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How Deep Those Foundations; How Tall Those Walls; How Strong That Roof: Building Practices In An Early Islamic Mosque At Jarash

The recording of the congregational mosque has been undertaken over ten years during the excavation of the site by the joint Danish / Jordanian Islamic Jarash Project directed by Professor Alan Walmsley (University of Copenhagen) and the Department of Antiquities of Jordan (FIGS. 1 and 2). The interpretation presented here rests on archaeological as well as architectural information.

Phasing

The mosque was occupied for at least 300 years. Any building used for that length of time will inevitably experience changes and alterations. The occupation and use of this mosque can best be described in three distinct phases.

Phase 1

Phase 1 represents the initial construction and use of the building that occupied a site previously used by a Byzantine bathhouse, its service area and at least eight Byzantine shops lining the Cardo and South Decumanus. Coins found in the drains of the bathhouse provide the earliest possible date for the construction of the mosque. The fact that the mosque used neither the water supply nor the drains that were available to the bathhouse suggests that the drains had been blocked for some time, and the bathhouse was possibly redundant when the mosque was constructed.

Phase 1 is typified by deep foundations and expert masonry work in terms of *spolia* choice, stone-cutting and laying, all of which encompassed conceptual planning (FIG. 3).

Phase 2

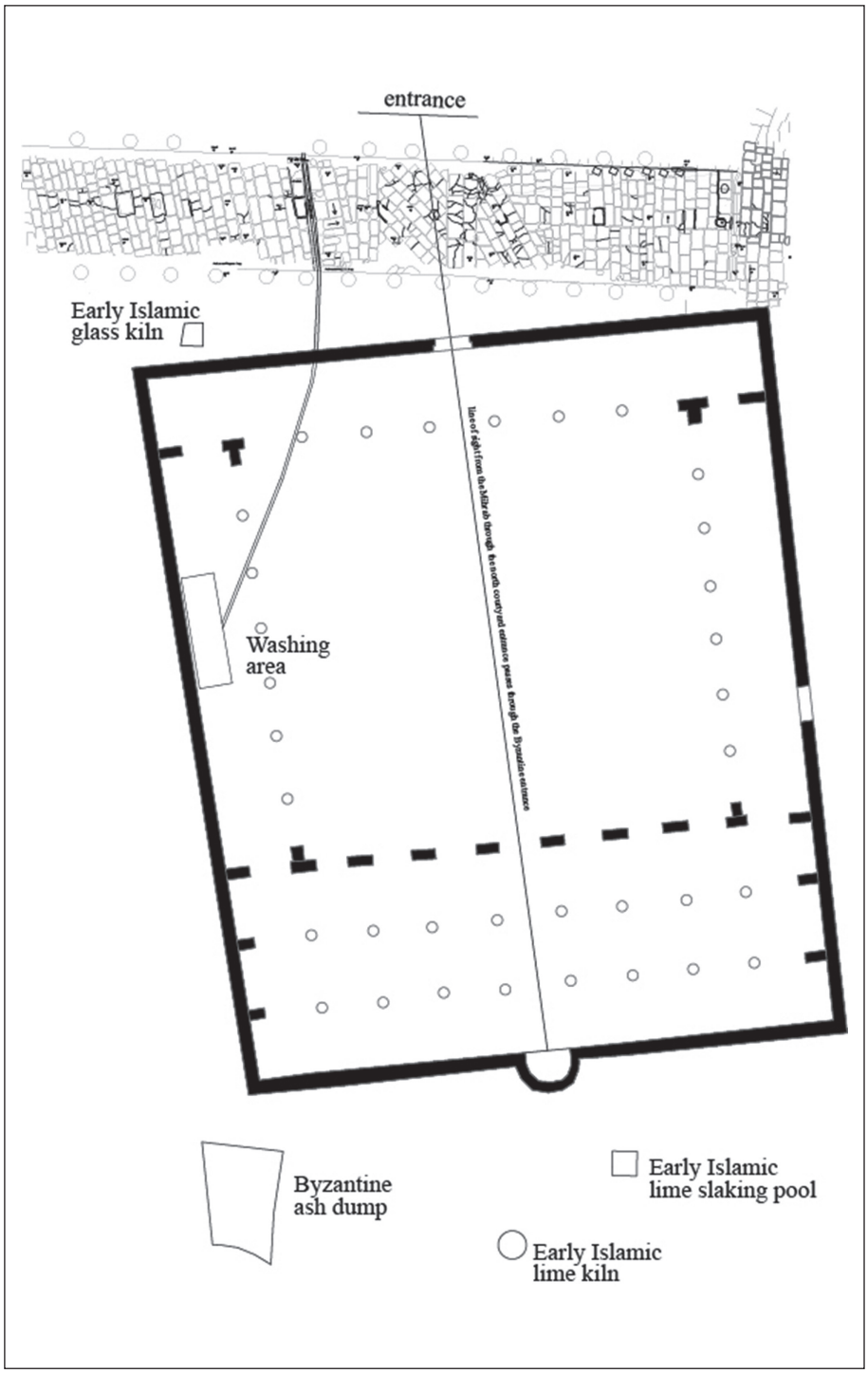
Phase 2 is, by far, the busiest and most socially active of all the phases. It involved the addition of a minaret, division of the prayer hall into two, the construction of a new (square-backed) *miḥrāb* central to the new prayer hall, the blocking of all but two of the arches in the north wall of the prayer hall, the construction of five shops on the Cardo, the creation of a raised platform outside the east wall of the courtyard giving access to a new doorway into a new room created by the blocking-in of arches on the east side of the courtyard and the resurfacing of the prayer hall itself. The phase also saw the blocking of the north entrance into the courtyard.

1. Location of the mosque within the protected heritage area of Jarash.

2. The large mosque excavated by the Islamic Jarash Project of the Department of Antiquities of Jordan and the University of Copenhagen.

Despite the evident building activity involved in this phase it was not archaeologically possible to date the various alterations to the building, or even to give a sequence of events as few of the alterations were directly related to one another.

Phase 2 is typified by shallow foundations, only the minaret had more than one course, poor choice of *spolia* for building material, only rough masonry cutting and commercial construction such as the addition of the shops



3. Groundplan, orientation and construction site facilities of the Phase 1 mosque.

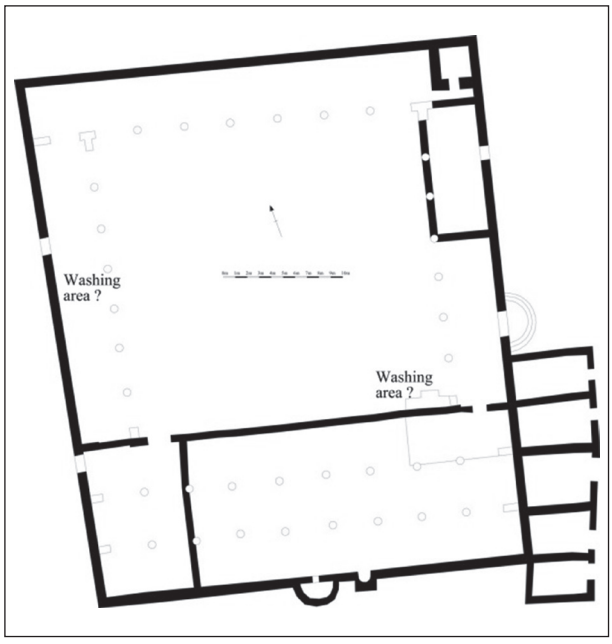
in order to support the mosque.

The architecture of these two phases collapsed in an earthquake, undisturbed remains of which were found outside the south (*qiblah*) wall of the mosque. Nearly all useful stonework from within the building was robbed at an early date indicating a very active building period elsewhere in Jarash (FIG. 4).

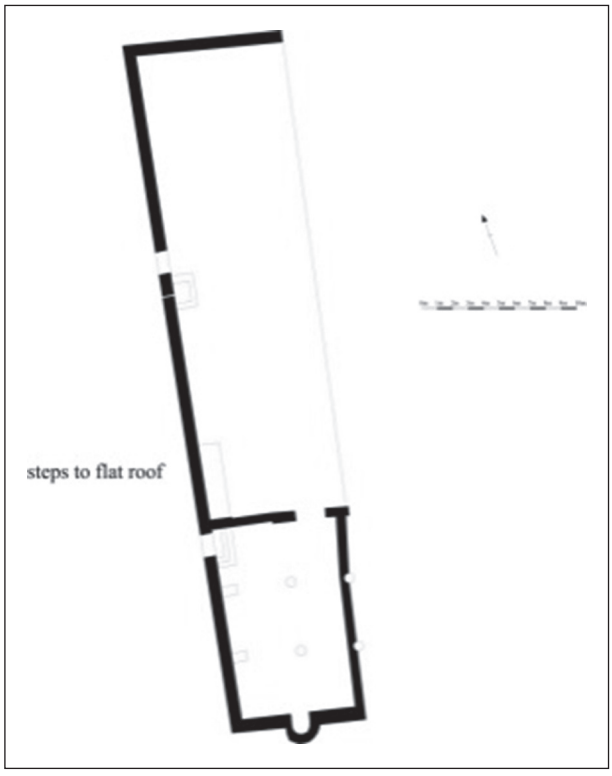
Phase 3

Phase 3 involved the clearance of collapse material from Phases 1 and 2 from around the west room of the prayer hall and its rebuilding as a new mosque, with the creation of a new *miḥrāb*, again central to the *qiblah* wall of the period (FIG. 5).

Phase 3 is typified by *spolia* re-use from



4. Phase 2, groundplan.



5. Phase 3, groundplan.

Phases 1 and 2, sparse roof tile fragments indicating flat, packed earth roofing with a new staircase constructed in the courtyard to give access to the roof (FIG. 6).

The sequence of *miḥrāb* use was confirmed by the excavation of sections behind all three *miḥrāb*s (FIGS. 7, 8).

The aim of this paper is to give a detailed account of Phase 1 (construction phase) of the building.

There are several mosques of a similar date with which this building could be compared, although the Jarash mosque (approx. 2,200 m^2) is much smaller in size.

Ibn Tulun Mosque, Cairo, Egypt (approx. 24,000 m^2, including forecourts, prayer hall and courtyard; built 879 AD - 265 AH)

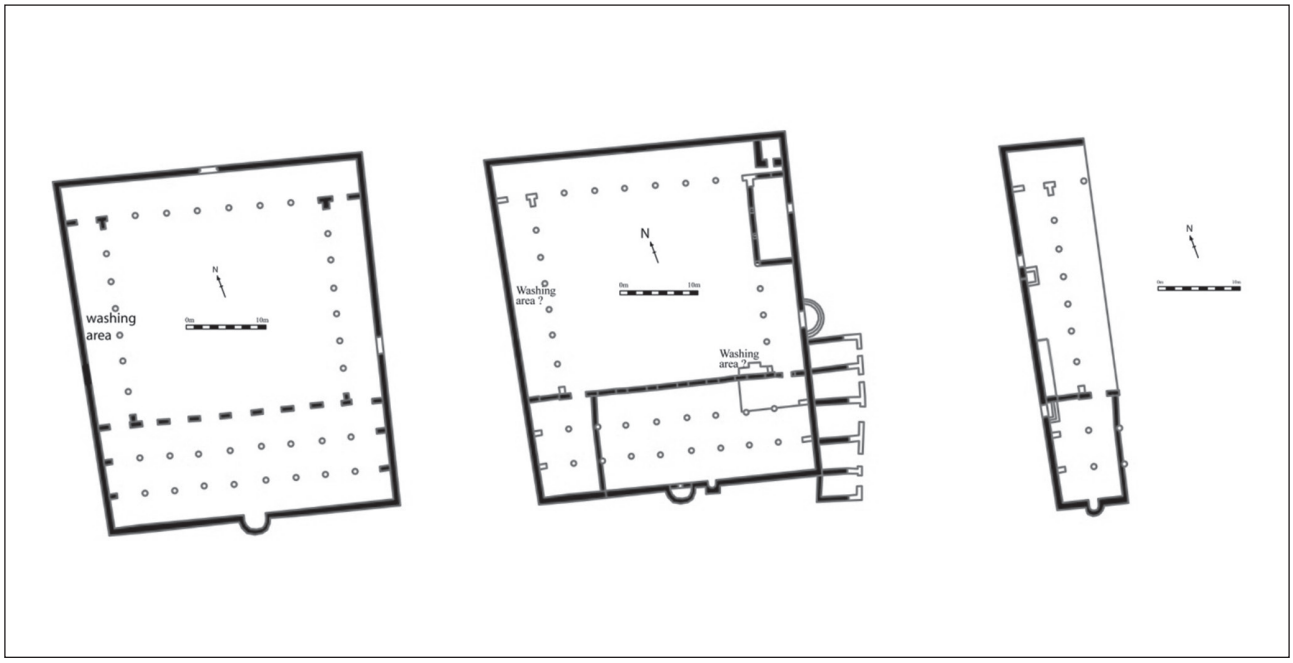
The Ibn Tulun mosque is more comparable in date with the second phase of the Jarash mosque than with its original construction. The forecourts (*ziyadah*) of the Ibn Tulun mosque however indicate the inclusion of the area outside the courtyard as having a social function for the community. The platforms outside the Jarash mosque, on the north and particularly the east sides of the courtyard would have been raised above street level, though probably not walled in as in the Ibn Tulun mosque. Being exposed to public view, they were probably not part of the social sphere but would have functioned as areas where only those having something to do with the mosque would have congregated. The Ibn Tulun mosque is almost entirely brick built and therefore has few construction features that are directly comparable with the Jarash mosque. This mosque has seen many alterations over time .

Great Mosque, Damascus, Syria (approx. 20,000 m^2, including prayer hall and courtyard; built 715 AD - 101 AH)

The Great Mosque in Damascus is directly comparable in date with the construction of the Jarash mosque. Built for Caliph al-Walid (r. 705 - 715), the Damascus mosque was meant as a prestige building expressing the dominance of Islam on a scale and with resources presumably far outstripping those of Jarash. There has never been such an extensive excavation of relevant foundational materials as at Jarash and many of the features within the Damascus mosque

FIG. 20—KADILI BEI ALIŞAR, MOSCHEE VON 1169

6. Similar to Phase 3, this mosque was in Iraq (*Ars Islamica* vol. V: 49).

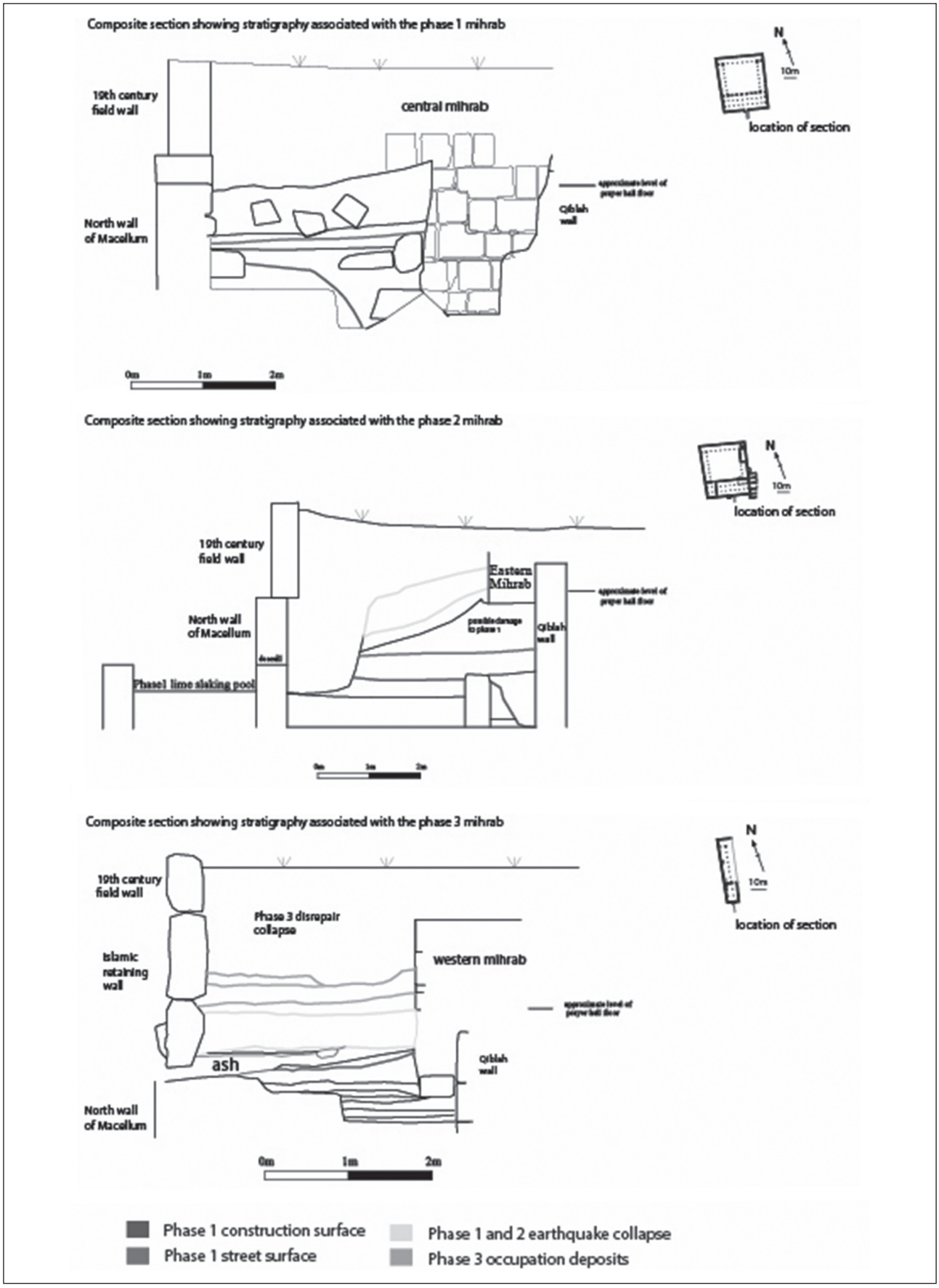


7. The three phases of the mosque: (left) Phase 1 - approx. 710 - 730 AD; (centre) Phase 2 - approx. late 8th to early 10th century; (right) Phase 3 - approx. early 10th to 11th century.

have been altered over time. The roofing of the Damascus mosque is similar to that which is proposed for the Jarash mosque except for the central cupola. However, no unusual tiling or pillar spacing which would have suggested the presence of cupolas were found at Jarash.

Sidi Oqba mosque, Kairouan, Tunisia (approx. 9,000 m^2; built 836 AD - 221 AH)

The Sidi Oqba mosque in Kairouan, Tunisia is later in date than the construction phase of the Jarash mosque. The mosque walling is again brick-built (as in the Ibn Tulun mosque),



8. Stratigraphy behind all three *miḥrābs*.

although there was a lavish use of *spolia* around the doorways and in the pillar and capital supports for the roof. From photographs, the foundations also appear to be stonework. In this case the *spolia* pillars and capitals still survive and show the roof support given by the capitals and the importance of maintaining the level of the top of the capitals rather than the bases (FIG. 9).

The Building Site at Jarash (*ca.* 700 - 720 AD)

The mosque appears to have been built by a single, professional team of builders working to a detailed, preconceived plan. Their employer was most probably a wealthy, influential Muslim occupying the building opposite the mosque, to the north of the South Decumanus. The north wall of the courtyard was lengthened so that there was a direct line of sight from the doorway opposite the mosque, through the north entrance into the courtyard, and through the central north arch of the prayer hall to the *miḥrāb* (see FIG. 3). The Phase 1 water supply was also supplied through the same building opposite the mosque.

The building site would have been first prepared by deconstructing the Byzantine bathhouse and shops to just below the planned floor level of the mosque. This was done with a great deal of precision (to within 10 cm), avoiding unnecessary work. Useful *spolia* would have been kept on site for later construction work. The colonnade along the south side of the South Decumanus was removed, some of the architraves being used in the construction of the mosque, though the column drums do not seem to have been re-used in the mosque.

A lime kiln and slaking pool were built to the south of the *qiblah* wall close to an already existing ash dump, giving the necessary elements for watertight mortar and plaster. A glass kiln also seems to have been built to the north of the courtyard wall, presumably to supply fittings.

The foundations (and presumably orientation) of the central *miḥrāb* appear to have been constructed first. The central *miḥrāb* and the *qiblah* wall are bonded together from the second course above the foundations of the *miḥrāb*. The *qiblah* wall was constructed with right-angled corners, as was the north-east corner of the courtyard, suggesting that the decision to lengthen the north wall of the courtyard does not seem to have featured in the original planning of the building.

The outside wall of the prayer hall and courtyard was constructed in one piece, with

9. Pillars and capitals still surviving in the Sidi Oqba mosque, Kairouan, Tunisia.

watertight foundations bonded with clay and the stone blocks above bonded with a reddish, clayey soil with the addition of ash. The arch piers that formed the north wall of the prayer hall abut the exterior wall, as do all but four of the piers that form the end points of rows of arches. The exterior wall, where visible, was built with every second course having headers and stretchers.

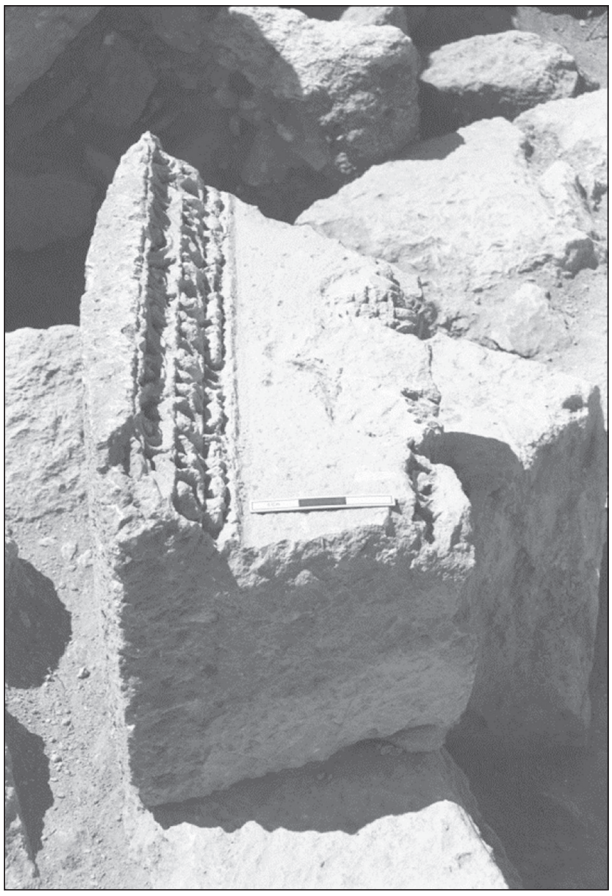
There is a heavy use of *spolia* blocks in the central *miḥrāb,*

on the corners of the exterior wall and the door-frames of the entrances into the courtyard. From the broken fragments of single-piece pillars in the excavation, it seems as though all interior, pillars, bases and capitals were also *spolia*.

Foundations

The foundations of the exterior wall of the prayer hall and courtyard were constructed in trenches, although the topography of the building site meant that these were far shallower at the south end of the prayer hall. The central *miḥrāb* had an irregular platform of blocks laid into the trench before construction of the *miḥrāb* foundations. The *miḥrāb* was built as a platform rather than as a freestanding wall. The stonework, only one block thick, was made up of expertly re-cut *spolia* blocks from an ornate acanthus leaf architrave (see FIG. 10) that terminated in a half-dome. Above the second course it is bonded with the freestanding exterior wall of the mosque.

The foundations of the west wall of the courtyard (the wall which would have had to be set back from its originally planned foundations) were constructed on a shelf of stones, heavily bonded with clay (FIGS. 11, 12). The use of column drums in the initial courses of the foundations help to bond the wall and again create a ledge for the walling. It is unclear whether the column drums have a purely functional or a validatory purpose, as the architrave blocks used in the *miḥrāb* seem to do. The origin of the column drums



10. *Spolia* block used in central *mihrab.*

is, at the moment, unknown. Owing to their diameter they do not seem to be drums from the deconstructed South Decumanus colonnade.

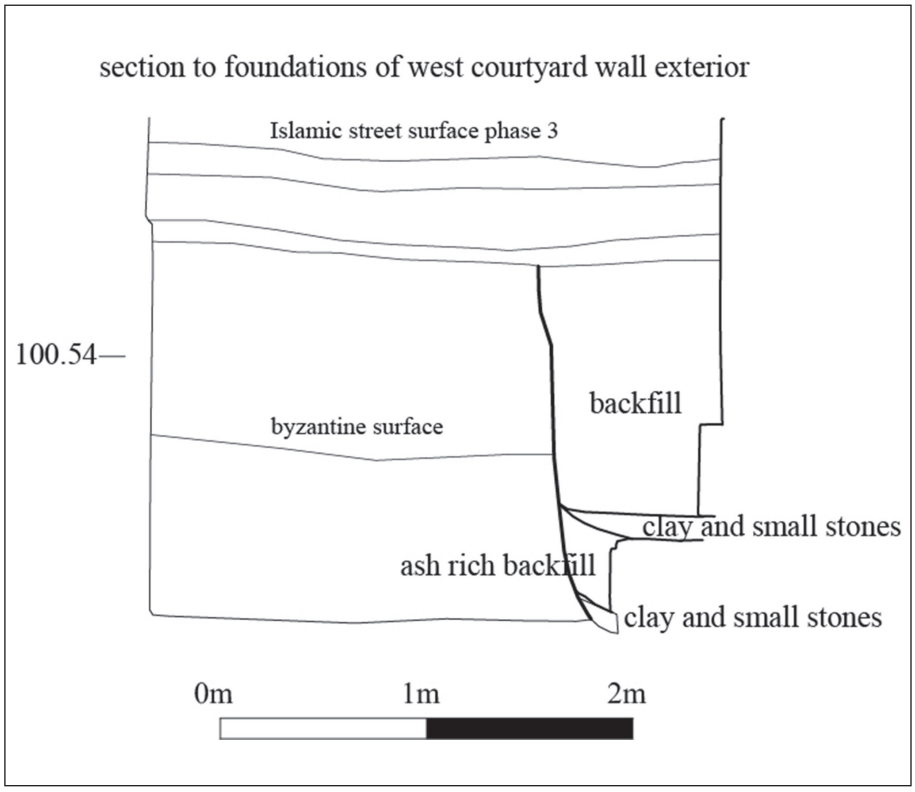
The foundations of the east wall, which are now visible sitting directly on the late Roman paved surface of the Tetrakionia crossroads, were originally some 20 cm below ground level. The wall cuts through the Roman shop remains bordering the crossroads, which were deconstructed to a height below the level of the rise in ground that would have led up to the east doorway into the courtyard.

Flooring

Only one fragment of flooring from the first phase of the mosque seems to have survived (see FIG. 14).

A section of orange, 4 - 6 cm-thick marble, smoothly finished, was found close to the central *mihrab*. These surviving fragments are the remains of three separate slabs. They were

11. Foundations and walling of central *mihrab*.



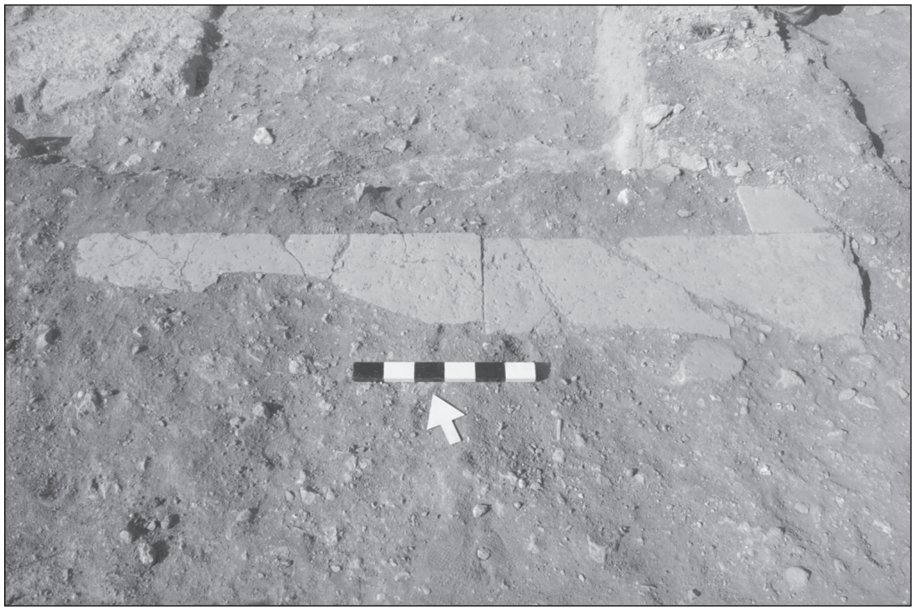
12. South-facing section showing deposits against the exterior of the west wall.

either square or rectangular with straight, neatly cut edges. Due to their level, they must have been present in Phase 2 of the mosque's use.

The leveling of the foundations of the 16 pillar bases within the prayer hall varies, as would be expected from the use of single-piece *spolia* columns from a variety of sources. Some of the column bases would have been just below the flooring, indicating that it was more important to maintain the level of the tops of the capitals, to support the arches.

From the level of Byzantine wall remains left intact, it appears that the Phase 1 courtyard was 50 cm higher on the west side of the courtyard than on the east, although the north entrance is level with the prayer hall. There are no archaeological remains to explain this change in levels.

13. Exterior elevation of the north end of the courtyard's east wall.

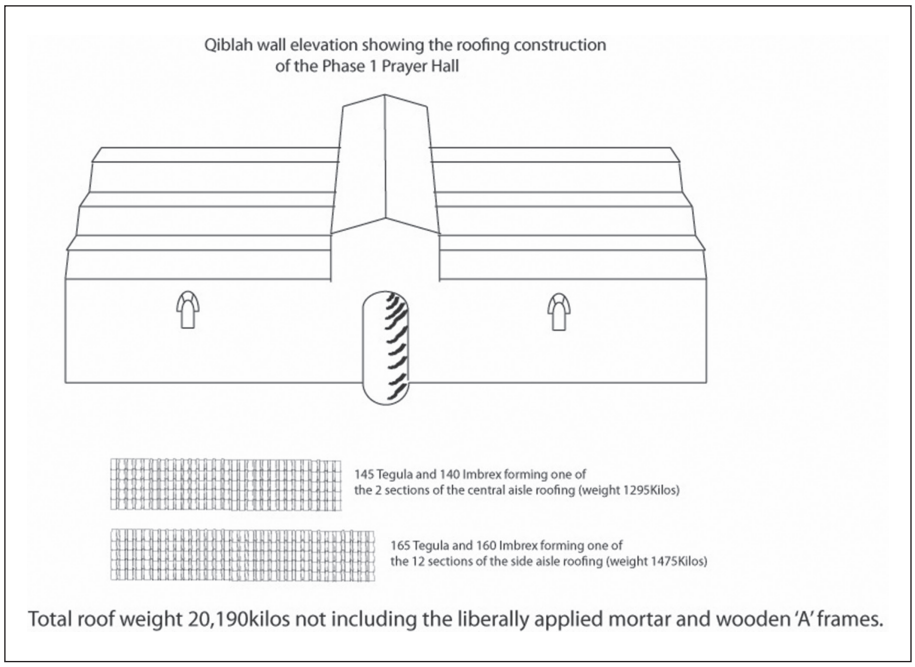


14. Surviving flooring from Phase 1.

Roofing

Our reconstruction of the proposed roofing of the initial construction is based on the remains from the collapse of Phases 1 and 2. A tile roof would have been supported on a wooden frame sitting on top of the exterior wall and arches which sprang from the piers to pillars, (the arches being constructed of trapezoidal blocks with grooves on the sides to allow bonding material to flow between them). A keystone from an arch, along with nails bent at 6 - 8 cm originating from the timbers of the roof support, were found in the collapse material to the south of the *qiblah* wall (FIG. 15).

This and the spacing of the pillars in the prayer hall suggest an original higher central roof running north - south, while the side roofing runs east - west. The side roofing is based on the support given by the side walls and arches, and would have comprised three A-frames supporting a slightly sloping three-ridged roof flanking the higher ridged roof spanning the central aisle. The only roof tiles excavated from mosque deposits were *tegulae* and *imbrices* with evidence of a heavy application of mortar used as bonding between the tiles. The quantity of mortar bonding the tiles together must have considerably increased the weight of the roof.



15. Phase 1 roofing reconstructed from evidence in the collapse material and the prayer hall groundplan.

In the courtyard, owing to the spacing of the pillars from the exterior wall, there would have been a ridged roof forming a covered walkway next to three sides of the courtyard. Assuming the exterior wall maintained the same height as the prayer hall, the widths of the doorways leading into the courtyard suggest they may have had a higher superstructure than the adjoining walling, although it is impossible to say anything concerning the roofing.

Plastering and Decoration

A lime kiln functioned during the construction phase, the ash necessary for watertight mortar being taken from a pre-existing dump south of the *qiblah* wall, possibly deposited from the bathhouse furnaces. The lime would have been crushed and then burnt in the kiln (see FIG. 16), and the resulting deposit dissolved in water in the slaking pool close by (see also FIG. 16). The pool was constructed at the doorway of the Macellum into the lane south of the *qiblah* wall, on a Byzantine mosaic with a Greek inscription. This would have ensured a watertight floor. A two course watertight wall was then constructed around the mosaic. Though the surviving plastering on arch blocks and walling probably survives from Phase 2, the cross-hatched mortar used along the entire interior face of the exterior walling is probably from the original construction of the building, indicating a plastered wall. However, the cross-hatched mortar is applied from 30 cm below the floor level to approximately 20 cm above and therefore seems to be aimed primarily at damp-coursing. The slots cut into the *spolia* blocks of the *miḥrāb*, used to position the stones by means of a wooden beam, have been filled with a white plaster, though no other evidence of exterior plastering survives.

The ornamental *spolia* used in the west exterior wall may be from Phase 3, but the ornamental block used in the east wall (see FIG. 13) is a Phase 1 feature that would have been just above ground level, though it would have been covered by an earthen platform in Phase 2. The design on the block was slightly damaged when the block was laid, so it appears to be a conscious re-use of *spolia* rather than cut for the purpose.

FIG. 17 shows the heavily chipped away foundational remains of a feature that decorated the west wall of the Phase 1 prayer hall. The walling above this feature appears to be a Phase 3 rebuild. This feature was presumably removed in Phase 2 when the prayer hall was

16. Lime kiln and slaking pool from Phase 1.

divided into two. It appears to be the remains of a shallow alcove, possibly intended to contain a decorative or donative plaque as the back of the feature is flat.

Water Supply and Drainage

A small hole was constructed in the north courtyard wall to allow access to a water pipe (see FIG. 18). The remains of a heavily mortared ceramic pipe were found inside the courtyard leading to the area of the presently exposed Phase 3 water basin. This water pipe appears to have come through a cut in the *stylobate* of the South Decumanus and to have originated in the building to the north of the South Decumanus (a cut exists in the paving of the South Decumanus). This would have been a gravity-fed supply in a sealed ceramic pipe.

A drainage hole was also created in Phase 1 (see FIG. 19) at the low point of the courtyard in the north courtyard wall (at the east corner), presumably for use on the building site as the water supply was laid but left for later use should there be flooding within the building. This drainage hole was uncovered during the 1930s by the Yale University excavations, which

17. Foundations of feature central to the west wall of the prayer hall.

18. Phase 1 waterpipe entrance (centre) and Phase 3 drainage hole (right).

19. Phase 1 drainage hole showing interior elevation with exterior entrance as inset.

also showed the survival at that time of three courses of the Phase 2 blocking walls between the pillars on the east side of the courtyard, two of which have since been removed.

These drainage holes in the north courtyard wall (one from Phase 1 [see FIG. 19] and one from Phase 3 [see FIG. 18]) would have been below ground-level at the lowest point of the courtyard then in use, and in both cases have a recognizable *spolia* block above them on the interior elevation to indicate their location, and a large, loose-fitting blocking stone to stop animals burrowing into the building. They are another indication that the mosque was not linked to the main drains and that these drains may have ceased to be used in this part of the city by the time of the mosque's construction. They also appear to indicate an important building technique in urban areas lasting from the 7th to at least the 11th centuries. They would only be necessary when an internal water supply was installed.

It is very seldom that one has the opportunity to investigate a mosque down to its foundations and this excavation should provide some primary evidence of Early Islamic architecture and social organization. I would like to thank the IJP project for the time to consider the findings from this excavation, the Department of Antiquities of Jordan for their permission and supervision of this project, the University of Copenhagen (Denmark) and the many supervisors and students who carried out the excavation, and the David Collection (Denmark) for funding the consolidation and partial reconstruction of the mosque.