



Building Materials & Their Areas of Use in the Architecture of the Syrian Jazirahⁱ during the Iron Age

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Abstract

The history of settlement in the Syrian Jazirah^{*} region during the Iron Age was built on the basis of several natural elements that encouraged stability in the region, and contributed to the increase and development of urbanization in it, as it was the result of the interaction of the population and the natural environment, where its inhabitants used what nature found of different materials to form different building materials. Based on what excavations at archaeological sites have shown, it is noted that they used during this period several types of building materials in the construction of the constituent elements of the building.

The study here focuses on the materials used in architecture during this period, because of their link to their development, as these materials were compatible and responsive, to various techniques in construction from foundations to ceilings, and contributed to the development of architecture during this period.

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مواد البناء ومجالات استخدامها في عمارة الجزيرة السورية خلال العصر الحديدي

* The Syrian Jazirah: The northern part of Mesopotamia formed between the Tigris and Euphrates rivers, and in northeastern Syria includes the floodplains of the Euphrates River and its main tributaries, Balikh and Khabor.

the Iron Age: The emergence of the Iron Age can be dated to the last quarter of the 12th century after a crisis period (first quarter of the 12th cent.) and a subsequent squatter reoccupation (second and third quarter of the 12th century). Iron Age IA,B,C covering the end of the 12th, the 11th and 10th centuries. Considerations of a historical and archaeological nature point to the beginning of the 9th century as a reliable turning point from Iron I to Iron II. Iron IIA and B, documented by several rebuilding activities in most sites, cover the 9th and 8th centuries dominated by the increasing territorial competition of the local kingdoms confronted with Assyrian expansion. The end of Iron Age IIB is marked by more or less severe destructions occurring in the last quarter of the 8th cent. which are often followed by an extensive replanning during Iron III, in the 7th-mid 6th centuries, a period characterized by cultural homogenization and Assyrian acculturation .

ريبر عبد العزيز خلف**

المستخلص

بني تاريخ الاستيطان في منطقة الجزيرة السورية في العصر الحديدي، على اساس عدة مقومات طبيعية شجعت على الاستقرار في المنطقة، وساهمت في زيادة وتطور العمران فيها، كونها كانت ثمرة تفاعل السكان والبيئة الطبيعية، وقد استخدم سكانها ما جادت به الطبيعة من مواد مختلفة لتشكل منها مواد بنائية مختلفة. واستنادا الى ما اظهرته التنقيبات في المواقع الاثرية، يلاحظ استخدامهم في هذه المدة عدة انواع من المواد البنائية في انشاء العناصر المكونة للمبنى .
وتسلط الدراسة هنا على المواد ومجالات استخدامها في العمارة في هذا العصر، لما لها من ارتباط بتطورها فقد كانت تلك المواد تتوافق وتتناسب، لتقنيات متنوعة في البناء من الاسس حتى السقف، واسهمت في تطور العمارة في هذا العصر
الكلمات المفتاحية: العصر الحديدي، الأجر، الأكساء، بيت خيلاني

1. Introduction

The Syrian Jazirah region is one of the regions that have had an important role throughout the ages, whether politically, economically, or technically, as its importance comes from the fact that it played the role of mediator between Mesopotamia to the east and between Asia Minor to the north and west in the transfer of civilization, through it, many features of human civilization crossed east and west, and many invading armies and forces marched on its territory. The man settled in these areas and contributed to the development of his own civilizational features. Many civilizations have succeeded in the place, and many states have sought to seize it in order to covet its privileged location, its natural resources, and the abundance of its water.

One of the most important periods that left its features on the architecture of this region is the Iron Age being one of the archaeologically rich periods and the emergence of many cultural and artistic features that characterized this era in general and characterized the Syrian Jazirah region in particular, It is related to civil architecture represented in many royal facilities such as palaces and their annexes, public facilities and service facilities such as commercial markets, water systems, irrigation channels, sewage facilities for public facilities, the construction of dams, and the inauguration of road networks.

With the emergence of settlements in this era, architectural residues, and remains have shown the use of various materials in construction, imposed by the environment in which these buildings were established, it is known that the environment has a great impact on the formation of architecture through the natural materials used in the construction and construction of various buildings and facilities. Therefore, the Iron Age is considered one of the most important periods in the Syrian Jazirah region, because of its distinguished architecture, and it is witnessed by the sites of Tell Halaf, Fakhiriya, Tell Bwaid, Ajaja, Barri, and others, and many civilized and distinctive features appeared in it, which characterized this region, especially with regard to civil architecture in this era, both royal and public with its service facilities and building materials used in its construction.

1.1. Study Significance

Since the transition of man to the stage of stability, the architectural character of each place he settles in began to appear, but it seemed to change from one place to another, as each civilization was seeking to find a distinctive identity and character for it, However, the factors affecting architecture that man did not interfere with are natural factors such as climate, geography, and geology of the place, and

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then comes the human factor economic, political, and social situation, where the architectural character of the country changes by changing any of the previous factors.

To understand the history of architecture as a form of archaeology and history, it is necessary to study the materials used in construction, in addition to the method used in its use, which leads to a new artistic movement and is therefore an integral part of art history.

In the Syrian Jazirah region, architecture had a special character during the Iron Age, as the materials available in it helped to distinguish architecture in particular in its royal, civil, and religious facilities and accessories, and the study here provides the nature of the materials used and the field of use in proportion to the environment of the place, many of which are still scattered in the folds of some hills in the region.

1.2. Research Problem

The study will seek to answer a set of questions, as follows:

First: What are the most prominent materials used in the architecture of the region during the Iron Age?

Second: What are the areas of use of these materials in architecture?

Third: What are the reasons that necessitated the use of these materials in the architecture of the region?

Fourth: What are the methods followed by the builders at the time in using these materials and the methods used to give the technical and architectural character to the building?

Fifth: What are the materials used frequently in the architecture of the region and the materials limited in use during the Iron Age?

Sixth: What are the main purposes of these materials "structural - decorative"?

Seventh: What are the most prominent sites that highlight building materials and their uses in the architecture of the Syrian Jazirah during the Iron Age?

2. Basic building materials, and areas of use in architecture and service facilities:

The architecture of any area is determined by knowing the materials in it, which were used in temples, palaces, and houses (Handock, 2011, pp. 119-120). It is noted that the Syrian Jazirah region, like other areas that have in common, is built on mud plains (Maxwell, 1921, p. 3). The Syrian Jazirah was the gateway to many natural resources during ancient times, and all the lands and areas to the north and west of the Syrian island were importers of metals, timber, stones, and copper. These are the most important materials used and their areas of use in the architecture of the region.

2.1. Adobe Bricks:

It was mainly used in the construction of walls, vaulted ceilings, floor tiling, and cladding of pitched ceilings.ⁱ They are placed in a mold and then dried in the sun so that they become more resistant

ⁱ Adding straw to clay will increase its hardness, cohesion, and ability to withstand greater weights.

to floods. It appeared in a non-uniform size and measurements (Najil, 2012, pp. 97-98). In the Iron Age, it appeared to be slightly larger in size, and burnt bricks were also used in public buildings rather than residential buildings (Sharif, 1982, pp. 172-173), Its color was usually according to the type of clay and the material mixed with it (Fig. 1).

By surveying the total hills in the Syrian Jazirah region, they were mud-brick houses, administrative buildings, palaces, and temples, and the majority of the discovered buildings were made of bricks that continued throughout the ages, it was made in many sizes and thicknesses, and in the Syrian Jazirah several models were common according to some sites, during the Iron Age, as shown in (Table. 1), and it was classified into two types:

2. 1. 1. Mud-brick:

Mainly used in the construction of walls, vaulted ceilings, floor tiling, and cladding of pitched ceilings (Najil, 2000, p. 409). It was more concentrated in the weak areas of the walls, including door openings, and the way this Clay brick is arranged is due to the traditional method known as the system (solution and tension), which gives the wall strength and durability (Saeed, 1985, p. 98).

2. 1. 2. Bricks

Bricks were widely used in the architecture of the region during the Iron Age in several areas, including:

2. 1. 2. 1. Water Drainage Streams

Where facilities built with square bricks were uncovered in most palaces (Baker, 2010, pp. 70-71), Water is discharged into the sewer through circular openings in the centre of the bricks used for this purpose.

2. 1. 2. 2. Floor Tiling

Used in paving floors to tile open yards and differs from the user in the rooms, and the builders' resort to levelling the part to be tiled with clean and fine sand that they brought from the riverbeds, and then describe the bricks in an artistic and geometric way in the form of a layer or parallel rows, and the tiling is for more than one role. The joints between the bricks (i.e., the binder) were filled with asphalt or tar (Mahmoud, 2005-2006, pp. 253-254). This is observed in most of the palaces of the Syrian Jazirah: in *bīt ḥilāni* / Tell Halaf and Tell Fakhiriya / it was widely used in large rooms and halls as well as courtyards in front of the entrances (Fig. 2 – 3 - 4).

2. 1. 2. 3. Wells Lining

The brick for lining wells differs in shape and measurements, where its shape is almost trapezoidal and with varying measurements, and this variation in the length of the inner and outer sides helped the circular formation of the well dams in proportion to its roundness. And the binder is clay. The reason for using bricks to cover wells was to ensure that they did not collapse due to the continuous daily use of well water.

2. 1. 2. 4. Entrances and arches

There were many forms in the construction of entrances and arches, and this brick group was decorated with decorations and drawings above the main entrances to the royal palaces (Mahmoud, 2005-2006, pp. 253-254).

2. 1. 2. 5. Building decoration

It revolves around the possibility of decorating clay walls with drawings, inscriptions and colours, in addition to the way of overlaying brick pieces that give the façade an architectural beauty.ⁱ

2. 2. Stone

Its use dates back to ancient (Sumerian) periods and was used for architectural purposes (Handock, 2011, p. 126), Its use was more widespread in the region, especially in the Neo-Assyrian period (Sharif, 1982, pp. 171-172), It was commonly used in their architecture, but in general, its use was limited to Iron Age architecture and was limited to:

2. 2. 1. Support Balcony Palaces, and Linkage.

2. 2. 2. Foundations Building (Al Jader, 1985, p. 84)

Which were carefully polished and filled the space between them with uncarved and flat blocks on top to place the first layer of adobe/dried brick in the sun (Delaporte, 1997, p. 330). This is what the Assyrians used extensively, as they laid huge foundations of stone for their buildings, and the Hittites preceded them (Breasted, p. 212).

2. 2. 3. In the manufacture of luxurious stone columns for palaces

Its first use was during the reign of Ashur-Nasir-Pal II, then by Shalmaneser III, Tiglath-Pileser III, Sargon II, Sennacherib, Esarhaddon, and possibly Ashurbanipal (Abdulrahman, 1997-1998, p. 135).

2. 2. 4. Protection of the Bases of the Walls

By stone paintings that obscure their outer surface from moisture and damage, and the Assyrians adopted this simple development during the first millennium BC, and decorated with great interest the meeting and reception halls in their main cities with alabaster stone paintings (Julides and Martin, 2006, pp. 19-22), This is evident from the various types of buildings and indicates the progress and development of the Assyrians in stone carvings of the inner and outer walls in an unprecedented way, and it appears that they were influenced by their proximity to northern Syria and Anatolia, and this is also found in the Kabara Palace in Tell Halaf and in bût hîlāni in Tell Fakhiriya. By cladding the bottom of the back façade wall to protect it from external influences and decorate it (Winter, 1993, pp. 34-37).

2. 2. 5. Floor Slabs

Placing stone blocks on the floor, sidewalks, and roads (Oppenheim, 1952, pp. 226-227). The entrances were covered with stone Slabs (Fig. 5) and were also used to tile the courtyards (Saeed, 1985, p. 102).

ⁱ For more on the subject of clay architecture, see: Eng. Shahwan, M., *Clay Architecture, Architecture of the Poor, Return to Life. and a simulation of the environment, on Andalusia*, <http://andalusiat.com>.

2. 2. 6. Artistic and Aesthetic Character

By decorating these paintings to become functional and decorative at the same time, including covering the walls with stone sculptures, and manufacturing sculptures that decorate the facades, such as statues and column bases. Some of them were adopted in their most important architectural edifices, such as the palaces of Tell Halaf and Fakhiriya (fig. 6). As well as anthropomorphic statues associated with the building and connected to it, and applies to a number of anthropomorphic statues, associated with construction and decorations for door corridors (Abu Assaf, 1993, pp. 152-156). And also, for floor mural carvings (Albenda, 1976, p. 49). The colours of these stones ranged from white to black, often for decorative purposes (Winter, 1993, p. 35).

2. 2. 7. Used for Other

Purposes as door sills, pivot stones for locking, and letter-shaped sewer ducts U (Mahmoud, 1984, pp. 112-113).

2. 3. Burnt Brick

2. 3. 1. Building material made in special furnaces and then hand-styled and fixed with mortar, its use in the field of architecture was limited to: Building structures loaded with weights, which are not subject to corrosion due to other weather or natural factors, such as walls used in the external facets, and which are not exposed to penetration or leakage of water by protecting their horizontal sections with moisture inhibitor.

2. 3. 2. Building structures that are not loaded, with furniture such as pillars or internal construction (walls), which are not exposed to severe corrosion due to weather and natural factors (Khalil, 1984, p. 261).

The burnt bricks were initially square in shape and sometimes rectangular, and their usual measurements are 16×16×6, and 24×10×10 cm, with the other type of 43×13×7 cm and 28×23×6 cm (Al Jader, 1985, p. 84).

2. 4. Woods

Wood is one of the most important necessary materials used in architecture, and it was known by the Sumerian term *geš* synonymous with the Akkadian *isum*, and the most common wood was tamarisk, cedar, juniper, oak, cypress, and pine.ⁱ

It was commonly used in the buildings of the region during the Iron Age in the following areas:

2. 4. 1. Fastening Material

ⁱ Tamarisk tree: grows in saline land in swamps, and is distributed in coastal areas. (Oak, juniper, and cedar): It is a perennial and evergreen tree, growing in many areas, and used in carpentry, and roofing works. (Cypress and pine): It is a perennial tree that is spread in cold and temperate regions, and is widely spread in Syria, and its wood is one of the most important types, used for furniture, and is characterized by its hardness and resistance (Abdulkarim, 2004, pp. 10-21).

Use a fixing material placed between the rows of clay bricks, creating a kind of layer that prevents any cracks or collapses that may occur in the walls, and prevents them from continuing in the rows of burnt bricks or clay bricks to more than four or five rows (Saeed, 1985, pp. 102-103).

2. 4. 2. Manufacture of doors and windows. And also, for framing windows, thresholds and jambs for the door.

2. 4. 3. Roofing Construction

When the expansions of the Babylonians and Assyrians spread to the west, they used them to roof buildings (Fig. 7) (Sharif, 1982, p. 175). Archaeological excavations have revealed the remains of pieces of wood up to four meters long, used in roofing entrances and rooms of palaces and dwellings during antiquity, especially the Neo-Assyrian period, King Ashur-Nasir-Pal II had written in his obelisk that commemorated the inauguration of the royal palace in Nimrud, where he described the palace with its eight wings named after the wood used in it, and a luxurious royal pavilion whose doors were made of cypress, cedar, and pistachios. King Sennacherib 704-681 BC brought timber in large quantities into the roofing of his palace. Wooden ceilings were probably the dominant feature of the roofing of Assyrian gates, as the halls are long and so small in width that they can be easily roofed with wooden rods (Hashem, 2008, pp. 601-602). As the Assyrian king Sennacherib pointed out in the following text: "*I built an incomparable palace and used cedar, cypress, and sandalwood that I brought from the Serara Mountains in Lebanon.*" (Muhammad, 2013, p. 185).

2. 4. 4. Supports for Walls

The columns were formed most often despite the stone, which was often used in the corners, in order to support the upper floors and ceilings, as it is noted that the similarities in the Syrian palaces of the second and first millennium BC involve the construction technique of Assyrian and Aramaic, as *bit hilāni* in Tell Halaf during the Iron Age, one finds the wasteful use of wood in the walls, supporting them with long timbers lined along the wall, and pressed with short timbers across them (Frankfort, 1952, p. 131).

Several Assyrian lists of spoils and royalties imposed by Assyrian kings on their neighbouring countries are contained, including types of good wood brought to build palaces, where it was used to make most of the furniture and tools of houses and royal palaces and was made of wood (Hashem, 2008, p. 592). The wooden doors were also money that the tenant took from the house and carried with other supplies (Muhammad, 2013, p. 185). In addition, the Chaldeans used it to support the distances of the walls and their filling as beams at the origin of the construction of the walls in order to reach a structural balance and complete stability in the construction (Saeed, 1985, p. 103).

2. 5. Metals

Used for purely architectural purposes, sometimes for decoration, which was an integral part of the structure (Handock, 2011, p. 131), These include bronze and iron. Which was used in wrapping the doors with ribbons and wrapping the bases of the columns on which the doors revolve (Saeed, 1985, pp. 103-104).

2. 6. Cladding Materials

2. 6. 1. Plaster/limeⁱ

Laster material was used to meet architectural needs and art products. As this material represents the oldest evidence of technical development (Hauptmann, 2000, pp. 61-68), It was used in the Iron Age and earlier for several purposes: to cover floors and walls, and was identified at the levels of Ras Shamra (Gwozdz, 1982, pp. 99-103). It was also used to cover the walls of storage pits (Thuesen & al, 1990, pp. 79-87).

During the Iron Age, this material was found in most of the sites, with plastered floors found in Tell Berri, in Tell Bwayd, where a basalt stone floor was covered, and in some walls. In bīt hīlāni in Tell Fakhiriya, the walls of the front hall were covered with stucco bands, and the system followed for this room and other rooms and halls were (Mcewan, 1985, p. 8).

The survival of plaster pillars in the Euphrates and Khabur region is reflected in the history of local architecture of the region, this reliance on plaster material, whether for carved stone, building with stone blocks, or for the manufacture of mortar and plaster, and we find it applied in all locations and all eras, and plaster and refinement stone pushes the sculptor or artist to adapt to the quality of the rock (Abdulmasih, 2002-2003, p. 165).

2. 6. 2. Asphalt-bitumenⁱⁱ

Initially, it was used as an adhesive for plant or animal materials on the tool to protect the user's hand (Boëda & al, 2008, p. 67). This substance continued to be used at sites of the Ancient East throughout the ages as a protective element against the destructive effects of rain (Handock, 2011, p. 125), Where it was commonly used in construction to prevent moisture, as well as in painting granaries in particular (Al Jader, 1985, p. 84), Which was used as a waterproofing cladding material in floors in the first place, and in cladding water basins in the courtyards of houses and temples. In the Neo-Assyrian and Chaldean periods, it was used as an insulating material in baths and water basins, but it was also used as a binder between brick walls, to isolate groundwater from the walls of the royal palace (Saeed, 1985, pp. 99-100). This substance was found in the Syrian Jazirah at a number of Iron Age sites, including on one of the floors of Tell Berri, and assumed to belong to a bath (Schwartz & Hollander, 2000, p. 83-91).

Conclusion

With the beginning of the Iron Age, a decisive shift is observed in the development of special forms of architecture based on the experience gained, taking advantage of the available materials and the nature of the construction of this era. With the beginning of the Iron Age, regular geometric shapes and groups of buildings distinguished by symmetry, regular rhythm, different configurations, and distinct details of the parts arose as important initial decorative and decorative elements of later artistic

ⁱ The use of plaster material dates back to the Neolite period, to meet architectural and artistic needs, and consists of calcium-rich clay, mixed with ash for particles of volcanic stones, and then mixed with water to become soft (Hauptmann, 2000, pp. 61-65).

ⁱⁱ The first use of bitumen dates back to the Mosterian period around 40,000 years ago, and it is a mixture of high-viscosity organic liquids, black in color (Boëda & al, 2008, pp. 67-83).

architecture, especially in Syrian civilizations on the banks of the Khabur, Euphrates, and Tigris. Contributed to this as a result:

- The effect of raw materials on the shape of the architectural image, between the architectural and artistic elements in most buildings. The most important of which is clay, which was used in construction as a basic material and in multiple ways.

- The development of the building in a variety of forms, commensurate with the nature of the place. Such as the establishment of facilities on terraces to protect them from flooding, and the scarcity of stones, which prompted the use of bricks, and also the scarcity of forests prompted the establishment of contracts and basements of bricks, and most of the rooms were small and longitudinal not exceeding five meters so that they could be covered with contracts.

Appendices:

Tables

Thickness (cm)	Width (cm)	Length (cm)	the site
10	40	40	būt hilāni (Aramaic)
10	42	42	
	40	40	Tel Arbid (Modern Assyrian)
	40	40	Tell Bwaid (new Assyrian)
30-10	40	40	Tell Barri (modern Assyrian and modern Chaldean Babylonian)

Table 1. Sizes of bricks used in Iron Age buildings in the Syrian island region, as they appear in some locations.

Figures



Fig. 1. A. section showing the bricks used in the construction of a Tell of Fakhiriya. **B.** Tell Tuneinir: Walls of the Neo-Assyrian Era. **C.** Tell Tuneinir: mud-brick walls, Neo-Assyrian period. Peter, V. B., "Excavation report of Sounding A, 2006", p. 6 & Fuller, M & N., "(Area 1 - Bronze Age and "(Area 1 – Neo Assyrian Features)".

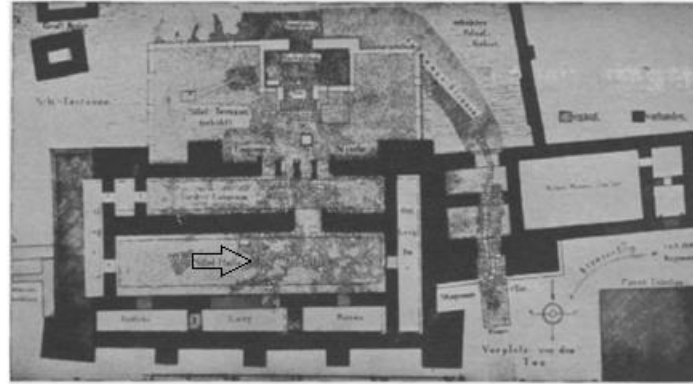


Fig. 2. Tell Halaf Palace: Model of *bīt ḫilāni*, the arrow points to the floors paved with gridded bricks and stones in many of its parts. Frankfort, H., *op. cit.*, p. 121.

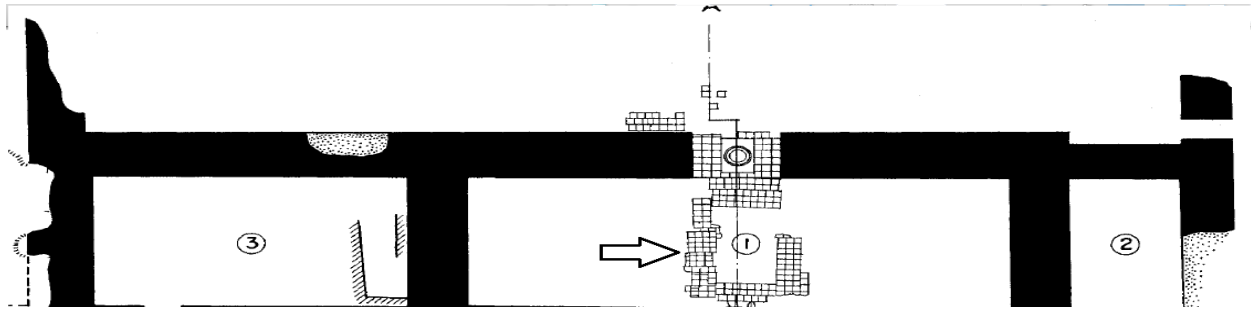


Fig. 3. Tell Fakhiriya: *bīt ḫilāni*, an arrow pointing to the brick floor of the entrance around the base of the column and its continuation into room 1. Mcewan, C. W., *op. cit.*, p. 112.



Fig. 4. Tell Fakhiriya: bīt ḥilāni and the circles point to the brick-paved entrance floor around the base of the column and its continuation into room 1. Mcewan, C. W., op. cit., p. 128.

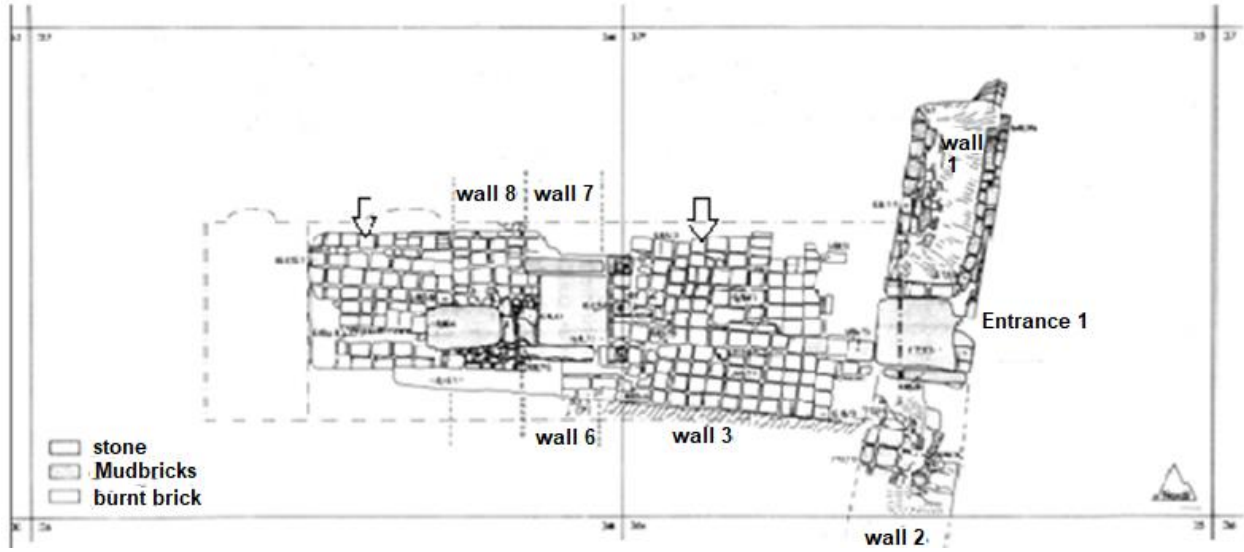


Fig. 5. Tell Ajaja Palace: Palace Plan Discovered at Level 19, Arrows Pointing to Stone-Lined Floors. Mahmoud, A & Kühne, H., "Tall 'Agāga/Sadikanni1984-1990, Archäologische Forschungen in Syrien (5)", AfO 40/41 (1993/1994), p. 216.



Fig. 6. Tell Fakhiriya Palace: Ninth Position, (A) Stone paintings in the northern part of the door buttresses, between rooms 1 and 3 (B) Stone paintings in the eastern part of the door support, between rooms 1 and 4. Mcewan, C. W., op. cit., p. 129.

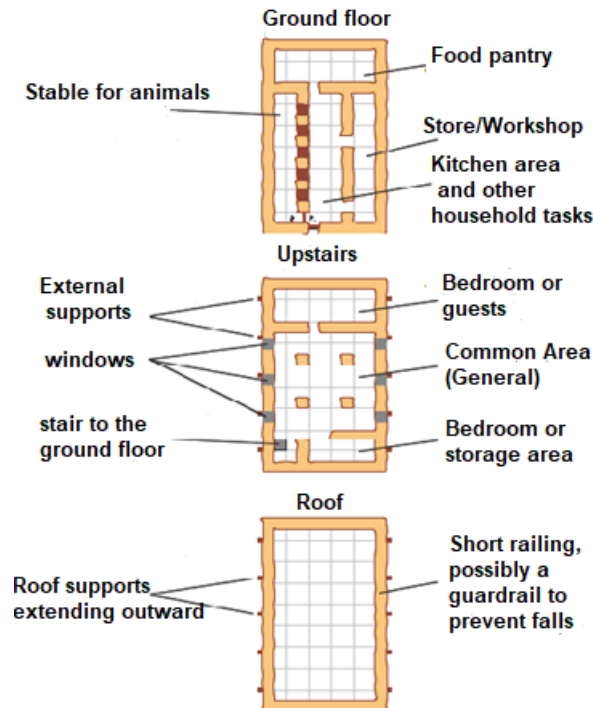


Fig. 7. Models for the planning of houses in the Iron Age in Syria and Palestine, and models of houses with columns. Iron age Houses in Syria – Palestine

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