

This presentation is the second in a series of regular articles devoted to architectural schools in the non-western world, their curricula and student work.

This study of a particular form of urban growth (the *borjs* and the *jneins* of Sfax) in Tunisia was done by Semia Yaiche and Slah Damak, students at the Institut Technologique d'Art et d'Architecture in Tunis. Their work, seen as an effort to discover and understand Tunisia's architectural heritage, was part of their diploma supervised by Mr. Marc Breitman and Mr. Mohamed Gharsallah. All text, illustrations and drawings are by the authors.

MIMAR feels that this work is an important contribution to an even larger field of study, namely an understanding of the formative influences upon Arabo-Muslim space. — Editors

Borjs and Jneins of Sfax, Tunisia: A student study project

The sandy plains extending to the East and the West of Sfax underwent considerable agricultural development towards the end of the 17th century. Almonds, pistachios, perfumed geraniums and jasmine began to be grown. This 'suburban' zone of gardens, and orchards known as *jneins*, were organised adjacent to radial roads from the city walls towards Tunis and Gabes, and up to a distance of 8 to 10 kilometres.

It was only in the middle of the 18th century that the first foreign travellers mention this agricultural development of the hinterland in their travel reports. They described the constructions which they found there as having "a defensive allure, with squarish towers set in the middle of gardens and orchards." They emphasised, among other things, the seasonal use of these dwellings and the fact that all the owners had their principal residence in the city, coming to the *jnein* only during harvest periods.

Beginning in the 19th century, a slow transformation of agrarian productive system, security and control in the region itself, as well as the breaking up of plots for inheritance purposes were factors which contributed to an increase in the number of *jneins*. Moreover, this regional transforma-

Glossary

Borj: Generally a two-storey structure, square or rectangular in plan, resembling a truncated pyramid. The *wust borj* is the centre of the dwelling and the *wust ali* the main room.

Jnein: A zone of gardens and orchards in the urban fringe. Adjacent to or in such zones, there is often a *merkez* or semi-urban centre.

Doukana: A masonry bench, also often used as a bed, similar to a *seddah* which is a raised sleeping platform.

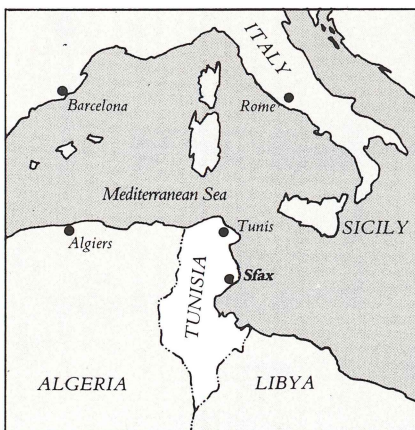
Ghaba: A group of *borjs*.

Jalsa: Sitting area (from the Arabic *jalassa*; to sit).

Kassasat: A lane, which usually creates a short-cut between wider roads.

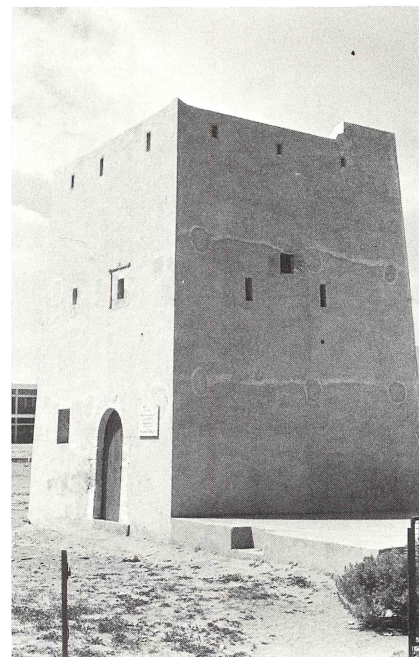
Tej: A screen of masonry or carved wood which separates the actual sleeping area from the rest of the bedroom or *bit*.

Zenkat: A narrow sunken pedestrian pathway bordered by a hedgerow.



tion was accompanied by the appearance of *borjs* of a more complicated type.

The system by which Arabo-Muslim space in Tunisia was formed emerges from our study of this specific *borj* typology, its modifications and the dialectical relationship this typology had with the morphology of the Sfaxian hinterland.



Borj Mnif, summer borj type, exterior restored.

Structure of the Region and Organisation of the Jnein Zone

Today there are 11,000 hectares of *jneins* on the periphery of the city of Sfax. They form a seemingly irregular mosaic on the landscape, interconnected by a network of cactus-lined paths. On a regional scale, it is in fact the roads to Kairouan, Gabes and Sidi Mansour which serve as the main accesses to the *jneins*. Along these roads are to be found semi-urban centres, called *merkez*, made up of buildings for the transformation and exchange of agricultural produce (e.g. olive oil) and serving, in turn, several *ghabas* (group of *borjs*, resembling a neighbourhood, in the medina). These *merkez*, primarily composed of row housing lining both sides of the road, act as marketplaces. *Kassasats*, or short-cuts, are perpendicular lanes to the radial roads and lead to different *ghabas*.

In order to reach the *jneins*, one has to take a *zenkat*, a narrow, sunken pathway bordered by a sort of cactus hedgerow which sometimes reaches a height of 2 or 3 metres. These are often basically dead-end lanes which afford privacy for the *jneins*. A traditional bent-entry leads to the garden itself.

System of Forming Lots and Fragmentation of the Jneins

A clear analogy exists between the street network in a medina and the hierarchical organisation of roads in the *jneins*, particularly evident in the creation of dead-end lanes.

Moreover, by studying the development of two *jneins* through the existence of notarised deeds — some of which date as far back as the end of the 18th century in one case — it is possible to discern the system by which the gardens were first formed and their subsequent transformation into smaller lots. Both events derive from the same fundamental principle: a) initially, large estates are created, spreading by increments across the open countryside in a way analogous to the manner in which the medina extends itself; b) then, internal division of these estates occurs as a result of successive inheritances or due to real estate transactions. The subdivision into plots is accomplished by simple orthogonal boundaries which permit access to the centre of the property by means of the *impasses*.

The Summer Borj

The summer *borj* appeared with the first division of land in the countryside behind Sfax. It was generally a two-storey structure whose plan was either square or rectangular. The form of these 'borj' resembles a truncated pyramid because of the external walls, which are inclined inwards, giving this architecture its peculiar character. The doorway opens onto the *wust borj*, or centre of the dwelling, which is covered with groined vaulting.

The *wust borj* is separated from the *jalsa* (seating area) by a semi-circular or horse-shoe arch. There is often a *doukana*, or masonry bench, which could serve also as a bed. Finally, there is the bedroom which usually has groined vaulting or a rather high and long, semi-circular vault. Niches are found in the walls for setting oil lamps.

As for the upper floor, it replicates the ground floor plan, but without the *jalsa*. The main room or *wust ali*, receives air and light from an opening in the roof. Moreover, there is frequently a hole, 10 to 15 centimetres in diameter, in the floor of the bedrooms or of the '*wust ali*' of the upper floor that allows the spinning of wool to great lengths. Access to the terrace is by a very steep stairway that continues upwards

Jneins



Localisation of different types of dwellings

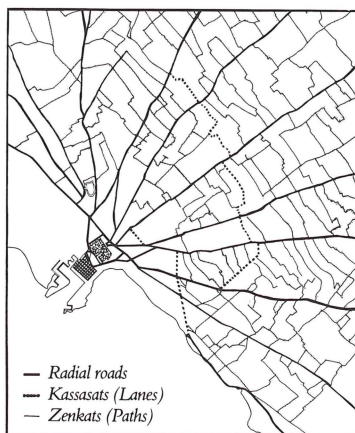
The zone of *jneins* extends over 11,000 hectares to the Northeast of the city of Sfax. The large radial roads leading to Tunis, Gabes and Kairouan give access to the gardens and orchards where the *borj* are to be found.



- Housing developments
- ▨ Modern city
- ▤ Rhats
- Medina
- Unbuilt zone + facilities
- ▧ Large Jneins
- ▨ Dense Jneins
- ⊗ Industrial space

Hierarchy of routes

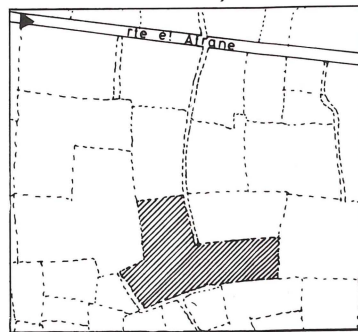
While the radial roads are the links in the distribution network to the *jneins*, the *kassasats* are perpendicular to these and provide access to groups of *jneins* or *ghabas*. *Zenkats* are narrow lanes bordered by cactus which lead to the *borj*.



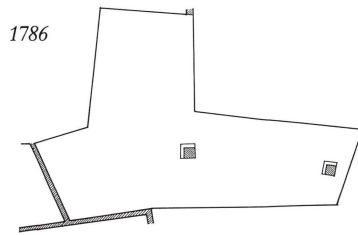
- Radial roads
- Kassasats (Lanes)
- Zenkats (Paths)

Jnein Yaiche

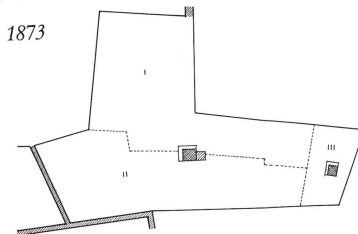
The successive subdivision of Jnein Yaiche, reconstituted from notarised deeds, illustrates the process by which inheritance rights or business transactions lead to the fragmentation of large properties. The divisions were achieved by simple orthogonal boundaries. Access to the pre-existing or new *borj* is obtained by extension of the *zenkats*, or by construction of an *impasse* in 1980.



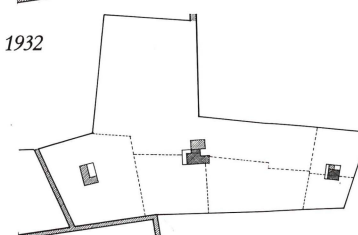
1786



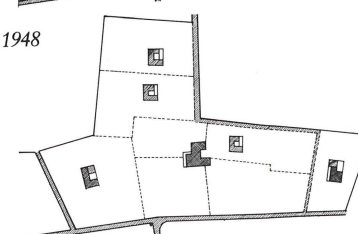
1873



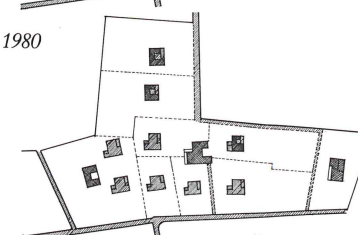
1932



1948



1980



from the main stairs.

There are loopholes, in the surrounding walls, and sometimes a triangular projecting space above doorways for shooting or dropping projectiles on would-be attackers.

Rainwater falls directly from the terrace into a cistern constructed at the base of the *borj* on the north side. A duct carries the water to a cistern measuring 6 to 8 metres deep, which is reached by a gallery from the stairs at ground level.

A main characteristic of this archetypal dwelling is that it does not have a courtyard as does the traditional habitation in Tunisia. Nevertheless, the interior is organised around a central space (the *wust borj*), which is a certain characteristic element in Tunisian houses. The *borj* does not have, on the other hand, a specific exterior facade, but only a minimum number of apertures in order to ensure proper ventilation and coolness during the hottest season of the year.

The Residential Borj

The typical organisation of the summer *borj* described above evolved rapidly into a more complex unit, with a series of additional rooms intended to make the *borj* more comfortable. What is revealing about the systematic way by which spaces were formed is that people introduced elements that originate in traditional rural housing.

A first addition was usually a groined-vaulted room. Here were to be found the chimney and a space for washing. Then came a courtyard, stables for a donkey, and a room for guests. Finally, a bent-entry was added to give privacy to the courtyard and to the *borj* itself.

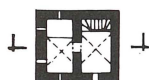
These different additional rooms that were built nevertheless leave the original *borj* intact and clearly in evidence. In fact, as in the case of traditional dwellings, service spaces are customarily located at the entrance to the *borj*.

The Palace Borj

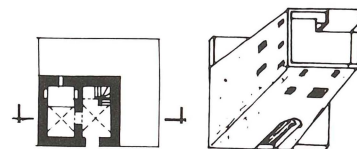
As Sfax itself developed economically, a new type of *borj* emerged, one which could be called the *palace borj*. The differences in comparison to the *residential borj* are essentially in the dimensions and degree of rich ornamental or spatial elaboration. In addition to the basic spaces such as stables, courtyard and guest room, the *palace borj* has arrangements identical to the vast urban residences in Sfax. For example, one or two galleries with arcades may be added, and

Summer, residential and palace borj as types

These three types of *borj* illustrate a clear spatial evolution over time, from modest summer *borj* to palatial *borj*. From a formal point of view, the primitive, truncated pyramid tower gradually through successive additions of new spaces such as the *wust houch*, gives way to the more conventional rectilinear tower form of the residential and palace *borj*. By its decoration and by its typical composition of long, narrow rooms in a T-arrangement, the palace *borj* directly reflects the architectural language of urban dwellings in Sfax.

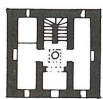


First floor

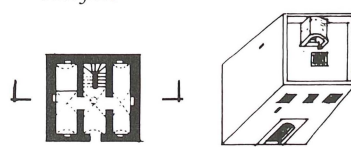


Ground floor

Summer Borj Mnif

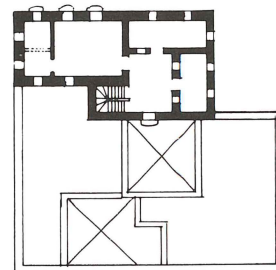


First floor

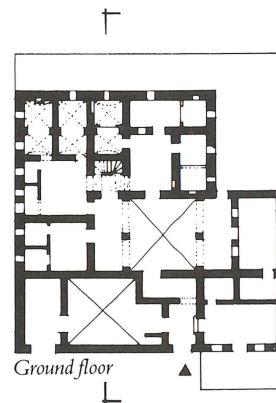


Ground floor

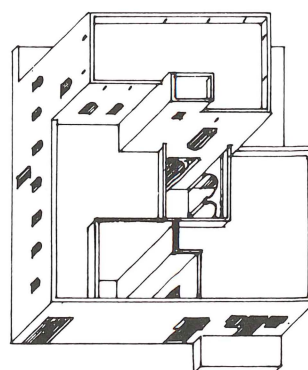
Summer Borj Gannouni



First floor

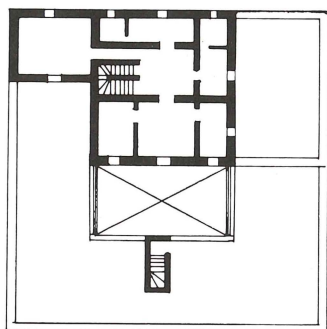
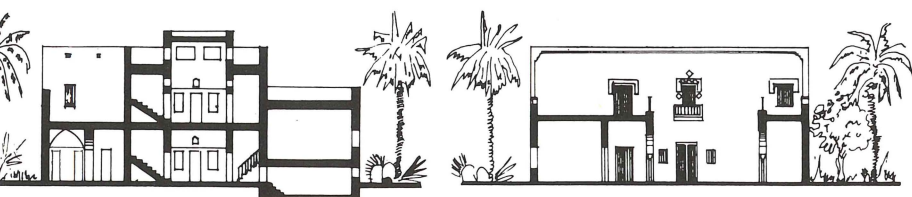


Ground floor

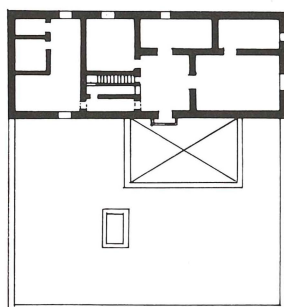


Residential Borj Aloulou

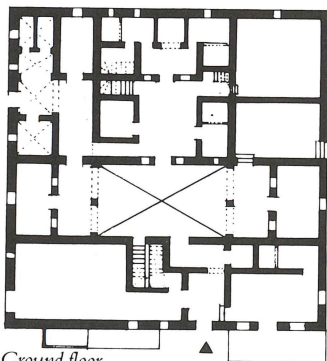
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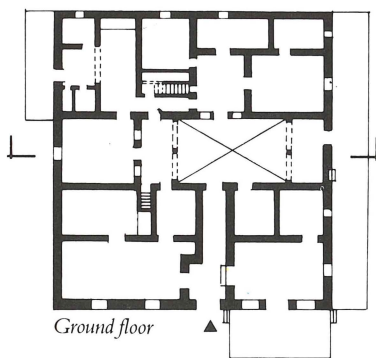
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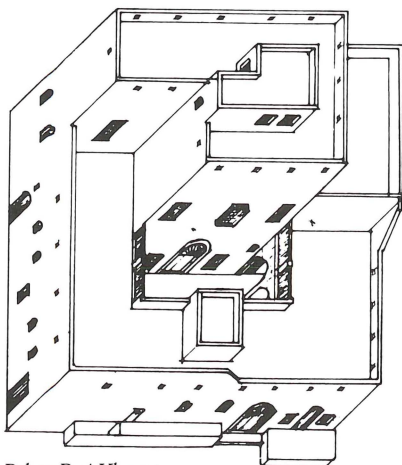
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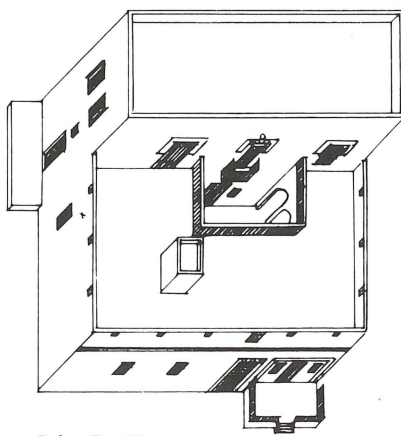
Ground floor



Ground floor



Palace Borj Kharrat



Palace Borj Kammoun

bedrooms are often furnished with *tej*, carved wooden ornamentation around beds.

The ground floor and upper floor of these palatial *borj* are arranged around a quite large central space whose dimensions are made possible through the use of expensive materials, such as heavy wooden beams. As with the residential *borj*, the silhouette of a tower stands out above the adjacent structures; however, the pyramidal shape has disappeared. The use of wooden beams in the structural system no longer makes necessary the construction of inclined, masonry walls which originally intended to counteract the lateral thrust of traditional stone structures.

The Systems and Organisation of Construction

The *borj* is built of stone, sand, clay and lime. The future owner was able to secure the necessary amounts of stone within the *jnein* itself. The operation began by tracing the walls on the ground, as well as the location of the cistern and the well. Digging the well first of all provided clay and water for future construction. A mixture of clay and water produced the lime mortar, which consisted of 3 parts sand and 2 parts quicklime.

Once the foundations of stone and mortar had been built, the mason, built up the four angles of the *borj* in order that they serve as reference points for the inclined walls. The mason employed a special ruler in the form of a rectangular trapazoid, one metre long with sides of 5 and 7 centimetres, in order to determine the inclination of the walls. With the aid of a plumb-line, he could construct a wall that inclined inwards by 2 centimetres for every one metre in height. These corner pillars were of stone and plaster, with tie-joints of plaster every 70 centimetres to ensure stability of the wall.

The ceilings of rooms were done in plaster with the help of wooden formwork onto which liquid plaster had been poured. Vaults are built of stone blocks and mortar. The upper floor is most often covered with wood and filled in with plaster and rubble. Lintels are generally in the form of low arches.

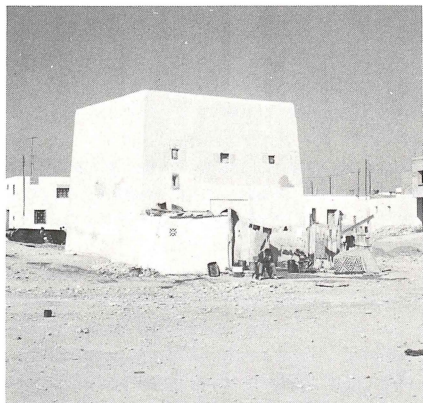
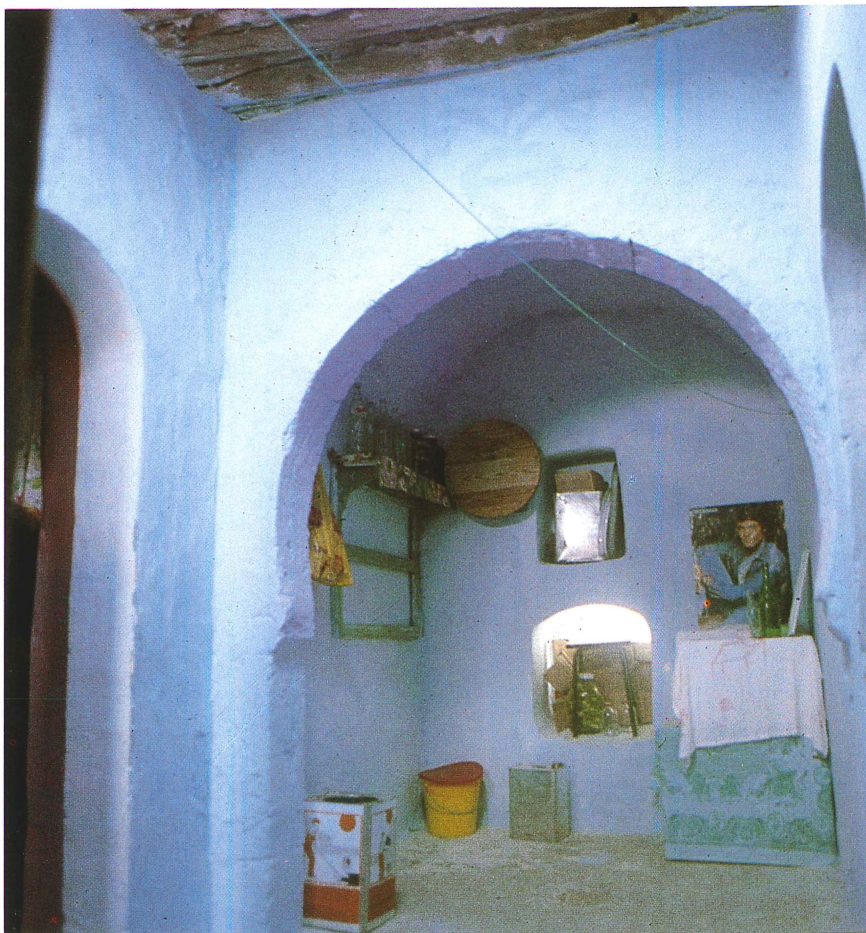
The Borj in the Future

The considerable economic development of Sfax has brought about an unprecedented

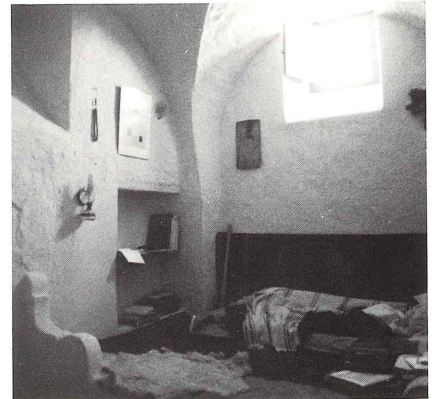
population growth and a radical transformation of the urban structure. The bourgeois class is leaving the old city's medina and building detached one-family houses in the *jneins* zone, resulting in a peculiarly distorted conception of modernity.

Regional planning as well as the Master Plan for Sfax encourage this developmental tendency on the periphery. Thus, the 'jneins' zone is being covered with a kind of proliferating gangrene of individual dwellings. In a very short time many of the *borj* have been destroyed and the *jneins* opened up to real-estate speculation. The cactus hedgerows are being replaced with cement walls. Overpopulation of the orchards is destroying the ecological balance which has been preserved for 300 years. The water table is now saturated with domestic pollution.

The municipality today must adopt a wiser and less costly attitude than in the recent past. One ought to consider protecting the zone of *jneins*, and suggest forms of urban development which would offer greater continuity with the historical traditions of the region. Unconstrained proliferation of buildings should be stopped because the landscape is being degraded and useless expense incurred. Grouped dwellings in the existing *merkez* should be given priority. If measures are not forthcoming soon, a source of economic wealth and an architectural heritage will disappear forever.



Right top: Borj Kharrat, palace of the borj type — the facade decoration dates from the 1930's.
Above: Borj Gannouni, summer borj type.
Right: Borj Gannouni, interior of wust ali (central room on upper floor).

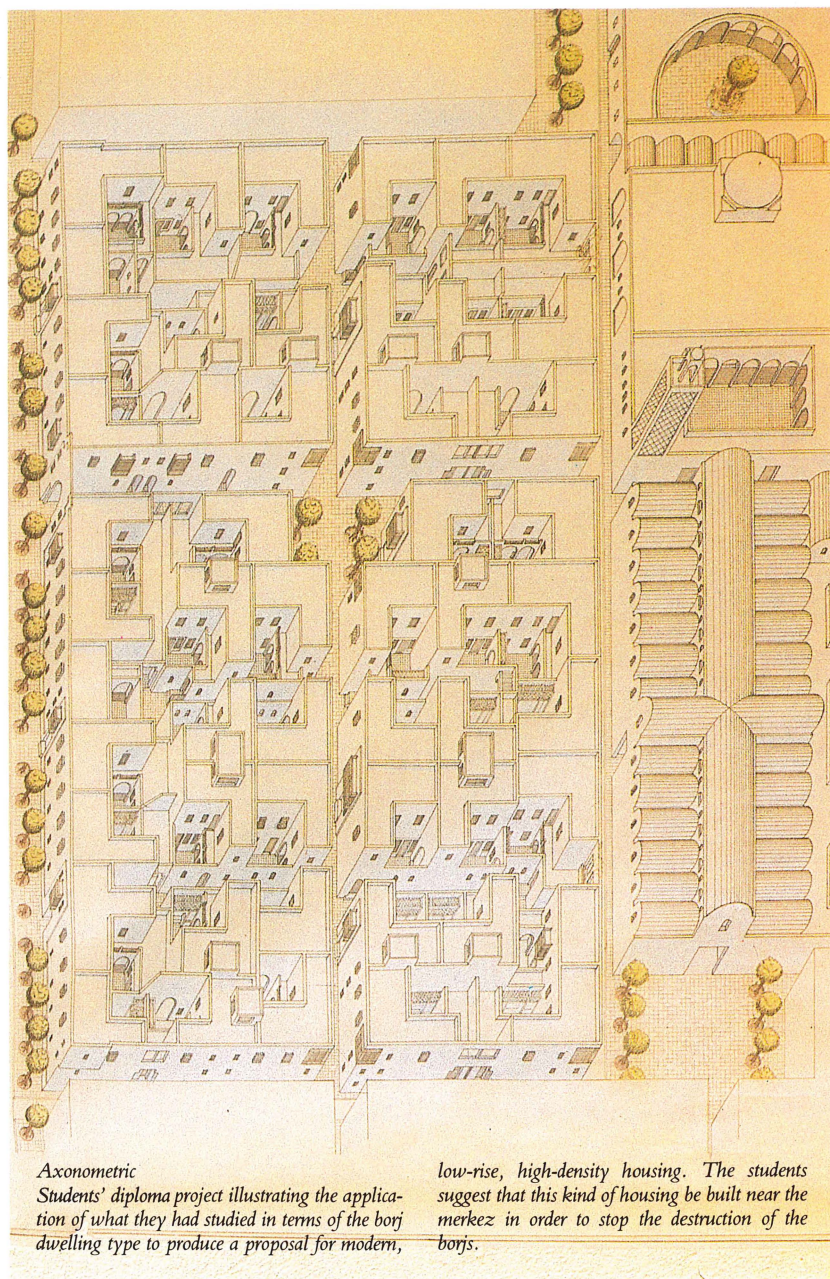
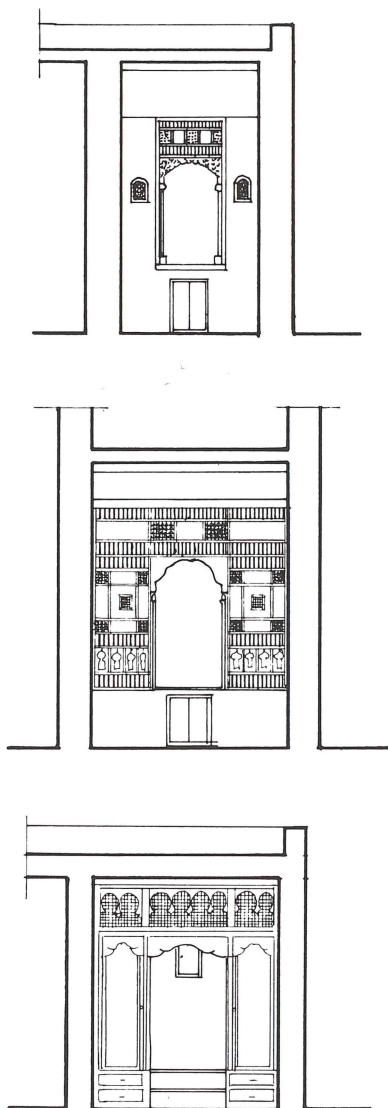


Borj Aloulou
 Left: Exterior view.
 Above: Bit with groined vaults, raised platform for sleeping, and niches.
 Below: Wust borj, recently restored.



The Tej

The tej in Sfaxian architecture is a screen of wood or masonry which isolates the actual sleeping area from the bedroom itself. The raised platform on which one stretches out is called a sedda. This arrangement of the bit, or bedroom, is common throughout Tunisia. The three categories of tej presented here are derived from the degree of ornamentation and the dimensions. They correspond to the three different types of borj — summer, residential, palace.



Axonometric

Students' diploma project illustrating the application of what they had studied in terms of the borj dwelling type to produce a proposal for modern,

low-rise, high-density housing. The students suggest that this kind of housing be built near the merkez in order to stop the destruction of the borjs.

Wust borj

The borj is organised around a central space called a wust borj. The aspect of centrality is fundamental to the special organisation of dwellings in Tunisia. It can be found in the urban house as well as in villas. The centre is given special consideration over that of symmetry. It is the topological rather than the geometrical centre which determines the modulation and decoration of the wust borj.

