

## THE ITALIAN EGYPTIAN PROJECT OF STUDY AND CONSERVATION OF THE MONASTERY OF ABBA NEFER AT MANQABAD 2018 - 5TH CAMPAIGN

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### Introduction

The 2018 campaign of the Italian Egyptian Mission at Manqabad was carried out on the site from 28<sup>th</sup> October to 4<sup>th</sup> December. The Italian members of the mission were R. Pirelli (director), P. Buzi (vice-director), A. D'Andrea, A. Bosco, I. Incordino, S. Mainieri, P. Musella, M.D. Pubblico, A. Ragionieri, A. Salsano; the Egyptian members were Ezzat Salib and Mohamed Kenawi<sup>1</sup>.

According to the approved points of the application and to the requirements of the Egyptian Ministry of Antiquities, the mission planned to carry out the following activities:

1. Archaeological survey, including surface collection;
2. Continuation of the topographical survey and drawings of the archaeological site;
3. Autoptic and photographic survey in order to verify the general condition of the paintings and structures and identify urgent interventions;
4. Intervention on selected materials (above all paintings and mud brick structures), with the aim of identifying the most suitable actions for the future restoration and preparing a conservation and restoration plan;
5. Theoretical and practical training of young Egyptian archaeologists and restorers<sup>2</sup>.

<sup>1</sup> The mission wishes to thank Dr. Nashwa Gaber, Director of Foreign Missions Affairs, and the Permanent Committee for having approved and supported the project; Dr. Ahmed Awad, General Director of the Asyut Coptic and Islamic Monuments, Dr. Ahmed Suleiman Abd el Al, Director of the West Bank of Asyut, and Madam Suheir Abd el-Naym Taha, for the precious support in all the activities of the mission. The mission is grateful also to the inspectors of the Asyut inspectorate: Mohamed Kamel; Amr Mahmoud; Ahmed Mamdouh, for the precious collaboration through the whole period of fieldwork; and the restorers Dr Niazy Mostafa Mohamed and Mr Khaled Abd el Maled for their contribution to the activities of consolidation and protection of the several paintings of the Northern Sector.

<sup>2</sup> The mission also thanks the trainees who joined the mission with mutual profitable results: three archaeologists (Iman Ismail Aly, Rufaida Adel Aly, Jihad Hany Mohamed) and one restorer (Iman Samir).

In order to obtain the expected results from this dense programme of fieldwork, we decided to postpone the continuation of the cataloguing and studying of the finds in the storehouses of el-Ashmunein and Asyut (Shutbi) to later campaigns, and to concentrate our activities on the site. We needed to recover the three years (2015-2017) spent awaiting permits from the Egyptian authorities and to verify the hypotheses and the data that emerged from the studies conducted meanwhile by the members of the Mission.

Along with a deeper analysis of the Areal Units of the Northern Sector of the site, it was actually necessary to start the (at least topographical) investigation of the monumental thermal complex located in the Central Sector, to inaugurate a surface survey and collection of pottery all over the site, with particular attention to ceramics and other materials accumulated in a large dump located immediately outside the South side of the town wall (Pirelli, in press), and finally to start the conservation activities.

During the period of the fieldwork, however, the mission also had the opportunity to visit the *Madrasat al-Salam* of Asyut, where some of the finds from Manqabad are kept, brought from the private collection of Sayed Bey Khashaba (Kamal 1911)<sup>3</sup>, and to meet and discuss with the Egyptian colleagues of the Asyut inspectorate who carried out excavations between 1998 and 2009/10<sup>4</sup>.

The report is divided into four main paragraphs (with some sub-paragraphs), corresponding to the activities carried out: A. Topographical survey; B. Archaeological activities; C. Epigraphic survey; D. Restoration activities; in the Concluding remarks the main results will be summarized.

<sup>3</sup> In order to carry out an in-depth study of these materials, we must ask permission of the Archaeological authorities and I will include this point in the next application.

<sup>4</sup> Dr Ahmed Awad, Dr Ahmed Suleiman Abd el Al and Mme Suheir Abd el-Naym Taha provided me with some pictures and excavation reports of those years, which will be usefully referred to later in this report.

## A. 3D SURVEY AND PHOTOGRAMMETRIC CAMPAIGNS (A. D'Andrea, A. Bosco)

The topographic campaign of the archaeological area of Manqabad started in 2014 (Pirelli 2015) and proceeded in 2018 with the aim to create a first map of the site. The survey needed to verify a series of alignments approximately West-East, previously identified by analysing some images on Google Earth, to clarify the borders of the site and, above all, to provide a detailed plan of the visible monuments scattered over a vast area of around 13 hectares and with a perimeter of 1.5km.

Due to the limited time to work in the field, the traditional survey was supplemented by close-range photogrammetry approach used to acquire and render rapidly some specific parts of the site according to a well-known workflow. As one of the targets of the project was the identification and analysis of the architectural elements of the monks' cells, the 3D digital twin of these houses has been created to easily inspect, describe and draw all the features also in the laboratory in Italy.

In 2014, six topographical pegs were fixed along the traces of the boundary walls of the site to entirely cover the extension of the ancient site. In the same year a 3D photogrammetric campaign also started; in particular five areas were captured: three in the northern part, one in the middle and the last close to the West gate (Pirelli 2015, figs. 10 and 11). The data-acquisition was carried out by a Nikon 90D SLR focal length 18mm 2Mpx; to scale and roto-translate the 3D objects some targets were measured by total station and linked to the topographical grid. In total 2335 photos were acquired with a mean resolution on ground of 1mm/pixel for an area of around 2.500 sq. metres. All the information captured on site or by images available on Google Earth, were georeferenced, according to the WGS84 system, and loaded into a GIS; a preliminary plan, superimposed onto Google Earth, was carried out by pointing the alignments West-East and the borders visible on the North and West side of site and partially in the East corner (Pirelli 2015, fig. 9).

After four years the work on field resumed and the first target of the new campaign was the check of the topographical grid in order to link perfectly the old survey with the new one to be

carried out in 2018<sup>5</sup>. As some pegs have been removed, except V1 located outside the North-West corner of the archaeological area close to the fence, some stakes were added to the previous grid. In order to align the new survey with the old one, some coordinates were extracted from the referenced 3D objects acquired in 2014; these points were measured by Total Station. The two grids were superimposed into Autocad and the new one roto-translated to coincide with the old one.<sup>6</sup> Even if it is not possible to have a precise estimate of the final error, it seems possible to say that the mean deviation between the two grids is lower than 3cm by comparing some control points taken in 2014 and measured in 2018 (Fig. 1)<sup>7</sup>.

After checking the grid, the work focused on a new close-range photogrammetric campaign, as the approach, tested in 2014, provided good and promising results. The target of the 2018 campaign was the creation of a 3D object as extensive as possible of the site by using a new shot technique based on a stabilised sensor mounted on pole (max 2m height) connected to a tablet to check the framing. Furthermore, to map some important cells and monuments, two digital cameras were used to obtain 3D objects with higher resolution. For the former data-acquisition a 1/2.3" Sony X3 sensor, 12Mpx, focal length 3.61 equivalent to 20mm, mounted on a DJI Osmo, was chosen; for the latter a full frame Nikon D750, 24.3MPx, focal length 24mm and a Canon 1200D, 18MPx, focal length 18mm. The features of these two cameras made it possible to carry out different techniques of shots: the first based on strips aimed at obtaining a wide portion of the area with a few shots at the same time guaranteeing a good final resolution in a narrow time frame; and the second one to acquire rooms or single structures with high resolution details. For the general

<sup>5</sup> In archaeological missions abroad, frequently, topographical grids need to be checked before starting a new survey, mainly when archaeologists work in a particular area. In 2014, two pegs of the grid had been removed during the night, therefore they were never used.

<sup>6</sup> To align the North of the drawing to the Geographic North the final survey has to be rotated 24° clockwise.

<sup>7</sup> Though the site is controlled by the military, the archaeological area is easily accessible. To reduce possible dangers for future surveys with the risks of aligning different grids with errors, from the new P2 station, three control points have been identified and measured; these points are on fixed and clearly visible modern structures (one pylon and two electricity poles) located outside the site.

survey, the sensor was mounted on a topographical pole 2m high; the sensor was set and controlled by the app DJI GO installed on a 7" tablet using the Android system. The parameters set up for the sensor were: 1/1250 sec., ISO 100 and shutter click each 3 seconds.

As the weather is always sunny at the archaeological site of Manqabad, the shots had to be generally scheduled in the period of the day between 11.30 and 13.00, when the sun is high and, consequently, the shadows of the walls and other architectural elements are less troublesome. Analogously the data-acquisition of the strips had to be planned to avoid the shadows of the surveyors on the features to be acquired. For each shoot some control points were positioned and measured by total station to allow the geo-referencing of the final model to the local grid.

The areas acquired were: North-West (486 photos); North-East (284 photos); Central strip North area (184 photos); one building in the Central area (196 photos); *Thermae* (before and after cleaning the western side - 525 photos), and, finally, the central area including four single parts (871 photos). Thanks to the targets, measured by total station, all parts were processed individually, referenced and then assembled. Area 4 of the 2014 campaign was added to the general map. The final model consists of 3077 images taken from a max. height of 5.12m for an area of 0.0577sq. km. and a resolution on the ground of 1.25mm/pixel compatible with the architectural target of the survey (Fig. 2). From a geometrical point of view the results are highly encouraging, especially if it is considered that the survey on-field lasted just one week. Looking at the final products, as 3D meshes and ortho-photos, the greatest issue concerns the colours, which are strongly affected by solar exposition and by long shadows, mainly in the lower parts of the cells; unfortunately, this criticality cannot be removed, but only partially lessened in the post-processing phase, by altering the excessive overexposure and increasing the brightness of the darkest parts.

As the final target of this photogrammetric campaign aimed at the creation of a general plan of the area, a contour map was generated after processing a DTM from the 3D replica. The DTM has been derived by the mesh model with a resolution less than 1cm. The elevation profile range of the DTM was -4.73 to 11.71m high. The Contour function was used to extract from the DTM contour lines each 25cm (Fig. 3). The polylines and polygons were finally exported

into Autocad in order to clean and improve the drawing. As the contour lines can be visualized onto the 3D mesh, the surveyor can easily check the lines and the model and draw the limits of the walls or any architectural element (windows, pavements, staircases, niches, etc.).

In 2018 a high-resolution photogrammetry campaign started with the aim of documenting some houses, located in the northern area; these cells had been cleaned and recorded by the traditional approach. Furthermore, by this technique other two areas were captured. In all, the acquisitions affected AUs 2, 3, 8, 9 and 26 in the North, the arch of the *suspensurae* of the *Thermae* in the central areas and, finally, the slope of the dump in the South-West corner of the site. The settings of the shots were calibrated in relation to the features of the objects to be surveyed and the light conditions. In general, an ISO value of 100 was preferred, with a diaphragm between 10 or 11 and focal lens of 24mm in order to guarantee a good compromise between depth of field and brightness. The distance from the object was a maximum of 2m. To scale and roto-translate the 3D objects, two different methodologies were selected; in most cases some targets were measured by total station; in a few situations, the coordinates needed to scale the photos were obtained from the general survey carried out by DJI OSMO. Both techniques were used to assemble each single piece of archaeological evidence, captured in 3D, on the general map (Fig. 4). The availability of a complete and 3D geo-referenced model of the area makes it possible to extract easily any coordinates to scale further data-acquisition campaigns focused on a single monument or structure. This three-dimensional reference base could be used to update the graphical documentation of the monuments, in accordance with the progress of excavation and cleaning activities. For this reason, the total station will not be required to complete the survey in the future.

The results, so far reached, have shown that a workflow based on data-acquisition, processing and assembling, make it possible to survey rapidly an extensive archaeological area without losing any details<sup>8</sup>. The methodology and the technique described provided excellent 3D items from which extract an accurate and precise graphical documentation. Furthermore, the digital replicas are particularly useful when it

<sup>8</sup> For the post-processing phase, Photoscan has been used.

is not possible to schedule new missions in a short time. The model can be easily explored and navigated to derive information about materials, geometries and architectural components.

Some tests have been carried out by comparing the results of the two different techniques, as this approach could be more and more useful. These analyses were designed to evaluate possible errors or deviations, so as to report any inaccuracies in the final drawings. Two different point clouds and meshes were compared; in particular the AUs 2-3 acquired by Nikon with the same portion of area extracted by the OSMO survey.

The following table compares the main parameters of the two-shooting techniques:

	DJI OSMO	NIKON D750
<i>Polygons of meshes</i>	318.000	2.400.000
<i>Photos shot</i>	40	259
<i>GSD</i>	2.66mm/px	0.5μm/px
<i>Max elevation of shot</i>	6.60m	1.8m
<i>Focal length</i>	3.61 (20mm equivalent)	24mm
<i>Resolution of the camera (Mpx)</i>	12	24

The table shows the better quality of the NIKON survey, mainly in terms of GSD value lower than 1mm in comparison with the 2.66mm of the OSMO. By contrast, the sensor mounted on the pole needed only 40 photos to cover the area even though the final model had less polygons. This comparison, based only on two areas, can be surely generalised to the other parts surveyed.

As the data-processing for both techniques followed the same workflow and by considering that the alignment among the different parts of the survey has been carried out by using the total station, in order to check the reliability of the two surveys, some 3D objects, taken by the two data-acquisition techniques, were compared<sup>9</sup>. In particular two areas have been chosen: the AUs 2-3 and 8-9. The photogrammetric campaign was performed contextually to the archaeological on-field investigations; therefore, in some cases there is no fit between the data-capture by the two different techniques. The removal of some superficial sand layers means that the volumes, acquired before and after the cleaning of the structures, are lightly different.

The main target of these tests was to evaluate and estimate the level of detail of the two surveys and its compatibility with the aim of the map rendering, mainly in terms of correct identification of the perimeter of the rooms and the thickness of the walls. A further target was to assess the reliability of the 3D grid, taken by the general survey by OSMO, in order to guarantee a correct geo-referencing for future photogrammetric campaigns without the Total Station. A similar test, carried out in Herculaneum, made it possible to geo-reference a single high-resolution 3D model through the coordinates extracted from the 3D grid obtained by a laser scanner survey (D'Andrea *et alii* 2018); the integration of digital object by laser scanner or close-range photogrammetry shows a mean error within 1cm.

The first two 3D objects compared were the meshes of the south court of AUs 2 and 3 acquired at a short time from each other. Thanks to the common reference grid, the two files are perfectly superimposable. In order to compare the areas surveyed by both techniques some parts were removed, mainly from the OSMO acquisition, as this sensor also captured the external sides of the room. A West-East polyline in the middle of the court was used to cut both meshes. Then, the average distance between the two profiles was measured; the value is 3cm lower, while the maximum is 30cm. The greater distance is particularly concentrated close to the East wall, probably cleaned after the first shot. In order to check this value, the distance was measured also between the two meshes in plan. In both cases the average distance is lower than 3cm.

The figures (Figs. 5, 6) show clearly the accurate level of superimposition of the limits of the walls. To check the results, the same test was carried out for AUs 8-9. In this case the distance between the two meshes was lower by 2cm.

In conclusion, the examination carried out by CloudCompare, demonstrated that the fastest data-acquisition system by OSMO provided good results in terms of identification of architectural features drawn, like walls. The accuracy can be estimated within a range of 2-3cm. If one considers that the walls, and in general the houses, were built of raw bricks, the measured distance appears compatible with a general 1:100 scale map.

<sup>9</sup> For this task CloudCompare has been used; it is an open-source software originally designed to perform comparison between point clouds and meshes. <http://cloudcompare.org/>.

## B. THE ARCHAEOLOGICAL ACTIVITIES

The archaeological activities concerned three areas of the site: the northern sector (investigation of the Areal Units and of their materials), the Central thermal complex (Pottery survey), and the southern sector, outside the town wall (Pottery survey) (Fig. 1).

### *B.1. Investigation of the Areal Units*

The archaeological survey was carried out by Stefania Mainieri, Rosanna Pirelli, M. Dilettia Pubblico, Andrea Ragionieri and Anna Salsano and concerned the northern Sector of the site, where some of the Areal Units - already dug by our Egyptian colleagues in 1985 and between 1999 and 2009 - were thoroughly analysed.

Five Areal Units (AU) were selected among the 46 identified and surveyed in 2014<sup>10</sup>.

AU 2 and 3, characterised by refined painted decorations;

AU 8/9, composed by a particularly important Housing Unit (HU), associated with a major oratory (North Chapel), a large court and several annex rooms and services.

AU 26, whose general plan was not clear after the first survey because of the large amount of accumulated sand hiding the rather low remnants of structures, above all in its southern sector.

For each of the AUs, we had planned to carry out a complete cleaning aimed at allowing a thorough investigation of the structures and of the different phases of development of the complex<sup>11</sup>, a more detailed drawing and 3D acquisition, and an accurate analysis by the restorers in order to prepare an intervention programme. The entire complex is actually marked by refined paintings exposed to agents and fragile mud-brick structures in urgent need of consolidation. Indeed, the excavations of the past years and other anthropic factors, deriving from the proximity to a modern village, are seriously compromising the conditions of the site. During the 2018 fieldwork, together with sand and debris, a huge quantity of plastic bottles and bags, food packaging, and animal carcasses buried in recent years were removed from the

AUs analysed, which the mission successively covered with sifted sand. Although resulting from an extremely disturbed context, all the artefacts (mainly ceramics and limestone architectural elements) were recorded and photographed, while the organic materials were sampled for analyses. We did not expect, however, to find significant artefacts and inscriptions that had escaped the investigations of our predecessors: this was instead the case for all the AUs analysed during this season.

The following descriptions are edited following the typology of the monks' cells (Housing Unit = HU) and of the patterns of spatial arrangement of the Areal Units (AU) of the Northern Sector, established after the 2014 campaign (Pirelli 2015; Pirelli *et alii* 2017), but they still represent a preliminary synthesis of the results of the 2018 fieldwork, since most of the documentation is still being processed<sup>12</sup>.

#### AU2

The northern part of AU2 is occupied by a HU of Type 1, while its southern sector is occupied by a complex of service buildings, very poorly preserved and mostly added in two later phases, likely to belong to our Pattern 2 (Fig. 7).

The general conservation status of this AU is rather incomplete, however its general structure is identifiable overall, and this year's investigation enabled us to add significant details both in the northern (AU2N) and in the southern sector (AU2S).

AU2N: the ground-floor room is a large rectangular space (8.10x3.90m, max pres. height of the walls ca. 1m), with a door on the eastern edge of the south wall, a slanting window almost in the centre of the same wall (the external dimensions of the frame are h 0.62x0.65m, the opening of the window being 0.38x0.38m), several niches along the East wall, three ventilation pipes in the northern wall, plus a small niche. The cleaning of its floor revealed the presence of a stairway going down from its South-West edge, thus confirming our conviction that this HU should have an underground room, although our Egyptian colleagues stated that there was none (personal communication). It will thus be important to plan a complete investigation of it for the coming campaigns.

The main niche (oratory) presents a fine vegetal decoration painted on a thick layer of white plaster. Unfortunately, the niche shows it

<sup>10</sup> On that date, a general survey of the whole complex of AUs of the Northern Sector was carried out by the mission. It was conducted to get a first idea of the different structures that characterised the area, without cleaning the buildings nor collecting materials still extant.

<sup>11</sup> In all the Areal Units our investigation was limited to the sectors already dug by our Egyptian colleagues in the last decades.

<sup>12</sup> Including the data from the photogrammetric survey.

has undergone major damage between our survey in 2014 and this last season, due to atmospheric agents (Figs. 8, 9, 10) (see also § D. Restoration activities). Moreover on comparing our pictures, taken both in 2014 and in 2018, with some photographs of the previous excavations, kindly provided to us by Dr Ahmed Suleiman during this season's work, we also have to regret the loss of an important portion of the niche showing the lower part of the image of a saint, today completely missing (Fig. 10).

Also the cleaning of the other niches in the eastern wall revealed unexpected details: in the first one (E1, a), located above the recess close to the entrance, we found the fragments of a glass ampoule, some date seeds, the remnants of a mat (?) and a mass of a resinous substance in concretion on the floor of the niche<sup>13</sup>.

The cleaning of the northernmost niche (E7) in the same eastern wall has revealed the presence of a large jar (diam. of the mouth 14cm) embedded in a floor added in the niche in second phase.

Finally, on the remnants of the western wall of the room, separating AU2N from AU1N, a Coptic inscription painted in red ink was found. It was detached by the restorers and kept in the storehouse of the site to enable it to be studied (Fig. 11).

The southern part of the Areal Unit (AU2S) is occupied by an open court (6.43x3.90m ca, max pres. height of the walls 0.98m) that shows it has undergone significant reworking through time.

Three phases were identified, below briefly schematized:

#### First phase:

- a. the court was originally limited both on the western and on the eastern side by thin walls (0.12/0.14m thick), separating AU2S respectively from AU1S and AU3S (open courts);
- b. the floor was coated with a thick layer of white plaster<sup>14</sup>, as is still present in front of the window and on the two plinths, running along the northern half of the western and eastern walls.

<sup>13</sup> Small portions of the organic materials have been sampled and kept in the storehouse of the local *taftish* for future analysis.

<sup>14</sup> For more detailed information about floor and wall coatings, see below, Investigation of plasters: typologies and uses.

#### Second phase:

- a. the floor was almost completely paved with reused square and rectangular limestone slabs<sup>15</sup>;
- b. the western wall was reinforced to a thickness of 0.60m;
- c. a small hearth was collocated close to it, about 3 m from the façade of the cell;
- d. a rectangular basin (currently missing) was built into the south-eastern corner of the court<sup>16</sup>;
- e. a door was opened in the eastern wall to connect AU2S with AU3S (at a distance of 1.65m from the façade of the HU), its limestone threshold being on the same level as the limestone floor of the court. The opening of the door caused the cutting of a portion of the plinth of the eastern wall;
- f. the plinth was enlarged and transformed into a low *mastaba*, whose dimensions (1.63x0.80m) appear appropriate to host a person lying down (Fig. 12).

#### Third phase:

- a. the western wall was further reinforced to host a stairway (starting at 2.34m from the façade of the cell) to give access to an upper room (probably a storehouse);
- b. the hearth was thus moved to the opposite side (covering part of the limestone slabs), close to the door connecting AU2S with the contiguous AU3S.

#### AU3

The northern sector is occupied by a HU of Type 1, while its southern sector is occupied by a complex of service buildings. The whole AU is in a bad condition, due above all to the previous digging activities, but also to the fragility of the thin walls of the court (Fig. 7).

The ground room is a large rectangular space (ca. 8.35x3.92m; max height ca. 1m). Its floor was originally coated with a thick layer of white plaster, as were the four walls which

<sup>15</sup> The rectangular slabs measure about 70x30cm, while the square slabs seem to be of two different sizes, the larger with a side of 40cm and a smaller with a side of about 20cm.

<sup>16</sup> Only a negative trace of it is currently identifiable - roughly measuring 2m (N/S) x 1m (E/O) - but the debris and the sand that we removed from this area evidenced the presence of several fragments of baked bricks and of thick remains of *cocciopesto*, employed in other similar structures observed at the site. This material was reused in a wall partially covering the area of the basin. We could not investigate this area, as it was not dug by our Egyptian colleagues and excavation was not included in our permit, but it will be added in our next request.

present, in the lower part, a belt 0.32m high, projecting for about 0.01m, running all around the perimeter; on the West wall, it rests on the usual plinth.

The South wall measures 3.92m; the door, 0.85m wide, has a stone threshold and was originally framed between two doorjambs (now missing), whose stone D-shaped bases are still extant. As usual at middle length of the wall, a window opens at ground level; it differs from most of the windows of the Northern Sector, as, on the external façade of the cell, a deep slanting area is in front of it, starting from the ground floor at 1 metre from the wall itself.

The eastern wall is in a very bad condition, but some features can be detected. Immediately after the door, a vaulted niche (h 0.60m; 0.50m, max depth 0.33m) contains two jars with flaring rims, embedded in the masonry and partly preserved ( $\varnothing$  23/24cm, 30cm deep). On the portion of wall immediately after the niche, there is part of a Coptic inscription painted in black ink and closed within a geometrically decorated frame, about 0.70m from the ground floor. As the upper part of the wall is missing, the inscription is not complete, but 10 horizontal lines are still visible: the max width of the inscription with its frame is 35cm, its max preserved height being 20cm (Fig. 13).

The oratory niche is collocated, as usual, towards the northern edge of the wall; it is semi-circular in plan and richly decorated, both on the external jambs and on the inner wall. The jambs are decorated with a vegetal green motif surrounded by a linear red frame, the whole imitating a ribbed column; the inner wall shows red palm stems crossing and drawing regular lozenges, these latter decorated in the middle with a cross, formed by a red circle with four green twigs (Fig. 14). Here also (as in the previous AU), the team of restorers made conservation interventions.

The North wall - still partially coated with white plaster - is badly ruined, but one can still recognise a small square niche at the base of its eastern edge and two large ventilation ducts, one at half and the other at  $\frac{3}{4}$  of the length of the wall.

The West wall has almost completely collapsed; a niche may be however identified in a small recess, carved at its northern edge.

The underground room of the cell was dug by the Egyptian team (2008/9), and most of its roof collapsed notwithstanding the building by the archaeologists of two baked bricks pillars

(Fig. 15). For preventing static problems to the pillars and consequently to the rests of the vault, we carried out only a partial cleaning, but this allowed us to collect significant information about the dimensions of the underground spaces, and more specifically their heights, and on the building techniques of the barrel vaulting. This information will be used to supplement the set of data that the mission has already collected on the HUs of type 1 in order to prepare a proposal for their virtual reconstruction.

The underground room is less than half as long as the ground-floor room, thanks to a large embankment occupying its northern part, and consists of a main room ( $\alpha$ ) (measuring 3.38x2.42m, h 2.20m) and only one annex room<sup>17</sup> ( $\beta$ ) in the south-eastern corner (measuring 2.54x0.50/0.60m, h 2.34m). The impost of the vault is 1.45m from the ground, while its rise is 0.75m; the screed between the vault and the flooring of the ground room has a minimum thickness of 0.23m and a maximum thickness of 1m.

The South wall is occupied by the staircase going down from the south-western edge of the ground floor and partly obstructed by a collapsed wall. A deep storage unit is under it, whose plat-band is reinforced by stone slabs. Above the staircase, a window opens slanting from the ground level of the upper room to shed light and to air the underground spaces.

The East wall is only partly preserved: more specifically the portion dividing the main room ( $\alpha$ ) from the annex room ( $\beta$ ) has almost completely collapsed, but one can identify the opening of a door at its northern edge. We used this room to allocate all the collapsed mud bricks coming from the partial cleaning.

The northern part of the room is still covered by the vault; the wall presents a square aeration pipe almost in the middle and at 1.30m from the floor.

The West wall is, as in most cases, smooth and devoid of particular features, except for a plinth that runs its whole length (h 0.65/0.7m; w 0.20m) and a thin belt 0.32m high, projecting from the wall for about 0.01m and resting on the plinth.

The southern sector (AU3S) is very poorly preserved, but the accurate cleaning allowed us to bring to light a refined paving made from reused large ceramic slabs, small granite blocks

<sup>17</sup> In other HUs, when the underground room is longer, three annex rooms are also present.

and reused stone architectural elements, some of them certainly coming from an earlier wall decoration (Fig. 16).

#### AU8/9

This double Areal Unit consists of a Housing Unit of type 1 (AU8N), a large square oratory (AU9N), a large open court with side service rooms (AU8/9 S) and a complex of underground warehouses (AU8/9 S1). To judge from its dimensions and major structures, it was certainly the Housing Unit belonging to the head of the complex (Abbot) (Fig. 17)

#### AU8N

Only the underground is completely detectable, as its vaulted roof has collapsed and, with it, the floor of the upper room. However some details of the ground-floor room can still be described in their relations with the underground level.

It is a large rectangular room (8.15/8.25x4.30m), characterised by the usual features of type 1 HU, with a door at the eastern edge of the south wall (lightly larger than usual = 1.10m); the window with its slanting windowstill opens approximately in the centre of the wall, above the staircase. The vaulted niche with embedded jars, usually placed at ground level in the East wall close to the entrance, seems to be absent here, but the conservation condition of this sector does not allow us to be sure. On the same wall, also three other rectangular niches are present, but very little can be said of them, as the wall is preserved for a max. height of 0.72m. The North wall is characterised by a single ventilation pipe just in the middle. In this sector the floor is still present as it lies on an embankment of 1.80m. The West wall is devoid of particular features, except for the usual plinth.

The underground room is quite large (7x2.95m) with three annex rooms on the East side, and a large rectangular lowered space contiguous to the North wall. All the surfaces were originally coated with white plaster, which is still preserved on the floor and on most of the walls.

The South part of the room is occupied by the staircase of 7 steps coming down from the south-western edge of the ground-floor room. The staircase presents, as usual, an upper landing resting on a rampant vault, but unlike other examples its level is ca. 1m lower than the floor of the upper room; thus meaning that the first steps of the stair were on the West wall (as in AU

2N and 3N) or that the upper floor had two different levels (as we observed elsewhere). The lower landing of the staircase was delimited by the wall of the annex rooms. As in the other cases, the rampant vault covers a deep boxroom; beside it, one smaller square niche is carved in the masonry. In a later phase, both the boxroom and the niche were partially closed by a short wall (1.40m high x 1.80m wide) in front of them, probably for static reasons. As everywhere in the underground floor, the walls are plastered white.

Along the East wall, there are three annex rooms ( $\beta$ ,  $\gamma$ ,  $\delta$ ), whose depth (including the walls) is about 0.90m. Only  $\gamma$ , empty, is detectable: it has no door, but a window (0.65x0.50m ca.) opening onto the main room ( $\alpha$ ); on the East wall of this room, some irregular hollows (for climbing?) are present. The other annex rooms appear filled up with debris: however, while  $\delta$  has two portholes in the wall,  $\beta$  seems to be completely closed (in a second phase?), so that we cannot be sure that it was actually a room.

A ventilation duct, opening just in the middle of the northern wall, at about 1.30m from the floor, comes from the top of the upper room, crosses horizontally the embankment between the two walls and then descends into the underground wall.

The West wall is characterised by the usual plinth and still keeps most of its white plaster to a height of 1.30m.

#### AU9N. Chapel-oratory

The chapel occupies a square of 9.5x9.5m (including the external walls), with a regular orientation towards the East.

It consists of a square room, with a door in the south wall; three niches are present in the same wall, two of them were semi-circular in plan, but were almost completely filled in a second phase (probably for static reasons). The apse is regularly on the East side, its entrance being framed, on the external piers, by two niches. Further, on both sides are the two *pastophoria*. Three rooms are along the North wall, the side ones being elongated rooms with a narrow door, while the central room appears to be a large recess, almost square in plan, whose external piers accommodate two vertical elongated cavities (for statues?). A rectangular recess, not very deep, is also in the West wall of the chapel, just in front of the apse.

The floor of the main room and the walls (preserved up to a max. height of 1.5m) appear to

have been carefully plastered white, while the floors of some of the side rooms currently appear to be of beaten earth, like the floor of the apse. This, however, might have also been originally lined with white plaster or limestone, although today only a deep hollow is present.

AU8/9S is a wide area, measuring about 15.8m (E-W) x 13.8m (N-S). It includes an open, rectangular court (8/8.5x5.5m), on which both AU8N and AU9N have access, a line of 4 rooms along the South side, 2 more rooms on the East side, and some niches on the West.

The original complex (AU8/9) consisted only of HU 8 with its chapel/oratory and a wide empty court delimited by thin walls, as in other cases in the North Sector (see above AU2S). Here, we were able to identify four major phases, summarised in the following scheme:

#### First phase:

- a. the court was limited by thin walls, as already observed in AU2;
- b. the floor of the court was at a lower level than the floor of the oratory, and a large white-plastered step was in front of its door (Fig. 18); no trace is now visible of an extended paving<sup>18</sup>;

#### Second phase:

- a. the chapel underwent small changes;
- b. the floor of the court ( $\alpha$ ) was raised and coated with limestone slabs;
- c. its western wall was reinforced to host three deep recesses (W1, 2 and 3);
- d. on the South side, four rooms were built, two on the East ( $\beta$ ,  $\gamma$ ) and two on the West ( $\zeta$ ,  $\eta$ ) of a passageway giving access to the complex from the South. Room  $\eta$  and  $\zeta$  are communicating and have access from the same door in the North wall of  $\eta$ . This latter contained a large basin (2x0.80m) with an embedded vase, while  $\zeta$  was certainly a kitchen, due to the considerable traces of two different hearths and to a thick layer of organic remains, among which were observed seeds and fish bones<sup>19</sup>.

#### Third phase:

the southern area of the complex was further enlarged (AU8/9S1) and three big underground storehouses  $\alpha$ ,  $\beta$  and  $\gamma$  were added. These were accessible from two stairways, one starting from

the kitchen (AU8/9S  $\zeta$ ) and one from room AU8/9S. The accurate cleaning of these three storerooms revealed the presence in the debris of several limestone architectural elements, most of them reused<sup>20</sup>. One of them is carved with a hieroglyphic text of Pharaonic times (Fig. 19).

#### Fourth phase:

two rooms ( $\delta$  and  $\epsilon$ ) were built in AU8/9S, occupying the eastern part of the court. Not only the fabric of their mud bricks is different<sup>21</sup>, but the building techniques also diverge, being actually characterised by a foundation of baked bricks.

#### AU26

The northern sector of this Areal Unit is occupied by a HU of Type 1 with a large embankment, while its southern sector is occupied by a complex of service buildings, both of them very poorly preserved.

The ground room (8.50x3m; h max 0.62/0.92m) shows it has undergone some changes, mainly along the East wall, but also elsewhere: at a certain time, two small mud brick walls were added in the South-East and South-West corners, very probably in order to reinforce the impost of the vault covering the room: the South-East one covered the niche with vases usually present immediately right of the entrance; while its western counterpart partially obstructed the upper landing of the staircase (Fig. 20).

As to the East wall and its features, very little can be said, because the wall is preserved for a max. height of 0.70m, so that for most of the niches we can observe only the base or a light trace on the top of the wall. The accurate cleaning of the second niche (E2), however, made it possible to acquire some significant information, as it proved not to have been completely dug by our predecessors: it was certainly modified in a second phase, when it was partially closed by a low wall built with a different type of mud bricks. At the bottom, some interesting artefacts were found in concretion in a mass of mixed material: a bronze ring (diam. 4cm), several date seeds with holes made in them - and likely to have been used as a rosary beads - and one bronze Islamic coin,

<sup>18</sup> In an intermediate phase, the level of the floor was raised and coated with white plaster.

<sup>19</sup> Samples of these materials were collected for analyses and kept in the storehouse of the local inspectorate.

<sup>20</sup> Unfortunately, we do not know if they were found in these rooms or if they come from the upper floor of the complex and were kept here by our colleagues.

<sup>21</sup> See below, B.3.

probably dating back to the 8<sup>th</sup> century (Fig. 21). It is inscribed with the *shahada*, whose text is divided between the *recto* and the *verso*. Palaeographically, it is very close to another coin that the mission was able to study in the storehouse of el-Ashmunein in 2014 (Pirelli 2015). Its diameter is 13mm and its weight is 5.90g. The text says:

There is no God but Allah, alone,

لَا إِلَهَ إِلَّا اللَّهُ وَحْدَهُ

Mohamed is his prophet

مُحَمَّدُ رَسُولُ اللَّهِ

While the North wall is also very poorly preserved, with its three ventilation ducts, the West wall could be studied more fully, as it is preserved up to 90cm. It is mainly characterized by a large opening (1.49m wide) at ground level in its southern half, putting in connection AU26N with AU25N; its south-western edge is occupied by the upper landing of the staircase, now partially obstructed (see above).

The underground floor can be easily analysed, as its vaulted roof collapsed (during the previous excavations?). Its dimensions are smaller than the upper one (4.88x2.28m), due to the presence of a large embankment in the northern half. The space is occupied by a main room ( $\alpha$ ) and two annex rooms ( $\beta$  and  $\gamma$ ): a portion of  $\beta$  (0.75x0.69m) was, in a later phase, closed by a thin wall.

As usual, no particular features are present along the North wall, except a single ventilation pipe, and along the West wall, except for the plinth. The South wall is occupied as always by the staircase (in this case made of 10 steps), coming down from the south-western edge of the upper room. Substantial remains of the white-plaster coating is still present on the floor and on the walls.

AU26S is an open court with some service structures, followed by a roofed room and a corridor (both in S1) which gave access to AU26 from the south. In 2014, the complex was attributed to our Pattern 2 (Pirelli *et alii* 2017)<sup>22</sup>, but after accurate cleaning in the last campaign, we could ascertain that the spatial arrangement of

S and S1 diverge from it: no staircase is present in the court, only one roofed room occupies S1, and a second open court follows this room to the south. Very little of the usual thick layer of white plaster is still visible on the floor and the other structures of this area.

#### B.2. Investigation of plasters: typologies and uses (M.D. Pubblico)

Studies on plaster could give much information about building technologies and the art of painting. Moreover, they are essential to plan the work of conservation and restoration. However, little research<sup>23</sup> has been undertaken to analyse the chemicals in this ever-present coating and to provide a typological classification based on its uses.

Chemically, plasters were made from two mains materials: clay and gypsum. Two qualities of clay plaster have been identified: the coarse quality consisted of ordinary Nile alluvium with a percentage of calcium carbonate (carbonate of lime) and gypsum; the better quality, called *hîb*, has as its main constituents clay and limestone. Sometimes, to improve the tensile strength of clay plasters, they were mixed with organic fibres of straw<sup>24</sup>. Gypsum plaster (lime plaster) was used to coat both qualities of clay plaster as a finishing layer<sup>25</sup>.

#### Materials and Method

The main aim of this research was the organoleptic examination carried out by a sampling of achromatic and coloured plasters collected from some selected Areal Units (AU).

The AUs chosen for this study (AU1-AU9 and AU26) are all in the Northern Sector of the site and they also include the housing units selected for the documentation and restoration/conservation work (AU2, AU3, AU8, AU9, AU26) of this season's fieldwork.

Small fragments of plaster were sampled from walls, floors, stairways, niches and plinths both from the northern and southern sections of the Areal Units, while some fragments of discarded plaster were collected from dump deposits (AU8N/ $\beta$ , AU26N/ $\beta$ , AU26N/S1). Each sample was measured, photographed and

<sup>22</sup> Pattern 2: the area is divided into two parts. The sector close to the northern HU is an open court occupied by a complex of service buildings (hearts, store-rooms on two floors, wells). The southernmost - very regular in plan - was a roofed building composed of a corridor/passageway giving access to two smaller rooms and leading to a door, which gave access to the whole area from the South.

<sup>23</sup> Ali 1995; Helmi, Ali 1995; Bolman 2002; Lyster 2008; Moussa *et alii* 2009; Ali *et alii* 2011; Marey Mahmoud, Papadopoulou 2012; El-Yamin *et alii* 2013, 26.

<sup>24</sup> Elsen 2006; El-Yamin *et alii* 2013, 36.

<sup>25</sup> Lucas 1924, 128-132; Lucas 1934, 76-79; Godin 2009, 14-15.

analysed using visual assessment. This allowed us to identify two layers per plaster: the first layer is a finer plaster, *intonaco*, sometime made from a thin whitewash, that coats a coarse layer of plaster, *arriccio*, that often contains mineral materials and straws.

### Results and discussion

The data obtained from the sample characterisation and the comparison between them permitted the typological classification of recurring kinds (Fig. 22):

- Type 1: thick plaster (around 20mm) probably gaining hydraulic properties. The *arriccio* is composed of coarse grains of minerals and straws; the *intonaco* is made mainly with very fine particles of minerals.
- Type 2: non-compact plaster, that measures around 11mm. The whitish and friable *arriccio* consists mainly of organic fibres of straw; the *intonaco* is composed of very fine grains of minerals.
- Type 3: very thin (around 1mm), smooth and friable whitish coating composed mainly of very fine particles of minerals.
- Type 4: non-friable plaster, that measures between 6 and 15mm. The *arriccio* is composed of very fine particles of minerals and straws; the smooth and finished *intonaco* is made mainly with very fine grains of minerals.
- Type 5: very compact and thin plaster (around 4mm). The *arriccio* and *intonaco*, without organic fibres of straw, are composed mainly of very fine particles of minerals.
- Type 6: compact plaster, that measures around 6mm. The *arriccio* is made mainly with medium and small-size mineral particles; the very thin *intonaco* is composed of small grains of minerals.
- Type 7: compact and thick plaster (around 13mm). The *arriccio*, without organic fibres of straw, is made mainly with medium-size mineral grains; the *intonaco* is composed of very fine particles of minerals.

Type 1 plaster was mainly used to coat both the northern and southern underground and ground-floor flooring. Thanks to its hydraulic properties, it was suitable to preserve the surfaces from both anthropic and atmospheric agents.

The thinnest plaster (type 3), whitish and smooth, was extensively used as a whitewash or a distemper<sup>26</sup> on the outer and inner walls of

housing units and also to coat some surface features, such as niches.

The stairways were usually covered with a hard, non-friable plaster (type 4). Sometimes, it coated plinths, which might also be covered with a layer of type 1 plaster, because of its thickness and strength.

The other types of plaster are not so recurrent: type 2 has been identified on walls, niches and baseboards; type 5 coated walls and niches; type 6 was on walls, niches and stairways; type 7 covered walls and flooring.

The collection of some samples of plaster made it possible to observe their stratigraphic composition in depth.

Visual assessment and a comparison between samples were applied in order to develop a deeper understanding of the plaster characterisation. Seven types of plaster, which were mainly used to coat the walls, flooring, stairways, niches and baseboards, have been identified.

This preliminary investigation will be essential to continue the study of the wall paintings. Actually, dry plaster walls, niches and other features were decorated with pigments (red, green, blue), paintings (two black and one reddish painting were found during this season) and painted decorations (mainly vegetal and geometric motifs).

During the next campaign the study of the plaster will be continued by sampling fragments from the others housing units. The samples will be chemically analysed to obtain more information about their mineralogical composition. Pigment analysis and a study focused on the painting patterns will be accomplished. This work will also provide a strong basis for planning the most suitable restoration and conservation work.

### B.3. Mad bricks and baked bricks (S. Mainieri)

One of the archaeological activities carried out during the 2018 campaign of the Italian Egyptian Mission at Manqabad regards the survey of bricks, baked or unbaked, from the five selected areas of the last season's work (AU2, AU3, AU8, AU9 and AU26).

This new survey was undertaken to try to understand not only the construction techniques used, but also to understand how they change in the different periods and areas. Already at first sight, the composition and dimensions of the bricks and the wall techniques are different

<sup>26</sup> Lucas 1924, 131; Lucas 1934, 77

between the northernmost and the southernmost sectors of the AUs.

As usual in Egypt, the domestic architecture is characterised by the use of mud-brick. We can also find baked-bricks at the site, but these were used primarily to consolidate the foundations of later mud-brick structures (Fig. 23), for basins and in a large and certainly multi-storey structure in the Central Sector of the site (Pirelli *et alii* 2017, 14).

In this preliminary report I have not attempted to make a seriation or to identify major phases on the basis of the data collected during the fieldwork, as the sample is still too small for meaningful conclusions. Moreover, the long exposition to water and wind erosion have led to the collapse of many mud-brick structures in the existing buildings and to the partial or complete disintegration of the bricks. These preliminary data, however, will constitute the basis for future analyses and identification of building techniques in both a synchronic and diachronic perspective.

### Mud Bricks

Mud bricks are the dominant building material used in Manqabad. Numerous bricks were sampled from different HUs, both single items, from collapsed structures, or *in situ*. Based on a preliminary autoptic observation, three different types of built fabric have been identified:

Type 1: a fine mixture characterised by local soil enriched with organics (straw) and a few inorganic materials (stone chippings). The bricks of this type range from 30x16x9cm to 23x12x5cm. These bricks seem to be the most common type used in the northern structures, i.e. the oldest ones;

Type 2: rougher than type 1; formed by soil, organic material and a greater quantity of stone chippings. The dimensions of the bricks are more regular than those of type 1: 28-29x15x8cm. These bricks are mainly used for the southernmost structures;

Type 3: with soil and straw (without inorganic inclusions); its dimensions being 24/25x13x5-6cm and 19x10x6cm. These types of bricks are rare.

### Backed Bricks

Baked bricks are scattered all over the site in different conditions to support heavy structures, to reinforce walls, in structures associated with the presence of water (Fig. 24).

Two types of baked bricks have been identified:

Type 1: light red /orange in colour, slightly porous, with uniform firing. Their dimensions range from 28x13.5x7cm to 24x11x5.5cm;

Type 2: dark red in colour, very porous and subjected to uneven baking as attested by the completely black inner side. This type of brick is uncommon and its dimensions are quiet regular. The samples, analysed measure 26x12x6cm.

### Bricks of special shapes

During the survey a wide range of specially-shaped bricks were also observed. All of them are mud bricks and they seem to be used especially in the construction of arches and vaults, but also for finishing the edges of structures.

a. The most common special form belongs to type 1 (in fabric and size) which presents a smoothed profile on one of the long sides. Examples of this type have been documented in AU26N both *in situ* and loose (Fig. 25).

b. Both square and rectangular bricks can have one of the corners rounded. These bricks were used to finish the edges of some structures such as basins or walls. They have very different dimensions due to their specific functions: AU8/9S - 2 special form bricks of 20x10x5cm; AU2 special form bricks of 24x12x6 and 30x2cm; AU26 special form bricks of 15x16cm or 23x12cm (Fig. 26).

c. A group of special (type 1) mud bricks come from a collapsed structure found at the southern edge of AU2S (see above). We could not analyse this area because we stopped our investigation where our Egyptian colleagues stopped digging. However, we decided to document these bricks because of their special features (Figs. 27-28), which will be the object of a study in depth in connection with the future investigation of this area.

### B.4. The stone architectural elements (A. Salsano)

Many stone architectural elements were found and documented during the cleaning of AU2, AU3, AU7, AU8, AU9 and AU26. Except for two small marble elements (from AU3N and AU3S), all the others are limestone ones. Most of them were not *in situ* and it is not possible to know their original position.

The documented finds include both decorated (two capitals and some elements of friezes) and undecorated (bases, thresholds and

sills, blocks used as accommodation of pins and angular elements) stone architectural elements.

The two capitals were found in AU2S and both were reused for the reinforcement of walls; the first was placed in the SE corner of the West wall, the second was in the containing wall of a hearth collocated along the eastern wall of the court. The first capital (Fig. 29) is fragmentary and could belong to the second type of Manqabad capitals, which was identified in 2014 for capitals A2, A3, A5 and A6. It corresponds fairly accurately to type 6 of the second subgroup of the second class of "Coptic" uncut capitals in Pensabene's classification: i.e. with two crowns of four uncut leaves (the first with leaves placed in the centre) and "v" volutes (Pensabene 1993, 163). All samples of Pensabene's type 6 come from the Monastery of Apa Jeremiah at Saqqara (Quibell 1912, plate 35.6; Pensabene 1993, nrs. 632-633). The capitals of the second type of Manqabad have only two leaves of the second zone and one of the first, because they are capitals of semi-columns or semi-pillars (Salsano 2015, 94, Fig. 2). It is not certain that this newly discovered capital belongs to the second group because its central and left lower parts are missing, so it is not possible to verify the presence of the central lower leaf. Likewise for the other second-type capitals, they have a vegetal element between the volutes; however, unlike them, this is not a trilobal element, but is formed by a bilobal upper part and a pointed lower part, similar to a spearhead. Although the capital is partially preserved, the decoration suggests that its total length could be 20.5cm; this measure is not suitable for the bases of the oratory niche in AU2N, but it is compatible with AU3N; however, there is no way to assess this hypothesis. The left side shows traces of a painted yellow decoration; thus the capital could be placed on the right part of a niche. The upper part has a hole in the front-left part. The second newly discovered capital belongs to the third type of Manqabad capitals, corresponding to type 9 of the third subgroup of the second class of "Coptic" uncut capitals in Pensabene's classification: i.e. with one crown of four uncut leaves without volutes (Pensabene 1993, 163). Its total length is 18cm, so it could come from the oratory niche of AU3N or from another compatible place.

Two fragmentary elements of friezes (Fig. 30) were found in the paving of AU3S; they are both decorated with the same meander motif with a double line and were originally embedded in a

wall, probably as parts of the same architectural element or of two elements placed symmetrically. One has traces of green painting in a corner. Some probably blind<sup>27</sup> holes are carved in the middle of the meanders: they are at least 2.5cm deep and one of them shows traces of rust, probably due to the original presence of decorative metal elements or rings.

Two quadrangular blocks with crosses were documented. One block (10x32.5x13cm) was found during the survey in the central area of the Northern Sector, it presents a cross pattée and shows traces of red colour; on the opposite side there is a little hollow (1.5x2.4x2.8cm). The other block (19x62x13cm) was found in AU8-9S1/γ; it has traces of plaster on the frontal and on one of the side faces and shows a similar cross with traces of red colour. A quadrangular hollow is placed on the right of the cross, two other fragmentary hollows are placed at one of its ends. Another similar cross is carved on the left side of the element. A *crux ansata* is carved on a slab (16.3x10.4x5cm) from AU26N. In AU26N, a slab was also found (16.7x12.2x5.1cm) with a figurative decoration; although the decoration is not clearly preserved, it could probably be ascribed to the late-antique period and represents a seated figure, dressed in a long-sleeved tunic, with bent arms, who seems to carry an object similar to a sack or some grain spikes under the right arm. In AU26N another slab was found (19x13x4cm), which is decorated with an "X"; a similar motif is attested on some parallelepiped blocks documented in 2014 (Salsano 2015, 101).

During the survey in the Northern Sector, a stone element (Fig. 31) with a red rhomboidal decoration was found (19.5x15.5x4.3cm; main diagonal: 17.5cm; minor diagonal: 13.5cm). The rhombus juts from the background of the slab, has a double frame and is divided into four parts by two crossing lines; each part is carved with a through hole (diameter: 1.4cm). The slab is almost entirely preserved except for two corners, one missing and the other damaged; the preserved corners show a decoration with three strips. A slab with a similar decoration, through holes and similar measures was documented in the storehouse during the 2014 campaign<sup>28</sup>.

<sup>27</sup> The hypothesis is based on comparisons with similar elements observed in the storehouse of El-Ashmunein.

<sup>28</sup> This decorated slab is still unpublished, but it was studied, together with the other stone architectural elements documented in 2014, in my master's thesis ("Gli elementi architettonici lapidei del monastero di Abba Nefer a

The bases of the oratory niches of AU2N and AU3N were already documented in 2014, but during this campaign they have been studied more carefully and other details have been observed. In particular, the bases of AU2N, coated with white plaster, appeared without the parting of the pedestal and without any indication of plinth and *imoscapus*; for this reason they were initially assigned to type 4 (Salsano 2015, 105). In 2016, heavy rain damaged the upper layer of plaster thus revealing both a lower layer of red plaster, and numerous engraved lines parting the pedestal and three engraved lines on the upper torus. The parting - hidden by the thick white plaster - was probably visible when coated only by the thinner red plaster.

Another little red base (12.5x5x8.5cm) was reused in AU2S; it has no engraved lines and is coated with a white layer of plaster on one of the long side faces.

The documented thresholds are *in situ* at the entrances of AU2N, AU3N and AU26N. The ledge of the threshold of AU2N (69x41x8cm) is 11.5cm wide and less than 1cm high; the lower part of the threshold shows traces of the friction of the door. The threshold of AU3N is formed of three stone elements: the central one is a big slab (63x24x10cm); the two D-shaped doorjambs (now missing) (24.7x13x20cm) are embedded in the ground and have a curved profile on the outer side. The threshold of AU26N (80x16x14cm) shows parallel oblique traces, perhaps work signs or caused by the friction of the door. A block (15x15x13cm) with a central irregular hole (hole: diameter 8cm, depth 6.5cm) for the accommodation of the door pin is placed North-East of the threshold; the hole contained concreted fragments of ash and coal, probably the remains of the door pin, originally housed here. A block (20.5x14x9.5cm) with a hole for the door pin (diameter 8.5cm), carved off-centre, is placed near the "mastaba"<sup>29</sup> in the North-East corner of AU2S, in the passage between AU2S and AU3S. A compact wad of concreted wood or leather was found in the hole and will be the object of future analyses. A slab (30x18,5x4cm) with a similar hole (diameter 12cm, depth 1.5cm) with concreted material is placed in AU8-9S1/γ and had the same function<sup>30</sup>.

Manqabad", at the Università degli Studi di Napoli L'Orientale, supervised by R. Pirelli and P. Buzi).

<sup>29</sup> See p.310

<sup>30</sup> Other similar finds were documented in 2014 (Salsano 2018, 194).

The niche N2 in AU2N still has its stone sill (28x8.5x10cm), which may have originally been coated with white plaster.

In the same AU, the upper landing of the staircase is indicated on the wall by a recess, whose edge was reinforced by a small stone pillar (13.5x55x14cm) embedded in the West wall.

A rather quadrangular slab (15x21x3cm) was found in AU8-9S1/γ; it has three rectilinear sides and the anterior one partly cut in the form of a semicircle and decorated with red and black crosses. A close comparison is to be found with a similar object, D23 (Salsano 2015, fig. 8), documented by the mission in 2014; their function is still unclear.

Other interesting classes of stone elements are the big blocks used as steps in different areas and the angular elements used to reinforce the corner of niches and openings. Some L-shaped elements are more curved and are not decorated, others are more defined and sometimes display a decoration with a double frame. Furthermore, the finds include other stone elements with quadrangular hollows, reused fragments of stelae in AU7S1/α, AU8N and AU8-9S1/α and a reused block with a hieroglyphic inscription in AU8-9S1/γ.

#### B.5. First pottery survey (M. Kenawi)

The survey activity began on 17 November and ended on 22 November 2018. It was conducted mainly in the Southern Sector of the site, specifically in an area without vegetation and whose structures are covered by a surface layer of sand. This condition allowed us to observe the chromatic variations of the soils and the distribution of ceramic material. The survey also investigated other parts of the site to identify the types of ceramics and propose a preliminary chronology of occupation.

The Southern Sector has undergone several modern frequentations; nowadays it is partly used as landfill for modern waste.

An area with clear traces of scorching was identified; several fragments of fired bricks with one side overexposed to heat and vitrified were noted on its surface. After simple superficial cleaning, it was possible to identify a structure with a South-North orientation where the surrounding earth makes it possible to observe the earth reddened by the heat, evident ash dispersion and charcoal fragments. It is not possible to speculate on the shape of the structure from observation of the ground (Fig. 32).

The elements overexposed to heat can be divided into two categories: the first are bricks that had been exposed to direct flame for a long period, or several times, until the outer surface vitrified, whereas the second are overcooked elements perhaps related to a production activity. In the first category, the bricks are interpretable as having pertained to a structural element for heating environments (*Praefurnia*) or as a stable furnace. In the second category, it is possible to assume a residue of production, although it is not clear whether it was of pottery or not (Figs. 33-35)

An anthropic accumulation of materials, appearing as a little kom, is visible a few tens of metres further to the West. In the most eroded points, it was possible to observe the internal stratigraphy, which is composed of layers of ceramic fragments intercalated by thick layers of ash. It seems likely that this could have been a dumping area. The ceramics found within these deposits are mixed with imported forms, especially LRA 1 and LRD or Cypriot red slip ware. Among the many forms of Egyptian ceramics, including amphorae, the typologies LRA 7 or AE 7 and AE 3 late version have been observed, along with common pottery for canteens and cooking, and finally ceramics produced in the region of Aswan. Overcooked elements have also been observed among the materials; they may have been bricks exposed to direct fire. The maximum height of this kom is 2.80/3.00m (Figs. 36-38)

A second accumulation similar to the abovementioned one was noted in the vicinity of the central kom. However, it is not eroded, and neither the profile nor the type of deposits are visible. On the surface of the same area there are several fragments of containers with internal deposits that seem to be related to the production/processing of the mortar/plaster used in all the late structures built of mud bricks on the site. The use of these containers in the production process is not clear; however, it is possible that they may have been used for the preparation of plaster before drafting.

In conclusion, what can be said with certainty about the Southern Sector of the settlement is that ovens had been active, but the type of production activity is not clear. The abundant presence of bricks exposed to fire for a prolonged time is compatible with heated structures such as *praefurnia* of thermal buildings or private buildings with heated parts. The quantity of many different imported materials in

the same context leads to exclude that it was an accumulation of kiln waste. The absence of glass or metal slag also excludes the production and processing of these materials in this area. The abundance of ash can be linked to the production of lime that had been used in constructions.

From the chronological point of view, several fragments belong to a chronological horizon dating from the second half of the 4th-early 5th centuries AD. Both Egyptian productions and imported amphorae support this chronology: in addition to the LRA 1, there are Gaza or LRA 4 amphorae and few materials from Proconsular Africa (Figs. 39, 40);

The abundant and constant presence of fragments of LR1 on the surface of the site is clear evidence of its strong commercial activity with the Cilician and eastern Mediterranean ports. The chronology of the surface material spreads mainly from the 5th century AD and continues at least until the 7th century AD (Fig. 41).

#### B.6. Second pottery survey (I. Incordino)

The 2018 field season at Manqadab was focused on the analysis of the ceramic fragments deriving from the cleaning of selected northern housing units (AU2N, 3N, 8N, 9N, 8-9 S1 α, β, γ). All the diagnostic pieces (144 ca.) have been documented, reproduced and included in the digital database of Manqadab Pottery, integrating the corpus of ceramics (82) documented in 2014 at the el-Ashmunein store. Among this material, it has been possible to recollect fragments of at least 3 complete vessels, and 6 vessels preserved between 50% and 80% of their original shape. Three vessels have been found intact. The decorated and inscribed fragments, together with the intact and semi-intact vessels (a total of 49 items ca.), have been stored in the small police building at the entrance of the site. The remaining diagnostic fragments have been buried in the northern section of AU4 housing unit (currently not object of cleaning).

Among the typologies identified, there are amphorae Late Roman 1 and Egyptian Amphorae 7 (LRA1 and AE7) dated to the 5th-7th cent. AD, some possibly fragments of 'Saqqara jars' dated to the 6th cent. AD, fragments possibly of 'Pseudo-Samien' ware, dated to the 7th cent. AD, and fragments of amphorae with painted decoration dated from the first half of the 5th- to the 7th cent. AD. Some fragments of Red Slip Ware possibly dated to the 5th cent. AD are interesting (Fig. 42).

Then a survey of the ceramic material still *in situ* was conducted in the northern section of the site, considering all the housing units. A total of 40 complete or semi-complete vessels has been recorded. As results of this analysis, different uses of pottery have been recognized and within it four different typologies have been identified: jars of medium size, often in pairs, usually located in a niche in the eastern wall of the northern section of the housing unit; jars or small cups/bowls inserted in the plaster floor of basins (?), usually situated in the southern section of the housing unit; vessels completely walled in masonry; and vessels used as water pipes. If the interpretation of the vessels in niches could be likely connected to the storage of water to be used before entering the house, the possible function of the vessels included in the waterproof basins needs more in-depth study to be conducted in the following months.

During the last days of work, a general survey was conducted in all the areas of the site. For each section of the surveyed area, some surface samples were collected, especially those deriving from the central buildings next to the "bath" structure. A total amount of 29 diagnostic pieces was gathered, documented and included in the digital database.

Particular attention was focused on the southern end of the site, where a significant amount of discarded pottery piled up in two or three 'kom' had already been noticed in 2014. In the area where a natural vertical section of the pottery 'kom' is exposed (close to the topographical point 71, Fig. 43), four different layers of deposits were identified, located in a 2.5m. high wall. A total of 20 diagnostic pottery fragments have been collected, documented and included in the digital database. Among them, four fragments could possibly be evidence of pottery production on the site (Fig. 44). Three of them seem burnt and the fourth is the pointed base of an amphora with rough clay all around it. The area should be object of a more systematic survey in the coming seasons in order to get more evidence to support (or reject) the hypothesis of a production site.

From this brief survey of the site some preliminary observation can be drawn. First, contrary to what seemed valid from the 2014 analysis of the items stored at el-Ashmunein, the regularity of fine decorated findings is not limited to the bigger housing units of the northern row, but is actually scattered everywhere on the main areas of the site. This element could possibly

derive from the nature itself of the survey (analysis of surface material without excavated context) but more likely from the intense excavation activity conducted by the Egyptian inspectors in the past decades, and its consequences as the huge amount of ceramic fragment 'dumps' in the proximity of each excavated area, which contain fine and coarse typologies in similar quantity<sup>31</sup>.

Second, the substantial number of total sherds and types identified so far (including some imported items) redefine and amplify the range of pottery use (and possibly production) on the Manqabad site. The hypothesis of a production area on the site should be, for this reason, hopefully confirmed by future excavation at least of a small section of the 'pottery dump' situated at the southern end of the site.

Finally, the cleaning and excavation of selected areas of the central part of the site (plus more housing units) is highly recommended since it would provide pottery fragments in context to analyse. Moreover, a careful survey of the Northern Sector just above the northern structures of the site would add more information about the typologies of pottery material deriving from the housing units.

#### C. THE EPIGRAPHIC SURVEY (*P.Buzi*)

Several inscriptions were found in Manqabad in past years (Pirelli *et alii* 2017). Among them, particularly numerous are funerary stelae mentioning a series of saints - Jeremias, Enoch, Sybilla, Michael - that are present also on stelae from the Monastery of Apa Jeremiah at Saqqara and, in part, in the Monastery of Bawit, testifying to the fact that there existed a religious, institutional and devotional network between these three monastic settlements.

The lower part of these funerary stelae is occupied by the name of the dead person, with the indication of the day of his death, unfortunately not followed by the *annus martyrum*, so that they are not precisely datable.

Moreover, Manqabad has returned a meaningful amount of painted inscriptions that are located on the walls of the housing units used by the monks and the related oratories.

In one of these inscriptions the archangel Michael is invoked as "archistrategos, of the

<sup>31</sup> By contrast, the samples of pottery collected by our Egyptian colleagues and kept at the el-Ashmunein stores consist only of complete items, mostly fine decorated wares.

heavens, who makes great miracles”, with an interesting combination of Greek and Sahidic Coptic languages, the latter being characterised by some orthographic errors (Pirelli *et alii* 2017).

During this last working season, new inscriptions have been found, both carved and painted. It is worth mentioning in particular two painted ones.

The first consists of a series of captions accompanying a painting showing four standing figures plus the seated Virgin Mary. Two of these standing figures are identified by the text as the archangels Michael and Gabriel, another man as Jeremias, while the last figure is anonymous.

The second inscription is a long, uncompleted text (Fig. 11), found in collapsed layer of AU2 and mentioning the ‘usual’ saints of Saqqara and Manqabad - Apa Jeremias, Apa Enoch, our mother Ama Sybilla - but also a certain Paul, who very likely is Paul of Tamma. All these characters are related to the cultural and monastic milieu of the so-called Middle Egypt and they represented a form of semi-coenobitic monasticism.

This last inscription is red in colour on a black background. The letters are extremely well designed, demonstrating once more the high quality of the decoration of the site.

#### D. THE RESTORATION ACTIVITIES (*P. Musella, A. Ragonieri*)

The restoration activities concerned six Areal Units (North Area): AU2N, AU3N, AU8N, AU9N, AU20S, AU26N, to test the maintenance operations to be developed in the future throughout the site.

During the fieldwork, preliminary studies were made of conservation and restoration of the walls, the materials of which they are made, and the appropriate methodology to be employed.

The restoration activities were carried out by P. Musella, A. Ragonieri and three Egyptian restorers - Ezzat Salib, Niazy Mostafa Mohamed and Khaled Abd el Maled.

The place where the monastery was built has different thermo-hygronomic factors between the hot season (April-September) and the wet season (October-March). Nevertheless, with only 10 degrees of difference between the minimum temperature of the night and the maximum temperature of the day, this steady indicator does not exert a considerable amount of stress on the materials of the site.

Yet, it is worth being mentioned that, due to its nature of open space, the site is subjected to

many other critical issues, among them the action of atmospheric agents (wind and sun being the most significant, but the action of rain has its influence as well), the problem of stray animals, and the anthropic factors (the site is very close to the residential area). On top of that, one other problem related to the general damage to the site is the material that constitutes the walls, made mostly of mud bricks covered with plaster.

In this respect, the only conservation measures carried out in the past were the installation of small dry brick counters to prevent the walls and the plaster covering them from falling, and the general preservation of the plaster itself from the action of atmospheric agents.

The purpose of this report is to define the intervention proposed for the conservation and restoration of the vertical architectural paraments, horizontal architectural paraments, and walls textures.

Divided by architectural types, the phenomena of damage are:

#### Walls

- a) Erosion of mud bricks constituting the walls;
- b) Detachment of brick and consequent instability of the structures;
- c) Flooding erosion of the upper part of the walls;
- d) Collapse of vaults and portions of walls.

#### Vertical architectural paraments

- e) Sediment of ground (caused by the flooding erosion);
- f) Microstructural and macrostructural decohesion (pulverization and cracks);
- g) Abrasions;
- h) Detachment and collapse of plaster.

#### Horizontal architectural paraments

- i) Sediment of ground;
- l) Parts of the floors collapsing;
- m) Abrasion of the edges of steps;
- n) Detachment of the floor layer from the lower layers.

As noted before, restoration work has been done in AU2N, AU3N, AU8N, AU9N, AU20S, AU26N.

First photographic documentation of the parts that needed work was made, and then the sediment of ground that blocked these parts was removed.

Later the plasters (both the decorated one and the achromic one) were consolidated:

fracture curbs have been made of mortar, a solution of water and acrylic resin (Acril 33) was used for the micro infiltrations, and imbibition of ethyl silicate was made to consolidate the pictorial layer.

Brushes with soft bristles were used to remove the disjointed sediments of ground on the plasters, and the coherent sediment was first softened with water and then removed.

The upper parts of the walls have been carefully dusted and examined to verify their state of conservation and to test the works of structural consolidation and the bond of disjointed bricks.

Notably during dusting in AU2N, working on the West wall (bordering the East wall of AU1N) some pieces of inscription plaster were found: first they were cleaned from sediment of ground until the inscription was clearly readable. The painted surfaces were consolidated with ethyl silicate and then they were covered with Japanese paper and carboxyl cellulose; when this overlay dried out, the pieces of the inscription were removed.

The strengthening of the West wall of AU3N was scheduled during the works carried out in this Housing Unit. The collapsing wall was supported with shoring of wooden elements.

The last phase of work was the conservation of AU2N and AU3N, covering their floors and their walls with a cotton textile to preserve these elements from agents of degradation.

#### CONCLUDING REMARKS

The 2018 fieldwork was long enough to consent both archaeological and restoration activities and to go on with the topographical survey in order to provide a complete and geo-referenced map of the site. It was also possible to start an overall pottery survey, and to conduct a preliminary investigation of the area immediately South of the town wall.

The thorough survey of the selected Areal Units allowed us to confirm some preliminary considerations about the Northern Sector complex raised from the 2014 campaign. The complex appears as composed of two long rows of buildings, realised in successive phases. All the AUs selected for investigation in the 2018 survey pertain to our Pattern 2 (Pirelli *et alii* 2017), where the northern row is occupied by a cell (HU) and the southern one appears as an extension of it, and is formed by an open court that, in later phases, was completed with some

service structures<sup>32</sup>. However, we realised that this pattern is more various than we expected based on the observations of the 2014 survey.

All the HUs that we have surveyed (AU 2, 3, 8<sup>33</sup> and 26) belong to type 1, and underwent lesser changes through time, both architecturally and structurally. They were originally completed in the South by a simple open court, which was limited, on the East, West and probably also South sides by thin walls (12/14cm) intended ideally to separate the monks from each other, however without creating an effective isolation and without forcing them to be really independent. Actually, as far as we could observe, during the first phase, none of the HUs was furnished with hearths, external storerooms, wells or basins. It was in a second phase that important changes occurred in the open courts in front of the cells, some of them common to all the observed AUs, others differentiating them from each other. In most cases, the West walls were reinforced to host niches with embedded vases, hearths, and store-boxes, while the floors were raised and sometimes paved with limestone slabs and reused architectural ceramic, granite and limestone elements, not only from the first Christian phase, but also from the Pharaonic period (AU3S, AU8/9). In a third phase, some walls were reinforced once more to support staircases that were to give access to upper (AU3S) or underground storerooms (AU8/9S1); it is likely that the addition of these storerooms caused the closing of some of the annex rooms of the underground space of the cells.

The preliminary observations on (baked and unbaked) bricks, building techniques and plaster types demonstrate that the major architectural changes also correspond to different qualities of materials and to different degrees of accuracy in realising and/or repairing structures (B.2 and 3).

The newly discovered texts and stone architectural elements point, once more, to a lively and refined cultural environment and a long and complex history of the monastery, which are also confirmed by the first results of the two pottery surveys. They were conducted in different areas of the site and with different approaches (see above B5 and 6) and notably enrich our data on this category of material, as the study in 2014 included only complete and

<sup>32</sup> Unlike the other Patterns, that are always characterised by the presence of other cells in the southern sector.

<sup>33</sup> AU9N being the large oratory of the contiguous AU8N.

mostly decorated items kept in the storehouse of el-Ashmunein. The samples analysed on the site, by contrast, were diagnostic fragments belonging to more varied types, mostly ranging from the late 4<sup>th</sup>/early 5<sup>th</sup> to the 7<sup>th</sup> century, and belong both to Egyptian original and imitation production and to imports.

As to the Egyptian production, several items could be attributed to well known Saqqara and Assuan types, but several different wares collected all over the site - including the area of the southern dump - point to the possibility that a local production also occurred. The imported wares interestingly draw a noteworthy network of - direct or indirect - relations and trade with not only Gaza and Proconsular Africa, but also with Cilician and eastern Mediterranean ports, as the abundant presence of fragments of LR1 demonstrates. The chronological time span of some of them seems to confirm that the origin of the site dates back far beyond the 6<sup>th</sup> century, and this is pointed to also by some monumental remnants of structures both in the Central Sector of the site<sup>34</sup> and outside the southern side of the town wall (Fig. 45)<sup>35</sup>. On the other hand, many reused materials of the Pharaonic period found in different areas of the site also suggest the closeness to structures of much older times.

As expected (Pirelli 2019), the survey of the large dump, South of the town wall, proved to be highly productive. The pottery and topographical surveys carried out in this area revealed a very complex situation that needs to be investigated more in depth, but the presence of different structures (see B.5, B.6 and note 35) and numerous fragments of burnt ceramics and bricks burnt by overexposure to heat - among the large amount of stratified pottery fragments and ashes - already make it possible to suggest that a productive area and kilns were present here, although their specific nature cannot be yet determined.

An important part of the activities of the last campaign was dedicated to restoration and conservation questions. The analyses of the materials and techniques employed both in

paintings and in buildings were aimed at two main objectives: carrying out urgent interventions on the fragile and threatened paintings and mud brick structures of the selected AUs (see above D), and making a master-plan of conservative restoration of the whole complex, also functional to a proposal of site management. These topics are of paramount importance to our Egyptian counterpart and are therefore destined to absorb a substantial part of the Mission's financial resources.

However, the necessity to reach a more complete knowledge of the site and of its historical and cultural context, before proceeding to its recovery, will entail deeper investigations of some selected areas. Among the objectives of the next campaigns, we will have to envisage some trial excavations in the area South of the city wall (of both the dump and the remains of buildings identified East of it), as it will be useful to proceed to the complete digging of the underground space of AU2N.

These points will therefore be added to the application for renewal of permits by the competent authorities.

All the archaeological activities as well as the strategies of conservative intervention have been discussed and carried out in close collaboration with the local institutions and colleagues, and have also concerned the involvement of young archaeologists and local restorers, for whom an intensive training program was planned, both theoretical and practical. Five archaeologists and three restorers have profitably participated in all phases of the work (archaeological and topographical survey, documentation, design of structures and ceramics, consolidation of structures and paintings) throughout the whole period of the mission.

Hopefully, the good network of relations that the Mission has been able to build and maintain in these years and the already active collaboration with the Egyptian authorities and colleagues will make it easy to enlarge the objectives of the research project.

<sup>34</sup> The monumental *calidarium*, acquired by the topographers (see above A), will be the object of a thorough analysis in the next months.

<sup>35</sup> The structures were observed in this area during both the first pottery survey (see above B.5) and the analysis of the satellite images. Some of them appear as parallel walls with an East-West orientation, others seem to be radiant, but their investigation is made difficult by the fact that the rest of the building is under the modern village.

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Fig. 1 - Satellite view of the archaeological area. The black rectangles identify the areas surveyed by photogrammetry during the 2014 and 2018 campaigns

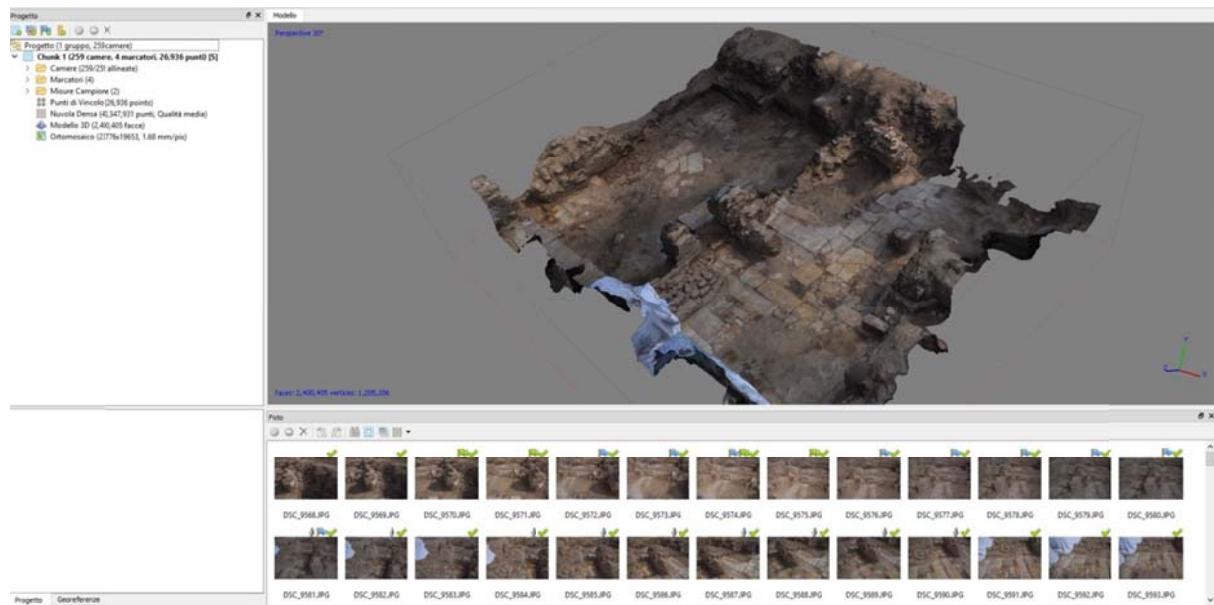


Fig. 2 - The final model of the rooms 2-3S processed by Agisoft Photoscan. The images were acquired by Nikon D750

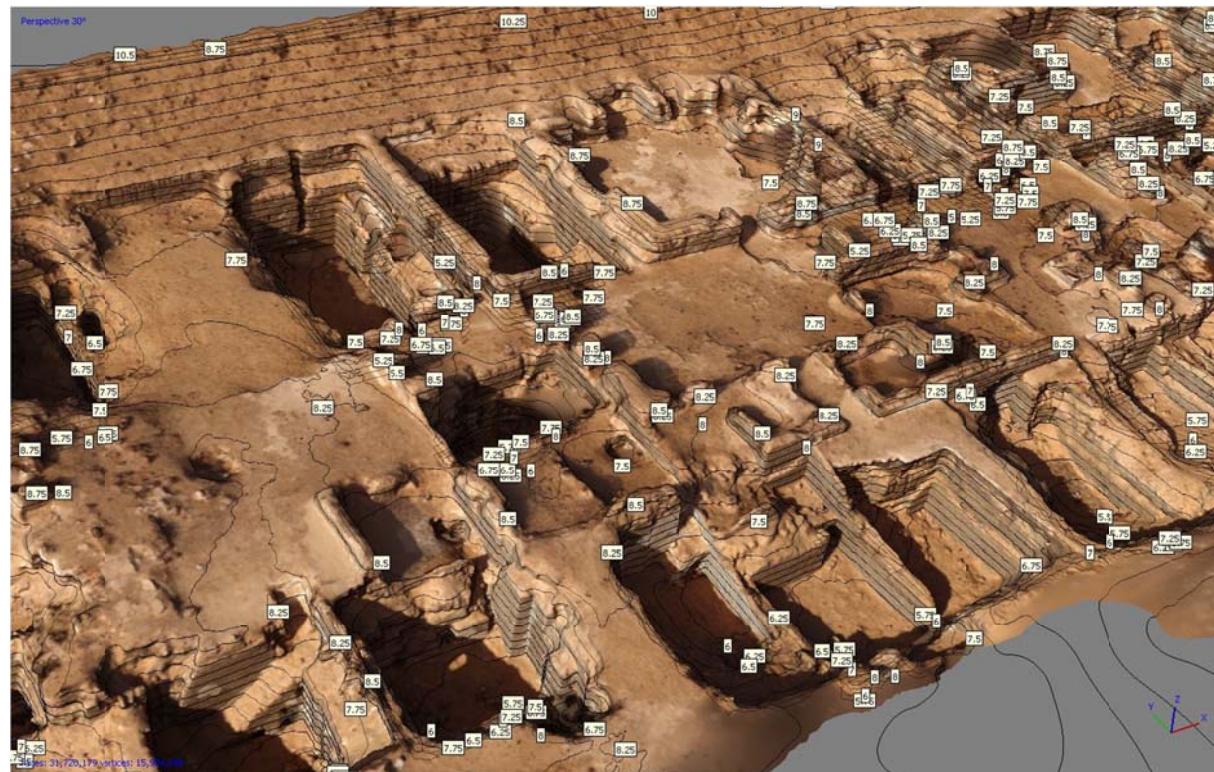


Fig. 3 - The 3D model of the North area after applying the tool to create contour polylines. The labels indicate the elevation each 25cm

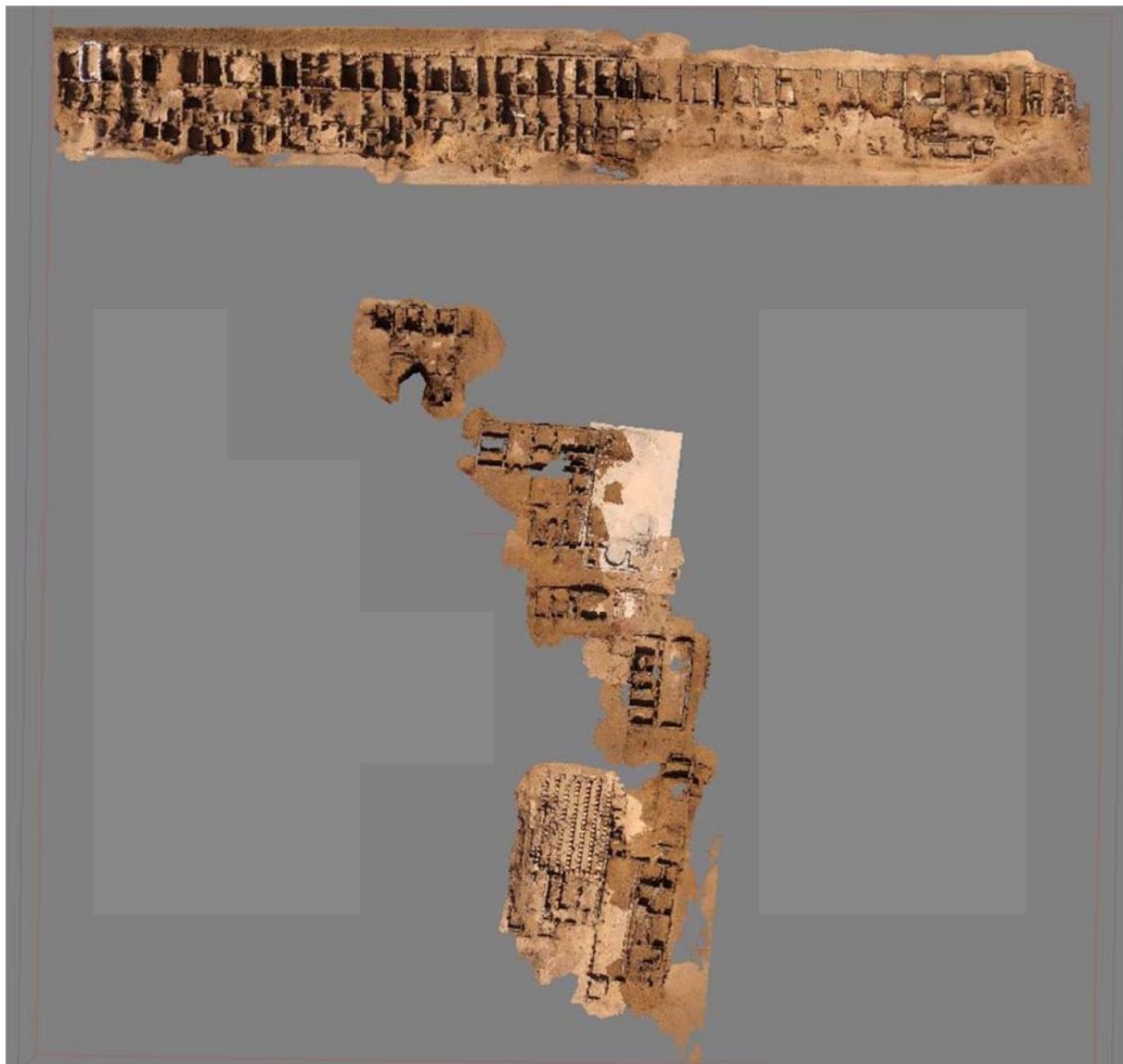


Fig. 4 - A global view of the digital replica scaled and merged

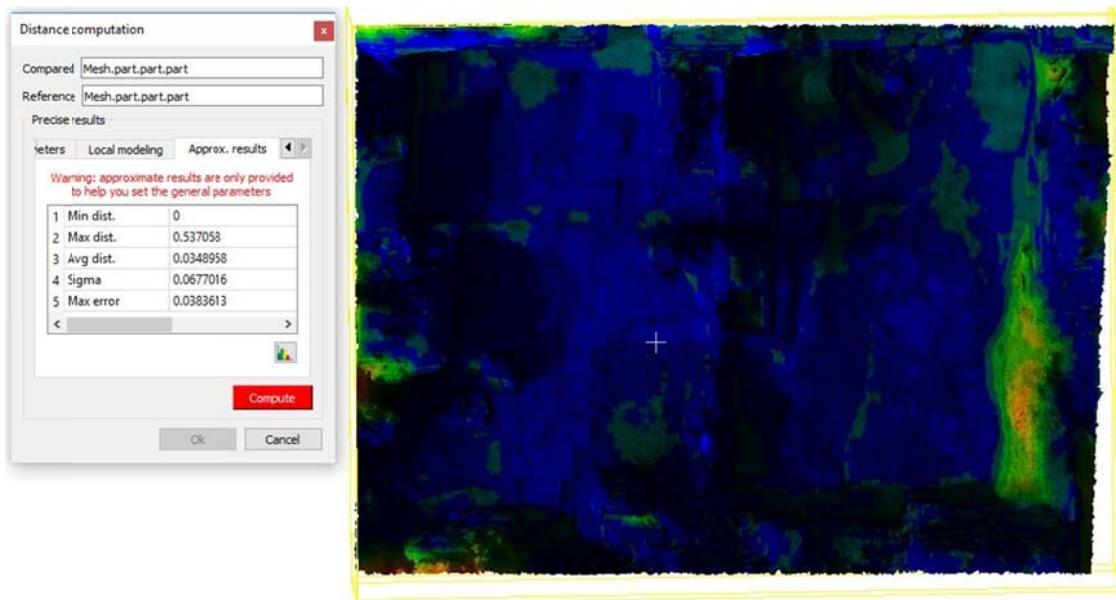


Fig. 5 - A comparison between the surveys by Osmo and Nikon D750 of AUs 2 and 3 of the North area. The colours highlight the areas of complete overlap in blue and deviations in yellow and green

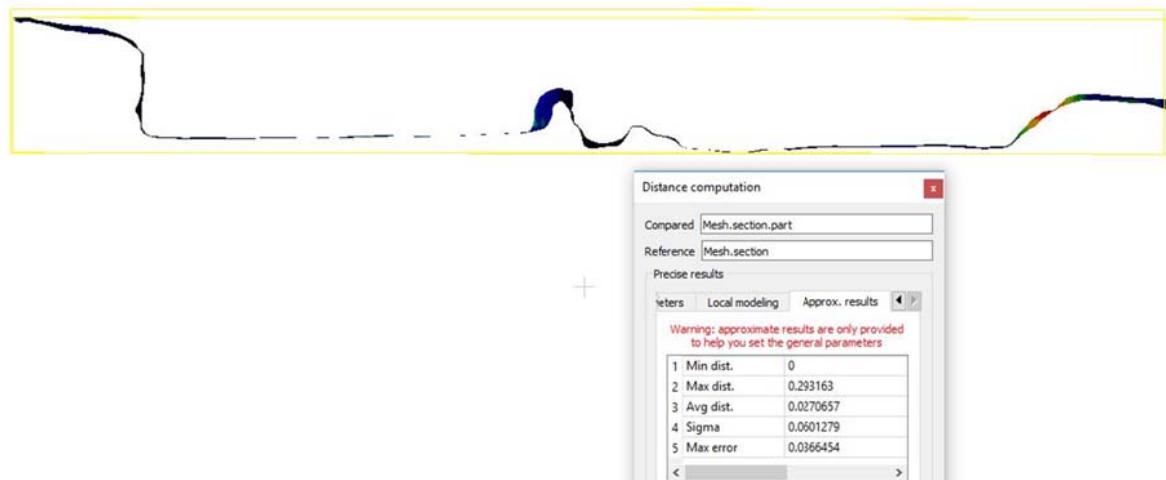


Fig. 6 - A comparison between the sections by Osmo and Nikon D750. The area with the greatest deviation (in red) is related to an accumulation of sand removed after the acquisition by Osmo

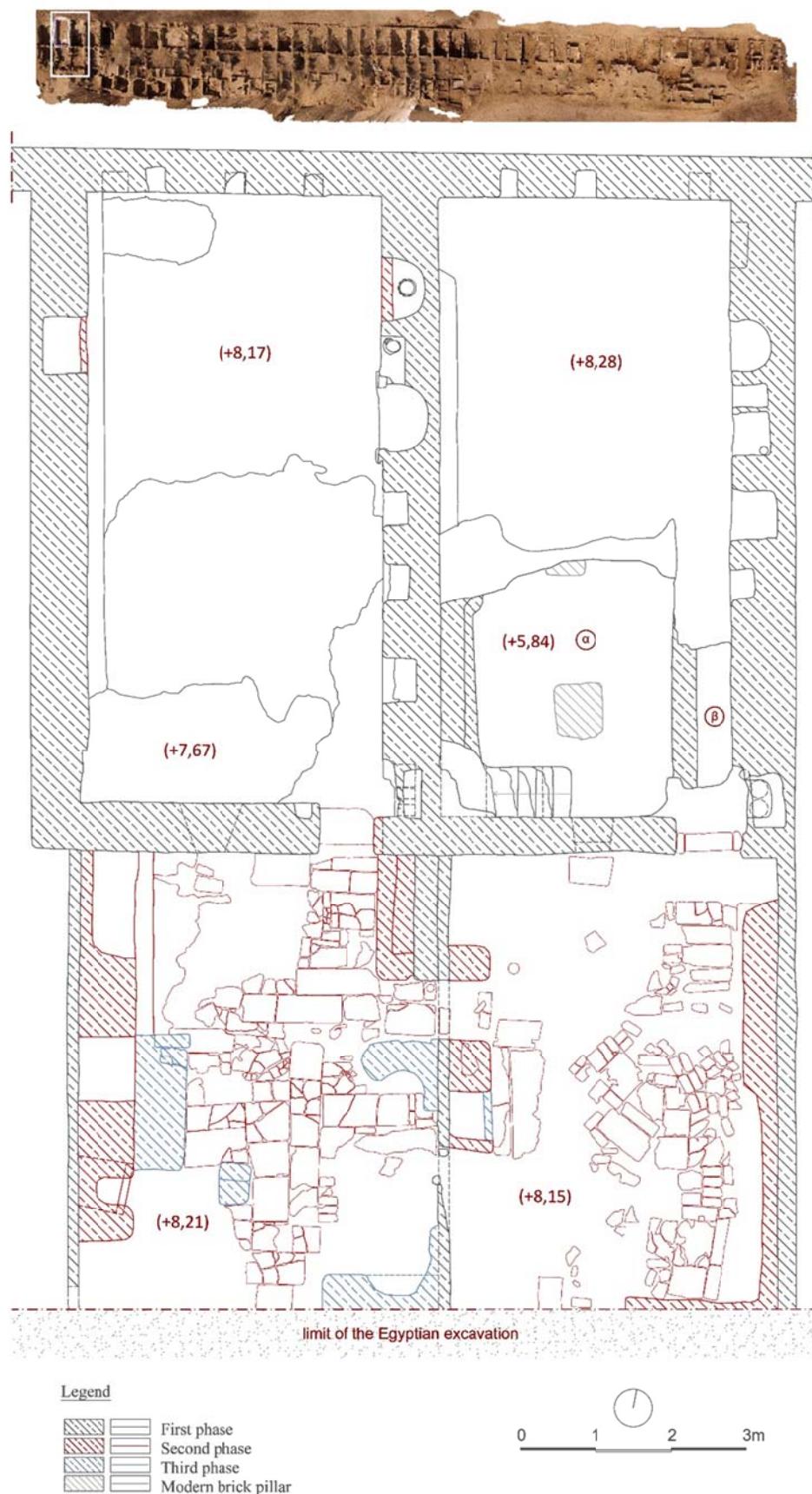


Fig. 7 - Plan of the contiguous AU2 and AU3 (Drawn by Daniela Palomba, Dep. Of Architecture, University of Naples, Federico II)



Fig. 8 - The oratory niche of AU2N in 2018



Fig. 9 - The oratory niche of AU2N in 2014



Fig. 10 - The oratory niche of AU2N during the Egyptian investigation in 2006



Fig. 11 - The newly discovered Coptic inscription, from top of the wall between AU1N and AU2N



Fig. 12 - The “mastaba” right of the door of AU2N



Fig. 13 - The Coptic inscription on the East wall of AU3N



Fig. 14 - The oratory niche of AU3N



Fig. 15 - The underground space of AU3N



Fig. 16 - Particular of the floor of AU3S, after a copious rain



Fig. 17 - General plan of AU8/9



Fig. 18 - Large step in front of the door of AU9N

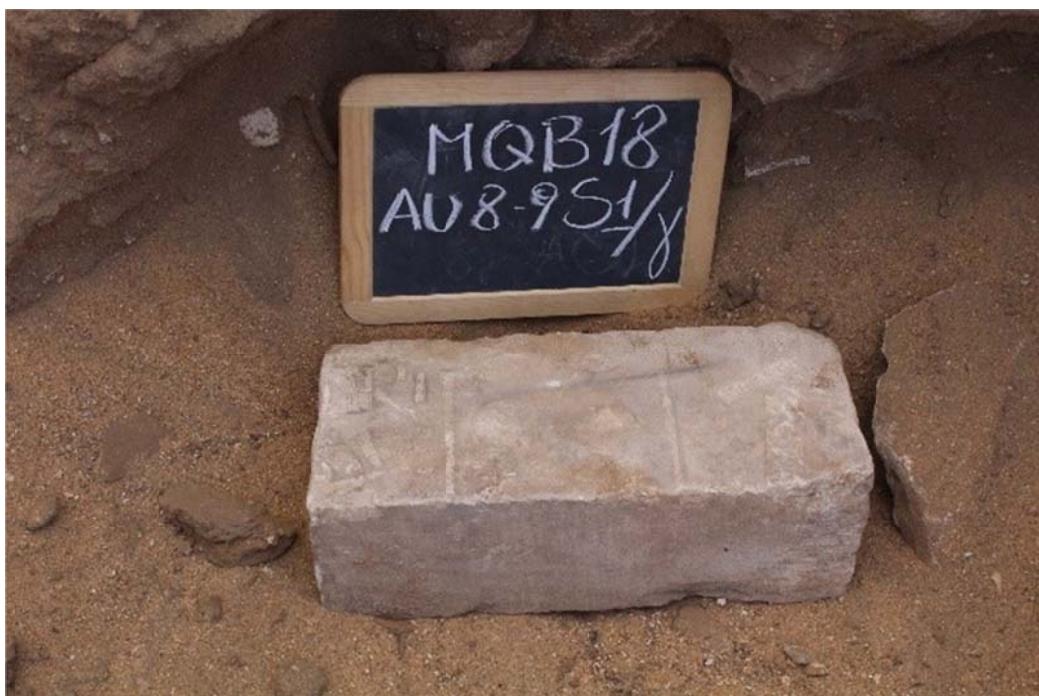


Fig. 19 - Limestone block with a hieroglyphic inscription found in AU8/9S1γ



Fig. 20 - Particular of the South wall of AU26N, with the two small walls probably added for static reason



Fig. 21 - Coin of the Islamic period with the shahada, from E2 of AU26N

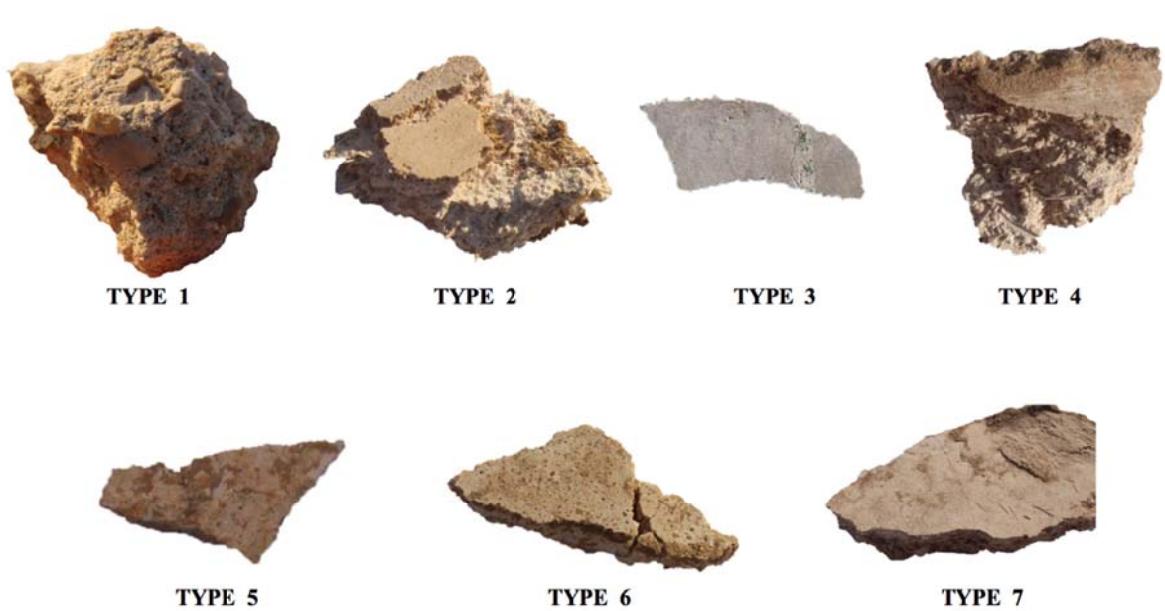


Fig. 22 - The 7 identified plaster types



Fig. 23 - One of the walls of the annex room in AU 8-9S



Fig. 24 - Basins in AU 8-9S/η



Fig. 25 - (On the left) special vault brick from AU26N, South-West wall of the underground floor. (On the right) isolated special vault-brick from the same area



Fig. 26 - Rounded corner mud-bricks used for basin and to finish edges of walls in AU26S



Fig. 27 - Special (type 1) mud-brick with a rounded corner and a narrow rectangular hollow on one short side



Fig. 28 - L-shape (type 1) mud-brick with rounded borders but flat on the back from a collapsed structure found at the southern edge of AU2S



Fig. 29 - The capital placed in the South-East corner of the West wall, belonging to the second type of Manqabad capitals



Fig. 30 - A fragmentary element of the friezes, decorated with a meander motif, which was found in the paving of AU3S



Fig. 31 - The stone element with a red rhomboidal decoration, found during the survey in the Northern Sector



Fig. 32 - Remains of surface structures related to firing process

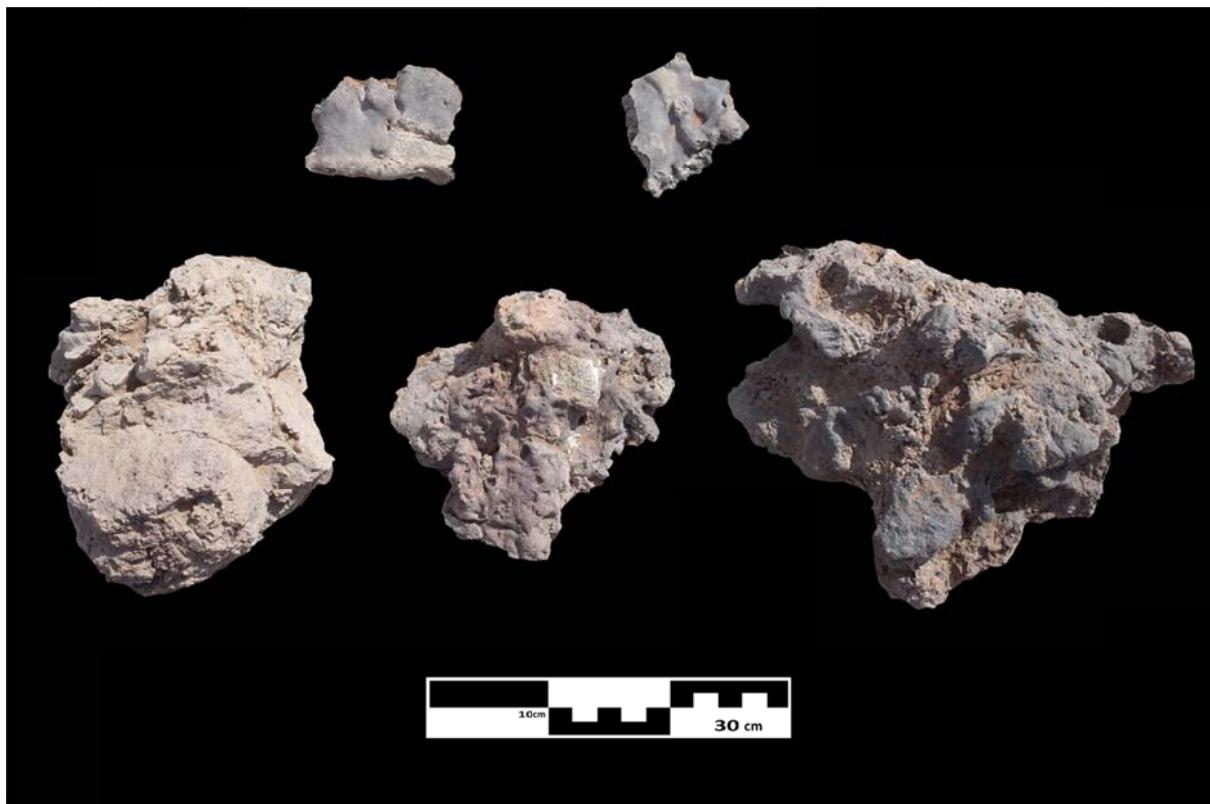


Fig. 33 - Large fragments of slag, waste of a probable kiln



Fig. 34 - Overcooked bricks from one side which was facing the firing room



Fig. 35 - Profile view of the pottery and waste mound, South of the site



Fig. 36 - Profile view of a mound composed of ashes waste of a production structure and fragments of potters and plaster



Fig. 37- Profile view of a mound composed of ashes waste of a production structure and fragments of potters and plaster



Fig. 38 - Profile view of a mound composed of ashes waste of a production structure and fragments of potters and plaster



Fig. 39 - Section with various layers of ash intercalated with ceramic deposits and various materials



Fig. 40 - Samples of Egyptian Amphorae 7, mainly produced in Middle Egypt



Fig. 41 - Surface observation of hundreds of imported Cilicia amphorae from the 4<sup>th</sup> to 7<sup>th</sup> centuries AD



Fig. 42 - Red Slip Ware fragment



Fig. 43 - Pottery dump at the southern end of the site



Fig. 44 - Possible evidence of production



Fig. 45 - Remains of structures, South of the city wall, partially below the modern village