

# UNIT I – Part C

## History of Architecture IV

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# Building Types cont'd...

## Minarets

- Tower near to, or built into, the structures of a mosque, which is used by the muezzin call out the Adhan in order to make people to come to prayers in Islam.
- The basic form of minarets consists of three parts: a base, shaft, and a gallery. For the base, the ground is excavated until a hard foundation is reached. Gravel and other supporting materials may be used as a foundation; it is unusual for the minaret to be built directly upon ground-level soil. Minarets may be conical (tapering), square, cylindrical, or polygonal (faceted). Stairs circle the shaft in a counter-clockwise fashion, providing necessary structural support to the highly elongated shaft. The gallery is a balcony that encircles the upper sections from which the muezzin may give the call to prayer. It is covered by a roof-like canopy and adorned with ornamentation, such as decorative brick and tile work, cornices, arches and inscriptions, with the transition from the shaft to the gallery typically sporting muqarnas.

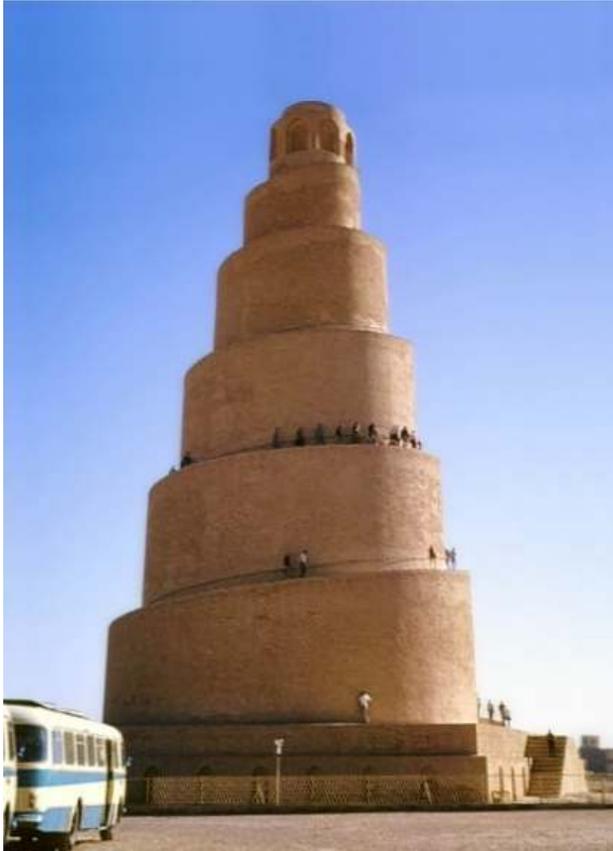


**Example 1 – Minaret – Qutb Minar – For detailed description refer Unit II notes**

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## Evolution of Minarets

- Minarets began as low **square masonry towers** on the pattern of pre-Islamic Syrian towers, which had been built for both pagan and Christian purposes.
- As soon as Islamic architects desired to make them higher, however, they resorted to the stepped storied construction typical of **Roman lighthouses**.
- From there it was but a short step to the introduction of varied shapes on different storey.
- Eventually a common form of minaret developed, which began as a square, changed in the next storey to a polygon and then to the cylindrical main shaft.
- The balcony was constructed of light wood, or cantilevered on brackets or Superimposed niches.
- The top of the minaret formed another storey, frequently contrasting, in shape and it was then crowned by a dome or a conical roof
- The stability of high minarets was assured, not merely by the storey of superimposed stories of decreasing size, but also by the use of the staircase construction to tie the outer skin of each minaret to its central core.
- With stone treads the tie was simple and strong, with brick it was created by building an arch under each tread, or a sloping barrel vault under each flight.
- Minarets of square plan were further strengthened by introducing arches under the landings. In this way the whole height of the minaret was constructed as a hollow screw of greater strength than its slender appearance suggested.
- Using this technique, Ottoman minarets rose to heights of more than seventy meters.



**Malwiya Minaret from the Great Mosque of Samarra – Iraq**

## **MALWIYA MINARET of THE GREAT MOSQUE OF SAMARRA Iraq**

The Great Mosque of Samarra was, for a time, the largest mosque in the world; its minaret, the Malwiya Tower, is a spiralling cone 52 meters high and 33 meters wide with a spiral ramp. The Malwiya Minaret is part of the Great Mosque of Samarra. The minaret was originally connected to the mosque by a bridge.

The minaret or tower was constructed in 848 – 852 of sandstone, and is unique among other minarets because of its ascending spiral conical design. 52 metres high and 33 metres wide at the base, the spiral contains stairs reaching to the top. The word "malwiya" translates as "twisted" or "snail shell." The Malwiya was used for the "call to prayer"; its height made it practical for such use. It is visible from a considerable distance in the area around Samarra and therefore may have been designed as a strong visual statement of the presence of Islam in the Tigris Valley.

In 2005 the top of the Malwiya minaret was damaged by a bomb.



Minaret - Great Mosque of Kairouan



### MINARET of THE GREAT MOSQUE OF KAIROUAN Iraq

The minaret, which occupies the center of the northern facade of the complex's enclosure, is 31.5 meters tall and is seated on a square base of 10.7 meters on each side. It is located inside the enclosure and does not have direct access from the outside. It consists of three tapering levels, the last of which is topped with a small ribbed dome that was most probably built later than the rest of the tower. The first and second stories are surmounted by rounded merlons which are pierced by arrow slits. The minaret served as a watchtower, as well as to call the faithful to prayer.

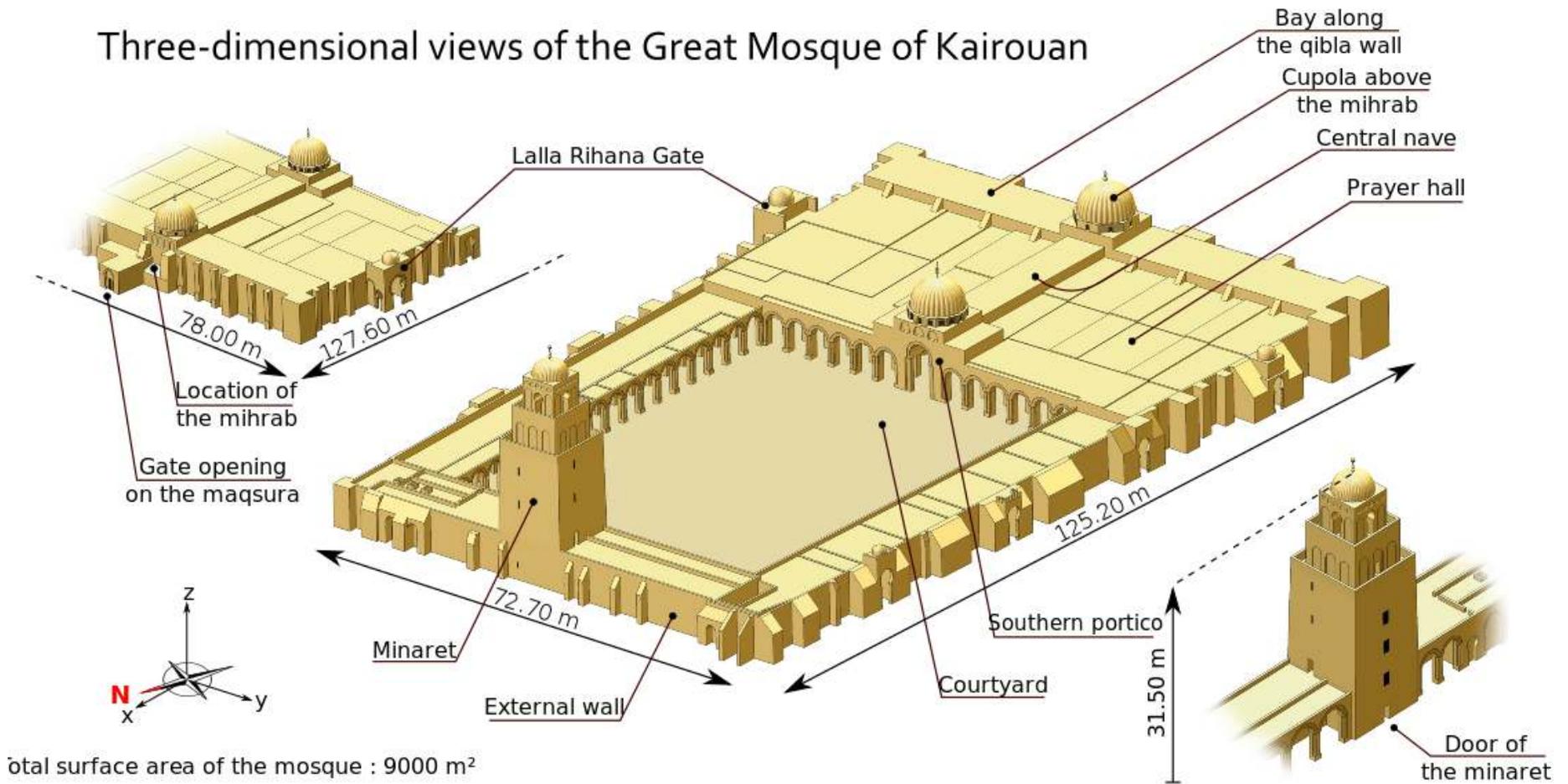
The door giving access to the minaret is framed by a lintel and jambs made of recycled carved friezes of antique origin. There are stone blocks from the Roman period that bear Latin inscriptions. Their use probably dates to the work done under the Umayyad governor Bishr ibn Safwan in about 725 AD, and they have been reused at the base of the tower. The greater part of the minaret dates from the time of the Aghlabid princes in the ninth century. It consists of regular layers of carefully cut rubble stone, thus giving the work a stylistically admirable homogeneity and unity.

The interior includes a staircase of 129 steps, surmounted by a barrel vault, which gives access to the terraces and the first tier of the minaret. The courtyard facade (or south facade) of the tower is pierced with windows that provide light and ventilation, while the other three facades—facing north, east and west—are pierced with small openings in the form of arrow slits. The minaret, in its present aspect, dates largely from the early ninth century, about 836 AD. It is the oldest minaret in the Muslim world, and it is also the world's oldest minaret still standing.

Due to its age and its architectural features, the minaret of the Great Mosque of Kairouan is the prototype for all the minarets of the western Islamic world : it served as a model in both North Africa and in Andalusia. Despite its massive form and austere decoration, it nevertheless presents a harmonious structure and a majestic appearance.

### MINARET of THE GREAT MOSQUE OF KAIROUAN Iraq

Three-dimensional views of the Great Mosque of Kairouan



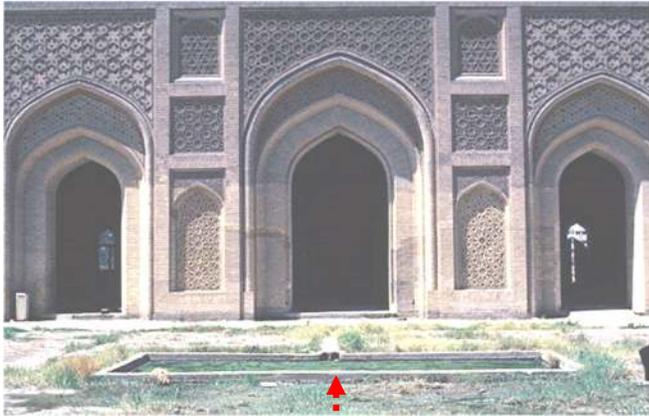
## Madrasa

- "Madrasa" literally means "a place where learning/teaching is done".
- This unique type of religious building has long been a part of Islamic civilization
- The Madrasa, a school for the training of spiritual and legal leaders, became one of the most typical institutions of the Muslim world of the 12th century.
- Most madrasahs were endowed (waqf) with private funds.
- A typical Islamic school usually offer-s-two- courses of study: a hifz course- that is memorization of the Qur'an (the person who commits the entire-Qur'an to memory is called a hafiz)- and an alim course leading the candidate to become an accepted scholar in the community.
- The Madrasa has halls on four sides (with a larger one in front of the Qibla), connected by two-story arcades which lead to dormitories.
- Madrasah is typical of Persian Architecture (Vaulted architectural spaces):
  - a. **Iwan** – a large covered area with mainly open facade – usually constructed at the edge of a courtyard.
  - b. **Stalactite** – The **muqarnas** (are a form of architectural ornamented vaulting, the "geometric subdivision of a squinch, or cupola, or corbel, into a large number of miniature squinches, producing a sort of cellular structure", sometimes also called "honeycomb" vaults from their resemblance to these. They are used for domes, and especially half-domes in entrances and apses, mostly in traditional Islamic and Persian architecture. When some elements project downwards, the style may be called mocárabe; these are reminiscent of stalactites, and may be called "stalactite vaults".

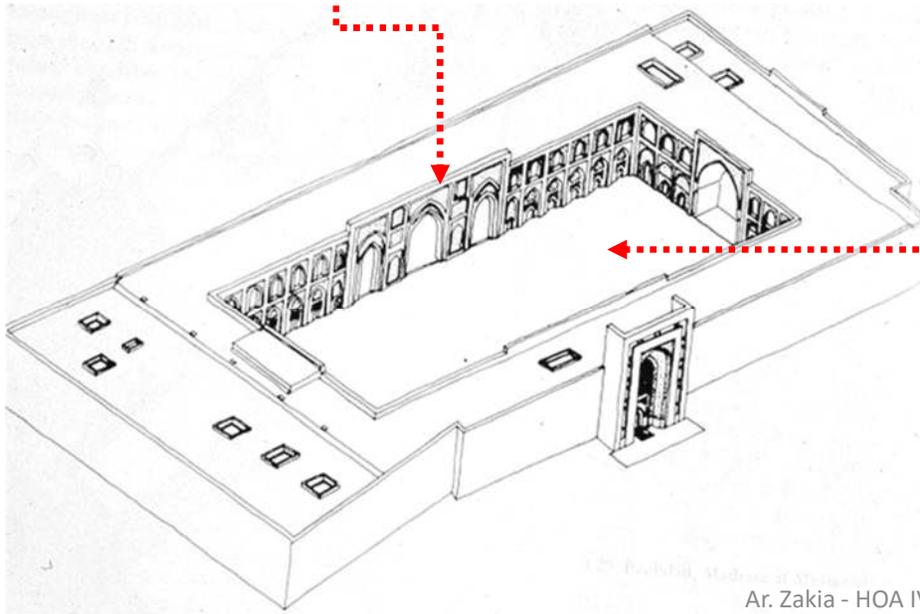
## Evolution of Madrasahs

- Madrasahs did not exist in the early period of Islam. Their formation can probably be traced to the early Islamic custom of meeting in mosques to discuss religious issues.
- At this early stage, people seeking religious knowledge tended to gather around certain more knowledgeable Muslims: these informal teachers later became known as the Shaykhs: and these shaykhs began to hold regular religious education sessions called majalis.
- The 'Madrasah' (religious seminary) came into being in eastern Iran. Established in 859, Jami'at al-Qarawiyyin (located in Al-Qarawiyyin Mosque) in the city of Fas (Fez) is considered the oldest madrasah in the Muslim world. It was founded by Fatima Al-Fihri, the daughter of a wealthy merchant named Mohammed Al-Fihri.

MADRASA AL MUSTANSIRIYA - Iraq



Triple Arched Entrance- Doorway



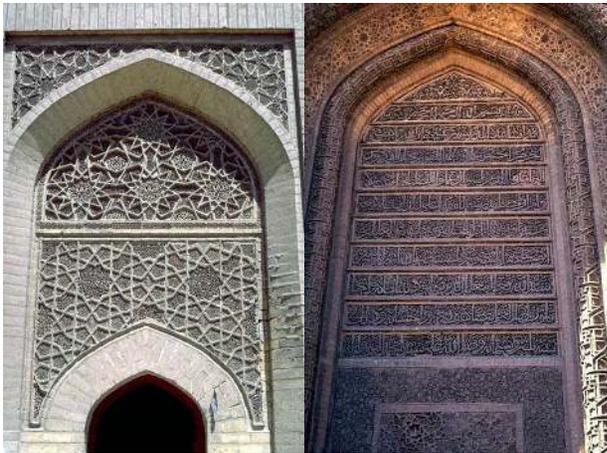
Courtyard With The Entry To The Prayer Hall & Madrasa



Exterior



COURTYARD



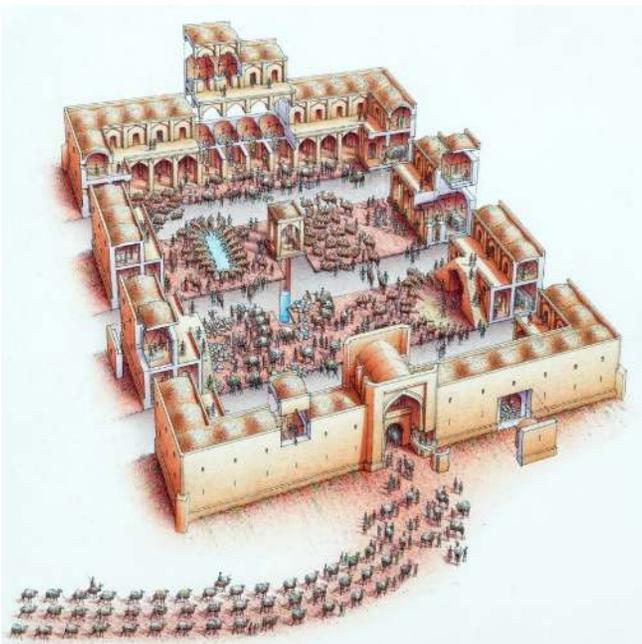
ARABESQUE / GEOMETRIC PATTERNS

## MADRASA AL MUSTANSIRIYA - Iraq

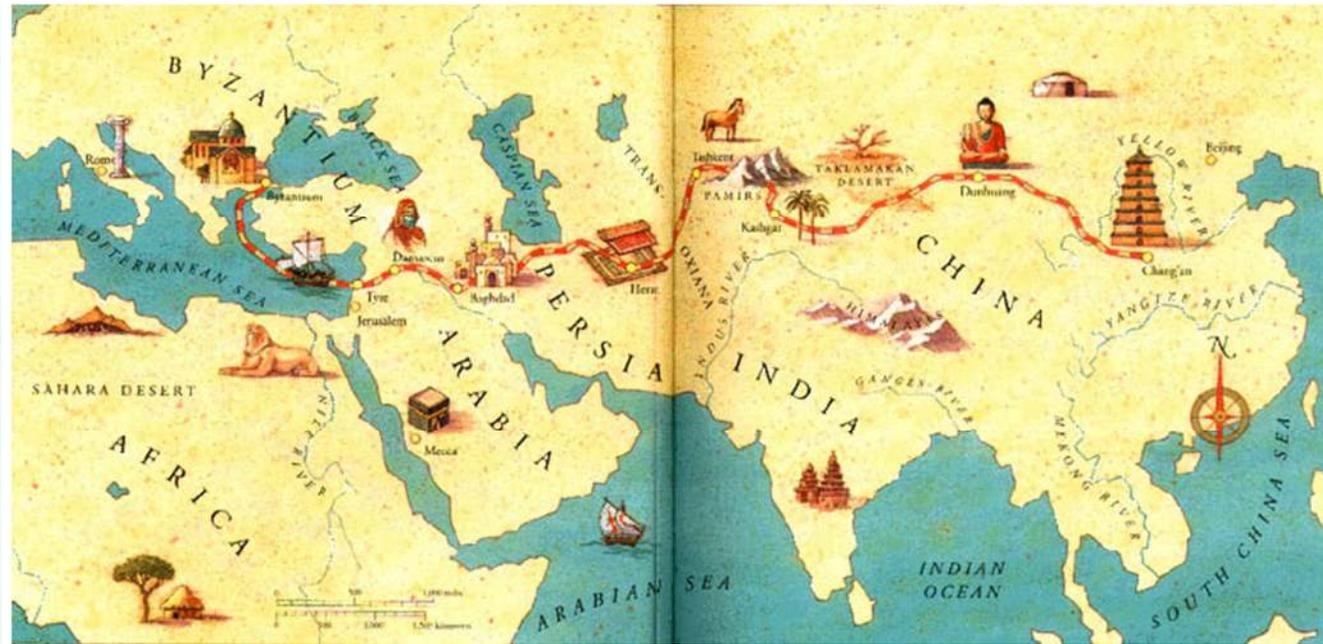
- Situated on the Tigris River, this brick, two-story, rectangular madrasa measures 106 by 48 meters Built by Caliph – al – Mustansis (1226-1242) 13th Century
- Double axial symmetry. organized around a central courtyard.
- Three iwans open onto the court while the fourth side leads down along corridor off of which are three open spaces that functioned as an oratory. They are around a central pool, for ablutions
- Other hallways and rooms extend from the court through pointed arched entrances creating a complex that served student needs, including a kitchen, prayer hall, living quarters, and baths.
- Both the iwans and the arched doorways were framed with plain brick vertical and horizontal strips.
- Pointed arches framed by majestic cornices.
- Students were lodged in separate cells in 2 storeys
- The madrasa could be entered through a triple-door opening on one of its long sides while directly across from it another triple-doorway led from the courtyard into the musalla, or prayer hall.
- These entrances exhibited arabesque-sculpted terracotta and geometric patterned masonry work, featuring vegetal themes

### Evolution of Caravanserai

Both the Arabs and the various non-Arab conquerors from Central Asia were originally nomadic and inherited a tradition of travel. Large armies were constantly on the move. Students and scholars undertook long journeys to sit at the feet of famous masters. The wealth of cities depended upon the transport of goods. And the Faith of Islam imposed upon the Faithful the most powerful of all motives for travel -- performance of the Hajj or Pilgrimage. In the harsh conditions and inhospitable countryside of most Islamic countries, travellers had a frequent need for places of rest and shelter in areas between the widely spaced cities and towns. This led to the construction of caravansaries.



View of a Caravanserai



Ar. Zakia - HOA IV - Dr. MGR Univ Map Showing Caravanserai Route

## What is Caravanserai?

The term caravanserai is a composite Turkish term derived from **caravan** (i.e. a group of travellers) and **serai** (palace). A caravanserai (Persian: **karwan ara**) was a roadside inn where travellers could rest and recover from the day's journey. Roadside building which provides accommodation and **shelter for travellers**.

Caravanserais supported the flow of commerce, information, and people across the network of trade routes covering Asia, North Africa, and South-Eastern Europe.

Generally it refers to a large structure which would be capable of coping with a large number of travellers, their animals and goods.

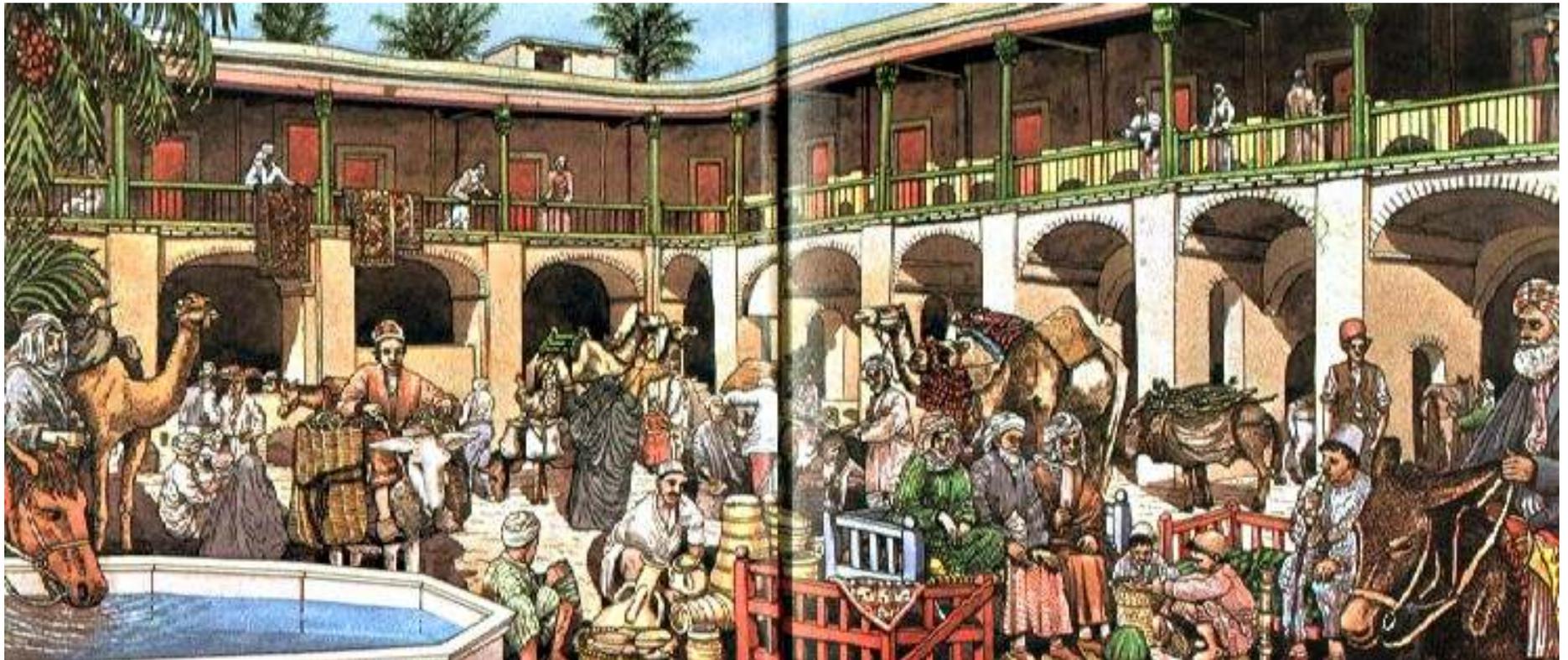
The term first seems to have been used in the twelfth century under the Seljuks and may indicate a particularly grand form of khan with a monumental entrance.

## Why was caravanserai built?

In the harsh conditions in the countryside of most Islamic countries, travellers needed places of rest and shelter as they travelled between the widely spaced cities and towns. This led to the construction of caravanserais (or "khans"). They were often built by the rulers to encourage trade which they taxed. The main function of a caravanserai was to receive travellers and merchandise. These caravanserais consisted of courtyards to take care of animals, rooms to lodge the travellers, and storage areas for their goods. The caravanserais which survive today show the spread of travel and trade which developed from the First centuries of Islam onward.

## What was inside a caravanserai? What happened there?

The colourful drawing of a caravanserai shows a central courtyard where animals are watered and fed, storage areas below, and apartments above for the travellers. There was always a mosque and bathhouse in the caravanserai. Caravans generally stayed only one or two nights before continuing their journeys.



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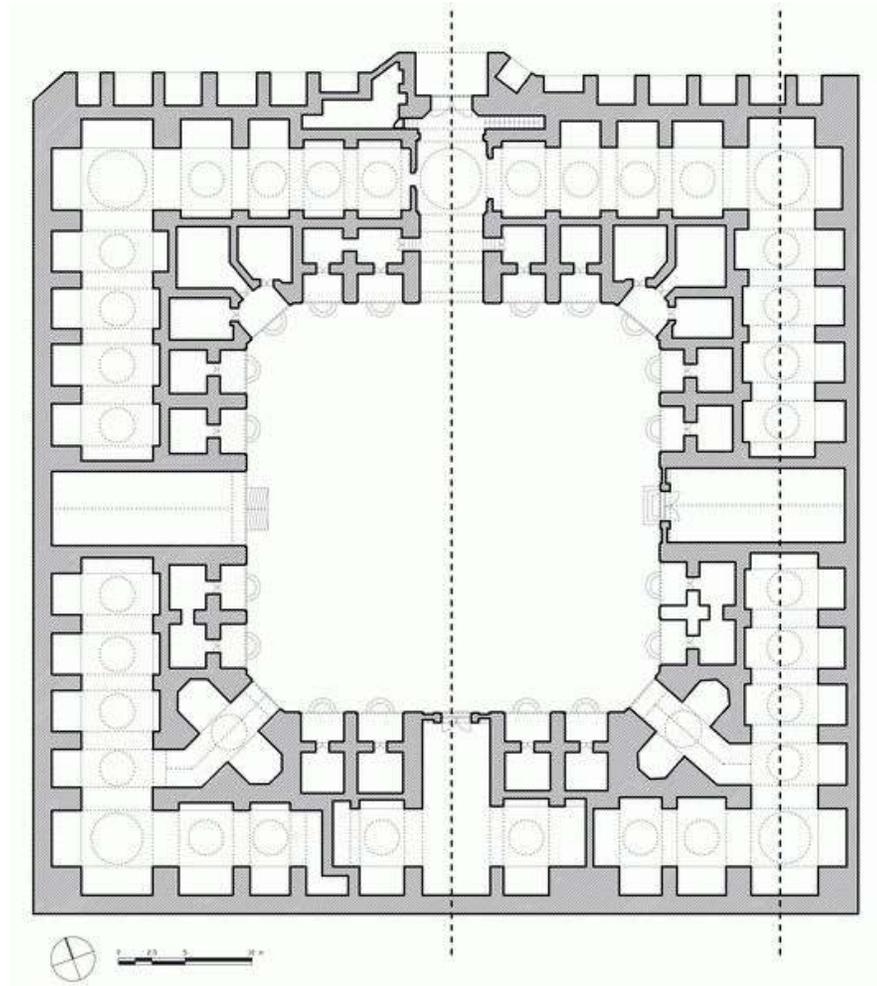
## Why did rulers build caravanserai?

Caravans travelled along the Silk Roads to China, One of the most travelled routes is from China to Istanbul, Turkey (Constantinople). Caravanserai were built about one day's travel apart, about 30 - 40 miles away. It was along routes like these that caravanserai were built by powerful rulers who wanted to encourage trade. (Rulers taxed traders and therefore they wanted to keep trade routes safe and open.)

### Typical Plan:

- It was a building with a square or rectangular walled exterior, with a single portal wide enough to permit large or heavily laden beasts such as camels to enter.
- The courtyard was almost always open to the sky, and the inside walls of the enclosure were outfitted with a number of identical stalls, bays, niches, or chambers to accommodate merchants and their servants, animals, and merchandise.
- Caravanserais provided water for human and animal consumption, washing, and ritual ablutions.
- Sometimes they even had elaborate baths. They also kept fodder for animals and had shops for travellers where they could acquire new supplies.
- In addition, there could be shops where merchants could dispose of some of their goods.

### SHAH ABBASI CARAVANSERAI – KARAJ - Iran



View of Shah Abbasi Caravanserai Karaj

Plan of Shah Abbasi Caravanserai Karaj

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## Palace

During Ummayyad and early Abbasid eras, the caliphs' families built desert palaces in Syria and Iraq some of which had hunting parks like those of the Sassanian kings. Or they had domed baths, derived from late Roman types of buildings. These palaces demonstrate the Western and Eastern artistic influences which characterized Islamic art.

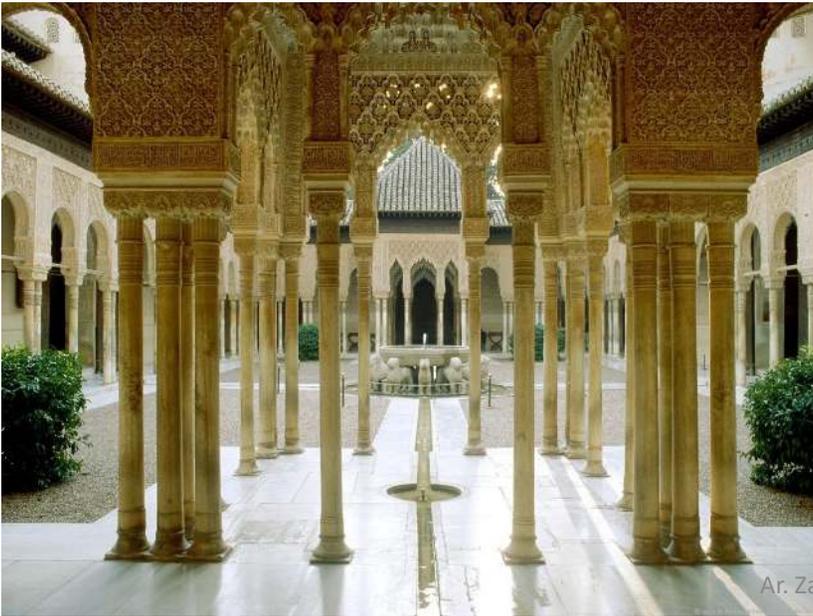
### History:

- The caliphs (successors of Muhammad) conquered new territories in the name of Islam.
- The sultans (emperors or kings) began to administer the vast empire and carried on extensive trade. They became rich and their palaces reflected this.
- Because the sultan's power was also tied to being a good Muslim, the rulers also built mosques as part of their palaces.
- Palaces also included living quarters for the wives of the sultan called a **harem**, bathhouses, kitchens and dining areas, and quarters for the Sultan's family, and servants.
- Soldiers were housed in a separate part of the palace or outside of it.

## THE ALHAMBRA PALACE OF THE MOORISH KINGS AT GRANADA, SPAIN



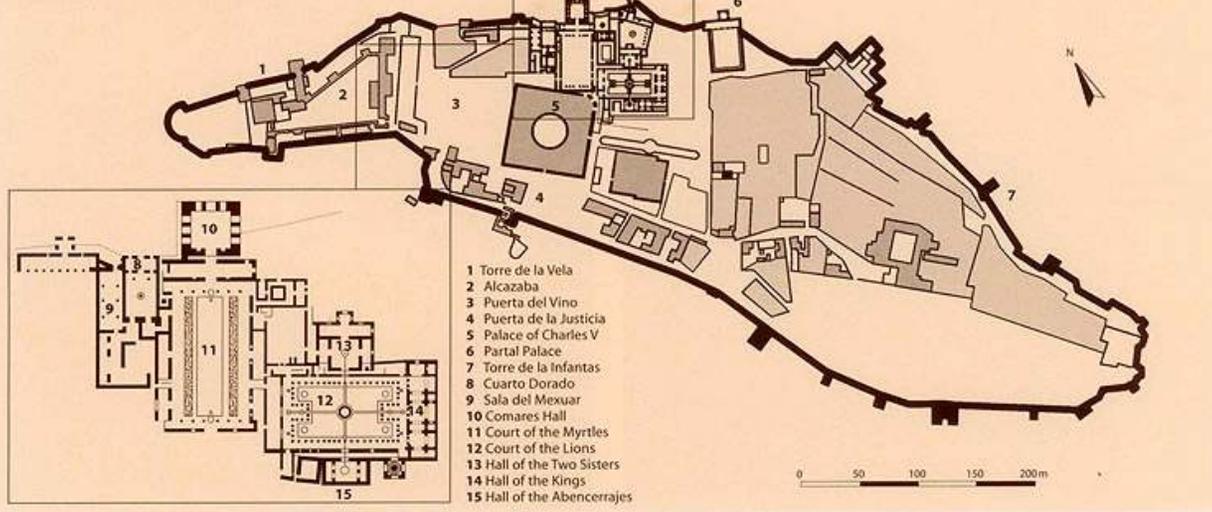
In the 13th century, the last Muslim dynasty of Spain made Granada its capital. The Alhambra became the dynasty's royal city. The **Alhambra** (Arabic: Al-Hamra', means "the red palace") is a palace and fortress complex of the Moorish monarchs of Granada, in southern Spain (known as Al-Andalus).



One of the most famous examples of Islamic architecture, the Alhambra was built in the 14th century and served as the royal palace for the Caliph, Abd-el-Walid. Once the residence of the Muslim kings of Granada and their court, it is currently a museum exhibiting exquisite Islamic architecture. The Alhambra was redesigned in the last half of the 14th century by Muhammad

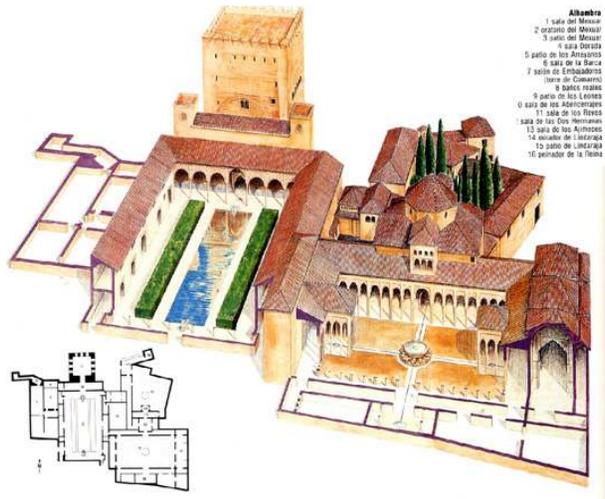
## THE ALHAMBRA PALACE OF THE MOORISH KINGS AT GRANADA, SPAIN

Ground plan of the Alhambra



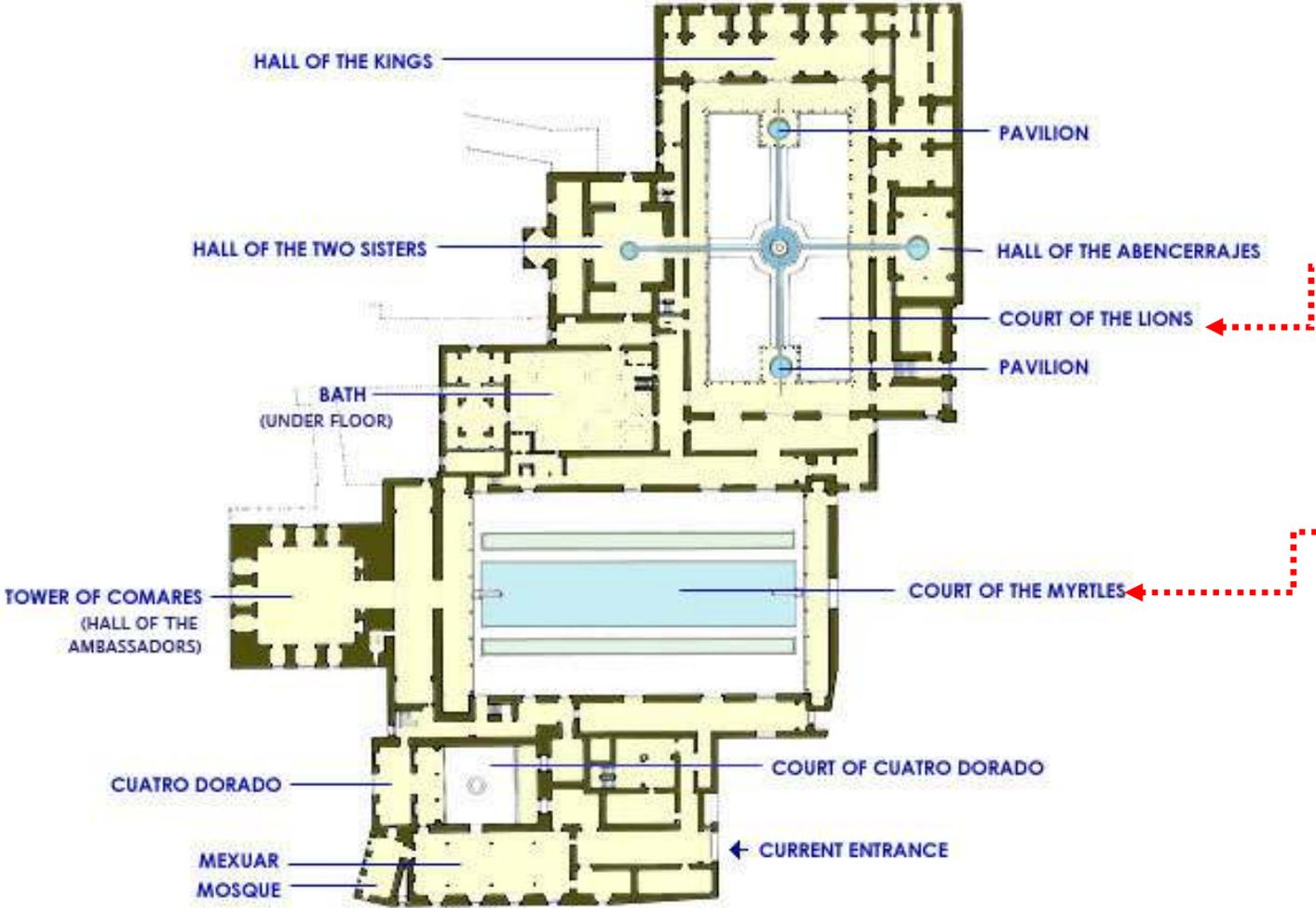
### Planning :

- The terrace or plateau where the Alhambra settles, measures about 740 m X 205 m
- It is enclosed by a strongly fortified wall, which is flanked by thirteen towers
- Within the walls of the Alhambra were Mosques, Baths, houses, gardens and a royal burial place.
- Except for the outer walls, the citadel and two large architectural units, little remains of the original construction.
- The plan of the Alhambra basically includes two great inner courts set at right angles to each other.
- Tile courts of the Alhambra lead to halls, and tile halls to apartments, each in turn giving way to smaller courts and baths, all richly dressed in geometric designs of stucco, ceramic and wood.



# THE ALHAMBRA PALACE OF THE MOORISH KINGS AT GRANADA, SPAIN

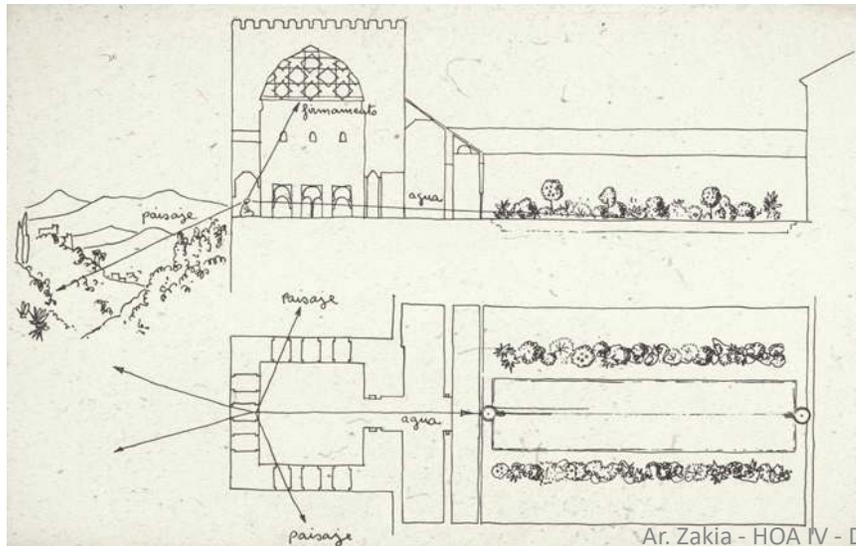
PALACE – Example



## THE ALHAMBRA PALACE OF THE MOORISH KINGS AT GRANADA, SPAIN

### COURT OF THE MYRTLES/ COURT OF THE POND/ COURT OF THE BLESSING

- This court is 42 m by 22 m, and in the centre there is a large pond set in the marble pavement, full of goldfish, and with myrtles growing along its sides.
- There are galleries on the north and south sides; On the south 7 m high, and supported by a marble colonnade.
- Underneath it, to the right, was the principal entrance, and over it are three elegant windows with arches and miniature pillars.
- From this court the walls of the **Torre de Comares** are seen rising over the roof to the north and reflected in the pond.



Plan & Section – Court of the Myrtles

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## THE ALHAMBRA PALACE OF THE MOORISH KINGS AT GRANADA, SPAIN

### THE CELEBRATED PATIO DE LOS LEONES (COURT OF THE LIONS)

- An oblong court, 35 m by 20 m, surrounded by a low gallery supported on 124 white marble columns.
- A pavilion projects into the court at each extremity, with filigree walls and light domed roof, elaborately ornamented.
- The square is paved with colored tiles, and the colonnade with white marble; while the walls are covered 1.5 m up from the ground with blue and yellow tiles, with a border above and below enamelled blue and gold.
- The columns supporting the roof and gallery are irregularly placed and the general form of the piers, arches and pillars is most graceful.
- They are adorned by varieties of foliage, etc.; about each arch there is a large square of arabesques; and over the pillars is another square of exquisite filigree work.
- In the centre of the court is the celebrated Fountain of Lions, a magnificent alabaster basin supported by the figures of twelve lions in white marble,
- Not designed with sculptural accuracy, but as emblems of strength and courage.



## THE ALHAMBRA PALACE OF THE MOORISH KINGS AT GRANADA, SPAIN

### OTHER AREAS OF THE PALACE

- "Honeycomb," "stalactite," or "mocarabe" vaulting in the "Hall of the Abencerrajes"
- Although the Alhambra is a royal palace, it was given no center or focus to emphasize power.
- It is a maze of rooms and courtyards, of passages and corridors, of water basins and canals that link the open and covered spaces, of fountains and of decorations that are undoubtedly among the most extraordinarily complex and technically accomplished in all Islamic architectural design
- The Gardens and Fountains are a symbol for "Paradise" or Heaven. (This connection between "garden" and "Paradise" are in the Qur'an.)
- A garden (al janna, "The Garden") is usually four rectangles with fruit trees arranged in rows parallel to a watercourse. The symbolic value of the formal Islamic garden was as an earthly anticipation of paradise.

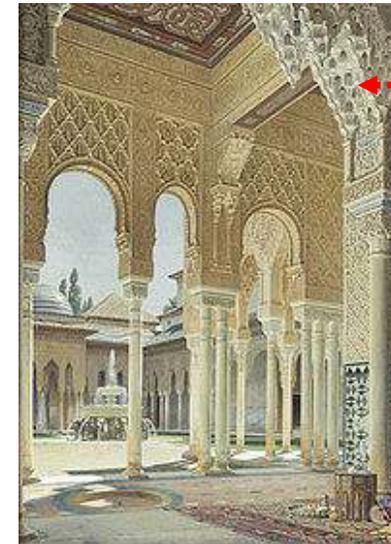


Inscriptions



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Garden



Stalactite

## The Markets

The Islamic culture was characterised by the extraordinary mobility of people. Travel was very customary in Islamic community (Hajj – pilgrimage). Those who returned carried goods with them to compensate the cost of travel.

**Islamic markets**-Three types of structures:

Network of covered streets

Khans (urban- equivalent to caravanserai)

Secured gated and covered edifice

**Market - souq / suq** (normally covered)

Canvas tents – food stuff

Temporary but regularly occurring

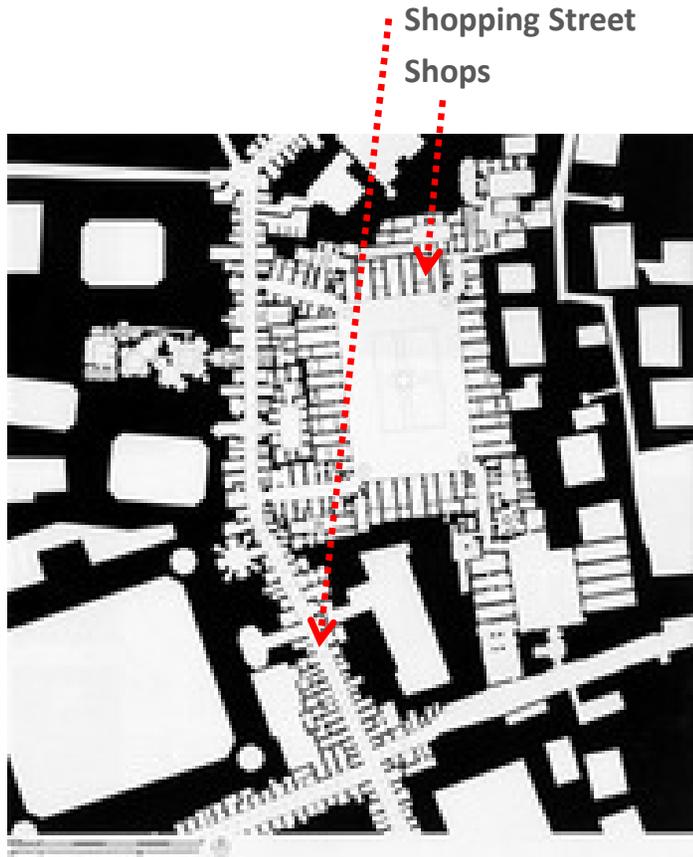
Cairo - Madrasa of Sultan Hassan – permanent remainder.

Strictly organized – according to what was being sold.

Bazaar – gates, secured at night

QAYSARIYA Feature

## BAZAAR ISFAHAN



The market is comprised of a covered east-west street flanked on both sides by shops.

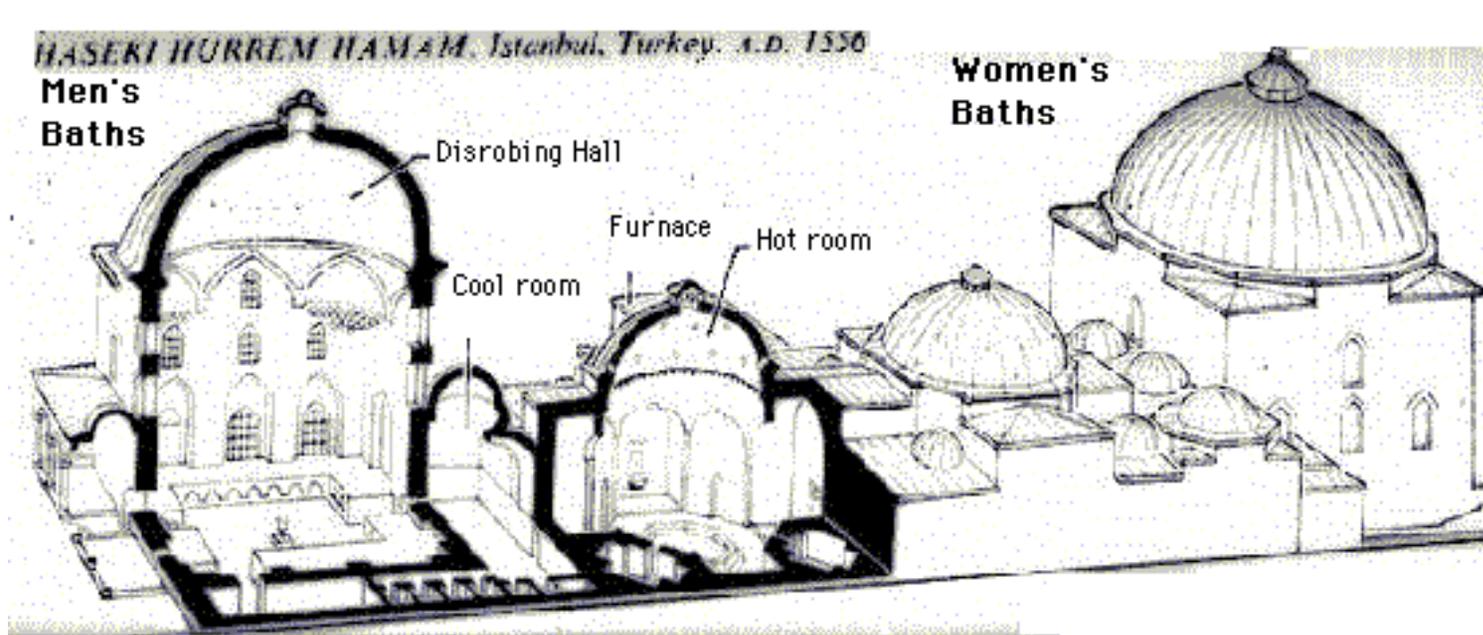
The street is covered by a fan vault, consisted of pointed semi-cones nearly meeting at the apex of the vault.

The side vaults are pierced with large open arches that allow plenty of natural light and streaming air directly into the covered street.

Just below these open arches shops extend into the street and are accessed by large arched doorways.

The shop units are covered with barrel vaults from within.

While the north row of stores have only small square windows facing the exterior, the southern stores open to the city through wide arches



law demanded completed immersion  
Mosque / Bazar / Hammam  
Grouped at the intersection / cross roads  
Chahar – suq (four sides) 4 road

# Elements & Characteristics of Islamic Architecture

## ELEMENTS & CHARACTERISTICS IN TERMS OF MATERIALS

The countries into which Islam first expanded were already rich in building materials. And the important techniques of exploitation of natural resources for building work and trade in building materials had long been established. Islamic architecture made use of locally available materials for construction. Indian Islamic architecture in its early stages sees the use of locally available materials scavenged from the earlier Hindu buildings.

Even in India there is a vast difference in the materials used from one region to another. The materials used in western India varies from the one used in eastern India. Contrast was a major element in their architecture. Hence the kind of materials that they used reflects the wonderful contrast that can be achieved in colour and texture. Massive structures, constructed of materials, characteristic of their geographical location. (Brick-making and walling in mud brick – alluvial plains and eastern Iran, stone bearing areas – Syria).

## ELEMENTS & CHARACTERISTICS IN TERMS OF MATERIALS

1. **Brick** – for the structure (Eg: Tomb at samarra , IRAQ)
2. **Stone** – Red sand stone
3. **Marble** – In the form of relief and inlay work, decorative marble slabs, grills, plate tracery.
4. **Polychrome Stones** – Inlay work (Dome of rock, Jerusalem).
5. **Mosaic** – coloured external surfaces of Islamic arch (Great mosque, Damascus)
6. **Lime** – for mortar and plaster (Great mosque of Jibla south of sana).
7. **Stucco** – In plaster
8. **Wood** – Timber played important structural role in the history of Muslim building.
9. **Gold Plating** – For ornamental use in religious and secular building. Screen wall in the (Taj Mahal)) was proposed to be in gold.
10. **Glass** – glass manufactures was sufficiently advanced to provide window glass.
11. **Ceramic** – fettering in Ceramic was used by the jimurid architects
12. **Lead / Bronze** – lead working and bronze casting and use of iron (dome construction).

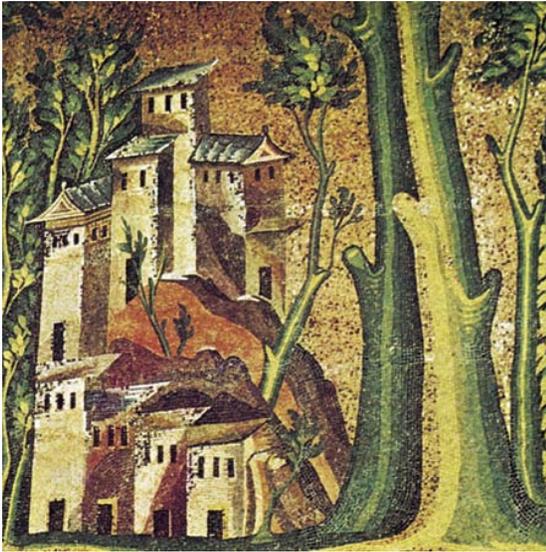
ELEMENTS & CHARACTERISTICS IN TERMS OF MATERIALS

**MOSAIC**

Ummayyads – used mosaics either as paving or wall facing. The technique is no longer, Roman, but strictly **Byzantine**. The mosaic, displays brighter colours, and has surface that glistens because the basic materials, is now Glass, not stone. In 5<sup>th</sup> **century** Glass mosaic technique – covering stone cubes with a layer of glass. In 6th Century – produce gold plated glass itself ( Glass – Gold leaf – Glass).On this uniform plaster surface, the contours of the motif were drawn with a sharp point, which served to fix the precise spot where each cut was too placed. These mosaics show, no living creatures, usually demonstrate an underlying vegetal theme.In the great mosque at Damascus, the mosaics represent a landscape (With majestic tree,and group of buildings and villas, set along the tanks of a stream). In great mosque at Corbola, Spain, the mosaics are purely ornamental

**Prominent Examples :**

1. Dome of rock, jerusalem
2. Great mosque of Ummayad, Damascus, Isyria
3. Palace complex of Khilbat – al – Mafjar , near jeeicho



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## ELEMENTS & CHARACTERISTICS IN TERMS OF MATERIALS

### STUCCO

A Simple plaster based manual coating stucco is the most widespread method of ornamentation in Islamic world (Central Asia, India to North Africa and Spain). Produced from GYPSUM, abundant in the Middle East. – Modest price. It does not require a high temperature to be transformed into plaster; an important consideration where wood is scarce.

#### Advantages :

- Easily fashioned / carved.
- Shaped and moulded.
- Construction materials, disappears behind finely wrought veils of STUCCO.
- Adaptable to all architecture elements – walls, pillars, vault etc.
- Depends on the skill of craftsman

#### Method :

- Preparation of coating material
- Its application
- Tracing
- Cutting of pattern
- Finishing touches

#### Prominent Examples :

1. Alhambra, Spain
2. Samarra, Iran

## ELEMENTS & CHARACTERISTICS IN TERMS OF MATERIALS

### BRICK

Brick is the principal construction material in Iran, central Asia, Indus and Mesopotamia. The formal characteristic of brick, offered the builder both a problem and solution.

#### Advantages :

- Brick bends itself to all sort of manipulations, which can disrupt the monotony. Eg:- tomb of the samanids, Bukhara
- Fascinating in the art of Brick Assemblage, is the perfect interaction between the construction technique and the ornamental pattern.

#### Prominent Examples :

1. Minaret of Mas'Ud at Ghazna (12th Century)

#### Disadvantage:

- Repeated use over a large surface, kings brings about monotony.

#### Ornamental Panels in Brick:

- Fragments of bricks are cut, according to Geometric or calligraphic shapes, assembled face down.
- A layer of plaster is then applied
- The whole template then shifted to the actual bldg.

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- Repeated use over a large surface, kings brings about monotony.

#### Ornamental Panels in Brick:

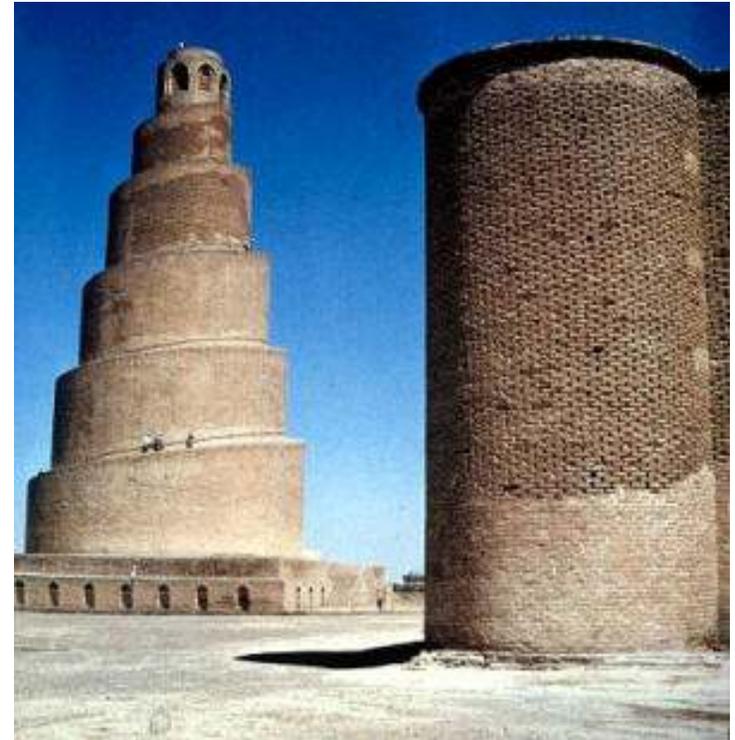
- Fragments of bricks are cut, according to Geometric or calligraphic shapes, assembled face down.
- A layer of plaster is then applied
- The whole template then shifted to the actual bldg.

## ELEMENTS & CHARACTERISTICS IN TERMS OF MATERIALS

### BRICK



Minaret of Mas'Ud at Ghazni,afghanistan  
(12th Century)



Samarra Iraq

## ELEMENTS & CHARACTERISTICS IN TERMS OF MATERIALS

### CERAMIC

Ceramic tiles were in the beginning limited to only monochromatic, colours in brick glazing. Then the polychrome tiles, in the 11th & 12th Century, announced a revolution in Islamic architecture.

#### Colours Commonly Used:

1. Turquoise Blue,
2. Cobalt
3. Navy Blue
4. Emerald green
5. White/Black
6. Saffron Yellow

Each one require a specific firing time in order to achieve maximum beauty

Example:- Shah-i-zinda. Necropolis-**Samarkand**  
**Baghdad, Samarra.**

## PRINCIPLES OF ISLAMIC PLANNING

**Symmetry** was a strong concept in all Islamic buildings. Ex: Garden Plans.

**Plans:**The plans were usually geometric in shape-Square, Rectangular being predominately used.(Ex: Damascus, Qairwan).

**Division into bays:**The plan was normally divided into nine bays.The central bay was large surrounded by 8 smaller bays, indicative of the 8 levels of precise.(Ex: Ak Serai, Samarqand)

**Axis:** A strong axial planning resulting in symmetry. Most of the Islamic gardens are formally laid out with a dominant axis. (Ex:- Caravanserai, KARAJ – IRAN, Madrassa, MUNSTASIR, BAGHDAD)

**Octagon:**The use of octagon in tomb architecture and other mosques was prevalent. There was preference of the octagon, over usage or the hexagon.Possibly in the importance of the no: 8,Coz 8, the first cubed no.(EX: Dome of Rock, Jerusalem format at samara).

**Power Architecture:** Begins, primarily, with military and defensive architecture. Resulting in structures, such as citadels walled cities, moats. (Ex: ALHAMBRA, Spain).

