

Roman Arcuated Construction

[Narrator]: Roman arcuated construction relies on a round arch as a basic unit for creating a variety of architectural spaces. A wood support structure is built as a type of inner scaffolding to assist in the creation of the arch. The arch is composed of two vertical support legs and a series of wedge-shaped blocks called voussoirs. The point between the leg and the first voussoir is known as the spring point of the arch. The last voussoir is the keystone and is sometimes, though, not always, visually emphasized. Once the keystone is in place, the weight of the arch is transferred through the voussoirs and down into the legs of the arch.

Unlike trabeated construction that relies on a materials tensile strength, the outward force of being pulled, the arch utilizes stones compressive strength, the force of being pushed together to work effectively. Even though the weight of the stone is directed into the legs, there is still a downward thrust that wants to kick the legs out thus additional support is needed especially when dealing with large structures. Additional support is achieved easily by building up material next to the legs to counteract outward thrust. You can now see how the aqueduct relies on the arch to span great distances and yet needs additional bracing between the actual arches.

The arch is the building block for two types of spaces. The first is a vault, also called a barrel vault or tunnel vault. The vault is an arch thrown down a straight, horizontal axis. The result is a long corridor. Vaults such as this one that have no openings to other pathways have an interesting effect on people. We tend to speed up and move more quickly because we have no choice but to get to the end. This is just one example as to how the built environment can affect human behavior.

A more complex vault is a groin vault which consists of two vaults at right angles. The intersection of the two vaults creates a distinctive x-shape in the ceiling as the two merge with each other. The groin vault allowed for more complex circulation to occur in a building.

The final and most dramatic space created by an arch is a dome. A dome is an arch spun on its central, vertical axis. The result is the largest, uninterrupted space made by humans. Unlike the hypostyle hall that was large in size, the dome does not need a forest of columns for support. The dome has a fascinating effect on human behavior. Due to its round footprint, the dome has an identifiable center. Humans are naturally drawn to this center because the major axis of the dome is vertical and not horizontal like a vault. When people first enter the space, they are drawn to the center and begin to slow down as they visually experience the vertical axis. Feel free to test this hypothesis in any domed space. Stand off to the side and watch newcomers enter the space, look up and slow down as they move towards the center. This phenomenon is not as noticeable for people familiar with the space.