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Architecture as Source of Chronological Information¹

A. Introduction:

Architecture is commonly considered an unreliable chronological marker when compared to other archaeological material². In view of the obvious stratigraphic significance of architectural remains such a general refutation seems uncritical, and in view of their relative abundance it may mean that a potentially rich source of chronological information remains untapped.

The objective of this paper is to discuss the undeniable restrictions in the use of architecture as a chronological marker and to present various examples where architectural data do provide reliable chronological information. This material might, after further examination, serve as a sound basis of a systematic search for criteria of chronological significance in the treatment of architectural remains.

B. Preliminary considerations:

The general difficulty of any chronological study stems from the simple fact that comparable data can result from different causes; such data are not valid chronologically. Understanding the causes is the only way to avoid misleading chronological conclusions. Needless to say that this is too ambitious a goal for ancient architecture. A safe analysis of ancient data should be based first on constant causes, as laws of physics. Therefore, this article will emphasize the study of building techniques.

Apart from the cultural package (mainly ideologies, traditions and aesthetic values), architecture is particularly conditioned by science: the existence of a construction, as its persistence, are the result of structural integrity requirements. Still, functional explanations of architecture are few; aesthetic, traditional and ideological explanations are attempted, and embedded sometimes in a fallacious typological framework. The aesthetic use of ashlar facing masonry was never put in doubt, while a functional use is rarely discussed, even in cases of massive presence. The L. B. A. temples of Dagan and Baal in Ugarit, and the Southern Palace of Ibn Hani make it necessary to review such generally accepted ideas. The deep foundation walls of these constructions -Down to 3 meters in Baal temple and some parts of the palace- with an outer facing of perfectly squared ashlar offer the evidence of a use for ashlar facing which is strictly functional³. The only plausible explanation stands in the required stability: the contact between perfectly squared stones provides optimum resistance against horizontal thrust, as the figure -1- shows. In the case of the palace, which is the best documented construction among the three, exceptionally important pressures could be supposed to derive from the huge masses of imported fillings that served in raising up the palace.

The well known aesthetic interpretation of the so-called "saw facades" of Neobabylonian houses is a case in point: seen as an expression of a locally and chronologically distinct style (REUTHER 1968:83-84), these walls misleadingly seem to bear witness to a degree of decoration and aesthetic awareness unheard-of in earlier habitations of comparable wealth. However, there is a much more straightforward functional explanation, namely that these walls are the least complicated and most economic solution to the problem of fitting orthogonal rooms

(defining the brick orientation) into a non-orthogonal space delimited by existing (?) streets. If anything, the “saw facades” bear witness to an unwillingness to make irregularly shaped bricks⁴: figure -2-.

C. Handling Different Kinds of Data:

1. Ground plans:

A plan is, at first glance, a form or a shape: it constitutes the most direct and complete architectural data archaeologists can obtain⁵. A given plan reflects a solution found for a specific need⁶ at a given time⁷ in a given place⁸.

Comparing plans hints to comparing spatial organizations. The spatial organization of a given construction has extensions that go beyond the limits of the preserved -generally treated- plan. Vertically, the construction could have existed on more than one level. Horizontally, the organization of a construction extends within a larger organization which is that of its built-up area (rural or urban); it depends on it in various degrees following mainly the nature of the construction itself. Accordingly, the similarity of two plans can't be considered chronologically significant in the absence of similar volumes and, to different degrees, of similar general layouts⁹. Therefore, common comparison procedures, limited to the unique preserved level, remain disputable.

Additionally, organizational comparisons of chronological aims are established on the optimistic assumption that common needs in comparable cultures lead to comparable constructions. The option of obtaining different constructions in spite of common needs and cultures can't be ignored; a considerable source of information risks being missed ignoring these “incomparable” constructions. But it is mainly the fact that also different needs, even in different cultures, could lead to comparable constructions, consequently to comparable plans, that constitute a serious failing of this comparative method¹⁰.

This does not mean that, in the lack of the built-up area layout or of data allowing a volume reconstitution, plans should be ignored; the chronological importance of a plan could be considered proportional to its complexity. In other words, the more complex similar plans are, the likelier this similarity could be chronologically significant. Accordingly, the validity of the so-called “front room house”¹¹ “type” for instance remains dubious; one wonders whether this simple plan should not be considered as reflecting a general tendency¹².

2. Techniques¹³:

The complexity of studying techniques as a chronological indicator stems from the large number of decisive parameters that suggest the preference of one technique over another. The main parameters are :

- 1- Geology: imposes the choice of construction materials and methods of constructions;
- 2- Geophysical conditions: such as earthquakes, floods ...etc., that could require framework, high stone “socle” ...etc.;
- 3- Climate: influences covering systems, plan orientation, disposition of open and covered spaces ...etc.;

- 4- The condition of the construction field (if it is virgin or not): influences foundation systems;
- 5- The type, size and location of the construction: which boils down to its foreseen durability, the dimensions and height of rooms and its relation to the neighboring constructions;
- 6- The available construction knowledge: that could be local or foreign;
- 7- A compromise between economic considerations and structural integrity requirements¹⁴;
- 8- Cultural values (aesthetic, traditional, ideological, educational ...etc.).

It is possible to divide these data into two categories. On one hand, geological, geophysical, climatic and construction field conditions constitute what could be called "field data". They are imposed. On the other hand, the construction itself, the applied knowledge and the economic consideration in view of the safety requirements constitute "human data": they are decided upon, to a certain extent, by human choice as conditioned by "field data". It is true that a clear-cut distinction between the two categories of data is impossible; the available knowledge for instance, could be imposed or restricted by traditions, while the choice of a material could be made for an aesthetic reason, independently from the geological surrounding. Yet, despite its roughness, the distinction between "field data" and "human data" allows to make the following observations: common "field data" impose a number of common techniques, that are more or less "basic" for all constructions. The remaining techniques stemming from "human data" are "selected" according to the construction.

Being imposed by field data, "basic" techniques enfold a major chronological problem: their dependence on "field data" entails a temporal persistence that deprives them from chronological significance. This problem is absent in a small category of "basic" techniques; a category that encloses techniques indicating a lack of knowledge. Once knowledge is acquired, they disappear. Circular and semi-circular dug houses attested in the Near East since the Kebaran period (AURENCHE et KOZLOWSKI 1999:27) offer a clear example - once masonry had been discovered these houses were replaced definitely during the PPNB (AURENCHE et KOZLOWSKI 1999:49) by constructed walls on floor level. Determining the time of appearance of "abandoned" techniques, as shown, is crucial; in case of well established knowledge, they could be helpful in rough dating. Of course, it remains sometimes unknown whether the appearance of a "basic" technique in a given place is the result of a foreign influence or of a natural psychological human reaction to the "field data".

This last problem concerns a part of "selected" techniques. The relative independence of some "selected" techniques from "field data" allows a temporal and geographical widespread that prevents them from having any chronological significance. Such techniques are generally simple (mono-material or/and any material), functional and economic. The stone wall bases assembled with a double row and a filling is an example. Turning ancient wall into new wall basements by leveling is an other.

The economic issue can restrict the spread of a "selected" technique and enhance, consequently, its chronological significance. Another cause of the spread restriction of a technique could be its complexity. Additionally, complex techniques

express an advanced know-how which is the outcome of a gradual response to the environment and as such, they reflect appreciable experience. Therefore, it is unlikely that they are the result of only local development. Indeed, massive architecture requiring sophisticated technical knowledge -as a result of the forces imposed by appreciable loads in addition to foreseen durability and aesthetic needs-, offers a worthwhile source of chronological information. The following examples of “selected” techniques are used in palatial and sacred constructions. Such constructions as we know constitute a considerable part of the Near Eastern massive architecture corpus.

The use of longitudinal beams in the foundations of massive mud-brick walls, is documented in the Northern Levant, in Early Bronze Age (DA I-II) temple “Bau II” of Halawa B (ORTHMANN et al. 1989:91-92) and in Middle Bronze Age I temples of Alalakh (levels XVI-VIII) (WOOLLEY 1955:47, 55 et fig. 18). Intended probably to alleviate differential settlement¹⁵, figure -3-, the technique is found earlier in the Anatolian region¹⁶. Its refinement lays in the subtle understanding of materials properties it shows.

The skeletal structure set on stone is another example of “selected” techniques. The traces of this type of skeletal structure, fixed on ashlar masonry with squared blocks presenting mortises and slots at least at wall ends, figure -4-, could be discerned in most of Middle Bronze Age palaces and temples of Ebla¹⁷. It is mentioned in some LBA houses of Mumbaqa¹⁸, Emar (MARGUERON 1982:23), the “Palais Sud” of Ras Ibn Hani (LAGARCE 1982:31), and palaces and houses of Ugarit¹⁹. Independently from the wall main construction material²⁰ the usefulness of the wood structure consists of providing the wall a flexibility²¹ that increases its resistance to different forces. Within the limits of the Levantine area, Ebla is most likely the starting point for the influence of combining the skeletal structure with the fixing system on ashlar. The origin of the technique would be possible to establish with further investigations²².

Multiple techniques characterize the two sites of Alalakh and Qatna within the Levantine region, and therefore are worth taking notice of. Decorative “facing orthostates”²³ fixed to mud-brick walls with the help of wooden beams²⁴ were found in prestigious rooms of palaces of Qatna and Alalakh VII²⁵. Conic column bases stabilized in pebbles, bronze hinges and sunk door sockets were found in both palaces of Qatna (DU MESNIL DU BUISSON 1935:75-76, 1928:7, pl.IV) and Alalakh IV (WOOLLEY 1955:124, 118). Furthermore, it is not unlikely that the ash traces discovered by Le Comte De Mesnil at the base of a wall north of the “Haut Lieu” in the palace of Qatna correspond to a skeletal structure, common technique in the palaces VII and IV of Alalakh²⁶, but also in above-mentioned sites. These technical similarities form a chronological value to be developed in the following chapter.

A difficulty lays sometimes in determining whether a technique is “basic” or not. The progressive spread of stone substructure in the Northern Euphrates during EBA, makes the technique appear as a newly discovered “basic” one. The map of figure -5- shows sites where a stone socle was introduced to walls after a first occupation of exclusively mud brick architecture (M marked sites). On other sites, stone socle existed since the first occupation (S marked sites). By the end of EBA the technique covers all the region. But in iron age, and in this same homogeneous environment, appears again exclusive mud-brick architecture (in tell Ahmar for instance). The technique then is not “basic”. For some reason(s) (economic,

traditional?) this technique was “selected” and used for considerable periods of time. In the limit of the same site and occupation, it appears as a “basic” technique. As the example shows, only a wide geographical and temporal study is bound to bring to light the chronological information these simple “selected” techniques enclose.

3. Materials:

It is naturally in the framework of the technique that the study of materials could constitute a source of chronological information. Obviously, such study concerns only techniques requiring specific material for their achievement. The study of techniques completely independent of construction materials²⁷, is restricted as such to the “idea” or “concept,” i.e. purely the technique.

The determination of accessibility of materials could indicate the direction in which an architectural influence has taken place. The birth, the development and simply the common use of a technique in a given place are all related to the easily accessible material(s), essential to its execution. They can also be related to the absence or rarity of a construction material; it is not by accident that vaulting techniques for instance are more developed in Mesopotamia than in the Levant, where construction wood, indispensable for flat roofing, was mainly imported.

Basalt and limestone are the main ashlar used respectively in Alalakh and Qatna. Nevertheless, conic bases²⁸ are made of basalt even in Qatna, just like some of the above-mentioned “facing orthostates”, the distribution of which within the rest of the limestone orthostates indicates a pure aesthetic luxurious feature, comparable particularly to the situation in palace VII²⁹. It is more likely then that Alalakh is the source of influence.

It is important to stress here the proportional relation between the comparable elements and the validity of chronological information. The series of resemblances found in Alalakh palatial architecture and the palace of Qatna is of a high chronological significance. We should keep in mind, and according to the study of architectural development in Alalakh³⁰, that the architectural identity of level IV appears to be the continuity of the newly established identity in level VII. In the light of comparisons which attempt to establish a date, one might suggest a hypothetical date for the palace of Qatna that is roughly contemporary to the palace VII of Alalakh.

This series of resemblances in the two palaces is in a striking contrast with the absence of any comparable elements in their plans, figure -6-. Not only the insufficiency of plan as a unique source of chronological information is proved in this example, but also the scientific danger of missing precious source of chronological information by ignoring construction methods analysis.

4. Volume:

It is through analytical and comparative study of archaeological data, plans and techniques, that volumes can be reconstituted. However, reconstitution of volume poses a number of difficulties that result easily in the uncertainty of the outcome, hence the necessity of implementing extreme care so as to avoid hasty chronological conclusions. Some of these difficulties are: the deliberate or accidental miscalculation of the structural integrity requirements by the constructors,

architectural modifications of the construction during its lifetime³¹, insufficient or misleading volume indicators³², etc.

Independently of those difficulties, the conclusions about chronological validity in the chapter about plans apply to the study of volumes. In other words, three points must be kept in mind: first, the general layout of the built-up area; second, common needs don't lead systematically to comparable constructions; and third, the more complex similar volumes are, the more chronologically significant this similarity is. But the uncertainty of the outcome, and according to the above-mentioned difficulties, is higher in proportion to the complexity of the volume³³.

A detailed architectural and archaeological study of dwellings³⁴ made it possible to suggest for M.B.A. houses of Halawa and a part of L.B.A. houses of Mumbaqa, as already suggested for L.B.A. Emar³⁵, a volume with one large covered room and two double floor small rooms: figure -7a-. L.B.A. houses in Bazi, Hadidi and Mumbaqa, could be reconstituted with a covered rectangular big main room; it is bordered with two-floor smaller rooms on its long (seldom short) sides in Mumbaqa, figure -7b-, on two successive perpendicular sides in Mumbaqa³⁶, on its three sides in Hadidi, figure -7c-, and only on one of its long sides in Bazi, figure -7d-. Some of these different volumes coexisting in the same site are due probably to economic and social heterogeneity within the same society. The chronological significance goes therefore, not to the size or the layout of the plan, but to the principle of associating one large mono-level room to double-floor small rooms. As it was already mentioned, the reconstituted volume should appear logical in relation to its surroundings. Among these sites, the largely excavated ones have allowed us to consider the urban situation. These volumes seem to be solutions that fit housing in crowded built-up areas (party walls are represented blank in figure -7-), where horizontal expansion is difficult. A second floor (or even a third in Mumbaqa) could be reconstituted over small rooms, and a terrace above the largest room. In view of the comparable general organization and the regional limitation³⁷ of these volumes during a certain period, it is possible to consider them as a local solution that seems to have spread during the L.B.A. period.

In case we accept these restitution propositions as the "correct" ones, the example shows:

Firstly, that even for plans of modest layout, we are far from defining the causes of the volume resulting from the restitution. Yet, understanding the causes, as has been clarified in the beginning of the paper, is the only way to avoid misleading chronological conclusions. The urban situation in this example seems to constitute one cause, the part of the volume functionality understood by the archaeologists constitute an other cause, the climate or "field data" might constitute others...etc.

Secondly, the above-mentioned common organizational principle upon which these houses are built would have eluded us in case of limiting the observations to similar volumes.

D. Conclusion

The common use of plans at the expense of other architectural data when architecture is explored as a source of chronological information is proved to be unjustified.

For plans, as for construction methods and volumes, a proportional relation between complexity and chronological validity is to be generally admitted. Accordingly, monumental palatial architecture appears to be a source of chronological information of particular interest; it offers generally complex plans and "selected" complex techniques.

Considerable restrictions and uncertainties remain when using plans or volumes as source of chronology. In contrast, being based strictly on real evidence, the study of techniques has been proved to be a most secure and valid way to chronological information.

Although provisional dating through architecture cannot be contemplated in the absence of dated material in at least one of the compared levels on different sites, examples showed how a detailed architectural analysis could be useful for provisional dating. In view of the relatively slow spread of architectural knowledge, one has to admit that architecture remains a rough dating indicator.

In conclusion, and in spite of the undoubted necessity of dating material for an efficient use of architecture in chronology, we have seen that deficiency in dating material could be compensated for by a meticulous analysis of all architectural data.

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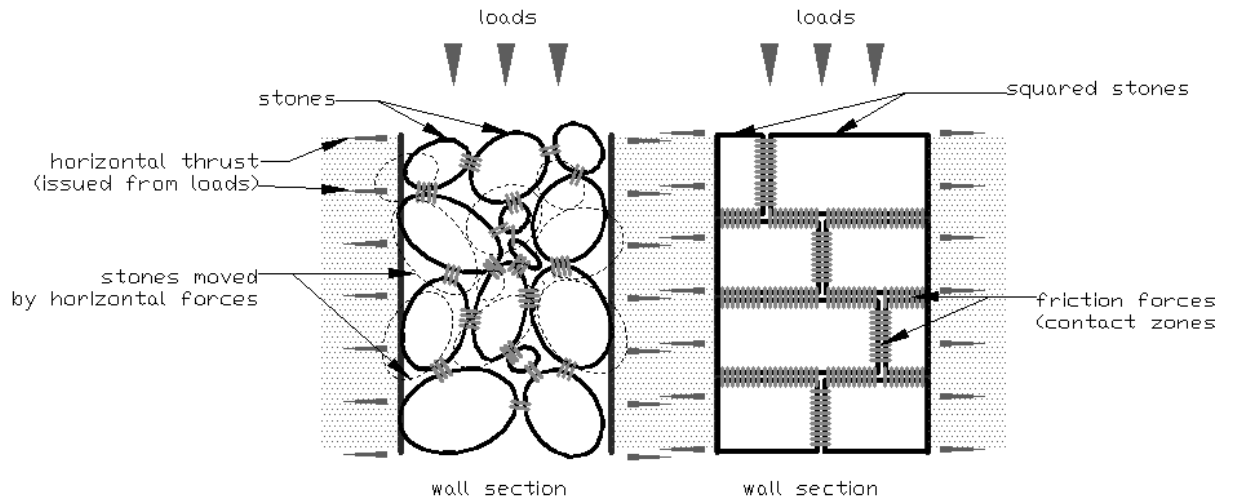


Figure 1: the resistance of the construction elements in a wall to horizontal rejection forces is proportional to the contact zones between these elements. Two opposed cases.

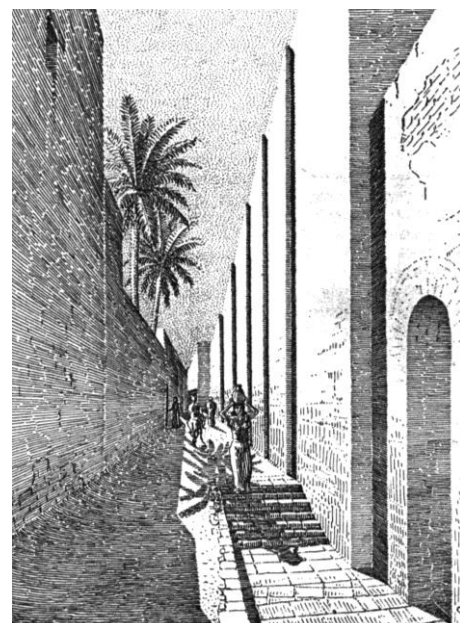
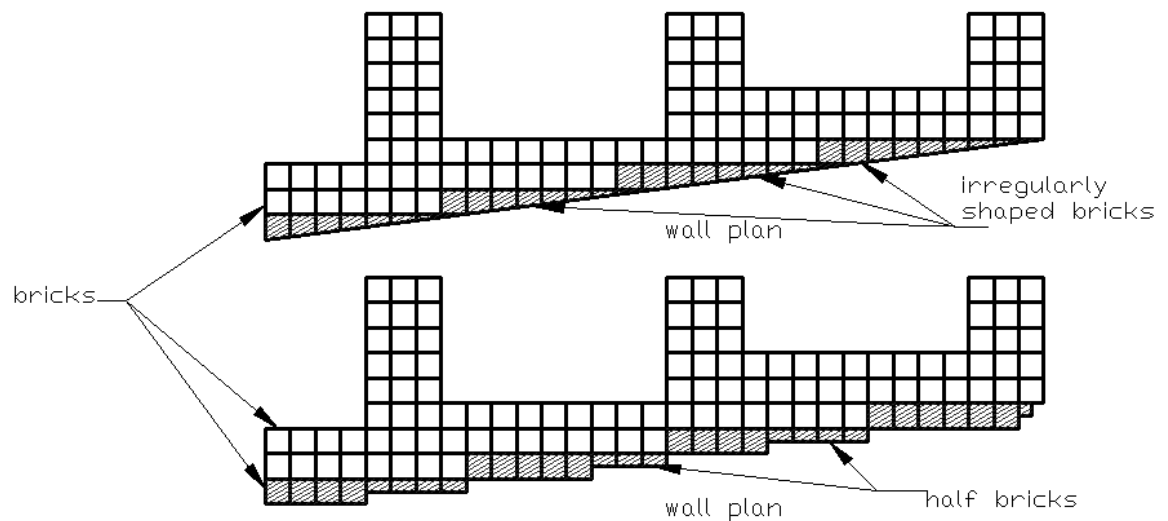


Figure 2: functional (above) and aesthetic (right, after REUTHER 1968) interpretations of the so-called “saw facades” of Neobabylonian houses.

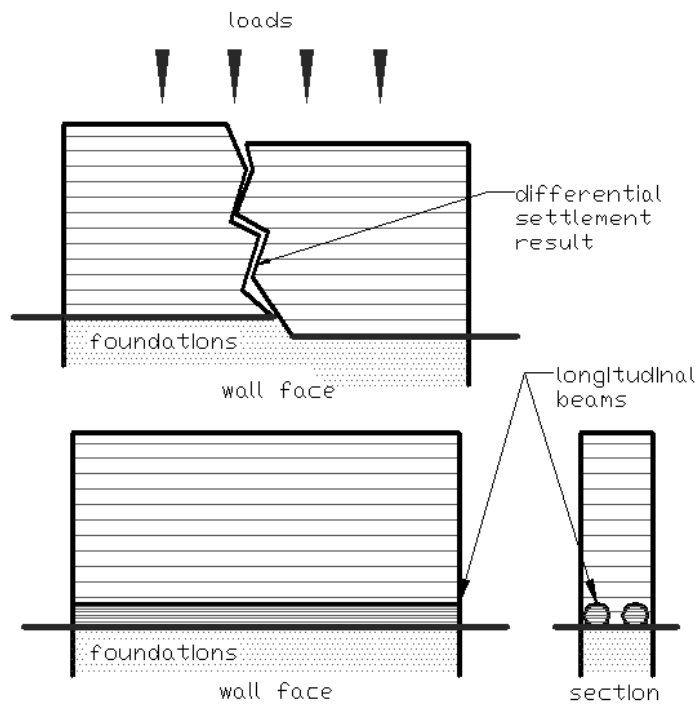


Figure 3: longitudinal beams introduced in massive walls foundations to alleviate differential settlement.

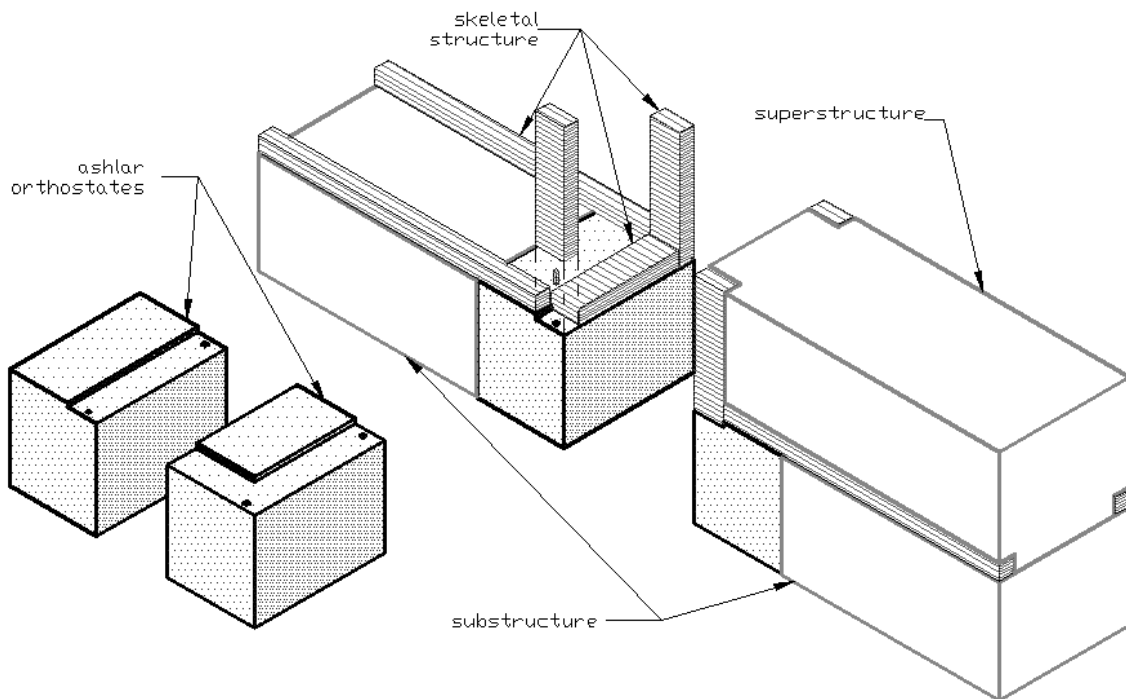


Figure 4: skeletal structure fixed, at wall ends, on squared blocks presenting mortises and slots.

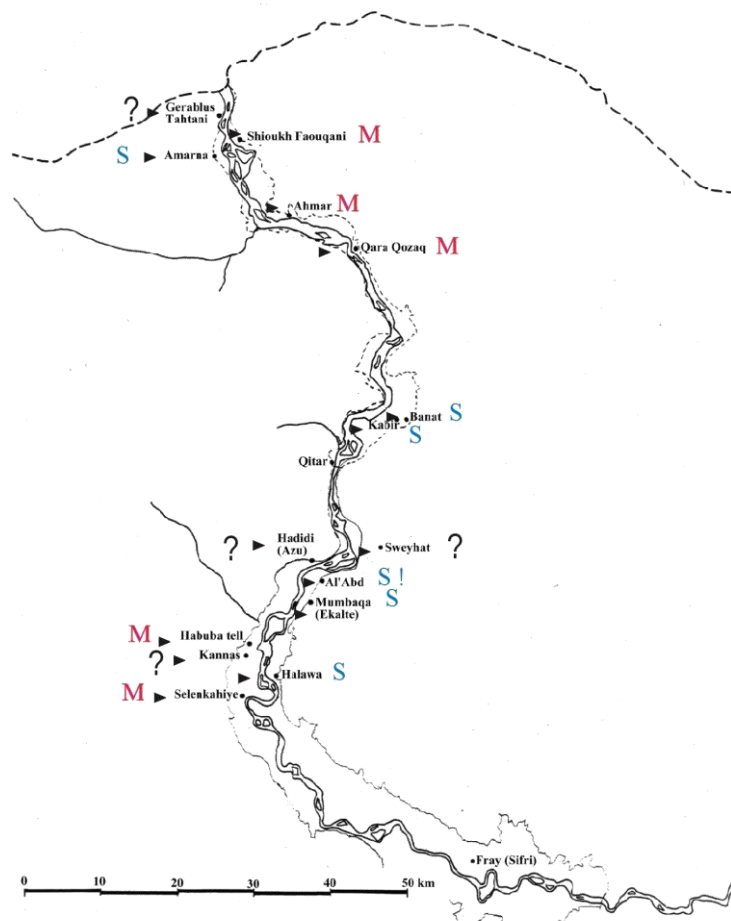


Figure 5: E. B. A. sites in the Northern Euphrates where stone was introduced in mud brick architecture after the first occupation (M), or at the first occupation (S).

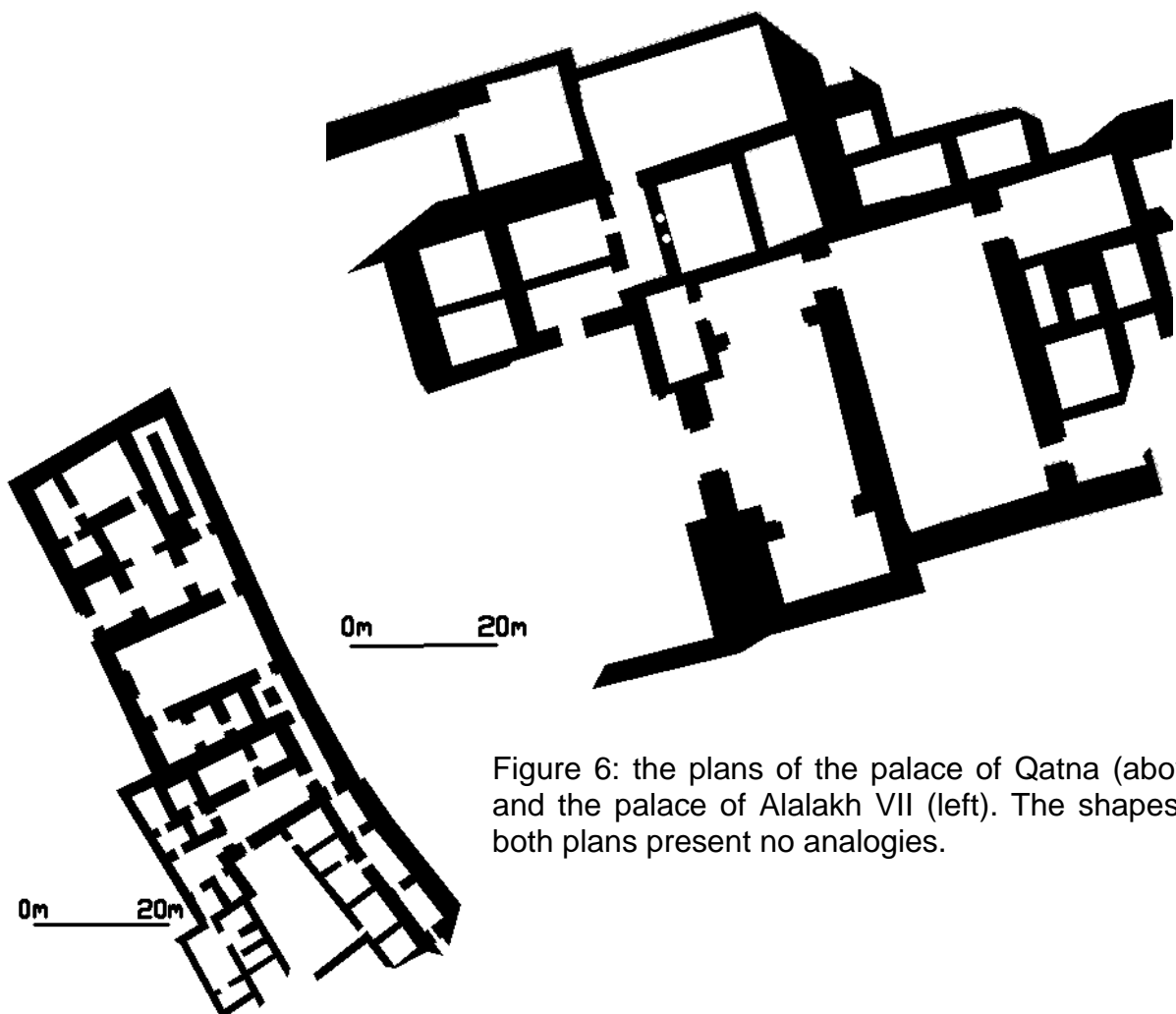
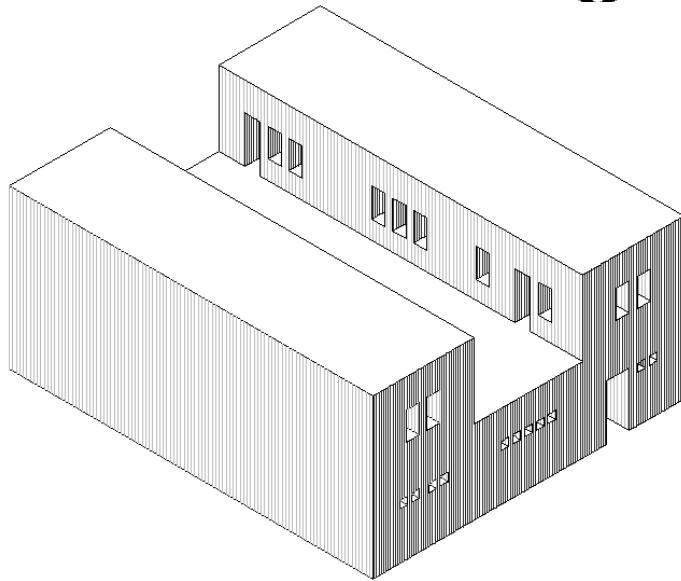
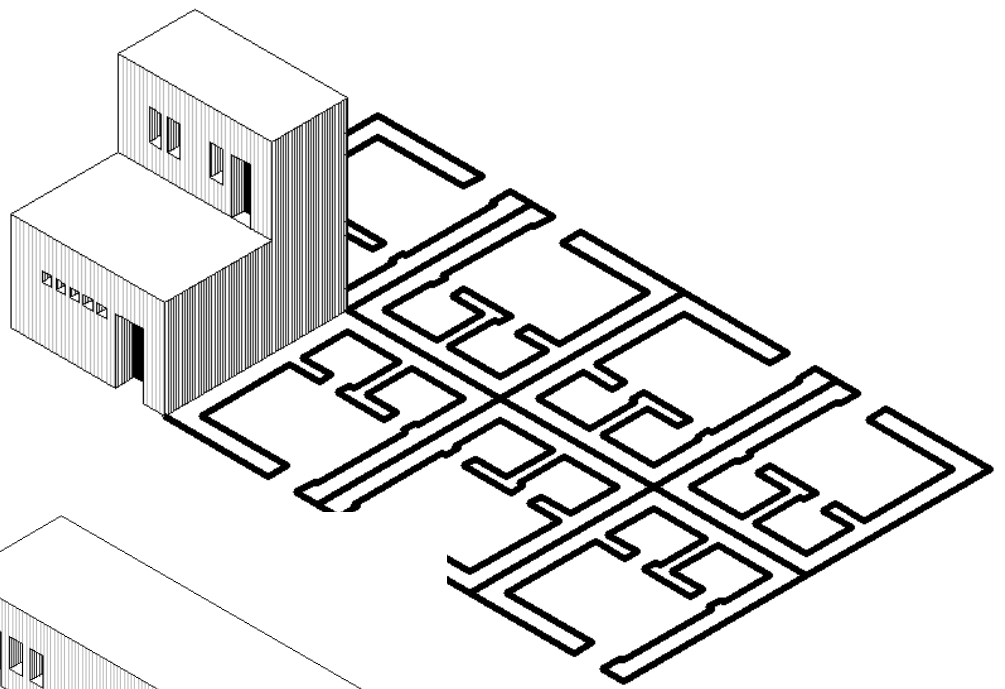
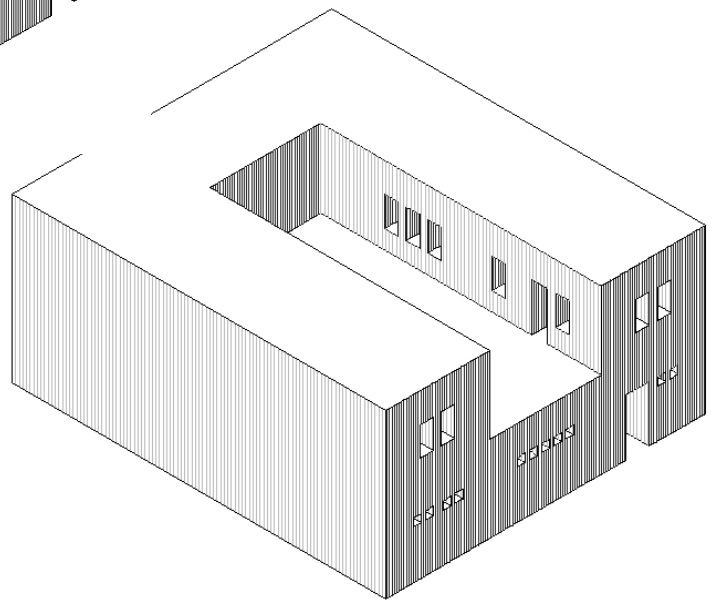


Figure 6: the plans of the palace of Qatna (above) and the palace of Alalakh VII (left). The shapes of both plans present no analogies.

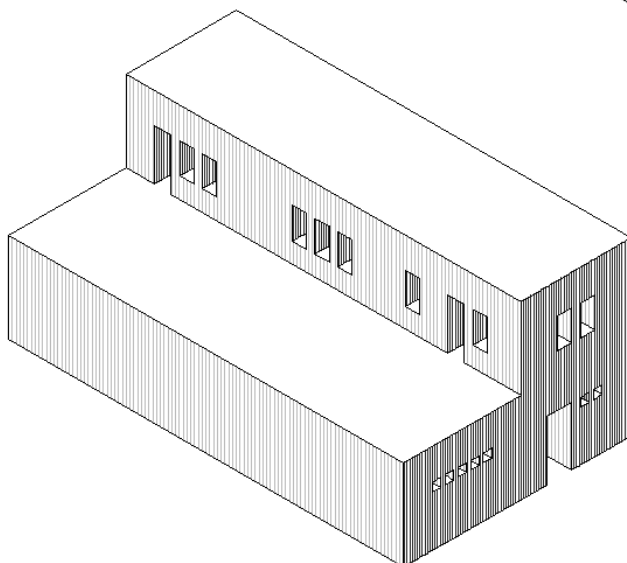
-7a- Halawa
(MB), Emar and
Mumbaqa



-7b- Mumbaqa (LB)



-7c- Hadidi (LB:Tablet building)



-7d- Bazi

Figure 7: different volumes
restitution.

1 I would like to express my gratefulness to Emmanuelle Capet and Manuel Gerber for their precious remarks

2 In the Ancient Near East bibliography, the low number of chronological studies based on architecture, as compared to those based on other archaeological artifacts, reflects this reality.

3 The functional importance of ashlar facing vary according to the case, while on the contrary, an aesthetic function for ashlar facing could be completely absent. The Egyptian Small Block (Zoser) masonry (2650 B.C.), WRIGHT 1997/1998:571, proves that a rough hewing is sufficient to obtain a perfect regular fine jointing outward appearance.

4 Curiously, the writer seems to be aware of the interest of this method as a solution to avoid “braking” bricks. He insists though on the aesthetic priority since the number of resulting corners exceeds, according to him, the real need. REUTHER 1968:84. However, the high number of corners allows a smooth grading with a half brick thick “steps” as illustrated in figure -2-.

5 It is probably for this reason that some architectural comparative studies are limited to the plan.

6 In reference to the functional aspect of the plan.

7 In reference to cultural, economic and political conditions.

8 In reference to field data such as geology, climate ... etc.

9 It is the case for instance of houses in an urban environment, as we shall see further in the study of volumes. On the contrary, monumental constructions in ancient Near East are generally independent structurally speaking: their interior organization is less influenced by the external one. It is their position into the agglomeration that could be considered.

10 One of the most striking examples in the history of architecture is the so-called plan of “basilica”, adopted for churches since the IV century, used originally for covered markets and courts of justice. GOMBRICH 1992:94-95.

11 Expression used in MCCLELLAN 1997:37.

12 As proposed for the *megaron* plan for instance (TREUIL et al. 1989:136). Contesting such typologies exceeds the object of the present paper.

13 It is important to distinguish in any construction method two elements: the concept (the idea) and the realization (construction materials). This chapter concerns mainly the design (that has sometimes a crucial link with the materials). The materials with which the idea is achieved are treated in the following chapter, “materials”.

14 This compromise can not be supposed systematically correct; some constructions failed while others were built with exaggerated structure.

15 Considering the complementary properties of earth and wood. See further, note 21.

16 This technique is attested in Beycesultan (level XIX) since the forth millennium (NAUMANN 1971:58, fig. 34 et 35). The foundations in this case are made of stone. Nevertheless, the utility of the longitudinal beams remains the same for the upper mud-brick walls.

17 The presence of wood in walls is mentioned by the excavator in Palace Q (MATTHIAE 1980:7-8, note 38). Analytical and comparative study of the architecture in Ebla -Carried out during my PhD thesis entitled “Techniques et matériaux de construction à l’Age du Bronze au Levant du Nord”, defended on the 30th of January, 1999, currently revised for

publication- allowed me to conclude that this technique is quite common in MBA massive architecture of Ebla.

18 In houses B and C for instance. MACHULE et al. 1986:106 et 1987:107.

19 Attestations are numerous, among them we can recall CALLOT 1986:741 for the "Palais Royal", SCHAEFFER 1962:125 for the "Petit Palais", YON et al. 1990:14, 16 for houses of the "Centre de la ville".

20 The skeletal structure is incorporated in stone walls in Ras Ibn Hani and sometimes in Ugarit; for the rest, it is incorporated in mud-brick walls.

21 Just like any other fibrous material, wood has a good resistance to cutting, bending and traction forces, while earth and stone have good load resistance.

22 In the Aegean world, walls with skeletal structure introduced in mud-brick and set on stone appeared during the last part of the seventh millennium (Early Neolithic) (TREUIL et al. 1989:131). Some geophysical information (TREUIL et al. 1989:93) allow for relating the development of this technique in the region to the permanent existing risk of earthquakes. In the Anatolian region, the presence of a developed skeletal structure is documented since the second half of the 3d millennium in Troja and later in Beycesultan (NAUMANN 1971:58, 59, 74, 84, 86). It becomes common in the L.B.A. Nevertheless, in both the Aegean and Anatolian worlds, examples of ashlar wearing mortises and slots are known only starting from the L.B.A. (NAUMANN 1971:74, 84. WRIGHT 1998:567).

23 Their decorative role is certainly dominant; detailed architectonic analysis is developed in my thesis (note 17).

24 In the framework of my PhD thesis (note 17) : the fixing system was possible to conclude in Alalakh, as a result of a meticulous analysis for all descriptions of walls given by the archaeologist (WOOLLEY 1955:92-123), while the interpretation given by the author in Qatna (DU MESNIL DU BUISSON 1935:73, Pl. XVII, 2) was reviewed in the light of a comparative study that allowed the restitution of wooden fixing beams behind the orthostates.

25 It's mainly in this palace (and in temple I) that polished basalt orthostates are used for decoration. The detailed architectonic descriptions of both palaces, VII and IV (WOOLLEY 1955:92-123) allows to notice that the use of decorative orthostates is considerably reduced in palace IV; rough and plastered orthostates used humid rooms are mainly functional.

26 The mass of mud brick walls allows for this interpretation. The ash traces are documented (Du mesnil du buisson 1935:98, tables XXIX and XXX/8) without being interpreted.

27 These techniques are generally "mono-material", which simplify their spreading; they could be achieved with bricks, stones ...etc., as is the case for corbelled vaults or some simple masonry techniques like bounding.

28 Basalt conic column bases are found on the site of Alalakh starting from level VII: In palace VII et IV, and temples V and I (WOOLLEY 1955 :116, 123, 124 fig.42). In Qatna, such bases are mentioned in DU MESNIL DU BUISSON 1928:9, 15, Pl IV.

29 It is interesting to mention here the bitumized limestone orthostates in the Northern palace of Ugarit. I tend to believe that this was done to simulate basalt stone, absent in the architecture of Ugarit, in order maybe to reinforce the luxurious aspect, and maybe imitate contemporaneous important constructions.

30 In the framework of the mentioned PhD thesis (note 17).

31 This point is detailed in MARGUERON 1986.

32 Elements like paved floors or “big” spans, still mostly considered as indicators of open courtyards for instance, cannot be taken seriously in absence of a general analysis of other data.

33 If more than a restitution is possible for one or a few architectural elements, each combination of these restitutions offers a suggestion of a volume restitution; the number of combinations increases with the multiplicity of architectural elements. The more numerous the solutions, the less likely one given is. Comparisons of similar volumes can be helpful in increasing the likelihood of one restitution being the right one over another suggested for the same plan.

34 Carried out during my PhD thesis

35 MARGUERON 1982:35-36.

36 Like houses M, E, Q and G.

37 The absence of these volumes from the coast and the inner regions of the Northern Levant enhance their chronological significance, although the technical realization differs in details from one site to another despite the geological homogeneity.