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The Conservation and Reconstruction of the Islamic Bath at Volubilis, Morocco

Alaa el Habashi, Tarik Moujoud, and Abdessalam Zizouni

The conservation of the early Islamic Bath at Volubilis in the North-West of Morocco led to the discovery of unknown aspects of the hydraulic system of the building in addition to the realisation of the first archaeological conservation work in the country which aimed to preserve the ruins and reconstruct the bath structures for future presentation to the public.

The conservation work of the bath represents the earliest known use of traditional and local material and labour in conservation project in the country, as well as its consolidation and preparation for display.

Introduction

During the years 2001-2005, the University College of London (UCL) and the World Monument Funds (WMF) established a project with the cooperation of the Moroccan National Institute of Archaeological Sciences and Heritage (INSAP) to excavate selected areas in Volubilis, to develop a site management plan, to build up a Geographic Information System to support conservation and maintenance scheduling of the site's structures, and to study and conserve selected walls and mosaics as pilot projects.[1] This paper reports on the third season of conservation, launched to carry on the previous works and to implement the third phase of the proposed project on the Idrissid bath, assessed

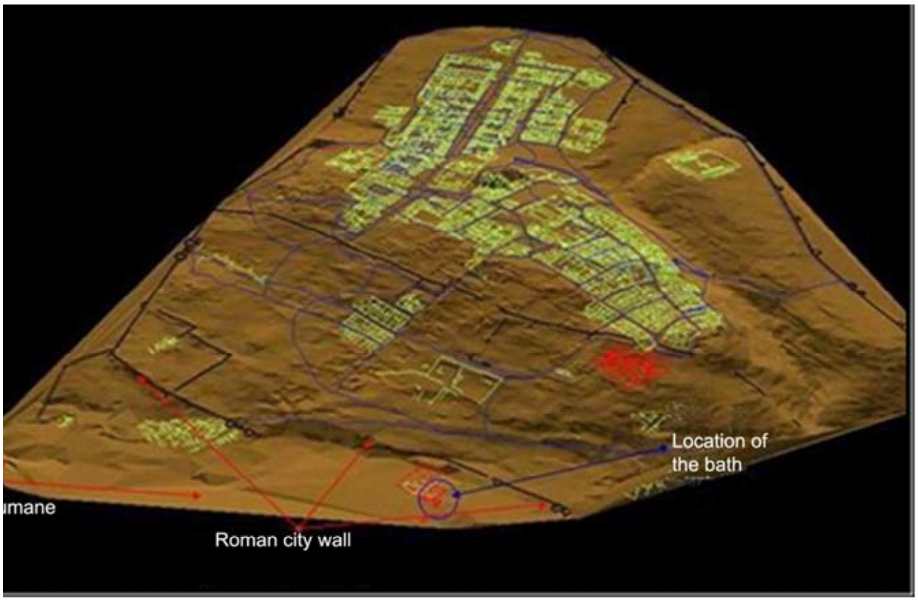


Fig. 1 - Digital Elevation Model of Volubilis showing the position of the baths.

1. The UCL-INSAP project, directed by Elizabeth Fentress, Hassan Limane and Gaetano Palumbo was sponsored by the British Museum, the Volubilis Foundation, the World Monuments Fund and the Van Berchem Foundation. For the excavations E. Fentress and H. Limane 'Excavations in Medieval Settlements at Volubilis. 2000-2004' . in P. Cressier, I. Montilla, J. R. Sánchez Viciana and A. Vallejo Triano, eds., Miscelánea de historia y cultura material de al-Andalus. Homenaje a Maryelle Bertrand,Quadernos di Madinat al-Zahra 7, 105-122.

by Tarik Moujoud.

The campaign was conducted by Mr. Alaa El- Habashi, the architect-conservator and conservation consultant for UCL-INSAP project, who did the design and the project study for conservation, the restoration and the mise en-valeur of the Idrissid bath.

The Site

The extra-muros bath is located southwest of the archaeological site of Volubilis, outside the Roman defensive wall built by Marcus Aurelius in 168-169 AD (Fig.1)2. It was built on a flat area in the valley of the Oued Khomane, outside the city walls of the town.

The bath was first mentioned in literature in 1897 by Henri de la Martinière, who mistakenly identified it as a Christian basilica because he found in it a bronze incense burner that is decorated with a cross.[3] The building was first excavated in 1964, but, with the exception of a published summary, the results of such excavation never saw the light.[4] It is not before 1992 that a comprehensive and detailed study was devoted to the understanding of the history of the bath, its canalization system, and its importance in the history of the development of baths in Morocco. Abdel Aziz El-Khayari conducted such analysis for the thesis he prepared for INSAP. In a published article, El-Khayari reports on the excavation he undertook in various areas in the monument, through which, he was able to find two Idrissid coins, one of which was well stratified, to date the construction of the building to the end of the 8th century AD, the beginning of the Idrissid dynasty. Moulay Idris I, the founder of the dynasty, was an Arab noble who fled from the Abbasids of Baghdad to arrive to Morocco in 788 AD.[5] There, he won the respect of enough Berber tribes to establish the first dominant state in the north of the country. Adopting this dating, El-Khayari examined the bath in relation to its precedents, and its contemporary examples in the vicinity and elsewhere in the Roman Empire and the Muslim World. The study reveals the importance of this Idrissid Bath, because it is considered an evidence of the transition phase of the Roman to the Islamic baths, especially during the early ages of Islam in Morocco.[6] The Idrissid bath of Volubilis is probably the oldest surviving bath in Morocco built after the arrival of Islam.

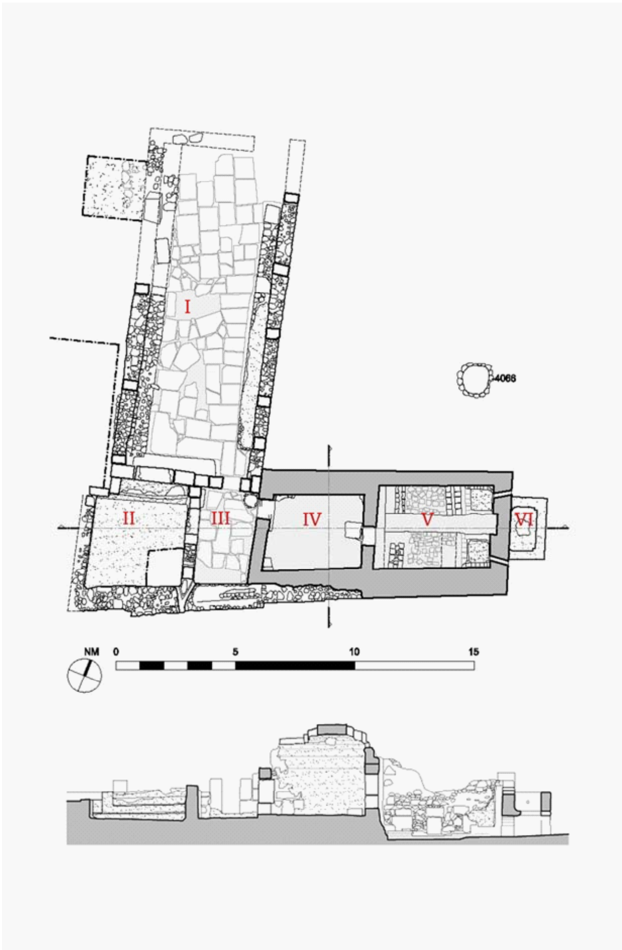


Fig. 2. Plan and section of the hammam

The bath thus constitutes a unique example in Morocco. It has a wide range of values that make it significant and valued not only for the history and

2. The current 3D GIS model was taken from unpublished report on Volubilis 2002.

3. H. De Villefosse, "Un encensoir en bronze découvert à Volubilis," in *BSNAF*, 1891, p. 149.

4. N. El-Khatib-Boujibar, "L'archéologie marocaine en 1964-1965," in *BAM*, 6, 1966, p. 545-6,

5. A. El-Khayari, "Les thermes extra muros à Volubilis," in Africa Romana: atti del X convengo di studio Oristano, December 1992, Sassari1994, 301-312.

6. El-Khayari, op.cit., 309-312.

the archaeology of Volubilis but also for the history of Islamic baths in the whole Morocco.[7] The preliminary assessment of its significance has brought into light a variety of values:

- *Historical*: It is considered the early example of the Islamic bath in Morocco; the other existing baths in the country are dated later in the 11th and 12th century.
- *Research, teaching and understanding*: The campaign offered an opportunity to train students in the techniques of conservation
- *Representativeness*: The building is a model of vernacular architecture during the early Islamic period, representing the transition from the Roman to the Islamic period. The plan and the internal organization reinforce the theory that it is transitional from Pre-Islamic to Islamic models.[8] Moreover, the *extra-muros* bath is the only standing building in the medieval town, which make it very important for the site.
- *Social, cultural*: the bath is a witness of the social and cultural transition during the early Islamic Period; the bath represents an essential part of the Muslim way of life.

Description of the Bath

The bath is located in the southeast of the site, outside the Roman defensive wall of Volubilis. It is built over a surface of 243m^2, limited by the course of Oued Khouman. Roughly orthogonal, the bath comprises six rooms (Fig.2).

The baths were entered from a room (I) which corresponds to the *Apodyterium* of Roman baths, where the bathers get changed. This room has benches on both sides and was paved with hard limestone slabs, probably taken from other monuments and reused. To the south is a plunge pool (II) covered with a hydraulic mortar, with a canalisation running on the top of southern wall to provide water. The evacuation of the used water is ensured by a drain situated in the northeast angle of the pool. The access to the third room (III) is ensured by a small entrance directly from the first room. This served as a transitional space into the hot rooms, and was decorated with a relief of a Roman shield, spoliated from the triumphal arch of Caracalla in the center of town (fig. 3). The fourth room is covered with a vault with two tiny window pierced in it to allow light to come through and to aerate the room. The fifth room is heated by a hypocaust system (fig. 4). The heated floor was supported by series of brick supports.

Fig. 3 Room 3, showing spoliated Roman relief (E. Fentress)

7. *Ibid.* 308.
8. El Khayari, *op.cit.* in n. 4, 312/

A longitudinal canal allows the circulation and repartition of the heat beneath the floor. In the same room, at the east end of the room two small basins are preserved in the corners. These were fed from water heated over the furnace, in space VI.

The construction techniques used to build the bath, were not very different from those used on the Roman site nearby. The material encountered could be divided to four categories:

- Spoliated elements used in floors, threshold and buttresses and doorsteps.
- River pebbles, from the nearby Oued Khomane, and unfaced stone bonded with mortar
- Unfaced stones bonded with earth: this is used in the benches, which were then covered with mortar.
- Bricks, probably recycled from Roman structures, used for the floor supports and the *praefurnium.*

The techniques generally used in building the bath is the *opus africanum* , with orthostats with a mortared rubble infill.

Fig. 4 Room 5 from the west (E. Fentress)

Condition

The building as it was found was fully documented in photographs and 1/20 drawings figs. 5 and 6). A condition survey of each element was made to identify locations of all deterioration procedures: missing masonry that leaves the wall with either partial loss of building material, or a total loss and creating wide voids and gaps in the walls. Another problem is the activities of insects that develop nests in the voids and the gaps of the wall and keep widening them weakening the bonding mortars, and eventually risking the structural stability of the structure; the detachment, partial and total loss of plaster layers; the manifestation of critical cracks in crucial stone lintels, and roofs; the growth of different kind of vegetation within the masonry joints; and the microbiological (such as lichens) attacks on the different kinds of building materials. In addition, an inventory of the building materials locally available was made, and samples were collected for tests. The purpose of this exercise was to re-construct the types of mortars that were used in the construction of the bath and the different plasters used in its spaces, especially those hydraulic ones used over the roof, and in the hot and cold basins. Several mortar samples were collected from different bath, and were analyzed in a local laboratory to confirm that the mortars could be reconstructed, so that homogeneity of any newly introduced building materials with the existing ones would be assured.

Fig. 5. Room IV, from the east and Fig. 6. Documentation of Room IV (A.el H)

These preparatory studies helped to draw a comprehensive understanding of the building construction techniques and systems as well as to identify the exact intervention required in different sections of the building.

Treatment

The conservation tasks carried out combined different conservation procedures, starting from simple cleaning, and going through consolidation and stabilization to end up with more complicated processes such as restoration and the reconstruction. The cleaning itself was fundamental, allowing us to observe a number of details about the water adduction to the baths, and the way in which the smoke escaped. Conservation can never be entirely separated from archaeological interpretation.

Lacunae in the walls were integrated, and mortar replaced over structures such as the benches. The nature of the interventions was not common to all of the different structures subject of our interventions; in fact every structure had different problem thus it needs different approach which needed to be adequate and suitable to it; to its material of construction and its significance. Constraints of time and the budget affected our schedule in terms of implementing the whole operation, especially as some of the processes turned out to be in need of more time and budget and demand further discussions. The most intense, and perhaps the most problematic, of these, involved the reconstruction of the vault over the hot room, and this will be the subject of the rest of this paper.

Fig. 7. The vault in room IV (A.el H)

The partial reconstruction/restoration of the vault

For the purpose of this paper, only the intervention that proved to be the most debatable is detailed here, the partial reconstruction and restoration of the vaults in rooms IV and V. The remains of the vault of room IV (the warm room) were partially reconstructed following its traditional construction technique. Such intervention was mandatory in order to prevent the sudden collapse of the existing, very lacunose portions of the vault. (fig. 7) The intervention consisted of stabilizing and consolidating the lateral walls, and the partial restoration of the vault in order to complete its load transfer system only in the minimum required sections of the vault. A wooden formwork was erected following the exact profile of the existing vault, using a wooden scaffolding and a compacted fill of sand and earth. Traditional fired bricks were used in the construction as shows (fig 8). At the edge of the reconstructed area, the bricks were left in their keying position in order to hint on a possible continuation, and to make the intervention distinguishable.

Fig. 8 The bricks used In the reconstruction (A el H)

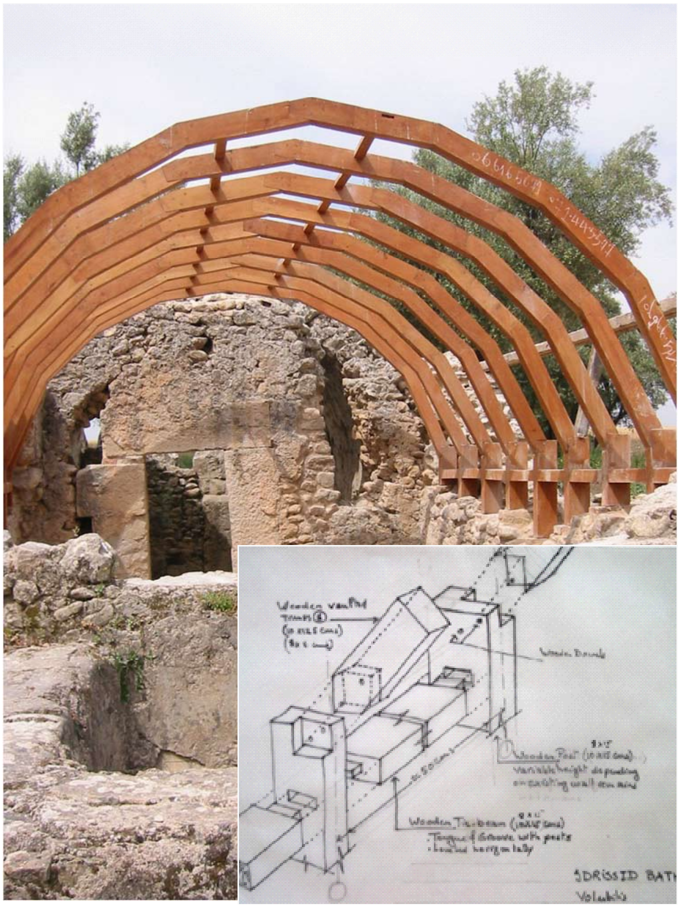


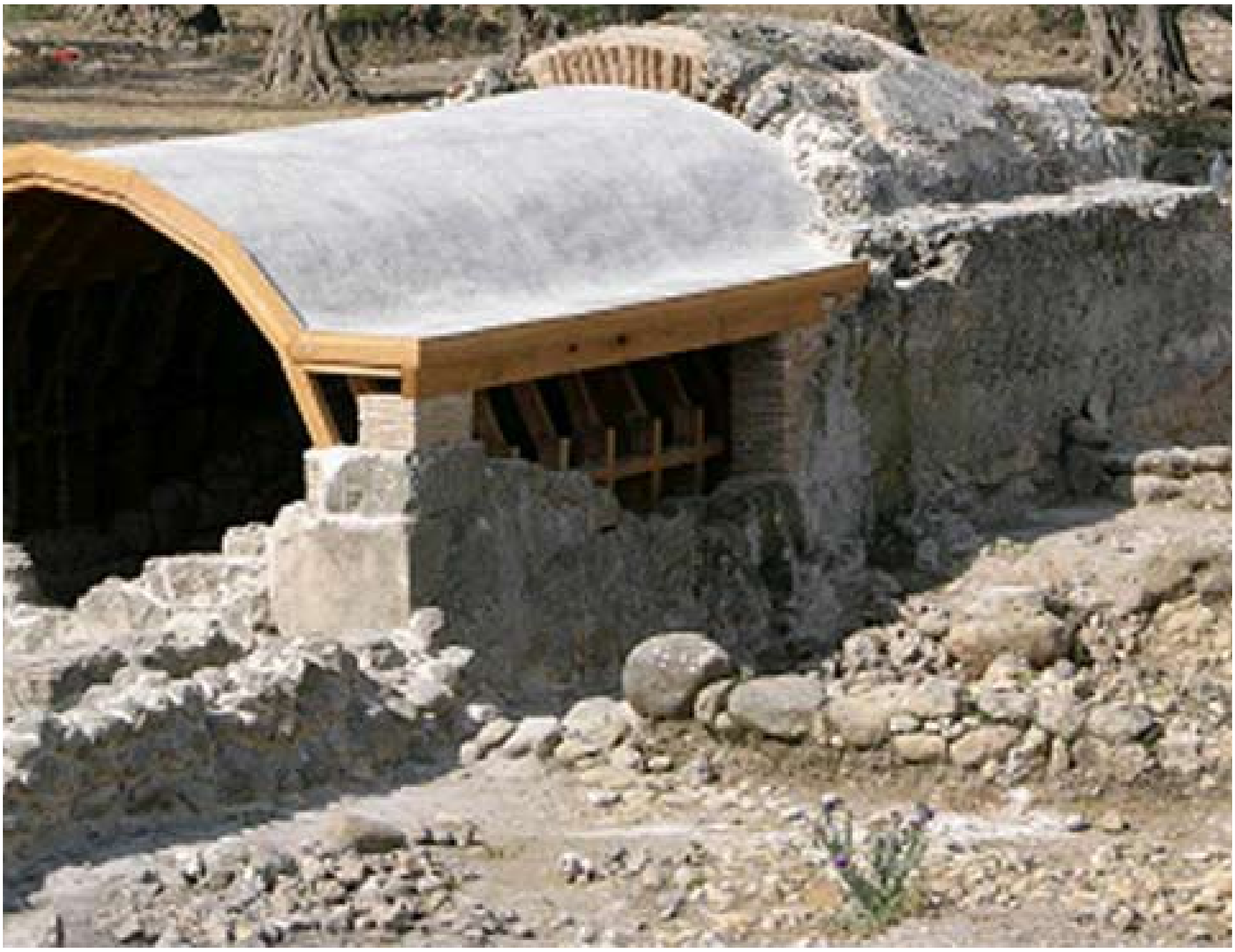
Fig. 9: The wooden formwork for the vault (A el H.) and Fig, 10. Carpentry details of the reconstruction (A. el H)

The vault over room V (the hot room) was totally lost, except from little sections at the top of the room corners. The top of the wall separating rooms IV and V follows the semicircular arch profile giving the curvature of the vault. This confirmed that the vault of room IV continued over room No. V, and possibly beyond, to cover areas of the furnace room (room VI). In the intervention plan, it was important to preserve the remains of the exposed hypocaust below, and to provide an indoor well-arranged space where visitors could grasp the heating system of the bath. It was, therefore, decided to provide a permanent shelter over room V, but not to reconstruct the vault following the historic technique, as followed in room IV. Instead, a lightweight structure, which could be removed at any time in the future without damaging the historic fabric, was proposed. Nine wooden frames were designed to rest onto wooden posts (8x15 CMS in section, figs 9 and 10.). The height of each post was calculated to fit onto its position following the profile of the existing ruined walls, left without any reconstruction, except for minimum leveling using crushed bricks and lime mortar to provide seatings for the posts.

This technique assured reversibility and offered a clear visual distinction between the preserved walls and the newly added roof. The weight of the frames and the roofing layers above keeps the new roof in place without in structural fixation, except for two tie beams that fix the top of the arched frames to the top of the wall that separate rooms IV and V. The purpose of these tie beams is to prevent any horizontal displacement due to unexpected movements. The span between the axis of the frames is 50 cm2, so that the frames would provide enough support for the 2 cm2 wooden planks which were fixed above the frames as ties.

Assembling joints between all the wooden members of the frame were designed in such a way that two consecutive members would be dovetailed to sustain the compression forces exerted onto them without the use of nails. Wooden dowels were also used to assure the stability of the joints and to fix them into their positions. A total of 486 dowels were made for the construction of the nine arched frames and their posts. All of these dowels were drilled manually because no electricity is available on site. Each wooden arched frame consists of eight wooden members dovetailed to each other and to the two extremities to the wooden posts. The assemblage of the arched frames is quite easy and takes few minutes if all the joints are well prepared.

Initially, a very lightweight vault was constructed. A reed mat covered the formwork, followed by a layer of plaster and a mortar layer. However, this proved far too fragile, and it failed to survive the harsh environment, so that it was removed in the subsequent season, and a new covering devised, starting with wooden planking. The wooden planks of the roof were then fixed onto the frames using brass screws (fig. 11). The planks sat on the southern wall of room V and on a wooden beam that marks the northern ends of the exterior of the vault



Fig, 11 The wooden vault covered with planking and waterproof membrane (A el H) profile. The reason for using this beam at the northern side of the wall was to prevent having to reconstruct the northern wall to reach the level of the vault. A waterproof membrane reinforced with fibreglass mesh was then laid on top of the planks. The edges of the membrane are protected with a wooden fascia. A protective screed was, then, applied on top of the waterproof membrane. Over the planking it was planned to place a layer of hollow bricks and roof plaster (fig. 12). The color and constituents of the roof plaster would be similar to those

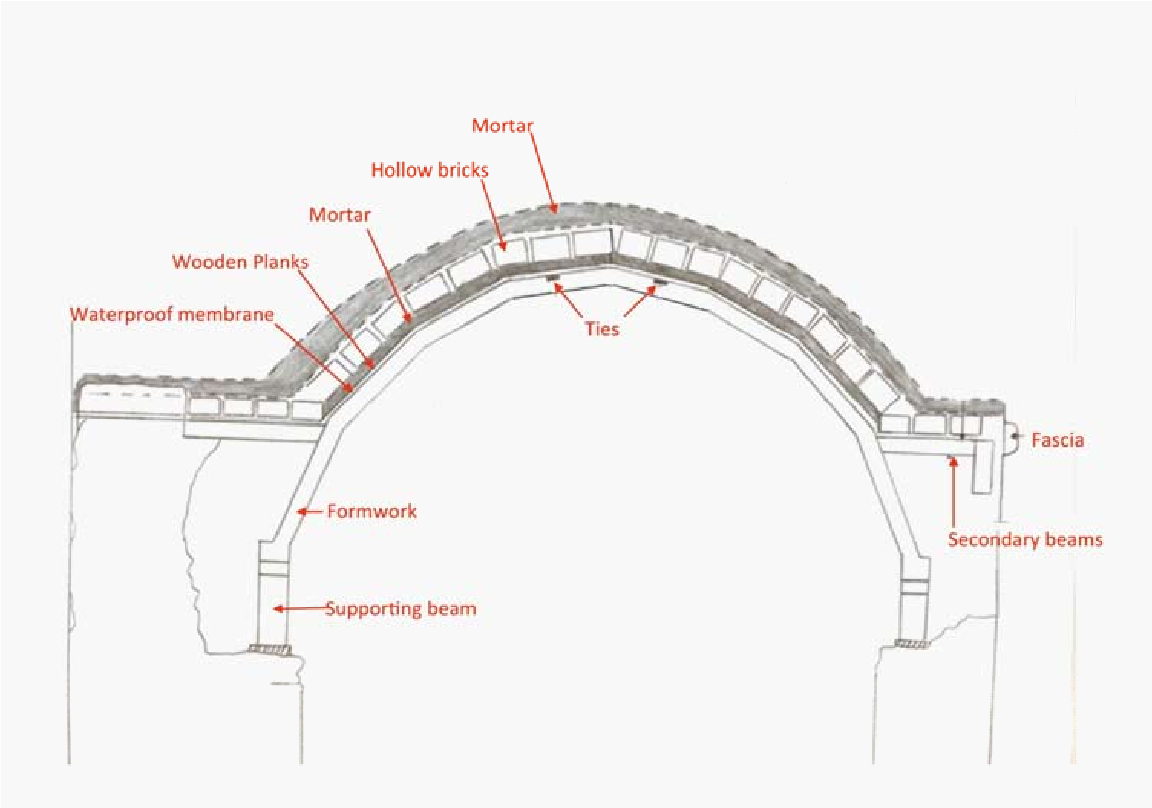


Fig. 12: the structure of the vault in room V: the hollow bricks were never added

of the historic hydraulic mortar that survived on the portion of the vault in room IV. These hollow bricks and the plaster above it should act as a thermal insulation that would minimize thermal movements of the wooden members of the new roofs, and thus elongates it life. This layer would also have lessened the height difference between the new roof and the preserved portion of the historic vault.

However, for various reasons - chiefly uncertainties about its weight ‘ the hollow bricks were never added to the vault, and today it is topped by the protective screed, which has held up reasonably well (fig. 13). The ensemble was to be completed by one of two panels designed for the site: in the event only one was put up. (fig. 14). This has now been defaced, probably by the local shepherds at a time of conflict with the director of the site.

Fig. 13. The structure in 2015.

Fig, 14. The explanatory panel – too far from the site- before its defacement (TM)

Conclusion

Ever since preservation was recognized as a profession, restoration of historic buildings has been debatable. The doubtful exactness of the historic information, the complexity of the historic fabric, the urge to respect all historic phases, and romanticism towards the past are arguments against any restoration scheme. Putting the building back in use, profiting from modern facilities, making clear distinction between additions and historic fabric, maintaining reversibility, and following minimum intervention approach are supportive reasoning. The excavations that the UCL-WMF-INSAP undertook in Volubilis revealed important historic evidence of the first settlements of Muslims in Morocco. The magnitude of the discovery, and the urge to attract visitors to a remote and difficult to access area in Voubilis were incentives to consider the partial restoration of the roof of the Idrissid Bath. This Bath is planned to undertake a role in the representation of the site that could had never been assigned to it throughout its history.[9] Public baths in Islamic cities are usually buildings that are hidden within the maze of the urban spaces. In the contrary, as a ruin that holds specific historic assets and special technical aspects, the Idrissid Bath needed a re-birth with new qualities in order to fulfil its new position in Volubilis. The partial restoration of the historic roof, and the permanent vaulted shelter are all qualities that could sustain this new function. However, the rare tourists and scholars that do visit the area have said that the wooden vault has completely changed the look and authenticity of the ruins: attracting attention more than the structure itself and the ruins nearby, it has a negative impact on the landscape of the ruins. There is a risk that the bath itself becomes invisible or unnoticeable in front of the impact of the wooden vault.

The use of the site as a tourist destination has sadly never materialized. A certain reluctance to publicize

9. For more discussion on the decision of the vault reconstruction, or rather the sheltering room V, see el-Habashi, 2006.

it as the headquarters of Idris I, the letting of the surrounding land for wheat cultivation (a good choice in view of the weeds elsewhere), and the necessity of either a long hike down the hill or a new stop for a bus has left it more or less abandoned: in a general crisis of maintenance at Volubilis, the site is seldom, if ever, weeded, so that it is covered by tall thistles. In spite of an explanatory panel, it is very difficult to understand what the site is about. The vault, however, remains in good shape, and if in the future tourist access to the site is encouraged the monument remains legible and intact.

Acknowledgments

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