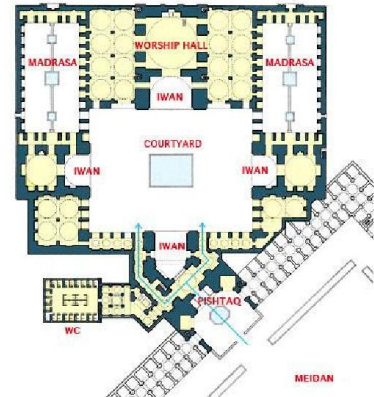


Architectural drawings:

- Floor Plan

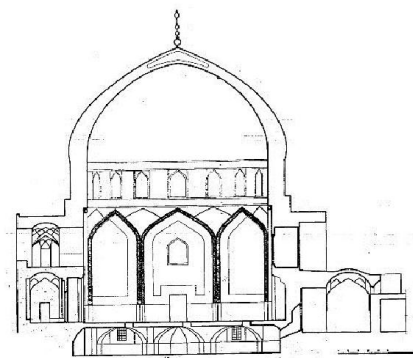
A scale diagram that shows the relationships between the rooms, spaces and physical features of a given level of a structure. Floor plans are a horizontal cut through the building, and provide a view at one meter above the level of the floor. Perspective is not included, so things close up or far away are shown at the same scale.



Floor plan of Shah mosque, Isfahan

- Section Drawing

At any point on the plan of a building, the architect can describe a line through the drawing and represent a vertical cut through of the spaces. This representation drawing is called a section and it explains the volumes of the spaces and indicates the position of the walls, floors, roof and other structural elements. This type of drawing also allows the architect or designer to investigate such issues as the exploration of the structure, the admission of light, vertical interaction within the building and relationships between the interior and the exterior. In the section view, everything cut by the section plane is shown as a bold line, often with a solid fill to show objects that are cut through, and anything seen beyond generally shown in a thinner line. Sections are used to describe the relationship between different levels of a building.



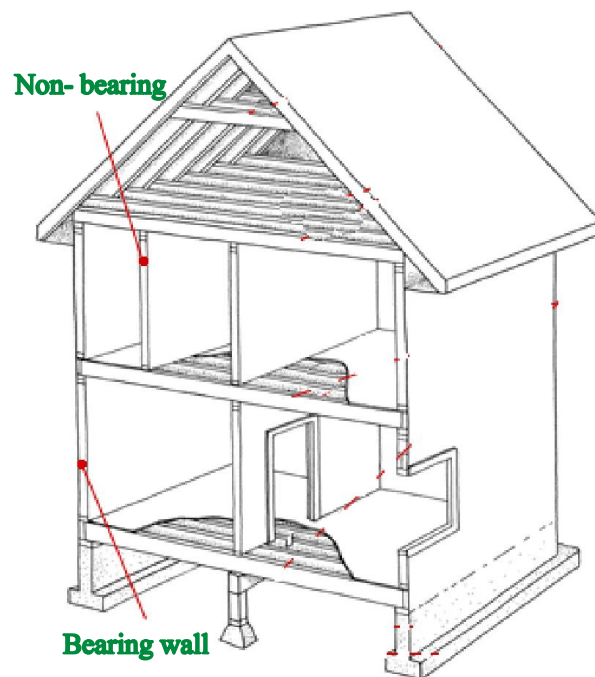
Section drawing of a mosque

- Walls:

There are two types of walls:

- 1) Load bearing wall (bearing wall) which supports the weight of floors and roofs. It is a wall that bears a load resting upon it by conducting its weight to a foundation structure. The materials most often used to construct load-bearing walls in large buildings are concrete or brick. Load-bearing walls are one of the earliest forms of construction.
- 2) Non-bearing which only supports its own weight. This type of wall is not structural.

And also there are two types of loads in a structure: *live and dead loads*. Dead loads are static forces that are relatively constant in a building. They can be in tension or compression, while the Live load is usually unstable or moving load; the dynamic load or stress that occurs during the normal day-to-day operation of a building. The passage of people in a hallway or staircase is an example of a live load. When calculating the stresses on a building's structure, these factors need to be taken into consideration.

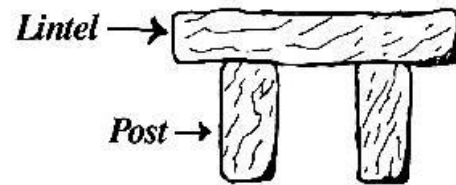


- Post and lintel

It is a system with a lintel as the horizontal member over a building void supported at its ends by two vertical columns, pillars or posts. As a "fundamental principle" of Ancient Greek architecture, builders continue to use this method to support the weight of the structure above the openings for windows and doors in a bearing wall.

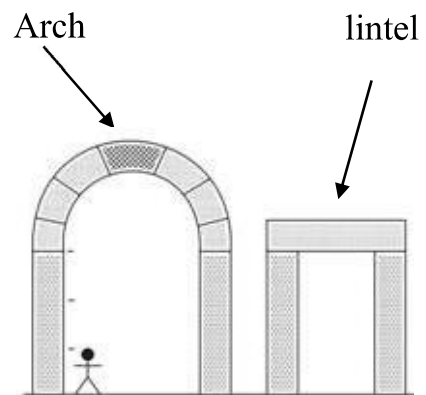


Stonehenge



- Lintel

Lintel is a horizontal beam made of wood, stone, steel or reinforced concrete that supports masonry above a door or window. Lintels were a prominent feature of Ancient Greek post-and-beam architecture. They are load-bearing and support the weight from the building structure in addition to their own weight.



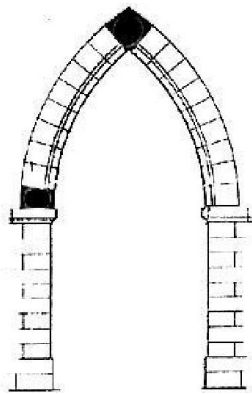
- Arch

Arch is a curved structure that spans an opening and supports weight above it. An arch is capable of spanning a much larger opening than a lintel. Arches have been a common feature of architecture throughout history. They were first developed in Mesopotamia (c.2500BC). Each subsequent civilization has developed the arch to create its own distinct style.

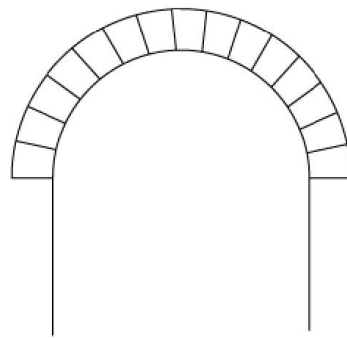
Arches are traditionally built from wedge-shaped stone or brick blocks that transfer the weight they support to the side supporting elements. The compression from the weight above is important to the structural integrity of the arch.



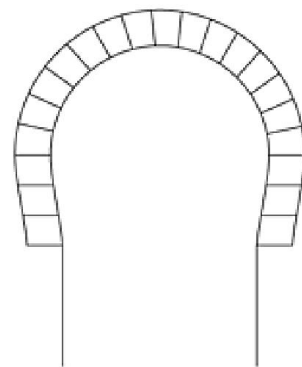
The arch is also a fundamental element in Iranian architecture, as other structural systems such as vaults and domes are derived from arched shapes. The arches in pre-Islamic architecture of Iran were elliptical, but in post-Islamic Iranian architecture a variety shapes of pointed arches was applied.



Pointed Arch



**Round or Semicircular
Roman Arch**



Horseshoe Arch

The central wedge-shaped stone at the top of a masonry arch is called key stone. A keystone is usually larger than the other wedge-shaped voussoirs or stones that form the arch. This is both for structural and visual reasons. Although the word keystone implies that it is the most important element in the arch, the removal of any voussoir would cause the structure to collapse.



voussoir

key stone

- Vault

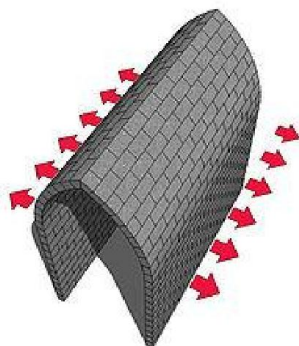
Vault is also an architectural term for an arched form used to provide a space with a ceiling or roof. In the other words, vault is a roof or ceiling in the form of an arch. There are different types of vaults; the simplest kind of vault is the barrel vault (also called a tunnel vault), since it resembles a barrel or tunnel cut lengthwise in half. The barrel vault is a continuous arch, the length being greater than its diameter. Therefore barrel vault is an architectural element formed by the extension of a single arch along a given



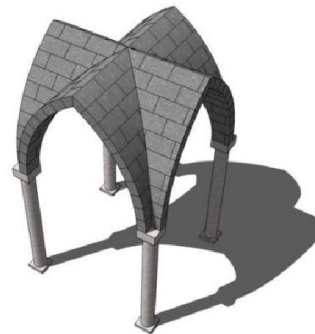
barrel vault , Taqi- Kasra, Ctesiphon

distance. The barrel vault is the simplest form of a vault that was invented in ancient Egypt and Mesopotamia. Kasra vault (Taq Kasra) in the ancient city of Ctesiphon in modern Iraq, is one of the best examples of masonry barrel vault. The vault was part of an imperial palace complex. The throne room—probably under this vault—was more than 30 m high and covered an area of 24 m wide by 48 m long. The top of the arch is about 1 meter thick while the walls at the base are up to 7 meters thick. It is the largest unsupported vault ever constructed in the world.

In a barrel vault openings are limited in size and number. This is a disadvantage, since it inhibits light and circulation. But Roman builders discovered that openings could be made by building two barrel vaults intersected at right angles to form the groin vault which is square in plan.



barrel vault



groin vault

- Dome

A structural element erected upon a circular base, and usually has a shape of a semi-sphere. A dome has a curved surface and functions much like an arch. Larger domes often have two or even three layers: the top and bottom are decorative, while the center layer is structural and supports the other two. Domes can be semicircular, pointed or bulbous.



Dome is a rounded vault forming the roof of a building or structure, typically with a circular base or plan, but in some cases can have octagonal, polygonal and elliptical bases too.

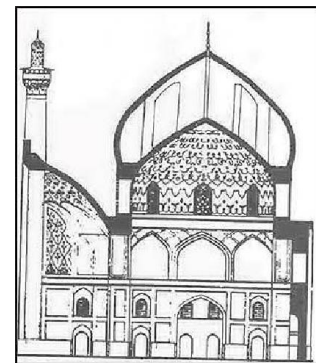
A structural element that resembles the hollow upper half of a sphere.

- Double-shell dome:

A structure which is consisted of two dome,

A dome within a dome,

The internal dome can be decorated by plaster and the external protects it from rain and also gives a magnificent view to the building.



- Climate

The temperature of a location. Climate is one of the most fundamental concerns of architecture because one of the primary functions of a building is to provide protection and shelter from the climatic conditions. This consideration includes the choice of materials to be used in a structure's design. Architecture traditionally responds to the challenges of a site's climate through the use of locally available materials. For example, ice is used to build igloos in the harsh Arctic environment while terracotta tiles and adobe walls are often found in the architecture of Middle East and southern Spain to help withstand heat and rainfall.

- Masonry

Building of structures from individual units laid in and bound together by mortar. The common materials of masonry construction are brick, stone, marble, adobe or mudbrick, limestone, or concrete block. Masonry is commonly used for the walls of buildings. Brick and concrete block are the most common types of masonry in use in industrialized nations. Concrete blocks and bricks with hollow cores, offer various possibilities in masonry construction. They generally provide great compressive strength. Filling some or all of the cores with mortar or steel reinforcement for concrete blocks, offers much greater tensile strength to structures.

A person who constructs masonry is called a **Mason**, or **Bricklayer**.



- Column

Column is a vertical element that allows the weight of a structure to pass through compression to structural elements below it. A column consists of the base, shaft and capital, and is commonly found supporting arches, beams or entablature.

Columns typically have a larger diameter at the bottom than the top, which makes them appear straighter and taller.



Building materials (construction materials):



Concrete

A pourable material made from Portland cement, sand, gravel, water and admixtures, which harden into a stone-like material. Concrete is often reinforced with steel.



Marble

A cut stone produced from metamorphosed limestone in a variety of colors. Marble is often highly polished to use in buildings especially for floors.



Steel

An alloy of iron and carbon. Often used to produce the frame of skyscrapers and reinforce concrete.



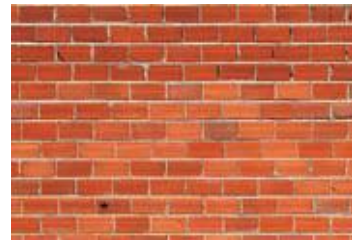
Timber

Wood, especially when regarded as a construction material. Sawn wood used for building frames.



Granite

A hard, durable rock used for cut stone and flooring tiles. Granite is available in many colors, and often highly polished.



Brick

A rectangular artificial stone block made with fired clay that is laid in rows with mortar.



Lime

A white or grayish white, lumpy, very slightly water-soluble solid, CaO, used chiefly in mortars, plasters, and cements.



Cement

A binder, a substance that sets and hardens and can bind other materials together. A building material made by grinding calcined limestone and clay to a fine powder



Gypsum

A widespread colorless, white, or yellowish mineral, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$, used in the manufacture of various plaster products

- Symmetry

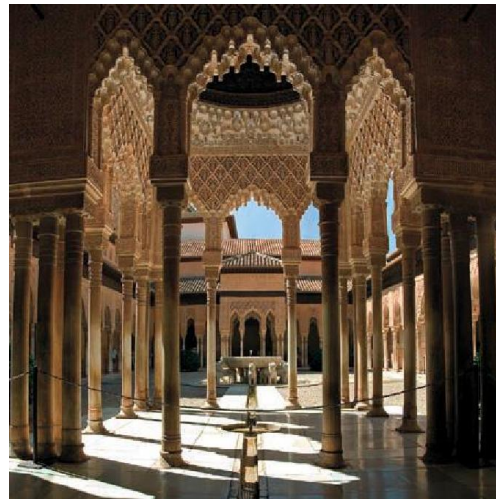
The balance or correspondence of one side of an object, drawing or place with its other side. Symmetry is a feature of classical architecture, where the buildings are typically balanced around a central axis. Symmetry helps achieve an impressive appearance, particularly in monumental architecture.



- Axis

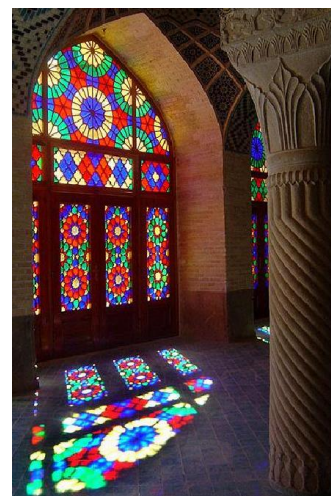
An imaginary line that usually runs through the center of a space or building, an axis is used as a planning device and is related to symmetry. Axial planning can be used to arrange a building or interior in straight lines or in a way that prioritises certain qualities (such as a view through the space) or emphasizes hierarchy. This is quite different to a centrally planned building, which will radiate from the center point.

The strong central axis that runs through the Alhambra in Spain is reinforced by the channel of water at floor level.



- Stained Glass

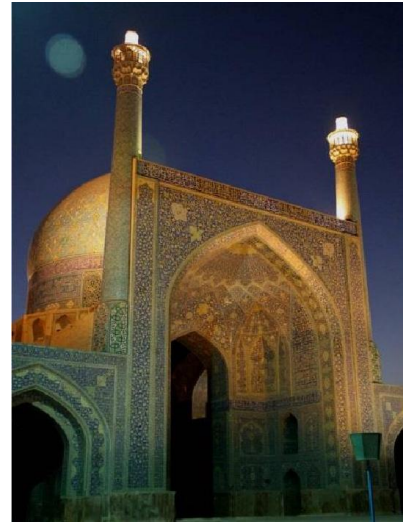
Colored pieces of glass that are held together within a lead or wooden frame and form a complete picture. The whole composition is usually held within a window and the arrangement is designed to be read as a narrative or story or to make geometrical shapes. The glass used is either stained through the addition of metallic salts during manufacture, or painted and heated in a furnace. Although traditionally found in



churches, stained glass is also commonly used in domestic front doors and entrance areas. The light passing through the glass can be spectacular.

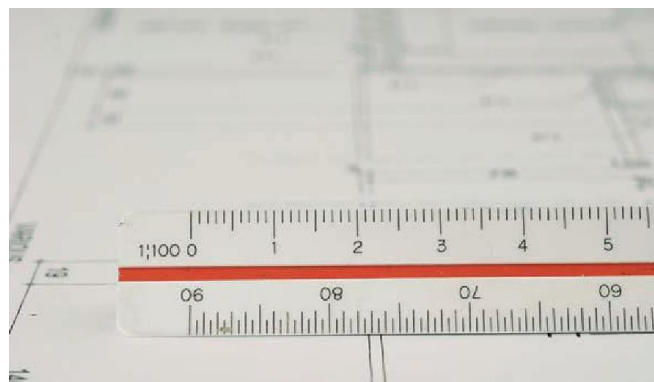
- Religious Architecture

Buildings erected to serve as gathering places for worship. Religious buildings and structures have driven creative architecture for centuries, from Stonehenge, England to Notre Dame in Paris France. Religious architecture typically includes symbolic elements and references, such as the orientation of Islamic mosques towards Mecca or cross-shaped Christian churches. Religious architecture may also be elaborately decorated as can be seen in the stained glass windows that are common to many Christian churches or the beautifully embellished domes of many Islamic mosques.



- Scale

Scale is a method of making comparisons between elements of different sizes. The architect will use scale to calculate the size of a measured drawing of a site, building or object. There will be a direct comparison between the drawing and the finished piece, so if, for example, a building is drawn at a scale of 1:20, the drawing will be 20 times smaller than the building's full size. Certain conventional scales are used on measured drawings, these scales are generally very small for a site map, (such as 1:1250 or 1:2500) and much larger for building design drawings (1:200, 1:100, for example), while details can be drawn at 1:20, 1:5 or 1:1. Very intricate work can be drawn at scales of 2:1 or larger.



- Structure

There are two basic methods of construction: load-bearing and frame. The load-bearing structure is thick, heavy and generally constructed from bricks or stone blocks built up from the ground. This type of structure creates small confined spaces due to the restricted span of the roof or floor beams and its windows are of a limited size. The frame structure is constructed from a series of columns and beams, usually organized in a grid formation, which takes the weight of the building. The walls, which take no structural load, can be divorced from the structure and so the choice of cladding material is almost unlimited.

The frame, which is usually constructed from steel or reinforced concrete, gives a great deal of freedom in the design of the space. The walls do not have to be connected to the structure and thus the manner in which the space can be used is very flexible.



- Steel

An extremely hard carbon and iron alloy widely used for construction. The advent of steel revolutionized methods of construction: the steel frame allowed for buildings free from intermediate walls to be realized, and this, coupled with the evolution of steel-reinforced concrete, produced a strong combination that facilitated the development of skyscrapers.

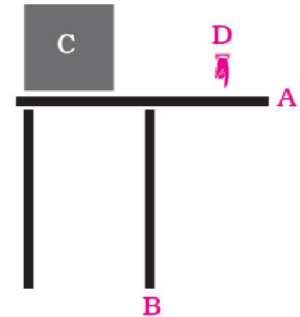
- Cantilever

A structure in which a beam appears to be unsupported at one end. The beam (A), projects further than its supporting column (B). The load pressing down on the supported end of the beam (C) counteracts the toppling motion pushing at D; this allows for the construction of overhanging structures that do not require bracing.

Cantilevers are used widely in bridge and balcony design.



The Forth Bridge, a cantilever truss bridge



- Prefabricated

A building method in which component parts such as walls, floors or even entire rooms are built off-site and shipped to the construction site for assembly. The use of prefabricated parts saves time and money in the construction process and facilitates construction in difficult environments such as high altitude locations or those with a short building season due to weather or difficult terrain. Prefabricated housing was



widely used in Europe following the Second World War as an economic means to meet basic housing needs after much of the original property stock had been destroyed. This method of building saw a resurgence at the beginning of the twenty-first century.

- Bauhaus

An art and design school that opened in 1919 under the direction of renowned architect Walter Gropius. The Bauhaus, which translates as ‘house for building’, aimed to provide a fresh pedagogical approach that focused on producing designs according to first principles rather than by following historic background. Bauhaus architecture rejected decorative detailing in favor of pure form without ornamentation. It is



characterized by economic and geometrical forms such as flat roofs, smooth façades and cubic shapes with open floor plans and low-key white, grey, beige or black coloring.

The evolution of Bauhaus was guided and influenced by the varying approaches of its different directors. The 1926 Bauhaus building in Dessau, Germany typifies the approach of Walter Gropius and his partner, Adolf Meyer. The Swiss Communist architect Hannes Meyer (the second director of the school, 1928–1930) then moved the architectural focus towards functionality. Ludwig Mies van der Rohe essentially imposed his own aesthetic vision on the school when he became director in 1930.

form follows function

A design principle associated with twentieth-century modern architecture that says the shape of a building should be predicated upon its intended purpose. Functionalism, in which form follows function, was popularized by American architect Louis Henri Sullivan. Expressing distaste for architectural ornamentation, functionalists focused on developing plain and simple designs. This enforced the idea that the shape of a structure should be formed by its functional requirements, rather than aesthetics. The building must be fit for purpose.

It's a movement shaped by the industrialization and urbanization of Western society, and that expressed functionality and progress through the maxim of ‘form follows function’. The aesthetic of modernist architecture focused on the functionality the design and featured little or no decorative adornment.

- Deconstructivism

A branch of postmodern architecture and theory that developed during the late 1980s and is characterized by ideas of fragmentation and non-linear design processes. It rejects such maxims as ‘form follows function’, preferring to distort and give an appearance of controlled chaos. His working method is possibly closer to that of a sculptor – he constructs models from torn and crumpled cardboard, which are assembled and reassembled many times. These models are then translated into architectural drawings through the use of specially developed computer software. The Guggenheim in Bilbao, Spain, is a fine example of Gehry’s sculptural approach. Its curved surfaces are clad with titanium sheets and the building appears to be permanently shifting within its dockside location.

Guggenheim Museum has been one of the most widely recognized deconstructivist buildings since its opening in 1997. Inspired by the shapes and textures of a fish, it can be considered a sculpture, a work of art in itself.



- Skyline

The horizon formed by the profile of city buildings from a viewing point. A skyline can be a very distinguishable feature given that each city is different and the outlines of some buildings are universally recognized. Many cities have planning regulations that control the impact of proposed new buildings on the skyline.



- Plaster

Plaster is a building material used for coating walls and ceilings. Plaster is manufactured as a dry powder and is mixed with water to form a paste when used. Plaster may also be used to create complex detailing for use in room interiors. In modern days this material is also used for False Ceiling.

The term **plaster** can refer to gypsum plaster, lime plaster, or cement plaster.



- Mortar

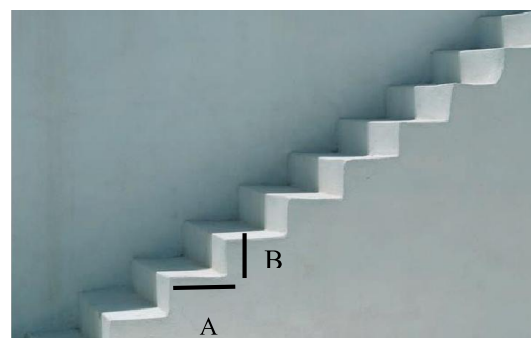
Mortar is a workable paste used to bind building blocks such as stones, bricks, and concrete masonry units together, fill the irregular gaps between them, and sometimes add decorative patterns in masonry walls. The mortar is intended to be weaker than the building blocks, because the mortar is easier and less expensive to repair than the building blocks.



Mortars are typically made from a mixture of sand, a binder, and water. The most common binder since the early 20th century is Portland cement but the ancient binder lime mortar is still used in some new construction.

- Stairs

A flight of steps that leads from one floor or level to another. A staircase includes the supporting framework and the balustrade or banister. The tread (A) is the horizontal surface of the stair and the riser (B) is the vertical surface. The nosing is the hardwearing edge fixed at the exposed junction of the two. Triangular steps are called winders, and these are



typically found in spiral staircases. The lowest step sometimes has a rounded bullnose to help provide a more stable base for the pickets of a banister and to invite movement.

- Sir Christopher Wren

Sir Christopher Wren (1632–1723) is considered by many to be the greatest English architect. After the Great Fire of London in 1666, in which four fifths of the city were destroyed, he was appointed as Surveyor General of the King's Works. He was responsible for the rebuilding of St Paul's Cathedral and fifty-one city churches, all in the classical style. St Paul's Cathedral can be regarded as Wren's masterpiece. It is constructed from the very pale Portland stone and it has a high serene dome above a ring of 32 closely spaced, slender columns. The dome is actually constructed from three domes; the tall upper and decorative lower domes are non-structural, leaving the middle cone to support the two. Baroque influences are evident in the building, most notably in the towers and the main façade.



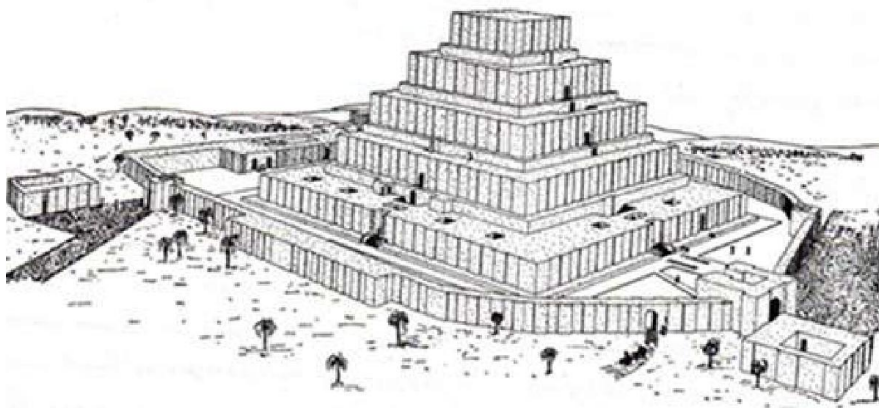
- Leaning Tower of Pisa

The Leaning Tower of Pisa is the white, marble freestanding bell tower of the cathedral in Pisa, Italy. Construction of the eight-storey, 56- meter-high tower began in 1173 and took 174 years to complete. However, it began leaning soon after construction finished due to a poorly laid foundation and a loose substrate that allowed the foundation to shift direction. The top six floors of the tower have columns with classical capitals, framing open arches.



- Ziggurat

A rectangular stepped tower originating from the Mesopotamian period. A ziggurat was based upon a pyramidal shape and usually took the form of a temple or other place of religious worship. The scale of the buildings was large and each stage was reached by a ramp. In the modern age of skyscrapers, the ziggurat has lost its religious significance, but is still used as a motif in the designs of buildings (such as the one pictured below in downtown Texas, USA).



Ziggurat, Choqa Zanbil, Susa, Iran



downtown Texas, USA