ARK-E0001 - Special Project of Architecture, Earth Architecture

Fall 2020 | History of Earth Architecture in Middle East

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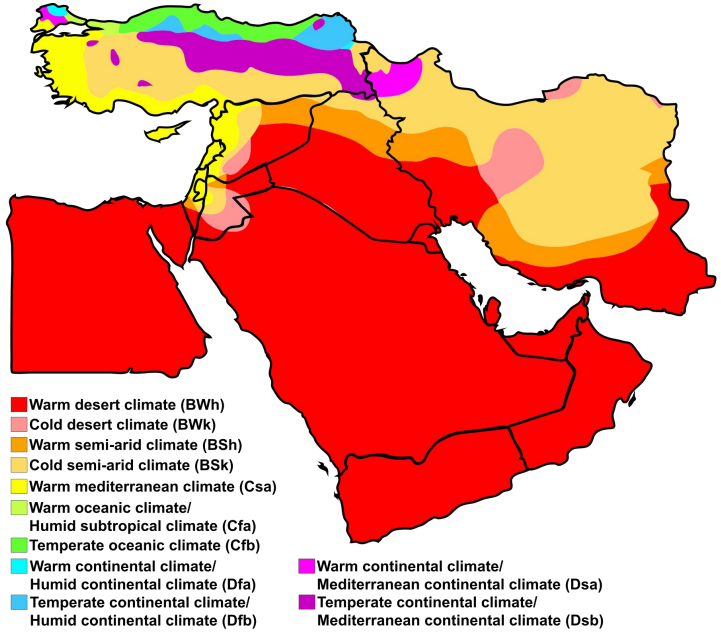
Middle East

The Middle East is a geographical and cultural region located primarily in western Asia, but also in parts of northern Africa and southeastern Europe.

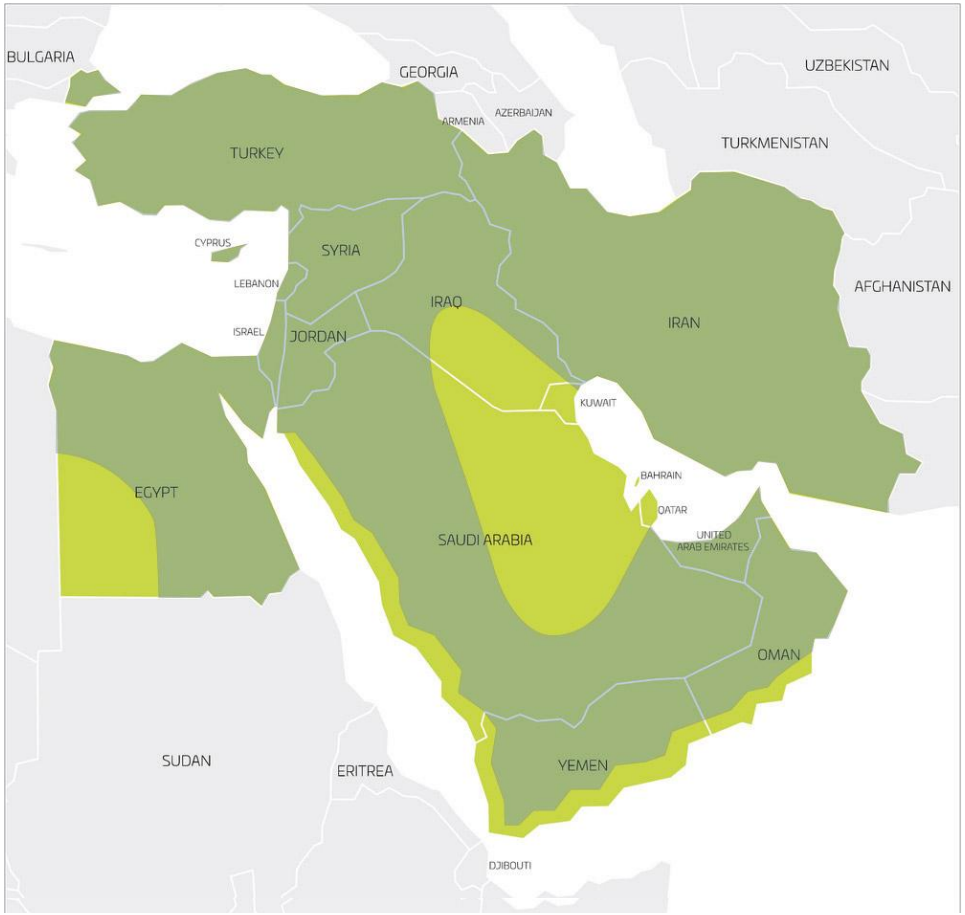
The majority of the Middle East region is characterized by a warm desert climate. As a result of its arid climate, the Middle East is home to several of the world's largest deserts.



Climate classification in Middle East

Satellite map of Middle East

Where earth architecture is found in Middle East



Geology and materials

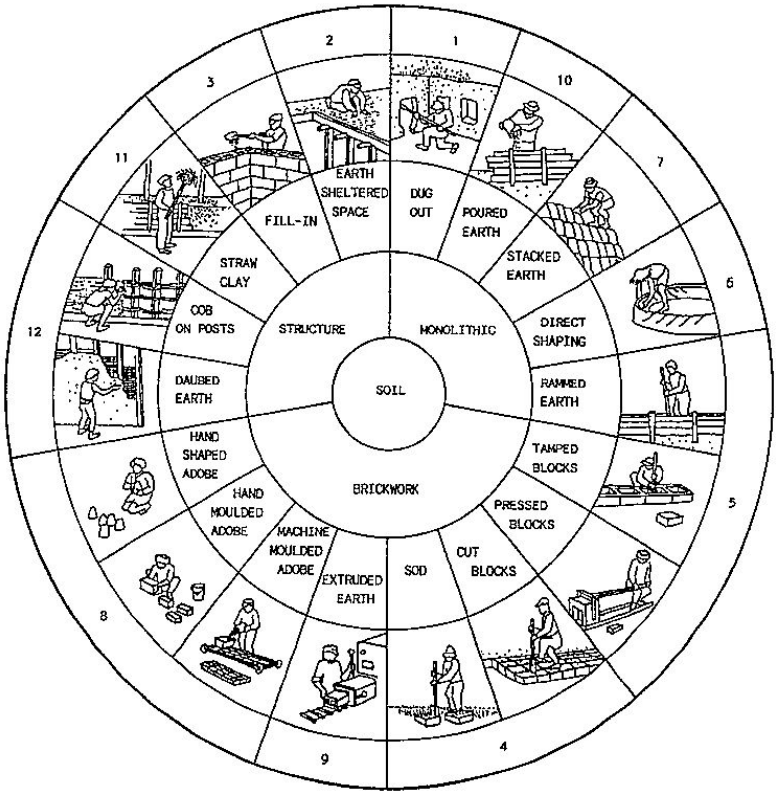
From the earliest civilizations right up to this day, human beings have used **earth and water** to build rural and urban settlements. Mud has been used for construction in many countries of the world, especially in the various urban settlements located near the valleys and rivers.Some of these areas (i.e. Mesopotamia) were lacking in some natural resources, including stone and wood. This deficit was overcome by using earth for large-scale construction.

Since the human race settled in rural settlements where soil was available around 10,000 years back mud deployed as a leading building material.

Philae Temple,
Nile Valley in Egypt
Constructed of mud brick

Middle Earth Architecture techniques used in Middle East

- Dug-out
- Mud brick
- Stacked earth, “cob”
- Moulded earth, “adobe”



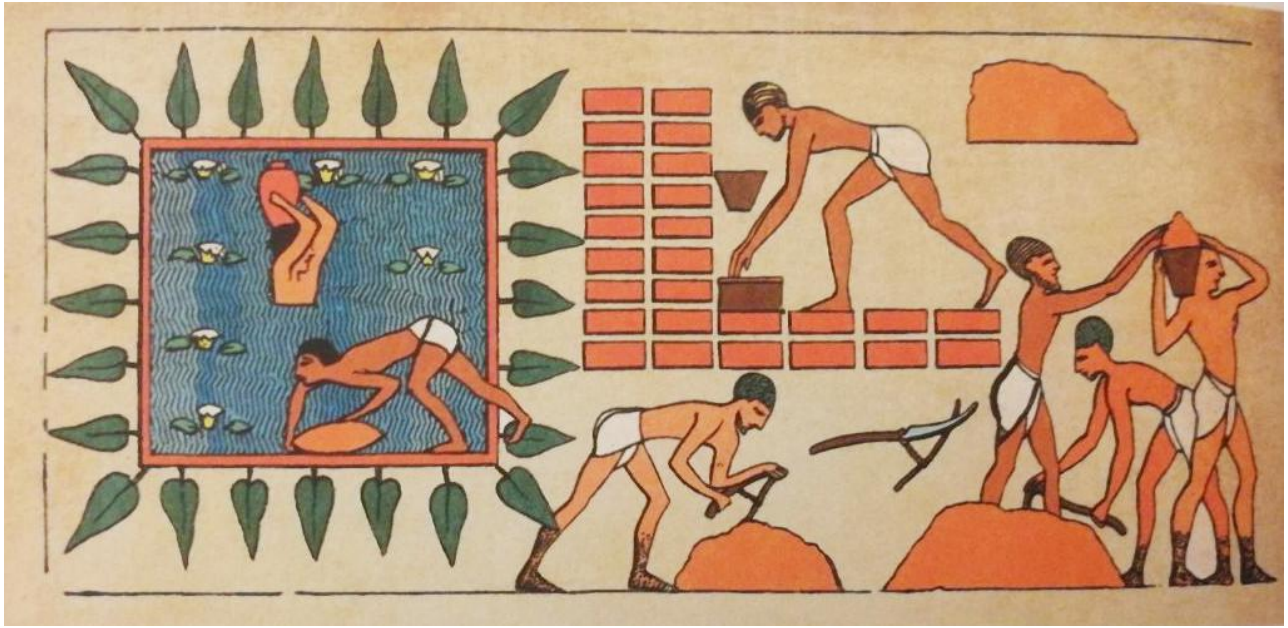
Mud brick

Ingredients: mud, straw and water.
Method: Mix and shape into a brick and bake in the sun until dry.

The use of mud brick and the birth of civilization.

Humankind's first cities were constructed of mud brick. As agricultural knowledge increased, builders realized that agricultural soil mixed with the straw left over from grain harvests, was highly suitable for creating a durable building module.

Examples:
Çatal Hüyük, Turkey.
Jericho, Israel
Chogha Zanbil, Iran
Shibam, Yemen
The Great Mosque, Iraq
Dom of Soltaniyeh, Iran



Hieroglyphs discovered in the tomb of Rekhmire, showing stages in the manufacturing process of earth bricks.

Çatal Hüyük

11 500 years ago, Turkey

Mud brick town of 8,000 people that dates back as far as 9500 B.C.E. Located in Turkey. This archeaologically important site was discovered in 1961. The scientific community is undecided as to whether or not Catal Huyuk was a large village, a small town or a cross between the two, owing to its fluctuating population and its large extent.

The site has provided evidences of a human settlement built entirely of raw earth, in the form of adobe. The houses are packed together rather than being separated by the streets. The interiors of the houses incorporate furnitures made out of earth.

Çatal Hüyük was declared a UNESCO World Heritage site in 2012

Visual representation of what Catalhoyuk might have looked at it´s time, Constructed of mud brick

Jericho

11 000 years ago, Israel

The oldest continuously inhabited city in the world. Located in Israel.

Archaelogical excavations made in Jericho show evidence of mud brick being used as early as 8359 B.C.E.

Visual representation of what Jericho might have looked at it´s time, Constructed of mud brick

Chogha Zanbil

3000 years ago, Iran

Chogha Zanbil, the great Elamite holy city, was inscribed on the World Heritage UNESCO List in 1979, making it one of the first cultural sites to be so recognized.

The **ziggurat** originally measured one hundred meters on each side and was about fifty meters in height, in five levels, at the apex of which stood a temple. It now stands 24 meters high, less than half its estimated original height.

A recreation of the ziggurat of Chogha Zanbil.

Building Materials and Construction

Brick

The architects of Chogha Zanbil used the Near East's traditional and most readily available building material: earth. Mud bricks, by far the most common medium used throughout the site, were either square (ranging from 36 x 36 x 8 cm to 40 x 40 x 10 cm) or rectangular (from 36 x 18 x 8 cm to 40 x 20 x 10 cm).

Baked bricks of the same dimensions were used for vaults and drainage gutters, pavements, and other architectural and decorative features. Fired in a kiln, the bricks could be glazed or inscribed for ornamental purposes. In certain cases, particularly where additional reinforcement was required, a **mixture of mud bricks and broken baked brick was used.**

A recreation of the ziggurat of Chogha Zanbil.

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WELCOME TO IRAN

Old Walled City of Shibam, “Manhattan of the Desert”

1700 years ago, Yemen

Walled City of Shibam is the oldest metropolis in the world to use vertical construction. The mud-brick high-rises, which stretch up to seven stories high, were constructed from the fertile soil surrounding the city. A soil, hay, and water mixture was fashioned into bricks and left to bake in the sun for days.

The structures are constantly threatened by wind, rain, and heat erosion, and require constant upkeep. In 2008, a tropical cyclone flooded Shibam, damaging several structures and threatening to topple its earthen towers.

Manhattan of the Desert,
Yemen
Construction technique moulded earth

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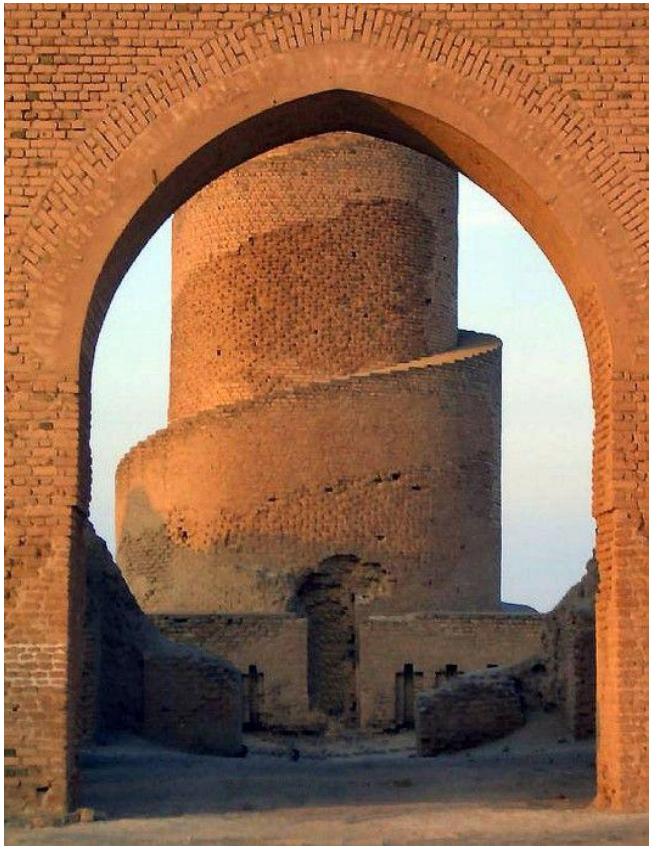
The Great Mosque

1169 years ago, Iraq

A dominating, magnificent structure that was once the largest mosque in the Islamic world built by Caliph Al-Mutawakkil in 836 AD using **baked bricks and clay**.

It has a rectangular plan measuring 240x160 m with walls 10 m high and 2.65 m thick, supported by 44 towers. The courtyard was surrounded on all sides by an arcade. The greatest part of which was the one facing Holy Mecca. The Mosque's minaret is the famous Spiral (Al-Malweyya), which rises 27 m away from the northern side of the Mosque to a **height of 52 m.**



Dom of Soltaniyeh

708 years ago, Iran

Soltaniyeh is the old city found its way onto the UNESCO list of the World Heritage Sites in 2004; and is home to Gonbad-e Soltaniyeh [the Dome of Soltaniyeh], the **world's highest brick dome**.

The octagonal building is crowned with a **50 m** tall dome covered in turquoise-blue faience and surrounded by eight slender minarets.
It is the earliest existing example of the double-shelled dome in Iran.

Soltaniyeh Dome is one of the great vestiges of Iran history in Ilkhani period which is built by OLJAITO. Not only the architecture of this building is based on mathematical calculations and scientific and mechanical roles but also the art works, paintings and decorations are done by skillful artists; all of this extraordinarily makes this building a rich one.

Dug-out

Method: Architectural space is formed by digging-out a hollow in the Earth´s surface. The earth may be excavated either horizontally or vertically.

Examples:
Kandovan Village, Iran
Cappadocia, Turkey
Meymand Village, Iran
Derinkuyu, Turkey

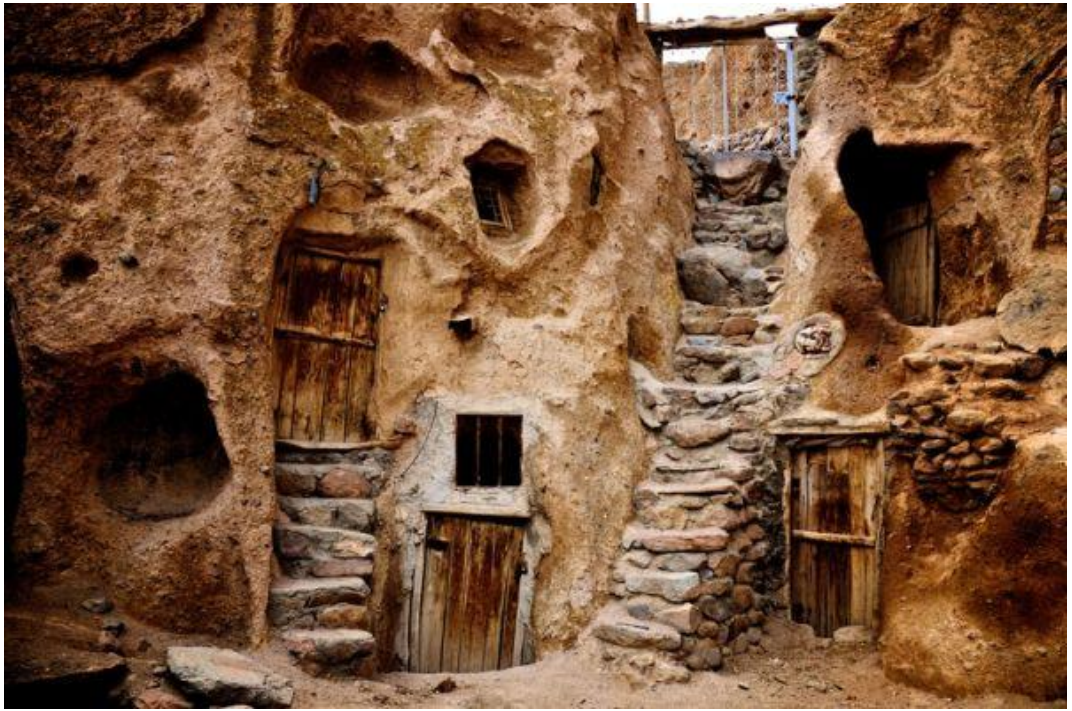
Kandovan Village

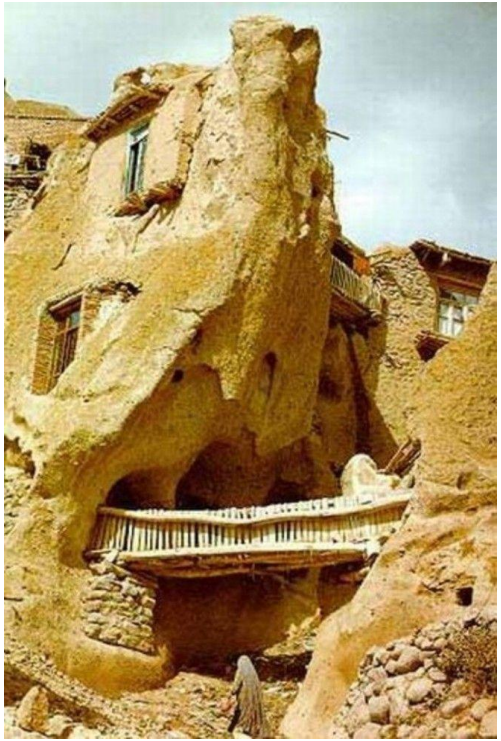
Kandovan Village

7000 years ago, Iran

East Azerbaijan Province, Iran. This 7000 years old village is a wonderful example of manmade cliff dwelling which is still inhabited.

What gives Kandovan an antique nature is presence of 117 families and houses inside rocky cone and pyramid-shaped masses in which villagers has made houses, corral, warehouse and workshops.
Appellation of Kandovan is due to hive-shaped houses which have been embodied inside conical rocks. The properties of these houses are that the weather inside is warm in winter and cold in summer. About traditional architecture of Kandovan, some researchers and geographers believe that kandovan has no similar in Ian, and its architecture is rocky architecture.





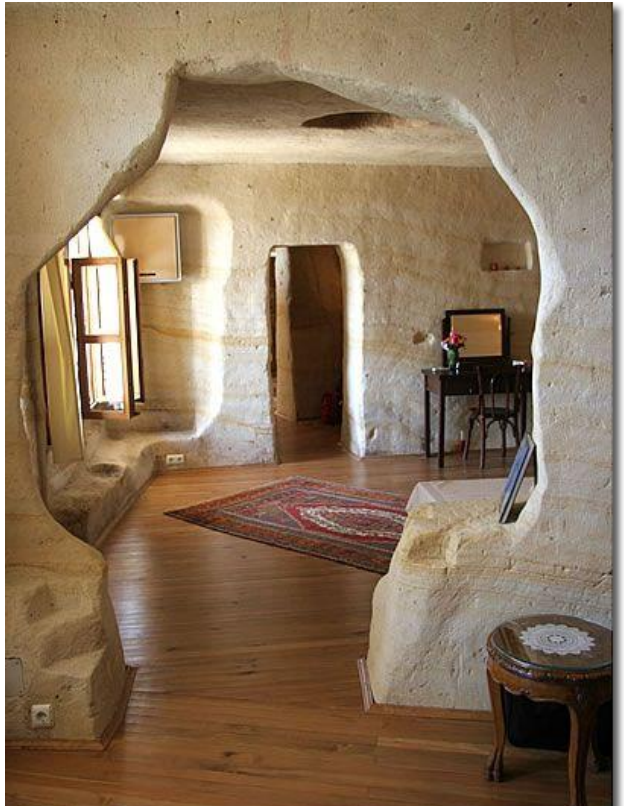
Cappadocia

5 000 years ago, Turkey

Cappadocia's landscape includes dramatic expanses of soft volcanic rock, shaped by erosion into towers, cones, valleys, and caves. It is located largely in the Nevşehir Province in central Turkey.

Centuries of volcanic action coated the landscape with layers of lava and volcanic ash; nearby Erciyas volcano still experiences minor eruptions. Over time, strong wind and rainfall sculpted the rock into deep valleys and soaring towers (called "chimneys") into which people – as far back as the 4th century CE – carved homes, chapels, tombs, temples and entire subterranean cities to safeguard from hostile invaders.

Cappadocia

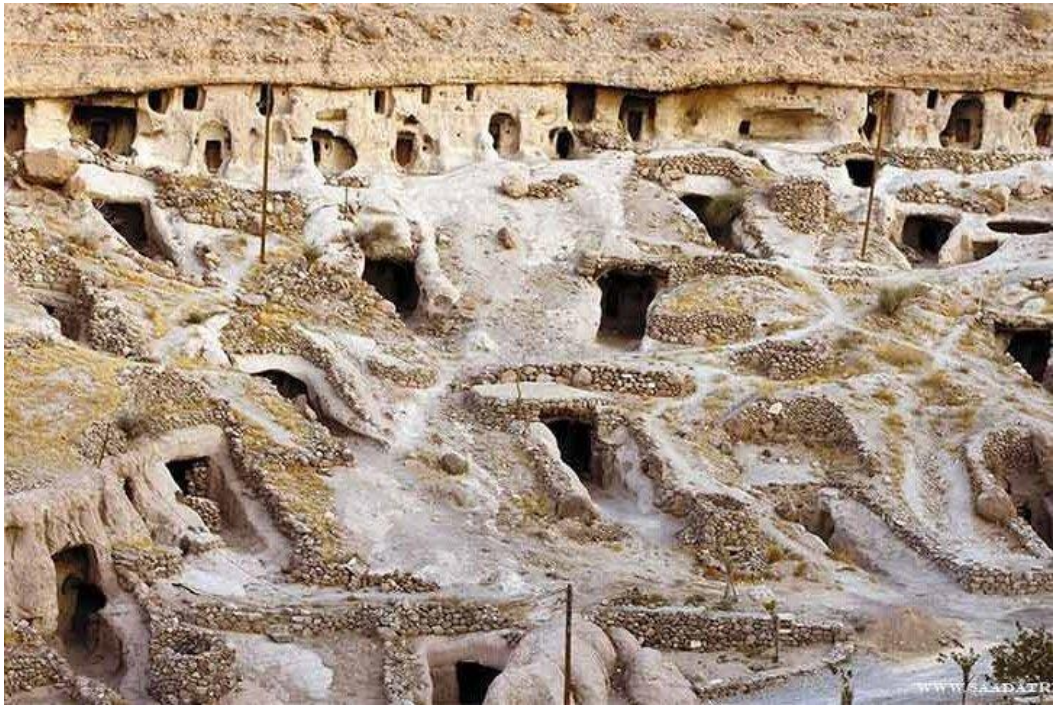


Meymand Village

12 000 years ago, Iran

Meymand is a very ancient village, was declared a UNESCO World cultural landscape, which is located near Shahr-e Babak city in Kerman Province, Iran. Meymand is believed to be a primary human residence in the Iranian Plateau, dating back to 12,000 years ago. Many of the residents live in the **350 hand-dug houses** amid the rocks, some of which have been inhabited for as long as 3,000 years. Stone engravings nearly 10,000 years old are found around the village, and deposits of pottery nearly 6,000 years old attest to the long history of settlement at the village site.

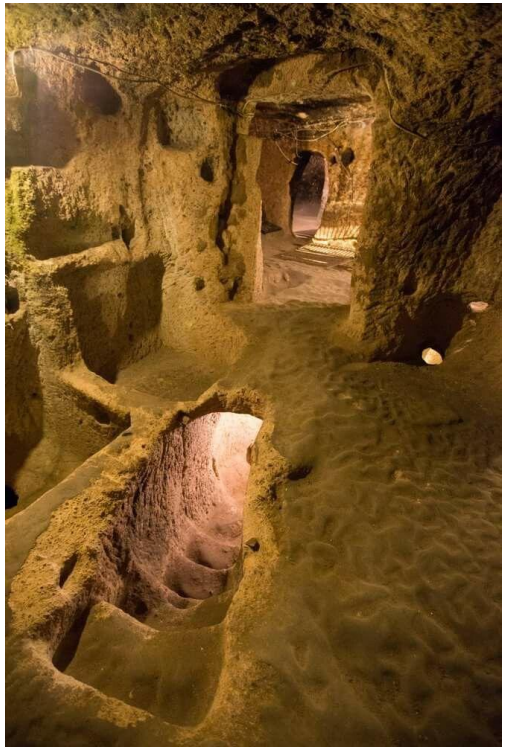
Living conditions in Meymand are harsh due to the aridity of the land and to high temperatures in summers and very cold winters.



Derinkuyu

5000 years ago, Turkey

This labyrinthine complex dates to around the 8th century B.C. and was most likely built to serve as a refuge during periods of war and invasion. With this in mind, its **18-story** interior was a self-contained metropolis that included ventilation shafts, wells, kitchens, schoolrooms, oil presses, a bathhouse, a winery and living space for some 20,000 people. When threatened by attack, each level of the city could be sealed off behind a collection of monolithic stone doors.



Derinkuyu Inside, Turkey

Stacked earth, ”cob”

Method: Earth is shaped into balls that can be stacked in layers to form thick load-bearing walls.

Examples:

Palaces and Houses of Najran Region, Saudi Arabia

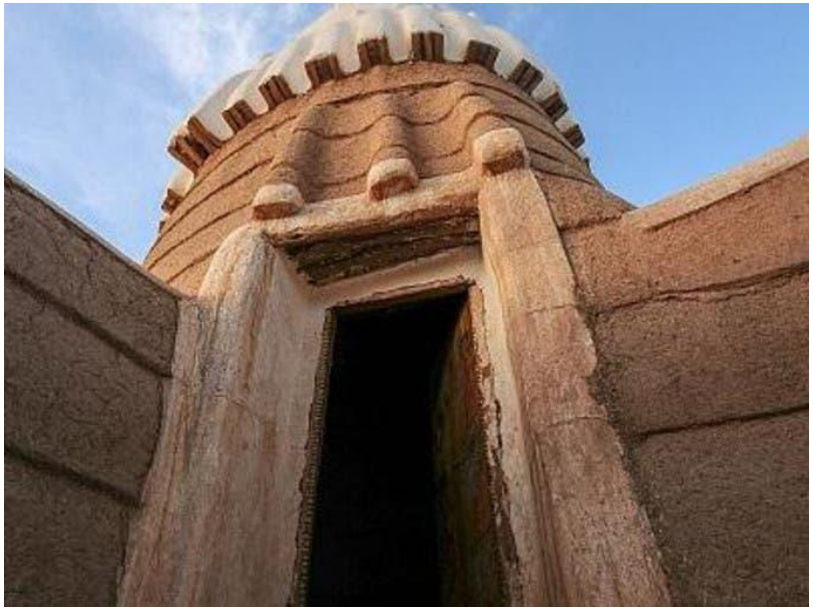
Palaces and Houses of the Najran Region

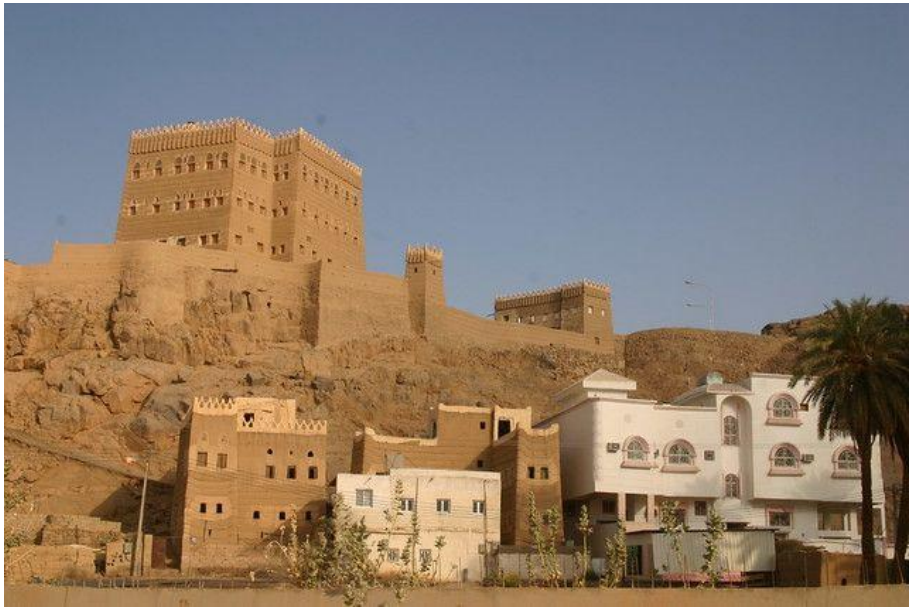
X years ago, Saudi Arabia

The architecture of the Palaces and Houses of the Najran Region represents vernacular earth architecture that expresses a strong cultural identity. All buildings here, from small houses to fortresses and palaces, have been constructed using cob technique.

Some buildings include rows of large flat stones protruding from the surface of their walls. These stones create shade, they drain off rain water and they protect the facade from water erosion.

Some of the houses have been given a coat of industrial paint to make them look more modern.





Moulded earth, “adobe”

Method: Earth is shaped by hand or using a mould, in order to create building blocks that are usually dried in the sun before use. The material is usually enriched with vegetable fibres (i.e. straws) to avoid shrinkage and improve resistance.

Examples:

Conical houses, Syria
City of Yazd, Iran
Arg Bam, Iran
Pigeon Tower, Iran

Conical Houses

6 000 years ago developed building tradition, Syria

In the northwest Syria, building tradition dictates that every room in a house is topped with a conical dome. The standard design of these houses has many variations that reflect the strong cultural identity of each village.

The base of the house is traditionally circular; layers of raw earth bricks are then added to create a spiral that tapers inwards as it approaches the top. The walls are strong enough to allow the builder to climb up the walls as the dome is being built.

Sadly, this tradition has been almost entirely obliterated by the Syria´s war in the early 21st century.

Beehive houses in Syria

Yazd

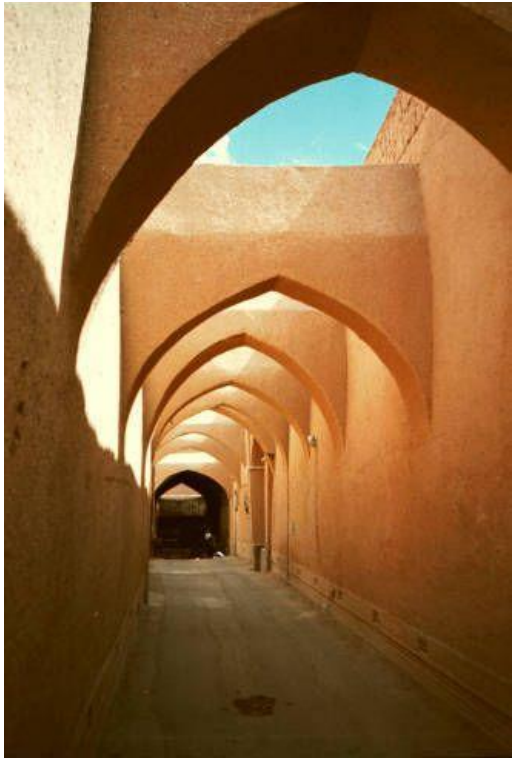
5000 years ago, X

Yazd one of the first and oldest earthen towns in the world. The city was built wholly of mud brick and adobe. Central to both the existence and the success of the city is its irrigation system, the *qanāt*, draining water from the mountains and into the city through pipes that run for many miles underground.

Yazd is Located between, the Dasht-e Kavir and Dasht-e Lut deserts. Winding alleys, wind catchers, mud-brick houses with wooden doors, and ancient Qanats are the most significant Yazd highlights. It is noteworthy that the adobe architecture of Yazd, along with beauty, is a solution to the environmental crises.

Yazd,
Constructed of adobe and mud brick

Yazd,
Constructed of adobe and mud brick



Wind Catcher, "Badgir" in Persian

282 years ago, Iran

The first historical evidence of wind towers in Iran dates back to the fourth millennium BC. The wind catcher is a Persian architectural element used to make natural ventilation in buildings located in arid areas.

The wind capture tower of **Bagh-e Dowlatabad house**, with a height of about **33 meters**, not only is the tallest old wind catcher in the world, but also is quite particular and unusual since, being octagonal, it manages to capture the wind from any direction. Other wind catcher towers, with a rectangular plan, can capture the wind only from one direction.

The main building material is clay mixed with straw. This material, known as adobe, is in fact particularly insulating towards both heat and cold, and is therefore ideal in these regions.

Bagh-e Dowlatabad house, Iran

In the second image we can see the windcatcher tower seen from inside the house, which opens directly over a pool of water: this technique helps to further cool the environment and to humidify it.

The wind capture tower of Bagh-e Dowlatabad house, Iran

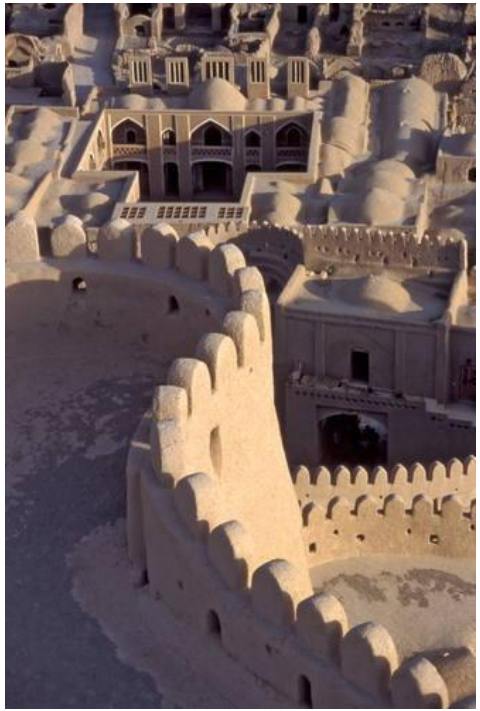
Inside

Arg-e-Bam

5th century BC, Iran

The historic Bam citadel, , located in Bam, a city in Kerman Province of southeastern Iran, with an approximate area of 200,000 square meters, is considered to be the largest collection of masonry brick works in the world and it is listed by UNESCO as part of the World Heritage Site "Bam and its Cultural Landscape".
*The 2003 earthquake in Bam, destroyed more than 80 percent of the citadel. As a world heritage of the world, many countries participated in its rebuilding.

The materials used in its construction consist mainly of **adobe, malate, bole and straw, and in rare cases part of stone, bricks and trunk of palm trees.**



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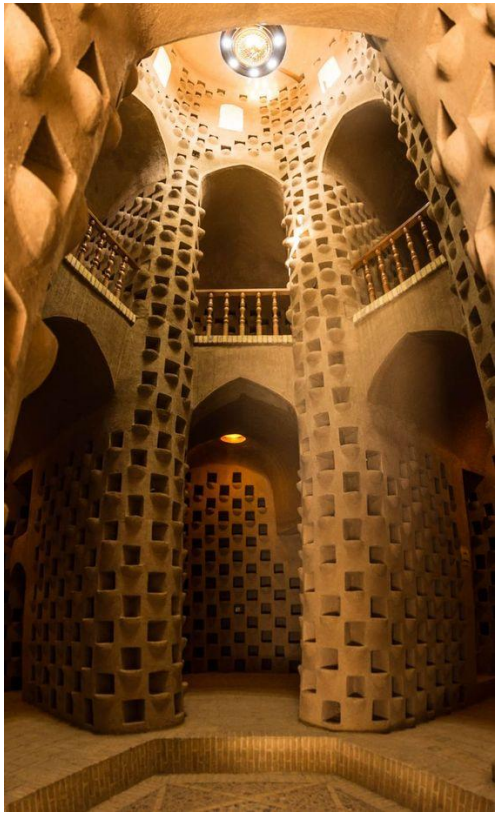
Pigeon tower

225 years ago, Iran

Pigeon tower or dovecote Tower was built in the Ghajar era and has a capacity of 4000 bird's dovecotes. This structure was built in order to supply the amount of fertilizer needed by the farmers and its design and architecture suits the purpose. Dovecote Tower has a cylindrical structure and there's a big bowl for saving water on its roof. Its plaster and brick decorations prevented the snakes and big birds from entering the tower.

The constructions are built with adobe technique.

Kabutar Khaneh, Pigeon tower, Meybod, Iran



Kabutar Khaneh, Pigeon tower, Meybod, Iran

Thank you!