

# NORTHERN UPLANDS . 4



## Northern Uplands.

### 4.1.1 Physical Description

Dividing the Batinah coastal plain from the interior desert of Oman is an extensive range of mountains running from the northern limits of Oman through to the north eastern coast. The principal area of habitation is the central valley lying at the foot of the Jebal Akhdar, massive limestone mountains rising to the immediate north of the plateau. Low hills divide the area from the desert, Rub-al-Khali, to the south, but to the south east the land opens out into the desert. Towards Bahla and Hamra the flat valley areas become increasingly reduced. At all times the mountains form an impressive backdrop to the scattered settlements. The largest town of the area is Nizwa, once the capital of Oman proper. As with the majority of towns and villages in the area, the settlement is surrounded by, or is beside, an area of date gardens and garden plots. Water comes from the underground irrigation (Falaj) systems, and many of the cultivated areas also supplement this supply with wells. Some of the riverbeds have water in them, but are in most cases only running during the flash floods that occur from time to time, filling the dry beds with several metres of water. Cultivation occurs in localized areas in between which there is little vegetation. The valleys have fertile soil, except for in the immediate vicinity of the river beds, which are filled with gravel and boulders. There are five main settlement areas, with their areas of fertility - Hamra, Bahla, Nizwa, Izky and Manah to the south east.

#### 4.1.2 Climate Introduction - Northern Uplands

The mountain terrain of the Northern Uplands is the chief factor modifying the climate. The high altitude is responsible for the somewhat cooler temperatures. Being inland from the coast and in the lee of the mountains, the air is dryer than that on the coast. Daily and yearly ranges in temperature are wider than on the coast where the sea acts as a moderating factor.

Very little meteorological data is available for the Northern Uplands because stations have not been established. Only very recently has P.D.O. begun to systematically collect climatic information at their base in Iski. Data from that station is presented here in chart form (Fig. 602). Because of the short history of the station, statistical averages over several years could not be calculated.

From the effective temperature chart it can be seen that the climatically critical months for which building designs must cater are from May to August when large parts of daytime temperatures exceed the comfort zone, and from November to February when temperatures are too cold for much of the day and night.

Winds are greatly effected by the mountainous terrain. Settlements in valleys are depending on the wind's directions and the position of the valley, either sheltered from the winds by the hills around or subject to winds which are funnelled along the length of the valleys. Prevailing winds are Northerly from October to May and South-westerly from June to September. Within this there are diurnal fluctuations caused by the heating and cooling cycle of the valley slopes during the day and night. Upslope winds occur during the day and down-slope at night (Fig. 404).

During the daytime the slopes receiving solar radiation heat up. Hot air on these slopes is light and therefore ascends creating a low pressure area. Cool air which has collected in the valley during the night moves up the slope toward the low pressure area. Daytime upslope cool breezes are created in this manner.

During the night, the valley slopes lose heat by radiation to the sky and become cooler. Air on the slopes is cooled and becomes denser and heavier and descends, flowing down the valley slope (illustrating air's fluid properties). Night-time down slope breezes are thus created. Daytime upslope breezes tend to be more intense than the night-time down slope breezes. \*

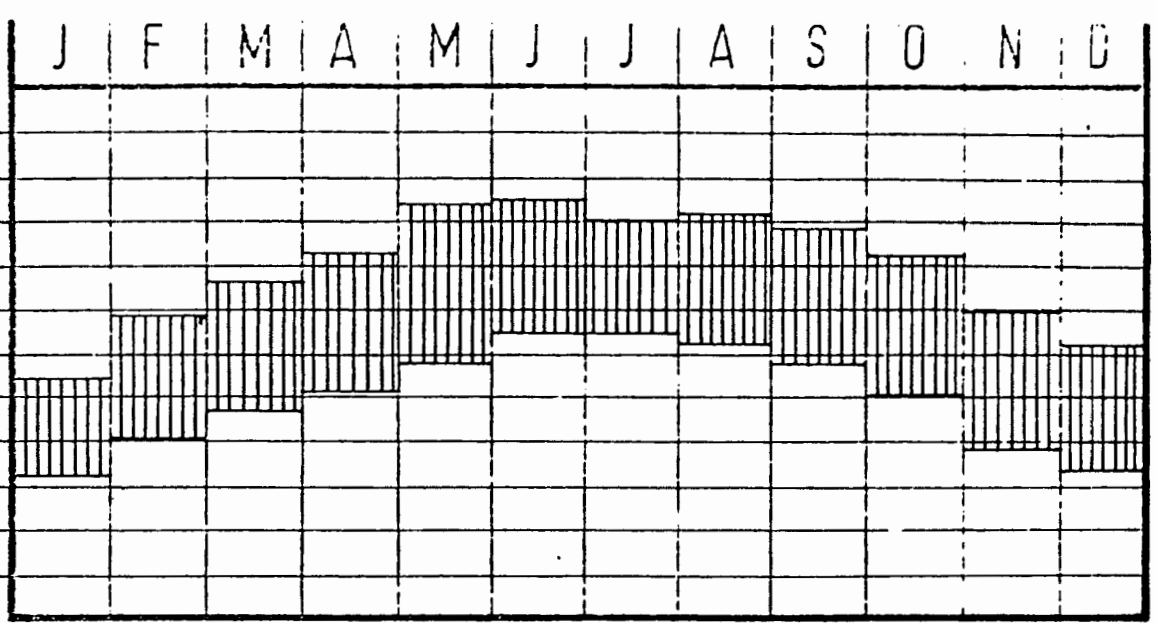
\* Ref: Chapter VII. The Climate near the Ground - Rudolf Geiger. Harvard 1965

IZKI

Fig 402

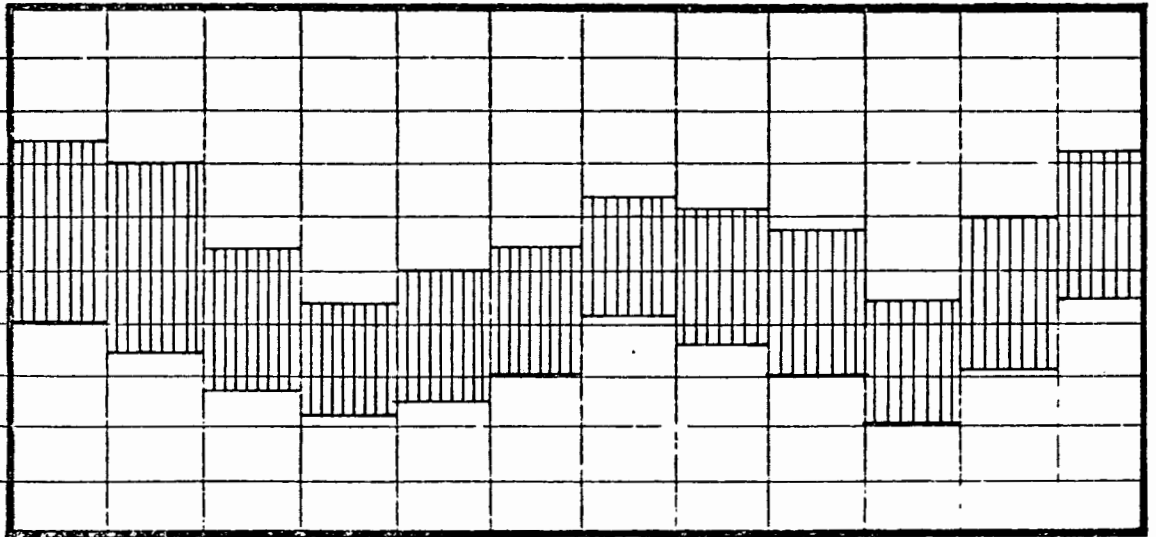
AIR TEMPERATURE °C

45  
40  
35  
30  
25  
20  
15  
10  
5  
0



RELATIVE HUMIDITY %

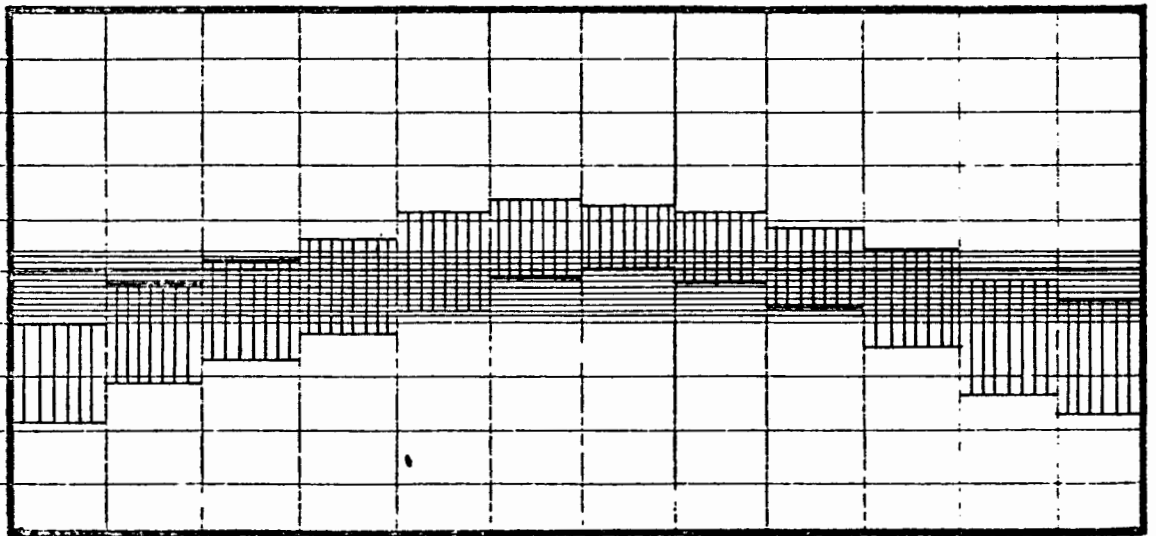
90  
80  
70  
60  
50  
40  
30  
20  
10



EFFECTIVE TEMPERATURE °C

45  
40  
35  
30  
25  
20  
15  
10  
5

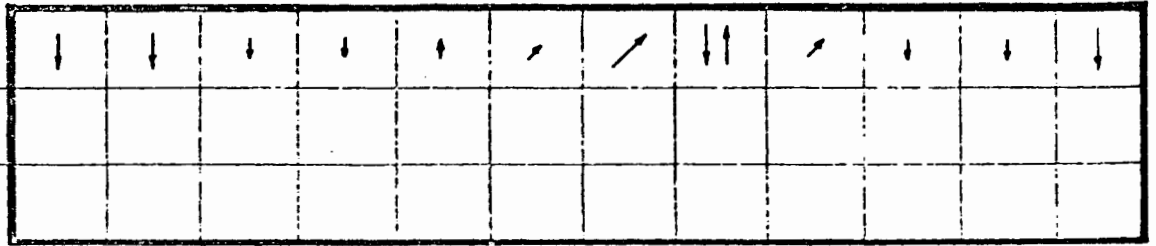
comfort zone  
25



WIND

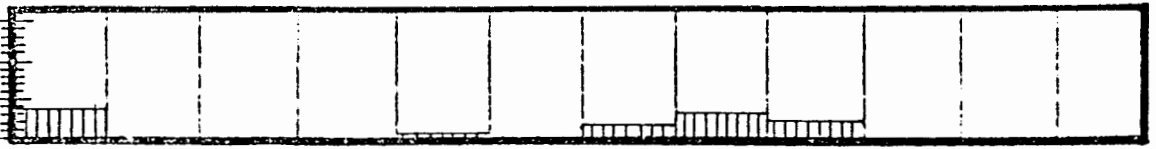
direction and relative direction

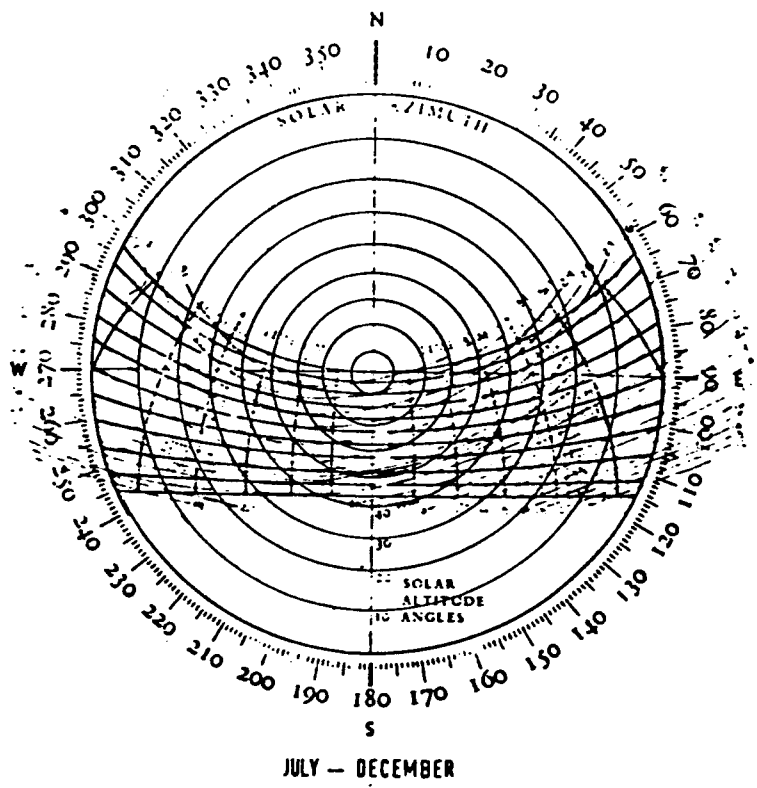
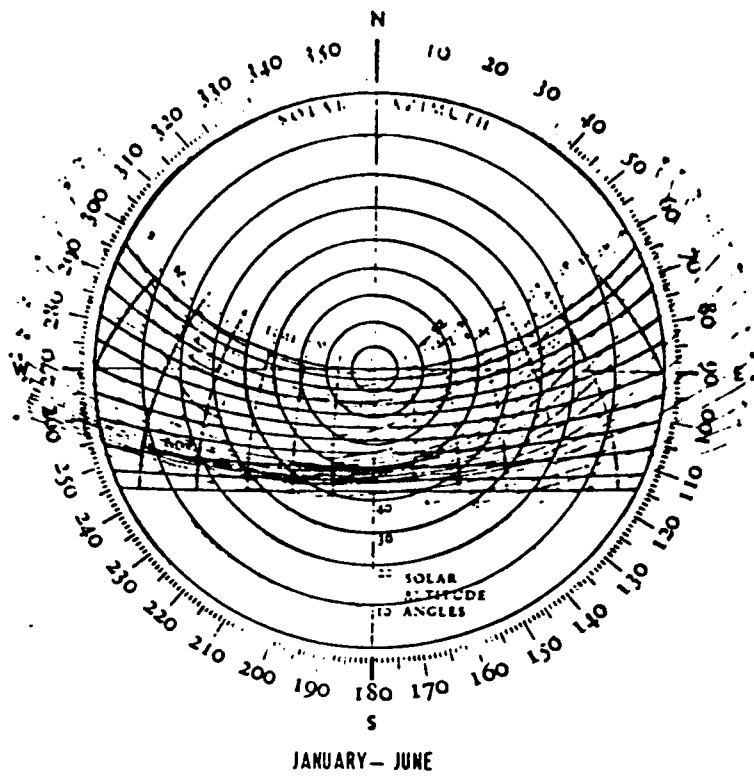
800 hr.



RAIN mm.

150  
100  
50  
0

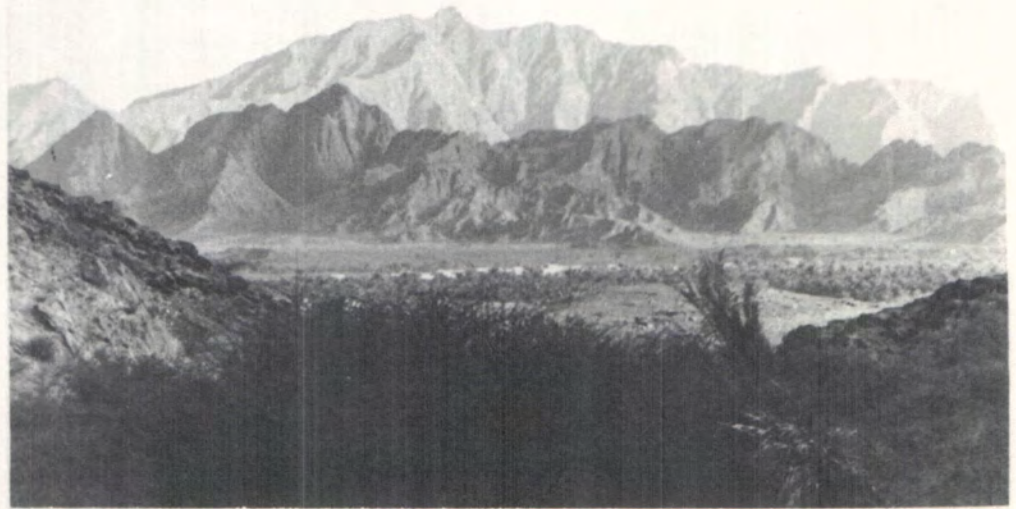




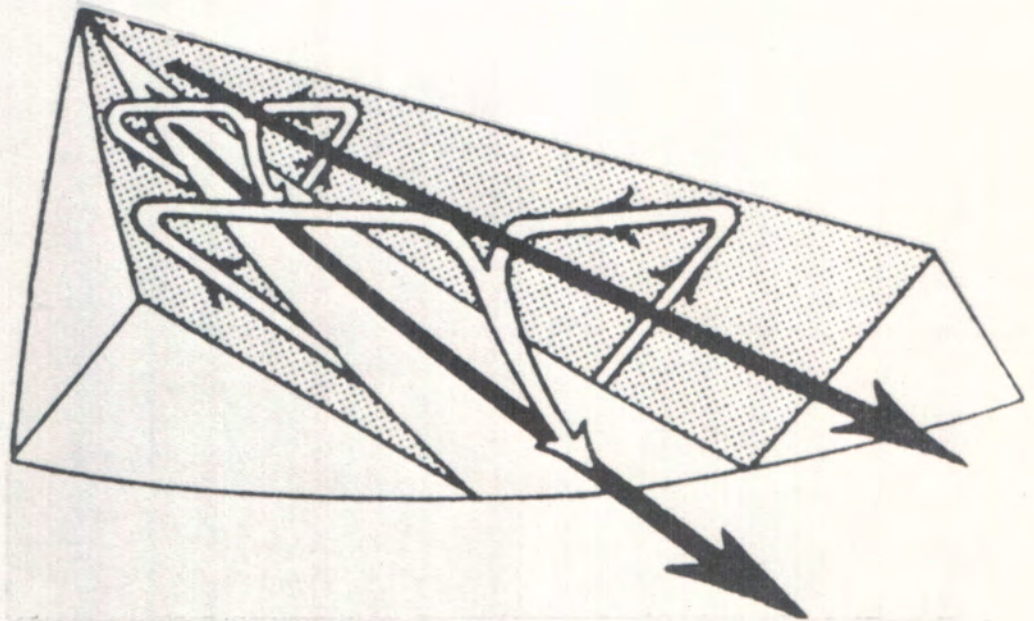
SOLAR CHARTS WITH TEMPERATURE OVERLAY  
 IZKI

Fig 404

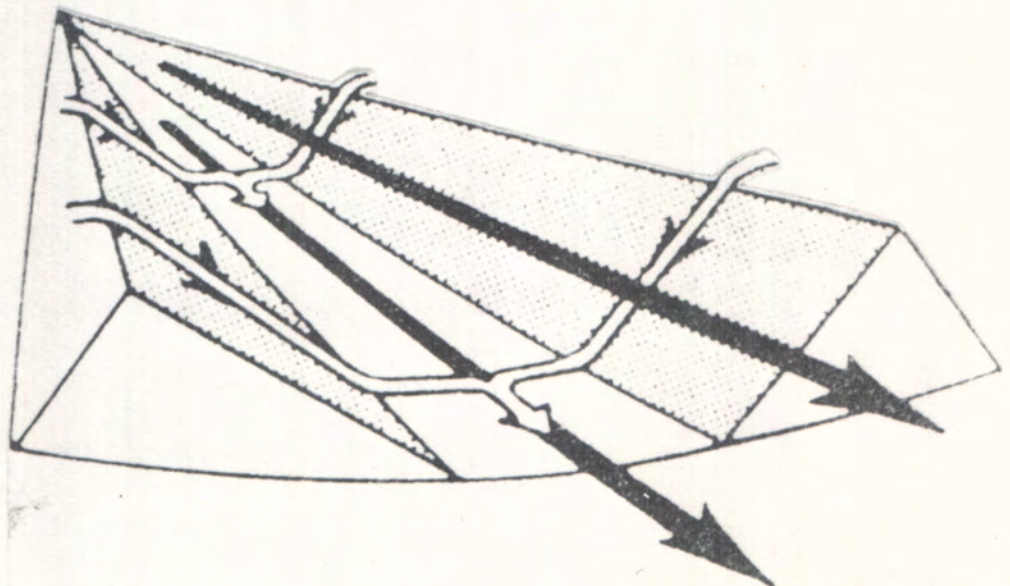
Valley  
near  
Izki.



Daytime



Nighttime.



Drawings showing the effect of valley winds  
modified by daytime upslope & nighttime downslope  
local winds.

#### 4.1.3. Socio-Economic Factors

Historically, the Northern Coastal plain and the Northern Uplands were often in conflict as separate states. The Coastal Plain was a Sultanate centred in Muscat while the Northern Uplands known as Oman Proper had an Imam (an elected religious leader in Nizwa).

This tended to cut the uplands off from outside goods and influence. Some trade continued for example in importing gold and silver for making ornaments, which were then exported. High quality dates were also grown and exported.

Generally the Northern Uplands developed as a self-sufficient inward looking area. Ample food and goods were produced locally to meet the areas needs. Craft industries were particularly well developed producing a wide variety of goods from gold and silver work to woven cloth, pottery and copper utensils.

This self-sufficiency was also reflected in the built environment. Indigenous building methods were better developed, particularly in the execution of mud brick, of which several storey structures were built. Local cultural expression was advanced, as evident in the articulation of buildings and in paintings on walls and roofs. The built environment was generally well maintained.

There was well developed traditional education, financed on profits made by water distribution. There are basically four economic groups. Firstly, the established tribal leaders, the wealthy peasants. The second related groups of merchants and craftsmen who sometimes also own land. There are poor peasants with very small holdings and finally herdsmen often living in separate small settlements on the mountain slopes and providing seasonal labour for the valley people.

With the opening up of the Uplands to the Coastal Plain and beyond, all this is in a state of unprecedented change. This process of change is probably more perceivable here than in most areas of Oman since there is a strong social-structure, that has only recently been seriously challenged.

The rate of change also clearly diminishes the further inland one goes. Thus although the influx of cheap imported goods from abroad is under cutting the local craft industries it remains the most vigorous craft production area in Oman. Tinned food from abroad is more slowly replacing the home grown diet. Concrete block houses in imitation of government buildings are being built (often at considerable expense) by some local people but their form closely resembles the indigenous house. (See Fig.408). On the otherhand an eight year old boy drew a detached English house probably from his school text book when we asked him to draw his own very different mud brick house. (See Fig101).

Another example of impending change is in the introduction banks. The indigenous system of banking is to convert wealth into fine gold and silver ornaments. This is still the rule and it keeps the gold and silver craft industry flourishing. But with the need to encourage people to save currency in banks, this is bound to lessen the local demand for gold and silver work and have detrimental effect on the craft which is of a very high quality.

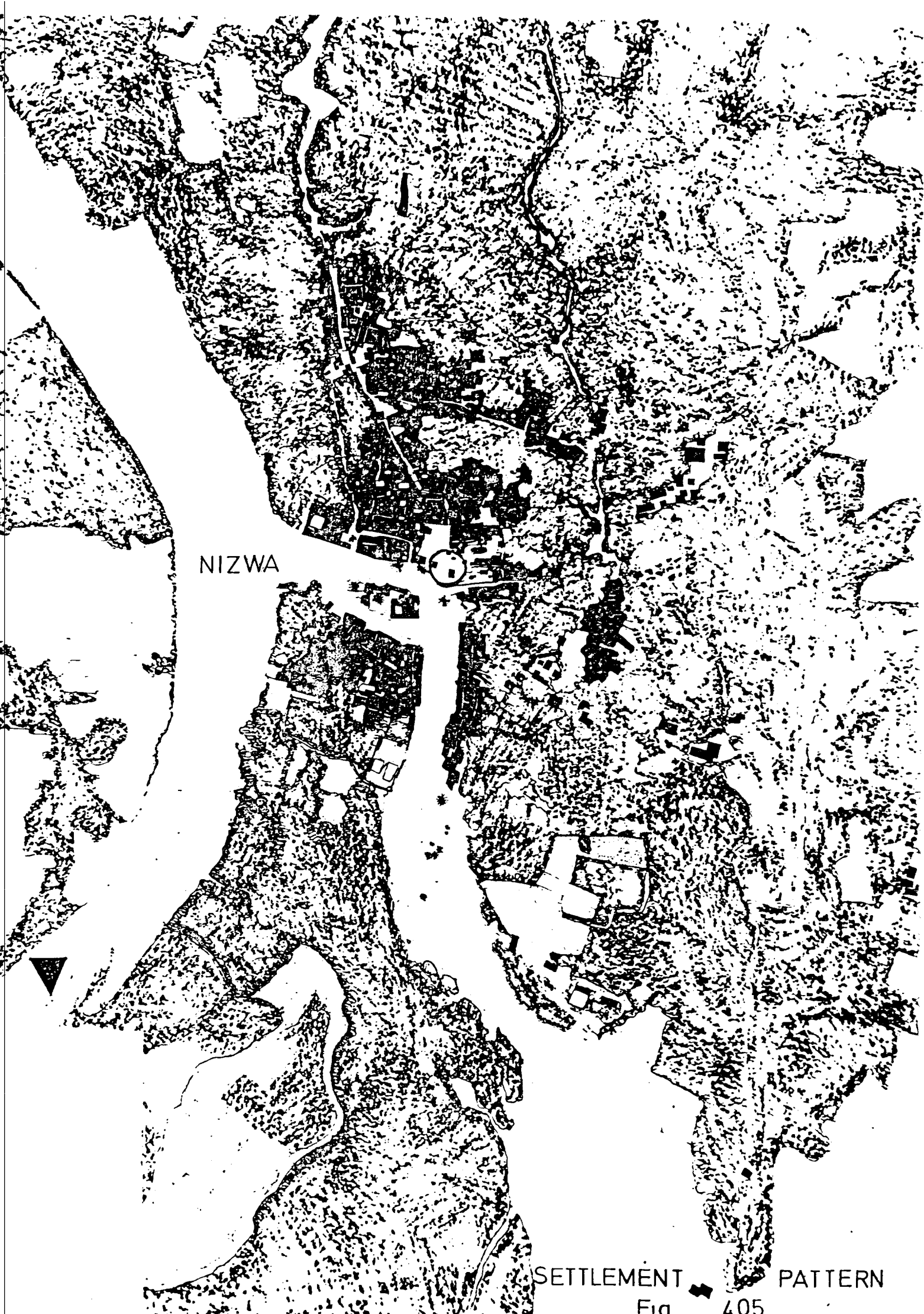
A new group of people have also been formed to add to the four previously outlined- those taken either off the land or from craft production to work for the government in the new hospital, municipality, school or the army camp, or for the Petroleum Development Company. In addition there are a significant number who have been drawn out of the area in search of work in the many



building projects on the Coastal Plain and in the Capital Region in particular.

Nizwa most clearly shows both the positive and negative aspects of all these changes. It has a new 50 bed hospital, a school, municipality, post office and a new house for the Wali. On the other hand price of goods have risen with those along the coastal plain, many houses lie abandoned, their owners gone to Muscat in search of jobs, and the built environment is generally neglected and run down compared to settlements further inland. Inland villages like Bahla and Hamra are still self-contained stable communities functioning comparatively smoothly.

A balance needs to be achieved identifying the essential changes that are real improvements and developing the indigenous potentials that exist in the Northern Uplands.



NIZWA

SETTLEMENT PATTERN

Fig 405

## 4.2 Settlement Patterns

### 4.2.1 Social and Economic Factors

The majority of settlements lie in large flat valleys extending from the Jebel Akhdar. They are often beside rocky water courses (Wadi's) which are dry except in the rainy season, when they can fill up during flash floods with several metres of water. A more regular supply of water comes from the ancient system of tapping the water table through a series of underground channels known as the Falaj. This is often supplemented by sinking wells. Cultivation is restricted to localised areas that can be serviced by these water sources. Thus the Northern Uplands are mostly uncultivated except around pockets of settlements lying by 'wadis'. These comprise of a built-up area surrounded by a larger area of date gardens and smaller vegetable plots.

Since easily cultivable land is at a premium most built-up areas are usually on land unsuitable for this purpose. Cultivated land can very rarely be used for building on and to cut down a palm tree requires specific permission which is not easily obtained. Since the 'wadis' are liable to flash floods dwellings by them are situated on higher ground. Sometimes a compact settlement occurs on an outcrop of rock, surrounded by lower lying agricultural areas.

The use of higher pieces of land also related to the traditional need for protection, villages and towns focussing round the fort which stands more often than not on the highest ground in the vicinity. Some villages likewise make use of the inaccessible backdrop of the mountains and run up the hillside where the natural landscape provides protection. In these cases the richer houses are usually nearer to the bottom of the slope, getting poorer further up the slope, relative to the proximity of the water supply, which is often easier down in the valley. Hamra is a typical case of a town of this type, showing a clear progression from rich houses at the bottom of the slope to poor at the top. In this town the whole settlement takes on the character of a fort, houses being clustered together to form a fortified wall.

The position of the village or town market (Suq) within the town is also important. The Suq has functioned for centuries in the Islamic world as a social gathering place, and continues to do so, embodying much of the collective expression of the people. As a meeting place, particularly when combined with a cafe, it functions as a centre for the exchange and development of ideas. The Suq incorporates both the intellectual and commercial development of the town.

In this role it plainly acts as a focal point in the settlement pattern and often comes adjacent or near to the fort, representing two important areas of the town. The fort has in the past been the seat of the local governor or mayor (Wali), attended on by a bodyguard of locals. The official running of the town focusses upon the fort and in the same way as the Suq is the commercial centre. Each is dependant upon the other and their physical relationship is nearly always close enough to allow communication and movement between the two.

This traditional focal point is beginning to shift with new government building away from these centres. For a more detailed comment on this see 'Proposals for the Built Environment'.

The water system of the town and its distribution to various areas are an important and integral part of the settlement and social patterns of the area. Water is used firstly by those who own or control it and then shared amongst the poorer inhabitants, but influenced by the tribal relationships of the community, since within the town there are often several tribal areas separated from each other by the main streets of the settlement. Each tribe operates in some aspects like an extended family, where there is a degree of social intimacy to the extent that the Mosques are totally integrated amongst the other buildings of the area, even occurring on the upper floors of a building, so that only intimate knowledge of the settlement will identify it. This is unusual in comparison to the prominent position that the Mosque has in most Islamic settlements throughout the Arab world, and is to a certain extent a characteristic reflected throughout the north of Oman, where the Mosque is often a modest building, bearing out the personal and private nature of Omani religion.

The towns and villages have two characteristics that relate to climate, firstly that the houses are clustered together, with narrow streets giving plenty of shade and coolness, in conditions where air movement is not of such importance, there being only moderate relative humidity and high diurnal ranges, which allow the shaded streets to retain their coolness when not in the direct sunlight. Secondly there is the seasonal migration from the towns to the date gardens during the hot summer months. Summer houses are set in relative isolation scattered through the gardens, although houses are built of the same materials for either season, in most cases mud brick. Surrounded by neighbouring houses, the summer house is in a cooler environment.

In some cases over looking such settlements are smaller communities of goat-herds who have established themselves by a mountain stream. The goats feed on the mountain scrub while the herdsmen manage to cultivate small vegetable plots for their own use. (See Fig 412). Their houses are single-storey, often single room units. The walls are built of flat limestone pieces stacked without any mortar on top of each other. Roofs are similar to those of the valley settlements consisting of timber beams and rafters, palm matting and mud.

#### 4.2.2 Climatic Response of Settlement Pattern

Two aspects of settlement which relate to climate are firstly the physical town pattern itself (which shows a relatively dense clustering) and secondly the localized seasonal migratory relationship between the town and the cooler date groves.

It has been stated already that built-up areas such as town centres are limited to lands which lie above the wadi's high water mark and which are in many cases unsuitable for agriculture, which has economic priority on fertile land. Because of these pressures, town areas tend to be somewhat densely populated. Houses are clustered together often sharing common walls. Streets are narrow providing plenty of shade and a trap into which cool air can settle at night and be held during the day. The dense clustering and the predominance of mud brick as a building material results in the built environment maintaining a relatively high thermal capacity. This means that both heat loss and heat gain between the building cluster and the external environment is limited. In other words internal temperatures remain moderate, at about the mean of the average daily range, because of the clustering effect. This is advantageous in the Northern Uplands which experience a relatively wide daily temperature range.

This settlement pattern is not conducive to the encouragement of air movement. Because of the moderate relative humidity air movement as a cooling factor is not as important a feature as it is in coastal areas where humidities are high. Although air movement is favourable in the summer time it is a disadvantage in those months when temperatures fall below comfort levels.

Hillside towns such as Hamra are examples of settlements which are both densely clustered and also make use of air movement for cooling (See Fig.406 ). Although the streets remain narrow and shaded the whole town is integrated into the side of the hill in a terraced manner. The upslope valley winds described in Section 4.1.2 come into play here drawing cool fresh air from the date groves in the valley up through the settlement during the daytime. Upper floors of buildings have windows opening on one side of the house and face only toward the valley breeze. On the otherhand the down slope night breezes which are often unwelcomed, especially during the winter months, have little effect on the settlement because houses are built into the face of the slope and present very little wall surface (windowless) to these night-time winds.

The second major response of the settlement form to climate is the local migratory factor. The dense town centres are thermally most comfortable during the cool season. During the summer in towns such as Nizwa there is often a move to the nearby date gardens. This should not be seen solely as a climatic response but also an economic necessity to tend the gardens. The shade and moderating effect of planting on the temperature and easy access to water, produce conditions much more comfortable than the town centre. Houses are no longer clustered but set individually on private garden plots. Air can therefore move freely around and through these houses which are built in a much more open way; the breeze aiding evaporative cooling.



Fig 406. Schematic section through Al Hamrah showing the effect of up-slope valley winds.

#### 4.3.1. House Form

##### Social and climatic influence

Town houses are predominantly built on a central courtyard form. Because of the density of housing in settlements of this area, the dwellings are usually two or three storeys high and in this context the courtyard is basically a light and ventilation shaft for the lower levels of the house. Most of the houses are arranged in such a way that privacy is ensured, courtyards being deep and narrow, and often there are parapet walls rising up above the top floor level so that there is no view into the neighbours house.

In this area, as on the Batinah coast (section 3.3.1), the Maglisse is a common feature providing a room for special social occasions and visitors, and is usually in a position near to the entrance of the house, or in houses where the ground floor is used for storage, on the upper floor.

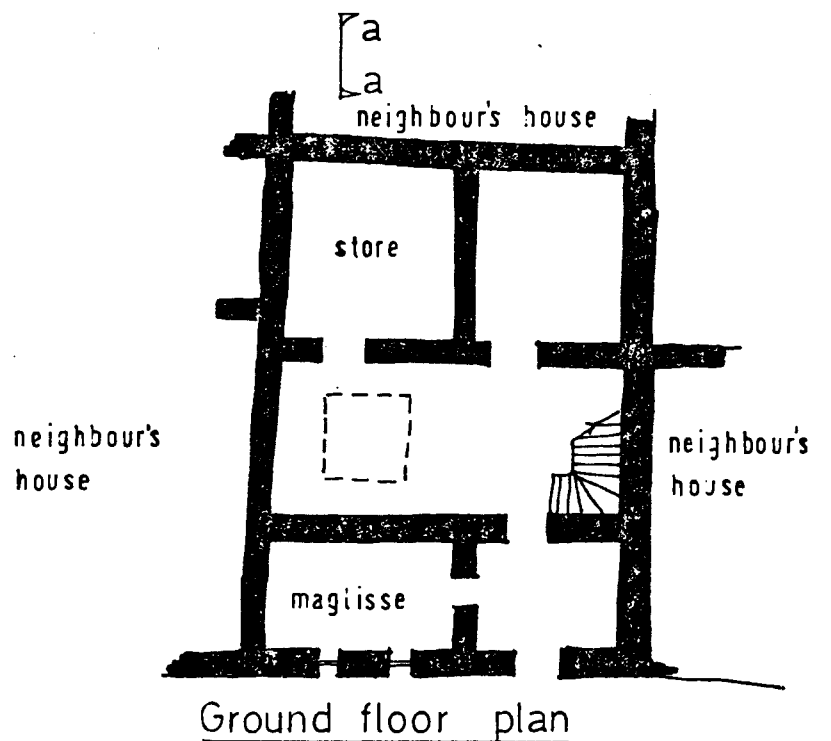
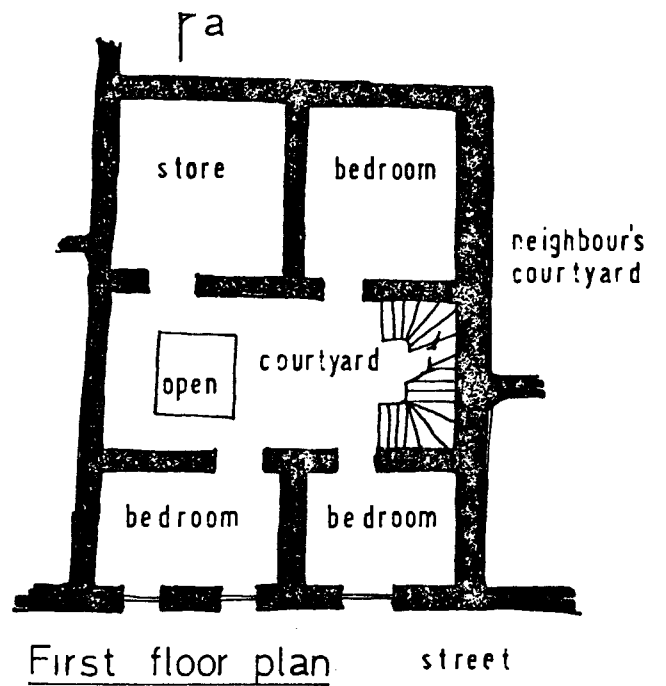
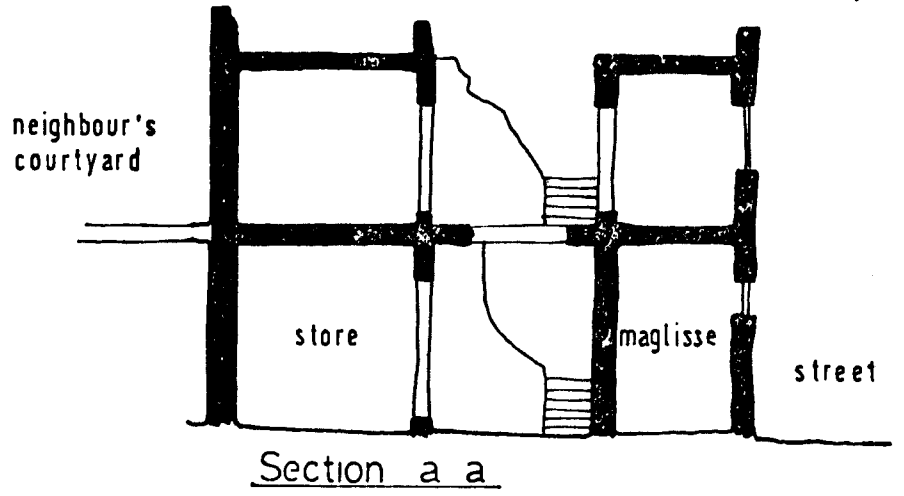
The use of the maglisse is more varied here than on the Batinah Coast, in that activities other than social are carried out here, for example, a silver smith may use the room as his workshop as well, because houses are quite small and space has to be used economically. Rooms are often dark and the house is largely an enclosed inward looking unit. In many cases the well and sanitary facilities are included in the house, made possible by the use of several storeys where the upper floors are brighter and more lived in. The ground floor is often used as a store area and the few windows that occur at this level are small and some rooms have none at all.

There is a strong traditional influence in the way that the houses are built; the use of alcoves in the walls, their shape, the form of rooms and the layout of the complete dwelling are all the product of a well defined indigenous house form. Even though some houses are now built using concrete block, they are still in exactly the same form as older houses. A new house recently completed in Izky has walls and forms directly influenced by the use of mud brick, even though concrete block is used throughout. The walls are built as thick as if mud brick had been used and the resultant cost of the house has imposed a serious and heavy financial load on the owner/builder, even though his enhanced prestige compensates in some ways for this life-long set back.

The building of a new house in the exact form of a previous house will gradually change as the influence of new Government buildings begins to be felt. Already children, when asked to draw the house they live in will incorporate areas used in the new schools and hospitals. Examples of this are shown in the introduction.

Although the house forms are in many ways a social response, climatic factors are also influential, the seasonal immigration to the date gardens demonstrates a human response to the climate and the way in which the house form relates to this. Rooms are well ventilated, with open stair-cases within the house leading to the flat roof where dates are dried, large windows let the breeze enter the house, and there is an emphasis on out of doors activities exemplified by the open air kitchen arrangements, where often the water supply is linked to troughs directly adjacent to the cooking hearths.

Fig 407



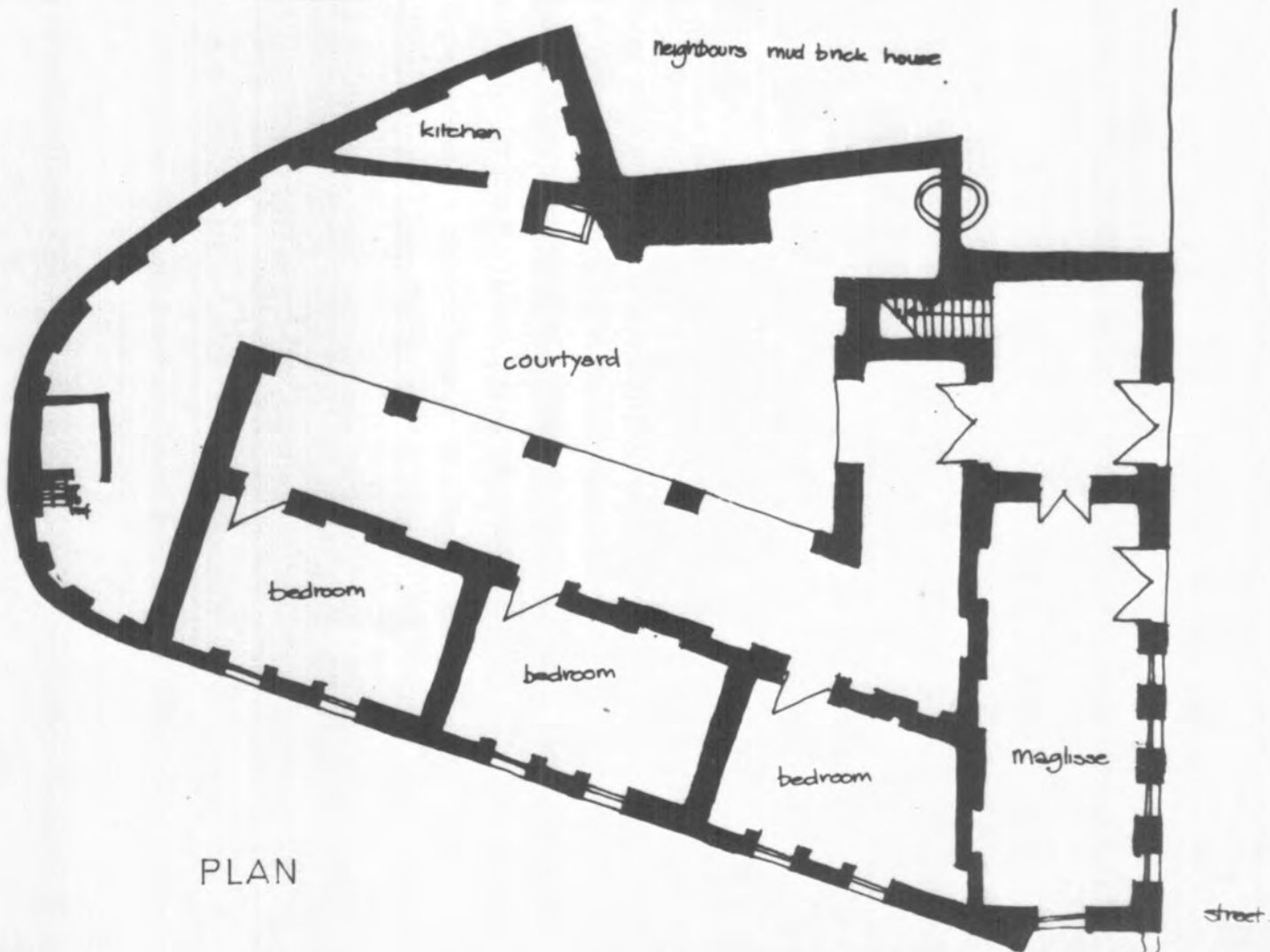
Winter house in town - Nizwa

La





Fig.408 Recently built concrete block house, in the indigenous form.



PLAN

Fig. 410  
Winter house  
in Nizwa

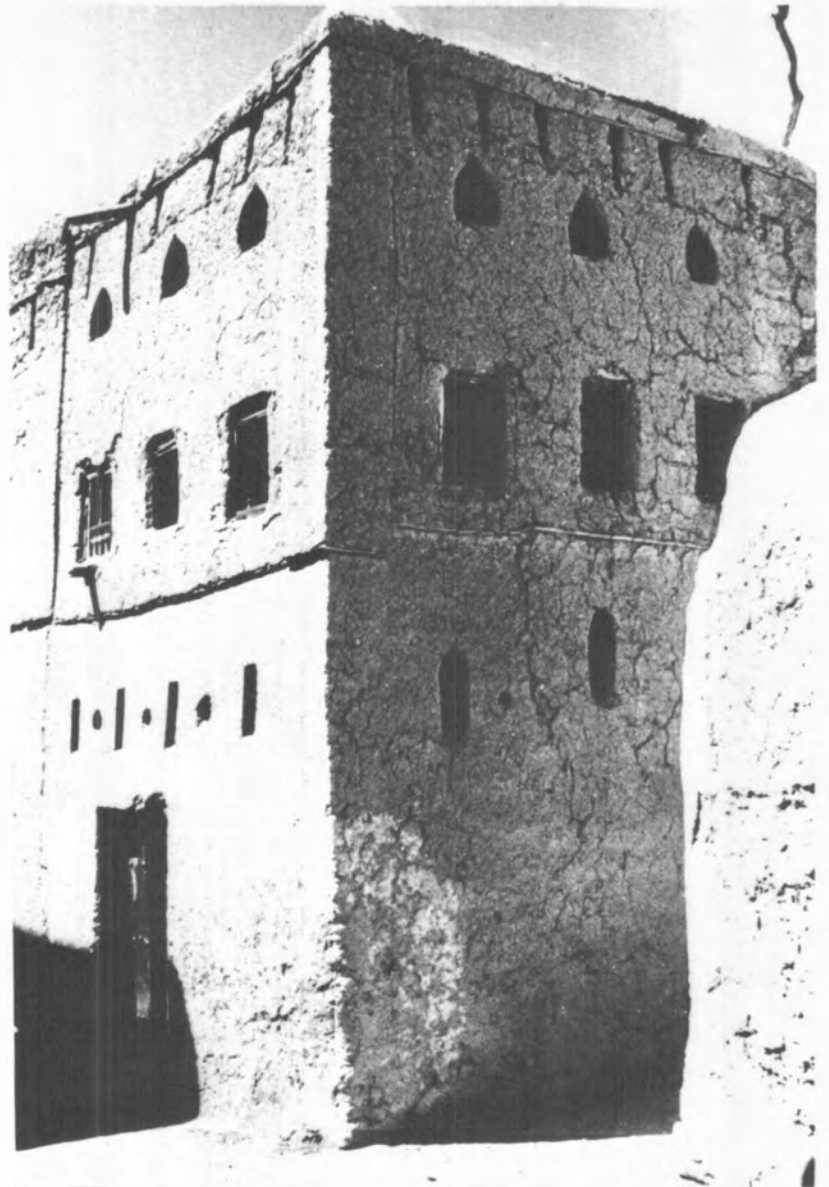
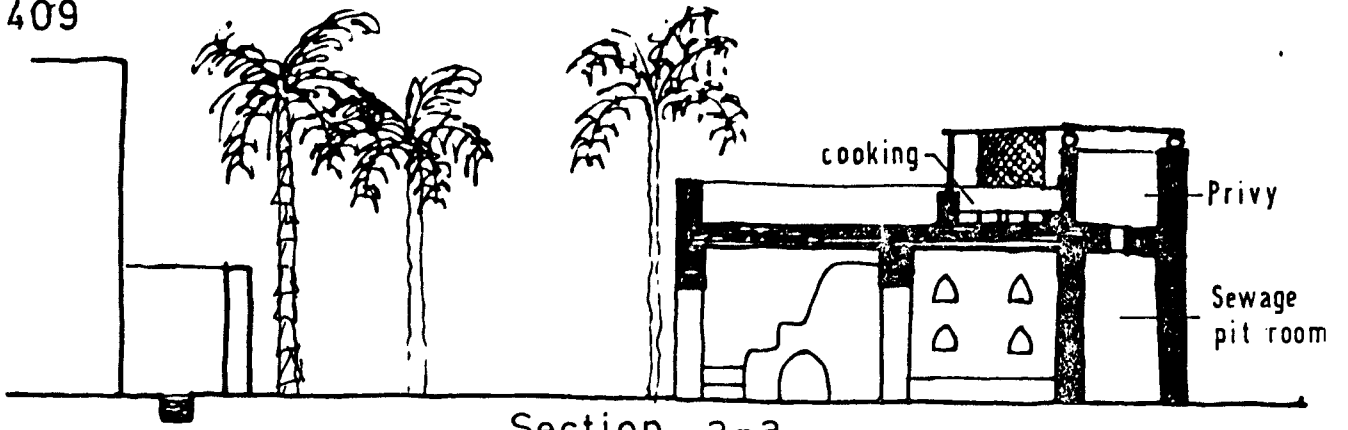


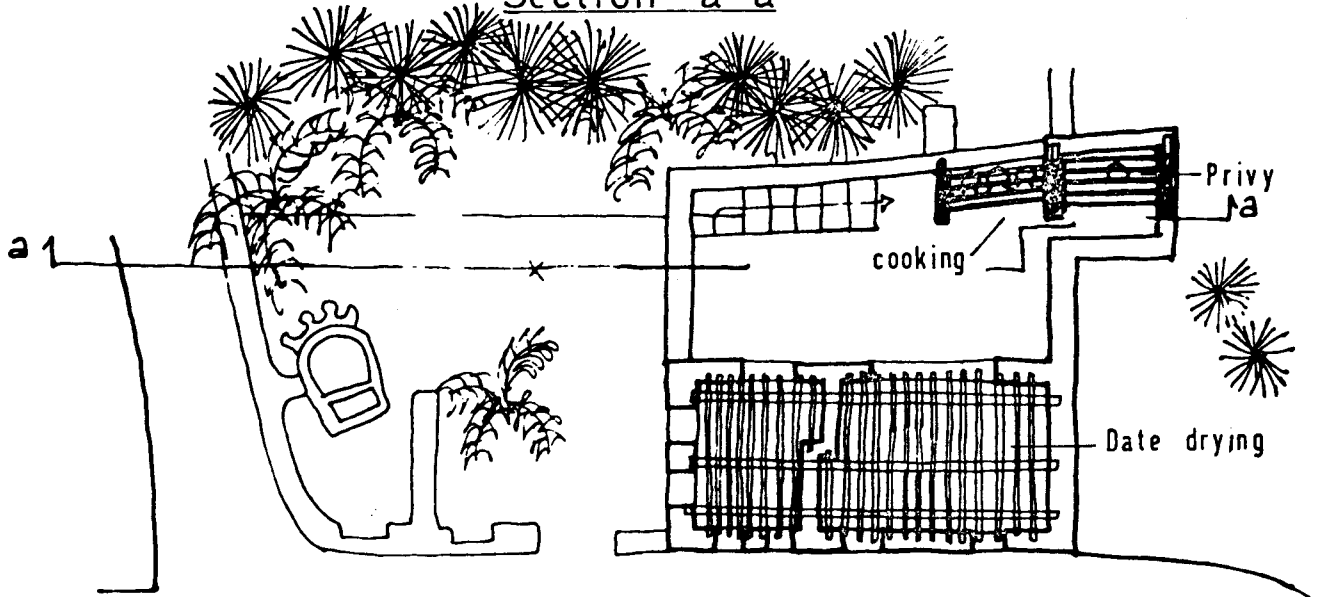
Fig 411  
Summer house  
in date garden  
where micro-  
climate is  
more favourable



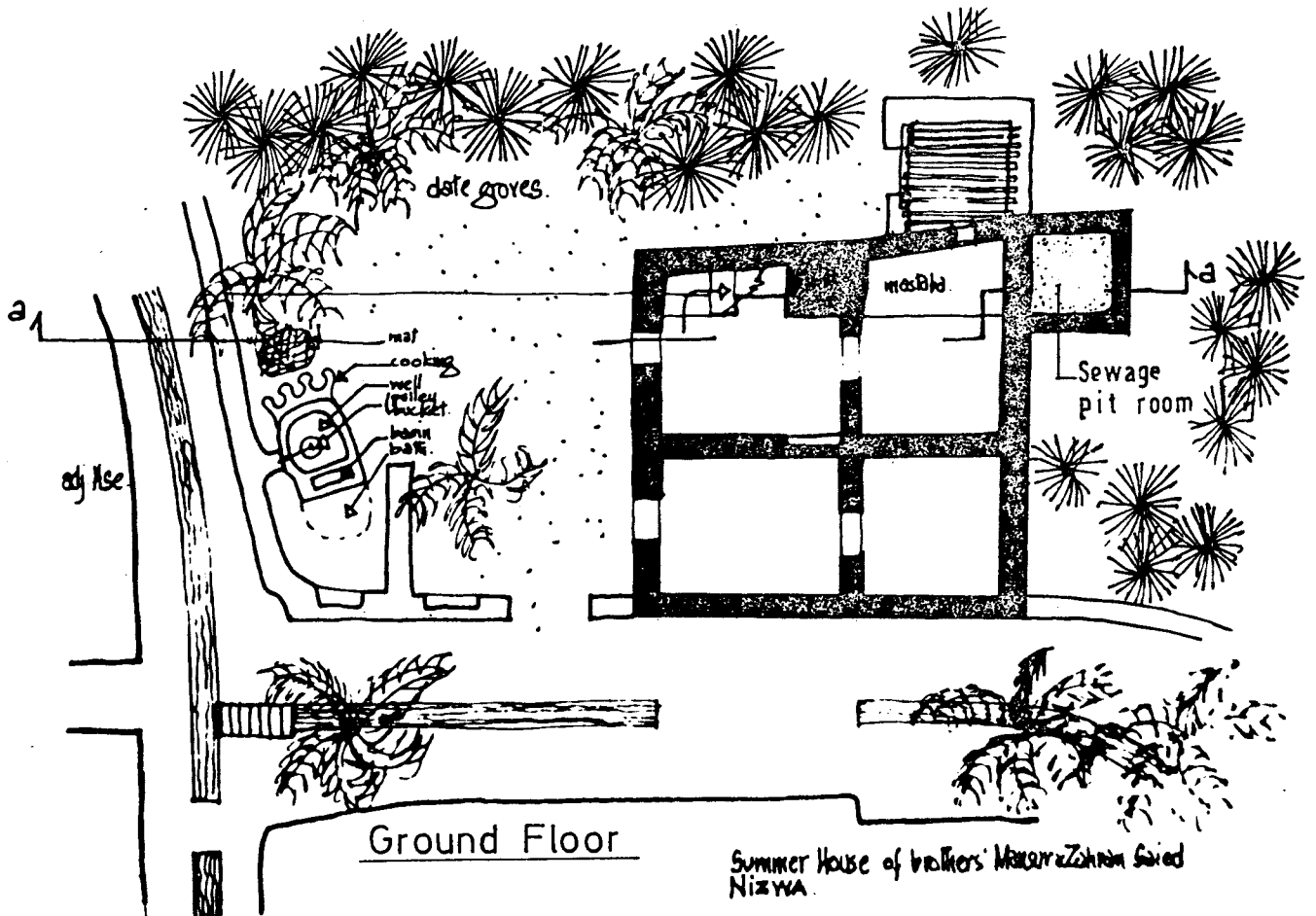
Fig. 409



Section a-a



Roof



Ground Floor

Summer House of brothers' Masarrah Zohran Saied Nizwa.

Summer House in Date Groves - Nizwa

Some rooms are almost solely shelters from the sun, the walls being pierced by numerous large openings, but usually facing away from public places, so that privacy is retained. Houses are predominantly built of mud brick making use of the low heat transfer rate of this material (See section 4.3.2 on mud brick). In the winter houses are mostly small, helping to reduce the amount of internal warmth that can be lost through openings and limiting the amount of air movement through them into the interior. The courtyards as mentioned allow light and fresh air into the lower levels of the house, and as the seasonal temperatures rise, will help to cool the house. At night-time cool air sinks to the bottom of the courtyard, replacing the warm air that has accumulated there during the day. As the air temperature warms up in the daytime, this pocket of cool air will be held at the bottom of the courtyard shaft, keeping the adjacent rooms cool. The same principle is in some aspects applicable to the narrow shaded streets, except that cool night time air will be blown away more easily.

Fig 412

Limestone house



Schematic settlement plan of Odeya in the foothills near Izki. All houses are limestone unlike valley houses are predominantly mud brick.

