2nd Year Architecture
2018/2019 second Semester

History of Architecture I

Lecture (8 and 9) :

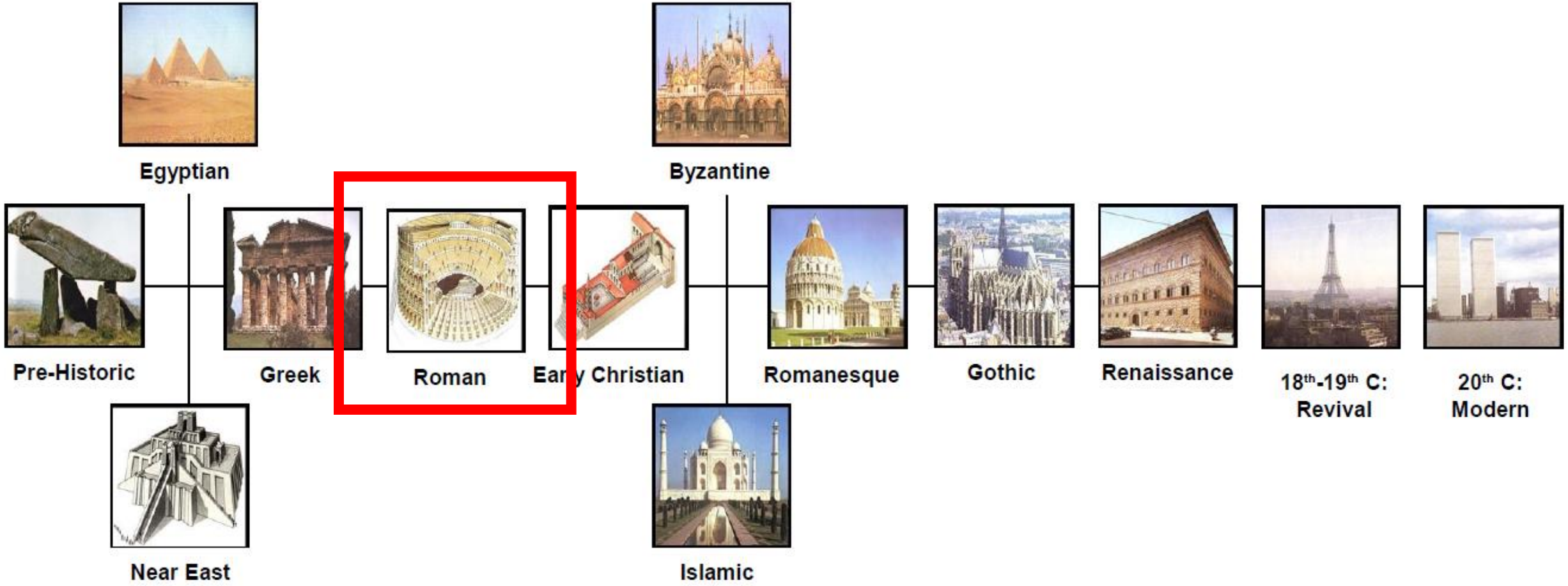
Classic Roman Architecture

by : SEEMA K. ALFARIS

Lecture ’s information

Course name	History of Architecture I
Lecturer	Seema k. Alfaris
Course ’s information	This course traces the history of Architecture from the early developments in the Paleolithic Age (Early Stone Age) to the Rome (16th century)..
The objective	1. Understanding the Rome Architecture , and the factors which shape this Architecture. 2. Understanding The Main Types of buildings that Rome famous with .

The Historical Timeline of Architecture



FACTORS INFLUENCING ARCHITECTURE

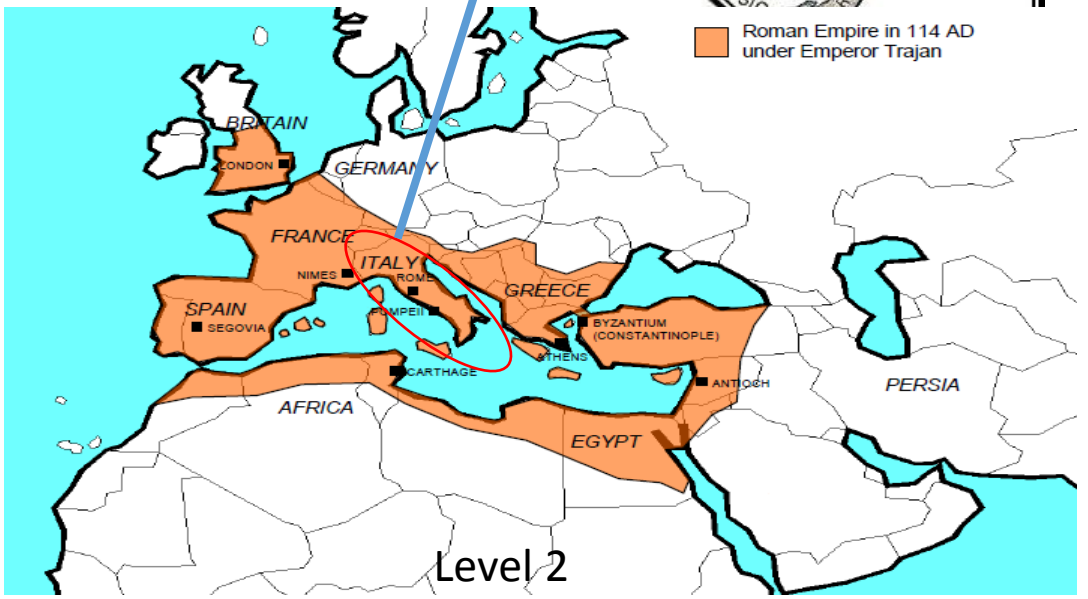
Roman Architecture

1. Geographical factor:

- The roman civilization started from the Italian peninsula.
- The central position of Italy in the Mediterranean sea helped to spread Roman Art & civilization to the rest of Europe, West Asia & North Africa.
- Unlike Greeks , Italians they were not a sea-faring people.
- Romans depended on conquest by land to extend their power.
- First , they conquered by war then ruled by laws & civilized by arts & letters Romans adopted the war.
- The Roman republic started its dominion from its grandest city, Rome which is estimated to be established at 750 B.C.
- There beginning was by fighting the Etruscans and controlling their lands, then many several wars against the Greek until it was able to control Sicily and north Africa (146 B.C.)
- Greece became a Roman province in 133 B.C. and became a gate towards Asian territories.
- The Roman empire stayed in power till the 4th century , one of the strongest empires in history .

Level 1

Italian peninsula



Level 2

Roman Architecture

2. Geological factor:

Rome had an abundance of many building materials :

- **Travertine** was a hard limestone.
- **Peperino or Tufa** is a stone of volcanic origin.
- **Terracotta** is clay used for backed bricks , Italian words for means “baked earth.“ . allowed an immense degree of freedom in a wide range of areas of construction such as the tiling of roofs and floors.
- **Marble** .
- **Pozzolona** was a type of sand which that led to great structural innovations (**concrete**) .this material when mixed with lime & water, formed a very hard & solid concrete that made the construction of finest Roman monuments possible.

Travertine

Peperino

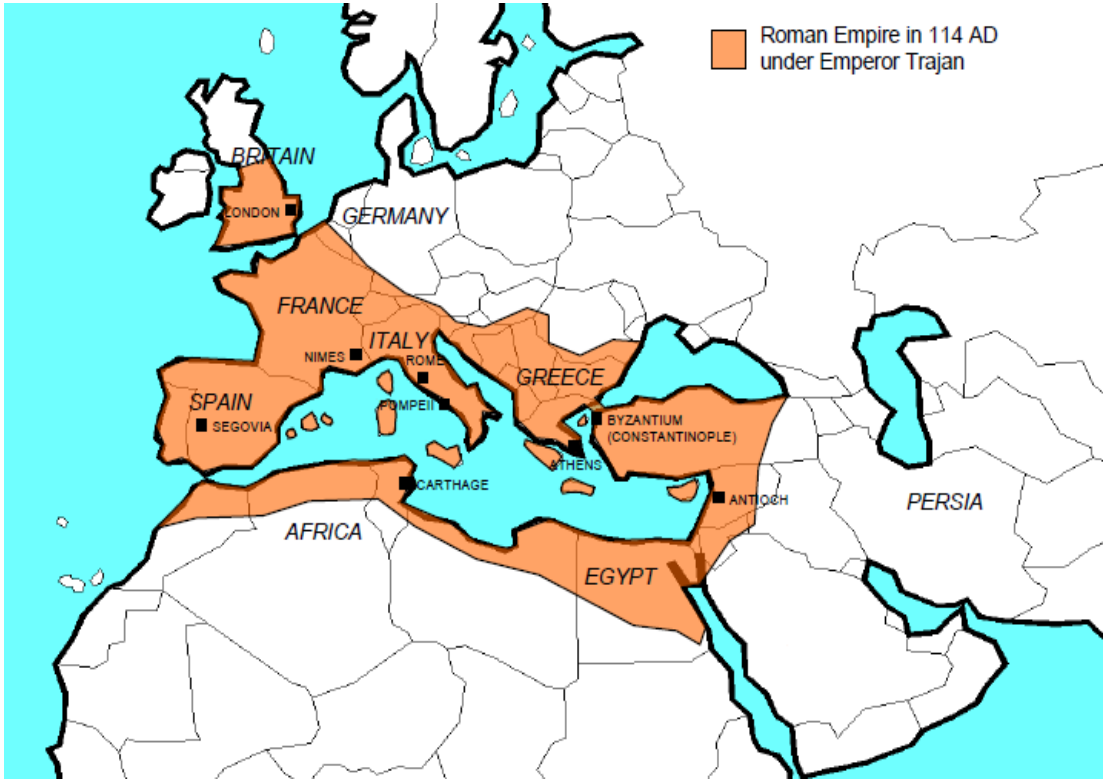
Pozzolona

Terracotta

Roman Architecture

3. Climatic factor:

- Italy has a **varied climate** with the north having a temperate climate,
- Central Italy experiencing Mediterranean climate & south having an almost tropical climate.
- This has **resulted in varied architectural features** & **treatment of buildings**.
- More over, the Roman Empire spread to Central Europe, Spain, West Asia & North Africa, which resulted in local modifications to the predominant Roman Style.



Roman Architecture

4. Religious factor:

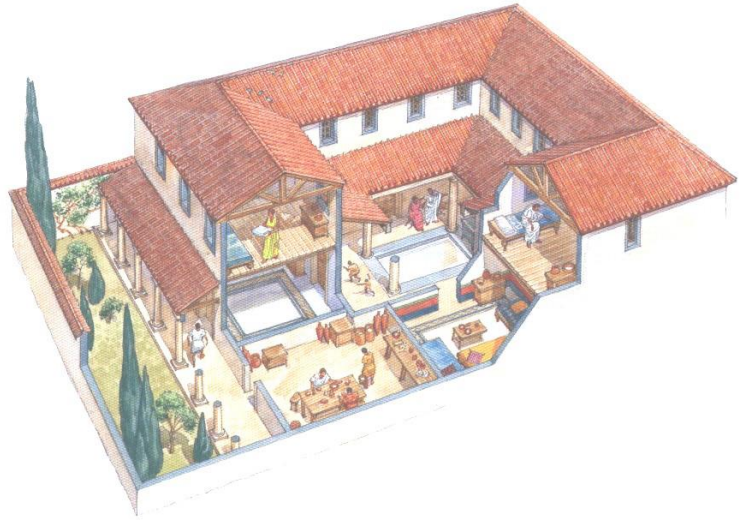
- Romans unlike Greeks were **not very religious people** & their religion was adopted from the **Greeks**.
- That's made there Architecture to be more civic than Greek .
- They tend to built civic structures than temples .
- Religion was a matter of state policy.
- The same 12 Greek Gods but they give them different names as the following :

1. **Jupiter** (**Zeus**)
2. **Juno** (**Hera**)
3. **Minerva** (**Athena**)
4. **Neptune** (**Poseidon**)
5. **Venus** (**Aphrodite**
6. **Mars** (**Ares**)
7. **Apollo (Apollo)**
8. **Diana (Artemis)**
9. **Vulcan (Hephaestus)**
10. **Vesta (Hestia)**
11. **Mercury (Hermes)**
12. **Ceres (Demeter)**

Greek Architecture

4. Social structure:

- The Roman social system had only Roman citizens & slaves with no middle class.
- The Emperor was all powerful & it was his bounden duty to protect his empire & people.
- The senators enjoyed an exalted position and distinguished themselves as law makers.
- The Domus was the house with a courtyard & implicit obedience to the father was the key aspect of the family life.



The Domus

Roman culture is the result of different influences:

- Primitive cultures of the area , Rome cultcure was founded from :
- the real romans were peasants and warriors.
- Etruria Civilization
- Greek and Hellenistic: by imitating there religion , art and culture.
- Rice of Christianity .
- They took Greeks language and invent there own langue (**Latin**) which is considered the origin of many language around the world.

Historical Background

Roman Architecture

- We can divide Roman history to **3 periods each period has a different ruling system which effect the Architecture** :

1. **Regoul (753 B.C - 509 B.C)** :

- Before the Roman , **The Etruscans** who settled in central Italy were the early builders & they are the responsible about the creation of the Arch & the Tuscan order.
- Rome is believed to have been founded in 750 B.C by the twins , Romulus & Reemus.

2. **Roman Republican (509 B.C - 29 B.C)** :

- Rome adapted a republican system of governance in which was ruled by annually elected senators called (Praetors) , who later called **THE CONSOULT** .
- Julius Caesar on of these senators how disobey this system and became a famous general and the first dictator .

3. **Roman Empire(27B.C – A.C 476) :**

- This period was ruled by unelected empowers.
- It was characterized by the rise of the Roman Empire and notorious leaders , such as Octariam Rome's first emperor who ushered an era of peace And Nero, Trajan, who were all great patrons of architecture.
- By 300 AD, Constantine had converted to Christianity & shifted his capital to **Byzantium**.
- Subsequently the roman empire was divided into: the Eastern half with capital at Constantinople & western half with capital at Rome with 2 Emperors ruling them.

Roman Architecture

Roman Architectural character

- Roman Architecture style is merged from two civilizations, they improved there structural elements to suit their purposes , as the following:
- **Greek :** They used the same (column-Trabeated) system and added **the arch** as a new development also used there classic orders as a decorative elements .
- **Etruscan :**They also took **the dome** Architecture from the Etruscans, and it became an important development for the Roman Architecture.

- Roman Architecture are so important , it became a **prototype** for an international nation inspiring many others to follow it (Byzantine , Early Christian ,Romanesque, Gothic Architecture).

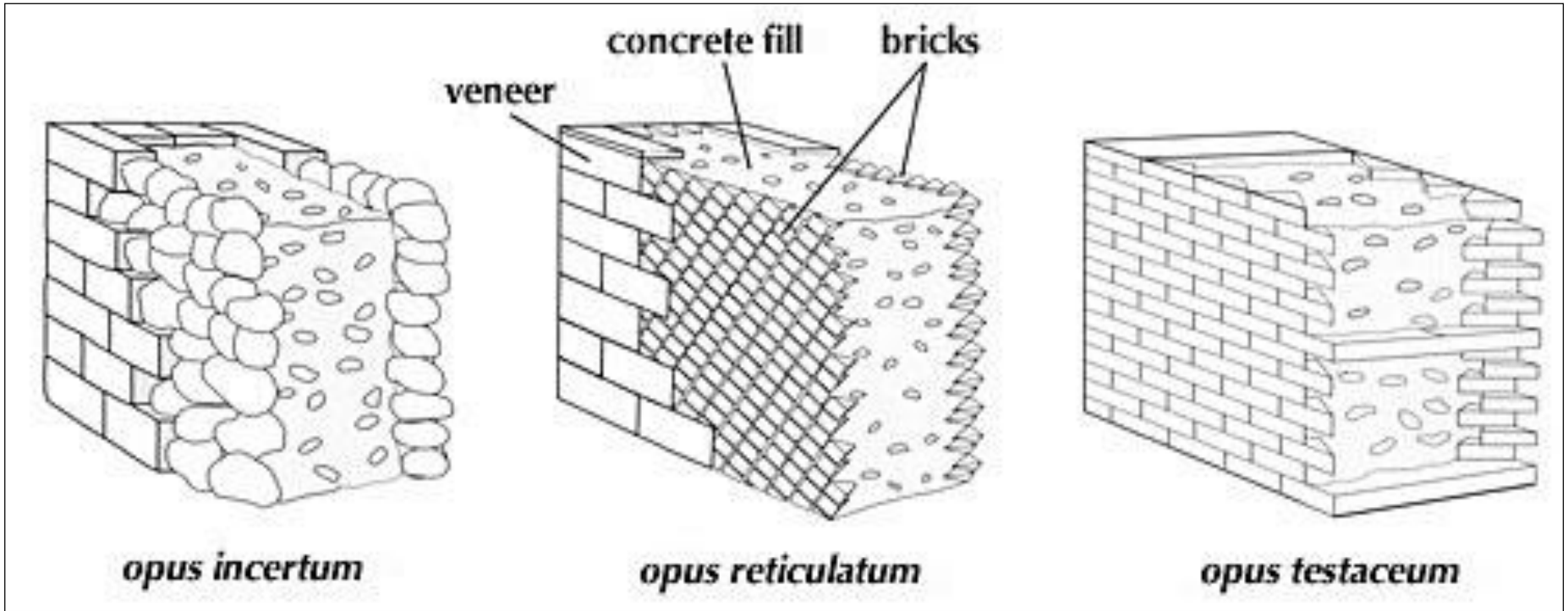
- They built more **public and civic buildings than religious buildings(temples)** , Like (the basilica was the court house, the public baths for recreation, the amphitheaters for watching sport & the circus for racing)

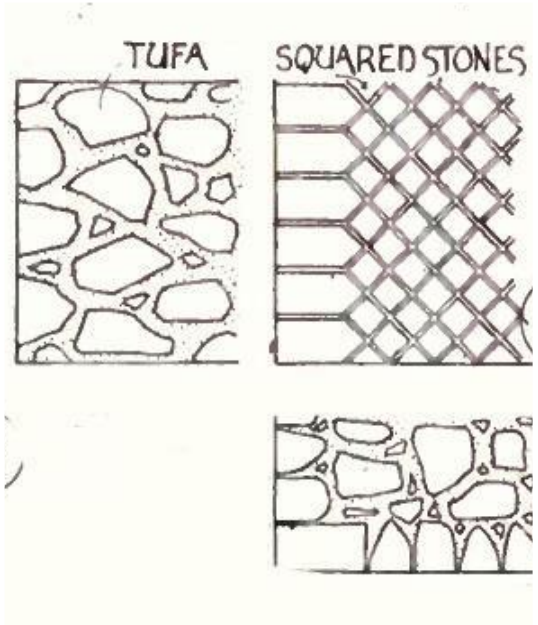
Roman Architecture

Roman Architectural character (Building techniques)

- The Romans they were the first engineers , utilized **concrete** for the first time, which was made of small fragments of stone and limestone mixed with mortar.
- This method, with the use of bricks led to many **building techniques**.
- **Concrete** allows the Romans to build larger structures that can withstand more weight ,so they invented 5 wall systems or building techniques using concrete :

1. “opus incertum ”**:** was concrete wall faced with irregular pieces of stone.
2. “opus reticulatum ” was concrete wall with diagonal lines & patterns.
3. “opus testaceum” Concrete faced with triangular shaped bricks of 10.5” thickness At regular intervals a brick bonding course was used.

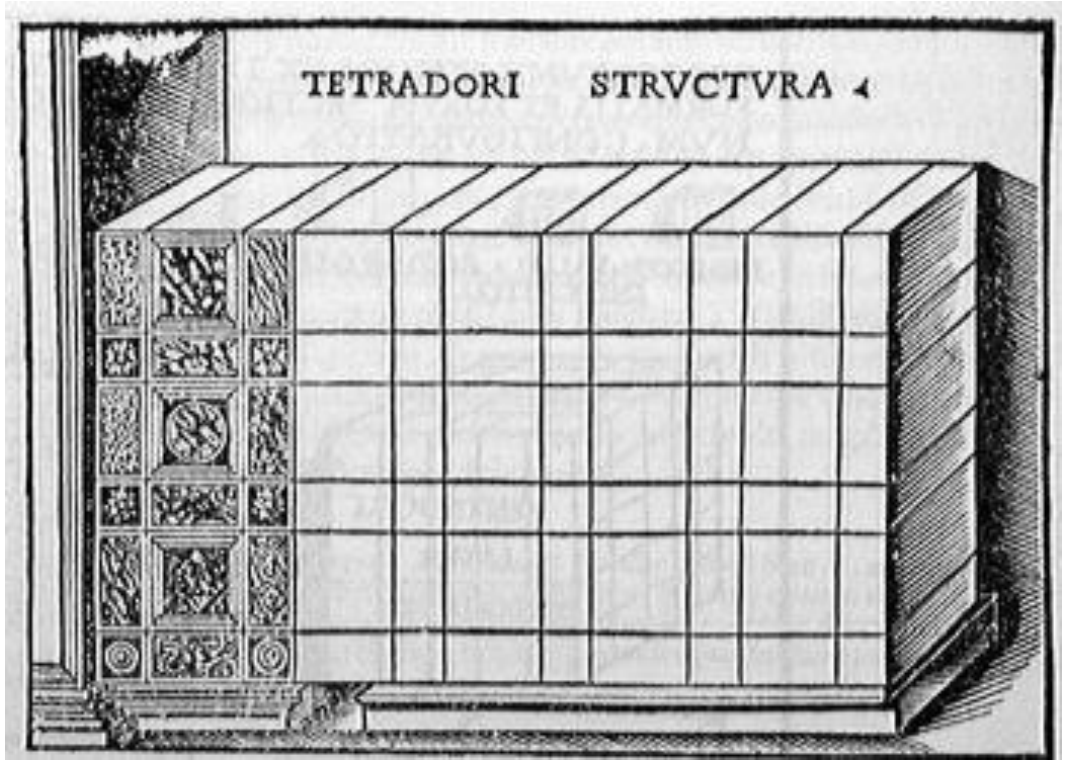




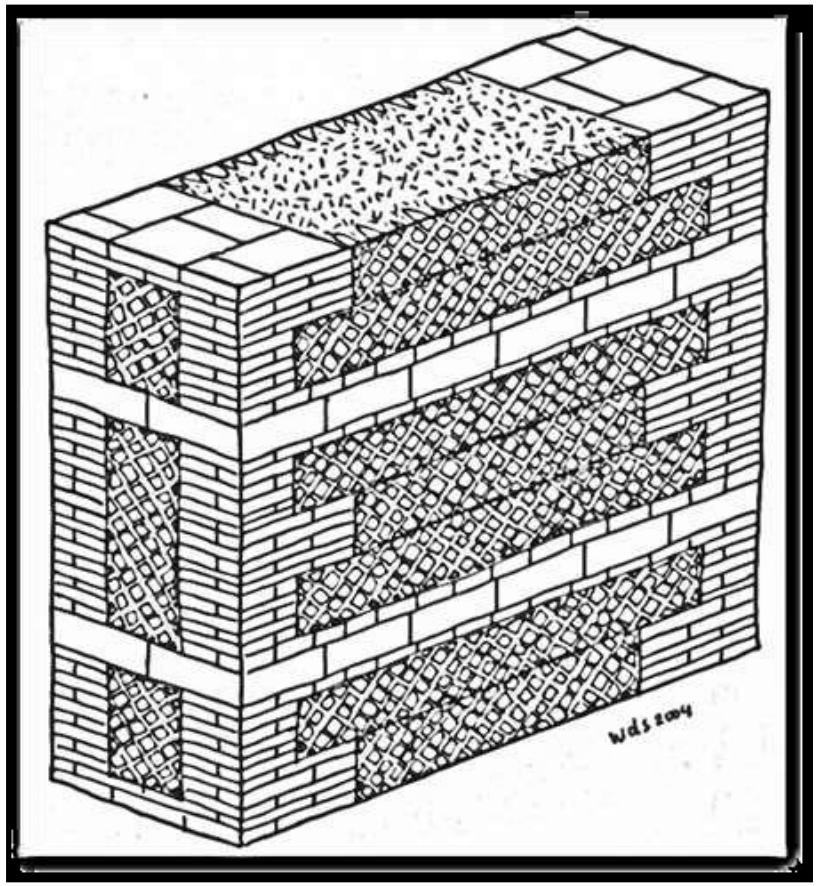
Roman Architecture

Roman Architectural character(Building techniques)

4. “Opus quadratum” **:** as rectangular pieces of stone laid with mortar & secured by cramps.
5. “Opus mixtum” Concrete wall faced with bands of tufa stone in between brick facing .



opus quadratum



Opus mixtum

Roman Architecture

Roman Architectural character(Building techniques)

Opus mixtum

“Opus quadratum

opus testaceum

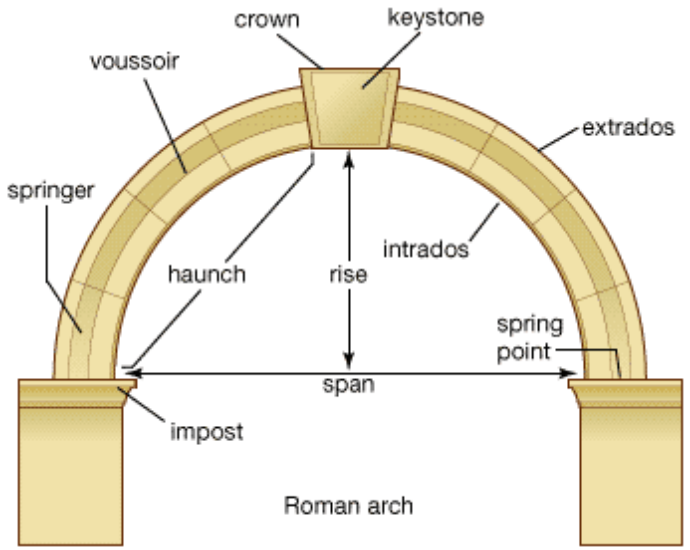
opus incertum

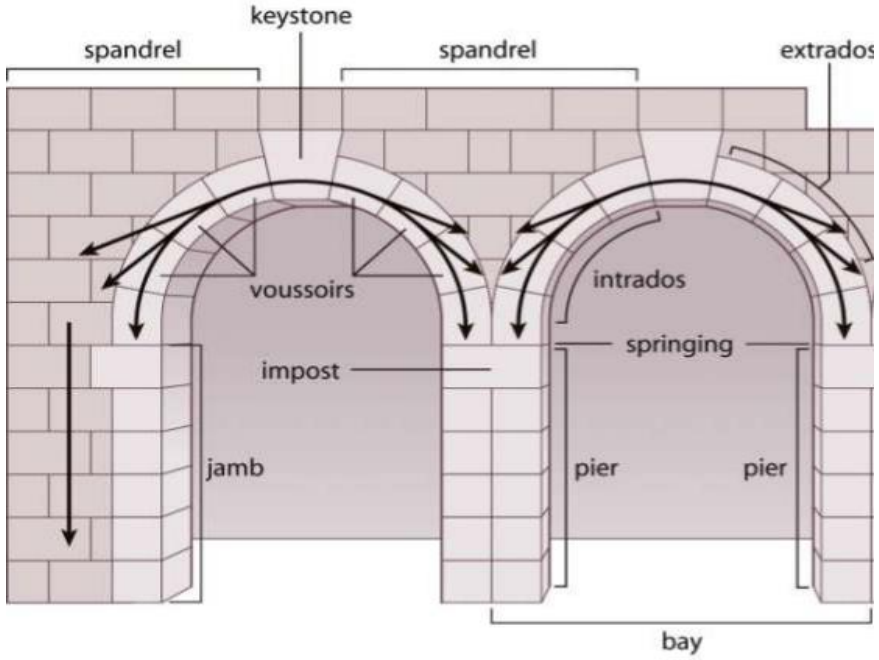
opus reticulatum

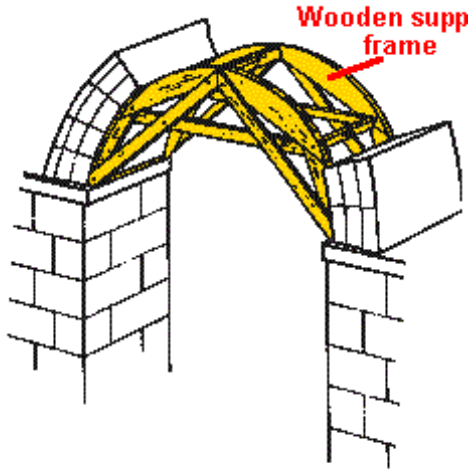
Roman Architecture

Roman Architectural character (Roman Arch)

- The Roman style, as it is commonly known comprises of an **arched opening** with **columns** on either side, supporting an entablature.
- The combined use of the column, beam & arch is **the key note of the Roman style**.
- In roman time Only the semicircular arches in stone bricks were used. Other types of arches were employed during the Romanesque & gothic periods.
- **The physics of the arch** , allowing it to hold more weight , and that's made Roman structures more larger and taller from Greek structures .
- The physics of the arch usually push the weight down the jambs, causing a lateral push that could cause the arch to bow out and collapse. So buttressing is required for the holding columns(Jambs) by adding more thickness (a lot of support material) .







Roman Architecture

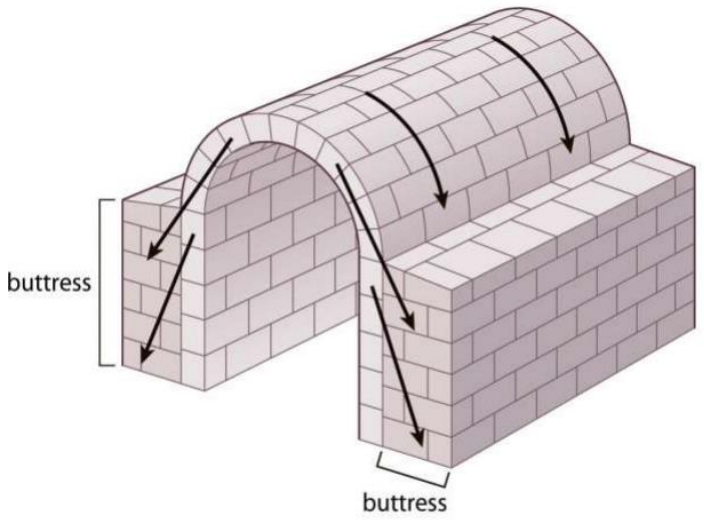
Roman aqueduct , Segovia Spain,

Roman Architecture

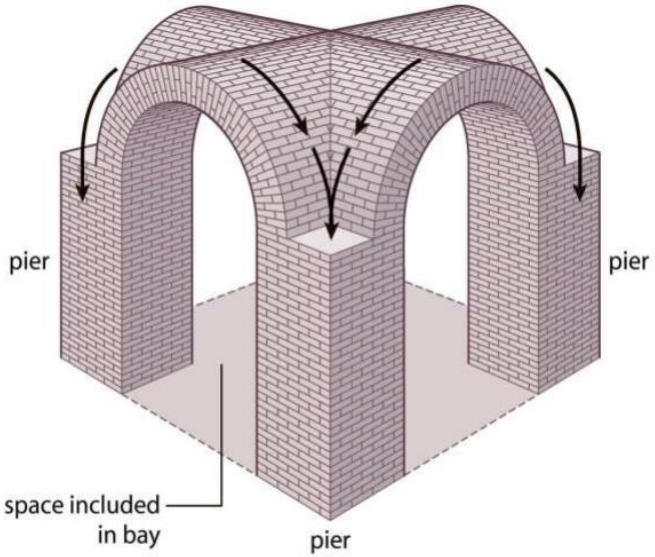
Roman Architectural character (Vault roofing system)

- The building techniques also improved the Roman vaulting system, which became an important development in Roman architecture.
- The character of roman architecture is largely dependent on the use of vaulting as a standardized structural roofing system.
- There 2 types of vaulting system :

1. **The barrel vault :** is the space created by an extended arch. (An arch extended along a line).
2. **The groin vault :** is formed by the intersection of 2 semicircular vaults of equal span was used over square spaces. They buttress each other, allowing the Roman engineer to take out the bulk of the barrel vault. The groin vault also allows for a clerestory , bringing light to an dark channel.



barrel vault

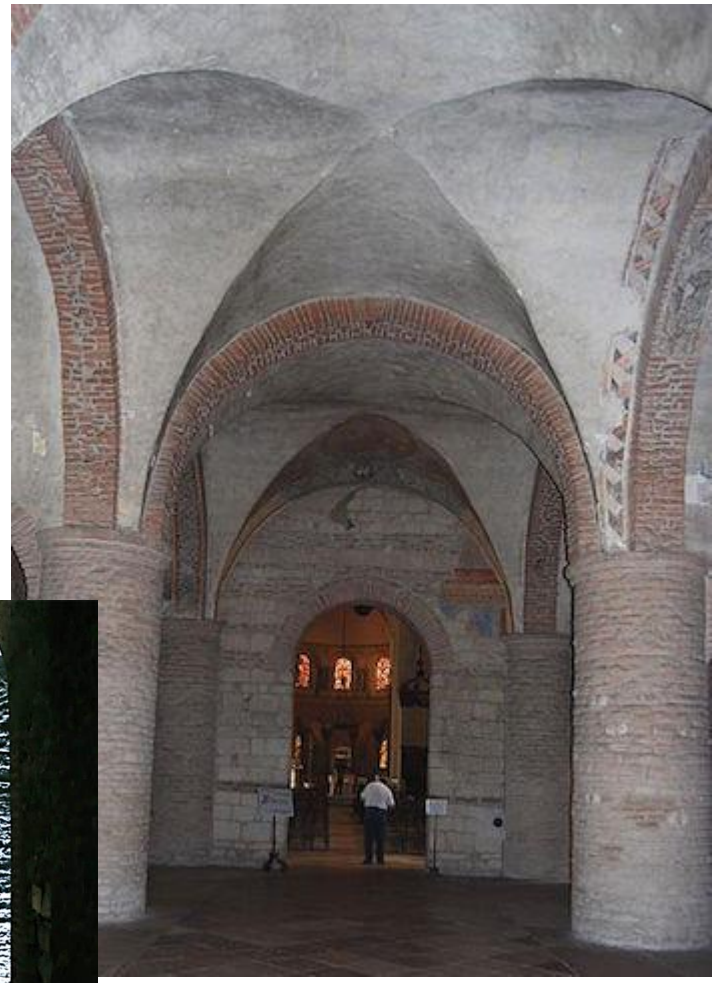


groin vault

Series of groin vaults with a clerestory

Roman Architecture

Roman Architectural character (Vault roofing system)



groin vault

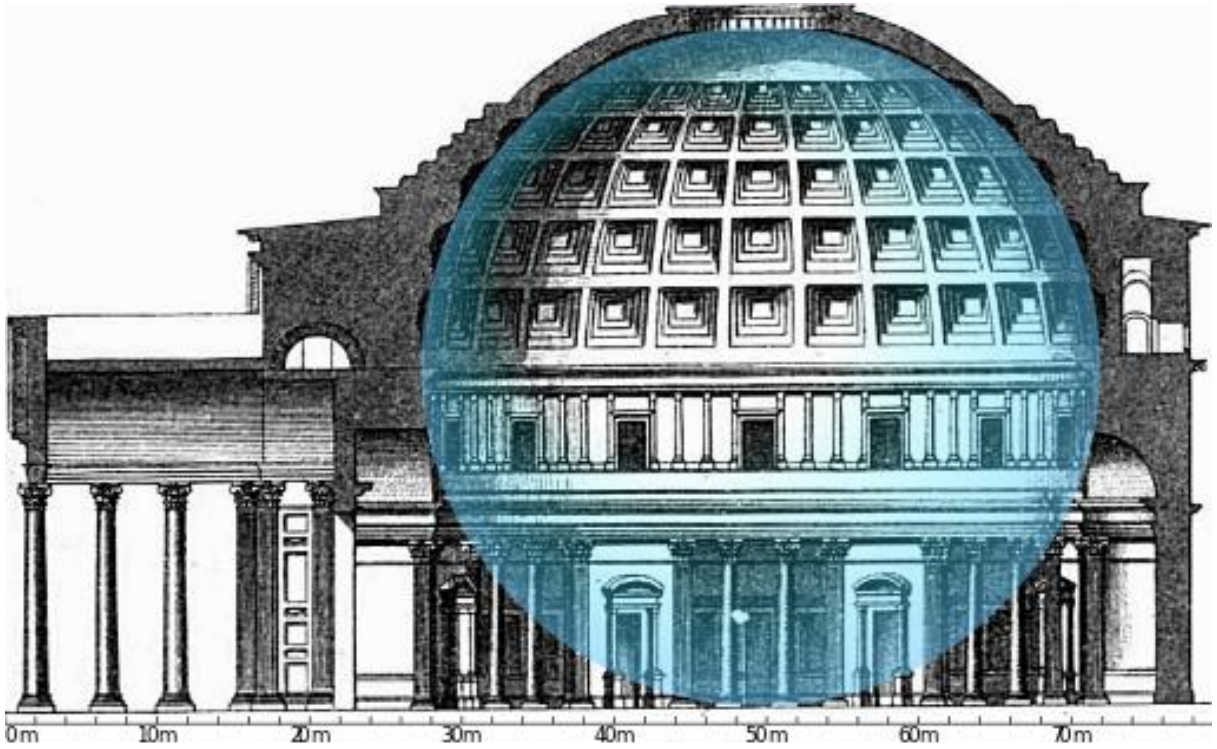
The barrel vault

Roman Architecture

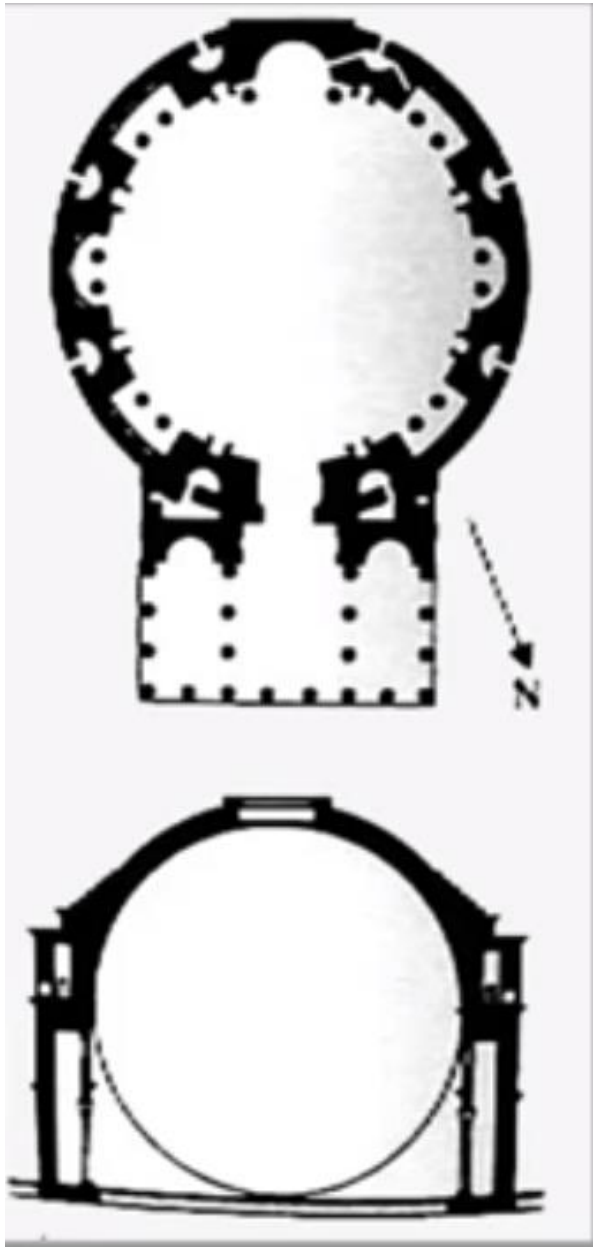
Roman Architectural character (Dome roofing system)

- **Hemispherical domes** :were used over circular spaces & semi-domes.

- It is An arch can pivot on itself 180 degrees to create a continuous dome.
- The hemispherical dome without any vent on sides , so the only vent, an oculus (an architectural eye) at the top of the dome brings in light.



Dome of The circle temple pantheon

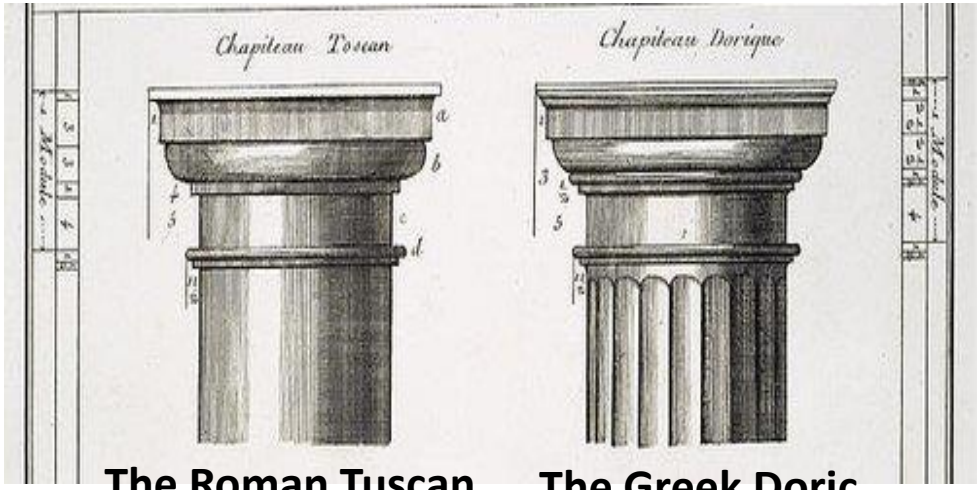


Roman Architecture

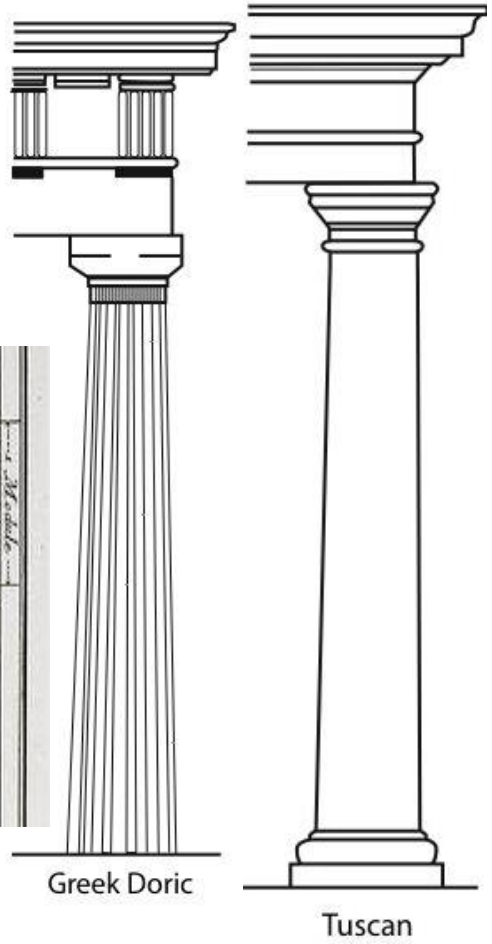
Roman Architectural character (classical orders)

- They also used the classic Greek column order after developing it, and they add 2 more types , thus we had **five** main columns orders: Doric, Ionic, Corinthian , **Tuscan** and the **Composite.**
- The Romans used the orders mostly as decorative features, as the vaulting & domes employed served as the structural system.
- **The Tuscan order**: is a simplified version of the Doric, about 7 dia. high, have a base, unfluted shaft, simply molded capital & a plain entablature.
- **The Composite order** : has a capital that is a combination of Corinthian & Ionic and was used ir triumphal arches, to give an ornamental character.

The Greek Corinthian **The Roman Composite**



The Roman Tuscan **The Greek Doric**

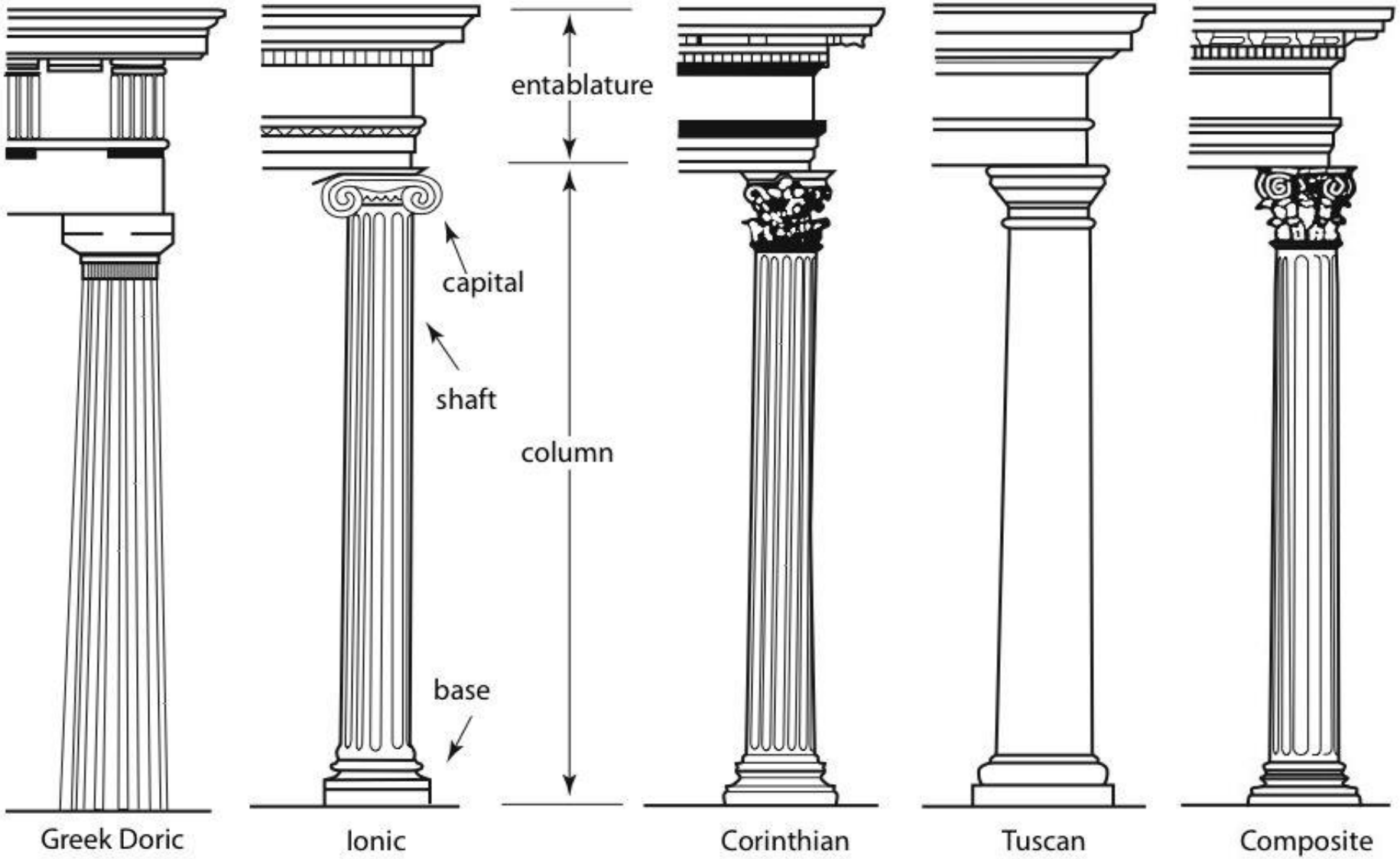


Comparison between columns capitals .

Roman Architecture

Roman Architectural character (classical order).

The five orders



Roman Architecture

Roman Architectural character (classical order).

The classical orders used as decorative elements only

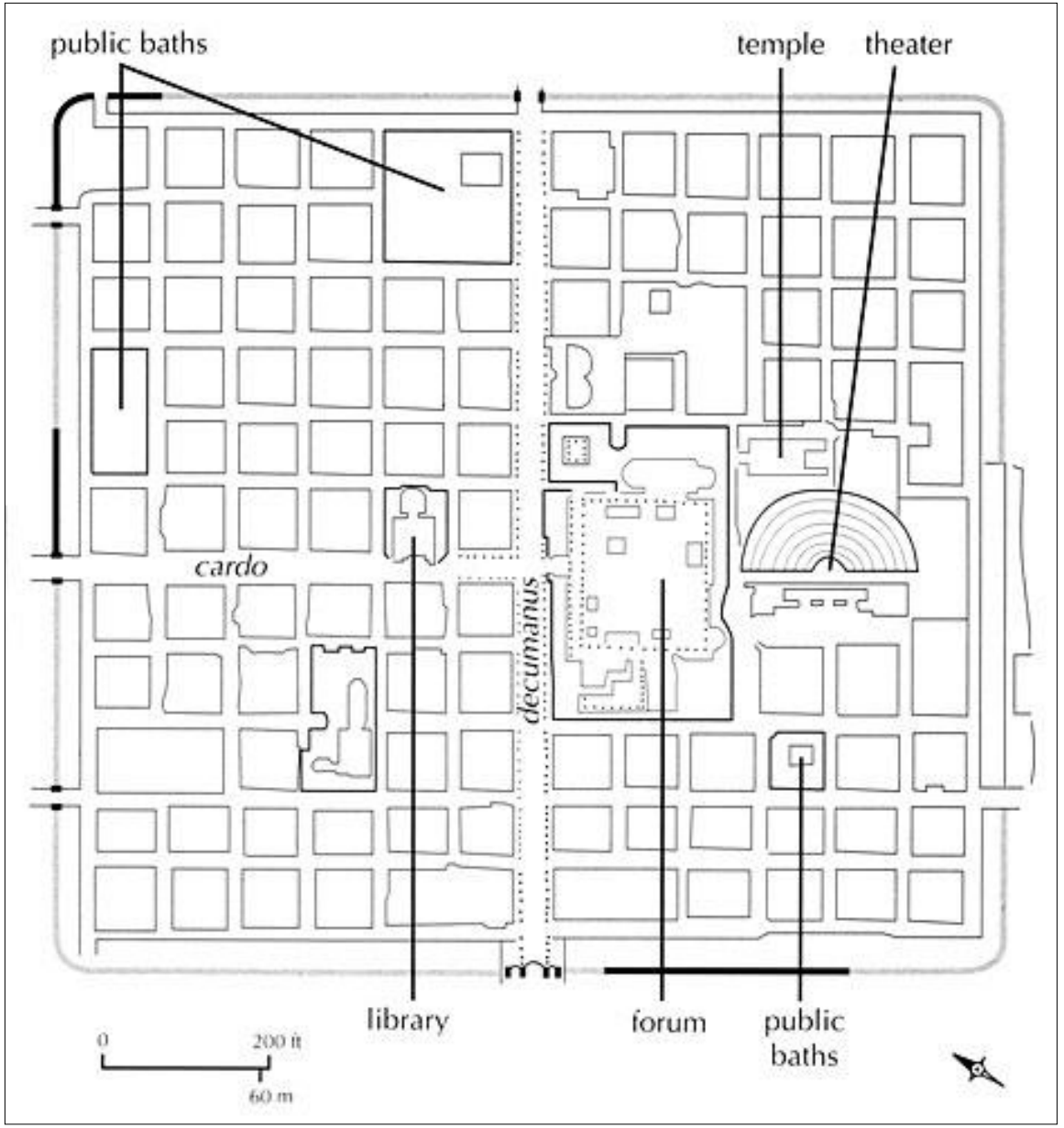
Roman Architecture

Roman Architectural character

- **Roman Principals of City Planning :**

- Roman cities were well-planned with straight streets crossing the town in a grid pattern.
- plan of the city was based on the **camp system** .
- It had two main axes**: (*Cardo* E-W) , (*Decumanus* N-S).**
- Where the two converged was **the *forum or fora*** (In the town center) it was an open space surrounded by a hall, offices, law courts and shops ,The rest of the space was divided into squares in which blocks of flats were built.
- The Romans were even willing to work within the Hellenistic design mold; the most spectacular examples of this are at Ephesus and Miletus.
- **Romans established the basics of the modern urban city and there planning has continued to this day and they are:**

1. The **infrastructure :** Water , sewer system , Transport(paved street) and defence.
2. Public spaces and markets.
3. Psychological effect: power and control



Example about Roman city plan

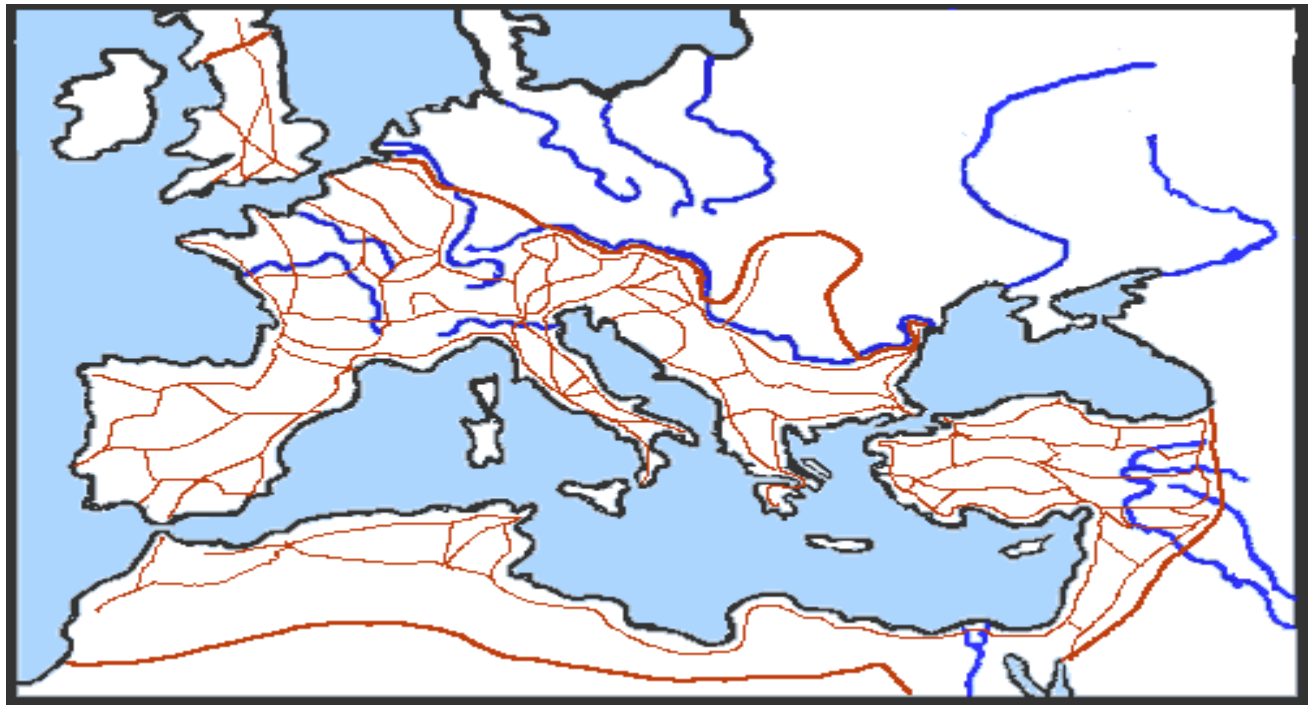
Roman Architecture

Road system

- **Roman Principals of City Planning :**

Roman Architectural character

- **In order to control there big empire , There was a need to link its cities through a road system (paved roads).**
- A 50,000 mile long road system (paved Roads) was built to :
- reach to any point of the empire.
- They facilitated both communication and political control.
- For the military and people , it facilities the movement and ideas through the empire.



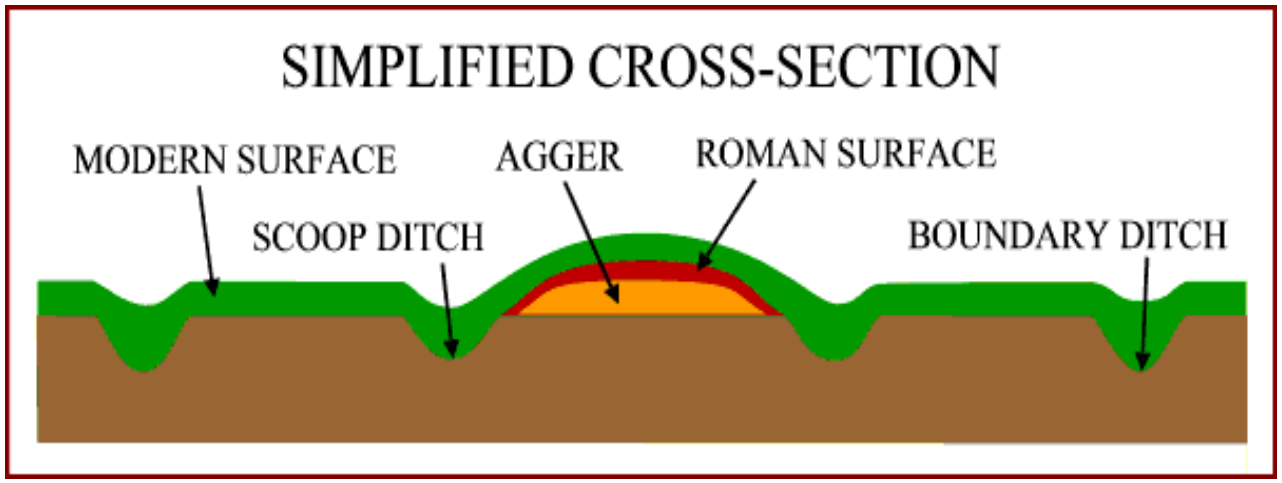
Roman Architecture

Roman Architectural character

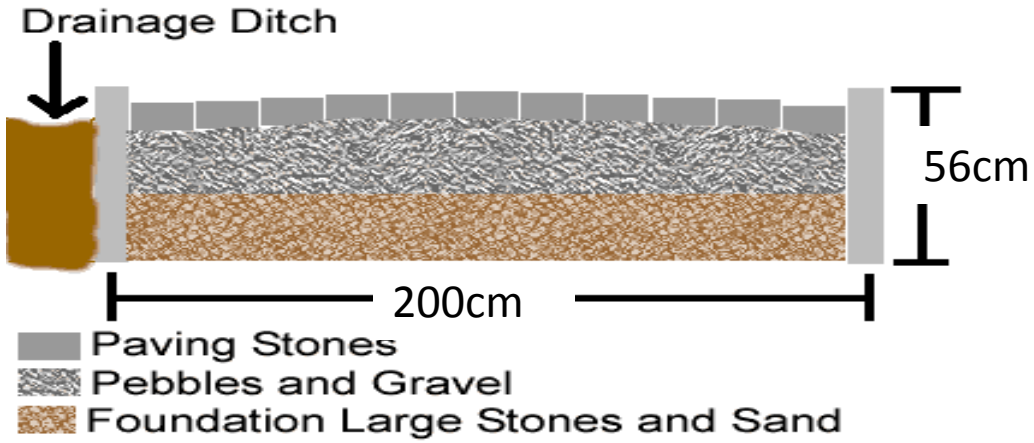
- **Roman Principals of City Planning :**

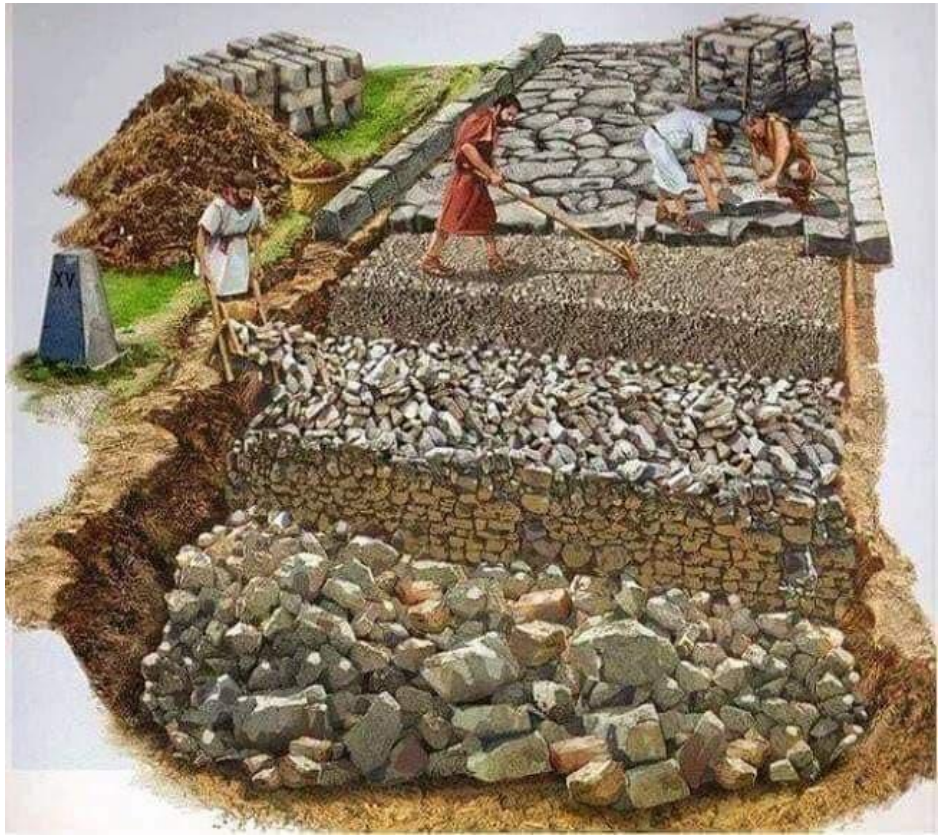
Road system

- The roads were made with strong foundations.
- Different materials were put into different layers.
- To measure the distance they created the *Milliarium* or stones located in the sides.



Section of a Roman paved road





The roads were not completely flat

They consisted of several parts:

- The central and highest was the most important, it was convex to conduct the water to the Ditches that were built in the sides.

Roman Architecture
Buildings types

Roman Architecture

Roman Architecture Buildings types

- Throw together **the invention of concrete, the roman arch , vault system , and the dome**, So the Romans have the necessary means to create structures that reflect their dominance in the ancient world.
- These structures dominate the nature (**unlike Greek structures that tried to be in harmony with the natural landscape**).
- These structures also **created to show there ruling power and glory (like the Pantheon and colosseum).**
- These structures also **support a growing population that is subject to a lineage of Emperors**.

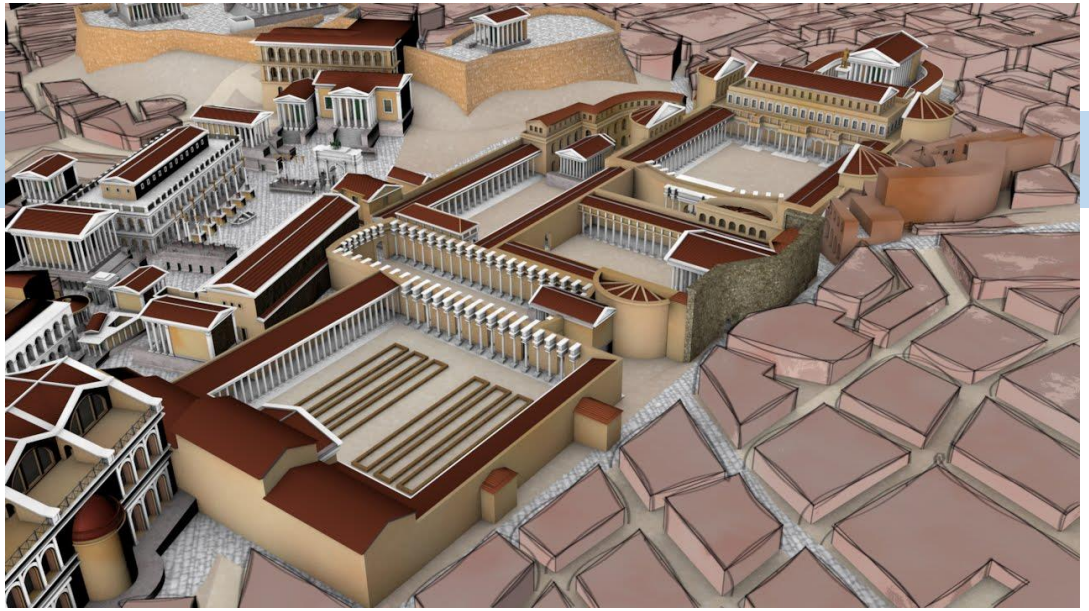
Roman Architecture has a rich structures that includes:

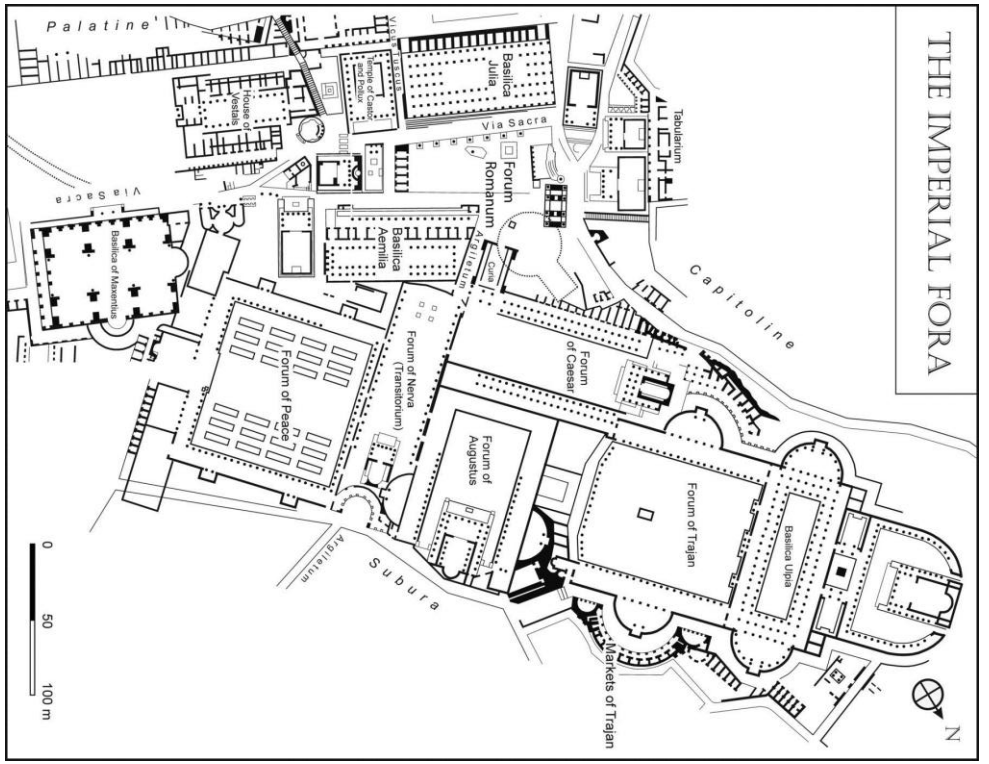
- Religious building: **temples**
- Civil buildings:
  2. Public: forums, basilicas, baths .
  3. Spectacles: theatre, amphitheatre, circus.
  4. Commemorative: Triumphal arches, columns.
  5. Domestic: house, palace
  6. Funerary: tombs
- Engineering works:
  1. Bridges
  2. Aqueducts

Roman Architecture

public building : The Forum(Fora) :

- **Forum** is associated with **Greek Agora**.
- The Forum (a Latin word meaning open space or market place) was the ***administrative and corporate heart of Rome cities***.
- Generally this word referred to the open space in any Roman town where **business**, **judicial**, **civic**, or **religious activities** were conducted.
- A typical forum might be surrounded by **temples**, **shops**, and **basilicas.**
- In Rome city, there were several forums. The most famous, the Roman Forum, was designed by the architect Vitruvius .
- Many other Roman cities included Fora like Timgad , Pompeii and Damascus.





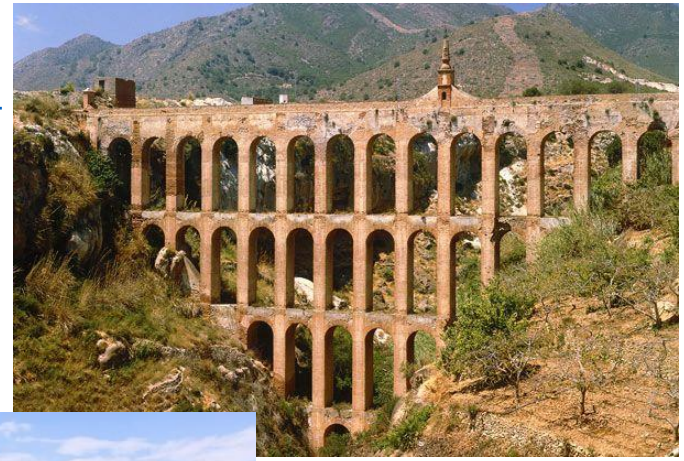
Roman Architecture

Engineering works : The Aqueducts :

- **An artificial channel** for conveying water ,typically in the form of a bridge supported by arches with tall columns .
- Aqueducts were built in order to avoid geographic irregularities between fountains or rivers and towns.
- Aqueducts were built to cross valleys and mountains by long tunnels, pits and levels of maintenance.
- **They were used to:** bring water to the cities centre , increased the public's access to water , helped improve public health also allows city populations to grow , Supports a social network of public baths , and A public works project that reflects the Emperors provision for the empire

Pont du Gard, Nimes , France.

Nerja, Spain



Tarragona Catalonia Spain

Roman Architecture

Commemorative monuments: Triumphal Arches

- A public monument displaying the triumph/s of an emperor— military victories, deification .
- Filled with inscriptions in the attic .

- **Used for :**
- usually placed at the main entrance of cities in order to remember travellers and inhabitants the Greatness and strength of Roman world.
- Arches were used not only for Roman victories or military generals: they also marked limits between provincial borders.

- At the beginning they were wooden arches where trophies and richness from wars were shown.
- Then changed to be built from concrete and stone and to be as a commemorative arches with inscriptions.

- They were a Roman creation and they succeeded many of them have been constructed until the present days.

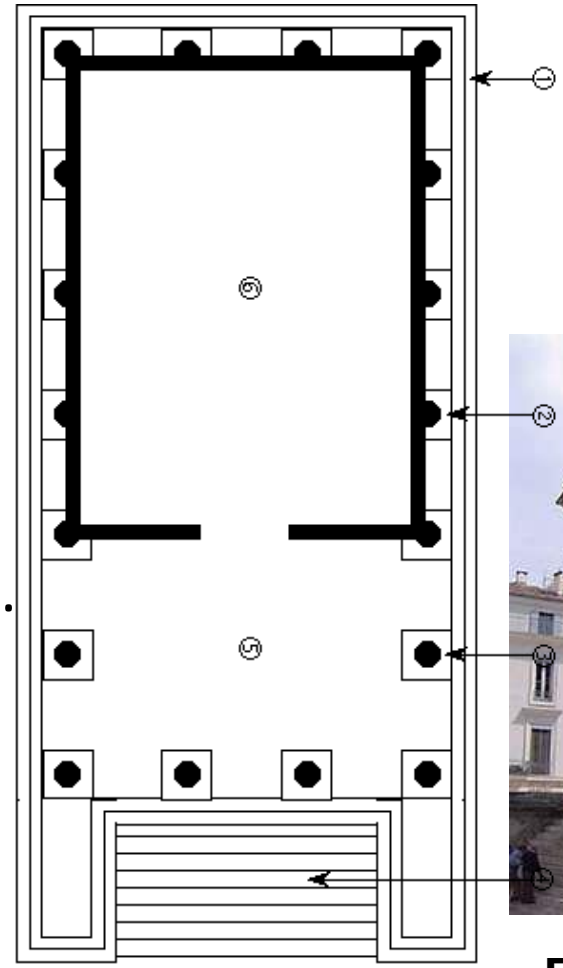
Arch of Septimius Severus, The Forum, Rome

Roman Architecture

Religious buildings : The Temple :

- It copied the Greek model.
- It has only one portico and a main façade.
- It tends to be **pseudoperipteral** Greek temple type .
- The ***cella*** is totally closed
- It is built on a podium or a high platform.
- Instead of having stairs all around (Greek temple) , it only has them in the main façade.
- There were other kind of temples:

1. **Rectangular**: similar to the Greek like the **rectangular temple** .
2. **Circular :**combined squared and circular structures and was in honour of all gods. like the **CIRCULAR TEMPLE ,** The Pantheon Rome.

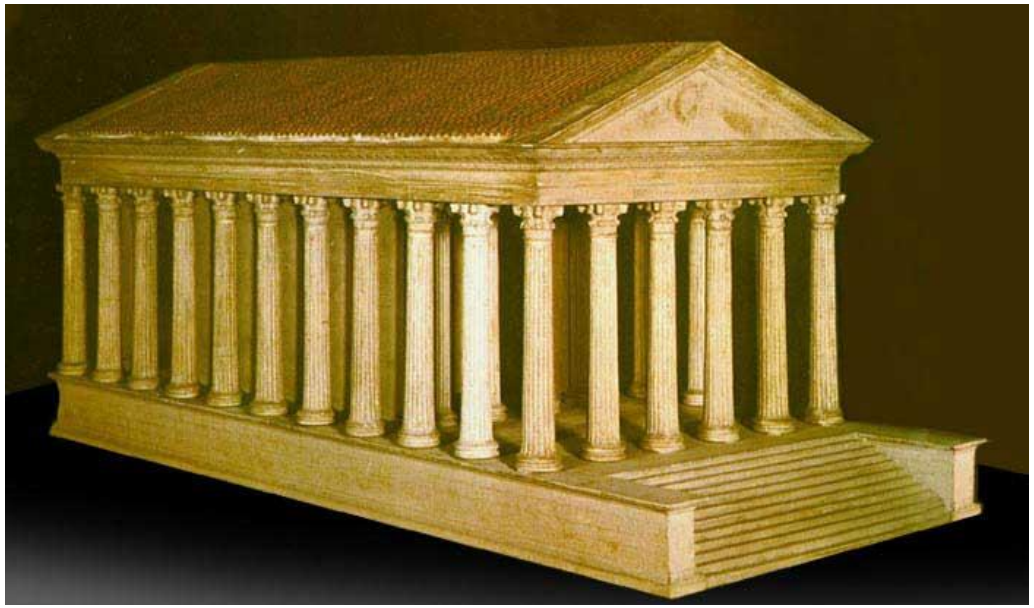


RECTANGULAR TEMPLE
Maison Caree, Nimes

Roman Architecture

Religious buildings : The Temple :

Temple of Portunus (formerly known as, Fortuna Virilis), c. 120-80 B.C.E., structure is tufa, stuccoed to look like Greek marble, Rome.



rectangular temple shape

Roman Architecture

Religious buildings : The Temple :

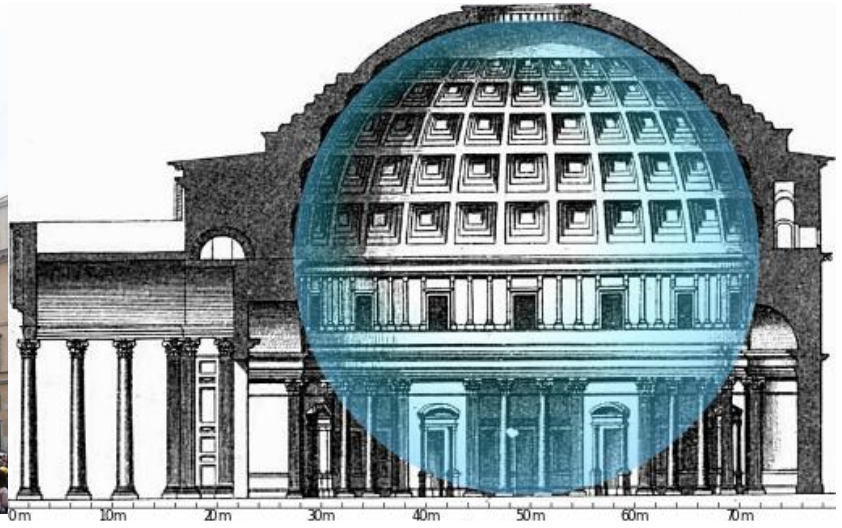
Example about CIRCULAR TEMPLE , The Pantheon. Rome

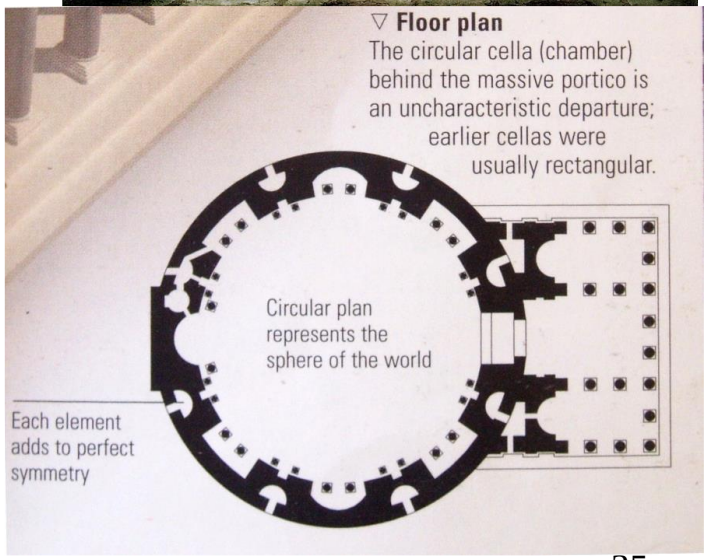
A CIRCULAR TEMPLE

Roman Architecture

Religious buildings : The Temple :

- **Pantheon** meaning "every god“, A temple for all gods .
- The building is circular with **a portico** of large granite Corinthian columns (8 columns in the first rank and two on the sides) under a pediment.
- A rectangular vestibule links the porch to the rotunda, which is under a concrete dome, with a central opening (oculus) to the sky.
- The height to the oculus (the open vent in the top) and the diameter of the interior circle are the same, 43.3 meters.
- Almost two thousand years after it was built, the Pantheon's dome is still the world's largest unreinforced concrete dome.

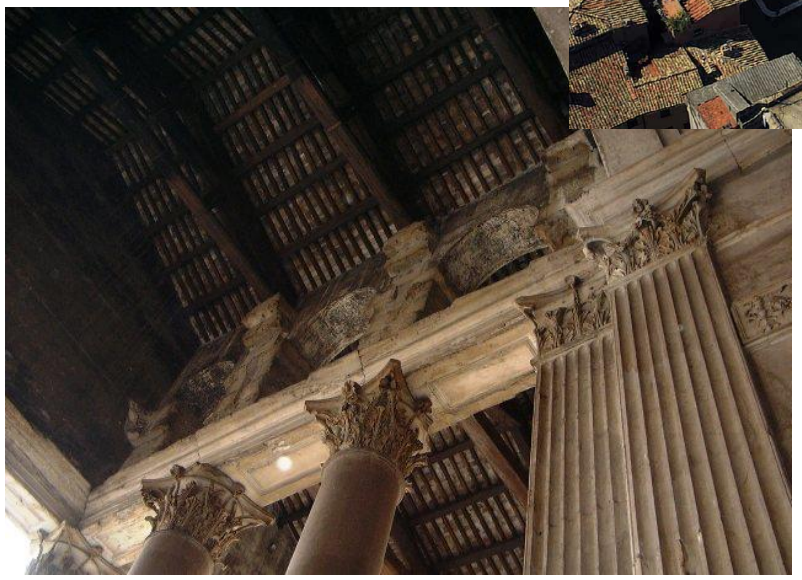




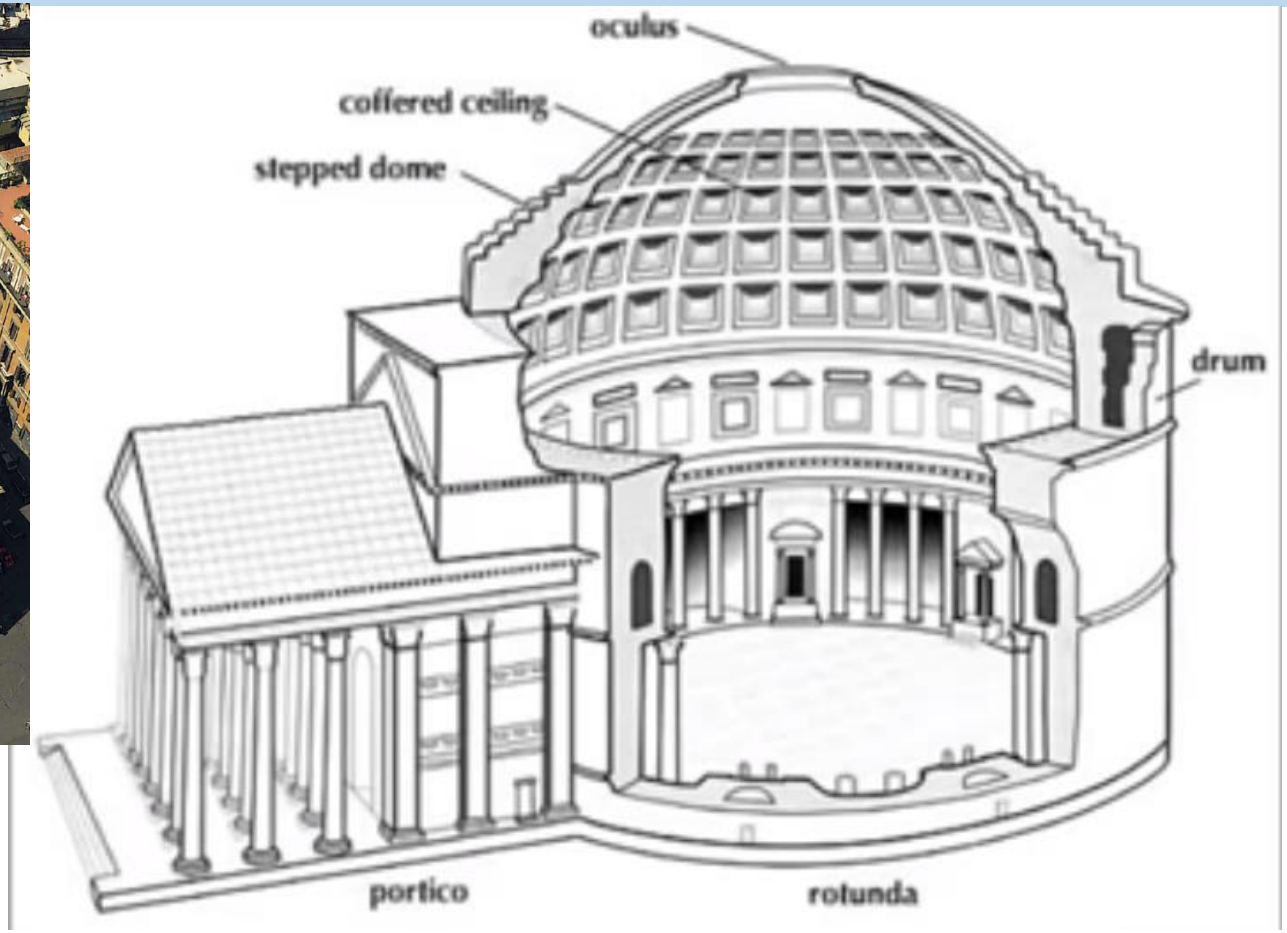
Roman Architecture

Religious buildings : The Temple :

oculus



Corinthian columns were used.



Cross-section of the Pantheon

Roman Architecture

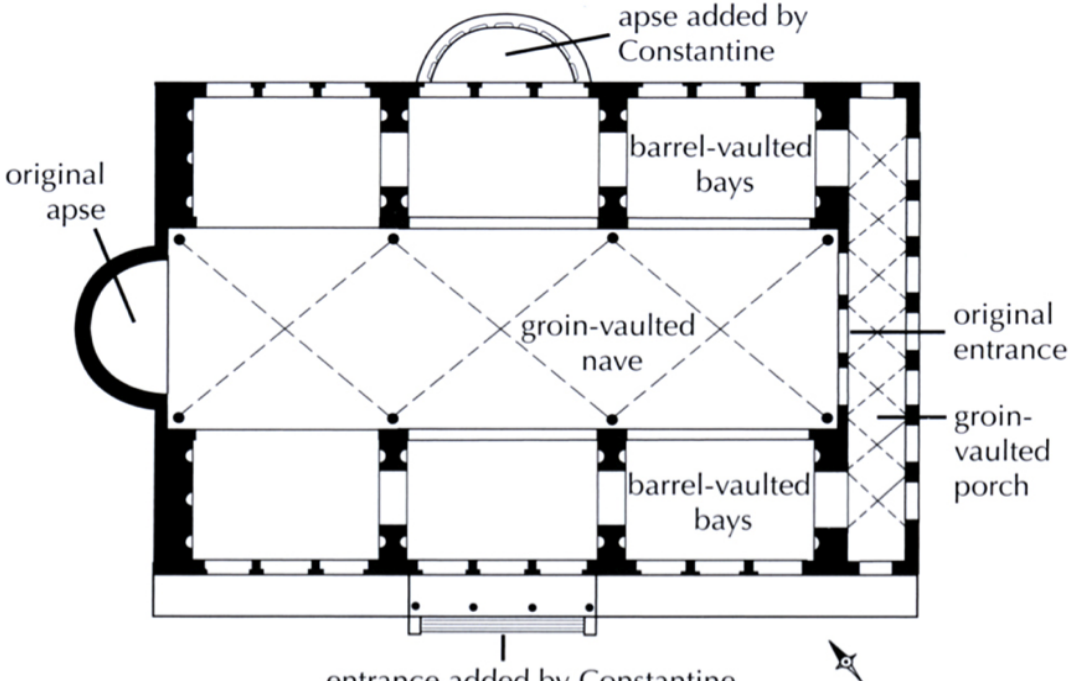
Public buildings : The Basilica :

- The 2nd century B.C. saw the creation and the introduction of a unique Roman building type, **the basilica**.

- The basilica was a large oblong hall or building with double colonnades and a semi-circular apse, that often had a multi-purpose use— from law courts , commerce , entertainments and as a place for any large gathering .

- Roman Architects came to prefer them for connecting the long sides of open squares.

- The basilica **later adopted by the Christian church** .

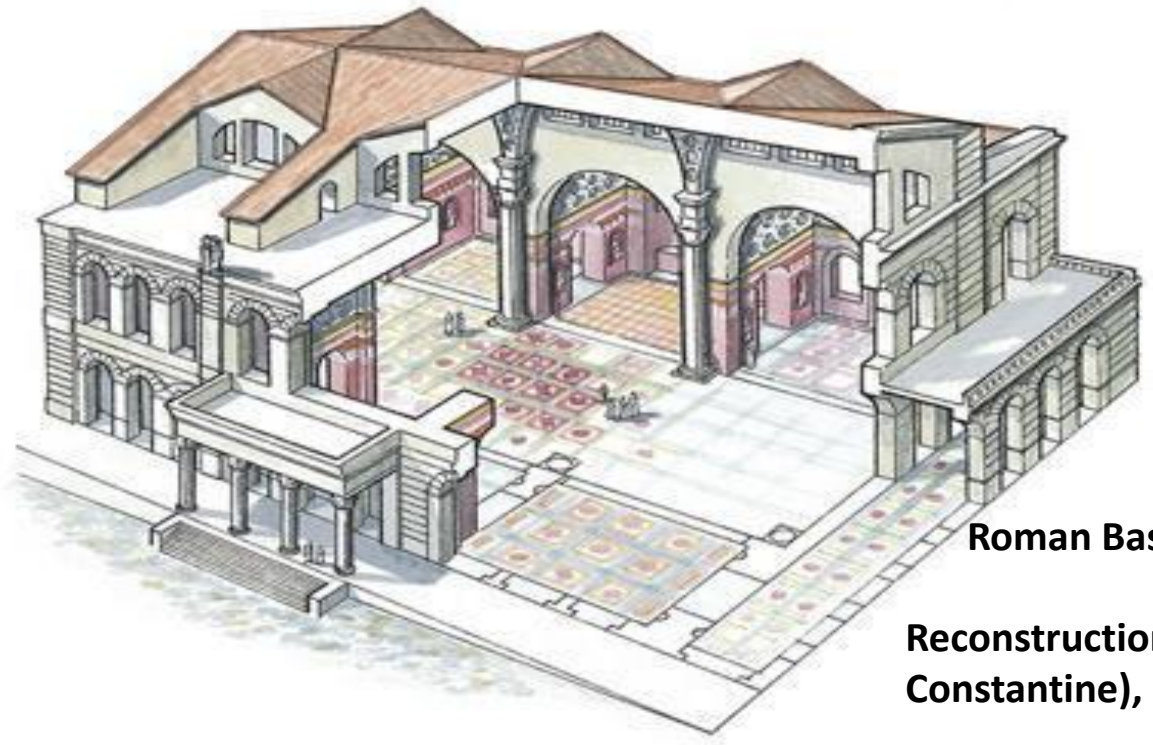


Roman Architecture

public buildings : The Basilica :

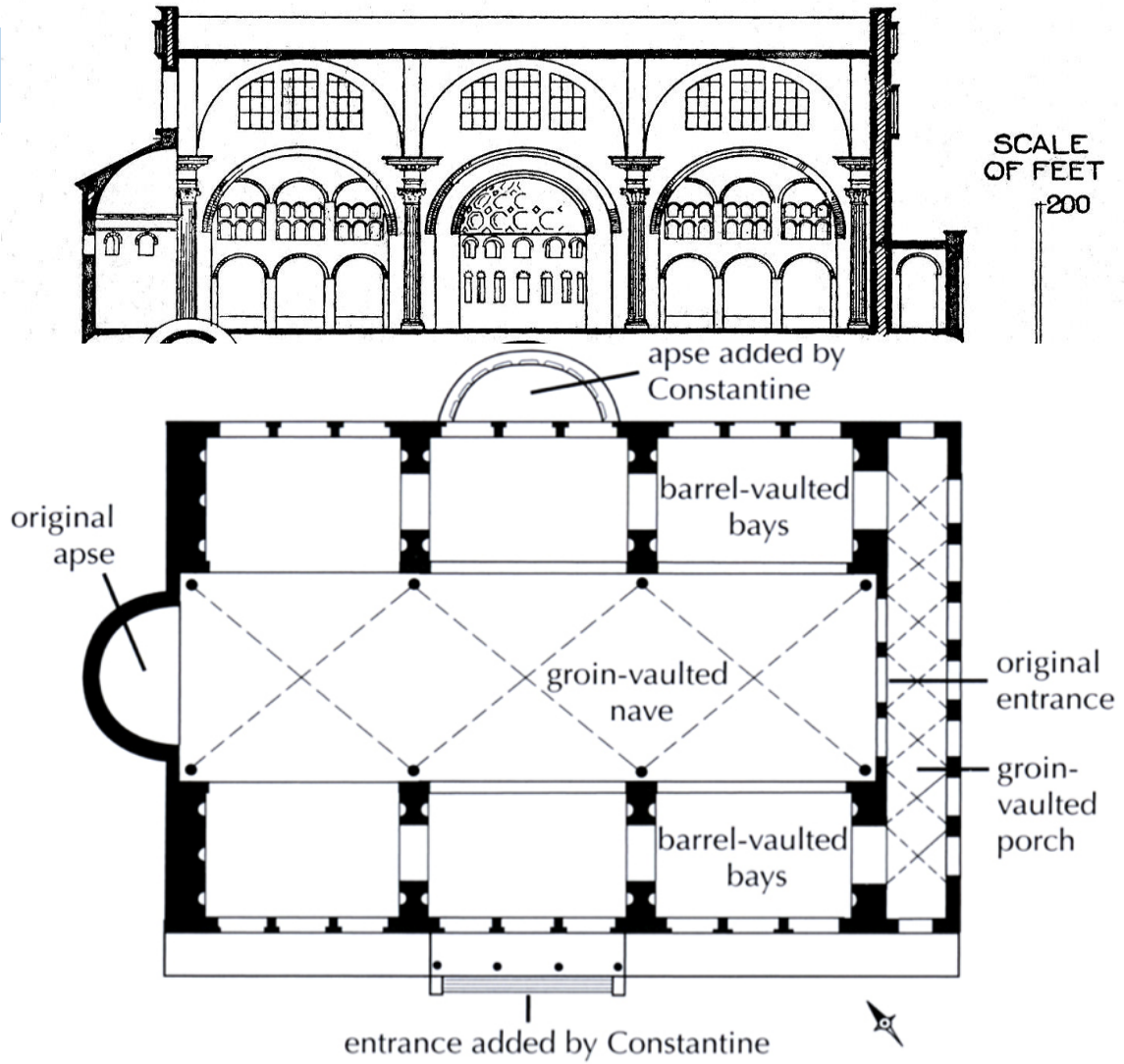
- It is a rectangular and has different naves .
- The central nave is higher and receives light from the sides
- The building ends in an apse
- It is covered with vaults system
  1. Groin vault over the central nave .
  2. Barrel vault over the lateral naves .

  Example : Maxentius basilica



Roman Basilica perspective

Reconstruction drawing of (Basilica of Constantine), Rome, Italy, A.D. 306–312.



Roman Basilica plan

Roman Architecture

public buildings : The Basilica :

Ruins of Maxentius Basilica

Roman Architecture

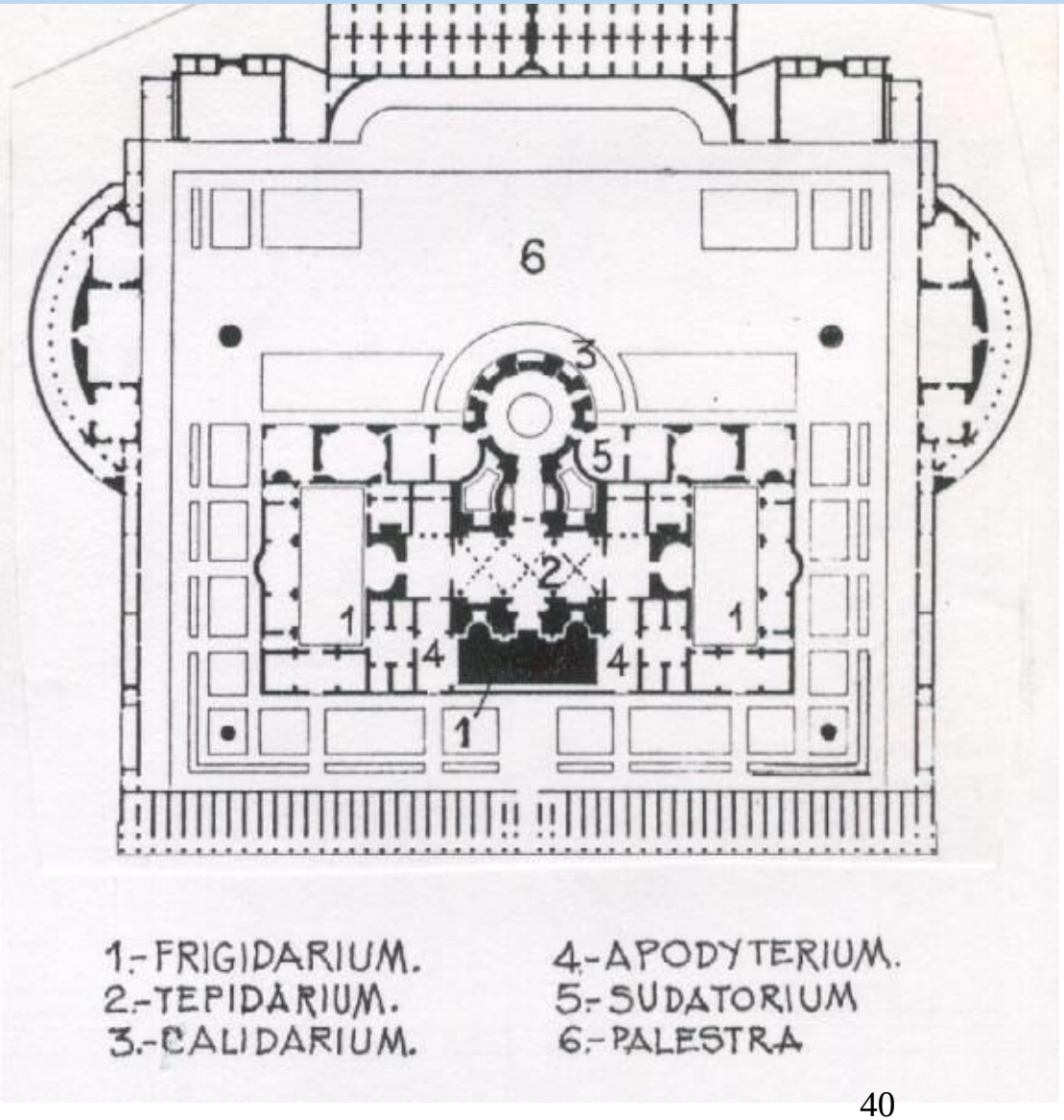
public building : The Baths :

- Entertainment varied greatly to suit all tastes in Rome, necessitating the erection of many types of structures.

- Romans liked to keep clean and fit
- Baths were spaces for public life
- Built elaborate public baths throughout the empire.
- They consisted of different rooms:

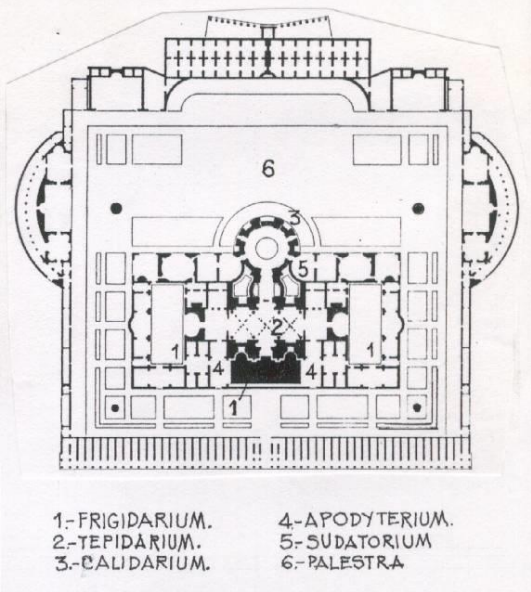
1. Apodyteria – dressing room.
2. Sudatorium - sweat room, rubbing with oil.
3. Tepidarium – warm bath.
4. Frigidarium – cold bath.
5. Calidarium – oils and perfumes room and warm water.
6. Palestra – reception .

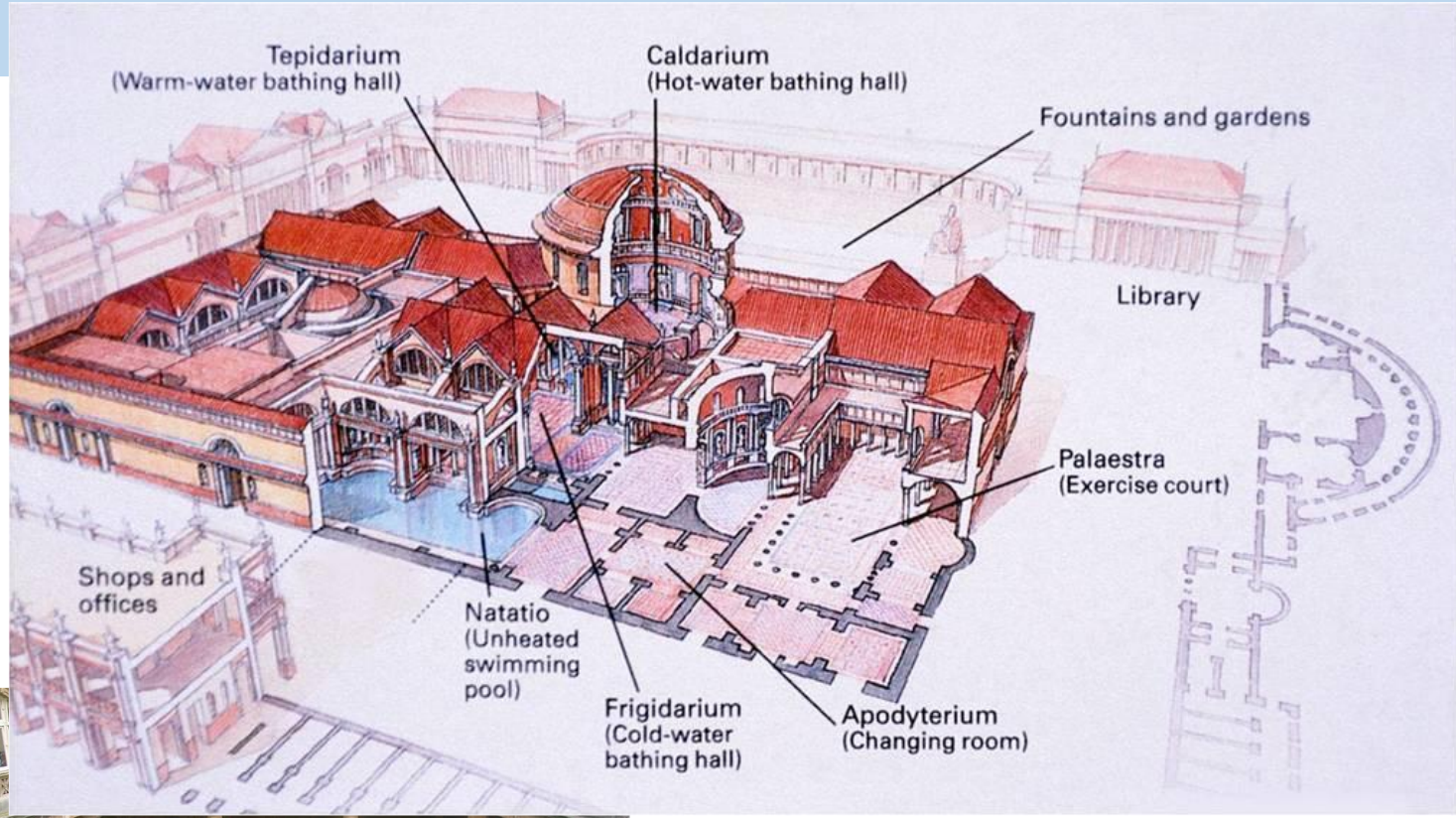
- Many baths also included libraries, concert halls, gymnasiums for training , shopes and exercise .
- Provided the emperor with a good reputation.



Roman Architecture

public building : The Baths :



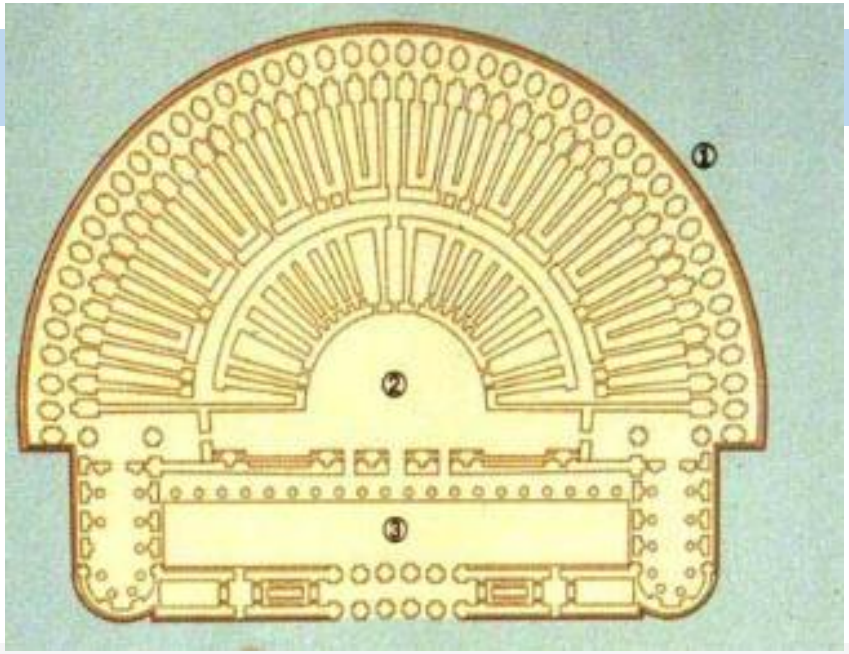


Caracalla´s Bath House

Roman Architecture

public building : theater :

- Roman theatre was inspired by **the Greek version**,
- Roman theatres have specific differences from Greek ones.



- The main elements of the Roman theater are :

1. cavea (Auditorium).
2. Orchestra.
3. scaenae frons (stage building).

Main charechtirestices:

- Independent structure , as being built upon their own foundations not like Greek built on the hillside.
- Orchestra was made semi-circular and the whole made using stone.
- Enclosed on all sides .
- The Romans also added a highly decorative stage building (*scaenae frons*) which incorporated different levels of columns, projections, pediments, and statues such as is found in the theatre at Orange (27 BCE - 14 CE)
- Capacity : 6000 person and more .

Roman Architecture

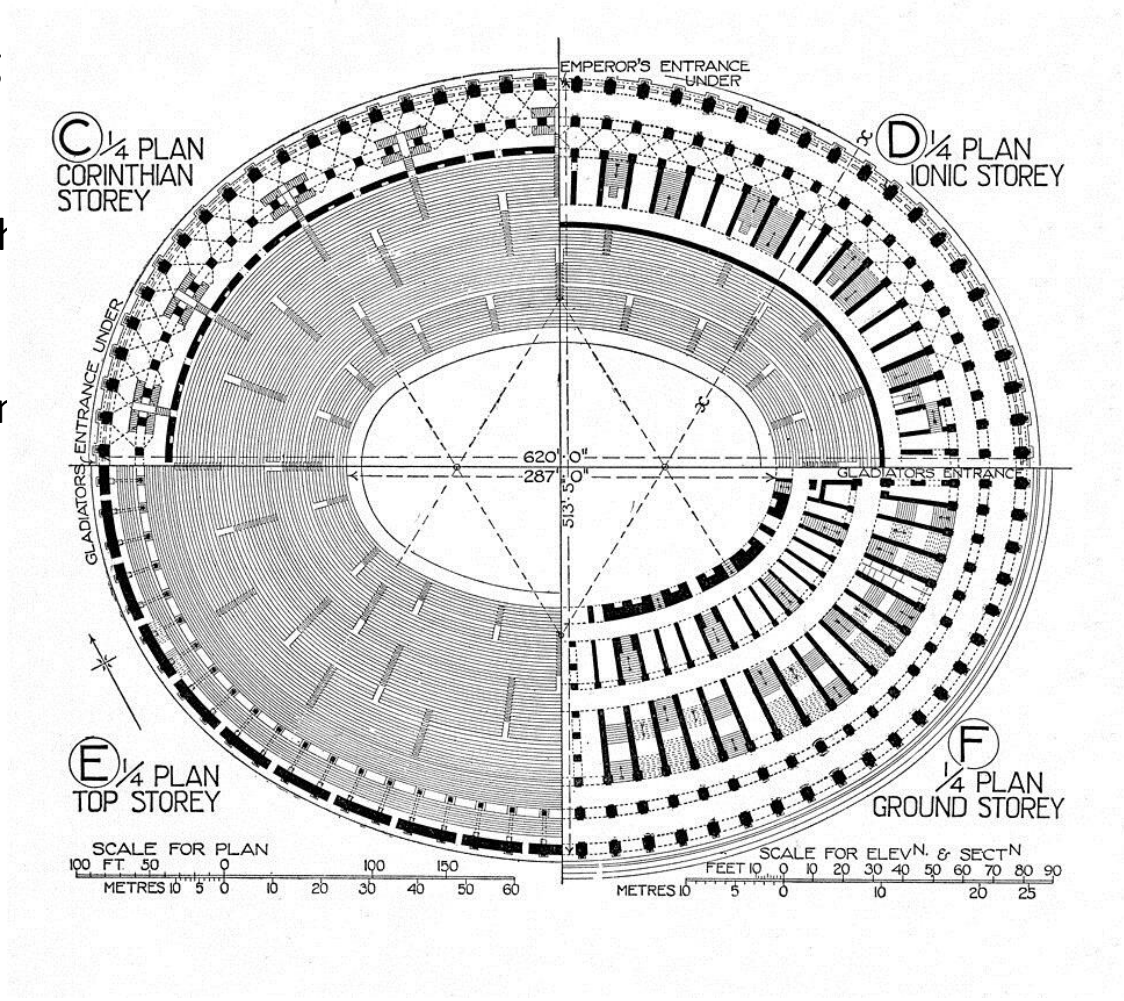
1. public building : theater :

Orange theatre
, Vaucluse, France

Roman Architecture

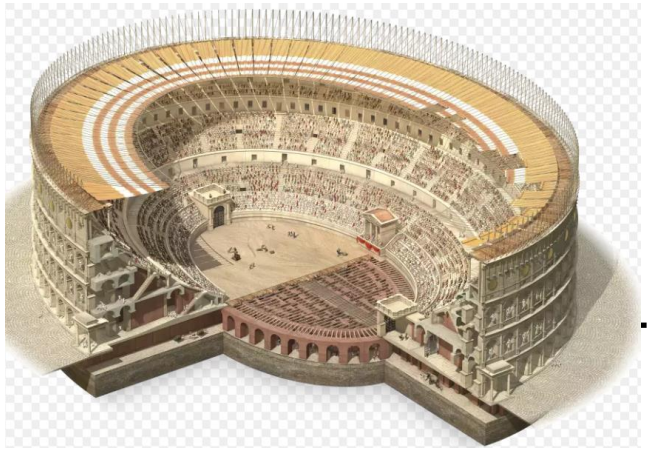
public building : amphitheater :

- **The Colosseum** is the largest and most famous, and it is a typical example copied throughout the empire.
- It was large, circular or oval open-air venues with raised seating built by the ancient Romans.
- It comes from the fusion of two theatres.
- The fully enclosed amphitheatre was a particular favourite of th Romans.
- Time to build: 8 years later (72 - 80 AD .)
- It was used for events such as gladiator combats ,animal slayings ar executions.
- They could be filled with water (flooded) for naval battles.

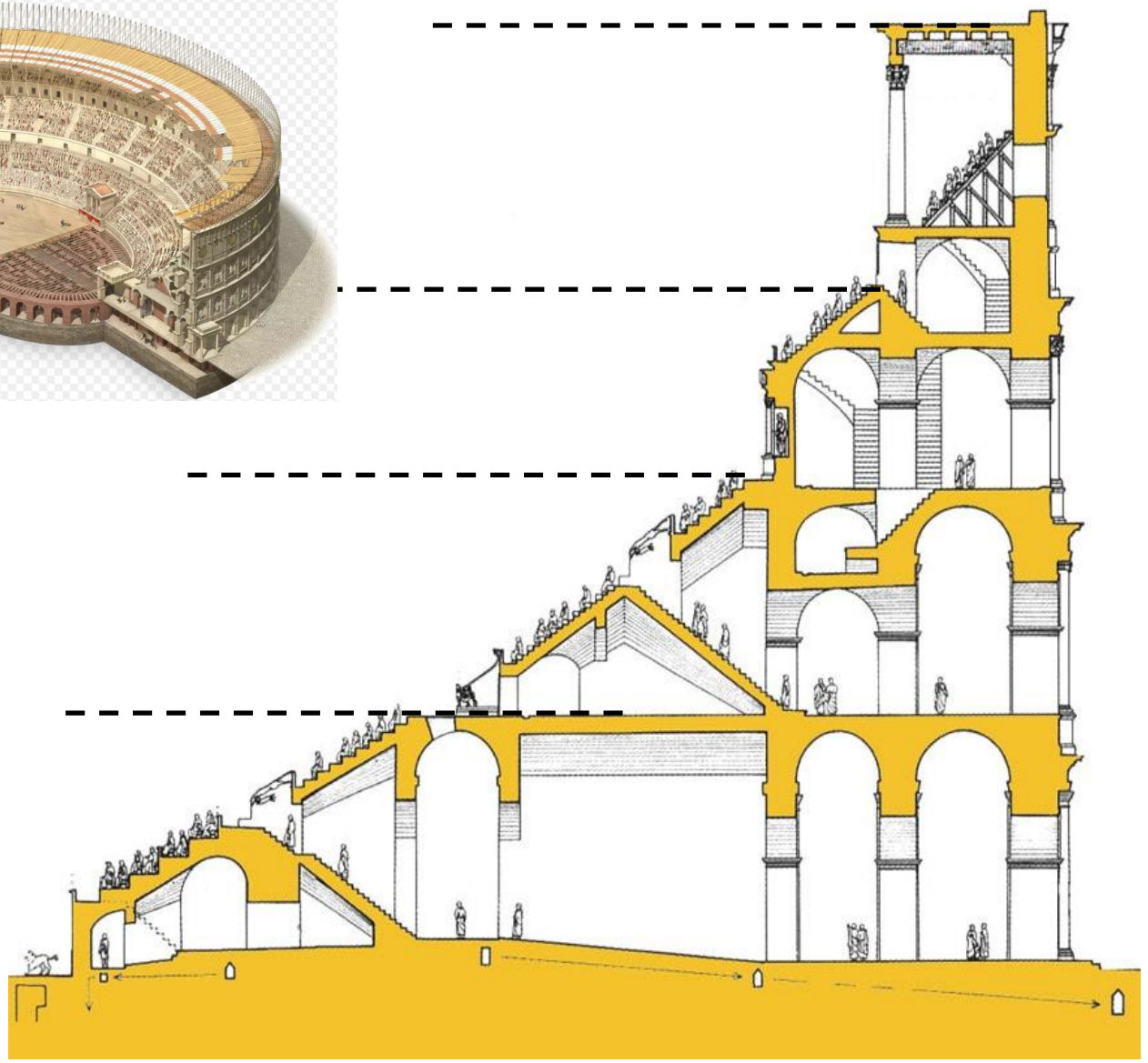


Roman Architecture

public building : amphitheater :



- The huge theater was originally built four floors. The first three had arched entrances, while the fourth floor utilized rectangular doorways.
- a highly decorative exterior, seats set over a network of barrel vaults, and underground rooms below the arena floor to hide people, animals and props until they were needed in the spectacles.
- The floors each measured between 10,5 -13,9 meters
- The total height of the construction was approximately 48 meters. The arena measured 79 x 45 meters, and consisted of wood and sand.
- The word "arena" is derived from the Latin arena, which means "sand."
- Nets along the sides protected the audience.
- The materials used were of concrete and sand.
- It is the largest amphitheater ever built and is considered one of the greatest works of architecture and engineering.



Roman Architecture

public building : amphitheater :

- **Corinthian Columns were used for the third floor.**
- The **second floor Ionic Order was used.**
- **Doric Order** columns were used for the first floor.

Roman Architecture

public building : amphitheater :

THANK YOU ...