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M'zab community, Algeria, North Africa: Its planning and architectural aspects—past, present, and future

Solieman, Khalifa Ali, M.A.
The University of Arizona, 1988
M'ZAB COMMUNITY, ALGERIA, NORTH AFRICA:
ITS PLANNING AND ARCHITECTURAL
ASPECTS--PAST, PRESENT, AND FUTURE

by
Khalifa Ali Solieman

A Thesis Submitted to the Faculty of the
COLLEGE OF ARCHITECTURE
In Partial Fulfillment of the Requirements
For the Degree of
MASTER OF ARCHITECTURE
In the Graduate College
THE UNIVERSITY OF ARIZONA

1988
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This thesis has been approved on the date shown below:

Professor of Architecture
ACKNOWLEDGMENT

In the Name of Allah,
the Merciful,
the Compassionate

Many people have contributed to my education throughout the years. To them I am and will always be greatly indebted and may Allah bless and be merciful with them.

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ABSTRACT

This thesis is a report of a study of some aspects of the architecture and urban planning of the M'zab Valley communities of southern Algeria, North Africa. The interrelation of physical planning and religious/social structures of the communities of the M'zab Valley are explored.

This study was concerned with the following questions:

1. What are the various environmental factors that influence the design values of the M'zabites?
2. To what extent is the distinctive style of architecture in the M'zab due to religion: the Ibadi heritage or Islam in general?
3. How has the M'zab social structure responded to outside influences in recent years?
4. What is the present trend of the M'zab urban communities in architecture and planning?
CHAPTER 1

INTRODUCTION

To its adherents, Islam represents a complete way of life that encompasses all aspects of human thought and behavior. Islam's living covers both the spheres of private, personal relations and public social relations and activities. To protect and nurture their faith, early Muslim communities set out to establish their physical and social environments based on the guiding principles of Islam as found in the Quran (the divine revelation to Prophet Muhammad) and the Sunnah (the practices of the Prophet Muhammad). The Ibadis have always understood religion to be one unit in the political, spiritual, and legal aspects of life, all of which should be carried out simultaneously. Those of the M'zab Valley, Algeria, represent traditional Muslim communities that have applied the fundamentals of Islam to development of social institutions and to building the physical urban environment.

In relative isolation the M'zab Valley communities developed social and physical institutions that successfully dealt with the harsh physical setting of the Sahara Desert.

The advent of modern building technology, central government planning and economic programs, as well as outside influences have impacted the traditional institutional practices and urban form of the M'zabite communities.
This thesis explores the relationships between Islam and the environment and their impact on the establishment and organization of Muslim communities in the M'zab Valley with particular emphasis given to architecture and community planning. Organizationally, this thesis is divided into five parts.

The first part contains two sections. In the first, the concept of the Muslim communities are introduced through an analysis of the first Muslim communities of Mecca and Medina. The relationship of these first communities to the formation of other Muslim communities in the world are discussed with particular emphasis on the example of the North African M'zab Valley communities in Algeria. In the second section, the religious and social systems of Azzaba, Ashira, and Amstordan are defined.

The second part is also divided into two sections: First, the physical and urban community patterns of M'zabite winter towns, summer towns, and cemeteries are examined. In the second section, significant urban features of M'zabite architecture are discussed.

The third part is an analysis of the traditional centralized house with superimposed courtyard found in the ksour (winter towns) and orchards, the modified traditional houses located inside the ksour, and contemporary houses outside the ksour, followed by a brief comparison between the traditional houses and the modified and newly designed houses focusing on climate, building materials, construction techniques, and house spaces.
The fourth part is a brief comparison of the layout of the traditional M'zab community, recent settlements, and new zoning developments.

The fifth part is a conclusion arguing the theoretical implications of the study.
CHAPTER 2

M'ZAB COMMUNITIES IN NORTH AFRICA:
HISTORICAL DEVELOPMENT

The M'zab community is one of the Muslim settlements in North Africa established by the Ibadis (Ibadiya or Ibadiyah). The Ibadiya is one of the earliest Islamic sects, whose foundation goes back to the first half of the first century Hijri (672 A.D.) (Ennâmi, 1972).

Spiritual Development of M'zab Communities

The origin of the M'zab community can be traced to the first Muslim communities in Mecca and Medina. Its establishment followed the example of Mecca, Medina, and other communities that have influenced every Islamic settlement established later, and through their influence to the same patterns found in other early Muslim communities. Examples such as Basrah, Kufa and Baghdad in Iraq, Damascus and Aleppo in Syria, Fustat in Egypt, and Qairiwan in Tunisia also show their influence in northern Africa (Figure 1). The M'zab communities have been particularly influenced by the earliest Islamic communities, especially by the Medina community.

The Medina Community

During the year 622 A.D., Prophet Muhammad (Peace be Upon Him [PBUH]) was commanded by God to migrate from Mecca to Medina. The migration (al-Hijrah) was a result of the hostility toward the faith
Figure 1. Location of early Muslim communities
from the Meccan Quraish. Prophet Muhammad (PBUH), the leader, and his companions established the first Muslim community in Medina by making brothers of those who were migrating from Mecca (the Muhajirs, al-Muhajirun) and those helpers who were already in Medina (the Ansar, al-Ansar). Yusuf Ali (1977, p. 434) commented on those who came from Mecca:

In Mecca the little Muslim community was not only fighting for its own existence against the Meccan Quraish, but for the very existence of faith in one true God. They had as much right to be in Mecca and worship in Ka'ba as the other Quraish, yet they were exiled for their faith.

The idea of brotherhood became the nucleus of the Medina community.

This is very clearly stated in the Holy Quran (S.LIX. 8-9) as translated by Yusuf Ali (1977, p. 1523):

(Some part is due) to the indigent Muhajirs, those who were expelled from their homes and their property, while seeking Grace from God and [His] Good Pleasure, and aiding God and [His] Apostle, such are the sincere ones; -- But those who before them, had homes [in Medina] and had adopted the Faith, show[ed] their affection to such as came to them for refuge, and entertain[ed] no desire in their hearts for things given to the [latter], but give them preference over themselves, even though poverty was their (own lot). The covetousness of their own souls, -- they were the ones that achieve prosperity.

The intent of the Medina community was to establish a neighborhood of people whose concepts, ideas, criteria, regulations, rules, manners, and values were and are all derived from Islam. This plan, a basis of the Muslim community, has been carried throughout Muslim history. The M'zab community is no exception.

The example of Medina provided very strong guidelines for all Muslim communities. The M'zabites understood those guidelines and
established their community according to them. The most important elements of those guidelines are summarized as follows:

1. The establishment of the mosque as a place of worship in the center of the Muslim community to create a place for most of the community activities. It is a place of worship, a place for discussion of all major and minor community problems, a meeting place, and a center for teaching the faith of Islam.

2. The establishment of a new relationship among the people in which they would be united in the tie of brotherhood. This measure was to provide a cohesive and pleasant life for the entire community.

The Influence of Basrah

The line of development of the M'zab communities can be traced from Medina through the City of Basrah in Iraq. Their development follows the first intellectual extensions of Islam as is stated by Ennâmi (1972, p. 48):

The development of the Muslim community, and its rapid expansion, created new centers in which groups of the companions settled [the companions of the Prophet Muhammad (PBUH)]. One of the major centers was the city of al-Basrah which was established during the caliphate of 'Umar b. al-Khattab as a military base and soon became one of the intellectual capitals of Islam.

The organization of the Ibadi communities started from Basrah, which was the center of the Ibadi movement until the end of the second century. The reasons for this were also documented by Ennâmi (1972, p. 61):
a) The religious leaders of the movement lived in Basrah and carried out all their educational activities there.

b) In Basrah the movement gained full support from the large number of Jabir's kinsmen of al'Azd, and their leading family of the Muhallabids (Jabir Ibn Zaid, the Imam, and the Mufti, and the man who was responsible for the development of formal legal Islamic opinions of the Ibadya).

c) Basrah was one of the intellectual capitals of Islam forming, besides Kufa, the cultural centre of Islamic and Arabic studies.

d) Finally, Basrah was in the centre of the Muslim countries of Asia, a fact which made the contacts easier between the centre of the movement in Basrah and the other branches of Khurasan, "Uman, Yemen, and Mecca."

The companions of the prophet and their students were urged to teach people the Islamic religion. The new generation of believers, called al-Tabiun, became the missionaries of the religion. The first of the Ibadi missionaries was sent from al-Basrah to North Africa. In discussing the missionary work and its purpose, Ennâmi (1972, p. 61) stated: "In Basrah, the Ibadi organization with the leadership of Abu 'Ubaidah and the council of the Shaikhs carried out the responsibility of forming the policy of the movement and preparing learned men for missionary work to be sent all over the Muslim countries." One of these missionaries of Basrah went to North Africa in order to study and establish new communities. The M'zab communities are the result of the missionary work (Figure 2).

Physical Structure of the M'zab Valley Communities

After the year 856 A.D., Tihart, one of the most important centers of the Ibadis in North Africa, became very weak because of political
Figure 2. Religious origins of M'zab
and economical reasons. As a result, Ibadis from different areas of North Africa moved to the M'zab Valley area, located on the northern edge of the Sahara Desert, to establish their own communities (Muammar, 1979). Some of the political and economic reasons for the movement were,

1. Politically, the Ibadis desired to isolate their communities in order not to be influenced by the divergent opinions arising at that time.

2. Economically, Tihart was affected by the limitation of cultivated areas and by environmental factors common to the desert, sand, and windy areas around Tihart and Ouargla.

Accordingly, the Ibadis isolated their communities to ensure the security of their plans and so outside influences could not affect them. These desires encouraged them to look for other more secure places in the Saharan desert.

The people from various North African Ibadi communities migrated south into the areas called Badiat Musab (M'zab) and Chebka (Net), located in the southern part of Algeria which includes the northern part of the Saharan desert. The areas are about 210 miles south of Algiers (Figures 3 and 4).
Figure 3. Location of the M'zab region
Figure 4. Location of M'zab Valley communities
CHAPTER 3

THE RELIGIOUS AND SOCIAL STRUCTURE OF M'ZAB

Councils (al-majlises) were created to exercise control over religious, social, and educational activities. The idea of the majlis appeared first in the major Islamic center of Basrah in Iraq and consisted of:

1. Council of the leaders (shaikhs), concerned with the religious, political, social, and economic problems,
2. Council for the teaching of general religious subjects,
3. Council for preparing the missionary work.

This organization was transferred into the M'zab Valley communities in the form of religious and educational councils (Azzaba majlises) and social councils (Ashira and Amstordan majlises).

In order to survive, these communities had to focus on two goals. The first was how to practice Islam without change and interruption to their social life. The second was to protect people from the hostile environment of the Saharan desert.

The majlises are discussed in this chapter, focusing their impact on the planning principles of the community and the physical environment. Their relationships with each other are discussed to illustrate how the practice of Islam was protected from outside influence.
The Azzaba System

The Azzaba system was founded by the knowledgeable people (ulama) of the Ibadis between 1286-1386 A.D. to practice the teaching of the Quran and the traditions of Prophet Muhammad (PHUH). This system was known as the Azzaba circle (Halgat al-Azzaba) and grew into one of the key organizations of Ibadi culture. Its ideas spread across the Maghrib (Libya, Tunisia, Algeria, Morocco, and Spain) showing its greatest strength in the Jabal Nufusa, Jerba, Wadi Erg, and the M'zab Valley (Figure 5). This system was adapted to the various areas with the addition of new regulations and procedures.

The Azzaba system was the form of self-regulation chosen by the Ibadi communities of North Africa. Its central principle was that all levels of society must function as a unit working toward the same goal. Each M'zab community had its own council (majlis) headed by a leader (shaikh). In turn, the leaders formed a higher Azzaba council headed by a leader. Selection to the Azzaba councils and to the positions of leadership was based on mutual consultation and agreement (Muammar, 1979).

The Azzaba of M'zab

The organization of the Azzaba system in M'zab was unique in a number of ways (Muammar, 1979).

1. The Azzaba majlis in the M'zab Valley could meet under any circumstance because of the close proximity of the communities. This is in contrast to the Jabal Nufusa in Libya where great distances separated the Azzabas from the central Azzaba.
Figure 5. Location of major Azzaba center
2. There was a separate majlis for women (Temserdan) that was concerned with women's problems. This majlis helped the Azzaba majlis in dealing with internal family problems.

The Azzaba majlises (men and women) were considered as one family which supervised and served the major and minor problems and needs of the entire community. These Azzaba majlises made sure that people in the community applied decisions that concerned morality, customs, and religion as well as the law. They also concerned themselves with the innovation of building on graves, which is prohibited in Islam; moral problems such as prostitution, alcoholic drinking or gambling, which were associated with and due to the French occupancy of Algeria; and internal and external fighting.

There were other systems very helpful to the Azzaba majlis such as Ashira, Amstordan, and Temserdan, which were also concerned with the domestic affairs of the community.

**The Ashira Majlis of M'zab**

Ashira, which means clan, kinfolk, or closest related tribe, consisted of many families (extended families) that were connected by kinship relations (garaba) between relatives on the maternal side. Also, there were other relationships called associations. These were concerned with social relations, social intercourse, companies, companionship and closeness. The most important of these were the religious connections that could be found in addition to the other ties previously mentioned. These kinds of ties have been mentioned in the Holy Quran (S.IV. 36) as translated by Ali (1977, p. 191):
Serve God, and join not any partners with Him, and do good to parents, kinsfolk, orphans, those in need, neighbors who are near, neighbors who are strangers, the companies by your side, the way-farer (ye meet) and what your right hand possess. For God loveth not the arrogant, the vainglorious.

Each Ashira had its own majlis who was responsible for the social problems that occurred inside the Ashira. These Ashira majlises were concerned with the care of orphans, widows, and incompetents. Also, they were concerned with collecting and organizing money (nafaqat, zakat, and mirath) to be given to the needy and poor families (Muammar, 1979).

The Amstordan of M'zab

The purpose of this system was to act as a police and military organization to monitor public safety, protection and supervision of public construction such as dams, mosques, and other buildings and structures. Also, they organized voluntary services, collected money, distributed to the charities, protected the society from crime and offered protection from internal and external problems. Finally, it worked as a combined security police, the boy scouts, and emergency and fire authority. The Amstordan's work paralleled the Azzaba and Ashira for the benefit of keeping and looking after the community's organization (Muammar, 1979).

The Impact of the Systems on the Urban Form

To study the three systems of Azzaba, Ashira, and Amstordan is very important to understand their function and impact on the urban form of the community and on the daily life of the people.
The Azzaba in M'zab and other areas enabled people to practice Islam as a way of life that is considered the most important function in establishing their communities, and to protect their communities from change and foreign influence. This point has been made by Ennâmi (1972, pp. 245-246):

As Ibadis have always lived in simple remote communities their laws were affected very little by changes of environment or time, and remained in their original form. Ibadis always tried to live according to the divine law, and to adapt it wherever they were and at all times. Special rules for the different stages of politico-religious situations were formed at an early stage according to which the Ibadi community had to maintain its existence.

The influence of social organization on the urban form is evident in M'zab. Following the examples set by the early Muslim communities, the Azzaba majlis started the physical planning of the community by laying out the mosques. Beginning the urban form, the Azzaba majlis of each new town first chose the location of the central (Azzaba) mosque. This mosque was the reference landmark for the Ashira councils in laying out their own local mosques and neighborhoods.

The Amstordan organized the voluntary labor for the actual construction of the mosques and other public works such as the defensive structures, public wells, and roads. Figure 6 schematically demonstrates the influence of the Azzaba and Ashira on the urban form as manifested in the establishment of the central (Azzaba) and local neighborhood (Ashira) mosques.

The Azzaba and Ashira majlises also organized the building and planning codes of the community. Certain community building issues were set by the Azzaba and Ashira assemblies to maintain privacy and
Figure 6. Influence of Azzaba and Ashira on the urban form
protection. Other community needs under their jurisdiction were the building of walls, towers, ramparts, and gates around the community; building palm-grove walls, towers, and dams, and the construction of public buildings and roads. The individual house was also a primary example of a community building issue. The Azzaba and Ashira understood that one of the most important aspects was how they dealt with people and how neighbors dealt with each other in constructing a building where there were no master plans or municipal codes. They succeeded in convincing the neighbors to follow unwritten rules in building their homes. Some of these rules became customary and were followed by everyone in the community. A summary of these rules, which were adopted in the M'zab communities as well as in other Muslim communities, were as follows:

1. Construction of the house was carefully oriented toward east and south so as not to cast shade on an immediate neighbor.

2. It was not permitted for anyone to be able to see inside his neighbor's house from outside openings or from the roof. Passers-by were not permitted to view into private spaces of the home. According to this custom, windows were usually located above eye level and kept very small. Exterior doors did not face each other and the doorway was designed so that each house had a bent entrance with two doors that prevented a direct view to the inside from the street.

3. The roof tops were surrounded by parapet walls to ensure privacy between one house roof and another. An exception
was made for women: In certain areas of the roof, low walls or small openings through the walls were used by women to visit their neighbors without being seen by men. These low walls or openings, sometimes with steps, were used as a path system for women's activities. This reinforced the separation for women of private activities from public activities.
CHAPTER 4

GENERAL SITING AND CHARACTERISTIC URBAN FEATURES OF THE M'ZAB VALLEY COMMUNITIES

M'zab Valley communities exhibit a consistent overall urban pattern made of the same three elements: fortified winter towns (ksars or ksour, pl. of ksar), summer towns or oases (wahat, pl. of waha), and cemeteries.

The basic visual organization of these communities followed the terrain: the white buildings of the ksars were laid out on high ground, the valley contained palm groves which sheltered the summer dwellings, and the desert areas contained the cemeteries (Figure 7).

The most distinct feature of these M'zab Valley communities was the separation between the ksars and the wahat. This separation reflects the seasonal movement of human activities between the hot urban areas and the lush green cultivated areas (Figure 8).

Winter Towns

The ksars are a typical feature of fortified North African communities. The M'zab Valley ksar, however, developed its own unique organization (Figure 9). The M'zab ksars diverged in plan from other North African ksars in that the ksar was located on a hill, the town layout followed natural topography, the Azzaba masjid occupied the highest ground, and the open market was located either outside or immediately within the walls.
Figure 7. Visual organization of Ghardaia, a M'zab Valley community
Figure 8. Ghardaia, Beni-Isguen, Melika, Bou Noura, and El Ateuf winter towns and their summer towns (oases).—From Roche (1969, p. 44).
Figure 9. Comparison of forms and sitings of the ksars in North Africa
The winter towns of Ghardaia, Beni Isguen, Melika, Bou Noura, and El Ateuf were located on hills by the Azzaba people for the same reasons.

1. Conceptually: The Azzaba always chose the highest point of the hill on which to build the mosque, which was considered a power structure of the Azzaba. They also chose such sites for defensive purposes. The ksars were densely clustered and compactly planned to serve the purpose of fortification for the Azzaba people and to control and protect the privacy of the M'zabites.

2. Economically: Town sites in the M'zab Valley were used as efficiently as possible by locating high densities of buildings and cemeteries on rocky and sloping sites, reserving fertile valleys for farming.

3. Environmentally: The sites as well as buildings were designed to protect human beings from the harsh and inhospitable desert regions. Also, the high location protected inhabitants from flooding of the wadi of M'zab.

The ksars of the M'zab Valley have the same major physical elements of the other Muslim settlements. These are the masjid, open markets, cemeteries, and summer towns (Figures 10 and 11). Their inter-relationship is shown in Figure 14 (p. 33).

Worship Places

The Mosque (al Masjid). The term is derived from one of the acts of praying (sujud) which is considered the noble prayer action
Figure 10. El-Ateuf community layout, showing major physical elements typical of M'zab Valley communities.
Figure 11. Interrelationship of M'zab Valley community physical elements
while praying. The masjid is a place for solitary worship of God (Allah). It is built to practice the five daily prayers and the Friday prayers and other community meetings and teachings. The central requirement features for a mosque are shown in Figure 12.

**Prayer Area (al Musalla).** The term musalla is derived from the act of praying (salat). The musalla is a place to worship Allah alone and is used for the annual prayers (Salat al-Eidain) and rain prayer (Salat al-Estisqa).

The definitions of the mosque and the musalla do not suggest a specific geometric form. However, the following diagrams (Figures 12 and 13) illustrate the spatial relationships of the worshipers to each other and the direction (kibla) of the mosque and musalla to the ka'ba in Mecca.

**Planning**

The most significant feature, physically, psychologically, and spiritually of Muslim community organization begins with the building of the first place of worship. In the Medina community this place was in the form of a house built by the Prophet and his companions. The community was started around this multipurpose space which was a place of worship, a shelter for the poor and visitors, and a place of economic, social, and moral activities. Kuban (1974, p. 3) described this as follows:

After Muhammad arrived in Medina, a simple house of mud brick on a stone foundation was built for him and his family. Opening onto the courtyard there was, to the North, a shelter, zolla, built with palmtree trunks which supported a roof of palm leaves and mud. And 'one could touch the roof with one's hands.' The zolla was used as a place for prayer (Figure 13).
BASIC REQUIREMENTS:
- Prayer Hall
- Mihrab
- Parallel rows
- Separation between MEN & WOMEN

Figure 12. Layout of typical prayer area; required features
Figure 13. Layout of Prophet Muhammad's mosque in Medina
In the earliest Muslim communities, the masjid was the first building to be laid out (Figure 14). Al-Hathloul (1981) reported on mosques in the communities of Kufa, Basrah, Fustat, Baghdad, and Sammerra, and stated that in al Basrah, "the first khittah planned was the mosque, then the dar al-imarh, which was originally located some distance from the mosque" (p. 35). In al Kufa, "the first element to be laid out was the mosque. They marked out an area surrounding it which took the shape of a square platform, which he later called sahn, with the mosque in the middle of it" (p. 36). In al Fustat, "on the laying out of the town, it was reported that when the decision was made to settle there, Amr undertook the laying out of the congregational mosque and designated the area surrounding it as the suq" (pp. 37-38).

Also, the circular city of Baghdad, founded by the Abbasid Caliph, was divided into three parts. The first part at the center of the city consisted of the congregational mosque and dar al-imarh. Subsequent to the central part were the residential quarters, with the military quarters near the walls (Figure 15) (Al-Hathloul, 1981, p. 16).

The simple multipurpose structure of the early Muslim community masjids with their central location was followed in the M'zab Valley. This symbolized the M'zabites' belief that the Islamic religion directs life in all its aspects and activities based on Islamic principles and teaching.

1. The masjid plays a major role in shaping the life of the people, so its importance is always felt.
Figure 14. Schematic land-use pattern for early medieval Arab city shows the mosque in the middle of the city core.—From Ismail (1969, p. 177).
Figure 15. Baghdad, the round city of al-Mansur
2. The second factor is related to the life of the community. The behavior of the people is filled with religious commitment and the masjid is at the center, the source of this essence of behavior.

3. The masjid is considered a multipurpose institution from which the religious school (madrasa) emerged. The judicial affairs, planning, legislation, and education also are placed in the masjid.

The masjid served as a center of activities in all fields: intellectual, moral, educational, cultural, architectural, and social. It was in the masjid that preparation and plans were made for the major events in the life of M'zabites. Membership of the Azzaba, Ashira, and Amstordan assemblies, which were formed to support the role of the masjid, was selected in the masjid. Also, from the Azzaba masjid, legal opinions (fatwas) were delivered to meet the problems which confronted the people in M'zab and which affected their relationships with the outside world. The Azzaba of M'zab made use of the mosque as a place of worship, as a place to learn the teachings of the practice of Prophet Muhammad (PBUH), and the place of community organization.

The M'zabite Masjid

The Azzaba Masjid. The Azzaba of M'zab plan and build their masjids visible to the entire community. Because the people must be called together at the appointed times (five times a day), the mosque has to be located so that the call to the prayers (adhan) can be heard
by all. The Azzaba minaret, with its triangular perforation on its corners, at the highest and central point in the community, fulfills this requirement. It also satisfies the requirement that the masjid be seen by the people while they are going to pray in the Azzaba masjid (Figure 16).

The Azzaba masjid of M'zab occupies the most accessible and dominant position. The members of the Azzaba or the Halgat (circles) usually built their homes around the mosque. The other citizens built their dwellings within the community following the same pattern. This pattern is due to the responsibilities of the Azzaba members which makes it preferable for them to settle around and near the mosque. Each of them has particular responsibilities, the Muazzin calls for prayer, the Imam directs it, and others are in charge of the Azzaba institution. This reflects the importance of the Azzaba institution which represents the spiritual center of the city.

Accordingly, the first urban form of the community was usually indicated by the religious council of Azzaba. When the town population had sufficiently increased, new walls and areas were developed. The new developments were usually in close proximity to the first Azzaba masjid built in each community (Figure 17).

The form of the Azzaba masjid is generally two stories high. It is divided into two sections according to male and female activities separated both horizontally and vertically (Figure 17). The activities in each section are very similar. Such separated elements are entrances, prayer halls, ablution and toilet rooms, staircases, and utility rooms.
Figure 16. Pattern of building layout shows the relationship of M'zab mosque (Azzaba masjid) to the entire community.—From Ravereau (1981, p. 254).
Figure 17. Conceptual form of typical Azzaba masjid
The courtyard is in the middle of these elements and serves as a buffer zone which further separates male activities from female activities (Figure 17).

The Ashira Masjid. The form of the Ashira masjid is mainly one story high. It is usually found inside the Ashira neighborhoods and near the cemeteries. Sometimes the Ashira occupies one or two houses, beside the masjid, which provide for the Ashira activities. Some of these masjids have minarets and some do not. Some of them have separate elements for male and female activities and some do not (Figures 18 and 19).

General Characteristics of the M'zabite Masjid

The M'zabite masjids are characterized as follows:

1. Very simple forms which usually follow the topography.
2. One or two stories in height.
3. Roofs which are used for summer activities, prayers, teaching, and meetings.
4. Very simple minarets with triangular perforations on their corners.
5. No decorations inside or outside.
6. Building adapted to the hot and dry climate by using the courtyard idea or underground shelter ideas.

Movement Systems Related to the Masjid

The unity of the circulation system and the motion of the M'zabites in the community can be discussed on four levels (Figure 20).
Figure 18. Ashira masjid in Bou Noura.—From Didillon et al. (1977, pp. 240, 242-243).
Figure 19. Elevations and sections of Ashira masjid in Bou Noura. From (a) Ravereau (1981, p. 107); b. Ravereau (1981, p. 152); c. Didillon et al. (1977, p. 244).
Figure 20. Levels of motion
The establishment of the mosque as the first element in the community helps the individual integrate his daily movements into the core of the community.

The second level is the establishment of the Friday mosques where relationships between the religious activities and other business activities are very clearly stated in the Holy Quran (S.LXII. 9:10-10) and translated by Ali (1977, p. 1548):

Oh Ye who believe when the call is proclaimed to pray on Friday (the day of assembly). Hasten earnestly to the remembrance of God, and leave off business (and traffic): that is best for you if ye but knew. And when the prayer is finished, then may ye disperse through the land, and seek of the bounty of God: and celebrate the praises of God often (and without stint): that ye may prosper. But when they see some bargain or some amusement, they disperse headlong to it, and leave Thee standing. Say: "The (blessing) from the presence of God is better than any amusement or bargain! And God is the best to provide for all needs."

The third level is the establishment of prayer places found in each community which are used for the minor feast (Eid al-Fiter, the feast of breaking the Ramadan fast), the major feast (Eid al-Adha, the feast while pilgrims perform Haji in Mecca), and the rain prayer (Salat al-Istisqa). These open places, temporarily used for prayer, could be the largest mosque courtyards, open market courtyards, or completely open areas which could also be used for sports activities. In M'zab, the musallas are in open areas outside the community. Most of them are paved and are connected to the cemeteries (Figure 21).

The path system for this level begins from the home. The movement of people starts from their homes and moves toward the neighborhood mosques where people gather and prepare themselves to move as
Figure 21. Example of musallas in Beni-Isguen.--From Ravereau (1981, p. 257).
one group toward the musalla in order to pray the Eid prayers and to listen to the sermon. This hierarchy and ceremonial movement pattern affects the street system of the community. It requires wide streets that connect such activities with the neighborhood mosques to be spacious and convenient for the people moving in groups.

The fourth level is determined by the orientation of the mosque and musallas toward Ka'ba, which is considered the center of the Islamic world. The Ka'ba, a special cubic building in Mecca, is the focus of the direction, and the mihrab of every mosque is aligned with it, and to it every Muslim turns to pray (Figure 22).

The sacred mosque in Mecca, where the Ka'ba forms the center, is the most important place of worship in Ka'ba. This meaning is given to it by the Holy Quran (S.II. 149-150) as translated by Ali (1977, p. 60):

> From whencesoever thou startest forth, turn thy face in the direction of the Sacred Mosque; that is indeed the truth from the Lord. And God is not unmindful of what ye do. So from whencesoever thou startest forth, turn thy face in the direction of the Sacred Mosque; And wheresoever ye are, turn your face thither: that there be no ground of dispute against you among the people, except those of them that are bent on wickedness; So fear them not, but fear Me; and that I may complete My favour on you, and ye may (consent to) be guided;

And also it is given to it by the Holy Quran (S.XXII. 27) as translated by Ali (p. 857): "And proclaim the pilgrimage among men: They will come to thee on foot and (mounted) on every kind of camel, lean on account of journeys through deep and distant mountain highways."

The importance and the spiritual meaning of this orientation was expressed by Kuban (1974, p. 11):
Figure 22. Sacred mosque and ka'ba in Mecca.—Shows circular pattern of Muslim's lining around ka'ba in Mecca during Hajj.
Among the three most venerated mosques of Islam (the sacred mosque in Mecca, the prophet's mosque in Medina, and Aqsa mosque in Jerusalem), the most important is al masjid al-Haram in Mecca. Although it has no special architectural quality, the sacred objects and relics such as the Ka'ba, the so-called Maqam of Ibrāhīm and Zamzam-well which it contains have necessitated the addition of annexes to serve the requirements of the annual pilgrimages.

One of the main points of the pilgrimage is to keep Muslim communities linked together, and also to maintain the distinctive features, entity, and sense of unity among Muslim communities all over the world.

The Open Market

The market (suk) in the M'zab Valley mainly consists of an open area (courtyard) surrounded by shops of two-story height with front arcades (Figures 23, 24, and 25). Open markets of the M'zab are equipped with cement benches in the center of the courtyard for the buyers to sit on. They are also equipped with wells to provide water (Figure 26).

The open markets of M'zab are considered one of the largest gathering places for the male population. They are also the only places for open public activities. As a result, the open markets are carefully and strategically located. They are usually found at the boundaries of the ksour near the walls.

The M'zab communities depend on the exchange of goods and information between the M'zabites and outside neighbors. These activities are dependent on the placement of the open market which should be located near the ksar walls. This reduces community exposure to nomads and strangers, who come to buy and sell and might enter the
Figure 23. Typical layout of M'zab open market
Figure 24. Ghardaia City plan showing the open market.—From Didillon et al. (1977, p. 152).
Figure 25. Ghardaia open market. --From (a) Didillon et al. (1977, pp. 174-175; b. Roche (1969, p. 36).
Figure 26. Cement benches and public well
community of the inhabitants. The inward private life of the urban com-
munity is not to be interrupted by the public gatherings.

The open market works with the Azzaba and Ashira public
places as a locale where general meetings and community festivals take
place, differences between people are discussed, and stories and news
of wars and battles are heard. It is only during the festivals that the
entire M'zab community, including women, attends the gathering in the
suk. Separation of the sexes is achieved by having the men sitting at
ground level in the courtyard while the women sit on the roofs of the
shops (Figure 27). In this way, the women can watch the festival with a
sense of privacy. Also, at this time, certain streets in the community are
reserved for women's pedestrian circulation, in addition to the roof paths
which are strictly reserved for women's activities (Figure 28).

Comparing the open market of the M'zab with those of other
Muslim cities, three significant factors are found. First, the M'zab
open markets are usually located on the boundaries of the community
near the outer walls. This idea is very different from the idea of hav-
ing the suks occupy the central part of the city.

Second, the religious concept of the organization of the suks
in both M'zab and other Muslim cities is very similar. The Muhtasib
works in the Muslim cities as a governmental authority in charge and he
is responsible for maintaining the suk's order, for supervising and en-
suring quality of the merchandise, and seeing that the process of buy-
ing and selling within the suk follows prescribed religious principles
and orders. The Azzaba majlis, with the help of the Ashira and the
Figure 27. Separation of women from men during the ceremonial activities during Festival Day in Ghardaia.—From Roche (1969, p. 54).
Figure 28. Women circulating at the Ghardaia festival.—From Ravereau (1981, p. 258).
Amstordan majlises is involved in the activities of the suk as well as in its organization. These majlises are responsible for setting the exact time for buying and selling, arranging the festivals in the suk, and supervising the quality of goods inside the suk. For example, the shops and other display areas of goods in the M'zab open market remain open all day during the week except on Friday, when the people gather in the mosque answering the Friday prayer call. At least one hour before and after the prayer call, the entire open market remains empty of business.

Third, the women's buying and selling activities in the M'zab usually take place in private houses, or near the walls in public spaces, which are reserved for women's activities and are supervised by the Ashira and Azzaba majlises.

Summer Towns

The summer towns (oases) of the M'zab Valley represent a balanced place of shelter within a harsh, dry, hot, and inhospitable environment. The summer towns mainly consist of palm tree orchards that are divided into neighborhoods or small family conglomerations. The orchards of date palms spread along the wadi of the M'zab Valley and form the basis of the M'zabite's economy (Figure 29).

Each ksar has its own summer town (Figure 8). Each summer town has its own orchards which are usually surrounded by very thick walls. The walls, used for circulation, sometimes contain small hidden guard towers (Figure 30). Most of the M'zab Valley orchards have summer houses. Some of the orchard summer houses are similar to the
Figure 29. Relationship of the ksar and the orchards (summer town)
Figure 30. Circulation walls within the orchards
urban houses of the ksar (see subsequent chapter on the traditional M'zabite house), while other orchards have rural houses that consist of a number of rooms surrounded by a wall.

The combination of the orchards and the ksour presents a lifestyle and a source of pleasure for all the M'zabite families. In summer they appreciate living in the orchards more than in the ksars, while they appreciate living in the ksars during the winter. M'zabite activities differ according to these two seasons. In the summer, the ksour remains silent and most of the M'zabite families leave the ksars to go to the orchards. There they help with the cultivation, harvesting of dates, and channeling of water into the cultivated area. They also enjoy a sense of coolness, of water, air, sun, and the moonlit nights. In winter, the whole family stays in the ksour except the old family people and servants who remain working in the orchards. This is because of need for children's schooling and the need to maintain places of work, shops, and other businesses. Only on Fridays and holidays does the family join the old parents in the orchards to help them and bring them some of their weekly necessities from the ksars. Only the families who have no agricultural areas or orchards stay in the ksars for the whole year. They sometimes visit their friends in the orchards on holidays.

Cemeteries

Each M'zab Valley community has its own cemetery located on a hill near the ksars. The reason for this location on barren land is similar to the reason for the location of the ksars. It is the concept of
using rocky sites for building while valuable cultivated land is saved for palm trees to support the economy (Figures 8 and 29).

The M'zabites' cemeteries expand as a process of gradual growth; no more than one body may occupy a grave, with a small passage left between the graves. Each grave has an identifying stone on it such as a headstone, middle stone, or footstone which is used to distinguish male graves from female graves.

Each of the M'zab cemeteries has its own musalla, an open area which is used for particular prayers (Figure 21). Also, some of them contain small masjids usually connected to the musallas. The masjid and the musalla are also connected to a particular community and to particular neighborhoods (Ashiras) by a gate found in the ksar walls. Because of this relationship, these cemeteries (Figure 31) are integrated into the whole urban setting of M'zab. By spreading them around the ksars, they become one of the important physical and psychological elements of the M'zab community. In M'zab people go to the cemeteries, musallas, and masjids near the cemeteries daily and weekly in order to pray for those who have died. This community concept makes people remember death while they are living, and death is considered the ultimate natural act for the M'zabites.

**Characteristic Urban Features**

**Streets and Alleyways**

The system of transportation inside the ksar consists of wide streets (8-12 feet) and narrow alleyways (6-8 feet) (Figure 32). The streets in M'zab are adequate for pedestrian traffic and animal use inside
Figure 31. Cemetery of Masjid Abo-Gademma, a typical M'zab Valley cemetery.—From Ravereau (1981, p. 240).
Figure 32. Schematic of street circulation within the ksar
the ksar. No wheeled vehicles are permitted inside the ksars, except for emergency purposes. They are restricted to the through streets (ring roads) located between the neighborhoods and the ksar walls.

The wide streets are mainly established to connect the major community facilities: The Azzaba masjid and madrasa in the most central area of the ksar, the public open spaces such as the open market, the cemeteries, and the oasis. They connect these facilities as follows:

1. The ksar with the oasis (winter town with summer town).
2. Public and private community facilities with the ksar (ring roads).
3. The neighborhoods with the central Azzaba masjid.
4. Commercial areas (private shops and open markets) with neighborhoods and with the central area of the ksar.
5. The public open markets with the outside world (Figure 33).

The alleyways are used mainly for private neighborhood purposes (Figures 34 and 35). They are used as passageways for pedestrian traffic, starting from wide streets and ending with cul-de-sacs. Some of them are covered and others are not. They also tend to follow the contours of the land (Figures 35 and 36).

Defensive Design Elements

The gates in M'zab are divided into two categories: main gates and small gates (Figure 36).

Main gates are usually found near the main roads that lead to the community and the open markets. These gates are used to mark the
Figure 33. Commercial street
Figure 34. Private alleyway.—From Ravereau (1981, p. 182).
Figure 35. Stepped street in private neighborhood. --From Ravereau (1981, p. 183).
Figure 36. Representation of defensive structures of Beni-Isguen.—From Didillon et al. (1977, p. 271).
main community transportation routes as well as being a frontispiece to the most public institutions of the ksour. Each community has at least one or two gates of this type.

The small gates are used to serve the internal community needs. They indicate transition points between the winter town and the palm groves, the musallas, the mosques (near the cemeteries), and the cemeteries. Small gates are used by the local people to serve local needs.

Both of these types of gates have certain functions in common. Curtis (1983, p. 186) discussed some of the defensive and cultural characteristics of the ksour gates as follows:

It [the gate] has a number of key functions in the life of the ksar. First of all, it is the way in and out, and this is no trivial matter when security is so highly valued; it is a point of control, and there used to be severe penalties for anyone who avoided it by, for example, clambering over a wall. But the gate is also the meeting point—literally and symbolically—between the familiar and the foreign.

Most of the gates are protected by high towers used for defensive purposes. In the M'zab community, the gates are closed at night and the community is watched from the towers by guards. The towers are used in emergencies for community defense and the gates are guarded by the M'zabites. To get home one must identify himself in order to enter the ksar.

These gates and towers are joined together by a highly defensive walls. The community walls are considered the third planning element of the community to be laid out, after the assignment of the Azzaba masjid in the center, and the designation of the Ashira neighborhoods
around the masjid. The walls are laid out by the Azzaba and by the Ashira and Amstordan majlises (Figures 37 and 38).

These three elements, the gates, the towers, and the walls, have certain characteristics in common:

1. They are designed in a highly defensive manner which is very clear from their proportions and relation with the other visual architectural elements of the community.

2. They are wall bearing, which results in a heavy appearance.

3. They are usually thicker at the bottom than at the top and have triangular perforations on their corners (Figure 37).

These common characteristics are repeated in other community elements such as minarets, and house walls.

The Hydraulic System

Three hydraulic systems are used in the Sahara. The first consists of shallow wells, through which the farmer tries to reach the aquifer. This method is used in the rural areas and has no overall irrigation pattern.

The second is an irrigation channel network system that connects the wells to the orchards. This system is connected to subterranean reservoirs by deep wells dug into the ground by primitive methods.

The third is the underground tunnel network system called foggara (qanat). The foggara is dug into the ground to provide water to the palm-grove plains and is fed by gravity flow from the foothills several kilometers away.
Figure 37. Typical defensive structures
The first two systems are used in the M'zab Valley area. M'zabites usually place their artificial dams in the wadi of M'zab to increase depth of the water and to create underground reservoirs. They dig wells 90-120 feet deep from which they can pull out water by primitive methods and then distribute it to the orchards by diverting it into channels (souaqu) (Figure 39).

Figure 39. Typical well and irrigation canal schematic
Summary

The urban form of the M'zab community is organized as follows:

1. Ksars are established on the tops of hills. These are the winter living spaces for the M'zabites.

2. Oases are found in the plains around the edges of the wadi of M'zab. These are the summer living places of the M'zabites.

3. Cemeteries are established on the sides of hills, each for a particular neighborhood (Ashira).

4. Each ksar has its own oasis and cemetery.

5. Each ksar is organized around the most central Azzaba masjid, which is used as the main center for the Azzaba majlis and other institutional activities.

6. Each ksar has its own open space market (suk) located near the main gate.

7. Each ksar consists of neighborhoods (Ashiras), each having its own mosques, musalla, social rooms, and cemeteries.

8. Each ksar is surrounded by fortified walls that have defensive gates and towers.

9. The main community facilities—the oasis, the ksar, the Azzaba masjid, the open market, the neighborhoods, the cemeteries, the musallas—are all linked by main streets.

10. Local Ashira facilities are linked by alleyways.

11. Each ksar has ring roads that are found between the walls and the residential areas.
12. The public places that are used for sitting, meetings, public playing areas for children, and shopping are found in the main streets.

**Additional Urban Features**

In addition to the previously described general characteristics, the most significant urban feature of M'zab architecture can be summarized as follows:

1. Narrow, well-shaded streets (both open and covered) of the ksar.
2. Precise irrigation channel network system of the summer towns.
3. Simple structures with plain, white-washed exterior walls.
4. Consistent housing forms with superimposed courtyards.
5. Simple minarets of the Azzaba masjids, and Ashira mosques without minarets.
6. Triangular perforation on the corners of buildings, houses, walls, towers, gateways, and minarets.
CHAPTER 4

THE M'ZABITE HOUSE

This chapter presents an analyses of the four types of houses of the M'zabite communities:

1. The traditional centralized house with superimposed courtyard in the ksar.
2. The traditional summer house in the orchards.
3. Modified traditional houses in the ksar.
4. Contemporary houses, large and small, outside the ksar.

It is not intended herein to provide evidence in favor of one house type over others, but rather to identify the merits and drawbacks of each. Such an approach provides a deeper insight into the problems of housing and paves the way for rational solutions that could help draw guidelines and conclusions for future development in the M'zab area.

The following figures of the M'zab community-type houses present the most important elements of the M'zabite house. These house types are categorized according to their plan shapes:

1. House with trapezoidal plan (Figure 40).
2. House with square plan (Figure 41).
3. House with L-shaped plan (Figure 42).
4. House with rectangular plan (Figure 43).
5. Extended family-type house (Figure 44).
Figure 40. Trapezoidal plan house.—From Didillon et al. (1977, pp. 154-157).

Key:

A - Bent entrance
B - Family living room
C - Kitchen
D - Male activity room
E - Chamber
F - Porch
G - WC
H - Toilet
I - Basement (cave)
J - Animal space
K - Storage
L - Central room
M - Utility room
Figure 41. Square plan house.—From Didillon et al. (1977, pp. 193-195).
Figure 42. L-shaped-type house.---From Didillon et al. (1977, p. 163).
Figure 43. Rectangular-type house.—From Didillon et al. (1977, p. 199).
Figure 44. Extended family-type house.—From Didillon et al. (1977, pp. 171-173).
Seasonal Usage of Rooms

The traditional house in M'zab consists of four different areas: ground and entry floor, upper floor, roof terraces, and basement. The ground floor contains the main spaces in the M'zabite house: the entry, central room (courtyard), family living room, kitchen, and multipurpose rooms. The central courtyard is used for family interaction, children's play area, and a place for weddings and festival activities. It is also used as a multipurpose room for daily activities such as sleeping, cooking, eating, weaving, meeting, sitting, and children's play. The family living room is used mainly for family activities or for receiving female guests. It is used for family activities such as weaving, sitting, praying, sleeping, and eating. The multipurpose chambers are used by parents and children for sleeping, as well as for storage and animals.

The upper floor contains male guest rooms, bedrooms, storage rooms, and other multipurpose chambers. Usually, this floor is reached by covered stairs and is connected to a neighbor's house by a wall opening and is used for women's activities and circulation.

The roof terraces contain many spaces divided by partitions for various summer family activities such as sitting and sleeping. They are always reached by open stairs.

Underground floor spaces also contain main family spaces used in the summer during the day for such activities as sitting and sleeping.

Figure 45 delineates the summer and winter activities that take place on the four levels of the M'zab home.
Figure 45. Daily usage of M'zabite home during winter and summer seasons
Traditional House in the Ksar

The M'zabite house was always adapted to and wisely integrated with community needs. Certain community building issues were set by the Azzaba and Ashira assemblies. The most important aspect of development was how the neighbors dealt with each other in constructing their building without benefit of master plans and municipal codes.

The Jama'ā, through the Azzaba masjid and Ashira social activities, could convince the neighbors to follow unwritten rules in building their houses. These unwritten rules became the custom to be followed by everybody in M'zab. Some of the rules such as openings not facing each other, roofs kept open for women's activities, and neighbors not being allowed to build higher than their neighbor were discussed previously.

M'zabites, like other Muslims, had a strong desire to create a type of setting in which they could enjoy their pleasant life in the open air and also live securely in a confined area completely protected on all sides. This type of setting maintained the privacy of their domestic life in accord with the Muslim way of life, M'zabite socio-cultural values, and environmental factors.

An answer to these complex factors and criteria was the creation of the "superimposed" courtyard house, which represented the assimilation of ancient ideas of the Islamic world and other civilizations. It was clearly integrated and wisely adapted and modified to the M'zabite's needs.

The M'zab house and its spaces can be viewed also as a restatement of the ksar organization, but on a much smaller scale. It is a fort within a fort (Figure 46).
Figure 46. The house as a restatement of the ksar
The Traditional House Spaces

The Superimposed Courtyard

The central area of the traditional M'zabite house forms a kind of superimposed courtyard that is divided vertically into two horizontal central areas (Figures 47 and 48). The lower area on the first floor has an opening in the ceiling connecting it with the upper area (second floor). Most daily activities take place in the lower area on a seasonal basis such as sitting, cooking, eating, sleeping, weaving, and playing. Figures 49-55 show the importance of the superimposed courtyard.

Figure 49 shows the importance of positioning the opening in the ceiling of the first floor. For the M'zab area, Patterns A and E (Figures 50 and 51) represent the best positioning of this opening. Also, these two patterns show the lining of the porches and the family living rooms according to the orientation of the opening toward the south.

The central area creates a micro-climate and facilitates air movement and natural lighting to the various house areas. An opening in the ceiling of the first floor is considered a unique climatic design element in M'zab (Figures 52 and 53). This opening is kept covered during the summer daytime to prevent heat and solar radiation from getting into the lower central area. During the summer nighttime, the opening is kept uncovered to allow the inside warm air to be replaced by cooler night air (Figure 54). In the winter, the opening is kept open during the day to let heat and solar radiation enter the house (Figure 55) and during the night it is kept covered to keep the house warm and to let the heat gradually penetrate the massive interior walls and floors (Figure 55).
Figure 47. Superimposed courtyard (interior).—From Ravereau (1981, p. 126).
Figure 48. Superimposed courtyard (exterior).--From Ravereau (1981, p. 138).
Figure 49. Analysis of the position of the opening of the superimposed courtyard of the M'zab house
Figure 50. Pattern A is one of the most popular patterns for the M'zab house design. Shows the relationship of the family living room on the first floor and the porch on the second floor to the superimposed courtyard openings.
Figure 51. Pattern E is another of the most popular patterns for the M'zabite house. This figure shows the relationship to the superimposed courtyard opening of the family living room on the first floor and the porch on the second floor.
Figure 52. Section through superimposed courtyard showing air movement
Figure 53. Air movement plan
Figure 54. Position of superimposed courtyard opening in summer
Figure 55. Position of superimposed courtyard opening in winter
Family Living Room

This space is one part of the central area. It is considered one of the main active covered spaces of the M'zab family. The most important activity of the family living room is weaving. In addition, there are religious and social activities held in this room. It is used by the women as a guest and reception room. It is also used as a gathering place for the entire family.

Most of the family living rooms in the M'zabite home are located on the north side of the central area facing south, southeast, or southwest to obtain maximum light from the opening of the central area especially during winter [see trapezoidal plan (Figure 40) and square-plan houses (Figure 41); also courtyard Patterns A-E (Figures 49-51)].

Male Guest Room

The male guest room, considered a separate unit from the family area, is usually connected to the main bent entrance and contains its own service rooms. It may be located near the entrance on the first floor or on the second floor over the entrance area, reached by its own staircase. In some houses, this room is divided into sections. A small room located on the first floor is used for minor receptions while the main reception room is located on the second floor above the entrance hall. Some of the male living rooms have direct access from the street or are connected to an outdoor sitting area used in the summertime during the night (Figures 40-43).
The Kitchen Space

This space is also considered as an external space as it is usually connected to or is within the central space (courtyard). The central space is also used for outdoor cooking, sitting, and working activities. Kitchen activities usually need a large space, especially for festivals, weddings, or other congregational activities. The kitchen is used as a source of heat during winter. There are two locations for kitchen corners in the M'zabite home. The first floor corner is one of the central area spaces. This first floor kitchen space is used as a source of heating for the first floor spaces. The second floor kitchen space, used in the summertime, is usually found under the covered terraces.

Bedrooms

The bed chambers (ghoraf) are found on the first and second floors and are used for multifunctional purposes—sleeping, sitting, and storage. Some chambers on the first floor are used as bedrooms for parents, children, and unmarried singles. One chamber on the second floor is used as a master bedroom and it has its own utility rooms.

Animal Space

Next to the main entrance and between the external and internal doors, a space is usually provided for animals (goats). This space is either in the bent entrance or in the small partitioned space on one side of it. Goats provide milk and meat and control food waste by consuming food scraps. Having this kind of animal inside the house or within its boundaries evolves from economic, social, and religious reasons.
The Bent Entrance

The bent entrance, an ancient concept, ensures the privacy of the central courtyard of M'zab houses from visual penetration from the street. The bent entrance is a solution for keeping outside people from seeing inside the house, while allowing for natural ventilation (see Figure 52). It provides a religious solution for privacy, essential to a defined life of goodness and purity of Islamic ideals. Ali (1977, p. 909) stated:

Privacy in the home is a nurse of virtue: Respect it with dignity and decorum. Guard your eyes and thoughts with rules of modesty in dress and manners: and learn from these to keep your spiritual gaze from straying to any but God (p. 903). . . . The rule about dwelling-houses is strict, because privacy is precious and essential to a refined, decent, and well-ordered life.

The main entrance to the entry hall or corridor is usually kept open during the day. The outside door is heavy so children cannot open it easily. Also, its being open allows women to enter the main door without being delayed outside in the street. The inner doorway of the bent entrance is usually kept closed by a curtain or other light material. The inner door is used for women visitors to receive permission to enter from the owner, after having knocked at the main entrance. Men visitors usually use the main entrance for obtaining permission by knocking on the door or calling by name.

The bent entrance space is used as a buffer zone to protect the family's internal activities from being interrupted. This space is also used for storage, for children, as an extension to the central area space, as a site for the ablution fountain and cistern, as well as a space kept for animal use (goats).
Openings

Openings can be categorized as windows, skylights, and doors. The external windows and doors are usually kept small. The windows on the external walls are very small, few in number, and placed at a height just above eye level in order to maintain privacy and family protection.

Function of External Openings. The external openings are used to prevent people in the street from looking into the house and to provide security, to reduce heat gain in summer and to reduce dust, and to prevent glare from the bright ground outside the house and also to provide indirect daylight and ventilation.

Function of Internal Openings. The internal windows to the courtyard are usually bigger than the outside windows because they are inward-looking windows. They are used for direct daylight and ventilation.

The skylights, which have the form of a square box, are located in the ceilings of the basement and the first floor. They are usually covered by bars imbedded in the ceiling edges. They are also defined by walls one to three feet high. The bars and walls are used to prevent children from falling down and to keep anyone from getting inside the house through these openings, which are located to heat the house during winter and to ventilate it during the summer. They are also used to bring in direct daylight for the underground floor and also the first floor.
Traditional Summer House in the Orchard

The orchard houses (Figures 56, 57, and 58) are built in the M'zabite summer towns. They are mainly used in the summertime when the whole family joins the parents to work and to enjoy the life in the orchards. Some of them are designed to line one side of the orchards forming a defensive line of walled houses between the rock hills and the valleys (Figures 59 and 60).

Other houses are designed to be laid at one of the orchard corners (Figures 59 and 60). Each of these layouts of orchard houses reflects the M'zabite's concern for preserving the best available land for the orchards and using the land of the rock hill sides and more desert areas for building their orchards. This also indicates why the orchard houses are very similar to the ksar houses.

The orchard house has most of the same elements as the ksar house, such as the superimposed courtyard, the family living room, and the male living room. Some of the orchard houses are two stories high, although others have only one story. Most of them have outdoor areas used for both men's and women's activities. Most of the orchard house spaces are used in both hot and cold seasons and also are used for a variety of daily and seasonal family activities.
Figure 56. Summer-type house.—From Didillon et al. (1977, pp. 206-207).
Figure 57. Trapezoidal-type summer house plan.—From Didillon et al. (1977, pp. 230-231).
Figure 58. Summer-type house, sections and elevations.—From Didillon et al. (1977, pp. 231-232).
Figure 59. Orchards surrounded by walls with houses at corners.—From Ravereau (1981, pp. 238-239).
Figure 60. Sketches of orchard houses built in the (a) most rocky desert lands in order to leave available cultivated lands for orchards and (b) boundaries of orchard corners.
Traditional Modified House in the Ksar

Modification of the M'zabite traditional house takes place inside the walls of the ksar. The modified houses are classified as follows:

1. The municipality of Ghardaia has established some regulations in order to control the modification or rebuilding of the traditional houses of the ksar in a way that the original form of the house and its main features will be kept. Only a few changes in some spaces and elements are allowed with the use of new construction methods and new materials, maintaining the same character as the traditional houses (Figures 61 and 62).

Figure 61. Example 1 of first floor plan of reconstructed house. --From Didillon et al. (1977, p. 191).
2. The second type is a new house designed for extended families according to the traditional plans of the M'zabite house within the ksar. Very few changes in spaces and elements are allowed. However, these houses are usually built with new building materials and new construction methods (Figure 63).
Figure 63. Example 2 of first and second floor plans, as well as roof plan, of newly modified house within the traditional ksar limits.—From Arbaoui (1981, p. 25).
Newly Designed Houses Outside the Ksar

Contemporary houses are designed for both small and large families (Figure 64). They are designed by the architects according to the Ghardaia municipality codes and according to the requirements of the M'zabites. The houses are composed of two stories and recall most of the traditional house elements which include the superimposed courtyard, the family living room, and the male guest room.

The new houses are built completely with new materials and new construction methods.

Most of the contemporary houses are inward-looking using the idea of the traditional courtyard. Also, they may include contemporary ideas that affect the houses' spaces, such as separation of the kitchen from the central area or the isolation of the bedroom private section from the living semi-public section by locating the bedrooms on the second floor and the living room on the first floor. Tables 1, 2, 3, and 4 summarize these differences and compare them with the traditional houses.
Figure 64. Plans for newly designed houses located outside the traditional ksar limits. — From Arbaoui (1981, p. 25).
Table 1. Physical and environmental comparisons between the traditional house and the modified and new houses

<table>
<thead>
<tr>
<th>Traditional House</th>
<th>Modified and New Houses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Family Living Room</strong></td>
<td></td>
</tr>
<tr>
<td>Location first floor, south opening, Patterns A &amp; E (Figures 50 and 51) to receive full daylight and direct heat during winter from skylight.</td>
<td>In modified house, is in traditional position.</td>
</tr>
<tr>
<td>In newly designed house, no particular location.</td>
<td></td>
</tr>
<tr>
<td><strong>Central Area (Superimposed Courtyard)</strong></td>
<td></td>
</tr>
<tr>
<td>Creates a micro-climate; facilitates air movement and supplies natural light to various areas of house.</td>
<td>In modified house, superimposed courtyard is still used.</td>
</tr>
<tr>
<td>In some newly designed houses, skylight opening is completely covered with glass or plastic and artificial heating and cooling is used.</td>
<td></td>
</tr>
<tr>
<td><strong>Kitchen</strong></td>
<td></td>
</tr>
<tr>
<td>Winter kitchen: A source of heat; on first floor; a corner fireplace located in central area.</td>
<td>A specific room (rather than an area), usually on first floor. Gas or electric equipment is used.</td>
</tr>
<tr>
<td>Summer kitchen: Usually located on second floor (heat is dispersed to outside).</td>
<td></td>
</tr>
<tr>
<td><strong>Terraces and Porches</strong></td>
<td></td>
</tr>
<tr>
<td>On upper floor. Roof terraces used for sleeping in hot weather (Figure 50).</td>
<td>Most traditional elements still used; in addition, outside balconies protected by shutters or mashrabiyyah are used.</td>
</tr>
<tr>
<td>Porches, always open to the south or southeast to catch winter sun (Figure 51), also used for winter activities.</td>
<td></td>
</tr>
<tr>
<td><strong>Ventilation Features</strong></td>
<td></td>
</tr>
<tr>
<td>Courtyards; kitchen shafts; small wall openings; vent entrances; central area opening, basement clerestories; all elements provide cooling in summer and warmth in winter by passive ventilation and heat exchange.</td>
<td>Most of the traditional elements are used, assisted by mechanical heating and cooling.</td>
</tr>
</tbody>
</table>
Table 2. Physical and environmental comparisons of construction techniques used for the traditional house and for modified and newly constructed houses

<table>
<thead>
<tr>
<th>Traditional House</th>
<th>Modified and New Houses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overview</strong></td>
<td></td>
</tr>
<tr>
<td>Self-help construction, building and repair. Help by family ashira and community member participation is important. House plan according to family needs, discussions and opinions very important. Built step-by-step, may start as one room with surrounding fence; later expansion as needed. Wall-bearing structure, no blueprints. Construction, form, and methods from experience.</td>
<td>Building depends on the family finances. Designed by architect, built according to approved municipal regulations. Concrete skeleton of structure (reinforced concrete).</td>
</tr>
<tr>
<td><strong>Foundation Walls</strong></td>
<td></td>
</tr>
<tr>
<td>Natural surface limestone foundation and walls started directly upon this base.</td>
<td>Concrete foundations, sometimes reinforced concrete footings and beams. Stone or concrete block walls (6&quot;-8&quot; thick); reinforced concrete beams and columns.</td>
</tr>
<tr>
<td><strong>Stairs</strong></td>
<td></td>
</tr>
<tr>
<td>Stone rubble stairs built on small walls.</td>
<td>Concrete stair cases; wood and metal stairs.</td>
</tr>
<tr>
<td><strong>Domes and Vaults</strong></td>
<td></td>
</tr>
<tr>
<td>Domes (based on stone pillars) and vaults or stone and timchent.</td>
<td>Not used or used for decorative purposes.</td>
</tr>
<tr>
<td><strong>Air Shafts</strong></td>
<td></td>
</tr>
<tr>
<td>Air shafts of stone joined by timchent.</td>
<td></td>
</tr>
<tr>
<td><strong>Openings</strong></td>
<td></td>
</tr>
<tr>
<td>Windows are small, limited openings, sometimes with wood shutters, not framed. Doors are made of palm-tree branches joined by pieces of wood nailed by three branches (sometimes olive-tree nails).</td>
<td>Large glass openings with shutters or covered by mashrabiyyah with frames.</td>
</tr>
</tbody>
</table>
Table 2.—Continued.

<table>
<thead>
<tr>
<th>Traditional House</th>
<th>Coating used determines color of house. Timchent and sanded coating. Lime water white coating. Natural colors.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified and New Houses</td>
<td>Cement and lime coating and other colors. Coating materials are introduced.</td>
</tr>
</tbody>
</table>
Table 3. Physical and environmental comparisons of building materials used for the traditional house and for modified and new houses

<table>
<thead>
<tr>
<th>Traditional House</th>
<th>Modified and New Houses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Timchent</strong></td>
<td></td>
</tr>
<tr>
<td>Hard, quick-drying plaster and mortar, usually gray, hydrated gypsum burned in buried ovens, locally produced, used alone as plaster or mortar, or mixed with sand and used as plaster or mortar.</td>
<td>Modified in a new form having same characteristics, produced in Ghardaia factories and used as a mortar. Cement also used as mortar.</td>
</tr>
<tr>
<td><strong>Wood</strong></td>
<td></td>
</tr>
<tr>
<td>Local palm-tree wood, trunks for beams and joists, fronds for roof covering.</td>
<td>Most wood imported from Northern Algeria and Europe. Local wood still used in some construction and for furniture.</td>
</tr>
<tr>
<td><strong>Stone</strong></td>
<td></td>
</tr>
<tr>
<td>Local white limestone blocks; walls and partitions of rough stones; flat stones for stairs, roofs, lintels, and arches.</td>
<td>Much used; also concrete blocks and local limestone blocks.</td>
</tr>
<tr>
<td><strong>Adobe</strong></td>
<td></td>
</tr>
<tr>
<td>Wet dirt mixed with straw used mainly in the orchards.</td>
<td>Adobe still used in the orchards.</td>
</tr>
<tr>
<td><strong>Plaster</strong></td>
<td></td>
</tr>
<tr>
<td>Sand timchent or mixed lime.</td>
<td>Lime and cement mortar.</td>
</tr>
</tbody>
</table>
Table 4. Overall layout: Religious and socio-cultural aspects of the traditional house and of the modified and new houses

<table>
<thead>
<tr>
<th>Traditional House</th>
<th>Modified and New Houses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use</strong></td>
<td></td>
</tr>
<tr>
<td>Used by extended families; two or three generations in one house.</td>
<td>Very modified small and big houses to contain one or two generations.</td>
</tr>
<tr>
<td><strong>Privacy</strong></td>
<td></td>
</tr>
<tr>
<td>Superimposed courtyard and external walls provide inward-looking privacy.</td>
<td>Inward-looking privacy achieved by use of external walls surrounding house and courtyard.</td>
</tr>
<tr>
<td><strong>Spaces</strong></td>
<td></td>
</tr>
<tr>
<td>Totally used according to daily and seasonal human needs (multifunctional use). They do not impose any specific function for the whole year.</td>
<td>Specific spaces and corners; spaces not totally used.</td>
</tr>
<tr>
<td><strong>Decorations</strong></td>
<td></td>
</tr>
<tr>
<td>No decorations allowed outside the home.</td>
<td>Decorations are allowed by use of mashrabiyahs and other new materials such as aluminum and steel.</td>
</tr>
<tr>
<td><strong>Family Living Space</strong></td>
<td></td>
</tr>
<tr>
<td>Used for women guests and family activities (weaving, reception, praying, sometimes sleeping), located on first floor.</td>
<td>Family living space used traditionally.</td>
</tr>
<tr>
<td><strong>Male Living Space</strong></td>
<td></td>
</tr>
<tr>
<td>For male guest reception, usually on second floor.</td>
<td>On first floor; library corner, utility rooms, and guest sleeping rooms.</td>
</tr>
<tr>
<td><strong>Bedrooms</strong></td>
<td></td>
</tr>
<tr>
<td>Parents and children bedrooms usually on first floor; newly married sons occupy bedrooms on second floor.</td>
<td>In private section, isolated from public living areas; usually on second floor; semi-private children’s rooms on same floor between public and private areas.</td>
</tr>
</tbody>
</table>
Table 4.—Continued.

<table>
<thead>
<tr>
<th>Traditional House</th>
<th>Modified and New Houses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Central Area</strong></td>
<td></td>
</tr>
<tr>
<td>A multipurpose room used for family interactions, children's playground, weaving,</td>
<td>Used with little change as back yard for the family activities (as weddings and festivals), and children's activities.</td>
</tr>
<tr>
<td>cooking, sitting, and for weddings and festival activities.</td>
<td></td>
</tr>
<tr>
<td><strong>Terraces</strong></td>
<td></td>
</tr>
<tr>
<td>Terraces and covered spaces of second floor are used for weaving in winter,</td>
<td>Same traditional ideas; also other modified terrace additions as verandas and mashrabiyyah balconies.</td>
</tr>
<tr>
<td>sleeping area in summer, circulation for women to visit neighbors and enjoy views.</td>
<td></td>
</tr>
<tr>
<td><strong>Bent Entrances</strong></td>
<td></td>
</tr>
<tr>
<td>Bent entrances are used as semi-private receiving areas, storage, and for animals.</td>
<td>Bent entrances are used, very modified, for specific purposes such as entry hall.</td>
</tr>
<tr>
<td><strong>Furniture</strong></td>
<td></td>
</tr>
<tr>
<td>Most furniture in traditional houses is built-in, homemade of wood; includes</td>
<td>Mostly imported from the north and made outside the M'zab Valley. Included are electrical equipment, refrigerators, gas ovens, coolers, sewing machines, tables, chairs, and laundry machines.</td>
</tr>
<tr>
<td>rugs, niches, steps, built-in beds, couches, and tables.</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 6

CASE STUDIES OF GHARDAIA AND BENI-ISGUEN

Recent planning and architectural innovations were introduced to the M'zab community by the late 1960s. These changes did not ameliorate earlier conditions or provide more comfort within the communities' traditions and principles. They resulted from the notion of French colonization of Algeria and recent exploitation of Algerian Sahara oil.

Because of these factors and the notion of the potential increase in population in the southern Sahara regions, the M'zab Valley region has become an important transit area in the Algerian Sahara Desert. Relative to this, Gharadaia specifically has become one of the major regional service centers among the Sahara desert centers. Ghardaia is also considered to be one of the Algerian municipal governmental centers dominating the entire M'zab region. The municipality of Ghardaia in its foundations was concerned with and controls the technical planning and architectural aspects. It works in accord with the religious and social institutions, which are presented by the Jama'a people. Each of the municipal governments of Ghardaia and the Jama'a has its own functions, activities, and independence. And until recently, they showed a great deal of cooperation and were considered as a single system, both concerned with Jama'a principles and community needs.
The coexistence of both systems, the Jama'a and the municipal government in Ghardaia, is made necessary because of the increase of outside influences. Therefore, more institutions are needed to serve these two systems.

The following comparison between the earlier composition of traditional communities within the ksars and the newly zoned settlements that have been planned outside of the ksaar walls demonstrates how some of the earlier planned developments and architecture respect the religious and social order of the traditional communities and how some influences do not respect the principles of the traditional community. The comparison focuses on the example of the traditional ksaar of Ghardaia and its open plan and Beni-Isguen and its preserved walls within the new extensions. Three areas of comparison are chosen for this purpose.

1. Power.
2. Defense.
3. Movement.
Traditional Communities vs. New Extension Communities

Power—Traditional Community

Decisions and community plans are always formed by the Jama'a of Azzaba practiced by the Jama'a of Ashira, and protected by the Jama'a of Amstordan.

The traditional context and its physical form is comprised of three zoning areas that are as follows (Figures 65-70).

1. Build-up areas of the ksar, the mosque, houses, and shops.
2. The planted areas of the palm groves and the summer houses.
3. The open spaces of the market, cemeteries, and musallas.

The urban form of the ksar is visualized and characterized by the construction of the Azzaba masjid at the most central and highest point of the ksar. As the population sufficiently increases, new walls and neighborhood areas are developed. This occurs within the limits of the ksar and in the close proximity to the Azzaba masjid.

The arable land is reserved for orchards and is assigned to serve the community need for the use of date palms.

The open markets are located outside the ksar in order not to interrupt the private life of the M'zabites by outsiders.

The cemeteries and the musallas are reserved (waqf, habs) and sited outside the ksars in the desert areas.
Figure 65. Patterns of physical urban growth of Ghardaia ksar (phase 1).—Arbaoui (1981, p. 5).
Figure 66. Patterns of physical urban growth of Ghardaia ksar (phases 2 and 3).—From Arbaoui (1981, p. 6).
Figure 67. Patterns of physical urban growth of Ghardaia ksar (phase 4).—From Arbaoui (1981, p. 8).
Figure 68. Patterns of physical urban growth of Beni-Isguen ksar (phase 1).--From Arbaoui (1981, p. 5).
Figure 69. Patterns of physical urban growth of Beni-Isguen ksar (phase 2).--From Arbaoui (1981, p. 6).
Figure 70. Patterns of physical urban growth of Beni-Isguen ksar (phase 3).—From Arbaoui (1981, p. 7).
Power--New Extensions

Decisions and plans of new developments are made by the municipality of Ghardaia with the help of the Jama'a (the most educated and religious people following the Azzaba and Ashira principles). Most of the new extensions are not laid out according to the traditional context. And they are not in close proximity to the first ksars. They are laid out according to contemporary zoning principles with little attention to the traditional disciplines, way of life, efficiency, and religious considerations.

The earlier extensions and their surrounding context are comprised of the following three areas (Table 5; Figures 71-72):

1. The built-up areas now include houses, mosques, commercial buildings, administrative buildings, schools, recreational areas, parking lots, garages, hospitals, hotels, and industrial buildings.

2. The orchard areas have become more invaded by the new orchard inhabitants. Also, the orchards are not used for a specific plantation purpose.

3. The open spaces consist of areas reserved for cemeteries, sports and playing fields, and parking lots.

Defense--Traditional Community

Creation of very defensive communities in the Saharan environment is an ultimate goal for the M'zabites. This was accomplished through the planning of the built-up areas on higher elevations. This kind of community could be easily administered and controlled. As the
Table 5. Master plan of the new extensions of Ghardaia and Beni-Isguen.—Explanatory key for Figures 71 and 72.

<table>
<thead>
<tr>
<th>Key</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Extension within the old ksar and the existing rural suburban elements:</td>
</tr>
<tr>
<td></td>
<td>1. Suburbs already established in which the perimeter has been determined.</td>
</tr>
<tr>
<td></td>
<td>2. Sites suitable for new settlements on hard ground, on hillsides of valleys, or on small hills are still available, while the best sites are already occupied by old ksars. New extended sites are being chosen for their location and accessibility to the existing ksars.</td>
</tr>
<tr>
<td>C</td>
<td>Low density residential zone:</td>
</tr>
<tr>
<td></td>
<td>1. Protected areas of greenery already existing.</td>
</tr>
<tr>
<td></td>
<td>2. Areas reserved on desert space suitable for plantation located in the surroundings of Ghardaia and Beni-Isguen ksars. These areas are also considered a new plantation zone.</td>
</tr>
<tr>
<td>D</td>
<td>Summer towns, preserving the traditional summer towns of the old ksars.</td>
</tr>
<tr>
<td>E</td>
<td>Economic, technical, and social facilities zone: These areas are chosen for their location, importance, and compatibility with the valley routes and housing.</td>
</tr>
<tr>
<td>F</td>
<td>Regional facility zone:</td>
</tr>
<tr>
<td>F₁</td>
<td>The administrative zone: These areas are located in a vast area in the suburb of the Ghardaia ksar.</td>
</tr>
<tr>
<td>F₂</td>
<td>The educational zone: These areas are located on the edges of the M'zab wadi and are reserved for colleges and high schools.</td>
</tr>
<tr>
<td>F₃</td>
<td>The recreational zone: These areas are located within each ksar's development and one area is reserved for the use of the entire community.</td>
</tr>
<tr>
<td>F₄</td>
<td>Medical zone: These areas are located so as to be close to the Sahara roads in the rural suburbs of Bou-Noura ksar.</td>
</tr>
<tr>
<td>F₅</td>
<td>Cultural zone: These areas are located on the hills because of their interest in the M'zab, connection to the Sahara, and to have an overview of the M'zab Valley communities.</td>
</tr>
<tr>
<td>G</td>
<td>The regional transportation zone: These areas are reserved in order to establish and maintain Sahara roads and local valleys.</td>
</tr>
<tr>
<td>H</td>
<td>Rural zone.</td>
</tr>
<tr>
<td>J</td>
<td>Reserved zone for future developments.</td>
</tr>
<tr>
<td>N</td>
<td>Cemetery zone: These areas are reserved and considered as religious properties (waqf or habs).</td>
</tr>
</tbody>
</table>
Figure 71. Land-use distribution (Ghardaia).—See Table 5 for explanatory key. From Deluz (1963, p. 14).
Figure 72. Land-use distribution (Beni-Isguen).—See Table 5 for explanatory key. From Deluz (1963, p. 14).
population expanded, the Azzabas always preferred founding new settlements (ksars) on other high ground rather than extending the existing towns into flat lands (Figure 8).

In addition to the natural defensive boundaries, the urban form of these communities is very defensive and contains the following:

1. Very defensive community walls, towers, gates, and ramparts.
2. Guards posted at the gates, and no one (stranger) can circulate alone in the ksar nor stay there after sunset. This fact also suggests the power of the Azzaba and Ashira who could apply this principle to the inhabitants of neighboring ksars. Beni-Isguen is an example of a M'zab ksar whose walls are still existing and maintained.
3. Very defensive homes. The orchard and ksar houses are designed to serve a defensive purpose against outsiders and the environment.

Defense—New Extensions

Most of the old ksar walls have been demolished by the development of new areas in the M'zab Valley (example of Ghardaia). Because most of the hilltop sites are already occupied by the old ksar, new developments occur on ridges or on exposed rock areas that are limited naturally by the flow of the wadies and the very high rock hills. The defense is limited to the settlement or neighborhood zones by an outside wall surrounding the housing areas. These walls often do not have the defensive character of the old ksar ramparts. They are built of local stone to a height of 9-10 feet. In time, the house will back upon it and
will rise above it, occasionally projecting over it. One or two gates are found in each settlement in order to control automobile circulation.

Growth—Traditional Community

The growth of the traditional community is limited naturally by assigning the ksar to high rocky areas, the cemeteries to desert areas, and palm groves to the available fertile areas.

The growth of each ksar is also limited by the construction of the outside walls. As the population grows, new residential areas are assigned for each Ashira and new walls are built around them (see Figures 65-70). Each ksar is self-contained with its own market, mosque, cemetery, and summer town facilities, developed and controlled by its own Azzaba and Ashira plans. Few visual changes occur inside the ksar. Example of such limited changes would be the modification of individual house facades by using new material and construction techniques and the enlargement of some alleyways.

Growth—New Extensions

The traditional urban form of the ksar has been affected by recent expansion that has occurred at the outside walls near the main gates. This has led to the demolishing of most of the traditional Ghardaia walls (Figures 73-75) and some parts of the Beni-Isguen traditional walls (Figures 76-79). Also, the lack of correlation between traditional urban patterns and the new more rectilinear block forms and street patterns is quite significant (Figures 78-79).
Figure 73. Pattern of physical urban growth outside the Ghardaia ksar.—From Arbaoui (1981, p. 31).
Figure 74. New developments outside Ghardaia ksar.---From Arbaoui (1981, p. 33).
Figure 75. Land use of new developments in Ghardaia. -- From Arabaoui (1981, p. 33).
Figure 76. Patterns of physical urban growth outside Beni-Isguen ksar
Figure 77. Beni-Isguen early new developments.
From Deluz (1963, p. 11).

Key:

- A = Old ksar
- B = Existing cemeteries
- H = New housing
- N = New cemeteries
- P = Parking
- 1 = Administration buildings
- 2 = Commercial buildings
- 3 = Existing schools
- 4 = New schools
- 5 = Open areas
- 6 = Future holding areas
Figure 78. Beni-Isguen, showing relationship between the old ksar patterns and new settlement patterns
Key:  
A = Old ksar  
E = Existing cemeteries  
H = New housing  
N = New cemeteries  
P = Parking

1 = Administration buildings  
2 = Commercial buildings  
3 = Existing schools  
4 = New schools  
5 = Open areas  
6 = Future housing areas

Figure 79. Beni-Isguen new settlement patterns.---
From Deluz (1963, p. 1).
Movement—Traditional Community

In the traditional community (see Figures 65-70), movement is determined by the transportation system between the following areas: the central area of each ksar, the Azzaba mosque, the open market of each ksar, the cemeteries and musallas of ksar neighborhoods and the palm groves of each ksar. These areas are connected by major streets mainly used for animal transportation. Motor vehicles are allowed to park only in the new parking lots created outside the traditional ksar, in front of the gates near the outside walls. These parking lots also serve as parking for the new extension area (see Figures 76-79).

Movement—New Extensions

Movement between the main traditional areas (see Figures 71 and 72) is still maintained in addition to transportation between the traditional areas and new zoned areas such as administrative, commercial, medical, and recreational areas.

Public and private movement is still maintained by the separation between traffic of public vehicles and the semi-private primary pedestrian traffic and private secondary pedestrian traffic.

The new planned areas are connected by new street systems mainly used for motor vehicles.

The semi-private primary streets provide a buffer zone between the public building zone and private neighborhoods.

Separate areas inside the new settlements are reserved for pedestrians and vehicles. Automobiles are allowed to enter only certain areas, using the traditional plan of gates and guards.
The need for wide streets, parking lots, and garages create new architectural problems for the new extensions.
CHAPTER 6

CONCLUSIONS

The M'zab community is an independent, homogeneous society that has retained its religious and socio-cultural origins, relationships, and practices. Until recently, the community practiced traditional Azzaba principles; they now follow the Jama'a principles, a continuation of the Azzaba. The evidence that a strong correlation exists between the religious and social organizations, on one hand and the community's urban forms and patterns on the other, is quite significant. The following two points were demonstrated in the previous chapters:

1. The M'zab has its own particular regional urban structure which developed from its specific social and religious institutions. At the same time that it is considered as a physical entity it is also linked in many of its planning concepts to a broader social and economic ordering system that reflects the basic principles of Islam. These principles can be characterized by the concepts of collective economic resources, of role-sharing, and brotherhood. The physical patterns that result from these principles can be characterized by walled communities that are closely controlled and tightly knit.

2. The urban structure and planning of the M'zab Valley is also based on certain concepts of the M'zabite's existence in relation to, and interaction with, their environment. This correlation

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is illustrated in the separation of functions of the winter and summer towns and cemetery areas.

All of these principles, traditions, and lifestyles continue to pose tremendous challenges to today's planning and architecture, whether it is based on international, national, or local models. Recent planning and architectural innovations, discussed briefly in the last two chapters, were mainly the result of the French colonization of Algeria and the recent exploitation of Saharan oil resources. At the same time, the M'zab was also subject to a very high rate of growth in population and urbanization. As a result, the community that was controlled by the people who worked and shared ideas collectively has now come under many outside influences. The new influences have been implemented through the authority of the municipality of Ghardaia which functions as a channel for change in the physical form.

The primary issue today is how to integrate these new developments into the community's principles and traditions. In M'zab, as elsewhere, traditions are undergoing change, in both their social and physical forms in the community. These changes and new influences need to be recognized. They cannot be denied. However, change and growth can be planned and controlled by the people of the region who have lived in these communities for centuries.

This will only happen if the changes and influences are channeled through the existing institutions of the M'zab. Accordingly, the real key behind the continued success of these institutions is their ability to direct the growth of their society. And, if these institutions
disintegrate, then the physical form of the community is going to lose
the coherency that is so closely illustrated in its traditional patterns.
Some of this lack of coherency is already evident in the new extensions
that were discussed and illustrated in the previous chapter.

Changes and new developments may occur in two forms.
Changes may occur rapidly, in a manner that does not provide enough
time for existing institutions and physical forms to adjust and adapt,
or they may occur slowly, in a manner that provides enough time for
the existing institutions and physical forms to adapt and to integrate
them. In the latter case, over a period of time it becomes hard to
distinguish between the new and the old as there is much interaction,
communication, and harmony between the developments of successive
generations.

To survive into the future, traditional communities such as
M'zab must develop both general and very specific guidelines to limit
rapid change and to integrate growth into the existing cultural and
institutional patterns.

The physical design criteria that are included in Chapter 3 of
this thesis are illustrative of the type of guidelines that are needed
for all aspects of the traditional society if it is to survive in a coherent
manner into the twentieth century.
SELECTED BIBLIOGRAPHY


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Mercier, M. 1922. *La Civilisation Urbanie au M'zab*. These de doctorat en droit.


