres in Libya made the earliest foreign settlements. One was Marcaviata, which is now known as Tripoli; the other two were Saprata located in the west Tripoli and Leptus Magana in the east of Tripoli.

In Libyan history, the Greeks, Romans, Vandals and Byzantines, have all been foreign occupants who imposed their rule upon the country. However, the most significant cultural and historical changes occurred when the Moslem Arabs led by Omer Ebn–Elas conquered Libya in 642 AD, bringing with them a religion, culture, language and certain pattern of living which became deeply rooted and which have characterised the country ever since. In 1911 the Italians invaded and occupied the Libyan coast until 1943. This briefly affected the civilisation process in the country; consequently, the Libyan people have inherited many methods of house construction, depending upon the local climate.

Every geographical and climatic area has its own particular type of houses, which meet the needs of the people, and the differences are clear between various countries and also within a large country like Libya. Excavation during the 1940s has revealed the remains of house types in Libya from the Roman and Greece periods. Fortified houses from the Roman period were found in the Tripolitania region both in the olive-growing areas of the western mountain (Jabel Nufusa) and in pre-desert areas the (Hamada Al-Hamara) region south of the western mountain (Reynolds, 1976).

These houses were often built with large well-dressed masonry. With regard to occupancy, it is clear that such houses were always used by more than one family. This type of housing could also have been influenced by the two Arabic tribes of

Bani Hilal and Bani Salim, who emigrated from the Arabian Peninsula south of Hijaz to the North Africa before the rise of Islam. This possibility is derived from the similarity between these fortified houses and the ancient architectural style of Yemen, the homeland of these two tribes. The other evidence is the Arabic names for these houses, Gasr and Kilah (Bukamar,1985).

As mentioned in chapter 2, Libya is divided into three main regions according to geographical and climatic characteristics. Each region has its own type of traditional vernacular architecture. These can be categorized as shown in (Figure 4.1).

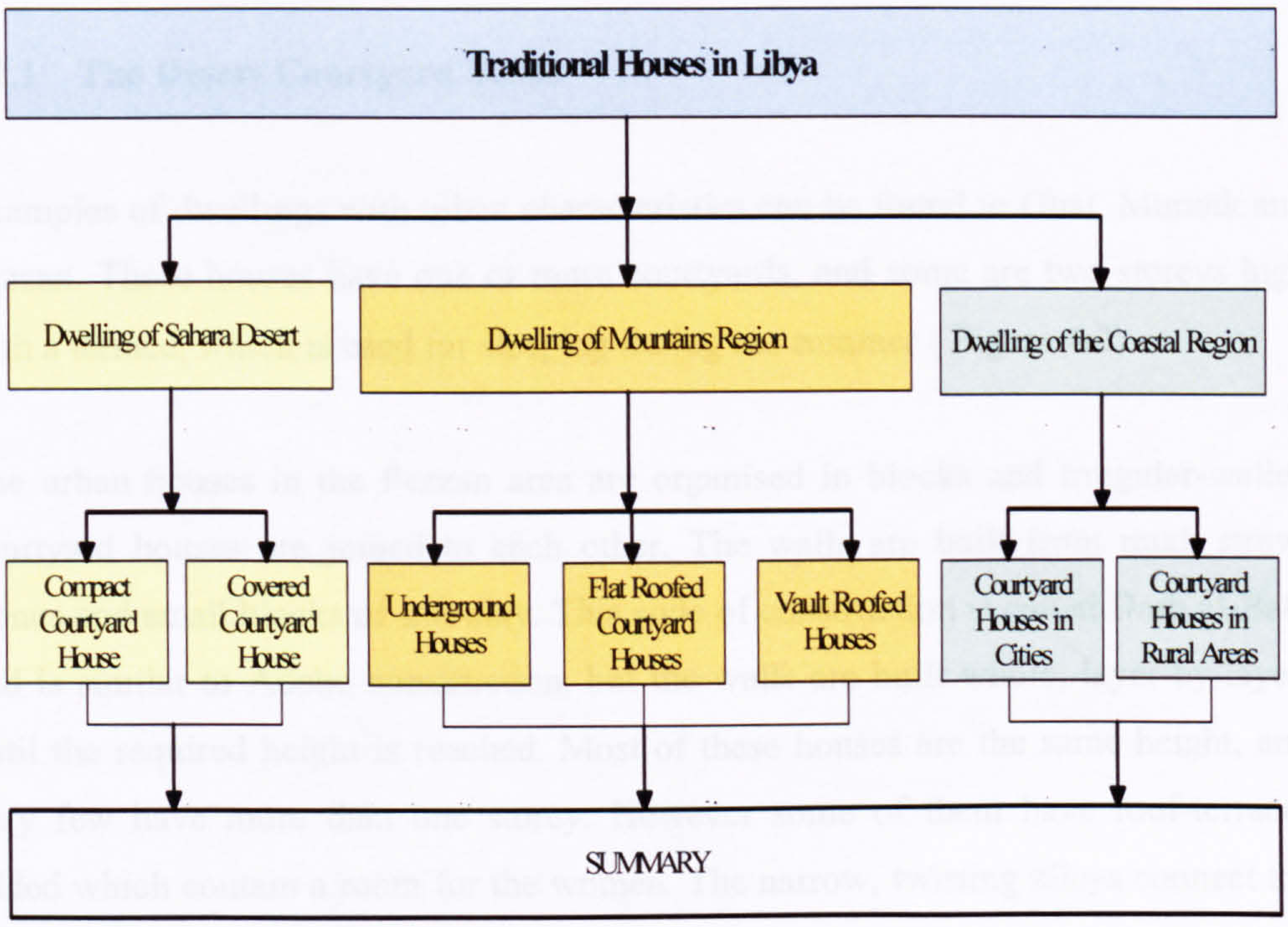


Figure 4.1 : Categorization of traditional housing types explored in chapter 4

The forms of housing developed in each of the three climatic zones of Libya are now explored.

4.2 Dwellings in desert settlements

The desert zone in Libya forms a major part of the Sahara desert. In the southern part of the country it extends from the edge of the coastal strip along the Mediterranean Sea and North mountains, Jable Nafousa to the west and Jable El-

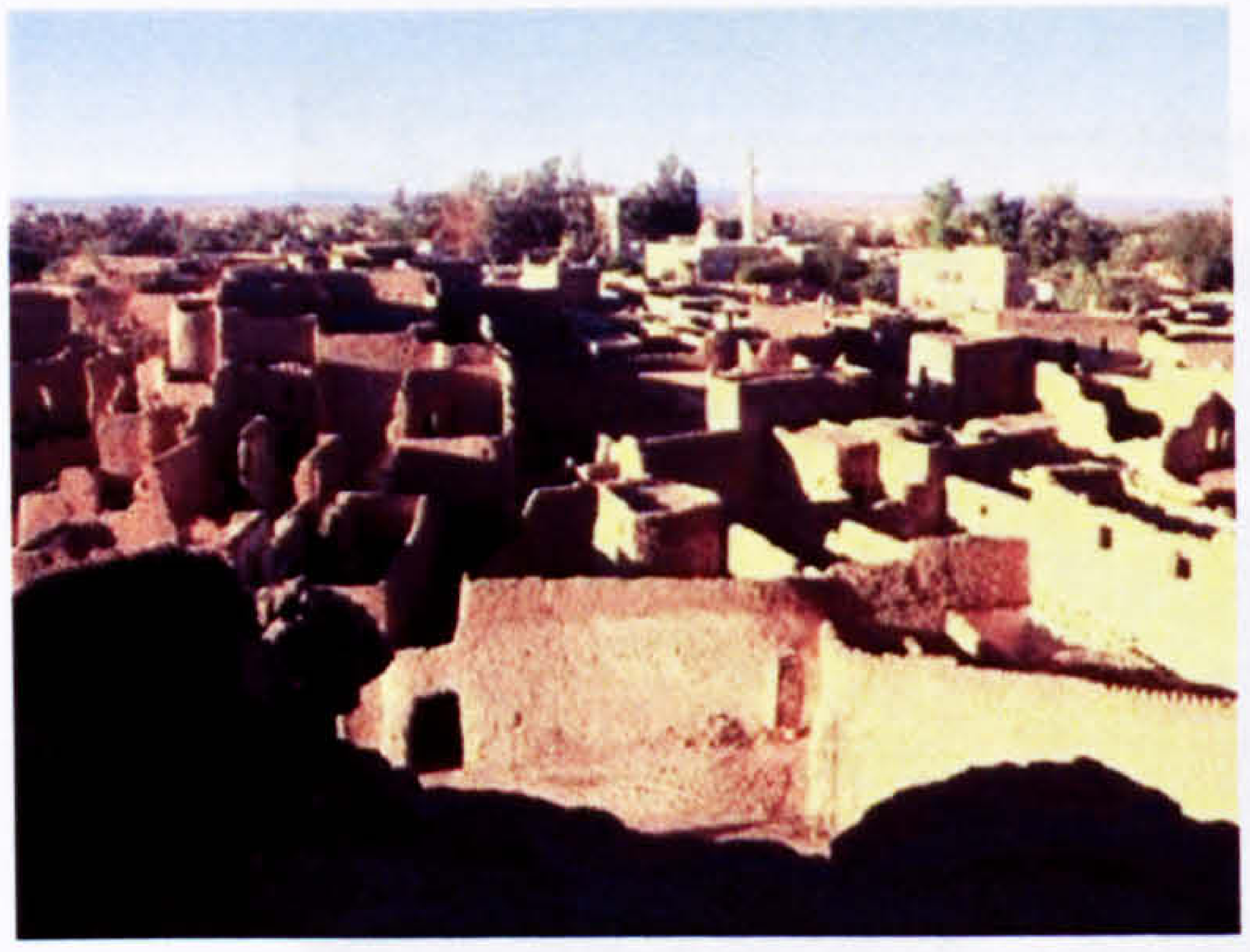
Akhdar to the East. This area includes two regions, the Fezzan region in the south west and the Kufra Region in the south east. The land is mostly flat, dry and rocky, and is covered with sand with a few scattered oases, such as Sebha, Ghadames, Murzuk, Ghat, and Kufrah. The desert settlements are located only where water is available in these Oases. Most of the desert towns demonstrate an urban style of unity and homogeneity in their planning and methods of protection from the harsh climate. Generally the houses in this region can be categorised in two types as follows:

- Courtyard houses in Fezzan and Murzuk;
- Covered houses (non-courtyard house) in the area of Ghadames.

4.2.1 The Desert Courtyard house

Examples of dwellings with urban characteristics can be found in Ghat, Murzuk and Fezzan. These houses have one or more courtyards, and some are two storeys high with a terrace, which is used for sleeping during the summer (Figure 4.2).

The urban houses in the Fezzan area are organised in blocks and irregular-walled courtyard houses are joined to each other. The walls are built from mud, straw, stones and small blocks of salt-clay. This style of construction is called Darb al-Bab, and is similar to Adobe construction, but the walls are built whole, layer-by-layer, until the required height is reached. Most of these houses are the same height, and very few have more than one storey. However some of them have roof-terraces added which contain a room for the women. The narrow, twisting alleys connect the buildings in circles without any connections to the outside of the settlement. The outer walls of the dwellings, which are on the perimeter of the settlement, form the external walls of the village (Figure 4.3).



Courtyard house at the oasis Ghat in the desert region,

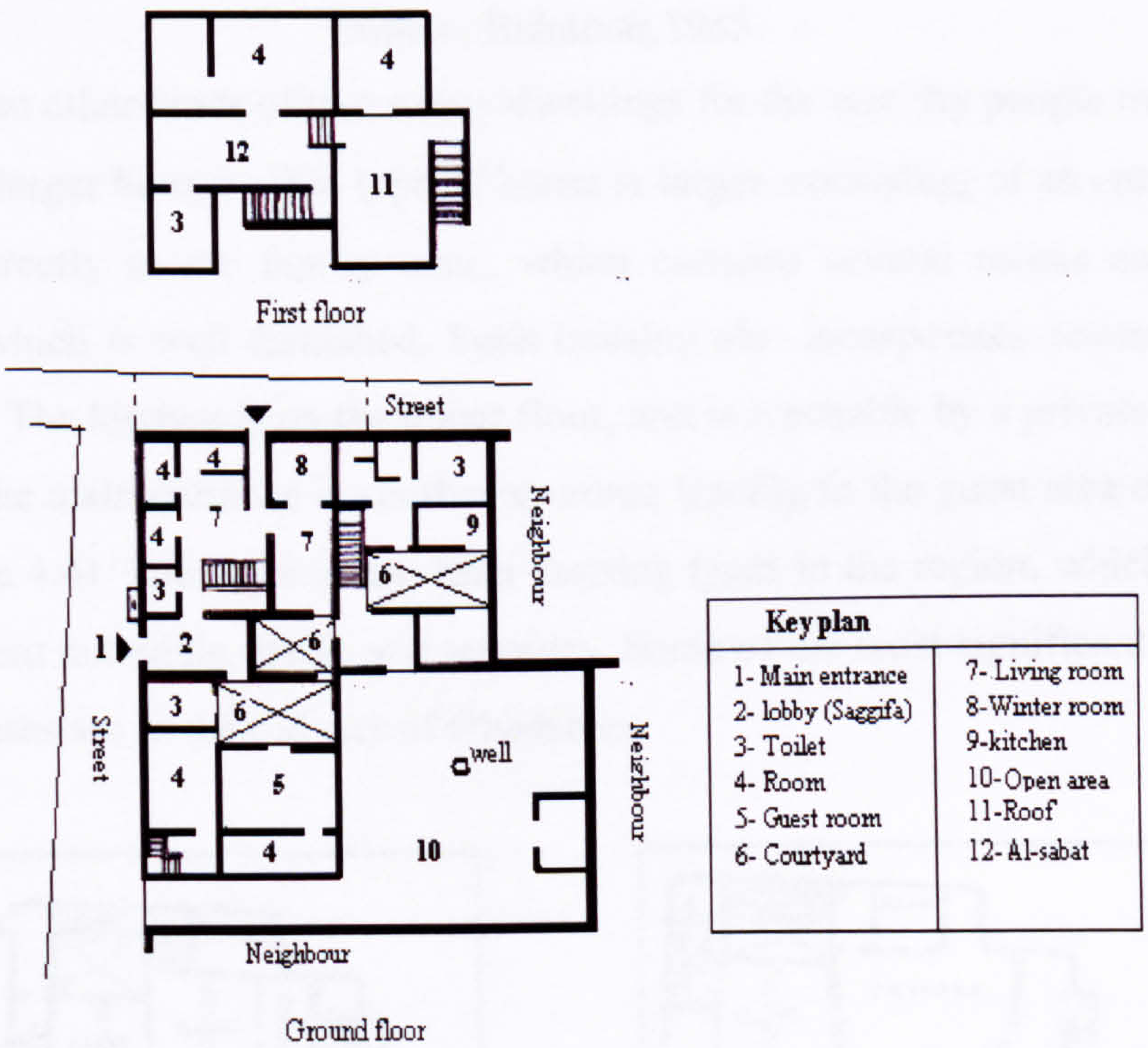
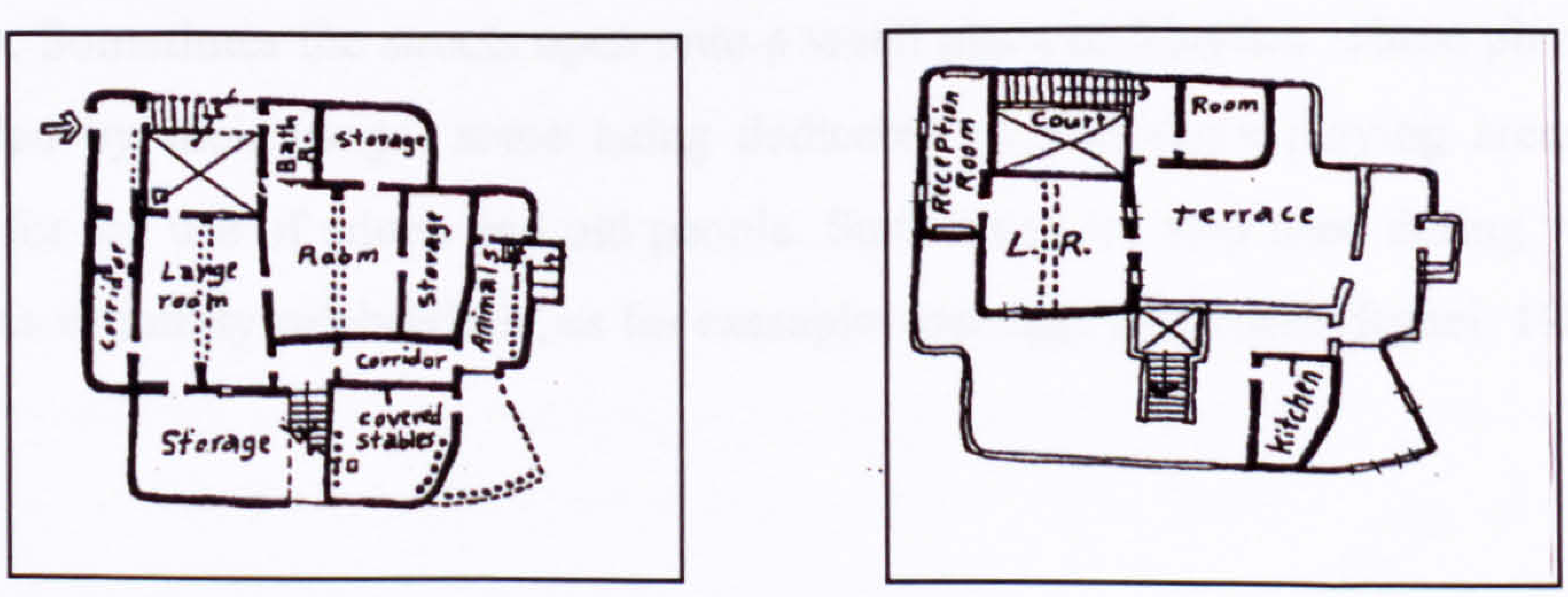


Figure 4.2 : Desert courtyard house at the oasis Ghat and two-storey house in Al-Qatrun

Source: Ministry of Planning and Development, Fezzan 1967

Figure 4.3 : Irregular walled courtyard houses in Sebha
Source: Bukamar,1985.

There are also other kinds of two storey dwellings for the wealthy people in this area, who live in larger houses. This type of house is larger, consisting of an entrance hall leading indirectly to the family zone, which contains several rooms and storage areas, and which is well furnished. Such housing also incorporates covered stables for animals. The kitchen is on the upper floor, and is reachable by a private staircase. In front of the main entrance is another staircase leading to the guest area on the first floor (Figure 4.4). There are many other housing types in the region, which are built using different materials, styles and attitudes. Some of the most significant examples of these houses are in the old city of Ghadames.



Ground floor first floor

Figure 4.4 : Two story traditional houses in Sebha dated between 1870-1950
Source: Bukamar,1985

4.2.2 Non–courtyard house in Ghadames

Due to climatic and environmental factors, some regions have adopted different typologies. For instance the Arabian Peninsula such as Jeddah in Saudi Arabia and Sana'a in Yemen, and the desert regions in North Africa such as Ghadmes in Libya.

Old City of Ghadames

Ghadames is a desert town, located 630 km southwest of Tripoli. As already described it has one of the extreme climates in the country, ranging from harsh cold in the winter to burning heat in the summer with almost no rainfall, and sand storms, which are strong and frequent. Houses here must be capable of accommodating these extremes, using only local material, namely mud, lime, palm trunks, and fronds. Due to the desert, building land around this town was scarce, and therefore, the living accommodation was tightly grouped together and constructed vertically rather than being designed to spread out horizontally (Ahmed, 1985).See Figure 4.5.

The City Form

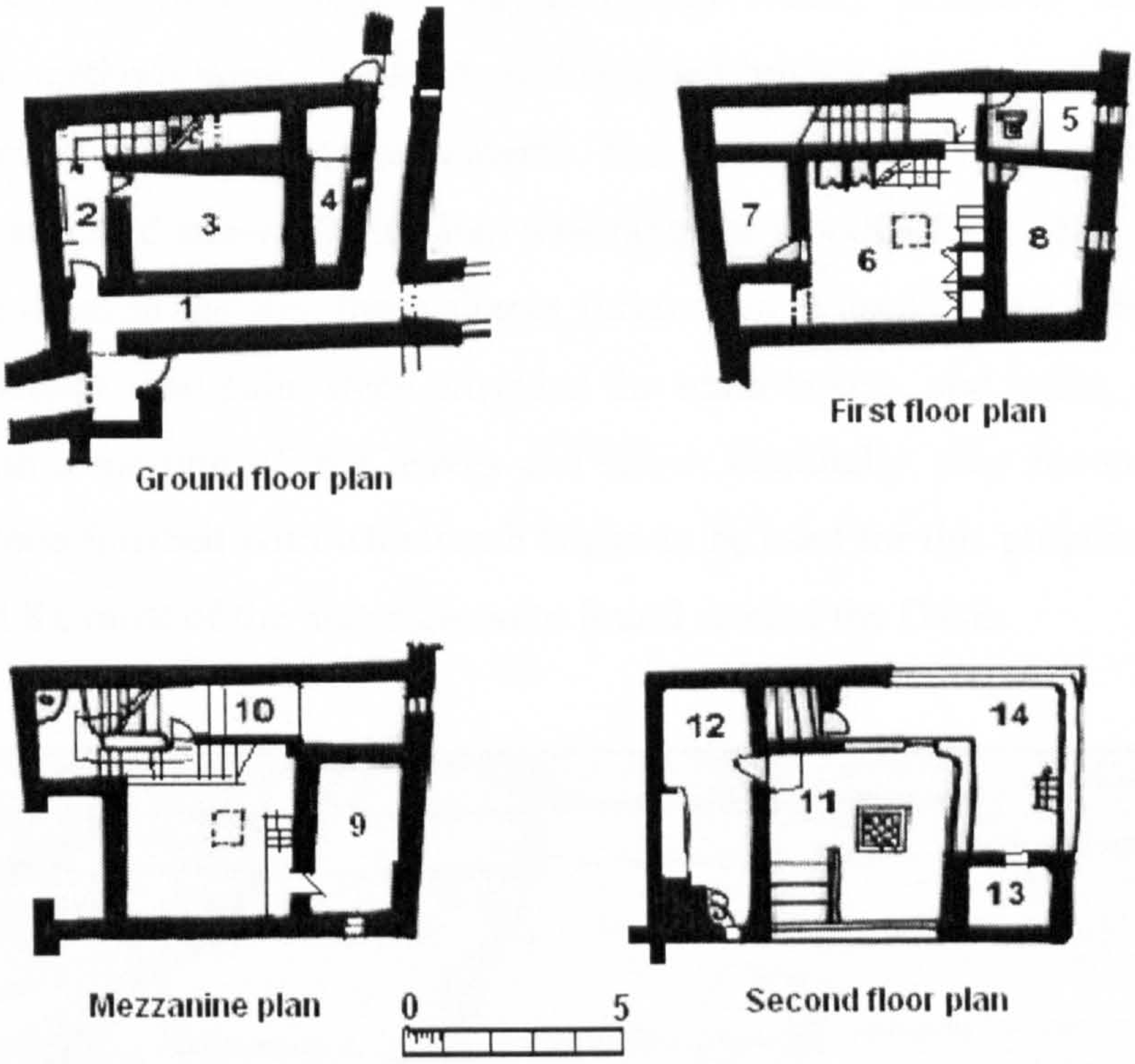
Within the old city, there is a hierarchy of streets, and in each sector, main and small streets, and long and short ones feature, with their ends being mostly closed. The alleyways of Ghadames were associated with the water supply system, which also functioned as an evaporative cooling system for the entire town. In order to give maximum protection from the climate, the alleyways are completely covered and the whole town is painted white to minimise absorption by reflecting the solar energy of the sun. Sometimes the streets open onto a small plaza or Maydan. These plazas are classified by their usage, some being dedicated as children's playing areas, and others for the use of adults and old people. Such areas are also used during various religious or family celebrations, as for example, marriage festivities (Rghei, 1987).

Figure 4.5 : Views of the compact houses in old city of Ghadames in desert area
Source: Chojnacki 2003

Type of Housing

Each house was built on three levels, with the entrance opening directly onto a covered passageway on the ground floor, which was used for storage, mostly for agricultural tools or commercial goods. Stairs led from the ground floor to the first floor where the most important area known as the Sadr el-beit was located. The Sadr el-beit was used as a living area and as a reception room for visitors and was placed in the middle of this first level. Fundamentally, the area was a covered courtyard, with lighting and ventilation coming from a small-unglazed window 75 x 75 cm in size, in the ceiling, and which opened to the sky. The Sadr El-beit was surrounded by bedrooms and led to a storage room, a few steps higher. On the second floor, a kitchen and terrace could be found, enabling women's daily activities, such as cooking, washing and buying from vendors, to be conducted without contravening the traditional separation of the sexes.

Additionally, this upper level served the purpose of an inner courtyard, giving the women space to meet each other and move across the roofs in complete privacy from the men, since all the houses were linked by an upper street which effectively mirrored the lower streets (See Figure 4.6). According to Ahmed(1985), most houses in Ghadames are of the same design, differing only in their size and decoration depending on the economic circumstances of the families living in them.



House plan key					
1	Street	6	Guest room and living area (Sadr el-beit)	11	Roof terrace
2	Entrance corridor	7	Girls room	12	Kitchen
3	Store	8	Master room	13	Children's sleeping
4	Latrine pit	9	Boys room	14	Steps leading to neighbour house
5	Latrine	10	Store room		

Figure 4.6 : The dwelling unit type in the traditional residential desert area

Source: Chojnacki 2003

Materials and Construction Methods

In all settlements in this region, builders used locally available materials and construction methods were simple. A mud or dried brick and limestone were used in the construction of all Saharan settlements. The materials were made of a mixture of clay soil, water, and straw, formed into a rectangular wooden form. (See Figure 4.7). After being dried in the sun, these shapes (bricks) were used for the construction of walls and arches. The palm trees provided the main beams, and joists, which were covered with a matting of tree leaves and straw. Gradually, clay mortar and small pieces of stone finished with whitewash began to be used for this purpose. As shown in Figure (4.8), most of the materials were found around the Oasis.

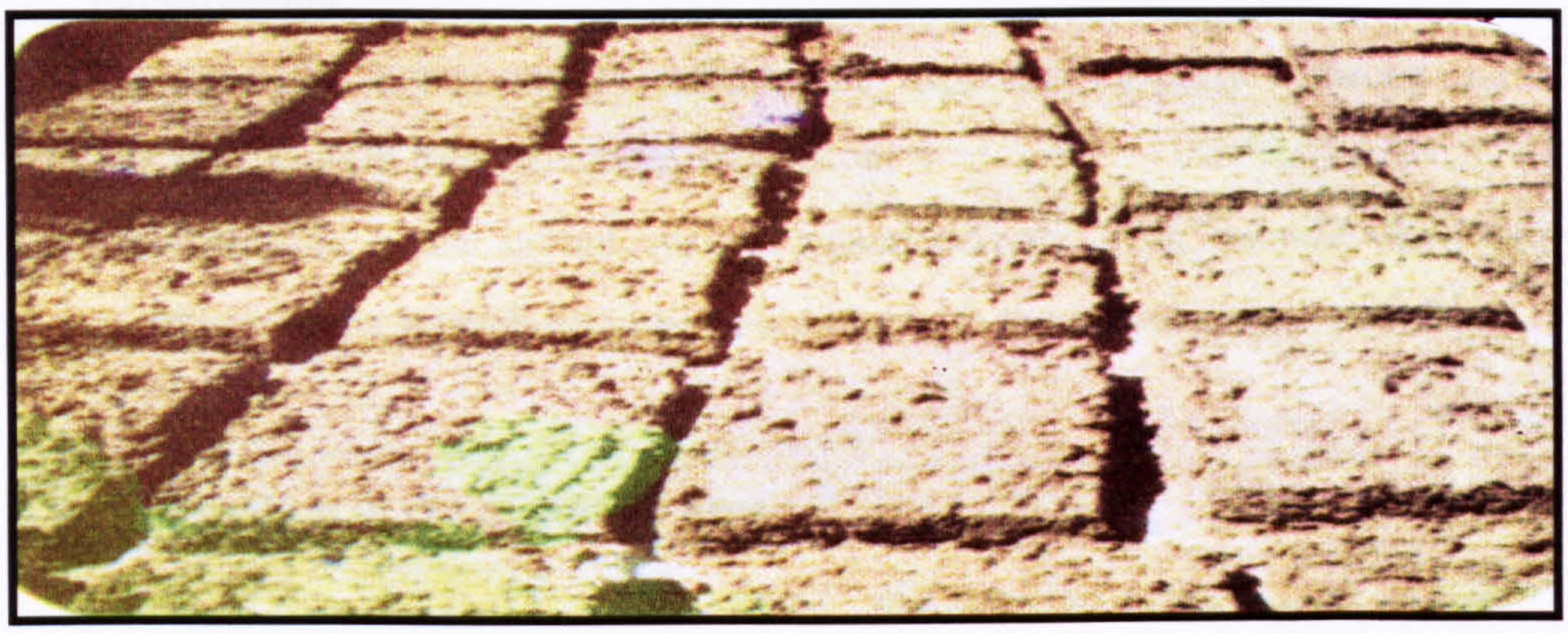


Figure 4.7 : The bricks made of mixture of clay soil and straw

Source: Omran 1989

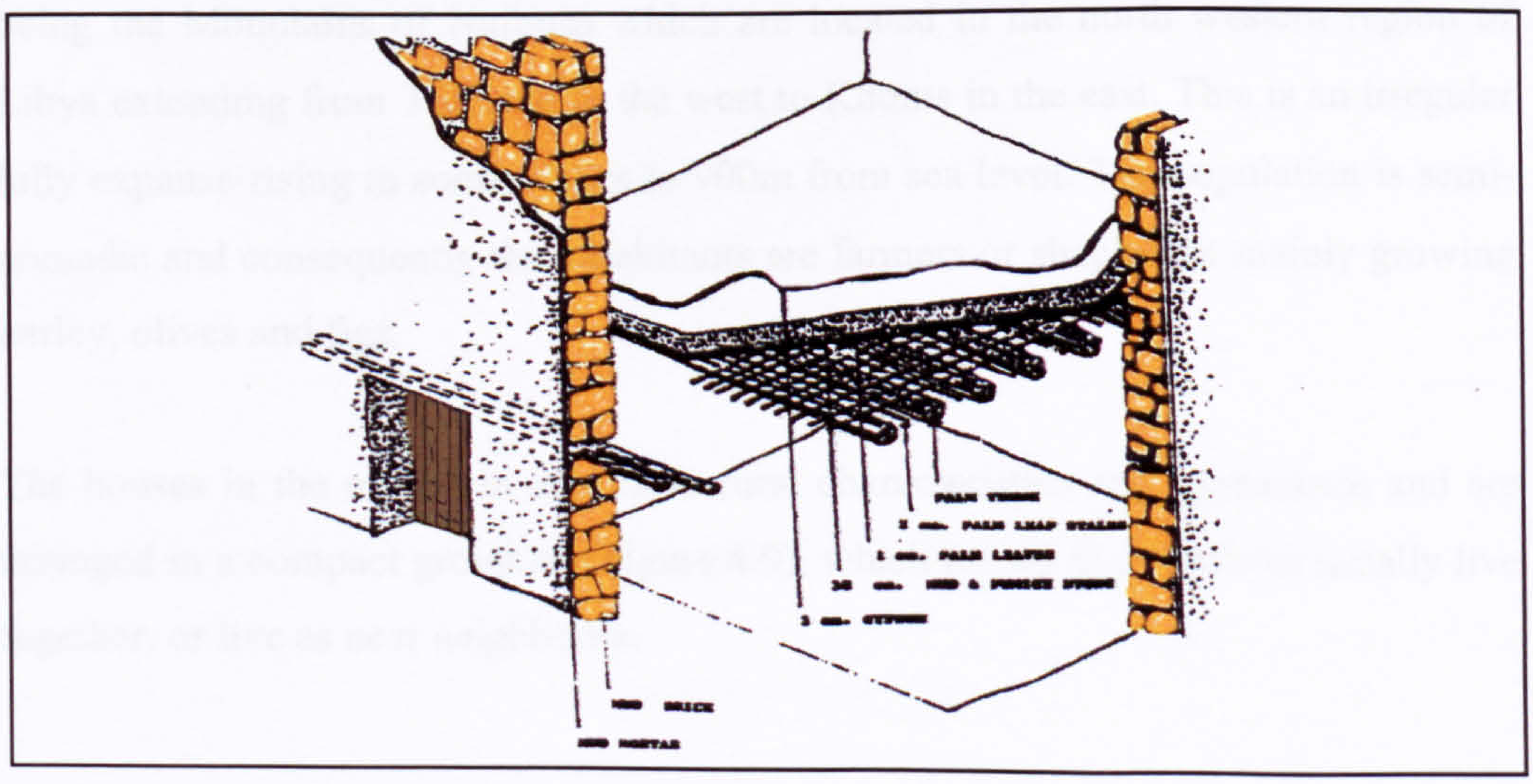


Figure 4.8 : Building material used in Ghadames traditional houses

Source: Awotona 1999

According to Awotona (1999), the housing of this region has some recognisable characteristics as follows:

- The type of dwelling achieves comfortable living space in a cruel climatic region;
- The tight spatial layout of a town such as Ghadames produces strong social bonds;
- The patterns of settlement, with houses being separated by narrow alleys, to provide protection from the heat and sun for those out in the street, improve the circulation of air in the houses by the covered and winding streets which aided the wind movement;
- Local materials are more suitable to the region's climate;
- There is an absence of an open courtyard which is a distinct feature of most houses in other parts of the country;
- Ghadamesian house design represents a clear expression of the socio-cultural requirements;
- Ghadamesian house design reflects the expected modesty between males and females through their complete separation;
- Ghadamesian house layout ensures visual privacy from outside while allowing members of the household to be in contact with the outside via the roofs.

4.3 Dwelling in the mountain area

4.3.1 Introduction

As indicated in chapter two, Libya consists of two mountainous areas, one of them being the Mountains of Nafousa which are located in the north western region of Libya extending from Tunisian in the west to Khoms in the east. This is an irregular hilly expanse rising in some places to 900m from sea level. The population is semi-nomadic and consequently the inhabitants are farmers or shepherds, mainly growing barley, olives and figs.

The houses in the mountain area have rural characteristics and appearance and are arranged in a compact grouping (Figure 4.9), which means that relatives usually live together, or live as near neighbours.

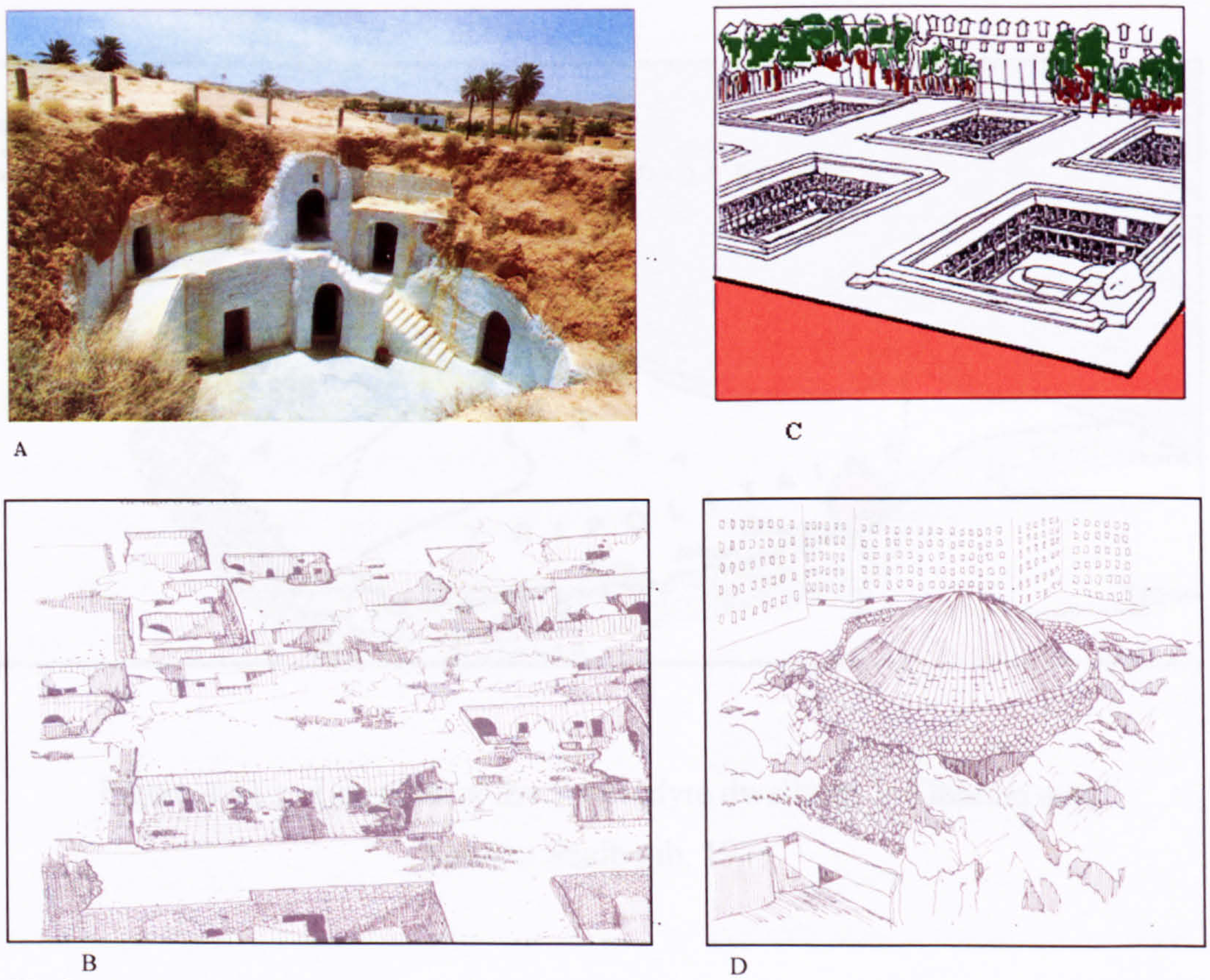
During the early centuries of Islam, the mosque and storehouse were the focal points of the community, and the layout of settlements reflected their importance by placing these buildings at the centre and constructing houses, which were usually adapted to the climatic conditions, around them (Warfalli, 1981). Mountain houses, as already mentioned, were generally inhabited by extended families, following the custom in traditional Libyan society. Two clear designs can be seen, these being underground and houses above the ground level. Within these designs, there are flat-roofed courtyard houses, vaulted-roofed houses and the storehouse(Gasr). According to Shaiboub(1979), the locally available materials, such as stone, clay, gypsum and olive tree-trunks were used for such buildings, and the type of soil in the mountain area made it easy to dig troglodyte houses.

Figure 4.9 : The compact grouping of underground houses

Source: El-Dweb 1997

4.3.2 The Underground Houses

In general, the underground house is one of the types used by ancient civilizations in many parts of the world. It is found in North Africa, particularly in Algeria and Tunisia, where the culture and climate are similar. For example, the town of Matmata in Tunisia. This town located in south of Tunisia is famous for its underground houses. The people of Magmata have been living in these houses for over 700 years. When times became more secure, the underground house was the ideal building solution in a region of great extremes of temperature, however, such houses were also widely used in China, Finland, France, and the United States where the culture is different, but where climatic similarities such as extremes of heat and cold, are prevalent (Sun, 1982, El-Fortea 1989). A number of examples are shown in can be seen (Figure 4.10).



A C B D

A) Underground houses in Matmata, B) Underground house in China C) UNESCO underground builds in France and D) Underground Church in Helsinki

Source: Akara 2000

Figure 4.10 : Examples of Troglodyte building

In Libya, the underground houses are located in the western mountains for example in the Gharian and Ufern area (Figure 4.12). In the western mountains, such troglodyte dwellings e.g. as found in Gharian, were the traditional dwellings since they were well suited to the climate, which as already identified, has high diurnal and annual temperature changes with little rainfall. Consequently, these houses remain comfortable throughout the year (Rghei,1987). Troglodyte dwellings can be categorised into three types as follows:

- **First type**: (Aboskefa) this is completely underground without any elevation;
- **Second type**: (Al-Feseal) this is partially underground with some elevation;
- **Third type**: (Al-Mgara) is a "hanging" house i.e., it is cave-like excavation in a vertical cliff face.

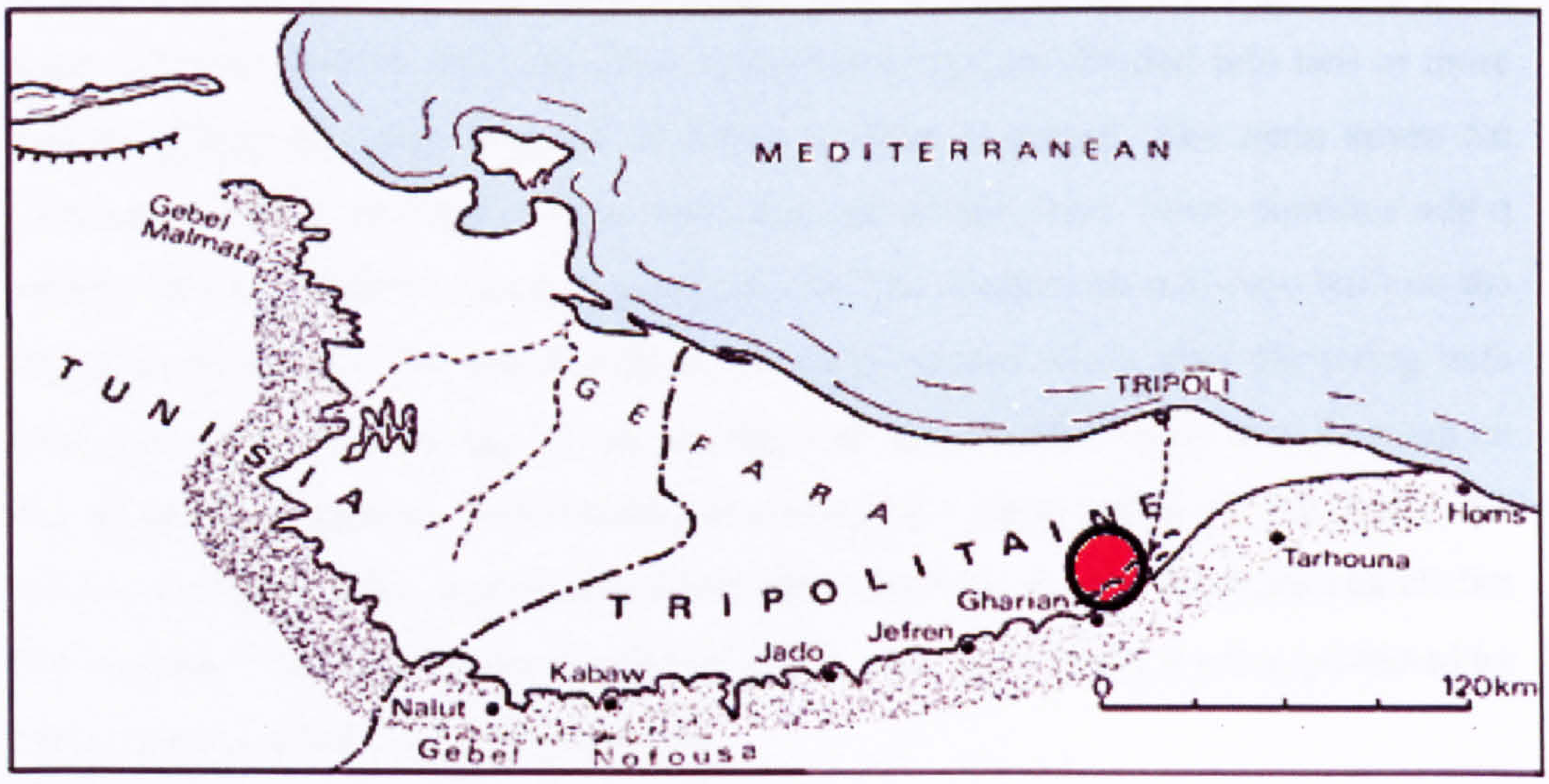


Figure 4.11 : Location of the Troglodyte dwellings in Gharian area
Source: Shaiboub, 1979

I. The first type (Aboskefa)

These types of buildings are completely underground. They consist of a square or rectangular courtyard surrounded by rooms. The size of the courtyard is 8m x 8m wide or more, and 7m to 10m deep dependent on the size of house, and its function is to provide natural light and ventilation, to create an area connecting with the sky and where the daily activity of women can take place. In the middle of the courtyard a cistern tank is dug into the ground and filled with salt and organic materials to absorb the rainwater . The tank is dug deep enough to collect the rainwater from the courtyard. The dug courtyard is surrounded by a small external wall forming an external courtyard built from the excavation material to prevent people and animals from falling into the courtyard below (Daza, 1982; Bukamar, 1985).

In each side of the courtyard rooms are cut that open onto the courtyard. The depth and width of these rooms is 6m x 3m and their height is 2.5m-3m. The rooms are allocated different functions, there being rooms for sleeping, a living room, guest room, kitchen, bakery and bathroom. Some bedrooms are divided into two or more spaces simply by using a piece of fabric to form a screen. The main space for sleeping is about two steps higher than the rest of the floor. Some families add a small room for children less than six years old. The cloakroom is always built on the upper ground level. The interior of all rooms is painted white after plastering with clay, and sometimes storage niches are dug into room walls. Plates may be hung on the walls for decoration. The entrance is usually by a ramp tunnel on one side of the house, and within this, spaces are carved out to provide storage facilities and shelter for animals. The width of the tunnel is 1.5-2 m, and its entrance is often protected by olive wood and palm logs (Figure 4.12).

The height of the courtyard is also 'stepped' to provide two separate levels. The steps are designed both to strengthen the four sides of the courtyard, and to offer access to additional storage space. The upper level, reached using the steps from the courtyard, forms a storage area for crops. Some families build a rectangular guestroom near the entrance of their underground houses, whilst others use one of the underground rooms for this purpose.

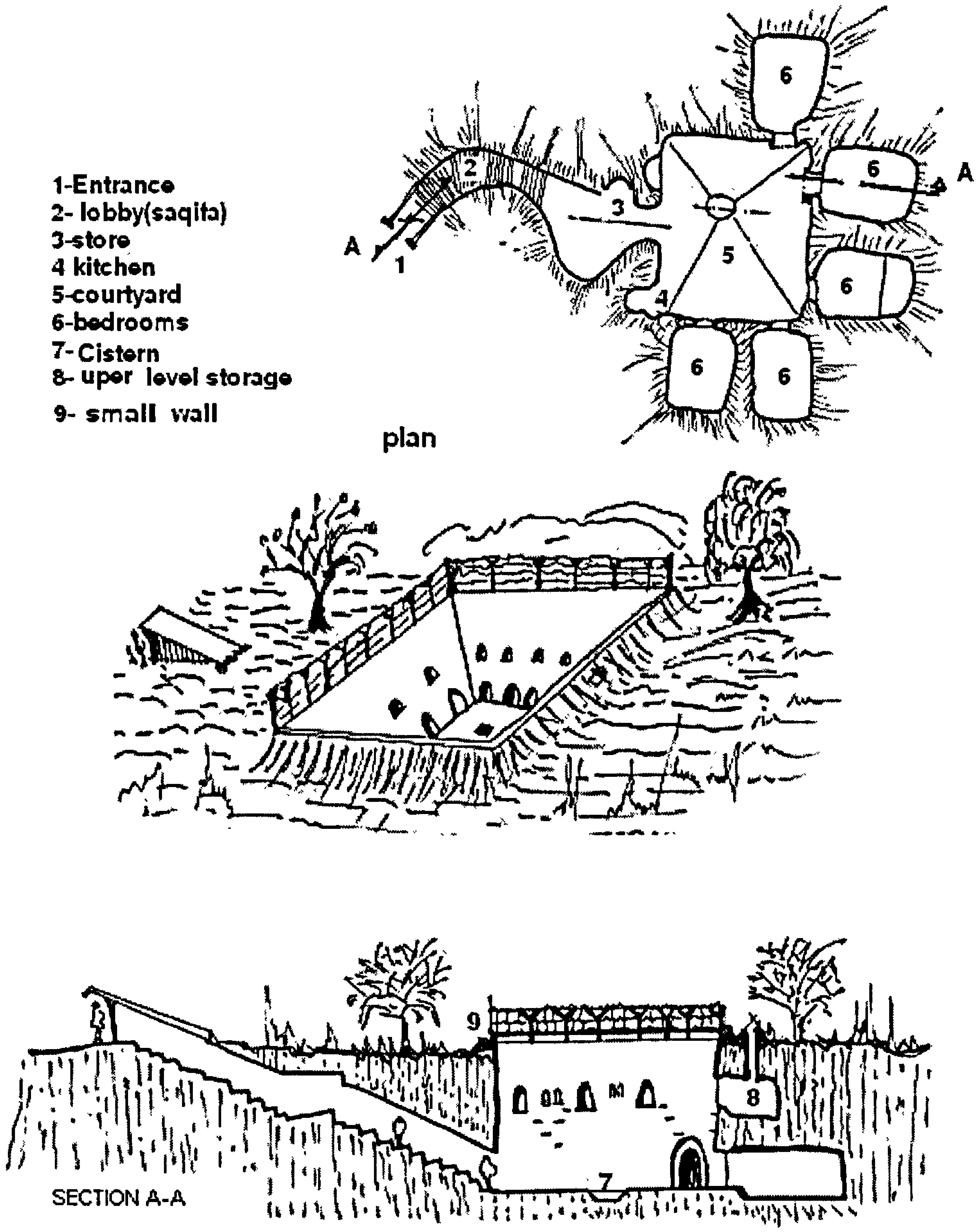


Figure 4.12 : The first type of underground house (Abskefa)
Source: El-Dweb 1997

II. Construction Methods

The construction of underground houses is systematic, and begins with the first stage which is the digging of the courtyard. Thereafter the entrance is constructed, and finally, the rooms on each side of courtyard figure are excavated (Figure 4.13).

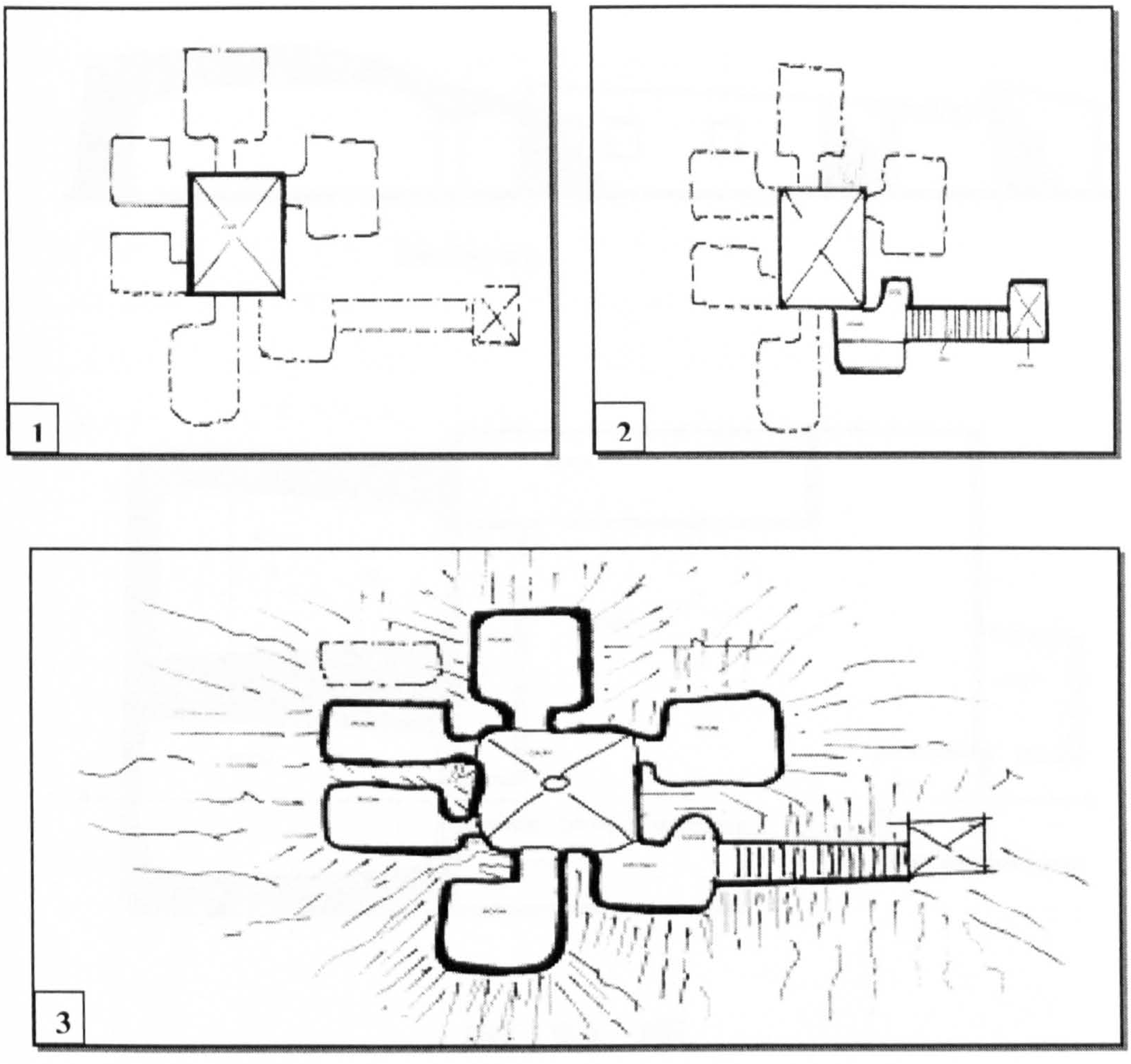


Figure 4.13 : The construction stages of underground houses in mountain area

1. The first stage after selecting the location is to dig the courtyard;

2. Second stag is to construct the entrance;

3. Finally, the Rooms are excavated.

III. The second type (Al-Faseal)

This type is located in the foothills of the mountains on a steep slope. The building has some elevation above ground and consists of a courtyard, almost rectangular in shape, and rooms, which are dug in three sides, the fourth side being built from stone. The light and air enters the rooms directly from the exterior. This type may have had a terrace in front that acted as a courtyard. See (Figure 4.14).

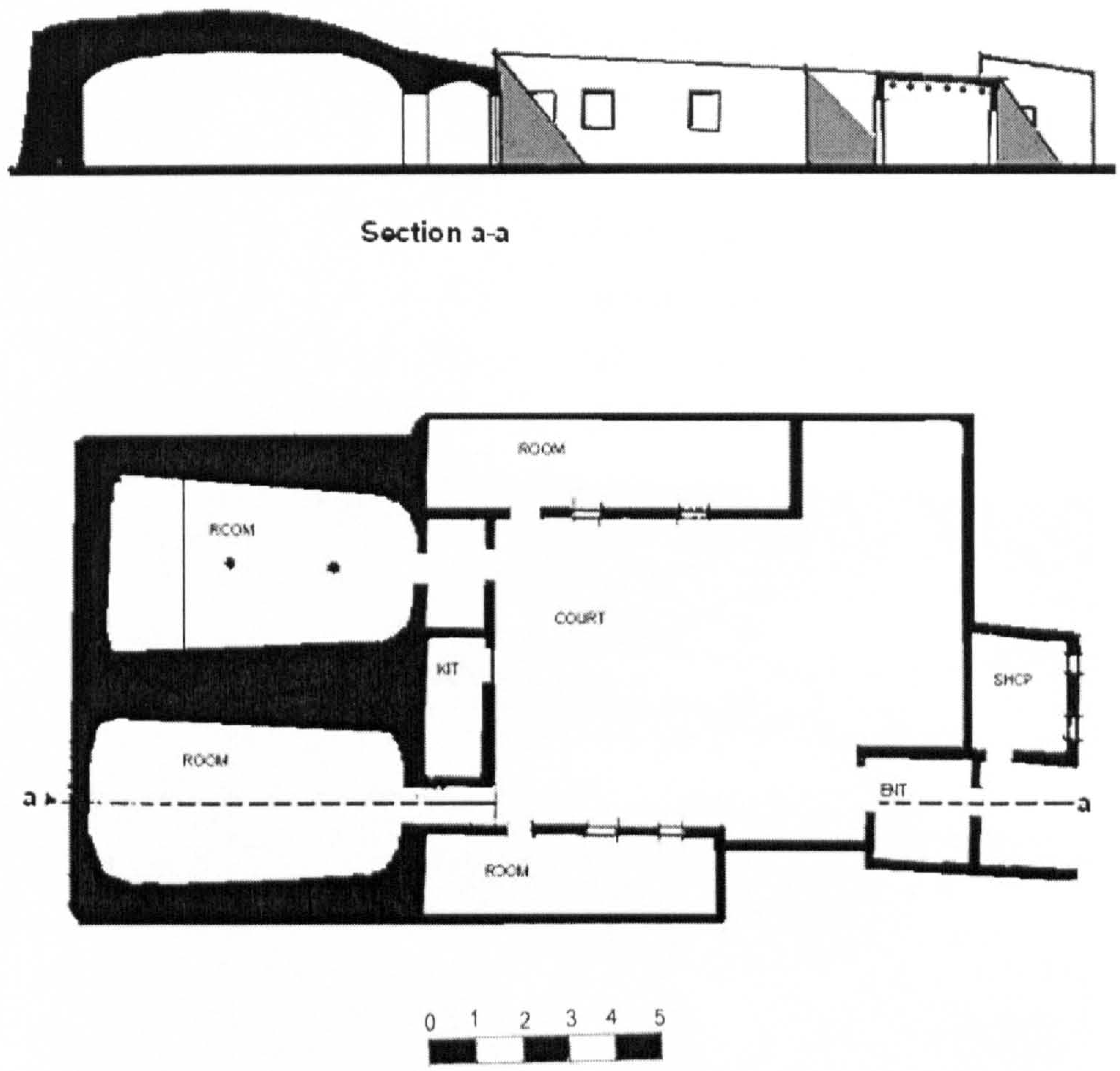


Figure 4.14 : The second type underground house (Alfasel)

Source: Doxiadis Associates 1964

IV. **The third type: Hanging house (El-mkhara)**

This type is located on the sides of valleys and is known as a hanging house, and almost all of these particular types were built in the Roman period. The entrance faced directly to the valley and rose above ground level by about 3m or more, and the house was divided inside to provide many rooms.

Hanging houses were used to offer a defence for their inhabitants in troubled regions, since access to this type of house was made difficult because there was no fixed staircase. Entry was through a moveable staircase, made from natural plants called Al-Alfa that grow in this region. There were also some open holes in the rooms, which were used for observation, as well as openings in the ceiling, that were used for ventilation and to remove smoke from the rooms (Figure 4.15) (El-Dweb, 1997).

The underground houses in Gharian are always dug in the owner's farm or cultivated land, and they require the co-operation of several people to complete the work (Said, 1985). Much diversity of troglodyte dwellings can be found in different areas, but fundamentally, they are all based on the principles described above.

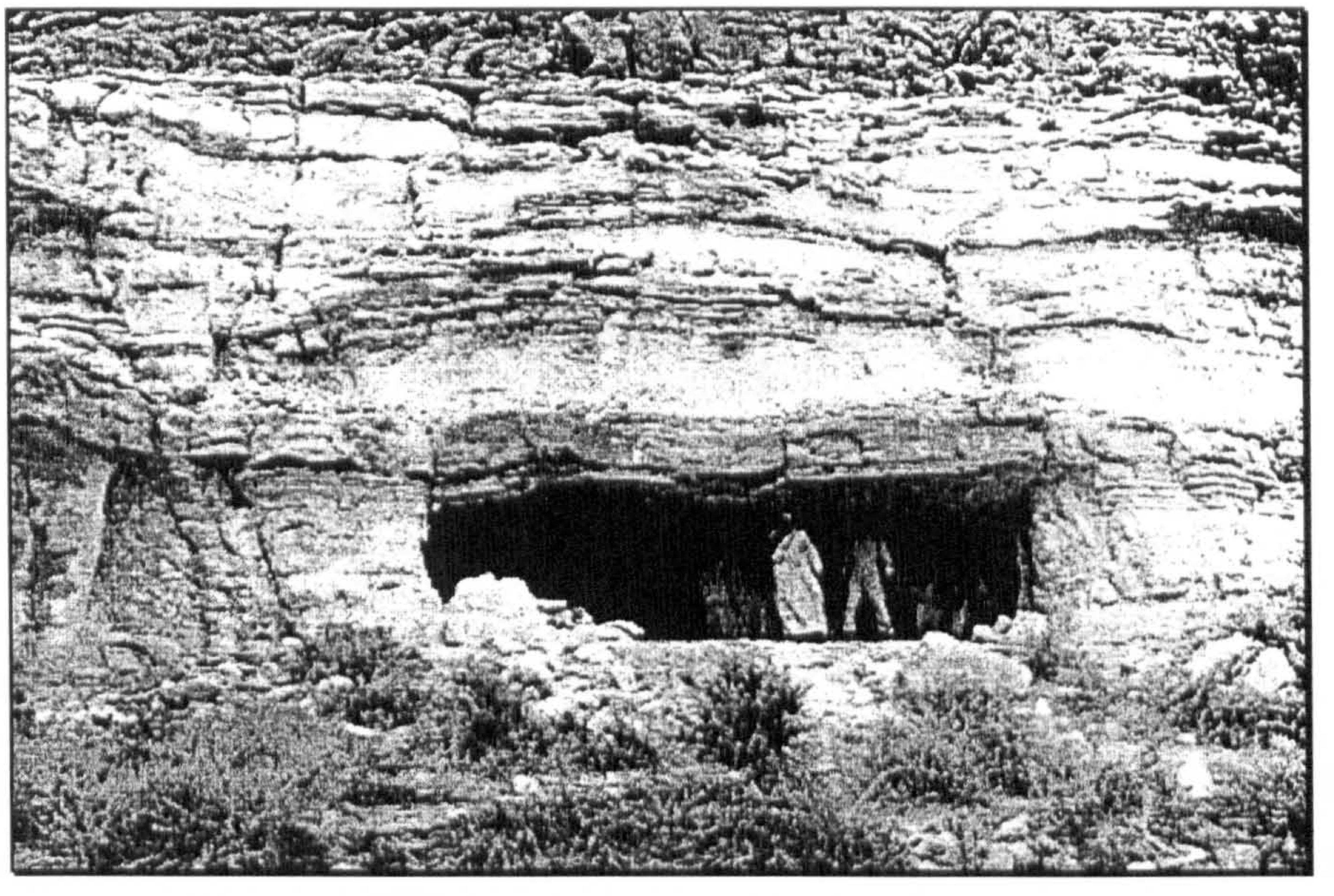


Figure 4.15 : Hanging house

Source: El–Dweb 1997

The advantages and Disadvantages of underground houses

1. The Advantages

There are many advantages to earth sheltered construction as follows:

- They were very inexpensive to build, and do not require much material;
- One of the benefits of underground dwellings, compared with above-ground dwellings, is that they are warm in winter and cool in summer. This is a result of the stability of temperature underground;
- They are the most effective dwellings against the hot, sandy winds such as those from the south (*Gibly*);
- They are secure houses, from man or nature;
- They provide a great deal of privacy for the large family.

2. The Disadvantages

As with any type of unusual construction, there are some disadvantages associated with earth-sheltered housing as follows:

- The underground house in this area isolates the family from their neighbours because of the long distance between dwellings;
- Although these types of houses are very secure, they are relatively unsafe for children, old people and animals, especially at night, falling in to unprotected courtyards;
- They rarely meet current perceptions or for finish and fittings.

4.3.3 Dwellings built above ground (mountain area)

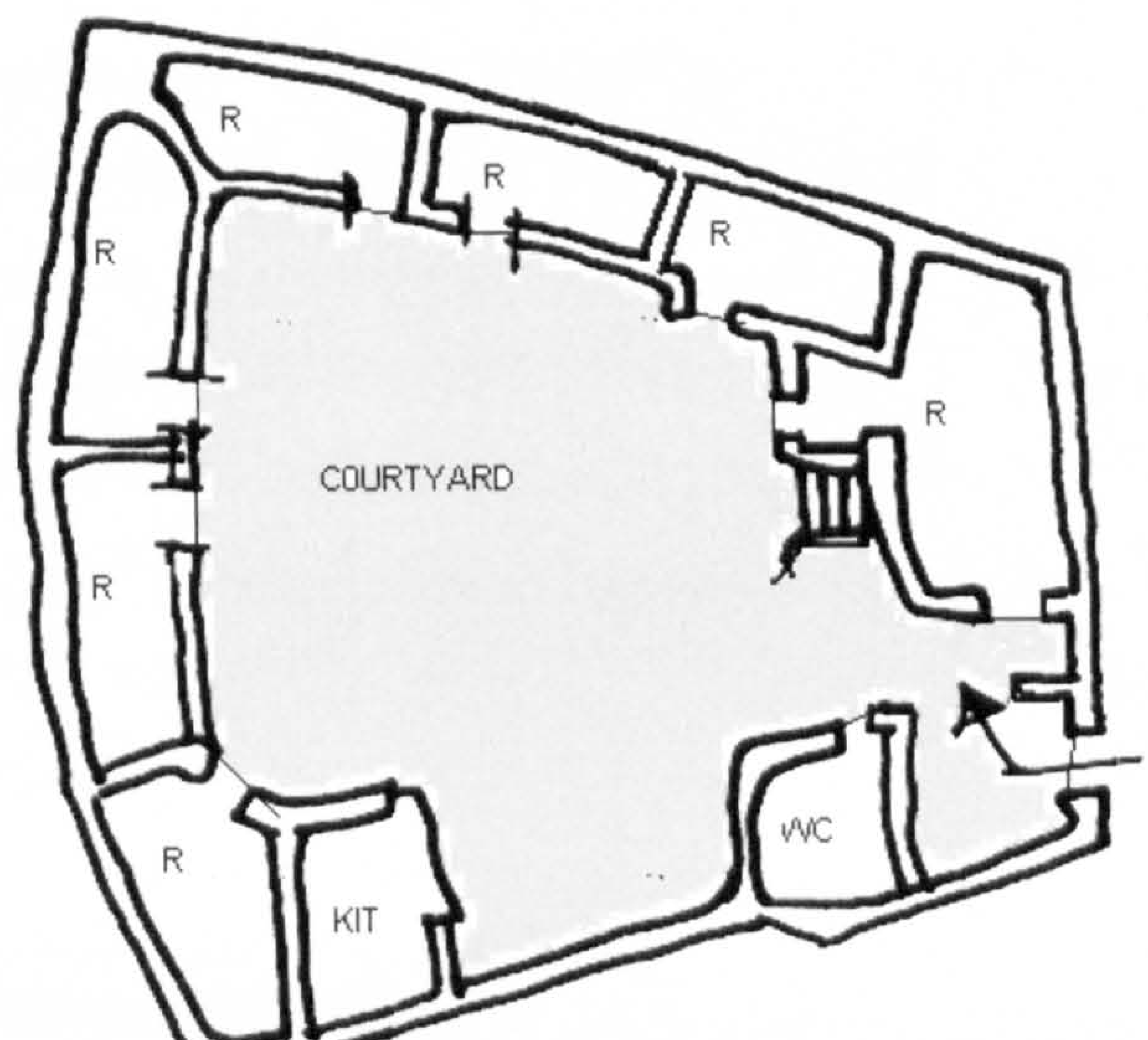
This type of dwelling can be categorized into two types:

- Flat-roofed courtyard house;
- Vault-roofed house.

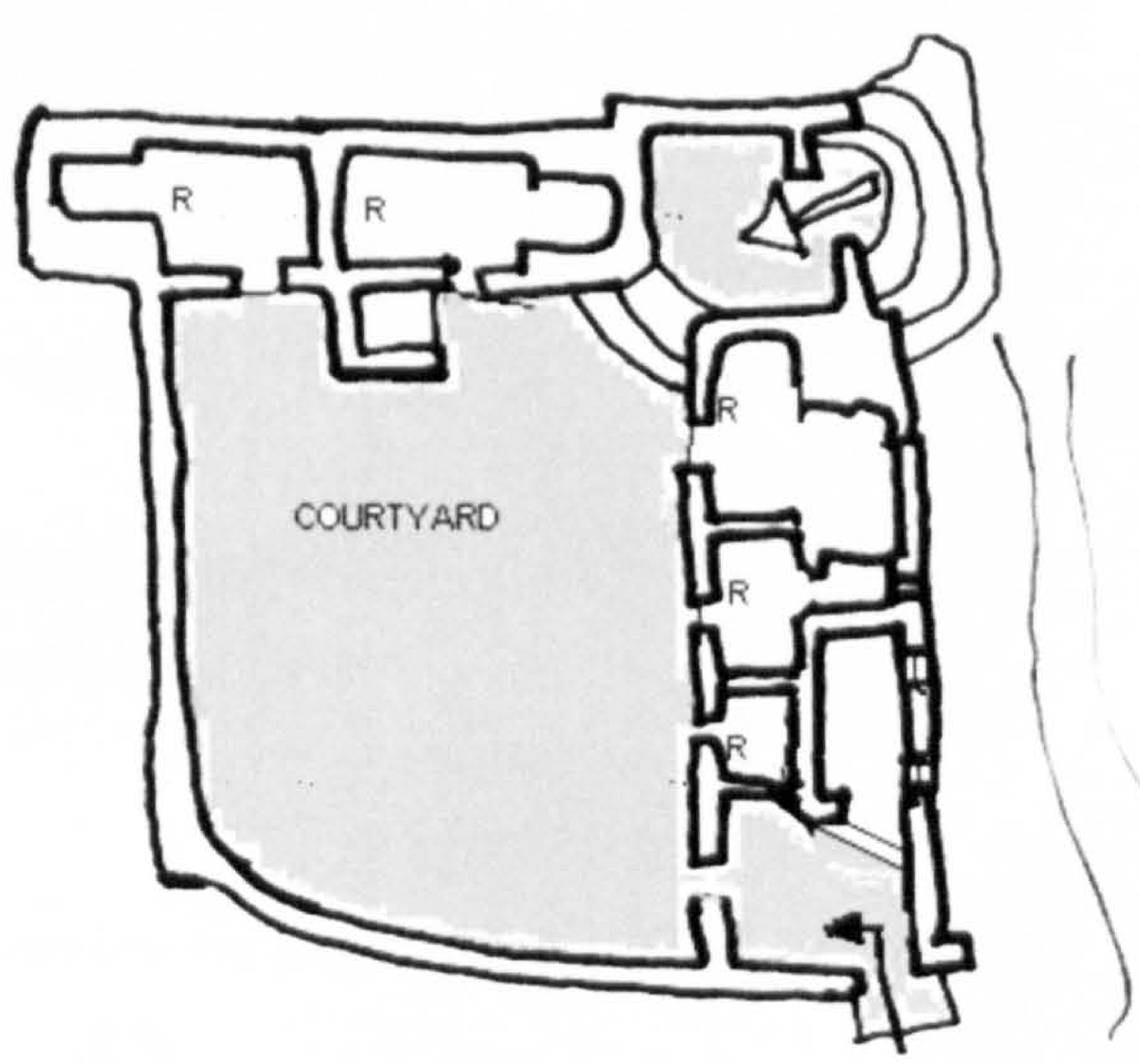
I. Flat-roofed courtyard houses

This type of courtyard house is found the mountain area, and its form is similar to courtyard houses in the coastal area, in terms of the location of the courtyard, which is placed in the middle. However, the form and character of the courtyard and the rooms differ in that the shape and rectangular form of the court are not exact and the corners, rather than being right-angled, have a tendency to curve. El-Fortea (1989) pointed out that, "The form is similar to houses in the coastal area but has a more rounded court thought to have been influenced by Berber traditions".

The material used in the construction of this type of dwelling was rough local stone, lime and clay mortar. The stone is not well shaped or cut, but is rather simply collected from fields and valleys and used without much alteration. Plaster coating is used to finish the walls, and the flat roof is formed from palm–tree trunks and olive branches which are placed across the small rectangular rooms, and then covered with a mixture of straw, clay and pebbles. The characteristic form of this type of house is for the courtyard to hold complete dominance over the rest of the dwelling. Sometimes rooms are built on one or two sides of the court with a wall enclosing the courtyard on the other sides, depending on the level of affluence of the family. In some cases, the courtyard house is formed by a cluster of joined small nuclei or cells (Figure 4.16).



A courtyard dwelling in Jefren



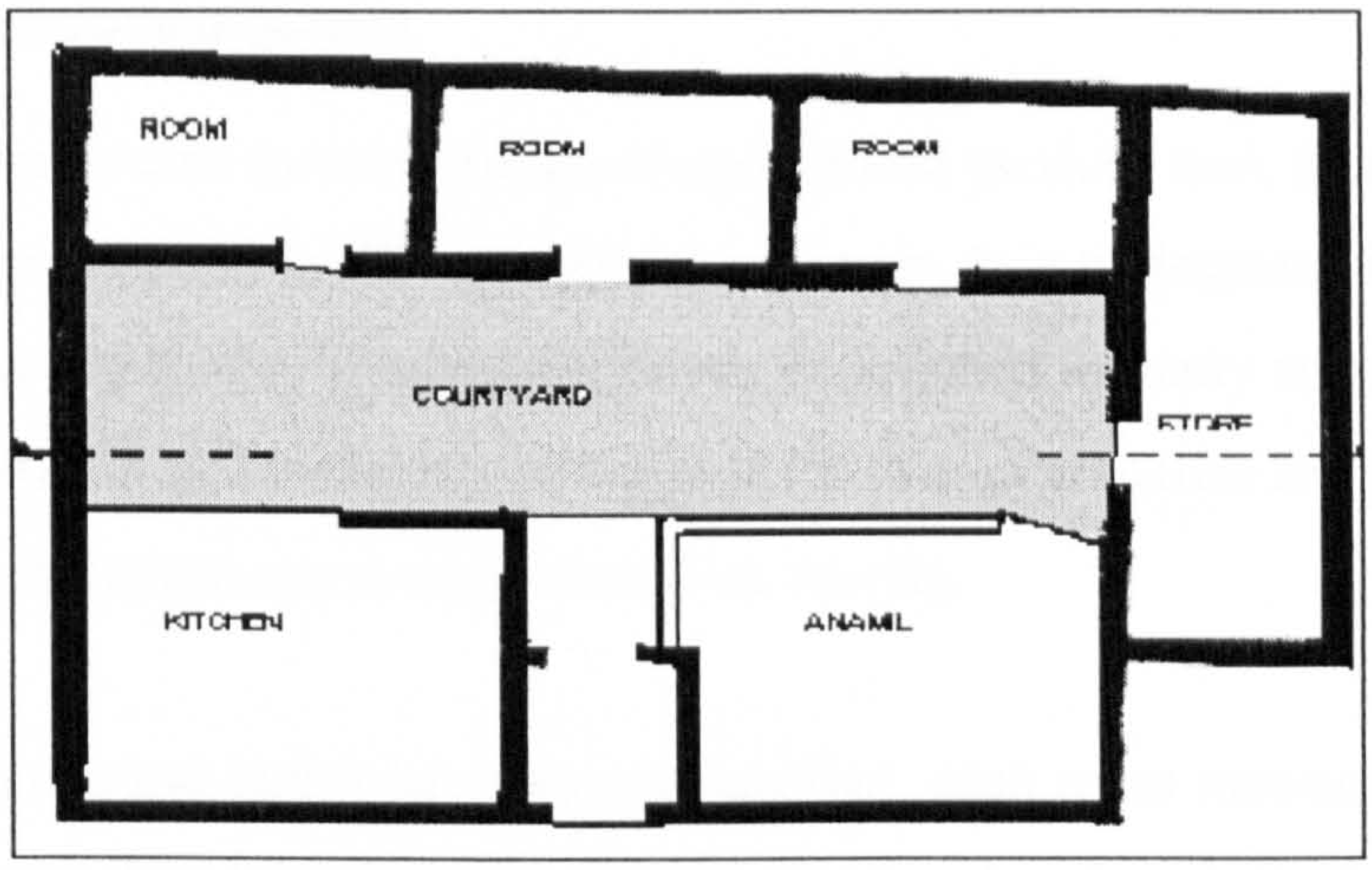
A courtyard dwelling in Jadu

Figure 4.16 : Flat roofed courtyard houses in the mountain area
Source: Daza 1982

II. Vaulted-Roofed Houses

These houses show great similarity to the more developed Gasr in which there would be a courtyard for animals with the storage rooms leading off. When danger did not threaten, people built their own small vaulted stores on top of the houses and then mirrored the pattern of the Gasr in the house itself. The vaulted roof was stronger and could, therefore, hold a considerable weight throughout a long period. Building, however, was still unrefined, although more advanced than in the flat-roofed dwellings. (Figure 4.17).

The material of construction is uncut local stone, see (Figure 4.18) laid in rows leaning in to form the barrel-vaulted roof. The vault could be left in curved form or made into a flat terrace with a covering of clay and plaster. Buttressed walls carried the weight of archways beneath but were often not strong enough, and they show signs of constant repair work being necessary, due to cracks. These problems often led to total collapse and the form was consequently not one that found favour in a wide area. Rebuilding was often influenced by the coastal settlements, where flat-roofed houses were used.



Ground Floor Plan

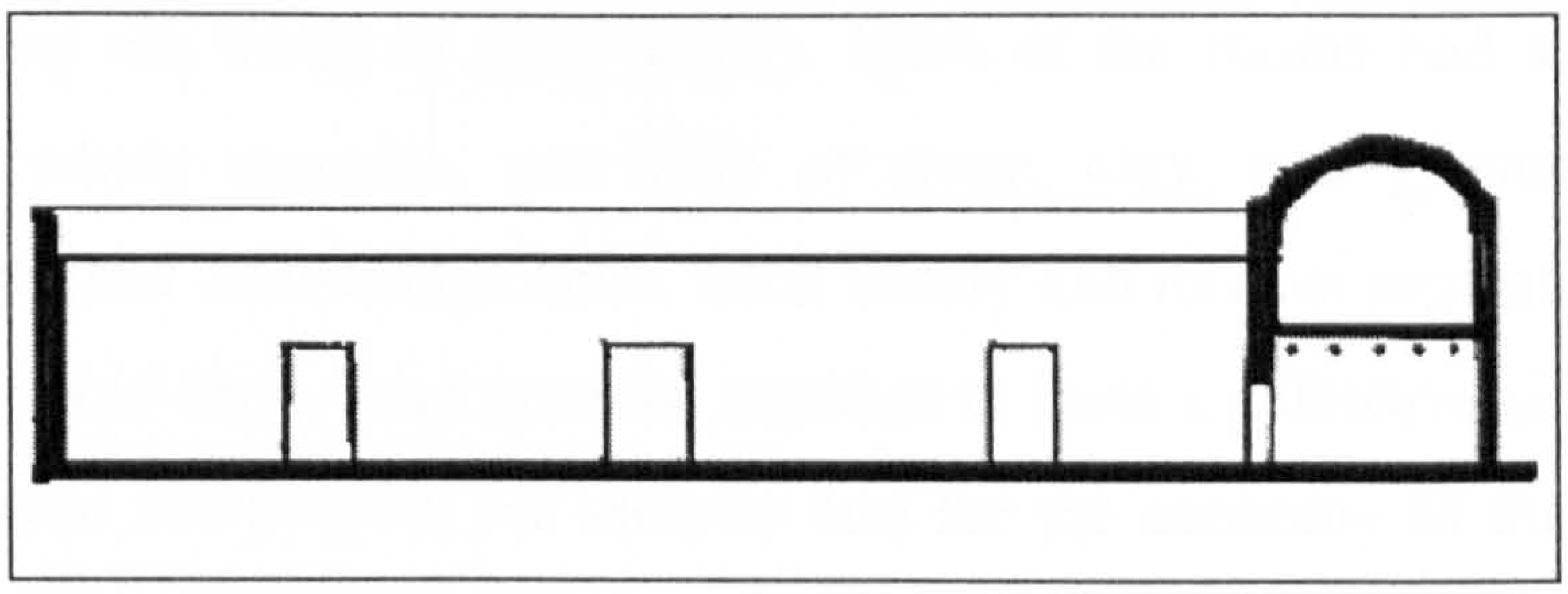

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Figure 4.17 : Vault roofed house

Figure 4.18 : The local stone, which is used in construction of houses

III. The Storehouse (Gasr)

The storehouse is used for the storage of agricultural produce and, therefore, it had a very important function in the agricultural economy. It is widespread throughout the Jabel Nafousa region. Fortified granaries are established in many areas such as Gasr al-Haj, El-Assabah and Nalut. (See Figure 4.19). Some granaries are tidy in a circle around an open central space, such as in Gasr Al-Haj.

The grain stores were built one on top of the other, each room measuring 1.9m long, 1.6m wide and 1.75m high. The doors of the storage chambers were, between 50 and 70cm wide and are made of palm trunks. Each of the rooms had a barrel-vaulted ceiling. The whole complex was built of stone, clay, and gypsum. Mostly the granaries contained 500 storage units. Each family had its own separate storage room in the granary, and these were grouped together to form a defensive citadel in case of attack. This type served both for security and for the economy of the entire region. The room itself was divided into many parts to store wheat, barley, olives and olive oil, which was stored in large jars. These granaries are widespread in North Africa, particularly in Tunisia and Algeria.

Figure 4.19 : The storehouse (Gasr)

Source: Grafa 1996

4.4 Dwellings of the Coastal Region

The coastal zone is located on the north border of Libya along the Mediterranean Sea and it extends from Egypt in the east, to Tunisia in the west. A part of the North African coast it consists mainly of fertile agricultural flat land. On the coastal strip there are some commercial centres towns such as Tripoli, Misurata, Alzawia, Khoms and Benghazi. Their cities are similar to the other coastal cities such as al-Eskandrai in Egypt, and Tunis in Tunisia. One of the important traditional cities in the coastal area in Libya is old Tripoli.

The scheme of the old city of Tripoli follows no superimposed grid system; it gives an obvious example of organic growth (Figure 4.20). The widths of streets or alleys are only 2 to 3 metres. Some streets are buttresses between the opposite walls of the houses that provide support of the houses.(See Figure 4.21). This scheme gives access to inward facing courtyard houses (Rghei 1978). The type of house used in this zone is mostly courtyard house. Azzuz (2000) indicated that the consideration of climate, customs and traditions were major factors in shaping this city.

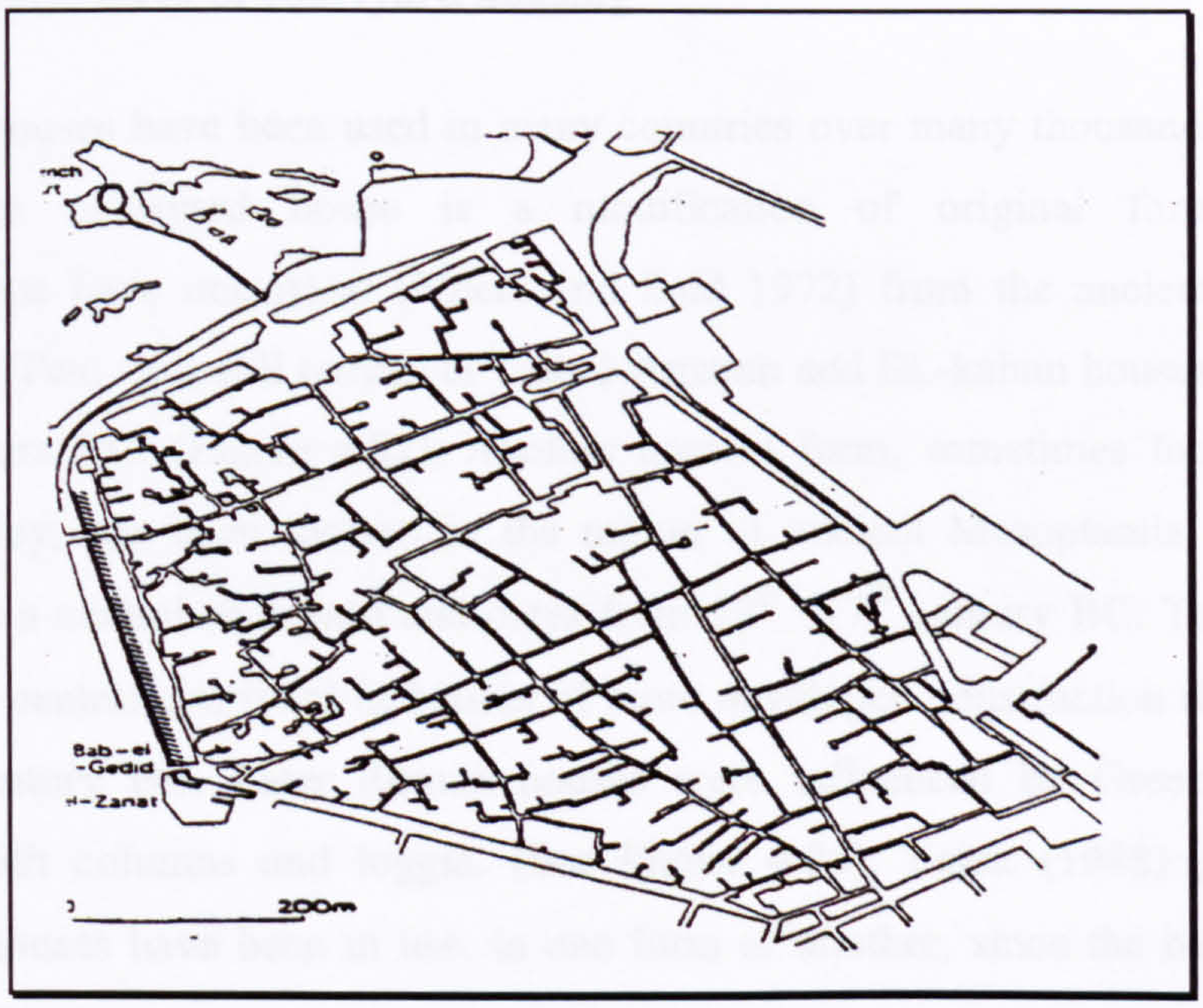


Figure 4.20 : City structure of old Tripoli

Source: Amourah 1993

Figure 4.21 : Streets and buttresses

4.4.1 Historic form of courtyard housing

Courtyard houses have been used in many countries over many thousands of years. The Libyan courtyard house is a modification of original forms, which archaeologists have unearthed (Elders and Said 1972) from the ancient Egyptian civilisation. Two sites still remain at Tell el-Amaran and EL-kahun houses date back to 2000 years BC. (Figure 4.22). Another ancient form, sometimes found with a second storey, has been located in the region of ancient Mesoptamia. This type usually had a central courtyard and dates from 19th –17th century BC. The Romans also used a central courtyard in houses of more developed construction dating from 4th –2nd century BC. Later Roman houses were influenced by Greek styles of building with columns and loggia. (See Figure 4.24). Leick (1988) points out; courtyard houses have been in use, in one form or another, since the beginning of human civilisation.

However, it is in Arab lands of the 7th and 8th century Islamic empire that this type of house was adopted as the predominant style of house design. The internal courtyard was not a design feature unique to Islam. It was borrowed from earlier civilisations in the Middle East, for example, from the Babylonians, Egyptians (Figure 4.23) (Majid, 1997). However, given the holiness of the family and "privacy" in Islam, the courtyard was something ideally suited to these objectives, quite apart from its important role in alleviating the strong heat of summer, through its capacity to manipulate the available air currents (Montequin, 1983).

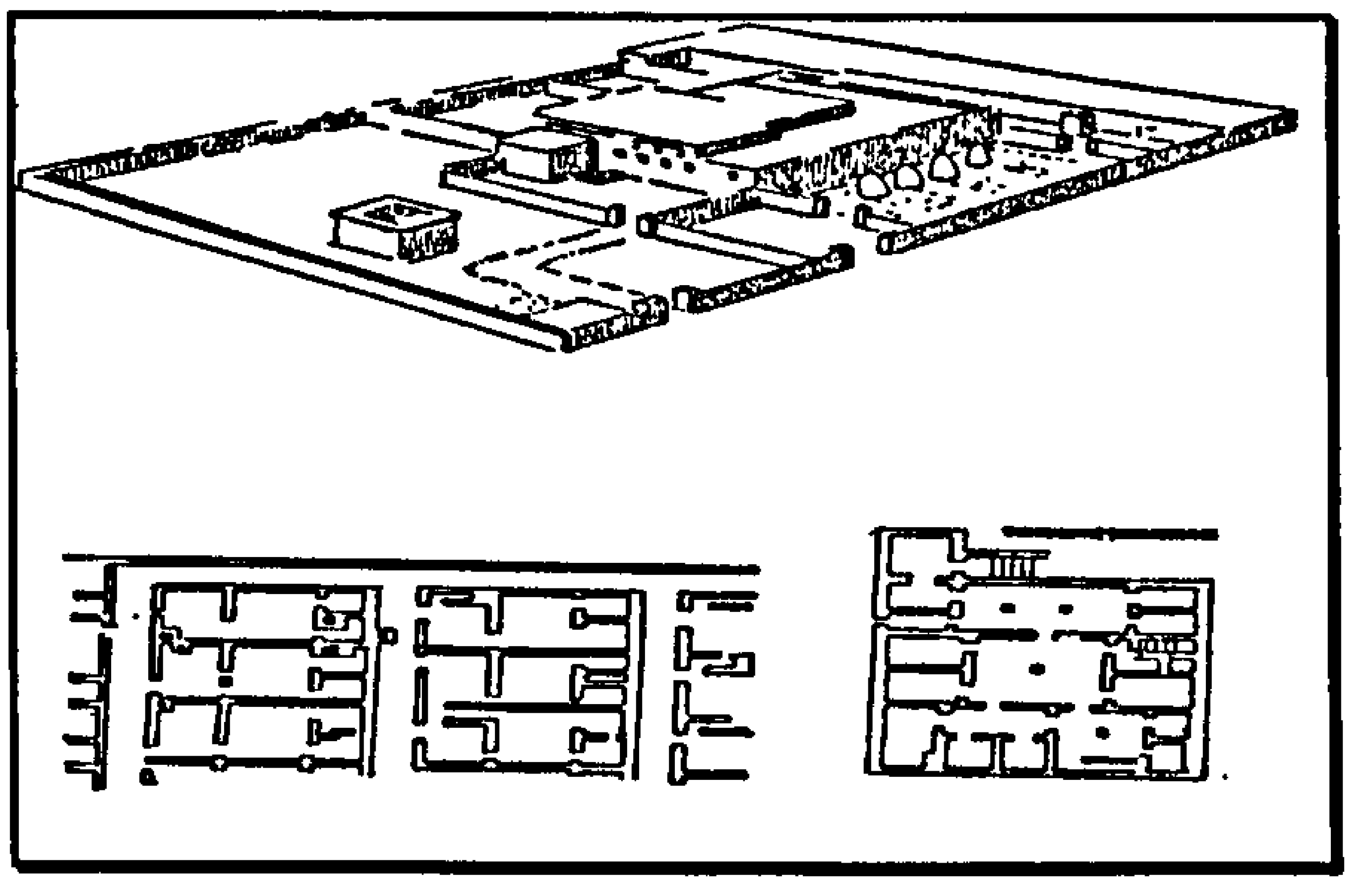


Figure 4.22 : Examples of ancient houses from (Tel El-Amarna)
Source: Shaiboub, 1979

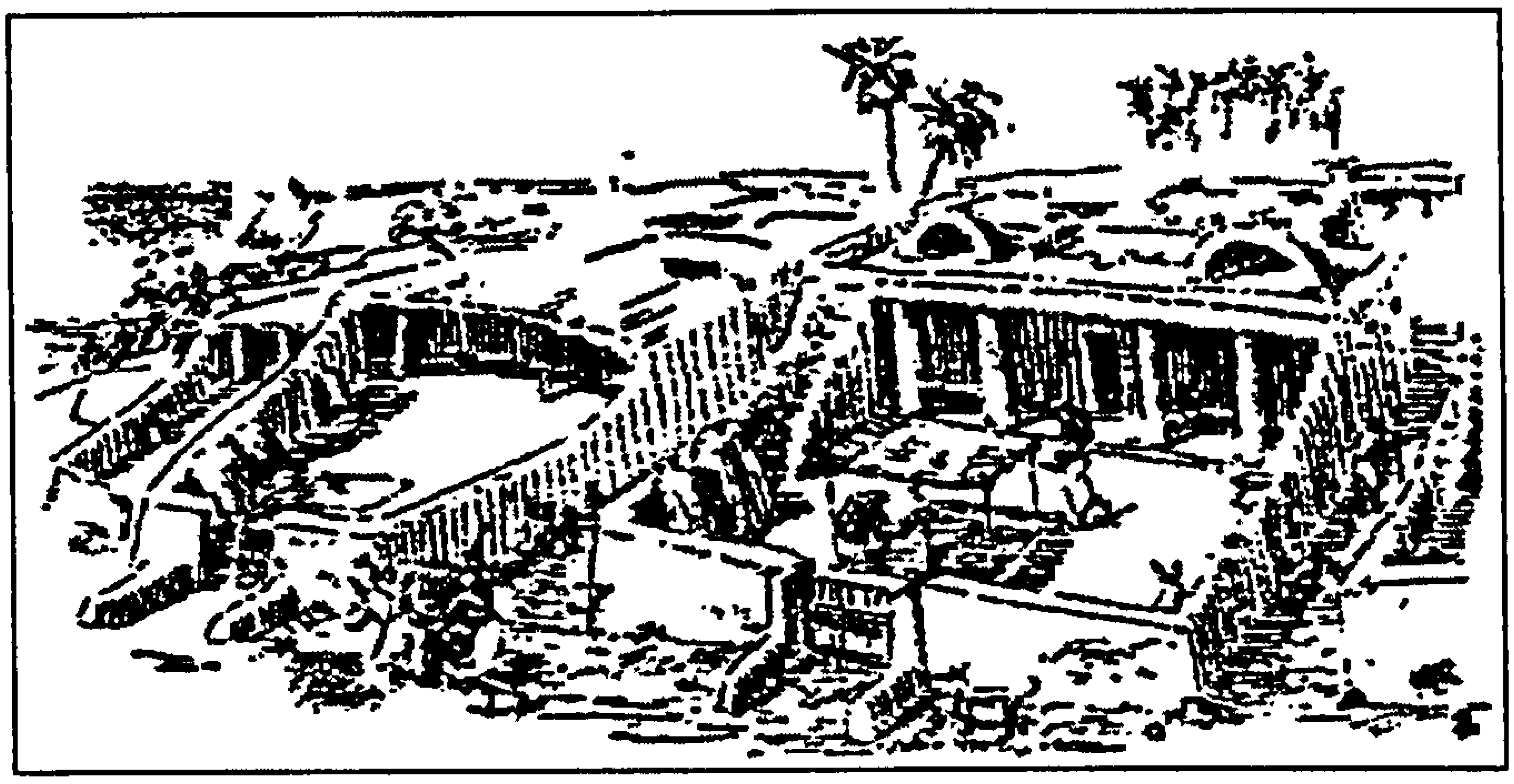


Figure 4.23 : Examples of ancient houses from (Tel El-Amarna)
Source: Shaiboub, 1979

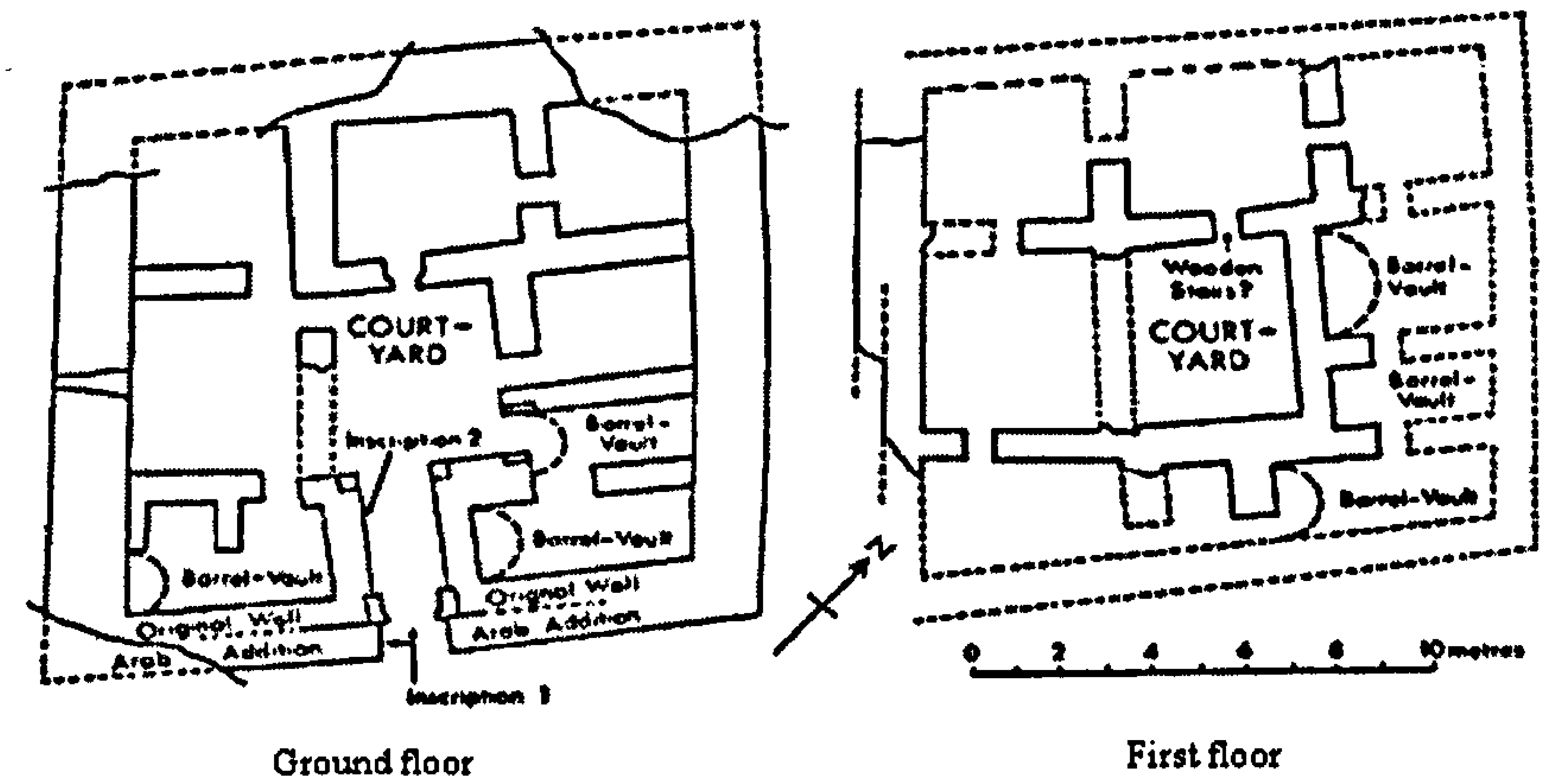


Figure 4.24 : The examples of Roman forts and Gasrs
Source: El-Dweb 1997

4.4.2 The houses in the Coastal Area

The courtyard house is widespread in Libya especially in the coastal cities such as Tripoli, Khoms and Misurata. However, with the entire coastal area, two-types of courtyard houses can be seen, one reflecting the needs of city dwellers, and the other being built in rural surroundings where there are different environmental and social influences.

The courtyard house in the cities

The courtyard houses in the cities are usually constructed in rows and have only the front facing onto the narrow streets, whereas the other sides are connected to adjacent housing. The average area of these houses is 300 square metres, and the courtyard ranges in size from 70 to 100 square metres. The traditional house was mainly categorised into two types, those with one storey, and those with two, which are more popular in the cities for reasons of land limitation. Figures 4.26 and 4.28 indicate that the shape of a courtyard house may be rectangular or square (Zarrugh, 1978).

This type of dwelling consists of a courtyard surrounded by rooms, which in themselves may be separated from the open courtyard by open arcades. Palm, fig trees and a fountain, are usually found in the courtyards. The trees provide shade and the fountain evaporative cooling during the summer. (See Figure 4.25). Bedrooms are usually situated on the upper floor or far away from the street side on the ground floor. The sizes of rooms are long and narrow about 2.5 x 6 m.


Figure 4.25 : Trees provide shade and fountain for evaporative cooling

All the construction materials such as limestone, sand stone, and mud brick were locally available, and roofs were generally flat, usually made of fine compacted earth or clay straw, and were laid on a timber structure made of pine timber joists and timber boards Figure(4.27). This type will be examined in depth in Chapter Five which considers courtyard houses in Tripoli.

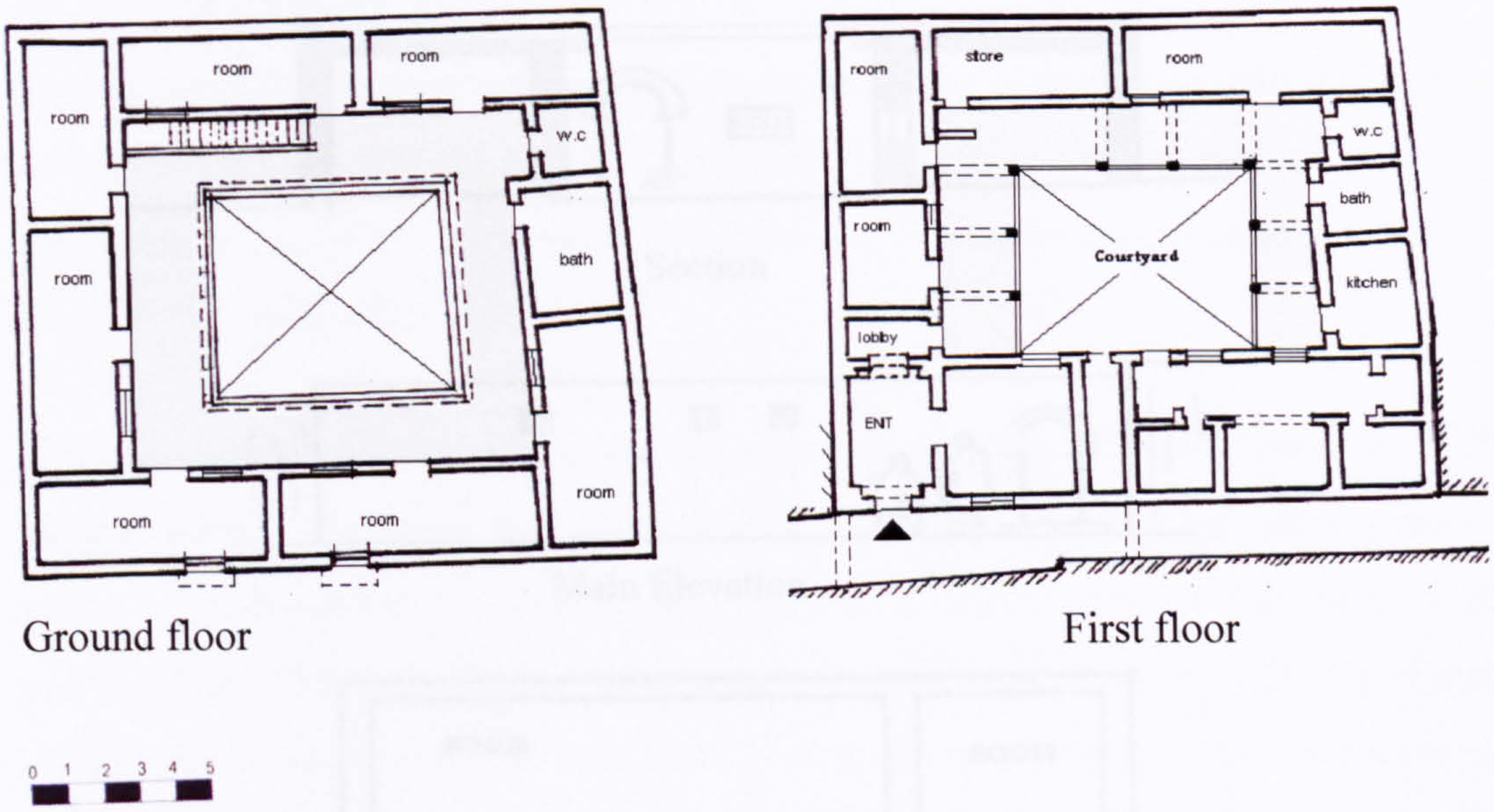


Figure 4.26 : A two-story Libyan courtyard house

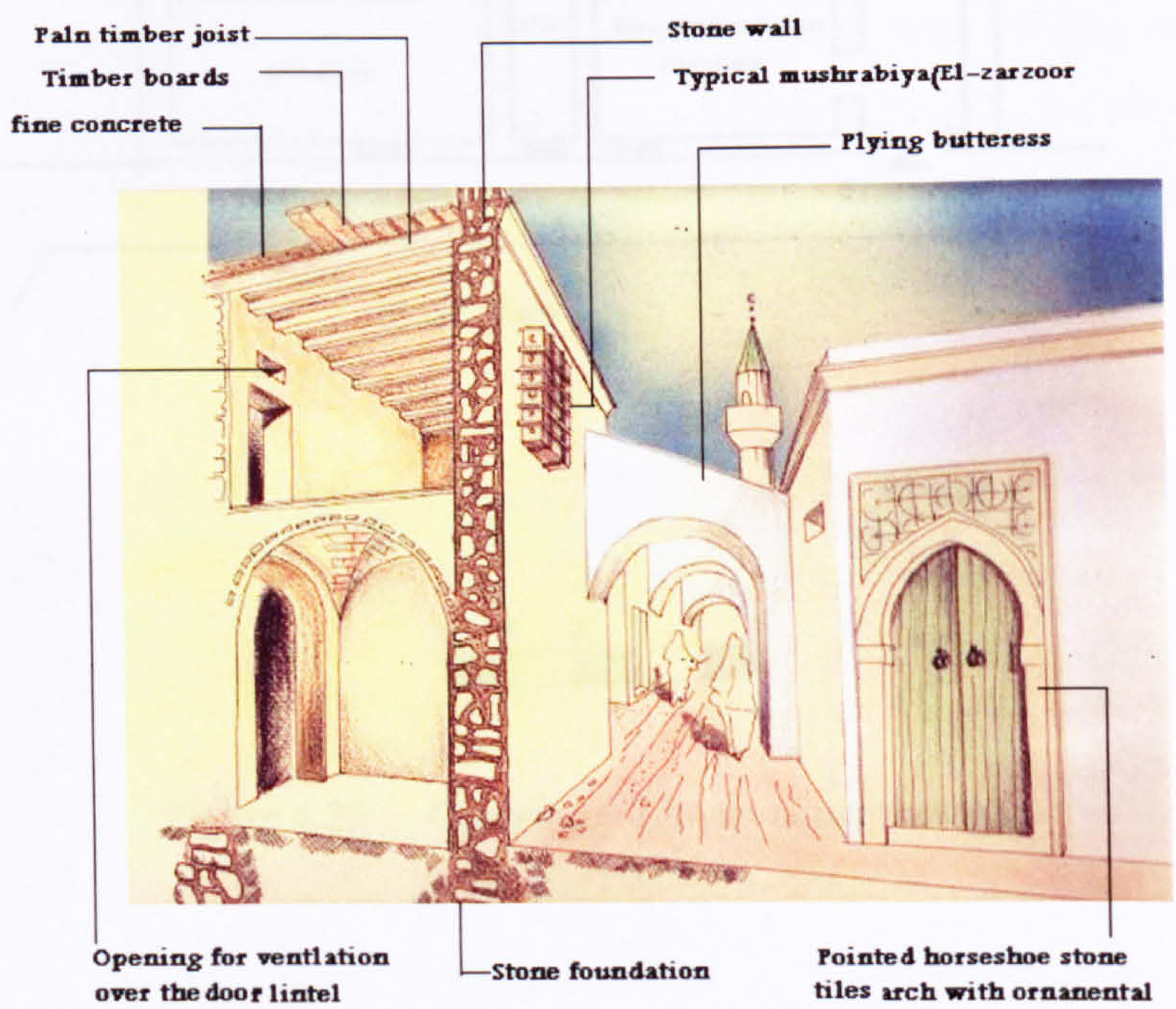
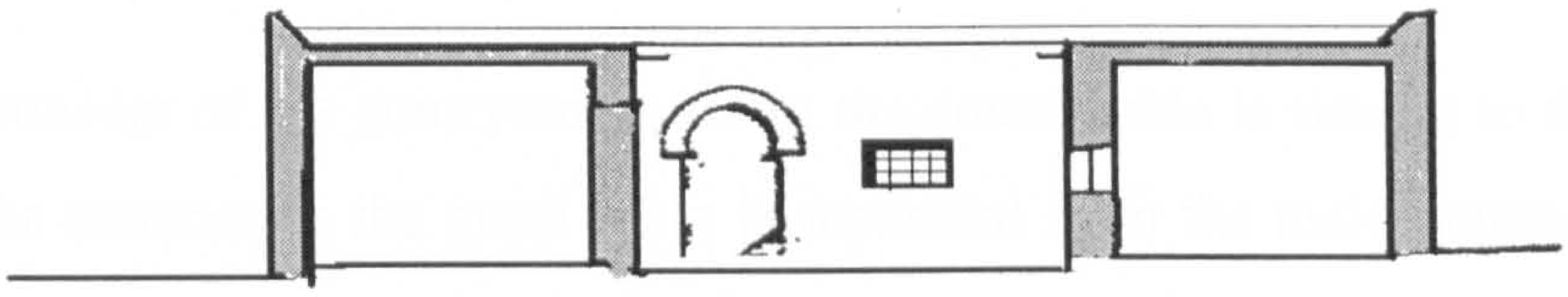
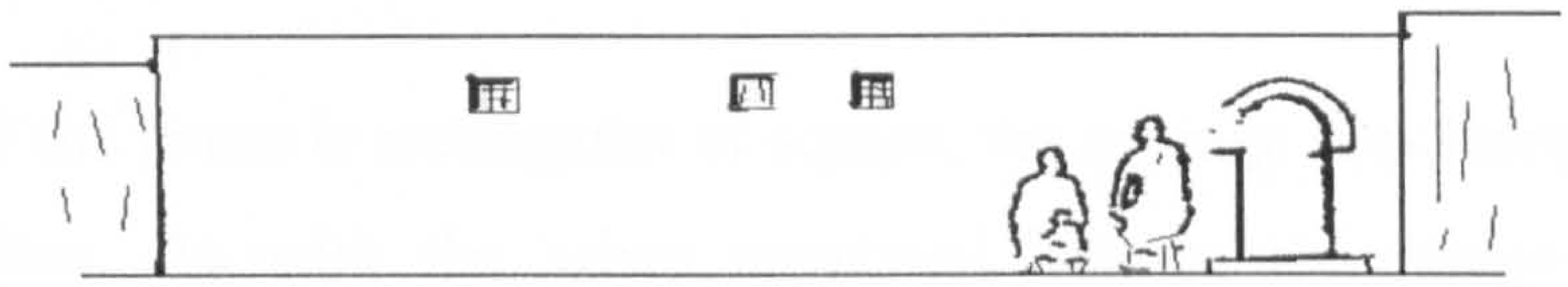


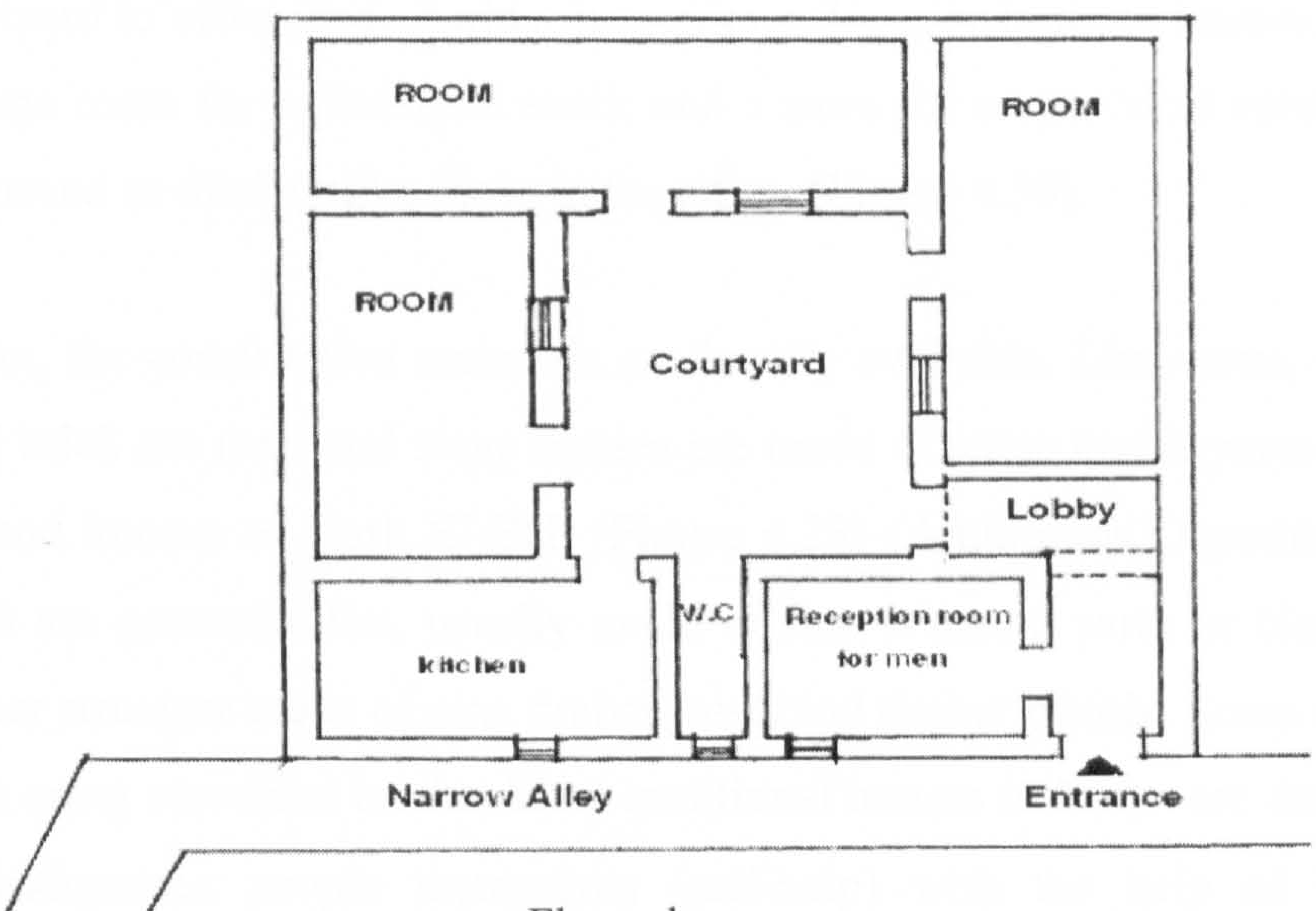
Figure 4.27 : A cross-section of alley and building materials in traditional city of Tripoli



Section



Main Elevation



Floor plan

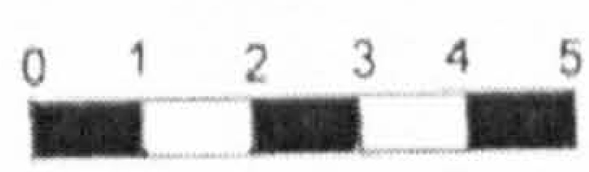


Figure 4.28 : One storey Libyan courtyard house

The courtyard house in rural areas

The concept of the courtyard house in the countryside is similar to that in the cities, but the entrance to the guest room is separated from the main entrance of the house, and because of fewer land restrictions, houses in rural environments are usually single storey with a flat roof.

The plan of the house is rectangular or square, the average area being more than 300 square metres. As with the urban courtyard houses, the design incorporates a courtyard surrounded by rooms, and the use of grapevines or fig trees in the courtyard to offer shade during the summer. Usually in these houses, there is a large storage room for agricultural tools, and a store for crops. Most rural courtyards are not paved or tiled, unlike those in the cities. (Figure 4.30).

Again, the construction materials are locally available. Limestone, sand stone, and mud brick are used and some houses are made of stone that is pressed together in a method known as Darb El-Bab (Figure 4.29) (Antiquities Department 2000). The roofs are generally flat, usually made of fine concrete earth or clay and laid on a timber structure made of pine timber joists and timber boards. Some other houses are built using sun-dried bricks. Most traditional houses in Libya are designed and built by indigenous people themselves (self-help) with the help of local craftsmen (Abdelhalim, 1985).

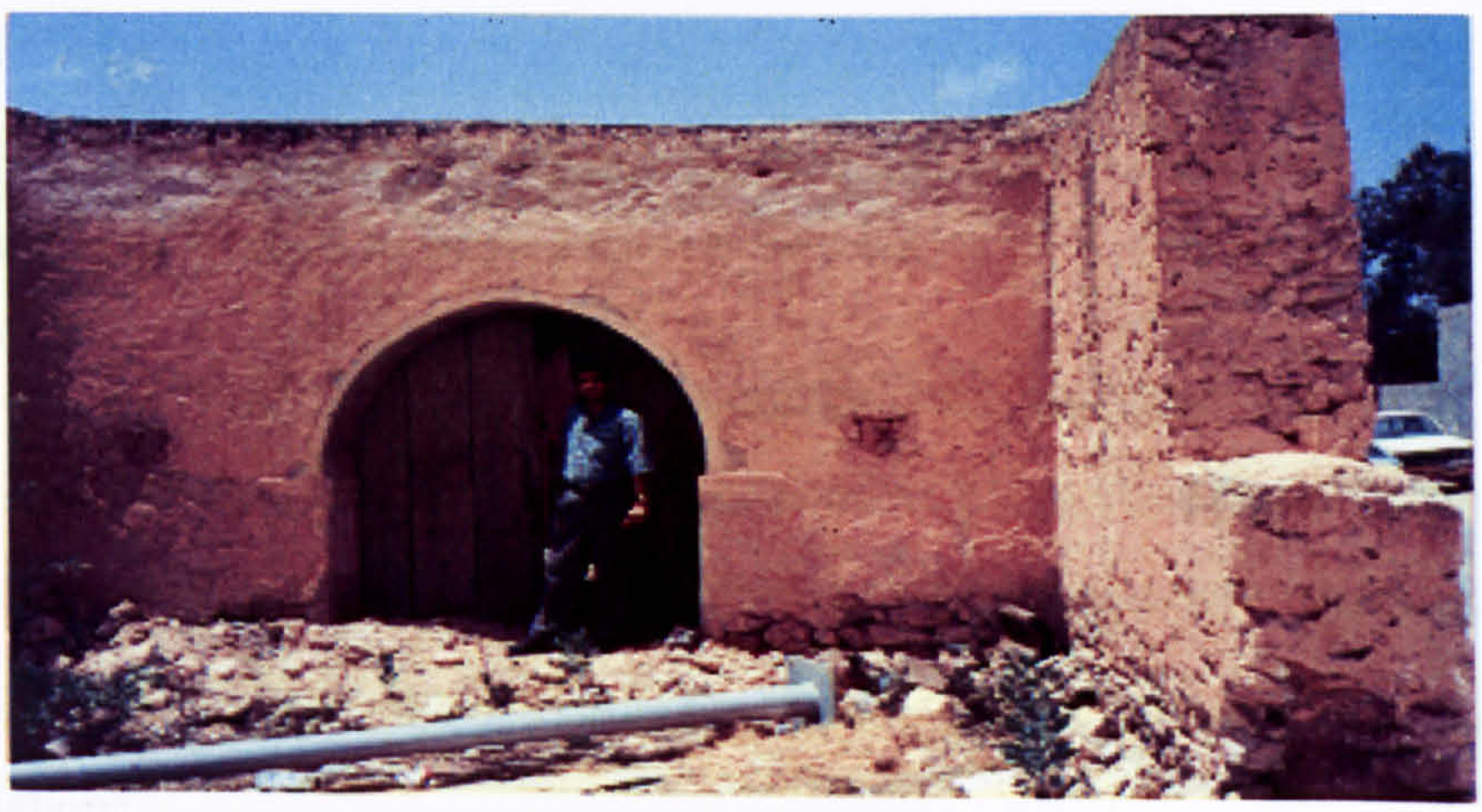
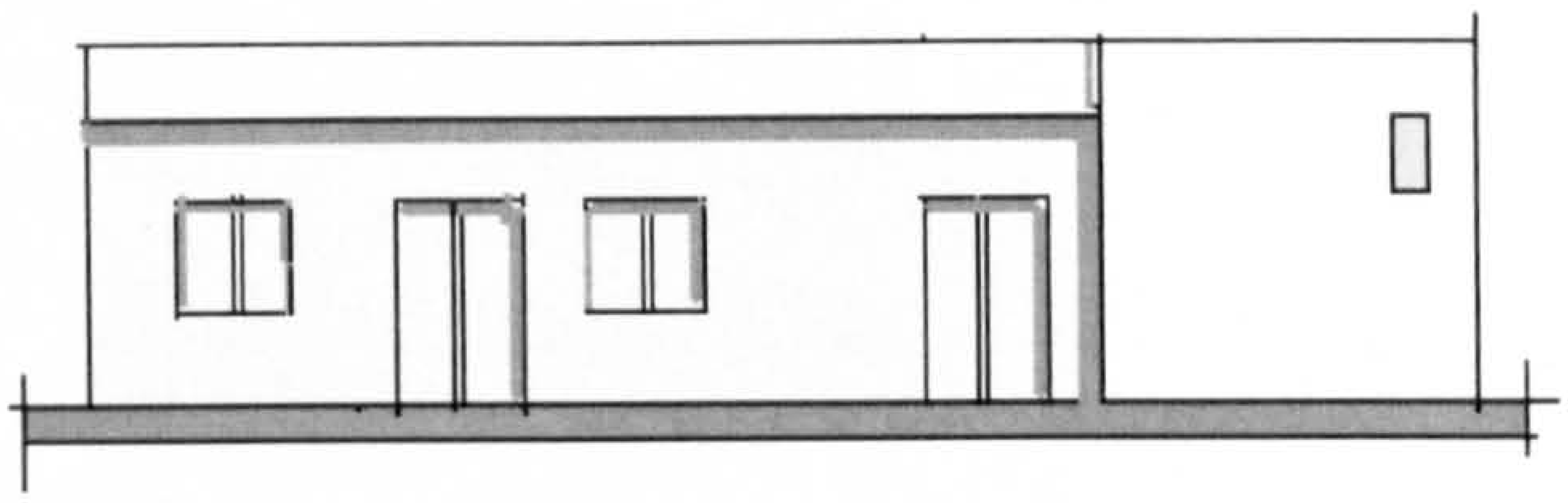
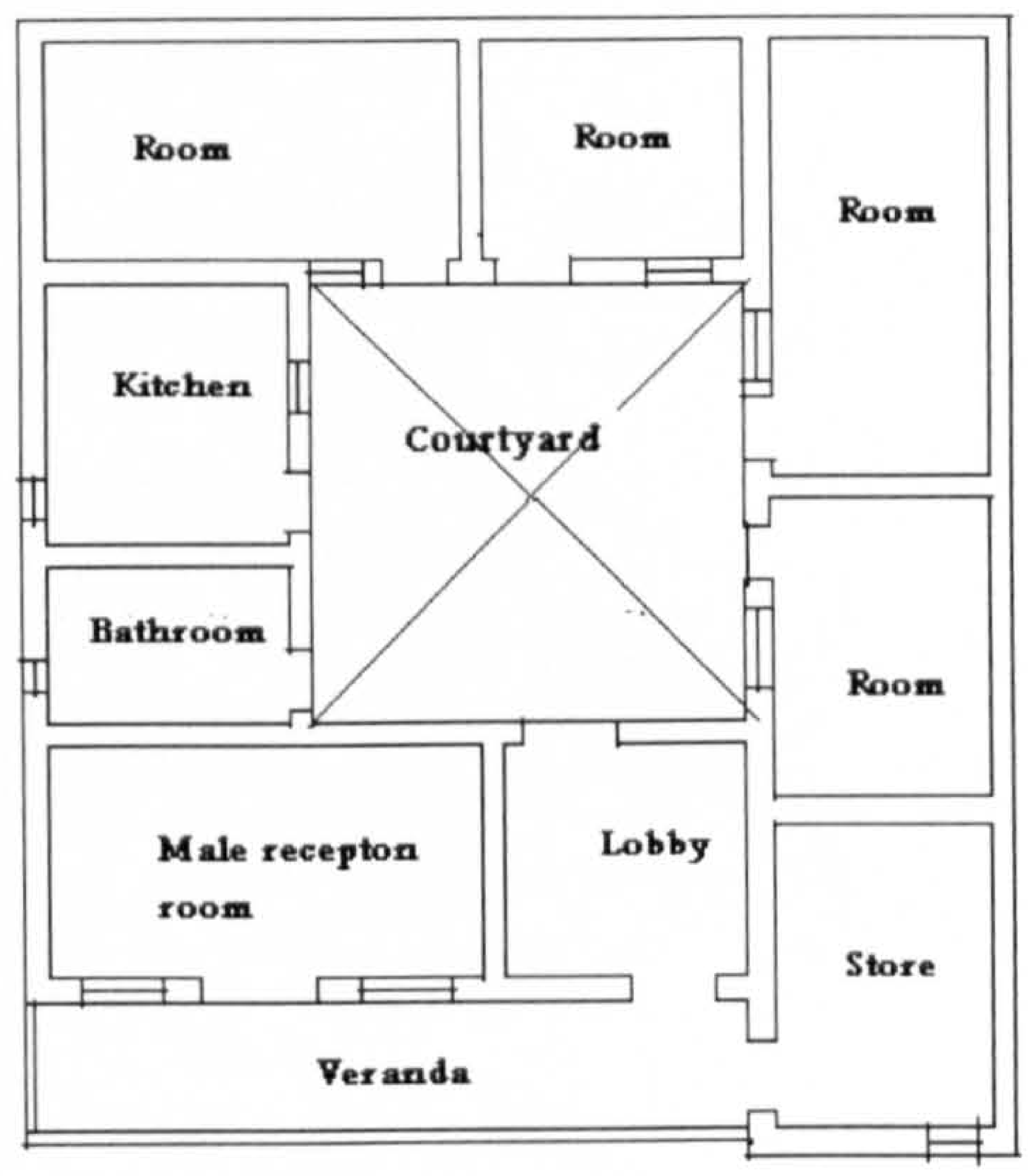


Figure 4.29 : The construction by Darb El-bab

Source: Grafa 1996



Main Elevation



Plan

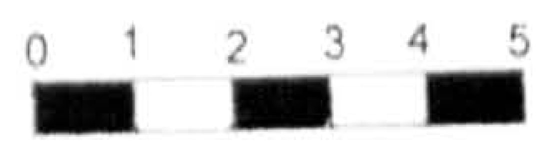


Figure 4.30 : Typical courtyard house in the rural area

4.5 Courtyard houses in some other countries

The use of courtyard form in other countries such as Iraq, Iran and Turkey is explored in appendix (4) to provide further context for the traditional examples from Libya. Explanation of these show the following common characteristics:

- Internal provision for female privacy was common, in keeping with the teaching of Islam;
- All inward looking and high fortress-like walls separate the house from streets;
- The plans are designed in accordance to Islamic teachings in relation to the segregation of sexes and for privacy;

- The important part of the houses is the courtyard, semi-closed and enclosed spaces look into. Openings to the street were kept to a minimum;
- Another division within houses was made with respect to seasons; the houses have summer and winter quarters. Summer quarters generally oriented to the north and winter quarters to the south;
- Fountain, plants and some greenery always exist and make the court climatically and psychologically more liveable;
- The building materials varied across the areas, reflecting the natural sources locally available;
- The wind tower or(malkafes) of wind catchers are common features;
- The flat roof is an important element of house design as many people in the summer use them for sleeping.

In general the traditional architecture of Libya and these examples were basically the result of three main factors: the hot and humid climate, people's lives and religion, and locally available construction materials.

4.6 Conclusion

Social and climatic factors are the main factors that have shaped and influenced the hierarchies and patterns emphasised in the traditional Libyan city.

The courtyard house is the dominant characteristic in Libyan domestic architecture in both rural and urban settings in all regions, irrespective of the different economic conditions across the population. This dwelling design has flourished for a long time in Libya and is a reflection of the social behaviour and climatic conditions. Furthermore this traditional house design displays a wealth of experience in the skilful use of local materials in ways that ameliorate the extreme climate.

From the study, it can be seen that traditional houses in all regions in Libya demonstrate clear differences, in detail which suit the particular geographical zones. Houses in the coastal zone, for instance, are dissimilar to those in the desert and mountain regions. The prevalent morphological factors determine which style is appropriate for the most comfortable form of living, and at the same time, each regional style is harmony with local climatic and social needs of the people.

Residential housing in the hot coastal zone was designed to offer complete protection from the sun's hot rays, by its close packed adjacent construction. The basic house design was the courtyard with open arcades on four sides and rooms on two different levels, particularly common in the old city of Tripoli.

In the mountains many houses are built completely underground, with excavated courtyards, which are accessible by ramp from the ground level. These buildings incorporate special thermal advantages. Other houses in this region are built at ground level using local materials such as stone, clay, and olive wood, which are suitable both for construction purposes, and for the climate. The traditional houses in the Libyan Sahara desert offer special facilities in both their indoor and outdoor spaces. They are built in a compact design in order to create a shelter against the extremes of the climate, and similarly, the community's external environment with its deep, twisted, and narrow streets mean that pedestrians are shaded by walls and roof coverings and hence, remain cool and comfortable, even during the hottest parts of the day.

As can be seen from the traditional houses in Libya and some examples of houses in different countries, such as Iran, Iraq and Turkey, the house designs are good examples for bioclimatic architecture. They provide further examples of the planning concepts for traditional form and we may learn from them for the future. Vernacular architecture building new structures using old techniques, and is based on the old model using new technological changes. Vernacular includes attributes of tradition, which is a distinct process and product. Linking features of the local vernacular it might be possible to create design guidelines for more appropriate domestic architecture for the popular suburban settlements of growing cities.

The subsequent chapter will explore the types of traditional courtyard house and contemporary housing in Tripoli city and comparative summary between both types.

Chapter 5: Characteristics of the case study area

5.1 Introduction

Chapter Four discussed the traditional housing in Libya. This current chapter will focus on Tripoli city. In order to understand the development of housing in Tripoli in more detail it is important to understand the development of the city and its urban form. Figure 5.1 outlines the structure of the chapter.

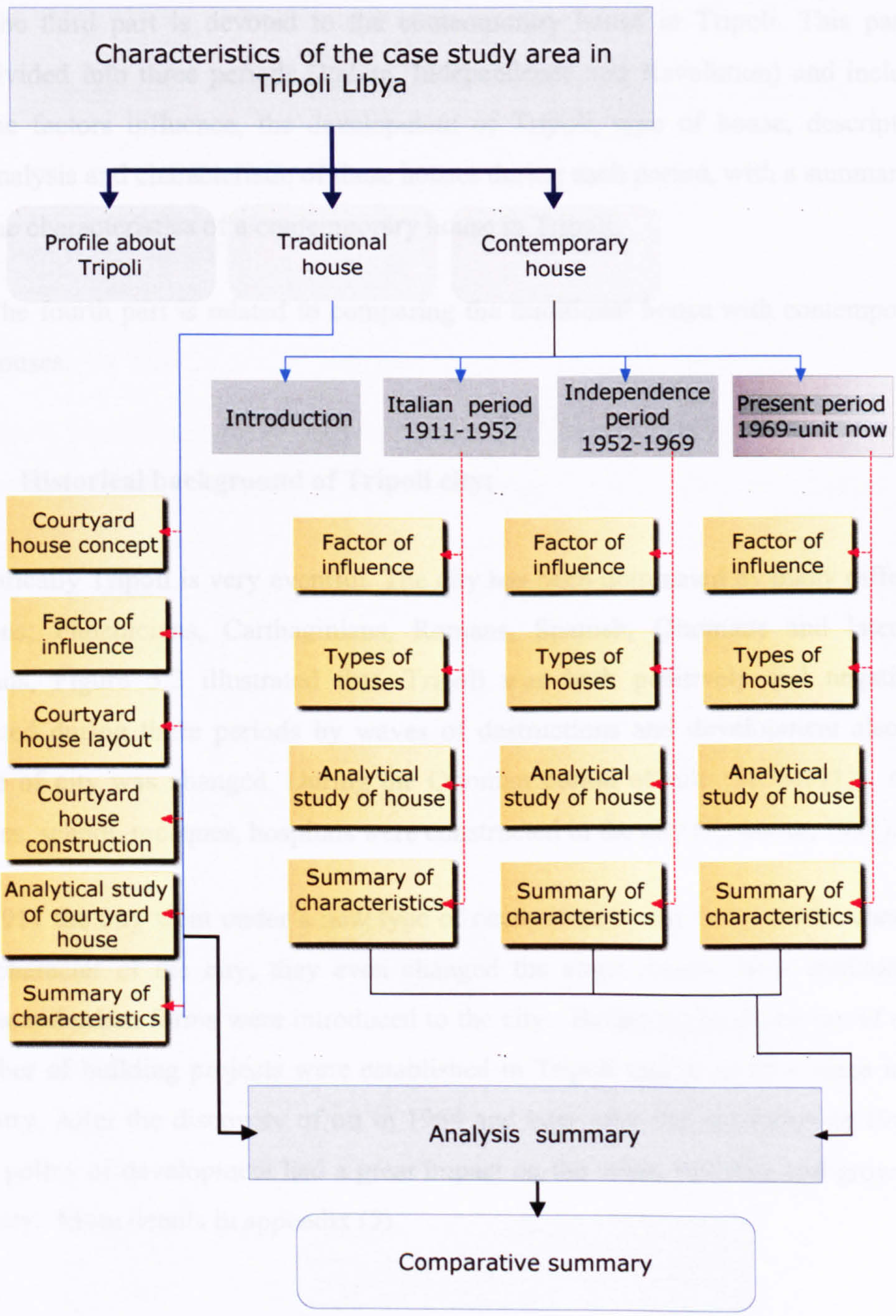


Figure 5.1 : Categorisation of housing in Tripoli explored in chapter 5

1. As a profile of the city, the first part provides a summary of the historical background of Tripoli, ancient and modern;

2. The second part deals with the courtyard house in terms of the courtyard concept and its position and function in the house layout, Building materials and construction methods are also examined, together with a description and analysis of house and a summary of characteristics of the courtyard house;

3. The third part is devoted to the contemporary house in Tripoli. This part is divided into three periods (Italian, Independence and Revolution) and includes the factors influence, the development of Tripoli, type of house, description, analysis and characteristic of these houses during each period, with a summary of the characteristics of a contemporary house in Tripoli;

4. The fourth part is related to comparing the traditional house with contemporary houses.

5.2 Historical background of Tripoli city;

Historically Tripoli is very eventful. The city has been dominated by many different nations; Phoenicians, Carthaginians, Romans, Spanish, Ottomans and later by Italians, Figure 5.2 illustrated that. Tripoli was both positively and negatively affected during these periods by waves of destructions and development also the name of city was changed. During the Ottoman period of rule (1835-1911), more houses, school, mosques, hospitals were constructed in the city (Sjostrom, 1993).

In 1911 the city went under a new type of occupation by the Italians who changed the character of the city; they even changed the street names. New architectural styles and urban forms were introduced to the city. Before to the discovery of oil, a number of building projects were established in Tripoli and in another place in the country. After the discovery of oil in 1964 and later after the revolution in 1969, a new policy of development had a great impact on the urban structure and growth of the city. More details in appendix (5).

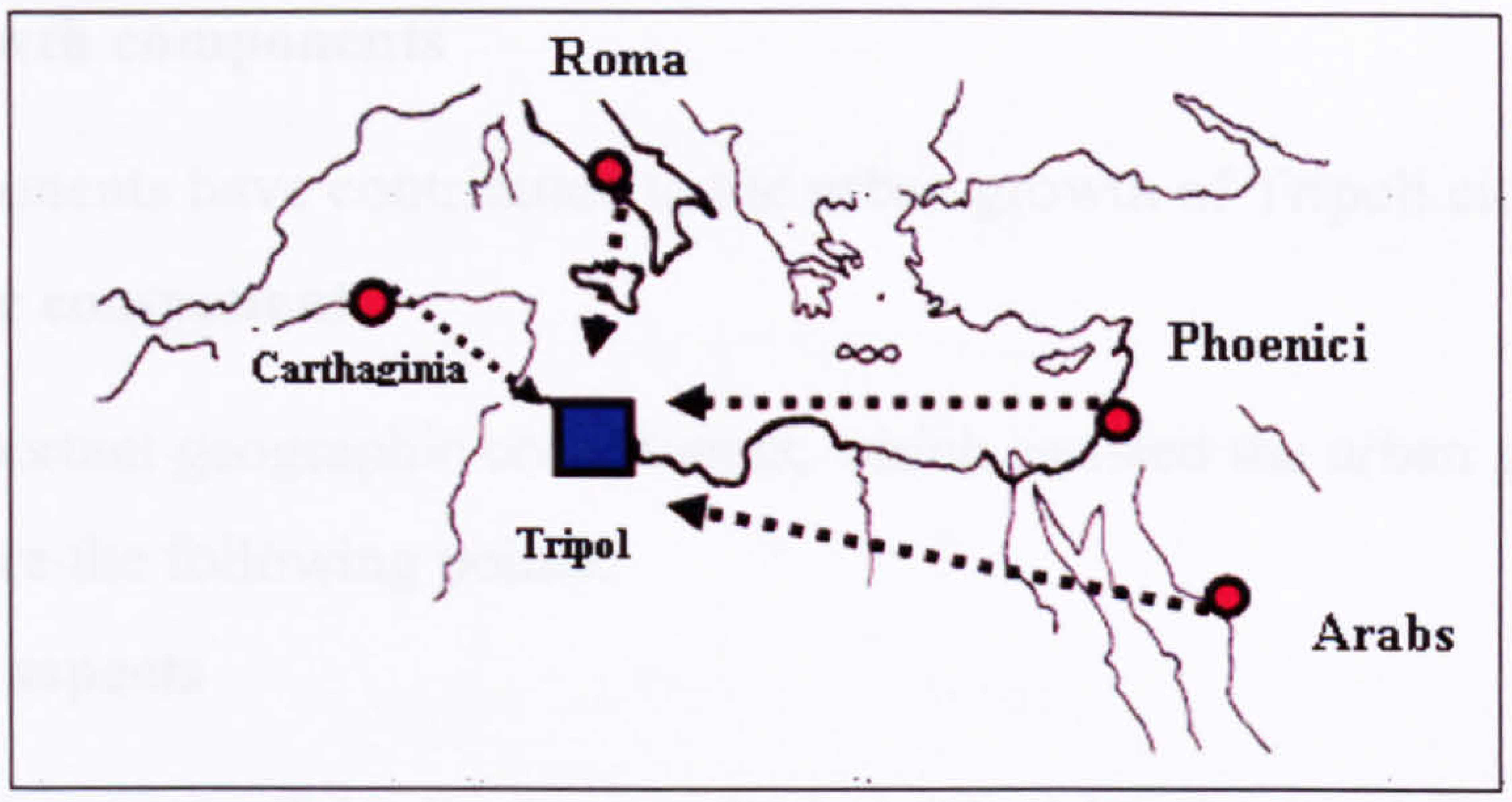


Figure 5.2 : The different nations, which dominated Tripoli city

5.3 Tripoli city profile

i. Tripoli City Site

The Tripoli region is in the middle of "Sahel-EL-Jafara". The City is geographically situated to the north of the Equator, at longitude 32.56 degree, and latitude 13.15 degrees east of Greenwich as shown in Figure (5.3). The Tripoli area is considered the most important of the planning provinces in Libya, as it is the biggest region in terms of population, the surface area of which reaches 225,282 km^2. It represents about 12.8% of the country's total surface. It is the most important city of the province and country , as well as the social, economic and cultural centre and major attraction for movement of the population inside and outside the province (Altumi 2001).

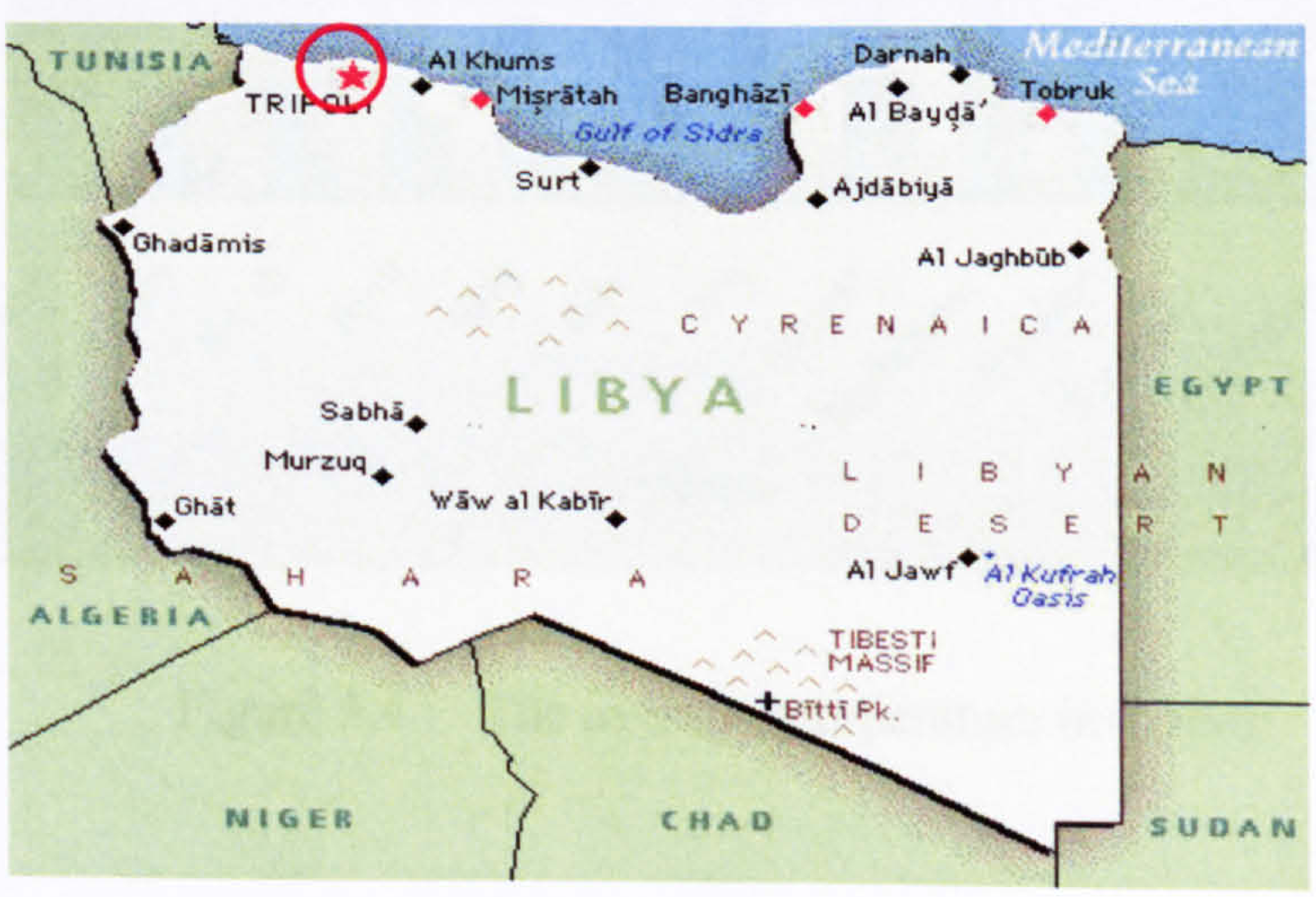


Figure 5.3 : The location of Tripoli (study area)

ii. City Growth components

Several components have contributed to the urban growth of Tripoli city as follows:

1-Geographic component

The most important geographic constituents, which assisted the urban growth in Tripoli city, are the following points:

a. Surface aspects

The surface aspects in Tripoli city are distinguished by the level-ness of the land, with altitude from the sea level about 20m at the beach of the Mediterranean up to about 80m over the surface at the south border of the city.

b. Climatic conditions

Tripoli is located within the influence zone of the Mediterranean. The climatic data characterise by a long periods of sunlight and warmth, with a short, temperate and wet winter season, with northwest winds (Figure 5.4). The hot dry summer brings the southern (*Algabli*) winds bearing dust. Spring and autumn seasons are distinguished by more temperate heat with northeast winds. Thus, throughout the evolution of traditional residential development in Tripoli old city this geographic and climatic reality has influenced the urban and residential modes and characteristics of the city (NCID2000).

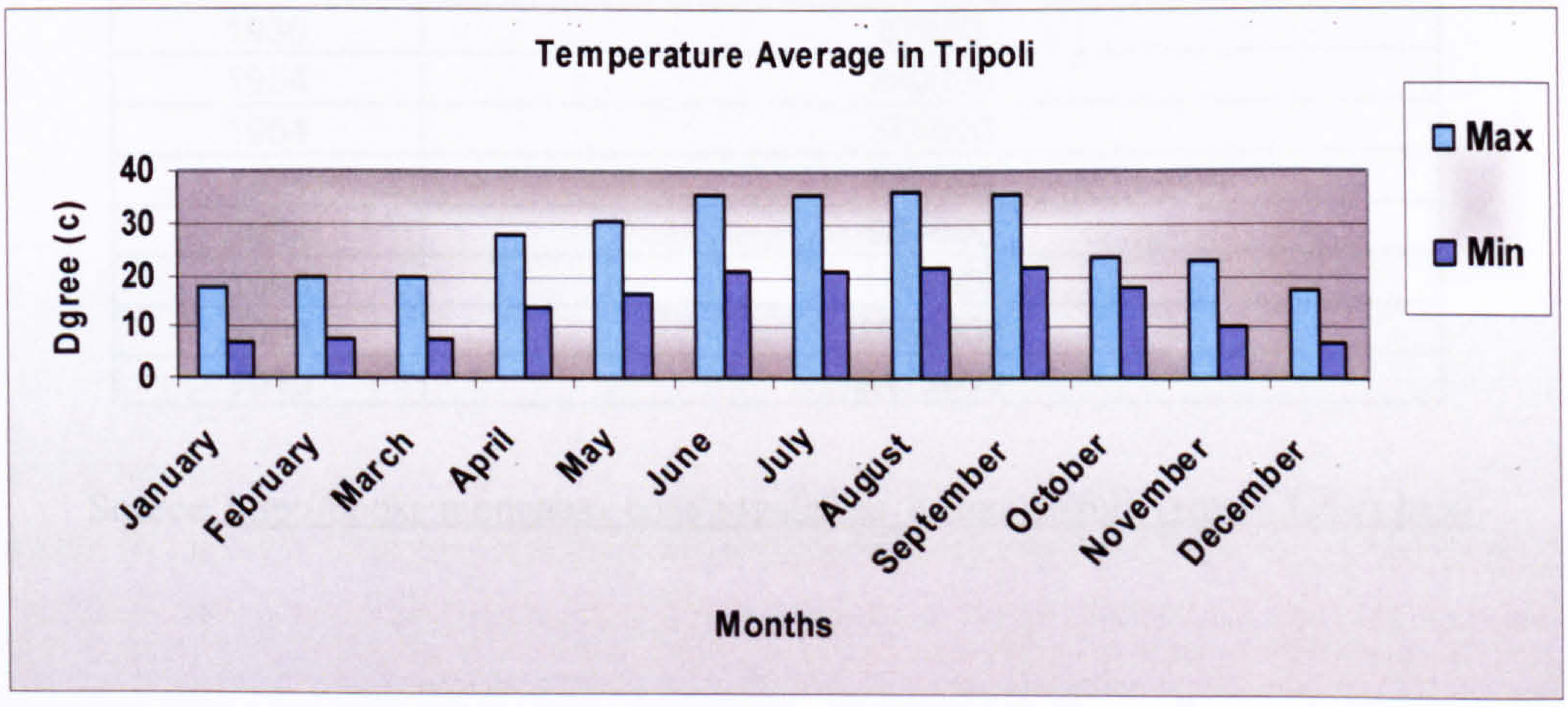


Figure 5.4 : The average temperature in Tripoli

c. Botanical aspect

The climate and topography have influenced the growth. Trees and herbs covering the areas surrounding the city, has produced a botanic belt that to a considerable extent protects the city and urban area from the *Algabli* dust bearing winds.

2-Cultural component

As a result of several successive periods of civilization in the city, including the Roman, Phoenician, and Islamic civilization, this gave the site strategic importance, and led to it becoming the capital of Libya. Its historical importance was elevated at the beginning of the Islamic Arab fateh (invasion) in the seventh century AD.

3-Social component

As a result of the strong economy in Tripoli city, the population increased through the twentieth century, accompanied by urban and economic growth. This increase is based on several factors, among them is extensive immigration. In 1930, the population was 37000 inhabitants, and it reached 1249000 inhabitants by the end of 1995, according to the last population statistics, also shown in Table (5.1). This increase in the immigration rate into the city has a huge effect on the government's population policy, and has created different cultural groups, which has led to several changes in the form of habitation. The population density is 13.4/ km compared with 2.6/ km in whole country.

Table 5.1 : Population statistics 1930-2015

Year	Number of population
1930	37000
1954	240000
1964	375000
1974	660000
1984	994000
1995	1573000
2005	2056000
2015	2413000

Source: http://books:mongabay.com/population_estimates/full/Tripoli- Libya.html

4-Urban and civilization growth of the residential modes in Tripoli

Through the historical and urban studies of Tripoli city, it has been shown that the city urbanization has been restricted inside the city walls up to end of the nineteenth century, based on what has been said by historians and travellers who have visited Tripoli city. Its urban and residential modes are distinguished, from the civilization side, by two civilized modes. (See Figure 5.5 & 5.6).

Figure 5.5 : Aerial view of the first civilized traditional urban area

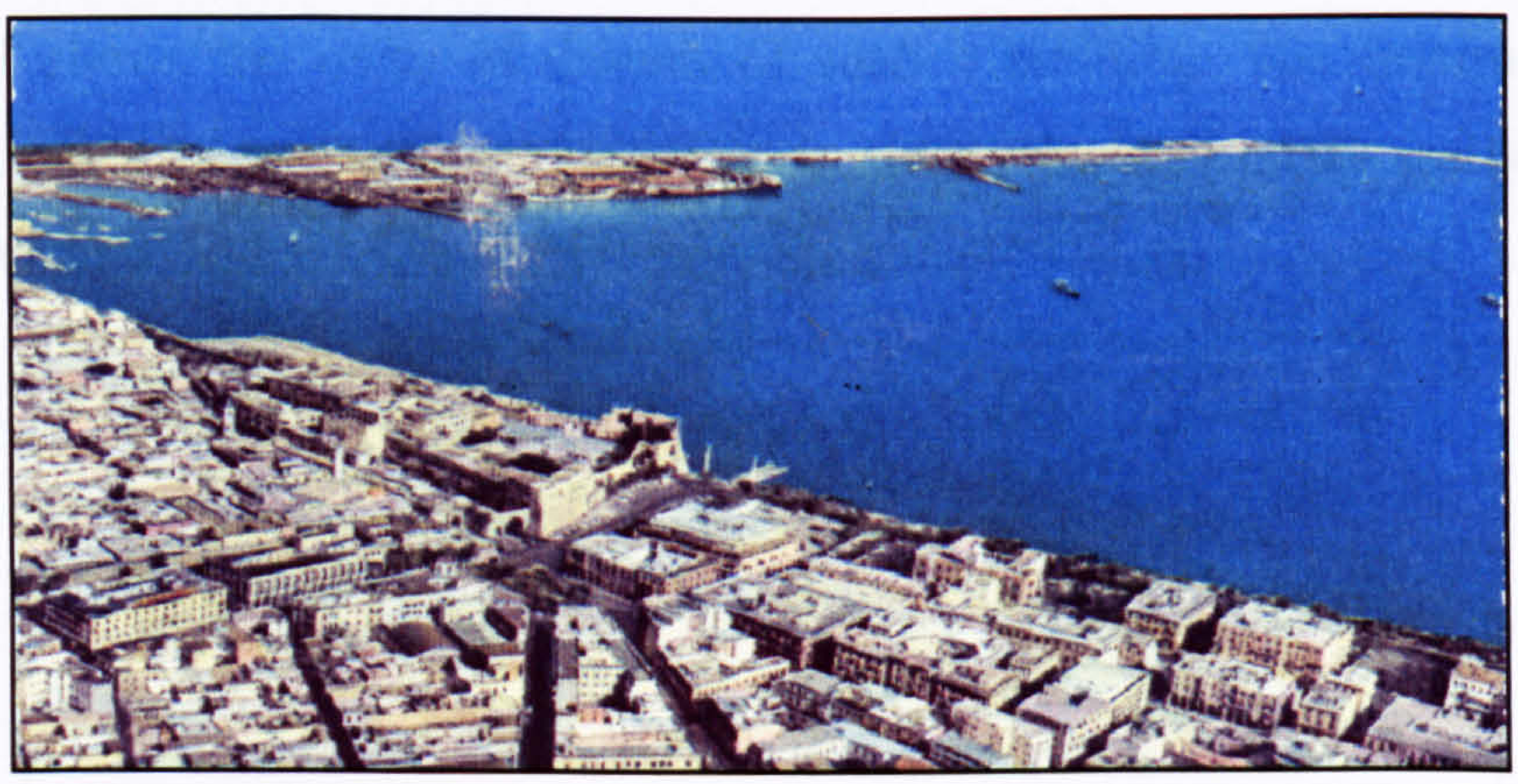


Figure 5.6 : Aerial view of the second civilized modern urban area

Thus, in this stage of study, we deal with the civilized growth of urban and residential modes of the old city and the next stage will be to study the civilized growth of modern urban and residential modes of the modern city. Referring to historical references, by the beginning of 1859 a part of Tripoli old city wall was destroyed by from the west side, for the purpose of allowing the urban expansion of the city. Buildings were erected in 1862 outside the old city walls in the eastern side in El-Mmanshiya area, subject to modern planning science.

This urban orientation is considered the beginning of a new civilization stage in the development of the residential modes in the city, and the beginning of the political influence on urbanism in the city.

5.4 The courtyard houses (Traditional period)

5.4.1 Courtyard house concept

As already described the main type of housing traditionally used in Libya and other countries that have a similar climate is the courtyard house where an enclosed space, open to the sky, is usually surrounded by rooms on all sides. The courtyard house is slightly different in its details from one country to another, but the main concept of design remains the same, as well as the building materials and the low height. In Tripoli and other countries, which used this type, houses might start with rooms only on one side of the enclosed courtyard. As family size increases requiring more accommodation, the houses extend by adding rooms on other sides of the courtyard. Figure 5.7 shows the order of growth of such a building. The information was obtained from a master builder. This type is always built from the inside out, and then the owner blocks the interior off from the narrow streets.

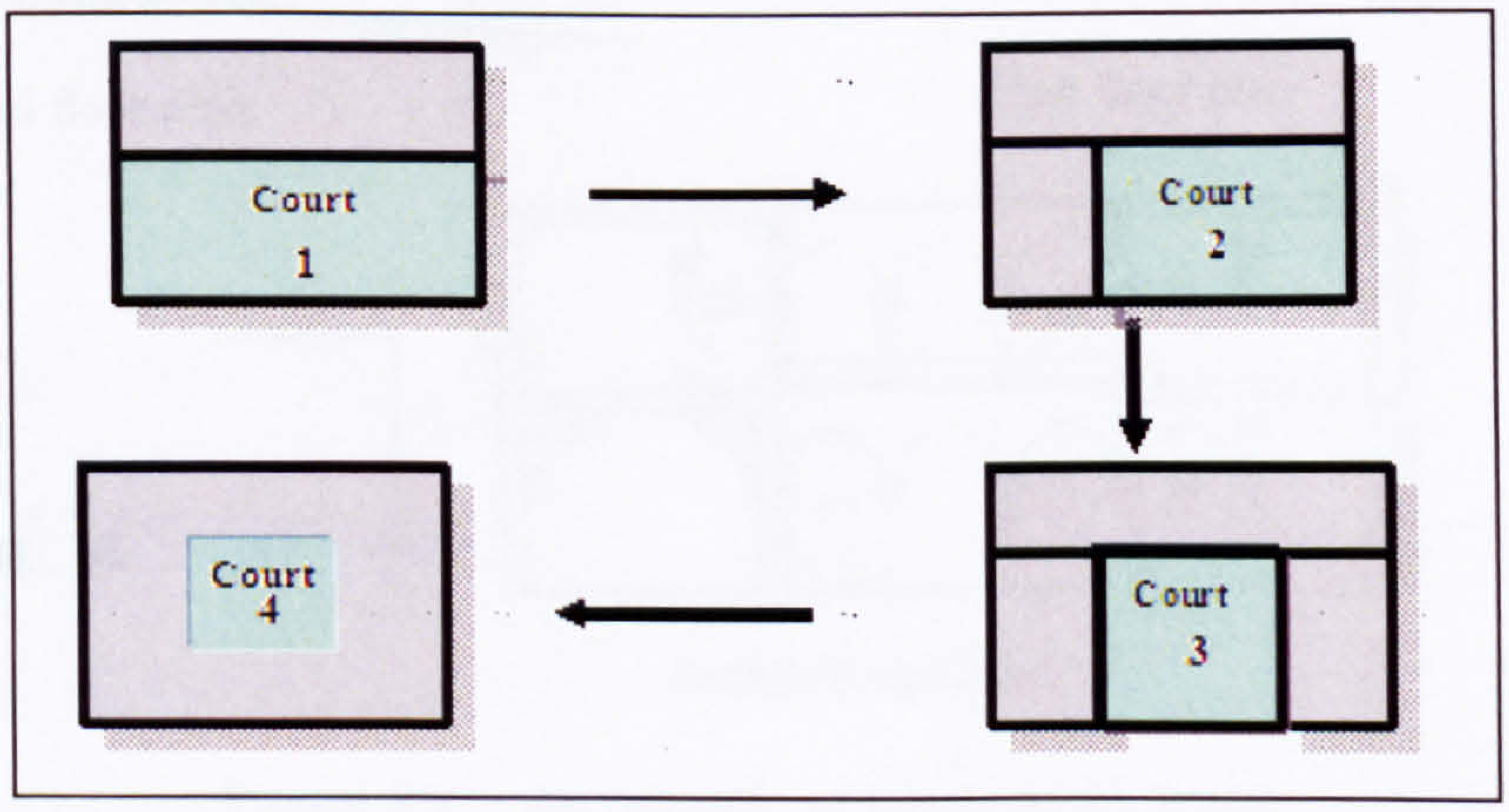
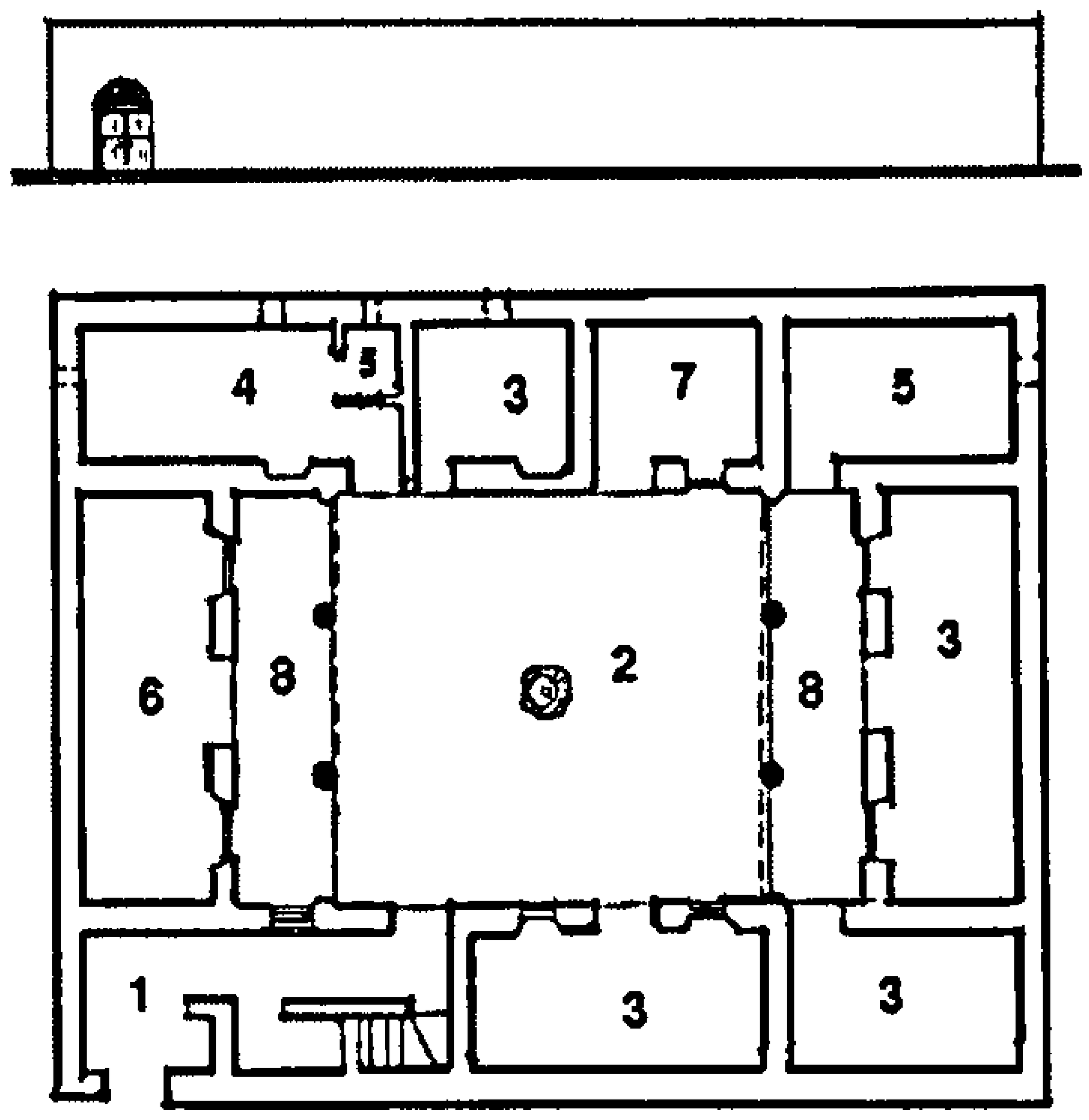


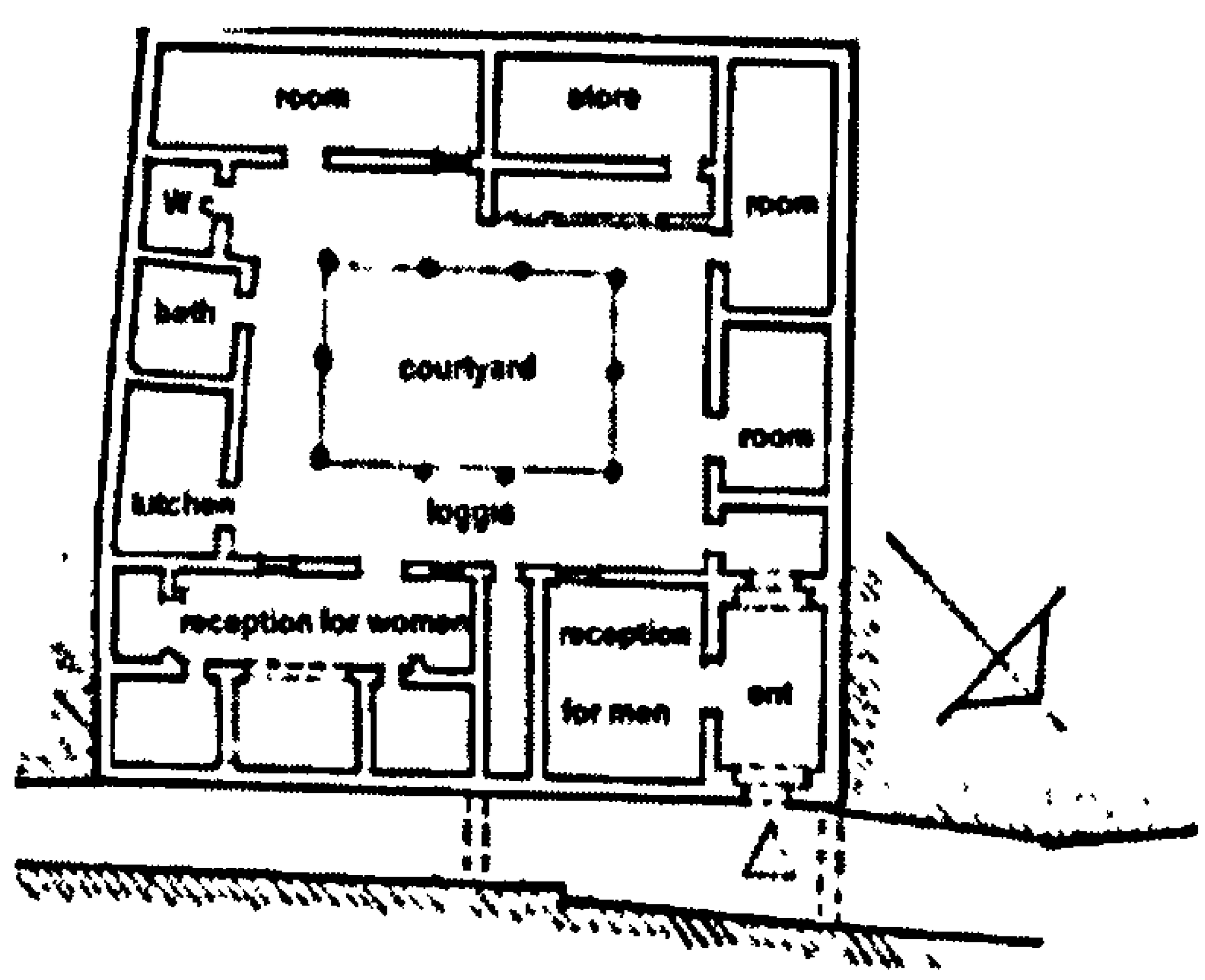
Figure 5.7 : The sequence of growth of the traditional courtyard house

The courtyard house in Tripoli, Libya is usually categorised into two types. First, single story which type was built before the Turkish occupation and used by middle-income families (Figure 5.8). Second two stories. These houses were built during the Turkish period and occupied by high status families (Figure 5.9).

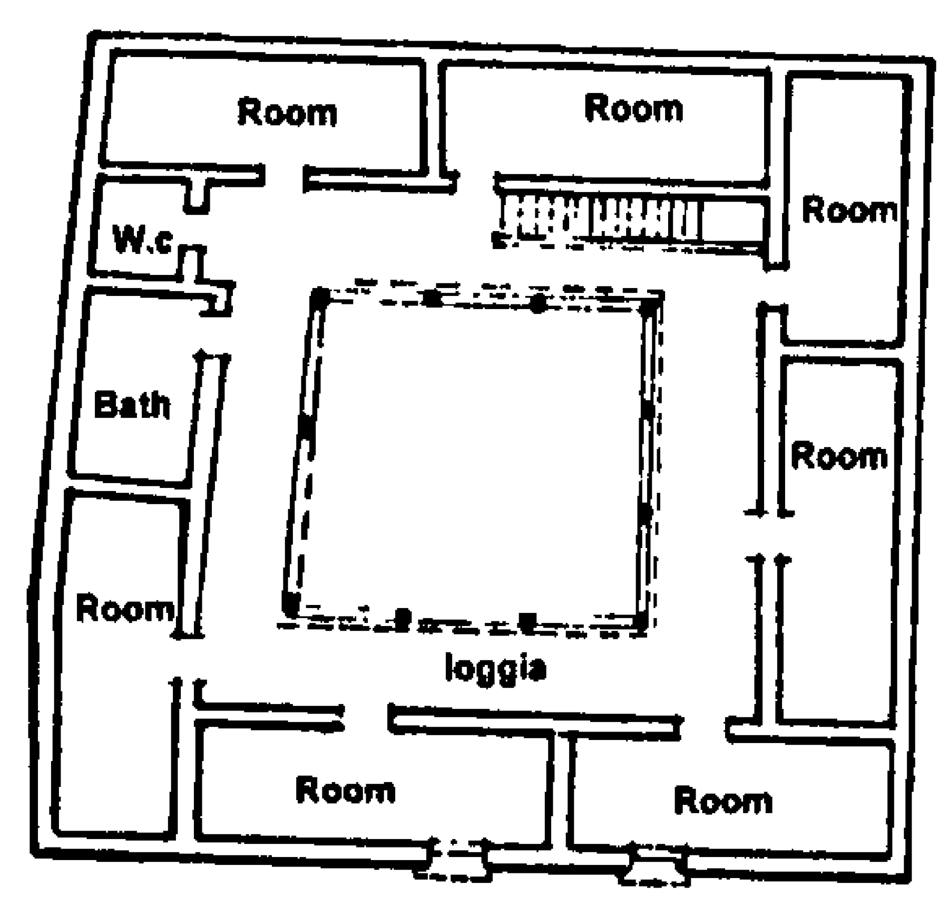


House plan key	
1.	Entrance
2.	Courtyard
3.	Bedroom
4.	Kitchen
5.	Store
6.	Sitting Room
7.	Bathroom
8.	Veranda

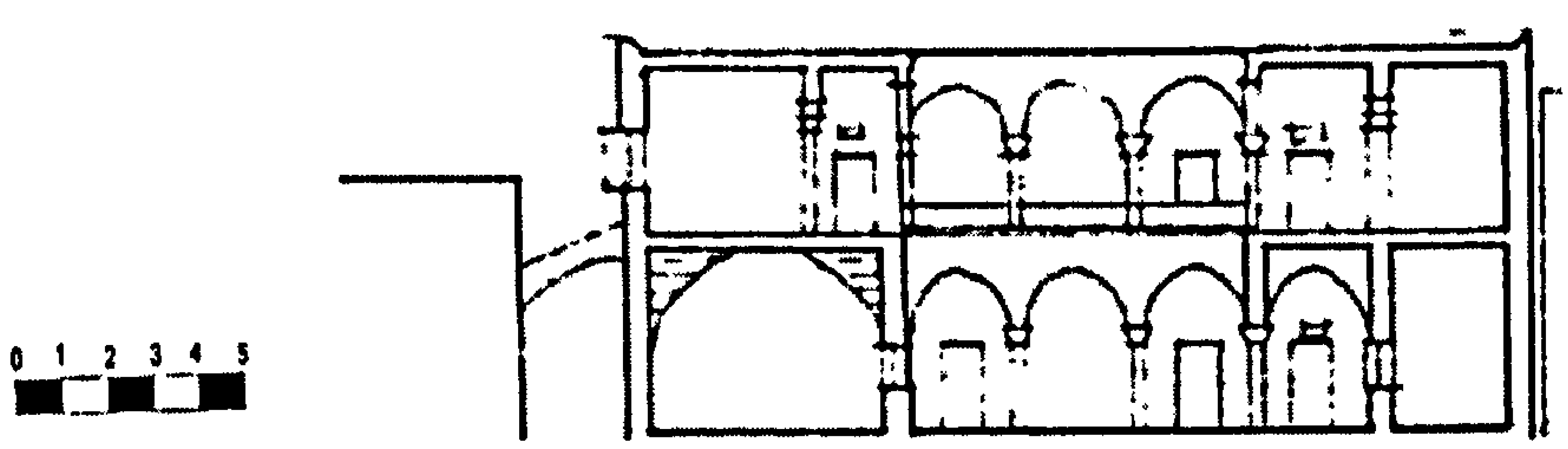
Figure 5.8 : An example of a single storey house



Ground floor plan



First floor plan



Sectional elevation

Figure 5.9 : An example of a two-storey house

The houses are laid out in strips, with a single façade facing the narrow streets called alleyways in the old city. The other sides are connected to other houses. Their plan is usually irregular (Figure 5.10). The courthouses were generally laid out in rows. Three sides are shared with other homes, with one side facing the street. (Zarrugh 1979)

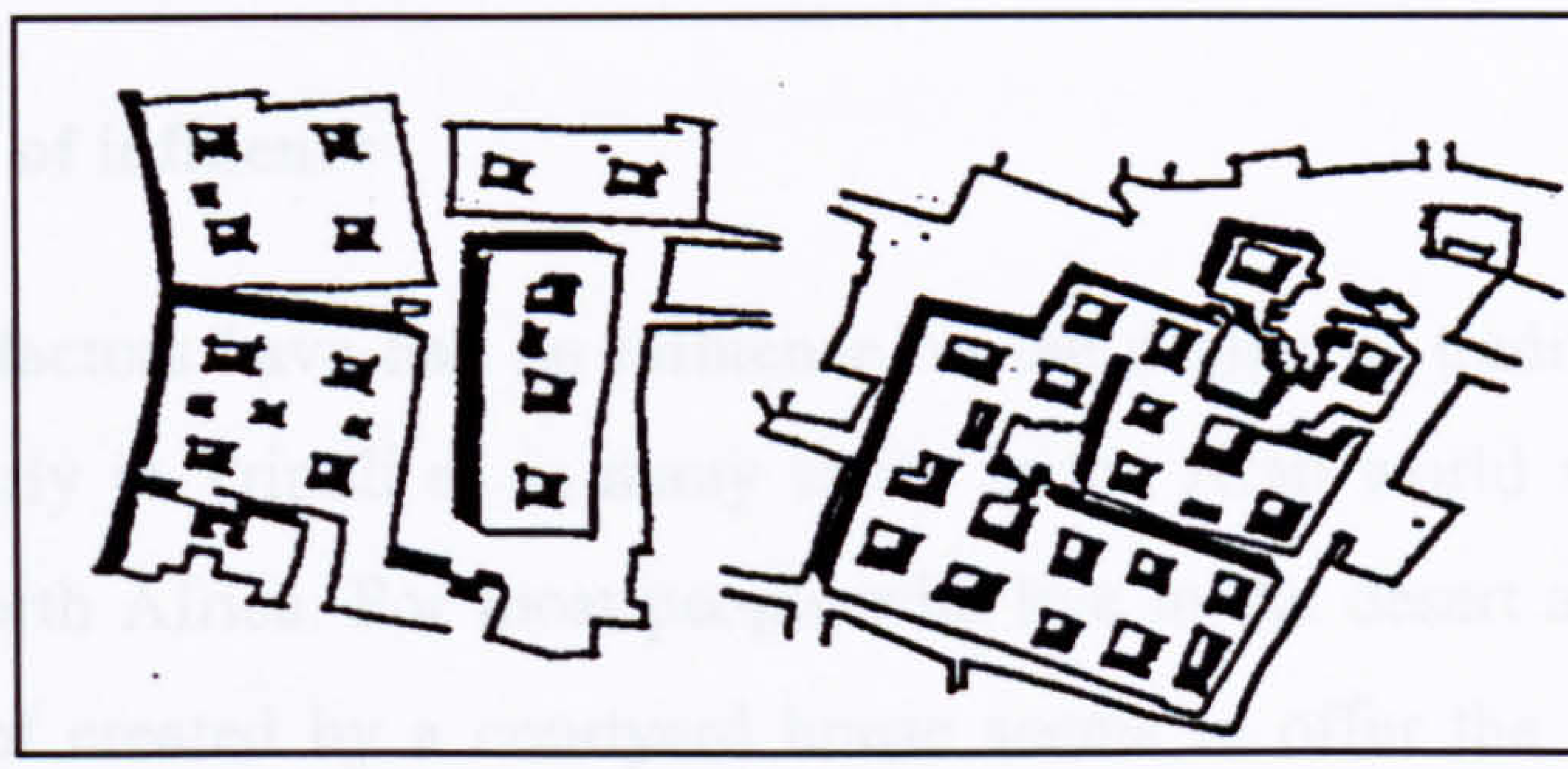


Figure 5.10 : Courtyard houses planning fabric

The thickness of walls and supports varies in the narrow streets of the non-uniform houses. Thus the size of the houses increases and the upper floor of some houses are extended to build an extra room spanning part of the street, which forms a shaded and covered part of the passage-way, known as the Sabat (Figure 5.11). The lanes and streets are mostly 2 - 2.5 m in width. In some streets there are buttresses between the opposite walls of the houses, which brace and support both houses. (Figure 5.12) (Shaibob1979).

Figure 5.11 : The Sabat covered and shaded the street

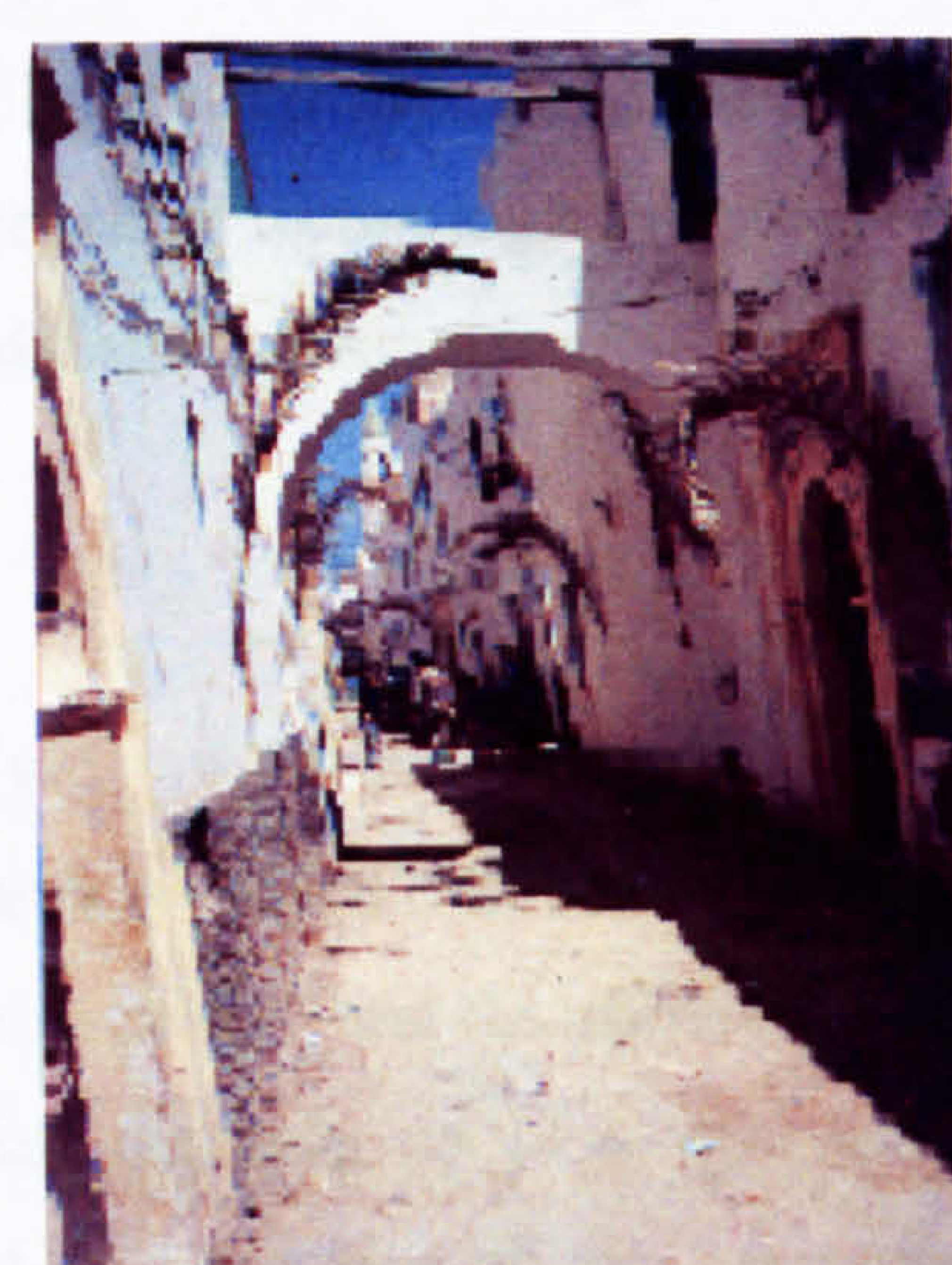


Figure 5.12 : The buttresses between the opposite walls

The average area of these houses is 300 square metres the size of the courtyard ranges from 70 to 100 square metres on the ground floor. The courtyard is usually entered from one corner through a veranda, which usually has three bays built of stone. The arch is mostly of the horseshoe type. The upper floor has a similar veranda with arches surrounding the courtyard to provide access in to the rooms on the first floor.

5.4.2 Factors of influence

A numbers of factors have had an influence on the design of traditional houses in Libya particularly in Tripoli as in many states in the Arab world and surrounding countries in North Africa. For most people who live in the desert areas like Libya, the environment created by a courtyard house seems to offer the ideal conditions they might desire of a home.

I. Building Materials

As mentioned before the Traditional house design in Libya depended on the natural resources available locally for building material. As there is an absence of forests the local building materials available in Tripoli and areas around are limestone brick, stone, mud and sun-dried brick which is used in walls. The plants such as palm-tree trunks and pine timber joists are used in the roof. These types of building materials restrict on the height, width and shape of housing. These constraints also gave traditional houses in Tripoli a sense of consistency in their scale, height, width and external shape. All house construction was done by local people, with skills passed down from one generation to the next. This vernacular technology and know-how factor was the major influence on the style of traditional housing.

II. The climate

Farsi (1982) pointed out in his study that the topography and climatic condition played a major role in shaping the residential area and in the house design. Beng (1994) climate is clearly one of the prime factors in culture and therefore built form. It is the mainspring for all the sensual qualities that add up to a vital tropical architecture. The difference of temperature and the intensity of the sun made it necessary to design a house to suit this climate. Many plans are employed to adapt this climate, including the thick outer walls to provide insulation against the build-up of heat. To complement the limited openings on the outside walls, there was the internal courtyard with veranda running round. The middle courtyard worked as a large vent allowing adequate daylight, fresh and cleaner air, as well as reducing external noise. The veranda offered a semi-covered space protected from direct sunlight and rain. The Provision of wind scoops promote ventilation and supplied the building with cooler and dust-free air, especially the cooler-breeze at night.

This promotion of ventilation was activated by the suction resulting from two forces; the wind riding over the courtyard during windy days and the stack affect due to the ground heating in the courtyard during calm conditions-more details in appendix(6). The courtyard itself is used as part of the family's living quarters, as the people need a shadowed area to live the hot climate. So inside the courtyard a tree is planted creating a further source of shade, usually fig and grape trees are used. It also provides food which was watered by a fountain in the middle, which also offered humidity. Housing in old city of Tripoli is also built adjacent to each other to decrease the area of walls exposed to heat.

Because of the lack of infrastructure to supply water, and the scarcity of rainfall in summer, the houses have a ground tank in the courtyard to store water from roofs, this is mainly used for drinking and food preparation. This is supplemented by a sunken well. Therefore, the courtyard of a traditional house provided a relatively pleasant internal environment against the prevailing climate conditions in Libya, particularly in Tripoli.

III. Economic factors

The house owner's occupation also had considerable influence on the traditional Tripoli house. This factor influenced both the scale and detail of the house's design. A supplier of goods, such as a chandler, might well have space within his property for the storage of his merchandise, as might well a ship builder. A house owner with livestock, such as horses, may have a courtyard in which to keep them. As has been seen in some of the examples, the larger houses may well have several courtyards to cater for all the different activities. A merchant, involved in buying and selling, might also have extra accommodation for receiving male visitors in his diwaniya. Economics would also have impact on the quality of the equipment and furniture in the house, with the richest families decorating the interiors of the houses with goods imported from overseas.

IV. Socio-cultural factors

The social factor affected the spatial organization of the house, the entrances, the separation of the parts allocated for family activities, and the guest-quarters (Oliver 1997). Tripoli housing was 'very inward-looking', reflecting the desire for privacy within the family, and providing a sense of security. In consequence, houses had few external openings, other than an entrance door/gate, big enough to cater for the family's occupational needs, and a few high slits in the outer walls to admit some light to the interior and to facilitate ventilation (Daze 1982 and Zarrugh 1976) If further evidence were necessary to support the idea of the importance attached to privacy and the need for security among the Libyan is one could draw attention to the wall.

To provide privacy the high outer walls of courtyard houses, the upper part forming a parapet at roof level, typically when family members might use the roof area for sleeping on hot summer nights. The interior layout of the house was essentially designed to maintain privacy of the female members of the family from the view of male visitors. As mentioned earlier, the entrance to the house was devised in a way so that a caller did not have a direct view into the interior of the house.

The principle of internal courtyard in a traditional house in Tripoli therefore was effective as much in the maintenance of privacy as it was in meeting climatic considerations. It has been seen that many houses were initially built with provision for extensions within the compound as the family increased. The importance of privacy was Libyan socio-cultural traditions mainly derived from Islam.

V. Influence of Islam

This section explores the particular influence if Islamic teaching and tradition on the formation of living habits of its followers and which in turn set the parameters for the design of their built environment. For Muslims all over the world, Islam is not simply a religion. It provides guidance in all aspects of a person's life, from birth until death. "One of the fundamentals of Islam, other than matters relating to religion beliefs themselves, is the importance given to the establishment of good relationships with one another to establish a strong social life" (Abdulati, 1978) .The principal Islamic sources are from:

- Qur'an;
- Hadith;
- Sunna.

These sources provide the guidelines that a Muslim is supposed to follow during their lifetime and can be summarized as follows.

The Qur'an is the main source of Islamic region, which is considered to be a divine relation through the last of the prophets, Mohammed (PBUH). The second source is the counsels and advice of the prophet Mohammed through the Hadith, which is collected together in written form by a number of Muslim scholars. The third source, the Sunna, is a record of the Mohammed (PBUH) actions, sayings judgements and attitudes handed down to his companions. In addition, Sunna depended in part on a written record of these as well as on observances that have been handed down by the oral tradition (AL-Rifa'ie,1997). Many influential aspects of these intrusions of Islamic on the life affected the housing design that distinguishes the Islamic house from other designs for housing in the world. These aspects can be described as the following.

1- Islam and the Neighbours

The status of neighbours is very important from an Islamic viewpoint. Neighbours of all kinds should enjoy a great number of privileges in Islam. The prophet Muhammad (PBUH) is reported as having said that nobody can be a true believer unless his neighbours feel secure and safe by his side. Do you know what the rights of neighbours are? He said the following:

- Help him if he asks your help;
- Give him relief if he seeks your relief;
- Lend him if he needs loans;
- Show him concern if he is distressed;
- Nurse him when he is ill;
- Attend his funeral if he dies;

- Congratulate him if he meets any good; sympathise him if any calamity befalls him;
- Do not block his air by raising your building high without his permission (Abdalati, 1978, p.4).

According to these principles about neighbourliness, which affect on housing design, the teachings emphasise the following principles involved with respect and care for one's neighbours.

- This would extend to building one's house so that it did not block out the passage of air, from the houses of one's neighbours important in a hot climate like that found in Libya and the Arab world;
- If one built one's house not to compete with them. Indeed, there is a saying, which expressly warns against seeking to build a bigger house. There is a solemn warning about the coming of a divine judgement on people, if certain behaviours come to prevail;
- When one intends to sell his house or land, he should offer it for sale to his neighbour and relatives before offering it to others.

2- Islamic and privacy

The other most important concept of house design in relation to the social life is that of privacy. Libyan is care and concern for one's neighbours extended to the protection of their privacy. This goes beyond not building houses that were taller than theirs. Privacy is also highlighted within the street and between the different quarters, as well as achieves security. Houses were built from the inside out and the owner later blocked out the street with walls thick enough to provide the aural privacy for the family. It also applied to the placement of windows so that members of the family felt free from the gaze of neighbours or passers-by in the street. Windows should not overlook the houses of one's neighbours. Affording of privacy extends to the relative positions of adjacent houses, so that one could avoid overhearing private conversations going on in the neighbour's houses.

Concern for the privacy of female family members, especially when male visitors came to the house, is evident in the positioning of the entrance door and, where necessary, in the use of screening in the hallway, as well as in the provision of

separate female quarters. The procedure for entering a neighbour's house places certain obligations on callers.
"If any one of you asks permission thrice to enter (a house), and permission is not given, then he should return" (Sahih Al-Bukhari).

If anyone removes a curtain and looks into a house before receiving permission and sees anything in these, which should not be seen, he has committed an offence, which it is not lawful for him to commit. If a man confronted him when he looked in and put out his eye, I should not blame him. But if a man passes a door, which has no curtain and is not shut and looks in, he has committed no sin, for pertains only to the people inside (Al-Hasmi 2002).

The latter saying also points out an obligation on the house owner. It requires him to maintain a curtain or other form of screen at the entrance door, if it looks directly into the family living quarters. The notion of privacy and decorum comes from Islam and this is reflected in traditional house design in Tripoli. Entrances were designed to prevent the caller from being able to see through into the house, when his knock at the door was answered. This might be done either by means of a strategically placed partition wall, screen or curtain. The importance of a curtain or screen in providing privacy to the females in one's family from the gaze of outsiders is also mentioned in the Quran;
"And when ye ask of them (the wives of the Prophet) anything, ask it of them from behind a curtain". (The Holy Quran 33; 52).

3- Separation between men and women

Although the Quranic verses refer directly to the Prophet's wives, what applies in their case holds true for all Muslim women. "Moreover, this is strong evidence that separation between men and women, especially strangers, existed from the times of the early Muslims and the life of the Prophet in Madinah" (Stowasser, 1994) Along with the obligation to the neighbours and privacy for the inmate, especially the female members of the family, there are also guidelines for the treatment of guests and visitors to the house. There are several quotations in the Hadith, for example; "Whosoever believes in Allah and the Last Day, should serve his neighbours generously should serve his guests generously by giving him his reward (to be entertained generously) for a day and a night with high quality food, and the guest has the right to be entertained for three days (with ordinary food)"(Sahih Al-Bukhari).

In keeping with such recommendations, it is an ancient custom in Tripoli for guests including the relatives and close acquaintances, for example, people of the same village, will be offered lodging by the city dweller in his house. It had to have proper regard for the reception of visitors without dislocation of family life, especially its female members, offering them hospitality, including washing and toilet facilities (Al-Hariri, 1996).

The method by which the traditional houses in Tripoli were arranged internally indicates that this particular aspect of the religious guideline, i.e. the treatment of guests, has been given consideration. Most guestrooms are located next to the main entrance to be used by men and as such would be available for male visitors to use without disturbing the women using the 'family courtyard' at the same time.

The reception room is also used as a sleeping room for the guest. In a single-courtyard house, if the access to the men's reception room was not made directly from the main entrance or exclusive passage, the women would withdraw from the courtyard to allow the male guest to reach their destination. By similar arrangement the guest might also be allowed to use the courtyard along with other members of the house. Thus the guest would be offered most of the conveniences enjoyed by other members of the house. In most houses the reception rooms for male visitors have the entrance completely separated from the main entrance.

4- The decoration

A final point to make about the influence of Islam on traditional housing, relates to the decoration of walls, screen and other surfaces. In these and in styles of dress, the issues of simplicity were commended. This extended to the use of imagery as well, where there was extreme sensitivity over the representation of God's creations. In Hadith reported by Aisha, one of his wives, the Prophet (PBUH) returned from a journey to find that she had placed a curtain with pictures on it over the door of one of her rooms. When he saw it, he tore it down saying; the people who will receive the severest punishment on the day of the resurrection will be those who try to make the likeness of God creation. Therefore, she turned it (i.e. the curtain) into one or two cushions (Sahih Al-Bukhari). From this, it can be concluded that Islam discouraged the use of pictures of living things in the house, because it was considered to be disrespectful to God, through the attempt to imitate His creation. This is emphasised in various saying of the Prophet (PBUH) "Those who make these pictures will be punished on the day of Resurrection, and it will be said to them; bring to life that which you have created" (Sahih Al-Bukhari). The examples above refer to concern about imagery and representations. There are also sayings to avoid patterns and to stick to simple things.

The Prophet (PBUH) once went to the house of his daughter Fatimah but did not go in. On her husband Ali's return, she told him this and he took up the matter with the Prophet, who explained; "I saw a (multi-coloured) decorated curtain on her door. I am not interested in worldly things" (Sahih Al-Bukhari). It can be seen that the prophet had a dislike of anything that could be conceived of as being ostentatious, such as the coloured decorated curtain in the doorway to a house.

All these guidelines, quoted and discussed above, that seem to have influenced the design of the traditional houses in Tripoli, may be grouped into four aspects of a Muslim's attitude to life;

- Responsibility towards and respect for one's neighbour;
- Privacy;
- Treatment of guests and visitors, and
- Modesty and simplicity of lifestyle, expressed through the avoidance of ostentatious decoration.

5.4.3 Courtyard houses typical layouts

The traditional house in Tripoli consist of the following spaces (Figure 5.13)

1. Main entrance (AL-Madakel);
2. The passageway (sqiffah);
3. Male reception (Marbouah);
4. Women reception (Hugrat Al-Qabu);
5. Courtyard (Wasat al-howsh);
6. Bed rooms (Hujrah el-noum);
7. Utility rooms (kitchen, bathroom);
8. Loggia (Rewaq);
9. El-Sabat;
10. Roof (Al-Satha).

Also consist of elements which contact between inside and outside such as Doors, Windows and Balcony. Each of these elements are explored in more detail below:

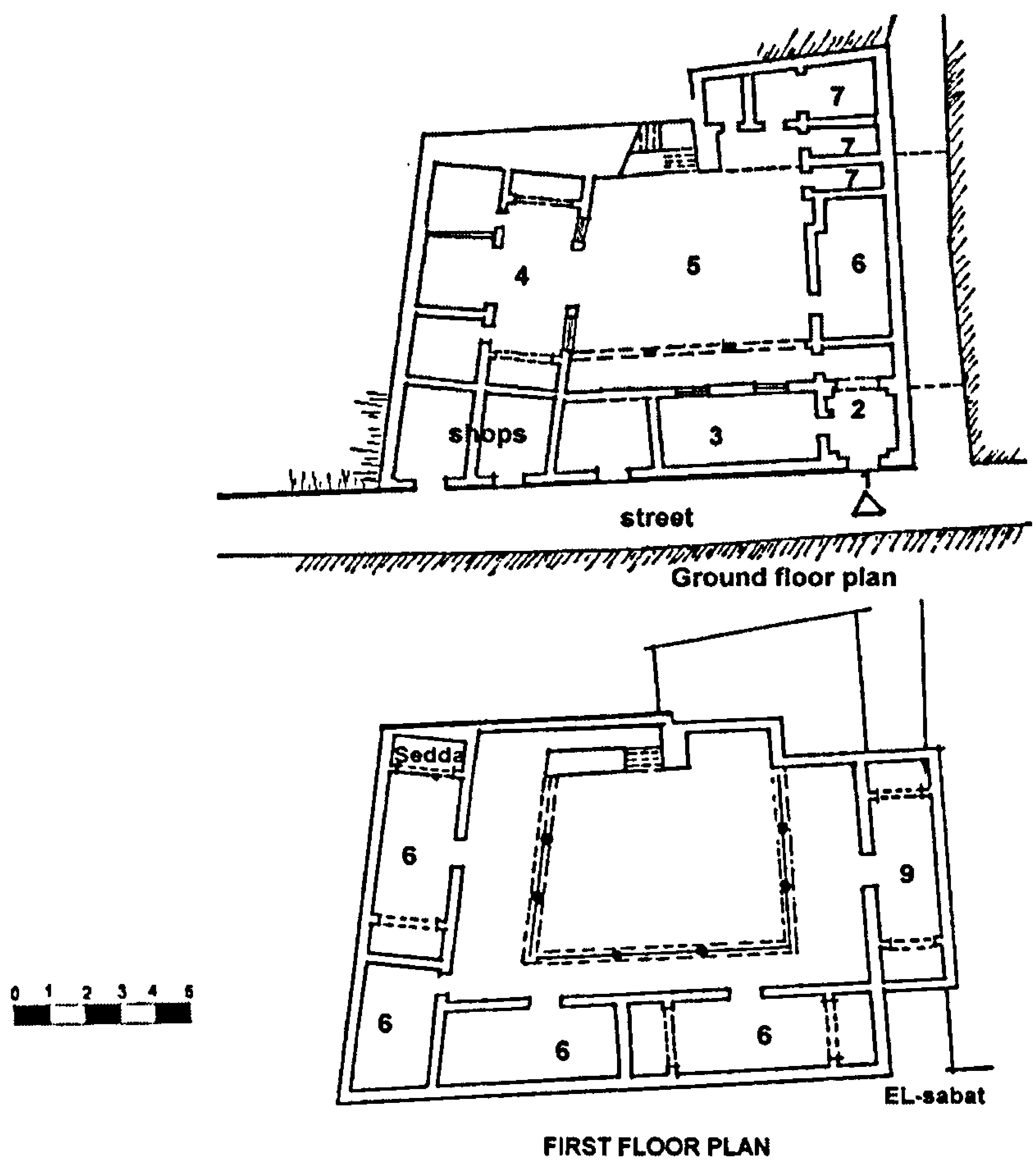


Figure 5.13 : A two-storey Libyan courtyard house in Tripoli

1. The main entrance (Al-Madaghal)

Access to the inner space of the house is through an arched doorway, (Figure 5. 14) which opens to a corridor, where the male guestroom is on one side with a solid wall to the side opposite. The door is never open straight into the courtyard to prevent anyone entering directly into it. The door usually leads into an L-shaped passageway, so that the privacy of residents is ensured .As mentioned previously the courtyard house in Tripoli is similar to the courtyard house in North Africa. Abarkan & Salamn (2000) describe the main entrance as flowing "the main gateway of the house usually does not give immediate access to the domestic spaces, but leads into a passage or a right angle turn. So that it is impossible to see the courtyard from outside". In other types of buildings such as mosques and schools where courtyard is a climatic requirement and there is no demand on privacy, the entrance is situated in the middle of building and opens directly into courtyard (Bahammam 2006).

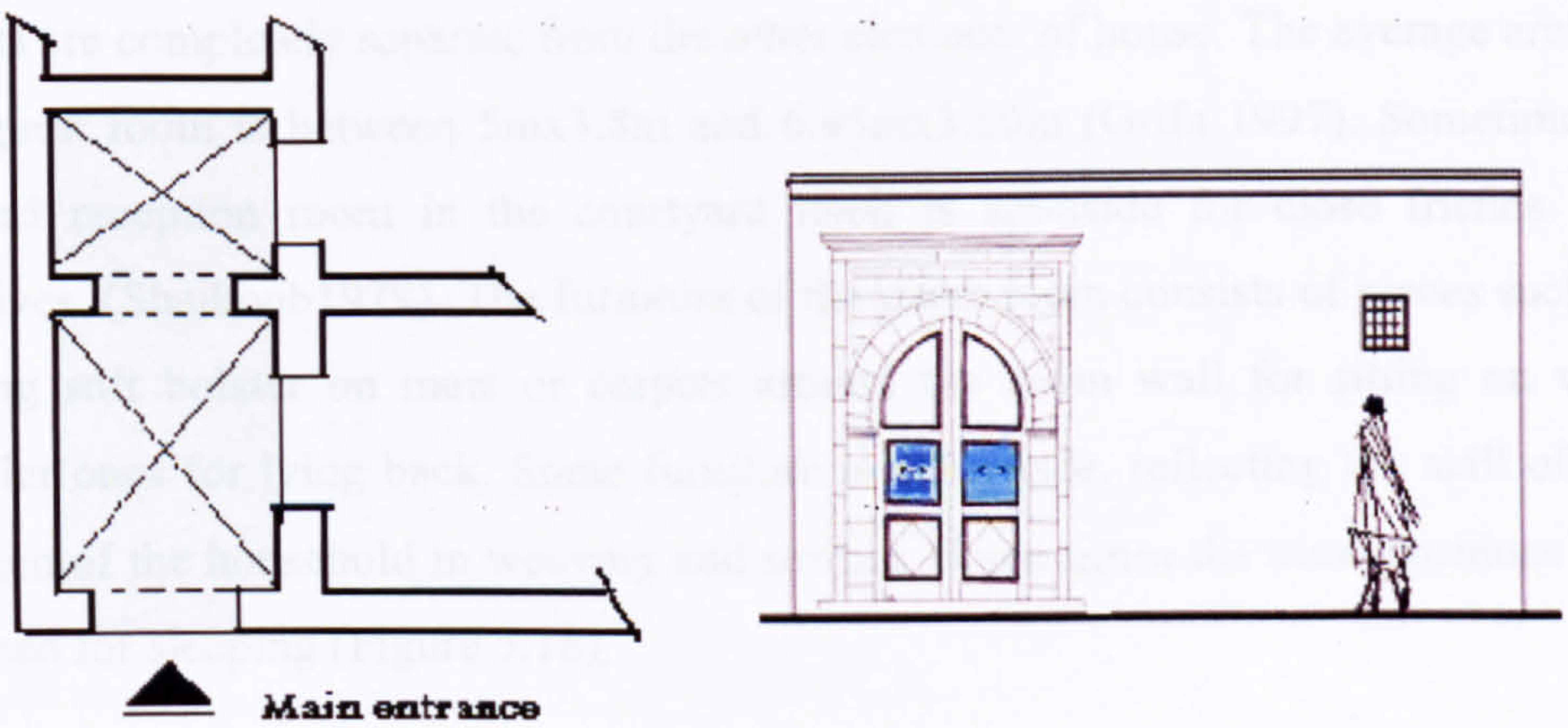


Figure 5.14 : Shows location of the main entrance

2. The passageway (El-Sqiffah)

The term El-Sqiffah means the entrance lobby or vestibule. It is a filter, which separates the events of the street from the domestic activities inside the house. The shape is usually L-shaped, a main feature of the Islamic house, which gives the chance for women to answer the visitors (Hakim 1988). The area is usually 6mx2m, with two entrances. The entrance to inner court has no door but is an open arch way some times with a curtain. (Bahammam 2006) describes that intermediary space between the public area and the private area of the house. It is also the space giving access to the guest room without intruding upon house privacy (Figure 5.15).

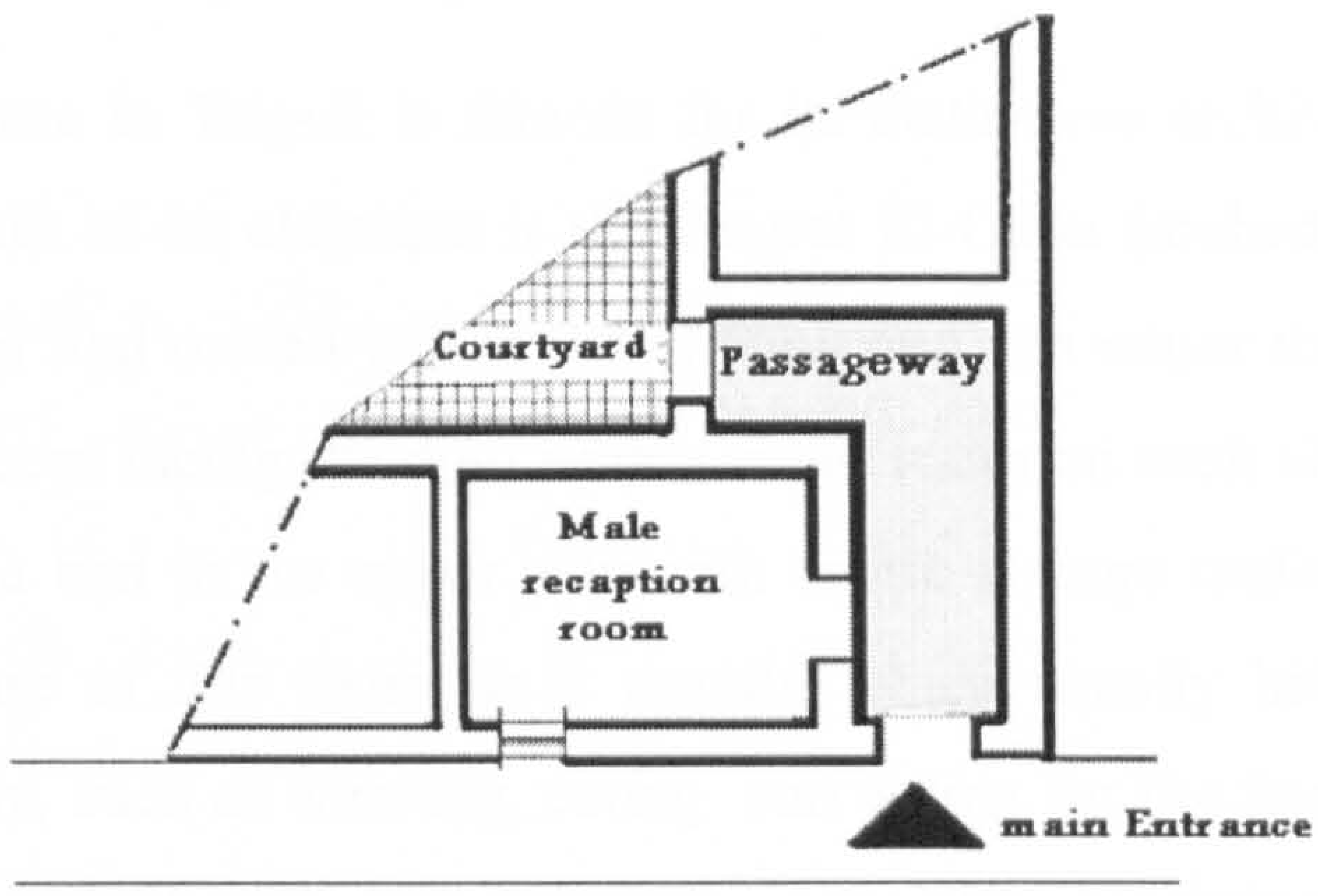


Figure 5.15 : The shape and location of the passageway (Sqiffah)

3. The male reception room (El-Marbouaa)

The term Marbouaa means the reception room for male visitors, located by the entrance and separated from the rest of the house with its door opening from the entrance lobby. It does not generally have a second door into the courtyard. Thus the guests are completely separate from the other elements of house. The average area of the guest room is between 5mx3.8m and 6.45mx3.80m (Grifa 1997). Sometimes a second reception room in the courtyard itself is set-aside for close friends and relatives. (Shaiboub1979). The furniture of the guest room consists of pieces such as a long soft bolster on mats or carpets around the room wall for sitting on with smaller ones for lying back. Some furniture is handmade, reflecting the skill of the women of the household in weaving and sewing. Some times the same cushions can be used for sleeping (Figure 5.16).

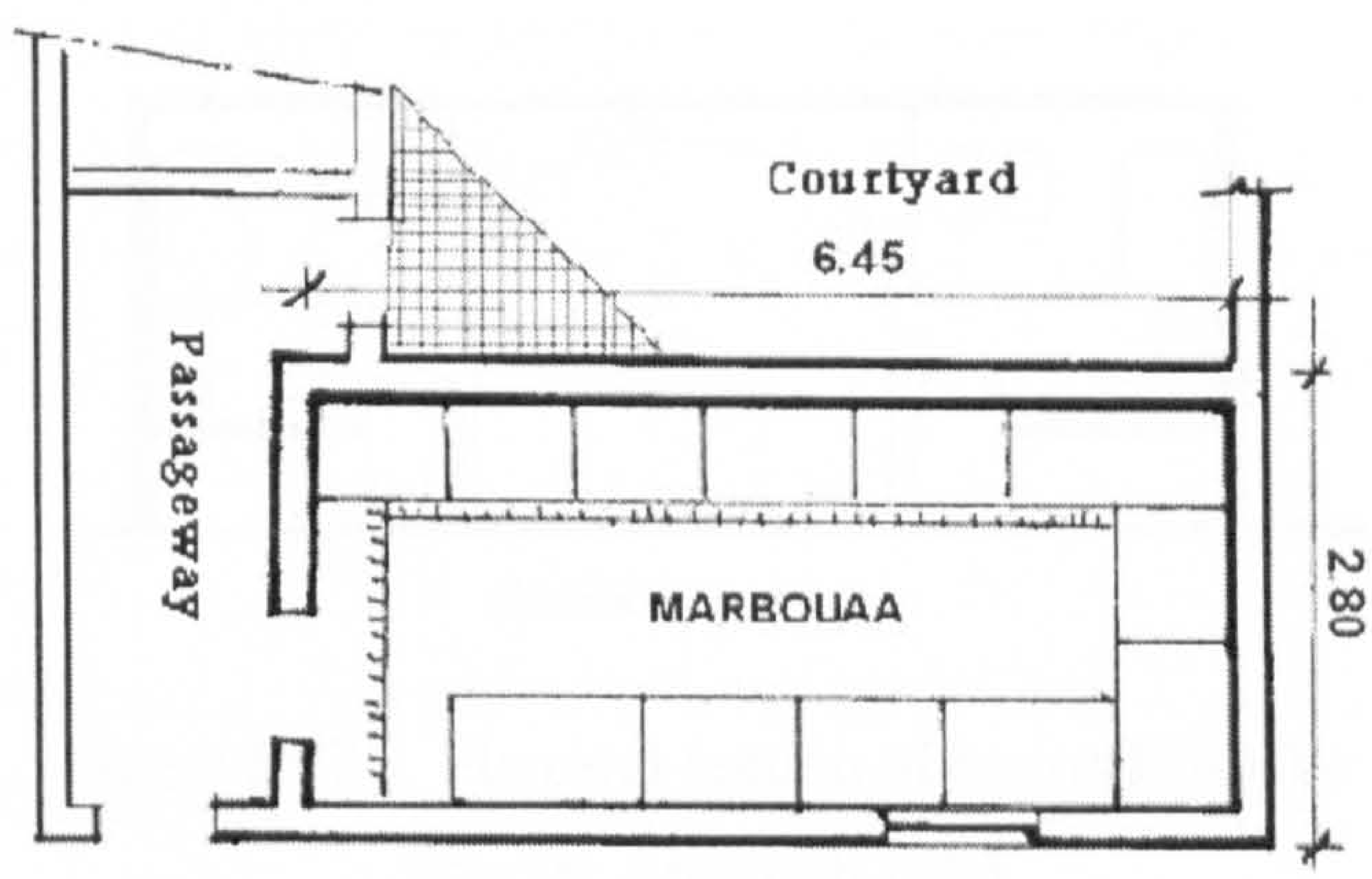
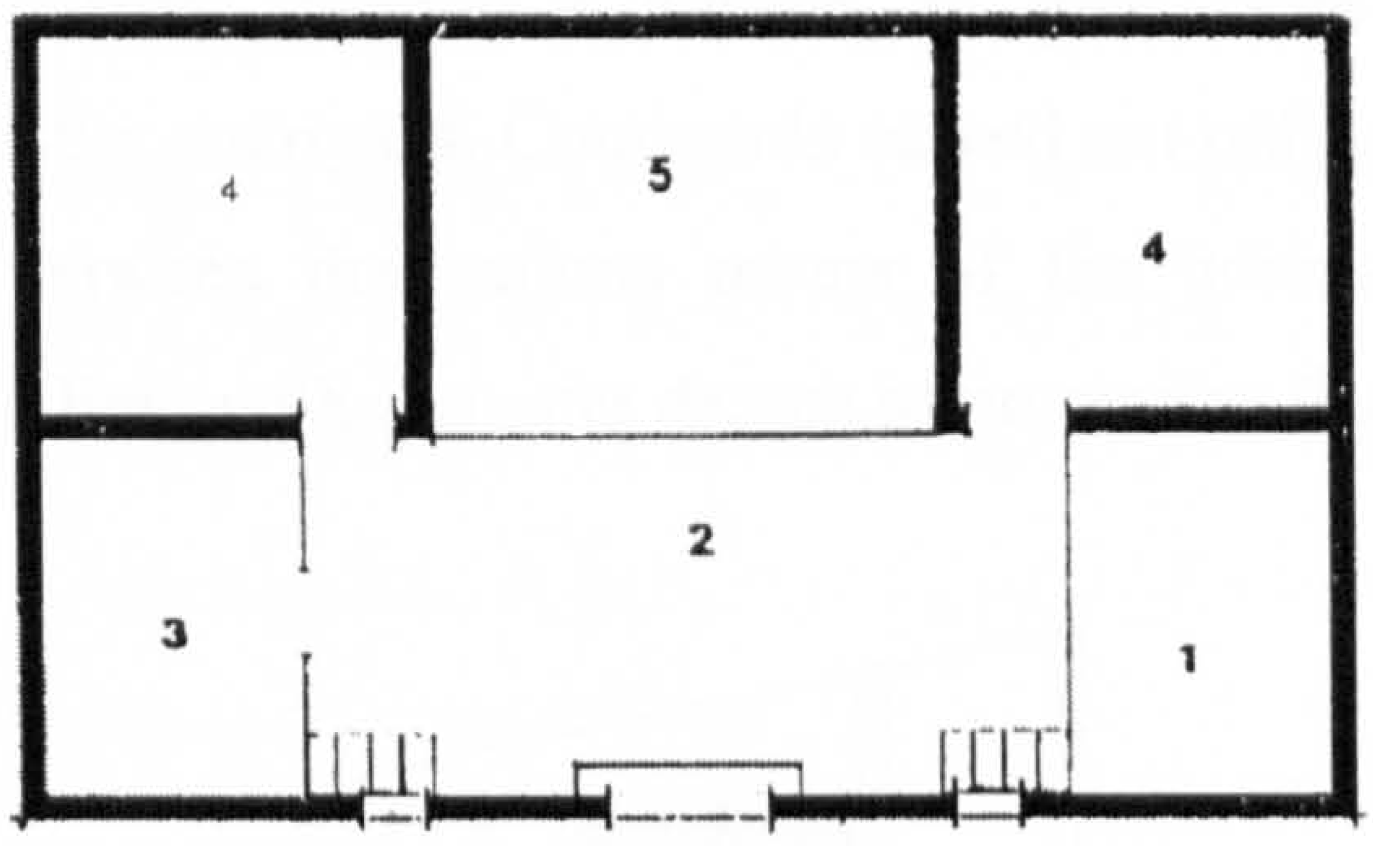


Figure 5.16 : Location of the guestroom

4. The living room (Hugrat El-Qabu)

The courtyard house in Tripoli is famous for its distinctive architectural elements. The most important of its elements is the Hugrat El-Qabu (arched room), which is usually rectangular and roofed with a barrel vault and is a major room of the house. It consists of a recess facing the door with a small room on each side and a wooden platform used as a bed in the upper side with centre storage under the bed in both rooms. The feature of this room, is it usually which usually has a multipurpose function in the day, such as weaving, eating and sitting for the family as well as its use by visiting neighbours and relatives, and also receiving female guests, (Amourah1993) and (Figure 5.17).



Hugrat El-Qabu (living room) plan key	
1	Platform
2	Lobby
3	Storage
4	Small Room with a wooden platform used as a bed with storage space under (Sedda)
5	Large Sitting room

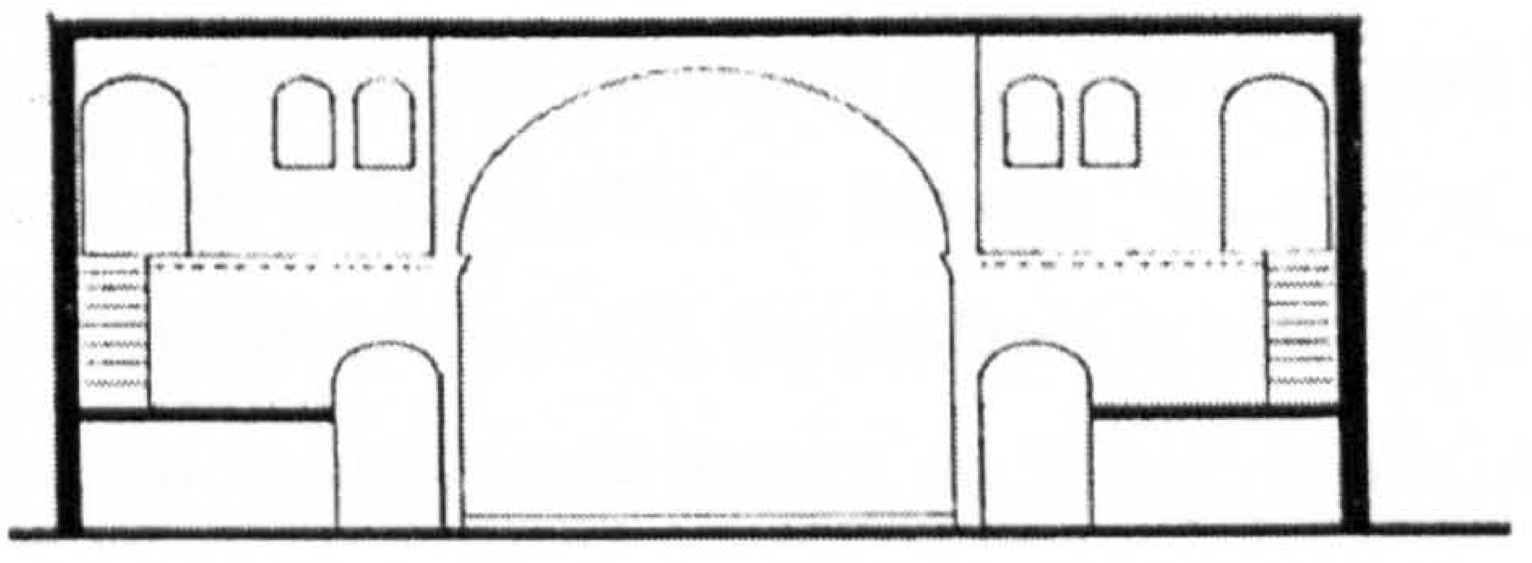


Figure 5.17 : Plan and section of hugrat El-Qabu

Source: Amourah 1993

5. The Courtyard (Wasat Al-Howsh or El-Fina)

The courtyard refers to an internal enclosed space open to the sky with habitable rooms and space and ancillary areas grouped around it (on two, three or four sides) and looking inward towards daylight and natural ventilation communicating with it directly. It may be of single or two storeys and is used as an open-air family living room in spring, summer and autumn, particularly in summer when almost all family activities take place there or around it. Shaiboub (1979) indicates that the courtyard is usually rectangular in shape almost a square. Al-Azzawi (1986) indicted in his study that the shape and size of courtyard depended on the size and shape of the plot. The plan of the courtyard in a few rare cases is a trapezium shape. It is always entered from one corner, through a portico, to give more space for interior arrangements around the courtyard. Courtyards served not only as a sheltered means of communication between the various rooms of the houses, but provided the advantages of air and light with a greater degree of protection from the sun and rain (Figure 5.18).

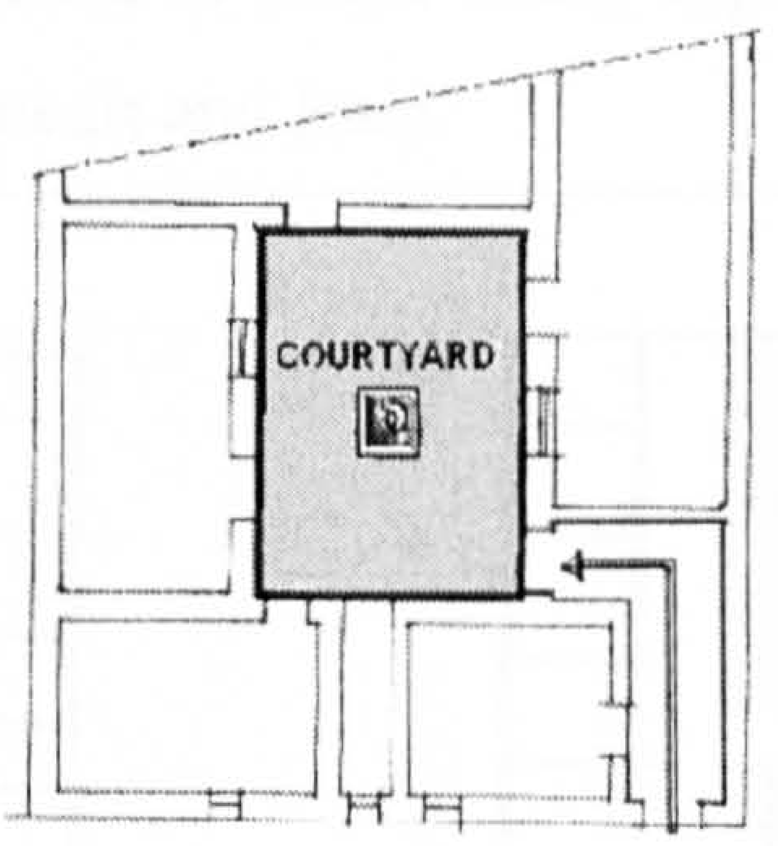


Figure 5.18 : The location of the courtyard

The name of courtyard: there are several English terms such as (courtyard, patio) all referring to a major space within the residential unit. The courtyard is defined by the Oxford English dictionary (2000 p.156), as follows: "an area of ground, without roof, that has walls or building around it, for example in a castle or between houses of flats". The courtyard is commonly known as "*Fina*" in the Arabic language- applied to any open area with in the house. Hakim (1986) also describes that it is a private open courtyard in the heart of house, with some houses having a gallery on one, two, three or four sides and a fountain. Cement or colour tiles mosaics or marble pave the floor depending on the economic situation of the family.

I. Position in relation to the housing areas

The siteing of courtyard is different in relation to one house from another, however, it's usually located in the heart of the building. Sometimes this is not necessary and the courtyard is located at one side of the building area i.e. away from the middle, sometimes forming an exterior wall of the house (Figure 5.19) there are two main reasons for this:

- The houses may have been designed to allow for later expansion depending on the economic circumstances of the family;
- The building plot may have been too small to enable the courtyard to be sited in the middle it, consequently being found in one of the corners of the building.

In the case of a house having more than one courtyard, these courtyards tend to be sited in the heart of the house and are inter-connected with rooms surrounding the main courtyard on all four sides. One of the courtyards may form an exterior house wall, but this type is not common in Libya being applied in the other areas of the Middle East such as Egypt, Kuwait and Iraqi.

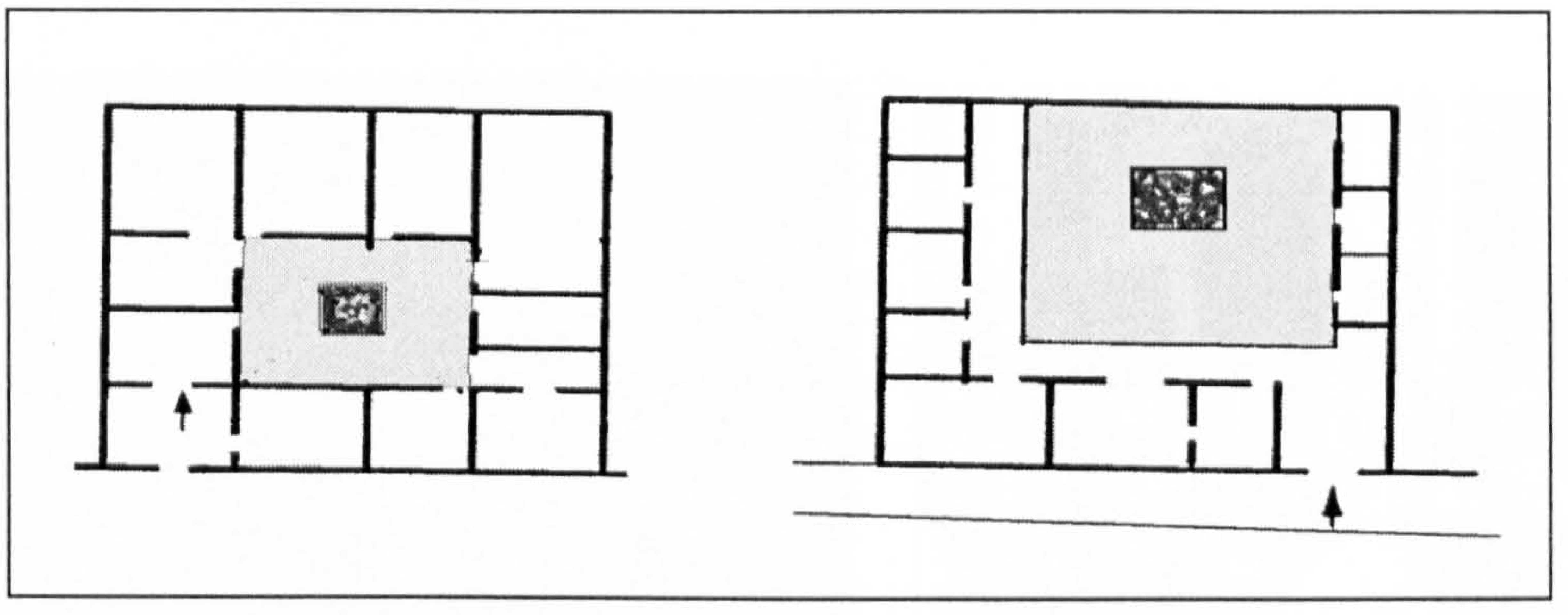


Figure 5.19 : Various positions of the courtyard

II. Function of courtyard

As a skylight to the house the courtyard serves many functions as follows:

- Drawing in any wind movement to cool loggia and rooms;
- Providing natural light whether in the day- time or to a lesser extent in the evening and at night to light rooms using moon- light, particularly in summer;

- In regions located in dry climate, sometimes the courtyard has a cultivated area to provide some humidity coolness even though this may result in some loss of day light entering the courtyard and rooms around it Noor (1986);
- The courtyard provides the families, particularly women, with privacy all through the day(Abed 1988);
- Some courtyards have a Loggia which functions to reduce the amount of glare from direct sunlight that enters the rooms and also provides a shaded area, which is cool and a pleasant place in which to sit. (Al-Sanafi 1997);
- The courtyard is a quiet place, surrounding the rooms. The walls around the house including any external wall facing the courtyard, are the same thickness (50-80cm) that offers good protection against the passage of heat and the street noise;
- The courtyard is a space for family gathering after sunset, where the family members enjoy cheerfully social interchange in comparatively fresh and cool air (Edrees 2001, Reynolds 2002). It is also used as area for activities during wedding and meeting friends (Figure 5.20).

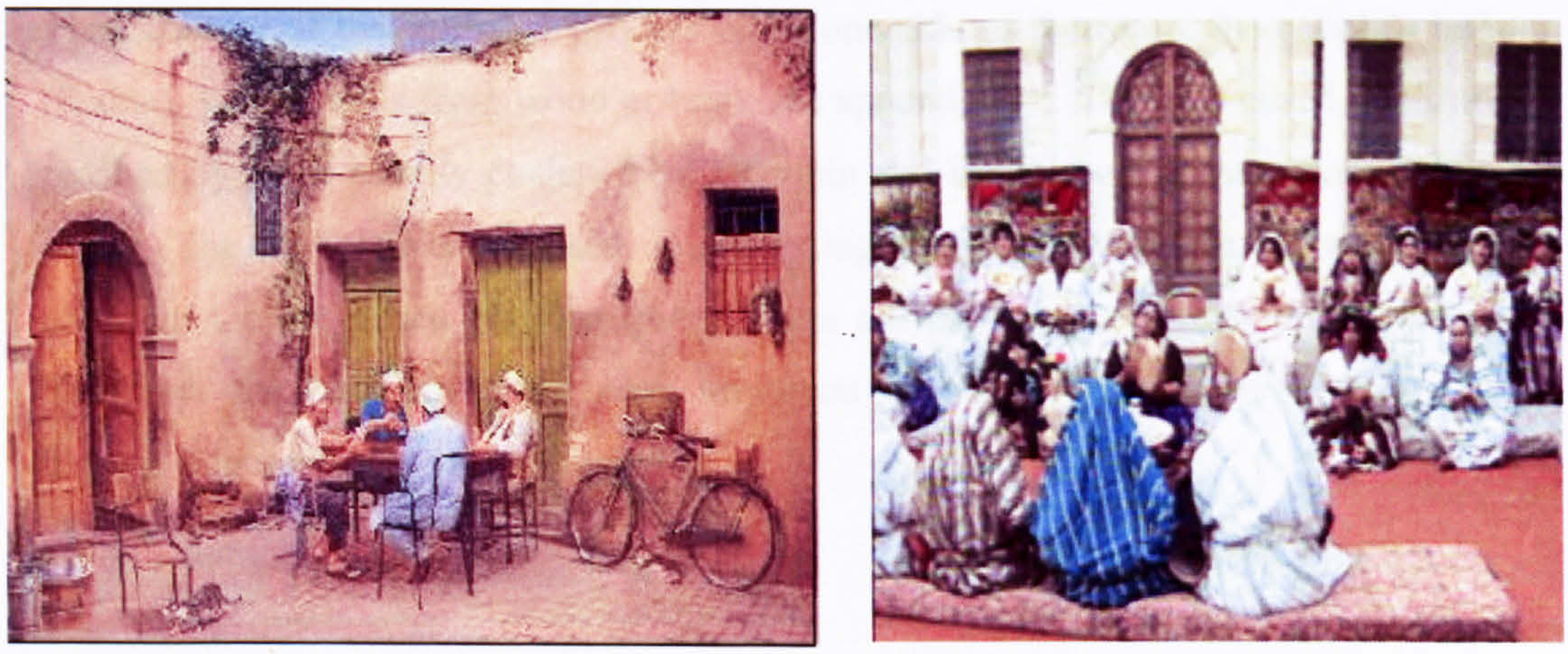


Figure 5.20 : Interior Courtyard their activities during different festivals.

Source: Awad Abeida

- The courtyard has a cistern in the ground in which is stored a limited water supply with also serves as a great hiding place when empty;
- The courtyard is an ideally safe area for babies and children to play in, under visual supervision of elders or mother.

6. The bed rooms (Hujrah El-noume)

The Room is known in Tripoli with (Hujrah or Dar) are mainly located on the second floor in the house which has two storey and in ground floor in single storey and also can be used as both sitting and sleeping area. The dimensions are approximately 6x2.5 metres this makes along narrow room from which a central doorway in the form of an arch next to which is usually one window facing the courtyard with a grilled covering.

This method of construction was due to the limitations of materials used, in this case, the length of a palm trunk. The members of the family share the spaces in the house, except for the main bedroom, which is only for the couple and their children. It is the woman's private area and cannot be entered without her permission. The bedroom has good decoration. She keeps the jewels, gold and gifts here also her children are born and babies looked after here. In this space a cradle of local manufacture is situated in the centre of the room for supervision at all times to ensure the baby's safety.

The furniture of the bedroom consists of on one side of the room, the couple's bed (Sedda), which made from wood or brick see appendix(7) . This is a raised platform reached by steps usually enclosed by a curtain and is the most private place in the house. The highest skill is used in decorating the Sedda with carved wood and painting. On the raised platform palm leaves are used and covered by a mattress. Therefore the bedroom is the most important element in the courtyard house in Tripoli (Figure 5.21).

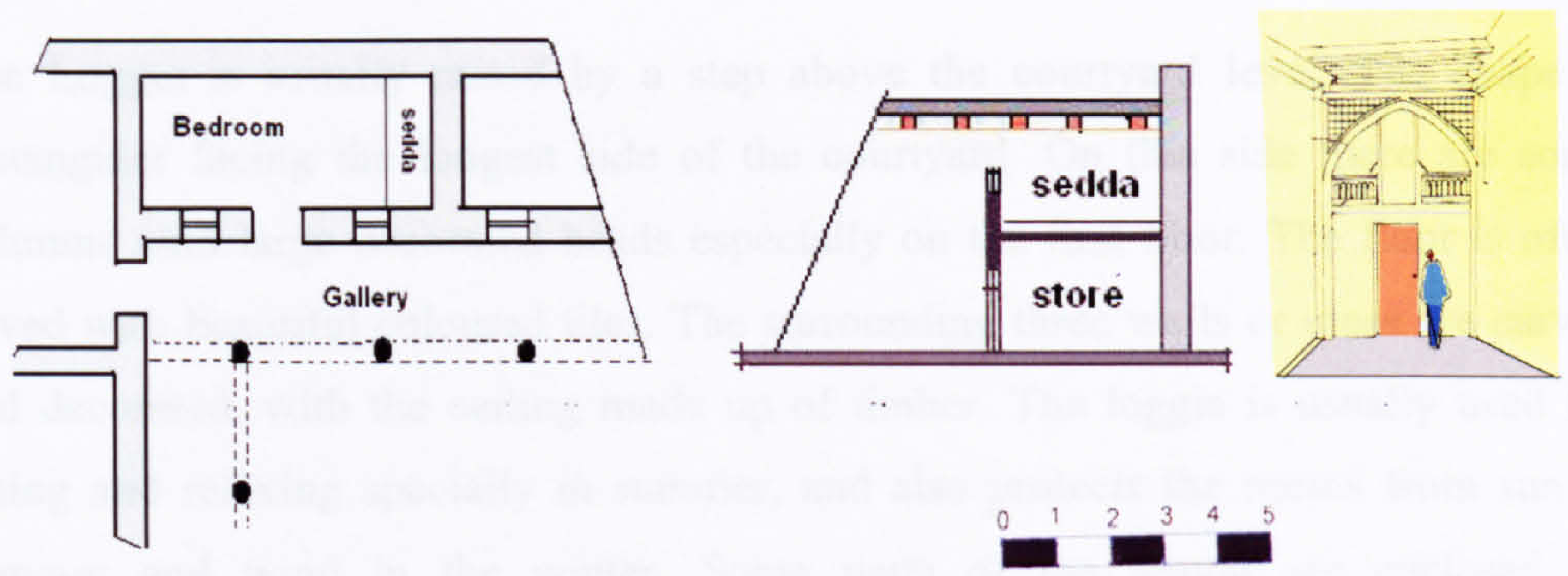


Figure 5.21 : The Hujrah (room) and section for sedda

7. Utility rooms (Kitchen, bathroom)

The kitchen (Matbakh), bathroom (Hammam) and toilet usually consist of one section of the ground floor. They usually have high, small windows out looking on to the street to allow some light to enter and to assist with ventilation. The size of kitchen is 3x2.5 or3x3.5 square metres and it is connected directly with the courtyard because most family activity takes place there the courtyard and it is near the source of water, as well other storage located in the courtyard. Some houses when built of two storeys have a bathroom on the upper floor. In terms of bathrooms the houses have a small bathroom often separated from the lavatories. The number, size and shape of bathrooms and latrines different from one house to another, according to the space available. Most kitchens and bathroom are located on the southern side Figure (5.22).

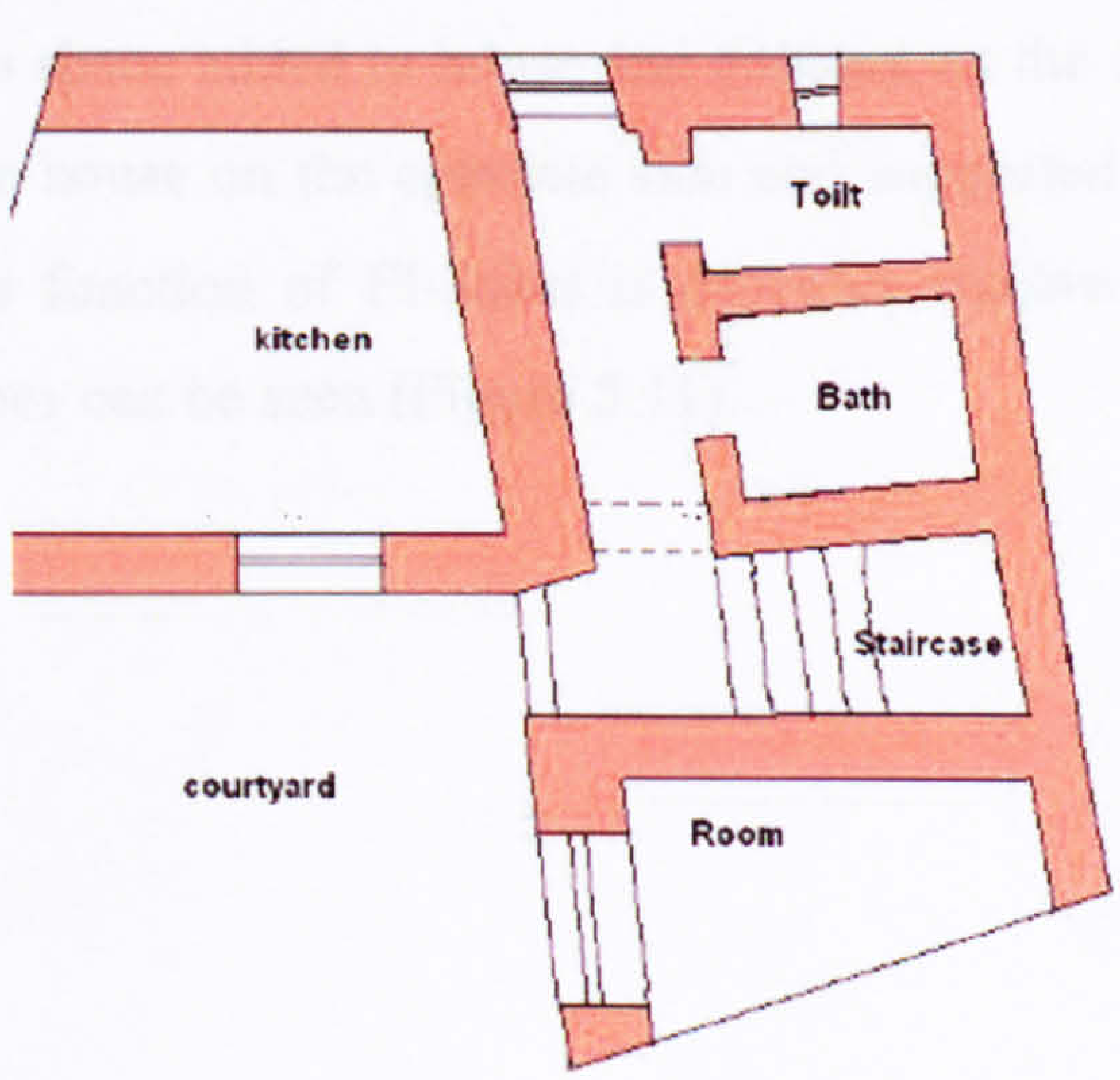
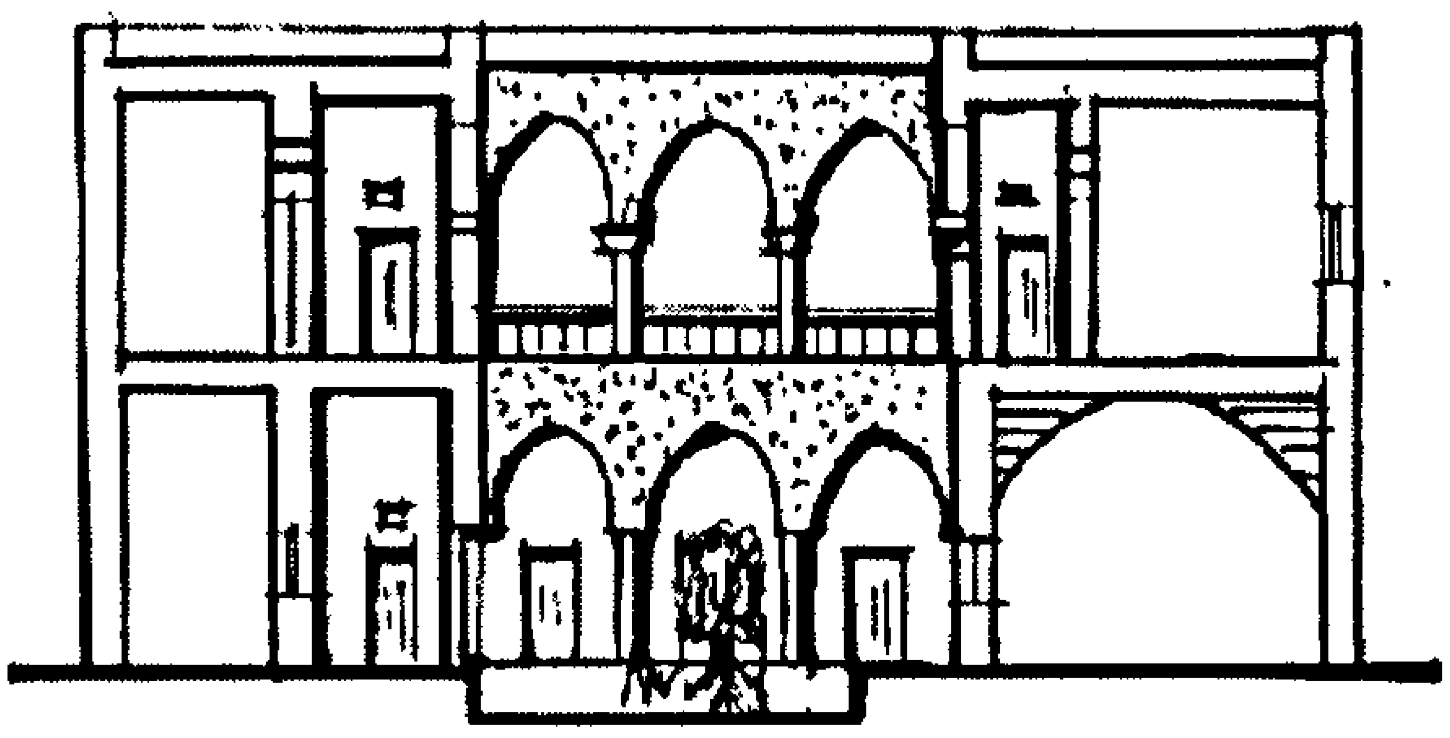


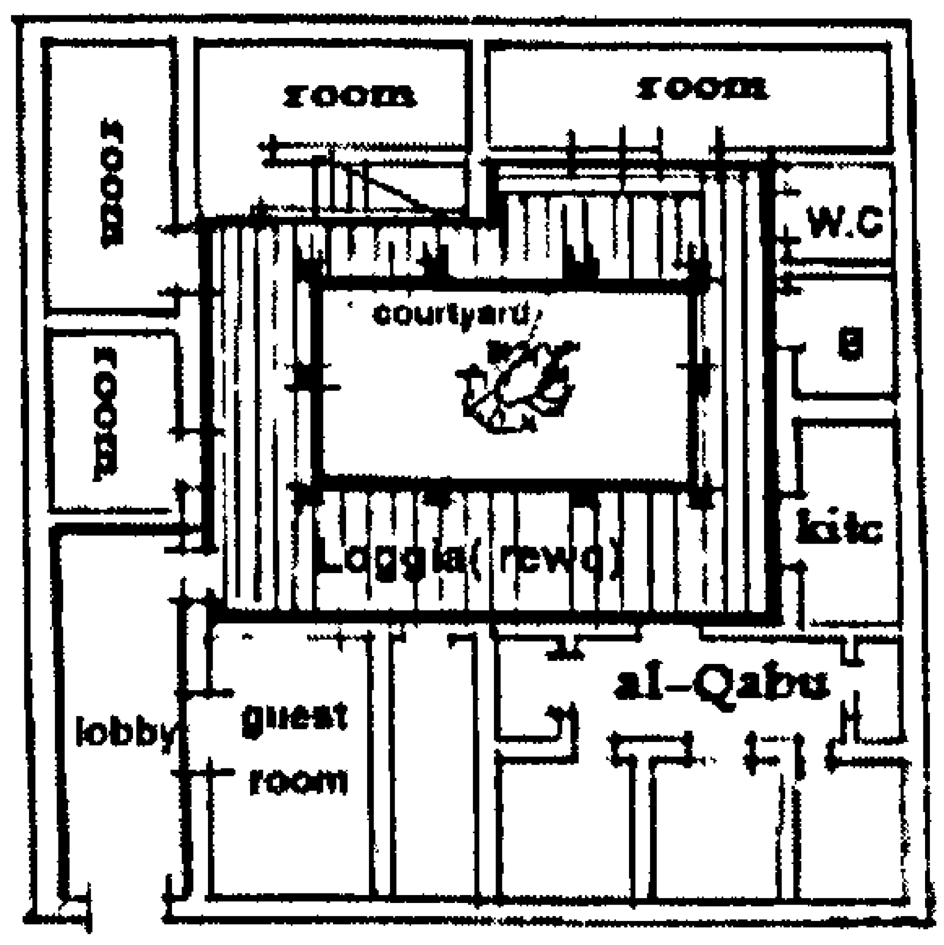
Figure 5.22 : The location of utility rooms (kitchen, bath and toilet)

8. The Loggia (El-Reuag)

The Loggia is usually raised by a step above the courtyard level. The shape is rectangular facing the longest side of the courtyard. On this side there are some columns with large decorated heads especially on the first floor. The floor is often paved with beautiful coloured tiles. The surrounding three walls or more are carved and decorated, with the ceiling made up of timber. The loggia is usually used for eating and relaxing specially in summer, and also protects the rooms from sun in summer and wind in the winter. Some parts of the loggia are enclosed by Mushrabiya or lattice wood over looking the courtyard (Figure 5.23).



Sectional elevation



Location of loggia

Figure 5.23 : The Loggia (El-Reuag)

9. El-Sabat

EL-Sabat is an extra space added to house and situated on the upper floor above the alleyway joining the house on the opposite side and supported by flying buttress in both the walls. The function of El-Sabat is provides shadow to streets and extra space on the first floor can be seen (Figure 5.11).

10. The Roof (Al-Satah)

The roof is an integral part of Tripoli life. Most houses' roofs in Libya, particularly in Tripoli, are flat with a slight slope on the surface so that water can run off for collection and is painted white to reflect the sunrays. The roofs are mostly surrounding by parapet walls for privacy. The terrace roof is used as a private outdoor sleeping space during the hot season. In addition, the roofs are used to dry food such as date or tomato and drying laundered clothing. The roof is normally accessible by a staircase inside the house, but some roofs have external stairs particularly in the countryside.

11. The main Door or El-Bab El Reysi

In the Arabic and Islamic patrimony the concept of the door has religious, social and cultural dimensions, the full details of which are outside the scope of this study. From the urban and architectural side the door represented for the peoples of the old cities, such as Tripoli city, a symbol of security and quietude. Therefore the door was subject to a great care in view of its decoration of the people living behind it.

Through the examination of some doors in the traditional house in Tripoli the door is distinctive socially and culturally among the population of the city. Socially in Tripoli, particularly in the countryside, doors are left open all day as a sign of hospitality. A closed door indicates the family had done something of which it is ashamed, or the family is not there.

The main patterns of the doors in some houses in Tripoli are rectangular, the curved mid-circle door, and the curved horseshoe shaped. They are made of timber and then painted green, blue and brown. Also some doors are made of palm, timber and steel plates or nails decorate some others. The average height ranges from 1.80 to 2.50m and width from 1.20 to 1.40 m (Figure5.24).

Figure 5.24 : Various patterns used in decoration of entrance

12. Window (El-Roshen)

For the population of Tripoli the window is known as "El-Roshen". The window or El-Roshen has multipurpose elements, it is a passage for air and light and a visual and auditory contact point. The window can control the air and light entering to interior spaces of the house, and conversation through the window particularly women on first floor. Also, according to architectural analysis of some traditional houses, the concept of windows is aimed to limit the direct visual contact of the people standing outside the house.

The shape and size of the windows is usually rectangular with dimensions from 1.5-1.00 m in length, and from 0.50 or 0.75 cm in width resulting from the need to minimize the size of the external openings. Most windows of the traditional house are small, made of timber and then painted green or blue with a steel grill to provide protection and safety from strangers (Figure 5.25). Generally speaking the window functions are firstly to permit light to penetrate the interior in such quantity and distribution that they satisfy the specific function inside the room; secondly, to provide a view of the exterior as well as ventilation. However, in the case of ventilation, the control of glare that results from the brightness of the exterior light, the provision of privacy, the control of sound transmission, dust, and houseflies contradict each other. For example, it is difficult to provide privacy as well as allowing the passage of air, and if you allow the passage of air it is rather difficult to control dust, houseflies and glare. Thus the window design in such environment is very critical.

The traditional Arab designer found the answer to the majority of these challenges in the Mushrabiya - a wooden lattice screen. The design of the Mushrabiya can ensure privacy through the following stages; Firstly, when looking towards the Mushrabiya from the outside, the solid areas will be bright and the gaps in between will be dark thus preventing a view of the interior. Secondly, spaces between the vertical and horizontal members vary from very finely spaced up to eye-level and increase gradually towards the top of the window.

Figure 5.25 : The shape and size of window's both inside and outside the house

13. The Balcony

In most of the houses in Tripoli the balcony is situated on the internal courtyard, but in some residential houses the balcony overlooks the street. It is noticeable that the use of balcony as an architectural element in the houses in Libyan in general, and in Tripoli in particular have prevailed since the second quarter of the nineteenth century. In the construction patterns before this era, the balconies overlooking the street were rarely in use. It is thought that this is due to the beginning of the influence of the Italian architecture on the construction and architecture in Tripoli city. (Figure 5.26) illustrates the constitution of the balcony in the houses of Tripoli.

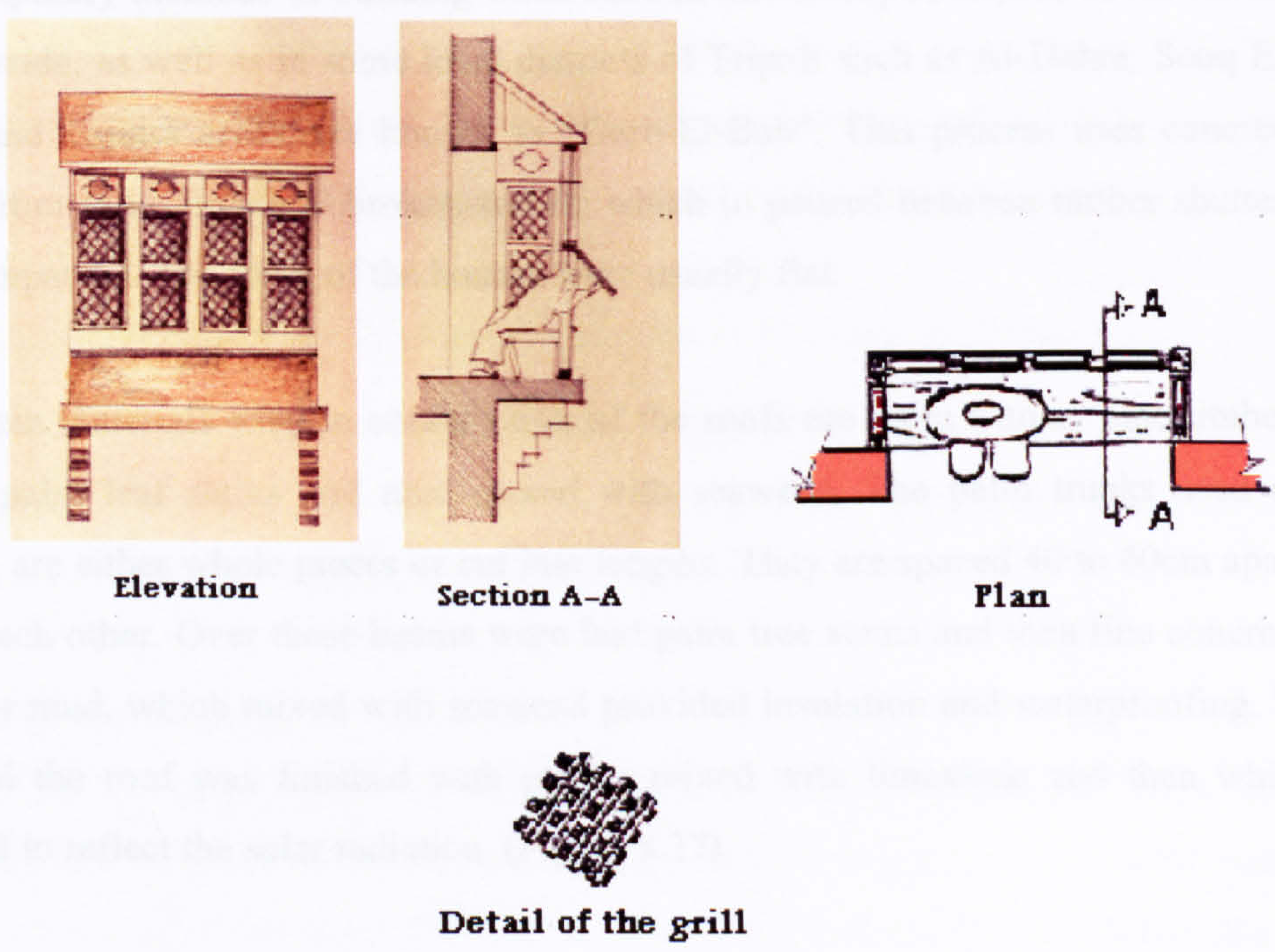


Figure 5.26 : The constituent parts of the balcony in the traditional

14. House construction

The traditional houses were constructed without drawings, designers or supervisors. Typically, construction was made under agreement between the landlord and the chief builder (Al-ustah) after the house owner had set out his requirements in terms of the number of rooms and their direction. All buildings are constructed completely from local materials the local building materials are limestone, sand stone, mud brick and sun-dried brick, palm tree and timber. Glazed tile and mosaics were used in some buildings especially Mosques and markets (Shawesh 2000).

In the costal area the walls were very solid and thick up to 70cm in the courtyard house suitable for to climate, safety security especially the outer walls that are usually load bearing. These walls were built with local stone or brick bound in lime mortar and finished with plaster and later white washed. Some walls were left un-plastered on the outer face, when built with well-cut and shaped lime stone blocks; white washed and plastered on the inside.

The thickness of the walls varies from 50 to 100 cm according to the height of building. The partition walls from 30-35cm, which are non-load bearing walls are also built from stone or brick bound in lime-mortar plastered and white washed. Contemporary methods of building walls used in one-storey courtyard houses in the countryside, as well as in some local districts of Tripoli such as Al-Dahra, Souq El-Juma and Tajuira areas, are known as "Derb-El-Bab". This process uses concrete made from sand, lime and broken stones, which in poured between timber shutters and compacted. The roofs of the houses were usually flat.

The main materials used in construction of the roofs are palm trunks, pine timber, joists, palm leaf stalks and mud mixed with seaweed. The palm trunks used as beams, are either whole pieces or cut into lengths. They are spaced 40 to 60cm apart from each other. Over these beams were laid palm tree stems and then fine concrete earth or mud, which mixed with seaweed provided insulation and waterproofing. In the end the roof was finished with plaster mixed with limestone and then white washed to reflect the solar radiation (Figure 5.27).

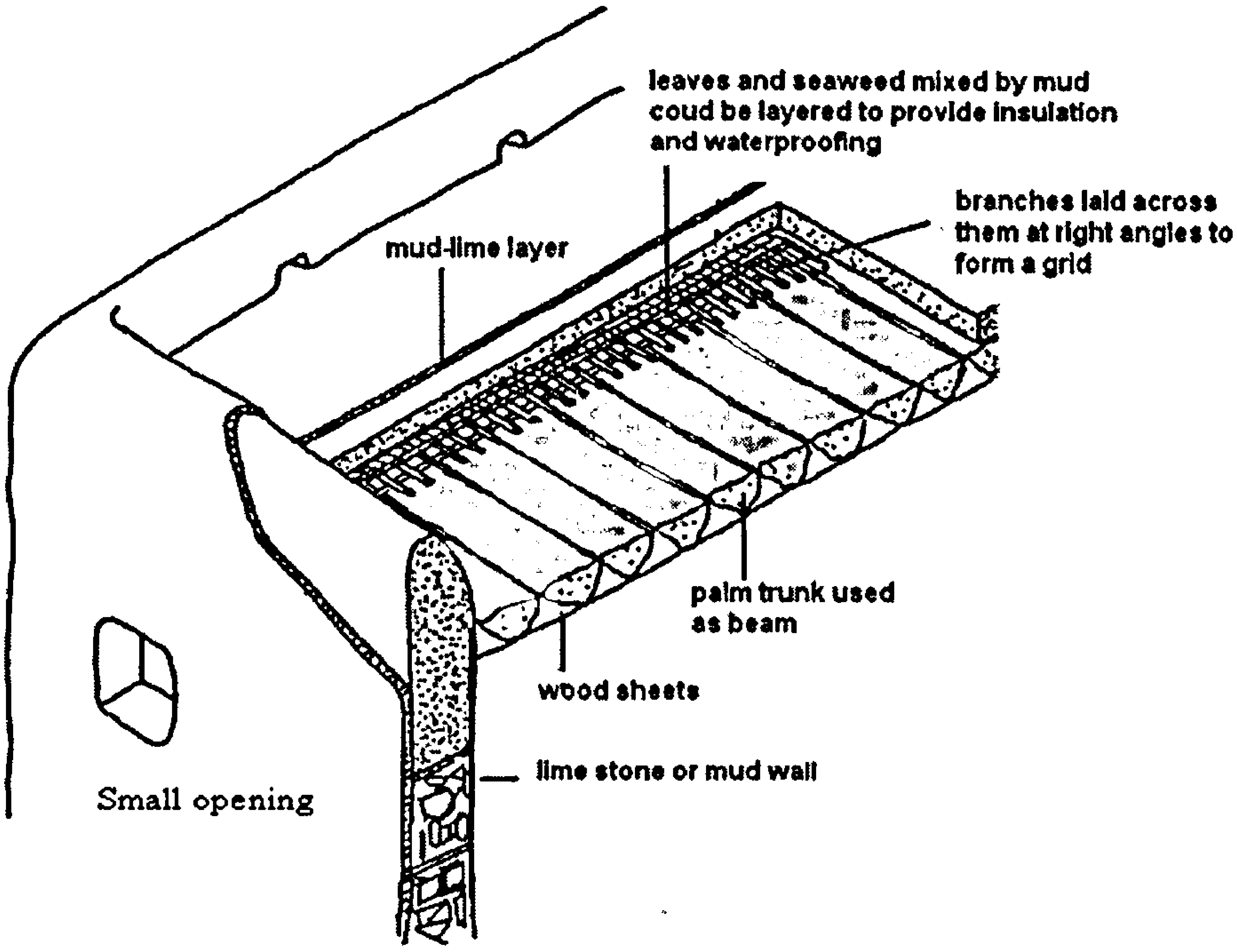


Figure 5.27 : The construction of a traditional house
Source: Gadi 1987

5.4.4 Analytical study of the courtyard House in Tripoli

This section will explain the ways in which the people in Tripoli solved their housing needs in the design of the courtyard house. This is based on the author's direct observation and practise on an idea about that two main considerations influenced that on the housing design, which are climate and socio-religious.

1) Physical considerations of housing design in response to climate

In traditional housing and urban design, layout, materials and methods of constriction of housing was such that they provided plenty of protection from the prevalent hot climate. People achieved this result by the following:

a. Layout of housing

Houses were closely related in order to protect each other from the sun's rays, resulting in a minimum amount of solar exposure on external and internal walls. These walls shaded the deep, twisted, narrow streets and some parts of the streets covered by El-Sabat. Also Flying buttresses to support houses create shadow on the walls (Figure 5.28). Daza, 1982 illustrated that in his study, the layout of the house, with a single façade facing the narrow streets, minimised exposure to direct heat. The nature of construction of such houses and the materials used add to the validity of the suitability of this form to its environment and terrain.

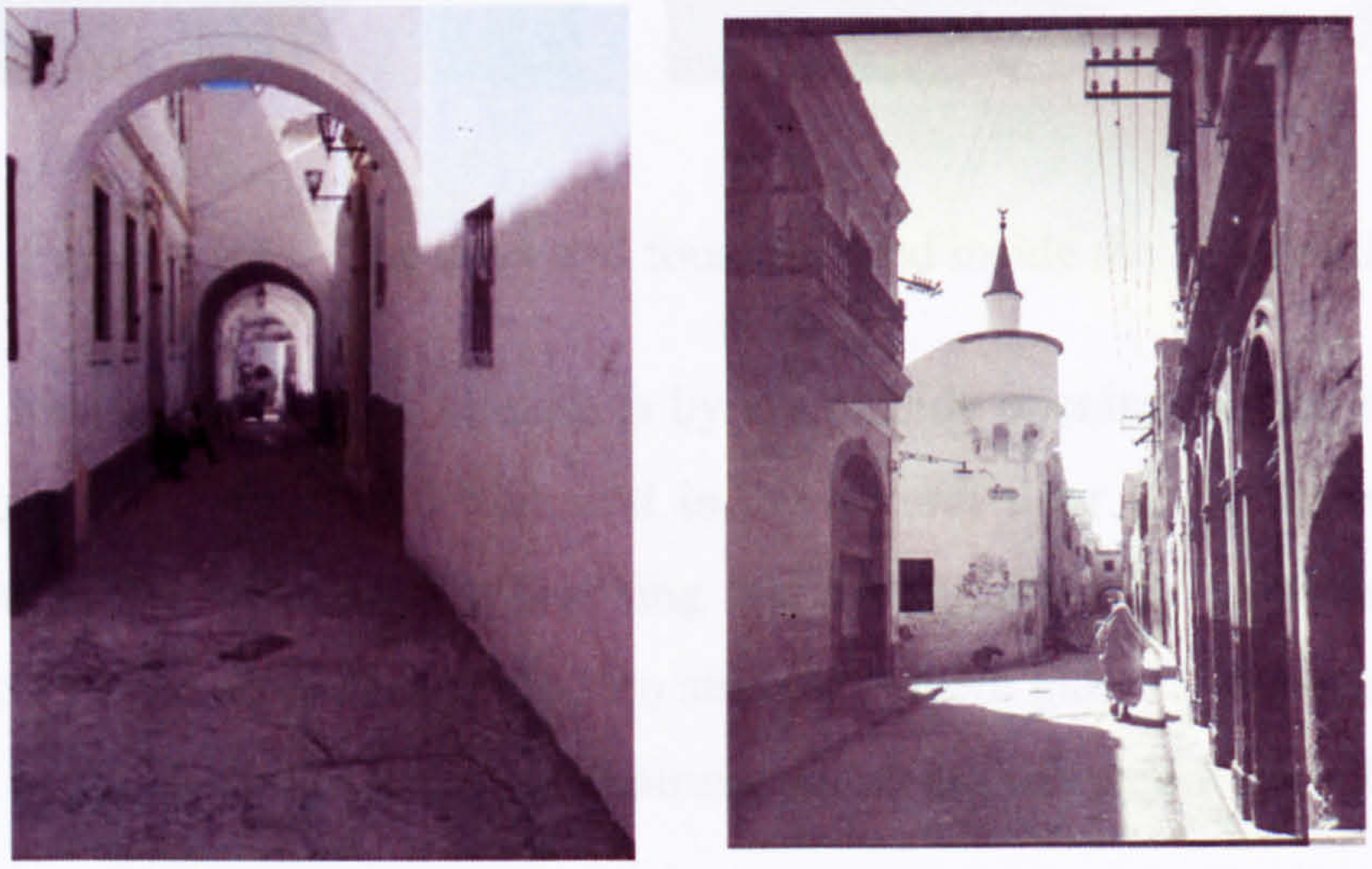


Figure 5.28 : The twisted narrow streets and the shadow

Source: Amourah 1993

b. Interior design

The Rooms are built around the central courtyard, which provides a relatively cool private out-door space for family activities. To increase the ventilation inside the house, and reduce the temperature, the height of ceiling is usually increased to 4m. This feature is associated with housing in hot climates, providing openings at the top that help the hot air ascend and escape (Evans 1980).

This is sometimes improved by planting trees (fig or grape) or shrubs besides some houses, and some houses have fountain in the courtyard which offered humidity in hot harsh climates. Also the courtyard protects from sand storms and sound pollution (Figure 5. 29).

Figure 5.29 : The trees and fountain used inside the courtyard

The other way to response to climate is by the outside openings of the house in the ground floor being small and high and in the second floor using the *mushrabiya*, which reduces the heat and dust reaching the interior. Also the *mushrabiya* allows the light to pass through, but the wooden struts cut-down glare. The passage of air is facilitated by the design of the wooden struts, which are rounded Rghei (1987).

c. Construction methods and materials

As mentioned previously the walls and roof were made of very thick material and the roof covered by mortar layer, followed by a layer of mud, and were constructed from local materials that offered a high degree of resistance to the heat such as limestone, (El-Fortea 1989).The other way to responded to heat is by painting the roof and external surfaces in white which reflects solar radiation. Danby (1983) indicated that, "A whitewashed roofs surface temperature can be 10c less than an unwhitewashed mud roof under the same condition.

2) Housing design in response to society and religions

Aspects of social-cultural and religion provide a second essential influence both inside and outside the house. Architecturally speaking the traditional designer had to balance the two influences this means that the design must facilitate and encourage maximum social contracts as well as maintaining privacy, particularly for the women. So the private house had to accommodate other functions. The following examples explain the different stages of achieving privacy.

a. The house design in terms of privacy

- **The entrance design**

As indicated previously the entrance space is designed to ensure privacy to the interior even when the door is open (Figure 5.30) illustrates the staggered entrance being turned in one or two sharp bends; any attempt of curious eyes to see into the interior is prevented. Furthermore, if any stranger entered the main doorway while the courtyard is occupied by the family the length of the entrance corridor will take him at least the same period of time as the women to escape to the other room.

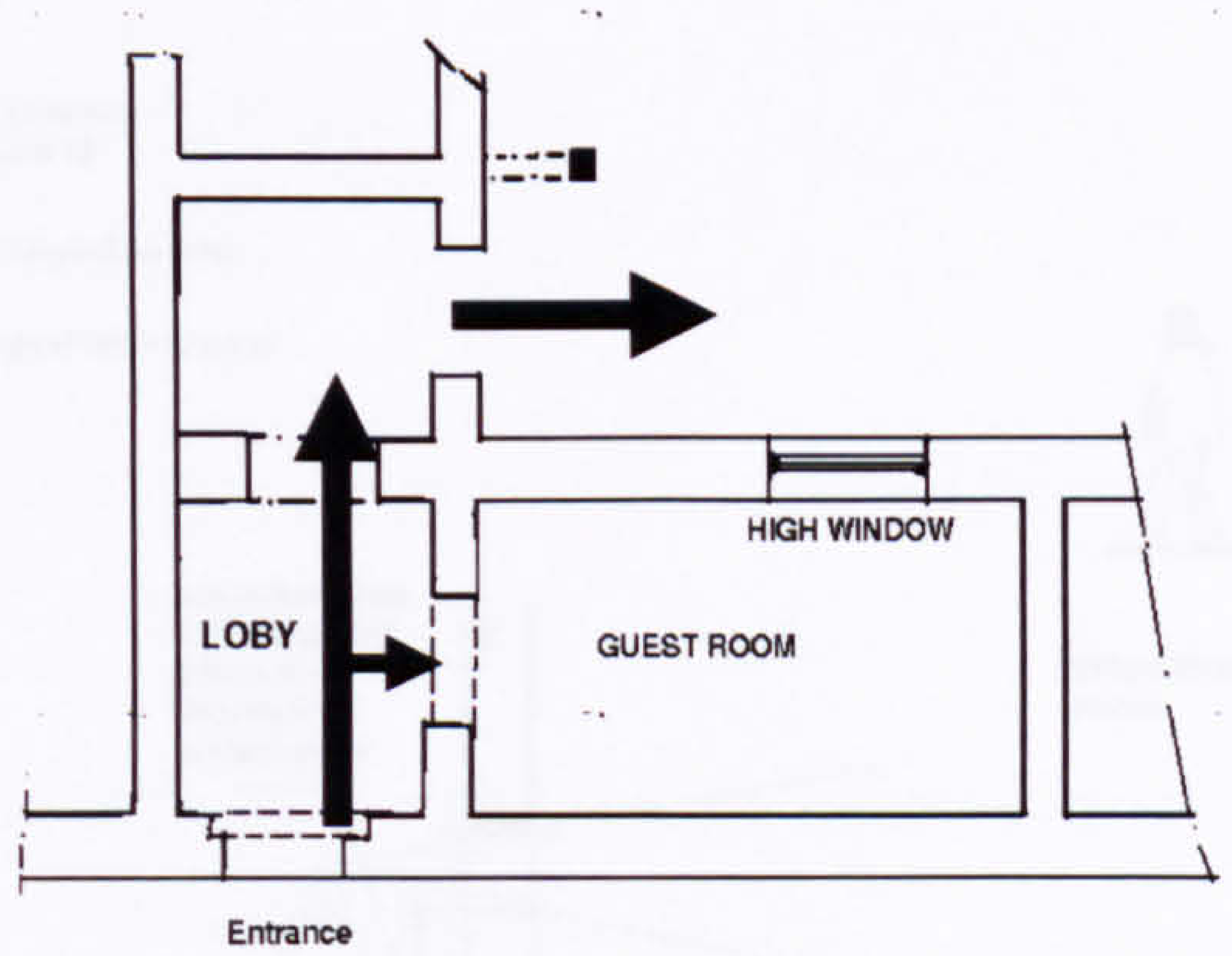


Figure 5.30 : The Indirect traditional entrance

Also the location of the main entrance doesn't face directly to the main entrance of opposite house (Figure 5.31).

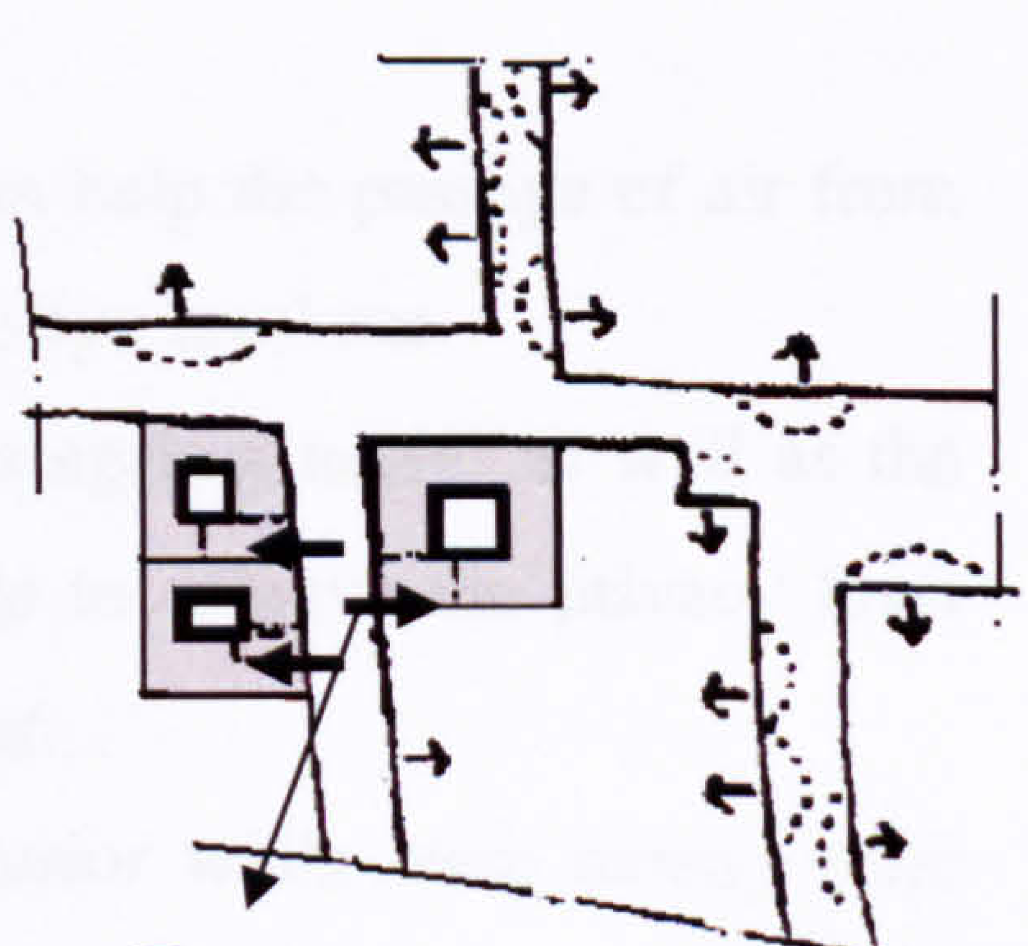


Figure 5.31 : The location of the entrances opposite each other

- **Opening design**

It is obvious that windows are the most critical items, which affect privacy, vision, and natural ventilation. For example, if we made them large, for ventilation and vision, the result would be to the cost of privacy, and so on. The following strategy will explain how the designer accommodated the three contradictions without hindering any other functions.

I. Less windows towards the street, or locating them to such a height that even a man in street cannot look into the interior (Figure5.32).

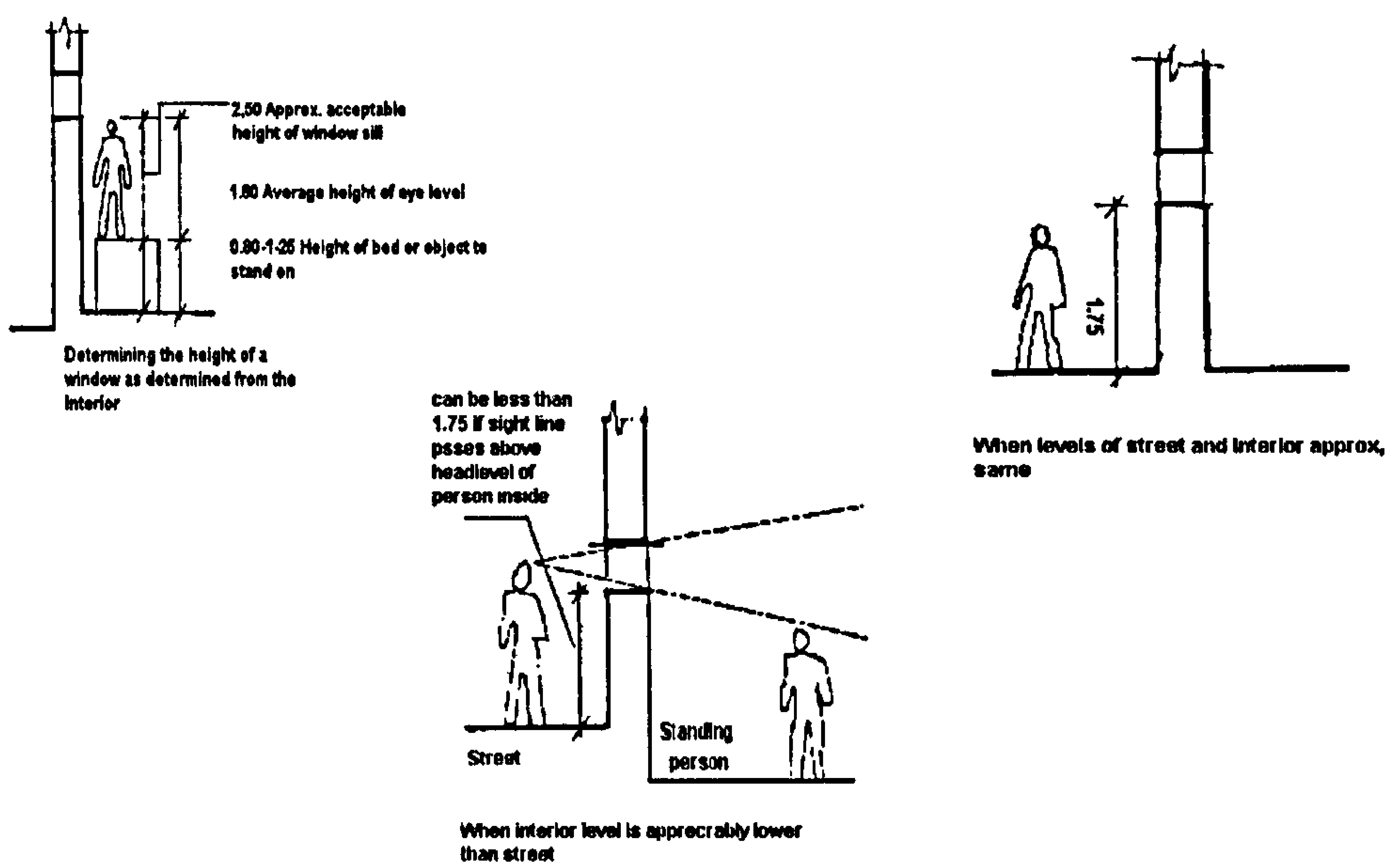


Figure 5.32 : The recommendations for dimensions of windows

Source: Hakim (1986)

II. Using the window screen in such a way that it can help the passage of air from the top openings while concealing the viewer up to eye level see.

III. Thick walls provide good security and protection against noise as well as the height of parapet on the roof also play great role to achieve the privacy form neighbours during the user used the roof in summer.

IV. All rooms open onto the courtyard and the exterior walls were mostly solid except for some small ventilation openings quite high up preventing pedestrians looking in.

From the analysis, the courtyard house in Tripoli is designed to completely respect the social life and climate. Generally, the traditional house in Tripoli is mainly divided into two parts see (Figure 5.33).

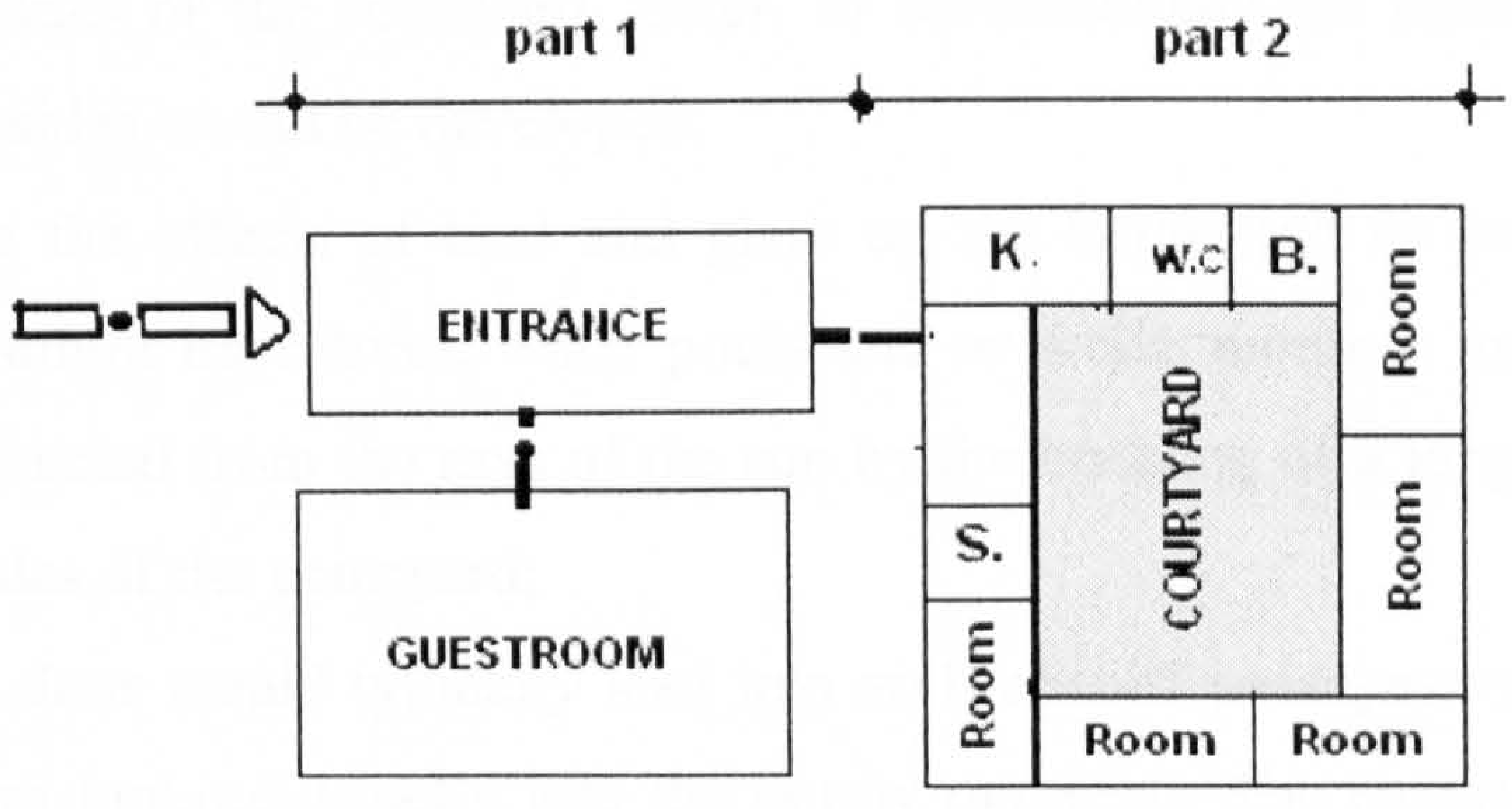


Figure 5.33 : The concept of the traditional house

5.4.5 Summary of characteristics of a traditional courtyard houses

From the analysis and studies of planning and design of courtyard houses in Tripoli the characteristics can be summarised as follows:

- Layout design with a number of streets adjoining houses. The houses are grouped in a cluster to decrease the walls exposure to direct sun. The standard definition of a courtyard house is housing with an enclosed space open to the sky and surrounded by rooms accommodating the various activities of the occupants, characterises the traditional houses built in Tripoli;
- With hardly any opening in the external walls, the houses are inward –looking, towards the courtyard rooms depend on the courtyard for almost all light and air circulation, sometimes in conjunction with small high-level slit-like openings in the extend wall. In the second floor the windows were generally large and obscure by mushrabiya to maintain the privacy and let light and airflow in house;
- The facades of the external walls are absolutely plain, devoid of any decoration just the main entrance door was usually decorated with tiles and gypsum ornamental and the elevations show straight lines and rectangles. The lime

coating typically applied to the walls, also gives the exterior a degree of uniformity;

- The houses are typically designed with the capacity for expansion of living accommodation within the existing shell. Development might initially occur on only two sides of the courtyard. Later, to accommodate the extended family, remaining sides would be developed;
- To reduce the effects of heat and glare on the home and its occupants, the courtyard might have trees, water pools and or wells, awnings and rooms are further protected from the rays of the sun by the building of a loggia along one or more sides of the courtyard;
- The main door would typically lead into an L-shaped passageway (preventing callers from looking directly into the family quarters). The passageway would offer separate access to the men's reception area and the family's living quarters;
- The effect of religion and social interaction on local architecture can be observed in two ways. Islamic religious teaching encourages privacy and modesty, and courtyard houses fulfilled this condition by providing an inward-looking house;
- The building material the limestone, brick stone and mud seaweed, which are local materials. The use of palm trunk and pinewood joists, which gave limited the width of, rooms some uniformity, from house to house and high, reaching 4m in some houses. This construction system and building materials are not strong enough for vertical expansion;
- The pattern of settlement, with houses being separated by narrow alleyways, to provide protection from the heat and sun for those out in the street, and to improve the circulation of air in houses;
- The traditional housing forms were socially, culturally and climatically successful despite the lack of most basic amenities and facilities;
- The disadvantage of the courtyard house, there are problems in the winter season when the rain enters courtyard and the narrow streets are not suitable for use cars that nowadays are essential element;
- In general the fundamental characteristics of the courtyard houses are in line with the family's tradition of isolating from the public and its need for a private family life.

5.5 Contemporary houses (Modern period)

5.5.1 Introduction

Up to the end of the nineteenth century the urban and residential mode in Libya, particularly in Tripoli city, have kept the traditional life and this is reflected in the cultural, economic, social and political status of its inhabitants, where religious, social and climatic factors have had an important role in formalizing its architectural production. At the beginning of the twentieth century, the urban and architectural features begin to change due to external and internal factors, of which the most important include cultural contact, independence period, economic factors and population growth, the revolution period and materials of construction and technology.

- **Cultural contact**

Due to the political, economic and technological developments at the beginning of the twentieth century, this extended the cultural contact between people. Such effects have first appeared in the population of Libya, in particular Tripoli, at the beginning of the Italian occupation of Libya in 1911.

- **Independence**

After the period of resistance to the Italian occupation, which led to the establishment of the Libyan State in 1952, its role has been seeking the development of society, culturally, socially and economically. Study programs were instigated in all areas of planning and, in particular, the housing field, which at that time suffered an extensive deficit in provision of fit houses. This period is considered as the beginning of the move away from the traditional urban and architectural modes, which had been the distinguishing feature of Libyan society for hundreds of years.

- **Economic factor and population growth**

Among the factors that helped urban development is the new economy based on oil, which began at the beginning of sixties. Obviously, this played an important role in the rapid population growth in Tripoli city and in the associated social, cultural and urban transformation. This also necessitated improvement of sanitary provision and educational services.

- **Start of the Revolution 1969**

The revolution has accelerated the speed in social and urban changes in Libyan cities, especially Tripoli, through the comprehensive social and urban development policies.

- **Materials of Construction and Technology**

The entry of modern construction techniques and technologies as part of the new architectural styles contributed to the urban and architectural growth in Tripoli city.

Through a review of these factors, it is possible to divide growth and development stages into three different structures that chronologically represent the major phases of growth of the city (Figure 5.34). The first sector (A) is the first extension of the city during the colonial period (1911 –1952); this structure is less dense with larger streets compared with the tradition zone. The second sector (B) built during the independent period (1952 – 1969) is laid out on a regular grid pattern with large streets defining square blocks of residential. The last sector (C) is a series of sporadic development including auto-constructed and mass housing sectors and dates mainly from (1969 – to present day).

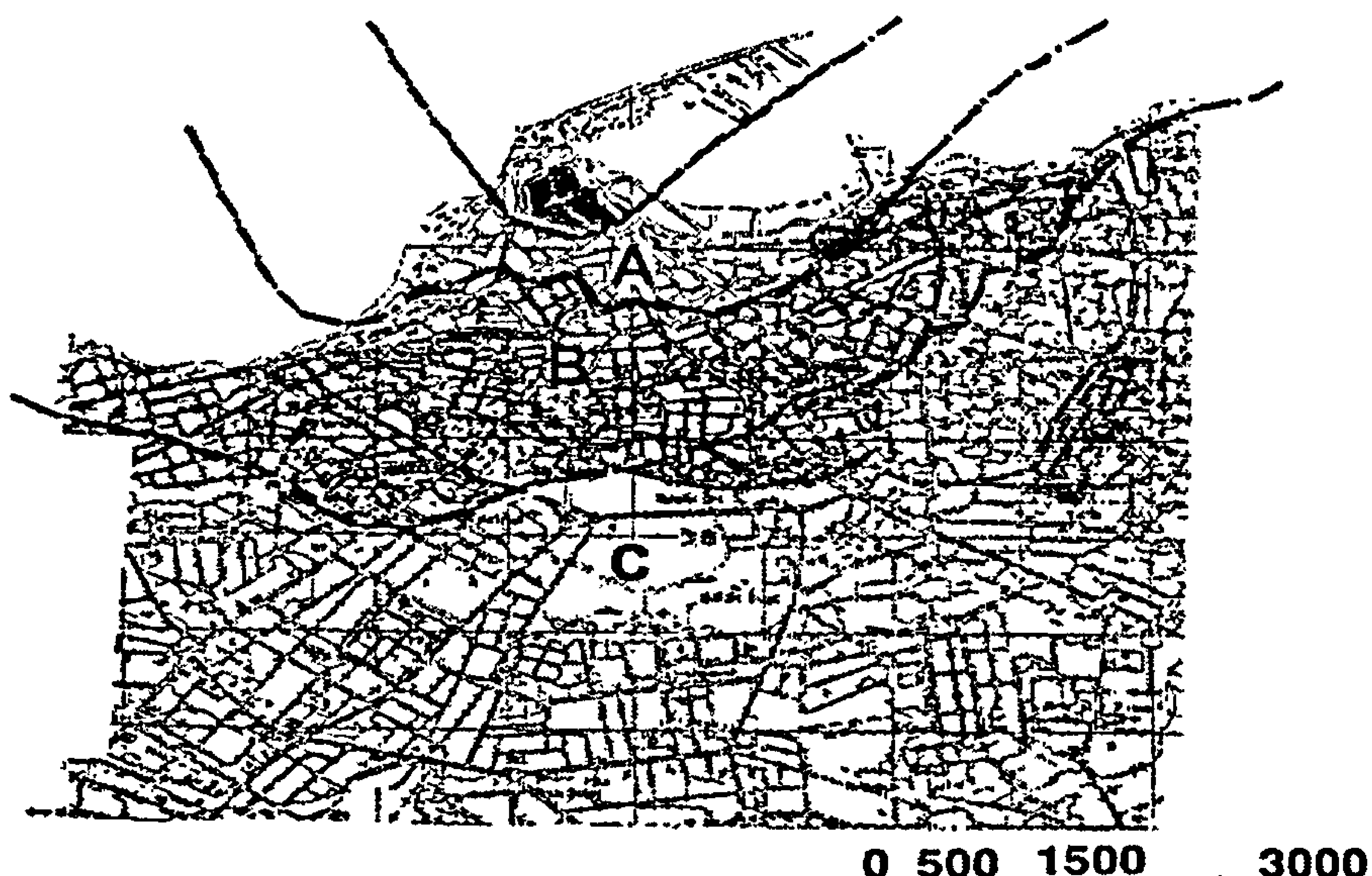


Figure 5.34 : The locations of the three periods in the development of housing

A) Italian period B) Independent period C) Revolution period

5.5.2 Italian period (1911-1952)

5.5.2.1 Introduction

This section describes the impact of the Italian period on Tripoli's historical urban and housing development, and the transformation of the city from the courtyard-type houses and Islamic city planning to a colonial city separated into old city and the new city of more Italian design. This is organized in three phases: the first phase deals with the reasons behind the Italian occupation of Libya; the second phase examines the land use pattern of Tripoli during this period; and finally, the third phase discusses the types of houses, which includes:

1- The factors influencing house design.

2- Houses type;

3- Describe and analyse the house including:

- Layout design;
- Detail design and finishing;
- Construction methods.

4- Summary of the characteristics of houses.

5.5.2.2 The factors influencing housing design

I. Profile of the Italian occupation of Tripoli

At the end of the nineteenth century, Europeans occupied all the countries in North Africa. The only area unoccupied was Libya because of its poor economic base at that time and its limited strategic importance (Wright 1981).

In September 1911, Italy sent a message to the Turkish emperor, while Italy announced its intention to occupy Libya, which meant the end of the Turkish colony in North Africa. According to Segre (1974), there were two reasons for the Italian occupation of Libya:

- The value of the colony as a symbol of "greater power and statues"; and
- The hope that Libya might provide a partial solution to the growing Italian population problem.

On 11th November1911, the Italian army occupied Tripoli. The occupation (1911-1943) represents one of the most important phases of Tripoli's historical housing development. It caused the transformation from the courtyard house, as characterised previously, to a European style. Kshedan, (1984) indicated that the old city of Tripoli was left untouched by the Italians with the exception of some parts of the old walls that were demolished. The urban development began outside the old city. Daza, in 1982, indicates in his study: "The Italian's like the French, were trying to spread, through architecture, a perception of themselves as paternal, caring and not rejecting of tradition." The Italian's felt that the mobility and communication within the old city was unsuitable for their modern economy and a new urban form, centred in the Manchia area, was developed in a more suitable manner (Daza 1982).

During the colonial occupation Tripoli became the economic, political, and cultural centre for the country. A new European type of city was created which is completely different from the old city. Located in the south and west of the old city the new development in Manchia zone was achieved by re-planning some areas, from which emerged a modern colonial city. According to Von Henneberg,(1997) and Shawesh (2000) the Italian construction activity can be categorised in three stages: the first stage was from 1911 to 1913; the second from 1913 to 1929; and the third began in 1929 and extended until the Second World War. The first period was almost entirely of military character including camps and administrative offices. In second stage the Italian government started to develop a new city that was separated from the old city. They adopted a strategy of establishing cooperation with the local population in an attempt to pacify the occupied land. The Italian government policy was not to start destroying the indigenous towns and architecture; they intended to produce a new architecture.

The third phase was based on Fascist ideology and concepts, which reflected Italian attitudes and policies in many buildings such as banks, churches, office building, and housing building. A wall was built around the new city in order to control the growth and of access (Figure 5.35) (Ben-Sewssi1996 and Tripoli Municipality1972). With fascist domination in Italy and Libya especially, Tripoli suffered from their policies because Libyan people were evacuated from their homeland by military force to live in concentration camps.

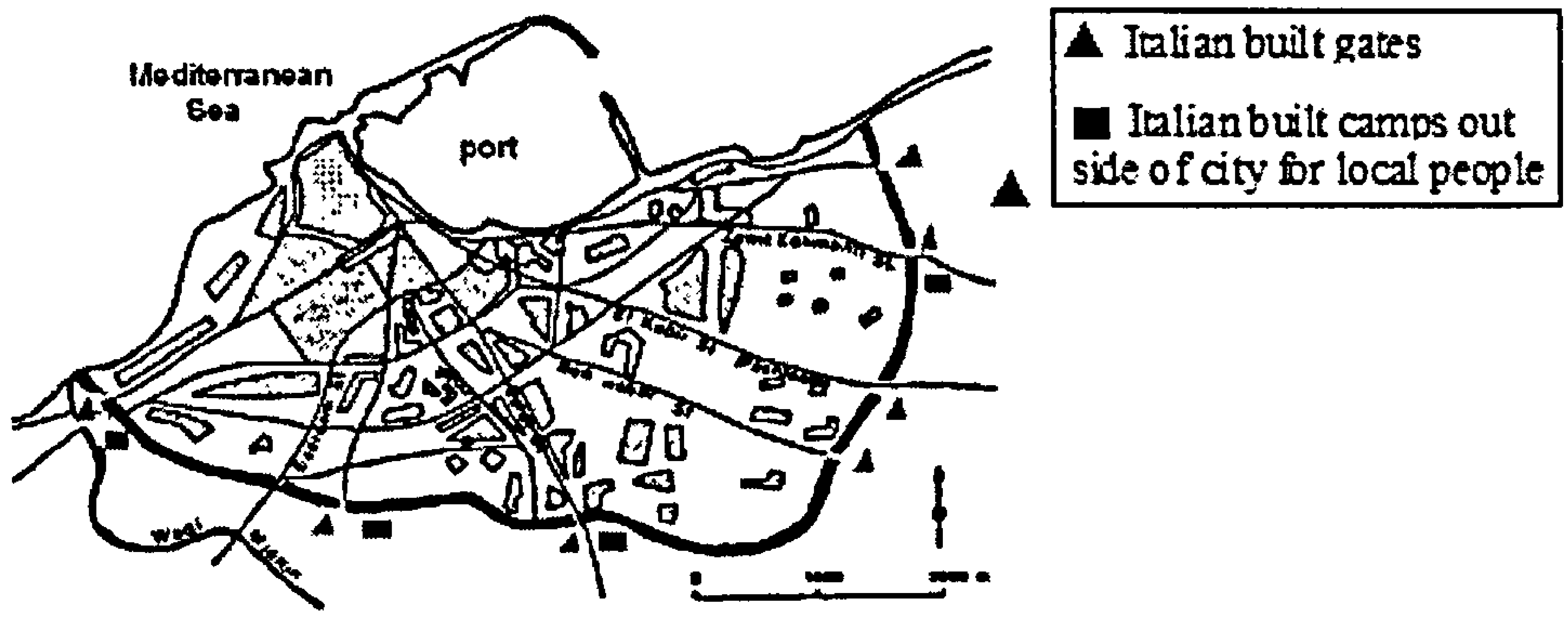


Figure 5.35 : The wall built around the new city by the Italian occupiers
Source: Municipality of Tripoli 1972

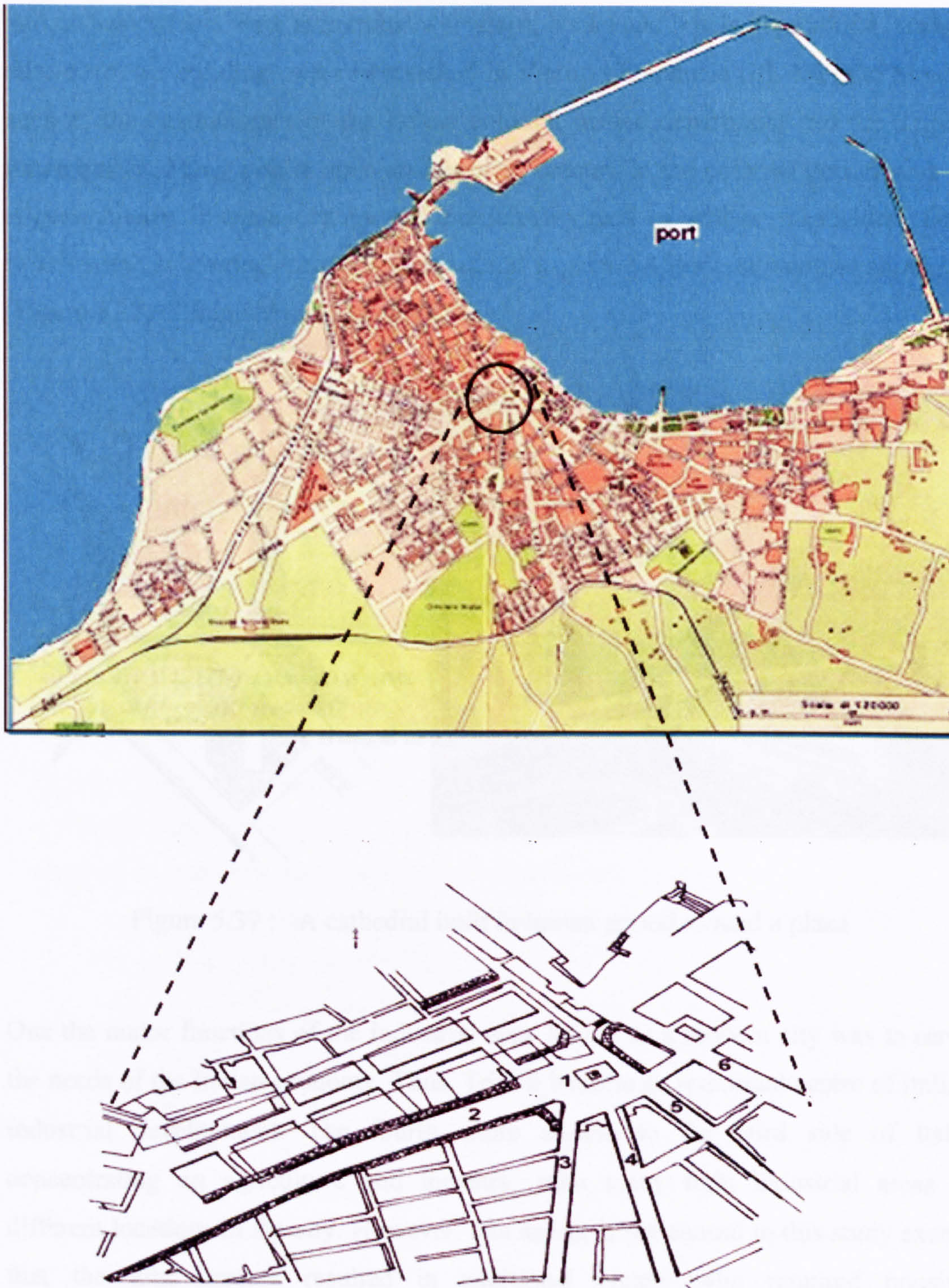
The Fascist principles and policies were used as guidelines for many architects and planners who worked in Libya and Italy. These policies emphasised mainly the power and civilisation of Italy, which insisted on the dominance of Italian culture in the colonies through the creation of fascist neo-classical architecture (Daza, 1982). This Fascist policy was also applied to many cities in Italy, where many large open spaces and streets were created for military exhibition. These open spaces and streets were filled with monumental buildings that reflected Fascist power and domination. In this regard Atkinson (1998) argued that

"In Fascist Rome, like Turin, the totalitarian appropriation of the streets was regarded as a central element of Fascist social control and the regime's to enforce the "Fascistisation of Libya".

During the fascist period many buildings and squares were demolished and replaced by large monumental avenues. According to Atkinson (1998) "the streets of Italy became some of the key sites wherein the regime articulated its authority, control and through inclusive spectacles sought the consensus of Italian population" Ghirado (1980) argued that the buildings, streets and open spaces became important element of Fascist policies, which served their definitive political programmes.

It should be mentioned here that when the Italians occupied Tripoli, there was no master plan for the city. As a result the Italians issued the first form of master plan in 1912, which was completed by 1934. Consequently, the city is divided into four urban areas: Multi-story building, villas, houses and light industry. Harrison (1965) observed that all of the multi-story building and the villas were built for the Europeans and the native population lived in the old city (traditional house zones). The new city consisted of modern shops, banks, business offices, hotels and new residential and industrial areas.

The new urban development resulted in three urban zones: the first was new central business districts, the second new industrial areas, and the third new residential areas. The Italians established for the first time, a modern, western style central business area in Tripoli. It was located south of the castle and extended from Italian square (now Green Square) southward which included the following streets: Victoriao Emanuele (now EL-Magrief Street) Via Lombardia (now first of September Street) and Corso Scilia (now Omer EL-Mukhtar Street).See (Figure 5.36) (Tripoli Municipality1972).



1- Italian square (now Green Square) **2**- Corso Scilia (now Omer EL-Mukhtar Street **3**-Via Piemonte(Omer Ibn-El-Ass) **4**-Via Lazio (Masran) **5**-Via Lombardia(now first of September Street) 6- Victoriao Emanuele (now EL-Magrief Street)

Figure 5.36 : The new pattern of the streets and urban fabric of Tripoli

Along these streets were numerous new shops, banks and hotels. In addition, several administrative buildings were established in Victoria Emanuele (EL-Megrief Street), such as the headquarters of the Italian colonial justice department and the Tripoli municipality. Many public open spaces were created in the colonial period such as Algeria square, El-qazala square and municipality park as well as a cathedral built in the south of central business area around a plaza (Algeria square) as shown in (Figure 5.37) (Tripoli Municipality 1972).

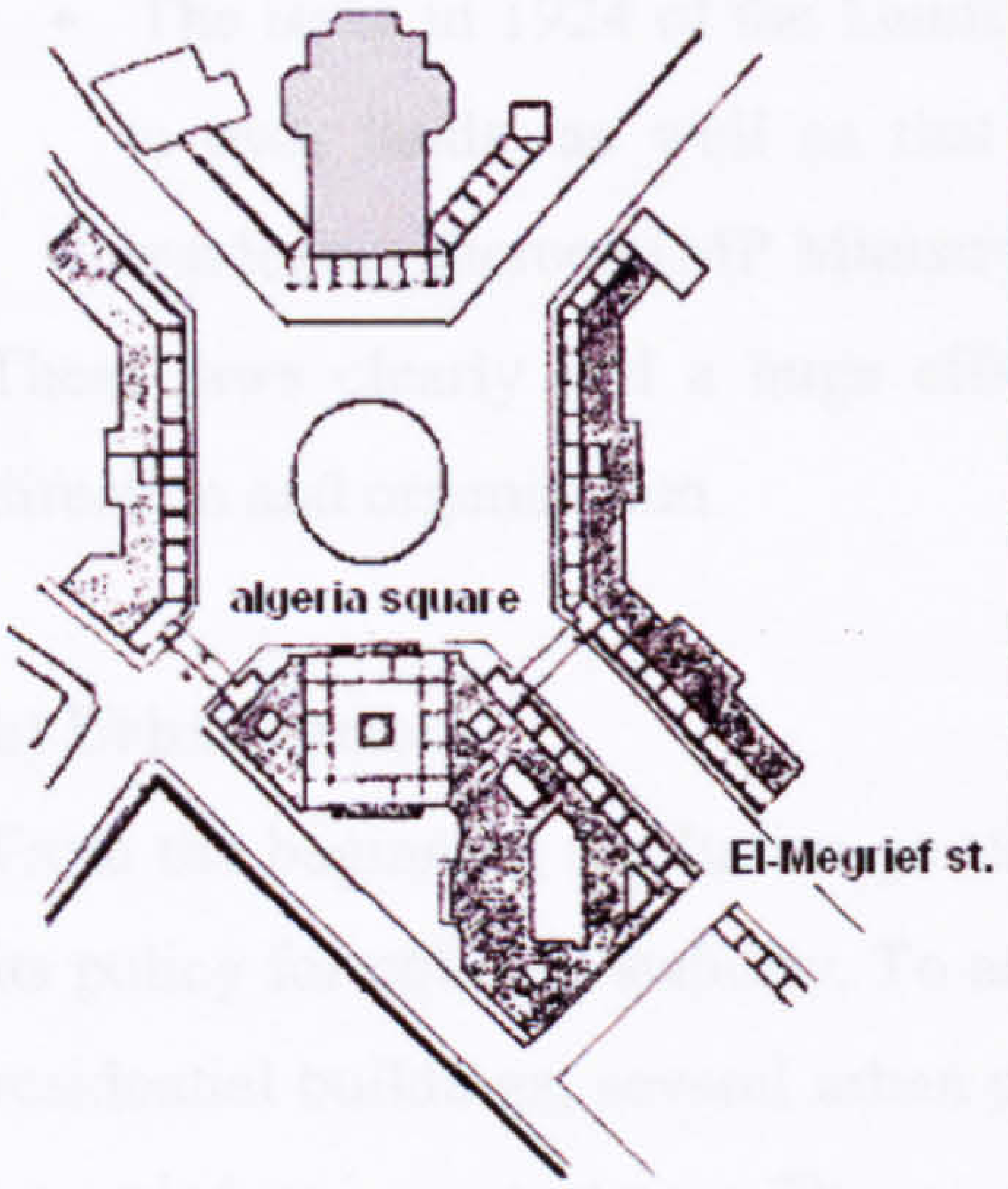


Figure 5.37 : A cathedral built in Italian period around a plaza

One the major functions of the industrial area Tripoli as a modern city was to serve the needs of the Italian economy. Thus, Tripoli became an important centre of Italian industrial development. The fourth shore adding to the third side of Italy, concentrating on agriculture and industry, with many light industrial areas in different locations in the city. However, this aspect is not central to this study except that the jobs created resulted in additional people who required housing accommodation.

II. Housing policy Italian period

The housing policy adopted by the Italian authorities was the most important factor affecting the urban change in Tripoli. Two factors were apparent in the policy: legal and urban.

a) Legal factors

The Italian authorities sought to issue and apply a set of building and planning regulations and laws related to urban development as follows:

- Abolition of the City Municipal Council in 1912 and application of Italian urban laws which are not compatible with the social and urban content of the cities inhabitants;
- The issue in 1915 of building regulations and the general terms of building according to an Italian identity, as well as special technical requirements for houses;
- The issue in 1924 of the Lands Laws, which granted the municipality the right to own lands, as well as that to plan and distribute land, and to construct residences thereon (MP Ministry of Planning1980).

These laws clearly had a huge effect on the city's urban and architectural from direction and organization.

b) Urban factor

From the beginning the Italian government developed a plan for housing as part of its policy for colonial stability. To address their need for administrative, trading and residential buildings, several urban projects were built in the city, of which housing occupied an important part. The most important of these are the:

- People's residences project, which was executed "between" 1922-1924. This was the first application of the Italian residential form in the city;
- Palbo project. The first residential project for Libyans. It was an area of huts to house the increased immigrant population in the interior of the city. The organization of huts was usually in longitudinal ranks (Figure 5.42). This indicates that the Italians intended from the beginning of their occupation to change the urban, social and cultural form of the city, by executing several buildings reflecting Italian society culture. This is clear in the second urban area.

The effect of the period of the Italian occupation was to sever the connection with the past. Despite this, during the period until the beginning of fifties, with such difficult conditions, the Libyan inhabitants of Tripoli old city, as well as of the neighbouring surroundings, have kept the traditional house mode as described the previous section.

However, due to these factors, new construction materials and modern styles of execution have contributed to change the urban and architectural content The modern Italian construction system, with concrete pillars and the hollow clay block for the roofs along with the reinforced concrete which allowed taller building forms, is evident in the second urban area, such as in first September Street, Magarief Street and Omer Almukhtar-Street.

III. Planning System

The decisions, regulations and general conditions that were issued in 1915 regarding the regulation of the building and the general conditions of construction were the starting point, to end the traditional fabric prevailing from the first urban zone of the old town. This period has witnessed the planning of many new quarters according to the new planning paradigm. The car was the main influence affecting the designs of the quarters.

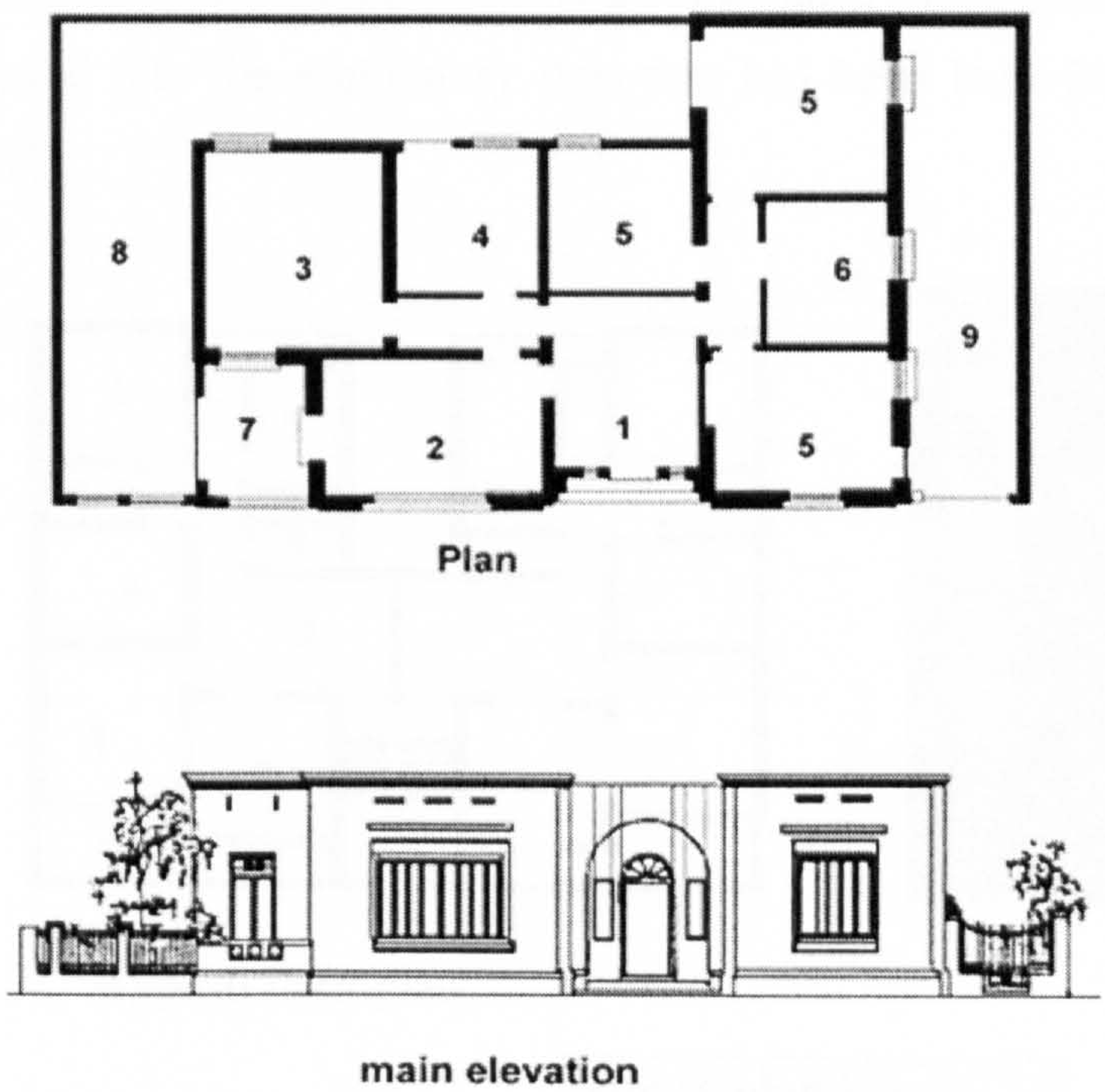
Regarding the relationship between the neighbouring houses, two types appeared in this period. These were different in nature depending on the type of the residential quarters; with longitudinal and parallel rows and others with houses arranged to enclose an external courtyard. In general, the Italian planners succeeded in making the new Tripoli a city similar to many of the Italian towns. The layout planning structure in this period is distinguished by a grid plan which expanded southward in semicircular developments with wide , paved streets and arcaded shopping areas. They adopted the ray-planning system from a focal point of the city with the present(green square) (See Figure 5.41).

5.5.2.3 Types of houses

During this period, Tripoli, as capital for the colony, was the location of many housing projects. Most houses created by Italians surrounded the central business district previously mentioned, especially those built on Omer EL-Mokhtar-Street, Elshut-Street, Dahra, Ben-Ashoure, Zawit-Edhmani, and Esreem areas.

According to the Tripoli municipality report in (1972), most of these houses were constructed after World War 1 (1918) and the concept of these dwelling units and their layout suited the Italian life style and cultural needs. The European house style was in complete opposition to traditional Islamic houses (Papasseit 1990 pp.1-26). These types can be categorised into four types, from luxurious villas to a very primitive type as follows.

1-Villas (Detached house) built in a garden city layout, then a modern suburban residential area of the high class Italian which was surrounded by a fenced garden; other (Semi-Detached) villas were built for Italian upper class, located in the Ben-Ashoure and Esreem neighbourhoods The concept of design was based on open-plan spaces. The main entrance opens directly into the corridor (Figure5.38).



House plan key	
1.	Lobby(entrance)
2.	Salon
3.	Living room
4.	Kitchen Room
5.	Room
6.	Bathroom
7.	Veranda
8.	Garden
9.	Garage

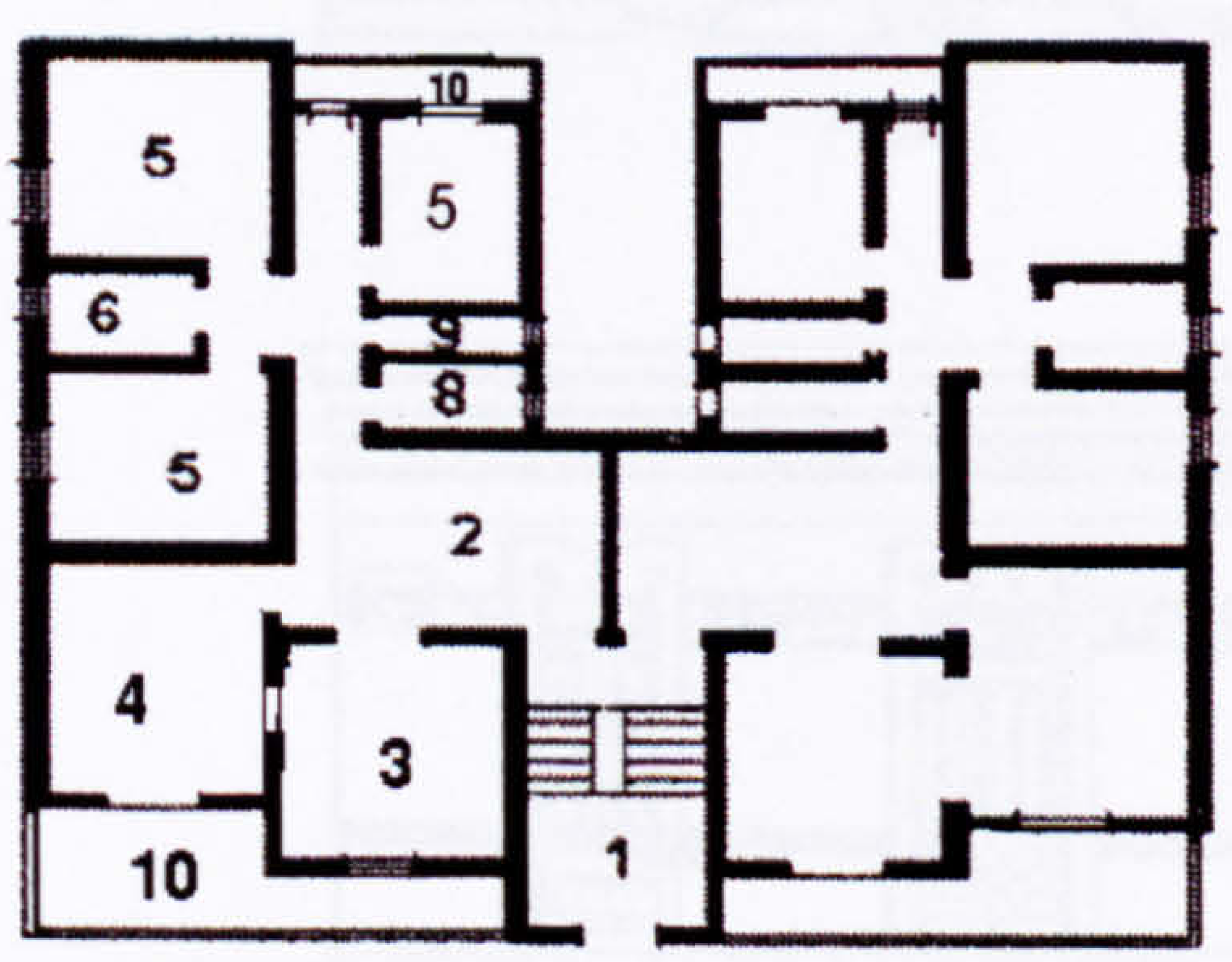
Figure 5.38 : Villa type built in Ben-Ashoure during Italian period

Source: Municipality of Tripoli 1970

2-Multi-story flats blocks

This type of dwelling was not known previously in Libyan society. It consists of a number of housing units in groups of blocks formed by many floors. The height of these blocks mostly from 4 or 5 floors and in most cases includes balconies as the only private outdoor space. Italian families occupied all units. This type of house was located in El-Megrief Street, Ben Ashoure area, Mizzaran Streets, (Figure 5.39).

Recently these flats are occupied by Libyan families and they made some alterations to suit their life style. For instance they have added Mushribiya on windows and balconies to maintain the privacy. This case can be noticed in many Arabic countries, for example most Algerians made modification on their flats when they moved into the multi-story flats that had been built for the French Brolin (1976 p.62).



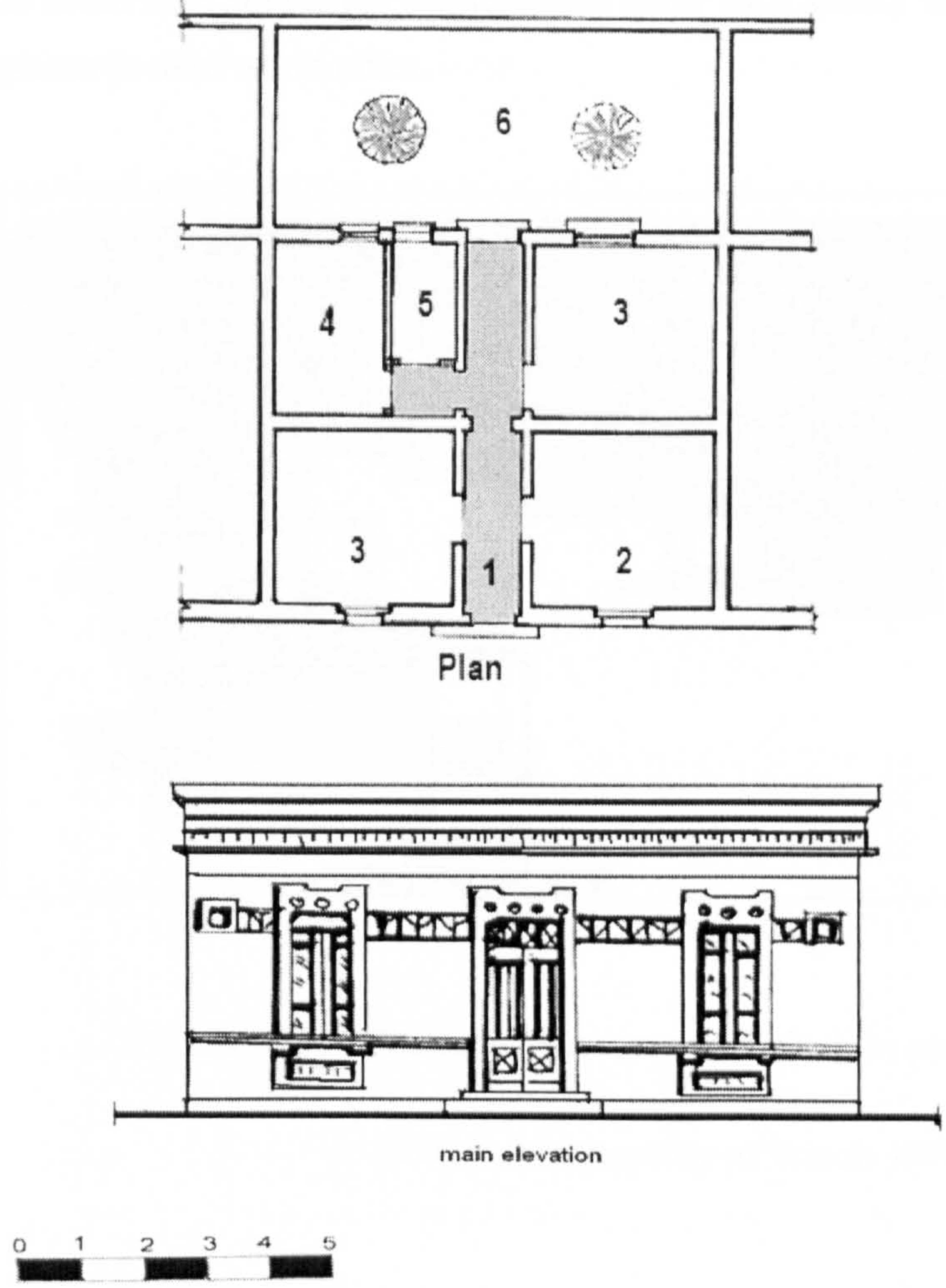
Typical floor plan

House plan key	
1.	Main entrance
2.	Living room
3.	Salon
4.	Kitchen
5.	Bedroom
6.	Bathroom
7.	W.C
8.	Store
9.	Balcony

Figure 5.39 : Typical floor plan-Multi-story flat blocks

3-Publicly owned houses

Public houses were built in rows on a street 4-8m wide. This type was located in Zawit El-dhmani for Italian labourers. This house covers an area of 120m^2. The main concept of design is looking out and the main entrance leads directly to single corridor with rooms arranged on both sides with the end of corridor open to the garden (Figure 5.40).



House plan key	
1	Main entrance and corridor
2	Living room
3	Kitchen
4	Room
5	Bathroom
6	Garden

Figure 5.40 : Public housing built in Zawiat-El-dhmani during Italian period

Source: Municipality of Tripoli 1970

4 - Camps of huts

These camps were established in 1935 as a housing estate for the local poor Libyan outside the boundary of the new city, located next to Bab-Tajura in east. This camp, known as Palpo camp "Campo de Bedouin", consisted of 500 huts constructed in a row without any of the simplest, basic services (Figure 5.41). Some Camps were allocated to Libyans serving in the Italian army, such as Bab-Azizia and Bab- Accare in south city. Dwyer (1975) described many such shanty towns existing in different places in third world cities.

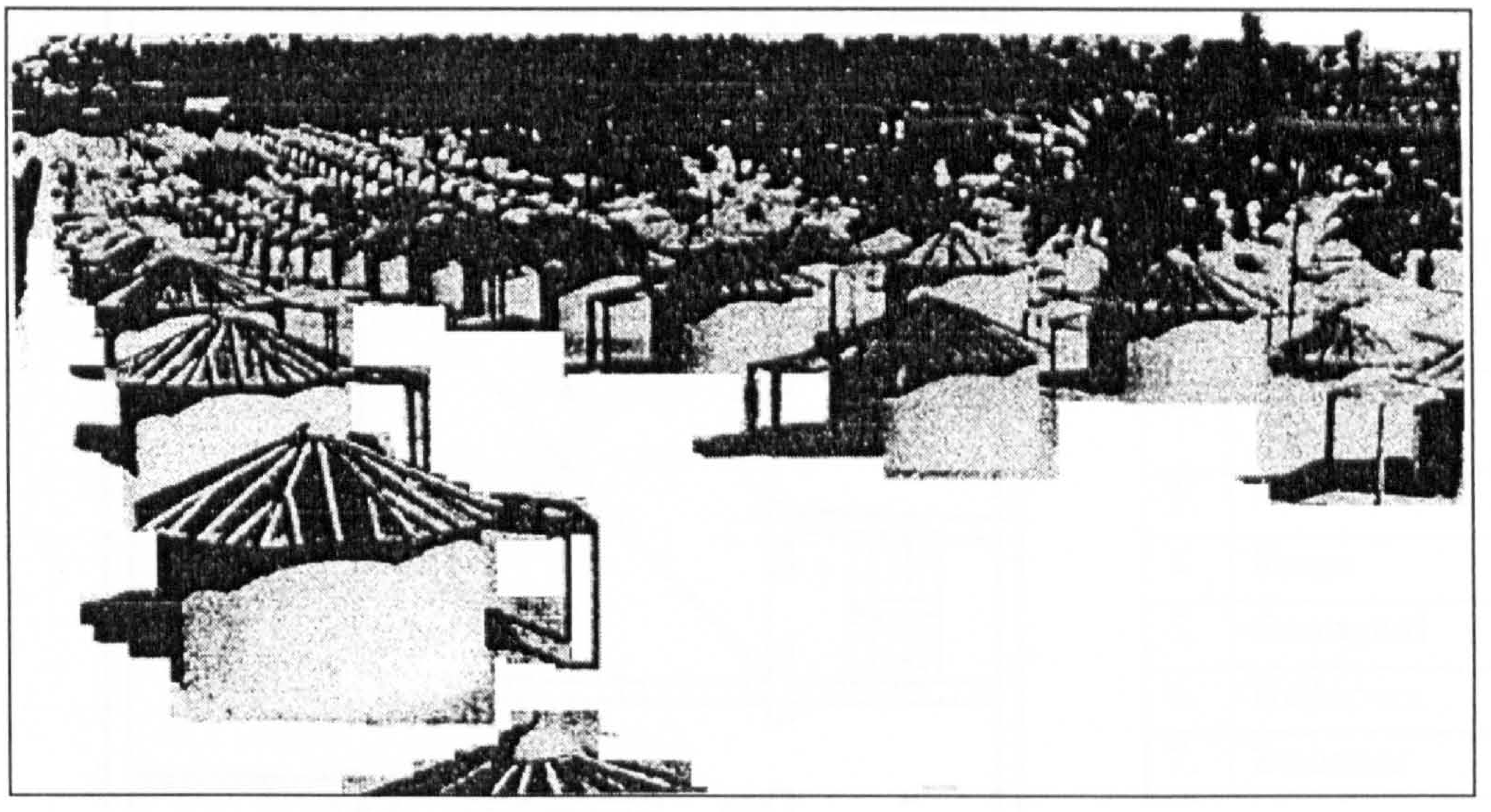
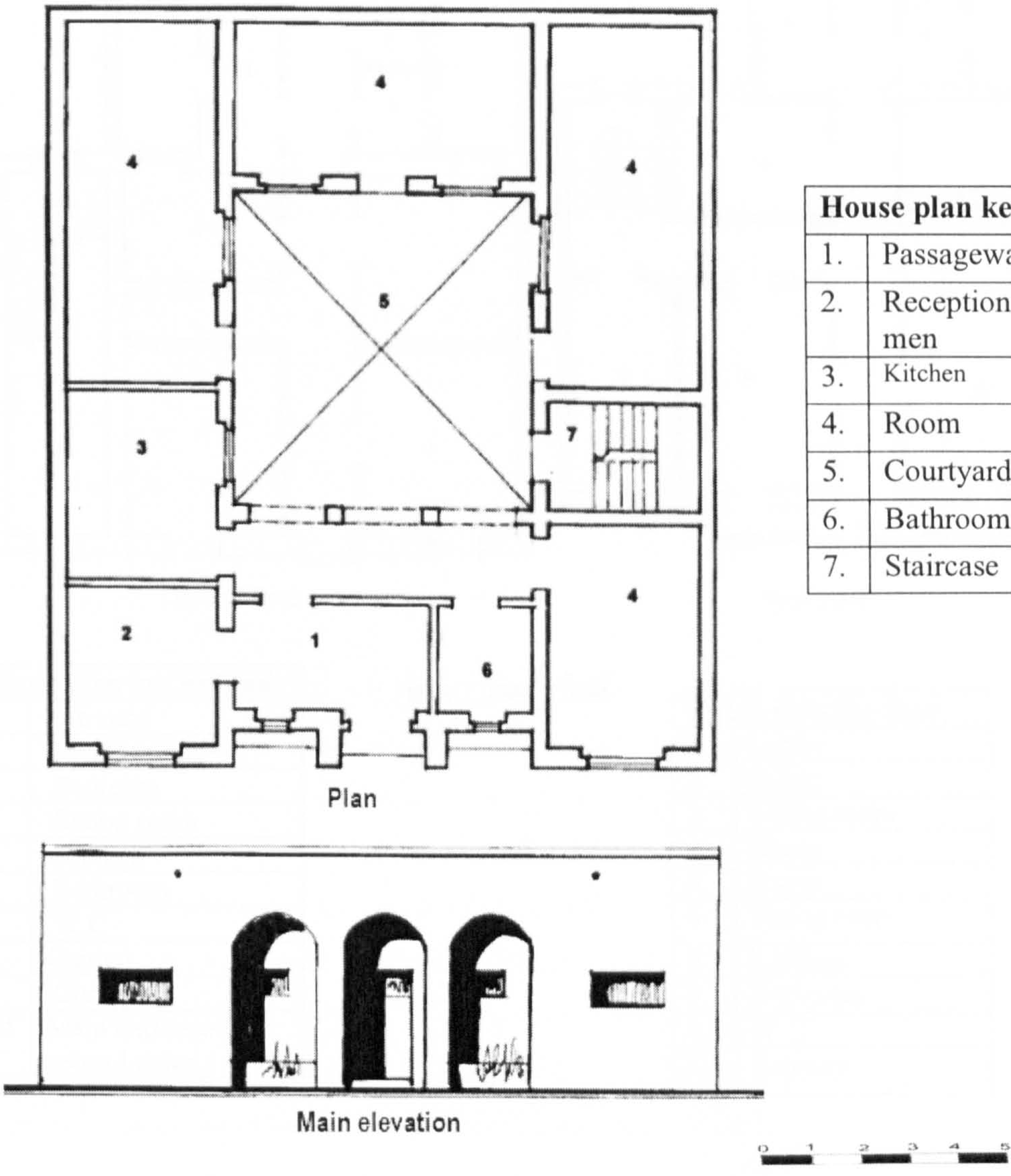


Figure 5.41 : The camp that was established for poor Libyan people

Source: Municipality of Tripoli 1970

5 - The Arabic House

This type is an extension to the traditional house with a courtyard constructed in the old city, built by Libyan people but under the Italian's authority. In other words, production of the courtyard house was ongoing during the period. Additionally, the form is more organized than the older courtyard house in the old city with some modifications, such as using better finishing materials and windows of some housing opening outwards. These types were built in the Dahra, Zowiet El-Dhmany area and in suburbs area such as Tajura and Sug El-Guma (Figure 5.42).



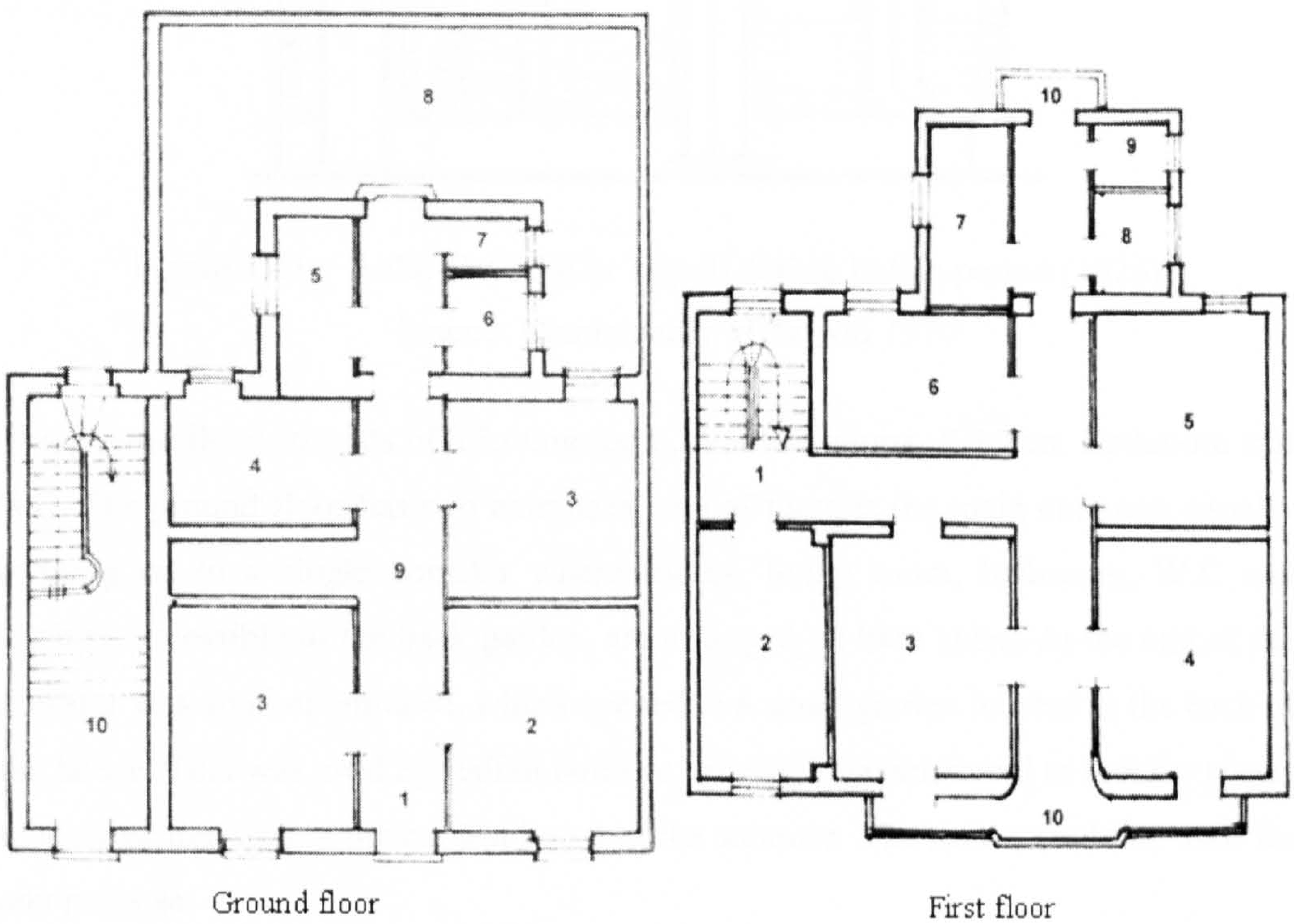
House plan key	
1.	Passageway
2.	Reception men
3.	Kitchen
4.	Room
5.	Courtyard
6.	Bathroom
7.	Staircase

Figure 5.42 : The traditional house built in the Italian period

Source: Municipality of Tripoli 1970

5.5.2.4 Description and Analysis: Typical two storey villa-flats

This house was built in Tripoli in 1926 in the quarter of Alshara-El-Garaby. The house covered an area of $340m^2$ within a plot area of $400m^2$ between two streets. It was of two-storey construction; each unit has a special entrance (Figure 5.43).



House plan key ground	
1	Entrance
2	Living room
3	Bedroom
4	Eating room
5	Kitchen
6	Bathroom
7	W.C
8	Garden
9	Corridor
10	Main entrance for second unite

House plan key first	
1.	Lobby
2.	Salon
3.	Living room
4.	Room
5.	Room
6.	Eating room
7.	Kitchen
8.	Bathroom
9.	W.C
10.	Balcony

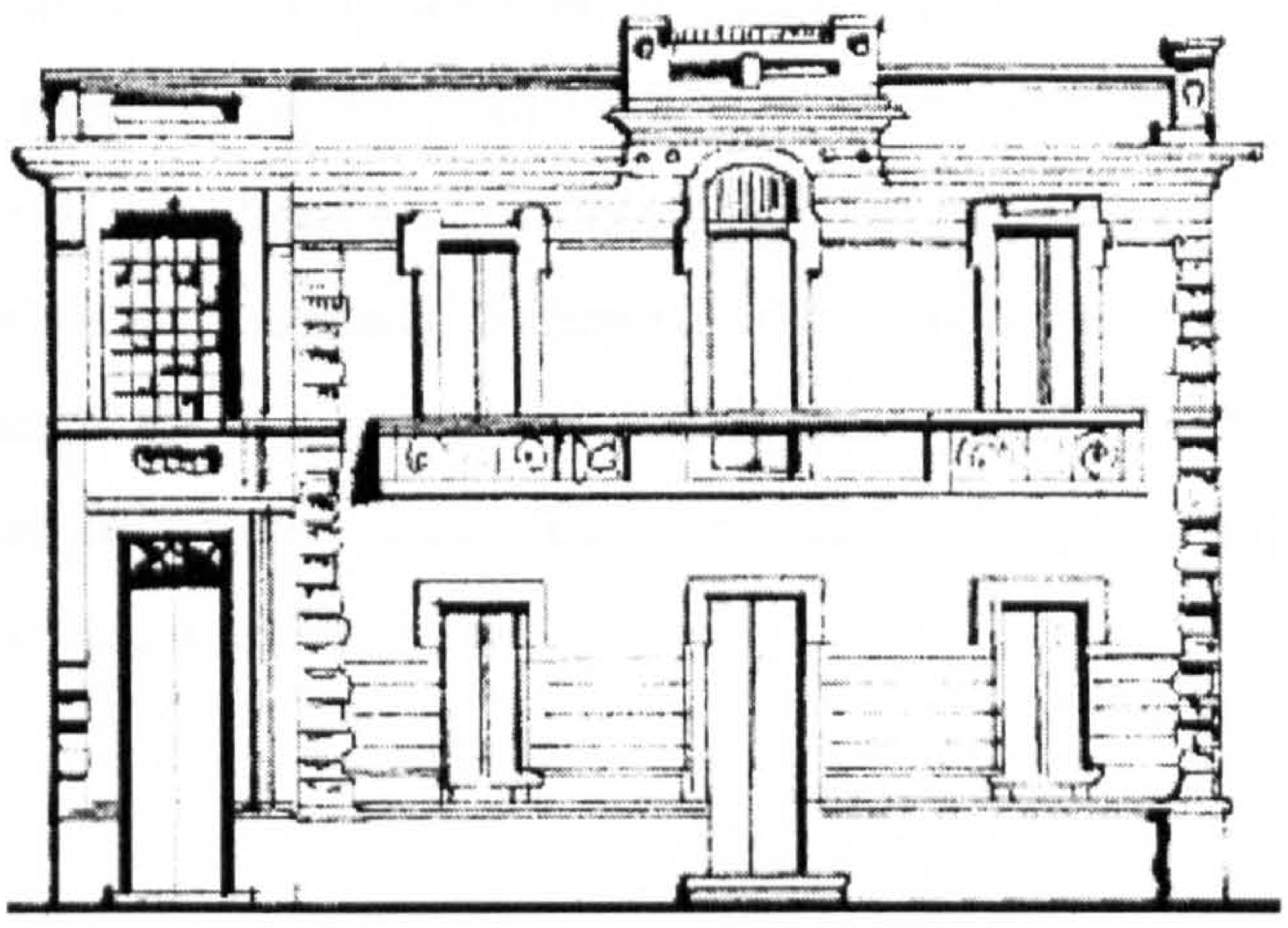


Figure 5.43 : Villa-flat built in Tripoli during Italian period (1926)
Source: Municipality of Tripoli 1970

The ground floor consists of a Living room, two Bedrooms, Kitchen, Bathroom and WC. The ground floor has two entrances; one of them is the main entrance, usually opening on to a single corridor where rooms, living room, bathroom, W.C and kitchen, accessible to the back garden, are arranged on both sides. At the end of the corridor was another entrance, which opened to a small garden located in the back of the house. This was used by Italian families for rest, relaxation and to receive guests in their garden during the coolest hours of the summer. The rooms could be used for any purpose.

The first floor forms a second unit, which is separated from the ground floor. The main entrance through the staircase leads to the single corridor, which takes a T-shape. This floor consists of rooms, living room (salon), kitchen and bathroom, again arranged on both sides. The end of the corridor leads to two balconies, one of them in the front, usually used by the family during summer for coffee and looking-out to the street. Libyan families rarely use this in the past and in the present. Decorative stone elements dress the façade. The balcony has a small canopy with decoration in steel. There is small concrete Panoply around each window to give a beautiful spectacle. Also, windows have a vertical aspect with a large glazed area with canopy shading. The doors are usually designed with two functions, both for closure and ventilation.

The building materials used in this type of house were different. Inside, decorative floor tiles were used and walls were built with lime block and a layer of cement mortar, and the roof used hollow clay block and concrete. These systems were strong enough to be extended vertically compared with traditional houses (Figure 5.44). The design concept of this house was for nuclear families, based on individual independence and mixing of sexes. This was quite different from the indigenous courtyard house or local architecture.

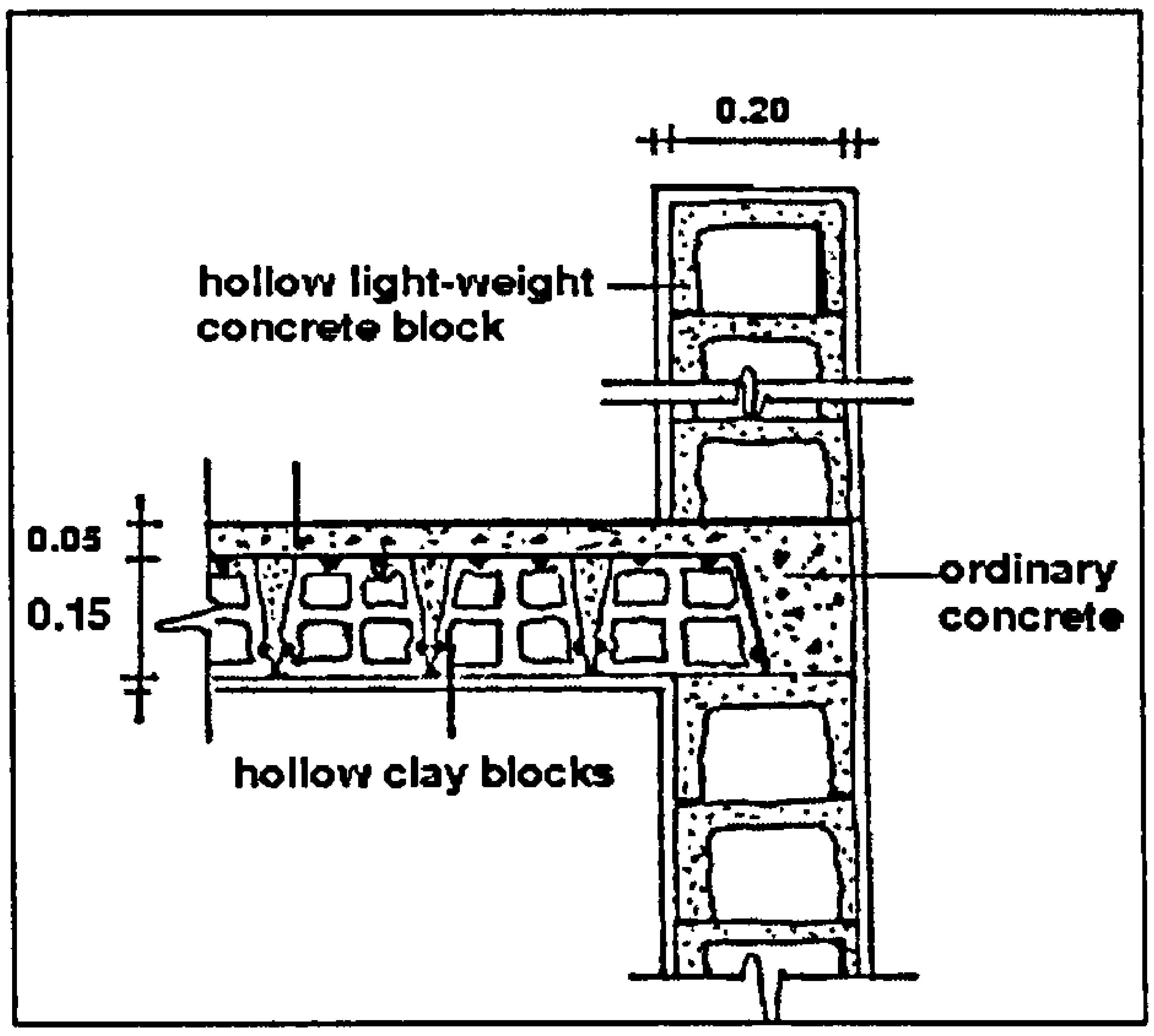


Figure 5.44 : The construction system of housing built during Italian period

5.5.2.5 Summary of the characteristics of housing design in this period

The following architectural and urban aspects characterized this period:

- Application of the laws and regulations of planning and execution, which includes the method of construction in respect of form, heights and external colours.
- Constructing the house units on pieces of land with regular dimensions, having large and perpendicular streets according to the modern planning practice;
- Facing the building towards the outside through the construction of large opening windows with vertical form and providing of outside gardens to the houses instead of the interior courtyard which previously prevailed in the traditional Libyan house;

- The appearance of new architectural elements, such as the balconies and the embellishment of the facades, which are basically occidental elements in the city tissue. See appendix(7) ;
- The use of modern methods and materials in construction such as framed structural forms and reinforced concrete in floors. This increased the size of spaces and increased height of buildings;
- A straight entrance layout leading directly to the saloon or corridor, which ignored the privacy factor, compared with traditional house;
- In general, the zone planning can be classified according to the main and branch streets; these streets were large and paved, thus organizing the human movements on the sidewalks, and offering parking to private and public vehicles;
- The house unit became a set of closed spaces, and opened towards the outside; see (Figure 5.45).

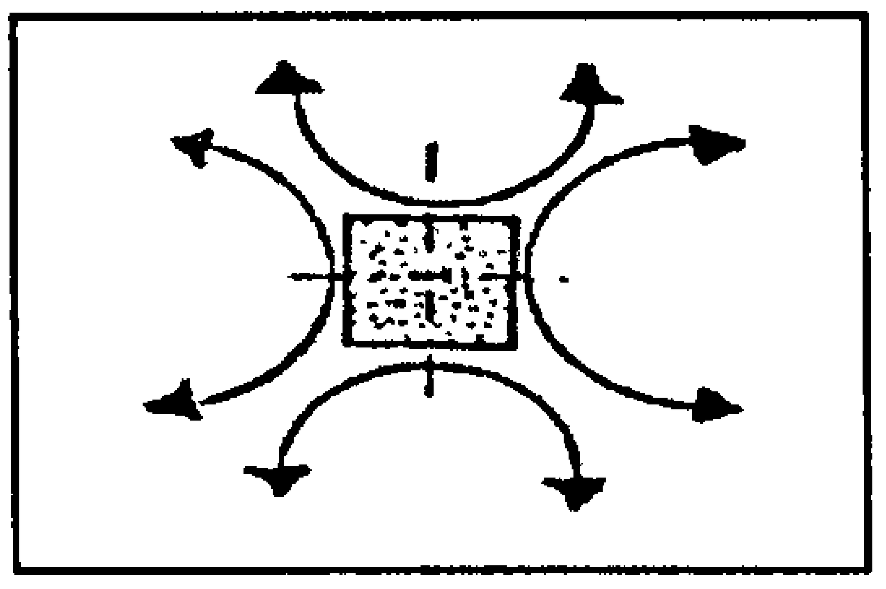


Figure 5.45 : The concept of houses in Italian period

5.5.3 The independent period (1952 –1969)

5.5.3.1 Introduction

In 1952, Libya became an independent country, and the local authorities received the political reigns of control. In the first years of independence, Libya faced a weak social and economic reality. According to the United Nations report of 1953, the inhabitants were living under a poverty threshold during the 1950s and this continued until the early 1960s, when Libya was relying on international help and some limited agricultural activities. The per capita income in 1950 as compared with the world per capita income was very low, not exceeding14 Libyan Diners (MP 1999). From the economic perspective, there was a lack of adequate qualifications and experience, which lead the authorities to look towards foreign specialists living in the country, whether Italians or others. And thus the Italian style dominance in architectural and urban aspects continued.

In the 1960s the oil era began, which significantly transformed the Libyan society from a poverty state to an abundance of wealth. Clearly this has played a key role in the social and cultural transformation of the inhabitants, reflected in the architectural and urban style of Libya and in particular the city of Tripoli. The increase of per capita income and improvement of living standards has lead to an exodus from the land towards cities. This fact necessitated the realization of residential projects.

The majority of these projects did not undergo a formal planning process, causing the appearance of random constructions, which have not observed the simplest of utilities and services. After the discovery of oil, the interior re-construction of the city commenced, changing the characteristics from an Italian style, to that of a multi-national styled city with different patterns. The study of the architectural and urban development of Tripoli city in this period is addressed through discussion of the factors affecting this development including planning; examining the types of houses that have been constructed, analyzing a sample of houses and finally studying the characteristics of these styles during that period.

5.5.3.2 The affecting factors

The factors that have contributed to the architectural, urban and social transformation of Tripoli city during this period are as follows:

1. **The political factors**

The establishment of the Libyan state with sovereignty and Tripoli as the political capital, with El-Fathaly the commercial and industrial centre of the country (1977); the fact of which has augmented its architectural and urban importance.

2. **Demographic factors**

During the oil exportation period of the 1960s and rapid growth of the economy, Tripoli increased in both population and area because it was the largest urban centre in western Libya. Internal migration was one of the most important causes of population expansion. People came from all different places in Libya (Figure 5.49)

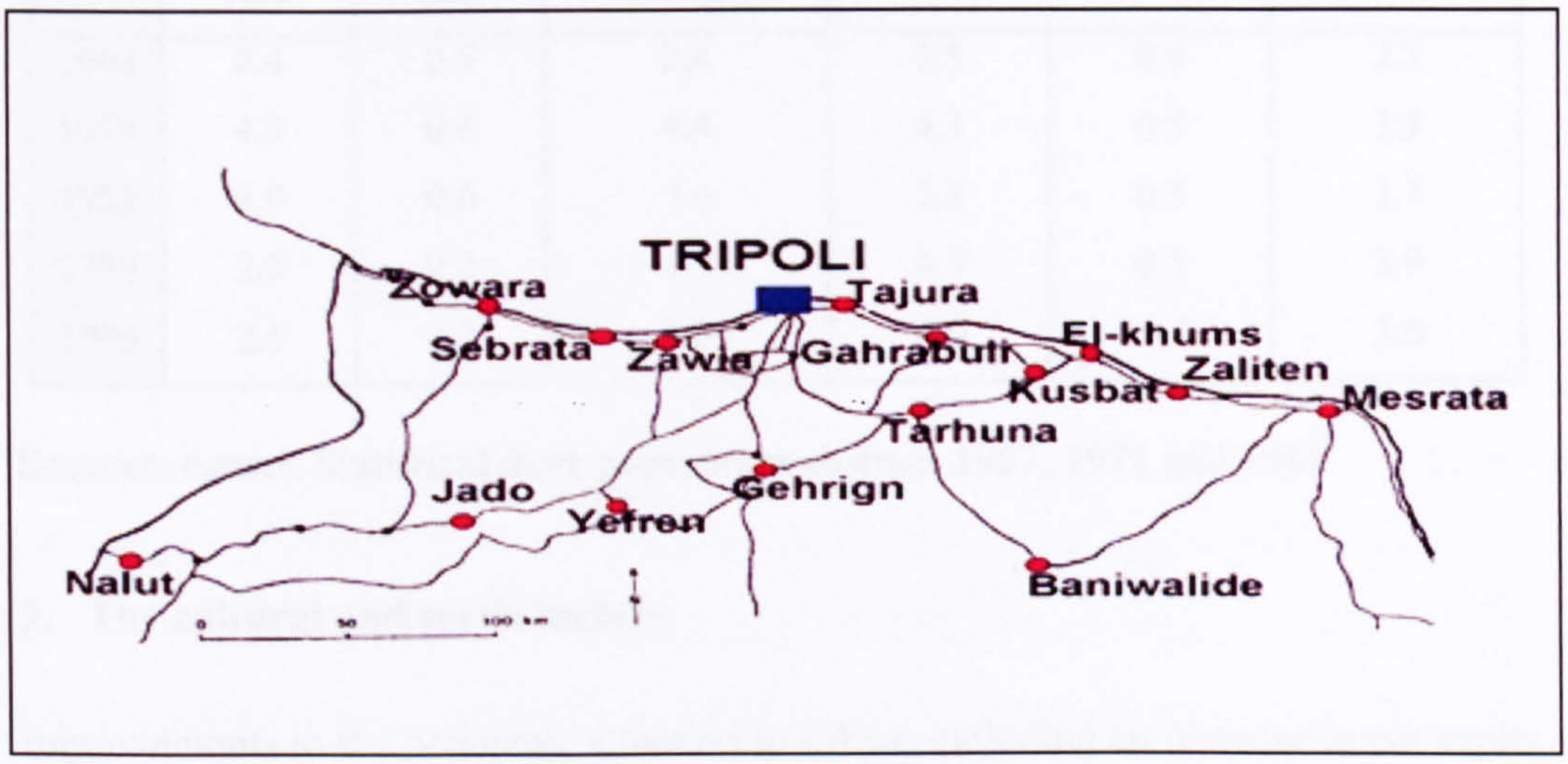


Figure 5.46 : The sources of immigrants to Tripoli 1964.
Source: Ministry of Planning, Atlas of the socialist people's Libyan Arab Jamahiriya Tripoli 1967

The impact of internal migration on Tripoli's population growth was demonstrated by a sample survey which was conducted in 1956. The result of the survey was that 50 % of workers in the industrial sector had been born outside Tripoli (World Bank (1960 p.63) According to the population census in 1964 about 73000 of the population were born outside of the city.

The second major cause of Tripoli's population growth was the high birth rate causing natural increase during 1954 and 1964. This rate of increase has been estimated to be 2.9 % per annum compared with an estimated rate of 2.5 % per annum in the whole country. This high rate of increase came as a result of service improvements to the health facilities and education, all of which reduced the death rate. Table 5.2 shows that the natural increase in Tripoli grew rapidly from 2.4% to 4.4% between 1964 and 1995.

Table 5.2 : Natural increase of population in Tripoli

Year	Tripoli			Total Libya		
	Birth rate	Death rate	Natural increase	Birth rate	Death rate	Natural increase
1964	2.4	0.4	2.4	2.5	0.4	2.1
1970	4.8	0.4	4.4	4.3	0.8	3.5
1981	4.0	0.6	3.4	3.8	0.5	3.3
1989	2.5	0.2	2.3	4.3	0.5	3.9
1995	2.5	0.2	2.3	4.0	.0.4	3.6

Sources: census Statistical dept. population abstract 1967, 1971 and 1981

3. **The cultural and social factors**

Improvements to the economic situation in Libya; including an increase in per capita income led to an expansion of the improvement of the educational and sanitary services as well as the introduction of new modern means in the activities of life, such as the car, television and radio. Libyan society has witnessed a considerable transformation from an underdeveloped society to a modern society, being in touch with all that is happening in the world thanks to information and communication technologies. All these factors contributed to the social and cultural development of society, which also influenced housing preferences, style, interior design, and care given to the outside aspect of the house.

4. **Materials and methods of construction**

Up-to-date materials were used in construction such as concrete, aluminium, as well as new modern applications in painting, and flooring … etc, which in turn helped the construction of many housing units, employing a wide range of methods and leading to the appearance of different patterns and forms.

5. **The Engineers and the Technicians**

Due to the lack of local technical cadres with the required experience, the state looked for the assistance of non-Libyan technicians in design construction and project management during this period. These cadres were not aware of the customs and traditions of the Libyan society resulting in the construction of patterns, which are unsuited to local life. Accordingly, the internal structure of Tripoli has been changed greatly. A wide range of residential, industrial and commercial forms have been built.

5.5.3.3 Development of Tripoli city Urban Fabric (1952-1969)

This period of urban development in Tripoli city is known as the third zone of urban development (Figure 5.47), characterized by dominance of spider planning as well as the existence of the chessboard planning. In addition, a random and unorganised planning appeared due to the illegal development of shantytowns in the suburbs such as the Bab-Akkara, Sidi-Masri and Sidi-kalefa quarters. These residential quarters were constructed by their owners (self-build) on public lands with non-stable materials lacking the basic modern services with random and extemporaneous methods below required technical standards.

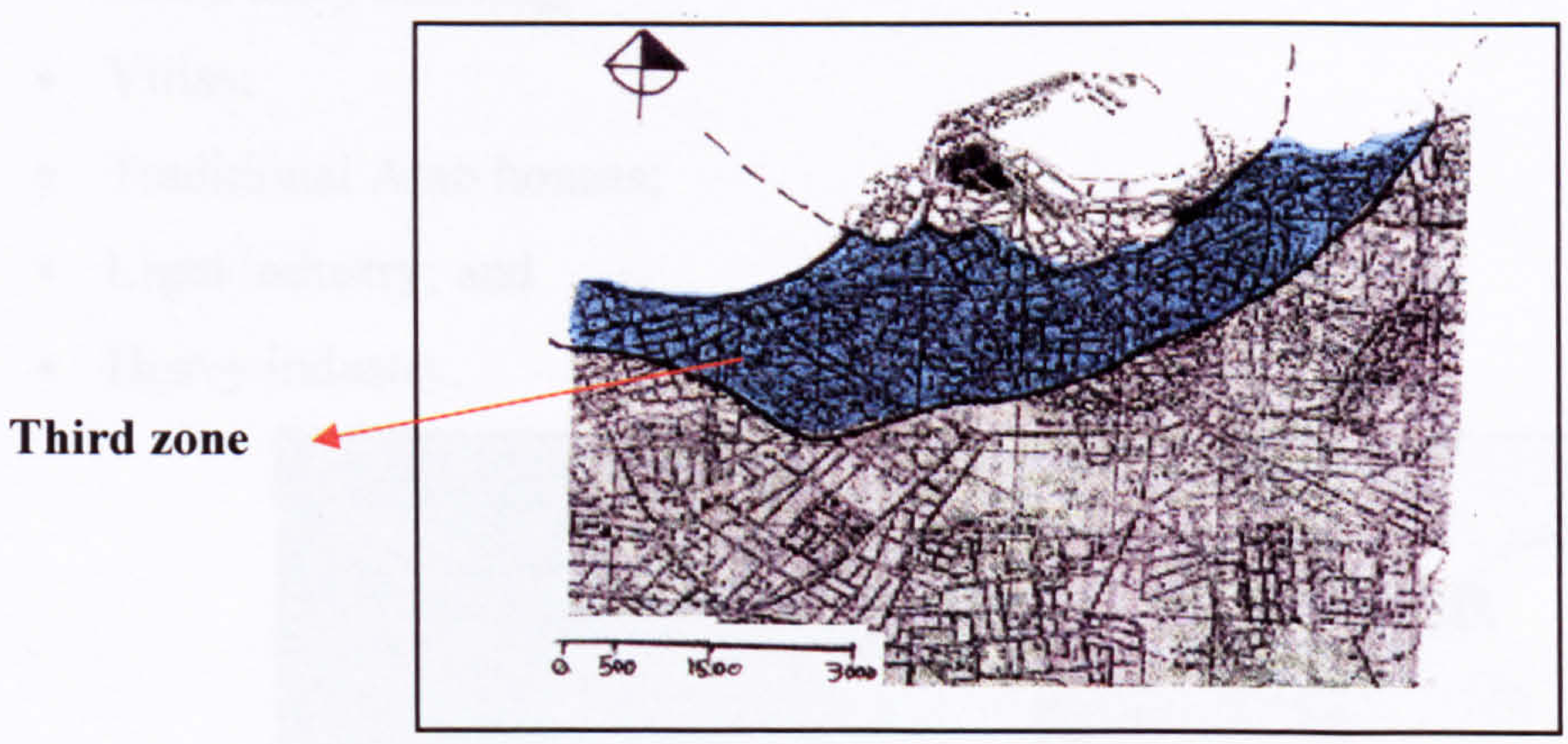


Figure 5.47 : The location of the third zone of development of housing
Source: Municipality of Tripoli 1970

During 1952-1958 pre-oil exploration and exportation in1962 Tripoli urban growth was very slow pre-oil exploration and exportation in1962. The main motivations for urban development came from the wealthy private sector. They played a big role in construction of many buildings, including industrial activities. Private developers participated in all sectors of the city's economy. This was caused by:

- The Tripoli municipality encouragement of the private sector with five years tax free status for any new residential buildings as mentioned in chapter two;
- The availability of cheap land and also cheap Libyan labour;
- The foreign embassies acquired many residential buildings for their employees.

The shortage of money meant no office buildings were constructed. Government used the offices built during the Italian period. Overall, most of the residential units built during the early period of independence were styled "Arab" houses, built without licenses from the municipality. This created poorly planned building and street layouts. In these new residential areas, the absence of any proper planning from the Tripoli municipality encouraged landowners to divide the land into small lots with narrow streets without space for public areas and lack of urban facilities in these new residential area; such as Al-hadba and Sidi-kalefa. According to Kshedan, (1984) the municipal government became aware of this problem and the fact that the city must have a planning department to control and organize the city's urban development. So that in 1958 the municipality issued the first master plan that divided the city into five urban planning zones. (Figure 5.48).

- Multi-story building;
- Villas;
- Traditional Arab houses;
- Light industry; and
- Heavy industry.

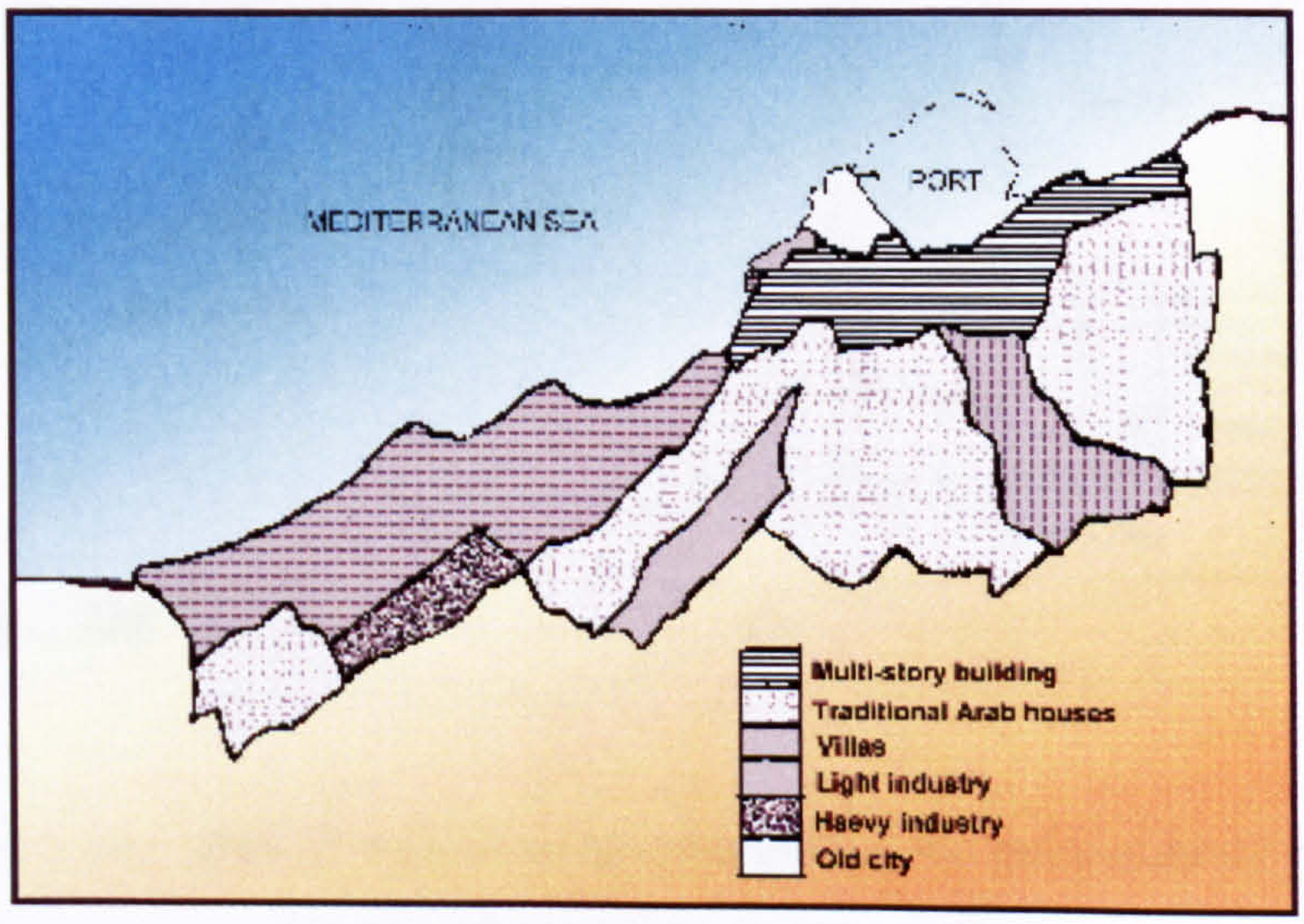


Figure 5.48 : Tripoli master plan in 1964

Source: Ministry of planning and development, Tripoli Master plan (Tripoli, 1964)

5.5.3.4 Types of houses

Following the discovery of oil in 1960, economic development and social change has been dramatic, resulting in a growing desire of the inhabitants for better accommodation. Development of the city the dwelling units constructed indicate the rapid. According to the field study and examination of technical documents of types of housing built during this period, Whiting (1966) revealed that 44% of houses were traditional courtyard and alternate courtyard houses, 22% were flats, 10% villas and 44% were temporary housings. These housing types can be divided to five different categories:

1) The Arabic House

Considered architecturally as a development of the traditional courtyard house, as constructed in the old city area. Construction of traditional houses stopped during the Italian era, except for some residences constructed by local inhabitants in the suburb of Tripoli. This Arabic house was different from the traditional type in view of the organization of its elements and spaces, and the materials and methods of construction used, which gave it a more organized form and interior more open towards the outside. These patterns prevailed in Zawiat-EL-Dahmany area and other suburbs of the city (Figure 5.49).

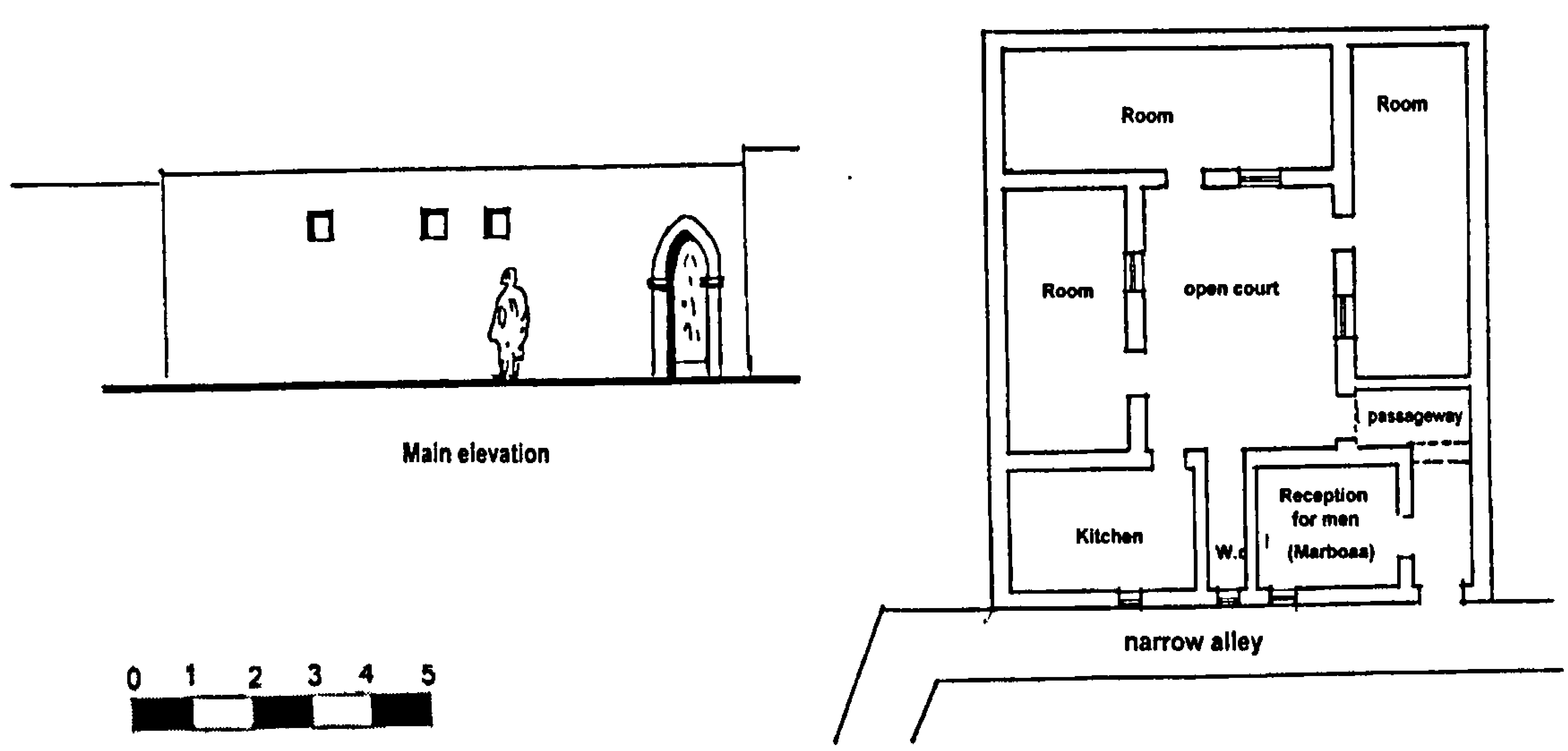
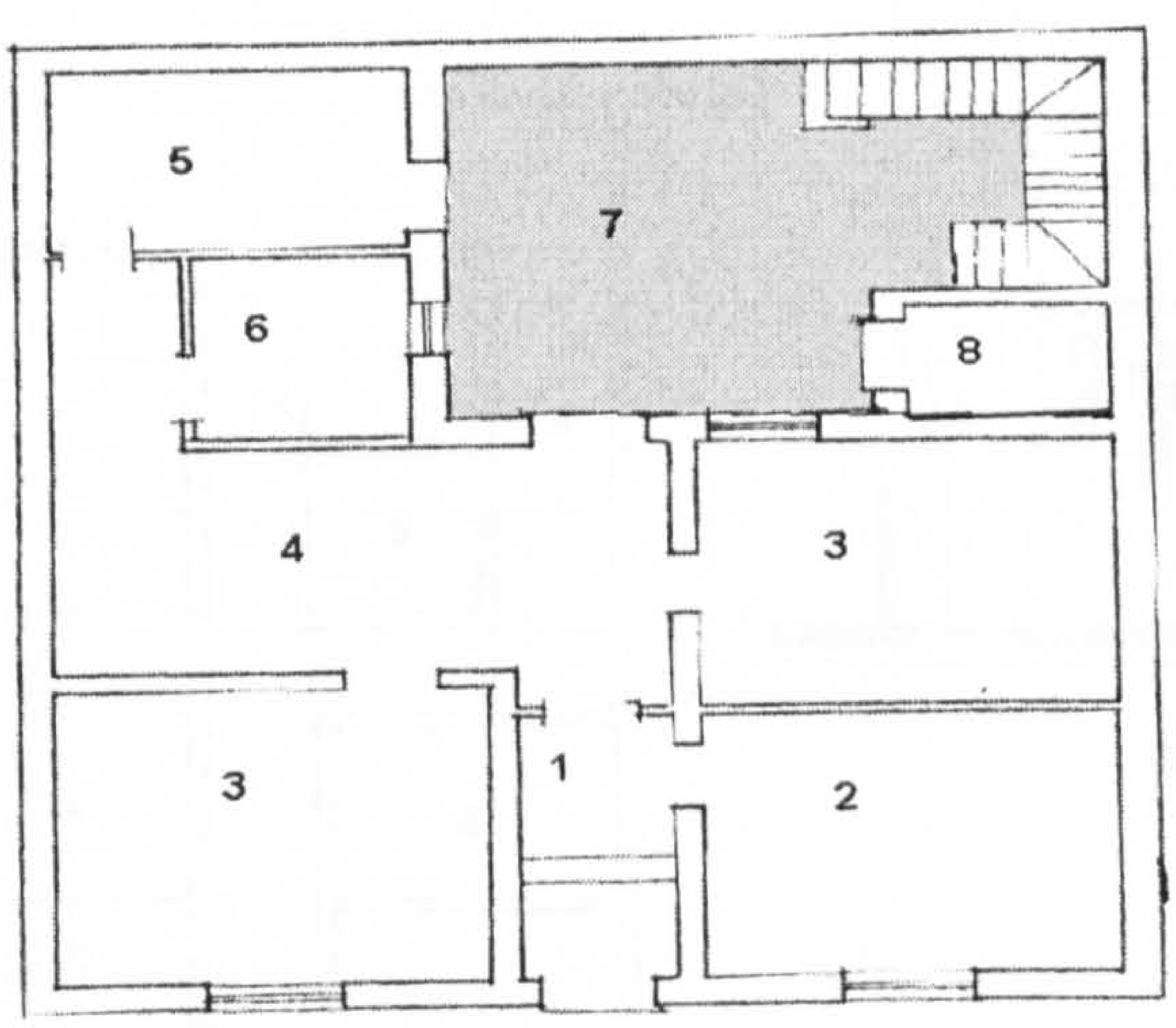


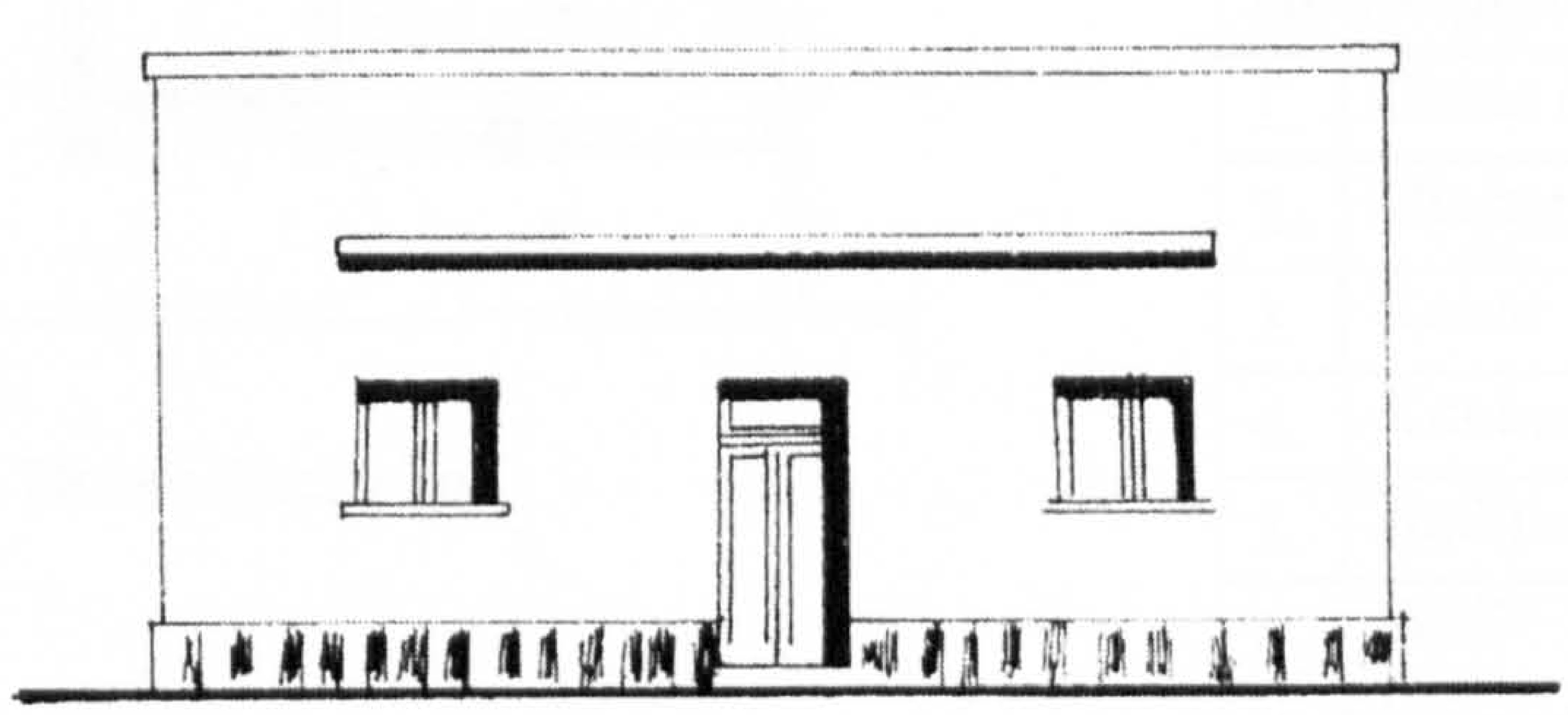
Figure 5.49 : Plan of traditional housing built in the independence period
Source: Municipality of Tripoli 1970

3) The Altered Arabic House

The altered Arabic house is a dominant type of construction in El-hadba-Eelkadra, Sidi-Elmazary, Sug-El-Goma and some areas in the west of the city. The architectural form of this pattern aimed to organize the elements of the house around a central ceiled hall known in the Arabic house as the opened courtyard. This courtyard was now moved to the rear part of the house, therefore becoming less important, being limited to the location of the staircase, the kitchen and the opening of the hall windows. This change is considered as the starting point of the end of the open courtyard, the basic element in the traditional house (Figure 5.50). In the mid 1970s, the central courtyard in some houses were covered with a roof higher than the rest of the house with openings to offer light and ventilation inside the house; rooms also provided windows facing outwards.



House plan key	
1.	Passageway
2.	Guestroom
3.	Bedroom
4.	Living room
5.	Kitchen
6.	Bathroom
7.	Courtyard
8.	Store



main Elevation

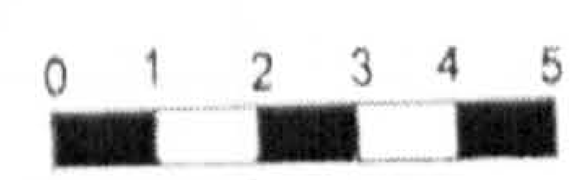
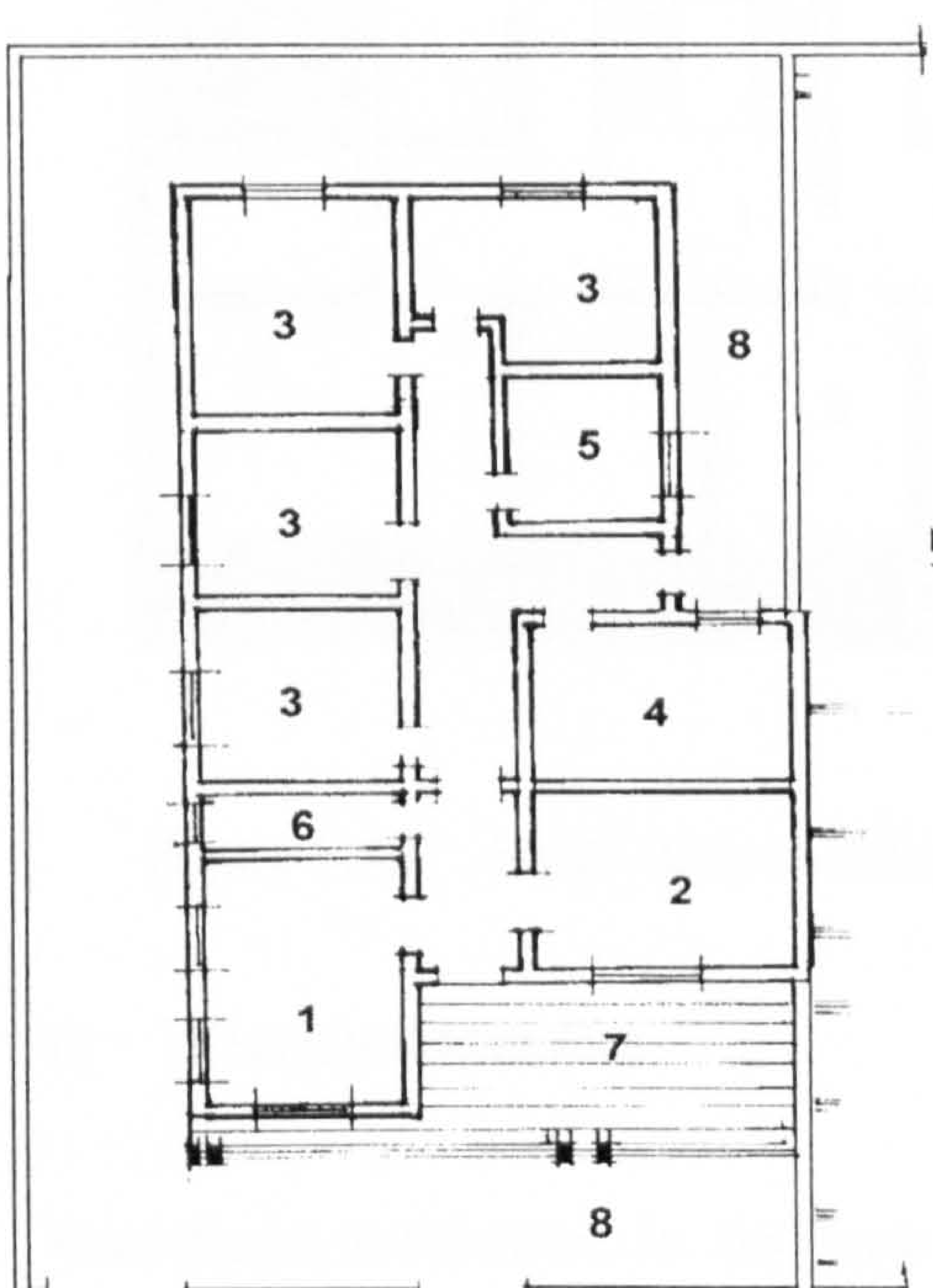


Figure 5.50 : Plan and main elevation for the Altered Arabic House

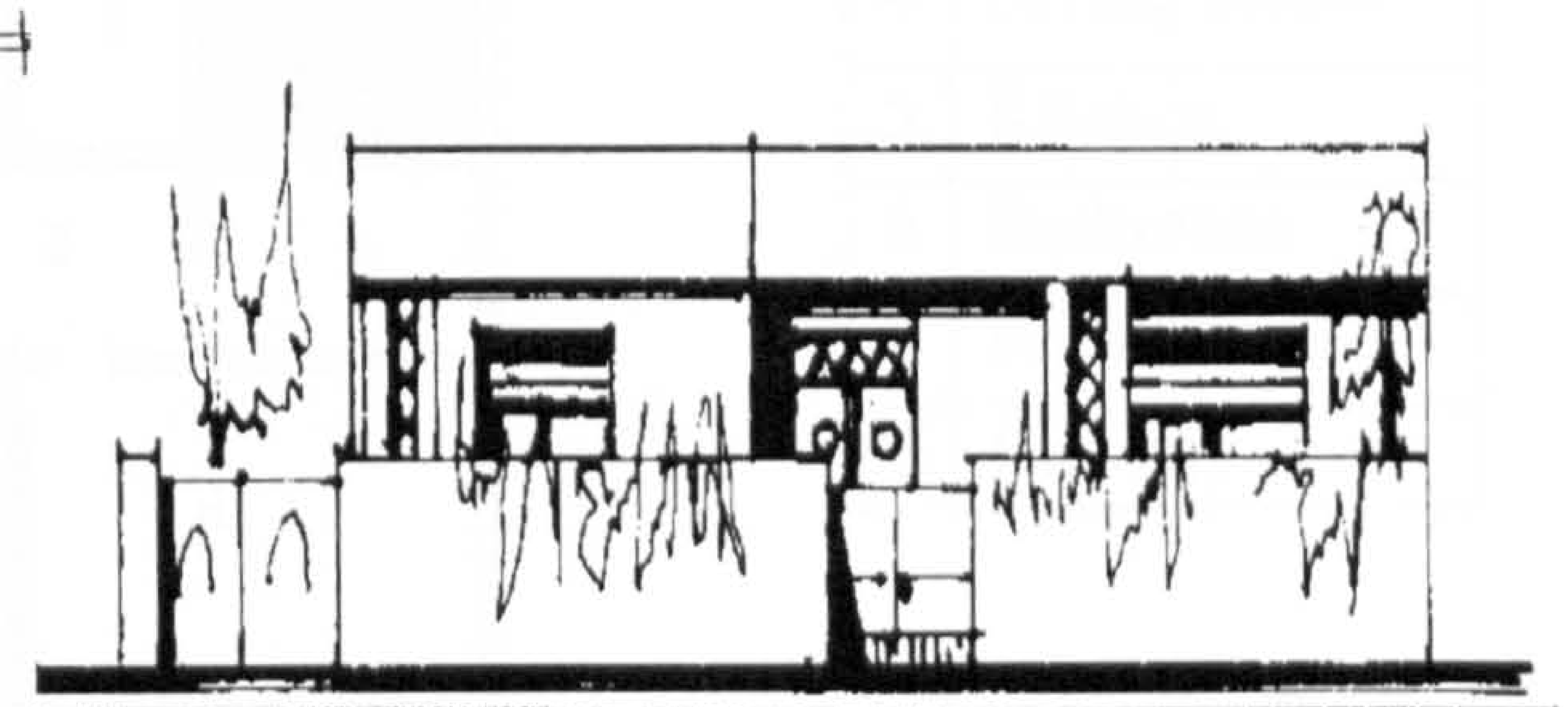
Source: Municipality of Tripoli 1970

3) The villas

Defined as a luxury form of housing, all villas have a garden from all or some sides on to which windows, balconies and terraces open, and are surrounding by fencing. Most of these types are single-story and when of more than one floor are occupied by a single family of high income. This pattern prevailed in hay-Damascus, Ben-Ashour and Gargarish areas on the periphery of the central business district. (Figure 5.51) shows a Villa built in Hay-Damascus. This villa covered an area of 240m^2 on a plot area of 500m^2. The feature of this type was no central hall; instead corridor. The garage became an essential feature of this period. Some villas have an extra kitchen with a room and toilet in the back garden. Foreign architects designed most villas built in this period, similar to those used in the Italian period.



House floor plan



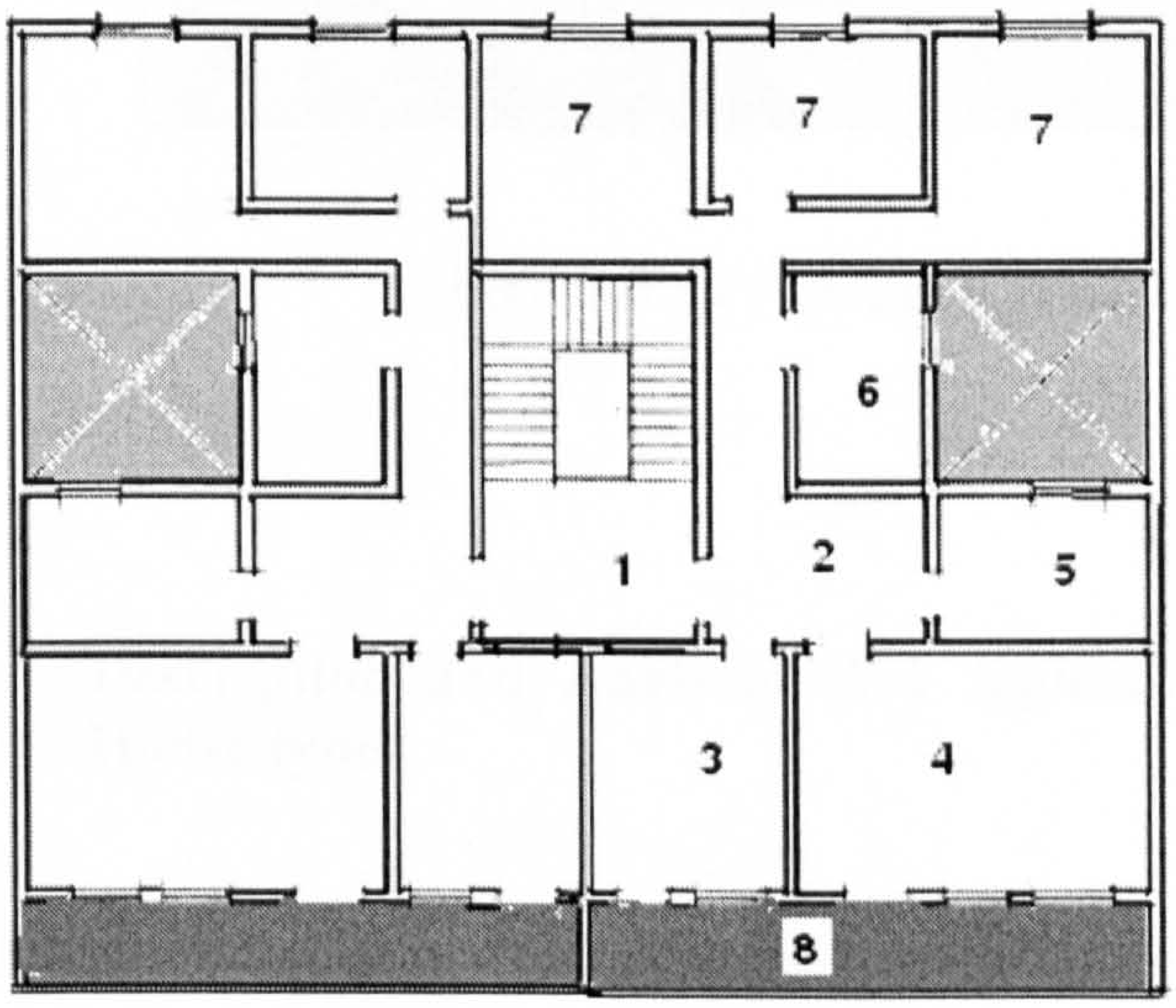
main elevation

House plan key	
1.	Guest room
2.	Dining room
3.	Room
4.	Kitchen
5.	Bathroom
6.	W.C
7.	Veranda
8.	Garden

Figure 5.51 : Villa built in Hay-Damascus in 1968

4) Multi-story buildings

According to Doxiadis reported in 1964 the Government moved towards building blocks of flats. For example in the mid-1960s' a few residential buildings were constructed by the state along present-day Nasser Street and Omar-Almukhtar Street. This was known as the Idriss residential project. This block occupies 300m2 of land and is four storeys high. Each floor consists of two flats with the balconies running along the length of the main elevation. Most of these balconies were used alternately by residents. Some buildings were constructed by their owners for the purpose of leasing (Figure 5.52).



House plan key	
1	Entrance
2	Lobby
3	Guest room
4	Living Room
5	Kitchen
6	Bathroom
7	Room
8	Balcony

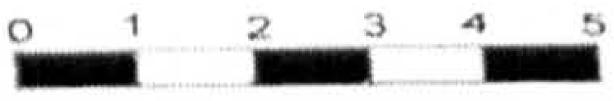


Figure 5.52 : Multi-story buildings built in Omar-Almukhtar Street in 1968

1) Marginal Housing

Transitional residences, in the form of shacks, bins, and tents were established around Tripoli, such as Bab-Benghashir, Airport Street, and Sidi-Almasri, with poor facilities (Figure 5.53). The number of people living in shantytowns within Tripoli was estimated to be 26.000 according to the MP (1970). This led the Municipality of Tripoli to concentrate its effort in order to solve this problem. Daza (1982) argued that after oil was discovered, 70% of development projects should be devoted to housing. The infrastructure was the main concern of the first five-year program starting in 1964.

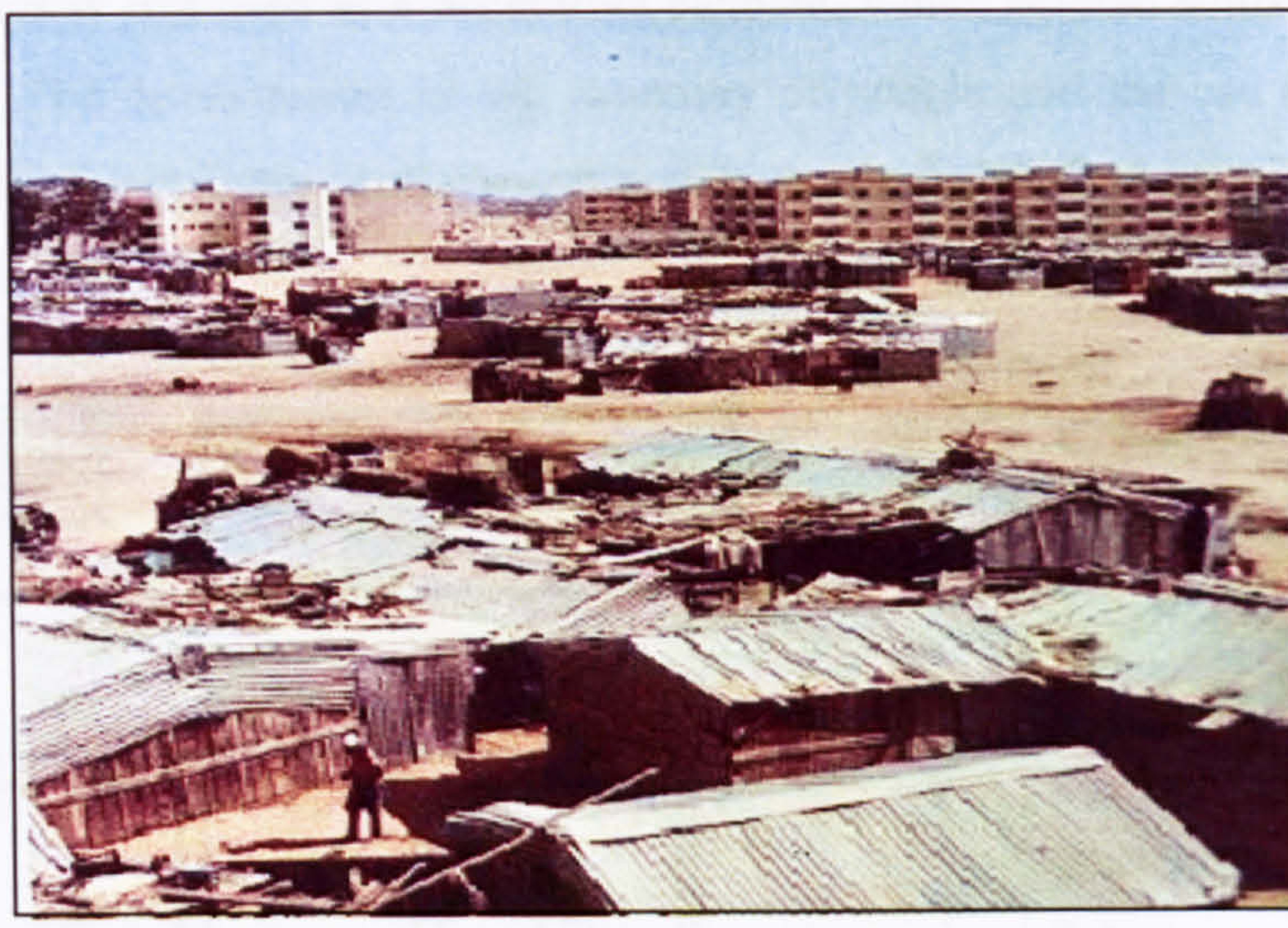


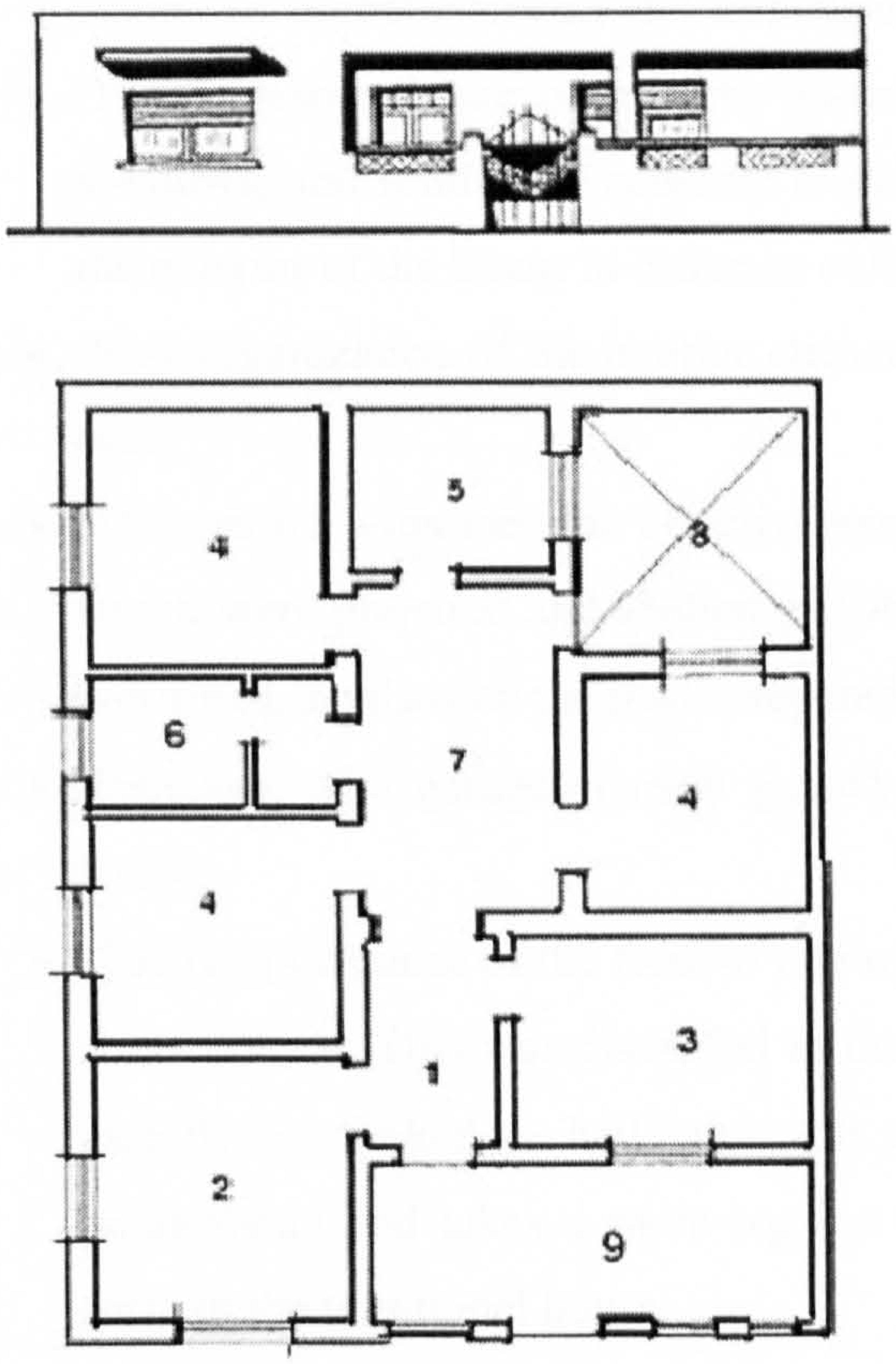
Figure 5.53 : Shanty Town in Tripoli

5.5.3.5 Description and Analysis of a typical house of the Altered Arabic House type

This house was built in Tripoli in 1965 in the district of Ziwat-Al-Dahmany. It has an area of 167m^2, and stands between two streets. It is single storey and consists of a guestroom, salon, 3 bedrooms, central hall (which replaced the internal courtyard). kitchen, bathroom, courtyard and one entrance leading to the passageway with a veranda in the front borrowed from the Italian period. The passageway is an important space in the Libyan house in terms of privacy, but this space was different in shape compared with the traditional L shape, which provided more privacy.

This type still keeps the courtyard, but it has been moved to the rear part of the house which means that this element becomes unimportant in Libyan house design (Figure 5.54).

The system of building was traditional and the building materials used were limestone blocks of 40-50 cm, which were used as load-bearing walls, with the roof of hollow clay block, such as that used in the Italian period. Some of these houses used reinforced concrete in the roofs. The windows are made from wood, are glazed and of rectangular shape, with a remarkable increase in size. However, the mushrabiya is still used as a decorative element, which offered some privacy to the entrance. The development of the economy of people and the use of cars had an affect on housing design with garages now becoming one of the house elements.



plan

House plan key	
1.	Passageway
2.	Guestroom
3.	Salon
4.	Room
5.	Kitchen
6.	Bathroom
7.	Central hall
8.	Courtyard
9.	Veranda

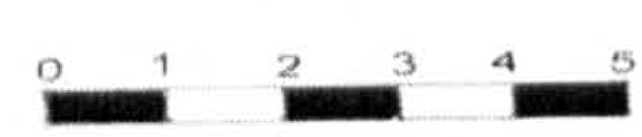


Figure 5.54 : Plan of house built in 1965
Source: Municipality of Tripoli 1970

5.5.3.6 Summary of the characteristics of this period

Through the investigation of the architectural and urban development, and the analysis of the residential units built during that period, we can deduce the following points:

- The house becomes more open towards the outside, and the courtyard moves to the rear and, in some cases, even disappears and is replaced by terraces, balconies and frontal and side gardens;
- More importance is given to the external aspect of the house through the construction of facades and the introduction of new architectural elements such as frames, embellishments and frontal sunshades;
- The widespread use of modern materials such as aluminium and wood in windows, and reinforced concrete in ceilings and columns, as well as painting the exterior of the house in different colours;
- New organization of the interior elements of the house, and increasing its plan area;
- This period witnessed the effective execution of the general and global plans, which were prepared and studied in 1966 until early 1968; before this date the construction relied on the plans prepared in 1918;
- Provision of a garage element gained more importance in the design of the house;
- The re-appearance of the form of entrance element known as the passageway in some houses. This was discarded in the Italian era. In this period the entrance directly overlooked the hall, but in this arrangement the entrance overlooked the passageway and takes a more regular or straight form instead of the twisted form in the traditional house.

5.5.4 The period of revolution (1969 – until now)

5.5.4.1 Introduction

This last period is the most important in terms of the changes that result socially and architecturally in Libya and in particular in Tripoli city. The first of September revolution of 1969 brought new economic, social and political factors, and due to these big and sudden changes, the new government started quickly to execute a number of global developmental plans and policies, in particular housing design and construction. Tripoli witnessed the greatest social, urban and architectural transformation in its history.

The revolution gave special attention to the housing sector in view of the big problems faced by society in the previous periods, such as the lack of sanitary houses and the appearance of "shanty" quarters. Therefore, the new government aimed to provide a suitable house for each family, and in order to achieve this target, programs and plans have been established to execute a number of residential projects in Tripoli city and other cities. This has taken many forms, such as public housing achieved and distributed by the state to the population, and private housing through giving real estate loans to individuals so that they will construct their houses.

Commercial banks and residential associations gave these loans. We can identify the urban and residential change in Tripoli city in this era by the appearance of the fourth urban zone (Figure 5.35). The factors affecting this rapid transformation in the appearance of the city will be expedited through the residential policies of this period, as well as the planning steps, analysis of the residence patterns used during that period, and finally the study of the urban and architectural characteristics of this period.

5.5.4.2 The factors affecting change

1-The housing policies

The housing policy set out by the new government contributed in developing Tripoli city in the following terms:

a) The legal form

On the basis of the plans and studies prepared to execute the residential programs and policies, the new government issued a number of new laws and regulations in order to determine the planning criteria, the general conditions of design and to carry out the urban and architectural programs in Libyan cities,

- The law of planning and organization of the cities issued in 1969;
- The regulation issued in 1971, which allocated the lands for residential use; and
- The regulation of urban streets and roads, issued in 1971.

All these regulations and laws together have contributed to creating the new residential quarters with different aspects as mentioned in chapter 2.

b) The architectural side

The residential policies during that period (1969–until now) gave rise to the construction of tens of thousands of house units in Tripoli city. This great number reflects the size of urban, architectural and social changes of Tripoli inhabitants. These changes occurred as a result of the execution of many programs and policies that were different in their methods of implementation, between the public and private housing sectors.

2-The economic factor, population growth and the family size

The great improvement in the per capita income and the new services, is reflected in same families through the increase in its floor area due to the increase of the size of the family. More care is given to the outside appearance by use of high quality finishing materials, and high-rise forms are used to accommodate population growth. Due to the increase of the economic income of the country, developmental programs were executed in Tripoli city that resulted in a rural exodus to the city. This was the main reason for the population growth extended in the city, in addition to the natural growth due to the improvement of the sanitary services. This factor has pushed the authorities to extend its residential policy to satisfy the great lack of residential units. Because of these great pressures the technical bodies were unable to achieve adequate programs, both quantitatively and qualitatively, a fact that pushed them to look at foreign companies consultants' and bureaus to accelerate the execution of most of these programs.

3- Planning system

Tripoli witnessed huge urban growth during this period as in many other cities in developing countries. The local authority (new government) adopted socialist policies that had a big impact on the urban structure and growth of the city. According to this policy, the government established a new development plan to provide urban services in the shantytowns, and to increase the standard of living of people in the city. As a result, new neighbourhoods were established in many areas around of the city. These neighbourhoods consist of a large number of public and private housing projects, education and health services, and a transport system. (Shawesh 2000).

According to Mukhtar (1997) urban planning, which has been carried out in Libya, is a western system. Ignorant of the social–cultural and climate condition needed for Libya the result is that most buildings are built by foreign companies and most building materials imported. According to the MP (1999), Tripoli as many Arab cities, has witnessed dramatic changes during the 20th century, especially during the past three decades. Since 1969 the city witnessed faster growth than any other North African city. Tripoli was growing at 9% per annum whereas the cities in North Africa were 3-5% per annum in 1975.

4-Construction materials and method of execution

These factors significantly affected the achievement of houses, through both public and private projects. Many factories for construction materials have been built locally to furnish these materials and this has helped the citizen to build his own house. This period has in fact witnessed a great technical progress in residence construction (Grafa, 2006).

5.5.4.3 Types of houses

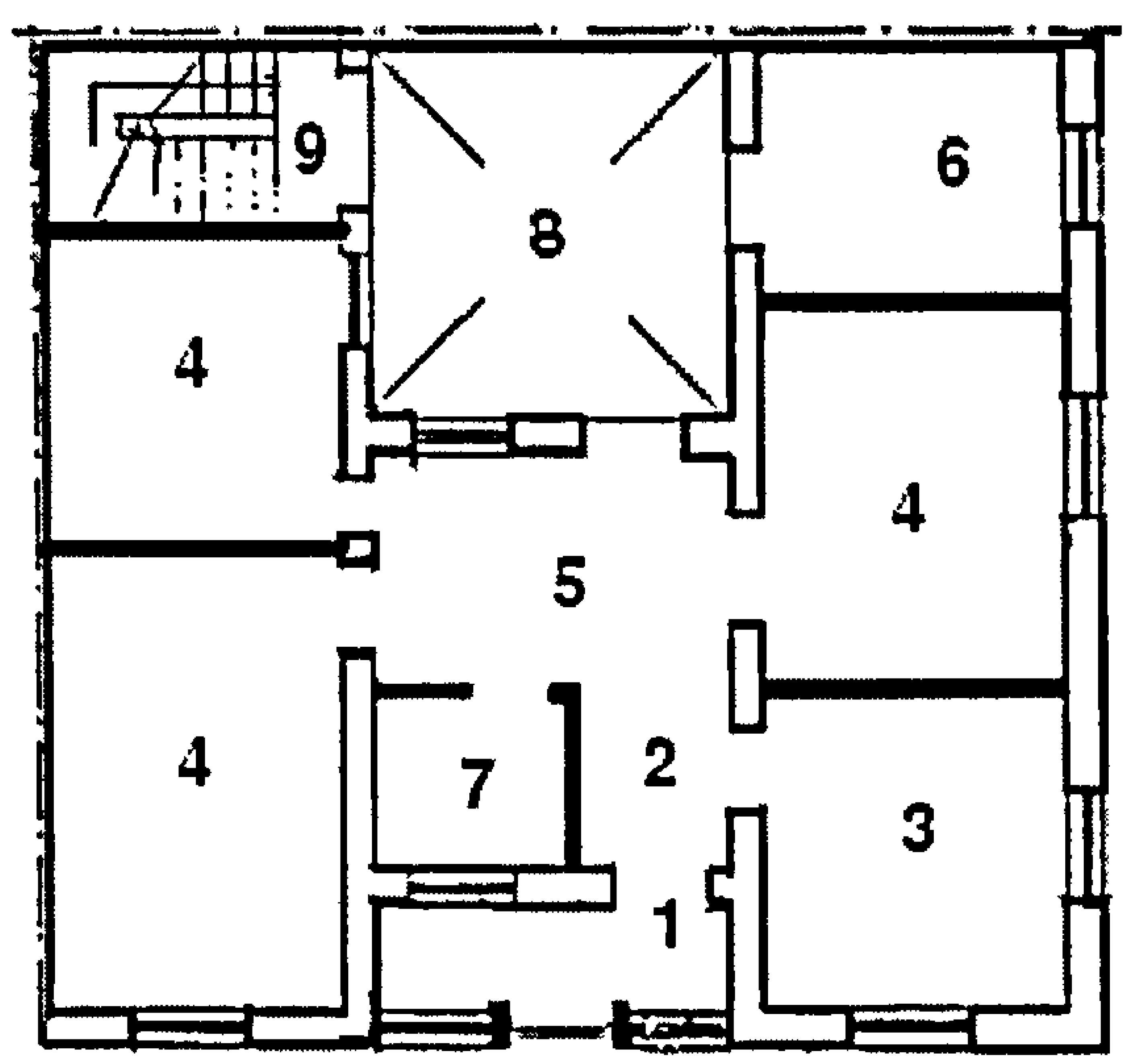
Through the field analysis and the examination of the architectural plans of the residential patterns executed during this period, and because of the social, political and economic changes and the diversity of the design and execution channels, thousands of housing units have been built, giving rise to very different housing patterns. Variety in construction systems, both traditional and prefabricated, can be classified as follows:

I. Private houses; and
II. Public houses.

I. Private houses

1) The Altered Arabic House

The altered house was planned for low-income residential areas in different parts of the city such as EL-Hadba neighbourhood. This type is similar to the house built in previous periods. The architectural formation of this pattern aimed to cover the courtyard, and the court shifted to the rear part of house. This house is a mix between traditional and western housing. This type tries to look towards outside and inside. The plan is simple and small in size, approximately 12x12m, and the main entrance is located in the middle. This type was constructed until the end of 1970's. (Figure 5.55).



House plan key	
1.	Entrance
2.	Passageway
3.	Guestroom)
4.	Bedroom
5.	Hall (Salah)
6.	Kitchen
7.	Bathroom
8.	Courtyard
9.	Staircase

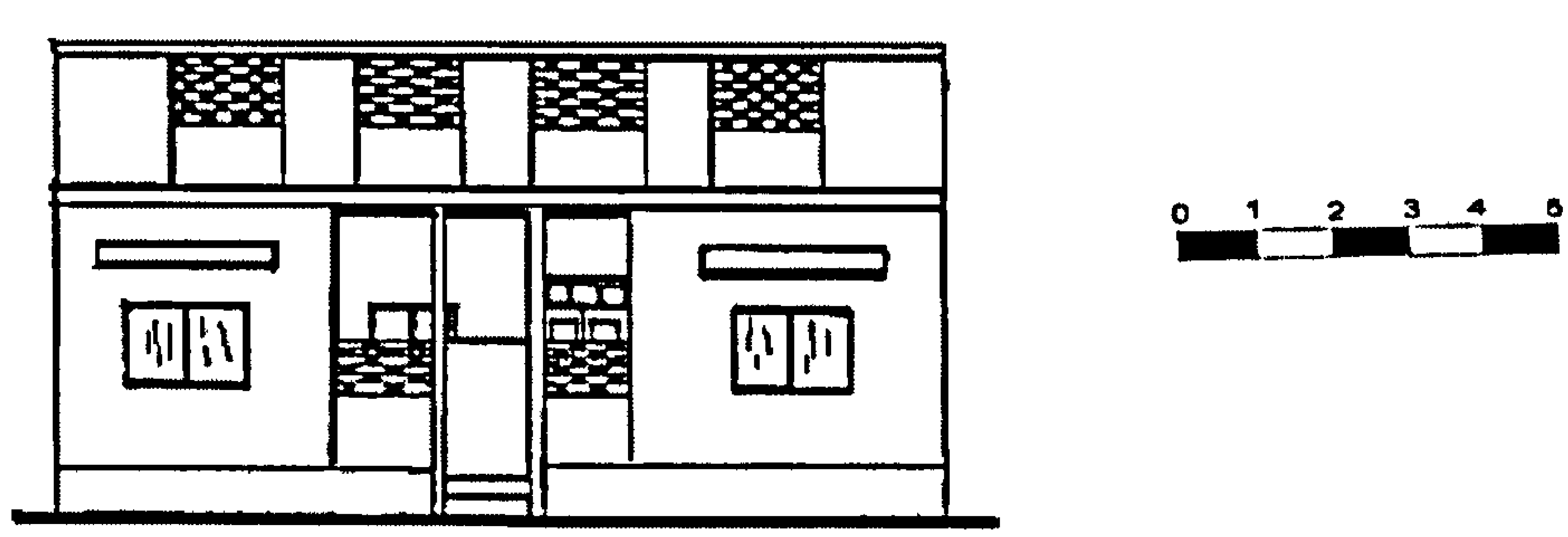
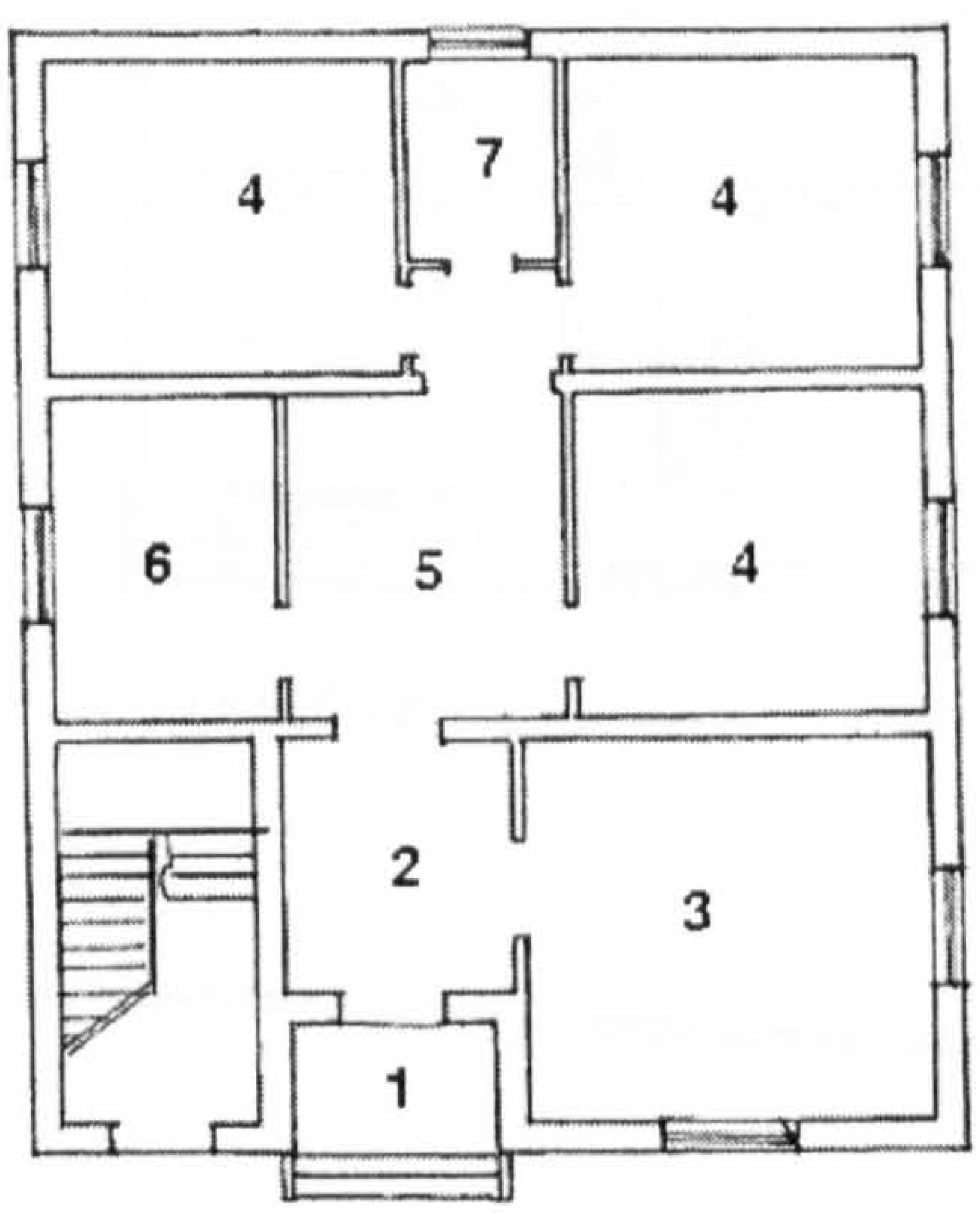


Figure 5.55 : An altered Arabic house

2- Semi-Detached

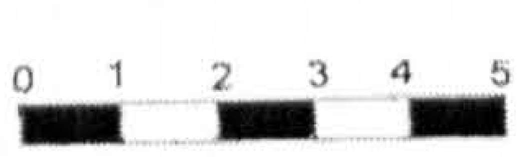
This type of residence is characterized by the disappearance of the interior courtyard and is replacement by a central and covered hall used for the accomplishment of the daily family activities. It is known as the western house with different patterns, characterized by the diversity of forms and positions of the flats, as well as the gardens and the balconies. The protection and the freedom for the family members, is absent, and the resident is obliged to make core alterations to these flats if they are to comply with social traditions (Figure 5.56).

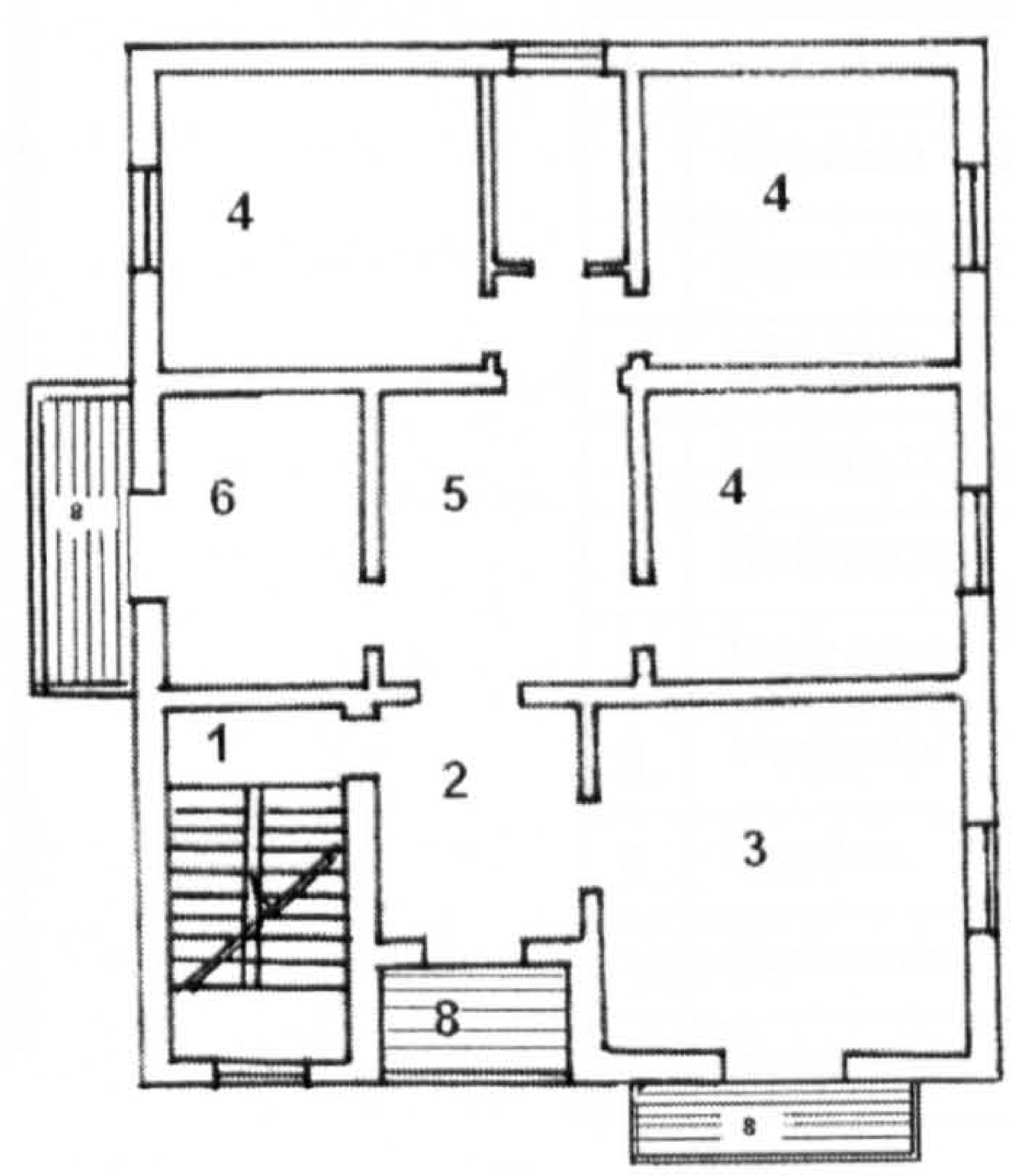


Main elevation

Ground floor plan

House plan key			
1	Entrance	2	Lobby
3	Guestroom	4	Room
5	Hall	6	Kitchen
7	Bathroom	8	Balcony



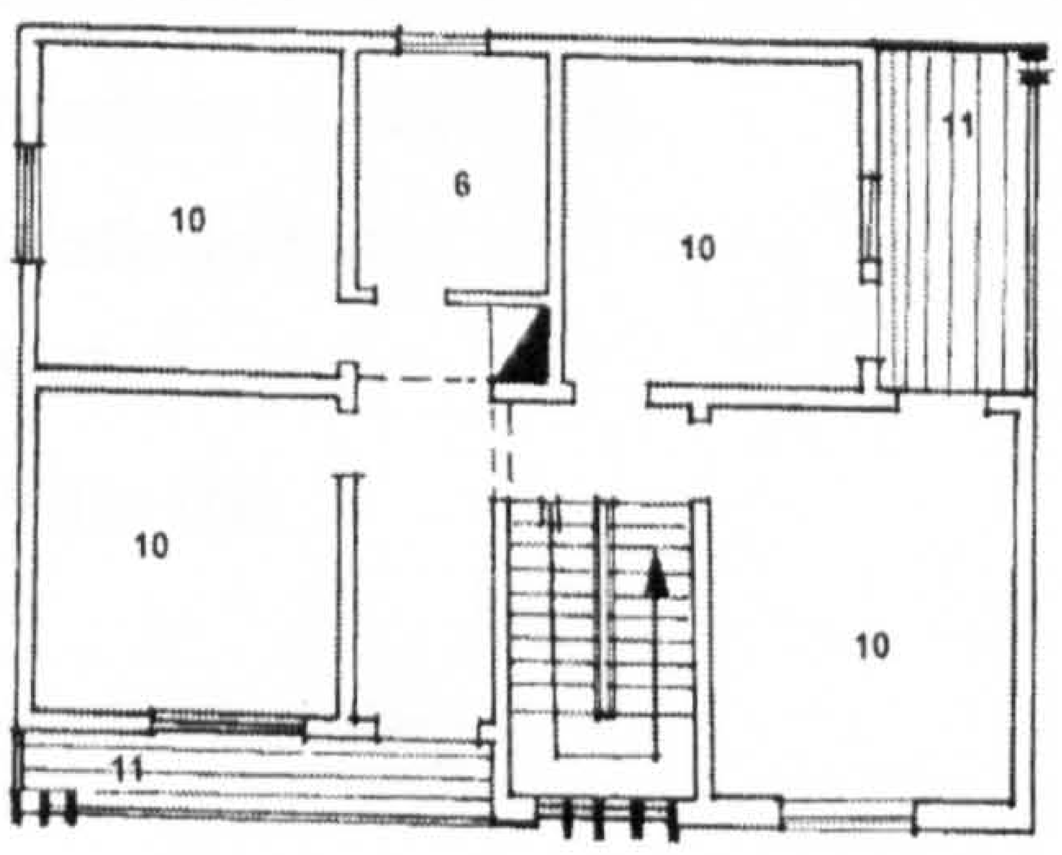


First floor plan

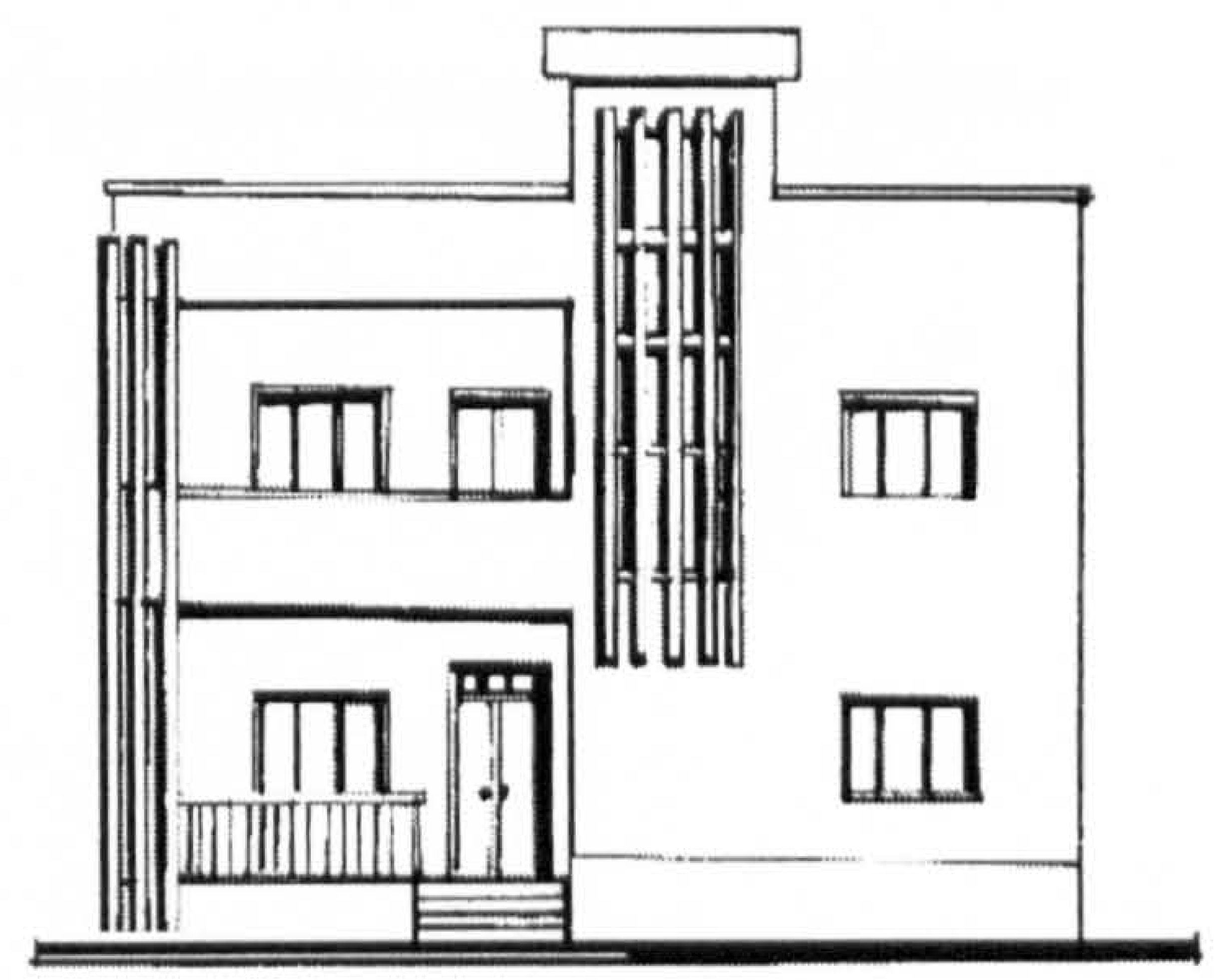
Figure 5.56 : Semi-Detached private houses

3- Villa or duplex

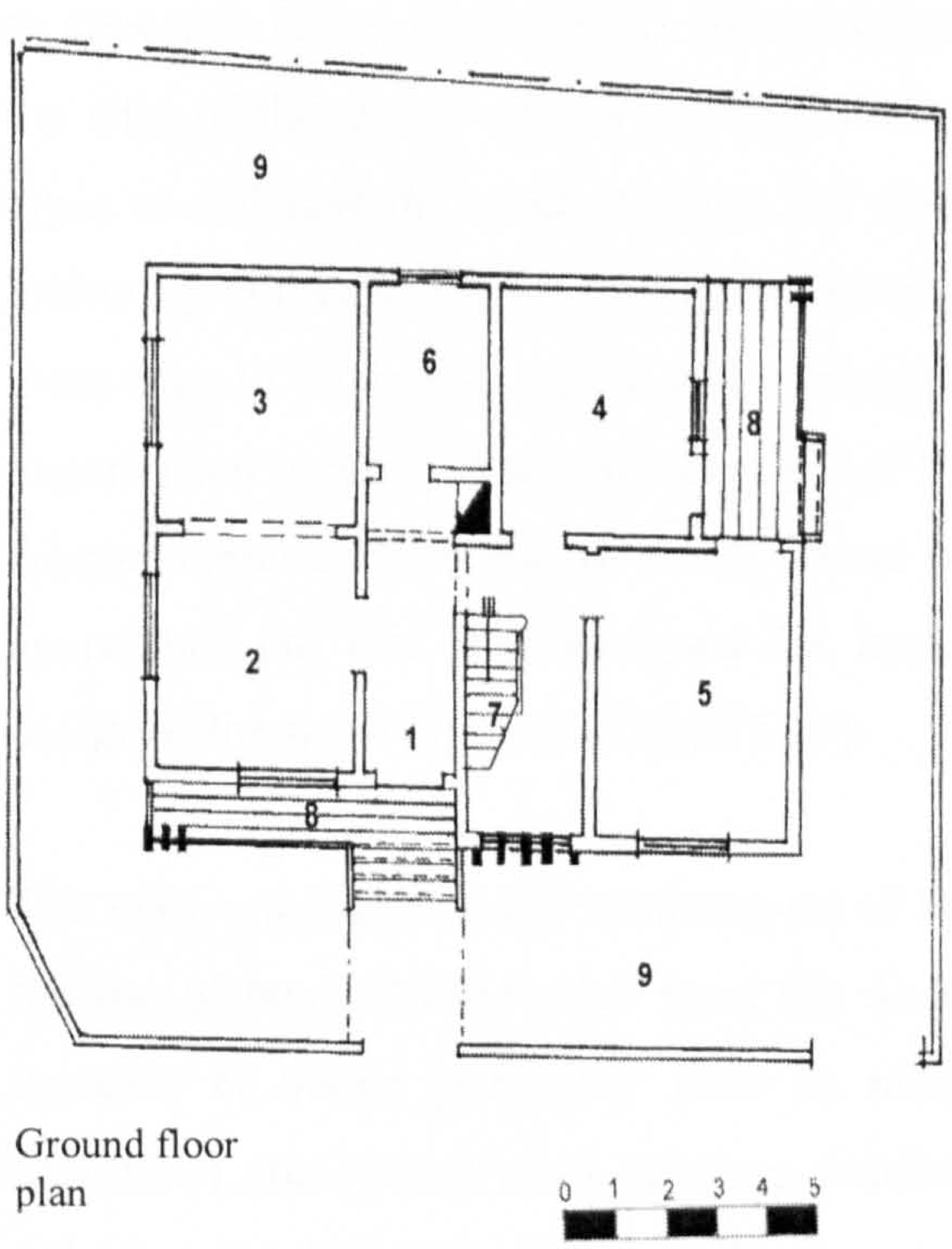
This type of housing is generally owned by high-income families, as examples located in Hay-El-Andalus and Ben-Ashour neighbourhoods. Many examples of this type are situated in a large plot of land between 600-1000m^2 including a garden. In this period different types and styles of housing were constructed, most of which were of western style (Figure5.57).



First floor



Main elevation



Ground floor plan

House plan key	
1.	Entrance
2.	Western salon
3.	Eastern salon
4.	Kitchen
5.	Living room
6.	Bathroom
7.	Staircase
8.	Veranda
9.	Garden
10	Bedroom
11	Balcony

Figure 5.57 : Private house (villa) built during the 1980s

II. Public housing

This part describes the dwelling units from two neighbourhoods which are located in two different locations in Tripoli:

- Airport highway neighbourhood.
- Sidi-Abdual-Jaleal neighbourhood.

The Ministry of Housing through the general housing corporation builds these schemes. Generally this type includes four main patterns, categorized as follows:

- Medium to high-rise;
- Walk-up flats;
- Villa;
- Villa-flat.

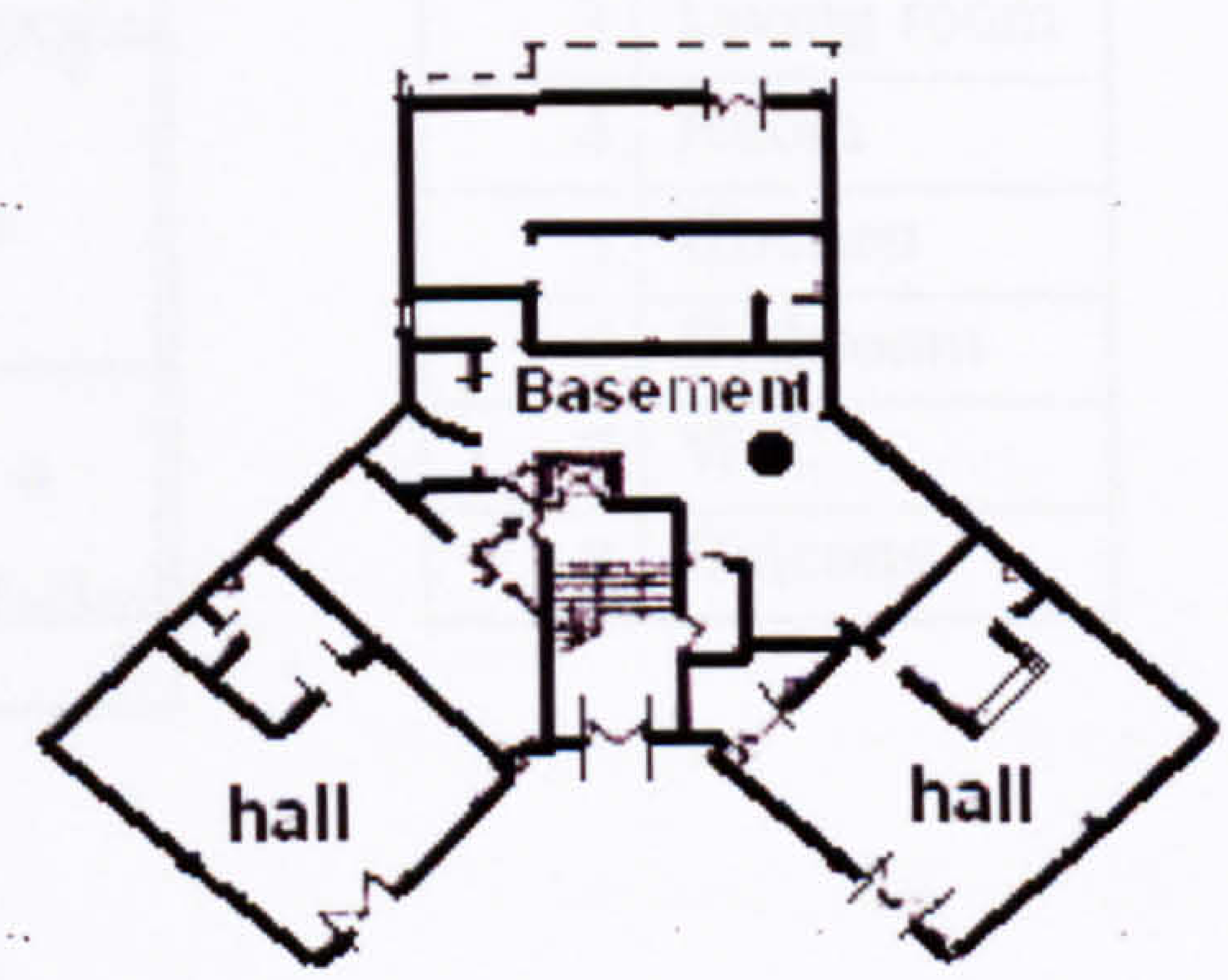
1-High-rise housing

As mentioned in chapter 2, the government adopted the new policy for housing (urgent housing programmes) to solve the housing demand. Therefore, this type began to appear in Libya in the 1970s. Most of these types were public housing located on the sites of the shanty camps established around the city. They aimed to build these types to re-house the residents from the shanty camps, who lived in bad conditions, and to try and cater for the rapid population growth. The height of this type of house were 4 to 12 storeys designed and constructed by foreign companies who were not experienced in the Libyan culture. One of these neighbourhoods was located on the Airport-highway (see Figure 5.58). These neighbourhoods consist of two types of apartment: the first was designed for large families, and the second is typically designed for small families (Figure 5.59).

The main advantage is the achievement of high density accommodation, by reducing the use of land. On the other hand the disadvantage of the high-rise building is an increase of social problems, such as missing their relative, compared with the traditional area where most relatives families live close to each other "this lack of cohesion has led to problems of " crime, large families dissatisfied about the small size of their flats and poor maintenance of buildings.

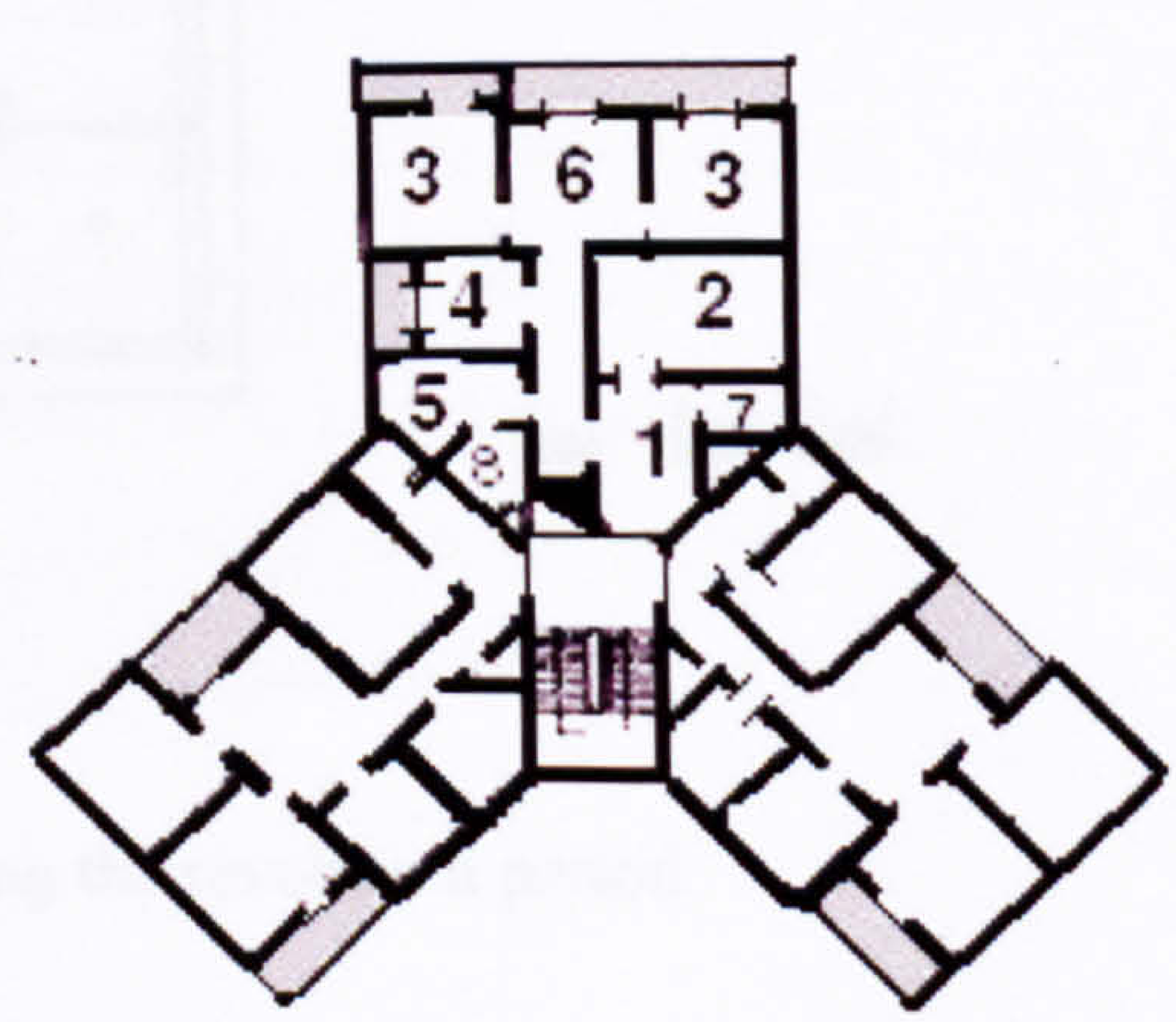
Figure 5.58 : New neighbourhood along the airport highway in Tripoli

Main elevation



Ground floor plan

House plan key	
1.	Lobby
2.	Guest room
3.	Room
4.	Kitchen
5.	Bathroom
6.	Living room
7.	Toilet
8.	Store

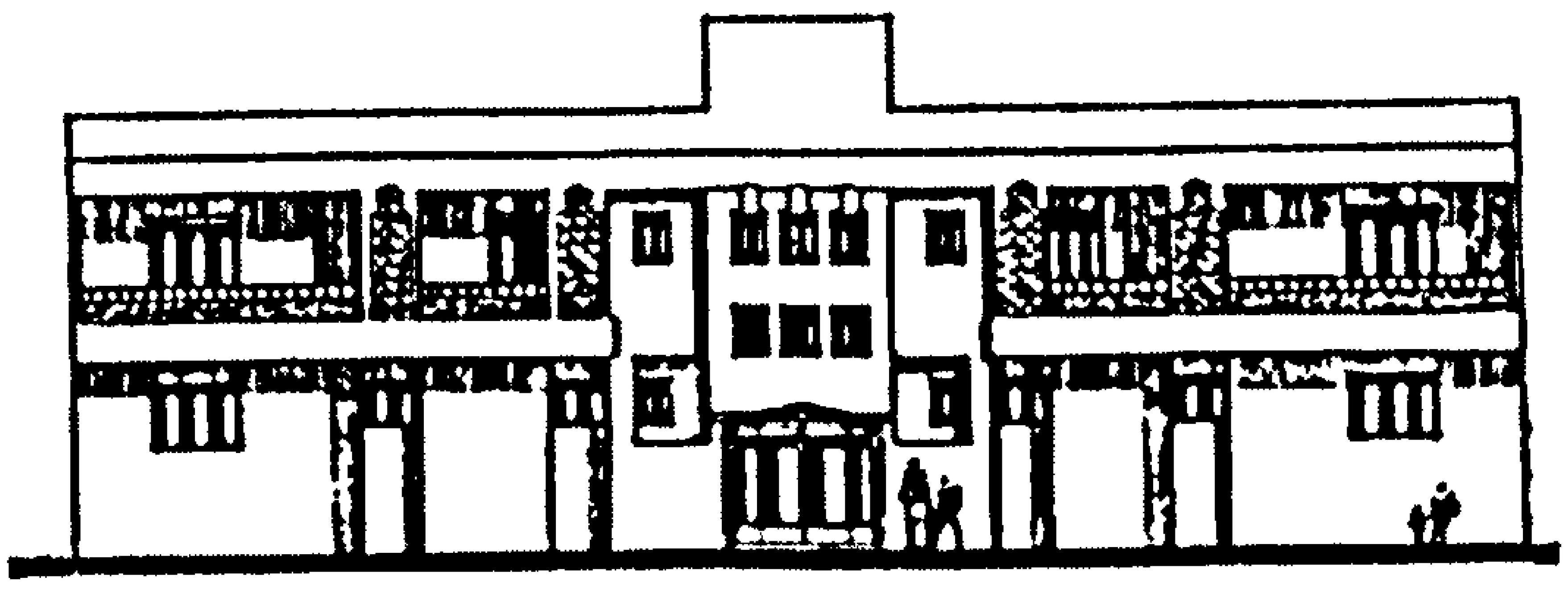


Typical floor plan

Figure 5.59 : High-rise building built during the revolution period

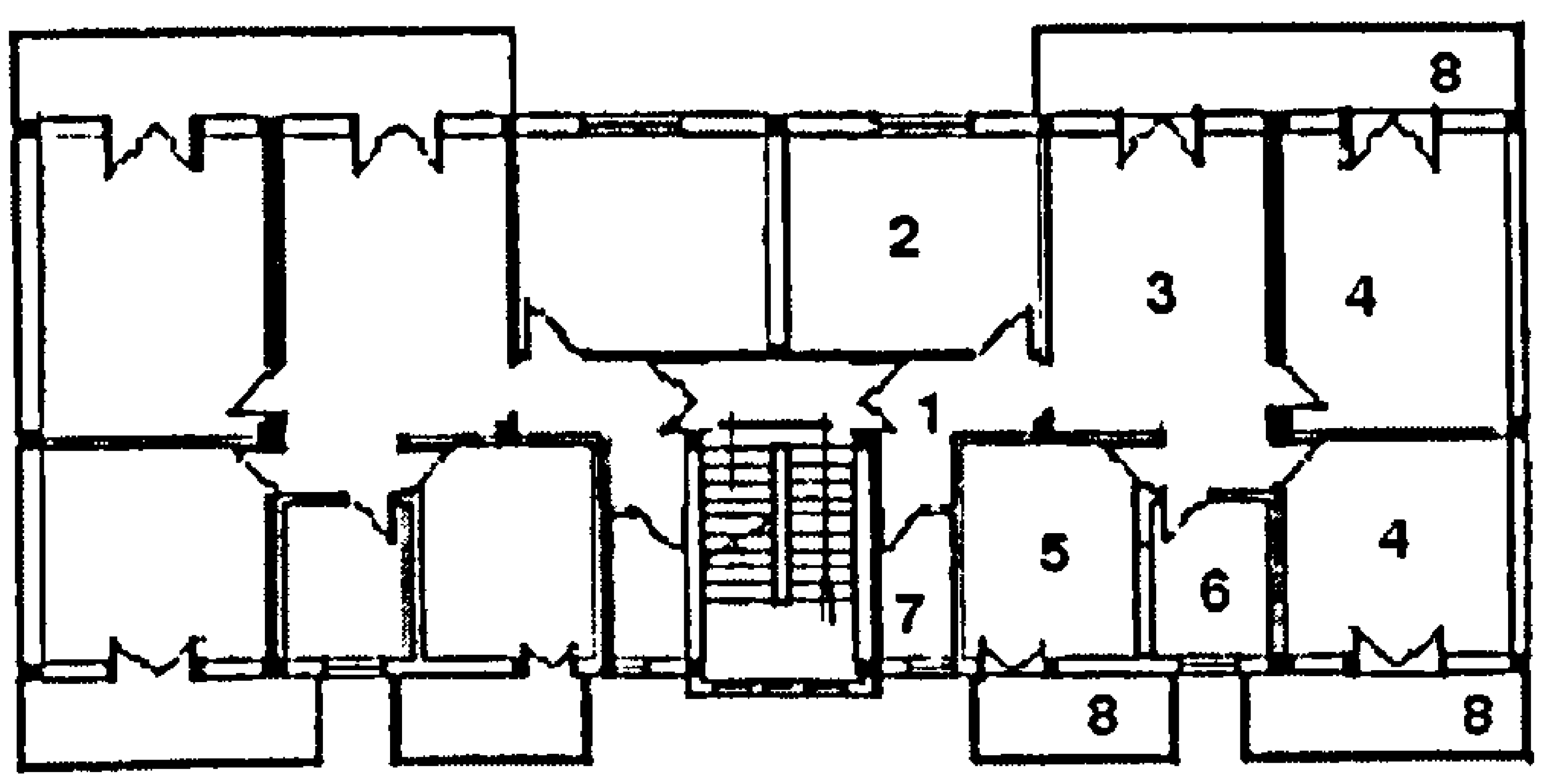
2- Walk-up flats

This type of dwelling unit is in a building of less than five storeys widely spread through out the country (Figure5.60). The building system is traditional for this type of dwelling, which is found in the Sidi-Abdu al-Jaleal neighbourhood, built in 1979 in Janzur to the west of city and constructed by (Libash firm) from Turkey. This project consists of three different dwelling types: walk-up flats, villas, and villa-flats. (Figure 5.61) shows the layout of project.

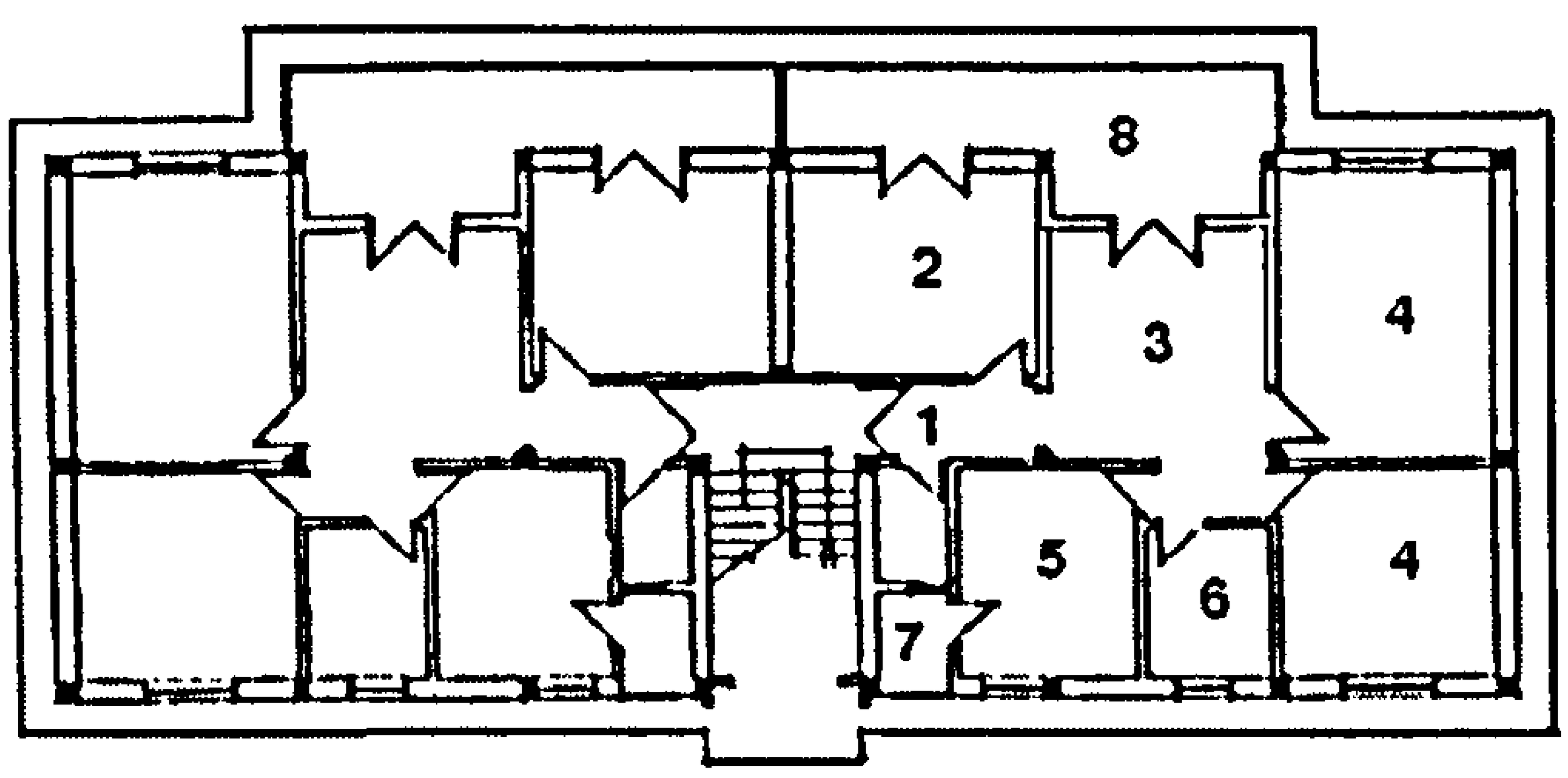


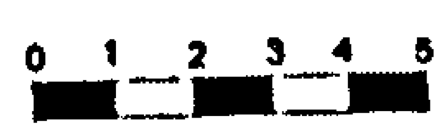
Main elevation

House plan key	
1.	Entrance
2.	Guestroom
3.	Living room
4.	Room
5.	Kitchen
6.	Bathroom
7.	W.C
8.	Balcony



First floor





Ground floor

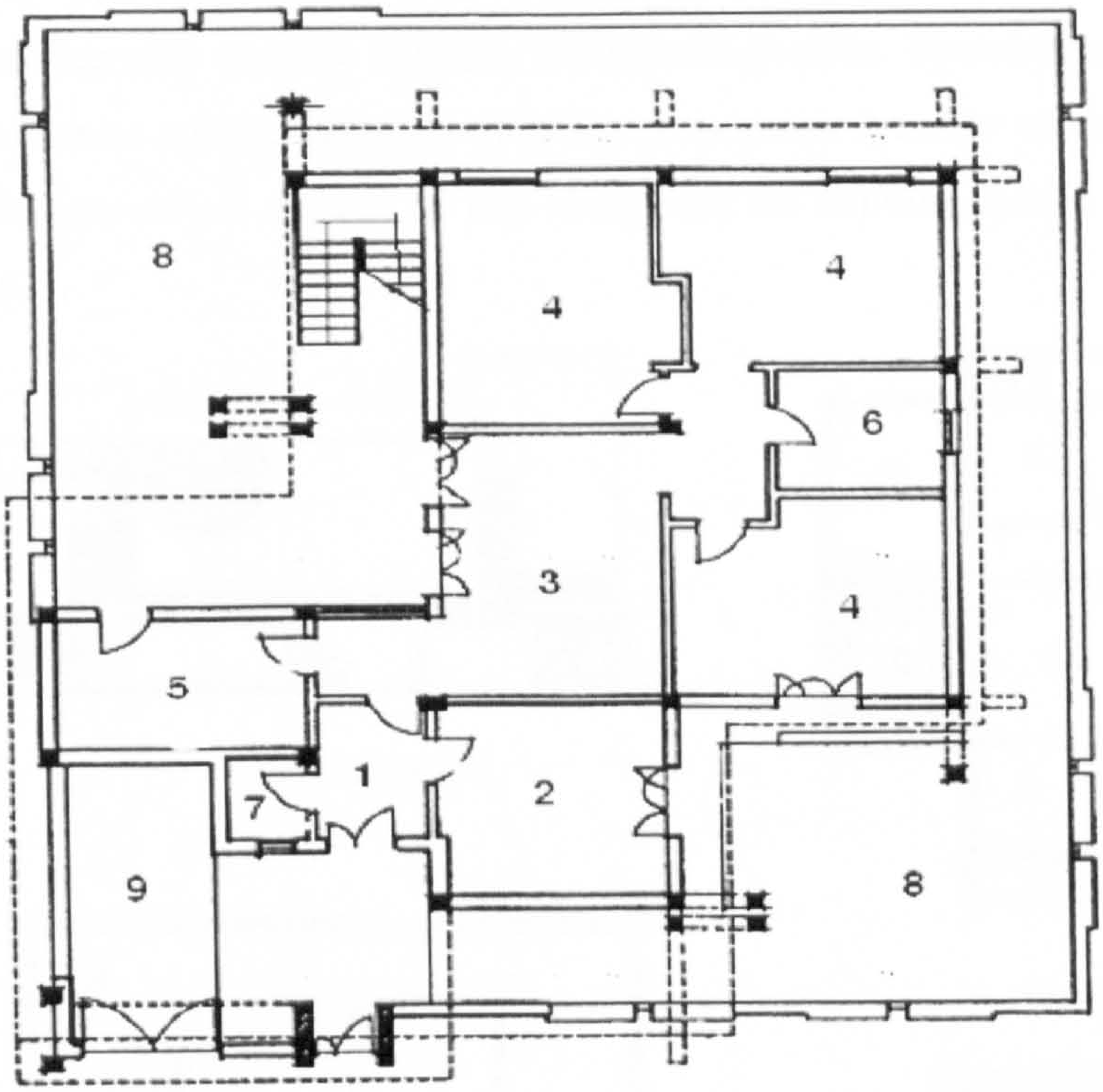
Figure 5.60 : Walk-up flats built during the revolution period

Figure 5.61 : Sidi-Abdu al-Jaleal neighbourhood in south Tripoli

3- Villa

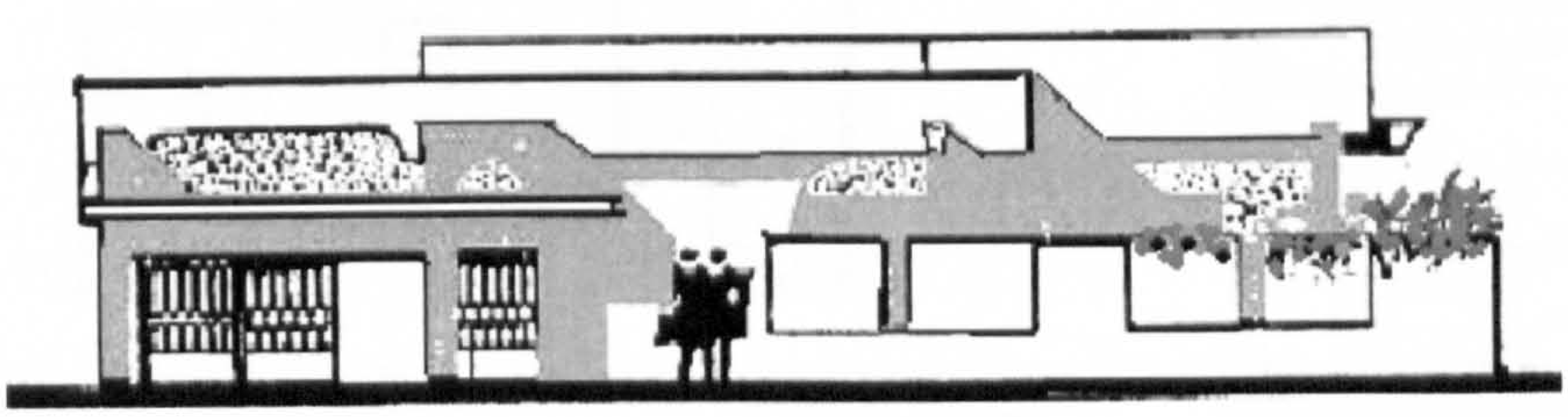
A single storey covered dwelling unit generally with a private garden, covering an area of 160-180m^2 on plots of area between 300-500m^2 which is a traditional building system (Figure 5.62). This house is divided into three areas: guest area, living area and sleeping area. The main entrance is covered by a veranda and opens into a small lobby (passageway) that provides access to the male reception room. This part is separated from the rest of house to maintain privacy.

The second part is the living area consisting of a living room and kitchen. Outer facades are opened to the back garden to allow abundant light, ventilation and views into the garden and are covered by a veranda. The third part is the sleeping area, which is separated from the living area to achieve more privacy and is reached by roof to a staircase located in back of house. The house is also surrounding by canopy to shade the windows.



House plan key	
1.	Entrance
2.	Guestroom
3.	Living room
4.	Room
5.	Kitchen
6.	Bathroom
7.	Toilet
8.	Garden
9.	Garage

Plan of villa

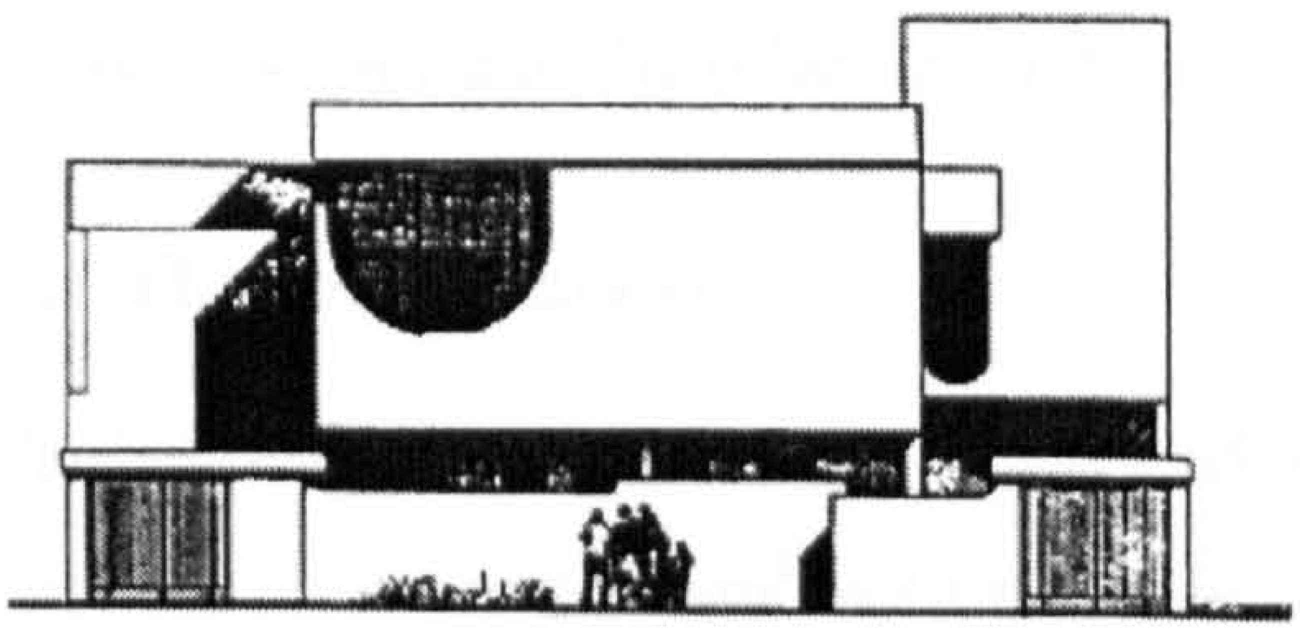


Main elevation

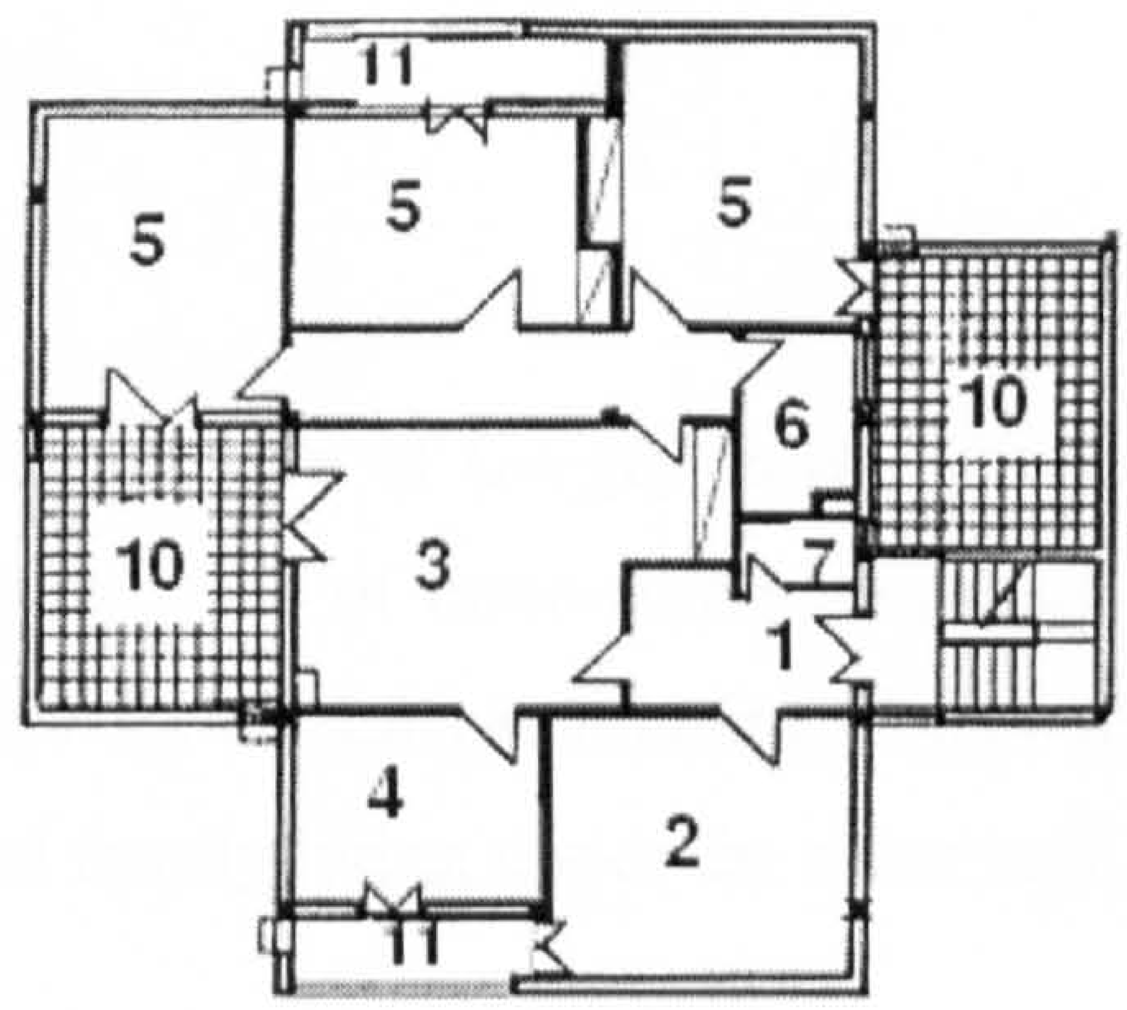
Figure 5.62 : Villa built in the revolution period

4- Villa-flat combination

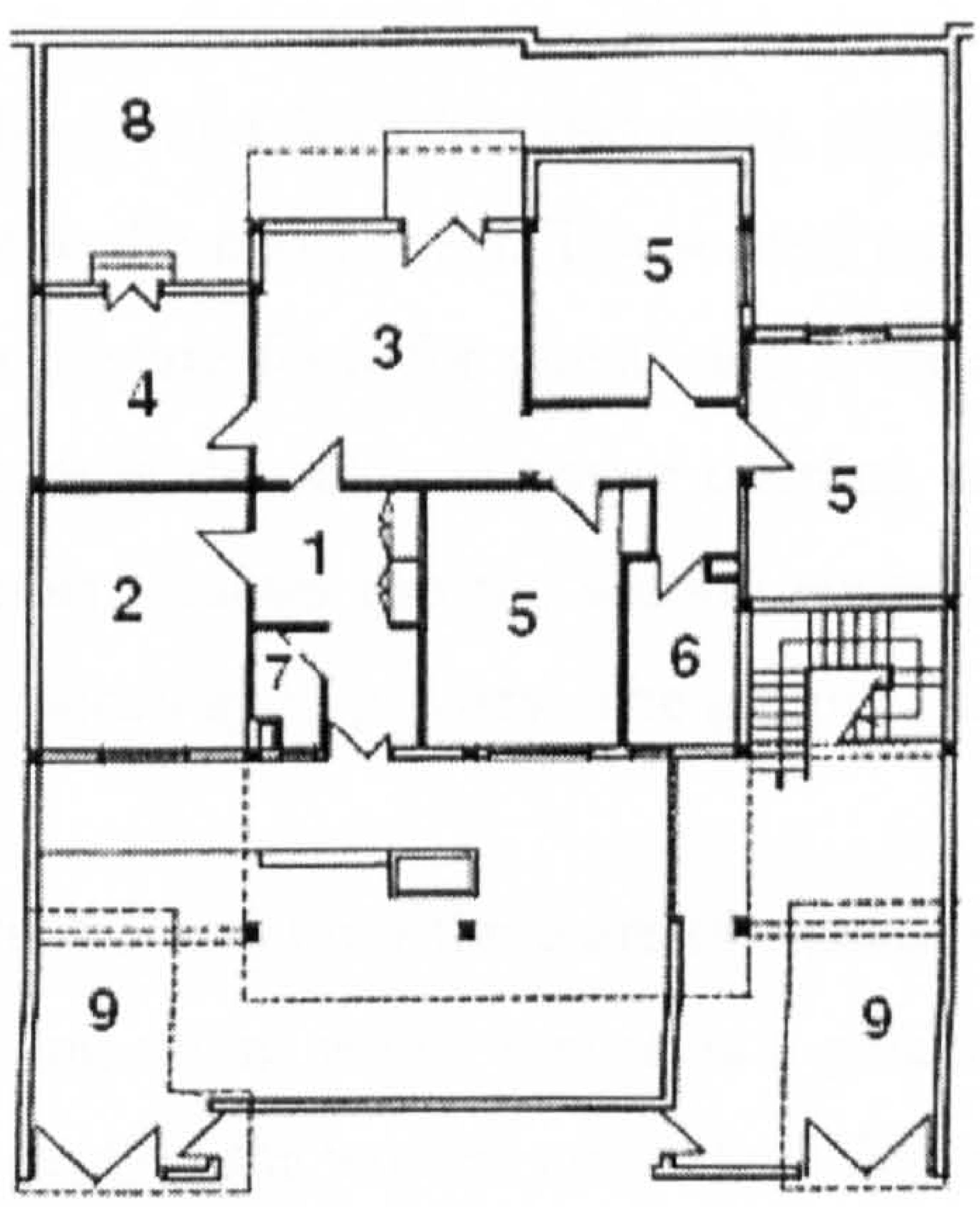
This type consists of two dwelling units combined into one, within a two-story building with separate entrance and private gardens. The unit in the ground floor can be seen as a villa, while the dwelling units above it can be considered as a flat. Also, this type covers an area of 160-180m^2 and the building system is traditional (Figure 5.63).



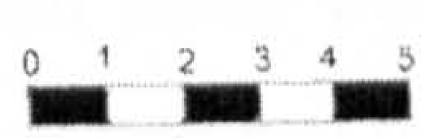
Main elevation



First floor



Ground floor



House plan key	
1.	Entrance
2.	Guest room
3.	Living room
4.	Kitchen
5.	Room
6.	Bathroom
7.	W.C
8.	Garden
9.	Garage
10.	Terrace
11.	Balcony

Figure 5.63 : Villa-flat built during the revolution period

Most of the public houses in these projects have been changed in the interior and exterior, probably because the design of these houses is unsuitable for the Libyan society in terms of privacy and safety as well as to the climate condition. This is particularly the case in the high-rise building. The reasons why residents alter their houses is explored in chapter seven.

5.5.4.4 Description and analysis

This section describes and analyses two houses built in this period; one from the private sector and the other from the public sector.

I. The Private house

This house was built in the suburbs of Tripoli in the area of *Gorgey* in the 1990s. It covers an area of 273m^2 with a plot area of 334m^2. It is of three-storey construction and includes a basement, which is something new for the Libyan housing. This house is used in the traditional way for a large extended family living under the same roof.

The ground floor has two parts, with the first part used as two shops opening directly on to the main street. The second part consists of a guest room for men, kitchen used to prepare food for guests and a toilet. The ground floor has two entrances; one of them is the main entrance opening to the ground floor and staircase leading to the upper. Guests use the second entrance situated in the back of the house because it provides good privacy. The ground floor is 1m above the lower-ground level.

On the first floor there are two parts; one is used for all-day activity and consists of a living room, which serves as a gathering place for the family, kitchen with balcony, reception for women and salons for the men who are family-members but sometimes used for guests, a toilet and small lobby were the main entrance opens. The second part, which is used for sleeping, consists of three bedrooms and a bathroom. This part is 1m above the part used for day activity, which gives more privacy. This system is now widely used in recently developed housing. This floor also has two balconies: one of them is to the front and the second is to the rear. Both look out onto open space. The first floor area is larger than the ground floor.

The second floor has two parts: one is used for all-day activity and consists of a living room; bathroom and kitchen, which are located of "between" living room; and reception room for women and men. This makes it easier to serve food to guests. The second part is used for sleeping, consisting of three bedrooms and a bathroom. As for the lower floor, this part rises 1m above the living area. This floor also contains a terrace and a balcony to the rear. The house has a single staircase linking all floors (Figure 5.65). In general, the modern house was mainly divided into three parts with the first part for guests, the second part for living accommodation room and the third part for sleeping.

Houses are now reoriented to the street. Consequently, out-wardress substitutes inwardness, given more importance to the external façade. The façades are painted in coloured cement paint which protects the walls from damp, as is the case for many houses of this period. There is a small canopy around each window to protect it from the sun and rain, and to give a good appearance. The columns are dressed in marble. The edge of some rooms and the balcony is curved. Hence, houses have become a medium of expression of the inhabitants' social status instead of a place to offer comfort and privacy (Qussadou, 1988).

Windows in recent years, with a locally manufactured aluminium frame have become available. They are often of large size; single glazed and come-in various rectangular, circular and arched configurations. Window shutters are now less frequently installed. These designs are unsuitable for the climate and privacy requirements. Some houses have also used some foreign design concepts and tried to customise them into local design, such as pitched roofs.

Building materials and structure

The majority of modern residential architecture in Libya has flat roofs. Heavyweight roofs are usually constructed from reinforced concrete system, with two main types of blocks used in wall construction such as:

Sand and limestone: these are natural stones obtained from areas where sand or lime is found in underground layers. Lightweight concrete blocks are manufactured blocks made from a mixture of sand, cement and gravel or fine aggregate for the exterior walls and interior wall partitions. Most walls are usually constructed without cavities.

From observation, the main building materials used in this house and others houses, built in this period are steel, cement, aggregate, hollow cement blocks, wood, mosaic and marble. Most of the materials are produced locally, but wood, mosaic and marble were imported, (Figure 5.64).

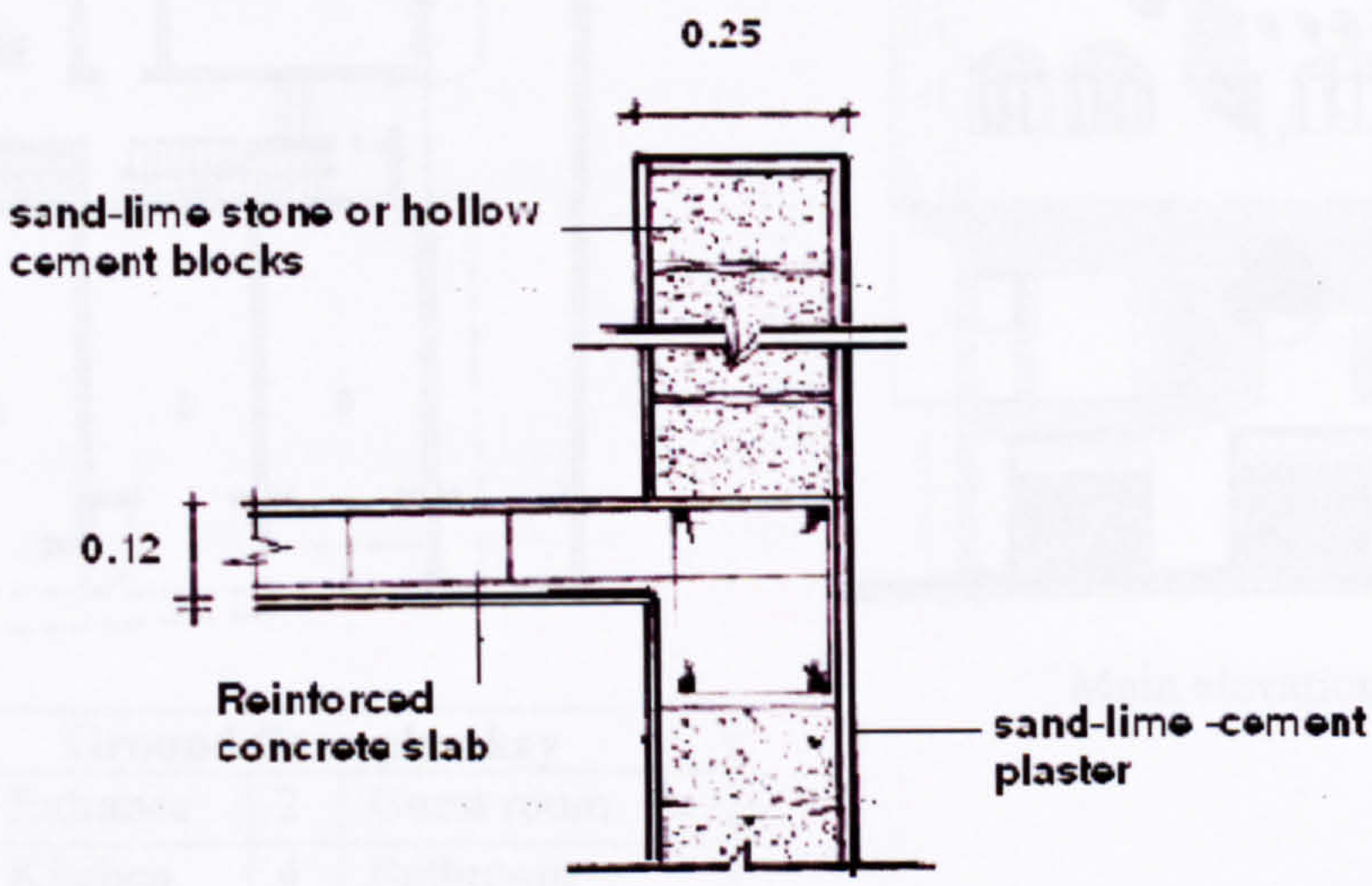
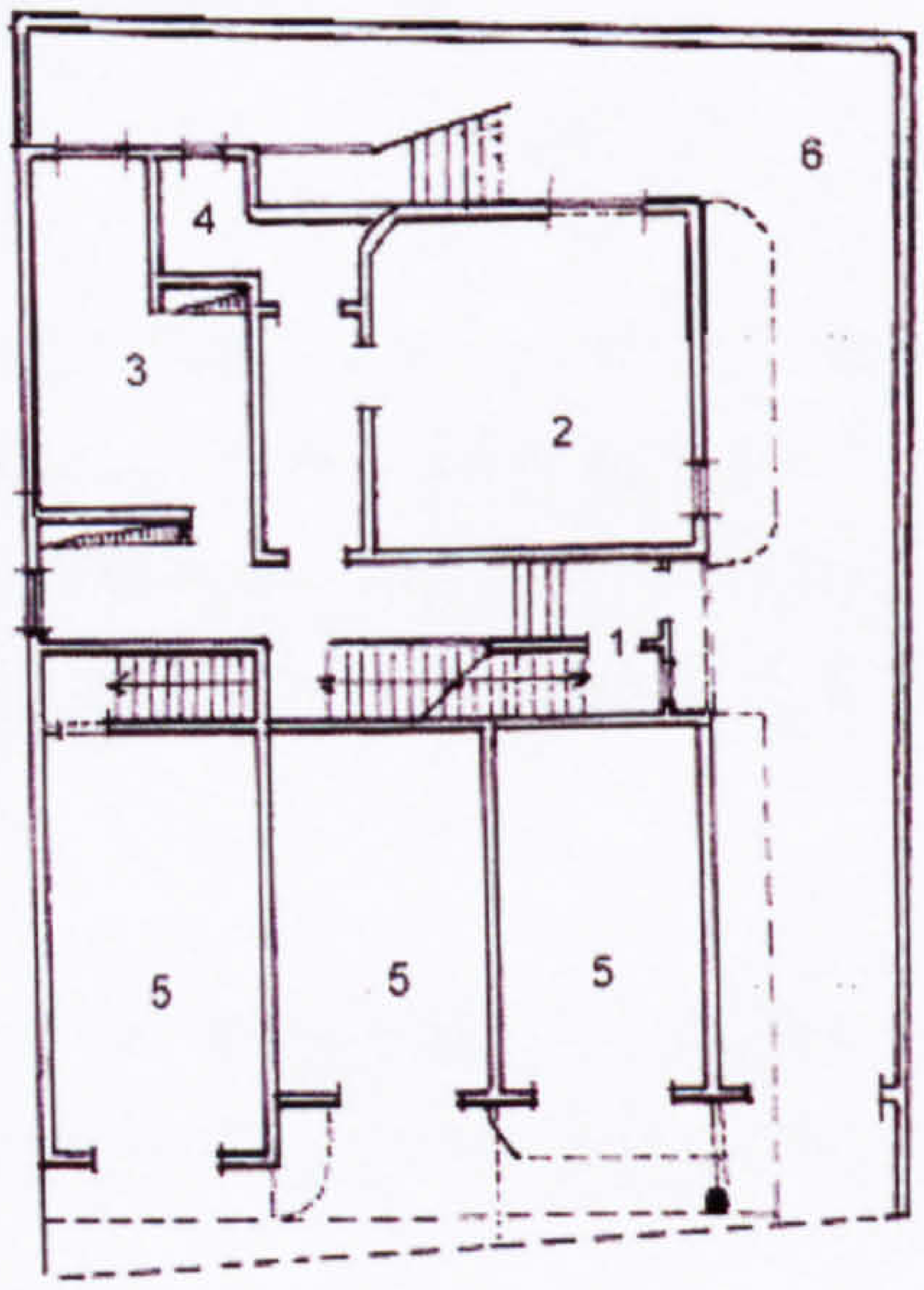


Figure 5.64 : Construction system of contemporary houses

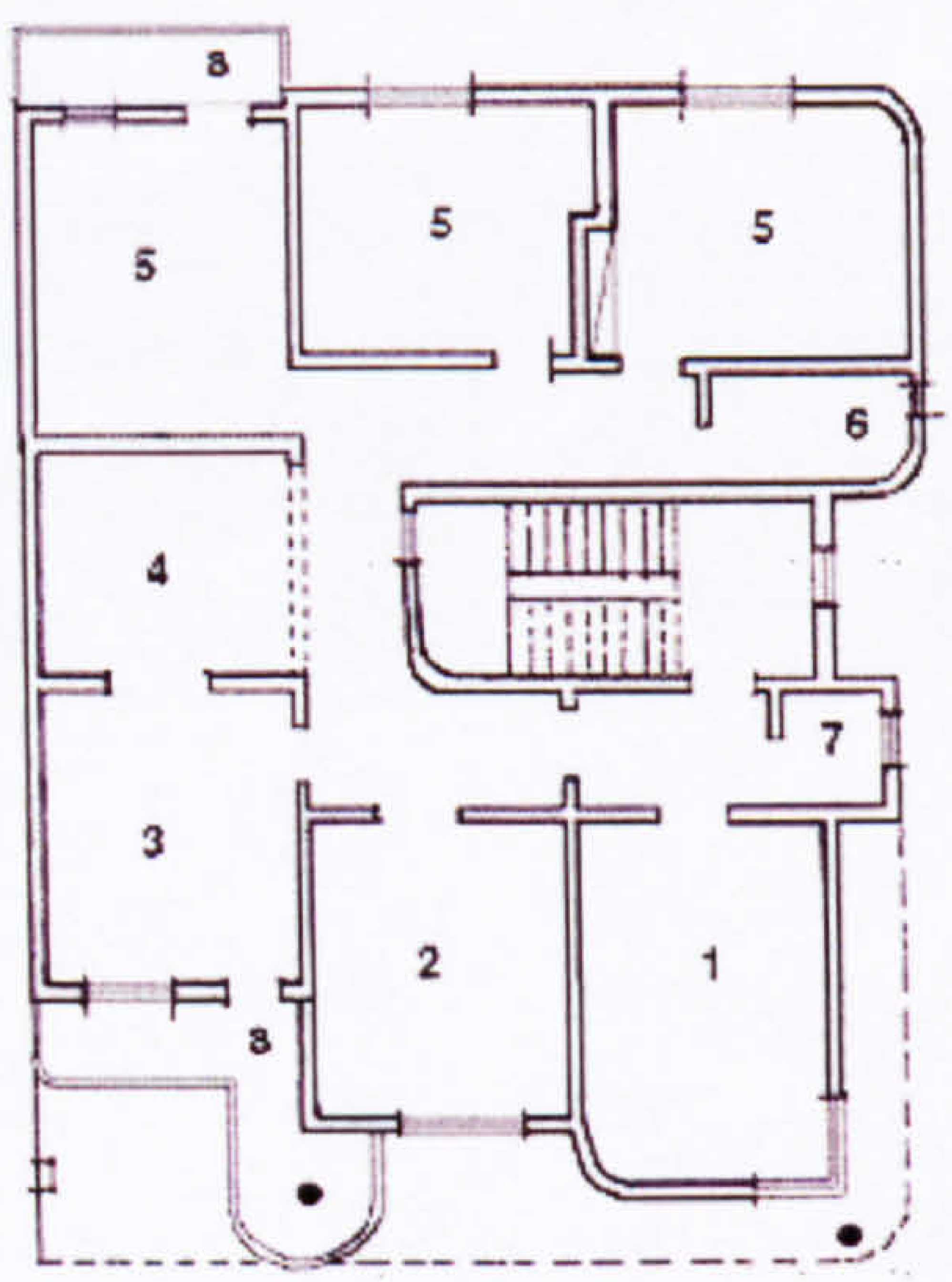
Orientation

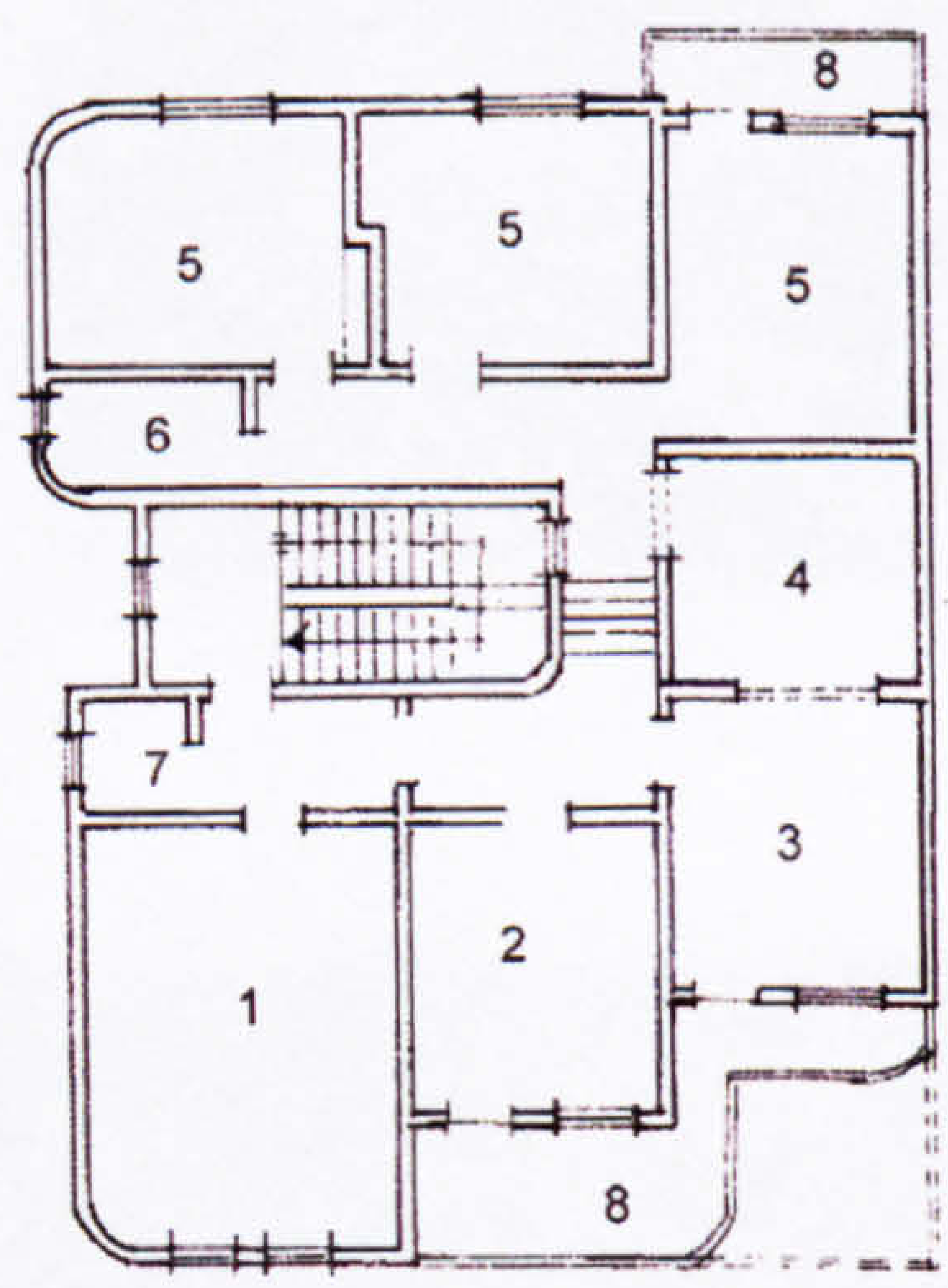
The urbanised life in the cities in Libya, particularly Tripoli, is expressed by the complete orientation of the house towards the street. A large covered hall has replaced the central courtyard, and all rooms open outside. The open space surrounds the house, compared with the traditional pattern, where the house surrounds the open space.



Main elevation

Ground floor plan key			
1	Entrance	2	Guest room
3	Kitchen	4	Bathroom
5	Shops	6	Garden





Second floor plan

First floor plan

First and second floor plan key			
1	Guest room	2	Women guest
3	Kitchen	4	Living room
5	Bedroom	6	Bathroom
7	Toilet	8	Balcony

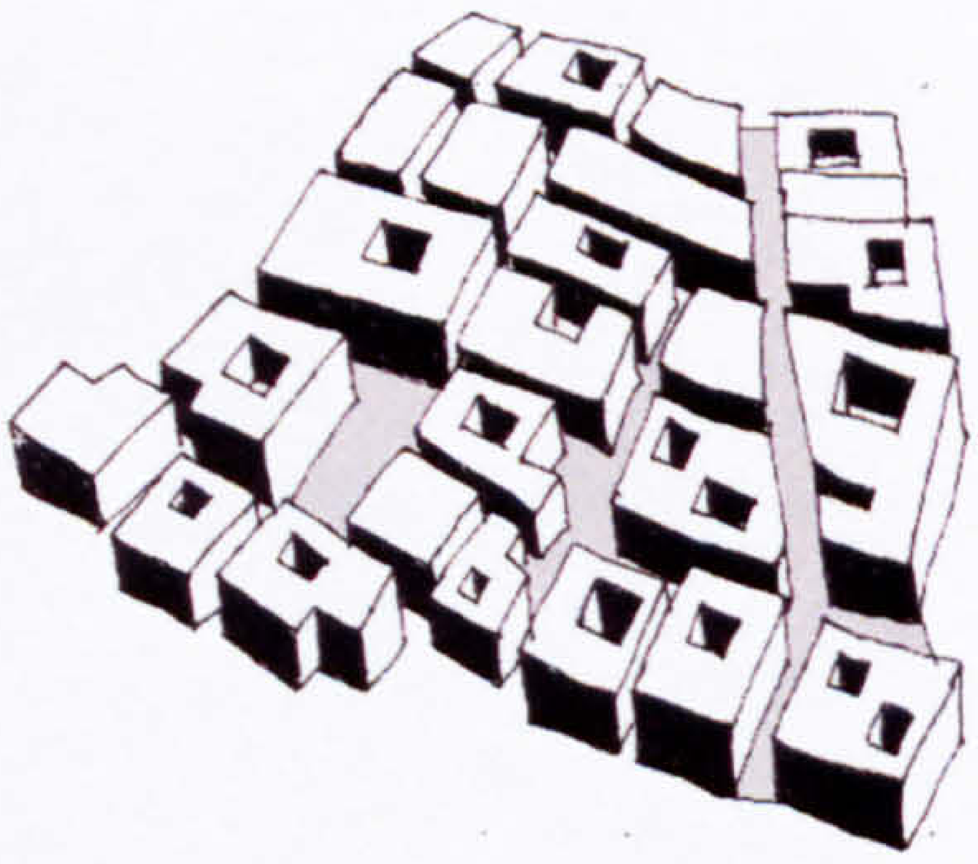
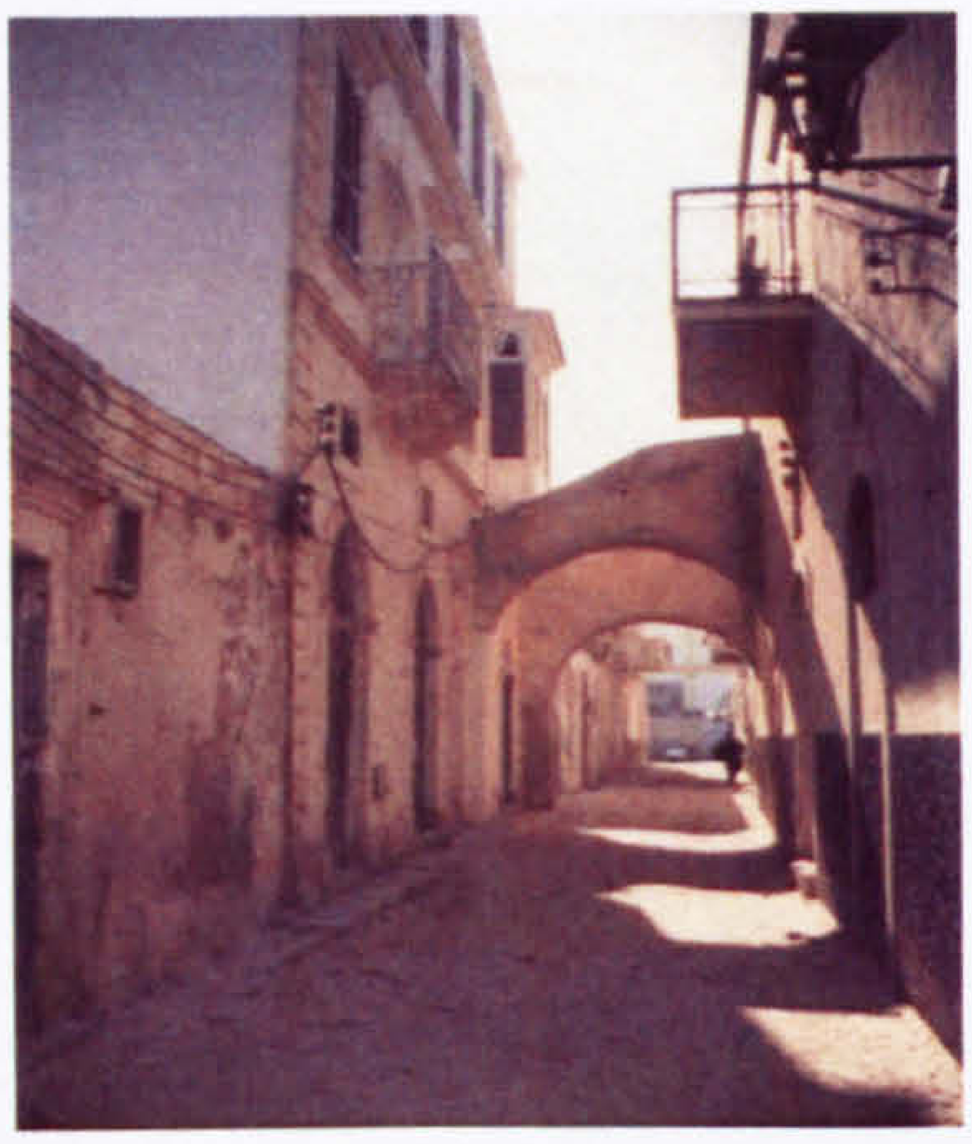
Figure 5.65 : Plan and main elevation of house Built during 1990s

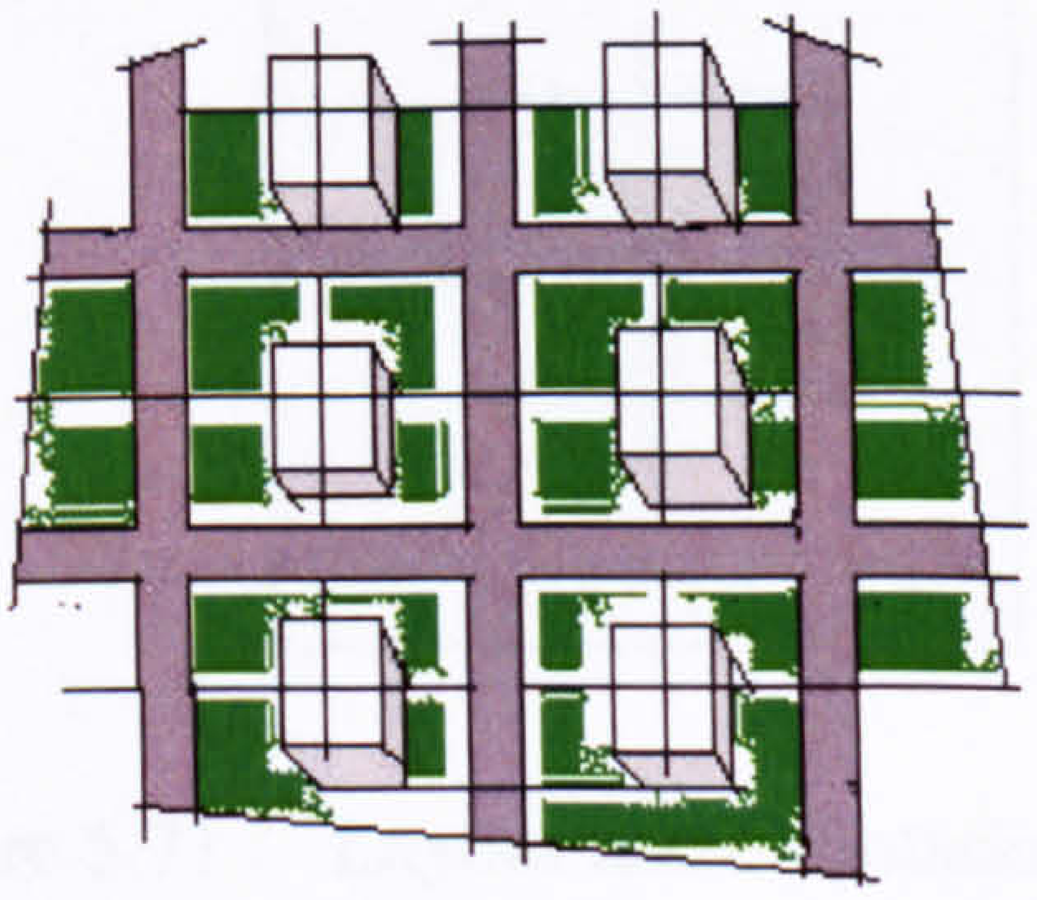
PAGE

NUMBERING

AS ORIGINAL

1-The planning fabric

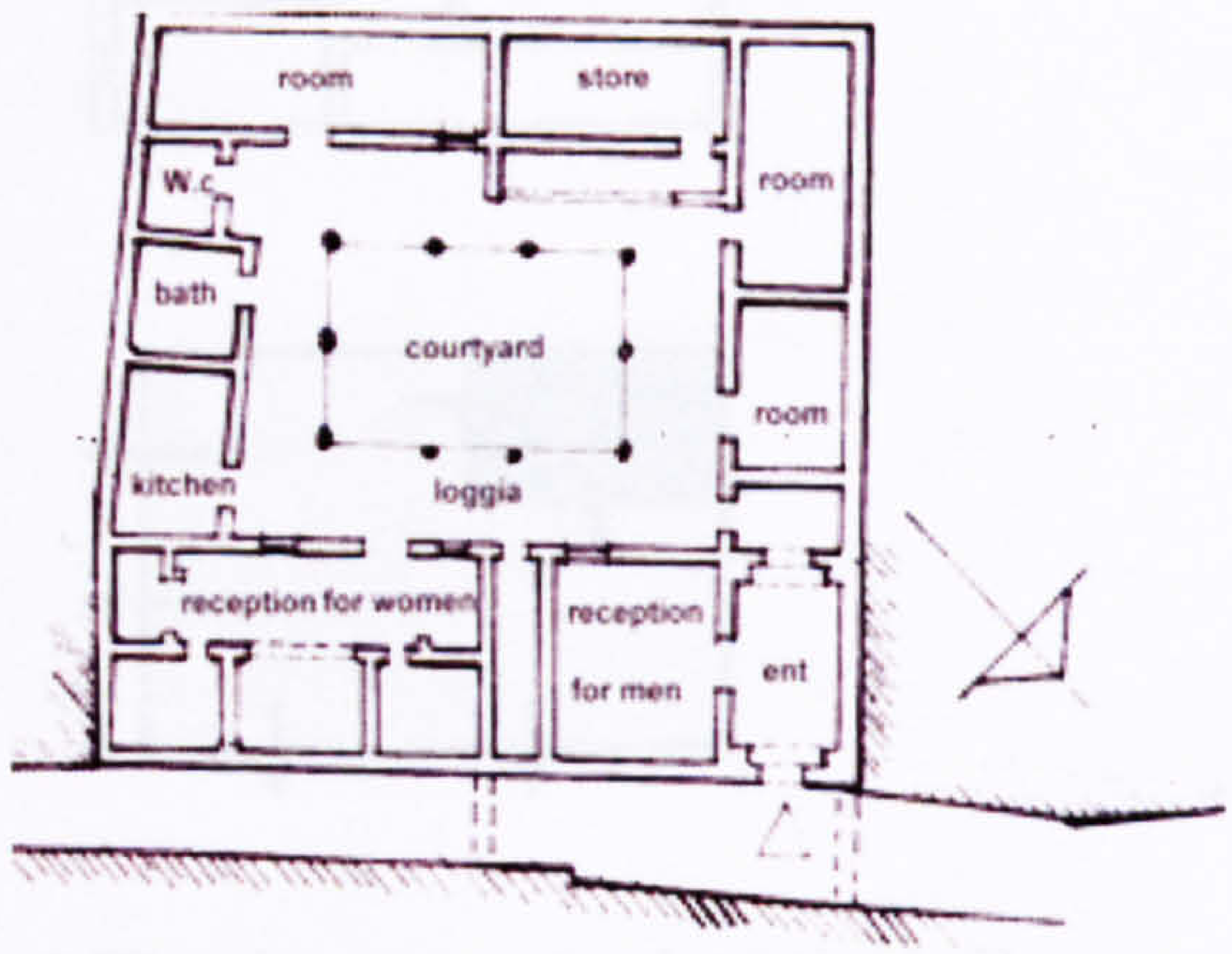
Traditional house	
The urban fabric in the old city of Tripoli is distinguished by its irregular narrow and partly covered alleyways. The system of these alleyways is hierarchical in its planning with regard to the function. Most of the streets of the traditional city are narrow and twisting, with sudden turns and slight curves. This fabric pattern of the old city and its street system encouraged social contact and relationships between residents and visitors. The vast majority of the plots were irregular in form and seem to overlap among them. They are clearly difficult to separate between the houses, as is evident in Figure (5.68)	   Figure 5.68 : Urban fabric in traditional area

Contemporary house	
The urban fabric in this period is distinguished by two types as follows: 1-The planning of the streets was based on a radial layout with a focal point (such as green squares). This system was established in the Italian period. See Figure (5.69); 2-The planning system was laid-out on a regular grid pattern with wide straight streets. Overall, planning laws caused the alterations to the urban fabric in the 20th century besides the technology imposed by the new way of life. The majority of pieces constructed homes were regular .and separated by streets, as displayed in Figure (5.70).	 Figure 5.69 : Urban fabric in colonial period   Figure 5.70 : Urban fabric in present period

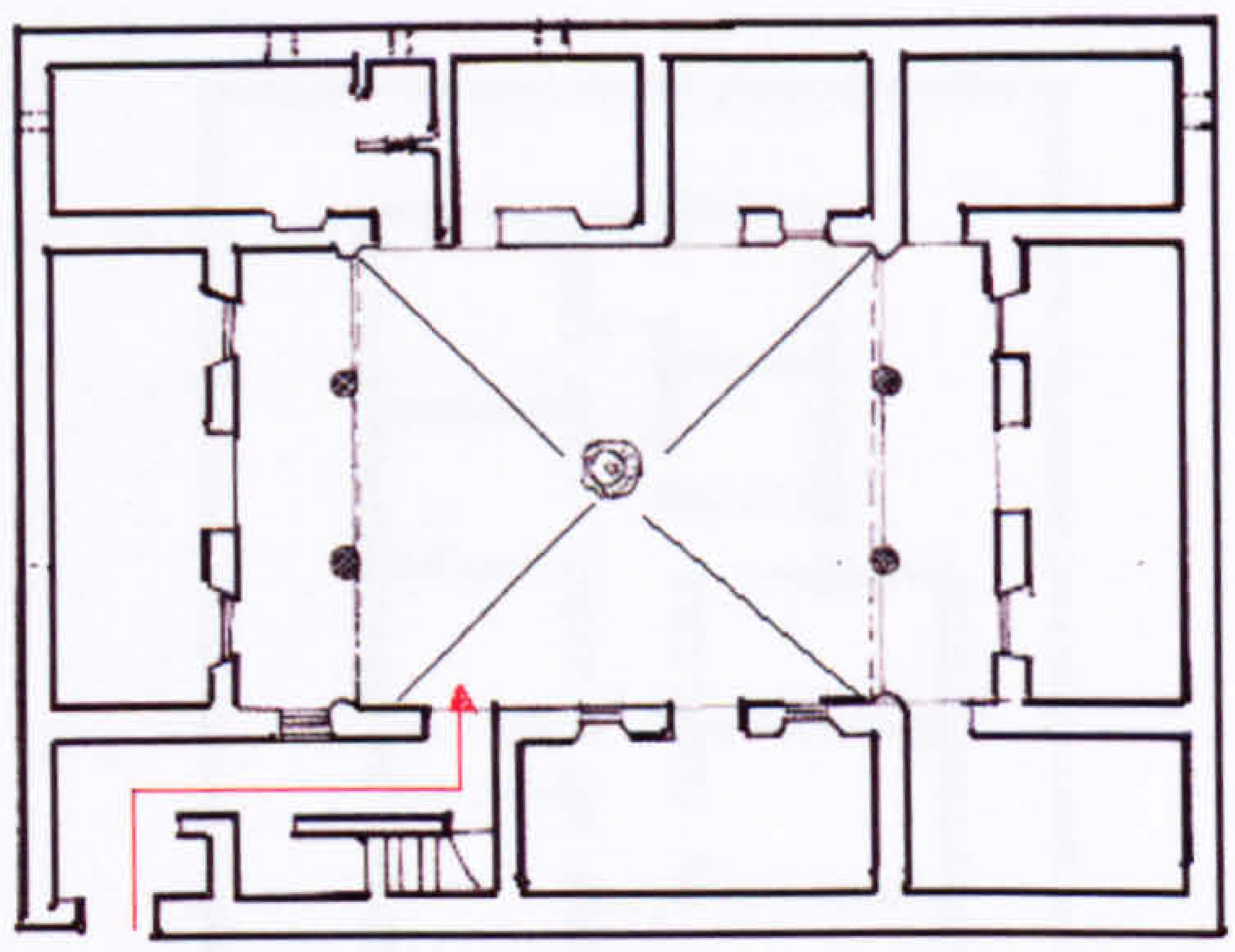
2- Layout and orientation of the house

Traditional house

Figure 5.71 shows the external walls of a house with inner courtyard devoid of any openings which creates a concentration of family life focused upon the centre of the house. This kind of house layout is ideal when emphasis on privacy is one of the most important factors of its design. This arrangement causes the orientation of the house to be inward looking .



Ground floor plan



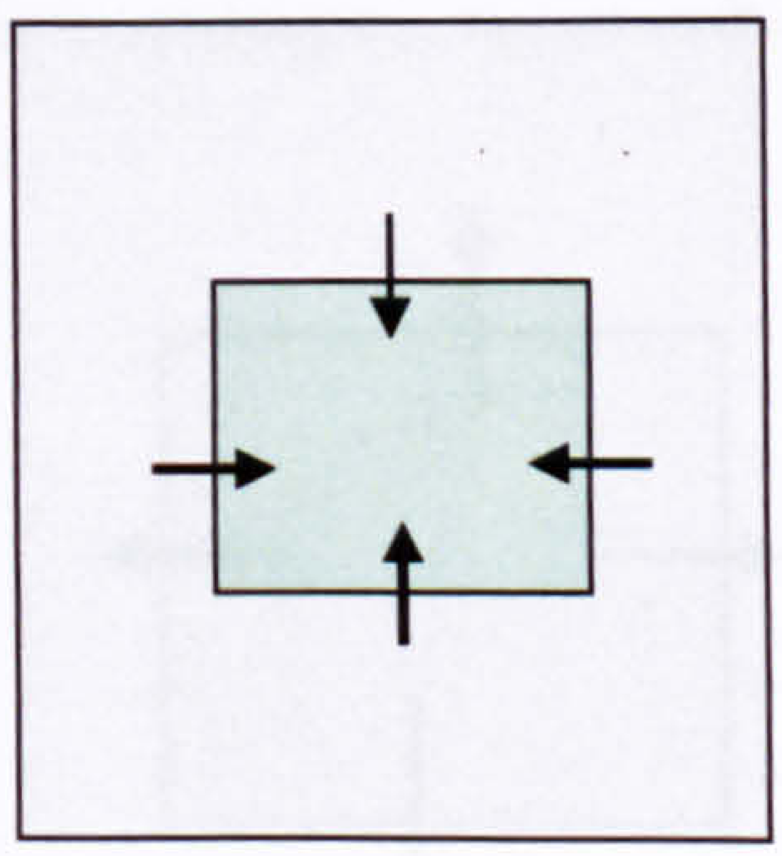


Figure 5.71 : Layout and orientation of the houses in the traditional phase

Contemporary house

During this period the layout and orientation of housing is divided into two phases:

1-The transitional phase:
This represents the western style, established by Italian occupation and the middle of the 1960s, when economic development and social change was dramatic, resulting in the growing desire of inhabitants to alter accommodation. So the architectural form organized the elements of the house around a central hall and the courtyard was moved to the rear part of the house, therefore, becoming less important. As well, some windows were positioned in the front wall facing the street Figure (5.72) .

2-The present phase:
This phase represents the period of the 80s and 90s. During this period new housing design opened out towards the street and was surrounded by open spaces that included gardens. In this stage of change, urbanised life is expressed by the orientation of the houses being outward looking. The courtyard disappeared and was replaced by a covered hall or central corridor, and windows opened outwards. Verandas, balconies and terraces at the perimeter of the house, were also outward looking. Such characteristics can be found in villas and flats. See Figure (5.73).

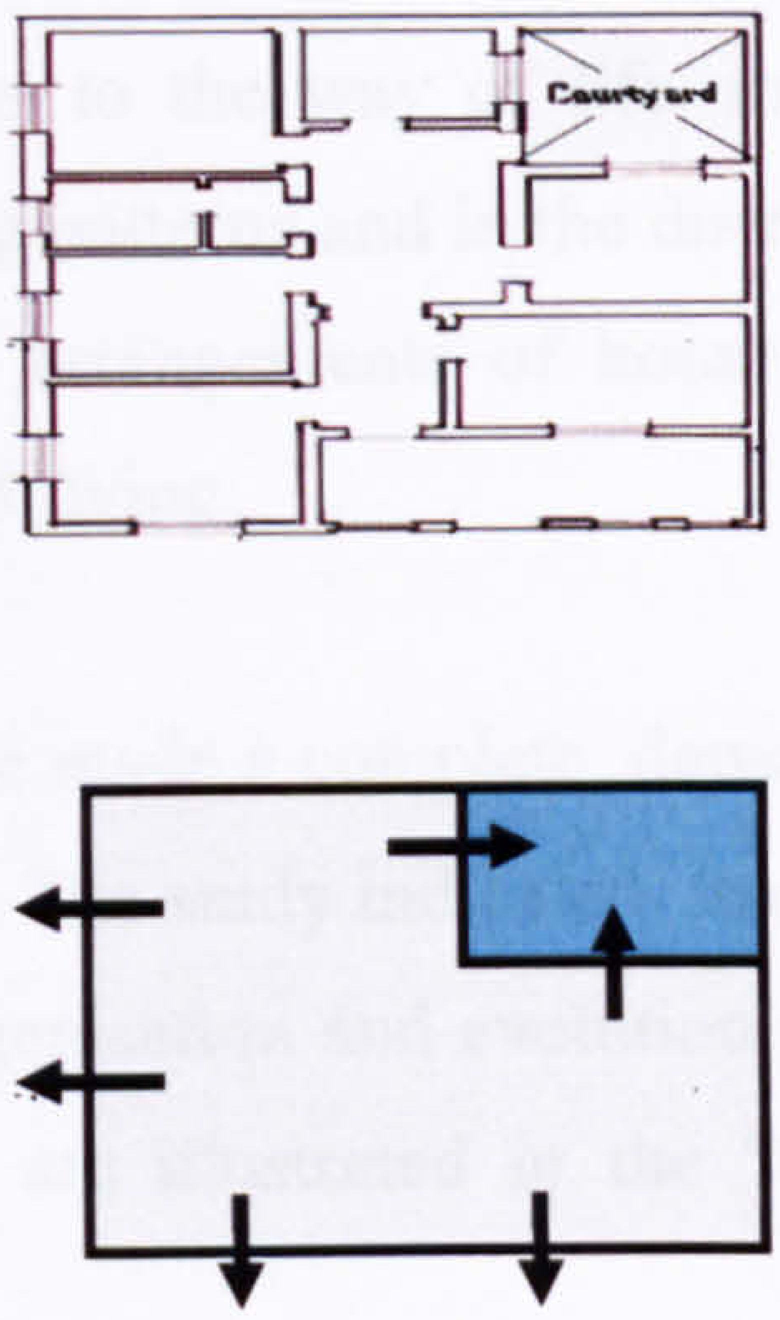


Figure 5.72 : Layout and orientation of houses in transitional phase

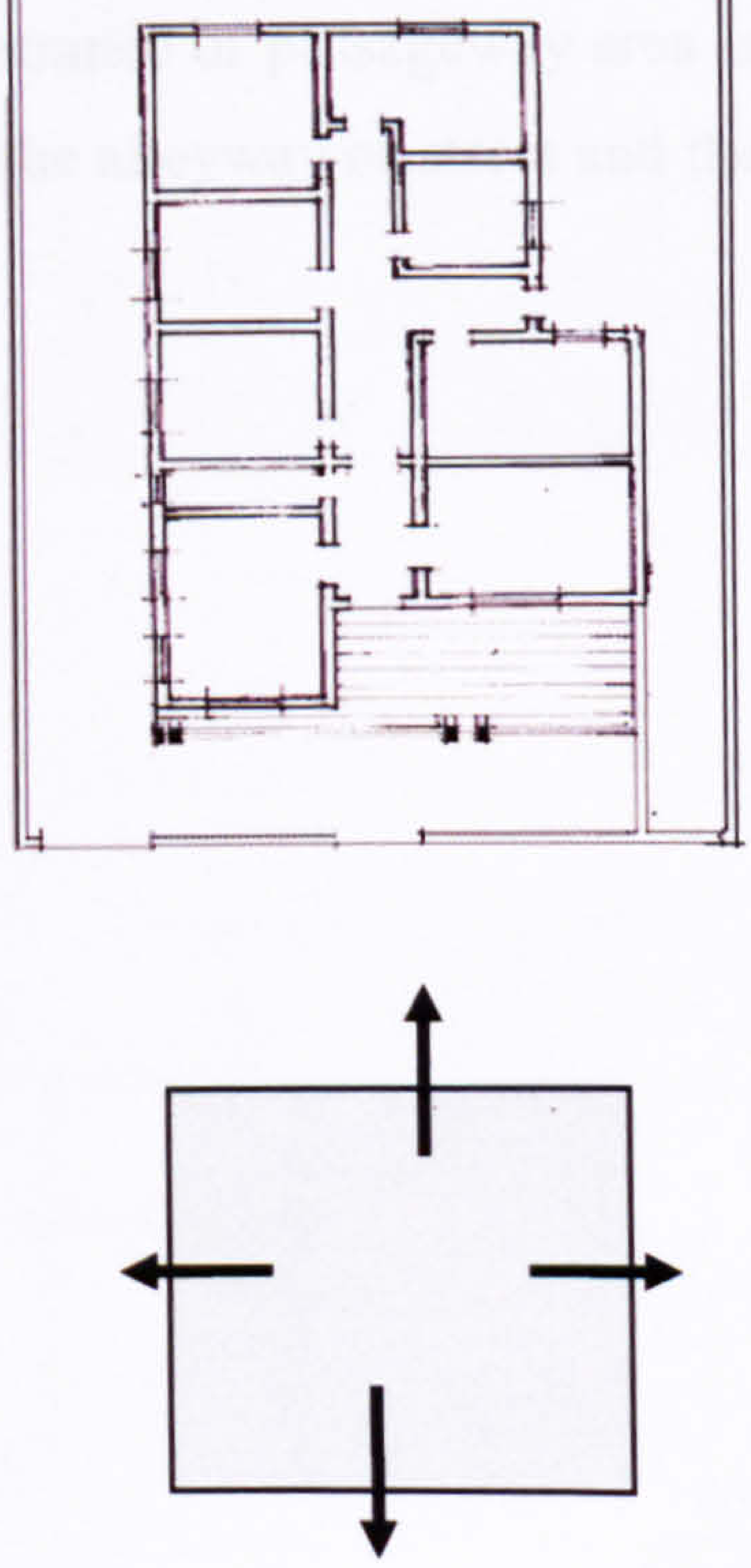


Figure 5.73 : Layout and orientation of houses in present phase

3 -The internal arrangements

The activities of a family in the modern house are dissimilar to those of the past. These differences have been caused by alterations to the way of life, methods of dealing with people, use of time, eating and sleeping patterns and in the distribution of roles amongst family members. As a result, the arrangements of house elements responded accordingly to meet the changed mode of living.

The alterations that occurred in Libyan society have made a complete departure from the design concept of a house in the former period. The study indicated that a variety of house types have developed over time. The organisation and evolution process of each of the housing elements at various phases are illustrated in the Tables that follow.

a) The main entrance area

The Separation between male and female is according to religious obligations and respect for social-cultural traditions to maintain privacy. It can be achieved by the use of various devices in the design of a house. The main entrance or passageway area is one such device utilised to create a buffer zone between the alleyway or street and the house interior.

The main entrance area (El-Segefa or passageway)

Traditional house	Contemporary house
Figure 5.74 demonstrates the shape of the entrance area in the traditional courtyard which takes an L- shape leading to a corner of the courtyard. The male room is entered through the passageway. The entrance is facing a blind wall and does not open directly onto the courtyard.	In the contemporary house, the main entrance leads directly to the hall which guides straight to a swing-door for access to the interior of the house. This door is mostly closed when the main door is open. The position of the male room is arrangement similarly to that in a courtyard house. Most entrances in contemporary houses are protected by a veranda. Figure (5.75) displays the type of main entrance in question.

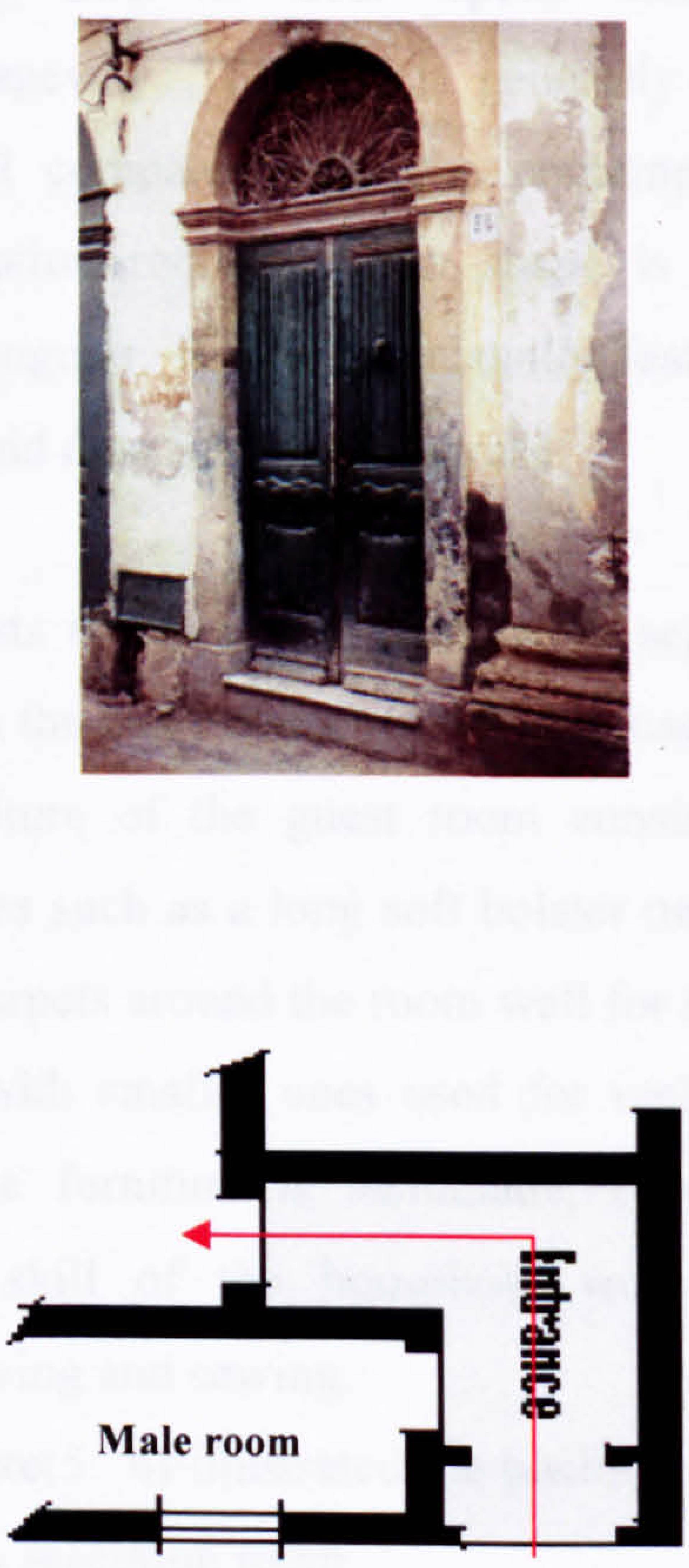


Figure 5.74 : The entrance area in a traditional courtyard house

Figure 5.75 : The entrance area in a contemporary house

b) The Male reception or "*El-Marboaa*"

Libyan society is no different to other Arab societies in being renowned for its hospitality. According to religious and traditional teaching, the male reception room should give attention to its position to offer separation between other reception rooms and the remaining elements of a house.

Traditional house

The male reception room (*El-Marboaa)* in the traditional courtyard house has its location next to the main entrance of the house and its door opens into the passageway. The size is generally quite small compared with the contemporary reception room and the shape is often rectangular. It does not usually feature a second door into the courtyard.

Guests therefore are completely separate from the other elements of the house. The furniture of the guest room consists of pieces such as a long soft bolster on mats or carpets around the room wall for sitting on with smaller ones used for reclining. Some furniture is handmade, reflecting the skill of the household women in weaving and sewing.

Figure(5.76) illustrated the position of the male reception room.

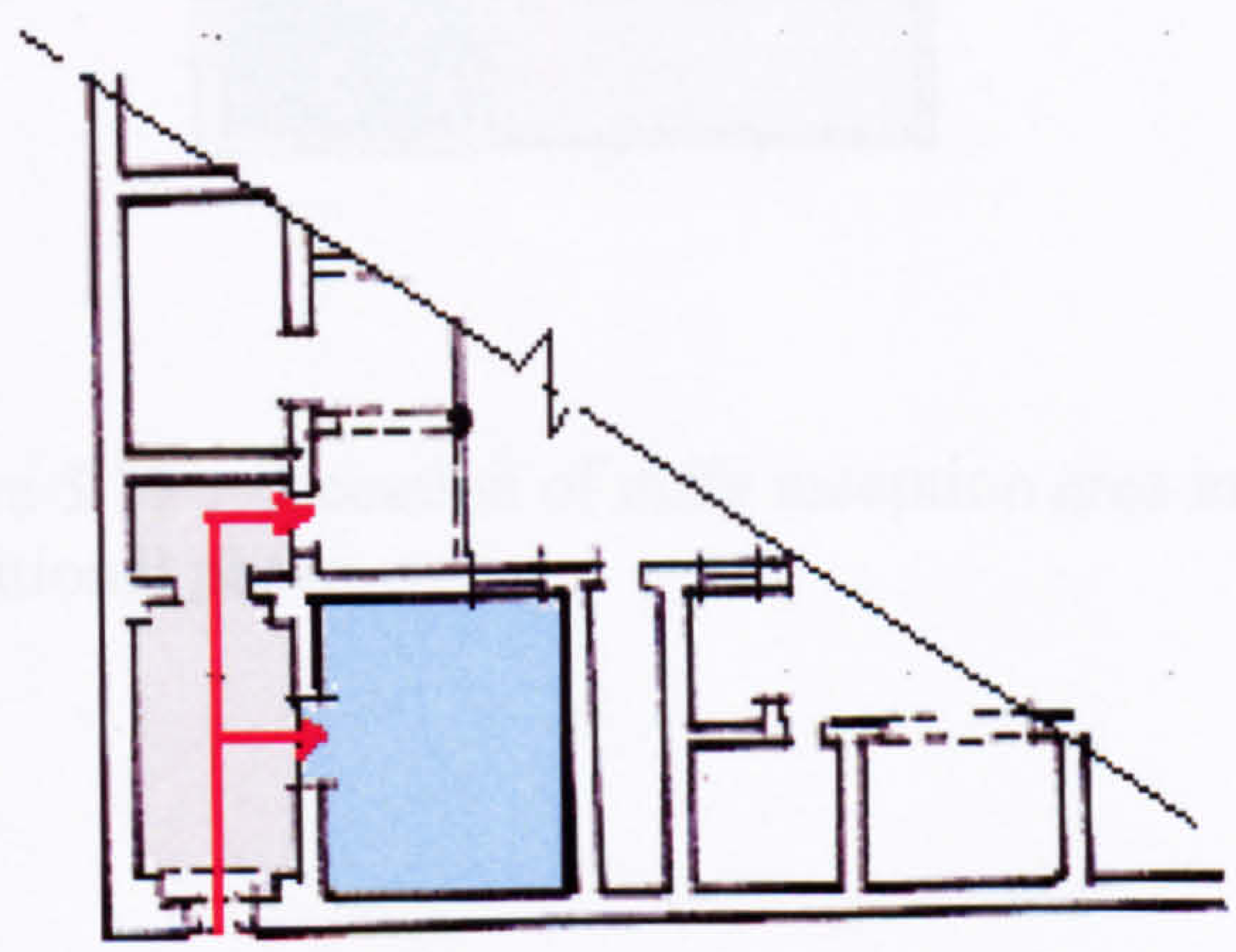
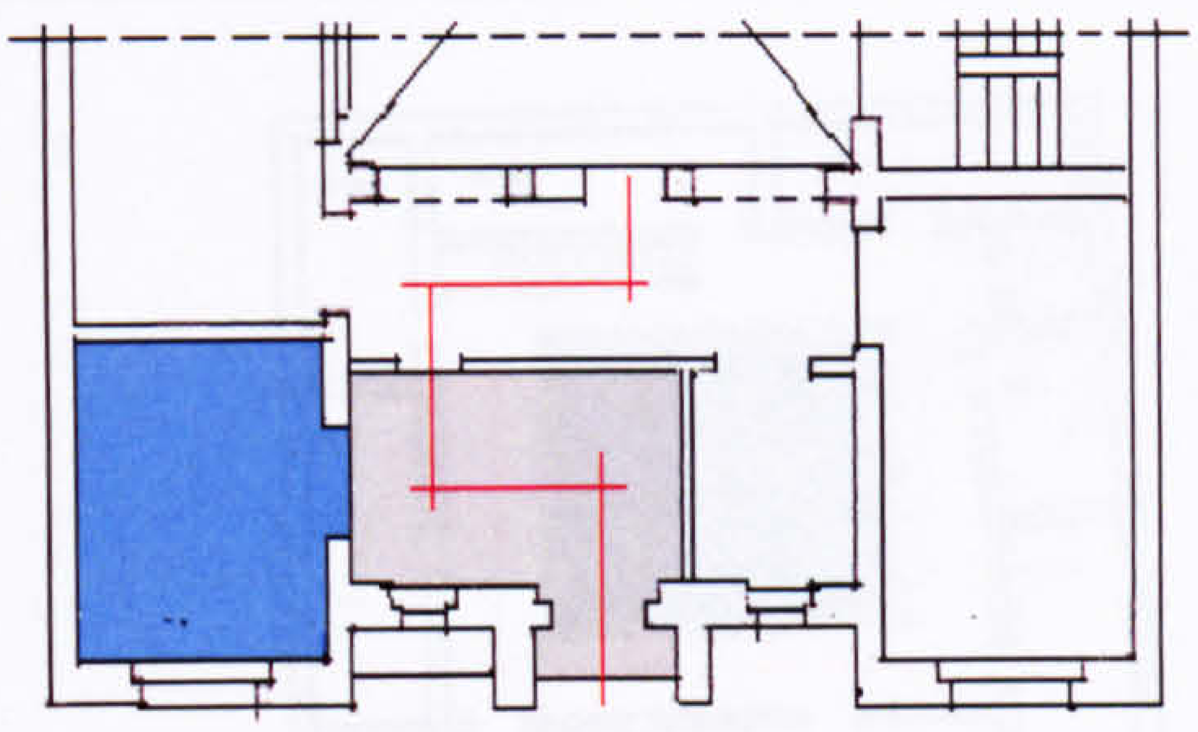
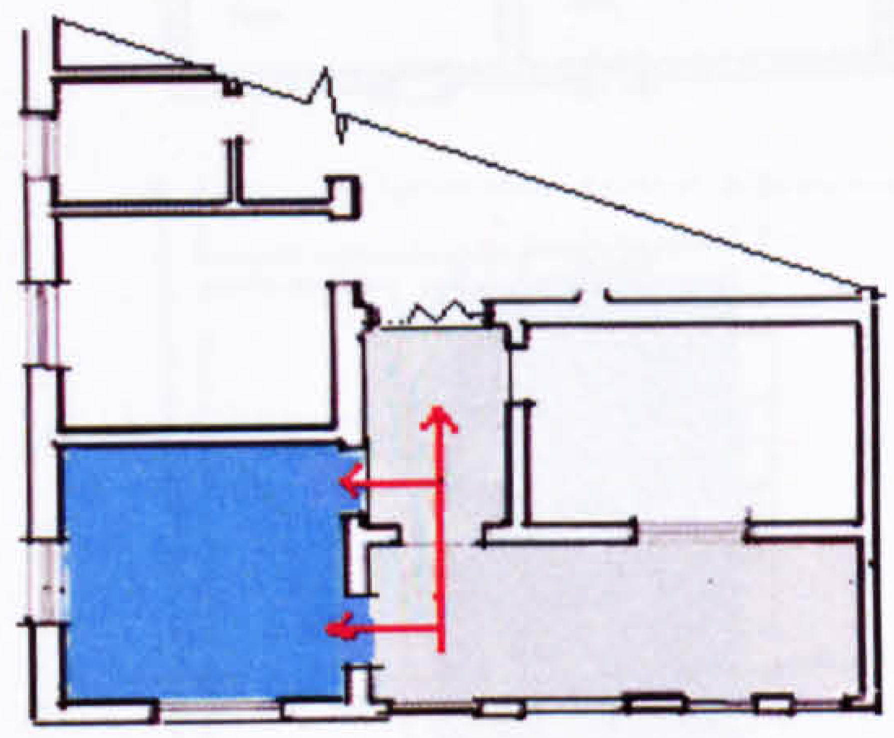
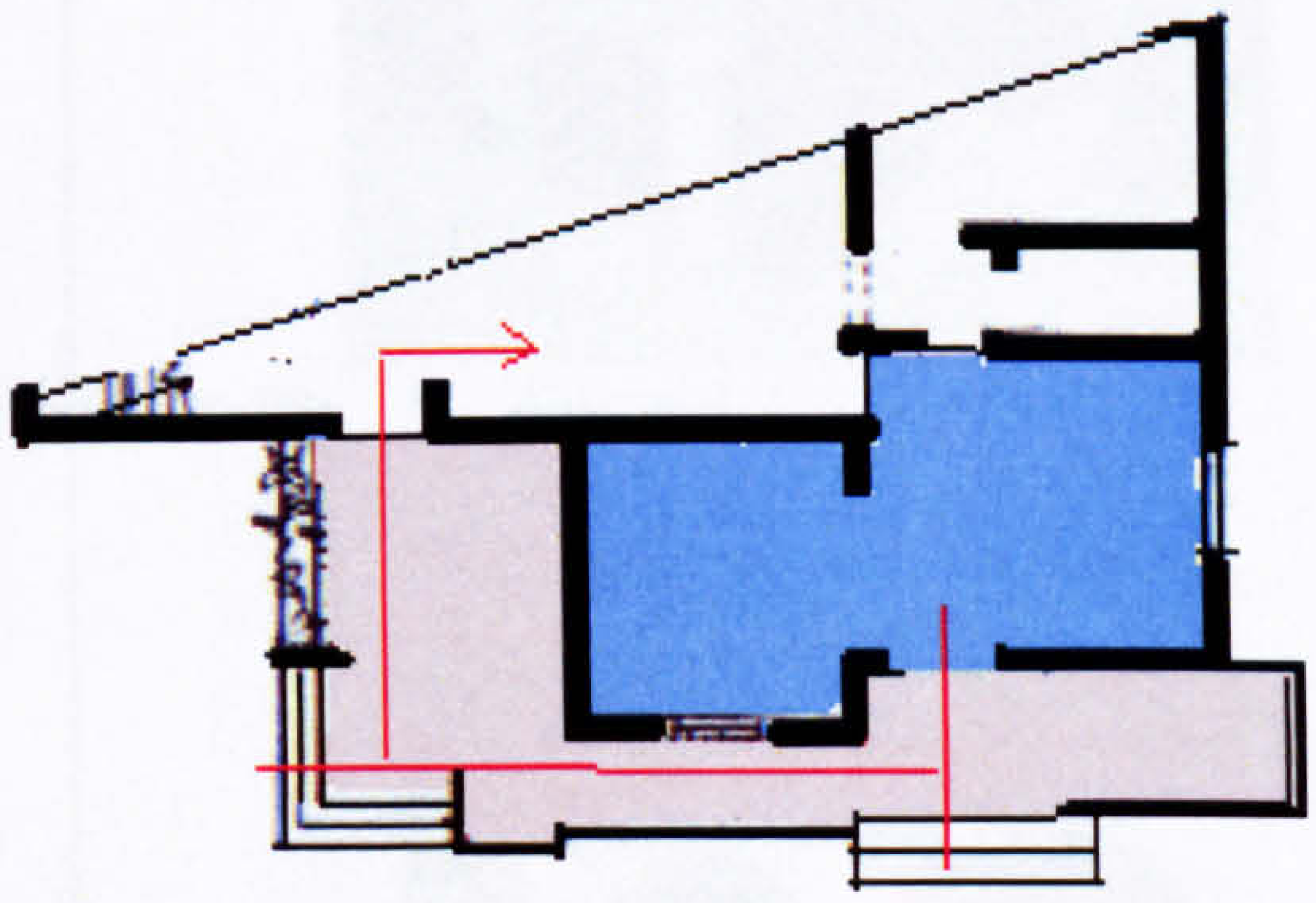


Figure 5.76 : Location of male reception area in relation to the entrance

	Contemporary house
The male reception room in the contemporary house has remained almost in the same location as previously. However, the shape and area has changed. It's size has become larger and its shape rectangular and, in some houses, consists of two spaces: one a furnished eastern salon, and the other a western salon provided with its own washing and toilet facilities. See Appendix (7). Typically, the male reception room is the most decorated space in the house and contains the finest furniture items according to their functions. Nowadays, the contemporary reception room usually has two doors. one is accessed from outside via the veranda, and the other opens into the interior house or to a lobby . In larger residences, this is totally separated from the house with all service rooms attached, but with direct access from the street. See Figures (5.77 and 5.78).	  Figure 5.77 : Location of male reception area in transitional phase  Figure 5.78 : Location of male reception area in the present phase

C) Courtyard

Traditional house

In this period, the courtyard played an important role to provide the families (particularly women) with privacy throughout the day, and as protection from the climate. This demonstrates its suitability for the hot weather, because it helped circulate the air and stimulate the required air currents. Figure (5.79) shows the courtyard in a traditional house.

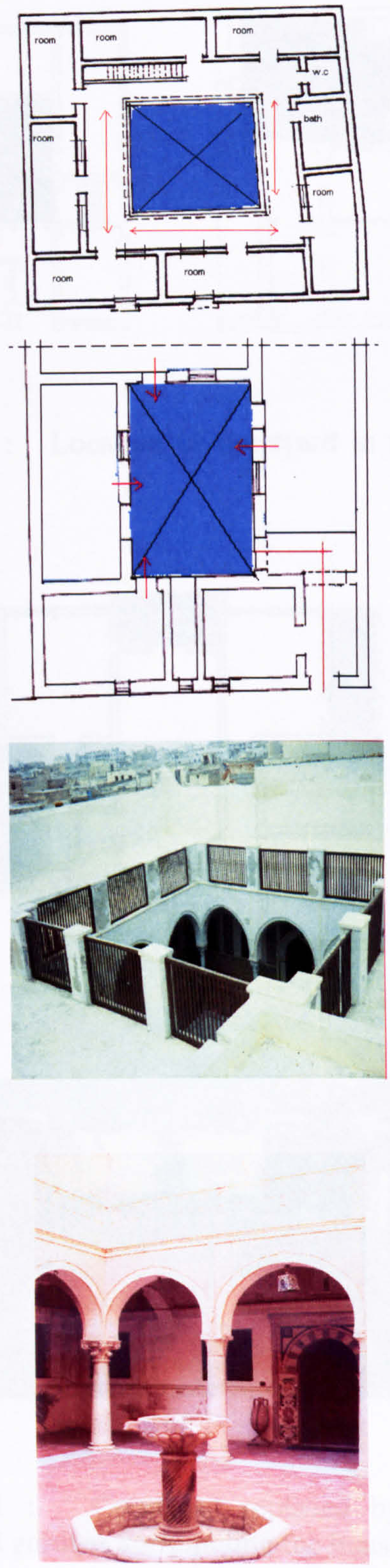
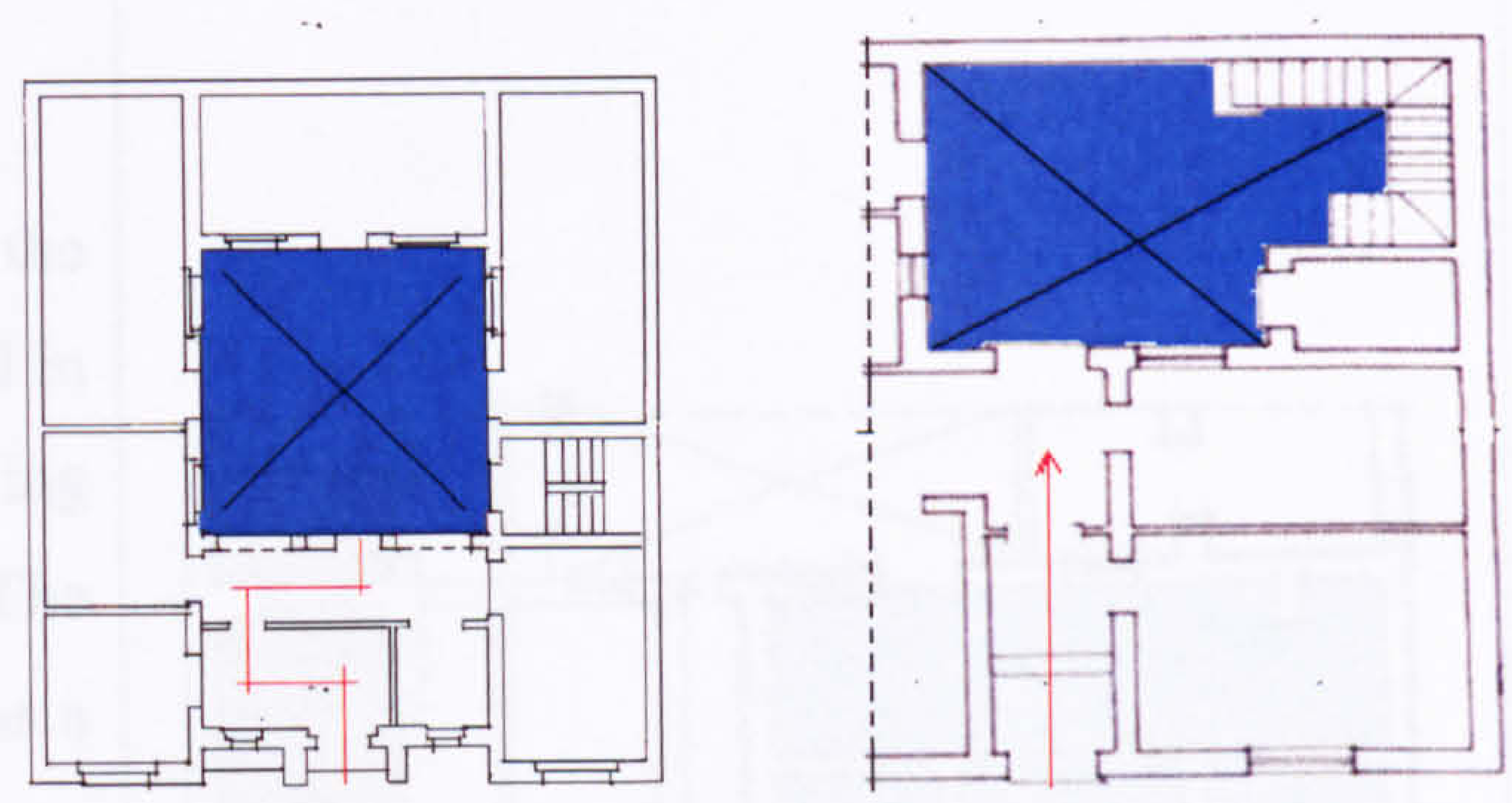


Figure 5.79 : The location of the courtyard

<table>
<tr><th colspan="2">Contemporary house</th></tr>
<tr>
<td>From the figures, it can be noted that the original form of the courtyard has changed over the years, and the open space is now replaced by veranda, balconies terraces and gardens. However, before the courtyard totally disappeared in the late 70s, its role had already shrunk, as witnessed in the alternate courtyard house, where the courtyard is replaced by a central covered hall and moved to the rear of the house. In the countryside, the central court has been covered with a roof higher than that of the remainder of the house. See Figures(5.80 and 5.81)</td>
<td>
Figure5.80 : Location of courtyard in transitional phase

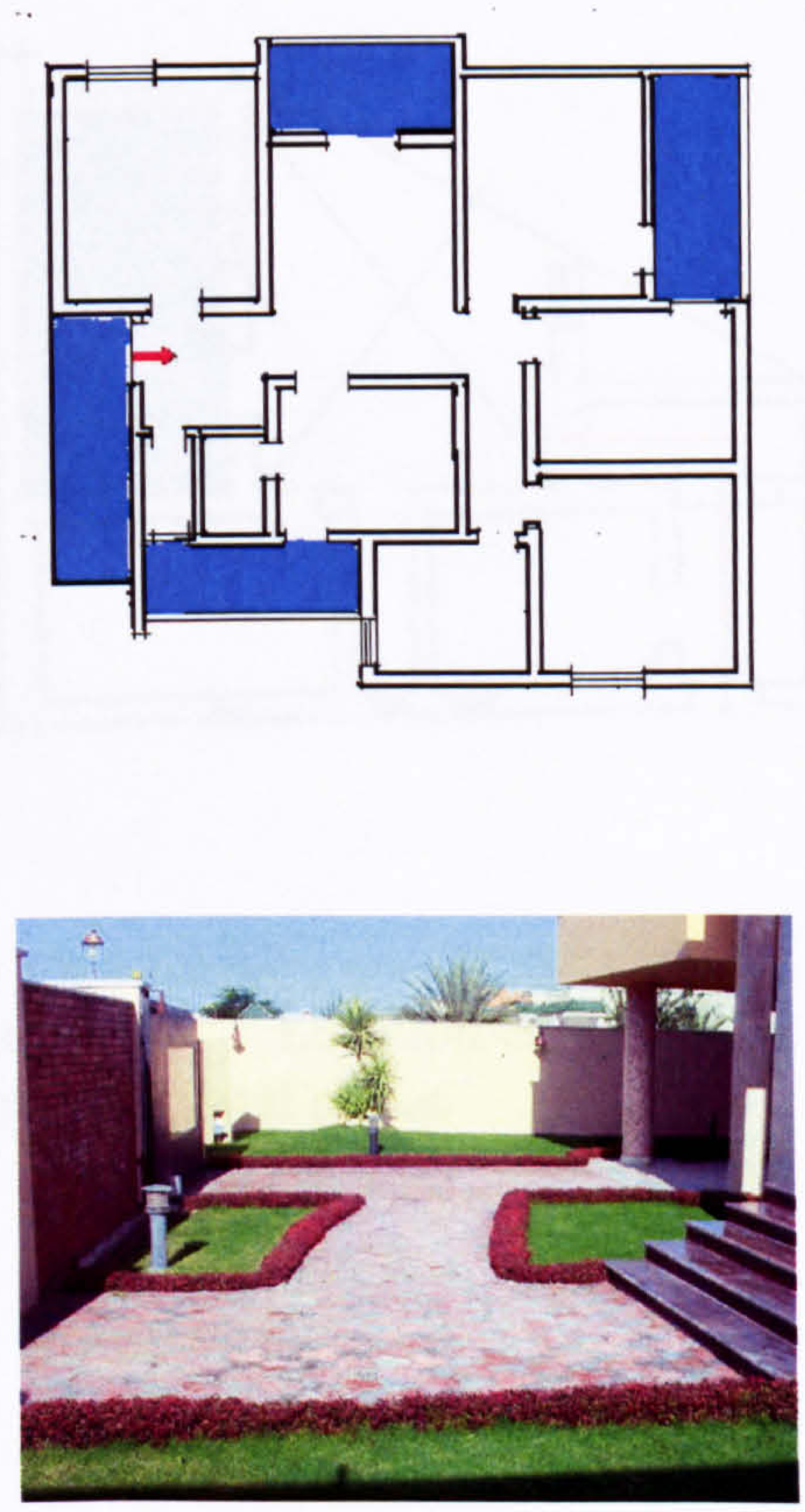
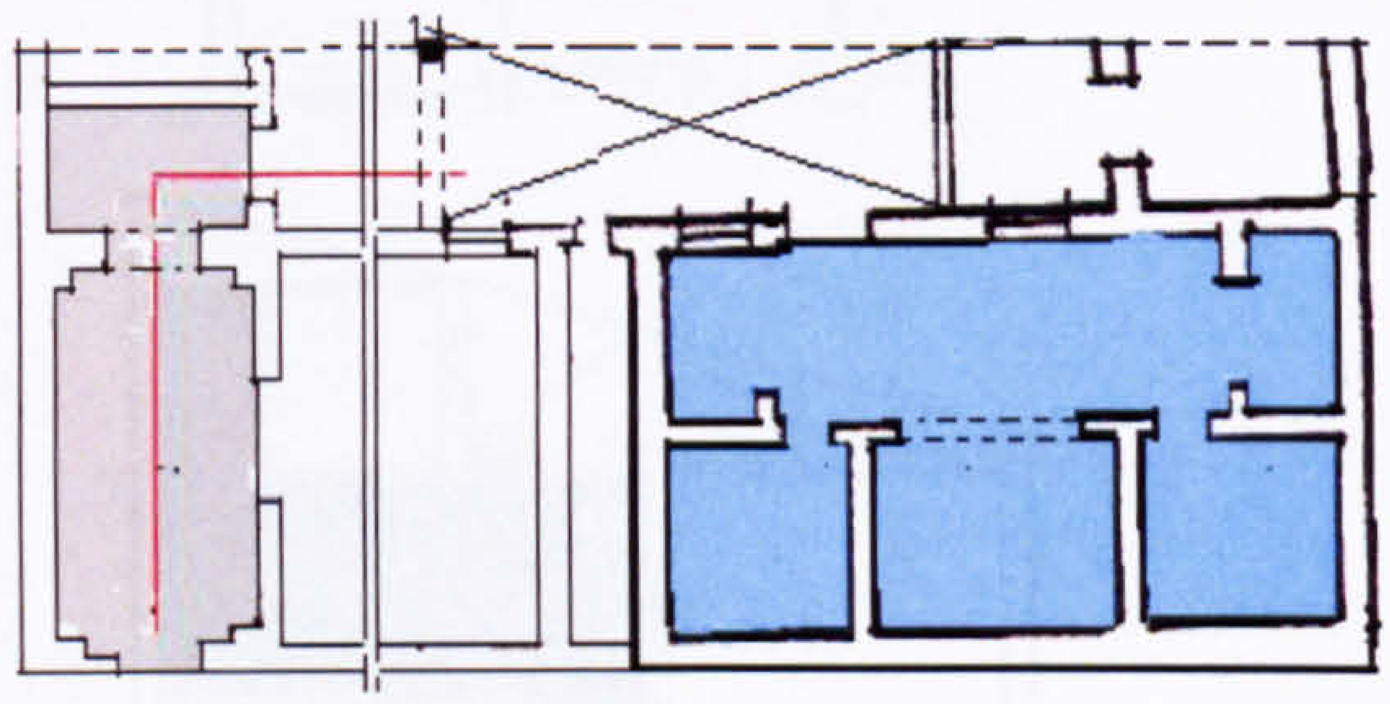
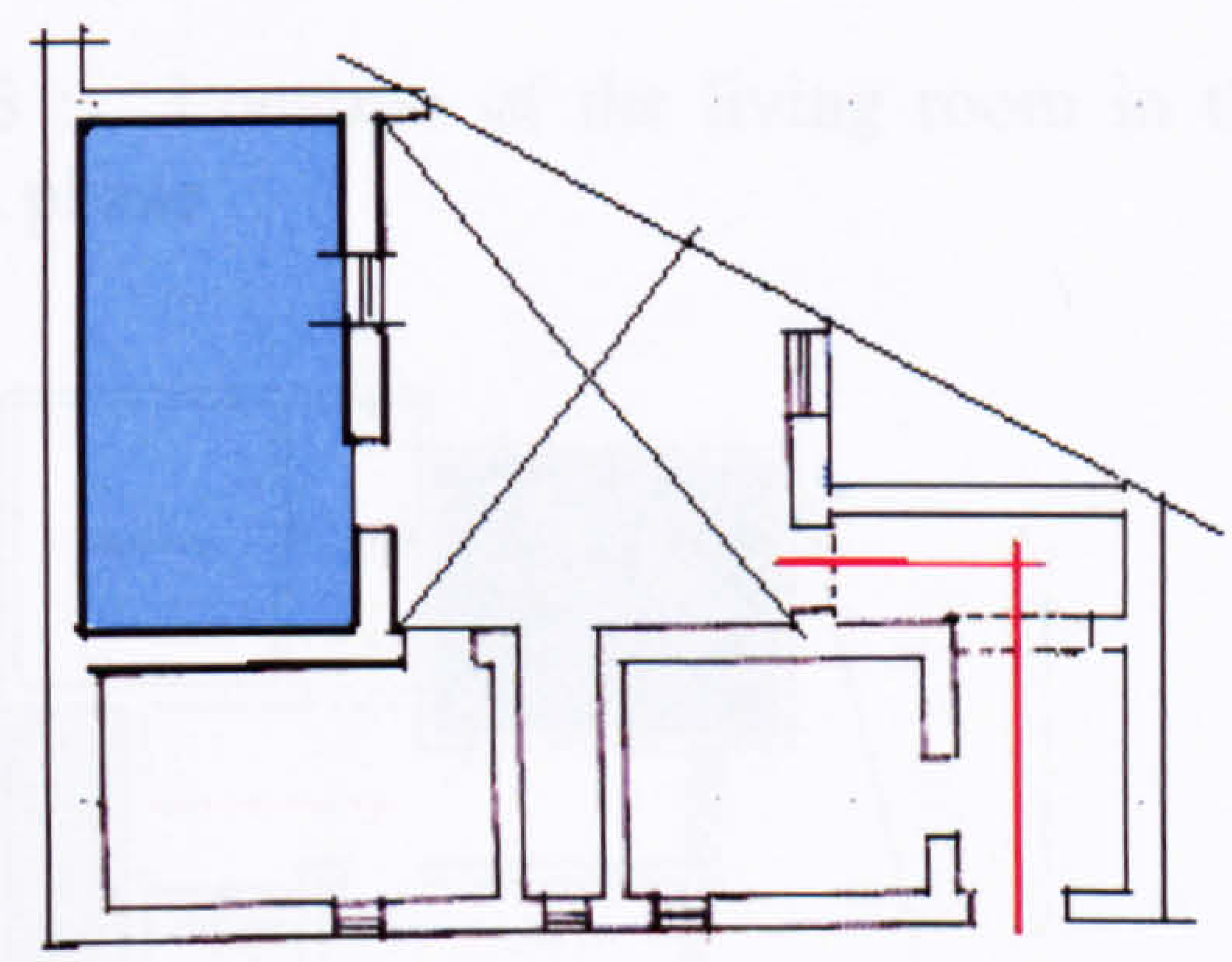



Figure 5.81 : Courtyard replaced by balconies terraces and gardens surrounding the house</td>
</tr>
</table>

d) Living Room

Traditional house	
From Figure 5.82 it can be observed that the living room (*Hugrat Al-Qabu*) and courtyard in the traditional courtyard house were acting jointly as one space for many functions. The feature of this room is that which usually has a multipurpose function in the day, such as eating and sitting for the family, besides its use by visiting neighbours and relatives in addition to female guests.	  Figure 5.82 : Location of the living room in the traditional phase

Contemporary house

The living room in the contemporary house has become the focal point where the family usually sits, eats and receives relatives. Furniture used, whether traditional or western, depends upon family circumstances as well as use of space for family gathering to watch television, or as children's a playing area.

In terms of function, this room is similar to the *Hugrat Al-Qabu* of the traditional courtyard house.

Female guests have a special room which is highly decorated and contains the best furniture. See (Appendix 7). In the transitional stage, the covered hall is used as the family's living room and also as a multi-function space. Figures (5-83 and 5.84).

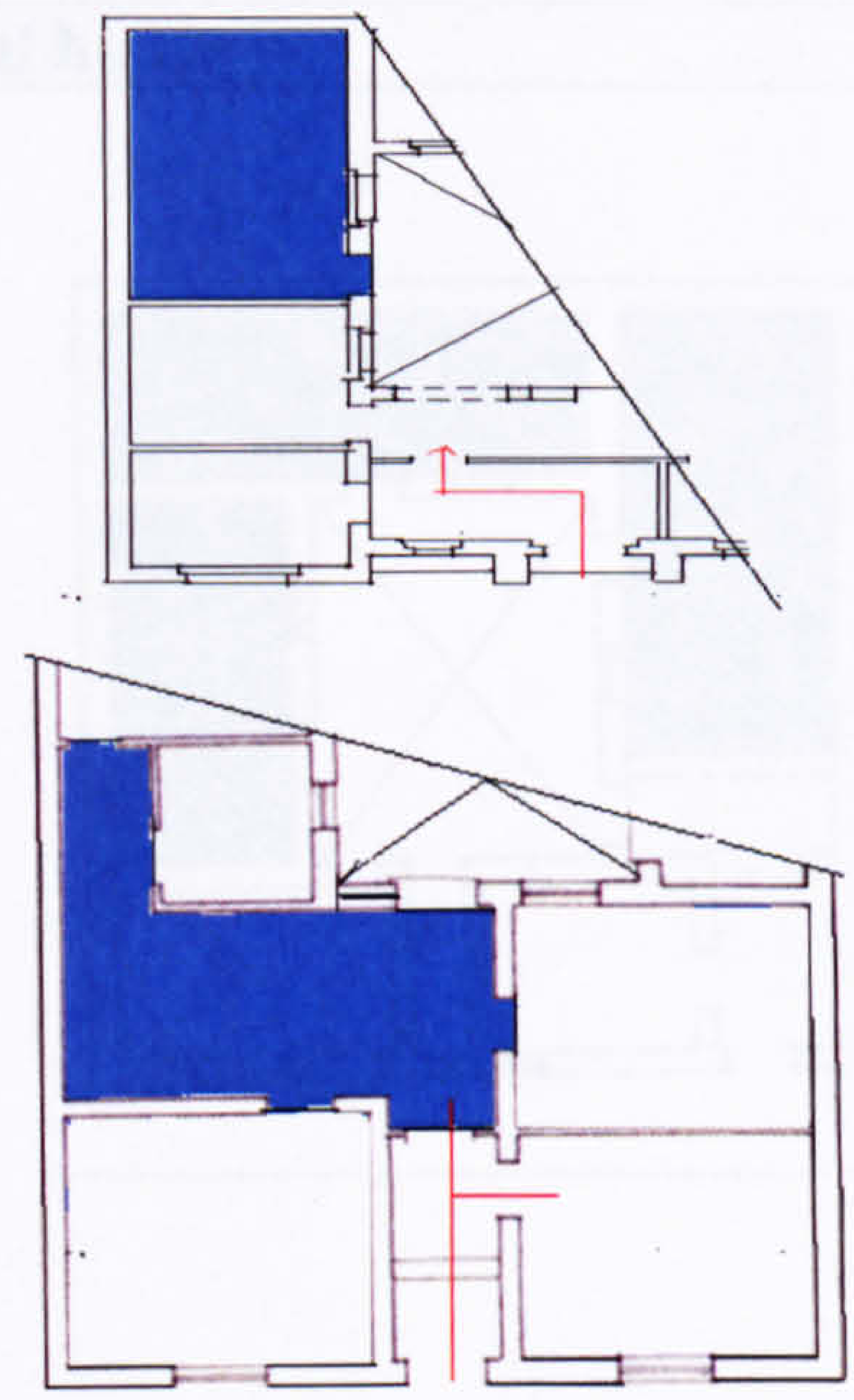


Figure 5.83 : Location of the living room in the transitional phase

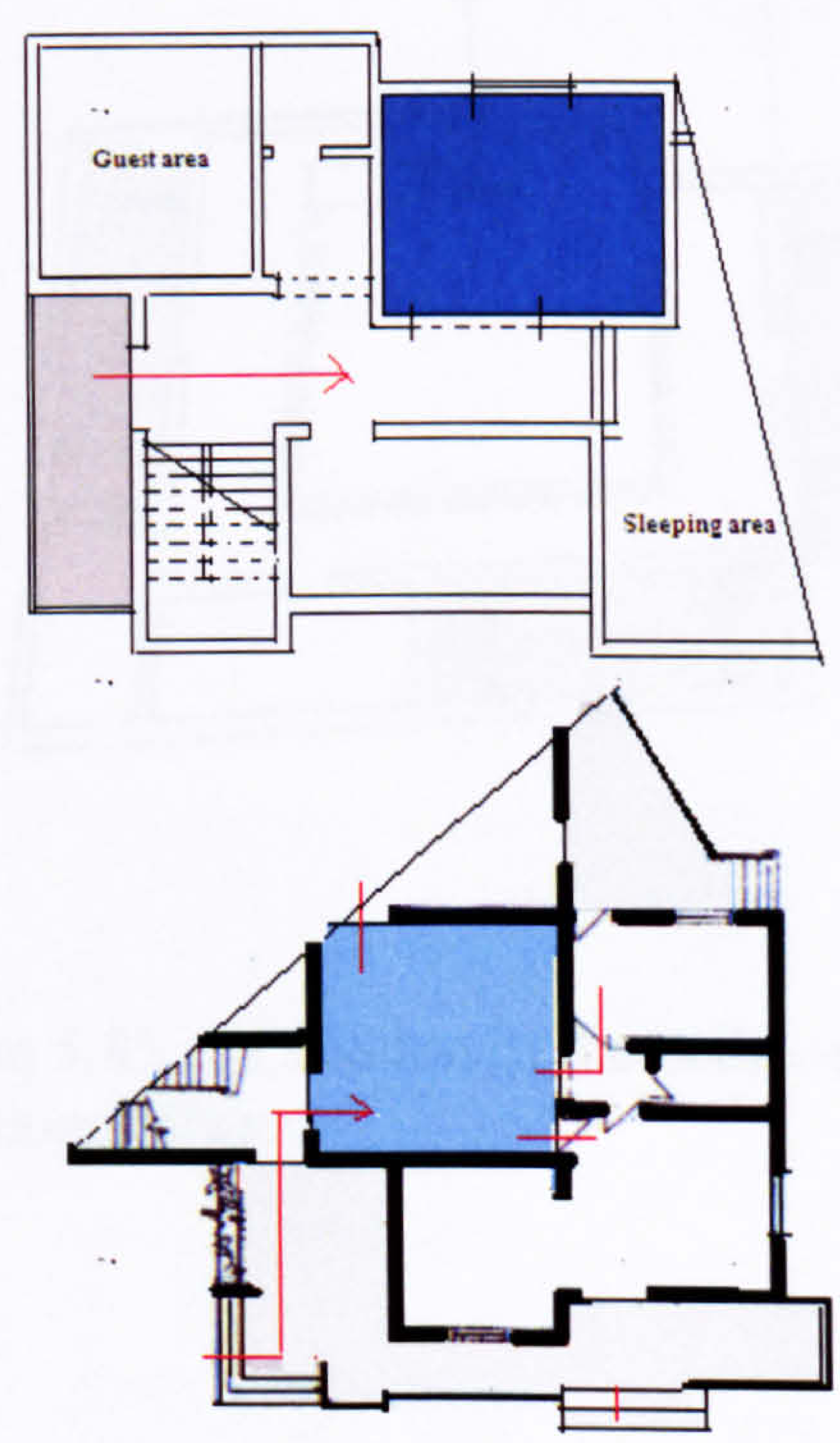


Figure 5.84 : Location of the living room in the present phase

E) Bedrooms or *Hujraht El-Naume*

Traditional house

Bedrooms in the traditional house surround the courtyard and are separated from the male reception room. According to construction methods and type of building materials the shape of the room is rectangular with a central doorway in the form of an arch next to which there is usually two windows facing the courtyard with a grilled covering. The bedroom furniture consists of the couple's bed, (*Sedda*) which is made from wood or brick an one side of the room.

In a two-storey courtyard house, the bedrooms would be located on the upper floor with screened windows opening onto the street. The number of rooms depends on family size and plot area. Figure(5.85).

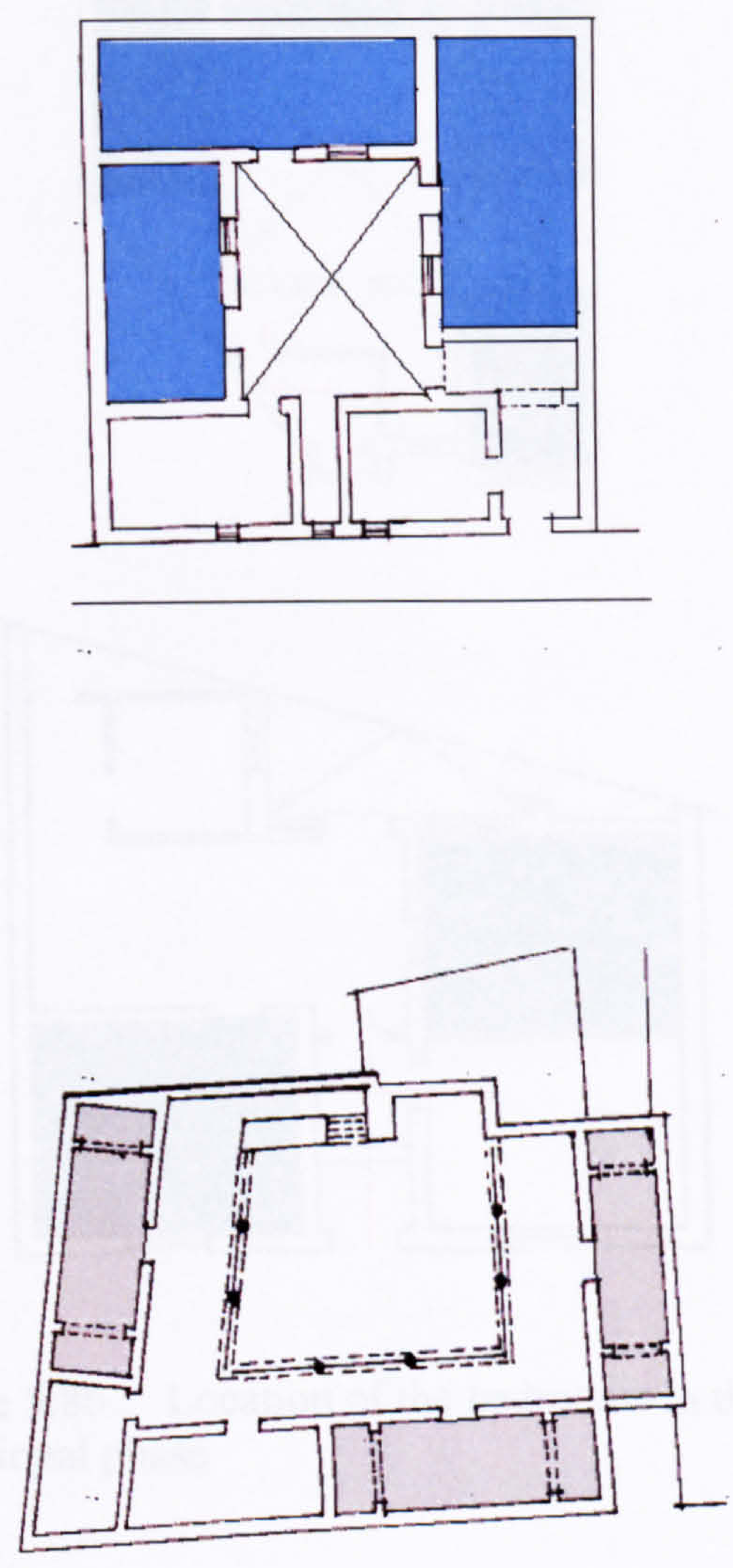


Figure 5.85 : Location of the bedrooms in traditional phase

Contemporary house

During the transitional phase, bedrooms are all grouped around the central covered hall as well as there being no specific shape to the bedrooms. These could be used for multi-functional purposes throughout a day except for the master bedroom.

In the contemporary phase, bedrooms of the houses of the 80s and 90s are located in the private suite, particularly if the house was two storeys and contain at least three bedrooms: one room for parents with a bathroom and office, two rooms for boys with a bathroom and one for girls with a bathroom. The shape is nearly square to meet the needs of modern furniture. See Figures(5.86 and 5.87).

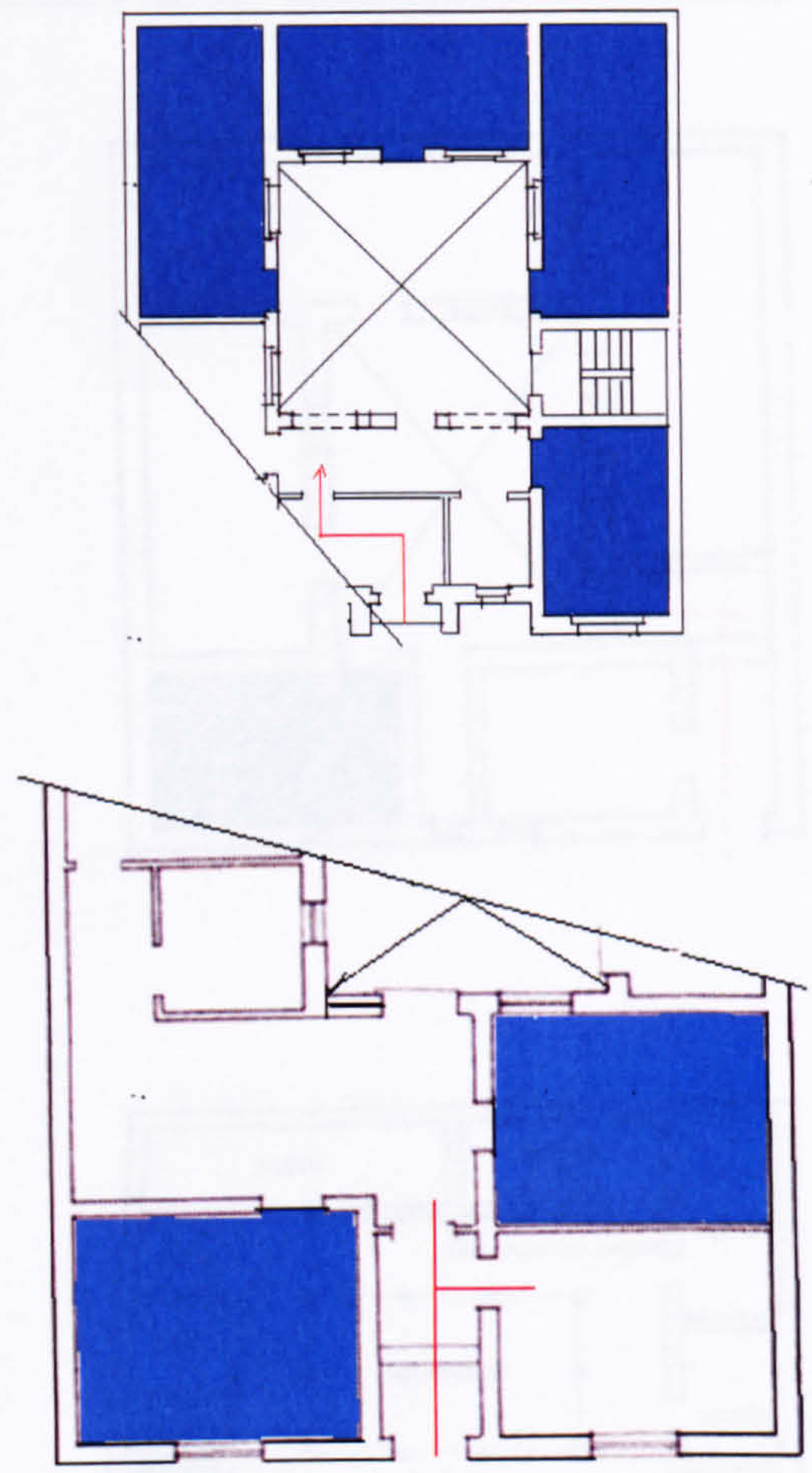


Figure 5.86 : Location of the bedrooms in the transitional phase

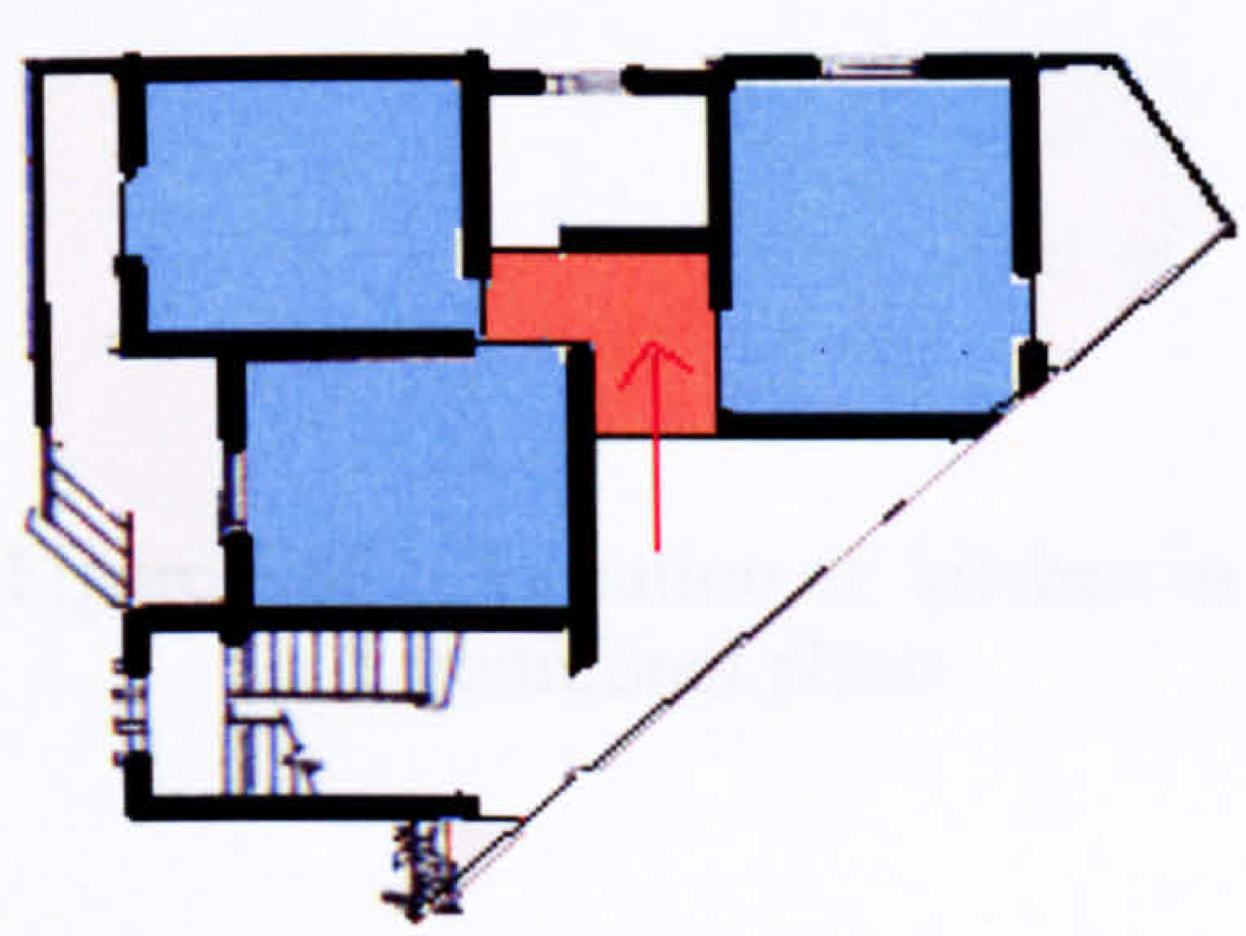
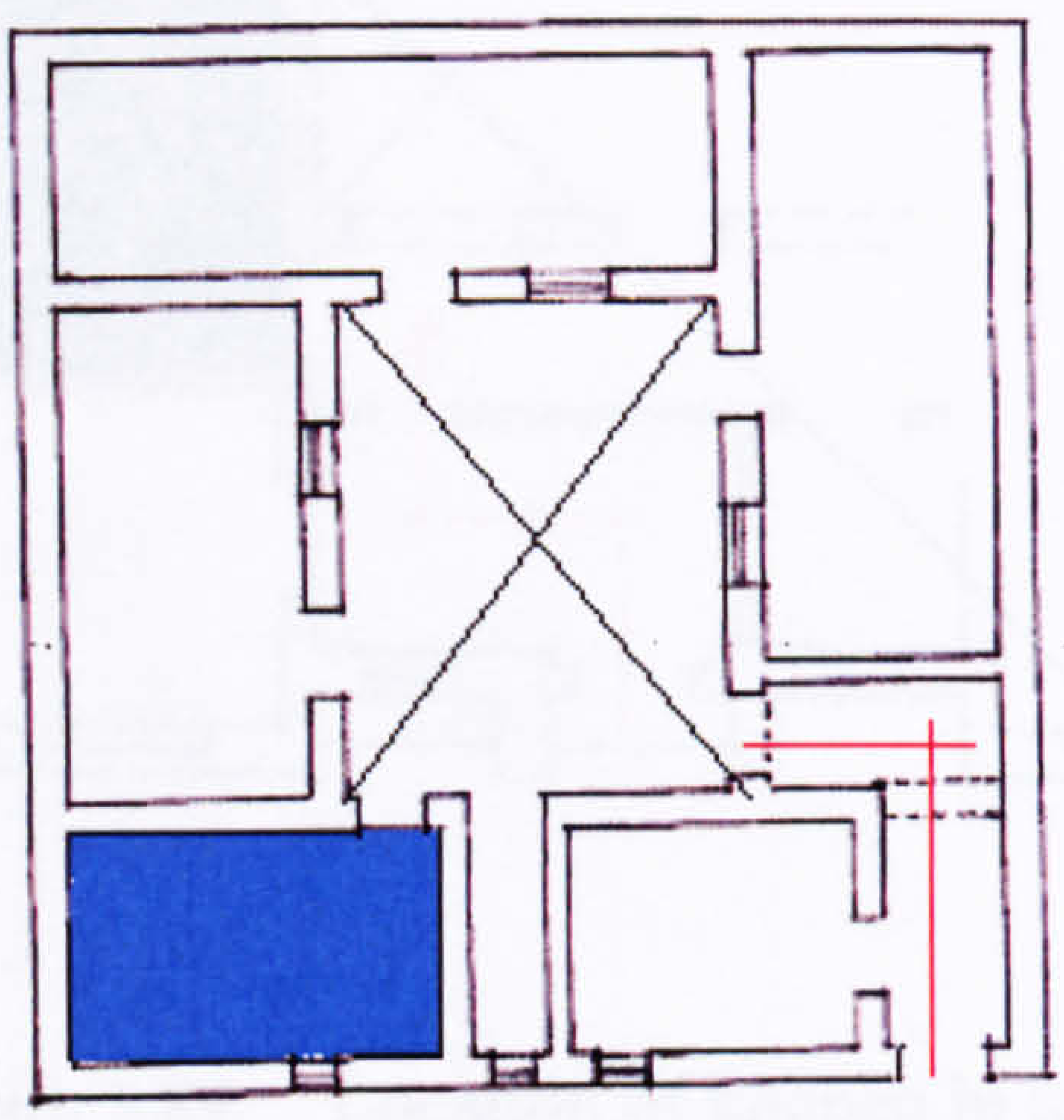
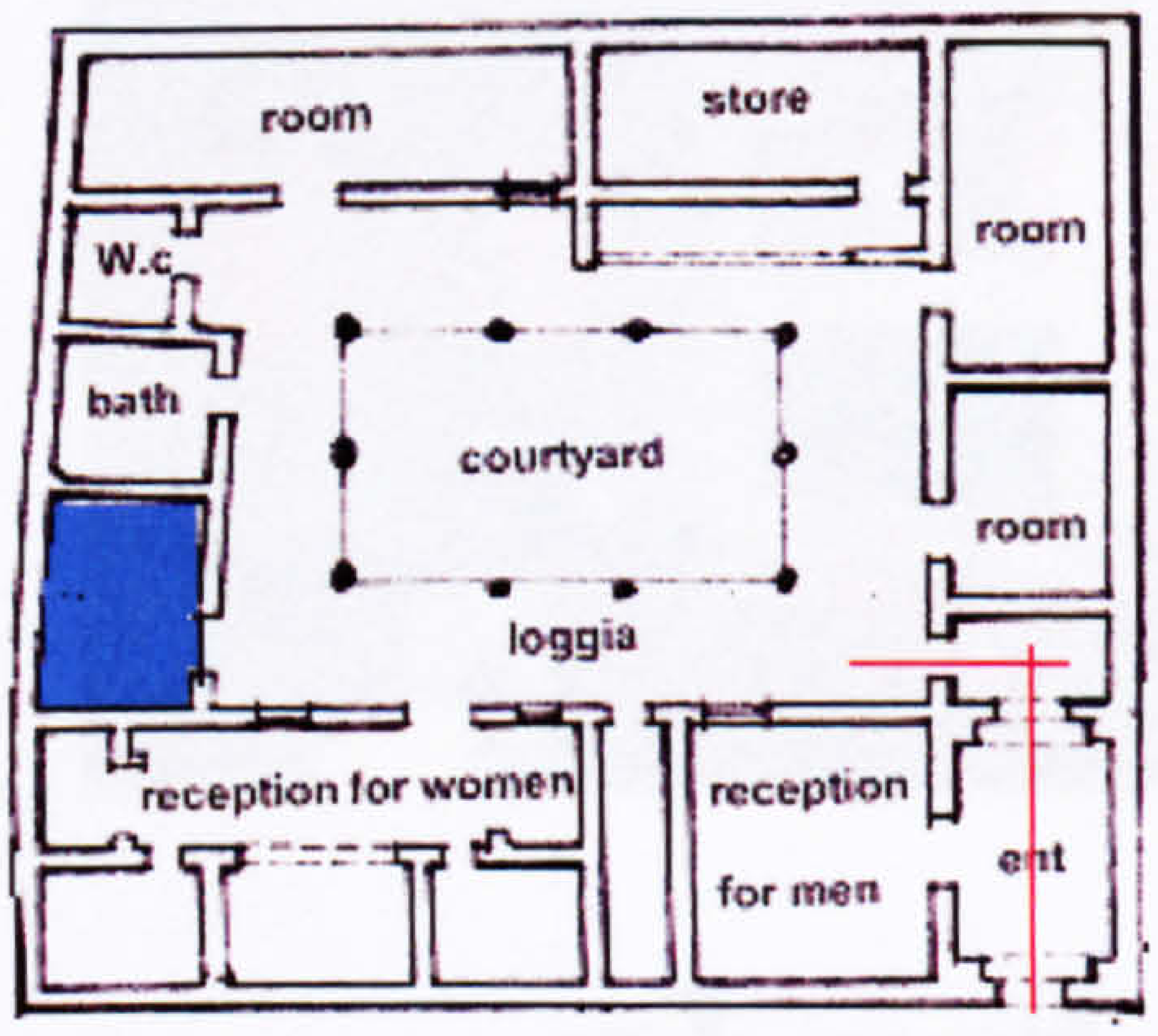


Figure 5.87 : Location of the bedrooms in the present phase

F) Kitchen (*El-Matbakh*)

Traditional house	
The kitchen in the traditional courtyard house is located on the southern side of the courtyard. As mentioned in this chapter it is connected directly to the courtyard because most family activity occurs there. The size of the kitchen is 3 x 2.5 or 3 x 3.5 m2, and it usually has small, high windows looking out onto the street as well as simple furniture. Figure (5.88) show this element.	  Figure 5.88 : Location of kitchen in the traditional phase

Contemporary house

In the contemporary house the kitchen became an important element that has witnessed a dramatic change with the introduction of new equipment. During the transitional phase, the alternate courtyard house saw the courtyard moved to the rear of the kitchen. It still overlooks the courtyard and the size is larger than previously. Its floor and interior walls are covered with mosaic.

In the late 80s and 90s, the kitchen became an outward-looking area with windows and doors opening towards the garden or to an outside veranda or balcony. It is accessed through a door from the central covered hall or lobby or the central corridor and its area has became slightly bigger. It is generally fully equipped with all modern facilities. Most kitchens in contemporary houses look outside towards a garden or balcony. Nowadays, however, as the researcher observed during fieldwork, many houses have two kitchens. One is built in the garden of the house and adjacent to the main kitchen which is used during different festivals. Nevertheless, most of these houses have no storage space. See Figure(5.89) and Figure (5.90)

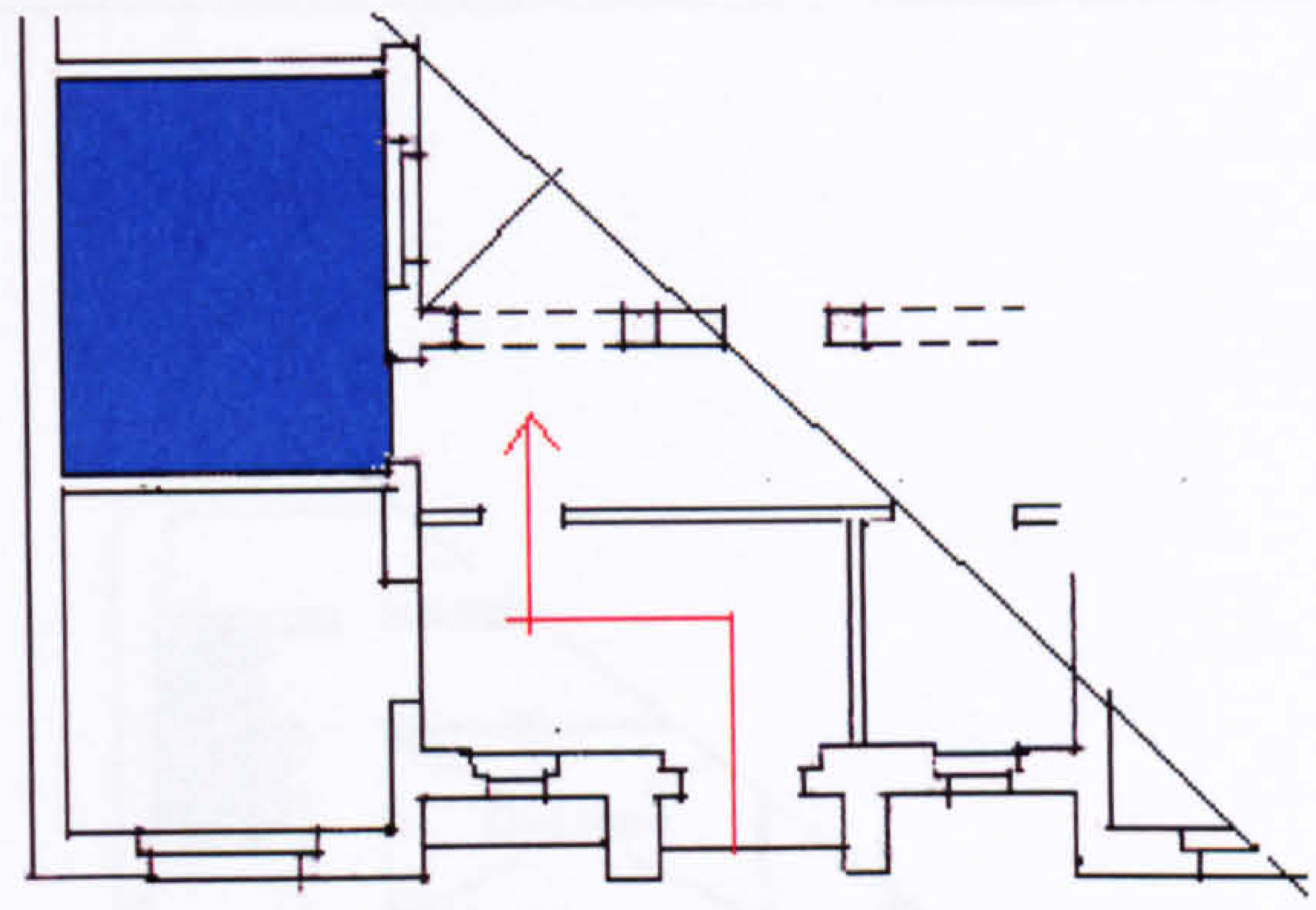


Figure 5.89 : Location of kitchen in the transitional phase

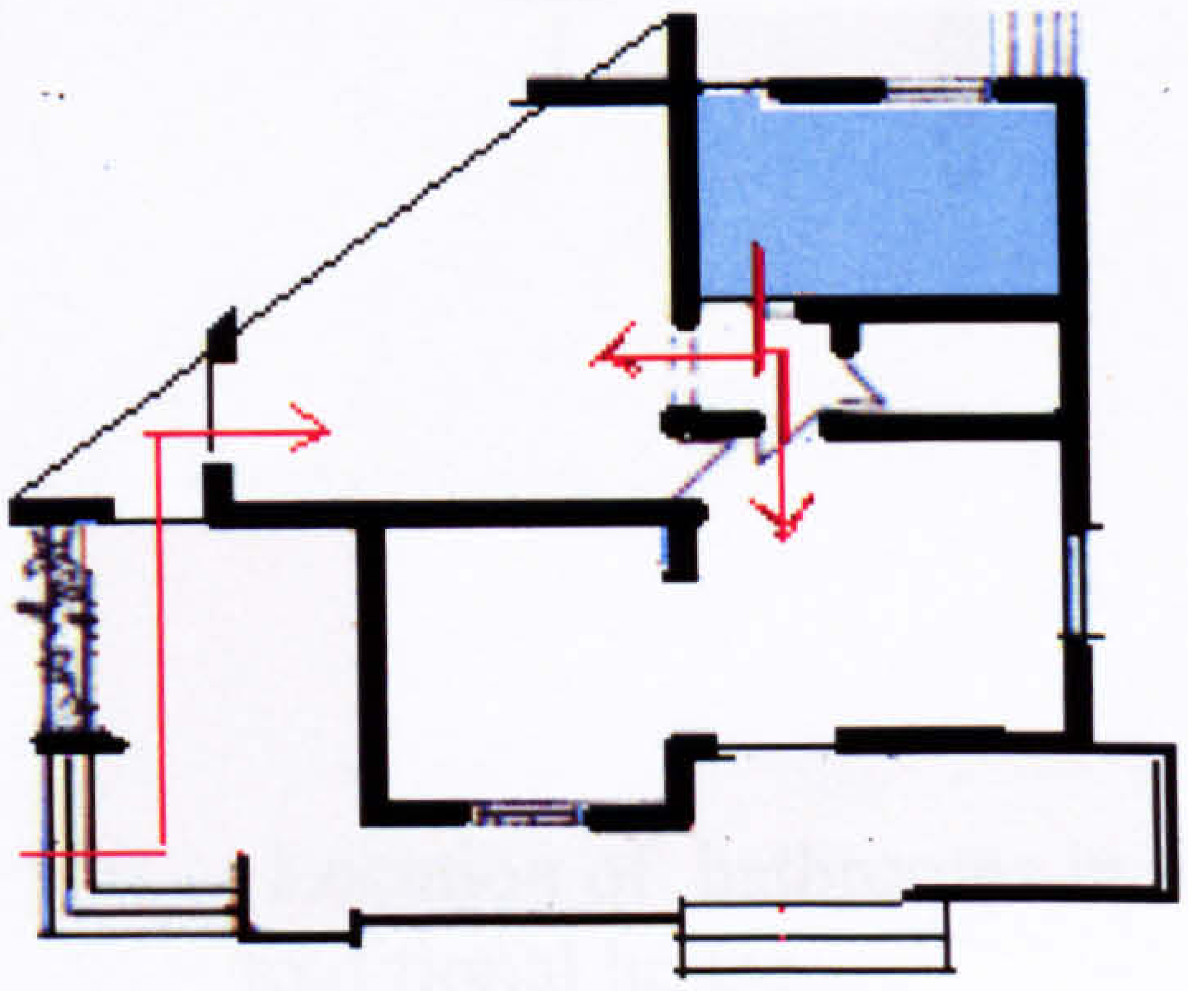
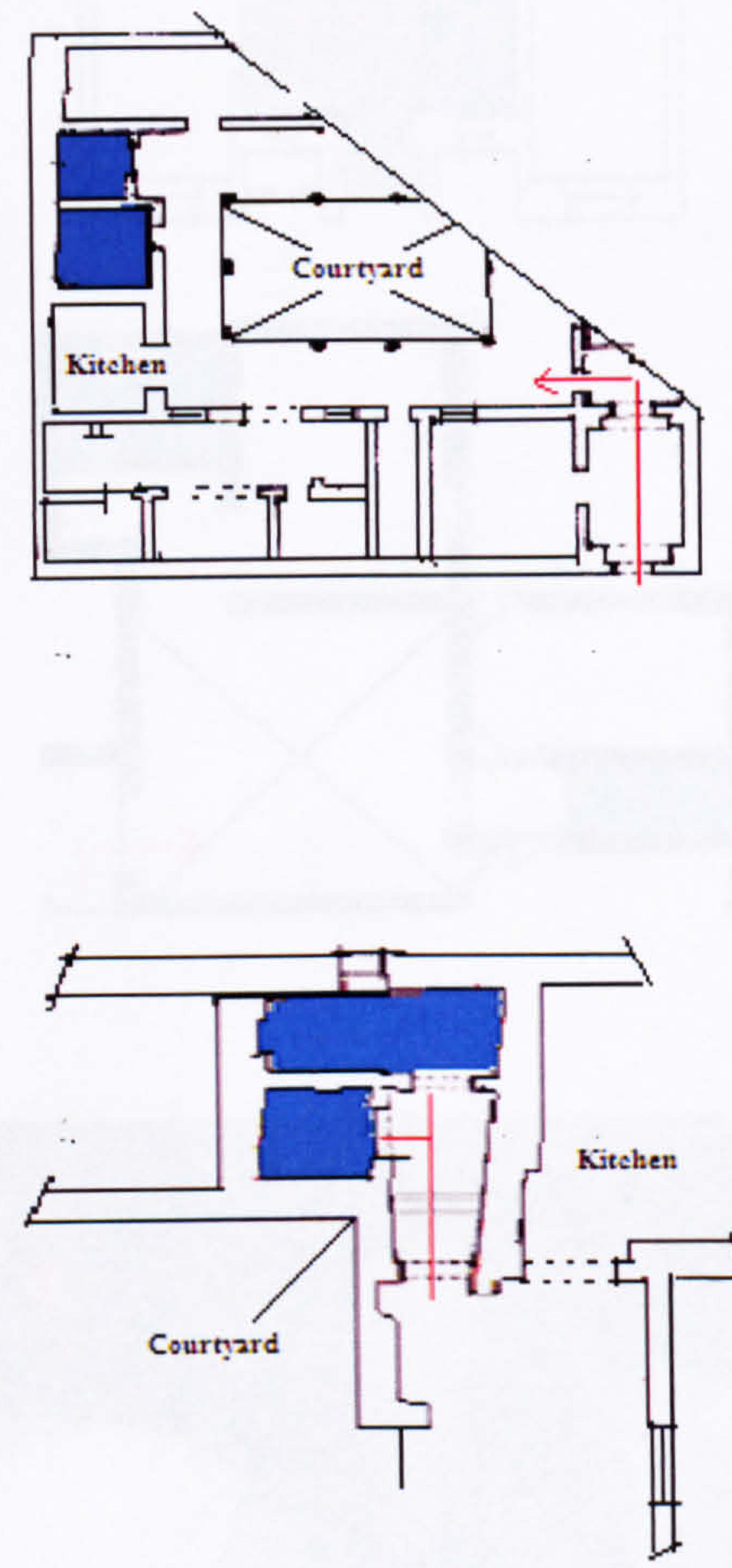


Figure 5.90 : Location of kitchen in the present phase

G) Bathroom

Traditional house	
The bathroom (Hammam) and toilet are usually adjacent to the kitchen on the ground floor. This often has a small, high, small window looking out on to the street to allow light to enter and to assist with ventilation. Water was obtained from a well or an underground tank. In addition, the bathroom was completely separate from the toilet. See Figure(5.91)	 Figure 5.91 : Location of bathrooms in the traditional house

Contemporary house

In the contemporary house water is supplied by a network. The bathroom includes washing and bathing facilities and a lavatory. The floor and walls are covered with tiles or mosaic. The number of bathrooms in a house depends on the size of the building. Most larger houses may have more than one. One is used by male guests. See Figure (5.92).

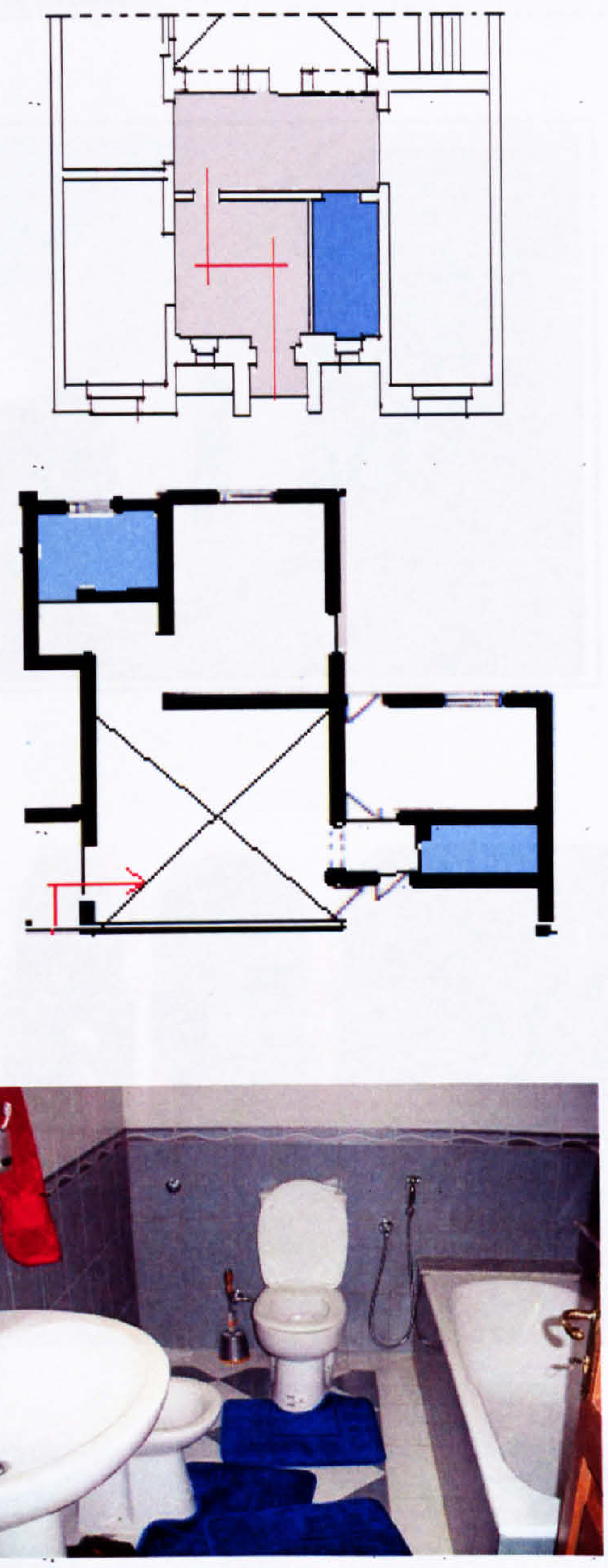


Figure 5.92 : Location of bathrooms in the contemporary house

4) Façade of the house

Traditional house	
As already mentioned, traditional houses are laid out adjacent to each other, so there is mostly one façade facing the street. The façades of the external walls are plain and devoid of any decoration, whilst the main entrance door was usually decorated with tiles, and ornamental gypsum, and the elevations display straight lines and rectangles. Lime coating is typically applied to the walls, which presents the exterior with a degree of uniformity. Greater attention was paid to the interior façade, particularly in two-storey buildings, such as it being carved and decorated with the columns and walls of a veranda. The windows on the upper floor were decorated by mushrbiyas, made from a wooden lattice screen. This can be remarked in Figure(5.93).	   Figure 5.93 : Façade of house in the traditional phase

Contemporary house

New building materials have played a fundamental role in forming the houses' shape, size, and decoration. Reinforced concrete, glass, and aluminium played an important role in the appearance of the façade whose design and decorative elements were borrowed from foreign architecture, such as cantilever balconies and verandas. In addition, this period is distinguished by the variety of expressions in the buildings façades.

One of the most striking features is the increase in the size of windows with glass and the disappearance of screens (such as (Musharabiya). Some examples can be seen in Figure(5.94) and Figure (5.95)

Figure 5.94 : Façade of house in the transitional phase

Figure 5.95 : Façade of house in the present phase

5) Building Materials

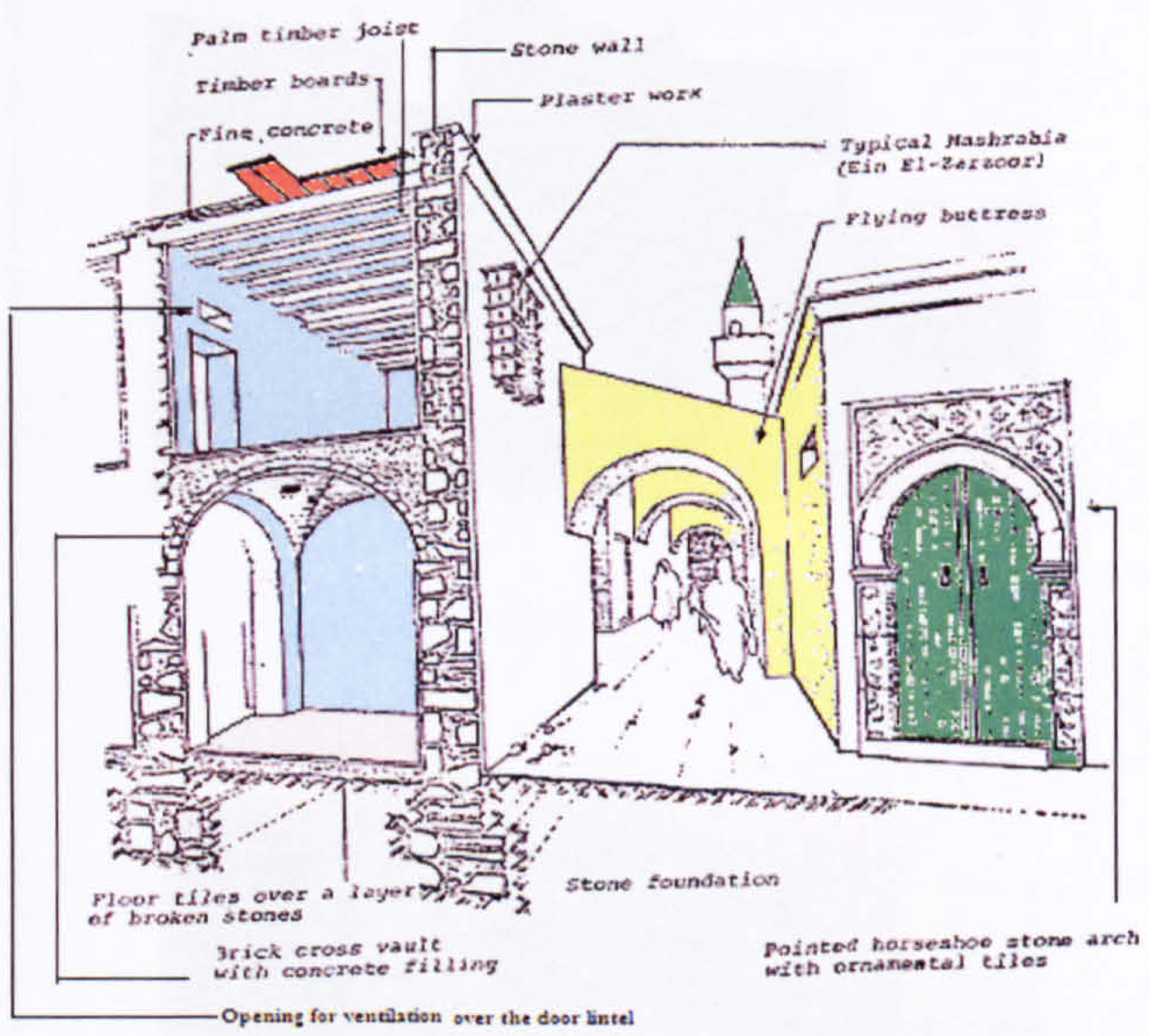
Traditional house

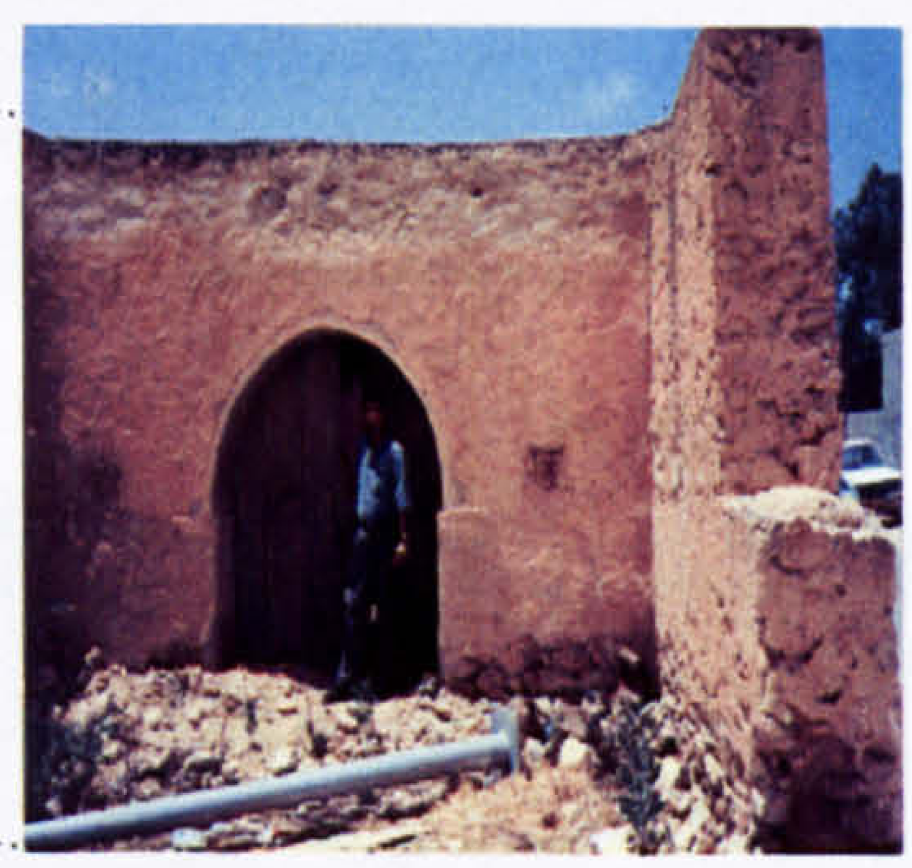
As mentioned earlier, traditional house construction depends on locally available natural resources for building materials.

Building materials available locally in Tripoli include limestone brick, stones, mud and sun-dried brick, which are used in walls. Other materials are produced from plants, such as palm-tree trunks, and pine timber joists, which are used in roofs. As a result, building materials play a role in restricting the height, width and shape of housing.

These constraints also gave traditional houses in Tripoli a sense of consistency in their scale, such as height, width and external shape. Local people built all houses, with skills passed down from one generation to the next.

See Figure (5.96)





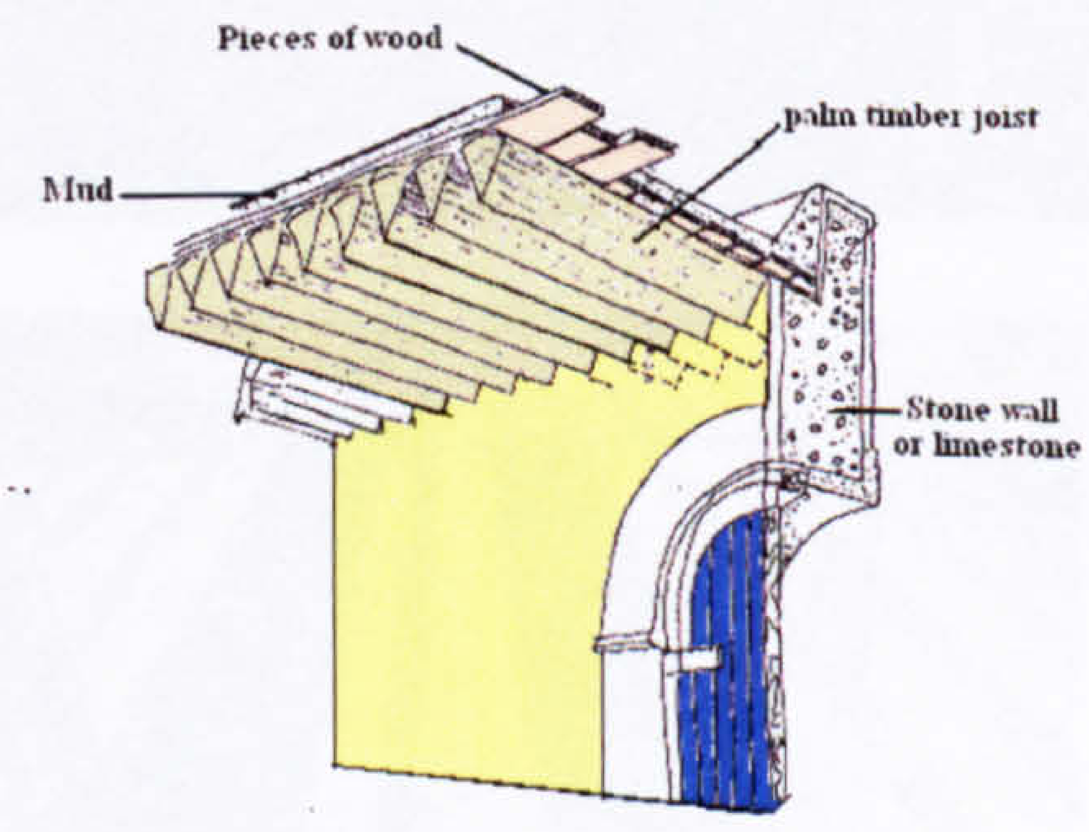


Figure 5.96 : Building materials and construction system-traditional house

<table>
<tr><th colspan="2">Contemporary house</th></tr>
<tr><td>Modern residential architecture is constructed primarily of a reinforced concrete system, which is used in columns, beams, floors and roofs, with hollow cement blocks or limestone for the exterior walls and interior wall partitions without any insulations materials.

From observation, the main building materials used in this period are steel, cement, aggregate, hollow cement blocks, wood, mosaic, and marble.

Some of materials are produced locally, but wood, mosaic, and marble were imported. These constructions are dependent on new technology, which leads to the appearance of different patterns and forms. The different colours used in the external and internal walls of the house are unsuitable for the climate. Figure (5.97).</td>
<td>



Figure 5.97 : Building materials and construction system-contemporary house</td></tr>
</table>

5.5.6 Traditional and contemporary housing in Tripoli: A comparative summary

Having considered the impact of the modern period on housing in Tripoli, it is considered useful to point out the principal points of difference between the traditional and the modern house, since the issues of traditional and modern housing were central to present study Table (5.3).

Table 5.3 : Summary comparison between traditional and contemporary housing

	Traditional housing		Contemporary housing
	Architectural design		**Architectural design**
1.	Simple shape mostly square or rectangular with courtyard a well-proportioned hollow centre. And consist of one or two story.	1.	House as enclosed cube. Each floor, where more than one any extension, built on side and consist of different style and type (villa on or two storey, ground house, flats.
2.	Built around courtyard with rooms and spaces looking inwards only men's reception looks out.	2.	No courtyard replaced by balcony and terraced. Rooms look outwards to garden or road at front.
3.	Flat roofs with high parapet (2m height) prevent being over looked by neighbours and used for sleeping in the night during summer.	3.	Flat roofs with parapet, not always high enough to prevent being overlooked. Some houses have pitched roof.
4.	Ceiling height of ground floor is higher than on first floor.	4.	Most floors same height.
5.	Outsides plain with few external openings. Most opening inside to courtyard.	5.	Outside full of openings on to street and neighbours.
6.	The courtyard increase humidity and coolness indoors by tree or shrubs planted, provided and fountain which shaded and cool.	6.	Consequence this type has not courtyard, so garden at front or back or even between houses, which offered shaded.
	Construction and building materials		**Construction and building materials**
7.	**a) Wall construction** Earth was one of the first and most available materials (mud bricks, set in mud, mud/chopped straw layer and stone jointed by mud mortar. Wall built of one thickness, without any different between external or internal wall (40-60 cm) and mud/chopped straw layer	7.	**a) Wall construction** The construction systems in most houses were Skeletons frame. Wall is usually constructed with out cavities and from heavy or lightweight materials. in general there are three main types of blocks used in wall construction • Sand and limestone; • Lightweight cement blocks;

	coated exterior and gypsum coated interiors kept rooms cool in summer and hot in winter. **b) Roof construction** Construction based on local materials, lattice of palm branches and leaves covered with layer of ash (to seal all small holes and prevent entry of rainwater. Topped with mud, chopped straw layer and wash by white colour some houses used timber in the roofs.		• Clay blocks. Wall built of different thickness (15-20cm) and plastering exterior and interiors by mortar cement. In addition, varieties of materials use on exteriors (e.g.) Marble, neutral stone. **b) Roof construction** The majority of houses have flat roofs except in some houses where pitched roofs are common. The roofs usually constructed from reinforced concrete slabs with 10-12cm thickness as well as some roofing materials such as a asphalt, cement mortar and roof tiles or just a light concrete layer of 5 cm thickness. Mostly have not use insulation materials.
8.	Building took no more than 3-4 months.	8.	Building takes minimum of 6 month.
9.	Simple decoration and mostly washed by white colour	9.	Most houses have decoration inside and outside and different use of colour.
10.	Most rooms have multiple-purposes	10.	Most rooms have one purpose.
11.	Small size	11.	More covered area.
	Micro climate		**Micro climate**
1.	Climatic conditions were considered During design	1.	Climatic conditions were not prospers considered During design.
2.	Housing built next to each other, protecting each other from the sun	2.	House built usually separated which exposed all side to the sun.
3.	Closely built houses greatly reduce the surface area (in plan and elevation) exposed to direct solar radiation.	3.	Surface area (in plan and elevation), exposed to direct solar radiation is greatly increased, as is thermal gain.
4.	Narrow alleyways between the houses protect them from the sun.	4.	Houses faces on to wide streets. No shadow protected from Climate during summer (hot, dusty), winter (cold, rainy).
5.	Courtyard ply role to offered good climate condition particularly in summer.	5.	Most houses build by reinforce concrete in roofs and hollow cement block in wall which high thermal conductivity.
6.	All Building materials were locally produced.	6.	Most houses paint different colour in exterior, which absorb the heat.
7.	Most houses washed by white colour, which reflected the sun.		
	Social customs		**Social customs**
1.	Families are extended with several generations under same	1.	Most families are nuclear.
2.	Roof provides continuity and offered safety.	2.	Families living in such houses are usually no similar income levels. Any relationship between neighbours may depend on the occupants, status

3.	Grouping of houses in compact layouts encouraged neighbour contact, particularly among women, with narrow alleys and Cul-de-sacs.	3.	Most neighbour hoods newly established and people do not know one another.
4.	Privacy were considered	4.	Privacy is not considered in external
	Economics		**Economics**
1.	Small building plots, hence relatively less demand a land for houses.	1.	Larger plots put high demand on land for houses. Result higher costs.
2.	Compact layout less demand and infrastructure	2.	Loose sprawling layouts increase infrastructure costs.
3.	Used available local materials also reduce the cost. Self-built	3.	Most building materials are use not available in local Markets. Result high cost. Construction by professionals & trades people
	Factors of influence		**Factors of influence**
1.	Culture	1.	Housing policy
2.	Climate	2.	Technological and building materials
3.	Religion	3.	Planning system
4.	Building materials	4.	Development of social and cultural
5.	Economic factory	5.	Population growth
		6.	Economic factory

This chapter explored the influence factors, types, characteristics and Comparative study in both traditional and contemporary housing in Tripoli. The next chapter addresses the method employed in collecting the data for the study.

Chapter 6: Research Methodology

6.1 Introduction

The aim of this chapter is to describe and discuss the research methodology in detail and the research process adopted to achieve the study's objectives. It explains the various techniques of measuring, sampling and collecting data. The empirical methodology used to measure people's satisfaction and housing preferences is described. The methodology is based on the use of a systematic investigative procedure, as illustrated in Figure 6.1.

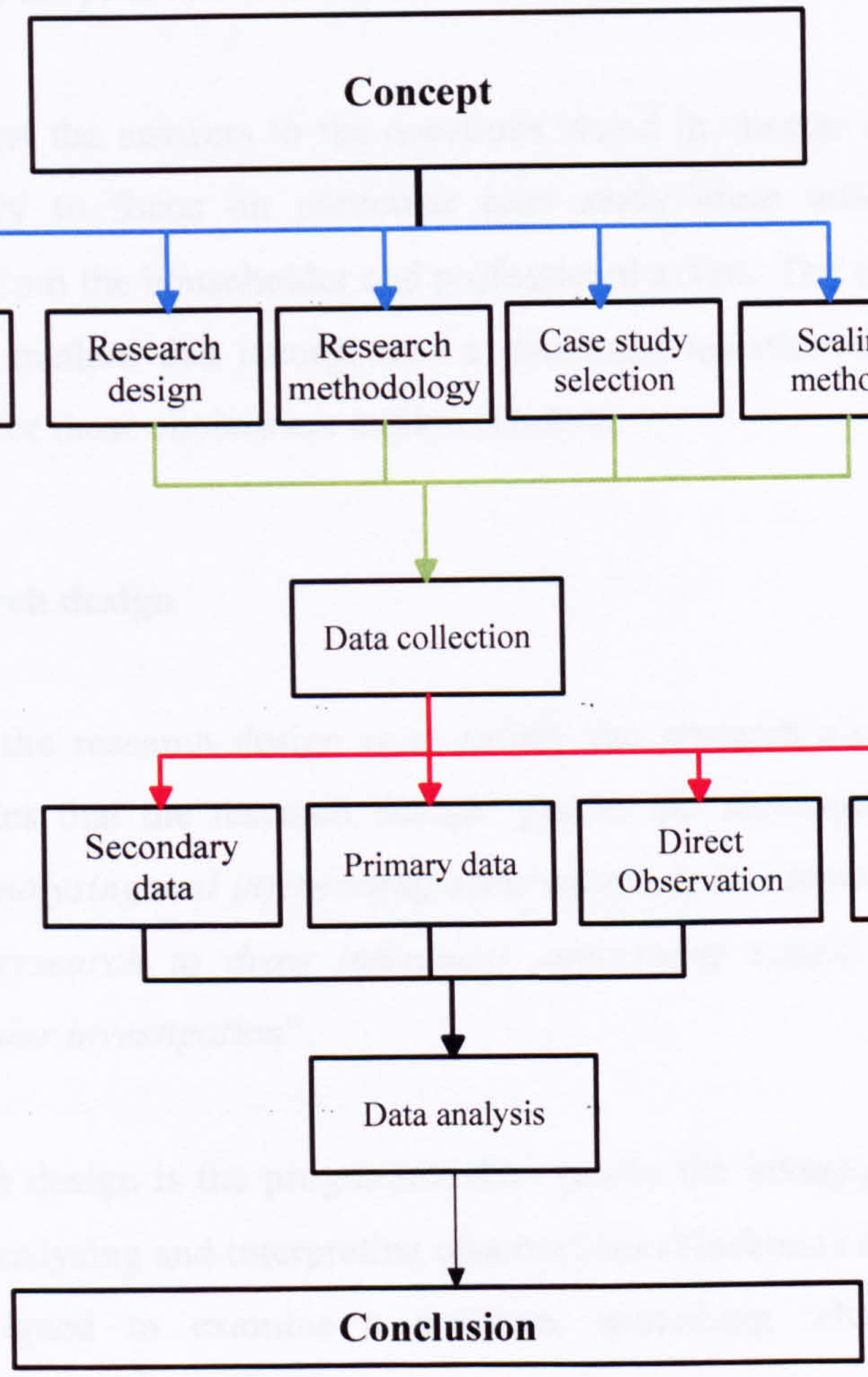


Figure 6.1: Diagram of research methodology

According to Yin (1994), the strategy of every research should be chosen as a function of the research situation. Each research strategy has its own specific approach to collecting data and analysing empirical data every strategy has its own advantages and disadvantages. Yin (1994) stresses the conditions, which should provide the grounds for strategy choice, the type of question posed, the control over actual behavioural elements and the degree of focus on historical or contemporary events.

To achieve the objectives stated in chapter one (section 1.3.2), the specific strategies have been followed during the different stages of the study. As with any research, the first task was the choice of the topic of study. Once this had been established, the time has been spent reviewing the nature of the problem, and determining clear research objectives. At this point, it is appropriate to present an explanation of the research procedure and method in addition to the method of collection of the data, to help delineate the path that tests the answers of the research questions.

In order to test the answers to the questions stated in chapter one (section 1.3.1), it was necessary to focus on particular case study areas and to obtain data and information from the householder and professional actors. The researcher has adopted a case study method that incorporates a structured questionnaire and an interview. The reasons for these choices are explored below.

6.2 Research design

The aim of the research design is to satisfy the research aim and objectives. Yin (1994) defines that the research design "*guides the investigator in the process of collecting, analysing and interpreting observation. It is a logical model of proof that allows the research to draw inferences concerning causal relations among the variables under investigation*".

The research design is the programme that guides the investigator in the process of collecting, analysing and interpreting observations (Nachmias et al 1996). Research is usually designed to examine a problem, something which needs explaining, describing, improving, or about which information is needed so that future occurrences can be predicted and an appropriate policy adopted. Research design however embraces a number of research strategies. The decision of the choice between different research strategies (experiment, survey and case study) is based on

the specific features of the different strategies. Coolican (1996) stresses that the researcher should understand the reasons behind the choice of the research design.
The research design should demonstrate how the research question will be answered and how cope with it. On the other hand, research design provides the plan and structure as to how explanation could be obtained.

Yin (1994) states five different types of research design. They are experiment, survey, archival, history and case study. The relevant situations for different research design are summarized in Table 6.1.

Table 6.1 : Relevant situations for different Research Designs

Strategy	Form of research question	Requires control over behavioural events?	Focuses on contemporary events?
Experiment	How, Why	Yes	Yes
Survey	Who, What, Where, How many, How much	No	Yes
Archival analysis	Who, What, Where, How many, How much	No	Yes / No
History	How, Why	No	No
Case study	How, Why	No	Yes

Source: Yin, 1994

6.2.1 Justifying the selection of case study method

Case study is a useful strategy for converting tacit knowledge into explicit knowledge so practitioners can learn more about the performance of their business systems. It is also particularly appropriate for individual researchers; it gives the opportunity for one aspect of a problem to be studied in depth within a limited time scale (Bell, 1993).
Yin (1994) appears to operate from realist ontology when he defends case method against attacks, especially in relation to the three forms of validity: construct validity, internal validity, and external validity. A key suggestion for dealing with construct validity is to use multiple sources of evidence; for internal validity Yin (1994) stresses the importance of building cases over time in order to eliminate alternative

explanation; and for external validity he points out that case studies rely on analytic rather than statistical generalisations. Sekaran (2003) stated that:

"Case studies involve in-depth, contextual analysis of similar situations in other organisations, where the nature and definition of the problem happens to be the same as experienced in the current situation" and Remenyi et al (1998) as "*a detailed investigation of the context and processes that affect a phenomenon within organisations*".

Yin (1994) defines the case study as "an empirical investigation into contemporary phenomenon operating in a real-life context". He states that the case study is the preferred strategy when "how" or "why" questions are being posed. This allows the researcher to determine not only what happened but also why it happened. The case study is excellent as a recorder of decisions, reasons, motivations and structural relationships (Leavy, 1994).

The case study is a research strategy, which focuses on understanding the dynamics present within single settings (Amaratunga and Baldry, 2000), and usually refers to relatively intensive analysis of a single instance of a phenomenon being investigated. Case study method is appropriate when a researcher's concern is directed toward a set of issues in a single organisation, or a single department within it, such as development of housing.

Bell (1993) develops an argument that the case study approach is particularly appropriate for individual researchers because it gives an opportunity for one aspect of a problem to be studied in-depth within a limited time scale. He also indicates the great strength of the case study method is that it allows the researcher to concentrate on a specific instance or situation and to identify, or attempt to identify, the various interactive processes at work. Case study approach is more appropriate when the researcher wants to understand an organisation's phenomena within their real-life contexts (Stake, 1995; Yin, 1994). It is used if the researcher wishes to gain a rich understanding of the context, and it is a worthwhile way of exploring existing theory (Saunders et al., 2003).

Yin (1994) classified case studies into three types for research purposes:

- Exploratory case studies: sometimes considered as a prelude to social research;
- Explanatory case studies: may be used for doing causal investigations;
- Descriptive case studies: require a descriptive theory to be developed before starting the project.

Therefore, this research adopted to use questionnaire survey and archival documentation as a source of data within the case studies, for examining the opinion of the householder, and points of view of the professional, about traditional and contemporary housing design.

6.3 Research methodology

Methodology is a system of methods and principles used in a particular discipline (McLeod, 1987). Methodology is mainly concerned with techniques and tools used to gather data. Wells & Wass (1995) argued that research methodology is the instrument through which the research objectives are achieved. Dwyes (2002) cited in Adam and Healy (2000) indicate that methodology is "the *overall approach, and within that the individual research methods and tools used to meet a given research objective. A clear and unambiguous statement of the research objective is therefore necessary to enable the selection of an appropriate research methodology and data collection techniques*".

Also Zickmund (2000) views methodology, as an" *the procedures for collecting and analysing needed information*". McGrath (1982) defined an it as" *attempt to develop a language for the relationship between a methodological approach and the area to be studied*"

According to Berry (1983), research methodology is not just about data collection and the rules for evidence; it is more about the nature of explanation and the means by which explanations are produced. However, there is no one universally accepted scientific methodology, but rather a combination of methodological paradigms is used to form the methodology of the research undertaken. In such a way, every methodology is unique and applicable only for its intended purpose. Therefore, considering the above issues, it becomes clear that the methodology used for the research needs to be sympathetic to the issues being investigated, in effect to "... *suit the method to the problem and not problem to the method"* (Michail, 1999).

Easterby-Smith et al (2002), gave three reasons why it is important to understand philosophical issues in management research. Firstly, such an understanding helps to clarify research designs, which include what kind of evidence is required and how it is to be gathered and interpreted, and also how this will provide good answers to the basic questions being investigated in the research. Secondly, knowledge of philosophy helps the researcher to recognise which designs will work and which will not. It should indicate the limitations of specific approaches. Thirdly, it helps the researcher to identify, and even create, designs that may be outside the past experience of the researcher.

6.4 Research techniques

The term 'research technique' is used here to refer to the step-by-step procedure to be followed to gather data and analyse in order to answer the research questions documented in this study. As Ghauri et al (1995) note, research techniques are primarily concerned with how one collects data rather than why one does this since this issue is determined by the research method employed. The research techniques implemented, mostly depend on the nature of the research and the environment in which the study will be conducted (Easterby Smith et al, 1991). In order to achieve the objectives of this study both secondary and primary data were used. Data about Libya in general and the selected housing projects were collected through fieldwork during October and November 2005. Many authors such as Easterby-Smith et al. (2002) Hussey and Hussey (1997) and others have mentioned different data collection methods. Those data collection methods could be summarised as:

- Documents;
- Archival records;
- Interviews;
- Direct observations;

- Participant-observation;
- Diaries;
- Focus group;
- Questionnaire.

Ghauri et al (1995) note that research techniques are primarily concerned with how one collects data rather than why one does this, since this issue is determined by the research method employed within the framework of the case study methodology.

Multiple methods of data gathering, aiming at enabling methodological triangulation, was adopted using both quantitative as well as qualitative methods whenever possible.(Fielding, 1993). The data was collected through a variety of data-gathering procedures, namely: Documentary sources, Questionnaires with residents, interviews with key government offices and professionals. Observation was are also used for collecting field data. The purpose of the questionnaire is to collect fundamental data pertaining to the organisation's background policies, and control systems (Dwyer2002).

The questionnaires will be used when interviewing selected households in the areas chosen. Multiple-choice, closed questions will be conducted. Open-ended questioning will be used to interview housing professionals. These methods are used in this study to collect relevant data, not available from other documents. The data collection and sources of data for this work-study can be classified as follows:

I. Secondary data (theoretical discussions)

The secondary data collected was related to the specific objectives of this study. The secondary data comprises both quantitative and qualitative data. This covers different aspects of the country, particularly Tripoli. This Data included (the geographical setting, historical background, climatic aspects, socio-economic situation, population census, housing policy, review the traditional houses in Libya and investigations, the traditional house (courtyard house), and development of contemporary housing in Tripoli. The secondary data was collected from journal, articles and relevant books etc. (See Figure 6.2). Also the researcher had to visit the relevant organisations concerned with urban planning and housing in the country at both government and local levels to collect documents and data. The secondary data was collected from various sources, namely:

- Journal, articles and relevant books,
- The Secretariat of Housing and Utilities reports and corresponds (SOHU),
- The General Housing Corporation reports (GHC),
- The General Urban planning Corporation reports and corresponds (GUPC),
- Secretariat of planning reports and corresponds (MP);
- The Engineering Consulting office for Utilities reports and corresponds (ECOU);
- Municipality of Tripoli and corresponds reports;
- The University of Al-Fateh reports;
- The General Peoples' Monitoring and Follow-up Secretariat reports and corresponds.

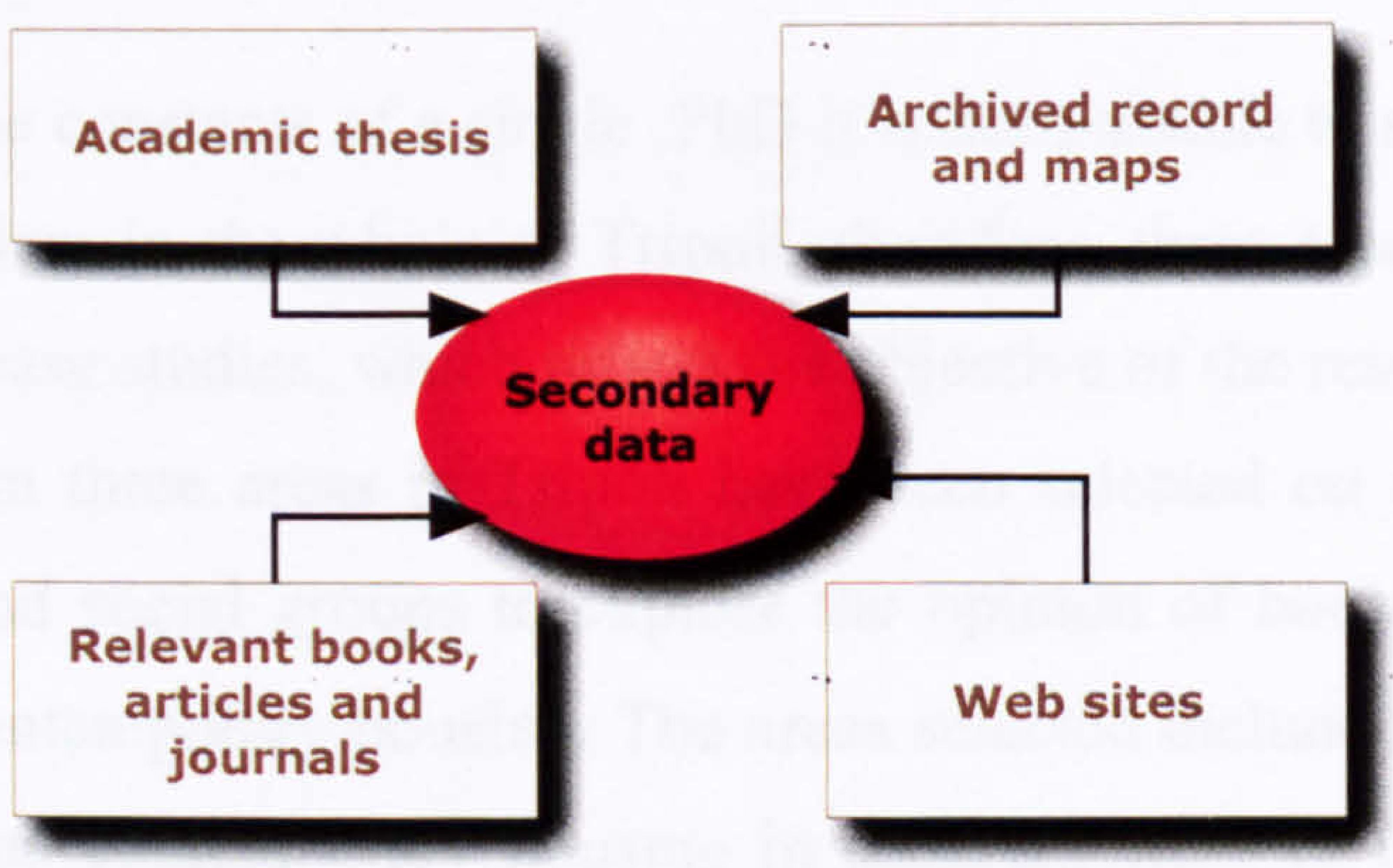


Figure 6.2: Source of secondary data

II. Primary data (empirical study)

The secondary data, that was available was inadequate to completely meet the objectives of the study. For this research the instruments used to collect primary data were questionnaires, guided interviews and direct observation where possible (Figure 6.3).

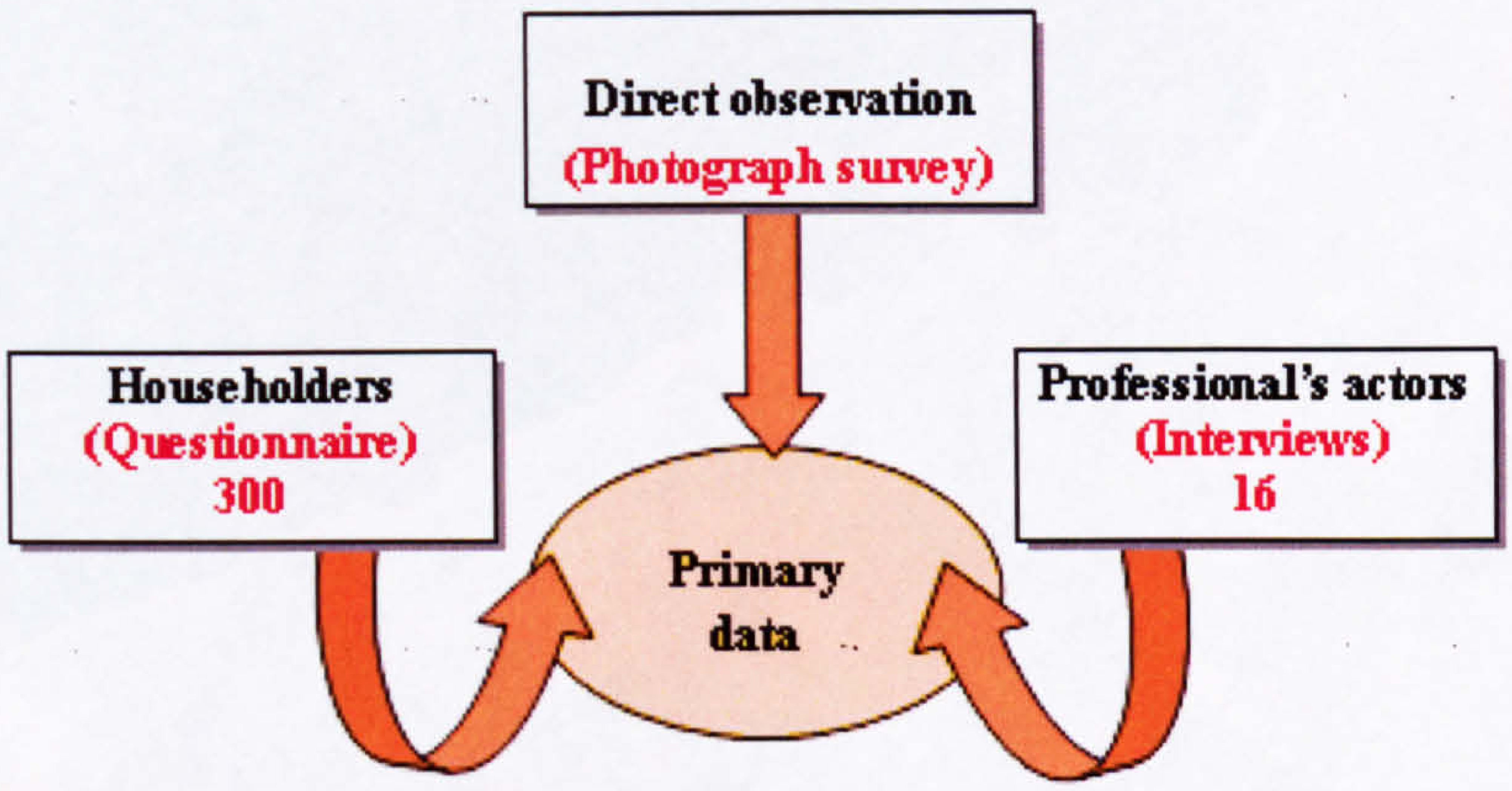


Figure 6.3: Source of primary data

6.5 The case study selection

Clearly, within the constants of a single PhD it is not possible to study all aspects of the housing problem in the whole of Tripoli, therefore, three areas of the city have been selected as case studies, which reflect the objective of the research. A sample of 300 households in three areas in Tripoli have been selected on the basis of house types, location and social groups to explore the opinion of households in terms of traditional and contemporary housing. The areas selected include traditional housing in the old city and contemporary housing in different areas of the city Figure 6.4 shows the three districts where three projects are located.

1- Tripoli old city 2- Airport highway project and Al-Hadba neighbourhood 3- Sidi-Abdu-Al-Jaleal neighbourhood

Figure 6.4 : Location of residential areas selected as case study

These selected sample are interesting because they represent different periods of developments in the city.

1. **Traditional area (Old city area)**

The old city of Tripoli is situated in the centre of city and was the main city of Tripoli until the 20th century when substantial developments occurred outside the city walls under an Italian town-planning scheme. Two traditional neighbourhoods are Bab el-Baher and Homet Geerian, which represents the traditional housing, built during Islamic and Ottoman periods.

2. **Modern area**

The areas selected as samples are characterised by grid planning, built during the last three decades a period as well as income and middle levels. These neighbourhoods are:

a) Airport highway project and El-Hadba neighbourhood

This project is situated to the south of Tripoli. The project comprises different dwellings high-rise buildings from 4 to 12 stories high. Two types of house are included the first for larger families and the second for smaller families This neighbourhood was designed and constructed by foreign firm Arcom from Romania in 1975 . Also some private houses were included selected randomly from El-Hadba neighbourhood which consist one-story houses, low-income housing, and villas, which were categorised as high-income housing.

b) Sidi-Abdual-Jaleal project

This project is situated to the northwest of Tripoli city about 12km from city centre. The Ministry of Housing constructed the project in 1975 through PHC. The project comprises 1543 dwellings of different types of housing such as villas, villa flats and walk-up flats. This neighbourhood was constructed by the foreign firm, Libash from Turkey. This type of housing was part of a comprehensive plan to build an administrative compound in Tripoli occupied by people from middle and low income groups.

These three districts were chosen for a number of reasons;

- They all contain a large number of dwelling units;
- They contain one type of building system and consist of different types of dwelling in terms of areas and height;
- These houses were built at different times;
- The houses in the latest estate show evidence that the occupiers have altered and extended their houses.

Since it is not feasible to survey all the dwelling units on these housing projects, a sample was drawn up from each estate. The most important consideration in any research is the need to obtain objective information from sizeable and representative section of the population being studied. Sampling also requires a comprehensive frame, which gives information on the characteristic, size and other aspects of the sample (Peil, 1982). These two elements of the survey are justified in more explanation in the fieldwork section.

6.6 Scaling methods

Measurement is defined as a way of assigning numerical values judged on the attributes of products, ideas or institutions (Oppenheim 1992). Many factors are effecting resident's satisfaction. The quality of housing was established through appraisal of the location and accessibility, safety and security, privacy, microclimate, topography, planting materials, availability of private places, and the availability of facilities and services.

From previous social science research and similar studies three scaling methods are widely used to measure people's opinion or satisfaction with their built environment. That is the Thustone, Likert and Guttman scales (Oppenhiem 1992). Most data required in the analysis of the Tripoli city study is ordinal, the most appropriate scale to use was Likert scale. Thus five options were provided for each question starting with very satisfied, satisfied, neutral, dissatisfied and very dissatisfied.

The Likert scale is not limited to just three points. Many studies have used five or seven point's scales (for example, Mayo 1979 and Dorfman, 1979) depending on how detailed the data is required to be. In the present study, providing five choices was believed to be the most appropriate.

Householder Questionnaire design

A questionnaire survey was considered to be the most appropriate technique for collecting data required for this study. The choice of the form of data collection is related to different factors. Fowel (1993) illustrated that: the choice of data collection mode, i.e., by mail, telephone or personal interview, is related to the sample frame, research topic, characteristics of the sample, available staff and facilities and finally the environment in which the survey is conducted. In this study the personal interview mode was adopted for different reasons:

- Due to the non-availability of telephones in all dwellings in the study areas, plus the disadvantages of the telephone survey, it was not possible to conduct the questionnaire survey by telephone;

- Because there is no clear address of each dwelling unit in the study area and home post is not used in these areas, it was not possible to use a mail survey.

Also, a mail survey would require the time, to send information and await feedback, which was not available to the researcher. Due to the reasons mentioned above the researcher decided to conduct the questionnaire survey using personal interviews. The questionnaire was designed specifically to reflect the aim of the study. It was drawn up in order to be facilitate a good response. The questionnaire was written in simple, clear language and was well produced, using good quality paper and printing. In this respect (Piel, et al 1982) says: questionnaire are likely to get the best results if they are contain straightforward and easily answered questions.

Furthermore, the questions were framed in a simple manner to make answering easier for the respondents. Oppenheim (1992) stated that: the close–ended questionnaires are easy and quicker to answer and very popular because they provide a greater uniformity for respondents. Moreover, (Robson 1994) stated that the closed questionnaire is usually a more satisfactory way of providing empirical data. Bobbie (1979) supports this area.

The questionnaire contained 31 questions; most of which are closed. The advantage of using both closed and open-ended questions has been well documented (Devaos, 1992; May, 1993; Flower, 1993). Some of the questions have multiple-choice answers. (See Appendix1).

The questionnaire was divided into six sections. The first section provides general information respondents including their age, marital status, family size, level of education and employment status. The second and third sections discuss the previous and present dwelling circumstances. The fourth section compares the previous and present dwelling in terms of householder's opinion about the choice of the dwelling, area, security and safety, privacy, suitability to climate, external façade and building material. Section five deals with the modification made to contemporary houses. The last section reviews the opinion of the householder's in terms of the type of houses they prefer and their viewpoint about the future houses.

The validity of the questionnaire

Before starting the actual assessment process, the questionnaire was tested for clarity and applicability through a pilot study conducted with some occupants who have experience in survey design. Kidder (1981 p, 132) has pointed out; "every instrument must pass the validity test either formally or informally. Every researcher who has decided on the instrument must judge whether the test measures the construct he or she wishes to study". Bell, (1993) indicated that "All data gathering instruments should be piloted to test how long it takes recipients to complete them, to check that all questions and instructions are clear and to enable you to removal of any items which do not yield usable data".

In order to measure the validity of the questionnaire used in this study, number of procedures had followed in this research:

- A draft version of the questionnaire was presented to experts for comments (Al-Awwad, 1991). The pilot questionnaire was designed and distributed to a number of contacts within the University of Salford who have experiences in questionnaire design including, Professor Stephen R Curwell the supervisor of this thesis and PhD students and Doctor Azaden, M. Shawesh, Director of Department of Architecture in the University of Al-Fatah in Libya. In the light of their comments some modifications were made.
- As the questionnaire would be administered in Libya where Arabic is the native language, translation of the questionnaire from English to Arabic was an important issue. The questionnaire was translated into Arabic by the researcher and given to another translator to corroborate the translation and later translated back into English. It was tested by Libyan professional to ensure that it had not lost any of the original meaning and to check this translation again corresponds.
- A pilot survey was conducted to examine the validity of the questionnaire, (Evens 1984) stated; "A pilot study serves more than one purpose. In the first place it gives a chance to practice administering the tests. Secondly, it may bring to light any weakness in the procedures of Administration", (Oppenheim 1992) supports this idea.

6.7 The pilot study

Accordingly, before the survey was carried out the researcher piloted fifteen copies of the questionnaire (Arabic version) with Libyan households living in the chosen housing areas. The aim of the pilot survey was to test the questionnaire and to identify the inevitable problems of converting the questionnaire design into reality. This involved comments about the language, suggested modifications to the questions and additional questions as well as obtaining experience of certain aspect of the survey. The pilot survey sample amounted to 5% -10% of the actual sample studied later. The analyses of comments obtained from the reviewers have been very helpful for improving the design of questionnaire. The following modifications were made to the field study.

- The number of questions was reduced from 50 to 31; the design, form and structure of some questions were also changed;
- The pilot survey led to changes in the wording of some questions;
- The length of some questions was found to be undesirable;
- To reveal weaknesses in the questions posed in order to improve their effectiveness;
- Order of questions.

Useful conclusions were also drawn about the interviewing procedures and the time needed to conduct the interviews.

Interviews with Professionals Actors

The research has adopted the semi-structured interview technique in order to obtain the maximum data from the interviewees (See chapter 7). According to Devaus (1996), (Nachmais 1976) certain people can provide valuable sources of ideas and can help to add value to the research since high quality responses are possible and could supplement facts about the subject. The decision to use the interview with professionals was influenced by three main considerations.

- It was considered that the interview allowed for greater flexibility of response than a questionnaire;

- It would allow the subjects to reflect not only on their professional practise and values but offer opinions, based on their experience and practice of Libyan's perceived their housing needs in light of their social and socio-economic expectations;
- The use of an interview programme offered the opportunity to ask interviewees supplementary questions, which might improve the researchers understanding of the issues and opinions raised by professionals.

Furthermore, in order to maintain a good level of transcription of the data collected and to avoid any possible losses of important information given by the interviewees.

The researcher has therefore simultaneously used one recording method for collecting the data from the conducted interviewees. This method was based on a predestined question-response template prepared by the researcher was used to record observation and take notes at the time they emerged during the conversation. This method allows the pre-classification of a certain number of important data that seem to be directly related to the aim of the interview, and further help on their analysis at a later data. The main purpose of conducting these interviews was to fill in the gaps in information that could not be collected from the questionnaire surveys. The open-ended interviews have to some extent provided most of the missing data needed for this research. The advantage of an open-ended nature is that there is a possibility to ask the interviewees to propose their own insights into situation and this may be used as the basis for further inquiry (Yin 1994). These types of questions included opinions and views of the interviewees about traditional and contemporary housing. The Interviews contained 11 questions; most of them opened with a small number of closed questions (See Appendix 2).

Direct observation

Robertson et al (1996), indicated that: observational methods are one of the strategies used to collect data and information in the social sciences. Direct observation aimed to cover the residents' practise, uses and actions, affecting the built environment. In the observation of the built environment, notes were taken about the physical character of the architecture and urban forms, physical attributes of the homes, street and open spaces. These were recorded through direct observation using field work as well as recording on maps and plans. Houses were visited and details noted. Information was gathered about house form, size, scale and interior layout. Features such as mushrabiya, windows construction type, building materials and their relation to order physical elements were the main areas of attention. Informal interviews were conducted during observation with residents. This involved asking people about the use of their streets and outdoor activities within their neighbourhoods.

Photographic Survey

The direct observation was supported by a photographic survey and was conducted to record certain architectural and urban forms. The survey provided valuable information about the nature of the physical environment such as height, type of building material, and modifications that had occurred to support the analysis of the suitability of traditional and contemporary housing. Examples are used in chapter five, seven and appendix (7).

6.8 The fieldwork

The fieldwork was carried out during October and November 2005. Two architects, one male and one female from the general peoples' Monitoring and follow-up Secretariat in Tripoli where the researcher is a fieldworker.

1. Access to Householders

Initial entry to the field survey was through the public committee (District Authority). The researcher explained to them the purpose of this study. Then they were asked to explain the purpose of the survey to some of the respondents before the interviews started, in order to encourage residents to co-operate with the researcher and to assure them that the research is for scholarly purposes only. Most of the interviews were done during the late afternoon and evenings, when the heads of households had returned from work and were available for interviewing. Each interview was completed within a period of approximately 20-30 minutes. Figure

(6.5) shows that the numbers of questionnaires distributed collected and response rate during the fieldwork.

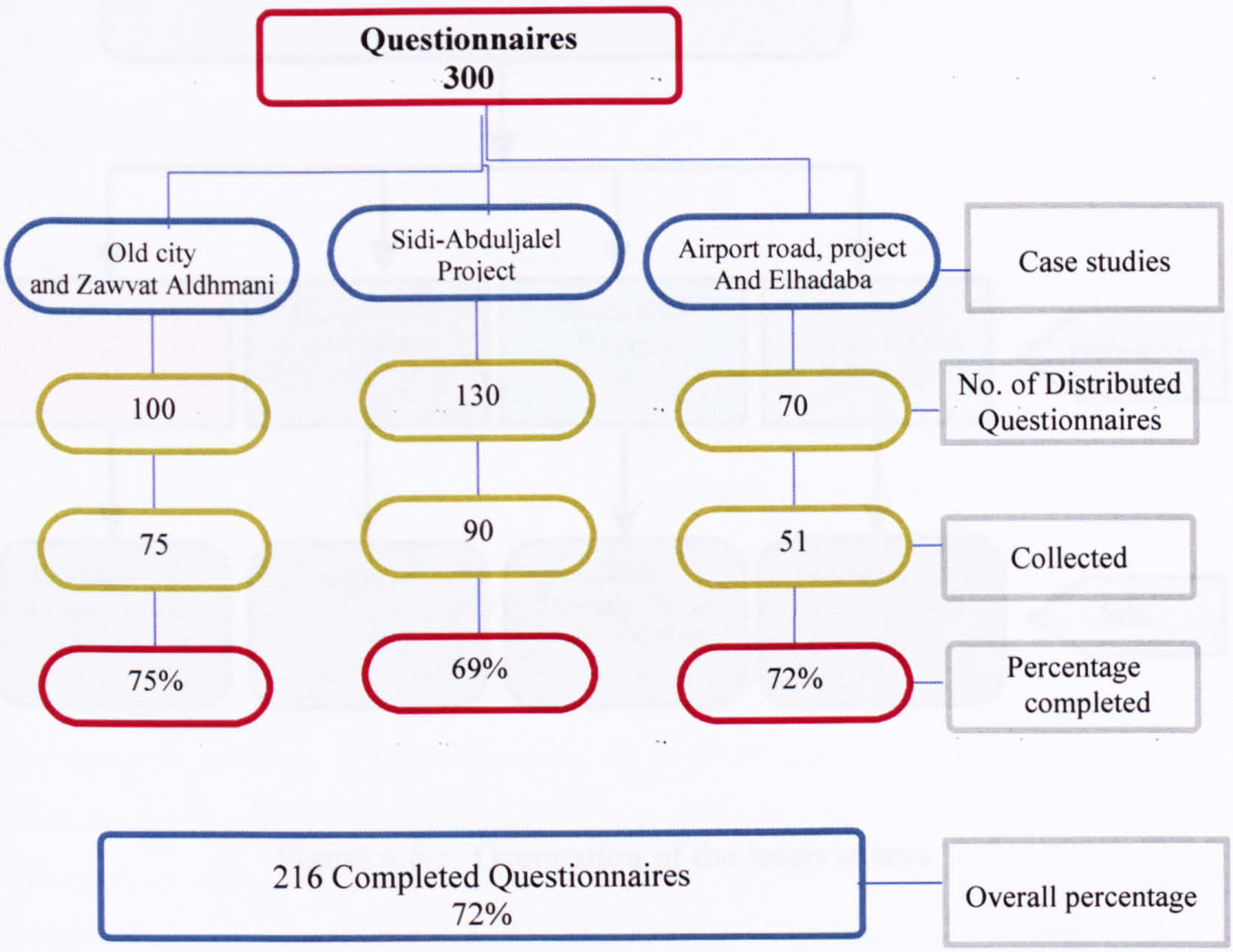


Figure 6.5 : Distributed and collected questionnaires and response

2. Professionals actor selection

The second source of data was from 16 interviews with the number of professional actors including architects, engineers, planning, academics, Key figures from the Municipality of Tripoli, Ministry of Housing, The General Peoples' Monitoring and Follow-up Secretariat and private offices these interviews were undertaken by the researcher (see Figure 6.6). The respondents were all are males except for 4 females 10 out of the 16 had more than 17 years of experience, and 6 had less than 10 years experience. The interviews lasted about 30-40 minutes.

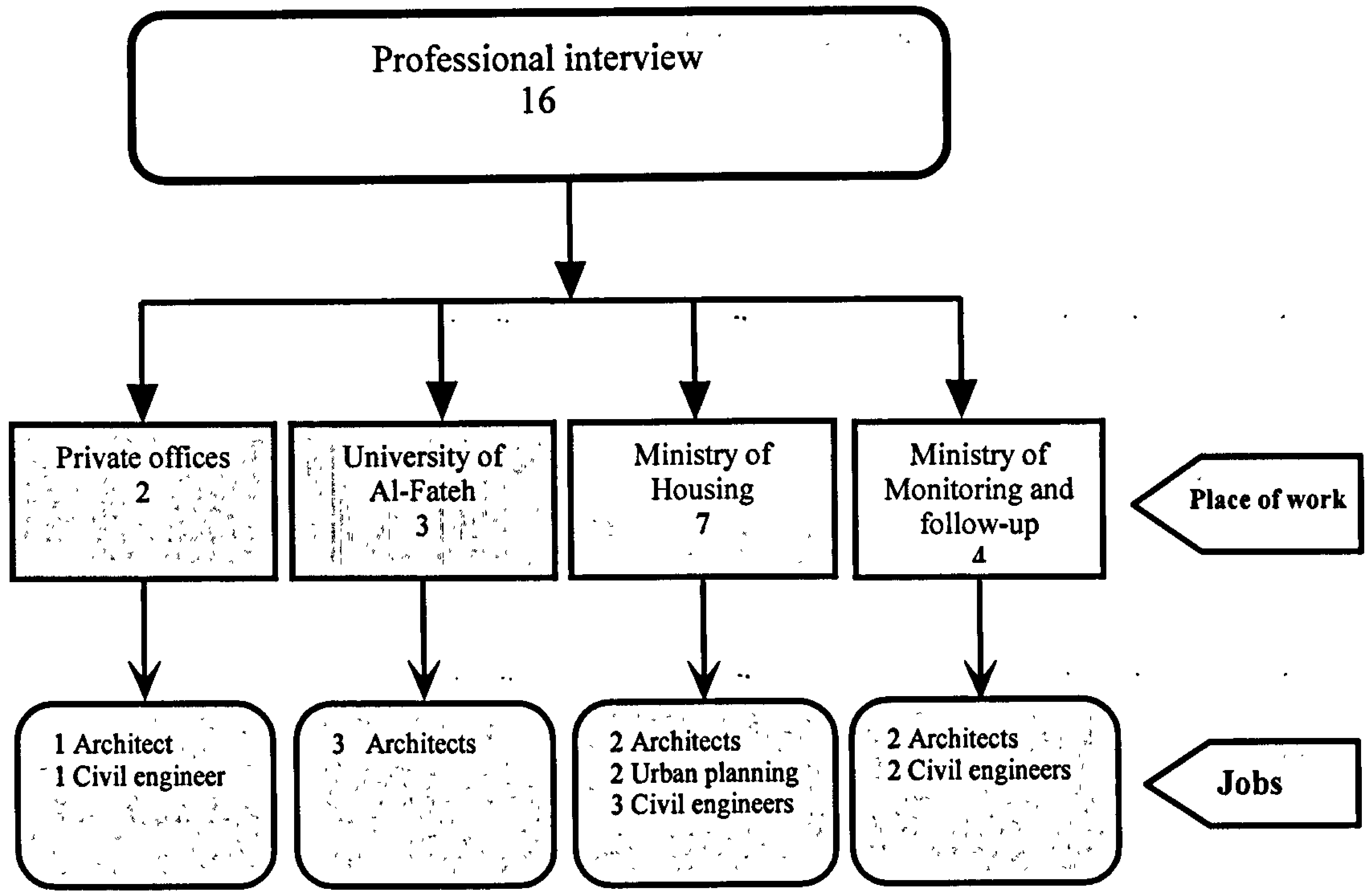


Figure 6.6 : Occupation of the interviewees

6.9 Data Analysis

Data analysis involves the checking, coding, ordering and structuring of data to produce knowledge and it is key to communicating the value of the findings (Nichols, 1991; Howard's, 1993; Awuor, 1996). Data from the questionnaire survey of households was coded and input on to a computer. The SPSS 10 /win computer package has been used for analysis of the data. The main steps in the quantitative data analysis were:

- Frequency distribution, this is considered to be as a simple means of exploring data by showing the frequency and the percentage of the variable categories. The findings were illustrated in tables;
- Measure of association: cross-tabulations were used to show the association between the variables. This method was used to establish certain links between some important features identified from the questionnaire's findings.

In terms of the analysis of qualitative data gathered from open-ended questions of the interviewees themselves. This was then followed by content analysis which involved coding the phrases that represented the derived themes. These phrases were counted and their frequencies were analysed using SPPS10 program.

6.10 Experts group

In order to achieve greater credibility and validity of the proposed guidelines, a group of 16 international and Libyan experts drawn from different disciplines (architects, planners and civil engineers) who have experience in housing design and construction were invited to validate the guidelines. The qualification, position held, and total number of years of experience is illustrated in Table 7.41.

6.11 Conclusion

The research strategy was developed on the basis of the studying traditional and contemporary housing through two periods(pre and past independence) in addition to the opinions and level of satisfaction of Tripoli citizens and professionals. Three neighbourhoods one representing the traditional housing and two representing the contemporary housing were visited in which data was collected by using the questionnaire (300 cases). The reliability and validity of the methods and techniques were tested before the final survey by using a pilot study.

The diagram below Figure(6.7) illustrating the methodology adopted for this research. As depicted in the diagram, the methodology consists of literature review, empirical study, preliminary conclusion, proposal guideline, validation of proposal guidelines and conclusions and recommendations.

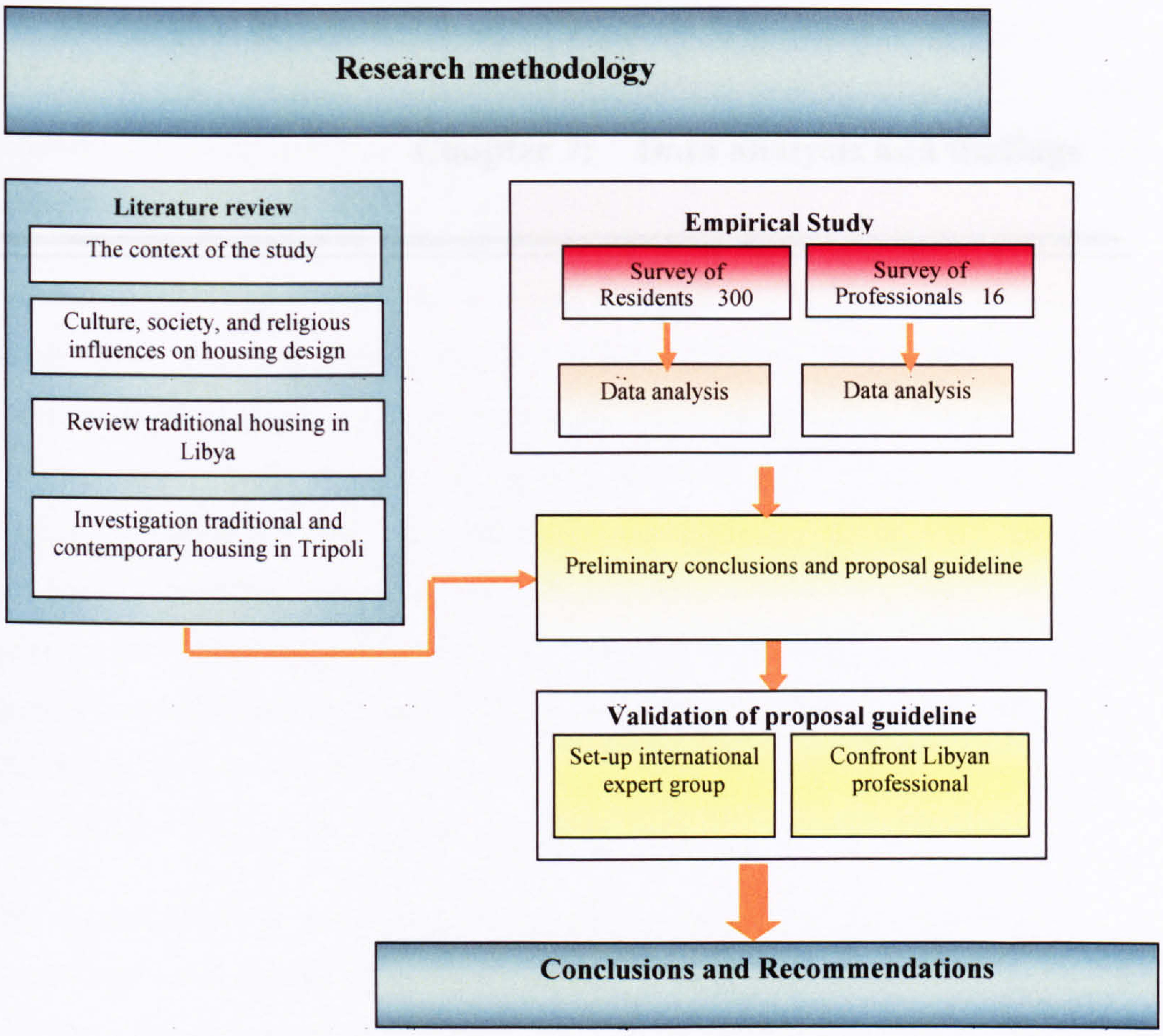


Figure 6.7 : Research methodology diagram

The result of the pilot study allowed the research to modify the questions used in the survey. In addition interviews with architects, planners, engineers and key figures, observation, photographic and a collection of documents by expert groups were used . The SPPS package was used for analysis. Research findings will be presented and discussed in the next chapter.

Chapter 7: Data analysis and findings

7.1 Introduction

This chapter considers detailed answers to the research questions posed in chapter 1 based on the data gathered by the methods described in Chapter 6 which, as already mentioned, was conducted in two areas of Tripoli, Libya. It also focuses on the interviews with private and professional actors.

Housing types and characteristics in Tripoli are discussed and reviewed in detail in Chapter five. However, this review left some aspects of the research questions unanswered or unclear, such as residents' opinions regarding traditional and contemporary housing in terms of degree of satisfaction about their own type of housing, building materials and suitability for climate, privacy and safety. It additionally identifies the reasons why most houses are altered once the residents move in, particularly in public housing. The areas for investigation were selected because it was felt that residents would be aware of the subject under investigation. The second source of information was the interviews with professionals, well-experienced in this particular field.

This chapter discusses issues related to household characteristics as follows:

- Previous and present circumstances of housing;
- Comparison between traditional and present housing in terms of choice of dwelling, security and safety, privacy (in terms of visual, acoustic, street, neighbours, separation of genders and interior space);
- Opinion about considerations of prestige relating to the home and the quality of finishing;
- The type of modifications made and the reasons for these in modern housing;
- Type of house preferred; and
- Viewpoints about the design of future housing.

In addition to the opinions of professionals, illustrated in terms of positive and negative aspects of both traditional and contemporary housing and the factors influencing contemporary housing design, the advice of professionals is also included on housing design in the future. In order to achieve this the survey of householders, selected to include all examples of traditional and contemporary housing in Tripoli City, collected data from a sample consisting of two groups:

- 216 householders who reside in these areas via a questionnaire survey;
- 16 professionals, representatives of a range of professional opinion, through interviews.

Separate questionnaires were used with the householder's elements and an interview schedule with the professional elements. The texts of these two instruments can be noted in appendix (1&2). In order to provide an answer to the main research questions, this chapter is divided into the following sections:

- Householder's survey;
- Professional interviews;
- Housing design guidelines proposed;
- Validation of guidelines;
- Conclusion.

Figure7.1. explains it is structure.

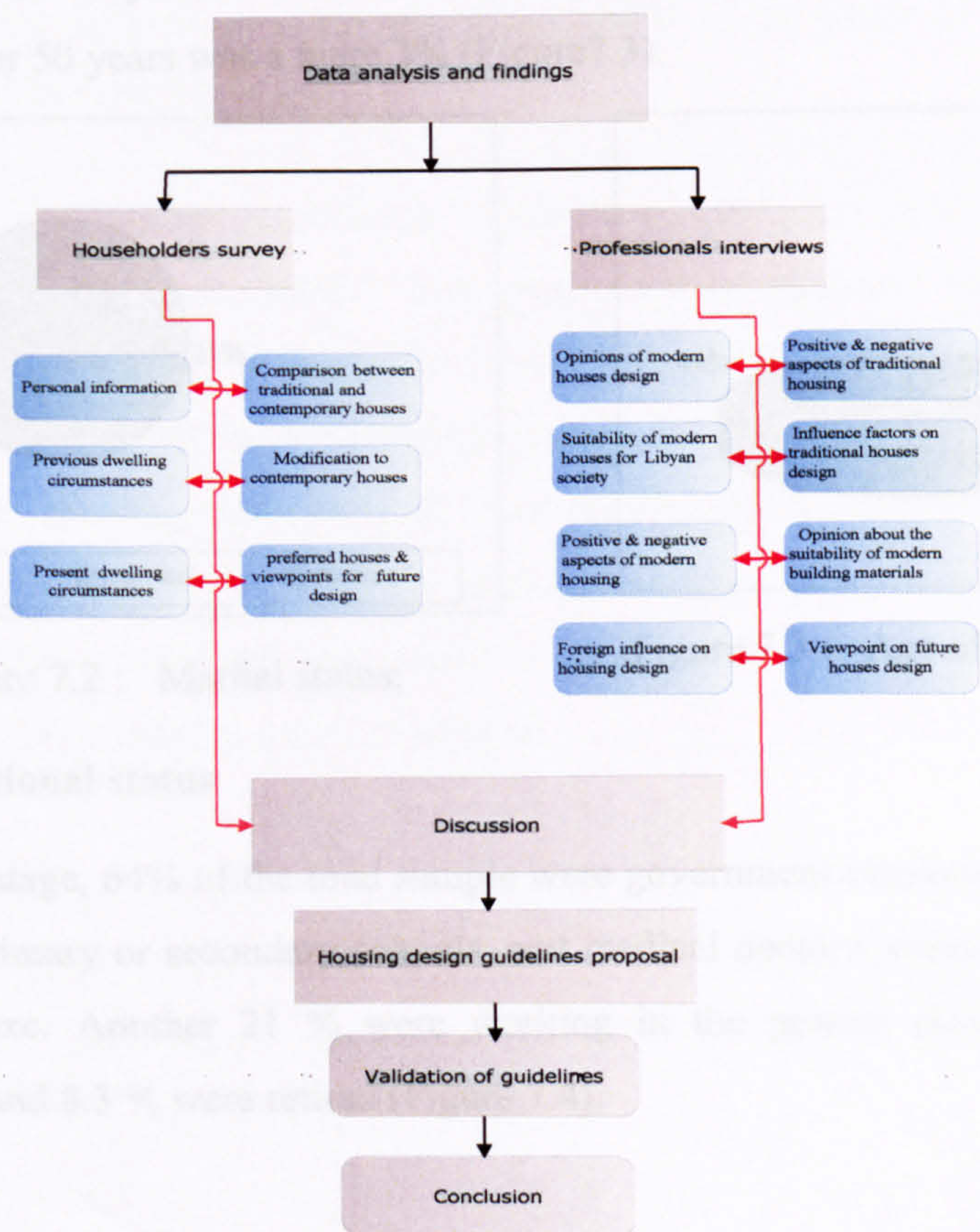


Figure 7.1 : Categorisation of data analysis explored in Chapter 7

7.2 Householders' Survey

The householder's survey is reported in six parts:

- General information on population of respondents;
- Previous dwelling circumstance;
- Present dwelling circumstance;
- Comparison between previous and present housing;
- Modification to the contemporary housing; and
- House type preference and viewpoint on future housing.

7.2.1 Part one: General Information on population of respondents

Q1, Q2 and Q3: Marital status and age of households

As can be observed from Figure 7.2, 78 % of the heads of households who responded were married, 21 % were single, while only 1.4 % were divorced. The predominant age group interviewed was over 40 (83%). The youngest age group, those between 20-30 years old was 14% and the smallest element in the sample i.e. those aged over 50 years was a mere 3% (Figure7.3).

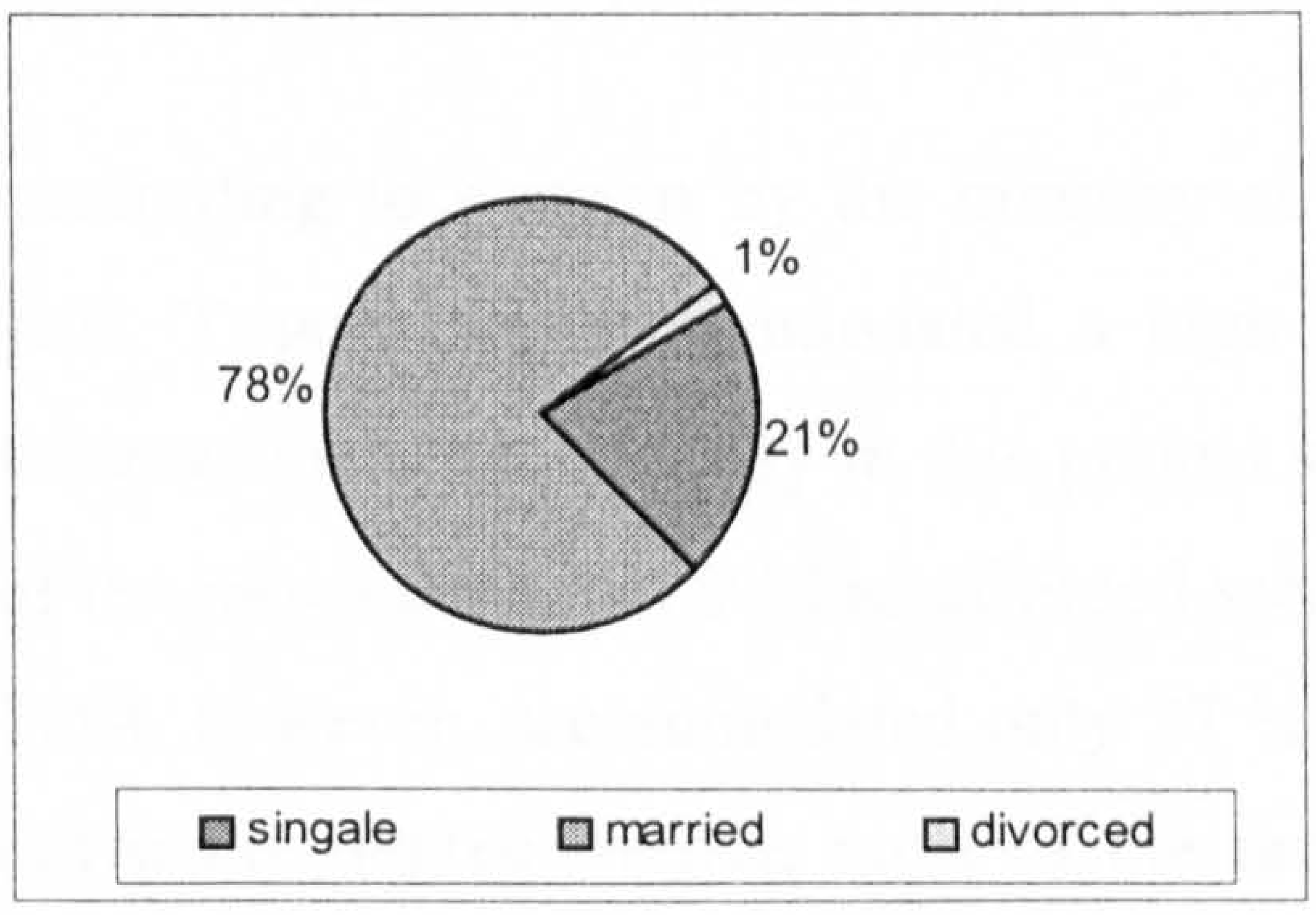


Figure 7.2 : Marital status;

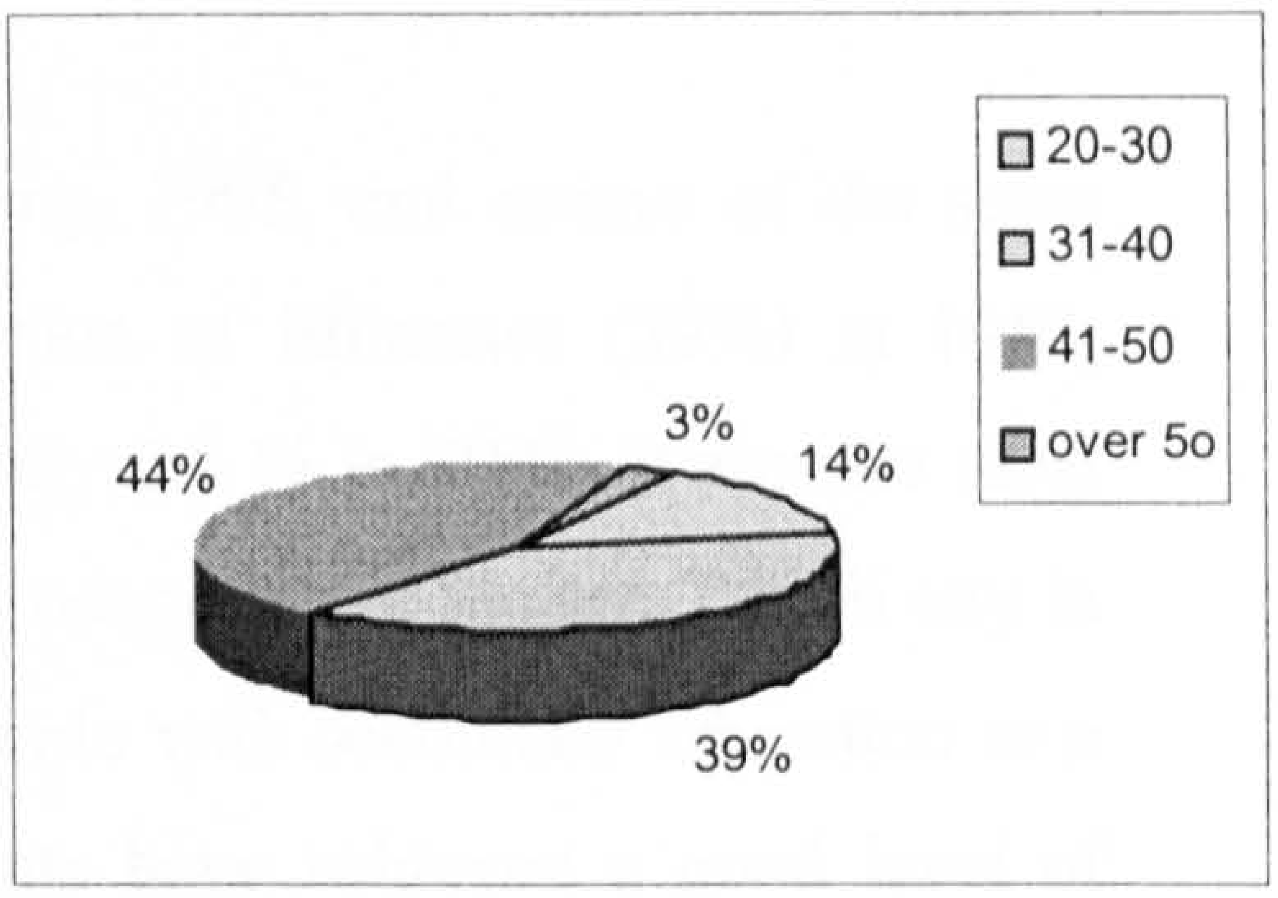


Figure 7.3 : Age of head of household

Q4: Occupational status

A high percentage, 64% of the total sample were government employees working as teachers in primary or secondary schools, and medical doctors working in hospitals and clinics exc. Another 21 % were working in the private sector, 7 % were unemployed and 8.3 % were retired (Figure 7.4).

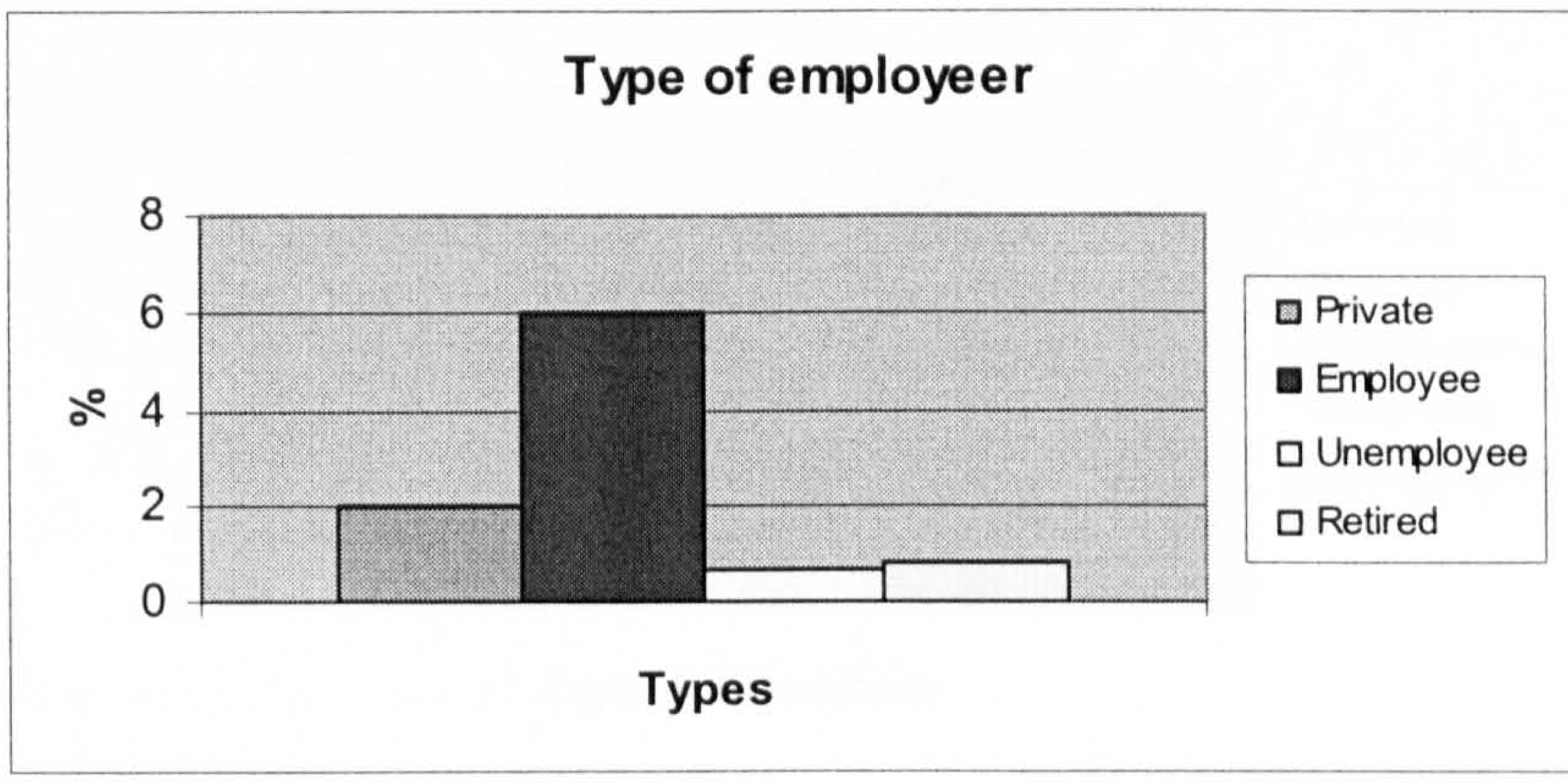


Figure 7.4 : Occupation of head of household

Q5: Educational status

The level of education is also considered to be an important factor that may influence respondents' opinions towards housing conditions and comparisons. According to Figure7.5, 37.7 % of the interviewees had a university degree, 16.7 % were postgraduate, 30 % secondary level, 21.5 % primary level and 5.6 % were illiterate. There were wide differences in the educational level of the heads of households in Tripoli city in 1984 (NCID 1995).

According to a report by the ministry of planning, 1995, and census of the same year, Tripoli city accommodated a high proportion of illiterates (59%) in 1984, whereas the areas of study in this project show only 5.6 % in 2002. It appears most of the respondents (84 %) had afforded secondary education or higher. Tripoli city in 1984, however, accommodated only 27 % of people with secondary education or a university degree. Hence, most of the respondents have achieved a good level of education, which gives them the ability to answer the questionnaire and further represents the more affluent sector of opinion.

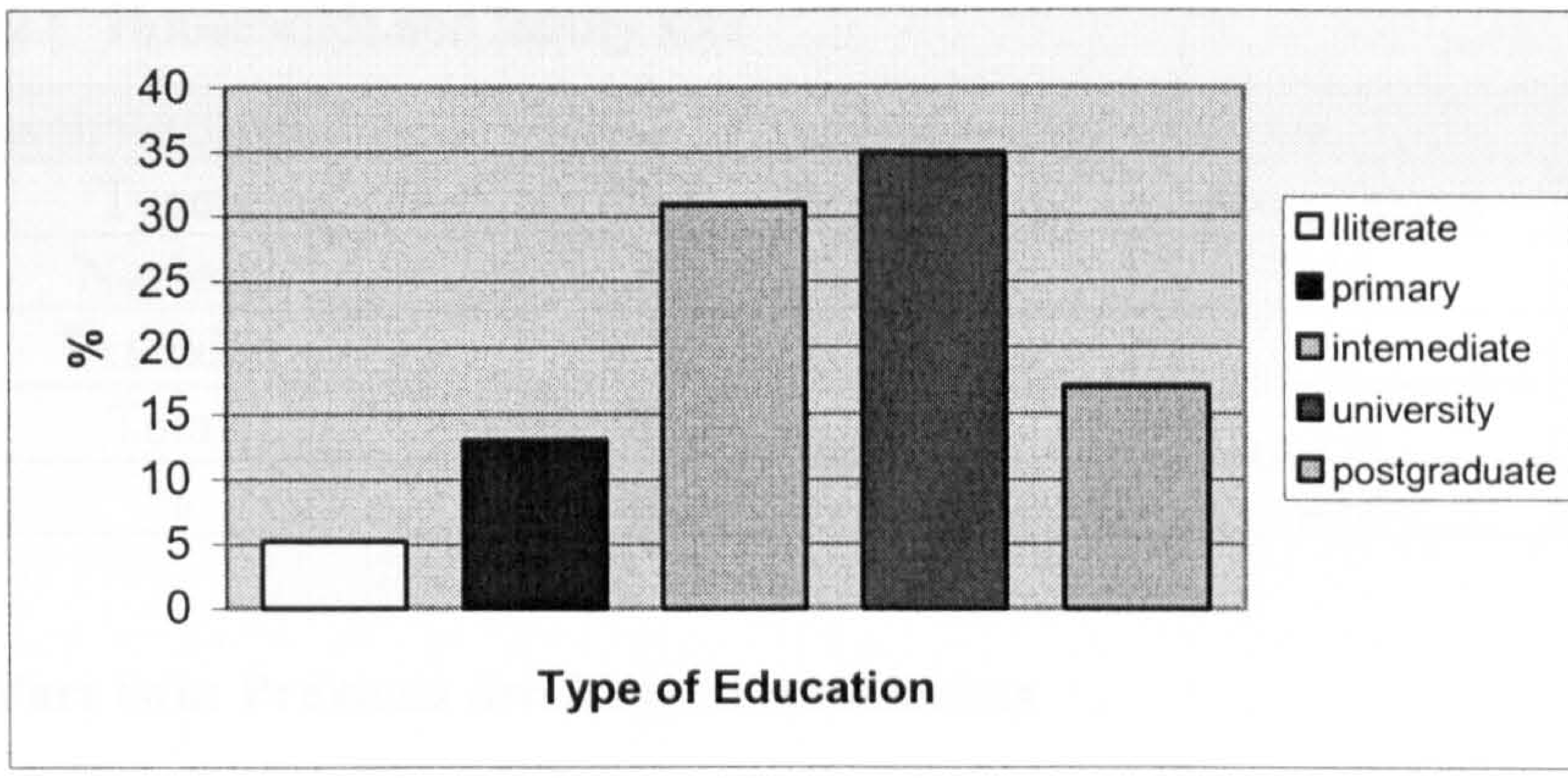


Figure 7.5 : Education levels of householders

Q6: Native-born residents of Tripoli

It is very important to ascertain whether all those interviewed are native to Tripoli or other cities. This is essential in order to make a correct evaluation of the information gathered during the fieldwork for, if most of respondents were born outside Tripoli, this means the answers are less district clear because they have little idea about traditional housing in the city. See Table 7.1.

Table 7.1 : Residents' place of birth

Place of birth	No: of household	%
Tripoli	162	75
Out of Tripoli	54	25
Total	216	100

The statistical analysis indicates that 75% of respondents were born in Tripoli and 25 % were born in other Libyan cities.

Q7 and Q 8: Type and size of Household

As a general feature of households interviewed, 86 % were nuclear families and 14 % were extended households. Most of the latter comprised married offspring living with their parents because these people were unable to build a house or obtain houses from the government. The size of these households varied from 3 to 8 persons or more, with the average being around 6 persons. 50 % of households consisted of 5-8 people, 26.3% of the samples consisted of households of 3-4 people and 23.6 % of households consisted of 8 persons or more Table 7.2.

Table 7.2 : Households and family size

Household structure	**No. Household and size**			**Total**
Types	3-4	5-8	More than 8	
Nuclear	57	99	30	186
Extended	0	9	21	30
Total	57	108	51	7
%	26.3	50	23.6	100

7.2.2 Part two: Previous dwelling circumstances

Q9 and Q10: Type of dwelling

Table 7.3 : Type of house

Type	%
Courtyard house	59
Altered Arabic house	23.6
Flat	6
Shanty	1.4

Responses about types of dwelling (Table 7.3) shows that 59% previously lived in courtyard houses, 6 % lived in flats, 23.6 % altered Arabic houses, and 1.4 % in shanty accommodation (self built).

Table 7.4 : Respondents period of residence

Type of houses	**No. of households and how long years resident**			
	1-5 years	6.10	10-15	More than 15
Courtyard	3	18	18	66
Altered Arabic house	3	0	9	27
Flat	12	12	9	12
Others	0	0	0	3

According to the result of analysis in Table 7.4, the vast majority of houses were of the courtyard type. The second most popular category of dwellings was attached followed by flats and villas. Most houses were built from local materials. Table7.4 also shows that 55.6 % had lived in their house for more than 15 years. 55% of these residents live in courtyard houses. 18.1 % had occupied their home between 10-15 years, 16.7 % between 6 and 10 years and 9.7 % from 1-5 years.

Q11: Kind of materials

Regarding the kind of materials used in construction of their houses, Figure 7.6 illustrates that 48.6 % used quarried lime stone block, sourced locally around the city, 23.6 % used natural stone, and 22.2 % used adobe. Only 4 % used hollow block (this system was introduced during the Italian period). In summary, most residents inhabit dwellings constructed from local materials.

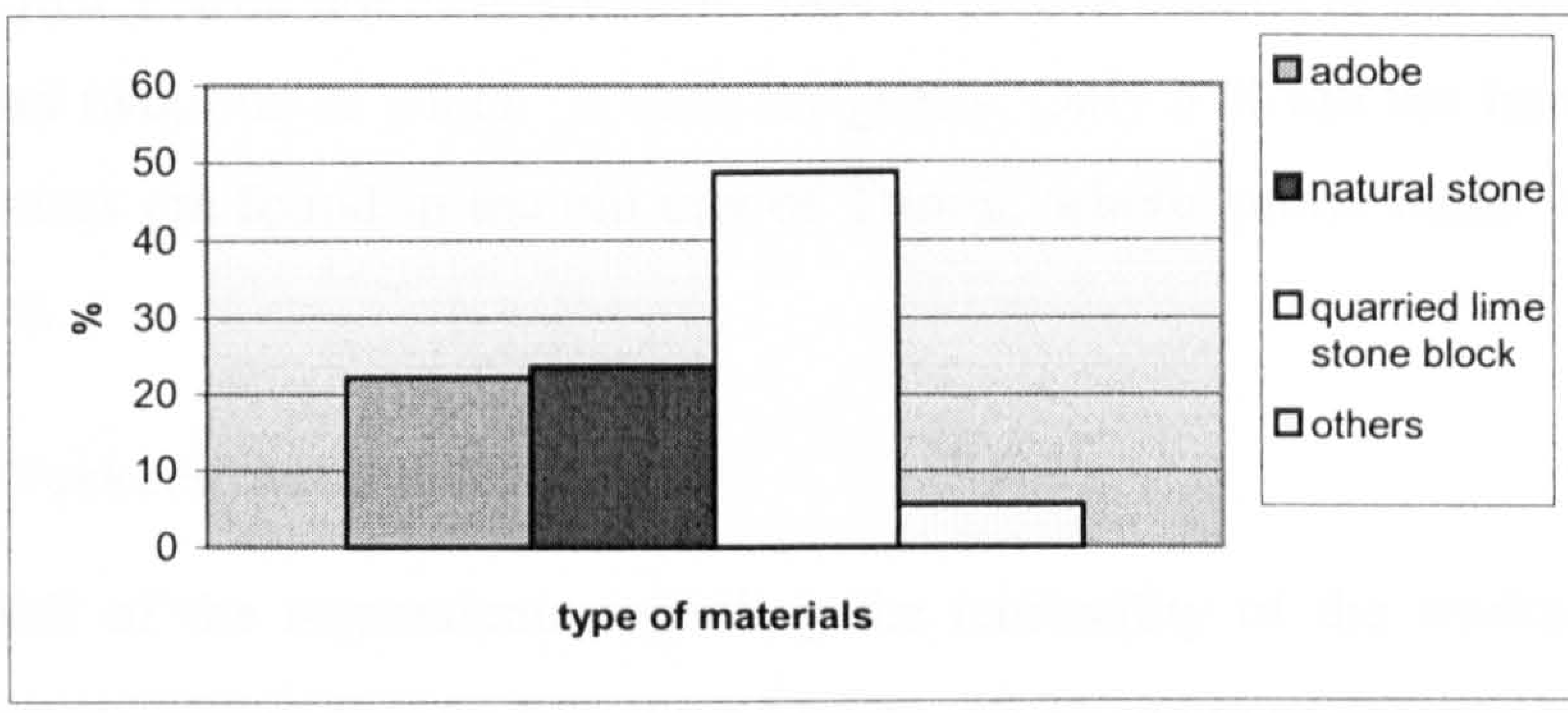


Figure 7.6 : Kind of material used in traditional house

Q12: Number of rooms in a traditional house

According to the results from the respondents of households in terms of the elements in their houses, the result is reported in (Table 7.5).

Table 7.5 : Number of rooms

Type	Numbers	%
Bedrooms	1	5.6
	2	18.1
	3-4	71
	More than 4	5.6
Guest room	1	91.7
	2	8.3
Living room	1	70.8
	2	12.5
	None	16.7
Kitchen	1	87.5
	2	9.7
	None	2.8
Bathroom	1	80
	2	15
	None	5

According to the result of analysis, 71 % of houses consist of 3-4 bedrooms. This figure is dominant in most houses in Libya, (El-Dwabe 1997). 18 % have two bedrooms, while 5.6 % have more than 4 bedrooms, and only 6 % have one bedroom. In terms of the guest rooms, 92 % of houses consist of one guest room used mostly for males and separated from the remaining elements of the house. 71% have one living room. This area is also used as a dining room, while 13 % have two living rooms found mostly in houses consisting of two storeys. Only 16 % do not have a separate living room. 88% of houses have one kitchen, whereas 10 % have two kitchens, and are usually used in houses whose occupants are an extended family. Just 3 % do not have kitchens. 88% of houses consist of one bathroom, while 15 % had two, one of which is used for guests. Only 5 % did not have bathrooms; such houses are found in the old city of Tripoli, where public baths were formerly available.

Q13: Workers' nationality

The result of the respondents regarding the nationality of the workers, who built these houses, shows that 65.5 % were Libyan, 30.3% were of foreign nationality and 4.2 % involved a combination of local and foreign workers. Table 7.6.

Table 7.6 : Workers' nationality

Workers Nationality	%
Foreign	30.3
Local	65.5
Combination	4.2

Q14: Satisfaction levels in terms of comfort during summer and winter

According to the respondents, 75 % were satisfied and 25 % were dissatisfied. Table 7.7

Table 7.7 : Percentage of those satisfied in terms of comfort

Sense of comfort during summer and winter	%
Yes	75
No	25

Q15: Satisfaction levels in terms of the amount of ventilation and lighting

Table 7.8: Shows that 54.2 % were very satisfied in terms of the amount of lighting, 40 % were satisfied and 5.6 % were dissatisfied.

Table 7.8 : Satisfaction level regarding ventilation and lighting for traditional house

Satisfaction level	%
Very satisfied	54.2
Satisfied	40.3
dissatisfied	5.5

According to Table 7.8, the majority of house owners were either very satisfied or satisfied with their previous houses. This is likely to be due to the role of the courtyard as mentioned in Chapter five.

7.2.3 Part Three: Present dwelling circumstances

Q16: Reasons for moving to contemporary housing

The question is aimed at establishing the reasons that led householders to move to their present house. It showed that 40.3 % needed more space, whereas 29.3 % moved to reside near their jobs and / or public services. 13.9 % stated that their old houses needed maintenance and 8.3 % preferred living near relatives. Only 2.8 % had problems with neighbours, 2.8 % preferred private houses, and the percentage of those who had no reason to move was 2.8 % (Table 7.9).

Table 7.9 : The reason for moving to present house

Reasons	No. Households	%
More space	87	40.3
Near to job and services	63	29.2
Old house needed maintenance	30	13.9
Live near relatives	18	8.3
Problem with neighbours	6	2.8
Others (preferred private house)	6	2.8
No reason	6	2.8
Total	216	100

Table 7.9 demonstrates that the majority of respondents siting the reasons for moving to their present house as the need for more space and to be close to services. In addition, most of their old houses required maintenance.

Q17: Type of dwelling

In terms of the type of dwelling it is evident from Figure 7.7 that 41.7 % of households occupy flats, while 22.2 % occupy courtyard houses. 22.2 % of households occupy single-storey villas, whilst 8.6 % occupy the altered courtyard houses and 5.6 % occupy villas consisting of two storeys or more.

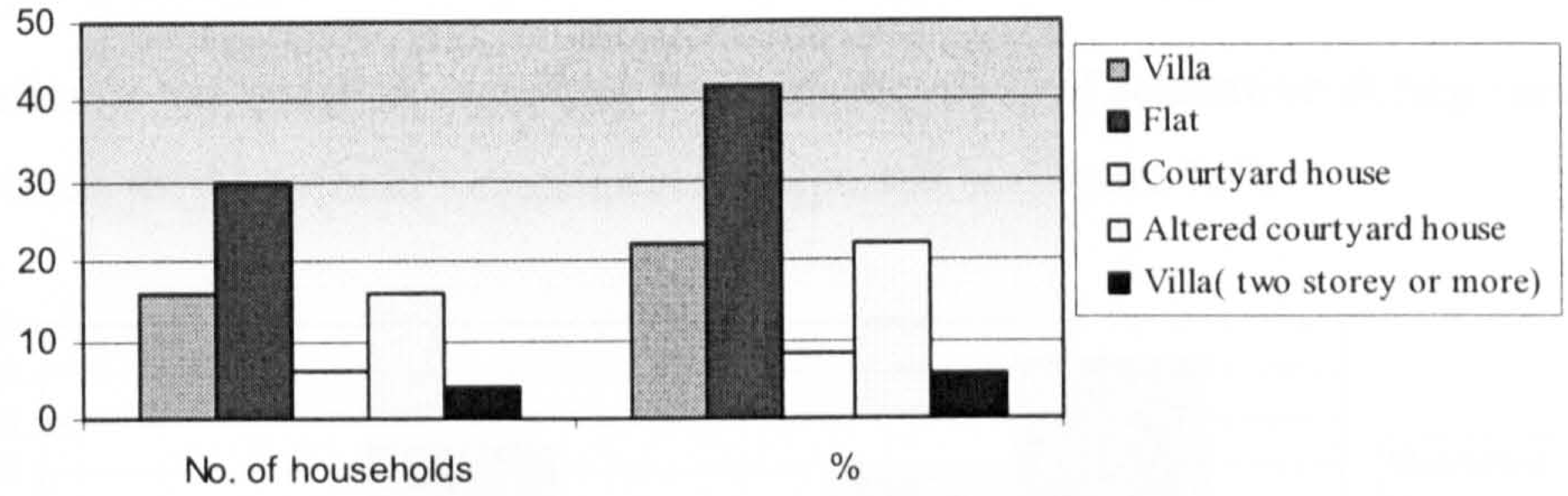


Figure 7.7 : Type of dwelling currently occupied

Q18: Number of rooms in contemporary houses (currently occupied)

In terms of the elements in houses, the results are reported in Table 7.10.

Table 7.10 : Number of rooms in contemporary house

Type	Numbers	%
Bedrooms	1	7
	2	21
	3-4	70
	More than 4	2.8
Guest room	1	71
	2	27
Living room	1	81
	2	15
	None	4.2
Kitchen	1	90
	2	9.7
Bathroom	1	21
	More than two	1.4
	2	78

70 % of houses consist of 3-4 bedrooms, 21 % two bedrooms, 2.8 % had more than four bedrooms while only 7 % had one bedroom. In terms of guest rooms, 71 % had one guest room, while 27 % of houses consist of two guest rooms, one of which is

western style. In terms of living room, 81 % of houses consist of one living room, whereas 15 % consist of two living rooms with one of them used as a dining area. Only 4 % did not contain a living room. 90 % of houses consist of one kitchen, whilst just 10 % had two kitchens, which were mostly found in private houses. In terms of bathrooms, 78 % of houses had two bathrooms, while 21 % had one bathroom. Only 1.4% had more than two bathrooms.

Q19: Satisfaction levels in terms of sense of comfort during summer and winter

In relation to the question regarding the domestic sense of relaxation during summer and winter, the household's responses are reported in (Figure 7.8).

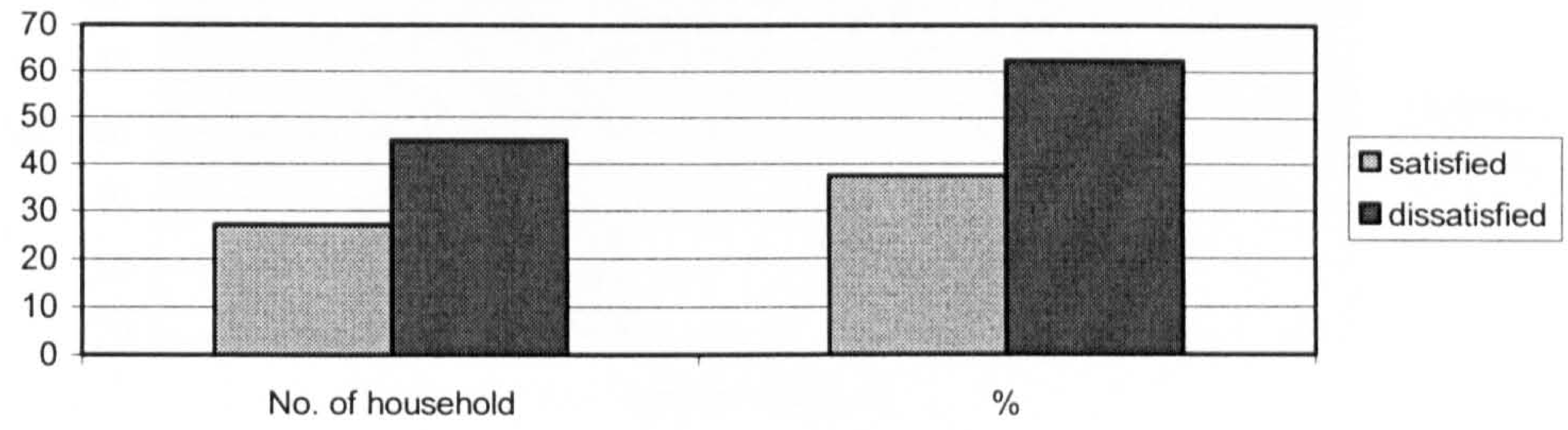


Figure 7.8 : Satisfaction level in terms of comfort during summer and winter

The majority i.e. 75 % of the respondents were dissatisfied, while 25 % of households were satisfied.

Q20: Satisfaction levels in terms of the rate of ventilation and lighting

In terms of the rate of ventilation and lighting in houses, (Figure 7.9) explains that 62.5 % of households consider this to be good and 37.5 % are satisfied.

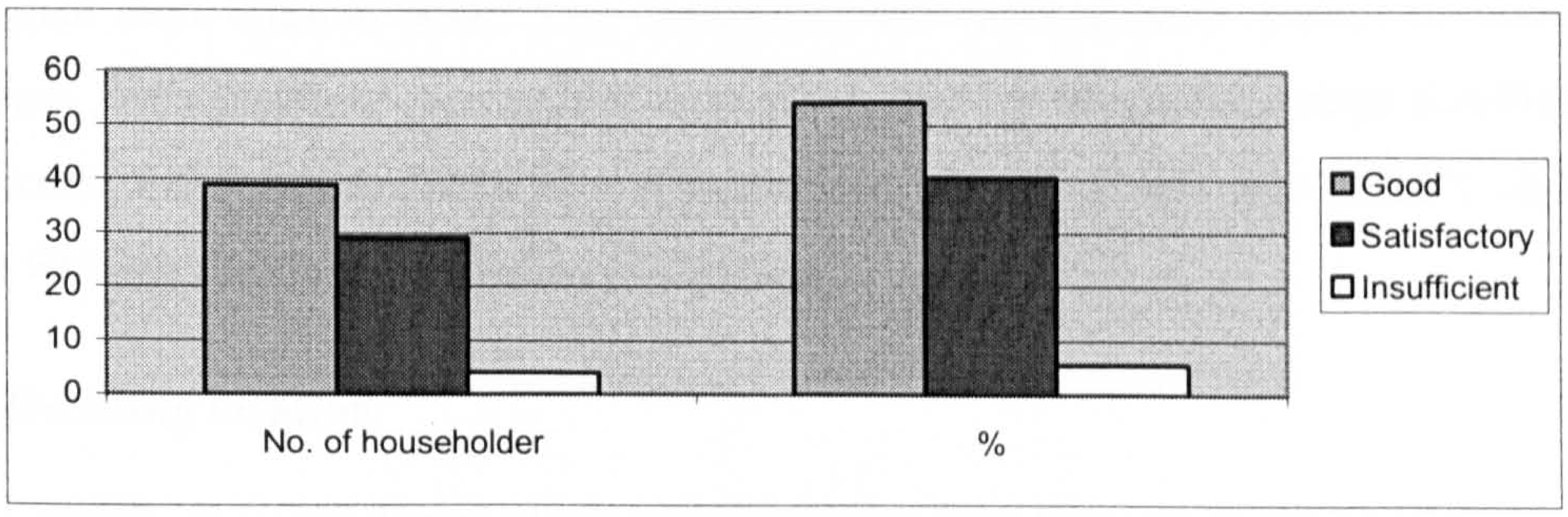


Figure 7.9 : Satisfaction level regarding ventilation and lighting

According to a statistical analysis in (Figure 7.9), all people were satisfied with ventilation and lighting because most openings in the house face outwards and are large in size.

Q21: Workers' nationality

In terms of the question about workers nationalities, Figure 7.10 identifies 100 % of workers as foreign.

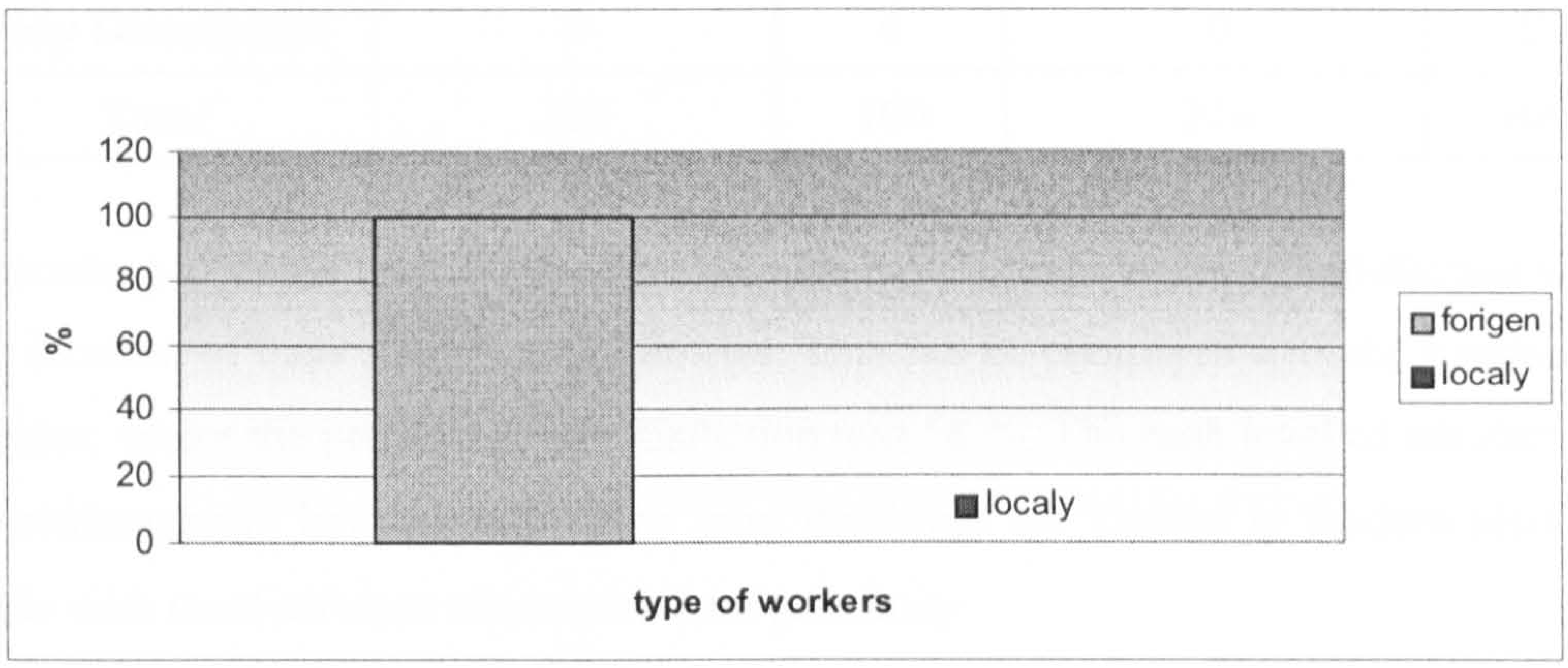


Figure 7.10 : The workers' nationality

According to a statistical analysis, all construction workers were foreign; this fact has shaped the new model of houses built in Libya.

7.2.4 Part four: Comparison between traditional and contemporary housing

Q22: Household's opinion about choice of dwelling

The selection of dwelling is fundamental for users. Households were asked to indicate their opinion about their traditional and contemporary houses in terms of choice. Four questions were posed to examine users' feelings about their dwelling to discover which components of the houses are relevant to the respondent's choice, and whether they are satisfied or dissatisfied.

a) Dwelling location

The results of respondents' views pertaining dwelling location in terms of proximity to/ from public services, such as schools, mosques, places of employment and other public services is summarised in Table 7.11.

Table 7.11 : Satisfaction levels concerning the location of dwelling

Satisfaction level	Traditional house		Contemporary house	
	No. Households	%	No. Households	%
Very Satisfied	51	23.6	48	22.2
Satisfied	75	34.7	123	56.9
Neutral	18	8.3	27	12.5
Dissatisfied	72	33.3	18	8.3
Very Dissatisfied	0	0	0	0
Total	216	100	216	100

According to Table 7.11, 80 % of households have a high degree of satisfaction with the location of their contemporary houses. This can be compared with the traditional houses; where the percentage of satisfaction was 58 %. The high level of satisfaction in contemporary housing is because most dwellings are located in modern planned areas with most services situated in close proximity.

b) Households' opinion about the overall form of the dwelling

According to the households' responses in terms of their level of satisfaction with traditional and contemporary houses, their responses are reported in table 7.12.

Table 7.12 : Satisfaction levels in terms of type of dwelling

Satisfaction level	Traditional		Contemporary	
	No. Households	%	No. Households	%
Very Satisfied	21	9.7	33	15.3
Satisfied	84	38.9	120	55.6
Neutral	33	15.3	39	18.1
Dissatisfied	78	36.1	24	11.1
Very Dissatisfied	0	0	0	0
Total	216	100	216	100

As can be seen from Table 7.12, 71 % of households were very satisfied or satisfied with contemporary houses, compared with only 48.6 % for traditional houses. The high level of satisfaction with contemporary houses refers to the use of new construction technology systems which created a variety of house types, each differing in size, while traditional houses are merely two or three types at most.

c) Households' opinion about the area of dwelling

Households' responses in terms of satisfaction level with area of traditional houses and contemporary houses are displayed in Table 7.13

Table 7.13 : Satisfaction levels about the area

Satisfaction level in terms of area	Traditional		Contemporary	
	No. Households	%	No. Households	%
Very Satisfied	33	15.3	36	16.7
Satisfied	72	33.3	126	58.3
Neutral	21	9.7	15	6.9
Dissatisfied	90	41.7	39	18.1
Very dissatisfied	0	0	0	0
Total	216	100	216	100

According to the results in Table 7.13, 75 % of households were very satisfied and satisfied in terms of the areas in the contemporary house, whereas 18 % were dissatisfied. This can be compared with traditional houses where the satisfaction level was only 32 %, whilst 42 % were dissatisfied. The biggest difference in satisfaction level about area between traditional and contemporary houses is the variety of sizes in new designs. In addition, there is a perception that the majority of contemporary houses are occupied by nuclear families. In traditional houses construction technology constrains the expansion area and most families who occupy these houses are extended families.

Q23: Satisfaction levels concerning security and safety

Shawesh (1996) pointed out in his study that in architecture, design for safety is not a novel concept. People have long been designing dwellings to protect themselves from sources of danger. In ancient civilizations, humans built their shelter as their base for safety and privacy. This section will deal with safety from burglary, street traffic, and the location of children's schools and play areas. The householders' responses are summarised in Table 7.14.

Table 7.14 : Satisfaction levels concerning security and safety

Satisfaction level	Traditional		Contemporary	
	No. Households	%	No. Households	%
Very Satisfied	27	12.5	51	24
Satisfied	150	69.4	45	21
Neutral	15	7	12	5
Dissatisfied	24	11	108	50
Very dissatisfied	0	0	0	0
Total	216	100	216	100

According to the statistical analysis in Table 7.14, the great majority of householders were satisfied or very satisfied with traditional houses (82 %), while 11 % were dissatisfied. This can be compared with contemporary houses where 45 % were satisfied /or very satisfied, with 50 % dissatisfied ; only 7% gave no response.

According to observation during the fieldwork, the high level of satisfaction in traditional dwellings refers to security and safety measures, which are expressed in the design character, for example window location at a high level, which provides defence and shielding (Nour, 1979). Neighbours providing strong social bonds, and the extended family provide security. The relationship between the courtyard and the street system also plays a critical role, as mentioned in Chapter five. The increase in the crime rate in most contemporary areas was a direct result of the neglect of security factors in the residential layout of these areas. This layout can be described as an open one, which means that any strangers can pass through the residential area without any restriction. Most residents do not know each other, so that the community is weaker and this resulted in the lack of security and the increase of petty crimes such as theft, mugging and burglaries, in most of the modern residential areas. The layout of modern residential areas is grid pattern, which is vehicle-oriented, encouraging vehicular movement by providing straight and wide streets. This however, resulted in the increase of car accidents inside the residential area. The planners of the contemporary residential area were concerned with the provision of dwelling units rather than looking at the outside area. Observational evidence demonstrates that people reinforce doors, windows and add metal doors which turn their homes more like prisons, especially those who inhabit flats (Figure 7.11).

Figure 7.11 : Reinforced windows, balcony and some closed-off balconies

a) Satisfaction level in terms of children's school location

The results of households' respondents are shown in Table 7.15, which explains satisfaction level with children's school location.

Table 7.15 : Satisfaction level with children's schools' location

Satisfaction level	Traditional		Contemporary	
	No. Households	%	No. Households	%
Very Satisfied	36	16.7	36	16.7
Satisfied	72	33.3	159	73.6
Neutral	6	2.8	0	0
Dissatisfied	102	47.2	21	9.7
Very dissatisfied	0	0	0	0
Total	216	100	216	100

According to the analysis the majority of households were either very satisfied or satisfied with contemporary houses.

b) Satisfaction level in terms of safety from traffic:

Respondents were asked about safety from traffic. Table 7.16 displays the satisfaction level.

Table 7.16 : Satisfaction level in terms of safety from traffic

Satisfaction level	Traditional		Contemporary	
	No. Households	%	No. Households	%
Very Satisfied	54	25	24	11.1
Satisfied	123	57	72	33
Neutral	6	2.8	0	0
Dissatisfied	33	15.2	120	55
Very dissatisfied	0	0	0	0
Total	216	100	216	100

The analysis of the households' responses indicates that 82 % were either very satisfied or satisfied about safety from traffic in connection with traditional houses. This is because the streets in the neighbourhoods are free of cars, especially in Tripoli's old City. Merely 44 % were satisfied or very satisfied with the contemporary neighbourhood house. According to a discussion with householders about satisfaction level with contemporary houses, which was less than traditional; they said, "the layout of the residential areas encourage residents to use cars inside the residential area, and this results in an increase in car accidents".

c): Satisfaction levels in terms of safety in children playing area location:

Households' response regarding their level of satisfaction with the safety in children's play area location is reported in Table 7.17.

Table 7.17 : Satisfaction level in terms of safety in children's play area location

Satisfaction level	Traditional		Contemporary	
	No. Households	**%**	**No. Households**	**%**
Very Satisfied	33	15.3	6	2.8
Satisfied	96	44.4	60	27.7
Neutral	15	6.9	9	4.2
Dissatisfied	72	33.3	141	65.2
Very dissatisfied	0	0	0	0
Total	216	100	216	100

As can be noted in Table 7.17, the results indicate that there is a greater level of satisfaction with traditional houses. This is because the courtyard offers a play area for children without having to leave the house, compared with the contemporary house where children mostly play in the street, which increases the risk of accidents.

Q24: Households' opinion of the privacy of their houses

The influence of the physical characteristics of the dwelling design on users' privacy, as perceived by the respondents will in their section, reveal three types of privacy of concern to households, internal visual, acoustic and privacy from neighbours and passers-by.

a) Internal visual privacy

The statistical analysis provides a clearer picture about respondents' satisfaction with traditional and contemporary houses in terms of visual privacy. This is reported in Table 7.18.

Table 7.18 : Satisfaction level in terms of internal visual privacy

Satisfaction level	Traditional		Contemporary	
	No. Households	%	No. Households	%
Very Satisfied	54	25.0	39	18.1
Satisfied	96	44.4	75	34.7
Neutral	6	2.8	0	0
Dissatisfied	60	28	104	47.2
Very dissatisfied	0	0	0	0
Total	216	100	216	100

According to Table 7.18, the majority of households are very satisfied or satisfied with the traditional house. This is because the main concern of users is for visual privacy, mainly for shielding female members from male strangers' eyes with separation between male reception areas and a household's female members. They also achieve privacy from the position of the main entrance (more details of this requirement in chapter five). On the other hand, in the contemporary dwelling no attention was given to this type of privacy when it was designed, especially in public houses. The segregation between female and male areas is negligible, because the main doors are located very close to the male guest room. It means that a visitor in a guest room can easily overlook any member of the household leaving or entering the dwelling.

b) Internal acoustic privacy

In addition, visual privacy of female household members from the view of male visitors, and the acoustic privacy from visitors is also of great concern in Libyan society (Shawesh 1996). The majority of people in the study sample were concerned about acoustic privacy, particularly between male and female besides children. Statistical analysis regarding households' satisfaction level on acoustic privacy in both traditional and contemporary housing is reported in Table 7.19.

Table 7.19 : Satisfaction level in terms of internal acoustic privacy

Satisfaction level	Traditional		Contemporary	
	No. Households	%	No. Households	%
Very Satisfied	48	22.2	12	5.6
Satisfied	102	47	90	41.6
Neutral	6	2.8	27	12.5
Dissatisfied	60	27.7	87	40.5
Very dissatisfied	0	0	0	0
Total	216	100	216	100

As can be remarked from Table 6.19, the majority of households were very satisfied or satisfied with traditional houses, particularly those located in the Old City of Tripoli, where the thick walls and distance between female and male areas play an important role in achieving this privacy. Satisfaction was low in contemporary houses because most do not have insulation material and the guest room and kitchen are located near to the main entrance, especially in public housing.

c) Privacy in terms of physical separation between brothers and sisters

The other most significant concept of house design in relation to social life is privacy in terms of separating brothers and sisters. All Muslims require privacy for separate brothers and sisters when they reach a certain age and when they sleep this must be achieved, at least with covers or curtains if it is not possible to offer sufficient separate rooms (Said, 1985). The householders' responses in terms of their level of satisfaction with the separation between brothers and sisters are reported in Table (7.20).

Table 7.20 : Satisfaction level in terms of separation between brothers and sisters

Satisfaction level	Traditional		Contemporary	
	No. Households	%	No. Households	%
Very Satisfied	21	9.72	54	25
Satisfied	75	34.72	138	63.9
Neutral	9	4.16	9	4.2
Dissatisfied	111	51.38	15	6.9
Very dissatisfied	0	0	0	0
Total	216	100	216	100

The results in Table 7.20 indicate the high level of satisfaction found in contemporary housing. According to the field study, 86% of households were nuclear families, while only 13.9% were extended families, meaning that most houses are used by nuclear families. This allows use of more than one room for children, compared with that available in traditional houses, where the level of satisfaction was less than with contemporary dwellings. Here, the households referred to the small area and the fact that most houses are used by extended families, which means that it is not possible to utilise more rooms for children; privacy can be achieved by using curtains.

d) Households' opinion about privacy from neighbours and the street (views and noise)

Several scholars have attempted to solve the problem of maintaining privacy and avoiding neighbours seeing into houses from the street or neighbouring houses. Hakim's study (1986) of the Arab Islamic City in Tunisia, noted that the location of doors and windows, which involved air and light was an important factor, but the right not to be overlooked was the main requirement. Shawsh (1996) points out in his study that external house walls in traditional Islamic cities were high to ensure that the domestic interior could not be overlooked. Any openings on the ground floor were small and covered by grilles and were above the line of vision of the passer-by (Betherbridge,2002). These solutions were based on Islamic principles and reveal the socio-cultural need for compatibility between Islamic principles and the architectural environment.

In Tripoli, particularly in the old City, there are elements and design features, which increase the protection of the household from neighbours, street view and noise, largely through the restriction of window position and placement of entrances (see figures 5.30 & 5.32 in chapter five) which are allocated in such a way as to conceal the household from both the street and neighbours. The placing of a skylight between houses offers a further solution to the problem of ensuring privacy. In observing the traditional layout of the Old City, the street offered privacy through the minor local streets and alleys. In addition, the buildings are all of the same height and the rooftop is surrounded by walls to a height of 2 metres, which also affords privacy when members of a household use it for sleeping during the summer nights. The result of householders' responses regarding the satisfaction level in terms of privacy from neighbours and street for both traditional and contemporary housing are recorded in Table 7.21.

Table 7.21 : Satisfaction level in terms of privacy from neighbours and streets

Satisfaction level	Traditional		Contemporary	
	No. Households	%	No. Households	%
Very satisfied	96	44.4	15	6.94
Satisfied	60	27.8	75	34.73
Neutral	9	4.2	0	0
Dissatisfied	51	23.6	126	58.33
Very dissatisfied	0	0	0	0
Total	216	100	216	100

Table 7.21 Clearly illustrates high satisfaction levels in the traditional houses because they were designed so that none of their windows overlooked any other houses. 58 % of householders were dissatisfied with contemporary houses because they have been designed without consideration for privacy or the Islamic way of life.

Q25: Households' opinions of house in terms of considerations prestige

a) Households' opinions of house in terms of suitability for climate during summer and winter

The householders' responses in terms of their opinion about the suitability of traditional and contemporary housing to climate during summer and winter are reported in Table 7.22.

Table 7.22 : Satisfaction level in terms of suitability to climate

Satisfaction level	Traditional house		Contemporary	
	No. Households	%	No. Households	%
Very satisfied	33	15.27	27	12.50
Satisfied	129	59.72	75	34.72
Neutral	9	4.16	12	5.55
Dissatisfied	45	20.8	102	47.22
Very dissatisfied	0	0	0	0
Total	216	100	216	100

The high satisfaction level found in traditional houses (75%) refers to many factors such as courtyard and building material suitable to the climate. This compares with contemporary houses where the satisfaction level was no more than 38%, because the new materials and house forms are less suitable for the prevailing climate.

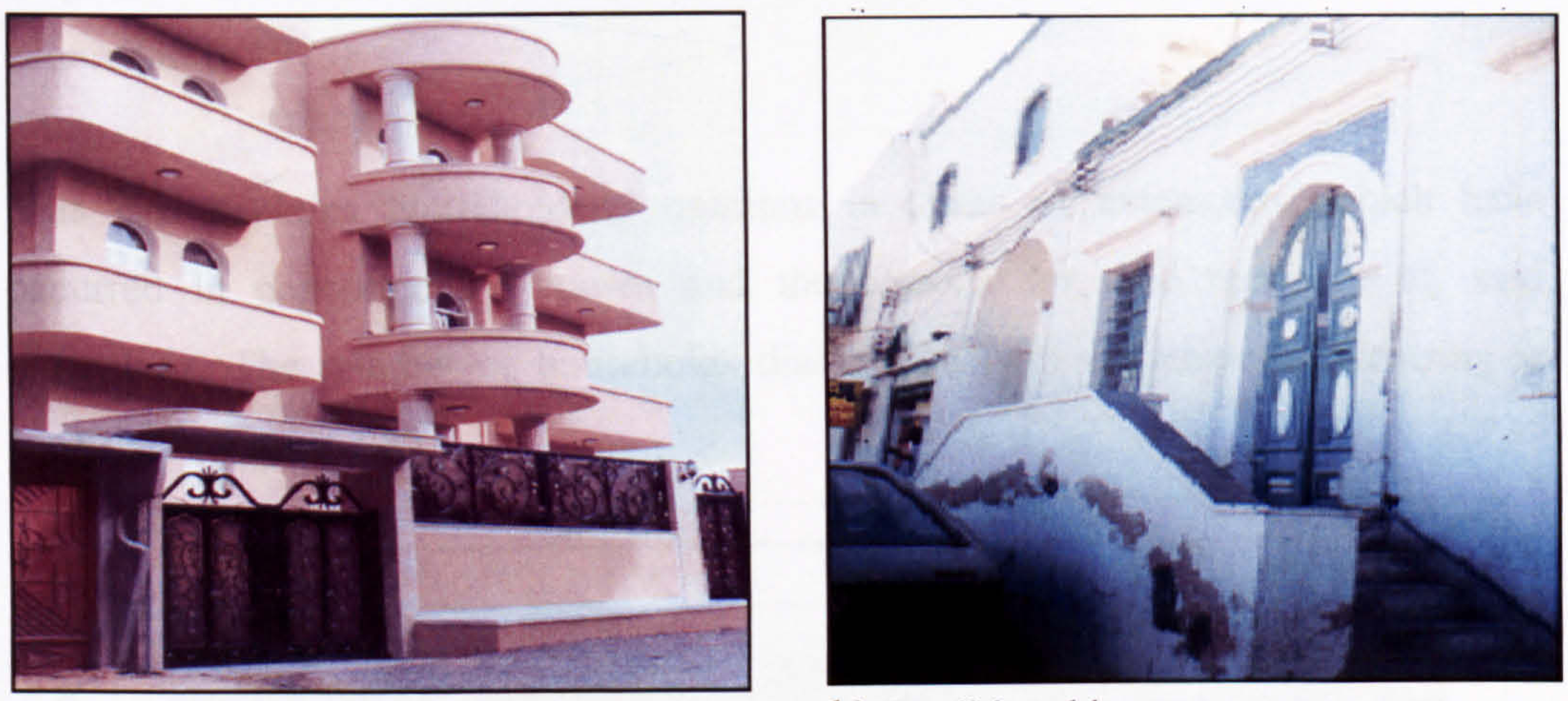
b) Households' Opinion about external façade of traditional and contemporary houses

Households' responses during the fieldwork regarding their opinion about external façade in both contemporary and traditional housing are reported in Table 7.23.

Table 7.23 : Satisfaction level in terms of external façade

Satisfaction level	Traditional house		Contemporary	
	No. Households	%	No. Households	%
Very satisfied	9	4.2	42	19.4
Satisfied	96	44.4	135	62.5
Neutral	6	2.8	12	5.6
Dissatisfied	105	48.6	27	12.5
Very dissatisfied	0	0	0	0
Total	216	100	216	100

As can be seen in the previous table the great majority of householders (82%) were extremely satisfied with the contemporary houses referring to the more exciting aesthetics and materials, compared with traditional housing where only 49 % were satisfied. (See Figure 7.12).



a) Contemporary house b) Traditional house

Figure 7.12 : External façade in both contemporary (a) and traditional housing (b)

c): Households' opinion in terms of type of building materials

The householders' responses in terms of their opinion about building materials in both contemporary and traditional houses are summarised in Table 7.24.

Table 7.24 : Satisfaction level in terms of building materials

Satisfaction level	Traditional house		Contemporary	
	No. Households	%	No. Households	%
Very satisfied	57	26.4	15	6.9
Satisfied	99	45.8	105	48.6
Neutral	15	6.9	18	8.3
Dissatisfied	45	20.8	78	36.1
Very dissatisfied	0	0	0	0
Total	216	100	216	100

Table 7.24 shows that almost 72 % of the respondents were very satisfied or satisfied with traditional houses, compared with the contemporary house where the satisfaction level is only 46 %. This is probably because the building materials in contemporary houses are mostly unsuitable for the climate because of poor insulation.

7.2.5 Part five: Alterations performed upon housing by residents

Q26, Q27 and Q28: Modifications made to contemporary houses

The legal requirement in the area of Tripoli is "any alteration or reorganization in construction, or any enlargement occurring on the construction whether in surface or height or its transfer from one place to another must have a certificate" (Tripoli Municipality 1970)

This part explains householders' opinions in terms of extensions, which have occurred in contemporary houses and the reasons for, and the type of, said extensions. The number of households dissatisfied with contemporary housing is reported in Figure 7.13.

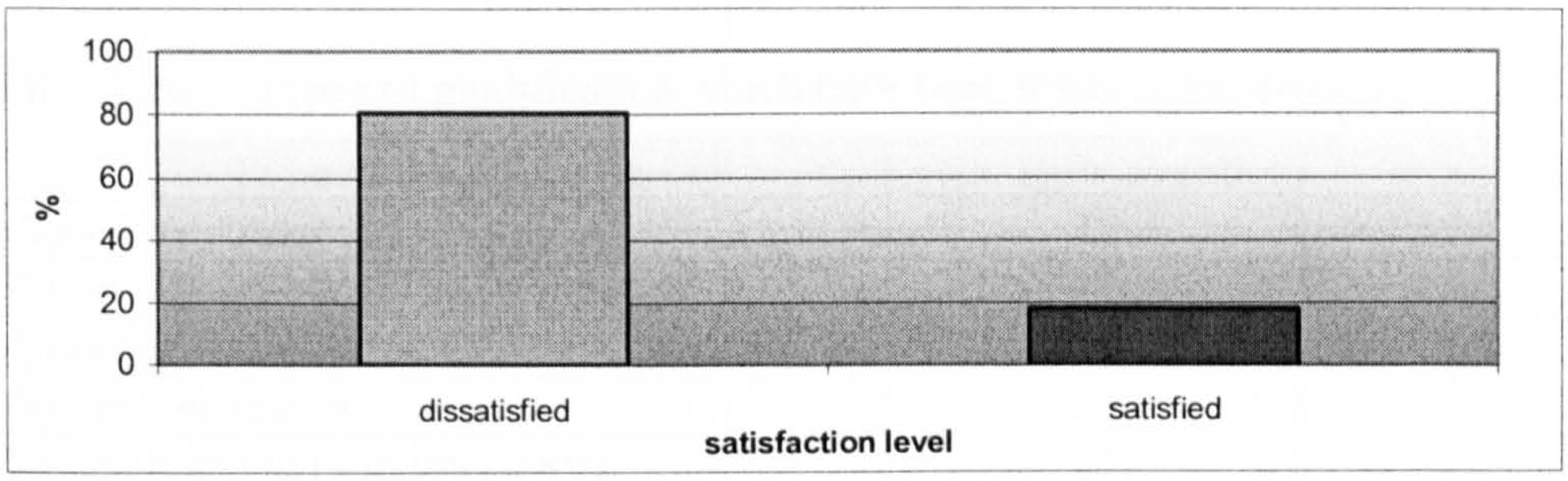


Figure 7.13 : Percentage of households' dissatisfied with changes

According to the result displayed in Figure 7.13, most households are dissatisfied with the outcome of changes. Respondents were asked about the source of dissatisfaction, where they indicated multiple reasons for dissatisfaction with contemporary houses. These reasons are summarised in Table 7.25.

Table 7.25 : Reasons which made residents dissatisfied

Reasons	No. Households	%
Unsuitable for climate	60	27.8
Aspect (external)	36	16.7
Area of house	33	15.3
Location	27	12.5
Opened towards the outside	21	9.7
Arrangement of space	18	8.3
Far away from relatives and parent	12	5.6
Type of neighbours	6	2.8

According to the result shown in Table 7.25, most households have reasons for being dissatisfied with their houses. As can be seen in Figure 7.14, 79 % of households have made modification to their house.

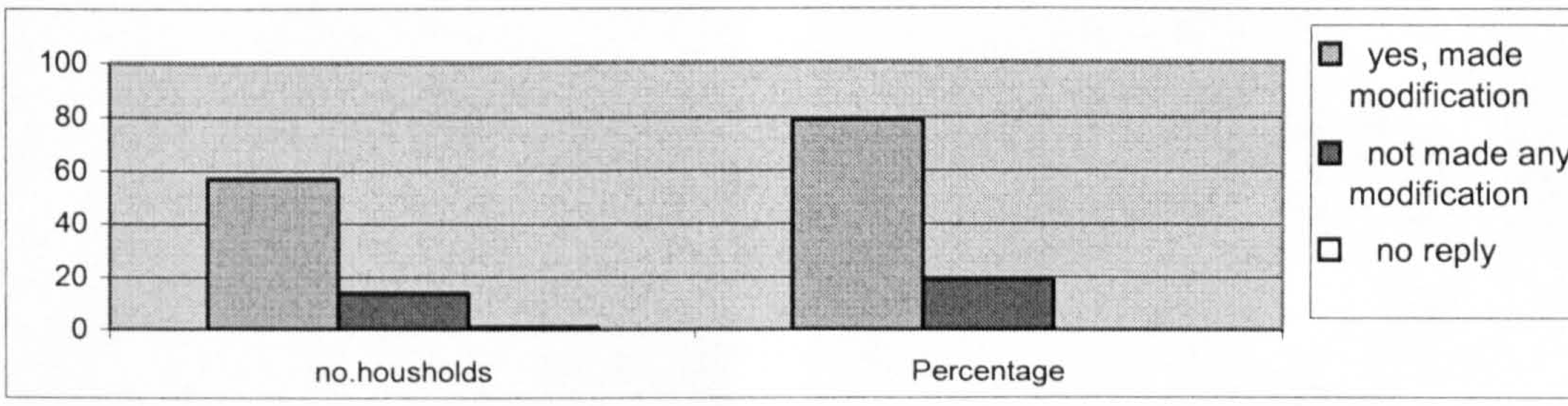


Figure 7.14 : Percentage of households who made modifications

Respondents were asked to specify the type of modification and responses are reported in Table 7.26.

Table 7.26 : Types of modification which have been made to the dwelling

Type of modification	No. Households	%
Closed balconies	42	19.4
Additional iron doors and windows	39	18.1
Building walls	36	16.7
Room conversion	33	15.3
Closed opening (window, door)	27	12.5
No Modification	24	11.1
Extra rooms	15	6.9
Total	216	100

From the analysis the main alterations effected are the following:

1. Closing the balconies: 19% of householders have performed the construction or fencing of some or all the balconies of their houses. Their methods can be classified in three categories: full closing of the balcony with one window at the middle of the built wall, closing only one part of the balcony, or fencing by steel sheets or aluminium with glass. See (Figure 7.15).

Figure 7.15 : Closure of balconies

Householders justify closing the balconies for social and psychological reasons; in order to achieve family privacy, security and safety and to avoid children falling. Also reasons that impelled them to close their balconies are climate factors, because the balcony is a place that gathers dust and is a source of cold and air currents into the house in winter as well as the sun ray's in summer, which can cause an increase in temperature indoors.

2- Adding windows and doors with steel fence or mesh: 18% of residents said they had rendered the windows and main door of their houses with protective steel particularly on the ground floor, first floor and top floor. The reason is to achieve greater security from theft. See (Figure 7.16).

Figure 7.16 : Steel and mesh added to the main entrance, windows and balcony

3- Building walls: from the fieldwork, building walls surrounding the dwellings has altered external observation of many buildings in most quarters selected. These walls have one main entrance solely for the residents' use, so that they will be entirely free to utilise the enclosed space for their exclusive social activities. Most residents have built a storehouse or garage for their cars or, in some cases, shops inside the walls which are normally built with limestone. See Figure (7.17).

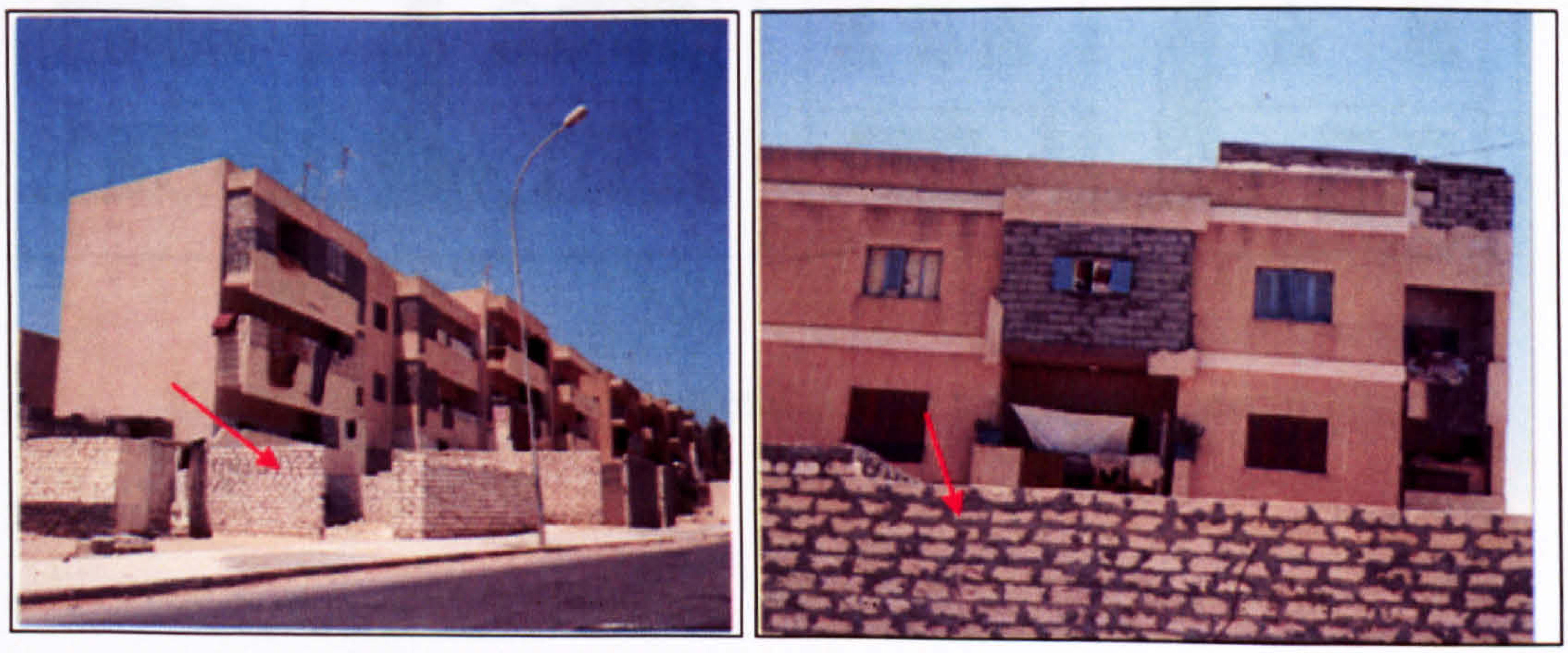


Figure 7.17 : Walls built around the dwellings

The reason behind the construction of the walls, from the analysis of responses of householders, is mainly due to social and cultural factors, i.e. the need to enclose a private space which belongs to the residents for social activities. Further, it is to find a relationship between the residential building and an environment by creating an area which is virtually private and provides extra open space for children to play in.

4- Internal changes and alterations: internal changes and alterations made by people signifies aspects, such as opening an internal space or a room conversion. Analysis of data shows that 17% of householders have made changes, including demolishing the walls separating the balconies and internal spaces, and then closing these balconies in order to enlarge rooms or to add a new room or store. Moreover, some residents construct rooms or a storey over the terrace of the residential building. (Figure 7.18 a & b) shows an original plan and the plan after modifications. (Figure 7.19) illustrates the modifications to the terrace and closure of the balcony.

a) Before b) After

Figure 7.18 : (A) The original plan and (B) the plan after modification

Figure 7.19 : Rooms or single storey added and alteration of balcony

The reasons underlying these changes are largely concerned with creating additional space to make the house more flexible, and providing security and privacy. It was indicated that the areas of houses was often inadequate due to increase in family numbers, mostly an average of 6 people, as mentioned previously. Discussion with the housing and municipality secretariat of Tripoli revealed that most of householders made extensions without permission from the local authority.

The research illustrates that the high rate of modifications undertaken in public housing, means that the design of the houses was unsuitable for Libyan society in terms of customs and climate. El-Dweb (2005, p.322) , and Qussadou(1988) argued that these types of modifications can solve some of the housing problems experienced by households, without any local authority intervention, and they reflect many disadvantages such as:

- Increased fire hazards due to inadequate provision of exits;
- Overloading structure or other instability; and
- Form & appearance become inconsistent and in some cases, this creates a disreputable or inferior aesthetic to that originally intended.

7.2.6 Part six: Housing Preferences

Q29: Preferred types of dwelling

The responses from householders when asked what type of dwelling they would prefer to inhabit given the choice and some of the common reasons provided, are reported in Table 7.27.

Table 7.27 : Reasons for preference

Dwelling type	Freq	Reasons	%
Villa or private house	100	• Design to my wishes; • More privacy; • More safety; • Beautiful façade; • Comfortable for living.	46
Combination style (traditional and modern)	80	• Offers modern concept and maintains social-cultural aspects for Libyan society.	37
Courtyard house	18	• Suitable / socially; • Suitable for climate; • Simple design; • Offered safety for children;	8.3
Flat	9	• Economic reasons; • Easy to furnish; • Suitable for small family.	4.2
Western style	6	• Expresses modern style; • Beautiful façade.	2.8
Terrace house	3	• Suitable to climate; • Economic reasons.	1.3

As can be observed in Table (7.27) the villa type has obtained the highest preference level. Respondents highlighted that building plots ought to be large enough to allow houses to be constructed which satisfy social customs, offering privacy for both their occupants and guests, and should include areas safe for children to play. They also expressed preference for a combination of traditional and modern houses, offering a modern concept whilst maintaining Libyan socio-cultural norms.

Q30: Viewpoints of households in terms of participation in the design process

The households' responses in terms of participation in the new housing are reported in Table 7.28.

Table 7.28 : Participation in the design process

Participation	No. Households	%
Yes	190	88
No reply	26	12
Total	216	100

As can be noted in Table 7.28, the majority of respondents prefer to be involved because the design is prepared according to their personal wishes and choice of the internal arrangement of elements within the house to achieve internal and external privacy. They are also able to choose building materials that are suitable to the local climate and decorated in self-selected colours.

Q31: Viewpoints of households in terms of the design of future housing

65% of households responded to the question about their opinions in terms of the design. Their suggestions can be summarized thus:

- 90% specified that the house height should not be more than two storeys in private and not more than five storeys in public houses;
- 75% preferred the internal house design to have three zones: semi-public, semi-private and private to maintain interior privacy;
- 85% expressed that house design should respond to socio-cultural aspects to be suitable for their daily life and reflect the locality of the place and their individual personality and preferences;
- 80% stated the house should offer a safe place for children play through provision of a garden or courtyard or terraces instead of small balconies that are found in most public housing such as flats;
- 75% indicated that house design should properly consider climatic conditions;
- 75% preferred that the house should be located near to services and in quiet residential areas;
- 65% desired development of local materials usage in traditional houses, coupled with the use of new technology ;

- 55 % wished the house to be simple and flexible in its construction and avoid large windows. Open balconies should be protected by mushrabiya and finishing materials, which avoids high expenditure.

7.3 The perspective of the professionals

The second source of data was from interviews with 16 Libyan professionals. All are male apart from 4 females. 10 out of the 16 had more than 17 years of experience, and 6 had fewer than 10 years of experience. The interviews consisted of 17 questions. See Appendix 2 and Figure 6.3, which display the profession of the interviewees.

Q1: The professionals' opinions of modern house design

Almost 50 % of professionals rated modern house design above that from the preceding 30 years as good, while 37.5 % believed it to be satisfactory and only 12.5 % unsatisfactory. See Table 7.29.

Table 7.29 : Professionals' opinions in terms of modern housing design

Opinion	Number of professionals	%
Very Good	8	50
Satisfactory	6	37.5
Bad	2	12.5
Total	16	100

The rationale behind the good rating by half of the sample was more varied. The professionals argue that modern house design is good because it has added new architectural elements to the Libyan house, such as living rooms, dining rooms and sitting rooms, which were unknown in previous house designs. Others argued that modern house design is bad for the reason that it ignores privacy requirements and climatic circumstances. This means socio-economic changes have had an effect upon house design in Libya. Therefore, transformation is under way for a new mode of housing for a different culture (Shawesh 2000) , Al-Sanafi 2001) and (El-Menghawi 2004).

Q2: Opinions of suitability of modern designs for Libyan society

69 % of the professionals considered modern design as suitable for Libyan society. They contested that it had brought into the house all the things that made life easier and more comfortable. On the other hand, 31 % considered modern design unsuitable. Table: 7.30 illustrates the percentages of professionals who believed the modern design of houses was either suitable or unsuitable for Libyan society.

Table 7.30 : Professionals' opinion in terms of the suitability of modern housing

Opinion of professionals	Suitable	Unsuitable	Total
Number	11	5	16
%	69	31	100

Most professionals' reasons for selecting modern design as suitable are provided in Table 7.31 and the reasons for unsuitability are shown in Table 7.32.

Table 7.31 : Reasons for considering modern design suitable society

1	Owners have an important role in designing their houses;
2	Suitable in terms of area;
3	Offers privacy in terms of segregation between sisters and brothers who have reached the age of 12 especially in private housing and between elements of house;
4	Suitable for modern Libyan social life;
5	Modern design suitable for nuclear family;
6	Appropriate for use of new technology;
7	Adds new elements to the plan of houses, such as women's sitting room and a living room.

Table 7.32 : Reasons for considering modern design unsuitable for society

1	Fails to meet needs of Libyan society in terms of privacy from street and neighbours;
2	Contributes to breakdown of extended family;
3	Multi-storey character is not appropriate for climate;
4	Ignores Arab Islamic identity and customs.

Q3 and Q4: Positive and negative aspects of modern design

The professionals were asked to classify what they perceive as the positive and negative aspects of modern house design in Tripoli. In relation to the positive features, they focused on the comfort, privacy and safety provided by the modern house and the meeting of occupants' needs. The interviews with professionals regarding the positive aspects of modern house design reveal a range of opinions. See Table 7. 33.

Table 7.33 : The positive aspects of modern design

	Positive aspects of modern design	**No. Professionals**	**%**
1	Offers spaces which have different functions, such as both Arabic and Western salons;	8	50
2	The quality of finishing is generally good;	7	44
3	Good arrangement of interior space;	6	38
4	Good privacy in terms of interior space such as separation between circulation area and other parts of the house i.e. living room and kitchen. Also provides space for children and separation between sisters and brothers;	5	31
5	Possibility for future extension;	4	25
6	Ventilation and lighting are suitable;	4	25
7	Allows use of new technology;	4	25
8	Offers safe construction.	4	25

50 % of professionals noticed that the positive aspect of the modern house was that it offers spaces and functions, whereas 44 % observed that the quality of finishing is good, which also incorporated pleasant internal and external views. Furthermore, 38% said that arrangement of internal space is good, and 31 % of professionals stated that the modern house affords good privacy, particularly inside. 25 % mentioned that the development permitted the use of modern technology, which not

only affected the structure, but many other aspects besides. 25 % pointed out that modern houses offer greater construction safety because of the use of modern reinforced concrete technology. 25 % of professionals additionally explained that another positive aspect of the modern house is the possibility of future extension, because the construction system allows for this (e.g. reinforced concrete). 25 % noticed that ventilation and lighting are among the most fundamental necessities which they describe in terms of position of windows and their direction (aspect & prospect) Table 7.34 outlines the views of professionals in terms of negative aspects.

Table 7.34 : The negative aspects of modern design

	Negative aspects of modern design	No. Professionals	%
1	Excessive in area and technology, material in external and internal finishing, required great expenditure;	14	88
2	Poor privacy in terms of streets and neighbours;	10	63
3	Unsuitable for climate in terms of building materials and size of openings (e.g. windows and balconies);	12	75
4	Limited functional elements e.g. many spaces used only twice or thrice per year. For example, the women's sitting room;	9	56
5	Ignores socio-cultural issues.	4	25

The interview results highlight many negative aspects. 75% of professionals emphasised that contemporary houses are unsuitable for the climate and physical environment because they use materials unsuitable for the local climate (besides large windows). 63% further argued that modern house design ignores privacy from the street and neighbours, which demands change in some elements of the house. 56% of professionals' consider modern house design has limited function elements, which reflect upon the use of the elements during the year, such as the space, which is used for female guests. This is only utilised when women have a party or have given birth. All these considerations reflect on the final cost. 88% point out that the exaggerated floor area and the technology of the material used in external and internal finishing is divorced from function. These factors add to overall house costs. Just 25% argued that modern design, by focusing on the nuclear family, had contributed to the loss of the extended family through construction of studio apartments in public housing projects.

Q5: Foreign influences on modern house design in Tripoli

The professionals were asked whether modern houses in Tripoli had been influenced by western design. All 16 agreed that foreign architects, from the outset of the Italian period, had influenced modern house design in the city. Table 7.35 sets out the features identified as evidence of western design influence.

Table 7.35 : Aspects of influence

	Aspects of influences of foreign architecture	No. professionals	%
1	External balconies and large glass windows and pitched roofs;	10	63
2	Studio apartments, single function rooms and outward looking aspect ;	12	75
3	New architectural elements introduced, such as master bedroom, western dining room and oriental salon;	6	38
4	Most housing schemes designed and built by foreign companies using new technology, such as prefabricated houses without accounting for the climate.	9	56

75% of professionals mentioned that the creation of studio apartments, single function rooms and outward looking aspect is the influence of foreign (alien) firms, which have designed and constructed these houses. 63% evidenced features such as external balconies, large glass windows and pitched roofs, which are unsuitable for the climate. 38% of professionals commented upon the master bedroom concept (complete facilities), large dining areas, and appearance of both types of reception rooms for men, i.e., western and eastern salons which provide evidence of western influence. 56% indicated use of prefabricated housing unsuitable for the local climate.

Q6 and Q7: The positive and negative aspects of traditional design

Table 7.36 sets out details on what the professionals regarded as the positive aspects of traditional house design. As can be noted, the most frequently referred to strength was suitability for the climate, social environment and the needs of the family (75%).

Table 7.36 : The positive aspects of traditional house design

	Positive aspects of traditional house design	No. Professionals	%
1	Suitable for climate and environment;	12	75
2	Offers good privacy particularly from streets, neighbours and between males and females;	10	56
3	Enables family to gather and allows establishment of good relationships between families and gender separation;	7	44
4	Internal Courtyard and multi-use of space;	6	38
5	Offers good natural ventilation and lighting through courtyard;	6	38
6	More safety in terms of children's playing area.	3	19

56% mentioned that good privacy was offered to the family and its members, from streets, neighbours and between families and strangers in a guest room. 38% referred to the internal courtyard and the multiple uses of space and rooms. 44% mentioned the capacity of the traditional house to support gatherings of the extended family, whilst also allowing gender separation. 38% of professionals referred to the ability of traditional houses to afford adequate natural ventilation and lighting via the courtyard, which played a critical role in providing circulation during the year. A low 19% perceived the other positive aspect of the traditional house in terms of safety for children playing in the courtyard area. Table 7.37 offers a similar breakdown of responses on what professionals regarded as the negative aspects of traditional house design.

Table 7.37 : The negative aspects of traditional house design

	Negative aspects of traditional house design	No. Professionals	%
1	Unsuitable for winter climate when rain and cool wind enter the open courtyard;	11	69
2	Areas were mostly small;	7	44
3	Limited in its vertical and horizontal extension capacity;	6	38
4	Weakness of ventilation in kitchen and bathroom;	4	25
5	Weakness of privacy in terms of within the house and poor organisation between elements.	3	19

69% referred to the weakness of the traditional house design being the open courtyard which, during the winter season, is rendered unsuitable for that season's climate. 44% pointed out the small area of traditional house, which did not permit extension when required. 38% highlighted the limited capacity of the traditional house for development; the frame of the house was held as not strong enough to support a vertical extension. Following the completion urban fabric, the close proximity of the traditional houses severely curtailed any expansion further than the house's existing perimeter. 19% referred to the weakness of privacy inside the house between rooms and poor organisation between elements. 25% mentioned the deficiencies of the traditional house in terms of ventilation to bathroom and kitchen, due to absence of openings to the outward side.

Q 8: influential factors on traditional house design

Opinions were sought about factors influencing traditional design, Table 7.38

Table 7.38 : The influential factors on traditional house design

	Factors	No. Professionals	%
1	Socio-culture: The design of components and space provide further protection inhabitants against outsiders, especially in the layout of the entrance and the positioning of upper floor windows;	13	81
2	Economy factor: Has influence on the design depended on the wealthy of the families. For example, traditional courtyard houses in Tripoli are categorised into three types: Small and modest for workers, medium for traders and large houses for rich families;	11	69
3	Climate: The design of courtyard was influence by climate. The extremely hot weather makes it necessary to close the living area from external atmosphere and the solid outer walls provide insulation against the intensity of heat external;	10	63
4	Religion: The aspects of influence, privacy, and gender separation, orientation of facilities in bathroom /toilet not to face or back towards Mecca and emphasis upon hospitality to guests and visitors.	9	56

81% identified the socio-cultural effect upon the design. 69% stated that the economic factor had also affected the design in terms of the type of materials and the area. 63% mentioned that the climate had a great bearing upon design in terms of choice of building materials, orientation of houses and position of openings (e.g. windows). 56% declared that religion also impacted upon design in terms of privacy between streets and neighbours tenants and separation between strangers and family members, according to Islamic tenants. These opinions emphasise the points mentioned in Chapter five.

Q9: Opinion of professionals in terms of suitability of building materials in contemporary house construction

Responses to the question in respect of building materials currently used in housing in the Tripoli area, as to whether they are suitable for climate, are shown in Table 7.39.

Table 7.39 : Opinion of professionals about suitability of building materials

Opinion	No. professionals	%	Reasons
Suitable	4	16	• Suitable for present era; • Good quality and perspective.
Unsuitable	12	75	• Not suitable for climate; • Most of these materials are imported.

According to the above Table, 75% thought the building materials in contemporary houses unsuitable for the climate. The reason behind this rating was that selected materials particularly used in construction are not compatible for the local climate. These include reinforced concrete and hollow cement blocks that are used without insulation.

Q10: Opinion of professionals in terms of future house design

- Housing design should properly take account of climate and the socio-cultural aspects;
- Safety and security for children and elderly people should be a considered factor;
- Private spaces should be available, especially for use by women and children;
- The availability of nearby public facilities and services should be considered;

- Materials should respond to their context and should be inspired by surrounding neighbourhoods to maintain the character and identity of an area;
- Ensure that materials are robust and will withstand their environment and likely abuse with minimal maintenance, whilst still providing an attractive appearance;
- Colour can be used to respond to local context and give buildings their own character;
- Dwellings should be orientated to minimise over-shadowing from adjacent properties.

7.4 Discussion

The sample consulted in the fieldwork consisted of two elements; householders and professionals. The following discussion of the findings considers the view of each of these elements in turn.

7.4.1 The views of householders

As mentioned at the beginning of this chapter, the 216 householders in the sample consisted of several occupations residing in various types of house. The finding of this chapter has exposed that the age group of the majority of the heads of household is around 41-50 years. Most were employed and enjoyed a good educational level. This enabled them to offer a clear opinion concerning both traditional and contemporary housing.

62% of respondents lived in a nuclear family, and 14% lived in an extended family, .i.e., with parents or sons who are married. Only 24% of the respondents lived in households of 8 people or more, 26% of the respondents lived in households of 3-4 people, while 50% of respondents lived in household of 5-8 people. This suggests that the Libyan culture of the extended family is changing, which has resulted in weakening the relationship between families.

Given the background of the householders, it could be argued that the respondents brought a variety of experiences of modern and traditional life in Tripoli and this is reflected in the views and opinions they offered on both types of housing. The majority of the sample were born in Tripoli and the results give reliable opinion concerning circumstances of traditional and contemporary housing. An assessment of respondents' facts about previous and present dwelling circumstances indicated the following:

Previous housing

- 59% had lived in courtyard house;
- 56% had lived in courtyard house for more than 15 years;
- 49% had used quarried limestone block;
- 66% of workers who built these houses were Libyan;
- 75% were comfortable during summer and winter seasons;
- 95% were satisfied with ventilation and lighting.

Present housing

- 50% are living in flats;
- 90% use reinforced concrete and hollow block cement;
- 100% of workers who built these houses are foreign;
- 75% are not comfortable during summer and winter;
- 63% are satisfied with ventilation and lighting.

7.4.2 Householder satisfaction levels

This section provides a descriptive assessment of housing properties of climate and social way of life. The results indicate the level of satisfaction with housing in both traditional and contemporary contexts as displayed in Table (7.40).

Table 7.40 : Rating of satisfaction level

Items	Traditional	Contemporary
Location	58%	**80%**
Forms	49%	**71%**
Area	18%	**75%**
Security and safety	**82%**	45%
Playing area location	**60%**	31%
Safety from traffic	**80%**	44%
Internal visual privacy	**69%**	53%
Internal acoustic privacy	**69%**	48%
Privacy from neighbours and street.	**72%**	42%
Physical separation between brothers and sisters	44%	**89%**
Climate	**75%**	47%
Façades	49%	**82%**
Building materials	**72%**	56%

The variety of satisfaction level of respondents in both traditional and contemporary houses can be seen in Table 7.40. In terms of location, it is evident from the above that the vast majority rated contemporary houses as highly satisfactory, because most dwellings are located in modern planned areas with services nearby. In relation to the forms of houses, the high satisfaction paid to the contemporary houses refers to the use of new construction systems ,which creates a breadth in the variety of style and sizes.

Again, the majority of householders rated the contemporary house as satisfactory or very satisfactory in terms of area. The wide variances in satisfaction level related to most contemporary houses being occupied by nuclear families and the variety of their size.

In terms of security and safety, the comparison demonstrates that the great majority rated the security and safety of the traditional house as very satisfactory. It referred to strong social bonds, with most families extended, besides the relationship between courtyards and the street, which also plays an important role in maintaining security and safety. In modern areas, the majority of respondents were dissatisfied with safety and security because of the layout of the modern residential area (grid pattern), which encourages vehicular movement by providing wide straight streets. This, however, resulted in an increase in car accidents within the residential area and affected children's safety. In addition, the increase in crime is a direct result of the neglect in security factors. This layout can be described as an open area, which means that any person can pass through the area. Most of the residents do not know one another, which does not engender a close community spirit.

In terms of privacy, both visual and acoustic, the results indicated that most householders were extremely satisfied with the degree of privacy for traditional houses, achieved by orientation of the houses and the concept of the courtyard in addition to the thick walls. The modern residential area did not maintain this privacy, by neglecting the arrangement of the house, which resulted in their being overlooked. The house entrances and openings often face each other and residents are unable to open their windows to receive fresh air. Also the different heights of the buildings and the diverse house types have an impact, such as villas adjacent to apartment buildings. Most householders were highly satisfied with contemporary house in terms of physical separation between brothers and sisters. This statement was confirmed by the area and type of families concerned. Nuclear families had the ability to use more than one room for children.

Again, the results indicate that the majority of householders were greatly satisfied in terms of climate within traditional houses due to the alleyways creating shaded spaces and protection from the sun. In addition, the alleyways act as cooling tunnels. The system of construction depends on local building materials and courtyard besides the use of white as a colour, which reflects the rays sun's. Modern residential areas neglect major climate factors, such as the direction of the sun prevailing wind direction, temperature etc. This resulted in ill-conceived orientation of the buildings when facing the sun for most of the day, blocking air movement, which prevents the use of wind for cooling. The large area of the street, which absorbs and stores the heat and impact of glare and uses different colours, absorbs the heat. There was a lack of consideration of building materials used in construction.

In terms of the houses' façades, the extreme satisfaction of householders for the contemporary houses was due to more exciting design and aesthetics without excessive finishing. The survey results indicated that the majority of householders were satisfied about building materials used in traditional houses due to their being local and suitable for the climate. In the modern residential area, most householders were not satisfied with building materials, such as reinforced concrete used for walls and ceilings.

The results also demonstrate that many householders made modifications to contemporary houses. The respondents indicated that the system and design of these houses, particularly apartments, do not meet the needs of householders due to the problems identified in part five. The discussion further indicates that most Libyan families prefer living in private houses such as villas or combining the features of traditional and contemporary houses with a height of not more than two storeys. Most householders have views concerning future houses, which should meet climate conditions, respond to socio-cultural conditions, use local materials by new technology, and have simplicity and flexibility in construction. Additional details appear in part six.

7.4.3 The views of the professionals

Most professionals indicated that the modern houses are influenced by foreign architecture, which created positive and negative aspects. There are many positive aspects of modern design such as different spaces with sufficient arrangement of interior space, good interior privacy, possibility of future extension, proper ventilation and lighting, and safe construction due to usage of new technology. On the other hand, they emphasised many negative aspects such as excessive floor area and size of windows, finishing materials in external facades, poor levels of privacy from streets, neighbours, and unsuitability for the climate as the layout neglected the climatic factors. A future aspect is the utilisation of building materials unsuitable for climate and a variety of colours that absorb and retain the heat. In addition, modern house design ignored local identity and socio-cultural issues.

In terms of traditional houses, respondents emphasised that this type has many positive characteristics, such as ingenious design in response to climate, maintenance of privacy, particularly externally, as well as a strong relationship between neighbours by adoption of local materials that should be involved in modern design.

All recommended that new house design should consider the following: combining the advantage of the traditional and contemporary designs and taking the courtyard concept as an essential element in design, simplicity flexibility, suitable for installation of modern furniture and avoiding large windows and small balconies that are not used in most houses for socio-cultural reasons and climate. They also emphasised use of the local building materials with modern technology and new insulation materials. The design should be suitable for its geographic location and reflect local identity and socio-cultural aspects. They stressed use of light colours, which reflect the sun's rays, avoid high-rise building where it is not in accordance with the desires of most Libyan families. Finally, they recommended the householder's contribution to design to break the gap between designers and owners, and to pay attention to any economic factors.

7.4.4 Comparison between opinions of professionals and views of the households

This section compares the views of professionals and householders to illustrate the level of agreement and disagreement of traditional and contemporary housing design in terms of suitability for social, cultural, climate and building materials aspects.

Social cultural aspects

As can be remarked from tables 7.18, 7.19, 7.20 and 7.21 the majority of householder were satisfied with traditional houses because it responds to Libyan social and cultural custom and has its roots in Islamic teachings. The planning and design in contemporary social housing pays little attention to the importance of privacy as an important dimension. The contemporary housing under values issues such as privacy. However, the contemporary housing was successful providing separation between brothers and sisters better than traditional housing design due to households being nuclear families. On the other hand, the professionals' opinion in terms of privacy in traditional housing design as noted in Tables7.36, 7.37, and 7.38 showed a majority in agreement that traditional housing offered good privacy to the family and its members from street , neighbours and between families and strangers. However, traditional housing was weaker in privacy within the house and provides poor organisation between rooms compared with contemporary housing design.

Regarding to contemporary housing design as demonstrated in tables 7.31, 7.32, 7.33, and 7.34 the majority of professionals sustained the householder opinions that the contemporary housing ignored privacy from street and other neighbours both in forms of the windows and acoustic separation. The professionals complain about large window in flats and cite internal overheating, insecurity (large panes are easy to break), cost and reduction in privacy. However, they agree with householders that these houses offer good privacy in terms of interior space such as separation between sisters and brothers compared with traditional housing design. In addition the contemporary housing design ignored Islamic identity. This overall illustrates that professionals and householders were in agreement in terms of positive and negative aspects of privacy in both traditional and contemporary design. Tables 7.13 and 7.31, show a high level of agreement between the householders' and professionals' opinions in terms of satisfaction with the area of dwelling in contemporary housing design.

Climate and building materials aspects

Tables 7.22 and 7.24, show that the majority of householders agree that traditional houses are suitable for climate condition and building materials. They refer to the use of the courtyard and local building materials. In contrast, the satisfactory level of contemporary houses was no more than 38%, because the building materials and house forms are less suitable for the prevailing climate. In Tables 7.37 and 7.34, the majority of professionals agree with the householders opinion that building materials in contemporary houses unsuitable due to using materials such as reinforced concrete and hollow cement blocks without insulation. On the other hand, 75% of professionals, which is a high percentage, agree that the traditional house was a successful selection to the problems of the harsh climate but they indicated that it is unsuitable for the winter climate when rain and cold winds enter the open courtyard. This illustrates that professionals and householders strongly agree that overall traditional housing design is more suitable than contemporary housing design and that contemporary houses were built without proper consideration of the environment and climate conditions and of selected building materials.

7.4.5 Final findings from survey results

- The survey results indicated that most Libyan families prefer to live in private houses rather than flats; Most respondents emphasized combining the best of advantage in both traditional and contemporary housing in new design ideas;
- Most respondents prefer to participate in the design process to achieve their individual needs and desires;
- Most respondents prefer to have the opportunity to select their own type of house according to size of family and their neighbours to maintain strong relationships between families wherever possible;
- Majority of residents are dissatisfied with contemporary housing with regard to protection from the climate besides external privacy, particularly in public housing;
- The high-rise building is unsuitable for Libyan families. The height of a house should not exceed two storeys in private and not be more than five in public houses;
- Majority of residents have made modifications to the original plan of their houses;
- Most respondents indicated traditional housing was unsuitable for winter months;
- Future houses should meet climatic conditions, respond to the socio-cultural aspects and use local materials with modern technology;
- Traditional houses have good solutions in response to climate that could successfully be applied in modern housing design.

7.5 Housing Design Guidelines emerging from the Result of the Study

7.5.1 Introduction

The literature review and empirical study emphasized aspects of modern house design that had been influenced by foreign styles that were less than ideal from the perspective of Libyan culture and climate. Features such as the large external glazed areas, external balconies, and other outdoor spaces were seen, to varying degrees, to be damaging to the privacy of the occupier and that of neighbours, which are important aspects of Islamic teaching culture.

The arrangement of the elements of the modern house was also a source of concern. The separation of genders had always been part of Libyan and Arab Islamic identity and traditions, yet the large dining room and reception areas do not lend themselves readily to the observance of this practice.

The Libyan tradition of men meeting in the evenings in one another's houses in the guest room might also fit uneasily within the interior of the modern home. Observance of the separation of genders could only be met through female members of the household cloistering themselves in a distant room. According to respondents, in Table (7.34) there appeared to be a number of disadvantages in modern design relating to the climate. Given the extreme heat, a large glazed area does nothing to reduce the diffusion of heat into the house, placing greater demands on today's air-conditioning system and necessitating the use of blinds at windows to protect furnishings from the glare of the sun. An external courtyard area does not help to increase the natural ventilation in the house as much as the internal courtyard, a distinctive feature of the traditional house.

Relevant literature

The research starts by an attempt to define the term "guideline". Guideline could be defined as an established standard by which something may be judged or examined PED(Public Education Department 2006). Sadler (1987, p.194) defines guideline as "a distinguishing property or characteristic of any thing, by which its quality can be judged or estimated, or by which a decision or classification may be made". The relevant literature has shown diverse attempts to determine standards and guidelines to fulfil specific aims in the following domains: housing policy, planning and house design (Fathy 1986), (Qussadou 1988), (Naji 1997), (Ashawesh 2000).

These attempts provide diverse international experiences from both developed and developing countries including the United States Punter (1999), Australia (RAIA 2005), New Zealand (ACC 2001), Ireland (DELG1999), West Wiltshire (WWDC2005), and BC(Bexley Council)(2006). The most common guidelines cited in literature regarding the establishment of new housing policy, houses design, (internal and external) planning. In a general sense, the above mentioned publications have provided useful insights that assist in establishing and developing initial guidelines for suitable housing design.

The key objective of the design guideline proposed is to improve the quality of design in application for residential development, via improving the housing policy, quality of landscape schemes, and quality of building design and building materials in terms of socio-cultural and climate conditions. The guideline, based on the analysis of the study's survey findings, and from the evolution of Tripoli houses in both traditional and contemporary houses is presented in chapter five. The design guidelines suggested below deal with public and private houses. These are set out in three levels. (See Figure 7.20)

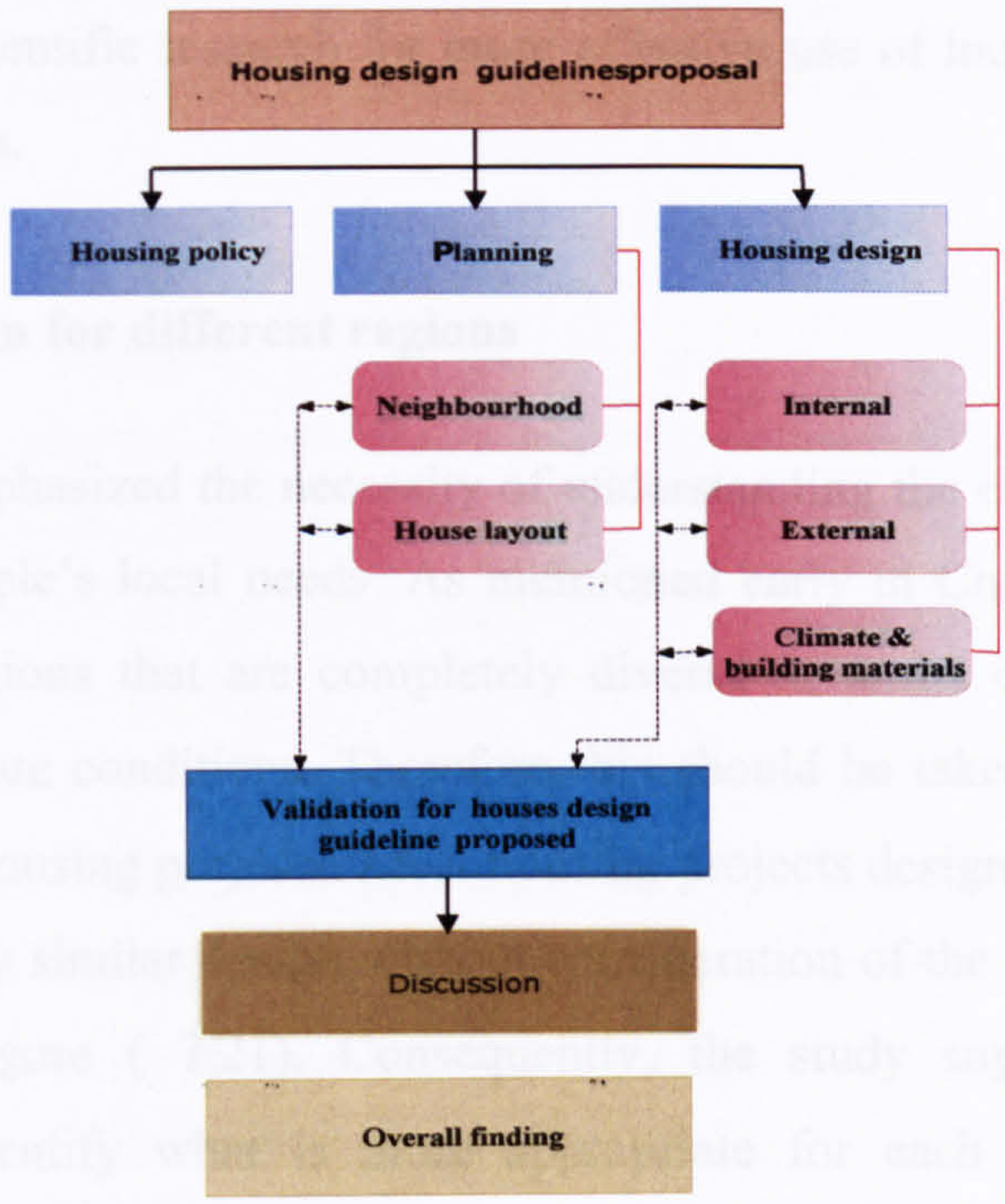


Figure 7.20 : Categorisation of proposed housing design guidelines

7.5.2 The first level: Housing Policy

The present policy of housing in Libya is to provide housing for residents who are unable, due to low income, to build their own houses. Effective delivery of this policy has suffered from lack of skills, technical, planning and design ability. The housing authority ignored households' social and cultural characteristics when producing contemporary dwellings. Therefore, the authorities should accept that present policies have failed and that a change of direction is necessary. For these reasons, the housing authority should consider, when establishing any new housing scheme:

- Variety of design for different regions;
- Choosing experienced planners and designers cognisant of local cultural and climatic conditions;
- Contribution of residents;
- Revision of legislation;
- Avoid building very high-rise flats; and

- Encouraging scientific research for more effective use of local building materials and technologies.

1-Variety of design for different regions

This study has emphasized the necessity of understanding the characteristics of each region and of people's local needs. As mentioned early in Chapter two, Libya has three types of regions that are completely diverse in terms of geography, socio-cultural and climate conditions. Therefore this should be taken into account when establishing new housing projects. Most housing projects designed during the 1970s-1980s were of very similar design without consideration of the characteristics of the different areas Figure (7.21). Consequently, the study suggests the housing authority must identify what is more appropriate for each region and provide guidelines for the designer and planner of new projects in order to obtain more suitable designs for each region (chapter Four-each region has a traditional settlement and building form to respond to climate and social culture).

Housing project established in Tripoli

Housing project establishing in Sabha

Figure 7.21 : Use of the same design in different geographical and climatic conditions

2- Choosing the experienced planner and designer cognisant of local culture and climate

This study illustrates that foreign designers lack any knowledge or experience about Tripoli residents' social characteristics besides the climatic conditions. e.g. most public housing designs offer inadequate external privacy because the housing authority had ignored these factors. As a result the local authority should pay more attention in selecting the designers and planners and opt for those who have knowledge of Libyan people's social life and the region where construction is to be undertaken.

3-Contribution of residents

Choice of the location and design of any project is the responsibility of the housing authority. From analysis, most respondents indicated that decision-making still lacks input from people in the planning and design processes and in selecting new neighbours.

Past experience has proved that one of the prime reasons behind the success of traditional housing was the direct contribution of residents. Tripoli (coastal) and the old city of Ghadames (desert) are good examples of homogeneity between neighbours because the choice of house was made according to their blood relationships. At present, due to the lack of implementation of this factor, residents are all too often dissatisfied with housing design projects. Based on interviews, people have a great desire to express their opinions and to contribute to the development process. Therefore, it is suggested that the housing authority should consider these steps when planning, designing, and distributing the proposed new housing projects:

- Allow people greater opportunity to express their views during design and construction process. This may be enacted by use of the survey in addition to public meetings, allowing for comment and observations; people are inevitably, more aware of their own needs then any planning body or organisation;
- Discussion of the draft design with professional comment;
- The public's comments and objections should be considered before adopting the design and plan;
- It is vital to encourage, or take into consideration, the forms of social system when distributing new housing. This may reduce social problems between neighbours and thus create a homogeneous society.

In general, planning and design will not only be intended for people but also be implemented with their suggestions and needs.

4- Opportunity to select type of house and neighbours

Give people more opportunity to select their own type of house according to size of family and their neighbours to maintain strong relationships between families where possible;

5- Revision of legislation

Revision of the legislation, regulation and building laws derived from colonial periods and foreign specification to create criteria and standards that better accommodate the Libyan- and Muslim-cultural environment. Related to this, there is a need to draft new laws that deal with maintaining the environment and establishing scientific and educational institutes for environmental studies.

6- Very high-rise flats

Very high-rise flats are not appropriate for large families. Height should therefore preferably be limited (four-five storeys) and consist of different types and sizes to suit the family's needs. The practical study has proven that low-rise houses are more socially acceptable and in addition, are more practical for the various private activities of citizens.

The study therefore recommends the adoption of the horizontal extension of the complexes specified to the multi-family residential lodging, and to reduce the number of floors to not exceed five in public housing and two in the private sector. In the case of Libya there is still much empty land around the city of Tripoli that could be made available for horizontal expansion rather than for high-rise building.

7- Encouraging scientific research for building technology

- Developing scientific research to produce energy from new and renewable resources. Encouraging scientific research in terms of developing building technology and specifications of building materials;
- The processes and operation of industrial construction in Libya switched to cement and concrete construction during the twentieth century (Grifa 2006). Accordingly, construction and building materials became one of the most significant industries nationally. Consequently the authority should develop these factors according to local materials to achieve materials suitable for the Libyan environment;

- Exploit and develop local materials via the use of new technology to help guide energy consumption during construction in order to maintain the environment.
- Encourage scientific research in terms of developing building technology and specifications of building materials.
- Secure a common understanding (professionals, politicians, authorities, users, etc) of the definitions of adequate housing, structural stability and safety and control to achieve a quality structure.
- Increase co-operation amongst institutions and access to information and education for building materials.
- Make people aware of new concepts and the ideas of alternative housing materials, via use of show cases, information brochures, lectures, etc.

7.5.3 The Second level: Planning

Urban planning can be defined as the formulation of alternative patterns of urban settlement, the rational use of resources to alleviate urban problems, and the provision of a city's physical and social infrastructure: transportation, utilities, housing, community facilities, and services in a manner the way that make the city aesthetic, convenient for human uses and environment-friendly (Thiloan, et al 2003, P.41). Thus these elements are significant in the scheme of new housing projects. The first responsibilities of planners are to accord high priority to urban planning. In the future, before designing new housing schemes, the following should be considered:

I. Neighbourhood layout

In general, the provision of a satisfactory living environment for residents and the long-term sustainability of the neighbourhood scheme ought to be one of the foremost considerations. Key criteria include:

- Ensure the scheme creates a pleasant living environment, which will meet the needs and preferences of the residents. Schemes involving a significant number of dwellings should create streets and spaces that provide a sense of identity and place, and thus, facilitate and foster the development of the community;
- Ensure the scheme makes a positive contribution to the overall environment of the locality. In this regard, care should be taken in integrating the new housing into

the existing built and natural environment so that it contributes to the social, environmental and economic sustainability of the area;

- Ensure a high degree of safety and security for residents. The scheme should be designed to discourage anti-social behaviour, e.g. layouts should seek to ensure that all access ways and public areas are overlooked by dwellings or are otherwise open to surveillance by residents besides lighting to pedestrian ways, dwelling entries, driveways and car parks to guarantee a high level of safety and security for residents and visitors at night;
- Maximizing amenity and energy efficiency by climate-sensitive design which takes account of orientation, topography and surrounding features to control wind effects while optimizing the benefits of sunlight, daylight and solar gain;
- Ensuring that, where practicable, the design minimizes barriers to accessibility for all users –especially the elderly and those with disability;
- Ensures quietness in the neighbourhood. This can be affected by avoiding siting a road with heavy traffic near the location of residents besides separating public spaces such as play areas and clusters of houses. An area should be reserved for shrubs and small trees;
- Ensures the landscape design exploits vegetation types and landscaping styles that integrate the development with the streetscape. The structure of the proposed buildings should not be affected. Personal safety is considered by ensuring sound visibility along roads, paths and driveways. Shrubby landscaping near dwelling entries avoided and contribution to energy efficiency and amenity is enacted by providing substantial shade in summer, especially to south and west facing windows, admitting winter sun rays indoors and improving privacy between dwellings;
- Dwellings are provided with private open spaces that should offer adequate privacy for residents, convenient access from a main entrance as well as some trees and a canopy to achieve shading during the hotter months of the year. In addition, public housing should include a special shaded area for the various activities of families.

II. House layout

- Ensures the opening orientation of house layout position is in the most suitable location regarding climatic conditions and the long sides of the houses are exposed on one side to capture the cold breeze in summer and to benefit from the sun-rays in winter on the other side. For instance, in Tripoli the opening orientation of house layout is in the most suitable location regarding climatic condition and the long sides of the houses are exposed to the north to capture the sea's breeze in summer, and to the south to obtain the sun-rays in winter;

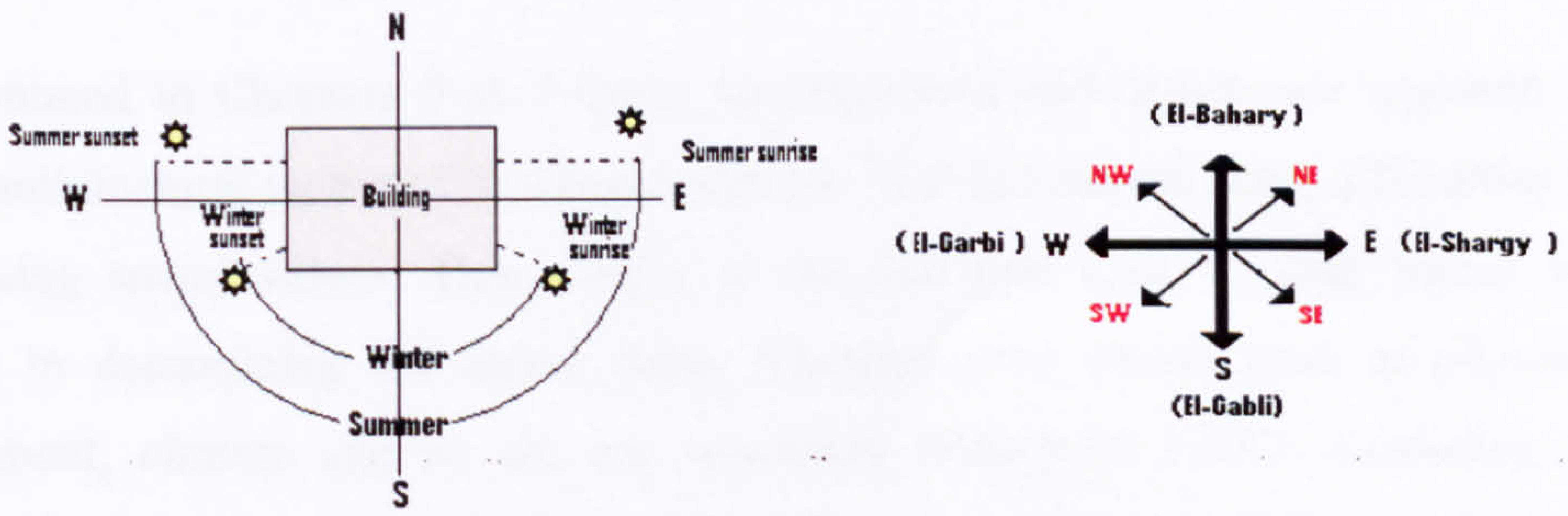


Figure 7.22 : Suitable orientation of houses in Tripoli

- Landscaping, including the shade of trees, should be planted in both front and back yards especially in private houses.

7.5.4 The Third level: Housing Design

Socio-cultural and climatic factors are among the most significant aspects which deeply affect dwelling design. Designers should consider the following criteria in internal and external dwellings: the success of any design process is dependent upon the form of adaptation to existing social life and culture as well as climate conditions. However, traditional solutions provide us with very worthy lessons that should be adopted as a guideline in this respect. This guideline for future houses design is divided into two parts as follows:

- Related to social and cultural criteria (interior and exterior design); and
- Related to climate and building materials criteria.

I. Design guidelines related to social and cultural criteria

Most, if not all, Muslim urban societies have changed considerably over the last few decades, (El-Menghawi 2004). Many aspects of life, especially in urban areas have encountered alterations due to political, economic, and social factors. Politically, Libya and most Arab countries' regimes, have adopted the capitalist mode of governing these societies. Economically, the discovery of oil in the 1960s has created economic increase, which introduces the advanced technology. Socially, the structure in Libyan society has been influenced by increased access to education and by new systems of modernisation that have appeared due to increasing contact with the world.

As mentioned in Chapters 5 & 7 many modifications and alterations appeared in layout, architectural style and building materials. This has caused some difficulties in maintaining social values. This alludes to the fact that socio-cultural forces are primary in determining the house form, whereas other forces such as physical environment, climate and so on, are secondary (Rapoport 1969). According to Abdulmalek (2006 p. 40) there is no doubt that climate context had its impact on numerous architectural and construction elements. However, many elements that characterise architecture could also be explained by socio-cultural conditions.

As noted above and previously in Chapter 3, and as a result of analysis, the social culture is an important factor in the design of houses. Consequently, architects and civil engineers should follow these guidelines during the design of houses. These guidelines are divided into two levels; firstly, internal design and secondly, external design.

I. Internal design

In order to achieve creative housing design, designers should consider the following:

- To achieve comfort, indoor space should be arranged according to daily and annual heating and cooling requirements. According to layout, the spaces with the most daytime use can be positioned on the south and north sides , sleeping area placed on the east and north-east sides, guest area placed in the south-east, and other facilities situated along the western façades to protect the building during the overheated and overcooled periods Figure(7.23);

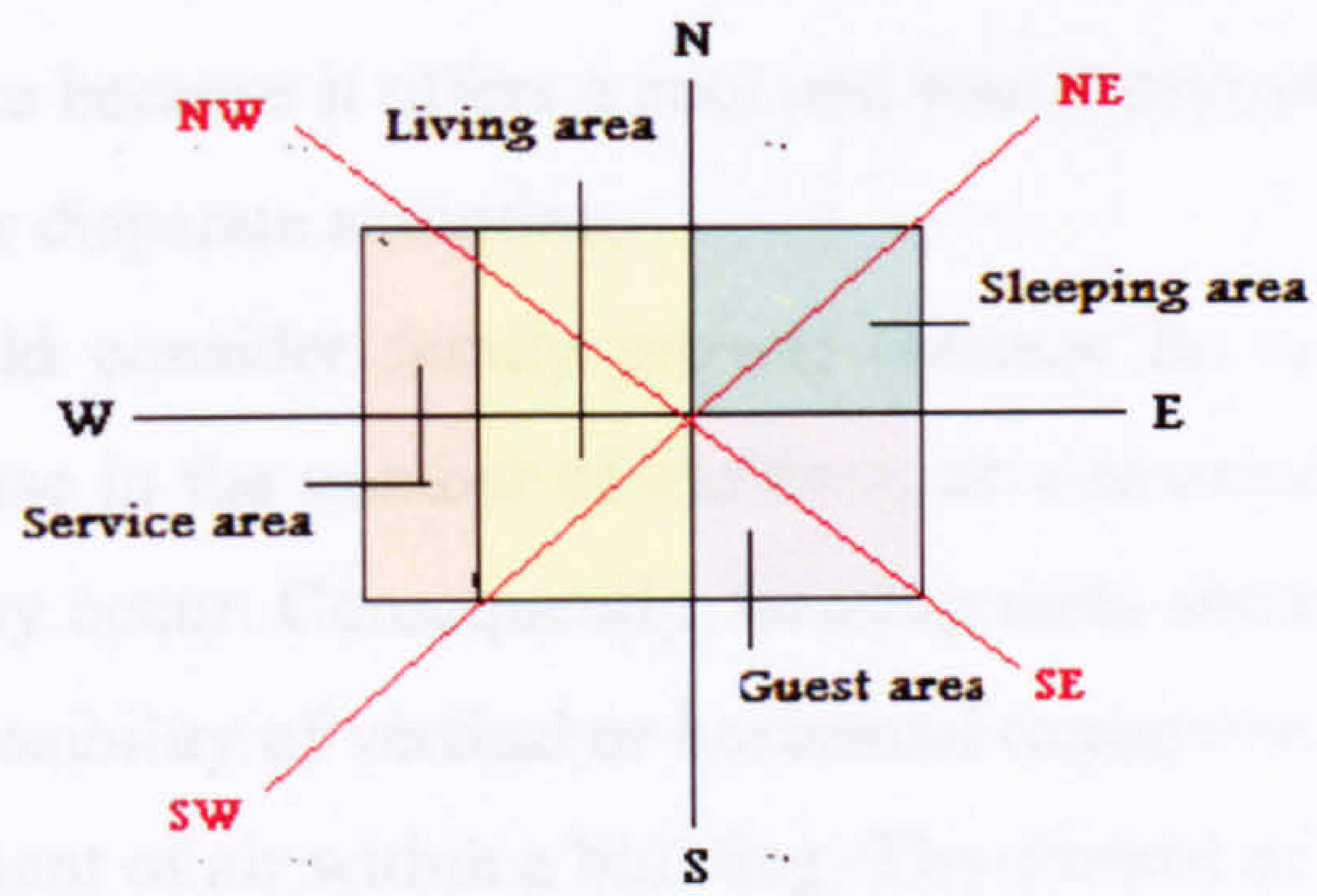


Figure 7.23 : House elements' orientation

- The entrance design should prevent the internal space from being observed from outside and emphasise the main entrance. In particular, the entrance doors to flats should be not face each other directly. There should be ease of access, which prevents the internal space from being witnessed from outside, by using passageway element as traditional system that works as a barrier. Greater attention should be paid to block(s) of flats with the main entrance not facing each other directly;
- The arrangement of the house units should reflect the social culture (i.e. religion and customs) desire for complete privacy within the home (Al-Hariri 1989). The survey findings emphasized this point. To ensure privacy inside a dwelling the house should be arranged in three sections: the guests' area, the family living area and the sleeping area. This ensures respect for the concept of separation between males and females according to Islamic instructions, besides assuring visual and aural privacy between the guest area and household members Figure (7.24);

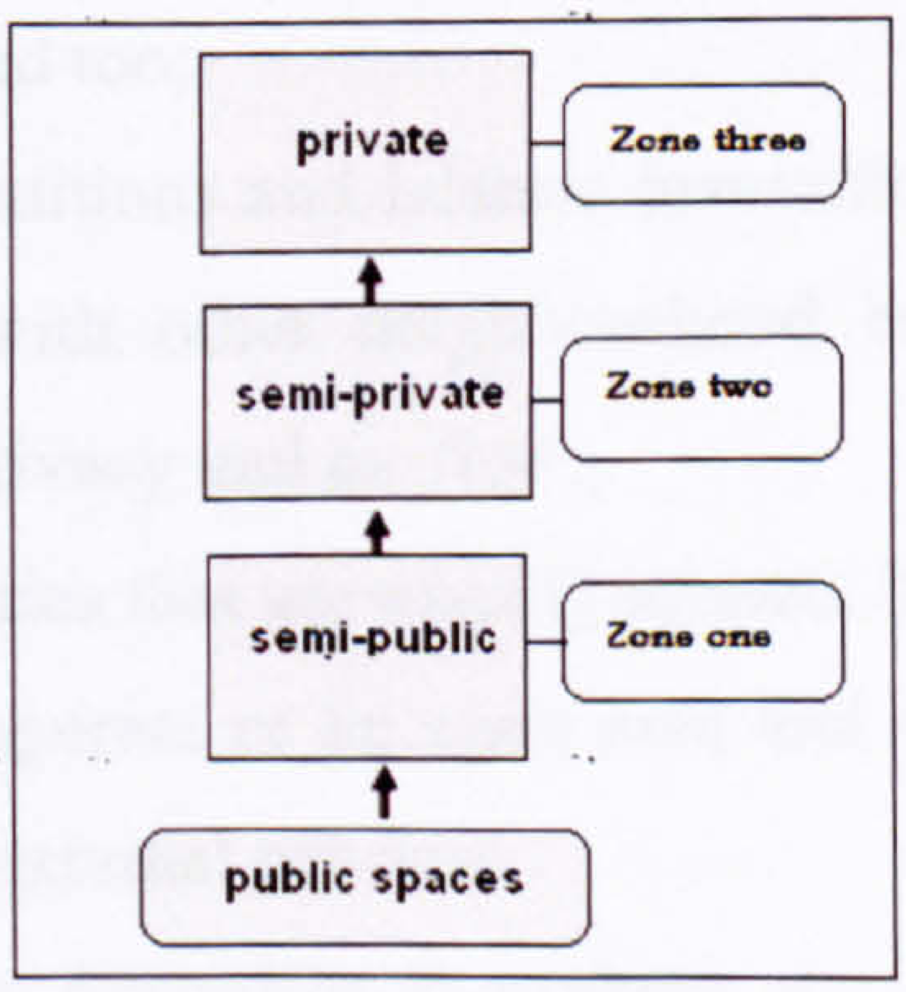


Figure 7.24 : The arrangement of house parts

- Encourages adopting the courtyard concept where possible; to provide a secure playing area for children and offer a good environment during the summer season. The courtyard may be covered by mechanical elements to avoid problems during winter such as rain. Furthermore, the basement or semi-basement is a significant element in the house because it offers a cool and warm environment and the space could be utilised for disparate activities;

- The designer should consider family growth because its size does not remain constant. An increase in the number of children, or a married son's family living with his parents may occur. Consequently, housing units should be designed to be flexible with the possibility of vertical or horizontal expansion.
- Assures the movement of air within a building. The control of ventilation is one of the most crucial concerns of building design. It can be achieved by cross-ventilation from north to south as well as through the use of a staircase to trap the northerly breeze.
- According to the traditions and customs of Libyan society, each housing unit should include a large living space with good accessibility to private outdoor space as well as to the main kitchen. Private outdoor space is necessary for daily activities, in addition to offering an extra space for social gatherings

II. External design

- Size, materials, and position of windows should be designed to achieve privacy and climate control by the use of "musherabyia", as can be observed in the screened windows of traditional houses. Besides this, shade elements and new technological materials like reflective and dark translucent glass ought to feature;
- The outer façade of the houses should be as modest as possible, i.e., plain and simple and harmonious with regard to shape, size, texture, and use colours that reflect the sun's rays. It should further reflect the local identity. Excessive finishing should be avoided too;
- In keeping with social traditions and Islamic instructions, the height of buildings should be in harmony with other neighbourhood buildings. This additionally improves the aspects of privacy and air flow;
- Avoiding scattered balconies that are usually unused. These can be combined into one or two spaces that operate as an open area and is protected by a fence and "mushrabiya" to achieve external privacy;
- Ensuring external privacy. According to analysis, the practical study in Chapter 7 shows that the weakness of privacy external to the house is one of the major problems faced by the residents with their dwellings, particularly in public

housing. Most were dissatisfied with some parts of their houses, such as the main entrance, especially when they have visitors, and with location of the kitchen and position of balconies in terms of aural privacy. Therefore, the study suggests four types of solution to prevent overlooking neighbours illustrated here by:

I. Ensuring that the boundary fence is a maximum of 1.6 m high with respect to at least the finished ground level of the adjacent gardens and, preferably, to the finished floor level of the internal ground floor of the property;

II. Also making sure that the roof parapet is at least 1.5 m high and uses a device such as mushrabiya to provide ventilation over the roof's surface, helping to cool the surface and rendering the roof space a more comfortable place to use;

III. Taking advantage of balconies above ground floor level to provide an extension to internal living space and, again, maintaining privacy by making them sufficient to inhibit the ability to be looked over or, in this case, incorporating a louvered mushrabiya to provide light and air circulation; and

IV. Providing devices to windows, particularly above ground floor level, that will bring light and air into internal spaces, while inhibiting views outwards that would breach privacy. This particular device has been shown as a horizontally located element, but it would work equally well vertically mounted, perhaps towards direct views where there is no privacy problem.

- Dwelling security/safety as noted previously in table 7-14, demonstrates the satisfaction levels of people who lived in the traditional houses had no experience of burglary or vandalism, and therefore did not require safety measures against such crimes. People who lived in contemporary dwellings were surprised to find that it was necessary to introduce measures to ensure their protection. Respondents complained that no attention was paid to their socio-cultural needs when their homes were originally designed. For that reason designers should account for the following during stages of design:
  - Rainwater pipes should be located against the wall as closely as possible so that thieves cannot gain access via them;
  - Windows should be located at a high level or reinforced by steel grids to reduce incidence of burglary and vandalism;
  - Building material should be fire resistant;

- Electronic gates should be introduced to restrict the free movement of strangers within the cluster.

2. Design guidelines related to climate and building materials

I. Climate

The main purpose of building is to change the microclimate. Early man built houses to keep the elements, sun, wind, rain, and snow at bay. Their purpose was to produce an environment favourable to their comfort and even to their survival (Fathy 1986). Prior to the start of the industrial era and mechanization, as noticed in chapter 4, man depended on natural sources of energy and available materials in forming his habitat according to his physiological needs.

Fathy (1986) indicated in his study that the successful solutions to the problems of climate in traditional houses did not result from deliberate scientific reasoning. They emerged from countless experiments and accidents, and the experience of generations of builders who continued to use what worked and rejected what did not.

According to the azimuth and altitude of the sun at the site of buildings, the microclimate on the south wall is quite different from that at the north wall and the climates at the east and west walls again differ. In addition, inside the building, each room has its own microclimate, which is a modification of one or more of the outdoor microclimates. As a result, the climate plays an important role in shaping the rhythm of their lives as well as their habitat and clothing. Thus, they construct houses that are more or less satisfactory in providing them with the required microclimate.

Latter-day architects have attempted to resolve this problem with modern technology, for instance, by introducing air-conditioning units, screen-walls, and using chemical material. These solutions are not appropriate for all residents because of the cost. Many people are unable to offer enough money to use this system. Numerous examples of this can be seen in entire elevations of modern buildings in the case study and tropical zones.

The study's results indicated that most residents are dissatisfied with contemporary housing, compared with traditional housing in terms of suitability of climate condition. Therefore, climate is a priority for designers. To achieve a comfortable climate in housing the designer should consider the following guidelines:

The insulation of walls and roofs is critical to create a comfortable climate in a house. This insulation could be attained by using the methods below:

- Using cavity walls or thermal insulation to increase lag-time of the wall will increase insulation. Since hot air rises, a considerable amount of air movement can be created by simply providing a vent at the bottom and the top of a wall. The hot air can rise and escape. Of course, these vents should be suitably screened to keep out insects. The use of natural materials such as mud mixed with straw and filling between double walls as well as the use of trees and climbing plants to shade it and heavy masonry are desirable on outer walls, particularly those to the west and south.
- As mentioned previously (Chapter five), the construction of a largely flat roof is desirable. The major part of the summer sun's heat falls on the roof of a building, due to its position with respect to the sun and has frequently to be protected to avoid overheating the spaces beneath. In addition the roofs of houses release most heat through radiation to the night sky, especially where construction involves reinforced concrete as observed in most contemporary housing. Therefore, the roof should be properly insulated from the sun. This can be accomplished by the following :
    - Shade can be achieved by using a double roof with a layer of air between or by covering the roof surface with hollow bricks; insulating materials such as fibreglass and light weight blocks are often used;
    - The shape of the roof is too, of considerable significance in a sunny climate. Pitching or arching the roof has several advantages over a flat structure. Using domes and barrel-vaulted further increase the speed of any air flowing over their curved surface and is effective in minimizing direct solar radiation;
    - Using roof garden plants will solve a great deal of the roof thermal, mainly by creating a shady area. Another advantage could be gained from roof plants in that the roots of such plants preserve a certain amount of moisture which can help to maintain a low roof surface temperature. A useful idea is to shade

the roof more naturally by designing it to suit popular traditions such as loggias or open galleries;

- Avoid high sold parapet walls around the roof which would, for example, create a stagnant pool of hot air;
- The other most significant concept of design in relation to the climate is that of windows. These must be sited suitably in relation to the prevailing breezes to permit natural airflow via the internal spaces and be suitable for warmth during the winter. Therefore the orientation of openings is determined by two factors:
    - Towards the prevailing breeze during the warm-humid season, to utilise its cooling effect;
    - Towards the sun during the cold season, to utilise the heating effect of radiation entering through the windows.

Internal blinds and curtains are not very effective ways of solar control. It is true that they prevent the passage of radiation but they themselves absorb the solar heat which can reach a high temperature (Koenigsberger et al. 1974). Therefore, the use of shading devices is important to reduce heat inside the house. This can be achieved accordingly:

- Encourage the use of elements shading to reduce the heat inside the house. West and south-facing windows require different shading solutions and this can be achieved by vertical and horizontal devices. Additionally, shading could be created by trees being sited close to windows besides the advantage of double-glazed windows with long insulated curtains. Deciduous trees can, however, be beneficial for providing shade from glare and overheating during the summer, whilst the bare branches will allow solar access during the winter.
- In sunny weather, external surfaces can become very hot, facilitating the transfer of heat to the building interior. Therefore, the reflection of radiation is another method of providing insulation. The colours of the surfaces of a building, which are exposed to the sun, play a large part in reducing the heat passing into the interior. When sunshine falls on a solid surface, part of the heat is reflected and part is absorbed. Light colours and bright metal surfaces reflect a great deal of the

sun's heat. Certain paints may reflect as much as 85% of visible radiation. Dark coloured surfaces should be avoided in all cases.

II. Building materials

The materials used in building are of prime importance for protection against heat and cold. As such, great care must be taken in the choice of wall and roof materials and their thickness with respect to their physical properties, such as thermal conductivity, resistively and optical reflectivity.

All building materials are processed before they can be integrated into the building. This compares with the traditional house constructed from materials found locally where processing was minimal (Roaf, et al 2003). No building can be constructed without the basic knowledge of building materials and construction (Stulz & Mukerji 1981). According to Fathy (1986) the choice of suitable building materials, the manner of construction, location and orientation of a house is crucial.

As noted previously in chapters 4 & 5, raw natural building materials were used before industrial materials came into use. Many cultures have established their own manner of improving their life by using structures, which were traditionally built with raw materials. Construction methods have been passed down from generation to generation among different cultures. Traditional techniques involve local labour and use of available natural raw materials.

The advantage of local materials is based on environmental principles (climatically) and social involvement (self-construction, by family and community working together). On the other hand, the disadvantages of local materials are their dependence on local availability, water absorption, and resistance to natural hazards such as earthquakes etc. and social acceptability in terms of a esthetical forms. The housing authority and designers should take into considerations the following guidelines:

- Analysis and evaluation of materials previously used, and an exploration of the possibility to propose new substitute construction technologies and materials having physical and chemical characteristics suitable to the geographical and climatic data of Tripoli in particular, and to the whole of Libya in general;

- Building materials with the best insulation should be used, the thickness of walls should be increased and, where possible, locally-produced building materials should be adopted such as limestone block in walls;
- Develop the technology of using local materials for new housing construction, as well as encourage local manpower to participate widely in the new development processes; and
- Encourage scientific research in terms of developing building technology and specifications of building materials.

7.6 Validation of the proposed housing design guidelines

In order to ensure the validity and credibility of the proposed guidelines, the researcher presented the guidelines to a group of experts consisting of 16 professionals. They were selected on the basis of their expertise in housing design and the construction industry, and agreed that the researcher email a copy of the guidelines with a covering letter and provide them with a briefing on the key objectives behind the study. Some were met face-to-face and others contacted by telephone in order to provide points of clarification.

The experts are holders of PhD and MSc degrees related to AEC industry. Most had considerable managerial experience, ranging from 10 to 26 years with an average of 19 years. 10 of the experts are Libyan and 4 of them are from other countries, which belong to approximately the same socio-culture and have similar climate conditions and which contribute to the validation and improvement of the guidelines proposed.

Table (7.41) illustrates a list of the participants. 14 out of the 16 experts have responded.

Table 7.41 : Membership of Expert Group

	Name	Discipline	Qualification	Position held	Years of experience	Country
1	Mohamed M. Ajaj	Architect, Urban design	PhD	Director of engineering in medical centre	26	Libya
2	Nabil El-Sawalhi	Civil Engineer	PhD	Construction manager	23	Palestine
3	Mohammed Zami	Architect urban design	MSc	Architect and lecturer	10	Zimbabwe
4	Salem A. Abukersh	Civil Engineer	MSc	Civil Engineer-in public sector	20	Libya
5	Aish Al- Mansuri	Architect, urban design	MSc	Architect lecturer	21	Libya
6	Mahmoud El-Saboni	Civil Engineer	MSc	Senior Project Manager	21	U A E
7	Ahmed Agiel	Architect & Urban design	MSc	Prof. at school of architecture	11	Libya
8	Khaled Elamari	Architect Urban design	MSc	Prof. at school of architecture	11	Libya
9	Aziden M. Ashawsh	Architect &Urban design	PhD	Director of architecture department of Al-Fateh University in Libya	26	Libya
10	Ali Mohammed	Urban planning	MSc	Department of architecture planning in Misarata City	15	Libya
11	Ali M. Sawan	Architect & Urban design	MSc	Manger of department of planning Misarata City Centre	25	Libya
12	Lobna Sherif	Architect	PhD	Professor of Architecture and Head of Department of Architectural Engineering and Environmental Design, AAST-Cairo	25	Egypt
13	Adel Al-Zitouni	Architect &Urban design	PhD	Architect and lecturer and private designer	12	Libya
14	Abubaker M. Shawsh	Architect & Urban design	PhD	Staff member of department of architectural and planning in Al-Fateh University, Libya	26	Libya

7.6.1 Analysis of interviews

These responses indicate that the experts are satisfied with all the guidelines proposed. The contributors' percentage of agreement on the three levels of guidelines is summarized and analyzed via the Tables (7.42-7.47). In terms of housing policy the experts' responses are tabulated in Table (7.42).

Table 7. 42 : Agreement of experts on guidelines of housing policy

The first level: Housing Policy			
Guidelines proposal		Agreements	
		No.	%
1	Suitability of design for different regions according to geographic entity, socio-cultural and climatic condition;	14	100
2	Allow people more opportunity to expound their views during the process of design and planning. This can be effected by variety of techniques;	14	100
3	Give people more opportunity to select their own type of house according to size of family and neighbours to maintain strong relationship between families where possible;	13	93
4	Revision of legislation, regulations and building laws inherited from colonial periods and foreign specification to create criteria and standards that better accommodate the Libyan and Muslim cultural environment. Related to this, there is a need to issue new laws deal with maintaining the environment and establishing scientific and educational institutes for environmental studies. In addition, issue relevant legislation and regulation to solve visual and acoustic pollution. Finally, it is crucial to issue legislation that focuses upon the maintaining of local architectural identity;	13	93
5	Very high-rise flats are inappropriate for large families, so height should preferably be limited (four-five storeys) and consist of different types and sizes to suit a family needs;	8	57
6	Encourage scientific research in the development of local materials through the use of new technology as well as applied research to support development of indigenous construction materials industry;	14	100
7	The local authority should pay more attention when selecting designer and planner cognisant of local culture and climate conditions to avoid problems noticed in most public housing, such as poor external privacy and unsuitability for climate conditions.	12	85

As can be noted in Table (7.42) the majority of experts are satisfied with the guidelines proposed as follows:

- Two out of seven guidelines have obtained a high-degree of agreement (more than 90%). This agreement is supported by empirical-study that emphasises the majority of participants indicated that these points should be considered during the design process and development.
- Three guidelines reached 100% as well as most experts emphasising consideration of socio-cultural factors.
- 85% of agreement was paid to selecting designers and planners cognisant of local culture and climate conditions. This statement demonstrated the significance of choosing designers or planners for designing houses according to people's and environmental needs.
- One of the guidelines obtained a lower agreement of around 57%. The drop in this percentage can be attributed to many factors, such as land value and population density. There is still much empty land around the city of Tripoli that could be made available for horizontal expansion rather than for high-rise building

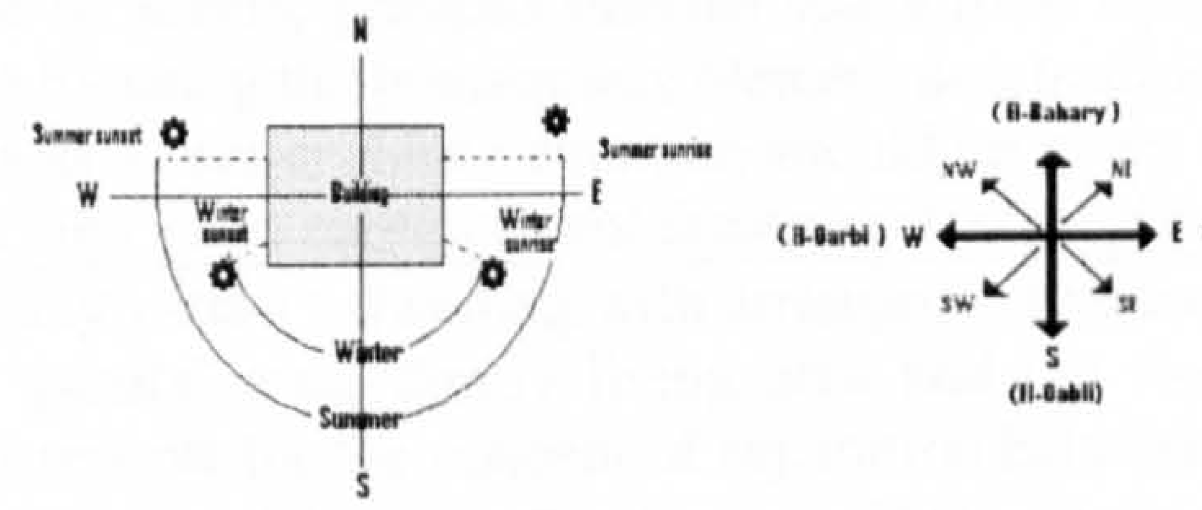
programmes and, as indicated in chapter two, Libya has a very small population compared to the size of its land. In terms of planning guidelines, these are divided into two as indicated previously. The experts' percentages of agreement vis-à-vis planning are displayed in Table (7.43).

Table 7.43 : Agreement of experts for planning guidelines

The second level: Planning (Neighbourhood layout)			
No.	**Guidelines proposal**	**Agreements**	
		No.	**%**
1	Ensure the scheme creates a pleasant living environment which will meet the needs and preferences of the residents. Schemes involving a significant number of dwellings should create streets and spaces that provide a sense of identity and place and, thus, facilitate the development of the community;	14	100
2	Ensure the scheme makes a positive contribution to the overall environment of the locality. In this regard, care should be taken in integrating new housing into the existing built and natural environment so that it contributes to the social, environmental and economic sustainability of the area;	14	100
3	Ensure a high level of safety and security for the residents. The scheme should be designed to discourage anti-social behaviour, e.g. layouts should seek to ensure that all access ways and public areas are overlooked by dwellings or are otherwise open to surveillance by residents besides lighting to pedestrian ways, dwelling entries, driveways and car parks to guarantee a high level of safety and security for residents and visitors at night;	13	93
4	Maximizing amenity and energy efficiency by climate-sensitive design which takes account of orientation, topography and surrounding features to control wind effects, while optimizing the benefits of sunlight, daylight and solar gain;	13	93
5	Ensuring that insofar the design minimizes barriers to accessibility for all users– particularly the elderly and those with disability;	13	93
6	Ensures the scheme can be constructed, managed and maintained at reasonable cost, and in a way which is economically, socially and environmentally sustainable. Materials should be chosen with this in mind. The design should aim to maximize the use of indigenous materials, optimize the distance of roads and other hard surfaces and minimize the length of service runs;	13	93
7	Ensures quietness in neighbourhoods; this can be done by avoiding including a road with heavy traffic near the location of residents besides separating public spaces such into play areas and clusters of houses. This should be reserved for shrubbery and small trees;	14	100
8	Ensures the landscape design exploits vegetation types and landscaping styles that integrate the development with the street-scape. This should not affect the structure of the proposed buildings, considers personal safety by ensuring good visibility along roads, paths and driveways and avoids shrubby landscaping near dwelling entries, contributes to energy efficiency and amenity by providing substantial shade in summer especially to south and west-facing windows admitting winter sun rays to house interior and improves privacy between dwellings;	13	93
9	Dwellings are provided with open space areas that should be afford adequate private for residents' convenient access from a main entrance as well as provision of trees and canopy to achieve shading during the hotter months of the year. In addition, a special shared area for different activities families, ought to be included,	14	100

As can be seen from Table (7.43) the vast majority of experts are satisfied and the average agreement with all guidelines was 96%. This represents the importance of the same to the planning of neighbourhoods. Therefore, planners should consider these guidelines during the establishment of new neighbourhoods. Regarding house layout, the experts' percentages of agreement are displayed in Table (7.44).

Table 7.44 : Agreement of experts for guidelines of house layout

The second level: Planning (house layout)			
Guidelines proposal		**Agreements**	
		No.	**%**
1	Ensures the opening orientation of house layout position is in the most suitable location vis-à-vis climatic conditions and the long sides of the houses are exposed to the north to capture the cold breeze in summer and to the south to obtain suns-rays in winter. For instance, in Tripoli Libya the opening orientation of houses layout is in the most suitable location regarding climatic condition and the long sides of the houses are expose to the north to capture the sea's breeze in summer and south to obtain the sun's-rays in winter;  Suitable orientation of houses in Tripoli according to wind direction and sun rays	13	93
2	Landscaping, including shady trees, should be planted in both front and back yards or courtyard especially in private houses to respond to Environmental needs.	14	100

The results of analysis shown in Table (7.44). The vast majority of experts agreed with the guidelines proposed for the house layout. The rate of agreement is as below:

- 100% of agreement paid to landscaping design. This statement indicated the significance of landscaping in and around house. All respondents emphasized certain points which should be considered when establishing the landscape and trees: before selecting plant materials it is important to know the regions basic climatic parameters, select drought-tolerant and low water species to save time and money, irrigation plants in dry zones such as Libya for example;

- The guideline proposed for orientation of house layout and position of windows reached 93% agreement. This statement emphasises that designers should consider the climatic conditions and wind direction to avoid dependence on air-conditioning units;

In terms of interior design guidelines proposed the agreements rate can be seen in Table (7.45).

Table 7.45 : Agreement rate of experts for guidelines of internal house design

The Third level: Housing Design (Internal Design)			
Guidelines proposal		Agreements	
		No.	%
1	To achieve comfort indoor space should be arranged according to daily and annual heating and cooling requirements. According to layout the spaces with the most daytime use can be positioned on the south and north sides , sleeping area placed on the east and north-east sides, the guest area placed in south-east, and other facilities situated along western façades to protect the building during overheated and overcooled periods;	13	93
2	Ensures ease of access, prevents internal space from being observed from outside by using the passageway element as a traditional system that operates as a barrier. More attention should be given to block(s) of flats with their main entrances not facing each other directly;	13	93
3	Ensures privacy within a dwelling with arrangement of the house into three areas: guests' area, family living area and the sleeping area. This ensures respect for the concept of separation between males and females according to Islamic instructions besides ensuring visual and aural privacy between the guest area and household members;	12	86
4	Encourages adopting the courtyard concept where possible; to provide a secure playing area for children and offer pleasant environment during summer season. The courtyard may be covered by mechanical elements to avoid problems during winter such as rain. The basement or semi-basement is another significant element in the house because it offers a cool and warm environment and the space could be utilised for a number of activities;	13	93
5	The design should ensure flexibility in use, adaptability and growth of the family;	11	79
6	Ensure the circulation of air within a building. Control of ventilation is one of the most significant concerns of building design. This can be achieved by cross ventilation from north to south as well as by use of a staircase to capture the northern breeze.	14	100

As can be observed in Table (7.45) the participating experts' give the impression of being satisfied with the proposed guidelines as follows:

- The average percentage of agreement for all proposed guidelines was 91%;
- Thee out of six guidelines have received agreement of 90%;
- One of the six guidelines gets total agreement of 100%;
- One guideline obtains 86% approval rating;

- Only one of the guidelines proposed obtained a less significant degree of satisfaction among the experts (79%).

In terms of agreements for proposed external house design guidelines the experts responses are reported in Table (7.46)

Table 7.46 : Agreement rates of experts regarding proposed external house design guidelines

The Third level: Housing Design (External Design)			
Guidelines proposal		Agreements	
		No.	%
1	Size, materials and position of windows should be designed to achieve privacy and climate control by use of "musherabyia" as can be observed in screen windows of traditional houses besides shade elements and new technological materials such as reflective glass, dark translucent;	12	86
2	The external façade of housing should be as modest as possible, i.e., plain, simple and harmonious with regard to shape, size, texture, and use colours that reflect sun rays. It should also reflect local identity. In addition it ought to avoid excessive finishing;	12	86
3	In keeping with social traditions and Islamic instructions, the height of new buildings should be in harmony with other buildings in the neighbourhood. This further improves aspects of privacy and air flow;	12	86
4	Avoiding scattered balconies that are invariably unused. These can be combined into one or two area that it works as an open area and is protected by fence and "mushrabiya" to achieve external privacy;	9	64
5	Ensuring external privacy as below		
	• The boundary fence is a minimum of 1.6 m high with respect to at least the finished ground level of the adjacent gardens and, preferably, to the finished floor level of the internal ground floor of the property;	8	57
	• Making sure that the roof parapet is at least 1.5 m high and uses a device such as "mushrabiya" to provide ventilation over the roof's surface, helping to cool the surface and rendering the roof space more comfortable;	8	57
	• Taking advantage of balconies above ground floor level to provide an extension to internal living space and, again, maintaining privacy by making them sufficient to inhibit their being overlooked or, in this case, incorporating a louvered mushrabiya to supply light and air circulation, and;	9	64
	• Providing devices to windows particularly above ground floor level that will draw light and air into internal spaces while inhibiting views outwards that would breach privacy. This particular device has been shown as a horizontally located element, but it would work equally well vertically mounted, perhaps to direct views where there is no privacy problem.	9	64

As shown above in Table (7.46) experts appear to concur with the proposed guidelines as follows:

- Three guidelines have obtained more than 80%;
- Three guidelines received 64%;

- Only two had 57% approval;
- The total average percentage of agreement for all guidelines proposed is 71%.

Regarding house design guidelines, concerned with the capability of house design to provide protection from climate change and materials selection the rate of agreement is shown in Table (7.47).

Table 7.47 : Agreement of experts regarding climate and proposed building materials' guidelines

The Third level: Housing Design (Climate and building materials)			
No.	**I. Guidelines proposal (climate)**	**Agreements No.**	**Agreements %**
1	Insulation of walls is crucial to create a comfortable temperature within the house. This could be attained by the following methods: • Use of cavity walls or thermal insulation to increase lag-time of the wall. This will increase insulation. Since hot air rises, a considerable amount of air movement can be created by simply providing a vent at the top and bottom of a wall. Hot air can rise and escape so of course these vents should be suitably screened to keep out insects, or natural materials such as mud mixed with straw should be used and filling between double walls besides planting trees and climbing plants can offer shade; • Heavy masonry is desirable for outer walls particularly those on western and southern sides.	13	93
2	The construction of mostly flat roofs means that the major part of the summer sun's heat falls on the roof of a building, due to its position with respect to the sun and has frequently to be protected to avoid overheating the spaces beneath. In addition, it is the roofs of houses release most heat through radiation to the night sky, especially those constructed by reinforced concrete, as observed in most contemporary housing. Based on these problems above, the roof ought to be insulated from the sun. This can be accomplished by the following : • Shade can be achieved by using a double roof with a layer of air between or by covering the roof surface with hollow bricks; insulating materials such as fibreglass and lightweight blocks; • The shape of the roof is also of considerable importance in a sunny climate. Pitching or arching the roof has several advantages over a flat structure. Using domes and barrel-vaulted design increases the speed of any air flowing over their curved surface and is effective in minimizing direct solar radiation; • Using a roof garden is plants can solve a great deal of the roof thermal mainly by creating a shady area. Another advantage could be gained from these plants in that their roots retain a certain amount of moisture which can help to keep roof surface temperature down. A useful idea is to shade the roof more naturally by designing it to suit popular traditions such as loggias or open galleries; • High solid parapet walls around the roof would, for example, create a stagnant pool of not air and should therefore, be avoided;	11	79

Table (7.47) continued

3	In sunny weather, external surfaces can became very hot, facilitating the transfer of heat to the building interior. So, the reflection of radiation is another method of providing insulation. The colours of the surfaces of a building, which are exposed to the sun, play a large part in reducing heat passing into the interior. When sunshine falls on a solid surface, part of the heat is reflected and part absorbed. Light colours and bright metal surfaces reflect a great deal of the sun's heat. Certain paints may reflect as much as 85% of visible radiation. Dark coloured surfaces should be avoided in all cases;	14	100
4	The other most important concept of design in relation to the climate is that of windows. These must be placed suitably in relation to prevailing breezes to permit natural airflow through internal spaces and be suitable for heating during winter. Accordingly the orientation of openings is determined by two factors: • Towards the prevailing breeze during the warm-humid season, to utilize its cooling effect; • Towards the sun during the cold season, to utilize the heating effect of radiation entering via he windows; • Encourage the use of shading elements to reduce heat within the house. South and west facing windows require different shading solutions and this can be achieved by vertical and horizontal devices; • Shading could additionally be created by trees being positioned close to windows. Deciduous trees can, however, be beneficial for providing shading from glare and overheating during the summer, whilst the bare branches will permit solar access during the winter; • Advantageous to use double-glazed windows with long insulated curtains.	10	71

Table (7.47) continued

No.	II. Guidelines proposal (building materials)	Agreements	
		No.	%
1	Materials used in building are of prime importance for protection against heat and cold. Therefore great care must be taken in the choice of wall and roof materials and their thickness with respect to their physical properties, such as thermal conductivity, resistively and optical reflectivity. Locally-produced building materials should be used;	14	100
2	Analysis and evaluation of materials previously used, and an exploration of the possibility to propose new substitute construction technologies and materials having physical and chemical characteristics suitable to geographical and climatic data of Tripoli in particular, and the whole of Libya and Arab countries in general;	12	86
3	Building materials with the best insulation should be adopted, thickness of walls should be increased and, where possible, locally-produced building materials should be adopted, such as lime sand block in walls;	13	93
4	Develop the technology of using local materials for new housing construction, as well as encouraging local workers to participate widely in new development processes;	12	86
5	Encourage scientific research in terms of development of building technology and specification of building materials.	13	93

The following can be noted from Table (7.47) above:

- Variety of percentages of agreements and satisfaction among the expert panel;
- 86% agreement has been achieved by the guidelines to encourage development of insulation materials by using shading elements, both industrial and natural;
- The guidelines for development of building materials scored 92%.

7.6.2 Discussion

As the survey results revealed, the vast majority of participants were dissatisfied with high-rise buildings. Most prefer the low-rise, high-density developments such as walk-up flats. The latter form provides a more suitable form for Libyan families which to a large extent, match the socio-cultural aspects. In this respect, more than 57% of the expert group concurred with this guideline. However, 43% had separate views and showed their disagreement with this guideline. They believe that economic aspects bear more weight than socio-cultural aspects, which are considered as a significant factor upon the housing design.

The socio-cultural factor has been of great significance according to a number of researchers, such as (Oliver 1997) who states: "the home is both a creative expression of culture and the frame within which people's experience of culture takes place, a process going on between the creation of this physical systemisation of nature and the experience of culture handed down from one generation to another". Rapoport (1969) indicated that "a home is a cultural phenomenon in the first place, due to the fact that the house is a reflection of the cultural and norm systems". Therefore, housing authority policy should avoid concentration of the population in large cities such as Tripoli and Benghazi. This can be achieved by encouraging and attracting people to inhabit the new developed urban areas.

In terms of arrangement of the interior elements according to their daily and annual heating and cooling requirements, this guideline obtained a strongly agreed response, because it is very important to arrange the house elements according to the function of these elements requirements and the climate as well as the direction of the prevailing winds, especially during the hot season. Related to this point, many researchers argued this, such as (Fathy 1986), (Eion, et al 1996 p. 23).

The high level of agreement in terms of preventing the internal space from being seen from outside, emphasized the opinion of householders where complaints recorded during the survey showed dissatisfaction. This was because in most public houses, the main entrances were facing each other and this is not the right direction in terms of religion and social culture. Aksoylu (1987) indicated that this point of connection, which is deemed to be subjected to vulnerability, is well located to lead indirectly to the inner spaces in order to ensure full visual privacy.

Looking explicitly at the experts' impressions, the vast majority reported strong agreement, which ensures privacy inside and outside a dwelling by arrangement of the house into three distinct areas. This statement confirms the significance of interior privacy in house design. In relation to privacy within a dwelling, the survey findings recommended that dwellings should respect the concept of separation between male and females within a house. (Bahammam 2006), (Chowdhury1992), (Noor 1986) and (Al-Hariri 1989) also indicated that principal house design arrangements in Arab and Muslim societies regarded privacy and separation between the genders (male and female).

Regarding encouragement of adopting the courtyard concept in modern houses, most experts strongly concurred. This agreement is supported by empirical study that emphasises that the majority of householders and professionals were united in their appreciation of the advantages of the traditional and contemporary house. The concept is based on using the private inner and exterior courtyard. One of the more recent studies in housing design (Mitchell 2006) argued that the notion of continuity of the courtyard in modern houses is very important for hot-dry climates and socio-cultural requirements.

79 % of experts were agreed that house design should ensure flexibility and adaptability. As indicated previously in this study family size does not remain constant in Libya as is the case in most Arab and Muslim countries. Consequently, the majority of householders in the field study had made modifications to their houses. Accordingly, housing units should be designed to be flexible with the possibility of altering changing function and allowing vertical or horizontal expansion. The DELG(1999) in social housing guidelines indicated that the "Designer should consider not only immediate needs of the prospective but also the changing needs of occupants over the life of the dwelling".

According to guidelines relating to ventilation of houses, the experts strongly agreed with the importance of this factor. Roaf, et al. (2003 p.110) illustrated that "The control of ventilation is one of the most subtle and yet the most important concerns of the building designer. How to make air move about the building? in a way that satisfies, and even delights, the occupant." Koenigsberger (1974) indicated that "as buildings are frequently closed for long periods, ventilation requirements should be satisfied during the hot-dry season by special provisions".

The strongest rating of agreement related to the size, materials and position of windows. This statement indicated the important role of window design in relation to achieve the comfortable climate and privacy within the house. Many researchers support this guideline such as (Fathy 1986), (Zletni 1993) and (Eion et al. 1996). They contest that the position and size of windows is crucial for hot-dry climates and socio-cultural reasons.

It is evident from the above that the vast majority of experts reached a high level of agreement in terms of the outside façade. This statement confirms that the design of the house façade should consider social traditions and Islamic instructions. Al-Sanafi (2001) supports this point in her study. In terms of combining the scattered balconies into one or two areas which work as an open area, the level of accord was greater than 60%. This statement confirms that small scattered balconies are unsuitable for Arab societies and particularly in Libya.

As mentioned in Chapters two and four, climate plays a significant role in housing design. The survey's findings supported this where it was indicated that the majority of householders and professional actors were dissatisfied with contemporary house design in terms of climatic considerations.

It is interesting to note that the experts expressed their impressions strongly where the total average was 89% in favour of guidelines concerning choice of building materials, insulation method, shape of roof elements of shading and surface colours in order to achieve maximum domestic comfort in summer and winter seasons. This statement confirms that all building materials need evaluation to some extent before incorporation into house construction to respond to environmental needs. In relation to the guidelines of Table (7.47) Golany (1980), Fathy (1986), Eion et al. (1996), and Roaf et al (2003), indicate that insulation materials, particularly in walls and roof, the shape of roofs and type of colours, shading elements, and choice of building materials are of prime consideration for protection against heat and cold. This statement emphasises that designers should consider climatic conditions and wind direction to avoid dependence on air-conditioning units.

7.6.3 Overall Findings from the experts' opinions

The results from the 14 experts to validate house design guidelines revealed how necessary impressions are in order to maintain proper implementation of housing design. A number of common themes that emerged can be categorized as follows:

- Most of the positive views related to the three levels of proposed guidelines and were rated as strongly agreed;
- The results obtained in relation to assessing proposed housing policy guidelines. The experts' views concur with separate design styles according to geographic, climatic conditions and socio-cultural factors. They also stress that people's contributions are significant in making their views known during the process of design, besides affording them the opportunity to select their own type and size of house according to family demands and neighbours to maintain strong relationships between families. Most experts agreed with revision of the legislation, regulations and building laws because in developing countries such as Libya, some legislation is of foreign specification;

  Very high-rise flats are not suitable for Arab societies and particularly that of Libya. A large proportion of respondents urge to avoid this system especially in Libya. While a few experts indicated the risk of using more land, they consider that the economic aspects have a more weight than the socio-cultural aspects. Most experts emphasise that the housing authority should encourage scientific research for building materials and the establishment of scientific and educational institutes for environment studies. This is evidenced in their answers which strongly agreed on this point.

- The results obtained in relation to planning guidelines proposed for neighbourhood layouts, where the general consensus of the experts is great, strongly points to the necessity of provision of pleasant living environments, with dwellings, streets, and places that afford a sense of identity. The other consent giving integration of new buildings with existing ones, stress the importance of ensuring neighbourhood quietness. They also highlight private open space areas with barriers such as trees and so on, to offer areas for the various activities of residents. The majority of experts emphasized the high level of safety and security as being very important in neighbourhood schemes.

The other leading guidelines give high consensus to landscapes that use architectural elements for screening, privacy control, and enhance the elements of buildings. The great majority of experts were fully satisfied with the application of housing clusters constructed close to each other.

- The results obtained from experts in terms of internal house design guidelines, reveal that to achieve a comfortable environment within a house, the designers should give high priority to the design and positioning of windows and direction of the staircase to control cross ventilation besides capturing the breeze. The other element, which must take top priority, is the arrangement of indoor spaces according to annual heating and cooling requirements. On the other hand, the comment ensures privacy both visual and aural-inside a house, particularly between guests and household members by arrangement of the house into three zones. In relation to the main entrances, the results emphasized preventing internal space from being observed from outside via the main entrance to maintain Islamic instructions in terms of privacy. The other element emphasised by experts is that designers should pay attention to adopting the advantage of the courtyard concept in new designs. Additionally, high consensus was given to flexible design to allow for future growth of families.

- The results obtained in terms of external house design guidelines: the majority of respondents stressed that designers should take account during design of the house, the size, type of materials and position of windows, which all play a significant role in achieving users' needs in terms of culture and environment. The results further yielded a high degree of agreement relating to external façade in terms of modest; appearance harmony with regard to shape, colours, texture and height of buildings in relation to other buildings. In addition, the external façade should reflect local identity whilst avoiding excessive and elaborate finishing.

With regard to combining the small-scattered balconies into one or two large balconies to be used as an extension to internal space (and protected by fence and mushrabiya) the results supported this idea but emphasized the maximum height of fence with mushrabiya should not be more than 1.5 m. To ensure external privacy, the results obtained designated that this factor should be accounted to by designers to offer external privacy between neighbours by avoiding orientation of the balconies, windows or main doors to each other and /or providing devices to windows or devices such as mushrabiya to the balcony.

- With reference to house design guidelines proposed in relation to climate and building materials, the findings indicated that high agreement was paid to insulation materials, particularly in walls and roofs exposed to direct sun-rays, to create a comfortable environment in the home by encouraging use of cavity walls, heavy masonry walls, or natural materials such as mud and so forth. Trees and roof garden besides the shape of the roof, which should be taken into account in design, can provide shade. In addition, window position and double-glazing should also be considered. On the other hand, light colours and bright metal surfaces should be taken into account during design stages. Designers ought to adopt guideline to achieve good insulation.

In terms of building materials, the results emphasized selection of suitable materials for climatic reasons. The field study and opinion of experts offered strong support to develop local materials by utilising new technology besides encouraging scientific research with regard to building materials, especially those which are local to create the specifications for Libya and countries with a similar climate.

Alternately, comments and feedback received from the think-tank besides new ideas that appeared during interview, contact and discussion, could optimize the development of the guidelines proposed. From literature reviews and the result of empirical study, convincing evidence was found that suggests that housing design development took scant consideration of people's needs vis-à-vis socio-cultural norms and climatic conditions.

It is evident that unsuitable design approach brought negative impacts to overall housing design in Libya and other countries with similar socio-cultural and climate conditions. As a result, the establishment of new or modified development guidelines can be summarized in (Figure7.25).

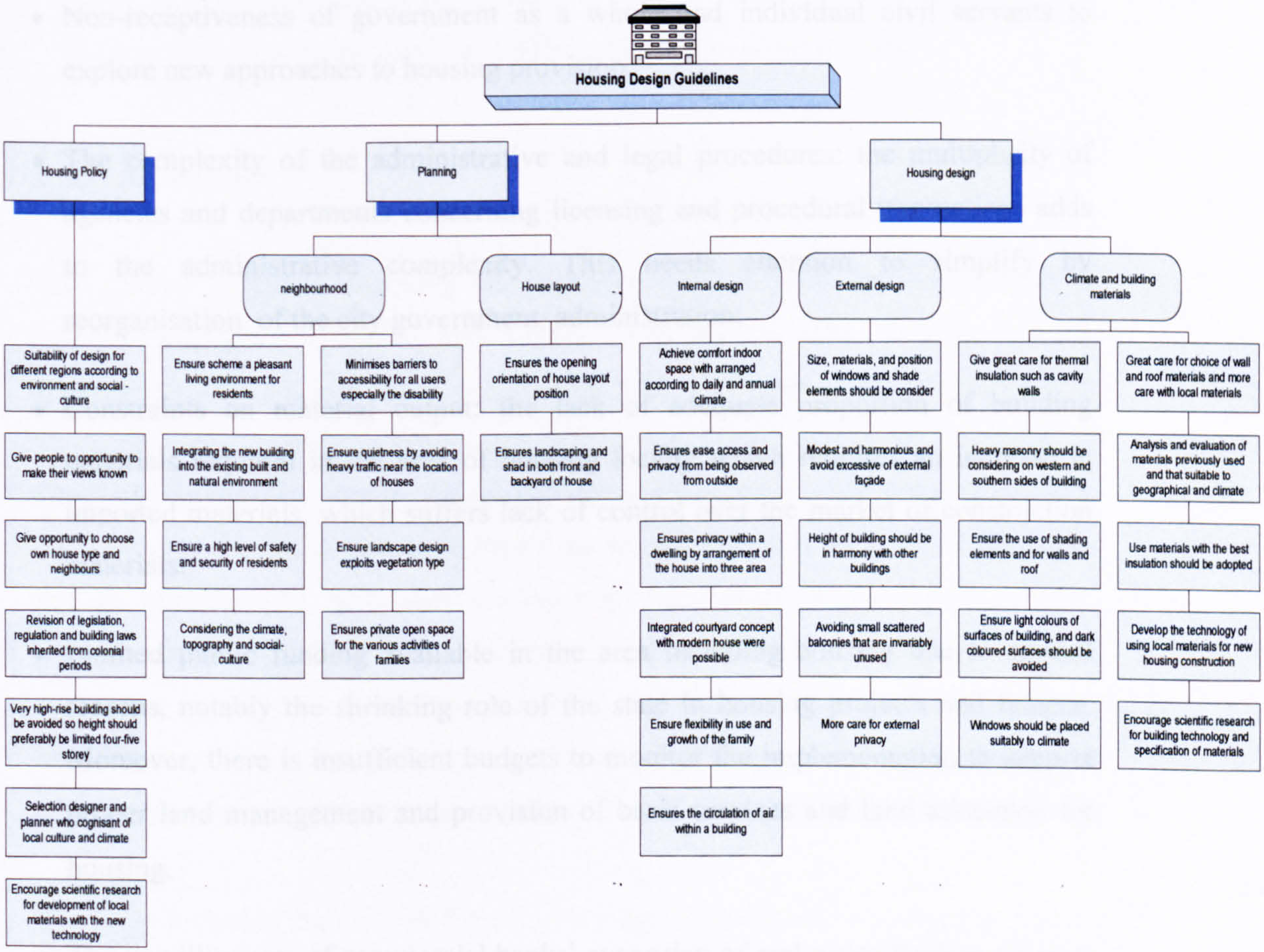


Figure 7.25: Diagram of housing design guidelines proposal after validation by the expert group.

7.6.4 Obstacles facing the implementation of the study findings and the proposed guidelines

There are a number of obstacles facing the implementation of the findings and guidelines. These obstacles can be summarised as follows:

- Unstable structure of the housing sector and the abolition of the mechanisms supervising housing activity over time creates an imbalance which means that the targeted housing plans and programs dealing with the housing is undermined and reduces interest in implementing the determinants of the adopted housing policy.
- Non-receptiveness of government as a whole and individual civil servants to explore new approaches to housing provision;
- The complexity of the administrative and legal procedures: the multiplicity of agencies and departments concerning licensing and procedural transactions adds to the administrative complexity. This needs attention to simplify by reorganisation of the city government administration;
- Constraints on material output: the lack of adequate proportion of building materials required in the area of housing locally which requires an increase in imported materials, which suffers lack of control over the market of construction materials.
- Limited public funding available in the area including housing due to several reasons, notably the shrinking role of the state in housing projects and finance. Moreover, there is insufficient budgets to monitor the implementation to support proper land management and provision of basic services and land allocation for housing.
- The unwillingness of commercial banks' expansion of real estate lending program which presents difficulties encountered in recovering real estate mortgages and loans in the past and clearly approval of relaxed repayment by the citizens in the absence of legal sanction by the banks.

- Unstable circumstances for investment and joint stock companies faced civil legislation or administrative procedures led to clear departure and continuity, contraction in the sector and the limited role of eligibility and individuals. Stakeholders seem to become reluctant to invest in housing, because of eligibility to expand housing projects and difficulties encountered in recovering of funds, which was disbursed in the past in this area.

- Professional resistance to change: design guidelines are sometimes seen as a constraint to designers freedom and certainty.

- Continuing uncertainties in terms of citizens requirements in a changing period where Islamic values are being challenged by new ideas from other cultures. This leads to new requirements which this study has begun to investigate.

7.6.5 Conclusion

This chapter began by analysing the responses obtained from the field survey of householders and interviews with Libyan professionals. The findings indicate traditional houses were designed in agreement with the wishes of the inhabitants who co-operated in the design process to be suitable for climate and social life needs. In terms of contemporary house, design findings indicate most users and professionals were unhappy, because they described it as unable to match their social life needs and the climate. This study shows many steps were made by the users to modify their dwellings. In general, both types of house bear advantages and disadvantages. According to evaluation and a comparison of traditional and contemporary housing, traditions are necessary in order to formulate new guidelines for appropriate architectural designs and planning concepts suitable for modern day Libyan society.

The key conclusion drawn from the analysis emphasises the importance of social and cultural factors, climate conditions, and building materials, as they all play an important role in the design of any house and are crucial to the level of satisfaction of users. Traditional houses were designed in agreement with inhabitants' wishes. They co-operated in the design process, with major considerations being suitability for climate and social life needs. The current design of housing failed to meet basic cultural and climate needs particularly in public housing.

Accordingly, it is necessary to formulate new guidelines for appropriate architectural designs and planning concepts that are suitable for societies in hot dry climates. Through evaluation and a comparison of traditional and contemporary housing, it is essential to draw up new guidelines for housing suitable for Libyan society. Based on the analysis, a set of guidelines for the design of future houses was developed. This guidelines are considered to offer suggestions on how future housing could be reflected in the design advantages of traditional and contemporary housing in terms of socio-cultural and climatic conditions. This would provide fitting accommodation for Libyan society, combining technological and other benefits of the modern era with design aspects, better reflecting their needs and aspirations. See more details in section recommendation .

The subsequent .chapter deals with the conclusion of the present study and recommendation for study.

Chapter 8: Conclusions and Recommendations

8.1 Introduction

This chapter is divided into seven parts. The first part gives an explanation of introduction, the second part aims to explain and summarise the research findings, the third part focuses upon the results of survey, the fourth part is to clarify the final remarks and the fifth part to explain the main contributions to knowledge, and sixth part explain the limitations of the research and seventh part focuses upon future research studies. Figure 8.1. explains it is structure.

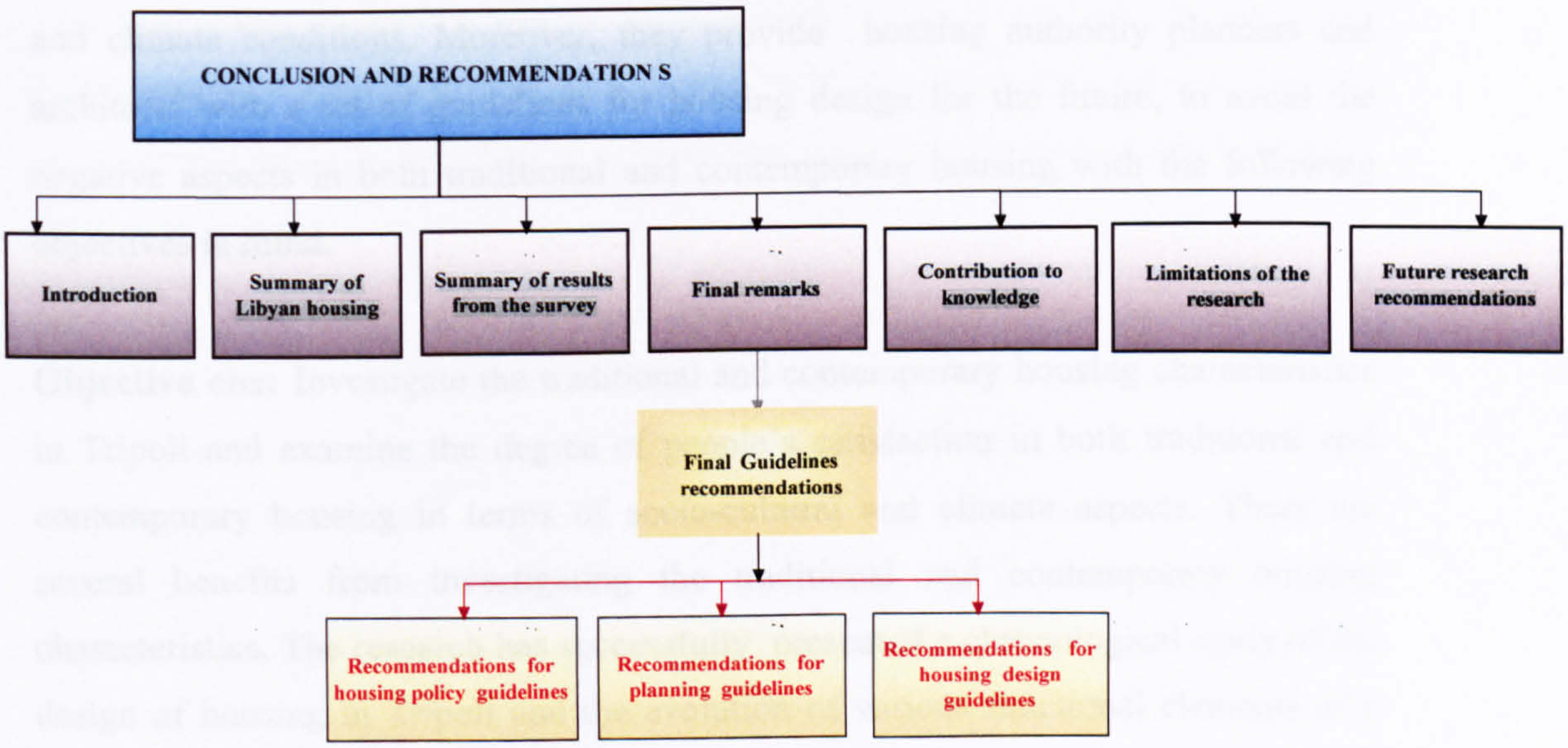


Figure 8.1 : Structure of conclusion and recommendations

As mentioned in Chapter One, the aim of this research was to assess residents' satisfaction with traditional and contemporary housing in terms of suitability for climate and social life, and to establish a profile of housing development in Tripoli with regard to people's preferences, and their reasons for subsequently modifying their housing. Chapter Two presented the background to Libya's current situation, making reference to its history, population, climate, economic conditions, and housing policy. Chapter Three explored culture, society, religion and ancient and modern influences on housing. Traditional Libyan housing and various examples from Arab and Muslim countries were described in Chapter Four. Chapter Five discussed both traditional and contemporary housing in Tripoli, considering types of housing and the evolution of both types. Chapter Seven analysed and discussed results of data collected via questionnaires and interviews, which relate to a sample side-view. In addition, to meet the objectives of this study, i.e., to propose guidelines, or a development programme for new housing project design, a set of guidelines for housing design has been established and validated by the experts group.

Achievement of objectives

The results of this research are expected to be of great benefit to give an understanding of the positives and negatives of traditional and contemporary housing and therefore, create suitability design that respond to social-cultural aspects and climate conditions. Moreover, they provide housing authority planners and architects with a set of guidelines for housing design for the future, to avoid the negative aspects in both traditional and contemporary housing with the following objectives in mind.

Objective one: Investigate the traditional and contemporary housing characteristics in Tripoli and examine the degree of people's satisfaction in both traditional and contemporary housing in terms of socio-cultural and climate aspects. There are several benefits from investigating the traditional and contemporary housing characteristics. The research has successfully presented a chronological study of the design of housing in Tripoli and the evolution of various functional elements of a Libyan housing, such as vernacular styles of houses and traditional courtyard house of the early 19th and the contemporary types of houses in Tripoli and shown its importance to modern culture. This objective is presented in Chapter four and Chapter five.

Objective two: Compare traditional and modern houses, in relation to their suitability for the socio-cultural and climatic conditions. When considering the impact of traditional and modern periods on housing in Tripoli, it is useful to point out the principal points of difference between the traditional and the contemporary houses, since the issues of traditional and modern housing gives an understanding of the characteristic of each period in terms of architectural design and construction, building materials ,micro climate , social customs and factors of influence . Multiple case studies were used . The research analysis presents an extensive comparison of the development of houses, both traditional and contemporary, which is the function of the subsequent recommendations houses. This objective was presented in chapter five in section (5.5.5 and 5.5.6).

Objective three: Investigate professionals opinions of design and construction in terms of the positive and negative aspects of both traditional and contemporary dwellings and suitability of building materials for Libyan society. The opinion provided a profound understanding of positive and negative features of traditional and contemporary dwellings in terms of suitability for social-cultural and climate condition. The research adopted the interview method of householders, and professionals' actors by exploring opinions and impressions of householders and professionals that are important to achieve this objective. Chapter seven has shown these opinions.

Objective four: Provide the authorities with a set of guidelines or develop a programme for designing new urban housing projects, which fulfil the requirements of different socio-economic groups in order to increase their level of satisfaction. The results from the questionnaire survey, interviews, and experts groups revealed important evidence used to constant the guidelines for housing design. The key objective of the design guideline proposed is to improve the quality of design in application for residential development via improving housing policy, quality of landscape schemes, and quality of building design and building materials in terms of socio-cultural and climate conditions. The guidelines, based on the analysis of the study's survey findings, and from the evolution of Tripoli, houses in both traditional and contemporary houses show this objective was achieved (Chapter seven section 7.5).

8.2 Summary of influence on Libyan housing design

This research has explored the overall development of housing in Libya and analysed traditional and contemporary housing, considering influential factors in the development of both types.

Libya became exposed to modern styles of housing during the Italian colonial period (1911-1943), when Italy's goal was to develop Libya as a part of its empire by modernising the country in concordance with western values. Italian influence spread throughout the country, and particularly in Tripoli where much latter-day evidence remains. On the whole, the occupying forces applied architectural techniques and methods, without regard for the socio-cultural and climatic conditions.

A further singularly important influence on the country was the discovery of oil during the 1960s, because this brought much economic change, which forced rapid development in all sectors, especially in housing. As a result, the government built new houses in numerous areas with a new grid system of wide roads. However, such development was not without adverse impact since, for instance, the rapid development of the city of Tripoli, by way of construction and expansion, depleted the supply of fertile agricultural land.

Housing policy in Libya in both private and public sectors was standardised, and was implemented by foreign design experts and planners who did not take the social and physical realities of Libya into consideration. These planners and architects lacked knowledge of Libyan culture and were unwilling to modify their architectural models in order to complement the local needs of residents and the extant physical conditions. It was the death of qualified and capable Libyan architects and planners, which partially forced the Secretary of Housing and the Secretary of Planning to rely heavily on foreign companies.

Every part of Libya has been influenced by western architectural ideas, which have become, to a large extent, an international style that is now endemic. Unfortunately, the obstacles of the severe hot arid climate and social and geographic issues in Libya have been largely ignored. Consequently such designs have raised many social problems through their unsuitability for the Libyan environment and societal customs.

In contrast, traditional housing in Libya and particularly in Tripoli is much more functional since it has the aptitude to utilise the country's existing resources to satisfy of residents needs. It is, therefore, of great importance to understand traditional housing in Libya, which in itself has been influenced by many factors. Clearly, Islamic culture has shaped the Libyan mode of life and translated it into physical manifestations, which are reflected in many Libyan cities such as Tripoli and Ghadamas, whose design is characterised by harmony and the human scale. Additionally, social and climatic factors are powerful forces that have moulded and influenced the hierarchies and patterns emphasised in the planning of cities and the designs of housing. Furthermore, as can be witnessed in Tripoli and Ghadamas, other factors are influential upon housing such as economic and the availability of particular building materials.

Courtyard housing is the dominant feature of Libyan traditional housing in both urban and rural areas, and this applies to both wealthy and poor inhabitants. The Libyan courtyard house persisted for a long time, representing a reflection of Islamic social behaviour and climatic conditions. Furthermore, Libyan traditional houses displayed knowledge of the skilful use of local materials, that are suitable to the climate and which, therefore, resulted in a high standard of quality, as is clearly evident from same examples in the old city of Tripoli. Within Libya, each regional style of traditional housing is in harmony with the local climate and is appropriate to socio-cultural needs. One such example, Ghadames is described in Chapter Four.

Housing in the Sahara Desert additionally requires special facilities in order to create a shelter from the extreme climatic conditions. The interior of the housing besides the outdoor urban spaces represent a compact form, and the narrow twisted streets are shaded by walls and roof coverings, so that they remain cool and comfortable during the hottest parts of the day.

Residential dwellings in the mountains are somewhat different, with many being dug into the ground, built completely underground, or built into the sides of excavated courtyards. This type of housing incorporates special thermal advantages as described in Chapter Four.

Residential dwellings in coastal areas are characterised by the basic courtyard design with an open space surrounded by arcades and rooms. This courtyard was the private open area for the people living in that house in general, and most houses were designed to completely protect each other from the sun's fierce rays as evidenced in many areas in Tripoli e.g. El-Hadaba, Ziwetadhmani, and the Old City.

The various stages in the development of the city of Tripoli during the twentieth-century displayed individual characteristics, which affected the residential model. Economic expansion during the 1970s and 1980s and the demolition of all shanty towns in Tripoli increased the demand for housing, which in turn led to the emergence of the modern residential areas that adopted the western grid pattern and high-rise buildings. However, recent decades have witnessed huge residential mobility from the traditional to the modern areas and, indeed one of the research objectives of this thesis was to establish the rationale for such migration. The foremost reason, which caused such a move, is that people required more space, wished to live near their work places and public services, that their old houses needed maintenance, and that they wanted to be close to relative and friends. These were revealed as the four most important factors influencing the selection of new residential locations.

8.3 Summary of results from the surveys

The key purpose of this section is to summarise the findings that emerged from the empirical work concerned with traditional and contemporary housing in three areas within Tripoli city. To assess these types of housing, three questions were posed in chapter one and have been answered in this study. The questions raised were: What do people feel about their house? Why do users modify the houses once they move in? Which type of housing is preferred by inhabitants and why?

To answer these research questions, a variety of techniques were used to gather the required data using both secondary and primary and observation sources. Secondary data was obtained from a wide range of literature that related to the research topic, in addition to books, articles, government reports, master plans, technical reports, etc. Primary data was obtained from residents in both types of house through questionnaires. A guided interview was also conducted to collect some data from professional actors. Other some data was drawn from direct observation by a photographic survey. The responses to the questions are summarised in section 7.3

In the previous chapter, emphasis was directed towards the assessment of residents' satisfaction with their housing design in terms of social life requirements. Three areas were selected for the sampling of this study. 216 heads of households living in these areas were chosen. Empirical information collected from the three areas between October and November 2005 is presented. Information on household characteristics, circumstances of housing in the past to the present, comparison between traditional and present housing in terms of choice of dwelling, security and safety, privacy, which also discusses the type of modifications that have occurred, the type of house preferred and citizen's viewpoints concerning future housing design. In addition the opinions of professionals were sought in terms of the positive and negative aspects of both traditional and contemporary housing, as well as the influential factors on contemporary housing design, and professional advice regarding future housing design.

The findings indicate that most residents are satisfied with the location of their contemporary housing because many dwellings are located in modern planned areas with most services nearby. In terms of the form of their dwellings, the findings indicate that the residents are more satisfied with the style and finish of their contemporary housing than with its traditional counterpart, and in this respect they specifically referred to the adoption of new construction technology systems. In connection to the size of dwellings, the findings indicate that the majority of users are satisfied with contemporary housing, since nowadays they live in nuclear, rather than extended, families, and demand for rooms is less than formerly.

This study's findings illustrate that traditional dwellings are designed according to residents' needs for security and safety, and that the user's perceptions is that they are safer than contemporary houses. The majority of users were very satisfied with their traditional houses in terms of security and safety from burglary, traffic (children's playing area location), referring to the fact that in traditional housing, residents live together according to their blood relationship, which increases the level of security. In contrast, most residents were dissatisfied with their contemporary houses in this respect as evidenced in Chapter Seven, page 249.

The findings indicated that traditional housing designs were concerned with offering both internal and external privacy. Arrangement of internal space, such as location of guest room, main entrance, women's section and kitchen, as well as the placement of openings in relation to the street, neighbours, or passers-by, have all to be considered with care. Communication between separate areas of the dwelling should be governed by the degree of privacy each zone requires. In respect of the degree of privacy afforded, the findings indicated that residents preferred the traditional housing design because it satisfied their needs for visual and acoustic privacy, a provision which is completely missing in contemporary dwelling practice. The only perceived benefit in this respect was the fact that contemporary housing affords greater privacy between brothers and sisters given the previously-mentioned feature wherein most houses are occupied by nuclear families, thereby allowing children to have separate rooms.

The findings show that traditional houses are considered to be more suitable for the climate than contemporary housing. Residents referred to the type of building materials used, and the presence and function of the courtyard, which combined to enable a good regulation of temperature see appendix (6). Additionally, they noted that the external openings of houses were small and high, and that the exterior walls and roof were constructed of very thick materials that offered a high degree of resistance to the heat. In contrast, most contemporary housing is unsuitable for the climate, because new material such as reinforced concrete which is used in the

skeletons of houses is less effective, and there is an exaggeration in the size of external openings. Large glass windows, and the use of assorted colours, all allow for the excessive absorption of the sun's radiation.
The findings indicated that the majority of residents were satisfied with positive aspects of contemporary housing design e.g. construction standards, hygiene, standard of finishing and fitting and furnishings.

Dissatisfaction was expressed by the majority of users in this study vis a vis internal building materials used in contemporary housing as these mainly consist of prefabricated concrete. This technology introduced to Libya by foreign firms, that use modern, which is not appropriate for the prevailing climate. Furthermore, some of the materials utilised are not available in the local market and this increases overall cost. Most of the materials used are of relatively low mass and do not have thick insulation, which is a marked difference from the massive traditional material in the traditional house, with which most residents were highly satisfied.

The contemporary house has been examined against the fulfilment of Libyan social needs, according to socio-cultural and climate condition. One reason for occurrence of serious problems is the replacement of traditional building legislation by western legislation with insufficient examination using "cut-and-paste", which pulls forms, images and ideas from one cultural context and randomly sticks them into another. The findings in this research indicated that most inhabitants living in contemporary housing, particularly in public social housing, made modifications to their houses because the design did not afford the required level of security and safety for residents and children, and did not provide them with the degree of privacy which society had made customary. Additionally, they felt their houses did not offer adequate protection against the climate, and much evidence of modifications in these respects can be viewed in Chapter Seven, pages 260,261 and 262.

Pursuing the aim of this study in terms of establishing housing preference, the findings illustrated that most residents prefer single storey and private houses built using a traditional system, because this offered many advantages such as greater privacy, safety, and security and allowed inhabitants the opportunity to co-operate in the house design processes. The results indicated that most inhabitants were unhappy with living in high-rise buildings. This is confirmed by most of the international experts but not all professional agree.

The findings additionally illustrated the opinions of residents and professionals in terms of future housing design, and identified the subsequent recommendations. New house design should consider the following:

- Combining the advantage of the traditional and contemporary designs;
- Take the courtyard concept as an essential element in design, simplicity;
- Flexibility, harmony suitable for modern furniture;
- Avoid the large windows and small balconies that not used in most houses for social-culture and climate;
- Also emphasised is the use of local building materials with modern technology and use of new insulation materials;
- The design should be suitable for geographic location and reflect the local identity and social-culture aspects;
- They emphasise the use of light colours, which reflect the sun-rays, and the avoidance of high rise building;
- Finally, they recommend the contribution of users in the design process to fill the gap between designers and users, however it is has to pay attention to economic factors and cost materials.

The findings of the investigation into **contemporary housing** reveal several disadvantages, such as:

- Unsuitability for the summer climate in terms of building materials and use of excessively large open glass windows;
- Lack of attention to socio-cultural demands and the accepted norms of life;
- Distance imposed between members of extended families, and the consequent absence of relationships.

The findings in this study also indicated a number of disadvantages in **traditional houses**. These can be summarised as follows:

- They are less suited to the winter climate during periods of rainfall;
- Due to technological limitation, they are restricted in vertical and horizontal terms, and the living areas are small;
- Although the layout provides better privacy for visitors the courtyard can result in less privacy between individual family members.

The findings revealed that **contemporary houses** possess many advantages, which can be summarised accordingly:

- They offer different spaces for diverse functions such as Arabic and western salons;
- The quality of finishing is superior;
- The arrangement of interior space is generally good;
- More privacy is offered in terms of separation between brothers and sisters;
- There is greater potential for future extension and adoption than in traditional housing;
- They are more structurally stable;

However, **traditional housing** also has its advantages, which are:

- It is more suited to the climate and environment than contemporary housing;
- It supplies more privacy, particularly from streets, neighbours and visitors compared with contemporary housing;
- It provides a good relationship within extended families;
- It allows to children greater safety in terms of their playing areas.

Assessment of the professionals and residents' levels of satisfaction with traditional and contemporary housing extracted a range of opinions. The logical traditional layout which was designed considering the social, economic and environmental circumstances and religious factors, resulted in the large majority of residents and professionals being satisfied with the traditional design since it was deemed to be suitable for the climate in summer and for social customs. On the other hand, professionals and residents point to most modern housing completely ignoring social, economic and environmental circumstances, resulting in a large majority of and residents being wholly dissatisfied with contemporary housing. Professionals expressed mixed views on the appropriateness of contemporary houses. The type of building materials, and the large excessive glass windows were identified as problems. However criticism of the contemporary forms does not mean that these should revert to the traditional forms and reject everything the contemporary ones offer. Positive aspects of this type should be taken into account e.g. construction standards, standard of finishing, fitting and furnishings.

8.4 Final remarks

The fundamental task of this study has been to investigate the features of traditional and contemporary housing making it possible to describe them and then use this comparison to understand the differences between them. Contrasting both types of housing makes it easier to point out disproportions between them in all areas: climatic, technological, social, and cultural. The study also illustrated the influence of western architecture style upon housing design in Libya particularly in Tripoli that started with the Italian occupation. In addition, the exploitation of oil in 1960s has played a significant role in the rapid transformation of socio-economic life that followed the flourishing economy. All these factors affected Libyan society, to lose their expression of cultural and heritage value in architecture. The policy has led to construction of many new projects, consisting of stereotype international style buildings, very often built by foreign contractors with little appreciation of the life styles and requirements of the local people.

The study has been an evaluation in depth of the present circumstances and the reasons for the modification that have occurred in the housing design. In addition, the positive aspects and lessons from the traditional housing should be taken into account with future design by combination with the positive aspects of modern housing. The evidence from the survey confirmed that most people prefer to live in single storey with traditional features rather than high-rise building. The results showed that the courtyard still represents a good feature and foundation for privacy and climate condition, which encourage the planners and designer to combination in future design.

Even though the Libyan society has undergone rapid changes, some social traditions and values, instruction of religion and the yearly events such as festivals and celebrations are still strong. The most important being the kinship ties in Libyan society. Therefore the separations age and sex and guests have long determined the roles played within the family, also the safety and security and privacy are dominant factors effecting the form of the dwelling which should be consideration in future housing design.

The result indicated that designers need to sensibly reconsider the use of high-rise buildings. As mentioned in chapter two Libya has a very small population compared with the area, consequently the vacant land around of Tripoli could be encourage the authority toward horizontal expansion rather than high-rise building programmes.

Climatically, the result confirmed that the traditional house design more appropriate to the environmental rather than contemporary housing design, therefore lessons learnt from traditional house form such as the function of courtyard, the value of the mass local building materials, cross ventilation, shading and position of windows and orientation of building and so on. On the other hand, the result of study emphasized that the building materials used in contemporary house failed to achieve an appropriately comfortable conditions for people, which led them to use air-conditioning in both summer and winter seasons.

The recommended set of guidelines it applied intelligently shard improve the quality of design and application for residential development and enhance residents' levels of satisfaction with house design.

8.4.1 Final guidelines recommendations

The recommendations of the guidelines proposed are divided into three levels.

1. Housing policy guidelines;
2. Planning guidelines;
3. Housing design guidelines.

1. Recommendation for Housing Policy Guidelines

1.1. Consider suitability of design for different regions according to geographic entity, socio-cultural and climatic condition;

1.2. Allow people more opportunity to expound their views during the process of design and planning. This can be effected by variety of techniques;

1.3. Give people more opportunity to select their own type of house according to size of family and neighbours to maintain strong relationship between families where possible;

1.4. Revise of legislation, regulations and building laws inherited from colonial periods and foreign specification to create criteria and standards that better accommodate the Libyan and Muslim cultural environment. Related to this, there is a need to issue new laws to deal with maintaining the environment and establishing scientific and educational institutes for environmental studies. In addition, issue relevant legislation and regulation to solve visual and acoustic pollution. Finally, it is crucial to issue legislation that focuses upon the maintaining of local architectural identity;

1.5. Very high-rise flats are inappropriate for large families, so height should preferably be limited (Four-five storeys) and consist of different types and sizes to suit a family needs;

1.6. The local authority should pay more attention when selecting designer and planner cognisant of local culture and climate conditions to avoid problems noticed in most public housing, such as poor external privacy and unsuitability for climate conditions.

1.7. Encourage scientific research in the development of local materials through the use of new technology as well as applied research to support development of indigenous construction materials industry;

2. Recommendation for planning Guidelines

This guidelines are divided into parts: the following should be considered.

2.1. Neighborhood layout guidelines;

2.2. Housing layout guidelines.

Neighborhood layout guidelines;

2.1.1 Ensure the scheme creates a pleasant living environment which will meet the needs and preferences of the residents. Schemes involving a significant number of dwellings should create streets and spaces that provide a sense of identity and place and, thus, facilitate the development of the community;

2.1.2 Ensure the scheme makes a positive contribution to the overall environment of the locality. In this regard, care should be taken in integrating new housing into the existing built and natural environment so that it contributes to the social, environmental and economic sustainability of the area;

2.1.3 Ensure a high level of safety and security for the residents. The scheme should be designed to discourage anti-social behaviour, e.g. layouts should seek to ensure that all access ways and public areas are overlooked by dwellings or are otherwise open to surveillance by residents besides lighting to pedestrian ways, dwelling entries, driveways and car parks to guarantee a high level of safety and security for residents and visitors at night;

2.1.4 Maximizing amenity and energy efficiency by climate-sensitive design which takes account of orientation, topography and surrounding features to control wind effects, while optimizing the benefits of sunlight, daylight and solar gain;

2.1.5 Ensuring that insofar the design minimizes barriers to accessibility for all users– particularly the elderly and those with disability;

2.1.6 Ensures the scheme can be constructed, managed and maintained at reasonable cost, and in a way which is economically, socially and environmentally sustainable. Materials should be chosen with this in mind. The design should aim to maximize the use of indigenous materials, optimize the distance of roads and other hard surfaces and minimize the length of service runs;

2.1.7 Ensures quietness in neighbourhoods; this can be done by avoiding including a road with heavy traffic near the location of residents besides separating public spaces such into play areas and clusters of houses. This should be reserved for shrubbery and small trees;

2.1.8 Ensures the landscape design exploits vegetation types and landscaping styles that integrate the development with the streetscape. This should not affect the structure of the proposed buildings, considers personal safety by ensuring good visibility along roads, paths and driveways and avoids shrubby landscaping near dwelling entries, contributes to energy efficiency and amenity by providing substantial shade in summer especially to south and west-facing windows admitting winter sun rays to house interior and improves privacy between dwellings;

2.1.9 Dwellings are provided with open space areas that should be afford adequate private for residents' convenient access from a main entrance as well as provision of trees and canopy to achieve shading during the hotter months of the year. In addition, a special shared area for different activities families, ought to be included,

Housing layout guidelines;

2.2.1 Ensures the opening orientation of house layout position is in the most suitable location vis-à-vis climatic conditions and the long sides of the houses are exposed to the north to capture the cold breeze in summer and to the south to obtain suns-rays in winter. For instance, in Tripoli Libya the opening orientation of houses layout is in the most suitable location regarding climatic condition and the long sides of the houses are expose to the north to capture the sea's breeze in summer and south to obtain the sun's-rays in winter;

2.2.2 Landscaping, including shady trees, should be planted in both front and back yards or courtyard especially in private houses to respond to Environmental needs.

3. Recommendation for housing design Guidelines

Related to social and cultural criteria (interior and exterior) ; and

Internal design guidelines proposed

3.1.1.1 To achieve comfort indoor space should be arranged according to daily and annual heating and cooling requirements. According to layout the spaces with the most daytime use can be positioned on the south and north sides , sleeping area placed on the east and north-east sides, the guest area placed in south-east, and other facilities situated along western façades to protect the building during overheated and overcooled periods;

3.1.1.2 Ensures ease of access, prevents internal space from being observed from outside by using the passageway element as a traditional system that operates as a barrier. More attention should be given to block(s) of flats with their main entrances not facing each other directly;

3.1.1.3 Ensures privacy within a dwelling with arrangement of the house into three areas: guests' area, family living area and the sleeping area. This ensures respect for the concept of separation between males and females according to Islamic instructions besides ensuring visual and aural privacy between the guest area and household members;

3.1.1.4 Encourages adopting the courtyard concept where possible; to provide a secure playing area for children and offer pleasant environment during summer season. The courtyard may be covered by mechanical elements to avoid problems during winter such as rain. The basement or semi-basement is another significant element in the house because it offers a cool and warm environment and the space could be utilised for a number of activities;

3.1.1.5 The design should ensure flexibility in use, adaptability and growth of the family;

3.1.1.6 Ensure the circulation of air within a building. Control of ventilation is one of the most significant concerns of building design. This can be achieved by cross ventilation from north to south as well as by use of a staircase to capture the northern breeze;

External design guidelines proposed

3.1.2.1 Size, materials and position of windows should be designed to achieve privacy and climate control by use of "musherabyia" as can be observed in screen windows of traditional houses besides shade elements and new technological materials such as reflective glass, dark translucent;

3.1.2.2 The external façade of housing should be as modest as possible, i.e., plain, simple and harmonious with regard to shape, size, texture, and use colours that reflect sun rays. It should also reflect local identity. In addition it ought to avoid excessive finishing;

3.1.2.3 In keeping with social traditions and Islamic instructions, the height of new buildings should be in harmony with other buildings in the neighbourhood. This further improves aspects of privacy and air flow;

3.1.2.4 Avoiding scattered balconies that are invariably unused. These can be combined into one or two areas that work as an open area and is protected by fence and "mushrabiya" to achieve external privacy;

3.1.2.5 Ensuring external privacy as below:

- The boundary fence is a minimum of 1.6 m high with respect to at least the finished ground level of the adjacent gardens and, preferably, to the finished floor level of the internal ground floor of the property;
- Making sure that the roof parapet is at least 1.5 m high and uses a device such as "mushrabiya" to provide ventilation over the roof's surface, helping to cool the surface and rendering the roof space more comfortable;
- Taking advantage of balconies above ground floor level to provide an extension to internal living space and, again, maintaining privacy by making them sufficient to inhibit their being overlooked or, in this case, incorporating a louvered mushrabiya to supply light and air circulation, and;
- Providing devices to windows particularly above ground floor level that will draw light and air into internal spaces while inhibiting views outwards that would breach privacy. This particular device has been shown as a horizontally located element, but it would work equally well vertically mounted, perhaps to direct views where there is no privacy problem.

3.1.2.6 Ensure security and safety of dwelling by use high level or reinforced the windows and building materials should be fire resistant.

Related to climate and building materials criteria

3.2.1. Housing Design Guidelines proposal (climate)

3.2.1.1 Use of cavity walls or thermal insulation to increase lag- time of the wall. This will increase insulation. Since hot air rises, a considerable amount of air movement can be created by simply providing a vent at the top and bottom of a wall. Hot air can rise and escape so of course these vents should be suitably screened to keep out insects, or natural materials such as mud mixed with straw should be used and filling between double walls besides planting trees and climbing plants can offer shade;

3.2.1.2 Heavy masonry is desirable for outer walls particularly those on western and southern sides.

3.2.1.3 The construction of mostly flat roofs means that the major part of the summer sun's heat falls on the roof of a building, due to its position with respect to the sun and has frequently to be protected to avoid overheating the spaces beneath. In addition, it is the roofs of houses release most heat through radiation to the night sky, especially those constructed by reinforced concrete, as observed in most contemporary housing. Based on these problems above, the roof ought to be insulated from the sun. This can be accomplished by the following:

- Shade can be achieved by using a double roof with a layer of air between or by covering the roof surface with hollow bricks; insulating materials such as fibreglass and lightweight blocks;
- The shape of the roof is also of considerable importance in a sunny climate. Pitching or arching the roof has several advantages over a flat structure. Using domes and barrel-vaulted design increases the speed of any air flowing over their curved surface and is effective in minimizing direct solar radiation;
- Using a roof garden is plants can solve a great deal of the roof thermal mainly by creating a shady area. Another advantage could be gained from these plants in that their roots retain a certain amount of moisture which can help to keep roof surface temperature down. A useful idea is to shade the roof more naturally by designing it to suit popular traditions such as loggias or open galleries;
- High solid parapet walls around the roof would, for example, create a stagnant pool of not air and should therefore, be avoided.

3.2.1.4 In sunny weather, external surfaces can became very hot, facilitating the transfer of heat to the building interior. So, the reflection of radiation is another method of providing insulation. The colours of the surfaces of a building, which are exposed to the sun, play a large part in reducing heat passing into the interior. When sunshine falls on a solid surface, part of the heat is reflected and part absorbed. Light colours and bright metal surfaces reflect a great deal of the sun's heat. Dark coloured surfaces should be avoided in all cases;

3.2.1.5 The other most important concept of design in relation to the climate is that of windows. These must be placed suitably in relation to prevailing breezes to permit natural airflow through internal spaces and be suitable for heating during winter. Accordingly the orientation of openings is determined by two factors:

- Towards the prevailing breeze during the warm-humid season, to utilize its cooling effect;
- Towards the sun during the cold season, to utilize the heating effect of radiation entering via he windows;

3.2.1.6 Encourage the use of shading elements to reduce heat within the house. South and west facing windows require different shading solutions and this can be achieved by vertical and horizontal devices;

3.2.1.7 Shading could additionally be created by trees being positioned close to windows. Deciduous trees can, however, be beneficial for providing shading from glare and overheating during the summer, whilst the bare branches will permit solar access during the winter;

3.2.2. Housing Design Guidelines proposal (building materials)

3.2.2.1 Materials used in building are of prime importance for protection against heat and cold. Therefore great care must be taken in the choice of wall and roof materials and their thickness with respect to their physical properties, such as thermal conductivity, resistively and optical reflectivity. Locally-produced building materials should be used;

3.2.2.2 Analysis and evaluation of materials previously used, and an exploration of the possibility to propose new substitute construction technologies and materials having physical and chemical characteristics suitable to geographical and climatic data of Tripoli in particular, and the whole of Libya and Arab countries in general;

3.2.2.3 Building materials with the best insulation should be adopted, thickness of walls should be increased and, where possible, locally-produced building materials should be adopted, such as lime sand block in walls;

3.2.2.4 Develop the technology of using local materials for new housing construction, as well as encouraging local workers to participate widely in new development processes;

3.2.2.5 Encourage scientific research in terms of development of building technology and specification of building materials.

8.5 Contribution to knowledge

This study can serve as a basis for research and practice. It provides better comprehension of traditional and contemporary housing design practice in developing countries. It provides clear concepts that should be undertaken by individuals and housing authorities, in the way in which designs are handled. The guidelines proposed should enable planners and designers to assess and manage suitable house design more effectively in future.

The most straightforward contribution of this research is reserved for the benefit of the housing sector. On the other hand, the theoretical contribution concerns the depth of understanding of the advantages and disadvantages of traditional and contemporary housing design and the primary factors impacting on house design in particular. Thus, the contribution of this research can be categorised into two areas.

- New knowledge to more explicitly understand how the traditional house design respond to people's needs and the reasons that impel people to effect modifications to modern houses and householders preferences in the Moslem culture and tradition;
- Form a set of guidelines for housing design, which could be utilised in Libya and countries that have similar socio-cultural and climatic conditions as a guide to housing authorities, architects and planners alike.
- Also the results can better inform future studies exploiting householders and professionals' opinions;
- The methodology adopted proved suitable to establish answers to the research questions. However the experience gained emphasises that the research approach needs to be sensitive to Islamic cultural conditions when delivering surveys of projects in the Islamic world. In these circumstances more careful planning to establish contact and permissions with stakeholders is required.

8.6 Limitations of the research

Like many other researchers, the author encountered certain obstacles during the empirical work. This study has suffered from several limitations, however, great efforts were made to overcome them and avoid their influence on the researching processes, findings, and conclusions and recommendation of this study. These limitations are as follows.

1. Libya is a large country in terms of area, therefore this study focused on Tripoli city the context of traditional and contemporary housing design. It is believed that the study has demonstrated that Tripoli city was the best geographical location in order to understand characteristics of traditional and contemporary housing design, but there is still the need to verify it's applicability in other area of Libya, in detail;

2. The social /culture context of the study that many respondents did not wish to participate in the empirical study. The researcher overcame this challenge by utilizing work, social and family relationships to encourage individuals to

participate in the study without whom this could not have been carried out. Like many other developing countries, people in Libya are not familiar with research projects and they do not readily accept the importance of questionnaire surveys and the need to participate. Thus, the research found difficulties in interviewing some households on the first visit, and therefore, a second visit had to be made. Most households interviewed were men, little information about women's degree of satisfaction with the new social and physical environments was collected. Friendship, and social influence were also significant to gathering other data;

3. these is a limited availability of information prior to theoretical and empirical studies of suitability of housing design, both the traditional and contemporary forms. Furthermore, the data available relevant to the contemporary housing design, was fragmented and contradictory. Moreover, Cities' internal boundaries have been changed many times, particularly in the last three decades, which makes the process of finding some documents such as maps or other relevant data extremely difficult. Thus, many difficulties were experienced in gathering data and information relevant to key issues of the research. In order to overcome this limitation, almost all data had to be gathered personally by the researcher. In addition, as the research was sponsored by Libyan government this constrained the period assigned for carrying out the fieldwork;

4. Majority of buildings and streets are not named or numbered in the city of Tripoli. As a result, the researcher and his colleagues found it very difficult to obtain suitable response rate using postal or email services in Libya. To overcome this limitation, the researcher adopted face-to-face methods in administering questionnaires. This limited the extent and progress of the research.

8.7 Future research recommendations

From the investigations and fieldwork undertaken in this research programme concerning architectural features of the Tripoli region, the subsequent recommendations for further research should be undertaken:

- The findings from this attitudinal study have revealed that most people are not satisfied with the courtyard facility during winter. The study therefore recommends further research and development of the courtyard function in order to render it more usable in winter, for example by adopting new technologies that would permit enclosing it in the colder months, and opening it during the summer time. This could even be performed automatically;
- Greater analysis pertaining to the connecting elements between the inside and outside of houses, with the intention of developing new solutions, which allow for their effective incorporation in contemporary design. These connection elements (terrace, balcony, windows, and doors) in the traditional house need to be studied as research subjects as they are acknowledged as being among the most critical elements, which determine the relationship between residential mode and the surrounding environment;
- Further research is required into the economics of housing in developing countries concerning:

    a. The market for hybrid designs embodying the best features of traditional and contemporary forms;
    b. The development of traditional materials for modern application in construction;
    c. The application of modern management methods to rationalise traditional construction practice.
- This research recommended attempting to apply the guidelines proposed in this study. Monitoring and evaluation the application these requirements would provide new information for the housing authority, planners and architects to circumvent numerous problems as outlined in this study and provide feedback to refine the guidelines and recommendations;
- Conduct a technical study of the traditional materials that have been utilised in the construction of dwellings in Tripoli. This would explain the choice of such

materials by locals, but it would also assist to contrast these materials with "modern" ones (man-made materials such as concrete and glass);

- Practical research and testing in both traditional and contemporary housing could explore in detail the comfort conditions in order to evaluate the recommendations emerging from the survey of residents attitudes completed in this study.

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APPENDIX 1 : SURVEY QUESTIONNAIRE

SURVEY QUESTIONNAIRE

Dear/ Resident of Tripoli city,

My name is Abdulkader Ahmed Amer. I am a postgraduate student at the University of Salford in England. I am doing a research project on comparison between traditional and contemporary housing in Libya. This will be performed by measuring people satisfaction and housing preferences, regarding of existing housing, both traditional and contemporary types.

The following survey questionnaire is part of my research and to achieve the aims of the questionnaire, it would be greatly appreciated if you could spend some time, if possible including family members, to answer the questions honestly and clearly. The results of this study will help the planners and designers to improve the design of housing which will satisfy the resident's needs. All information will remain strictly confidential.

Please tick the boxes in each question, ☐ which apply to your situation.

Part one: Information about yourself

I am interested in knowing some things about you and your family members that will help us to classify your responses for our analysis.

Address: --

Sample No: --

Q 1: Gender:

Male ☐ Female ☐

Q 2: Age of the head of household:

20-30 ☐ 31-40 ☐ 41-50 ☐ over 50 ☐

Q3: Marital Status:

Single ☐ Married ☐ Divorced ☐ Widowed ☐

Q4: Occupation:

Professional ☐ Labourer ☐ Employee ☐

Technical ☐ Unemployed ☐ Retired ☐

Q5: Academic Education level:

Uneducated ☐ primary stage ☐ intermediate stage ☐

University stage ☐ postgraduate ☐

Q6: Place of birth of head of family:

Tripoli ☐ Out of Tripoli ☐

Q7: Household structure:

Nuclear household ☐ Extended household ☐

Q8: Number of persons in household:

2 ☐ 3-4 ☐ 5-8 ☐ more than 8 ☐

Part 2: Previous Dwelling Circumstances:

Some questions about your previous home

Q9 : What kind of dwelling did you live in prior to moving to your present home?

Courtyard ☐ House ☐ Villa ☐ Attached house ☐

Flat in a block ☐

Other (please specify) --

Q10 : How long did you live in your previous dwelling?

1– 5 years ☐ 6-10 years ☐ 10 -15 years ☐

More than 15 years ☐

Other (please specify) --

Q11: Under which of the following categories would you classify your previous home in terms of construction material?

Adobe ☐ Natural Stone ☐ Quarried limestone block ☐

Other (please specify) --

Q12: Number of rooms in your house:

1- No. of bedrooms:

1 ☐ 2 ☐ 3 ☐ 4 ☐ more than 4 ☐

2- No. of guest rooms:

1 ☐ 2 ☐

3- No. of living rooms:

1 ☐ 2 ☐

4- No. of bathrooms:

1 ☐ 2 ☐ none ☐

5- No. of kitchens:

1☐ 2 ☐

Q13: What was the nationality of the workers who built your house?

Foreign ☐ local ☐

Q 14: Do you feel comfortable in your house during summer and winter?

Yes ☐ No ☐

Q15: How would you rate the ventilation and lighting in your house?

Good ☐ Satisfactory ☐ Insufficient ☐

Part 3: present dwelling circumstances:

I would like to ask you some questions about your present dwelling.

Q16: What are the reasons that made you move to your present home?

1- Former home needed maintenance ☐

2- Nearer to workplace and public services ☐

3 - More space required ☐

4 - To live near relatives ☐

5- Problems with neighbours ☐

Other (please specify) --

Q 17: What type of housing do you occupy?

1-Villa ☐ 2- Flat ☐ 3- Courtyard house ☐

4- Altered courtyard house ☐

Other (please specify)--

Q18 : Number of rooms in your house:

1- Number of bedrooms:

1 ☐ 2 ☐ 3 ☐ 4 ☐ More than 4 ☐

2- Number of guest rooms:

1☐ 2 ☐

3- Number of living rooms:

1 ☐ 2 ☐

4- Number of kitchens:

1 ☐ 2 ☐

5- Number of bathrooms:

1 ☐ 2 ☐

Q 19 : Do you feel comfortable in your house during summer and winter?

Yes ☐ No ☐

Q 20 : How would you rate the ventilation and lighting in your house?

V. Good ☐ Good ☐ Satisfactory ☐ Insufficient ☐

Q21: What was the nationality of the workers who built your house?

Foreign ☐ Local ☐

Part 4: Comparison of Previous and Present Housing

Here is a list of aspects related to housing with which people are often concerned. I would like to know how satisfied you are with each of these aspects with regard to your previous and present house connected to your socio-cultural values.

(2-V. Satisfied)   1-(Satisfied)   (O (Neutral)   (-1(Dissatisfied)

(-2 V. dissatisfied)

Q22: Choice of dwelling in terms of:	Previous					Present				
	2	1	0	-1	-2	2	1	0	-1	-2
1-Proximity of public services;										
2-Type of dwelling;										
3- location of dwelling;										
4- Notice of neighbours;										
5- Security and safety;										
6- Privacy;										
7-Ventilation and lights.										

Q23: Security/ safety in your home in terms of:	Previous					Present				
	2	1	0	-1	-2	2	1	0	-1	-2
1- Burglary;										
2-Children's school and location in terms of safety;										
3-Safety from traffic;										
4- Children's play area location in terms of safety.										

Q24: Privacy in your home in terms of.	Previous					Present				
	2	1	0	-1	-2	2	1	0	-1	-2
1-Visual privacy between male and female within the house;										
2- Acoustic privacy between male and female sections within the home;										
3-Privacy from street and neighbours;										
4- Children's sleeping area (separate between males and females over 10 years);										
5- Interior space organisation (location of kitchen bathroom, living room and bedrooms).										

Q25: Prestige consideration in your home in terms of.	Previous					Present				
	2	1	0	-1	-2	2	1	0	-1	-2
1- Opening of windows and doors in terms of size;										
2- External facades;										
3-Home comfort in terms of climate during summer and winter;										
4-Quality of construction work and finishing quality;										
5-Type of building materials used.										

Part 5: Changes, to Houses Effected by Residents

Q26: Are you dissatisfied with your present house?

Yes ☐ No ☐

If yes go to question 27:

Q27: Can you tell me what makes you dissatisfied with your present dwelling?

1-Location.		6- Aspect (external).	
2-Area of house.			
3-Arrangement of space (design).		7-Unsuitable for heat and cooling insulation.	
4-Type of neighbours.		8- Far away from relatives and parents.	
5- Outwards openings.			

Q28: Are there any modifications that you have carried out since you moved into this dwelling?

Yes ☐ No ☐

If yes: what are they?

Closed opening (windows & doors) ☐ Additional iron door ☐

Conversion of rooms ☐ Extra rooms ☐

Closed balconies ☐ Extra iron screens ☐

Others: --

What is the reason for this modification ?

Not enough privacy ☐ Small area of house ☐ Climate circumstances ☐

Location of guest room ☐ Safe location of kitchen ☐

Others: --

Part Six: Housing preferences:

Q29: Do you prefer to participate in the design process of your new home?

Q30: What type of dwelling would you prefer to live in if you had the option to choose? Supply reasons:

Q31: Do you have any comments or suggestions about future house design?

Thank you for your assistance,

Abdulkader Ahmed Amer

APPENDIX 2: INTERVIEW FOR PROFESSIONAL ACTORS

Personal interview

Q1: Do you think that building design in terms of architectural and interior design during the last 30 years in Libya was:

Excellent ☐ Good ☐ Satisfactory ☐ Poor ☐

In the case of one of the above alternatives, give reasons:

Q 2: Do you think that modern designs are suitable for Libyan society?

Yes ☐ No ☐

If yes, give reasons

If no, give reasons

Q3: What are the positive aspects of a modern home, in your view?

Q4: What are the negative aspects of a modern home, in your opinion?

Q5: Do you think that modern Libyan architecture has been influenced by western architecture?

Yes ☐ No ☐

If yes, what are such influences?

Q6: What are the advantages of traditional housing design, in your opinion?

Q7: What are the disadvantages of traditional housing design, in your opinion?

Q8: What are the factors which influenced traditional Libyan houses?

Socio- cultural factors ☐ Religious factors ☐ Climate factors ☐

Economic factors ☐

Others: --

Q9: Do you think that building materials used in modern houses are suitable for the climate?

Yes ☐ No ☐

If no give reasons: --

Q10: Do you have any suggestions in terms of future house design?

Thank you for your assistance,

Abdulkader Ahmed Amer

APPENDIX 3 : OPINION OF EXPERT

Explore opinion of expert

Dear/ Sir/ Madam/---

I am a PhD student at the University of Salford working on research with the theme: "Comparative study of traditional and contemporary housing design with reference to Tripoli, Libya".

During the mid-1960s and early 1970s, and immediately after the discovery and exploitation of oil in Libya an acute shortage in housing was witnessed. This issue led the Government to adopt an urgent housing policy. This latter depended on foreign companies to design and construct massive public housing projects. To implement these projects, foreign companies applied international styles and utilised new technology but did not take into account the socio-cultural and climatic aspects of the local Libyan environment.

Previous housing studies in Libya and findings from empirical study conducted by the Researcher demonstrate that most modern housing projects were inappropriate and failed to provide for the current needs of Libyan society. The inadequate and insufficient provision of the real needs of Libyan society resulted in large modifications made to contemporary housing projects in terms of internal and external being design.

To contribute towards resolving this issue an attempt has been made to better develop a set of guidelines, which would assist planners and designer in taking the correct decisions regarding implementation of public housing projects. These guidelines would further assist in the selection of location, size and quality of design input of the overall scheme and dwelling unit.

As an expert in the field of architecture and housing planning, you are required to provide your opinion regarding these proposed guidelines. Your opinion, comments and feedback are of great value to the researcher.

Thank you in advance for your interest, contribution and co-operation.

Abdulkader Ahmed Amer

A Proposal of Guidelines for New House Design

Name: ---
Special discipline: ---

Position held: ---
Total years practical experience: ---
Country: ---

The proposed guidelines are divided into three levels as follows:

The first level: Housing Policy

The housing authority should consider the following in its planning and design of new housing projects. Key criteria include:

1. Suitability of design for different regions according to geographic entity, socio-cultural and climatic condition;

   ☐ Agree ☐ Disagree

   Comment: --
   ----

2. Allow people more opportunity to expound their views during the process of design and planning. This can be effected by a variety of techniques;

   ☐ Agree ☐ Disagree

   Comment: --
   ----

3. Give people more opportunity to select their own type of house according to size of family and their neighbours to maintain strong relationship between families where possible;

   ☐ Agree ☐ Disagree

   Comment: --
   ----

4. Revision of legislation, regulations and building laws inherited from foreign specification (colonial periods) to create criteria and standards that better accommodate the Libyan and Muslim cultural environment. Related to this, there is a need to issue new laws to deal with maintaining the environment and establishing scientific and educational institutes for environmental studies. In addition, issue relevant legislation and regulations to solve visual and acoustic pollution. Finally, it is crucial to issue legislation that focuses upon the maintaining of local architectural identity;

   ☐ Agree ☐ Disagree

   Comment: --
   ----

5. Very high-rise flats inappropriate for the large families, so height should preferably be limited (four-five storeys) and consist of different types and sizes to suit a family's needs;

☐ **Agree** ☐ **Disagree**

Comment: --

----

6. Encourage scientific research in the development of local materials through the use of new technology as well as applied research to support development of indigenous construction materials industry;

☐ **Agree** ☐ **Disagree**

Comment: --

----

7. The local authority should pay more attention when selecting designers and planners cognisant of local culture and climate conditions to avoid the problems noticed in most public housing, such as poor external privacy and unsuitability for climate conditions.

☐ **Agree** ☐ **Disagree**

Comment: --

The Second level: Planning

III. Neighbourhood layout

In general, provision of a satisfactory living environment for residents and long-term sustainability of the neighbourhood scheme should be one of the primary considerations. Key criteria include:

1. Ensure the scheme creates a pleasant living environment, which will meet the needs and preferences of the residents. Schemes involving a significant number of dwellings should create streets and spaces that provide a sense of identity and place and, thus, facilitate the development of the community;

☐ **Agree** ☐ **Disagree**

Comment: --

----

2. Ensure the scheme makes a positive contribution to the overall environment of the locality. In this regard, care should be taken in integrating new housing into the existing built and natural environment so that it contributes to the social, environmental and economic sustainability of the area;

☐ **Agree** ☐ **Disagree**

Comment: --

----

3. Ensure a high level of safety and security for residents. The scheme should be designed to discourage anti-social behaviour, e.g. layouts should seek to ensure that all access ways and public areas are overlooked by dwellings or are otherwise open to surveillance by residents besides lighting to pedestrian ways, dwelling entries, driveways and car parks to guarantee a high level of safety and security for residents and visitors at night;

☐ **Agree** ☐ **Disagree**

Comment: ---

4. Maximising amenity and energy efficiency by climate-sensitive design which takes account of orientation, topography and surrounding features to control wind effects, while optimising the benefits of sunlight, daylight and solar gain;

☐ **Agree** ☐ **Disagree**

Comment: ---

5. Ensuring that, insofar as is practicable, the design minimises barriers to accessibility for all users – particularly the elderly and those with disability;

☐ **Agree** ☐ **Disagree**

Comment: ---

6. Ensures the scheme can be constructed, managed, and maintained at reasonable cost and in a way which is economically, socially, and environmentally sustainable. Materials should be chosen with this in mind. The design should aim to maximise the use of indigenous materials, optimise the distance of roads and other hard surfaces and minimise the length of service runs.

☐ **Agree** ☐ **Disagree**

Comment: ---

7. Ensures quietness in neighbourhood; this can be done by avoiding including a road with heavy traffic near the location of residents besides separating public space into play areas and clusters of houses. This should be reserved for shrubbery and small trees;

☐ **Agree** ☐ **Disagree**

Comment: ---

8. Ensures the landscape design exploits vegetation types and landscaping styles that integrate the development with the streets-cape, it should not affect the structure of the proposed buildings, considers personal safety by ensuring good visibility along roads, paths and driveways and avoids shrubby landscaping near dwelling entries, contributes to energy efficiency and amenity by providing substantial shade in summer especially to south and west facing windows admitting winter sun rays to house interior and improves privacy between dwellings;

☐ **Agree** ☐ **Disagree**

Comment: --

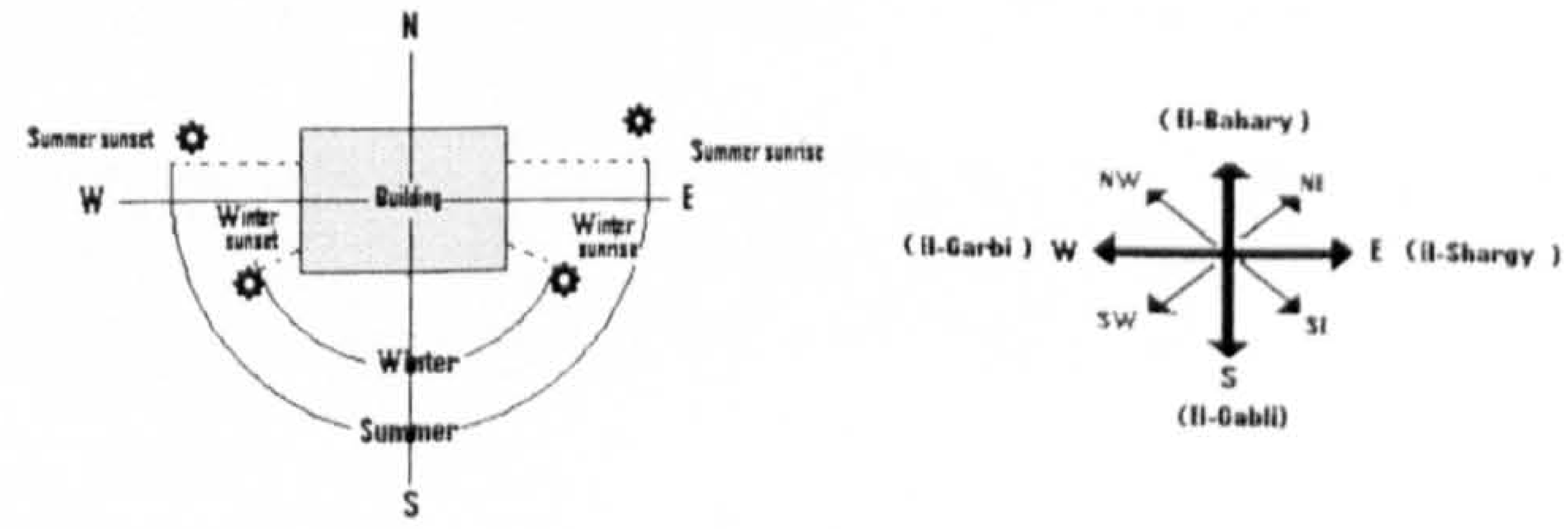
9. Dwellings are provided with open space areas that should afford adequate privacy for residents' convenient access from a main entrance as well as provision of trees and canopy to achieve shading during the hotter months of the year. In addition included special shared area for different activities of families, ought to be included.

☐ **Agree** ☐ **Disagree**

Comments: --

IV. House layout

1. Ensures the opening orientation of house layout position is in the most suitable location vis-à-vis to climatic conditions and the long sides of the houses are exposed to the north to capture the cold breeze in summer and to the south to obtain sun-rays in winter. For instance, in Tripoli Libya the opening orientation of houses layout is in the most suitable location regarding climatic condition and the long sides of the houses are expose to the north to capture the sea's breeze in summer and south to obtain the sun's-rays in winter;



Suitable orientation of houses in Tripoli according to wind direction and sun rays

☐ **Agree** ☐ **Disagree**

Comment: --

2. Landscaping , including shady trees, should be planted in both front and back yards, especially in private houses to respond to environmental needs.

☐ **Agree** ☐ **Disagree**

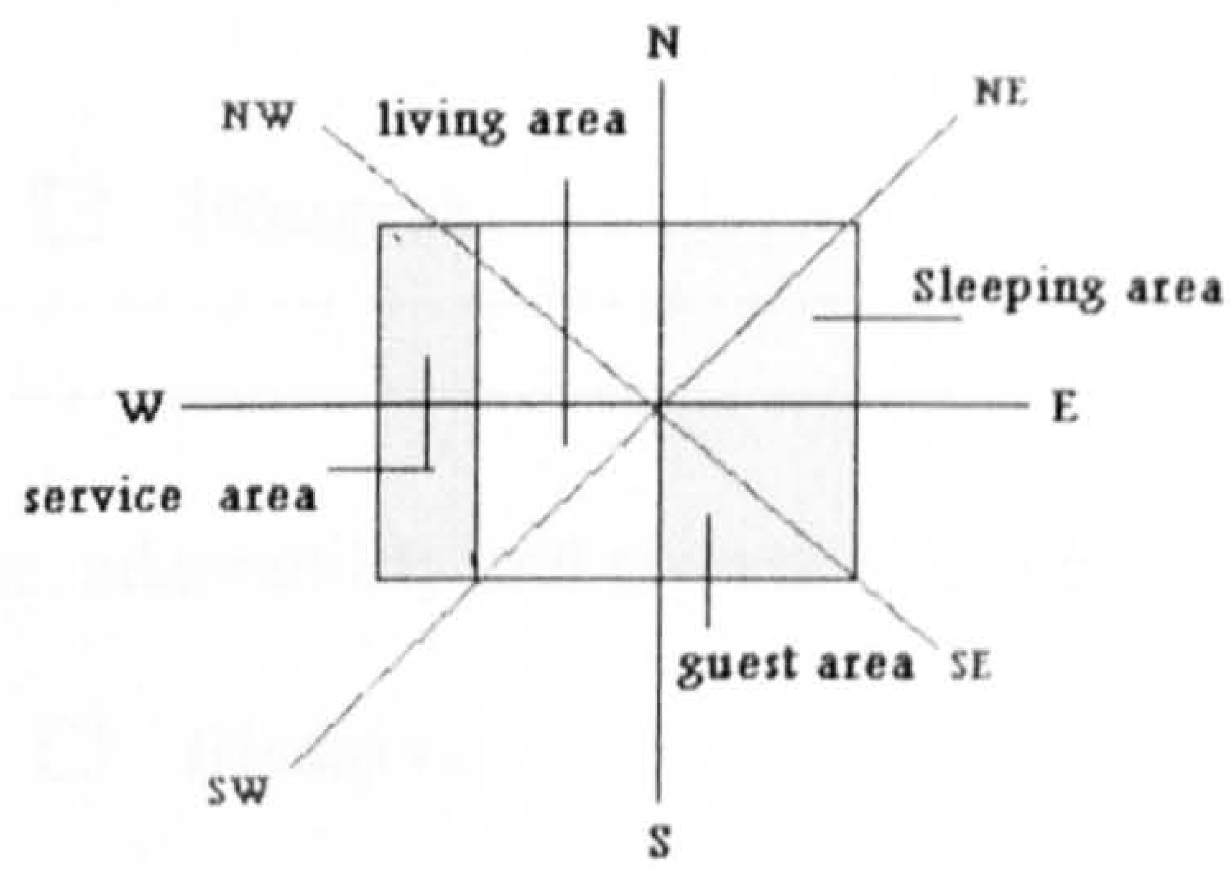
Comment: ---

The Third level: Housing Design

The socio-cultural and climatic factors are among the most significant aspects which deeply impact upon dwelling design. Designers should consider the following criteria in internal and external dwelling:

I. Internal Design

1. To achieve comfort indoor space should be arranged according to daily and annual heating and cooling requirements. According to layout the spaces with the most daytime use can be positioned on the south and north sides, sleeping area placed on the east and north-east sides, the guest area placed in the south-east and other facilities situated along the western façades to protect the building during overheated and overcooled periods;



☐ **Agree** ☐ **Disagree**

Comments: ---
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2. Ensures ease of access, prevents internal space from being observed from outside by using the passageway element as a traditional system that operates as a barrier. More attention should be given to block(s) of flats with their entrances not facing each other directly;

☐ **Agree** ☐ **Disagree**

Comment: ---
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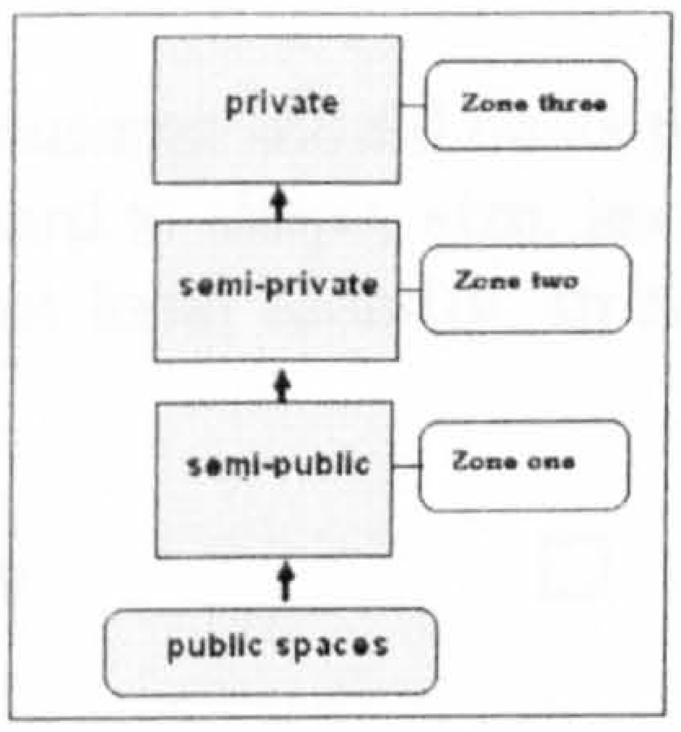
3. Ensures privacy within a dwelling with arrangement of the house into three areas: guests' area, family area and the sleeping area. This ensures respect for the concept of separation between males and females according to Islamic instructions besides ensuring visual and aural privacy between the guest area and household members;



☐ **Agree** ☐ **Disagree**

Comment: ---
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4. Encourages adopting the courtyard concept where possible; to provide a secure playing area for children and offer pleasant environment during summer season. The courtyard may be covered by mechanical elements to avoid problems during winter such as rain. The basement or semi-basement is another significant element in the house because it offers a cool and warm environment and the space could be utilised for a number of activities;

☐ **Agree** ☐ **Disagree**

Comment: ---
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5. The design should ensure flexibility in use, adaptability and growth of the family;

☐ **Agree** ☐ **Disagree**

Comment: ---
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6. Ensures the circulation of air within a building. Control of ventilation is one of the most significant concerns of the building design. This can be achieved by cross ventilation from north to south as well as use of staircase to capture the northern breeze.

☐ **Agree** ☐ **Disagree**

Comments: ---

II. External Design

1. Size, materials and position of windows should be designed to achieve privacy and climate control by use of "musherabyia" as can be observed in screen windows of traditional houses besides shade elements and new technological materials such as reflective glass, dark translucent;

☐ **Agree** ☐ **Disagree**

Comments: ---
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2. The external façade of housings should be as modest as possible, i.e., plain, simple and harmonious with regard to shape, size, texture, and use colours that reflect sun rays. It should also reflect local identity. In addition it ought to avoid excessive finishing;

☐ **Agree** ☐ **Disagree**

Comments: ---

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3. In keeping with social traditions and Islamic instructions, the height of new buildings should be in harmony with other buildings in the neighbourhood. This further improves aspects of privacy and air flow;

☐ **Agree** ☐ **Disagree**

Comments: ---

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4. Avoiding scattered balconies that are invariably unused. These can be combined into one or two areas that work as an open area and is protected by a fence and "mushrabiya" to achieve external privacy;

☐ **Agree** ☐ **Disagree**

Comments: ---

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5. Ensuring the external privacy as below:

- The boundary fence is a minimum of 1.6 m high with respect to at least the finished ground level of the adjacent gardens and, preferably, to the finished floor level of the internal ground floor of the property;

☐ **Agree** ☐ **Disagree**

Comments: ---

- Making sure that the roof parapet is at least 1.5 m high and uses a device such as "mushrabiya" to provide ventilation over the roof's surface, helping to cool the surface and rendering the roof space more comfortable;

☐ **Agree** ☐ **Disagree**

Comments: ---

- Taking advantage of balconies above ground floor level to provide an extension to internal living space and, again, maintaining privacy by making them sufficient to inhibit their being overlooked or, in this case, incorporating a louvered mushrabiya to supply light and air circulation;

☐ **Agree** ☐ **Disagree**

Comments: --

- Providing devices to windows particularly above ground floor level that will draw light and air into internal spaces while inhibiting views outwards that would breach privacy. This particular device has been shown as a horizontally located element, but it would work equally well vertically mounted, perhaps to direct views where there is no privacy problem.

☐ **Agree** ☐ **Disagree**

Comments: --

III. Design guidelines related to climate and building materials

A. Climate

1. Insulation of walls is crucial to create a comfortable temperature within the house. This could be attained by the following methods:
   - Use of the cavity walls or thermal insulation to increase lag-time of the wall will increase insulation. Since hot air rises a considerable amount of air movement can be created by simply providing a vent at the top and bottom of a wall. Hot air can rise and escape of course these vents should be suitably screened to keep out insects, or natural materials such as mud mixed with straw should be used and filling between double walls besides planting trees and climbing plants to shade it;
   - Heavy masonry is desirable for outer walls particularly those on southern and western sides.

   ☐ **Agree** ☐ **Disagree**

   Comments: --
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2. The construction of mostly flat roof that means the major part of the summer sun's heat falls on the roof of a building, due to its position with respect to the sun and has frequently to be protected to avoid overheating the spaces beneath. In addition it is the roofs of houses which release most heat through radiation to the night sky, especially those constructed by reinforced concrete as observed in most contemporary housing. Based on these problems above, the roof ought to be insulated from the sun. This can be accomplished by the following:
   - Shade can be achieved by using a double roof with a layer of air between or by covering the roof surface with hollow bricks; insulating materials such as fibreglass and lightweight blocks;

- The shape of the roof is also of considerable importance in a sunny climate. Pitching or arching the roof has several advantages over a flat structure. Using domes and barrel-vaulted designs increase the speed of any air flowing over their curved surface and is effective in minimizing direct solar radiation;
- Using a roof gardens is plants can solve a great deal of the roof thermal mainly by creating a shady area. Another advantage could be gained from these plants in that their roots retain a certain amount of moisture, which can help to keep the roof surface temperature down. A useful idea is to shade the roof more naturally by designing it to suit popular traditions such as loggias or open galleries;
- High solid parapet walls around the roof would, for example, create a stagnant pool of not air and should, therefore, be avoided.

☐ **Agree** ☐ **Disagree**

Comments: --

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3. The other most important concept of design in relation to the climate is that of windows. These must be placed suitably in relation to prevailing breezes to permit natural air flow through internal spaces and be suitable for heating during the winter. Accordingly the orientation of openings is determined by two factors:

   - Towards the prevailing breeze during the warm-humid season, to utilise its cooling effect;
   - Towards the sun during the cold season, to utilise the heating effect of radiation entering via windows;
   - Encourage the use of shading elements to reduce heat within the house. South and West facing windows require different shading solutions and this can be achieved by vertical and horizontal devices;
   - Shading could additionally be created by trees being sited near to windows. Deciduous trees can, however, beneficial for providing shading from glare and overheating during the summer, whilst the bare branches will permit solar access during the winter;

☐ **Agree** ☐ **Disagree**

Comments: --

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4. In sunny weather, external surfaces can became very hot, facilitating the transfer of heat to the building interior. So, the reflection of radiation is another method of providing insulation. The colours of the surfaces of a building, which are exposed to the sun, play a large part in reducing heat passing into the interior. When sunshine falls on a solid surface, part of the heat is reflected and part absorbed. Light colours and bright metal surfaces reflect a great deal of the sun's heat. Certain paints may reflect as much as 85% of visible radiation. Dark coloured surfaces should be avoided in all cases;

☐ **Agree** ☐ **Disagree**

Comments: --

B. Building materials

1. Materials used in building are of prime importance for protection against heat and cold. Therefore great care must be taken in the choice of wall and roof materials and their thickness with respect to their physical properties, such as thermal conductivity, resistively and optical reflectivity. Locally produced building materials should be used;

☐ **Agree** ☐ **Disagree**

Comments: --

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2. Analysis and evaluation of materials previously used, and an exploration of the possibility to propose new substitute construction technologies and materials having physical and chemical characteristics suitable to geographical and climatic data of Tripoli in particular, and to the whole of Libya and Arab countries in general.

☐ **Agree** ☐ **Disagree**

Comments: --

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3. Building materials with the best insulation should be adopted , the thickness of walls should be increased and, where possible, locally produced building materials should be adopted, such as lime sand block in walls;

☐ **Agree** ☐ **Disagree**

Comments: --

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4. Develop the technology of using local materials for new housing construction, as well as encourage local manpower participate widely in the new development processes.

☐ **Agree** ☐ **Disagree**

Comments: --

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5. Encouraging scientific research in terms of development of building technology and specification of building materials.

☐ **Agree** ☐ **Disagree**

Comments: --

APPENDIX 4 : COURTYARD IN OTHER COUNTRIES

I. Courtyard Houses in Iraq

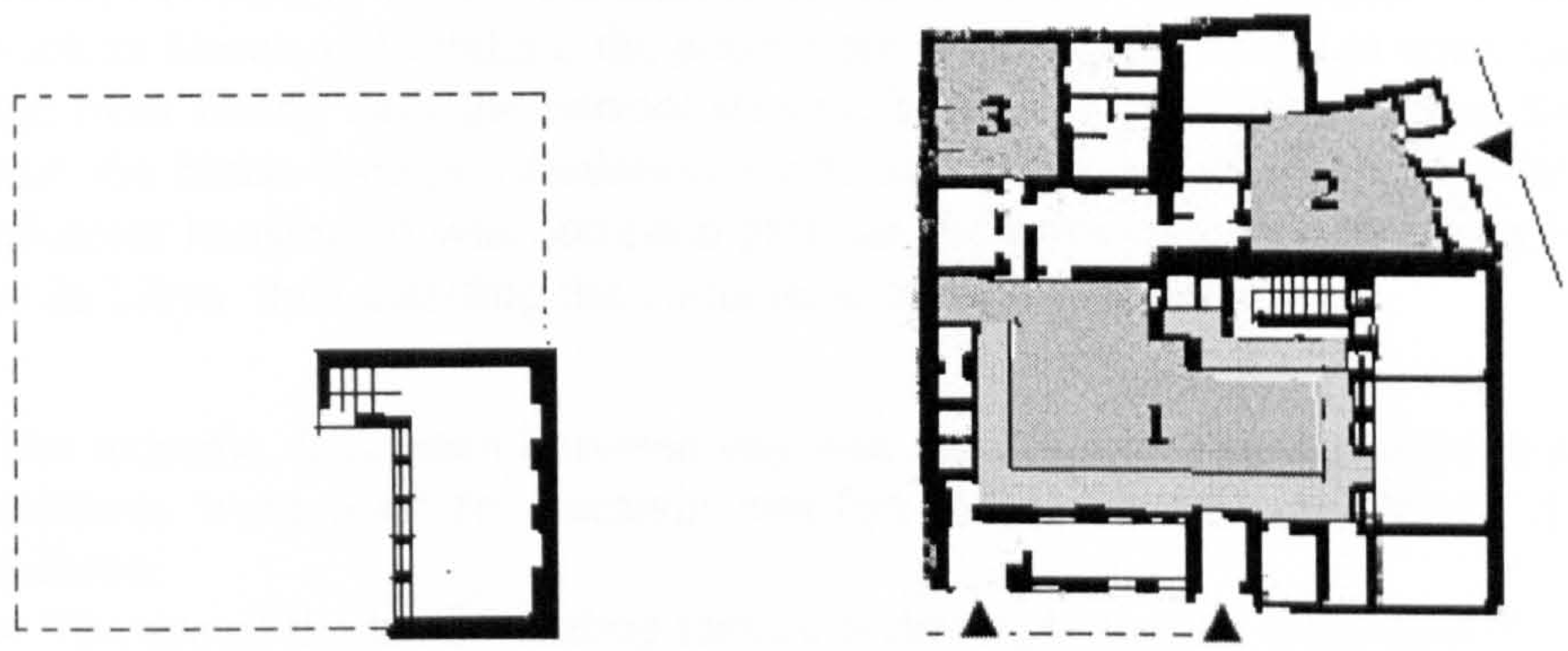
The courtyard houses in Iraq are indigenous types dating back to ancient times in concept, and in some concepts of design, construction, and detailing. They developed through the ages by trial and error to a state of general acceptance and satisfaction within the limitations of the building technology existing at the time and within the economic means of owner. The concept of the house itself is an internal courtyard with habitable rooms around it and looking inwards towards it for lighting and ventilation.

The courtyard in Iraq is locally known *El-Bayt Moftooh* (open house) or *El-Byat Sharqi* (an oriental house) or *El-byat El-Qadeem* (an old house). In mid 1950s the new names of house was introducing as result of enormous economic and socio-cultural changes took place in the Iraq and use of imported architectural styles, construction systems and building materials such as *Bayt Gharbi* (Western House) or *Bayt Oroppi* (a Western House) or *Bayt Hadeeth* (Modern House or new House) (Azzawi 1984).

The plan of courtyard house is usually of rectangular shape also a few cases the plan is trapezium shape. The height is typically categorised into two type's single storey or multi-storey houses, the basement usually formed one of the floors (Al-Sanafi 2001).The different floors of the house were linked by separate staircases, one of which would lead up to the main hall on the first or second floor, where male visitors to the house were received and to smaller rooms where business might be conducted
House design is relies mainly on the traditional emphasis on three basic concepts are:

- Function;
- Safety security;
- Social-privacy.

The architects in Iraq laid emphasis on these concepts through the division of the courtyard of traditional houses into three courtyards, one exclusively for female members of the household which is present in the great majority of housed. The second courtyard is for the guests quarters, the third courtyard for the kitchen (Figure 1). Among these spaces are spaces of communication or movement, which run their positions, their importance, form and detail, depending on the types of spaces between them (Al-Beirouty 1992).



Basement Ground floor

House plan key	
1	Family courtyard
2	Kitchen courtyard
3	Guest court

Figure 1: Shows the plan of traditional house in Iraq
Source: Al-Beierouty 1992

II. Courtyard Houses in Iran

The courtyard houses construction in Iran vary from region to region according in response to the local climate and topography (Al-Sanafi 2001 cited in Memarian, 1998). in Iran; there is evidence of houses being built with courtyards going back 8,000 years. These have been excavated in the Gazvin region to the north west of Tehran (Karimi, et al 1995).

In terms of the height the houses were categorised into a number of types. For example two-storey houses, were a feature of the *Abianeh* area, where ground floor space was typically given over to storage and stabling, family accommodation being on the first floor.
Iran lies in the hot-arid zone where rainfall is relative low. As a result the climate has had a great influence on Iranian houses and in neighbouring Arab countries such as Iraq and Kuwait. In the Zavareh area, basements were a feature of local houses. Part of the basement would provide living room accommodation for summer use, as this offered greater shelter from the daytime heat. At other times of the year, the family would use living quarters on the ground floor. Typically, houses in this area had a small garden courtyard, with a veranda running round its perimeter offering shelter to the rooms beyond and provided some ventilation.

In *Bushire*, where space for housing was at a premium because of the terrain, the construction of multi-storey houses was the norm, these often consisting of three storeys (Ghodar, 1978). Furthermore, the compact urban texture of historic towns such as Shiraz and Isfahan, the houses are usually constructed in rows and have only the front facing onto the narrow streets absorbing the air, which then found its way into the house though ventilation shafts and windows, whereas the other sides abut adjacent housing. It was common practice for entrance passages not to be L-shaped, as in Libya thus assisting the circulation of air though the house.

The extreme difference between day and night temperatures results in a number of methods were used to maintain comfort (Memarian, G. & Brown, F. 2006), as follows:

- The use of the local building materials that high thermal insulation.
- The construction of basements;
- The use of Badghir (wind-catchers);
- The use of courtyards.

In the hot-humid zone the courtyards served a variety of functions, all contributing in some way or other to ventilation, especially in the summer heat. They also afforded some measure of privacy for families, even when, as in rural areas of Iran such as *Ghilan*, in the cooler north of Iran. The courtyard was a fenced plot within which the houses are placed rather than an internal feature (Ghirshman, 1964). Where the courtyard was external, its walls or fence usually completed the square rather than surrounding the house entirely. In rural areas the courtyard was in effect the farmyard, with the farm's fields lying beyond the fence or wall delimiting the property. In urban areas like Shiraz, in contrast, the courtyards were smaller and 'internal'. They not only provided privacy but also some green spaces and a small pool.

III. Traditional house in Turkey

The courtyard represents one of the features of traditional houses in Turkey, for example the Diyarbakir houses. Diyarbakir located in the Southeast of Turkey, is like a closed city with its walls. The history of this city reaches back to 3000 BC. As in Tripoli the traditional houses of Diyarbakir have been planned with a courtyard and next to each other, in response the climate (Figure 1) (Imamoglu 1980).

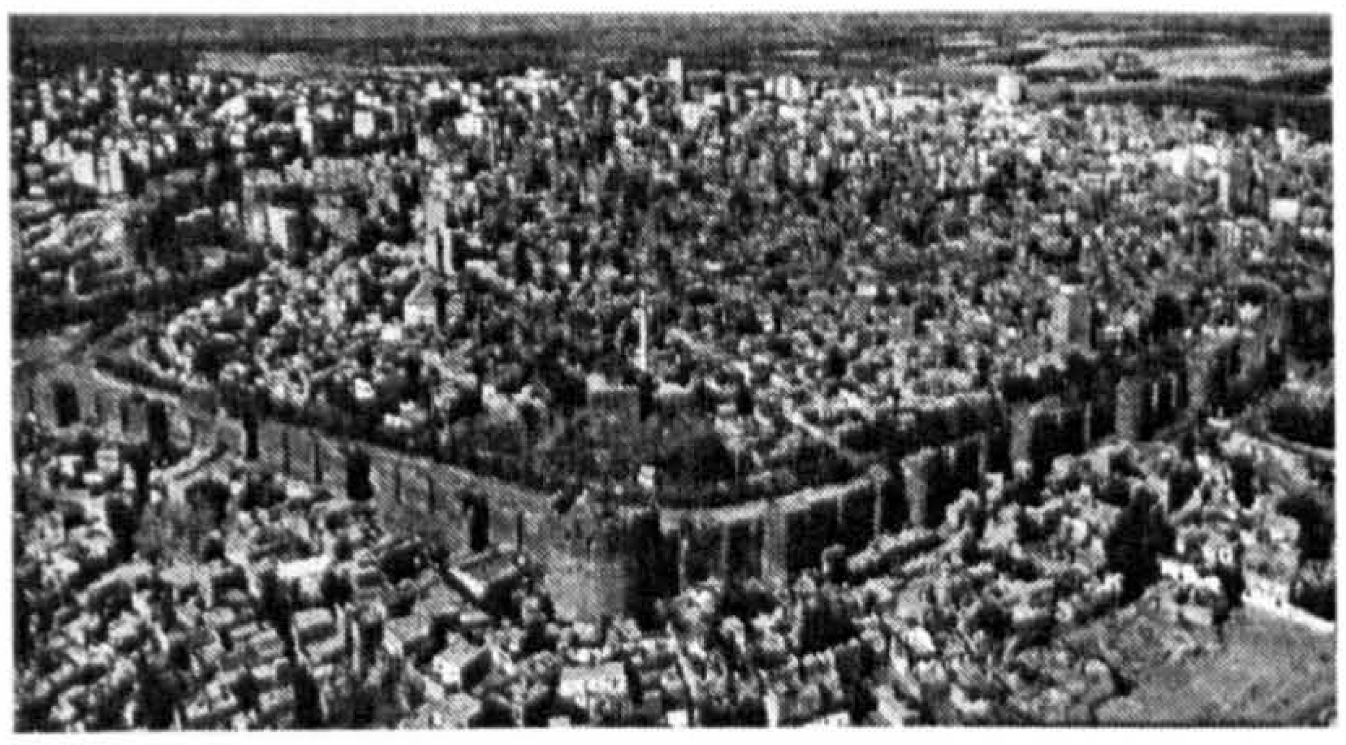
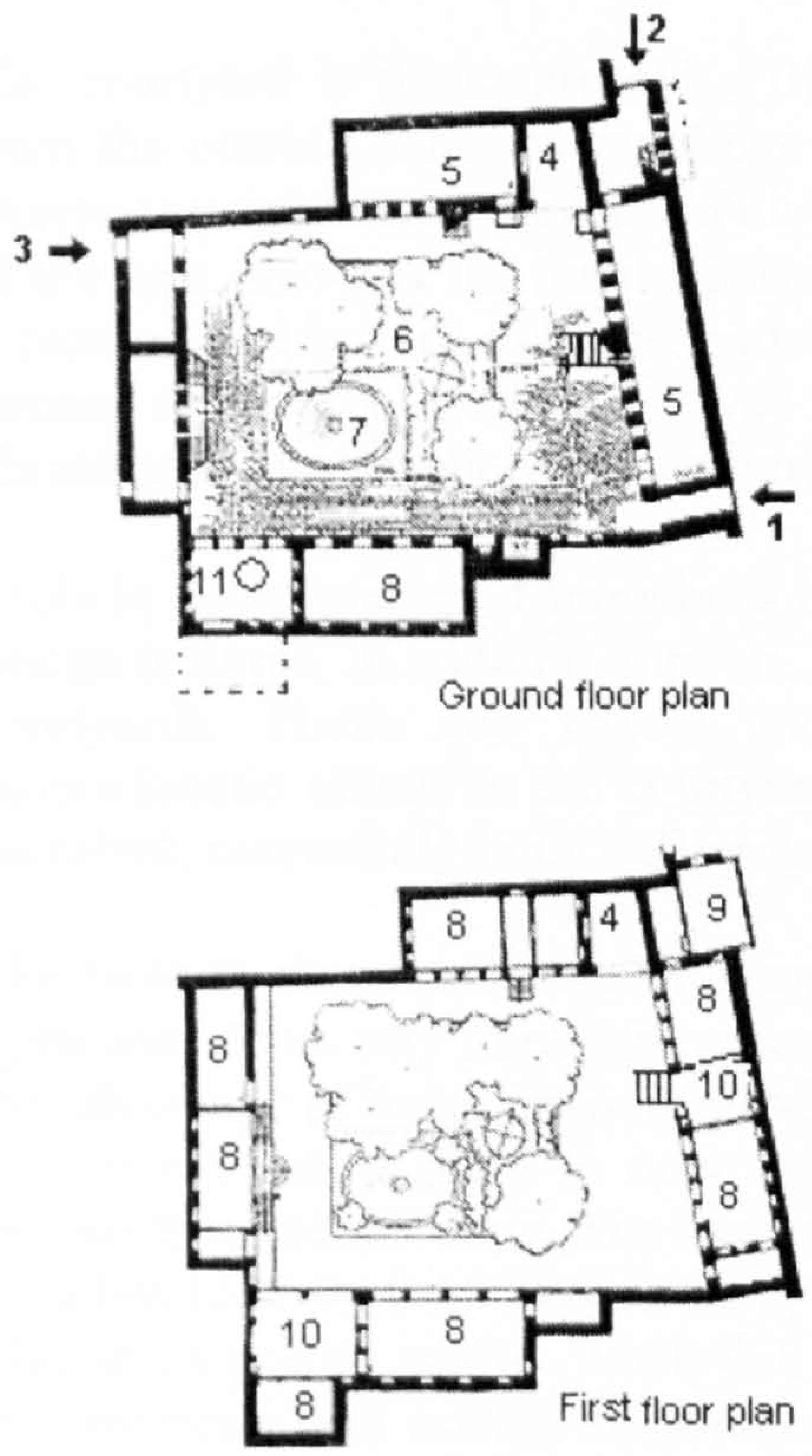


Figure 1: Diyarbakir castle and settlement
Source http://www.ersa.org/ersaconfs/ersa06/papers/465.pdf

Diyarbakýr Houses

The majority of houses in Diyarbakir are the courtyard type Figure(2). Although their size and complexities may change according to their first owner's economic power and social status, they are all inward looking. High, fortress-like walls separate the houses from medieval street. Due to the Islamic need for the segregation of the sexes and for privacy, houses used to have a private (*harem*) and public (*selamlik*) section. In the houses of the rich, these two sections became two adjacent but separate houses with passageway in between. This separation disappeared after the Turkish Republic, and the separately built sections of houses became independent residential units. Another division with in houses was made with respect to seasons; especially the large houses had summer and winter quarters. Summer quarters were generally oriented to the north and winter quarter to the south (Imamoglu 1980). Turkish houses are generally two-stored. The important part of the house is the courtyard, with semi-closed and enclosed spaces looking into it. Openings to the street were kept to a minimum. Basalt, a strong black charcoal – coloured volcanic stone, is the main building material for walls, floors, and pools. Roofs are flat and generally of compacted earth.



House plan key	
1	Entrance to harem (private section)
2	Entrance
3	passage to selamlik(public section)
4	Kitchen
5	Cellar
6	Garden
7	Poor
8	Room
9	Room with A
10	Eyvan
11	Sadiryan cool room

Figure (2) plan of house in Diyarbakir

Source : Golany 1980

Rooms in courtyard houses have high ceilings, many windows and a light, spacious atmosphere. Due to the seasonal division of large houses, rooms were also divided; the ones used during summer have a northern orientation, which secures shading as well as day and night breezes. Winter rooms, on the other hand, generally have a southern orientation and provide sunny, warm days and protection against winds during winter. Sometimes in Diyarbakir houses one can find a room in the basement which is known as the *Serdaps* or on the lower ground level designed for creating extra cooling.
Windows are oriented towards the courtyard. The proportion of total window area of a room to its floor area varies between 15 and 35 %, which makes the interior well lighted. On top of 5/9 to 4/9 proportioned and generally arched main windows, there are also small windows for ventilation purposes. Rooms on the first floor may also have openings to the street by way of a projecting kiosk, called Sahnis (pronounced shahnish). It is cantilevered out from the load-bearing wall of the lower floor and has windows on two short sides, while its main façade is kept closed. This type of a kiosk given a good perspective of the narrow street and lets in the air currents created by the tunnel effect of shaded, cool streets. The main façade of the Sahins has no openings primarily because of the limited width of medieval streets. Besides, there is no thing to look at first floor rooms may also have windows at the top which open to the street to make cross ventilation possible.

The courtyard is the centre old a Diyarbakir house. It is private, totally separated from the outside either by buildings or by high walls, are cannot be seen from the streets or neighbouring houses. With the exception of cold days during a few months of the year, many of the family activities are carried on in the courtyard. A pool and a planted section are essential parts of a courtyard. Regardless of the size of the house, at least a pool and some greenery always exist and make the court climatically and psychologically more liveable.

pools in courtyards, and sometimes in rooms and semi-closed spaces, are important design features. In addition to pools, flowers and trees are important elements of the courtyards. Plants add colour, movement, and life as well as shading and microclimatic effects to the courtyard. They also make an elegant blend with calm, dignified, masterfully built well-proportioned facades.

The Iwan is closed on three sides and on top and connected to the courtyard by its open end. It is a very important space for the family since it is always shaded and has the advantage of being open. Depending on the size of the house, there may be more than one Iwan if there is only one; it is usually oriented toward north to the prevailing wind direction. The Iwan opens to the courtyard by an arch and is covered by a flat roof. Its floor is covered by a special kind of basalt, called' feminine stone 'due to its porous nature. When this kind of floor is washed, it keeps some water in its tiny holes and makes evaporation possible for a long period. Some Iwan may have small pools and become even more attractive for family living, entertaining guests, or resting. Courtyards and Iwan are used day and night. On summer nights, people sleep on the roofs or in the courtyards to be able to make maximum utilization of breezes.

Building materials

The traditional building materials for most parts of the country were stone. With the exception of the black sea region and some coastal regions, it used to be the only building material in cities. However, stone is used so widely and masterfully in the arid zone that floors, even roofs turn into stone; arches, vaults, and domes are utilized; and stone workmanship became a phenomenon in itself. People sleep on roofs in other parts of Turkey, too; but it lasts only a few weeks during the hottest period of summer. In south-eastern Turkey, most people sleep outdoors for several months of the year.

APPENDIX 5 : HISTORICAL BACKGROUND OF TRIPOLI CITY;

The history of Libya, especially Tripoli, is very eventful. The city has been dominated by many different nations, Phoenicians, Carthaginians, Romans, Muslims, Spanish, and Ottomans and later on the Italians.

Libya particularly Tripoli was the central commercial activities, since it is at a point that connects Africa, Europe and Middle East. Form its earliest history Libya flourished as a centre of trade. It has been recognised as a crossroad of civilisations: the Phoenician, Islamic from the East, the Greek and Roman from the North (Hill and Goivin, 1976). According to Said (1970) Phoenicians were one of the first nations to use maritime trade in history (EL-Barghuti, 1970). The Phoenician civilization, which was based in Palestine and Lebanon, reigned supreme at this time. The Phoenicians extended their empire by development along the Western part of the coast of North Africa.

As a Phoenician city, Tripoli was formed in the 12 century BC and survived until 7 century. At that time, the name of the city was Oia. The city was located between the two other major Phoenician cities situated along the same coast, Sabratah about 45 km west of Tripoli and Lepits about 120 km to the east see (Figure 1) (Shaiboub 1979).

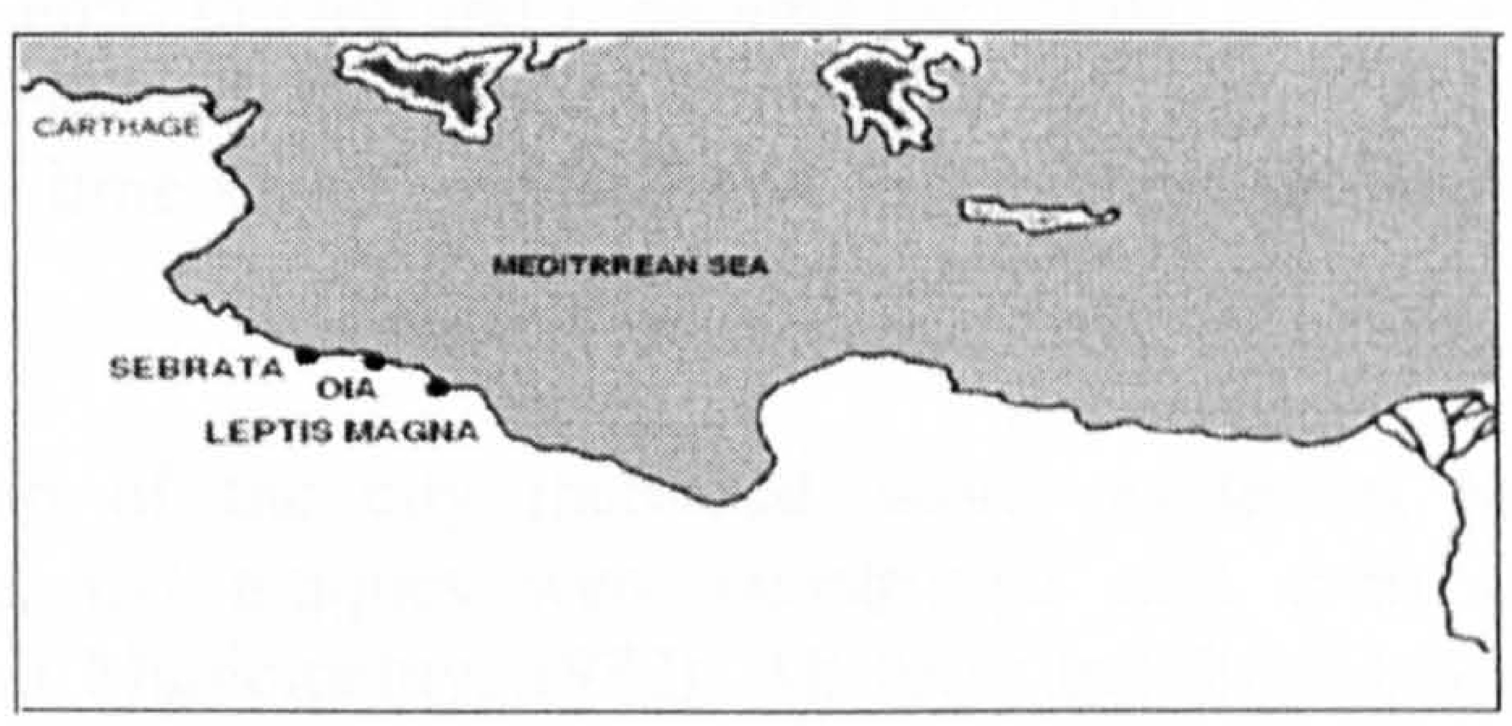


Figure 1 : The location of Oia (Tripoli)

Source: Shaiboub 1979

During this period, the native people shared their work and trade activities with the Phoenician and the relationship between the Phoenician and the native people brought a mixture of the two cultures (Wright, 1969).

In this period, the city of Tripoli was small, with a limited number of residential or commercials buildings. The Phoenician and native Libyans lived together in peace in the city (Naji 1970). During the Phoenician domination, Tripoli became an important port for main market in the North Africa. It was a meeting point for locals with trades from South, West and East Africa. In addition, it was one of the main meeting points for the caravan trade in the North Africa. Tripoli was connected to other important coastal cities and oases in desert zones.

At this time, the city was known for the manufacture of pottery and carving of ivory, both of which gave rise to economic growth, (Cachia 1975) describes that "for many years Tripoli had almost a monopoly of the caravan trade. The city is the Mediterranean Mecca for long lines of camels streaming in from depths of desert spaces, bringing ivory and gold dust, ostrich feathers and gums, wax and tanned leather, sometimes mats and henna, using three or four months or longer for their deliberate progress".

In 146 BC: The Carthaginians took-over Tripoli after the collapse of the Phoenician empire. During this period it was under tight control especially in relation to trade, as Carthage did not give local people commercial freedom and the city was heavily taxed (Haynes, 1981).

In 202 BC: The Romans conquered North Africa and took-control of the city after they had destroyed Carthage the capital of the Carthaginians. Tripoli welcomed the Roman occupation since it removed control from the Carthaginians. From that time the city's name was changed to Oea. The Roman period was known as an era of development at all levels. There was economic improvement, more freedom and more protection in trade for the local people. Extensive urbanization took place in the tripolitanian (Leptis, Sabratah and Oea) area. (Naji, 1970, Haynes, 1981) Oea was redeveloped with Roman architectural and planning forms. In the early stages of the Roman occupation of tripolitanian more urbanisation and development occurred in Sabratah and Lepits magana than in Oea. However, during the administration of Septimus Severus, Oea became more important than the other two cities. He moved the capital from Lepits to Oea and it became the capital of Roman North Africa, as well as the political and commercial centre for the region (Tripoli municipality, 1972). From that, time Oea flourished and has remains the capital of Libya until now.

As the population of the city increased, more residential buildings, markets, workshops, baths and temples were constructed and even some streets with pavements (Tripoli Municipality, 1972). All these buildings have been demolished except the Triumphal Arch of Marcus Aurelius, which still remains today, see (Figure 2).

Figure 2 : The Arch of Marcus, which still remains in Tripoli
Source: Villard.H.1956

Roman architecture and urban forms were well established in several sites along Libyan coasts such as Oea (Tripoli), Sabratah and Leptis-magana where native people and Romans worked together in building and planning their cities (Sjostrom, 1993). The Roman period in North Africa has always been recognized as a source of civic influence and contact whit the local people rather than as a period of colonization the influence North Africa in technical, economic and architectural principles and forms (Ward, 1969). In the Roman period Libya became a large, stable, highly urbanized area (MacKendrick, 1980). In this era, trade routes were opened on a regular basis with the far west and south. The Roman architecture in North Africa cities, theatres, amphitheatres, temples, houses, baths, and Christian basilicas can still be widely found. Also there are some traces of decorations and pavements for houses, public building and workshops. The organization of Roman cities was a crucial factor in the formation of Libyan cities (Dunbabin, 1978).

The developments in agriculture and urbanization that took place in the six centuries of Roman occupation were destroyed, especially in Oea (Tripoli city) by theVandais who occupied the country in 426AD (Etlissi, 1985). After about a century of Vandal control of Oea city local people with their leader, Antaias, (532AD) liberated it and all of North Africa from the Vandals' domination and established Byzantine control in the whole region. In this second era of Roman domination there were further improvement in the building of churches, renewal of the city walls, the castle and developments in agriculture. Tripoli flourished to become a major trading centre once again (Etlissi, 1985).

In 643 AD: A new era was born. Islam came to Oea and occupied it under the leadership of (Omer Ebn-Alass). The second invasion led by (Ugba Ebn-Nafi) was in AD 645-646. During the following eight centuries of Islamic occupation many movements and urban developments occurred. In this era a new religion, language, and easy of life were introduced to the city. The attention given to the city led to improvements in human life and the construction of new houses, mosques, public baths, shop s and markets. The population also increased in this period from 5,000 in the eighth century to 10,000 in the sixteenth century (Aswad, 1967).

In 1510: The Spanish occupied Tripoli. In this era, destruction spread in the city Most of the better houses and public buildings were destroyed and also native people were removed from their houses and from the city it self (Sjostrom, 1993). Consequently most of the native population left the city because of the struggles of Libyans against the conquerors and the Spanish imposed an economic boycott on the city so that all trading activities were transferred to other cities such as Benghazi.

In 1551: Tripolitiania becomes a vassal state under the Ottomans who were moving westwards and establishing their new empire. The Libyan people welcomed the Ottoman occupation because of the pressure put on the country by the Spanish. They viewed the Muslim Ottoman's as natural allies against the Spanish (Daza, 1982). During the Ottoman's period Tripolitania had limited resources and was dominated by the regional powers in the from of tribal confederations. The Ottoman administration of the country was divided because of competition between the Ottoman and some tribal associations. In this period most of the native people were semi-nomadic; they moved between their city houses and oases for their livelihood. However, during Kharamanli control (1835-1911) some improvements to the city occurred with mosques; such as Ahmad Basha mosque and Darguth Basha mosques school of arts and crafts located in September street (Madraset El-Funun Wa El-Sanayah), restaurants, coffee shops and a modern port, some of which still remain today (Zarrugh, 1976). At the end of the Turkish period development took place outside the walled city where residential buildings were constructed. These houses were designed and constructed in a four areas (Myzran, Bulkair, Dhara and Esreem). Furthermore, the EL-Kubza and EL-Tulata markets were created at this time (Kshedan. 1984).

In the long period of Ottoman occupation the quality of urban life, the organization of society and the built environment declined in the whole country with some limited exception in Tripoli city. Even here, little attention was paid to development. However, during the rule of the Kharamanli family in the period of Turkish control, more houses, school, mosques and hospitals were built in the city though this ceased when the Kharamanli administration ended and this was followed by further urban neglect. During the Turkish period the city was still a suitable place for traders and travellers to rest and to exchange goods. For example, Muslims from Spain and Northwest Africa took rest in Tripoli on their way to Mecca to perform the Hajj. Caravan trade routes in the 19th century were the only means from Tripoli to central and Southern Africa for the conveyance of European goods such as English cotton, glass and mirrors, drugs, writing paper as well as Tripoli silk brocade. These caravans returned to Tripoli with items such as worked leather, Kola nuts, ivory, gold dust, skin, coffee and tea (Cachia, 1975). This system of trade helped in the development of the built environment and increased the worldwide importance of Tripoli city, connecting it to other important cities such as Tunis, Cairo and Algiers.

This brief review of Tripoli's history before the twentieth century shows how the ancient influence, gave way to the enduring influence of Islamic civilization, which has dominated the city since the seventh century. It is from this Islamic background that the city entered the twentieth century.

In 1911: Libya was occupied by the Italians from the 11th of November 1911 Tripoli city was the first city occupied .The influence of Italian principles and action showed itself in new architectural and planning forms that spread throughout the city, such as western styles of houses, offices, shops and wide of streets, roads and piazzas. This period from 1911 until 1943 when Italy lost the second war, defeated in Libya will be explored in more detail in terms of development of housing in this chapter. At that time the United States of America, Britain and France took-over the government of the whole country until 1951(Polservice 1980)

In 1952-1969: On December 24th 1952 Libya received its independence. According to Mukhtar (1997) Tripoli as a western –style capital city, began to expand. Demand was high for housing, administration and commercial buildings. The Libyan government during this period established many programmes for all sectors especially housing, because Tripoli witnessed many rural migrants who established many Shantytowns around Tripoli such as the Abuslum site.

In 1969-present time: After the revolution, the new government adopted a new policy, which had a great impact on the urban structure and growth the city. As a result, modern housing, education and health services, and a transport system were provided. More details of the revolution period will be explored in this chapter.

Tripoli City Creation

The Phoenicians between the twelfth and seventh centuries BC founded Tripoli city when they occupied North Africa, by developing trade along the Mediterranean coast, linked with the Great Sahara (Africa). Some researchers considered it likely that the creation of Tripoli city took place in the prehistory era, referring to periods preceding the Phoenician establishment in the North Africa. According to travellers and historians the name of Tripoli was changing many times during the historical eras (Figure 3) (Grefa 1996).

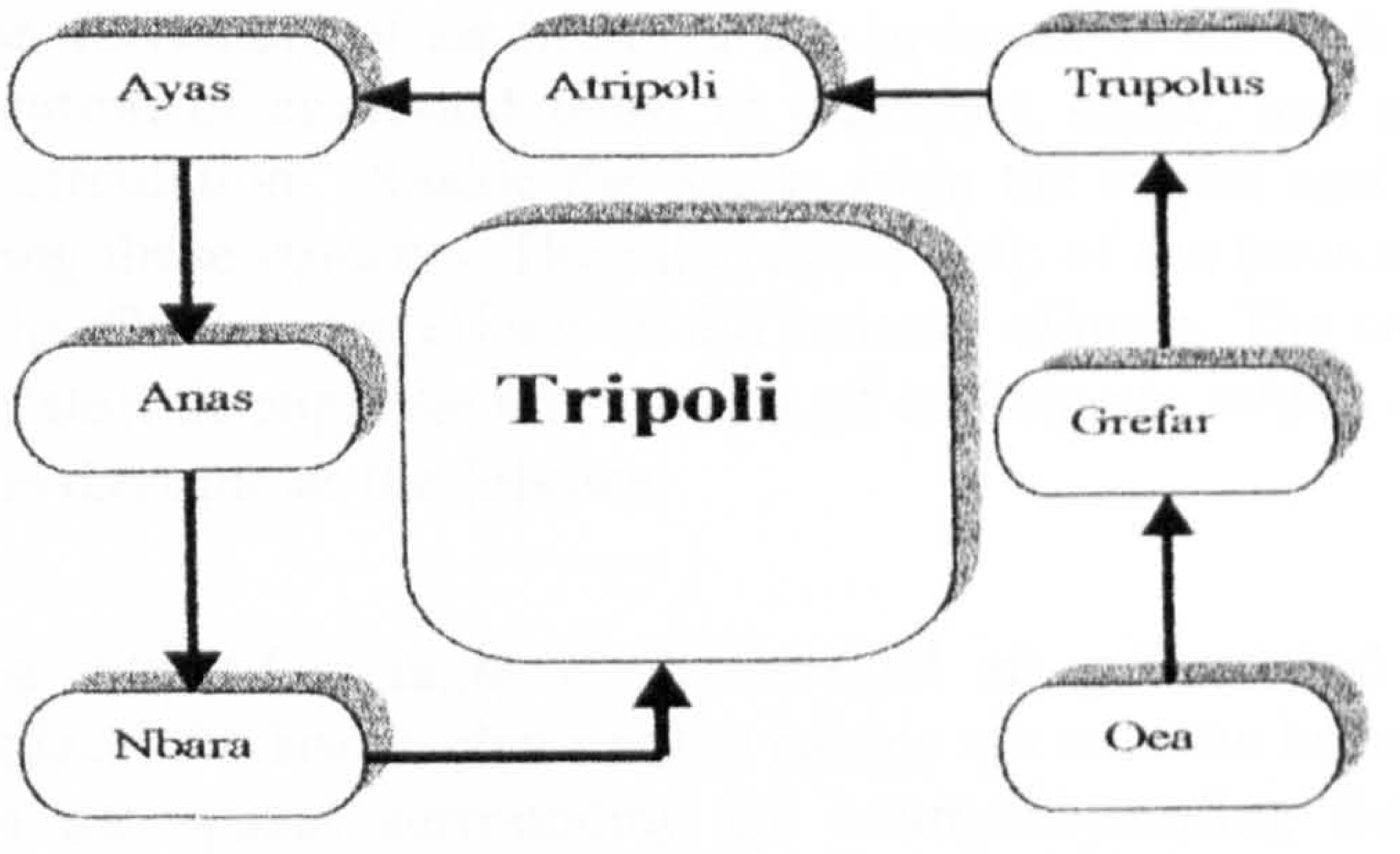


Figure 3 : The changing the names of city during various historical eras

APPENDIX 6 : THERMAL REGULATIONS IN THE HOUSE THROUGH THE COURTYARD

The courtyard as an architectural element was functionally based on aspects of the climate, demonstrating its suitability for the hot weather, because it helped in circulate the air and stimulate the required air currents.

These currents occurred because of the interplay of shaded areas with sunny ones. The shaded areas have high pressure when the sunny ones have low pressure and this result in the movement of air from the low pressure to the high-pressure areas. The raised elevation of courtyard helps in providing shade, and consequently in stimulating air circulation. Outside the house, even the streets and adjacent alleys helped in creating these currents. The interrelationship of the houses and the use of courtyard help to alleviate the effects of the summer climate. The courtyard is used as thermal regulator, through the three cycles of cooling air, which occurred during the night and the daytime as the follows.

The first cycle: Started at night when the cool air gathers and falls in to the courtyard to replace, the hot air that rises to escape out side the house this cooler air moving around the spaces surrounding the courtyard-cooling the rooms, walls, floors and ceilings and even the furniture. This coolness is effective until the noontime (Figure 1).

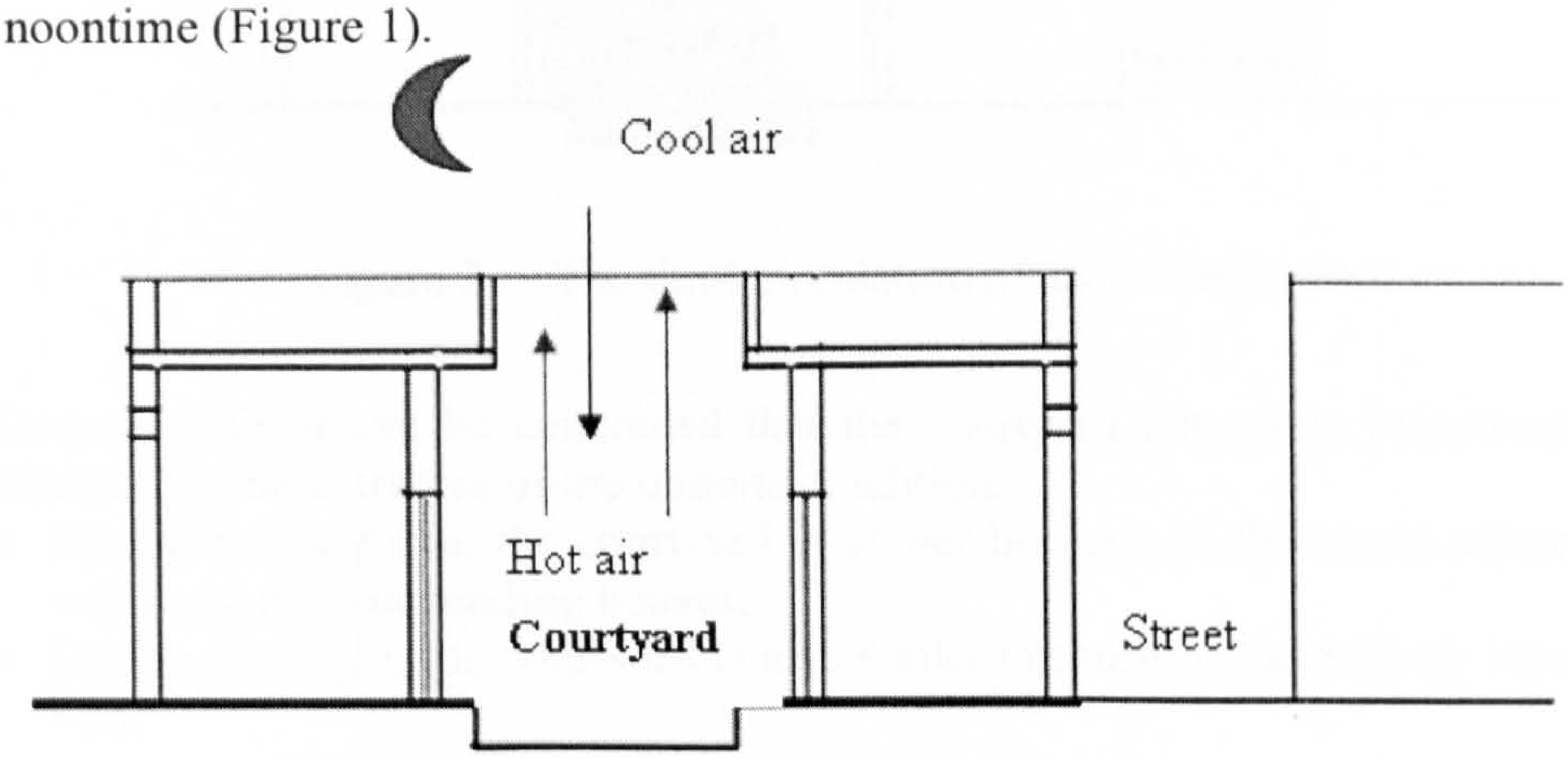


Figure 1 : The first circulation of air at night

Second cycle: At noontime when the sun rays fall vertically on the courtyard. The heat of the surfaces expose to the sun rises through the stack effect. The cool air stored in the rooms in the night. Start to filtrate out side to the courtyard. Therefore air moves from the external alleys out side the house toward the room spaces and towards the courtyard and then from they're toward the roof. These currents provide more comfort to the residents sometimes helped by sprinkling water at noontime or through a fountain to produce cooler air as a result of water vaporisation. This cycle continues until the sun starts to set. (Figure 2).

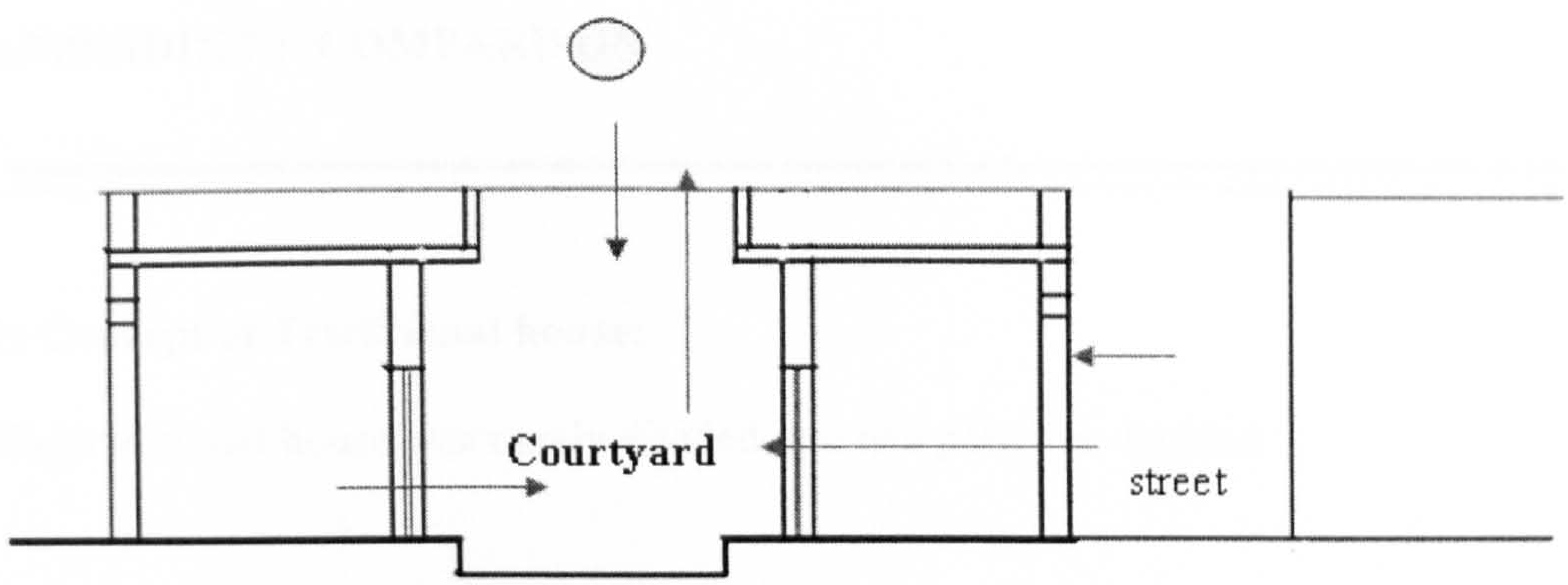


Figure 2: The second circulation of air at noon

The third cycle*:* Starting in the afternoon period the hot air begin to rise up where it is replaced with cooler air, which enters in to the house from the roads and from the shade provided by the courtyard also as the assumed of sun declines deeper shade results. Thus this cycle continues into the night until the first cycle starts once again. (Figure 3).

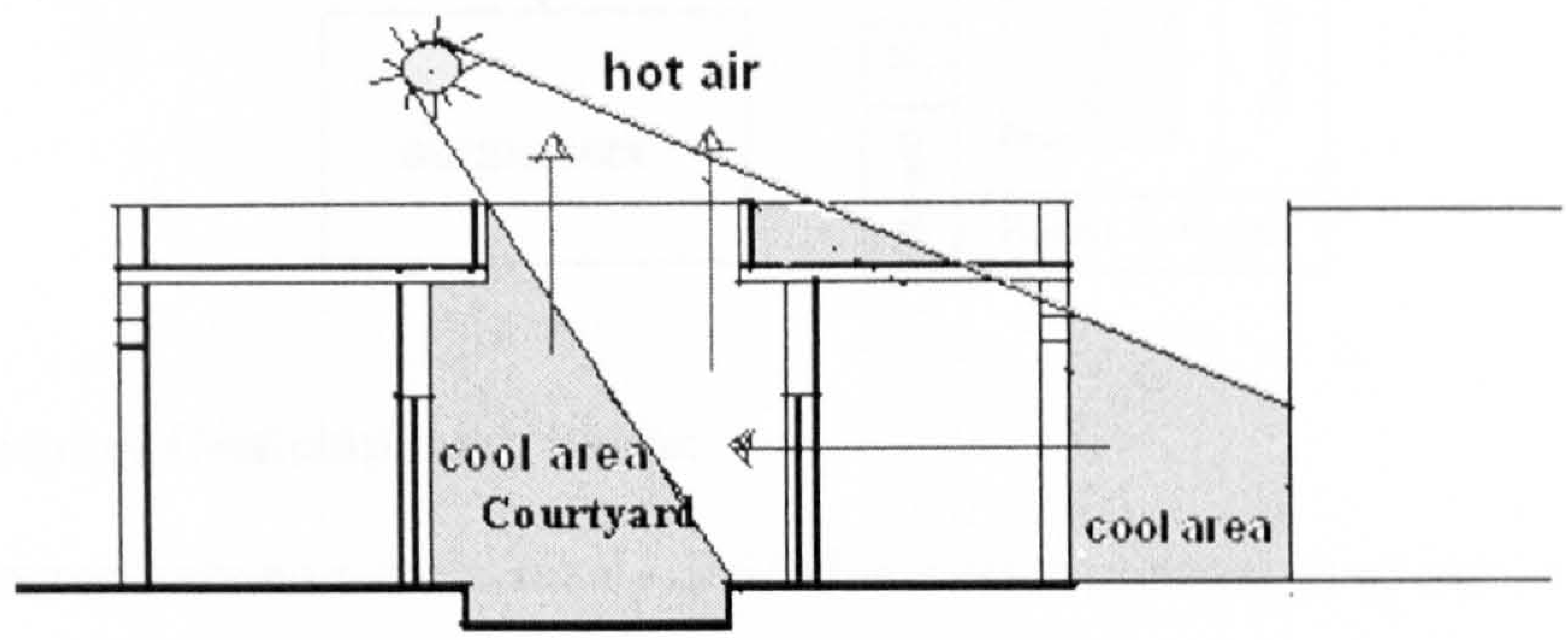


Figure 3 : The third circulation of air in the afternoon

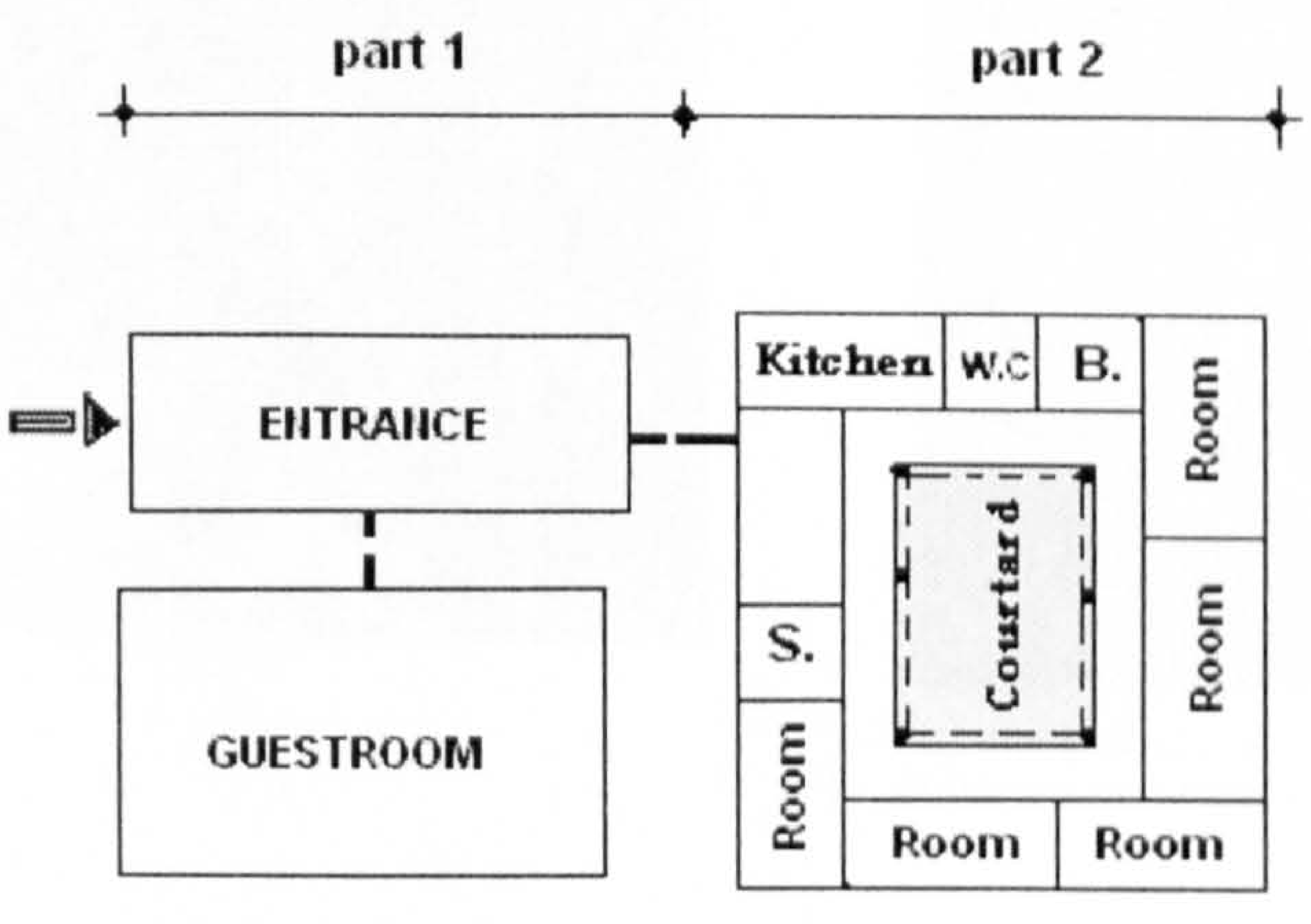
Consequently it can be concluded that the courtyard plays two important roles in countering the extremes of the climate condition:

- During the daytime, the courtyard is cooler because of the shade offered by the walls and the surrounding houses;
- During the night, the courtyard is also cooler because of the cold air layers on the floor.

APPENDIX 7 : COMPARISON

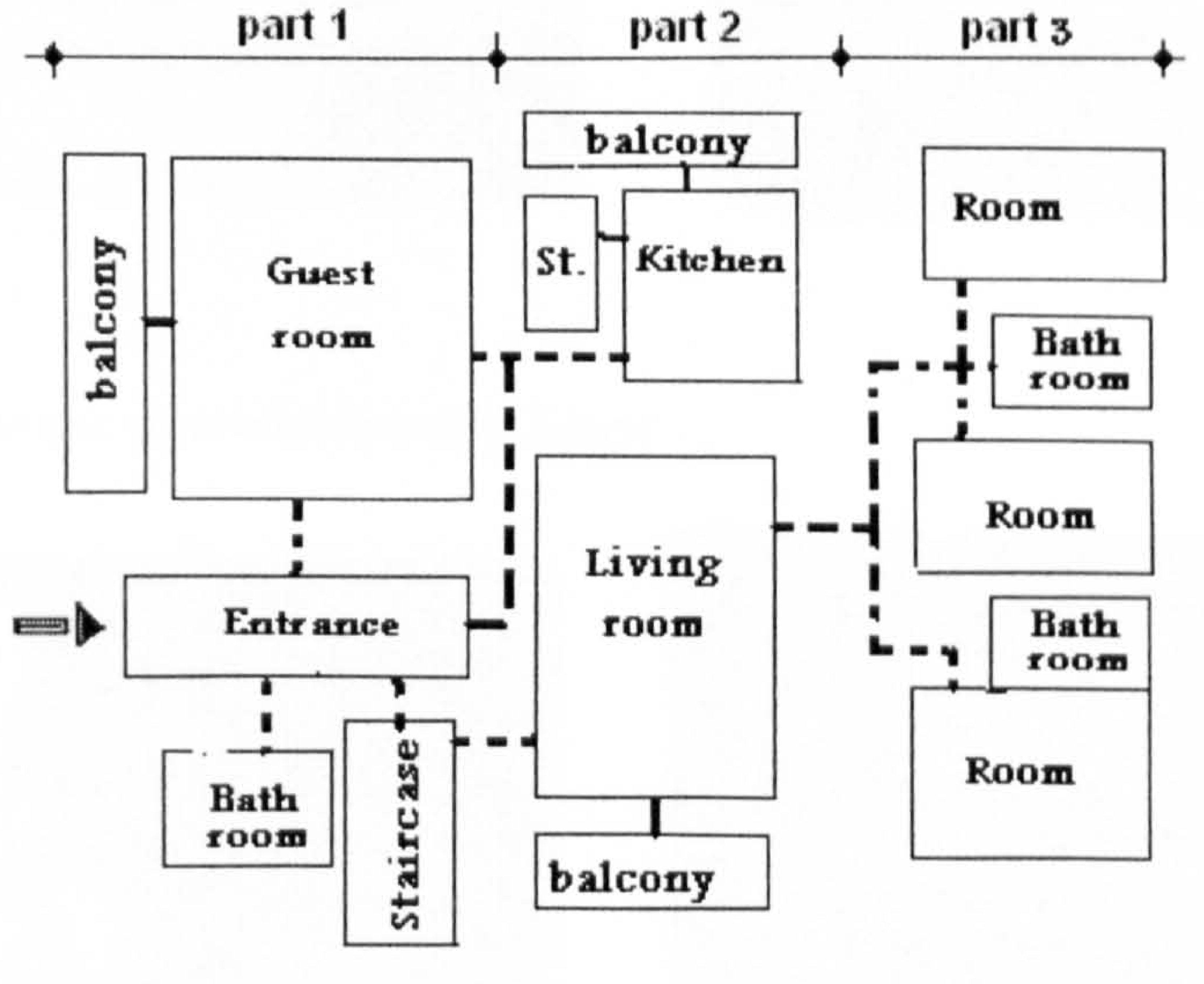
1) Concept of Traditional house:

The traditional house was manly divided into two parts see diagram



2) Concept of Contemporary house:

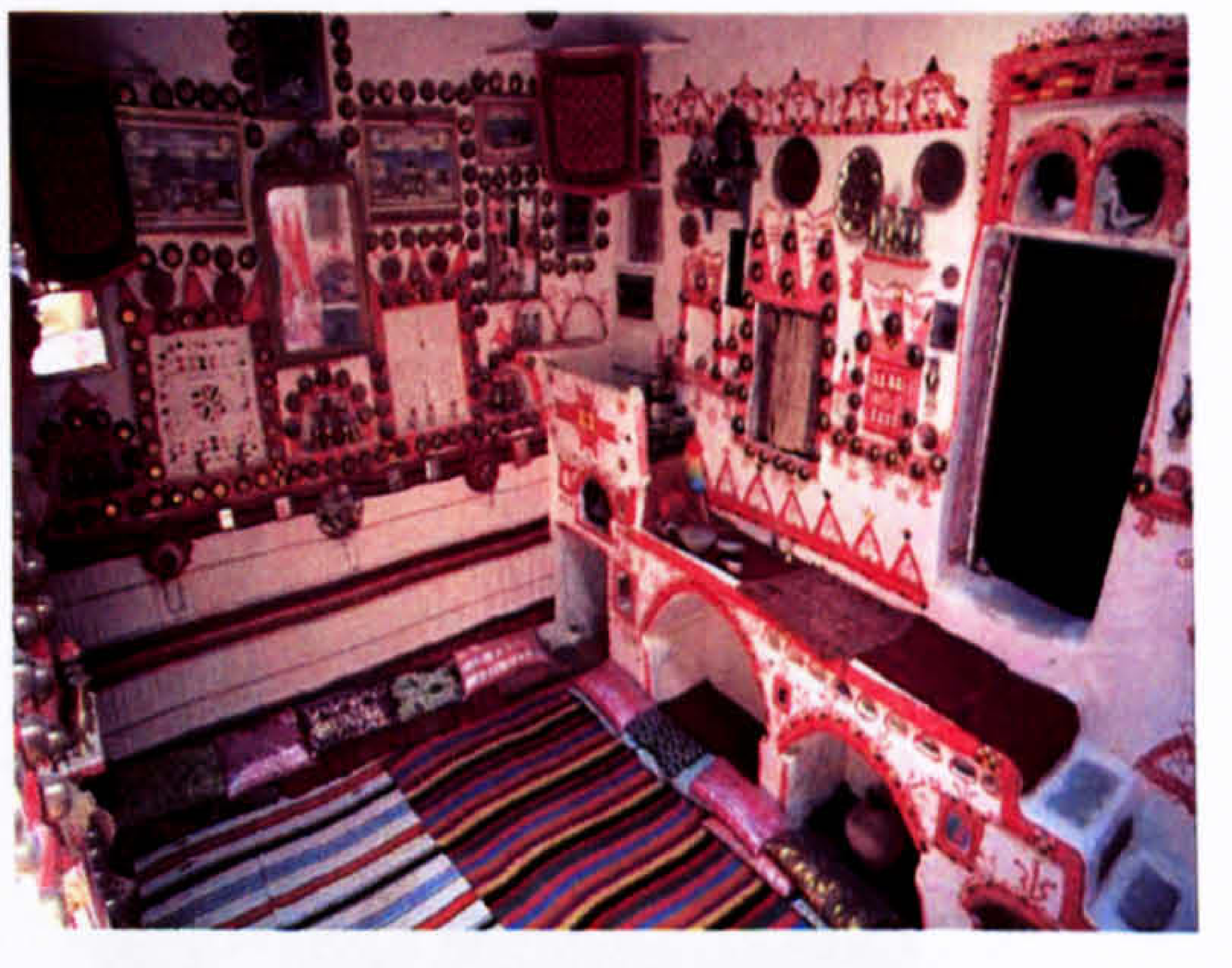
The contemporary house was manly divided into three parts see diagram



Furniture's

A) Interiors furniture in traditional house:

Interior pattern of room(hujar) shows Wooden platform or built-in "sedda" tripoli



B) Interior furniture in contemporary house

Western Salon used in modern house

Arabic Salon used in modern house

Façades

A) Type of façades in traditional house in Tripoli





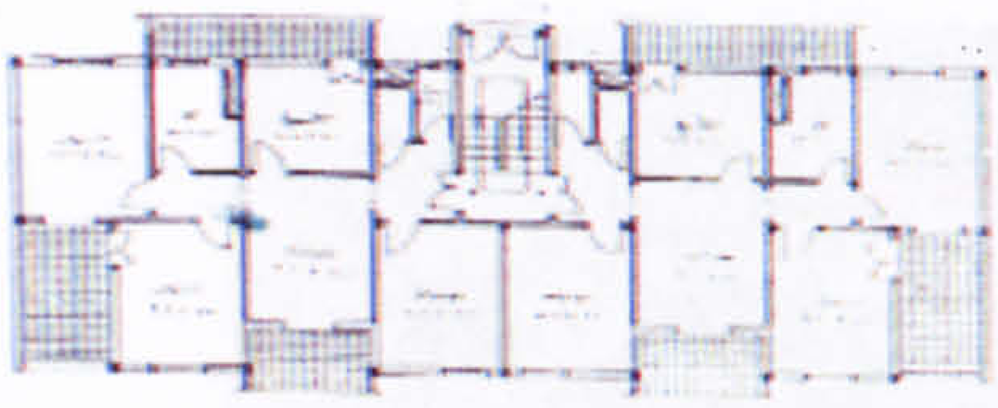
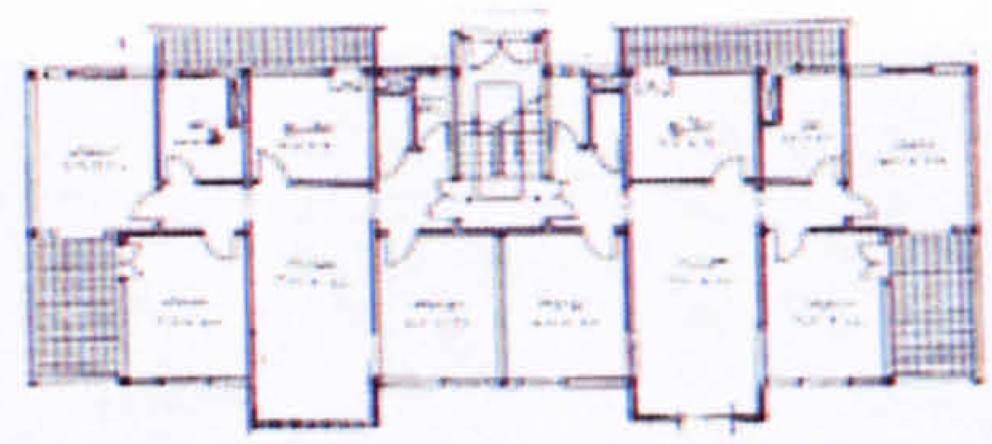

B) Types of Façades appearance during Italian period

This picture shows the appearance of new architectural elements such as balconies and large windows

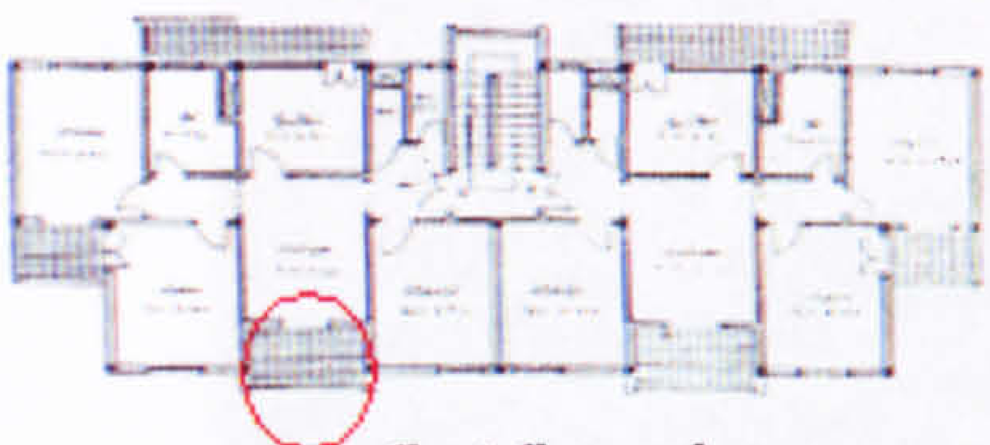
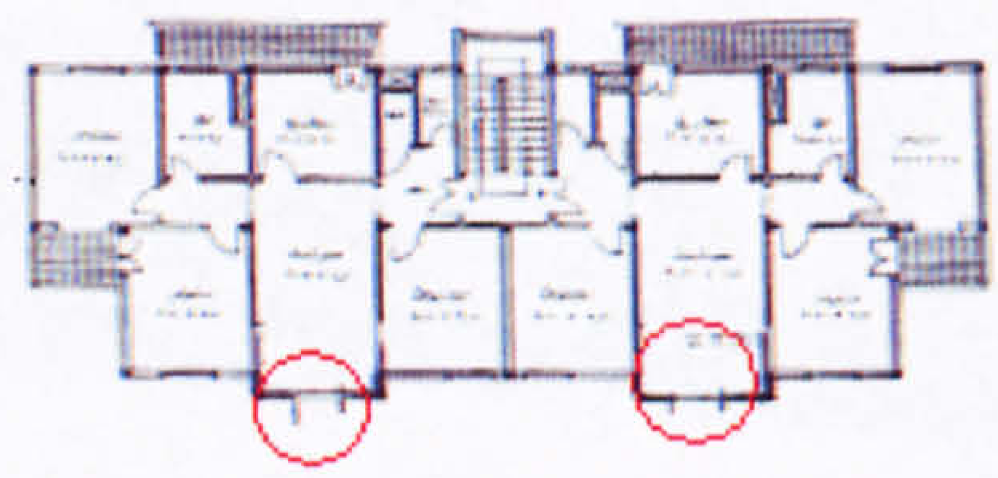
C) Types of Façades appearance during present (contemporary houses)

Modification, which made in oriental plan

1) Multi-story flats

Ground floor plan

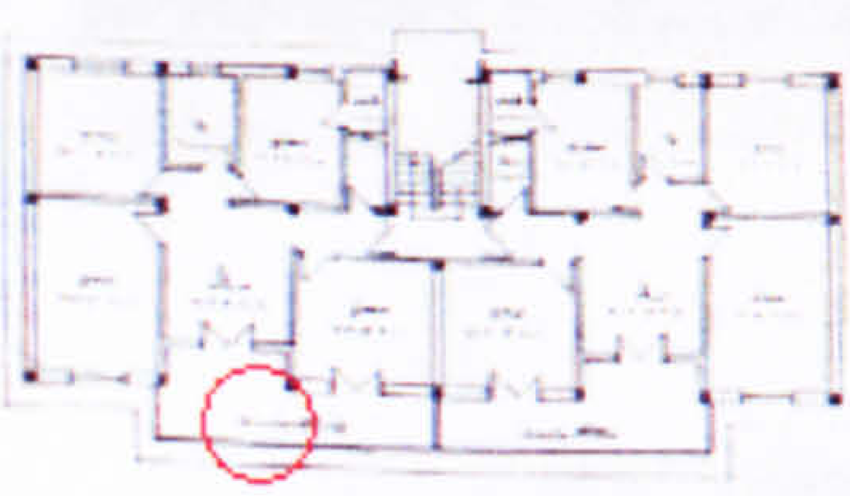
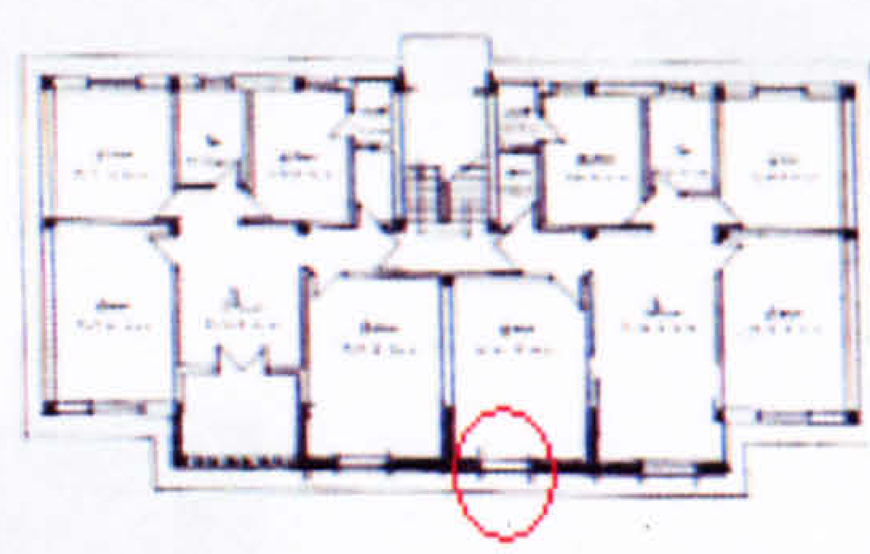



first floor plan

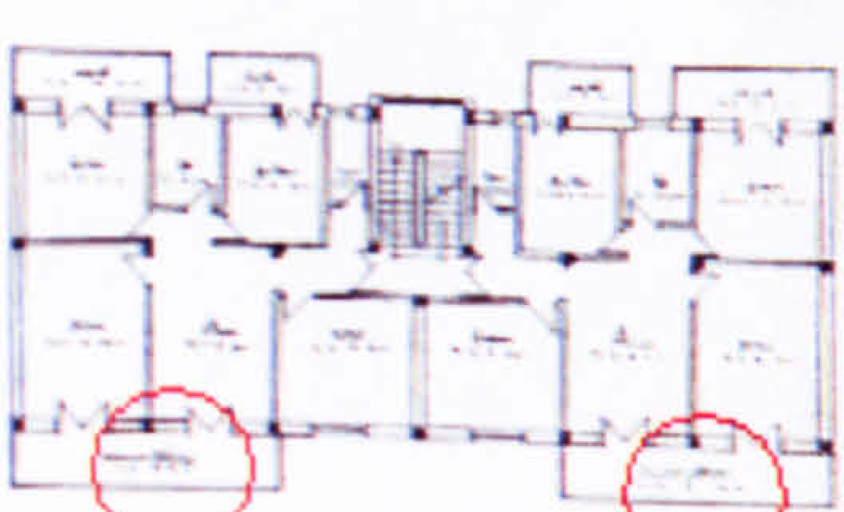
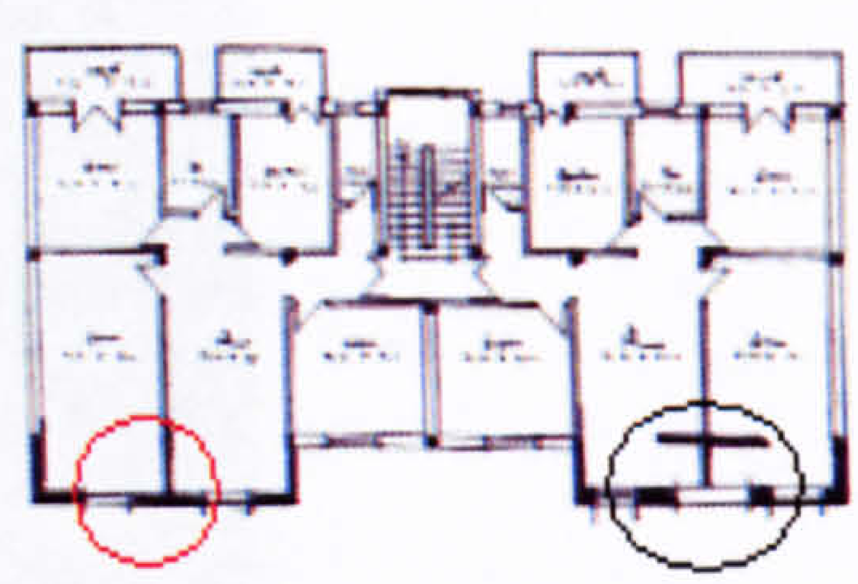

plan befor use

plan after used

2) Walk-up flats:

Ground floor plan

first floor plan


plan befor use

plan after used

3) Modification which made in Elevation