BUILDING ARCHAEOLOGY IN JORDAN: PRELIMINARY REPORT ON THE 2009 - 2011 SURVEYS AT UMM AS-SURAB

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The Site

Umm as-Surab (MEGA Jordan n. 2806) lies in the district of Mafraq, *ca.* 2km south of the Jordan-Syria border. The archaeological site is located in a slightly elevated area of the southern Ḥawrān, where rich agricultural soils cover the underlying volcanic rock. The basalt has been used as the main building material all over the region since Antiquity, with structures of Roman, Byzantine and early Islamic (Umayyad) date, as well as those of the modern era. Additionally, Iron Age and Nabataean pottery and epigraphs have been recorded in previous surveys and excavations (cf. Homès-Fredericq and Hennessy 1989: 622).

Reasons for Selection of the Site

Umm as-Surab is an ideal site for a building archaeology survey for many reasons:

(1) It is large enough to have many styles of construction represented, without being so large that it cannot be investigated within a relatively short period (e.g. three to four seasons);

(2) It has many buildings with walls standing 3-5m high, with few recent restorations; this makes the wall elevations suitable for stratigraphic analysis;

(3) It has been inhabited for long periods with numerous gaps in occupation that help in identifying construction phases (including reconstructions and adaptations);

(4) The construction styles represented at the site are representative of the wider area, which was relatively homogenous in cultural terms during many historical periods.

The southern Ḥawrān has a long tradition of well-documented interdisciplinary studies, from the beginning of the 20th century to the present day. In particular, there are well-published projects by French scholars working in the Syrian Ḥawrān that permit useful and detailed comparisons on a vast range of issues concerning settlement and building techniques (in particular cf. Clauss-Balty 2008).

In the Jordanian Ḥawrān, the site of Umm as-Surab is less well documented than the better known site of Umm al-Jimāl, which is situated nearby and has been – and still is – the subject of long-term investigations by American missions (De Vries 1998). Fortunately, the chronological sequence at Umm as-Surab seems to be the same as that of Umm al-Jimāl, enabling chronologies at the former site to be established on the basis of comparisons with the latter.

Project Aims and Methodologies

As described above, Umm as-Surab is an ideal site at which to conduct a 'Building Archaeology in Jordan' project. The main aim of the project is to compile an 'Atlas of Building Techniques', e.g. rooms, roofs, openings, masonry, building materials etc., as they are represented both at this site and in the region as a whole. In essence, the research aims to understand how the extant buildings have been built. A 'constructional history' can be produced by recording all the building information that is inherently 'written' into the architectural structures (*viz*. materials, techniques, size of elements etc.), thereby shedding light on change and evolution over the course of time.

The 'Atlas of Building Techniques' is closely linked to the methods used to record building characteristics and to the reconstruction of their structural history according to the principles of archaeological stratigraphy, applied through identifying and recording the results of 'consistent and homogeneous constructional actions'. A

'consistent and homogeneous constructional action' might be what Harris (1989) calls context in excavations but, in the case of buildings, stratigraphic study can be slightly different. As part of the formation of a stratified deposit, a 'homogeneous constructional action' might be a whole 'building unit' (e.g. the Ss. Sergius and Bacchus church referred to below, in relation to the buildings surrounding it). However, it must be demonstrated that there are clear chronological differences between the different 'building units'.

Within the 'building units', there can be different 'constructional phases' (e.g. the reconstruction of a roof during the Mamluk or Druze period). Within the 'constructional phases', there can be different 'activities' (e.g. construction of the diaphragm arch, followed by construction of supports for the horizontal beams, filling of residual spaces and, finally, covering with an impermeable material).

More circumscribed 'constructional activities' are referred to as 'stratigraphic units' (e.g. filling an opening, preparation of floor surfaces etc.). Within a single 'stratigraphic unit', there can be further levels of observation (e.g. different layers of internal replastering).

Stratigraphic analyses combine these five levels of close examination. Therefore, the results are based on these observations of relative chronology.

At Umm as-Surab it was decided to record the first two levels only, namely 'building units' and 'constructional phases'. The analysis was expanded to include individual 'stratigraphic units' only in few key areas where it was necessary to gain an understanding of construction sequences (e.g. in the room immediately north of the *prothesis* of the church).

Stratigraphic analysis of buildings was first undertaken in Italy in the late 1970s by archaeological projects that were digging stratigraphically for the first time (see Parenti 2002: 73 for a bibliography on this subject). Since these projects were investigating historical periods between the 9th and 14th centuries, the research was conducted inside buildings that were sometimes still in use and always had tall, elevated walls.

Careful observation of masonry has enabled us to identify differences between the various building components (e.g. building material, dimensions, workmanship, mortar, stone-cutting etc.) visible in wall elevations, to the extent that the logical next step was to record them and attempt to reconstruct their relative chronologies.

Observations were recorded according to criteria that have, in essence, remained the same since the late 1970s, *viz*. (1) drawing the walls and identifying 'coherent constructional actions' (now replaced by orthophotos and 3D models with photographic restitution of the surfaces), (2) recording the characteristics of each 'constructional action' (US = It. "stratigraphic unit") and (3) establishing their relative chronologies. For example, if the US being recorded were an extension to a room, it would be 'supported' by earlier masonry. As in excavation, negative US can also be identified and recorded, e.g. removal of building material through collapse or demolition, in which case the US 'cuts' the wall.

Proceeding in this way, an entire building complex can be divided into 'homogeneous constructional actions', with their own relative chronologies (i.e. 'before', 'after' or 'contemporary with'). These 'constructional actions', each defined by a sequential number, can be studied by means of a stratigraphic diagram or 'Harris matrix'.

By interpreting the results of these surveys, we can reconstruct successive building phases, with relative chronologies for the different activities associated with the construction of walls and other structures. When studying standing buildings with long construction sequences, this allows us to create 'local typological series', with no need for lengthy and expensive excavation seasons. Epigraphy, ancient written sources, surface pottery and many others forms of evidence associated with the building itself enable the relative and absolute chronologies to be linked. Also, archaeometric and biochemical analyses can be carried out on small samples of building material. These may permit more accurate typological comparisons that may shed light on the chronology, use and abandonment of the structures, thereby enabling the building to be dated more accurately.

Initial Survey Results

After a first season in 2009, the Laboratory of Building Archaeology at the University of Siena carried out a second instrument survey season on the standing monuments in 2011, involving an Italian - Jordan team directed by

R. Parenti[1].

Hitherto, the site had only been the subject of preliminary studies. H.C. Butler visited it in 1904-1905 and again in 1909. More recently, G.R.D. King provided a description of the main churches (see Homès-Fredericq and Hennessy 1989: 624 for a comprehensive bibliography of research carried out up to the late 1980s). On the whole, scholars focused on the remains of the main Ss. Sergius and Bacchus church and surrounding buildings, particularly the extant tower that K.A.C. Creswell considered to be an early example of a square Syrian-style minaret (Creswell 1989). More recently, the Department of Antiquities of Jordan (DoA) has carried out some restorations, as well as a small sounding (see notes in the MEGA J entry).

29 'topographic units' (TU) have been identified in the archaeological area (**Fig. 1**), most of which have been geo-referenced. This has allowed the new surveys to be matched with old aerial photographs and surveys. We have focused on the Ss. Sergius and Bacchus church (TU 28) and a building complex in the southern part of the archaeological area that has recently been excavated by the DoA (TU 24), as well as a little church beside the road mentioned by King (1983).

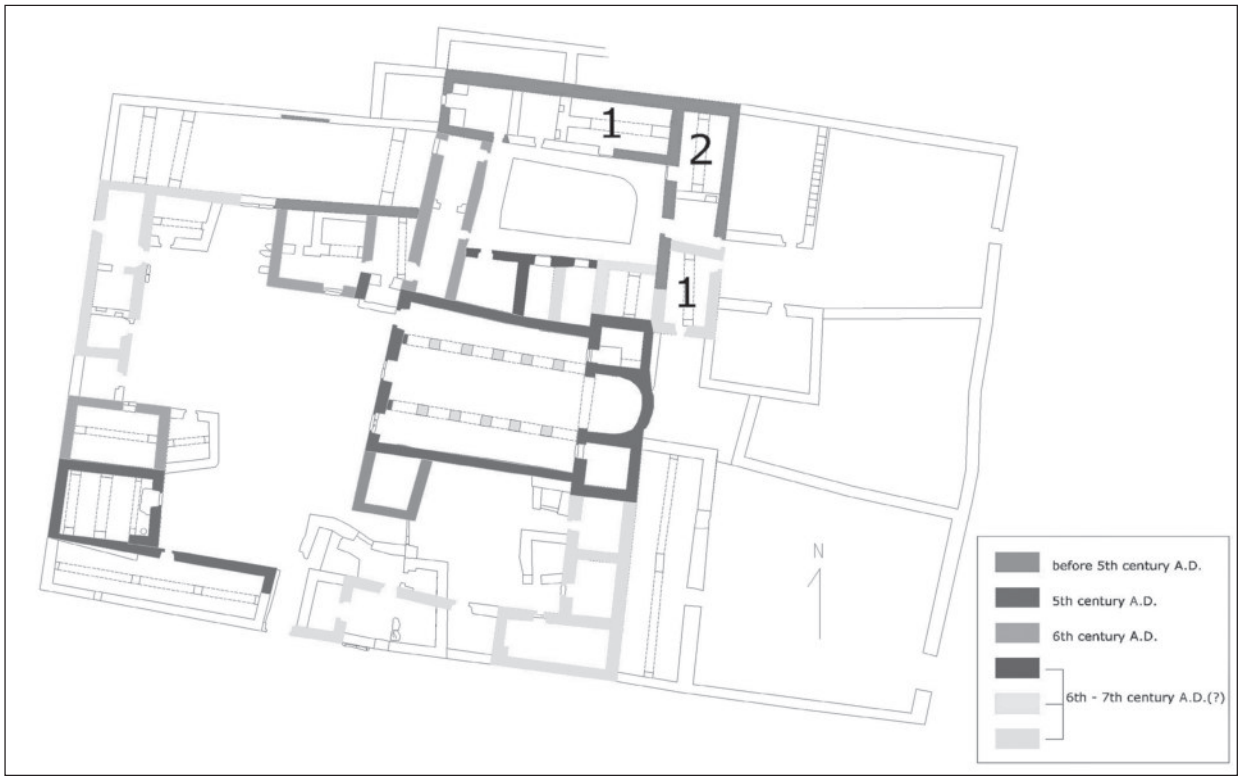
The 'Building Units' of TU 28 and Wall Construction Techniques

It seems clear that the very large complex in TU 28 (**Figs. 2-3**) is earlier than the church of Ss. Sergius and Bacchus (489 AD). Recent soundings carried out by the DoA close to its north-west corner yielded pottery of probable Late Roman period date (Dr Jamile al-Qutaish, pers. comm.).

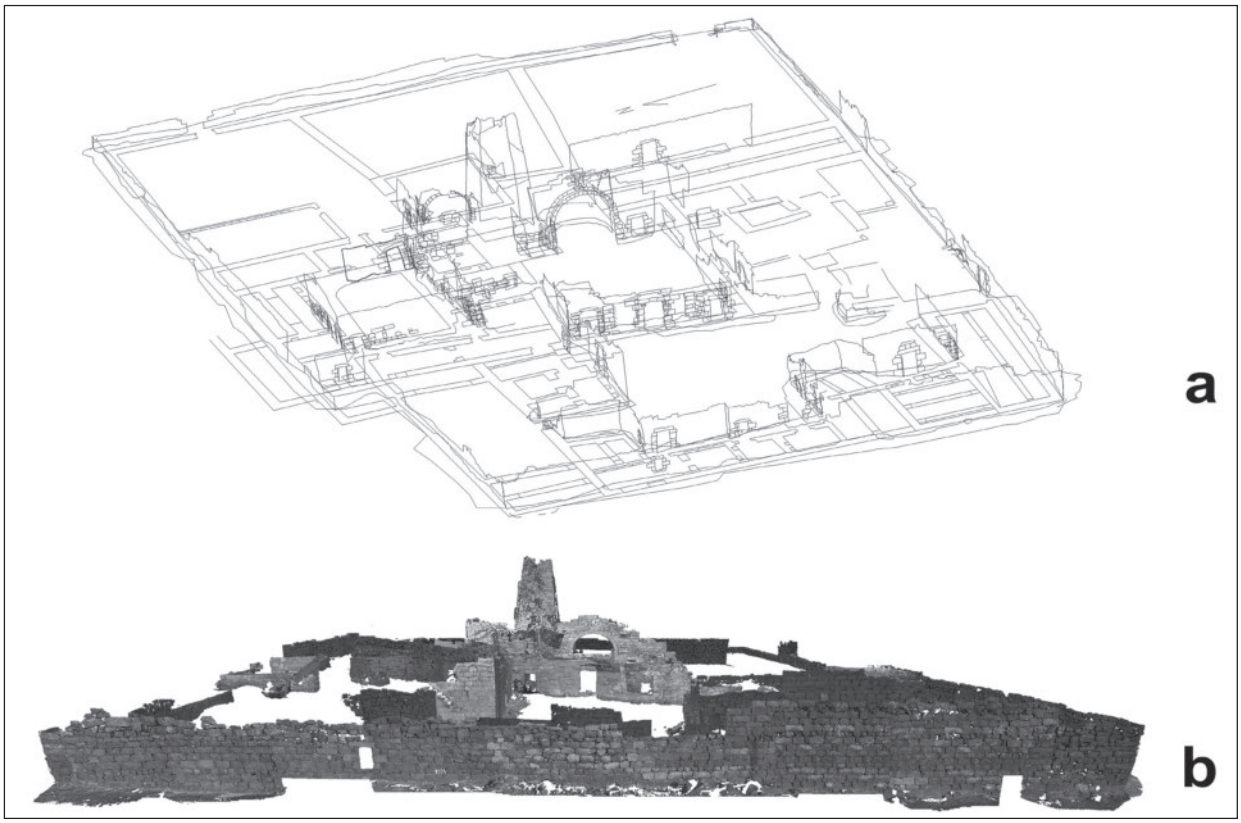
The building complex is characterised by Type 1 masonry (**Fig. 4**), which is especially clear on the north side of TU 28 and stands more than 2m high in some areas. Near the north-western edge, two rooms have this type of masonry

1. Umm as-Surab: 'topographic units'.

1. The University of Siena project is supported by the Italian Ministry of Foreign Affairs. The fieldwork was carried out by a team consisting of: Prof. R. Parenti (director, University of Siena), S. Anastasio (MiBAC), T. Hunaiti (DoA), J. al-Qutaish (DoA), S. Mariotti (University of Siena), F. Saliola (METRA), A. Arrighetti, P. Caciagli, P. Gilento and N. Pini (University of Siena students). Data-processing at the Laboratory of Building Archaeology in Siena was carried out by the following students: A. Arrighetti, P. Caciagli, E. Casalini, A. Fortini, A. Furno, P. Gilento, C. Nerucci, N. Pini and C. Sessa. The plans and orthophotos are the work of A. Arrighetti, P. Caciagli and P. Gilento.



2. Umm as-Surab: plan of the Ss. Sergius and Bacchus church, showing the different phases.



3. Umm as-Sarab: (a) RGB point clouds of the Ss. Sergius and Bacchus church with standing turret; (b) orthophoto.

(rooms 1 and 2 in **Fig. 2**). Although the perimeter of room 1 seems complete, the outside wall of room 2 has been partly demolished to create a new entrance opening on to the internal courtyard. Even though a small window remains near the north-east corner, the complete perimeter of room 2 could not be traced. Since the inner wall extended at least as far as the north-east corner of the church, it seems likely that both rooms had similar dimensions. In others parts of TU 28, this type of masonry is only found in the course separating the foundations and superstructure, *viz*. a row consisting exclusively of bond stones (*diatoni*).

There are some traces of masonry that is later than Type 1 but predates the construction of the church. However, its scarcity permits neither reconstruction nor interpretation.

The construction of the church of Ss. Sergius and Bacchus was a significant event, which can be accurately dated to 489 AD (cf. Bader 2009: 61 and bibliography) on the basis of the dedicatory epigraph that once graced the lintel of the main entrance to the church (now broken and no longer *in situ*).

The church had a nave and two aisles, with a semi-circular apse and two side rooms (possibly a *prothesis* and *diaconicon*). The columns set on the church paving display two types of workmanship (one with masons' marks), but it is unclear whether this represents two constructional phases or the reuse of earlier columns (**Fig. 5**). Shortly after the construction of the church, a small room was added to the façade.

The lateral door in the north wall, now collapsed and almost entirely obscured by rubble, seems contemporary with the masonry of the church. This implies the existence of a courtyard, two sides of which were formed by the earliest room; the third side is formed by a room with Type 1 masonry that associates it with the church, while the fourth side – close to the north wall of the church – can not be studied because of subsequent modifications. At least other two entrances were opened on the west side of the courtyard, giving access to the western and northern rooms.

After the construction of the Ss. Sergius and Bacchus church, at least three complexes were built to its north in a period that remains uncertain, but which was before the Islamic period. The first is very similar to buildings known from the second half of 6th century AD (according to the Petra papyri), with several parallels at Umm al-Jimāl (with at least three floors, external staircases and windows and doors similar in shape to many examples from the southern Ḥawrān) (**Fig. 6**).

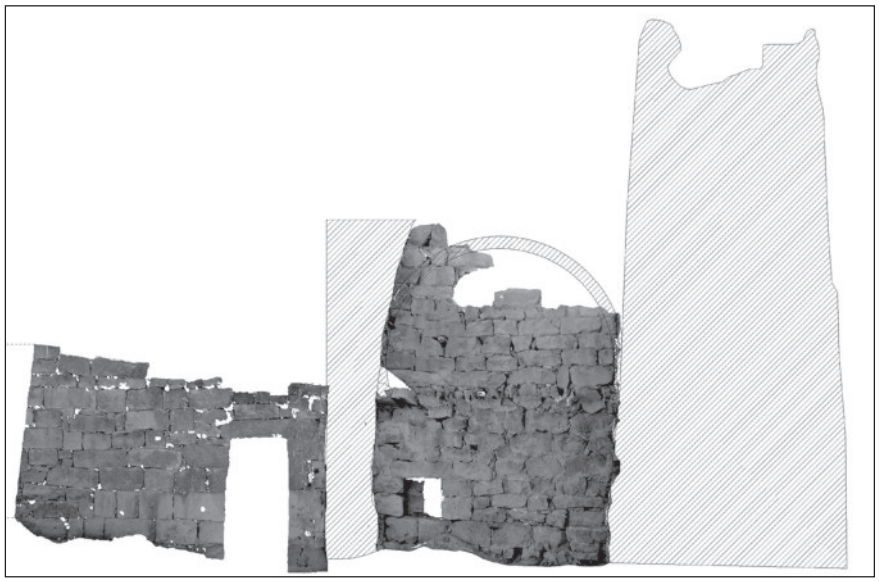
It is very probable that, along with the church and courtyard, at least other three or four 'building units' already existed. Two were found near the south-west corner of TU 28 and were most likely built one after the other, while another was located near the north-western edge of the church. If we include the western wall of TU 28 with these 'building units', along with their associated rooms, as a whole TU 28 represents a quadrilateral entity defined by 'building units' and other structures. It had few entrances and contained the church, a courtyard in front of the church and probably two cisterns (one in the courtyard of the religious complex and another under the 'building unit' near its south-western corner).

4. Umm as-Surab: Type 1 masonry.

5. Umm as-Surab: columns on the church paving.

With the advent of Islam in the area (around 636-640 AD) there were no major structural changes to the site. However, the church was converted to a mosque by blocking the arch, demolishing the apse, creating a *miḥrāb* in the southern wall (noted by King in 1980, before the recent restoration work) and constructing a turret adjacent to the *prothesis* (**Fig. 7**). This turret is very similar to a nearby example located in village of Sama'a, which appears to be later than 625 AD (King 1983: 127) on the basis of building activities that seemingly postdate an epigraph. According to Butler, Creswell (1926: 137) interpreted them as Byzantine bell towers, while King (1983) supposed them to be minarets; the latter interpretation has been confirmed by the survey. The Umm al-Surab and Sama'a minarets may be two of the earliest examples of such structures, probably dating to the early 8th century AD. The cistern in the small courtyard was also restored by building some pointed arches over it, presumably to support a cover.

It seems possible that the village was abandoned in the 8th century (perhaps as a result of earthquake damage), owing to a total lack of immediately post-Umayyad pottery. It seems likely that subsequent changes to the abandoned structures did not occur until the Mamluk resettlement in the early 16th century. These involved the restoration of the diaphragm arches support-



6. Umm as-Surab: orthophoto of the west side of room 1.

7. Umm as-Surab: turret on the Ss. Sergius and Bacchus church.

ing the roofs and the construction of small shelters close to the houses, presumably for animals.

Subsequently, the Druze–who first appeared as refugees and were then deported to the area – rebuilt the abandoned ruins or constructed new residences; their occasional building activities can be identified quite easily (**Fig. 8**).

8. Umm as-Surab: Druze building.

9. Umm as-Surab: standing pointed arch.

Building Techniques and Material

This report is limited to brief discussions of some of the major analytical themes. Regarding building techniques, we focus here on pointed arches. Creswell's theory (Warren 1991) was that the Umayyads inherited a system of round arcading from the Byzantines, which had a tendency to become slightly pointed. Under Umayyad rule, the round arch persisted, but developed into a two-centered form with increasing pointedness. In the following two centuries the trend was still apparent, but was complicated by the appearance of a four-centered arch; Umm al-Surab is a good case study for these developments (**Fig. 9**).

Regarding the masonry, Type 1 (**Fig. 4**) is the earliest of the types represented in the church. This is apparent in the stratigraphy of the room to the north of the *prothesis*, on the eastern wall and – with less certainty – in the foundation trench of the wall in the northern survey. The latter is supported by the presence of unstratified Late Roman and Early Byzantine sherds in the survey material.

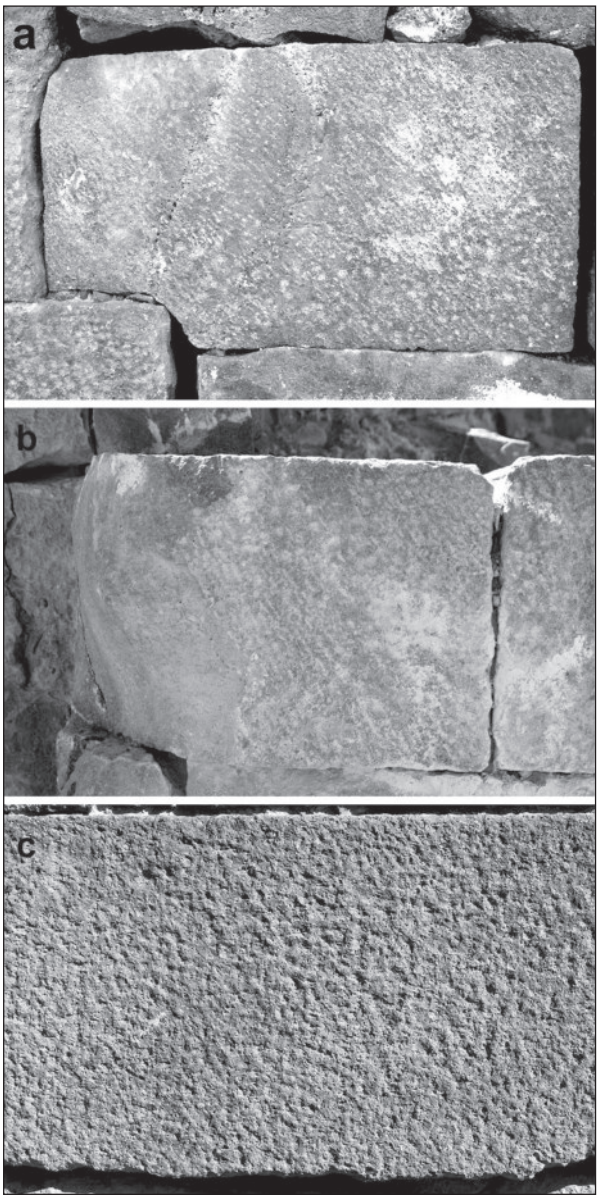
The principal characteristics of this masonry are: (1) the dimensions of the individual blocks (typically larger than other masonry types), (2) the occasional presence of doubled rows with a few large wedges and (3) the fact that openings are made with perfectly squared blocks. The tools for finishing the blocks comprise pointed tools used almost perpendicularly, as well as the *mazza*, *marteau tetu* and *macao*. There are also indications for the use of a broad chisel or axe, as at Umm al-Jimāl.

Openings, which include doors, windows and small loopholes, consist of a threshold and door jambs with leaf and lintel. The numerous niches are perhaps the most characteristic element. The thickness of the masonry can tentatively be considered another characteristic element, since it is always at least 85cm thick and frequently attains 90-95cm.

Type 2 masonry is most likely Byzantine but, as it could date to anywhere between the mid 5th and late 7th centuries, a more detailed assessment of its chronology will be carried out in 2012. The description below is based on the west wall of the TU28, the two main 'building units' and the alignment of the Type 1 wall (to which the bond stones [*diatoni*] and two upper courses are connected). The characteristic feature of Type 2 masonry is the presence of continuous rows of bond stones, whose external face is either square or slightly narrower, alternating with four courses taller than the bond stones and with occasional small wedges. At Umm al-Jimāl this technique is more recent than the *quinconce* bond stone technique.

A variation on this theme (*viz*. row of bond stones plus four horizontal rows) is characterised by the reuse of a great deal of earlier material and frequent use of wedges, but with well built corners using longer and better squared blocks. Above this type of masonry is more recent rebuilding associated with roof construction, perhaps relating to the Mamluk or one of the Druze periods.

Building material consists mainly of volcanic basalt, owing to its local availability. Blocks were prepared and finished using different tools, which varied according to the type of rock. In the basalt area, there are a great number of quarries just a few metres from the buildings; these were occasionally converted into cisterns. **Fig. 10a** shows a block from a Type 1 wall, located on the east side of the cloister at Umm as-Surab, with tool marks very similar to those on a block of the so-called Commodo Gate at Umm al-Jimāl (**Fig. 10b**), i.e. 2nd century AD. This is very different to the tool (*martellina*) marks on the Byzantine block at **Fig. 10c**.



10. Different tool marks: (a) Roman blocks from Umm as-Surab; (b) Roman blocks from Umm al Jimāl; (c) Byzantine block from Umm as-Surab.

The appearance of mortar is an interesting matter. The first mortars used as settings or beds are thought to be at Qaṣr ’Bshīr, dating to the end of the 3rd century AD, i.e. Roman. Some interesting examples of mortar can be seen in the extant walls at Qaṣr al-‘Uwaynid, where two Severian epigraphs – dating to 200 - 202 AD and 201 AD respectively – were found. However, the chronology of this site requires further analysis. A different type of air-drying mortar appears at Qasr al-Kharana in the early 8th century; these so-called ‘mortar bricks’ are gypsum-based and were made using unusual technology that gives them great strength and durability. At Umm as-Surab, we have found a different lime mortar in the turret, where it was also used for exterior plastering (see Parenti and Gilento 2010: 190-192).

Survey Methodology

In order to get reliable results, we need to identify and record the different building phases of many elements. Data recording must be done precisely and consistently. Additionally, the processed data must be both detailed and easy to share across different platforms, as well as being suitable traditional publication and on-line / multimedia products.

Taking these requirements into consideration, we have adopted a data-recording system that acquires the walls’ features via rapid photogrammetry and produces processed data that is compatible with Database Management Systems and GIS. The computer aided methodology we use allows for a composite survey based on: (1) a marker based system using a total station and (2) a visual system that produces orthophotos, 3D Models and photographic renderings. The latter uses innovative technology based on point clouds (Z-Scan and Z-Map [developed and released by MenciSoftware, Italy]); it has almost the same resolution as a laser scanner, but with lower costs and photographic rendering of the surfaces.

These techniques offer the following advantages:

(1) Different protocols can be applied to different contexts inexpensively, thereby improving the sustainability of projects;
(2) They are not destructive;
(3) They allow less time to be spent in the

field, albeit at the cost of more time in the laboratory.

Expected Results

The next season is scheduled for autumn 2012, with the aim of completing the instrument survey and shedding further light on remaining uncertainties, especially regarding the chronology of the Ss. Sergius and Bacchus church and its associated minaret.

The most urgent task concerns the measures required to minimise further collapse of the standing buildings. It should be noted that the archaeological site lies within an inhabited area; as a result, the ruins are continuously traversed by the inhabitants of the modern village.

Completion of the work will proceed alongside the compilation of the regional 'Atlas of Building Techniques', thanks in part to the comparisons made possible by investigation of sites with standing buildings.

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Bibliography

Bader, N.
2009 *Inscriptions Grecques et Latines de la Syrie XXI, Inscriptions de la Jordanie. Tome 5 - La Jordanie du Nord-Est (BAH 187)*. Beirut, IFAPO.

Clauss-Balty, P. (ed.)
2008 *Hauran III. L'Habitat dans les Campagnes de Syrie du Sud aux Époques Classique et Médiévale (BAH 181)*. Beirut, IFAPO.

Creswell, K.A.C.
1926 The Evolution of the Minaret, with Special Reference to Egypt-I. *The Burlington Magazine for Connoisseurs* 48: 134-135, 137-140, No. 276.
1989 *A Short Account of Early Muslim Architecture,* (revised and supplemented by J.W.Allan). Aldershot, Scholar Press.

De Vries, B. (ed.)
1998 Umm el-Jimal: A Frontier Town and its Landscape in Northern Jordan, Volume 1. Journal of Roman Archaeology Supplementary Series 26. Portsmouth, JRA.

Harris, E.C.
1989 *Principles of Archaeological Stratigraphy*. London & New York, Academic Press.

Homès-Fredericq, D. and Hennessy, J.B. (eds.)
1989 *Archaeology of Jordan. III. Field Reports. Surveys & Sites A - K*. Leuven, Peeters.

King, G.R.D.
1983 Two Byzantine Churches in Northern Jordan and their Re-Use in the Islamic Period. *Damaszener Mitteilungen* 1: 111-136.

Parenti, R.
2002 Dalla Stratigrafia All'Archeologia Dell'Architettura. Alcune Recenti Esperienze Del Laboratorio Senese. *Arqueologia de la Architectura* 1: 73-82.

Parenti, R. and Gilento, P.
2010 Orient and Occident: Continuity and Evolution in Construction Know-How from the 4th to the 9th Centuries. *Archeologia dell'Architettura* 15: 181-195.

Warren, J.
1991 Creswell's Use of the Theory of Dating by the Acuteness of the Pointed Arches in Early Muslim Architecture. *Muqarnas An Annual on Islamic Art and Architecture VIII*: 59-65.