

Typology 5: civil structures

Environments or structures for various purposes, strictly connected to the everyday life, finances and social life of human communities.

Having gained inner knowledge, Man began to modify the environment he lived in by building rock shelters, huts, houses, palaces, factories and roadways, sometimes using bold architecture. All of this, in his search for structural and cultural stability. Public construction often exploited the underground, creating both underground and semi-subterranean structures using criteria still used today, although today different types of material and machinery are used in large-scale construction. Such structures were used, and are still used, in everyday life and served to develop an underground solution for community life and to resolve viability problems.

Artificial grotto

A structure resembling a natural cave, generally erected in public gardens for ornamental purposes and as a backdrop for statues, fountains and water features.

The use of artificial grottoes was established during the Renaissance period and is still popular today in the adornment of public gardens, avenues and thickets. The Great Grotto of Boboli Gardens in Florence, designed by Bernardo Buontalenti is worthy of notice.

Butto

Normally open-air waste disposal pit, sometimes found in natural or artificial caves.

A relatively deep, pit or well-shaped excavation, the *butto* was used for the storage of solid inorganic waste. It could be an unlined structure, cut into the rock or could exploit pre-existing cavities such as disused wells and cisterns or natural fissures in the rock, which may even have been widened and adapted.

Cellar

Partially or entirely underground room generally used for the storage of wine.

A cellar must have a low, constant temperature. This is achieved by creating partial or full rock cellars or by building an underground or semi-subterranean room with thick masonry walls and ceiling for good thermal insulation. Sufficient ventilation will be provided by small, suitably placed openings, sometimes of the “*gola di lupo*” type. Layers of waterproofing material and dry stone drains can be used to prevent water infiltration and humidity.

Crypt

Originally a covered subterranean or semi-subterranean passage.

This was originally a simple covered passage, which was not necessarily underground. Generically speaking, the term *crypt* now refers to the underground sections of a public building used primarily for holy or cemeterial purposes, but also used for civil purposes, which relate to the purpose of the building itself. The same term also referred to the primitive catacombs and later to the subterranean or semi-subterranean section, directly beneath the presbytery of Christian basilicas, which often holds a martyr's tomb.

Cryptoportico

Covered portico, with masonry arch, normally illuminated by slits in the side of the arch and used in Roman architecture.

Cryptoporticos are longitudinal, subterranean or semi-subterranean architectonic structures, which are illuminated by small openings of the “*gola di lupo*” type. These were covered passages leading to the various parts of a building or connecting two separate buildings.

Dovecot

Structure intended to house pigeons or doves, sometimes cut into rocky flanks and, or more rarely, created underground.

Also known as *dovecot* or *columbarium*, this structure built to house pigeons or doves generally consists of many small niches cut into the walls, each one containing a nest. Some types of columbarium may be cut into rocky flanks or created in underground environments or even in pre-existing underground structures.

Granary pit

An underground area, generally used for the storage of grain.

A granary pit is normally a hemispherical, coated rock excavation; when created in the ground, it must be kept dry with a masonry coating. Its access is air-tight and due to the lack of ventilation, the carbon dioxide released from the cereal creates a protective environment.

Jails

Place where people deprived of personal freedom are confined.

Building, environment or series of environments for the confinement of people awaiting sentencing or serving a sentence. Jails may be underground or may be created in the lower floors of structures used for other purposes.

Mushroom cultivation

A structure for the cultivation of edible mushrooms, normally contained within a cave or tunnel.

Underground structure, cave or semi-subterranean room for the cultivation of mushrooms for commercial use; these are often natural or artificial cavities such as disused mines or quarries, which have been adapted for this purpose.

Nymphaeum

A building with particular architectonic features, containing a fountain.

A nymphaeum was originally a sanctuary consecrated to the nymphs. In Hellenistic and Roman times, a nymphaeum was a rectangular, circular, elliptic or often apse-shaped structure with niches, columns and a fountain. In Renaissance and Baroque times, nymphaea were also created in semi-subterranean or underground rooms in the gardens of villas. They would contain a fountain and often reproduced the inside of a cave.

Pedestrian tunnel

A constant and/or variable section structure, through which the continuity of a journey is ensured.

Pedestrian routes can consist of sections that are cut into the rock and sections that are cut and covered; where the tunnel is small, it is sometimes known as an *advancement passage*. Pedestrian tunnels can be found both in and outwith urban areas. These may be for private or public use.

Powder magazine

Room, or rooms, for the storage of powder, artifices and explosives in general.

Rooms for the storage of explosive material are required for civil as well as military purposes. The location, construction and the distribution of munitions and explosives are regulated by stringent laws, which divide explosives into groups according to the way they react in the event of combustion or explosion. A powder magazine can be both an underground or semi-subterranean structure. For particular explosives, it may also consist of small barracks separated one from the other by strips of land. Mining plants include a storage area for material used in the charging of mines.

Railway tunnel

A constant-section excavation ensuring the continuity of a railway track.

The excavation of a railway tunnel allows mountain ridges and reliefs to be crossed without the need for complicated bypasses. A tunnel can be straight or curved and have slightly inclined tracks and a wide angled curve. The excavation of long horizontal sections is normally avoided to eliminate water stagnation; the tracks always follow a slight inclination.

There are several types of tunnel:

ramp tunnel, used where entrances are situated at different altitudes;

helical tunnel, the same as the previous but used in mountainous areas where there are steep slopes;

overflow tunnel, when the entrances are at roughly the same altitude, the tunnel is excavated from each end, following a slight upwards slope in order that water can be easily discharged from each section.

‘Special railways’ include various types of railways, with or without tunnels:

- cable railway: for steep inclines, this generally follows a short, rectilinear course;

- underground railway: for the rapid transport of a high number of passengers, usually within a city.

Road in cutting

Road in cutting consisting of a roadway below the natural ground level.

The cutting of soil or rock for the creation of roadways over orographic obstacles to the surrounding areas and of link-roads to connect such areas. This method was utilised in the past and is still used today.

Cutting: a type of *road in cutting*, consisting of a single vertical cutting in the rockface and of a horizontal cutting for the roadway; ‘L excavation’ allowed rocky spurs to be overcome without the need for trenches or tunnels.

Platform road in cutting: another type of road in cutting, which does not always involve the vertical cutting of the rockface, the partial roadbed of which is surrounded by protruding wooden scaffolding.

Via cava: also known as cutting, this type of road can be for both pedestrians or vehicles or, due to its limited width may be for pedestrians only; it is made by cutting the rock at a depth of up to and beyond 15 m. Western-central Italy has a unique concentration of such structures. Created from the VII-VI centuries B.C., the majority are attributed to the Etruscans and the Falisci.

Road tunnel

Normally a constant-section tunnel, this may be masonry lined and ensures the continuation of a road.

Logical deduction, leads us to believe that mineral extraction, once again, led to the idea of creating passages underground using acquired excavation techniques. Just like aqueducts, the tunnel axis was first plotted on the ground and then excavated. Shafts, inclines or openings were sometimes created in order to reach the necessary depth, for the removal of extracted material and for ventilation purposes.

Rock apiary

Place where the beehives of honeybees are kept.

The term rock apiary refers to a place where large numbers of beehives are kept within the same cavity. The cavity generally consists of a rock shelter or of a rock-cut flank, which can be sealed to create a rock environment suitable for beekeeping.

Rock dwelling

Environment carved into a rocky flank or by cave adaptation (with horizontal or sub-horizontal development) or in a shelter under the rock to serve an individual and his family as a temporary or permanent refuge.

The term 'rocky' indicates a horizontal or sub-horizontal dwelling unit, created along rocky crags and which sometimes took advantage of rock roofs, recesses and even caves. Created in soft rock, such as certain tuff, carbonate rock or sandy limestone, this type of dwelling can consist of one or more rooms on two levels and have various elements, such as seats or wall cupboards, chiselled or modelled directly into the rock matrix; there may also be internal or external cisterns for the capture of rainwater or dripping water or wells for the capture of groundwater. Various examples of rock dwellings show the level of care taken in the excavation: openings providing light were positioned in such a way as to allow sunlight to reach the innermost recesses of the building. Numerous parts of Tuscany and Latium saw the adaptation of pre-existing rock tombs, normally of Etruscan origin, and on occasion their sheer concentration gave rise to articulated villages, known as *rock settlements*.

Sealed-up caves: an underground environment with one surface masonry face, often constituting the sole means of access. This type of cave results from the sealing of a natural cavity (or an adapted cavity), of a prominent rock shelter or simply through the excavation of an artificial cavity for dwelling purposes.

Rock settlement

Urban centre, the dwelling units of which are either partially or completely cut into a rocky flank.

A central settlement created along rocky crags either at the foot or half-way up the crest of hills or mountains, which presents signs of construction structure, organisation of spaces, of services, of work and production areas, of roads and control of territory control is classified as a rock settlement.

Cliff dwellings: these are pre-Columbian settlements which developed in large horizontal or subhorizontal rifts between Mexico and the U.S.A.

Sirocco Chamber

Artificial cavity, used during the hottest hours of the day and diffused throughout Sicily.

This type of underground environment, is generally quadrangular and with a single chamber. Aquifers are sometimes intercepted during excavation or alternatively, hydraulic channels are created. The chamber is equipped with an access ramp and a roof ventilation shaft, which also serves for illumination purposes and seats cut into the rock matrix. In Palermo (Italy), sirocco chambers were very popular from the XVI century onwards, where it seems that these were used on particularly hot days and for the preservation of food.

Souterrain

Room or rooms, specifically for civil use and built under the ground surface and.

There are many examples of basements for civil use, either purpose built or created within pre-existing cavities. Every factory probably has its own rock or underground variant and many ancient public and private structures have suitable rooms for various purposes. For this very reason, this wide range of underground structures has been catalogued under the same sub-typology. Future explorations will undoubtedly lead to a more accurate and detailed subdivision. The washery is part of the mining plant and consists of several areas for crushing and mineral concentration through flotation or hydroseparator treatment. Although some parts may be underground, washeries are generally to be found on the surface.

Hypocaust: ancient Roman central heating system for both public (public baths) and private use. Hot air from a furnace was channelled under the floor and in the walls of the room to be heated. The temperature was regulated by increasing or decreasing the fire within the furnace. The floor was raised with masonry or brick pillars (*suspensurae*), thus creating an air chamber.

Underground car-park: very common, particularly in the last few decades, for parking of motor vehicles. Shelters for small coaster boats are sometimes created by cutting the rocky banks or exploiting large niches or marine, lake or river caves.

Storeroom

Room or rooms for the storage of various products and materials.

In this specific case, warehouse can refer to a subterranean, semi-subterranean or rock-carved storeroom and may even refer to the adaptation of a pre-existing cavity. Consisting of one or more rooms, the storeroom can be used for the storage of various products and materials.

Horreum: In ancient Rome, this term referred to both private and public storerooms; the building could be either subterranean or semi-subterranean.

Depots: in industrial sites this is the group or rooms used for the storage of raw materials and manufactured products, while in business installations, the warehouse is used for the storage of merchandise.

Underground dwelling

Environment created underground to provide an individual and his family with temporary or permanent shelter.

The term underground dwelling refers to a temporary or permanent shelter, excavated under the surrounding natural surface level. The many types of underground environments used in daily life primarily depend on the consolidation and hardness of the rock matrix.

Damùs: type of underground Libyan dwelling, used both for dwelling and industrial purposes. It has an entrance passage, known as *sghifa*, which follows a steep underground descent and then curves to lead into the well court.

Underground pit: Libya also provides examples of single-room, generally temporary dwellings used by farmers and shepherds.

Matmata - troglodyte dwellings: type of dwelling deriving its name from the Jibel region of Tunisia; similar to the *damùs*. It consists of tunnelled steps leading to the base of a type of large well, which can be of various dimensions. Along its walls are the entrances to one or more levels of underground dwellings, equipped with hydraulic systems, mills and granaries.

Vicinanza: a type of underground dwelling, built until relatively recent times, was developed in Massafra (Taranto - Italy). It has yet to be established exactly when these were first developed. A downwards ramp, generally with steps, was excavated into the ground. The tunnel widens horizontally at a depth of 4-6 m forming a sort of quadrangular court known as *zoccata* (also quarry or *tufara*). The underground dwellings composed of one or more rooms are accessed via entrances in the vertical walls (*zoccata* façade). A rainwater cistern, laundry tank (*pila*) and drainage channel can normally be found in the courtyard. Such a complex is known as a *vicinanza*.

Underground oil mill

A type of underground installation for olive preparation.

Olive mills are sometimes built underground, by cutting rooms into the rock and by using pre-existing structures or natural cavities. There are no construction costs involved when creating underground structures and it is easy to keep the environments warm, dry and at a constant temperature; oil tends in fact to solidify at temperatures of around 6°, thus olive pressing must take place in a non-humid, mild environment. There are numerous underground olive presses.

Trappeto (“*trappitu*”): particularly popular in the south of Italy, this is tool is used to crush solid materials; especially used in olive preparation; the room in which the olives are pressed is known by the same name.

Underground palmento

A wide, shallow basin used for grape-pressing and must fermentation; by extension, the term also refers to the underground environment in which the basin was excavated.

The *palmento* is a masonry basin, which in underground environments is normally cut into the rock and rendered water-tight. A few examples of underground *palmenti* have been uncovered in the Montalè area (Sassari - Italy). These structures were either built *ex novo* or reutilised existing *domus de janas* or small rock-cut churches.

Underground settlement

Underground settlements are normally more concentrated than rock settlements, in that they are fully underground and have, generally protected openings, providing access to the surface.

Such settlements can hold hundreds or thousands of people in a structure not dissimilar to a beehive, in an environment, the daily structure of which is more rigorous than in any other type of settlement. Life would have been centred around a marked structure and careful discipline; otherwise permanency and community life would have been impossible. The settlements would have had all the structures necessary for daily life, such as water supply systems consisting of wells and cisterns, waste disposal systems, public and private areas, work areas and places of worship. Ventilation, generally consisting of shaft ventilation, would have been of vital primary importance.

Generally speaking, the organizational structure of underground settlements is not solely dictated by defensive or financial motives or by the difficulty in obtaining or importing building materials. Climatic adaptation for thermal insulation, almost impossible by other means, also plays its part. Motivations and applications are undoubtedly subject to regional variation, however they share common principles. The complexities arising in the research and understanding of many such structures is given by the very nature of the territory and by their state of abandonment. They may have been abandoned spontaneously, following famine or due to water supply issues or even following epidemics, internal conflicts, political or even wartime factors. The lack of maintenance therefore led to their obliteration by natural and progressive burial and structural collapse. Underground systems may have been occupied during different and distinct periods of time, in which case pre-existing structures may have been adapted, their spaces being amplified or reduced. The resulting stratification is difficult to interpret in terms of providing an accurate picture of the man-made complex.