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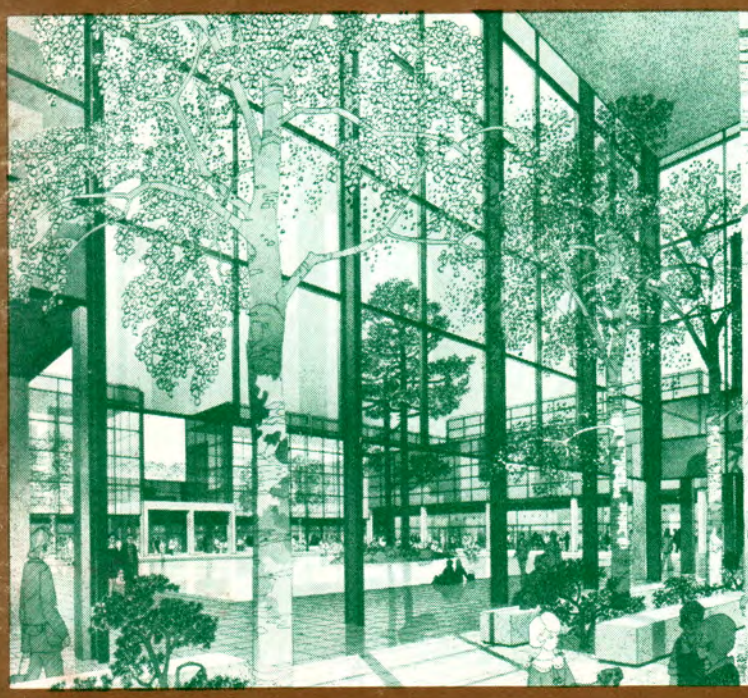

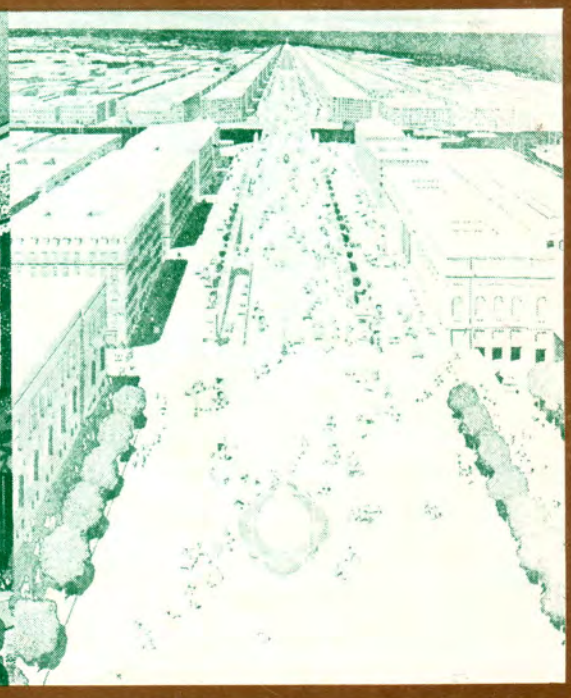

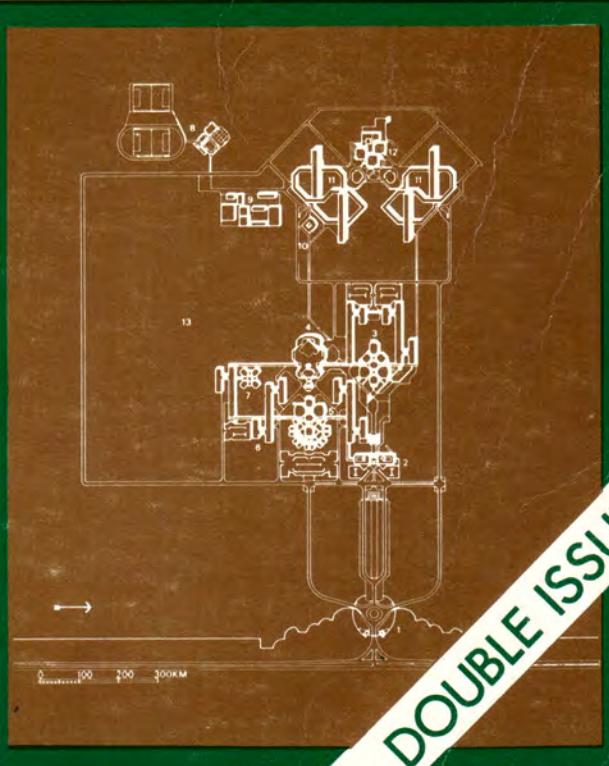

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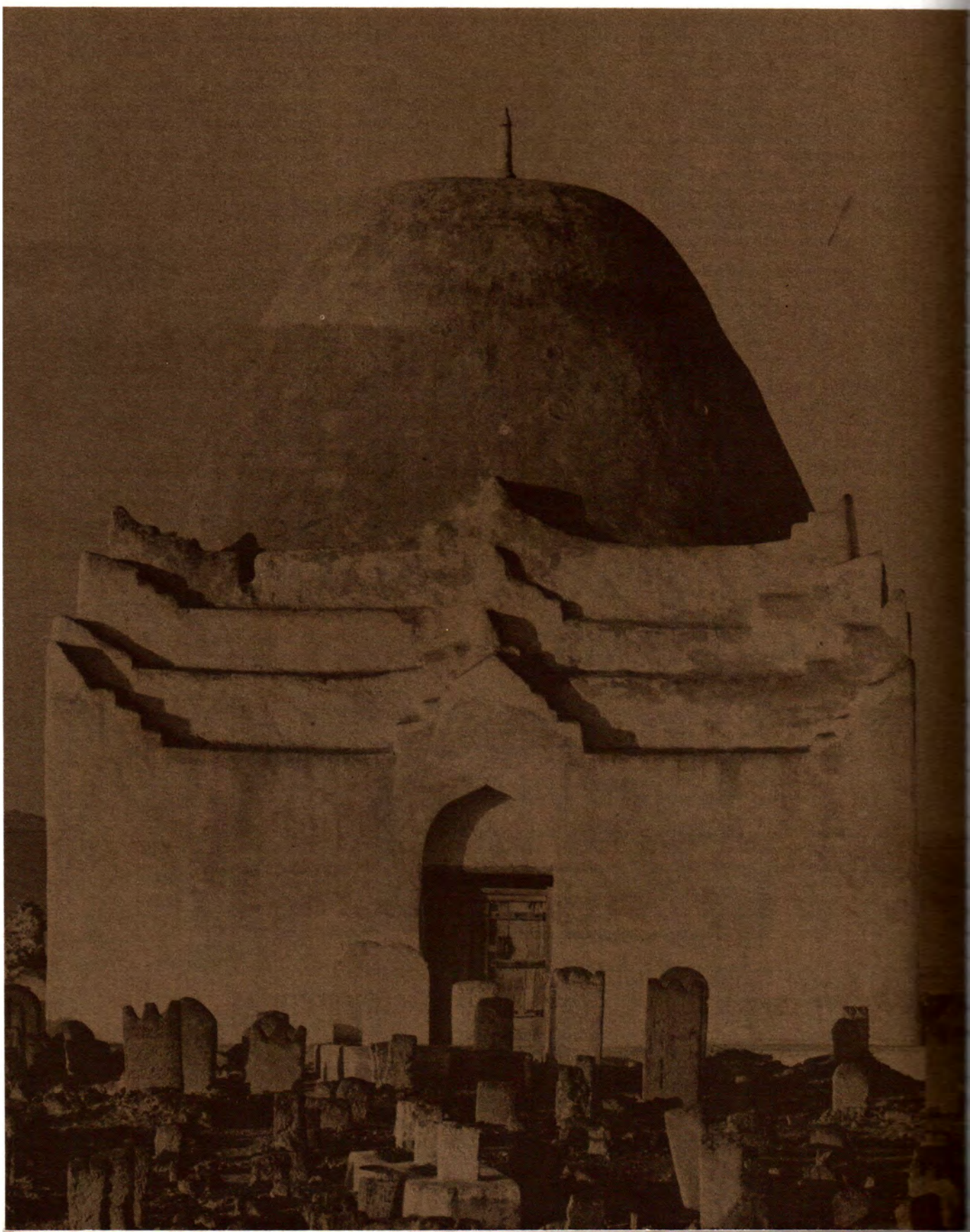

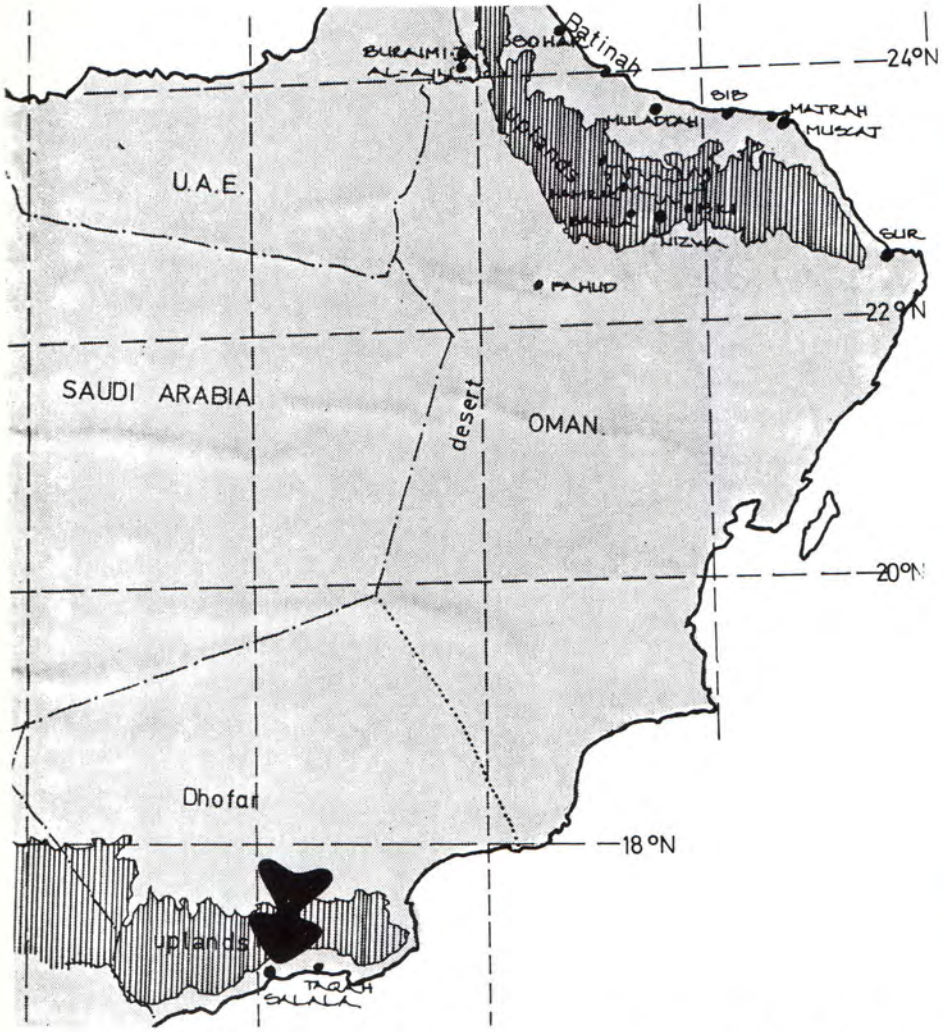

INDIGENOUS BUILDING AND RAPID URBANISATION:

A CASE STUDY OF SALALA IN SOUTHERN OMAN

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The purpose of this case study is to look at a traditional settlement and analyse the influences, both environmental and socio-economic, which produce its characteristic built environment. The patterns are seen through its settlement and the forms into which the houses have evolved. The question is asked whether these forms are valid today when such traditional centres are experiencing economic changes and rapid urbanization. Salala, a traditional trading town in Oman, has experienced recent rapid change along with the rest of the Arabian Peninsula, but more particularly has a refugee problem as a result of the guerrilla war in Dhofar.

Salala is the capital of Dhofar, a province of Oman, on the Indian Ocean coast of the Arabian Peninsula. Ruins of a city dating back to pre-Islamic times have been found in the neighbourhood of Salala. History has shown the present town to have been an important port of call on the dhow routes connecting Zanzibar and the African coast to Muscat, the Gulf, Iran and India. Salala was also a centre for the export of gum arabic - frankincense - for which the Dhofar hills were once famous.

Left: Mosque in Salala

Although there are similarities between the Dhofar coast and the rest of Arabia, its terrain and climate are unlike most of the arid Peninsula. While Dhofar is far removed from the main path of the Indian Ocean monsoon it still feels its influence; the coastal hills, with a limited rainfall, are green with vegetation for parts of the year, and the towns on the coastal plain experience a heavy mist in summer.

In the past the population was divided between these two regions - the coastal plain and the hills. The coastal inhabitants were sedentary, and divided themselves into groups ranging from administrators, such as the local Governor (and at times the Sultan who has a palace in Salala), through merchants, to farmers, fishermen, and finally the slaves who had been brought from Africa at the height of Oman's era of power in the Indian Ocean. The hill people (Jebbelese) on the other hand were mostly herdsmen, subsisting on their cattle and any trade which grew out of selling cattle and gum arabic. Because of their basic poverty and reliance on a single economy little specialization developed in the hills.

The economy of both the coastal townspeople and the hillsmen relied to a large extent upon trade between the two groups. Because of the seasonal rainfall pattern the hills were only green for part of the year, so that cattle grazing was impossible for the remaining time. During the dry period the herdsmen were dependent upon the merchants on the coast for buying dried fish for fodder.

Off the Dhofar coast there are excellent fishing grounds, where the main catch is sardines. Many of the inhabitants of the coastal areas were involved in seasonal fishing and agriculture. In the towns, some of the merchants, owning larger boats, engaged in fishing on a greater scale. The main catch was taken during the winter, and the sardines were then spread on the beach to decompose and dry. For months the distinctive odour of rotting sardines hung over Salala. Afterwards oil was collected and exported to the Gulf; and the dried residue was either used as agricultural fertiliser or sold by the merchants to the hillsmen as fodder to tide them over the last few months of dry weather before the summer rains. The merchants and townspeople would in return have a continual supply of meat to supplement their basic fish diet. The merchants also exported the gum arabic, gathered by the Jebbelese, to India.

Settlement on the coast followed basic economic patterns. Fishermen lived on the beach so that their boats could be hauled up in front of their houses. Behind the beach lay the palm planted belt where

Above left: Settlement patterns Salala. *Above right:* Coconut palm stems are important as a building material near the beach. *Below:* Townscape of old centre.

A framework of hardwood sticks or palm stems is the supporting structure for the walls. Leafy palm fronds become the screening material.

most of the agriculture was carried out. The Sultan's palace, surrounded by the huts of his household slaves, the Suq (market) and administrative buildings, such as the customs house, were also grouped near the beach. Further inland the merchants lived in the town centre of Salala. Within the town itself the settlement pattern followed not only economic, but tribal lines; tribes grouped into areas each presided over by the local leader or Sheik. The tribal distinctions within the town of Salala itself often mirrored the tribes of the hills, but members were involved in trading rather than herding.

The settlement pattern of the coastal plain also responded directly to the particular micro-climate of the coast. The daytime onshore and night time offshore wind system found in most areas near large bodies of water is felt in Salala. Winds of any kind are welcome in the hot humid season. Air movement is essential to aid the body's evaporative cooling mechanism. Houses have been built and the settlement organised in such a way as to take these factors into consideration. Near the beach and in the nearby palm planted belt, peasants and fishermen have built their houses of palm stems. Screen walls are constructed of this material and allow air movement through, while maintaining a high degree of visual privacy. The loose matting also softens the light and reduces the glare from the exterior. Further inland the merchants demand a more substantial house but still experience the heat and humidity of the beach dwellers. Here limestone is the basic building material. Its thermal capacity, though regulating the heat, is really only an advantage in the somewhat cooler winters. Here the micro-climate has been controlled through the layout of the settlement and the design of spaces between and within the houses. Because it is essential to encourage air movement, houses are situated in a way not only to accept the maximum breeze but also so as not to block air movement to neighbouring houses. Ideally each inhabitant would chose to build his house where there are no obstructions between it and the southern sea breeze exposure, so that air could reach the front of his house with maximum velocity. Any obstruction of the wind produces a 'wind shadow' behind it where velocity is reduced. Town houses in Salala were sited with this in mind, and each house is built beyond the wind shadow of the neighbouring house. Included in the plan of most town houses in Salala is a large front yard, which ensures that building is not carried out immediately upwind of the house. There were no formal roads in Salala's town centre as the wide spacing provided ample room for movement.

Not only the settlement but the house has evolved along climatic lines. The traditional courtyard house found in most tropical regions has been adapted to Salala's particular climate. The Salala town house makes use of the inward looking courtyard's cool air well to trap night time air, as well as presenting an open faced south wall pierced by many openings to accept the cooling sea breeze.

The evolution of the courtyard house also reflected the patriarchal social and economic structure of the family. The head of the extended family was, as well, the director of the family business. The rest of the family were economically tied to him and lived under the same roof. Thus as the extended family grew, so did the house. The existing town houses reflect the accumulated growth of many generations.

Hence, within the indigenous settlement of Salala one can see how its form and process of growth over many years has been in response to environmental factors such as climate as well as social and economic influences. This is true for most indigenous settlements which have grown largely without a predetermined master plan.

Refugees have become squatters in the old Town Centre of Salala.

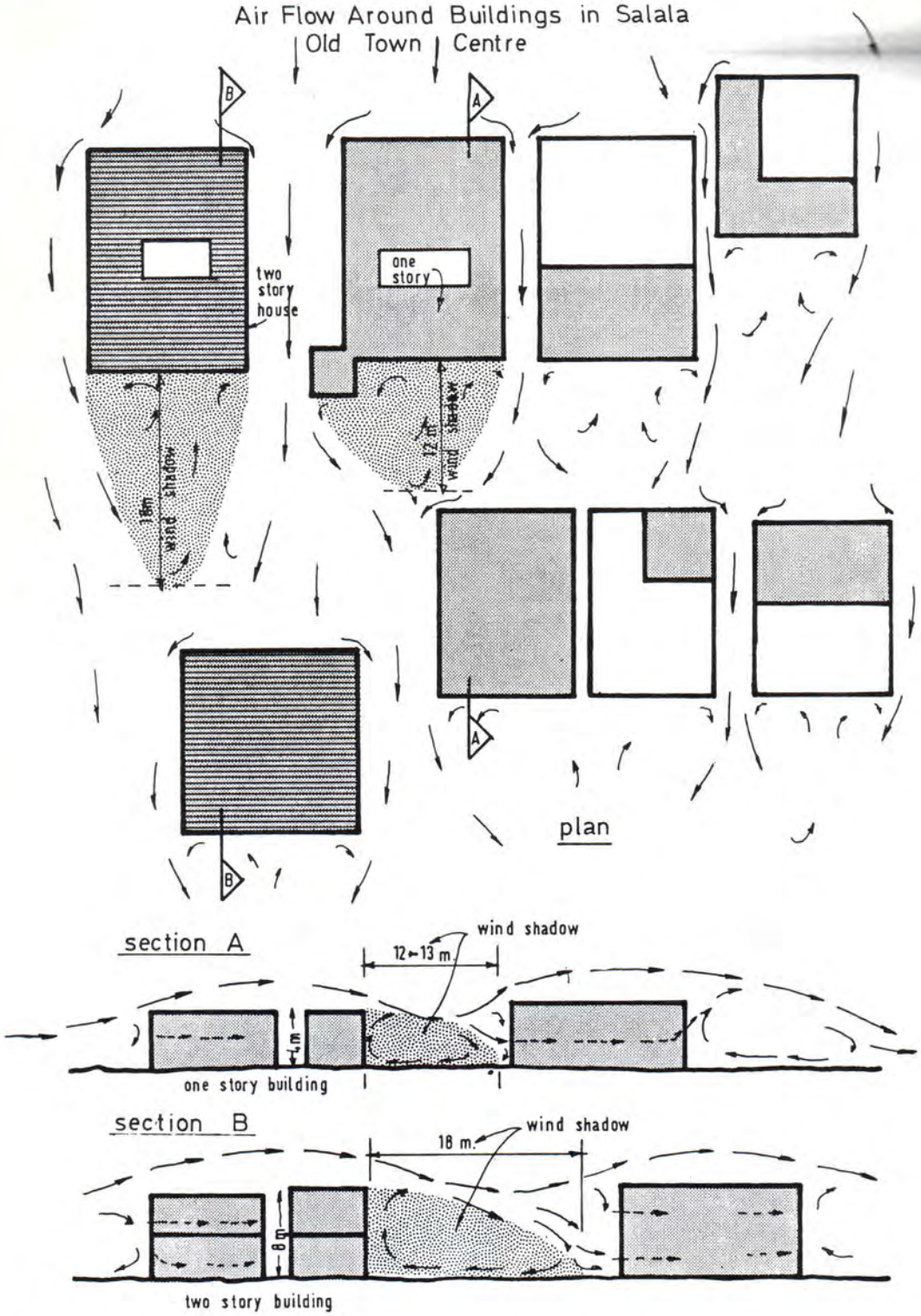
But today with the concentration on growth within urban areas the economy of these traditional centres has changed. Rapid urbanisation has been accompanied by huge population increases with its related environmental and health problems. The investment in non-traditional industries has been detrimental to these old centres and the rural areas. The depopulation of some rural villages has gone hand in hand with overpopulation and overtaxation of resources in the old town centres. These centres have rapidly turned into slums, providing cheap accommodation for those looking for employment in the new industries which have grown up around or outside the old quarters. Salala today is an example of some these changes, though seen on a much smaller scale than in Cairo or Delhi.

The discovery of oil in Arabia is basic to the economic change. Young men left Dhofar for Saudi Arabia and the Gulf to find employment in the oil fields and now return, after a few years, with their wages. Permanent emigration is not the rule, and migrant workers usually send money home periodically, or save up their earnings towards an investment in a house or a small business, which, on returning, will allow them to remain in their native town. The other factor which has strongly influenced Salala is the guerrilla war, which began in the hills in the mid 1960's and continues today. Salala finds itself cut off from its hinterland, and consequently the traditional trade relationship between the townspeople and the herdsmen in the hills has died. Many of the irrigation canals which once watered large vegetable gardens and palm groves are blocked and agriculture is in decline.

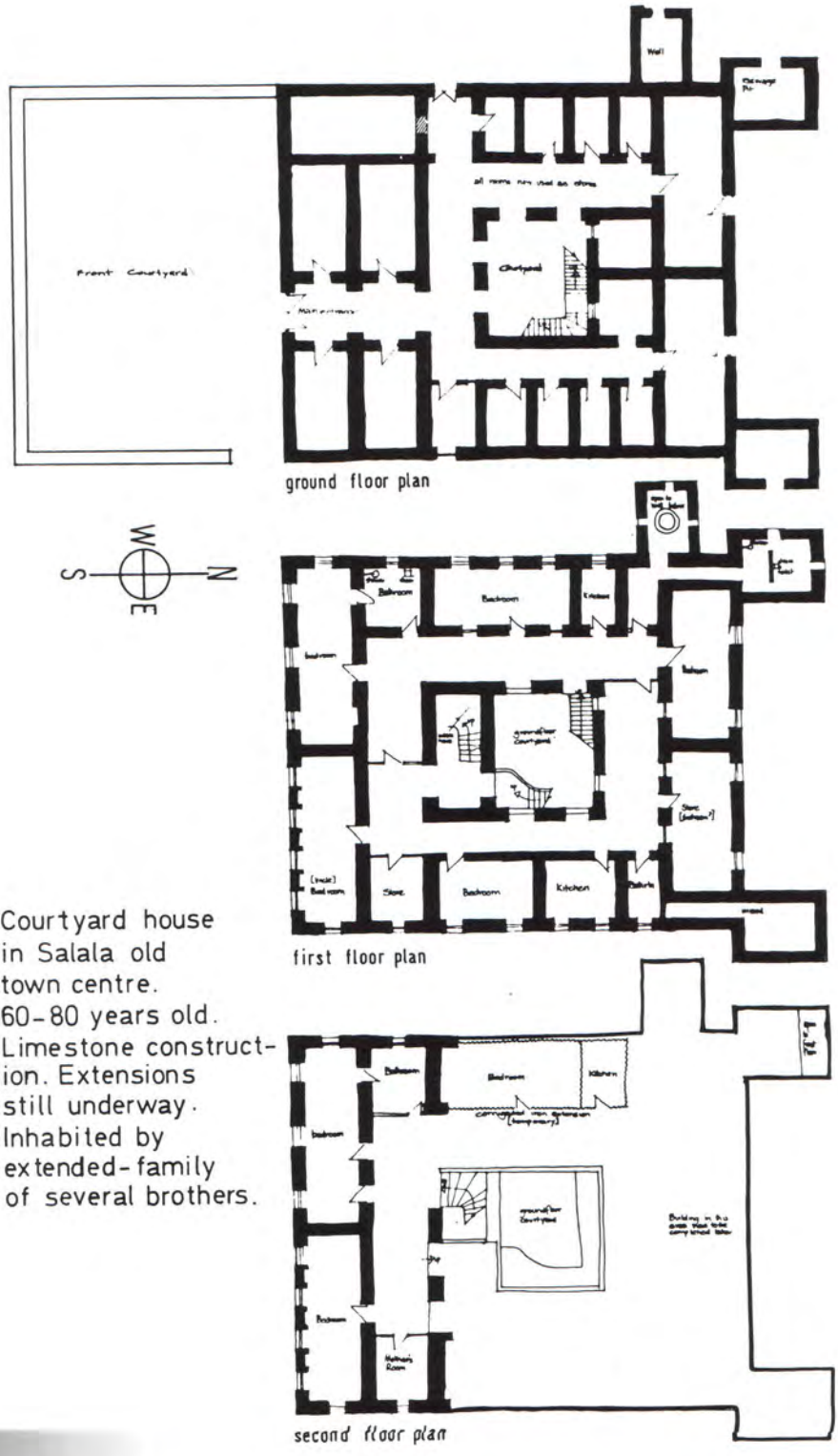
With grazing land in the hills burned and the hillspeople's economy destroyed, large numbers have moved down to Salala in hope of staying with kinsmen there. Overcrowding in the old town centre is the result. Refugees from each tribe from the hills try to settle in their corresponding tribal area in the town. The existing settlement pattern, depending on openess for ventilation and climatic comfort, can not accommodate an increased building density. Squatter settlements have established themselves in the open spaces, with all the associated problems of sanitation and hygiene. Bedrock only a few centimetres below the surface makes sewage saturation of the soil an added problem.

The destruction of the traditional economy has also affected the merchant families of Salala. The economy no longer rests in the hands of the heads of families. Most of the money is with the young workers who have returned from the oil fields. This shift in economy is also felt on the social level, with the change in the structure of the extended family. Now it is common for a young man to build his own house rather than live in that of his father. Several young brothers may pool their resources and labour to begin building a home. It is usual for one of these young men, on returning to Salala, to secure a small plot of land either privately or from the municipal government and begin building immediately. This group differs from the squatters because they have rights to the land on which they are building, and more importantly they have money to invest in building. Not only are workers from the Gulf oil fields in this group of owner builders but also those who are fortunate enough to have jobs with foreign contractors, in the local administration, or on the British air base.

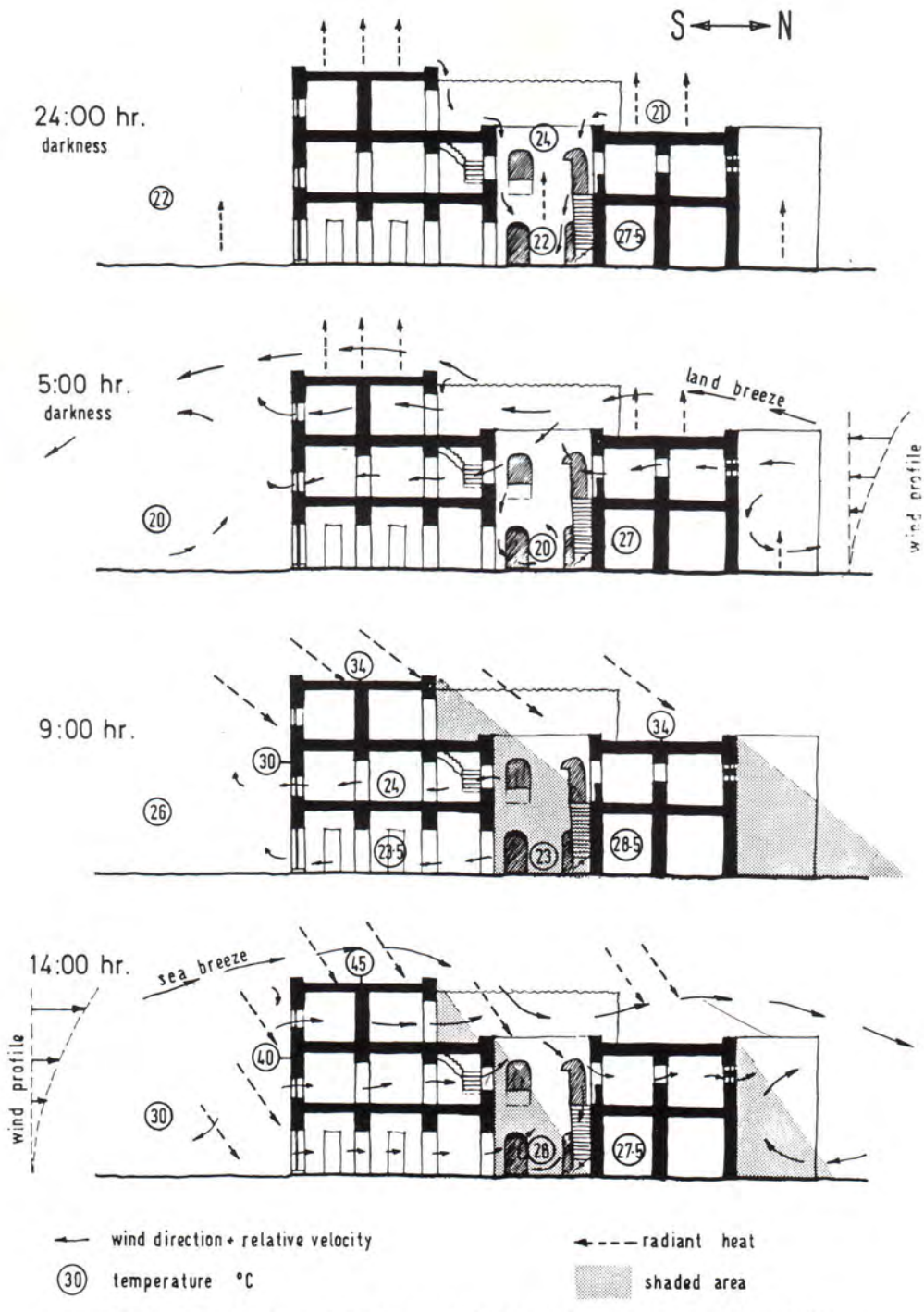
Problems of high density and those relating to health and hygiene are apparent.



Tests were carried out using portable meteorological equipment, in order to establish the relationship between air movement and the siting of houses. (Arrows indicate air movement).

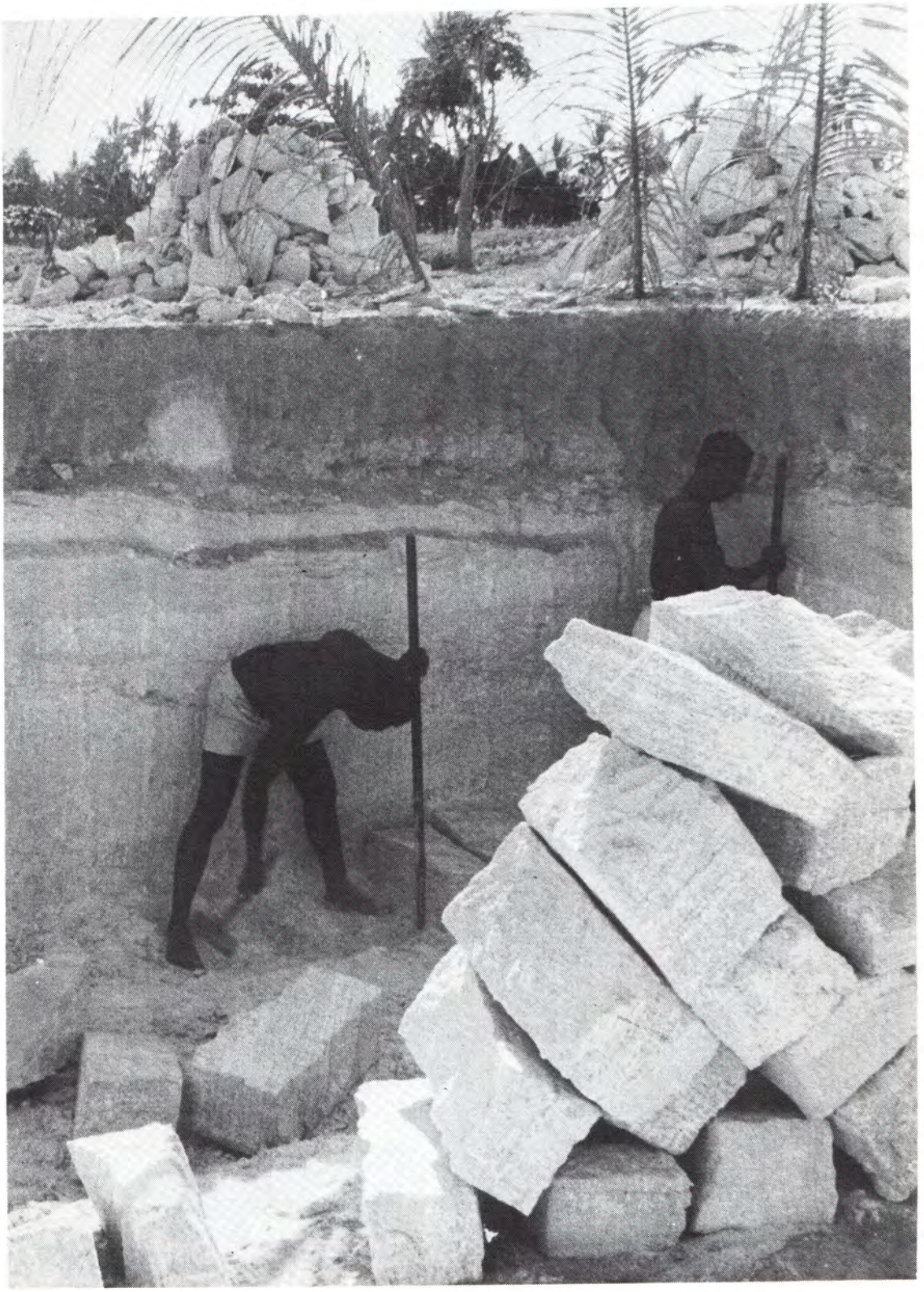


Courtyard house in Salala old town centre. 60-80 years old. Limestone construction. Extensions still underway. Inhabited by extended-family of several brothers.

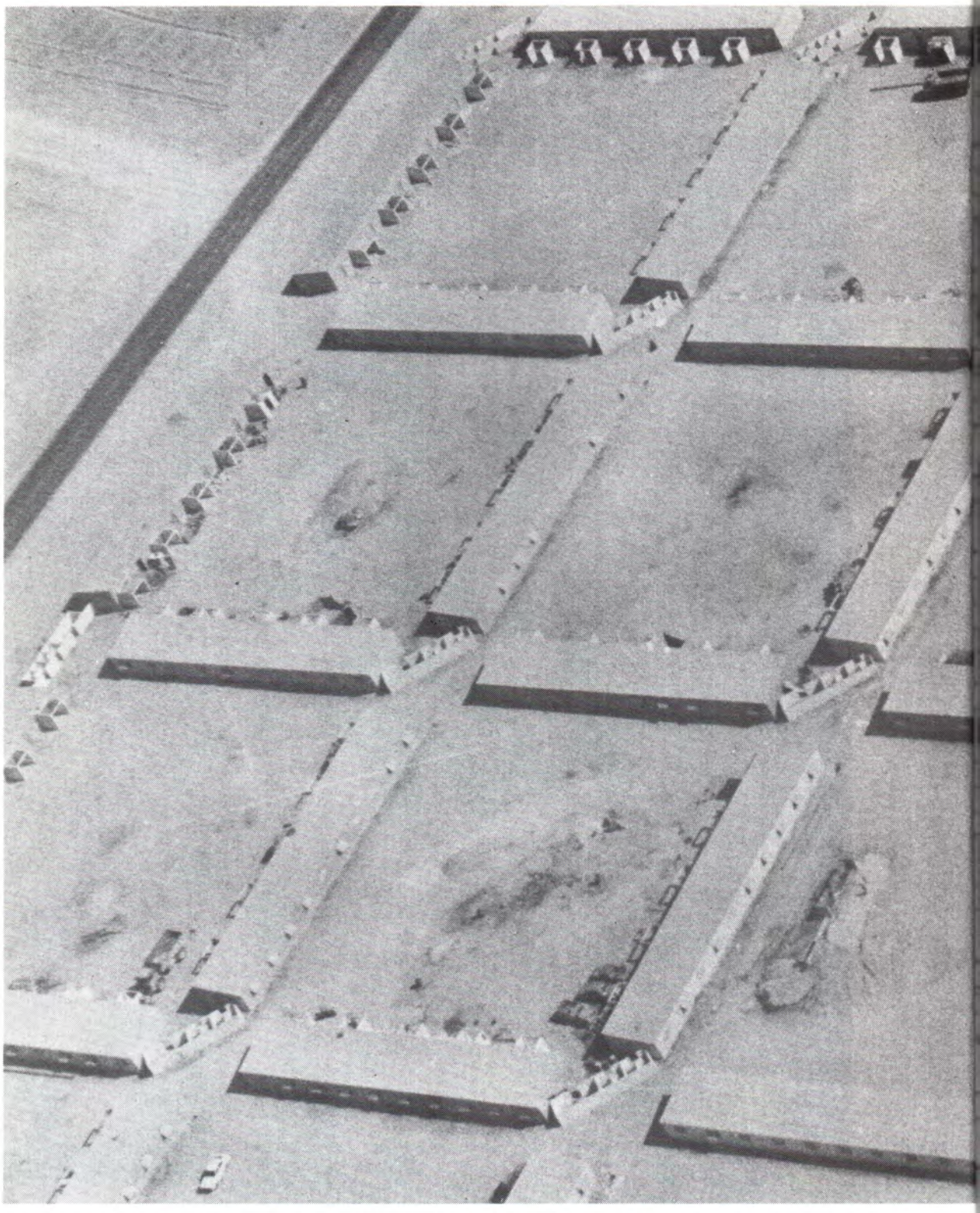


Climatic Response of Salala Courtyard House · Oct. 28, '73

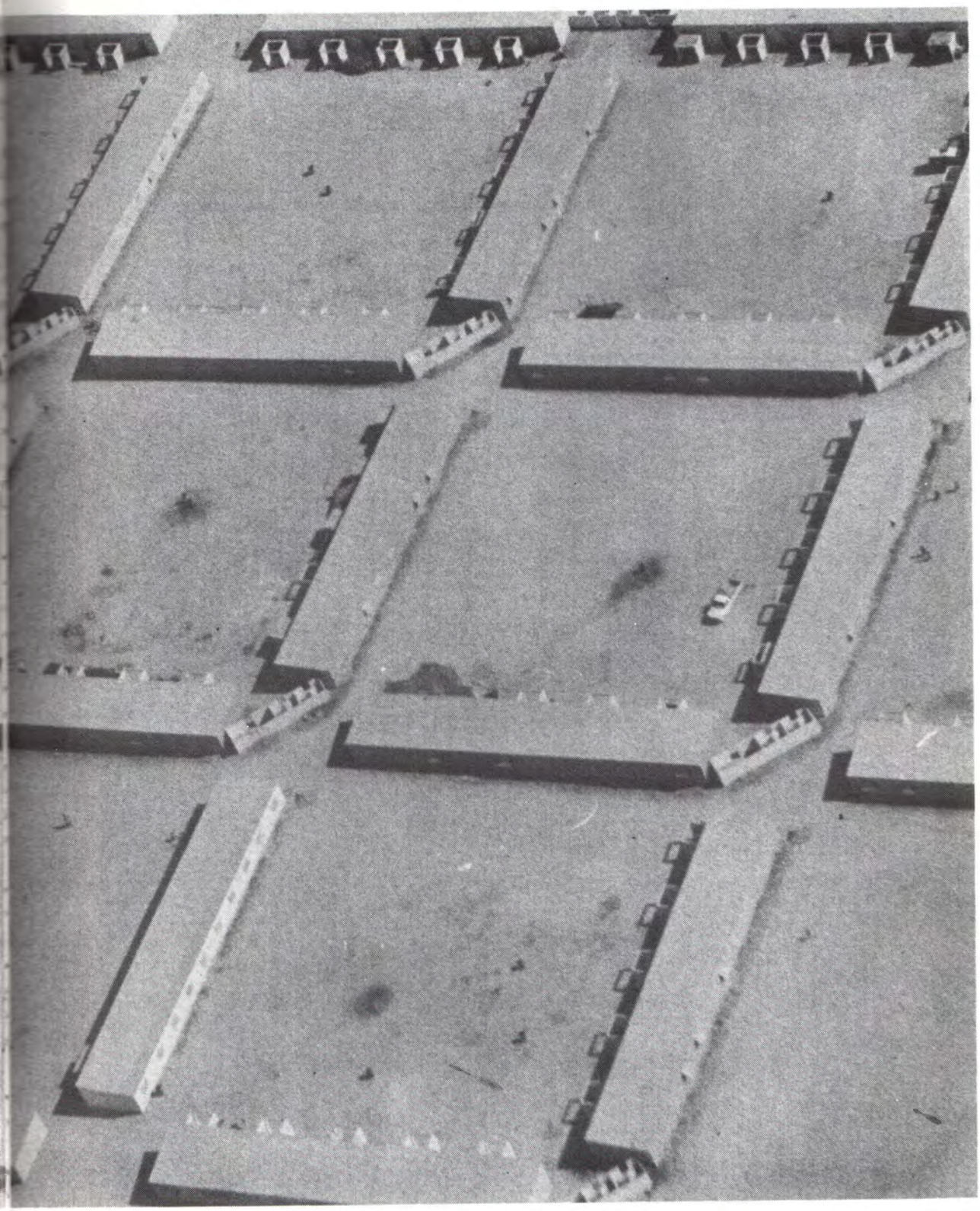
The courtyard house, typical to hot regions has evolved in a different way due to Salala's particular micro-climate. Its response to the climate is seen over the span of a typical day.



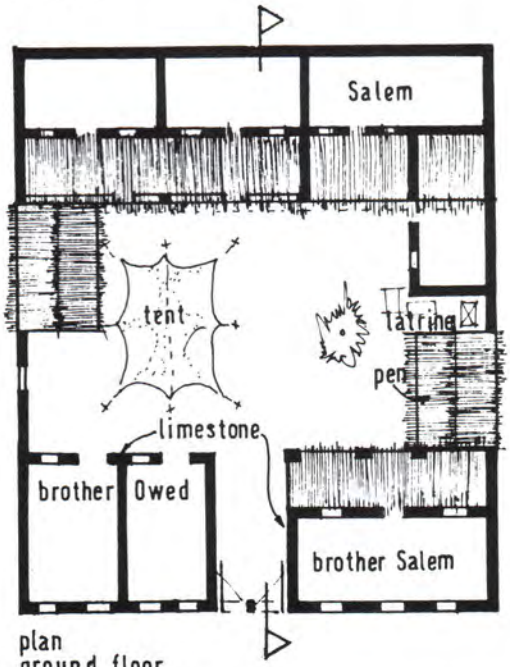
Quarry pit.



The official solution to the refugee problem has been the construction of a limited number of barracks like units.

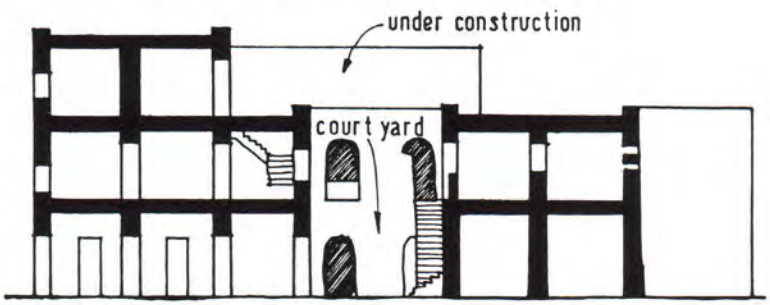


section



plan
ground floor

Three story limestone house
in old town centre of Salala.
60 to 80 years old. Extensions underway.



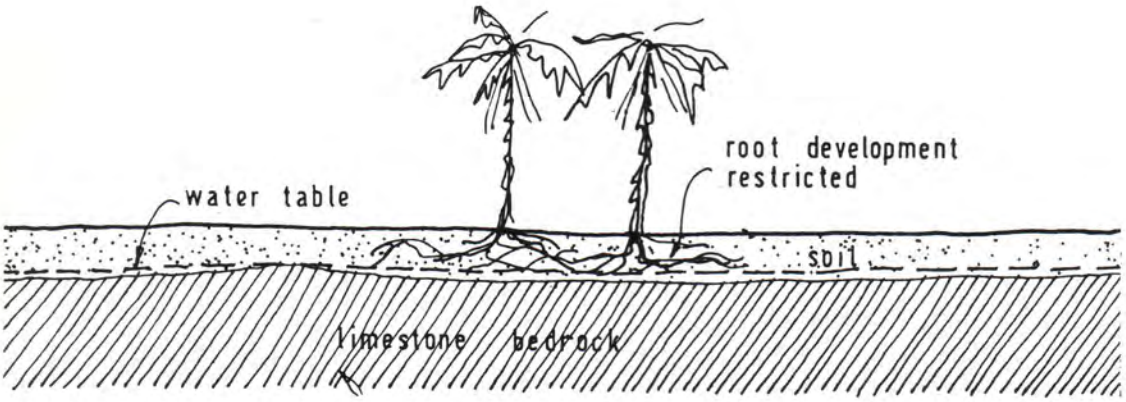
section south ↔ north

In time the new houses show signs of evolving into a form similar to the traditional courtyard house.

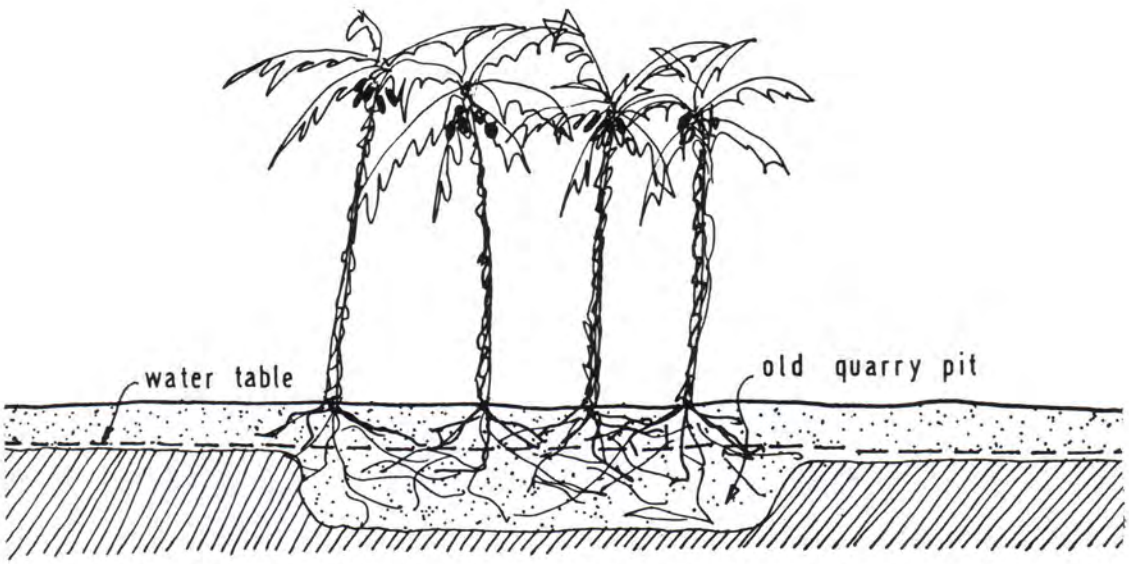
New building in Salala illustrates the process of the evolution of the traditional courtyard house.

New building in Salala illustrates the process of the evolution of the traditional courtyard house.

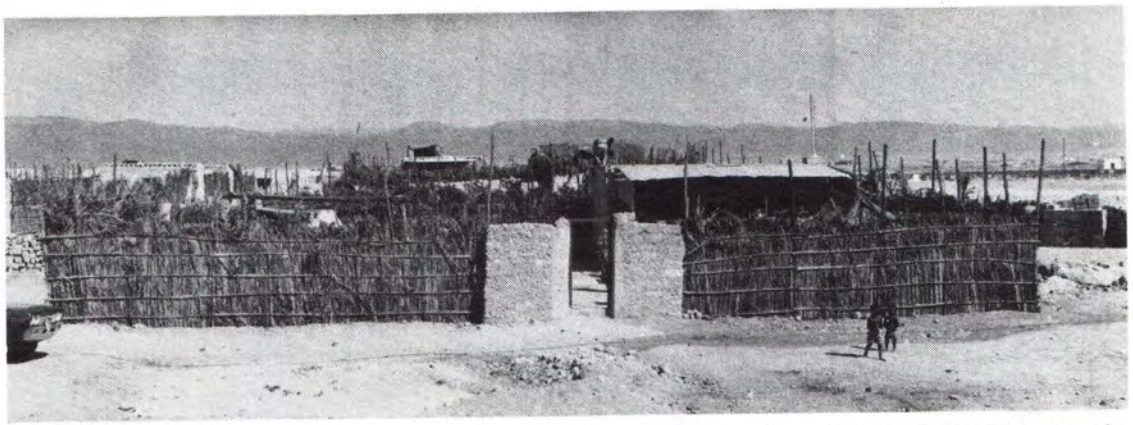
The manual method of quarrying limestone is with pike, hammer and chisel.



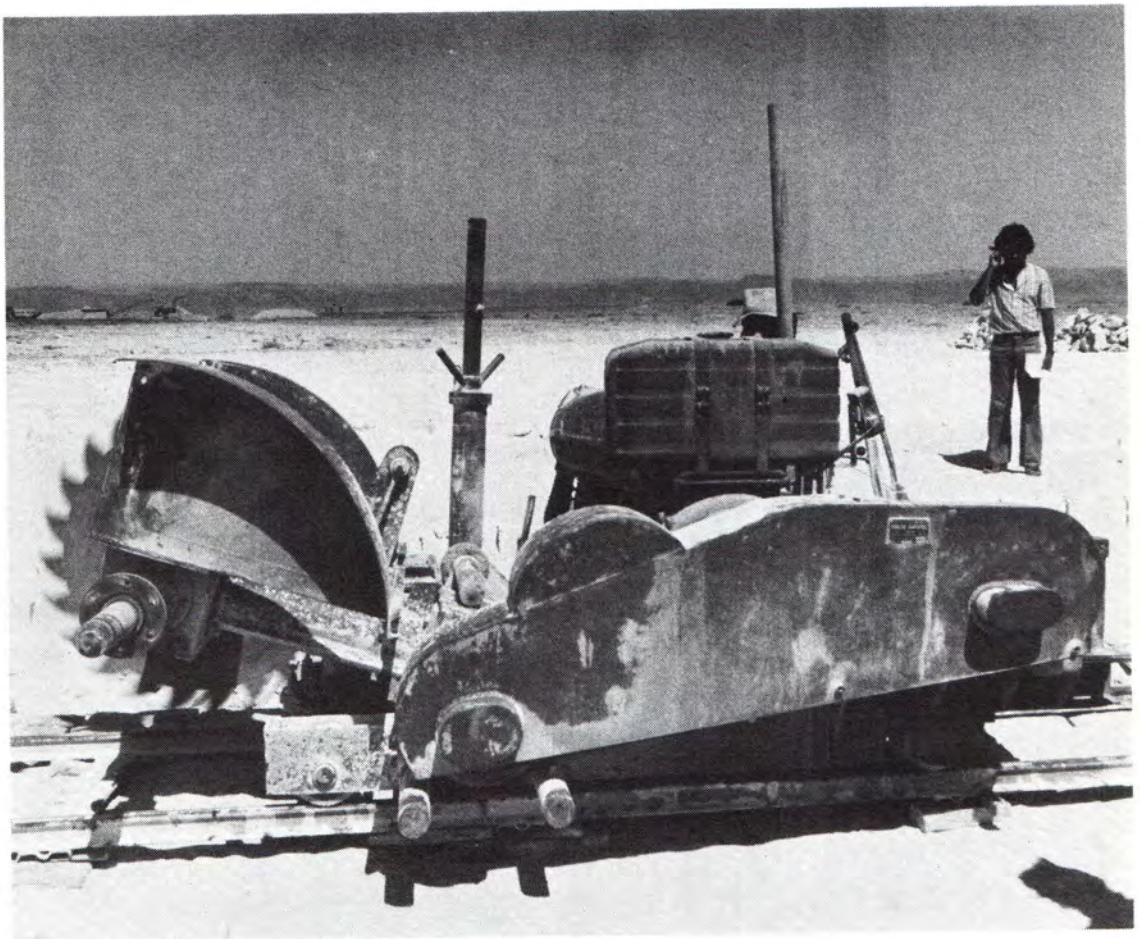
The restricted root development of a limestone bedrock condition.



The improvements provided by planting on old quarry sites.

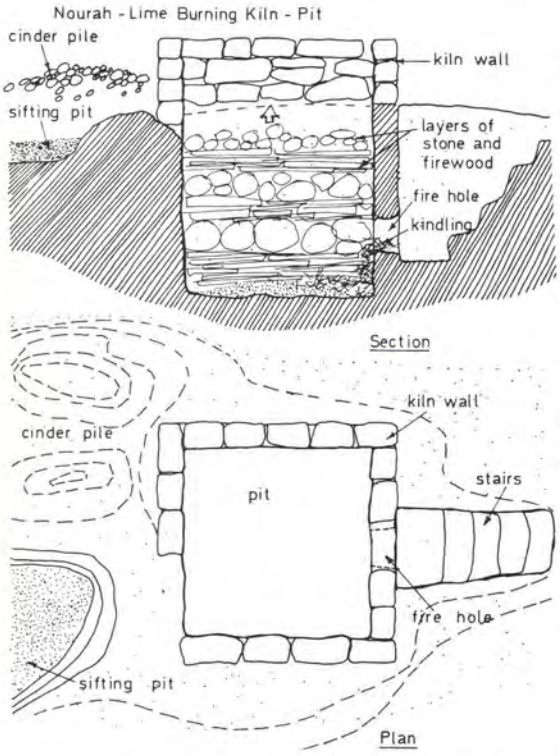


The first stage in owner built housing is the erection of a perimeter wall around the plot and the establishment of a formal entrance way.

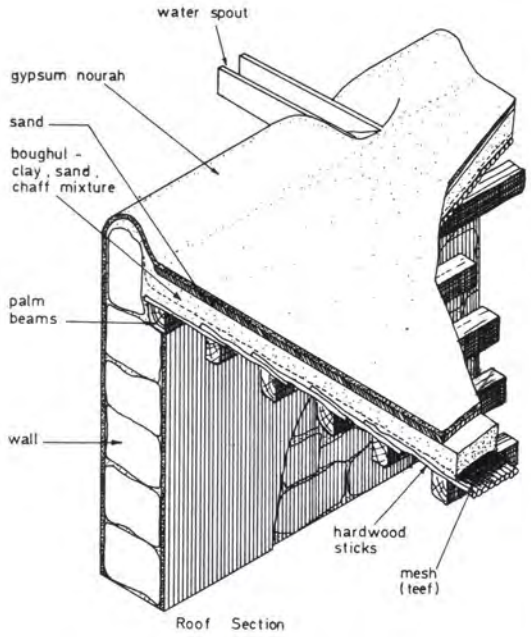


Italian made limestone cutting machine now being run in Salala.

Officially built refugee housing.



Traditional Nourah-Lime Burning Kiln-Pit in the Salala area.



Most houses made of wood obtained from the hills, for roofing.With this source cut off, new roofing solutions have to be looked for.

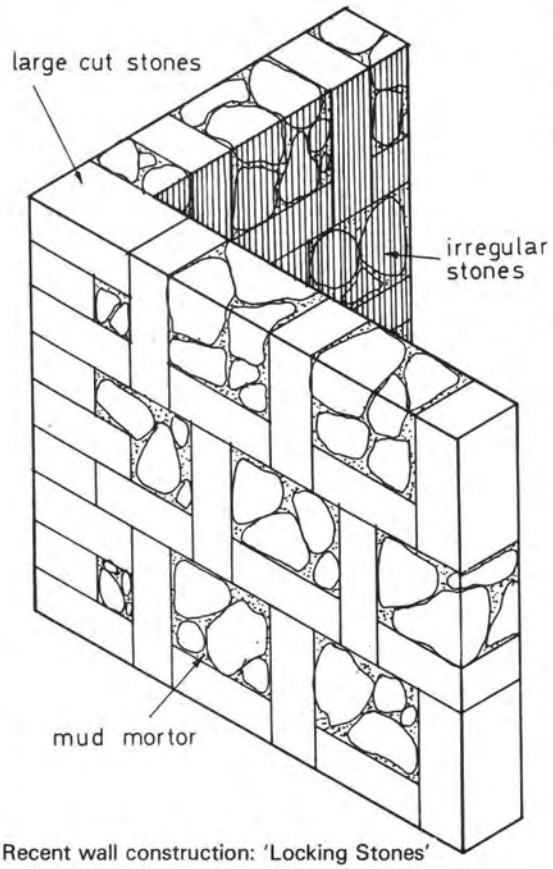
An owner builder with little money to begin with, will start only by building a palm stem wall around his plot and a simple room with the same material. A formal entrance way, made of limestone block, and situated on the south face of the perimeter wall, is always built during this first stage. As soon as financial resources permit the owner will extend his house, within the walled plot, by building one or two substantial rooms, usually of limestone block. These new buildings are developing into a form very similar to the courtyard house, indigenous to the Salala area. Ground floor rooms are being built with load bearing materials very consciously so that they would support future growth above, in the same manner as did their fathers' houses.

With the sudden influx of people into Salala, there is a tremendous increase in the demand for building materials. The most common indigenous building material is limestone. The soil is very shallow on the coastal plain and limestone is the bedrock. Limestone comes from the compacting over centuries of marine material such as coral. More recent deposits are found near the coast and the older harder material is found inland. The war has limited the limestone quarrying to the coast. Limestone is an excellent building material for use in Salala where houses are continually growing and the materials re-used. Hard limestone blocks are used over and over again. Limestone is traditionally quarried by hand, using a hammer, wedges and a pike. This is very hard work and is carried out under the hot sun. Quarry pits are usually places where ten or more men work together, but each as an individual and selling only the blocks that he cuts himself to local builders or individuals who are building their own houses.

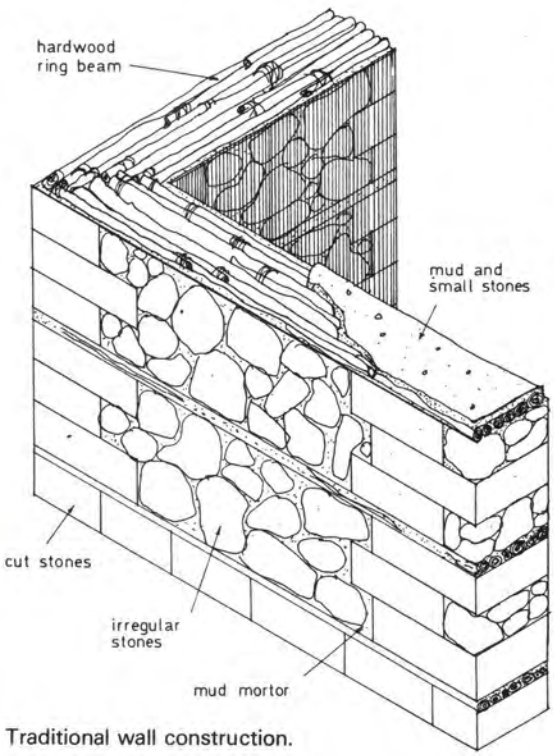
The demand for building materials has put great pressure on the traditional quarrying system. The price of limestone blocks has gone up ten fold in the past four years. One year ago limestone blocks were being sold for as much as 30 Rials, or £33 per 100, while concrete blocks, which have recently been introduced, were selling for 22 Rials, or about £25 per 100. Since then concrete, which has to be imported, has tripled in price, making it out of the reach of the owner builder. Thus with the increase in prices and the problems of supplying the materials, house building becomes slower.

Suggestions have been made on upgrading limestone production through mechanisation. An Italian limestone cutting machine was bought and given to one of the foreign contracting companies to run. The machine was being operated by its crew of eight at well below the manufacturer's stated production rate of two to three thousand blocks per day. The process was constantly being hampered by mechanical breakdowns and dull blades, as the Salala limestone was unlike the Italian stone for which the cutter was designed. The block output per man using the mechanical method in fact compared unfavourably with the traditional system, where a man could produce more than 30 blocks per day.

Upgrading of the production of building materials is essential in Salala. Investment in the development



Recent wall construction: 'Locking Stones'



Traditional wall construction.

of the indigenous building systems on which the majority of the people depend may provide an answer. If interest has been shown in the improvement of methods within the traditional quarrying system chances of success may have been better. The men who now work together on the quarry site, but as individuals, if organised into a co-operative, could operate a cutting machine effectively. Their knowledge of the best cutting sites and the qualities of the local stone would be an advantage. Mechanisation, if only creating a dependance on imported parts and personnel, is questionable. The acquisition of mechanical skills by the local people should accompany the mechanisation of such industries as limestone cutting.

The war and accompanying economic problems has affected other aspects of the indigenous building industry. Access to the hills, where one obtained hard limestones for the production of burnt lime, and more importantly timber for reinforcing, lintels, and roof construction, is now very difficult. Consequently traditional building, which relied on a supply of these materials, has had to adapt itself to new solutions or become dependant upon the importation of building components or materials from abroad. Limestone structural walls were, for example, dependant on the use of hardwood lateral reinforcing between alternate courses of block. This allowed for the use of irregular infill stones between the blocks, thus greatly decreasing the need for cut stone and making the walls cheaper. Since this hardwood from the hills is no longer available, walls have to be built using more precisely trimmed limestone blocks in an interlocking way, thus increasing overall cost. On the other hand, pressures are such that imported timber, plywood and concrete are now being used for roofing.

The growing dependance on imported building materials and components means that money invested by the local people in building and housing is leaving the community. Although there was a tremendous amount of building begun with the influx of refugees and workers from the Gulf, this has now all but stopped with money running out, having been spent on imported materials. The same money spent on indigenous materials and methods would still be circulating in the community, producing employment and generating more building.

In conclusion, it can be seen that economic change in Salala has produced a basic change in the social structure, but the indigenous courtyard house remains the dominant form. Environmental factors such as the climate and physical terrain remain as important today as they did in the past. Whilst an artificial micro-climate can be created using expensive mechanical means, the traditional built response remains both effective and a source of valuable information from which to design and organise new settlement.

With new pressures on the building industry the way materials are used has changed, and at times new materials have replaced old. When this has led to the reliance on imported materials and mechanical systems, the corresponding shift in investment away from the local building industry has further weakened the indigenous economy of Salala.●