THE INFLUENCE OF NATURAL AND CULTURAL ENVIRONMENT ON THE FABRIC OF THE CITY, WITH SPECIAL REFERENCE TO IRAQ

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1983

VOLUME CONTAINS CLEAR OVERLAYS

OVERLAYS HAVE BEEN SCANNED SEPERATELY AND THEN AGAIN OVER THE RELEVANT PAGE

For My Mother,

The Memory of My Father

and

To The Young .... Who Hold In Their Hand
The Shape Of Tomorrow

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by

SAHER M. AL-KAISSI

S U M M A R Y

The magical words 'protection' and 'leisure' convey the two concepts which together were responsible for shaping Man's shelter and settlement in the pre-industrial city, in such a way as to accommodate, whatever his estate, the individual's varied physical and biological requirements, within an environmental framework and the constraints of available natural resources.

Since the Industrial Revolution sophisticated technology has increased Man's capacity for protection and leisure which has changed the dimensions of his lifestyle and become the dominant influence on the quality of life. However, the significance of technological advancement has extended far beyond this, especially in situations where it has been uncritically imported, without adaptation, often creating discord within the host community. This conflict will be the focal point of the thesis, which itself represents an attempt more closely to juxtapose the needs of Man and his environment with the tools of advanced technology, in order to achieve a pleasant and satisfactory urban fabric.

This thesis commences with an historical analysis of different consecutive civilizations within a single context, in order better to understand Man's attempts at creating an environment

fitted to his needs. It is followed by a consideration of the nature of human form and its capacity to adapt to change, together with an examination of the characteristics of the surrounding natural environment, the attendant natural and cultural resources, and Man's efforts to control and utilize them.

The theoretical foundation has been developed through experimental studies and empirical research by case studies in Iraq. A detailed case study of urban fabric in Baghdad has analysed both traditional and modern housing areas. This analysis is also brought into a broader national perspective by further case analyses in different regions of Iraq. The case studies were carried out through personal observations and measurements, and an interview survey in Baghdad with a multi-phase random sample of 300 households.

The assessments and conclusions from the case studies are used as a basis for a set of design principles and guides for future urban design in Iraq.

ACKNOWLEDGEMENTS

Those to whom I am indebted are legion. To list any is to risk omitting many. They are -

Iraqi Government

Family and Friends

Technician and Typist

Many will recognize in this work some personal contribution. For this, and them, I am grateful.

The guidance and help of Roy Dark and Miss Al-Kaissi have been so telling, however, that they must be singled out for special thanks.

Saher

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Architecture and Urban Design are more than the art of constructing individual buildings. It is also the creation of environment. Buildings do not exist in isolation. They not only impose their character on their surroundings but also have an incalculable effect on the lives of the human beings who inhabit them.

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A

MAN'S ROLE IN CHANGING THE URBAN FABRIC

TO MEET HIS REQUIREMENTS

[A] MAN'S ROLE IN CHANGING THE URBAN FABRIC TO MEET HIS REQUIREMENTS

Man's natural capacity for physical self-protection and biological adaptation led to his survival. Therefore, he created shelter to correspond with his basic needs and demands utilising his ability to shape the surrounding environment.

In this sense, Man the builder, consciously or unconsciously, acts as a force continuing the biological and ecological process which led to his own formation.

Man's inventiveness enabled him to defy the rigours of his environment by using fire for warmth and furs for clothing. When the weakling among animals substituted Promethean inventiveness for the physical adaptation of other species, the shelter became his most elaborate defence against hostile climates. It enlarged the space of biological balance and secured a favourable milieu for productivity. As the shelter evolved, accumulated experience and ingenuity diversified its form to meet the challenges of widely varying climates [Olgyay, 1963, p.3].

Furthermore, in addition to dealing with climatic conditions, Man's inventiveness enabled him to protect himself against predators by living primarily in caves, then creating his own shelter and finally, due to the development of his personal and social requirements, created his dwelling.

This represents an ideal process but in reality, since the earliest times, Man's ability to shape even the simplest natural shelter to meet his needs and demands has been circumvented by external forces. As life has evolved the function of natural

shelters (i.e. the cave) to provide for human requirements has declined and Man has been forced to design his own shelters and constantly develop them to overcome the constraints imposed by the natural and cultural environments. This change in the type of shelter was related to Man's change in his survival resources (i.e. from hunting and gathering to agriculture, which relies upon cultivating the soil and necessarily has implications for the manner in which order and continuity are maintained). The need for some ground rules about sexual access and the sharing of food remains, but to these, arable farmers require others to be added, bringing with them further demands, constraints and control mechanisms. For example, as trade increased different kinds of quarrel arose and the means to resolve them were newly evolved.

The practice of agriculture demands fixed residence in a given geographical area for at least part of the year. This period must generally be such as to allow land to be cleared and cultivated, the crop to be sown, protected while it grows and finally harvested. These activities are thus carried out in the company of a more or less stable and continuing group of co-residents - a sharp contrast to the nomadic group with its fluctuations in size and composition, larger groupings of agrarian settlers are found than among hunters and gatherers, as arable farming generally allows a greater population density. Individual shelters have been organized to form the nucleus of these farming communities.

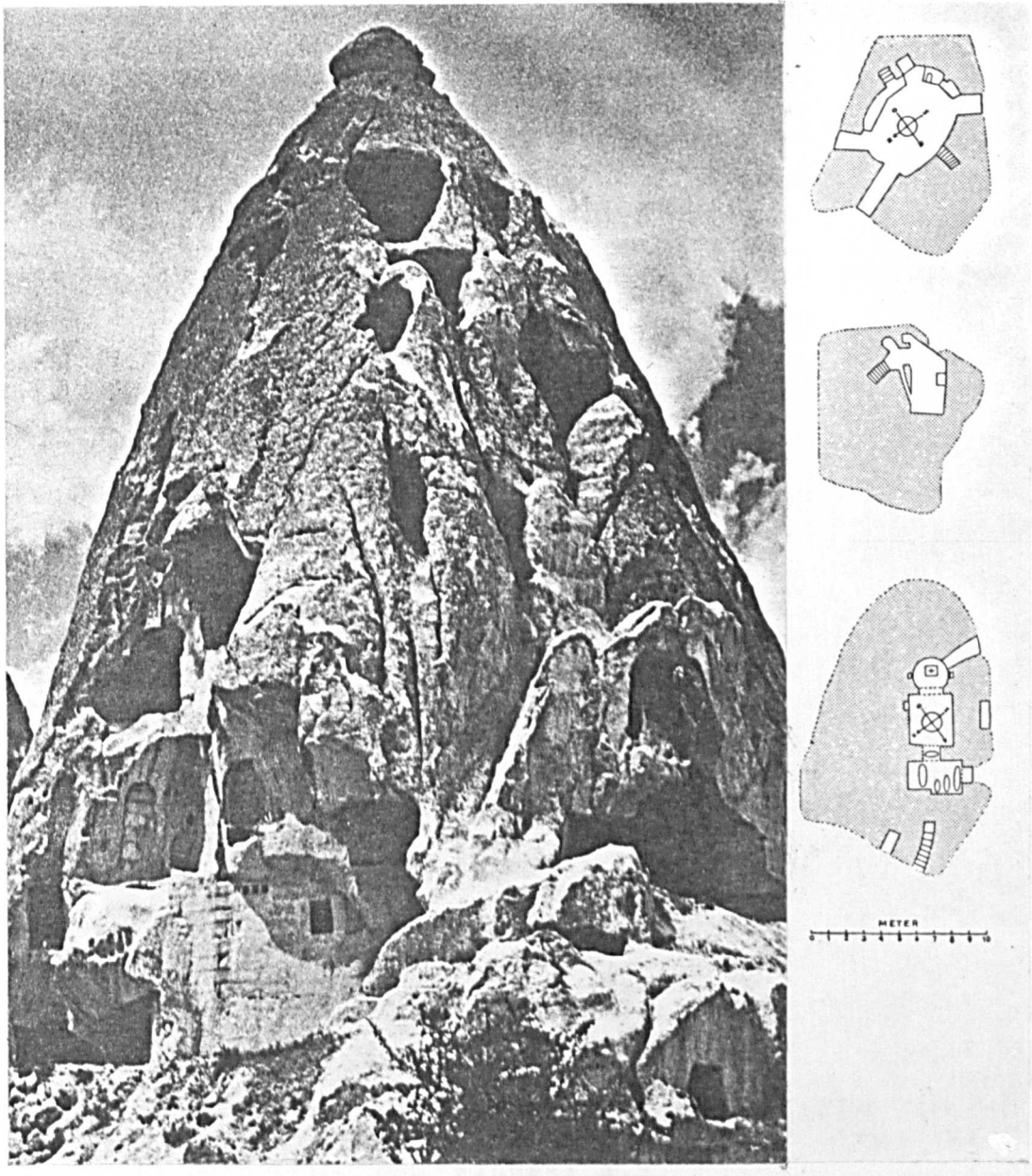
At the same time, settlement may demand different and more elaborate forms of cooperation compared to those necessary in hunting and gathering. These will centre on the building of permanent dwellings and on the farming operation itself. Careful coordination

may be required if everyone's field is to be prepared and planted in time for a short growing season. Cooperation may also be demanded for defensive purposes as it is harder for a farming community to melt into the trees in the face of a potential enemy than it is for a band of hunters and gatherers.

Two other developments coming with a more settled life are the possibility for accumulation of property and the development of a different relationship with the land. Such property will take the form of more durable dwellings, farming implements and household goods, as well as any surpluses which may be incidental to farming. Property may also lie in enduring rights over specific areas of arable land. In those societies which practise shifting agriculture, moving on every few years as a newly cleared area becomes exhausted, people are unlikely to establish a permanent relationship with a particular tract of land, but where settled agriculture is practised, durable rights may come to be recognized as residing in particular individuals or groups.

Agriculture may bring more leisure. While the business of keeping alive typically involves work for at least part of every day in a hunting and gathering band, farmers may be able to live off each season's crop, with little that has to be done in the interval between one harvest and sowing again for the next [Roberts, 1979, p.101].

Evolution of new environments and ways of living created new needs and demands which resulted in a wider concept of culture. This circle was repeated over and over again through time and space to produce our present variety in built-up environments.



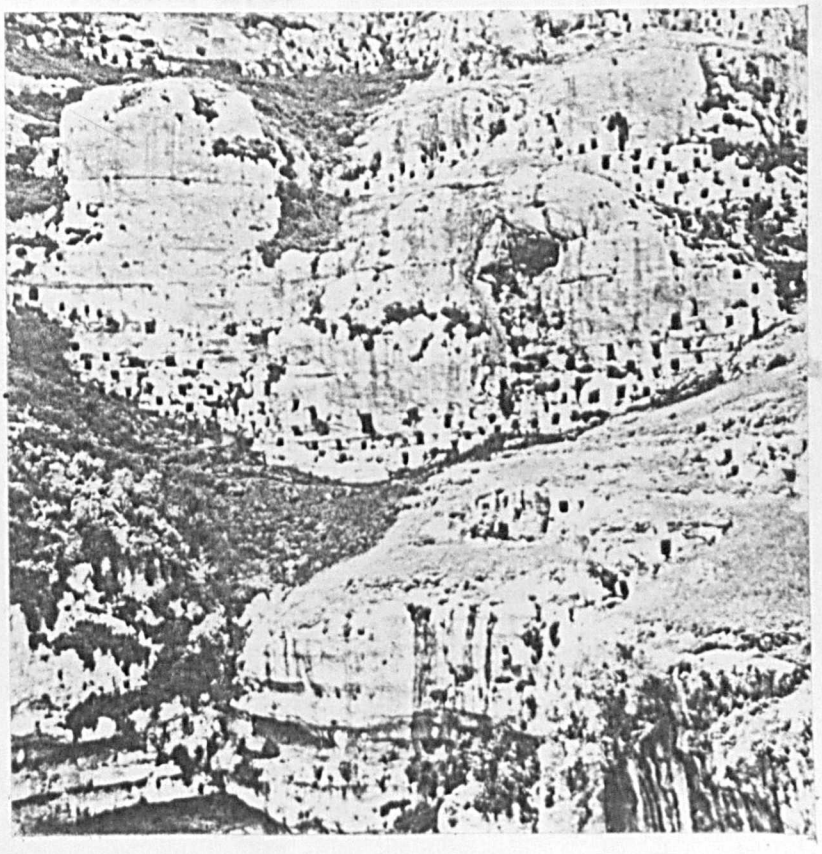


FIGURE: A.1.

The Cave as a Shelter.

Rudofsky, 1977, pp.13,24

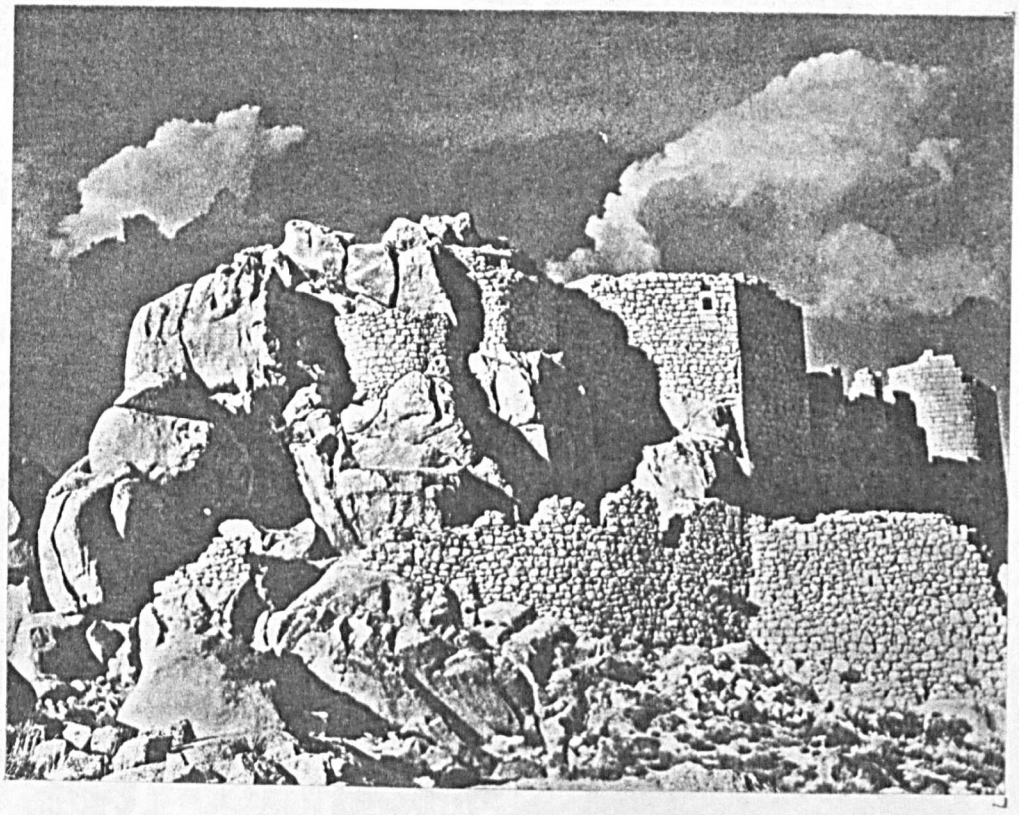


FIGURE: A.2.

The Cave Extended to Meet Man's Growing Needs.

Rudofsky, 1977, p.52

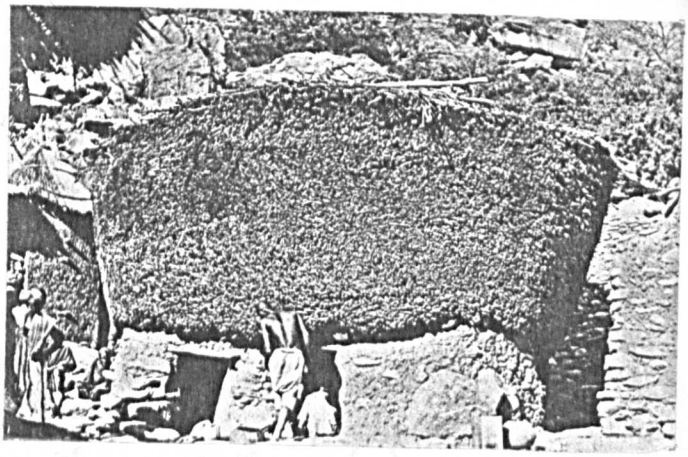


FIGURE: A. 3.

Individual Shelters in Various Environments.

Rudofsky, 1977, pp.144-145

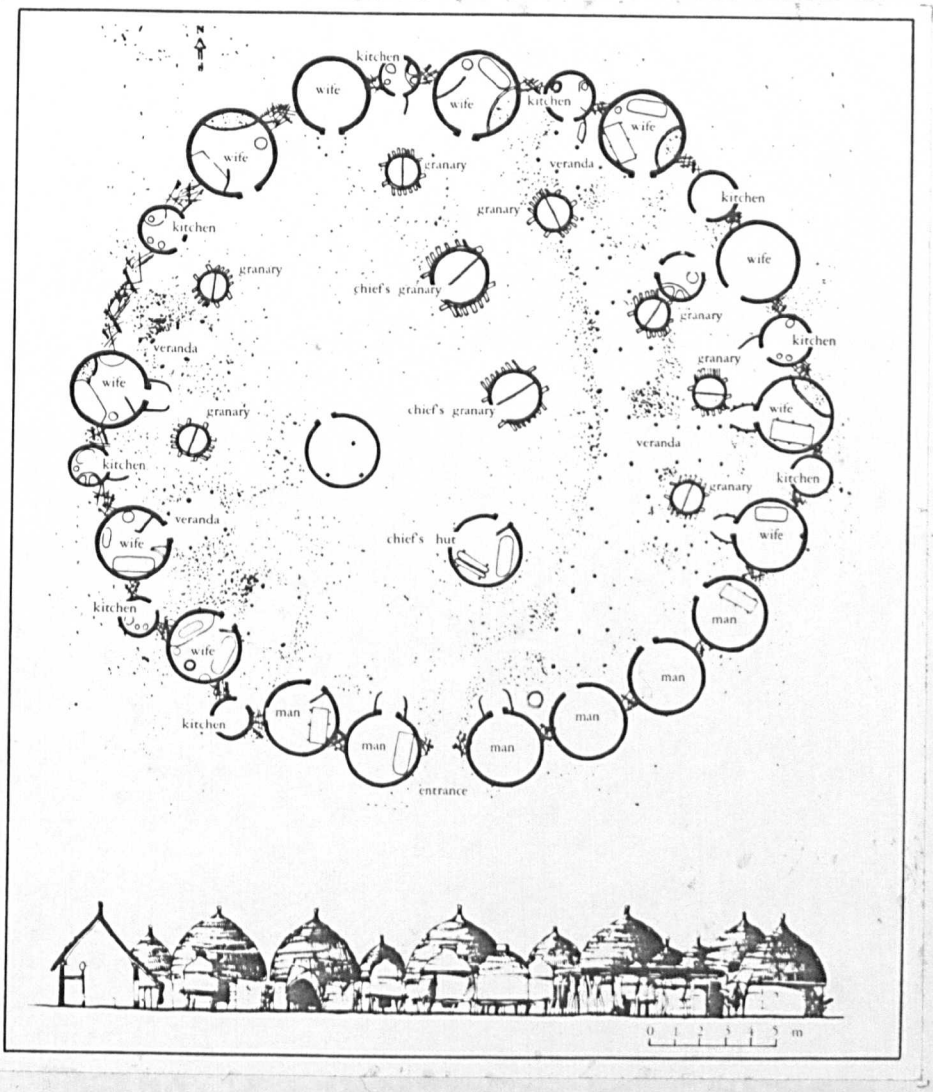


FIGURE: A.4.

Tribal Grouping of Shelters.

Benevolo, 1980, p.

FIGURE: A.5.

FIGURE: A.6.

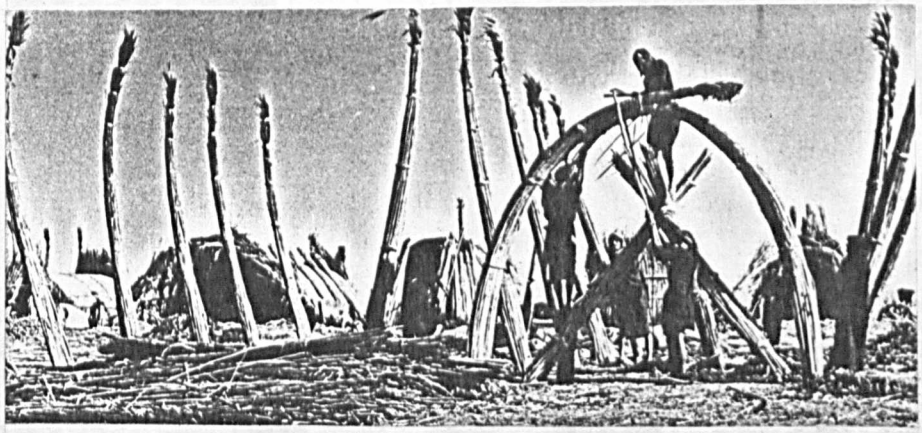
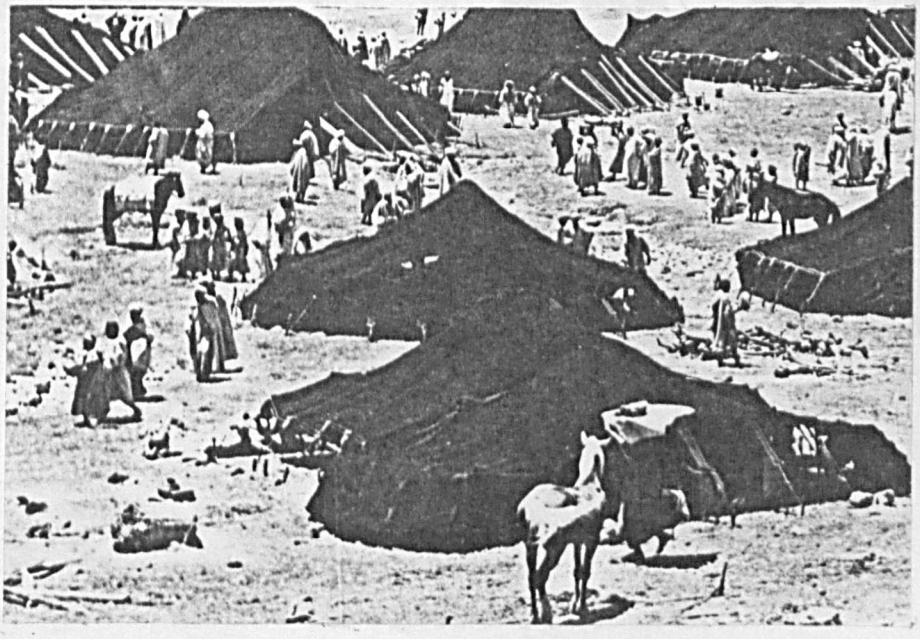


FIGURE: A.7.



FIGURES: A.5; A.6: A.7.

Shelters in Highland, Marshland and Desert Environments.

Rudofsky, 1977, pp.41,46,126

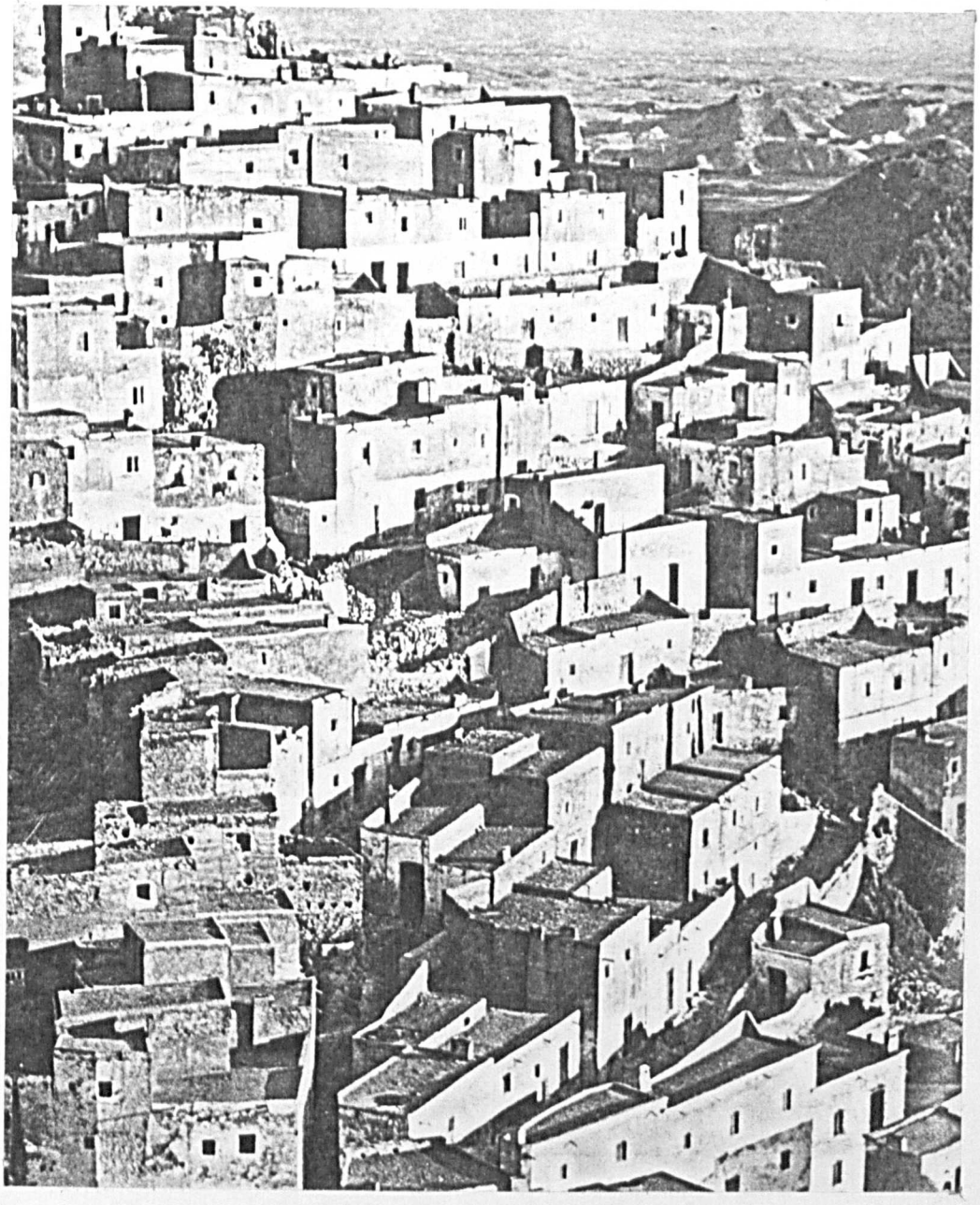


FIGURE: A.8.

Shelters in a Mountainous Environment.

Rudofsky, 1977, p.38

FIGURE: A.9.

The Introduction of Ownership and Privacy.

Rudofsky, 1977, p.131

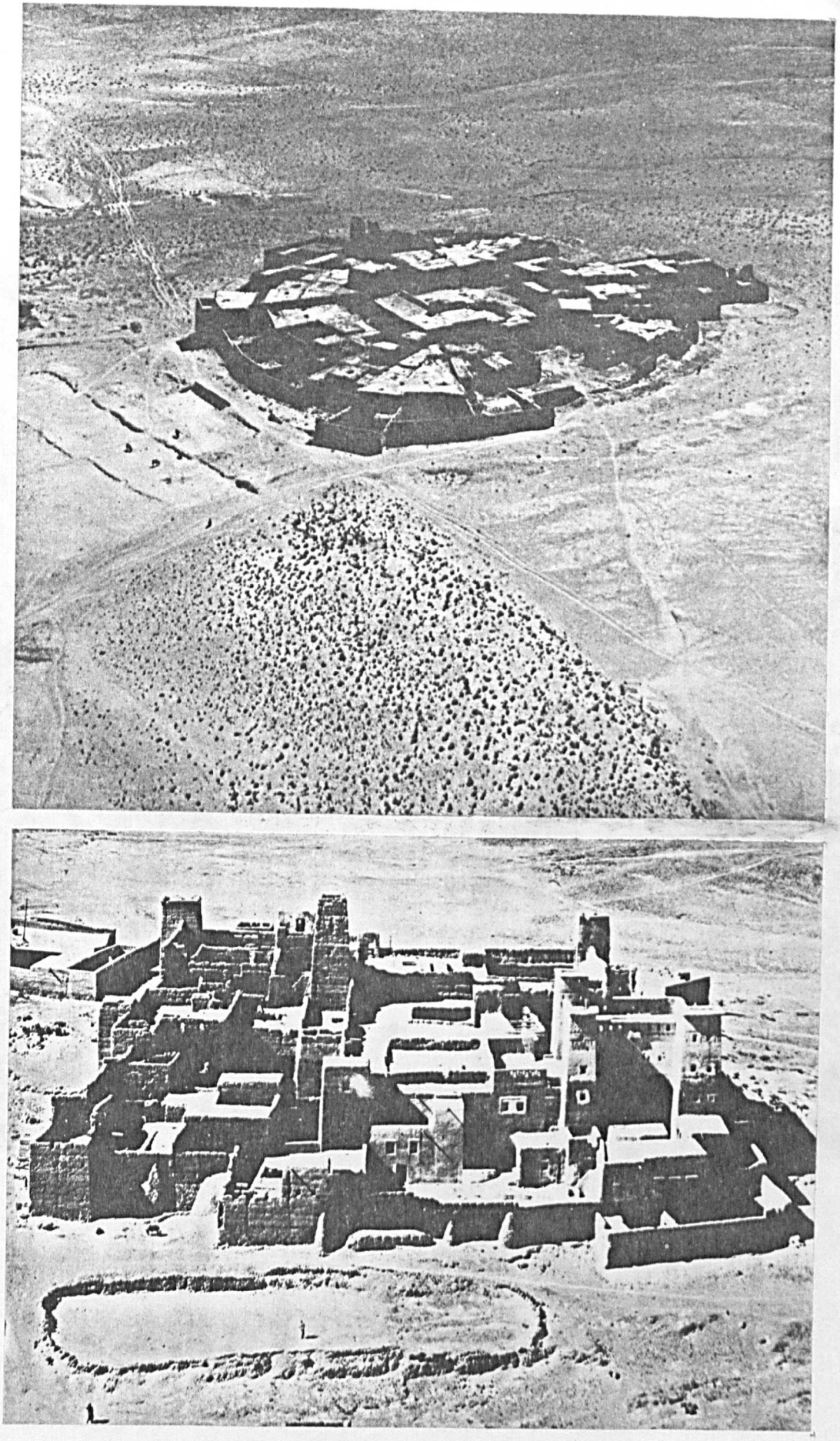


FIGURE: A.10.

The Fortified Urban Fabric.

Rudofsky, 1977, pp.59-60

FIGURE: A.11.

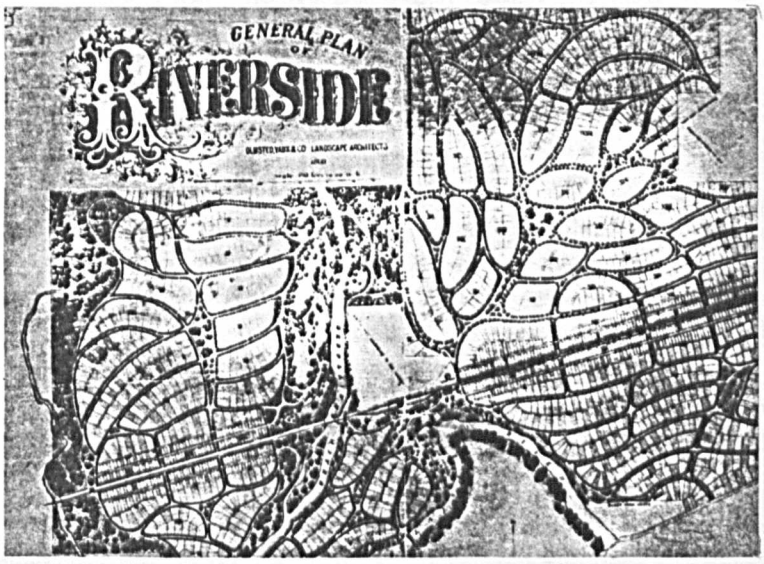
Pre-Industrial Urban Fabric (Erbil City: Iraq.)

Erbil (Ancient Arbela) in north-east Iraq, in the centre of the photograph, has been more or less continuously occupied for perhaps 6,000-8,000 years. A.E.J. Morris, History of Urban Form, 1972, p.9.

In the course of time the organization of social life within communities has improved. As the early villages developed into towns, they were subject to restrictions placed upon them by the physical environment as well as Man's limited natural capacity. This meant that until the Middle Ages the city was created and shaped on a human scale. This is apparent from the existence of narrow meandering streets and alleys and of low-rise buildings often adorned with carving or ornamentation. In such cities the form of the urban fabric was a product of mainly three dimensions: Man's need and demand, the environmental constraints, Man's physical capabilities and human endeavours. The technological capability of society at that time was relatively limited. Cities were mostly built without machinery.

During the Industrial Revolution a new element or dimension emerged as a product of Man's cultural environment and subsequently increased his capacity to shape the urban fabric to meet his developed needs and demands. Although technology has increased Man's ability to control the urban form, it has also impinged upon the physical space of the urban areas, which is now shared between Man and his modern technological inventions, modes of transportation and communication, modern industry and its infrastructure.

The forces which interact to shape the urban form include Man's requirements at both the individual and corporate level. Basically these fundamental demands (i.e. shelter and settlement) have remained constant since time immemorial, but the ways in which the needs are met have changed over time. These needs and demands may vary according to different cultures (i.e. value concept) and they may also vary from one generation to another.



Two predecessors of present-day curvilinear subdivisions: *above*, a section from Olmsted's plan for Riverside, Illinois, 1869; *below*, suggested subdivision design by the firm of Pitkin and Mott, published in 1936 by the Federal Housing Administration in one of its early brochures, "Planning Neighborhoods for Small Houses."

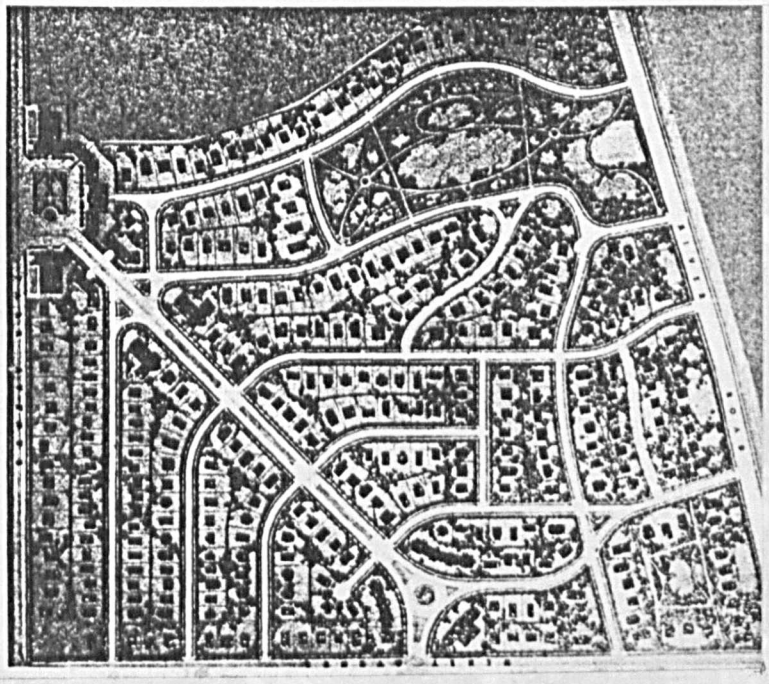


FIGURE: A. 12.

The Influence of the Motor Car on the Urban Fabric.

Tunard and Pushkarev, 1963, p.91

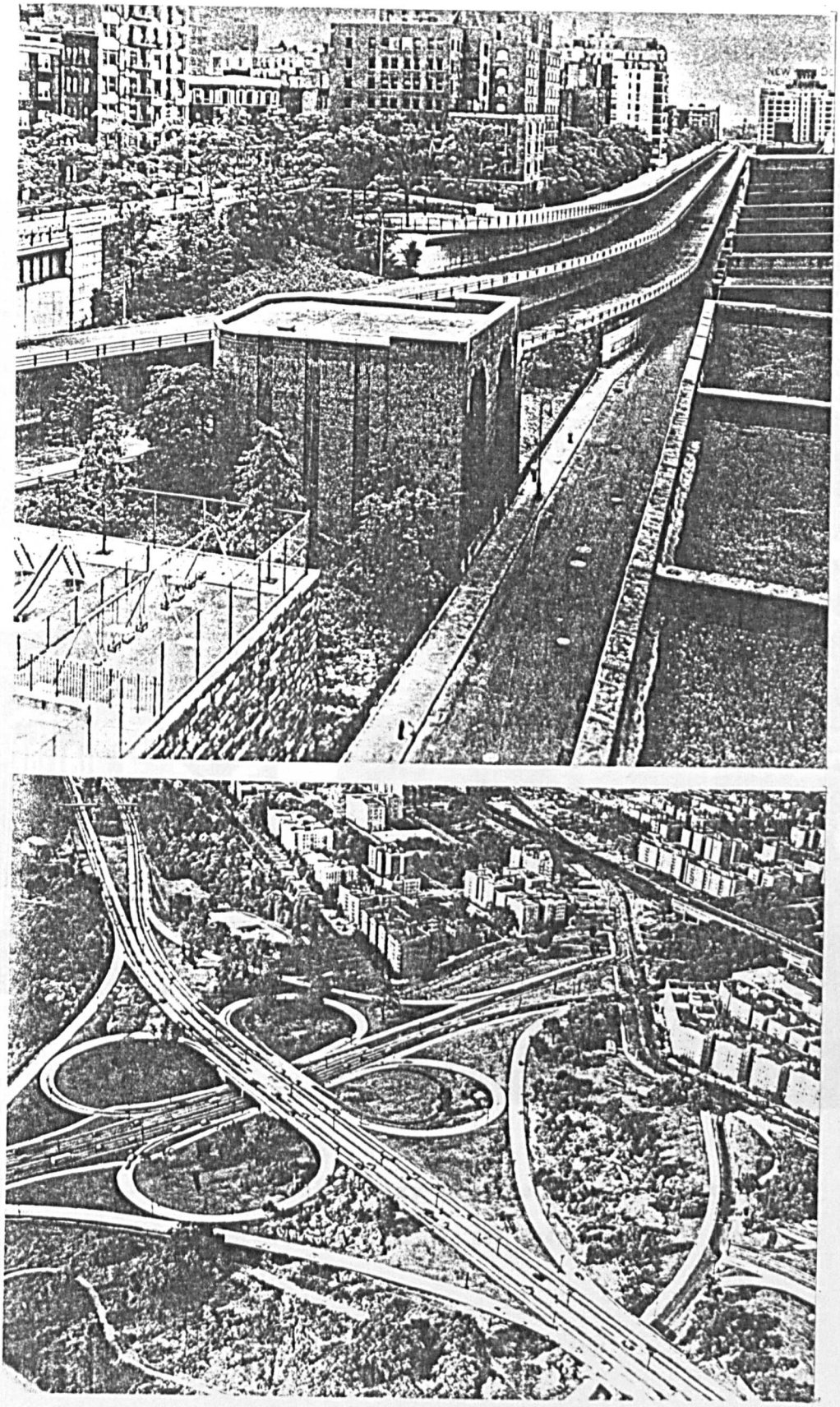
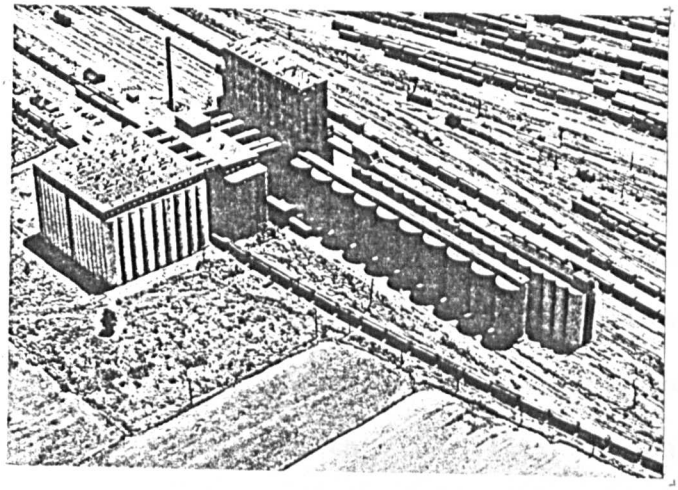
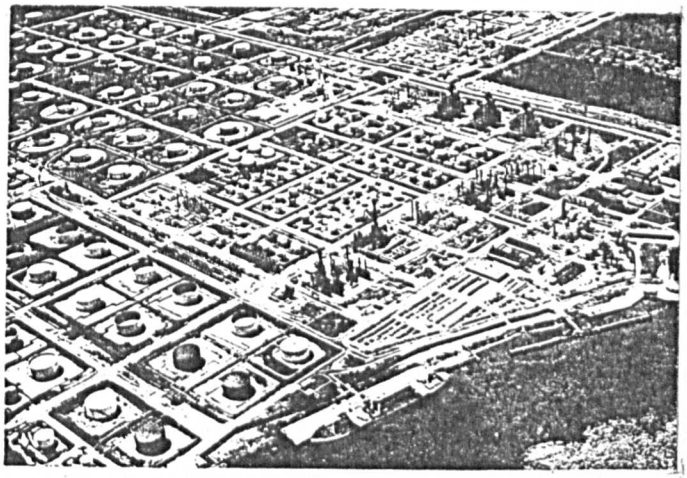


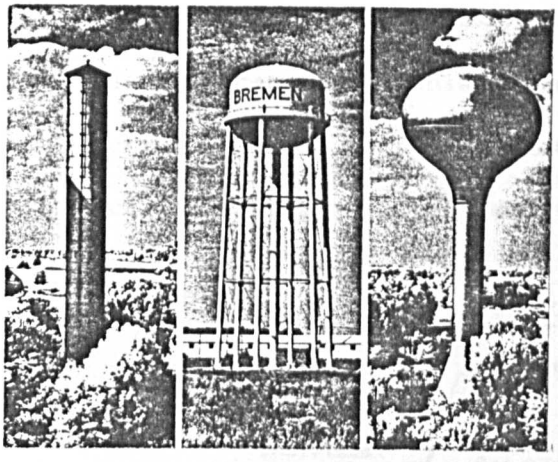
FIGURE: A.13.

The Impact of the 20th Century Transportation Network on the Environment.

Tunard and Pushkarev, 1963, pp.215, 255







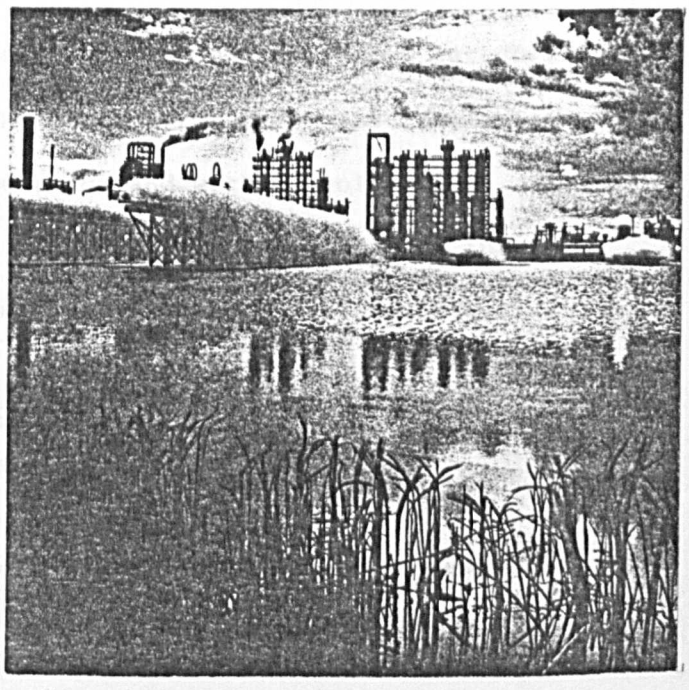


FIGURE: A.14.

The Impact of Modern Technology on the Environment.

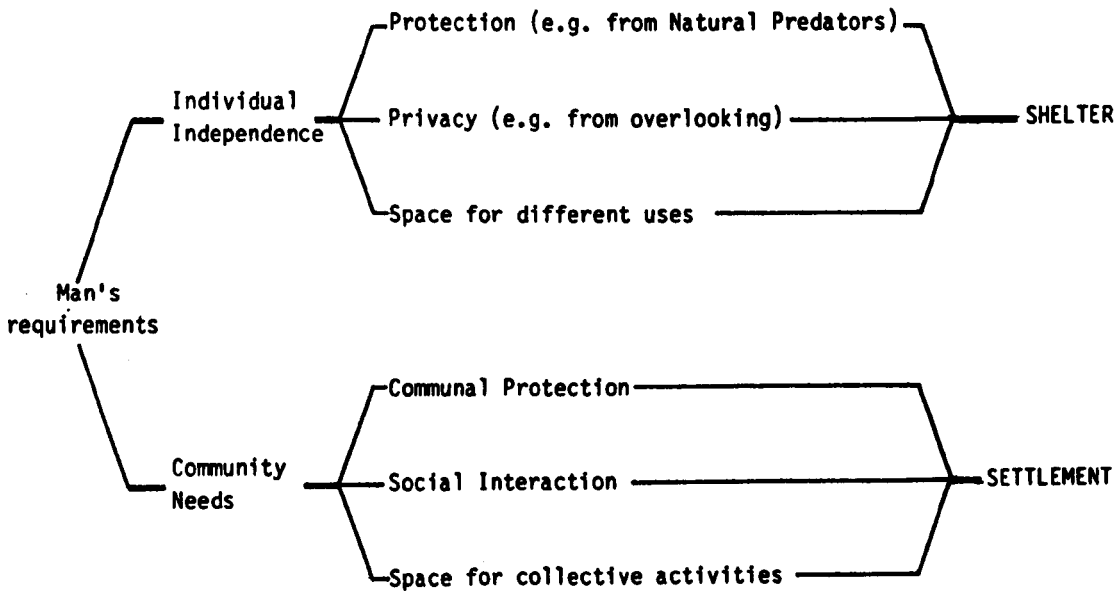
Tunard and Pushkarev, 1963, pp.291, 295, 314

However, these varying requirements may be considered in two categories:-

First, individual independence - the individual private necessities, which basically consist of three major elements: individual protection, privacy and space to house the different uses (activities). Every form of shelter (that is, house, apartment, school, factory, etc.) should seek to accommodate each of these elements within its final fabrication.

On the other hand, community (*) makes up the second category of environmental requirements. Thus, any interaction and consequent benefits cannot be achieved in isolation and without collective action. These mainly include:- communal protection, social interaction and space for collective activities as shown in Figure 1.15.

FIGURE: A.15.



(*) The term 'community' as used here, represents a group of individuals having common values, interests and place of residence.

Therefore, community represents the successful attainment of these goals through the integration of individual shelters.

In order to satisfy both categories of needs/demands in a community, the environment should provide the facilities which are necessary to achieve the desirable linkage of single dwellings to form an integral settlement. The form of the built environment at a certain time reflects the underlying history and culture of the society in combination with changing needs and demands, technology, wealth, etc.

The factors which may be helpful in an analysis of the evolution of the built environment may be summarised as follows:-

1. Historical Background
2. Technology
3. Living Standards
4. Social, Economical Relationships
5. Habits and Customs
6. Religious and Ethnic Factors

These elements provide us with ample information and their importance may change over time with their relative dominance alternatively waxing and waning. The ranking of these factors ultimately determines the architectural anatomy of the city, which can be clearly seen in any layout of any urban fabric.

It is very essential that if one is to use any concept of a changing urban fabric the researcher should carry out a comparison and detail studies of the relationship between elements of natural and cultural environment in the locality to be studied.

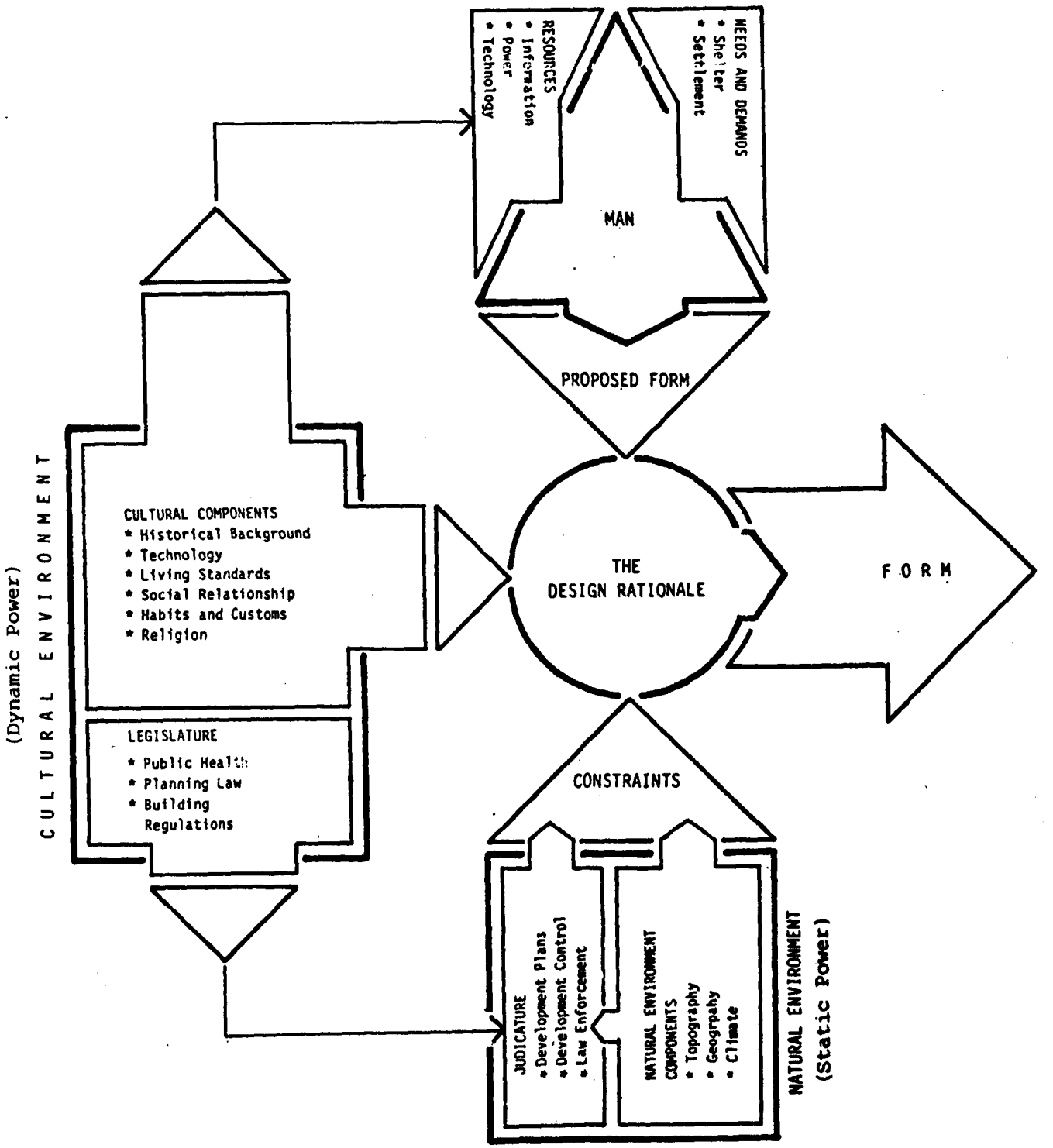
Therefore, it seems so obvious that types of building materials from cold climates cannot solve problems of cities where heat is the dominant problem and that solutions from communities with average per capita income of, say, $7,000 per annum cannot work in communities where the income is less than $70. Yet the cities of the tropics are full of galvanized iron roofs, plate glass windows and buildings that could just as well stand in Manchester, Detroit or Montreal. The resulting urban environment is climatically and socially inadequate [Koenigsberger and others,1978, p.xvi).

However, whatever the relationship between Man's needs/demands and the elements of his cultural environment, Man's ability to shape the urban form may be inhibited by both prevailing natural environmental factors (i.e. climate, geography, topography, etc.) and the legislative framework of the society, which in itself is derived from the cultural environment. This legislation is created in order to protect the rights of individuals and the well-being of the community by organizing the relationship between the Man, Society and the urban fabric. Accordingly, legislation plays a crucial part as one of the main constraining factors which shapes the built environment. It is inevitable that the components of the legislative system should be derived from that cultural environment, i.e. information, powers, experience, and technology, in order to operate within the parameters of the particular country or culture.

The above exposition has indicated that Man through his struggle for survival has adapted ways and means of coexistence between his personal necessities and the cultural environment which all led to the present forms of human settlement in addition to providing a framework for laying out future settlements.

FIGURE: A. 15.

A MODEL OF THE PROCESS OF DEVELOPMENT OF URBAN BUILT FORM.



This Model presents a balanced state, necessary to produce an adequate urban form.

While the climatic determinism of Huntingon [1915] and other 19th and early 20th Century geographers is no longer acceptable, it is quite clear that climate, ethnic characteristic, land-use, culture and built form are closely related [Markus and Morris, 1980, p.140].

Consequently, the city may be looked on as a story, a pattern of relations between human groups, a production and distribution space, a field of physical force, a set of linked decisions, or an area of conflict. Values are embedded in these metaphors: historic continuity, stable equilibrium, productive efficiency, capable decision and management, maximum interaction or the progress of political struggle. Certain factors become the decisive elements of transformation in each view: political leaders, families and ethnic groups, major investors, the technicians of transport, the decision elite, the revolutionary classes [Lynch, 1981, p.38].

[A.1] THE URBAN HERITAGE OF THE CITY

It is clear that the environmental heritage of the city is a consequence of its historical, physical and cultural development.

The physical/natural environment remains in the broadest sense, almost unalterable, whilst the cultural development may be subject to rapid transition in terms of both time and space.

In order to study the organic growth of any city it is essential to consider those environmental factors which combine to shape its urban form. These can be seen as follows:-

A.1.1 CULTURAL ENVIRONMENT

This consists of a number of variables which exist in a state of interdependence and not isolated. At the same time they are all subject to the constraints of the natural environment (climate, geography, topography etc.).

A.1.1.1 Historical Background

Any worthy enterprise of the mind extrapolates, searching forward with the light of ideas for new areas of understanding, all the while referring each new hypothesis or intuition back to what is known. In this sense history, though essentially an intellectual craft, has something in common with the work of planners and officials. Both move from an ever insufficient supply of information towards the larger whole, which must be understood if the true significance of the facts can be comprehended or a practical work can be accomplished. [Lapidus, 1970, p.51].

History may be defined as the product of events and experience, viewed retrospectively, at both the individual and communal levels; the individual derives a perspective of his needs from his past and present experiences, whilst on the level of community historical perspective on the city is derived from the achievement of successive civilizations, both nationally and internationally, and the imprints they have left on the urban fabric.

A.1.1.2 Technology

Technology represents a response to Man's necessities, which is to say that "necessity is the mother of invention". In this respect it increases Man's capabilities and reduces the amount of time and human effort needed to achieve his desired ends. Whereas Man's physical capabilities are strictly limited, technology is in a constant state of flux providing inventions of improved quality or substitutional value.

Since the onset of urbanization and industrialization the two forces of human needs and advancing technology have come to co-exist within the urban form. On the one hand Man is seeking to utilize technology to better serve his demands for space, and yet paradoxically the modes of technology themselves compete with Man in a need for space, which is itself increasingly at a premium.

Traditionally the form of the ancient city reflected only the human scale of Man's technology, whereas today these same cities face the problem of a conflict between the humanistic and the mechanistic. Increasingly it has been seen as the role of architects, urban designers and planners to protect Man against the encroachment of

technology by evolving systems which can resolve this conflict between human needs and demands and the instruments of technology.

With developing new theories technology is always producing new elements and materials which means that the problem for architects, urban designers and planners, is forging acceptable relationships between man, his existing urban form and the new technologies. A process which is always subject to redefinition.

Within any natural environment the scope of technology which can be employed will depend upon economic well-being and educational attainment or potential at both the level of the state and the individual. It is essential that the technology which is to be utilized can be implemented by those responsible for operating it.

However, it is true to say that cities are themselves only made possible to the extent that techniques are able to modify natural circumstances on a sufficient scale.

The first cities were only possible because agriculture, defence, water supply and transport were sufficiently developed. Techniques of drainage and sanitation alone make possible our modern cities, and without modern transport they could not survive. Technical considerations consequently weigh greatly among the constraints consciously acknowledged [Evans, 1978, p.19].

Cities always act as experiments and a laboratory for new techniques. In modern times, the enthusiasm for new ways of building sponsored mass-production and pre-fabrication of housing construction in Western cities until the middle sixties. These methods still peep through in enthusiastic proposals for unit factories and the like. In transport technology, there has been a shift entirely away from a

former principal concern - external communications - towards the problems of dealing with traffic within the town itself. Great emphasis is nowadays placed on a scientific approach to using natural resources, i.e. solar radiation, in producing energy for heating and cooling.

A.1.1.3 Living Standards

The income of the individual is influenced by both the level of a country's gross national product as well as his own level of education. It is a fact that in the developing countries of the Third World there is a greater variance in educational standards than is evident in Western economies and, at the same time, a wider spread in living standards. There is a dichotomy in many of the more prosperous developing countries between a high national income and a widely divergent standard of living.

The level of national income differs from one country to another and is dependent upon the availability of the means of production. Moreover, the ability to improve the national product is influenced by the prevailing standards of education and technology, as well as the availability of further investment resources.

A.1.1.4 Social Relationship

The form of the city fabric reflects the degree of social relationship which exists, both as a closely woven network within the home and in the wider context of the local community. In terms of the communal framework the relationships can be seen as follows:-

(a) Communal Social Relationships, which include national, ethnic and religious activities and ceremonies taking place in public buildings and open spaces.

(b) Communal Trading Activities, which bring the community together in the market places of the city (e.g. the town planning of the early Greek cities).

(c) Communal Political Activities, which present opportunities for democratising the society and, through community gatherings, allowing it to play a role in its own self-government (e.g. this was the basis for planning the urban core in the Roman period).

Close social relationships are often dependent upon similarities between individuals in terms of their economic status and educational background.

In considering the interdependence of the cultural environment factors it is worth considering how the extent of social relationships may be determined by prevailing technological influences. By way of example the relationship between Man and machinery at the time of the first Industrial Revolution encouraged the formation of small concentrated settlements. In contrast in pre-industrial societies agrarian production often requires a considerable amount of land per head of population in order to produce even to a level of subsistence. Therefore, such settlements tend to be dispersed.

In addition the extent of social relationships may be determined by the technological systems which operate, either improving the potential for social interaction or affecting it detrimentally.

A.1.1.5 Habits and Customs

These may be considered as having a historical derivation, either from the home culture or foreign civilizations, and help to lend special characteristics and identity to any country. Moreover, they represent a means by which architects and urban designers may reflect the cultural heritage within their designs.

However, Man's relationship with many of his ancient habits and customs may be altered or even dislocated by the degree of influence of modern technologies. In effect this has led to an increasing degree of standardised behaviour as technology crosses national and cultural boundaries.

However, in considering the urban fabric it is particularly difficult to adopt new forms, materials, and technologies, since they have to co-exist with the prevailing buildings, which themselves reflect older habits and customs. Whilst in many Western countries the urban process has been essentially incremental, with successive stages of development evolving from preceding ones, throughout much of the developing world the adoption of new industrialized technologies has severed many of the links with past building forms.

A.1.1.6 Religion

Religion provides Man with a source for his spiritual needs, and for some time it has also worked as a mediator between these spiritual needs and his more materialistic worldly demands. Furthermore, the Islamic religion adds another dimension by control of Man's worldly possessions in relation to his spiritual needs (i.e. in the Koran it is specified how an individual's estate after death should be divided). In all these ways religion is helping to create a balanced individual/community and thus the ideal city.

In Ancient times, city temples played a crucial role in the organization of a coherent urban community. In Christian times the Church was decisive in local society. In each epoch, the prevailing religions represented a different set of values and understandings, a different type of organization and a different form of society; but in all ages, Ancient, Christian and Muslim, community life seems to have been inextricably bound up with religion. From religious teachings come the ideals and the norms of social action; from religious organization, the structuring of social life [Brown, 1970, p.57].

In the Middle Ages the church formed the natural core of European cities, acting as both a spiritual and cultural centre for the people. In this respect its role helped Man to achieve the desired balance between his spiritual and materialistic needs.

In Middle Eastern cities of the Islamic period the Mosque acted as both a spiritual and cultural centre, as well as a place from which government directives could be given to the people. Rooms in some Mosques were used for social and edcuational activities or to provide public health facilities, whilst the inner open courtyard provided a space for public gatherings, although the general population were not allowed to participate in the process of government.

The open spaces surrounding the Mosque at first supported common trading activities but over time as the role of the Mosque declined the majority of these activities, together with associated leisure and adminsitrative functions were attracted away from the traditional urban centre along the major routeways out of the city, so shifting the central business district away from the spiritual centre. As this process has continued the Mosque has become isolated merely as a place of worship, and has lost its dominant role as the

epicentre of the city. The same is true for the European cities which were dominated by the Cathedral or Church.

In modern times in Western developed cultures the role of the religious centre has declined, and there has been a separation of the spiritual and materialistic forces within the city, with the state taking a firmer hold in determining Man's needs and demands.

The relationship between the community and religious centres depends upon the strength of its relationship with the forces of materialism, generated by advancing technologies and scientific thought. The tendency is that as materialism grows then spiritual activities decline, although on an individual level these may be widely divergent balances. Today in developed societies the individual is often seeking to achieve a balance between cultural materialistic demands and inner spiritual and emotional fulfilment.

Within more recent urban civilizations, which lack a recognisable historical perspective and heritage, there has been a tendency to substitute major civic or commercial buildings as alternatives to religious centres as the focal point of the city. In such cases emphasis is focussed on the modern life and technologies and materialism, rather than on the spiritualistic.

The religious centres can act as basic elements to be utilized by planners, architects and urban designers to emphasize the urban heritage when planning in the city, either to reflect new developments or as sites of conservation.

A.1.1.7 Legislation

Legislation is produced by governmental organizations in order to determine the shape and development of the city fabric, and within a defined framework seeks to create an ideal human environment.

Legislation may be considered in four separate, though inter-related facets:-

(a) Building Regulations - which seek to establish standards for construction and layout, and define the relationship between buildings.

(b) Environmental Health Controls - which aim to ensure or preserve environments of accepted quality. This helps to keep the quality of the environment in a healthy natural condition where the human can live without pollution and disease.

(c) Legislative Responses to the Natural Environment - which seek to establish principles for design in a certain area in relation to its climate, pollution, topography and building materials.

(d) Non-Statutory Agreements - these are essentially courtesy agreements between neighbours which although outside the framework of legislation, create precedents which may regulate development. It is clear that legislation, if adequately implemented, plays an important and increasingly powerful role in controlling the development process and shaping the urban form.

However, in forming these laws it is important that legislators should have a deep knowledge of the natural and cultural environments they are seeking to regulate and how the elements of cultural environment are changing with time in order that the appropriate controls can

be adapted to fit different situations, in addition to their awareness of the technologies which are influencing that society.

The system for forming the legislation and the control differs from one place to another (i.e. the process of making the laws in a democratic country is different from the dictatorial one).

In the democratic countries, strategic policy is formed by a central body, according to the urgency of problems in the country. In other words, strategic policy means the general direction of change or control supported by the government, within which local authorities can form their local policies and plans.

A.1.1.8 Evolution of Urban Legislation in Iraq

With regard to evolution of urban legislation, it will be approached as follows:-

(a) Ottoman Period: during this period according to the information at hand, urban legislation was non-existent, thus urban development was haphazard.

(b) British Mandate Period (1917-1923): urban legislation during this period commenced, firstly through health regulations then land survey and then finally, building and roads regulations.

(c) The Monarchy and Republican Period: legislation remains on the British foundation. Improvement was introduced slowly, based on the French, British and finally, American experiences.

Details of the above legislation will be included in details in the Case Study for Iraq.

A.1.2 NATURAL ENVIRONMENT

The natural physical elements of the environment, which influence the growth of the city, may be considered as enduring and virtually constant. These are:-

A.1.2.1 Topography/Geography

This describes the physical shape of the terrain, from the flat landscapes of the great Plains through the undulating hills to the high mountain peaks. It includes the green fields of the temperate lands as well as the deserts in more arid climates.

The fabric of the city may not only reflect the topography, with contours influencing the design layout and the network of communications, but also the use of localized building materials and construction technologies (e.g. the stone buildings in the mountain region of north Iraq, or the brick buildings on the flat plains in central and southern Iraq, or the reed shelters on the Arab Marshes in the south of the country).

Moreover, the nature of the topography may reflect the ways and directions of life. In the Middle East where the temperatures are generally higher on the flat lands most of the houses and the other building stock are built on the courtyard principle, which emphasises a way of life within the dwelling environment. Conversely on high ground where temperatures are generally lower, many of the buildings tend to be much more compact, and life directed much more towards the external environment.

With regional differences in landscape, it is essential that building design allows for topography variations, although there may be instances where designs are determined by other factors and do not allow for the physical nature of the land.

A.1.2.2 Climate

The elements of climate include temperature, humidity, air pressure, solar direction and altitude, angles of radiation, wind speed and direction, and level of precipitation, all of which contribute to the prevailing climatic condition in any specific region, subject to seasonal changes. The elements of the prevailing climate will help determine the urban form and the responses of architects and urban designers in adapting buildings and their siting within the urban fabric (through the use of open spaces, form, openings and material) to suit the prevailing existing conditions.

Adaptations or building details may be a product of the local natural environment (e.g. air scoops or courtyards, type of openings, in the building fabric) or artificial technological responses (e.g. central heating or air-conditioning).

[A.2] THE ENVIRONMENTAL CONSTRAINTS: URBAN FABRIC

If the development planning and control system acts to determine the development of the urban fabric, then the urban fabric will reflect the by product (i.e. either in the form of agreements in societies which lack formal legal control, or in an autocratic regulatory form as in the ancient societies, or in response to public opinion, as in the democratic modern societies). Accordingly, the urban form will be moulded.

Therefore, the urban fabric is the result of the needs and demands imposed by a society at certain time and space. The variation in the needs and demands is determined by the components of the natural and cultural environments prevailing at the time, which directly affect the shape and form of the urban fabric which evidently could clearly be witnessed in the historical development of different parts of the urban areas.

The adequacy or inadequacy of that urban fabric will largely depend upon the degree of balance achieved between the components of the natural and cultural environment, separately or totally.

The balance can be achieved on two levels: either by giving the opportunity for all the environmental factors to exhibit and to interact freely almost in the same level within the created urban fabric, or by imposing the domination of one of these environmental factors, according to urgent needs and demands, whilst the remaining factors adapt to coordinate and function interdependently within the dominant factor parameter.

However, if one of those components is dominant according to the prevailing circumstances, regardless of creating a balance with the remaining ones, then undoubtedly the fabric will be inadequate and therefore this pattern of the urban fabric will be avoided in the future. Conditions contrary to that will create an adequate urban fabric which tends to be repeated and developed in the future.

[A.3] CIVILIZATION: URBAN FABRIC

It is undoubtedly true that throughout its long history, the world has always been influenced, at any one point in time, by the productive output from its centres of civilization, among them architecture, urban design and building science. This certainly holds true for the courtyard building which was the product of ancient civilizations, and yet has been distributed and experienced throughout vast areas of the world, despite major prevailing cultural and natural environment differences; a fact which has only been possible because of the capacity of this type of building to adapt to different sets of conditions. In spite of the fact that it originated in Iraq in the ancient period, it has subsequently occurred as one of the main elements in the design process throughout different time periods (Roman, Renaissance, Islamic etc.) and in many different countries.

Throughout history different societies have emerged to play the dominant role in civilization, superseding previous ones which have then declined as power, resources, and influence have been transferred to the newly emergent civilised society. This has been evidenced in the early twentieth century with the case of Europe, from which the new ideas of the Modern Movement in architecture, accompanied by advanced industrial technologies and new building materials, have diffused, far beyond the continental boundaries, introducing once again the compact building as the main design principle in the urban form. Almost without regard to the preponderate environmental conditions, the influence of this building form has itself been distributed throughout the world during the remainder of this century; the converse of a movement of the courtyard principle in

ancient times.

This diffusion of influence occurs on two distinct levels; firstly, at the macro level between separate countries and across national boundaries, and secondly, at the micro level with an international dispersion from the capital to the provinces and from the urban centres to the rural areas.

By about 1900 BC Ur (right) was a web of streets and, like other Sumerian cities, can never have been laid out to a plan. A wealthy house of this period (below) had an open courtyard in place of a central room.

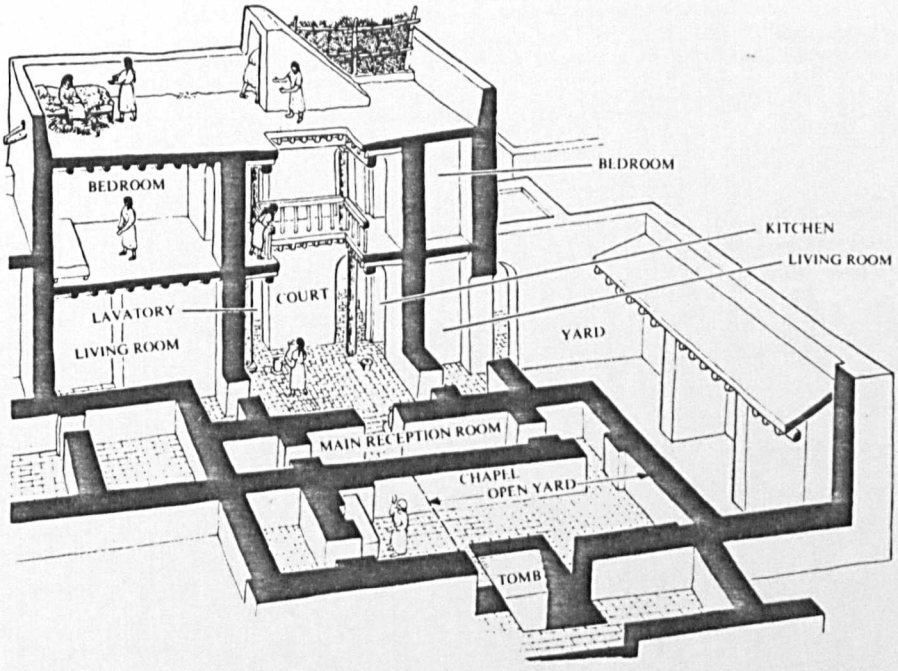
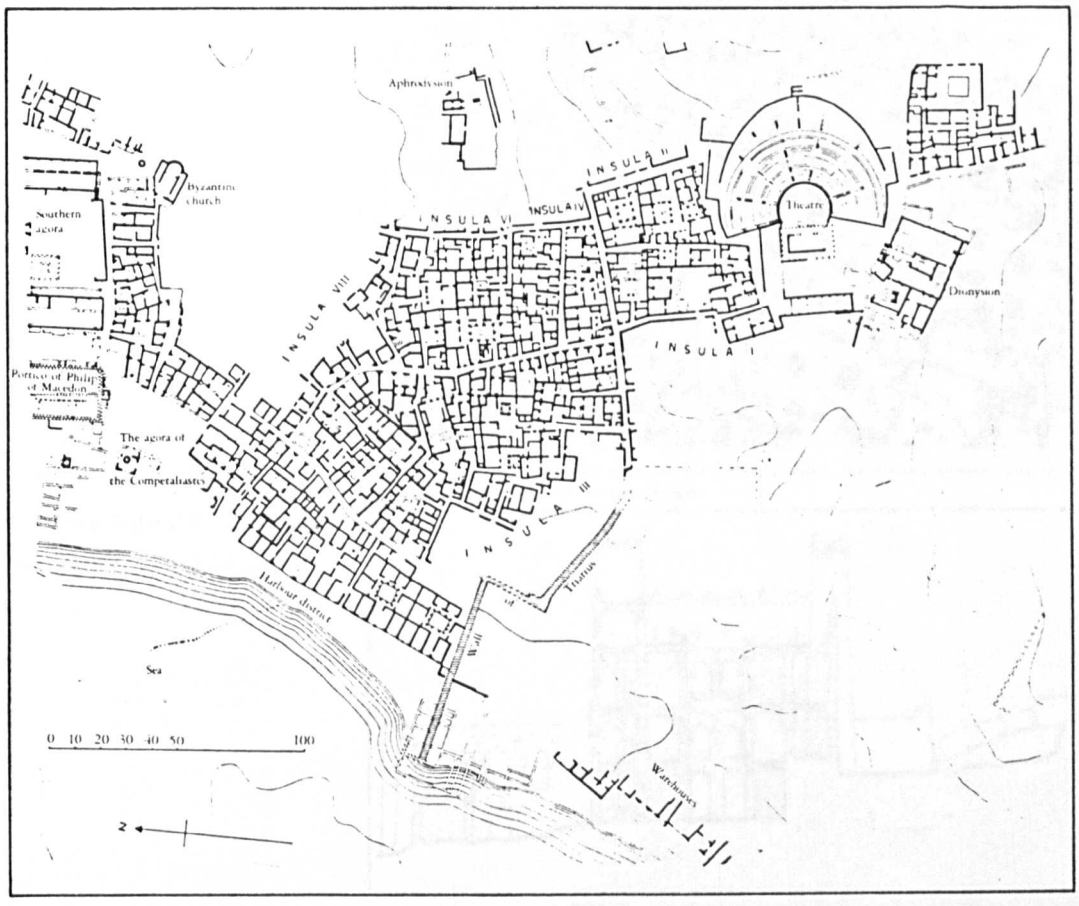


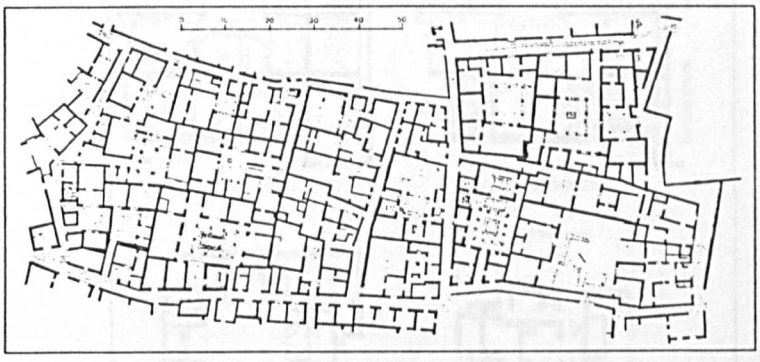
FIGURE: A.16.

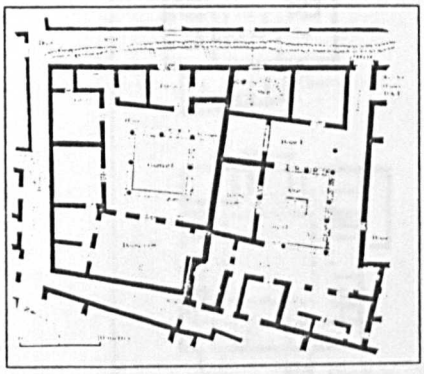
Section of a Courtyard House in its Original Form in Ancient Mesopotamia (Iraq.)

Whitehouse, 1977, p.51

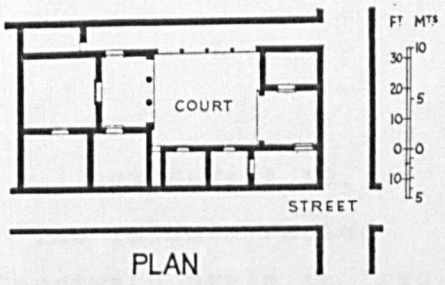


The harbour area at Delos. The houses excavated date from the third and second centuries BC and correspond to a type that spread throughout Greek cities from the fourth century onwards. Demosthenes wrote that the first houses with a pillared courtyard were built on the outskirts of Athens towards the middle of the fourth century.





Figs 159–60 *Insulae* I, II, IV, and VI at Delos, and two houses from *insula* II.



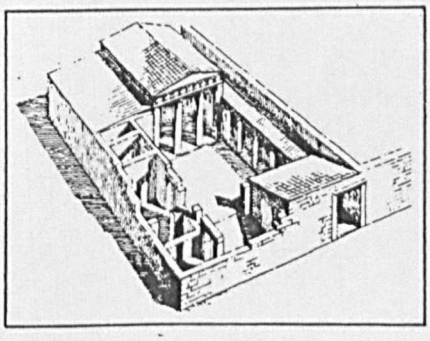


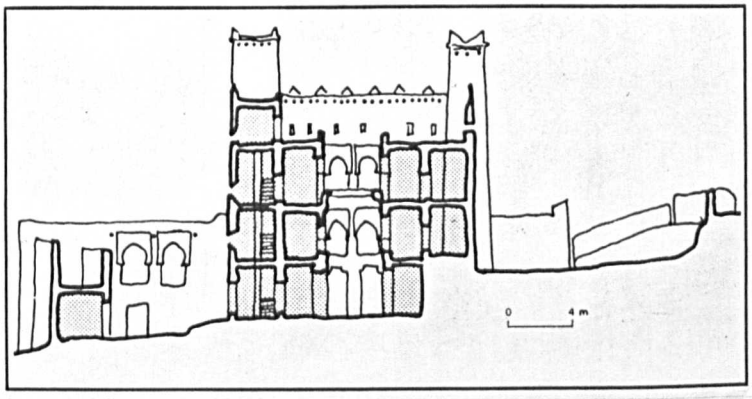
FIGURE: A.17.

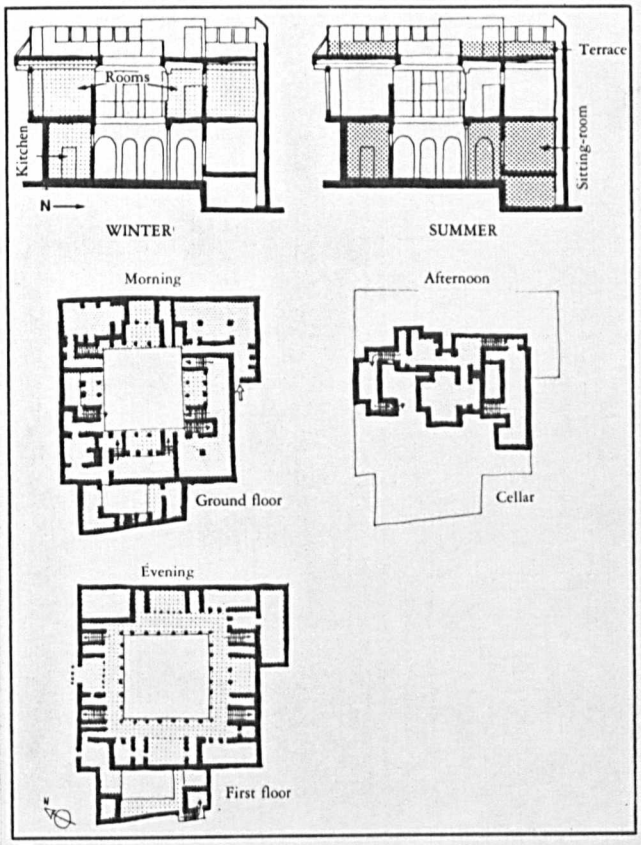
The Influence of the Courtyard Style on the Greek Urban Fabric.

Benevolo, 1980, p.

Aerial view of the townscape of Tripoli; each house has its own private courtyard, whether large or small, on to which it faces.

FIGURE: A.18.
The Courtyard Style
in North Africa.





The rooms are distributed round the courtyard so as to allow them to be used for different purposes, depending on the time of the day or the season of the year; these particular drawings are of a house in Baghdad.

FIGURE: A.19.
The Islamic Period
Courtyard Style in Iraq.

Benevolo, 1980, p.

B

THE URBAN FABRIC IN IRAQ -

ITS EXISTING PROBLEM

[B] THE URBAN FABRIC IN IRAQ: ITS EXISTING PROBLEM

The sharp contrast of the traditional contemporary urban fabric, marking most urban centres throughout Iraq and modern urban plans has left the architect, urban designer and planner with a conflict of options and a question mark over the approach they should follow in order to meet the requirements of Man's current needs and demands.

Traditional approaches to town planning and building design and construction existed in the ancient times and continued their development until the end of the Islamic period. The development of town planning and building techniques was carried out by consultants and advisers who developed their knowledge and experience through an everyday direct contact with existing local environmental circumstances and the inhabitants of the country. Even when advisers in these fields were needed from outside the country they were usually from neighbouring countries, whose experience had been developed in similar circumstances as is the case in Baghdad city. Accordingly, common standards and principles have been founded (i.e. the principles of the pre-industrial city). In spite of these similarities in the general concepts of design at the macro level, differences can be recognized in the detail of the urban fabric in the regions of Iraq, due to the differences at the micro level in both natural and cultural environments. This process of evolution has built up local design characteristics in each region and a homogeneous design pattern at different scales for the various parts of the city and within the whole region.

Subsequently, the country became exposed to a great metamorphosis in the ways of everyday life, when the door opened to influences from the Western European world in the late nineteenth century. This was followed by the failure of the Ottoman Empire, which changed the course of Iraqi history. The influence of the Western world was increased by the independence and the oil revenue in the beginning of the twentieth century. This change has introduced new ideas, technology and also new design principles and techniques for both the city and buildings (i.e. the principles of the industrial city and modern architecture) were brought in by the foreign experts and advisers and Iraqi architects and planners whose education was based on the Western background, whether they graduated from Iraq or Western institutions. Moreover, the media have also played a major role in diffusing the Western concept.

The new approach to design creates a dramatic change, not merely in the urban fabric, but also in the direction of society (i.e. from inward to outward looking). This new concept of design has been distributed throughout the country as a standard orthodoxy without any attention being paid to the local differences in the natural and cultural environments. This is because of the centralized administration, wherein all the laws and regulations relating to town planning and building design are uniform throughout the country.

In general, within the existing situation, the people living in either the traditional or the contemporary urban fabric are showing signs of dissatisfaction, since the modern design fails to meet the natural and cultural requirements of society, whilst the traditional design does not respond any longer to the new requirements of everyday life in that society. This is the focal point of

the existing problem of the urban fabric.

Attempts have been made in the form of academic researches and official reports to highlight this problem, in order to find a suitable remedy. Unfortunately, most of these attempts considered the problem from the point of view of either the natural or the cultural environment, which resulted in recommendations and policies for narrowly defined areas. This created unacceptable side effects when they were implemented.

The attempt of this thesis is to bring together information about Man and different aspects of the environment, in order to develop a concept for design which helps to give architects and urban designers both guidance and a framework in which to create a functional urban fabric so as to achieve the needs and wishes of the people.

By focussing on the analysis of the past and the contemporary situation of the urban fabric in relation to Man and the two environmental levels, this study not only involves empirical consideration, but also requires a deep understanding of how the existing social and administrative institutions function, how the component elements of the human environment interact, and how some variables can be deliberately altered to produce the desired results.

In order to analyse the situation satisfactorily, it is necessary to examine:

(a) The natural environment as a character and constraint, both generally and with specific reference to Iraq.

(b) The behaviour of the human body in relation to the natural environment.

(c) The urban fabric in relation to Man and natural and cultural environments.

(d) The administrative and legislative systems in relation to both Man and environments.

As the urban fabric is a subject which touches different aspects of life and consists of different elements and covers wide areas (i.e. housing, public services, and industry, each of which has its own problem of influence and function, either in an individual manner or at communal level) it forms its shape and pattern changes through time and space.

Baghdad city can be considered as one of the best examples in the country where the urban fabric contains a variety of forms and patterns. This is because it has been the capital of Iraq over centuries. Accordingly, its development has been emphasised and in addition, it has been a principal location for experimenting in new approaches to architecture, urban design and planning.

Housing acts as the most important element amongst the other urban fabric elements, since it touches the life of the whole community, and occupies two-thirds of the built-up area on average. It has been the subject of priority for different governments in modern Iraq.

Accordingly, in view of the constraints imposed on an individual, research will focus upon the problem of the influence of the

natural and cultural environments on the urban fabric, at two levels:

(i) A general overview delivered as follows:-

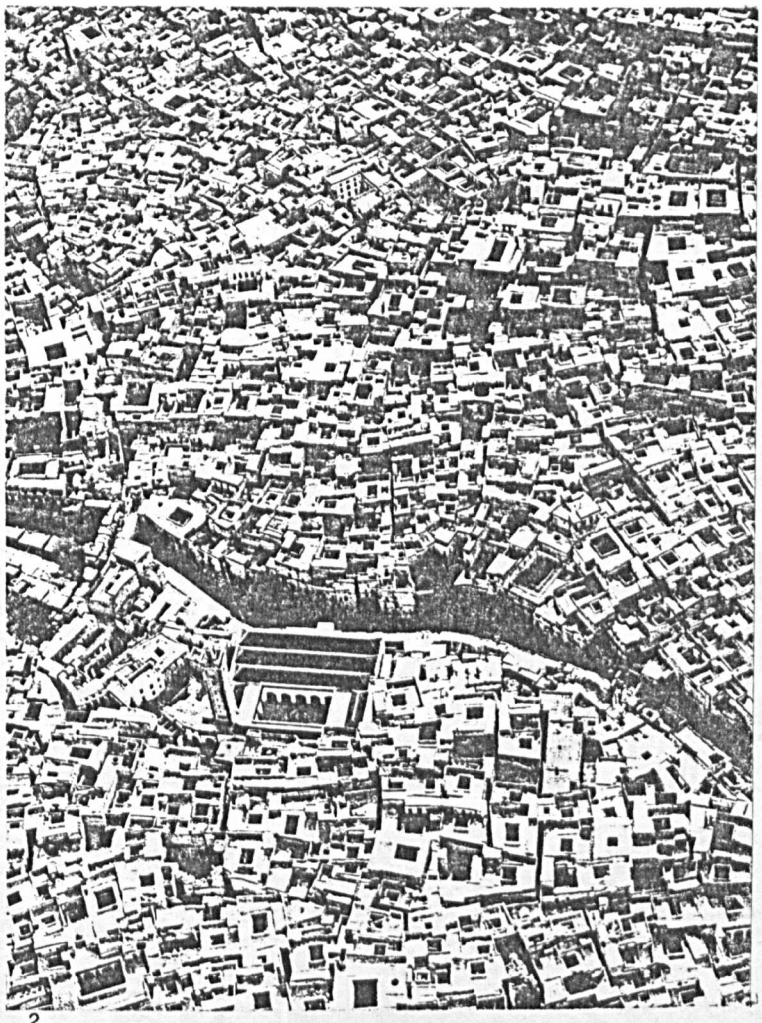
1. The different urban fabric patterns and their form throughout the country.

2. Baghdad's urban fabric under the influence of different issues, i.e. analysing the planning issues, policy implementation and their impact on the city.

(ii) On a detailed level, the urban housing in Baghdad will be the key element to be looked at, since it is the dominant issue within the urban fabric which needs urgent solutions. The consideration of urban housing in other regions and other urban fabric elements might follow a similar approach in further research studies.

However, the reviewed problem not only concerns Iraq, but in all the cities of the Middle East there is the same conflict between the traditional and the modern urban fabric (Figures A.20 and A.21).

1.



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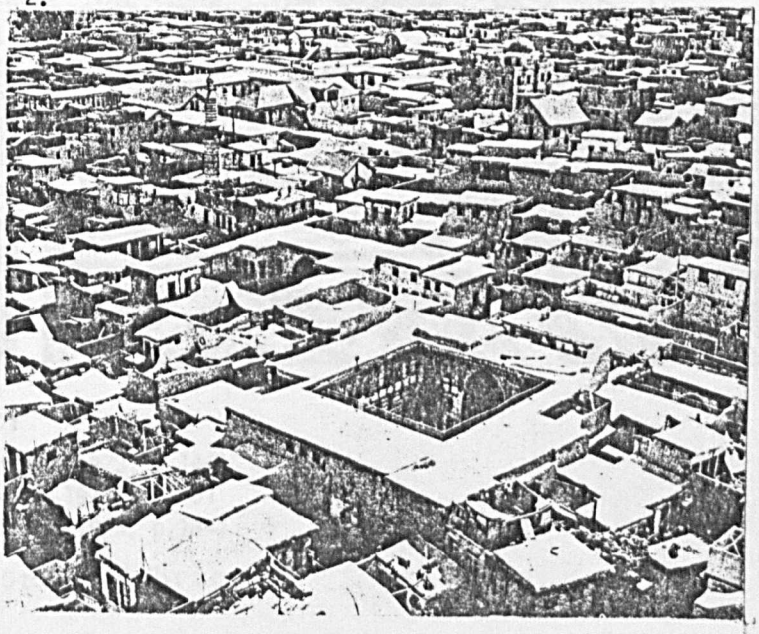
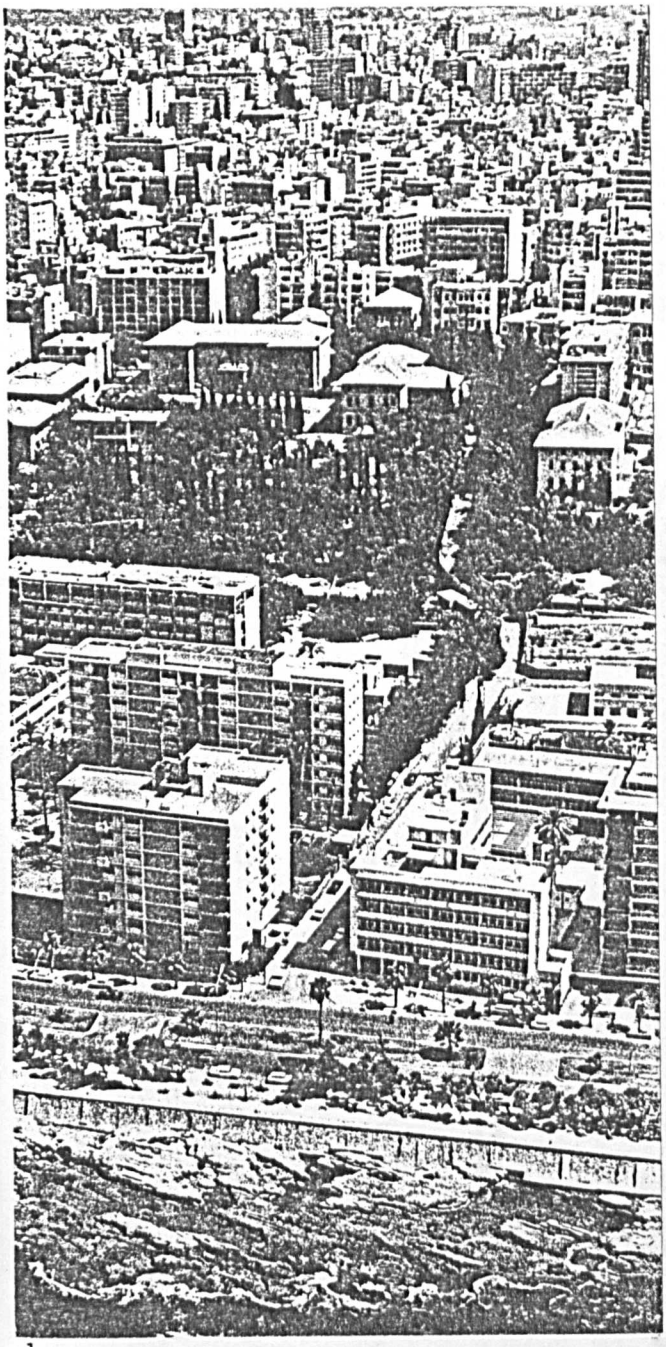


3.

1. Baghdad
2. Fez (Brown, 1973, p.20)
3. Damascus (Brown, 1973, p.291)

FIGURE: A.20.

The Traditional Urban Fabric.



1.

2.

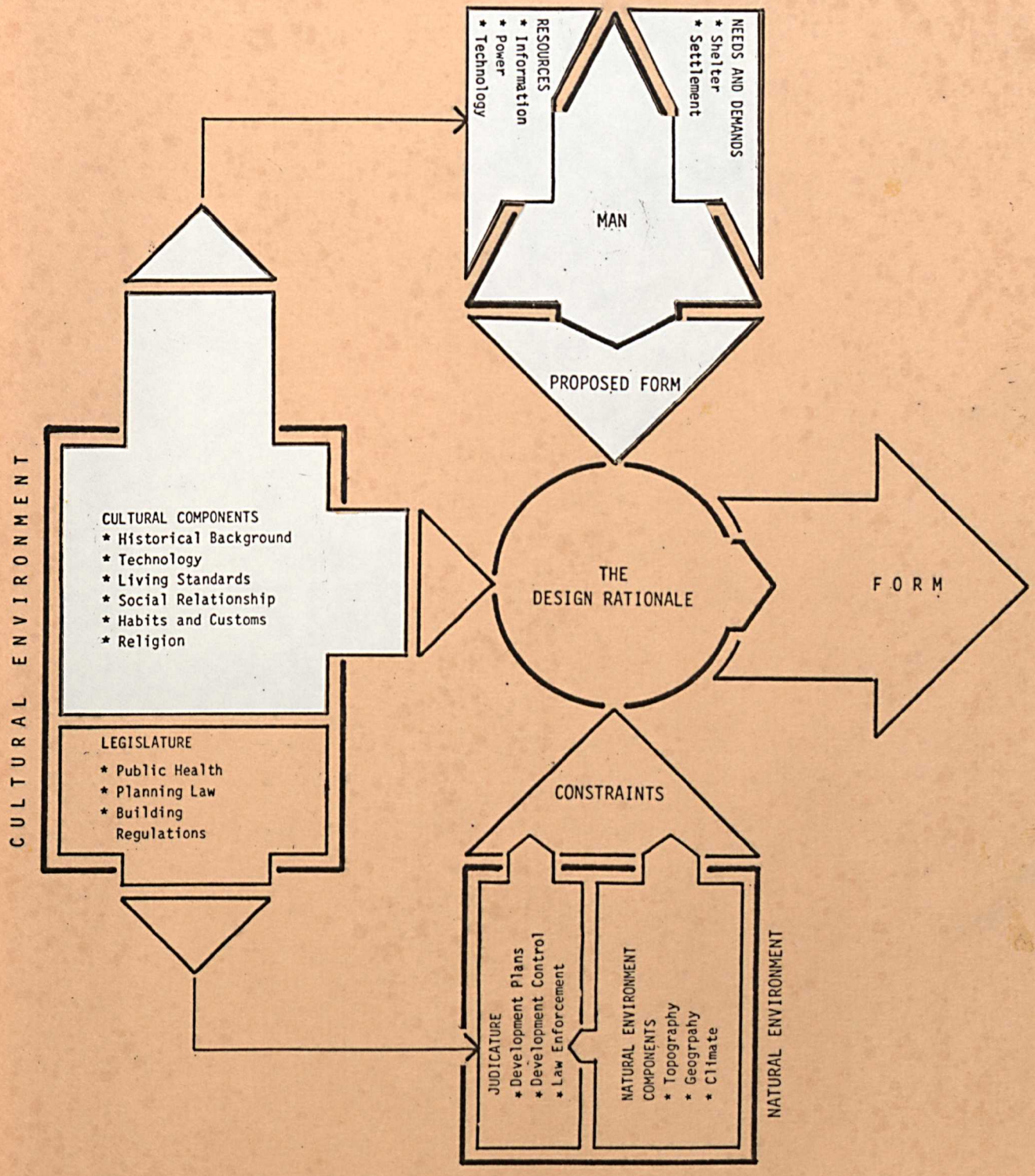
3.

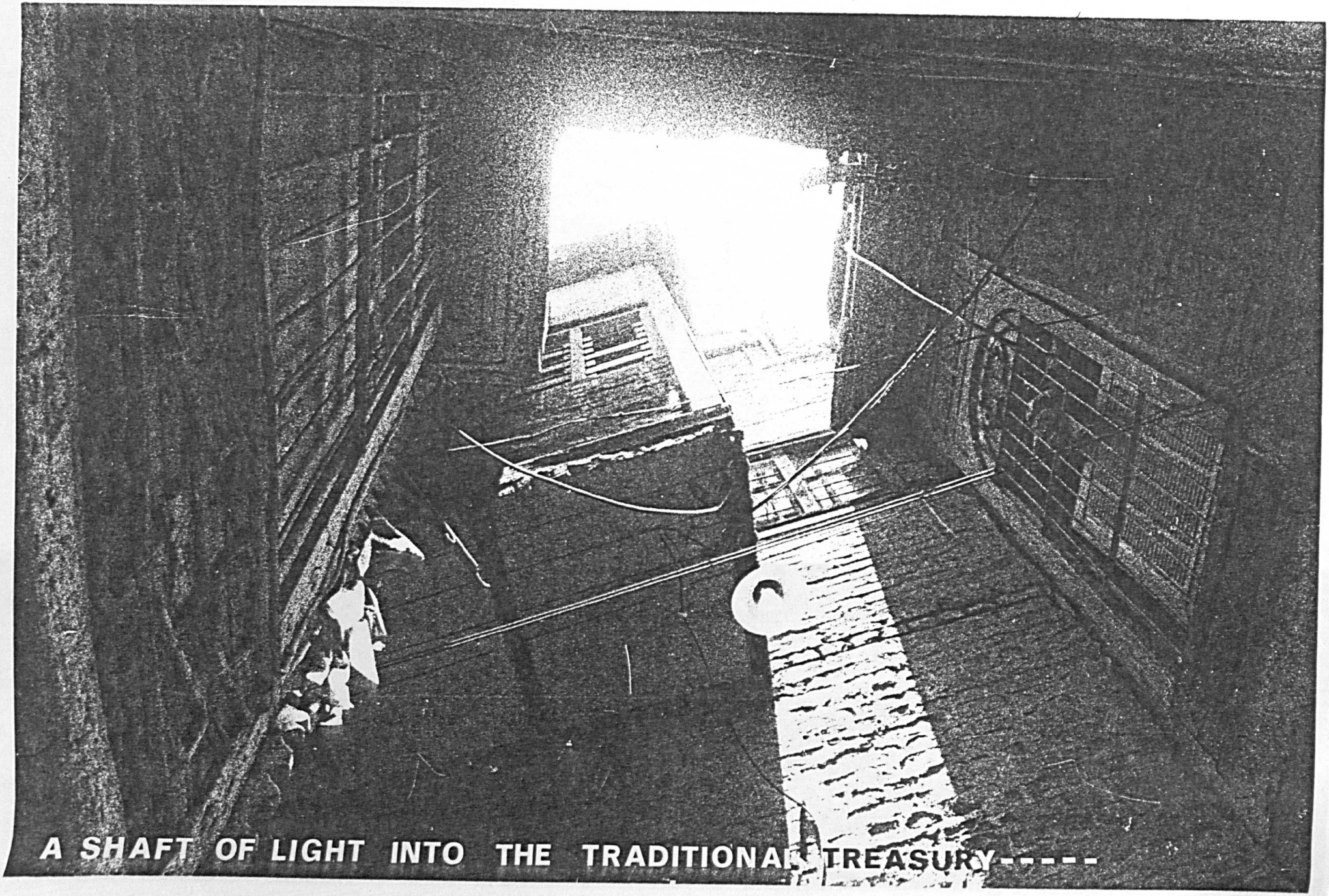
FIGURE: A.21

1. Beirut (Brown, 1973, p.146)
2. Cairo (Brown, 1973, p.110)
3. Kuwait (Brown, 1973, p.184)

The Modern Urban Fabric.

A MODEL OF THE PROCESS OF DEVELOPMENT OF URBAN BUILT FORM.

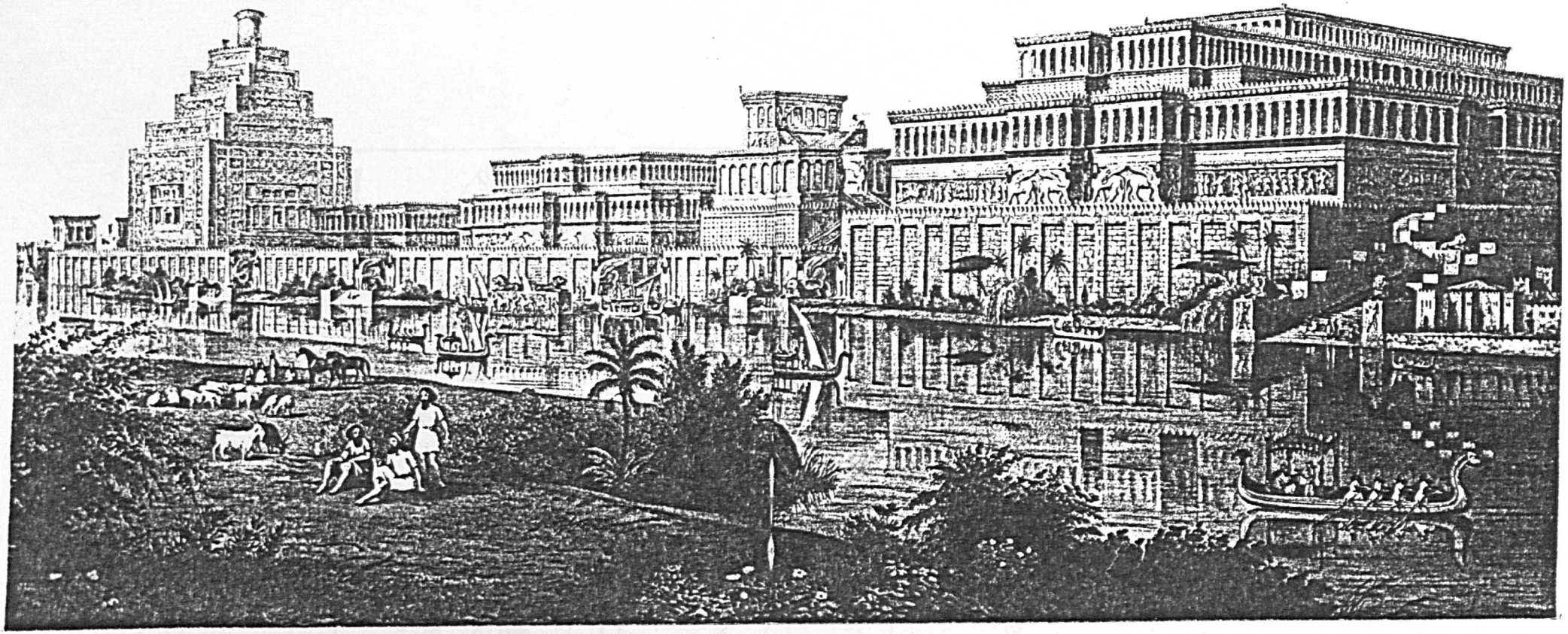



A SHAFT OF LIGHT INTO THE TRADITIONAL TREASURY-----

C

THE ANCIENT CIVILIZATION

Nimrud: an Assyrian capital



"THE PALACE OF NIMROUD RESTORED"

(from a sketch by James Fergusson: British Museum)

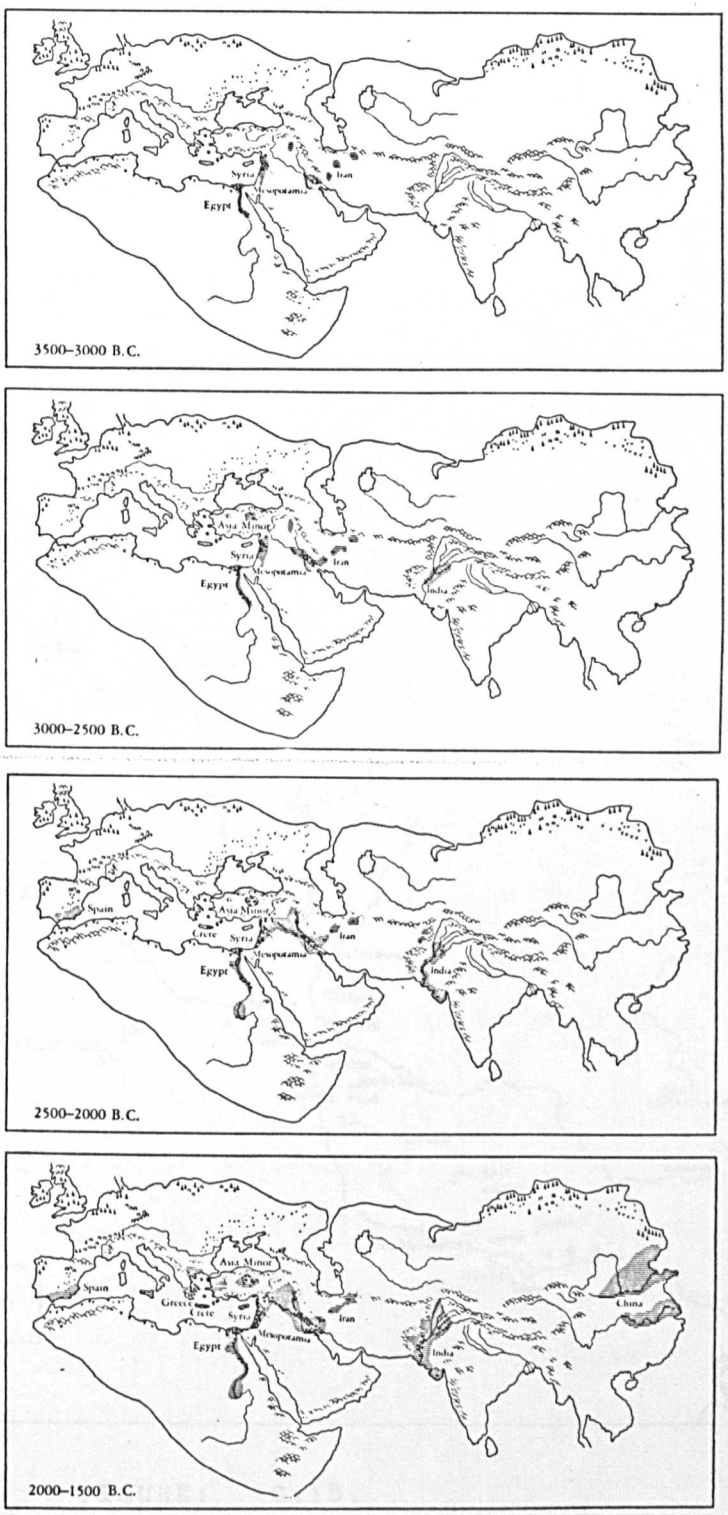


FIGURE: C.1a.

The Development of Urban Civilization

3500 and 1500 BC.

Leonardo Benevolo, 1980, p.18-19

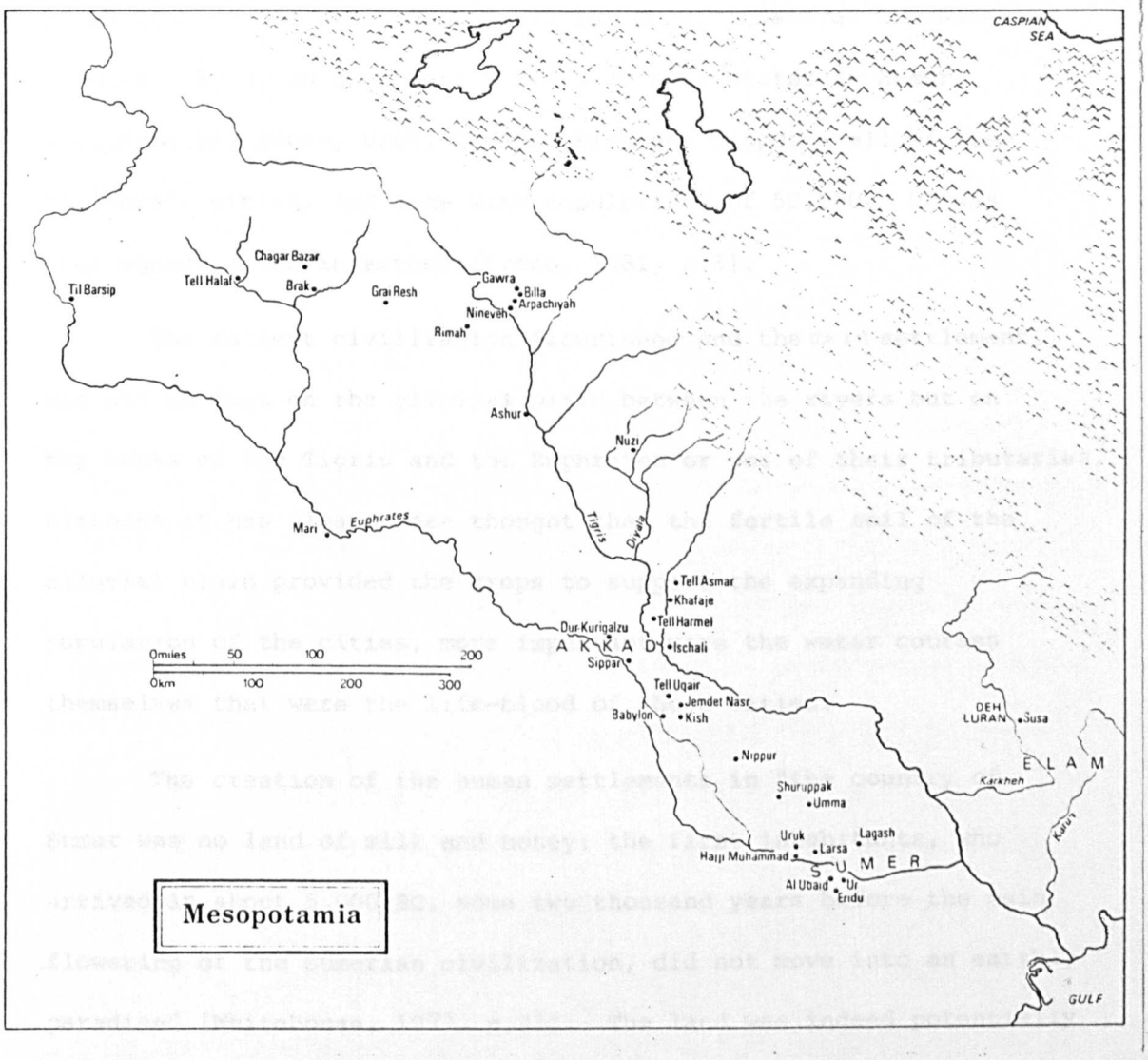


FIGURE: C.1b.

Mesopotamia.

Burney, 1977, p.51

[C.1] MAN: ENVIRONMENTAL CONSTRAINTS AND THE CREATION OF CIVILIZATION

In cases where urban civilization did appear, it came a millennium, more or less, after the fundamental agricultural revolution occurred in that region. Domesticated plants appeared in Sumer about 5,000 BC, while Eridu - the first city that we know of in that area - existed by 4,000 BC, housing several thousand persons. By 3,500 BC, there were 15-20 city states in Sumer, including Ur, Erech, Uruk, Lagash, Kish and Nippur - all of them full-scale cities, and some with populations of 50,000. Ur was four square miles in extent [Lynch, 1981, p.6].

The Ancient civilization flourished and the main settlement was not in fact on the alluvial plain between the rivers but on the banks of the Tigris and the Euphrates or one of their tributaries. Although it has always been thought that the fertile soil of the alluvial plain provided the crops to support the expanding population of the cities, more important were the water courses themselves that were the life-blood of those cities.

The creation of the human settlements in "the country of Sumer was no land of milk and honey: the first inhabitants, who arrived in about 5,000 BC. some two thousand years before the main flowering of the Sumerian civilization, did not move into an earthly paradise" [Whitehouse, 1977, p.33]. The land was indeed potentially rich in one of the most basic of all natural resources - fertile soil - and by 5,000 BC, technology was sufficiently developed to exploit this potential, but the prosperous and thriving cities, that seemed to the Sumerian scribes to have existed from the beginning of time, were in reality created laboriously out of a land of contrasting arid plains and watery swamps, devoid of all mineral resources and

vulnerable to disastrous flooding. Hydrologists believe that, at the time when the first settlers arrived in Sumer, the world's first urban civilization almost certainly arose in the fertile area of Mesopotamia's two rivers, and it persisted there for some 2,500 years [Whittick, 1974, p.43]. "The climate was very much as it is today: hot, arid and semi-tropical, with rain restricted to light falls in winter. One consequence of this for human settlement is clear - it would have been impossible to farm using only natural rainfall and the practice of cereal agriculture would have depended on irrigation. Indeed, irrigation is a concept inseparably linked with Mesopotamia in popular thought and this is correct: the courses of old irrigation channels criss-crossing the Mesopotamian plain are visible everywhere and the ancient tablets are full of references to the construction and maintenance of dykes and canals. However, it would be a mistake to imagine that the massive irrigation works we know from the Babylonian period of the second millennium BC were necessary, or practicable, from the beginning. Quite modest measures, like the damming of existing streams, diverting small quantities of water into small channels, would have allowed the cultivation of considerable plots of land and would have been within the competence of small groups, even individual families, to organise" [Whitehouse, 1977, p.34].

Urban development in this early period of history was limited or constrained by the availability of building material for the region under construction. Indeed, the region lacked even adequate building timber, since the plain was treeless and the marsh vegetation did not include trees which produce large, strong timbers. If the southern Mesopotamians wanted these materials, they had to obtain them from the mountains and plateau regions flanking the plain and, indeed,

in the case of some building commodities, from further afield; this necessity was a keystone in the construction of Sumerian civilization [Whitehouse, 1977, pp.37-38], which forced that society into creating a good network both for transportation and communication, with the neighbouring areas. As a result of the disputes between city status throughout the third millennium, an authority, more substantial than a mythical deity, became indispensable. Furthermore, Mesopotamia was constantly exposed to attacks from the surrounding mountainous regions and an efficient military organisation was needed to protect the achievements of civilization against the Barbarian raiders.

[C.2] THE ANCIENT CITIES' URBANIZATION

The possibility of providing for permanent concentrations of large numbers of people arose only after the development of an agricultural economy, based on irrigation, that could provide a surplus of foodstuffs, thus permitting the rise of specialized occupations and the evolution of an accepted system of trading goods and services. Between the fifth and the third millennia BC, these conditions appeared in several places in the general area between the eastern Mediterranean and the Indus Valley and gave rise to a number of self-supporting rural villages [Whittick, 1974, p.43].

The late prehistoric and the old protoliterate periods appear in the archaeological record as phases of rapid and creative technological development, with advances in the manufacture of, among other things, seals, metal tools and stones and metal vessels. By

contrast the Early Dynastic period appears technologically not as a period of invention but rather as a period of consolidation and expansion based on the achievements of the earlier period. However, quantitatively there was an enormous increase in production in Early Dynastic times; indeed this was an important feature of the growing urban economy, with production stimulated largely by the royal retinue and the growing military establishment. This increase in production indicates an increase in the number of full-time specialist craftsmen with both the time and the opportunity to develop a high level of skill in their crafts; their achievements are most easily recognized archaeologically in the field of metallurgy [Whitehouse, 1977, p.77].

However, the degree of urbanization and the level of development within the city can be related to:

1. The growth of the state - and the degree of control; on internal and external city functions, and organisation of inhabitants' activities.

2. Protection, privacy and ownership provided for the inhabitants on both the individual and communal levels.

3. The availability of natural resources in the region, degree of technology, science and specialism.

4. The homogeneity between the groups of people throughout the different parts of the region.

Given the coming together of the above factors, many towns, cities and city states were founded in ancient Iraq. These cities were

surrounded by either a wall or a ditch, defensive measures which for the first time also provided a barrier between the natural environment and the artificially-enclosed urban area. The surrounding countryside was itself subjected to man-made changes; instead of marshes and areas of desert there were now fields, meadows and orchards, divided up by a network of irrigation canals [Benevolo, 1980, p.21] (Figure C.2). In addition "the cities themselves were truly urban in the sense that they were centres of economic production and commerce" [Hawkes, 1973, p.64] and specialist services.

The governors of the cities in their capacity as representatives of the local deities controlled the wealth of the community by administering the food supply of the whole population, by arranging for the manufacture or import of the stone and metal tools needed for war and for everyday use, and by maintaining the statistical information required to ensure the smooth running of the community [Benevolo, 1980, p.21].

However, these urban centres can be categorized as theocratic societies, because the temple played a major role in directing the city's different activities. The Sumerians introduced a hierarchy of priestly government with methods of taxation and record keeping (in cuneiform script upon clay tablets) [Whittick, 1977, p.43]. As has commonly been suggested, religious institutions were a major precipitating factor in the growth of cities; particularly in modern terms the Mesopotamian temple functioned largely as an economic organ, acting as a central authority engaged in the collection and distribution of surplus both in the form of agricultural produce and of the products of the specialized crafts and industries it sponsored;

"Food and other goods were gathered as tributes from peasants and outlanders and distributed among citizens by the priestly class, who were at the centre of society" [Lynch, 1981, p.6].

In spite of the temple's role as a centre for religion and economy, it also played a major role in urbanization and as Whitehouse indicated "it was probably through the mechanism of the temple economy that the urban revolution was accomplished in Mesopotamia" [1977, p.59].

Despite the important position of the temple in the Sumerian city, it is clear that supreme political power was at an early period vested in the secular figure of the 'king'. The titles used to identify the office of kingship varied from one city to another, perhaps owing to the manner in which the office evolved [Jacobsen, 1943, pp.159-178]. Growth in the economy of cities depended very much on conquering more and more of the surrounding territories, and on building channels and embankments in order to drain the marshes and to restrain the violence of floods [Woolley, 1965, pp.418-419].

"The Mesopotamians dug channels to water the fields and drain the marshes, and built dykes and platforms to protect people and cattle from the waters and to raise them above the floods" [Childe, 1963, p.144].

"In the third millennium which archaeologists call 'Early Dynastic' there were in this region a number of small independent kingdoms in the form of city-states, with a similar language, religion, social organisation and material culture" [Childe, 1965, pp.152-153].

Each such state consisted of a city, occasionally several cities, with surrounding territory, including dependent towns and villages [Oates, 1979, p.24].

However, one of the Sumerian city-state characteristics was its individualism and its strong resistance to any form of central political control. This tendency to separatism remained an important factor in Mesopotamian history. Thus, the city was and remained for a long time the basic form of political unit. "Each of these ancient cities must have started as the urban centre of a small isolated area of food-producing land that had been made fertile by draining and irrigation. The still unreclaimed surrounding swamp must have insulated these city-states from each other. With the advance of agriculture, the competition between them became very intense. The quarrels over water-supplies or claims to some fertile territory irrigated by the system of canals and sometimes owned in common led to wars between the neighbours" [Childe, 1965, p.155]. The border wars between city states led to permanent warriors, leaders, professional armies and perpetual aggression. Priest and King became separate, and in time the latter dominated. Finally, with the rise of Sargon of Akkad in 2,400 BC, we enter the period of military empire [Lynch, 1981, p.6].

The conquest of large territories could be regarded as a kind of contribution to civilization; it secured peace over wide areas and adequate supplies of raw material for industrial centres; it also spread urban life and transformed the economy of less advanced regions. Warfare itself was an incentive to new technological discoveries that could be used generally in everyday life [Bernal, 1957, p.94].

Consequently, there emerged a necessity for a political order more compatible with the new economic realities than the system of city-states. The Sumerian world was united politically first by Sargon, the Semitic ruler of Akkad, then by the end of the third and the beginning of the second millenium by the Sumerian King of the Third Dynasty of Ur and finally, about 1,800 BC by the Babylonian King Hammurrabi who unified the whole of Mesopotamia, established a common capital - Babylon - and organized a permanent system of government [Childe, 1964, pp.9-10].

The physical effects of these periods of domination were as follows:

1. The foundation of new cities, in which the main source of political power lay in the royal palace rather than the temple. An example of this is the earlier city-palace of Sargon II near Nineveh (Figure C.31).

2. The growth of certain cities such as Babylon and Nineveh, each of which became the capital of an empire, the hub of political power and the commercial and administrative centre of a greatly enlarged world. They were the first cities to reach dimensions comparable to those of a modern metropolis, and have for a long time been regarded as the first examples of large urban conglomerations, and consequently also as the first places to experience the advantages and drawbacks of crowded city life [Benevolo, 1980, p.28].

C.2.1 CITY DENSITY

Babylon was reputedly the largest of all the cities of Mesopotamia and, at its zenith, around 600 BC, it seems to have

reached a population of a million. The city of Ur may have had a quarter of a million living at a density of about 250 to the acre (617 per hectare) according to its excavator, and Uruk is known to have been larger than Ur. Other large cities included Nineveh in the north and Nippur, Lagash and Akkad [Whittick, 1977, p.47].

C.2.2 CENTRALIZATION AND DEMOCRACY

In spite of the power and decision in the hands of the temple and the palace, people could also participate in making some decisions about urban life; "there is some evidence to suggest that communities in prehistoric Sumer were originally essentially democratic in their structure, though not in the modern sense of this much-abused term. Indeed Thorkild Jacobsen has proposed that the earliest form of government of the city-state was a bicameral assembly of free citizens, with an upper house of 'elders' and a lower house of 'men'" [Whitehouse, 1977, p.55]. This assembly was called into session in emergencies, acting by consensus and choosing a temporary leader to carry out its wishes.

C.2.3 OCCUPATION AND SPECIALIZATION

However, "by the latter part of the fourth millennium BC, a number of settlements in Sumer can be described as 'urban' not only in the sense of size but also of specialized function" [Hawkes, 1973, p.64]. By the end of the Early Dynastic period the quantity of trade and the development of manufacturing industry emerging from the archaeological and documentary records suggests that there must have been a considerable number of full-time specialist craftsmen in stone, metal, pottery, wood, glass and textiles" [Lynch,

1981, p.6], "are all recorded as merchants and what we might call the 'civil services'" [Whitehouse, 1977, p.55].

The population of these urban areas also included "workers paid by tenants (who paid a tribute of between a seventh and an eighth part of its yield) or by the unpaid labour of the other inhabitants" [Benevolo, 1980, p.24].

Moreover, trade was organized reaching as far as Syria and the Indus Valley [Lynch, 1981, p.6], which offered the opportunity to exchange experiences and knowledge.

C.2.4 SOCIAL STATUS

The physical morphology of the ancient cities clearly reflected the location of centralised power and the pyramid of social status; as indicated in Hammurabi's time in the eighteenth century BC, there was a formal division into three classes: noblemen, commoners and slaves. In spite of these divisions in social status and wealth, there was no formal division into classes. In principle all citizens who were members of the temple community, except slaves, were equal: they were all equally servants of the god and equally devoted to his service; there was no leisured class.

Furthermore, the women's role in public life was minimal, and women received no education. The major role of a priestess was to act the part of the goddess in the Sacred Marriage ceremony. At a different level, women served as temple slaves, used in preparation of wool and in food processing. The role of women as wives and mothers, their rights and obligations were defined in law [Whitehouse, 1977, p.56].

C.2.5 LAND OWNERSHIP

At this stage the urban area had already been divided into separately owned units of land; the temple owned only a part of the land of the city-state; the rest belonged to the palace or to individual private citizens [Oates, 1979, p.26]. Diakonoff in his studies of Mesopotamia, indicated that the largest proportion of the land in c.2,500 BC was privately owned, much of it belonging to what he termed the 'nobility', i.e.members of the ruling family, palace administrators and priests [1969, pp.173-203]. Labour on these large private estates was performed by a special category of 'clients' or 'dependents', whose status resembled that of the temple dependents. The commoner owned a particular plot of land as a member of a family rather than as an individual; the hereditary land held by such extended families or 'clans' could be alienated and sold, but only by certain designated members of the family [Oates, 1979, p.26].

Whereas in the countryside ownership was administered in common on behalf of the local deities, at Lagash the countryside was split up between some twenty deities. Three-quarters of this land was divided into individual family plots, while the remaining quarter was cultivated [Benevolo, 1980, p.24].

C.2.6 WRITING, MATHEMATICS

The complexity of the different urban life activities requires a medium of recording information to aid interaction within the system and increased communication between different specialists, whether tradesmen, engineers, scientists, politicians, religious figures, etc.

To fulfil these urgent needs and demands "writing was invented soon after 3,000 BC" [Childe, 1976, p.101] "which was to have explosive consequences, developed from the pictographs and counters used to tally goods. It flowered into a complicated cuneiform system, taught in scribal schools and based on lexical lists common throughout the region" [Lynch, 1981, p.6].

"Mathematics, as writing, was a consequence of the economic needs and complexities introduced into social life by the urban revolution" [Bernal, 1957, pp.78-84], which required some standardised weights and measures and a system of numerical notation, in order to calculate the supplies of food and raw materials, precise calculations for architects and engineers, in construction and the mass production of standardized burnt bricks. Dwelling houses became permanent structures as a consequence of the use of robust materials. Standardization of the construction elements and the grouping of building types exercised a considerable influence upon the town plan.

Apart from the mathematical theories, "geometry seems to have been considered only one of many subjects in practical life to which arithmetical procedures could be applied. Geometric interpretation in the Euclidean fashion was unknown. This is evident from solutions where areas and lengths are added or areas multiplied. However, one table, enumerating problems relating the area of a circle to that of polygonal forms, seems indisputably of a theoretical nature" [Saggs, 1960, p.141] (Figure C.7).

In addition, a variety of geometric composition has been used in art as a soundles rhythm with different appearance, crafted or

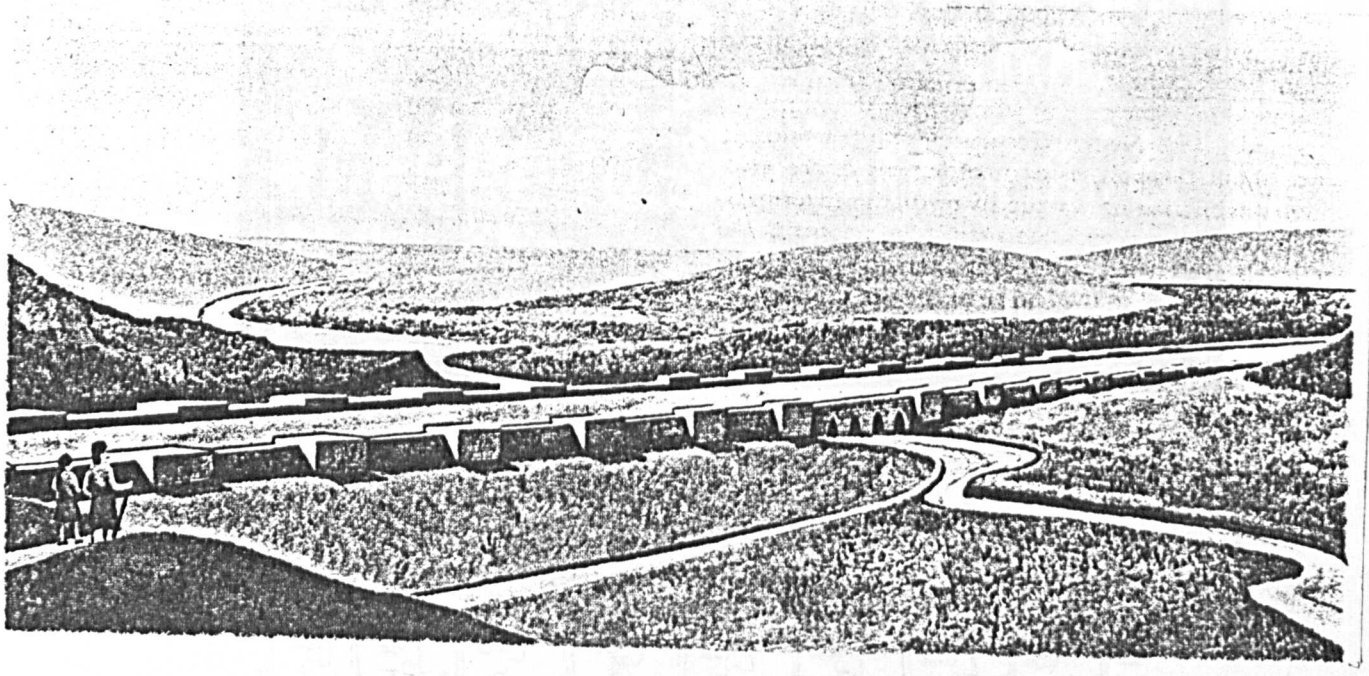
coloured, to cover various surfaces (Figure C.6). In contrast with natural forms of composition, the geometric shape compositions were frequently repeated (monotony rhythm) and used as a frame, to emphasise the contents of the wall painting or the relief (Figure C.3).

C.2.7 LAW AND CONTROL

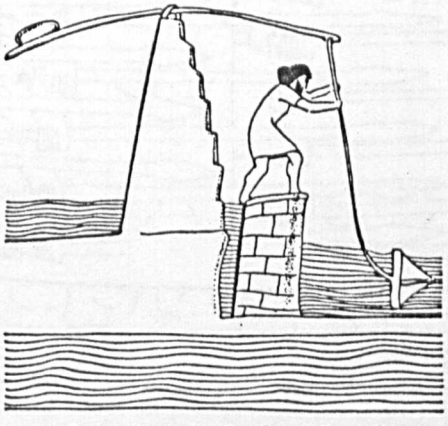
Moreover, the development of laws was another sign of urbanization in the ancient period; it was the medium through which citizens' rights could be defined and citizens' duties could be determined with respect to their everyday activities. Laws appeared in the Hammurabi period. The laws were carved in 49 vertical columns on a Basalt stele. This law code covered a variety of subjects, largely involving the disposition of and responsibility for property, both private and real, and dealt with certain areas of commercial law. Each is presented as a conditional sentence; if such and such happens, then this penalty will follow [Oates, 1979, p.74].

C.2.8 WHEEL AND TRANSPORTATION

Wheeled vehicles drawn by animals were coming into use at this time, in order to speed up travel about the city, to carry the food supplies to the town and for other transport purposes in peace and war [Bernal, 1957, pp.75-78], which had a very significant impact on the urban form of the ancient city. "Parallel with the improvement in land transportation, people had begun to master the mechanical difficulties connected with the use of water transport" [Bernal, 1957, pp.75-78].



Postgate, 1977, p.64

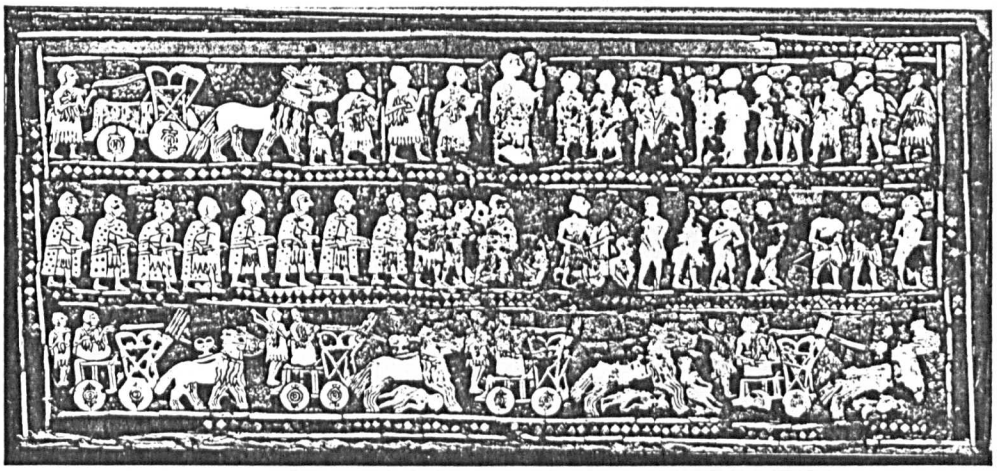


Irrigation, the basis of Assyrian agriculture

FIGURE: C.2.

Irrigation.

Saggs, 1965, p.45



Inlaid panel ("Standard") from the Royal Cemetery at Ur, in red limestone, shell and lapis lazuli. Height 20 cm. London, British Museum

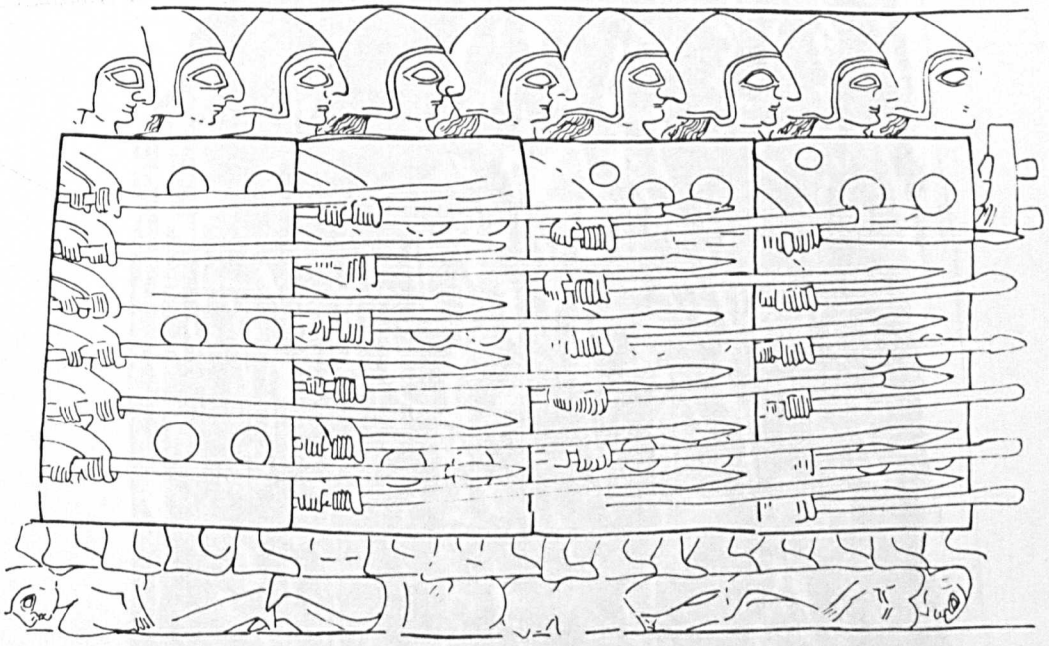


FIGURE: C.3.

The War and the Offensive Weapon.

Oates, 1979, p.27

FIGURE: C.4.

The Victory Stele.

Oates, 1979, p.40

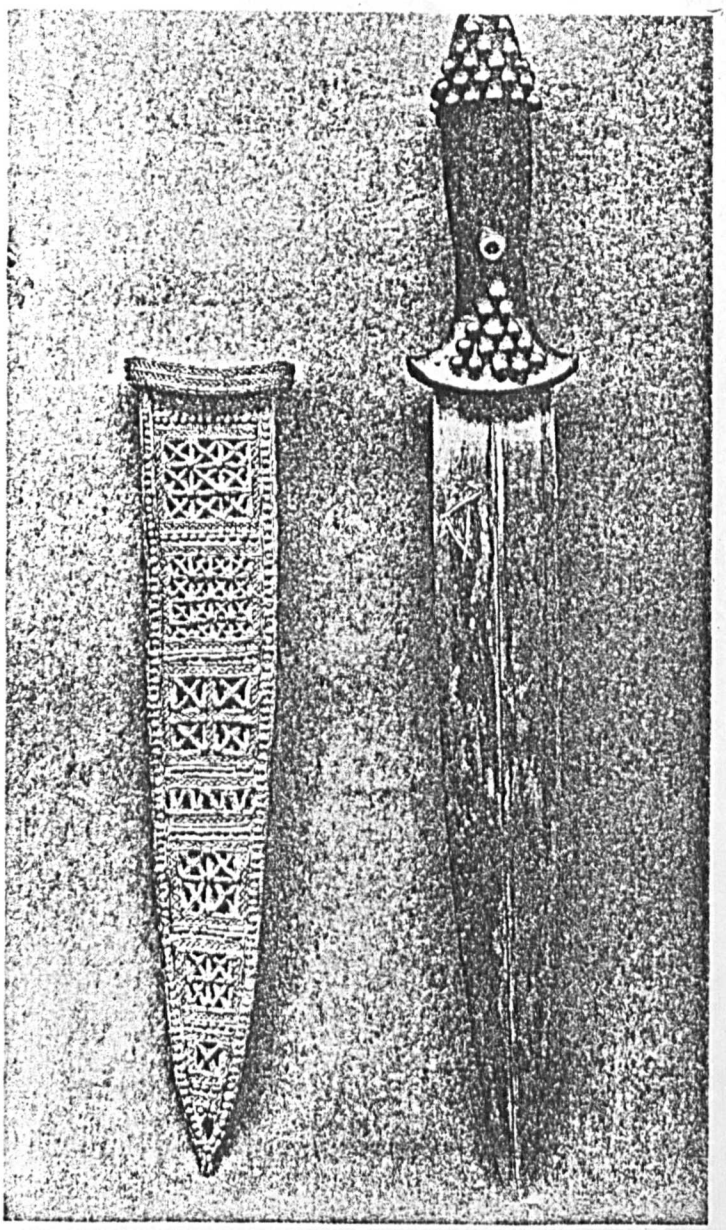
THE EVOLUTION OF THE CUNEIFORM SIGNS

PICTOGRAMS			CLASSICAL SUMERIAN c. 2400 B.C.		OLD-AKKADIAN c. 2200 B.C.	OLD-ASSYRIAN c. 1900 B.C.	OLD-BABYLONIAN c. 1700 B.C.	NEO-ASSYRIAN c. 700 B.C.	NEO-BABYLONIAN c. 600 B.C.		
URUK c. 3100 B.C.		JEMDET NASR c. 2800 B.C.	LINEAR	CUNEIFORM						PICTURE	MEANING
										NECK + HEAD	HEAD FROM
										NECK+HEAD + BEARD OR TEETH	MOUTH NOSE TOOTH VOICE SPEAK WORD
										SHOULDED BODY (?)	MAN
										SITTING BIRD	BIRD
										BULL'S HEAD	OX
										STAR	SKY HEAVEN GOD
										STREAM OF WATER	WATER SEED FATHER SON
										LAND-PLOT + TREES	ORCHARD GARDENER TO GROW TO WRITE

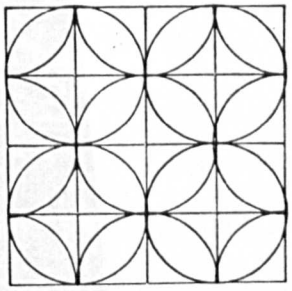
FIGURE: C.5.

Forms of Writing in the 19th Century BC.

Postgate, 1977, p.26-27



--THE GOLD AND LAPIS DAGGER AND SHEATH FROM A ROYAL TOMB AT UR (WOOLLEY, 1926–7) (BAGHDAD MUSEUM). *By permission*

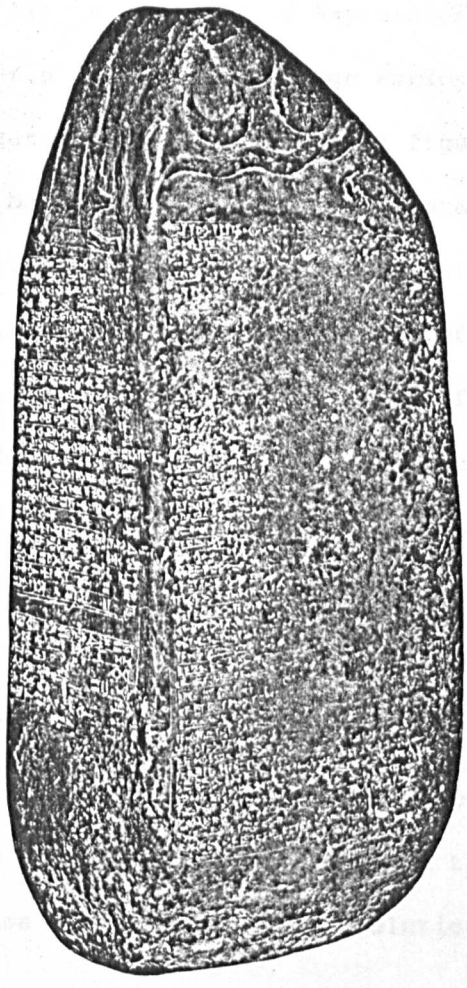


A number of complex geometrical relationships were known to Old Babylonian mathematicians. This diagram is copied from one of the few Old Babylonian maths texts that appear theoretical in content. The tablet was inscribed with geometrical exercises in which the student had to calculate the areas of various shapes. 'A square, the side is 1. Inside it are 4 quadrants and 16 boat-shapes. I have drawn 5 regular concave-sided tetragons. This area, what is it?' After Saggs.

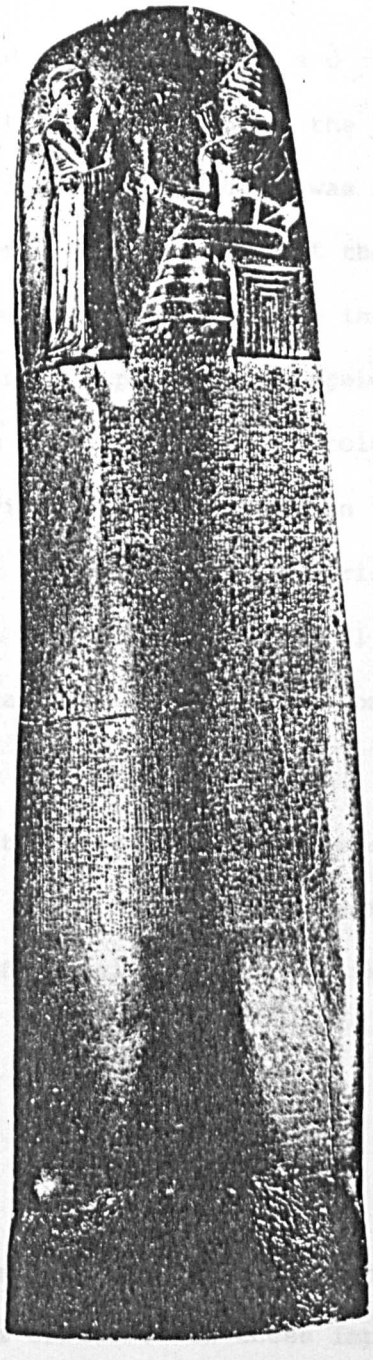
FIGURE: C.6.

Geometrical Patterns in Various Usage

Oates, 1977, p.185



A Cassite boundary-stone
with divine symbols
Probably from Nippur, twelfth century B.C.



Stele of Hammurabi, King of
Babylon 1792–1750 B.C.

FIGURE: C.7.

The Method of Publicizing the Laws
and Mathematical and Geometrical Solutions.

Saggs, 1965, p.141

[C.3] THE ARTS

Art is a medium of expression and record; drawing and carving acted as a pictorial language employed by early Man until the first civilization, when Man invented figurative language which was essentially based on pictorial representation. But, in spite of the new innovation, fine art did not lose its role in everyday life in which it continued to serve as a medium of visual expression alongside the figurative language. In addition, fine art played a major role in recording the development of life activities, particularly in the ancient Orient - the development of art ran parallel to the rise and fall of dynasties and their power. Art also provides a visual record of the external (imported ideas) and the internal (socio-economic) influences on a culture.

Moreover, art not only reflects the development of the society and its cultural status throughout time and space, but also reflects the sense of beauty and the evolution of manual and artistic skill.

C.3.1 SUMERO-AKKADIAN ART

C.3.1.1 The Protohistorical Period

About 3,000 BC in Uruk (modern Warka) the sacred place of Inanna, the Sumerian 'Lay of Heaven' was created. In these impressive and splendid architectural works 'House of Heaven' cuneiform script and the origins of the cylinder seal were identified for the first time. These artefacts were in the temple administration. The building also bore the first example of massive carved friezes composed of figures.

The crumbled ruins represent one of the oldest of the large cult buildings of mankind, the first evidence of a truly monumental architecture.

(a) Architecture

Ideas and development can be achieved through experience and practice. This can be illustrated by the improvement of the visual impact, scale and dimension of the temple in its setting. During this period the use of the old site and the ground-plan of previous building was used as a construction base for the new temple. This method helped to develop the visual sense "as in the remains of the Enki Temple in Uruk or 'Ubaid' period, the Sumerian water-god in Erdu, the most ancient Sumerian centre of civilization. This site had been used for rebuilding, after being levelled or filled in, and gradually with time became a 'High Temple' i.e. a temple on a high platform. In this way it became the prototype of the Ziggurrat which later became a significant feature of Sumero-Babylonian architecture" [Moortgat, 1967 p.1].

The most characteristic feature of Sumerian building was the use of sun-dried mud brick as the basic element of their architecture. The attitude of Sumerians to life, for whom nothing was final but for whom, on the contrary, everything seemed to rotate in a constant cycle of development and disintegration, was applied not only to the sacred place but to the rest of the city. This can be seen in the ground-plan of Eanna Sanctuary. In two elevations, two phases which followed one upon the other, are to be found important modifications in building technique and style [Lenzen, 1949 (quoted from Moortgat, 1967)]: (Figure C.8), the first and earlier phase of the walls were constructed from limestone blocks where the outer surface was decorated regularly with niches. This kind of building

material is not available locally but was used for buildings of special importance, i.e. sanctuary buildings which were intended as permanent. This technique was abandoned by the time of building the second phase. For the later construction another method was tried: building with mud and reed, or mud and wood. This had been the custom in the Land of Two Rivers for many centuries and had produced its own laws and evolved its own styles [Andrea, 1936 (quoted from Moortgat, 1967)]. In order to protect the mud walls, wall-casing was used, consisting of thousands of nail-shaped clay cones (Figure C.20), which were set closely together in a clay bed. The cones had flat heads decorated by incisions - and were coloured black, white or red. The way in which they are arranged forms a mosaic or geometric pattern. This mosaic facing of clay cones on mud walls represents a second transformation of building construction as used in the Ancient civilization of Iraq.

In the same way the pillar-like supports in the colonnade with their mosaic facing of clay cones are only a substitute for earlier stone pillars.

Moreover, Sumerian architecture does not attempt to express in artistic form the interplay of the stresses of load and support, the overcoming of the forces of gravity through the structural elements of a building. Rather Sumerian architecture expresses itself from the beginning in the disposition of the ground-plan and the decoration of the wall surfaces. The actual framework of its building was clad in a skin, or rather a garment of clay cones not as applied decoration, but as an integral part of the structure. In this it

resembles ancient sculpture.

In Jamdat Nasr it is true that building of this period was carried out using Riemch bricks and that the walls were decorated with cone mosaics, but in other respects the whole design of the sanctuary at this period (Uruk III) gives the impression of a completely new building [Lenzen, 1949 (quoted from Moortgat, 1967. p.6)]. The temple was surrounded by numerous dwelling houses and administrative offices, as well as places for sacrifices. These buildings were arranged in several groups, each group around a courtyard, and all inside a girdle of buildings in order to achieve maximum functional separation for privacy and protection.

Visually the combination of building technique means that no longer is there any harmony or symmetry controlling the evolution style of this period (Eanna) architecture.

(b) Sculpture

Sculpture in the round in Mesopotamia before 3,000 BC did not progress beyond the undoubtedly expressive but idol-like terra-cotta figures dating from the late Ubaid period, such as those found in Ur and Eridu. At that time male and female figures were kneaded from clay into shapes completely divorced from nature. Individual parts of the body are over-emphasized, others are carelessly modelled and reduced in size. Painting is used to help produce an effect of plasticity and it underlines the demonic character of these objects, which are mere craft products [Ur Excavations, 1949 (quoted from Moortgat, 1967, p.7)].

(c) Relief and Two-Dimensional Art

There were only two vehicles for the expression of two-dimensional art which have been discovered from this period: painted pottery and the stamp seal.

During the first phase of the Protohistorical period (Uruk VI-IV) a new shape of seal was created. The cylinder seal was evolved instead of the rectangular flat stamp. This new seal, a stone roller where the surface of the cylinder offers a large surface for carved design, when rolled onto clay produces a continuous frieze.

Motifs found in this period (and they were not continued at all or not until much later) included wild and domesticated animals. These figures occupied an important place as motifs, as symbols of dual power, either promoting or threatening Man's life.

Naturalism and symbolic abstraction not only combine in the themes adopted but also, from the beginning, dictate the pattern of Sumerian art, in the portrayal of the single figure as well as in the composition of pictures.

In the Jamdat Nasr part of this period, the wall reliefs carried the traditions of the Uruk IV period into quite new categories of art; they portray individual figures of Man and beasts in the same naturalistic manner.

In addition, three-dimensional art moved from relief towards sculpture in the round. Relief was raised to such an extent that it became almost completely detached from the surface of the picture.

However, the Sumerian art of the Prothistorical period found that representation of domestic animals, with water and useful plants, provided an especially happy way to express their attitude to life. These animals and plants are, therefore, not purely material elements of nature but represent a symbolic expression of power and differences in power.

C.3.1.2 The First Transition Period and the Mesilim Period

Due to the transformation of the goddess Innin from a mother-goddess figure into a supreme 'Lady of Heaven', new ideas of expression and arrangement in fine art emerged which contrasted with the Protohistorical period: "The Eanna Sanctuary was completely re-arranged; many features appeared in its architecture which do not fit into the picture of interior and exterior harmony which we have been led to expect as characteristic of the Protohistorical period. These features are not only contrary to the symmetry of the ground-plan and elevation, but also to the laws of building, and they seem to lead to a formlessness and chaos" [Moortgat, 1967, pp.18-19].

(a) Architecture

There was a fundamental change in architecture, extending from the form of the individual brick used in building to the technique of making foundations from the individual layout to the overall ground-plan of the whole complex. Consequently, formlessness and chaos were the result due to new building techniques and methods which were being employed without the benefit of any previous experience in their use. Skill in using new techniques needs time and effort in order to tie the whole building process together.

A synthesis of building elements and techniques can act to achieve unity and a unique style.

The visual aspect of change in building form during this period occurred in terms of building technique. Potzen and Riemchen bricks and the cone mosaics of the Protohistorical period were replaced by a new building method using the so-called plano-convex brick (Figure C.9).

Building foundations were also built on a completely new method. The foundations were built on a levelled stretch of ground and buried deep in the earth.

"The change occurred in the overall effects of building form for the Sumerians from their earlier harmonious blending of elements to a contrasting growing dualism attitude. This resulted in a new architectural feature in prominent buildings by surrounding the sacred area of the gods by a wall which cut it off from the world around and protected the Holy place from other parts of the temple-city" [Moortgat, 1967, p.19]. (Figure C.10).

"Parallel to the changing focus of political power, a new monumental building was constructed beside the temple during the Mesilim period. This was the residential and administrative centre of the city ruler (palace)" [Moortgat, 1967, p.19].

(b) Art

In art and as part of a continuous cycle of development, improvement in artistic skill and technique occurred during this period. Artistic innovation covered the whole of the range of

art elements, as they are linked together. The material used for cylinder seals and stone cult vessels was changed from clay to stone with, for example, stone maces, decorated with reliefs, serving as votive objects. Moreover, fine art was enriched in quality as well as variety in the Mesilim period by the appearance of three-dimensional art and there was an attempt to idealize the human shape by replacing the natural, living forms wherever possible by solid, geometric, contrived compositions.

The following second transition and Akkadian periods were passed through without great change in artistic forms or technique; generally, these periods continued the process of improvement in fine art. In terms of urban form in the Akkadian period the palace became of great importance and dominated the whole city.

C.3.1.3 The Sumero-Akkadian Revival

The Sumerians and Akkadians were sharing the control of the country during this period after releasing their country from the rule of the Guti (from the Iranian mountains). "As the old Akkadian elements were more and more becoming part of the neo-Sumerian culture, it is better to describe the works of art from this period of the state of Sumer and Akkad as belonging to a 'Sumero-Akkadian' revival" [Moortgat, 1967, p.55].

(a) Architecture

In this period extensive and complex sacred precincts arose.

The two fundamental achievements in architecture during this period are, firstly, the true 'Ziggurrat' the artificial high podium for the temple of the city-god which nominally had an almost square ground-plan and a height of 20 to 30m, with sloping or graduated exterior walls. Secondly, the type of temple building changed, being erected on level ground with a broad cella (hall).

(b) Art

Works of art from this time do not achieve the intellectual quality of the Mesilim period and lack evidence of intellectual advance nor do art works exhibit the human warmth of many works from the Ur I period. Technically they are a continuation of the major form of sculpture from the old Akkadian period.

C.3.2 OLD BABYLONIAN ART

This period is characterised by the personality of Hammurrabi of Babylon who created innovations of the greatest political-cultural expression.

He was able to create a united kingdom in which political and military power was in the hands of the semitic Canaanites, who had slowly, for centuries, penetrated the whole Sumero-Akkadian area, from Aleppo to Larsa, from the Mediterranean coast to the Iranian

border mountains.

In spite of their great willingness to adopt and continue the ideas and forms of the Sumero-Akkadian revival, the artists of this period had their own individual character which contrasts with the cultural inheritance which they had adopted.

(a) Architecture

In this period no great change is to be found in the architecture, i.e. in terms of technique or design, when compared with the Sumero-Akkadian period. The Mari Palace, for example, is not innovating and large parts of it were built in the time of the Kingdom of Sumer and Akkad.

(b) Art

This period witnessed the continuation and improvement of fine art, i.e. in better technical achievement as in wall painting and sculpture. A noticeable feature towards the end of the Old Babylonian period is the tendency to exaggerate the height of the human figure.

C.3.3 MIDDLE BABYLONIAN (KASSITE) ART

The Kassites ruled Babylon for several centuries, although their origin is not clear. However, this period saw further changes in art and culture.

(a) Architecture

The architecture found in the beginning of this period showed their own distinctive and original character, such as the rectangular 'log house temple' [Moortgat, 1967, p.94], (Figure C.11), in which the ground-plans have no inner courtyard. The building is a free-standing monument and could be walked round in similar fashion to a Greek temple (Figure C.12).

Moreover, in this period a vast door with barrel vaulting above has been preserved a distance of over three metres in height. This scale of building was necessary in order to build Kurigalzu's shrine on a platform, which then gives a certain aesthetic significance [Seton and Safar, 1947, p.135].

(b) Art

In fine art, especially in sculpture,were two main vehicles for three-dimensional relief: the votive plaque and the victory stele, disappeared. In their place moulded brick relief makes its appearance in Babylon as a form of architectural sculpture. In the wall painting and relief no significant achievement occurred during this period.

C.3.4 ASSYRIAN ART

Assyria, the country on the Tigris to the north of Jebel-Hamrin, was a Sumero-Akkadian province during the third millennium. The Assyrians tried to free themselves from absorption by the Canaanites and from the leadership of the south in cultural matters. They made alliances with Anatolia in the north in order to obtain

raw materials. Later they became a part of Hurri-Mitanni Kingdom which extended from the Zagros mountains to Palestine.

(a) Art and Architecture

Assyrian art was transformed completely during the 15th and 14th centuries. While at first in the 15th century it was under the influence of the Hurrian-Mitannians, in the 14th century it was laying the foundations of a style which was the basis of the great achievements of the stone-cutter in the 13th century and the monumental wall relief of the late Asyyrian period.

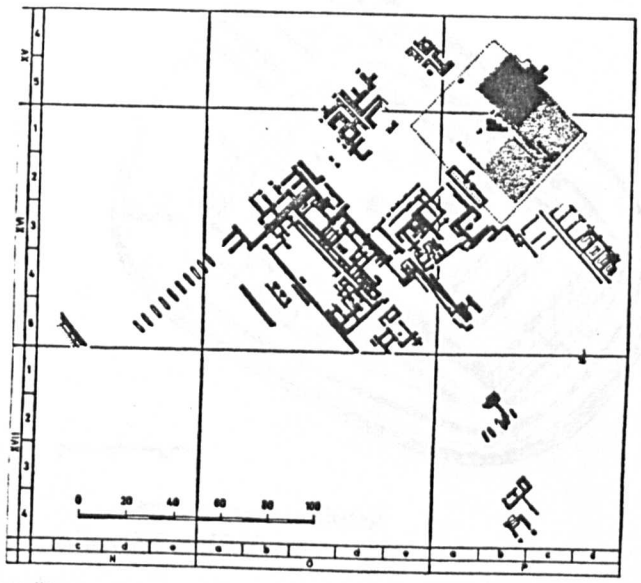
Moreover, one of the most important achievements in this period was the narrative pictorial frieze, without which neither the wall relief nor the wall painting of later periods can be imagined.

Later in this period, and after the Assyrians were set free from the traditional influence of the Arameans (a branch of semitic nomads from Syria), i.e. in racial, linguistic and religious matters, the various branches of architecture and art, including the building of temples and palaces and later of forts, along with sculpture, relief and painting, were combined together to create an integration of architecture and pictorial art. The architectural coalescence of royal palace and divine temple as a high cosmic unity found its expression during this period. Painting and relief are not merely used to decorate vacant wall surfaces as the servant of architecture; on the contrary, sculpture and two-dimensional art were combined to create a new organic linkage of art and architecture and here again, we found the contribution which must have been made to this by the Arameans. New architectural features appeared during this period, as in the ground-plan of the first Sin-Samash Temple (Figure C.10).

"In the wall relief the Assyrian royal palace became, by the integration of architecture and pictorial art, an artistic unity rather than merely a building. The development of wall relief was not simply a change from wall painting to wall relief in the interior decoration, but pictorial art decorating the throne room presented as a whole, unified manifestation of the Assyrian concept of kingship in both its aspects, half mythical-supernatural and half real and historical" [Stearns, 1947, p.72].

Assyrian relief remained an art of decorating flat surfaces based on drawing, in incised lines, and an engraved outline rather than on modelling or plasticity. "Even in Assyrian sculpture it is the surface, the garment which stands in the forefront of artistic interest: the portal of animals, of necessity partly three-dimensional, are really two profile views conceived at right angles and then combined as one. The pictorial surface in Assyrian relief almost never conveys spatial depth by perspective" (Figure C.13) [Moortgat, 1967, p.134]. However, the relief became the most important means of expression in the late Assyrian period [Moortgat, 1967, p.134].

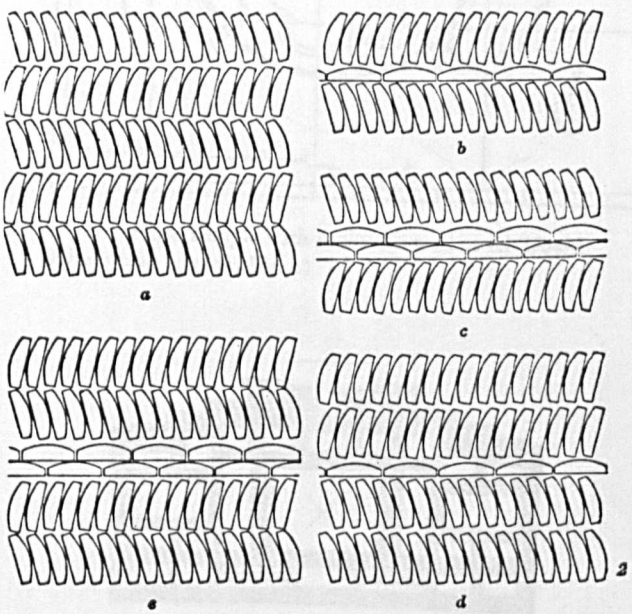
The development of art and evolution due to the natural environment influence, in particular the architecture, will be discussed in detail in the courtyard adaptation (Part 5).



Eanna Sanctuary at Uruk, Level III a–c
(After: UVB 20, Pl. 30)

FIGURE: C.8.

Eanna Sanctuary at Uruk.

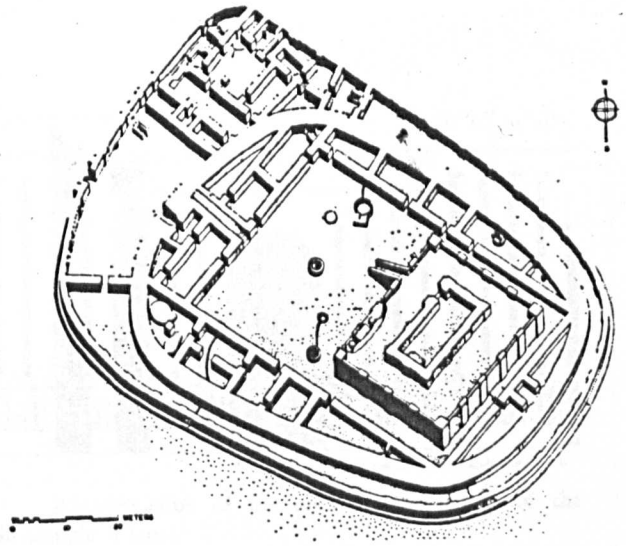


Plano-convex bricks (Diagram)
(After: Christian, *Altertumskunde*, Pl. 148, 2)

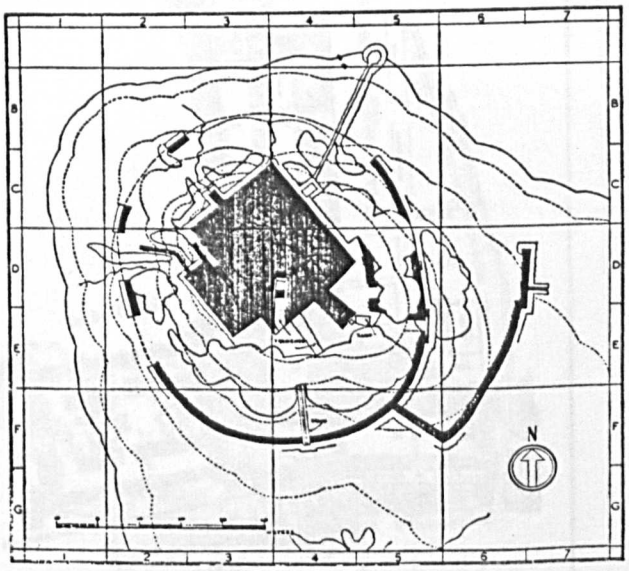
FIGURE: C.9.

Plano-convex Bricks.

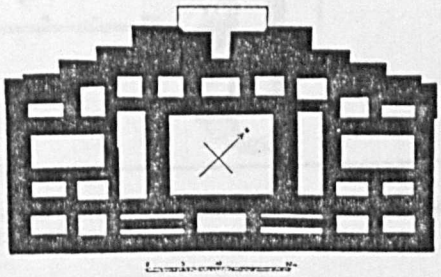
Lenzen, H.J., 1967



'Temple Oval' at Khafaje
(After: OIP 53, Pl. V)



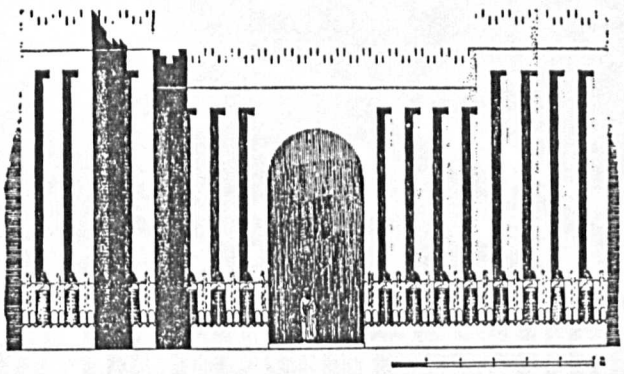
High Temple with enclosure wall at Al 'Ubaid
(After: Iraq 5, p. 10, Fig. 2)



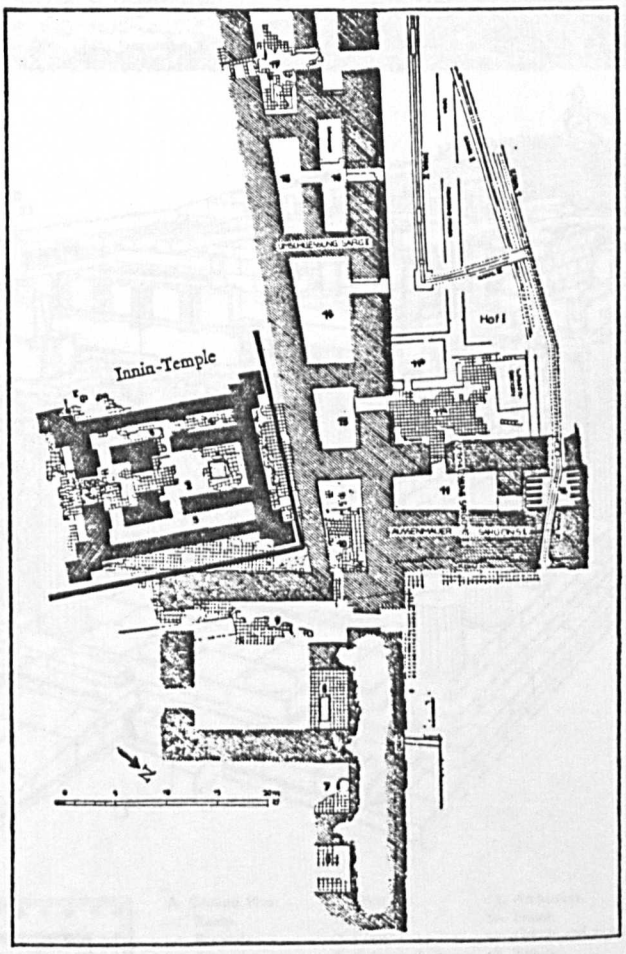
Plan of the first Sin-Shamash temple of Ashur-nirari I at Ashur
(After: W. Andrae, *Das wiedererstandene Assur*, p. 100, Fig. 44)

FIGURE: C.10.

Layouts of Temples.



Reconstruction of the south-eastern façade of the Innin Temple at Uruk
(After: UVB 1, Pl. 16)

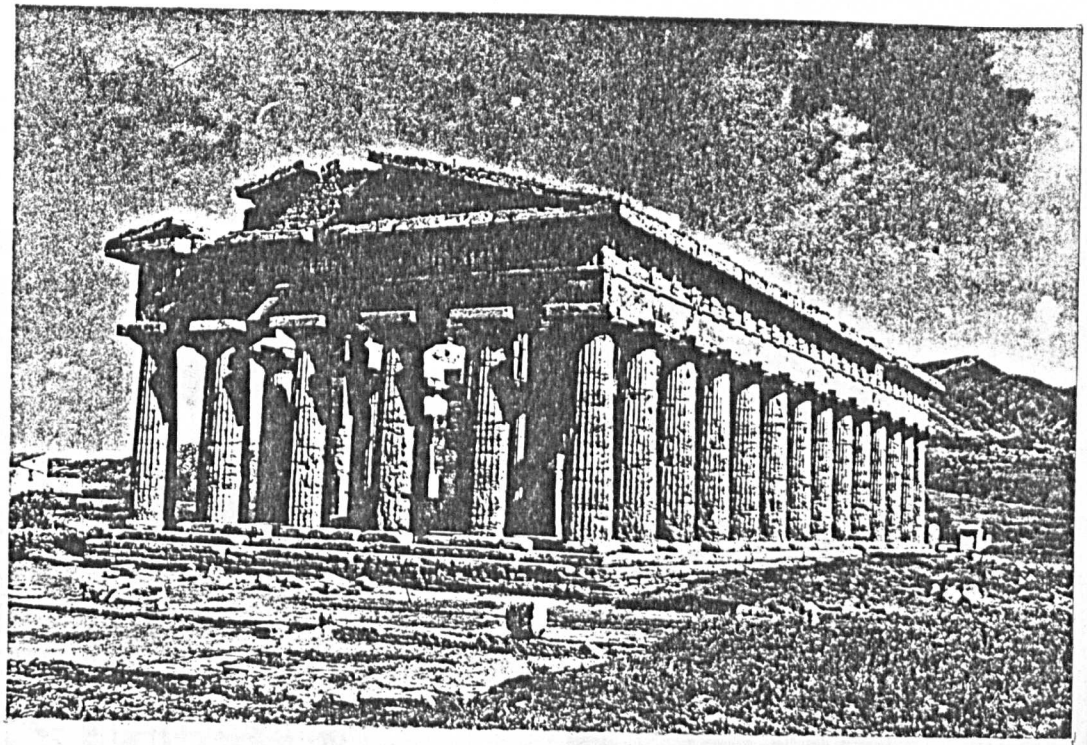


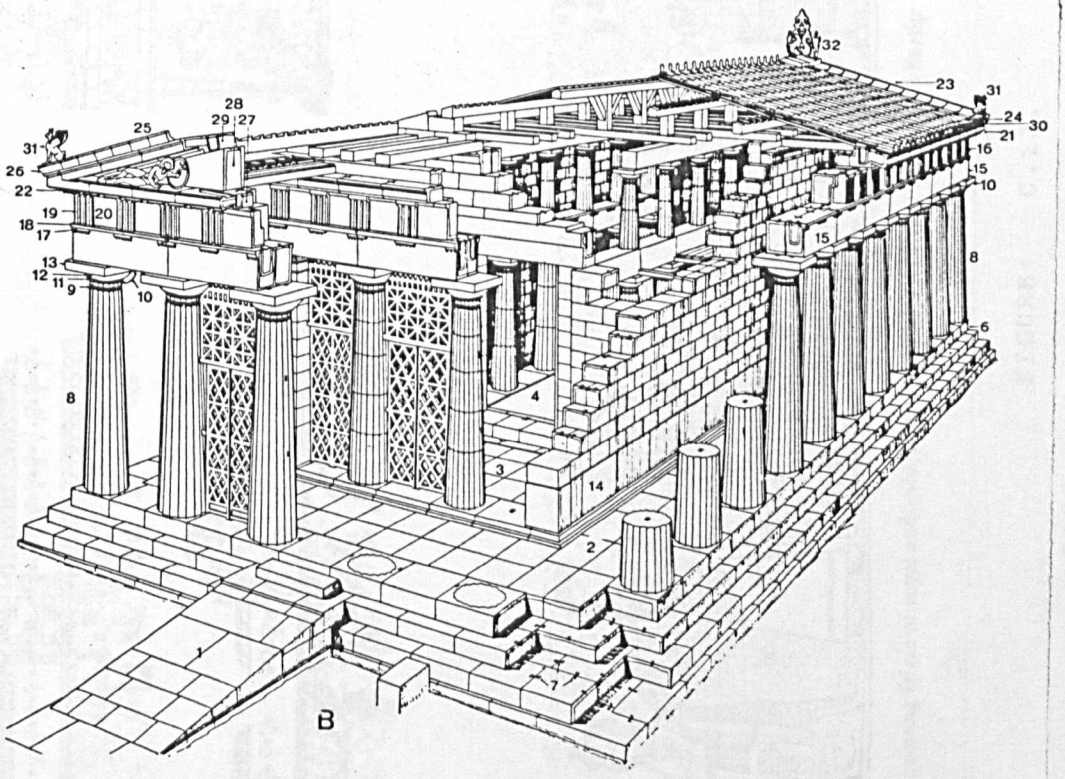
Plan of the Innin Temple of Karaindash at Uruk
(After: UVB 1, Pl. 10)

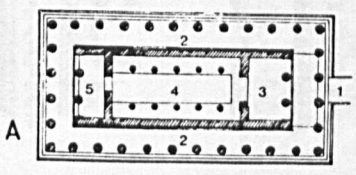
FIGURE: C.11.

Plan and Reconstruction of the Innin Temple at Uruk.

Lenzen, H.J., 1967







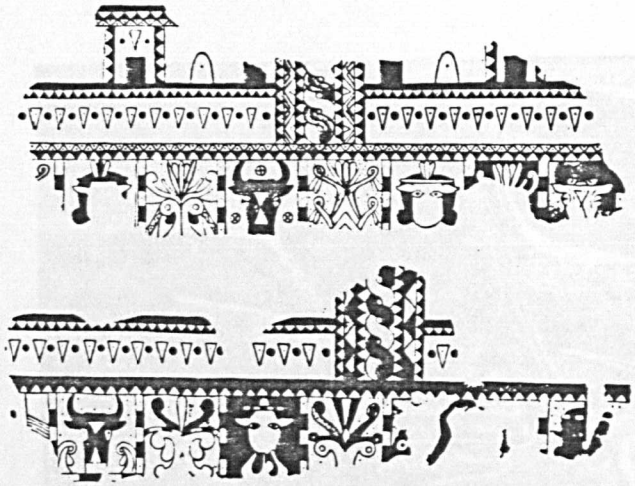
A. Ground Plan:
1. Ramp.
2. Peristyle.
3. Pronaos.
4. Cella.
5. Inner cella.

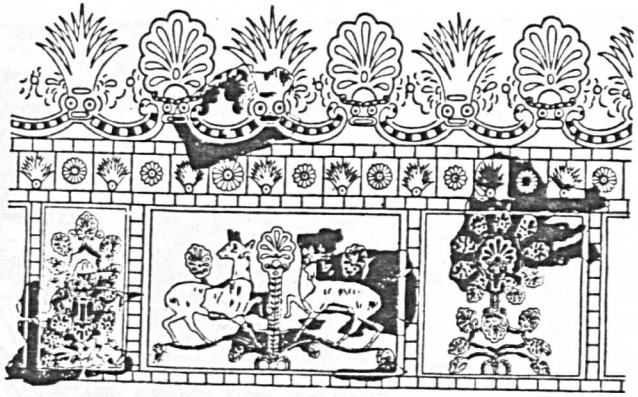
B. Elevation:
6. Stylobate.
7. Clamps.
8. Column shaft.
9. Hypotrachelium.
10. Capital.
11. Annulet.
12. Echinus.
13. Abacus.
14. Orthostatae.
15. Architrave.
16. Frieze.
17. Guttae and regula.
18. Taenia.
19. Triglyph.
20. Metope.
21. Dripstone.
22. Mutules with guttae.
23. Roof.
24. Eaves-tiles.
25. Pediment.
26. Sima.
27. Horizontal cornice.
28. Tympanum.
29. Raking cornice.
30. Antefix.
31. Corner acroterium.
32. Terminal acroterium.

FIGURE: C.12.

The Temple of Neptune at Paestum (5th Century BC.)
Compact Freestanding Design Showing Similarities Between the Greek and the Babylonian Temple.

Benevolo, 1975, p.59-61





Wall painting frieze of royal audience, from Room XXIV of the Palace of Til Barsip (After: A. Parrot, *Assur*, Fig. 112)

FIGURE: C.13.

Different Styles of Wall Painting.

Lenzen, H.J., 1967

FIGURE: C.14a.

Samarian Statue of the City's Governor, Gudea.

Whitehouse, 1977, p.106

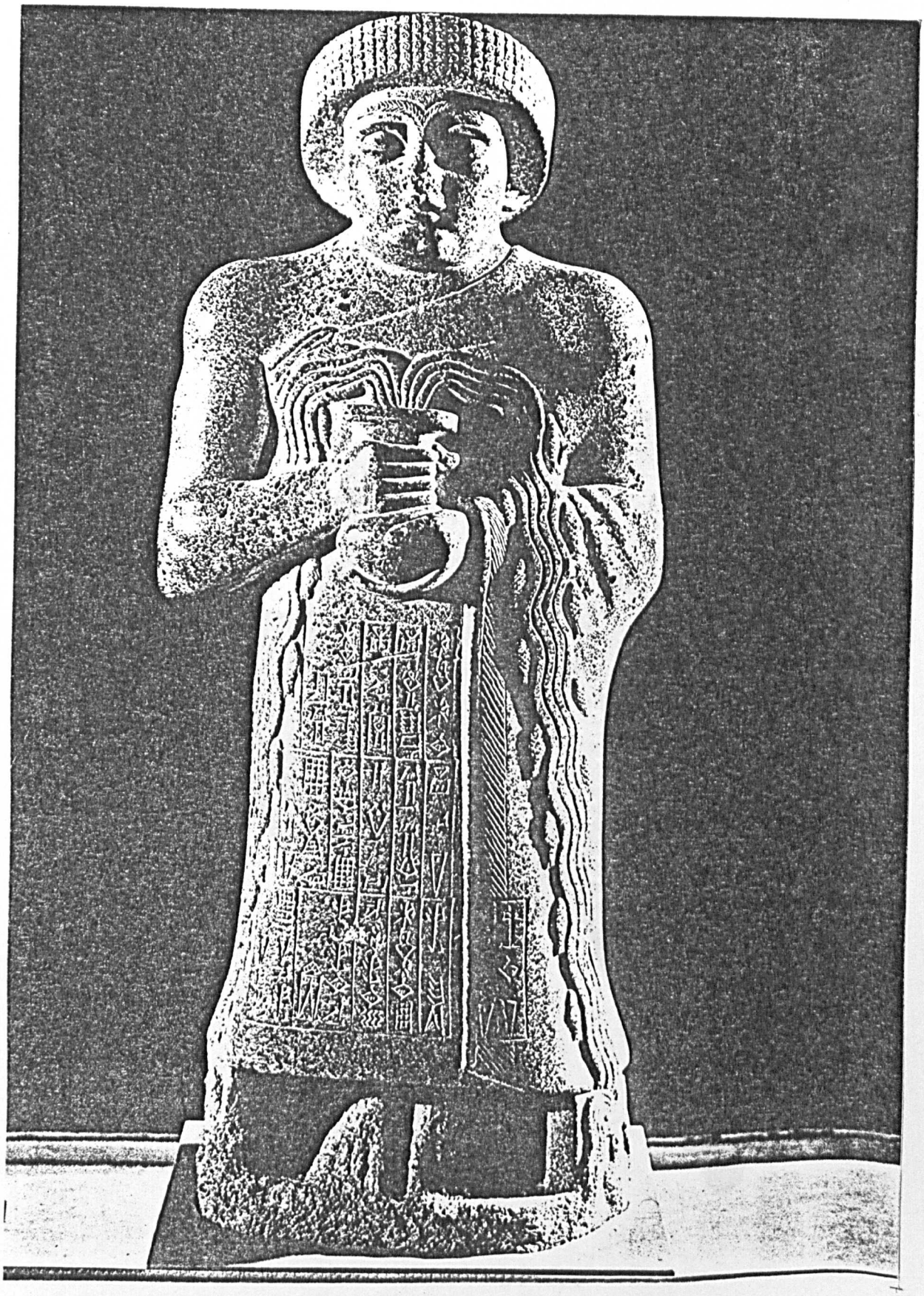


FIGURE: C.14b.

Statue of Gudea Holding a Vase
from which flow Streams of Water with Fishes.

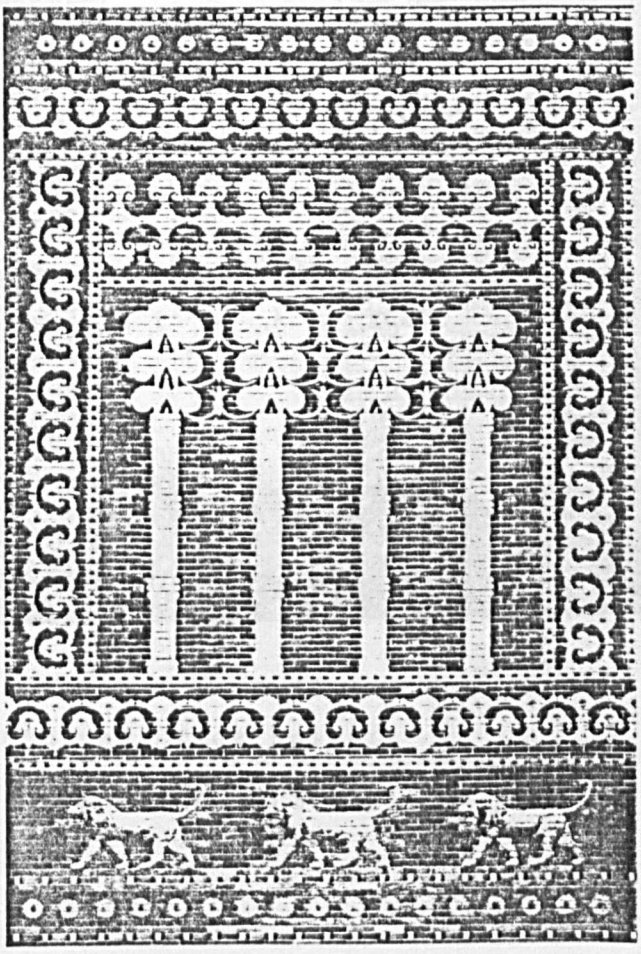
Postgate, 1977, p.45

FIGURE: C. 15.

Samarian Sculpture of Sargon of Agade.

Whitehouse, 1977, p.105

FIGURE: C.16.
Large Guardian Figure in Baked Clay.



Reconstruction of the glazed-brick frieze on the façade of Nebuchadrezzar's throne room (ill. 101, *c*), now in the Vorderasiatisches Museum, Berlin. The background colour is dark blue, the columns and lions appearing in yellow, white, blue and red, now weathered to green. (See also *MDOG* 99, 1968.) Ht 12·40 m.

FIGURE: C.17.
Glazed Brick Frieze.

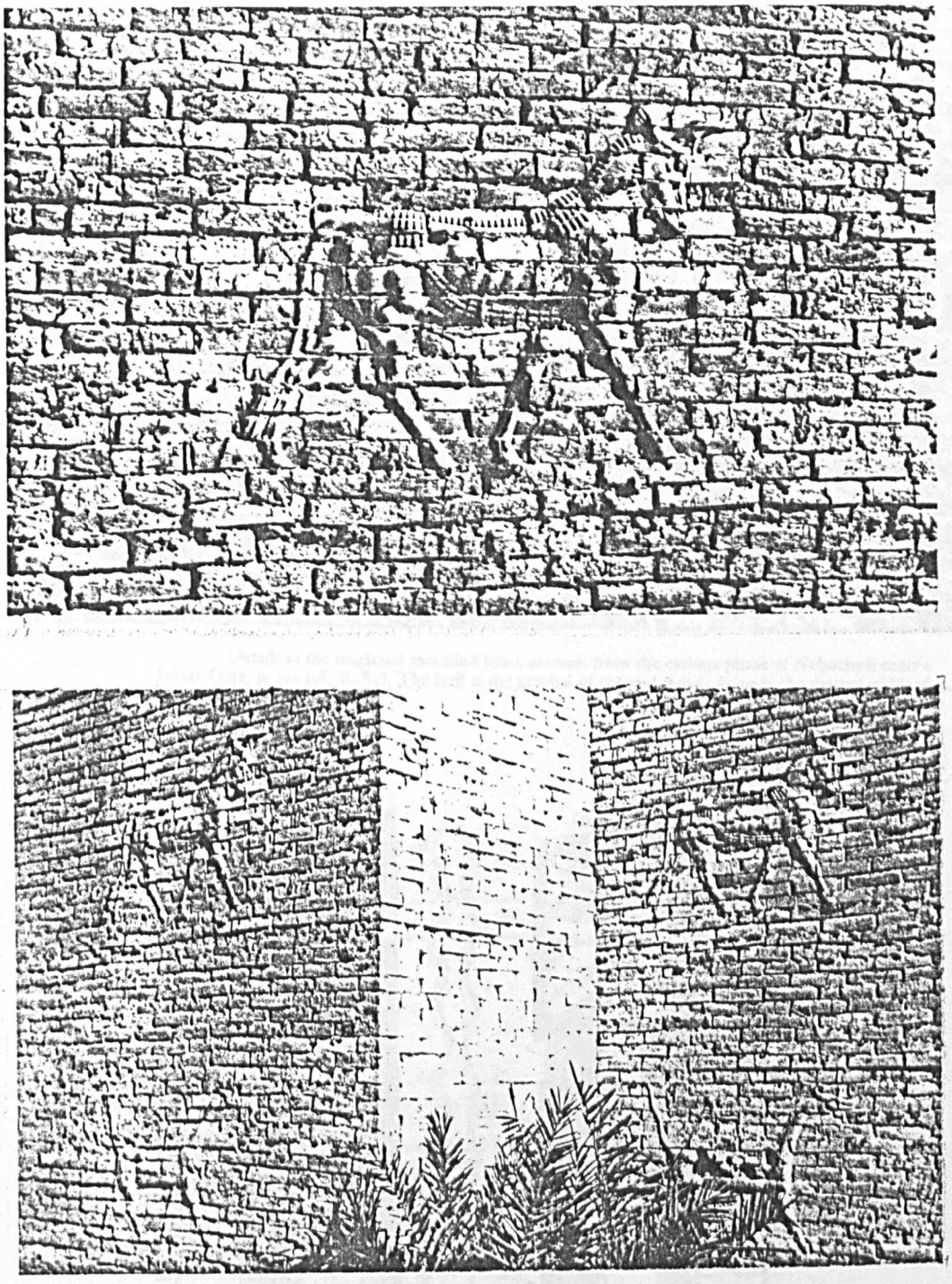
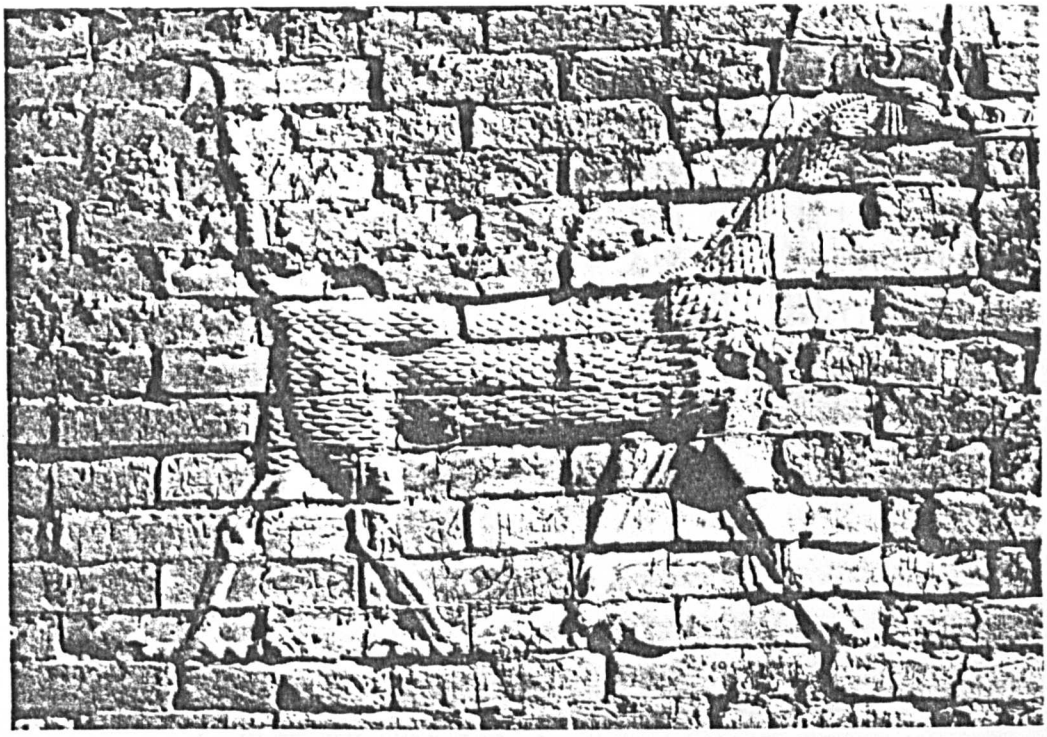


FIGURE: C.18.

Moulded Brick Relief.

Oates, 1979, p.155



Details of the unglazed moulded brick animals from the earliest phase of Nebuchadrezzar's Ishtar Gate, *in situ* (cf. ill. 85). The bull is the symbol of the god Adad; *below* is the dragon of Marduk. Ht 1·30 m.

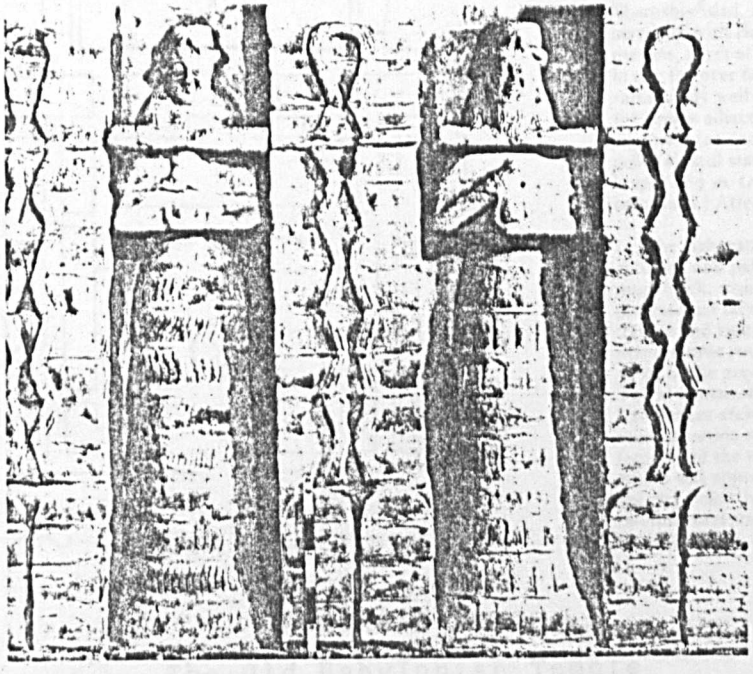
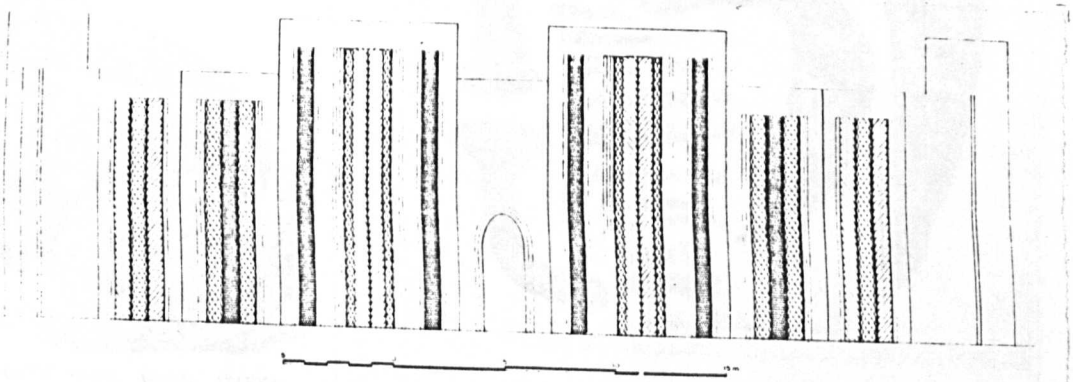
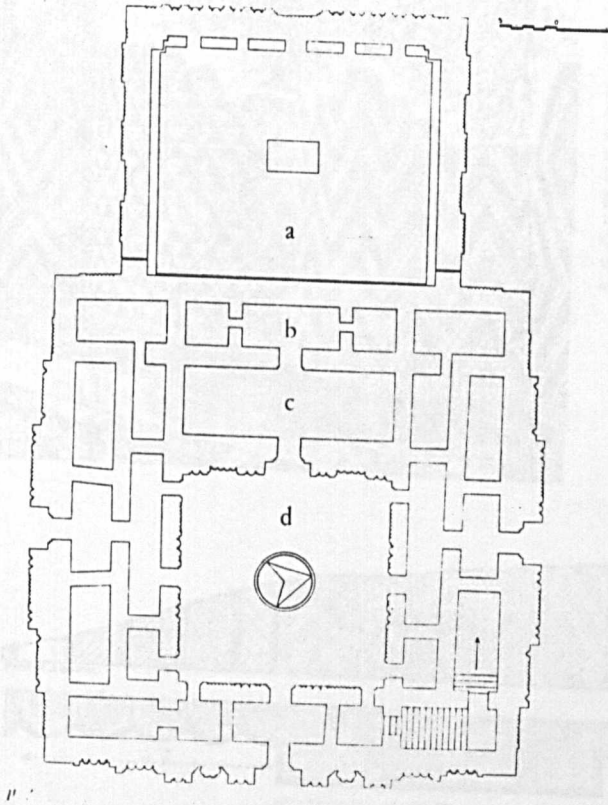


FIGURE: C.19.

Detail of Moulded Brick Relief.

Oates, 1979, p.154-188





Perhaps the finest example of the Old Babylonian temple plan is found in Assyria at the site of Tell al Rimah. Built under the patronage of Shamshi-Adad, almost certainly with Babylonian masons, parts of it remained in use for over 600 years. It is remarkably well preserved, the rooms adjacent to the ziggurrat (*a*), including the cella (*b*), still standing to a height of 7 m. (*c*: antecella, *d*: courtyard.) After D. Oates.

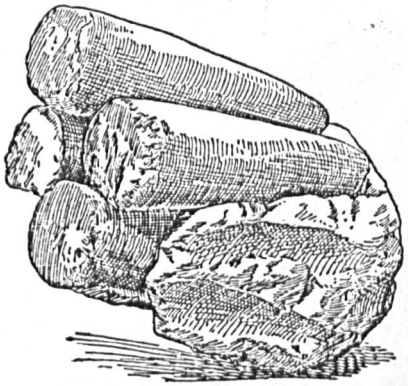
The elaborate spiral columns and palm trunks in mud-brick, which ornament the external façades of both temple and ziggurrat and the main temple courtyard (ill. 57:*d*) of the great temple at Tell al Rimah, are unique in Babylonian architecture. This reconstruction shows the east façade and the main entrance, which was approached from the city below by a long monumental staircase. After D. Oates.

FIGURE: C.20 a.

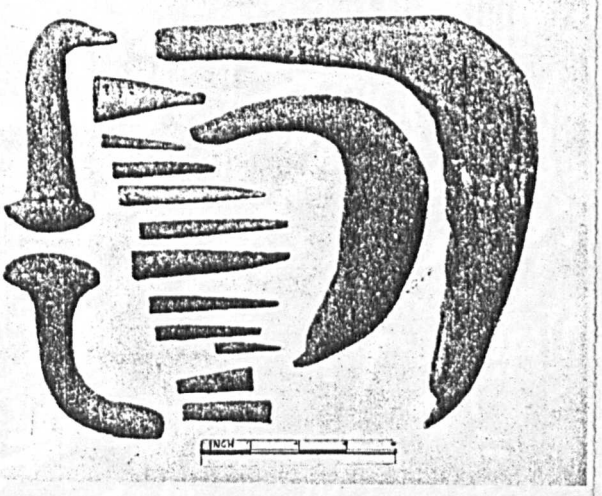
The Old Babylonian Temple

(Shamshi-Adad)

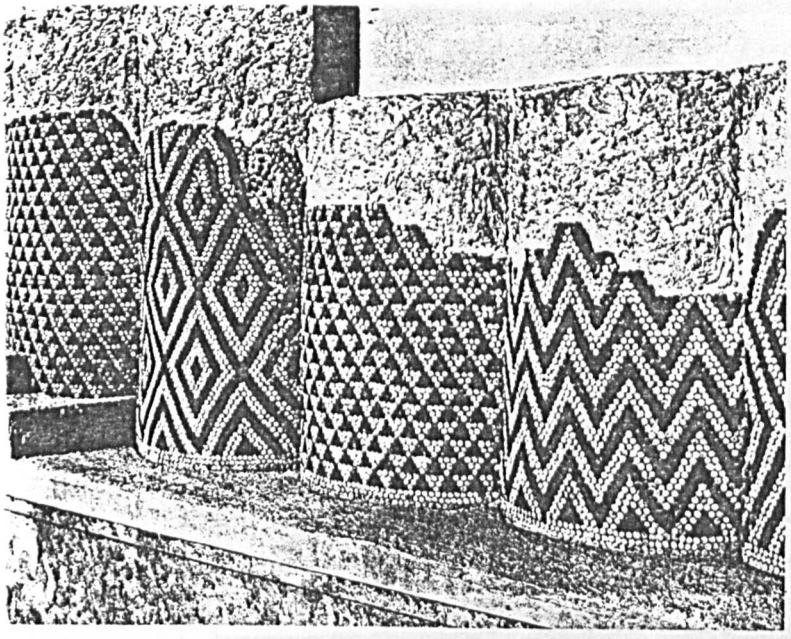
Oates, 1979, p.81



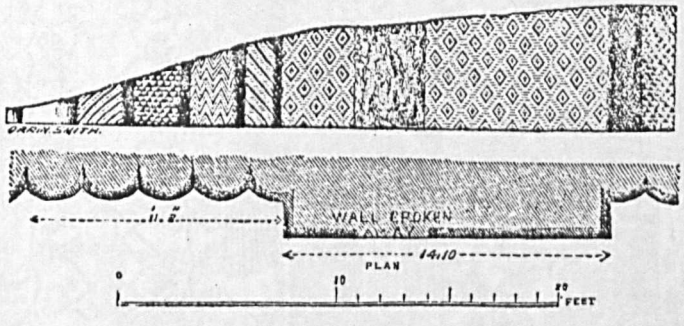
—CONES FROM WALL, WARKA: BRIT. MUS.



—POTTERY SICKLES, 'NAILS' AND CONES: SHAHRAIN, 1919



The approach to the Pillar Hall of Eanna IV was flanked by these engaged columns. The facade of the Pillar Hall had two rows of four very stout columns, 2.62 m. in diameter, the earliest known example of the use of free-standing columns. Their girth and primitive method of construction, with bricks laid radially to form an approximate circle, suggests a hesitant and experimental approach. Over the surface of the columns thick mud plaster was daubed; and, when it was still wet, cones of baked clay were inserted to make mosaic patterns, appearing to imitate the bark of a palm trunk or alternatively basketry or reed matting. On the columns black and white cones were used, while red cones occur in the mosaics elsewhere in the Pillar Hall and its surroundings.



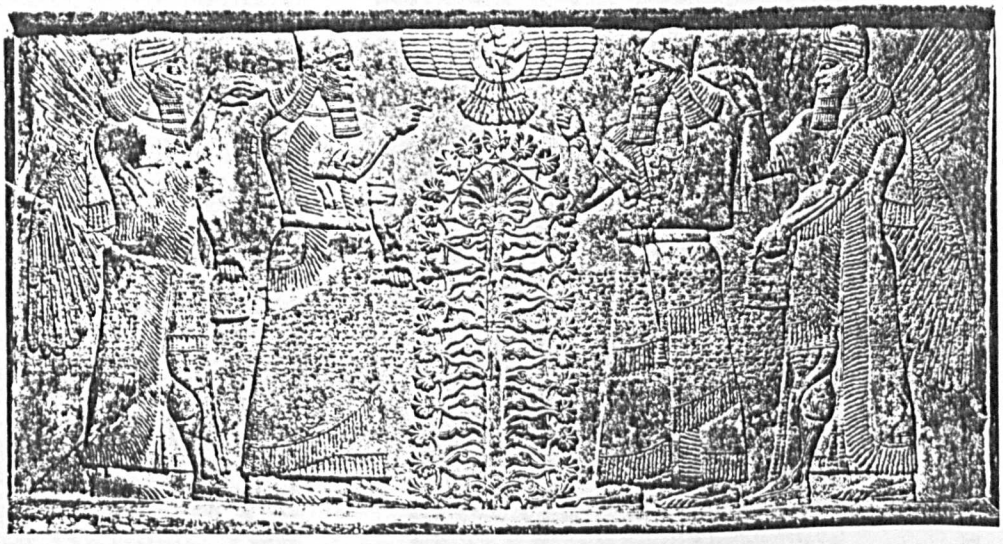
ELEVATION AND PLAN OF THE TERRA-COTTA CONE WALL, WARKA

FIGURE: C.20b.

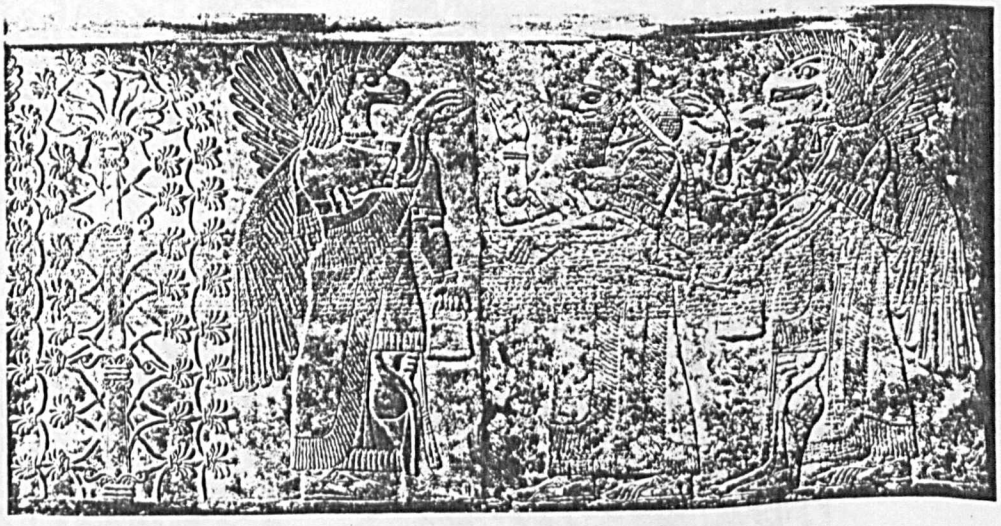
Cones and Nails.

Lenzen, H.J., 1967

Burney, 1977



Alabaster mural relief from the N.W. Palace of Ashurnasirpal II in Nimrud. Height 1.78 m. London, British Museum



Alabaster mural relief from the N.W. Palace of Ashurnasirpal II in Nimrud. Height 2.18 m. London, British Museum

FIGURE: C.21a.

Wall Relief.

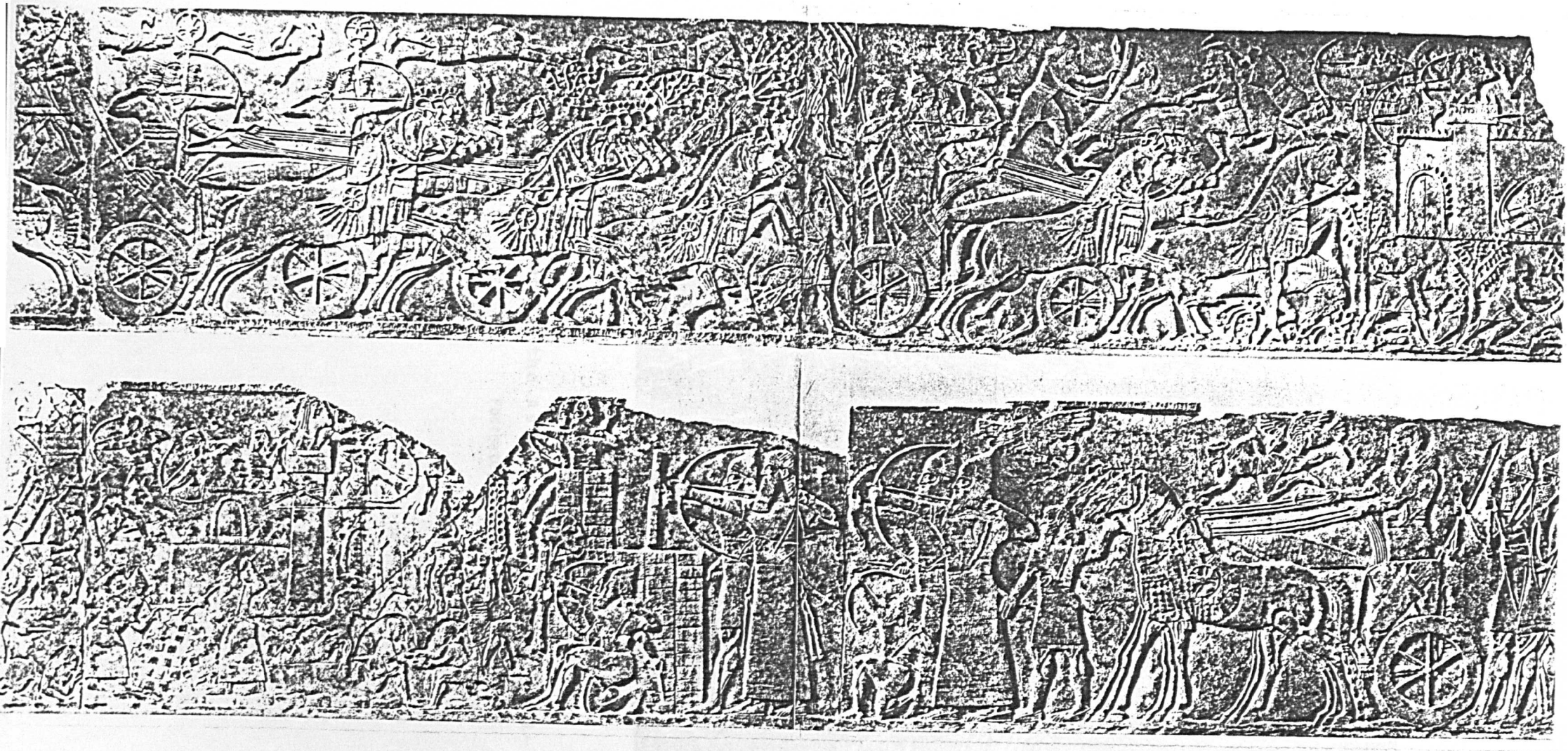


FIGURE: C.21b.

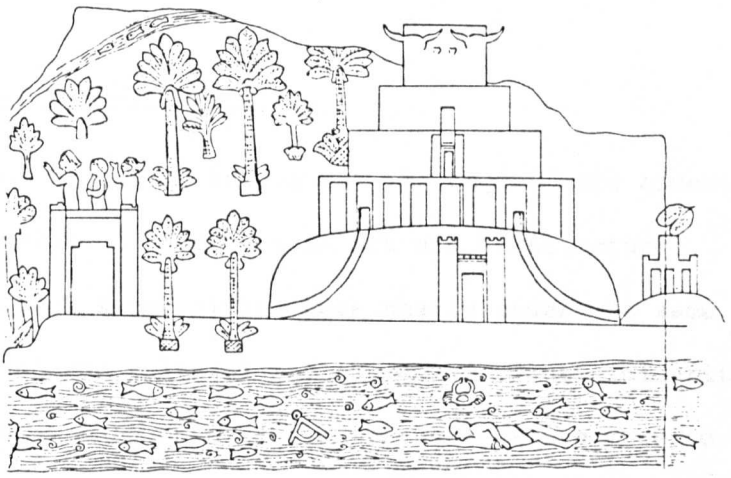
Wall Relief.

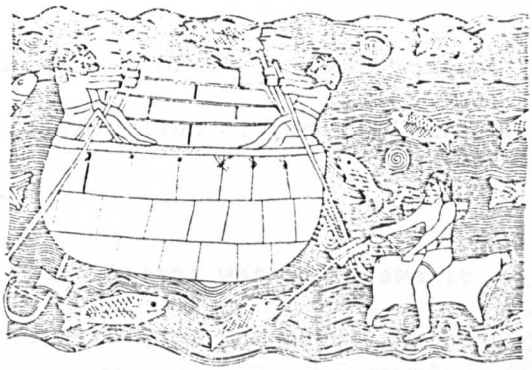
Lenzen, H.J., 1967

FIGURE: C.22.

Wall Relief of the Assyrian King Sargon (721-705 BC.)

Postgate, 1977, p.24





Rafts floated on inflated skins were used for heavy transport in Babylonia, while lighter local traffic was carried in coracles, such as this one, similar to the modern Arab *guffa* still to be found along the Euphrates. The modern *guffa* is made of wickerwork covered with bitumen, but this ancient Assyrian example, a detail from a relief of Sennacherib now in the British Museum, appears to have been covered with skins. The detail also shows a man fishing, supported by an inflated goatskin. After Layard.

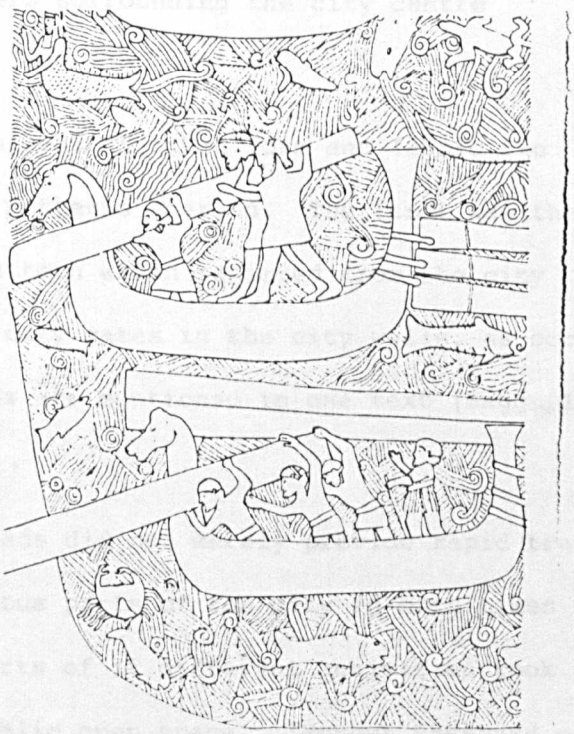


FIGURE: C.23,

Methods of Water Transportation.

Oates, 1979, p.118-119

[C.4] THE CITIES : CHARACTERISATION

Most of the Ancient cities throughout the region were almost the same, although detailed differences in art and architecture were to be found. Most of those cities were nearly under the same circumstances of natural and cultural environments. Thus similarities in the characteristics of the urban fabric in those cities were to be found and can be generalized as follows:

In addition to the similar locations of the Ancient cities, most, if not all the Ancient cities were walled cities, as occurred in Uruk and Babylon etc. (Figure C.25).

Another character shared by those cities was the dramatic contrast of forms in their urban fabric, between the sharp, regular, legally controlled city centre and the irregular, organic, personally controlled residential quarters surrounding the city centre (Figure C.26).

As a result of the contrast of urban form and fabric two contrasting road or alleyway patterns emerged. The first was the main wide straight road network pattern which radiated from the city centre and terminated at the city gates in the city walls, as occurred in Babylon. Twenty-four roads are mentioned in one text [Saggs, 1960, pp. 164-166], (Figure C.22).

This system of main roads did not merely provide rapid transportation throughout the various parts of the city in both times of war and peace, but in some parts of it different activities took place such as using the roads as public open space. 'Morduk Shepherd of his Land' is the name of a section of road which entered the city of Babylon through the Ishtar Gate in the north wall, just east of the

palace. This road is now usually known as the Processional Way, from the fact of its being the principal street used by Marduk when the priests took him through the city on ceremonial occasions. It was an efficient piece of road engineering. Up to 66 feet wide in parts, it consisted of a brick foundation covered with asphalt to form a bed for large paving slabs of limestone.

The main road pattern also ties the main parts of the whole city together as one unit by running throughout the different parts, overcoming the existing obstacle in its way such as the river, as in Babylon city. "From the Ishtar Gate the Processional Way ran parallel to the Euphrates half-way through the old city and then turned west to pass between Etemenanki and Esagila towards the river, where it passed over a bridge into the western half of Babylon. This bridge had 'been built on piles made of bricks bonded with bitumen. These piles were 30 feet wide and 30 feet apart' in a boat shape", [Saggs,1960, pp.164-166].

However, at the level of urban design this transportation system, in spite of its function as providing the main arteries for different city activities, also served a visual function by emphasising axiality which was to insure the order, will and the power of the ruler, and also to present the city centre complex as a dominant feature and a main focal point for the whole city (Figure C.24).

Furthermore, the main road network system also provided access to the second road network system (alleyways) within the residential quarters within the city, in order to link the whole parts of the city together.

Moreover, due to natural environment (prevailing wind, sun direction, temperature, etc.) the main roads of the city were carefully planned and designed, as occurred in Babylon "where the main streets were laid out in a direction from north-west to south-east, the object of this being to give the city the full benefit of the prevailing north-west wind to carry away smells and keep the temperature down" [Saggs, 1960].

The secondary road network pattern within the city, as in direct contrast with the main road network, was that of narrow meandering alleyways, created by the will of local inhabitants.

This road pattern and its hierarchy was created as a result of accumulated pressure from inhabitants; due to limited growth and the limited area within the walled city, and in order to create more homes, there had to be some rationalisation of urban structure. This problem was solved either by using every available open space left within the city, as residential quarters in particular, or by dividing or expanding the existing buildings, after providing decent access, usually of modest dimensions within a minimum human scale. The haphazard result of this situation resulted in irregular patterns of narrow meandering alleyways within which the inhabitants were able to achieve building forms which met economic, defensive and control objectives.

Visually, those alleyways lined by building facades on both sides of the alleyways could provide a rich visual perspective, avoiding monotony and creating sudden changeand surprise with dramatic bright light, deep shade and shadow.

In addition to the visual patterning created by alleyways, this form of development also protected the inhabitants from the severe weather of the arid-zone by providing head cover and shade.

Ancient cities were also characterized visually, on the city level, by the importance of the city centre complex; the temple and palace dominated the skyline of the city, which was mostly composed of residential quarters (Figure C.24).

Moreover, on the city level, the basic elements of the urban fabric in the ancient cities of this region were based on courtyard principles, where the courtyard acts somewhat like pores in the skin.

Generally, the building materials were found locally, except for rare materials, which were necessary for construction, like wood and limestone. These were brought from the mountainous regions. However, most of the buildings in the city centre complex were constructed and decorated from strong rich materials: baked bricks, stone, marble, wood.

Apart from the functional purpose of urban design, the appearance of city elements themselves served a symbolic purpose.

Social class and income differences, directly observable in social life and in living standards, were not merely reflected in urban behaviour but also in urban design; architecture exhibited these social differences at different levels throughout the city. Various measures were utilized to indicate social and power differentials. One of these was the location of urban elements according to their importance and function in the city. The temple and the palace poised in the centre of the city dominated city life and were

surrounded by the residential quarters.

Differences in the building heights were used to differentiate between the importance of the urban elements as in the domination of the city centre complex over the rest of the city. Also the straight main roads which radiated from the city centre played a major role in emphasising the above aspect by presenting the city centre as the focal point.

The colour and building materials were other measures which have been utilized in order to differentiate between the urban elements. In Babylon, to ensure the dominance of the city centre, the temple walls were frequently adorned with multi-coloured decoration, usually made of clay cone mosaic.

In addition to the vertical pattern and sloping walls which characterised the buildings' facades as the result of structural needs, visually it gave the buildings a feeling of power and dignity.

Building materials used in the rest of the city (mostly residential buildings) were relatively cheaper and weaker materials - mud, brick, wood.

However, building materials were arranged in a way which responded efficiently to the local climatic conditions.

Those cities were commonly characterized by flat-roofed buildings.

Most of the city elements were built on the principle of fortification. The city itself was fortified but individual buildings were also strongly constructed in order to act as a second defensive wall after the city wall. Accordingly, the court-

C.5: TOWN PLANNING

The first detailed town plan for the City of Nippur
etched on clay 1500 BC

yard principle had been utilized as the main solution to provide security for individual buildings.

In this way open space on public or private levels became part of the building, which achieved a controlled open space.

[C.5] THE CITY TOWN PLANNING

City planning has been considered as one of the important factors of the establishment of cities in the Ancient civilization since it reflected the needs and demands of inhabitants and was necessary for the organization of the city and its elements on one hand and between the urban elements themselves on the other.

Cities and towns in the Ancient time shared many similarities. From those similarities the main principles of urban structuring can be indicated. Those principles were the result of the needs and demands for order and control reflecting the dominant culture and the adaptation of environment against nature.

In order to understand those principles, it is essential to know what were the causes which created them and how they became a base for town planning in that time.

For this purpose it is essential to divide this subject into the following sections:

C.5.1 FACTORS DETERMINING THE LOCATION OF THE ANCIENT CITIES WITHIN THE REGION

From the evidence remaining from the Ancient towns and cities, it seems that the Ancient people were very careful in choosing the

location of their cities and towns. The decision was important since it concerned the continuation of the city dwellers' life and their survival. Throughout time and experience, principles for this purpose had been founded.

One of those principles was the water course, which played a major role in the life of the city. In spite of its role in the life of the living being and their activities, it played an important role in defending the city by acting as a barrier surrounding it, protecting the city from any attack.

Nebuchadnezzar, one of the Sumerian kings recorded: "In order to strengthen the defences of Esagila that the evil and the wicked might not oppress Babylon, that which no king had done before me, at the outskirts of Babylon to the east I put about a great wall. Its moat I dug and its inner moat-wall with mortar and brick I raised mountain-high. About the sides of Babylon great banks of earth I heaped up. Great floods of destroying waters like the great waves of the sea I made to flow about it; with marsh I surrounded it" [Langdon, 1905, p.85].

Water was used in transportation, communication and trade. "The rivers, in particular the Euphrates, and their tributaries served throughout Mesopotamian history as the major trade routes to and from all parts of the country; they were used also for the movement of people, supplies and in later times, military contingents" [Oates, 1979, p.11].

Moreover, the traditional function of water in an arid region is for providing food and for earlier prehistoric populations, with economies based on the hunting and collecting of wild foods, the

marsh environment would have seemed a virtual paradise [Masry, 1977, pp.221-234].

According to the important role played by water in the life of the Ancient cities, as mentioned before, cities were located differently to the water bodies, as occurred in Babylon, where the Euphrates river penetrated throughout the city, dividing it into nearly two equal parts (Figure C.25). in order to protect the city from the enemy, who might use the water to enter the city.

Nebuchadnezzar (one of the Babylonian kings) adds: "In order that no pillaging robber might enter into this water sewer, with bright iron bars I closed the entrance to the river, in gratings of iron I set it and fastened it with hinges. The defences of Esagila and Babylon I strengthened and secured for my reign an enduring name" [Langdon, 1905, p.85].

Cities were also located on one bank of the river as in the case of Ur and Nippur.

Furthermore, the water body was a place for leisure and a climatic regulator, especially in such an arid zone [Olgyay, 1963, p.51], providing cool and offsetting dryness.

Another important element in choosing the location of cities was the strategy of the geographical location due to defence and control of the surrounding areas outside the city walls on one hand, and the availability of transportation, communication networks and raw materials on the other.

C.5.2 ENVIRONMENTAL CONSTRAINTS AND THE PHYSICAL MORPHOLOGY OF THE ANCIENT CITIES

As is learned from history, warfare and the struggle for independence were the main factors that played a major role in the life of the ancient cities. "The cities of Sumer and Akkad enjoyed a uniform culture and although, or because, all were dependent on the waters of the same rivers, each was politically independent and ready to fight its neighbours. Almost the oldest legible documents, other than account tablets, describe wars between the adjacent cities of Lagash and Umma for the possession of a strip of frontier territory. Metal war gear forms a prominent item in the furniture of all early graves. Even in the Uruk phase some seals were engraved with battle scenes. Of course, citizens might also have to repel onsloughts by starveling barbarians from the desert fringe who cast envious eyes on urban wealth and on the cities' lands, created by centuries of toil" [Childe, 1976, pp.107-108].

This, on top of the other natural and cultural environmental factors which determined the shape of the urban fabric, was Man's attempt to obtain protection and privacy, on both the individual and communal levels. Accordingly, defence was the dominant factor in city planning at that time and under its umbrella all the other urban elements should adopt, function and integrate in a balance with each other.

Consequently, every element in the city was built to act as a defence, whether considering individual buildings or the whole city, in order to obtain self defence on one hand and to create a strong base to support military actions on the other hand.

However, a close look at the different elements of the city in the Ancient time (city wall, city centre and residential quarters) (Figures C.31a, C.31b and C.39) shows clearly that the defensive factor has great impact on the city design, high walls, windowless external limited entrances for greater control, interlocking courtyard building units, to minimize as much as possible building exposure to outside attacks.

Factors support the idea that the courtyard building technique was created as a result of cultural environment, i.e. protection, privacy and socio-economic factors. This solution combined another measurement of protection from the natural environment, i.e. hot climate.

This fact can be seen on two levels: on the macro level, in countries such as "in Japan which does not lie in the hot climate belt, a courtyard has always been regarded as an important part of a dwelling. In Japan, it has a spiritual and philosophical basis of design" [Saini, 1971, pp.341-343]. This fact is also true as regards some European countries, where the courtyard has been used in their buildings, in spite of their position in the cold belt.

On the micro level, in Iraq, the courtyard has been distributed over all the regions, i.e. mountains, alluvial plain, marshes and desert, in spite of their wide differences in natural environment factor constraints, i.e. topography, climate and geography.

Moreover, physically there is an essential relationship between the size of the ground-plan area of the courtyard and its height, which determine the degree of its effectiveness on the

climatic conditions.

"The traditional courtyard house is held within fairly strict limits of size because only a small courtyard can be protected from the sun. If a large house is required, two or more of these units are joined rather than a larger one being created" [Dunham, 1960, p.666]. This relationship did not exist in the firstly created vast courtyards of the temple and the palace buildings in the Ancient periods. But the relationship was established later, when the dwellings in the urban areas adopted the same technique of the courtyard, but on a smaller scale, which achieved the physical relationship.

At the same time this pattern of design provided an ingenious solution to overcome the region's climatic problems, by increasing the buildings' protective capacity from the adverse environmental conditions. This factor will be discussed further in the section on courtyard buildings (Parts 4 and 5).

Relating to the above-mentioned principles, the Ancient cities shared similarities in terms of town planning and physical design, since they were under the same environmental constraints, and in order to build an idea about the content, construction and the inhabitants of these cities, Babylon city will be discussed as an example. As the capital of King Hammurabi it was laid out in about 2,000 BC in the shape of a rectangle measuring 2,500 metres by 1,500 metres, divided into two unequal halves by the River Euphrates (Figure C.25). The city itself, which was walled, covered an area of some 400 hectares, while another wall, further out, enclosed an area almost twice as large. All the buildings within the inner wall, and not just the temples and palaces, were laid out in a strictly geometrical pattern with streets that were straight and of

uniform width, and walls that intersected at right angles. In this way the distinction between public buildings and those inhabited by the ordinary people were erased: the city became composed of a series of different quarters, the outer ones being accessible to everyone and the innermost ones being reserved for the king and the priests. It was these last who were in communication with the gods, as can be seen in sculpture of the time, and for this reason it was they who had privilege and control over all things temporal. Private houses, such as the one illustrated on page 135 were miniature versions of the temples and palaces, complete with inner courtyards and stepped walls.

Historical evidence therefore indicates similarities in the distribution of elements in the Ancient cities. Those elements generally were: city wall, city centre, residential quarters.

C.5.2.1 City Wall

Defence was one of the important elements for the Ancient cities' survival as mentioned before (see Section C.2). Fortification of the city by a continuous wall with controlled gates was the efficient way to protect the city and its inhabitants from any outside attacks; since the weapons of war were solely dependent upon human capability and animals, fortification was necessary and effective. This solution was used in most of the Ancient cities such as "Uruk city, one of the Sumerian cities, where the outer wall supposedly was the work of the hero Gilgamesh himself, had a circumference of about 9.5 kilometres; it consisted of a double rampart, the inner one of which had a core 4.5 metres

thick, built of the plano-convex bricks which characterize Early Dynastic buildings (flat on one face but rounded on the other so that the courses had to be laid not flat but in herring-bone fashion). There were semi-circular towers at regular intervals and rectangular ones flanking the entrances. This wall was a source of pride to the Sumerians themselves" [Whitehouse, 1977, p.48].

The gates and approaches of those cities were found in the highest parts of the city wall and usually decorated since they were the only access to the inside and outside world. As mentioned in the case of Babylon city "the north approach to the Ishtar Gate situated between high walls is decorated with rows of lions, sixty on each side, in red, white and yellow enamelled tiles" [Saggs, 1960, pp.89-93]. A similar technique was employed inside the Ishtar Gate itself, where bulls and dragons were depicted.

C.5.2.2 City Centre

The administrative, religious institutions in the Ancient cities and their buildings complex which were shaped in a fortificated form and dominated by the palace and the temple, usually occupied the city centre. This complex acts visually as a focal point on one hand and a nucleus for the whole city activities on the other. The massive palace and temple buildings were enclosed around groups of courtyards, separated truly and symbolically from the rest of the city by the surrounding windowless walls to achieve the maximum protection and privacy to the inhabitants of the enclosure.

The inhabitants of this part of the city, usually of high social status, were attached to certain occupations: priests, temple

administrators and scribes were respected members of the community and among the wealthiest of the citizens (excluding royalty). The other social elite were found in the palace with the king, the palace retinue and the military establishment.

However, not only administrative and religious activities were practised in the palace and the temple, but some industry production took place in these institutions [Whitehouse, 1977, p.80].

Generally, the city centre quarter usually occupied either the centre of the city, i.e. surrounded by houses from all directions, as in the case of Ur (Figure C.26) or the city centre quarter was located on the edge of the city forming part of the city wall, such as in Babylon and Khorsabad (Figure C.31).

(a) The Palace

In spite of the differences in styles, the palaces in the Ancient cities shared mostly the same activities. They were mainly both the ruler's residence and the centre of administrative activities. However, the composition of the palace elements were clearly reflected in its plan; the design carefully separating the different activities and giving full protection and privacy, as occurred in the palace of Mari (Figure C.25).

The palace comprised units of rooms ranged around an open court. This arrangement allowed for air, light and communication, with security and privacy as prime considerations. This is apparent in the way in which the two doors giving admittance from the small forecourt inside the gateway through a corridor to the largest of the central courtyards

are not in line: thus protection and privacy were achieved. The only place which allowed for visitors and the public to enter the palace was the vast public court which was adorned with a painting and surrounded by the great fortress-palace from the north, and from the opposite, faced by a room approached by semi-circular steps with a dais at its south end, clearly for a throne. This appears to be an early example of an audience-hall. While the door close to the north-west of the great court led to the king's apartments the administrative offices were grouped round a second large courtyard. Directly west of this lay the administrative quarter or secretariat, where there were also groups of rooms centred round a small rectangular court. Immediately to the north, between the secretariat and the royal apartments, were two rooms containing mud-brick benches and a scattering of tablets - this was the school. To the south of the secretariat quarters were service elements including some of the kitchens and store rooms. These occupied over one-third of the total area of the palace, its southern portion.

North of the secretariat were the royal apartments, shut off from the public sector by long passages, the rooms grouped around a central almost square courtyard. In this part of the palace the chief interest lies in the mural painting: the court was embellished with a frieze painted in cobalt blue. On the south side of this court was located the chapel or shrine which consisted of three rooms, with a throne room beyond. In line with the doorway into the court was the podium, or throne-base, with holes for two posts to

support a canopy over it. Nearby was found the famous statue of a goddess with liquid flowing from a vase in her hands. The throne-base had eight panels on top painted to imitate marble, surrounded by a long multiple-spiral band. Off the east end of the inner room opened a small chamber described as the king's private chapel [Burney, 1977, pp.94-95].

(b) The Temple

Before speaking about the temple and its elements at the Ancient time, it is essential to know what religion meant for the people and how the people practised their religious activities.

Religion of Ancient Mesopotamia was not simply polytheistic or monotheistic, but the regional and chronological complexities of religions' development give it the complex form of many overlapping and interlocking layers.

There were an enormous number of gods and goddesses recognized throughout the Sumerian country but only a few were universally rated as major divinities. However, each city had its own patron god; the city, its land, buildings and people were regarded as the property of the deity. In Pantheon there were three important gods: they were the sky-god Anu (associated with Uruk), the air-god Enlil (Nippur) and the water-god Enki (Eridu); the mother-goddess Ninhursag was the chief female deity, other important gods were the moon-god Nanna and his son Uiu, the sun-god, and daughter Inanna, and the goddess of love (Ishtar).

The Sumerians thought of the universe as a disc (the earth) surmounted by a vault (heaven), the whole structure surrounded by the ocean. Moreover, they believed also in an underworld, sometimes conceived as a huge space beneath the earth, corresponding to the vault of heaven above and approached by one or more gateways situated in the city of Uruk. Furthermore, Sumerians believed in life after death. This encouraged people to bury their dead in a pit underneath the house created for this purpose, together with the body's personal goods.

The focal point of ritual in Mesopotamian religion was the image of the god itself; the images were always in human form, with very few exceptions. The home of the image was of course the temple; it lived in a recessed niche in the main chamber, visible from the courtyard through the doorways of one or more ante-rooms. The image served as the focus for ritual activities within the temple; in addition it was carried in processions and ceremonies outside the sanctuary, which served to demonstrate the connection between the city and its god.

As a relation between people and their gods, the individual was the servant of the god in the temple to which he belonged and this relationship was crucial in the economic organization of the early Sumerian city state.

The development of temple architecture was characterised by two main features: the need to raise the temple physically and symbolically above the city to which it belonged and the desire to relieve the dull flat mono-

chrome effect which is so characteristic of mud-brick architecture. The first led initially to the erection of platforms on which the temples were constructed and ultimately to the vast ziggurats of the period of the Third Dynasty of Ur and later.

The second need led on the one hand to the wide-spread use of niches, recesses and buttresses which relieved the 'flat' impression and, on the other, to the use of coloured decoration usually in red, black and white; this took a number of forms, but one of the most characteristic was in the use of clay cone mosaic.

However, "the erection of these monumental temples and artificial mountains, the manufacture of the bricks and pottery goblets, the importation of pinewood (from Syria or the Iranian mountains) and of lapis lazuli, silver, lead and copper to adorn the shrine presupposes a substantial labour force - a large population" [Childe, 1976, p.100].

"The temple was the god's earthly residence and in later times accommodated his household - not only his personal attendants who performed what we should term priestly or cult services, but his secretaries (scribes), stewards and many servants of lesser status who administered his estates and were engaged in commercial or manufacturing activities.

In theory the Sumerian city was the actual property of its main deity, to whom it was assigned on the day of creation. This total identification of the god with the city was an underlying tenet of Sumerian society; the temple of

the city-god was the city's central feature. Often there were smaller temples or shrines dedicated to the wife or children of the chief deity" [Oates, 1979, p.25].

The temple also contained workshops, storehouses, and shops where various categories of specialised craftsmen lived and worked [Benevolo, 1980, p.21].

(c) Commercial Institutions

Initially the vast bulk of agricultural and other produce passed through the temple's magazines. As well as the products of Sumer itself, the goods from foreign trade - gold, silver, copper, lead, lapis lazuli, wood and so on - flowed straight into the temple stores. The merchants of Early Dynastic times were concerned exclusively with import and export; the distribution of goods within the community was organized by the temple (with little scope for exchange between individuals on a barter basis). So the temple acted as the economic centre for the concentration and redistribution of goods.

The temple of Esgila played a major part in the control of the national economy. The agents of the temple were responsible for a good deal of the external trade of Babylonia [Saggs, 1960, p.166].

The complexity of the temple organization was made greater by the fact that, though they had systems of weights and measures, to begin with they lacked money or indeed any constant exchange value, so that accounts had to be balanced by the use of a series of approximate equations between the utility values of different commodities, e.g. one gur of barley was considered equivalent to one gin of silver; it was also the rent for one gan of land (the

precise values of these measures is unimportant for this purpose) [Whitehouse, 1977, p.66].

Moreover, documents suggest that the most important exports were textiles, which were produced in great quantities in the temple and royal workshops [Whitehouse, 1977, p.80].

(d) Residential Quarters

The biggest elements occupying most of the city land were the residential quarters, which were situated around the city centre and bounded by the city walls. It consisted of dwellings forming a series of clustered (or interlocking) courtyard buildings. These dwellings framed a network of narrow meandering alleyways, which offered to the dwellings the only access to the outside world, both the courtyard dwellings and the meandering alleyways moulding the patterns and the characteristics of these quarters.

This urban form was evolved over a long period of time in order to reflect the inhabitants' needs and demands. These requirements developed from a hierarchy of prevailing factors and functions of adaptation towards the natural and cultural environments. Functional requirements varied over time and space and evolved as a result of experience and continuous attempts at development.

These quarters were occupied mainly by the commercial or working people in a mixed manner, since their belief was that they acted as servants of the god (see Section C.5b). The population varied in their occupation, income and social status.

"Artisans, artist-craftsmen, merchants and civil service occupied many of the mud-brick houses that lined the narrow alley-

ways and the crooked thoroughfares, crowded organic growths full of energy and devoid of plan" [Hawkes, 1973, p.64].

In addition to what Diakanoff had suggested (see Section C.2.5) documents from Shurppak, Abad and Lagash of about 2,500-2,400 BC recorded sales of property by private individuals. "Clearly some private enterprise existed by this stage and many scholars, including Kramer, accept the Diakanoff view, that in Sumerian society land was predominantly privately owned" [Whitehouse, 1977, p.54].

Moreover, historical evidence indicated that the allotment of land to the citizens distributed by the temple organization were not at all equal [Childe, 1976, p.102] and the accumulation of private wealth was possible. However, history, in accordance with evidence available to hand, does not inform us either how the land was divided, or about any building regulations except what we have discussed from Hammurabi's code (see Section C.2.7).

According to the above facts, the researcher is of the opinion that the land in the residential quarters was divided in organic form into irregular sectors and plots, both in shape and size, and this resulted mainly from the lack of legal land division regulations, a mixture of social status occupiers, varying economic conditions and the shortage of land within the city walls. Thus the divisions, sales of lands and properties were dependent upon the needs and demands of the inhabitants and the landlord.

(i) Courtyard Dwellings

Therefore, to erect a house, and in order to achieve maximum protection as it was the main element of Man's need and demand at this time (see Section C.2), the dwelling

would be erected to act as a second defensive wall after the city wall, in a fortification form. Furthermore, the Babylonian had another two objects in view "He wanted privacy, particularly in respect of his women folk and he wanted a refuge from the burning Babylonian sun" [Saggs,1960, p.168].

Thus the inhabitants tried to copy the main traditional and evolved form available for them (courtyard buildings), the shape created in building the complex of both the temple and the palace, "the first elements erected in the city" [Whittick, 1974, p.43]. They were constructed in a way to meet the same basic principles and requirements (see Section C.5), aided by the same skills and prevailing materials and technology as possible. Due to this, central courtyard dwellings were created as a solution to achieve the above main goal. This led to inwardly directed dwelling units. "At the same time privacy and protection from the sun had been achieved by having the outer walls of the house almost blank and by arranging for the rooms to open only onto a central courtyard" [Saggs,1960, p.168].

In this respect, the concept of the courtyard house can be defined as a building situated on a given piece of land framed by a continuous perimeter wall of considerable mass, acting as a defensive wall, which achieves the internal courtyard, and also provides the skeleton upon which the honeycomb of rooms is enclosed where a part of the occupants' activities take place. These rooms look inward over the enclosed individual private open space (courtyard) which, having vertical access to the atmosphere, provides an efficient

source of sunlight and fresh air as well as a degree of protection and privacy.

As indicated in Section C.2, this type of dwelling originated during the Sorgonid period as a response to support military action.

The private houses were of assorted sizes but of generally similar plan. A few were small, but most had an upper floor and some may even have had three storeys. The majority of larger dwellings had fronts built of burnt-brick for the first storey with mud-brick above.

The street door (occasionally arched) led through an ante-room into a central open courtyard. The ground floor rooms, guest chamber at the back, kitchen, servants' sleeping room and other staff accommodation opened onto the court. A stairway with lavatory below led to a wooden balcony supported on four corner posts, and this gave access to the family rooms. The house roof was wide enough to cover the balcony, and sloped inwards with gutters designed to shoot rainwater into the court below, whence it was drained into a sump. Attached to the back of the house were the family chapel and burial vault [Hawkes, 1977, p.151].

However, whatever the shape and size of the given plot, the house started its creation from a regular central courtyard (mainly square), leaving at its periphery irregular spaces (in size and form), which resulted from the creation of a regular central open space and an irregular form of the whole plot.

Moreover, this type of dwelling is physically self-reliant, i.e. sunlight, fresh air and inhabitants' activities are directed towards the inside courtyard, which enables it to fit in any space and cling together with other dwellings without missing any of the physical functions or creating any physical problems with neighbouring dwellings of the same type.

(ii) Layout and Road Patterns

Grouping the courtyard houses into units to form the urban fabric after providing suitable access, this grouped siting forms the pedestrian and transportation network patterns.

In my opinion, the first stage of the land and property sub-division would be started on the periphery of the district which was bounded by the main wide roads. The second stage of the sub-division came after almost no space was left from the first stage; this stage took place on both sides of the thoroughfares which provided from the main roads The third stage was to divide what had been left from the land behind the dwellings bounded by the main roads and the thoroughfares, after providing adequate access cul-de-sacs as terminals.

Generally, main roads, thoroughfares and cul-de-sacs were following in their creation what already existed on the site by providing corridors between the buildings. Furthermore, the scale and the hierarchy of these alleyways had been determined as a result of the traffic capacity and the dimensions of plots. (Figure C.43).

"Though these streets almost always joined one another at right angles, they did not form a continuous grid-iron plan. These streets were narrow - only wide enough to allow for passage of a man and a donkey" [Whittick, 1974, p.45] while "the main streets were wide enough to accommodate a wheeled vehicle" [Whitehouse, 1977, p.53]. Nevertheless, all these roads mainly formed narrow meandering alleyway network patterns.

Consequently, the whole arrangement of the space system (covered or uncovered) in these parts of the city, i.e. residential quarters, were started from regular spaces of individual central courtyards linked to irregular spaces of the house and road pattern network, then the whole residential quarters were linked to the main space arrangement system of the city which was almost always a regular, grid-iron plan.

Lastly, what I have presented in this section on the Ancient civilization draws me to an opinion which is contrary to that of Whittick, Childe and others, who reported that "there was no overall plan for the city" [Whittick, 1974, p.45].

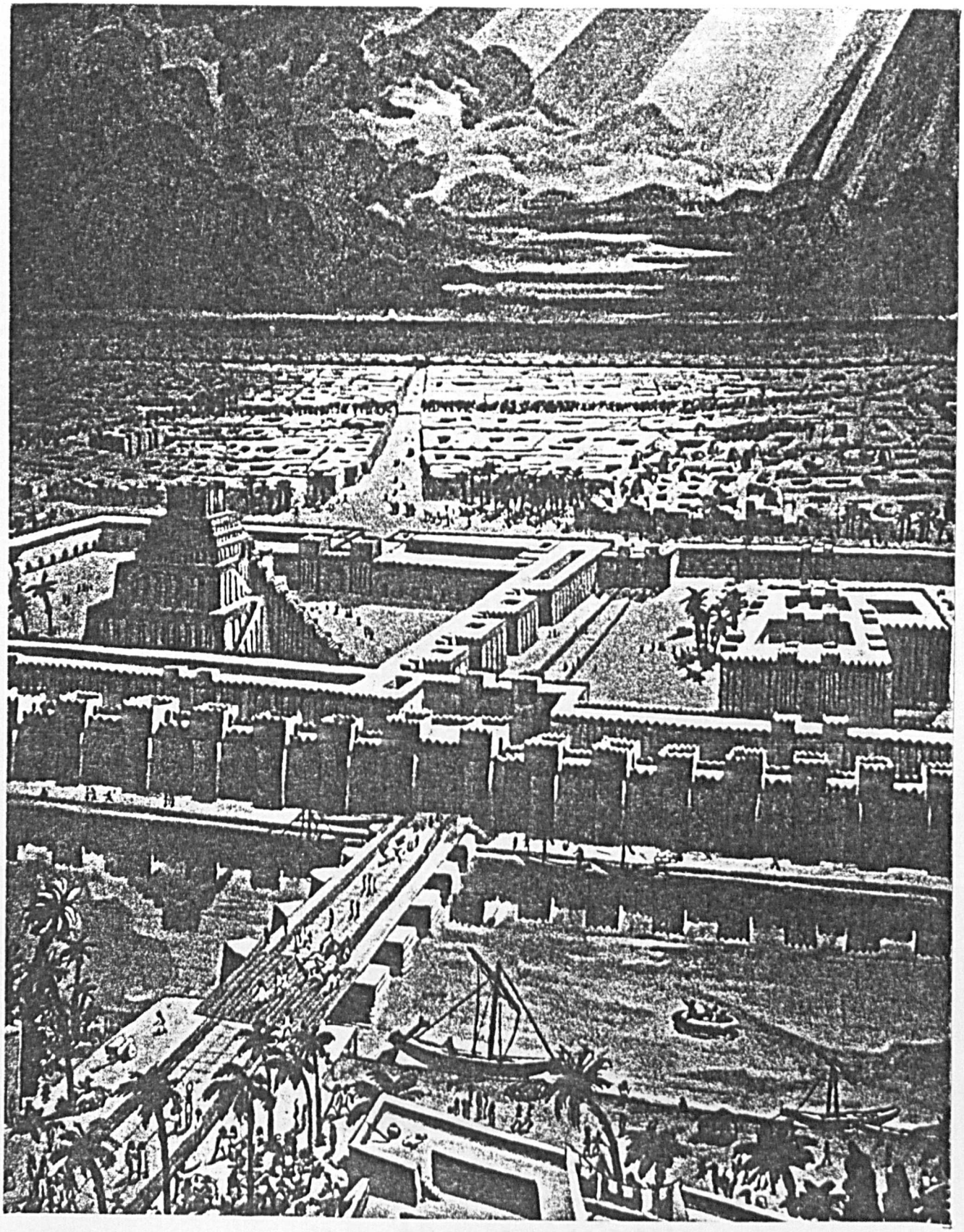


FIGURE: C.24 a.

The City of Babylon.

Ministry of Information, Iraq, 1977, p.32

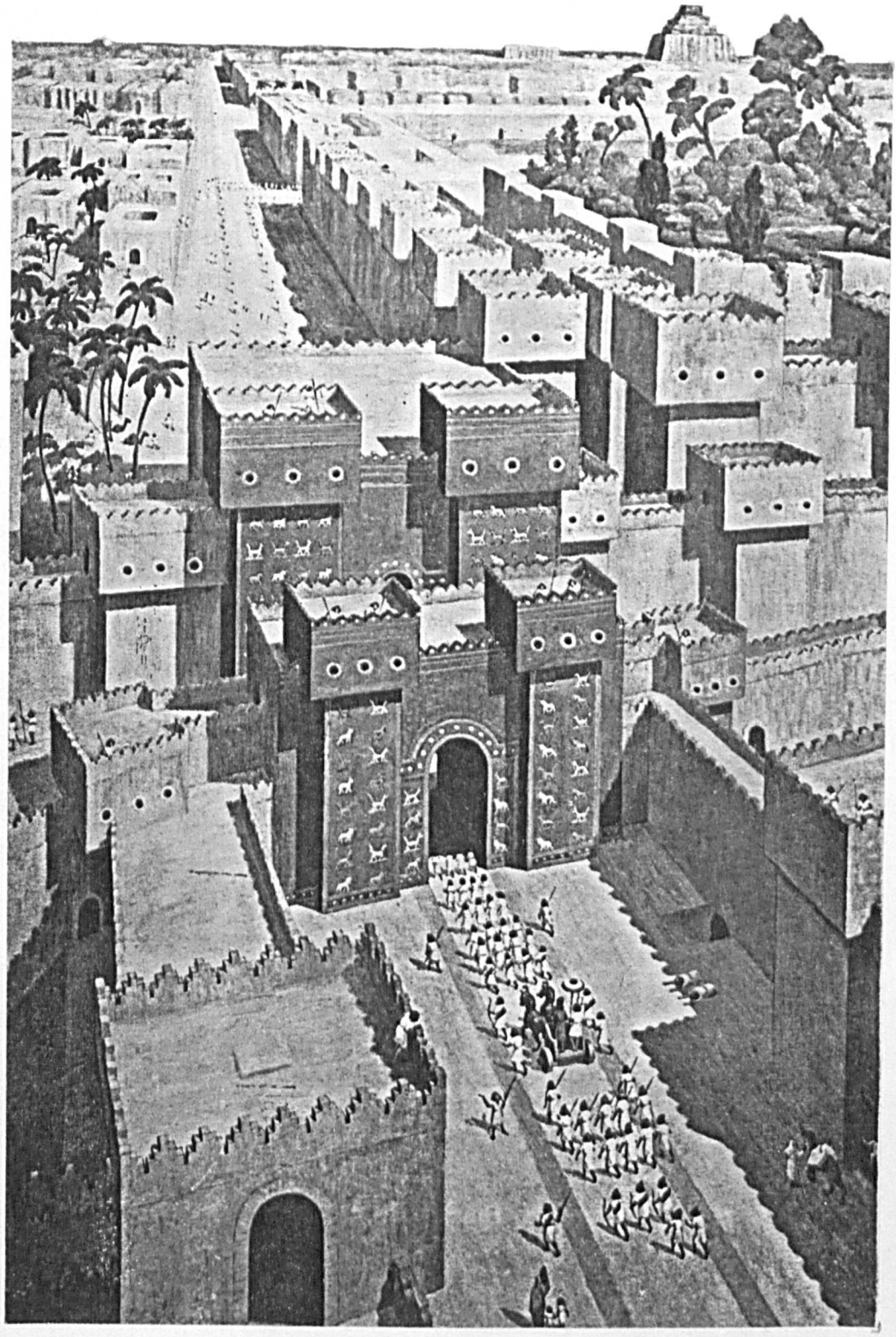


FIGURE: C.24b.
Reconstruction of the Processional Way
and the Ishtar Gate in Babylon.

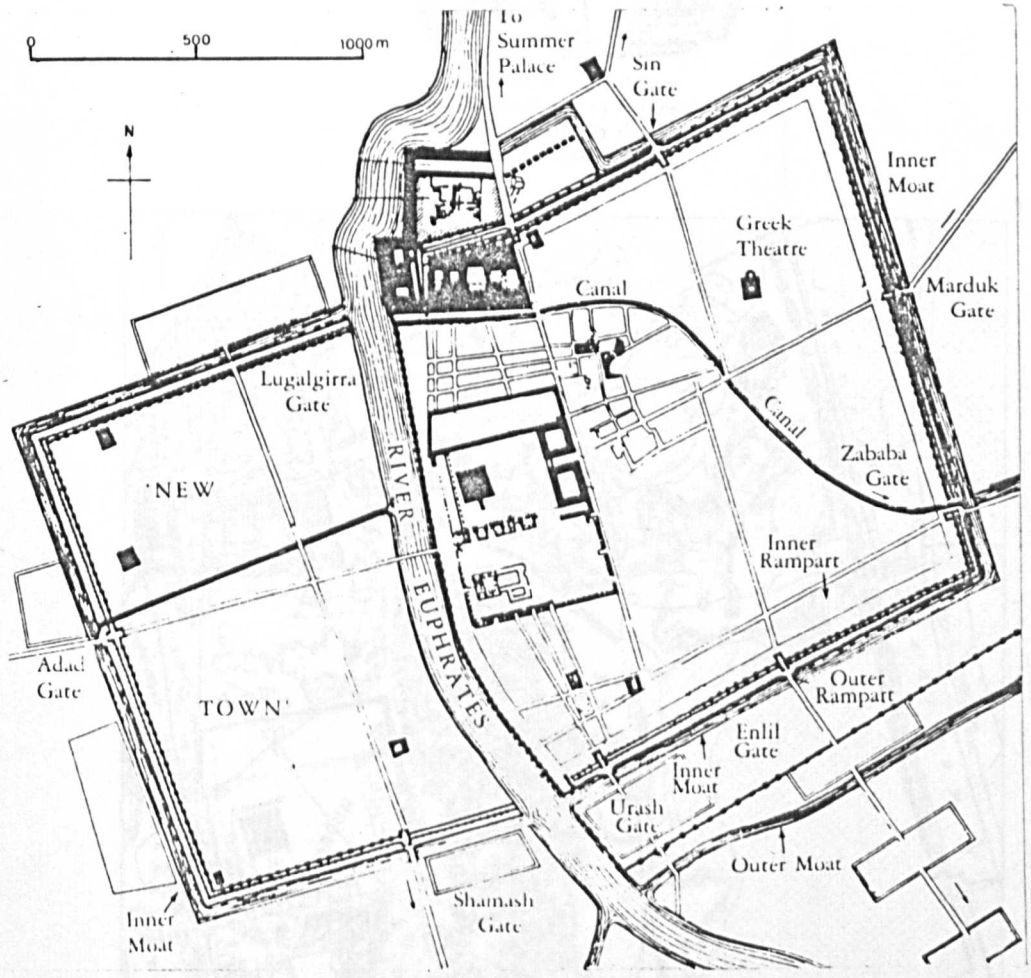


FIGURE: C.25 a.

Layout of the City of Babylon.

Benevolo, 1980, p.32

Babylon. The stele of Mardukapaliddina (714 BC), records the granting of land by the Assyrian kings to a Babylonian vassal.

FIGURE: C.25b.

Babylon: Plan of Excavations in the Eastern Part of the City.

Benevolo, 1980, p.33

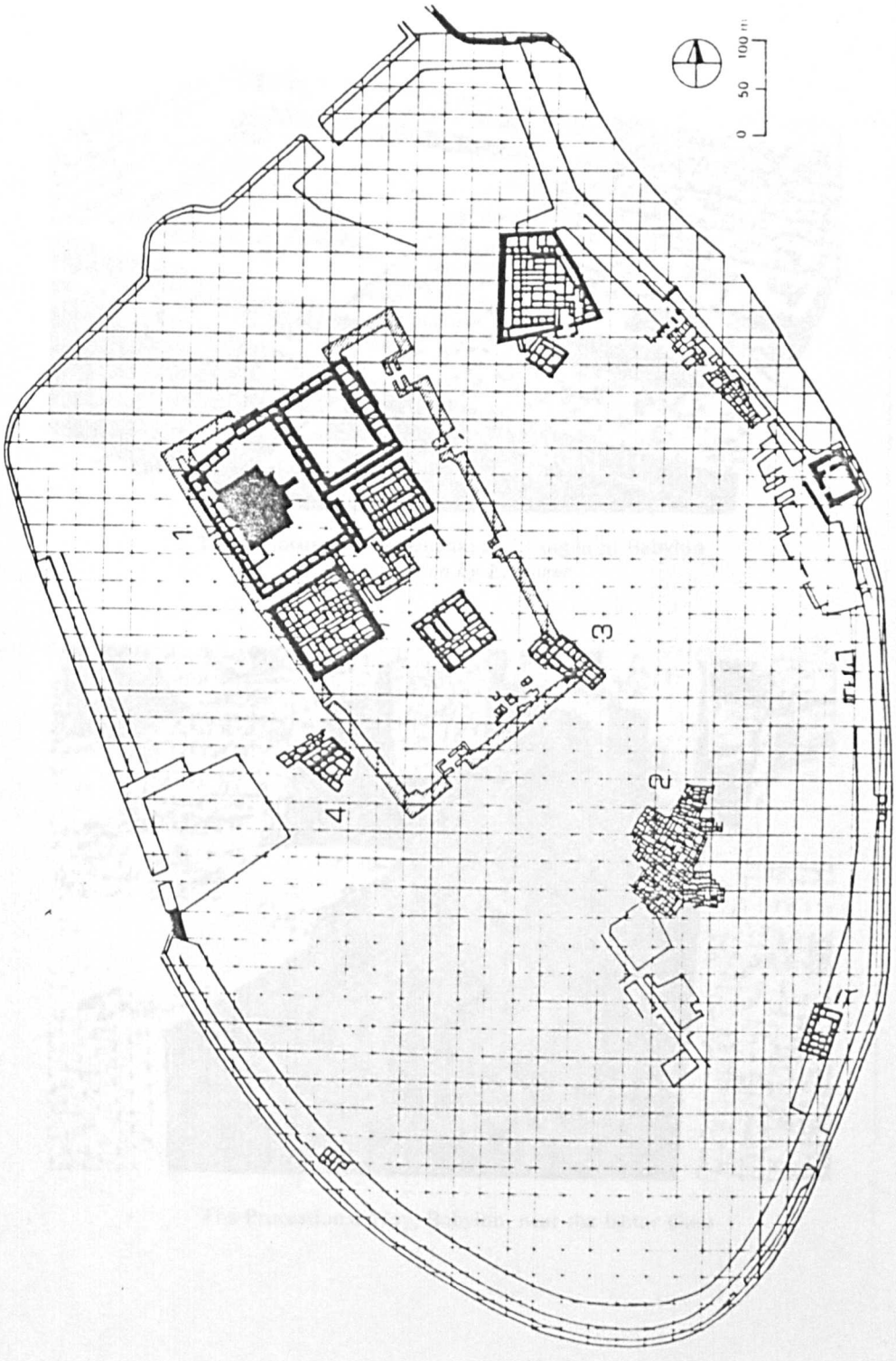
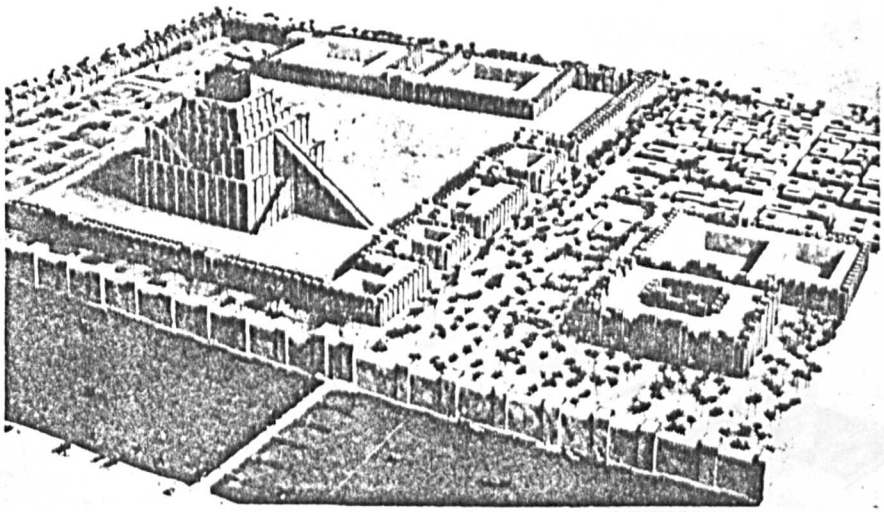
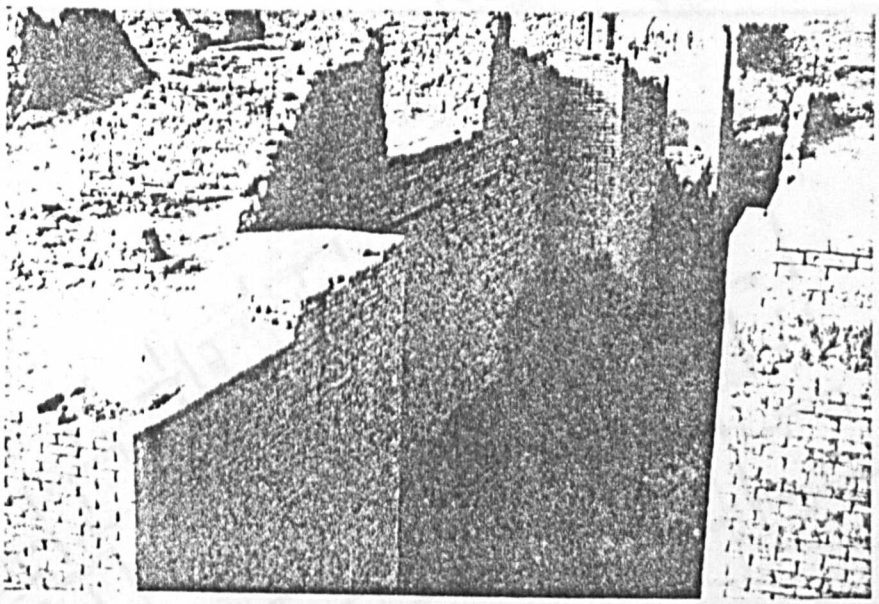


FIGURE: C.26.
Layout of the City of Ur: 1900 BC.

Benevolo, 1980, p.22



The enclosure of Etemenanki and Esagila in Babylon
A reconstruction by E. Unger

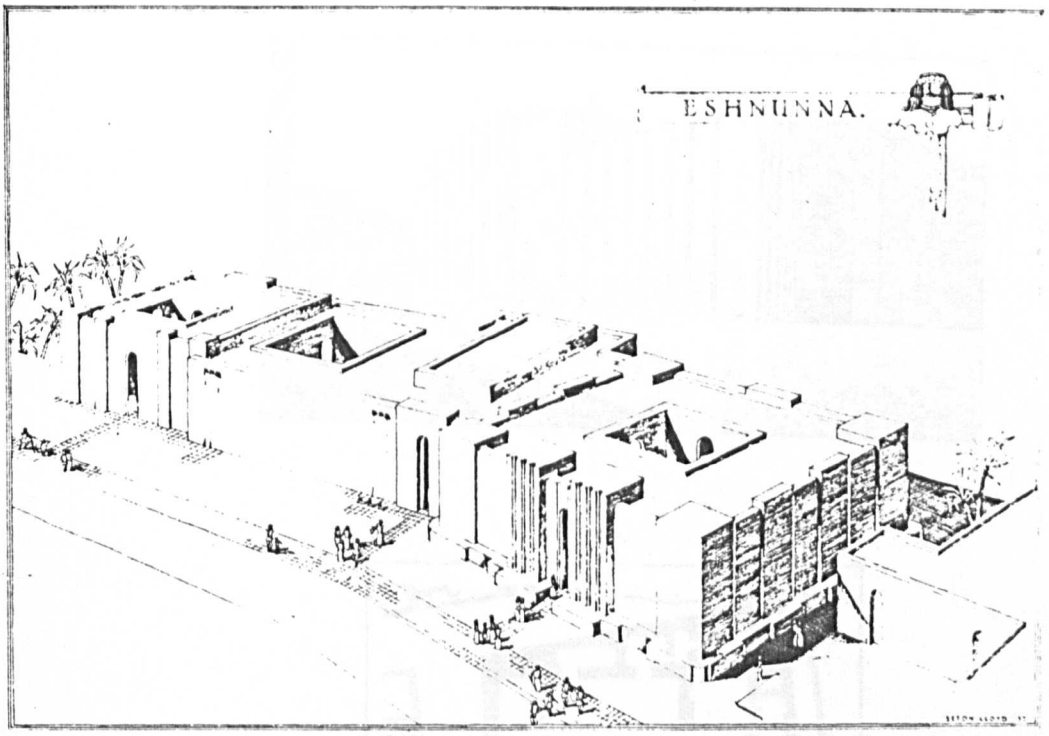


The Processional Way, Babylon, near the Ishtar Gate

FIGURE: C.27.

Aerial View of the City of Babylon.

Saggs, 1965, p.160



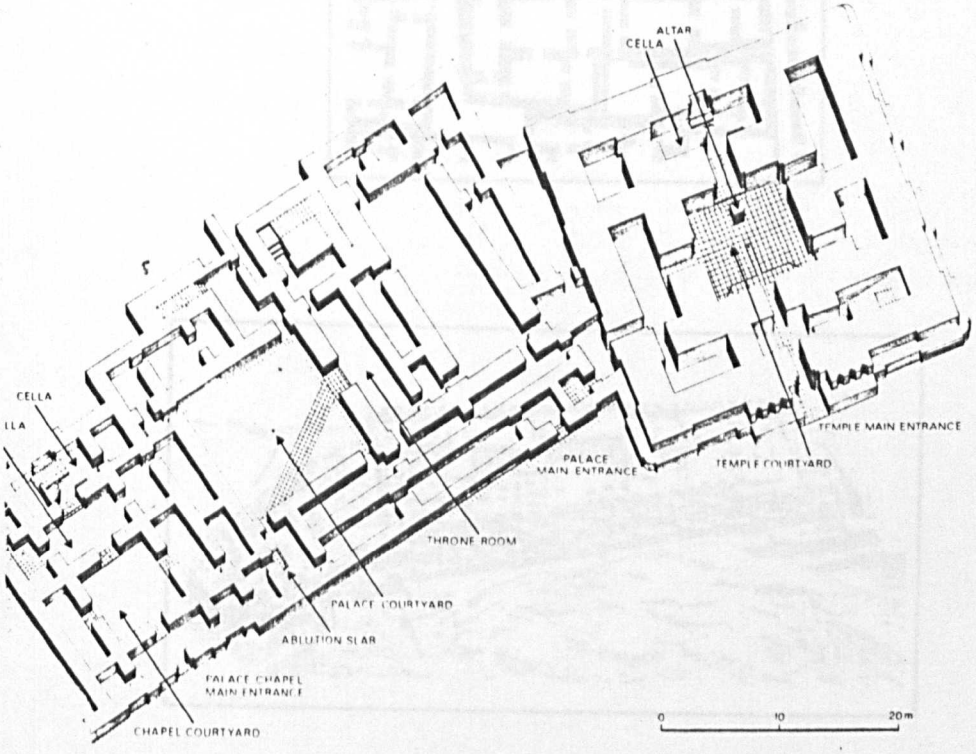
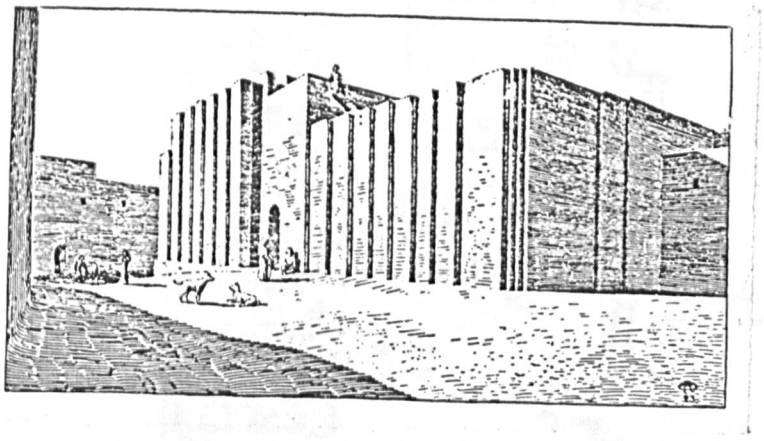
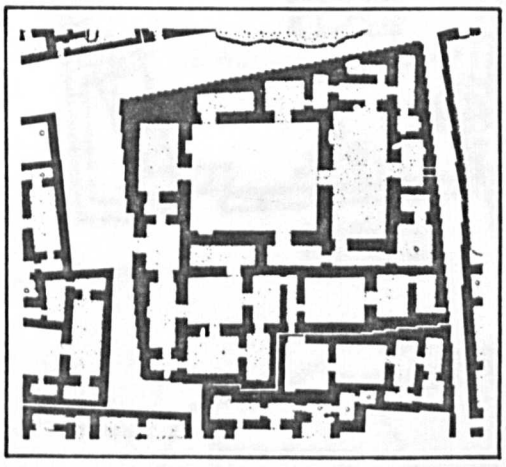


FIGURE: C.28.

Plan and Reconstruction of the Palace of the Governors and the Temple of Shu-Sin at Eshnunna.

Oates, 1979, p.50-51





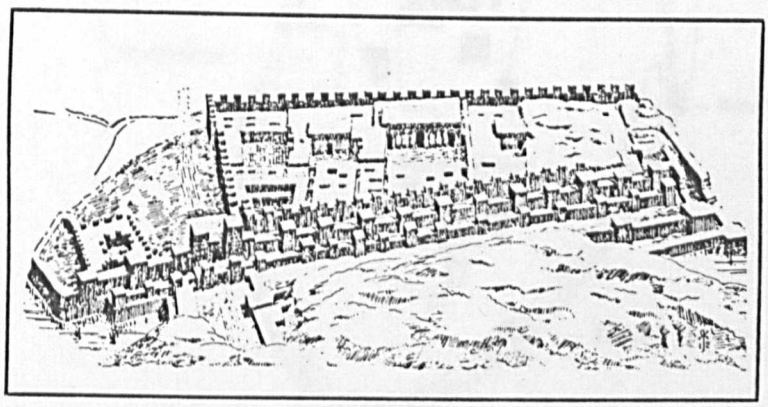
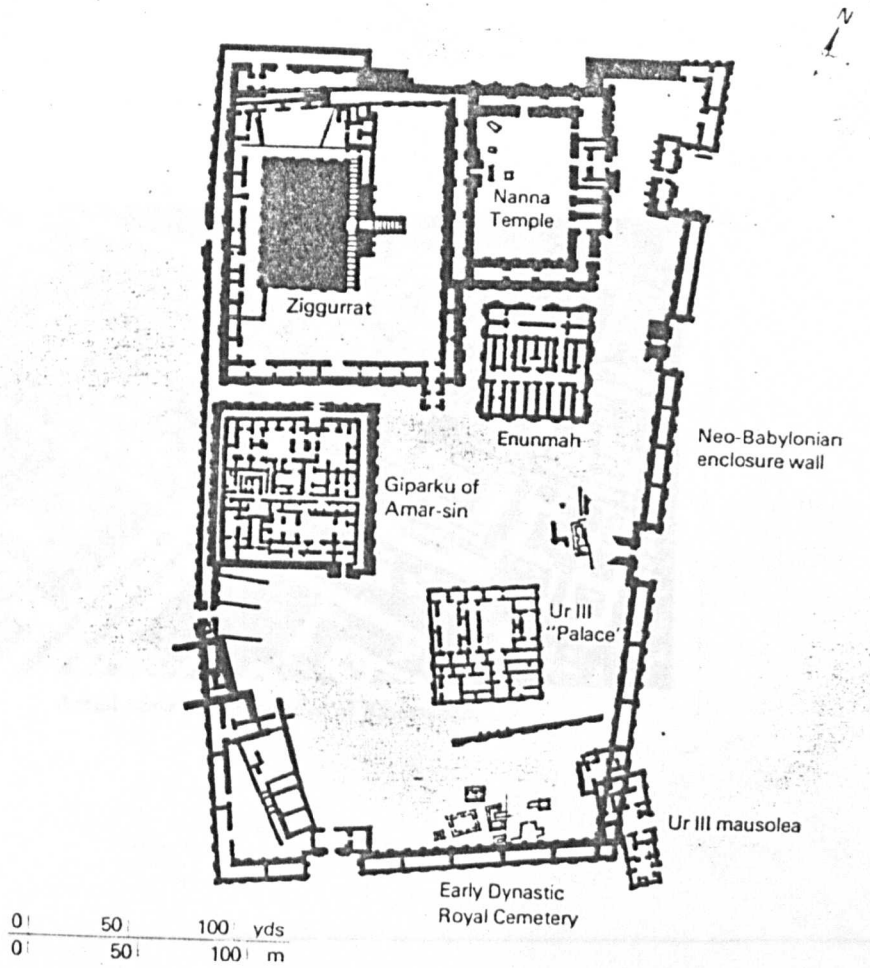


FIGURE: C.29.

A Babylonian House.

Benevolo, 1980, p.32



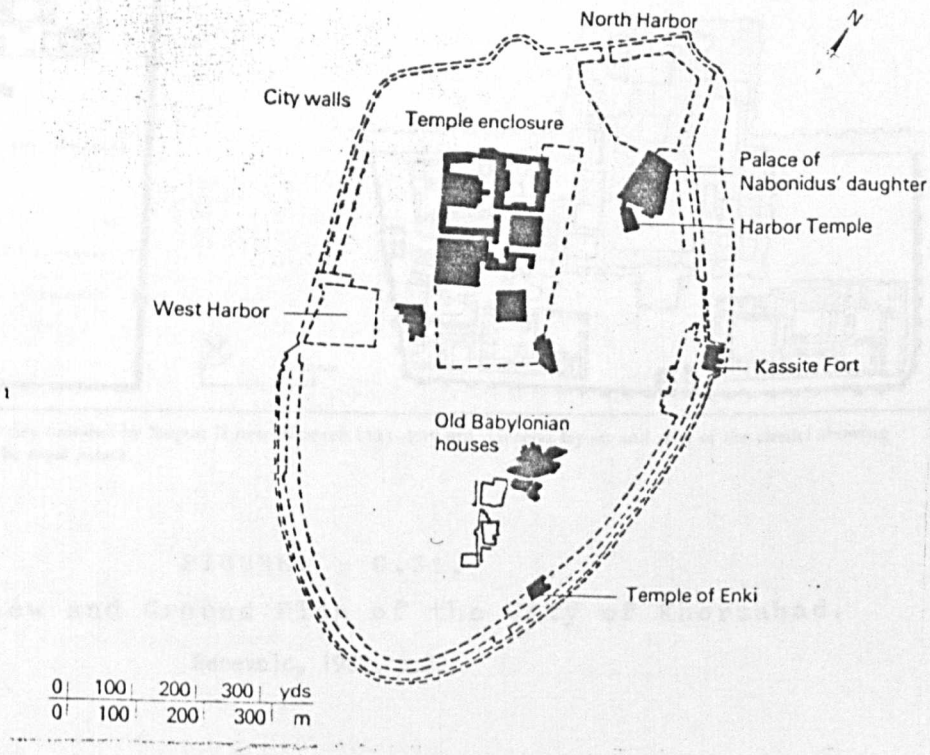
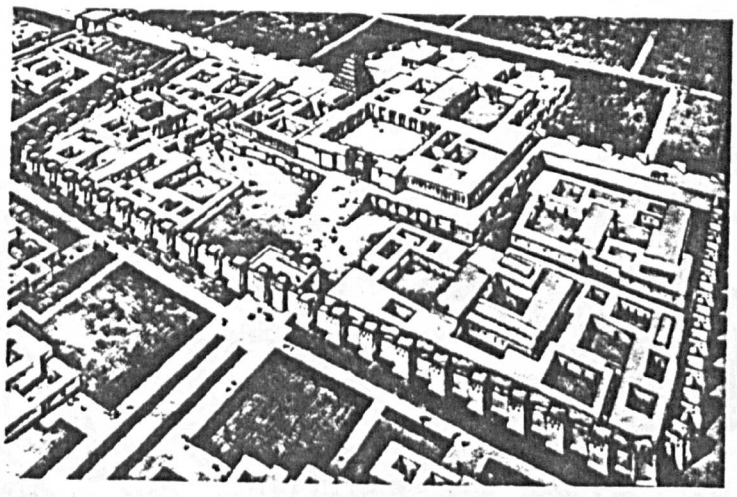


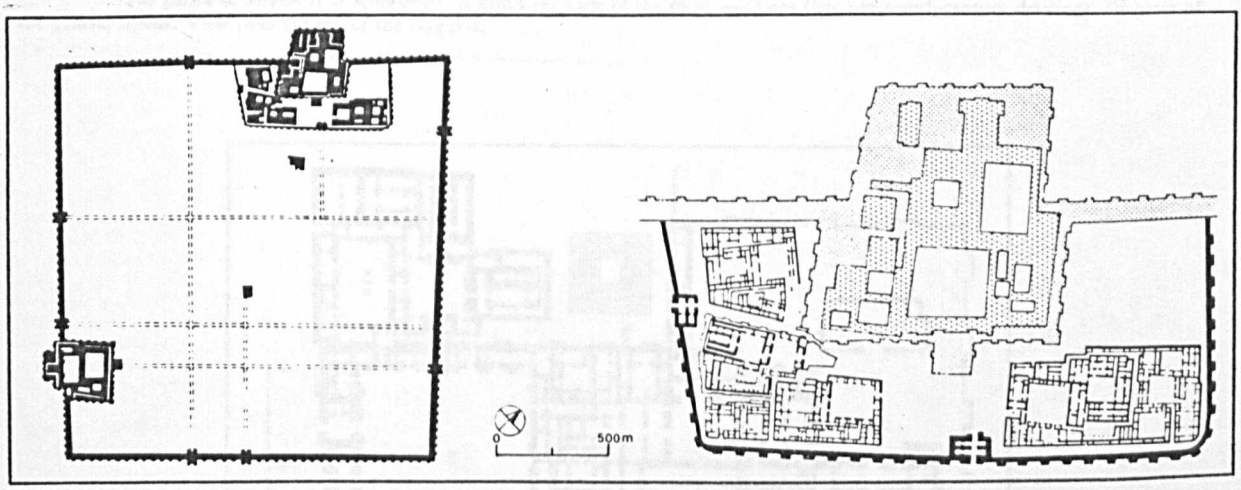
FIGURE: C.30.

The City of Ur.

Postgate, 1977, p.47



Aerial view of the citadel of Khorsabad.

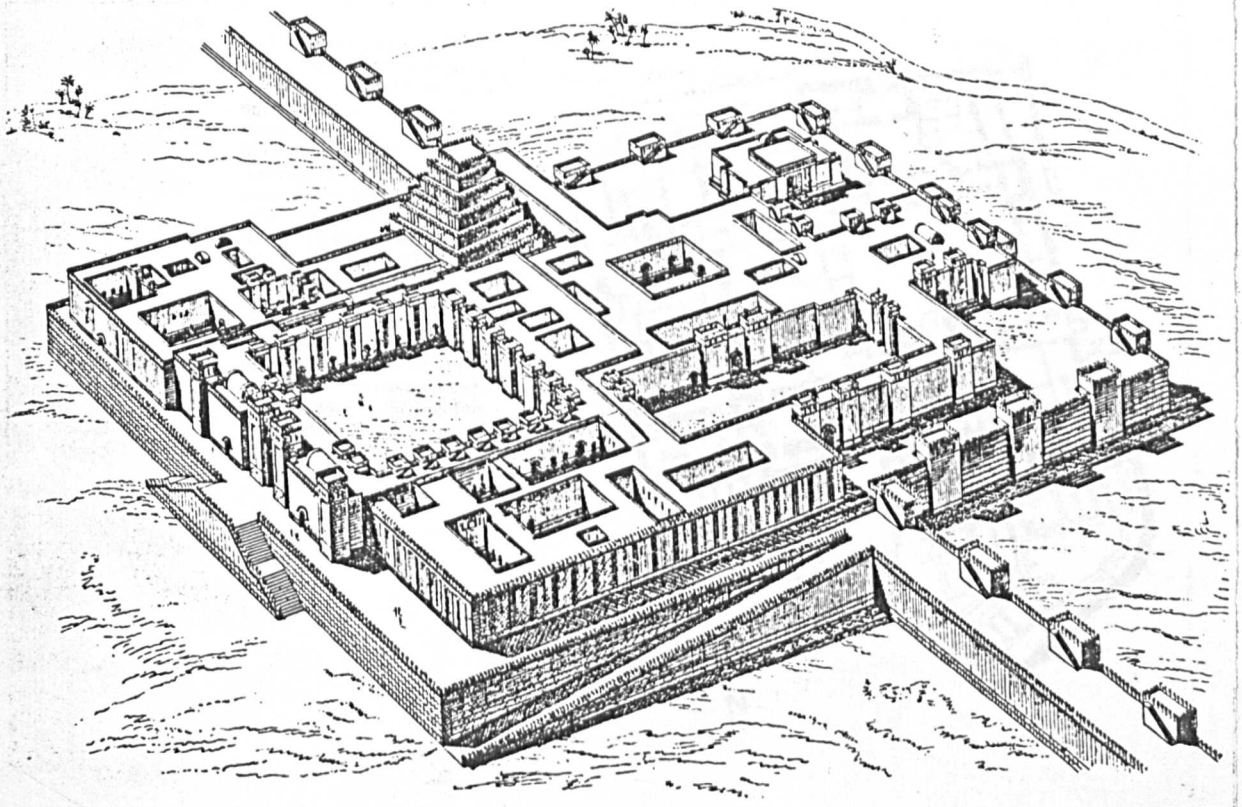


Khorsabad, the new city founded by Sargon II near Nineveh (721–705 BC). General layout and plan of the citadel showing the houses of the nobility round the royal palace.

FIGURE: C.31.

Aerial View and Ground Plan of the City of Khorsabad.

Benevolo, 1980, p.29



The palace of Sargon II at Khorsabad. A bird's eye view of the royal buildings (late nineteenth-century drawing). Diagram of the general layout. View from the top of the ziggurat.

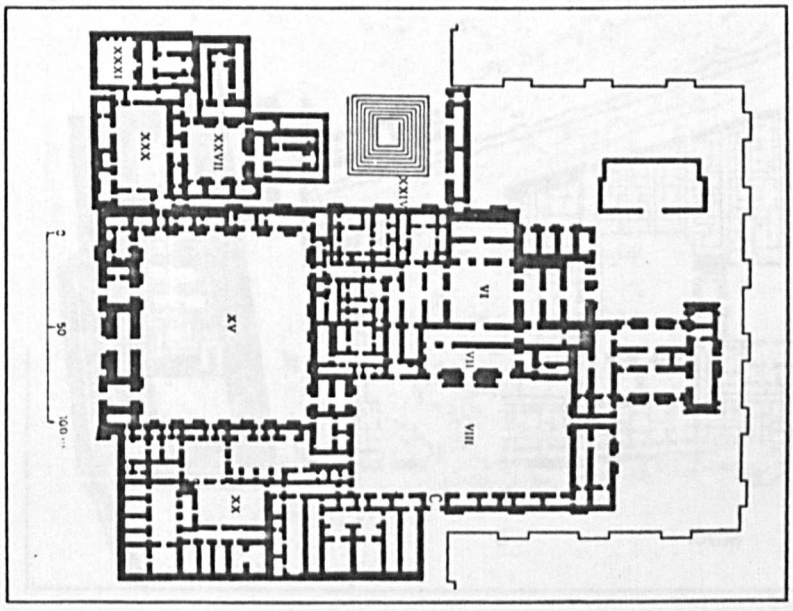
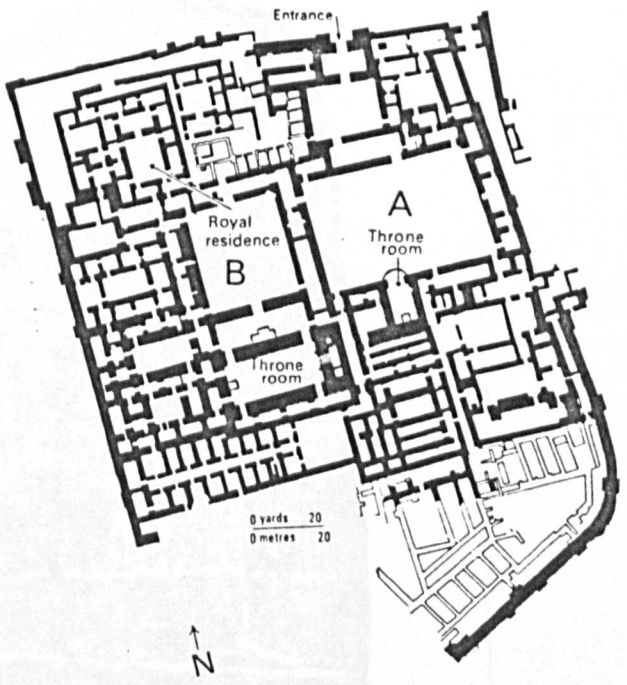


FIGURE: C.32.

The Palace of Sargon II.

Benevolo, 1980, p.30 -31

The great palace of Zimri-Lim at Mari contained more than 260 rooms and courts. A double throne-room suite is situated to the south of the inner courtyard (B) which was panelled with paintings some 2 m in height, most of which appear to date from the time of Shamshi-Adad I. The vast and complex plan owes its final form to Zimri-Lim, but wall paintings in the earliest throne room, south of courtyard A, display close parallels with stelae of Gudea and Ur-Nammu and date this earliest phase of the building to the late 3rd millennium. After Parrot; and Hawkes



The main or Southern Palace at Babylon lies between the Processional Way to the east, from which it was entered, and the thickly walled citadel to the west. Part of the inner city wall can be seen to the north of the palace adjoining the famous Ishtar Gate (*a*). Nebuchadrezzar's throne room (*c*) is situated on the southern side of the third or central courtyard, approached through a monumental gateway to the east. To the east of the Processional Way lies *E-mah*, the temple dedicated to Ninmah (*b*). After Koldewey.

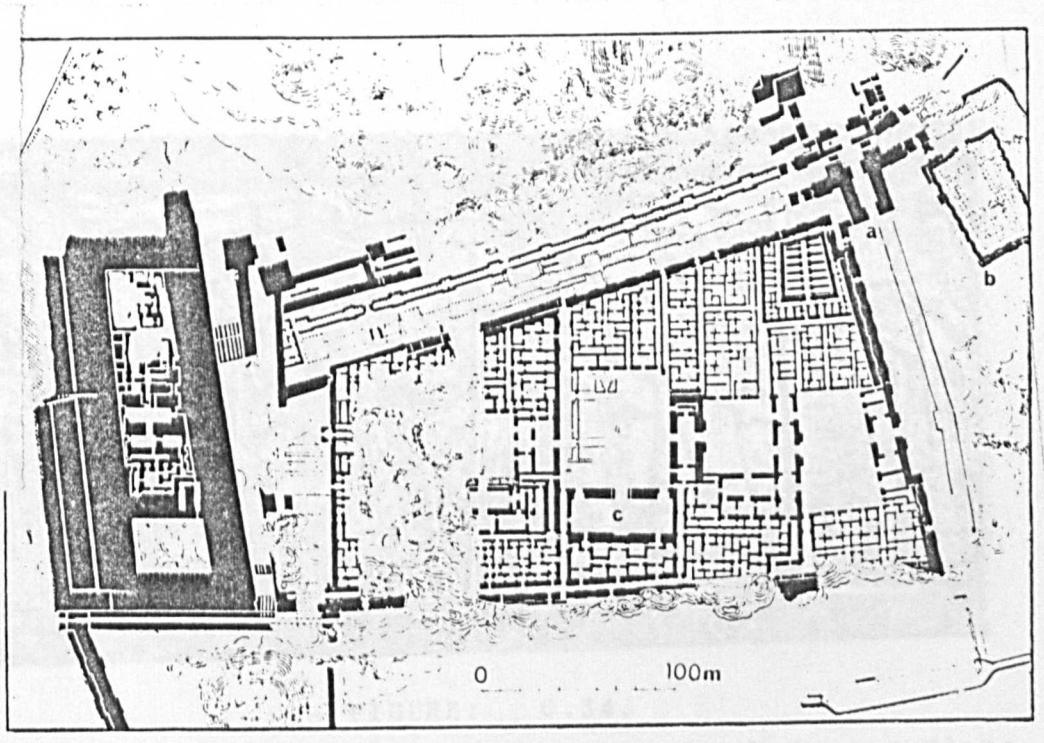


FIGURE: C.33.

Palaces at Mari and Southern Babylon.

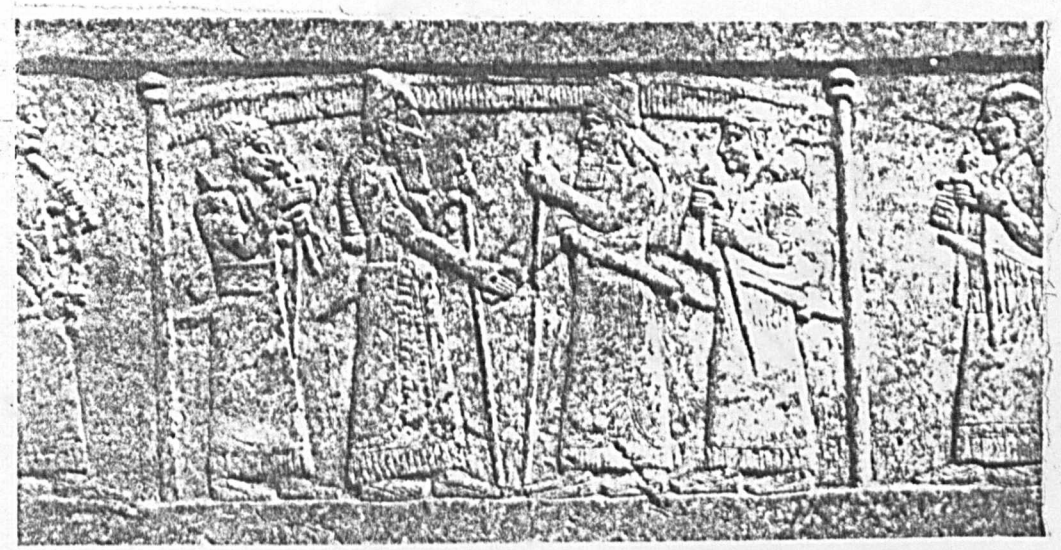
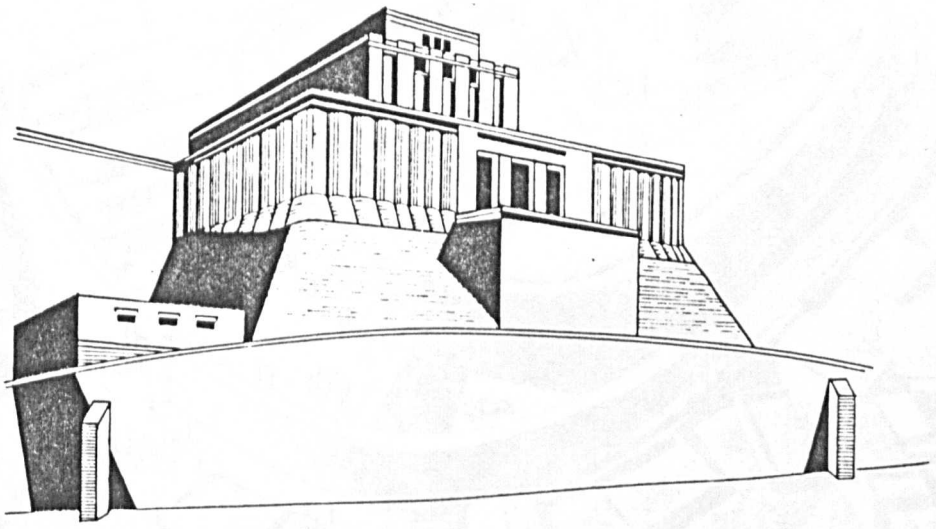


FIGURE: C.34.

Ceremonial Meeting of the Assyrian and Babylonian Kings.

Iraq Museum



One of the earliest in a series of temples built successively on the one site at Eridu.

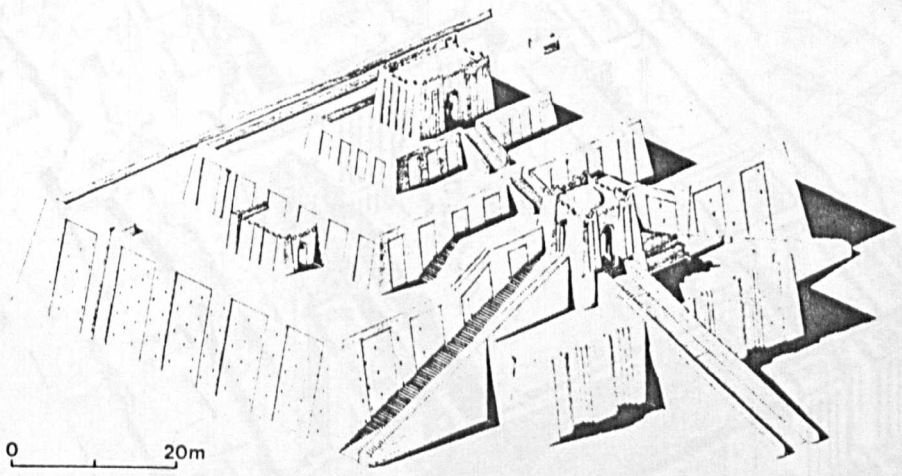
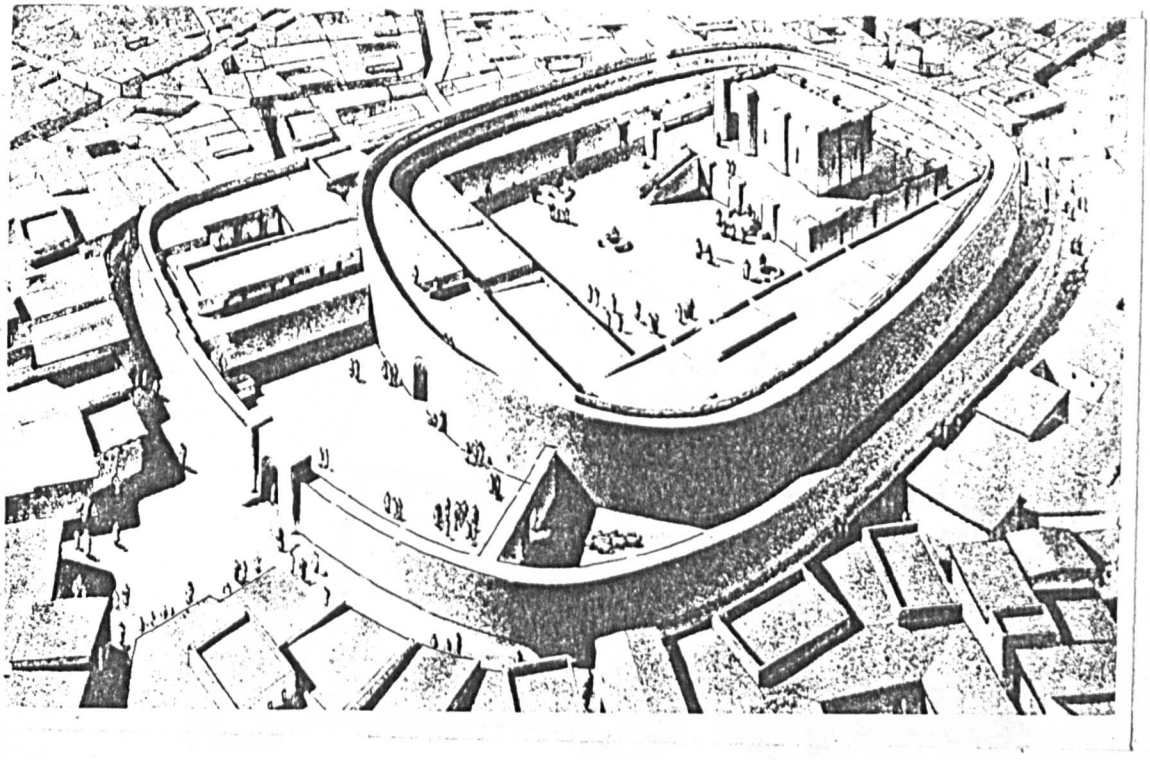


FIGURE: C.35a.

Forms of Temples.

Whitehouse, 1977, p.61



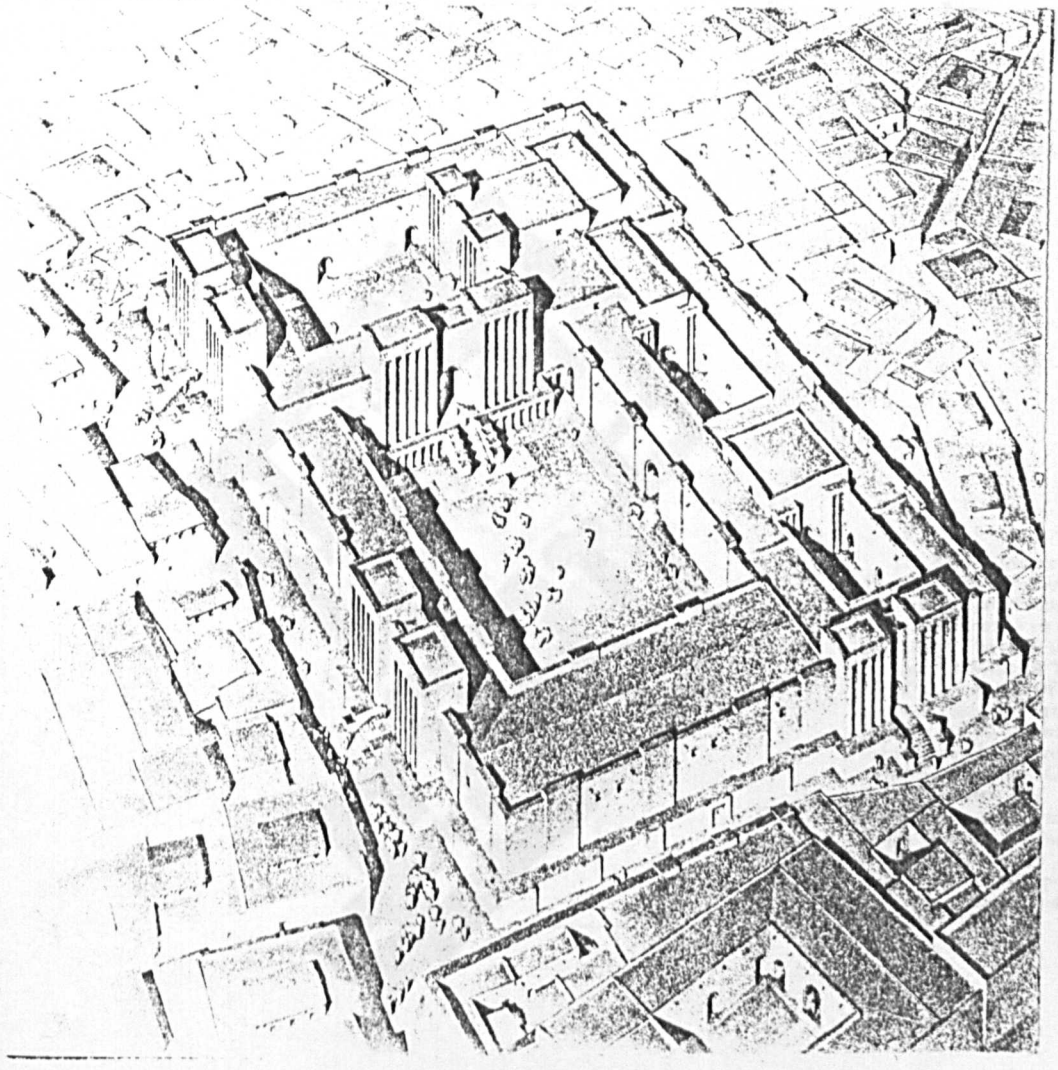
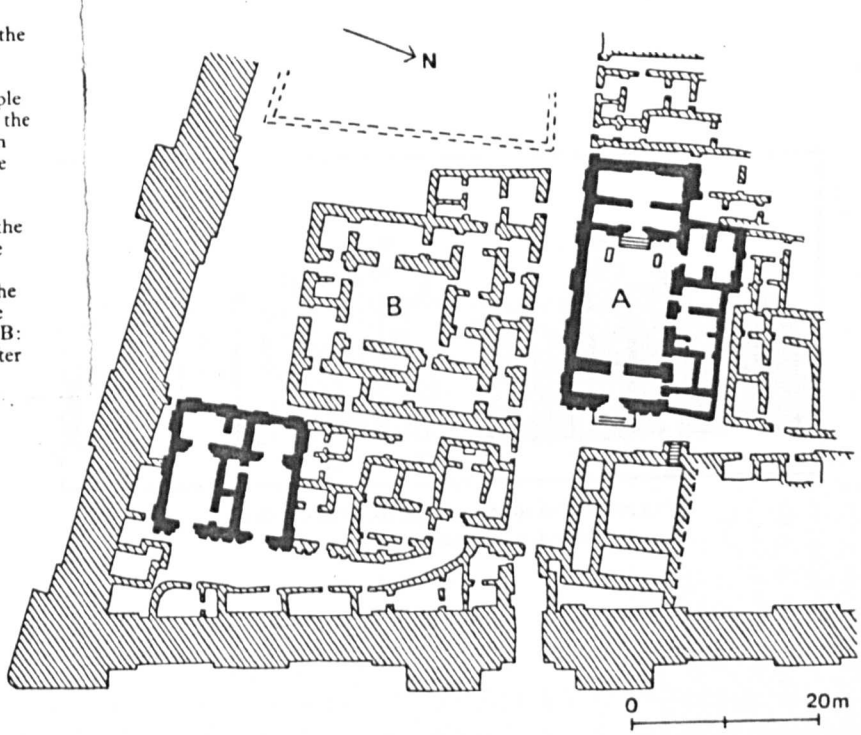


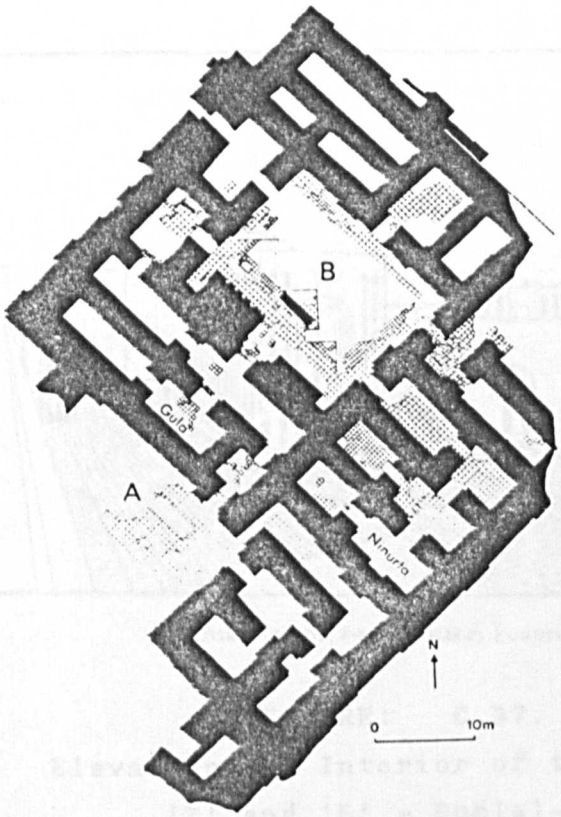
FIGURE: C.35b.

Temples Showing Enclosed Courtyards.

Burney, 1977, pp.68, 91

Southeastern corner of the Old Babylonian town of Shaduppum (modern Tell Harmal). In the main temple (A) both the principal and the subsidiary shrine (northern side) are constructed in the broad cella plan characteristic of the Old Babylonian period, while the smaller twin shrines in the southeastern angle of the town (solid black) are of the long-room type later more characteristic of Assyria. (B: administrative centre.) After Baqir.

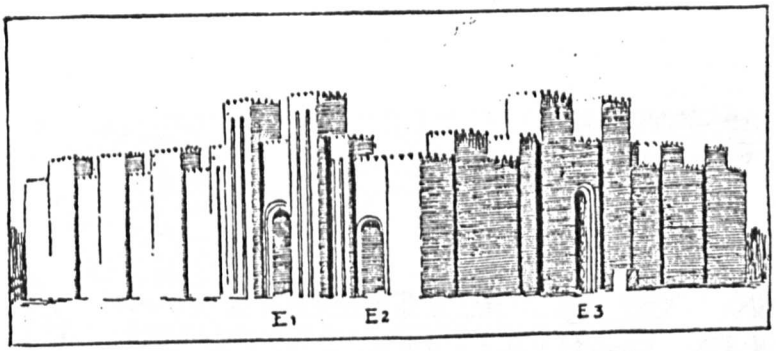




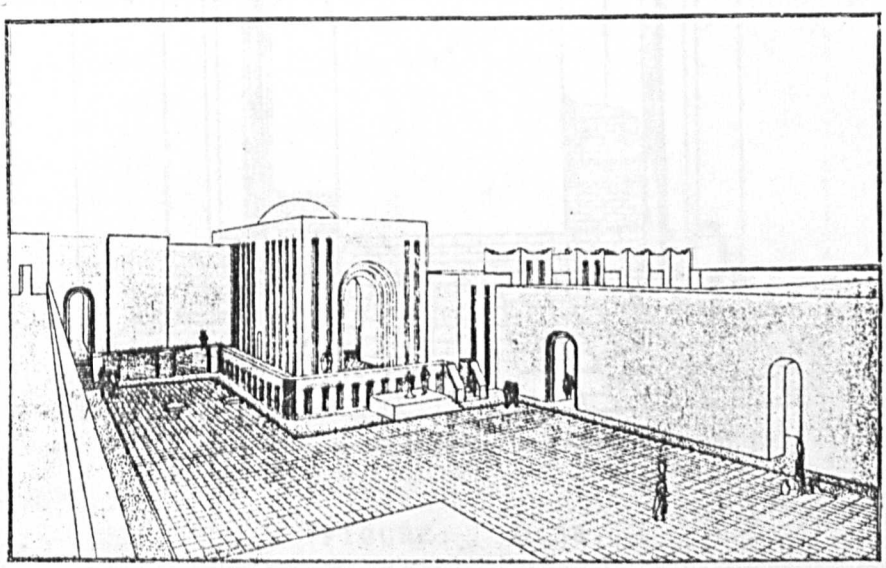
The Kassite temple of Gula, goddess of healing, at Isin was entered through a buttressed gateway on the northwest. The main shrine, of typical Babylonian 'broad-room' plan, opened off the southwest side of courtyard B, and a second doorway on the southeast led indirectly to a chapel dedicated to Gula's consort Ninurta. The domestic quarters of the temple probably surrounded the inner courtyard A. After Hrouda, Fritz, Haussperger, Aziz, Strommenger and Weidner.

FIGURE: C.36.

Plans of Temples.

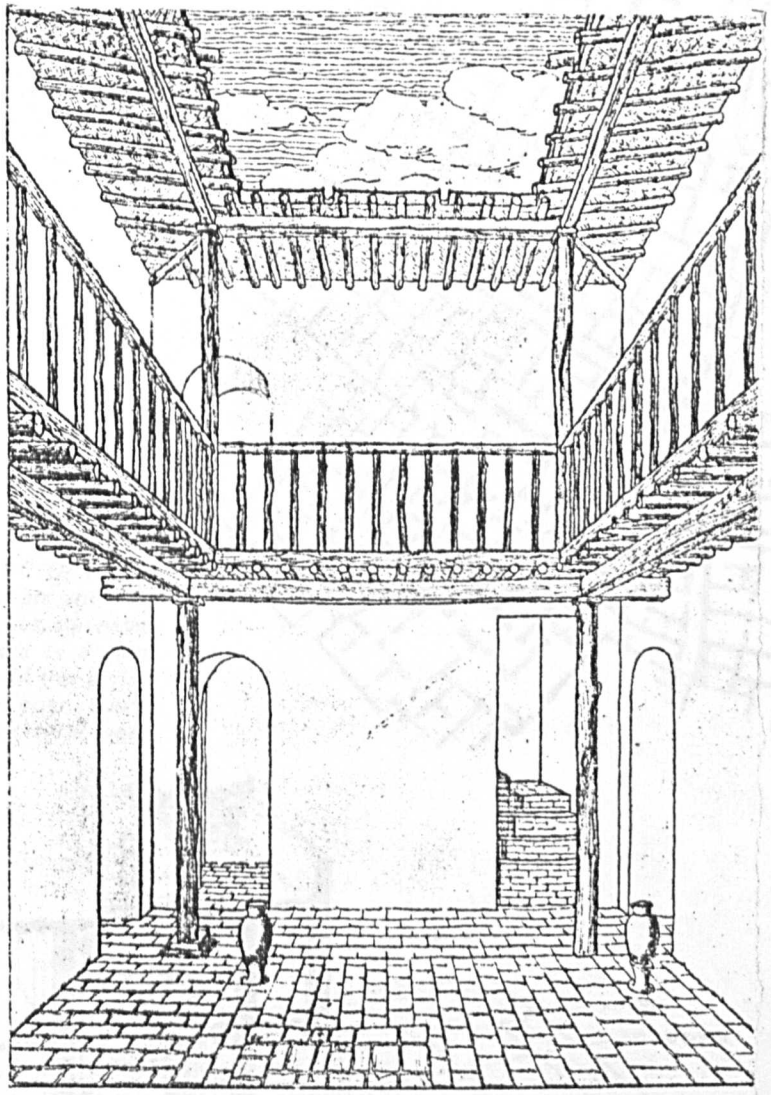


—CONJECTURAL RESTORATION OF TEMPLE 'Z'
(King: *after* Koldewey and Andrāe)



—RESTORATION OF *Ê-DUBLAL-MAKH*: KURIGALZU PERIOD

FIGURE: C.37.
Elevation and Interior of the Temples
'Z' and 'E' - Dublal-Makh.



—RESTORATION OF THE COURT OF AN ANCIENT HOUSE AT UR

FIGURE: C.38.

The Interior of a Courtyard House.

By about 1900 BC Ur (right) was a web of streets and, like other Sumerian cities, can never have been laid out to a plan. A wealthy house of this period (below) had an open courtyard in place of a central room.

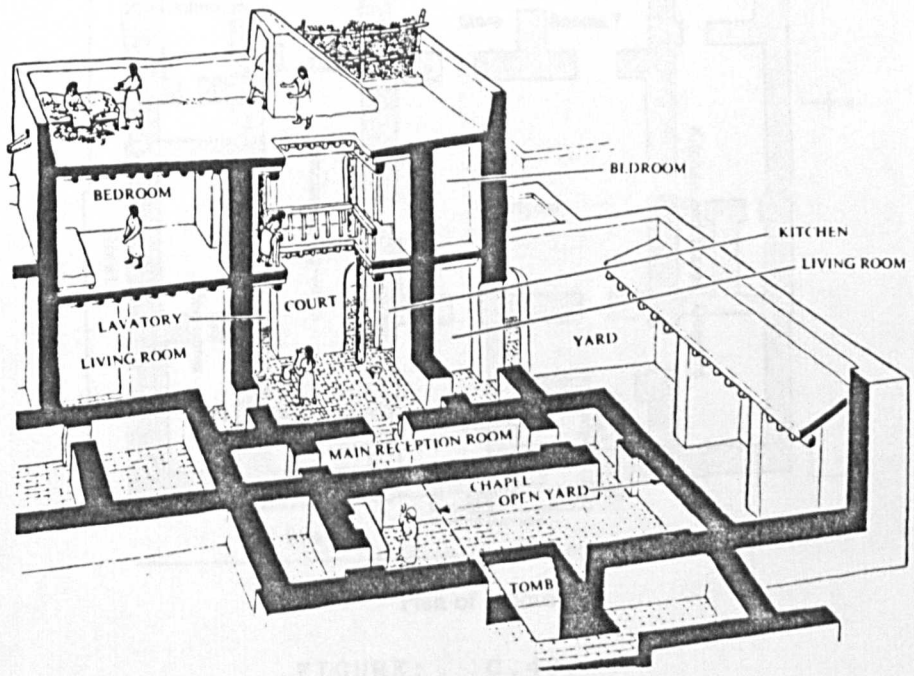
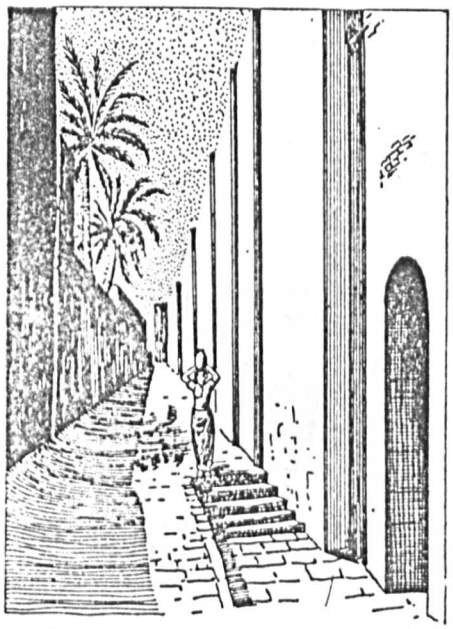


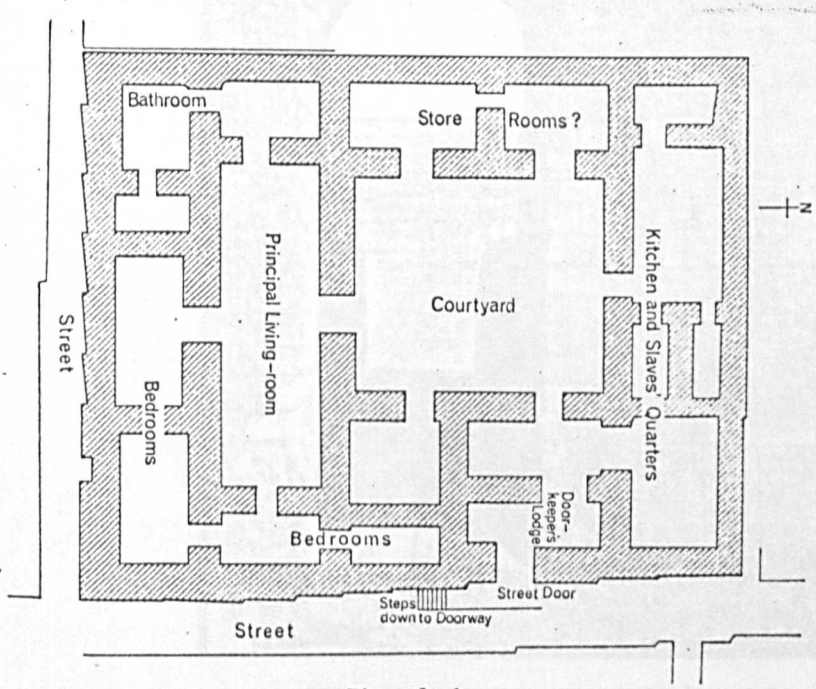
FIGURE: C.39.

Layout of a Residential Area in Ur and a Section of One of its Houses.

Burney, 1977, p.96
Whitehouse, 1977, p.51



House of the Nebuchadnezzar period

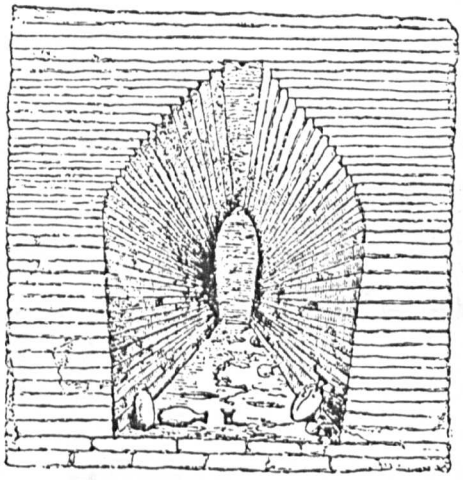


Plan of a house

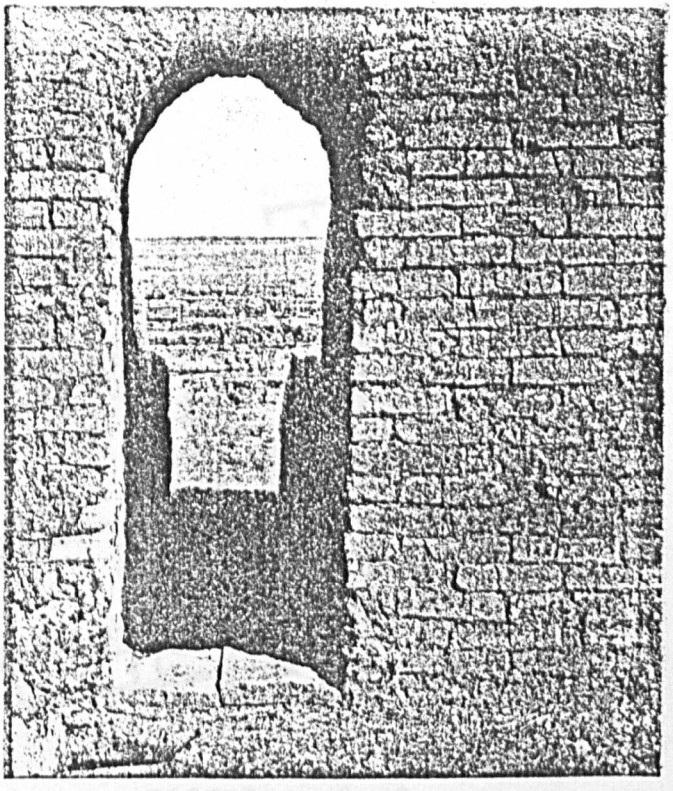
FIGURE: C.40.

Plan and Elevation of a Courtyard House.

Saggs, 1965, p.169



—TAYLOR'S SKETCH OF A BRICK VAULTED TOMB AT UR



ARCHED DOORWAY IN Ê-DUBLAL-MAKH (1400 B.C.)

FIGURE: C.41.

The Use of the Vault and the Arch in Construction.

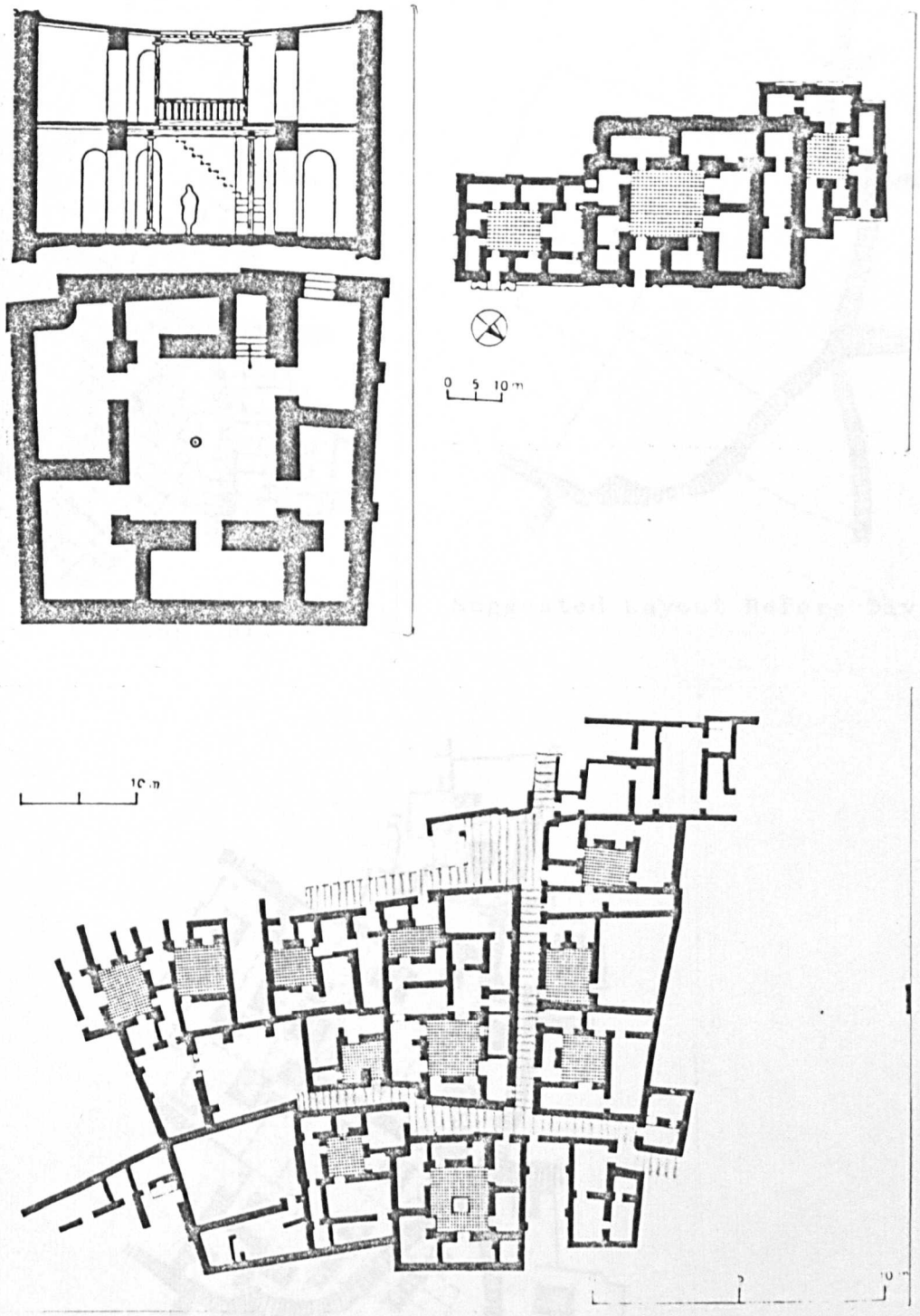
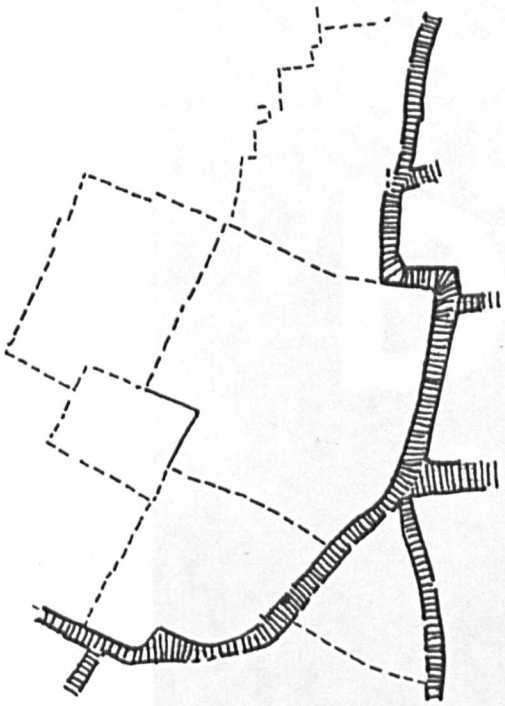


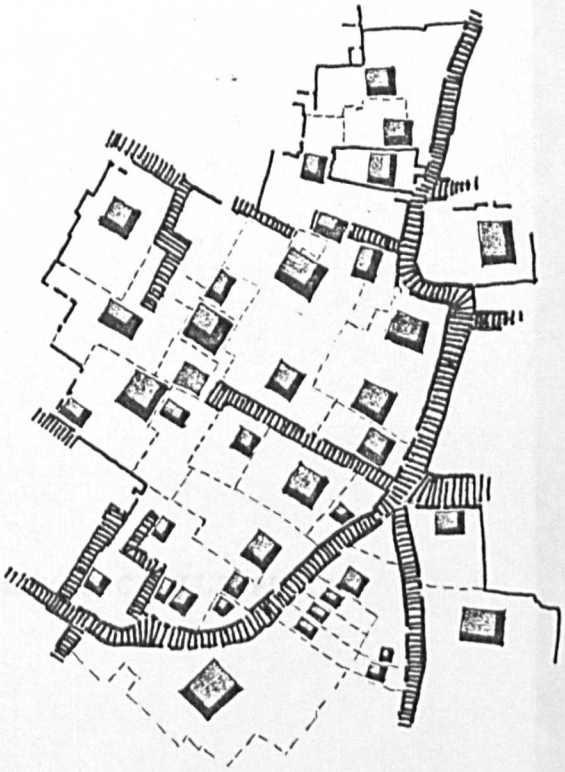
FIGURE: C.42,

A Detailed Plan for the Grouping of Courtyard Houses.

Excavations of Housing: Ur.



Suggested Layout Before Division.



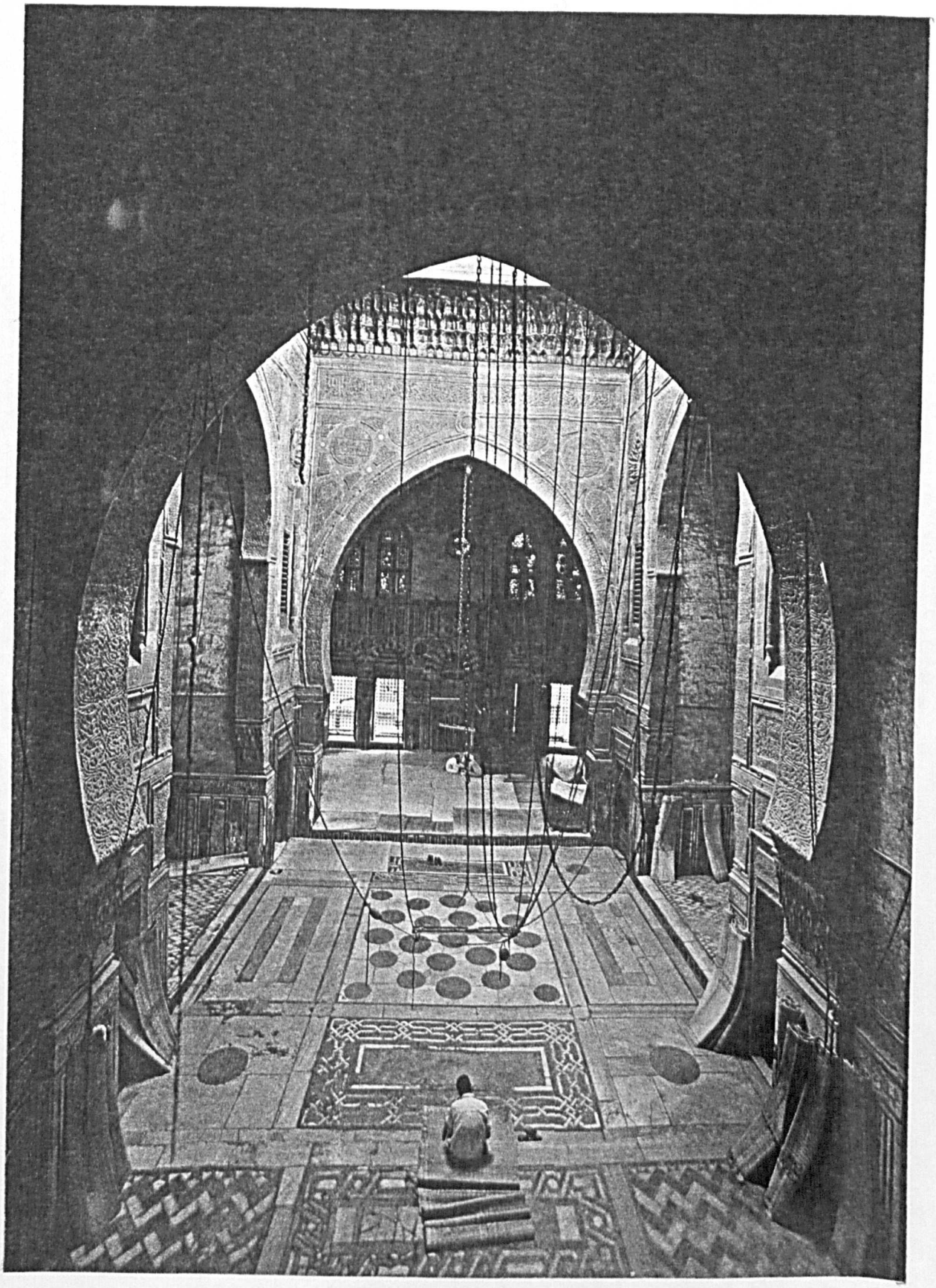
Layout of Housing and Road Network.

FIGURE: C.43.

Theory of the Development of the Road Network System.

D

THE ISLAMIC CIVILIZATION



THE SYMBOL OF ISLAM.

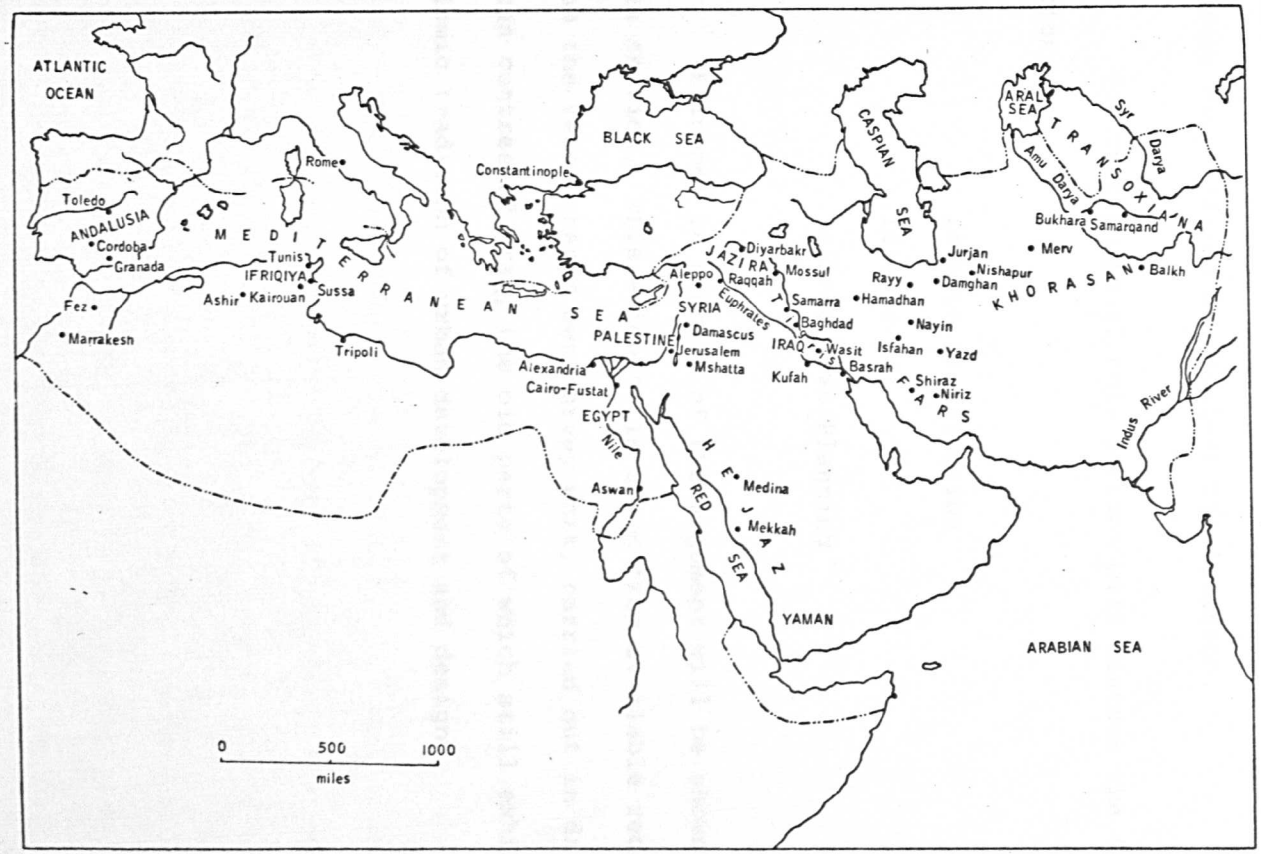


FIGURE: D.1.

The Muslim World in the Tenth Century.

[D] THE ISLAMIC CIVILIZATION

In order to study the urban fabric of the city during the Islamic period and the factors which moulded its fabric it is necessary to trace the similarities and differences between Islamic civilization and Ancient civilization.

For this purpose, this section will discuss the following factors:

Islamic Urbanization

Islamic Art

Islamic Town Planning

Evidence in support of the argument will be shown throughout this section. This evidence is drawn from available records and from the researcher's own survey work, carried out in different urban centres of Iraq, the old parts of which still exhibit the Islamic tradition of urban development and design.

D.1 INTRODUCTION

Throughout the history of the world each successive civilization, as it has evolved and attained a position of relative dominance, has adopted the concepts of previous civilizations within its own sphere, incorporating those principles, characteristics and experiences which conform with its own dominant ideologies whilst filtering out those which represent a conflict of aims and views. Accordingly, over time, evolution results in an increasing sophistication of its underlying principles helping to create a new and independent civilization. The inherent socio-economic, political and other cultural factors will all influence the changing nature of the society, its environment, and urban fabric, although at any one time one factor may exercise a greater degree of influence compared to the others, dependant upon the social, economic and political context.

As regards Iraq during the Islamic period, the country was subject to the influence of the whole Islamic community, whilst at the same time exercising its own influence over that civil realm in an essentially interactive relationship. In the context of urban design although Iraq echoed Islamic principles these were accommodated so as to accord with the country's own natural and cultural environments.

This section seeks to highlight the concepts of and basis for the layout and form of the Islamic city in general and to illustrate the particular use of the experience and characteristics of Islamic design in the surrounding regions, as these came to affect Iraq. In studying the background of urban design in Iraq it is essential to consider the influence of the wider civilization and not to view the country in isolation.

The study of traditional Islamic cities touches on all aspects of Islamic civilization. To understand the principles of development and design in Islamic cities it is necessary to appraise the historical context in which they have developed and the nature of the society within which urban development took place. An attempt will be made to consider the influence of historical background, social experiences, scientific achievement, religious affiliation and aesthetic ideas on the physical form, architecture and urban fabric of the Islamic cities of Iraq.

The pre-Islamic past was the foundation of development in the Islamic city. Millenia of previous experience in the organization of urban society and the cultural and religious appreciation of cities underlay the Islamic experience. As indicated in the previous section the legacy of the past was a highly differentiated society, stratified by classes, divided into sub-communities and dominated by a hierarchical form of social organization with developed imperial governments at the apex. From the past came also the complex techniques of production and crafts, norms for commercial exchange and market institutions. Cultural traditions assigned a great importance to religion in the organization of urban society; city living was valued as an essential element in a fully developed human life. This tradition was, of course, a living tradition in the thousands of different types of human settlement founded in Ancient times but continuing into the Islamic era.

In spite of this region being the place where the first urban civilizations were born, it also witnessed the influence of many civilizations founded outside this region, e.g. the Byzantine and the Sassanian, both of which were founded prior to Islamic developments.

As Islam developed the Arab world in the seventh century stretched from the Steppes of Central Asia to the Pyrenees. Artisans developed new techniques, architects created new types of monuments, older functions acquired new forms and a new mood of visual expression permeated the Islamic empire.

This new expression was influenced in the beginning by Sassanian, Byzantinian and Central Asian culture which themselves were originally influenced by the Ancient civilization of Mesopotamia. But almost always these influences were modified and transfigured in ways that are remarkably consistent. The novelties and transformations acquired a life and existence of their own.

The political, social, religious and intellectual components of the Muslim world did not remain static over the centuries; generalizations or conclusions valid for one period or one area are not necessarily true for a later time or for another region. Diffusion depended, in part, upon the political power of the Islamic empire. Often local developments and creations were passed on to the other areas of the Muslim world. Local innovations and adaptations of architecture and urban fabric can be clearly seen in different Arabic cities and different regions, although nowadays, they are no longer identified as part of a single empire.

In the seventh and eighth centuries, a synthesis was created between the new needs and aspirations of Islam and the immensely rich artistic vocabulary of earlier civilization. This synthesis can appropriately be called Arab because the dominant impetus for its creation lay in the taste and the requirements of the Arab leaders

of early Islam in Syria and Iraq. The Arabic language remained the principal medium of intellectual discourse. After the thirteenth century literature began to develop in other languages.

From the tenth or eleventh century onwards, Arab art flourished in a smaller area, approximating the Arabic world. After the destructive Mongol invasion of the thirteenth century, cultural differences within the Islamic empire became politically significant. Baghdad and most of the Tigris valley became enmeshed in the complex dynastic struggles of Iran. The middle Euphrates valley became the easternmost outpost of the Mamluk world, which was centered on Cairo. This did not affect the art which reflected a fascinating symbiosis of local Egyptian, Syrian or Palestinian and Iraqi traditions.

D.2 ISLAM AND URBANIZATION

One of the unique features of Islamic cities in the medieval ages which distinguished them from the "Hellenic cities" as well as from the pre-industrial cities of medieval Europe, was the significant role played by Islam in creating a sense of functional, if not civic, unity among its various constituent groups.

Like other ideological systems that envisage restructuring of the social order, Islam played the dominant role in the emergence and development of a new social order which transformed the social, economic, cultural and ecological panorama of the medieval Middle-East [Hassan, R. 1972, p.108].

"The Prophet Muhammad himself was born in the most highly developed urban community of contemporary Arabia. The appeal of his message was in large measure a reflection of its appropriateness to the urban situation" [Grunebaum, 1955, p.142].

In order to study the urbanization in the aforementioned region, it is important to examine the basic traits that characterize Islam, which were conducive to the establishment of human settlements.

Settlement of nomadic tribes was one of the fundamental social ideals of Islam. Bedouinism in early Muslim society was disparaged and resented as a fault to be redressed by settlement.

As Islam was religion for whole nations, a powerful political centre was needed, to create a settled state inside and to diffuse the message beyond the homeland. This political power required a strong economy, integration of people, specialization and sophisticated technology, which were impossible without urbanization, therefore, permanent settlement was seen as the solution needed.

D.2.1 FACTORS INFLUENCING ISLAMIC URBANIZATION

The "jami" mosque was one of the major early religious institutions which played an important role in the emergence of permanent settlements. The establishment of "jami" required a fixed settlement with a permanent population of at least forty legally responsible men to be present to make the religious ceremony valid [Hassan, 1972, p.108].

An additional facilitating factor in the growth and development of urbanization in the Islamic Middle-East was Islam's legislative norms. These were tailored to fit the needs of a commercial community by their penalising the religiously lukewarm Bedouins and the corresponding higher valuation of the transition to settled life, But the most fundamental role that these religious norms played was in the substitution of religious affiliation in place of kinship and tribal affiliation as the rationale for social organization [Ibn Khaldun, (translated by Resenthal, 1958, Vol.II, Chapter 4)]. This new basis for social organization helped to transform a previously nomadic society into a thriving urban civilization within a century of the use of Islam as a religious system.

Ibn Khaldun, a 14th Century Muslim historian, was the first person to consider the sociology of medieval Islamic cities and to point out the role of Islam in bringing about the social transformation of Arab society from a nomadic to an urban culture. The "Nomadic Culture" (Umran Badawi) and the Urban or "Civilized Culture" (Umran Hadari) were identified. The "Nomadic Culture" was considered as characteristic of pre-Islamic Arab societies and the "Urban Culture" characterized the post-Islamic societies of the Middle-East [Mehdi, 1957, p.201].

The "Primitive Culture" concentrates on cultivation of land, the domestication of animals either in one locality or whilst roaming the desert. It was characterized by simplicity in various aspects of life and the satisfaction of only basic needs. Communities were small and self-supporting; foodstuffs were simple and eaten without processing; clothes were made of animal skins or hand-woven materials, and people sheltered in caves, tents or simple huts. All but the necessary tools and arts were absent. There was no organized rational knowledge. There were no cities, public works or market economy and no taxation. Social solidarity was based on common ancestry, common interests and common experience of life and death. Nomadic culture engenders personal feuding and indifference to authority, the habit of continuous movement and lack of attachment to certain regions, and the habit of appropriating whatever is available or seen, regardless of the rights of others.

The "Civilized Culture" cannot exist without respect for authority, attachment to a certain locality and deference to the rights of others. The transformation of "Primitive Culture" to a "Civilized Culture" takes place by overcoming the shortcomings of a "Primitive Culture" and by enhancing and buttressing social solidarity. To achieve this an "additional force" is required. This force in the Middle East was religion (Islam). Once religion is adopted and supported by a primitive group, it becomes a highly effective force for change and development. Religion creates a new loyalty, absolute belief in and obedience to the demands of law and authority. This then becomes the source of social solidarity superior to and more lasting than the social solidarity based on natural kinship and simple wordly desires. Social solidarity based on religion was a most

powerful force in the creation of civilized culture which centered around life in cities. The organization of cities is conceived as the natural completion of life begun in primitive culture and the end to which human nature is seen to have been moving since the creation of the most simple forms of communal life [Mehdi, 1957, p.201].

Thus, the development of urbanization in Islam was strongly influenced by the growth of Islamic religion. Islam also performed a latent function of unifying the loyalties of an urban population. Although religion acted as an instrument for social solidarity and played a major role in the establishment of Muslim cities, their further growth and maintenance depended upon the power of the state or dynasty. As Ibn Khaldun indicated 'power' was the necessary means to obtain and preserve political stability for a dynasty which in turn became a factor in extensive urbanization [Ibn Khaldun (translated by Resenthal, 1958, Vol.II, pp.201, 203-209)].

The religion of Islam, which gave its name to a vast empire, began to dominate every aspect of its civilization. Significantly enough its founder, Muhammad, was not only a Prophet, he was also leader, judge, legislator and general, and the Khalifah who came after him inherited and assumed all these roles.

Muhammad founded the nucleus of the Muslim empire not by religious conversion alone but by force, political manoeuvres and administrative ability. He first gathered around him a small group of followers of Mecca; his influence was used to increase control from Mecca and Medina. The period following the death of the Prophet was one of successive victories for the Arab. The Islamic armies rode on and conquered Syria in 636, Mesopotamia in 637, invaded Egypt in 639 and entered Alexandria three years later. Having

conquered Syria and Egypt, they overwhelmed and converted Persia, took over Western Turkestan and part of the Punjab and seized North Africa and Spain [Grube, 1966, p.8]. In less than a century, half the known civilized world, from Spain to China, was under the control of the Muslims, unified under the new culture of Islam.

United efforts, greater numbers of people and cooperation of workers, are the main elements in the construction of urban areas.

As the Islamic empire expanded and became more powerful, workers and resources were brought together from all regions to build cities. The power of the state also served to subdue the disagreements, wars, conflicts and divided loyalties that are likely to arise when numerous independent groups are brought together. The power of the state also served to control and unite the conflicting factions. This unification was conducive to the development of functional harmony and social stability in intergroup relations which is essential for the continuous growth and functioning of a large city. In addition to this the Muslim state, like all states, provided, protected and regulated the economic, social and cultural opportunities and facilities, and above all, safeguarded people against their external and internal enemies [Hassan, 1971, p.62].

Although the transformation from nomadism to urban existence affected the lifestyle of the people, the background of the social life, habits and customs of the traditional life was still reflected on the new urban form; people who had passed from nomadism to a settled life still made prototypical urban settlements which quite clearly reflected the form of nomad camps with their circle of tents and the chieftain's tent in the centre, as shown in Figure D.16 [Burckhardt, 1976, p.183].

In cities like Aleppo and Damascus after the spread of Islam, the city walls continued to delimit an area which was organized around the Ancient system of coordinates. The "jami" mosque has taken the place of the agora. The Hellenistic checkerboard structure was rendered ineffective by the build-up of the individual quarters. The decomposition of the checkerboard had in some places begun as early as the fourth century AD [Gustav, 1961, pp.148-199]. But the development was consummated under Muslim domination.

Selected basic Hellenistic urban institutions survived the Islamic conquest and were even to provide a model for later elements of the Islamic-Arab city; the sūq developed from the colonnaded avenue, the qasariyyah and the khan from the basilika, the hammam from the thermae or ancient bath [Xavier, 1959, pp.23-26], and the courthouse from the ancient courtyard house.

However, other Hellenistic urban elements such as the gymnasium and theatre were to disappear from Islamic-Arab towns. These elements were functionally compensated for by the social and educational function provided by the mosque, and from the eleventh century onwards by religious learning in the 'madrasahs' [Gustav, 1961, p.141].

D.2.2 LAW

Organised societies including urban societies cannot exist without a legislative system, such laws reflect the political ideology of the government. These rules are usually provided in order to organize and control different aspects of social life.

In Islamic society, the underlying ideology has been drawn from the Koran. Islam, however, is not simply a religion, it is a way of life, a curious mixture of religion, philosophy, social order and politics all rolled into one. The Koran dictates how men should live their lives and outlines a series of laws controlling what they may and may not do. Apart from the Koran, which is the word of God, there is also the Hadith (traditions) which record a collection of the Prophet Muhammad's sayings, teachings and judgements not included in the Koran [Bamborough, 1976, pp.12-13].

In Al-Mansur's reign the tradition (Hadith) ceased to be handed down orally and began to be embodied in a system of canonic law adapted to the necessities of the advancing civilization of Islam.

Al-Wakaf and Al-Hasbah are examples of the laws which are derived from the Koran and Hadith, in order to control those aspects of urban life which were concerned with people's wealth, ownership of goods and industrial products.

The financial basis for road building and also for the provision of urban shelters, schools, baths and markets, was more broadly spread throughout the Islamic community than elsewhere in the medieval world. As early as the ninth century private revenues were being used to erect facilities for pilgrims all over Arabia. Such funds were made available as a Wakaf, an inalienable gift of money, property or other valuable object, to be used only for the purposes specified in the Deed of Endowment and administered in perpetuity, according to religious law. As regards trade and travel in the Islamic world, a Wakaf could operate in two ways: funds were raised for the maintenance of shelters and caravanserais for

travellers to stay gratis for a specified number of days and to receive food for themselves and their beasts during the period; or the caravanserai, the khan or the bath could be turned into the revenue-producing instrument [Sims, 1978, p.97].

The main duties of the market supervisor (Al-Hasbah or governmental officer) were to ensure fair dealings in business transactions, the maintenance of proper physical facilities and the implementation of building control regulations. He helped to settle commercial or business disputes and supervised the standardisation of weights and measures. Along with the judiciary and the city police, it was one of the most important administrative offices. These all helped to regulate the economic and social life of the city [Ibn Khaldun (translated by Resenthal, 1958, Vol.I, pp.461-462)].

D.2.3 SCIENCE IN THE ISLAMIC ERA

The use of science in everyday life is one of the important features of urbanization.

The phrase 'Arabic science' refers to a vast and complex body of knowledge and enterprise that was effectively launched by the early Abbasid Kalifah at Baghdad shortly after 750. A vigorous, checkered existence was maintained for at least six hundred years which gradually spread over a geographical area that extended from Andalusia (Spain) to the lands beyond the Oxus River in Central Asia.

To some extent Arabic science may be regarded as the continuation of a Greek tradition that had been preserved by the Hellenic

people who came under Arab rule. But, as historians have noted, it was more than that. Baghdad was in fact heir not only to Alexandria but also to Persia and India, and the scientific texts available for translation into Arabic includes works in different languages (Sanskrit, Syriac, Pahlavi) as well as in Greek. The work of translation into Arabic led to an accumulation of scientific learning that surpassed anything previously known; the Arabic language rapidly became an international language of science.

Following Aristotle, those who wrote scientific works in Arabic distinguished between the 'mathematical' and the 'physical' sciences. The former group were concerned with quantity, whether discrete (number) or continuous (geometrical magnitude) whereas the latter dealt with things that possess a principle of motion, such as elements.

D.2.3.1 Mathematics

A logical starting point in an account of Arabic mathematics was Arithmetic, which usually heads the list of mathematical disciplines. The Arabs derived their early information of number theory (ilm al-adad) from different sources translated to Arabic. They developed the theory, which resulted in expansion of the concept of number to include irrational numbers.

The Arabic word hisab, which refers to the art of reckoning and generally, to the process of determining unknown from known quantities, was used to cover the fundamental arithmetical operations (addition, subtraction, multiplication and division), root extraction and algebraic procedures.

The Arabs inherited three different systems of arithmetic reckoning:

The first, possibly indigenous to the Middle-East, was known as 'finger-reckoning' (hisab Al-Yad, hisab Al-Uqud). In this system numbers were expressed in words, not symbols.

From India came a superior system of reckoning, which was able to express any number, however large, by means of nine figures and a symbol (zero, or sifr) indicating an empty place in an array of figures. The figures were expressed in somewhat different forms in Eastern and Western parts of the Arab world, and it was the Western figures that migrated to Europe, where they became known as 'Arabic numerals'.

The third arithmetical system was called 'the arithmetic of the astronomers'. Although it was Babylonian in origin, Arabic mathematicians became familiar with it and it was always used in astronomical and astrological calculations. It employed sexagesimal fractions, and it designated numbers by letters of the alphabet.

Al-Kachi was the scientist who successfully applied the place-value decimal system to both integers and fractions. Al-Khwarizmi was the first author in the field of Arabic algebra. Arabic geometry absorbed not only the contents and methods of Euclid's elements but also the higher techniques of Apollonius and Archimedes. The Arabs were the first people to solve many mathematical problems in Ibn Al-Haytham's optics (Kitab Al-Manazir). Another classical problem to which Arab mathematicians devoted special attention dealt with the theory of parallels.

D.2.3.2 Astronomy

Medieval Arabic astronomy was based on previous civilizations (Greek, Indian and Persian) as a result of the early translation of previous work. Arabic astronomers engaged in the important and difficult task of making this body of work more accurate, more efficient and more elegant. They made new observations aimed at improving the ptolemic parameters - inclination of the ecliptic, mean planetary motions, equinoctical precision and so forth. They developed ingenious and increasingly efficient computational techniques and they devised new planetary models designed to make ptolemic planetary theory more in harmony with its avowed principles.

In attempts to improve upon the calculus of chords, which they found in Ptolemy's Almagest, Arabic mathematicians gradually developed the trigonometric technique which was considered an invention of Arabic science.

Recently historians have noted a strong similarity between the models produced at Maragha and Damascus and those of Copernicus, but whether or not Copernicus was influenced by these Arabic prototypes remains a matter of conjecture.

D.2.3.3 Optics

Islamic achievement in optics, a field in which the Arabs made substantial progress was based on the foundation laid by the Ancients. It was in Ibn Sina's lifetime, however, that Ibn Al-Haytham formulated a theory of vision quite distinct from any other that existed at that time or had existed earlier. Starting from problems suggested or implied in Ibn Al-Haytham's work, Kamal ad-Din was able

to make at least one important breakthrough: a successful explanation of the rainbow phenomenon [Hayes, 1978, pp.121-135].

All these examples give some idea of the range, vigour and sophistication of Medieval Arabic research in the field of the exact sciences. The Islamic Arabs not only assimilated previous science (Ancient, Greek) but also made themselves masters of its methods and techniques. Their role did not consist merely of handing over to Europe what they had earlier acquired from the Ancients; they were able to enrich it by new observations, new results and new techniques. The importance of the Arabic contribution to the history of science is not in doubt, but much of its content is still unknown.

All the above mentioned scientific achievements were reflected directly on society by application of this new knowledge including fine art, architecture, town planning and urbanization, which created powerful political centres. It is possible to take the view that the growth of knowledge and the development of towns proceeded hand-in-hand insofar as urbanization aided communication and the transfer of information and experiences but also reflected an increasing division of labour with specialists being given scope for developing science and other forms of knowledge.

D.3 ART IN THE ISLAMIC PERIOD

D.3.1 ISLAM AND ART

Since art acts as one of the media which reflect society's status, before looking at the specific works of art found during the Islamic period, it is important to know how Islam ideology affected the life of the society on one hand and to recognise the relation of Islamic culture on the different types of art expression on the other.

Neither the Koran nor very early Muslim practice in Arabia itself indicates the existence of a Muslim doctrine on representation of living forms. Islam rejected idols but not representations. Islam asserted with full force only God is the Creator and only He is to be worshipped, but neither one of these basic tenets was associated with the quotation or representation of living forms.

At the same time, the more common Muslim attitude towards artistic practice was to reject the use of images as symbols of the faith and of the state. In part, this rejection became a traditional idea of rejecting physical representation, insofar as the absolute power of God and the sin of idolatry make the utilization of representations untenable.

Furthermore, the egalitarian moralism of Arab Islam inspired a mistrust of any intermediary between Man and God or, for that matter, between Man and secular authority [Grabar, 1978, p.95].

In spite of what had been mentioned before, the Koran on the other side encouraged the Muslim to recognize what God had created for them, not only to make use of them, but to indicate His power and to enjoy the beauty of His creation. As confirmation some quotations from the Koran are selected:

"In the name of God, the compassionate, the Merciful.
And the cattle! For you hath He created them: in them
ye have warm garments and gainful uses; and of them ye eat;
And they beseem you well when ye fetch them home and when
ye drive them forth to pasture:

And they carry your burdens to lands which ye could not else
reach but with travail of soul: truly your Lord is full of
goodness, and merciful:

And He hath given you horses, mules and asses, that ye
may ride them, and for your ornament: and things of
which ye have no knowledge hath He created."
[Rodwell (translation), 1978, p.200].

Moreover, the Koran gave the Muslims the clue and direction of how they could enjoy and measure the art of the Creation and its beauty, by recognizing what had been created by God, a combination of function, form, construction and beauty.

"By the noon-day BRIGHTNESS,
And by the night when it darkeneth!".
[Rodwell (translation), 1978, p.25].

"By the Sun and His noonday brightness!
By the Moon when it followeth Him!
By the Day when it revealeth His glory!
By the Night when it enshroudeth Him!
By the Heaven and Him who built it!
By the Earth and Him who spread it forth!
By a Soul and Him who balanced it!".
[Rodwell (translation), 1978, p.38].

"Can they not look up to the clouds, how they are created:
And to the heaven how it is upraised;
And to the mountains how they are rooted;
And to the earth now it is outspread?"
[Rodwell (translation), 1978, p.54].

Furthermore, apart from art and beauty, the Koran encourages Muslims to take care of their personal appearance.

> *"O children of Adam! Wear your goodly apparel when ye repair to any mosque; and eat ye and drink; but exceed not, for He loveth not those who exceed.*
>
> *Say: who hath prohibited God's goodly raiment, and the healthful viands which He hath provided for his servants?*
>
> *Say: These are for the faithful in this present life, but above all on the day of the resurrection. Thus make we our signs plain for people of knowledge."*
> [Rodwell (translation), 1978, p.296].

D.3.2 FACTORS IN THE DEVELOPMENT OF ART IN THE ISLAMIC PERIOD

Islamic religious affiliation, the vast area of the Islamic empire, which includes people from different cultures and regions, and the forms of administration, all played a major role in developing and preserving the arts in this period. Some of these factors were:

Pilgrimage: this factor is one of the five basic duties of Islamic religion. It is the duty of every Muslim to go to Mecca for pilgrimage if he can. In addition to its religious function, pilgrimage acts as a big conference offering the opportunities for individuals and groups of different fields and specialisations to meet, in order to exchange and share knowledge and experience. Throughout the gatherings, ideas can be created and developed or agreements could be reached between pilgrims for the sharing of benefits.

In addition, Al-Wakaf and Al-Hasbah (see Section 2.2), in spite of their socio-economic benefit to the society, played a major role in preserving pieces of art as records for the generations to enjoy and learn from, with the possibility of continued development by later generations.

D.3.3 EARLY ISLAMIC ART

The Islamic era was counted from the year AD 622, the date of Muhammad's journey to Mecca. Within little more than twenty years of that date Syria and Egypt had been wrested from the Byzantine empire and Iraq from the Sassanians.

Islamic art is not art of a particular country or a particular people. It is the art of civilization formed by a combination of historical circumstances, the conquest of the Ancient world by the Arabs, the unification of a vast territory under the banner of Islam, a territory which was in turn invaded by various groups of alien peoples. From the start the direction of Islamic art was largely determined by a political structure which cut across geographical and sociological boundaries.

For this reason the art of the Islamic world is discussed in this thesis with reference to Iraq under the various dynasties who came to power, ruled over and segmented the original Muslim empire.

As far as art was concerned, this dual heritage was fundamental, and its importance was only equalled at first by the influence exercised by Semitic thought and, rather later, by the role played by the non-figural style of the East. These divergent trends, unified by the universal adoption of the Arabic script in one or another of its forms, became above all the factor which made the art of the Islamic world into a distinctive style; the distribution of Islamic art coincided with the bounds of the faith, and not those of any particular ethnic or political element within it.

However, the earliest caliphs were established in Mecca and Medina, but it soon became apparent that these cities, desirable as

the centres of an unwordly religious faith, were not suitable for the administrative capital of what had, in two decades, become a great political empire [Rice, 1965, p.9].

The new capital was established at Damascus, in what is today Syria, and it was in this area that the earliest developments of an art which can truly be termed Islamic took place (the Umayyad). It continued until about 750, when the capital was transferred to Mesopotamia and a new dynasty, the Abbasid came to power [Rice, 1965, p.10].

D.3.3.1 Umayyad Period

Art in the Umayyad period was eclectic, but in its very diversity it is also new and original. In this period, the unification of the Arab-speaking world had opened up the frontiers to numerous diverse influences, which led to the birth of a new art.

(a) Architecture

The architectural composition and style in many facades were derived either from those of the rock-cut temples of Petra or from the ideas drawn from the artistic imagination of the old classical tradition which were left on the wall paintings (Figure D.3).

The mosque of al-Aqsa at Jerusalem appears originally to have had the form of a great columnal hall and represented a new concept in Islamic architecture, though its columns and capitals were Byzantine.

Umayyad architecture employed the following constructive devices: the semi-circular arch, the round

horseshoe arch, the pointed arch, flat arches or lintels with a semi-circular relieving arch above, arches braced with tie-beams, joggled voussoirs, tunnel-vaults in stone and brick (the latter constructed without centreing), the system of roofing in which transverse arches support parallel tunnel-vaults, wooden domes, and also domes of stone on true spherical-triangle pendentives. The squinch does not appear to have been employed and intersection of tunnel vaults was avoided. In fortification, half-round flanking towers were employed.

In planning, a geometrical network, derived from earlier Syrian practice, was employed for laying out the Dome of the Rock, and a curious system of successive, symmetrical sub-division of the building into three sections as found at Minya and Mshatta.

The decoration was of the most splendid kind; marble was used for panelling, the slabs being cut in half and opened like a book, so that the wavy grain ran from opposite sides towards the joint. The upper part of the exterior and interior walls was sometimes decorated with glass mosaic (fusaifisa) [Creswell, 1958, pp.151-158].

The main elements of architectural decoration in Umayyad times are derived from late classical tradition, stone carving, mosaic floors, wall-painting, but added to these traditional forms is the new and alien form of plaster decoration. The decorative stone carvings of most Umayyad buildings - capitals, door-lintels, cornices etc. - follow almost without change pre-Islamic Roman tradition in form and

execution. Mosaic floors display a great variety of geometrical abstract patterns.

It has been pointed out that these mosaics had a distinct meaning for the beholder of the time, celebrating the golden age of peace that began with the rule of Islam (hence the open landscapes, open palaces, unfortified open cities) and each architectural setting represented a specific place.

In the medium of plaster decoration Umayyad art evolved a wide variety of sculpture in the round. Although always forming part of a wall decoration, some of these sculptures are astonishingly finely modelled [Grube, 1966, pp.15-16].

(b) Mosaic Work

The characteristics of the mosaics work in this period was more naturalistic, less formal, but without living figures, in comparison with Byzantine types, though both trees and villages were depicted in an entirely naturalistic manner, as occurred in the Great Mosque of Damascus.

"In the fantasy and delight of their compositions, however, the Damascus mosaics far surpass any similar works of Roman, Hellenistic or Byzantine art that survive, and they undoubtedly constitute not only one of the greatest glories of all Islamic art, but also one of the most delightful mosaic decorations known to the world" [Rice, 1965, p.16].

(c) Wall-Painting

Influences on wall-painting were so fragmentary, that the motifs comprised both formal decorative patterns and the figures of living persons, and Sassanian elements were nearly as much to the fore as Hellenistic (Figure D.2).

(i) Art in Iraq During the Umayyad Period

We know from texts that mosques were built in Iraq during the Umayyad days at Basrah, Wasit, Kufa and elsewhere, but although the capital was moved to Mesopotamia in 750, and soon after established at Baghdad, there are very few monuments on a major scale which can be attributed to these early days.

With the fall of the Umayyad dynasty, the seat of the Khalifate changed from Damascus to Baghdad. The centre of gravity of the empire was changed and the mental and artistic atmosphere became more oriental. The Hellenistic influences of Syria were replaced by the still-surviving influences of Ancient Iraq and Sassanian which profoundly modified the art and architecture [Creswell, 1958, p.318].

(ii) The Islamic World at the End of the Umayyad Period

The establishment of the Abbasid Khalifah signified the end of political unity in the Islamic world. Beginning with Al-Andalus (Spain) which remained in the hands of the Umayyads, a process of division began. By 800 Spain and all North Africa were independent, and in 868 Egypt too was separated from the rest of Islamic control when its

governor Ibn-Tulun established the Fatimid dynasty. Accordingly, by the tenth century there were three Khalifahs ruling in the Islamic world, the Abbasid Khalifah in Baghdad, the Fatimid Khalifah in Cairo and the Umayyad Khalifah in Cordoba.

Iraq was to remain the main centre of power and culture during the time of the Islamic empire for about 500 years [Marzouk, 1965, p.66], until the arrival of the Seljuks in the twelfth century [Rice, 1965, p.46], through which the capital was transferred from one place to another due to administrative circumstances. Therefore art has been affected depending upon the location of the control power and the influences surrounding it. Accordingly, art in Iraq during this time can be divided into different periods, following the movement of the capital and the change in political power and local influence.

D.3.3.2 The Abbasid Period

The Abbasid who ruled the Islamic empire after Umayyad had chosen the Iraqi region to be the centre of the ruling power for a number of reasons. Above all its central location among the Islamic empire, i.e. from North Africa to Samirkand, it is the land of the first civilization, and its position in relation to the main transportation routes, in addition to the availability of raw materials made it a centre for artistic development.

Al-Kufa city presents the first capital for the Abbasid Khalifah Al-Saffah in Iraq. The capital was later transferred to Al-Hashimia city before the foundation of the new capital city Baghdad in 762 by

Al-Khalifah Al-Mansur. With this change the emphasis shifts decidedly towards the Eastern tradition - the new capital in Baghdad even being built on an ancient oriental round plan - a first step towards a final division between Eastern and Western Islamic art and culture.

With the constant influx of Turkish people from Central Asia into Western Asia and the gradual substitution of the Arab army by a Turkish military caste, a new chapter in the history of Islamic art begins. In the early ninth century this new phase was marked by the removal of the court from Baghdad to Samarra, a new city on the east bank of the Tigris. Samarra was built as a new capital by the Abbasid Khalifah Al-Mutawakkil (847-861), in order to put an end to the constant friction between the Turkish troops of the army and the citizens of the old capital Baghdad [Creswell, 1958, p.259; James, 1974, p.57]. Samarra art was the first manifestation of a new taste in Islamic art [Grube, 1966, p.35].

This period had witnessed the rise of Muslim literature and science; history, medicine and astronomy began to be studied and Al-Mansur was the first to cause Greek scientific works to be translated into Arabic. Thus the rise of Muslim science began.

The effect of all this on art has been well expressed by Terrass: "The Khalifah passed from Hellenistic soil to a country where the traditions of the Ancient East remained full of life. In Abbasid Mesopotamia an art was about to develop which in almost everything is opposed to the semi-classic art which still prevailed on the shores of the Mediterranean" [Creswell, 1979, Vol.II, p.49].

(a) Architecture

In considering the Islamic architecture of Iraq, it falls into fairly distinctive geographic groups: in the north an essentially stone architecture prevails, while brick is the main building material in central and southern Iraq.

The architecture of early Abbasids was coloured by pre-Islamic Ancient civilization and East Asia influences; the adoption of the Ancient and the East Asia concept of kingship, coupled with concern for political security, contributed to the creation of the three cities at Baghdad, Samarra and Raqqa [Philon, 1978, p.245].

The round city of Al-Mansur (Baghdad) may fairly be considered as one of the most remarkable examples of town-planning that have come down to us; it appears probable that the earliest circular enclosures were the Assyrian military camps as shown on a slab found by Layard at Nineveh [Creswell, 1958, p.170]. Nothing of Abbasid Baghdad survives, but its marvels have been described so extensively that some sort of reconstruction is possible. The city, founded on 1st August 762, by order of Al-Mansur at an astronomically specially auspicious moment, was built on a circular plan [Grube, 1966, p.36] (for further details see Section F).

A fortified palace also appeared in this period at Ukhaidir (for further details see Section D.4.4.3). Architectural themes new to the Islamic world appeared at this time. Abbasid architecture is essentially brick built and is characterised by varied vaulting techniques, domes on squinches, lobed arches and the pointed arch, the last originating in

Eastern Early Christian architecture.

Architectural elements were employed for purely decorative purposes and geometric ornamental brickwork (Hazarbaf) was introduced, as found in the arched hood of the niche in the Raqqa archway. It is a geometrical design consisting of four swastikas and five squares. The design is executed entirely in brickwork which was destined to be elaborately developed later in Persia. The pattern is raised slightly, and the hollows are decorated with rows of rhomboids in stucco [Creswell, 1958, pp.185-186].

(b) Wall Decoration

At Samarra the remains of extensive wall decorations in stucco were found and also fragments of some extremely interesting wall paintings (Figure D.11). These had adorned part of the harem in the first palace built by the Khalifah Al-Mutasim, and known as the Jausaq Al-Khagani. Most impressive was a great scroll enclosing birds and animals. Birds and animals were also shown individually, usually within medallions adorned with dots representing pearls (a favourite Sassanian motif frequently used for textiles).

Many of the motifs have been derived from Hellenistic art. The rather heavy style of the painting and the colours, with red and bright blue predominating, were essentially Sassanian.

The stucco (Figure D.11) was used not only in the palace but in many of the houses as well, and often stood almost to roof height, covering the entire wall-space of

the rooms. In the earliest examples the decoration was moulded and fine-lobed vine scrolls formed the main theme; in the next group the stems of the scrolls were omitted and only bud-like designs were included. In a third and distinct group, the stuccos were carved as well as moulded; the carving was in low relief, with sloping margins, a technique known as 'bevelled carving'. Prototypes for the first two styles which Creswell designates A and B, are to be found on earlier sites in Iraq such as Hira (eighth century) and Iskafir-bani Junayd (Figure D.11). Style B served as the basis from which the stucco work, which was later to become so important for the decoration of mahrabs all over Persia, was developed.

The third style, C, appears to have been evolved at Samarra itself.

Another important type at Susa and Samarra is wholly Islamic, though there has been considerable dispute among the pundits as to which part of the Islamic world was responsible for the invention of this technique - lustre (Figure D.12.d) which were first made in Iraq. The earliest lustre tiles were polychrome, a rich ruby colour predominating, together with a shade of yellow and brown. The double-winged motifs were popular; no figures, animals or birds appear on the earliest examples.

Fabric, usually of a fine texture and white in colour, was covered with a thin coat of transparent glaze, and then fired. Onto the prepared surface the designs were painted in

metallic glazes and the pots refired in a muffled kiln at a low temperature. The result was a delicate lustre surface, which was in itself attractive, over the designs which were also usually of great beauty in themselves [Rice, 1965, pp.29-34].

D.3.3.3 Buwayids

Once again, due to administrative circumstances, in 883 the capital was moved from Samarra to Baghdad, and remained there until it was sacked by the Mongols in 1258. But it would seem that the period between its reinstitution and its sacking showed nothing like the same profusion of expenditure on art and design as the earlier age. Indeed the power of the Abbasid Khalifahs was at this time nothing like as great as it had been, for they had become virtually puppets in the hands of their ministers [Rice, 1965, p.97]. With the crumbling of the Abbasid dynasty, smaller dynasties mushroomed in Iraq [Philon, 1978, p.245]. At the same time a number of local dynasties established themselves in Iran, Khurassan and Central Asia, creating cultural centres of their own. Among these are the Buwayids, a Dailamite family that had maintained its independence from the central Muslim government in their region south of the Caspian Sea, and that had begun to take over large parts of Iran during the first half of the tenth century, reaching Baghdad before the middle of the century and forcing the Khalifah to resign from all political power [Grube, 1966, p.41].

However, the spiritual-secular unity of Islam had now disappeared at the highest level, for political necessity and ambition demanded that the two be separate, at government level at least [James, 1974, p.9].

This period witnessed developments in different fields of science and literature. The most important Islamic people who appeared during this period were: Al-Farabi, Abin-Sina, Al-Khowarzmi and Akhwan Al-Safa [Marzouk, 1965, p.79].

(a) Architecture

The ruins of old Baghdad are inaccessible and so cannot give any clues about the architecture of this period and no other large city of this period has so far been excavated in Mesopotamia, although there was certainly a good deal of building [Rice, 1965, p.97], as mentioned in the literature of this period, e.g. Al-Bemarestan (hospital), Al-Marsad observatory and the scientific academy [Marzouk, 1965, p.79].

(b) Decoration

As mentioned above, no architectural features remained from this period in Iraq. Consequently, nothing is known about building decorations during this period, but other elements which were used in everyday life carried the pattern of the arts of that period, which can be identified, i.e. silver and gold works, pitchers and golden medallions, silk fabrics, calligraphy and potteries.

A quantity of silver plates with figurative scenes very much in the Sassanian tradition but clearly not in the Sassanian style have been found.

The silk patterns are decorated with lengthy historical inscriptions while others combine the calligraphic

with the figurative elements. Animal motifs dominate, but there are also representations of the human figure in stiff, formal hunting scenes. Most of the textiles are woven in two contrasting colours, brown, blue or black with an off white. Most patterns are reversible, so that there is either a light pattern against a dark ground or vice versa.

A variety of pottery types eitheremploy a mainly linear incised technique with an almost monochrome colour effect, not unlike some of the simple textile patterns (the glazes are dull brownish-white, while the glazed incised design appears dark or light red) or a more complex type, with its vividly coloured glazes and elaborate figurative designs [Grube, 1966, p.41].

D.3.3.4 The Seljuks and Ayyubids

In the eleventh and twelfth centuries orthodoxy reasserted itself. The Seljuk Turks, a Central Asian people who established themselves in Iran (the Great Seljuks 1037-1157) and Anatolia (the Seljuks of Rum 1077-1300), destroyed the Buwayids and occupied Baghdad in 1055, taking the Abbasid caliph under their 'protection' [James, 1974, p.9]. The Seljuks created an independent kingdom in Persia. During their reign which lasted until the Mongol conquest in the early thirteenth century, the region under their control saw its highest form of cultural development in Islamic times. The Seljuk Turks, who took over Anatolia in the twelfth century dominated most of the Muslim world [Grube, 1966, p.70] (Khurasan, Iraq, North Syria, Turkey and others) [Marzouk, 1965, p.80].

At the same time, Salahdin Al-Ayyubi put an end to the Fatimid Khalifah, founding a dynasty, the Ayyubi, which controlled Egypt and Syria until the middle of the thirteenth century [James, 1974, p.9].

(a) Architecture

During this period many architectural elements had been introduced, among them the Iwan; it is a hall inserted in the centre of each side of the courtyard that interrupts the two-storey running arcades, within the original plan of the mosque or the madrasah. The other architectural element introduced was the dome chamber above which a row of blind niches with painted arches transformed the square into the circle of the dome. This element became the standard design for the intermediary zone and appears with variations in all major buildings of the period. The new features exemplified in these buildings were later to serve as models for Mongol architecture.

Moreover, the Seljuks developed a great number of architectural forms, notably the religious school complex (Madrasah). This consisted of an open courtyard surrounded by rooms, small iwan-halls that served as classrooms, and often a domed chamber mosque on one side, as in the Al-Mustansiria Madrasah in Baghdad (Figure D.44a).

During this period many tomb towers and shrines were built acting as monumental features throughout the cities, for example the Tomb of Zoomorad Khatoon in Baghdad (Sitta Zubayda) (Figure D.12c).

(b) Decoration

Figure decorations appeared on Seljuk pottery from the mid-twelfth century onwards. At first the decoration was carved or moulded while the glaze was monochrome, though on the lakbi carved wares several colours were used. Sometimes decoration was applied directly onto the pots, painted in black slip under a clear or coloured glaze to create a silhouette effect. Birds, animals and fabulous creatures and human figures appear - the silhouette figures often stand alone though it is usual for human and animal forms, whenever they occur, to be superimposed on a foliate background.

Figure painting on pottery advanced rapidly with the introduction of minai and lustre. The minai enabled many colours to be used and the result is something like manuscript illustration, an effect increased by the frequent absence of a foliate background.

Although the compositional structures of minai painting are part of the Mesopotamian and Seljuk traditions of pre-Mongol manuscript illustration, the rapid graphic style is relatively little used in those traditions.

Another extension of representational imagery peculiar to this time is the intrusion of figures into the domain of calligraphy in the form of human-headed letters, and people and animals intermingling with script, a fact that indicates the strength of representational art during this period [James, 1974, pp.42-44].

A group of illustrated manuscripts is usually attributed to Baghdad - these are copies of the Arabic work of the Maqamat (assemblies) of Al-Hariri. The miniatures in these manuscripts are among the most impressive paintings of the entire Middle Ages. They represent the culmination of the tendency towards naturalism referred to above and give a complete picture of life among the urban people of the thirteenth century Islamic cities [James, 1974, pp.42-44].

D.3.3.5 Mosul

Mosul was another important centre of artistic production, in the north of Mesopotamia in the twelfth and thirteenth centuries. "The city was not controlled by the Seljuks" [James, 1974, p.44] "and was affiliated to Syria" [Philon, 1978, p.246].

However, the availability of good stone has left us with rather more evidence about art in this part of Mesopotamia and even if no excavations have been made and not much survives in the way of architecture, there is a quantity of stone sculpture laying above ground, all carved in an independent and individual style.

(a) Architecture

An essentially stone architecture developed, although brick was also used. Distinguished for its pointed pyramidal roofs with interior muqarnas domes, and for the extensive use of grey-blue marble, this architecture featured terracotta brick decoration and also glazed tiles, especially on minarets. The inlaying of marble with paste, especially for inscriptions originated in Mosul in the twelfth century.

Reserved for mihrabs, doorways and wall facings, marble was deeply carved with arabesque design [Rice, 1965, p.98]. Examples for this period are the Mosque of Nūr ad-Din (Figure D.32.c) and the Tomb of Imam Yahya.

(b) Decoration

During the reign of Badr ad-Din Lulu, animal and human representations became important elements of the decorative vocabulary [Philon, 1978, p.246].

In Mosul there arose an important school of metal work [James, 1974, p.44] which shows a certain amount of Seljuk influence.

D.3.3.6 Baghdad in the Later Abbasid Period

The later Abbasids produced an eclectic form of architecture by knitting together in the madrasa, the monumental arched entrances of the Seljuks and the internal portal scheme (pishtaq) as at Ukhaydir. Pointed and segmented arches and vaults, cross-vaults, domical vaults, muqarnas vaults and domes were all employed.

Surface decoration was notable for the combination of brick or stucco strapwork set with intricately carved terracotta in bold patterns against a spiralling ground, usually on a single plane. The combination of lines and terracotta inserts creates geometric patterns with three-dimensional effects.

The architectural and decorative techniques of the late Abbasids was further refined in subsequent dynasties. By the fourteenth century, larger surfaces were covered in finely carved terracotta, forming geometric designs in different layers of relief [Philon, 1978, p.246].

D.3.4 IRAQ AT THE END OF THE ISLAMIC ERA

At the beginning of the thirteenth century the eastern part of the Islamic empire experienced the terrifying holocaust of the Mongol invasion, which turned northern and eastern Iran into a desert and, in 1258, extinguished the control of the Abbasid Khalifah when the city of Baghdad was sacked and the last Khalifah put to death.

This period pointed to the end of the role of Iraq as a leader of the Islamic empire. After the Mongol invasion the eastern part of the Islamic empire split up into several distinct areas.

The fall of Baghdad did not completely end the reign of the Abbasid Khalifah. As the Marmadukes owed allegience to him, and after the destruction of Baghdad by Mongols in 1258, they set up a relative of the last Khalifah in Cairo. His descendants continued in office until 1517 when the reigning Khalifah was taken to Constantinople by the Ottomans, where the Sultan assumed the title.

The Ottomans were one of the many Turkoman tribes which superceded the Seljuks of Anatolia, but became strong enough to extend their power over the whole of Asia Minor and to destroy the remains of the Byzantine empire, capturing Constantinople in 1453 [James, 1974, pp.9-12].

From this time another Islamic era started, although not accompanied by the massive developments and innovations of the early period.

As far as Iraq is concerned this period, until 1924 [Marzouk, 1965, p.84] was a "dark age" for the development of Iraqi culture.

D.3.5 BAGHDAD DURING THE OTTOMAN PERIOD - AD1405-1916

Iraq, in particular Baghdad, had suffered 500 years of Turkish rule because the main interests of the Turkish governor was to collect taxes and send them to the imperial capital which was Constantinople. In AD 1831, a great plague spread in Baghdad which killed approximately four-fifths of the population. The population was reduced from 150,000 to 30,000 [Hakim, 1973, p.11]. In AD 1832 the Tigris flooded Baghdad, which demolished most areas of the city. The city was rebuilt afterwards and the curve of urban growth began to rise. In AD 1953, the population was 60,000 and Baghdad was composed of the eastern part (Russafa) and the western side (Karkh). In addition, there were the main settlements on the northern peripheries of the original city, Kadhimiya on the west bank of the river and A-dhamiya on the east bank of the river (Section G). Due to growth of the city the Turkish governor ordered the demolition of the western wall of the city and replaced the western walls by a flood-protecting dyke [Gulick, 1967, pp.246-247].

This growth in the city continued especially on the eastern side of the Tigris, whereby in 1914, the population was 150,000. This period ended when Amir Faisal revolted against the Turks in 1916, in Mecca.

D.3.6 GEOMETRIC PATTERNS IN ISLAMIC DESIGN

As has been mentioned in different parts of this section, geometric patterns have characterised Islamic art, i.e. architecture, decoration, etc. These patterns formed two- and three-dimensional

effects depending upon location and function. The geometric patterns appear in different materials according to availability; various colours and textures were used to emphasise the designed patterns.

The two-dimensional geometric patterns were used mainly to decorate and cover surfaces of different forms and materials, i.e. walls, wooden panels, pottery etc.

To break down the monotony resulting from repeated units, and to create variety or to emphasise particular parts within the basic pattern, different shapes and materials were inserted, i.e. organic and geometric figures or calligraphic letters, to give the final geometric complex.

No records have survived explaining the theory of design of Islamic geometric patterns, but attempts have been made to illustrate how the craftsmen at different times and space in the Muslim world proceeded to apply geometric principles to the practical problems of making geometric patterns.

D.3.6.1 The Principles of the Two-Dimensional and Geometrical Pattern Design

This section includes all design based on the repeat pattern generated from squares inscribed in a circle. The repeat pattern, which gives the design its character, is determined by grid lines drawn between points established by the intersecting sides of the square inscribed in the circle. By inscribing squares within the circle, a geometric method of proportional subdivision of the area of the repeat unit and, thereby, of all the grid lines of the pattern, is achieved.

On the surface to be decorated, one of its sides should be divided into a number of equal parts depending on the number of repeated units required (Figure D.4.1), resulting in filling the area with circles (Figure D.4.2), the diameters of which are equal to the subdivision of the side of the surface being decorated.

Accordingly, the area can be divided into equal square repeating units by the point-joining method (Figure D.4.2).

In each square repeat unit (Figure D.4.2) the proportion of the side of the square ACBD to the side of the square abcd is $\frac{AD}{ad} = \frac{1}{\sqrt{2}}$ so the areas are halved.

In Figure D.4.2 where only the squares of Figure D.4.2 with vertical and horizontal sides are considered, the proportion of the sides of these series of squares is 1:2 which means that the sides are progressively halved and the area quartered.

The points of intersection of the diagonals ac and bd of the square abcd with the circle, formed the square efgh, which is congruent to square ACBD, but with sides parallel to square abcd. The squares ACBD and efgh thus create an octagonal star, which forms the 'master grid' of the unit pattern based on this octagonal star.

A geometric system of harmonious subdivision of the repeat unit can be created by drawing the concentric octagonal stars using the point-joining method (Figure D.4.3). In this system, the proportion of the consecutive parallel sides are $1:\sqrt{2}$ and of the alternate parallel sides 1:2 [El-Said, 1976, pp.8-9].

With little modification of the basic design, that mentioned above, this system enables the designer to create an infinite variation of a design pattern (Figures D.6, D.7, D.8, D.9, D.10).

D.3.6.2 The Three-Dimensional Geometric Pattern

The most characteristic example is the muqarnas or stalactite, a very typical element of Islamic architecture, which can be described briefly as cupola supports in the form of niches, repeated one after the other in the same way as the cells of a honeycomb are repeated, or as crystals clustering together according to the radiation of their axes. The muqarnas permit the clear articulation of any passage between plane and curved surfaces as the transition between a cupola and its rectangular base. The Romans used a different approach to three-dimensional transformation from the rectangular to a circular form, by employing the pendentive, which provides a continuous and, as it were, gliding transition.

The Muslim craftsman brought together a number of honeycomb niches in such a way as to create a gradual transition between the corner and the dome's circular base. Vertically, the niches mount one upon the other; horizontally they are joined together by their arrises which become variously accentuated; when these arrises are extended into space, they look rather like stalactites.

Practically, muqarnas consists of elements which are carved or moulded according to a certain number of models and which can be variously assembled. The ways of their arrangement vary according to the profile of their arches and the degree of concavity of their vaults (Figure D.5a) [Burckhardt, 1976, pp.70-73].

There is a dualistic relation common in Islamic art whereby the relation between figure and geometric pattern can be reversed. In some contexts a geometric pattern will be superimposed on a figure as decoration or conversely, a figure will be superimposed on a geometric background.

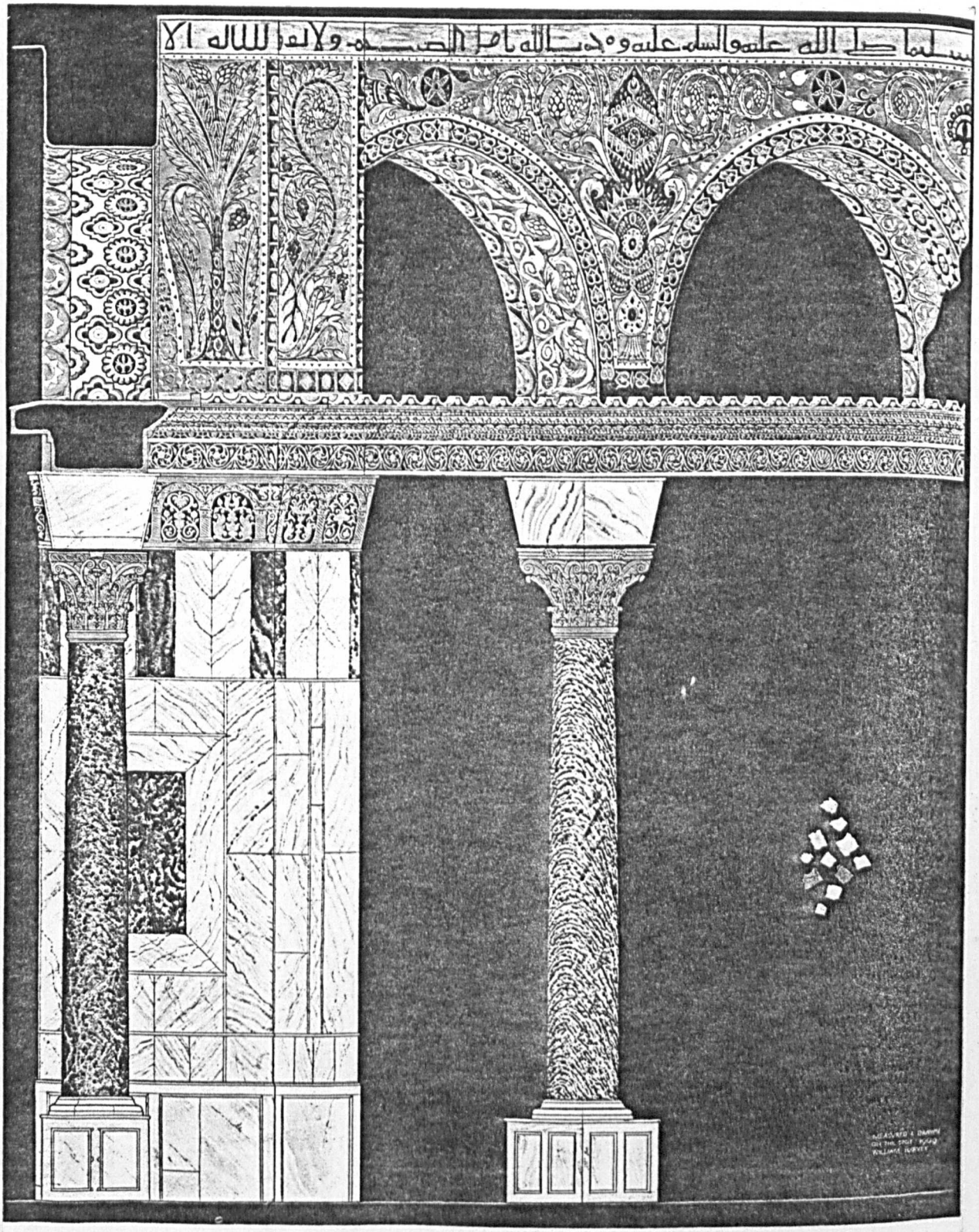
D.3.7 CALLIGRAPHY

As a part of art in the Islamic period, calligraphy plays a major role in decorative design. Two themes have dominated architectural decoration: the first is writing, at times small inscriptions woven into ornament, at other times boldly stated proclamations surrounding a whole monument. The inscriptions are usually either religious quotations, primarily from the Koran or proud lists of princely titles [Grabar, 1978, p.92]. Apart from the naturalistic, semi-naturalistic and abstract geometrical forms used in infinite pattern, Arabic calligraphy played a dominant role in Islamic art and was integrated into every sort of decorative scheme. There are two main scripts in Islamic calligraphy: the angular Kufic and the cursive Naskh [Grube, 1966, p.11]. The second theme consists of designs that sometimes emphasise a specific architectural element and at other times seem purely arbitrary. Vegetal motifs are frequently incorporated in these designs which are rarely copied directly from nature, but their dominant feature is a strong geometry.

Writing and geometry are viewed as arbitrary conventions; intellectual devices that can be manipulated to lead the viewer to a set of values other than those of the surrounding world.

Writing led to God or to an appreciation of princely power; geometry is the basic but invisible skeleton of reality [Grabar, 1978, p.92].

Calligraphy was incorporated as decoration into architectural compositions, often with geometric backgrounds which created a contrast with the free-flowing script of calligraphy (Figures D.13 & D.14).



JERUSALEM: DOME OF THE ROCK. Detail of octagonal arcade.
Measured and drawn in 1909 by the late William Harvey. (By kind permission of his son.)

FIGURE: D.2.

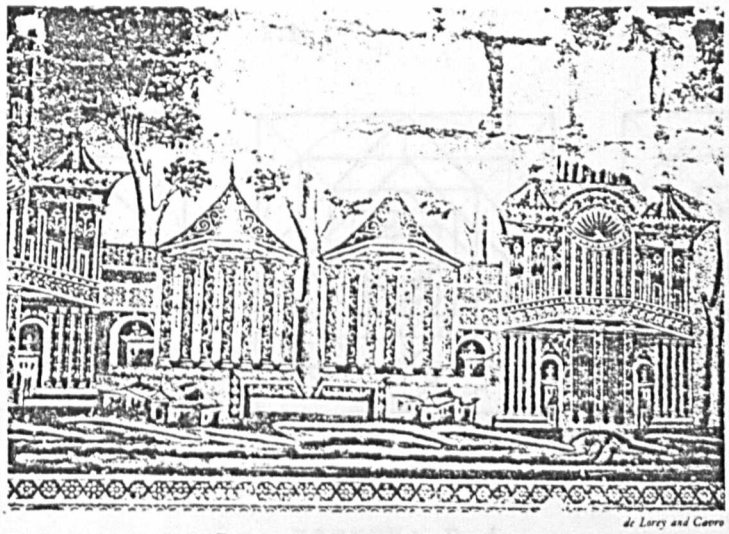
Jerusalem; Dome of the Rock

(Detail of Octagonal Arcade.)

Creswell, Vol.1, Plate 30, 1958

FIG. 399. Village and left wing of the palace

FIG. 400. Extremity of the right wing of the palace, and village



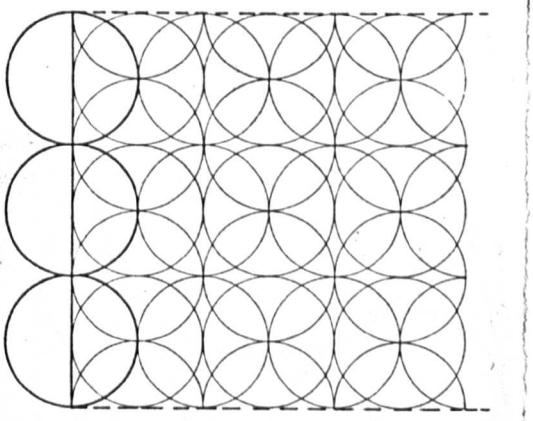
de Lorey and Cerro

FIG. 401. Centre of the palace—the 'tholoi'

FIGURE: D.3.

The Barada Panel: Details of Mosaics.

Creswell, Vol.2, Plate 57, 1958



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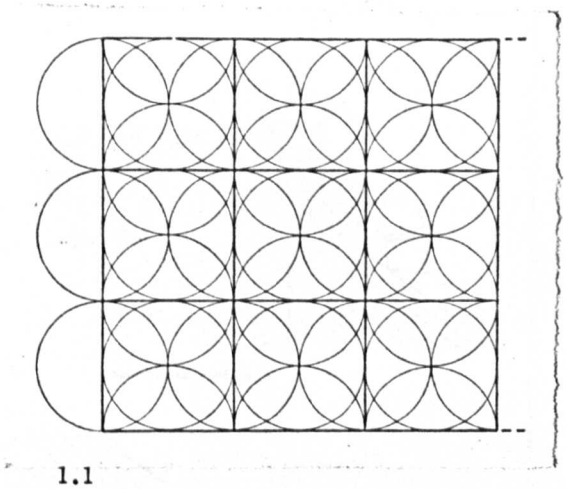

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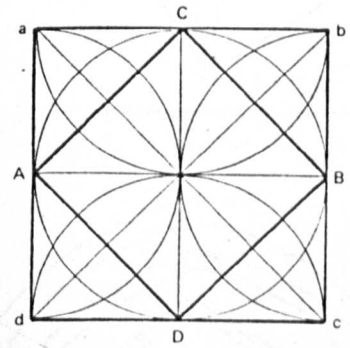

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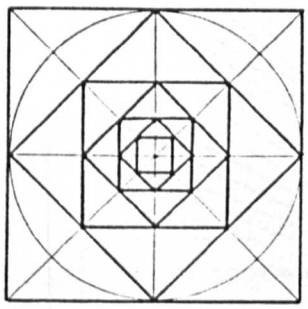

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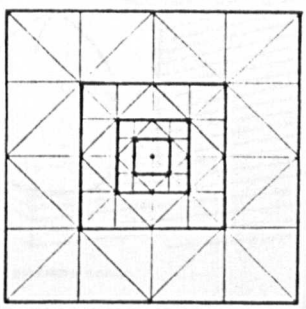

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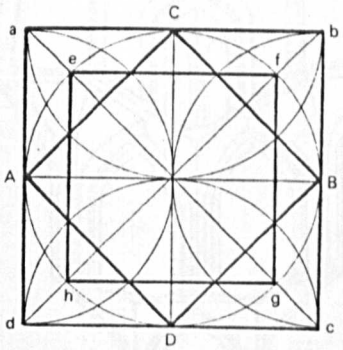

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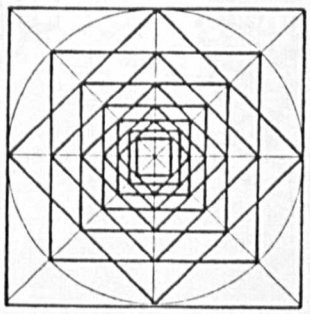

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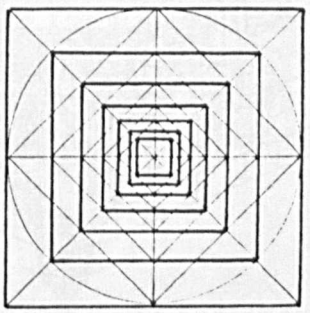
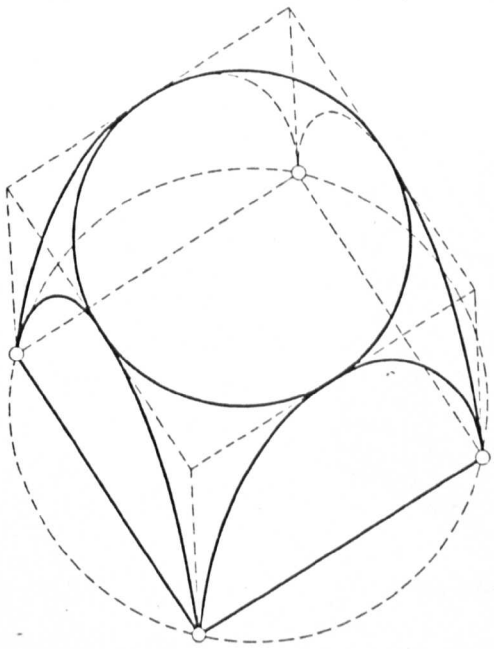


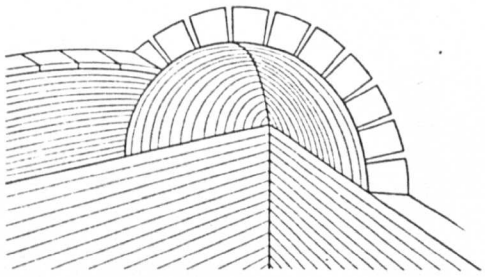
3.2

FIGURE: D.4.
Geometrical Patterns in Islamic Design.

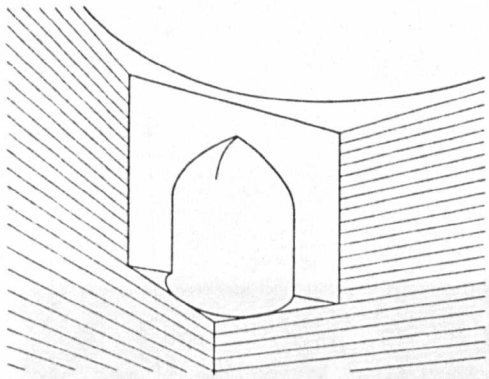
El-Said, 1976, pp.8-9



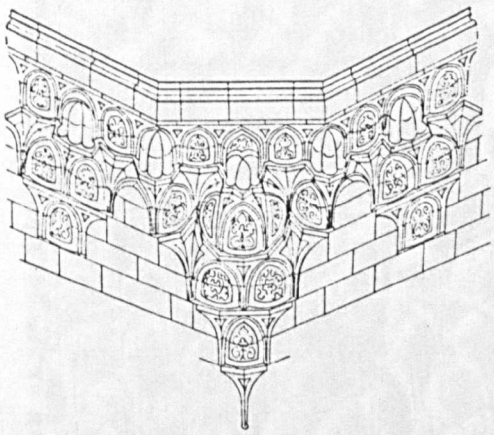
Roman pendentive, a geometrical analysis.



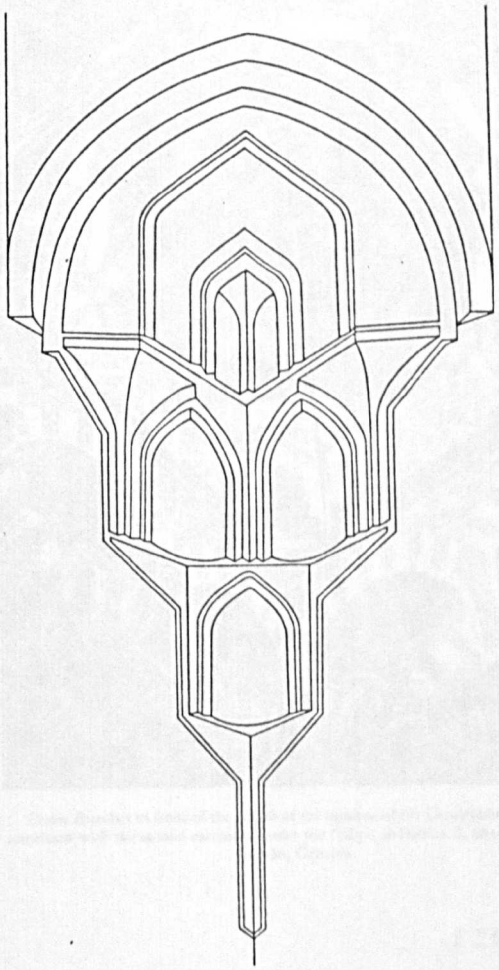
Sassanid corner squinch.



Corner squinch in the form of a niche.



Muqarnas forming a passage from square to octagon.



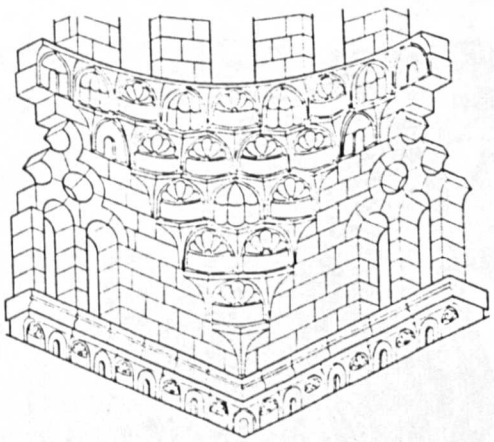
Muqarnas as squinch of a cupola.

FIGURE: D.5a.

Three Dimensional Geometrical Patterns.

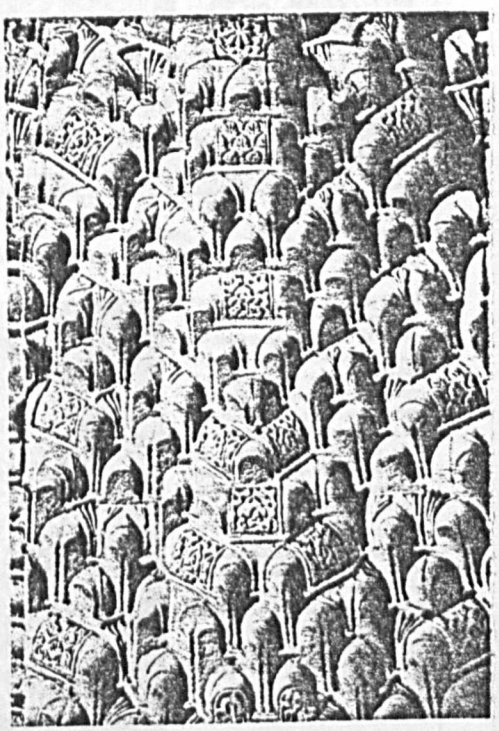
Michell, 1978, p.150

The Sphere and the Cube



Muqarnas forming a passage from square to circle.

Dome chamber in front of the *mihrab* of the mosque of the Umayyads in Cordova, associated with the second extension under the Caliph al-Hakam II, 965–970. Photo: Garzón, Granada.

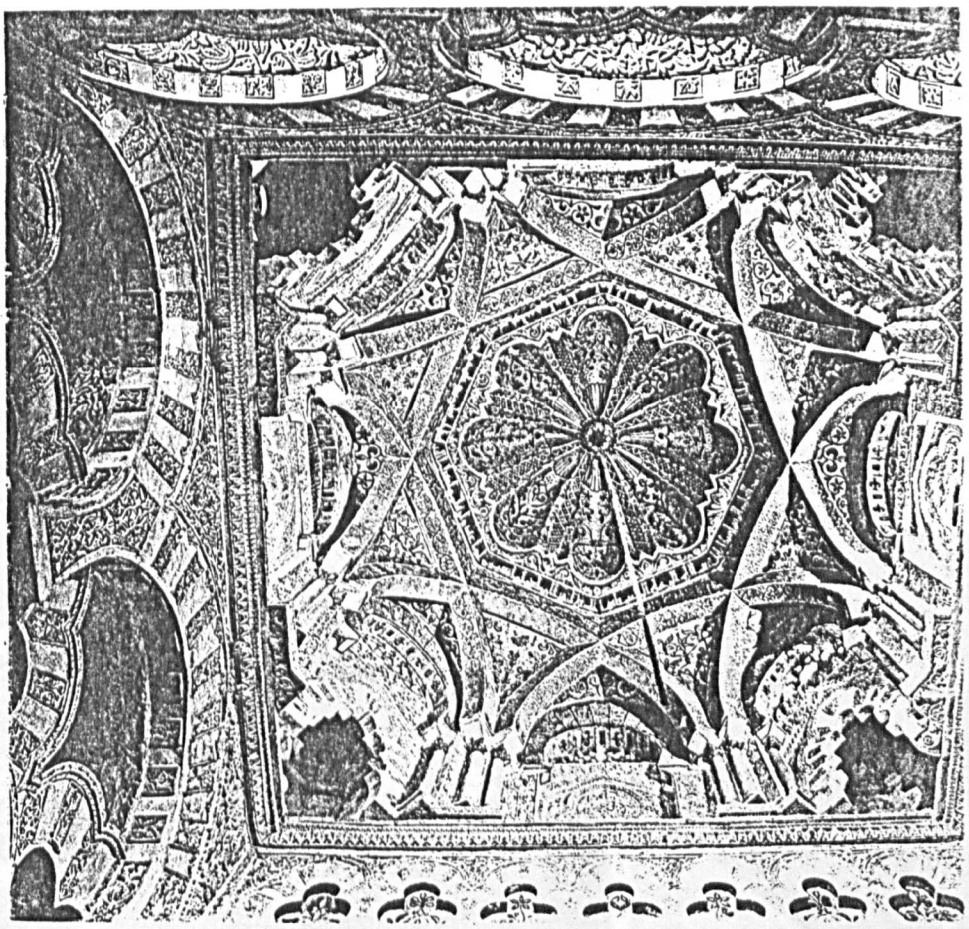


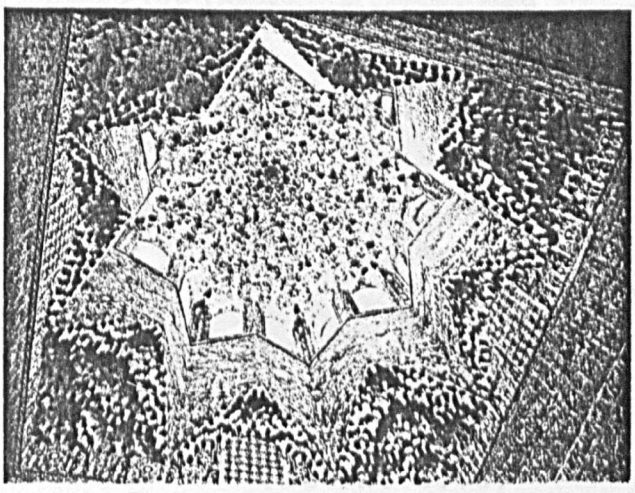
Detail of *muqarnas* from Bu'Inaniyya *madrasah* in Fez, Morocco. 14th century.

FIGURE: D.5b.

Three Dimensional Geometrical Patterns in Use.

Kuhnel, 1966, p.188





The ribbed dome over the bay ir the *mihrāb* in the 10th-century m Cordoba (*above*) is one of many technical improvisations created Muslim builders in Spain. The lob bridging the corners alternate with arches containing clerestory wind lines of the colonnettes framing the are continued upwards to form semicircular ribs linking each ar neighbours on either side, and com form an octagon supporting the don

In the Alhambra (*left*), the last grea Muslim Spain, the octagon is tra into a sixteen-pointed star contain dows, above which the *muqarn* resolves the star into a hemisphere as the display is, ornament has her largely divorced from structure. (41

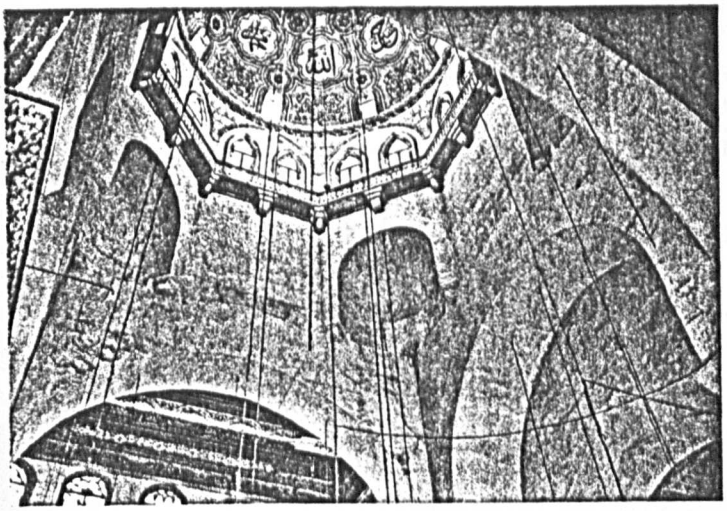
FIGURE: D.5c.

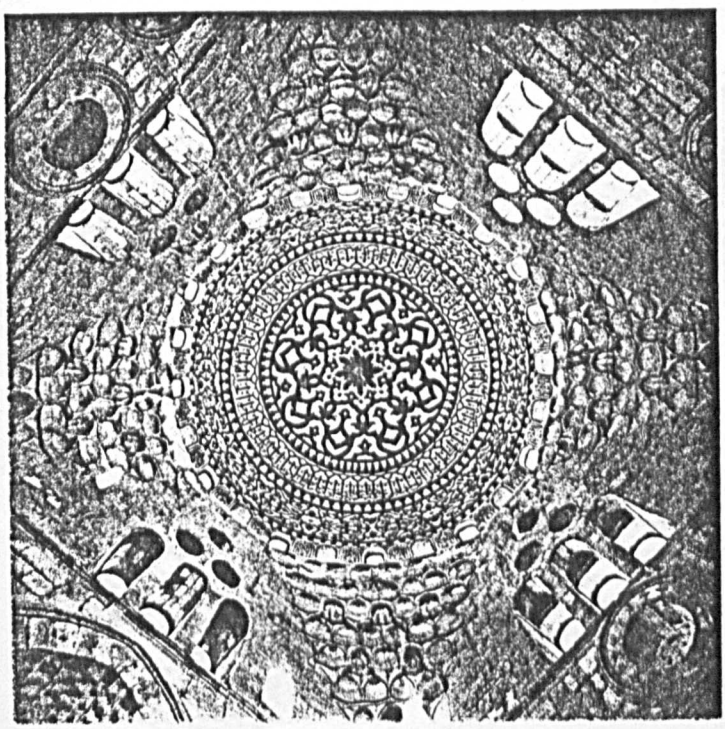
Three Dimensional Geometrical Patterns Used in Domes.

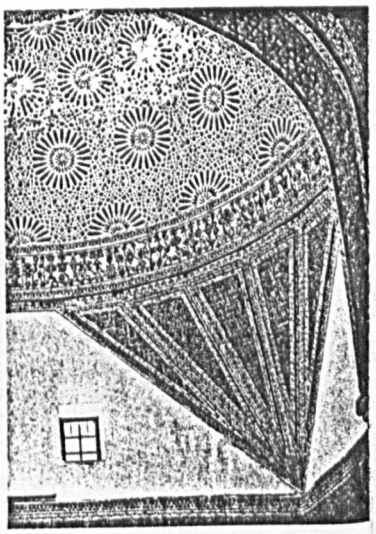
Burckhardt, 1976, p.70-71

The dome

Domes became increasingly characteristic features of Islamic architecture after Seljuq times. More or less structurally stable themselves, they are difficult to place over the square base resulting from rectilinear planning. A safe structural transition has to be made between the square and the circle, and Islamic architects evolved a number of ingenious and beautiful solutions. The simplest was to use corner squinches, creating an octagon which could merge easily into the circle. In a dome of the Great Mosque at Damascus (*left*), built in the 8th century, reconstructed in the 19th, the surface within the squinch is shaped into a small semi-dome, and is load-bearing. Above, an octagonal drum supports the dome. By the 10th century, Islamic architects had developed a technique for bridging the corners by using tiers of superimposed arches. Eventually these arches were organized according to a complex interlocking geometry to produce a stalactite, or *muqarnas*, vault. *Below left:* the *khānaqāh* and mosque of Sultan Barqūq in Cairo. (37, 38)





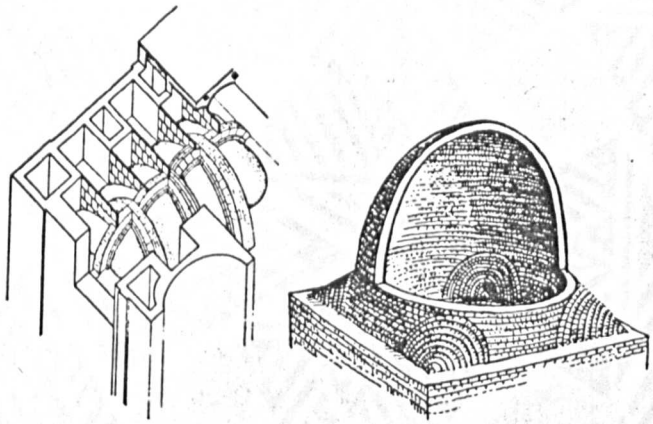


An alternative to the squinch was the pendentive, a triangle of masonry filling the same space. This became the commonest solution in Ottoman mosques, which adapted the standard Byzantine curved pendentive. The Seljuq Büyük Karatay Madrasa at Konya (*above*) employs a variant faceted form consisting of a simple radiating fan of plain surfaces. (39)

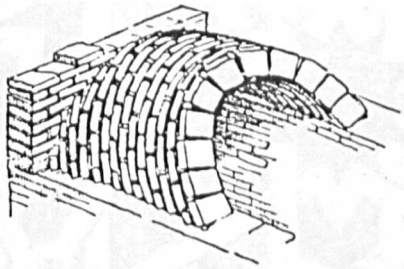
FIGURE: D.5d.

Three Dimensional Geometrical Patterns Used in Domes.

Michell, 1959, p.125



Roofs or upper floors are built on slender cross-walls above the vaults or domes to cut down weight; these rest not only on the ribs but even on the cells between them. (5)



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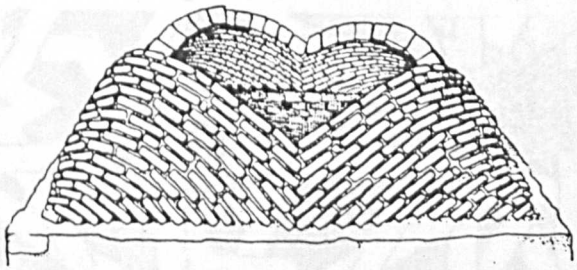
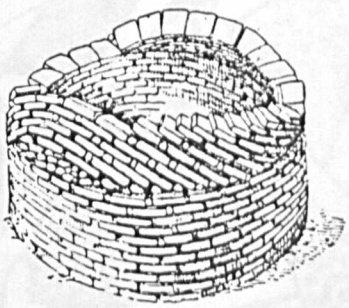


b



c

Traditional methods of building stone or brick vaults without centring: (a) *Brick barrel vault of a type excavated at Khorsabad, 8th century* BC. *Layers of brick 'lean' against the end wall until a complete arch can be formed, whose slope provides the necessary support for the next layer.* (b) *Covering a square space by bridging the corners until the edges meet in the middle: in other words, a diagonal groined vault. Pl. 14, p. 115, shows a vault being constructed in this way today.* (c) *Domed roof to a pit excavated at Khafaje, going back to about 2000* BC; *this again uses sloping bricks, which rise in two vaults to meet at the centre. (4)*

FIGURE: D.5e.

Methods of Constructing Domes.

Michell, 1959, pp.140-141

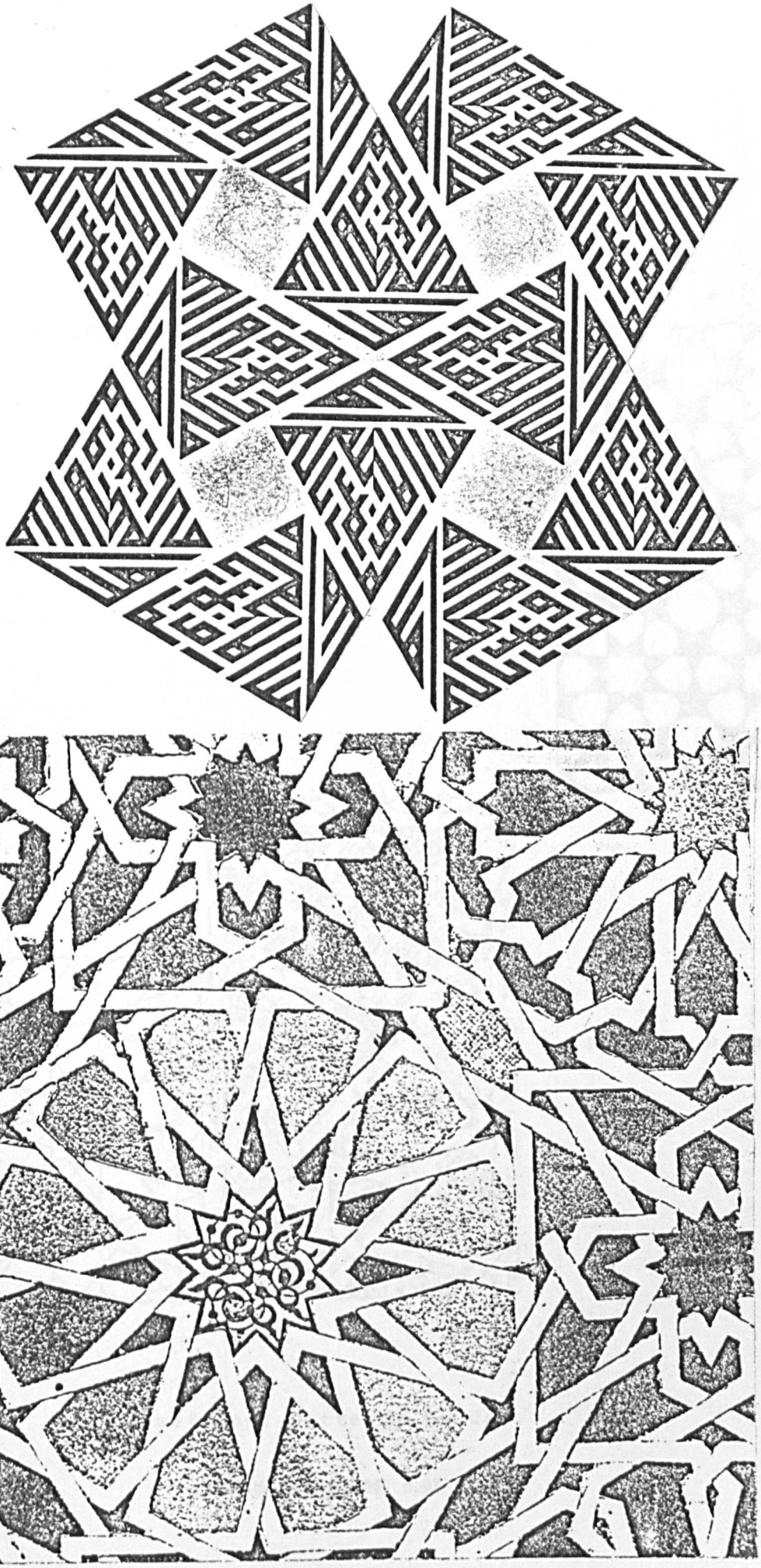
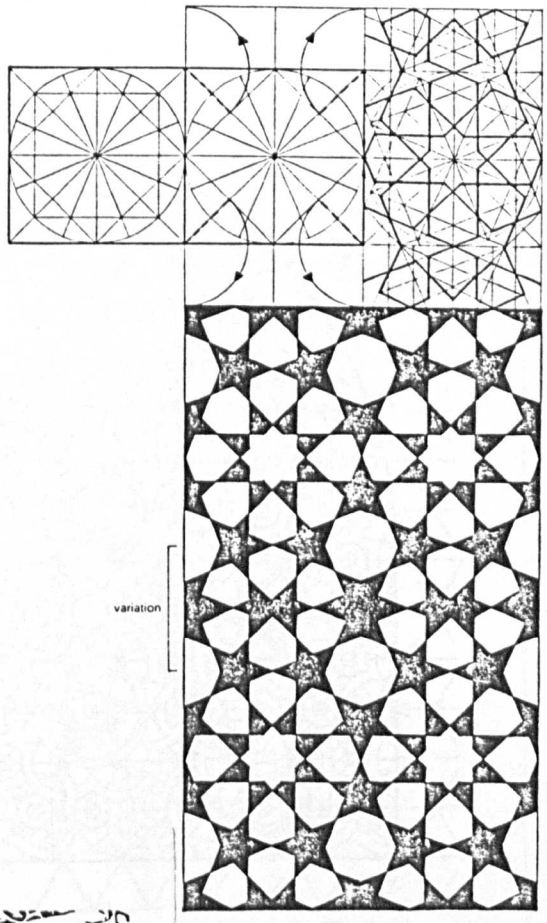


FIGURE: D.6. Geometrical Patterns - Floral and Caligraphical Forms.

El-Said, 1976

FIGURE: D.7a.



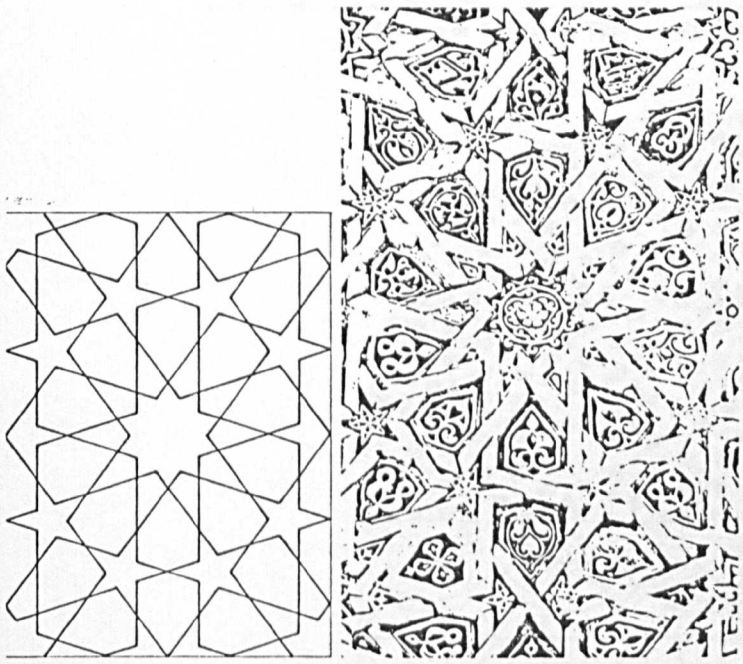
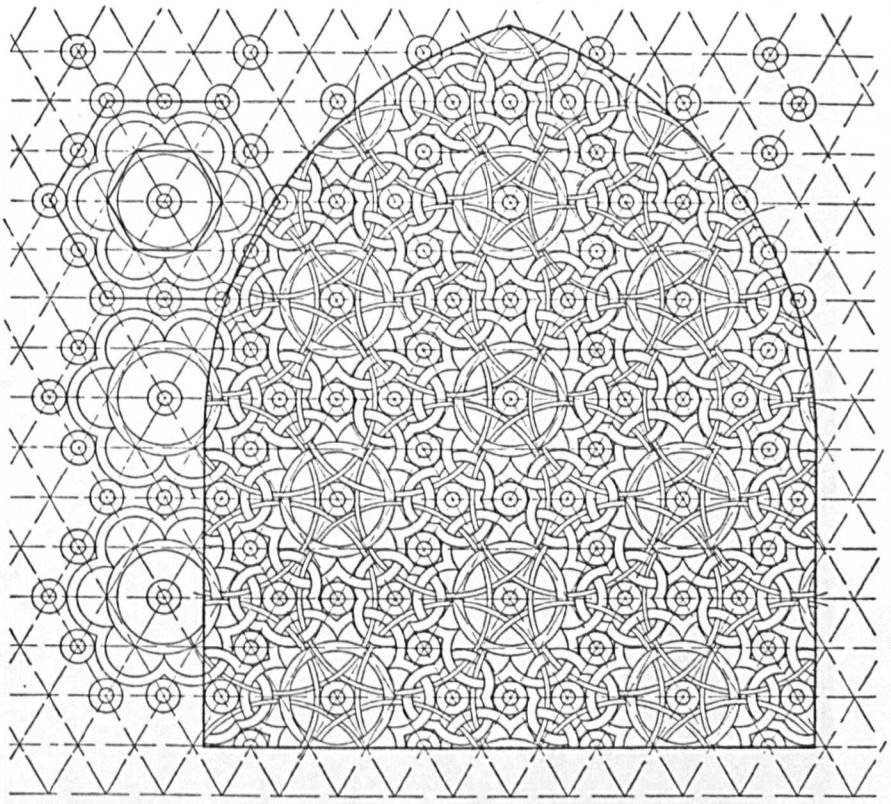


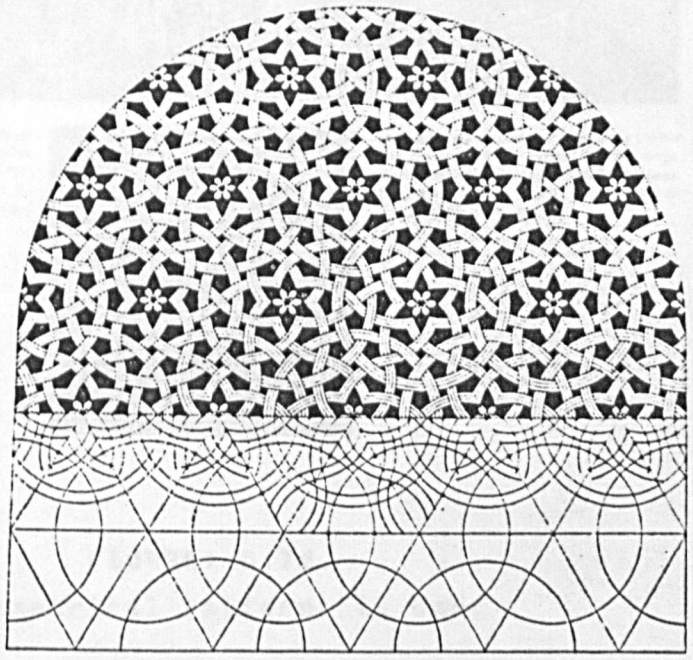
FIGURE: D.7b.

Geometrical Patterns in Use.

El-Said, 1976, p.46, p.93



Mosque of Aḥmad ibn Ṭūlūn: analysis of stucco window grille SE. 16.

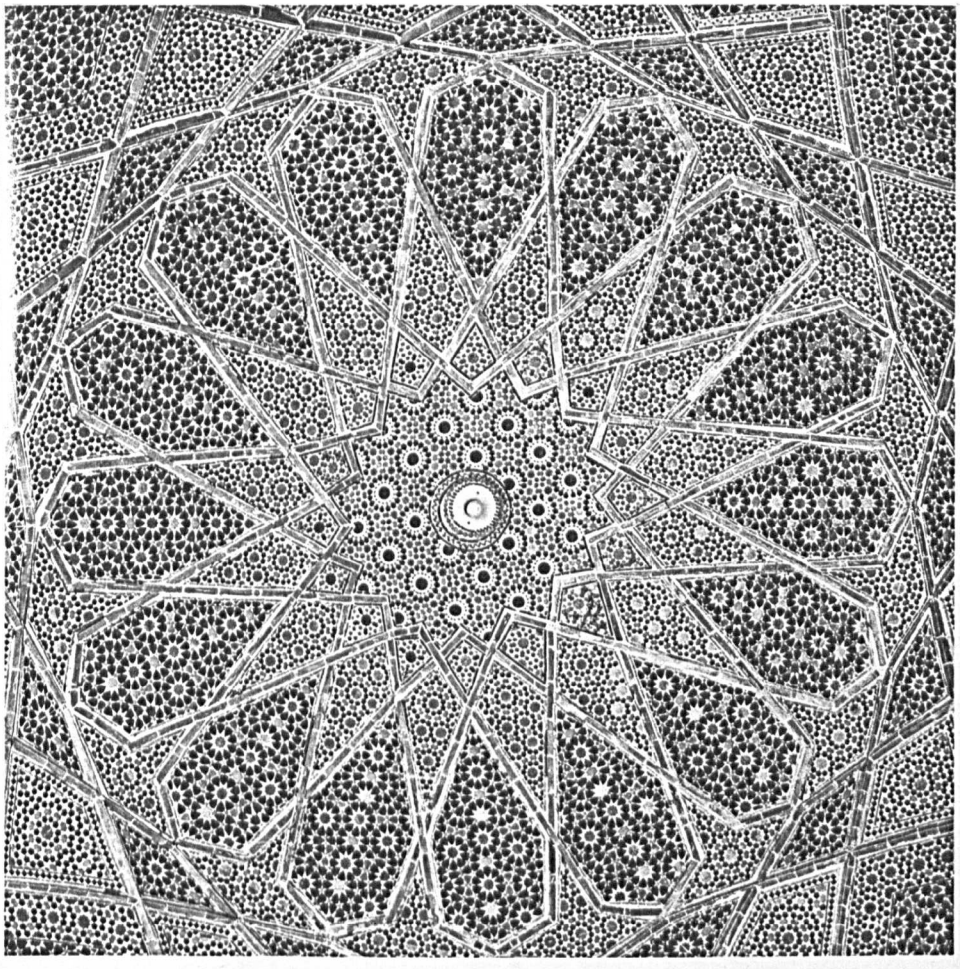


Window grille from Khirbat al-Mafjar and its geometrical scheme.

FIGURE: D.7c.

Geometrical Patterns in Use.

Creswell, 1979, p.348



The star, six, eight, sixteen or more points, is one of the fundamental and ubiquitous shapes of Islamic geometrical design. It can be used equally in two dimensions or in three, to transform a dome into a complex net of interlinked surfaces or to decorate timber and bronze fittings inside the buildings. *Above*: ceiling of the tomb of Hāfiz at Shiraz. *Left*: detail from a door in the *madrasa* of Sultan Hasan, Cairo. (11,12)

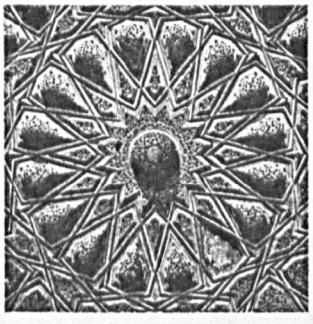
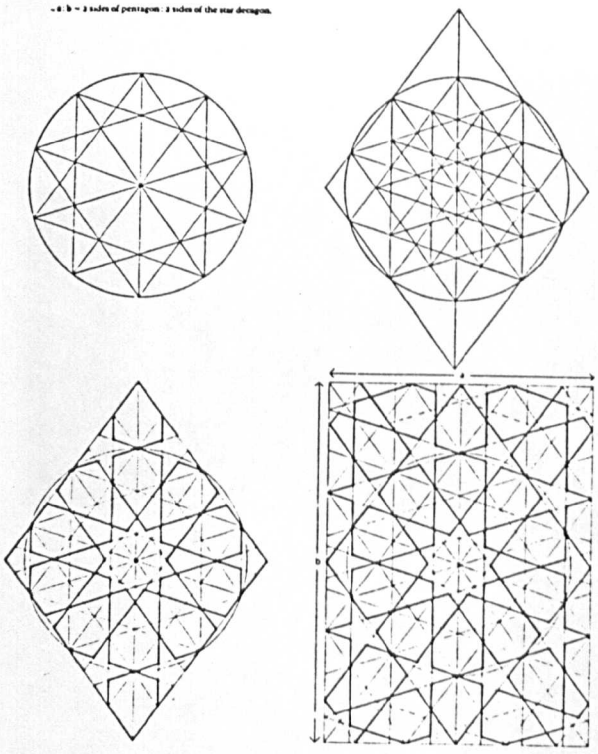
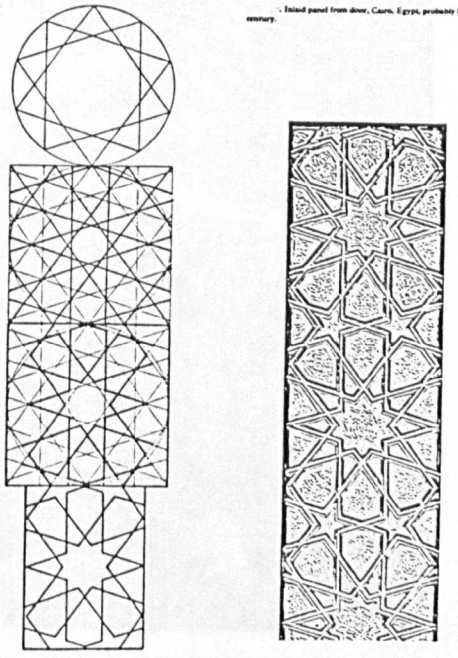


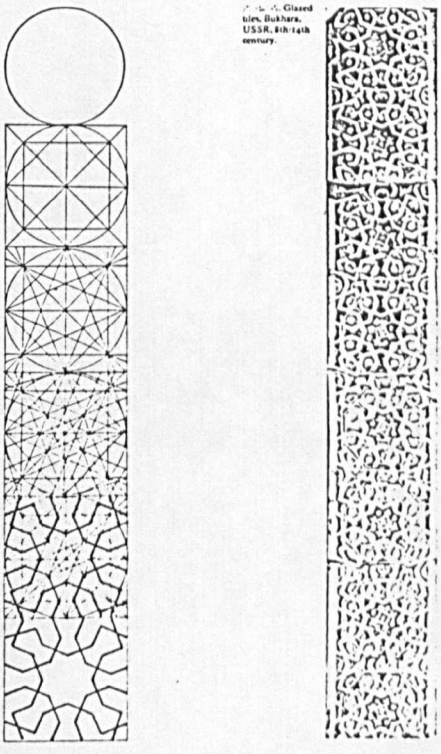
FIGURE: D.7d.

Geometrical Patterns in Use.

Michell, 1978, p.149







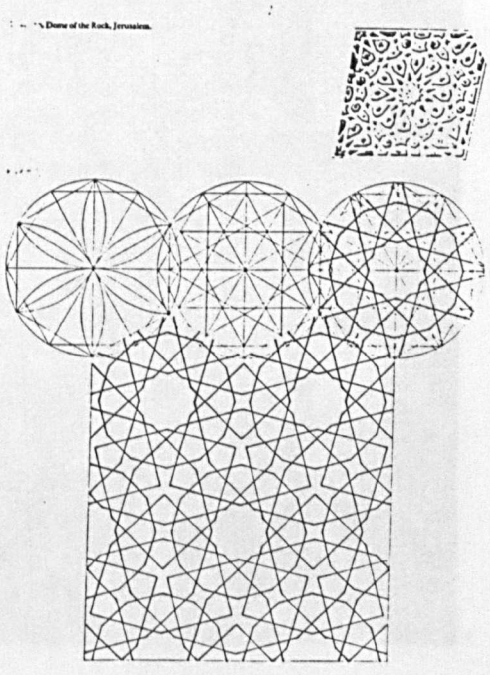
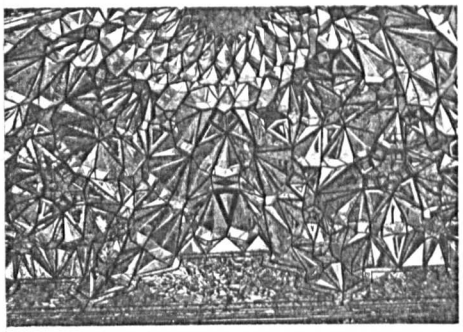


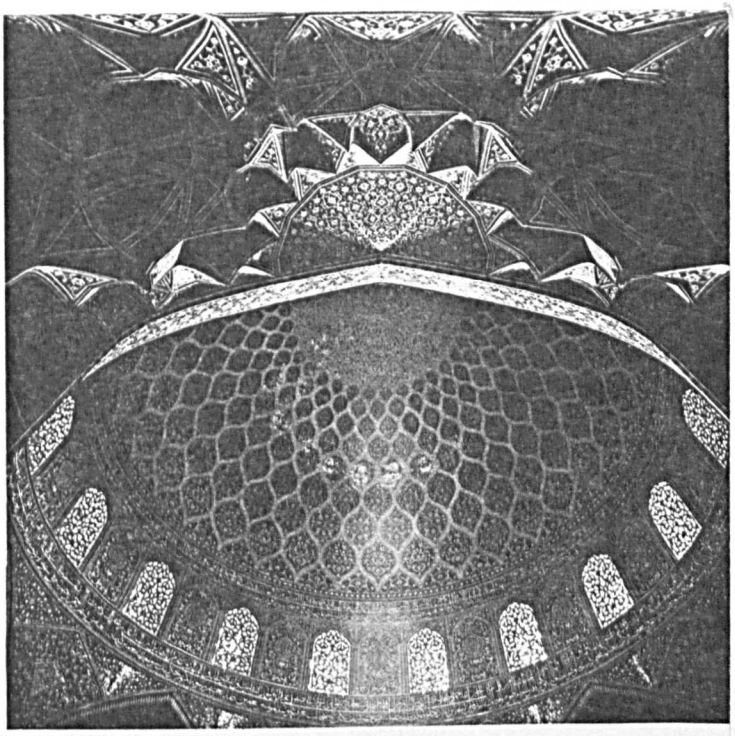
FIGURE: D.8.

Two Dimensional Geometrical Patterns in Use.

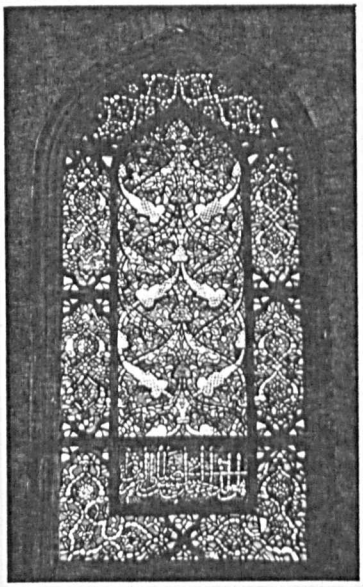
El-Said, 1976, p.143, p.92, p.142

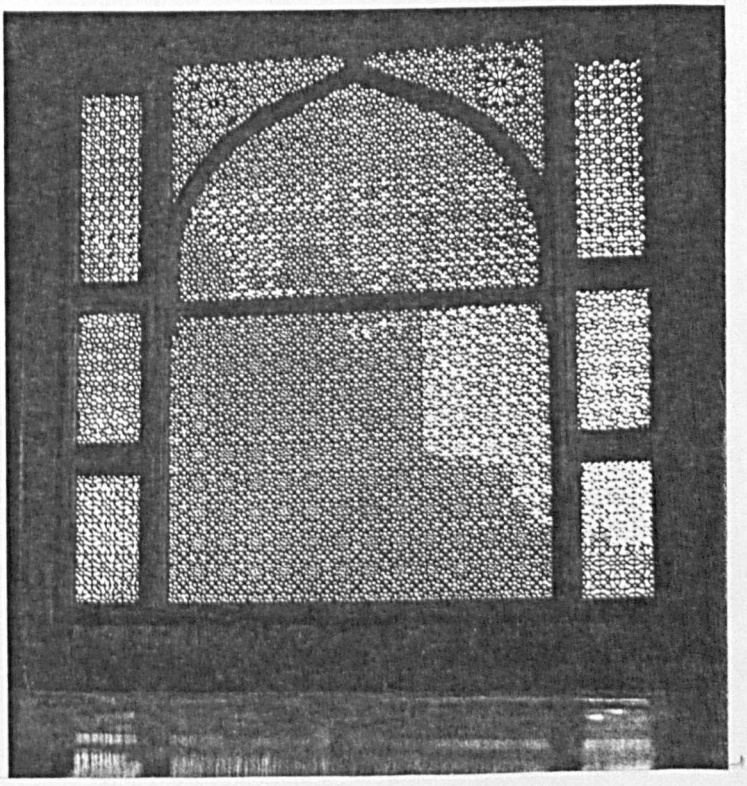
Play of light





Reflected light: the development and multiplication of *muqarnas* cells beneath the domes can be understood by their function in reflecting and refracting light. To accentuate their play of light, shining ceramic tiles and even mirrors are utilized, as in the Shāh-Hamza 'Alī mausoleum at Shiraz. *Right*: a similar effect achieved in the Shaykh Lutfallāh Mosque in Isfahan. *Opposite*: sunlight reflects upwards from a window of the Alhambra, Granada, to be diffused in the *muqarnas* vault. (20, 21, 24)



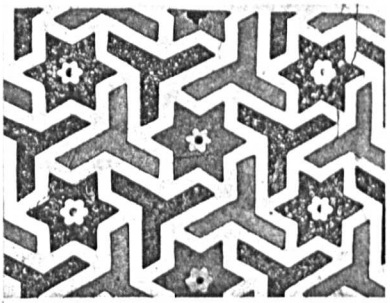


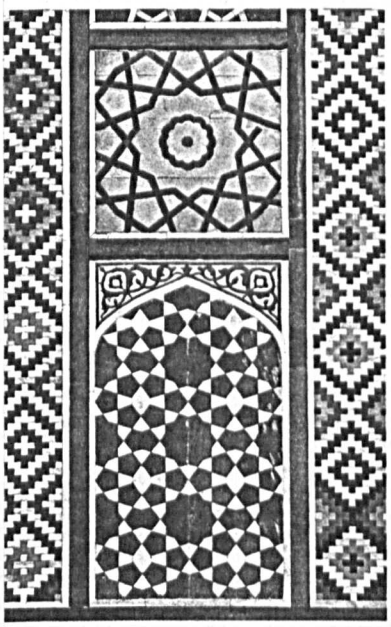
Light penetrating through glass or transparent screens projects patterns onto the already patterned interior surfaces and dissolves the boundaries between solid and void. *Above*: a window in the Süleymaniye Mosque, in Istanbul. *Right*: a screen at Fatehpur Sikri, India. (22,23)

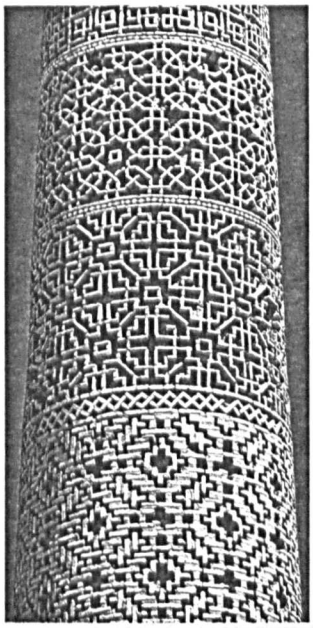
FIGURE: D.9.
The Play of Light in Geometrical Patterns
Using Different Materials.
Michell, 1978, p.152

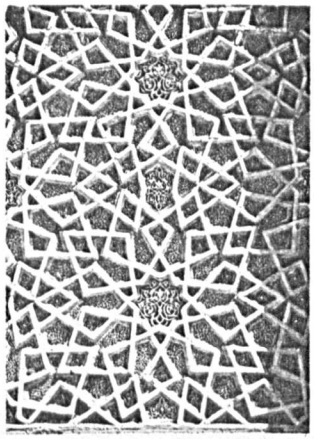
Geometry

Islam transformed geometry into a major art form, using the circle as the basis for the generation of patterns and applying the principles of repetition, symmetry and change of scale to create a bewildering variety of effects. *Below*: detail from the tomb of I'timād ad-Dawla, Agra. (6)

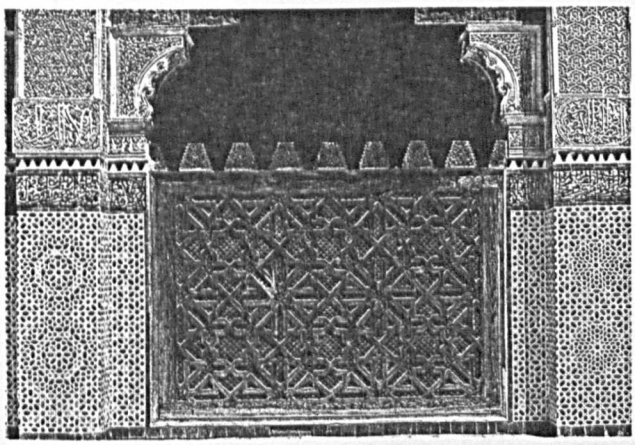








Surfaces, curved or flat, in brick or stucco, are covered by designs that are infinitely expandable. Patterns are rendered visible from a distance by contrasts of plane which permit the play of light and shade. *Left*: the curved outline of the minaret of the Great Mosque at Damghan, Iran. *Above*: part of a stucco panel from the *madrasa* of al-Mustansir, Baghdad. (7,8)



Optical effects achieved by negative and positive areas are created in different coloured stones. On the tomb of Akbar at Sikandra, India, it is applied on a huge scale, yet would be unchanged if the object were a small inlaid box. (9)

Different textures and materials are unified by the geometric principles that govern their design. At the Bū-'Ināniyya Madrasa, Fez, stucco, ceramic mosaic and the wood of beam and screen share a common decorative conception. (10)

FIGURE: D.10.

Floral Designs Using Geometrical Patterns.

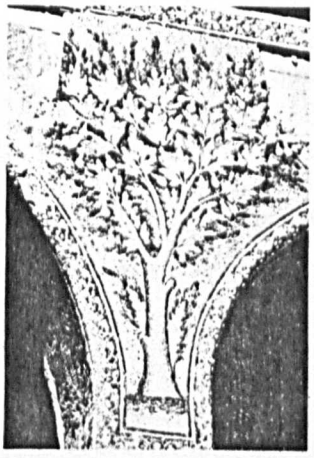
Michell, 1978, p.148

Foliation

The Classical vine and scroll motifs provided Islam with a starting point for a whole repertoire of lithe, living forms, ranging from almost scientific naturalism to the completely abstract art of the arabesque.

Contrasts in early Islam: the Umayyad wooden panel (*far left*) is clearly based on the Classical vine emerging from a vase. Wholly stylized forms (*left*) appear on a stucco dado from Samarra, of the 'Abbāsid period. (25,26)

The endless line of arabesque takes the curvilinear shapes of the vine and scroll and imposes symmetry upon it. *Left*: from the mosque of as-Sālih Talā'i', Cairo. *Above:* carved tombstone in the courtyard of the mausoleum of Timūr at Samarqand. (27,28)



Phases of naturalism: *(from left to right)* spandrel in the Great Mosque at Damascus, dado from the Tāj Mahal, Agra, and Iznik tiles from the harem of the Topkapi palace, Istanbul. (29,30,31)

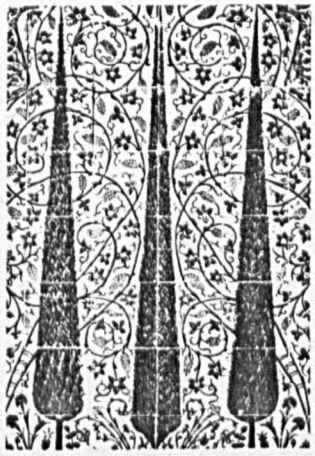


FIGURE: D.11.

Foliage Designs in Geometrical Patterns.

Michell, 1978, p.154

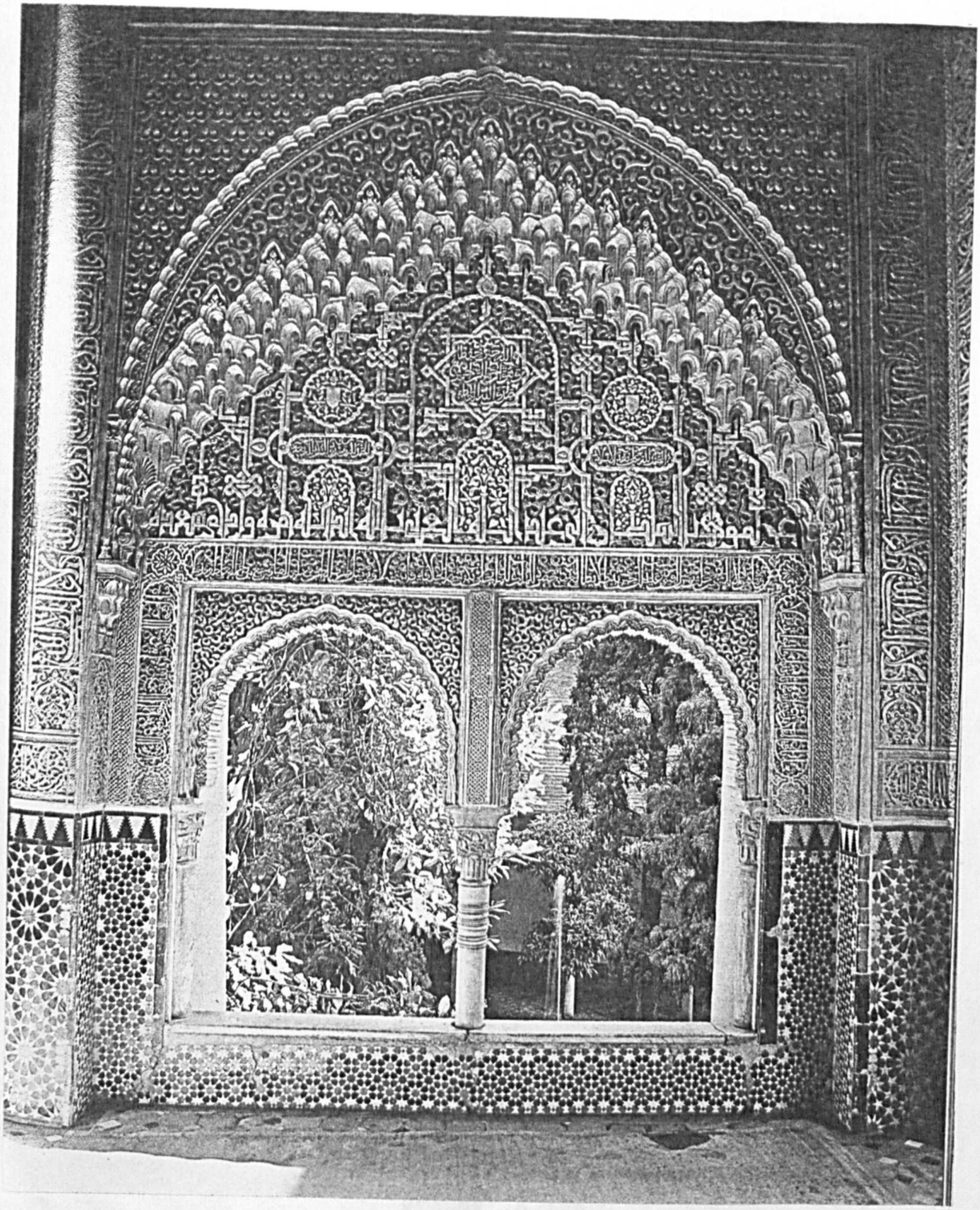


FIGURE: D.12a.

The Composite Use of Geometrical Patterns.

Michell, 1978, p.153

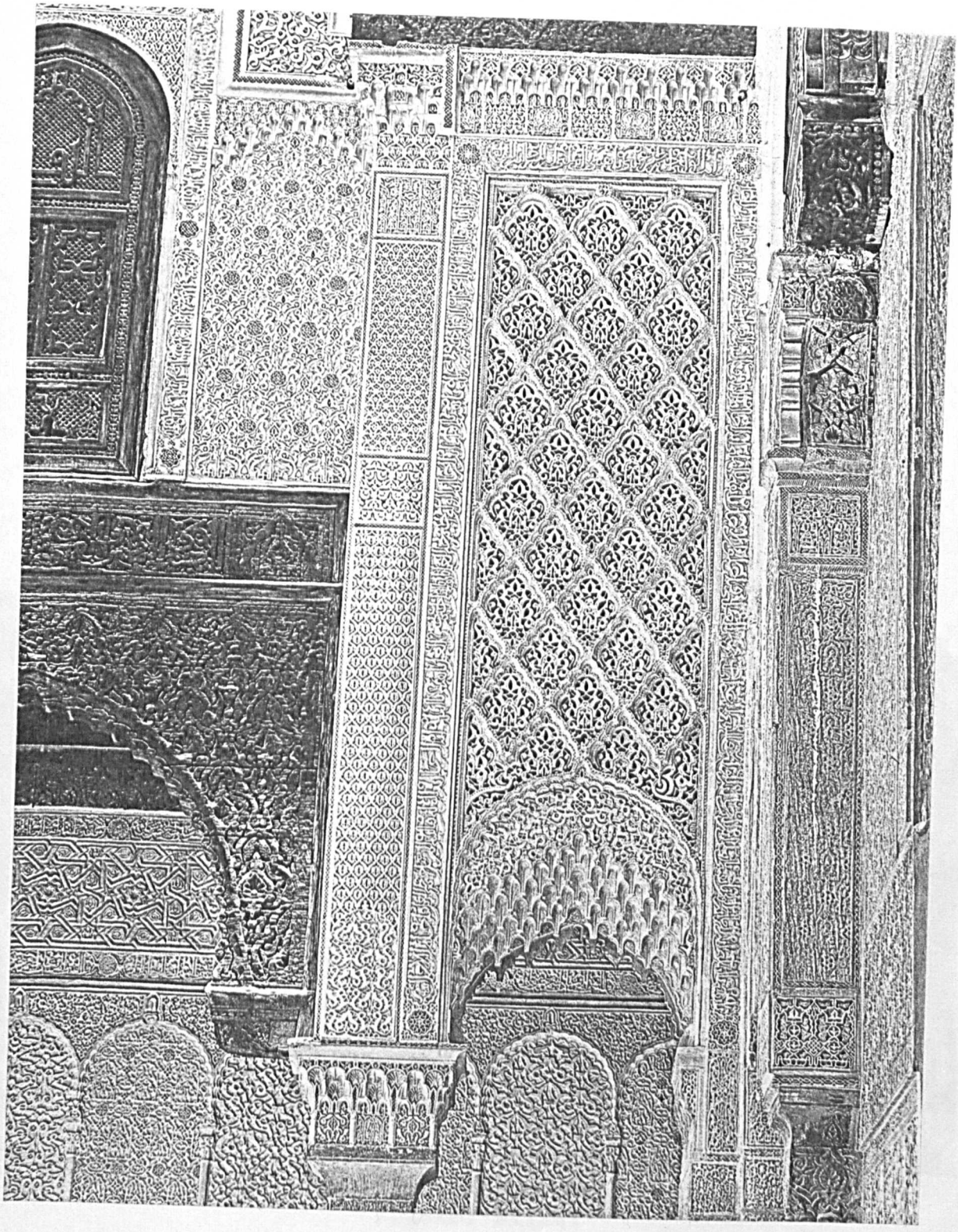


FIGURE: D.12b.

The Composite Use of Geometrical Patterns.

Michell, 1978, p.128

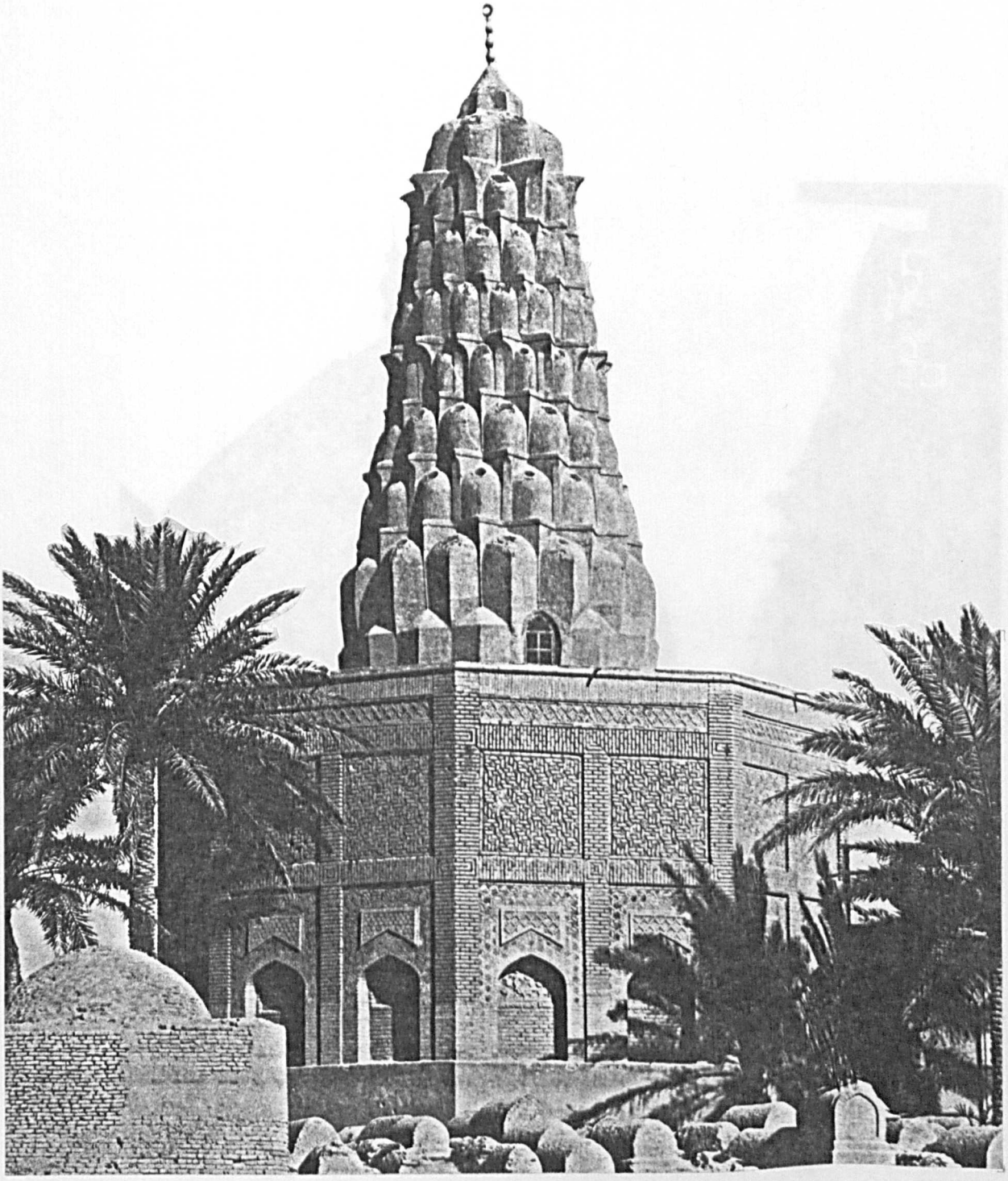
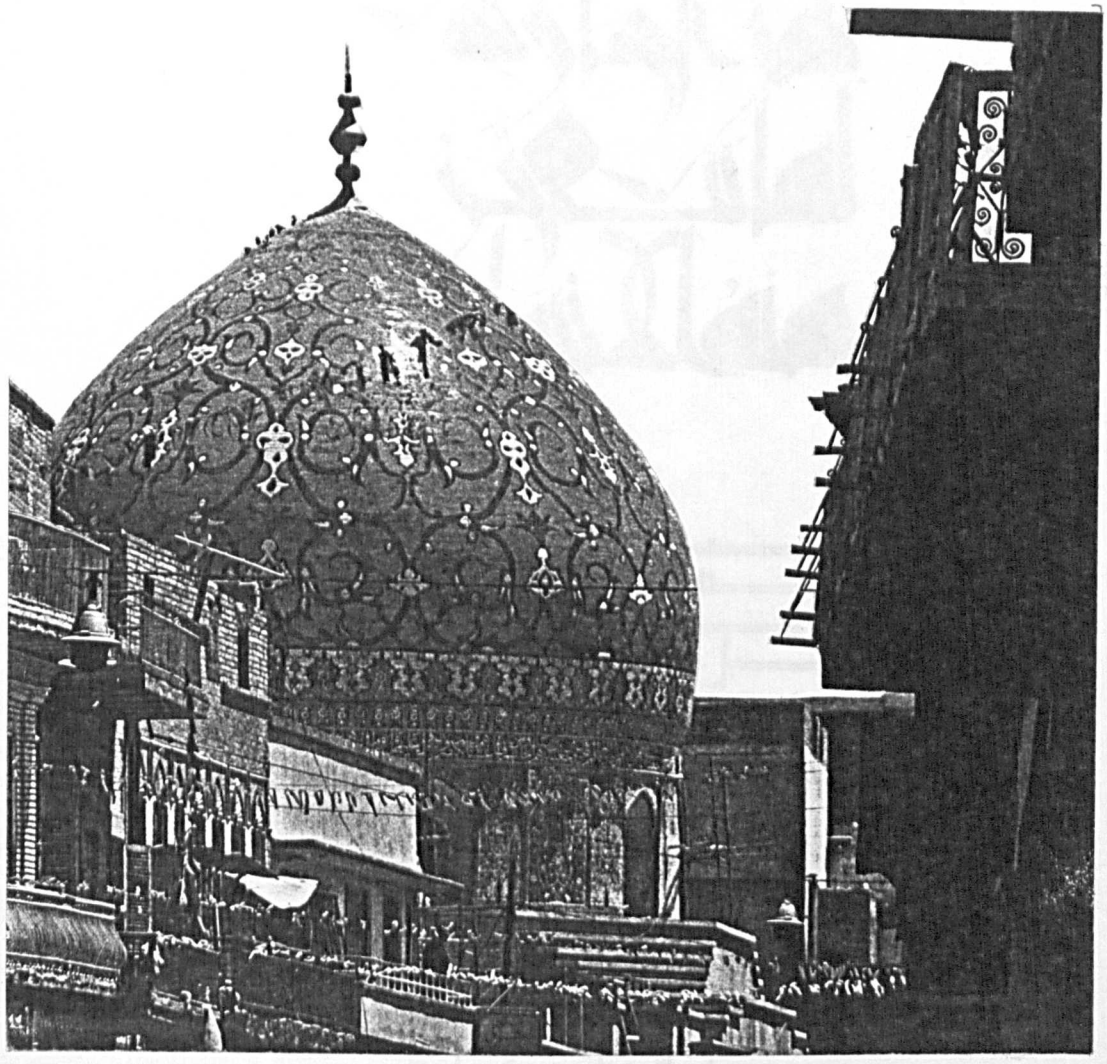


FIGURE: D.12c.

Tomb of Zeomorad Khaton in Baghdad.

The Combination of Two- and Three Dimensional Patterns in Use.

Iraqi Engineers Association, 1969, p.213



Häidar-Khana Mosque: Baghdad.

FIGURE: D.12d.

Arabesque Patterns Using Lustre.

Ministry of Information, Iraq, Baghdad, 1977, p.83

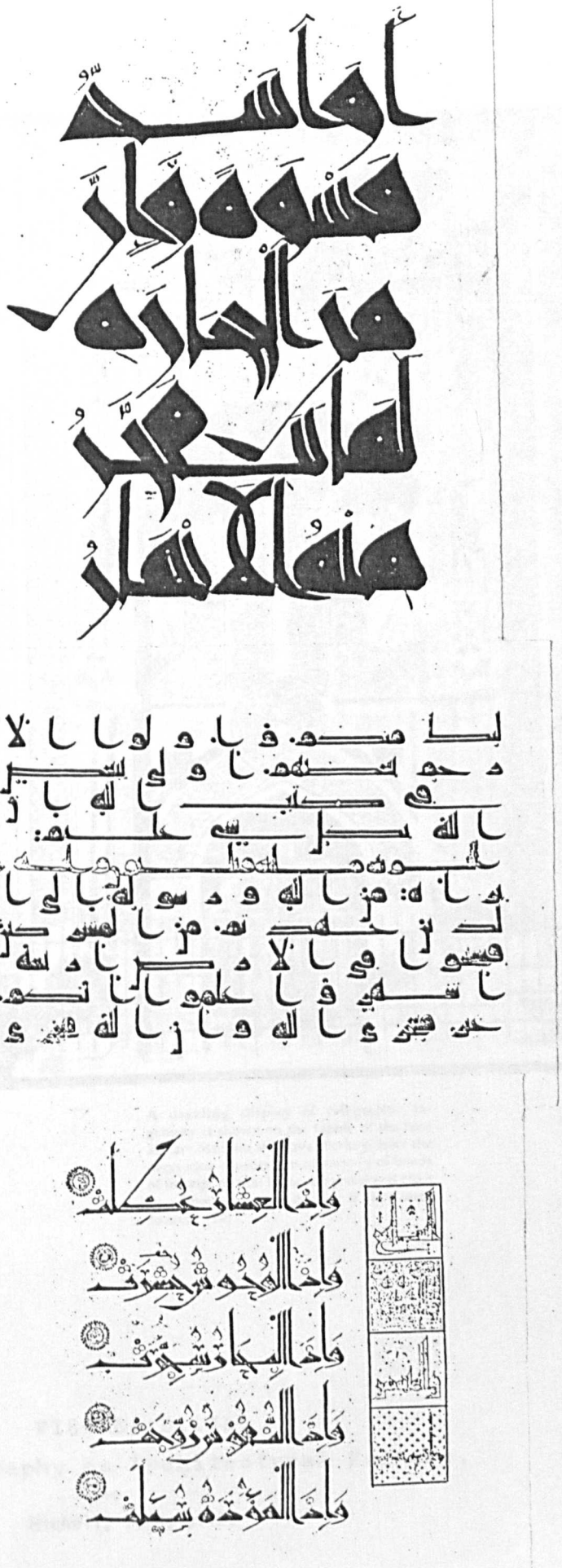
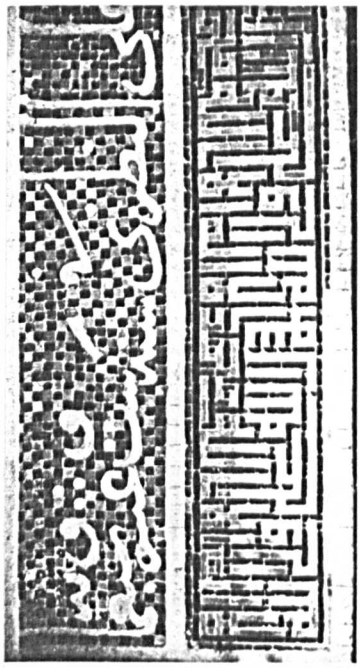


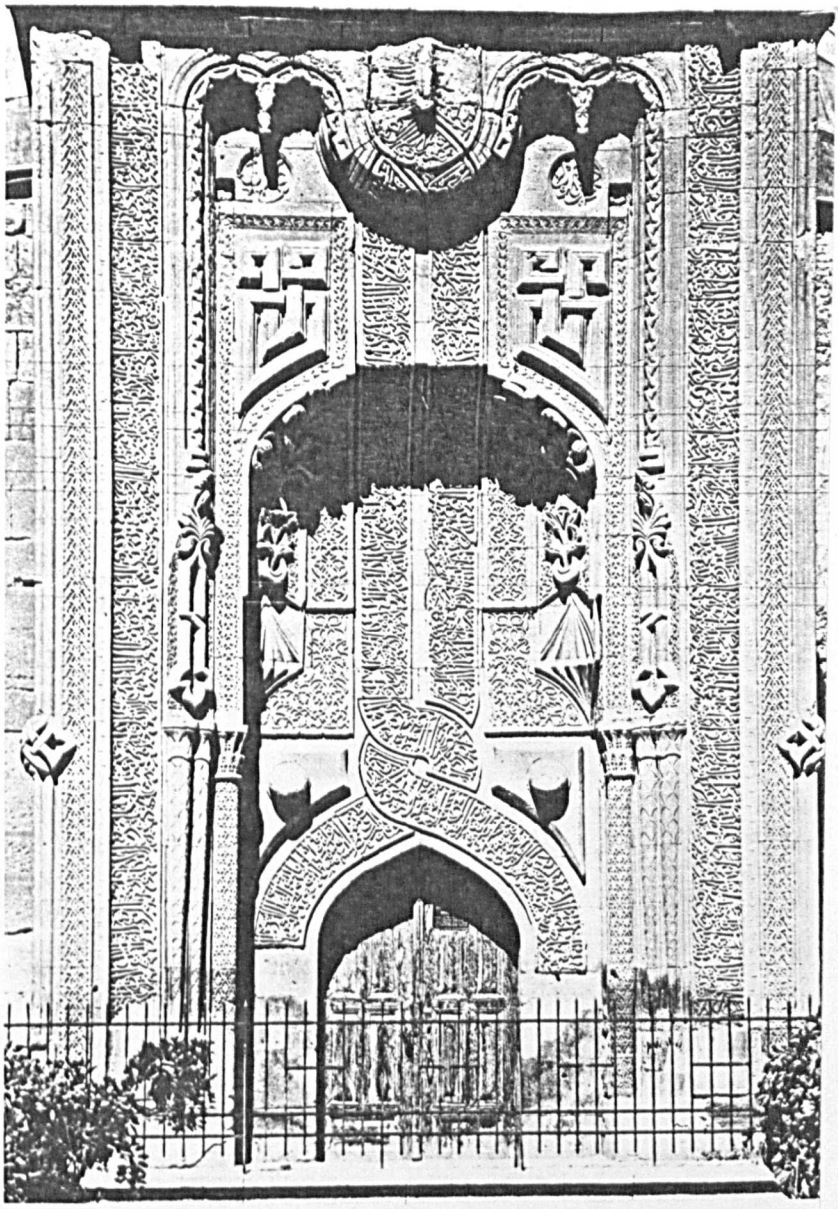
FIGURE: D.13.

Different Styles of Caligraphy.

Lings, 1976, p.7, p.13, p.10



Side by side, cursive script imitating the strokes of the pen and the heavy monumental *kūfī* climb the façade of the monastery, *khānaqāh,* at Natanz in Iran. Arabic reads from right to left, but in architecture is frequently placed vertically. Different styles of lettering are found in different materials, as in the ceramic and inlaid marble of the pier from the Bū-'Ināniyya Madrasa, Fez. (17, 18)



A dazzling display of calligraphic ingenuity is shown on the façade of the Ince Minare Madrasa at Konya, Turkey. Here the decoration consists almost entirely of bands of inscription that frame the portal and cross in a knot above the door as if they were banners. (19)

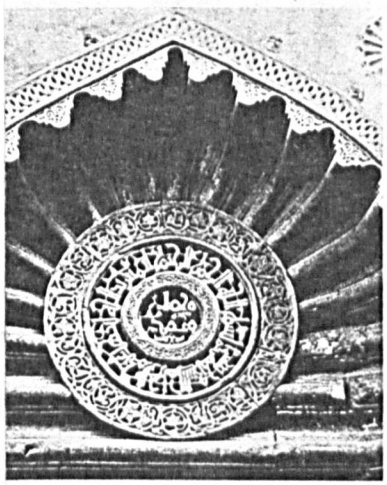
FIGURE: D.14a.

Arabic Caligraphy as Architectural Feature.

Michell, 1978, p.151

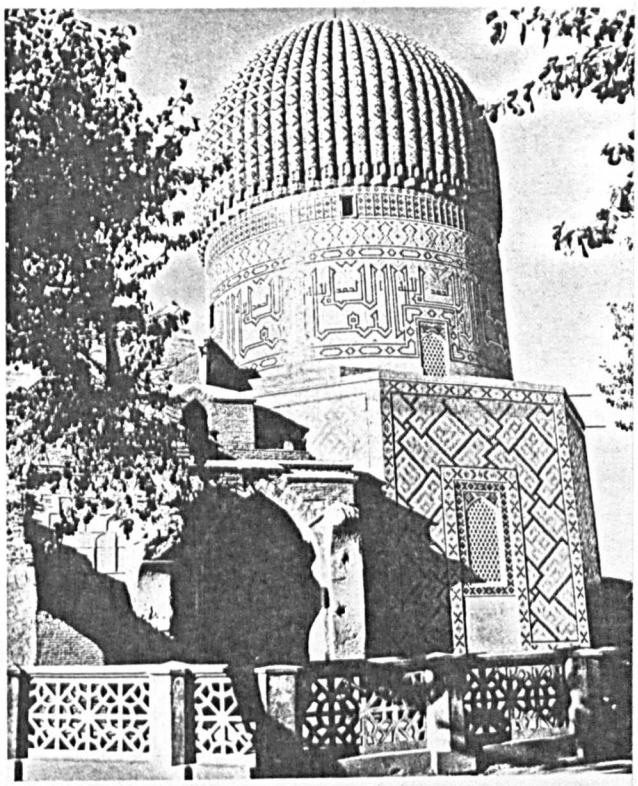
Calligraphy

Inscriptions are found incorporated in the decoration of almost every Islamic building, and in that of a large number of objects as well. Arabic lettering was brought to a high level of artistic sophistication and scripts can vary from the flowing cursive styles (*naskhī* and *thuluth*) to the angular *kūfī*. Often different styles appear on the same building, some of them so complicated as to be barely legible. On the tomb of Tīmūr at Samarqand (*right*) the drum of the dome has a continous inscription, whereas on the wall beneath an extremely stylized writing is set in irregular panels defined by darker coloured tiles. (15)



Stone calligraphic bands, both linear and circular, proclaim the word of God on the façade of the mosque of al-Aqmar, Cairo. Such inscriptions are Qur'ānic and give meaning to the building by clarifying its function. (13,14)

Undulating bands of carving carry the Qur'ānic message around the base of the Qutb Minār, Delhi. Characteristic of Islamic art is the way in which geometric and foliated designs mingle with calligraphy; in this example the letters themselves are set against a floriated background. (16)



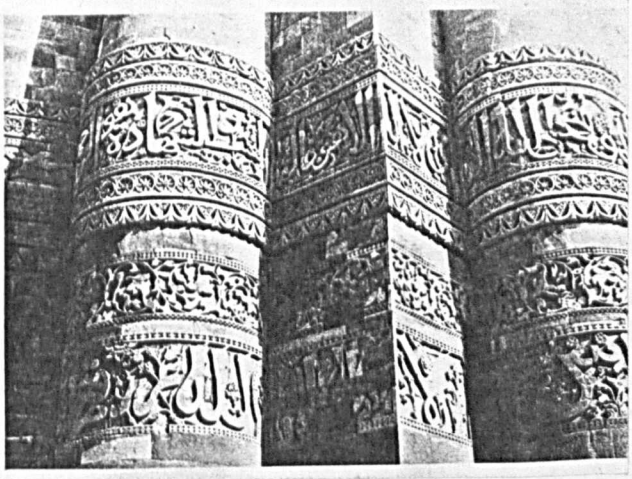


FIGURE: D. 14b.

Arabic Caligraphy as Architectural Feature.

Michell, 1978, p.150

D.4 ISLAMIC CITY TOWN PLANNING

In addition to what has been mentioned before, that cities were created as a result of the inhabitants' needs and demands determined by the natural and cultural environmental constraints, we can add that apart from town planning designs, cities can be seen as the result of the relationships between the social organization of inhabitants and spatial patterns on one hand, and the spatial siting within the surroundings on the other hand.

All cities prior to the rise of the scientific and industrial revolution shared important 'structural characteristics' and demonstrated a startling degree of communality, despite their distinctive cultural content and style [Sjoberg, 1965, pp.213-263].

Accordingly, Muslim towns had internal divisions but they were themselves part of larger entities. Many towns were parts of double or composite bodies - bodies formed by adjacent communities grown together, or a core unit and its surrounding suburbs and villages. Suburbs and villages whose inhabitants shared in the daily life of particular towns radiated for miles around and might even be ringed by outer walls to protect them from attack, as well as the dense core of the township. Thus, Muslim towns appeared not only as densely settled places divided into residential and commercial districts, but often as complex settlements made up of a number of towns, suburbs and villages, interrelated by social and commercial contacts and sometimes united by the construction of encompassing walls.

Just as the influence of law reached into the countryside away from the town core and just as political administration reached from the fortress to the town and the surrounding districts, physical organization may be understood in terms of the relationship between town and countryside rather than in terms of isolation of the town from surrounding settlements. In various ways the physical structure reflected both the parochial and the integrating aspect of Muslim urban society [Lapidus, 1973, pp.63-68].

In many respects Muslim cities were created by large historical developments - migrations of peoples, the formation and collapse of empires, the diffusion of political and religious institutions, economic growth and regression, and the transmission of religious values and aesthetic preferences - which transcended any individual city experience and gave form to cityscape, city society and city culture. Muslim cities, then, were the product of Islamic civilization, a microcosm of the whole, a reflection of the larger forces by which the history of Islam has been made. On the other hand, cities generated the forces which made for civilization. Political institutions, religious values and forms of social organization were the creation of city peoples. The relationship between Muslim cities and Muslim history and civilization were dialectical. The unique properties of each city played against the participation of each city in a common Near-Eastern Muslim civilization. Historically, no city can be understood in isolation from the experience of the region as a whole. Socially, it is difficult to trace institutions separately from the broader formations and social organisations of the Muslim world. Cultural and religious values of Islam were universal ideals embodied in particular places. Physically, cities

interacted with the surrounding environment in ways which merged the city into a larger complex of settlements.

It is clear, therefore, that in all cities the urban system has been determined by the needs, capabilities and ethos of its society. The allocation of space to certain institutions, the positioning of shops, the selection of household location and the criteria for status are universal problems faced and resolved in one way or another by every urban society. It is unreasonable to expect any society to adhere rigidly to a single principle of organization, particularly if it is dysfunctional or based on a single criterion. Thus, Western industrial cities are the product of a rational, economic, materialistic society but it is not axiomatic that choices of household or even business location should be purely economic decisions or, on the other hand, that in the traditional sacred centres of Islam that economic factors were ignored [English, 1973, p.74].

In a sense, beyond the domain of art, since the city images the whole life of the community, this very fact will enable us to give the arts their role in the context of social life. Moreover, town-planning is an art in itself, whether expressing the will of a single individual - notably the sovereign, who is a builder of cities - or a group of individuals, very often anonymous, acting in pragmatic fashion but always in the framework of tradition - and this allows us to speak of 'Muslim town planning' [Burckhardt, 1976, p.181].

In spite of the Arab lands of the Middle East and North Africa presenting various types of topography, the major part is desert lying in the hot-arid zone between latitudes 10°-30°N. Climate and the impact of Islam act as dominant factors organizing

the life of society which affects architecture and town planning. During the Middle Ages defence was an additional important factor in design.

'Therefore, it is not surprising that we find a marked uniformity in the development of urbanization. From the early time of the Arab Muslim civilization until the later part of the Turkish period, all cities in this vast region bore great similarity to one another. The typical layout was characterised by narrow winding streets with a similar arrangement of housing plots'

The Hellenistic rectangular plan had a certain effect on several towns of Islamic origin in Al-Mahgreb and Egypt, where semi-rectangular plans were to appear at the beginning of urban settlements such as towns successively built on the site of Cairo (Al-Askar, Al-Qata'i and Al-Qahirah), towns of Almohades (Rabāt , Meknes, Taza, Qasabah of Marrkech and Fex-Jadid or new Fex), Mermid towns built in the 14th Century AD in Morocco and Tunisian towns

The circular urban plan of Assyrian use was possibly effective in the Eastern Islamic regions, where it was realized in the first Islamic settlements of Kufa, Abbasid Baghdad of Al-Mansur, and in certain Islamic Iranian towns [Burckhardt, 1976, p.183].

The square and the circular city not only reflect different lifestyles but are implicitly associated with two diverse conceptions of the universe, for town planning in this period never fails to involve cosmology. The city is always an image of totality; its form shows the way Man integrates himself into the universe. The

square city, laid out along the cardinal axes, is an expression of sedentary life and also of a static image of the universe, whereas the circular city, which derives from a dynamic conception of the world, is a kind of reflection of nomadism on the plan of urban life which, as such, is sedentary [Burckhardt, 1976, p.183].

However, town planning physically was initially centred almost exclusively on fortified cities. When the frontiers of the Muslim world became stabilized around the middle of the eighth century, a more or less formalized system of defence was established almost by necessity. As in the early Abbasid Khalifah period cities seem to have been principally involved in fortifying and garrisoning such as Tarsus or Massissa. In North Africa small forts seem to have been constructed primarily either to control Berber tribes or to protect the coastline against Byzantine incursions. In Spain, similar forts (Merida, Tarifa, Gormez) overlooked the major roads to the north [Grabar, 1978, p.66].

From the ninth and tenth centuries onwards, as central authority weakened and political power was taken over by large numbers of local dynasties frequently fighting with each other, military architecture spread to almost every urban centre and in many ways established itself as a consistent component of Islamic cities until artillery made such defences superfluous, and the remains were transformed into nodal points within the growth of the cities.

D.4.1 FACTORS DETERMINING THE LOCATION OF THE ISLAMIC CITIES

The first measure of town planning which devolves upon a kingly builder of cities is the choice of a site. This site is determined essentially by the availability of water. The hydraulic

works realized by founders of Muslim cities are legion: aqueducts bringing water from afar, catchments into which water settles, underground canals for water percolation, rainwater cisterns and even the distribution of water from a whole river to a town on a slope. It is water, more than any other factor, which determines Muslim town planning, since it is both the safeguard of life and the indispensable element in ritual ablutions. It is not, therefore, surprising that Islamic architecture should have ornamental water-jets, fountains and reflecting surfaces of water, which give peace to both the mind and the senses.

A second measure of town planning was to ensure the security of roads communicating with other urban centres; caravanserais were founded on the roads in order to give security to travellers.

A third measure which could only depend upon the king was to fortify the city.

Finally, it was expected of monarchs to endow a city with such public buildings as mosques, colleges, hospitals, caravanserais and bath houses. This was a duty of princes and their due, but not their privilege, for citizens with sufficient wealth could do the same, the co-ordination of town planning initiatives from 'above' and 'below' being assured by the traditional institution of a wakaf. Accordingly, the works of town planning realized by monarchs such as the construction of an aqueduct or a university and the charitable foundations of an ever-increasing number of citizens all combine to form a patrimony belonging to everyone and at the same time shielded from the whims of individuals if not from occurrences of force mageure. It thus comes about that a quarter or even half of a city can be transformed into common property. On the urban level it is incontestably

the most direct expression of the community spirit of Islam. It makes a powerful contribution to the historical continuity of a town, to the maintenance of public works of benefit to all and sometimes, paradoxically enough, to the immunity of ruins in the centre of the town [Burckhardt, 1976, pp.185-188].

D.4.2 CHARACTERISTICS OF THE URBAN FABRIC IN ISLAMIC CITIES

A contrast between the geometry of the general layout plan and the irregularity of the residential quarters characterised the ancient city (See Section C.5), which was continued during the Islamic era, highlights one of the main characteristics of the urban fabric which was widespread throughout the Muslim world.

Defence against outside attacks was another of the main factors which played a major role in the design of the city and its elements. Accordingly, fortification became a feature characterising the Islamic city and its fabric, which developed over time.

In fortification a marked advance on Umayyad practice was made at Baghdad and Raqqa; both these cities had double walls flanked by half-round towers, and the four gates of the former were bent entrances, a device unknown to the Romans or to the Byzantines before that date. At Ukhaidir Palace a further advance was made, in the provision for downward fire from the gallery in the wall, throughout almost the whole circuit of the enclosure; also in the elaborately defended gateways, with outer portcullis and slits in the vault above the entrance passage [Creswell, 1958, p.321].

D.4.2.1 The City As An Expression of Power

Islamic culture was and is primarily an urban culture. Whole cities or parts of them were conceived as expressions of power.

The earliest Islamic cities of Iraq could be interpreted as expressions of power. Basrah, Kufah and Fustat were called camps (Muāskar) and served to separate the early community of the faithful from the rest of the population. However, there is little evidence that any of the physical characteristics of these camps reflected their function, they were in fact planned as egalitarian communities rather than as visible expressions of physical or symbolic power. This correlation of urbanism with power occurred in Baghdad which was founded in 759. Astronomers presided over the tracing of this round city, roughly a mile in diameter. A mighty wall was built with four axial gates, bearing the name of the provinces or cities towards which they led, enclosing an outer ring of living and commercial quarters, and in the centre, a mosque and the imperial palace. The latter was provided with two superimposed domes, the symbolic centres of the city and of the universe. The uppermost dome was green, topped with the statue of a rider, and it was echoed by four gilt domes, one over each gate. The city's geometric perfection, rationally conceived order, and even its name - the City of Peace - served as a physical demonstration of the power and universal claims of the new empire.

Cairo was founded in 969 as the dynastic capital of Fatimids, another example which expressed the power of the rulers in which some of the symbolism found in Baghdad was repeated. The palaces occupied the centre part of the city, and living quarters for selected groups of followers were set in the rest of the palace

enclosure. The remains of the city consist of stone walls and three gates, two of which are known as gates of victory. However, in Cairo the expression of power is found in the separation of a royal city from the urban centre proper. Gates or walls became curtains, dividing the community rather than, as in Baghdad, enclosing the whole community from itsleaders down to the poorest members.

A more original manner of expressing power occurred in cities through the location and design of monuments that in themselves did not directly emphasise the dominance of the authority's power. For example, the street of Shāri ā bayn Al-Qasrayn in Cairo, which was originally the central artery of the restricted Fatimid city, became one of the main axes of a bustling commercial metropolis after the fall of the dynasty. This change represents the changing nature of power over periods of history. Over the centuries, wealthy patrons who in addition to endowing pious foundations (madrasahs (schools), hospitals, convents) were also building warehouses and hostels for mercantile activities, sought to justify and express their expenditure by conspicuously building along a major street in the city. Thus an unparalleled succession of facades and minarets with buildings squeezed into whatever space was available, appear to broadcast the wealth and power of their patrons like a succession of neon signs in a modern Western town [Grabar, 1978, pp.70-71] (Figure D.38).

D.4.2.2 Space and Functional Separation

Furthermore, the structure of the city expresses in a rational manner, the way in which space is organised. In these cities there is a functional allocation of land in the commercial districts, the residential quarters and even the household compounds because most

structures of those cities, despite the monumental ones, were erected by the men who lived and worked in them.

'These men built with a more general Near East cultural tradition which clearly designated the correct form a house or shop should take' [Christopher, 1966, pp.46-54].

Enclosure and security was evident in the organization of the residential quarter. The organic, irregular plan of the residential quarters is universal in the Muslim world. The streets and alleyways are narrow and twisting with many sharp turns and frequent cul-de-sacs.

The disregard for the outside appearance of a structure is often developed to the extreme, whereby even a monumental structure such as a congregational mosque, is completely hidden (Figure D.28) by being totally surrounded by secondary adjacent buildings (bazaar). This hiding of major monuments goes hand in hand with a total lack of exterior indications of the shape, size, function or meaning of a building. Even if a structure has a visible facade or a portal, these features tell little, if anything, about the building that lies behind it. In other words, rarely does a facade give any indication of the inner organization or purpose of the building in question and it is rare that an Islamic building can be understood, or even its principal features identified by its exterior [Michell, 1978, p.10].

Public life and private life are quite separate, and as a result public and private space are clearly differentiated. This public-private polarization in the organization of space and society in the city can be seen in the use of the different areas such as a feeling, it seems, that these spaces are controlled privately and used publicly. (For further details see Section D.4.4.6).

One of the most striking features of all Islamic architectural monuments is their focus on the enclosed space, on the inside as opposed to the outside, the facade or the general exterior articulation of a building.

The most common and widely recognized expression of this attitude is the Muslim house; organized around an inner courtyard, it presents to the outside world high windowless walls interrupted only by a single low door. Often several houses are collected together into a larger walled complex accessible only through a single alleyway (cul-de-sac) which leads to the individual dwelling entrances. The arrangement of these houses and in some cases, even large building complexes, give the traditional Muslim city its characteristic appearance, which still survives today in many examples of town centres throughout the Islamic world [Michell, 1978, p.10].

A tendency towards interior refinement is one of the many distinguishing characteristics of Islamic architecture in Arab lands, most Arabic-Islamic monuments must be seen inside for proper appreciation, e.g. the Al-Hambra, whose exterior blandness in no way prepares the visitor for the subtle proportions, the constantly shifting effects of height and shade and of fullness and void, and the orgy of simultaneous impressions that characterize the interior.

The same wealth of unsuspected effects and contrasts strikes the visitor entering the large mosque of Damascus, it is as though the whole point of these major architectural constructions was to provide a sense of peace and quietude. This invitation to privacy and personal fulfillment is found in architectural compositions that, almost secretively, led through bent passages to another world. It

occurs also in the modifications wrought in very traditional forms of construction [Hayes et al, 1978, pp.91-92]. (For further details see Section D.4.4.6).

D.4.2.3 Architecture, Decoration, Construction

The technical vocabulary of construction and decoration used by Muslim Arabs derived almost entirely from the rich repertoire of the Ancient Near-East, decoration techniques were mainly traditional: stone and wood sculpture, painting and mosaics. However, the Islamic world adopted the Ancient stucco sculpture.

The basic architectural forms tended to be the same for religious and secular functions. The courtyard, usually porticoed, served as the centre of most compositions. The main supports consisted of walls and of columns and piers surmounted by arches; walls were made of stone throughout the Arab world, except in Iraq during an earlier period, in Islamic Egypt, where brick was preferred. In large buildings wooden ceilings were common, especially in private dwellings and mosques, but vaults and domes predominated in military and commercial architecture from the earliest times. Roofs were usually tiled, formal gates and portals were rarely built during the early centuries, which increased both in number and in quality later, and mostly they were covered with elaborately decorated half domes.

Generally, Islamic architecture was eminently practical, it performed the functions for which it was created [Grabar, 1978, p.92].

D.4.3 TECHNICAL CONCEPT OF DESIGN

From an analysis of the literature about traditional Iraqi housing and urban settlement and from experience gained during the author's survey of a number of traditional areas in Iraqi cities, it is felt that three fundamental characteristics can be attributed to traditional architecture and design. These three features are extendability, flexibility and the use of repetitive elements. Clearly these features of traditional Iraqi architecture are interrelated insofar as the use of repetition in formal elements of building enclosure or decoration allows the possibility of extension in a design. Furthermore, by the adoption of modules or units in building form it allows interchangeable functions or uses within buildings.

D.4.3.1 Future Extensibility

Arab houses are never complete. As each extended family grows, so does the house, which comes to reflect the history, accumulated growth and family structure of a number of generations.

However, the courtyard perimeter defines the potential area of the future extended family home and house construction usually starts by building a boundary wall around the plot. This plot is divided into different zones, each fulfilling a particular function but allowing potential for future expansion.

Family extension in dense urban areas may mean that an adjacent house is taken over with the use of an internal passage, a bridge or a tunnel under the alleyway which will be constructed to join them into a single unit (Figure D.47). 'The very possibility of enlarging a given structure in almost any direction by adding units

of almost every conceivable shape and size to the original scheme, is a characteristic that Islamic architecture shares with that of no other major culture' [Michell, 1978, p.13].

D.4.3.2 Flexibility

The buildings in the Islamic period generally show a flexibility in their design: the spaces within these buildings were arranged in such a way that can be easily separated or converted for another use depending upon the prevailing circumstances.

As a continuation of the hidden architecture concept (where the external appearance of the building was often obscured by surrounding buildings) Islamic architecture generally can be adapted to serve a variety of functions; the four-iwan courtyard structure is an example of this concept: this structure can function equally well as palace, mosque, school, caravanserai and private dwelling at different times and in different places. In other words Islamic building does not reflect function in its form. The courtyard form of building need not be designed to serve a particular purpose, but is, in most cases, an abstract and perfect scheme that can be used for a great variety of functions without any difficulties. This scheme can best be demonstrated in the monumental four-iwan plan for the mosque - madrasa Sultan Hasan in Cairo, fitted into an irregular site that is singularly unsuited for it [Michell, 1978, p.12].

A comparison between the basic form in Islamic house design and the European house is useful to show the versatility of the Muslim courtyard form. The rooms in European houses are usually allotted to a specific activity, such as bedroom or dining room - the

significant divisions in Muslim houses are those of social accessibility, both public and private. In the private part of the house (harim) most interior spaces are functionally polyvalent and non-specific; rooms can be used interchangeably for eating, sleeping, recreation and domestic tasks [Petherbridge, 1978, p.199].

D.4.3.3 The Ability To Repeat

Systematic repetition is one of the main characteristics of Islamic art. The approach resulted from repetition of chosen units that can be used to create a pattern (control system or basic framework), within which each unit can be divided individually or in relation to the others, in order to create a special identity. This concept had been applied as a base for the Islamic decoration, fine art and architecture (Figure D.7.6) (for more detail, see Section D.3).

Visually these patterns can act as neutral tone, when they are used as background. But in case the need is to break down the monotony of the repetition or to make emphasis on parts of the pattern, changes can be created inside some of the units within the pattern. However, in both cases variety can be achieved.

D.4.4 THE PHYSICAL MORPHOLOGY OF MUSLIM CITIES

Due to the dominant need for defence the main physical features of a great majority of Early and Medieval Muslim cities was their oval or circular shape. They were walled cities with large exit gates which were closed during the night. Above these gates were military installations to guard the cities against enemies and other unwelcome visitors. The city walls were generally built of solid local material.

Beyond the walls were fairly deep ditches often filled with water. These ditches served as the first defences of the cities [Encyclopedia of Islam, 1934] as occurs in the Medieval Muslim Middle-East, such as Baghdad, Basrah, Kufa, Rabat, Mecca, Damascus, Fez and Cairo.

However, inside the walls, Islamic cities generally followed a concentric pattern which radiated from the centre of the city towards the city walls. Each of these concentric enclosures more or less acted as an independent unit physically and functionally. In the centre of the city, the ruler's palace and governmental buildings were located. Next to the central enclosure was the business district (market place) which consisted of separate markets for different commodities, including mosque, madrasah (school) and public bath. The market place was usually surrounded by residential quarters [Hassan, 1972, p.109].

In order to identify each of the mentioned city elements and to determine their function and relation to the city and to the other elements, the following sections will deal with each one of them separately.

D.4.4.1 Walls, Towers and Gates and Citadels

Three consistent components characterised the military and defensive architecture of the earliest Islamic cities: walls towers and gates. These features appeared in the centre of the empire in rare instances such as Baghdad, where their importance was symbolic rather than practical.

(a) Walls and Towers

As early as the ninth century the complex of cities known as Raqqa, on the Euphrates in Syria, were provided with fortified enclosures. The walls of the present-day city of Raqqa, massive mud-brick constructions preceded by a moat, may indeed be remnants of early Abbasid walls. Raqqa's function was to be an assembly point for military expeditions against Byzantium and to protect it against nomadic incursions.

Hardly a town of any significance existed without fortified walls, mighty towers and elaborate gates after the tenth century. From an architectural point of view, walls and towers mostly are massive constructions built in materials characteristic of the region in which they are found: unbaked brick or packed earth as in Iraq, stone in Syria and Palestine, various mixtures of brick and stone in Spain. Round, square or elongated towers served as buttresses, lodgings, arsenals or whatever other military purpose may have been required. Cranellations, walkways, machinolations and occasionally, small protective cupolas at key intersections of walls were probably stock elements in the construction of most of these walls and towers.

(b) Gates

Two types of gate predominate in Muslim architecture, the straight gate, which was primarily a passageway even when provided with massive doors and the bent entrance, which has obvious defensive uses [Grabar, 1978, p.67]. This latter device was in fact unknown to the Romans or to the Byzantians

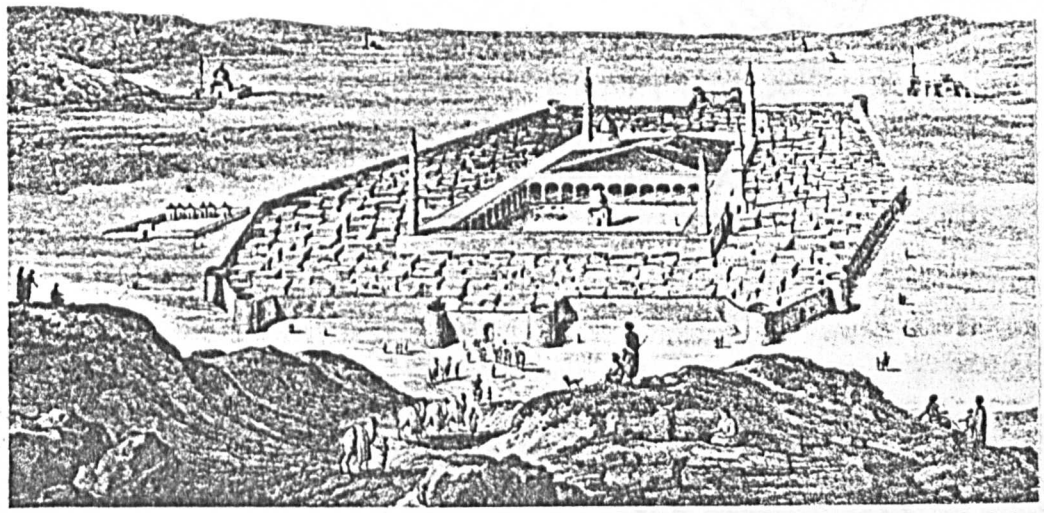
before that date [Creswell, 1958, p.321] as occurred in Baghdad and Raqqa.

More interesting aspects of gates are their construction, their decoration and the name given to them. Because gates are dated (as in Cairo and Granada) they are one of the best means of understanding the history and development of vaults. Gates were built with an unusual number of different techniques of vaulting. Squinches coexist with pendentives, parallel vaults with cross vaults, simple semicircular arches with pointed or horseshoe arches. However, the gates can serve as a sort of gauge of the most common construction techniques and easily available materials of any one time. This is particularly so in areas where stone predominated, as baked brick was less frequently used in large-scale military monuments or has not been as well preserved.

Certain innovations in Islamic vaulting techniques, especially the elaboration of squinches and of cross vaults, were the direct result of the importance of military architecture for which strength and the prevention of fires, so common among wooden roofs and ceilings, were major objectives.

(c) Citadels

An original development of Islamic military architecture is the citadel (Qal'A); a fortified defensive unit, occupied by a king or by a feudal lord and located in an urban centre. This military architectural element was derived from the ancient Assyrian cities, as occurred in Khorsabad.

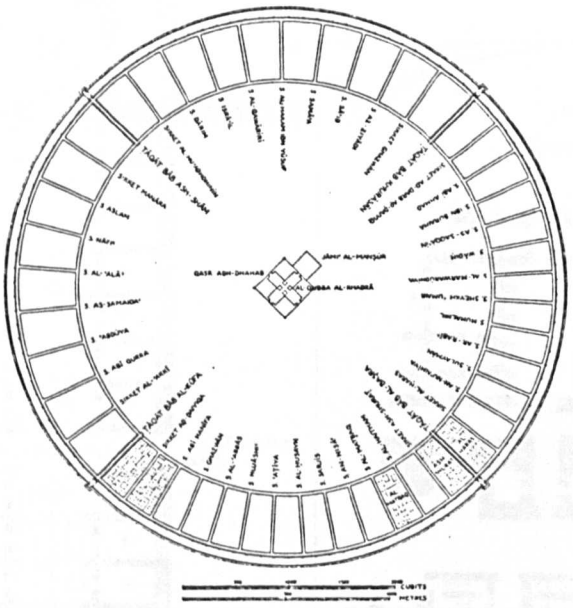


Medina, Saudi Arabia, *ca.* 1787. (From: Mourradja d'Ohsson, *Histoire de l'Empire Ottomane.*)

FIGURE: D.15.

The Layout of the First Islamic City.

Brown, 1973, p.42



Baghdad. Reconstruction of the original city of Mansur, 762. (After Creswell)

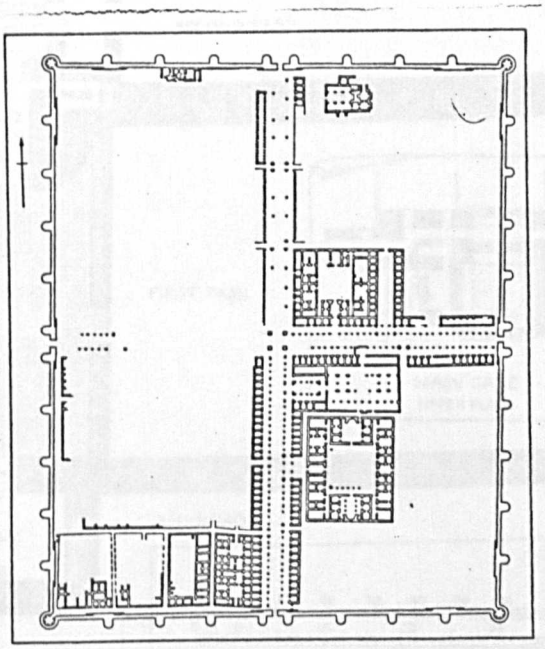
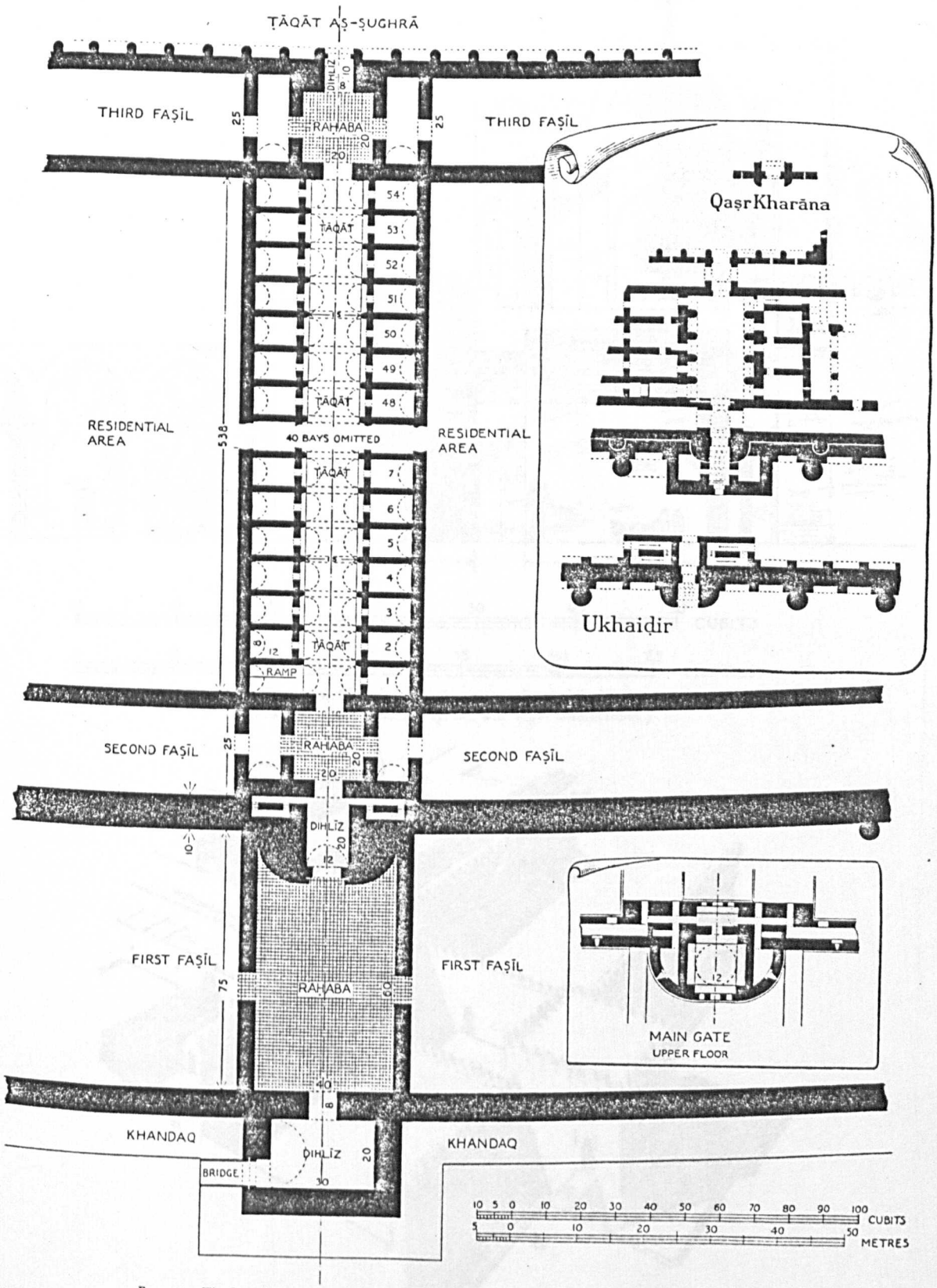


FIGURE: D.16.

Plans Showing Different Types of Islamic City.

Creswell, 1958, p.9, p.182

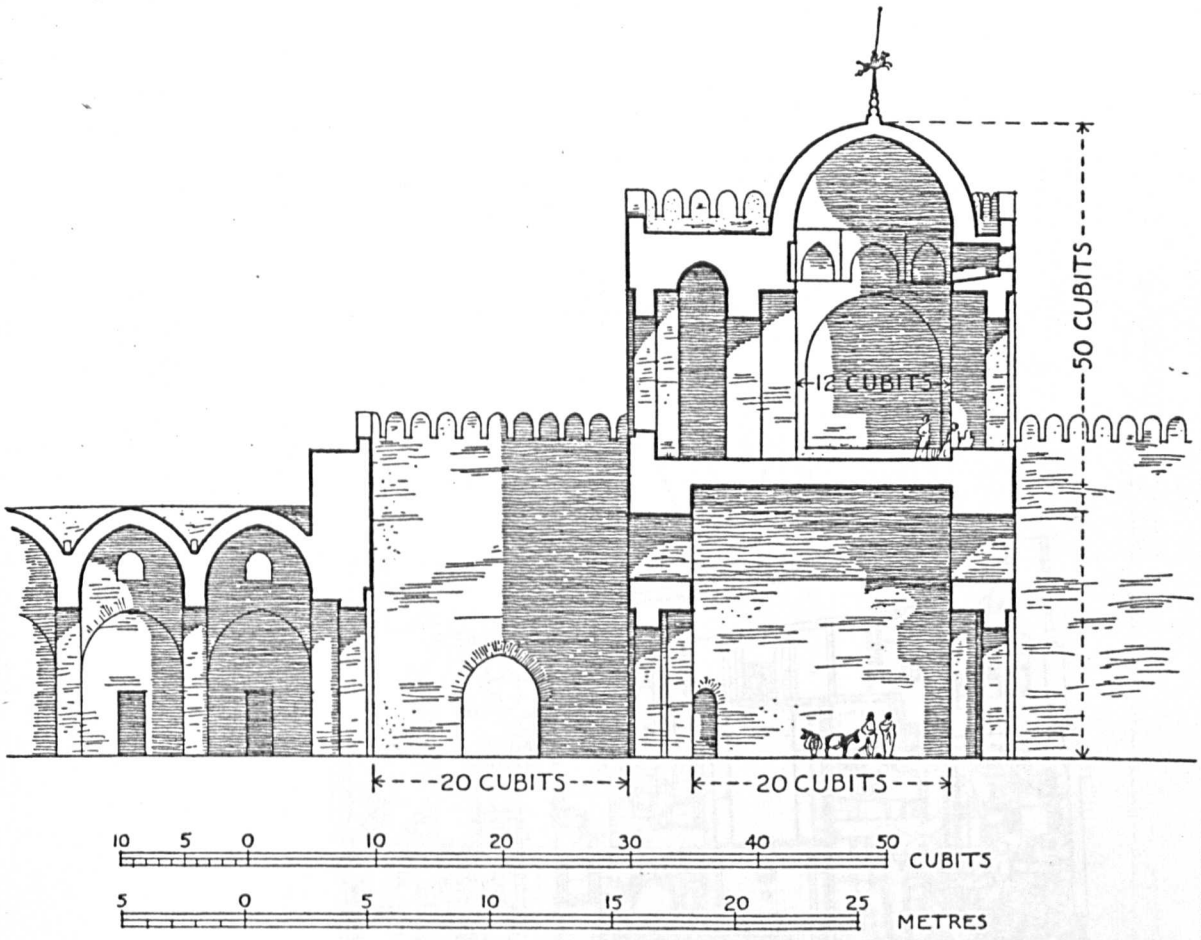


Baghdād: The Round City of al-Manṣūr, plan of one of the outer and inner gates, *raḥabas*, and *ṭāqāt*.
(From Herzfeld, *op. cit.*, slightly modified.)

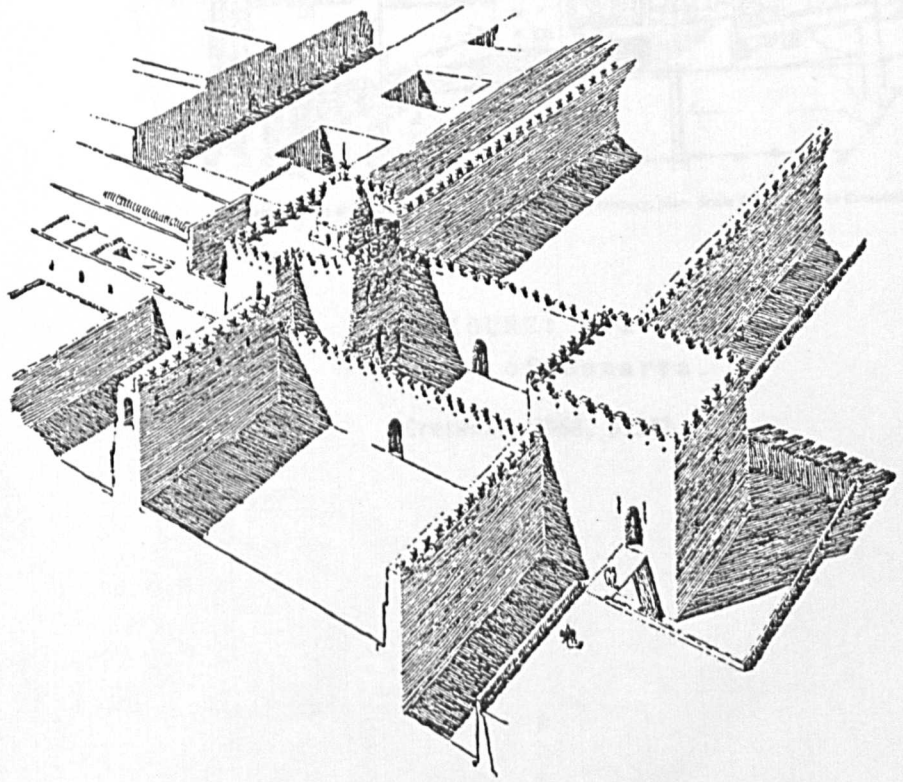
FIGURE: D.17a.

The City of Baghdad - Plan of the Gate.

Creswell, 1958, p.13



BAGHDĀD: The Round City of al-Manṣūr, section of one of the inner gates. Scale 1:200.
(From Sarre and Herzfeld, *op. cit.*, with slight modifications.)

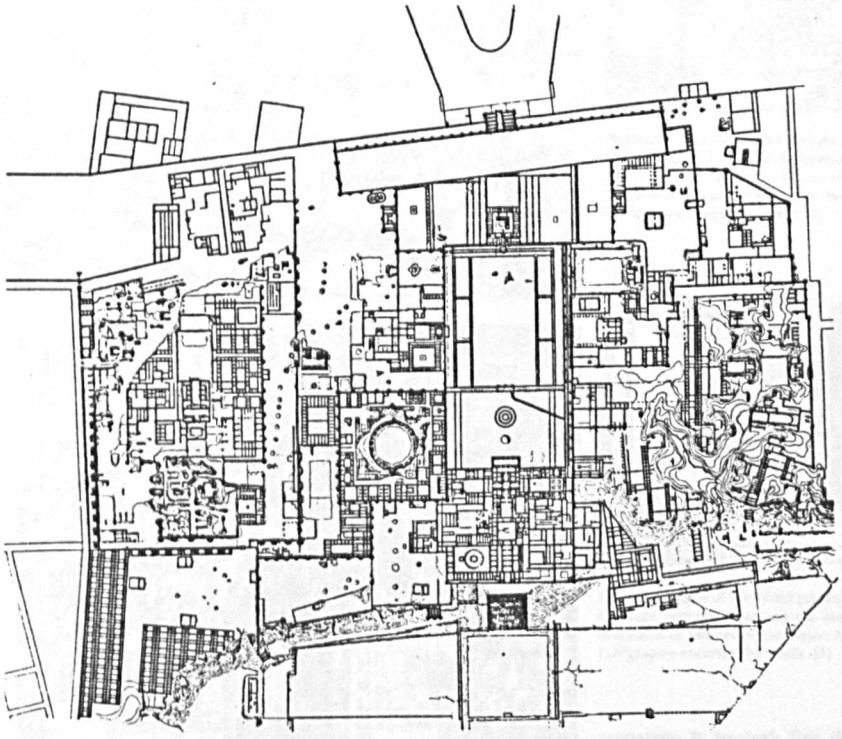


BAGHDĀD: The Round City of al-Manṣūr; bird's-eye view of one of the outer and inner gates, etc.
(From Brodführer's drawing in Sarre and Herzfeld, *op. cit.*)

FIGURE: D.17b.

The City of Baghdad - Section and Perspective of the Gate.

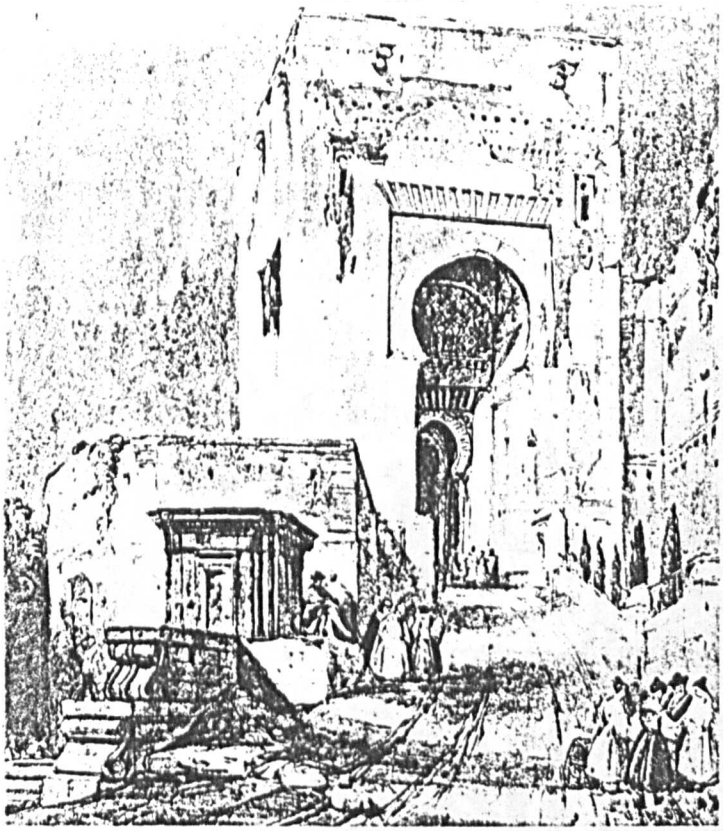
Creswell, 1958, p.15



. Samarra. Jausaq al-Khaqani palace, middle of the 9th century, plan. Scale 1:2000. (After Creswell)

FIGURE: D.18.
Plan of Samarra.

Creswell, 1958, p.242



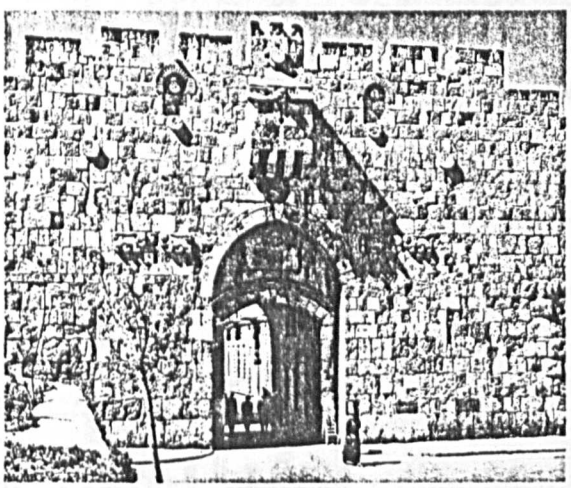
Gates

A gate serves to admit and to exclude. It is also a symbol – of strength, of security, of wealth.

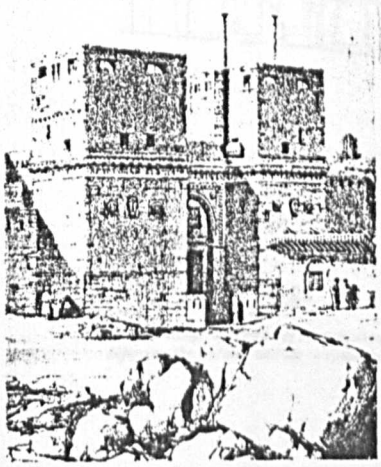
Granada: the Gate of Justice (*left*) in the Alhambra leads through the southern wall to the palace enclosure. Carved in the keystone of the arch is an upraised hand, probably a symbol of divine protection. (2)

Baghdad: The Talisman Gate (*above*), dating from 1221, was unusual in having dragons carved above the door. When this photograph was taken it had already been walled up; it was destroyed in 1917. (3)

Rabat: the Gate of the Wind (*above*), built in the 12th century, is among the most richly decorated of Moroccan gateways. A band of calligraphy encloses the whole. (5)



Jerusalem: St Stephen's Gate (*left*) may originally have incorporated animal sculpture representing either magical protection or the arms of the reigning prince. (4)

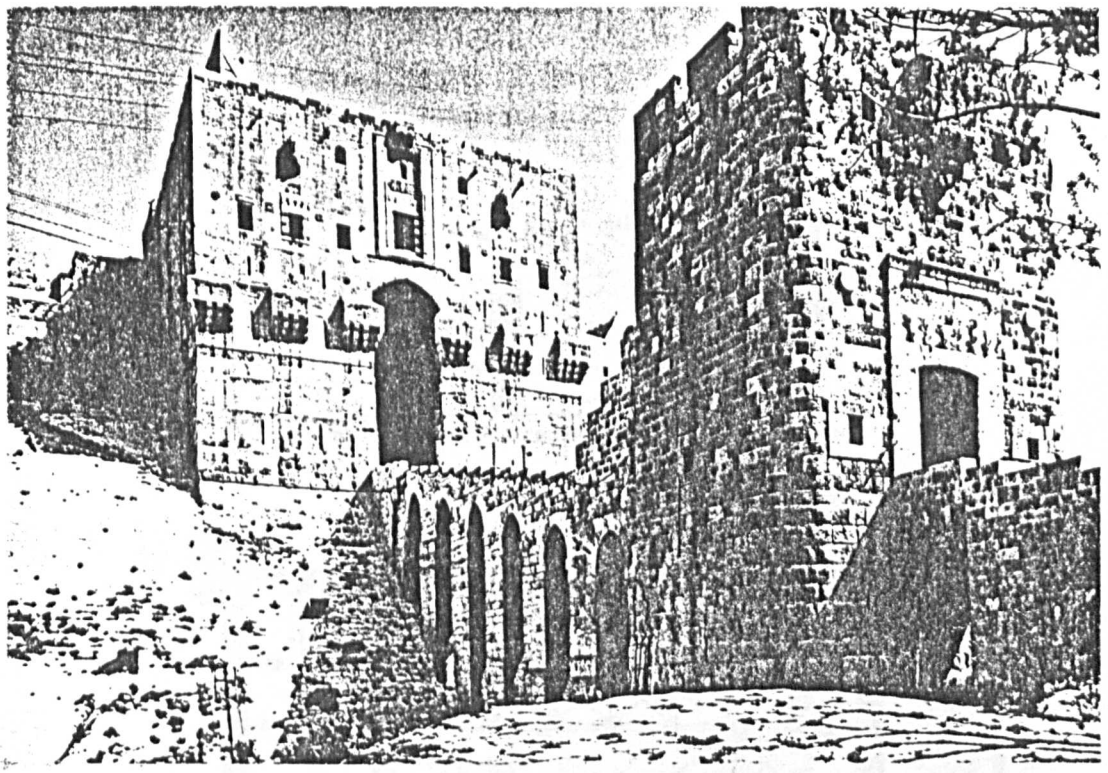


Cairo is among the best preserved of Islamic cities and several of its ancient gates are intact. The Gate of God's Help (*left*) and the Gate of Conquests (*right*) were both built in the 11th century to traditional designs – basically straight passageways with heavy doors – and differ only in the shape of their towers. Above the first is carved the Muslim profession of faith in *kūfī* letters and an inscription giving the date, 1087. (7,8)

FIGURE: D. 19.

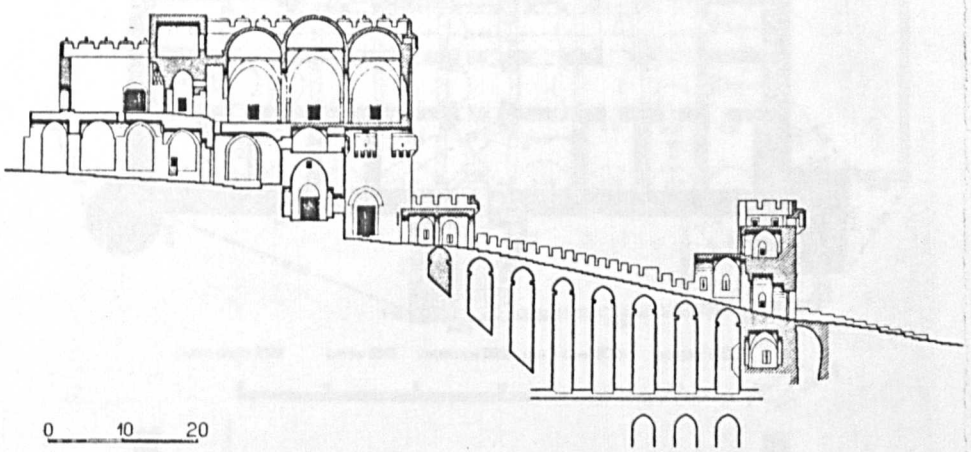
Gates - Showing Different Architectural Styles.

Michell, 1978, pp.50-51



Aleppo: the double gates of the citadel (*above*), connected by a bridge over a moat, proclaim impregnable strength. (6)

Palaces, Citadels and Fortifications

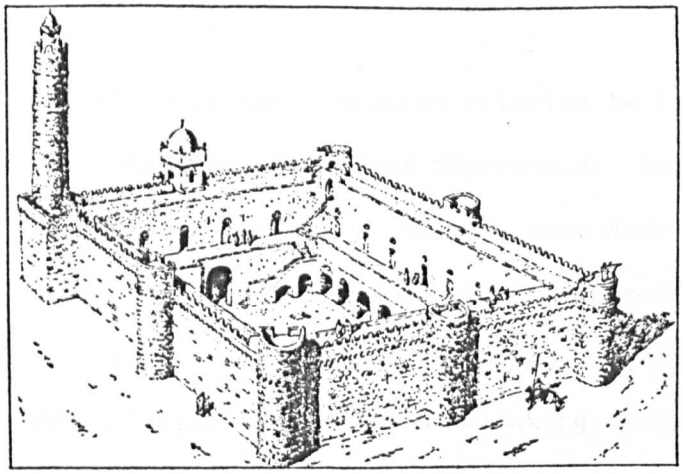


Section through the citadel of Aleppo, showing the fortified gate, the bridge, the massive barbican defending the entrance and the reception hall built over it. (1)

FIGURE: D.20.

Example of Fortification in an Islamic City.

Michell, 1978, p.51, p.69



Sūsa: The Ribāṭ, from the north-east. (From Marçais, *Manuel.*)

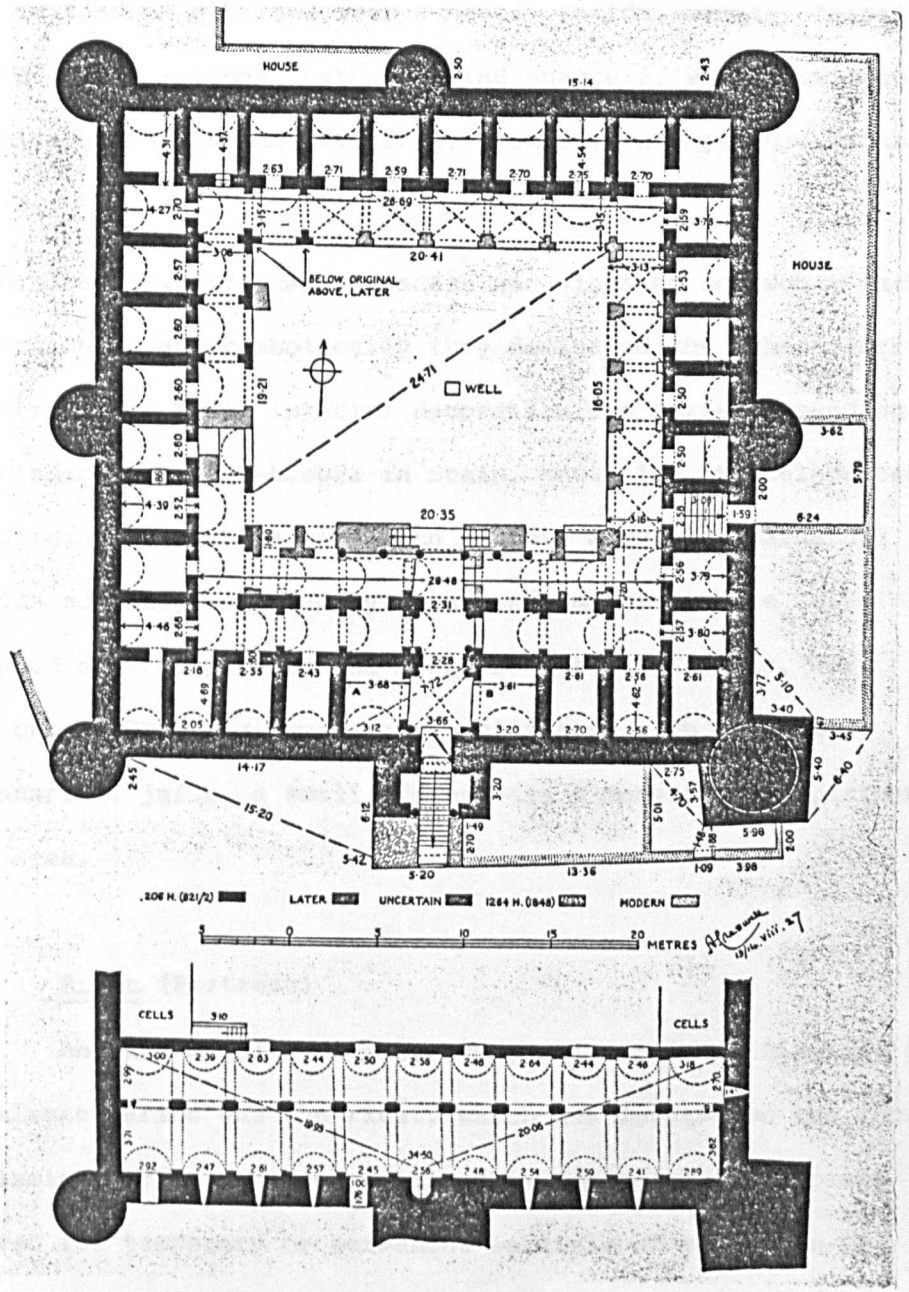


FIGURE: D.21.

Islamic Border Fortification.

Creswell, 1979, pp.168-169

The form and location of the citadel in relation to the city generally was of a forbidding and fortified appearance. Usually citadels were built astride the city's walls, but were sometimes tucked away in a commanding corner of the city or, much more rarely, situated outside the city, such as the one in Aleppo, located on a partly natural and partly artificial mound overlooking the whole town. A superb stone glacis emphasises the height of the monument, which can only be reached through a bridge over a moat. Inside, ornate, formal audience halls adjoin mosques, baths, living quarters, even a religious sanctuary dedicated to Abraham, cisterns, granaries and prisons [Grabar, 1978, pp.67-70].

Furthermore, most of these citadels were located in such a fashion that both practically and symbolically they dominated the urban centres that they controlled. Their interior decoration was varied depending upon time and space. The Al-Hambra in Spain, known for its celebrated palace, was originally a whole city with houses, a mosque, baths and other amenities normally required by an urban community. The Cairo citadel included several palaces and mosques. Other citadels, for example, the one in Damascus, were mainly military, with barracks, arsenals, granaries, jails, a small oratory and a more formal apartment or reception area.

(d) Ribāt (Fortress)

Another complex of military architecture originating in the Islamic period was the ribāt, which was located on the frontier of Islamic territory. Technically this was a fortified place reserved for temporary or permanent warriors of the Faith who committed themselves to the defence of frontiers and in which

they passed several months, giving themselves up to religious devotion in the intervals from warfare. Several early examples are known in Tunisia (Sūsa); they resemble the early Islamic palaces, but the interior arrangement of large halls, with a sizeable mosque and a minaret, identifies its special needs for meetings, keeping arms and prayer. In the early days of Islam the frontiers were guarded by lines of ribāts [Creswell, 1979, p.167-170] (Figure D.21).

In conclusion, walls with towers, gates and citadels served primarily military functions and were constructed so that although individual examples may be different from each other, they are found all over the Muslim world and lend themselves to some sort of generalization.

D.4.4.2 The Palace

The palace was another element which dominated the Islamic city besides the mosque. Expression of power has always been one of the functions of palatial architecture; in addition, palaces are one of the most important documents about Islamic art.

The basic shape of the palace is no different from that of a house which, in Arab lands, is a rectangular structure around an inner court. This rectangle may well consist entirely of dwelling units/ rooms opening out onto the court. It may equally be two blocks of living quarters facing one another and joined by enclosing walls. In the latter case, the courtyard is frequently lengthened to become an enclosed garden or is transformed into a reception court between one porch-house and another containing an audience-room.

It will be seen that these elements lend themselves to the development of symmetrical spaces dominated by principal axes of development. In practice, however, axial orientation was reserved for courtyards and reception-halls alone; for the rest, sovereigns had no objection to breaking up axial and symmetrical alignments in order to create their own private residential quarters. A very typical example of this is provided by the royal city of Al-Hambra at Granada, Spain, the various complexes of which are composed of the Mashwar, the Court of Myrtles and the Lion Court, which fit very well into the symmetrical plans, but between these clearly designed spaces there are breaks of continuity, changes of axis and indirect approaches, which can only be intentional and doubtless, mark off degrees of privacy.

Palaces can be divided according to their relation to the city and as an individual result of social and political circumstances, into two groups:

(a) Palaces erected outside the urban centre, as Al-Ukhaydir near Karbala City in Iraq.

(b) Palaces erected within the city, as Qasr Adh-Dhahab (Golden Palace) [Creswell, 1979, p.9] in Baghdad City.

(a) <u>Palaces Erected in the Countryside</u>

About twenty early Islamic, primarily agricultural sites in the fertile crescent show some evidence of a palace, or at least some sort of more elaborate establishment above

simple inhabitations. Of these, the most important are: Khirbat Minyah, Qasayr Amrah, Khirbat Al-Majfar, Jabl Says, Qasr Al-Hayr West, Qasr Al-Hayr East, Mshatta and Ukhaydir [Grabar, 1973, p.141].

In spite of differences in the inside, plan arrangement and the use of building materials and techniques, the layout of these palaces reflected the principles of ancient Assyrian palaces as in Khorsabad.

Three functional elements appear in almost all early Islamic palaces: the first one is a mosque which occurs in one of two ways; either as a separate building, i.e. Qasr Al-Hayr West [Grabar, 1976, p.145] or the mosque is included within the composition of the palace and forms one of its component units as in Ukhaydir.

The second function appearing in all these palaces is the residential and official quarters; they were usually planned alongside of each other for easy communication and for security reasons. The main residential and official unit was a square building, generally some seventy metres to a side. From the outside this complex appeared to be a fortress with heavy, almost always round, corner towers, a varying number of half-towers on each side. The facade wall was covered with an elaborate composition of stucco sculpture, as in Qasr Al-Hayr West [Grabar, 1976, p.145]. In Mshatta the celebrated series of triangles with stone carvings give the impression of defence.

The interior arrangements of residential buildings were of two types: the first type consisted of a central courtyard

surrounded by a portico and of rooms arranged along the walls: this type was mostly a two-storey complex.

The second type of arrangement of residential quarters is based on subdividing this quarter into self-sufficient units each with a separate courtyard as occurs in Mshatta and Ukhaydir.

In addition to the mosque and the residential quarter the last elements of the palace are the gates, reception hall and living places.

The entrances were all fairly elaborate compositions, which can be divided into three groups. The first one, found for instance at Khirbat Minyah, consists of a projecting hall, covered by a large cupola, that leads to a long hall. A second and more common one had one or two long halls with side benches at Khirbat Al-Mafhar; this was a heavily decorated area of the palace. The third group consists of a complex of long halls, domed rooms, and a variety of attendant halls, which forms the whole entrance complex. The mosque was attached to this complex as occurs in Ukhaydir and Mshatta [Grabar, 1973, p.148].

The entrance functions as a place for waiting visitors thus acting as a controlled protecting element for the occupiers.

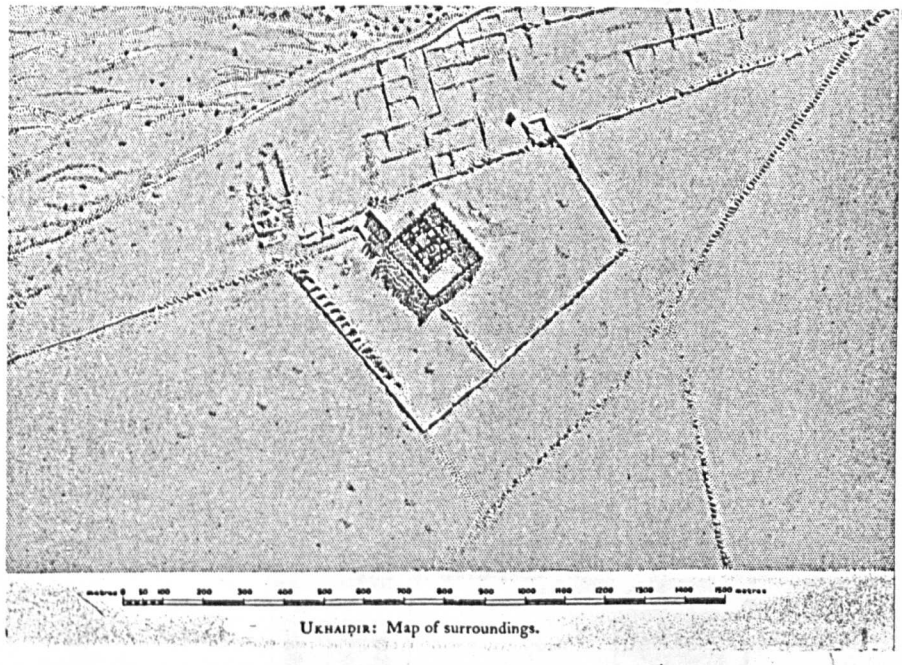
The next space after the main entrance is the official hall (Majilis) in which the owner received his guests and visitors.

Baths were a common feature of early Muslim palaces, found either within the living unit as occurred in Ukhaydir or as independent units within the whole palace layout (Qasyr Amrah).

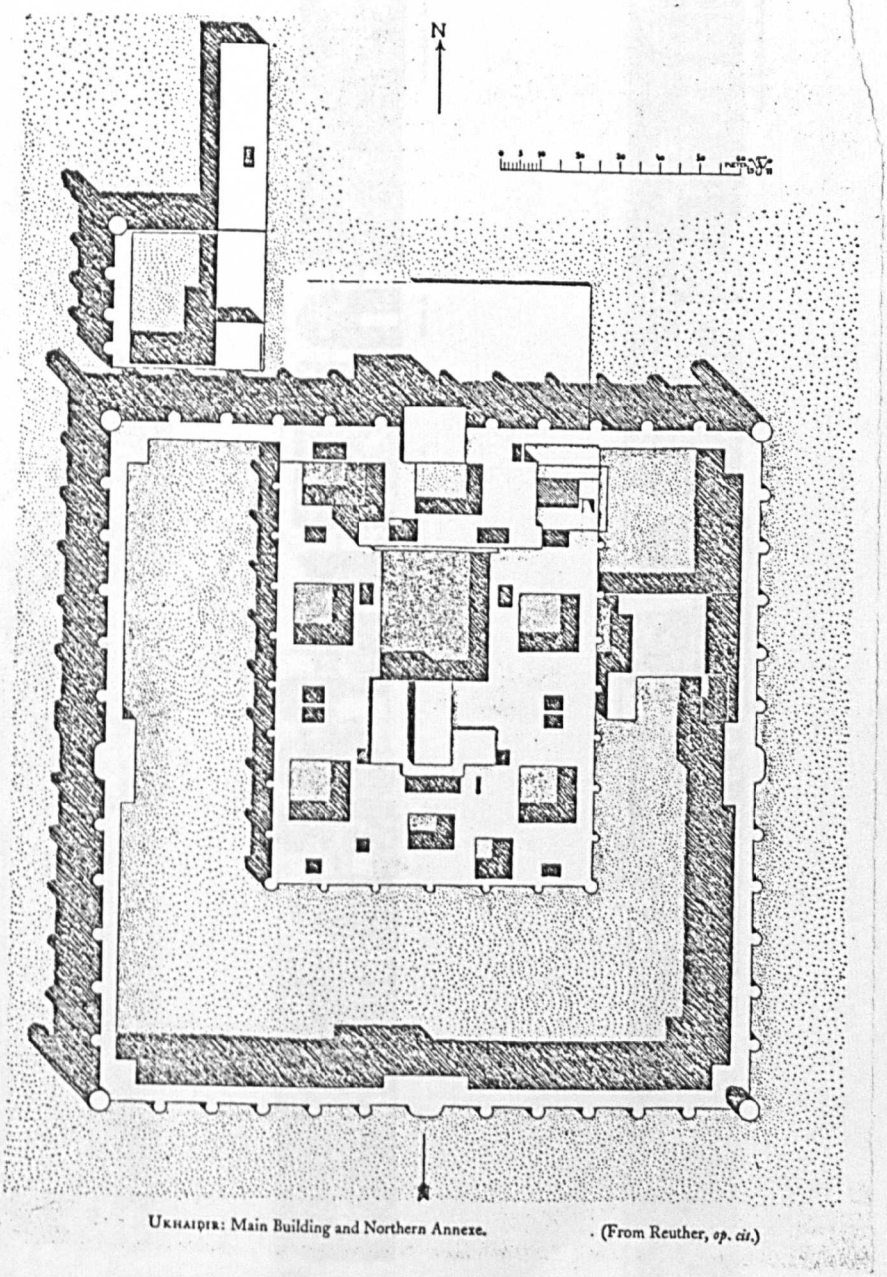
An example of a palace erected outside the city is the palace of Al-Ukhaydir which was founded during the early Abbasid period, near Kurbala, some 120 miles to the SSW of Baghdad. Its plan is rectangular and the high external wall, supported by semi-circular pastion towers, has an entrance at the centre of each side. There was an elaborate chemin de ronde along the top of the wall from which an attacker could be menaced from above, while the four gates consisted each of a chamber bounded by an inner door and an outer portcullis which could be lowered if the door was assailed, trapping attackers in a chamber where they could be exterminated at leisure. The building itself, standing as it does far from any habitation, exhibits features of defensive architecture which are entirely new and a layout of the living quarters within the wall which was to be followed for many centuries all over the Islamic world. The main residential area was divided into a series of courtyards each surrounded by narrow chambers. At Ukhaydir these were covered with vaulted roofs and there was an impressive vaulted entrance hall at the western end, with pillars at its sides and with two upper storeys. The vaults and arches were all of elliptical forms - the pointed version. One of the ground floor chambers was a mosque [Creswell, 1979, pp.50-91].

(b) City Palaces

The limited existing evidence about the earliest urban palaces does not bring to light any significant architectural differences from the residential units of country palaces, the only new characteristic is that they are usually located next to



UKHAIDIR: Map of surroundings.



UKHAIDIR: Main Building and Northern Annexe. (From Reuther, *op. cit.*)

FIGURE: D.22.

Site Layout of Ukhaidir Palace.

Creswell, 1979, p.65

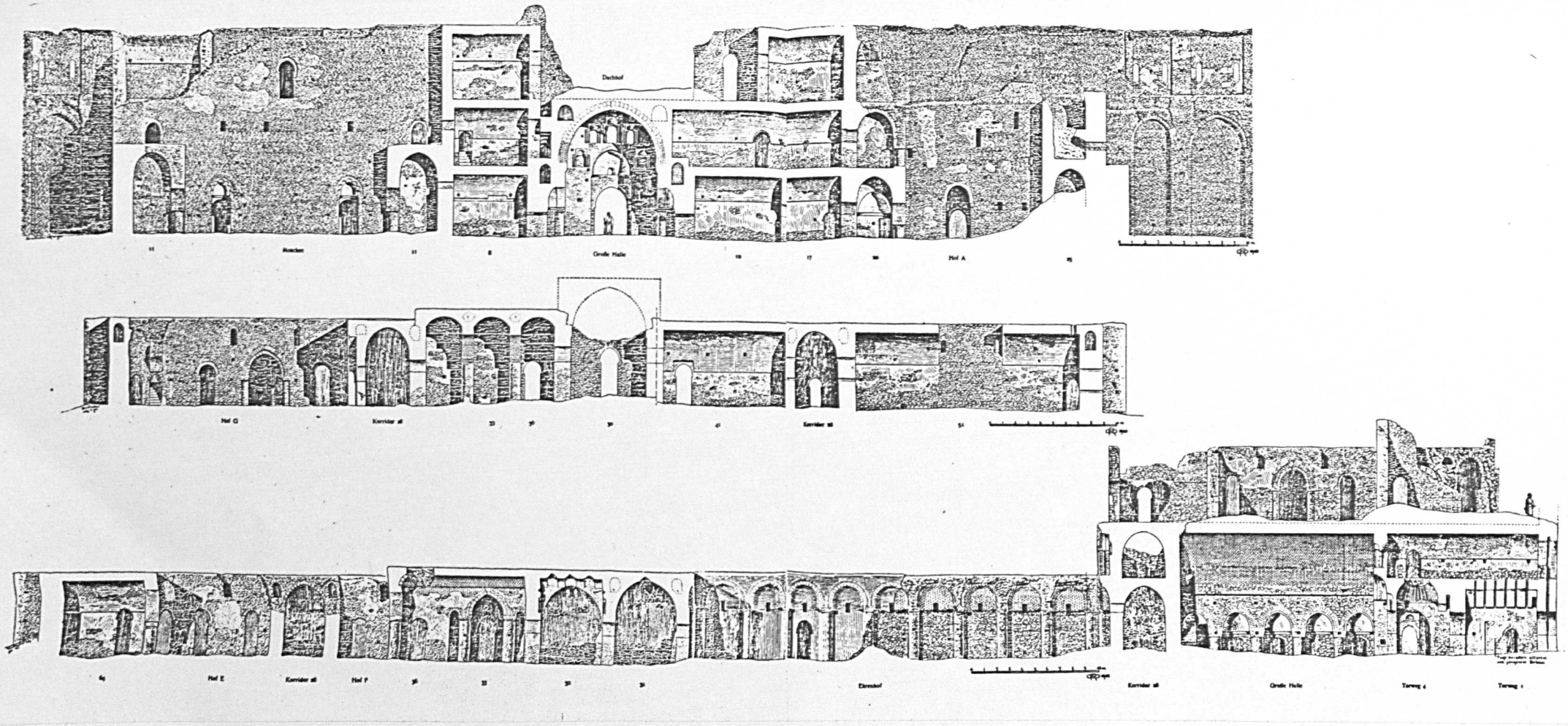


FIGURE: D.22a.

Sections of Ukhaidir Palace.

Creswell, 1979

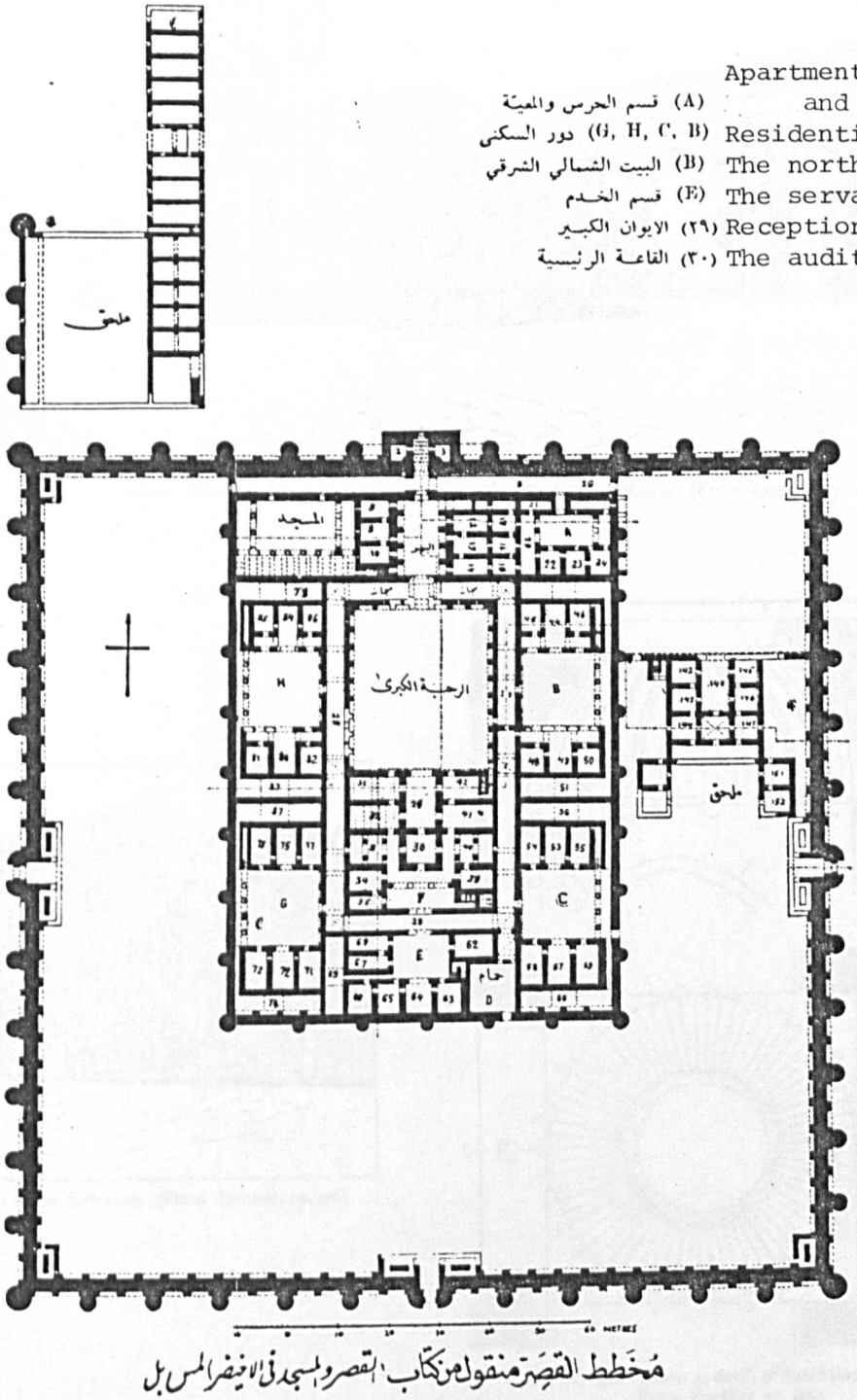
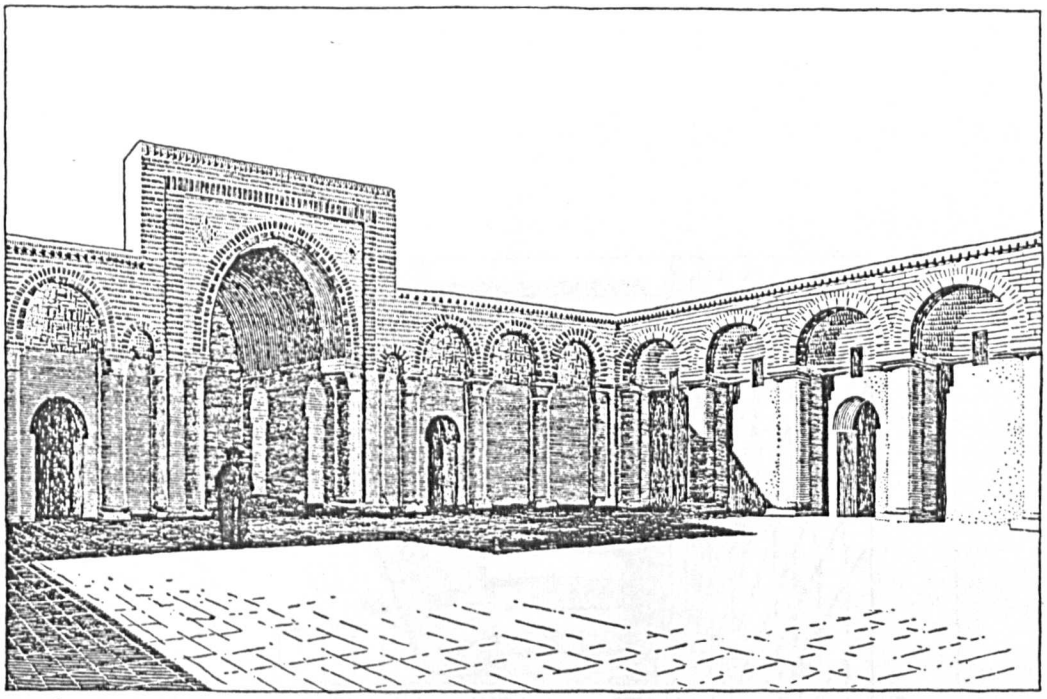


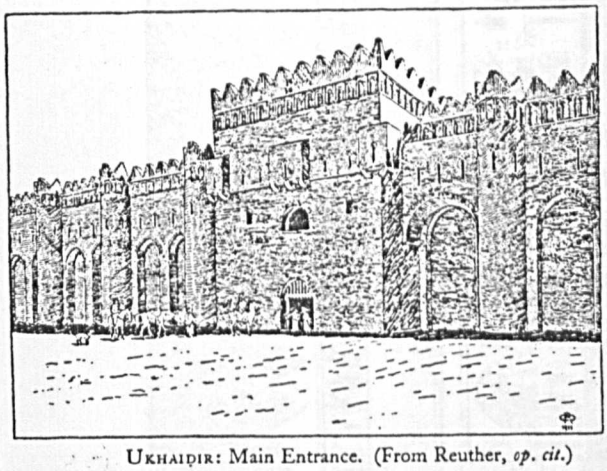
FIGURE: D.22b.

Plan of Ukhaidir Palace.

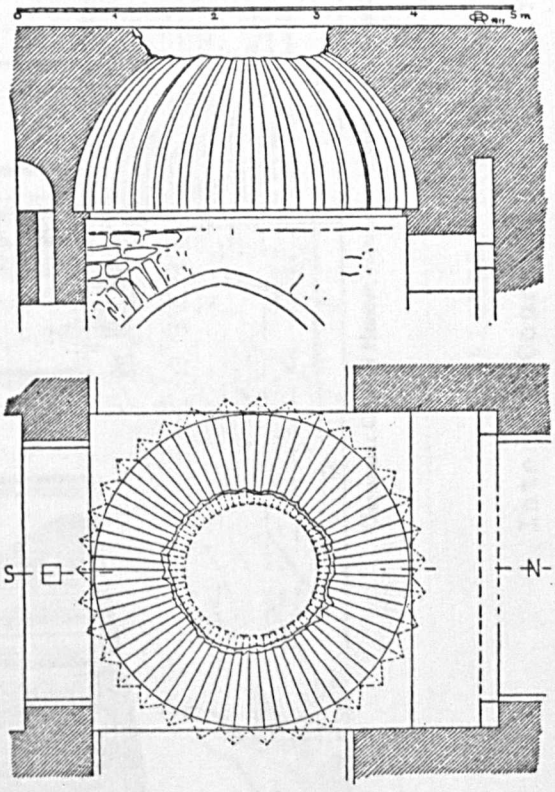
Grabar, 1973, p.61, p.65



UKHAIḌIR: Court of Honour, restoration of south side showing *pīshṭāq*. (From Reuther, *op. cit.*)



UKHAIḌIR: Main Entrance. (From Reuther, *op. cit.*)

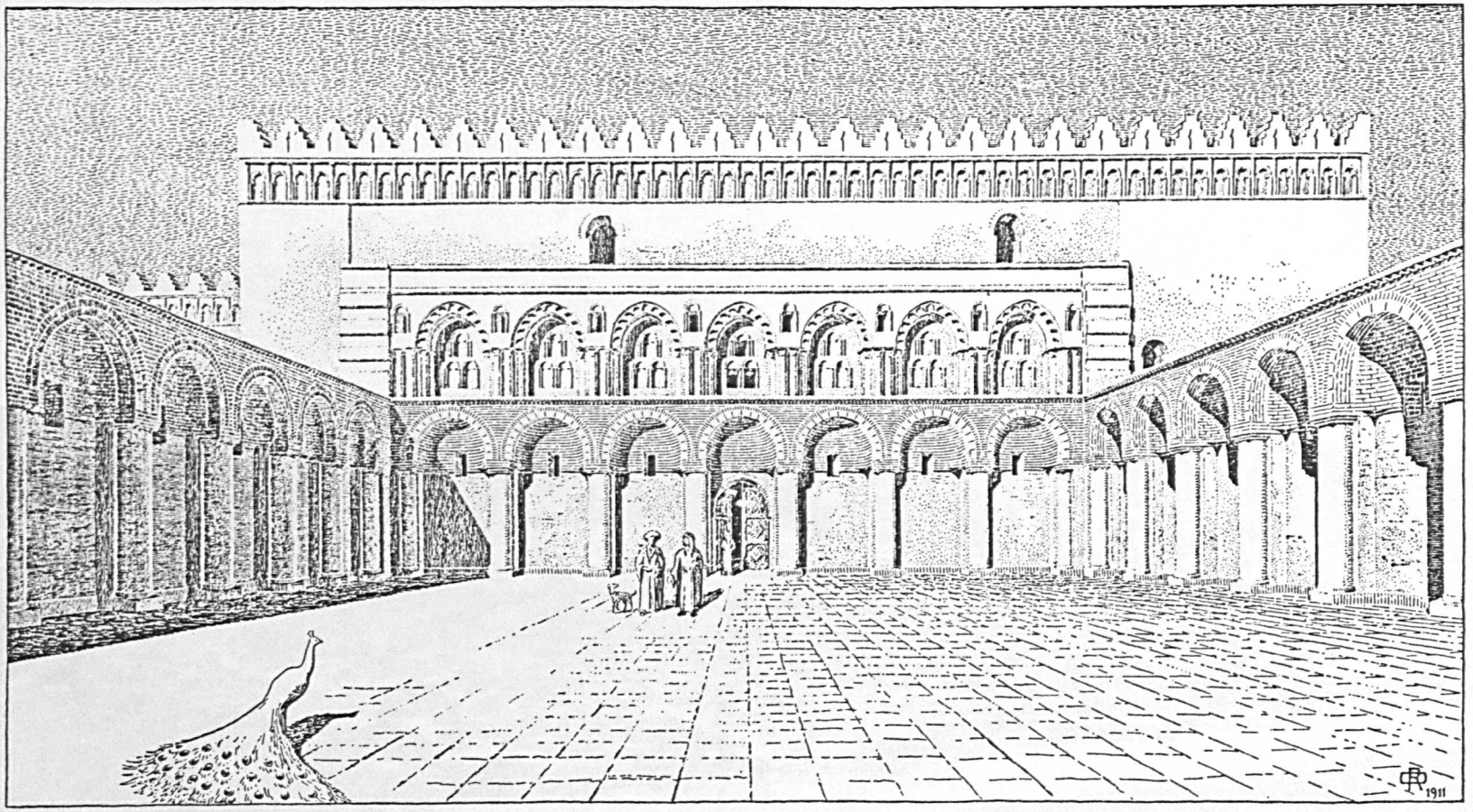


UKHAIḌIR: Room 4, detail of fluted dome.
(From Reuther, *op. cit.*)

FIGURE: D.22c.

Details of Different Parts of Ukhaidir.

Creswell, 1979, p.56, p.66



UKHAIDIR: Court of Honour, restoration of north side. (From Reuther, *op. cit.*)

FIGURE: D.22d.

Interior Courtyard at Ukhaidir.

Creswell, 1979, p.65

FIGURE: D. 22e Exterior of Ukhaidir Palace

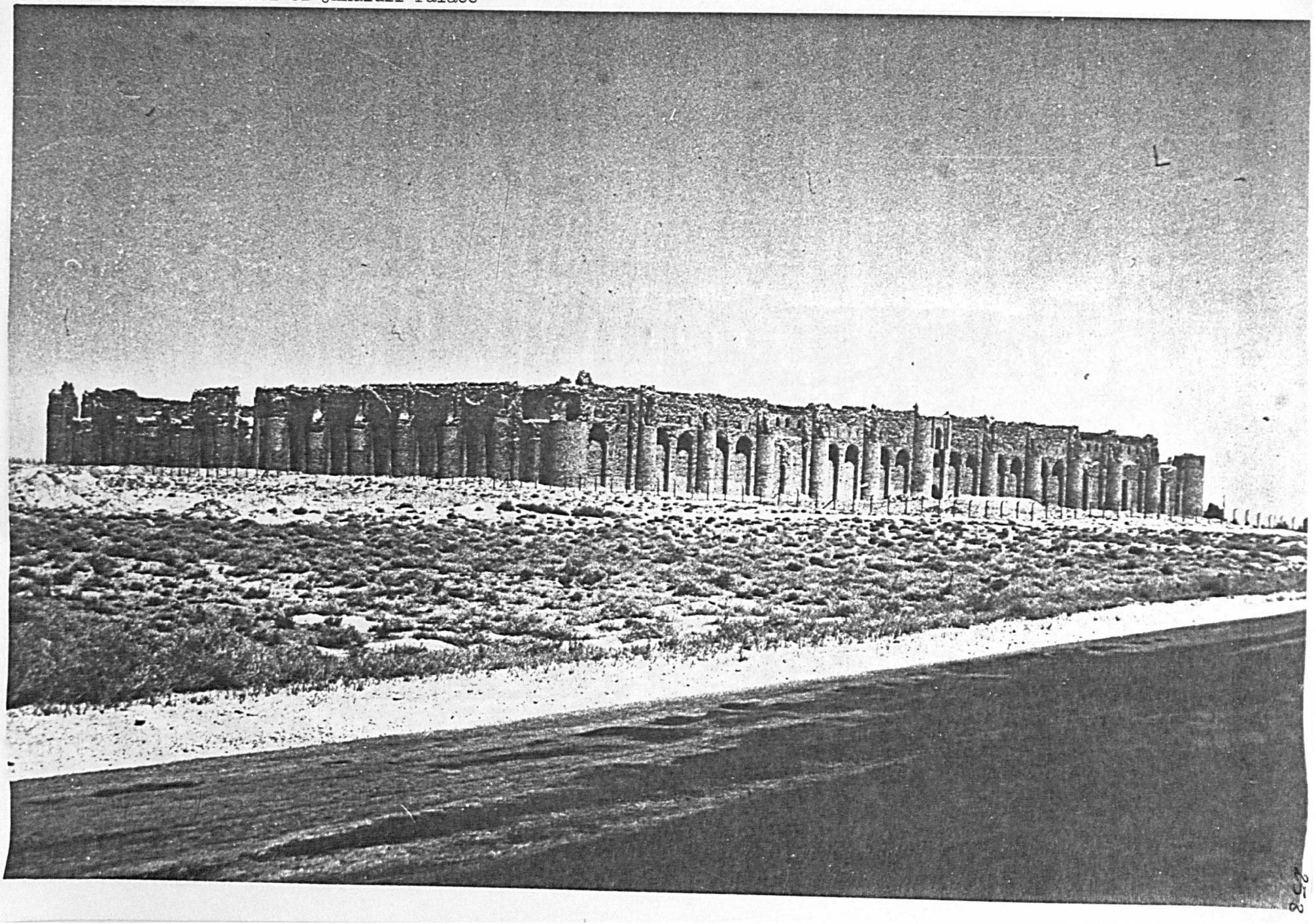
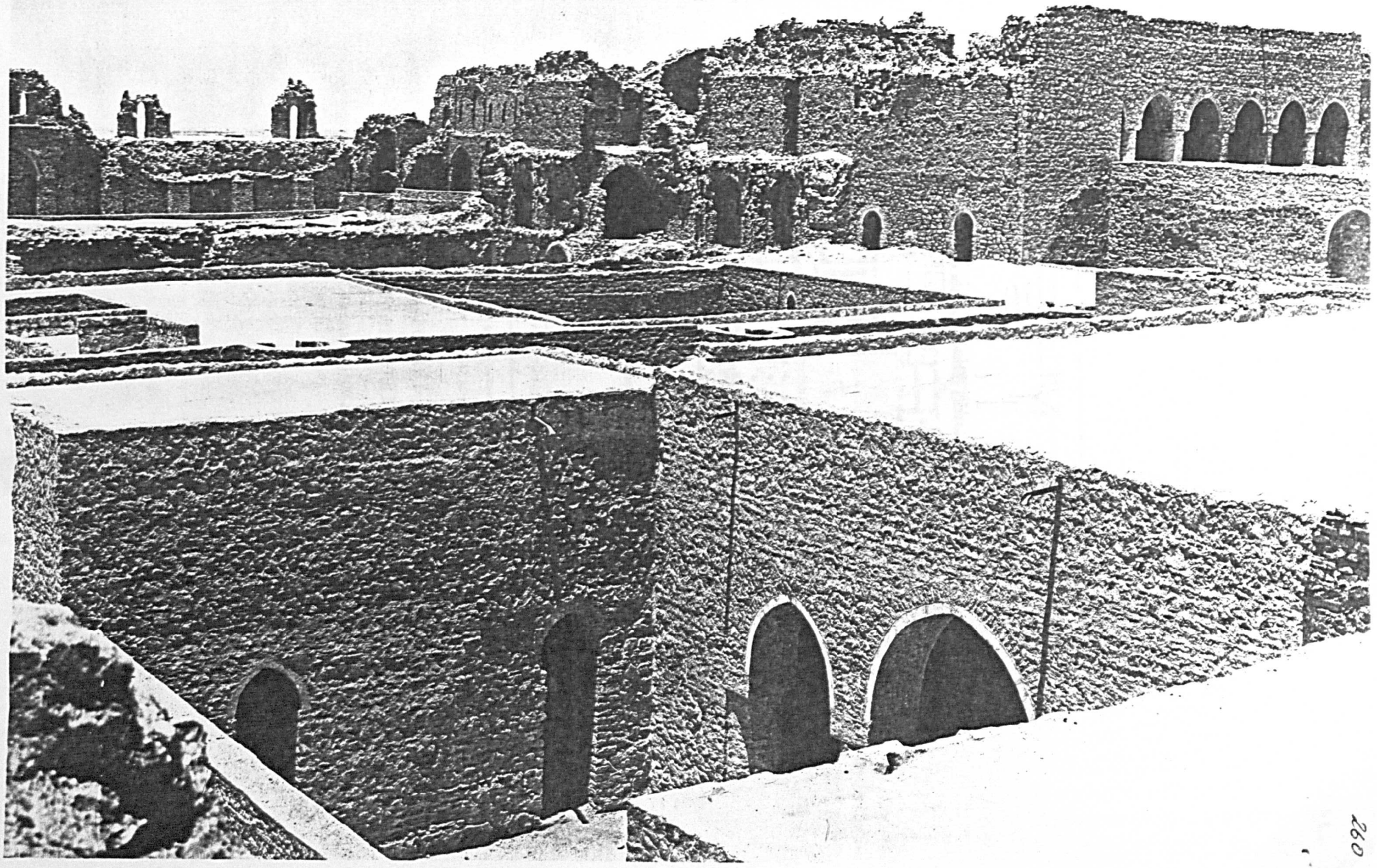
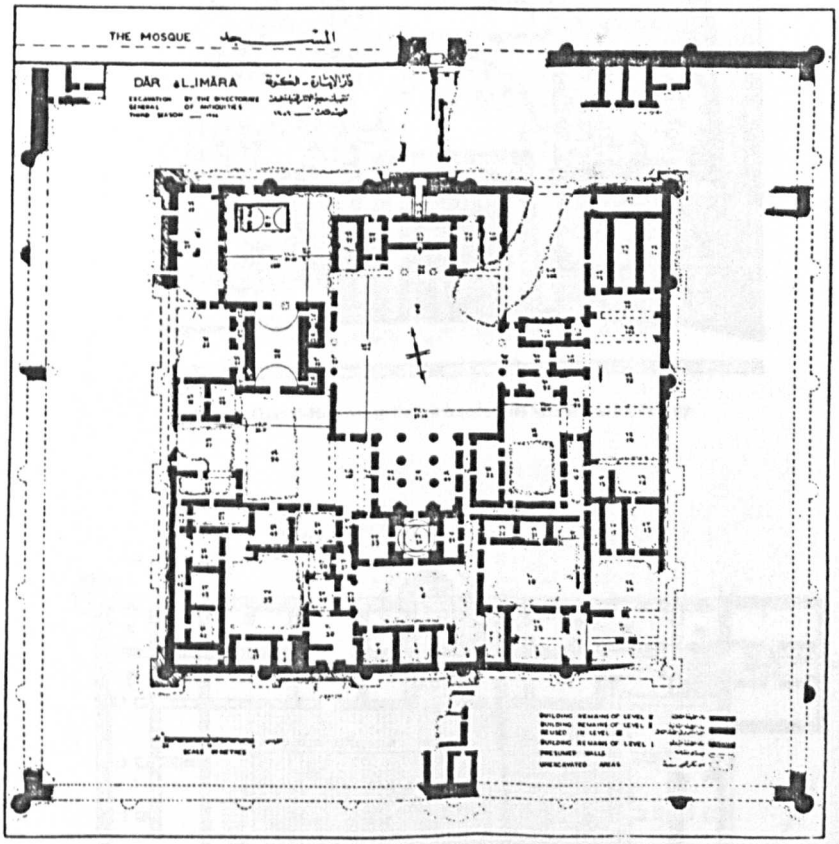


FIGURE: D. 22f Interior of Ukaidir Palace

FIGURE: D. 22g Top View of Ukhaidir Palace



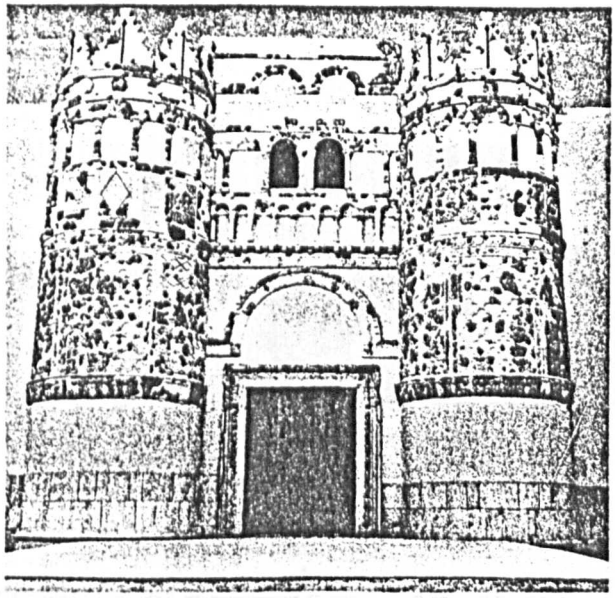


Kufah. City palace, late 7th and early 8th centuries, plan. (After Ali)

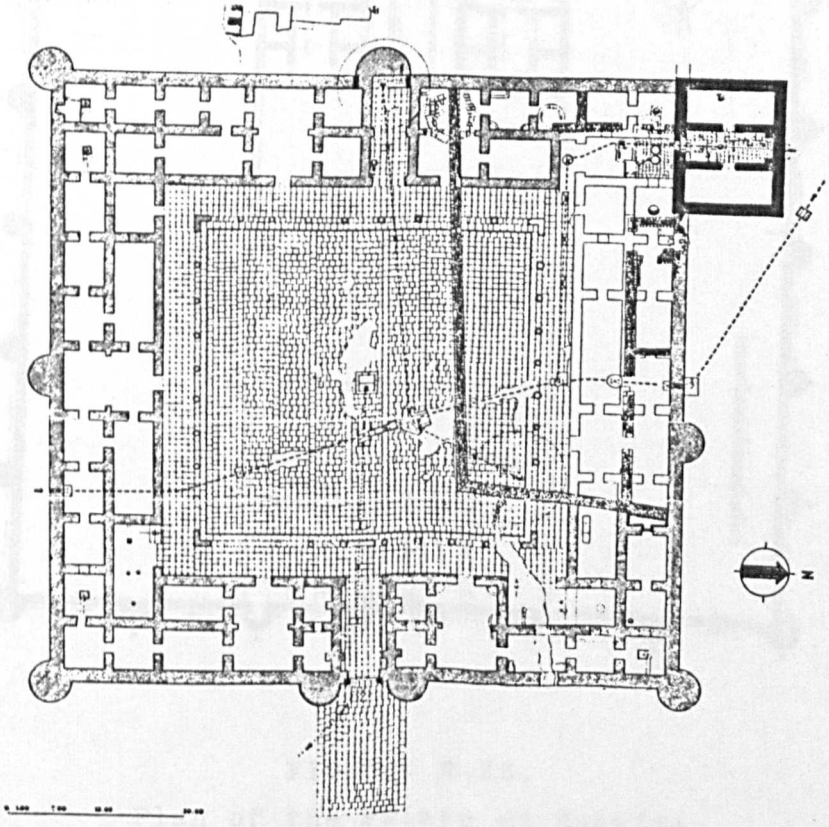
FIGURE: D.23.

Plan of the Palace at Kufah.

Grabar, 1973, p.64



Qasr al-Hayr West. Palace façade, first half of the 8th century.

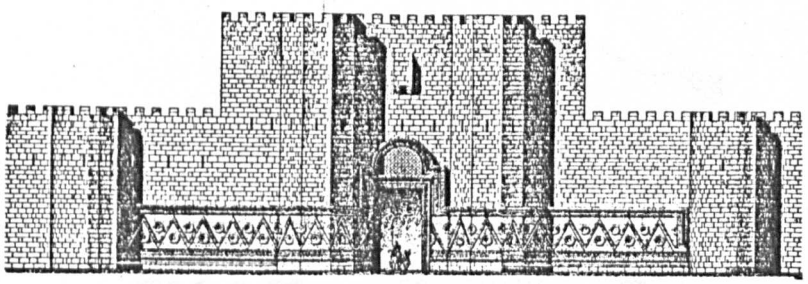


Qasr al-Hayr West. Palace, first half of the 8th century, plan. Scale in meters. (After Schlumberger)

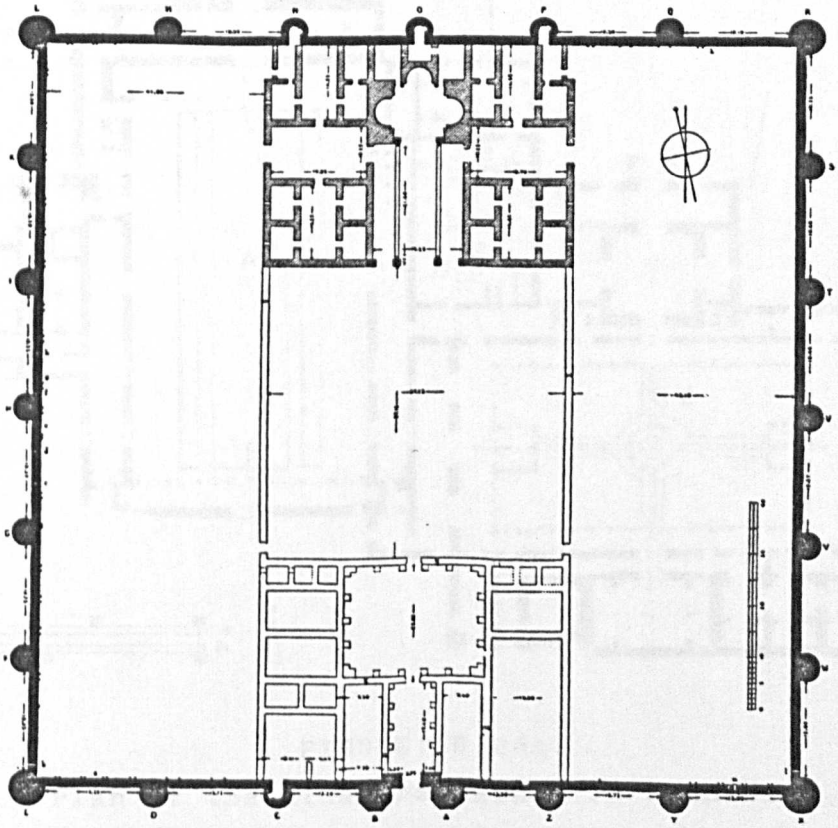
FIGURE: D.24.

Plan of the Palace at Qasr al-Hayr West.

Grabar, 1973, p.65, p.61



Mshatta. Reconstruction of façade. (After Schulz)



Mshatta. Palace, first half of the 6th century, plan. Scale in meters. (After Creswell)

FIGURE: D.25.

Plan of the Palace at Mahatta.

Grabar, 1973, p.62, p.65

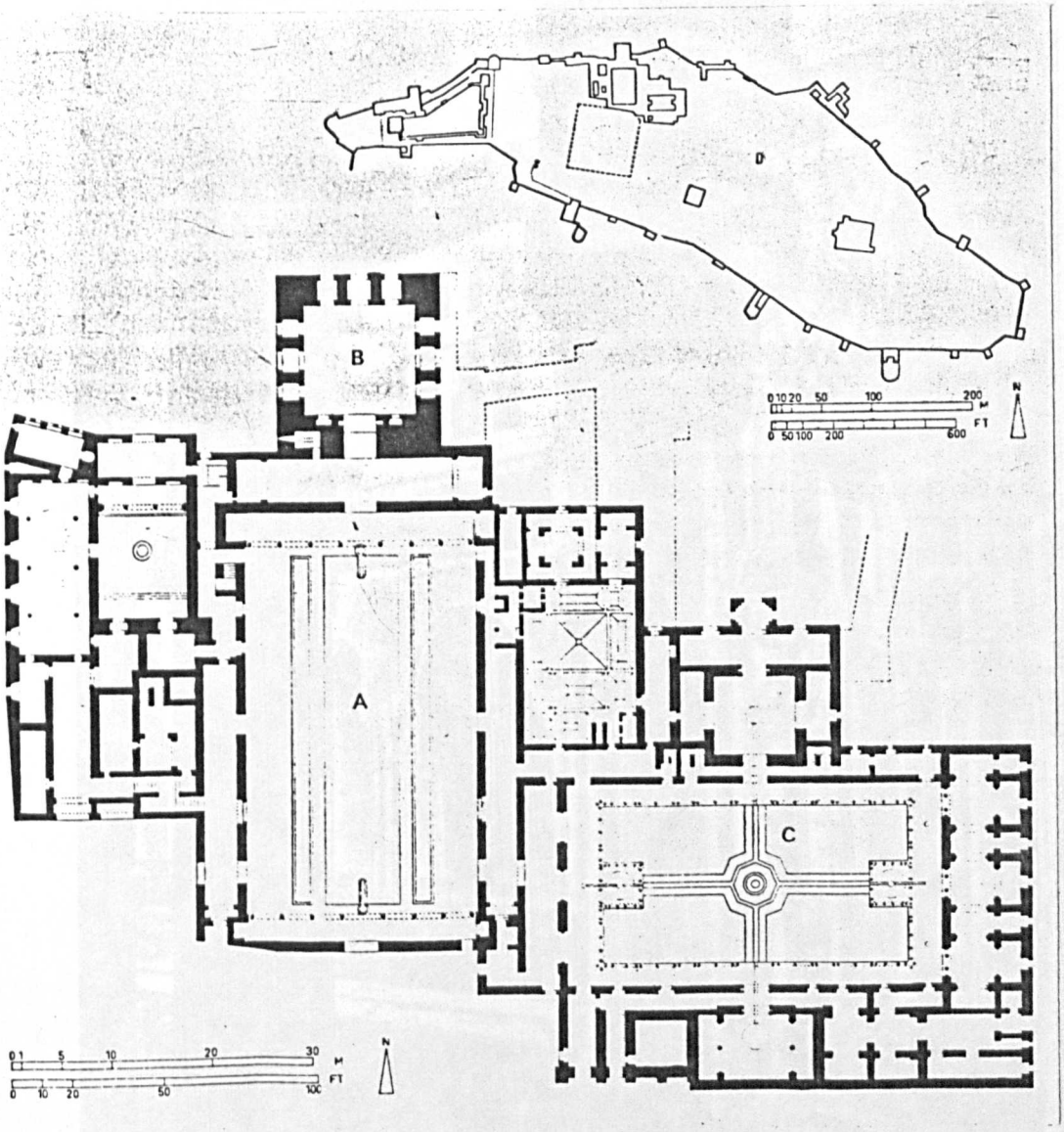


FIGURE: D.26a.

Plan of the Alhambra Palace in Granada.

Stierlin, 1977, Vol.2, p.352

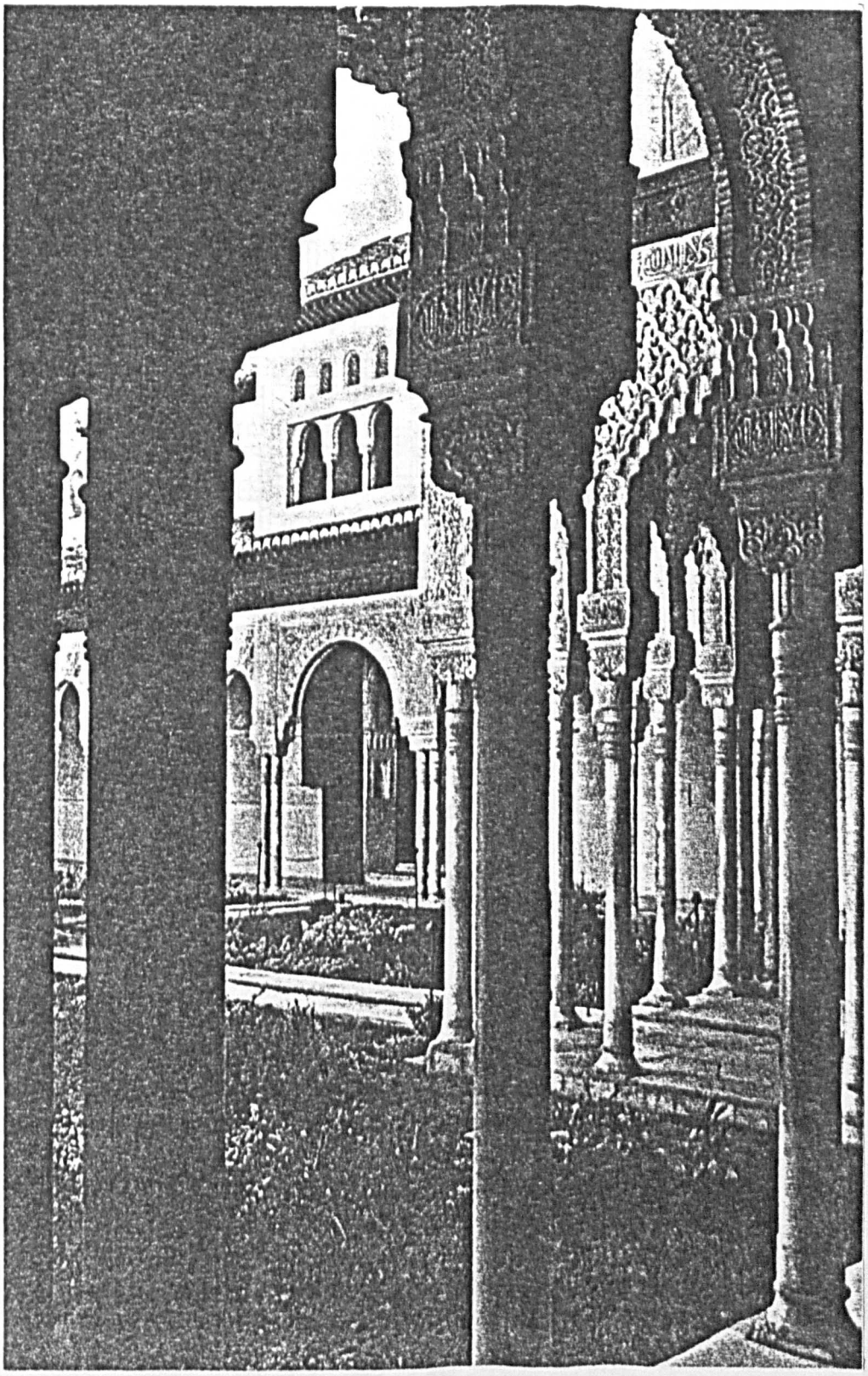


FIGURE: D.26b.

Detail of the Lion Courtyard in the Alhambra Palace in Granada.

Badeau et al.: Phaidon, 1978, p.103

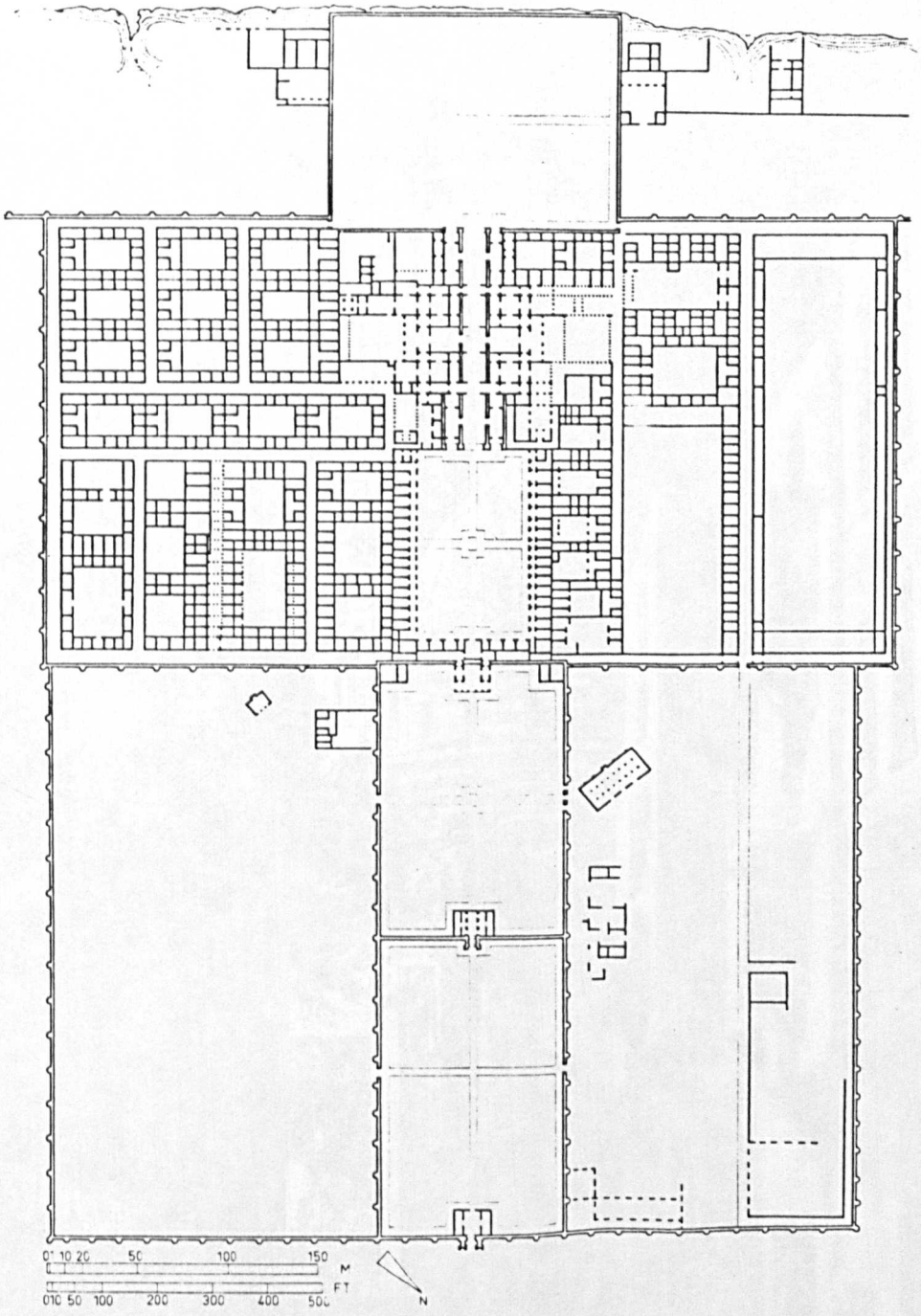


FIGURE: D.27.

Plan of the Palace at Samarra.

Stierlin, 1977, p.346

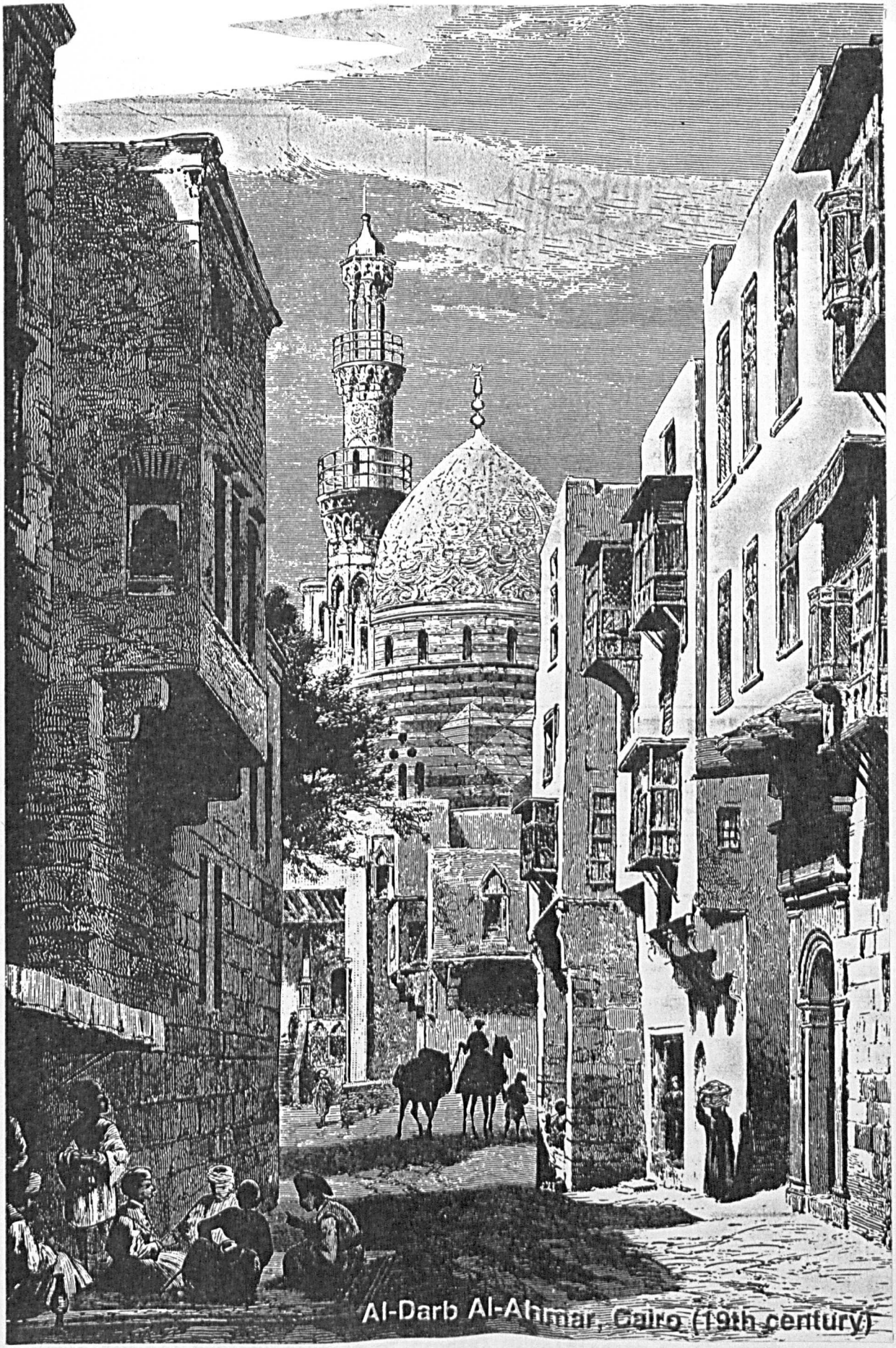


FIGURE: D.28.

The Mosque.

the main city mosque such as in the case of the culmination of this first series of buildings: its plan consists of some iwans and domes. The city does not merely consist of the rural palaces, but there were a large number of imperial and aristocratic establishments also. They were not all built at the same time nor did they always remain in use after the lifetime of their builder.

One of these royal palaces, Al-Khaqani in Samarra, was an immense building comprising some 432 acres, of which 172 were gardens, and entirely surrounded by high walls with only one main entrance and provided inside with a large number of quarters. The formal part was designed on axis and consists of a succession of gates separated by open spaces leading to a cruciform office unit with a central domed hall opening onto iwans and courts. Between branches of the cross were baths, a mosque and probably some living quarters. The immensity of the royal compound was like a forbidden town within the city [Grabar, 1973, pp.166-167].

D.4.4.3 The Mosque (jami)

Islamic religion dominated the cultural environment in the Middle East during the Middle ages. All the other factors of the culture were influenced by religion. The mosque presented the symbol and therefore, became the focal point of the society.

The mosque (masjid) acted as a spiritual and physical centre of the community during the Middle ages. The Koran did lay down one rule for all Muslims that is of crucial significance to the architectural history of the mosque: the obligation to perform prayers. The

act of prayer is a private act, and a celebrated tradition asserts that wherever one prays there is a masjid. But the act of prayer is also a collective act. The function of praying is not merely religious practice, but it serves to strengthen the formal ties of the Muslim community.

In order to understand the architecture that developed from Islamic religion the following characteristics of Muslim prayer are of particular importance. First of all, a ritual of prayer was created. Once a week, on Fridays at noon, it involved the whole community. Akhutbah was pronounced, which was both a sermon and an act of allegiance of the community to its leader. This was the time not merely for a pietistic performance but also for the announcement of news and decisions pertaining to the whole group and even for certain collective decisions. As social scientists might put it, communications took place between the collectivity and its leaders.

'The mosque, as a social and cultural institution, was so important that no community could exist without it. It performed religious, educational and cultural functions in the community' [Hassan, 1971, p.63]. In addition, it became the centre of political, intellectual and judicial activities. 'The commonly shared experiences in the above areas of community life became the basis of community solidarity. The institution of jami was elemental in the maintenance and integration of the community system' [Benet, 1963, pp.221-226].

The requirement of prayer five times per day distributed throughout the day, spanning from early morning until late at night, and the different activities which take place in the mosque make the need for climatic control an important design consideration. Internal comfort for the people is needed to perform their activities;

the act of prayer should take place in a covered space during the day, where shade can be provided to protect the worshipper from the direct sun. When prayers take place in open spaces during late afternoon and at night, the people can be directly exposed to fresh air. Open space within the mosque therefore offers a flexible space for multi-purpose activities, changing the activity space in the mosque available for summer use. All functions take place under cover during the winter.

These requirements determine the arrangement of the mosque and it became the main basic principle and consideration in the design and layout of mosques.

The first mosque was the prophet Muhammad's house in Madinah. Its major features were a square, large courtyard fifty by fifty metres with two shaded areas. One, towards the south, consisted of two rows of palm trunks with a thatched roof; although it provided a shaded place it also served to indicate the direction of prayers... this courtyard is where the official activities of early Islam took place.

The early mosques in the Middle East were in Syria; the Muslims had either divided or taken complete possession of the existing churches while in Mesopotamia, however, conditions were different - mosques were designed and built as new structures to fulfil their function and requirements as in the two new towns in Iraq, Basrah and Kūfa which had been founded.

Ziyad Ibn Abihi who was appointed governor of Basrah in 665 had greatly enlarged the mosque, using burnt brick and mortar, and roofed it with teak. The roof of the sanctuary rested on five rows of columns, the stone for which came from jabal Ahwaz. Pebbles were spread on the ground.

In Kūfa, a vast mosque, the cupola side has five aisles, whereas the rest have two only; the aisles are supported by columns like masts, composed of hard blocks of stone superimposed piece by piece, beaded on lead and not surmounted by arches; extremely high, they go up to the ceiling of the mosque [Creswell, 1958, pp.12-13].

These simple shape and design principles became the model for future mosques which developed throughout the time in all lands with a Muslim population. Early texts refer to the open part of a mosque as a Sahn or court; the covered part being called a Zullah or shaded area as in Kufah where the first mosque was founded in the newly created Islamic city in Iraq in 670. Other examples include Kairouan mosque in North Africa and Ibn Tulun mosque in Egypt. With the development of the mosque the shaded part was screened from the upper part as in Kairouan mosque. Exceptions from the above mentioned shape and principles are also found in the Aqsa mosque in Jerusalem (Figure D.29c), which has certain peculiarities due to its location in a unique setting.

The mosques in the early Islamic period vary widely in design; in Iraq, the type in which the roof rests directly on piers or wooden columns, without the intermediary of arches, was widely spread (e.g. Kūfa, Wasit, Baghdad, Samarra etc.). Nevertheless, mosques with the roof resting on arcades appear at Raqqa and the mosque of Abu-Dulaf in Samarra and in Egypt the mosques of Amr and Ibn-Tulun. The square plan of early Iraqi mosques (Kūfa, Baghdad, Wasit, etc.) is departed from in the two great mosques of Samarra; nevertheless, it was brought to Egypt by Ibn-Tulun. Vaulted mosques were the palace mosque at Ukhaydir and the mosque in the Ribāt of Sūsa. Mosques with a dome in front of the mihrab can scarcely have been a feature of Iraqi origin [Creswell, 1958, p.318].

Like other elements of urban fabric in the Middle East region during the Middle ages, the mosque and its activities are inwardly directed, which allows the mosque layout to take 'the fortress-like character of the strongly buttressed outer walls...' [Kuhnel, 1962, pp.36-37]. In spite of the mosque design following basic principles already mentioned, various types of layouts appeared throughout the region, as a result of the location, local variation in design and other environmental differences. 'Regional peculiarities are manifested in the ground plan; in Egypt these approximated to a square mosque (Figure D.29d) whereas in Syria a horizontal rectangle (Figure D.29a and in the Mahgreb a vertical rectangle were the rule (Figure D.29d). These variations may be due to local historical circumstances and previous building forms, and building experience. One plan which was to be of considerable importance falls, however, right outside the general scheme. This is the Dome of the Rock, the Qubbat as-Sakhra in Jerusalem. It is in the form of an octagon (Figure D.29c). This unusual arrangement arose from the need to build round the Holy Rock; a contributing factor may have been the desire to place an equally imposing monument beside the Christian rotunda, the Church of the Ascension, at the same place' [Kuhnel, 1962, pp.36-37].

Throughout the development of the mosque, different types of mosques can be distinguished; a masjid and a masjid al-jami. The latter is the large mosque of the collectivity, called Friday mosque. Each city had at least one huge mosque, i.e. the city of Baghdad (Figure D.16), while the masjid is relatively smaller than the masjid al-jami, usually without minaret, and mostly located within the residential quarters.

The other types of mosque are the mosques which contain shrines. Usually these mosques are big, to provide enough space for visitors from inside and outside the city. In spite of their normal functions, these types of mosque play an important role in the economy and in city planning because they need special organization for the different facilities and amenities surrounding them, where the visitors can find suitable places for their activities. In addition, it was one of the factors which encouraged urbanization. This kind of mosque can be seen in Iraq at Kerbala, Najaf and Baghdad (Figure D.36b).

The early Muslim theory of construction was the ability of the construction system to be expandable, flexible and additive. The principle can be defined as one in which the main internal support consisted of a single element that could be multiplied at will in any needed direction [Grabar, 1973, p.114].

The early Muslims applied their hypostyle system by using columns; its features were influenced by Ancient architecture using columns, each in its locality, as in Iraqi mosques. Most of the Muslim region east of Iraq and Syria in which they used units of columns: base, shaft and capital, were influenced by Ancient architecture, e.g. Damascus mosque [Hoag, 1963, p.13] (Figure D.30) or Jerusalem mosque (Figure D.29c); the colums which were used in these buildings were influenced by Roman columns.

Moreover, the Damascus mosque is the earliest surviving example of the complete assimilation by the Muslims of foreign architectural elements and their new use of them to establish an environment specifically their own.

Another treatment was also used in the buildings when applying the theory of a flexible, expandable and additive construction system in the Islamic period. Instead of single more or less equal supports over its whole area, as in Iraqi and Egyptian buildings, a nave was arranged from which a succession of supports were supporting the covered parts of the building as in Cordoba, Damascus and Aqsa mosque in Jerusalem. It is clear that by the addition and subtraction of naves, a form of direction was provided. Thus the multiple directions of the purer hypostyle of early Iraqi mosques are avoided.

Following the development of the above mentioned theory of construction new types of column were appearing in the newly erected or expanded mosques as in Cordoba mosque in Spain (Figure D.29e) and Kaioun mosque in North Africa (Figure D.29d),

Another element acting as roof support was the pier. 'The brick pier, whose history became so brilliant in later Islamic architecture, seems to have developed primarily because of its usefulness in the mosque and to have acquired there its later versatility' [Grabar, 1973, p.115].

These piers occurred in the great Samarra mosque in Iraq (Figure D.29b) and Ibn Tulun mosque in Egypt built under the influence of Iraq (Figure D.29d).

Piers are of various type: the most common shape is the rectangle with engaged colonnettes and in some cases, they appear almost like segments of walls as in the Abu Dulaf mosque in Samarra, Iraq (Figure D.29b).

The vast majority of supports are surmounted by arches: most of these are semi-circular, but, as has been often pointed out, the pointed

arch that culminates in the mosque of Ibn Tulun appears in a number of early Islamic monuments. The full architectonic properties of the pointed arch were not fully realized except in the comparatively minor aspect of lightening the spandrels on the arch's sides.

The exception occurs in Cordoba, whose double-tiered system exhibit a variety of shapes, from simple horseshoe to a number of polylobed modifications of the horseshoe shape (Figures D.29f & D.29g) [Grabar, 1973, p.130]. These double-tiered systems act as buttresses to support the mass of long columns.

In order to cover a large square span free of supports, a cupola construction system was used. In this system, various techniques of construction were introduced. Firstly, techniques of transforming the square to a circle or octagon, in order to erect the cupola over. Secondly, various techniques were used in constructing the cupola.

The first step in transforming the shape of the covered space was achieved in a number of ways. One technique which was used in Kairouan mosque is an example of the robustness and clarity of its movement from square to octagonal zone, sixteen-sided zone to ribbed cupola, and the sobriety of its ornament [Grabar, 1973, p.130]. Here, small plain arches springing from the square provide the transition to the sixteen sided dome. Another example of transforming the square to circle or octagonal was achieved by muqarnas, stalactite-like characters (Figure D.5a).

The second step is constructing the cupola. One technique was by the polylobed arches system, which acts as the main skeleton for cupola roofing as occurs in Cordoba mosque (Figure D.5c).

However, 'No iconographic meaning as such can be given to the forms of the arches and domes, but one can be suggested for the existence of more elaborate forms in certain parts of the mosque. They are all found around the mihrab (Figure D.33b) and on the axial nave, serving thus to emphasize the holiest part of the mosque or its royal part' [Grabar, 1973, p.131].

(a) Minaret

Another important feature which was added to the mosque during its evolution was the minaret. It is a tower. Its official purpose is that of calling the faithful to prayer. In the time of Prophet Muhammad no such thing as a minaret existed, he and his followers prayed without any preliminary call to prayer. As a signal, the Prophet Muhammad ordered Bilal to give the call to prayer, which he was accustomed to do from the highest roof in the neighbourhood [Creswell, 1958, p.5]. With the development of the mosque throughout different Muslim lands, the minaret took various locations and shapes. The minaret was either immediately attached to the mosque as in Damascus and Kairouan mosques (Figure D.32b) or standing nearby as in Samarra mosque (Figure D.32a).

Different forms of minaret appear as a result of the minaret development and the influence of ancient towers, i.e. square minarets as in Syria (Figure, D.30) were influenced by Roman and Hellenistic constructions. Spiral type minarets as in Samarra, Iraq and Ibn Tulun in Egypt, were influenced by the Ziggurats of Mesopotamia.

Cylindrical minarets were developed in the eleventh century, as in most Iraqi mosques.

(b) Mihrab

The mihrab, another important feature in the mosque (Figure D.33c), is usually a concave, heavily decorated niche, created on the wall of the mosque directed towards Mecca. Thus, it acts as a necessary 'sign' towards which prayers are directed.

The mihrab also appeared in different shapes and forms. Over the first centuries of Islam, the mihrab grew enormously in importance. In Cordoba it is actually a whole room that appears as an open door from the interior of the mosque itself (Figure D.33e). In Kairouan or Samarra it acquired considerable size (Figure D.33b).

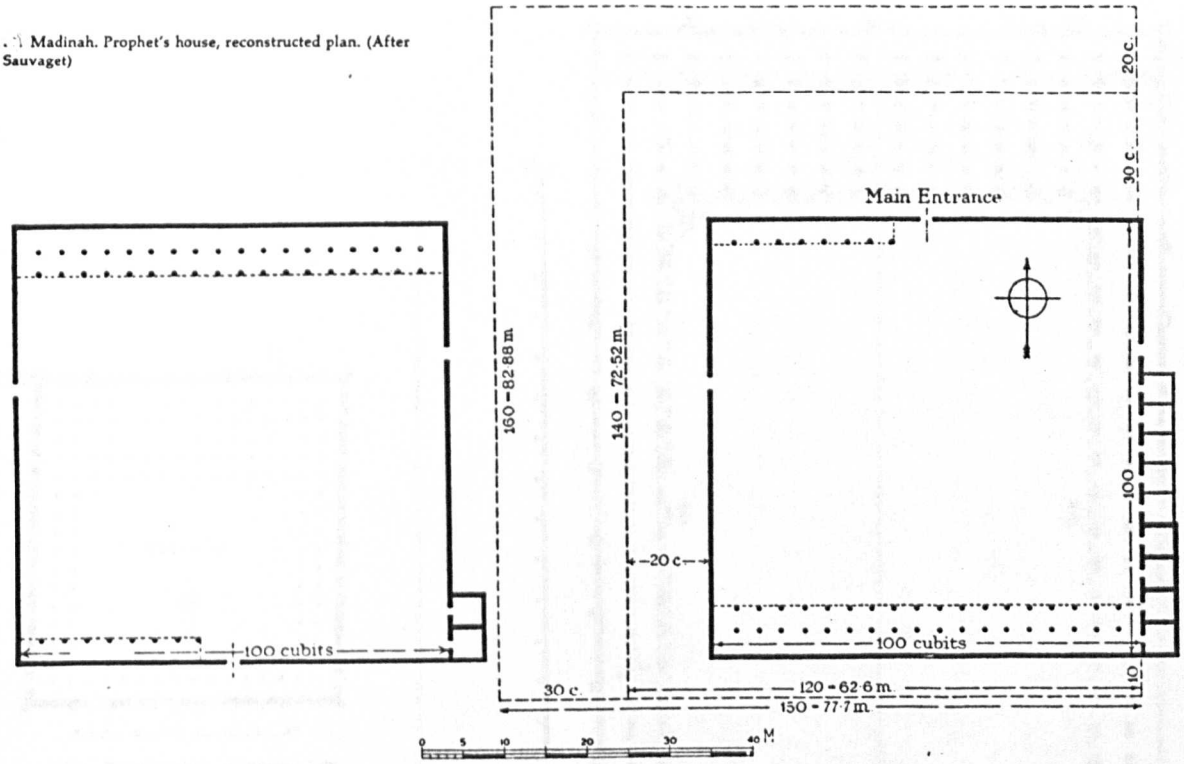
Also there are some other features that appeared in different individual mosques which are of lesser importance and did not become part of the mosque type, i.e. the maqsurah

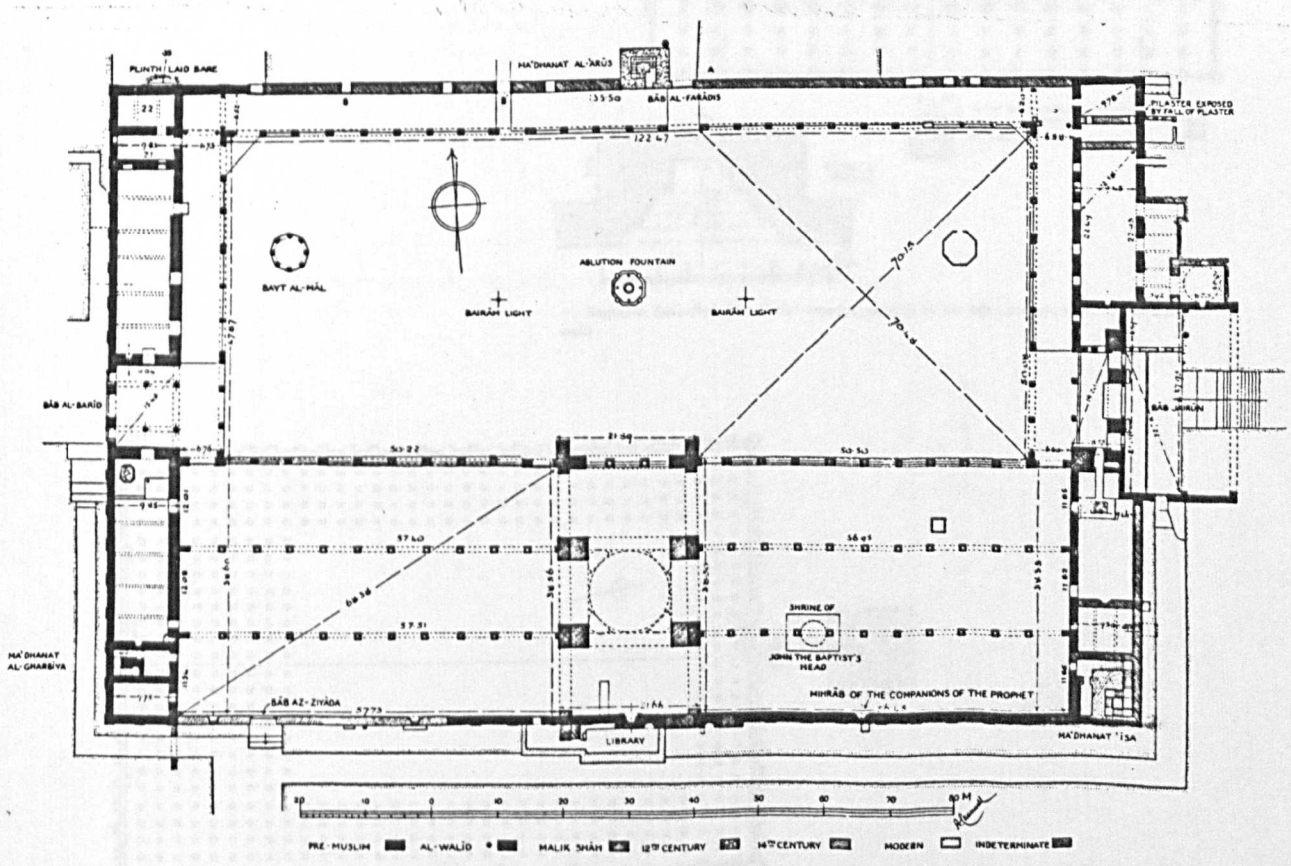
Within the urban fabric of the medieval Islamic cities, the mosque did not merely play the main role of being a centre of community activities but it also dominated the skyline of the city; the minaret, the strong vertical element, appears in the sky and can frequently be seen from the narrow meandering alleyways giving a sense of direction and orientation.

Moreover, the mosque contains most of the main and the biggest public open spaces in the city and so acts as the main focal point in which many public activities take place.

Due to the differences in architectural background, the availability of building materials and skills, differences

. ٦ Madinah. Prophet's house, reconstructed plan. (After Sauvaget)



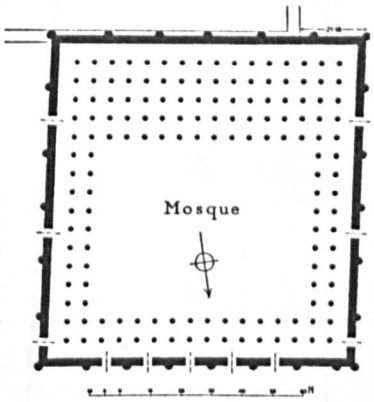


. Damascus. Umayyad mosque, 705–15, plan. (After Creswell)

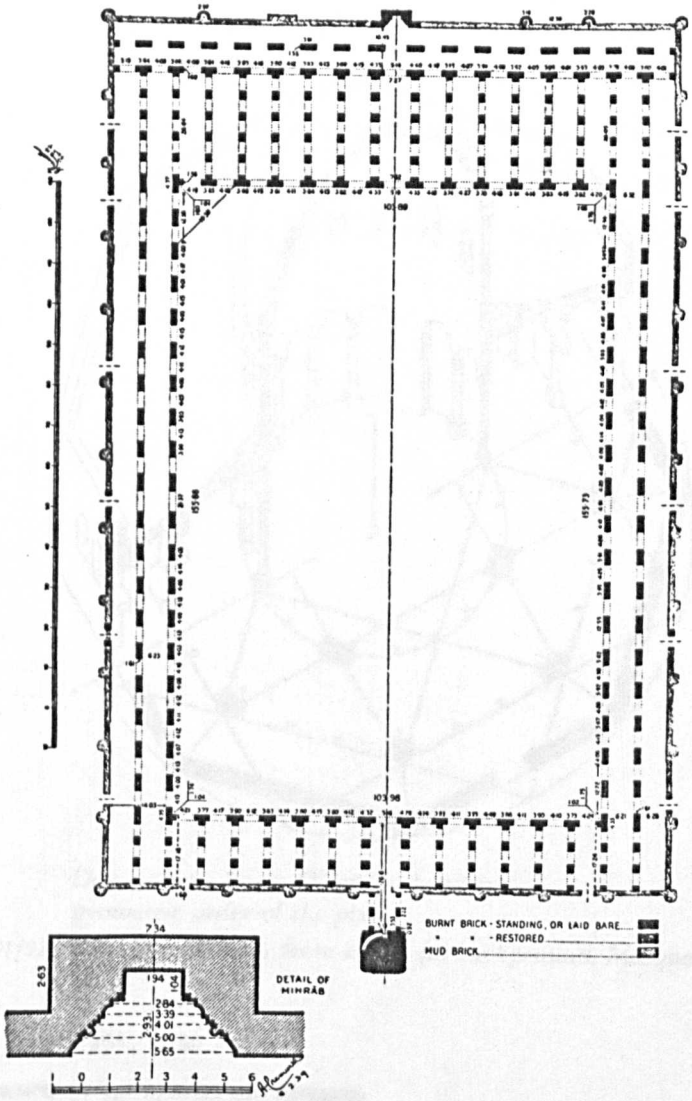
FIGURE: D.29a.

Plans of Mosques.

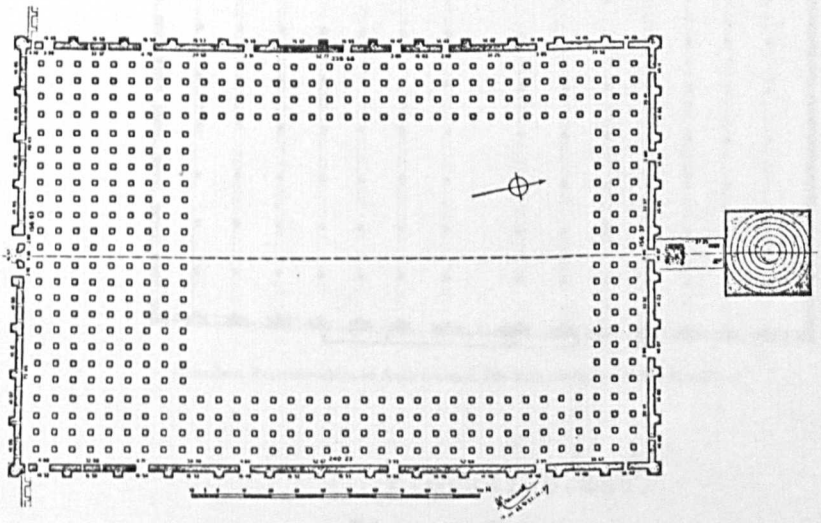
Grabar, 1973, pp.22-23



Kufah. Reconstruction of mosque, late 7th century. (After Creswell)



Samarra. So-called Abu Dulaf mosque, middle of the 9th century, plan. (After Creswell)

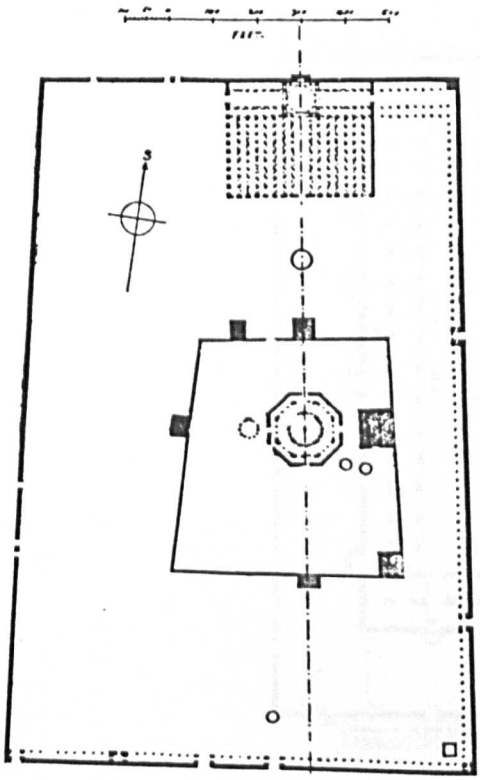


Samarra. Great Mosque, middle of the 9th century, plan. (After Creswell)

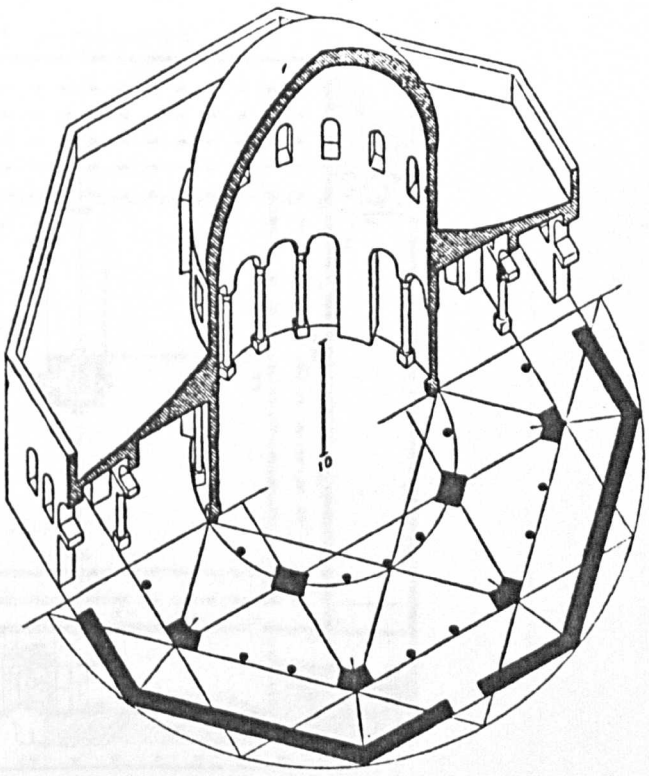
FIGURE: D.29b.

Plans of Mosques.

Grabar, 1973



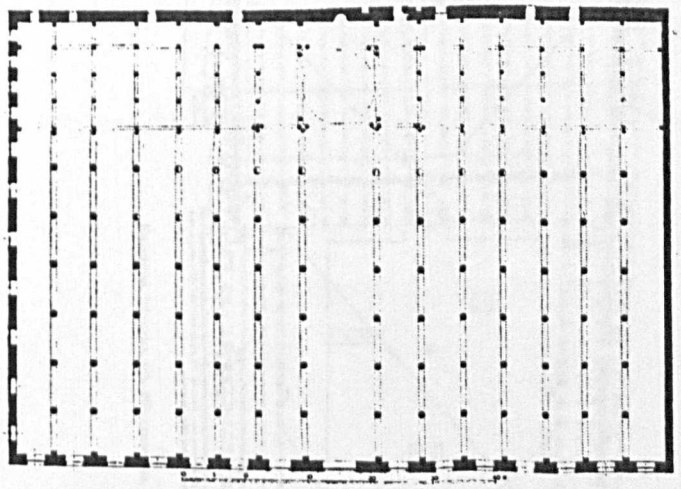
Haram as Sharif, Jerusalem. Plan, in the tenth century.



Dome of the Rock. Diagram showing geometric order of the plan.

Dome of the Rock, Jerusalem, 688/89–691/92. Temple area seen from above (in background, Mosque of al-Aqsa).

Hog, 1965, p.50

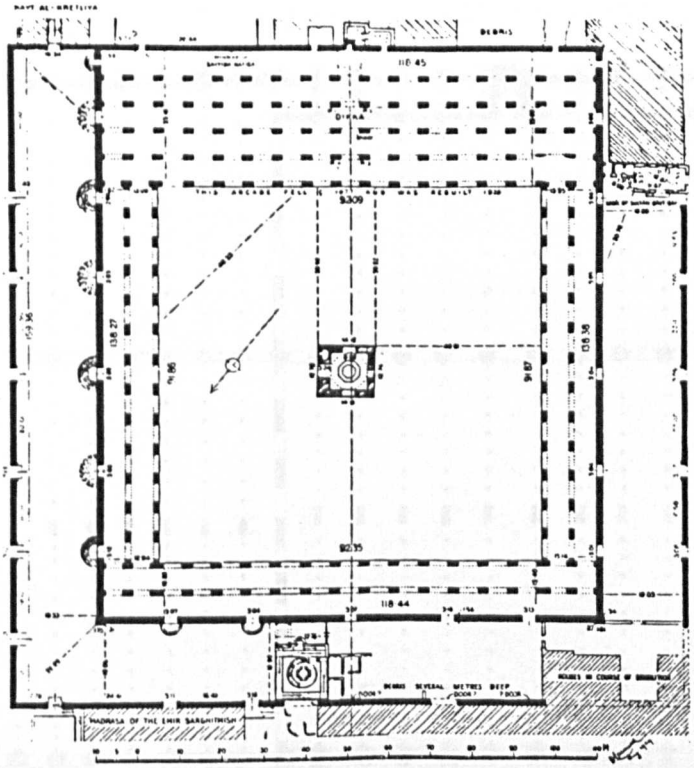


Jerusalem. Reconstruction of Aqsa mosque, 7th–11th centuries. (After Hamilton)

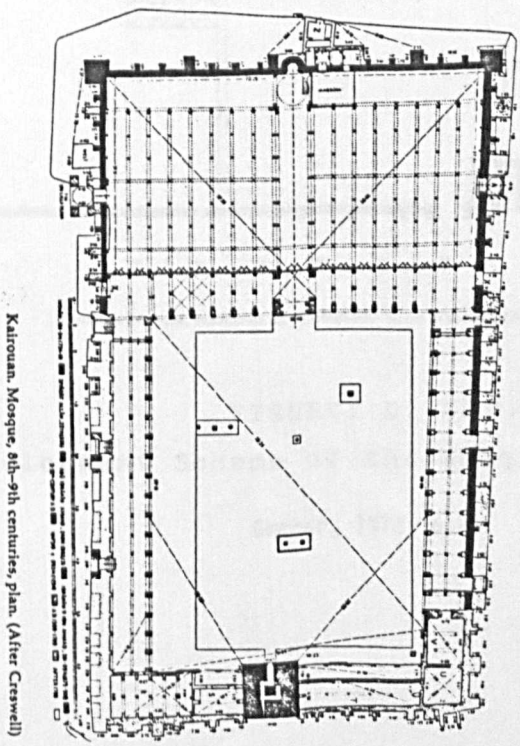
FIGURE: D.29c.

Plans of Mosques.

Grabar, 1973, p.37



Mosque of Ibn Tulun, Cairo, finished 879. Plan. (Credit: Creswell)

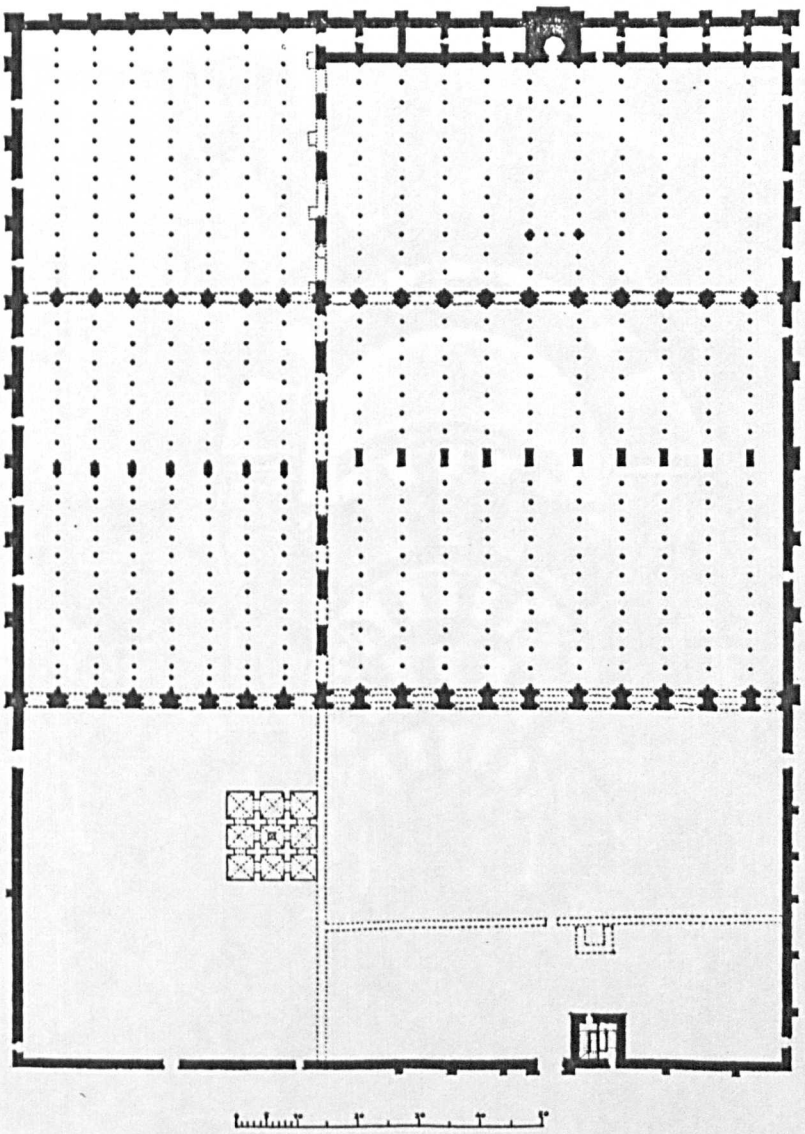


Kairouan. Mosque, 8th–9th centuries, plan. (After Creswell)

FIGURE: D.29d.

Plans of Mosques.

Grabar, 1973



Cordoba. Mosque, scheme of its development. Scale in meters. (After *Ars Hispaniae*, vol. 3)

FIGURE: D. 29 e.

Development Scheme of the Mosque at Cordoba.

Grabar, 1973, p.27

Arches and columns give the interior of the Mosque an air of the mystery of the Orient.

FIGURE: D.29f.

Horse-shoe Shaped Arches.

F.I.S.A., 1975, p.27

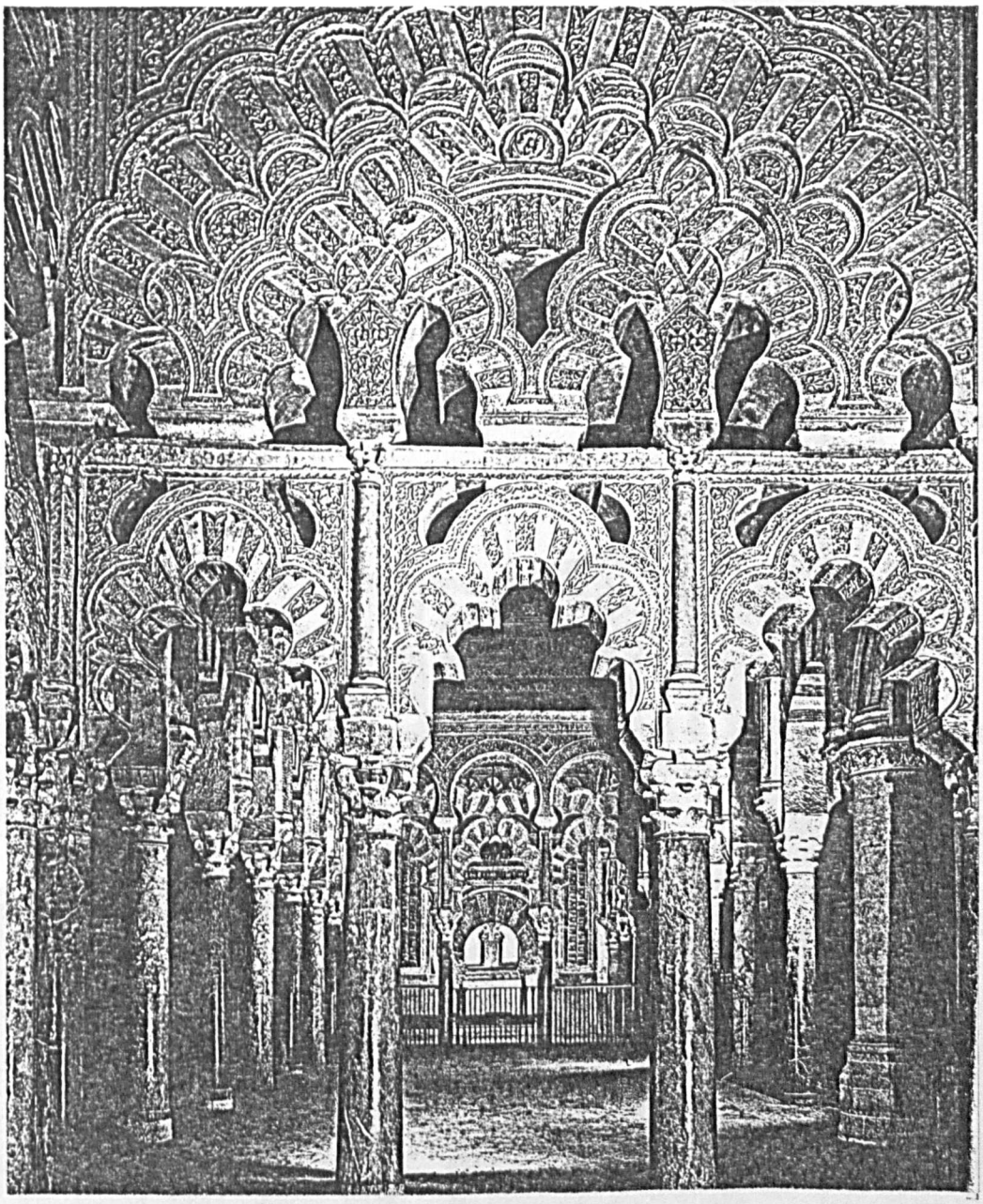


FIGURE: D.29g.

A Complex Horse-shoe Design.

F.I.S.A., 1975, p.22

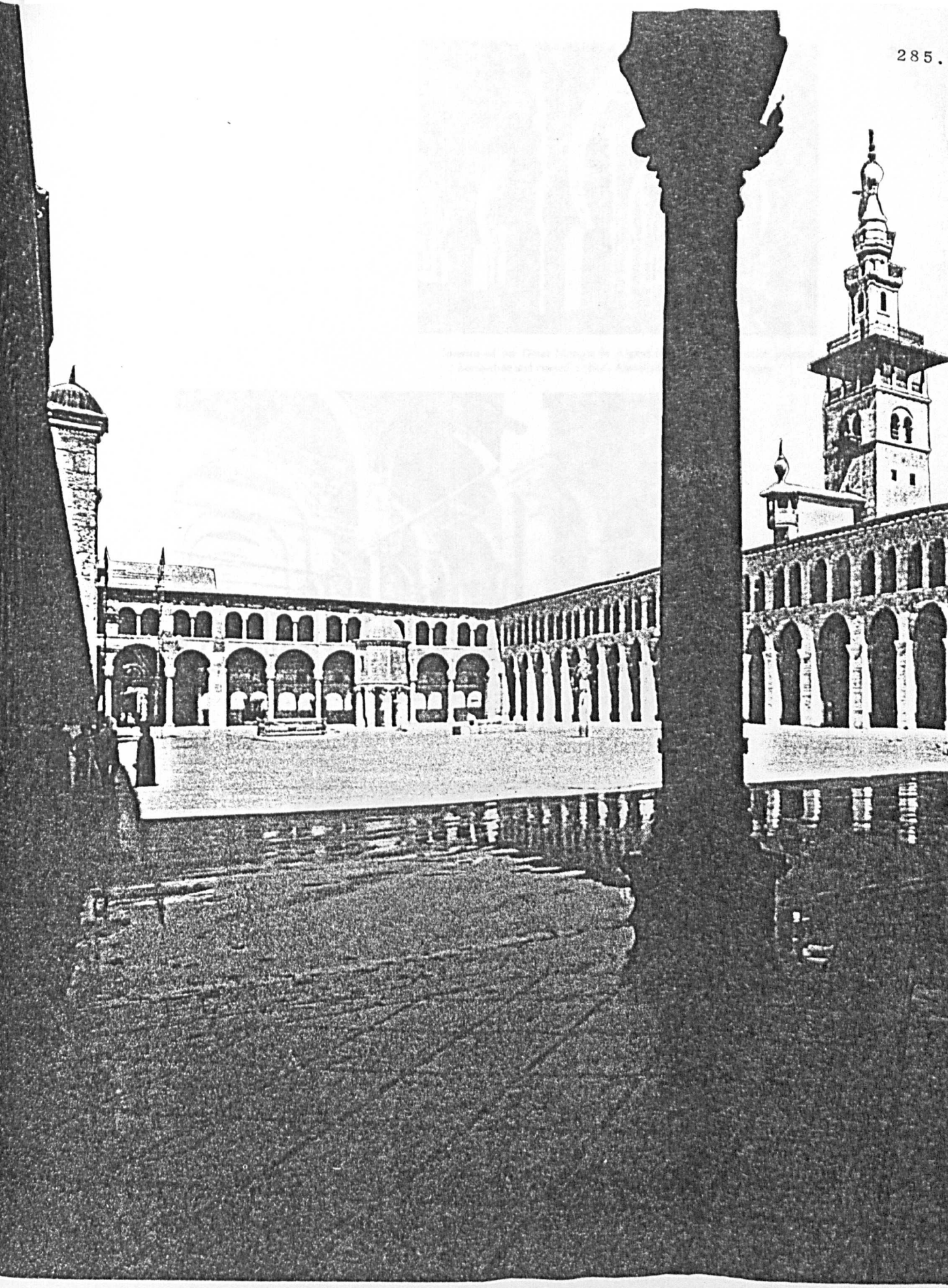
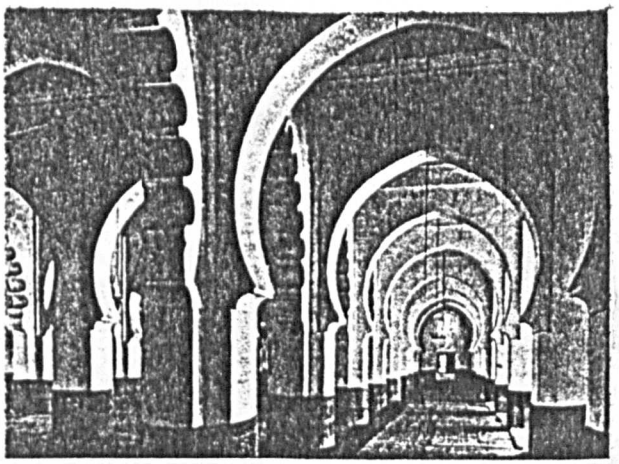


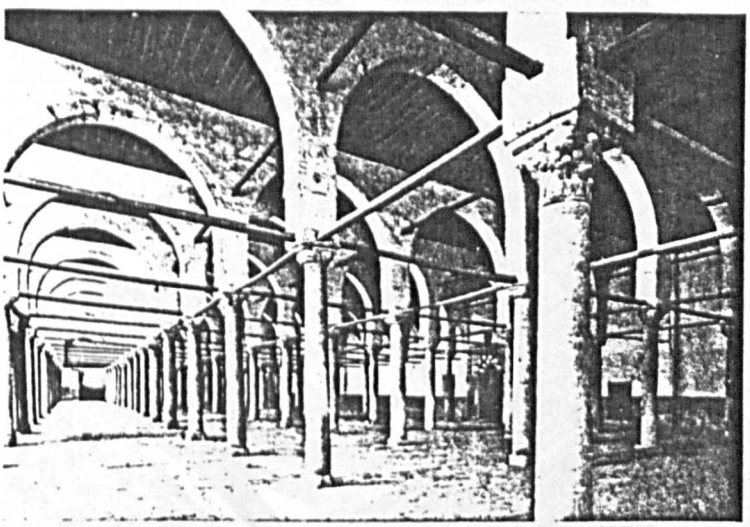
FIGURE: D.30.

The Great Mosque in Damascus.

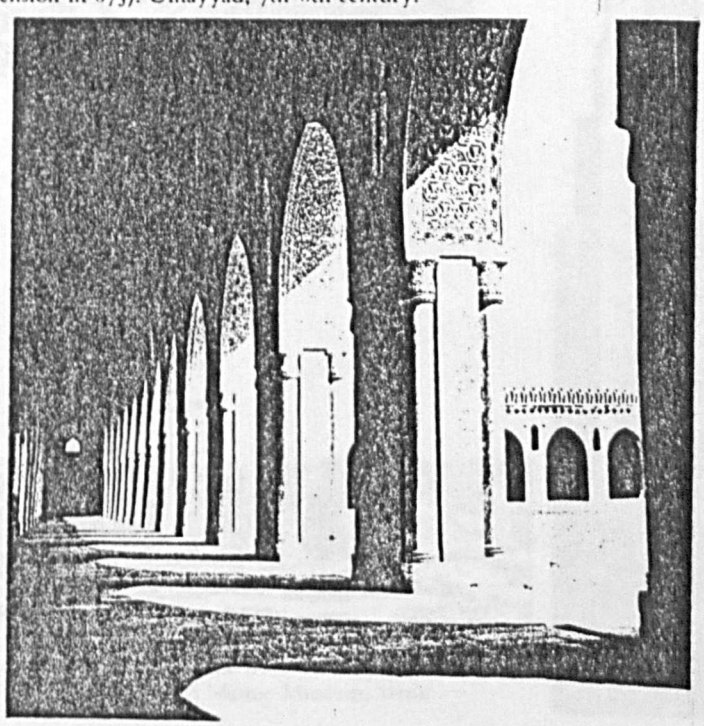
Creswell, Plate 46, 1958



Interior of the Great Mosque in Algiers (on brick piers, with pointed horse-shoe and cusped arches). Almohad period, 12th century.



The pillared hall of the 'Amr Mosque in Old Cairo (founded in 642, first extension in 673). Umayyad, 7th–8th century.

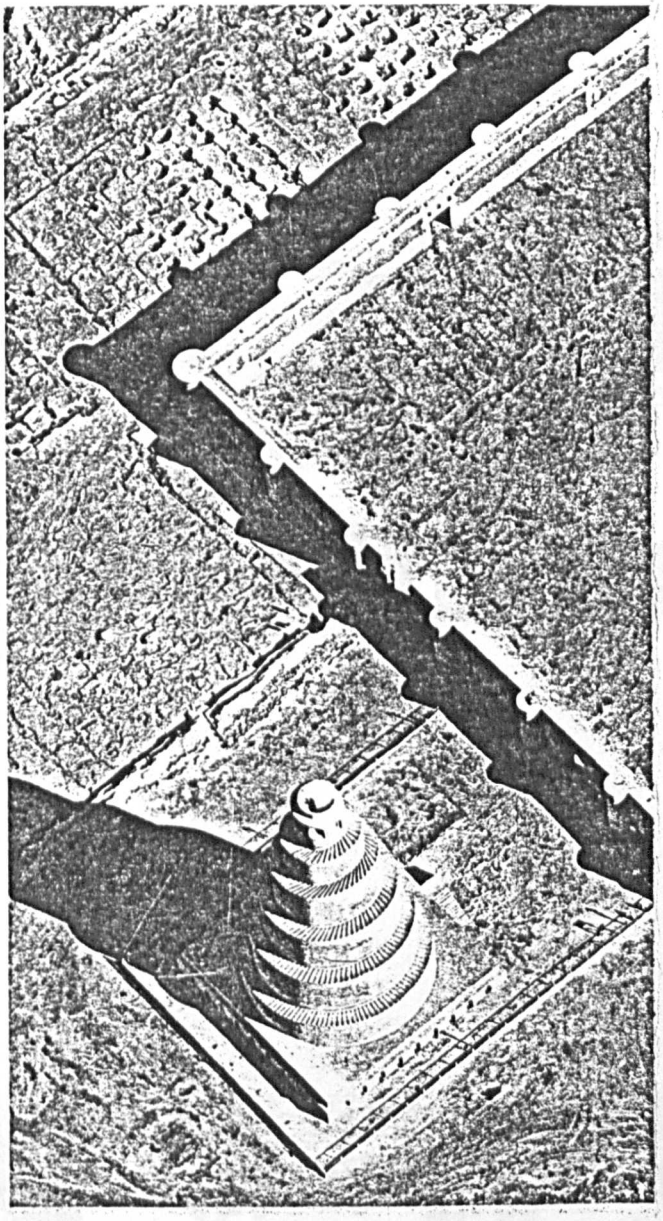


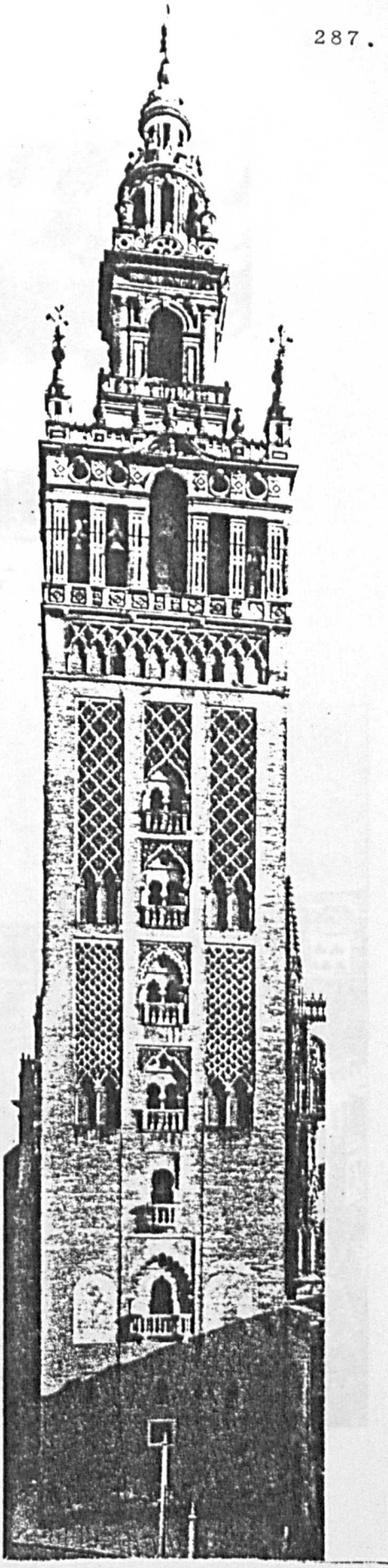
Cairo. Ibn Tulun mosque.

FIGURE: D:31.

Interiors of Mosques Showing Different Architectural Styles.

Kuhnel, 1966, p.53



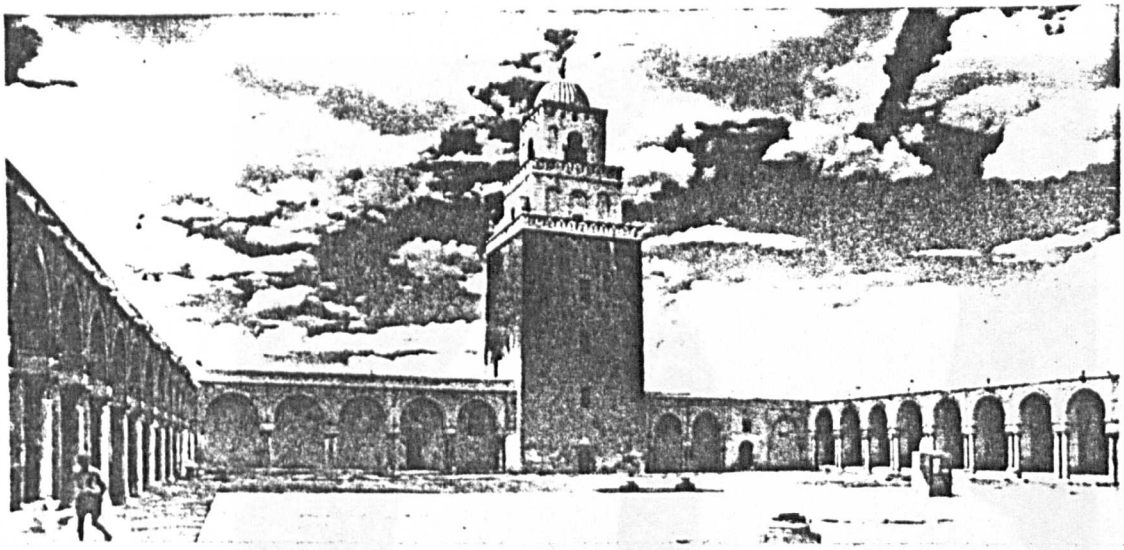


Enclosure wall of the Great Mosque in Samarra with the 'Malwiye', 846–852 under the Caliph al-Mutawakkil. Photo: Islamic Museum, Berlin.

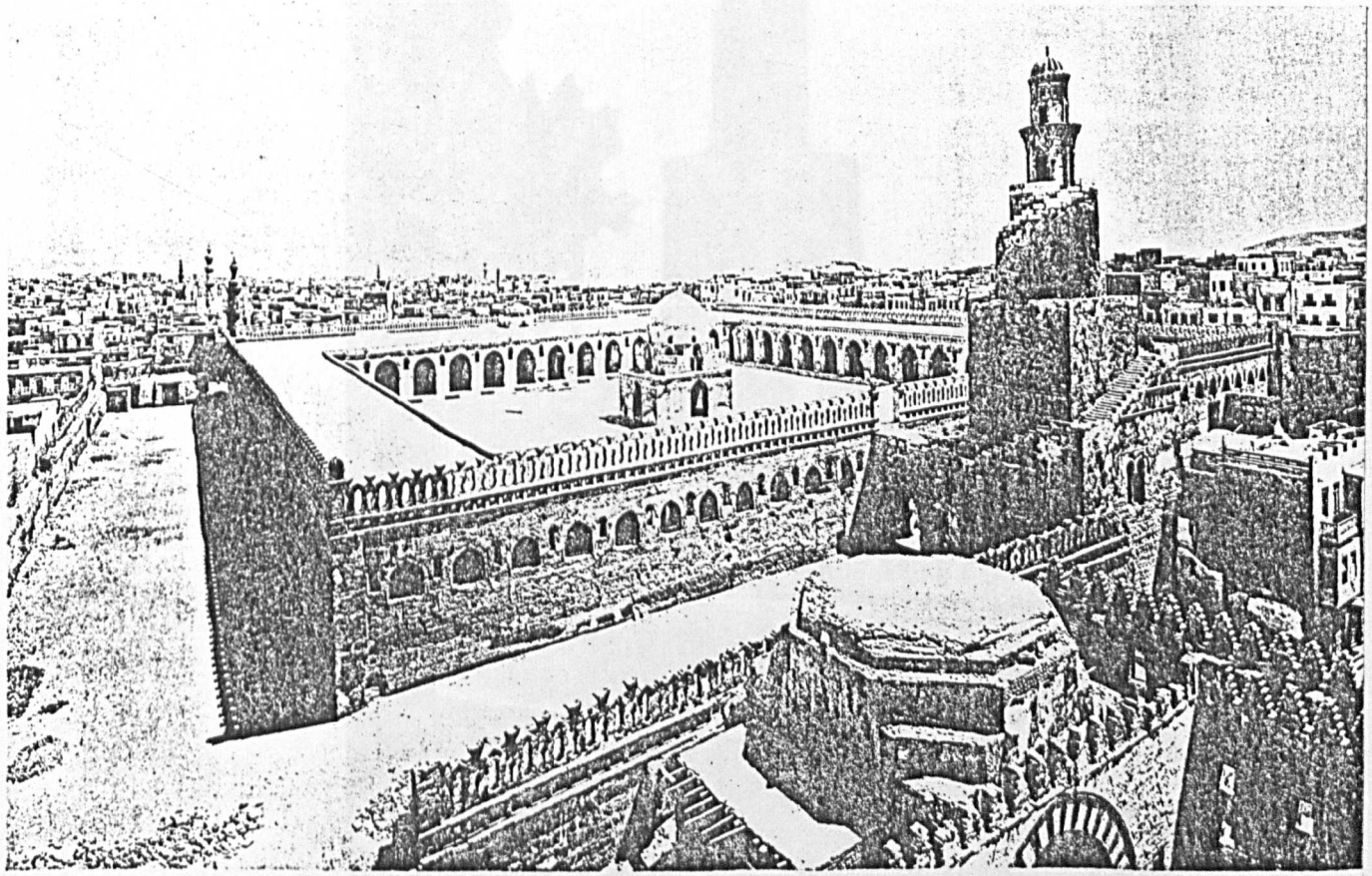
FIGURE: D.32a.

Different Styles of Minaret.

Kuhnel, Plate 138, 1966



Kairouan Mosque.

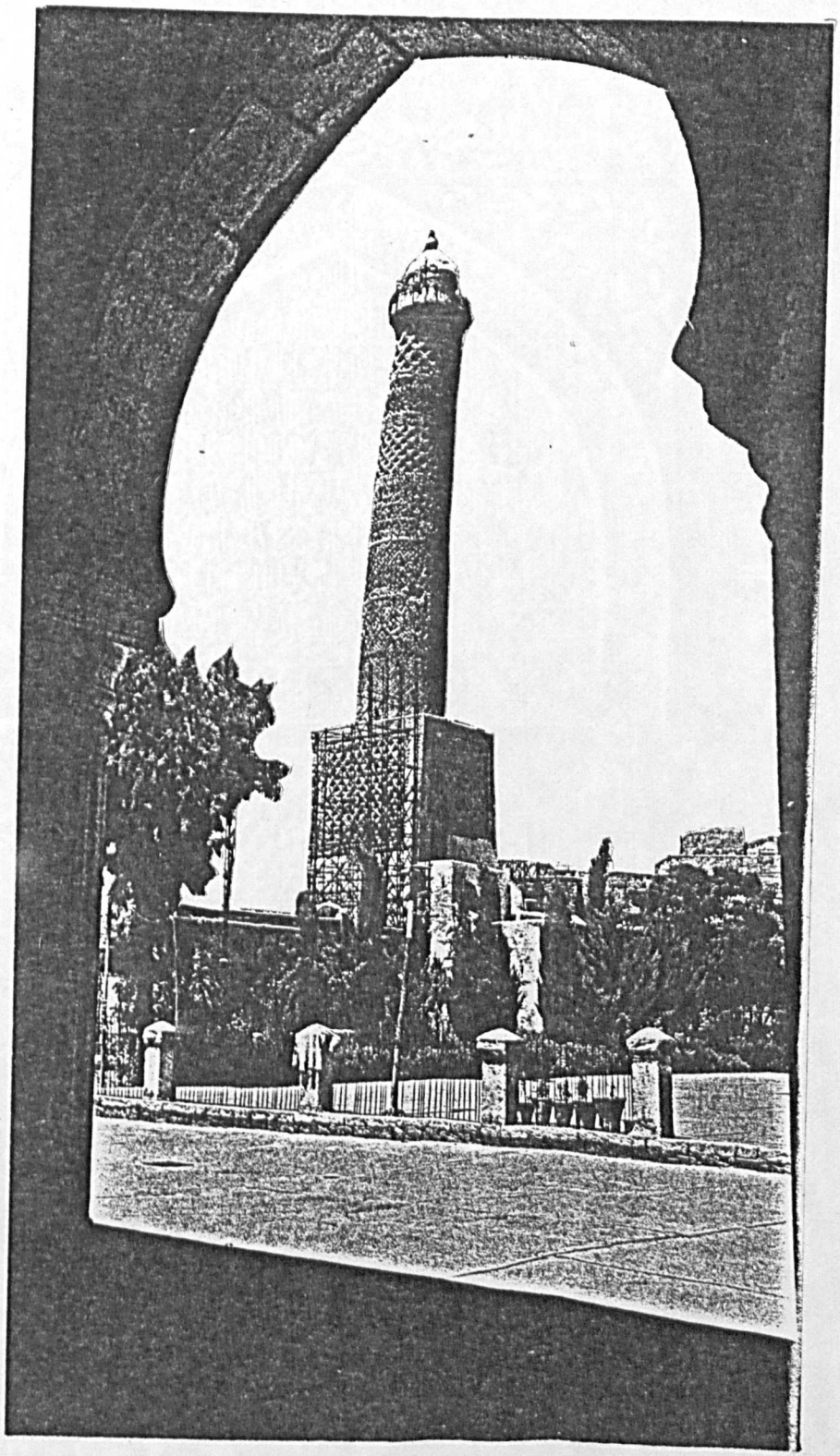


General view from the minaret of the Madrasa of the Emir Şarghitmish

FIGURE: D.32b.

Different Styles of Minaret.

Creswell, Vol.2, Plate 48, 1958



Nur ad-Din Mosque: Mosul.

FIGURE: D.32c.

Different Styles of Minaret.

Ministry of Information, Iraq, Baghdad, 1977, p.48

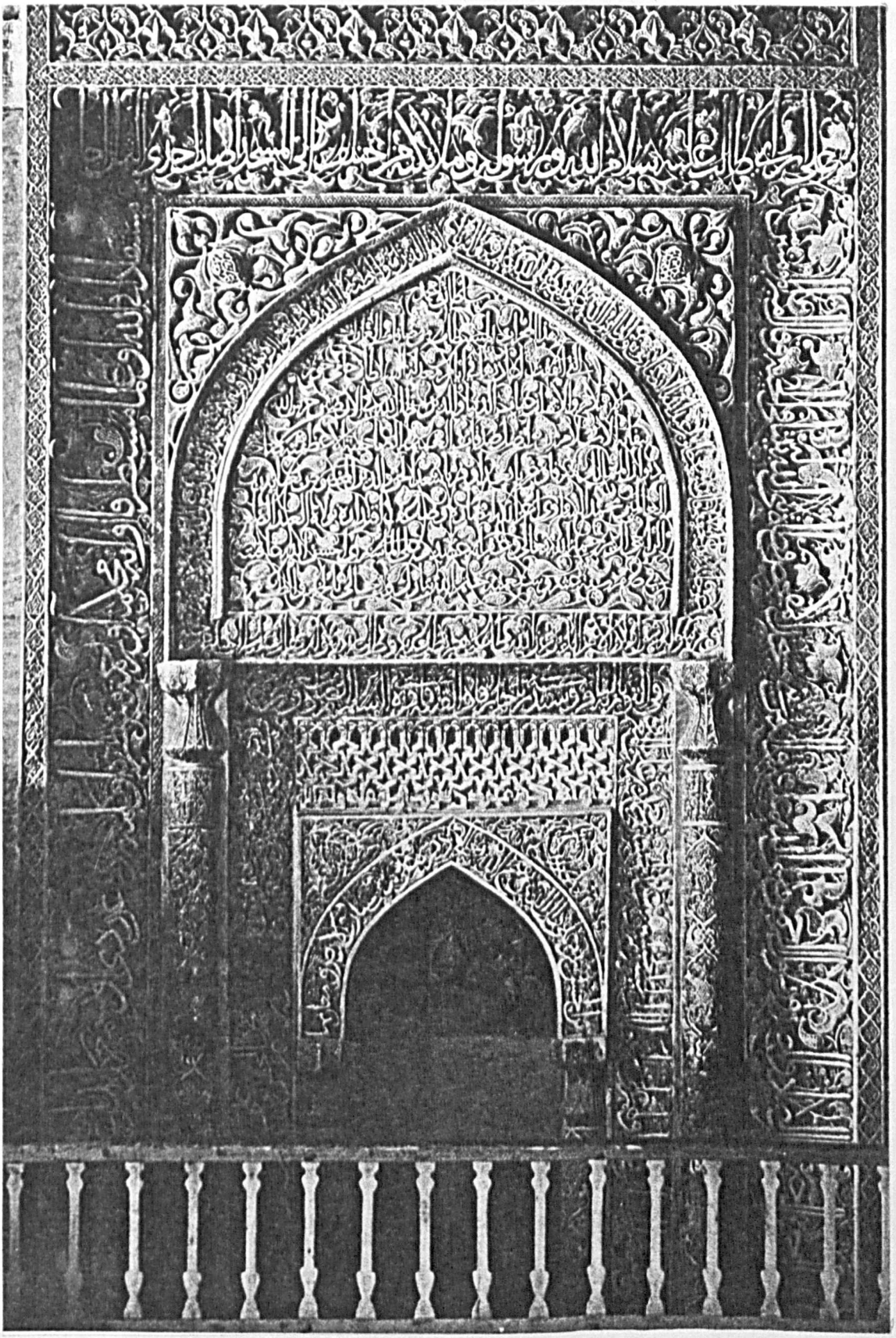


FIGURE: D.33a.

Different Styles of Mihrab.

Burckhardt, 1976, p.87

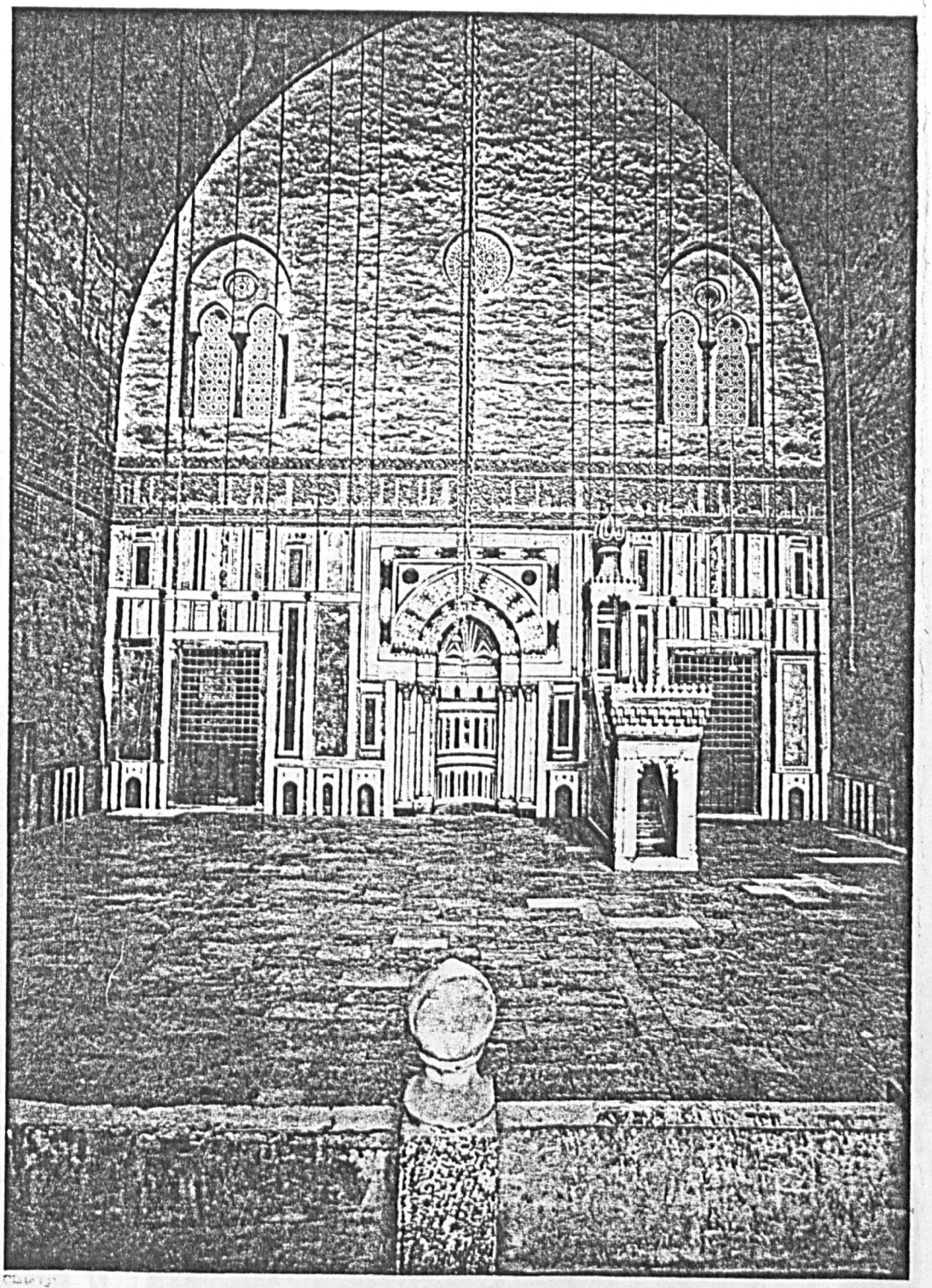


FIGURE: D.33b.

Different Styles of Mihrab.

Burckhardt, 1976, p.140

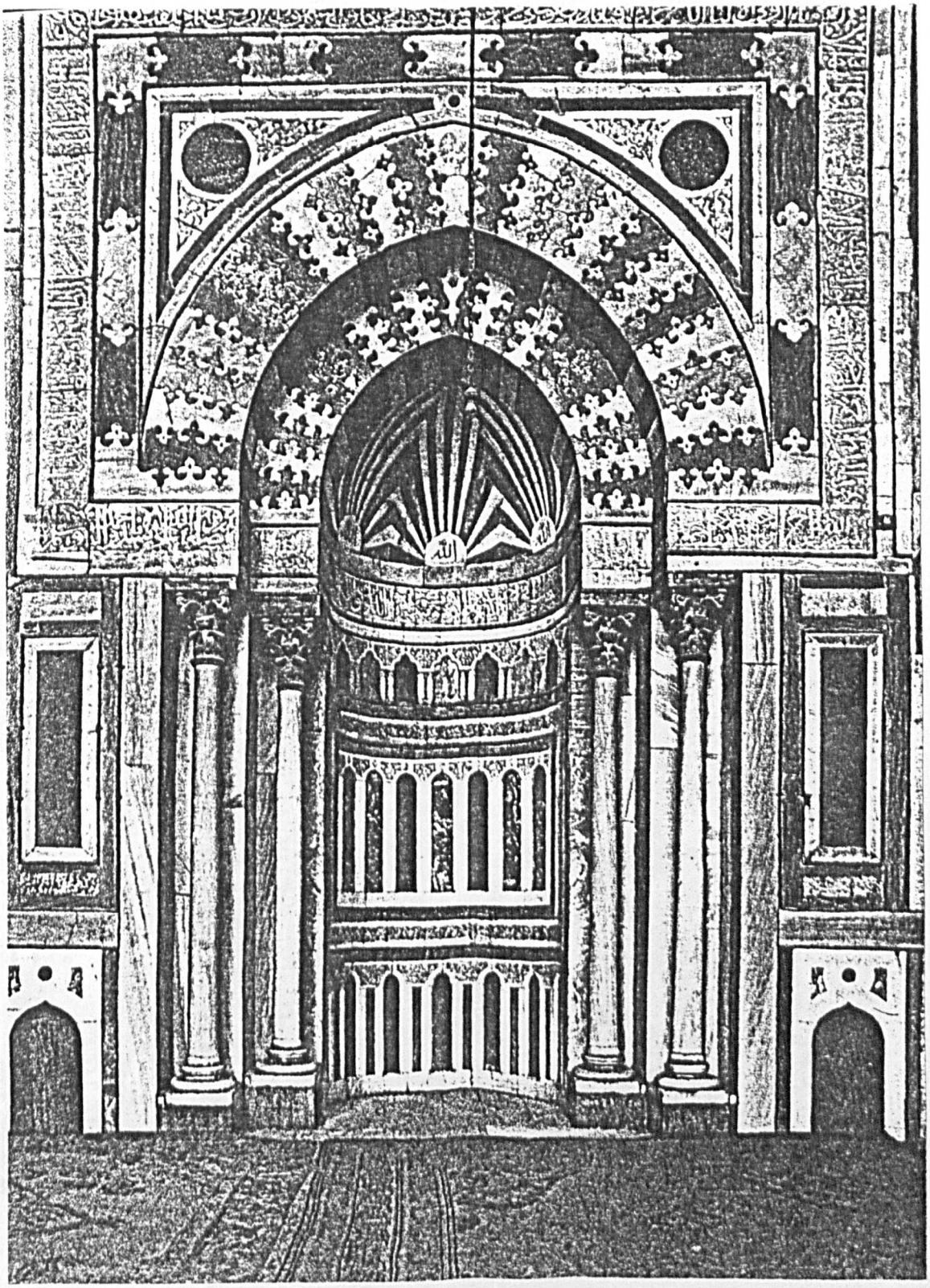


FIGURE: D.33c.

Detail of a Mihrab.

Burckhardt, 1976

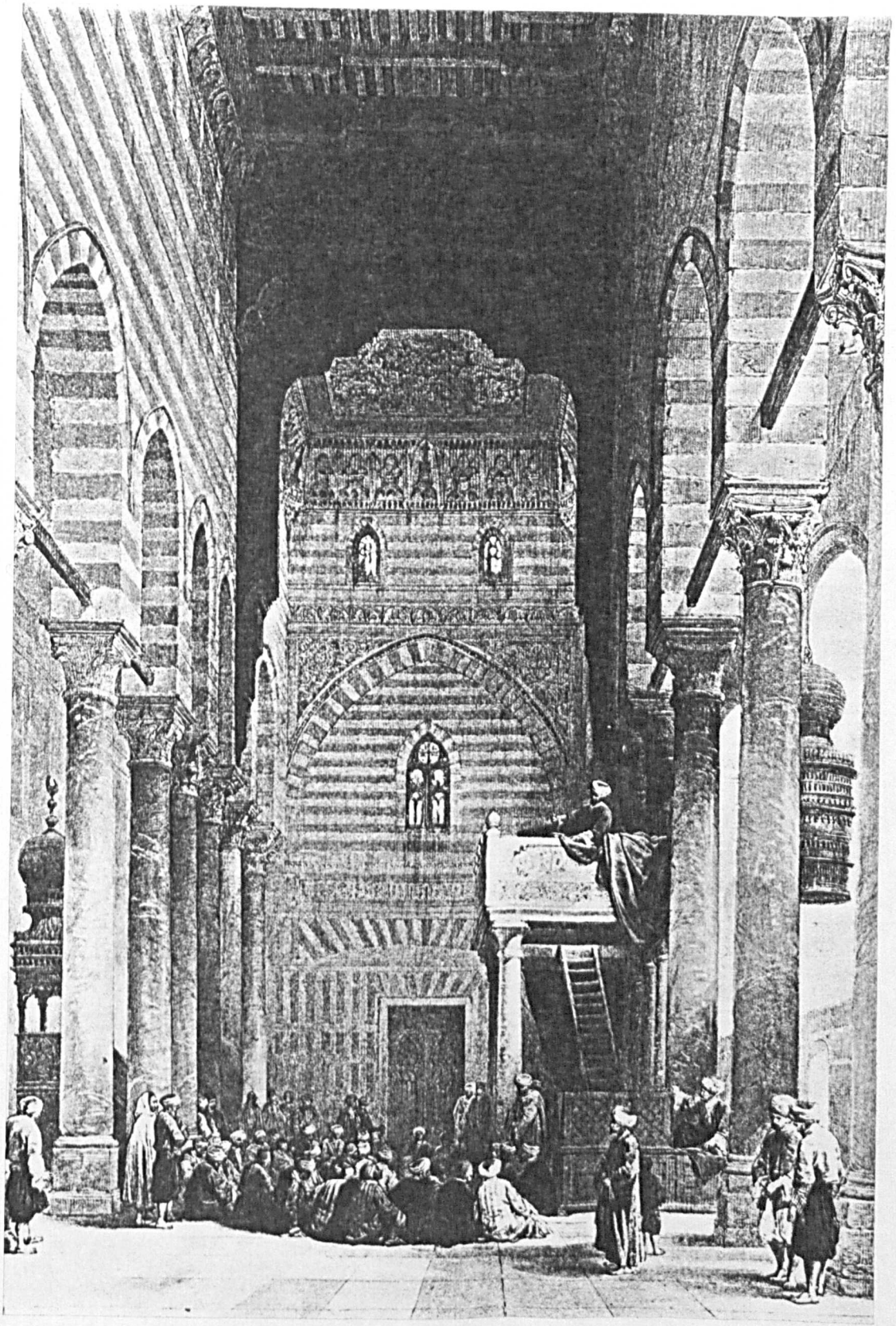
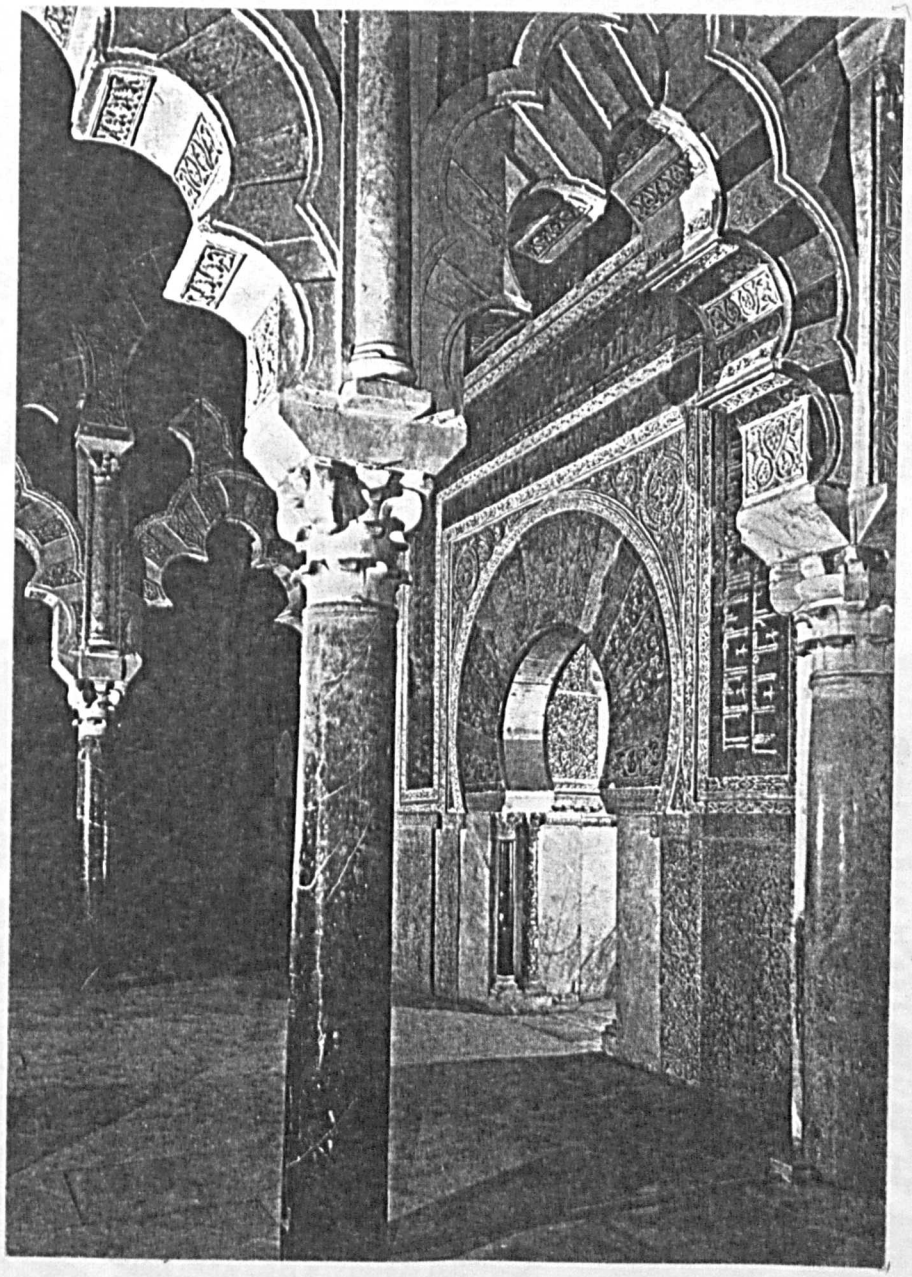


FIGURE: D.33d.

Congregation Round the Mihrab

Listening to a Speech from the Mimbar.

Michell, 1978, p.23

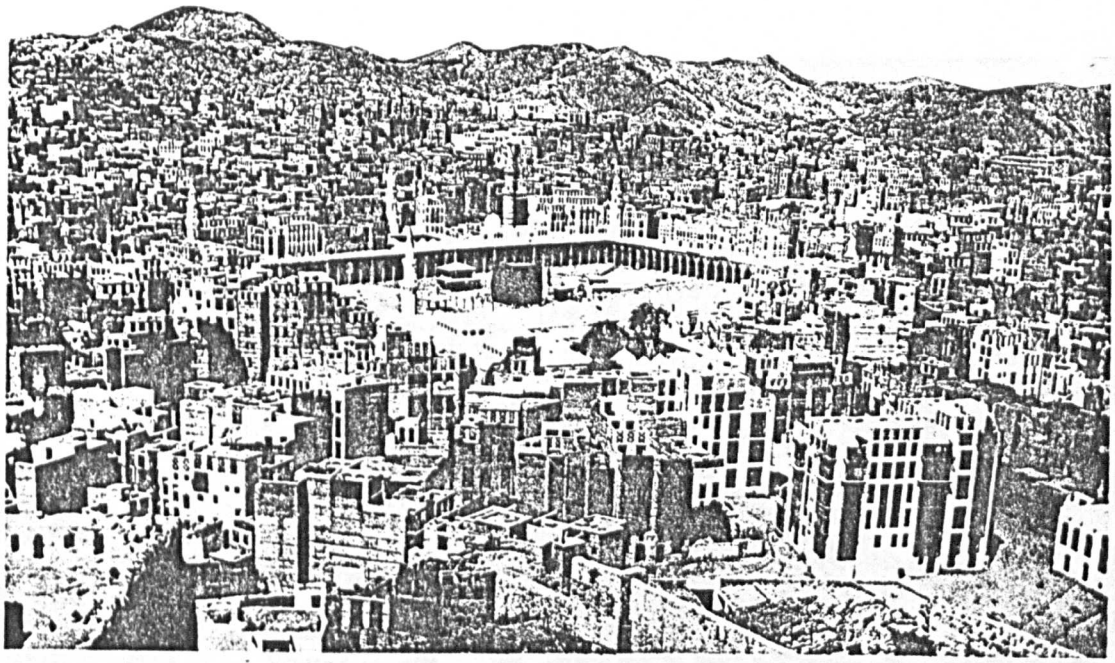


A side view of the Mihrab shows the elegance of its supporting columns.

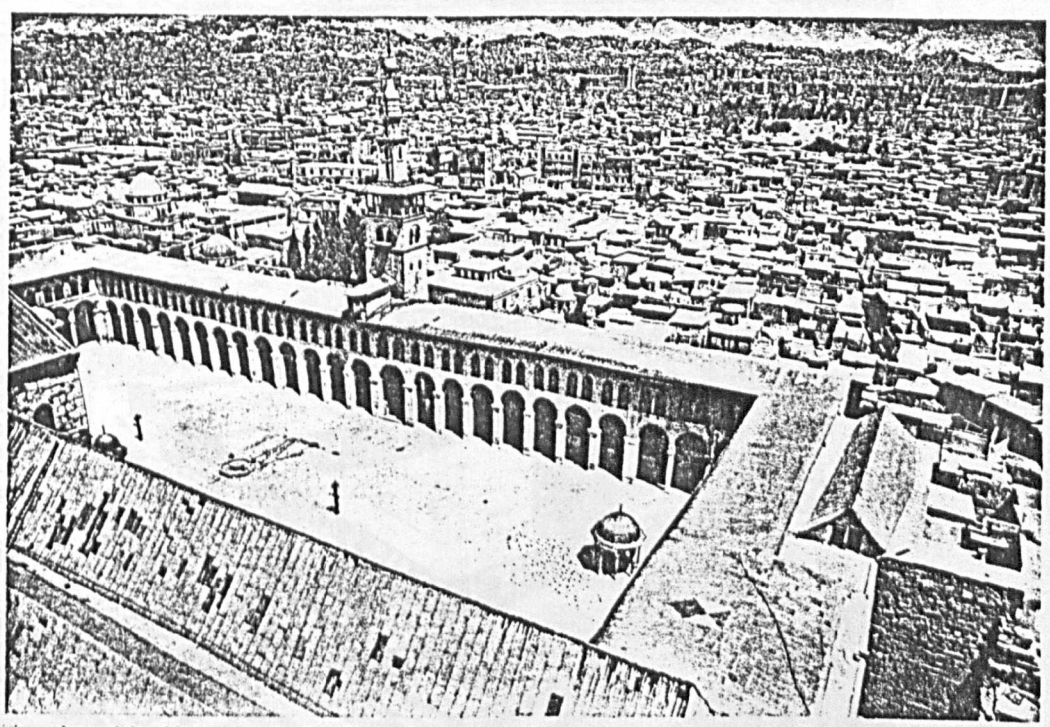
FIGURE: D.33e.

The Mihrab as a Separate Room.

F.I.S.A., 1975, p.14



Mekkah. The Haram, general view. (Popperfoto)

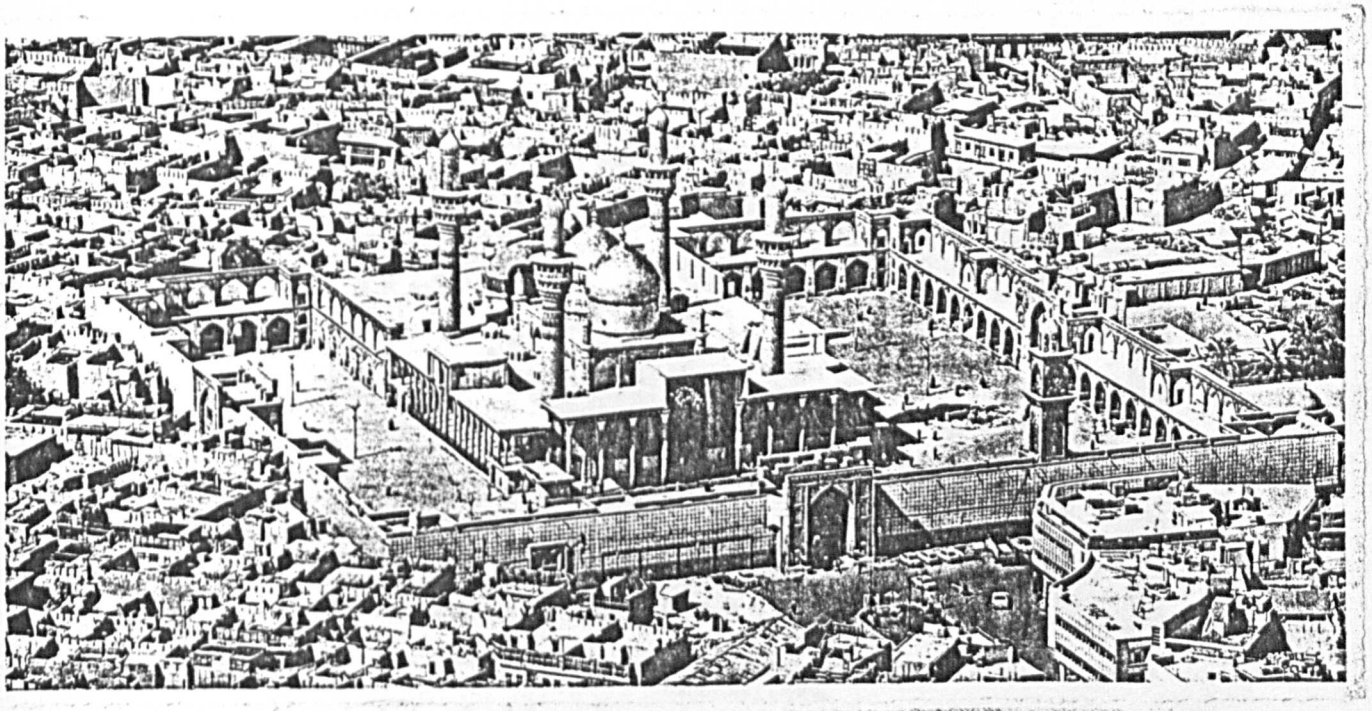


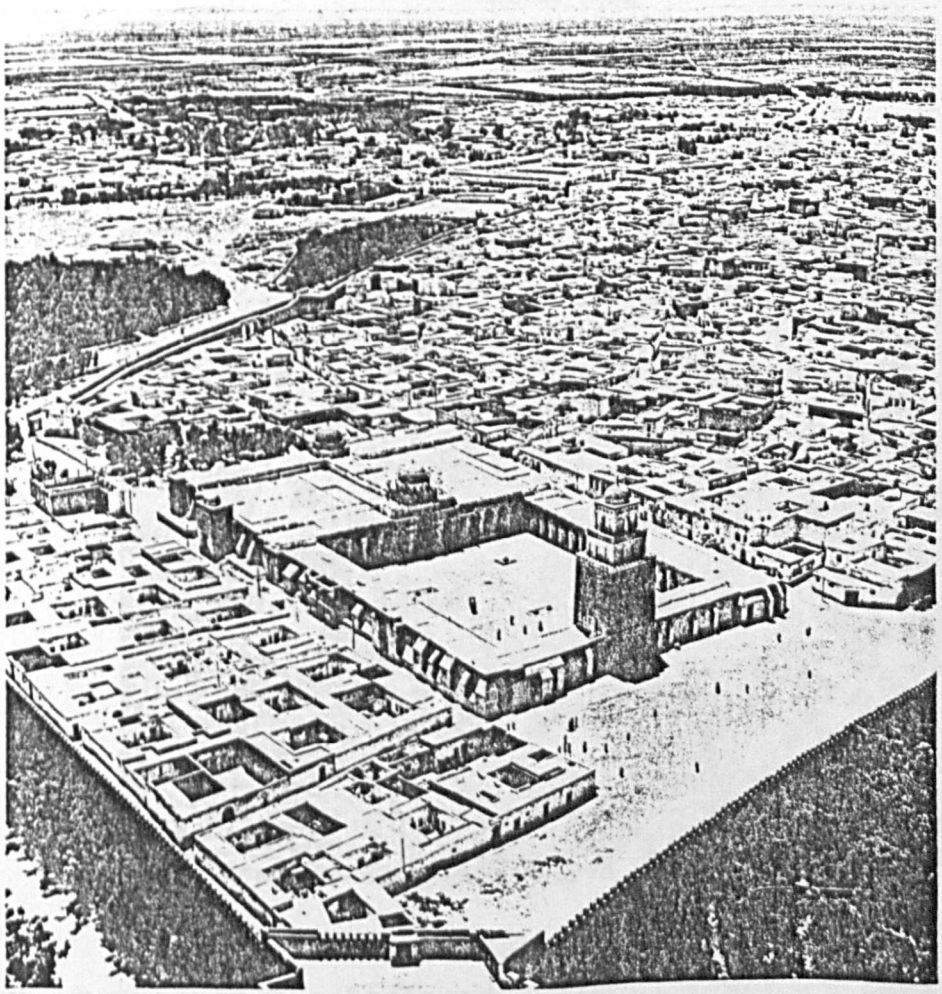
A general view of the courtyard of the Great Umayyad Mosque taken from the south-east minaret (Jesus minaret), in Damascus, with the Bride minaret on the north side of the wall.

FIGURE: D.34a.

The Mosque as the Dominant Feature of the Islamic City.

Grabar, 1973, p.22



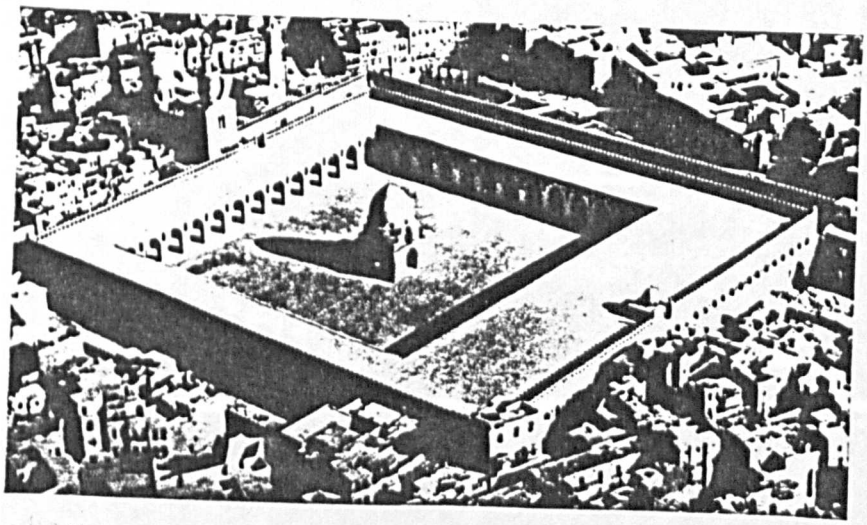


Kairouan. Mosque, general view. (Roger Wood Studio)

FIGURE: D.34b.

The Mosque as the Dominant Feature of the Islamic City.

Grabar, 1973, p.41



The complex of the Ibn Tulun Mosque in Cairo, 877–879. Photo: Lehnert & Landrock, Cairo.

89. Old Jerusalem, Aerial View. (Photo: Pantomap Israel Ltd.; reproduction by special permission.)

FIGURE: D.34c.

The Mosque as the Dominant Feature of the Islamic City.

Ettinghausen, 1973, p.292

Amadia.

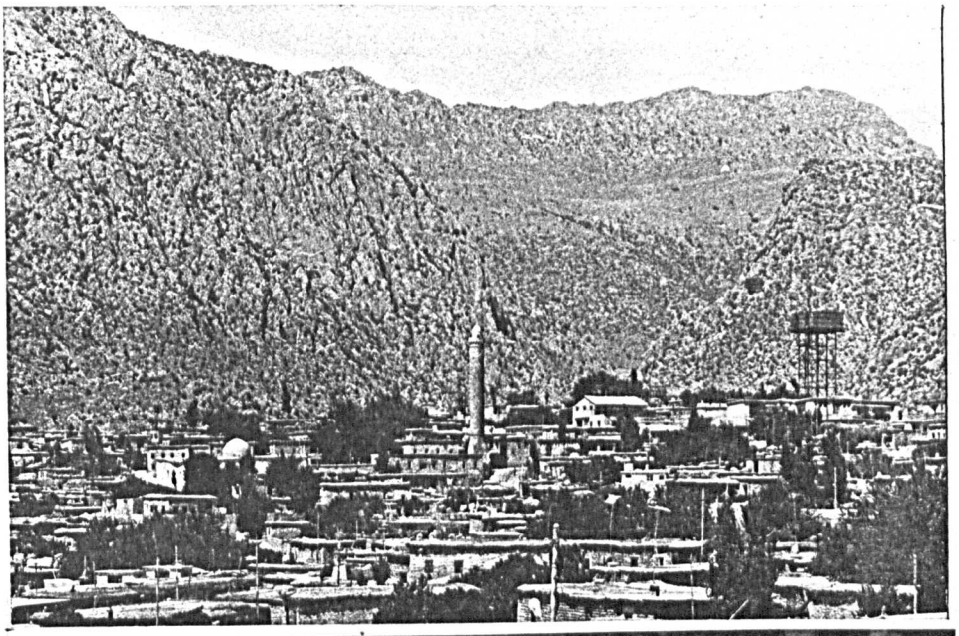


FIGURE:D.35.
(North)

Mosul.

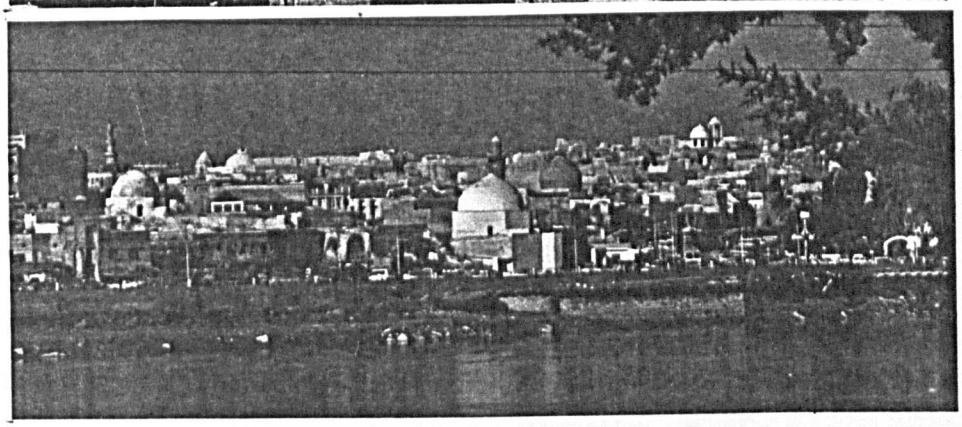
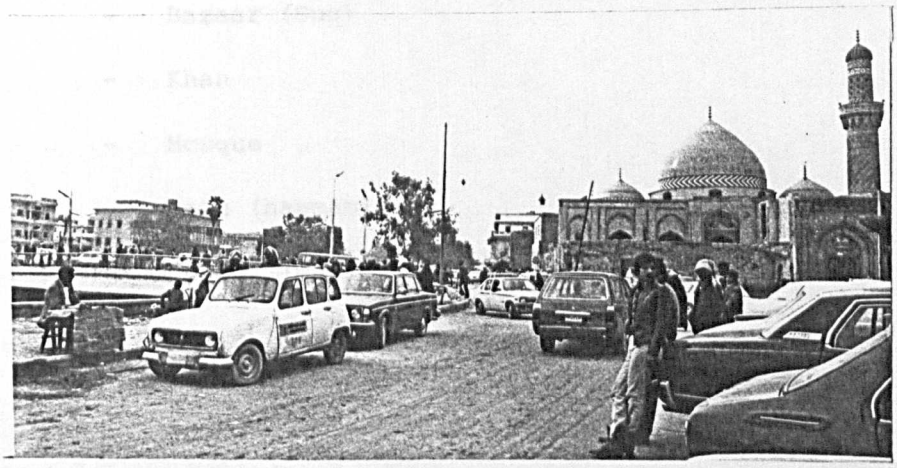


FIGURE: D.36.
(Central)

Baghdad.

FIGURE: D.37.
South.

Basrha.



The Mosque in the Iraqi Urban Fabric.

effect that it was unwise to have them so close to the palace area, persuaded Al-Mansur to transfer them to the suburb of Karkh, which was founded outside the walls for that purpose [Creswell, 1979, p.16].

The market place is in fact a public area and is completely open to every man of the community and to outsiders. It is the centre of the secular life of the community, containing commercial and business functions, coffee houses and sometimes a small inn [Delaval, 1974, p.254].

The market linked the city with the countryside as well as with desert and distant lands. The market thus played an important role in the integration of the city with its surroundings and furthermore, it was always under the direct control of the government. This control was exercised by a public officer known as the market supervisor (hisbah) [Delaval, 1974, p.254].

The market place can be divided into different elements, which formed the structure of the typical Islamic market:

- Bazaar (Sūq)
- Khan
- Mosque
- Bath (hammam)
- School (madrasah)

have been found in the mosque buildings, such as the building material, type of construction and shapes of the elements.

In addition to the differences which have been seen on the macro level throughout the Arab Islamic region in the Middle Ages, differences can be clearly seen on the micro level as well, as I found in my observations in Iraq. The differences in topography, climatic conditions, building materials and skills resulting in different characteristics in the mosque appearance (Figures D.36a, D.36b, D.36c).

D.4.4.4 Commercial Institutions

(a) Market Place

This element represents one of the main features of the Muslim city and it is a vital element which supports the continuity of city life.

In the market area of the city, not only commercial, but religious and political life were concentrated. The sūqs had shops, workrooms, store rooms and also mosques and madrasas or higher schools. From within or near the markets the qadis (courts), the notaries and the muhtasibs (unions) as well as other public officials operated, and in some cities the main markets were adjacent to the citadel or fortress of the town [Gulick, 1967, p.246] (as occurred in Baghdad city, where the four market areas were located at the four main gate-ways (see Figure D.17a)). The markets were formed of great arcades. These arcades were originally the market of the town until 773 when a remark of the Greek ambassador, to the

(b) Bazaar (sūq)

Bazaar is the arena of urban economic life. Each medieval Arab city had its markets; the larger the city, the bigger the markets. Larger cities, such as Baghdad, Cairo and Aleppo had to provide goods not only for their populations but for the countryside as well. The amount of trade in such cities permitted the existence of different sūqs of different sizes and types in the same city [Halim, 1963, pp.162-163]. Besides the main sūqs, other secondary small ones were to serve the local needs of different residential quarters [Ismail, 1972, p.117].

Two types of sūqs appeared in urban areas; permanent and temporary.

The permanent sūqs were usually covered and if a statement applicable to the entire Islamic world can be made it is that beaten earth, mud and wood tended to be replaced by brick and stone vaults or domes [Sims, 1978, p.100]. The natural light for these sūqs was provided by holes in the top of the domes and topside windows along both sides. These permanent sūqs have not been found prior to the fifteenth century.

Despite these incipient changes, the bazaars of Islamic cities exhibit the same general structure found in other pre-industrial muslim cities, central location is highly valued and the best shops therefore, are found around the mosque. The minaret, in spite of its basic religious function, therefore provides a clue to the travellers' caravans of the location of the sūq. This relationship between the sūq and

the mosque marked one of the main characteristic features of the Islamic cities.

In the markets, the shops, mosque, schools and offices were mixed together because of the undifferentiated lifestyle of Muslim tradesmen.

Prayer, learning and public consultation and adjudication were not highly specialized activities segregated in special centres; they were part of the everyday life of the people.

These physical facilities were juxtaposed to permit easy movement from one element to another, making it handy for both the people who are working in the sūq and the people doing business [Lapidus, 1973, p.63].

The bazaar often exhibited a remarkably uniform structure. The producers or the retailers of the same kind of goods always occupied adjacent stalls or shops and each trade had one of the suqs completely to itself. Most Muslim cities had suqs for books, incense and perfumes, utensils, textiles and various other household and luxury goods [Von Grunebaum, 1955, pp.146-147]. The arrangement of these specialized groupings within the whole bazaar depend upon the domination and the function of the surrounding buildings. Bazaars were usually located around the congregational mosque. A much paraphrased passage describes the hierarchy by which wares tended to be grouped around the mosque. Purveyors of candles and incense were directly next to the mosque, in the company of booksellers, stationers, bookbinders and the vendors of

other small leather goods. These were followed by the general clothing and textile bazaars, although precious textiles and furs, with other valuables, would have their own enclosed bazaars, which had gates that were closed at night. The hierarchy descended through furniture, household goods and utensils until the most mundane of goods were found in suqs on the edge of the city or by the wall and gates. Nearest the city perimeters, where the caravans often assembled, were the ironmongers and smiths, and the other vendors and craftsmen serving the caravan trade: workers of large leather goods with metal finishings, such as saddles and bridles, the suppliers of sacking and string, tents and whatever else the long distance traveller needed for his journey [Sims, 1978, p.100].

Apart from the sale of goods to the urbanites and other customers, the market also functioned as an international trade and commerce centre. Socially, along with the mosque, it was the place where various segments of the urban population came into contact with each other.

Suqs formed a linear pattern but followed either a rigid grid-iron plan as a part of the overall city plan (as in Baghdad Al-Mansur) or followed the organic pattern of the residential quarter of the city (as in Al-Kadymia sūq in Baghdad). A section of the suq above the shops were living apartments either for permanent residents or as hotels. These markets (or suqs) were regularly rented and could be locked (Figure D.38a).

(c) Qaysariyya

This is a specific Islamic market element usually of an oblong hall, roofed and colonnaded with a double row of rooms, often domed, with a door at one or both of the short sides that was securely locked at night. Security was its most important feature, as security had been the most evident feature of the large rooms carved out of living rock at Petra (Jordan) with their single openings and their small recesses for the deposit of relatively small objects or parcels of value. The Ottoman qaysariyya, the bedesten, was a similar internal strong-room, always located at the heart of the market area. It often became the fiscal centre of government where taxes and duty were collected and funds distributed for the upkeep of municipal institutions [Sims, 1978, p.100]. However, the architectural form of the qaysariyya developed from the Byzantine market building [Grunebaum, 1961, p.146].

(d) The Temporary Bazaar

These bazaars usually sold foodstuffs and live-stock in an open area which was often covered by canvas awnings or tents, transforming these areas into temporary but regularly occurring suqs. In addition, on some weekdays periodic bazaars were held, and more valuable merchandise - woven silk, wheat and animals - were brought to bazaars from villages for sale [Lapidus, 1973, p.84].

Through these functions the bazaar has become the most vital and distinctive element of the city.

(e) Caravanserais

Warehouses are the second basic element of the Islamic market place, known by a variety of names, of which khan is the most common. There were two kinds of khans, one of them was located within the urban centre and the other was located on the main routes between the cities.

(i) Khans in the Urban Areas

These were buildings chiefly designed for the reception of merchants and their goods. There, they found lodging and storage for their merchandise until such time as they could dispose of them. Thus, khans became of vital importance for trade [Ziadeh, 1966, pp.100-101).

Warehouses were generally two or three storey high buildings, usually arranged around a rectangular or square courtyard in plan, with a single portal. On the upper floors galleries gave access to small rooms, each of approximately the same size, with windows and chimneys if the climate required, while historical and regional differences dictated innumerable variations in roofing and the disposition of other details. The chambers for merchants, where their merchandise could also be deposited, were usually on the upper floors and the ground floor, as originally used for stables and shops, together with large-scale storage, although with time the stables tended to be removed to elsewhere in the market. Clearly, the standard form of most warehouses is related to the caravanserais.

Khans were built by officials and private individuals as pious works, made wakaf (see Section D.2.2) for the benefit of a particular quarter or a specific monument - a mosque, madrasa or a convent - in the same way that baths (hammams) were so endowed [Sims, 1978, p.101]. One of the khans built on these principles in Baghdad, was the khan at Mirjan, built in 1359 for the benefit of Al-Mirjan madrasah. Built in brick, its rectangular building has a long vaulted hall (14 metres high) with a fountain in the middle, onto which the surrounding two-storeyed structure opens. The entrance is Seljuk type, lavishly decorated with terracotta inserts with deep arabesque designs. The entrance is flanked by two semi-circular decorated buttresses, interrupting the row of shop facades located on both sides. The first-floor gallery, supported by corbelled muqarnas, runs round the hall with eight transverse arches placed at equal intervals, except for the middle bay, which is wider. The vaults rise in stepped stages along the profile of the arch and are topped by domes on squinches. Each stage is pierced with windows opening onto the roof. The plan, vaulting and lighting systems of this khan are unique in Islamic architecture. Like the typical khan design the ground floor was originally used for large-scale storage and shops, while the upper floor was divided into small rooms for different usage (Figures D.40b, D.42a). This khan is now converted to a restaurant.

The continuous growth of the city, and the advanced technology resulted in changing the location and means of trade, business, storage and mode of transportation, which put an end to the position and the function of khans as centres of trade

and business within the market place. The architectural value of some of these khans, their historical background, and location within the historical areas of the city, encourages their conversion to entertainment centres in order to attract tourism or other uses.

(ii) Khans On the Main Routes Between Cities (Caravanserais)

Leaving Cairo for Damascus in July of 1326, Ibn Battuta travelled on the main road connecting Egypt with Palestine and Syria, staying not in the colleges and convents, as had been his custom in North Africa and Egypt, but in caravanserais: 'At each of these stations between Cairo and Gaza there is a hostelry which they call a khan, where travellers alight with their beasts, and outside each khan is a public watering place and a shop at which he may buy what he requires for himself and his beasts'. Ibn Battuta's statement perfectly summarizes the function of the classic Islamic caravanserais, with the exterior shops and a watering place.

Almost any Islamic caravanserai presents to the traveller a square or rectangular walled exterior, fortress-like, with a single portal wide enough to permit large or heavily laden beasts such as camels, to enter. The courtyard is almost always open to the sky and along the inside walls of the enclosure are ranged a number of identical stalls, bays, niches or chambers to accommodate merchants and their servants, their animals and their merchandise. Water is provided in some way, for washing and for ritual ablutions, and some later caravanserais

have elaborate baths. Animals and the stables were separated from the lodgings for travellers.

Later and larger caravanserais might have special rooms or suites in the entrance block for important guests, and a resident staff of caretakers might be permanently housed in small rooms in the portal block. Shops for travellers to replenish their supplies and for merchants to dispose of some of their wares are often found from the fourteenth century onwards, and some of the later caravanserais were so well provided for, with mills, bakeries and tea-shops, that they came to resemble small villages.

On the same principle caravanserais occur on the Tigris in Iraq, in the Jazira (the land lying between the upper reaches of the Tigris and the Euphrates).

(f) Public Bath (hammam)

The other main feature within the market place in the Muslim city is the public bath (hammam).

The public steam bath and the public latrine are urban elements of the Roman and Byzantine periods. They were adopted by the Arabs to become typical elements of the later Islamic-Arab city (Figure D.43) [Ismail, 1972, p.119]. References in texts mention the construction of baths in the earliest Islamic cities, such as Al-Basrah in Iraq and Al-Fustat in Egypt, and archaeological remains bear witness to their existence as early as the Umayyad period [Sourdel, 1965-1966, p.139].

Some of the hammams are for men, others for women, and some for men during the morning and women during the afternoon.

As a Muslim urban institution, the hammam had to serve different purposes: hygienic, social, recreational and indirectly, almost religious.

The hammam being a hygienic institution, provides thorough cleaning not only for the exterior of the body, but of the whole organism as well.

As a social institution, the life of the whole quarter revolved around the bath. All the great social occasions in the life of Medieval Muslims was accompanied by taking a bath. In addition, the hammam has traditionally been a centre for social contacts between members of the society. For men, it is a place of informal business conversation. For women, it provides an opportunity for the exchange of housekeeping ideas [Sourdel, 1965-1966, p.145].

Moreover, the hammam is also a centre for recreation, being a place for relaxation and where massage is available after bathing.

Finally, the ritual use of the hammam in the performance of the major ablution explains why it has always been considered one of the essential amenities of Muslim cities [Torres-Balbas, 1953, p.109].

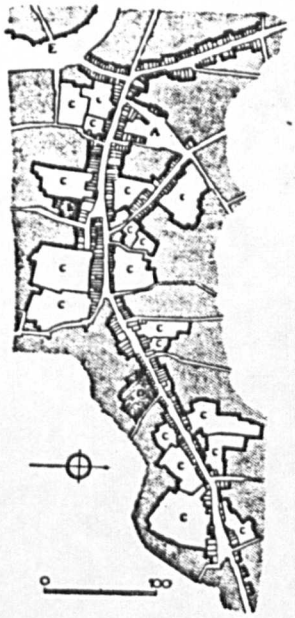
The physical construction of a typical hammam, its form and location within the urban fabric was determined by the nature of the operations performed in the bath.

FIGURE: D. 38a.

The Traditional Islamic Suq.

Iraqi Engineers Association, 1969, pp.322-323

The Banqousa *Sūq* for grain, Aleppo



A. Market for poultry

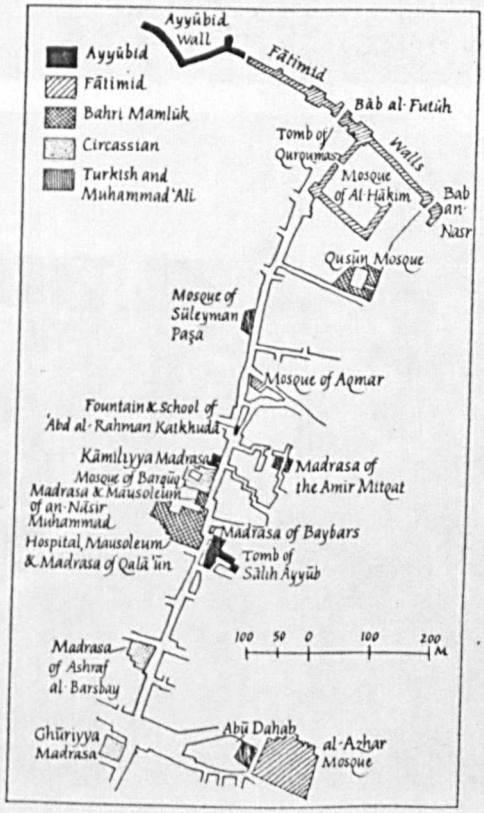
B. Hammam

C. Granary

D. Hammam

E. Drainage outlet

Source: Jean Sauvaget, Alep: Essai sur le développement d'une grande ville syrienne des origines au milieu du XIX siècle, *Paris, 1941, p. 228*



The shāri' a bayn al-qasrayn, one of the main arteries of Fātamid Cairo, is lined with pious foundations endowed by rich patrons – to the glory of God, but also partly to their own. The buildings date from the 11th to the 19th centuries. The oldest is the mosque of al-Hākim (1013), the latest that of Süleyman Paşa (1839). (2)

FIGURE: D.38.b.

The Layout of the Market Place in the Islamic City.

Grabar, 1978, p.71

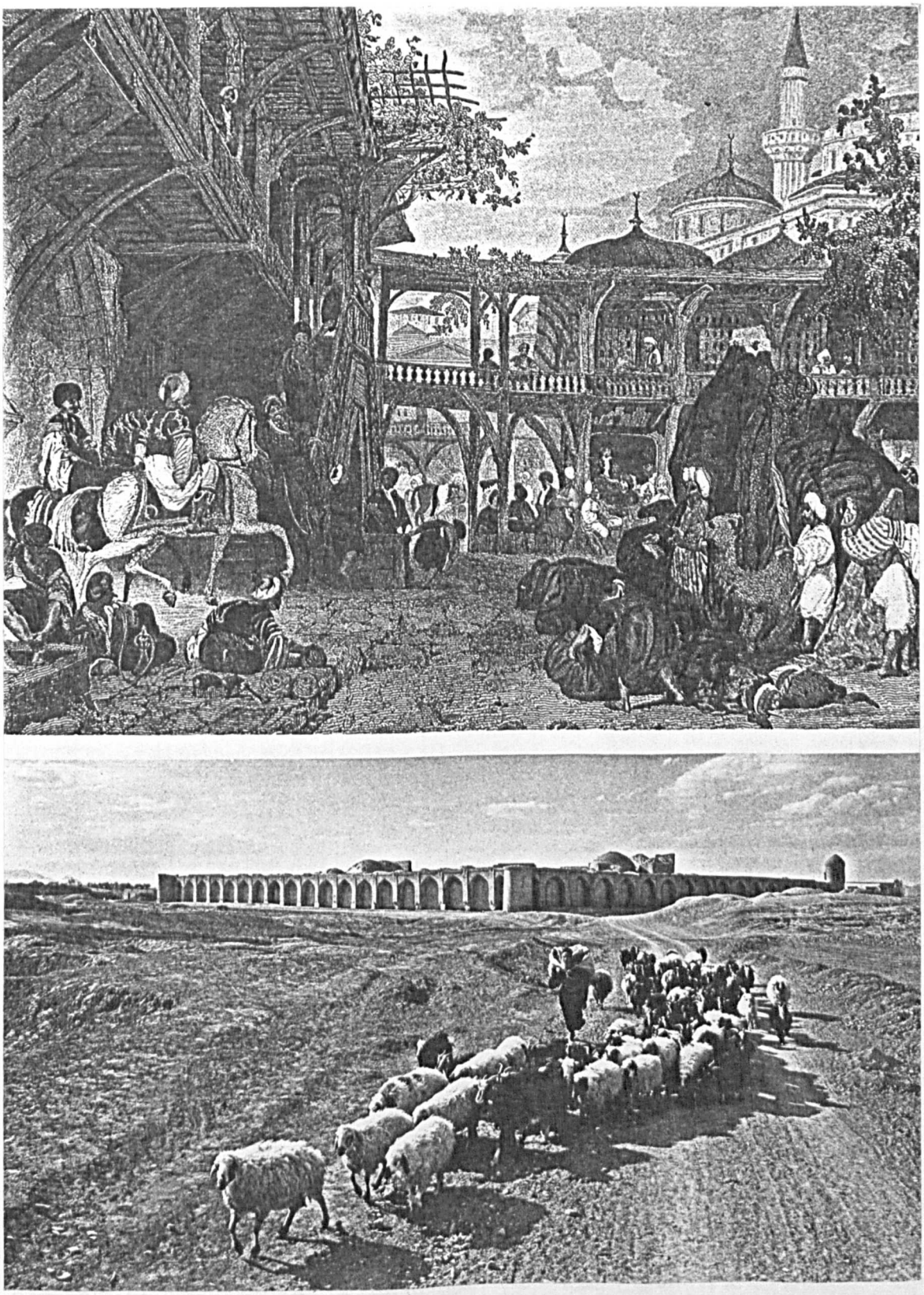


FIGURE: D.39.

Khans and Caravanserais.

Sims, 1978, p.89

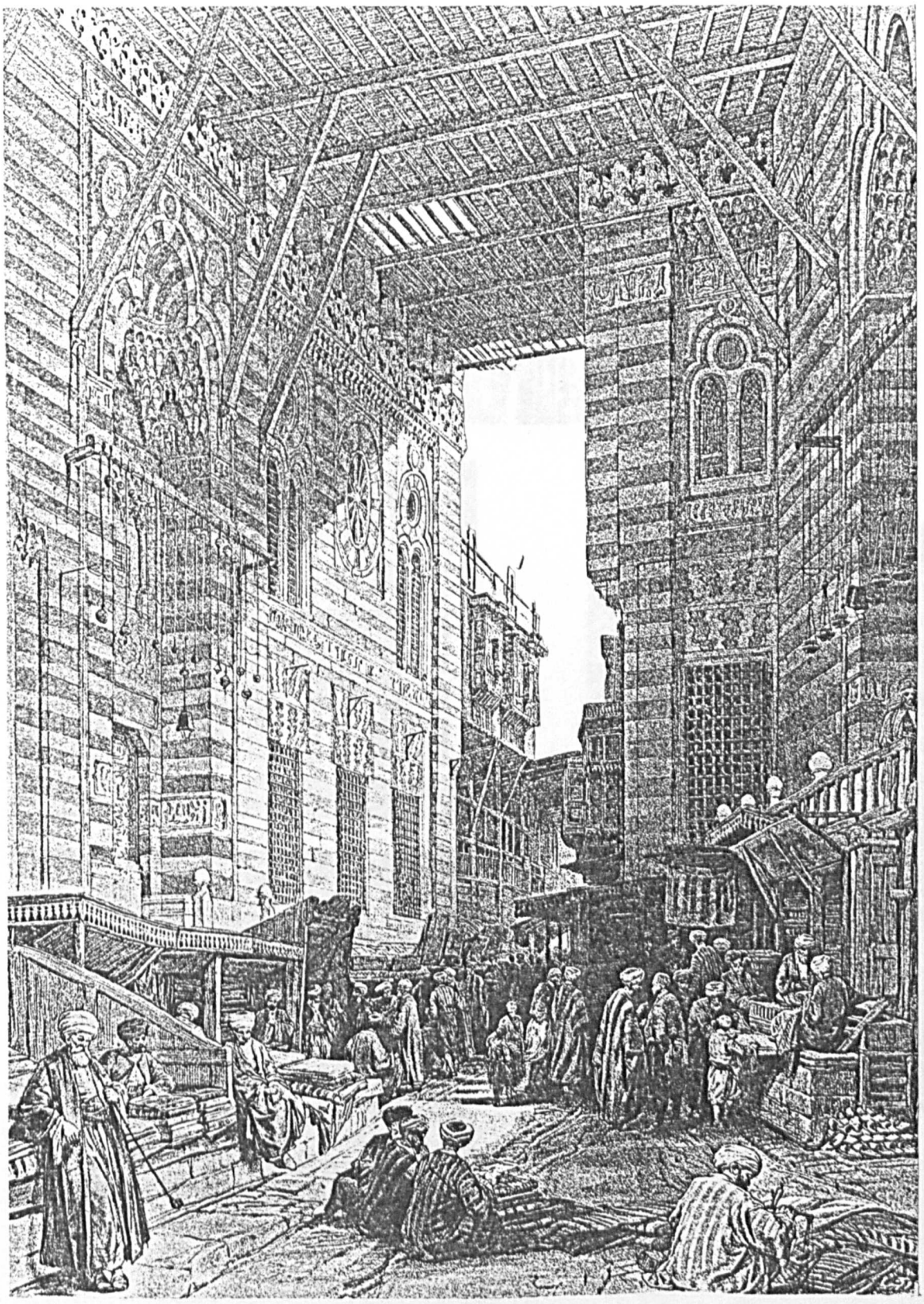
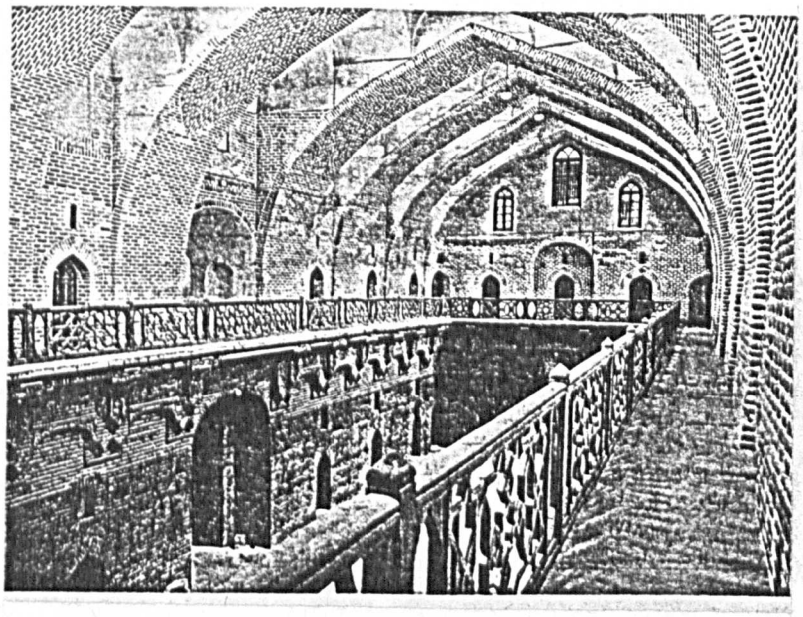
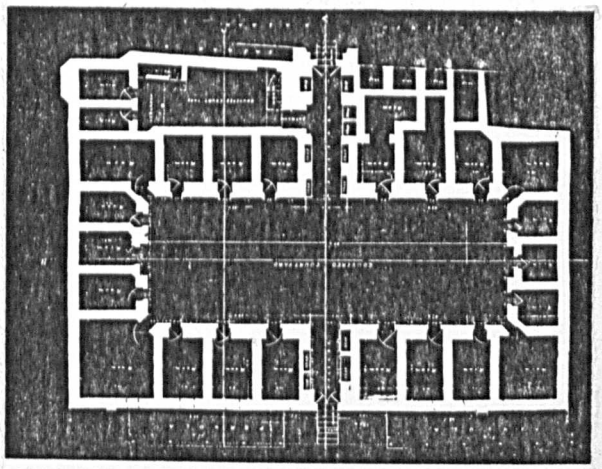


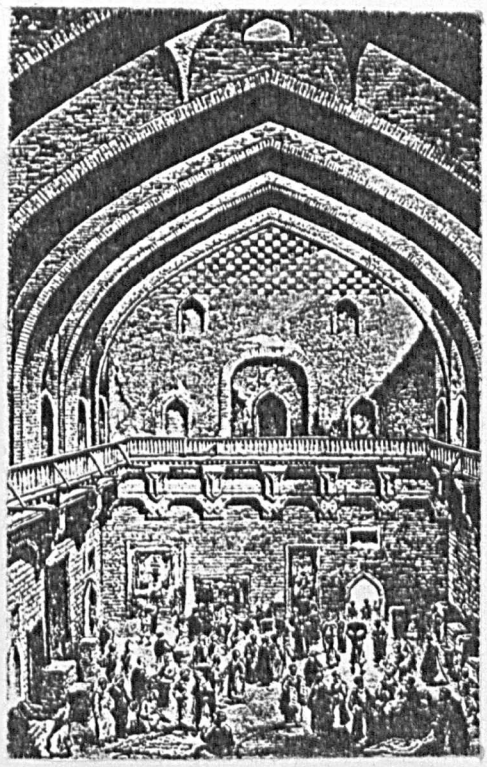
FIGURE: D.40a.

The Bazaar in Cairo.

Sims, 1978, p.96







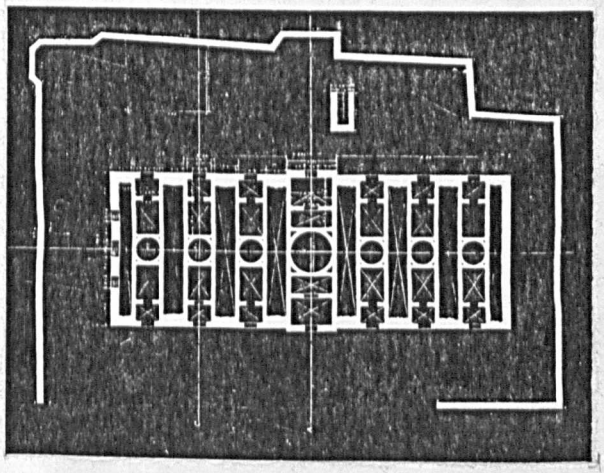


FIGURE: D.40b.

Plans and Interiors of Khans.

Iraqi Engineers Association, 1969, pp.151, 269

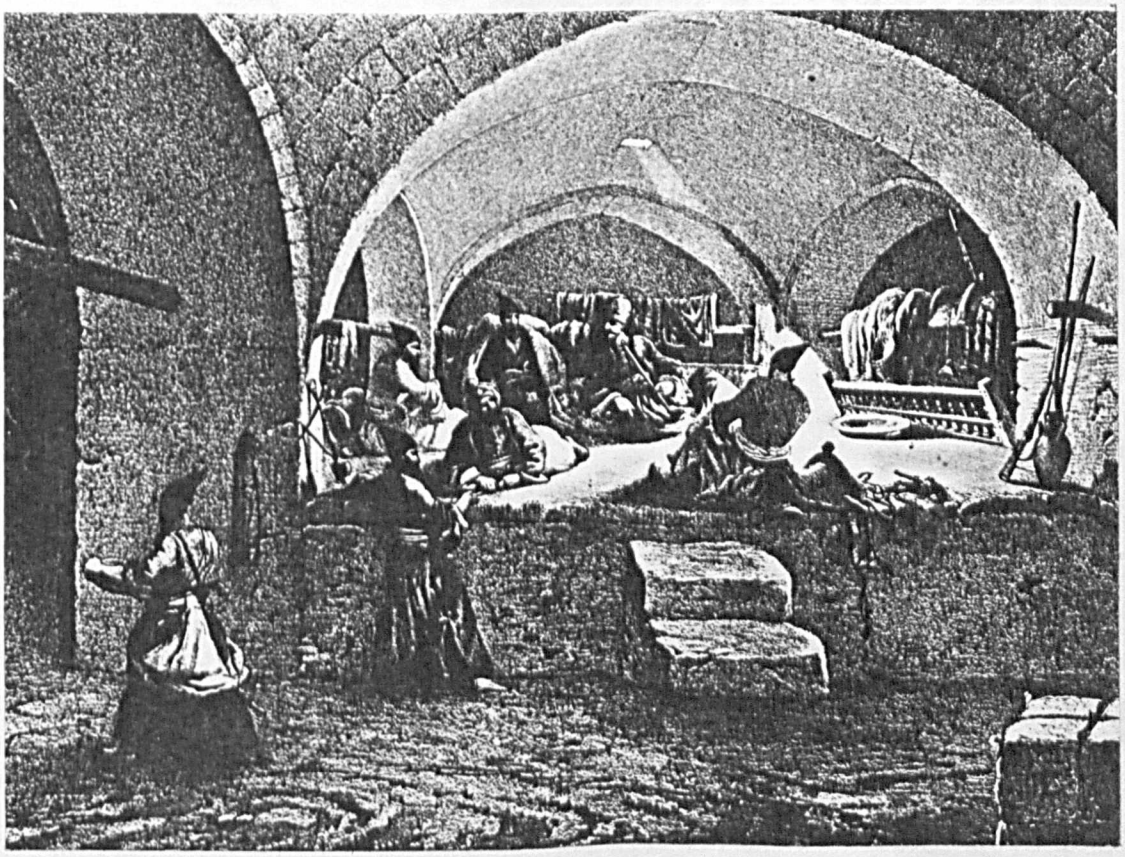


FIGURE: D.41.

Caravanserais.

Sims, 1978, pp.86-87

FIGURE: D. 41a Khan Between Najaf and Karbala in Iraq

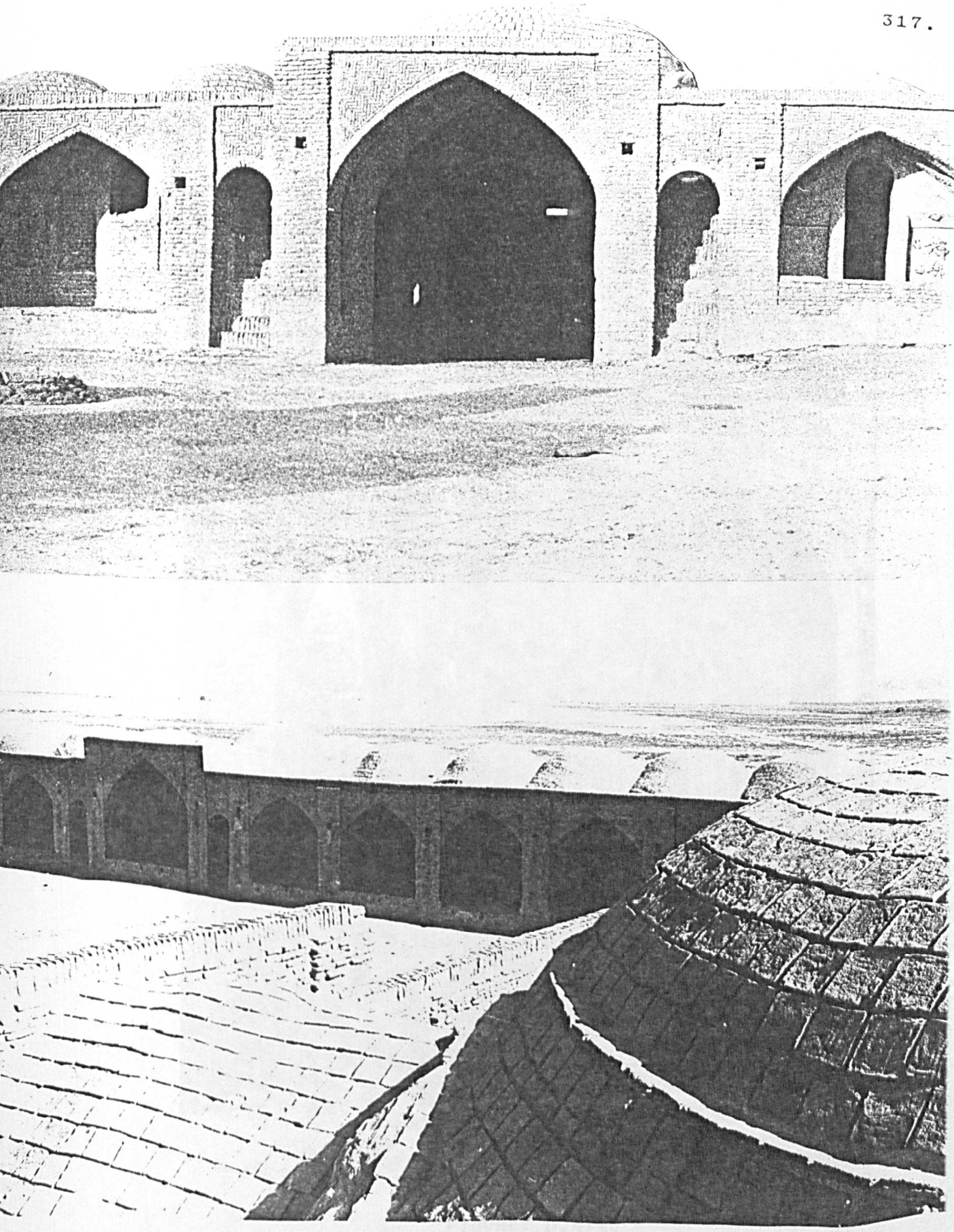


FIGURE: D.41b.
Courtyard of the Khan.

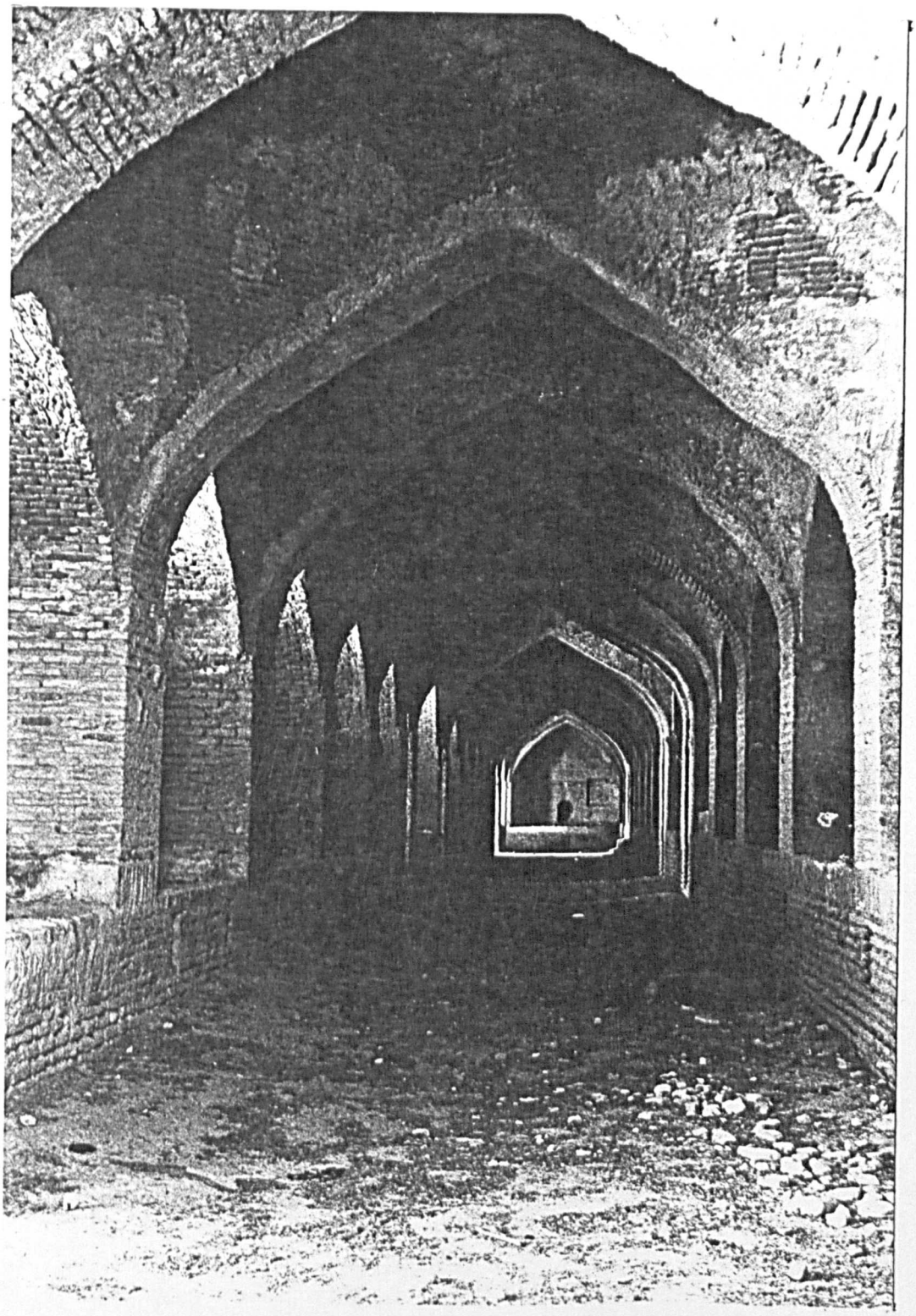
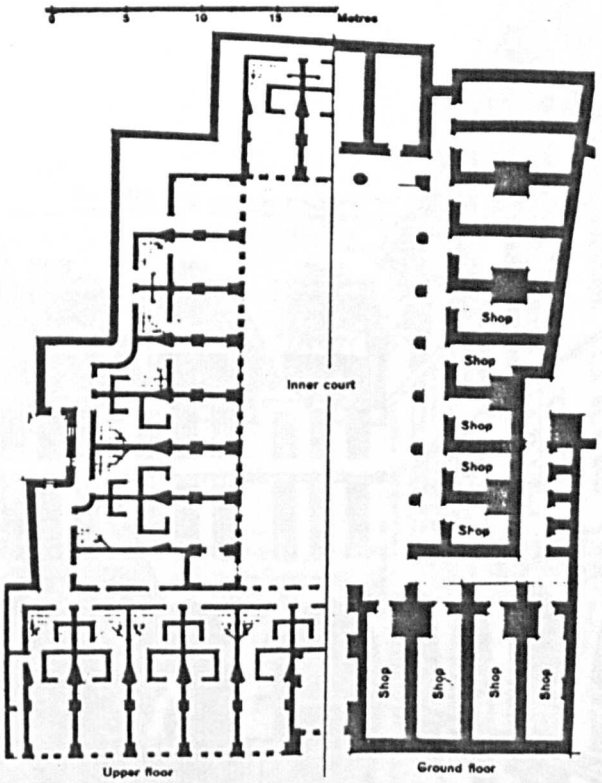


FIGURE: D.41c.

Interior of the Khan.

The *wekālah* of Sultān Al-Ghūry from the 16th century, A.D., Cairo



Source: Ahmed K.M. Abdel-Fattah, Analytical Study of the Underlying Factors Governing the Design of the Consumers' Community Shopping Centres, *Doctoral Dissertation, The Swiss Federal Institute of Technology, 1962, p. 19.*

FIGURE: D.42a.

Plan of Al-Ghury Han in Cairo.

Michell, 1978

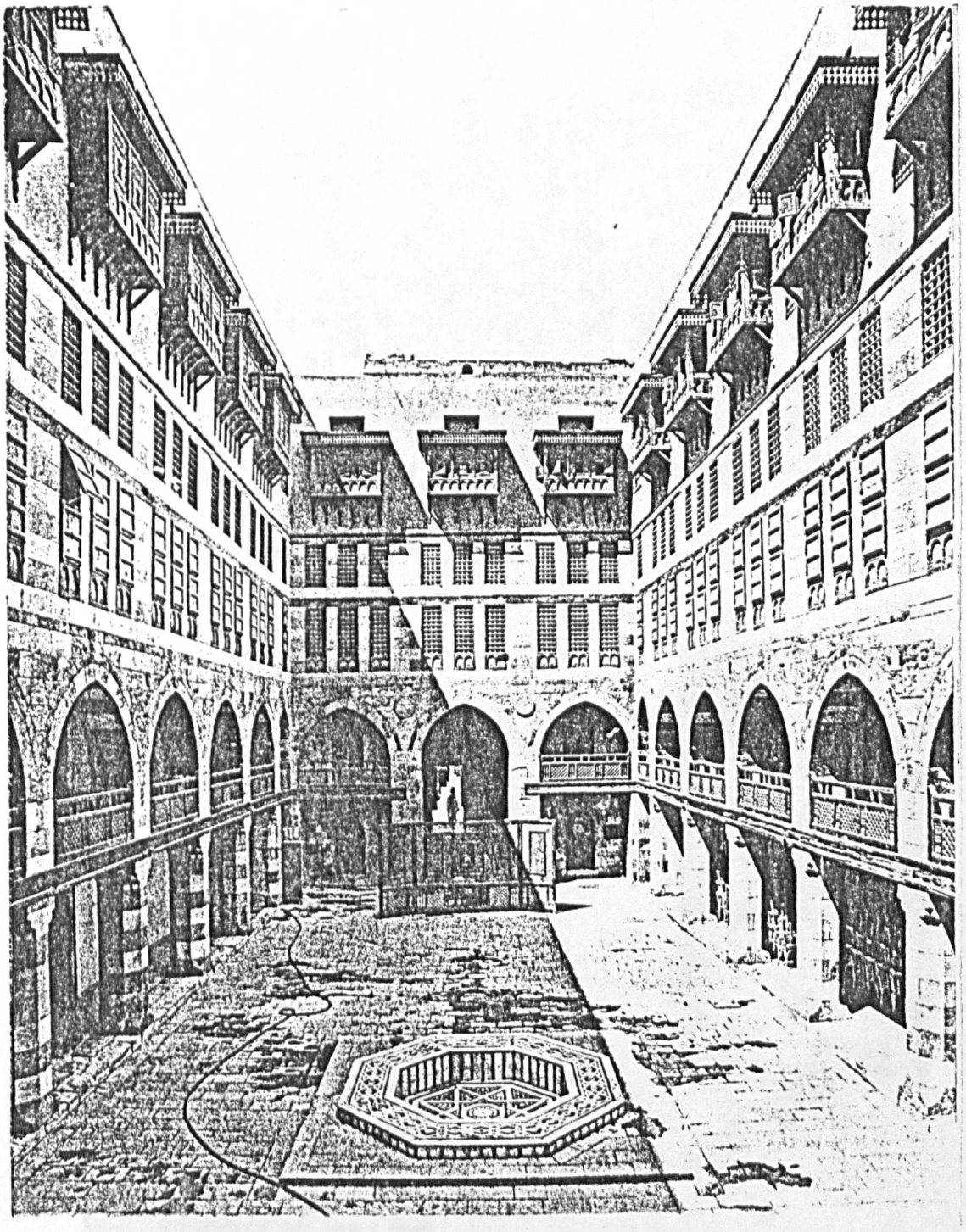
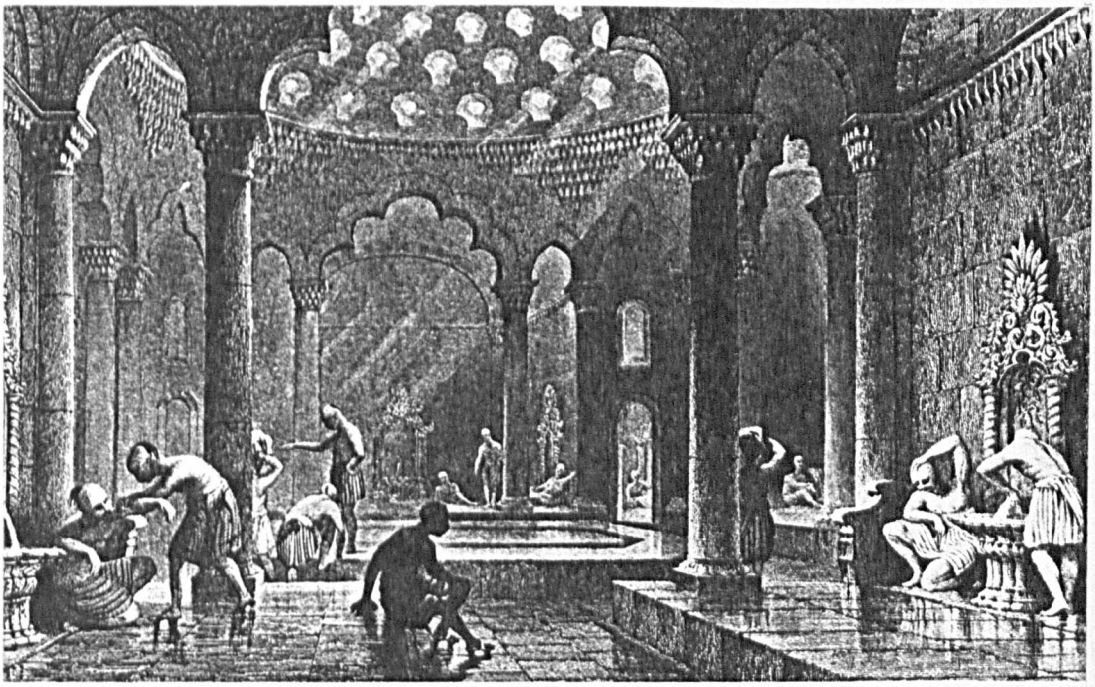


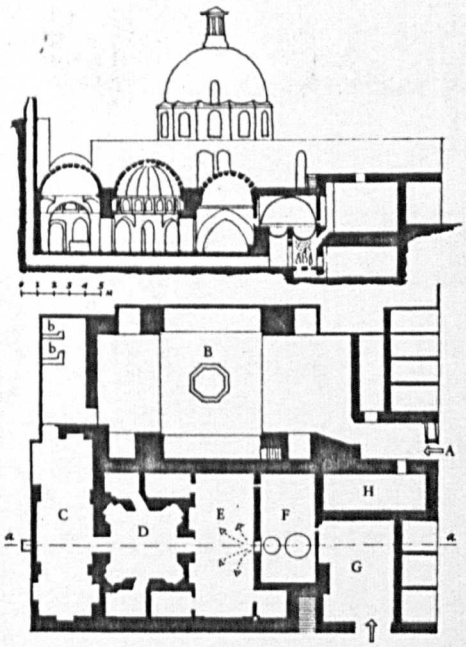
FIGURE: D.42b.

Interior of Al-Ghury Han in Cairo.

Michell, 1978



The bath (*hammām*) was an institution inherited by the Muslims from the Classical world. A 19th-century engraving of the 18th-century Çağaloğlu Hammām in Istanbul (*above*) shows the hot stone in the centre and the stone benches where bathers stretched out and steamed. *Below left:* the disrobing room of a Mughal bath, depicted in 1603, showing bathers undressing and preparing to enter the hot rooms. *Below right:* part of the baths of Ganjī 'Alī Khān at Kerman, recently restored. (36, 37, 38)



The Hammām al-Bzouria, Damascus. A, *entrance with shops on each side;* B, *disrobing room, with fountain in the middle;* b,b, *lavatories;* C, *cold room;* D, *warm room;* E, *hot room;* F, *steam room;* G, *fuel;* H, *water-tank. The section is taken on the line* a–a, *and behind it can be seen the great dome of the disrobing room. (5)*

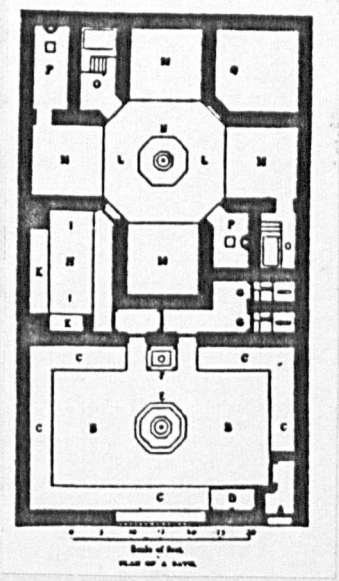


FIGURE: D.43.

The Public Bath.

Michell, 1973, p.110
Ismail, 1972, p.119

Thus, it appeared in both the central district of the city within the market place and in the heart of the residential quarters, and where an abundant supply of water was available. Because of its ritual use it gradually became a sort of annex to the mosque [Ismail, 1972, p.122].

A nammam is entered from the suq by an inconsequential doorway interrupting the row of shops in the suq. Once inside, however, the hall widened and gave access to a spacious domed disrobing room lit by a lantern in the dome directly over the pool in the centre of the room. At either end, the room was lengthened by deep wide iwans with low ceilings. This room is linked with a long room covered by three domes, the so-called 'cold room' - cold in relation to the succeeding rooms because it lay furthest from the source of heat, which acts as an intermediate zone between the outer and inner atmospheric bathing area. Connected to the mentioned room was a warm room, elaborately constructed and decorated, with niches in the four corners of the chamber forming stone benches for the bathers. On the axis with the cold and warm rooms the hot room was arranged, which had a lower domed ceiling and simpler construction. This room stimulated sweating before bathers returned to the warm room for cleaning and massaging (Figure D.43). [Sims, 1978, p.109-110].

(g) School (Madrasah)

In the market place the madrasah played a major role in education. Education is important from the Islamic perception, indeed from the very first word of the first revelation to Mohammad.

Quotation from the Koran:

"In the Name of God, the Compassionate, the Merciful."

"Recite! (or read)
In the name of thy Lord and Cherisher,
Who created -
Created man, out of
A (mere) clot
Of congealed blood
Recite! And thy Lord
Is Most Bountiful, -
He who taught
(The use of) the Pen, - "

[Rodwell (translation), 1978, p.19].

Islam had the character of a literary and, therefore, learned civilization; in such a context the acquisition of knowledge and its transmission were paramount. Of these twin aims the madrasah was the instrument, and a network of madrasahs was soon established, providing higher education in almost every urban area in the Islamic world.

The mosque or more accurately its courtyard, formed the first school known by the Muslims.

The schools were groups of scholars devoted to the study of the Shari'a - Islamic law; in the early centuries of Islam, various groups sponsored several versions of the Shari'a which differed in matters of detail and to some degree in the jurisprudential principles upon which they were based. Accordingly, four schools formed and persist to the present day representing four definitive versions of the Islamic holy law.

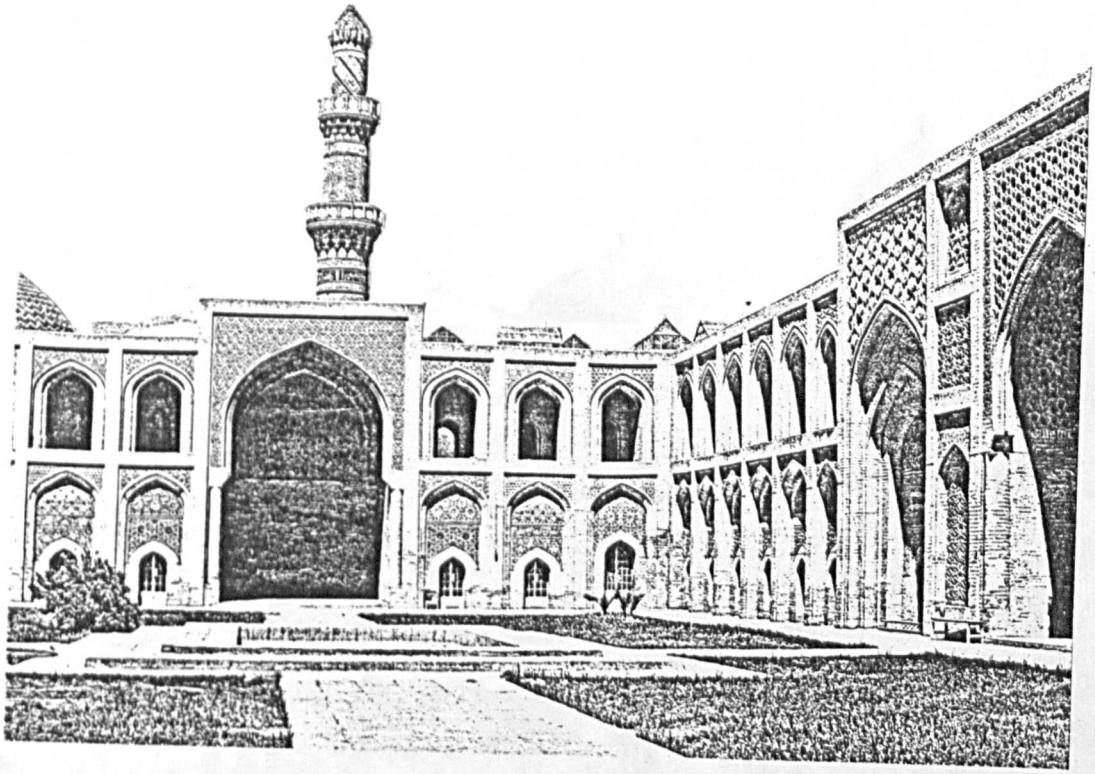
The schools performed many functions for their members. They formed study groups of scholars, teachers, students and interested laymen who kept alive the school traditions in the study of the Koran, hadith, law and theology. The formal institution of learning, madrasah, were endowed to pay salaries to the teachers and stipends to the students. The school building also functioned as a mosque and meeting house for the schools and their followers.

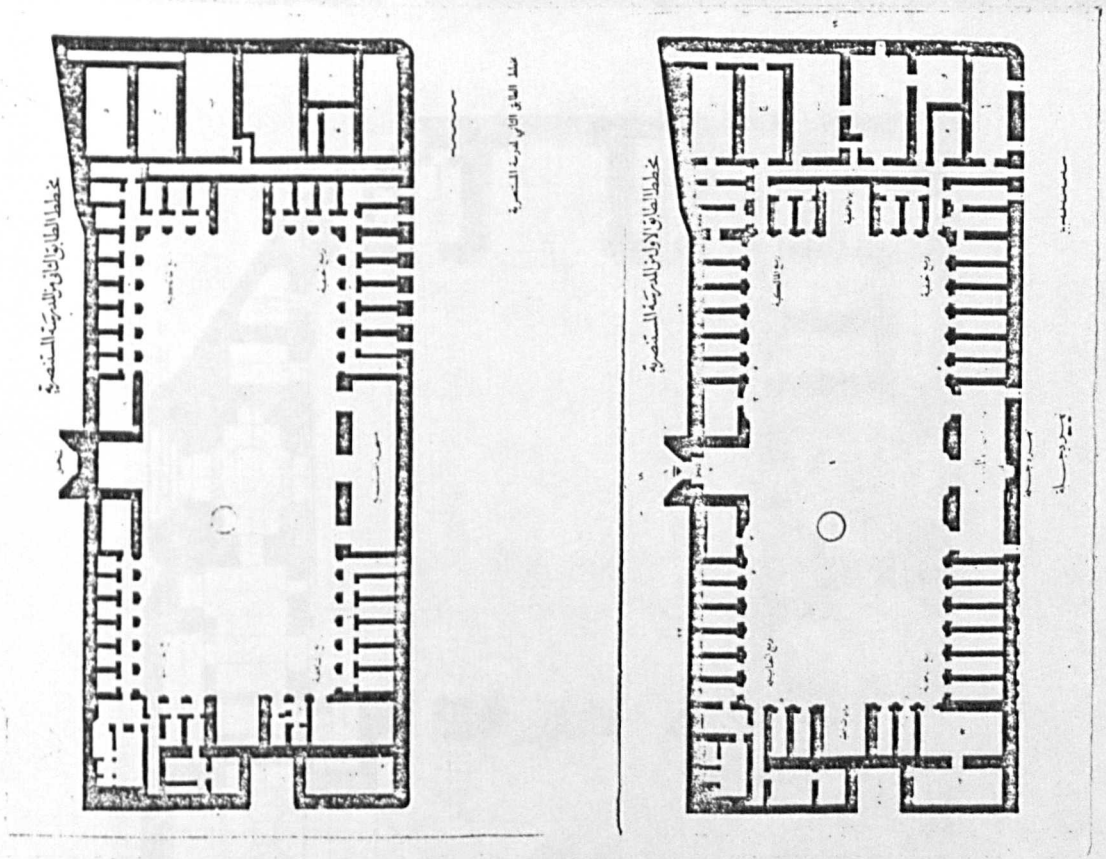
From the law schools came the notaries, muftis and judges who witnessed contracts, gave legal advice and adjudicated disputes. The schools applied their teachings to maintain the religious norms for family and commercial life. Leading members of the schools were also consulted by their lay followers on many social and communal matters, and ulama or school scholars, represented their constituencies to the political authorities and dealt with the State on their behalf in matters of public order and security, taxation, and the maintenance of streets, roads and other public facilities. Thus, in each town the several law schools formed a cadre dealing with matters of everyday community life. The schools represented the values and norms of the community and preserved the religious and scholarly traditions through which these ideals were kept alive. They provided for education and especially higher education, legal and commercial administration, political representation, and general counsel to the populace [Lapidus, 1973, pp.56-57].

However, in Islam higher as well as elementary education is based on the religion and related philological

disciplines. The elementary school functions inside the mosque some of which, such as Al-Azhar in Cairo include facilities for higher education.

The most famous Islamic University, the Nizamiyya of Baghdad, was established in 1067. Its site remains unexcavated, although there is no lack of evidence about its location. The Nizamiyya was eventually eclipsed by the rival establishment of the Mustansirriyya founded in Baghdad in 1233; [Sims, 1978, p.38-39] the khalifah, Al-Mustansir, built this madrasah for the teaching of the four holy laws. It is a four-iwan courtyard building with a prayer hall, kitchen, student accommodation and baths. The decorated iwan on the north-west external wall off the building belonged to the Dar Al-Koran. The river facade, decorated with a meandering pattern, outlined in raised brick plugs adorned with rosettes, has an inscription replacing the original one. This two-storeyed rectangular brick building is composed of eight groups of cells (in two floors) symmetrically arranged around the court-yard. The ground floor contains pointed-arched doorways to the cells while the upper floor opens onto a similarly arched corridor. The arches are set within recessed panels outlined by undecorated horizontal and vertical bands. The iwans are similarly decorated. On the two shorter sides, in between the cells, are single iwans. Their pointed arches on engaged columns are set within undecorated frames rising above the level of the cells. On each of the longer sides is an arrangement of triple doorways, one leading to the musalla and the others forming the entrance complex. The arch spandrels and the areas



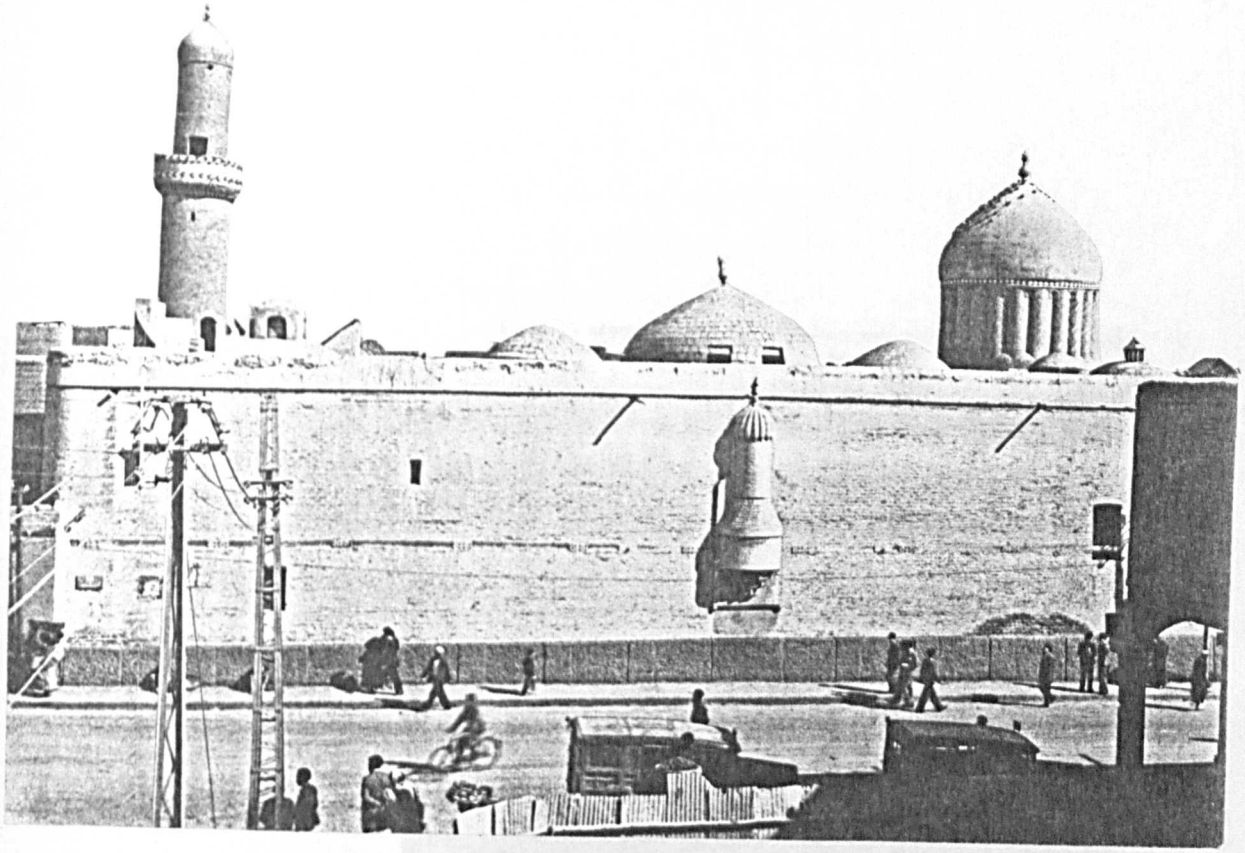


Al-Mustansiriyya School

FIGURE: D.44a.

Plan and Interior of a School in Baghdad.

Iraqi Engineers Association, 1969, pp.258-259



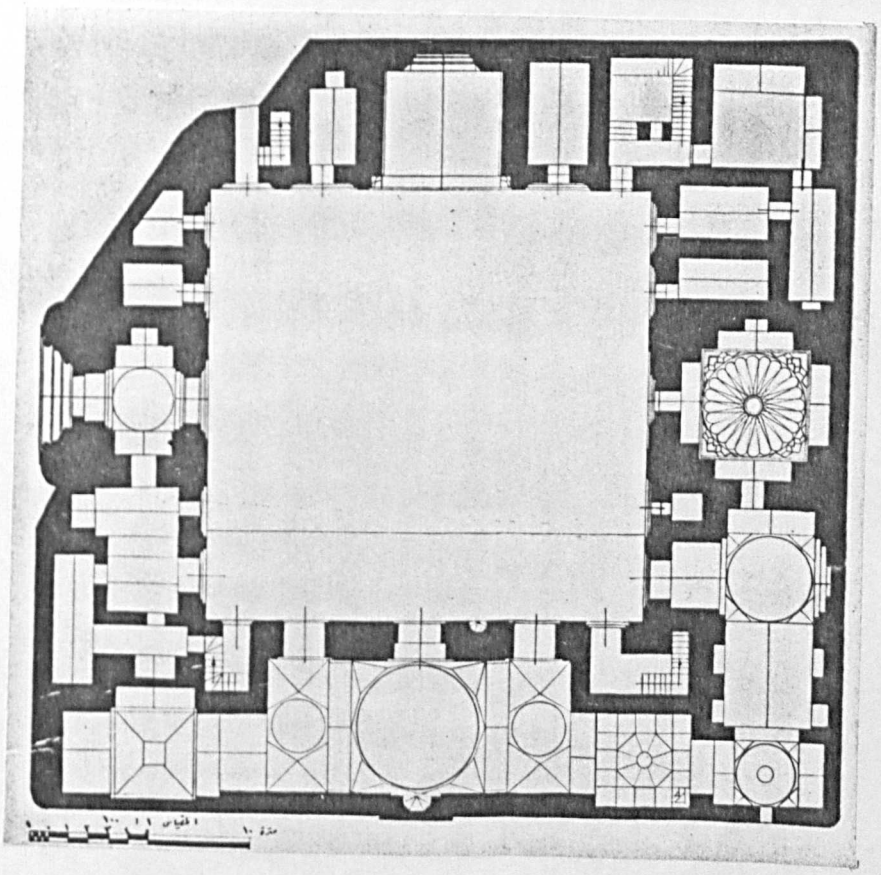
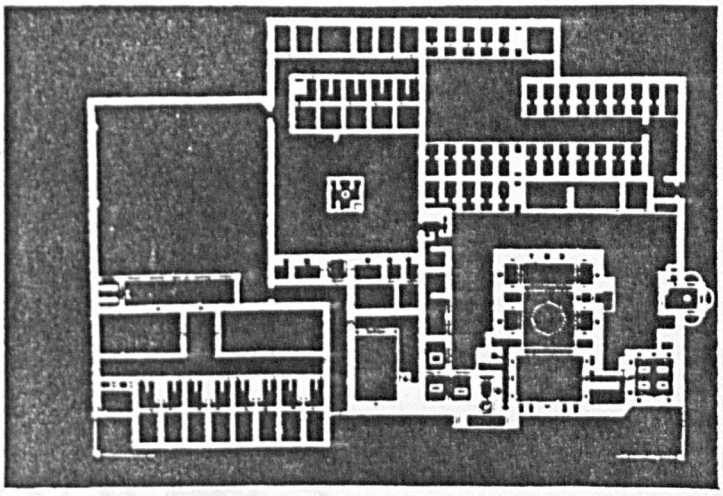


FIGURE: D.44b.

Marjan School in Baghdad.

Iraqi Engineers Association, 1969, pp.264-265

Madrasah, Khānqah, and mausoleum of Sultān Ināl from the middle of the 15th century A.D., Cairo



Source: Dietrich Brandenburg, Islamische Baukunst in Aegypten, Berlin, 1966, p. 172

FIGURE: D.44c.

Plan of Khanqah School in Cairo.

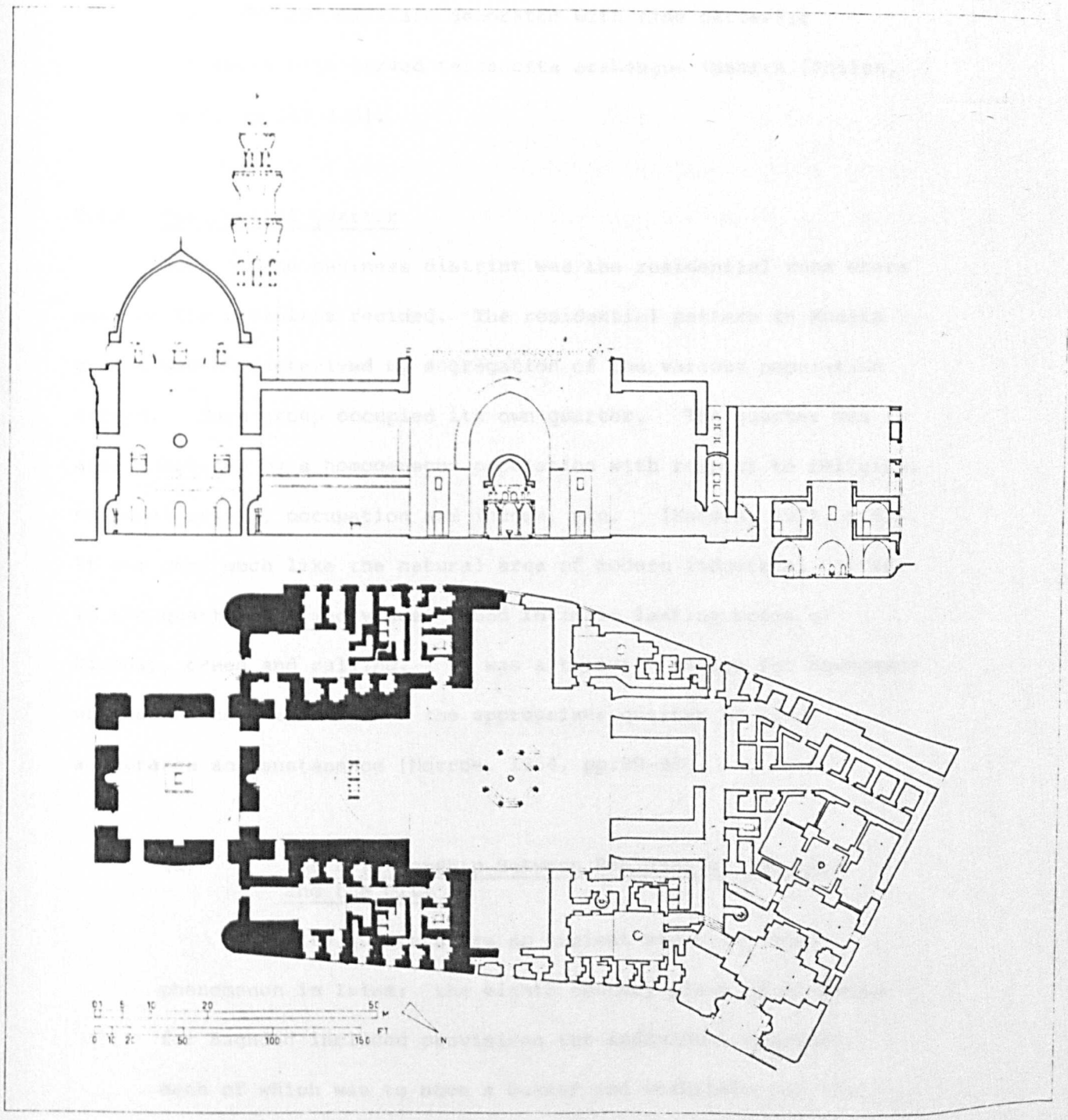


FIGURE: D.44d.

Plan of Sultan Hassan School in Cairo.

Stierlin, 1977, p.365

above the doorways are decorated with fine geometric brickwork with carved terracotta arabesque inserts [Philon, 1978, pp.247-248].

D.4.4.6 Residential Quarter

Next to the business district was the residential zone where most of the urbanites resided. The residential pattern in Muslim cities was characterized by segregation of the various population groups. Each group occupied its own quarter. The quarter was an area inhabited by a homogeneous population with respect to religion, national origin, occupation and income, etc. [Hassin, 1971, p.65]. It was very much like the natural area of modern industrial cities. In the quarter the individual found intimate lasting bonds of kinship, creed and calling. It was a thriving refuge for newcomers who needed only to seek out the appropriate quarter to find acceptance and sustenance [Morroe, 1964, pp.89-90].

(a) The Relationship Between Residential Quarters and the City

City quarters are an Ancient and ubiquitous phenomenon in Islam: the eighth century plans of Al-Mansur for Baghdad included provisions for individual quarters, each of which was to have a bazaar and workshops for its needs. Socially, a quarter was a microcosm with rich and poor living alongside one another and sharing mosques, fountains, hammams (baths), ovens, markets. This is typical of pre-industrial cities as noted by Sjoberg [1965].

Although the quarter is a closely knit group, providing consciousness of social identity and security,

there is always a balance maintained between this social self-sufficiency and isolation and the quarter's participation in the communal and economic affairs of the city as a whole. Though its entrance might be guarded at night and in times of civil unrest, each quarter is not usually architecturally emphasized and is physically linked with the neighbouring buildings of the adjacent quarter. The residents of a quarter sometimes extend their contacts in all directions to include their back-to-back neighbours.

However closely the individual is associated with the life of his quarter, he also belongs to another unit: the family, the basic and irreducible unit of social life. The right and obligation of the family to live enclosed in its house has led to a clear separation between public and private life, perhaps the most significant social characteristic of Islamic culture [Petherbridge, 1978, p.195].

The composition of residential quarters on an ethnic basis appear in cities of pre-Islamic origin. In the cases of newly founded Islamic cities the Arabs settled by tribe, each having its own quarter [Grunebaum, 1961, p.147] which introduced early nomadic Arab social values into urban life. Thus, the development of the quarter as a social, political and physical phenomenon was consummated under the Muslim domination in the later Middle Ages. The quarter phenomenon was fully developed, where Islamic-Arab cities became divided into districts called 'Mahallahs'. Many of these quarters maintained a solidarity and were closely-knit whilst retaining a special character [Lapidus, 1967, p.85].

The solidarity of some districts was based on religious identity; in this case, there had been no prior unity of race, origin or family but unity had grown out of the eventual association of the whole quarter with the school and under 'Sheikh' leadership. There was also an economic basis for the homogeneity of particular quarters - some were named after a market or craft.

During the Ottoman period, this arrangement was formalized into the 'millet system' which officially recognized the existence of a large number of separate and distinct social communities [Gibb and Bowen, 1950, pp.207-261].

The solidarity of the quarter was reinforced by the important social and administrative responsibilities which developed upon it. Administrative responsibilities extended to police functions as well. Social and administrative cohesiveness naturally extended to communal defense. During insecure times, when thieves, bandits, civil war, or invasion, threatened, the quarters barricaded themselves behind great doors, closed off the thoroughfares to the rest to the city, and hid themselves from attack. But however cohesive within, the quarters were not isolated ghettos, but adjacent streets and districts within the cities. Only in times of trouble, not in their daily life, did they impose a quasi-physical isolation by sealing themselves off from each other.

Each quarter, being a small fortified self-sufficient neighbourhood, was able to live independently when necessary [Figure D.45). It contained its own daily life facilities,

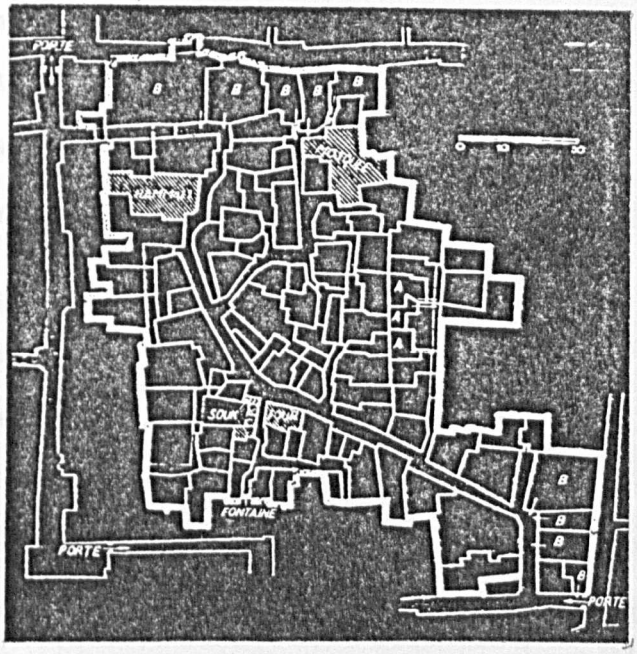


FIGURE: D.45.

Residential Quarter: Damascus.

Jean Sauraget "Esquisse d'une histoire de la ville de Damas", Revue des études islamiques, Vol.VII, No.4, 1934, p.452

and workshops, especially for weaving.

However, it was not a rule that every quarter was a real unit of social organization, or had an identical economic base, or was physically bordered. In some cases, a large area containing more than one quarter was the unit of effective social action, or presented an economical function, or had a physical identity. Therefore, quarters were neighbourhoods within the urban whole, but their size varied [Lapidus, 1967, p.85].

Neighbourhood activity focuses mostly around the small mosques and shrines dotted throughout the quarters, providing one of the few collective experienecs in which the people, wealthy and poor, can unite. In the crowded quarters, the small mosque is a place where the men of surrounding lanes worship together [English, 1973, p.83].

The number of quarters in the city depended upon the extent of the social heterogeneity of its population. Generally the population was differentiated on the basis of anyone or any combination of, the following factors: tribal affiliation, indigenous or immigrant status, religious affiliation, social classes and occupation. The residential zone of the Muslim city was a mosaic of various quarters. Residential segregation was not always the result of voluntary processes only but sometimes it was required by custom or law that the different groups should live in the specified residential areas [Hassan, 1972, p.109]. As occurred in Baghdad 'in 1853 there were 63 named quarters in Rusafah and

25 in Karkh. In terms of size, each could be linked somewhat to a modern city block, though each actually consists of a small network of alleys and the abutting buildings [Gulick, 1967, p.246].

The dwellings forming these quarters are clustered together, framing narrow twisting alleyways, which achieved adequate access to them. Each of these dwellings was based on a courtyard principle in plan. In fact this residential quarter concept was not new, it was introduced during the Ancient Mesopotamian period, which continued in the Islamic period because the courtyard house principle, in addition to its capacity to adapt to the natural environment, fulfilled the requirements of the new cultural environment and ideology of the Islamic civilization. (Figure D.46).

The concept of the courtyard house has been discussed in detail in the previous section (C.5.2.2.d), and in order to avoid repetition, this section will focus only on what had been developed and modified on this concept during the Islamic period.

Gulick described a house from a retained quarter in Iraq of the Islamic period as follows:

'It consists of two storeys built around four sides of a courtyard or three sides of a courtyard which is enclosed on the fourth side either by the two-storey blank wall of the adjoining house or by a one-storey high wall. The roof is flat and the courtyard has an open gallery running around it. The street-front elevation features a low, heavy door and

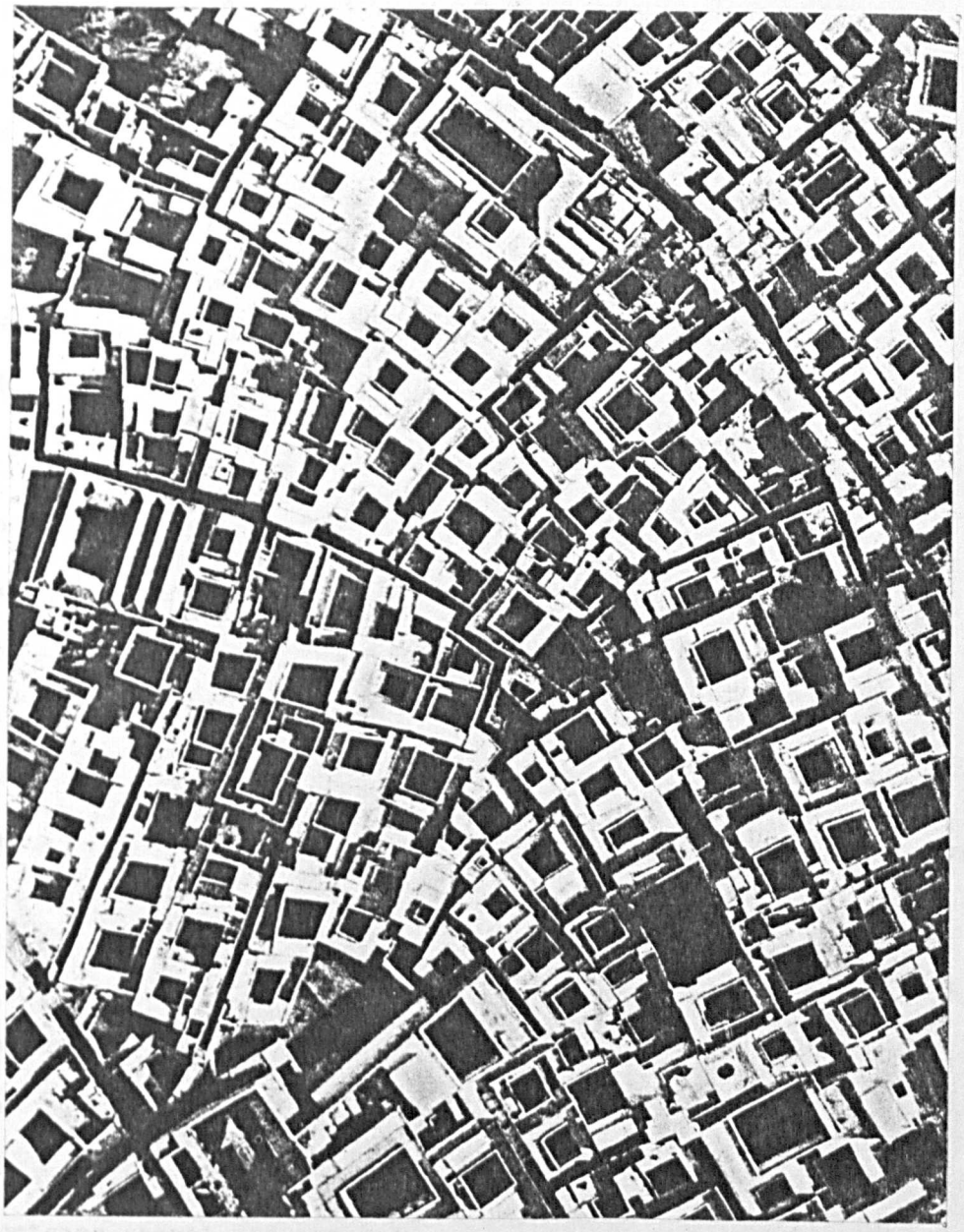


FIGURE: D.46.

The Courtyard Urban Fabric in the Islamic Era,

(Morocco)

Rudofsky, 1964, p.54

a few small windows on the ground floor, overhung by a projecting wooden porch or (alternatively) a projecting wooden-walled room with large glazed windows. Brick air-scoops on the roof draw fresh air into the lower floor and basement, which is used in the summer. The upper floor is used principally in the winter and may include an inside gallery or mezzanine which provides private quarters [Gulick, 1967, p.250].

Many of the features of this house are the result of long experimentation with solutions to the problems of achieving spacious privacy in a densely populated setting, plus protection from excessive heat in the summer [LeBon, 1956, p.21]. Embellishments and size vary of course, but the style lends itself to rather uniform row-house arrangements, and it is the rows of projecting upper storeys that give streets their tunnel-like quality.

Therefore, the Islamic house, as an introverted form, conceived from the inside outwards, will emphasise the decoration of interior elements, such as the courtyard facade, while the street facade is usually a plain wall (unless it contains shops) and the only access is the entrance portal [Petherbridge, 1978, p.197].

(b) Factors Determining Dwelling Forms

In Islamic culture it is both the explicit and the implicit Koranic prohibitions that are the primary determining factors in the formation of a domestic unit, for these define what is socially unacceptable. For example, in the 'sūra of the Confederate Tribes' it is stated:

"In the name of God, the compassionate, the Merciful".
O wives of the prophet!
ye are not as other women.
If ye fear God, be not too complaisant of speech,
lest the man of unhealthy heart should lust after you,
but speak with discreet speech.
And abide still in your houses, and go not in public decked
as in the days of your former ignorance"
[Rodwell, (translation), 1978, p.473].

In another sūra, the Koran stated; how should the visitor behave when he want to visit a family?

"O ye who believe! enter not into other houses than your own, until ye have asked leave, and have saluted its inmates. This will be best for you."
[Rodwell (translation), 1978, p.445].

Therefore, the dominant factors determining residential construction within Islamic society are: defence and privacy.

(i) Defence

This factor has been considered on two levels: the whole residential quarter and the individual unit.

The lack of any open space within the various quarters and the complicated, misleading street pattern followed in the residential area, made it highly protected from enemies and strangers. They were arranged so as to prevent combination; each quarter was separated from the other by gates guarded by a warden whose duty was to regulate access or ingress, especially to belated wayfarers at night; but in times of

social unrest all communications could be cut off between different quarters and other parts of the town, by simply shutting the gates [Ameer, 1955, p.191].

In addition the high population densities of the neighbourhoods was another element which provided security and protection. It is known that as density increases security also increases [Basheer, 1978, p.24].

The defence on the individual unit within the residential quarter was achieved by applying the courtyard concept which afforded the possibility for the units to cluster and gave a highly protected windowless facade.

(ii) Privacy

The other factor determining the character of the residential quarter during the Islamic period was privacy.

The Arabic name 'Sakan' to denote the house is related to the word 'Sakina', 'peaceful and holy' and the word for woman, 'harim', is in term related to 'haram', 'sacred area' which denotes the family living quarters. The harim, or domestic area of the house is primarily the women's domain [Petheridge, 1978, p.196]. The houses faced away from the street; they received their light from an inner courtyard and their constituent buildings were so arranged as to secure a maximum degree of privacy for the inhabitants. This emphasis on privacy was the outgrowth of social mores that demanded as complete a withdrawal from the public as possible for the women of the family [Hassan, 1972, pp.100-101]. The separation of women had made their activities mostly home-

centred. Women's relationships were not more extensive than with other women in the residential area. The alleys, houses and their courtyards were best areas, or spaces for women to gossip or practice their social relationship and activities. Moreover, such spaces were the children's playgrounds, because there were no public green open spaces within the residential quarter, so children were able to play under their mothers' eyes.

To ensure the privacy of the family within the quarter it also inspired the insistence that windows and roofs must be constructed in such a way as to prevent anyone intruding unseen into the intimacy of his neighbour's life. For this reason house doors on opposite sides of the street did not face each other [Von Grunebaum, 1955, p.74].

In house architecture, the screened bay window (shanasheel) allows the female occupants to view the outside world without being seen - it also performs the important function of modifying the natural environment of the arid zone of the Islamic world. In the interior of houses, screens may be built opening from the private family quarter onto the reception rooms so that men's gatherings and festivities can be observed safely by women. The house, therefore, is an introverted form, conceived from the inside outwards, with emphasis on the decoration of interior elements, such as the courtyard facade, while the street facade is usually a plain wall (unless it contains shops), and the only opening is the entrance portal. External house walls must be built to a height that ensures that the domestic interior cannot be

overlooked, and that intruders are discouraged. Any openings in the ground floor are small, with grilles and above the line of vision of passers by. The windows of upper storeys are generally larger and may project considerably; though admitting light and air, they must not overlook neighbouring courtyards or terraces.

Furthermore, special requirements were needed for providing maximum privacy and protection for the house inhabitants from the eyes of outsiders which led to the development of a 'double circulation' system, or the division of the house into two parts; under this system, male friends of the dwellers were to be received in one part, leaving the other part as a private family sanctuary.

To achieve the double circulation, several solutions were adopted in the house design, which were based on horizontal or vertical divisions:

Horizontally: in some houses with a single court the private family part (harim) was generally raised a few steps above the rest of the house (Figures D.47 and D.51). Some other houses were planned with two courts, one for men's activities and the other for women and family activities [Ismail, 1972, p.115] (Figures D.47 and D.52).

Vertically: the separation between the private part and the men's part was achieved by two-storey houses where the men's area was on the ground floor and the private family part on the upper floor [Planhol, 1959, pp.26-27].

Furthermore, in wealthy establishmetns, the male and female quarters may be housed in separate buildings, linked together by a bridge on the first floor if they are located on either side of the alleyway.

(iii) The House Entrance

Whilst the relationship between the various parts of the house and the main entrance was adopted to obtain maximum privacy, the main gateway of the house usually does not give immediate access to the domestic quarters, but leads into a passage with a right-angle turn (bent) so that it is impossible to see into the courtyard from the outside.

Usually the Islamic house has a single entrance, but a second entrance may be used exclusively by the womenfolk, as occurred in the aforementioned examples (Figures D.47 and D.52).

The man's reception (or guest) room tends to be located adjacent to, or directly accessible from, the entrance lobby of the house so that visitors do not meet with females in the household or violate the private family quarter (harim).

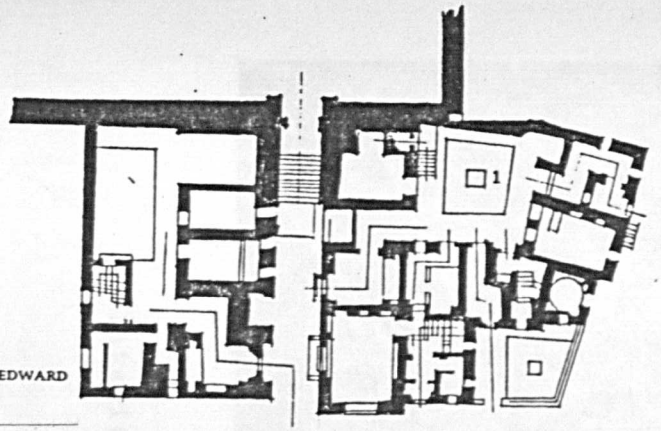
(iv) Material and Construction

Islamic ideology is fundamentally hostile to luxurious dwellings and to lofty ones, which are symbols of pride and arrogance. Thus, the low-built house is characteristic of early Islamic-Arab settlement. Big apartment dwellings, except for certain cases, were rare in these cities [Planhol, 1959, pp.23-24].

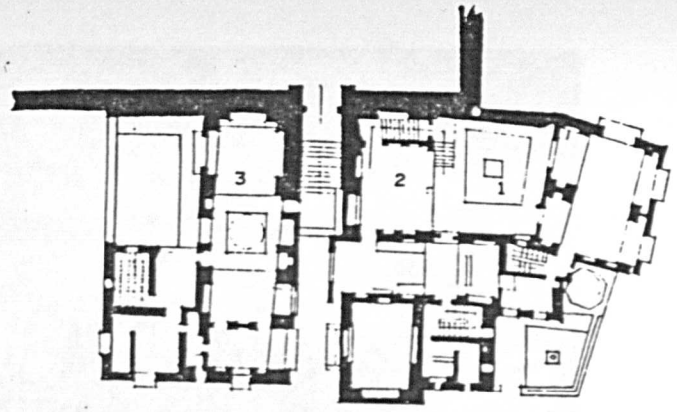
Double Courtyard House.

4.3 *Kritliyya House, AD 1631*
1 Open court
2 Makáad *(loggia)*
3 Kaa *(covered hall)*
4 Women's sitting room
5 Women's sitting room overlooking kaa
6 Sleeping quarters

ORIGINAL PLANS COURTESY OF KRITLIYYA MUSEUM. THESE DRAFTS BY EDWARD HUANG, RESEARCH ASSISTANT, PORTLAND (OREGON) STATE UNIVERISTY

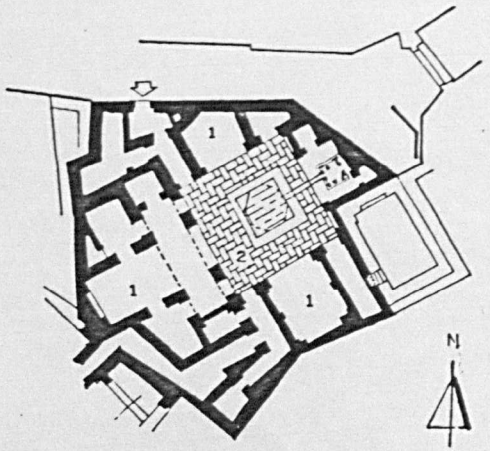


A. GROUND FLOOR



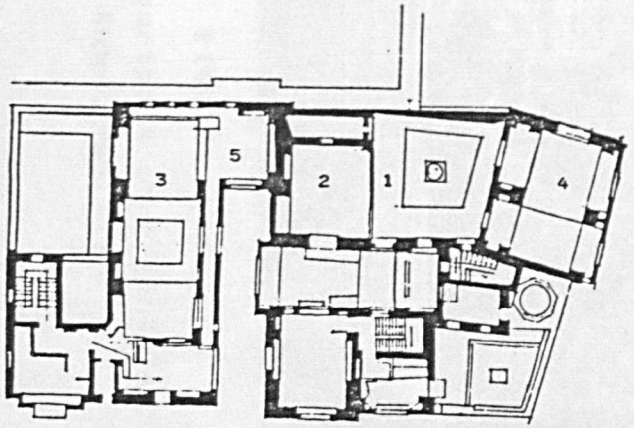
B. FIRST FLOOR

Single Courtyard House.



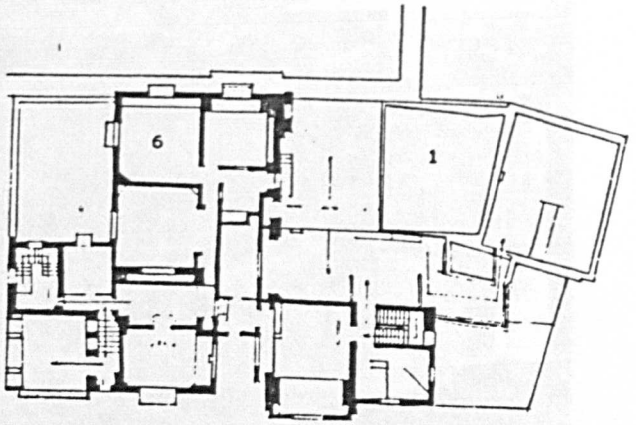
4.2 *Tulun house in Fustat, Egypt, tenth century AD.*
1 Iwans
2 Open court

FARID SHAFEI. *Al imara al Arabia fi masr al Islamia* [ARABIC ARCHITECTURE IN ISLAMIC EGYPT], CAIRO, 1969, VOL 1, p 434



C. SECOND FLOOR

N



D. THIRD FLOOR

FIGURE: D.47.
Courtyard Houses in Egypt.

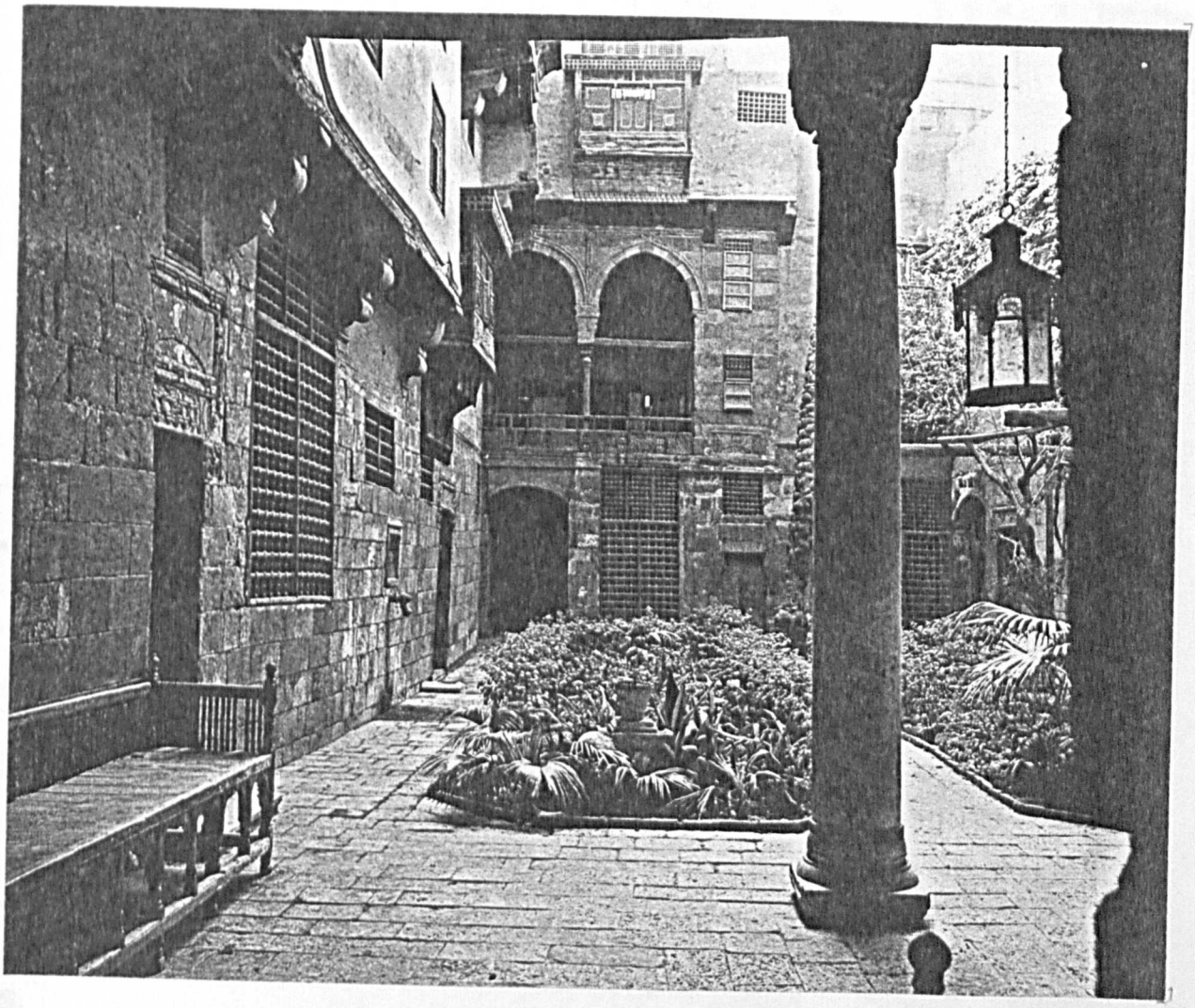
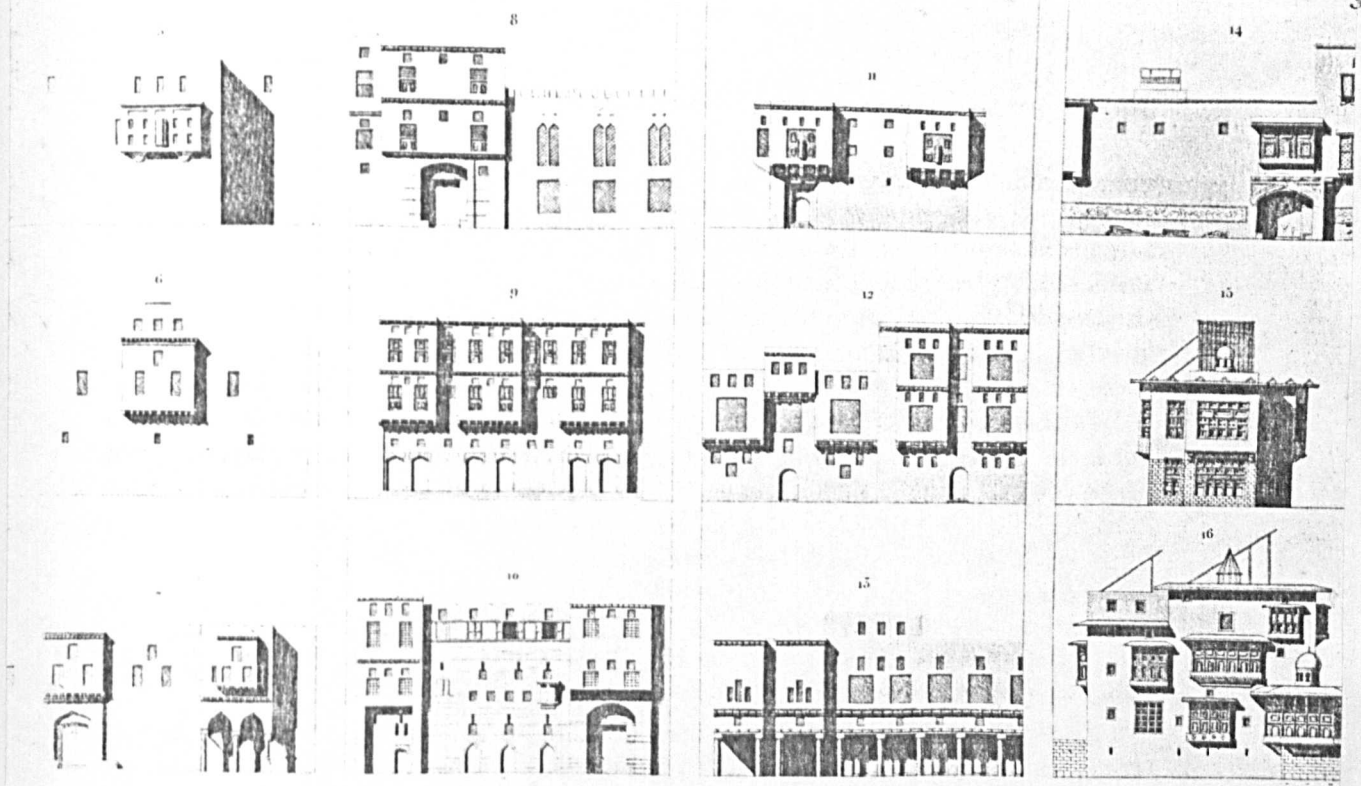


FIGURE: D.48.

Interior Courtyard of Kritliyya House.

Michell, 1978, p.185



34. Examples of traditional Egyptian housing styles, *ca.* 1800. Nos. 5-7 from Alexandria; 8-10 Rosetta; 11-13 Damietta; and 14-16 Cairo. (From: *Description de l'Egypte.*)

35. Lithograph depicting traditional upper-class housing styles along the canal in Cairo during the early years of the nineteenth century. (From: M. J. Marcel, *Egypte depuis la conquête des Arabes,* Paris, 1877.)

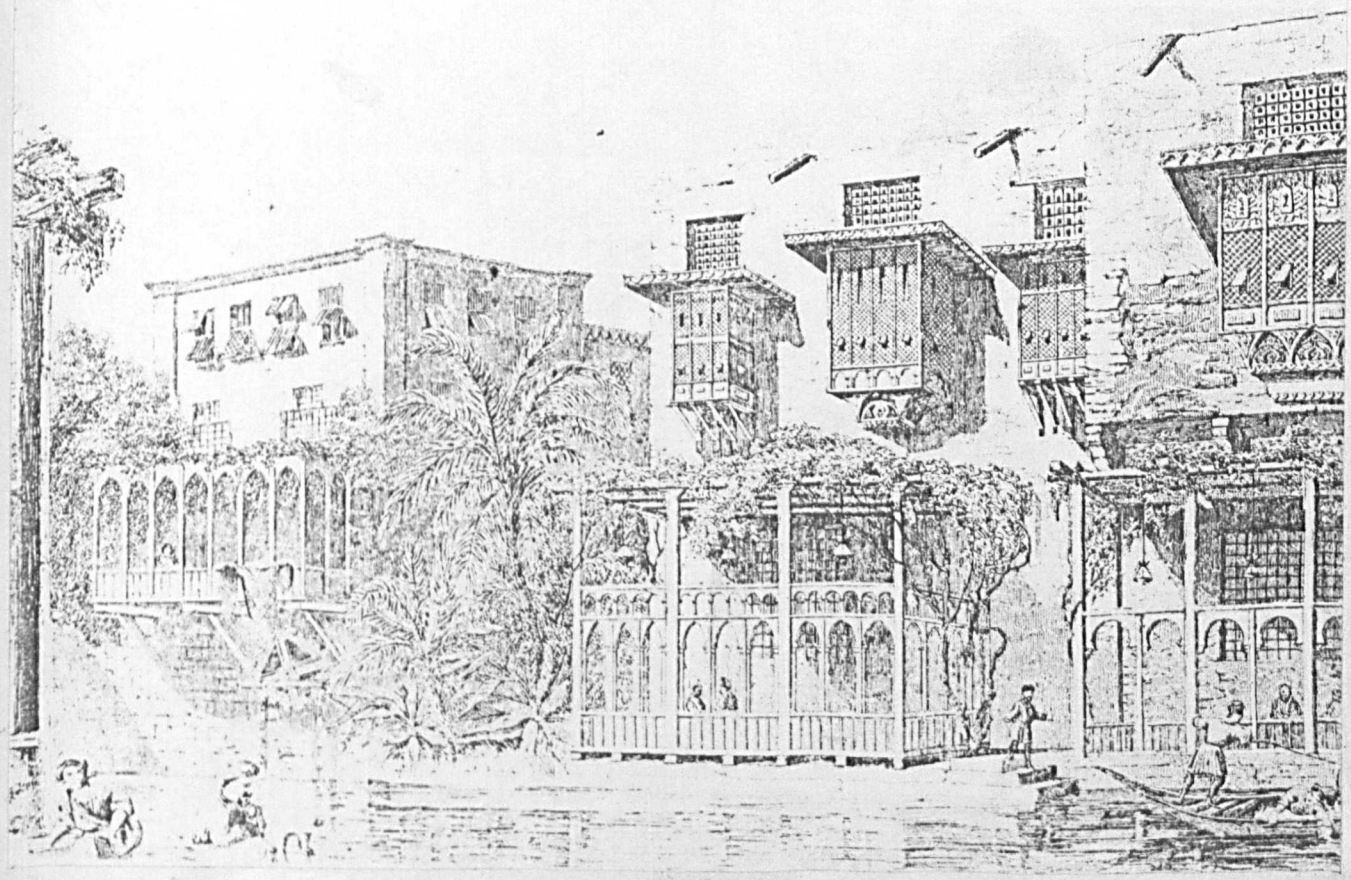


FIGURE: D.49.

The Facade of the Traditional Courtyard House in Egypt.

Brown, 1973, p.95

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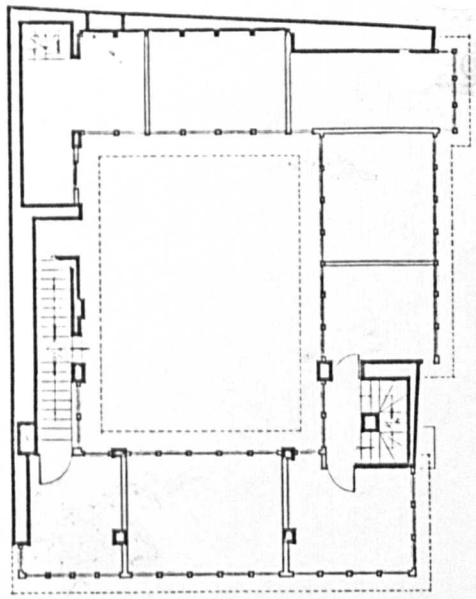
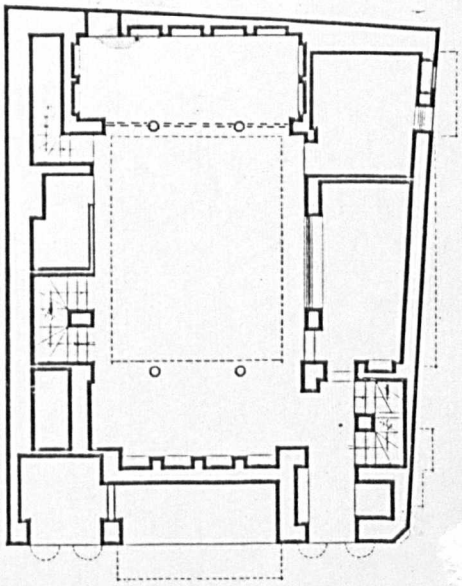
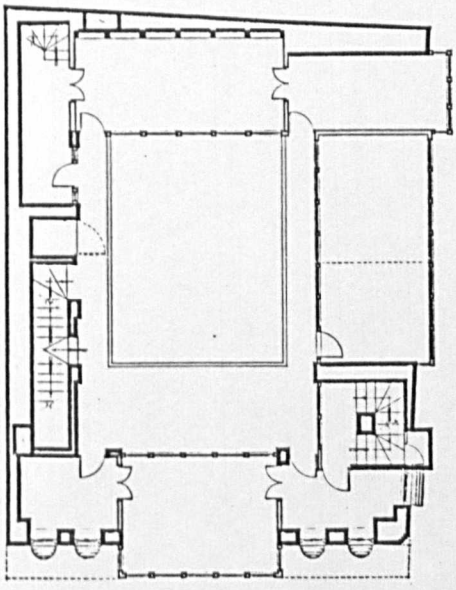


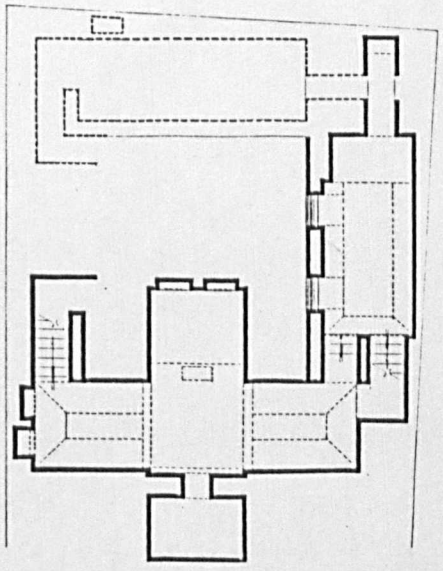
First Floor.



Ground Floor.



Second Floor.



Basement.

FIGURE: D.51.

A Single Courtyard House in Baghdad,

(Kadimiya)

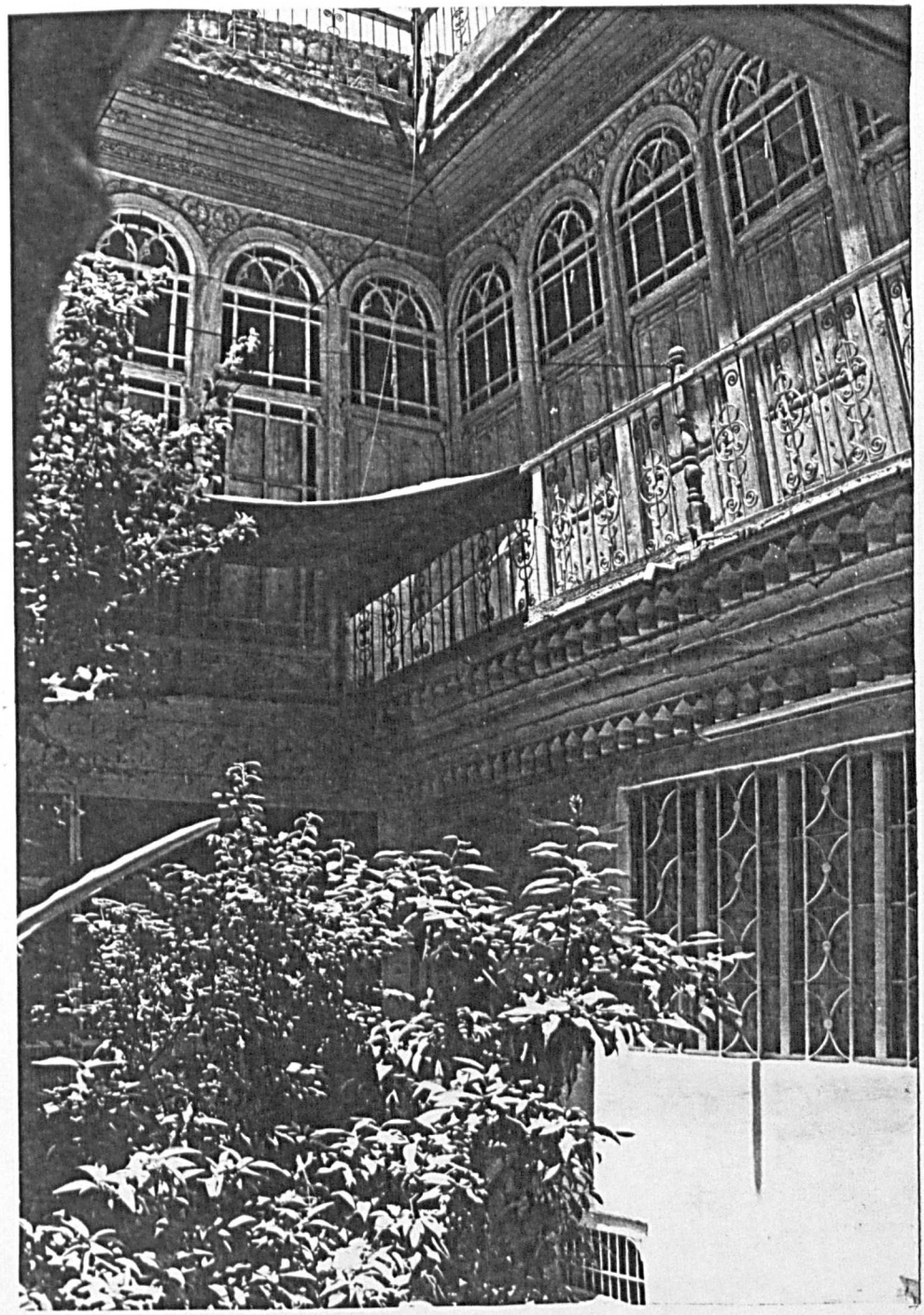
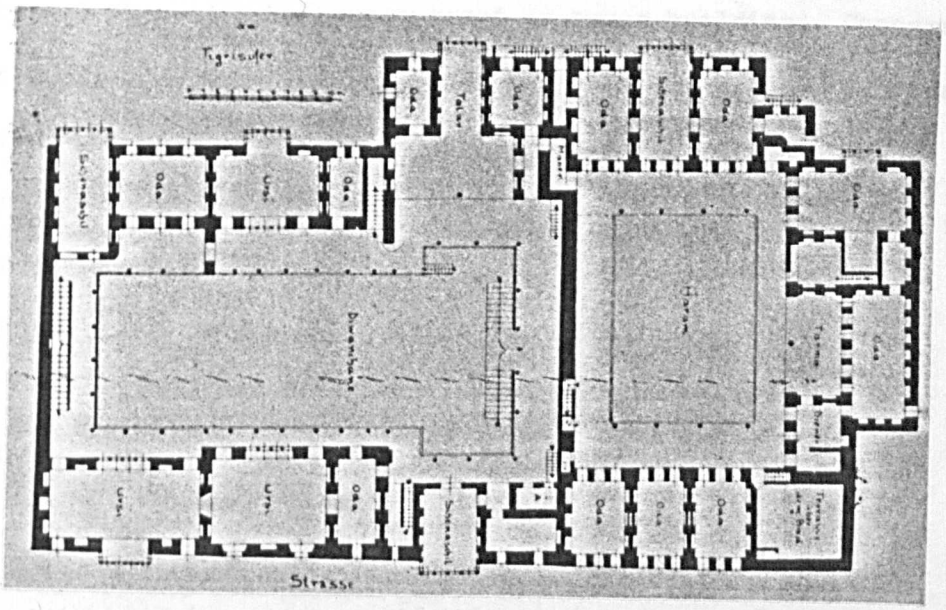
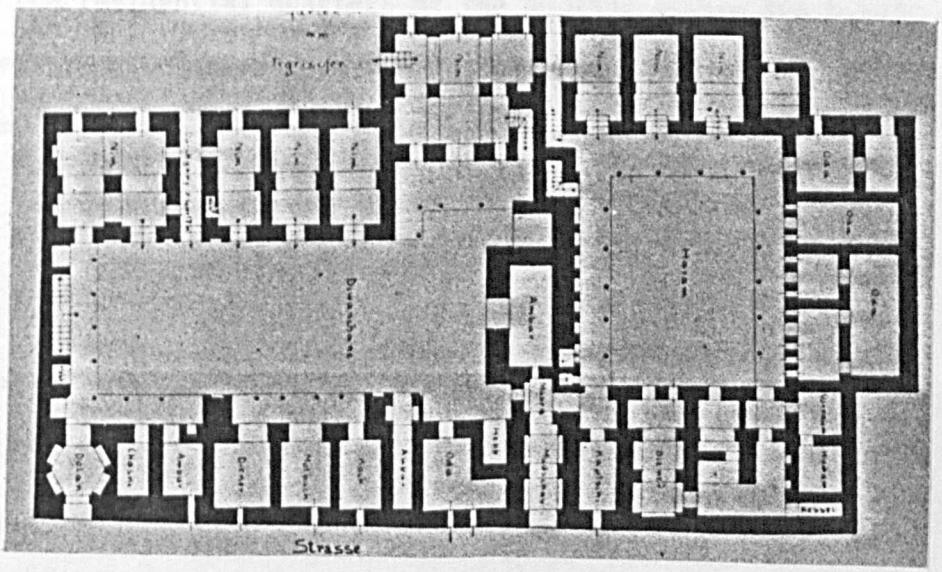


FIGURE: D.51a.

Interior Courtyard of the House at Kadimiya.



First Floor.



Ground Floor.

FIGURE: D.52.

A Double Courtyard House in Baghdad.

Jawad, M., 1969, p.342

Moreover, the use of fragile and perishable materials has also been encouraged in house building. Concern for durability is secondary; the use of fragile materials is a token of the insubstantiality of material things. This rule was not strictly observed in the later periods, where stone was also used whenever available, for the wealthier home [Ismail, 1972, p.115].

(c) Construction of Residential Quarters

The circumstances which created the irregular shape and size of the residential plots and the twisting road patterns in the residential quarters of the Ancient cities which have been discussed in detail in Section C.5.2.4, were similar to those circumstances founded in the Islamic period.

(i) The Courtyard House

Consequently, the shape and size of plots were usually irregular in these residential quarters.

The Islamic builder carried on the same solution in erecting the house (courtyard house) as the Ancient builder did but with improvements and modifications.

The first stage in erecting a house is to compose a regular courtyard on the middle or on one side of the given plot to act as the basic element for the whole composition of the design to be related, leaving the irregular spaces (rooms) to the boundary of the plot. In order to compose the courtyard and determine its size, many points have to be taken into consideration; function and social aspect, prevailing wind and

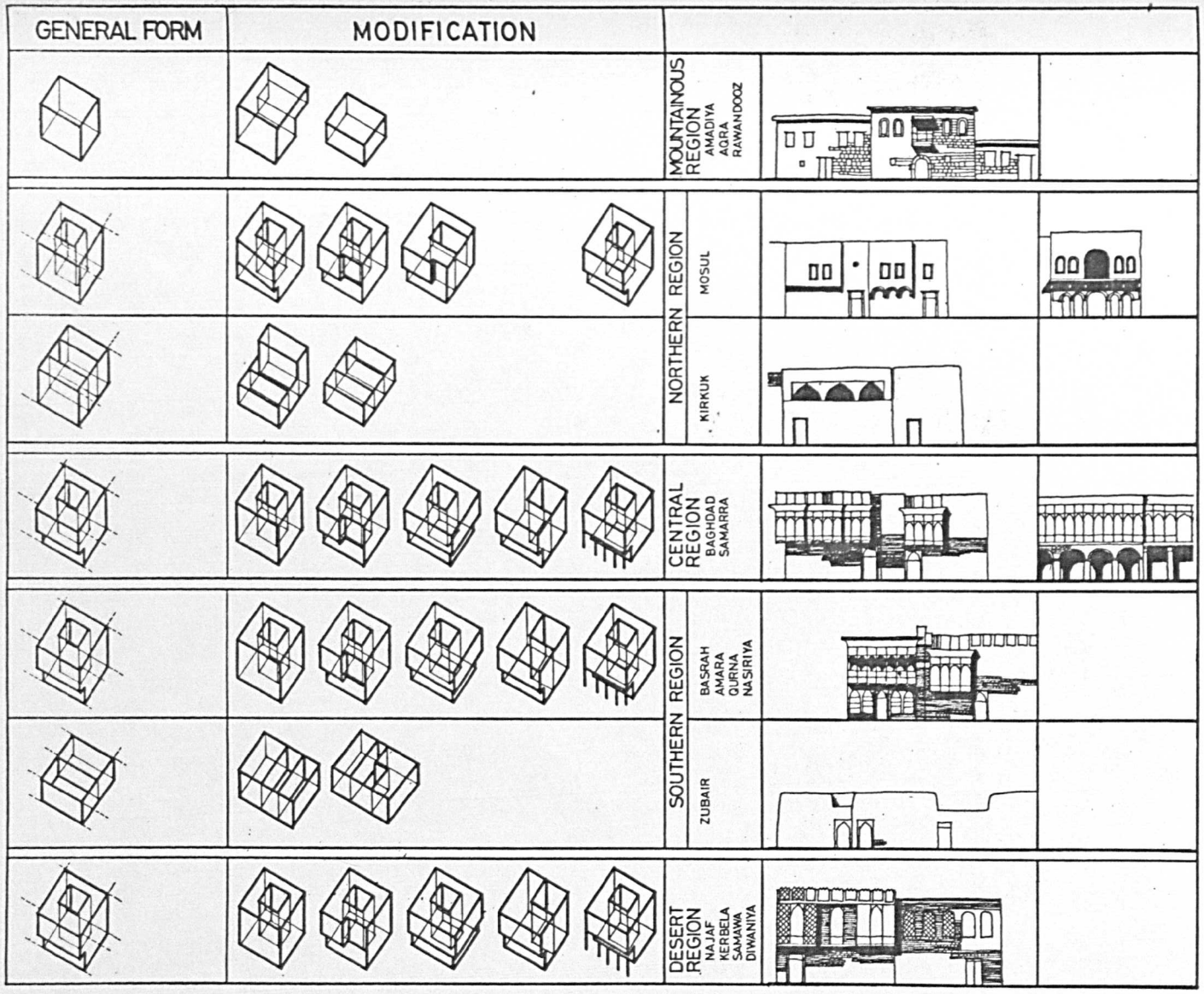


FIGURE: D.53.

Classification of the Traditional House in Iraq.

Ministry of Works and Housing, Iraq, 1977, p.148

sun direction, technology and availability of building materials. (Figure D.53).

These points are arranged in the design in such a way to create a symmetrical regular composition, as far as possible, as one of the main principles of the Islamic builder. This symmetry was achieved by the creation of right angled corners in relation to the position of the basic design unit (the courtyard) that leads to the variation in wall thickness; these walls of varied thickness offered spaces to insert cupboards, niches and air tunnels (badgeers) inside them (Figures D.47 and D.51).

This is true of the ground floor, while in the upper floors additional features are added in order to substitute the internal space lost by arrangement of the gallery round the courtyard (which offers access to the rooms) by projecting parts of the rooms onto the adjacent alleyways. These cantilevered upper rooms are supported on wooden, brick or stone corbels, often elaborately decorated. (Figure D.54).

As shown in Dardiri Street in Cairo, the architect of the house was confronted with a bend in the shape of his plot where he wanted to correct this in his first-floor plan, so he created brackets that increase in size to take up the increasing overhang necessary to establish rectangularity in the main reception part over the irregular ground floor plan. By this solution, the architect animated the facade of the house and solved the problem in an interesting and clever way, like a musician who creates a dissonance and solves it by a sequence of chords. The more intricate the resolution, the

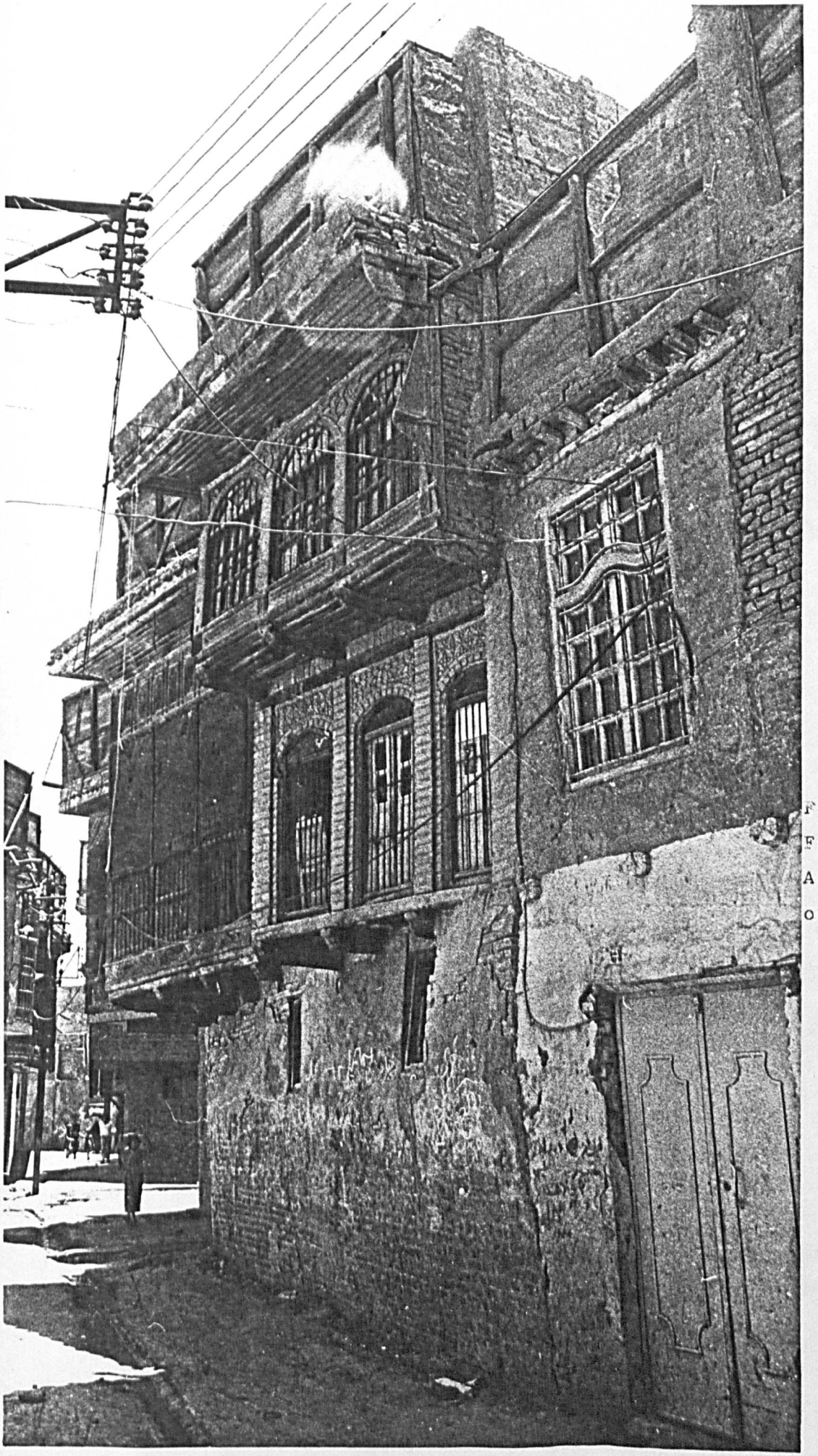
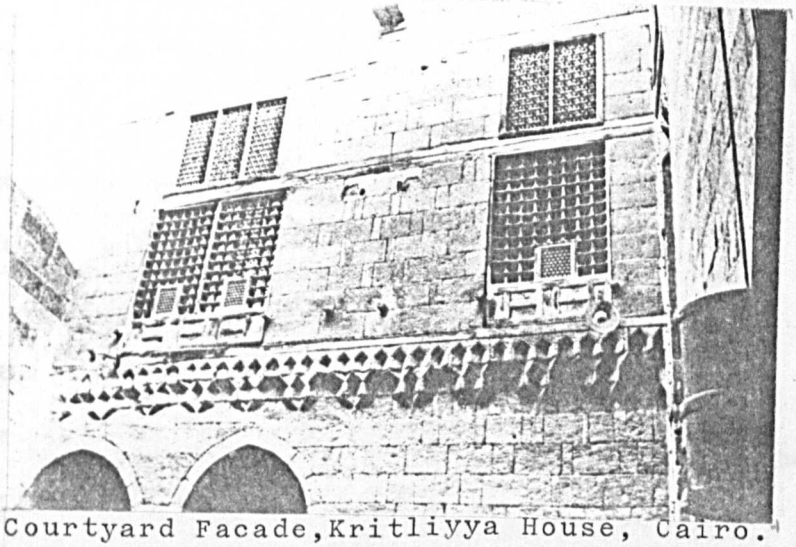
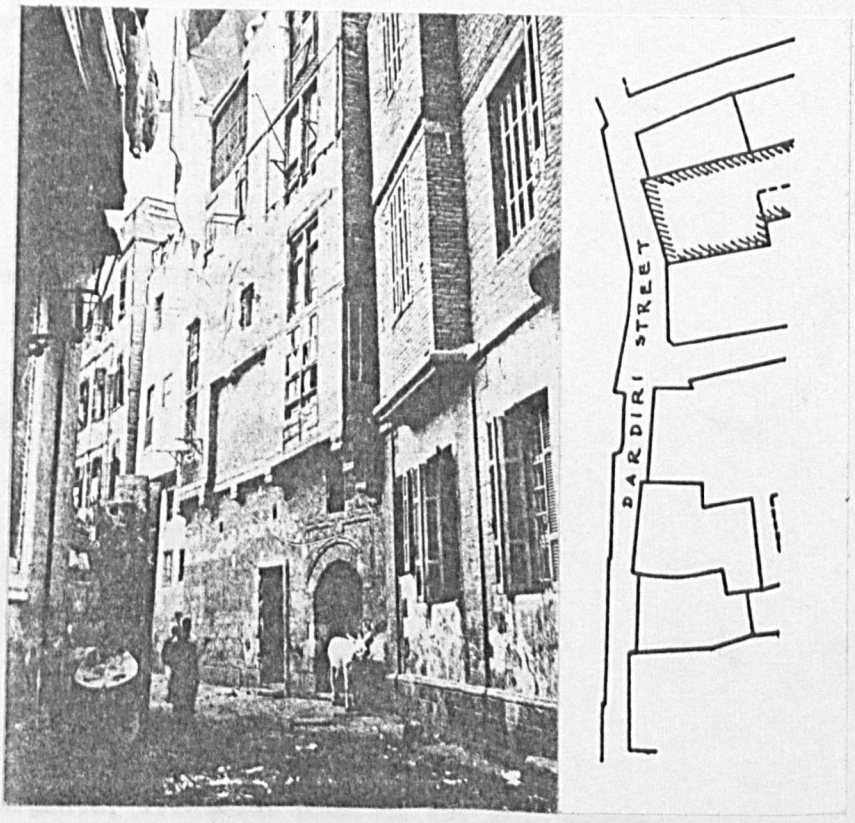


FIGURE: D.54
Function and
Arrangement
of Space.



Courtyard Facade, Kritliyya House, Cairo.



Dardiri Street, Cairo.

FIGURE: D.55.

The Correction of the Right-Angle in the Twisting Alleyways.

Brown, 1973, pp.323, 324

more interesting the music [Fathy, 1973, p.323].

Moreover, the projected parts (shanasheel) with their large windows, gave advantages to the house occupiers by increasing their vision into the alleyways and creating cross-circulation to speed up the air movement between the alleyways and the inside courtyard. The advantages of these features for the residential quarter are in projections acting as a cover protecting the pedestrians from sun in summer and the rain in winter.

Usually, the house was built of local building materials (bricks, stone, wood); the ground floor and basement were built in brick or stone, while the first floor was mostly built of wood so as to minimize the load on the ground floor, even though some houses were completely built by bricks or stones.

Generally, the first floor was constructed with double height space, which enabled the construction of a mezzanine in some parts of the floor space, after providing a staircase (Figures D.47 and D.51).

(ii) Roads Network Pattern

The organic, irregular plan of the residential quarters of the old city is universal in the Muslim world; the street and lanes are narrow and twisting, with many sharp turns and frequent cul-de-sacs. The street as a means of circulation is exceptional; there is no traffic network because there is virtually no traffic. Neither wheeled

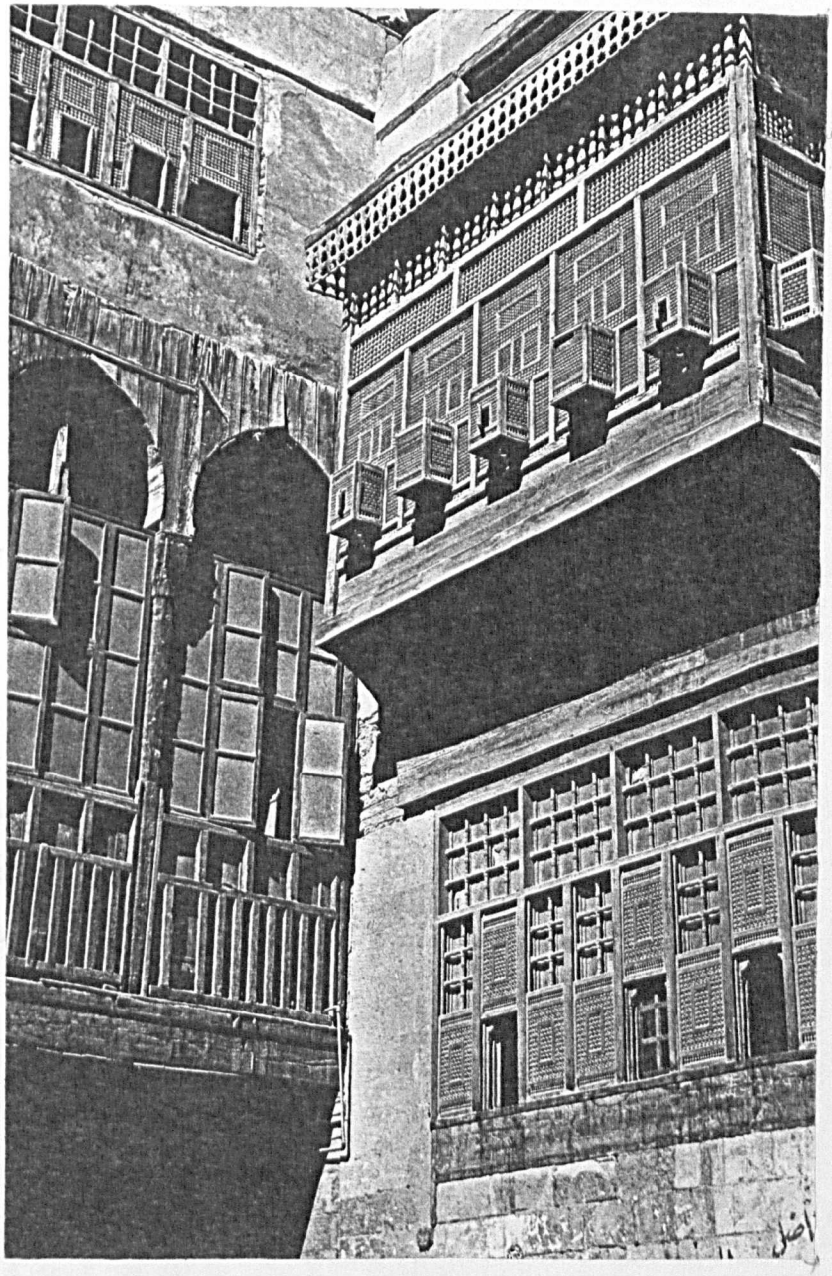


FIGURE: D.56.

Detail of the Projecting Windows (Shanasheel)

Michell, 1978, p.121

vehicles, water pipes, nor sewage drains were used. The alleyways are heavily shaded. The walls of the household compounds are heavily studded and barred and windows ten feet above the ground have iron grilles - the result of an emphasis in the city on security and privacy [English, 1973, p.78]. (Figure D.46).

Fundamentally, the alleys are footpaths for walking from one centre of life to another, from the home to the bazaar, through narrow and twisting alleys; they are not equally narrow, and some of the wider ones (as wide as 10 feet) cross entire quarters to provide easy routes of travel for transients. In them one rarely finds congestion, and by this measure, these streets are adequate for their purposes and anything wider and more elaborate would be wasteful of land [Munsford,1961, pp.281-305].

The narrow and winding streets with closed vistas have the same function as the courtyard in the house, namely, they act as a temperature regulator. Where the street is wide and straight, the cool night air would not be retained and they would heat up more readily during the day.

From the aesthetic point of view, this layout creates more interest. Irregularity of the street alignment serves as a stimulus to the creativity, ingenuity and sense of discrimination of the architect and master-builder.

The road system in the Arab city was a result of the patterning of buildings, not a determinant as in most modern planning. By the first attitude, such a city enabled the people to articulate space more advantageously, to experiment with

ideas and to solve problems of architecture and planning as they occurred.

The configuration of streets with closed vistas has another advantage over wide, straight streets. Almost every enclosed view in the city is composed with the location of important buildings and less important ones arranged in a certain order, the disposition of buildings increasing in importance like a crescendo, as in the approach to the climax of the mosque or palace, thus giving a feeling of unity while maintaining a variety of artistic expression that could not be achieved if the buildings were all of a monumental design and layout.

Another point in the comparison between open and closed vistas is that of the straight streets with parallel sides and an open vista: the only point to attract the attention of the pedestrian at the beginning of the street is the vanishing point at which the parallel lines meet on the horizon. As these lines meet only at infinity, the pedestrian would feel psychologically tired before he had walked very far.

In the old quarters, sections of streets with closed vistas do not exceed 300 metres each, thereby making each section easy to walk in. Thus, the way is subdivided into sections, each one a separate entity, almost like the movements in a sonata, with exposition development and recapitulation [Fathy, 1973, 130].

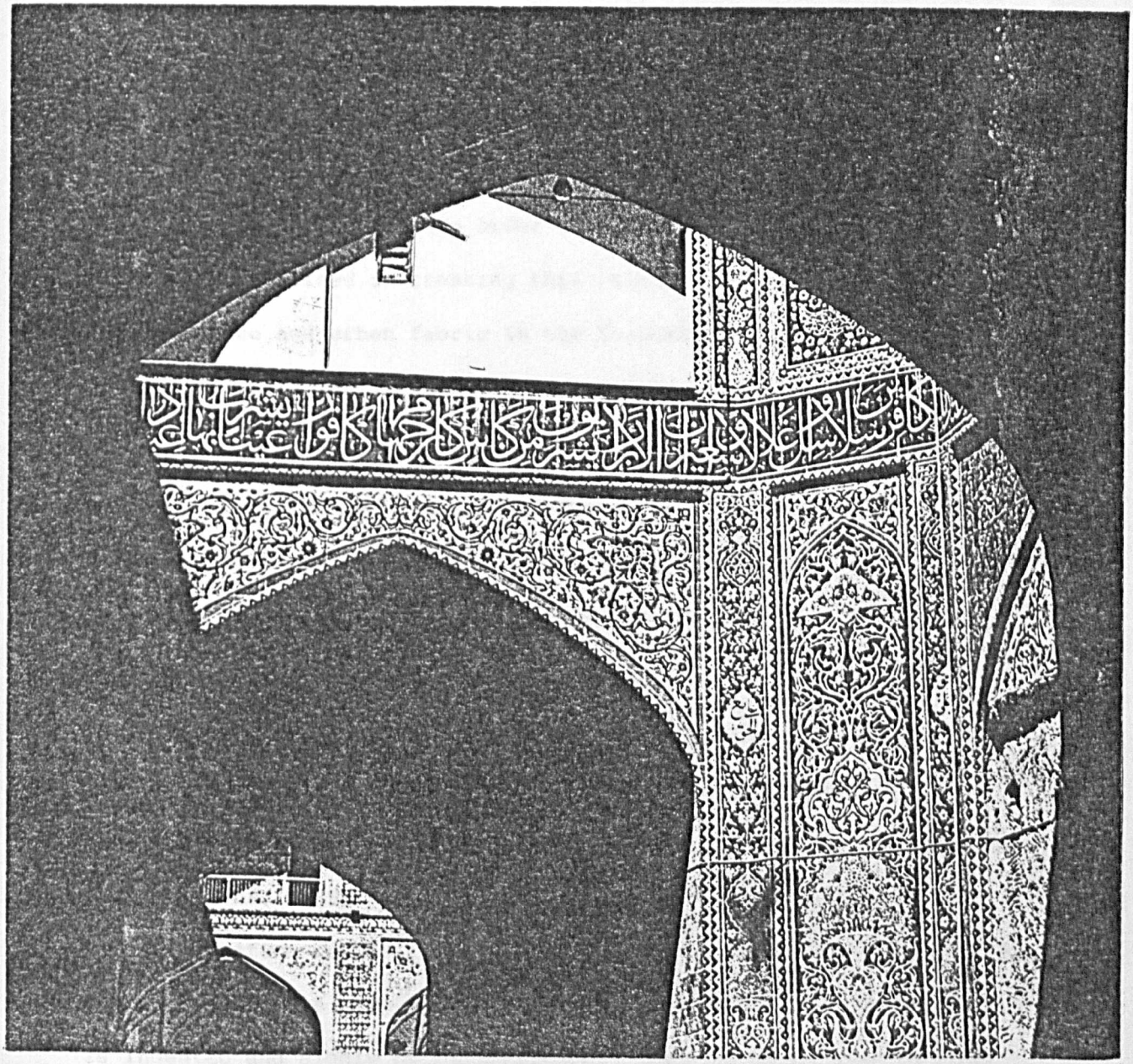


FIGURE: D.57.

Form. Configuration and Space Transitions.

D.4.5 FORM CONFIGURATION - SPACE TRANSITION

The traditional builder intuitively realized the necessity for maximum use of available space and of integration and the binding of his building with the surrounding space, so he arranged the space and its transition throughout the various buildings in such a way that there was a distinction between the different functions of the space, particularly the private and public areas, on both the domestic and neighbourhood level. In order to understand the language and the elements he utilized in creating this relationship, it is possible to analyse space and urban fabric in the following way, although it was not specifically designed in this way:

It is possible to visualise the interpenetration of solid building forms and the space they create, as positive and negative elements. The buildings create positive physical forms which delineate space and which may be visualised as a negative form

The relationship and the strength of the relationship between the physical forms and the delineated space are determined by configuration of the solid element as a whole and its surface texture (Figures D.58, D.59)Where the surface of the building is plain, the interpenetration of building and space, the boundary between building form and space, is simple and weak. When the surface of the building is indented and highly modelled the interpenetration of building and space is complex and strong (Figure D.56).

If an assumption is made that the solid element with plain surfaces acts as a neutral form, then every change in the surface texture adds complexity to the relationship between building and space; the projected parts will act as a positive element (bay window, bridges,

etc.) whilst the recessed parts (niches, iwans etc.) become negative elements. Where space is considered as a form in its own right, the complex interpenetration of building and space will assume the opposite characteristics so that the iwan is a positive extension of the bonded space whilst the projecting window is a negative element or a reduction in the extent of bonded space. The interaction between the solid element and the space will depend upon the number and form of these interpenetrating elements; the increase in their numbers, increases the forces of bonding between them and creates the stability of the whole complex (solid element and space). The effect is also to increase the visual interest and variety of the built environment.

Visually the stability and the harmony of the form depends on a balance in the distribution and location of the smaller interpenetration element within the larger built form. Balance may be achieved either in a symmetrical or free composition arrangement. A plain building without articulation is considered dull whereas a building which is excessively articulated is considered over-modelled.

Light falling on the building helps to identify the articulation of form which appears in its different tones. These shades and tones play a major role in emphasising the balance, stability and interaction of the building and its space; on the basis of this idea, the transition and interaction of buildings and space throughout the urban fabric within the Islamic cities can be analysed: generally the space within these quarters can be divided into public and private spaces. Outdoor activities such as shopping and walking usually take place in the twisting alleyways within the residential quarter, which can be considered as the main public open spaces, while indoor activities such as social gathering ceremonies, religious affiliation and education,

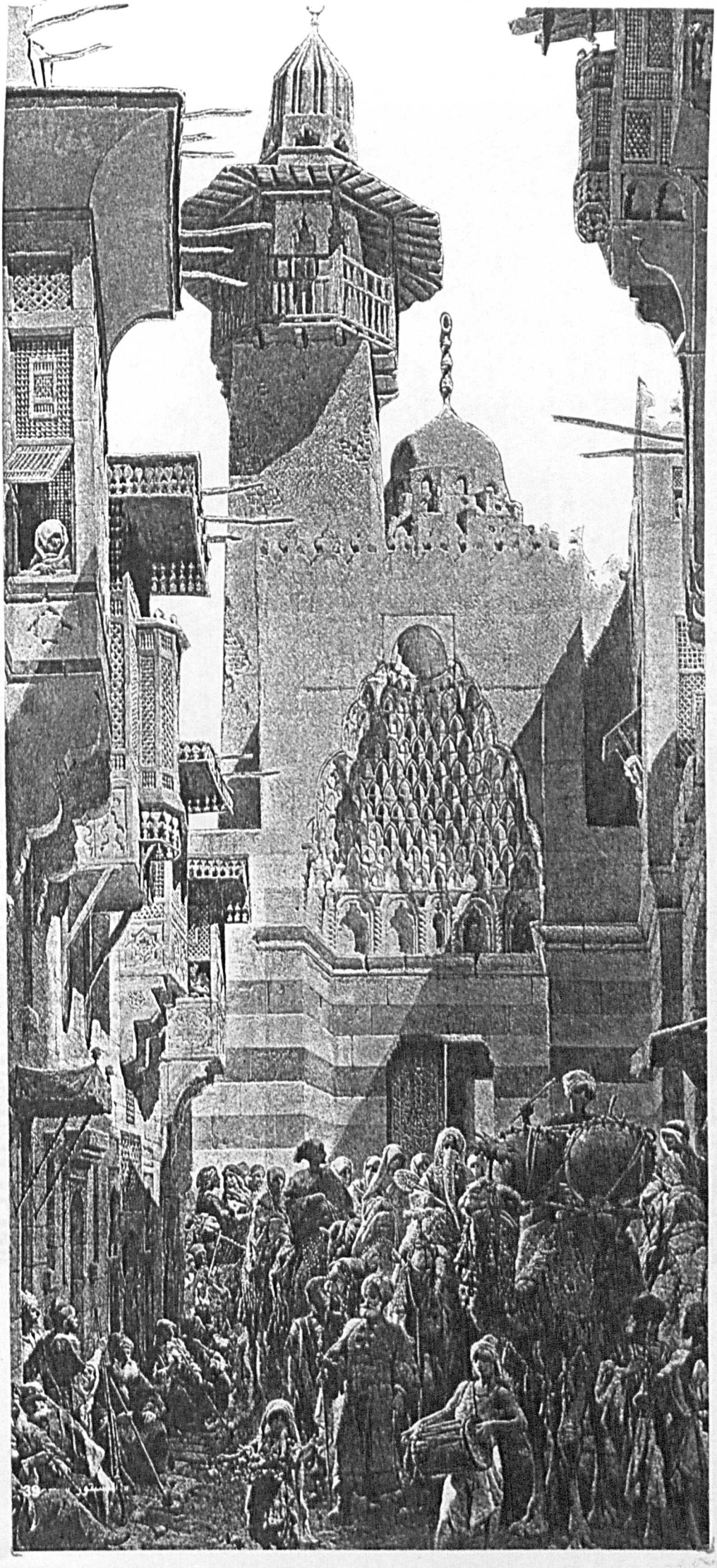


FIGURE: D.58.
The Configuration Between Mass and Space.

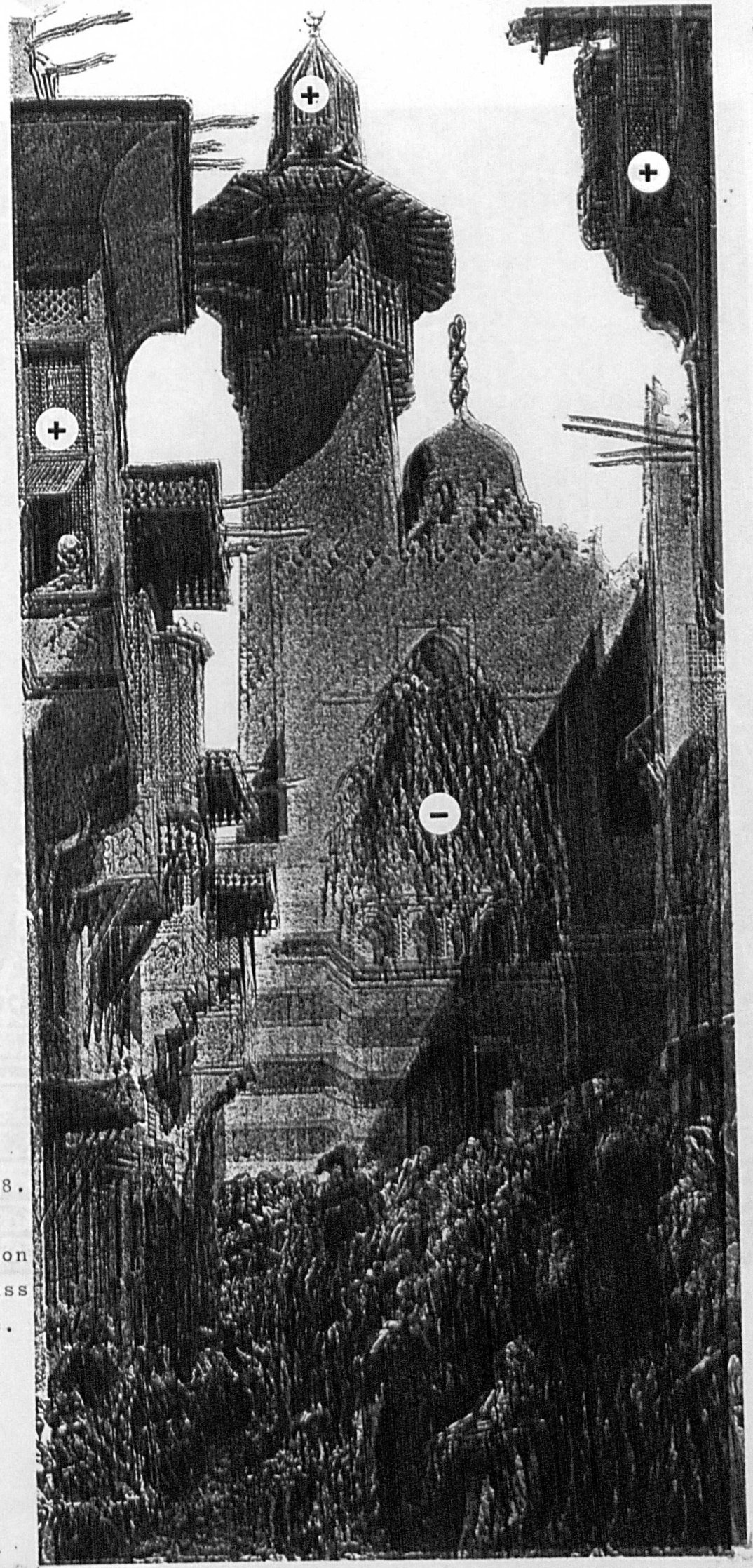


FIGURE: D.58.
The Configuration Between Mass and Space.

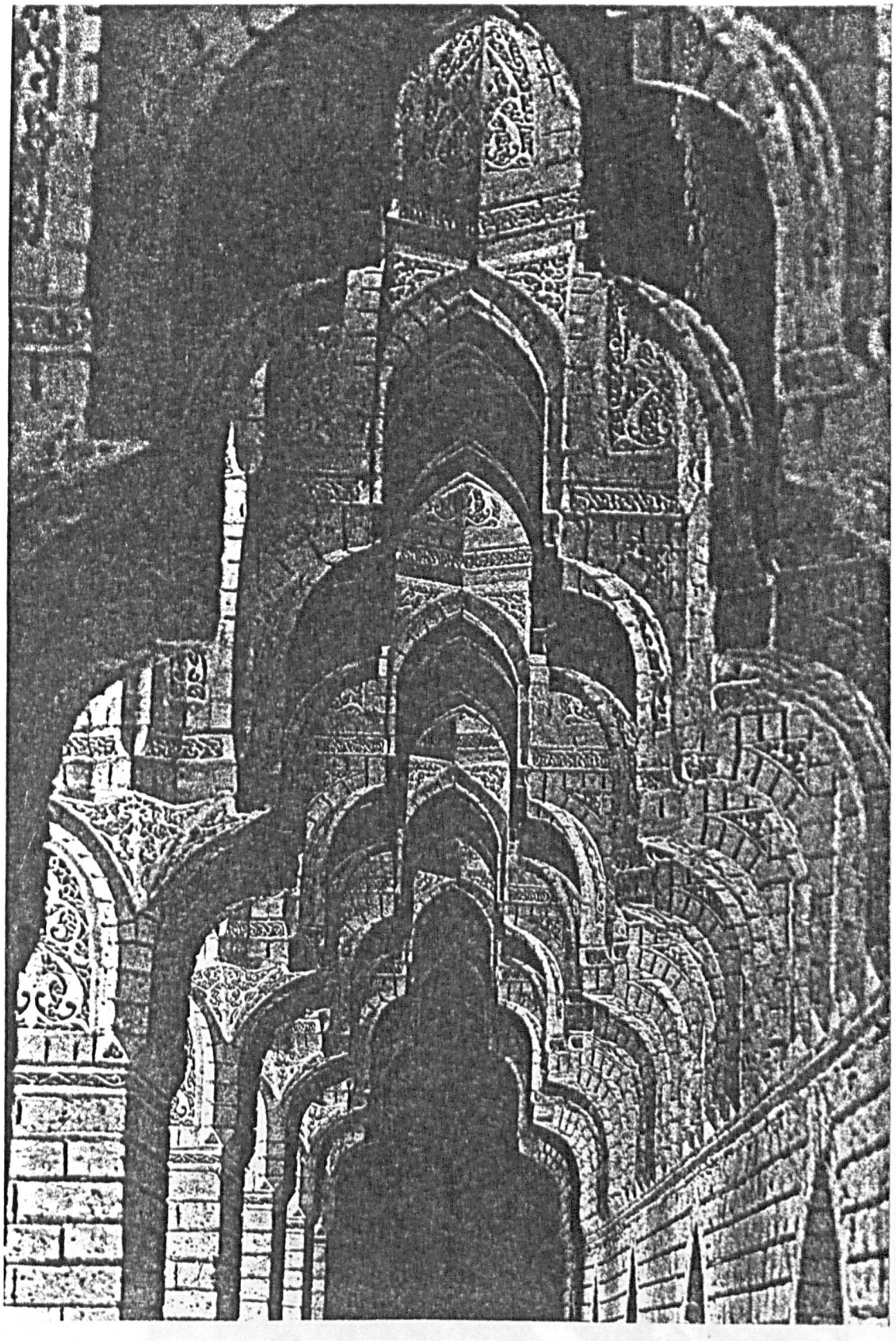


FIGURE: D.59.

The Articulation of Mass, Space and Texture.

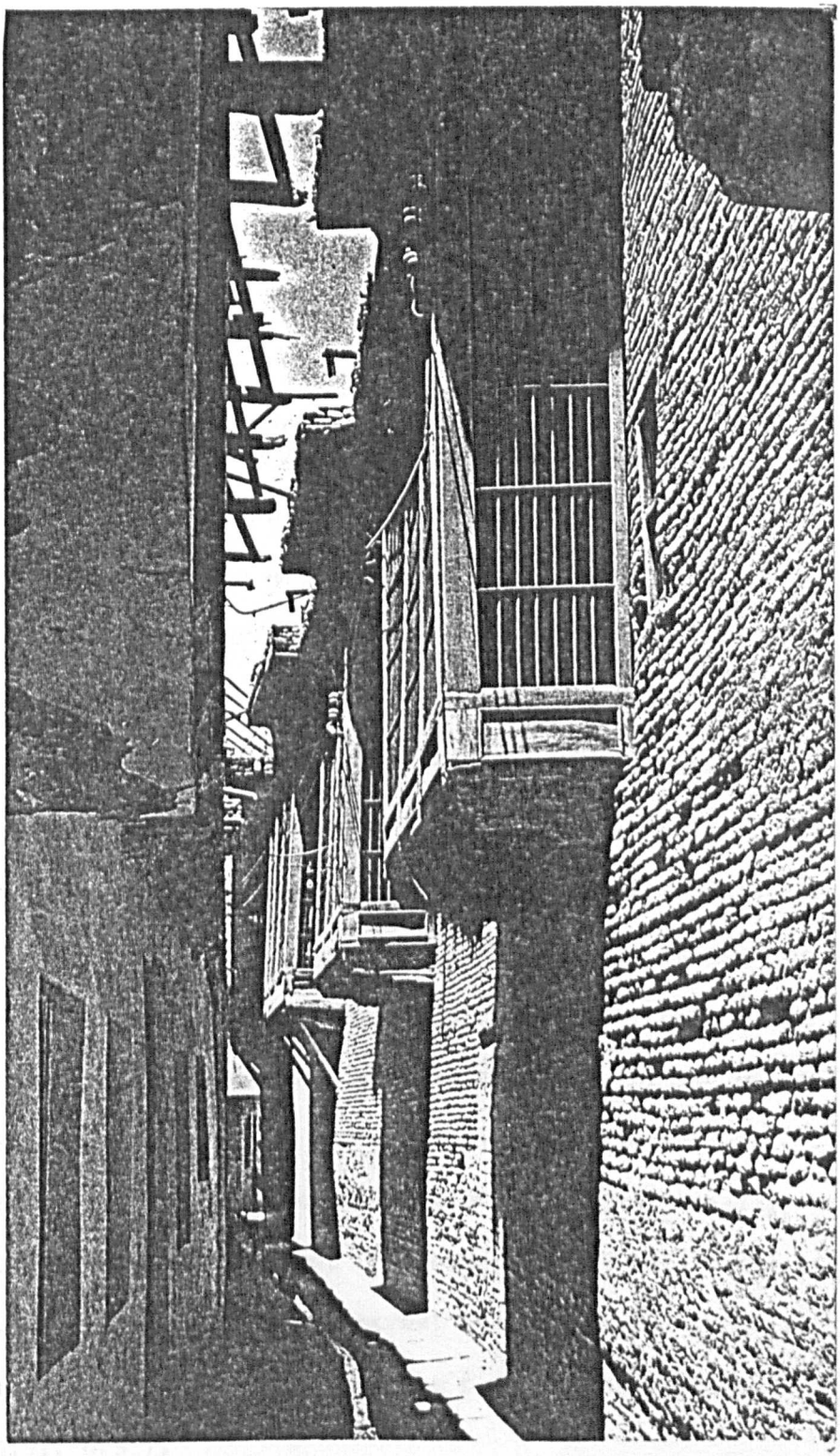


FIGURE: D.60.

The Definition of the Charged Elements by Direct Sunlight.

usually take place in private open space (courtyards) related to particular institutions such as house, mosque, school.

The free movement of the pedestrians throughout these alleyways is clearly reflected on the free urbanization of the public open spaces, i.e. the free layout of the narrow meandering alleyways and the free composition of the bounded buildings' facades, which form a continuous wall on both sides of the alleyway (Figures D.28, D.49, D.53).

In contrast to the free form of the street which is articulated by interpenetration of space and building elements the interior of the traditional Middle Eastern house is normally ordered around the courtyard. Order and control are reflected in the interior arrangement and design of the house, a regular space (square or rectangular in plan) with a symmetrical composition of facade around the courtyard.

In traditional Middle Eastern cities the largest possible open spaces are found within the boundary of buildings. For example the mosque, school, etc. are either surrounded by high walls which mark out the boundary and create a large area of open space within which the building sits, or the open space is created in the middle of the building itself as a courtyard. The street is not adequate for public assembly and meetings and such functions are traditionally catered for within public buildings. An exception to this pattern is the market, which simply uses the street form to create a public space for commercial transactions. (Figures D.38a, D.44a, D.44b, D.44c, D.47, D.51, D.55).

D.4.5.1 A Technique for Analysing Urban Form in the Middle East

Having established some principles for considering the street and its visual impact, we intend to develop an analytic technique which describes the visual experience of movement through Middle Eastern towns.

The variety and articulation of space in both the vertical and the horizontal dimensions of the alleyways provide a composition of signs or a visual language which allows the city dweller to determine his/her location.

Therefore, the vertical cross-section, through the facade of the first and upper floors on both sides of the alley, consists frequently of positive charged features: these are the cantilevered bay windows (shanasheel, oriel) and bridges etc. which squeeze the space, on the principle of extendability, allowing surveillance of the street from the house but containing the longer view for passers-by vision and consequently increasing the dwellers' downward vision and perception of nearby features, while in the horizontal cross-section in the same level, the space is penetrated in zigzag forms along the configuration of the neutral facade wall and the projected positive features achieve strong integration between the solid element and the space (Figure D.60).

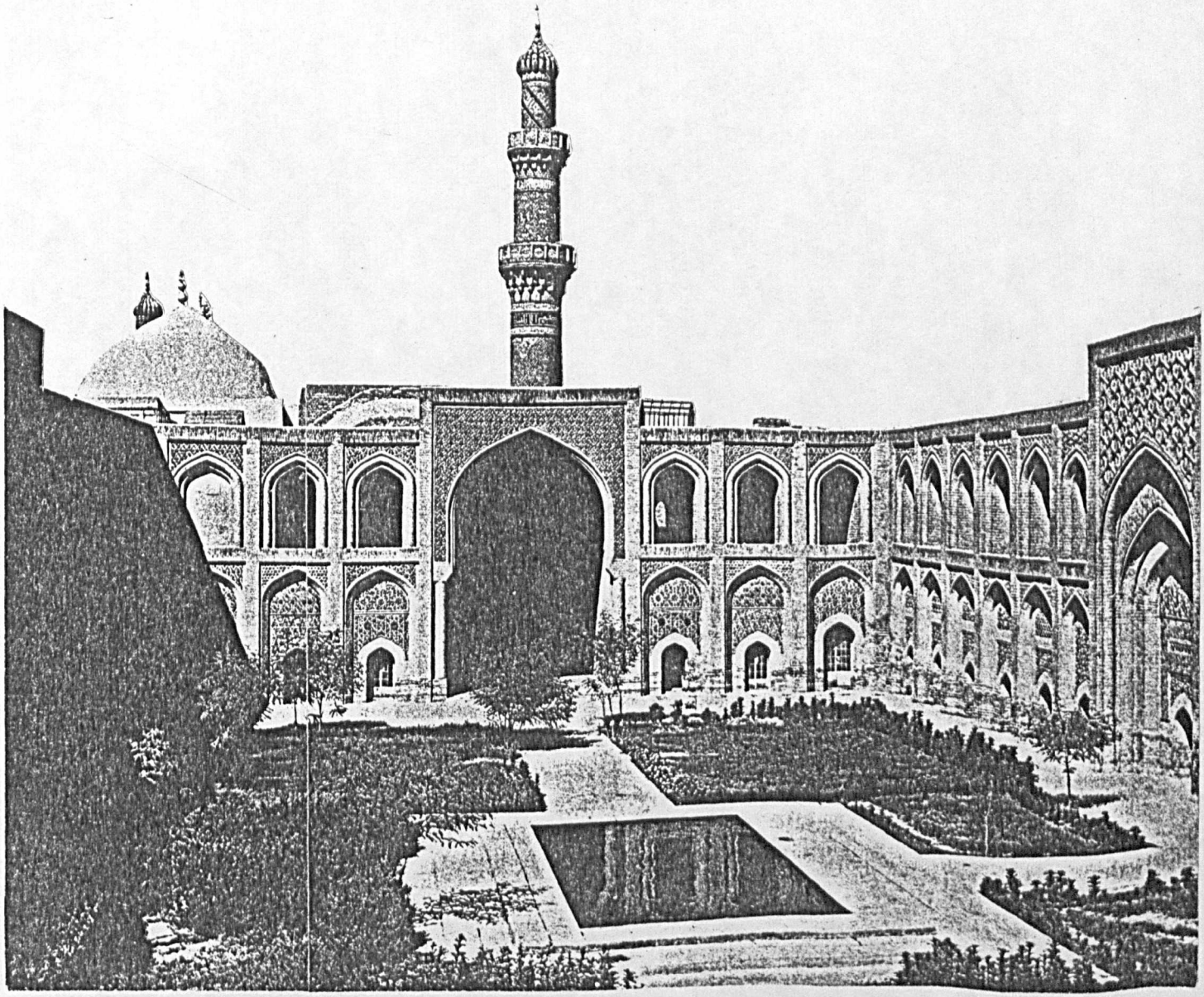
On the ground floor level, the vertical and horizontal cross-sections show that the alleyways become wider, as determined by the solid neutral facade wall, by considering the facades of the dwelling as a facade for the whole alleyway. To create integration between the solid element and the space, and to induce transition of the space throughout the buildings on this level, the negative charged features

are used in order to ensure the smooth movement of the traveller throughout the alleyways, and to widen the pedestrian's vision. The negative charged features are achieved by the recessed entrances, i.e. niches and iwans in the dwellings and public buildings of the residential quarter (Figure D.58).

To give the pedestrian signs to indicate the main entrances of the private and the public buildings, different languages have been utilized: decorated pointed arched entrances within the level of the neutral charged facades indicated the private dwellings' entrances, whilst recessed entrances with negative charge features are used in the public buildings to achieve a sign of transition between spaces, in this case giving entry into the solid element, a powerful sign of the entrance inviting the passer-by to enter and also providing a clear space between the door and pedestrian flow along the alleyway in order to avoid congestion and conflict between the groups of people leaving these buildings and the people who are walking in the alleyways. In some cases, in the important public buildings, entrances are formed with double spaces to create a break in the transition and rhythm of space in order to emphasise the entrance, resulting in an imposing and dominating entrance feature (Figure D.58).

Entering any private or public building must be achieved mainly after passing through a 'bent' entrance forming a dark transition space; this transition acts as an on-off switch or as a hinge between the dimly-lit narrow twisting alleyways (public spaces) with the freely composed facades, and the bright regular courtyard (private spaces) with symmetrical composition of the facades. This contrast creates a visual shock or sudden surprise for the traveller (Figures D.47, D.51, D.61).

The recessed negatively charged features (iwans) within the courtyards, in spite of their function as covered shaded areas which are used for different purposes, play a major role in the transition from open space into the solid elements of the building, which achieves stability, integration and balance between the space and the building. In addition, the dim light acts as a major element in the articulation of the light between the dark internal spaces of the building and the bright open space. (Figure D.61).



Al-Mustansiriyya School

FIGURE: D.61.

The Order, Articulation and Light.