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In The Name of The Merciful

ARDAKAN

HOUSING ON THE EDGE OF THE DESERT

1990

by

Fatima Azam Taghi

Submitted to the Mackintosh School of Architecture, University of Glasgow, July 1990, in fulfilment of the requirements for the degree of Ph.D. in Architecture.

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***Dedicated
to the my beloved lord***

Abstract

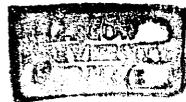
This study concentrates on the city of Ardakan which lies in the edge of the Kavir-i Seiah Kuh Desert in central Iran.

The city is relatively isolated which has meant that its ancient architecture has had the opportunity to develop in a continuous line of evolution for about a thousand years. This evolution has produced an architecture that represents as perfect a fit between climate culture and available resources as one can expect to find. It also represents the essence of the beautiful quality of the normal, standard nature of vernacular building.

This study only covers housing in detail as again this represents the standard building type as apposed to special buildings such as mosque, hammam etc.

The study examines in detail various standard features of the houses and then examines a variety of individual houses from poor farmer to rich merchant. This is complimented by consideration of the materials available and the resultant techniques of construction in particular the vault. This examination exposes the intense fit between all the requirements laid on the house and the resultant buildings are a classic case of "form following function". But it is function given its fullest richest meaning, this when coupled with a respect for the simple laws of symmetry and some restrained decoration has resulted in a memorable architecture produced with apparently great ease.

Finally a question is posed- does this tradition still apply today? The answer given is - in many aspects-yes.



Acknowledgments

For me it is possible to study architecture alone but it is not possible to research architecture alone. Many people over the past eight years have provided various forms of assistance and help. To each and all I am indebted. I would like to cite the following: persons for freely giving their time, counsel, reviews and their comments: Tony Vogt, Dr. Michael Burgoyne, and Dr. John Alexander Smith.

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During the course of this research I was afforded a significant amount of help and encouragement from members of staff and the student body of the Mackintosh School of Architecture, particularly Tony Vogt and the staff. Accordingly I am grateful in particular to the staff of the computer burau and the library of Glasgow School of Arts.

Very special thanks are due to my family for ongoing support, concern and advice.

Finally in acknowledging my fond memories and respect, I would like to dedicate this work to the people of Ardakan.

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Glossary

ab anbar cistern

andaruni interior courtyard

badgir wind-tower

bagh garden

balakhaneh one or two rooms on an upper floor

biruni exterior courtyard

caravanseri inn for travelers, merchants; ribat

chahar-suq crossroads; dome over intersecting street in bazaar

chahar-taq square domed room or kiosk with four arched entrances

cheshmeh opening to courtyard

darband private lane with gate

darvazeh (city) gate

gach Plaster

guristan cemetery

hammam bath

hashti octagonal vestibule

hauz pool

hisar citadel

husayniyah theatre for performance of ta'ziah (martyrdom of Husayn)

iwān open-fronted barrel-vaulted hall facing on a courtyard or as facade feature

kahgil mud plaster

keryas vestibule

kond low flat pointed arch

khābideh very low

khanaqah hospice or other structure for sufi devotion

kuh mountain

kushk pavilion, palace

madrash religious seminary hospice or other structure for sufi devotion

mahalleh quarter

masjid mosque, Muslem house of prayer

maydan large open square or plaza

miyan khaneh connectinglements within a bulding; "room between"

muhandis architect, engineer, geometry specialist

pishtaq entrance portal

qanat underground canal drawing water from mountajn sources by
gravity

qiblah the direction of Mecca where prayer must be orientated

qishlaq winter quarter of nomadic group

ribat See caravanseri

sabat row of arched recesses; passage

saqf roof

sardab basement

suffe See iwan

sufi adherent of mystical Islam, often ascetic member of an Order

taq vault

Tond Sharp pointed arch

Shi'a (adj. Shi'it) the branch of Islam which supports the spiritual
authurity descended through the family of the Prophet. Historical
opponents of the Sunnis

Sunna(adj. sunni) the branch of Islam which supports the authority
of the most able person within the prophet's tribe

yeilaaq summer quarter of nomadic groups

Methodology

This research divides into three sections: Ardakan and Historical Expansion, Elements of Houses, and the Housing Quarters. This narrative concludes with a chapter entitled Materials and Construction.

In section one, the chapters give general information about the region of Yazd and discuss the town of Ardakan and its historic expansion.

In the six chapters of section two the elements of housing are discussed. The discussion focusses on the relationship between the principle factors of climate, culture, materials & construction, and the organization of space or aesthetics.

In section three, six quarters, each of which is recognisable by its individual historic centre, usually where an underground water tank was located, are chosen as typical of the town in terms of their occu-

pation and class of resident such as Charkhab Quarter where the main landlords predominate. Similarly shopkeepers next to the bazaars (Bazar-no Quarter), and farmers on the edge of town next to the fields (Kumlaq Quarter) are discussed. In each chapter, the surveyed houses are considered typical and good examples of these quarters. Most plans are at 1:200 scale and orientated to the north. All the material has been measured and drawn by the author unless otherwise stated. The work originally started under the auspices of Melli University. The survey work took one and half years during which time the author stayed in the Yazd districts - to measure, interview and consult local historic documents.

In the last chapter local materials and ways of construction such as vaulting and arch building are discussed, finishes, etc.

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Section One

Q: What is the purpose of the first section?

A: To introduce the topic and provide background information.

Q: How does the author develop the argument?

A: Through a series of logical steps and supporting evidence.

Q: What are the main points of the section?

A: The author discusses the importance of the subject and its impact on society.

Q: How does the author conclude the section?

A: By summarizing the key findings and providing a final thought on the matter.

Q: What is the overall tone of the section?

A: The author maintains a professional and objective tone throughout the text.

(1) Introduction

(2) Ardakan

(3) Historic Expansion

Introduction

The ancient region of Yazd is situated on the south-east margin of the central Iranian desert. It is a harsh and inhospitable land of barren plains and rugged mountains. Five large towns are located in Yazd: Ardakan, Maybod, Bufgh, Taft and Ashk-i Zar veh Zarch, and the principal city, also called Yazd, is the centre and economical focus of the region (fig 1).

Yazd is largely independent in agricultural and craft products. Wheat, grain, vegetables, pistachios and pomegranates are grown, along with cotton and silk used notably in carpet weaving. Some of these products are still exported to other parts of Iran and abroad. Each craft product of any part of the state is different in style. For example, each town produces its own distinctive sizes, patterns and qualities of carpet.

Yazd is an important centre of Zoroastrian religion in Iran but the bulk of the population is Muslim. Its people are renowned for their strong religious commitment and their hospitality.

Despite a harsh environment, the industriousness of the people of Yazd is recognised throughout the nation. This determination to overcome hardship is expressed also in the forms of the traditional architecture of the region. Rooftops undulate with shallow domes of the yellow loam houses, while here and there treetops can be seen contrasting with the slim needles of minarets and the distinctive shape of the smooth blue-glazed dome of a mosque. The architecture creates an impression of lightness, even of floating but without any claim to monumentality or dominating effect while the greenery in and around walled gardens along the edge of the town helps articulate

the boundary of the urban environment. It is difficult to imagine human settlements being placed more harmoniously in a landscape than in these old towns with their houses of similar types, made from same materials and of the same colour, with barrel-vaulted or domed roofs; houses built so closely together that they have the effect of being one huge low flat building complex. Though perforated by numerous courtyards and intersected by the thin veins of narrow crooked lanes, the complex maintains its homogeneity even when the silhouette is determined by special elements such as wind-towers. This harmony is maintained by the choice of compatible building elements and the result is serene, concentrated and convincing.

In identifying this splendid architecture an examination will be made of one city, Ardakan (fig 2).

Ardakan

Ardakan town is situated at 32°20' latitude and longitude 53°48'. It is located on the edge of a desert at a height of 2580 metres above sea level on the present route from Nayin to Yazd. To the north is the district (buluk) of Aghda⁽¹⁾ and to the south Maybod (fig 3.a).

Ardakan lies on a plain between two mountain peaks, "Shah Afzal" and "Cochil", to the north, and a low mountain range, "Ashez", running south-east to north-west.

Ardakan district is one of the largest in the state of Yazd. It contains two main towns and forty-four small villages⁽²⁾. The centre of the district is the ancient town of Ardakan.

The climate of Ardakan is very dry with a typical annual rainfall of only 67mm⁽³⁾, concentrated between November and April. There are two seasons, the “hot season” and the “cold season”. The former extends from the beginning of May until the end of October with an average midday temperature from July to September of 36°C. The cold season is generally dry and sunny with night temperatures falling as low as -5°C.

The town of Ardakan is surrounded by gardens and farms. On the north, south and east sides are pistachio and pomegranate orchards, and cotton and vegetables farms. These farms and orchards protect Ardakan from the wind and dust of the desert and by cooling and moisturising the north-east breeze they improve the microclimate.

In 1930 Ardakan’s population was 10,430⁽⁴⁾; in 1980 (the latest figure available) it numbered about 50,000⁽⁵⁾.

The official religion of Ardakan is Shiite Islam, though many Zoroastrians have lived for centuries in this area and in the nearby village of Sharifabad.

When the Arabs conquered Iran in the seventh century A.D. most people converted to Islam but some remained Zoroastrian. These people stayed mainly in the southern margin of the central plateau of Yazd, though some fled to find refuge in India. As “non believers” Zoroastrians who remained in Iran had to pay the jaziya (poll tax) to the Caliph. It was no easy life for them. They had to wear plain clothes, were forbidden to ride horses or to engage in commerce and they had to pay more for property than Muslims⁽⁶⁾. As a consequence many learned to conceal their wealth from public view. Indeed, not until the accession of Reza Shah Pahlavi in 1924, when all antagonistic behaviour between religious communities was officially prohib-

ited, did the Zoroastrians feel at ease to venture beyond their fortified township of Sharifabad. In subsequent years the boundary walls of Sharifabad and Ardakan were left to collapse. Gradually the Zoroastrians expanded their township while Muslims commenced a move into Sharifabad.

In such a dry climate the most important consideration for founding a town was to have a good sufficient water supply. The water supply of Ardakan was facilitated by the “*qanat*” system (fig 3, 3.a).

“Qanats brought water and civilisation to areas that totally depended on irrigation water for survival and otherwise would not have been habitable and productive. Qanat system is the most important method of obtaining water in the centre of Iran since Sasanian Times⁽⁷⁾.”

Qanats are underground channels routing water from the under-

ground water table sometimes over distances of as much as fifty miles is then distributed through surface channels called *jubbs* to irrigate the fields and orchards. This qanat system is of ancient origin, and is costly and dangerous both to construct and maintain. But the qanats, the course of which may be traced from the air as a series of crater-like depressions, are Iran’s veritable lifelines; these apparent craters are in fact the mouths of the shafts which are dug at regular interval both to take air down to qanat diggers and to enable the excavated material to be deposited on the surface (fig 3b).

The qanat is recognised as one of the most important factors influencing the pattern and location of residential development throughout Iran. Water distribution techniques and regulations helped determine patterns of streets and built-up areas. Until about thirty years ago, when piped water was introduced to Ardakan, most houses had

access to qanat water. The qanat usually ran at a depth of between two and six metres under the surface. There were four qanats bringing water to Ardakan from the south-eastern hills, each servicing to three mahalle⁽⁶⁾, or quarters. Towards the south side of the town a qanat runs in an open channel in some places and provides irrigation for gardens and orchards. The qanats also serviced the *ab anbars* (underground water tanks) of each mahalle (fig 4). When qanat is serving a cistern at the same time no have access to the qanat to use.

The bazaar in Iran was the economic as well as the social centre of the city and in most cities it is located at the physical centre. The word bazaar is derived from a Pahlavi word *vajar*, meaning market. A bazaar is primarily a centre of trade which has developed over the years from a simple market. However, the bazaar had many more functions than a mere market place, featuring bazaar shops, work-

shops, carvanserais⁽²⁶⁾, warehouses and trade offices. The social elements were largely public amenities such as baths, rest houses, water reservoirs and public washing facilities. Control over imports and exports and tax collection on there was also carried out in the bazaar in special caravanserais and at the gates. These establishments were state built. Other important social elements which controlled the political and ideological life of society were mosques and madrasas⁽⁷⁾ (religious schools) often forming part of the bazaar.

The architectural form of the bazaar is of vaulted streets lit by apertures in the centre of each bay, creating a cool and well ventilated space that is ideal for hot climates⁽⁸⁾.

The bazaars of Ardakan serve not only the town itself but also the surrounding villages. This has always meant that traditional village

produce and crafts were brought to the town for sale.

Grain, sesame, roots of runas (madder), cotton, pomegranite, and pistachio are all on sale. Pomegranite and pistachio are important exports from the region. Carpets, kilims and canvas are the most important crafts and most houses have a hand loom. The canvas is woven by older women and the carpets by young women and girls. Various other local products are made by artisans for sale in the old bazaar. There are two bazaars, the Old Bazaar running from west to east which is a productive bazaar, and new bazaar from the south to the north which is more for shopping (fig 5).

History

The origin of the name of Ardakan has become obscured through time. In this state there are many towns and villages with Persian

names which belong to the period before Islam. According to the local people and to certain histories of the region⁽¹⁰⁾ different pronunciations of Ardakan have different meanings:

1 - Ard in Pahlavi means brave, and could imply that the people who lived in this area were very brave⁽¹¹⁾;

2 - Ardeh is a popular sweet still made locally from sesame seeds. In Farsi “kan” means a place or source of something. So ardeh and kan together mean a place of ardeh;

3 - Erd in Farsi means circle. Because this area was surrounded by mountains (in which there were turquoise, copper and lead mines) perhaps it was called Erdakan⁽¹²⁾;

4 - In Farsi “ordak” means duck and it seems that the area enjoyed a reputation as a habitat for this bird⁽¹³⁾. Indeed a story is recalled in several local history books which refer to a “duck lake” located between Maybod and Ardakan⁽¹⁴⁾.

Pre - historic Ardakan

Recent research based on surviving manuscripts dating from the eleventh century onwards and contemporary archaeological work indicate that a salt water lake comprised the area around the village of Bargin, 24kms to the south-east of Ardakan⁽¹⁵⁾ (fig 3.a). It must once have been a salt water lake.

There is also a story about “Saveh Sea” or Black Sea which refers to the existence of a large lake in this area.

Yazdgerd, the son of the king Bahram, was the last ruler of the Sasanian dynasty. When he arrived in the Yazd area he commanded three officers, called Bidare, Aghdar and Maybodar to build three villages. These were named Bideh, Aghda and Maybod and were located beside the Saveh sea (fig 3.a). Construction continued into the Hammadan era and villages survive today, on the perimeter of the town of Ardakan.

Hence both sources strongly imply that Ardakan did not exist as a settlement before Islam. It is therefore my opinion that:

There was not any name of Ardakan in history and geography books. There was no Ardakan at all or it was not an important place like Aghda or Maybod but. Now it is more important than both of them⁽¹⁶⁾.

Islamic Ardakan

In referring to local history books concerning Yazd⁽¹⁷⁾ and the oral history tradition of local people, there are some episodes from Ardakan’s history after Islam which are worthy of consideration:

There was a place called Zardog. It was the first village where people lived before coming to Ar

dakan. Today there are still some important signs of that village such as a Zoroastrian fire temple⁽¹⁸⁾ (fig 3.a).

Also Baha al-din Abad, located in the north of Ardakan, had its endowment⁽¹⁹⁾, in the thirteenth century, coded: "Ardakan is located in the south of Baha al-din Abad"⁽²⁰⁾.

However, Ardakan remained a village, or a small town until the Safavid period, between the tenth and sixteenth centuries A.D..

Possibly for the first time, the name of Ardakan was recorded through an association with Sheikh Taghi al-din Dada Mohammad, a celebrated gnostic and wise man⁽²¹⁾. He went to Ardakan, built a *khanqah* there, and stayed for the rest of his life⁽²²⁾. There is still evidence of his endowment in Ardakan but no sign of his *khanqah* remains. His mausoleum and mosque are in Bandar Abad 36km west of Yazd.

Ardakan's Historical Development (Fig 6).

A-The First Settlement of Ardakan, now known as the Qal'a, "Citadel".

B-The Second Fortification in the Mongol Period, 7-10/13-16th centuries.

C-the Third Fortification in the Safavid period, 10-12/16-18th centuries.

D-The Fourth and last Fortification, until the end of the Qajar Period, 12-14/18-20th centuries.

A- The First Settlement (13thC) (fig 8)

Ardakan as a place of settlement was established around the thirteenth century. As archeological excavation has confirmed, the citadel was constructed to a definite plan⁽²³⁾. The first qanat, service-

ing the needs of the inhabitants of the castle was named “Ghiyath al-din Amiri”⁽²⁴⁾.

B- The Second Town Wall , 1295-1501 (fig 9).

The outline of the first city wall is shown on plan. The only surviving building which is directly related to this period is Zir-i deh mosque:

“there is a small mosque called Zir-i Deh (literally, “below the village”) below Castle Square. It is supposed to have been built in the early 10/16 century. The date of the foundation is inscribed of the entrance door”⁽²⁵⁾.

This period of development occurred throughout three hundred years until the arrival of the Safavid Dynasty. Construction was established along two sides of the castle square, that is, to the north and to the

south. The north became known as “Bala Deh” or “above Castle Square” and the south was named “Zir-i deh” or “below Castle Square”. This expansion included a continuation of the “Qanat-i Amiri “ which extended from north to south through the town.

There was a famous and important road which passed south west of Ardakan. It came from Isfahan (fig 9), divided into two branches, one to Tabas and Mashhad; the second to Yazd, Kerman and Bandar Abas (on the Persian Gulf). The first was used as a pilgrimage route to Mashhad and the second was a trade route. The proximity of these roads to Ardakan was evident in some shops through the exchange of goods. There was also a carvanserai⁽²⁶⁾ accommodating pilgrims on their way to Mashhad.

C- The Third Town Wall, Safavid Period, 1501-1736(fig10).

The name of the settlement of Ardakan has been recorded as “Baladeh” and also as “Qasabeh”⁽²⁷⁾. This implies that Ardakan was a township by the seventeenth century . The next evidence concerns the situation at that time: “this noble town has from earliest times been a place of a knowledgeable, wise, faithful and religious people. Ardakan was called Small Greece among the learned at that time. It contained mosques, a khanqah, public baths, bazaars, suqs, orchards, and beautiful houses”⁽²⁸⁾.

Ardakan an endowment of Sa’id Rukn al-din Hassn-i Yazdi in Aghda, “was a village of Maybod”⁽²⁹⁾.

The establishment of some of the older and important buildings, such as the Masjid-i Jami^c, are recorded with apparent accuracy:

The Jami^c Mosque is on the side of the east-west bazaar. It must have been built in 11/17th century . There is a kilim which was made in 1038 AH (Islamic date), this date can be observed on it (fig 11)⁽³⁰⁾.

In conclusion, the historical evidence implies that Ardakan was not a town or a large place until the Safavid period.

The development of Ardakan, in this period, continued to the north and to the south. Because of the main road passing through the town, the bazaar continued to expand and the population became richer and grew in numbers.

The newly established quarters were Charkhab, Kushk-no, Bazar-no and Mirsaleh⁽³¹⁾. The people who lived in these quarters had a variety

of occupations; for example, most people who lived in Charkhab district were landlords and typically the governors of the town also lived there. The inhabitants of the Bazar-no, or Kushk-no quarters, beside the bazaar, were mostly merchants, tradesmen or workers in the bazaar (fig 12).

There was another district which was called Sharifabad. It was located outside the recognized Ardakan boundary because the inhabitants were not Moslem but Zoroastrian. In this period Ardakan had two bazaars, centres for shopping and trade with an extensive range of shops. Friday mosques, religious schools and public baths were established in each district.

Each quarter had a small centre to satisfy the needs of the people who lived around the area. Shops, a water tank for communal supply and

a square for public meetings were established. These depended on the size of the population and as a result the size and quality of these spaces varied.

D- Fourth Town Wall, 1736-1924 (fig11).

This period of development occurred over approximately 150 years during three dynasties (Afshrid, Zandid and Qajar) of which the last , Qajar, was the longest⁽³²⁾.

A wall surrounded Ardakan, it had eight gates⁽³³⁾. One gate called “Safe gate”, at the beginning of the western-eastern bazaar opened on the road from Isfahan to Yazd (from the north-west). Near it were two carvanserais which were used to store and exchange goods. The gate

at the beginning of the second bazaar on the south side, was named “Bazaar-No gate” and opened on the Isfahan-Tabas road and the Sharifabad-Herisht shrine road (fig 3.a). Pilgrims who wanted to visit Imam Reza’s shrine, which is in Mashhad, had to pass through the desert. Groups of travellers in caravans came from the Isfahan area and stayed in Ardakan for a while before passing through Tabas, Nishapur and Tows before finally reaching Mashhad. Sometimes these journeys took more than one month. On one side of the Bazar-no gate, inside the town wall, a carvanserai called Hazraty was established for pilgrims of Imam Reza, who stayed there free of charge. There was also a *ribat*⁽³⁴⁾ to the south of the town, near Mirsaleh gate, providing shelter for travellers.

It seems that the development of the south-north bazaar was related

more to Herisht’s shrine, which is located to the north of Ardakan in the mountains 15km away. Zoroastrians visit this place each year on the 18th of the No Rose Persian New year (20 March).

During this period, not only were the established quarters expanded but also new quarters such as Ali-bek, Tiran and Kumlaq were commenced. By 1741 there were four main roads, each of which terminated at a gate on the town boundary. Two roads passed through the bazaars, as can be seen on the town map. The Isfahan-Yazd road originally came through the town but during the Second Period the road was re-routed outside the boundary (fig 12).

References

- (1) The other is Maybod which is 6km away to the west of Ardakan. Maybod was founded more than 1500 years ago.
- (2) The Geographical culture of Iran, no date, Tehran, 10.
- (3) Based on table 5. Cambrige History of Iran, Vol. I, Ed. W.B. Fisher, Cambridge, 1968.
- (4) According to Masud Kayhan, Juaghrafiya, ii, Tehran, 1933, 438.
- (5) According to counting in 1975 by Ministry of Home.
- (6) Lord Curzon, Qazieh Iran, 294.
- (7) P. Beaumont, Qanat system in Iran, 1971.
- (8) Mahalle was (and still is) a unit of the residential area based on either religious or occupational groups. The divisions are peculiar to each city according to social and political criteria. Mahalle or quarter has a center which includes a few architectural elements such as ab

anbar, mosque, squre, some shops, etc.

- (9) Madrasa was an endowed theological school providing student learning, a prayer hall, and sometimes class rooms. Perhaps devised in the tenth century by Ghaznavids to combat Shiism, it was adapted for the same purpose by the Persian and Turkish Seljuks (J.D. Hoag, Islamic Architecture.

From the Seljuk to the comming of the Mongols (1040-C.1220). As Sunnis, the Sljuks were anxious to defend their orthodoxy and in their fight against the propaganda of orthodox shiism they developed the madrasa, a form of theological college, to train Sunni leaders.

- (10) The principal sources are: Muhammad Mustoufi, Jami^é-i Mufidi, ed. Iraj Afshar, 3 volumes, (11/17th century), Tehran, no date. and “Borhani Jami^é” which is an old Iranian dictionary.
- (11) Abolghacem Rafiy Mehrababadi , Ardestan Fire Tower, Tehran, no date, 10.

(12) Jami-i Mufidi, 726.

(13) Although the size of the lake (before Islam) gradually diminished over the years there were still so many ducks available that their hunting proved a popular pastime with the local people.

(14) The historical books which are mentioned below (no 16).

(15) In Farsi “Bargin” means harbour suggesting that this village used a harbour for ships on the Saveh Sea.

(16) The references are:

Iraj Afshar Memorials of Yazd, Anjuman-i Ahtar-i Melli, Press, Tehran, 1970, 57; Jafar abn Mohammad-i- Mohammad-i- Hasan-i- Jafari Tarikh-i Yazd (9/15th century) , ed. Iraj Afshar, Tehran, 29; Dr Sutodeh, Hudud-i Alam (the Boundaries of the World), Tehran, 1961, 136.

(17) Abol Hossain Ayat, Tarikh-i Yazd, Tehran, 1367/1939, 135, 136, 137; Jami-i Mufidi, Memorials of Yazd and Ali Mohammad

Vaziri, Jami-i al-Khairat, Ed. Iraj Afshar, 733/14th century, republished in 1960, Tehran.

(18) Iraj Afshar, Memorials of Yazd, 57.

(19) The name Baha al-din Abad comprises two elements “Baha al-din” and “Abad”, the first part is an Arabic name and Abad in Farsi means a place of settlement. In about the thirteenth century a trademan called Baha al-din was paid to dig a qanat for the inhabitants of the Baha al-din Abad area which became his memorial.

(20) Memorials of Yazd, Iraj Afshar.

(21) such as: Jami-i Mufidi, volume 3, 660; Memorials of Yazd, 57; Tarikh-i- Yazd, 111 and History of Yazd, 135, (7/13th century).

(22) Khanqah, usually translated into English as “convent”, provided accommodation for Sufi mystics.

(23) The excavation has been undertaken by Anjuman-i Athar-i Melli, since 1977, not published.

(24) Usually each qanat has been named after its founder and this one was founded by Ghiyath al-din Amiri.

(25) Memorials of Yazd, 59:

(26) Caravanserais, loading travelling merchants and their animals, were prominent urban monuments to trade. They were built mostly on the outskirts of town and were often the results of private benefactions, (World of Islam, 1970, Ed. Bernard Lewis, 111)

(27) In Jam-i- Mofidi , volume 3, 326, 338 and 391.

(28) Ibid, 726

(29) In Jam-i- al Khayrat , 132

(30) In Memorials of Yazd, 58

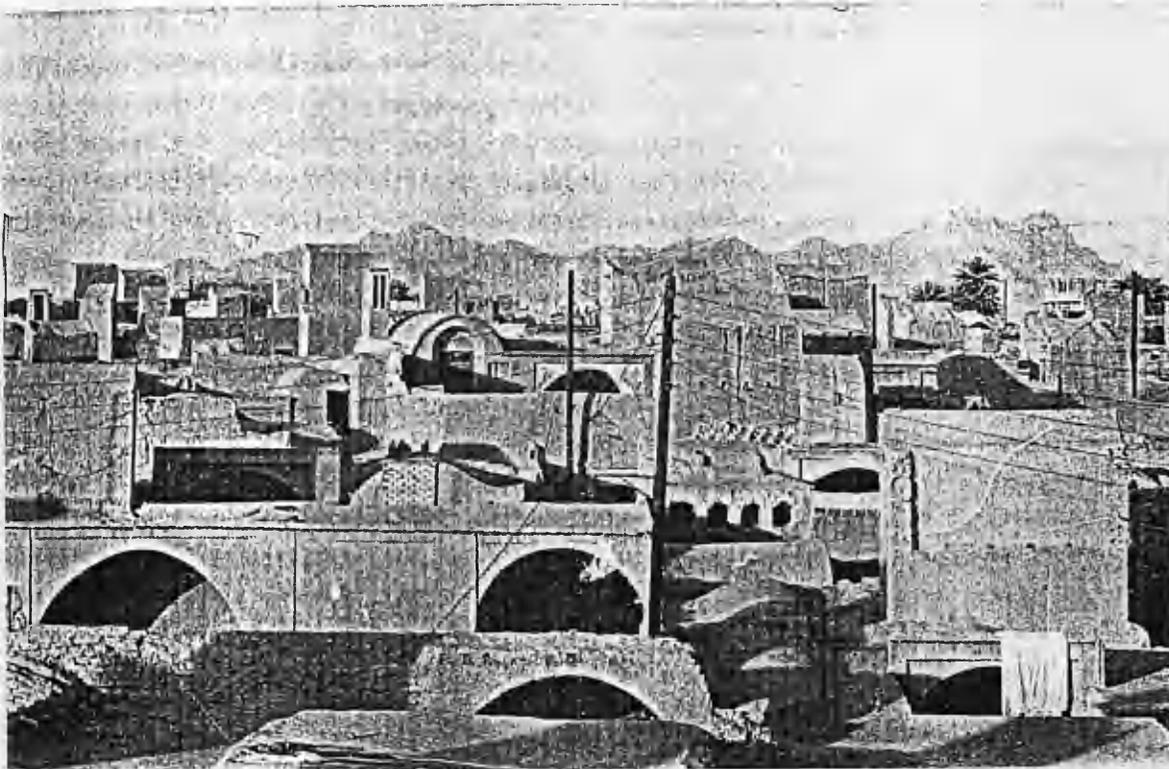
(31) This information is supported by the sources mentioned above and through oral traditions about mahalles or quarters which are handed down until today. There are still signs of the ancient places, e.g. Charkhab public bath and some parts of the second wall.

(32) In 1149/1730 Nader became Shah. The Zand dynasty succeeded in 1193/1779 and Qajar rule was established by Fath Ali Shah in 1212/1797. This dynasty remained in power until 1924, when overthrown by Reza Shah. World of Islam, 270.

(33) From the sign remains of the last boundary, the writer was able to draw a plan closely resembling the original one. There is a local story about Masha Allah Kashi who was a rebel near the end of the Qajar dynasty. He attacked Ardakan with his men and conquered it. He stayed there for a few months and by gathering taxes he repaired the town wall.

(34) Caravanserais are often called *ribats* or *robats* in Persia. Founded by the Seljuks and their predecessors, their primary function was to encourage trade by protecting caravans; they also served as Royal Post houses

(35) Architecture of Islamic World, London, 93.



al view over the rooftops of Ardakan towards the mountains in the north.



Fig 1: Map of Iran showing the position of Ardakan on the modern trade route from the Persian gulf to Turkey and the old pilgrimage route from Isfahan to Mashhad.

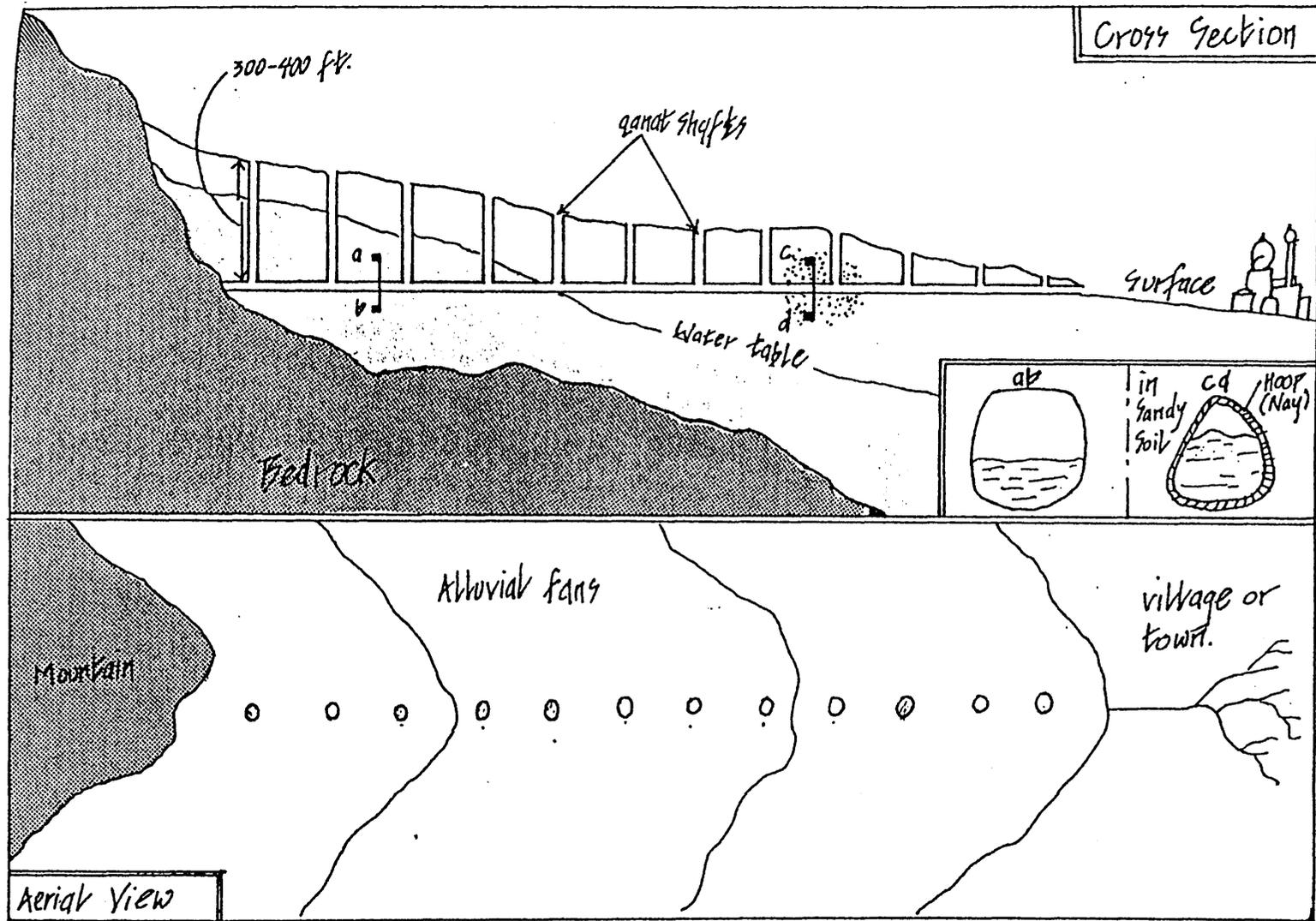


Fig 3: A typical qanat system (F. Akhalaghi, Kashan, Oxford University, 1983).

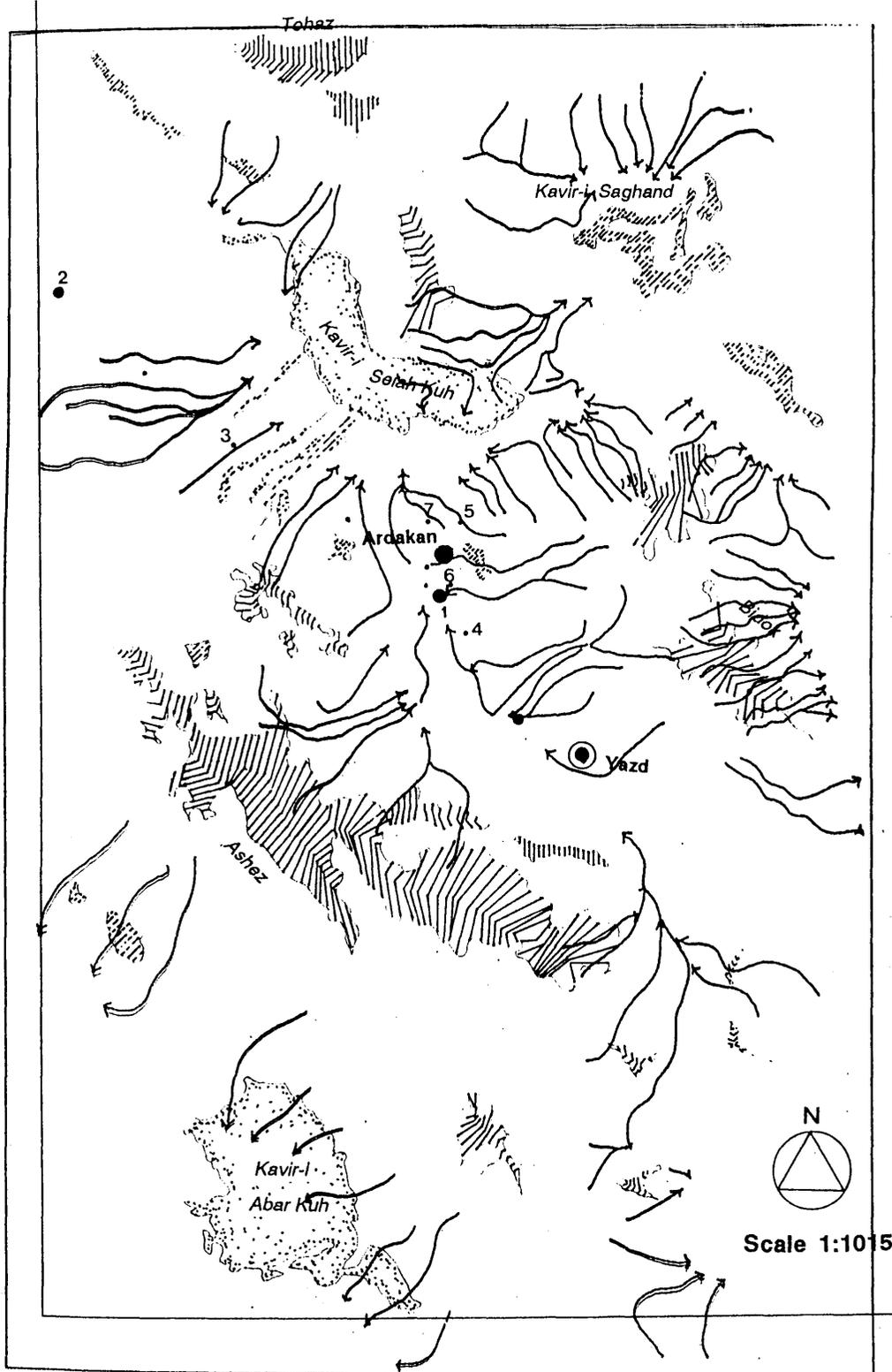


Fig 3.a: Ardakan in the region of Yazd (drawn by areal survey)

1. Maybod
2. Nayin
3. Aghda
4. Bideh
5. Herisht
6. Bargin
7. Zardog

Fig 3.a: Seasonal streams in the region of Yazd.

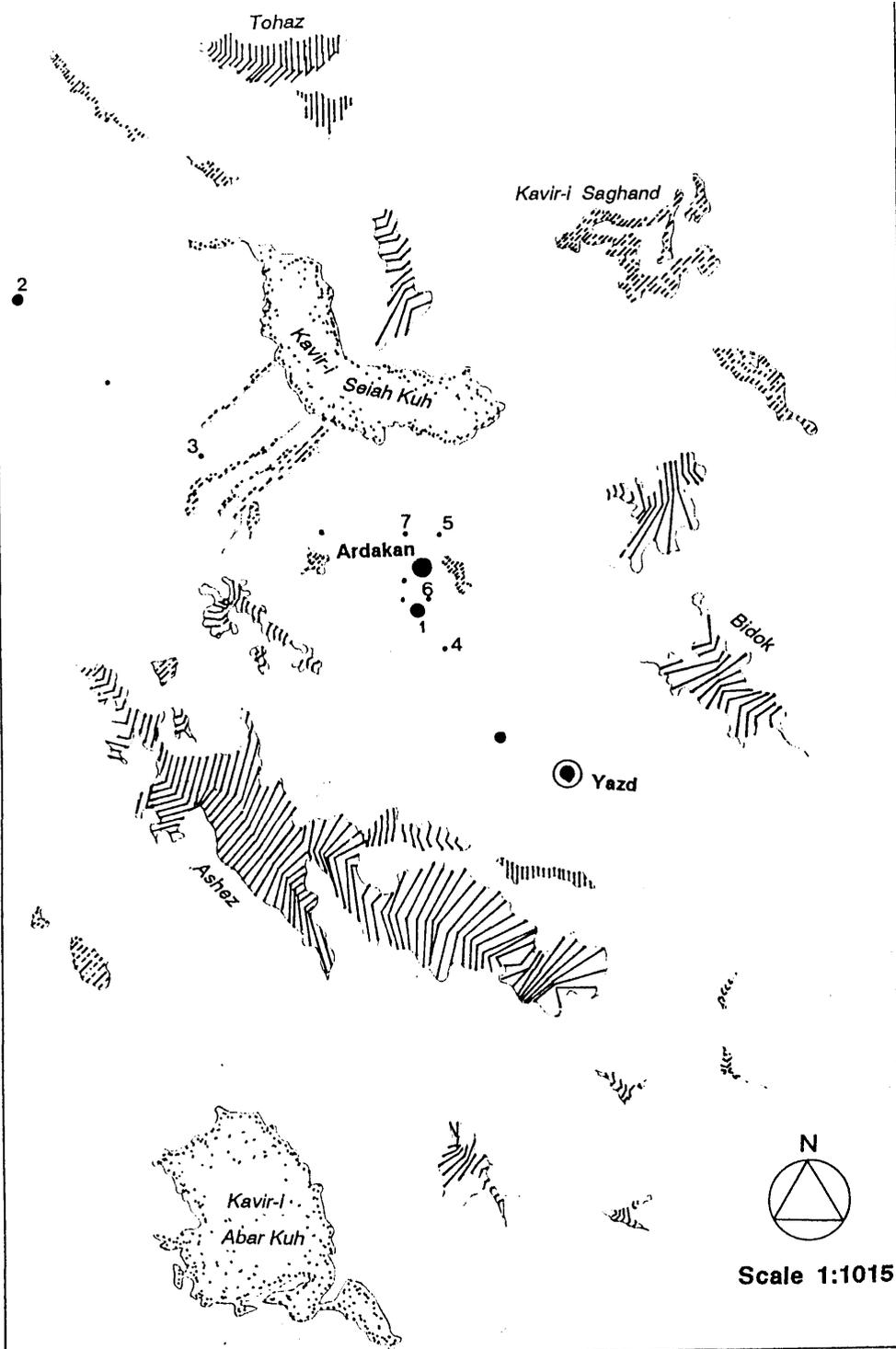


Fig 3.a: Ardakan in the region of Yazd (drawn by areal survey)

1. Maybod
2. Nayin
3. Aghda
4. Bideh
5. Herisht
6. Bargin
7. Zardog

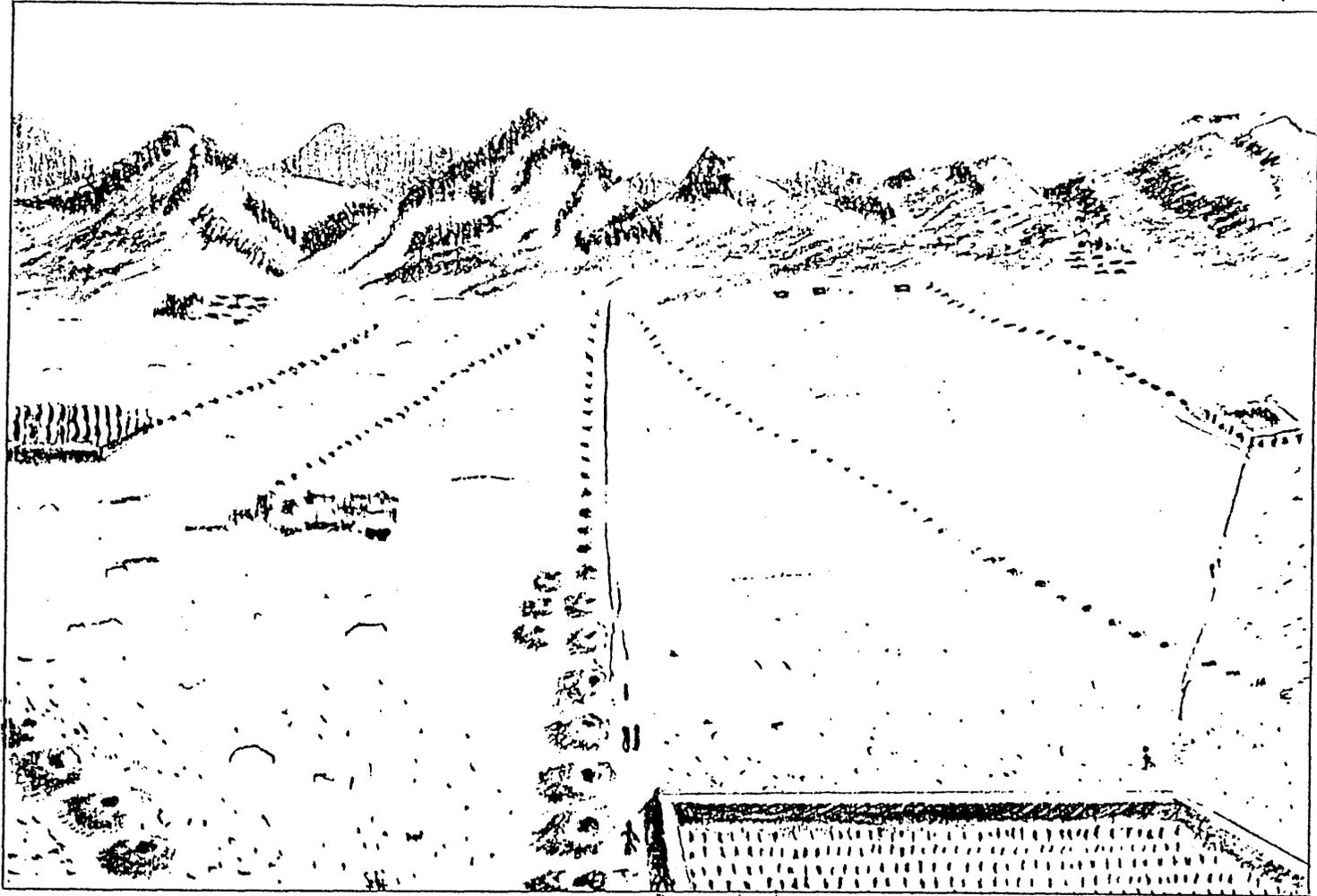


Fig 3b: Line of qanats leading from the hills to villages and towns, (E. Beazley & M. Harverson, Living with Desert).

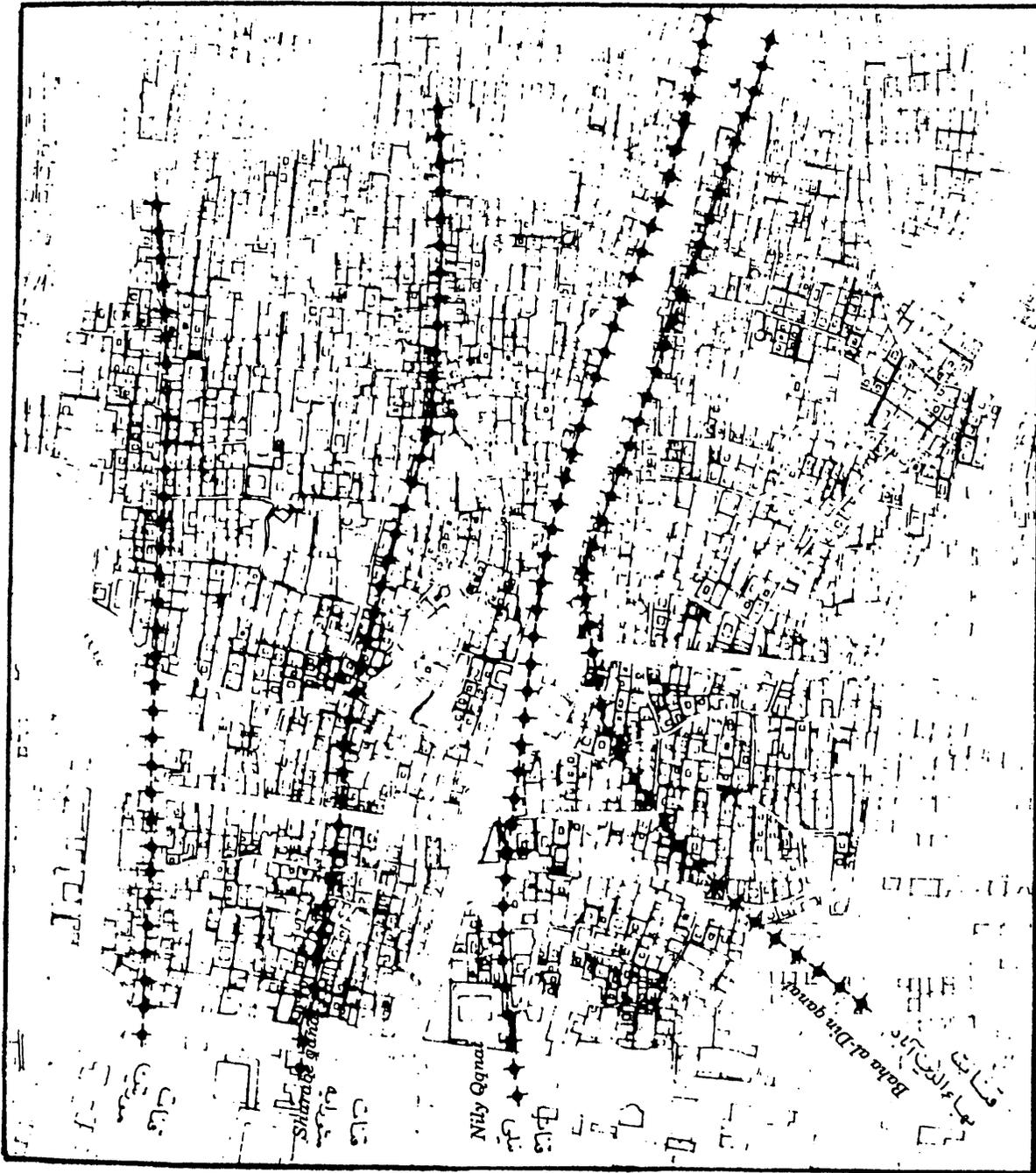


Fig 4:
Four qanats bringing water to Ardakan
from south-east hills.

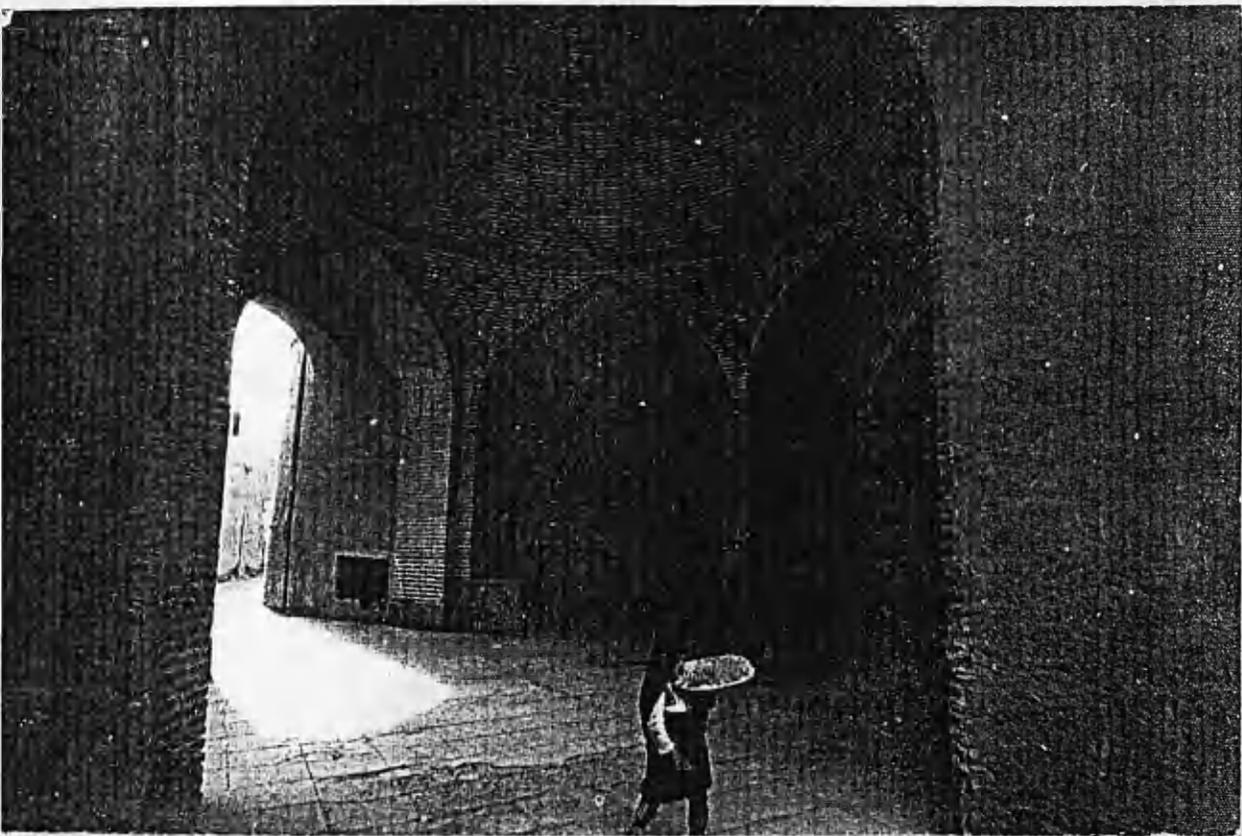
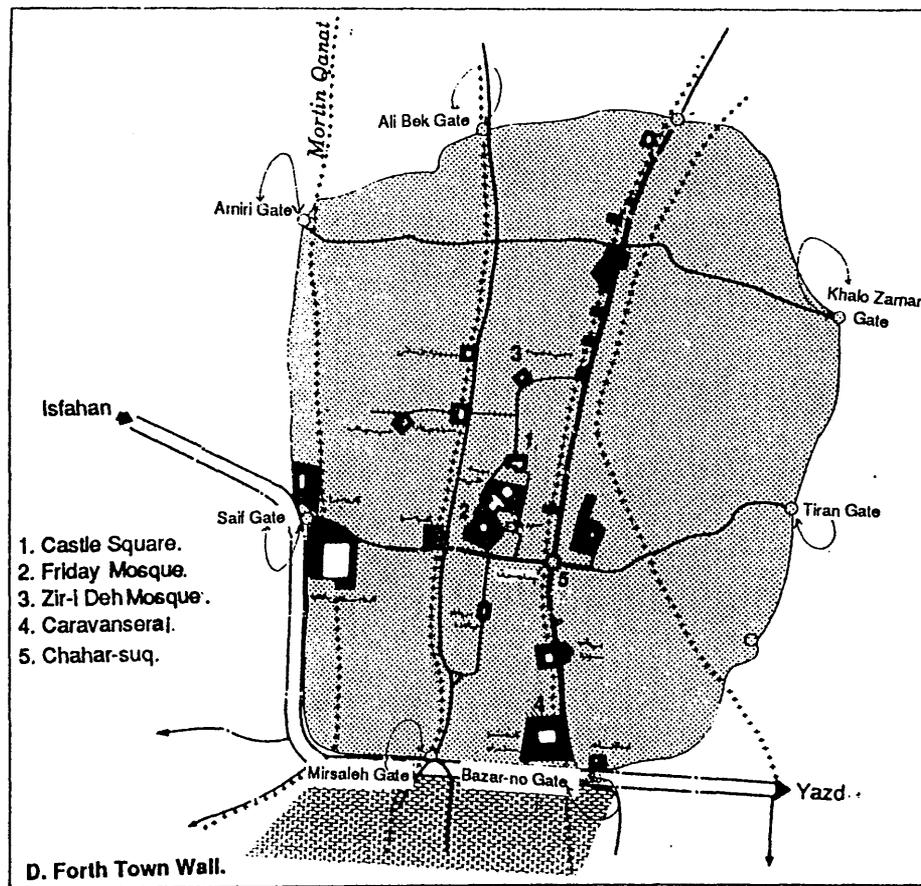
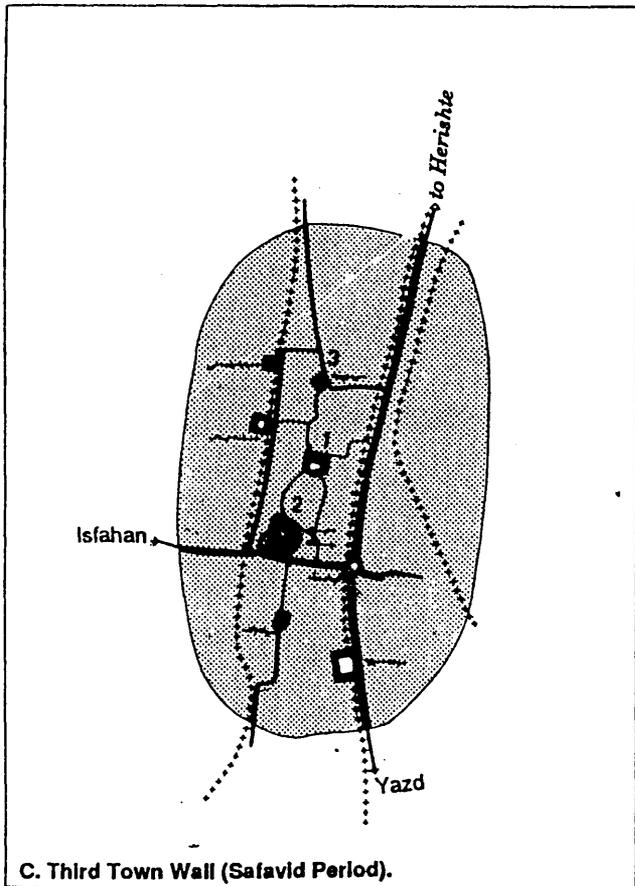
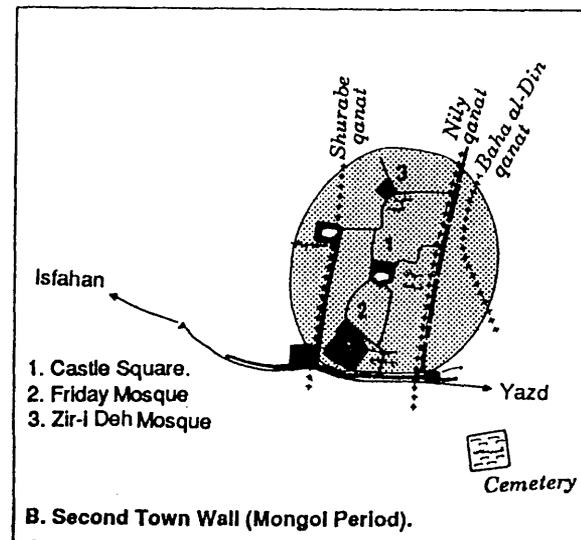
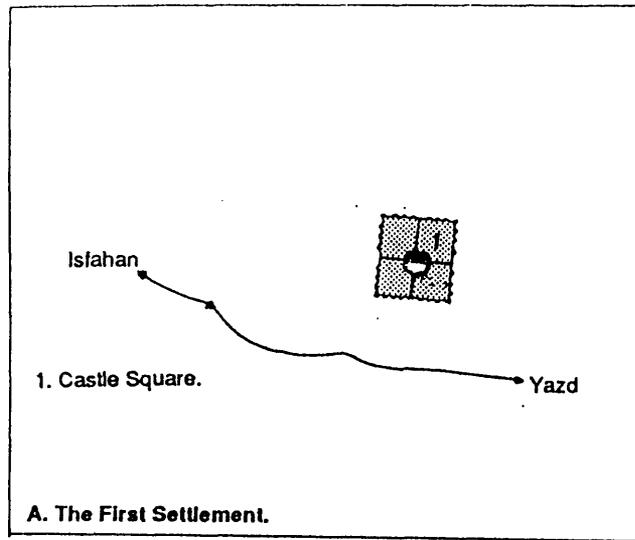


Fig 5: The Mohammad Taghi junction (chahar-suq) between two market-streets (suqs) in the New Bazaar.





a

Fig 7:

a. Shops in the New Bazaar.

b. Women and children in Citadel Square.

c. Metalworkers shop in the old Bazaar.



b



c

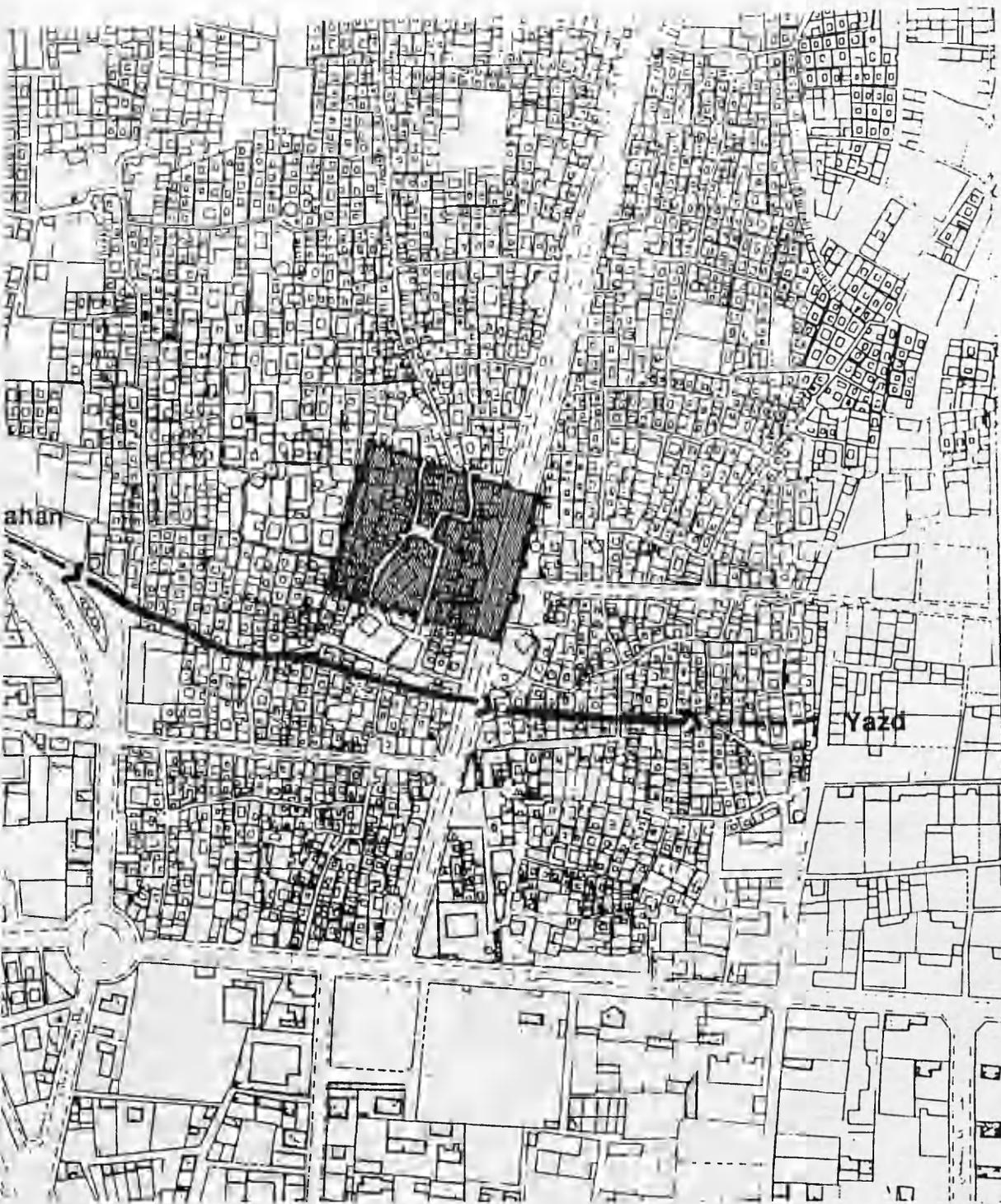


Fig 8: Map of the centre of Ardakan showing the position of the first, fortified settlement and the old route from Isfahan to Yazd.

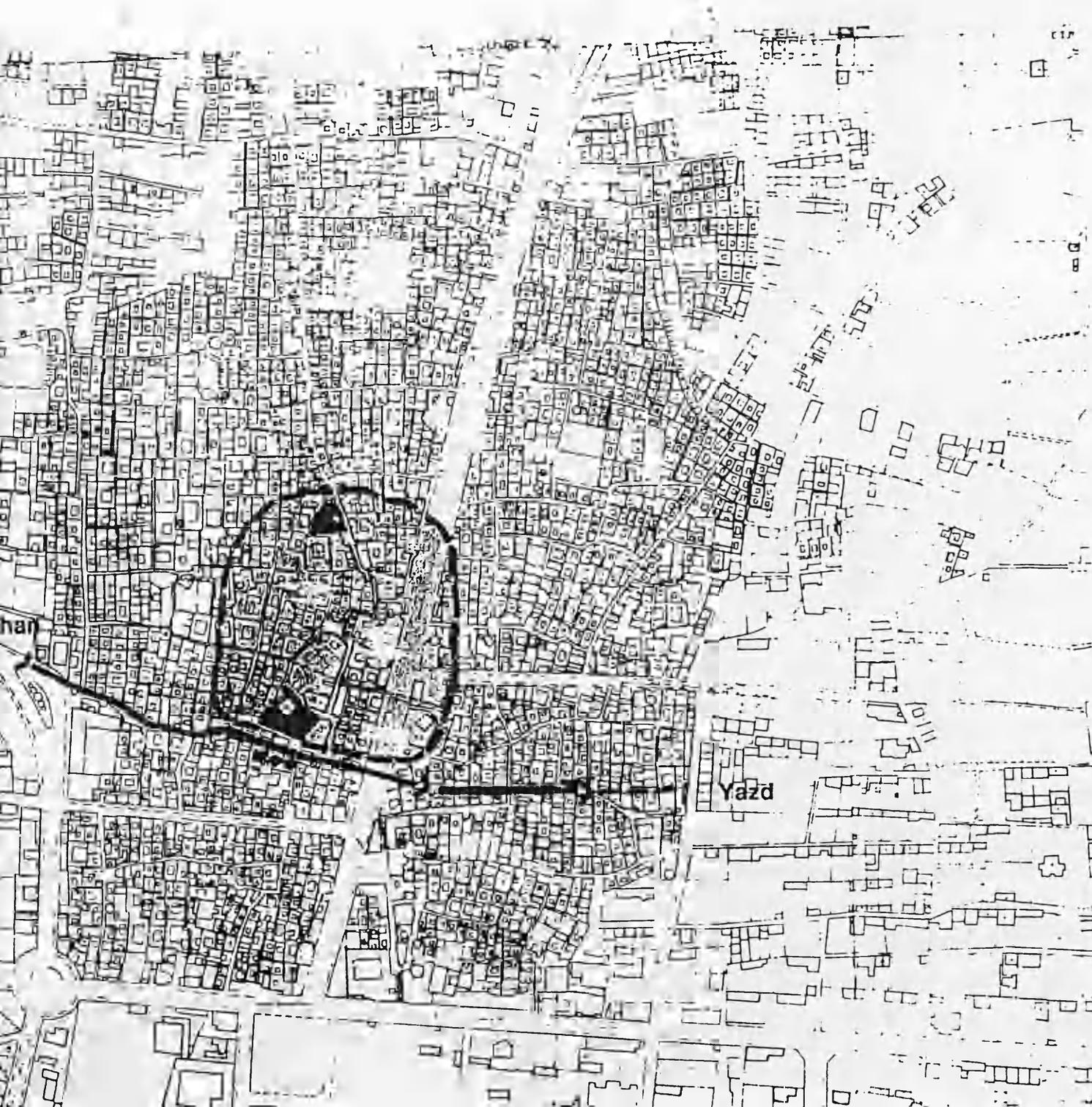


Fig 9: The second wall of the town included two quarters (Baladeh and Zir-i deh) and two mosque.

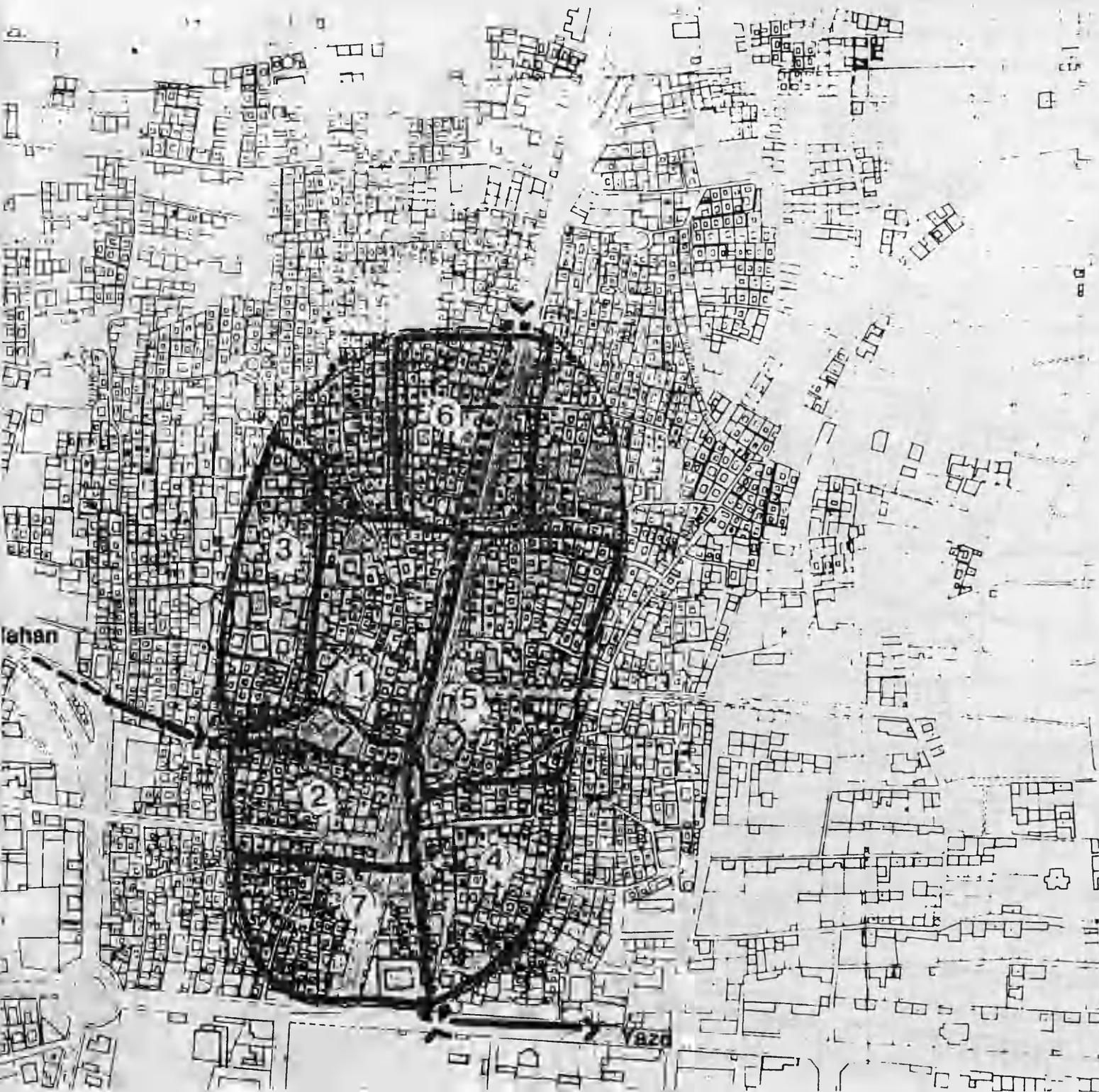


Fig 10: Third wall , enclosing seven quarters and two bazaars.

1. Zir-i Deh
2. Baladeh
3. Charkhab
4. Baza-no
5. Tiran
6. Kushk-i no
7. Mirsaleh

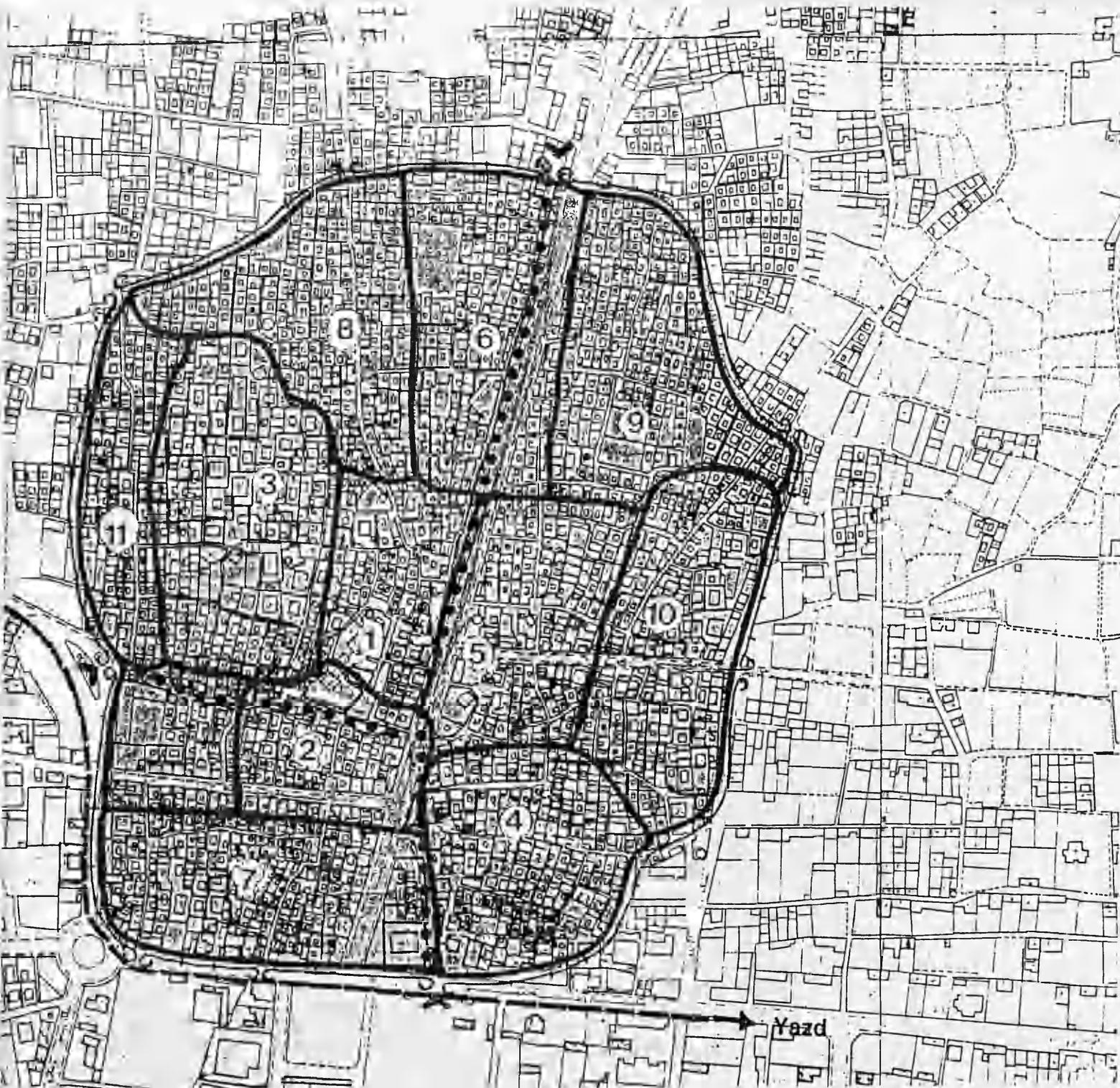


Fig 11: Forth and last wall enclosing eleven quarters.

1. Zir-i Deh
2. Baladeh
3. Charkhab
4. Baza-no
5. Tiran
6. Kushk-i no
7. Mirsaleh
8. Ali-Bek
9. Kumlaq
10. Amiri

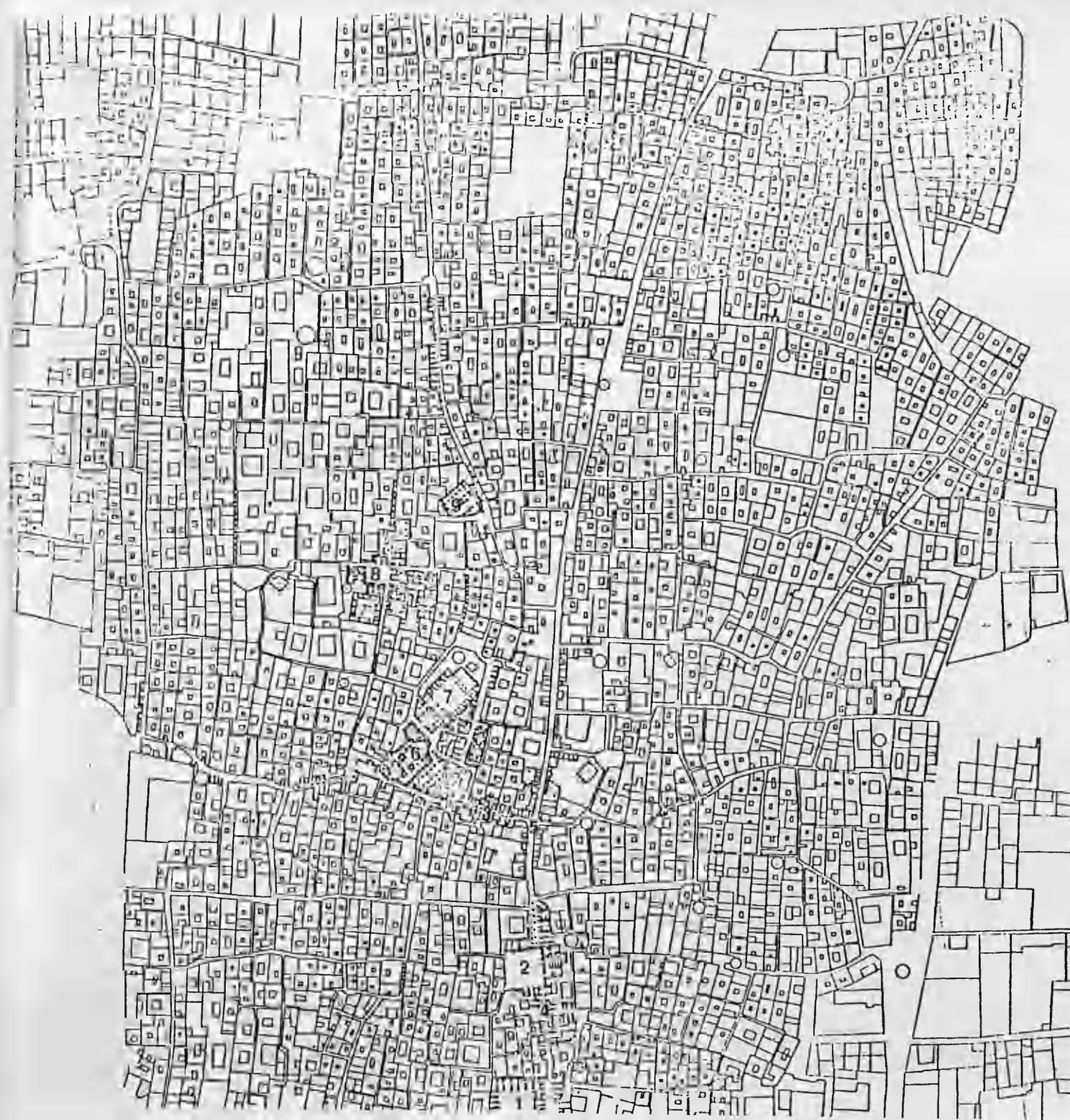


Fig 12:
1. Caravanseri.
2. Bazar-no Square.
3. Old Bazaar.
4. New Bazaar.
5. Chahar-suq.
6. Friday Mosque.
7. Madras.
8. Charkhab Square.
9. Zir-i deh Mosque.

Section Two

(4) Courtyard

Courtyard

“For the mountain dweller who has wandered a long day through the soundless, shadeless desert, coolness, the green of a tree and the bubbling of water mean paradise”⁽¹⁾
(fig 1).

Courtyards in Ardakan are usually rectangular and are the central feature of the houses. The rooms, depending on their importance, open directly by doors and windows or indirectly through passageways or suffes on to the courtyard, which can in turn serve to connect them. The rooms, in large houses, are generally about 600-800mm above the level of the courtyard and in small houses about 200-400mm. The courtyard is the central connection in each house. Not

only is the main entrance connected to it but also most of the rooms are reached through it (fig 2).

The courtyard also serves as a direct or indirect light well in buildings with few windows on the street. If any room lacks openings on the courtyard, one or more skylights are used.

The courtyard performs an important function as a modifier of climate. Trees in flower beds and water in a small pool generate humidity and lower the ambient temperature, thereby cooling the surrounding rooms⁽²⁾. Suffes, badgirs and sardabs work together with the courtyard to create a cool and pleasant micro-climate in the heat of summer (fig 3), (see chapters on Badgir and Sardab below).

The courtyard serves also as an air well into which the cool, dense, night air sinks. Because it is protected by high walls or surrounding rooms, the sun's rays do not heat the courtyard until later in the day. When the sun's rays penetrate into the courtyard the heated air rises and convection currents set up an air flow that ventilates the house and keeps it cool (fig 4). The walls to the courtyard also facilitate outdoor activities as a result of protection from the wind and dust.

The courtyard is a centre of private domestic life. Where necessary high parapet walls are erected between houses to preserve privacy by screening neighbours from each other. Although a simple facade is presented to the outside world, the interior courtyard of the house is the place where the family is free to work and relax (fig 5).

Types of Courtyard

In wealthy establishments the male and female quarters are housed around separate courtyards. Field studies indicate that there are two basic house types in Ardakan, one with a single courtyard and another with two or more. In the latter form, one courtyard was probably also intended for male visitors, with a second exclusively for the use of the family and friends. Occasionally a third was provided as a service area or as a stable (fig 6).

A- Houses with one Courtyard

In this type of house the courtyard serves as both living space and service space, which can be classified into five groups as follows:

Courtyard completely surrounded by rooms (fig 7.1). Those rooms

to the north and south are used as living spaces while those to the east and west are usually service areas.

Courtyard surrounded by rooms on three sides and a wall on the fourth, (east side), (fig 7.2). The majority of houses in this group include summer and winter suffes at the north and south ends of the courtyard. The reason for the west-facing wall, which has no rooms behind it at all, is that during summer afternoons the high level of the sun, combined with the highest ambient air temperature, makes rooms on this side of a courtyard unbearably hot.

Rooms on the north and west sides (fig 7.3). The north end is occupied by the winter suffice, while the west side contains service spaces such as kitchen and stores. On the east and south sides are high walls.

Rooms at the north and south ends of the courtyard; high walls on the east and west sides (fig 7.4). This and the preceding layout avoid the problem of west-facing rooms mentioned above.

These four types exist in old urban districts. The fifth type, in which only the northern end is developed (fig 7.5), is found in newly developed area. This type consists of a winter suffice, living space and service space along the north end

B- Types of Houses with more than One Courtyard

In a good example there are two or often three courtyards. The whole family lives in the best compound and the men folk receive their visitors in the smaller one. Though this rule is not without exceptions, women in this type of house do not seem to complain about the nature

of the housing. Houses which have a main courtyard and a second courtyard have slightly more privacy than houses with only one courtyard. This is because traditionally the members of the owner's family may enter the main courtyard, while guests, with no direct relationship to the family, would not enter that courtyard (fig 8).

The celebrating of important family occasions, such as births, marriages (the giving of wedding feasts) and religious feasts, is usually centred on the second courtyard. A family reception room separate from the men's reception room is often provided.

In the design of traditional houses, sunshine, difuse light, air and water were of predominant importance. In Ardakan, each house

usually has a pool in the courtyard and some flower beds, allowing the inhabitants to appreciate nature⁽³⁾.

Concepts of wealth, fertility and coolness are all associated with water, which is an essential part of Persian architecture hence. Pools are the most important architectural elements in the courtyards.

The smallest courtyards in the poorest people's houses feature a small pool and a tree situated in such a position that they can be seen from the rooms (fig 9). Originally necessary for storing water, pools are now often used for irrigating flower beds and for absorbing dust from the atmosphere. They were also used for rinsing dishes and washing clothes, although nowadays sinks and washing machines usually suffice. Evaporation of water and the presence of plants both raise the

humidity and help to keep the air cool. Accordingly pools and channels were developed for their visual beauty and incorporated into elaborate architectural schemes (fig 10).

In the past (before the introduction of piped water supply in 1960), pools in some large houses were filled by pumping water from a qanat passing through the house. In this sort of house, a moveable platform on which the inhabitants might rest and drink tea or eat dinner in the afternoon was often placed over the pool in summer. Such platforms also provide a cool and safe place for sleeping at night under the protection of a mosquito net. The platforms have legs which are placed inside the pool. In this way people are protected from rodents, which are unable to reach the platform through the water in the pool (fig 11).

Trees and flowering plants are grown in beds for their natural beauty, and in addition most trees produce fruit by the end of summer and many plants offer medicinal uses. Pomegranite and date for fruit , weeping willow for shade, yellow rose for perfume and for the treatment of stomach disorders, oleander for killing insects and sweetorier as a source of medicine, are among the most popular plants in Ardakan. Another characteristic of courtyard plants is their deep colour, which absorbs sunlight and reduces discomfort through glare (figs 12-14). It is important that the space between the plants and the summer areas of the house is small. If there is too much space between them or there is no vegetation in the courtyard, the glare results in visual discomfort from reflected sunlight off the pavement penetrating into the living space.

Usually, a small house has a modest flower bed with a pomegranite tree and a small pool. The size of the smallest pools is about 1.0 x 1.0 x 0.8m deep. Mostly, the spacious richly-tiled courtyards of wealthy townhouses contain four flower beds around a large pool with a fountain (fig 15). Walkways, often raised above ground level, separate the planted areas. In some quarters, such as Mirsaleh, the whole garden is sunk to the level of the cellar floor, so as to be nearer to the qanat. Because the level of the qanat below the ground is between one and two metres, so there are two levels of courtyard, one at the qanat level and the other at ground level (fig 16).

Sensibility and affection for nature, together with the diversity of the local conditions in this area, have led to widely different building-forms.

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- 1) Rainer, R. Iran, Tehran, 1974, 12.
- 2) Michell, George. Architecture of the Islamic World, London, 1978, 90, 184, 199.
- 3) Napiar, M. Five Years in Persian Town, London, 12, 14.

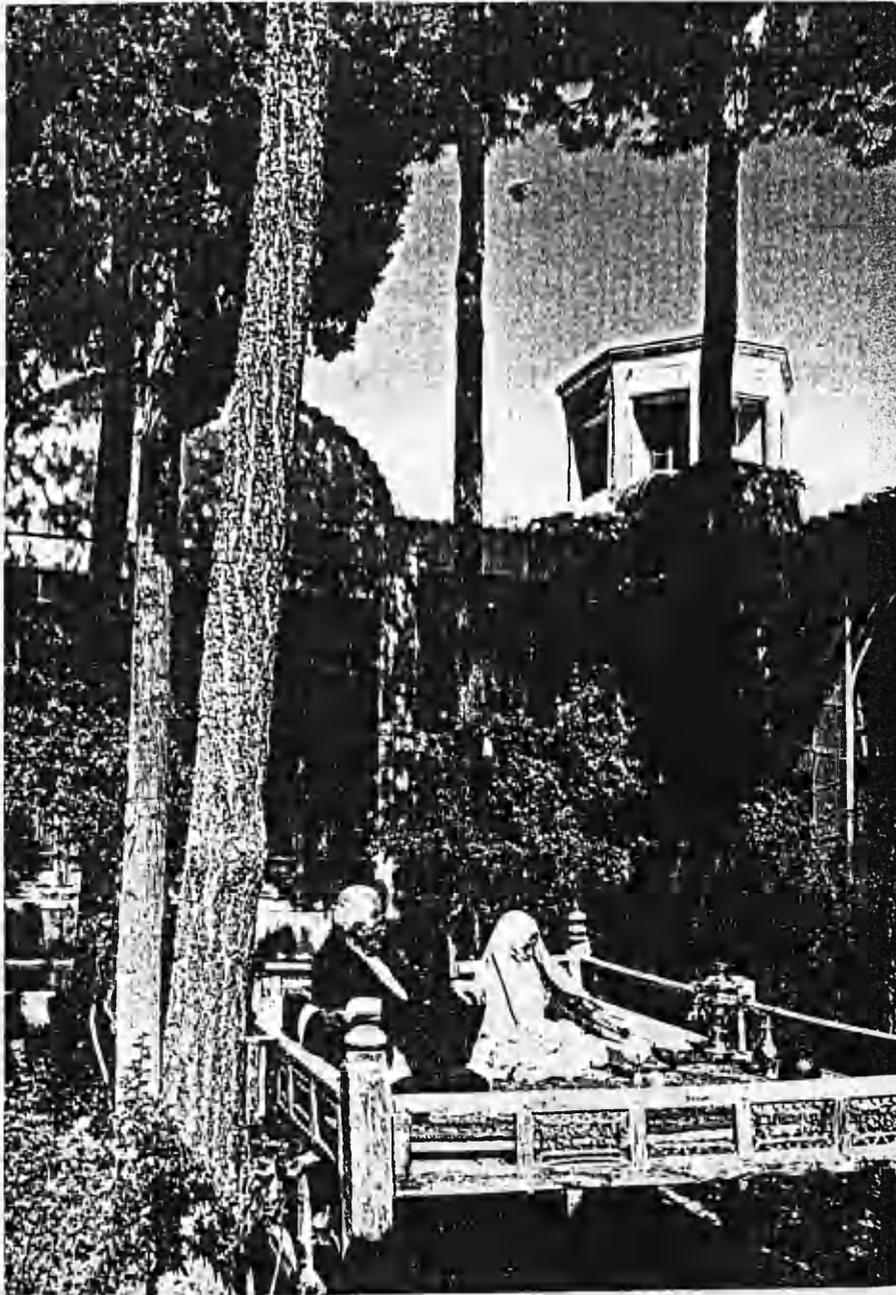
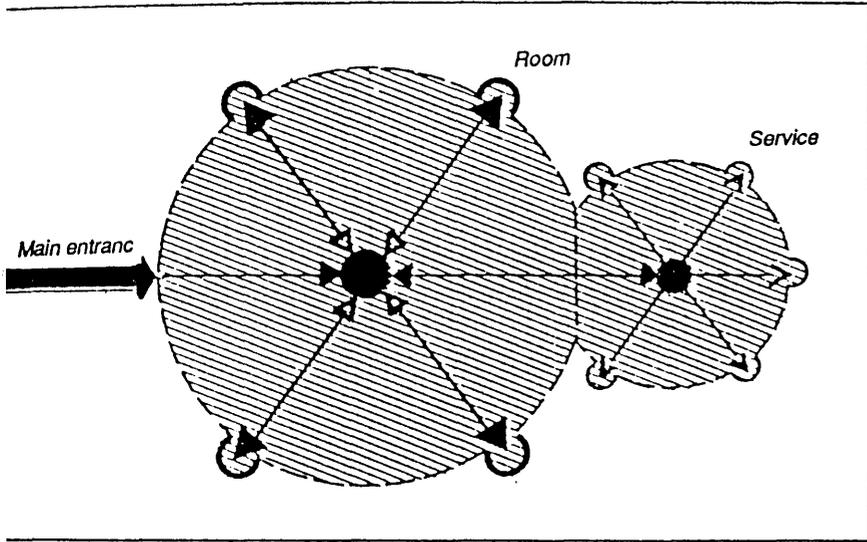


Fig 1: Family enjoying afternoon tea on a moveable platform over a shaded pool in the centre of the courtyard.



2: Courtyard works as centre of connection.

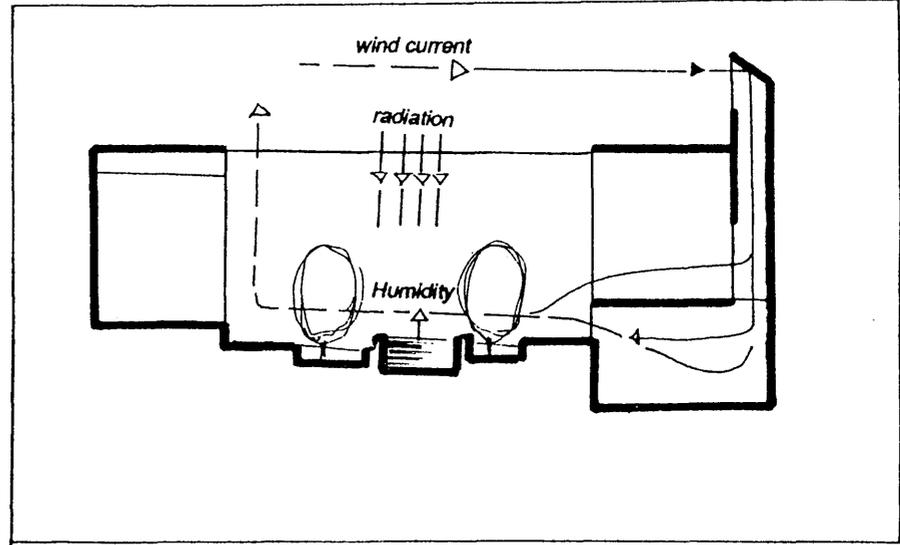
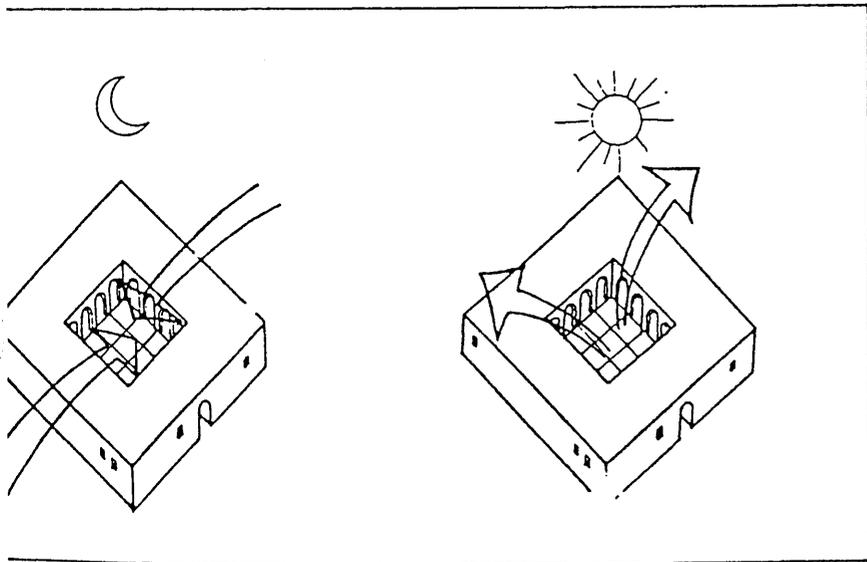
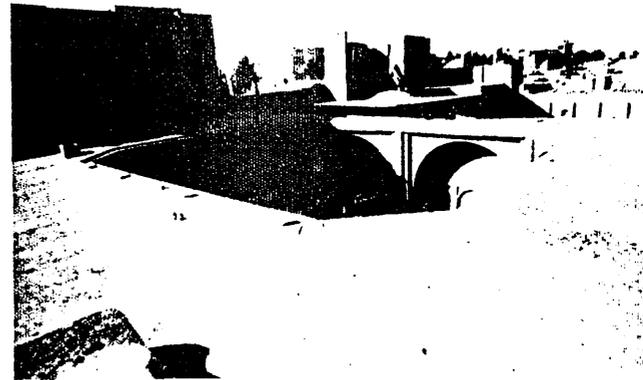


Fig 3: Courtyard as a modifier of climate.



3: Courtyard, as lightwell and air well.



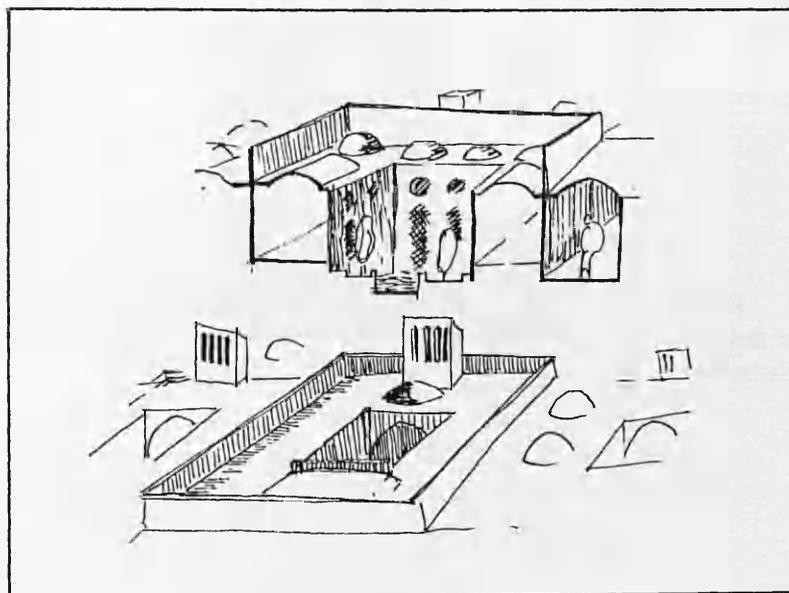
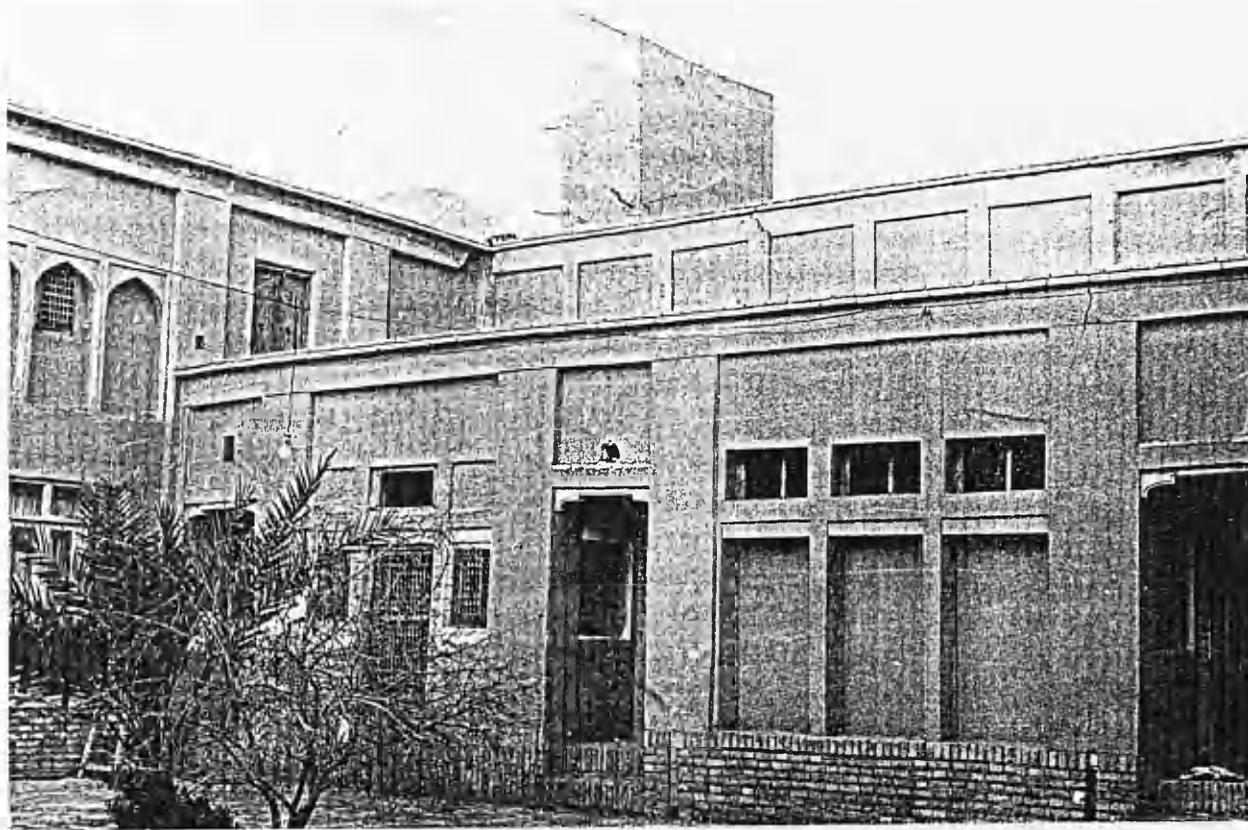


Fig 5: Private domestic life. High parapet walls preserve privacy, screening neighbours from each other.

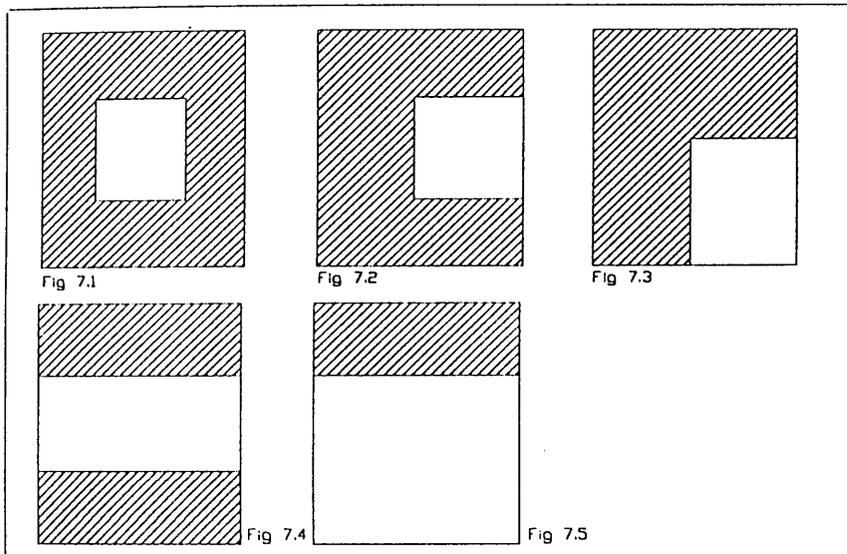


Fig 7:
Typical houses with
one courtyard.

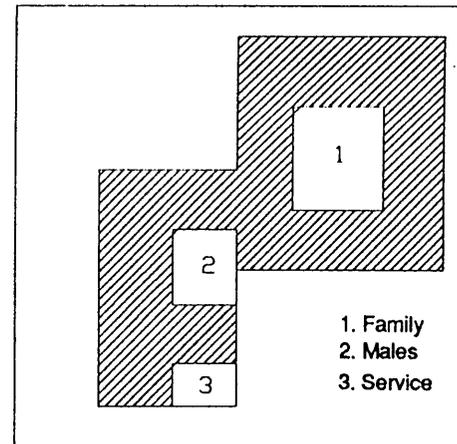


Fig6:
A house with three courtyards.

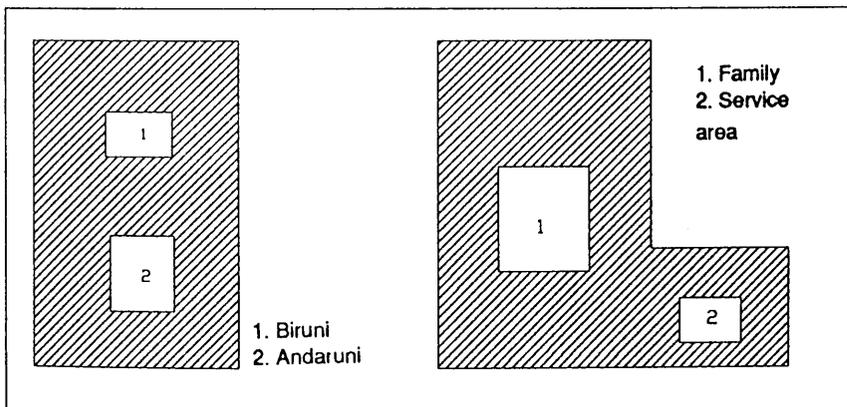


Fig 8:
Typical houses with
two courtyards.

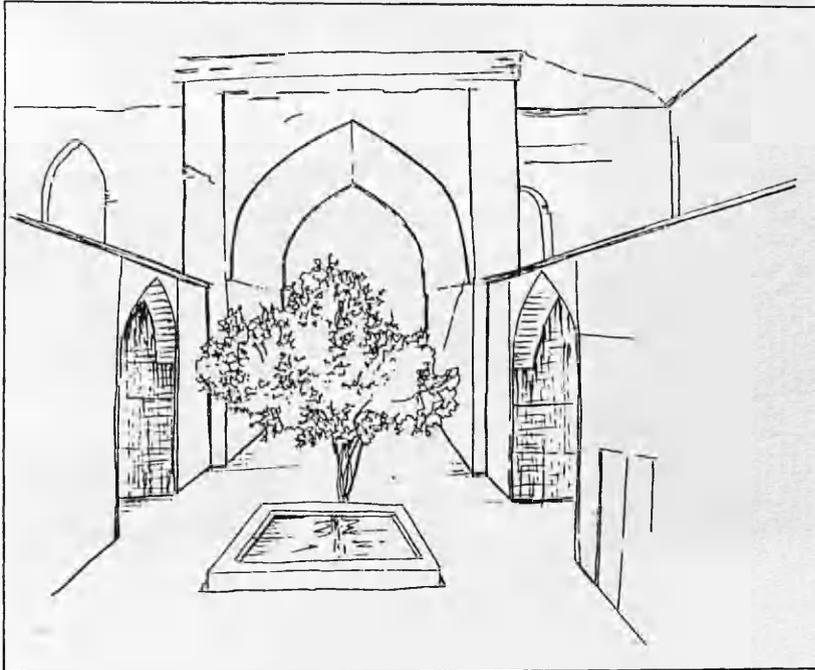
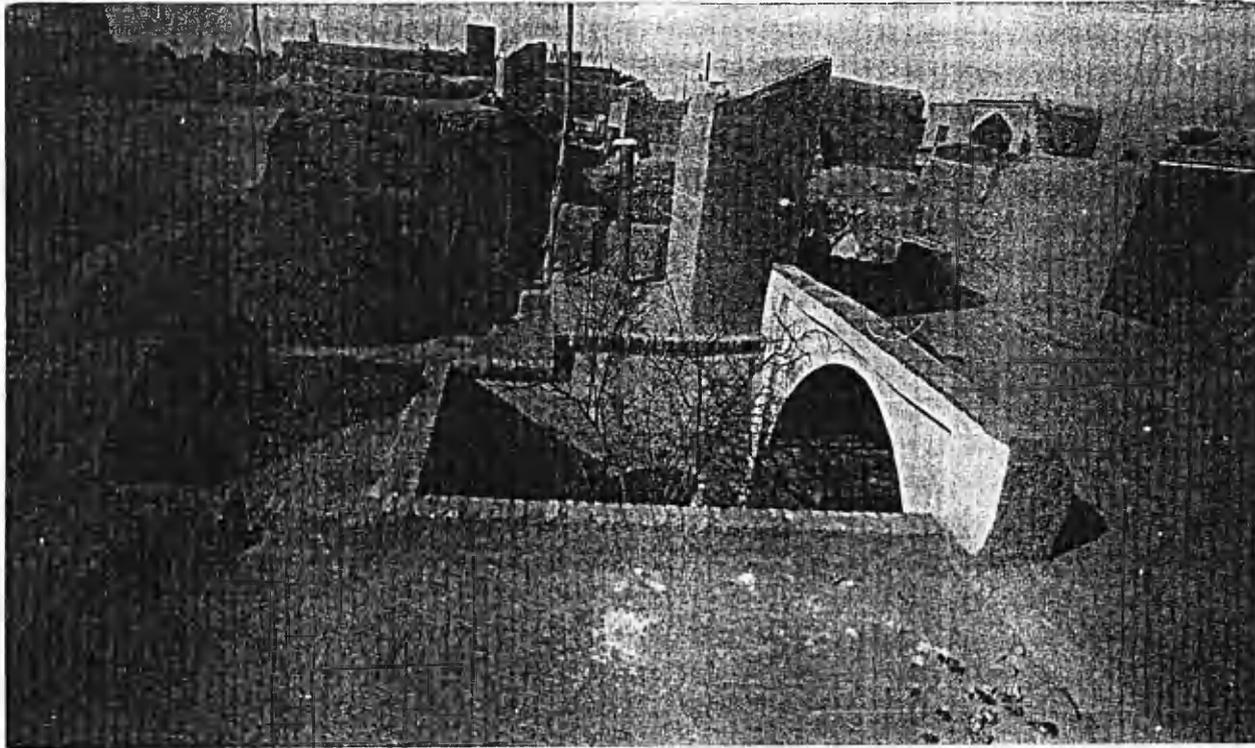


Fig 9:
Small courtyard with pool and flower-
bed.

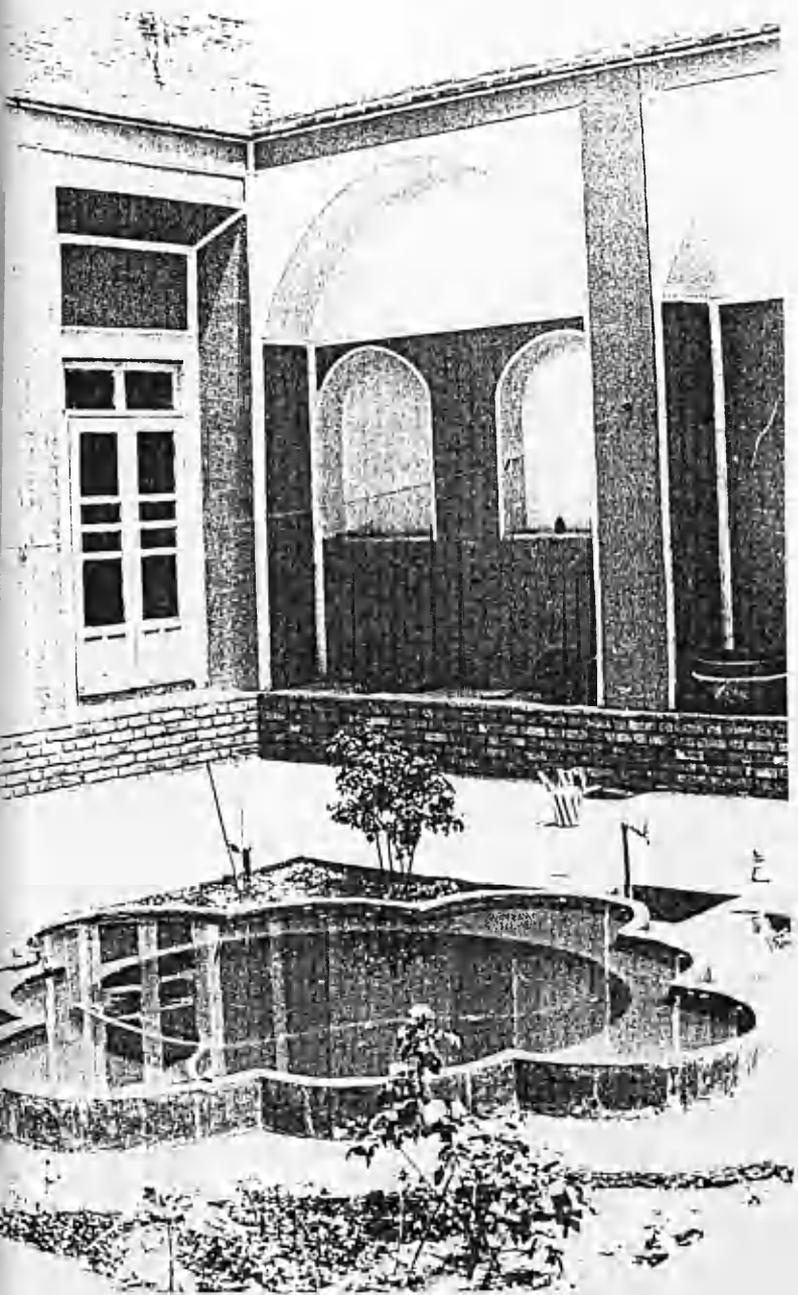


Fig 10:
Pool and flower-beds develop beauty in
elaborate architecture.

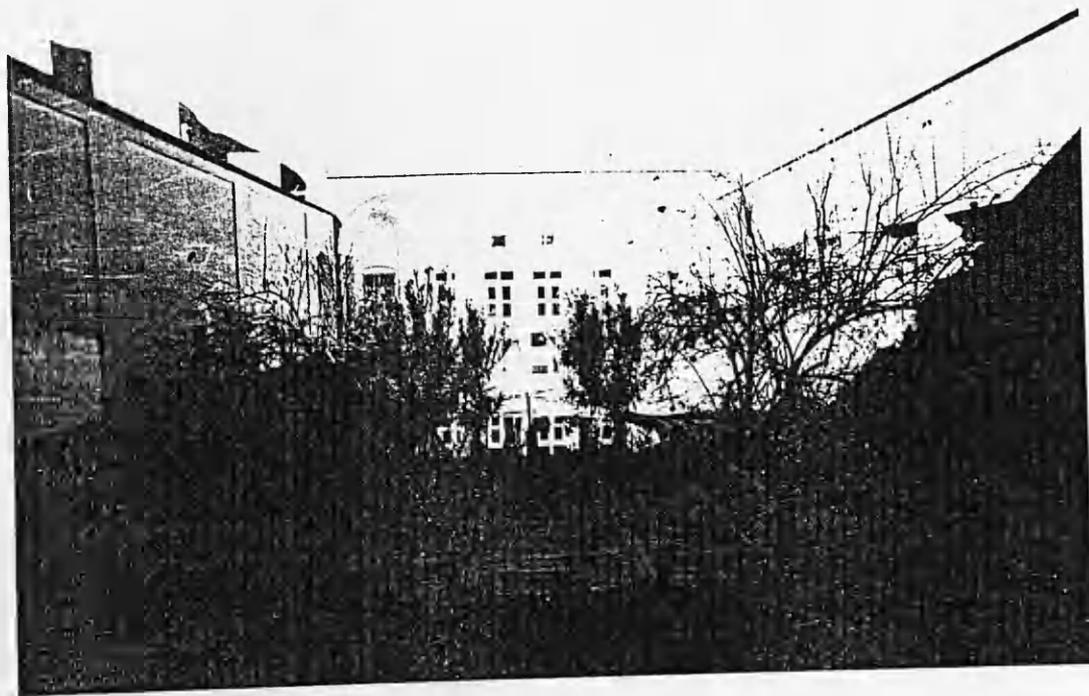


Fig 11:
Moveable platform with legs.

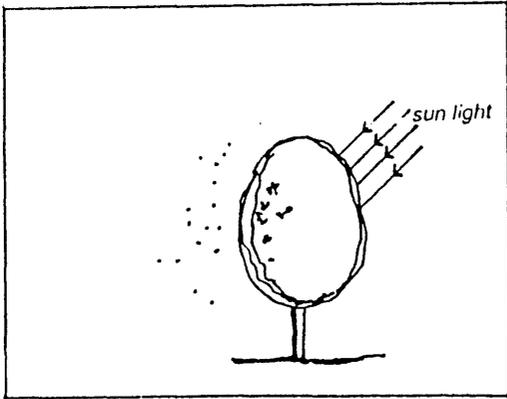


Fig 12: Dark colour of plants reduce discomfort of glare.

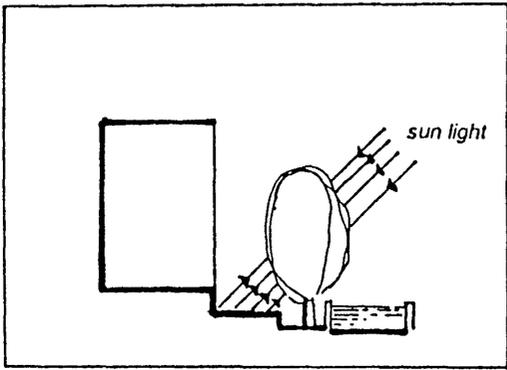


Fig 13: Plants shade living area.

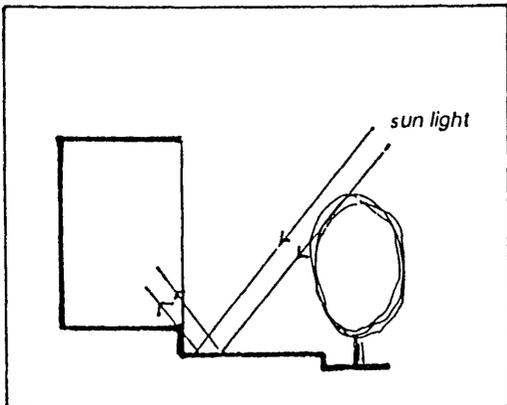


Fig 14: Reflection of sunlight cause discomfort in living area.

Fig 15:
Various arrangements of pool and flower-beds.

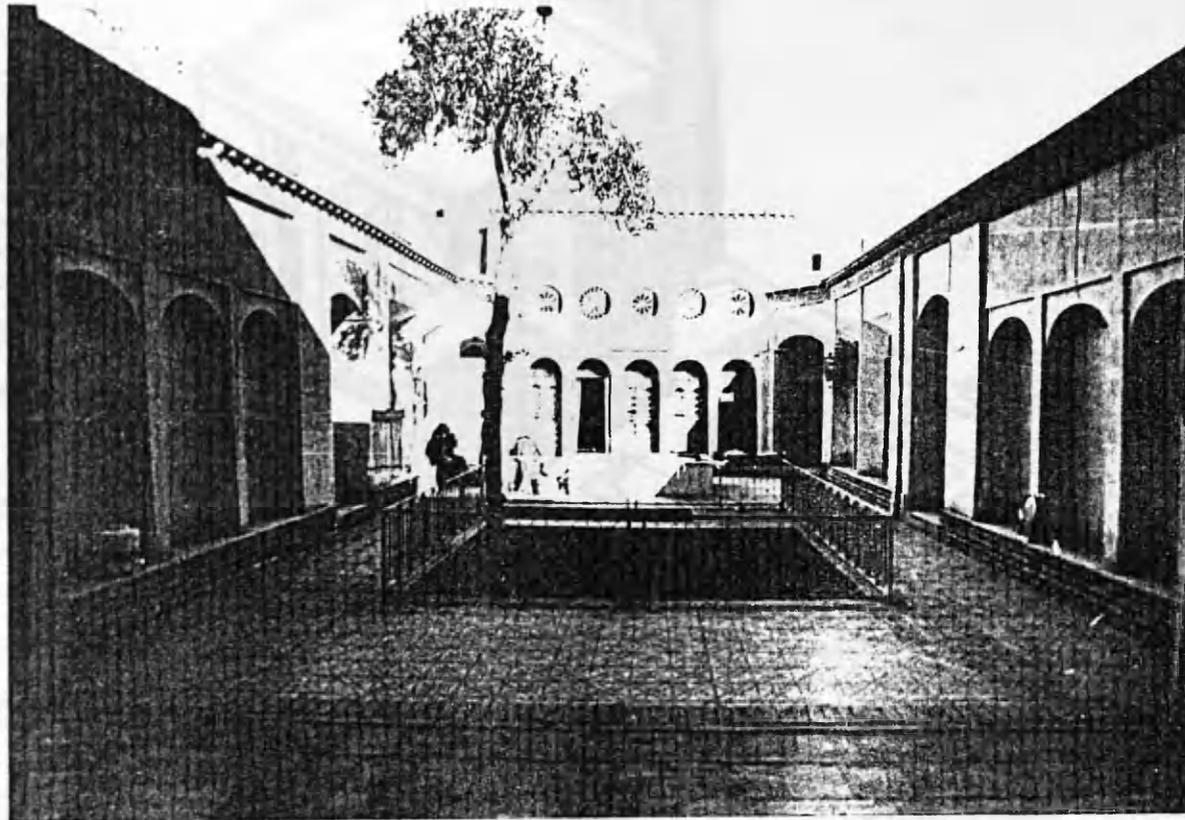
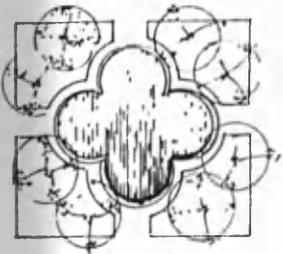
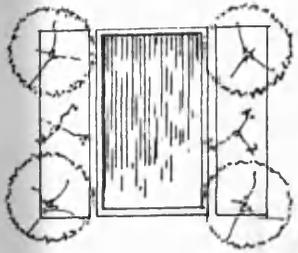


Fig 16: Courtyard of merchant house in Baladeh Quarter.

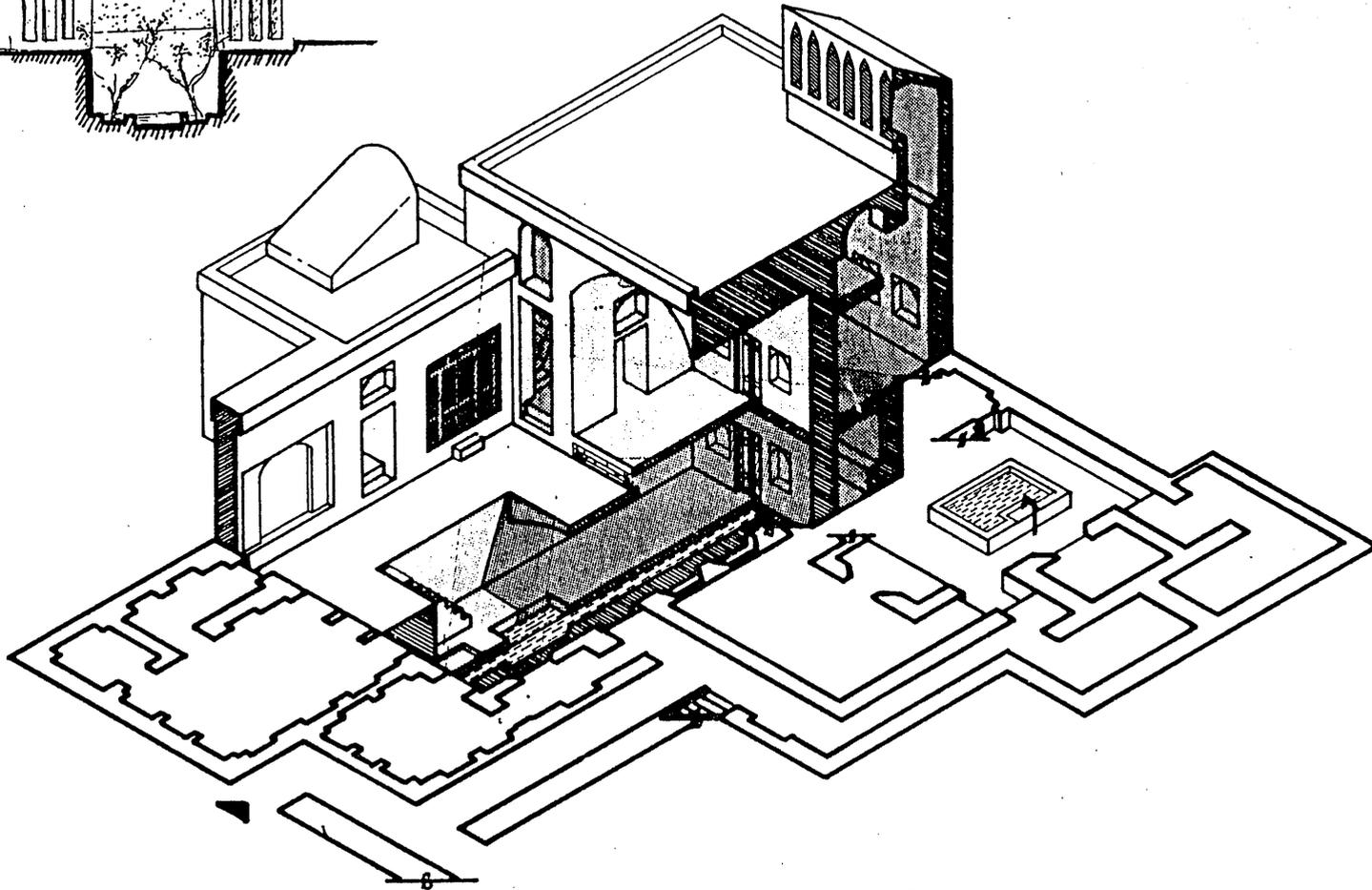
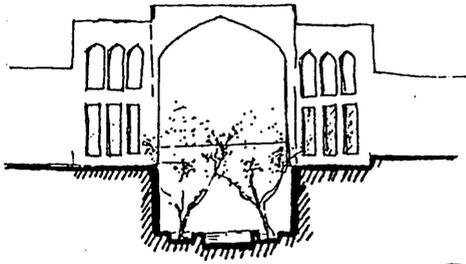


Fig 17: Courtyard at different levels.

(5) Suffe

SUFFE

The word *suffe* is the equivalent of the Farsi *iwan*⁽¹⁾, a vaulted chamber open at one end. *Suffes* in Iran have different shapes according to their geographical locations, but all have one feature in common: a vaulted area opening on a courtyard.

In the vernacular architecture of Ardakan a *suffe* is a vaulted space, rectangular or square in plan, situated on the north-south axis. Depending on its aspect, the height of the vault varies. North-facing *suffes* have higher vaults than south-facing ones. Both types of *suffe* open on to a courtyard to the south or north. Ordinary rooms are to east and west.

The *suffe* has evolved as a result of a blend of influences of (a)

culture, (b) climate, (c) construction techniques and (d) aesthetics (fig 1).

In the *suffe*, people commune with nature beside a courtyard under a blue sky, by a pool of sparkling cool water surrounded by shadows of trees in a garden. Here they can perform their daily tasks. Old people make craftwork, knit, weave carpets, or shell pistachio nuts. At the same time a woman of the house can usually observe the state of activities in the courtyard. The *suffe* is also used for more intimate family gatherings under its vaulted roof⁽²⁾.

These perennial activities have led to the development of two district types of *suffe*, the winter *suffe* and the summer *suffe*. However, there

is a third type, which is less common: the two-sided suffe, being a combination of winter and summer suffes.

Usually in working class houses, at the end of the suffe a *chala-yi karbus bufi* (weaving well) is located. This is a rectangular pit sunk in the floor, with an earthen bench on one side, just big enough to allow a woman to sit and work a treadle-loom. The warp-threads of the loom are carried across the little courtyard and fastened to a wooden hook set in the wall of the opposit suffe, just above head height in the courtyard⁶.

The Winter Suffe

The Winter Suffe is located at the north end of the courtyard where it enjoys the best of the winter sun. It is called “panah” in Farsi, which means “refuge” in English, because of its warmth in winter.

A winter suffe is more important than any other living area and is the first thing to be built in most houses in Ardakan. Its high vault allows the best use to be made of the sun’s warmth during the “cold season”.

The inhabitants of a traditional house spend most of the day in the winter suffe. Daily life begins in the south-west corner of the suffe as soon as the sun’s rays penetrate this space, generally, people expanding their activities in the suffe. Before noon the family gather to drink tea prior to lunch, which is usually eaten in the winter suffe. After lunch they relax in the sunshine or continue with their work. While there is sunlight in the suffe its occupants are busy (fig 2). After sunset they go to the winter rooms where they remain until the next morning.

There are two sub types of winter suffice:

Type A. This type is considered the superior type of winter suffice primarily because of its balanced construction (fig 3). The connections between the rooms which surround the suffice are independent of the suffice and therefore people who remain in the suffice can be in a private comfortable environment undisturbed by traffic between the rooms. This type of suffice is found in the Charkhab, Mirsaleh, Teiran and Bazar-no districts.

Type B. This is the simplest winter suffice, as shown in fig 4. The area of this type is smaller than that of type A but its height is the same or occasionally higher.

Approximately three-quarters of the houses in Ardakan have a winter suffice with winter rooms on either side (fig 5). The size and type of the winter suffice depend on the owner's financial circumstances.

The Summer Suffe

The Summer Suffe is located on the south end of the courtyard, opposite the winter suffice. Summer suffes are found in about half of the traditional houses in Ardakan. Called "*nesar*" in Farsi, they face away from the direct sun, and a good one is deeper than a winter suffice providing shade and a cool atmosphere far from excessive heat and glare. Evaporation of water from a courtyard pool significantly cools the ambient air and greatly enhances thermal comfort (fig 6).

Additionally some summer suffes have a wind tower (badgir) or a cellar (sardab), which further aids cooling by increasing air movement.

The suffice always has a barrel-vaulted roof, which sometimes rises up to 2m above the general roof level. That vaulted roof configuration is cooled more easily by the prevailing winds, and the added ceiling height increases air movement and circulation⁽⁴⁾.

As its name implies, the summer suffice is used during the “hot season” from May till November so that for about five months of the year a habitable room is provided without resorting to active environmental controls.

People usually start their daily life around 5am in the south-east corner of the summer suffice, which receive no direct sun. Fig 7 indicates that the morning sun only reaches a very small part of the summer suffice for approximately 2 hours every day even in mid summer. As the sun comes up people expand their activity. In most houses the family will retire to sleep or rest at the back of the summer suffice near the wind-tower outlet and in some cases right below its shaft⁽⁵⁾, although in houses which have a cellar the family will after retire there in summer afternoons, or move to a summer room (if they have one) for shelter from the heat. If the house has none of these features, people remain in the summer suffice (the winter suffice’s adjoining winter rooms are too hot for comfort in summer and the winter rooms are too small for summer activities like carpet weaving which cannot be done in a small space). In the afternoon people return to the summer suffice and stay there until they retire for the evening,

either in that same *suffe* or sometimes on the roof with a mosquito net for protection.(6)

Depending on the wealth of the owner and the size of his house there may be three types of summer *suffe*.

Type A (fig 8). This is the largest and best type, which is called "*talar*". It is about 30-40 square metres in area and has a wind tower and a cellar, which combine to create a comfortable living space in summer. The *talar* is often built in the form of a cross with very stumpy arms, or rather of an oblong with the corners moved so as to render it slightly cruciform. The long side of the oblong faces the courtyard. To the right and left of the *talar* are short walled-off passages which are used as entrances. Corresponding to the projecting front part between the passages there is at the back a recess under the *badgir*, completing the cruciform design. The roof is arched into

a high dome. The whole space is raised one metre above the level of the ground and has a view of the flower bed, which also gives room for a window of the cellar room (*sardab*) underneath. A large proportion of this type of summer *suffe*, which usually has the same dimensions as the winter *suffe*, is found in Charhkaab, Mirsaleh and Tiran quarters.

Type B (fig 9). This type is usually found in middle-class areas, in the houses of merchants for example, and boasts both a wind tower and a cellar. Some type B *suffes*, belonging to farmers or craftsmen, have a wind tower but no cellar (fig 9). As fig 9 indicates, ingress and egress from the courtyard to the rooms is through the *suffe*.

Type C (fig 10). This type has neither wind-tower nor cellar and is not deep enough for daily life in summer. Its only purpose is

symmetry to balance the winter suffice opposite. Type C is approximately 3m high and 3m wide, and varies in depth from 0.7m to 2.5m (fig 10).

The chart in fig.11 shows the average length, width and height of summer suffes in each district.

The Two Sided Suffe (fig 12).

Two-sided suffes are found in houses with two courtyards. One of these courtyards is like a garden, the other is the main courtyard enclosed on all sides. The two yards are connected by the two-sided suffice, which can be at either the south or the north end of the main courtyard. If the suffice is at the south end of the courtyard its northern part is used as a summer suffice and its southern part as a winter suffice,

and vice versa if the suffice is at the north end of the courtyard. In some houses the two parts of two-sided suffes are separated by doors to reduce unwelcome drafts in winter (fig 12).

Fig 13 shows the numbers of houses with two suffes, which are mainly found in the older and wealthier districts.

Changes to the Winter Suffe in the Last Sixty Years (since 1930)

In some houses instead of an open winter suffice at the north end of the courtyard there is a room with three windows opening on the courtyard , offering comfortable and sunny accommodation in the winter months.

Fig 14 shows how winter suffes have been altered in some places. These alterations include doors on the suffe and an arcaded verandah in front. Such alterations to the winter suffe have brought some advantages, such as doors protecting furniture and equipment from dust, but they have the singal disadvantage of reducing the amount of sun penetrating and heating the suffe.

References

1)The iwan is sometimes called *rewaq-i manzar*. Riwaq means terrace or gallery. Manzar is a place of sitting. Nader Ardalan, Sence of Unity, Chigago Prcess.

The Iwan itself is an Iranian invention which appears to have been translated to central Asia during the Sasanian Period. Hott& Lean

ard, Islamic Architecture, Iran.

2) Hoag. J.D., Islamic Architecture, 89.

3) Iran and Islam, Ed. Bowsworth.

4) Bcazly, E. Living with Dcscsr, 1971, 65.

5) Ibid, 66.

6) Through the all my observation at the time of living in Ardakan.

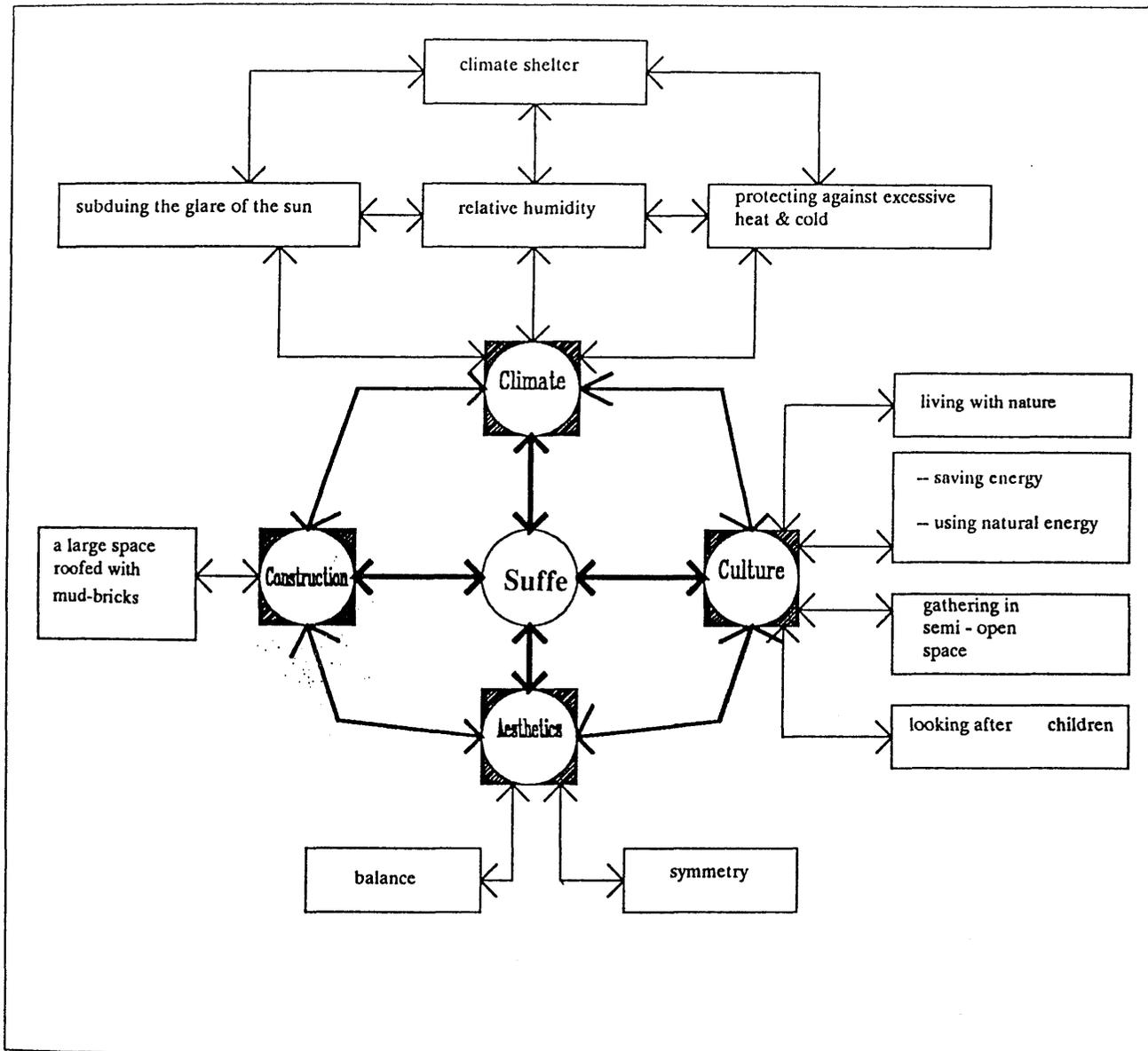


Fig 1: Diagram of factors influencing the form of suffe.

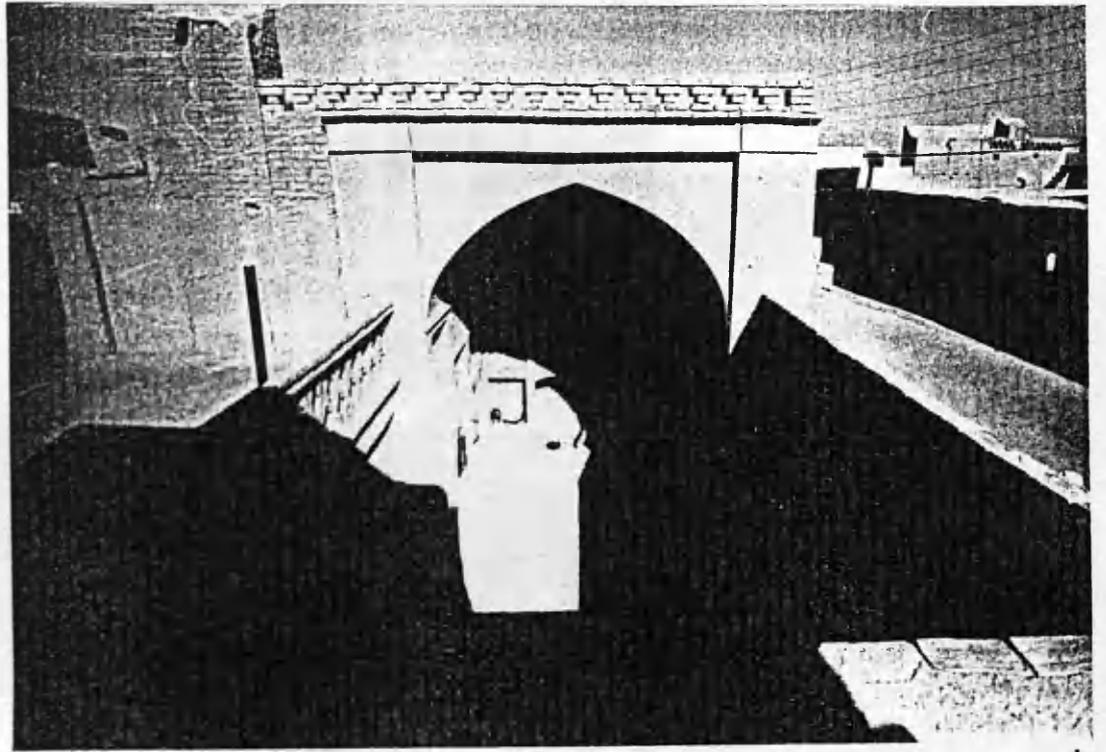
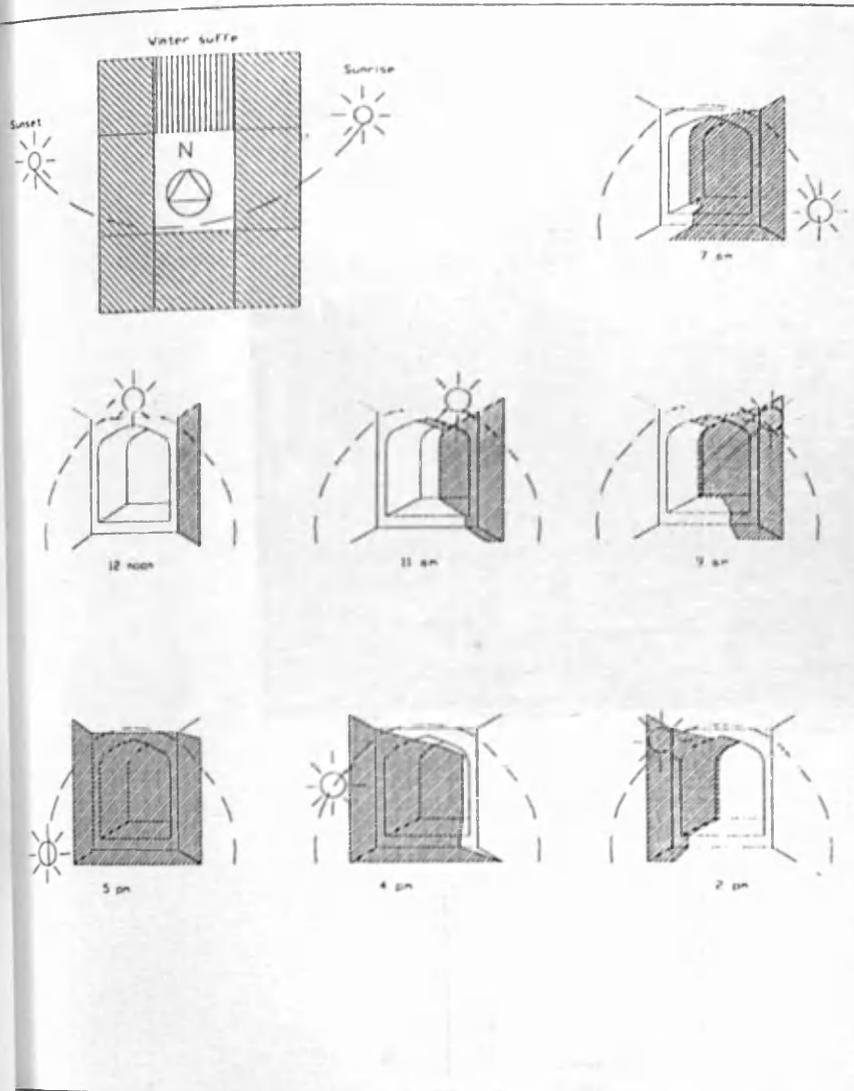
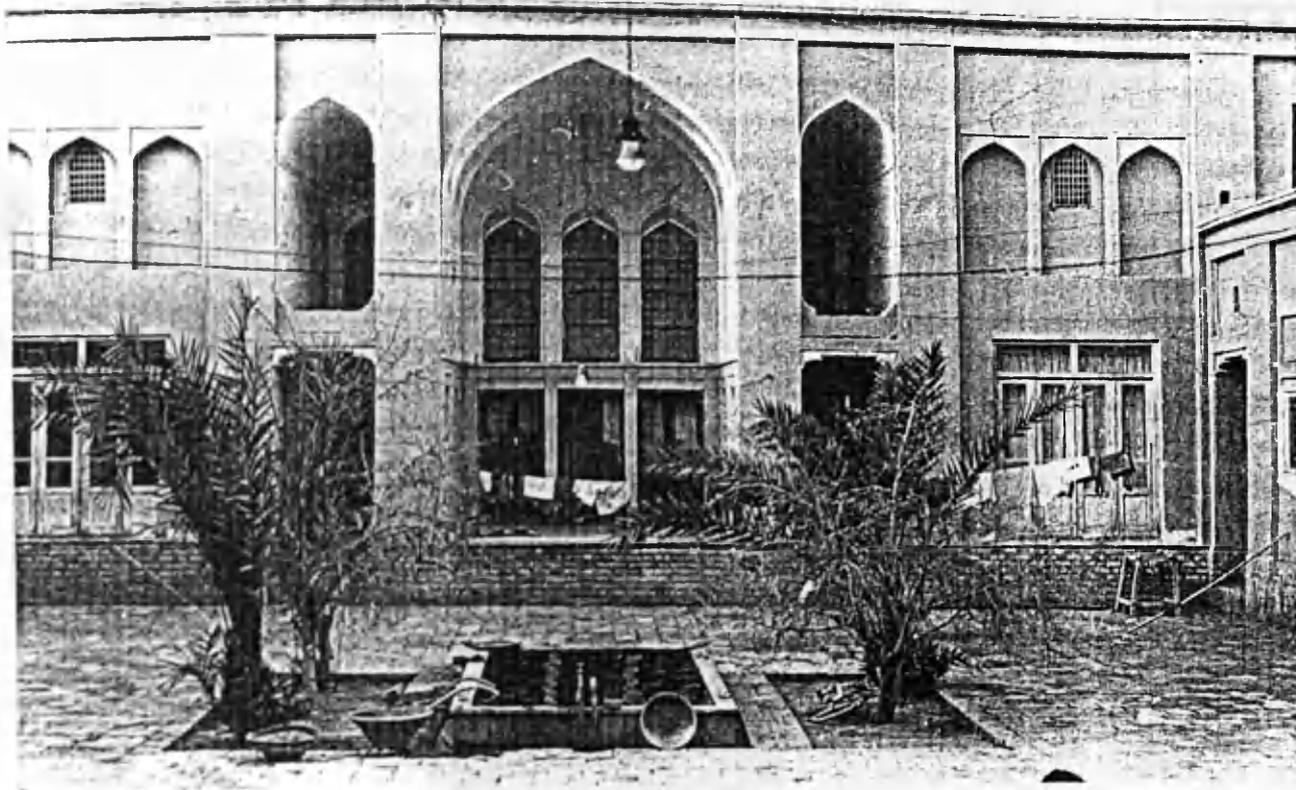


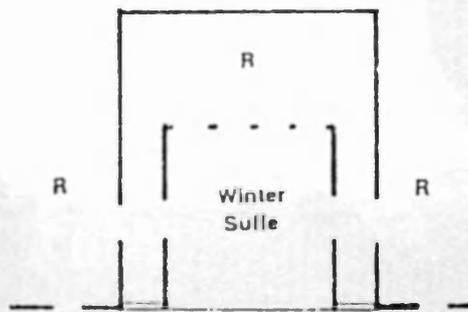
Fig 2:
 a. Showing movement of sunlight in winter suffe a sunny day in winter.
 b. The photo showing sunlight in winter suffe in early morning in winter time.

a

b



a



b

Fig 3:

a. Winter suffe type A (photo taken in Ansari House, Charkhab Quarter).

b. Plan of winter suffe type A.



b

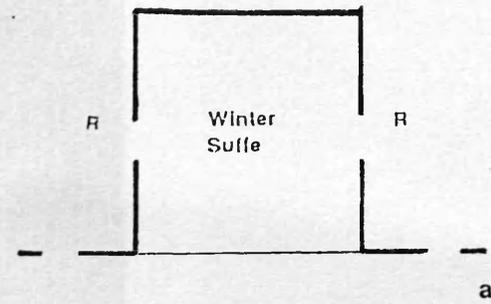
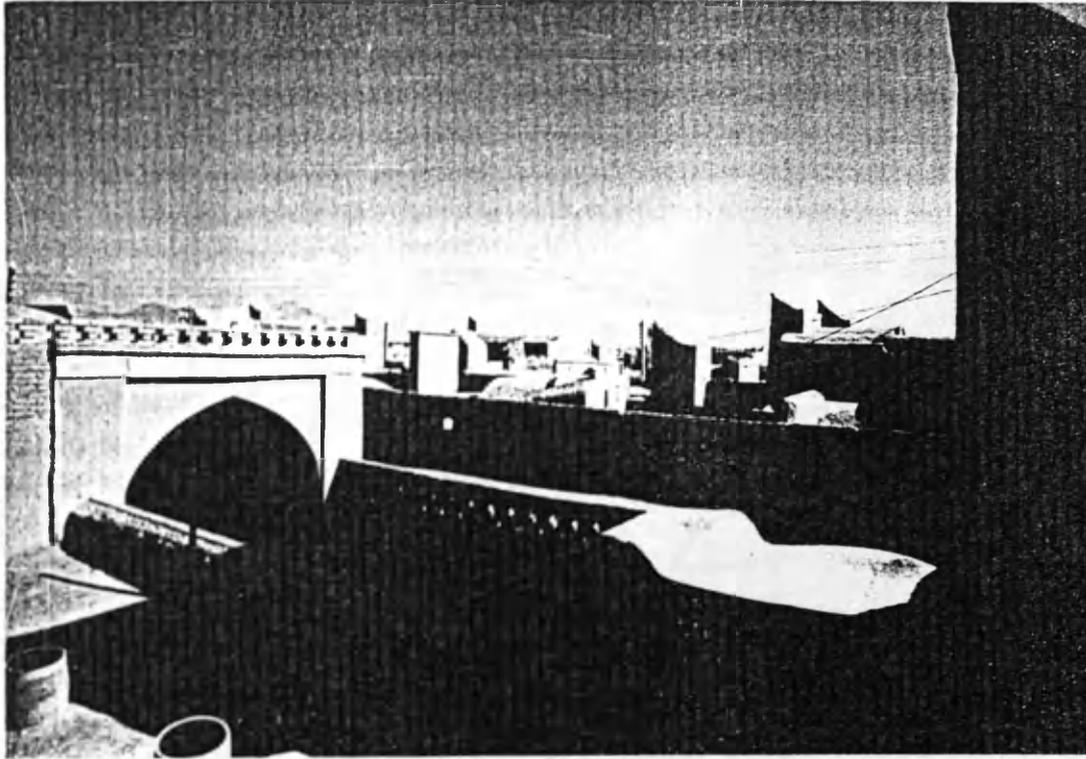


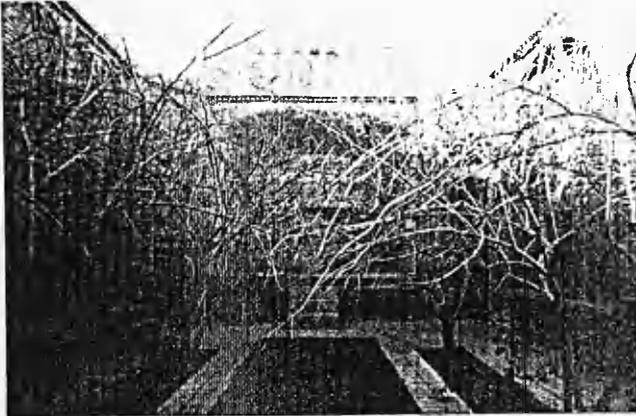
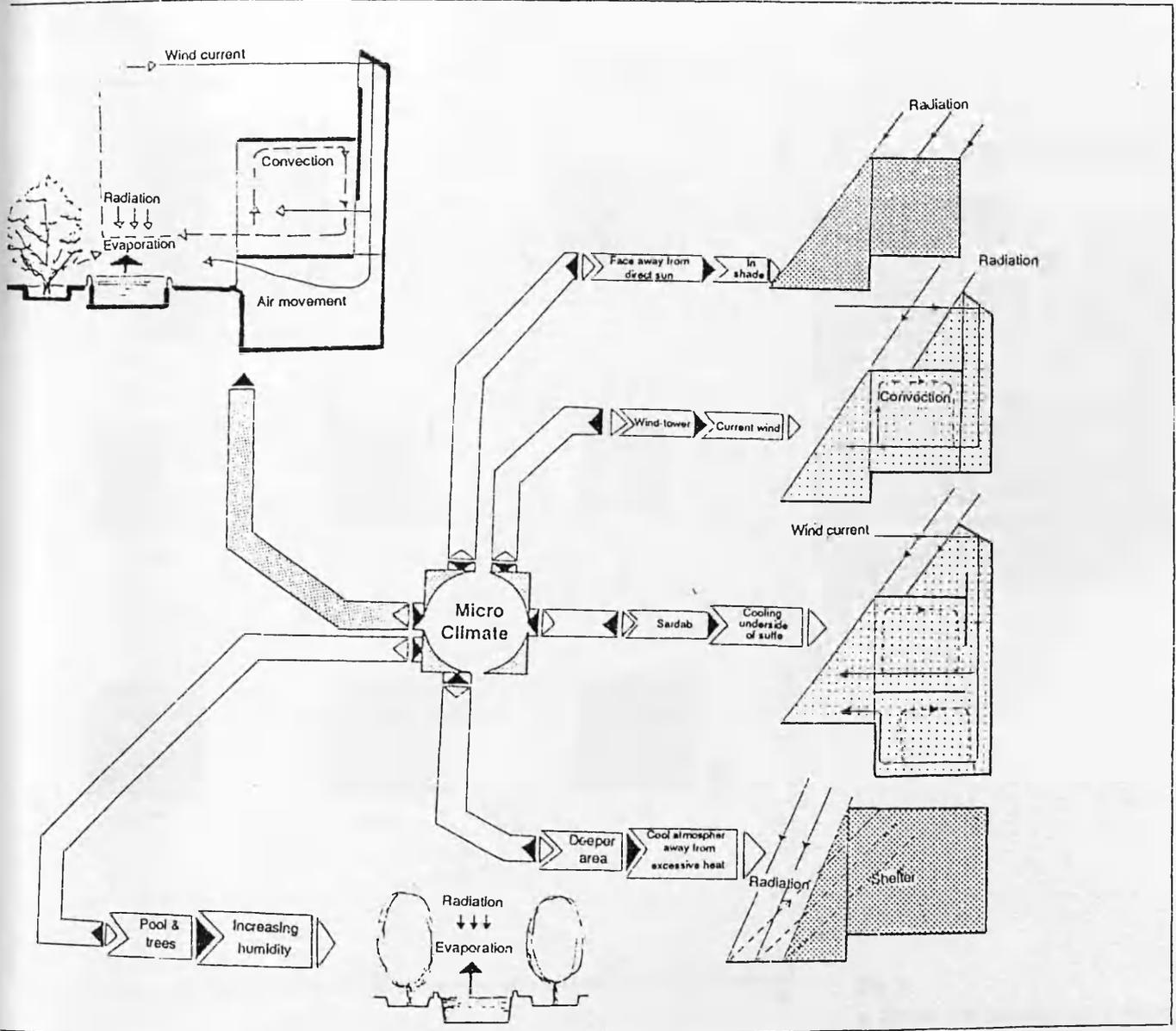
Fig 4:
a. Winter suffe type B.
b. Photo, sunshine penetration in winter suffe.



In some houses the height of the winter suffice is much higher than the summer suffice.

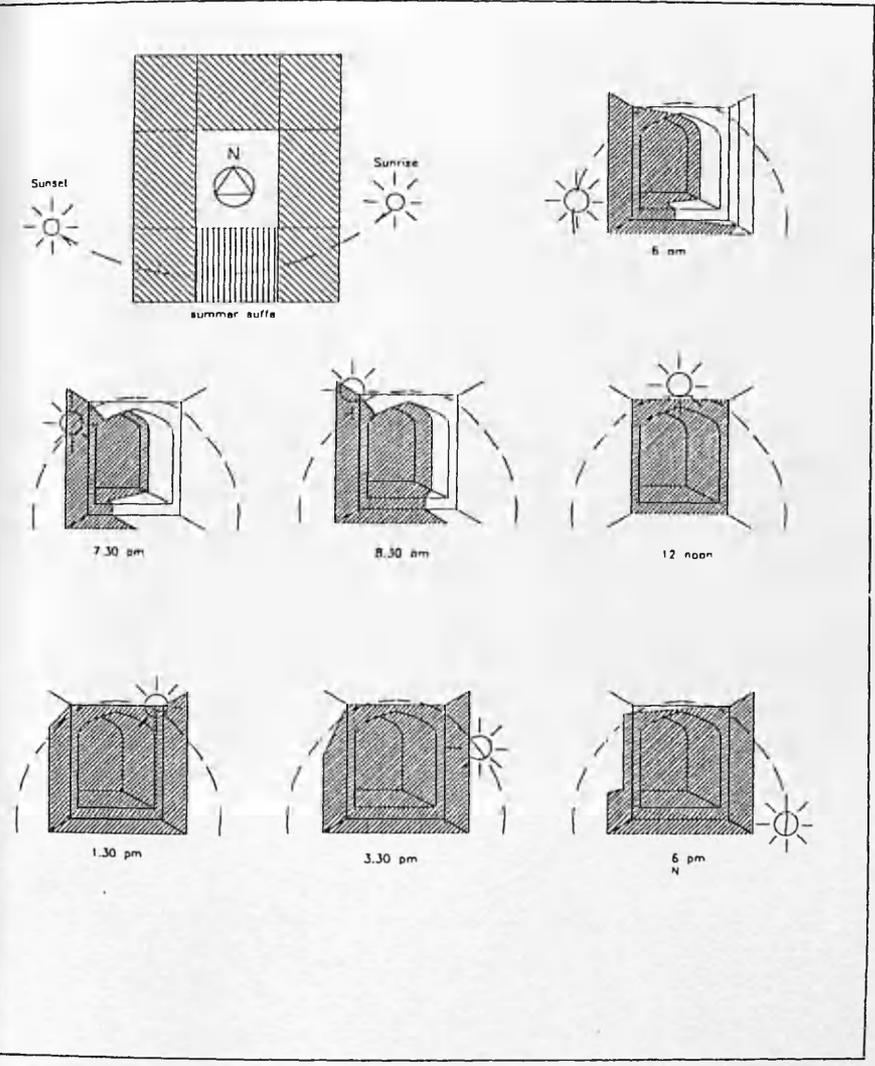
QUARTERS			Kumlaq	Charxhab	Sharif- Abod	Mirsolen	Bozor-Ho	Tiran
WINTER SUFFE	S - W	area	14.2 m ²	23 m ²	13.3 m ²	18.4 m ²	17.2 m ²	16.5 m ²
		height	3.8 m	5.98 m	4.8 m	4.1 m	4.1 m	5.1 m
	Existence of the Space							

Fig 5:
Diagram showing proportion of houses with a winter suffice in different quarters.

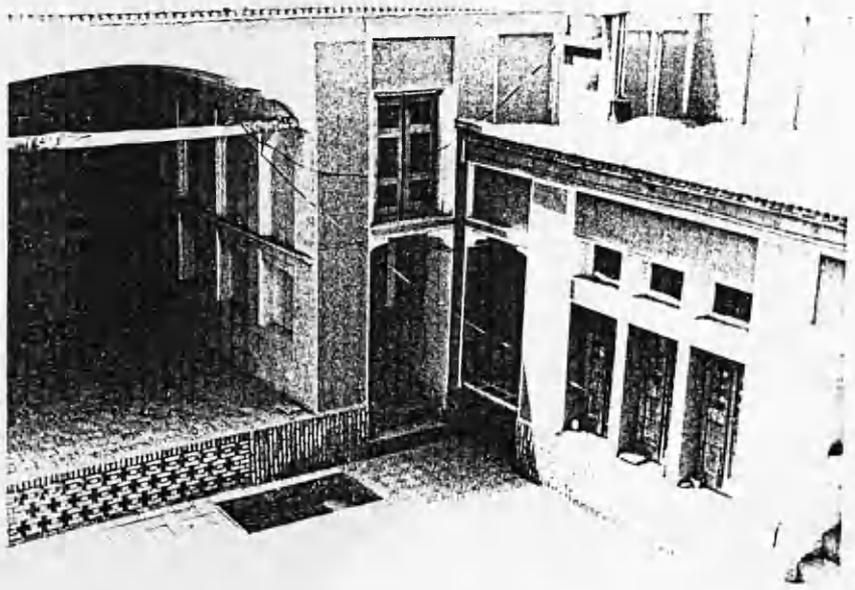


Coutyard in Tiran Quarter.

Fig 6:
Diagram showing interrelationship between suffe, wind-tower, pool and plants, and the way in which they reduce the discomfort of a hot, dry climate.

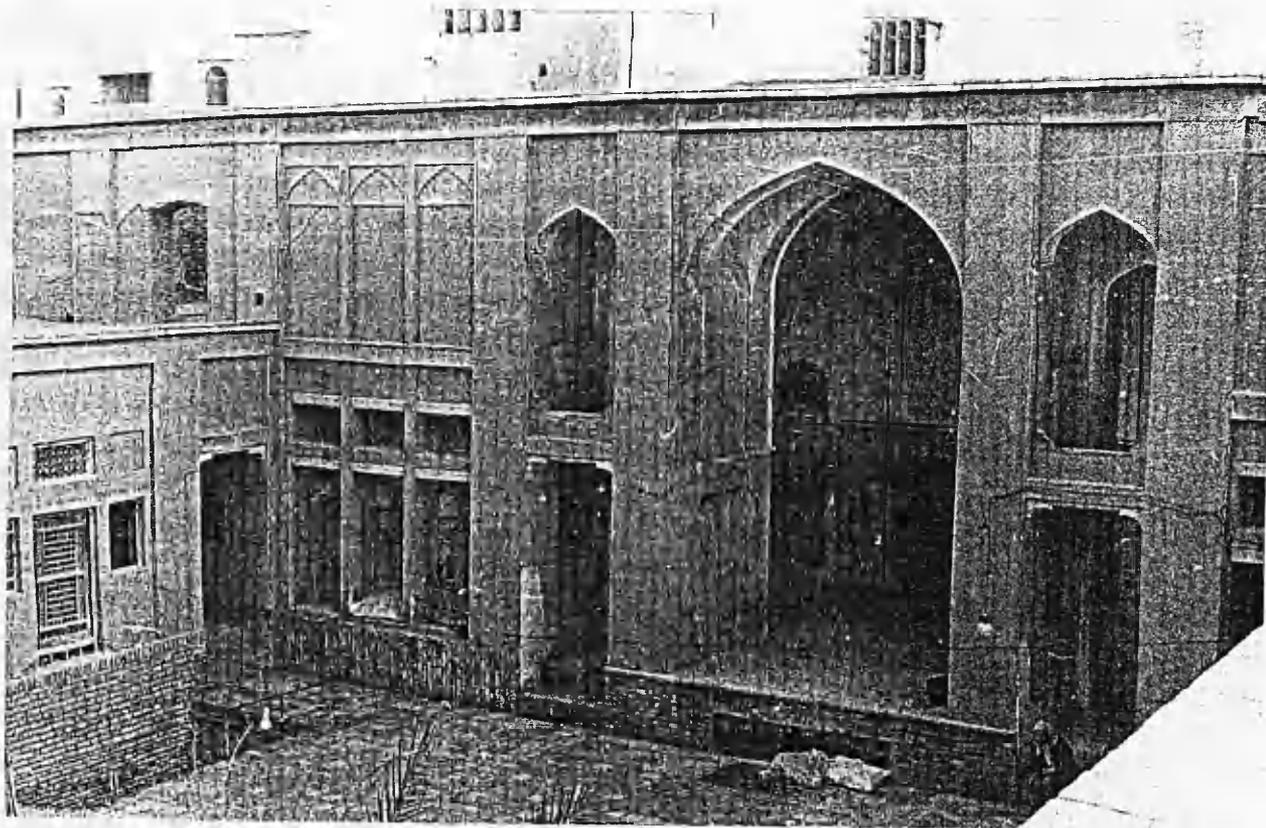


a

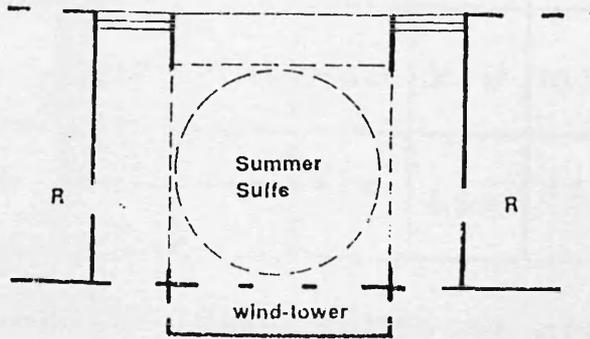


b

Fig 7:
 a. Shade in a summer suffe throughout the day.
 b. Summer suffe in shade during summer.

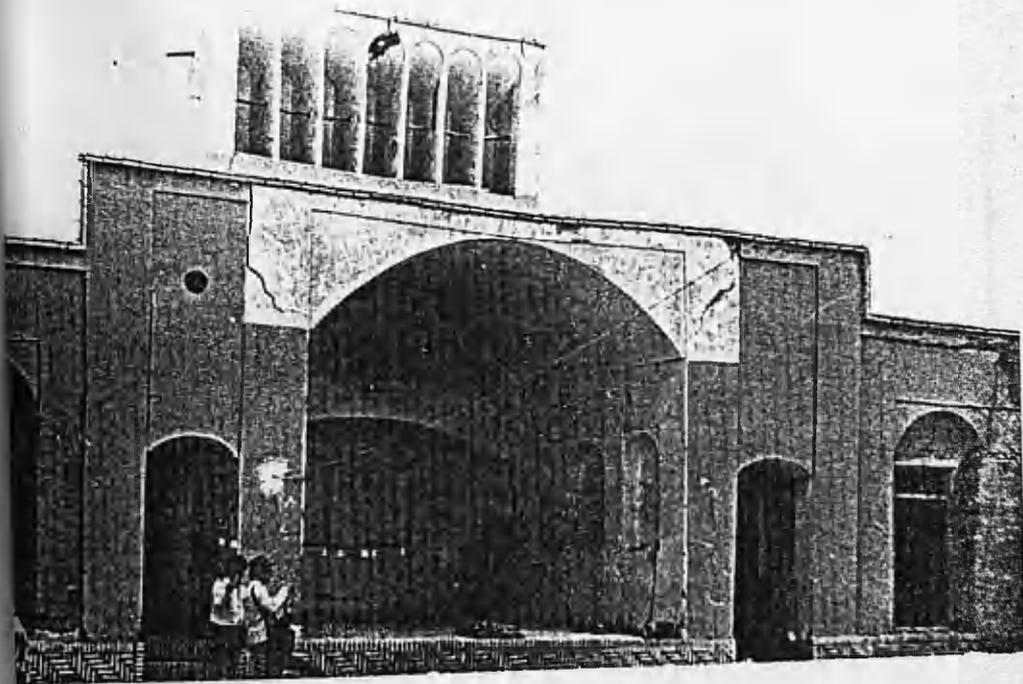


a



b

Fig 8:
a. Summer suffe with very high ceiling type A
(photo taken in Ansari House in Charkhab
Quarter).
b. Plan of summer suffe of the superior type A.



mer suffice type A (photo taken in Merchant House in Tiran Quarter).

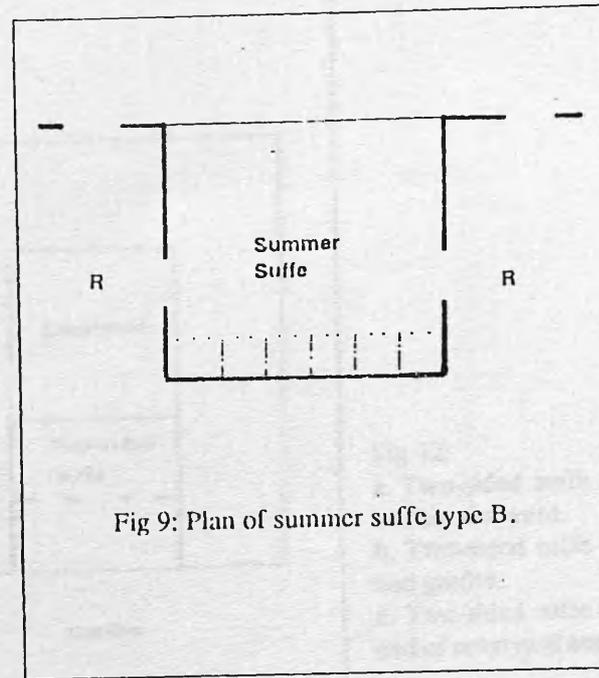


Fig 9: Plan of summer suffice type B.

QUARTERS	Kumlaq	Charkhab	Sharif- Abad	Mirsaleh	Bazar-No	Tiran	
SUMMER SUFFE	area	12.9 m ²	41.7 m ²	14.5 m ²	30.1 m ²	10.7 m ²	15.2 m ²
	height	3.17 m	5.3 m	4.7 m	5.6 m	4.4 m	4.6 m

11: gram noting that summer suffes are larger, with higher ceiling, in the wealthy quarters of Ardakan.

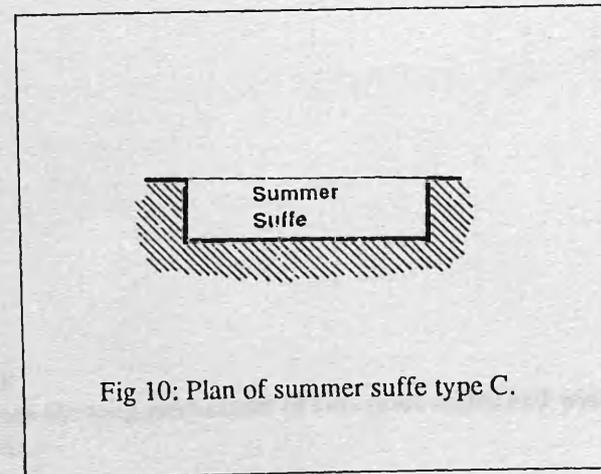


Fig 10: Plan of summer suffice type C.

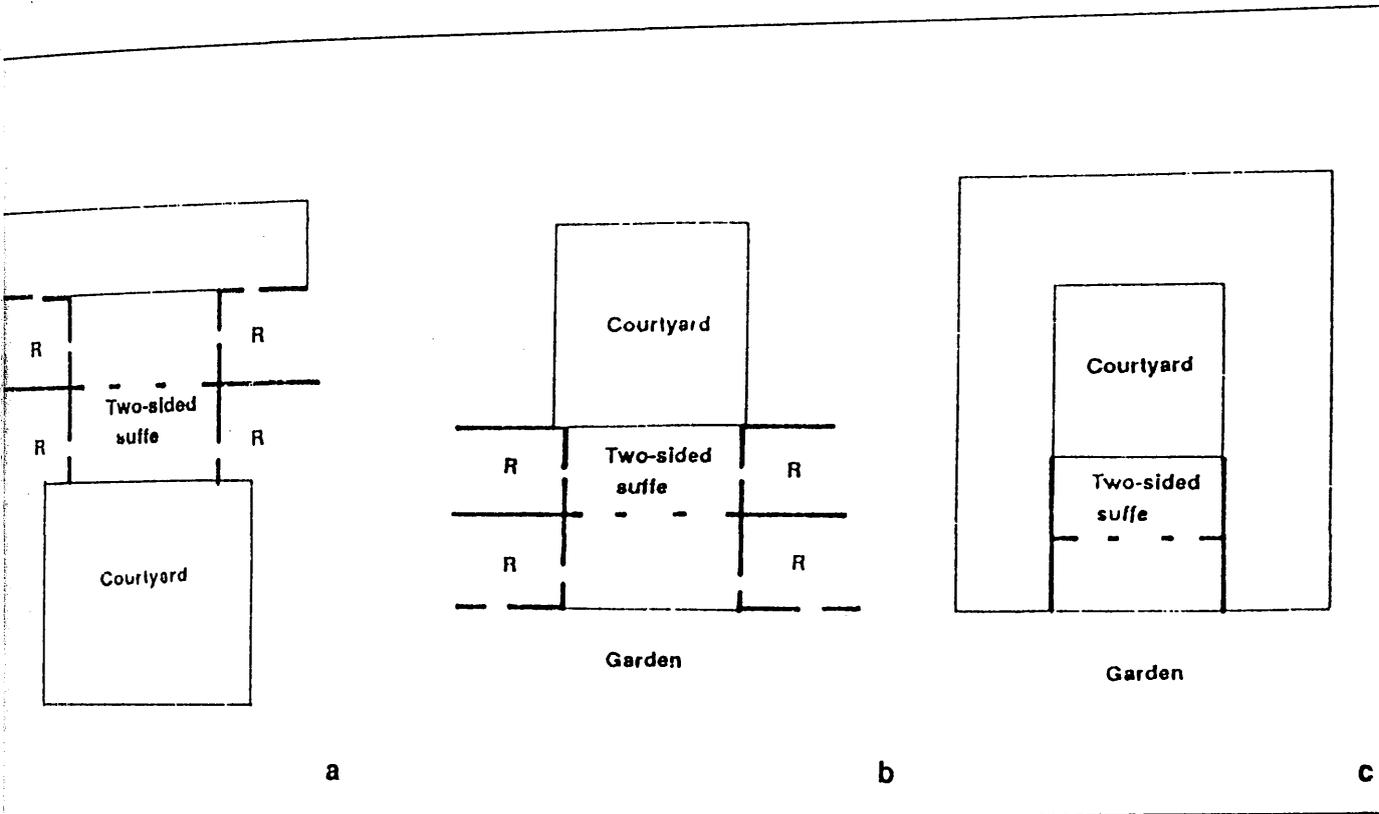


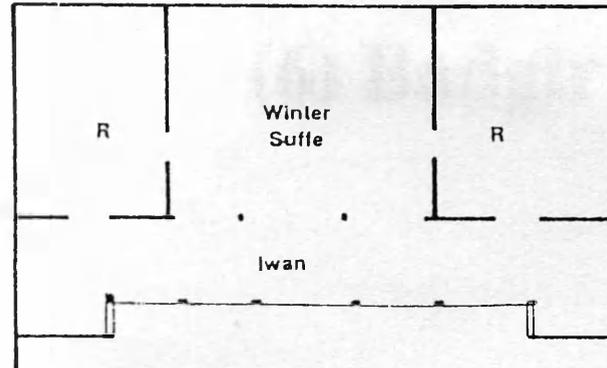
Fig 12:
 a. Two-sided suffice opens on courtyard and service yard.
 b. Two-sided suffice opens on courtyard and garden.
 c. Two-sided suffice located at the south end of courtyard and opening on garden.

QUARTERS	Kumlaq	Charkeh	Sharif-Abad	Mirsaleh	Bazar-No	Tiran
INTER SUFFE	■	■	■	■	■	■
Two-sided suffice						

Fig 13:
 Diagram showing proportions of two-sided suffes and winetr suffes in different quarters.



a



b

Fig 14:
a. New type of winter suffe with glazed doors ("French windows")
dating from 1930s.
b. Plan of new winter suffe.

(6) Badgir & Sardab

Badgir or Wind-catching Tower

In Ardakan and the surrounding region, the roofs of the old settlements are dominated by distinctive mud brick towers with an assortment of vertical vents at their heads (fig 1). They are called *badgir*, which means literally “wind-catcher”.

The wind-catcher is one of the passive cooling systems used in hot and dry climates. Many authors believe that wind-towers originally date from the Pharaonic period in Egypt (1200-1300BC). Since pictographs on papyri found in tombs of the New Kingdom show wind-catchers (*malqaf* in Arabic) on the roofs of houses⁽¹⁾.

In Iran it has been suggested that wind-towers were associated with two recesses at the back of the great Throne Hall at Babylon (c.600

BC), and with a sophisticated air circulation system at the Sassanian fire temple at Firuzabad (c.250 AD) but without more evidence it is impossible to be sure⁽²⁾.

In Ardakan the *badgir* consists of ventilating shaft, which projects above the roof building. At its top, a series of vertical openings that face the prevailing winds serve to catch the breezes and pull them down to a room at the ground level, or more frequently, to a cellar (*sardab*) where the dry desert air picks up humidity from a pool of water⁽³⁾ (fig 2).

The performance of a wind-tower is affected by variables such as height, cross-sectional plan, the orientation of the tower and the location of outlets. Wind speeds increase with height above ground, due to resistance from the ground surface, and air temperature decreases with height above the warm ground.

Thus the height of the wind-tower influences the speed and temperature of wind captured in the vents. The overall height of the vents at the head of the tower will also have a bearing on the volume of air taken into shaft. There are structural limitations on the height of the vent sections of the tower, since their internal partitions are constructed with thin bricks standing on their sides, supported on cross timbers⁽⁴⁾.

When a wealthy householder required a prestigious wind-tower he called in a master builder to construct a large, imposing and elegantly detailed tower (fig 6.b). These structures are between 3 and 7 metres higher than the roofs on which they are built; they have elaborate inlet vents. Some have tall heads which are designed to maximize the volume of air flowing down the shafts. Many such details have been used over the centuries by succeeding generations of builders. A good builder would have a very fixed idea of what constituted a good design (fig 3).

Data from the Iranian meteorological office indicate that the prevailing wind in this region is from the north-west (average speed 32km/hour). This wind is humidified as it crosses the north-west mountain range and pistachio groves to the north of the town. A stronger but less frequent wind, which blows from the south-east across the desert, is hot and dusty. Most wind-catchers in Ardakan therefore face north-west (fig 1).

Badgir can be divided in two main groups. The most common, is built over ordinary houses and cisterns and consists of a tower with from one to five vents. Some houses have much grander ones built, which can have as many as twelve vents.

The second group comprises two-sided badgir with one or two vents

in each side (fig 4), though some have four or more open sides.

Four-sided badgirs are rare, occurring only on very wealthy houses or in public buildings such as mosques and ab anbars endowed by wealthy benefactors (fig 5.1). (The Hajji Muhammad Taghi Mosque in Tiran Quarter, next to Montazeri Avenue, is unique in Ardakan in having an octagonal badgir, open on all eight sides, (see fig 5).

Badgir in the first group usually rise less than 3 metres above the roof and in many cases no higher than 1.2 metres. They are commonly used in smaller houses but also used in larger establishments as secondary badgirs, for example in the Ansari House, Charkhab Quarter (fig 3:c), where the main badgir above the summer suffice is supplemented by a simple wind-catchers over the summer rooms on the either side of the suffice .

The overall height and other factors such as the height of vents, the cross-sectional area, the orientation and the location of outlets affect the performance of a badgir.

The higher one builds, the greater is the wind speed and the lower the air temperature, for there is less air turbulence and less reflected and convected heat from buildings.

The height of the vents at the head of the tower also has a bearing on the volume of air taken into the shaft. The back of the vents is reinforced structurally by a lattice of tree trunks, and the higher the vents, the greater the number of reinforcing timbers required (fig 6).

The cross-sectional area of the shaft determines the total volume of air that can pass and influences the speed at which it travels. There is

a wide range of sizes in use from 400mm length by 800mm height up to 7 metres length and 3 metres height with different depths. The relationship between the area of the vent opening and that of the shaft is critical, for there comes a stage when any a further increase in the area of the shaft would mean that the air passing down the shaft would slow down to such a degree that the system would become inefficient (fig 7).

Overall, the tower is divided into number of shafts (fig 8.c). The size of the shaft is between 70cm width by 100cm depth which is divided into two vents at the top of 2 metres height. This size of division is for a one sided wind-tower whose length is from 700mm to 7 metres (fig 1 at the top).

The smallest size of shaft in three-sided, four-sided or even eight-sided wind-towers is 300mm by 430mm, which has no vent division

at the top of the tower (fig 8.b). The biggest one is 80cm by 100cm which is divided into two vents and the height of the vents are between 2 metres to 4.5 metres.

While most badgir have vents in only one side, facing the prevailing north-westerly wind, some have vents in two or four sides, which allow them to take advantage of changes in wind direction, though reducing their intake from the prevailing wind. Two-and four-sided badgirs have other limitations also, for wind turbulence created by the tower creates negative air pressure on the leeward side, tending to draw air up the leeward side of the shaft. In strong wind this leakage of air up the shaft is not important because the downward thrust is much stronger but in conditions where the wind speed is less than 0.3 metre a second, leakage represents a large proportion of the air in circulation.

Function of wind-tower, in general depends on the microclimatic condition and wind conditions particularly during day and night. Due to the heating of the tower during the day, air in the shaft warms up and the shaft acts as an air stack, causing the hotter air in the shafts to rise and escape from the vents. The air from the rooms below is thus drawn into the tower and replaced in turn by cooler air from the courtyard. This effect may occur at any time during the day but is most common in the still air of night.

At night when there is no wind wind-tower operates like a chimney, circulating air by pulling it upward and out through the tower openings. The tower mass, including the internal walls of air passages the absorbed heat during the day; and since heat flows in the direction of decreasing temperatures, the mass transfers heat to the cool night air and pressure at the top of the tower is reduced, creating upward air draught. The air in the building is drawn up through the doors and windows. The process continues during the night, so that cool air is kept circulating through the building⁽⁹⁾.

Sardab

Many houses, specially the large ones, have an excavated basement or *sardab* situated under the summer suffice. Some larger houses have, in addition to the sardab under the summer suffice other basement rooms, sometimes including a second sardab under the winter suffice.

The sardab provides a cool place to shelter from the afternoon sun. In some houses, the sardab is further cooled by being connected to the qanat system by a vertical shaft, 600-800mm in diameter (fig 9). Air at the head of such shafts has been measured to be some 6°C cooler than the rest of basement⁽⁹⁾.

Generally Sardabs are ventilated by air from a badgir situated at the

rear of the summer suffe. Directly below the shaft of the wind-tower, is an opening in the floor of the suffe, usually protected by a timber grille, which feeds air from the wind-tower to the sardab. This air passes through the sardab and out to the courtyard through high-level openings pierced in the brick wall (fig 8.a).

Air passing down the wind-tower may be cooled by the evaporation of moisture absorbed by the mud brick walls of the shaft during the night. It has generally been supposed that air flowing down the shaft cools considerably, but measurements taken in Yazd region⁹ reveal that in towers less than eight metres high there is a difference of only one or two degrees Celsius between the ambient temperature in the shade and that of the air leaving the wind-tower. At certain times of

day air introduced into the summer rooms may be at the same temperature as the rooms, or even warmer, particularly in relation to the sardab. The most important property of the air emitted from the badgir is its movement, giving several air changes per hour. While the occupants of the summer room may not experience much cooler air, they enjoy the cooling effect of sitting in a light breeze (fig 9).

Some basement rooms have no wind-tower and so maintain a relatively stable temperature of about 25-28° C during the day. With relative humidity ranging from 40% to 65% during the day, rising as high as 75% at night. Such basements are not ventilated adequately for human occupation and generally are used as store rooms⁹ (fig 10).

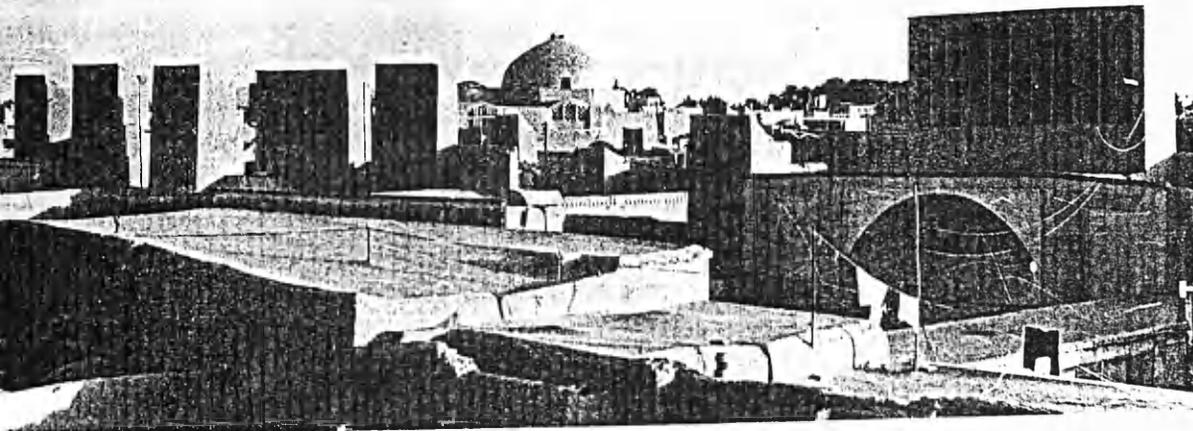
Use of the Sardab

Many Ardakani families in summer sleep on the roofs of their houses. They rise with the sun and go to work at about 6.30am. The hottest part of the day is the afternoon. At about 1 o'clock the men return home to rest in sardab. Many men, notably those working in the bazaar, will return to their businesses in the afternoon, not returning home again until about 8pm. The evening is passed in the summer rooms or the suffe before the family retires at the end of the evening to sleep.

Referevces

- 1) Benamara, Y. Passive Thermal performance of Hotel., Mackintosh Shool of Architecture, Glasgow 1987, 130.
- 2) E. Beazly and Harverson, Living with the Desert, 1971, 58.
- 3) L. Golmobek and D. Wilber, TheTimurid Architectureof Iran and Turan, Prin
ston University press, 1988. 79.
- 4) E. Beazly, Living with the Deasert, 61.
- 5) Benamara, Y. Passive Thermal performance of Hotel., Mackintosh Shool of Architecture, Glasgow 1987, 140.
- 6) E. Beazly, Living with Desert, 69.
- 7) Ibid, 66.

Fig 1:
Wind-towers in Charkhab Quarter all facing north-west.



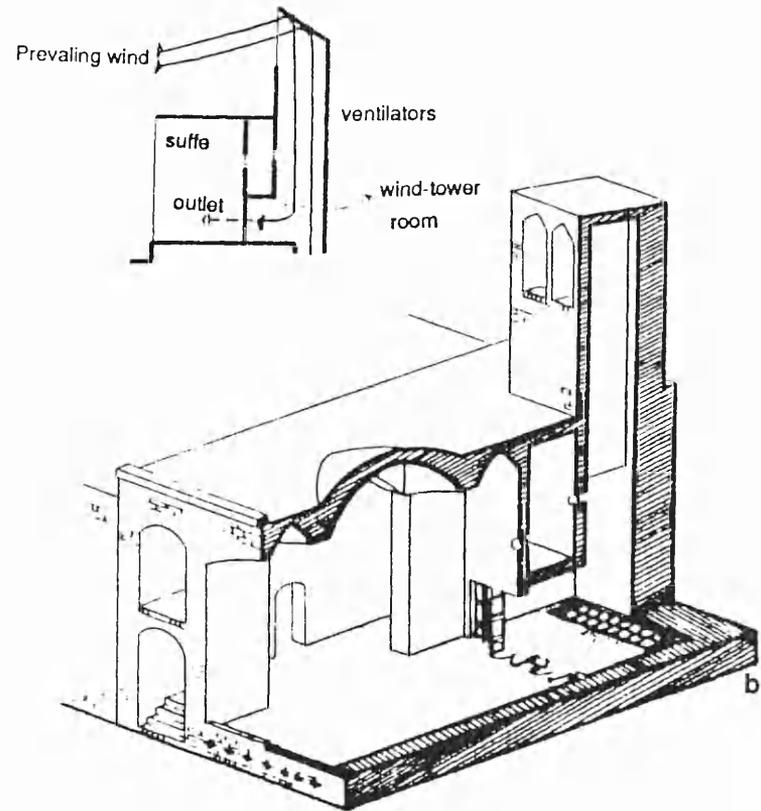
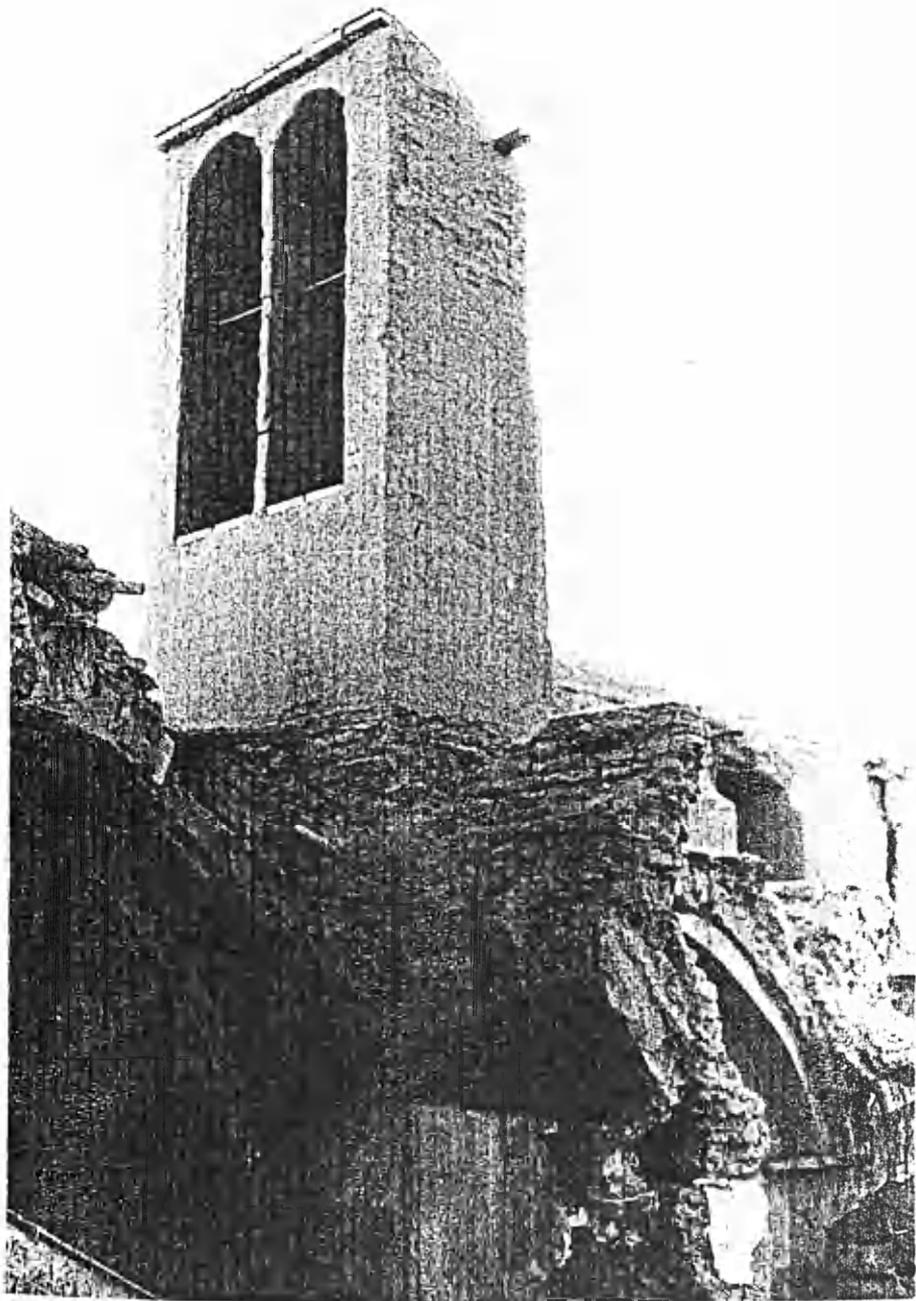
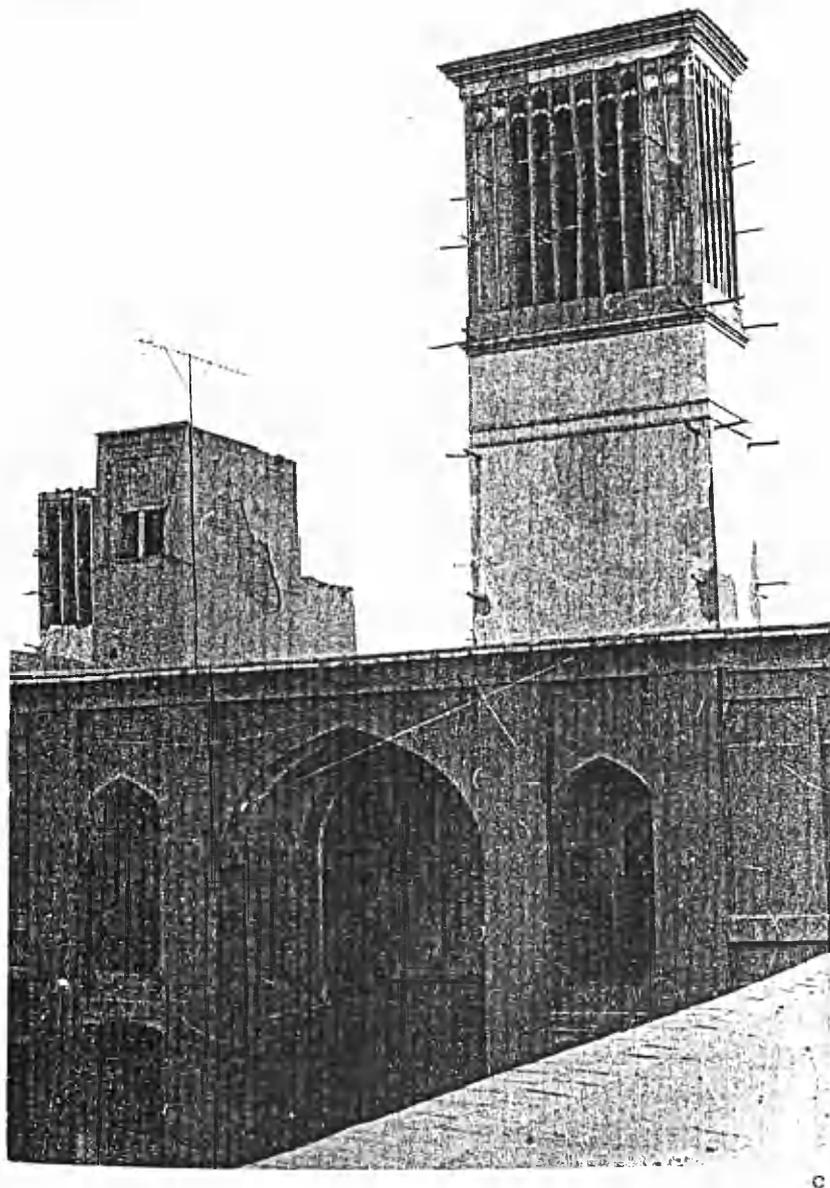


Fig 2:
a. Different parts of badgir: wind-tower, vents, shaft, ventilators and let outlet to shaft.
b. Photo of a badgir with two vents.



c

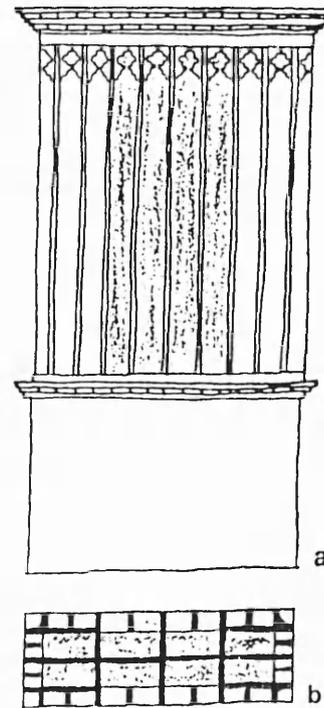


Fig 3:
a. Elevation of a four-sided badgir.
b. Horizontal section through vents and shafts, showing partitions.
c. An elegant four-sided badgir in Chakhab Quarter. The height 10-12m above roof level.

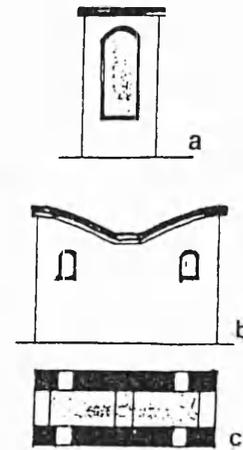
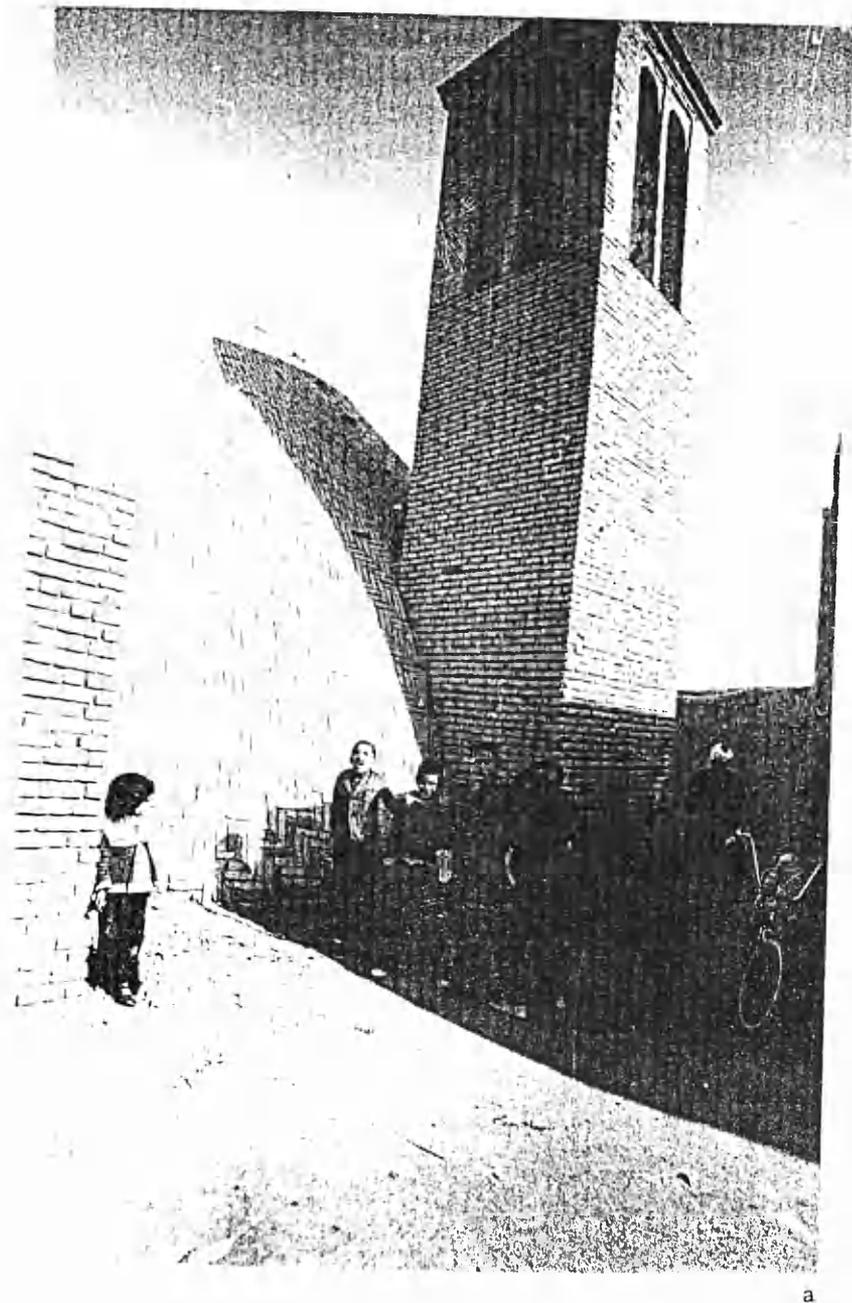


Fig 4:
 a. Front elevation of a two-sided badgir.
 b. Side elevation
 c. Plan showing inter-division.
 d. Back of wind-twoers in Ardakan.



Fig 5:
 The only eight-sided badgir in Ardakan.



a

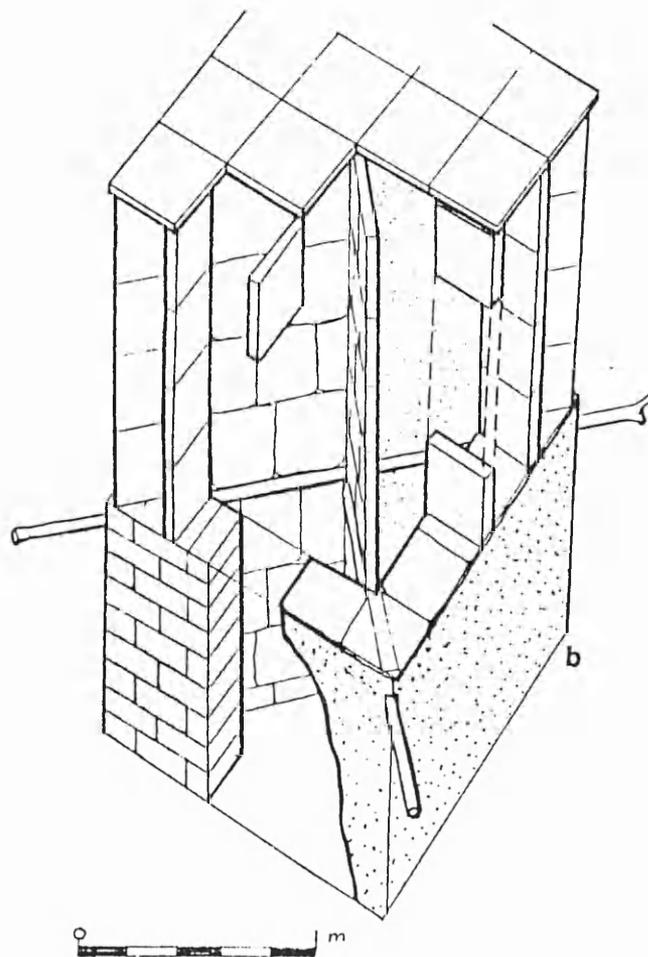


Fig 5.1:
a. Four-sided badgir with bricks partition (E. Beazley, Living with Desert).
b. Four-sided badgir of an abanbar in Kumlaq Quarter.

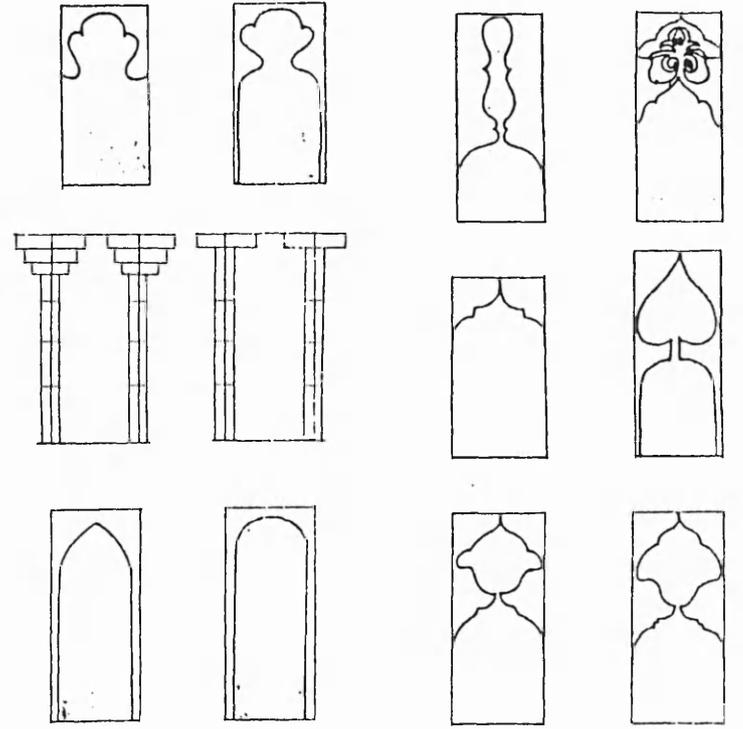
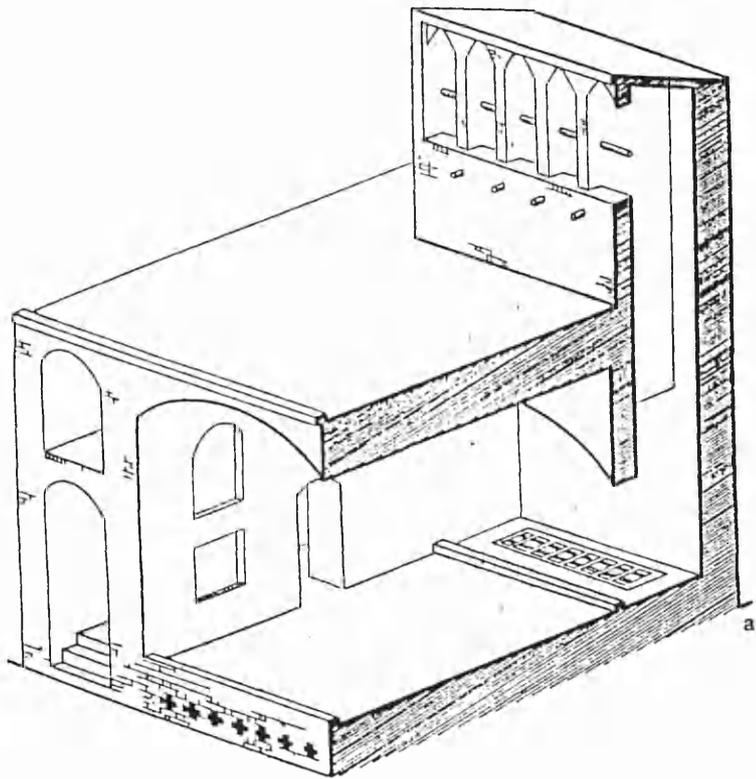


Fig 6:
 a. Cut-away isometric of a typical badgir.
 b. Different designs of vents.

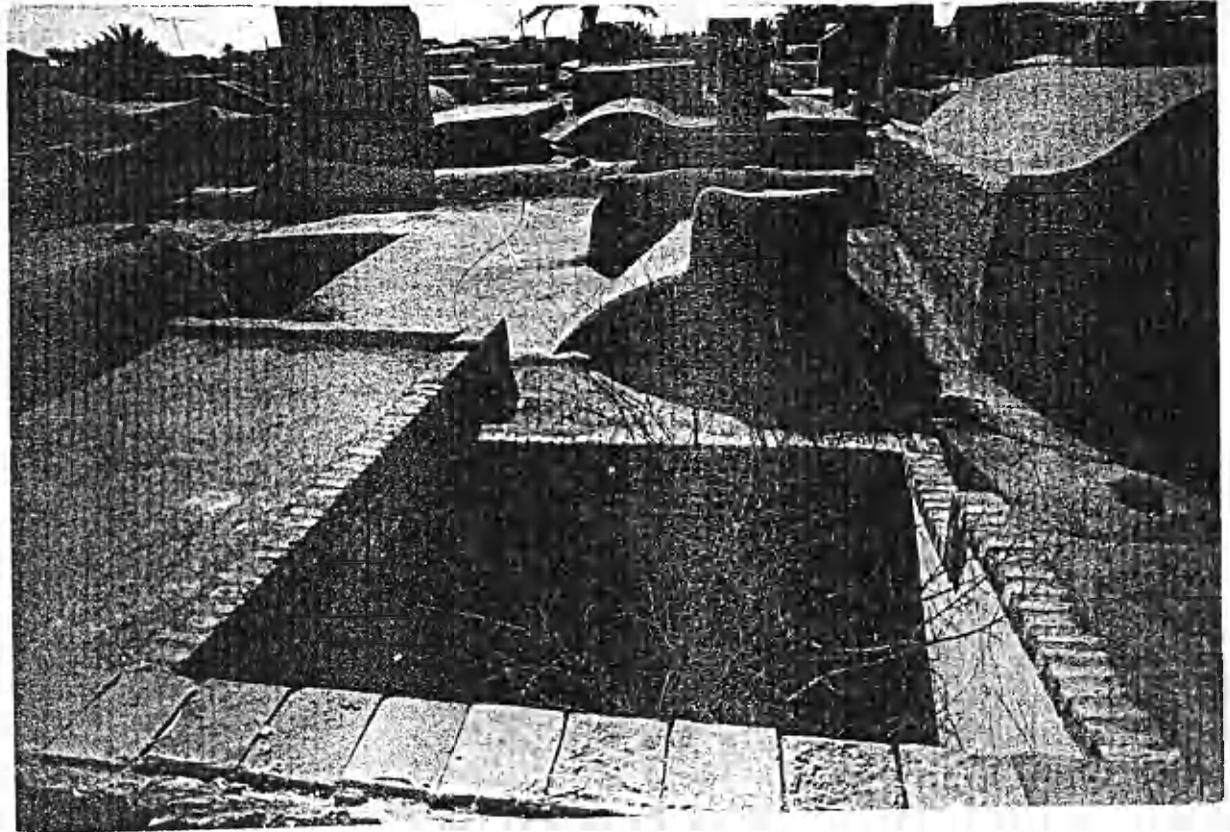


Fig 7:
Small opening to catch air, which works as a ventilator above a courtyard.

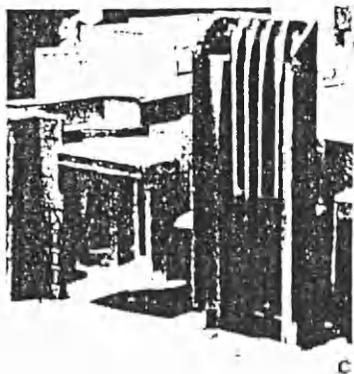
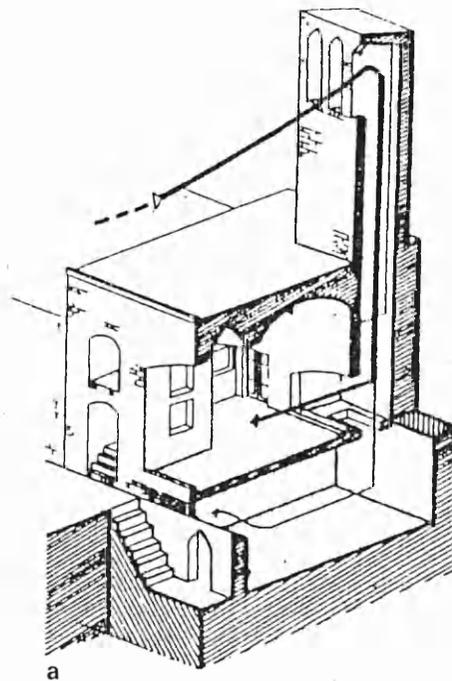
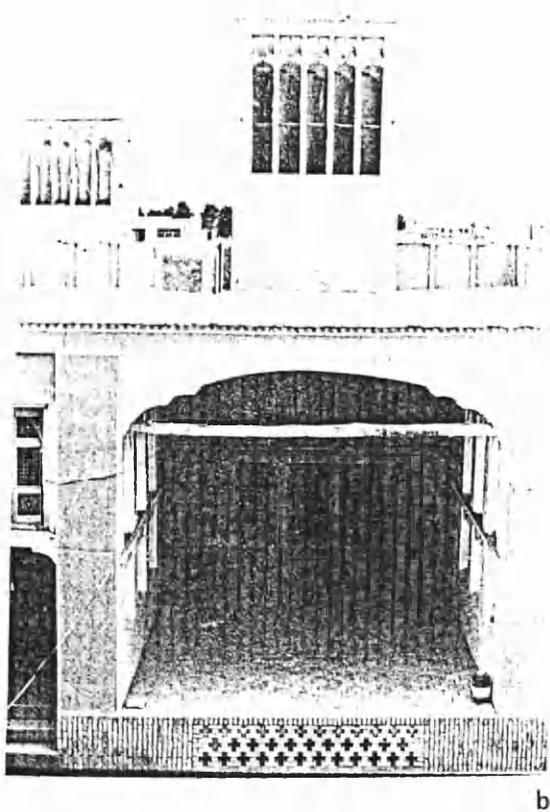


Fig 8:
 a. Cut-away isometric showing how summer suffice works with badgir and sardab.
 b. Openings of a sardab on courtyard, the vents of wind-tower.
 c. Rear of a wind-tower, showing shafts division.

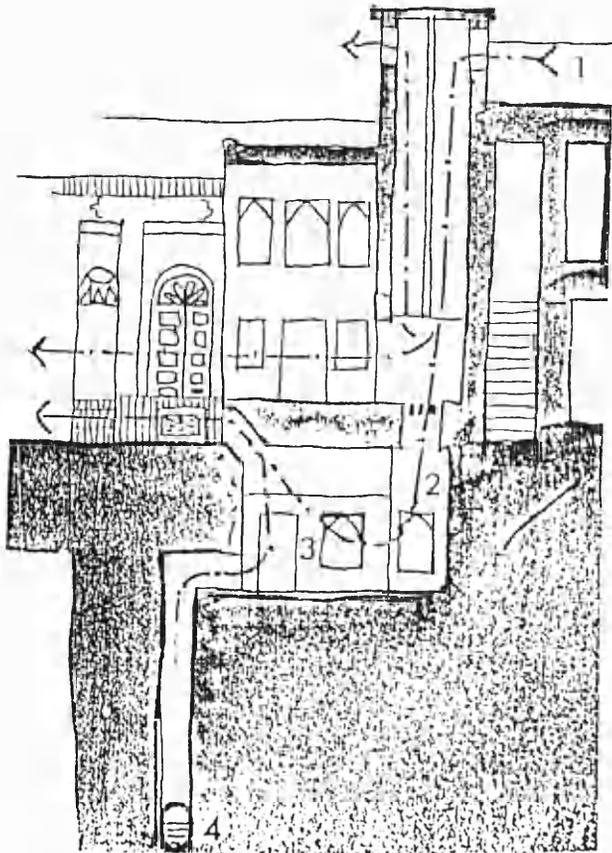


Fig 9:
 Section showing how a qanat can cool a basement. Relative temperatures:
 1- 36.5 C, 2- 29.9 C, 3- 24 C 4- Qanat, (E. Beazley, Living with Desert).

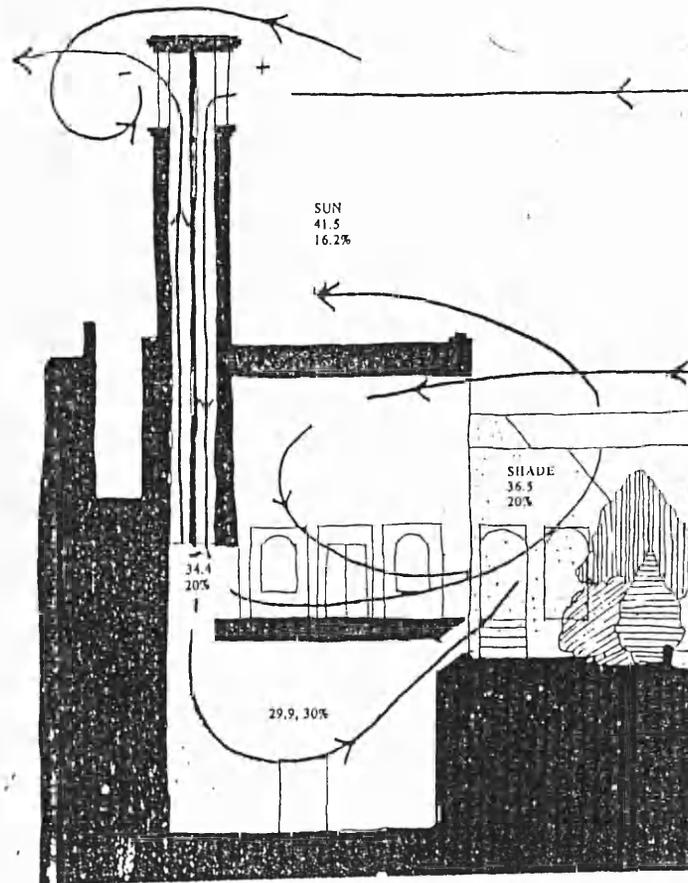


Fig 10:
 Section to show the performance of a wind-tower and sardab in degrees Celsius with relative humidity, (E. Beazley, Living with the Desert).

(7) Rooms

Rooms

In general, when we wish to discuss the rooms of a house we refer to their function, e.g. living room, dining room, bedroom and so on.

However in the houses of Ardakan, when a space is called a “room” or *otaqe* the meaning is different. A room is one of the closed living spaces of a house which may be used for a variety of routine activities such as eating, sleeping, resting, studying, praying, entertaining, and is related to other open spaces such as courtyards and suffes⁽¹⁾ (fig 1).

Rooms may be divided into four types as follows: **1**-winter rooms; **2**-tanabys; **3**-summer rooms; **4**-autumn and spring rooms.

1- Winter rooms are at the north end of the courtyard, facing the sun in winter, flanking the winter suffice. **2**- A tanaby is usually located at

the back of the winter suffice, with one or three openings onto it. **3**- Summer rooms are on the south end of the courtyard, on either side of the summer suffice, facing away from the sun in summer. **4**- Rooms on the east and west sides of the courtyard are used throughout the year for various purposes. The west facing wall often has no rooms in it at all (see courtyard chapter p.30 & 31).

The rooms' names are climatical because of the occupants' movement through and around the house with each changing season of the year. The orientation of a traditional Ardakani house is, therefore, critical.

With the organization of the rooms around a courtyard, a migration

is effected each year in September or October to winter rooms on the south-facing side of the courtyard and in April and May across to the north-facing side⁽²⁾. The sun is the effective form of climatic control. Most of the winter months will be spent in the winter rooms on the ground floor but in summer, due to the dramatic change between the night and daytime climates, comfortable conditions are achieved by a different form of migration, not horizontally around the house as occurs from season to season but vertically through the house (fig2).

Winter Rooms

Rooms are generally named by the number of windows they have, usually one, three or five. In large houses, winter rooms with one or three front windows on either side of winter suffe also have a door

into the winter suffe leading by way of a passageway to the courtyard⁽³⁾, (see plan of Ansari's House in Charkhab quarter p.171). The size of this type of room is usually about 5 by 3 by 2.5m high (to the springing of the vault). In this sort of house the winter rooms are warmed by the heat of the sun so that people sometime spend the whole day there. Even during cloudy and windy days these spaces are well protected (fig 3). These winter rooms exist in rich districts only, such as Charkhab, Tiran and Mirsaleh (see plans in the following description of quarters).

A type of winter room which replaces the winter suffe can be found in the larger wealthy houses. This type of room has three or five windows. A good five-windowed room will have a frontage of five tall-arched openings, each divided into two parts. The tympanum of the arch contains a semicircular fanlight composed of pieces of

coloured glass fixed together in a wooden lattice (fig 4) see, for example, of the Camel House in Tiran Quarter.

In poor districts, such as Kumlaq, Ali Baik, and the area on the margin of Ardakan belonging to the peasant farmers, and also in some middle-class districts such as Bazar-no and Sharifabad where the houses are very small, there are only two winter rooms on either side of the winter *suffe*. These have no window to the courtyard but each room has one door to the winter *suffe* and in some houses there is one window to the winter *suffe*. The hardy working men who live there demand only the simplest shelter against the cold. They keep warm in these windowless rooms⁽⁴⁾, the walls of which have been heated by the sun during the day, by using a *kursi* or brazier. Sometimes these houses may have no summer room, so the winter room has to protect people from both the cold and the heat. Usually

the size of this sort of room is 3 by 2 and 2.2m high (fig 5).

Tanaby

In some houses, at the (north) of the winter *suffe* there is a room called a *tanaby*, which is used as a winter room. During the day the winter sunshine enters and heats the room through windows in the rear wall of the winter *suffe*, so turning the structure into a sort of storage heater. The number of doors and windows from a *tanaby* to the winter *suffe* depends on its size. A good one will have three glazed doors surrounded by tall windows opening into the winter *suffe* and also two doors opening into passageways running alongside the *suffe* (fig 6). There are also *tanabys* with no windows above the doors. Both types exist in wealthy houses in areas such as Charkhab and

Mirsaleh. There is one more type of tanaby which usually is found in the smaller houses. If a house does not have enough room for a summer suffe, the family retires during the heat of the day in summer into a tanaby with only one door into the winter suffe. This room has its walls isolated from solar radiation to the south by the winter suffe and in this way the climate may be manipulated for relative comfort even without a wind-tower.

Summer Rooms

In large houses there is a summer room on either side of the summer suffe with one or three pairs of glazed doors opening on the courtyard. These doors are kept open during summer (fig 7). Behind the summer rooms are corner rooms, *gushes*, reached by passage-

ways running alongside the suffe.

A wind-tower (*badgir*) is situated between the *gushes*, with small window-like openings on either side into them. Otherwise there are no openings except for one, two or three in the crown of the vault and consequently these rooms are dark and cool. They are usually used for taking afternoon naps (see plan of Majd al-Olama's House in Charkhab quarter p.168).

Another type of room is the "back summer room" which lies directly behind the summer room. A small door connects the two. Back summer rooms have no other openings (except very occasionally openings in the vault) and are consequently very dark.

In farming districts or in small houses there is a type of summer room

which has no opening on the courtyard, only a door leading from the summer suffe. These are small, approximately 3 by 2m and are kept cool and shaded (fig 8).

Spring and Autumn Rooms

As is evident from their names, these rooms on the east and west sides of the courtyard are used during the spring and autumn seasons. Rooms on the west side of the courtyard, open to the rising sun, are used at breakfast time, while rooms on the east side are warm enough for afternoon tea (fig 9).

In large houses there are such rooms on one or both sides of the courtyard. Bedding is kept in them and the family sleeps there in

winter. In wealthy houses, a large room with three or five windows on the east side of the courtyard serves as a reception room during winter. This room is reached by passageways on either side from the courtyard and is often elaborately decorated, notably around a stucco hood over a fireplace in the east wall.

Reception Rooms

On the east or west side of the courtyard of every house, where economically possible, are rooms where guests are entertained and major family occasions celebrated⁽⁴⁾. In the poorer houses there may be no separate room for guests, and there the father's room, often situated near the entrance, is used. In wealthy houses, male guests are entertained away from the female quarter. In this sort of house, there

is a complexity of design which accommodates a double circulation system. The “Camel house” in Tiran quarter for example, has an octagonal entrance vestibule from which one passage leads to a guest complex around a secondary courtyard, while another passage leads to the family rooms around the main courtyard (see p.193 & 200). In addition, there are separate entrances from the street to the two courtyards. The kitchen, located between the guest complex and the main courtyard, serves both.

Overall, the reception room is a symbol of the economic status of the household. It is furnished with family heirlooms and is generally the most richly decorated room in the house. The Soltan house in Charkhab quarter, for example, has a reception room with rich stucco decoration concentrated on the ceiling, windows of the drum under the dome, and window arches. Apart from being a place for relaxa-

tion, the reception room is used for religious discussion and instruction.

Some houses in Charkhab quarter (see Ansari House, p.172) have a summer guest room or *balakhane*, on the upper floor as well as the winter reception room on the ground floor. Balakhanes usually have a three-windowed balcony overlooking the street.

Taq-cha & Rafe

In every Ardakan traditional house round every room there is a series of recesses called *taq-chas*, usually about 20cms deep, used as shelves for storage or display. If the height of the room will allow it, as in suffes and reception rooms which have high ceilings, these *taq-chas* are surrounded by an upper register of recesses, usually *shal-*

lower than the lower ones. Between the two registers of taq-chas in high rooms and above the single register in low rooms there is often a projecting ledge, called a *rafe*, not unlike a cornice. In reception rooms the rafe is used for displaying ornaments and heirlooms while in suffes and other rooms it serves simply as a decorative moulding in the plaster (fig 8).

Furniture

Rooms are used interchangeably for eating, sleeping, relaxation and domestic tasks. This flexible use of living space is possible because there is virtually no furniture. The inhabitants sit on the floor using carpets, rugs, cushions and mats, which can be rolled up and stored away when not wanted. The only valuable things to be seen during the winter season are carpets, which are usually laid right up to the

walls, and protected by a piece of rough Yazdian drugget laid on top, usually around three sides of the room.

In winter, a *kursi* is used to provide heat. The kursi is a low wooden table, about 65cms high and 80cms square. Beneath the table is placed an iron brazier of burning charcoal. The kursi is surrounded by mats with cushioned backrests and a large quilted cover is placed over it. Usually a large copper tray is laid on it for serving food. The kursi acts as a focal point for the family. They sit on the mats, tuck their legs under the rugs and enjoy eating and talking together. Often during the winter season they sleep on the mats around the kursi. The kursi is not generally kept in the room except in the coldest weeks. In the beginning of winter or in spring the brazier is often brought in on a copper tray, either for heating the room or for keeping the teapot warm.

Curtains are not much used for windows but are commonly used at doorways.

Doors and Windows

Rooms, as mentioned above, are generally named after the number of their windows, which is usually three or five. A good five-windowed room (*Panj-dari*) will have a frontage of five arches fitted with glazed doors surmounted by semicircular fanlights. The glazed doors consist of two leaves turning on cylindrical hinges set in circular recesses in the timber threshold and lintel.

The fanlights consist of pieces of coloured glass in a wooden lattice. In some older houses the fanlight is a full circle called a sun-window (*khurshidi*), set in an arched recess. The lattice resembles fretwork

but, in reality is elaborately pieced together.

There are also fixed rectangular windows protected by wooden grilles. Some of these are glazed and others unglazed. The unglazed windows are closed by pasting paper or muslin over them in winter. The woodwork of doors and windows is protected with varnish.

References

- (1) All kinds of rooms can be found in large houses belonging to the rich people. In the middle-class and lower-class houses, two or at most three kinds of room can be observed. There, however, is always a winter room.
- (2) Beazly, E. Living with Desert, 1971 65.
- (3) Napier, M. Five Years in Persian Town, London, 1905, 18.
- (4) By combination of the transfer of heat from the sun through the walls plus, when necessary, the useful kursi or brazier.

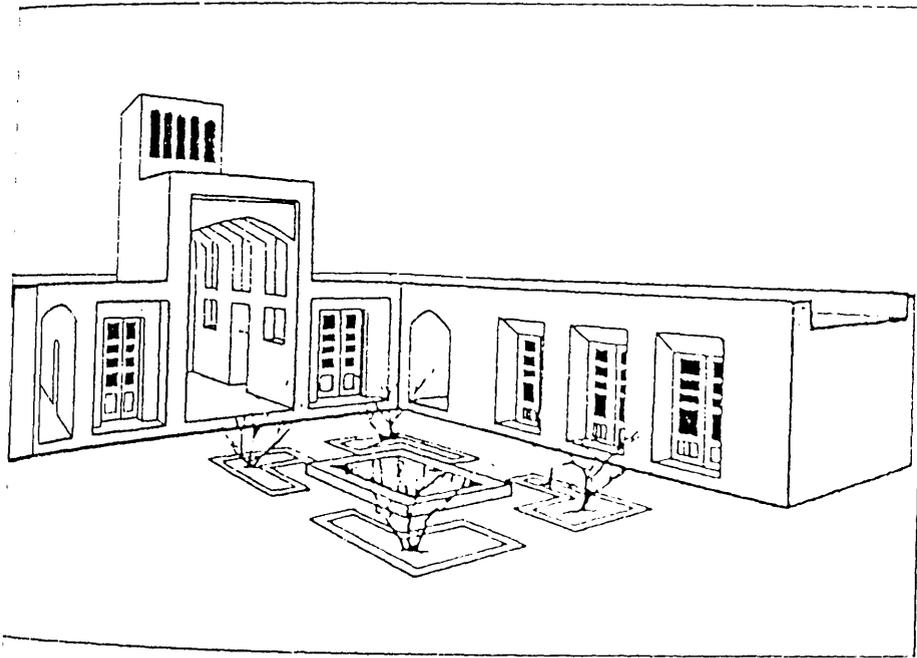


Fig 1: Connection of rooms to the open space (courtyard), and semi-open space (suffe, passageway).

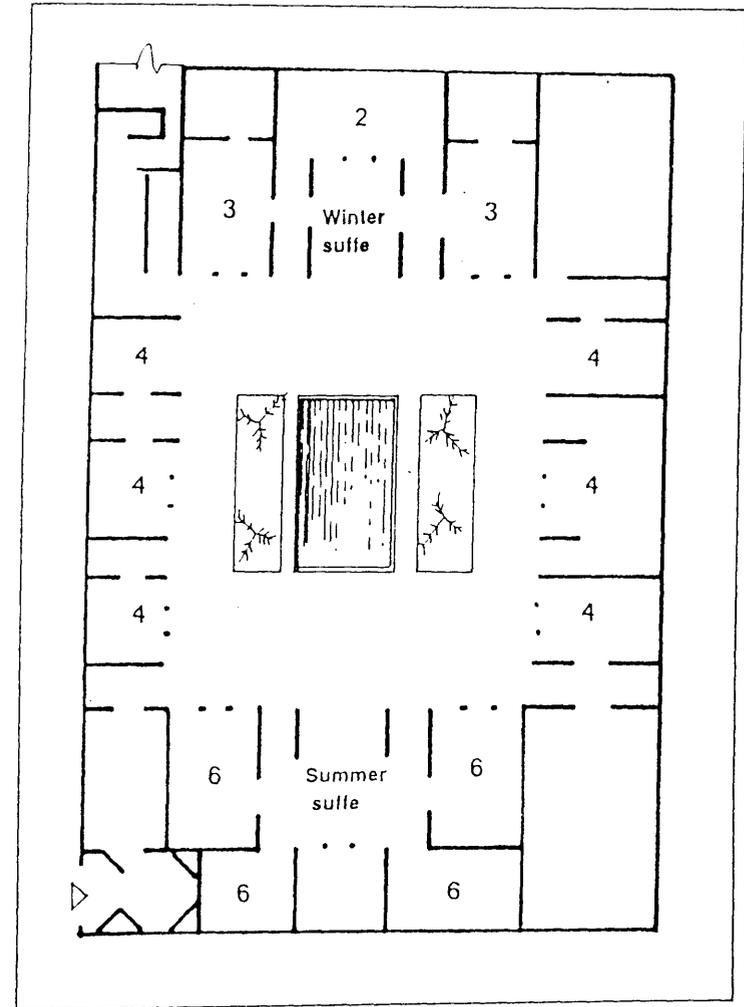


Fig 2: Different types of rooms; (3) winter room, (2) tanaby, (6) summer room, (4) spring and autumn room.

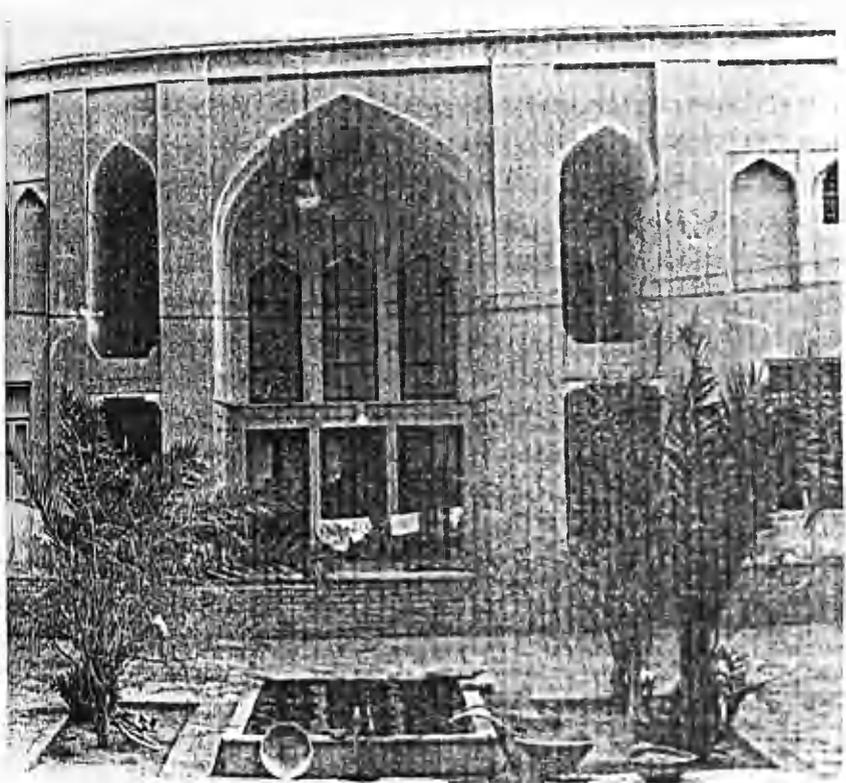


Fig 3: Winter rooms on either side of winter suffice.

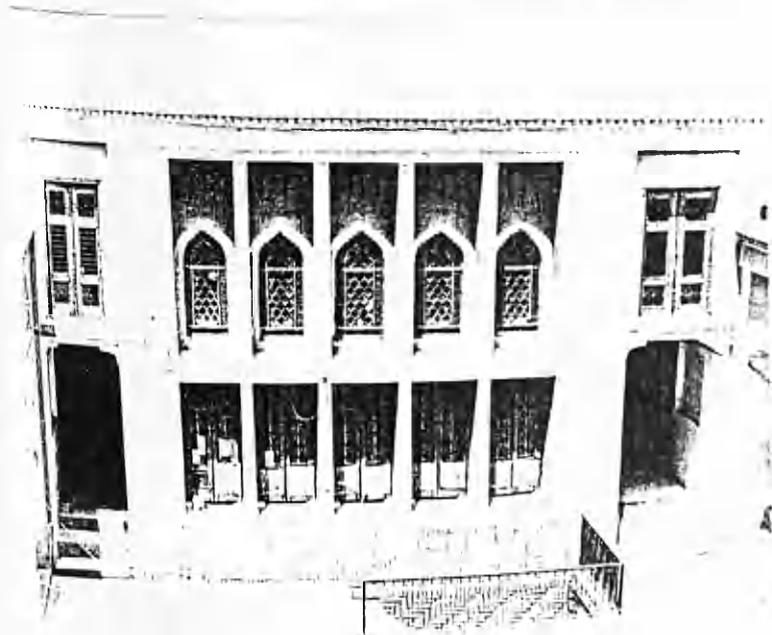
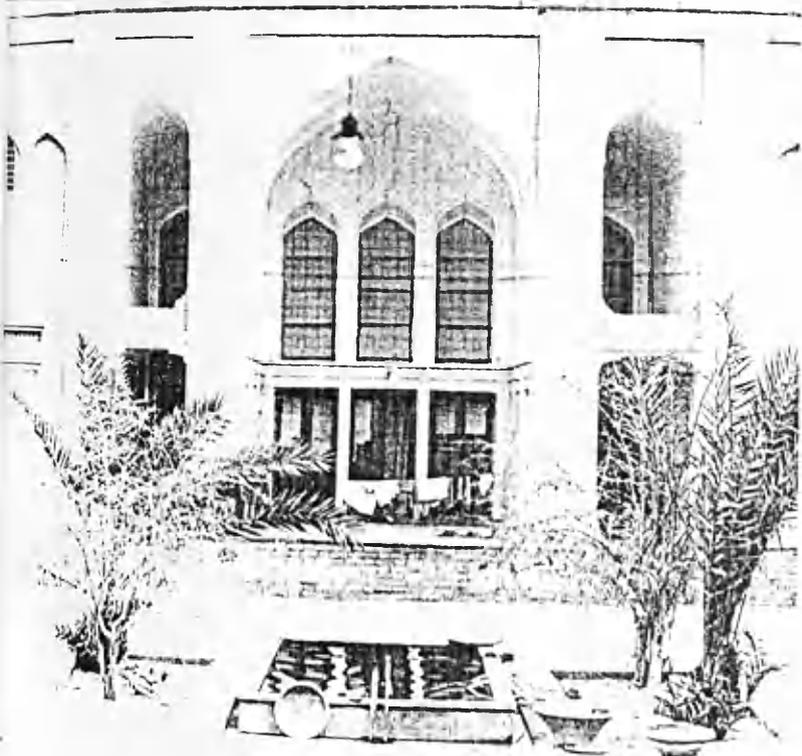


Fig 4: Winter room in place of winter suffice.



a

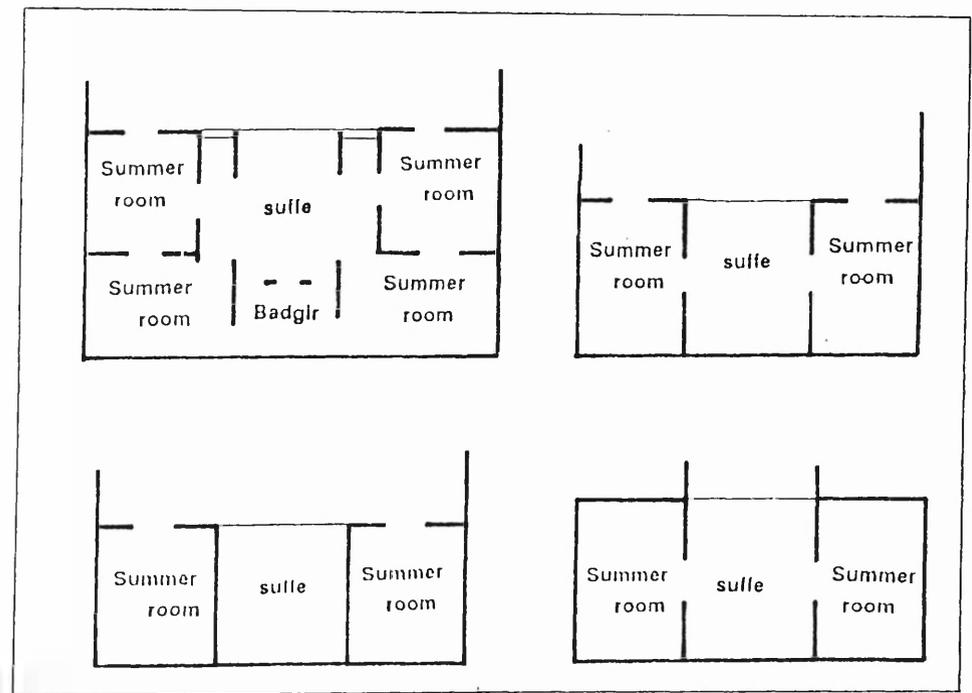
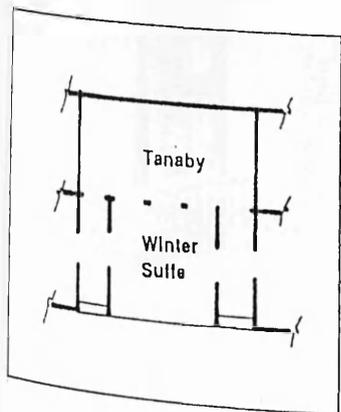
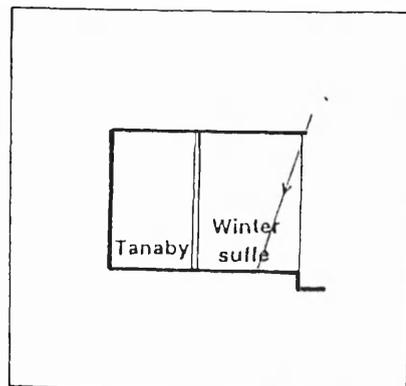


Fig 6. Showing all types of summer rooms.

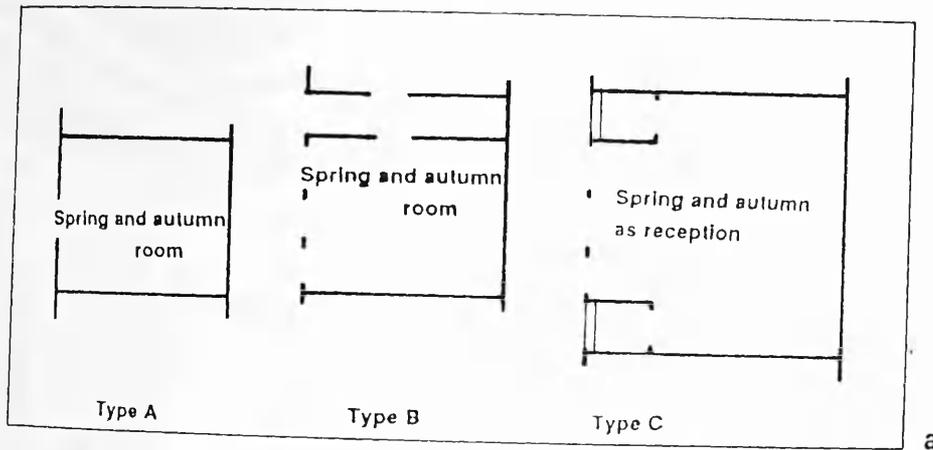


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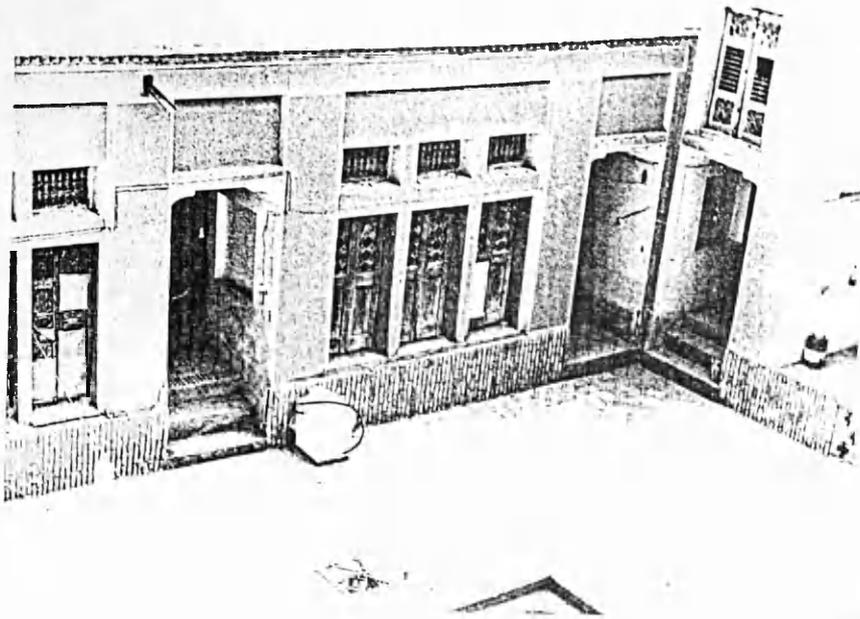


c

Fig 5:
 a. Openings of tanaby in winter suffice.
 b. Plan of tanaby
 c. Sunlight penetration of winter suffice during summer.

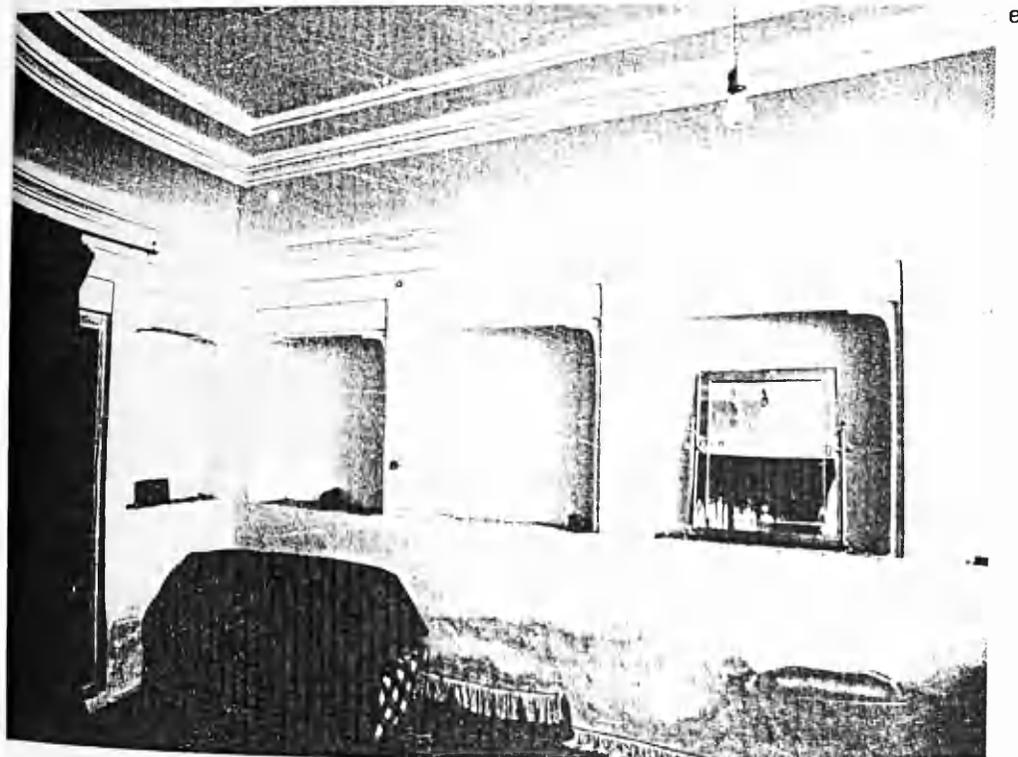


a



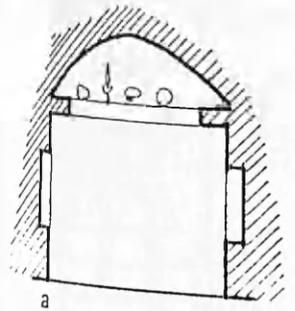
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Fig 7:
 a. Showing all types of spring and autumn room.
 b. Rooms on east side of a courtyard.

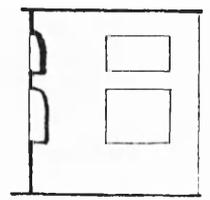


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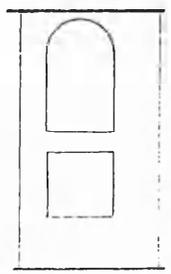
Fig 8:
 a. Section through a room showing niches and rafs.
 b. Niches in a room.
 c. Niches in a suffice.
 d. Niches in high-ceilinged suffice.
 e. Interior of Ansari House in Charkhab Quarter.



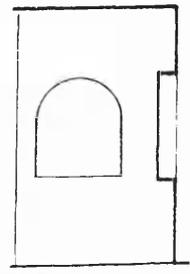
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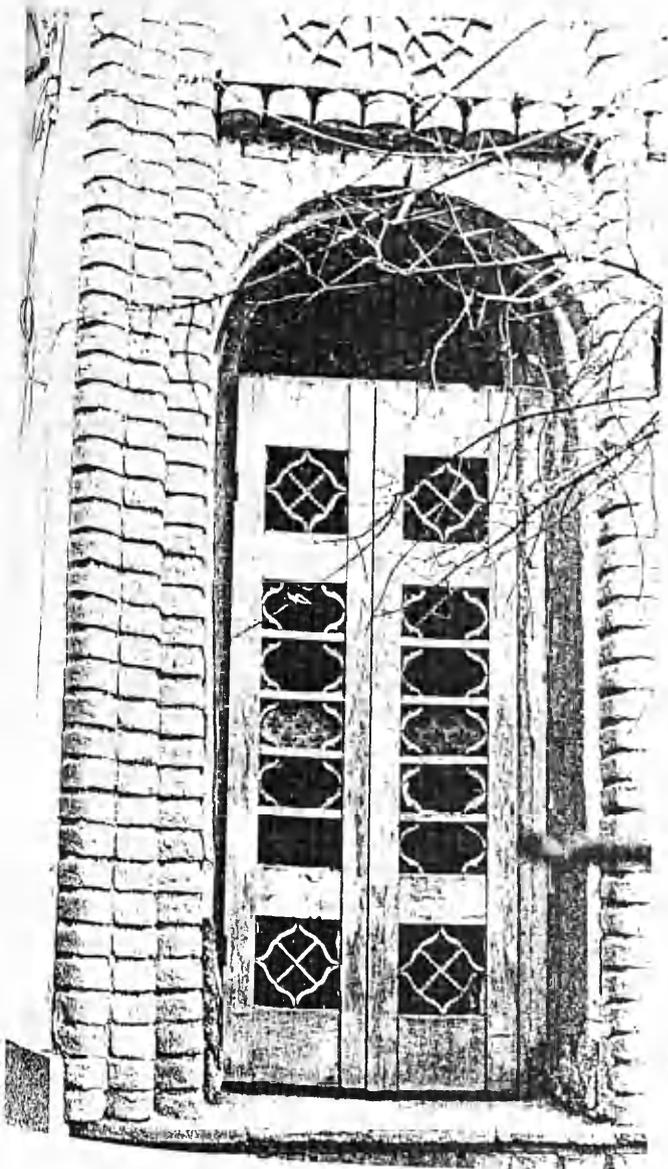
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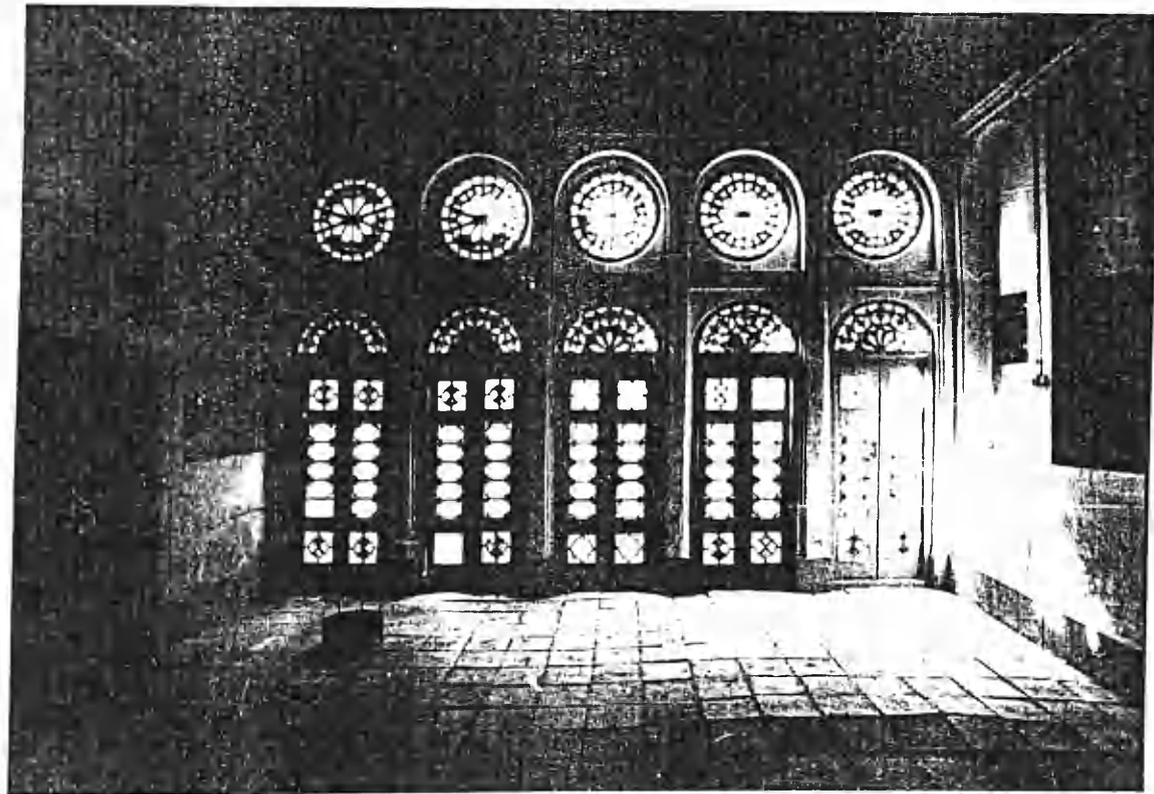
c



d



b



a

Fig 9:
a. Five-windowed room with the fanlights called sun-light (*khurshidi*).
b. Glazed door consist of two leaves.

(8) Connection Areas

Connection - Spaces

1 - The Entrance

The entrance is the connection between public life and the interior of the house. In Ardakan the entrance is arranged strictly to prevent the private area of the courtyard from being viewed from the street (fig 1). The introduction of this transitional space was to facilitate lateral movement in the entrance as well as passage into the courtyard.

The entrance portal represents the economic status of the household. There are several different types of entrances such as type (A, B and C in figs. 2-4).

Direct Type A

This type of entry consists of, a shallow portal containing a simple door. In wealthy houses the portal is high and wide, very elaborately decorated, and usually has stone seats on either side of the door which opens into a vestibule. At the other extreme, in some farmers' houses there is no portal but a plain entrance door which opens into a passageway leading to the courtyard (fig 2).

Indirect Type B

Some house groups have one entrance porch which serves more than one house. Such configurations occur throughout the town, not

exclusively in either wealthy or poor districts (fig 3).

The size of these entrance porches, square or rectangular or even octagonal in plan, varies from two metres up to about eight meters depth (figs 6, 7). In the latter case it becomes a small entrance court.

Type C, the smaller porches contain only one entrance door while the long entrance court includes doors into different living quarters, such as houses, stables and stairs to rooftops, or provide access for the removal of sewage from septic tanks (fig 4).

Hashti (vestibule)

The vestibule (in Farsi, *hashti* or, in Ardakan, often *keryas*) is an eight-sided room, usually immediately inside the entrance door but

occasionally reached by way of an entrance corridor. This space typically includes more than two openings which lead to different areas such as separate houses, stables and so on. Invariably, several of the eight sides have narrow mud-brick benches against them, each topped with stone.

In some houses the dome of the hashti has a very decorative vault or a skylight, and the floor often has bricks laid in stylish patterns (fig 5). This space is used for many purposes in wealthy and middle class houses comprising more than one courtyard and in complexes of houses. The main purpose is to provide a peaceful space for those visitors or customers who have to wait until permission to enter the house is given.

The vestibule serves also as a junction between the private and social

lives of the inhabitants and as a display of the wealth and power of the householder. Thus the eight-sided form provides ample opportunity to have doors leading in different directions, a suitable place for sitting and talking, and elaborate decoration reflecting the taste of the owner (fig 6).

Private Alley or Darband

In earlier times, all the members of a typical family lived together. When a son married he would bring his new wife to stay with the family. When the father became too old or infirm or died, the eldest son, or the most capable one chosen by the father, became his replacement as head of the family. Today families still live together but not as closely as before. The size of family living together is

different. If the family were farmers, usually they would stay in one house and all live together. Middle-class and merchant families usually had a big house with more room for comfortable living. Some families stayed in two houses (e.g. Camel House in Tiran p.200). Very wealthy families such as those of successful merchants, landlords or the local governor, often stayed in several houses connected together in a large walled complex ultimately accessible only through one high doorway.

This portal (*dar*) is the first component of the *darband*. It leads often through a vestibule (*hashti*) or an open court into a corridor which is the second component of the *darband*. Entrances to individual houses open off the vestibule, court or corridor. As well as providing access to the houses of an extended family, the *darband* also gives added protection to the family at night from robbers and bandits. Many

houses in the Charkhab district have darbands; they are found only occasionally elsewhere, for instance in Tiran and Mirsaleh Quarter.

The Sadr al-Fosalah House in Charkhab district has a good example of a darband (fig 7.1). A magnificent high portal leads into an internal entrance court, open to the sky. Two doors lead to a stable on one side and to an entrance corridor on the other. From the corridor three doors give access to the three houses of the Sadr al-Fosalah family (fig 7). Another type of darband is found in the Majd House, also in Charkhab district (fig 8). Here the high portal has stone seats set on either side of the entrance for the benefit of waiting visitors and for the inhabitants of the house to sit and engage in conversation with friends passing by. The entrance opens into a domed octagonal hashti lit by a lantern at the crown of the dome. Doors in the sides of the hashti lead to various houses of the Majd family. The one opposite the

main entrance leads by way of a long corridor to two houses. Formerly the corridor was roofed by a vault and lit by one or two small rooflights, to afford protection from the sun. One advantage of few rooflights was that burglars might not easily find their way out at night and perhaps fall into a man-trap, a deep ditch across the corridor, which would be covered with a wooden bridge during the hours of daylight.

Interior Connecting Spaces: corridors and passageways.

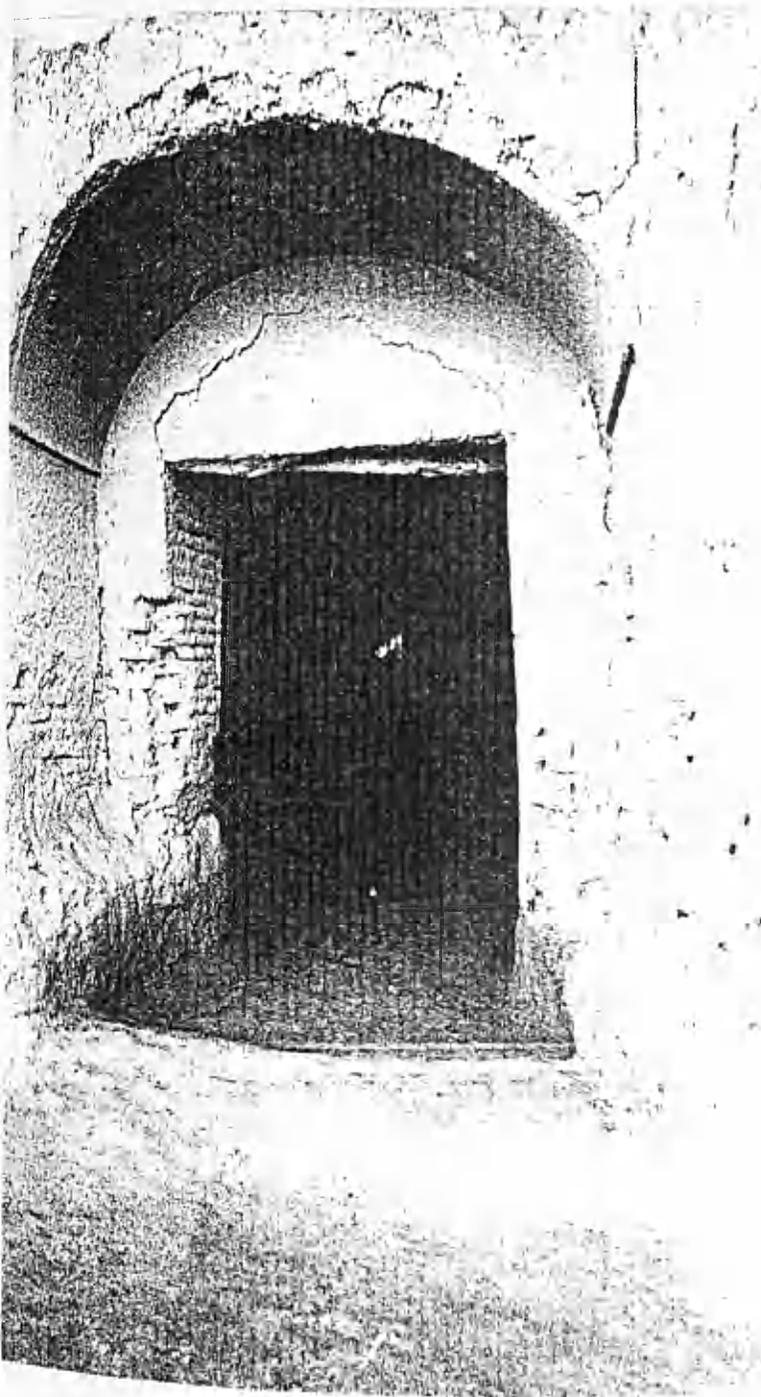
Corridors and passageways connecting different parts of the house are generally between 900 and 1200mm wide and 1800 and 2300mm high. There are several reasons for these interior connecting spaces. The most obvious is in order to provide access. A second considera-

tion is privacy. Entrance corridors for example, invariably have one or more dog-legs to prevent passers-by from looking directly from the street into the courtyard(1). Another reason for the surprisingly large number of corridors in some houses seems to be a desire on the part of the builders to maintain symmetry in the courtyard elevations. Thus, in the Ansari House for example, there are short corridors on either side of the summer suffe corresponding to large corridors flanking the winter suffe at the opposite end of the courtyard. Corridors such as these also provide extra protection from the cold wind in winter and the hot air in the summer, thereby serving as intermediate spaces between rooms and the open courtyard. Corridors also have a structural purpose. Those adjacent to high vaults serve to contain the lateral thrust. The corridors are usually two storeys high, with vaulted ceilings at both levels, supported by thick walls. The lower vault serves to link the two walls, improving the

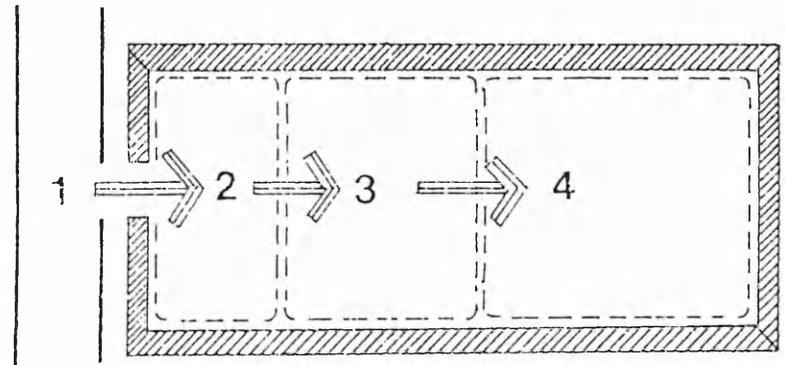
stability of the structure. The upper-storey space above the corridor is used for storage or occasionally as a small bedroom. Generally these spaces are reached by ladder, though in some large houses (e.g. Camel House in Tiran Quarter p.200) there is a narrow stair at the end of a corridor leading to the vault above (fig 11).

Notes

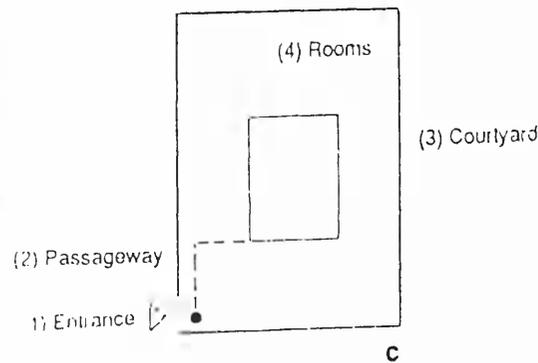
(1) Occasionally the entrance corridor runs alongside the street, with what is called a "ghost wall" separating it from the rest of the house (p.171, Ansari House, Charkhab Quarter) before turning to open on the courtyard. These corridors often have benches built along both walls.



a



b



c

Fig 1:

- a. Entrance off a private lane.
- b. From diagram showing sequence of events in a typical house:
1. Public street; 2. Private covered space; 3. Private uncovered space; 4. Private covered space.
- c. Plan illustrating above diagram.

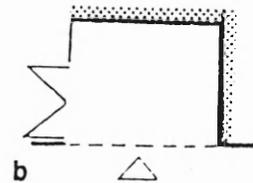
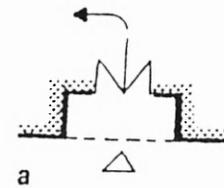
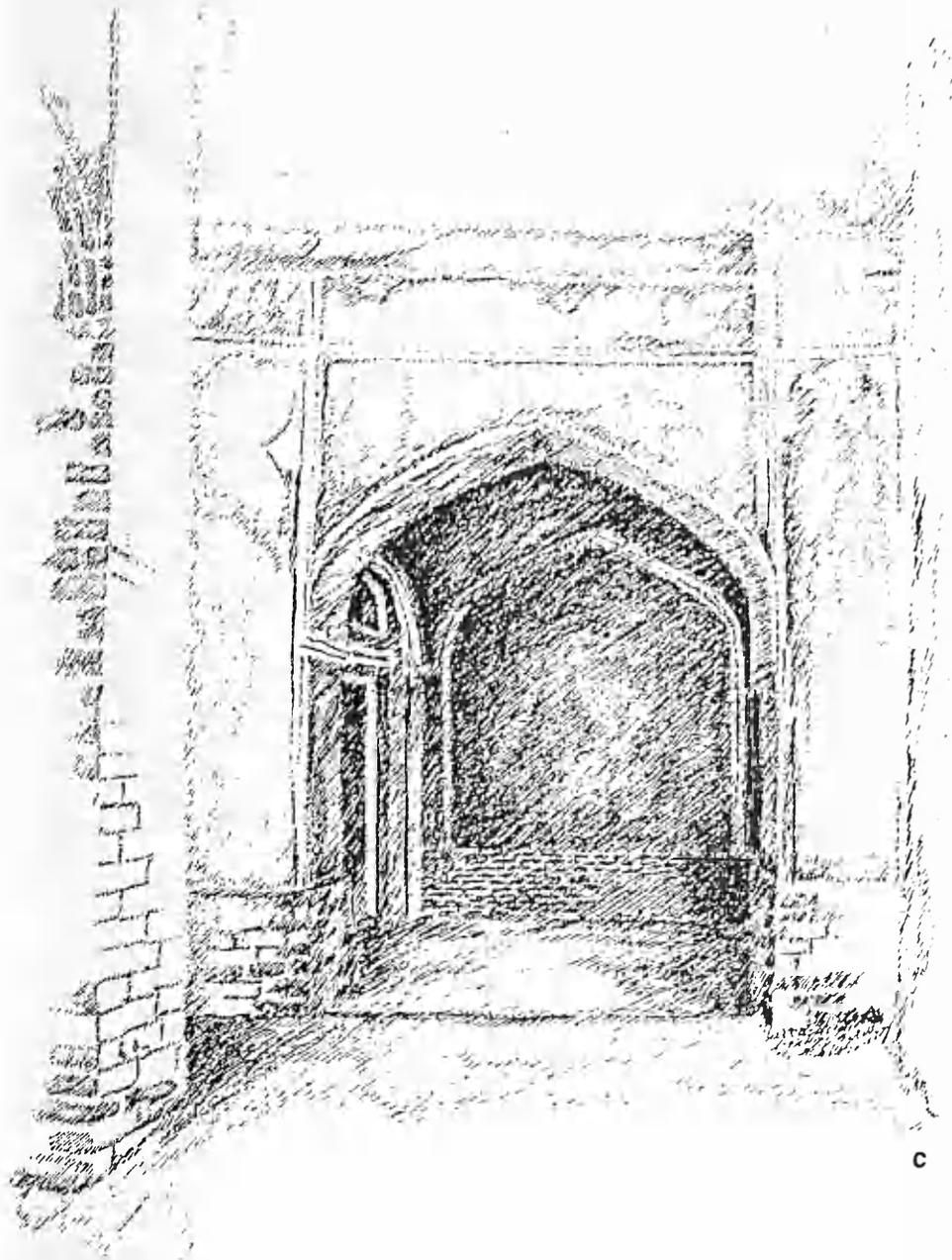


Fig 2:

- a. Portal Type A with direct entrance.
- b. Portal Type A with side entrance.
- c. Sketch of portal with side entrance.

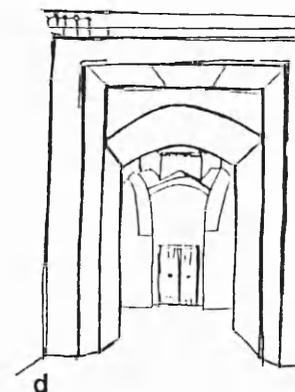
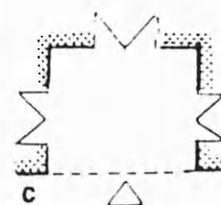
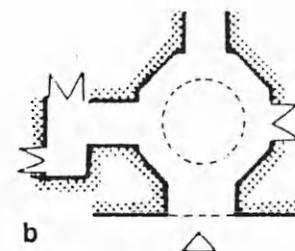
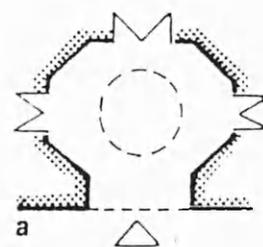
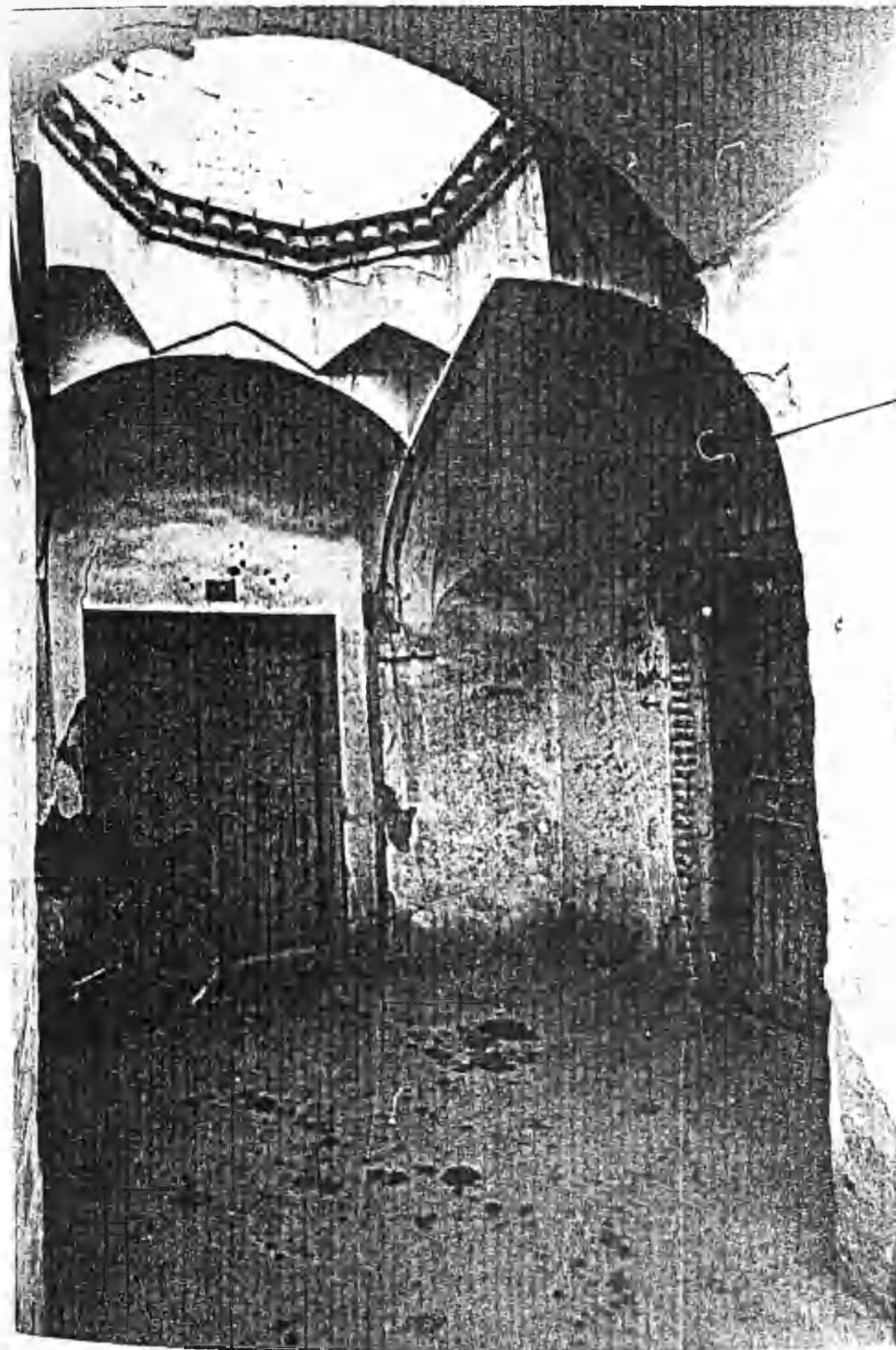
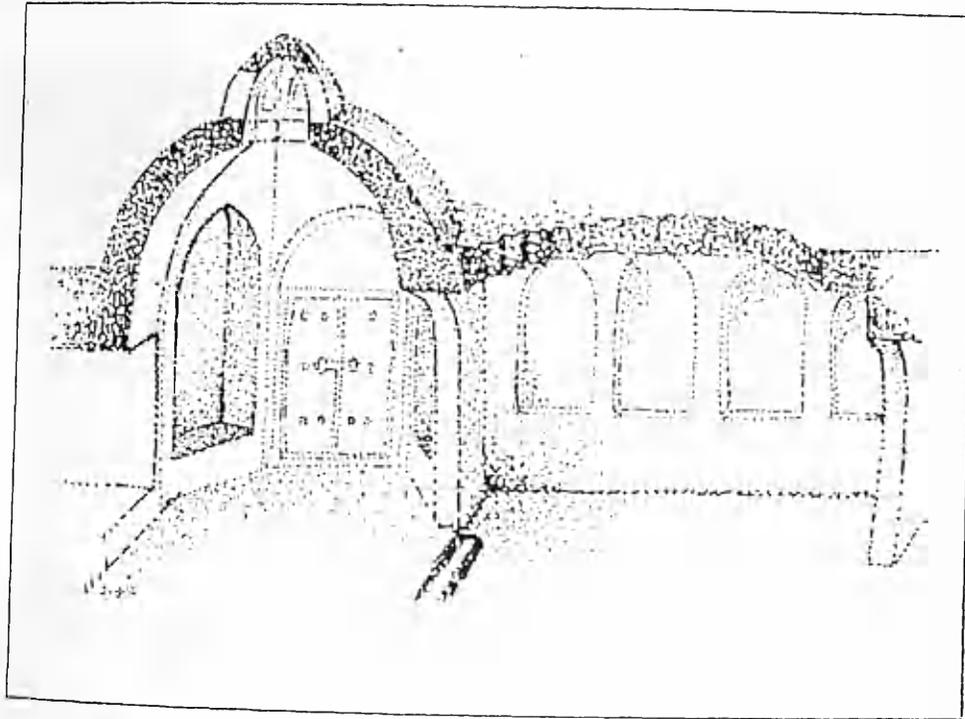
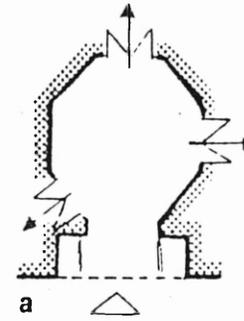


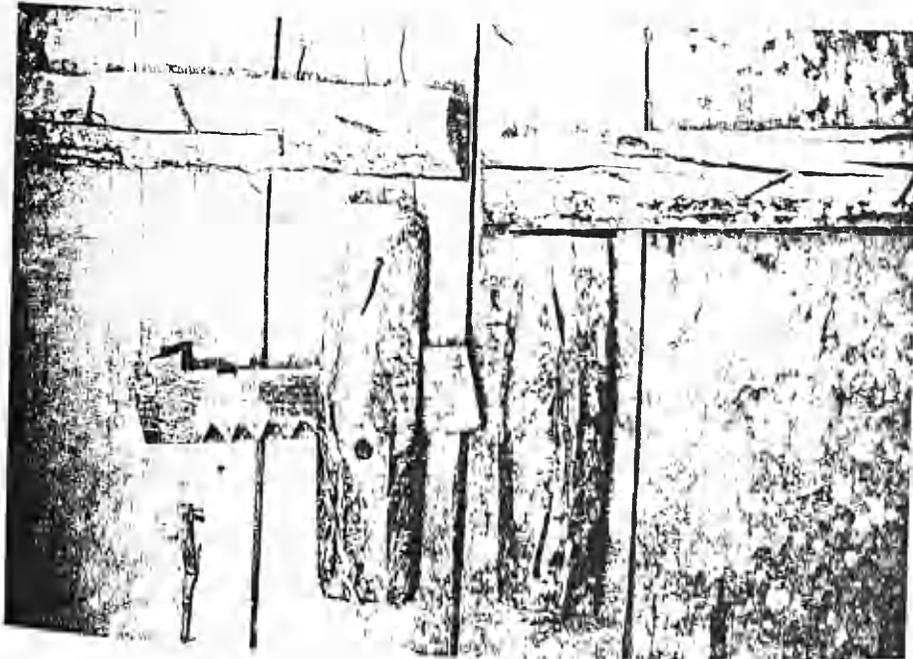
Fig 3:
 a, b, c, and d. Type B entrances, which indicate more than one entrance to each space.
 e. Semi-covered space with three entrances.



b



a



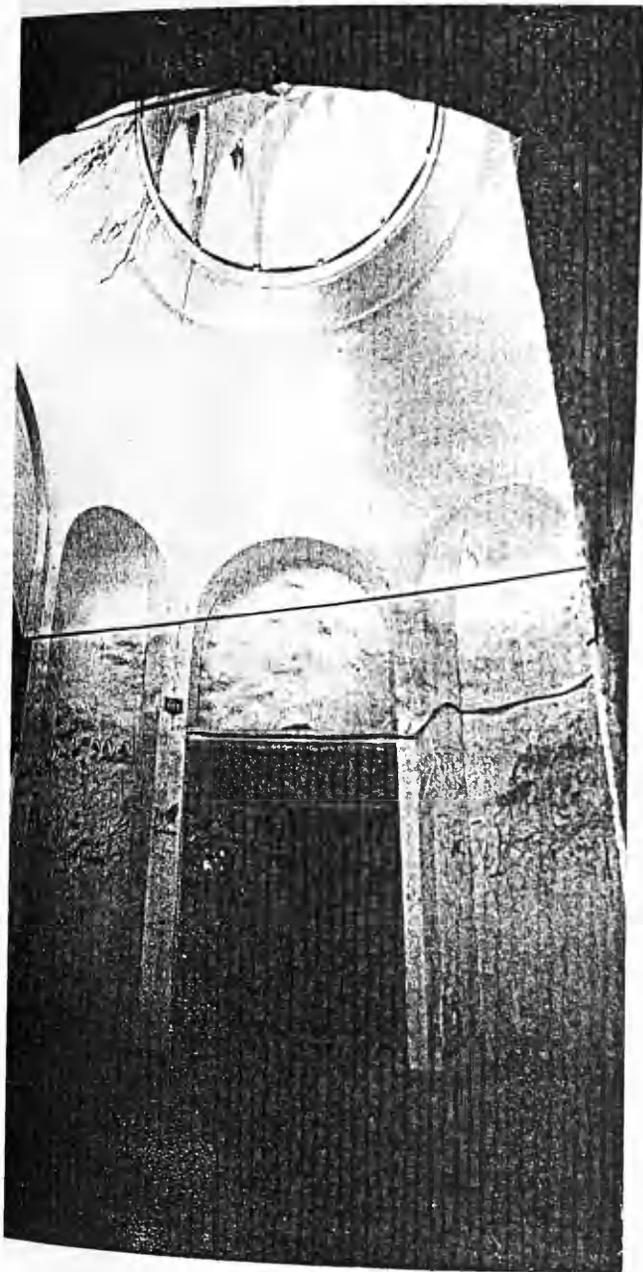
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Fig 4:

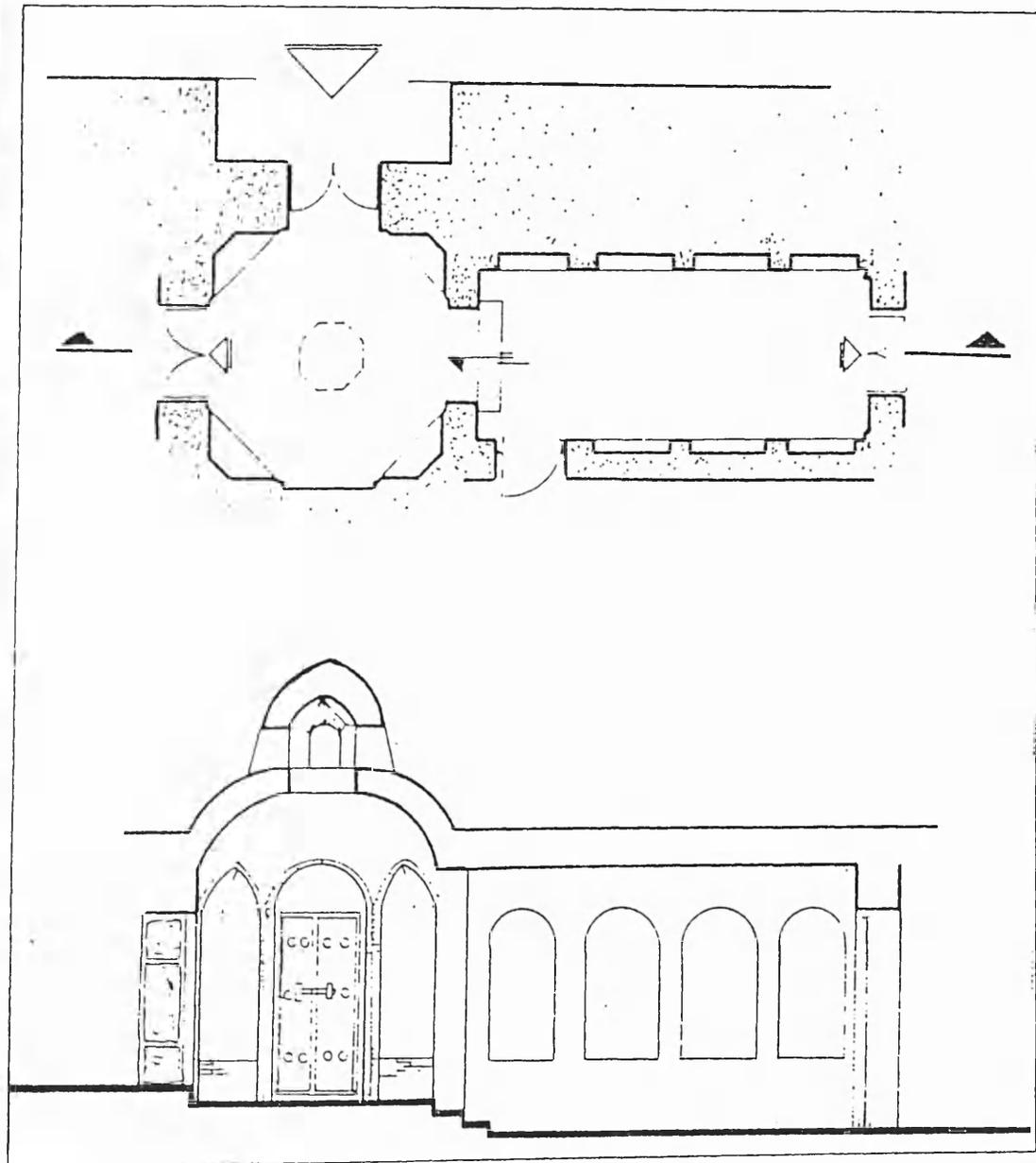
a. Type C; portal into hashti with three entrance doors.

b. Section through hashti and vestibule.

c. Lock (kolum) of entrance door, from behind the door.

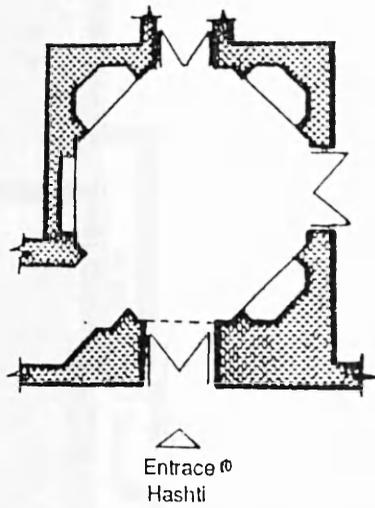
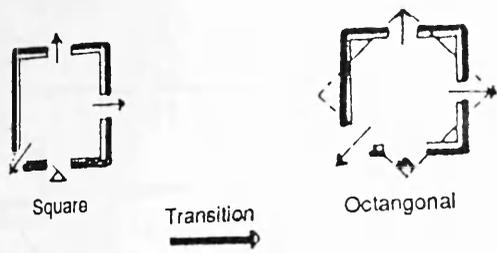


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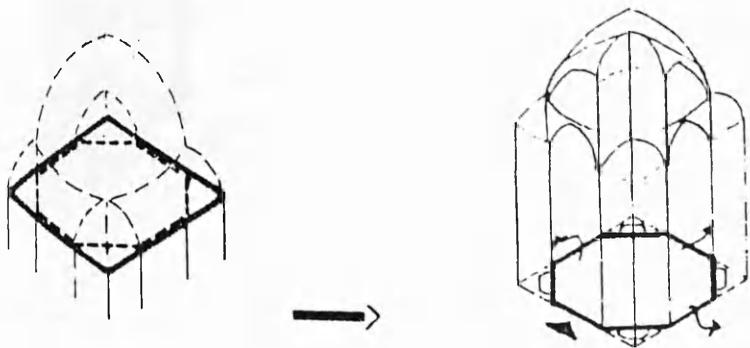


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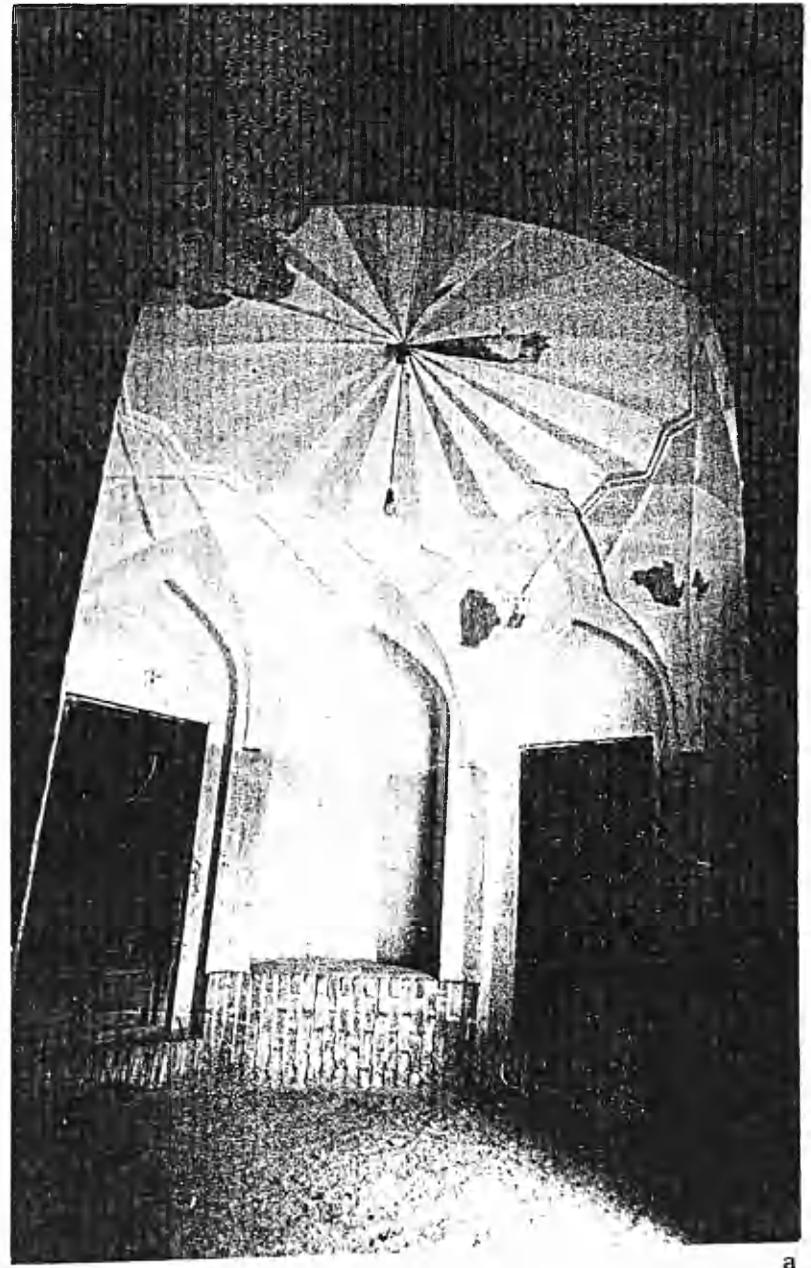
Fig 5:
a. Hashti with elaborate sky light.
b. Plan and section of a hashti and vestibule.



b



c



a

Fig 6:
a. Hashti with seats and entrances.
b, c. Transition from square to octagon carrying dome.

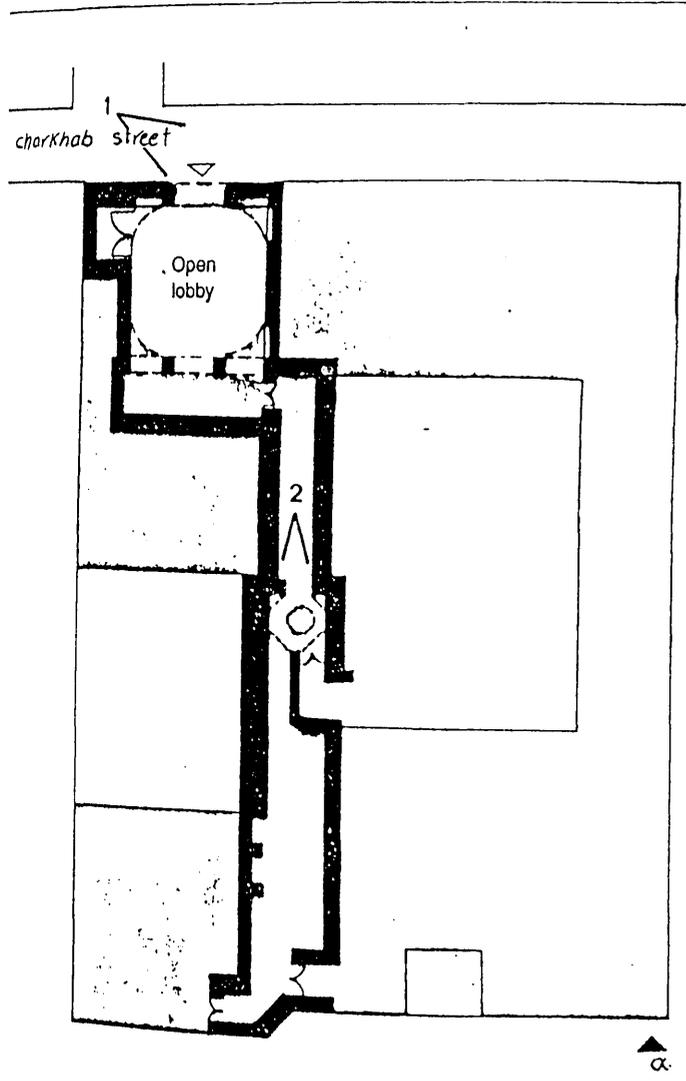
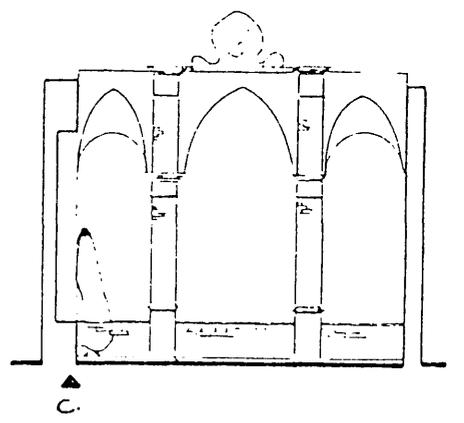
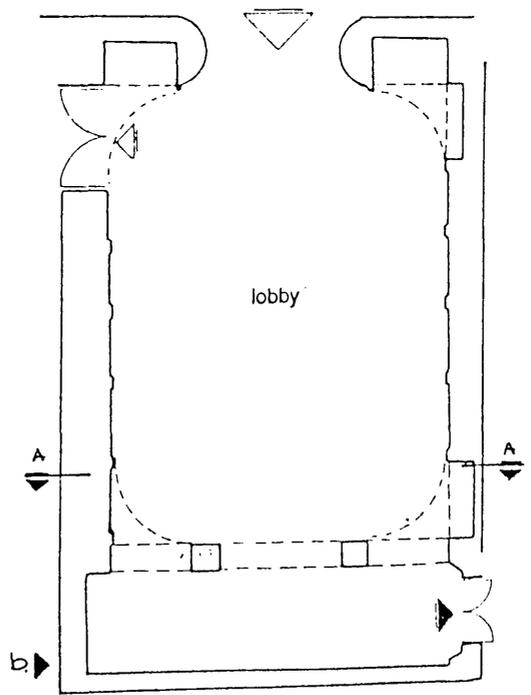
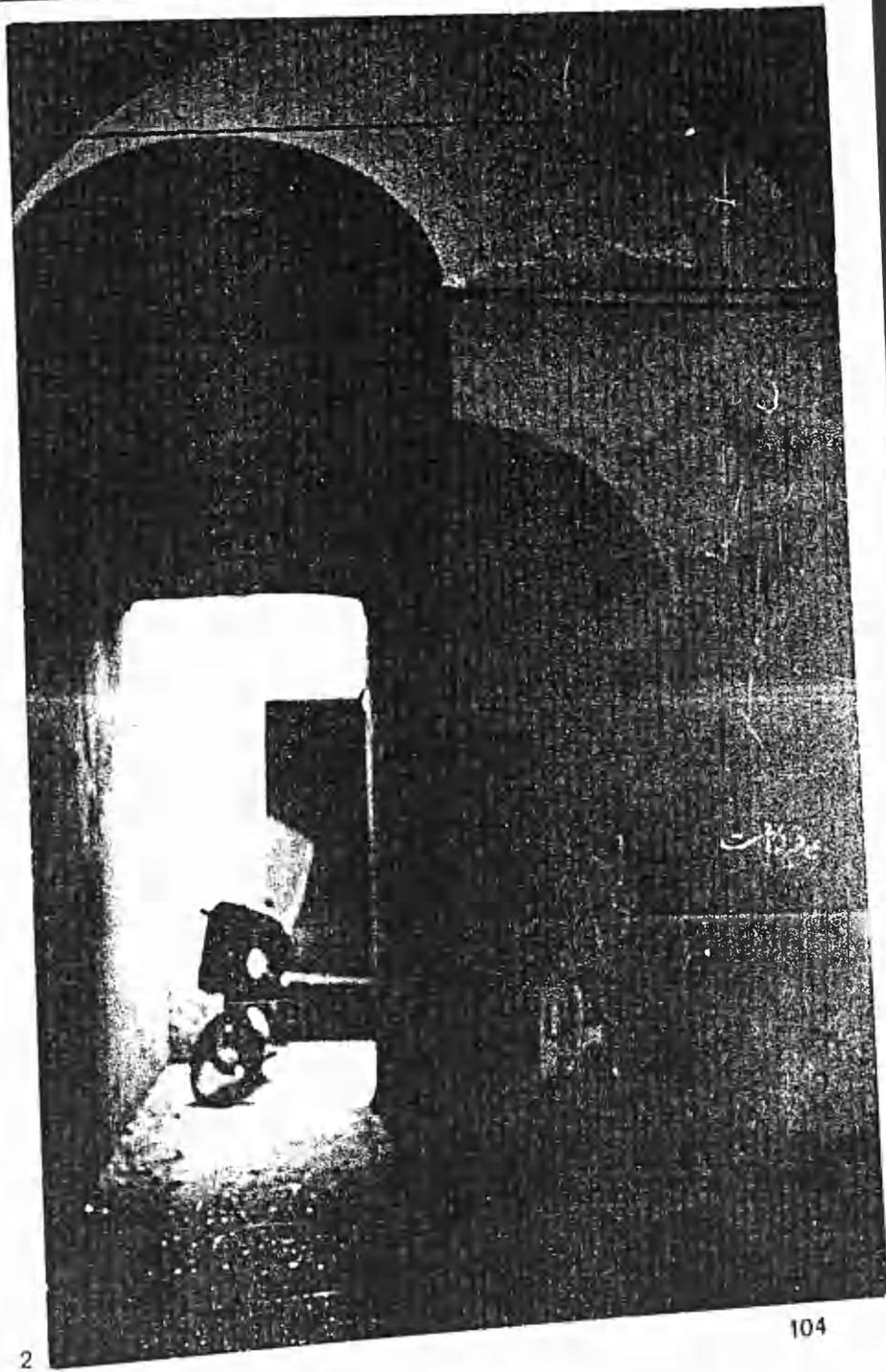


Fig 7:
 a. Sad al-Fosala darband.
 b. Courtyard entrance type D.
 c. Section A-A through entrance court.





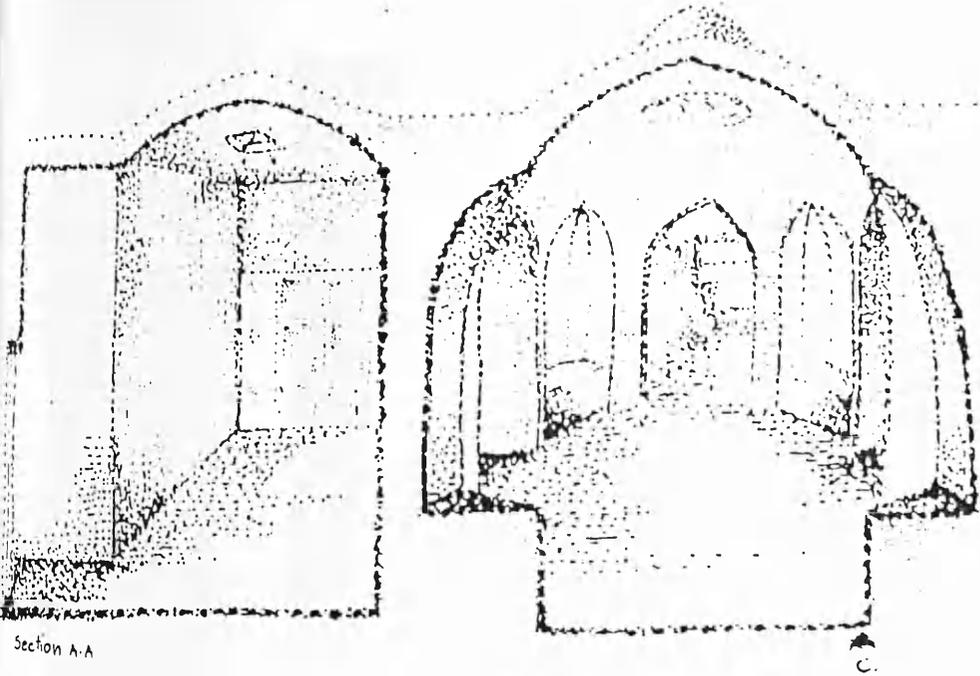
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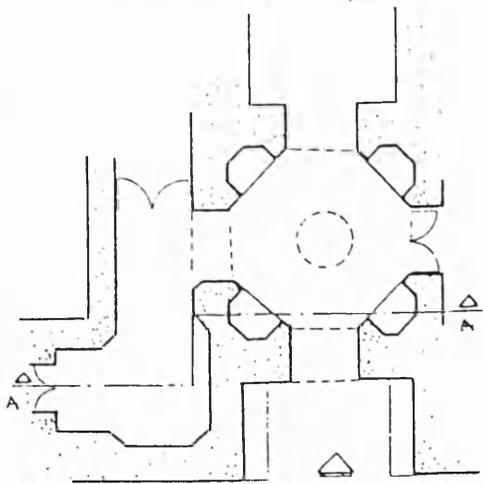
Fig 7:

1. Showing the entrance to the lobby.
2. Showing middle of the darband.

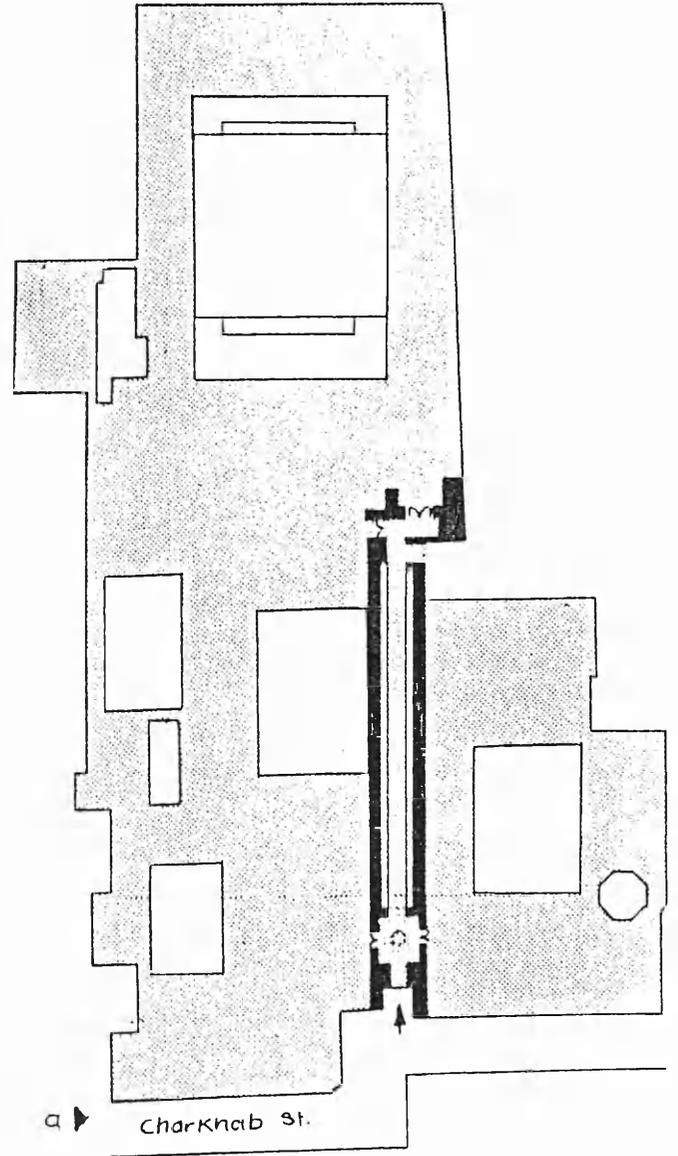


Section A-A

C

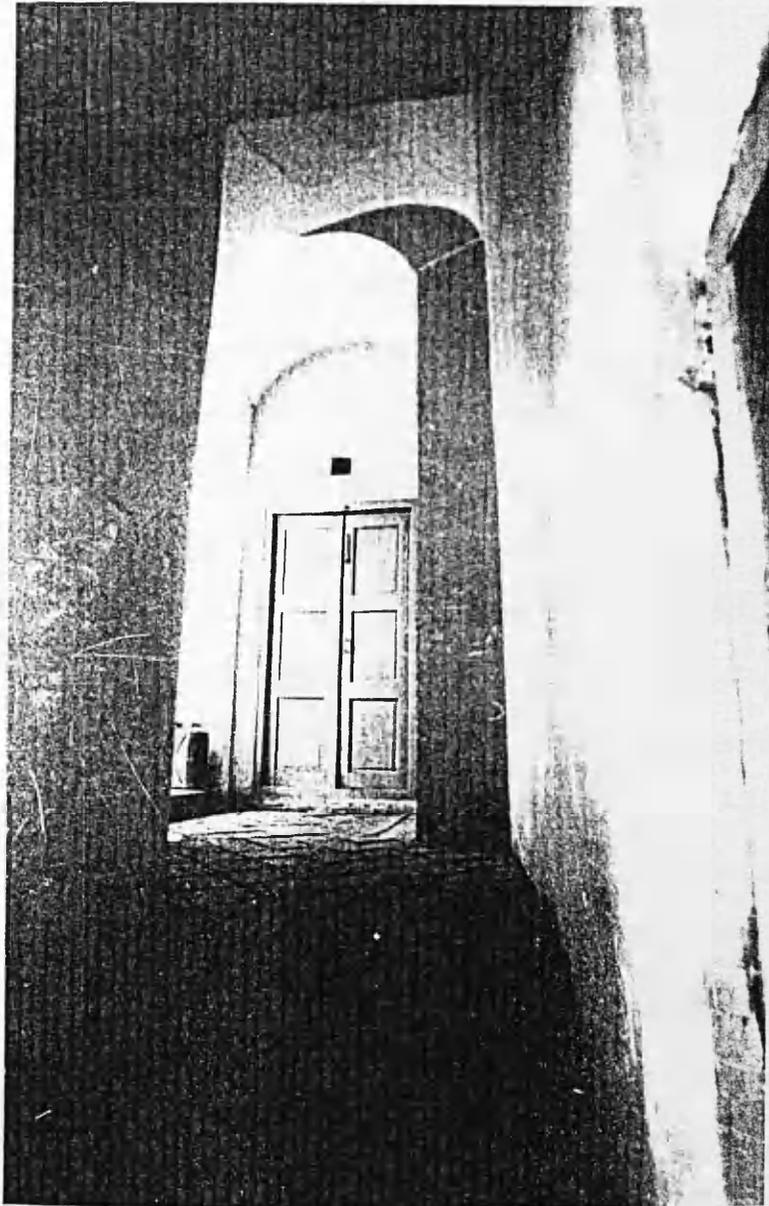


b.



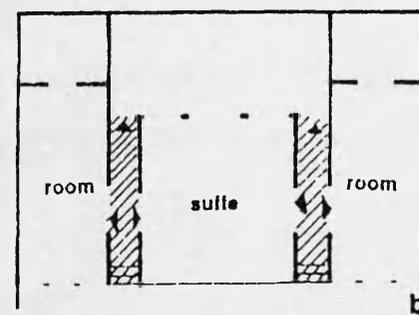
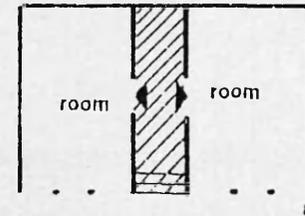
a ▶ Charkhab St.

Fig 8:
Majd al-Ulama darband (plan).
Hashū entrance.
Section through hashū and darband.



c

Fig 9:
a. Connection between two rooms across passage way.
b. Connection between suffice and flanking rooms.
c. Passageway to suffice.



b

(9) Service Areas

Service Areas

Service areas fall into two categories, covered and open. Covered areas include kitchens, underground water channels, lavatories, stables and stores. Open areas include stable yards and back courts.

Two factors influence the location of service areas in a house. First there is the relationship between individual service areas, such as kitchens, water channels and wood stores, or the relationship between privy, stable, hay and store, which all must have a convenient access to the street. Then there is the relationship between service areas and living areas, such as entrances, corridors and courtyards.

The location of service areas is also governed by the size of the house. In small houses, service areas are located on the west and east sides of the courtyard while the north and the south aspects are occupied by living areas. However in some houses additional service areas are

situated near the entrance. Thus the kitchen and store may be on either side of the courtyard and the latrine and stable beside the entrance (fig 1).

In average size houses service areas are usually in two separate areas. The kitchen, water channel, stores and servants room are grouped around a back court, while the latrine and stable are placed close to the street to allow easy removal of effluent.

In large houses the service areas are generally grouped around one or two back courts, isolated from the main living rooms (fig 2). This arrangement provides the best conditions for those working in the service areas.

Elements of Service Areas

Before discussing individual service units, we should note the main service area, the back court, mentioned above in the section on courtyards. The back court is an open space which often doubles as a interior courtyard where the females of the family and servants can work comfortably without being overlooked.

Kitchen

The kitchen, normally located in the back court close to the qanat, services both the reception area and the main courtyard.

In some large houses the kitchen is found in one corner of the main courtyard. In small houses with only one courtyard the kitchen is on

one side of the courtyard, usually the east. The Asari House (fig 3) in Charkhab quarter is a good example p.171.

A typical Adakanian kitchen is barrel-vaulted, with three small openings in the roof for ventilation and light since it is unusual to have windows opening on the court. It will be dark and the walls blackened by wood smoke. At one end is a wood store, separated from the working area by a low wall. Beside the wood store is a big clay oven (*tanur*) for baking and, alongside that, open hearths where food is cooked. Pots and pans hang from the walls ready for use. Food is stored in a pantry; spices and condiments are kept in cupboards along with plates and dishes. A mud brick table built against one wall is used for preparing food, with long shelves below for dishes. The sink, for washing-up is in the courtyard and is connected to a septic tank (fig 4).

Pakane

Pakane is the connection to the qanat. Each water channel (qanat) has one or more proprietors who own the right to use or sell the water for irrigation. When the qanats pass through the town, the householders have the right to use the water free of charge, though they must pay for services such as cleaning sediment (mud and slime) from the qanat.

Almost all houses have access to a qanat. In some outlying parts of the town in the wealthier districts (fig 5) , remote from the qanat system, householders dig wells to supply water or, failing that, collect water from a public water tank (*ab anbar*) which is filled by same qanat but at the time of supplying no one allowed to use the qanat.

There are two different types of access to the qanats. If the house lies on the route of a qanat there is direct access called *raste* (which in Farsi means “direct”), but some houses are not close enough to a qanat and they are serviced by a new channel called a “indirect” access or *kageh* (fig 6).

Each access to the qanat consists of stairs leading down an underground room beside the water channel (fig 7).

Depending on the location of the house and the depth of the qanat, there may be between 10 and 29 steps down to the underground room. This room containing the qanat is used for washing, recreation on summer afternoons, paddling and also for storing food, as a cold room.

The location of the stairs in relation to the water channel depends on the size of the house. In wealthy houses which have more than one courtyard the stairs are usually located in the service court, which is easily accessible from other service areas (House of Majd fig 9, p.169 in Charkhab quarter). However in some large houses there is access to the qanat from more than one courtyard. Where there is only one large courtyard, the stairs to the qanat area are near the kitchen (Ansari House p.177, in Charkhab quarter). Usually in small houses, the stairs are commonly situated in the courtyard close to both service and living areas (fig 16, p177, Ansari House in Charkhab quarter).

Table 7.b, shows the distribution of pakanes according to quarters. As can be seen, houses in some quarters do not contain any pakanes

(e.g. Sharifabad, because the qanat passes through the middle of the quarter and the residents can easily reach it to draw water, p.229 & 230). Type 1 opens off the main courtyard, and is the commonest throughout the town. Type 2 has two pakanes, one off the main courtyard, the other off the service court. It is found in wealthy districts and only occasionally in houses whose builders were rich enough to be able to afford a second pakane. Some poor houses have no pakane at all as their builders could not afford one.

Privies

Housed in small rooms approximately 900 by 1100mm, Privies are generally of the simplest type, raised three or four steps to allow for

a septic tank below (fig 8). Water for flushing was brought in copper ewers (now plastic ones are used) from the pakane or from a pool in the courtyard. Cesspools are not employed because the ground is very rocky, making excavation difficult, and because of the danger of contaminating the qanat water supply. The septic tanks are emptied three or four times a year, the effluent being used as fertilizer on farms and orchards. Each tank has an access hole, sealed with a cement cap which is broken away when the pool is to be emptied. For ease of disposal, the privy should be located close to the street to minimize the difficulties in collecting the effluent, and away from living areas to avoid smells. In houses with a service yard, the privy will be found there (fig 9). In farmers' houses it is usually beside the stable or the entrance door (fig 10).

Storerooms

Depending on the occupation of the householder and the size of his family, the type and number of storerooms vary. There are at least four different types. In wealthy houses when religious and family festivals are celebrated large quantities of glass and chinaware need to be stored, including kettles, teapots, glasses for tea and cold drinks, and serving trays. Occasionally this equipment is lent to poorer families when they have to cater for a marriage or a funeral. Since the storeroom where the equipment is kept does not need to be lit, it is usually placed in a corner of the courtyard (fig 11:1). Some houses have a small storage area for routine equipment like beds at the back of summer and winter rooms (fig 11:2).

In general, every house has a special place for storing a year's supply of wheat and grain in large pots up to 1.5m high. Until 1950 the local people baked their own bread and so the number of these large pots depended on the size of the family. This storeroom would be on the ground floor near the kitchen (fig 11:3). Farmers store their annual crops for sale (such as pistachio nuts) in a secure room, usually on an upper floor (fig 11:5).

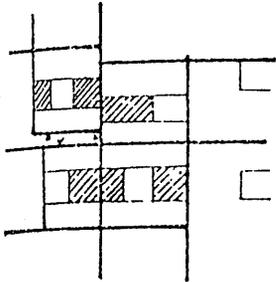
Stables

Most houses have a place for animals, including donkeys, sheep, chickens and very occasionally horses and camels (fig 11:6). The houses of wealthy owners of horses or camels have a yard and a large

room which were used for stabling. Merchants' houses usually have a stable where donkeys are kept while farmers' houses have a stable for both sheep and donkeys (fig 11:6).

Staircases

Staircases fulfilled utilitarian and service functions and never monumental in appearance. Service stairs which gave access to the roofs and to the interior spaces between two levels, such as the Camel House in Tiran Quarter p.x, stairs within passageways area gave access to room on the second story that flanked the suffice.



Service area,
different locations.

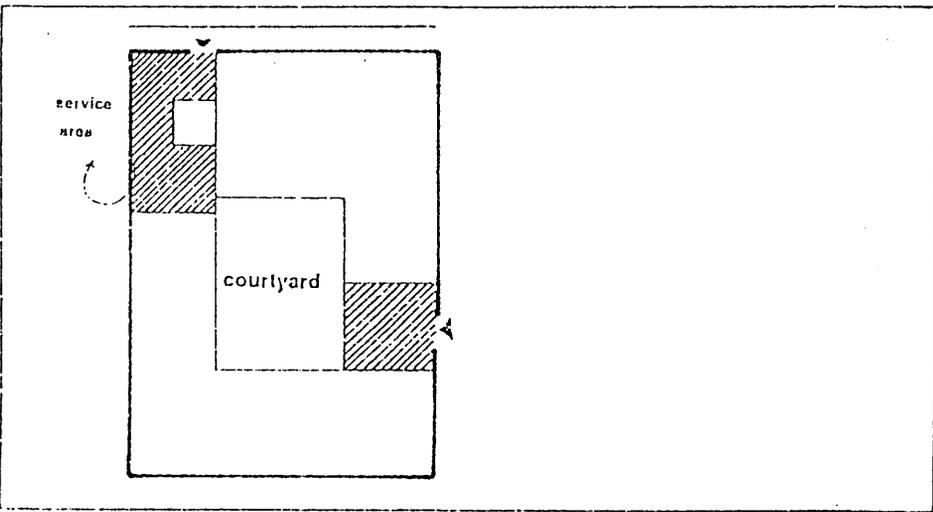
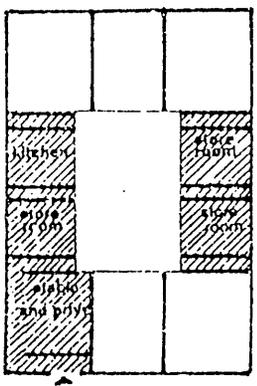


Fig 2.a: A service area relationship with the entrance.

Fig 1: Location of service area.

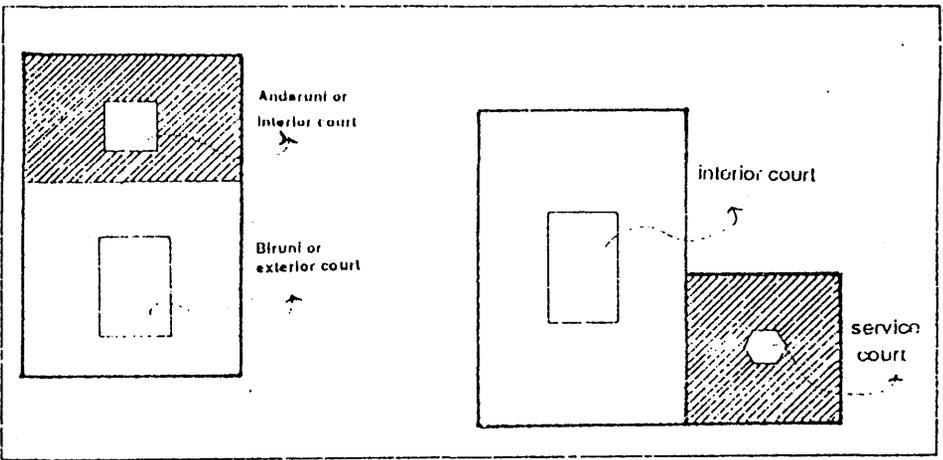
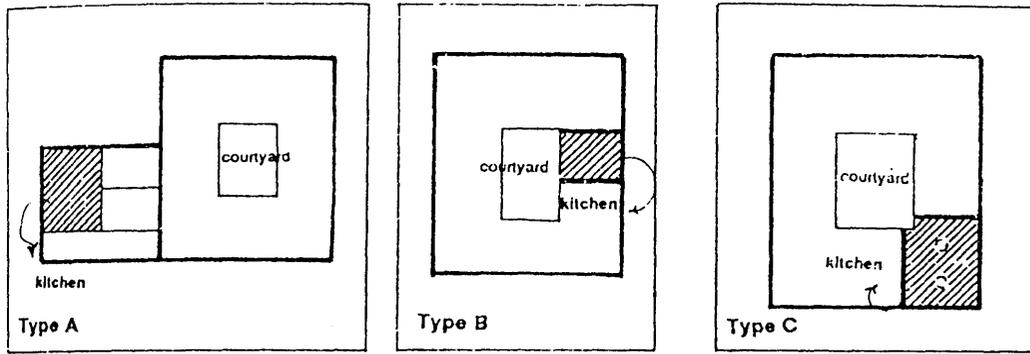


Fig 2.b: Service area relationship with the courtyard.

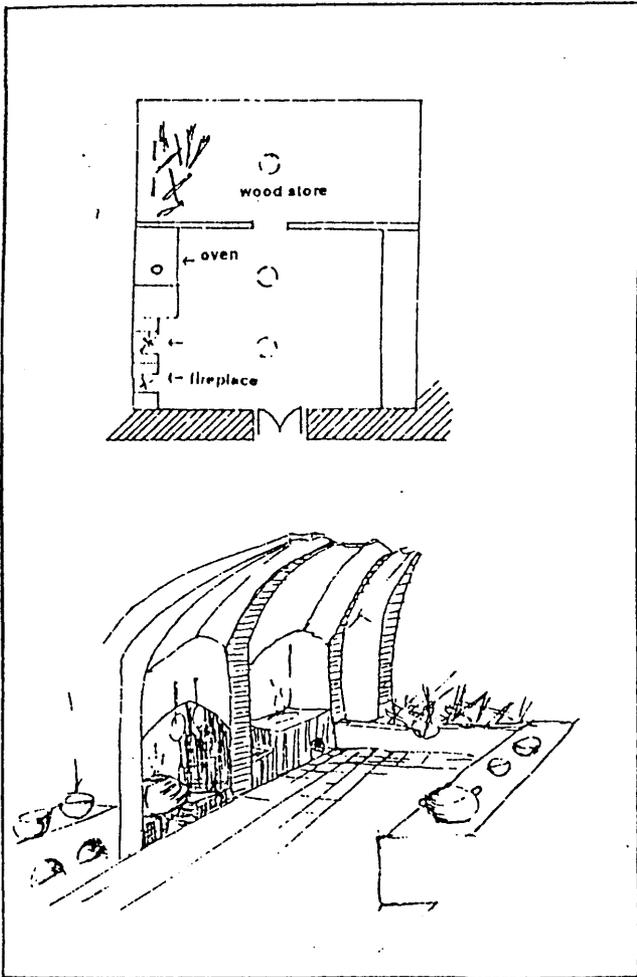


Quarters	Kumalq	Charkhab	Sharifabad	Mirsaleh	Bazar-No	Tiran
Type A		■			■	
Type B		■	■	■		■
Type C	■	■	■	■	■	■

d. percentage of each type kitchen in the quarters.

Quarters	Kumalq	Charkhab	Sharifabad	Mirsaleh	Bazar-No	Tiran	
Kitchen	area	3x2.2	6x3.5	4x3.2	3.5x3	4x3	6x3.5
	height	3	3.5	3.2	3	3.5	3.4

e. table showing the average size of kitchen in each quarter.



Quarters elements	Kumalaq	Charkhab	Sharifabad	Mirsaleh	Bazar-No	Tiran
oven	shaded	shaded	shaded	shaded	shaded	shaded
Fireplace	shaded	shaded	shaded	shaded	shaded	shaded
Chimney	shaded	shaded	shaded	shaded	shaded	shaded
close to channel	shaded	shaded	shaded	shaded	shaded	shaded
Wood store	shaded	shaded	shaded	shaded	shaded	shaded

Fig 4.b: Proportion of different kitchen features in each quarters.

Fig 4.a: Interior of typical kitchen.

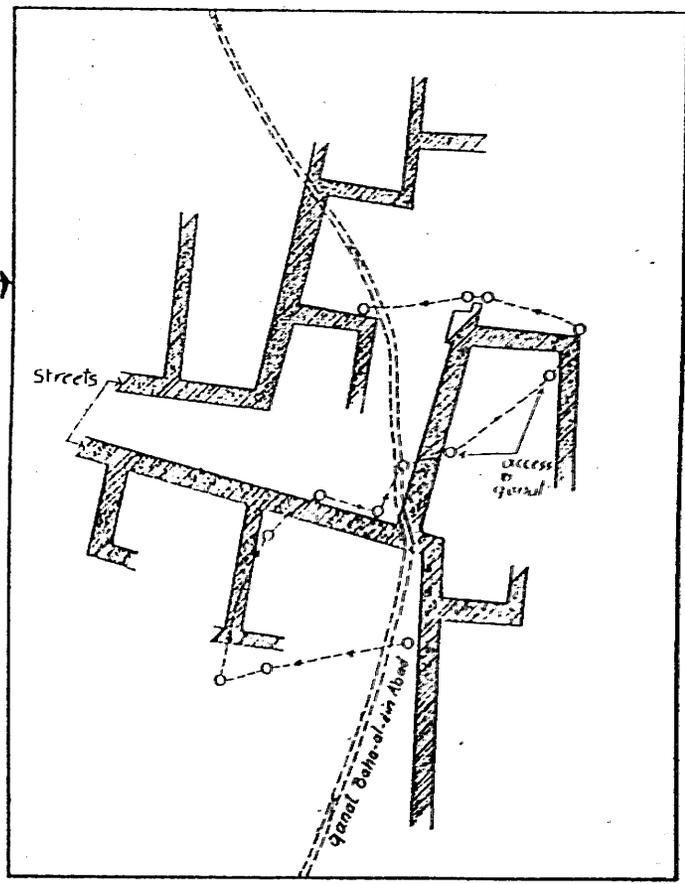
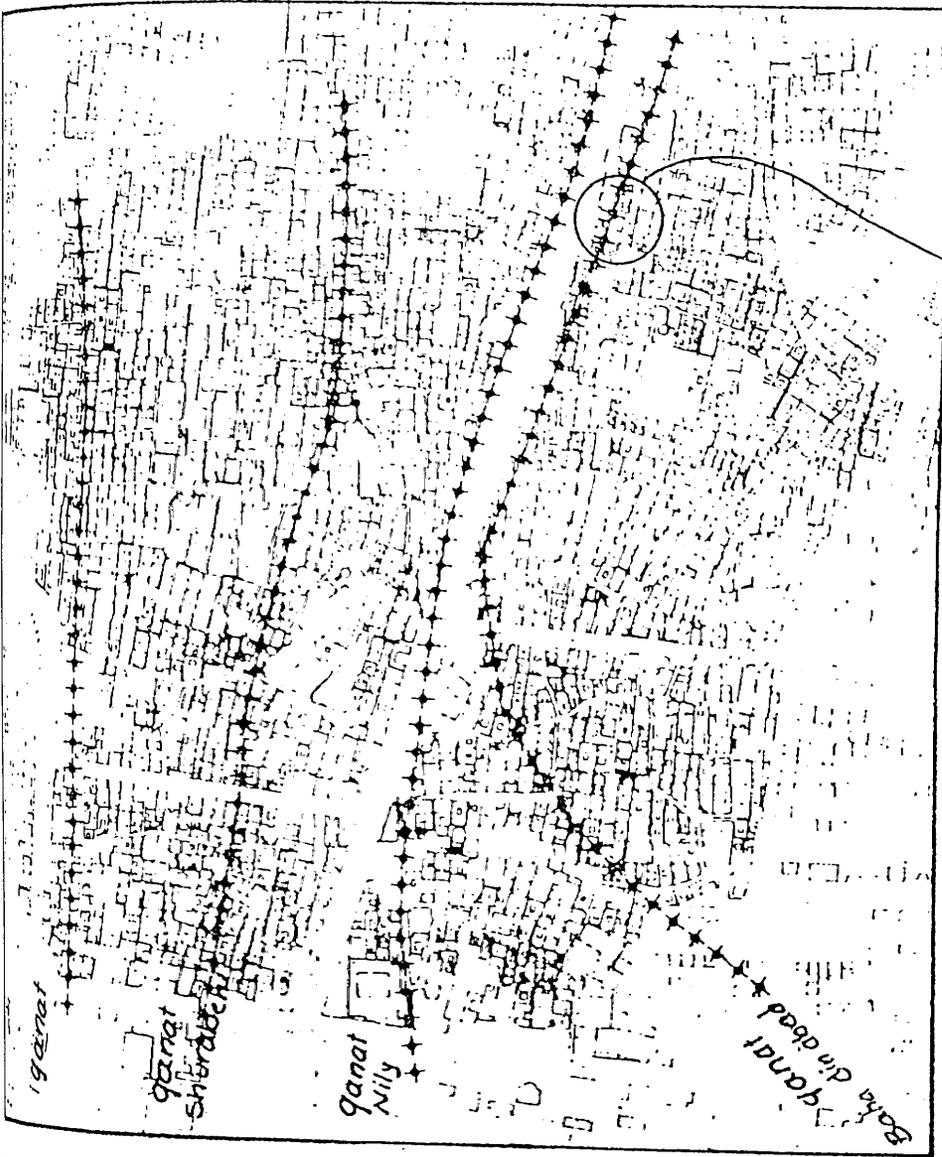


Fig 6: Direct or indirect access to the qanat in the houses.

Fig 5:
Existing qanats running through Ardakan.

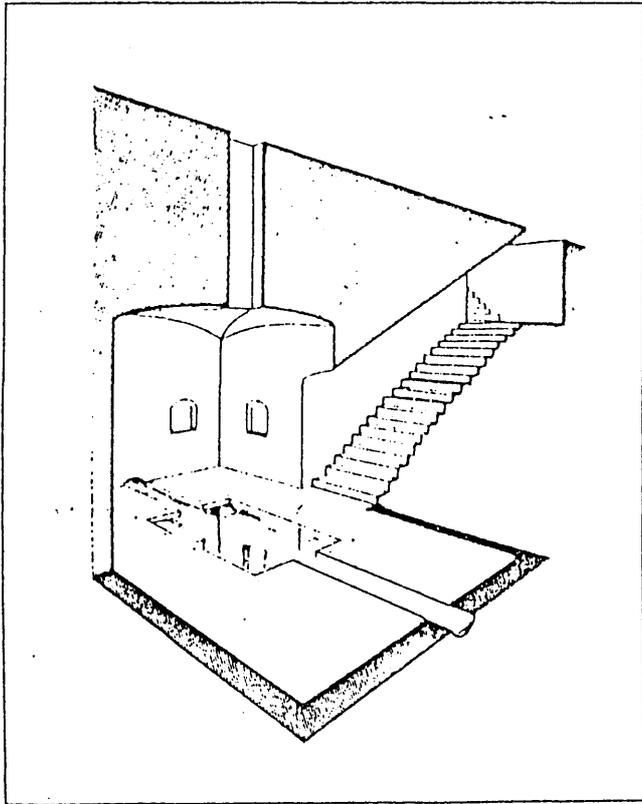


Fig 7.a:
Isometric section through the staircase to qanat and underground room beside the water channel.

Quarters water channel	Kumalq	Charkhab	Shorifabad	Mirsaleh	Bozor-No	Tiran
Type 1						
Type 2						

Fig 7.b: Table showing quarters percentage access to qanat.

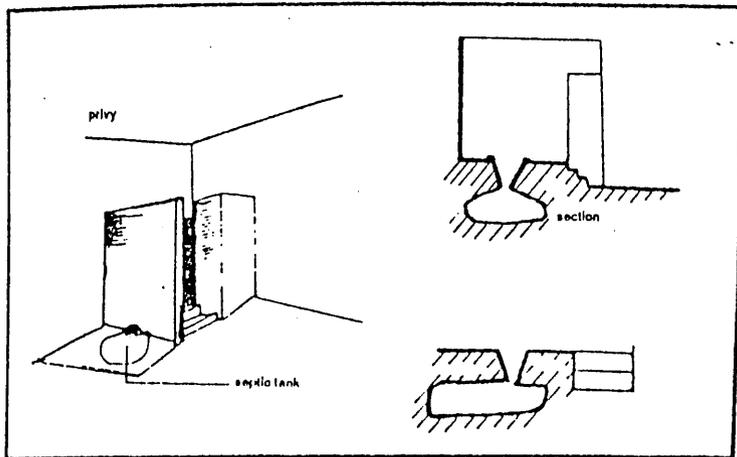


Fig 8: Section through septic tank and privy.

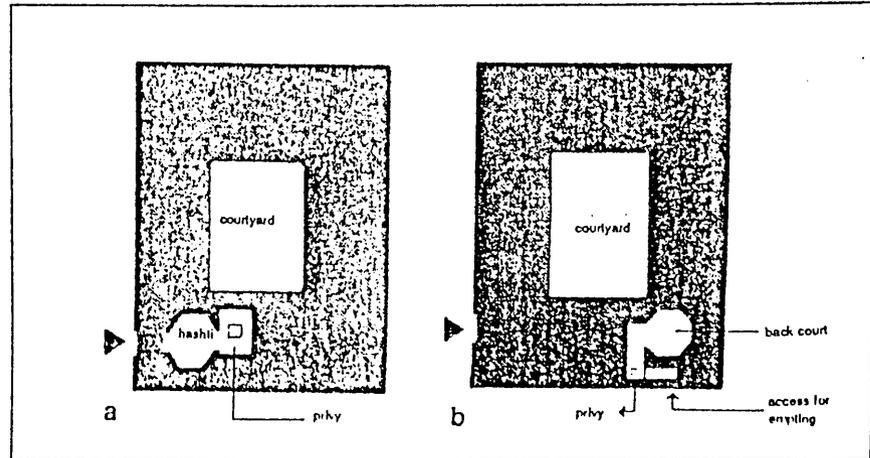


Fig 9:

- a. Privy located close to entrance, Ansari House Charkhab Quarter.
- b. Privy located in service court, Majedi House in Charkhab Quarter.

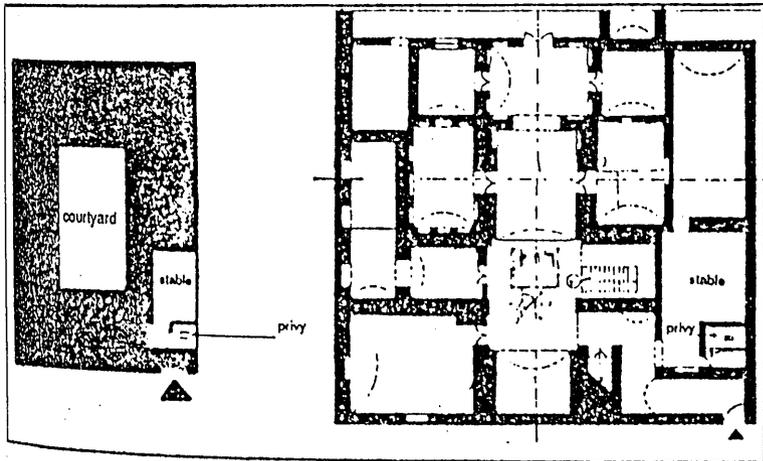


Fig 10: Privy located in stable; Amri House in Charkhab Quarter.

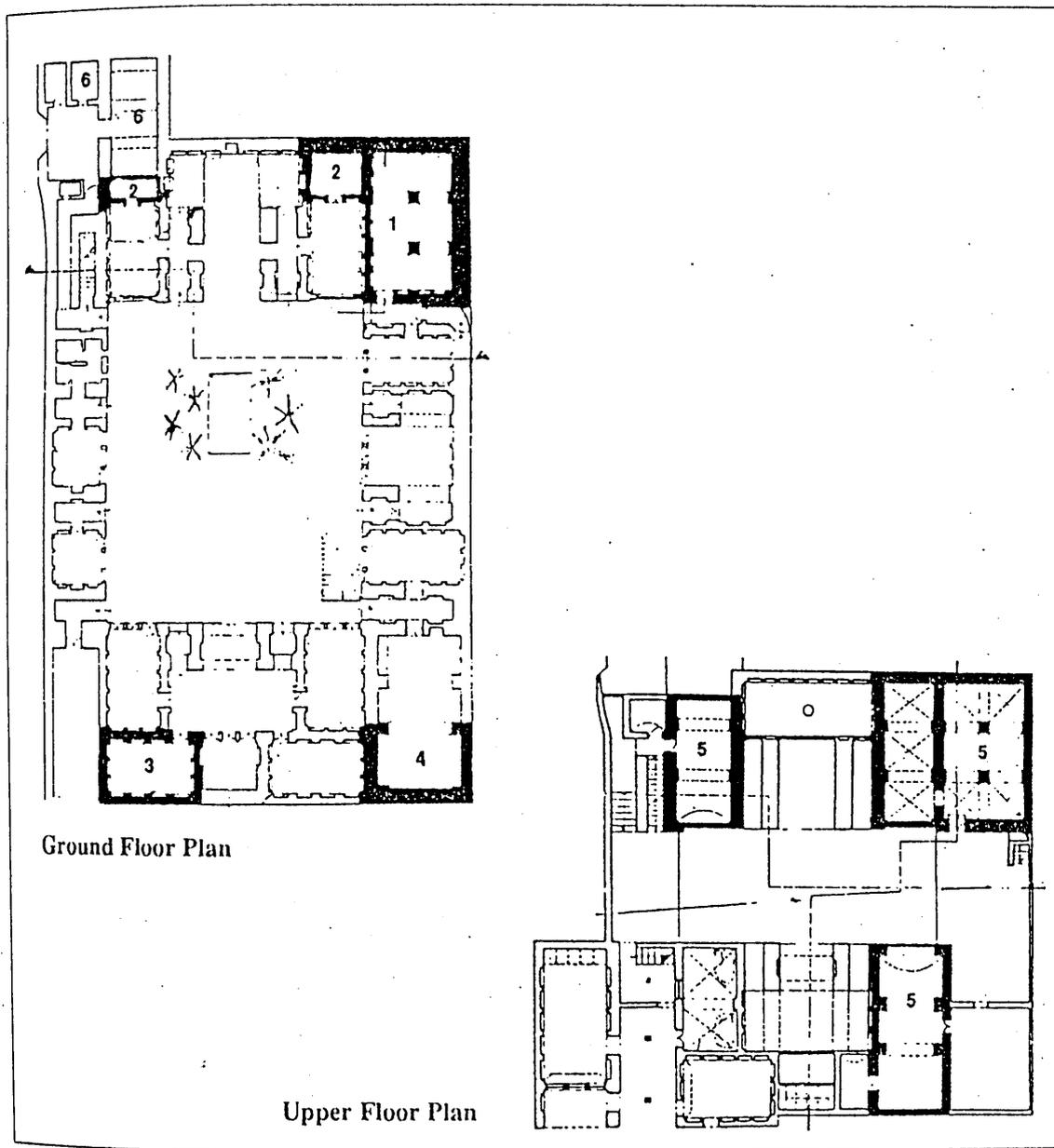


Fig 12:
 Storerooms location in Ansari
 House; Charkhab Quarter

1. Storeroom.
2. Storeroom, routine equipment.
3. Pantry
4. Wood store.
5. General storeroom.
6. Stable.

Section Three

1980-1981

(10) Daily Life

Daily life in the Houses of Ardakan

Houses in Ardakan are chiefly of one storey, perhaps with one or more upper storey rooms. Upper storey rooms in general do not protrude above the vaults of the main ground floor rooms, being placed usually on either side of a *suffe* so that the line of the roof of the *suffe* is followed by that of the upper floor rooms, called *balakhane*—⁽¹⁾ometimes *balakhane* are situated above galleries on either side of a *suffe* and lit by windows in the walls of the *suffe*.

Roof have low protected wall a provide a measure of privacy and seclusion for the family, who in summer often sleep on the roof in the cool night air(1).

It is on the ground floor, however, that daily life is conducted. The houses have all the elements needed for comfortable living: a sheltered courtyard with trees, a pool, outdoor furniture (a moveable platform), summer and winter *suffes* and rooms, wind-towers,

underground room (sardab), access to a water channel (pakane), kitchen and latrines.

When a break is taken in the hottest part of the afternoon, the internal temperature of the house is still well below the ambient temperature externally.

In summer work begins early, when the day is cool. Always in the early morning before breakfast the courtyard is swept and water

poured over the paving. The family breakfasts in the west or north facing rooms overlooking the courtyard. Shortly after midday a break is taken to rest in the hottest part of the afternoon, when the family sleeps in the coolest part of the house under the wind-tower or in the sardab, if they have one⁽²⁾. When activity restarts later in the afternoon the outside temperature is past its peak but the temperature is still rising indoors and so people tend to move outdoors, spending time in the courtyards and gardens. Again as before, water is poured over the courtyard to evaporate and lower the temperature. The same

is done on the roof before the family retire there. The evening meal is taken either in the courtyard or on the roof in summer, before retiring to bed.

This sort of movement through and round the house to avoid the intense heat from south, east and west during the day is called *yeilaaq qishlaq*.

Qishlaq is during winter time when the residents live on the north end of the courtyard in the winter *suffe* and winter rooms. On sunny days

they stay in the *suffe* for lunch and also for afternoon tea; they retire to a winter room for dinner and to sleep.

It is also common for middle-class families to move to summer houses (*yeilaaq*) in the orchards around Sadr-abad about 6km south of Ardakan. Usually the whole family will move to its summer house, leaving only the head of the family with a housekeeper in town to continue his business, visiting his family only occasionally during the week⁽³⁾. Wealthy families used to go further afield than Sadr-abad, usually to the south of Yazd in the Shir Kuh mountain range.

The summer months would be spent in the cooler fruit-producing valleys several thousand feet higher than the city of Yazd.

There used to be twenty to fifty people commonly living in a large house or complex in Ardakan. In order to share household chores a strict division of labour is practised. The large distances (up to 30m) involved in opening a door, or serving food from the kitchen, going, to the basement, or collecting a pillow from the roof would make an exhausting business for a couple, but with large extended families everyone is expected to play his or her part. Children perform many

everyday tasks inside and outside the house. Shopping for provisions, for instance, is often done by young boys since women traditionally do not leave the house except to go to the mosque or the hammam, or to visit friends. Cooking is done by the mother or an elder daughter, while the younger children wait at table, answer the front door, and so on.

References

- 1) M. Boyce, The Zoroastrian House of Yazd, 140.
- 2) E. Beazly, Living with the Desert, 66.
- 3) Ibid, 68.

(11) Baladeh & Mirsaleh Quarters

Baladeh and Mirsaleh Quarter (fig 1)

Baladeh is one of the oldest quarter of the town. The first bazaar passes through it and it is here the Friday Musque of Ardakan is situated. When Ardakan was little more than a village it comprised, Baladeh (the upper quarters) and Ziredeh (the lower quarter), with Castle Squire (see above, p.9&25) in the centre.

The bazaar was the focal point of the social, religious and political life of the old town. The Friday Mosque, next to the bazaar (fig 2), has two entrances from the bazaar as well as its main entrance from the north. Beside the Mosque are a madrasa (theological college) and two hammams (bath-houses), one for men and the other for women.

The old bazaar and the New Bazaar (Bazaar-no Quarter, above, fig 2) cross, the *chahar-suq*, was marked by a dome, and it was under this dome that the scholars met and engaged in philosophical discussion.

In those early days, life was different. Business, religion and study were all conducted in one area. The *chahar suq* was demolished when a new road, Montazeri Avenue, was cut through this area in the 1960 (fig 1).

In Baladeh Quarter the qanat runs close to the surface and so only a few steps are needed to reach it. This ease of access to the qanat has affected the architecture of the houses in this quarter, many of which have a courtyard on two levels, the main rooms of the house on the upper level overlooking a garden on the lower level through which the water channel runs.

The expansion of Baladeh Quarter was to the south into the area that now is Mirsaleh Quarter, which is bounded by the line of the city wall (fig 1) to the south and west, and by Bazar-no Quarter to the east.

Merchant House No.1 (fig 3)

This house was originally owned by a merchant working in the bazaar. It comprises, in effect, two houses, each centred on a courtyard. The large one called “interior” (*andaruni*), was used by the merchant’s family; and the smaller, called “exterior” (*biruni*) was the service area and servants’ quarters.

The complete house is now occupied by one family. Unusually there is no stable although there may originally have been stables to the west of the entrance passageway(1) or in what is now a privy(13) in the “exterior” house.

A single entrance from the street serves both parts of the house, leading by a long “dog-leg” passageway(1) past the entrance to the

interior house and onto a separate entrance to the exterior house. At the first turn in the passage double doors open to an adjoining unsurveyed building, which is where stables may once have been located. At the second turn stairs(10) give access to the roof. Across the passageway lies the entrance to the interior house. Where a short passage leads to the main courtyard; on the west and east of the courtyard are spring and autumn rooms(8), the eastern having alongside it a stair(10) to the roof. A winter suffe(5) has a winter room(6) to the west and antechamber(16) and store room(7) to the east. At the south end of the courtyard is a summer suffe(3) and a corridor to a kitchen(11). The summer suffe has a recess in its rear wall flanking a door into a back room(4) with a wind-tower (fig 4.a). Above the back room is a sort of mezzanine(15) which opens on the wind tower shaft. This room is actually part of a balakhaneh consisting of three rooms in all, reached by a staircase from the kitchen

corridor on the east side of the summer suffe. The section A-A, besides illustrating the relationship between the balakhaneh and the main rooms of the house, shows the courtyard on two levels. The upper level forms a gallery(2) from which steps(9) lead down to the lower level. At the lower level, a small garden and a pool are fed by a qanat of a deep underground chamber, sardab, to which the family may retire in the heart of the day (fig 4.b).

The entrance to the second, exterior house opens into a short dog-leg passage leading to the central courtyard. To the west of the passage is the privy(13) referred to above. The other rooms are disposed around the courtyard. There is no summer suffe. A winter suffe(5) on the north end has a side passage leading to a large *tanabi*(14) behind, from which doors open south, one into the suffe and another into a spring/autumn room(8). A winter room in the last room overlooks a

staircase at the north-east corner of the courtyard, which leads-down to *pakaneh* where water may be drawn from the qanat under the room. A further two spring/autumn rooms open on either side of the courtyard and, at the south-west corner, there is a kitchen(11) with its wood store(12).

Merchant House No.2 (fig 5)

This house, one of the very grandest in the quarter, was built by a merchant in the old Bazaar. Like the previous house, it is in two parts, “interior” (*andaruni*) and “exterior” (*biruni*) (fig 6), each with its own central courtyard. A family of four -a shopkeeper with his wife and child and his mother- occupying the exterior house, which is amply large for their needs. At the time of the writer’s visit, the

interior house was up for sale.

Both parts of the house are reached from a covered lane that runs west from the new Montazeri Avenue before turning north through the quarter. On the north side of the lane is one stable(12) belonging to the house and, just off Montazeri Avenue, a staircase(11) to the roof. The entrances to the two parts of the house open off an octagonal porch, *hashti* or *keryas*(1)(see chapter of connecting area, P.93 &112), in the covered lane. That of the interior house leads into a dog-leg passage to the large central courtyard (fig 7). The accommodation is arranged around three sides of the courtyard: winter suffice(7) to the north, summer suffice(2) (fig 8), to the south and two spring/autumn rooms(5) to the east. Both suffes have towers, that of the winter suffice having doors in its wind-catcher that could be closed in winter. In the corners of the courtyard are various service areas: in the

north-east steps lead up to a group of two store rooms(6) and a staircase(9) which gives access to a privy(13) before continuing up to the roof; in the south-east there is a kitchen(8); and in the south-west there is a stair(10), down to a sardab and pakaneh below the summer suffice. The floor of the summer suffice is raised in order to provide headroom in the sardab, which has its own wind tower(14) (fig 8). The winter room(7) has five glazed double doors- the traditional *panjdari* or “five-door” arrangement (see chapter room, window, P.85 & 91)- which provide extra shelter in cold weather (fig 9). There is a double doorway connecting to the exterior house.

The layout of the exterior house is ever more symmetrical, with rooms around the central courtyard. At the south end of the courtyard is the summer suffice(2) with its wind tower, a staircase to the roof, and two flanking summer rooms. At the opposite end is the

winter room(4) reached by steps through a corridor along its east side, which also gives access to a privy(13). A staircase(9), entered from the main entrance passage, rise above the privy to the roof. To the west of the main winter room is another winter room, entered from the north-west corner of the courtyard. On either side of the courtyard on the spring/autumn rooms(5), those on the west reached by way of steps up to a short corridor at the south end, and those on the east, two steps above courtyard level, are reached from the main entrance passage to the north and a passageway to the south connecting the two parts of the house. As in the interior house, the courtyard contains a flower bed and pool with two sinks for washing dishes.

Doctor's House (fig 10)

Originally built by a doctor, this house with its attached surgery

complex continues to be used by the founder's son, also a doctor, and the part to the east is his surgery and waiting rooms. Both the house and the surgery complex have courtyard(8) with pools and steps down to a *pakaneh*.

The entrance to the surgery complex opens directly into the east courtyard. At the north end of the courtyard a flight of four steps rises to a covered iwan, from which a double door to the west gives access to the waiting room(6) and glazed doors to the north open on to a sort of winter *suffe*(4) which serves as a surgery. Since the surgery is used in summer as well as in winter, it has a wind tower. A door connects the waiting room directly with the surgery. At the south end of the courtyard is a summer *suffe*, raised five steps above courtyard level over an underground chamber(19) which has a high level window on the courtyard. At the north-west corner of the courtyard another

flight of steps leads down past a landing (with a wash hand basin) to the *pakaneh*.

A passage at the south-west corner of the courtyard links the surgery complex with the doctor's house, which has a door from its complex into the surgery. The main entrance to the house is however from a lane to the north, by way of a zig-zag passageway(1) to the courtyard. A privy(16) opens in the last wall of the passageway.

On the east side of the courtyard is the door into the surgery and the passage linking the two courtyards. Between these is the former kitchen(11), which has a long chimney in its wall for ventilation. On the other (west) side of the courtyard is the new kitchen(18) with attached store room(12). The main rooms of the house are at the north and south ends of the courtyard (fig 11). At the north end these

comprise a winter room(9) flanked by another winter room to the west and a living/sleeping area(10). These rooms are connected by a vaulted iwan overlooking the courtyard through a triple arcade carried on two pillars (fig 12). At the south end of the courtyard is the summer suffe(3) with its wind tower(5) and flanking summer rooms(15) (fig 13). The linking passage at the south-east corner of the courtyard also gives access to a raised gallery leading to a store room(13) and to the summer suffe of the surgery complex. Beneath that gallery stairs descend to the underground chamber, described above. A further flight of steps, at the south-west corner of the courtyard, leads down to the second pakane(7) with a cupboard recess(17) in its west wall.

Baladeh and Mirsaleh Quarter

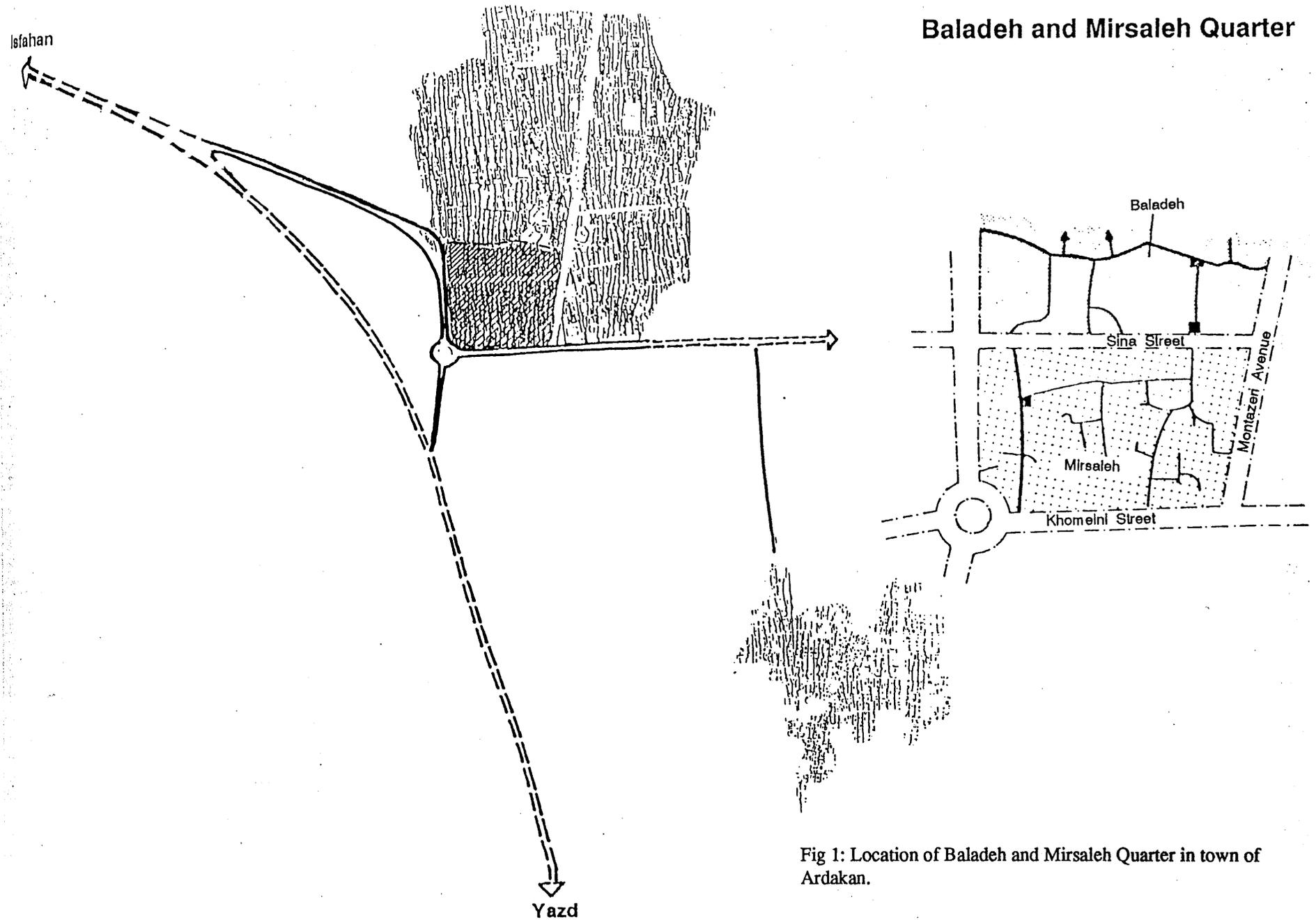
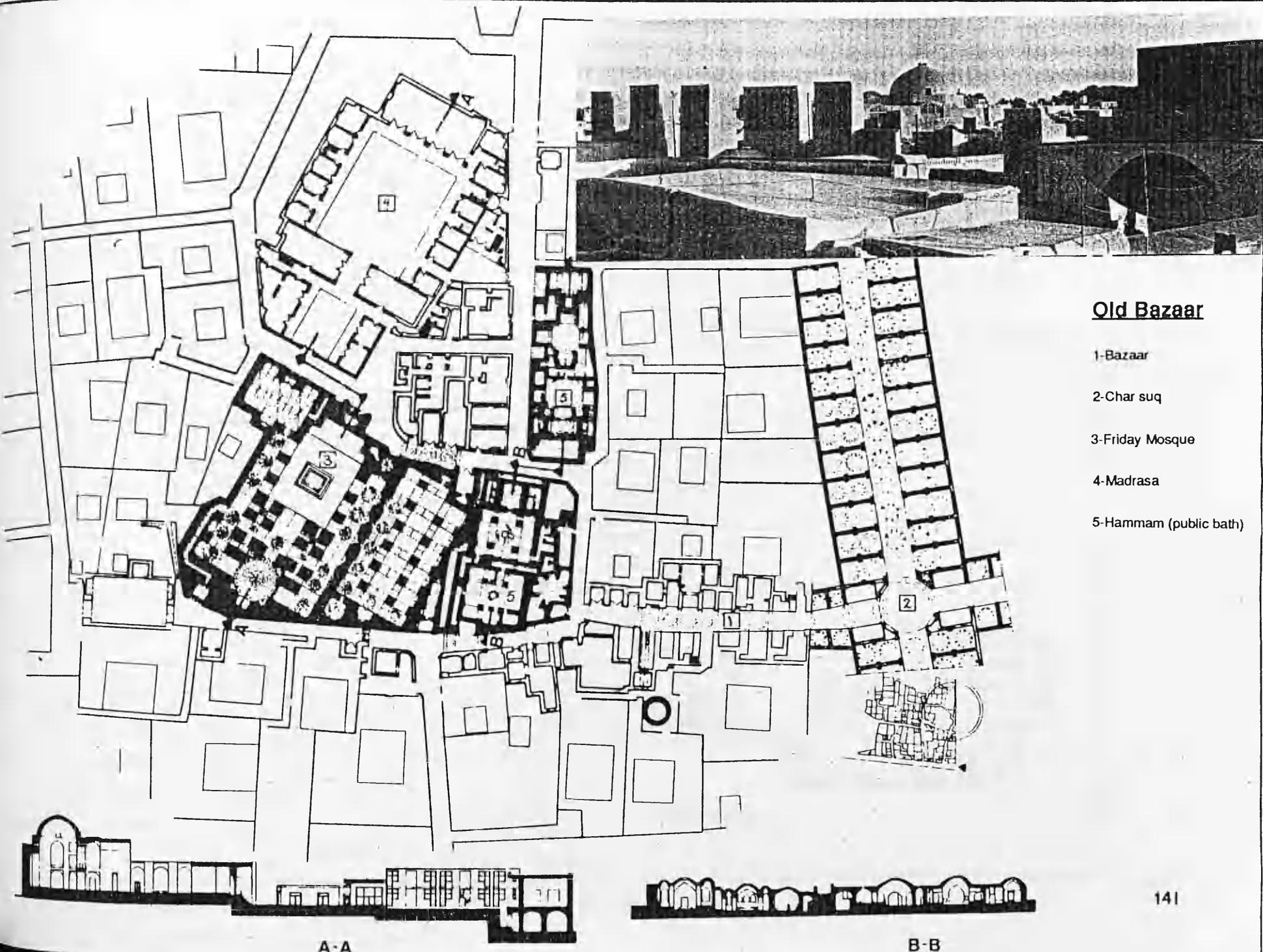
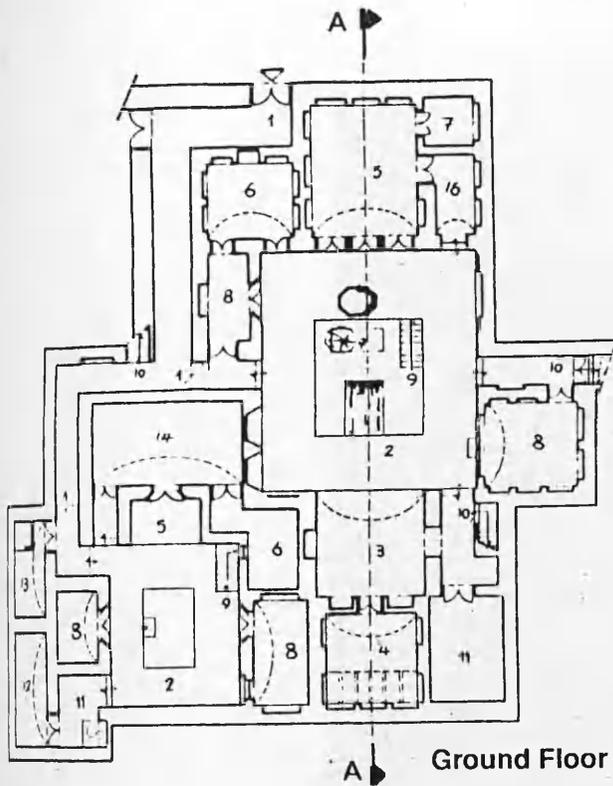
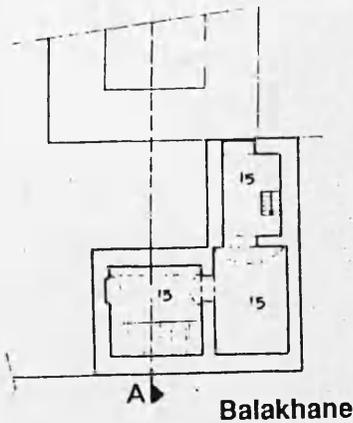


Fig 1: Location of Baladeh and Mirsaleh Quarter in town of Ardakan.



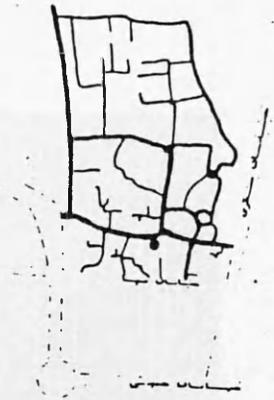


Ground Floor



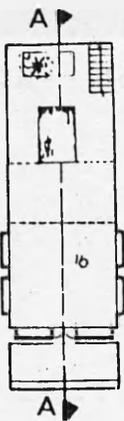
Balakhane

Baladeh Quarter

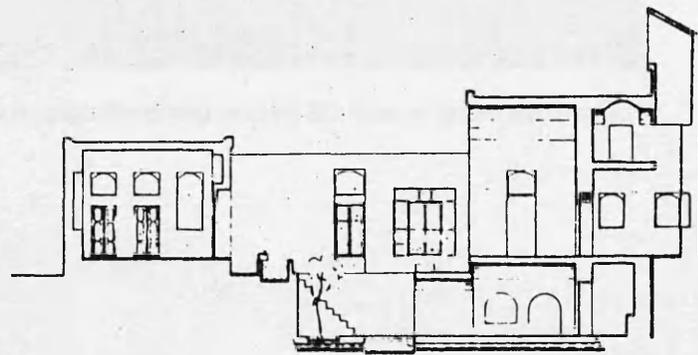


Merchant House No. 1

- 10-Staircase
- 11-Kitchen
- 12-Wood store
- 13-Privy
- 14-Tanaby
- 15-Balakhane
- 16-Antechamber
- 17-Sardab



Sardab



Section A-A

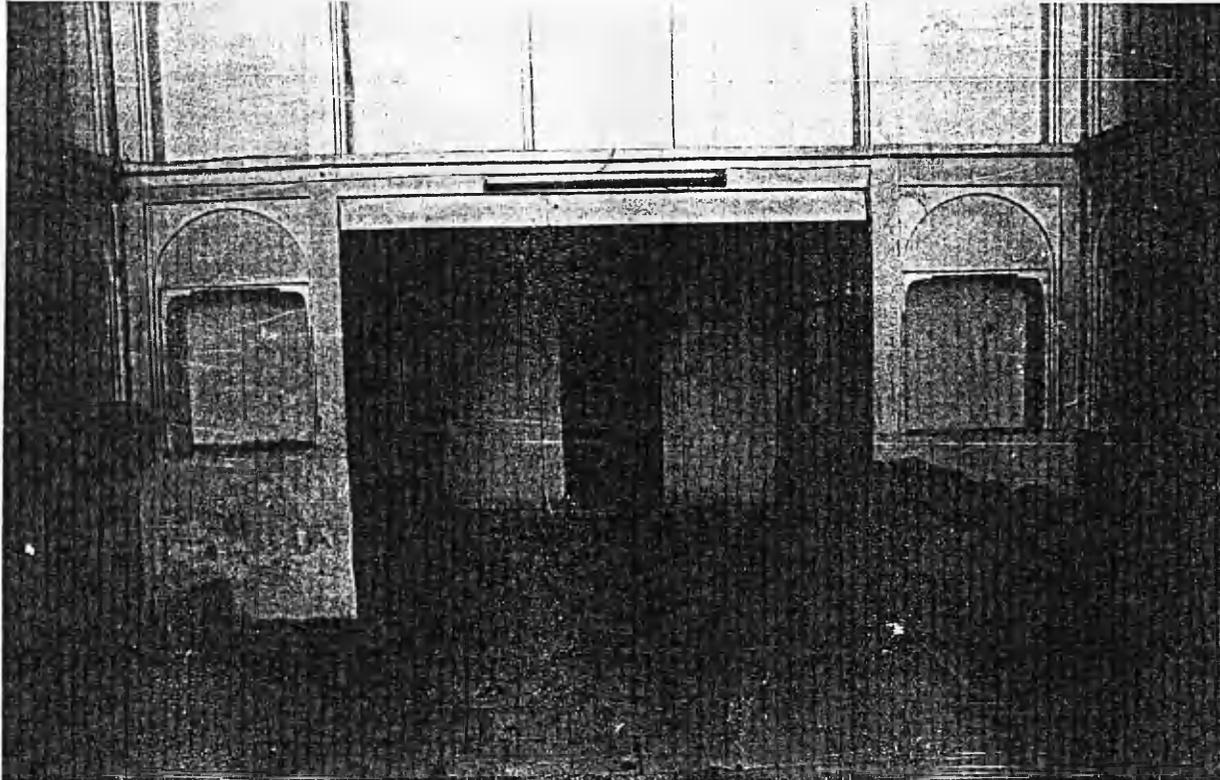


Fig 4.a: Showing connection of wind-tower to sardab through the timber grid on the floor of the summer suffe.

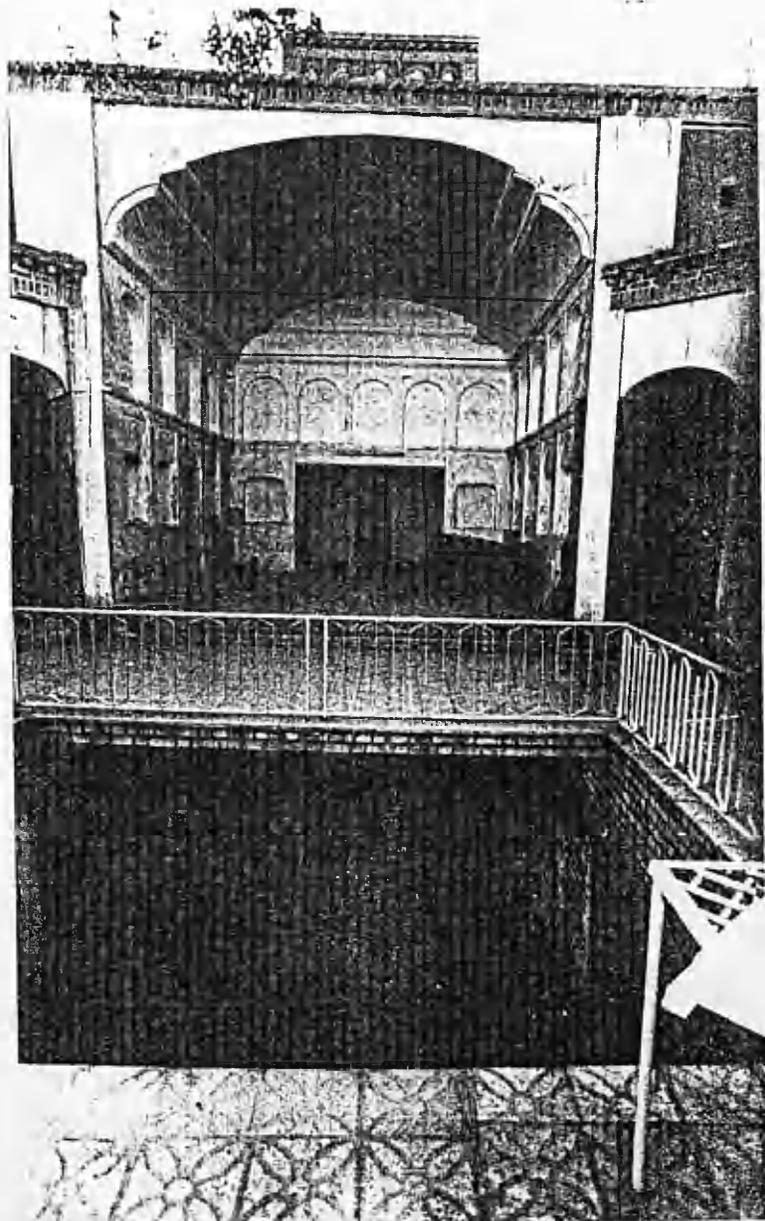
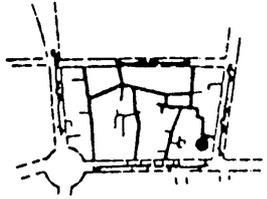
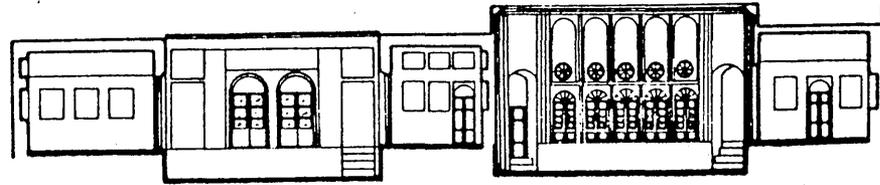


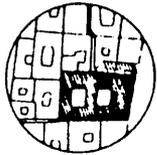
Fig 4.b: View to the summer suffe and the courtyards are arranged in two levels.



Mirsaleh Quarter



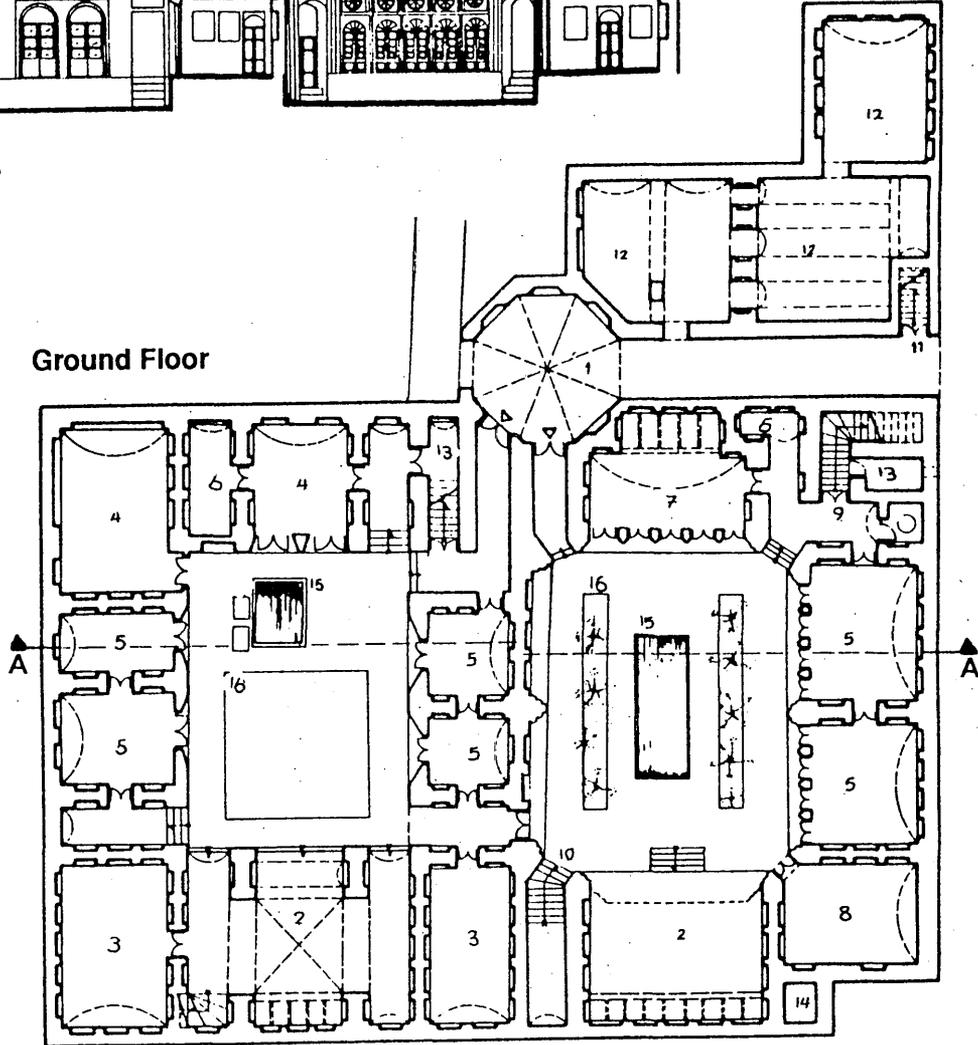
Section A-A



Merchant Houe No .2

- 1 - Porch
- 2 - Summer suffe
- 3 - Summer room
- 4 - Winter room
- 5 - Sping/autumn room
- 6 - Store room
- 7 - Winter room
- 8 - Kitchen
- 9 - Staircase to the roof
- 10 - Staircase to pakane
- 11 - Staircase to balakhane
- 12 - Stable
- 13 - Pool
- 14 - Flower bed

Ground Floor



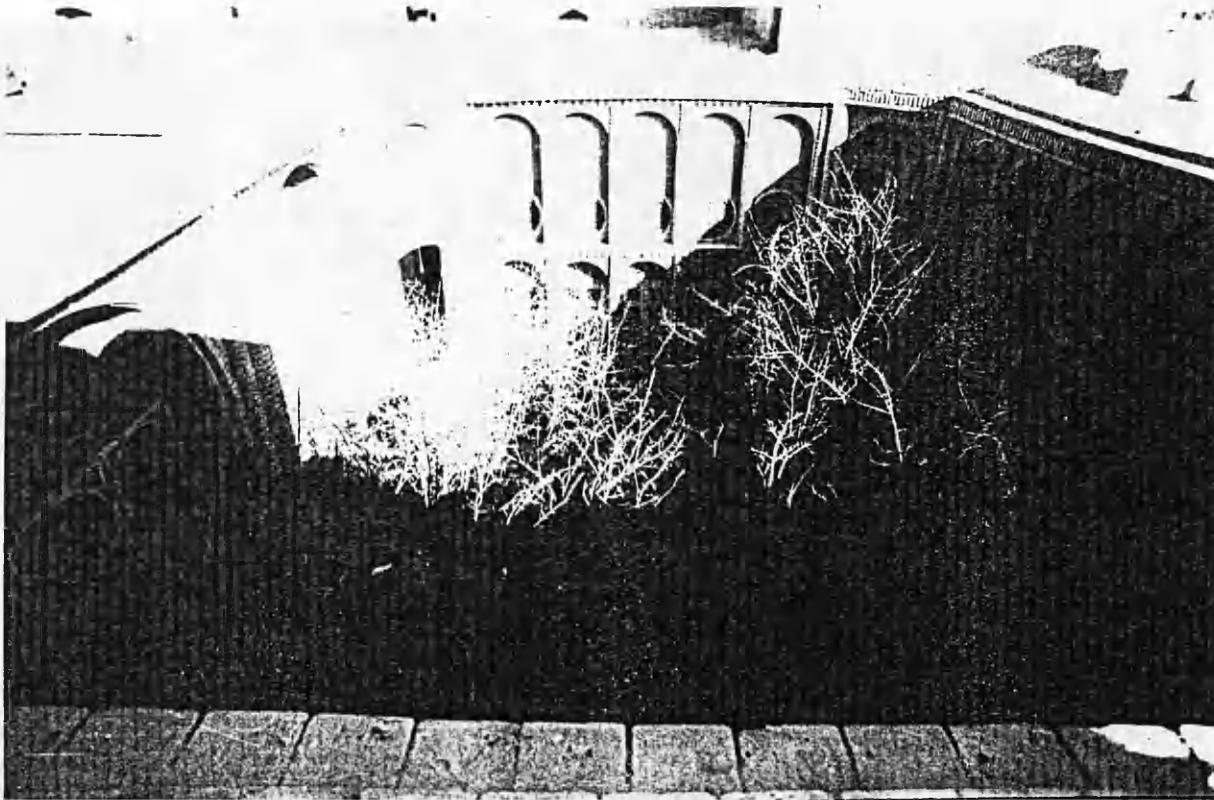


Fig 6: Exterior house *biruni* , all rooms arranged around the courtyard.

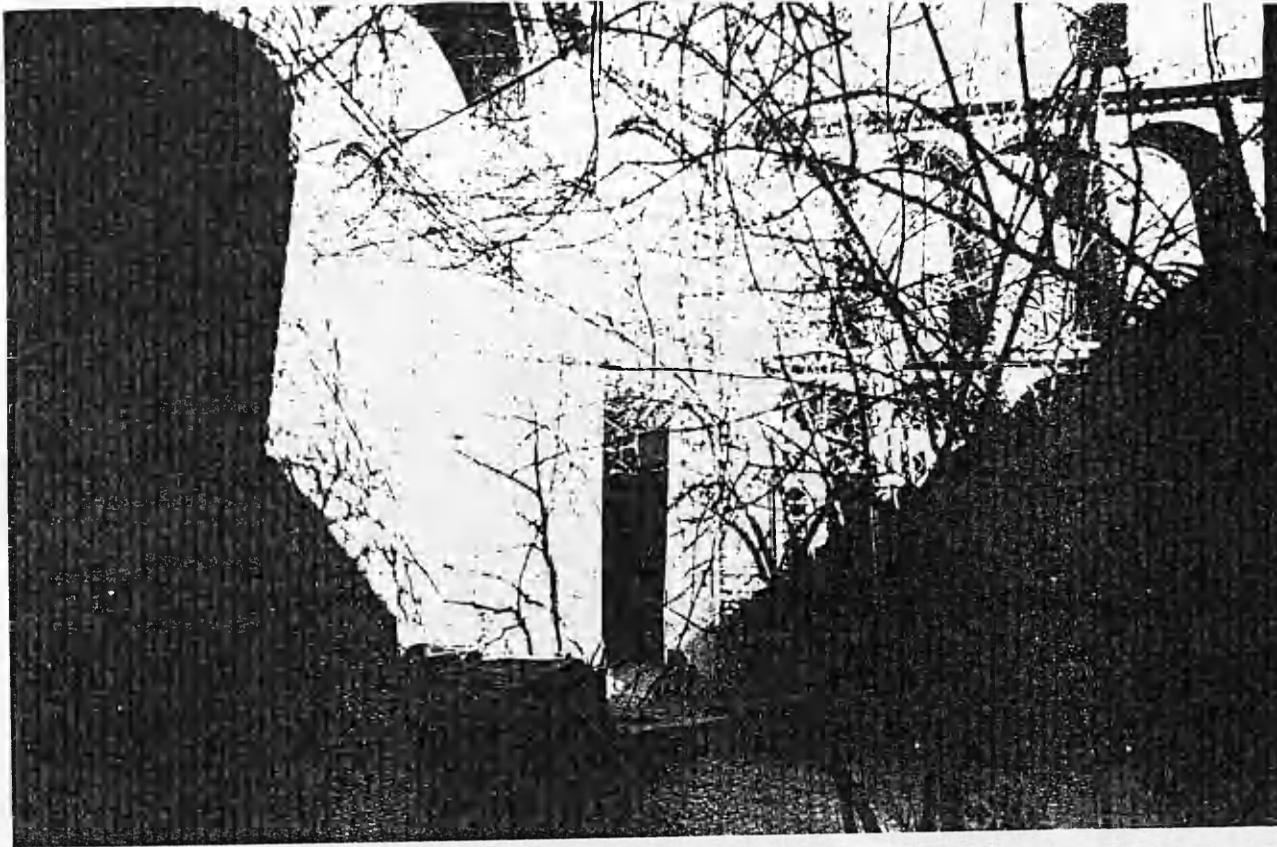


Fig 7: Entrance to the courtyard (biruni) on the north-west corner.

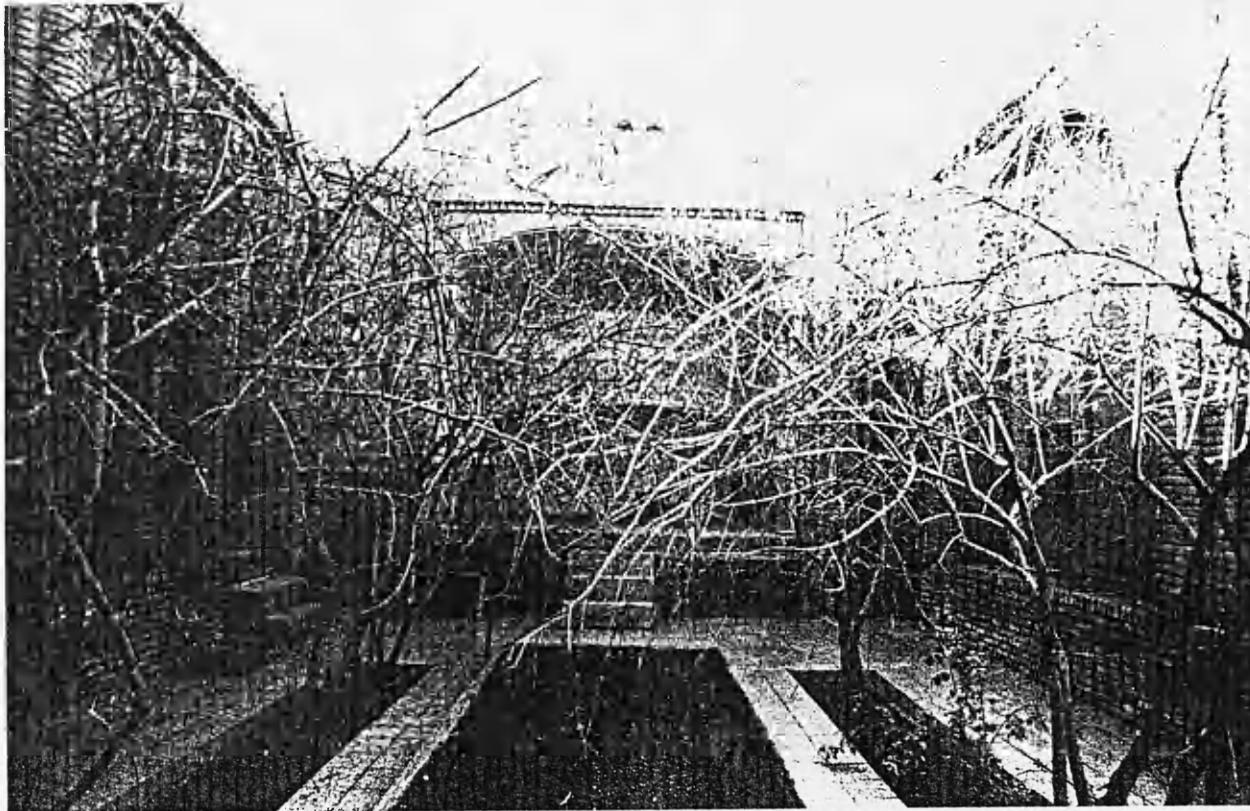


Fig 8: Summer suffe is raised up to make room for sardab opening to the courtyard.

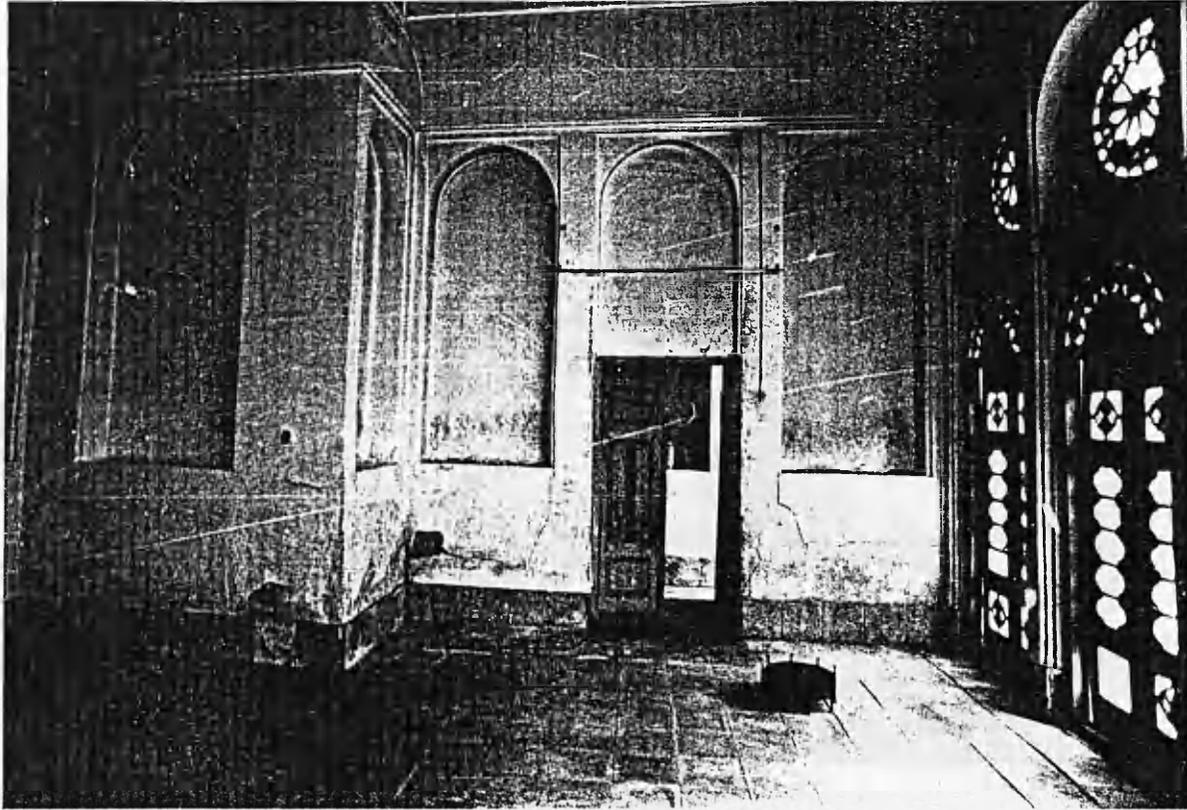


Fig 9: b. Showing winter room with side access to the passageway.

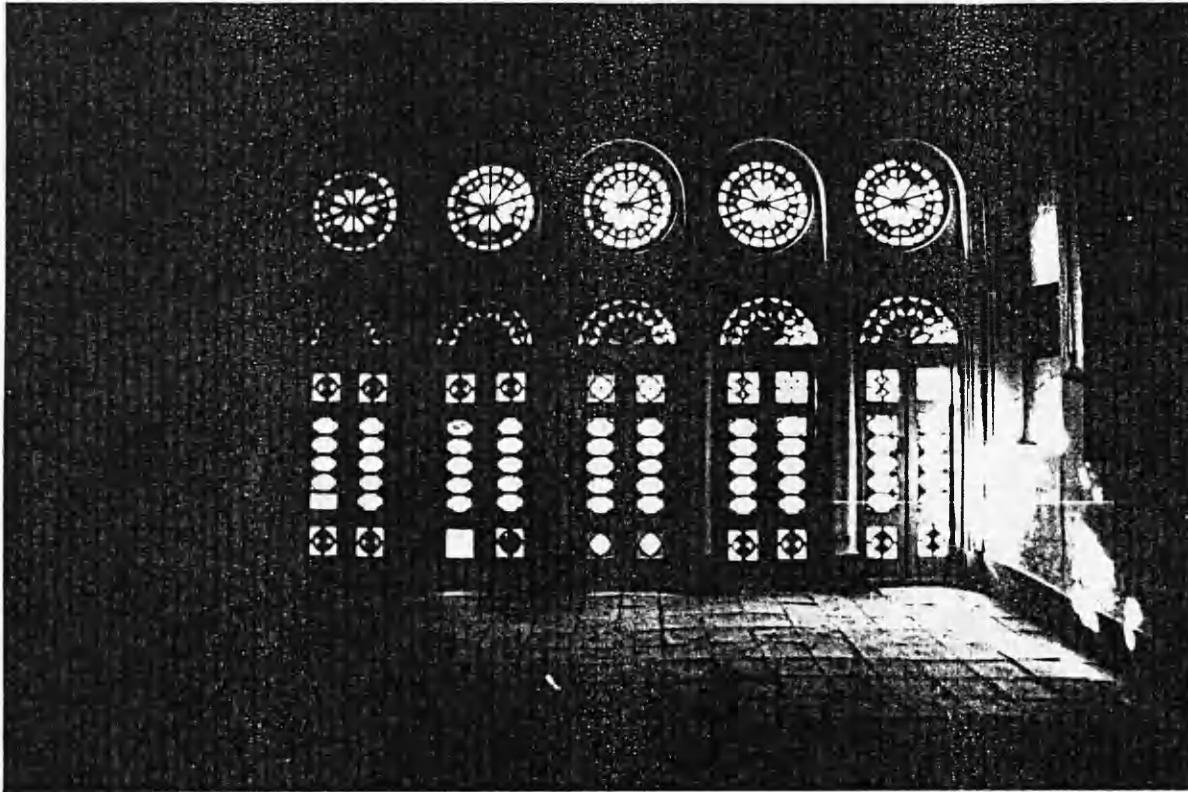
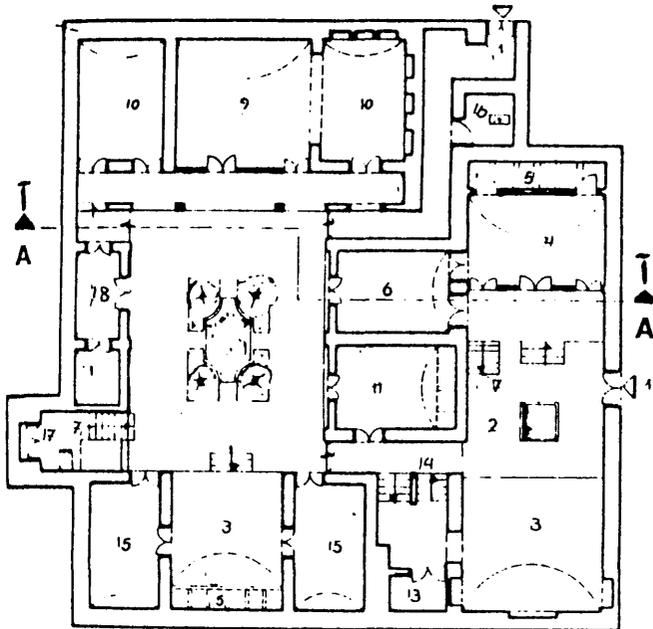
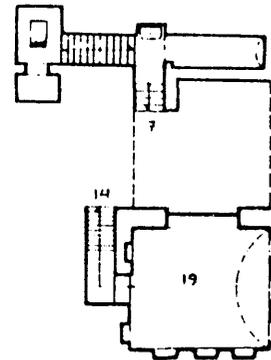


Fig 9: a. The winter room with five-door, *panj-dari*, to the courtyard.

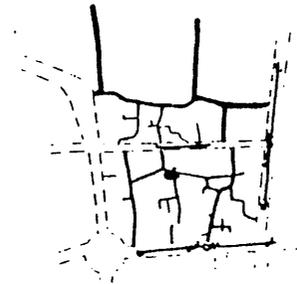


- Doctor's House**
- | | | |
|----------------------------|------------------------------|------------------|
| 1 - Entrance | 9 - Winter suffe (reception) | 19 - Sardab |
| 2 - Exterior courtyard | 10 - Winter room | 18 - New kitchen |
| 3 - Summer suffe | 11 - Kitchen | |
| 4 - Winter suffe (surgery) | 12 - Store room | |
| 5 - Wind tower | 13 - Store room | |
| 6 - Waiting room | 14 - Staircase to the sardab | |
| 7 - Saircase to pakane | 15 - Summer room | |
| 8 - Interior courtyard | 16 - Privy | |
| | 17 - Cupboard | |

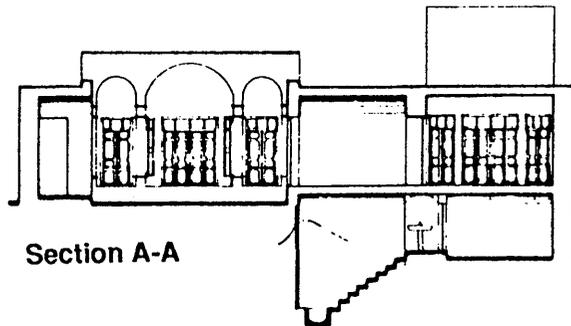
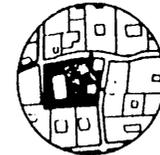


Sardab

Ground Floor



Mirsaleh Quarter



Section A-A

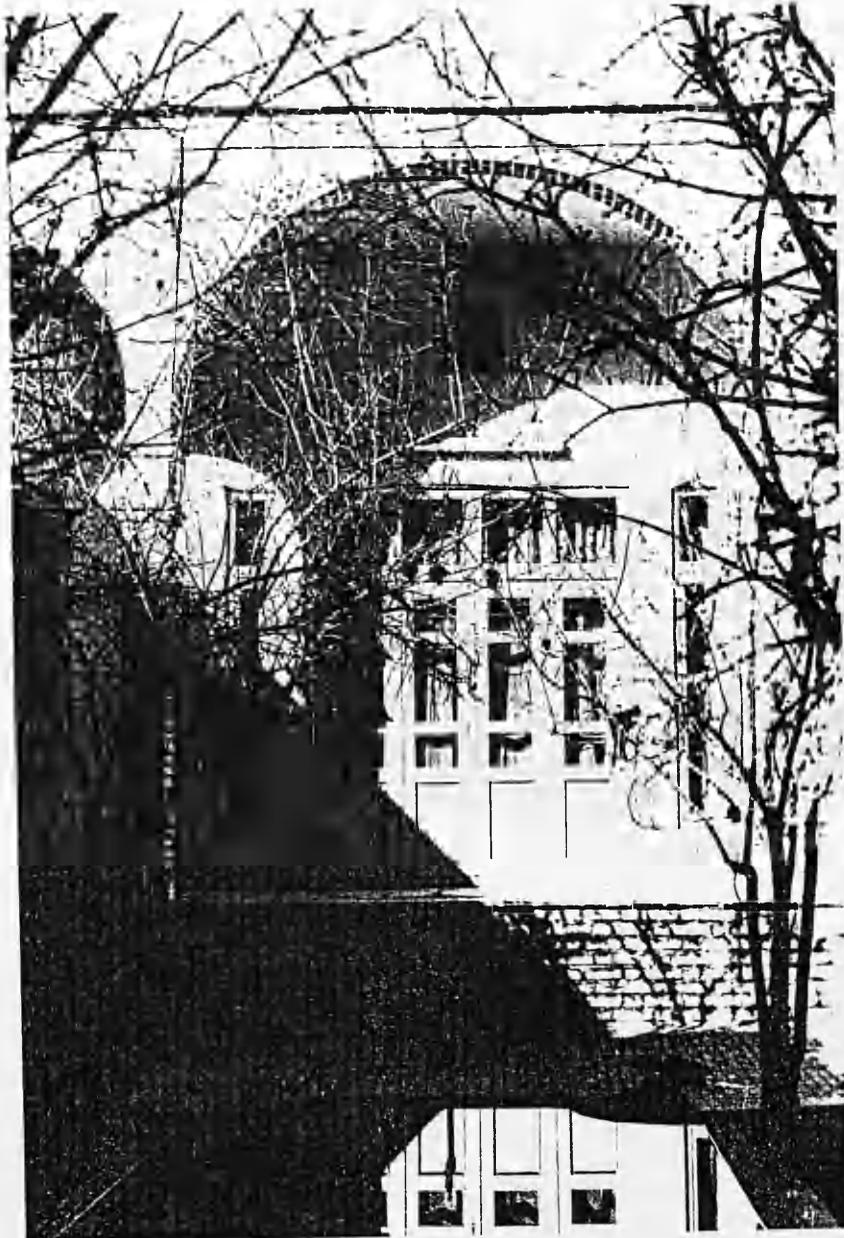


Fig 11: The main winter room at the north end of the courtyard with French windows.

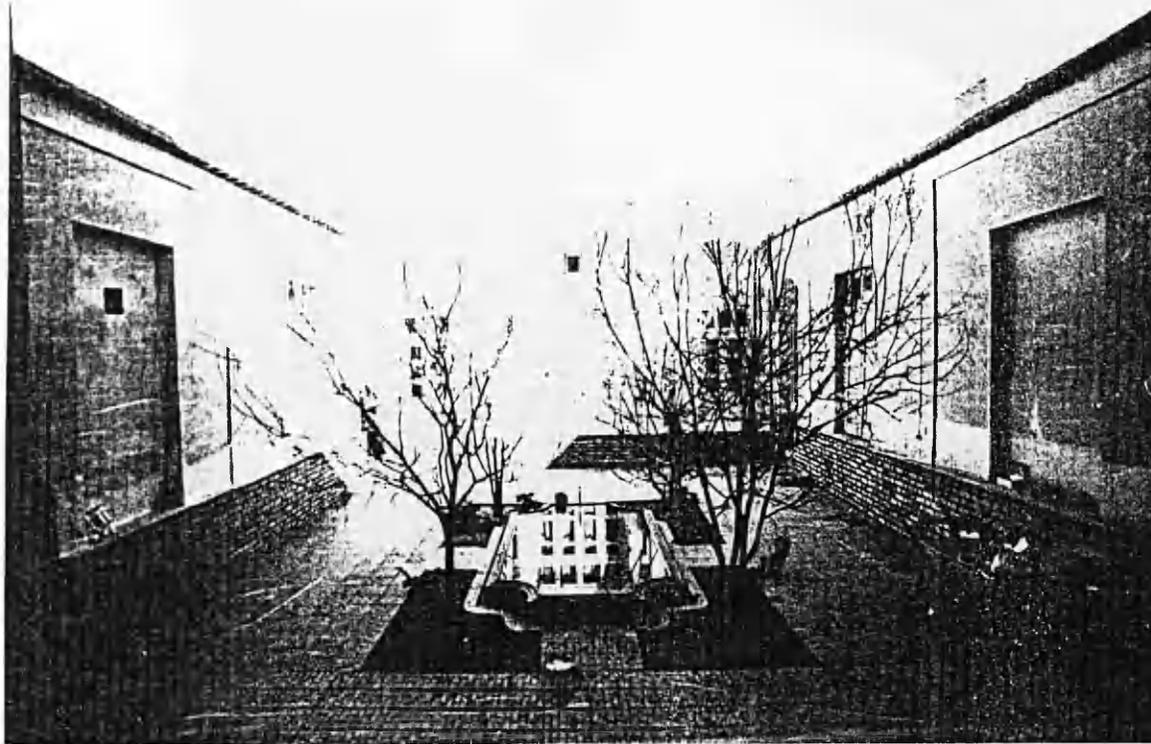


Fig 12: The winter rooms and the vaulted iwan at the north end of the courtyard is not easy to recognize but is visible in mirror of the pool.

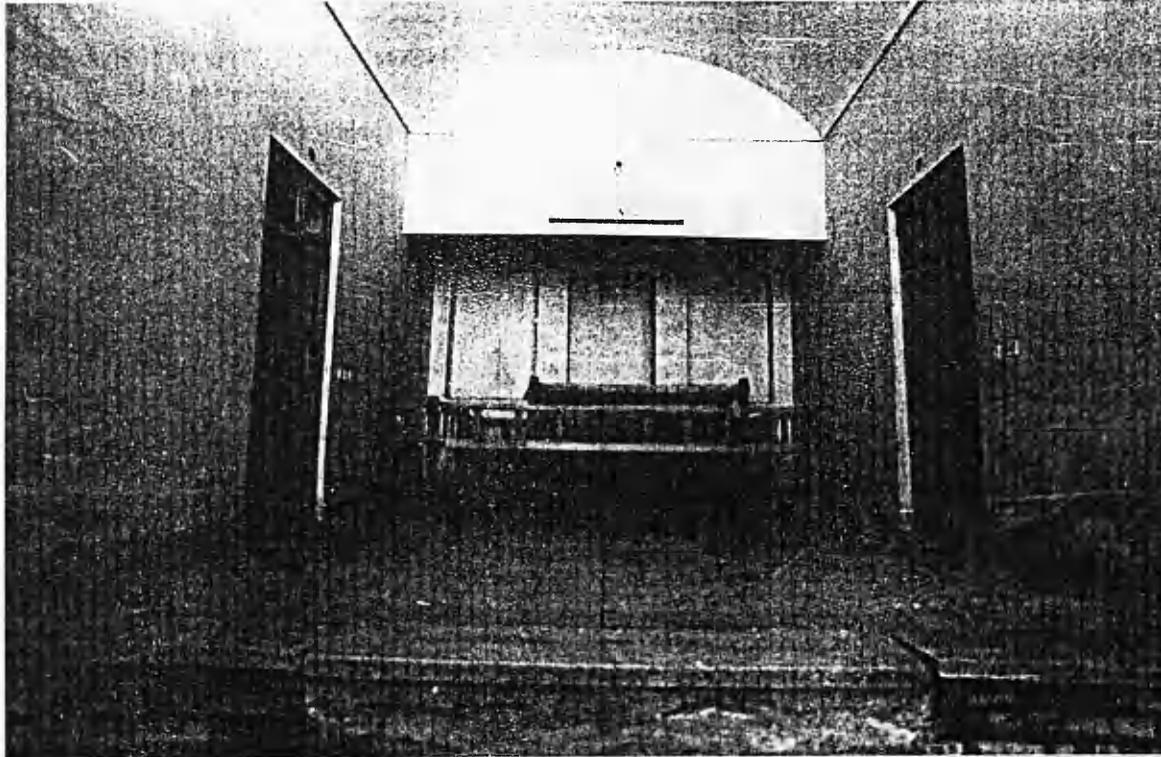


Fig 13: Summer suffe of the interior house, wind-tower and access to flanking summer rooms from the summer suffe.

(12) Charkhab Quarter

Charkhab Quarter (fig 1)

The district of Charkhab was built up in the 18th century at the same time as the last town wall surrounding Ardakan was constructed. The elderly people remaining in this quarter say that their forefathers laid the foundations of the quarter about 250 years ago.

These people came to this area from the north of Iran because Nader Shah (1149 A.H./1730 A.D.), the ruler at that time, banished them to the edge of the desert. They set up home beside Ardakan citadel with its water-wheel (*charkh-ab*).

In the past most of the inhabitants of this district were wealthy and educated, magistrates and landlords. Nowadays the inhabitants are still generally well educated and enjoy skilled employment. Many of them occupy the houses of their forebears to this day (fig 2 to fig 5 showing some views this quarter).

An examination of a number of significant houses in this district follows.

Darband-i Majd al-'Ulama'

In the past it was normal for the entire family to live together under one roof. This alley (*darband*) contains four houses which were built by Majd al-'Ulama', a magistrate of the town during the Qajar period (17-18 C.). The house occupied by the magistrate is distinguished by dotted shading in (fig 6).

His eldest son lived in the house shown unshaded in (fig 6) The black shading defines the private quarters of the family, while the hatching shows the part of the house used for entertaining visitors or business people, and these could be described as being two houses in one. A

special feature of the houses is the shared kitchen which connects the private family quarters (interior court) with the public quarters (exterior court), thus serving both the normal family and their guests (fig 7).

Majd al- 'Ulama' House (fig 8)

This house was formerly occupied by the head of the Majd al-'Ulama' family and has since been converted into a girls school. Despite this change of use it is possible to distinguish the previous plan of the house and to obtain a general idea of the interior.

The entrance to the house is situated at the far (north) end of the darband where it takes a short dog-leg to the right to form a small private forecourt(1) lit by a decorated triangular skylight. Inside the entrance door is a large lobby called in Farsi *miyandar* (meaning a space between two doors)(2) where visitors might wait in comfort.

Two doors open from the lobby, one north to a small passage leading to the main courtyard, and one west into one of the summer rooms at the south end of the courtyard. A tall badgir(17) ventilates the summer rooms(4) and, as usual, the summer suffe(3). In the south-west corner of the courtyard is the entrance to a service area containing a kitchen(9), food store(16) and stairs(8) to the water channel (*pakaneh*) arranged round an open court(10). A long corridor leads south alongside the food store to the latrines(11), situated well away from the living areas next to the stable(12) and near a lane (see site plan) where refuse could be collected for disposal.

Majd House (fig 9)

The owner of this house was Majd, the second son of Majd al-'Ulama' and at the present time a great-granddaughter of Majd still resides there.

The original entrance to the house was towards the north end of the *darband* but that entrance has been blocked and the vestibule (numbered 14 on the plan) converted to a kitchen. The present entrance is further to the south, leading through a new vestibule (1) to a central courtyard. The whole house has an attractive and welcoming character that is hard to define.

An interesting architectural feature of the house is the recesses in the back walls of both the summer and the winter suffes. Such recesses are called *shekamdarideh* which in Farsi means literally “with the middle scooped out”. The *pakane* access to the qanat system, is situated under the summer suffice, helping to keep the floor of the suffice cool.

To the west of the stairs leading down to the *pakaneh* is a short passage leading to an open service court(7). Unusually, this court is

octagonal, with doors in four sides and shallow recesses in the others. Besides the door from the main courtyard, doors open to a staircase(15) to the roof, to a kitchen(8) now used as a utility room, and to a long passage leading to a privy(9). A window in the west wall of the privy is lit from a small access chamber to the west, open to the sky, with doors on the street to allow sewerage to be removed conveniently (fig 10).

Ansari House (fig 11)

This house belongs to the Ansari family, descendants of the original founder.

The entrance doorway leads to an octagonal or *keryas*. The multifaceted saucer dome over the *keryas* is exquisitely decorated in plaster (fig 12). A door in the south side of the *keryas* opens onto a

stable for guests horses and another door opens east to a staircase to three guest rooms on the upper floor (fig 12). Guest rooms on an upper floor (*balakhaneh*) are a special feature of wealthy houses in Ardakan.

A fourth door leads from the *keryas* north through a wide lobby with brick benches on either side to the main courtyard of the house. That lobby, is lit by three skylights pierced in its barrel vault.

The living rooms are disposed quite symmetrically around the courtyard (see plan, fig 11). On the south side is the summer *suffe* with summer rooms(7) on either side of it and a tall *badgir*(6) behind (fig 13). The winter *suffe*(14), facing the summer *suffe*, has a large *tanaby* behind it, provided with a fireplace. The *tanaby*(17) (fig 14) was used a dining room (*sofrekhane*), which could accommodate many guests, and is screened from the winter *suffe* by doors covered

with special translucent paper instead of glass. The winter rooms(15) on either side of the winter *suffe* have been fitted with new glass doors in place of the original ones, and resembled those still in place in summer rooms on the opposite side of the courtyard (fig 14).

On the east side of the courtyard is a reception(13) room with five windows arranged in such a fashion as to mirror the fenestration of smaller rooms on the west side of the courtyard, thus maintaining symmetry. On either side of this reception room are smaller rooms(12) with glazed doors and a window on either side and another above; (see fig 15)an unusual arrangement known as *seh chashme*, “three openings”.

Steps lead down alongside(24) under the eastern summer room(7), and to a *sardab* under the summer *suffe*.

The service areas are located in the four corners of the house. The entrance is in the south-west corner. In the north-west corner is an open court(20) with a chicken coop(22), a straw store(23) and stables(21) off it connected by a wide doorway to the street. To the south of that court is a privy(25), reached by a corridor running alongside a store to two upper-floor family rooms. A large storeroom occupies the north-east corner(16). In the south-east corner was the kitchen(9) with adjoining store(10). A new kitchen and bathroom have been introduced in rooms(18 and 19) on the east side of the courtyard.

Athari House (fig 16)

This house was built by a farmer against the last town wall of Ardakan. It is still occupied by a farming family.

The Athari House is an example of a four-suffe house, with the suffes arranged around a small courtyard(6). An unusual feature is the big open yard(18) behind the winter suffe(3), which is used as a vegetable garden.

The summer suffe(8) opens at the south end of the courtyard. The east suffe(7) contains the stairs down to the water channel (*pakaneh*), and the west suffe(10) now used as a kitchen leads to the original kitchen (now used as a baking area) and food store(11).

The winter suffe(13) at the north end of the courtyard has an exceptionally high vault (see section, fig 16) to allow sunlight to penetrate in winter despite the smallness of the courtyard. The winter rooms(14) on either side of the winter suffe have thick walls and no windows, allowing them to retain heat during long winter nights.

To the north, beyond the winter suffe, where a *tanaby* is normally to be found there is an interesting type of summer room(15) with subsidiary summer rooms(16) on either side. These summer rooms(15) enjoy a fine view of the garden to the north and, through the winter suffe, to the south of the courtyard (fig 17).

The Shopkeeper House (fig 18)

Situated next to the Castle Square, this is one of the oldest houses in the district. In the past, as now, most houses close to the shops in Castle Square depend on it as a place of work. In fact, this house incorporates a shop next to the entrance which formerly opened directly on the street leading north-east from the square. The shopfront has been bricked up and the shop is now used as a store room(1).

Lack of space led the builders to forego a summer suffe, building in its place only a small arched recess(3). The winter suffe(4) on the north side of the courtyard has to serve also as a summer suffe, and for this reason has a badgir(5) to keep it cool in summer. A small food store opens off the badgir at the back of the suffe.

Otherwise the layout is more or less conventional with stairs in the courtyard down to the water channel(9), a kitchen(8) and baking(10) area on the west side of the courtyard, winter rooms(7) on either side of the suffe, and a stable(13) to the north of the entrance passage and a privy(14) reached through a store room(15) on the south side of the passage.

A staircase leads(16) from the entrance passage to the roof where there are rooms used for storage and as bedrooms during summer(17).

Charkhab Quarter

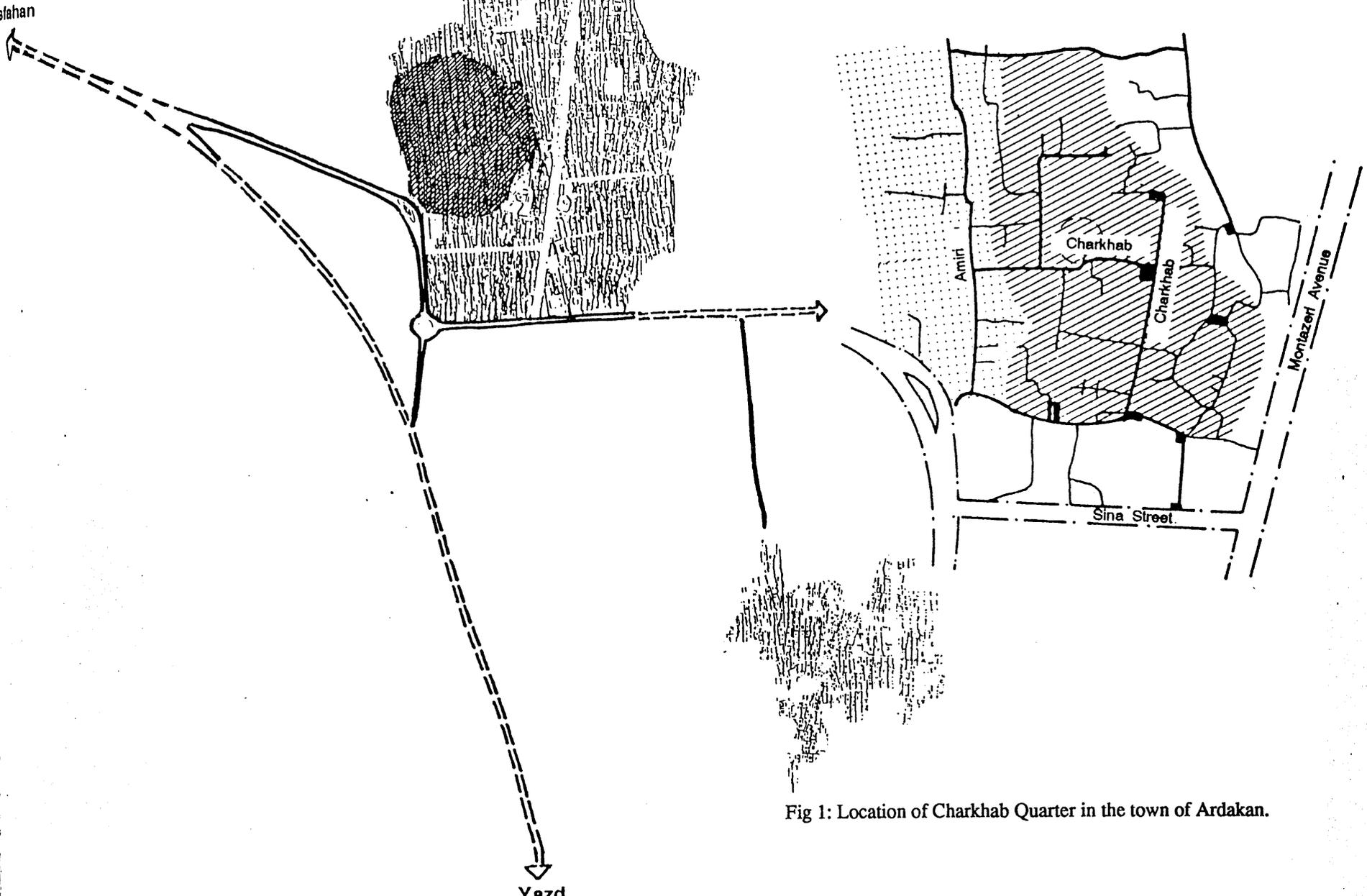


Fig 1: Location of Charkhab Quarter in the town of Ardakan.

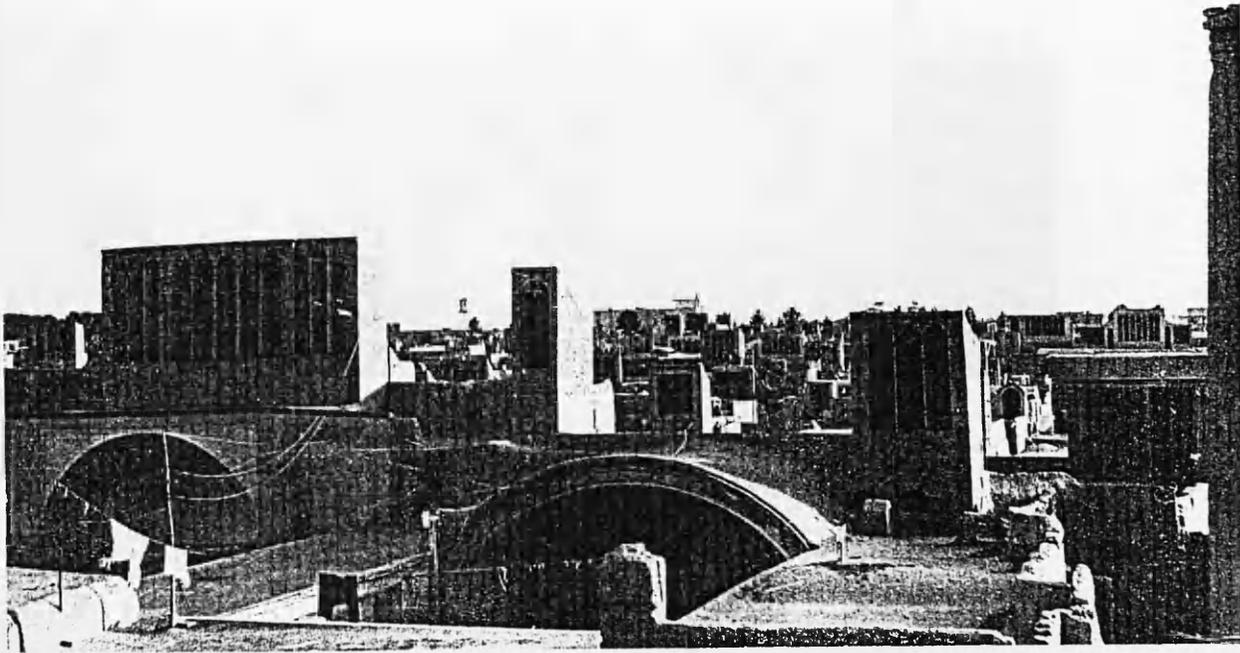


Fig 2: A roof-top view of the Charkhab Quarter to the south.

a



b



Fig 3:

a. A roof-top view of the Charkhab Quarter to the north-east.

b. The dome of Charkhab Quarter's Mosque.

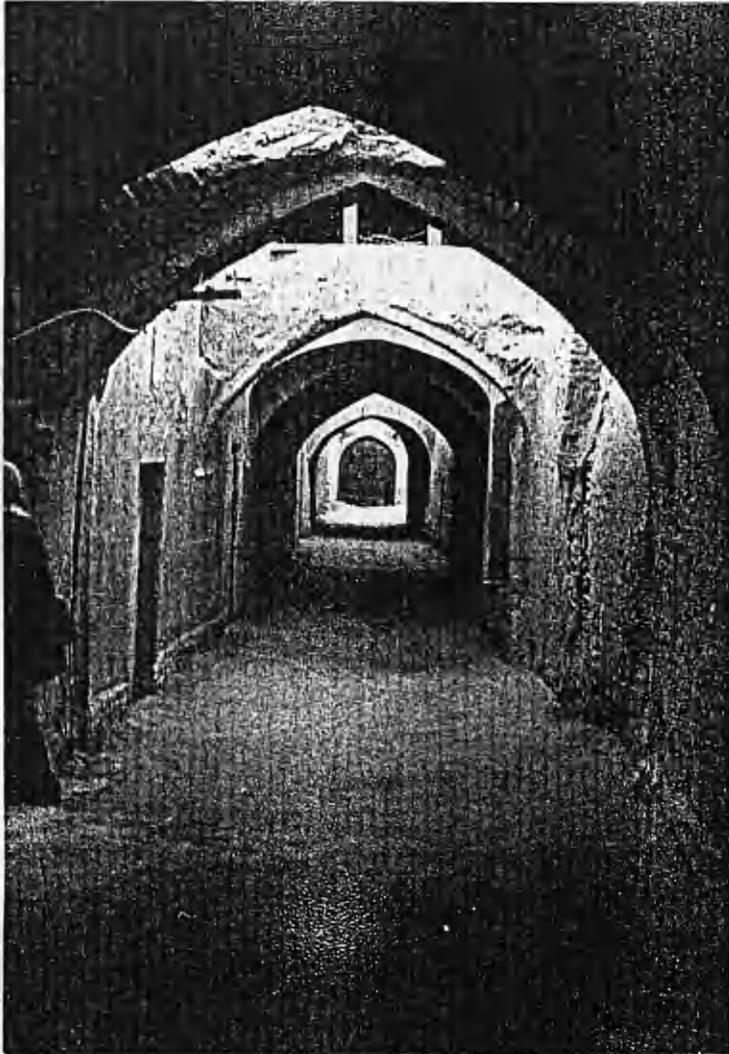


Fig 4: The north-southstreet of the Charkhab quarter.

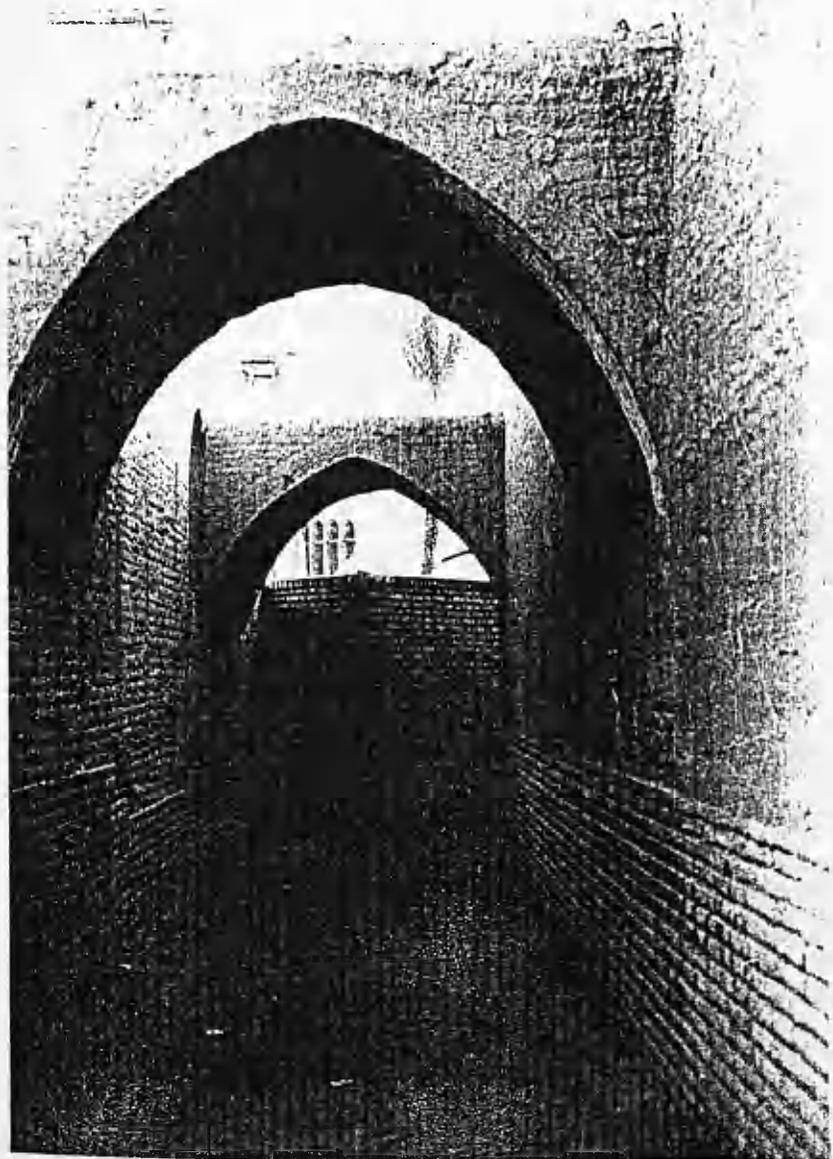
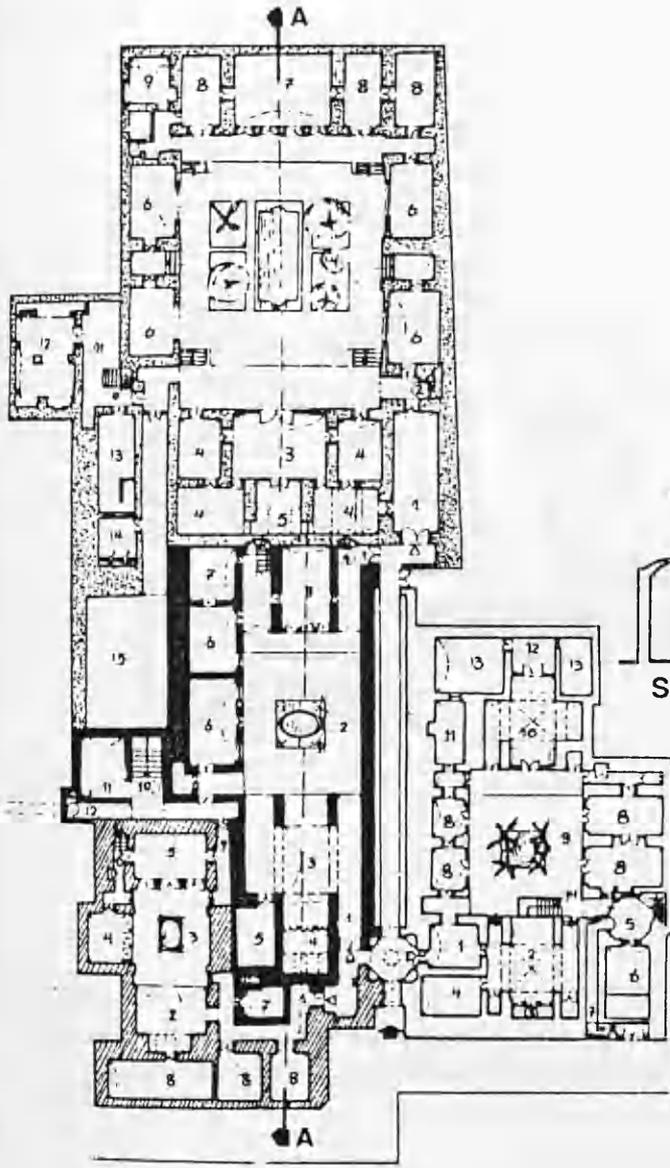
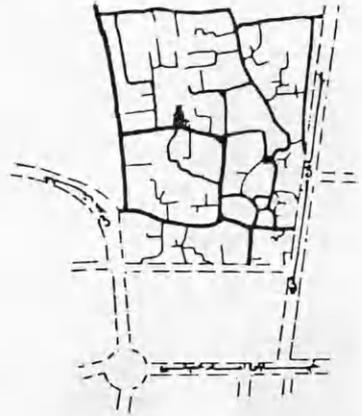
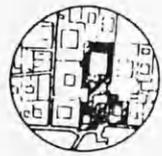


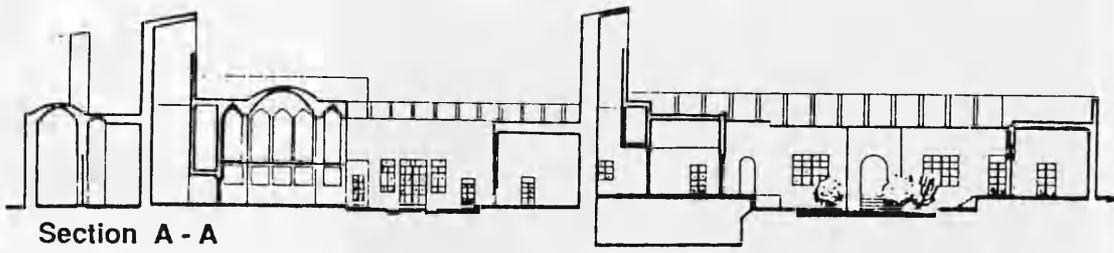
Fig 5: Lane leads to the quarter's public bath-house.



Ground Floor



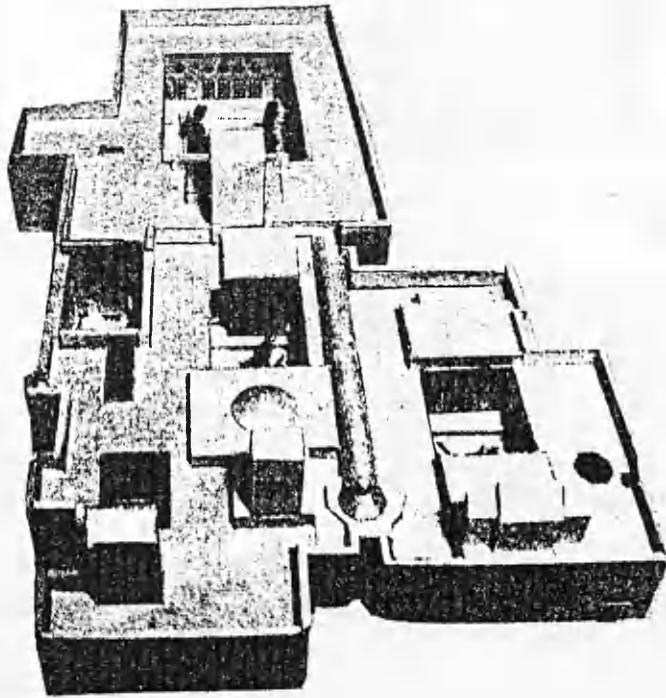
Charkhab Quarter



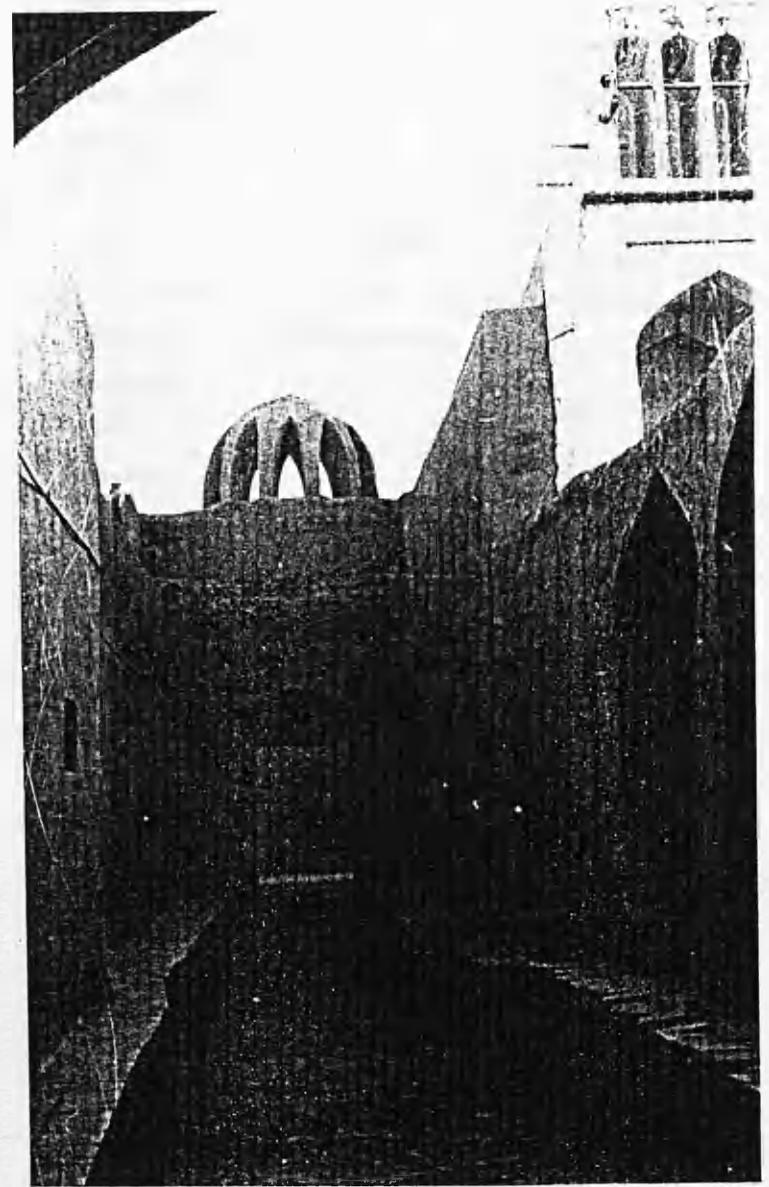
Section A - A

Darband-i Majd al-^c Ulama'

- | | | | | |
|------------------------|-----------------------------|-----------------------------|-----------------------------|---------------------------|
| House | 11 - New Kitchen | 7 - Winter suffe | 2 - Courtyard | House |
| 1 - Entrance | 12 - Tanaby | 8 - Winter room | 3 - Summer suffe | 1 - Entrance |
| 2 - Summer suffe | 13 - Winter room | 9 - New Kitchen | 4 - Wind-tower | 2 - Summer suffe |
| 3 - Wind-tower | 14 - Staircase to the Qanat | 10 - Staircase to the Qanat | 5 - Summer room | 3 - Courtyard |
| 4 - Summer room | House | 11 - Service yard | 6 - Spring/autumn room | 4 - Spring/autumn room |
| 5 - Service yard | 1 - Lobby | 12 - Old kitchen | 7 - Store room | 5 - Winter suffe |
| 6 - Kitchen | 2 - Staircase to the roof | 13 - Store room | 8 - Winter suffe | 6 - Staircase to the roof |
| 7 - Privy | 3 - Summer suffe | 14 - New privy | 9 - Staircase to the roof | 7 - Kitchen |
| 8 - Spring/autumn room | 4 - Summer room | 15 - Stable yard | 10 - Staircase to the Qanat | 8 - Store room |
| 9 - Courtyard | 5 - Wind-tower | House | 11 - Kitchen | 9 - Internal connection |
| 10 - Winter suffe | 6 - Spring/autumn room | 1 - Entrance | 12 - Privy | |



a



b

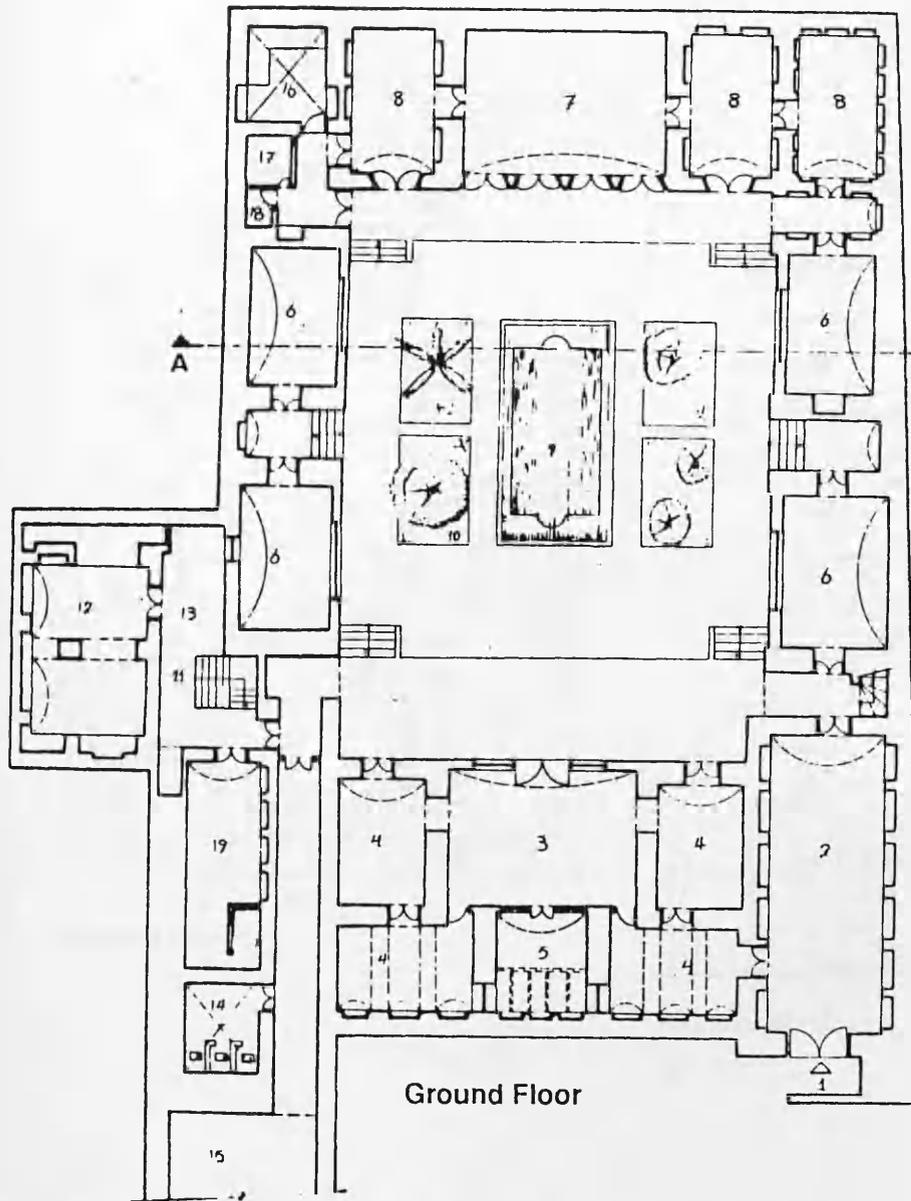
Fig 7:
a. Model of Darband-i Majd al-Ulama complex, south-north.
b. A view from the south of the Darband-i Majd al-Ulama, showing the hashti and the skylight.

Majd House

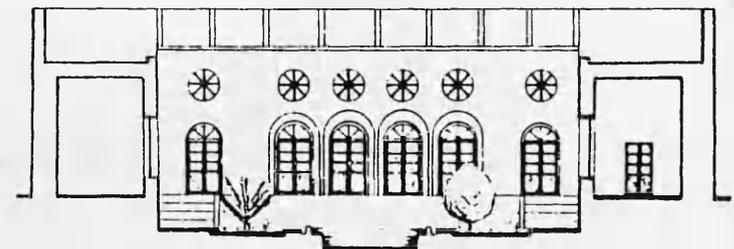
- 1 - Entrance
- 2 - Lobby (miyandar)
- 3 - Summer suffe
- 4 - Summer room
- 5 - Wind-tower
- 6 - Spring/autumn room
- 7 - Winter suffe
- 8 - Winter room
- 9 - Pool
- 10 - Flower bed
- 11 - Staircase to the Qannt
- 12 - Old kitchen
- 13 - Service Yard
- 14 - New kitchen
- 15 - New privies
- 16 - Stable yard
- 17 - Bath room
- 18 - Privy for teachers
- 19 - Store room
- 20 - Staircase to the roof



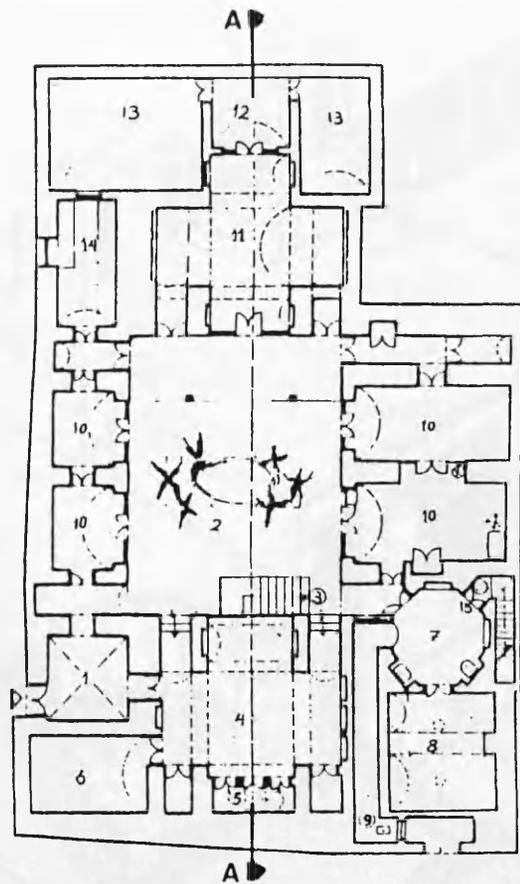
Charkhab Quarter



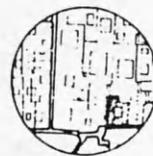
Ground Floor



Section A - A



Ground Floor

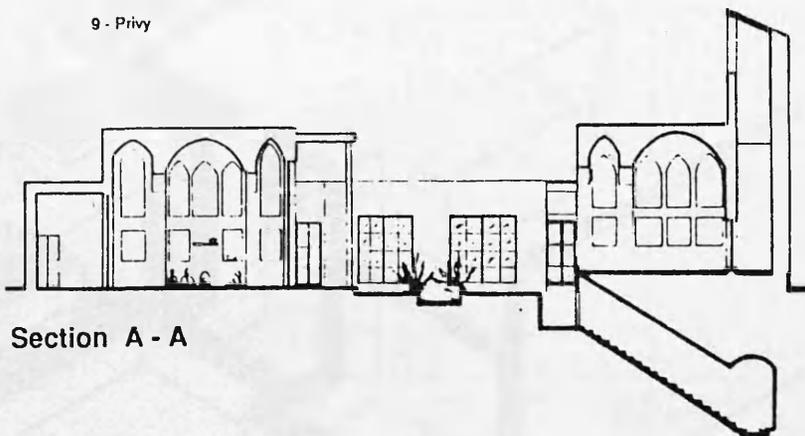


Majedi House

- 1 - Vestibule
- 2 - Courtyard
- 3 - Staircase to the qanat
- 4 - Summer suffe
- 5 - Wind-tower
- 6 - Summer room (Gusheh)
- 7 - Service court
- 8 - Old kitchen
- 9 - Privy
- 10 - Spring/autumn room
- 11 - Winter suffe
- 12 - Tanaby
- 13 - Winter room (Gusheh)
- 14 - New kitchen
- 15 - Staircase to the roof

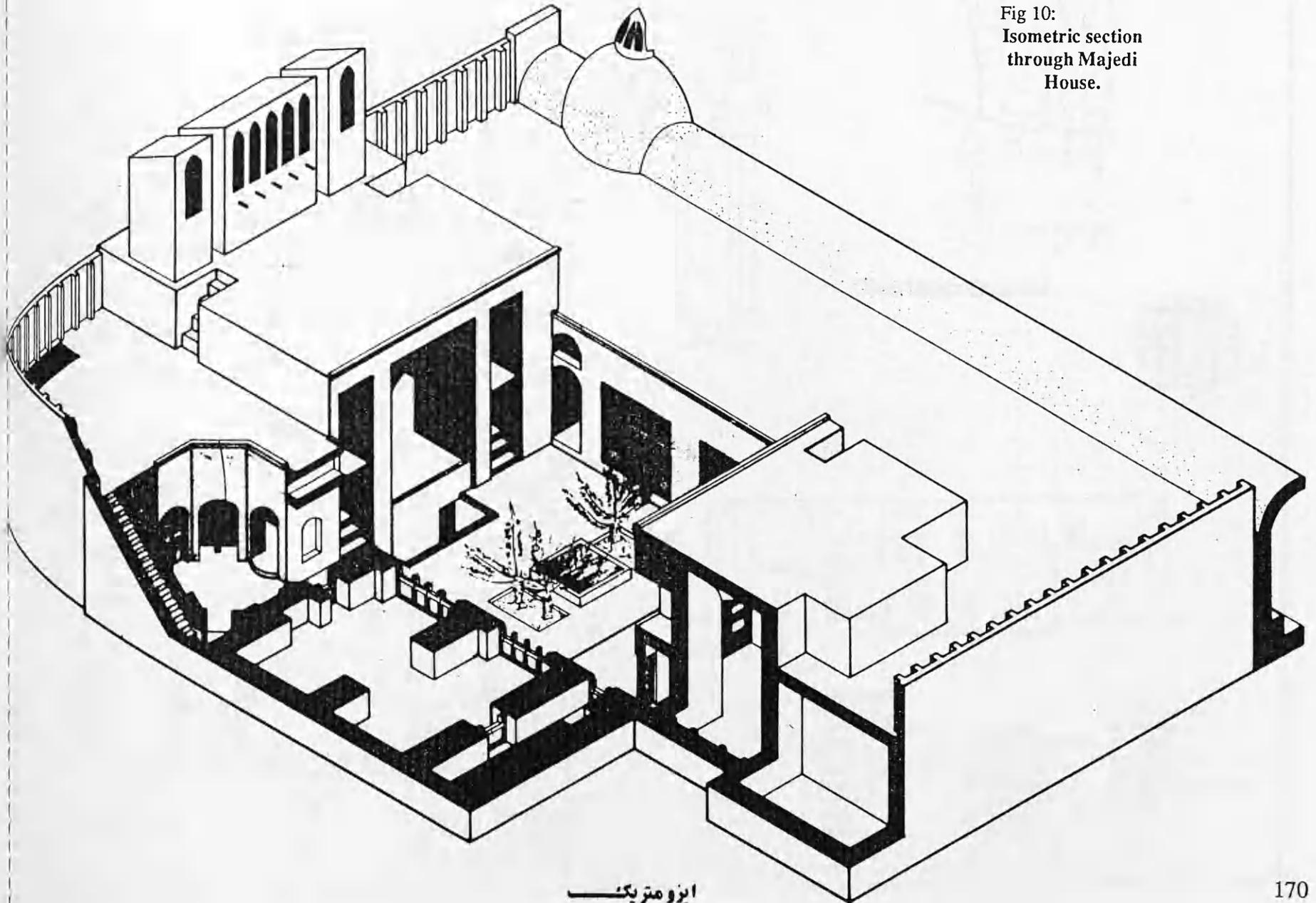


Charkhab Quarter

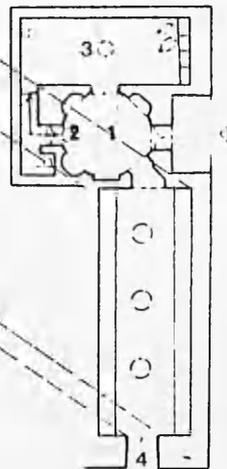
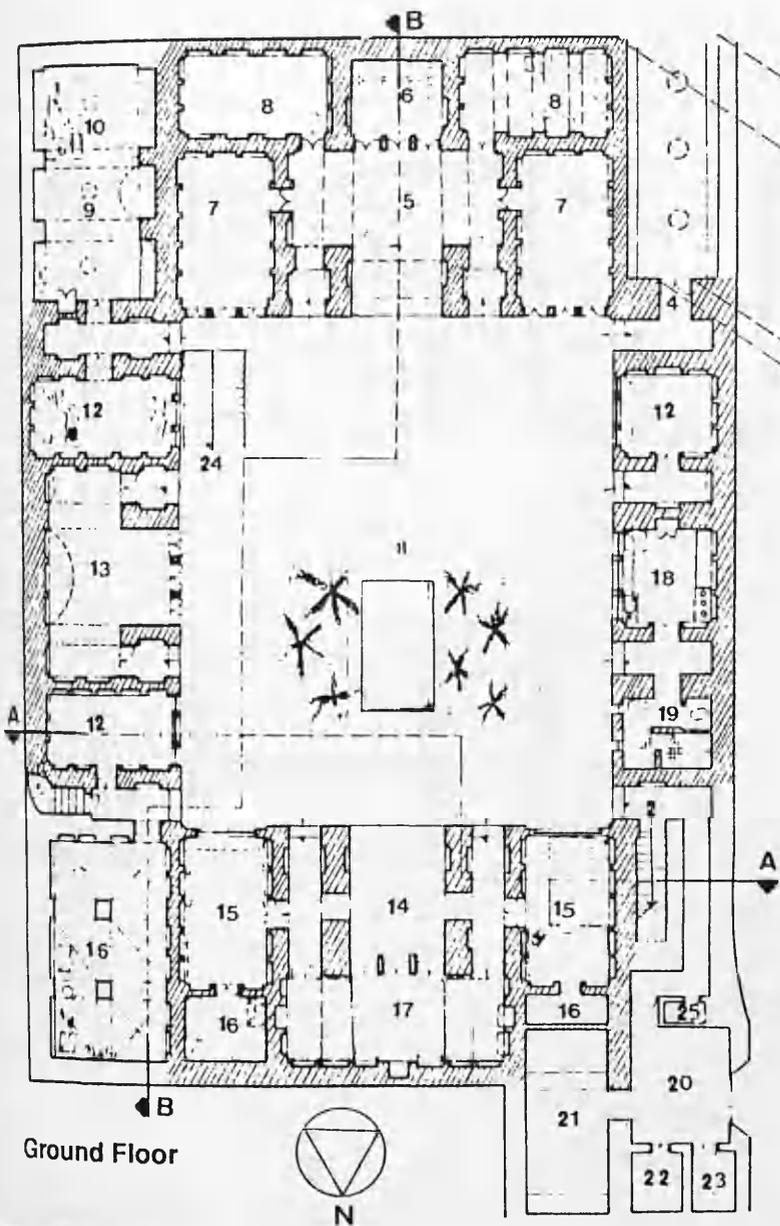


Section A - A

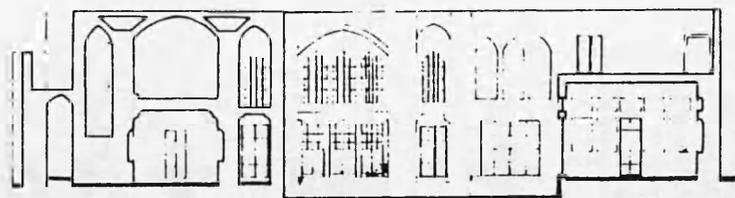
Fig 10:
Isometric section
through Majedi
House.



ایزومتریک
خانه ماجدی



Charkhab Quarter

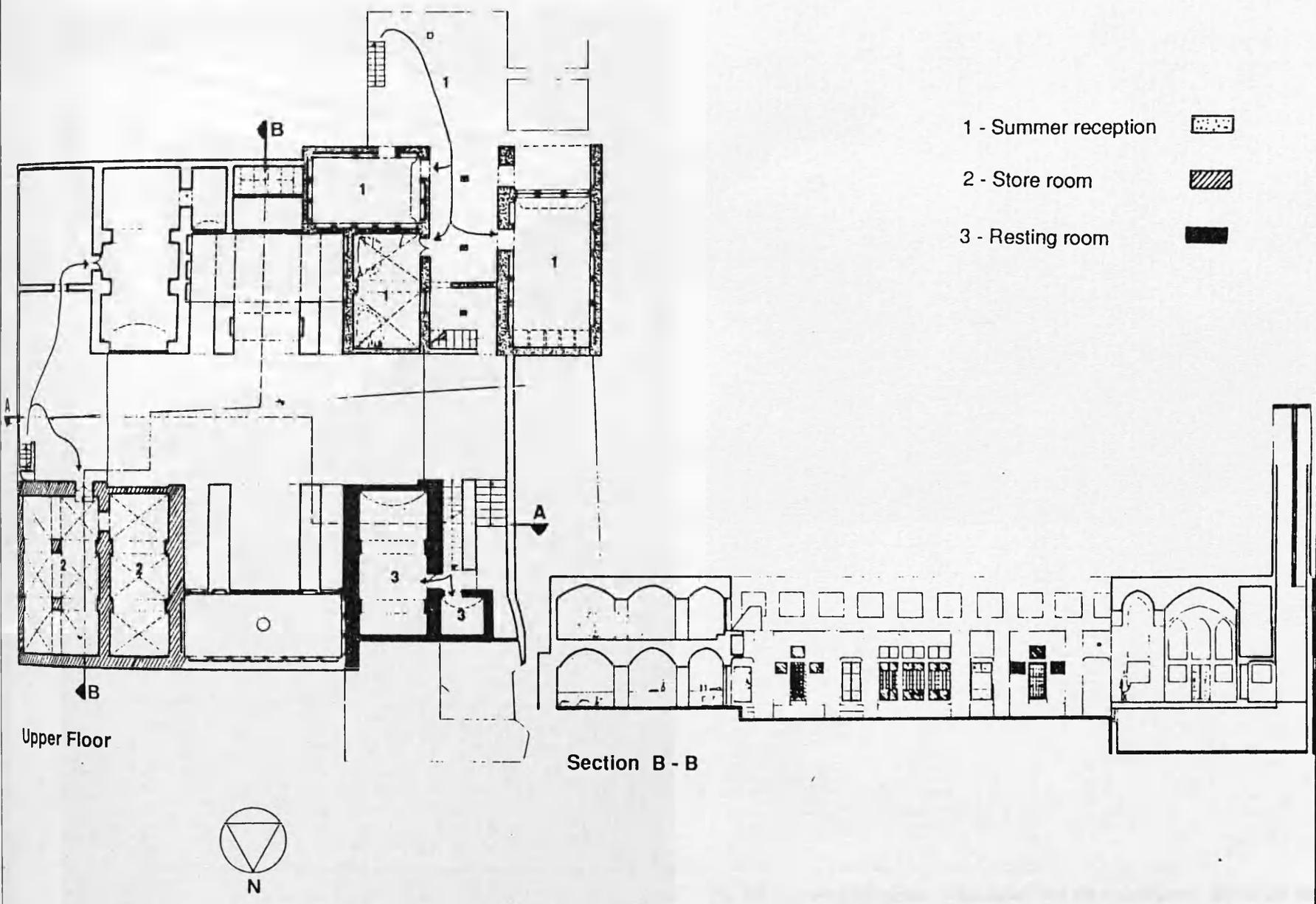


Section A - A

Ansari House

- | | | |
|-------------------------------|-------------------------|-----------------------------|
| 1 - Hashli (entrance) | 10 - Wood store | 19 - New bath room |
| 2 - Staircase to the roof | 11 - Courtyard | 20 - Open court |
| 3 - Stable | 12 - Spring/autumn room | 21 - Stable |
| 4 - Entrance to the courtyard | 13 - Reception room | 22 - Chicken coop |
| 5 - Summer suffle | 14 - Winter suffle | 23 - Store room |
| 6 - Wind-tower | 15 - Winter room | 24 - Staircase to the qanat |
| 7 - Summer room | 16 - Store room | 25 - Privy |
| 8 - Pantry | 17 - Tanaby | |
| 9 - Kitchen | 18 - New kitchen | |

Ground Floor



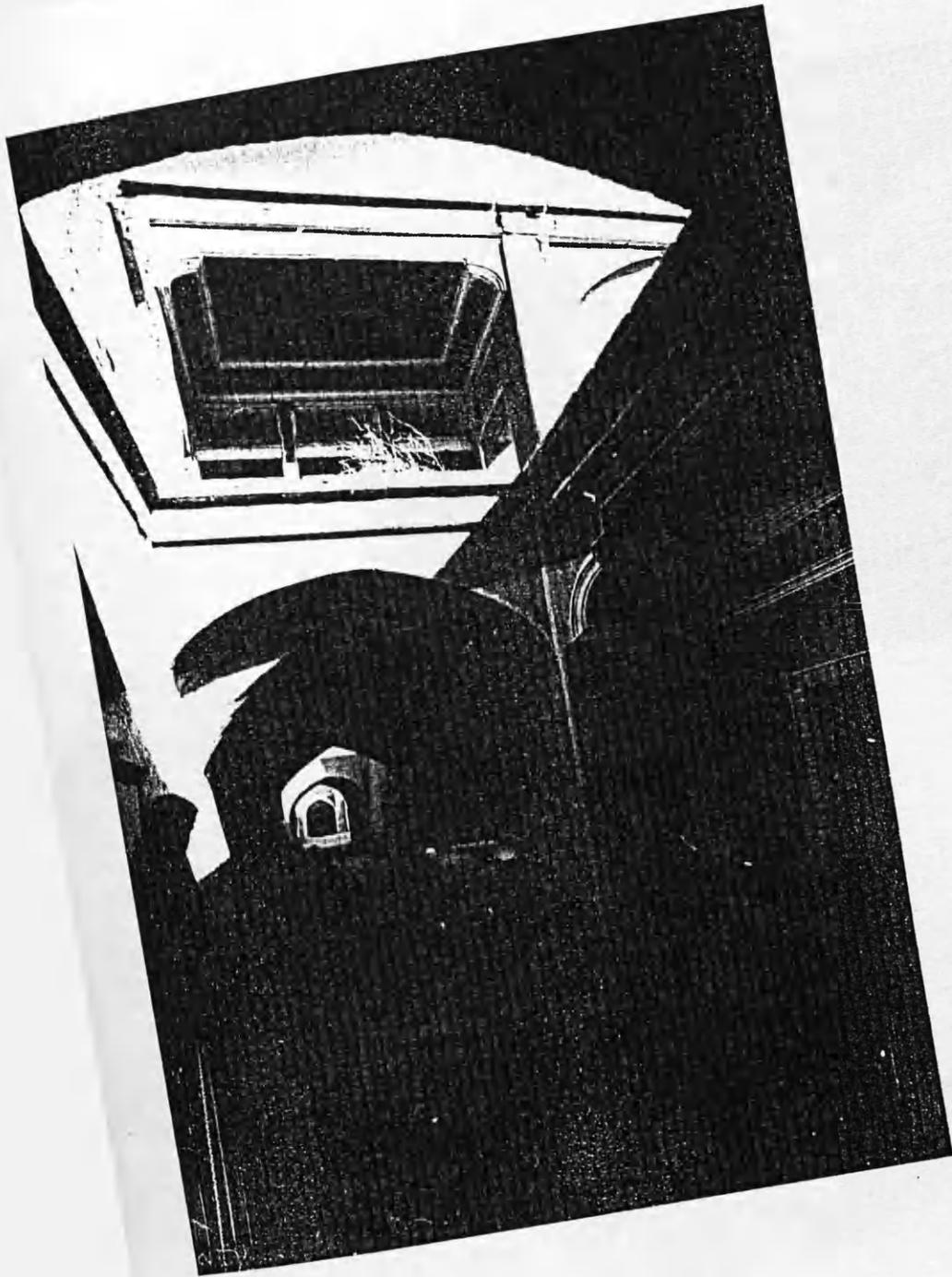


Fig 12: Showing the portal to the hashti and the *balakhaneh* above the street.

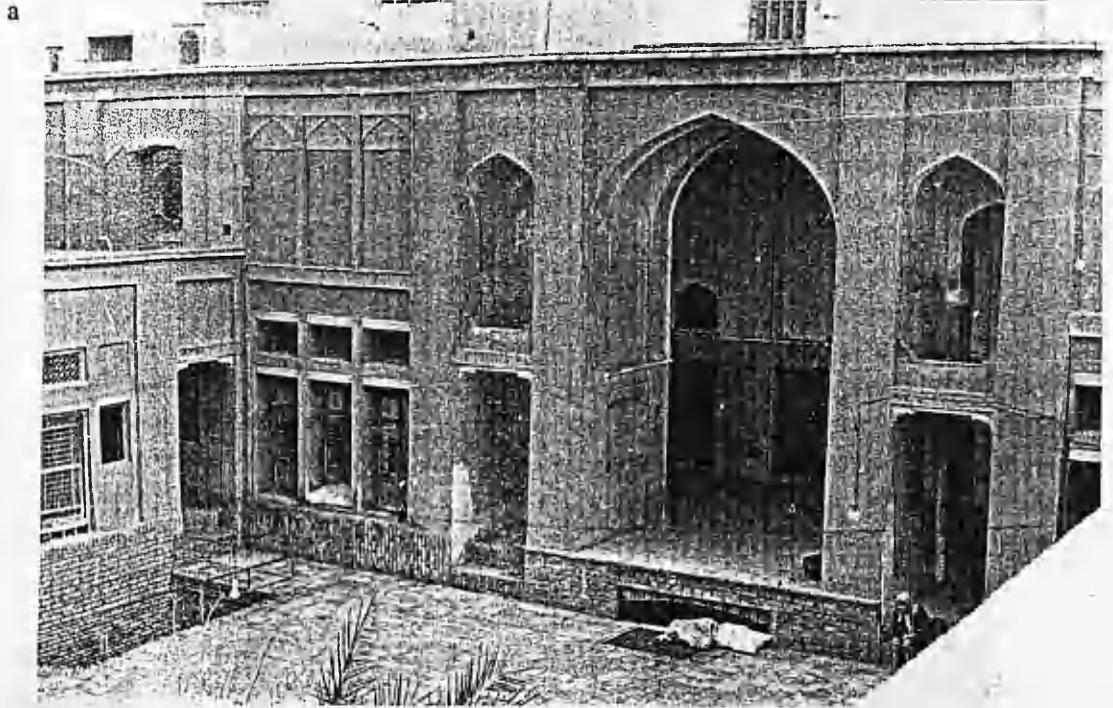
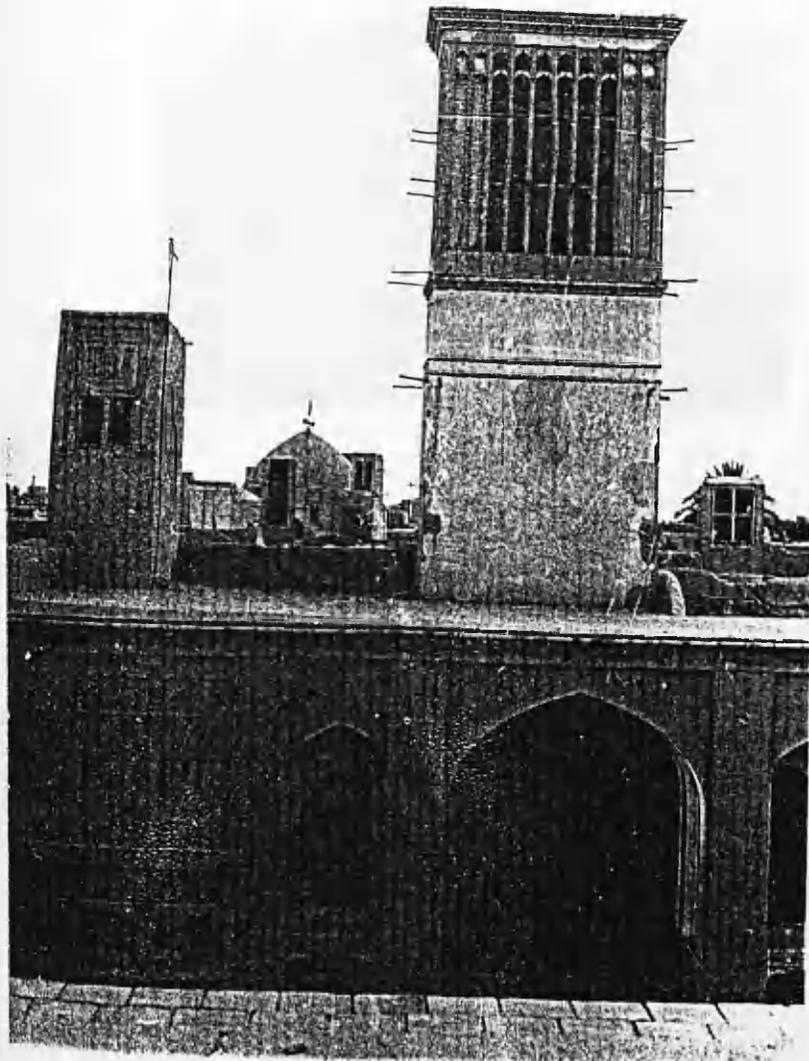
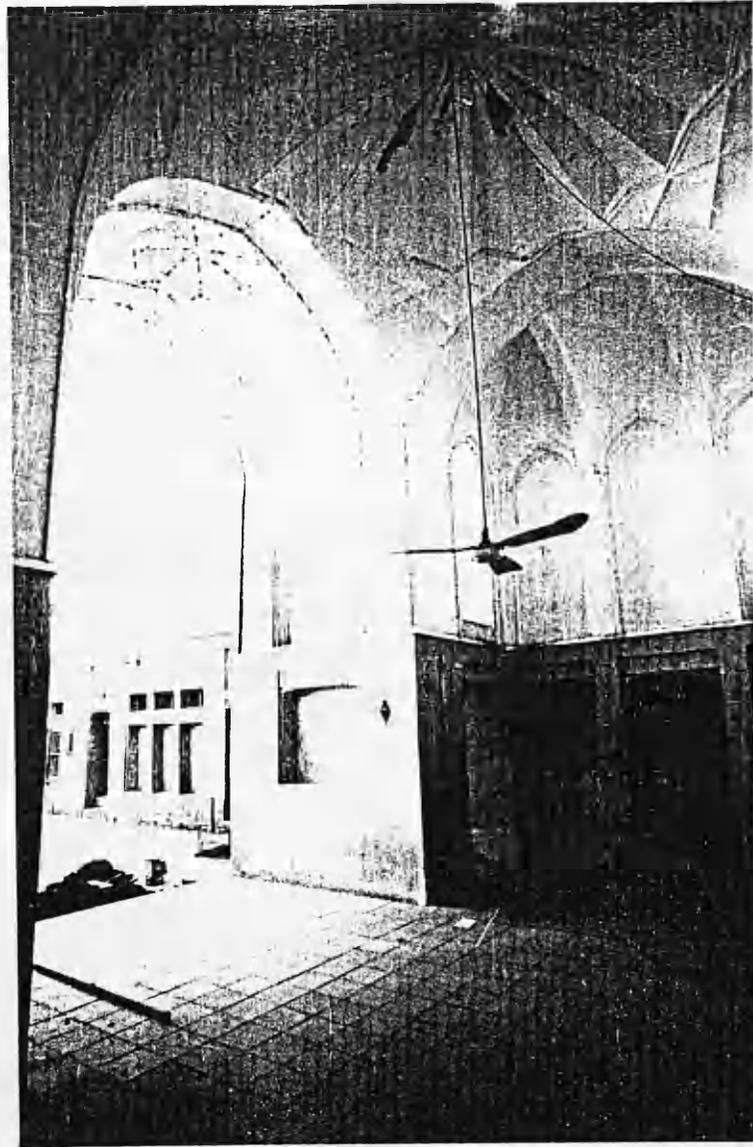


Fig 13:

- a. Summer suffe with flanking summer rooms, sardab's opening to the courtyard.
- b. A tall four-sided wind-tower at rear of the summer suffe.



d



c

Fig 13:
c. Interior view of the summer suffe, showing elaborate ceilings and walls.
d. Another view to the summer suffe's wind-tower and summer rooms.

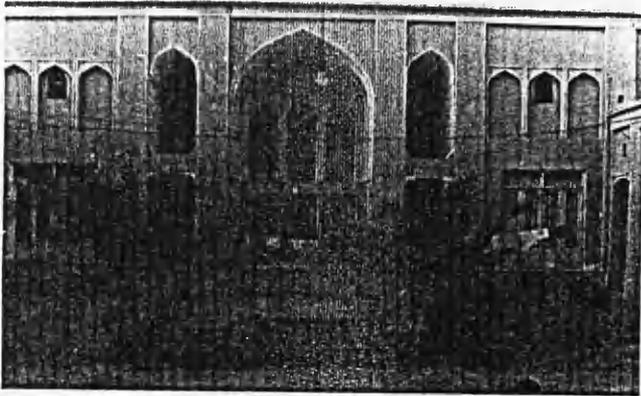


Fig 14: Showing winter suffe with flanking winter rooms and tanaby is screened from the suffe.

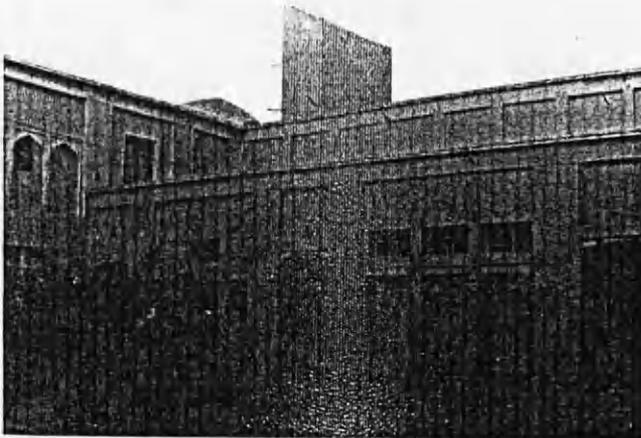
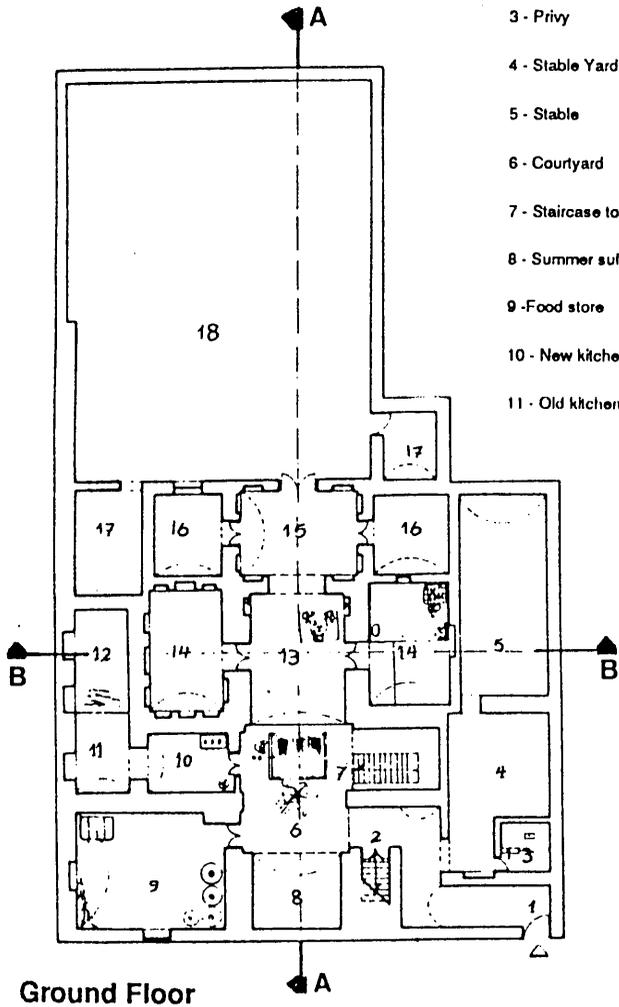


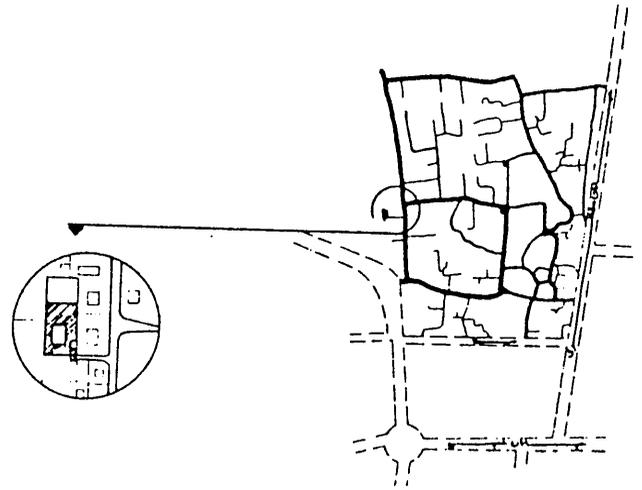
Fig 15: Reception room in which the openings were blocked, spring and autumn rooms.

Amiry House

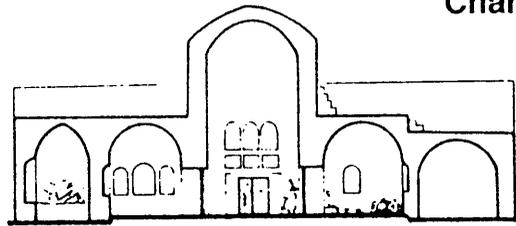
- 1 - Entrance
- 2 - Staircase to the roof
- 3 - Privy
- 4 - Stable Yard
- 5 - Stable
- 6 - Courtyard
- 7 - Staircase to the qaqt
- 8 - Summer suffe
- 9 - Food store
- 10 - New kitchen
- 11 - Old kitchen
- 12 - Wood store
- 13 - Winter suffe
- 14 - Winter room
- 15 - Tanaby
- 16 - Summer room
- 17 - Store room
- 18 - Garden



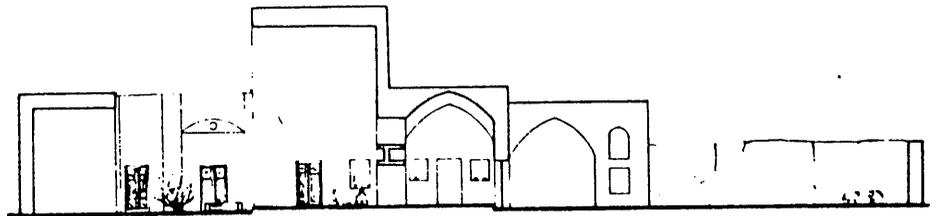
Ground Floor



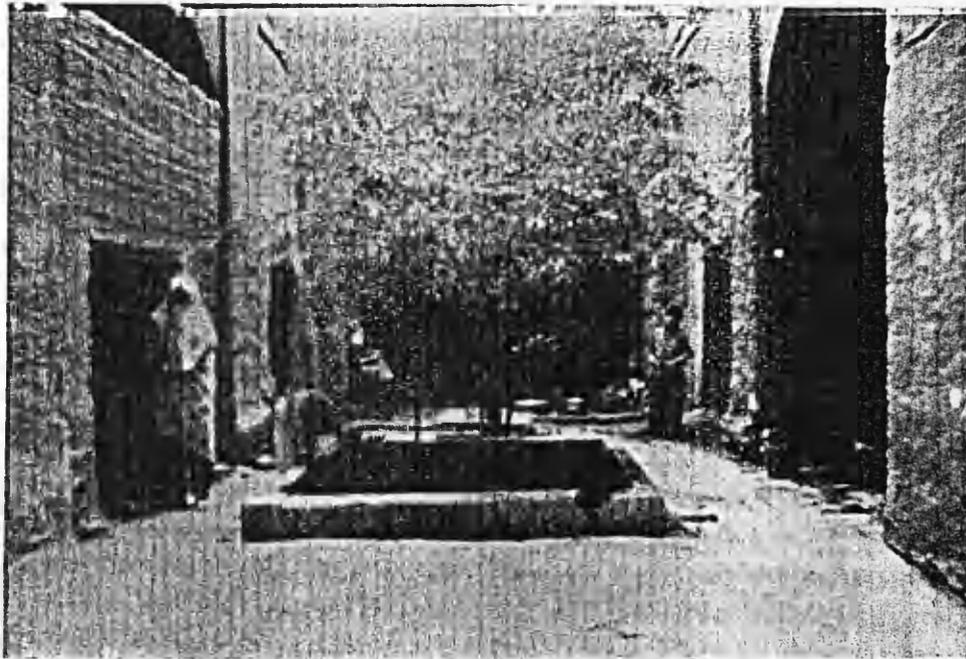
Charkhab Quarter



Section B - B

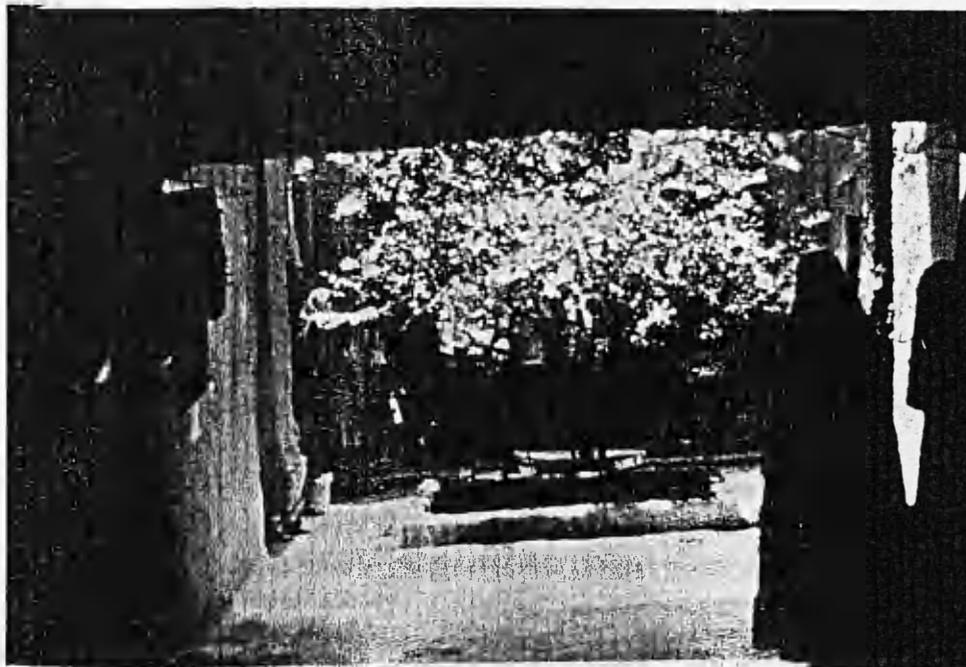


Section A - A

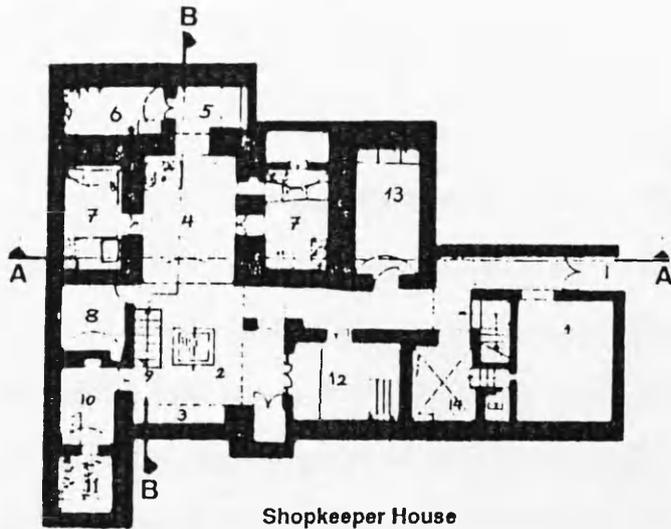


a

Fig 17:
a. View from winter suffe to the courtyard.
b. View from tanaby to the coutyard.



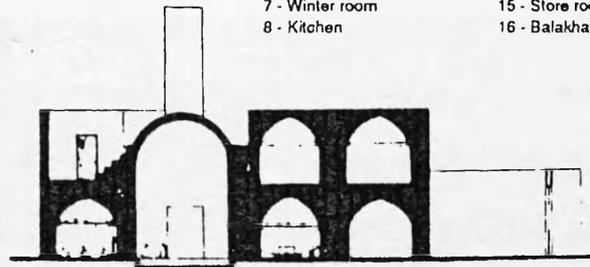
b



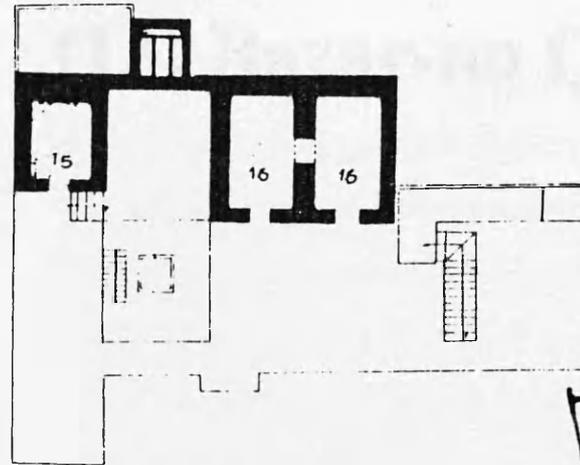
Ground Floor

Shopkeeper House

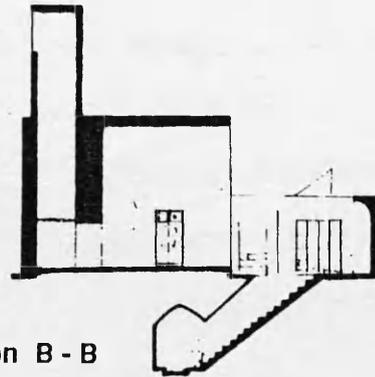
- | | |
|-------------------|------------------------------|
| 1 - Previous shop | 9 - Staircase to the qanat |
| 2 - Courtyard | 10 - Baking room |
| 3 - Recess | 11 - Wood store |
| 4 - Winter suffe | 12 - Spring/autumn room |
| 5 - Wind-tower | 13 - Stable |
| 6 - Store room | 14 - Privy |
| 7 - Winter room | 15 - Store room |
| 8 - Kitchen | 16 - Balakhane (upper floor) |



Section A - A



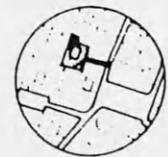
Upper Floor



Section B - B



Charkhab Quarter



(13) Bazar-no Quarter

Bazar-no Quarter (fig 1)

The Bazar-no quarter is bounded by Tiran quarter to the north, by new housing to the east in the area formerly occupied by small farms outside the town, by Khomeini Street to the south, and to the west by Montazeri Avenue (fig 1). The quarter takes its name from the bazar-no, the “New Bazaar”, which runs through the quarter (fig 2). The New Bazaar, established during the period of the Third Boundary (1156-1299/1741-1884. see above P. 10 & 11), is so-called to distinguish it from the older bazaar, which runs east-west along the northern edge of Mirsaleh quarter (see above P. 134). The New Bazaar originally extended the full length of the town from the Kushk-no Gate in the north to the Bazaar-no Gate in the south, as a result of the Zoroastrians who travelled, every Persian New Year (Noroz), from all over the state of Yazd, Iran, even India on pilgrimage to Heryshte⁽¹⁾.

The construction of Montazeri Avenue led to the demolition of the most of the bazaar. Even the *chahar-suq* which was of the two bazaars (old and new), and was covered by a dome. Only the southern part which runs through Bazar-no Quarter has been spared (see fig 2).

Toward the north end of this part of the bazaar is the Husseiniyah, a large open space where the Shiite festival of Dahe-i Muharram, commemorating the death of Hussein is performed during the month of Muharram⁽²⁾. The quarter includes three abanbars (underground water tanks) and a hammam (public bath-house).

The pilgrim route to the Shrine of Immam Reza in Mashhad passed through this area (see chapter of history, Second Boundary, fig 10) and the bazaar included facilities for pilgrims, such as a caravanserai

beside the town gate. The inhabitants of the quarter mainly work in the bazaar as shop keepers or shop assistants, but formerly some of them earned their living by attending to the needs of pilgrims, in particular by looking after their camels, horses and donkeys (fig 3).

Camel House No.1 (fig 4)

The builder of this house was a merchant who had many camels to transport his merchandise. The house is of the so-called *andaruni/biruni* type (see chapter courtyard, P. 38) with two courtyards, one for the main living areas (*andaruni*="interior") and one for the service area and servants quarters (*biruni*="exterior"). It was in the latter part of the house that the merchant would have conducted his

business. The house is now divided into separate dwellings, each with its own courtyard.

The bigger, interior house has two entrances; a main entrance from the street to the south next to the main square of the quarters and a secondary entrance from the street to the north. Both entrance open into dog-leg passageways leading to the main courtyard. The smaller, exterior house is entered from the northern passageway.

The first dog-leg in the main entrance passage serves as a sort of lobby(1) from which a door to the east gives access to a stable(4) and hay store(5) with a privy(3) in the corner of the stable. At the south side of the dog-leg a staircase rises to the roof. A further door in the east side opens into the principal room of the house, a summer

room(6) at the south end of the courtyard. This summer room is ventilated by a wind-tower(7) and has an adjoining room(8) used as a carpet-weaving workshop.

At the north end of the courtyard, the north entrance passageway turns east into an *iwan*(13) overlooking the courtyard through three arches, (see section A-A, fig 4). Where the passageway turns, another staircase(14) rises to the roof. Beyond the *iwan* lie three winter rooms(15, 16) each with a glazed door on the *iwan*. From the eastern-most, access to a *balakhaneh* of three chambers above the winter rooms (see section A-A, fig 4).

A new kitchen(11) and bathroom(12) occupy one of two rooms on the west side of the courtyard. The second room(10), used as a living room, has a door on the courtyard and another into the entrance

passageway. In the north-east of the courtyard steps(22) lead down to the qanat. The courtyard itself contains a small garden and pool(9).

The second, exterior house was once connected with the interior house by a doorway in the common wall, probably in the back wall of the chief winter room(15). This opening has been blocked. Now the only entrance to the exterior house is from the northern entrance passageway. That door leads through a dog-leg(1) to the central courtyard, the former service yard of the whole house. The first opening off the passage is to a stable(4) and privy(3) to the north. To the east of these is a stair(14) connectsto the roof.

The remainder of the accommodation is disposed around the courtyard which has its own access(22) to the qanat. To the north is a

winter suffe(19) with a weavers' pit in the floor, an adjoining winter room(20) on the east and a small store(23) on the west. The summer suffe(17) on the south end of the courtyard has the customary wind-tower and is flanked by summer rooms(18). The east end of the courtyard is occupied by an autumn room(21), and the west by a storeroom(25), kitchen(11) and wood store(24). The last three rooms(11, 24 and 25) originally contained the kitchens of the whole house.

Camel House No.2 (fig 5)

Local immediately to the west of Camel House No. 1 this house also

has a main courtyard and family area with a separate service yard and ancillary accommodation to the north. Like his neighbour, the builder of this house was a merchant with many camels. His son still lives in the house.

There are two entrances, one from the north to the service yard, and one from the south to the main courtyard. The south, main entrance opens off the main square of the quarter, where local religious festivals are celebrated. An unusual feature is the special recess in the wall beside the entrance, which contains tiers of benches for spectators.

The main entrance opens on small porch(1) with a recessed bench in its west side. From the porch a dog-leg passage(4) leads past a donkey

stable(2) on the left and a privy(3) on the right to the courtyard. Within the thickness of the east wall of the passage is a staircase(5) to the roof.

The principal rooms of the house lie south of and north the courtyard, the summer quarters to the south and the winter quarters to the north. There are no rooms on the west or east sides of the courtyard.

The summer suffe(6), vaulted in three parallel bays, has a wind-tower in its back wall, from which a store(9) to the west rises to a balakhaneh on the roof. Flanking the suffe are summer rooms(7) looking onto the courtyard, which contains an elegant pool(10) set in flower beds.

The winter suffe(11) on the north side of the courtyard is vaulted in four parallel bays (see section B-B, fig 4). On either side of the winter suffe are winter rooms(12), each of which is separated from the courtyard by a raised platform or iwan(13)

A door in the middle of the back wall of the winter suffe connected this main part of the house with the service yard(14). The head of a flight of steps(18) down to the qanat is sheltered by a curious recess at the north end of the yard, (see section B-B, fig 4). A window in the back wall of this recess lights the servants' room(19), which is entered from the entrance passage(21). Another two recesses(15) occupy the west and east sides of the yard, the latter leading to a large pantry(17). Nearby those recesses a door in the west side of the yard opening into a kitchen(16) and the month of the passage in the east

side. At the mouth of the entrance passage a staircase(20) leads up to the roof.

Grocers House (fig 6)

The owner of this house, who runs a grocery shop nearby in the New Bazaar (bazar-no), lives here with his wife and three children, his brother and his mother. The house is compactly arranged around a small courtyard, except for a sort of service wing to the west which contains a pakaneh(1) connected to the qanat water supply and a stable(2) housing a privy in its south-east corner.

The entrance is set back from the street, beyond the pakaneh, which

consequently is accessible to passers-by. The entrance opens into a dog-leg passage leading to the courtyard past a stable, a stair(3) to the roof and a store where the owner keeps stocks of his merchandise. The whole of the south end of the building forms a service area.

A shallow recess(6), which functions like an alternative summer suffe, leads to a kitchen(7). In the south-east corner of the courtyard a passage(9) provides access to a second stable(8), one for sheep. Two storerooms(12, 13) open on either side of the courtyard.

At the north end of the courtyard, the living rooms comprise a winter suffe(10) with flanking winter rooms(11) and, beyond the suffe, a tanaby(14) with flanking rooms(15). The eastern room, flanking the tanaby, has a weavers pit in its floor. Despite endeavouring to the

improve the natural light in this part of the house by making the ceiling of the winter suffice unusually high and providing an oculus (also useful for ventilation) in the ceiling of the tanaby, (see section B-B, fig 5), the daylight reaching this room is so inadequate that weaving must be very difficult.

References

(1) Heryshte's shrine is located on the northern mountains of Ardakan region, 15kms to the north-east. Zoroastrians believe that one of Yazjerd's Queens called Heryshte disappeared in those mountain when Persia was conquered by Islam.

The shrine is a small room with a fire in the middle. The oldest

abanbar has been built in the Naser-al-din Shah (Qajar period 1884)

(2) Festival of Hussein, under the Safavid, that branch of Islam known as Shi-ite became the official religion of Iran. The Shi-ite (as opposed to Sunnis) hold that Mohammad's rightful successors were his son-in-law Ali, and Ali's descendants; they reject the elected Caliphs as usurpers and unorthodox. In general, Shiite are less strict in their observances than their Sunni counterparts.

For all Shi-ites, the great occasion of the year was the Festival of Hussein, Mohammad's grandson, who was killed at the Battle of Karbala and whose blood stained shirt is still preserved in the Royal Mosque at Isfahan. (W. Blunt, Isfahan Pearl of Persia, 1968).

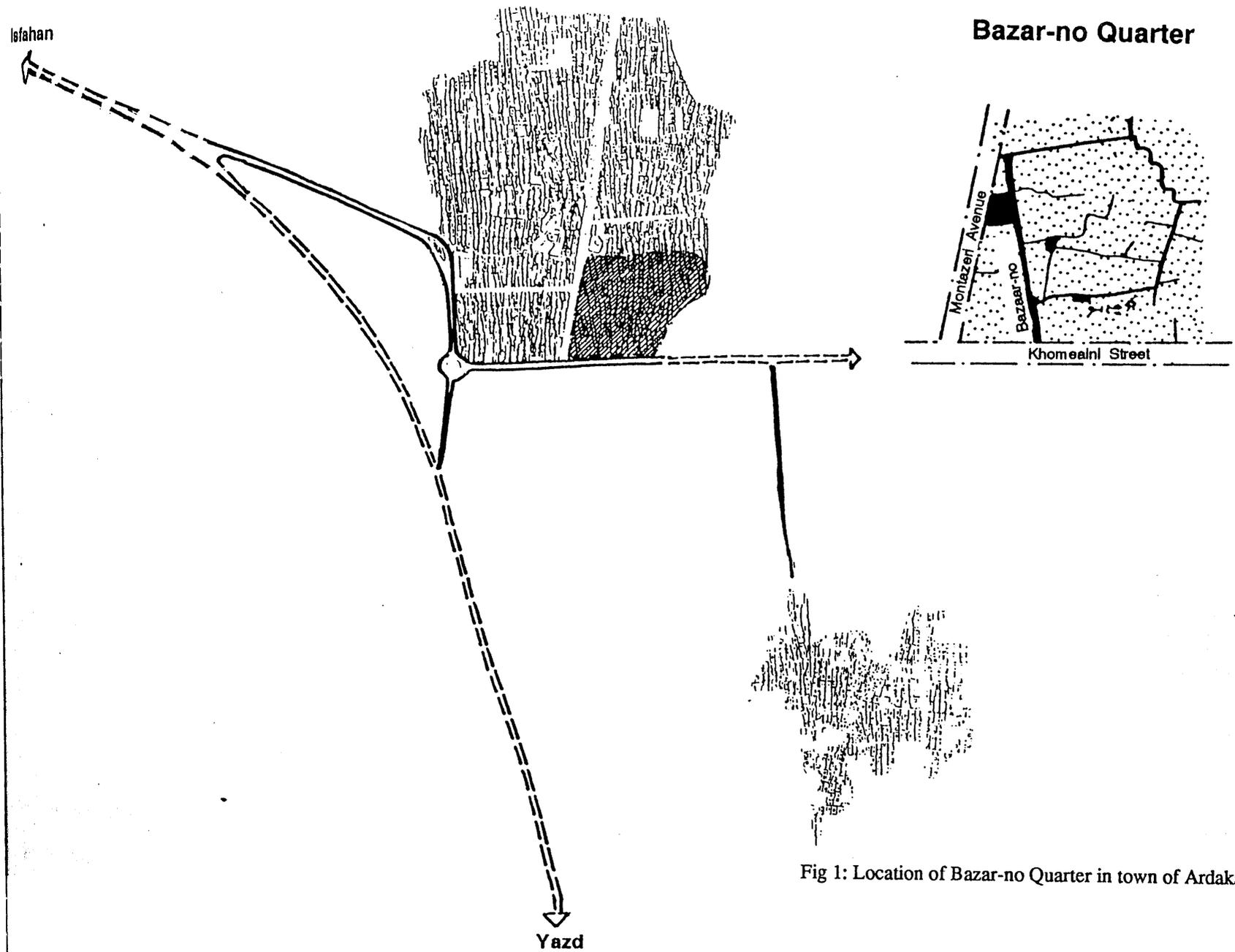
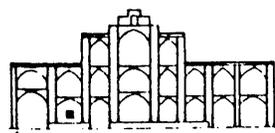
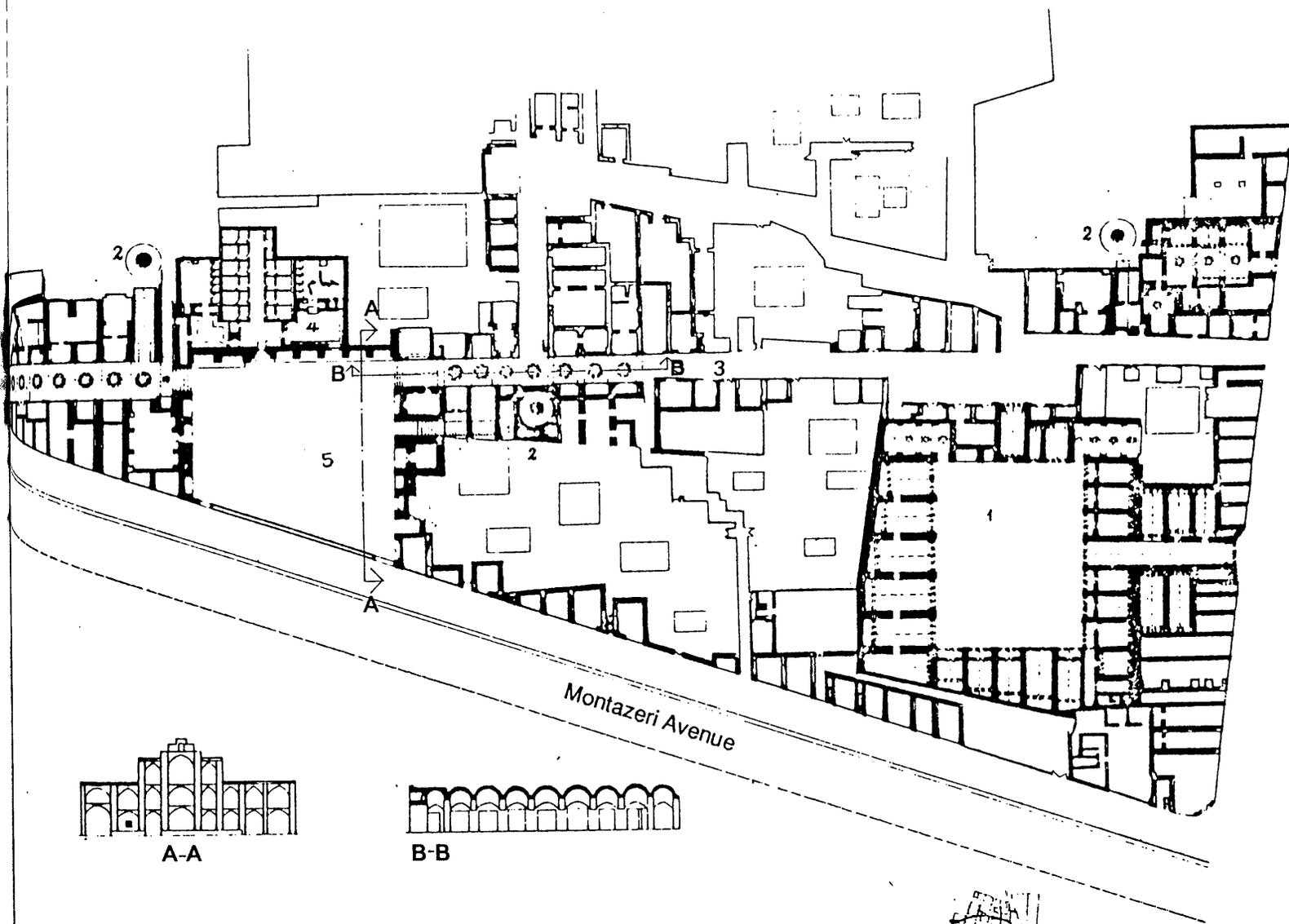


Fig 1: Location of Bazar-no Quarter in town of Ardakan.



A-A



B-B

- 1- Caravanserai
- 2- Abanbar
- 3- Bazaar
- 4- Hammam (public bath-house)
- 5- Husseinayah

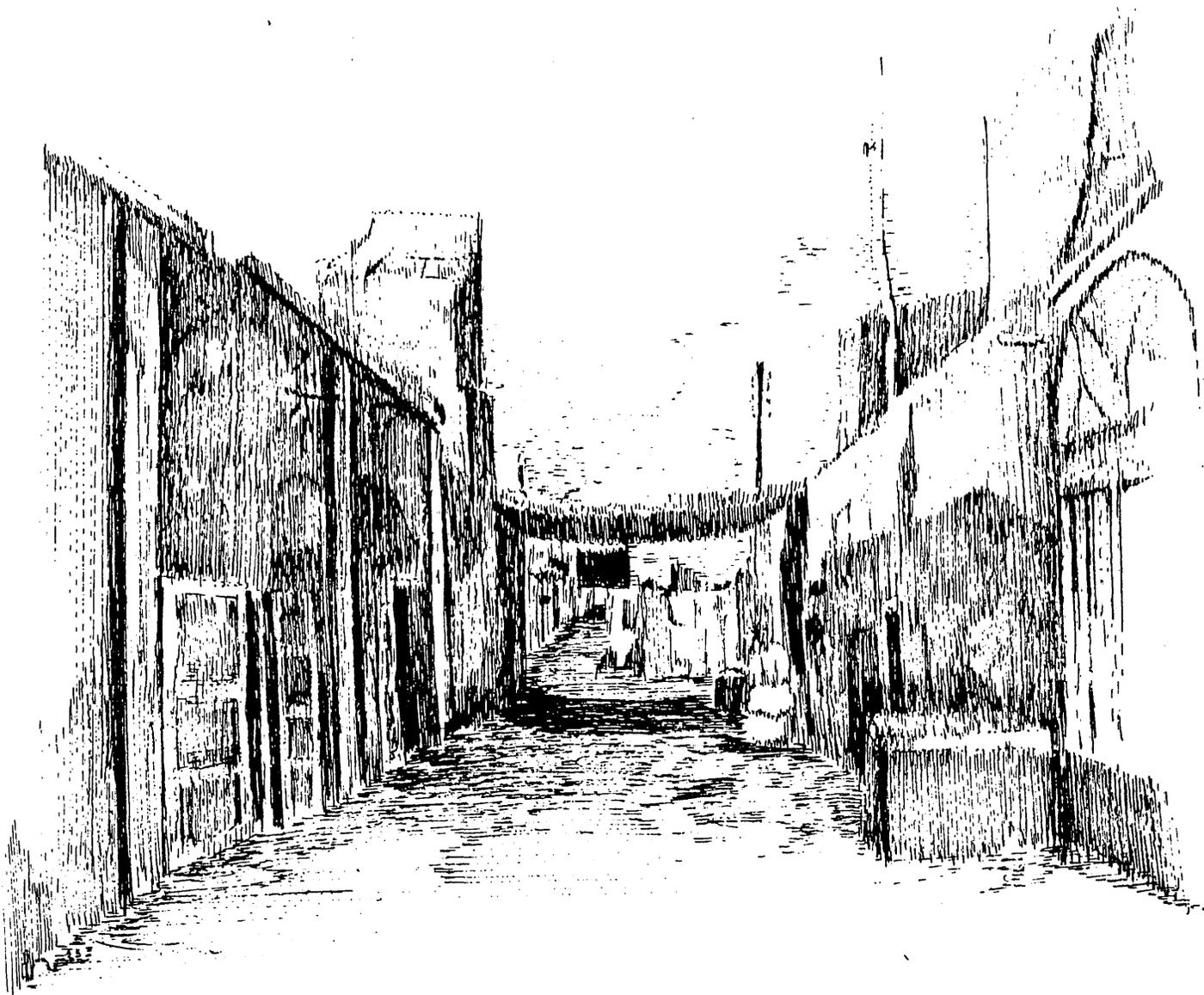
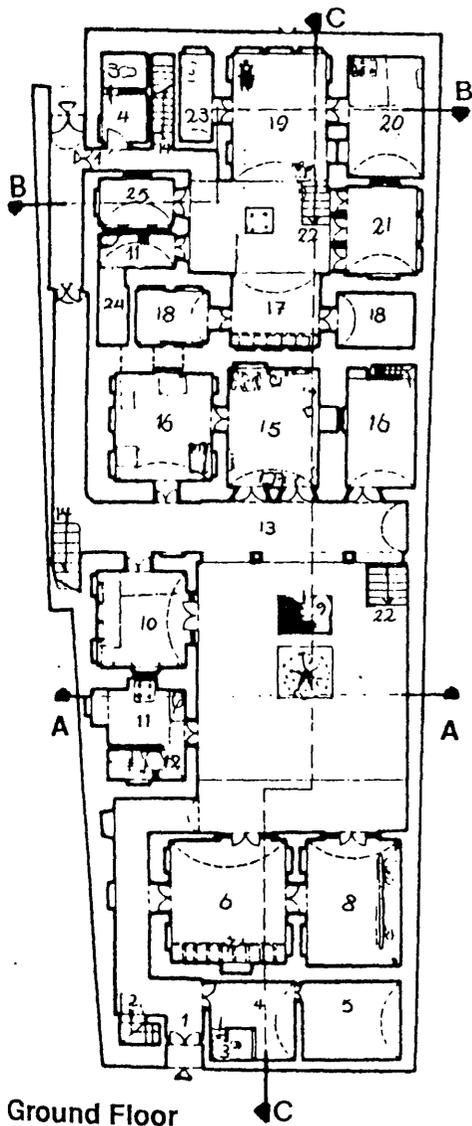


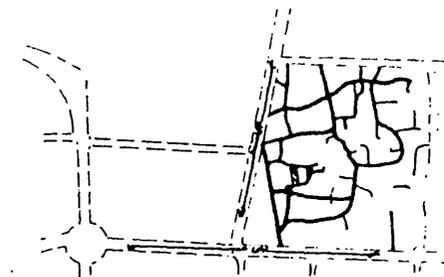
Fig 2: A view from the main srteet in Bazar-no Quarter.

Camel House No. 1

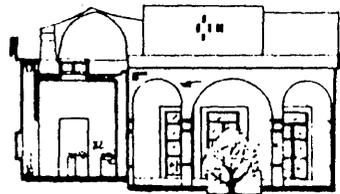
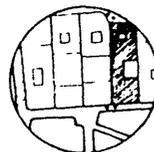
- | | |
|----------------------------|-------------------------|
| 1 - Entrance | 16 - Winter room |
| 2 - Staircase to the roof | 17 - Summer suffe |
| 3 - Privy | 18 - Summer room |
| 4 - Stable | 19 - Winter room |
| 5 - Hay store | 20 - Winter room |
| 6 - Summer room | 21 - Spring/autumn room |
| 7 - wind-tower | 22 - Staircase to qanat |
| 8 - Summer room | 23 - Store room |
| 9 - Pool | 24 - Wood store |
| 10 - Spring/autumn room | 25 - Store room |
| 11 - New kitchen | |
| 12 - Bathroom | |
| 13 - Iwan | |
| 14 - Staircase to the roof | |
| 15 - Winter room | |



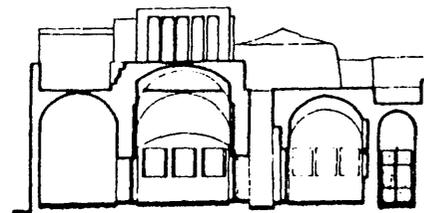
Ground Floor



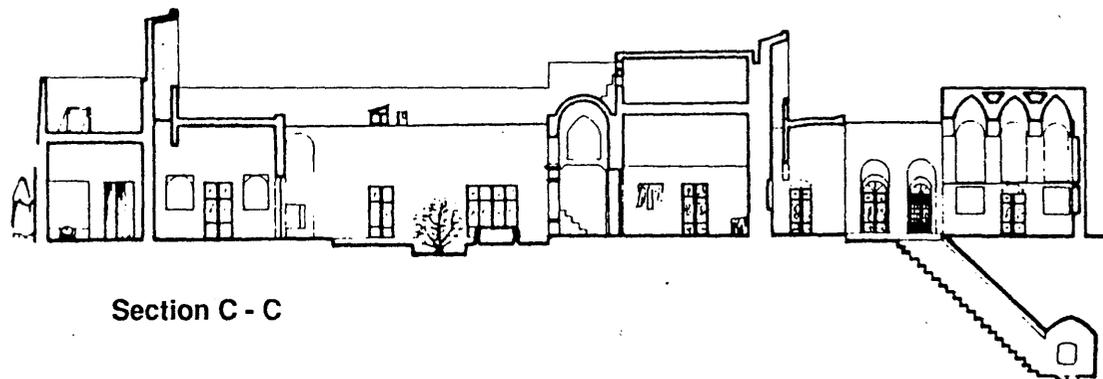
Bazar-no Quarter



Section A - A



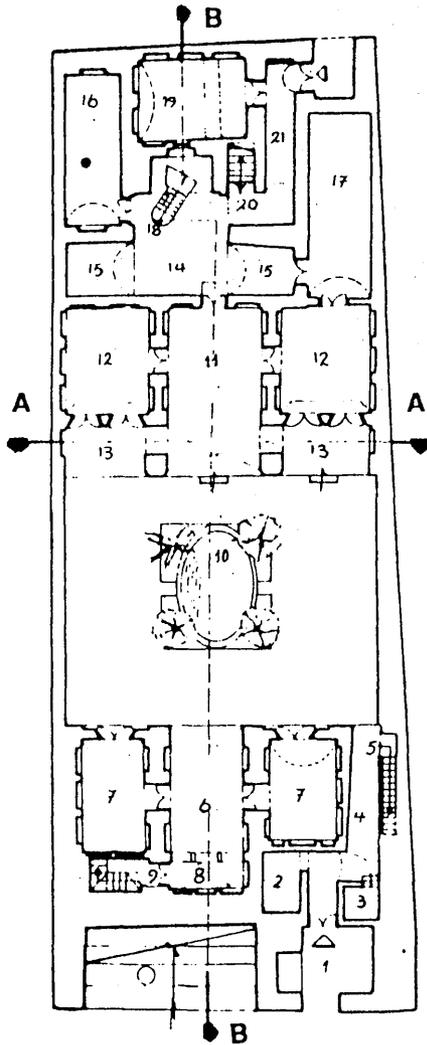
Section B - B



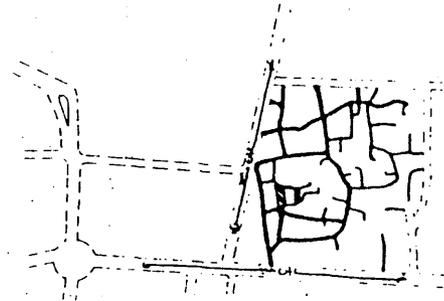
Section C - C

Camel House No. 2

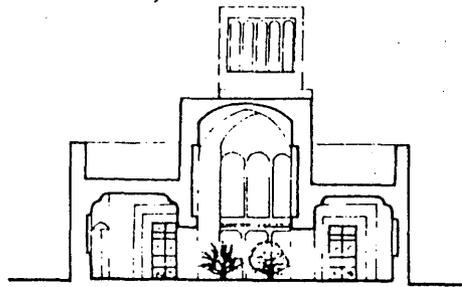
- | | | |
|---------------------------|---------------------------------|-----------------------------|
| 1 - Entrance porch | 8 - Wind-tower | 15 - Spring/autumn room |
| 2 - Donkey stable | 9 - Staircase to the balakhaneh | 16 - Kitchen |
| 3 - Privy | 10 - Pool | 17 - Pantry |
| 4 - Passage way | 11 - Winter sulle | 18 - Staircase to the qanat |
| 5 - Staircase to the roof | 12 - Winter room | 19 - Servants room |
| 6 - Summer sulle | 13 - Iwan | 20 - Staircase to the roof |
| 7 - Summer room | 14 - Service yard | 21 - Second entrance |



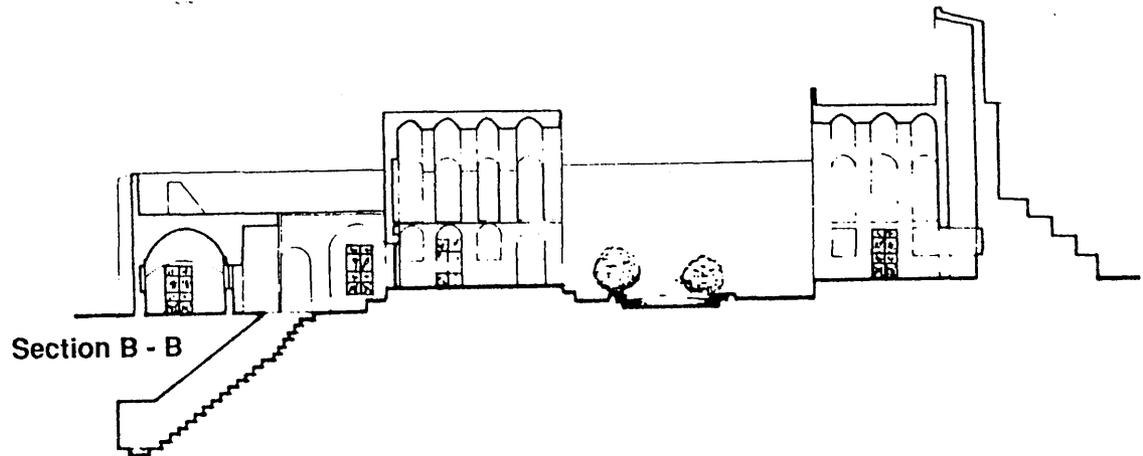
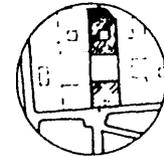
Ground Floor



Bazar-no Quarter



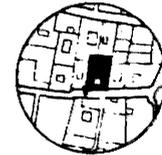
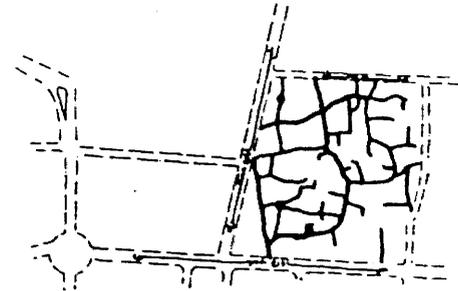
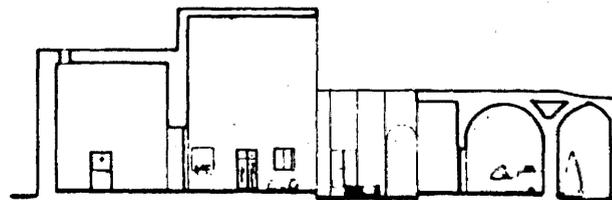
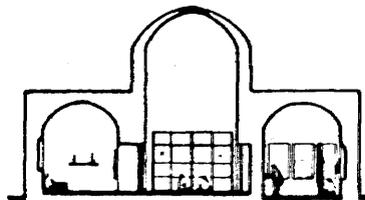
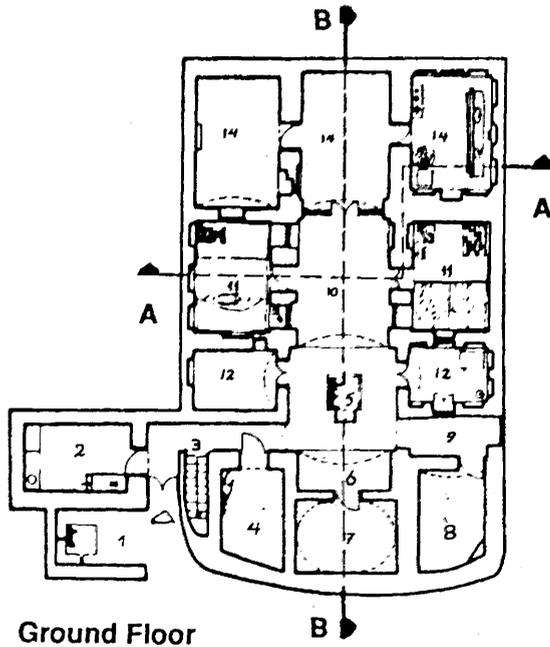
Section A - A



Section B - B

Grocers' House

- | | |
|---------------------------|---------------------|
| 1 - Pakaneh | 10 - Winter suffice |
| 2 - Donkey stable | 11 - Winter room |
| 3 - Staircase to the roof | 12 - Store room |
| 4 - Store room | 13 - Store room |
| 5 - Pool | 14 - Tanaby |
| 6 - Shallow suffice | |
| 7 - Kitchen | |
| 8 - Stable | |
| 9 - Passageway | |



(14) Tiran Quarter

Tiran Quarter (fig 1)

This quarter is located next to the Bazar-no quarter (on the west side of Ardakan) (fig 1). In Farsi, *tiran* means another race or different people. The reason for this name derives from the fact that the residents of this quarter were adherents not of Islam but of the Bahai religion, which was formed in the middle of the nineteenth century. The first Bahai to settle in Ardakan was Shaykh Baghir Sadr, a wealthy merchant from Shiraz. In about 1953 there was an attack on the Bahais and they were forced to leave Ardakan (fig 2).

Most of the houses in this quarter are large and about two centuries old. The qanat supplying this quarter was named after its builder, Baha' al-din Abad.

Camel House (fig 3)

This large and complex house comprises what are in effect two houses. The bigger, called the "exterior" or *biruni*, was used for business and entertaining(23) and the smaller, called "interior" or *andaruni*, was for family life(12).

The house was built by a merchant who had many camels to carry goods to and from Ardakan, hence its name. The entrance lobby, *keryas*, is long and unusually wide with recesses in the side walls containing mangers. It was here that the camels rested as they were unloaded after a journey. At the north of a lobby, a doorway opens to a hay store(22). To the east end of a door opens into the stable

yard(18), which has doors opening east into the stable(19) and north into two carpet-weaving workshops lit by rooflights(17).

Both houses are reached by a dog-leg passage from the second bay of the entrance lobby(1). At the east end, the lobby is lit by a rooflight. Here the lobby turns north towards the main entrance to the “exterior” house. Within that entrance is a large octagonal *hashti*(10), from which one door leads by way of a tortuous passage to the “interior” house. Another leads by way of a longer and no less tortuous passage (from which the only privy(15) in the building is reached) to the exterior house, and a third doorway opens on a staircase to the roof.

The rooms of the “exterior” house are disposed symmetrically around a rectangular courtyard containing a pool and a small sink for washing dishes. East and west of the courtyard are flanking spring/

autumn rooms(6) which have three openings each on the courtyard and one access to a short passageway into the courtyard. At the south end of the courtyard opens an extremely large summer *suffe*, flanked by two-storey passageways (fig 3) and ventilated by a wind-tower in the back wall. Here large numbers of people could gather in a comfortable semi-open (*nimeh-baz*) space in summer(2) (fig 4.a). There are no summer rooms and no winter *suffe* but a large winter room at the north end of the courtyard (fig 4.b). This winter room has five glazed doors (*panj dari*) on the courtyard and, like the summer *suffe*(4), is ventilated by a wind-tower(3). On either side of the winter room are two-storey passageways corresponding to those flanking the summer *suffe*. The upper storeys of these passageways provide quiet, private places for rest. Such upper-floor rooms are known in Farsi as *hijleh-khaneh*, which means “trysting place”, to which the bride and groom traditionally retire after a wedding.

A corridor from the north-west corner of the courtyard leads to a narrow back lane. A second corridor from the passageway to the west of the summer suffe leads past a kitchen(8) and a narrow stair(24) to the south-western *hijleh-khaneh* of the interior house. In this location the kitchen and a wood store(14) next to the staircase are strategically placed to serve both houses.

The “interior” house has another access from the west through a dog-leg passageway, which is located to the north of the wide lobby for camels. It is also arranged symmetrically around an open courtyard. Towards the north end of the courtyard a flight of steps leads down to the *pakaneh*(24). The summer suffe(2) at the south end of the courtyard is flanked by summer rooms(7) and ventilated by a wind tower. The winter suffe(5) at the north end of the courtyard(11) is flanked by winter rooms. Three of the four rooms on either side of the

courtyard appear to have been altered; originally they probably opened directly on the courtyard like the one at the south end of the west side. A staircase in the south-west corner of the courtyard leads to the roof(9).

Merchant House (fig 5. a,b)

Built by a Bahai merchant who was forced to leave along with the other Bahais in 1953, this house has two yards; an exceptionally large main courtyard (which gives the place a bleak, somewhat impersonal character) and a second yard, evidently intended as a courtyard for the household servants but now used for animals.

The main entrance(1) opens into a dog-leg passage leading to the

main courtyard. Opening to the east of the passage is a latrine(19), and to the west a staircase leading to the roof. The usual layout of rooms around the courtyard includes a summer suffice(3) with wind-tower(4) flanked by summer rooms at the south end, and a winter suffice(7) flanked by winter rooms(6) at the north end. A short corridor at the north-east corner of the courtyard leads to a service area comprising an open court, a kitchen(9) and a woodstore(10). Unusually, there is a second kitchen(9), reached by a corridor from the south end of the courtyard. It would seem that, perhaps due to the size of the courtyard, the kitchens were used at different times of year, the southern one being used in summer (or for baking) and the northern one in winter. At the east side of the courtyard is a recess(11) flanked by spring/autumn rooms(12), which have their own direct access to the courtyard. On the west side, there are three rooms(13,14) which are connected by a short passage to the courtyard. One of them(12)

used to be a spring/autumn room. Now, all are storerooms.

A right-angled corridor in the north-west corner of the courtyard leads to a back lane. A door from that corridor gives access to the servants quarters and stabling. Here are a suffice with two adjoining rooms at the north end of the courtyard and, in the north-west corner, another corridor to the back lane. To the east of this corridor are two rooms(12), probably originally intended for the stabling of animals but now used as hen coops. Between these two rooms and the servants rooms to the south lies a long barrel-vaulted chamber still used for the storage of animal feed.

Farmer House (fig 7)

A typical Ardakanian farmer's house, this one was built about 160

years ago. It is occupied today by a farmer and his family. The house has two yards, a central courtyard containing a pool, and a service yard.

The entrance door(1) leads by way of a long dog-leg passageway down two steps to the central courtyard(5). To the south of the passageway lies a sort of annex comprising a hay store(2) and fuel store(4) with an open stable(3) between them. Within the stable are a privy and a staircase(14) to the roof.

The other apartments of the house are arranged symmetrically around the courtyard. At the south end is a summer *suffe*(6) ventilated by a wind tower, with flanking summer rooms(7) which have very small windows on the courtyard. The eastern summer room has a door in its back (south) wall leading to a second staircase to the roof.

On either side of the courtyard are rooms used as storerooms(11) and, in the south-west corner, a bathroom(12) with a small antechamber.

A winter *suffe*(8) at the north end of the courtyard is flanked by two winter rooms(13). The *suffe* and the winter rooms all have doors in their north walls opening on the service yard(9). These doors allow the *suffe* and flanking rooms to be used in early summer as well as in winter.

The service yard extends the full width of the building. Beyond the yard is a kitchen(10), which is very long and narrow, also extending the full width of the building. Next to the kitchen a *pakaneh*, a flight of steps(15), leads down to the *qanat*. This arrangement is convenient for the residents, as it is during the winter that most cooking is done. In the summer they eat mainly cold food.

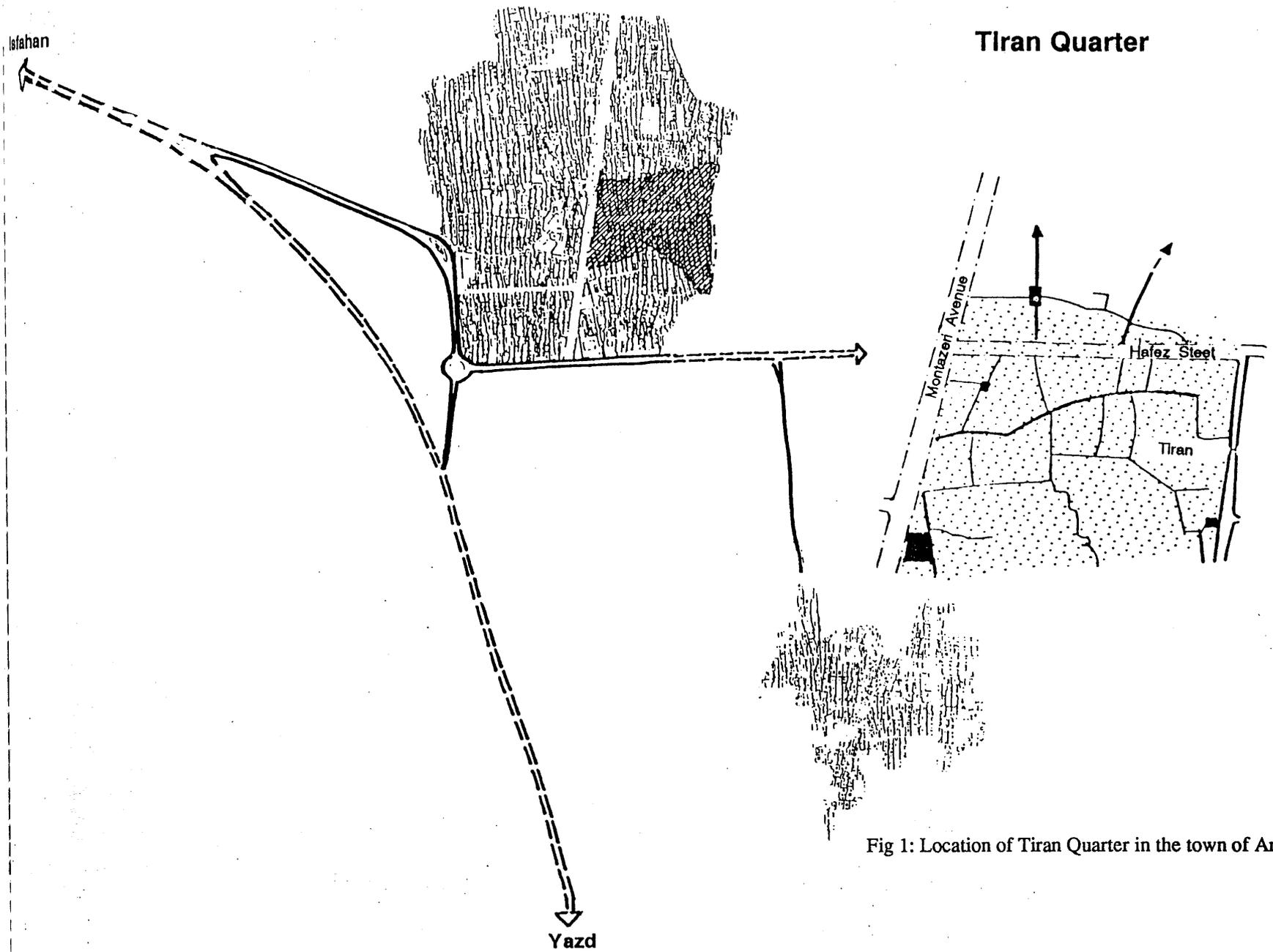
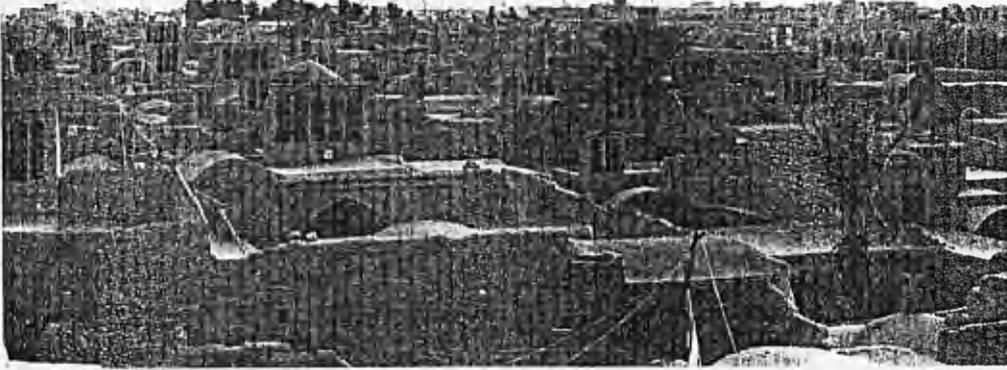


Fig 1: Location of Tiran Quarter in the town of Ardakan.

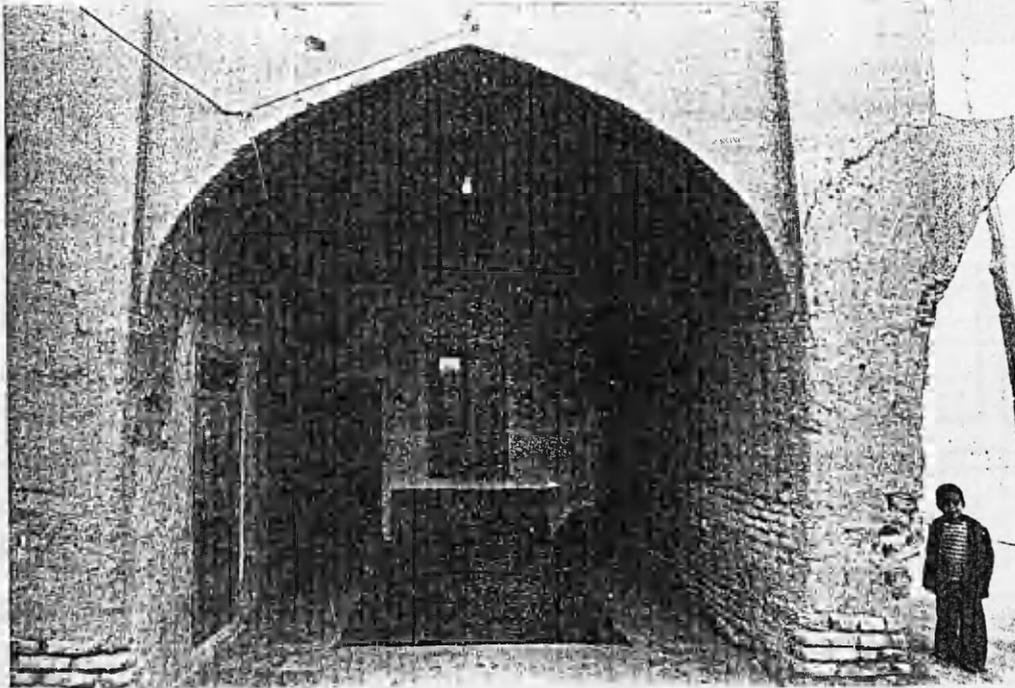
Fig 2:

a. Roof-top view to the south over Tiran Quarter.

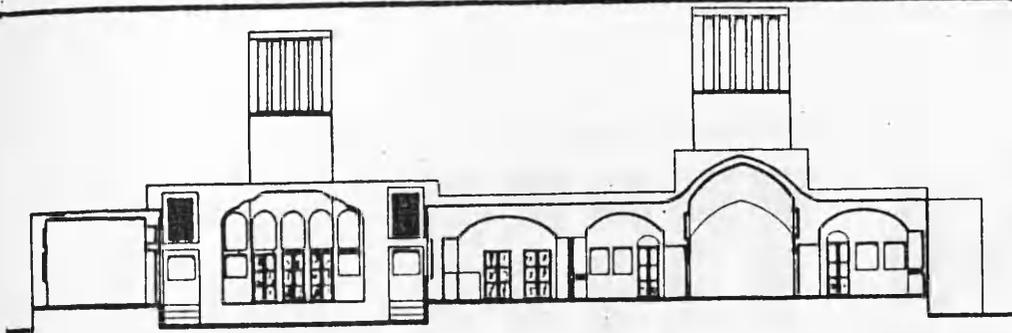
b. Entrance of an abanbar and a local place for prayer in Tiran Quarter.



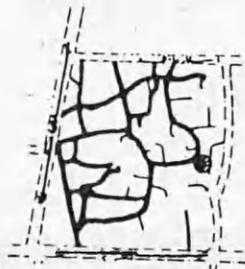
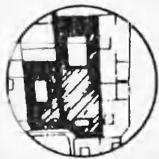
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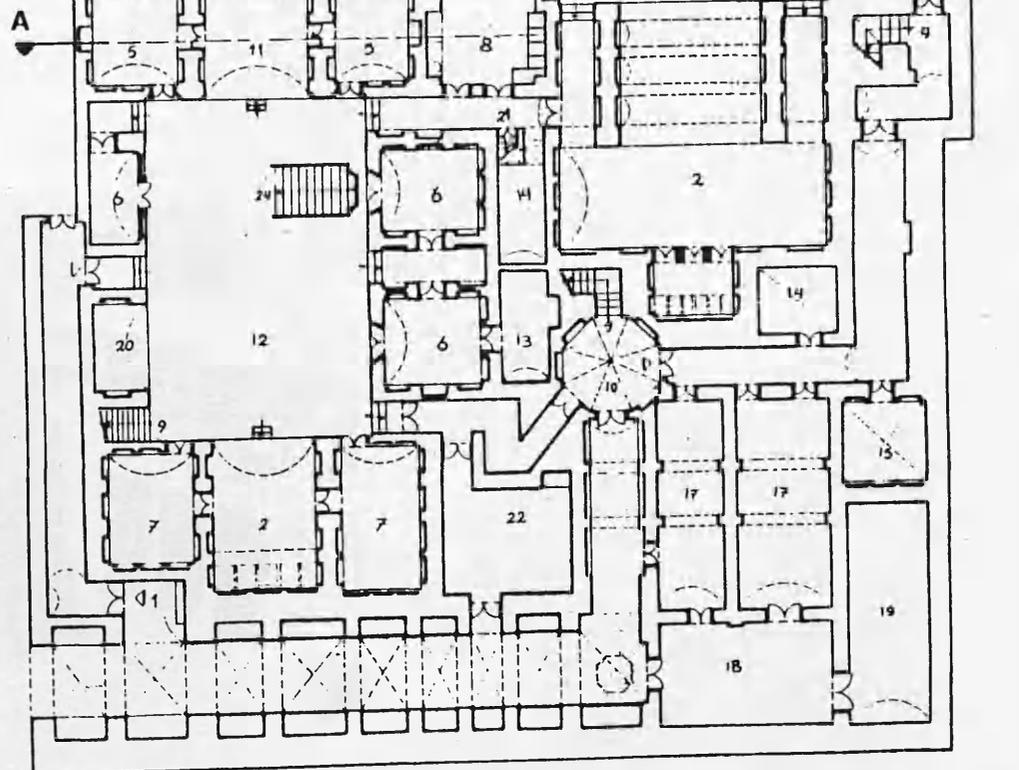
Section A - A



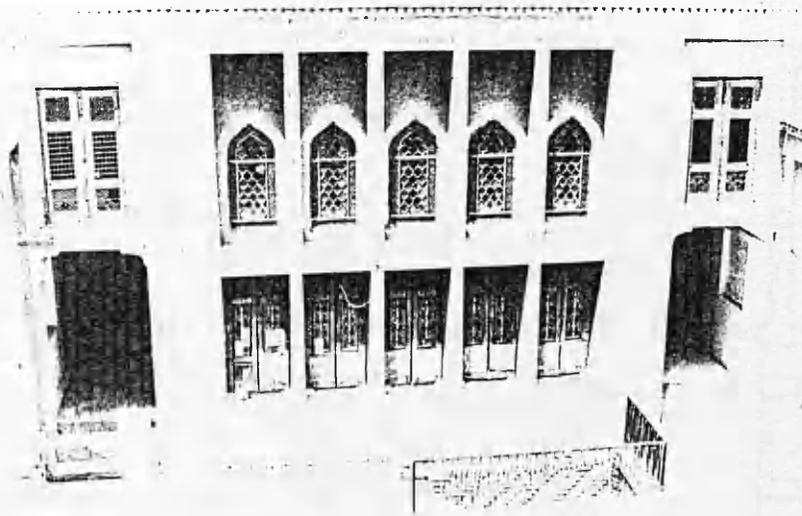
Tiran Quarter

Camel House

- | | | |
|---------------------------|-------------------------------|----------------------------------|
| 1 - Entrance | 10 - Hashti | 19 - Stable |
| 2 - Summer suffe | 11 - Winter suffe | 20 - Recess |
| 3 - Wind-tower | 12 - Andaruni | 21 - Staircase to the balaikhane |
| 4 - Winter room | 13 - Store room | 22 - Hay store |
| 5 - Winter room | 14 - Fuel store | 23 - Biruni |
| 6 - Spring/autumn room | 15 - Privy | 24 - Staircase to the qanat |
| 7 - Summer room | 16 - Work shop | |
| 8 - Kitchen | 17 - Carpet-weaving work shop | |
| 9 - Staircase to the roof | 18 - Stable yard | |



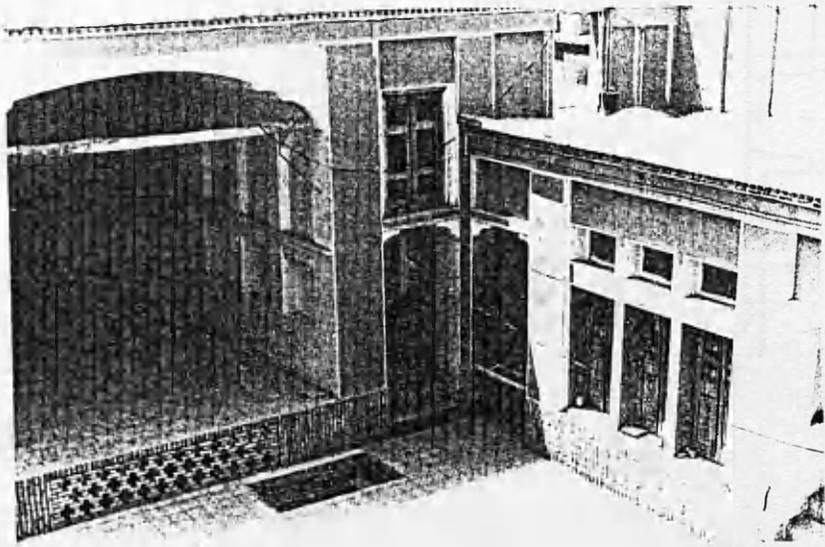
Ground Floor



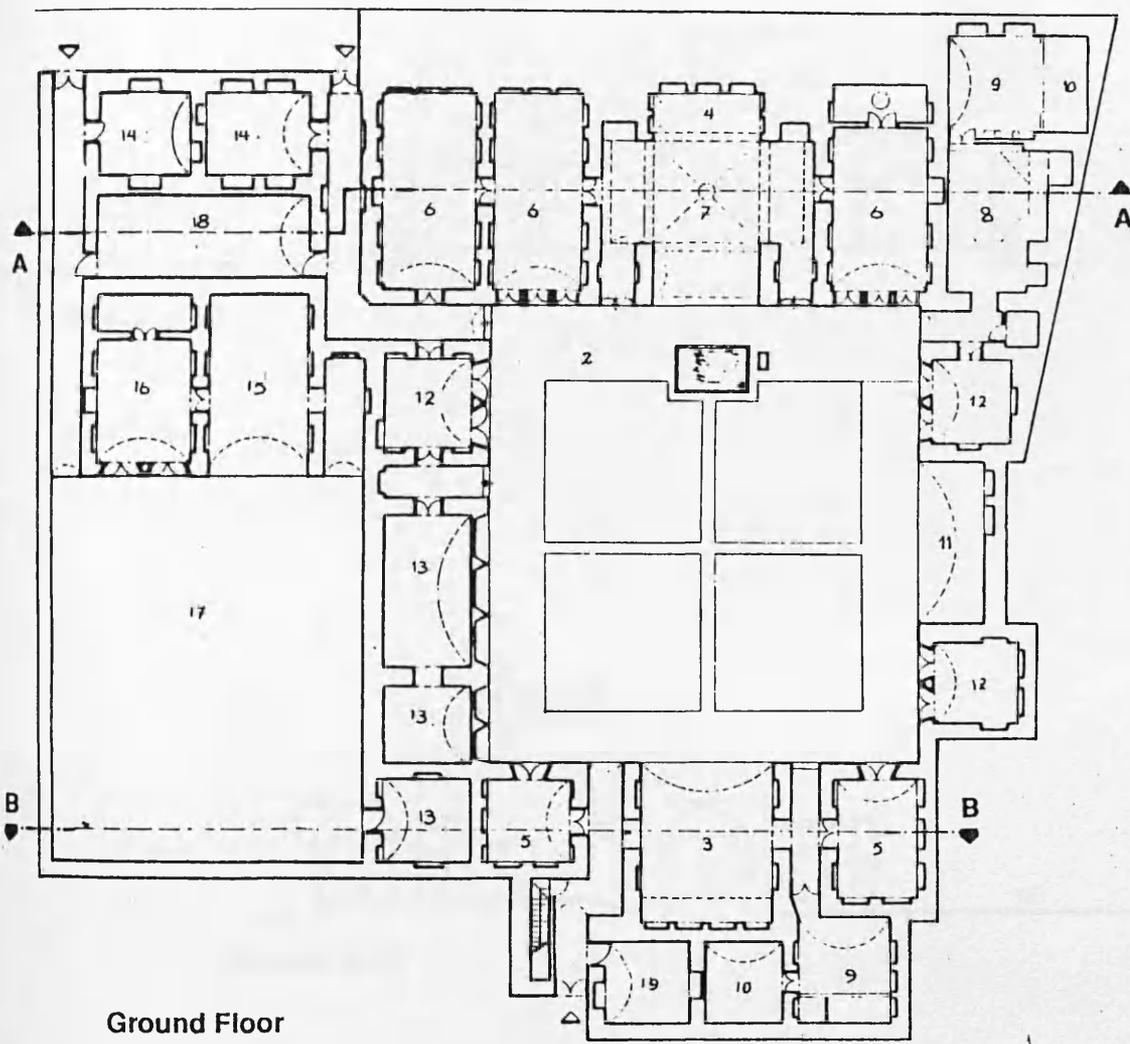
a

Fig 4:

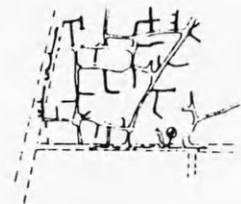
- a. Winter room, with five openings, at the end of the courtyard, and also access to the qanat is shown.
- b. Summer suffice and stairs to the sardab at the south end, autumn & spring rooms at the west of the courtyard are located.



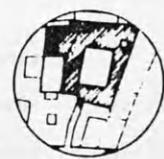
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Ground Floor

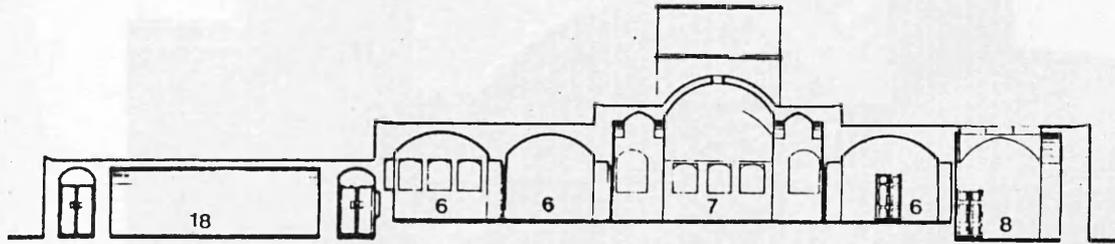


Tiran Quarter



Merchant House

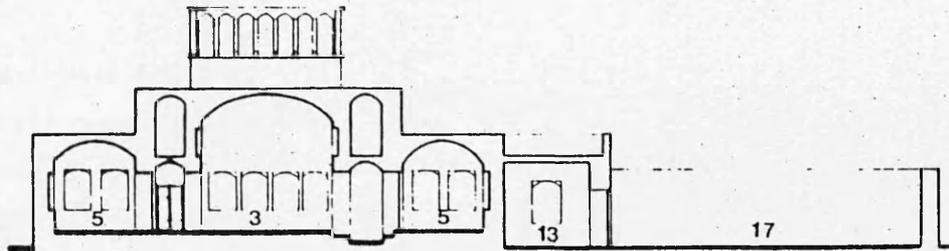
- | | | |
|------------------|-------------------------|------------|
| 1 - Entrance | 10 - Wood store | 19 - Privy |
| 2 - Courtyard | 11 - Recess | |
| 3 - Summer suffe | 12 - Spring/autumn room | |
| 4 - Wind-tower | 13 - Store room | |
| 5 - Summer room | 14 - Stable | |
| 6 - Winter room | 15 - Winter suffe | |
| 7 - Winter suffe | 16 - Winter room | |
| 8 - Service yard | 17 - Courtyard | |
| 9 - Kitchen | 18 - Hen-coops | |



Section A - A

Merchant House

- | | |
|--------------------|-----------------|
| 3 - Summer suffice | 13 - Store room |
| 5 - Summer room | 17 - Courtyard |
| 6 - Winter room | 18 - Hen-coops |
| 7 - Winter suffice | |
| 8 - Service yard | |



Section B - B

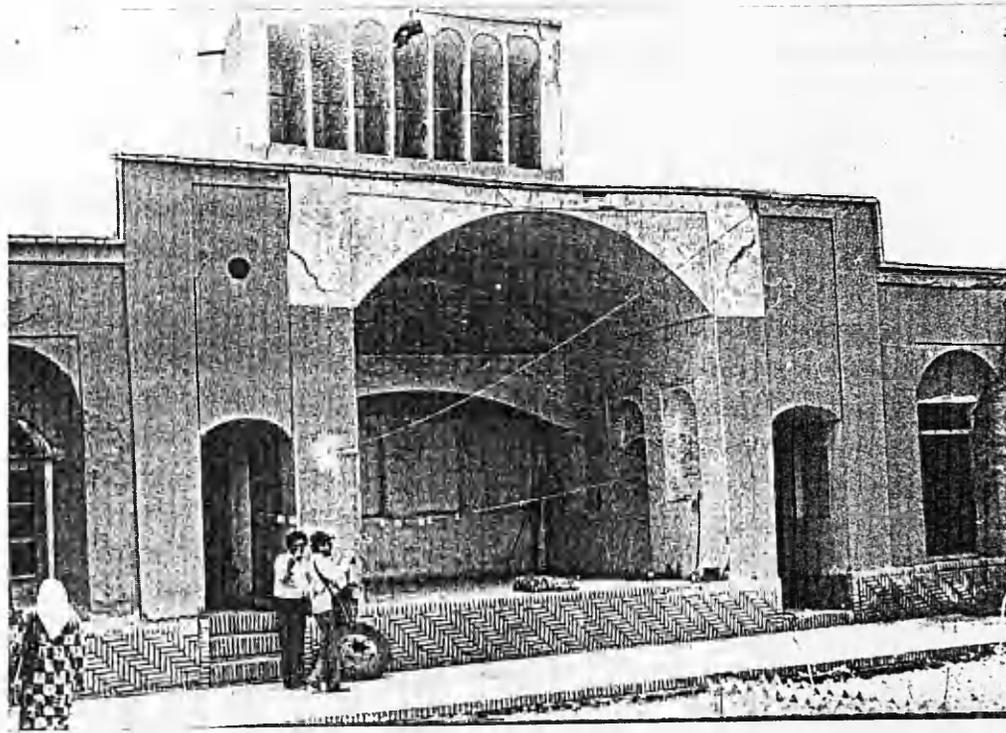
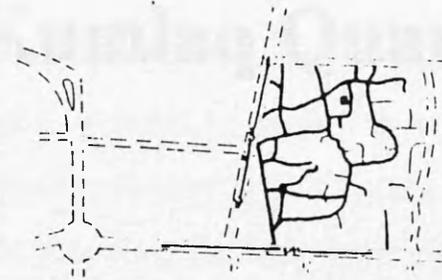
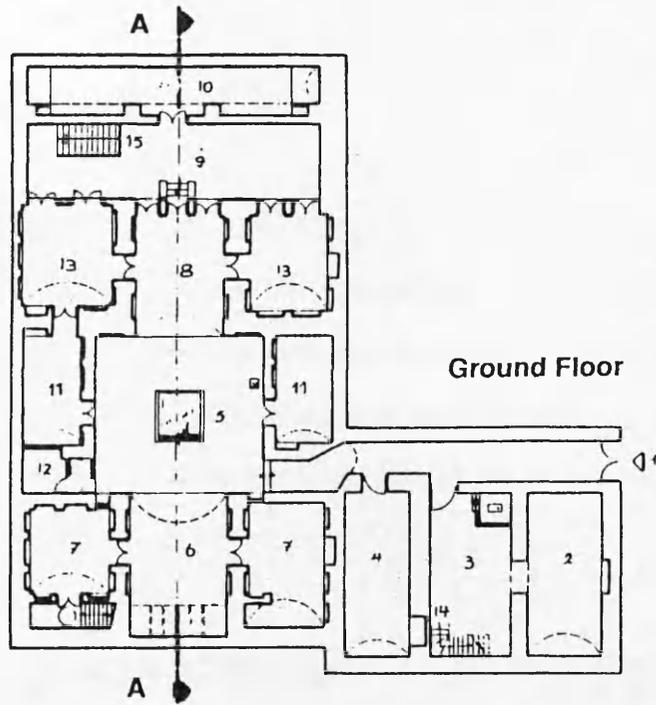


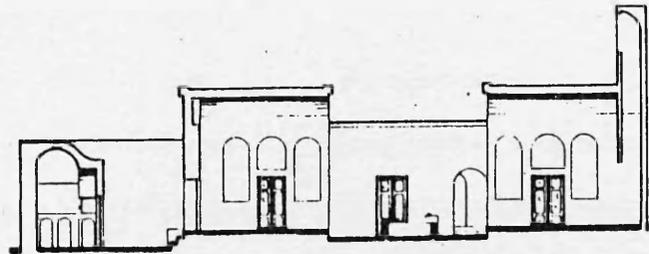
Fig 6:
Showing summer suffe raised three steps from the courtyard.



Tiran Quarter

Farmer house

- | | |
|--------------------|-----------------------------|
| 1 - Entrance | 8 - Winter suffice |
| 2 - Hay store | 9 - Service yard |
| 3 - Open stable | 10 - Kitchen |
| 4 - Fuel store | 11 - Food store |
| 5 - Courtyard | 12 - Bath room |
| 6 - Summer suffice | 13 - Winter room |
| 7 - Summer room | 14 - Staircase to the roof |
| | 15 - Staircase to the qanat |



Section A - A

(15) Kumlaq Quarter

Kumlaq Quarter (fig 1)

This quarter, before becoming built up, was a walled pistachio orchard within the town boundary. The original name, Qal'eh-bagh, which means literally “citadel garden”, refers to its earlier use and surrounding wall. The derivation of its present name, Kumlaq, is unclear; old inhabitants of the district say that it is simply a corruption of the original name.

The quarter is situated just inside the forth, and last boundary wall (built in 1154/1741) of the town, which indicates that it is one of the more recent quarters to be developed. As the boundary wall ceased to serve a useful purpose and was left to collapse in the second half of the nineteenth century, so the district expanded beyond the line of the wall to the north (fig 1). Surviving traces of the boundary wall still mark the eastern boundary of the quarter.

The oldest houses are in the southern part of the quarter, with newer houses to the north located around the New Bazaar. The original residents were pistachio farmers and to this day the district is occupied mainly by farmers working their own or rented farms to the north and east. It is not a wealthy quarter and consequently many houses lack some features of grander houses, such as summer suffes (fig 2).

Farmers House No.1 (fig 3)

The entrance leads into a short passage(1) to a central courtyard (5). To the right (south) of the passage is a stable(7) with a privy(9) in the corner. Opposite the stable door, stairs rise to a hay loft(11) on the roof. A summer suffe(6) with a small wind-tower(10) on the south

side of the courtyard faces a larger winter suffice(4) on the north side. There are rectangular recesses in the floors of both suffes to allow someone (usually the housewife) to sit on the floor and work the pedals of a loom with her feet. Such looms are used for weaving canvas, with the warp suspended from the opposite suffice and stretching across the courtyard to the loom (fig 4).

On either side of the winter suffice are winter rooms(3), of which the eastern is used as a store room. A small room(8) on the west side of the courtyard is used as a fuel store. There is no kitchen. In summer the family eats only fresh uncooked food such as yoghurt and raw fruit and vegetables; in winter cooking is done in the winter suffice or winter room(3), where a brazier serves also to heat the room.

Farmers House No.2 (fig 5)

This house, almost square in plan, is the home of an elderly farmer and his wife. The street entrance opens into a passage(1) leading to a central courtyard(9). To the right (north) of the passage lies a stable(15) with a hay store(14) beyond. On the south side of the passage an archway opens to a second stable(2) with a domed ceiling. In a corner of the second stable is a privy(3).

The summer suffice(4) at the south end of the courtyard, ventilated by a wind tower(5), is flanked by summer rooms(6). The winter suffice(10) at the north end is flanked by winter rooms(11). As in Farmers House No.1, there is a recess for a weaver in the floor of the winter suffice.

The service areas are located on either side of the courtyard: a *pakaneh*(12) (steps down to the water channel) and a staircase(13) to the roof on the east side, and a kitchen(8) and a room(7) used in spring and autumn on the west side.

In the middle of the courtyard is a small garden and a pool.

Farmers House No.3 (fig 6)

Though this house occupies a long site, much of the space is given over to stables and animal feed stores. There is no summer *suffe*, the winter *suffe* being adapted for summer use by the addition of a wind tower. Two generations live in the house, parents and their son and daughter-in-law. All the facilities are shared save for the two winter

rooms(7), each of which is used as a bedroom.

There are two entrances, a main one from the north which opens into a dog-leg passage(1) to an open courtyard, and a service gate from the south which leads by way of a narrow lane(21) to an open yard with a garden(20) of date palms in the middle and steps down to a water channel on the west side(19).

The main stable(3) is to the east of the entrance passage, separated from it by a hay store(2). To the south of the stable and hay store lie the winter *suffe*(4), opening on the courtyard and flanking winter rooms(7), each of which has a storeroom(5) at its north end.

At the dog-leg in the entrance passage, which is lit by an octagonal oculus at the apex of a domed ceiling, a door opens south to another

stable(9). On the east side of the courtyard are a store room(10) and a hay store(11). On the west side are stairs to the roof(15), a wood store(12) and a kitchen(13) containing two ovens. A further two ovens for summer use are situated in the open air at the north-west corner of the yard. A privy(14) occupies the north-east corner. A range of rooms on the west side of the yard includes a storeroom(16), a kitchen now used as a store(17) with a small antechamber, and a stable(18).

Craftsmans House No.1 (fig 7)

In the centre of the quarter, this house is situated beside an *ab-anbar* (fig 7). Now occupied by a farmer and his family, the incorporation of four shops opening on the streets around the house

suggests that it was originally built for a tradesman.

Two shops(5,6) opening on the eastern street are now empty. Of the two shops(5 and 6) opening on the southern street, one continues in use as a grocer's shop and the other(6) is now used as a stable, woodstore and bakery by the householder.

There are two entrances to the house, a main entrance from the south through a lobby(11) to a central courtyard(14), and a service entrance from the east into a passage(1) leading to an open yard. A ventilation shaft for the *abanbar* occupies the north-west corner of the yard (fig 7). On the east side of the yard are a privy(2), a stable(3) and a small room(4) lying empty.

The main part of the house lies to the south of the yard. A winter suffe(15), flanked by two winter rooms(16), opens north through a

glazed screen to the yard and south directly to the central courtyard. On the west side of the courtyard is a storeroom entered from the entrance lobby(13). On the east side are a spring and autumn room(9) and kitchen(7) connecting with the stable(6) mentioned above.

Stairs(8) at the south end of the courtyard lead under a small summer room(10) to a cool sardab (see section, fig 7). A staircase(12) in the north wall of the entrance lobby leads up to the roof.

Craftsmans House No.2 (fig 8)

This complex of buildings, evidently all built at the same time, comprises two dwellings and a workshop. According to the present occupants it was originally a single house, the service yard of which

has become the core of what is now a separate house for the eldest son and his family in the north-west corner of the complex. A curious feature of the layout is the skewed alignment of the summer suffe at the south end of the former service yard. The reason for this alignment is unclear; it may simply reflect a change in the street alignment at this point.

The workshop(2) occupies the south-west corner of the building, and contains two looms operated by the two sons of the householder.

North of the workshop, the entrance to the main house leads by way of a dog-leg passage(1) to a central courtyard. At the dog-leg in the passage a door opens south into a summer room(3), a second door opens east into a privy(16) and a third opens north into a stable(14). A staircase(15) to the roof rises from the right-hand (south) side of

the opening from the passage to the courtyard(13).

At the south end of the courtyard lies a summer suffe(5) vaulted in three parallel bays, which is flanked by summer rooms(3,8) with storerooms(4,7) beyond. A wind-tower(6) at rear of the suffe provides ventilation. A winter suffe(12) at the north end of the courtyard has a door in each side wall giving access to flanking winter rooms(11).

The entrance passage and stable on the west side have been mentioned above. Two rooms on the east side of the courtyard serve as kitchen(10) and bakehouse(9), facilities which may originally have been located in the service yard.

The second house is entered from a doorway a short distance north of the entrance to the main house. This doorway leads into a small

lobby which opens north on the former service yard, now the courtyard(21) of this house. A privy(19) is reached through a narrow door at the south end of the lobby.

On the south side of the courtyard is a summer suffe(18) with a weavers pit in the floor and, to the east of it a summer room(17). Quite unusually, there is no winter suffe, which tends to confirm that this part of the building originally was a service area for the main house. If so, the original connection between the two has disappeared. The north side of the courtyard is occupied by two winter rooms(24) preceded by a low bench running the full length of the courtyard. At the east end of this bench a staircase(23) leads up to the roof. A small kitchen(22) occupies the remainder of the east end of the courtyard.

Kumlaq Quarter

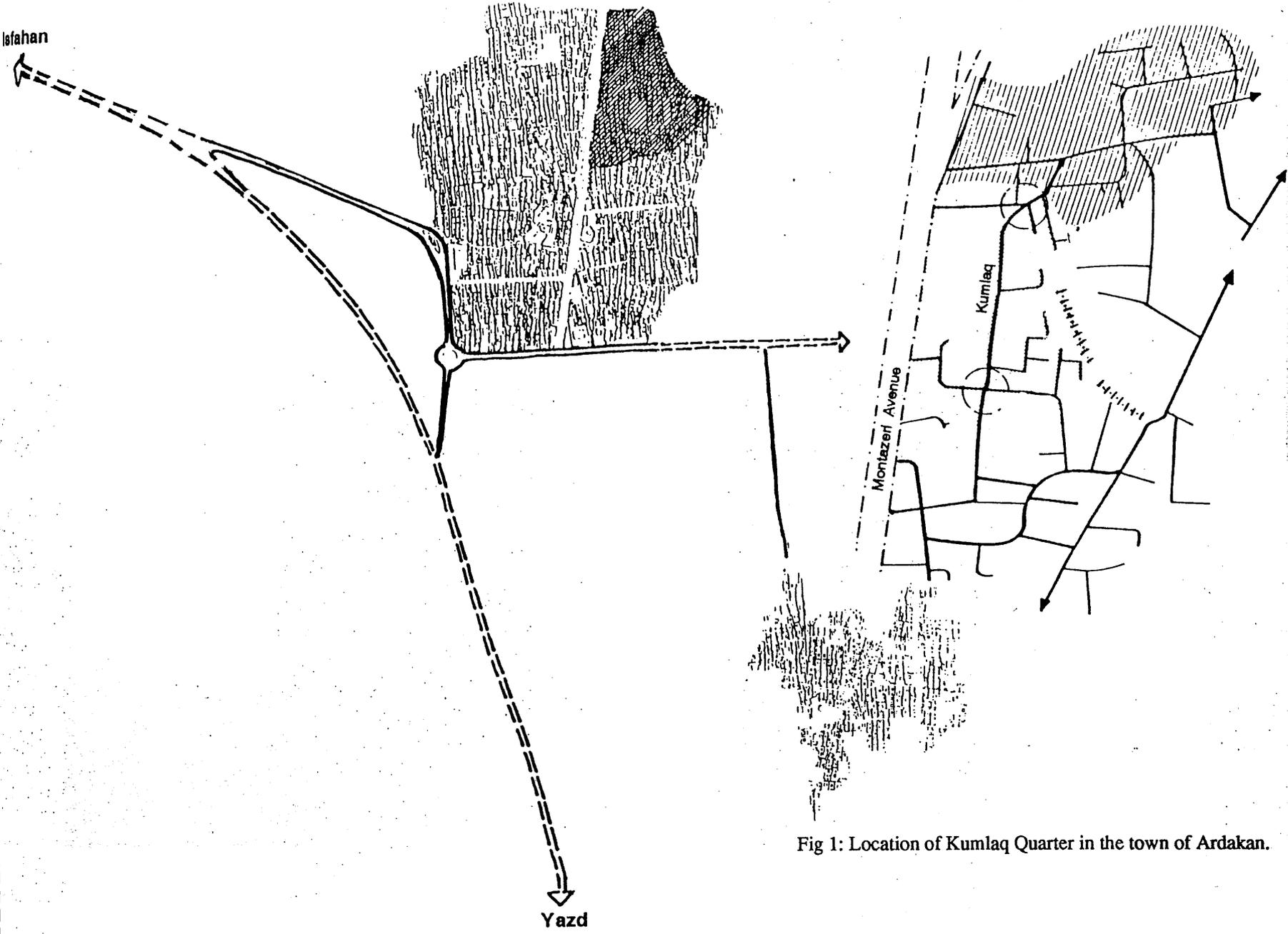


Fig 1: Location of Kumlaq Quarter in the town of Ardakan.

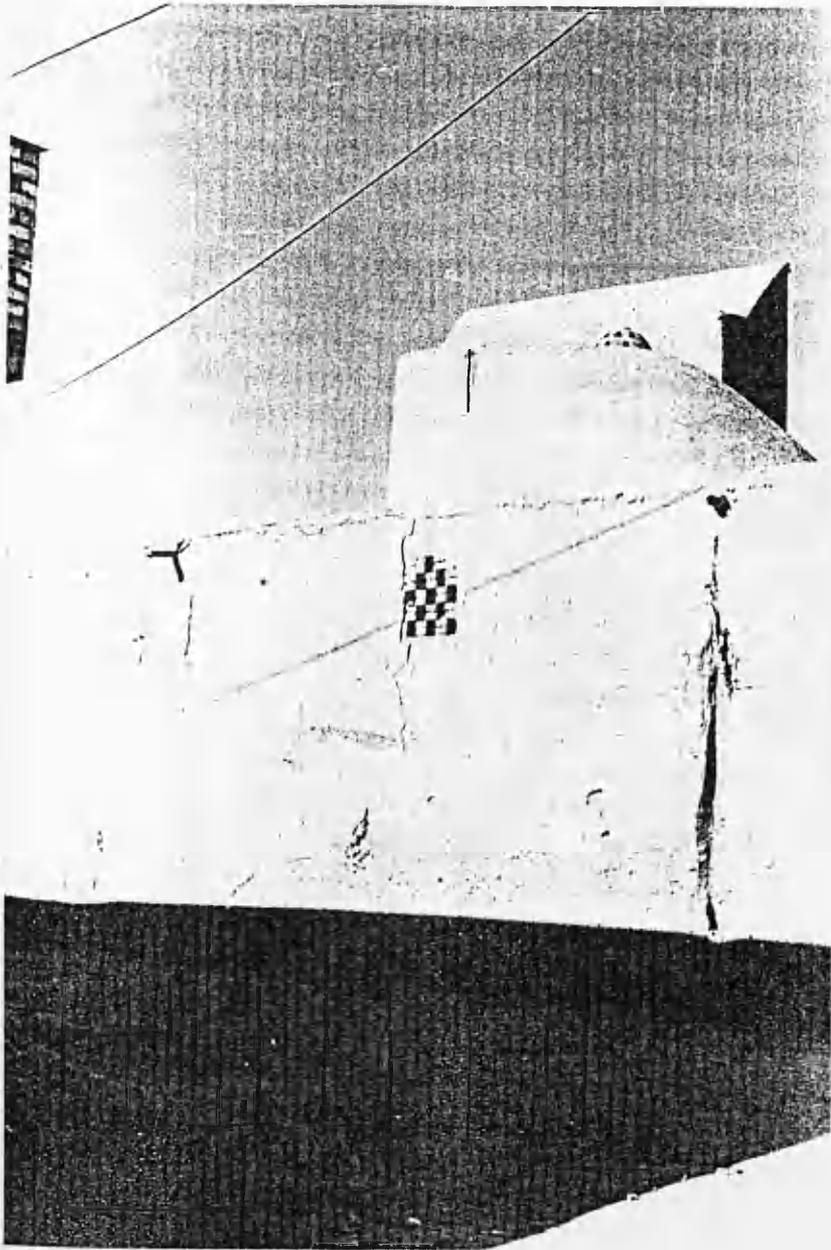


Fig 2:

a. A roof-top view over Kumlaq Quarter to the north.

b. Showing an opening to the street and skylight of a house in the quarter.

a

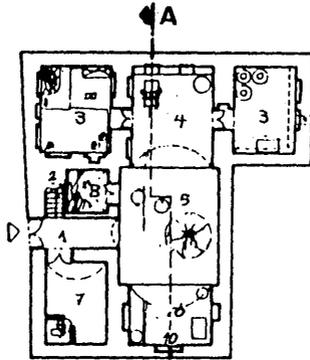
b



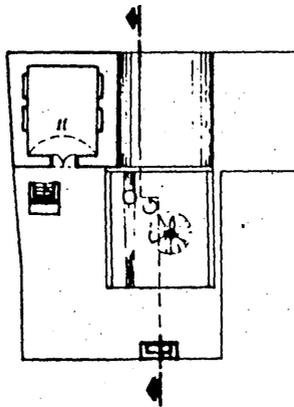
Fig 2: c. A view from the main street in Kumlaq Quarter.

Farmer House No . 1

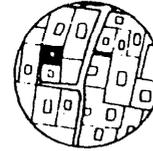
- 1 - Entrance
- 2 - Staircase to the roof
- 3 - Winter room
- 4 - Winter suffice
- 5 - Courtyard
- 6 - Summer suffice
- 7 - Stable
- 8 - Fuel store
- 9 - Privy
- 10 - Wind-tower
- 11 - Hay loft



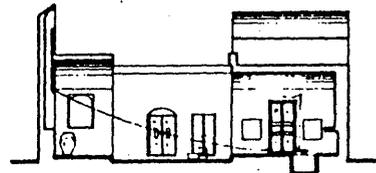
Ground Floor



Upper Floor



Kumlaq Quarter



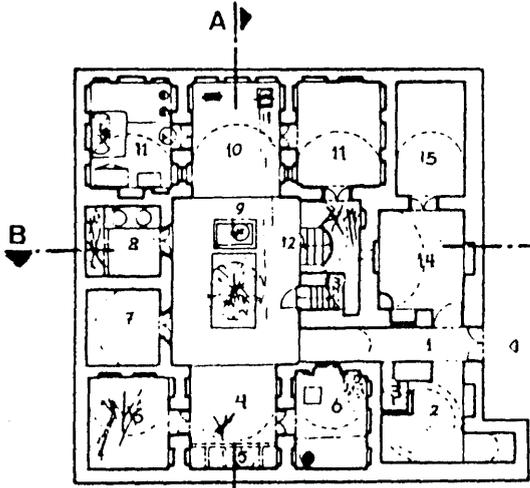
Section A-A



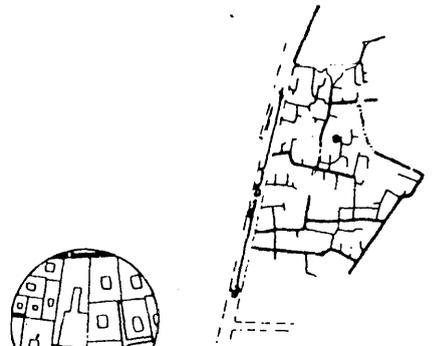
Fig 4: Winter suffe during winter.

Farmer House No . 2

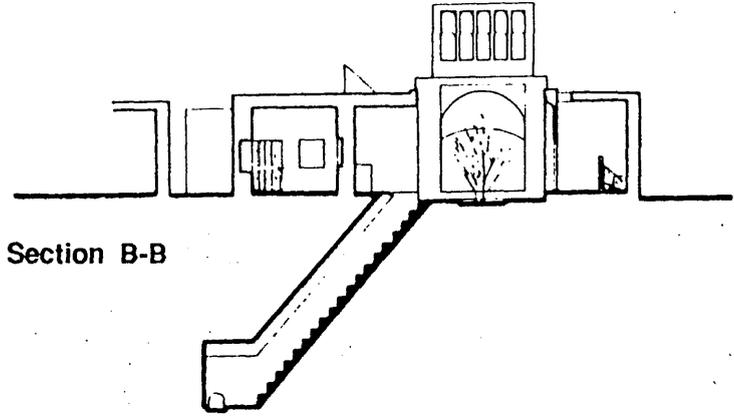
- 1 - Entrance
- 2 - Stable
- 3 - Privy
- 4 - Summer suffice
- 5 - Wind-tower
- 6 - Summer room
- 7 - Spring/autumn room
- 8 - Kitchen
- 9 - Courtyard
- 10 - Winter suffice
- 11 - Winter room
- 12 - Staircase to the qanat
- 13 - Staircase to the roof
- 14 - Hay store
- 15 - Stable



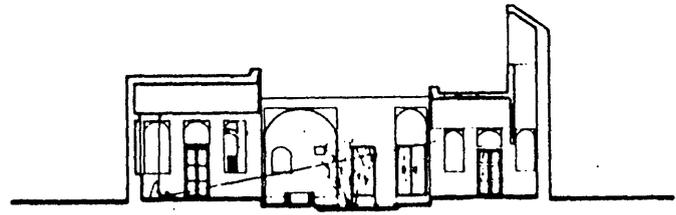
Ground Floor A



Kumlaq Quarter



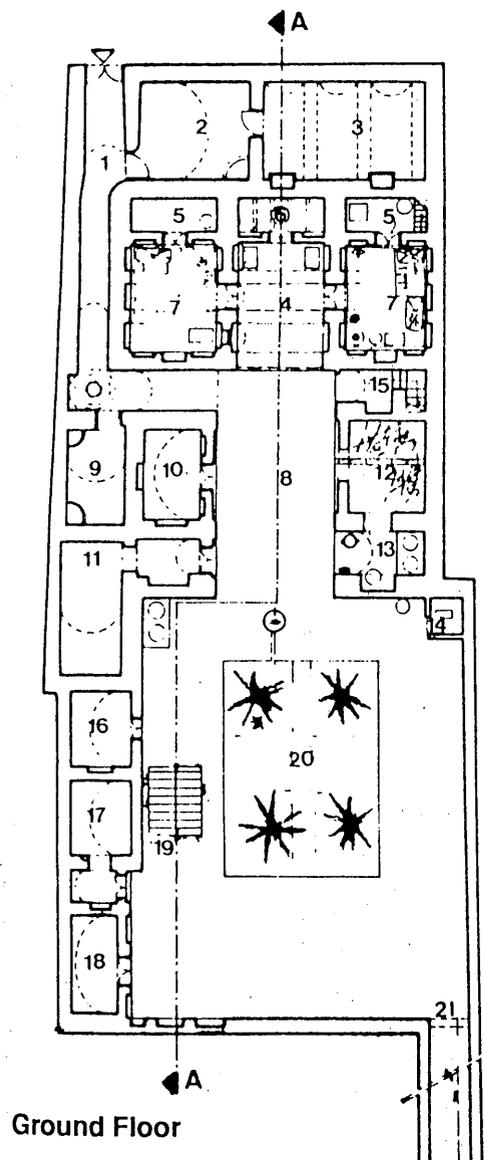
Section B-B



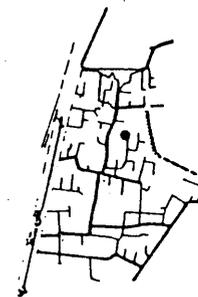
Section A-A

Farmer House No. 3

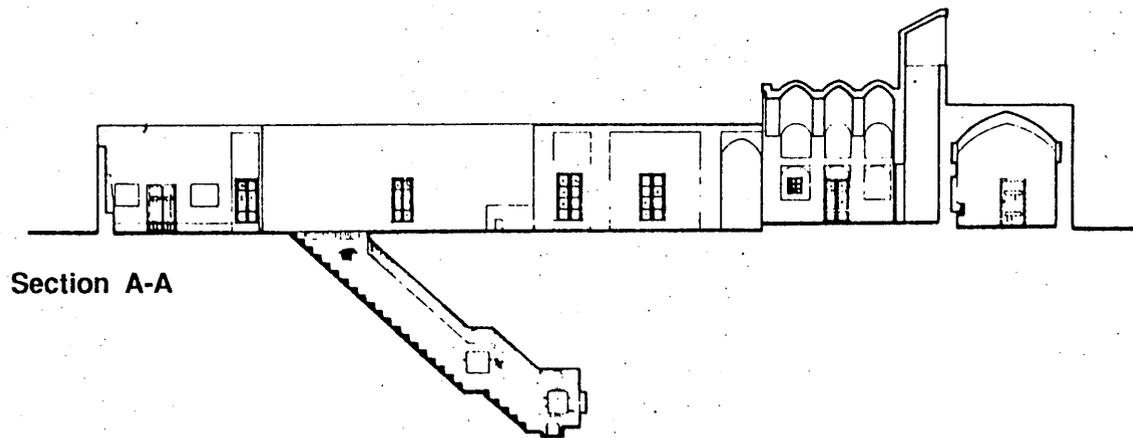
- | | |
|-------------------------|-----------------------------|
| 1 - Entrance | 12 - Fuel store |
| 2 - Hay store | 13 - Kitchen |
| 3 - Stable | 14 - Privy |
| 4 - Winter suffe | 15 - Staircase to the roof |
| 5 - Store room | 16 - Store room |
| 6 - Wind-tower | 17 - Old kitchen |
| 7 - Winter room | 18 - Stable |
| 8 - Courtyard | 19 - Staircase to the qanat |
| 9 - Stable | 20 - Garden |
| 10 - Spring/autumn room | 21 - Second entrance |
| 11 - Hay store | |



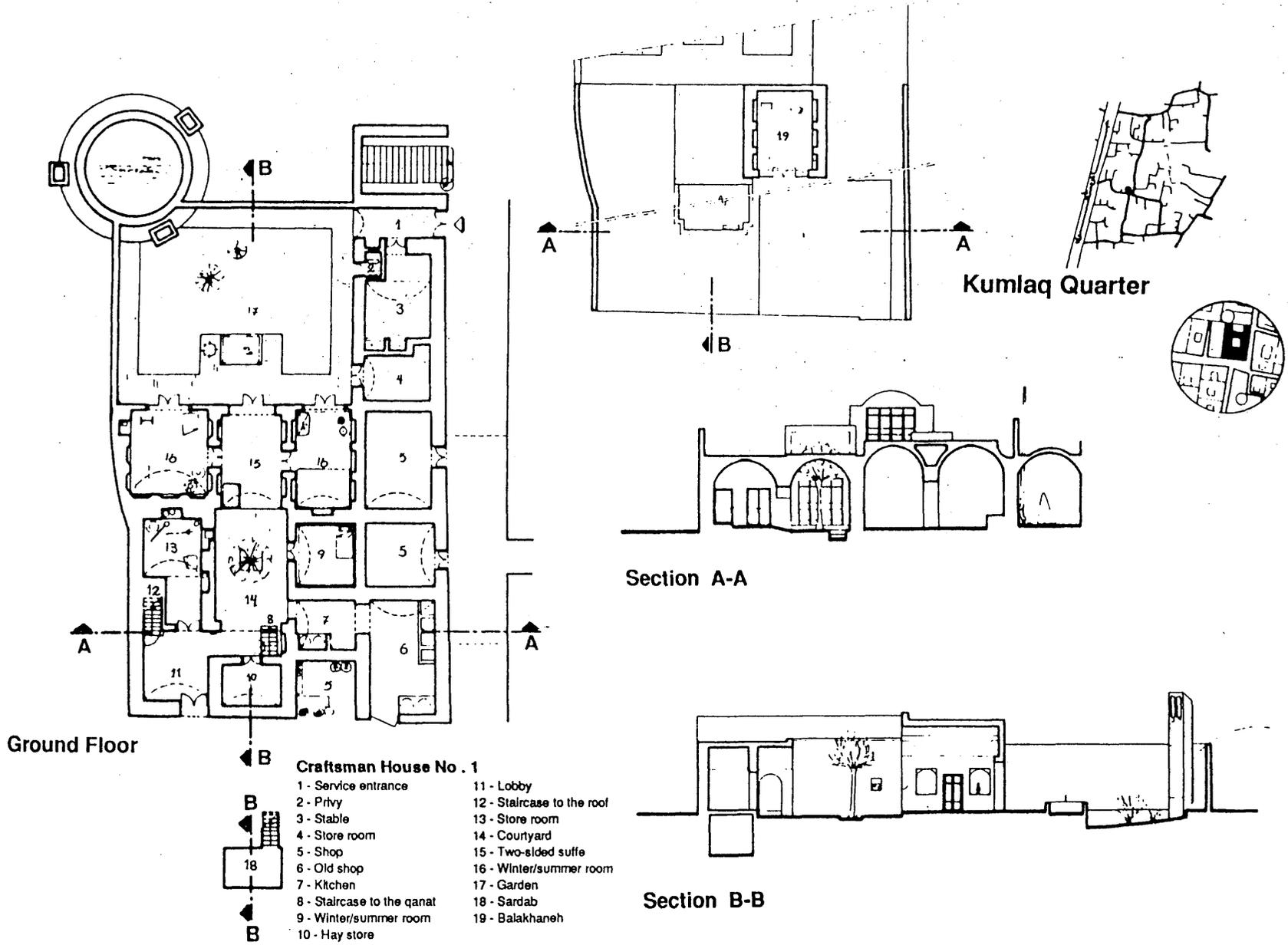
Ground Floor



Kumlaq Quarter

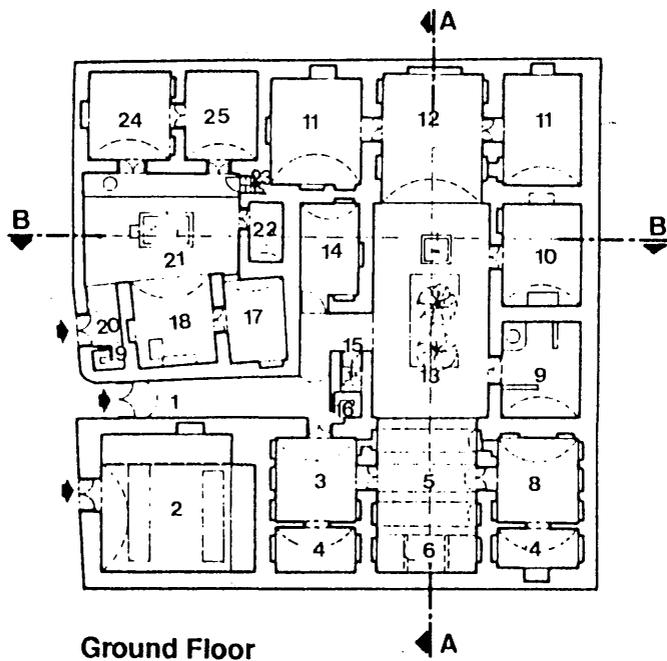


Section A-A

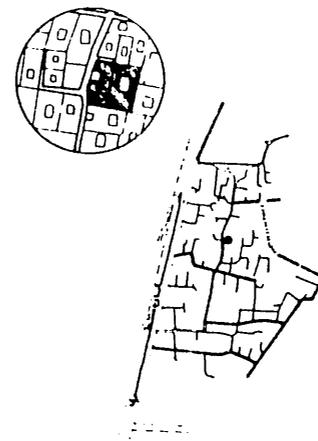


Craftsman House No. 2

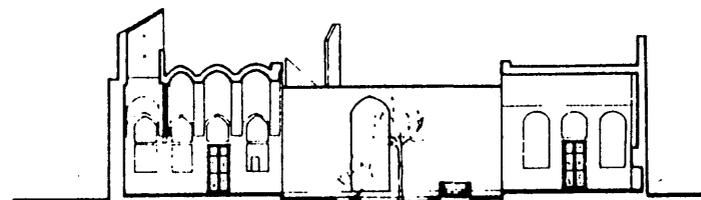
- 1 - Entrance
- 2 - Work shop
- 3 - Summer room
- 4 - Store room
- 5 - Summer suffe
- 6 - Wind-tower
- 7 - Store room
- 8 - Summer room
- 9 - Bake house
- 10 - Kitchen
- 11 - Winter room
- 12 - Winter suffe
- 13 - Courtyard
- 14 - Stable
- 15 - Staircase to the roof
- 16 - Privy
- 17 - Summer room
- 18 - Summer suffe
- 19 - Privy
- 20 - Entrance
- 21 - Courtyard
- 22 - Kitchen
- 23 - Staircase to the roof
- 24 - Winter room
- 25 - Winter room



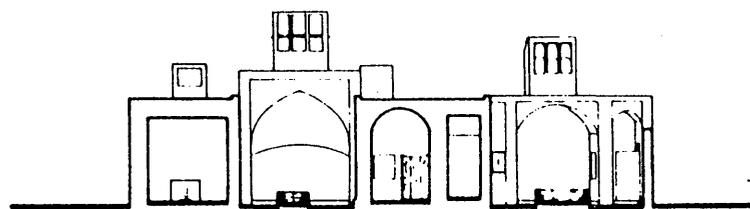
Ground Floor



Kumlaq Quarter



Section A-A



Section B-B

(16) Sharifabad Quarter

Sharifabad Quarter (fig 1)

This quarter is located on the south-east side of Ardakan. Zoroastrians moved to there about one hundred years ago from Ahmadabad, a village 4km north-west of Ardakan.

Because of the hostility of the Muslims of Ardakan, the original Zoroastrian settlers built for themselves a fortified enclave called Sharifabad outside the town (fig 1).

In the past fifty years Sharifabad has expanded north and east of the original enclave to link with the main town, the old fortification walls having largely collapsed. Thus Sharifabad developed over two distinct areas at two different times. In the old part live Zoroastrians, most of whom are farmers, while in the nearer part most residents are Muslim, many of them wealthy, who have built houses on land formerly used for orchards.

The houses in the old part tend to be small. Older houses had no wind-towers until 1898 (fig 2). (Since then some of the finest wind-towers in the region have been built by Zoroastrians in Yazd⁽¹⁾.)

A particular feature of the quarter is the open qanat reached in places by steps from the street. Here people wash their clothes and dishes (fig 3), and animals- notably cows- are brought to drink and have their fodder washed.

Zoroastrian House No.1 (fig 4)

Almost square in plan, this house is situated in the old part of the quarter. It is occupied by a young Zoroastrian family, the head of which works for the town council.

A plain entrance door opens from the street into a short passage(1) leading to a central courtyard. Doors open from the passage to a hay store(5) on the south and a stable(4) containing a privy(3) on the north. A staircase(2) rising against the north wall of the passage gives access to the roof.

A summer suffe(8) with wind-tower (see section fig 4) at the south end of the courtyard is flanked by a summer room(9) to the east and a storeroom(6) to the west. A staircase in the south-east corner of the storeroom rises to an upper room or *balakhaneh*(14) on the roof. At the north of the courtyard, a winter suffe(12) has a door opening to a winter room(11) on the east. At the west end of the courtyard a doorway opens a kitchen(10) which contains an oven for baking.

There is nothing in the layout of this house to distinguish it from houses in other quarters of the town (fig 4).

Zoroastrian House No.2 (fig 5)

Unlike the previous house, this house has at the north end of its courtyard distinctive arrangement of rooms comprising an intermediate chamber (*otaq miyani*) with doors in on all from sides, two opening on suffes to north and south and two leading to closed rooms to east and west. A similar arrangement may be found in the Pre-Islamic domestic architecture of the Zoroastrian Sasanians.

The house is entered by a recessed portal opening into a dog-leg passage leading to a central courtyard(21). From either side of the passage doors lead into a stable complex comprising (to the west) a stable yard(16) to the south, and (to the east) a further two stables(4, 6), the first of which contains a privy(3). The stables and hay store(6) are lit and ventilated by openings in their vaulted ceilings. A staircase(2) to the roof rises south from the passage.

At the south end of the courtyard is a summer *suffe*(7) with a wind-tower(5) in its rear wall and a Summer room(8) to the east, where food is kept. Two rooms, on the west and east sides of the courtyard are used respectively as a living room(12) and a kitchen(9) lit by rooflights. A winter *suffe*(11) at the north end of the courtyard has a door in each side wall giving access to flanking winter rooms(10). In the rear wall of the winter *suffe* a door opens into the intermediate room(18), through which reached one flanking rooms(17), which function as summer rooms, and to the north a third *suffe*(19) opening on to a vegetable garden(20). Completing this distinctive group of rooms is a *sardab* under the intermediate room and north *suffe*, reached in the eastern half of the intermediate room.

Houses in the area of recent development

In the area to the north and east of the original Zoroastrian enclave

Muslims had gardens and orchards, often including a small house to which they moved from Ardakan during summer. In the past fifty years, especially in the past thirty, the owners of these gardens have erected new, permanent houses, generally enclosing big gardens.

Clerk's House No.1 (fig 6)

The original house, at the south end of the site, was a sort of garden house or *yeilaq* where a family stayed in spring and summer. It overlooks a large pomegranite orchard. There are two smaller orchards to west and east of the main one.

A later house overlooking a pool at the north end of the orchard is much larger and incorporates servants' quarters and a service area.

There are three entrances to the site, one to the original garden house at the south end of the orchard, one to the service area at the north-eastern corner of the large house and one that leads from the west boundary through a vaulted passageway to a vaulted lobby opening on the garden in front of the servants' quarters (described below).

Next to the western entrance, a flight of steps leads down from the street to an underground chamber, which has a second flight of steps at its east end leading up to the orchard. Evidently harvested pomegranites were stored in this chamber where their freshness would be preserved in the cool subteranean atmosphere.

The southern entrance opens into a porch(1) which in turn opens through a door in its north wall to the orchard. To the west lie the main rooms of the garden house, a summer *suffe*(22) with a wind-tower

and flanked by summer rooms, the western of which is now a pigeon-house(21). Against the west wall of the pigeon-house a staircase rises to the roof. In the orchard in front of these rooms a flight of steps(20) descends to a *sardab* under the *suffe* (fig 6), also ventilated by a wind-tower.

The large house at the north end of the orchard comprises a central residential block laid out symmetrically around a winter *suffe*(9) furnished for entertaining guests, servants' quarters to the west and a service area to the east. The residential block is where the family lives most of the time, even during summer. It has been "modernized" over the years, a new privy(7) and new kitchen(11) being

provided along with an elaborate colonnaded *iwan*(10) separated from the winter *suffe* by a glazed screen. Apart from these elements, the residential block contains a wind-tower(8) at the rear of the *suffe*

and three winter rooms, two of which are the rooms(6) of the clerk's son and daughter, who are students, and one(12) is used as a living room and as the parents' bedroom. A long corridor(5) behind the wind-tower connects the servants' quarters with the service area.

The servants' quarters to the west of the main residential block include a suffe with an adjoining winter room and a storerooms all facing south to the garden.

From the back of the servants' suffe the corridor leads to the service area to the east of the residential block. A northward spur of the corridor with a window in its north wall serves to light the east end of the corridor second the spur, the corridor leads past a pantry(2) and the new kitchen(11) to a bathroom(13) with a small anteroom for changing. A door opens from this end of the corridor to the garden.

From the garden a second door opens onto a dog-leg passage leading to the original kitchen(14), which is now used as a store, as are the various cupboards opening off the passage. A short passage(17) from the garden leads up a flight of steps to a privy(7). To the west of this passage is a staircase leading to the roof.

A gate beside the entrance to the passage(17) gives access to the eastern orchard, at the north end of which is the north-eastern entrance(5), a stable(15) and a small pigeon-loft(21).

Paradoxically, in this house the large area of the site, with its gardens and orchards, has led to an unusually awkward plan, apparently because of the lack of a central courtyard to give the plan coherence.

Clearks House No.2 (fig 7)

This is another large new house in the area of recent development. It

accommodates a family of five, parents and three boys. Although it includes modern facilities like a modern kitchen and bathroom, the layout is symmetrical and traditional.

An arched recess shelters the entrance, which leads through a dog-leg passage(1) to and a pool(14) with a fountain. Two doors open east from the passage, the first into a stable(2), the second into a storeroom(3) and a staircase(4) to the roof. At the south end of the passageway is a guest room(5).

Opposite the entrance to the stable, three steps lead up to a corridor which leads to the principal room or tanaby(10), which opens south on an *iwan*(6) overlooking the garden. Short flights of four steps leads down from either side of the *iwan* to the yard. The tanaby can be ventilated by a wind-tower(11) in summer and has winter room(7 and 12) on either side. The western winter room(12), entered from

iwan, is used as a living room. The eastern room(7) has two doors, one from the *iwan* and one from the corridor(8). Across the corridor is a door into a storeroom(9).

The west wing of the house contains the service area, a large kitchen(13) lit by a circular window in the vault, a bathroom(16) with anteroom and a privy(15), also with a small anteroom and wash hand basin. The southern room of this wing serves as a food store, though its position suggests that it was intended a an autumn room. An old privy(18) in the south-west corner of the garden supplements the more modern one(15) in the house.

References

- 1) E. Beazely, Living with Desert, 64.

Sharifabad Quarter

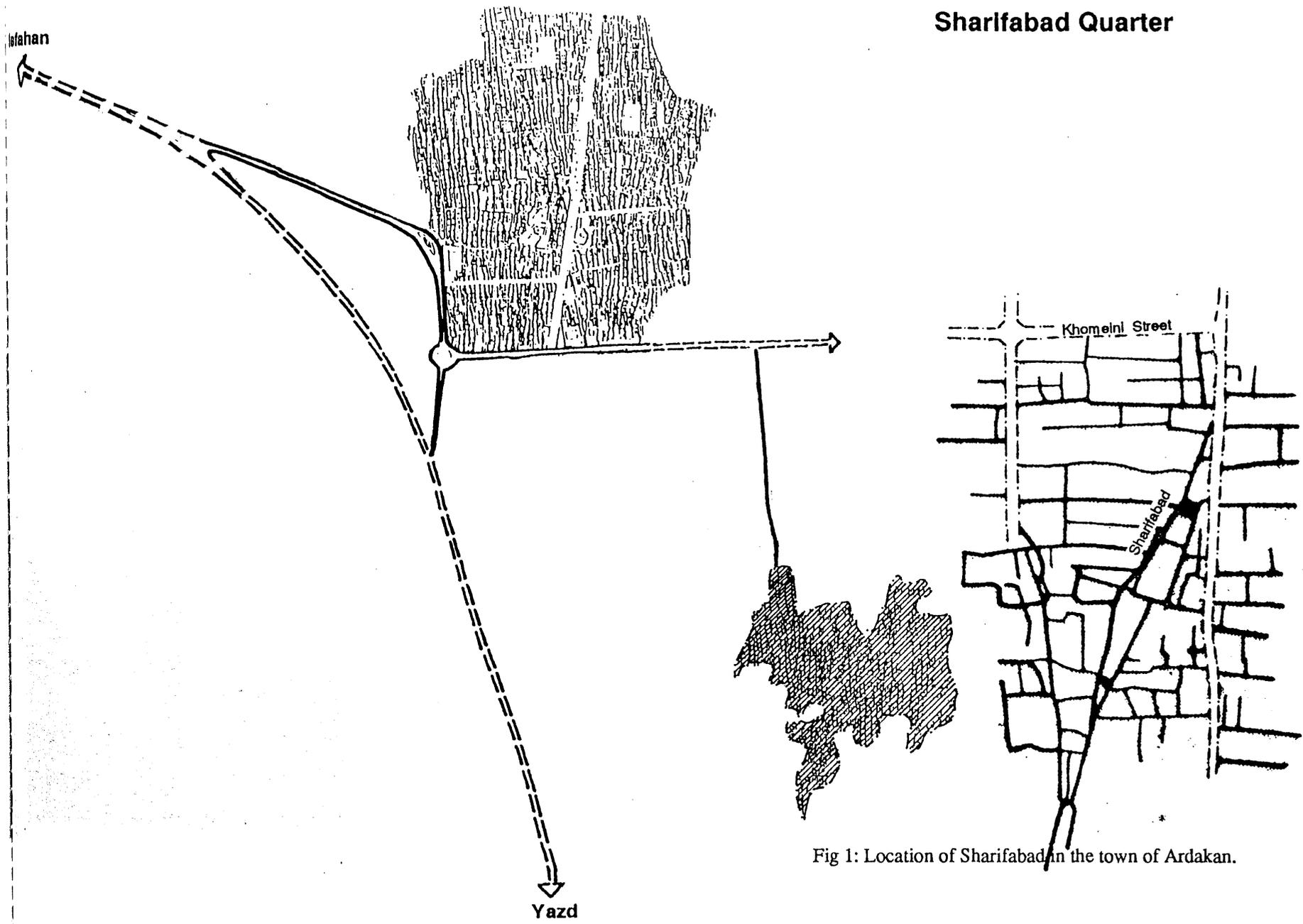


Fig 1: Location of Sharifabad in the town of Ardakan.



b



a

Fig 2:
a. Roof-top view through Sharifabad Quarter, the old houses have no wind-tower.
b. Showing when the people using the qanat for washing.

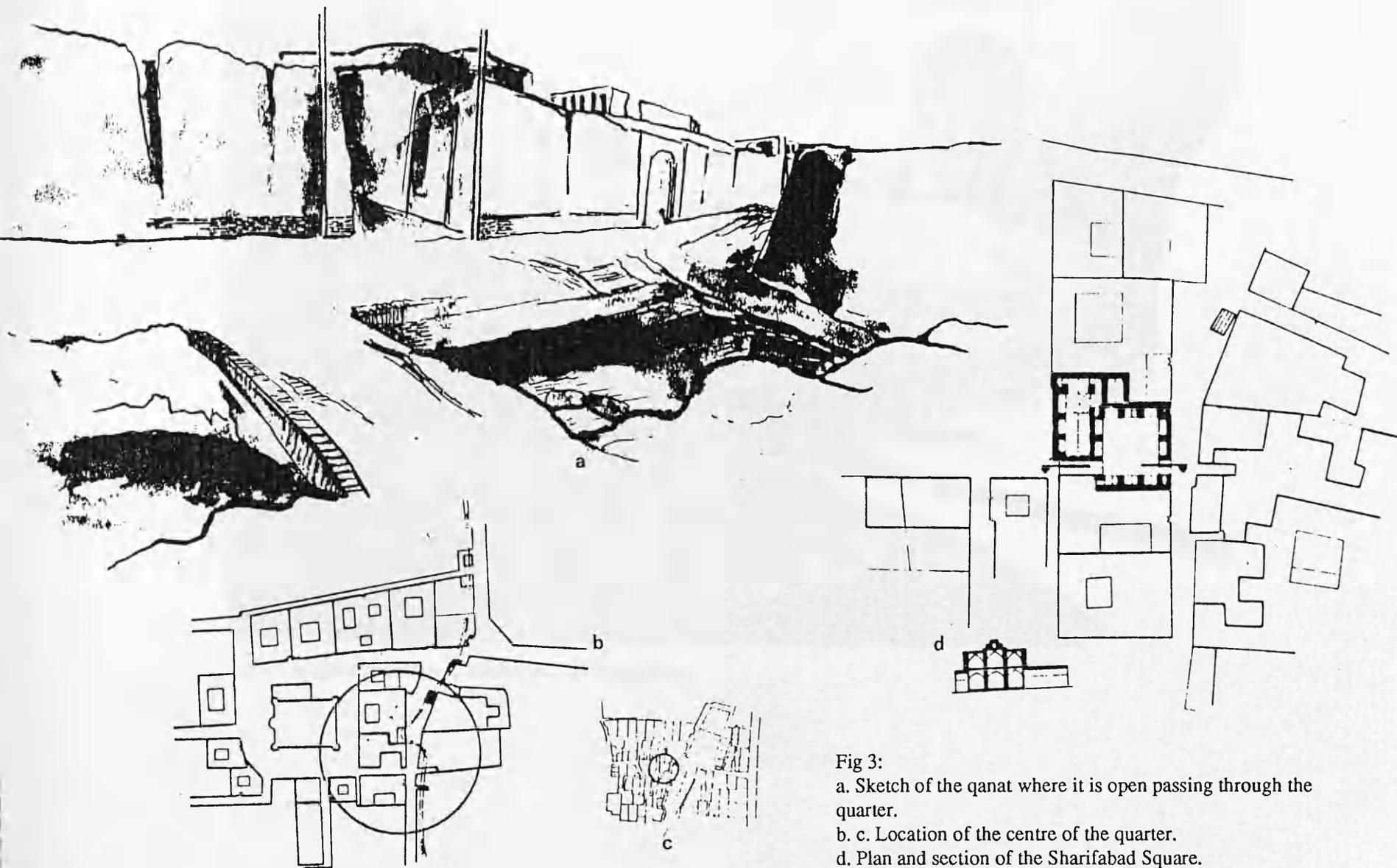


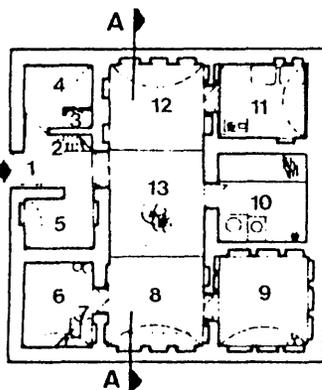
Fig 3:
a. Sketch of the qanat where it is open passing through the quarter.
b. c. Location of the centre of the quarter.
d. Plan and section of the Sharifabad Square.



Fig 3: The qanat is opened in another part of the quarter.

Zoroastrian House No. 1

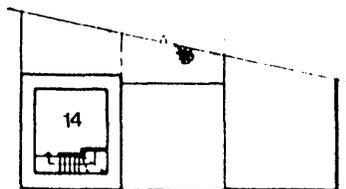
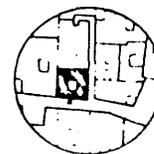
- 1 - Entrance
- 2 - Staircase to the roof
- 3 - Privy
- 4 - Stable
- 5 - Hay store
- 6 - Store room
- 7 - Staircase to the balakhaneh
- 8 - Summer suffe
- 9 - Summer room
- 10 - Kitchen
- 11 - Winter room
- 12 - Winter suffe
- 13 - Courtyard
- 14 - Balakhaneh



Ground Floor



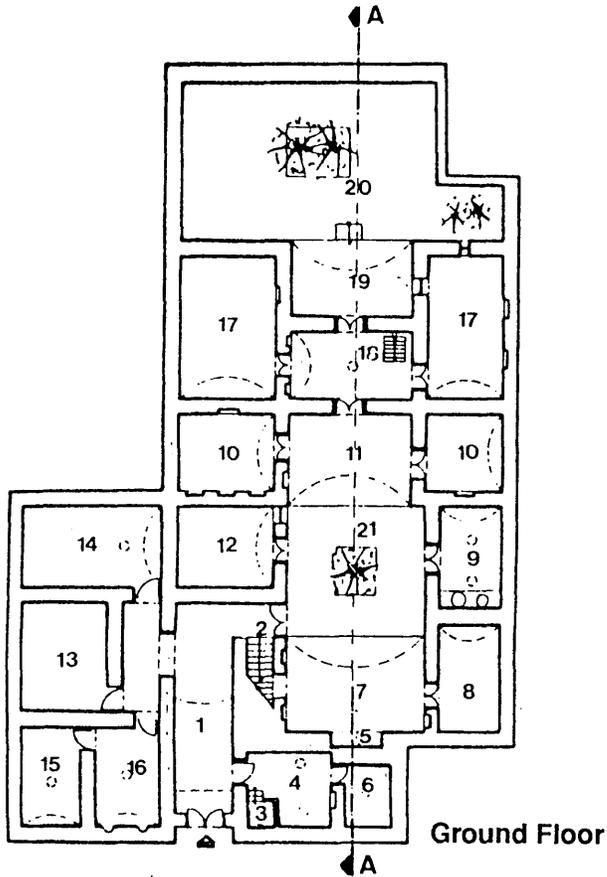
Sharifabad Quarter



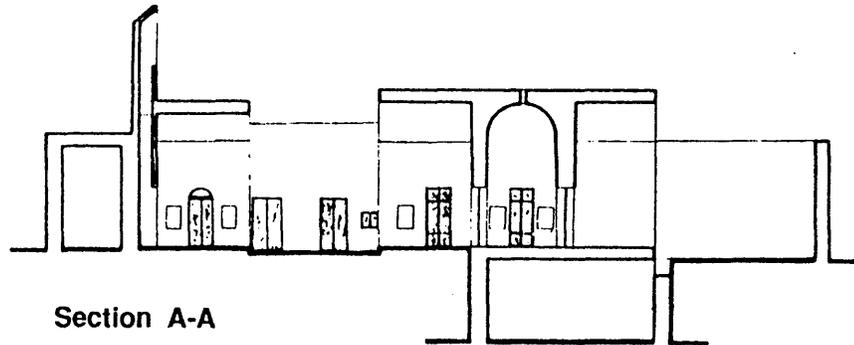
Balakhaneh



Section A-A

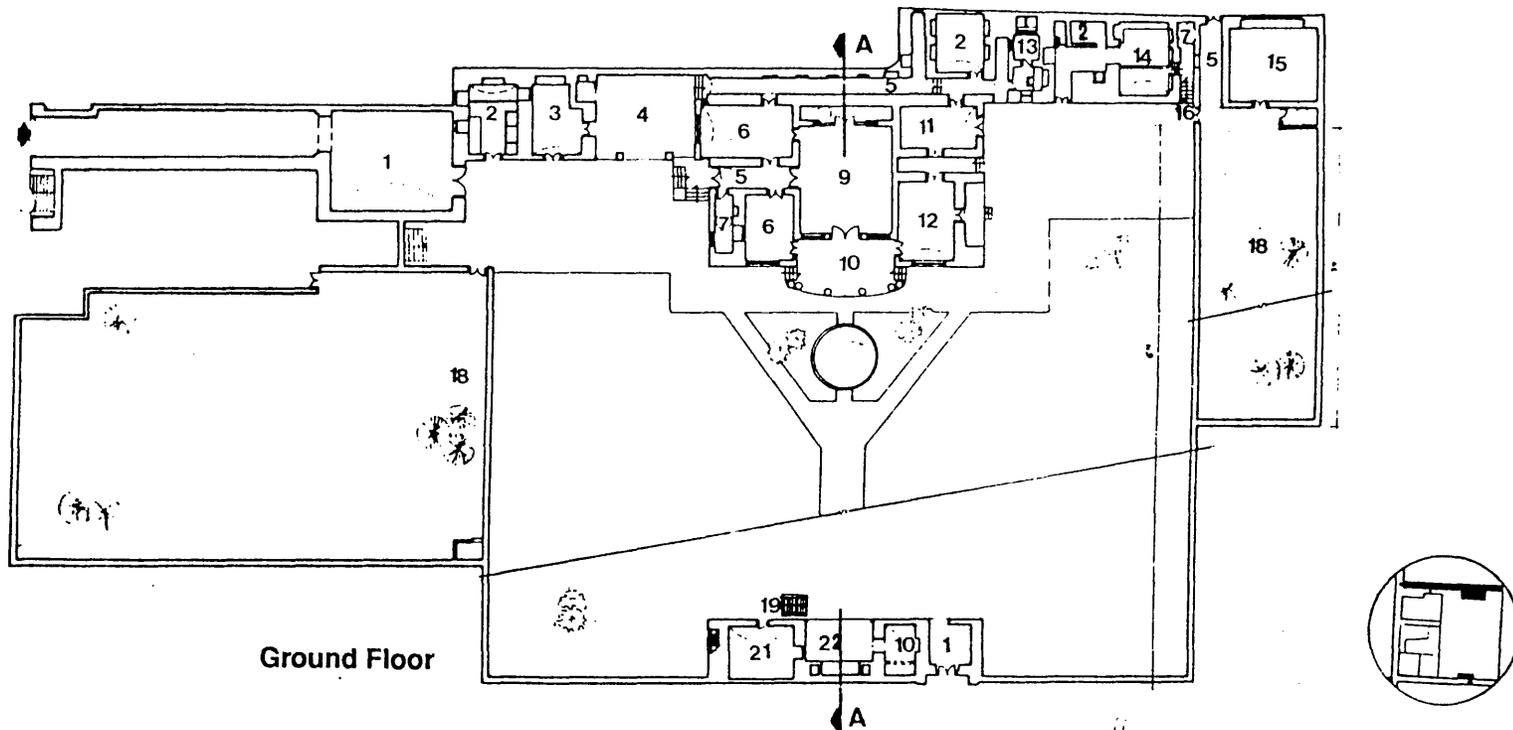


Sharifabad Quarter

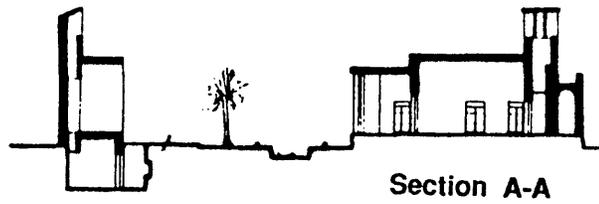


Zoroastrian House No. 2

- | | | |
|---------------------------|-------------------------|------------------------|
| 1 - Entrance | 8 - Pantry | 17 - Summer room |
| 2 - Staircase to the roof | 9 - Kitchen | 18 - Intermediate room |
| 3 - Privy | 10 - Winter room | 19 - Summer suffe |
| 4 - Stable | 11 - Winter suffe | 20 - Garden |
| 5 - Wind-tower | 12 - Spring/autumn room | 21 - Courtyard |
| 6 - Hay store | 13 - Hay store | |
| 7 - Summer suffe | 14/15/16 - Stables | |



Ground Floor



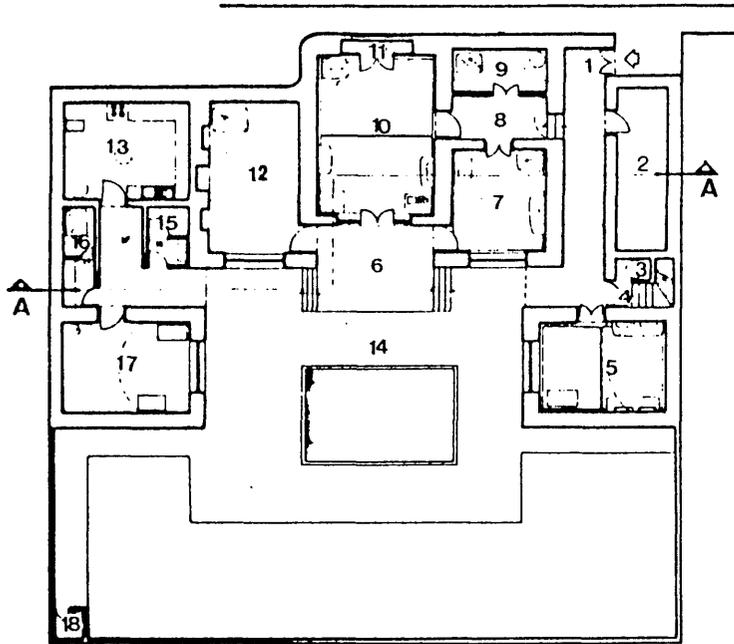
Section A-A

Clerk's House No. 1

- | | | |
|------------------------------|------------------------------|-------------------|
| 1 - Entrance | 11 - New kitchen | 21 - Pigeon room |
| 2 - Pantry | 12 - Winter room | 22 - Summer suffe |
| 3 - Gardeners room | 13 - Old bathroom | |
| 4 - Winter suffe | 14 - Old kitchen | |
| 5 - Corridor | 15 - Stable | |
| 6 - Winter room | 16 - Staircase to the roof | |
| 7 - New privy | 17 - Passageway | |
| 8 - Wind-tower | 18 - Orchard | |
| 9 - Winter suffe (Reception) | 19 - Staircase to the Sardab | |
| 10 - Iwan | 20 - Summer room | |



Sharifabad Quarter



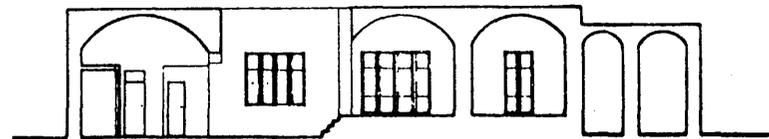
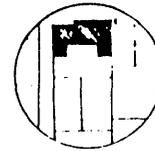
Ground Floor

Clerk's House No. 2

- | | | |
|---------------------------|------------------|----------------|
| 1 - Entrance | 7 - Winter room | 13 - Kitchen |
| 2 - Stable | 8 - Corridor | 14 - Courtyard |
| 3 - Store room | 9 - Store | 15 - Privy |
| 4 - Staircase to the roof | 10 - Tanaby | 16 - Bathroom |
| 5 - Guest room | 11 - Wind-tower | 17 - Pantry |
| 6 - Iwan | 12 - Living room | 18 - Old privy |



Sharifabad Quarter



Section A-A

(17) Materials & Construction

Building Materials

In Ardakan, the houses are usually built by a local builder who carries out the construction of the building in summer. Building work is carried on from early morning to sunset. This period is naturally longer in summer than winter and the summer weather allows mortar to dry quickly, thus enabling the constructor to continue quickly. This is particularly true of mud-brick construction.

Building materials are dictated by the raw materials available of the area, The choice of materials up to the past 30 years was limited to a claysand mixtures found locally suitable for producing mud-brick (*khashet*) and clay (*gel*) . Accordingly the mud-brick is laid in the caly mortar⁽¹⁾. Approx 400 years ago (Seljuk period) fired bricks were used for special buildings. During the last 30 years they have started to be used in housing construction. In the Yazd area the bricks are yellow in colour, and laid in a mortar of gypsum and soil. Usually

mud-bricks did not have any standard size beyond the job in hand. They were made from clay on site allowing the builder to choose the most convenient size. In Sasanian times they were typically 37.5 by 50cm and 8.75 to 12.5cm thick. They were about 22.5 by 22.5 by 5cm in earlier Islamic buildings. There are great variations in mud-brick sizes, the smallest size being from 10cm square by 3cm thick up to 50cm by 25cm and 20cm thick. The small size would be used for a delicate areas such as niches and the bigger size for constructing walls or vaults.

Mud-brick is composed of earth and straw mixed by treading it with bare feet. The bricks are moulded on a bed of chaff using an open wooden frame, and rows of bricks are made closely ranged side by side. They are dried for half a day before being turned, to dry for a further day. They are normally used immediately after being made⁽²⁾.

Burnt-bricks are made in a same way, using more carefully chosen clay and clean sand, which is soaked for twenty-four hours before moulding. The moulded bricks are made on a gray sand bed, and dried for twice as long as the sun-dried bricks before being packed into a large brick-kiln and fired for three days. A ramp usually leads up to the top of the kiln allowing most of the bricks to be packed and unpacked from above⁽³⁾.

The standard or common bricks have variations, in size as well as colour, which depend on the area and use of the brick. The bricks range from 18cm to 31cm square with the most usual sizes between 20cm and 22cm square. The thickness of these bricks varies from 4cm to 7cm, with between 4.5 and 5cm as the most common thickness⁽⁴⁾.

Use of Mud-bricks and Bricks

As is to be expected, the type of houses built depended on social condition and status of the individual. The poorest houses are of the simplest kind the entire structure is of mud-brick covered with a render composed of clay and straw⁽⁵⁾. Wealthy people built their houses with mud-brick for lower walls while the domes of the roof used fired-brick with gypsum mortar. Fired-brick arch frames with gypsum rendered spandrels for the inner surfaces of the courtyard, all baked by mud-brick⁽²⁾.

Baked-bricks were regarded as necessary for permanent buildings such as mosques, public bath-houses, bazaars, shrines, tomb, and so on.

Gypsum and Lime

Gypsum and lime are the common materials of plasters and mortars. Gypsum was used for dry conditions, but where the mortar was exposed to damp conditions a lime mortar was employed.

Lime plaster is rendered for water proofing roofs, channels and drains and for special marble plasters. It is generally true that gypsum was preferred for expences and highly finished stucco-work, and very often the angles of mouldings are pointed in white gypsum (fig 15). The predilection for gypsum mortar resulted from its more rapid set which aided greatly in the erection of arches and vaults over temporary or permanent structure. Samples of gypsum mortar from various structures indicate that it was frequently mixed with clay, sand , fine gravel and even mud⁽⁷⁾.

Iran has virtually unlimited deposits of limestone suitable for lime burning and almost the same can be said of gypsum rock, so that both lime and gypsum burners can obtain their raw material from local quarries. Today lime burning (*ahak-pazi*) and gypsum burning (*gac-pazi*) are specialized crafts (*kureh-pas*) in towns where there is sufficient demand⁽⁸⁾.

The raw material is stacked in the kiln and a fire is lit in the hearth. The lime and gypsum burners use the the same dry desert shrubs for fuel. Sir John Chardin decribed a burner's kiln and mill in 1665 as follows:

They take the sotnes (for gypsum) out of the mountain in great plenty; they burn it, then pound it, or bruise it with a great grinding stone, thicker than a mill stone, but not so broad by two third of the diameter, it turns round on its back and a man always stand by, with a shovel, to throw the plaster under hte grinding stone.^{'(9)}

There is another mortar called *ghir-charo* or *saroj*, which is very strong but flexible, allowing some movement of the structure. It is used for sticking tiles, in constructing a dome or a very high vault and also for waterproofing pools, tanks, *abanbars* etc. The formulation is a mixture of lime and water with extract of date and grapes which is pressed in quantity plus sugar canes as a glue⁽¹⁰⁾.

Vaults

There are many types of vaults, all derived from a single elemental component, “the arch”. When an arch moves along the horizontal axis, a barrel vault is created (fig 1), when two barrel vaults intersect the vaults are called cross- or groined-vaults (fig 2), in Farsi called *chahar-bakhsh*. or *chahar-taq* And if the arch is rotated on itself, a dome is created⁽¹⁰⁾(fig 5).

The barrel vault, the simplest of all, can be built relatively rapidly and cheaply. A timber framework is used on which a vault usually rests until is completely set. (See later how special vaults are made without a framework p.257, fig 11). The barrel vault usually was dark and the only source of light was available from the end of the tunnel. Creating windows in the walls causes weakness of the structure, as a result of the weight and thrust of the vault carried by the walls⁽¹¹⁾. This problem is solved by the transverse arch and vault with ribs and infill, in Farsi this type of roof is called *taq-tavize*. This development concentrated the load directly onto piers, so that the walls were relieved of their previously weight-bearing function. Now thin and light, the vaults could safely have beneath them windows, doors which can give direct or semi direct illumination and also niches etc (fig3). When a suffice required a high ceiling, a barrel vault was the answer. Amiry House in Charkhab Quarter is a good example p.159 & 178. In large houses the suffes and other room were covered by a

transverse arch and vault. This helped the planning to become more flexible, making it possible to have non-rectangular plans, with a variety of windows, doors, niches etc. A good example is Camel House in Tiran Quarter p.200 & 201.

There is a flat arch called *kelil* which is used for galleries between rooms and for those rooms which are placed between other spaces. These arches being very flat, are not capable of long spans (1.5m max). The thrust from these arches must be taken by other arches or thick walls (fig 4).

It must be also pointed out that vaults of all types except domes require regular rectangular walls of even height to spring off. This fact produces the great regularity and clarity of the plans and causes clear use of plan forms to translatable given angular or curved lines

into rectangular and therefore buildable space, see fig3 in Bazar-no Quarter, p.190, where the angular edge wall is clearly rationalized into rectangular spaces, for basic system see fig 4.a.

Domes are a more complex form, particularly used over a square plan and capable of innumerable variations. Domes are structurally stable in themselves, but are difficult to place over the square base resulting from rectilinear planning^(1,2). A safe structural transition has to be made between the square and circle. Numerous solutions have evolved. The simplest was to use a corner squinch creating a shape which could merge easily between both geometries. This type of squinch in Farsi is called *taq-bandi* (fig 5.c). The squinch is achieved by building over the corner of the square to form an octagon. The walls of the octagon are carried upwards to a certain height and form a base for the dome. One or more polygons may be interposed between the

octagon and dome to decrease the incongruity of square and circle. This particular aspect of dome building has been greatly elaborated by builders over the centuries.

Another method was to use the pendentive. In this system the dome structure continued down the supporting piers in a continuation of the dome (fig 16.a).

There is also a “primitive” vault which has evolved over the square plan called *clombu*. There are four big squinches at the first stage. This in turn produces a smaller square at the top which is again squinched making a yet smaller square, and so on until the last hole is either left as an eye or filled with one stone. Clombu are very stable and resistant to earthquakes and can accommodate a sky light at the crown. Usually these are used for spaces such as kitchen and entrance halls (fig 6).

In all of these cases, the creation of a flat floor above the vault or dome presents another problem: To fill up the space on either side of the vault. Accordingly light parallel walls on top of the surface of the vault or dome were introduced and the space between these was then spanned by small brick vaults under the floor surface. This left most of the volume below as void (fig 7).

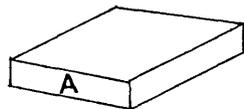
The roofs are usually covered with clay mixed with a straw binder, or paved with flat tiles of sun dried adobe (see the photo at the beginning of this chapter).

Construction or Way of Making a Barrel Vault (without the use of a framework)

The barrel vault or tunnel vault, the simplest of all, can be built relatively rapidly and cheaply without shuttering. Such a vault,

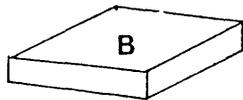
however, is restricted to a relatively narrow width. Also, since the weight and thrust of such a vault is carried by walls, they cannot be pierced by windows without seriously, even fatally, weakening the structure. Hence the vaults are dark. Despite this, many great structures were built in this form. There are three different methods of construction depending on which way the bricks are placed in the arch. These are called:

A- Zarbi (fig 8)



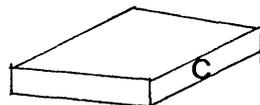
Zarbi vaults, are made by placing the sides against another in the arch form.

B- Romi (fig 9)



Romi vaults are made when the bricks are placed using sides against another. This is the strongest .

C- Thighe-i (fig 10)



Thighe-i vaults are constructed when the bricks used with sides are

placed against one another. This is the weakest and requires considerable skill so that the resultant vault is light⁽¹⁰⁾.

In addition there are three different type of gable or "*Sper wall*" which infill the semi-circular ends (fig 11).

Foundation

Although no excavation has been undertaken, it is evident from the erosion around existing structures that the foundations usually consisted of rubble masonry. Thus, it is not known to what depth foundations go or whether they become broader than the walls above ground. However, they have served to carry the weight of the superstructures without signs of uneven settling. In fact, the only

major damage caused by settlement appears to be of a fairly recent date and is probably the result of underground irrigation channels which have been led too close to structures (fig 12).

Arches

The most historic and common arch is called *Haluchin* or *Bize*. For this variety of arch, type of ellipse, there is an expression in Farsi:

“If you put an egg vertically underneath a camel foot, it will not break.”

That means of course that the ellipse arches on either side of an egg are strong enough to tolerate the weight of a camel.

Using a half ellipse as an arch vertically or horizontally, was a

discovery by Persian architects, hundreds of years before Islam. Up to 50 years ago these arches were still commonly used for vaults and domes (fig 3.a).

When an ellipse is used vertically it is called a *Haluchin* (Fig 14.a). In some building, this type of arch is constructed from the foundation up to the top of the roof but is finished as a ceiling. It also can appear as a vertical wall with niches and cornices. This combined roof and wall structure is hidden within the forms of houses which appear to have walls with domes on top of them⁽¹³⁾.

After Islam most arches changed to pointed arches as these were found to be more easily managed over the different plan form of the varied houses. The pointed arch evolved as can be seen in fig 14.

Finishes

The Persian builder never made a blank wall except sometimes the walls of stables and outhouses. Walls for the sides of rooms, passages, porticos and courtyards consist of a series of blind arches. This gives rise to a series of vaulted niches enclosing rooms or courtyards. Even parapet walls between houses are niched. In the courtyard, sometimes the arches may be open (such as the Camel House in Bazar-no Quarter or the Doctor's House in Mirsaleh Quarter). The closed arches appear on facades in the courtyard on one or more walls. Blind arches on exteriors have a decorative value, but are also structural. The blind arch is a more sophisticated manifestation of the building tradition, where the buttressing of the thinner wall is formed as an arch and where the vault loads are taken by the arches. These are then carefully moulded. Very often the angles of

the mouldings are pointed with white gypsum or, when ornamental designs are pointed with white gypsum or when further ornamental designs in the same fashion are added, the effect is exceptionally elegant (fig 15.a). Generally the rooms, suffes, lobbies and entrance porches (hashti) in the houses are entirely whitened with gypsum, and a moulded design, about 3 millimetres deep is made (fig 16.b). In some wealthy houses the dome of the suffe or reception room or even the entrance hall including pendentive areas may be decorated by geometric pattern. The lines in the pattern are a series of intersecting arches. This transforms a polygonal base on one plane into a polygonal star on higher plane. In plan this produces "net arch" in Farsi called "*Carbandi*"⁽¹⁴⁾(fig 16.a). These geometric pattern produced by the local people are made with no better tools than chisels

and pieces of string. The formation of the arches and straight mouldings without instruments is equally wonderful, but the appearance is straight geometrical. No two arches are never exactly the same as each other when one comes to measure them but they all always fit perfectly.

References

- 1) Ed. C.E. Bosworth, Iran and Islam, 125.
- 2) R. Lewcock, Architecture of Islamic World, 137.
- 3) Ibid.
- 4) Ibid.

- 5) Ibid, 116.
- 6) Ibid.
- 7) Ibid, 138.
- 8) L. Golombek & D. Wilber, The Timurid Architecture of Iran and Turan, 94.
- 9) E. Wulff, The Traditional Crafts of Persia, 126.
- 10) According to the Professor Karim Pirnia, Tehran University.
- 11) A.v. Pope. Persian Architecture, 250.
- 12) Ibid, 104.
R. Lewcock, Architecture of Islamic World, 141.
L. Golombek & D. Wilber, The Timurid Architecture of Iran and Turan, 97, 104.
- 13) Ibid, 153,155.
- 14) Ibid, 106,107,110

Barrel Vault



c

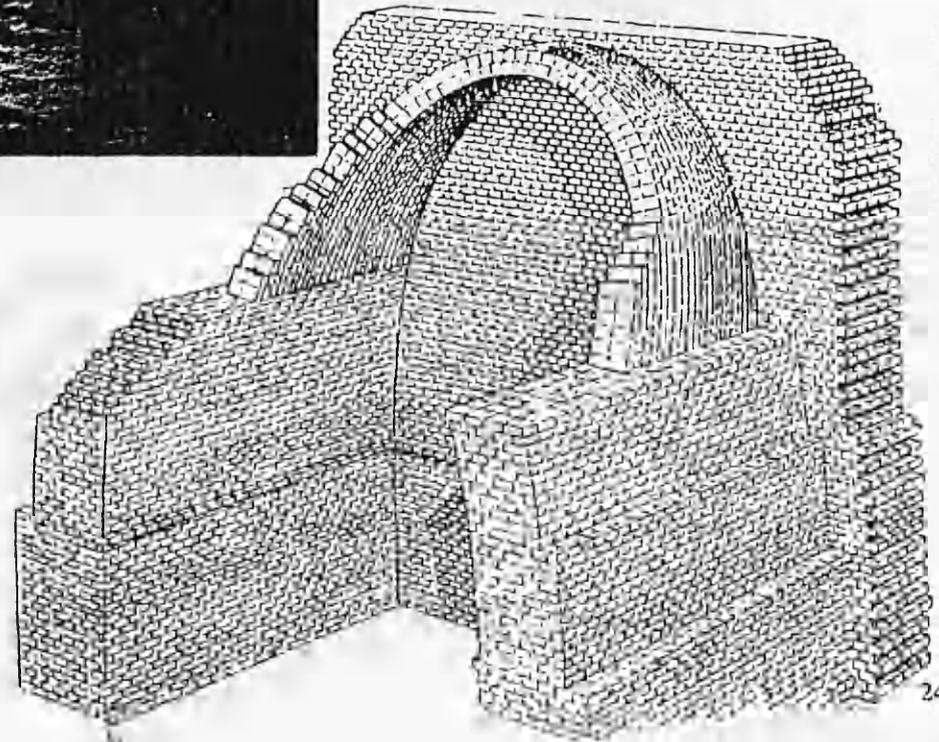
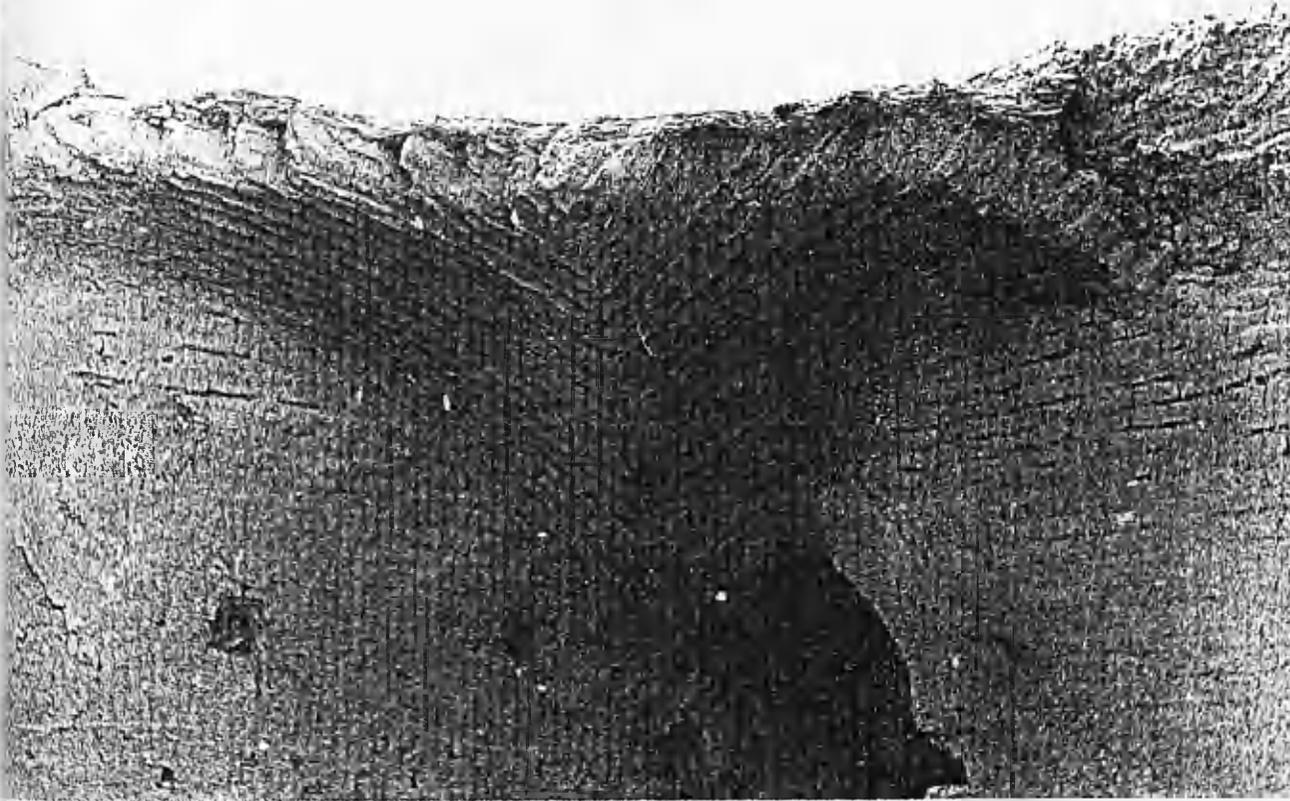


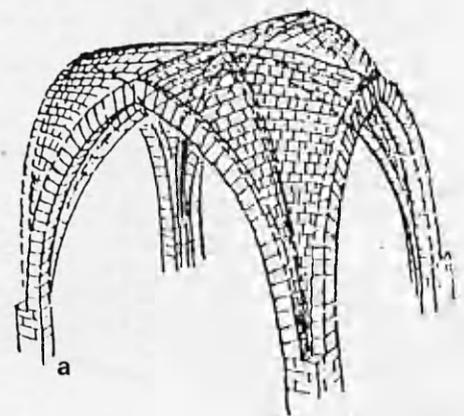
Fig 1:

- a. Arch moving along the horizontal axis.
- b. A barrel vault constructed on a gable. (Persian Architecture, A.U.Pope.)
- c. Barrel vault at the end gable with a hole as a skylight.

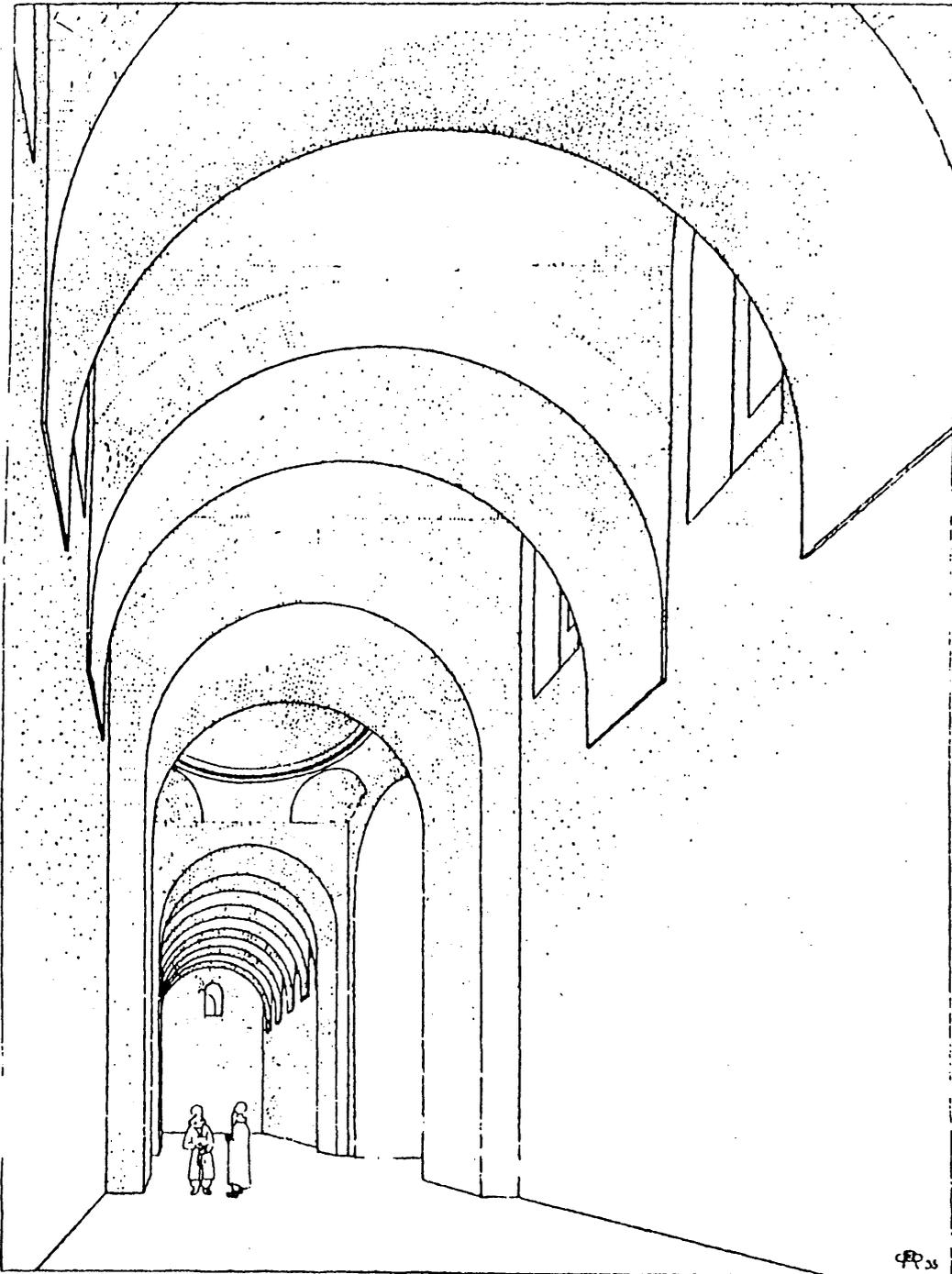
Cross-vaults



When two barrel vaults intersect each other they are called cross vaults.
Showing the groined-vaults of a summer suffice in Tiran Quarter.
Viewing the groined-vaults in a stable.



b



Taq-tavize Vaults

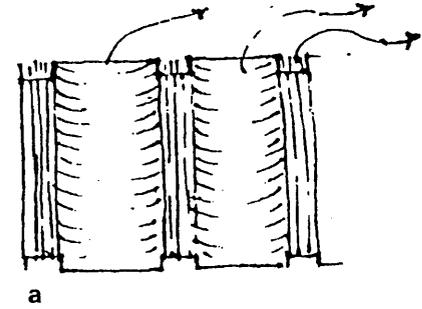


Fig 3:
a. Plan of a transverse arch and vault.
b. Taq-tavize vaults allow windows to be placed in the wall. (Persian Architecture, A.U.Pope.)

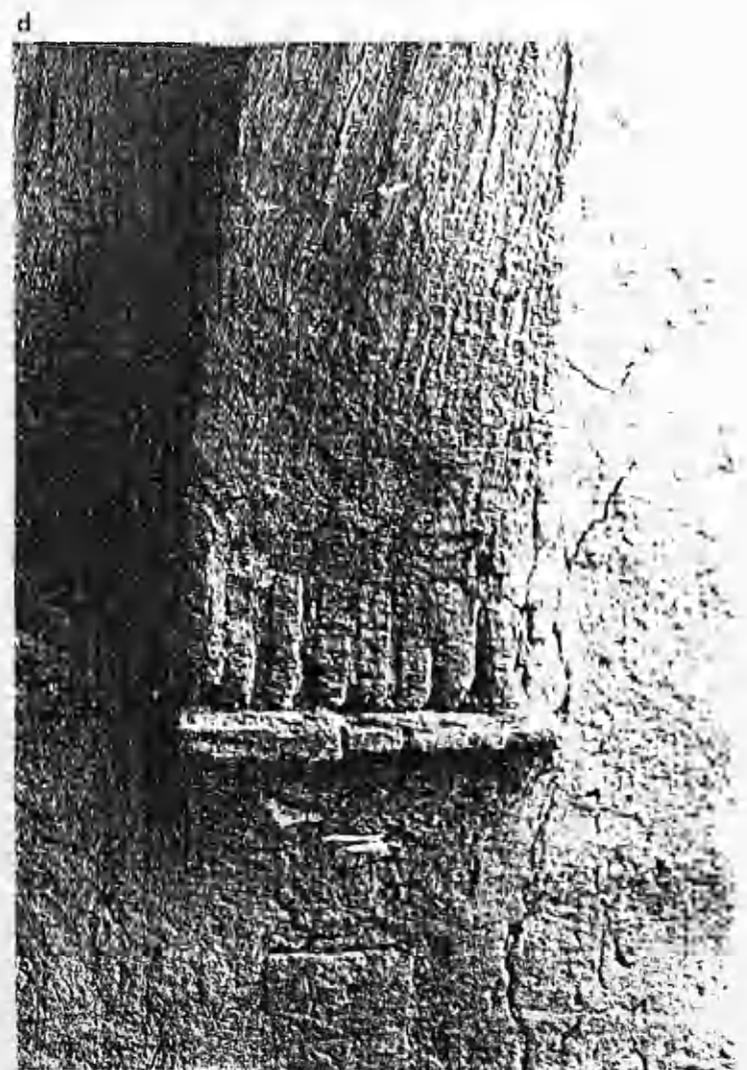
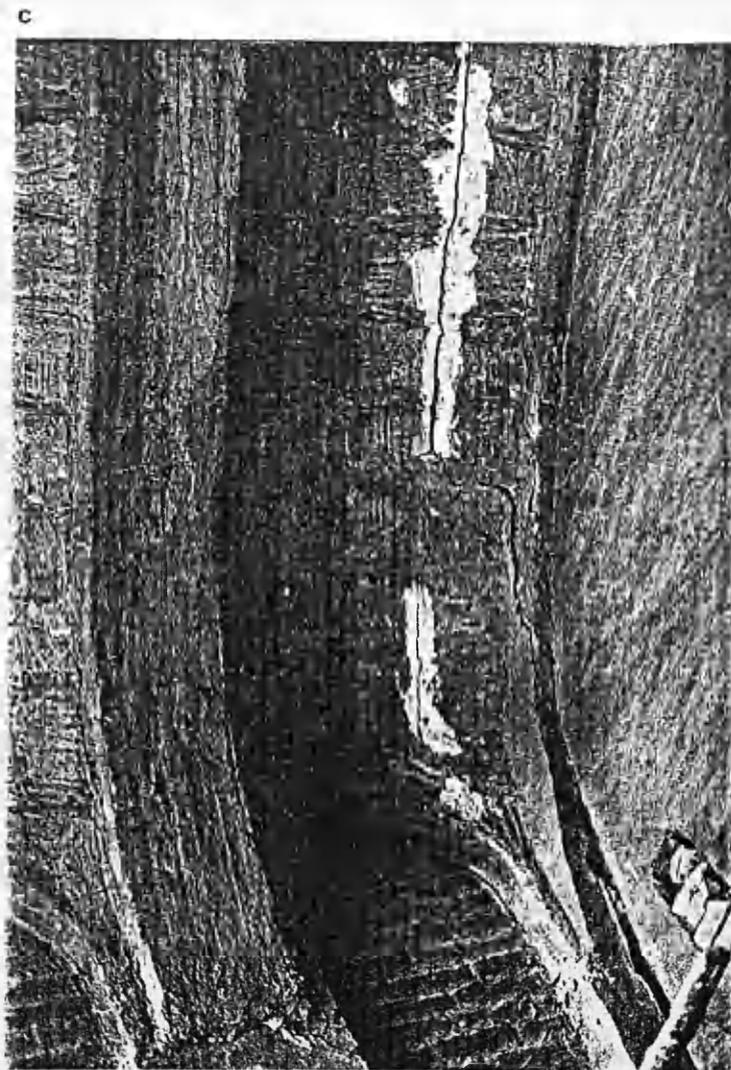


Fig 3:
c. Showing window space when the vault is a transverse arch and vault.
d. A pier which carries all the loads onto it.

Kellil Vault

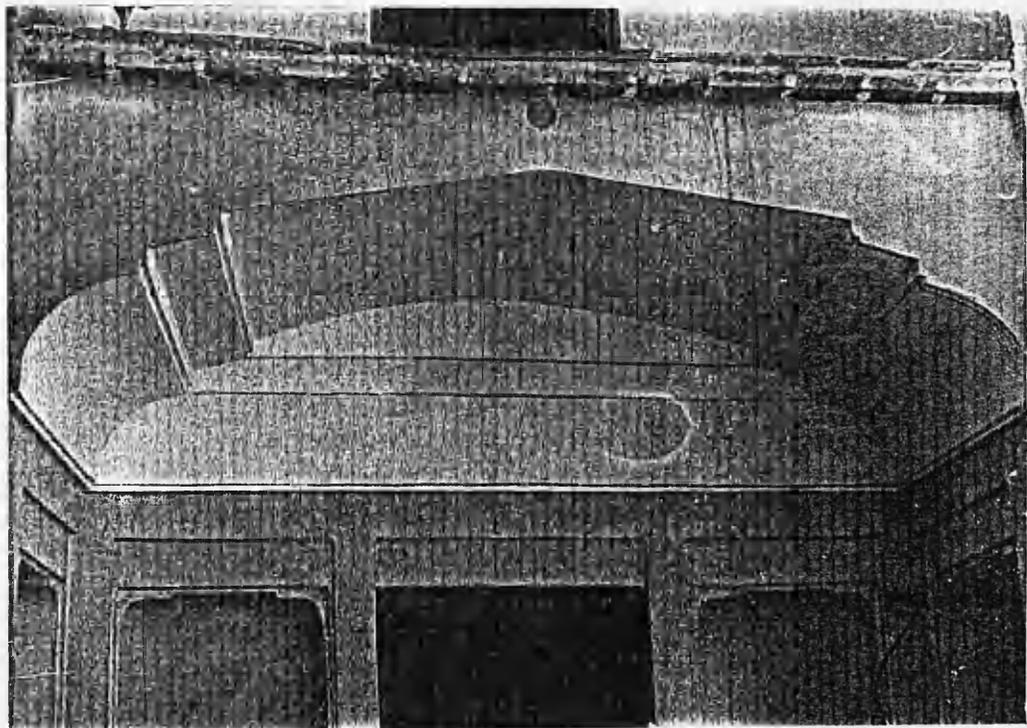
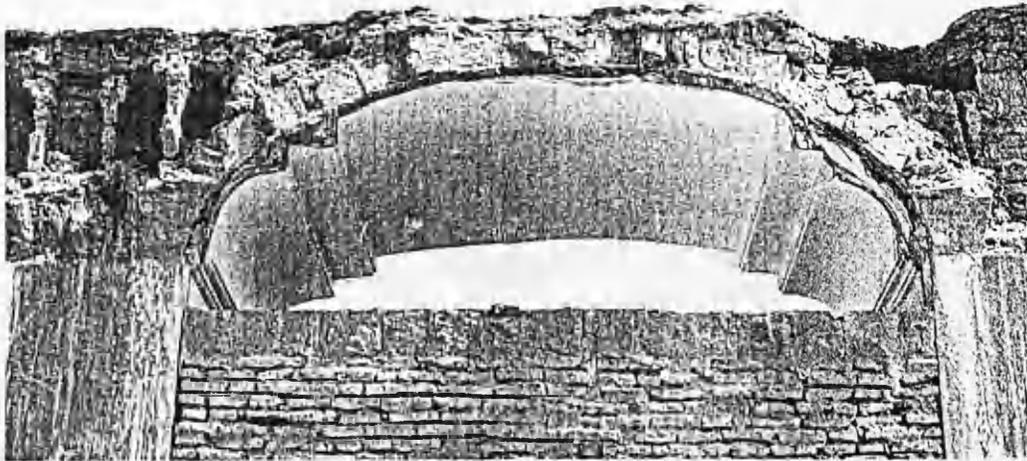
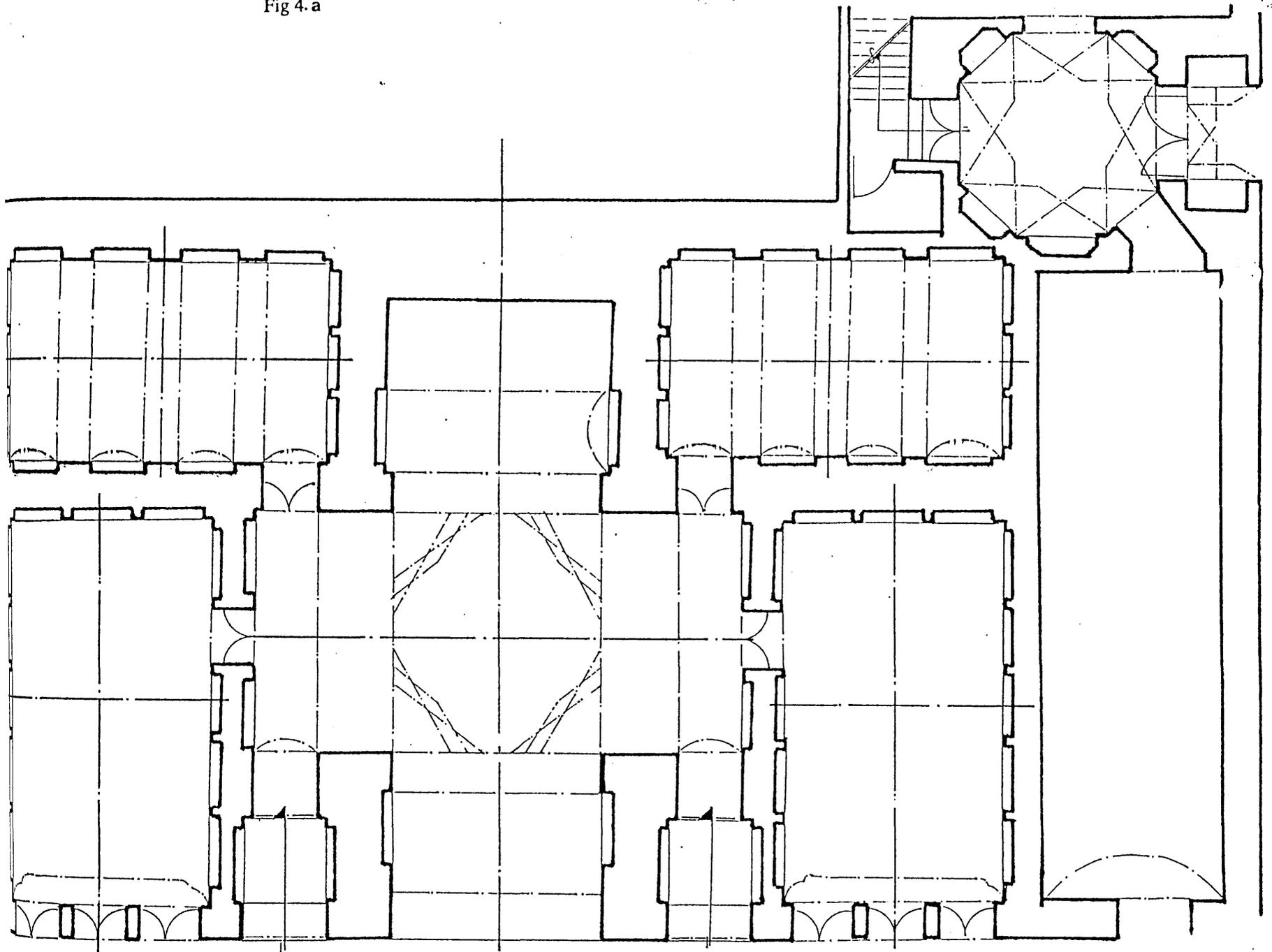


Fig 4:

a. Section of a Kelill vault.

b. A decorated Kelill vault placed in front of a room as an iwan.

Fig 4. a



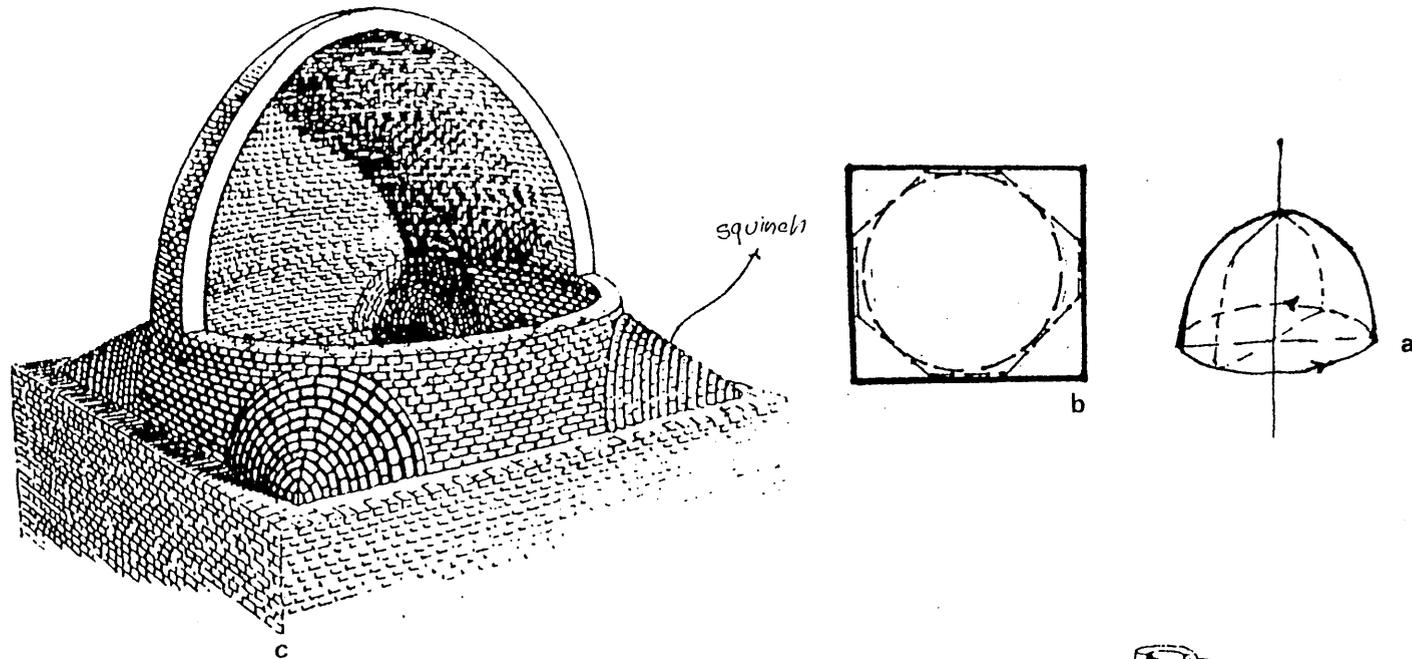
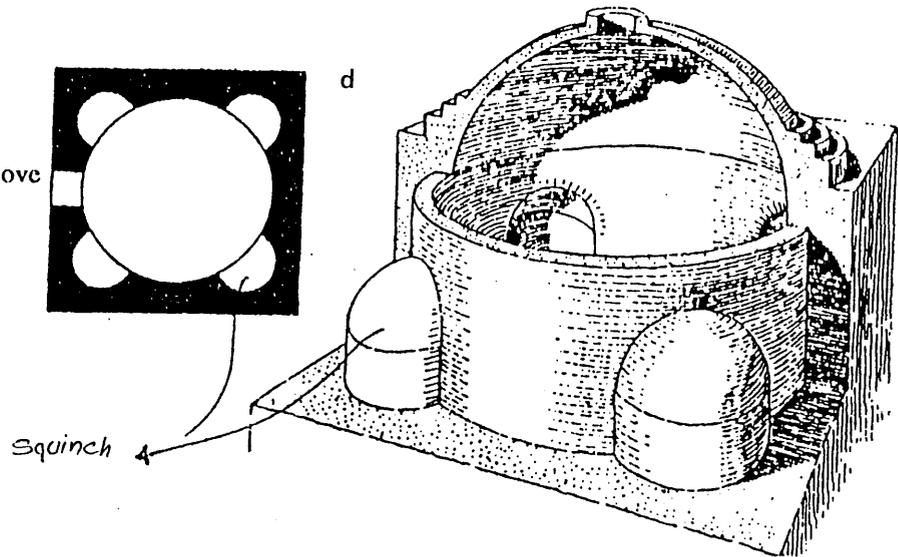


Fig 5:

- a. When an arch is rotated on itself, a dome is created.
 - b. Transition from square to circle.
 - c. The Persian type of squinch is one of the solutions to move from a square into a circle.
 - d. Clunbo, another type of squinch.
- (Persian Architecture, A.U.Pope.)



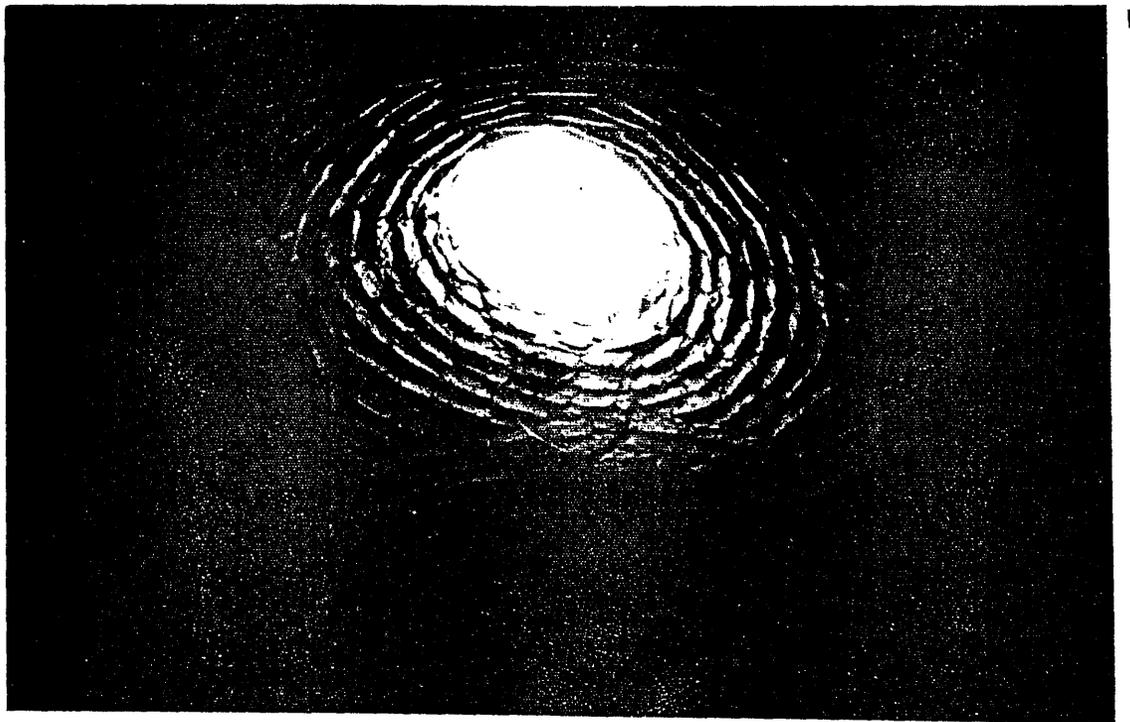
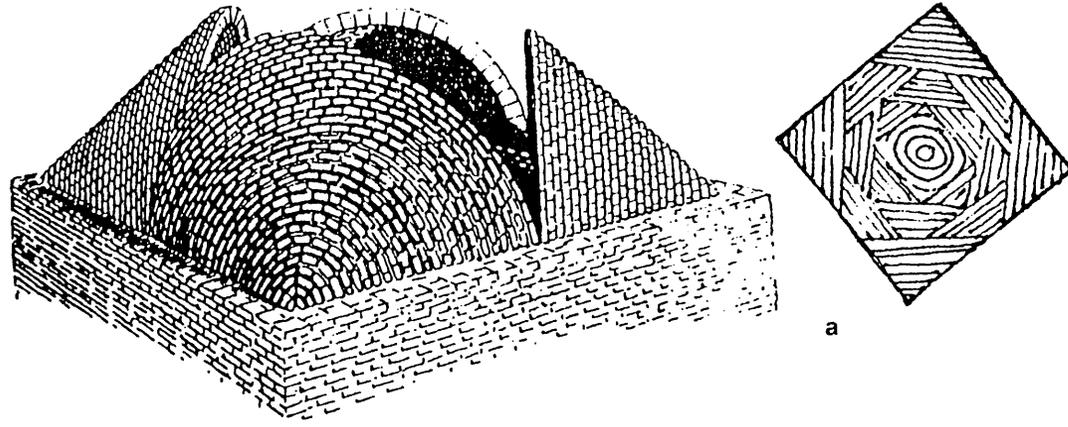


Fig 6:
a. Vaulting over a square plan .
b. The centre hole left as an
oculus.

Flat Roof

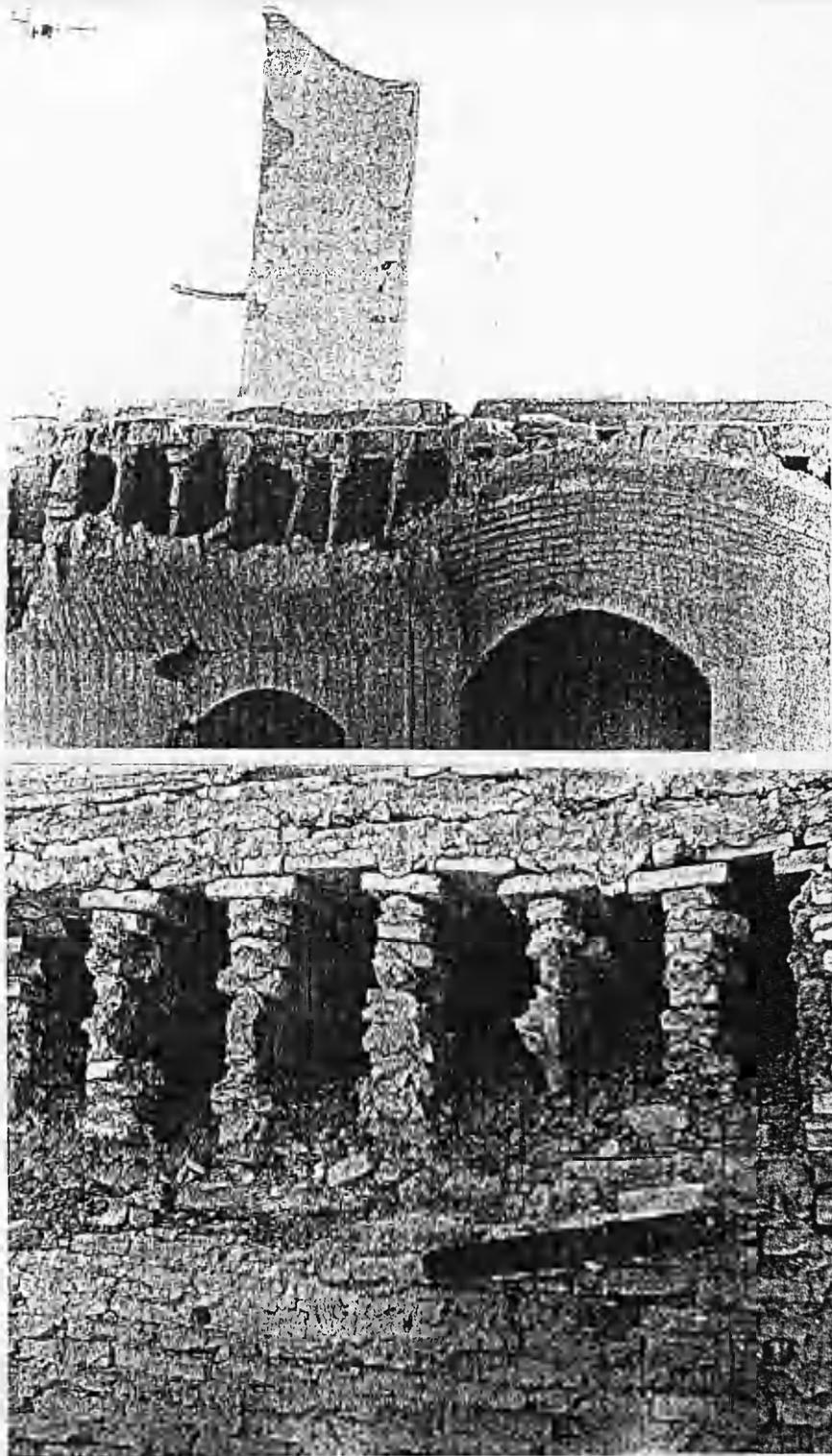


Fig 7: A flat roof on either side of a vault created by thin and light parallel walls.

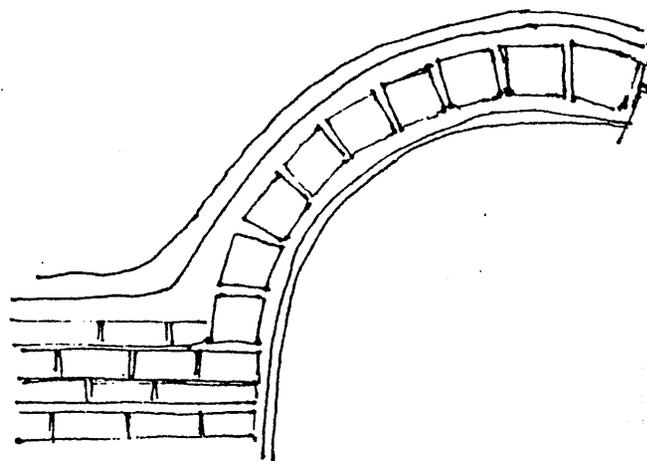
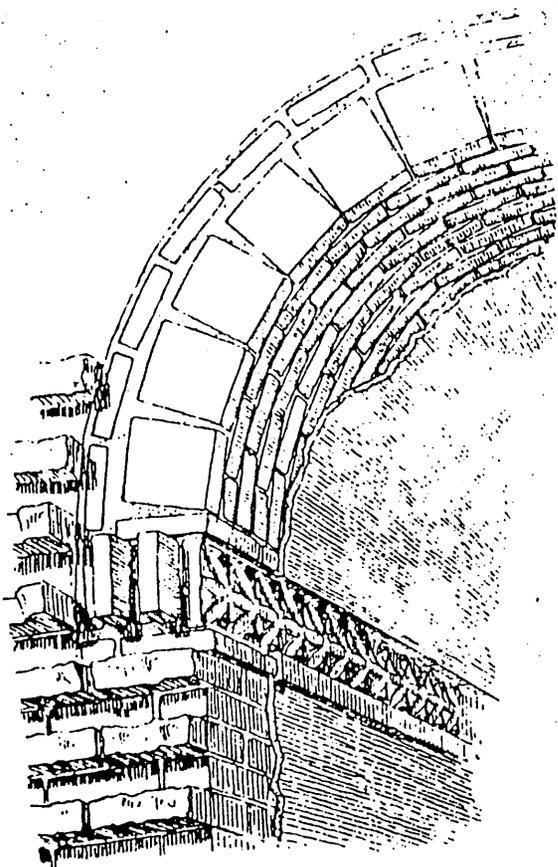


Fig 8:
a. Different angles of a Zarbi vault.



b

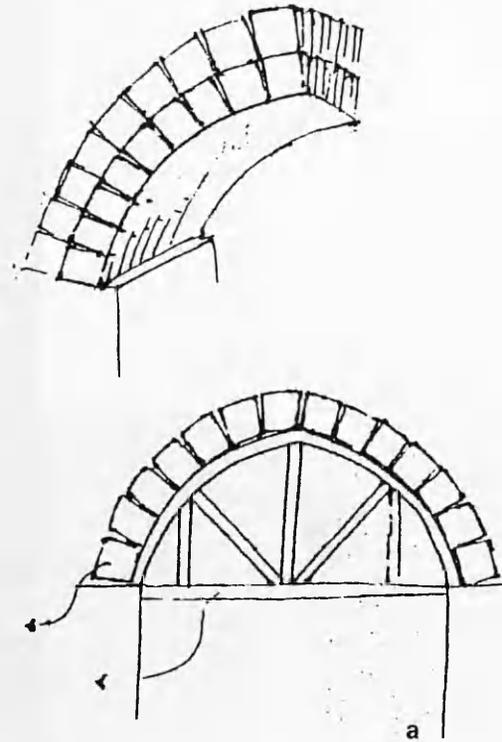


Fig 8:
b. Creating a vault with timber frame work.
c. A vault constructed by mud-brick.

Romi Vault

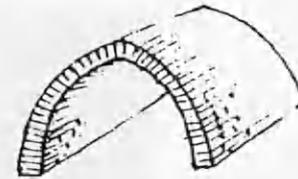
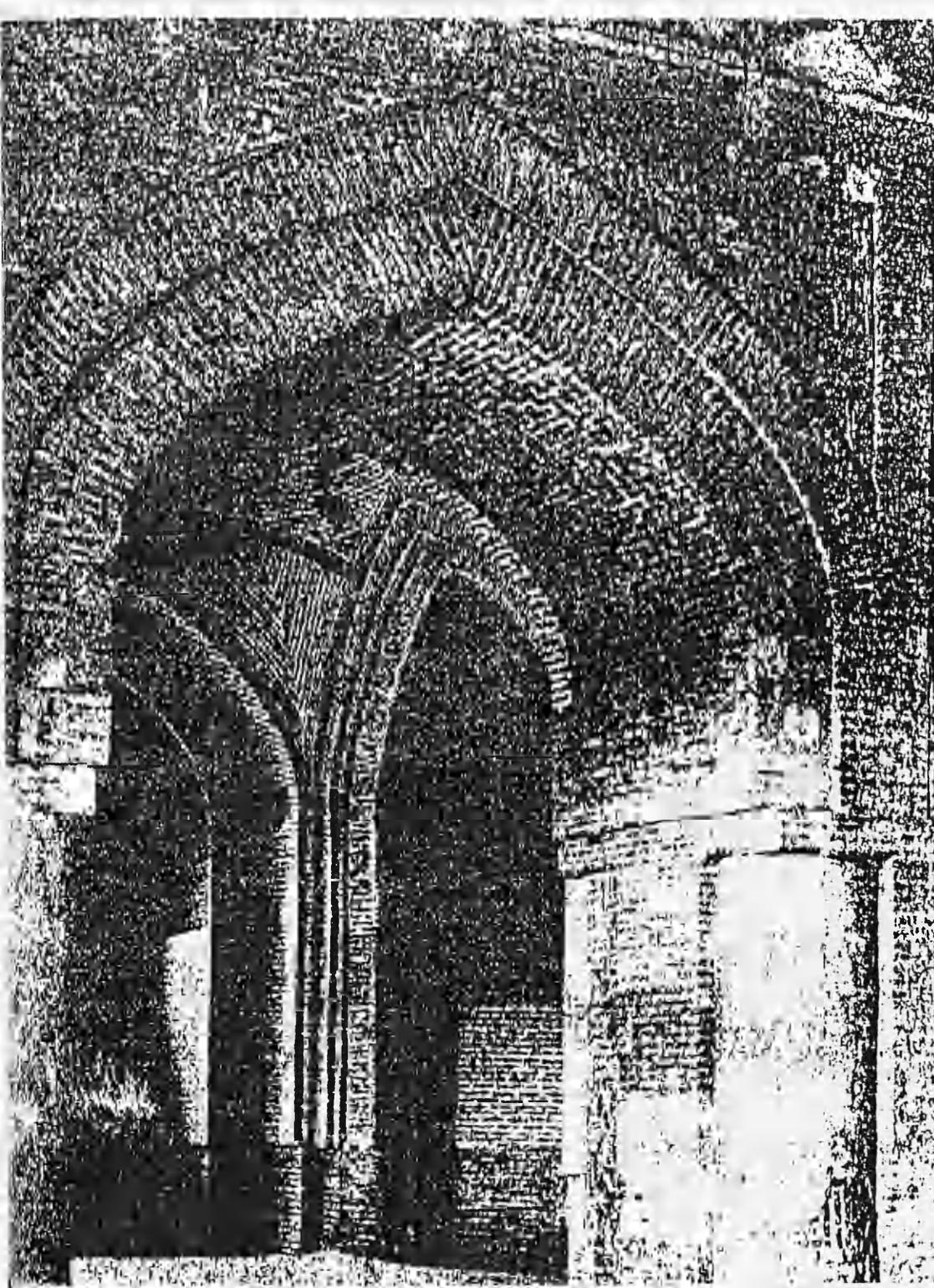


Fig 9: The strongest type of arch is the Romi vault which is used in monumental buildings.

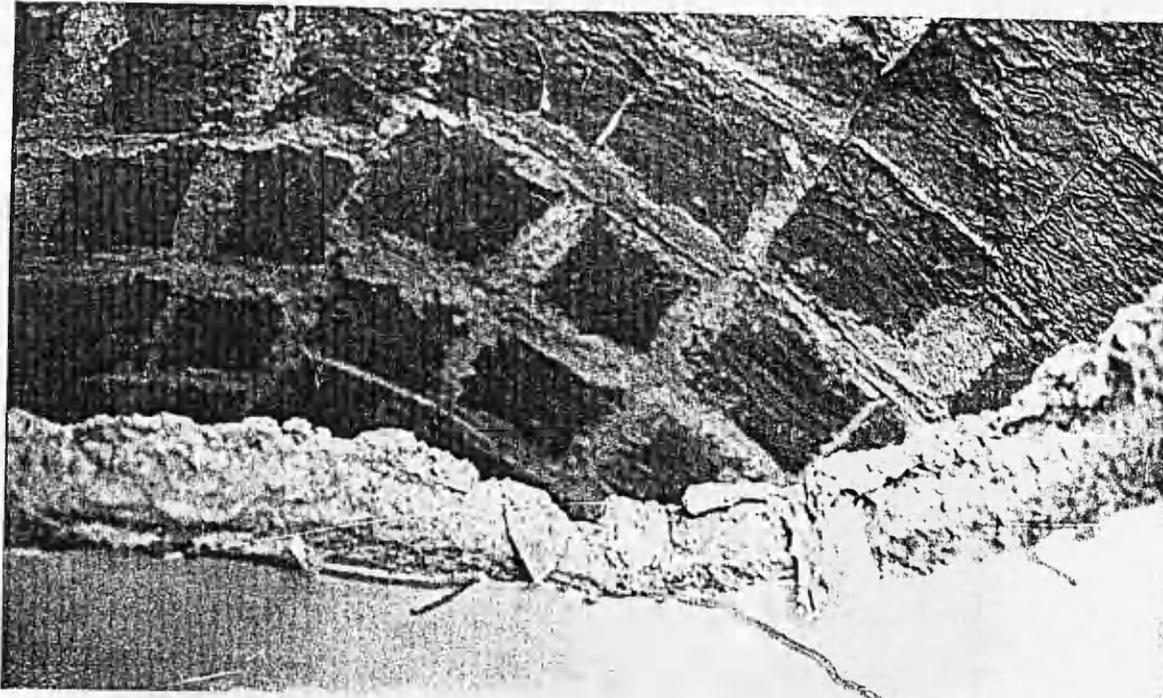
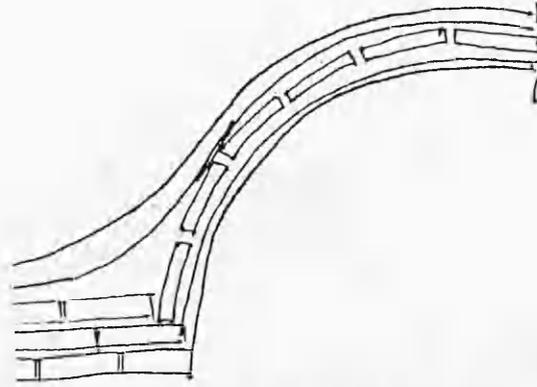


Fig 10: This very light and thin type of vault is usually used for constructing a "taq-tavizh" vault.

Sper Wall

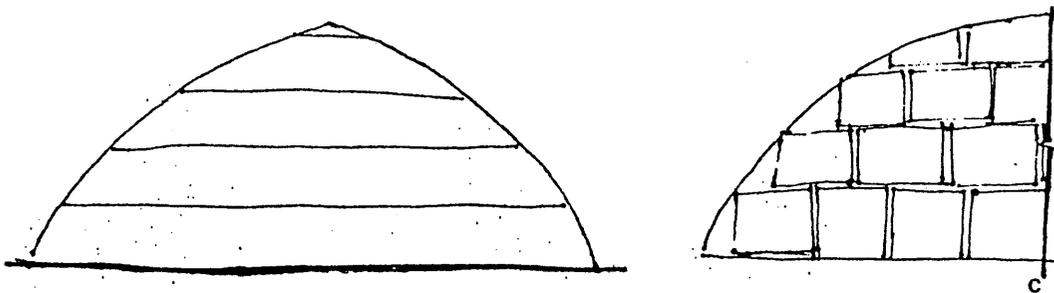
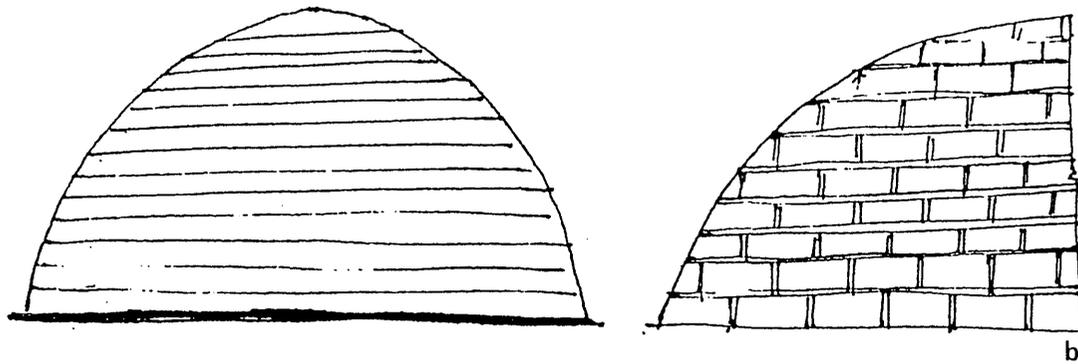
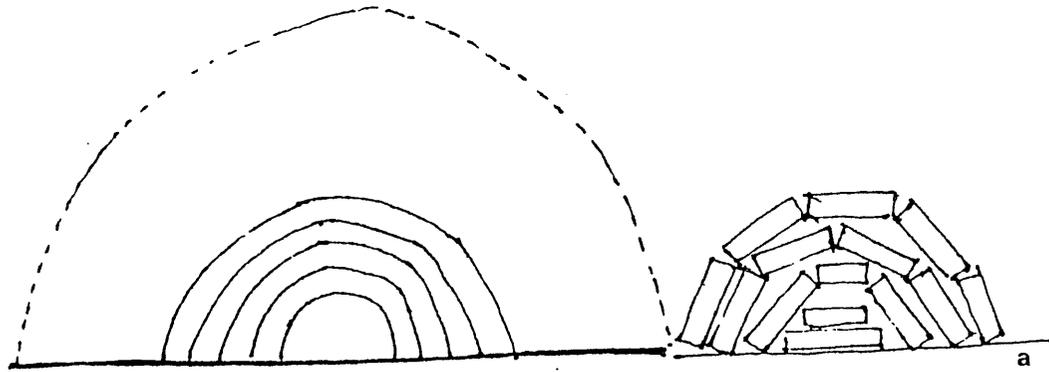
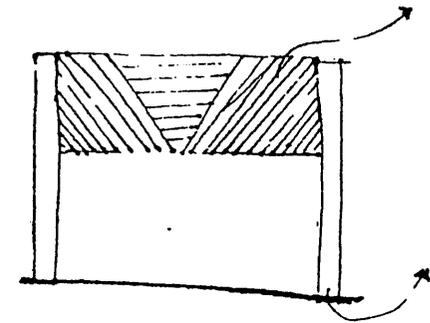


Fig 11: Methods of construction,
a. When the type of vault is Zarbi.
b. When the type of vault is Romi.
c. When the type of vault is Thigheh-ie.



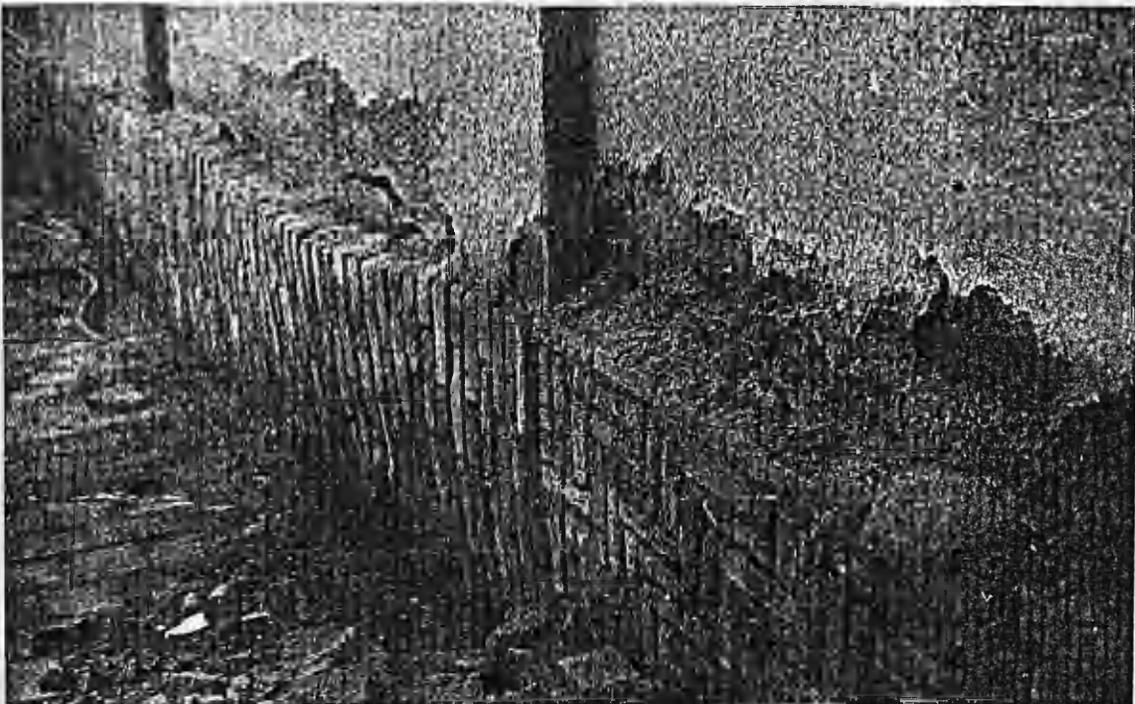


a



b

Fig 12:
a, b. Showing how foundations are made for a house in the present day.
c. The damage caused by an underground water channel.



c



a



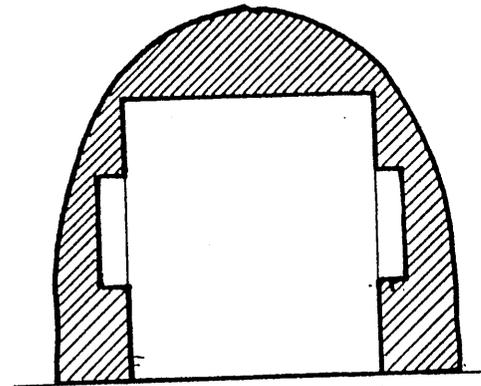
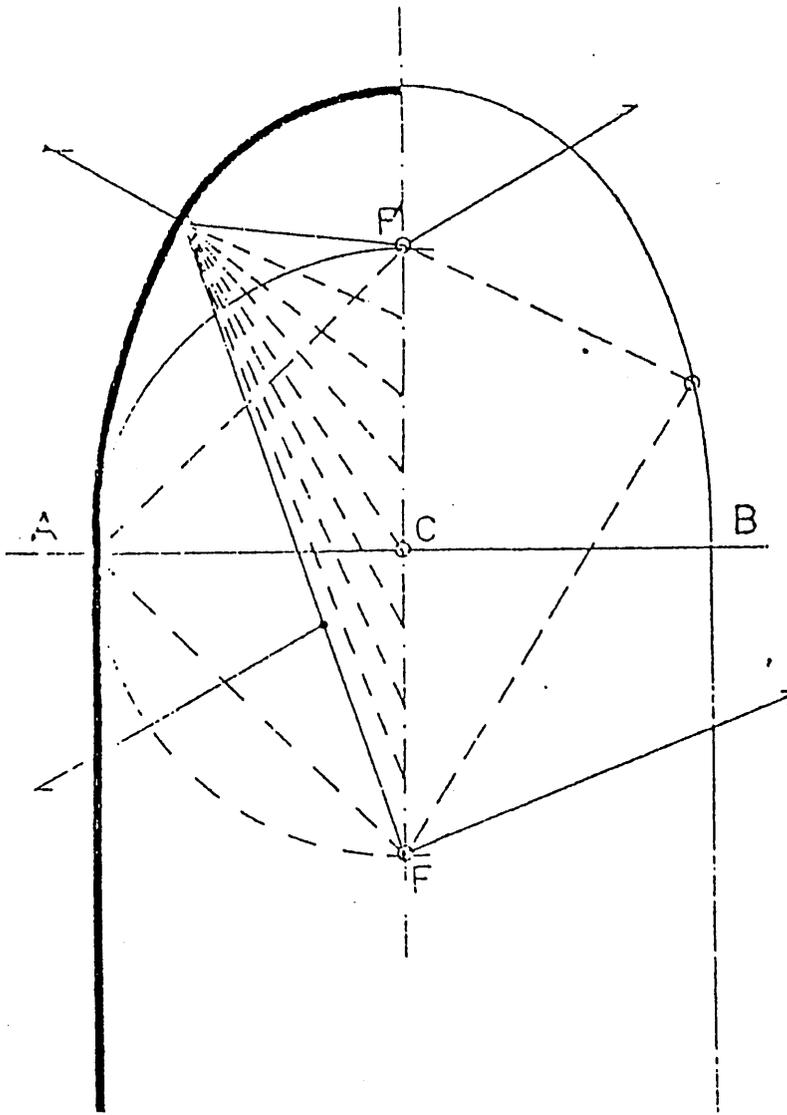
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Fig 13:

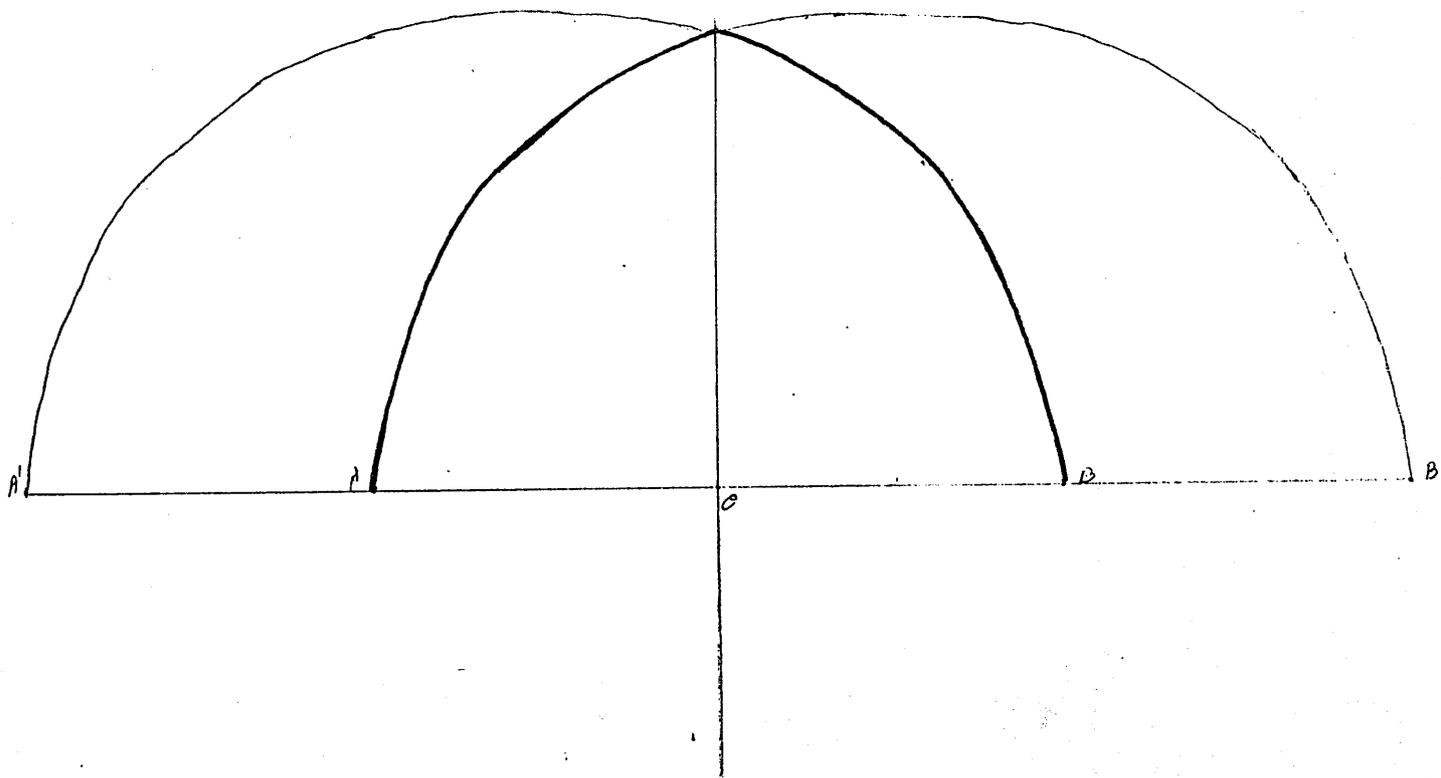
a. A water gully through the roof to street.

b. Showing construction of a mud-brick wall.

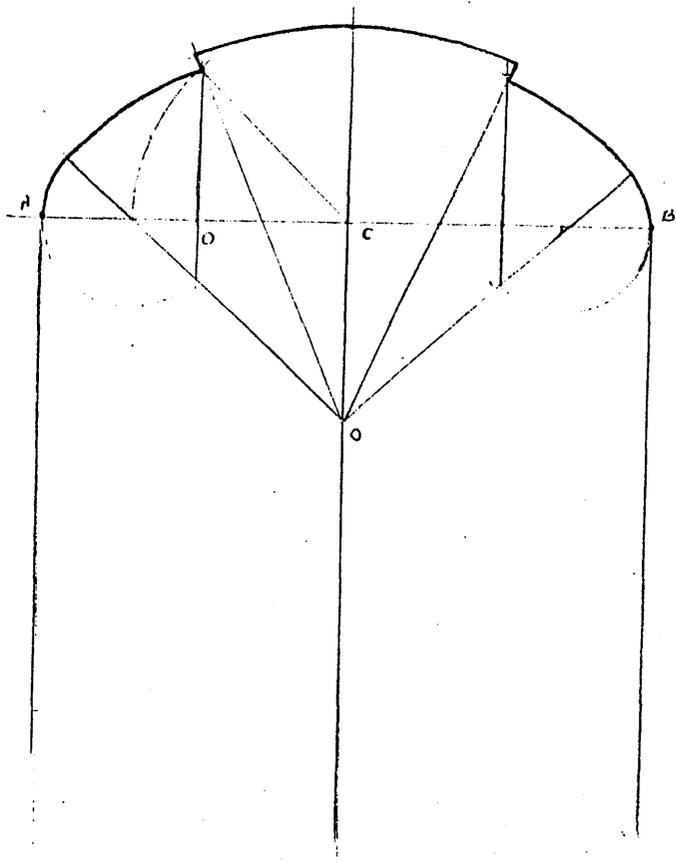
Haluchin Arch



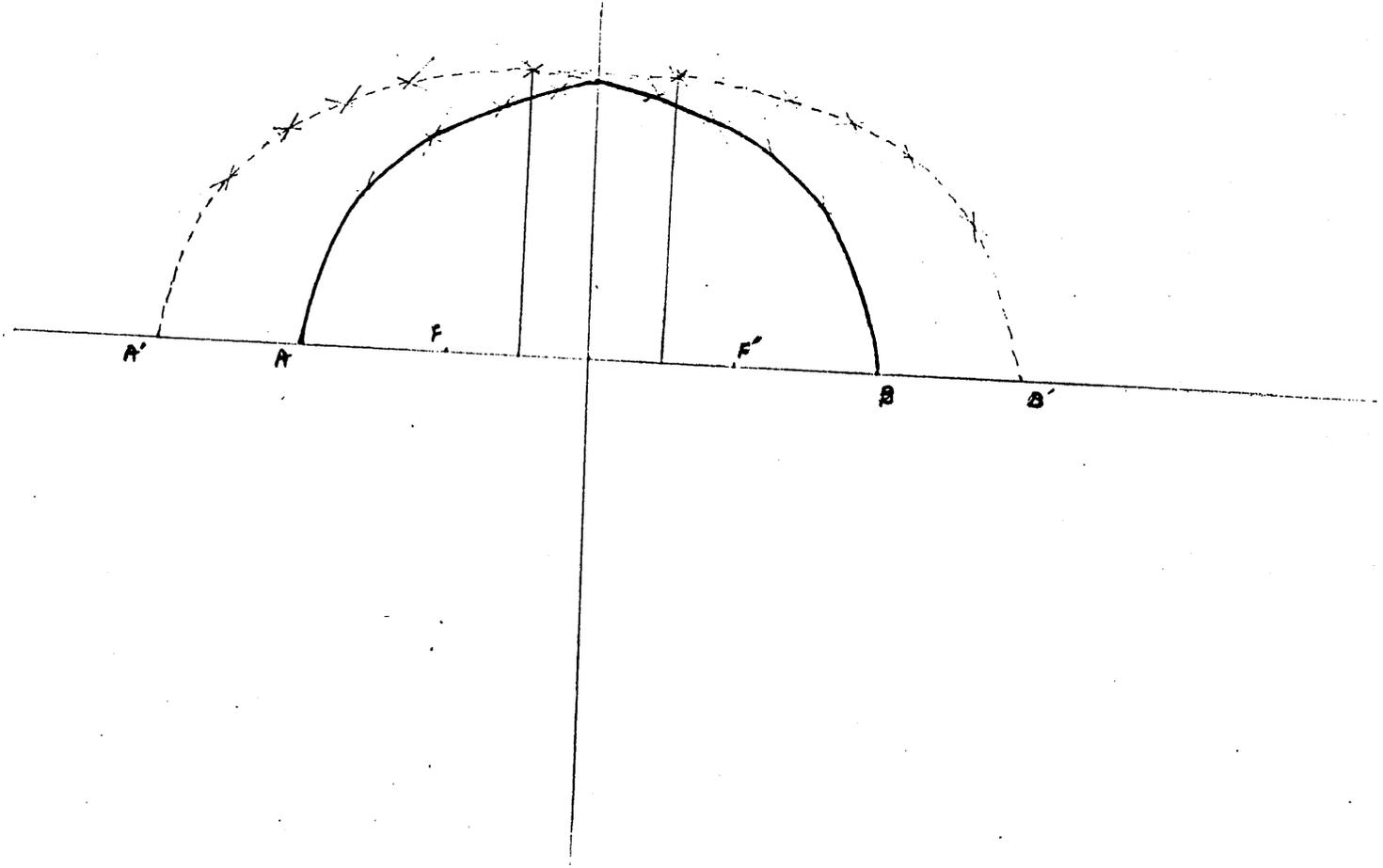
Chamane Arch



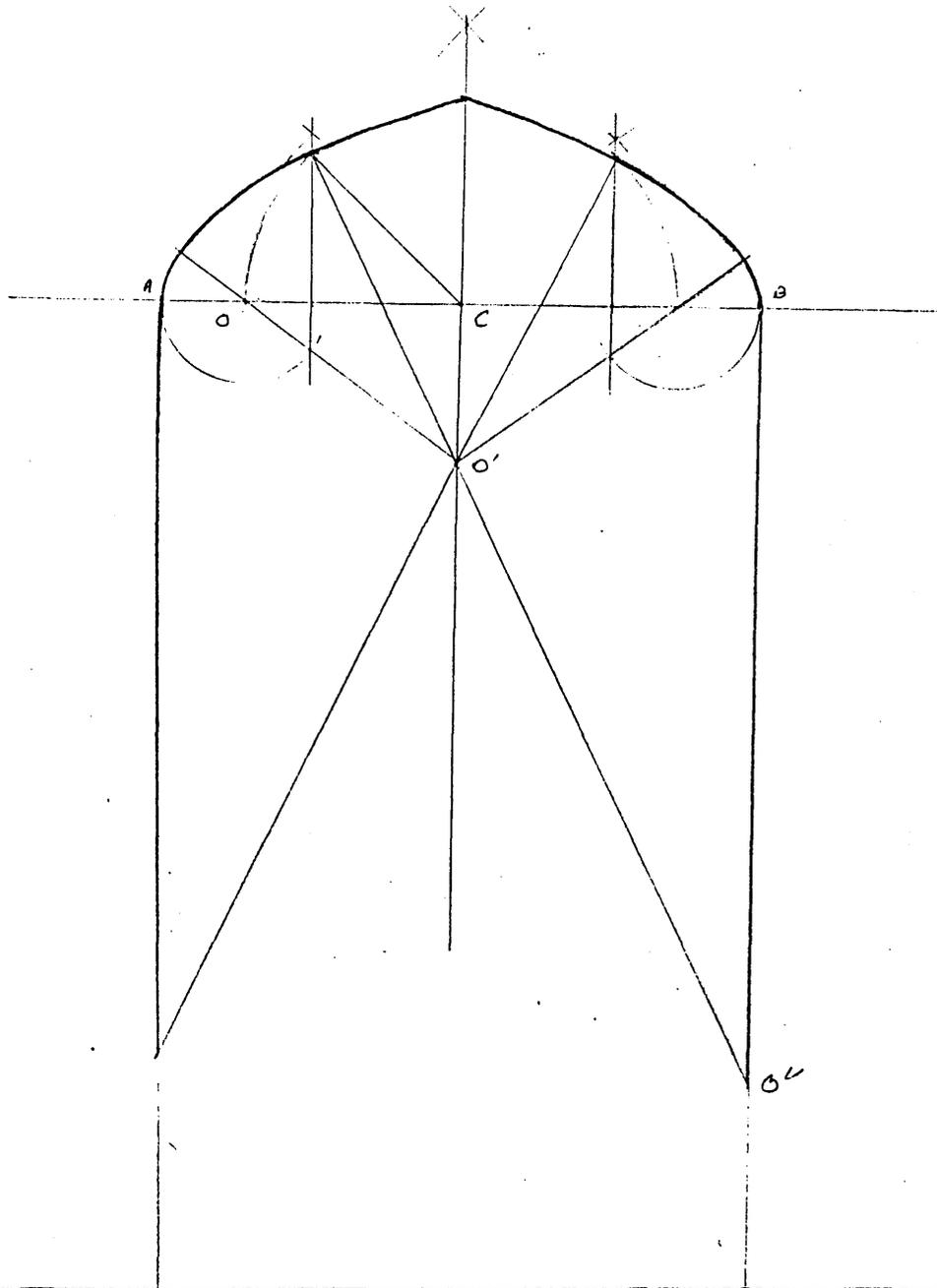
Kelil Arch



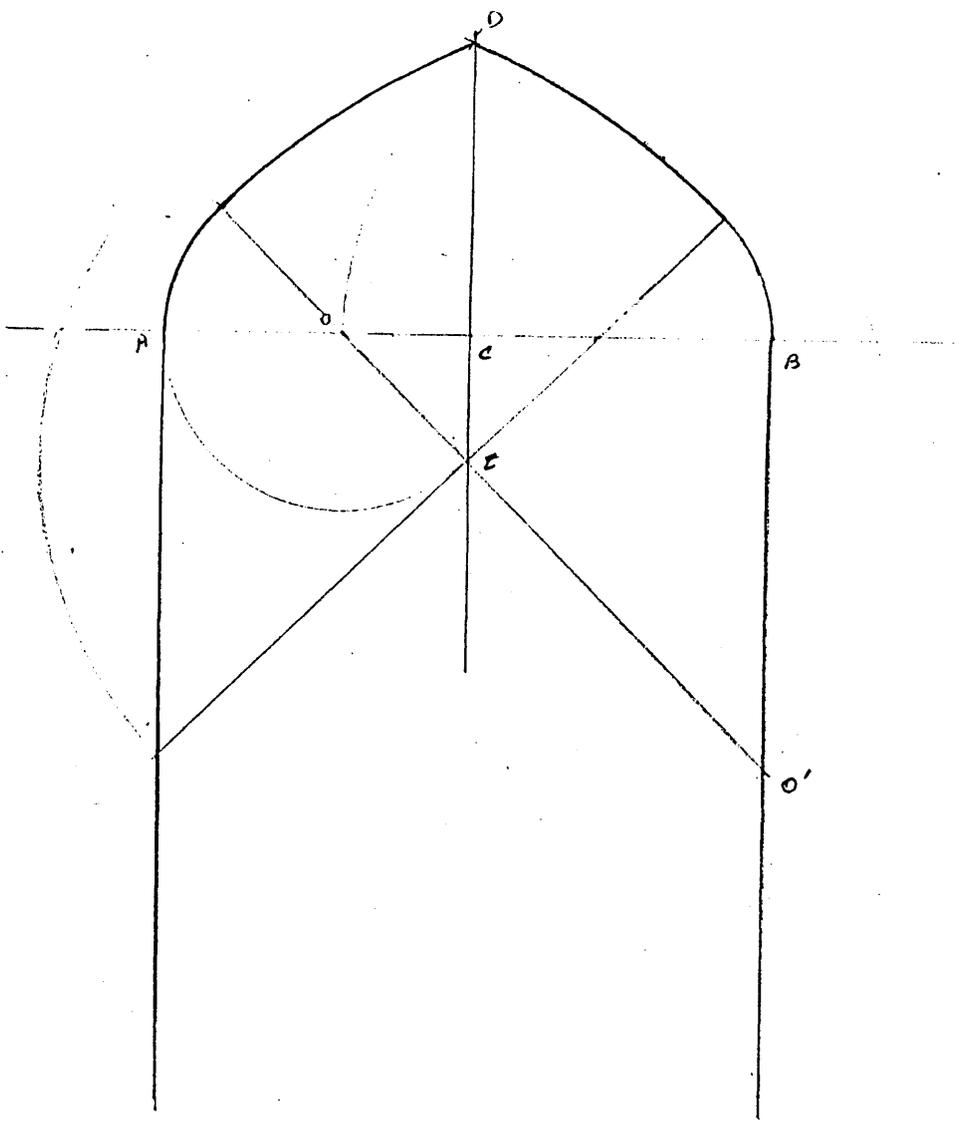
Panj o haft Arch



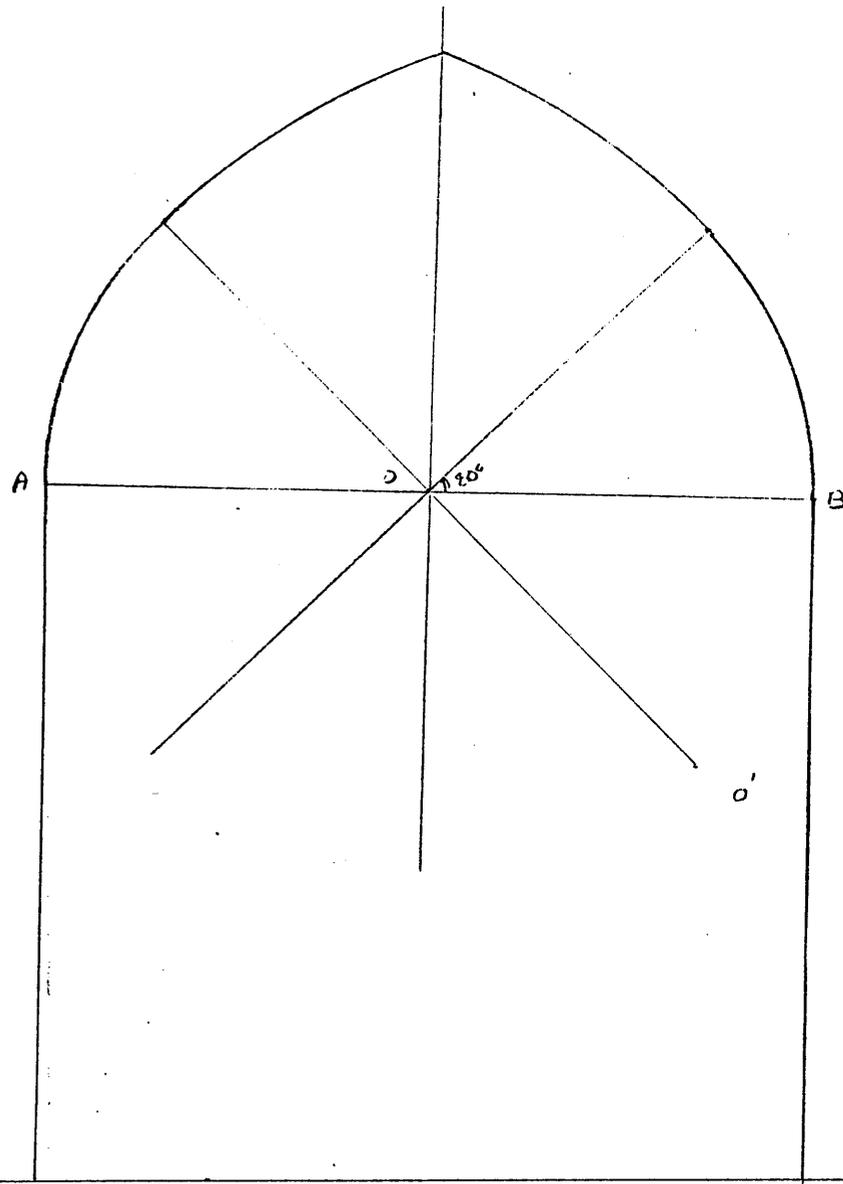
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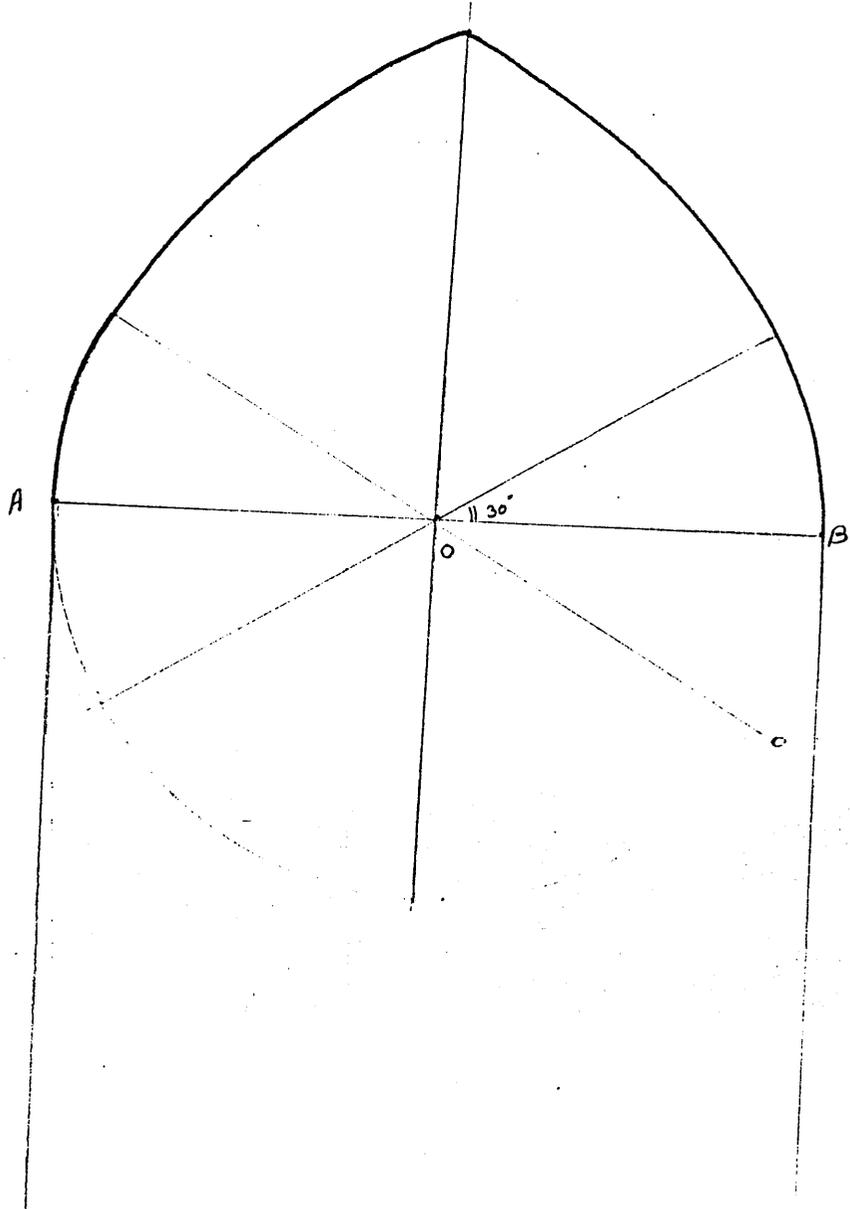
Panj o haft-i Tond Arch



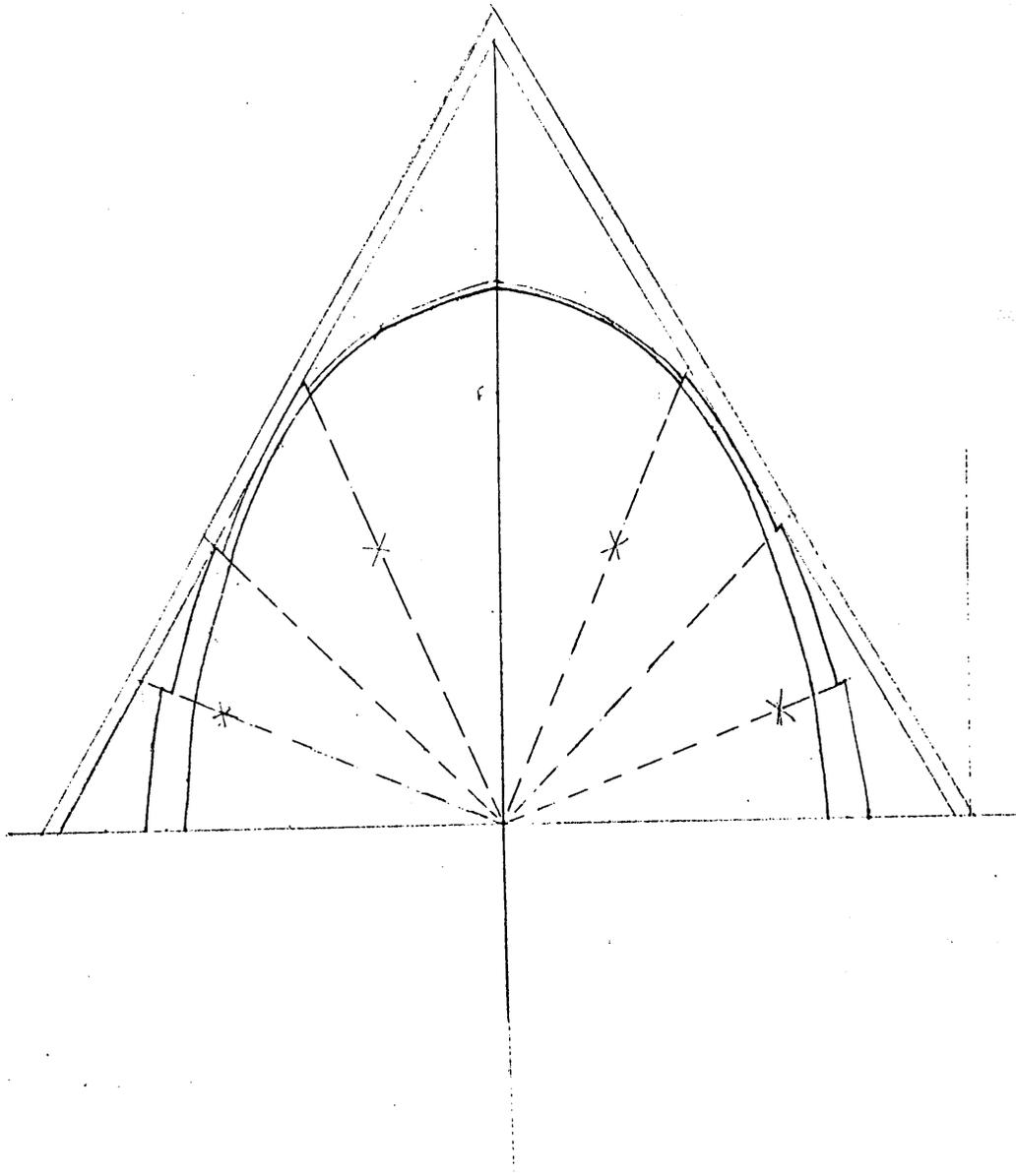
Shabdari-i kond Arch



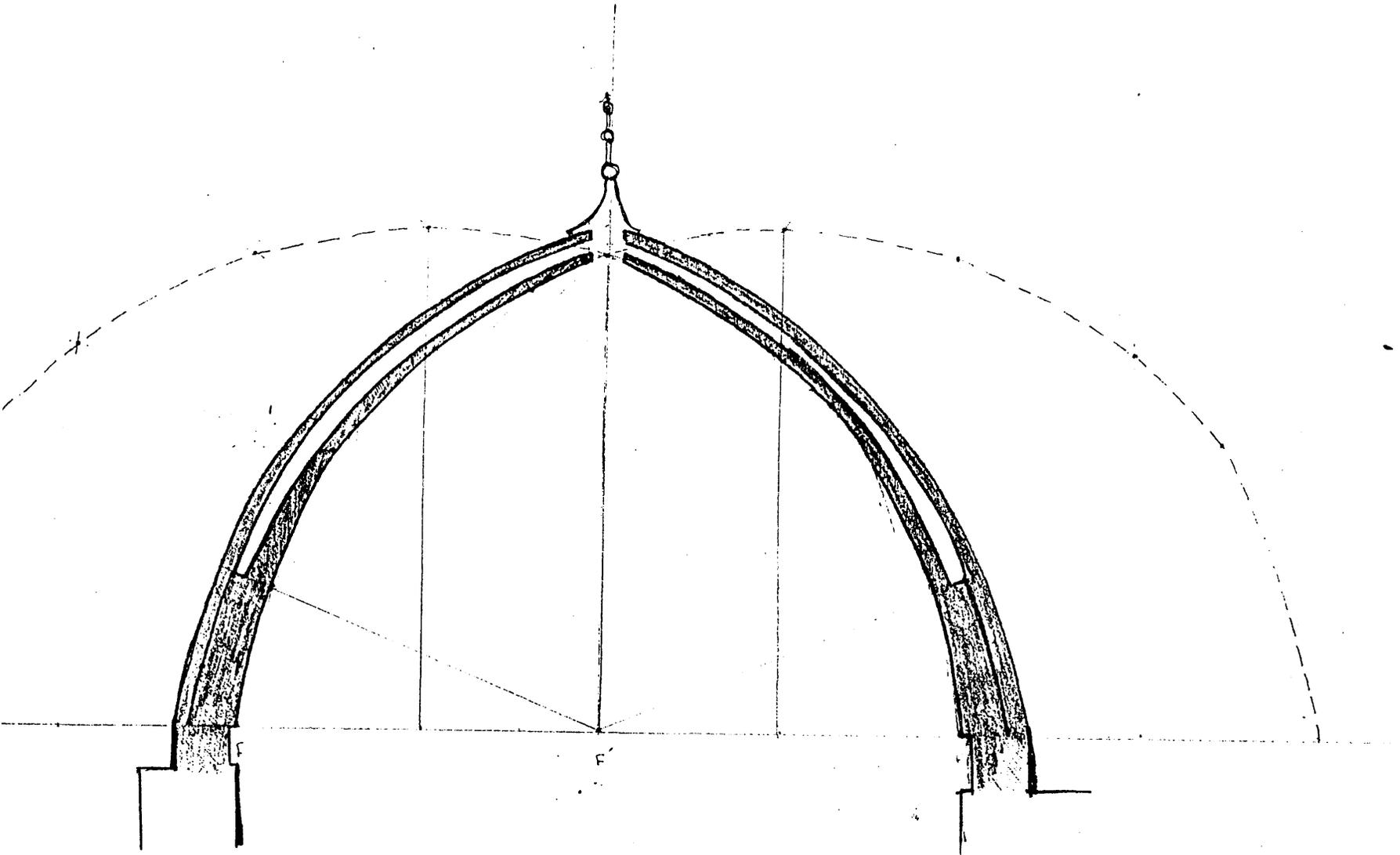
Shabdari-i tond Arch



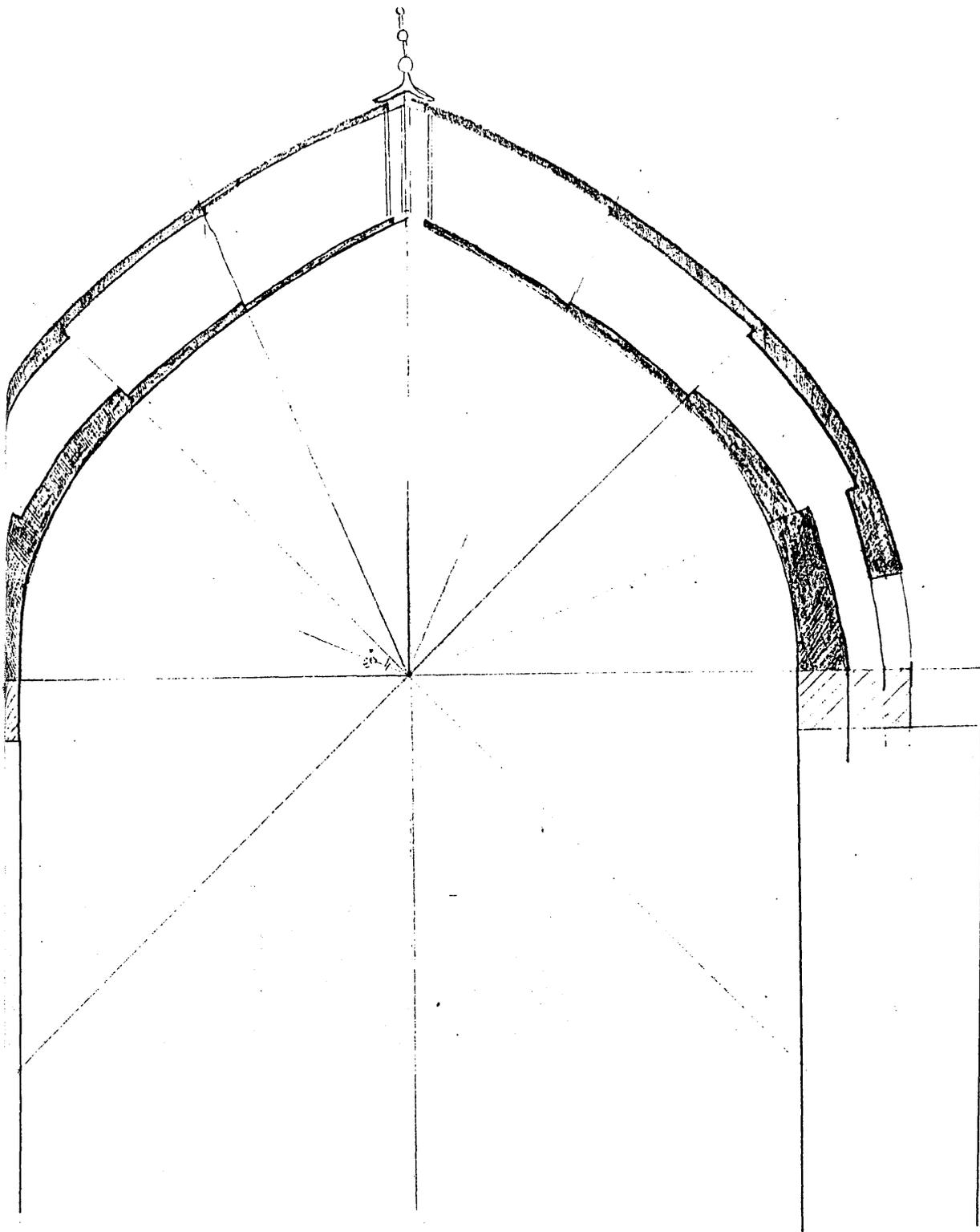
Double Dome



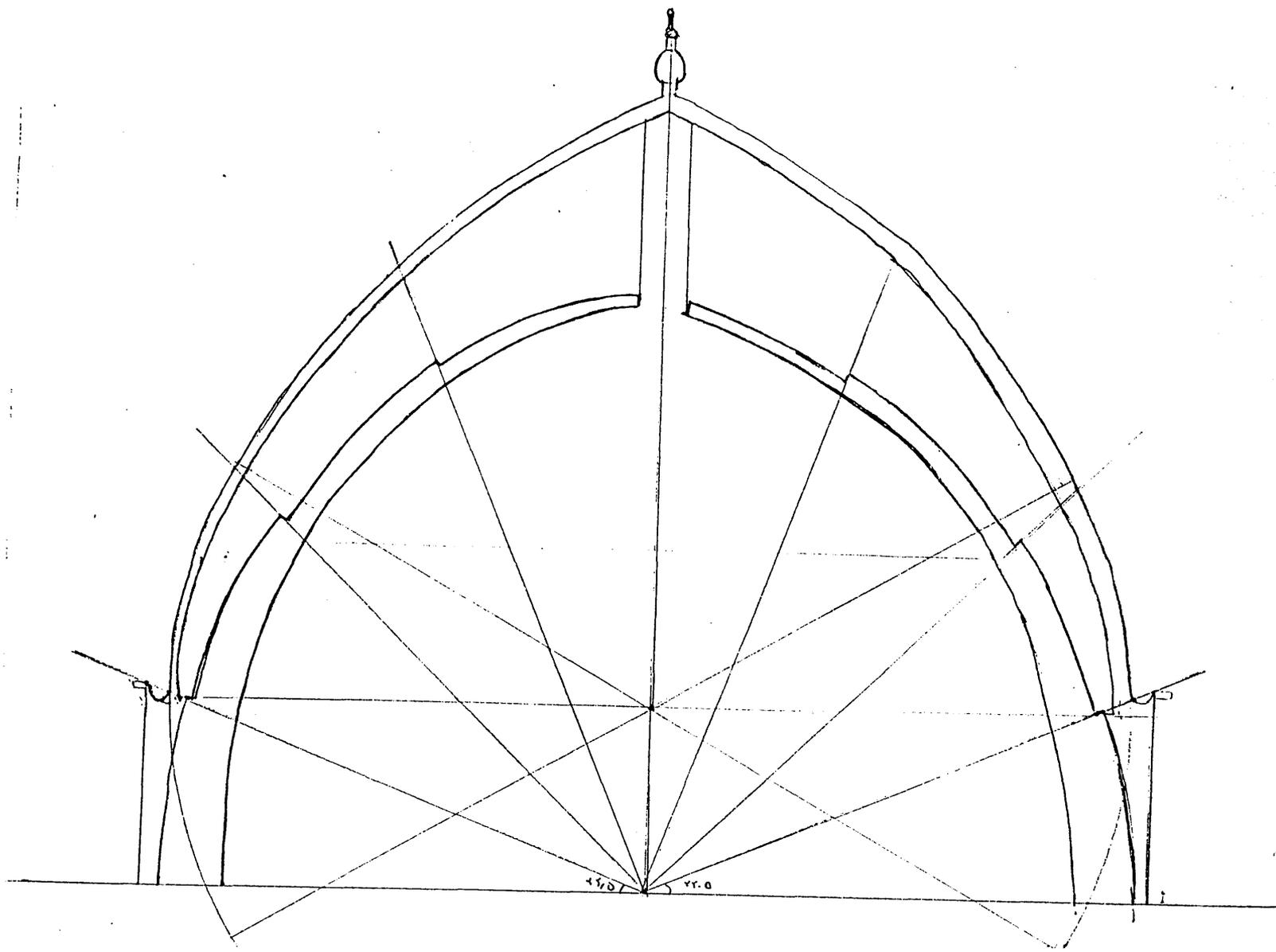
Double Dome



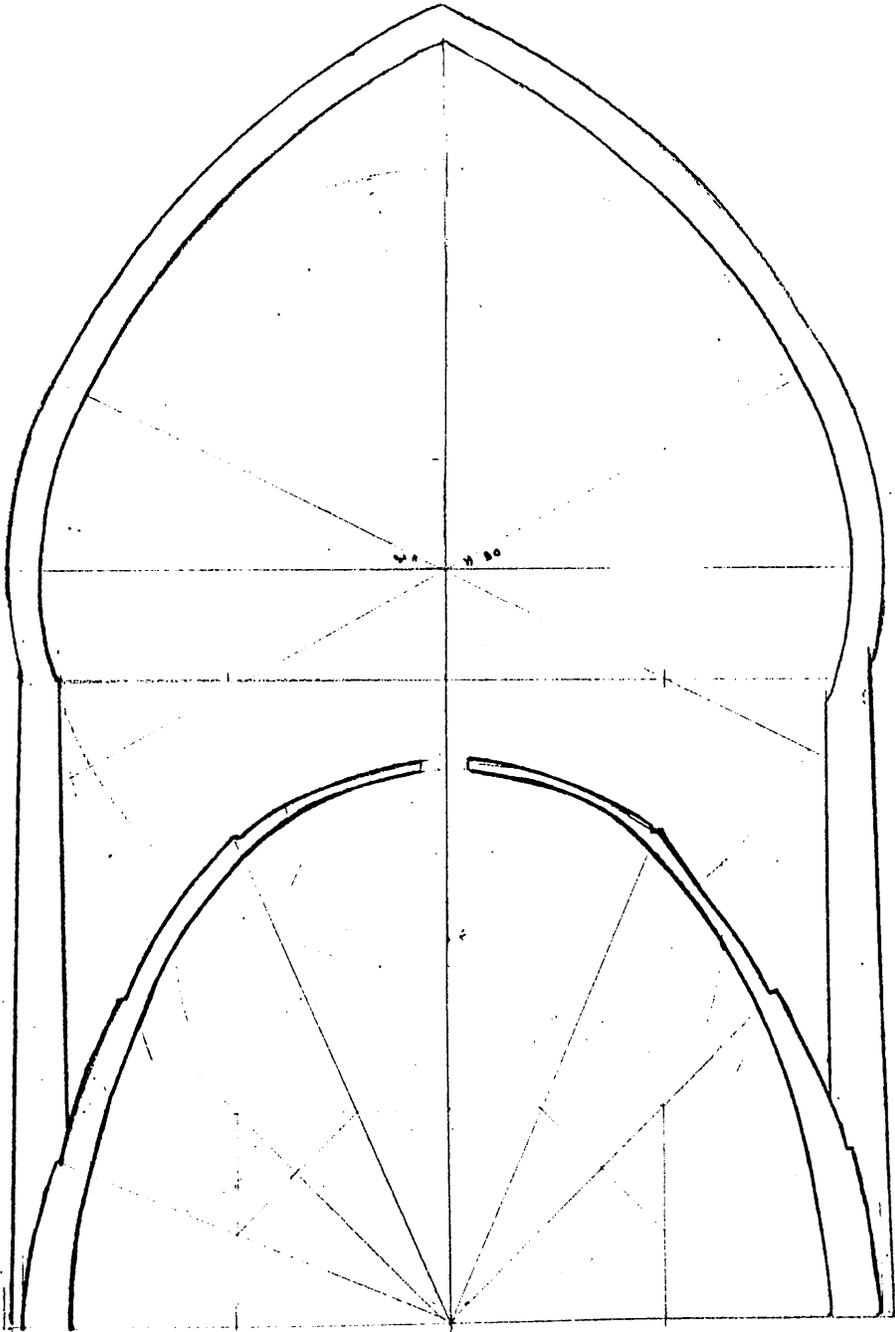
Double Dome



Double Dome

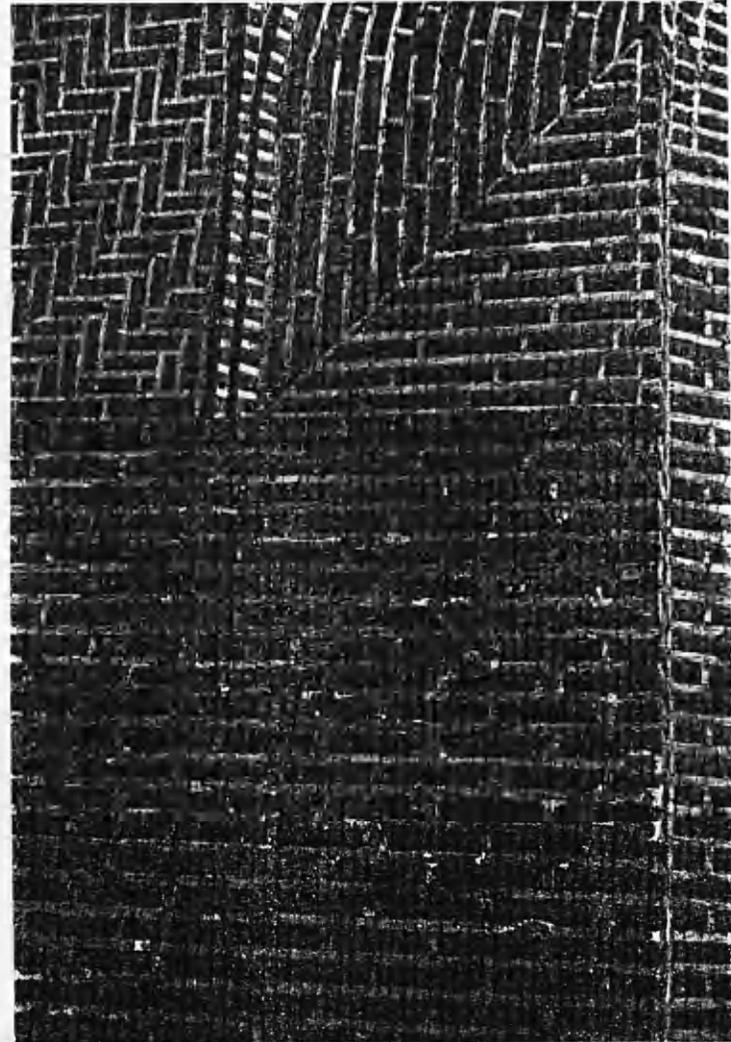


Double Dome



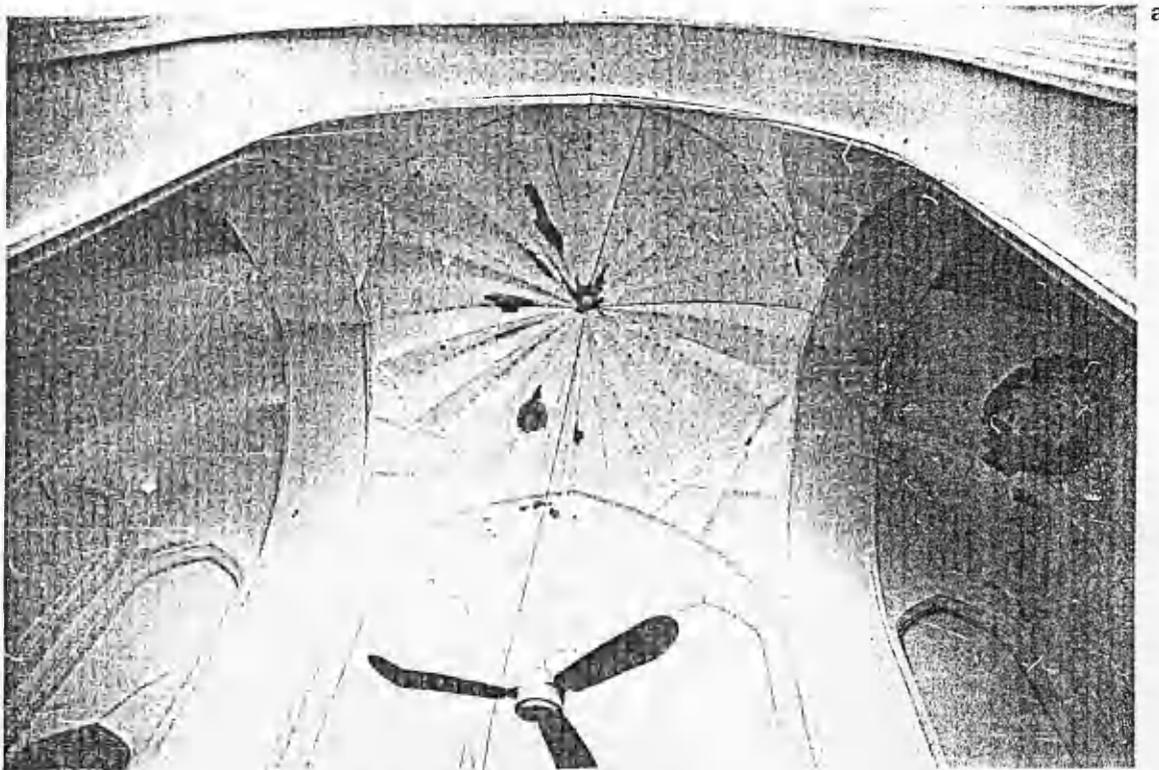


a

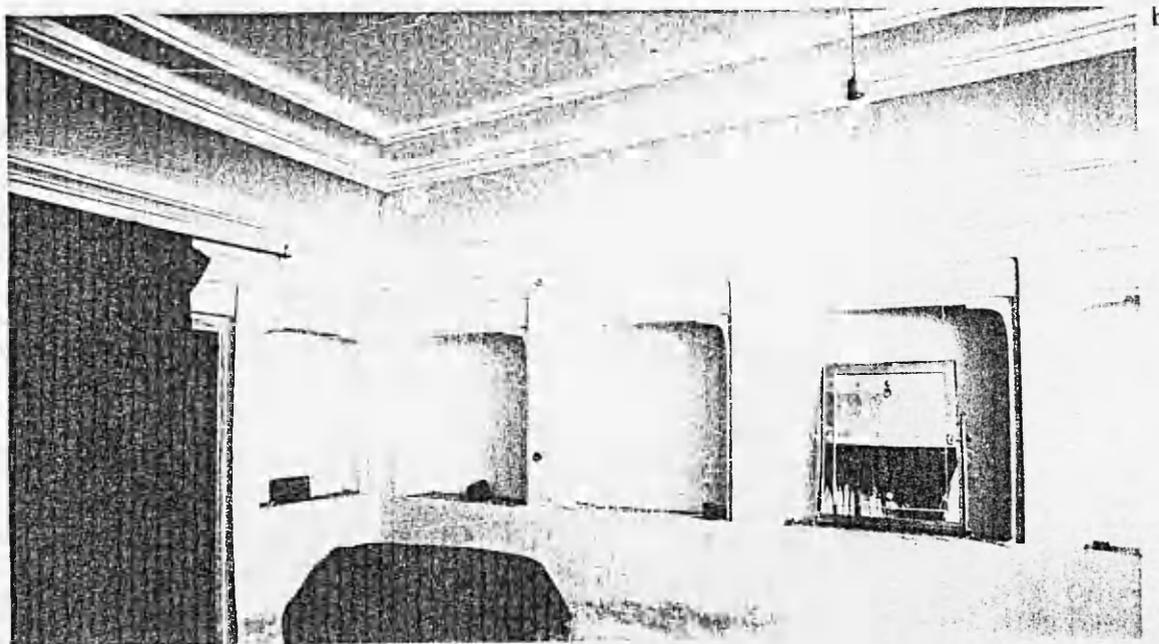


b

Fig 15:
a. Very often the moulding is pointed with gypsum.
b. Pointing between bricks.



a



b

Fig 16:
a. Pendentives are an elegant transition of square to circle which are decorated by *carbandi*.
b. Room entirely whitened with gypsum.

(18) Conclusion

Conclusion

In the past thirty years the way of life has changed in Ardakan and this change is reflected in the design of new houses. The provision of a piped water supply means that more houses have bathrooms. Electricity supply means that new houses rely on mechanical air conditioning and cooling systems, not on natural ones. New building materials such as steel and cement permit new forms of construction. A government policy of industrialising the regions has led the provision of new housing for workers. More people work in offices and factories, and increasing wealth has allowed them to own their own homes. Motor cars allow them to travel longer distances to work

and so new housing spreads into the suburban areas. The average size of families living in one household is smaller. Young people tend to move to a new house when they are married instead of living with their parents or parents-in-law. And new houses tend now to be designed by officials of the Ministry of Housing in Tehran, not by local builders. Architects study abroad or are trained by teachers educated in different countries with different architectural traditions. Thus house designs have become standardized, taking little or no account of local culture, climate, and materials.

All this has had a detrimental effect on the architecture of Ardakan. New roads for motor cars have brutally cut through areas of centuries old houses. Private bathrooms have led to the decline of the old hammams. The vernacular tradition in architecture has been lost. No longer do houses have the traditional courtyard, the *suffe*, the *sardab* or the wind-tower; and without them they lack the capacity to control or modify the internal climate to permit comfort in all seasons. Windows are too big, there is no natural air movement or ventilation; no cool places in summer or warm places in winter. Consequently, people rely on mechanical coolers and heaters, both of which

consume expensive (and unreliable) electricity. However, the humid cold air generated by mechanical air cooling causes rheumatism, which is now much more widespread than it was before.

Something must be done to reevaluate that lost tradition, otherwise the knowledge and skill exhibited by vernacular architecture in Ardakan will disappear in twenty or more years time. Such has been the experience at Tehran and other cities.

Through the study of housing in Ardakan and by analyzing the elements of these houses, it has been established how the houses worked in the past and continue to do so today. In future housing designs some of the vernacular elements are recommended to be taken into account. They are after all a result of hundreds of years of experience and comfort.

At the outset of this study I had questioned how this fine architecture originated and progressed through the centuries to realise, from a late twentieth century, a coherent urban form held together by sound

design concepts and rules.

After a sustained eight years period of working, thinking, analyzing, discussing, studying and reflecting upon this subject, perhaps it is appropriate to recall some key observations:

- a. The architectural is a three dimensional solution to the problems set by hostile climate, the cultural requirements, in particular that of privacy, of a predominantly Muslim people, the limitations of the local builders in exploiting the construction capabilities of limited resources;
- b. If the architectural can be understood in terms of elegant controlled and meaningful forms including and interesting roof

profiles. Then the concepts of space whether internal, external, or partially both, are expressed in such a way that the observer can marvel at an assuredness of composition where careful geometric principles have helped create spaces which are human in scale, uplifting in spirit and beautiful in themselves;

- c. Each building has its own architectural ryhtem, where materials, decoration, symmetry, structure, elemental forms, constructional detailing, light and shade, all contribute to that building's character, in itself unique, which in turn harmonises with those of its neighbours:

- d. Each building, whehter in a prosperous or relatively poor quarter, whether built for a farmer, merchant, shopkeeper or local landowner, and whether embellished by additional decoration or larger design elements, is the response of its builder within a constructional and cultural tradition of, perhaps, over two millenia in its evolution, where design princiles have been refined until they are seemingly second nature in their application.

This last observation is no better illustrated than in how the courtyard

integrates with the other elements and spaces of each house.

The courtyard is one of the most popular open spaces enjoyed by people. Courtyards can help create a modified micro-climate in houses thanks to two significant elements, pools and flower-beds.

The provision of light and air for rooms beside it ensures a measure of privacy and helps to retain a private life inside the house. Semi-open spaces facing the courtyard and linked to the next room are required in new housing design, in order to create cool spaces in summer, and save on significant ventilating and passive cooling systems. The wind-tower and sardab will help circulate breezes in the

living-space and make it more comfortable. In winter people will enjoy the presence of a warm sun in the morning or even in the afternoon, when they are working, eating lunch or just enjoying the company of friends, guests and so on.

In this way significant amounts of energy for cooling or heating can be saved and people need not rely on importing expensive systems from abroad. Although constructing a house with these elements may be expensive in terms of capital costs, over a long period people will experience more relief and will live in natural comfort while saving

on costs and energy.

Some construction techniques offer potential. Maintaining the internal temperature of individual rooms in the past relied on thick mud-brick wall construction. Nowadays burnt brick cavity wall construction with insulation can work as well as the traditional methods.

Finding a balance between modern, fast construction methods and good internal planning of circulation and living spaces, allied to a respect for and understanding of the tradition ways of life, the

functions and the forms of vernacular architectural elements, will help ensure a living architecture fit for the future and mindful of the past. Such an architecture, found at the fringes of a desert, clearly identifies with a peoples' spirit.

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