

PRELIMINARY REPORT  
ON THE DUWEYM WAD HAJ SEASON 2022  
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This contribution reports on results of multidisciplinary research in Duweym Wad Haj in January and February 2022. The archaeological excavations focused on the internal structures and architecture of the old mosque and discovered eleven residuals of bases of pillars and/or columns of a *riwaq*. These results indicate the existence of the *riwaq* along all the perimeter walls, with a different number of arcades along each wall, which enclosed an open internal yard. The soil survey confirmed a ca 7 metres high eolian dune below the old mosque, without traces of any significant settlement down to a depth of ca 5.5 m. Research on the mudbricks and construction of the old mosque confirmed its irregular plan, due to the orientation of the *qibla* wall and the making of mudbricks sourced from both local and imported material. Analysis of ceramics indicated the presence of pottery largely from the Funj period. Samples taken during the season will be subject to further research.

**Keywords:** Sudan, Duweym Wad Haj, mosque, architecture, *riwaq*, survey, soil, mudbricks, Funj

The season 2022 within the framework of the APVV-17-0579 project “*Slovak Research on the Sudanese Site of Duweym Wad Haj*” (DWH) located about 350 km north of Khartoum, in the Great Bend of the Nile River on its left bank, opposite to Gebel Barkal, took place from 19 January to 12 February 2022.<sup>1</sup>

The SAMS set as its research goals for the 2022 season the following:

1. Archaeological excavations in the squares of Area 1 and Area 2 inside the old mosque;
2. Research on the mudbrick structures of the old mosque and mudbrick sampling;
3. Research on sedimentation layers by means of a soil survey;

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<sup>1</sup> The group of researchers of the Slovak Archaeological Mission in the Sudan (SAMS) consisted of Jozef Hudec, Tibor Lieskovský, Lenka Horáková, Miroslav Černý, Branislav Kovár, Emil Fulajtár, Kveta Smoláriková and Renáta Rábeková. Siham El-Sidiq, Elwaleed Mohammed Ali Naim and Mongeda Khalid Magzoub Ali took turns respectively as inspectors of the National Corporation for the Antiquities and Museums (NCAM) for the mission.

4. Archaeological survey around the site and geo-informatics processing of data;
5. Pottery research and sampling;
6. Wood sampling for dendrochronological and C14 research;
7. Sampling of local stones on visited sites, with a focus on Tombos.

## 1. Archaeological Excavations

The archaeological research followed up the excavations from the previous seasons.<sup>2</sup> The planned start of work in the old mosque of Duweym Wad Haj on 23 January had to be postponed by two days because of a local interment and related traditions. The archaeological excavations used five full squares (5x5 m) and five testing pits (four pits 2x2 m, two pits 1x6 m). The squares were excavated in layers and stratigraphic units (SU) to detect possible column bases or other interior structures of the old mosque. Seven fully unearthed bases of *riwaq* pillars and/or columns were documented in these squares and pits as well as four partly unearthed bases of *riwaq* pillars and/or columns, i.e. eleven architectonic items have been discovered and documented altogether (Fig.1).

### 1.1. Square X370Y130

The square was located close to the centre of the *qibla* wall of the old mosque. The *minbar* (SU48) extends over the eastern section into the square (Fig. 2); the surface of the *minbar* was partly studied in the 2019 season.<sup>3</sup> SU1 was approx. 40 cm thick, of a very pale brown colour (Munsell 10 YR 7/3).

Below SU1 was situated SU42, which was approx. 50 cm thick, very loose and with altered very pale brown and white colours (Munsell's 10 YR 7/3 and 10 YR). Several stone-mud structures (SU44, SU47, SU49) were covered by the SU42. These structures caused the alternating soil colours of the SU42. At the bottom of the SU42 a white sand layer of probably a loose floor was found. It was recorded also in other squares (e.g. SU39 in X360Y125, SU49 in X370Y120).

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<sup>2</sup> HUDEC, J., CHEBEN, M., KOVÁR, B. Report on Surveys in Duweym Wad Haj. In *Asian and African Studies*, 2019, Vol. 28, No. 2, pp. 168–179, 418–428; HUDEC, J., KOVÁR, B., FULAJTÁR, E., LIESKOVSKÝ, T., HORÁKOVÁ, L., ČERNÝ, M., BARTA, P. A Brief Report on the 2019 Season in Duweym Wad Haj. In *Asian and African Studies*, 2021, Vol. 30, No. 1, pp. 202–224, 254–273.

<sup>3</sup> HUDEC, J., KOVÁR, B., FULAJTÁR, E., LIESKOVSKÝ, T., HORÁKOVÁ, L., ČERNÝ, M., BARTA, P. A Brief Report on the 2019 Season in Duweym Wad Haj. In *Asian and African Studies*, 2021, Vol. 30, No. 1, p. 206.

Part of a pillar base of the mosque's *riwaq* – SU44 – was found covered by the SU42 in the western section of the square (Fig. 3). Its uncovered dimensions were 100x80x60 cm and it consisted of stones and mudbricks with the dimensions 25x12x7 cm. The base was not excavated to its full extent. Three rows of the construction were identified: two consisted of mudbricks, one consisted of stones. Mud mortar was found between individual rows of the structure.

Near the northern section another pillar base – SU47 – was found in SU42. The dimensions of the structure were 100x100x50 cm (Fig. 4) and it consisted of stones and mudbricks (26x12x7 cm). Three rows of the structure were identified: two of mudbricks, one of stone. Also mud mortar was found here between individual layers.

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A part of a stone structure (including two large stones) – SU49 – with the dimensions 50x20x20 cm was unearthed in the south-eastern corner of the square in SU42. The last part remained earthed in the neighbouring unsearched squares. The nature of the discovered structure and its location corresponds to the frame of the pillar bases of the *riwaq* (Fig. 5).

The square was partly further excavated along the western and northern sections (to a width of 150 cm and 200 cm respectively), ca 15–20 cm deeper below SU42. The depression was registered as SU54 in the site documentation. However, its filling consistence was the same as that of SU42.

## **1.2. Squares X375Y135 and X375Y130**

Square X375Y135 covers the area of the *mihrab* and part of the *qibla* wall, square X375Y130 covers mainly the area of the *minbar* and part of the *qibla* wall. Work in both squares focused on cleaning an area inside the old mosque between the *mihrab*, the *minbar* and square X370Y130. The cleaning uncovered a clay plaster representing one of the floor strata in the abovementioned area, probably after the

building of the *minbar*. The construction of the *minbar* on the right side of the *mihrab* (Fig. 2), on the already plastered *qibla* wall, as well as the different levels of the bases of the pillars and the fundament of the *minbar* indicate that the *minbar* was built sometime after the construction of the first stage of the old mosque.

### 1.3. Square X370Y120

The first layer, about 20–25 cm thick (SU1), was identical on the surface of all the archaeological squares; it was represented by a rather loose sandy layer, 10 YR 7/3 (very pale brown colour on the Munsell scale).

The next SU31 (10 YR 7/3 very pale brown colour) was similar to the SU1, but was more compact and about 20 cm thick. In the eastern part of the square, there was an accumulation of gravel and mudbrick (SU37), probably associated with the collapse of the column SU41, which was discovered during excavation.

SU34 was situated below SU31; it was ca. 10–20 cm thick and paler than the SU31 (10 YR 7/2 light grey). It covered the whole square, with the exception of a part near the eastern profile, where the debris of column SU37 was located. A wide range of pottery fragments was discovered.

SU31 and SU34 surrounded the SU37, which contained gravel and pieces of mudbrick on an area of about 50x150 cm and 10–20 cm thick. The base of an angular column SU41 was found nearby. During the research of SU31 a very loose white layer SU40 (10 YR 8/2 white) was encountered. A similar layer was found also in other squares in the old mosque (e.g. SU39 in X360Y125). It might represent the remains of the mosque's loose floor, on which mats might have been placed.<sup>4</sup> The layer was 13–18 cm thick.

Near the northern section of the square, in SU40, the quadrate stone-earthen base of a pillar SU41 (Fig. 6) was discovered. The dimensions of the base were 120x100x30 cm. It contained trimmed quadrate stones of various dimensions and mudbricks (usually with uniform dimensions of 25x14x7 cm). There were remains of mortar between them. It might have been associated with the destroyed remains SU37. Near SU41 a part of SU55 was excavated. However, both SU might be identical. The SU55 did not contain archaeological finds.

In SU40, two more structures were come across, which might be associated with the interior structure of the mosque and be interpreted as column bases. In the western section of the square, structure SU50 was detected, containing stones

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<sup>4</sup> HUDEC, J., KOVÁR, B., FULAJTÁR, E., LIESKOVSKÝ, T., HORÁKOVÁ, L., ČERNÝ, M., BARTA, P. A Brief Report on the 2019 Season in Duweym Wad Haj. In *Asian and African Studies*, 2021, Vol. 30, No. 1, p. 205.

and mudbricks. The unearthed dimensions of SU50 were 52x29x20 cm. Part of it remained covered in the unsearched neighbouring squares.

SU51 was in the white layer SU40 in the south-eastern corner of the trench. It was not recorded in its full extent either (detected dimensions are 50x20x20 cm). Structure SU51 contained stones. With regard to its nature and location, it also corresponds to column bases.

#### ***1.4. Square X365Y125***

The aim of excavation in this square was to verify the indication of the geophysical research from the 2018 season.<sup>5</sup> Therefore, the testing pit focused on an area with the dimensions 2x5 m in the northern part of the square. SU1 was a loose sandy layer of very pale brown colour (Munsell 10 YR 7/3), approximately 50 cm thick.

SU58 was situated near the eastern section of the testing pit; it was a rather compact loam/clay brown layer (Munsell colour 10 YR 8/3) approx. 8 to 25 cm thick, covering the whole area of the testing pit, i.e. 200x500 cm. It might represent the debris of a structure. Below SU58 was a loose sandy layer SU59 (10 YR 8/2 very pale brown) and SU60 at the bottom. The debris of a structure – SU 60 – was situated near the eastern section of the pit, with unearthed dimensions 140x110x10 cm. It contained mainly remains of mudbricks and some stones. The interpretation of SU60 is uncertain – it might be the collapsed pillar or arch of a *riwaq*.

#### ***1.5. Square X360Y125***

The surface layer of loose very pale brown sand was mixed with crumbled mudbricks and stones. A concentration of bricks was unearthed at a depth of 30–50 cm (SU33) in the south-western corner of the square, below which was SU35 with a strong deposit of fine light-brown sand.

A concentration of limestone and sandstone rocks in the central northern half of the square proved to be the angular base of a pillar (SU36) with dimensions of ca 130x140 cm. The stones were of various sizes, bigger ones on the margins and smaller ones in the centre and around the bigger stones. Thick layers of mud mortar were used to bond the stones together. On the southern side of the base were the still visible remains of a thick layer of white coating.

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<sup>5</sup> HUDEC, J., CHEBEN, M., KOVÁR, B. Report on Surveys in Duweym Wad Haj. In *Asian and African Studies*, 2019, Vol. 28, No. 2, pp. 173, 422, Fig. 8.

The floor on this level (SU39) was created by a layer of very fine white sand. The layer decreased north-westwards. Below SU39 and on the northern and western side of SU 36 was discovered the masonry of two regular rows of mudbricks (23x13x5 cm) and mud mortar (SU45), which apparently supported the stone base SU36 (Fig. 7). A mud layer continued up to the north-western corner of the square.

### ***1.6. Square X360Y120***

After removing a surface layer of loose very pale brown sand, the massive mudbrick collapses of arcades SU 43 and SU46 appeared at different depths of the square. The collapses were rather higher on the eastern side of the square and seemed “structured” south to north. The mudbricks were mixed with stone fragments. Secondary reused red granite grinders and trowels were also discovered, probably used in the vaults of the arcades as crown stones. The use of crown stones is also evident in the vaults above the windows of the old mosque.

Below the mudbrick collapses was discovered an angular pillar base (SU52) in the north-eastern corner of the square (below a control block between X360Y120 and X360Y125) and the round stone base of a column (SU53) on the western side of the square, partly covered by the western section.

The angular base SU52 with dimensions of ca 110x120 cm (Fig. 8) consisted of two rows of mudbricks, (with dimensions of 25x10x6 cm), which were bonded by thick layers of mud mortar from the sides.

The oval base SU53 consisted of two rows of lime and sandstone of various shapes and sizes. Two layers of stones with mud bond were unearthed on an area of 130x110 cm (Fig. 9). A part of the western section of the square was removed to research the whole extent of the base. The construction of this base in the 5th arcade of the eastern wing of the *riwaq* was considerably different from the other four arcades. The difference could be interpreted as architectonic, as four eastern arcades consisted of pillars and the last arcade, flanking the internal yard, was constructed of more massive columns (as seen on the flank of the northern wing), which needed stronger matching bases.

A thick layer of fine white sand (SU56) was also discovered beside bases in this square, representing probably a floor of the *riwaq*.

### ***1.7. Square X360Y115***

Due to time constraints, a testing pit with dimensions of 2x2 m was excavated in the square, situated according to the calculated position of the column base. After

removing ca 60 cm layers of fine yellow sand (without arcade debris), quartzite and sandstones of varying size, without processed surfaces (round and quarried) were uncovered on an area of about 120x100 cm (SU62). They were bonded by mud mortar and supported by sand. Like SU53, the structure and shape of SU62 (Fig. 10) might also have been intended for the construction of a yard flanking the column.

### ***1.8. Squares X365Y110 and X365Y105***

The square X365Y110 was excavated beside the internal side of the southern wall of the old mosque, ca. between the fourth and fifth arcade of the eastern wing of the *riwaq*. The square X365Y105 was excavated in its north-western part only (as its area was largely outside the old mosque), to study the pilaster of the above-mentioned 5th arcade on the internal side of the southern wall. The excavations confirmed the width of the southern wall as ca. 60 cm, preserved up to the level of six rows of mudbricks, and discovered pink internal plaster above the fundamentals of the wall, starting at the level of the third mudbrick row.

The unearthed pilaster of the 5th arcade showed a specific feature: it was situated in a spot where the full width of the southern wall thinned out into a half width and the resulting corner was covered up by deltoid mudbricks, creating a  $\frac{3}{4}$  column (Fig. 11). The purpose of the niche thus created, which might continue in the southern wall westwards, is unknown; it might eventually have reached a door, which led (?) towards the *gubba*. The continuation of excavations further westwards was impossible due to static concerns caused by a water tank. Also it is not known whether the collapsed southern wall included windows.

Some research was done in square X380Y115, which covered the south-eastern corner of the perimeter wall of the old mosque. A bond pattern of mudbricks was studied in the corner, as well as the thickness of the eastern and southern walls (60 cm and 60 cm respectively); the southern wall was preserved up to only two mudbrick rows in the corner.

### ***1.9. Square X355Y120***

A testing pit with dimensions 2x2 m was excavated in the square, in line with the bases from squares X360Y120 and X360Y125, to verify, whether there was a column base in the southern wing of the *riwaq* of the old mosque. However, work in the testing pit did not discover any such base.



### **1.10. Square X355Y115**

Another testing pit with dimensions of ca 2x2 m was excavated in the square to verify a base of the south wing of the *riwaq* of the old mosque. The pit was limited from the western side by the concrete platform of the new mosque. In the northern corner of the pit, covered by about 100 cm of fine yellow eolian sand, a mud layer with pebbles and bigger grey-greenish stone (SU57) was unearthed. The mud layer was about 30 cm thick, with reconstructed dimensions of about 130x80 cm in a depression in greyish sand. SU57 continued into the northern section.

### **1.11. Squares X335Y120 and X335Y115**

Testing pits (6x1x1 m) were dug alongside the internal eastern and western walls of a storeroom, northwards of the main gate to the old mosque. The eastern wall was constructed secondarily. It filled up a space in an arch between two columns; maybe the arch belonged to an arcade consisting of one row of columns in the western *riwaq*. In the wall is a walled-up door with two different periods in time stages. The older one is a narrow door, with a mudbrick doorstep at the level of column bases. The lower southern side of the door is made of processed stone. The later period of the door is wider, with a redbrick doorstep about 40 cm higher than the older mudbrick one. From outside the walled-up pivot of the door is visible, on its right upper side. The present entrance to the storeroom was once its window, according to a local citizen. No observations were made on the western wall of the storeroom.

## **2. Research on Mudbrick Structures**

Research on mudbrick grain texture and sampling in the 2022 season continued research from 2019<sup>6</sup> and focused on the analysis of mudbrick from the fundamentals of the eastern and southern walls, from a pillar foundation, from the storeroom and from recent mudbrick and Nile mud for comparison. The old mosque has continued to be documented by photogrammetry; continued detailed research of the mosque's architecture and structural techniques, materials used, etc.

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<sup>6</sup> HUDEC, J., KOVÁR, B., FULAJTÁR, E., LIESKOVSKÝ, T., HORÁKOVÁ, L., ČERNÝ, M., BARTA, P. A Brief Report on the 2019 Season in Duweym Wad Haj. In *Asian and African Studies*, 2021, Vol. 30, No. 1, p. 221.

During the season other samples of soil and mudbrick were taken for *in situ* testing and also for additional laboratory testing of mudbrick and Nile mud in a Slovakian laboratory, as shown in Table 1.

Samples of sand have been analysed by grain size curve during the archaeological survey in Sudan and also a visual description, admixtures, and Munsell colour classification were carried out. In addition, some of the mudbrick samples were taken to the laboratory of the Slovak University of Technology in Bratislava, Faculty of Civil Engineering for additional tests in laboratory conditions.

The composition and statistical measures of the mudbrick tested suggest that the raw materials are all naturally occurring sediments in the area of the Nile River. Brick composition was very much a matter of what was easily and locally obtainable. Nevertheless, research can still provide valuable additional information about the quality of the mudbrick, reuse of materials, construction techniques, etc.

Methods used for determining the granulometric composition of mudbrick are mainly sieve analysis (grain  $> 0,1$  mm), a hydrometric test (grain  $< 0,1$  mm) to specify Atterberg limits (shrinkage, plastic, liquid) and a Proctor compaction test.

In sieve analysis a known weight of dry soil is placed in the largest sieve (the top sieve) and the nest of sieves is shaken. The soil retained in each sieve is weighed and the percentage of soil retained in each sieve is calculated. The results are plotted on a percentage graph of particles, finer than a given sieve versus the logarithm of the particle sizes as shown e.g. in Fig. 13 to Fig. 16. Tables of grain size curves for sand samples are shown in Fig. 13 to Fig. 16.

The grading curve is used for the textural classification of soils which describes soils based on their particle size distribution. Various classification systems have evolved over the years to categorize soils for a specific engineering purpose.

For mudbrick we also know, for example, the recommended limits of the type of material used, the suitable grain size curve slope, etc. In addition, data obtained from a mudbrick comparison help to illustrate the relationship between constructions and their material. A brief description of grain size distribution curves for mudbrick and soil samples is given in Fig. 12. A sieve analysis of the sand and mudbrick samples carried out during the excavation is shown in Fig. 17.

According to a very clear consensus of the sand samples 18/DEP and 21/DEP, it is possible to assert that the same local sand was used in the foundation area of the southern wall and on terrain inside the mosque, probably at the same time.

A comparison of the composition of new mudbrick 15/DEP and sand samples 18/DEP and 21/DEP indicates that even today local sand in the area is quite similar to the sand used at the time of the construction of the mosque.

However, based on a composition of the mudbrick 16/DEP from the southern foundation of the walls of the old mosque, it is possible to assume a different type of sand, which contains much smaller sand particles. Maybe some of the mudbricks were delivered to the site from different places where they were made. For a more precise hypothesis it is necessary to extend the database of samples and cooperate with archaeological research which brings new knowledge.

The research also focused on some selected structural parts of the mosque. Mudbrick columns were usually founded on a stone base created by two layers of stones covered by two layers of mudbricks (Fig. 5). In general, a typical mudbrick size is ca. 27x13x6 cm.

The static system of the mosque is formed by peripheral masonry supporting walls and a system of columns creating vaulted walls. These columns are set from ca. 3.9 m to 4.9 m apart.

Only a few rows of mudbrick are preserved from the southern wall of the old mosque. The western part of the wall was probably destroyed during the construction of the new mosque and the eastern part may either have collapsed or have been dismantled.

Some stabilization problems have been identified at the north-eastern corner of the old mosque, northern wall of which is leaning towards the outside. A huge crack is visible at the north-eastern corner from inside and outside (Fig. 18) as well as beside the north-western corner (Fig. 19).

The brick bonding in the north-eastern corner supports the hypothesis that the western and eastern walls were built (and connected to the northern wall) probably at the same time, despite differences in the corner angles made by these walls. The north-western and south-western corners are roughly at right angles, the north-eastern corner has an acute angle of about 85° and the south-eastern corner has an obtuse angle of about 95°. This is caused by the eastern (*qibla*) wall which is very accurately oriented towards Mecca, at the expense of the rectangularity of the perimeter walls of the mosque. It seems that due to the (older?) building of the mausoleum (*gubba*) and the character of the terrain, the mosque was unable to be constructed in a rectangular shape.

Terrain constraints are confirmed also by the leaning of the northern wall, probably caused by a stability problem associated with the sloping terrain. Temporarily, the stabilisation of the northern wall was solved, probably during the construction of the mosque or very soon afterwards, by the building of a retaining wall. It was built along the northern perimeter wall, from the north-eastern side gate to north-west corner, to stabilize the northern wall of the old mosque (see Fig. 20).

The geodetic measurements confirmed that the eastern (*qibla*) wall is exactly oriented towards Mecca and this orientation caused a difference of about 5° in angle with the neighbouring walls of the old mosque. On the other hand, except

for the *qibla* wall, the right angles are respected in the corners of the other walls. Such a situation might lead to the assumption that the *qibla* wall was built as the last one of the perimeter walls, and therefore diverted in relation to the other standing walls. However, the brick bond between eastern and northern walls confirms a mutual connection and not an affixing. Some remaining questions may be answered after additional research.

The total width of the old mosque is 37.5 m and its lengths are 45.2 m (southern wall) and 48.35 m (northern wall), due to the deflection of the *qibla* wall. The total area of the mosque is ca.  $(37.5 \times ((45.2 + 48.35) / 2))$ , i.e. 1754 m<sup>2</sup>.

### 3. Soil and Geomorphological Survey

The soil and geomorphological survey was carried out as a complementary research activity supporting the archaeological research on the site. Its aim was to provide background information for a more comprehensive interpretation of the archaeological excavations.

The main task was to determine the stratigraphic characteristics of the soilscape and youngest sediments and to find out whether there may exist archaeological cultural layers buried by wind-blown sands covering the study site. This could be achieved by drilling a network of deep boreholes distributed at representative positions in the nearest surroundings of the mosque. The second goal of this survey was to provide a brief geographical and paleo-environmental characterization of the site studied. Knowledge of the environment enables a better understanding of the settlements studied, their functions, the problems which they faced and the measures they undertook to improve their living conditions.

The soil survey started in 2019 and during this season 8 stratigraphic profiles were described.<sup>7</sup> The 2022 season contributed by another 4 boreholes, which were done by newly adjusted auger equipment extending from an original length of 3.5 m to 4.5 m. However, in 2019 some boreholes were drilled at the bottom of dug archaeological excavation pits and thus the overall observed soil and sedimentary profiles were deeper (5.5–6 m). In 2022 the soil survey could not benefit from dug pits, and so the soil profile observations were based solely on drilled boreholes ca 3.5–4.5 m deep. An important part of the soil and geomorphological survey was the grid of geodetic measurements of the exact positions and elevation of the studied soil profiles.

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<sup>7</sup> HUDEC, J., KOVÁR, B., FULAJTÁR, E., LIESKOVSKÝ, T., HORÁKOVÁ, L., ČERNÝ, M., BARTA, P. A Brief Report on the 2019 Season in Duweym Wad Haj. In *Asian and African Studies*, 2021, Vol. 30, No. 1, pp. 217–219.

### 3.1. Study Site

The study site is situated at the boundary of the flood plain of the Nile and the slightly elevated alluvial lowland of the Nile valley.<sup>8</sup> Along the boundary between the flood plain and the slightly elevated alluvial lowland there occurs an elongated hill elevated above its surroundings, occupied by a recent rural peasant settlement. On the hilltop stands a mosque complex comprising an old mosque, a new mosque, mausoleum (*gubba*) and cemetery. Such slightly elevated positions situated on the margin of intensively agriculturally exploited flood plain and dryland that could be used for extensive grazing, could be very suitable for ancient settlements. The presence of sacral architecture might indicate ancient spiritual traditions that can be linked to very early times when Christian churches and Muslim mosques were built at sites with ancient temples in the Nile valley.<sup>9</sup>

### 3.2. Methods

The soil profiles were investigated using soil hand auger with an extension rods (maximum depth of 4.5 m). The drilling was aimed to reach the interface of the eolian sand complex with its substratum. The depth of each borehole was decided according to the stratigraphy of the profile under investigation. The basic observable characteristic (colour, texture, roots, artefacts, carbonate content, etc) were recorded.

The soil profiles were distributed irregularly in an attempt to select significant landscape positions, and this selection had also to respect the accessibility of the selected places in the village. From the stratigraphic viewpoint the selected profiles can represent logical sequences which can be grouped into two landscape transects. The main transect (T1) was oriented across the long axis of the hill (i.e. from the Nile towards the desert) and the second (T2) was oriented parallel to the hill axis and more or less perpendicular to the first transect. During the 2019 season 8 boreholes were drilled, representing the major points of the T1 (6 profiles) and only the central part of T2 (2 profiles). During the 2022 season another 4 profiles were added, 2 of them complemented T1, increasing the

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<sup>8</sup> HUDEC, J., KOVÁR, B., FULAJTÁR, E., LIESKOVSKÝ, T., HORÁKOVÁ, L., ČERNÝ, M., BARTA, P. A Brief Report on the 2019 Season in Duweym Wad Haj. In *Asian and African Studies*, 2021, Vol. 30, No. 1, p. 215.

<sup>9</sup> ABD EL-LATEEF, R. S. et al. Luxor Temple as a Reactivated Holy Site. Sacred Architecture Between Cosmology and Authority. In VERSACI, A., A. et al. (ed.). *Conservation of Architectural Heritage*, pp. 49–53.

observation density and representativeness of this main transect and 2 profiles extended the T2 and represent its end points.

Geodetical measurements of the soil profiles (coordinates, distances between the boreholes and their elevations) were carried out using a total station for the central parts of the transects and GPS for the most remote points. The data were processed by GIS (ArcMap). Points measured in relation to the soil survey were combined with all other geodetical measurements of archaeological objects and the whole grid was used to develop the DTM of the hill under the study.

### **3.3. Results**

The distribution of investigated profiles is presented on Fig. 21. The major result of the soil survey was the description of soil and sedimentation complexes identified in the boreholes. The following profiles were described:

#### **3.3.1. Profile No. 1 - at Lower Street Corner**

##### **Description:**

- 000–180 cm: Yellowish sand. Fresh aeolian sand not altered by pedogenesis.
- 180–270 cm: Brownish loamy sand with low content of organic matter. Probably polygenetic fluvial eolian deposit influenced by pedogenesis (formation of alluvial soils).
- 270–300 cm: Brown loamy sand with low content of organic matter (darker colour and finer texture than former horizon). Probably alluvial deposit with limited input of eolian material considerably influenced by pedogenesis (formation of alluvial soils).
- 300–420 cm: Brownish (colour and texture lighter than the upper layer) loamy sand with low content of organic matter and few calcareous nodules. Probably polygenetic fluvial-eolian deposit influenced by pedogenesis (formation of alluvial soils).
- 420–450 cm: Dark brown loamy humiferous material. A-horizon of well-developed alluvial soil.

##### **Interpretation:**

Well-developed alluvial soil covered by a 220 cm thick layer of polygenetic, predominantly alluvial sand (with a contribution of eolian sand) and a 180 cm thick layer of fresh eolian sand. This profile is similar to Profile 3 investigated during the first survey season.

### *3.3.2. Profile No. 2 - In Front of the Cemetery*

#### **Description:**

- 000–230 cm: Yellowish sand. Fresh eolian sand not altered by pedogenesis.
- 230–270 cm: Fine gravel, sub-angular stones up to 15 mm in diameter. This material did not undergo long-distance transport by river. It was deposited probably by extreme rainfall and runoff events bringing material from close surroundings (wadis in slightly elevated denudation lowland with desert vegetation).
- 270–335 cm: Very fine gravel, subangular stones up to 5 mm, a few stones up to 10 mm, at a depth of ca 280 cm a few fragments of burnt bricks. Genesis of this material is the same as the layer above, the only difference is that it is finer.
- 335–370 cm: Fine yellowish-greyish clay. Genesis of this material is not known as the detailed quaternary or geological mapping of the area is not available. Most probably it is Holocene alluvial clay deposit of the Nile but older age (Pleistocene, late Neolithic) cannot be excluded.

#### **Interpretation:**

The cover of eolian sand is much thinner (ca 230 cm) here than in the central part of the hill (where the mosque and archaeological site are situated). The base of the eolian sand complex is formed by a ca 105 cm thick layer of fine poorly rounded gravel deposited from wadis occurring in the surroundings of the alluvial plain. Below this gravel there is a clay layer, which was already found in the Profile 6 investigated during the 2019 season.<sup>10</sup>

### *3.3.3. Profile No. 3 – In the Upper Street*

#### **Description:**

- 000–330 cm: Yellowish sand. Fresh eolian sand not altered by pedogenesis.
- 330–360 cm: Fine gravel, subangular stones up to 15 mm in diameter. This material did not undergo long-distance transport by river. It was deposited probably by extreme rainfall/runoff events bringing material from close surroundings (wadis in slightly elevated denudation lowland with desert vegetation).
- 360–380 cm: Yellowish-greyish eolian sand with a small amount of coarse sand fraction and very fine gravel (up to 5 mm).

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<sup>10</sup> HUDEC, J., KOVÁR, B., FULAJTÁR, E., LIESKOVSKÝ, T., HORÁKOVÁ, L., ČERNÝ, M., BARTA, P. A Brief Report on the 2019 Season in Duweym Wad Haj. In *Asian and African Studies*, 2021, Vol. 30, No. 1, pp. 218–219.

**Interpretation:**

This profile is similar to profile 2. The thickness of the eolian complex is 330 cm here. The base of the sand complex is formed by fine poorly rounded gravel deposited from wadis occurring in the surroundings of the alluvial plain. Below this gravel another layer of coarse sand occurs. It is most probably of fluvial or colluvial origin, similar to the above layer of fine gravel, what is indicated by its texture, which is much coarser than the texture of eolian sands.

*3.3.4. Profile No. 4 – Behind the Cemetery*

**Description:**

000–420 cm: Yellowish sand. Fresh eolian sand not altered by pedogenesis;

**Interpretation:**

The whole profile is formed by a thick layer of eolian sand which is very homogeneous throughout the whole observation depth. The thickness of the sandy deposits at this site exceeds the depth extent of the used auger. This is a similarly homogeneous profile to the deep sandy deposit in the Profiles 4, 5, 6, 7 from the 2019 season.<sup>11</sup>

**3.4. Interpretation of the Results**

The investigated soil profiles reveal that the study site is covered by a thick complex of eolian sand deposits.<sup>12</sup> In the most elevated parts of the hill their thickness exceeds the extent of the used auger and therefore the soil profiles on the upper parts of the hill did not reach the basement of the eolian sandy deposits. However, those profiles which are situated on less elevated positions on the hill slopes and its surroundings reached the basement of the eolian sand complex and thus, considering the positions of investigated profiles and their elevations determined by a geodetic survey, the thickness of the eolian complex can be estimated to reach at least 7 m in the central part of the hill, while it is reduced towards its surroundings.

The auger observations indicate that most probably no significant ancient settlement existed on the hill. A settlement may have existed on the uppermost part of the hill where the base of the aeolian complex was not reached, and in the

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<sup>11</sup> HUDEC, J., KOVÁR, B., FULAJTÁR, E., LIESKOVSKÝ, T., HORÁKOVÁ, L., ČERNÝ, M., BARTA, P. A Brief Report on the 2019 Season in Duweym Wad Haj. In *Asian and African Studies*, 2021, Vol. 30, No. 1, pp. 218–219.

<sup>12</sup> *Ibid.*, pp. 219–220.



area occupied recently by cemetery, where a survey was not possible. But in this area only minor rural settlement could exist because this area is too small (ca 1.2 ha) for large settlement of urban character.

#### 4. Archaeological Survey

SAMS also photographically documented 10 wooden tablets – *alwāh* – deposited in the old mosque's storeroom of the old mosque and 3 *alwāh* discovered in the excavation pit of the storeroom. The *alwāh* will be subjected to further research. SAMS also acquired an Arabic text from the new mosque concerning a local tradition about the architecture of the *gubba* and the old mosque, which may be utilised in further publications on the old mosque.

#### 5. Pottery Research

The research focused on the material from the 2019 season as well as new material from squares and pits excavated in the 2022 season. The field season of 2022 yielded only a limited number of pottery fragments – only 72 sherds in total. The majority of sherds recovered consisted of badly eroded fragments with no visible decoration. The pottery was fragmented; no whole vessels or larger fragments were found.

The characteristics of the ceramic assemblage from the 2022 season are consistent with the observations made during the first field season in 2019.<sup>13</sup> Although most of the fragments were relatively small and no significant patterns of decoration or morphological attributes were observed, based on the fabric, these sherds can be dated almost exclusively to the Funj period.

As the number of new pottery fragments from this field season was very limited, further research focused on the assemblage from the previous field season. Although the majority of the pottery recovered was dated to the Funj period, some evidence of earlier settlement present at the site was also documented.

The oldest evidence of human activity at the site consists of a few pottery fragments, dated possibly to the Mesolithic/Neolithic period. These fragments come from thin-walled vessels and are decorated with incised lines or a rocker

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<sup>13</sup> HUDEC, J., KOVÁR, B., FULAJTÁR, E., LIESKOVSKÝ, T., HORÁKOVÁ, L., ČERNÝ, M., BARTA, P. A Brief Report on the 2019 Season in Duweym Wad Haj. In *Asian and African Studies*, 2021, Vol. 30, No. 1, pp. 210–211.

stamp technique (Fig. 22a–c). Pottery might be represented also by ceramic fragments with the remains of “pattern burnishing” (Fig. 22d).

One of the biggest pottery fragments recovered during the field season in 2019 may possibly come from a post-Meroitic jar (Fig. 23). These fragments differed from the majority of pottery from the site in their forms of decoration and fabric. However, the pre-Funj pottery at the site is rather scarce.

The most common was Funj pottery. Decoration of these fragments consisted of incised lines or horizontal bands of crosshatching near the rim or incised lines on the body of the vessel (Fig. 24a–c). Vessels with thinner walls were often decorated with a “twinned pattern”, often combined with red slip (Fig. 24d). The assemblage of the pottery from the old mosque is supplemented with some recent pottery (Fig. 24e–f), which comes from the test pits in the storeroom.

As the number of the pottery fragments from the site is of limited quality and quantity, further research will focus on the petrographic characterization of the major types of fabric found at the site. Several samples were selected to be brought to Slovakia for further analysis. All of the common fabric types of Funj pottery were included,<sup>14</sup> as well as various rare fabrics present at the site.

## 6. Other Samplings and Researches

Two wooden samples were taken from a fallen juniper (?) beam from a window in the mosque’s and a palm beam from the decomposed roof construction of the storeroom; one charcoal sample was taken from a mudbrick for dendrochronological and C14 research to estimate the building periods of the old mosque.

A stone sample was taken from stone chips in Tombos, from a spot close to the unfinished Napatan royal statue and two samples from the quarries closer to the Nile River, to compare them with a sample from the damaged unfinished royal statue discovered at DWH.

## 7. Conclusions and Further Prospects

The SAMS has successfully fulfilled all its goals set for the 2022 season. The project of research in DWH, supported by the Slovak Government’s Research and Development Agency, will be completed in December 2022. SAMS intends to

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<sup>14</sup> HUDEC, J., KOVÁR, B., FULAJTÁR, E., LIESKOVSKÝ, T., HORÁKOVÁ, L., ČERNÝ, M., BARTA, P. A Brief Report on the 2019 Season in Duweym Wad Haj. In *Asian and African Studies*, 2021, Vol. 30, No. 1, p. 210.

summarise the results of its multidisciplinary research in DWH in a collective open-access publication in English.

According to the impact of the projected publication, SAMS intends to facilitate further conservation of the mosque by an appropriate Slovak academic, who could apply for an international grant, as the old mosque might well have wider than regional implications for the spread of Islam and the haj pilgrimage to and from Western and Central Africa.

The aim of the excavations inside the old mosque was to find out whether there were any interior structures of the mosque, mainly columns and parts of the *riwaq*. Excavation confirmed the occurrence of column bases which were found in various states of preservation. They were mainly stone-earthen structures. Individual layers of stones and mudbricks were bonded with mortar. These column bases were surrounded by a pale or even white loose layer. It might have been the loose “floor” of the mosque. Below it, there was a layer of sand without finds. All column bases were recorded in the general architectonic plan. Structures were identified by means of a geodetic total station and documented by means of photogrammetry.

A few ceramic artefacts were found in the trenches. Unfortunately, they do not make it possible so far to calculate the exact chronology of the construction of the mosque or its phases.

According to a preliminary assessment the *riwaq* in front of the eastern (*qibla*) wall consisted of four rows of pillars and one row of columns, which is confirmed by the pilasters and semi-columns in/on the northern and southern walls. The row of columns ended at the southern wall with a  $\frac{3}{4}$  column, after which the continuation of the southern wall of the old mosque westwards is thinner, about a half of the original thickness. A possible door towards the *gubba* might be considered in this part of the southern wall.

The pillars and columns confirm that the *riwaq* was constructed along the northern and eastern (*qibla*) internal walls of the old mosque. The *riwaq* was very probably also built along the southern wall, although only one weak base of mud mortar could support this suggestion, as the area of a possible southern *riwaq* is now overbuilt by the new mosque (Fig.25). According to local tradition there were a *hammam* (bathroom) and a women’s wing in the south-western part of the old mosque.

The old mosque has several axes. They might have some chronological implications. There is an axis of the eastern wing of the *riwaq*, which runs from the northern side gate (Figs. 26–27) across the middle of the wing towards the southern wall. The excavations have not so far provided evidence of whether this part of the old mosque might be the original core of the building.

Another axis runs from the false door in the western wall (Fig. 29) across the northern wing of the *riwaq* towards the *qibla* wall. Due to modern interventions

in the western wall it is not possible to assess whether there were more false doors in the western wall. Most probably there was not a false door on the external side of the *qibla* wall but rather the axis of northern wing of the *riwaq* ran towards the first window from the northern side in the *qibla* wall.

The central axis of the old mosque ran from the left side of the western gate (Fig. 28) towards the *mihrab* (Fig. 30). If the southern wing of the *riwaq* had only two arcades, the axis would be rather asymmetric in the open courtyard. Also it could support the hypothesis of another shape or arrangement of the main western gate in the past.

Therefore, two testing pits were also dug along the eastern and western wall of the storeroom, northwards (left) of the main (western) gate to the old mosque. Two phases of construction of a door in the eastern wall of the magazine were discovered. The older phase of the door was contemporary with the column bases in the NE and SE corners of the storeroom. The storeroom was created of walls constructed by closing the arches of the *riwaq* by means of mudbricks. However, no traces of an older gate to the old mosque have so far been discovered in the western wall of the storeroom.

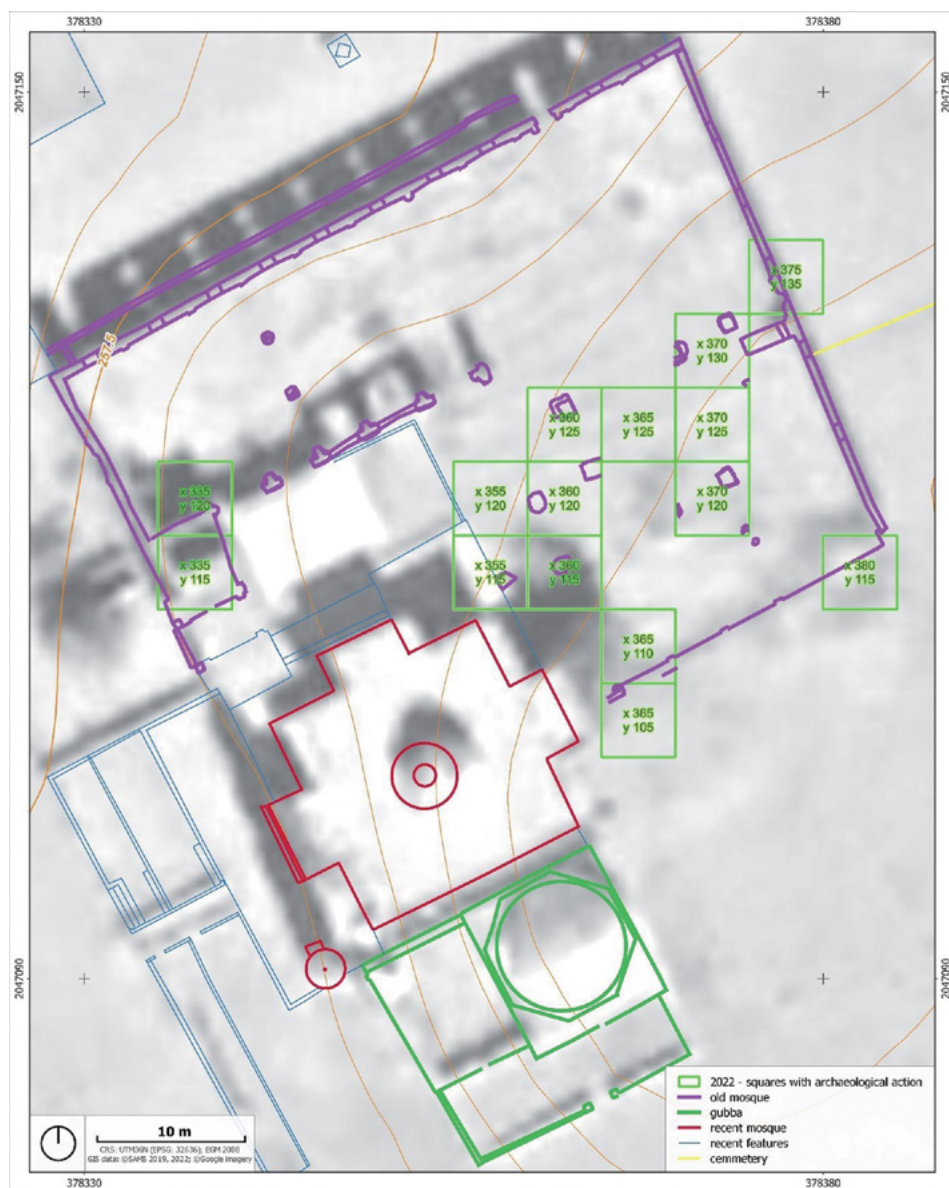
The soil survey achieved its goals and provided a deep stratigraphy of the soil and sediment complex at the archaeological site and precluded the existence of a larger ancient settlement with a possible metropolitan function. However, it does not preclude the existence of a smaller ancient temple at the site. The information on soilscape was used to make a brief paleo-environmental reconstruction of the site and to contribute to a better understanding of the environment in which ancient societies lived.

## REFERENCES

- HUDEC, Jozef, CHEBEN, Michal, KOVÁR, Branislav. Report on Surveys in Duweym Wad Haj. In *Asian and African Studies*, 2019, Vol. 28, No. 2, pp. 168–179.
- HUDEC, Jozef, KOVÁR, Branislav, FULAJTÁR, Emil, LIESKOVSKÝ, Tibor, HORÁKOVÁ, Lenka, ČERNÝ, Miroslav, BARTA, Peter. A Brief Report on the 2019 Season in Duweym Wad Haj. In *Asian and African Studies*, 2021, Vol. 30, No. 1, pp. 202–224.
- ABD EL-LATEEF, R. S. et al. Luxor Temple as a Reactivated Holy Site. Sacred Architecture Between Cosmology and Authority. In VERSACI, Antonella, A. et al. (ed.). *Conservation of Architectural Heritage*. Springer 2022. pp. 41–56.

# PLATES





**Hudec, Fig. 1:** Map of excavations in the 2022 season (Drawing: T. Lieskovský)



**Hudec, Fig. 2:** Minbar (SU48) extending over eastern section of the square X370Y130 and a clay floor on its northern side (Photo: J. Hudec)



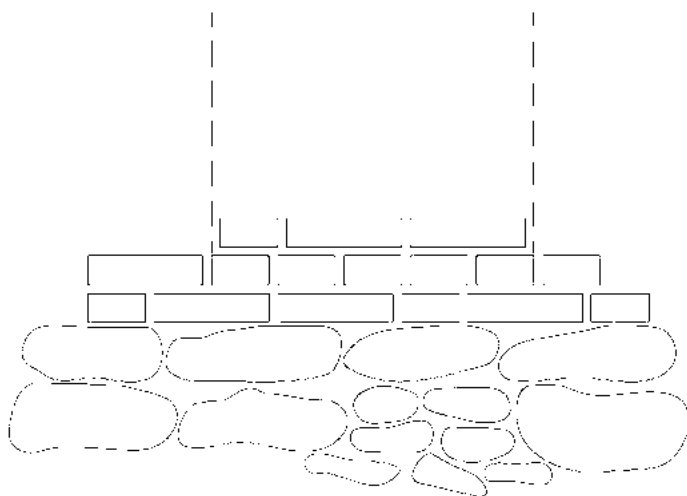
**Hudec, Fig. 3:** Part of the base of pillar SU44 in square X370Y130 (Orthophoto and plan: T. Lieskovský)



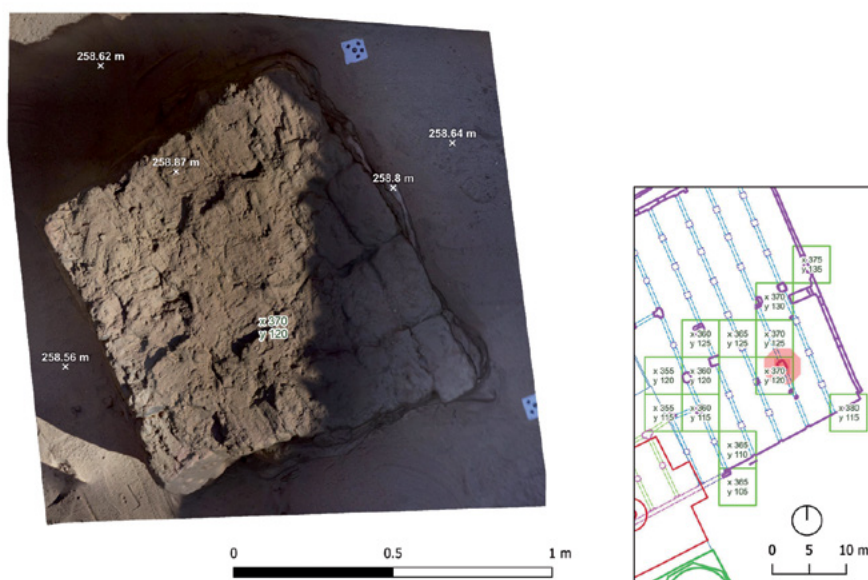




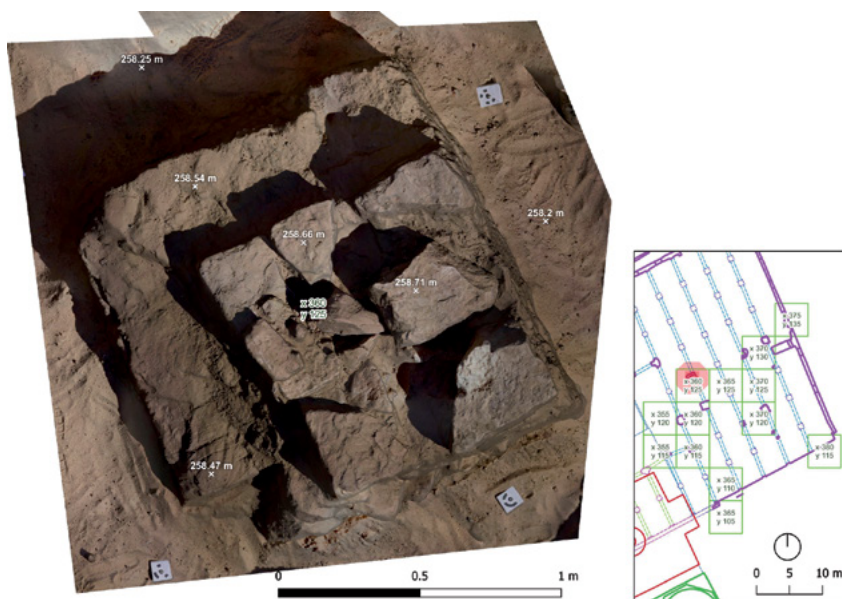
**Hudec, Fig. 4:** Base of pillar SU47 in square X370Y130 (Orthophoto and plan: T. Lieskovský)



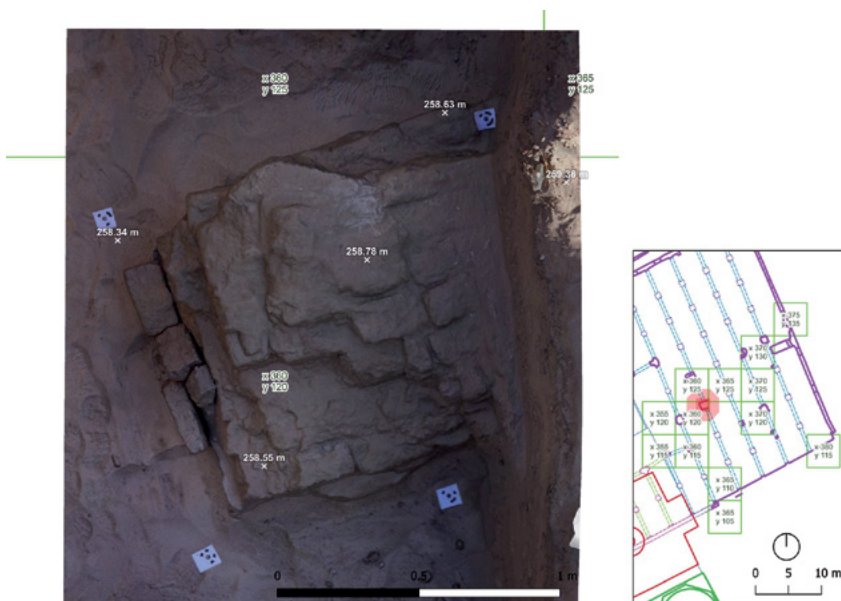
**Hudec, Fig. 5:** The typical schematic foundation of a pillar of the mosque's riwaq (Drawing: M. Černý)



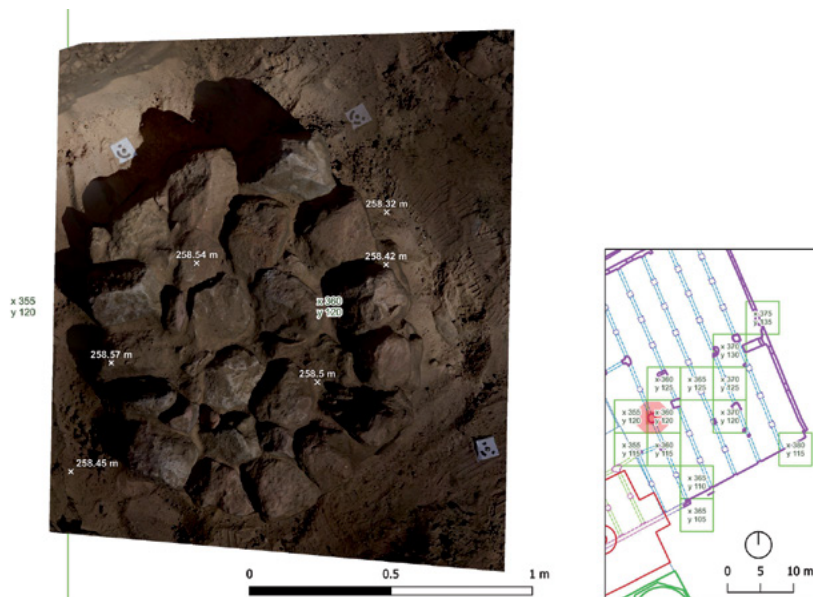
**Hudec, Fig. 6:** The quadrate stone-earthen base of pillar SU41 in square X370Y120 (Orthophoto and plan: T. Lieskovský)



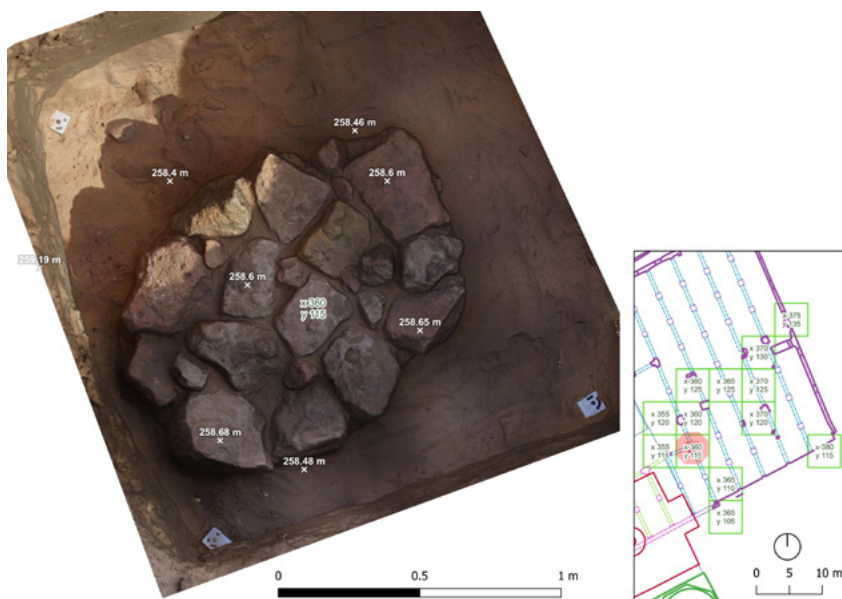
**Hudec, Fig. 7:** Masonry of SU45 supporting stone base SU36 of a pillar in square X360Y125 (Orthophotograph and plan: T. Lieskovský)



**Hudec, Fig. 8:** The angular base SU52 of a pillar in square X360Y120 (Orthophoto and plan: T. Lieskovský)



**Hudec, Fig. 9:** The oval base SU53 of a column in square X360Y120 (Orthophoto and plan: T. Lieskovský)

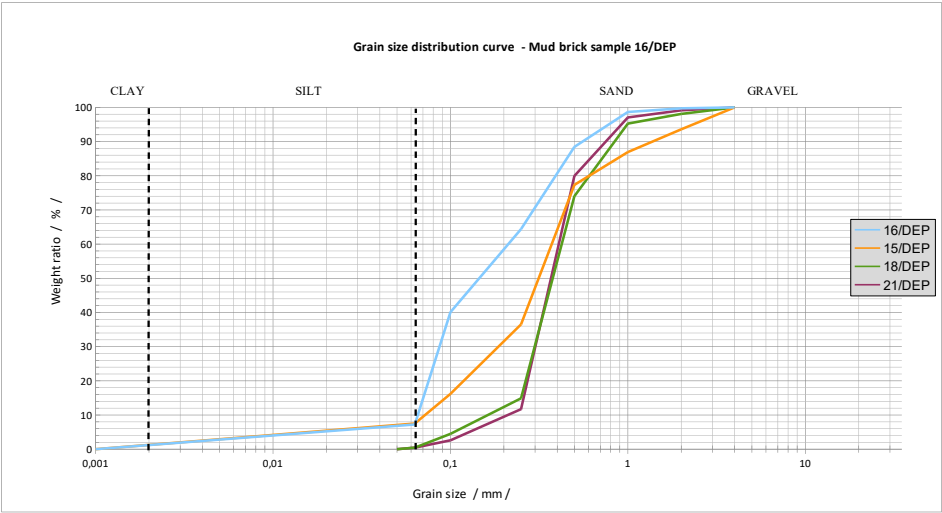


**Hudec, Fig. 10:** Oval stone base of a column in square X360Y115 (Orthophoto and plan: T. Lieskovský)

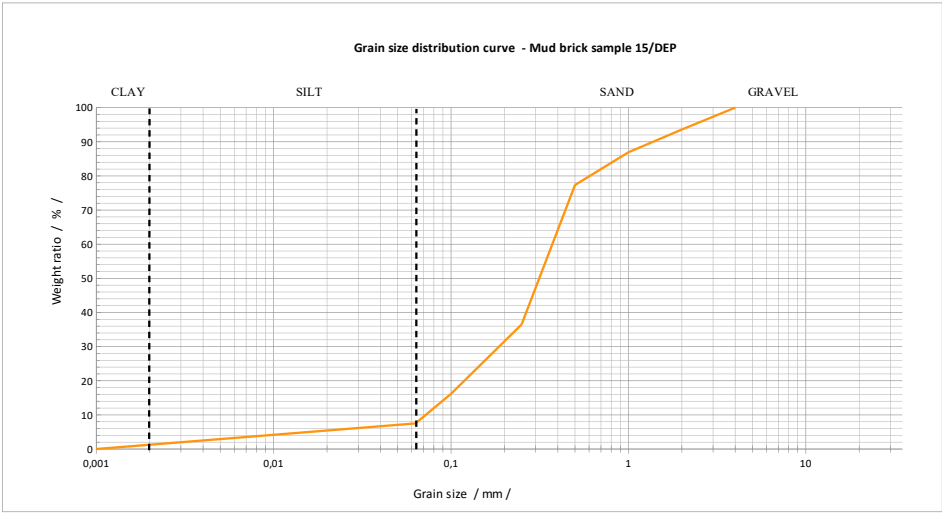


**Hudec, Fig. 11:** Tapering southern perimeter wall with  $\frac{3}{4}$  column in square X365Y105 (Photo: J. Hudec)

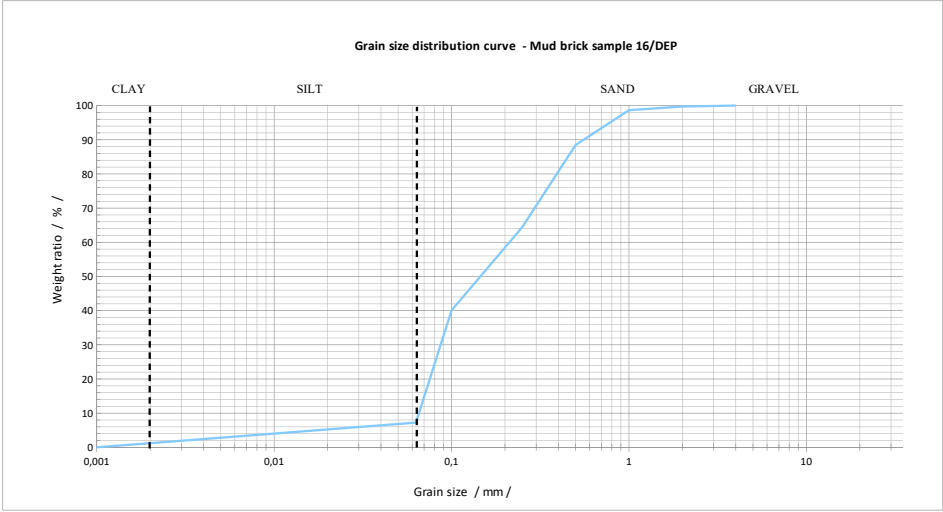




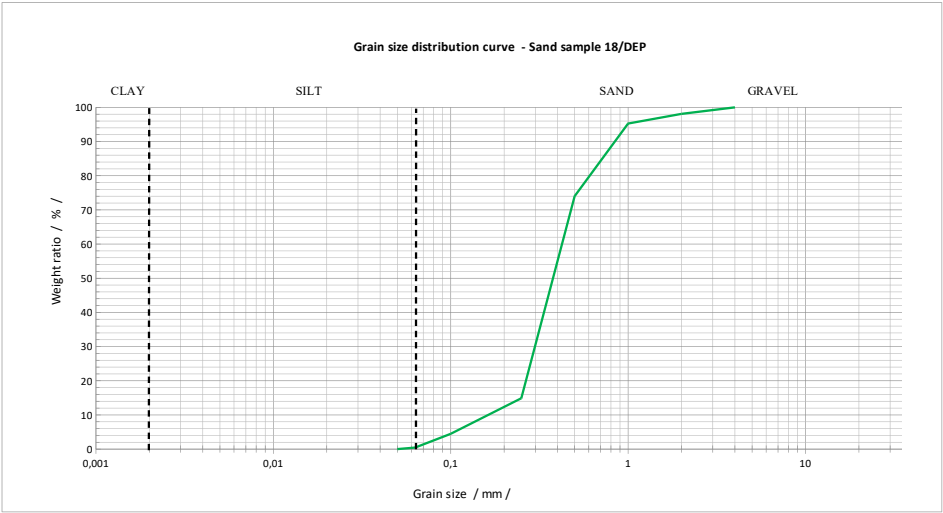
**Hudec, Fig. 12:** Grain size curve – a comparison of the sand and mudbrick sample (Graph: M. Černý)



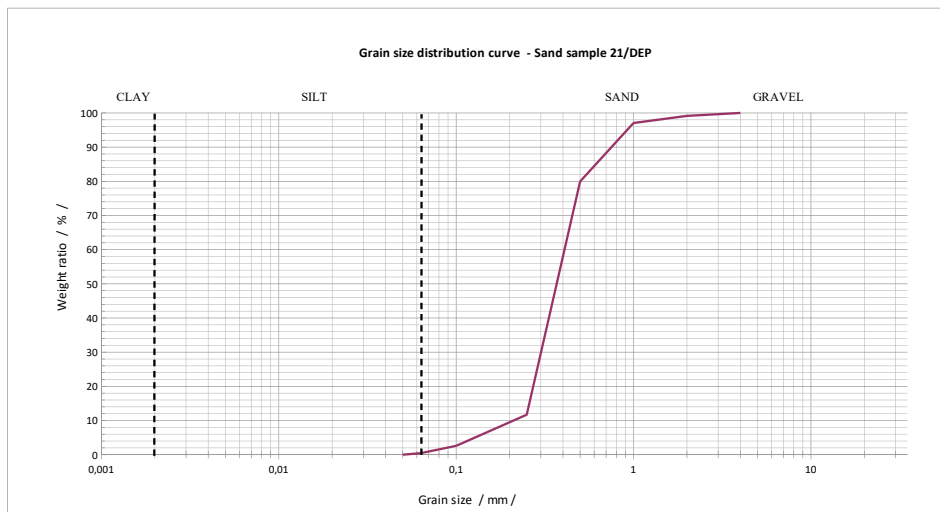
**Hudec, Fig. 13:** Grain size curve – mud brick sample 15/DEP (Graph: M. Černý)



Hudec, Fig. 14: Grain size curve – mud brick sample 16/DEP (Graph: M. Černý)



Hudec, Fig. 15: Grain size curve – sand sample 18/DEP (Graph: M. Černý)



**Hudec, Fig. 16:** Grain size curve – sand sample 21/DEP (Graph: M. Černý)



**Hudec, Fig. 17:** Sieve analysis at the site (Photo M. Černý)



**Hudec, Fig. 18:** Eastern view of the corner wall crack (Photo: M. Černý)



**Hudec, Fig. 19:** Western view of the corner wall crack (Photo: M. Černý)

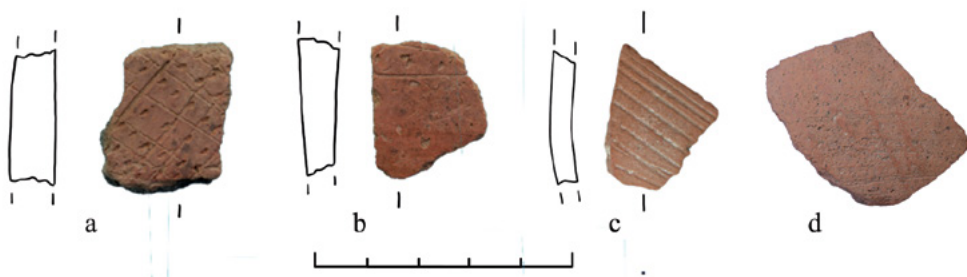


**Hudec, Fig. 20:** A stabilizing retaining wall along the northern wall (Photo: M. Černý)





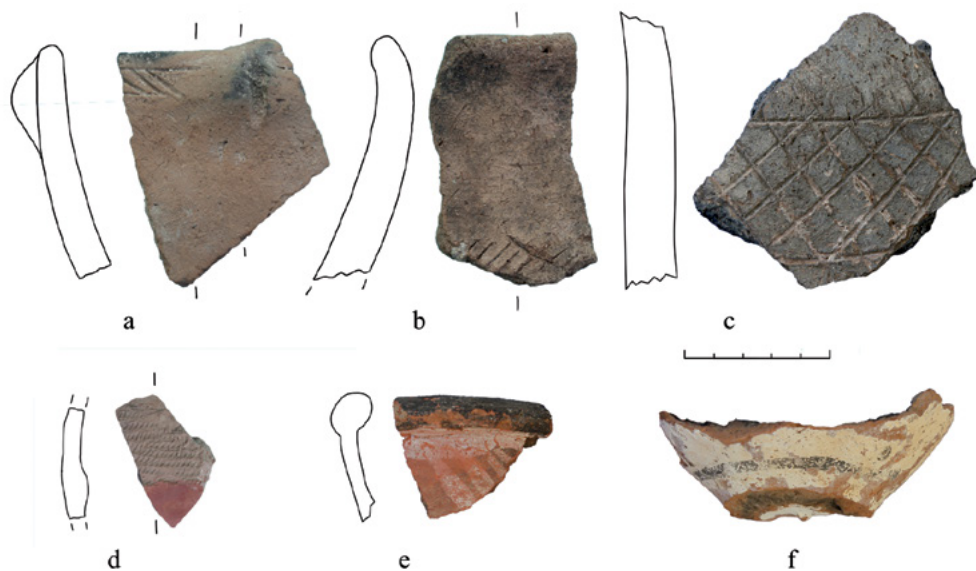
**Hudec, Fig. 21:** Distribution of the soil profiles studied at Duweym Wad Haj. The soil profiles made in the 2022 season are designated by red numbers (Drawing: T. Lieskovský)



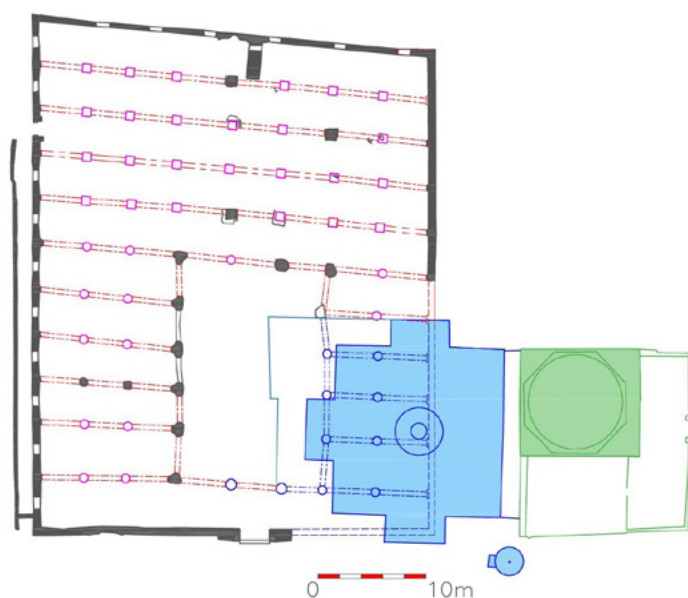
**Hudec, Fig. 22:** Pottery fragments, dated possibly to the Mesolithic/Neolithic period (Photo and drawing: L. Horáková)



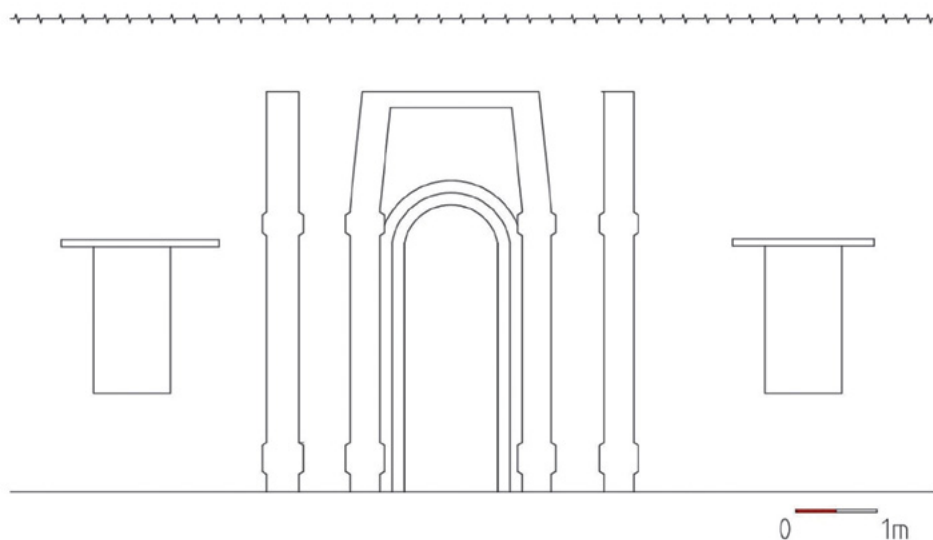
**Hudec, Fig. 23:** Pottery fragment of a post-Meroitic jar (Photo and drawing: L. Horáková)



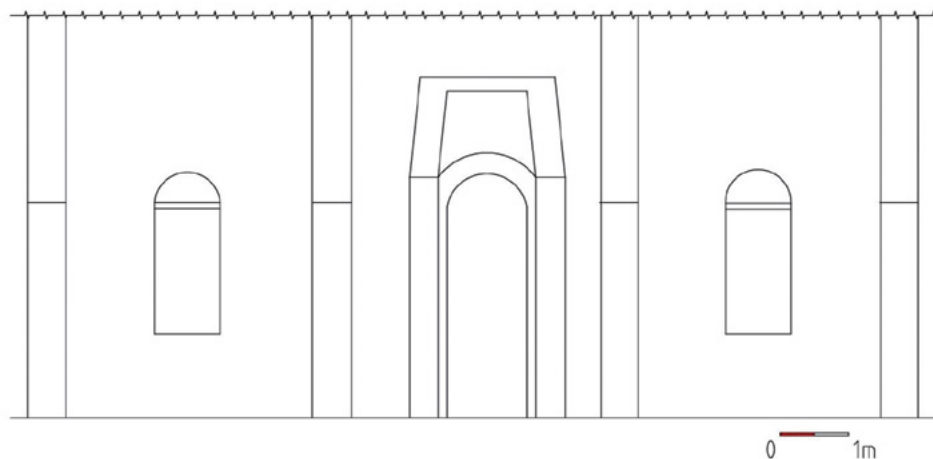
**Hudec, Fig. 24:** Samples of Funj pottery (Photo and drawing: L. Horáková)



**Hudec, Fig. 25:** Layout plan of the old mosque. Black colour – old mosque's remaining parts, red colour – reconstructed parts, blue colour – the new mosque, green colour – the gubba (Drawing: M. Černý, T. Lieskovský)



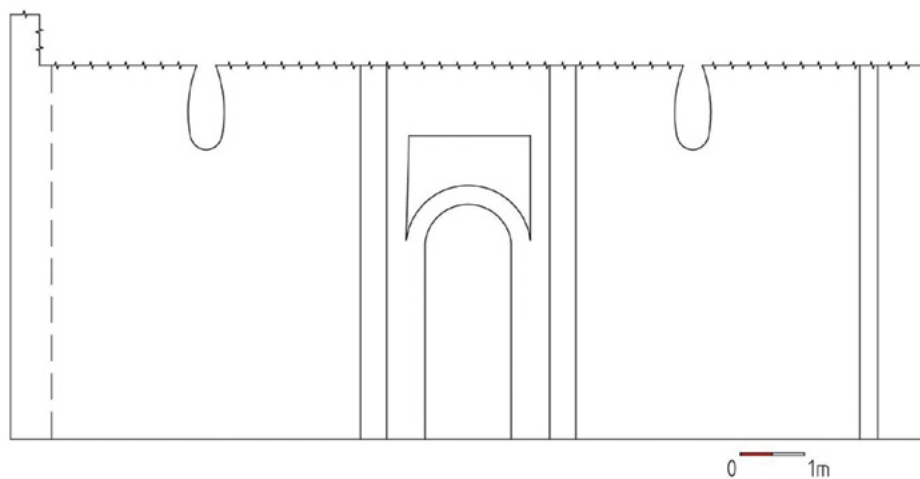
**Hudec, Fig. 26:** The side gate in the northern wall – outside view (Drawing: M. Černý)



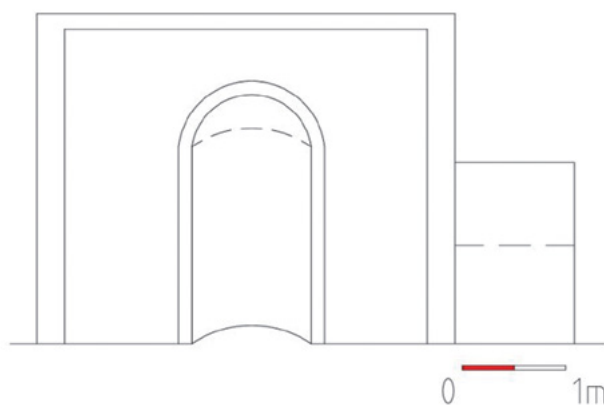
**Hudec, Fig. 27:** The side gate in the northern wall – inside view (Drawing: M. Černý)



**Hudec, Fig. 28:** Main gate in the western wall – outside view (Drawing: M. Černý)



**Hudec, Fig. 29:** False gate on the western wall – outside view (Drawing: M. Černý)



**Hudec, Fig. 30:** Mihrab with minbar on the right side (Drawing: M. Černý)

Table of samples – season 2022				
type of sample	name	location	stratigraphy unit	Description
mud brick	15/DEP	-	-	A new local mud brick, drying on the street, near to the mosque
mud brick	16/DEP	X380 Y115	SU 5	Mosque – a 2nd row from a southern wall foundation
mud brick	17/DEP	X380 Y115	SU 6	Mosque – a 2nd row from an eastern wall foundation
sand	18/DEP	X385 Y115	SU 5	A sand sample under the foundation of a southern wall
mud brick	19/DEP	X335 Y115	SU 1	A mud brick from the wall above the door at the main entrance
sand	20/DEP	-	-	A sample of Nile mud (the River Nile is in the distance, about 0,9km from the mosque)
sand	21/DEP	X375 Y130	SU 6	A sand sample under the foundation of the minbar
mud brick	22/DEP	X370 Y130	SU 47	a mudbrick from a column foundation above a stone base