

British Mission to Tell el-Amarna

# **Great Aten Temple Report on Recent Work (February–May, 2020)**



Barry Kemp, Miriam Bertram, Anna Hodgkinson, Scott Allan, Fabien Balestra, Marzia Cavriani, Paul Docherty, Juan Friedrichs, Tim Hagedorn, Sue Kelly, Margaret Serpico, Julia Vilaró and Alexandra Winkels

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# **British Mission to Tell el-Amarna**

## **Report on work done by the British Mission to Tell el-Amarna, February–May, 2020**

The spring season of work at Amarna in 2020 commenced with the opening of the expedition house on January 30th, 2020. The plan for the season was to engage the workmen and builders from February 15th until March 25th. In consequence of the rapid increase in public measures to contain the spread of corona virus all but three of the team had left Egypt and returned home by March 18th. It was then still possible to keep to the planned schedule and to close the fieldwork in an orderly way (on Sunday, March 29th). The site magazines nevertheless remained open until June 1st, which allowed recording of the many hundreds of fragments of quartzite relief from the Stela site to continue.

The members of the archaeological team were Barry Kemp, Miriam Bertram, Anna Hodgkinson, Scott Allan, Fabien Balestra, Marzia Cavriani, Paul Docherty, Juan Friedrichs, Tim Hagedorn, Sue Kelly, Margaret Serpico, Julia Vilaró and Alexandra Winkels. The Ministry of Tourism and Antiquities was represented by Hamada Abd el-Aziz and Mazhar Khalifa (excavation site) and Mohamed Abd el-Mohsen and Sarwat Shawki (magazines). We thank the officials of the Minia inspectorate, particularly Gamal Abu Bakr (general director for Middle Egypt), Mahmoud Salah (responsible for South Minia), Fathy Awad (general director of archaeology for the Mallawi area) and Hamada Kellawy (the chief inspector of Amarna), for administrative support, and the Permanent Committee of the Ministry for permission to work at Amarna in 2020. The procurement and delivery of cut blocks of granite from the Aswan quarries needed for embellishing the temple were thanks to Nicholas Warner and Mahmoud El-Tayeb in Cairo.

The season's programme has combined excavation and stone-laying at the Great Aten Temple and work on material stored in the magazines attached to the expedition house. The Great Aten Temple offers a huge open space for investigating how people responded to being in a place where, according to the king's designation, the sun god should be honoured. It became, in the course of his reign, also the site for a major construction in stone, subsequently demolished with many elements broken up.

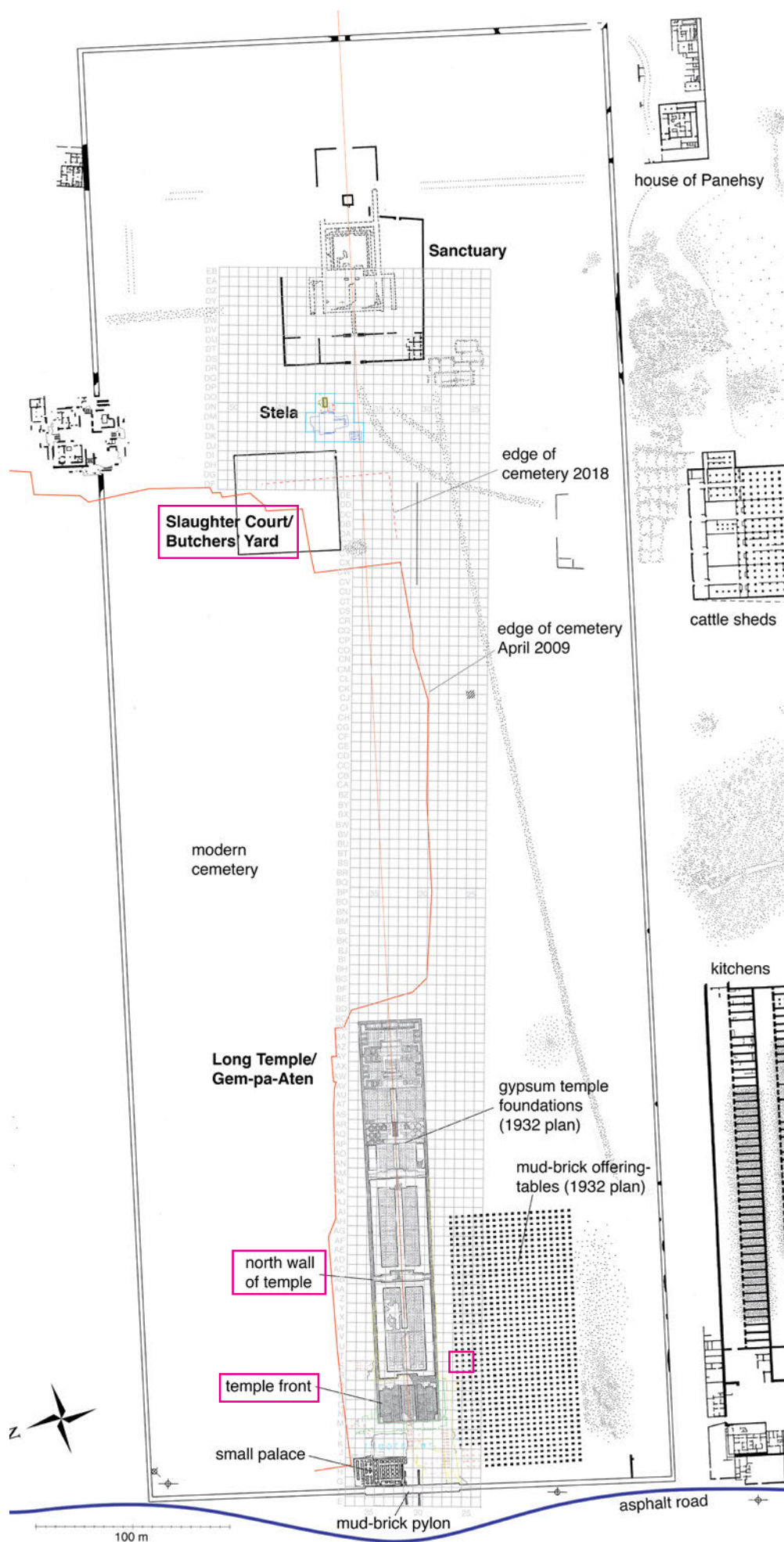
### **Work at the Great Aten Temple**

The stone building which came to dominate the temple enclosure was surrounded by open ground which preserves archaeological traces of human presence. On the south and west sides, the initial ground surface (in use for perhaps seven years) had been deliberately buried by up to nearly a metre of rubble and sand mid-way through the city's occupation. This has resulted in excellent preservation of the buried structures and associated deposits belonging to the early phase of the temple's history. Further away, the two periods merge into a single surface which lies almost at the present ground level.

The investigation of the deeply buried features this year was carried out in two places (areas 1 and 2). Area 3 is the foundation trench for the north wall of the temple. Area 4 is the Slaughter Court or Butchers' Yard some way behind the temple and in front of the Sanctuary (Figure 1). It lies adjacent to the site of a large Stela.

### **Area 1. Completion of the study of the early floor south of the temple axis**

A small area remained over from the previous large-scale exposure of the early mud floor at the front of the temple. The final work here (undertaken by Miriam Bertram) was spread over the autumn season of 2019 and



**Figure 1.** Plan of the enclosure of the Great Aten Temple. It shows the main features within the enclosure and the location of the main areas of current fieldwork (the temple front, the north temple wall and the site of the Slaughter Court/Butchers' Yard) which are highlighted in red.



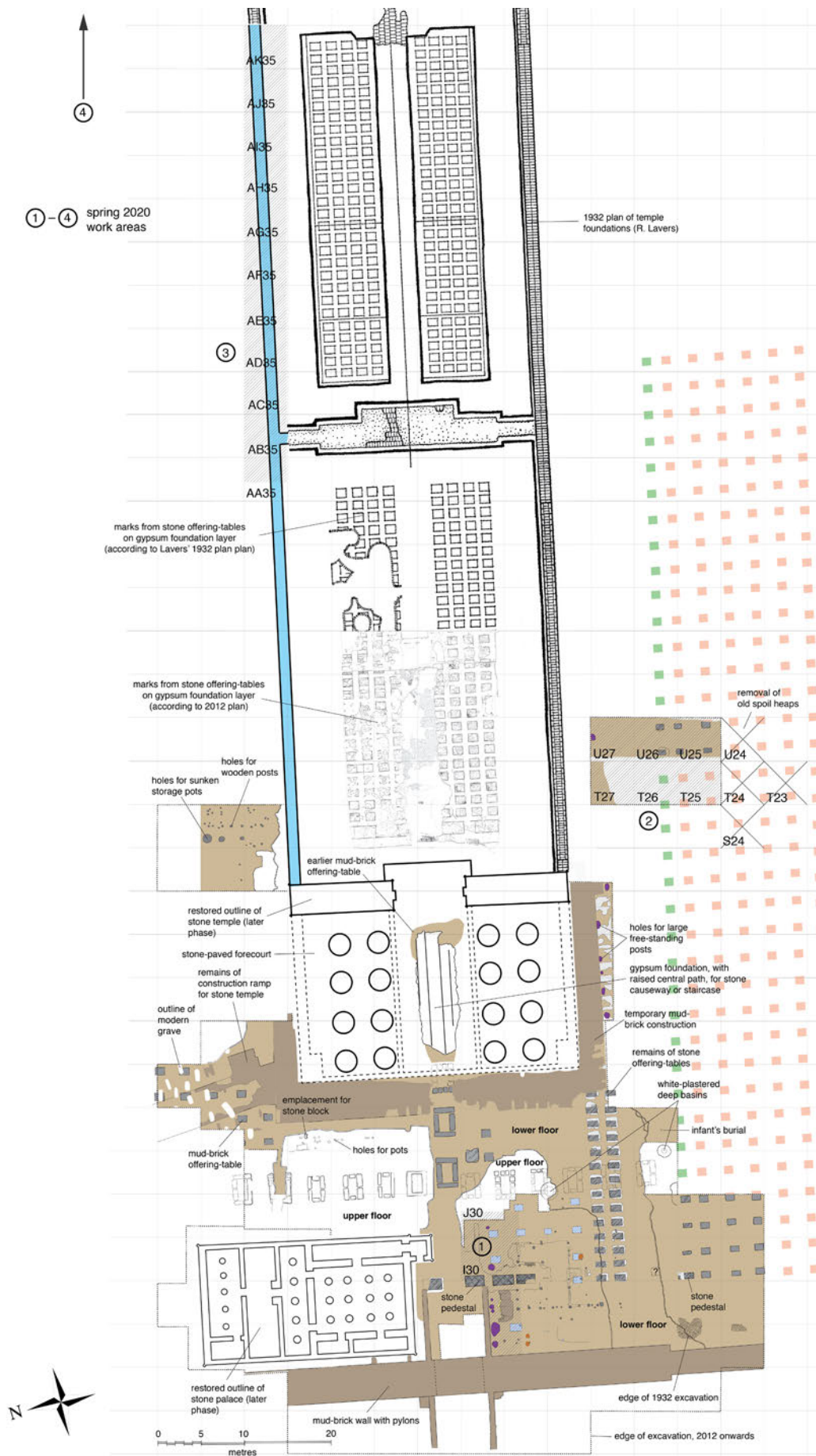


Figure 2. Plan of the front part of the Great Aten Temple (Long Temple) showing areas of recent work. Nos. 1–4 in circles refer to areas where work was carried out during Spring 2020, no. 4 being the Slaughter Court (Butchers' Yard).



**Figure 3.** Area 1, square J30, view to the east. Just above the 1m scale is the faint outline of a mud-brick offering-table [19426] which has been removed and subsequently plastered over. Beside its top-left corner is a large post-hole <19427>. Photo, Amarna Project.



**Figure 4.** Area 1, square J30, view to the west. In the foreground is a large post-hole <19427> lying beside the outline of the removed offering-table [19426]. Photo, Amarna Project.





the spring season of 2020. It saw the completion of the excavation at the front area south of the entrance ramp. It included squares G29/30, H29/30, I29/30 and J29/30 (Figure 5).

After the removal of the levelling rubble that covered the entire area, several features became visible. One is known from earlier seasons in this area: removed mud-brick offering-tables (Figures 3 and 4). The two in squares I30 [19294] and J30 [19426] line up from east to west, whilst another one in G29 [19153] does not. They had been removed to create space for the wooden palace of the king that was erected in this area before the latest building phase began in or after year 12 of Akhenaten's reign. (For details see: <https://www.amarnaproject.com/documents/pdf/GAT-report-Autumn-2017-2018-v2.pdf>). In squares H29/30, a low ramp [19157] (maximum height 0.12 m) that rose towards the north was created by a layer of fine sand on top of an existing mud floor, contained by mud bricks at the western edge and covered with a layer of partly white-washed mud floor. Unfortunately, not much of it remains, because a trench dug by a previous expedition along the entrance ramp of the temple (and towards the east and south) destroyed much of it.

In the same area three large post-holes <15064>, <15065> and <15066> had been uncovered during the 2012 season. They line up with two recently discovered post-holes in I30 <19257> and J30 <19427> and might have belonged to the northern part of the wooden palace. Nothing of significance was found in the fills; only post-hole <19257> contained several mud bricks, arranged in a way as to support a wooden post. A number of smaller post-holes occur over the area, often close to each other. Is this an indicator that the palace had been built up more than once, maybe for special occasions? They cut through a very crumbly mud floor 19291 in the northern part (that had been renewed several times and was almost 0.10 m thick at the end) and a firmer one 19151 in the southern part of the area.

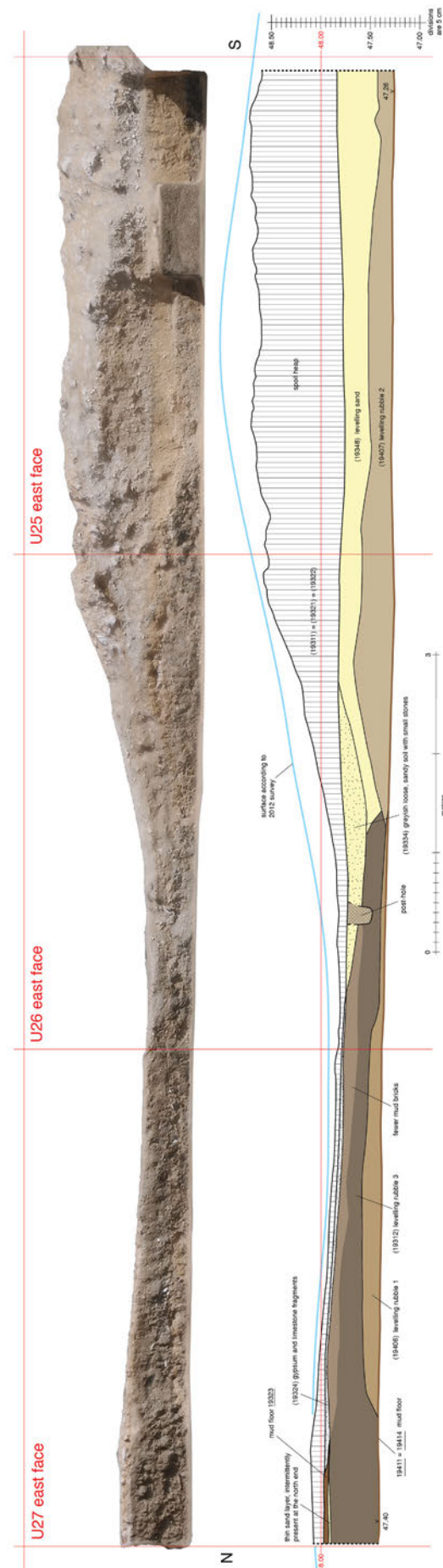
## 2. Offering-tables south of the temple

The second area has only become accessible this year, following the removal in previous seasons of part of a large spoil heap which perhaps goes back to Petrie's season at Amarna in 1891/2. The removal has exposed the top of the thick layer of levelling-rubble (and sand) which had been used in Akhenaten's time to bury the landscape of offering-tables and other structures which had been laid out when the city was first founded. The excavation (supervised by Fabien Balestra and Scott Allan) began with the removal of the final traces of sand and rubble across a group of six contiguous 5 x 5 m squares (T25–27, U25–27). This revealed that many pits had been dug into the surface, especially in T26 and U26. There was some suggestion that some of the pits might have been Petrie's, dug as he sought offering-tables (which he had identified as pillar bases) which followed a pattern of spacings which he found he could predict. On the other hand, Petrie's map, when combined with an excellent aerial photograph taken in 1935, suggests that this general area had escaped the digging of pits intended to locate offering-tables. Other holes looked like post-holes partly filled with stones to stabilise the posts. Modern material was found within them, but all one can conclude is that they pre-date the start of the current excavation in 2012. The pits and holes had not been dug to a sufficient depth to have cut into the floor and structures of the Amarna Period.

The delay caused by examining and recording the modern disturbance led to the postponement of excavation across T25, T26 and all but the northern end of T27. Within the time available, however, it was possible to complete a thorough study of the floor and structures across U25, U26 and U27 (Figures 6–8). The removal of the modern spoil heap exposed the relatively flat surface that had developed after the end of the Amarna Period and remained the surface of the ground for nearly thirty-five centuries. The surface was the top of a thick deposit which had been used to bury the offering-tables belonging to the first phase of use of the ground. The burial had left the tops of the offering-tables covered by several centimetres of material and so invisible. Across the northern half of the trench the levelling-material was mainly mud-brick rubble (19312), in places (and mainly towards the







section line



**Figure 7 (left).** East section face of the trench on the south side of the temple. It is shown as a drawn section and as a photogrammetric composite, the work of Paul Docherty and Fabien Balestra. The profile of the top of the dump (blue line) is derived from the contour survey of Hans Barnard, 2012. **Figure 7 (right).** Vertical photogrammetric realisation (by Paul Docherty) of the eastern half of the trench on the south side of the temple. North is towards the bottom.



*Figure 8. Oblique photogrammetric view (to the south-east) of the eastern half of the trench on the south side of the temple, showing the remains of offering-tables built on the mud floor. Photogrammetry by Paul Docherty.*

bottom), mixed with sand and fine pebbles (19406). It reached a maximum depth of 50 cm. Towards the northern edge of the excavation (squares T27, U27) the pieces of brick in the rubble were larger and more distinct. They were covered with a thick floor of mud which ran in a conspicuous, horizontal line across the 10-m width of the trench, but only for a width of 75 cm. Had it originally spread further south and been eroded? There were no surviving patches here.

A likely origin for the levelling-rubble is the thick brick wall which had temporarily surrounded the front of the stone temple when it was being built and acted as a retaining wall for sand which helped the builders engaged in erecting the large columns to raise the individual blocks. That wall had come to an end c. 7 m west of T27. There was thus less brick rubble conveniently located for use as filling material. The base of the revetment wall had been left in place and served as a support for a gypsum concrete layer which had perhaps been covered by a pavement of limestone blocks. The distinctive mud floor in T27 and U27 would have continued this stone pavement to the east, providing a clearly marked, hard margin around the base of the temple wall.

Across the southern half of the trench, where the offering-tables had stood, the levelling-material became predominantly sand (19348) with brick rubble (19407) below (Figure 7 (left)). Since brick rubble had been used to bury offering-tables further to the west (as revealed, for example, during the 2018, 2019 excavations), it could not be reasonably claimed that sand was chosen as more appropriate for structures used in temple cult. These deposits were damp when first exposed. A layer was at first left adhering to the sides of the offering-tables. As it slowly dried it fell away, leaving the tables fully exposed and revealing that they were relatively well preserved (Figure 9).

Four rectangular offering-tables lay across the southern half of the trench (mostly in square U25), each at the intersection of an underlying grid which must have been marked out either on the desert surface or on the mud floor which had been laid over it. The same grid or one with slight modifications had covered a wide area at the front of the temple and to the south. The idea that the placement of each offering-table was determined from its mid-point comes from the fact that each of them has different dimensions: NE [19420] 82.5 x 59.75 cm, 46 cm max. ht; SE [19422] 97.5 x 79.5 cm, 50 cm max. ht; NW [19421] 82.5 x 66.75 cm, 60 cm max. ht; SW [19423] 97.25 x 57.5 m, 54 m max. ht. Each also has a different brick pattern, sometimes using broken pieces of brick. In the case of [19422] (SE) gaps were left between bricks which were filled with sand. With [19423] (SW) traces remain of a larger offering-table ([19444], 101.75 x 71.75 cm) which had been cut down and then rebuilt. All this strongly





**Figure 9.** The northern pair of mud-brick offering-tables in the trench south of the temple, view to the west. The broken remains of a foundation for a stone offering-table lie to the right of the nearer brick offering-table. An equivalent foundation to the west has not yet been examined. Photo, Amarna Project.

points to the offering-tables having been constructed at the same time, each one belonging to a common scheme but erected by a separate person not abundantly provided with raw materials.

Once finished, each offering-table was given a thick coat of mud plaster enriched with chopped plant material and painted white. The corners were not sharp but rounded, and had not been given a torus-moulding. Offering-table [19422] had been given two coats of mud plaster and white paint, [19437](#) and [19418](#). Table [19421] (NW) was the tallest, at 60 cm. No individual bricks were visible on the top. The flat mud surface might have been the original.

To the west of this group of four mud-brick offering-tables, an east-west line had extended of single offering-tables made from limestone blocks on a foundation layer of gypsum cement. Others had been discovered earlier within excavation squares I25, J25 to the west. The earlier excavations of Petrie and Pendlebury had not detected them. With all the examples found so far the limestone blocks had been removed. This season's area had covered the locations of two of them, within square U26. They were first revealed as irregular holes in the mud floor. That to the east, <19435>, was completely excavated; that on the west side, <19433>, was outlined but not excavated further, part of it lying beneath the baulk which had been left between U26 and T26. The original limestone blocks for the offering-table built within pit <19435> had been laid on a layer of gypsum concrete [19436] which had filled a hole cut into the mud-plastered floor [19414](#), through to the underlying desert sand (19448). Its surface was 10 cm below the mud floor. When the blocks had been removed most of the concrete layer had been broken although about half of it still lay on the sand. No clear edges were visible, but one can estimate that the offering-table itself was of approximately the same size as the nearest of the mud-brick tables [19420], thus 80 x 60 cm. As with the limestone offering-tables in I25, J25, the new ones, following the same line, were closer to those made from mud bricks although following the same east-west lines. There was no trace on the mud plaster to suggest that they had been built later.



The remainder of the area to the north, covering part of U26 and the whole of U27, contained only a single built feature: a rounded hole c. 75 cm across filled with bricks from the levelling-rubble. As the northern section face shows, the hole was dug into the mud floor before the levelling-rubble was put down. If one looks at the plan of the whole excavations (Figure 2) it can be seen that one or two rows of large holes had been cut into the desert floor and through the gypsum foundations of an inner line of stone offering-tables further to the west in squares O27, P27, Q27 and R27. A prolonging eastwards of the alignment of these holes brings one to the hole in U27. It has previously been assumed that these large holes were to support wooden posts, which seem to have been a widespread feature of the earliest phase of activity at the temple site. With an equivalent area of mud floor exposed in T27 it is clear that the post-hole (if that is what it is) in U27 is not part of a line of them. Comparison with the exposure in O27–R27 also shows that the regularly spaced rows of limestone offering-tables, with their gypsum-concrete foundations, did not extend this far. Had they done so, enough space is exposed along the northern edge of the excavation to have picked up at least the edges of the foundation beds.

The mud floor 19414 between the offering-tables and the northern edge of the excavation extends for 7.5 m. It was (apart from the post-hole) devoid of evidence for structures. The floor had originally been coated with white plaster 19413 of which little remained in this area. The materials of both the mud plaster and the white coating are weak and easily damaged and worn away. Partly this would happen through people walking on the surface, partly it would happen through the almost constant deposition of dust and sand, and subsequent abrasion by sweeping with brushes. Occasional rainfall would accelerate the degradation. These comments provide a necessary introduction to a surprising feature close to the eastern edge of square U27. This is a straight, white line, 69 cm long and c. 9 cm wide, which runs in the same east–west direction as the general trend of the temple as a whole (Figure 10). At first sight, when seen against the darker mud background of the eroded floor, the line reminds one of white lines painted on modern roads and sports pitches. This, however, is an illusion. Originally the entire floor was painted the same white colour.



**Figure 10.** A linear patch of white plaster preserved on the mud floor of the south trench in square U27. The entire floor had originally been coated in white. The preservation of this strip must owe itself to having been protected beneath something lying above (a wooden beam?). South is towards the top. Photo, Amarna Project.

The presence of the line encourages pattern-recognition. One is tempted to look for its continuation across the rest of the excavations area to the west, and for signs of other possible lines or other features. The initial plan, made by conventional scale drawing, identified two lines preserved as fragments, the second parallel line c. 2.4 m to the south. The photogrammetry carried out by Paul Docherty (and the basis of the way the white pigment is reproduced in Figure 6) provides a comparative source, but one that still does not provide a clear answer. The reason is that different degrees of wear to the surface create different colour tones that run from fairly clear remains of white pigment to areas of mud surface which appear pale because they reflect better; and all the time one must remain aware that originally the entire surface had been white. Had it not been for the white line which stands out in the north-east corner of U27 no discussion would be called for. As it is, the line cannot be ignored.

One possibility is that the surface has been protected by being beneath something solid and of the same dimensions, and a beam of wood comes to mind. A second possibility is that it is an accidental result of the way the floor was finished off. Originally the entire surface was coated with white, a huge area. Was it done in wide parallel strips, with a narrow band of overlap? The double thickness would have protected the strips a little more from erosion. But the sharpness and straightness of the line argue against that. It is to be hoped that a better understanding will come from future excavation of the ground to east and west.

Immediately to the north of the end of the trench the ground drops into the ditch which marks the line of the southern wall of the stone temple. As yet this remains filled with wind-blown sand and has not been investigated.

The site of the trench became available for excavation as a result of methodical removal by excavation of the large spoil heap from past work during previous seasons. This was resumed in the latter part of the season, as part of the longer-term plan to make available for excavation a large area of the buried floor and offering-tables on this side of the temple. As in past seasons, the work was supervised by Julia Vilaró. It covered squares S24, T24, U24 and T23 (Figure 2). A quantity of sculpture fragments was recovered.

### **3. North wall trench**

The plan of the large stone temple which was built over the earlier layout during Akhenaten's reign is of a rectangular building 188 m long (excluding the colonnades at the front) and 32 m wide, unusual in its narrowness compared to its length. Internally it was an open space from front to back, subdivided by several partition walls given pylon-like appearances, the whole filled with limestone offering-tables to an estimated total number of around 750. Since the stone temple replaced the earlier layout that included even more offering-tables (of mud brick) it is reasonable to conclude that the stone temple was a more elegant and monumental version of the earlier layout. Although it had been designed with an impressive entrance system on the west, access to the offering-tables would have been difficult without supplementary doorways along the south wall (and perhaps also the north wall). If such had been provided, however, they are not shown in the tomb pictures.

The Pendlebury expedition, according to the plan made by the architect R. Lavers, had cleared the debris that had filled the trenches in which the surrounding wall had been built, recording details of the gypsum-concrete foundation layer. In previous seasons the expedition had started to clean the trenches again, under the supervision of Juan Friedrichs who has made fresh plans as the work has progressed. By the end of 2019 a length of roughly 45 m of the north wall (extending eastwards from the line of the front pylon) had been cleaned and planned, as far as a point half way along square AA35. A start had also been made on building a new foundation wall for the intended final course of fine Tura-limestone blocks. In the course of the 2020 season it proved possible to extend the clearance of the trench and the planning of the foundations by a further 53 m (to the end of AK35). Once the clearance was under way the builders began to lay the courses of small local limestone blocks for the new foundation wall. They finished the last stretch on March 29th. The new wall now has a total length of 100 m (Figures 13 and 14). This leaves a further 72 m before the new wall joins the stonework of the north-east corner,

the foundations for which were examined and rebuilt in 2017. The wall had kept a constant width of 1.18 m, which could be measured from the ancient builders' guide lines.

It had already been found, during the autumn 2019 season, that the Pendlebury expedition had abandoned the clearance of the trench part of the way along, stopping its eastwards progress at a point c. 40 m from the line of the front pylon (thus in square Y35). Lavers had, nonetheless, filled in details of the block pattern of the gypsum-concrete foundations. The foundation layer, in this newly cleared part, turned out to be generally well preserved, with many places where the original builders' ink guide lines were visible. The depth of the trench floor also rose where two successive steps upwards had been created (in addition to a third found earlier, in square S34). One was in square AB35, the other in square AF35. The result was that, whilst the level of the foundation concrete was at 46.90 m near the western end, at the eastern end of AK35 it lay at 47.59 m. Since this is very close to spot heights on the foundations beside the north-east corner (two values are 47.62 m and 47.63 m) we can conclude that no further steps were added along the remaining unexcavated section.

The stepping-up of the foundations does not seem to have corresponded with a stepping-up of the pavement within the temple. This pavement is represented by a thick layer of gypsum concrete running beside the wall trench on the south side. Close to the front pylon this stood at a height of 47.94 m (but 48.09 m in a corresponding place on the southern side of the temple). Beside the trench in square AK35 it was 48.07 m and 48.05 m. As had been noted in 2019, from large pieces of the concrete that had slipped into the trench after the stonework of the wall had been removed and was thus well preserved, the surface of the concrete had been left rough and uneven, with no sign of mortar for a covering layer of stone paving blocks.

The interior space of the temple had been divided by cross walls which thickened towards the middle and so gave emphasis to a doorway. These walls had, according to Lavers' plan, joined the long side walls. One of these was anticipated in square AB35. The excavation revealed a well-preserved T-junction which coincided with one of the steps in the foundation concrete (Figure 11). The wall which ran towards the depression which marks the foundations for the entrance had the same width as the north boundary wall. It was, however, exposed for a distance of only 70 cm.

### **Later burials**

In 2019 several burials were discovered, within the line of the foundation trench and in small pits cut into the gypsum-concrete pavement beside the trench on the south side. They were all for children, except for an adult female in the trench. It seems likely, from an eroded coin, some beads and a sherd that the burials within the trench were of the Late Roman Period whilst the children buried in the neighbouring pits at a higher level were from an undetermined time after the Arab conquest. The two groups seemed also to follow slightly different orientations.

This time only a single burial was discovered in the trench, again of a child buried with head to west, on its right side, face uppermost. Excavation and recording were done by Tim Hagedorn. It wore a pair of earrings, each one a simple circlet of copper-alloy wire (object no. 43520, Figure 39). Other pits probably for child burials had been dug into the higher ground on either side of the trench but none was investigated further.

### **Outlining the temple with new stones**

The main purpose of cleaning the original wall trenches, as with the trenches which accompanied the front pylon and associated colonnades, was as a preparation to marking the main outlines of the temple in new blocks of good-quality limestone cut to the ancient size which centred on a length of one ancient cubit (52 cm). These blocks are mostly intended to form a single course mortared on to a foundation of small, local limestone blocks





**Figure 11.** Area 3, the north wall of the temple. The foundation trench has been cleaned, exposing the remains of the gypsum concrete foundation layer. This is the place where the wall separating two of the temple courts joined the north wall. The foundation trench for this joining wall is still filled with white stone debris, visible in the section. View to the south. Photo, Amarna Project.



**Figure 12.** Area 3, the north wall of the temple. The view is the same as that of Figure 11 but the photograph was taken after the wall trench had been filled with a new stone foundation and sand. The beginning of the wall running south to divide the two temple courts has also been marked with new stonework. View to the south. Photo, Amarna Project.





**Figure 13.** Area 3, the north wall of the temple. The ancient foundation trench for the wall has now been filled with a new wall of small limestone blocks. In the future it will be covered by a layer of fine limestone blocks from the El-Tura quarries. View to the east.



**Figure 14.** Area 3, the north wall of the temple. Photograph taken on the last day of work showing the completed new foundation wall which now has a length of 100 m. View to the east.



**Figure 15.** The front of the stone temple, its features marked by new stonework and column bases made in reinforced white cement. The central feature is the base of a long staircase originally leading up to an offering-platform. On either side there had been balustrades in a different stone. Granite from Aswan has been chosen to represent them. View to the south-west.

which will not be visible. A start had been made at the western end, beside the pylon, in an earlier season. Here the foundation wall required a depth of seven courses of the small blocks. The continuation began on February 15th and ended on March 29th. By the end, because of the stepping-up of the level of the foundations, the number of courses of small blocks was reduced to three, resulting in considerable acceleration of the work. The top of the wall closely matches the surrounding ground level. When the time comes to add the final layer of Tura limestone blocks most of their thickness will be above the surrounding ground level.

Incorporated within the wall (but now invisible) are many blocks which bear the names of donors whose contributions have helped pay for the project.

Last year the marking of the staircase leading to the platform between the front pylons of the temple by means of new limestone blocks was finished. Originally the sloping side walls to the staircase had supported balustrades made from slabs of a different stone, either alabaster, granite, indurated limestone or quartzite, all known to have been used for this purpose. As a finishing-touch, four blocks of Aswan granite were obtained, cut to an appropriate thickness, and were cemented into grooves made for that purpose in the upper surface of the sloping ramp walls (Figure 15). The original balustrade slabs would have been higher but, if reproduced exactly, would have made them disproportionately tall and also vulnerable to damage.







**Figure 17.** Area 4 on the east side of the temple, the site of the Butchers' Yard or Slaughter Court. In the foreground is the side of the entrance to the courtyard, made from mud bricks. Beyond it the original mud floor is still covered with an organic layer. View to the north.



**Figure 18.** Vertical photogrammetric composite of the 2020 excavation area at the Butchers' Yard site. North is towards the top. Photogrammetry by Paul Docherty.

The ancient ground level lies very close to the modern surface, which has been much disturbed by the regular passage of farmers and their animals and by motor vehicles, sometimes delivering loads of stone blocks for the construction of more tombs and their enclosures. Despite this, once the covering of loose sand and dust has been removed, with trowel and brush, thin archaeological layers remain in sufficiently good condition to repay careful investigation.

The 2020 season began with the removal, across a wide area, of modern building debris, the remains of illegally built (but not yet used) tomb enclosures which had been recently demolished by government order. The excavation was done across a block of four contiguous squares, DH38, DH39, DI38 and DI39. In the case of square DI39, the topmost material had been excavated in 2019, exposing the mud-brick wall [19300] and its gateway, located at the south-east corner of the enclosure which formed the Butchers' Yard.

The mud-brick wall [19300] divides the excavation area into two almost equal zones, representing the inside and the outside of the court. Over much of the interior of the court, last season's work had shown that erosion has removed much that had lain on the ancient desert surface. The brick wall must have collapsed over time, and the resulting debris will have helped to preserve deposits beneath it. The excavation of the northern pair of squares (DH39, DI39) exposed a wide spread of crumbly mud floor 19299 (DI39) and 19392 (DH39). Above this lay a deposit — 19273 (DI39) and unnumbered (DH39) — of light brown dusty material containing small stones. A sample viewed under a low-powered microscope revealed primarily quartz grains, many tiny carbon fragments and occasional pieces of plant material. A few bones were recovered (two provisionally identified as from cattle). It was covered with irregular patches of a pale, grey crust which is probably the result of chemical reactions within a layer containing waste matter from humans and animals (it was prominent above rubbish deposits outside the walled village at the Workmen's Village site, for example). Here it would be consistent with the decayed remains of animal manure. In Figure 16 the general outline of this crust is marked with a broken line. It is visible in the photographs, Figures 17 and 18. Beside it in DH39 patches remained of deposits with the colour of mud bricks and an irregular top surface (19388). These are probably the eroded remains of a layer of collapsed brickwork from the wall which, closer to the wall, has been entirely lost as a result of weathering.

The deposits covering the ground in both squares had been cut by a pair of trenches, c. 25 cm across. These are likely to be the work of Pendlebury's workmen, asked to dig test trenches using a broad-bladed mattock, a common way of quickly examining ground at the time. A pattern of these trenches criss-crossing the site is faintly visible on the 1935 aerial photograph.

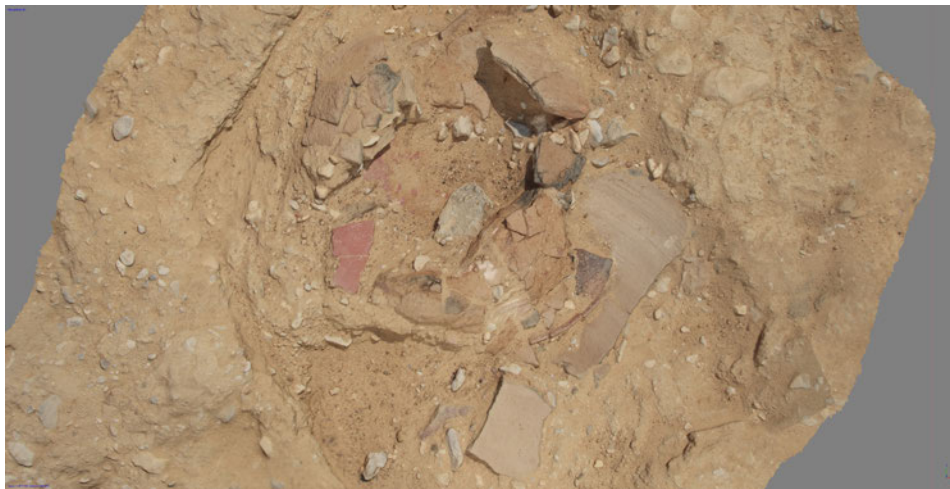
South of the enclosure three areas remained from a 'floor' or covering of mud, 19393 (in two places) and 19456. They are greyish to dark brown, with crumbled and powdery surface, poorly defined at the edges and containing pebbles and only a few potsherds. Part of 19313 was preserved in a narrow strip running close to the brick wall, its preservation perhaps as a result of a covering of decayed bricks. Where it touched the wall, at its western end, a small patch of white plaster was preserved, supporting the idea that, at least for some distance, the 'floor' had been a properly laid white-plastered mud surface. The other part remained as an island and was covering a thin layer (19363) of mud, sand, pebbles and a few sherds which seemed to be a layer preparatory to making the floor. The broad expanse of 19456 spreads across the southern half of the square.

On first being uncovered following the brushing away of the surface sand, little of interest was visible. Repeated examination and brushing of the surface revealed darker, softer areas, sometimes rounded, sometimes elongated. These turned out to be the fills of fairly shallow pits cut into the desert. Three of them were circular: <19394>, <19396> and <19398>. The filling material was as follows: for <19394> it was (19395): dark brown soil containing, near the surface, a little resin, and further down a few date stones, feathers and charcoal; for <19396> it was (19397): dark brown soil with pebbles, devoid of other material; for <19398> it was (19399): dark brown soil with a



few pebbles, but no sherds or other finds. The purpose of these holes was clarified by a fourth (and larger) example <19400> (Figure 19). It had originally contained three pottery vessels, probably placed one above another – a red-slipped bowl, a medium storage vessel and a ‘hearth’ – which had become crushed within a shallow hole, with the subsequent loss of many of the broken pieces.

Further east were two elongated oval cuttings or trenches into the desert, <19364> and <19366>. They were initially visible on account of the darkness of the filling material: for <19364> it was (19365): grey, sandy soil in which were found feathers, charcoal, date stones, fragments of wood and potsherds; for <19366> it was (19367): greyish pebbly soil containing feathers, charcoal, date stones, fragments of wood and potsherds. Pit <19366> had also had a pit <19455> cut into its base (devoid of distinctive material), and three secondary smaller pits cut into one side: <19368>, <19451> and <19453>. The filling material for the three was: (19369) in <19368>: dusty brown soil with pebbles containing feathers, charcoal and sherds; (19452) in <19451>: dusty brown soil with pebbles and no cultural material; (19454) in <19453>: dusty brown soil with pebbles and no cultural material.



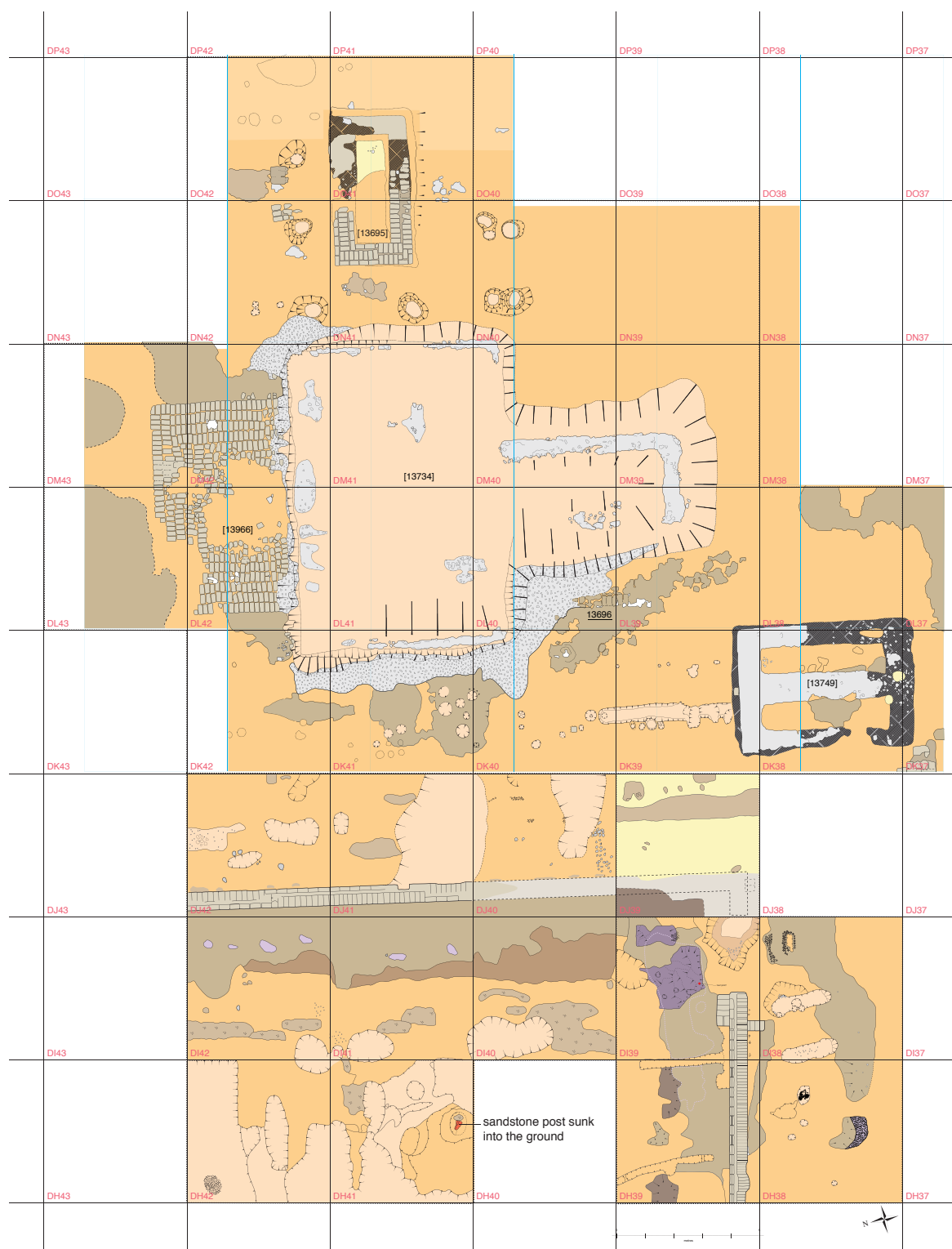
*Figure 19. Photogrammetric record of the group of crushed pottery vessels in hole DH38 <19400>. Photogrammetry by Paul Docherty.*

Both of the long pits ran into the edge of the mud layer (perhaps floor) 19456. The intensity of erosion makes it hard to be sure what the chronological sequence is. Nevertheless, it can be stated that the southern end of pit <19364> in particular was judged to run beneath the material of 19456. This observation could make the pits and their contents earlier than the Butchers’ Yard, assuming that the floor had not been repaired. A way of checking this would be to see if similar pits lie beneath the better-preserved floors inside the Butchers’ Yard. It was planned, therefore, to remove areas of the floors within squares DH39 and DI39 lying to the north. The early stoppage of work at the site prevented this plan from being carried out, however. It is hoped to resume it in the future.

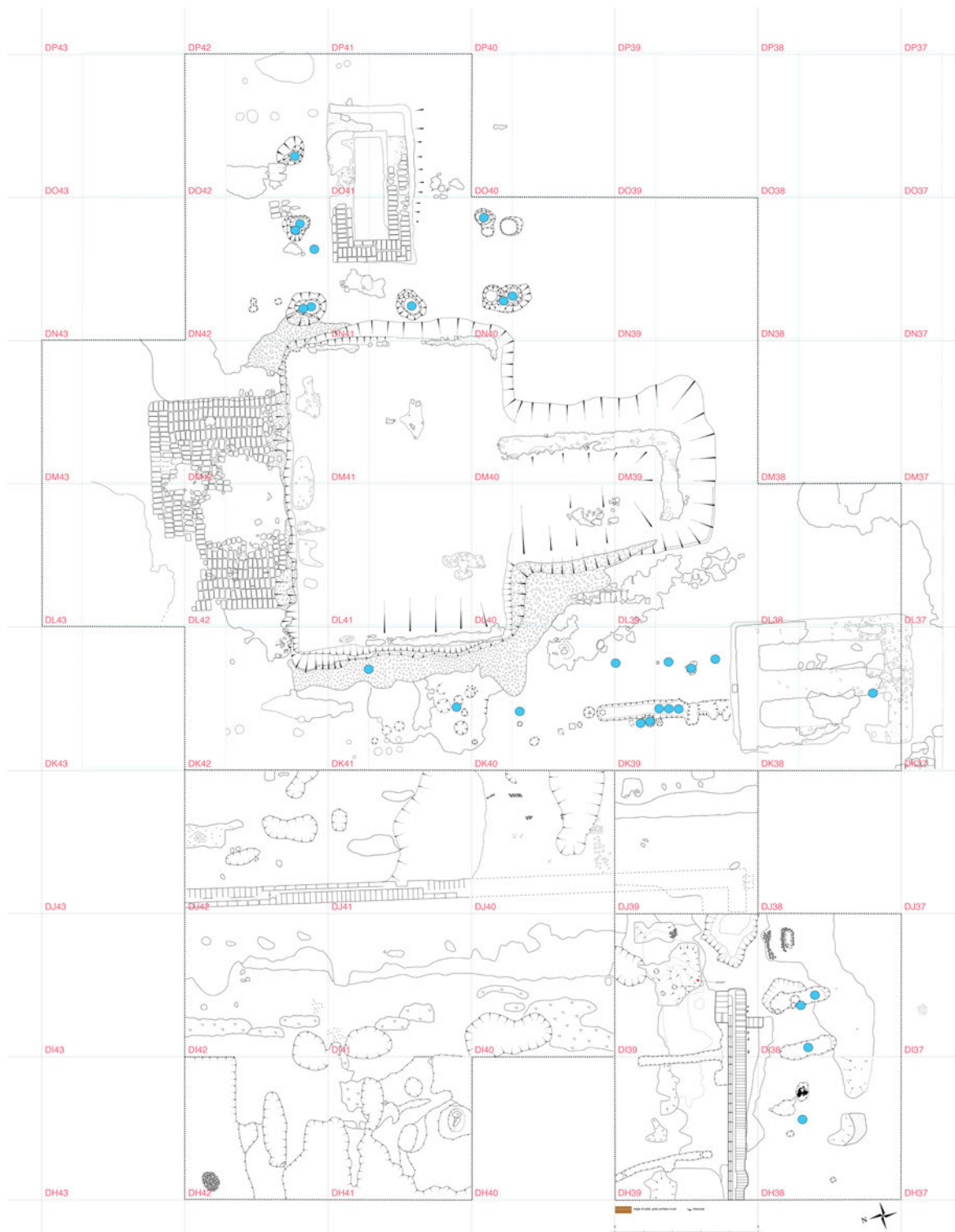
#### **Comparison with the results of the excavation of 2012 on the adjacent ground to the east (the Stela site)**

The excavation of 2012 (under the supervision of Mary Shepperson) centred on a T-shaped pit in the desert which had been recognised by the Pendlebury expedition of 1933–4 as the likely site of a large free-standing stela shown in three of the rock tombs (Meryra, Panehsy and Ahmes). The resulting plans from the 2012 season have been added to those from this year’s work (Figure 20).

The 2012 excavation recognised two phases of construction and activity (Shepperson 2012). The earlier included areas of mud floor in which could be recognised many holes in which pottery vessels had been stood and others for the support of wooden posts. The practice of setting pottery vessels in shallow holes in the ground as a way

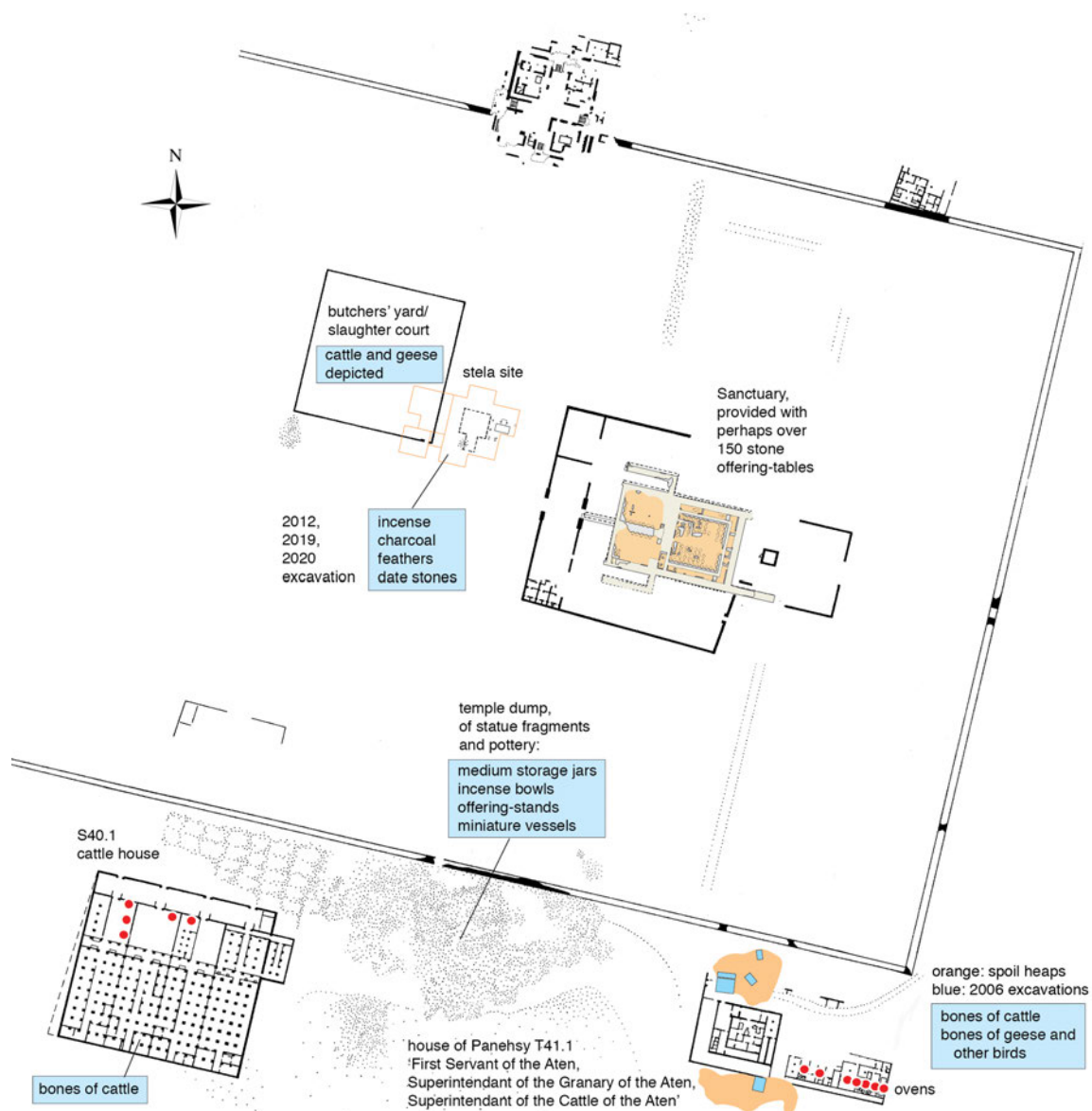


**Figure 20.** Combined plan of the Stela Site (above) and Butchers' Yard (below). Original plans of the Stela Site (2012) by Mary Shepperson, and of the Butchers' Yard (2019, 2020) by Marzia Cavriani.



**Figure 21.** Combined plan of the Stela Site (above) and Butchers' Yard (below), see Figure 20. In this version the blue circles mark the locations of accidentally buried deposits of offering materials.





**Figure 22.** Plan of the rear part of the enclosure of the Great Aten Temple and surrounding ground. The highlighted features identify evidence that relates to the preparation of offerings.

of keeping them upright has been found elsewhere in the temple enclosure, primarily on the upper mud floor in front of the temple and also on the earlier mud floor a little to the south, and an area of early mud floor on the north side of the stone temple. The practice seems to have been an alternative (and a cheaper one) to the use of wooden stands for the same purpose, something which is to be seen in the tomb pictures. As for post holes, a distinctive group were 50–70 cm wide and up to 1.9 m deep, with smooth vertical sides. They had surrounded a small mud-brick platform [13695] (in squares DN41 and DO41) on the north side of which were the remains of what had probably been a small brick staircase. The placement of the post holes around the platform suggests that they had supported a canopy. The later phase saw the erection of the T-shaped stone platform, presumably with staircase, in a shallow pit floored with a foundation layer of gypsum concrete [13734]. It matches the image depicted in the Amarna rock tombs of how the large, round-topped stela had been displayed. Close by was a second rectangular foundation of gypsum concrete [13749]. The fact that it was laid directly on the desert surface, without foundation trench, implies that its height was modest. The stela platform [13734] had been surrounded by a further floor, of which large patches remained, partly made from mud plaster and partly made from mud bricks laid as a rectangular pavement [13966] behind (to the north of) the stone platform.



**Figure 23.** Part of the depiction of the House of the Aten in the tomb of Meryra at Amarna. It shows the stela with accompanying statue of the king. Below is one of the two butchers' yards. At 'A' two birds prepared as offerings lie on a dish. Other offerings are shown on cylindrical stands (perhaps of bronze) and one amphora stands in a wooden frame. After RT I, Pl. XXXIII.

With archaeological deposits that are so shallow and eroded, stratigraphic evidence is inevitably ambiguous. On reviewing the results of the 2012 excavations, a good case can be made for re-dating the brick platform and some other areas of mud floor to the earlier phase. The most important reason centres on the area of mud floor 13696 which lies on the west side of the staircase foundations. Impressed into the mud are the shapes of a line of bricks. These align with the western edge of the brick platform [13966]. It could be that both belong to the same feature and that originally the brick platform occupied much of the space later taken by the foundations for the stone platform and staircase where the stela stood. This would leave the later phase represented only by the two sets of foundations for stone buildings. The fragments of carved purple quartzite from one or more reliefs (one of them presumably the stela itself) include Aten cartouches, in the early form. This suggests that the building work was carried out before Akhenaten's year 12, and thus probably before the Long Temple was started.

The holes for wooden posts and the holes made to keep pottery jars upright trapped small amounts of debris which presumably lay more thickly over the ground, namely, incense, charcoal, feathers, date stones and potsherds. Figure 21 shows the locations. Of the various materials incense is the most widely distributed. The material suggests the preparation of offerings, involving birds (one thinks of geese but no specialist identification of the feathers has yet been possible). The flat open ground of much of the temple enclosure has seen little accumulation of sand since the Amarna Period, other than that of the spoil heaps of modern archaeologists. Almost three and a half thousand years of periodic winds will have removed much of the light debris, especially feathers and plant material, and caused pieces of incense to crumble away. The buried deposits are a rare form of evidence: trapped samples of what must have been an uneven ground-cover of rubbish from the use of the area for the preparation of offerings. To get a better idea of how wide this area was will require an extensive programme of sampling across the flat surface of the temple enclosure, in particular to locate further holes left by pots and posts.

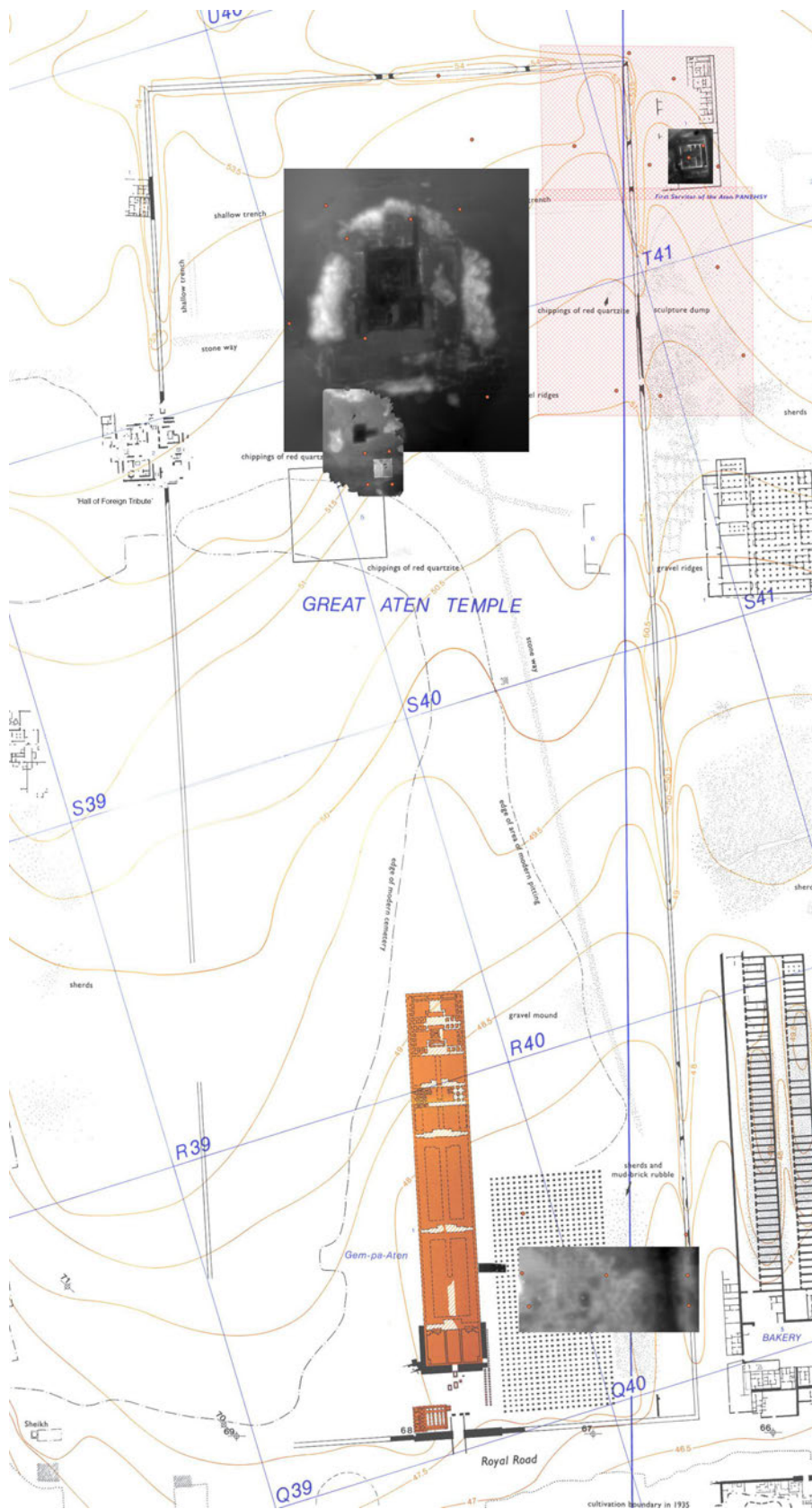
The evidence for birds (mainly geese, one assumes) has the makings of a trail across the rear part of the temple enclosure (Figure 22). Although no feathers have been found inside the Butchers' Yard, one of the tomb pictures (tomb of Meryra) shows a pair of plucked birds, their wings, feet, neck and head removed, lying in a shallow bowl within the yard itself (Figure 23). Feathers have been recovered from several of the pits in the ground outside, both to the east and to the south. The end of the trail for us is represented by material from test trenches in old spoil heaps around the house of Panehsy, although it lies outside the temple enclosure wall and more than 100 m further to the east (Payne 2006, 2007). Of a sample of 371 bird bones, goose was the dominant species but bones from other birds were present as well (including the common crane, teal, water rail, doves, quail, wading birds and a variety of perching birds, including shrike), suggesting an eclectic approach to capture (Stimpson 2016a, 2016b). The parts of the birds that were identified were predominantly leg and the main bone from the wing, suggesting that the edible parts had been taken and consumed elsewhere. Of the mammal bones found and identified, 95% were from cattle. The person who identified them concluded that the butchery had been done at the house of Panehsy (Payne 2006, 2007; also Legge 2012, 11).

Taken together the evidence points to both the Butchers' Yard and the ground around Panehsy's house as places where cattle and birds were killed and prepared as offerings (and ultimately for eating). The spread of incense in the ground near the Butchers' Yard and the Stela site points to this as a place where offerings were 'presented', although if, in the early phase, there had been a formal and permanent place for presentation — one or more offering-tables — it has left no trace. It could have been situated where the foundations for the stela platform were later dug, or the offerings could have been placed on tables made of wood or tall stands made of bronze or pottery and thus portable. Such supports are a common element in the tomb pictures, and a bronze offering-stand was amongst a group of bronze temple vessels found buried in the nearby Sanctuary (COA III, 188–9, Pl. LX.5–8; Kemp 2012, 107, Figs. 3.19–3.21). The Sanctuary itself, with its offering-tables, could have been the main place for presentation. The final stage in handling the birds and joints of cattle meat, the cooking and eating, must have taken place somewhere else, since across the entire space of the temple enclosure no trace of a single oven has been found. By contrast, the house of Panehsy, just outside the enclosure, was furnished with seven (Figure 22).

## Photogrammetry

Photogrammetry is now a regular technique used in archaeology. It can be used at different stages throughout a project from initial site surveying, excavation recording, through to artefact analysis and archiving. Whilst photogrammetry has been looked at previously at Amarna (Docherty 2019), the Spring 2020 season included a digital archaeologist, Paul Docherty, who joined the team with the purpose of undertaking photogrammetric captures of the site excavations and any features discovered. Initially this was to take place over a four-week period during the second half of the season. However, global events surrounding the Covid-19 pandemic reduced the time to two weeks. The following is a summary of the areas and features captured during this time. The results were obtained through a combination of hand-held cameras and a small remotely-controlled camera mounted on the end of a 3.5 m lightweight pole.





**Figure 24.** Plan of the enclosure of the Great Aten Temple and associated subsidiary buildings (part of Kemp and Garfi, 1993, sheet 4). The rectangular areas with grey-scale features are areas of completed photogrammetric survey. The pink rectangles cover areas not yet fully processed.

The latter involved the use of a DJI Osmo Pocket; a dedicated camera and gimble combined into a small form factor. This camera is small and lightweight, is able to shoot 20mb stills and 4K video at 60 frames per second remotely through a mobile app. With the ability to shoot 4K video at a fast frame rate the Osmo Pocket opens the potential to use a variation in photogrammetric capture known as structure-from-motion (SfM). Here we record a video of the ground surface throughout the predefined capture route. Once this has been achieved, we can extract the relevant individual frames from the video and use those as the input for photogrammetric reconstruction. This method has the advantage of maintaining a constant coverage with appropriate overlap between images. It is also possible to extract further images from the video should there be a need during camera alignment in software.

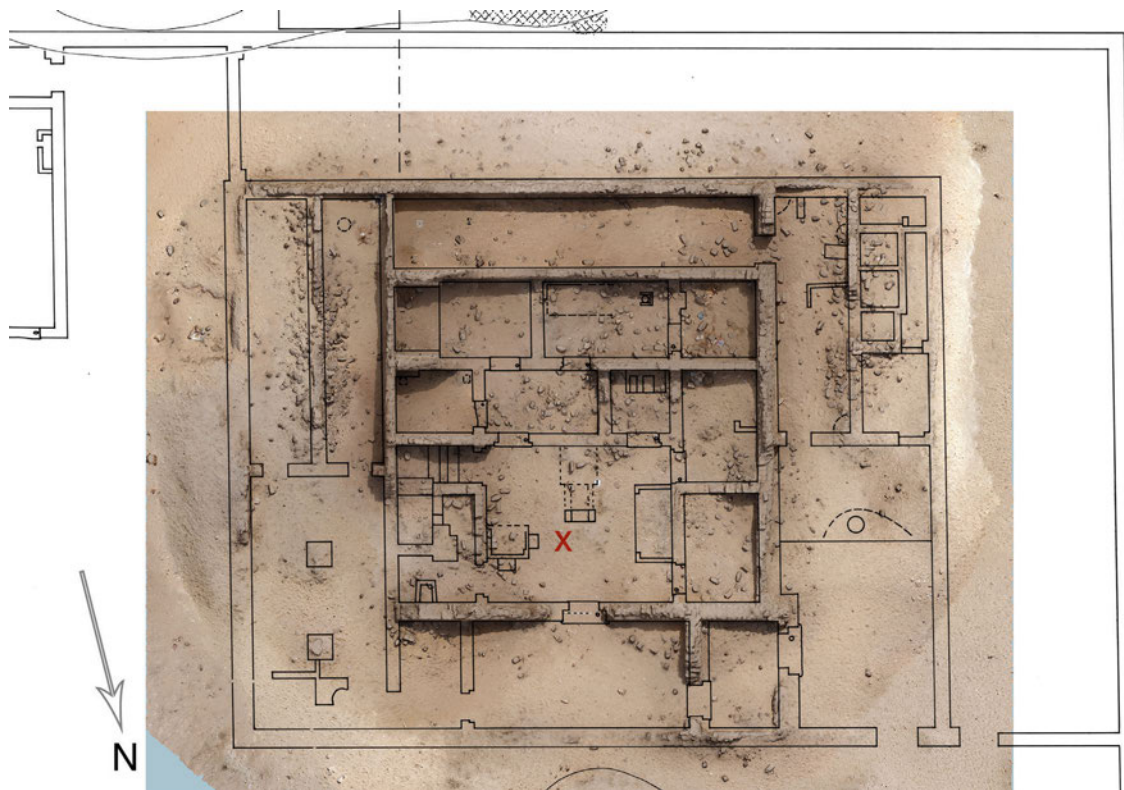
To maintain accuracy in the physical measurement of the site, ground control targets (GCT) were laid down and surveyed by Anna Hodgkinson and Miriam Bertram. The data from these GCTs were then used to scale and orient the reconstructed models later in software. In order to ensure that the captures were successful it was important to check the data at the end of each day and run a test photogrammetric reconstruction. Processing was done at low settings within software to enable quick results and determine whether further captures of the subject needed to take place.

The current main aim of the photogrammetry is to develop a comprehensive three-dimensional record of the Great Aten Temple enclosure and surrounding ground into which the results of the present excavations can be integrated (Figure 24). Most of the time was devoted to the capture of features at the eastern end of the enclosure. This encompasses the Sanctuary, a house (T39.1) that the north-eastern wall of the enclosure had cut across, the 'Hall of Foreign Tribute' that straddles the northern wall, the Stela and the Butchers' Yard (or Slaughter Court). The related ground also includes the northern house of Panehsy (T41.1), a senior priest and administrator of the temple. A sample strip across the south-western part of the enclosure, in continuation of the excavated trench (area 2), was also undertaken.

#### *Northern House of Panehsy*

Figures 25–28 show the house of Panehsy and demonstrate how much detail the method can capture. It is also a record of by how much the house has changed since the excavation of Frankfort in 1926 (COA III, 26–7, Pls. XXX, XXXI; Frankfort 1927, 211–13; Figs. 1, 2; Pls. XLIV, XLVII). The red 'x' is close to where the limestone shrine had stood. It had comprised a rectangular platform reached by a staircase of almost the same width, and a small shrine of carved and painted blocks built on top. By the time the house was abandoned the shrine had been demolished and many of the blocks removed. Those that remained were, with one exception, parts of the decorated shrine itself, evidently found loose in the sand and rubble fill of the house. The exception was the group of the stones which marked the beginning of the stairs. They were still in place, as were the ends of the two low balustrade blocks set in grooves. Also still in place was the bed of gypsum concrete which still retained the outlines of the lowest course of blocks. The brick wall behind also preserved some of its original mud plaster, including an area smeared with the cement used on the blocks of the platform which had stood against the wall.

The loose, decorated blocks were removed and taken to Cairo where they can still be seen, restored, in the Egyptian Museum. The unique foundation layer, with its lowest step and balustrade blocks, seem to have been left behind. We can imagine what happened afterwards. Villagers suspected that the gypsum foundation covered the entrance to a tomb and dug into it. On finding nothing they extended their digging until much of the surrounding brick floor had been removed, and the rear wall as well, which had stood about 1 m tall. The new images show the extent of the loss.



*Figures 25 (above) and 26 (below). Photogrammetric vertical capture of the northern house of Panehsy. In Figure 25 the image has been overlaid with an outline plan of the house based on the excavation plan of 1926 by H.B. Clark (COA III, Pl. XI). The red 'x' is close to where the limestone shrine had stood (see also Figure 27). Photogrammetry by Paul Docherty.*





*Figures 27. Photograph of the location of the limestone shrine in Panehsy's house, as it was found in 1926. The red 'x' is in the same location as in Figure 26. View to the south. EES archive photograph 26/5.*



*Figure 28. Photogrammetric oblique capture of the northern house of Panehsy, viewed to the north-west. Photogrammetry by Paul Docherty.*

### *The Sanctuary*

The Sanctuary is the name given by the Pendlebury expedition to the stone building which had stood across the temple axis towards the rear of the main enclosure. It had been first cleared by the Petrie/Carter expedition of 1891/2 and then by the Egypt Exploration Society in two seasons: Frankfort in 1926/7 and Pendlebury/Lavers in 1933/4. By the time of this last excavation all of the covering material had been removed and heaped around the sides. There must have been relatively little left to excavate. Lavers' plan, supplemented by a few photographs taken at the time, is the main source for our understanding of the site.

It was briefly looked at in 1986 by Garfi and Kemp resulting in additions and modifications to Lavers' plan (AR IV, 103–14 and especially Figure 8.1, reproduced here as Figure 29). The additions were principally very broken sections of an embankment which had originally surrounded the building on the north, south and east sides. The embankment had evenly sloped outwards to a width of c. 6 m. It had been built up with gypsum mixed with fragments of stone, some quite large and of sandstone. 'Over a long period of time it weathers from white to brown, and exposed surfaces appear to take on an added hardness, so that the result is fairly durable' (AR IV, 105).

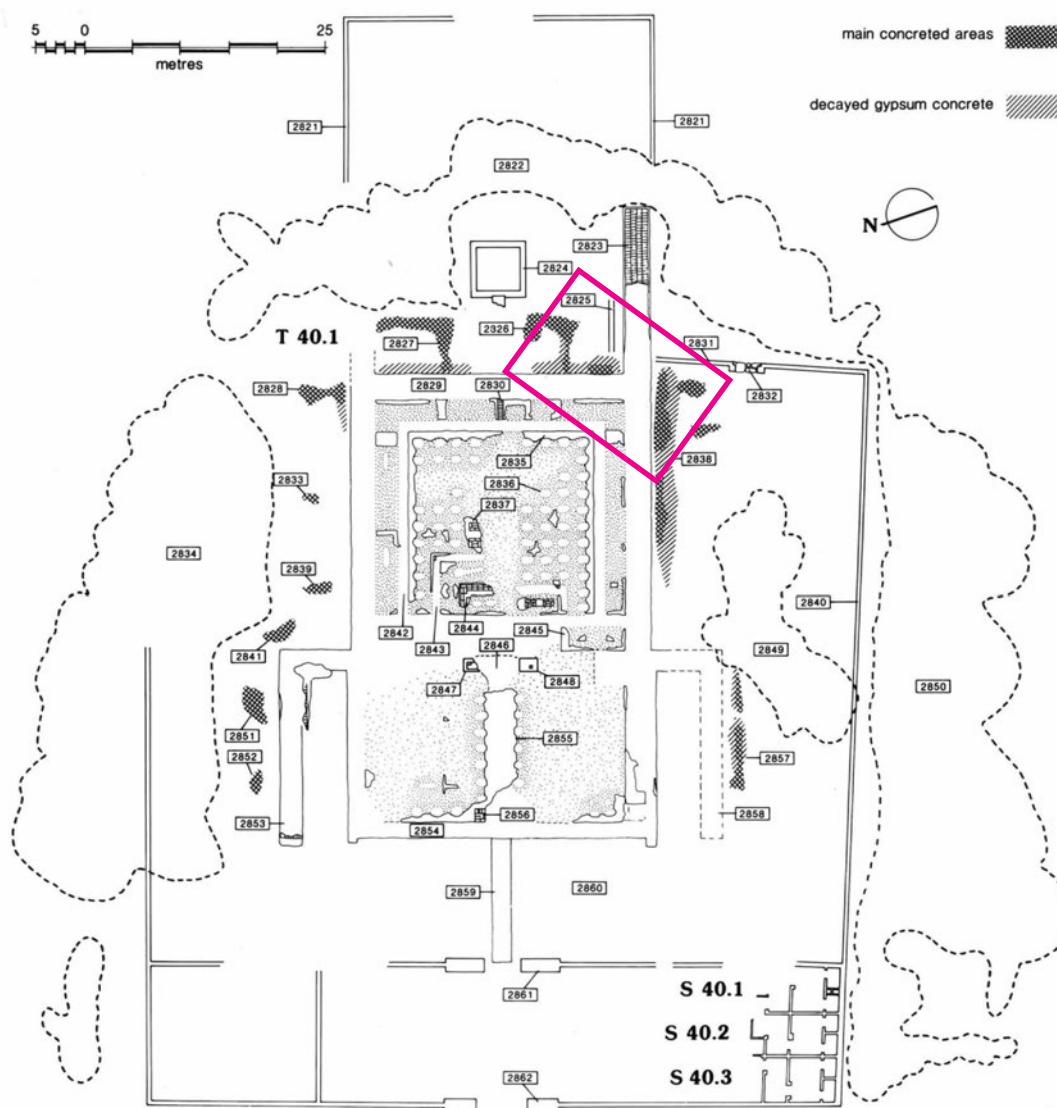
'The embankment was perhaps mistaken in Pendlebury's time for rubble deriving from the destruction of the Sanctuary, but if so this was wrong. Wherever portions are at all well preserved they display a constant and even slope downwards away from the walls of the Sanctuary, and, as the COA III photographs show, when viewed laterally it has an impressive evenness of thickness and disposition in relation to the underlying ground. It has to be accepted that it is part of the original building' (AR IV, 105). (The COA III photographs, Pl. XXVI.1, 2 and 4, show the sections as they faced inwards).

As to its possible purpose, Kemp has speculated that the entire Great Aten Temple enclosure represented a miniaturised rendering of Akhetaten itself, reduced to a set of architectural symbols. 'The Sanctuary at the back of the Great Aten Temple thus represented the eastern mountain. The strange stone wings that ran outwards and forwards from beside the pylons are a simplified rendering of the desert cliffs that, having formed the horizon for Amarna, turn and run towards the river. Moreover, the idea that the Sanctuary stood for the Horizon of the Aten, the distant line of cliffs and thus a plane elevated above the desert in front, was given material form by making it seem to stand on a white hill' or mound, the remains of which are the gypsum embankment sections around the sides and back of the Sanctuary. 'By this explanation, the big flat open space in front represents the desert of the Amarna plain, and the Long Temple the place in the city where people gathered to greet and celebrate the sunrise' (Kemp 2012, 94).

The main aim of photogrammetry here was a more accurate record of the remains of the embankment around the edges of the Sanctuary and, incidental to this, a record of what remains of the foundations of the stone building itself.

To this end a full photographic capture of the site was achieved. Processing was directed towards a series of outputs. The first was a topographic model in which elevation is conveyed by false colours, ranging through the spectrum from red for high elevations to violet for low elevations and shaded to convey the rise and fall of the surface of the ground. The ground control points ensured horizontal accuracy so that the result (Figure 33) incorporates a more accurate plan of the remains than was achieved by Lavers (and the 1986 corrections).

The second output was a series of 3D-visualisations of photographic quality for which high angles were chosen to provide bird's-eye perspectives both of the site as a whole (Figure 30) and of particular features, such as the gypsum-concrete embankments which originally surrounded the central part of the building (Figure 31).



**Figure 29.** Plan of the Sanctuary of the Great Aten Temple, after Lavers in COA III, Pl. VII, with additions and corrections made from observations in 1986 and the use of an aerial photograph taken in 1935, reproduced in AR IV, 104, Figure. 8.1. The red box marks the area which is shown in detail in Figure 31.

The third output derived from the digital elevation data which are a vital part of photogrammetric capture. One use to which the data can be put is a contoured version of the topographic model, with contours calculated down to centimetre intervals. The same data can be used automatically to create profiles along chosen lines. For the Sanctuary five lines were chosen and five profiles generated (Figure 32).

A 'mud paving' spread over the ground west of the Sanctuary. The present surface, which is likely to be not much different in level, stands at c. 52.20 cm, more or less the same as the surface of the 'cement causeway at high level' marked on Lavers' plan. Could this have been the foundation for a shallow staircase either rising to the platform for which the embankments formed the edge or to an offering-platform similar to the one which stood at the front of the Long Temple? Over much of the central space of the Sanctuary, Lavers' plan marks irregular areas of 'cement flooring'. This is likely to be a layer of gypsum concrete on which foundations for stone offering-tables and other features were erected, the spaces between being filled with sand (as in the Long Temple). The embankment around the edge (which extended to the outsides of the L-shaped extensions at the front) will have been faced on the inside with a limestone wall built in the foundation trench which the Pendlebury excavation recovered. The new profiles show that the top of the embankment reached at least an elevation of 53.20 m. It will

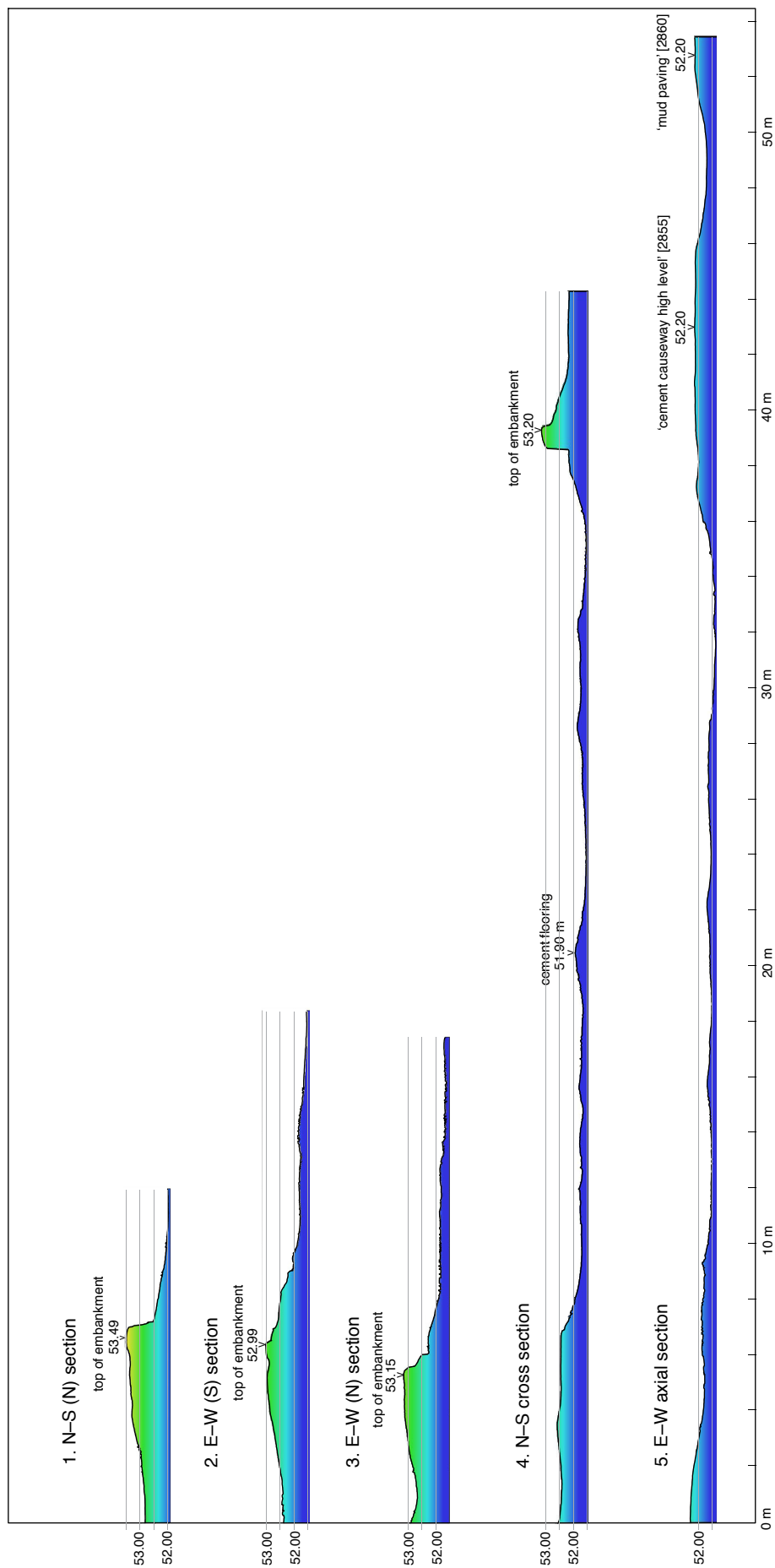




*Figure 30. Photogrammetric capture of the main area of remains of the Sanctuary, viewed to the west. Photogrammetry by Paul Docherty.*

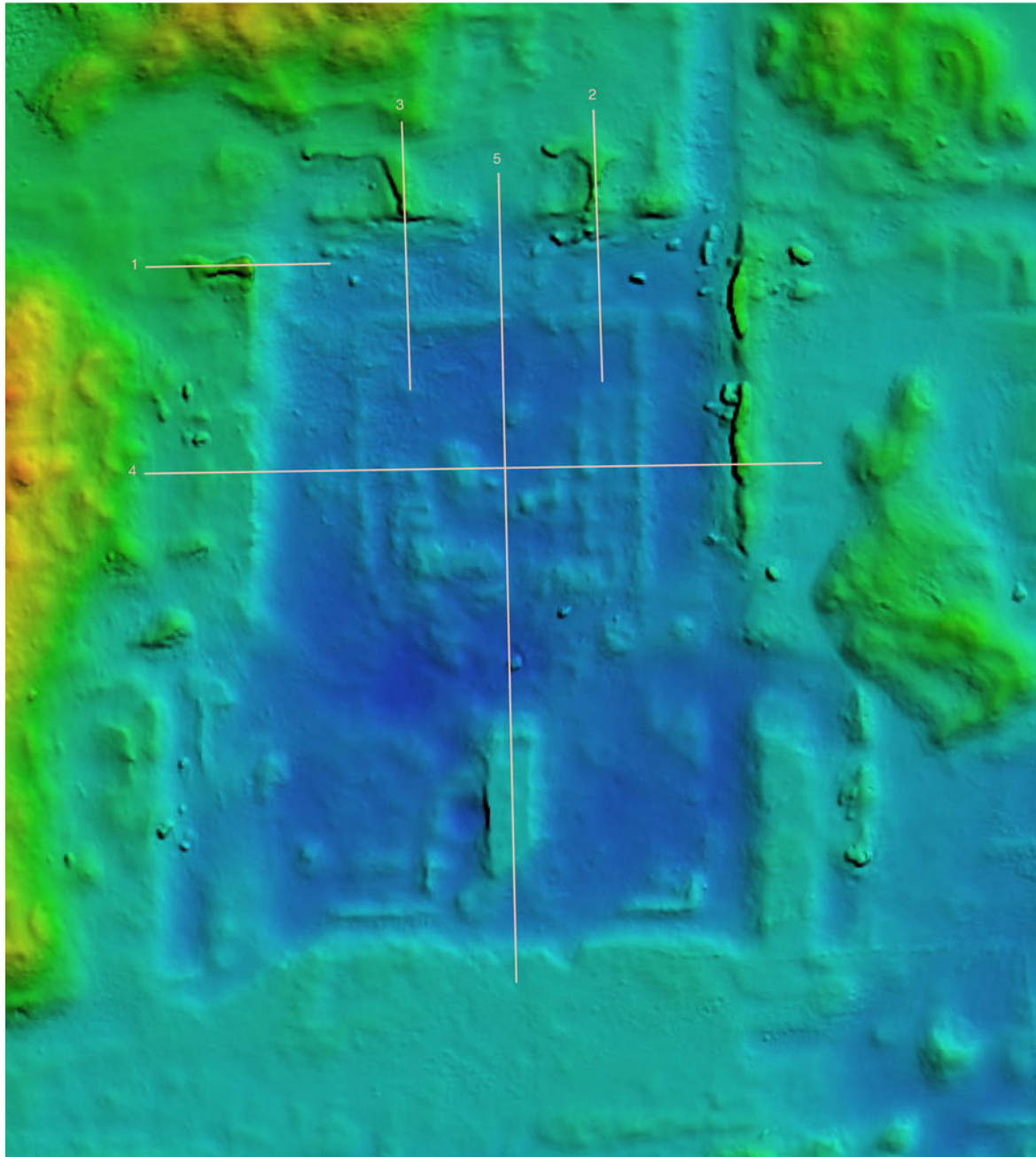


*Figure 31. Detail of the photogrammetric capture of the south-east corner of Sanctuary, viewed to the south-east, showing the remains of the embankments of gypsum concrete which bordered the southern and eastern sides of the building. The area is marked as a red box on the plan, Figure 29. Photogrammetry by Paul Docherty.*



**Figure 32.** Profiles, derived from the photogrammetric data, along the five lines marked on Figure 33. Note that the vertical scale is greater than the horizontal scale. The spot heights derive directly from the digital model.





**Figure 33.** Topographic model of the Sanctuary and surrounding spoil heaps derived from the photogrammetric capture of the site. The spectrum of false colours conveys elevations, from red (high ground) to violet (low ground), with shading to aid visualisation. Lines numbered 1–5 are those of the five profiles of Figure 32. Photogrammetry by Paul Docherty.

thus have been at least one metre above the surrounding ground level. The main part of the Sanctuary, however, could have been higher, since the central square part was itself surrounded by a separate stone wall which could have acted as a revetment to contain an extra thickness of sand fill beneath the final stone pavement, as well as being the surrounding wall to the Sanctuary. It would have appeared to rise from a low mound with a hardened gypsum surface. One of the fragments of carved stone found this year in the Long Temple contains, in a damaged text, a possible reference to the Aten as ‘lord of heaven, lord of earth in the mo[und] of...’ (see below and Figure 36).



### *Butchers' Yard*

After the excavation was completed at the Butchers' Yard, the site was also captured and the result is shown in Figure 18. To help complete the spread of vertical heights a contour map was also derived from the photogrammetric data. Additionally, a small collection of broken pottery was captured in detail using a digital single lens reflex camera (dSLR) with the resulting model shown in Figure 19. By having a 3D rotatable model, it is possible to revisit the pottery assemblage as it was prior to excavation and so aid in later interpretation.

### *Trench with offering-tables (area 2)*

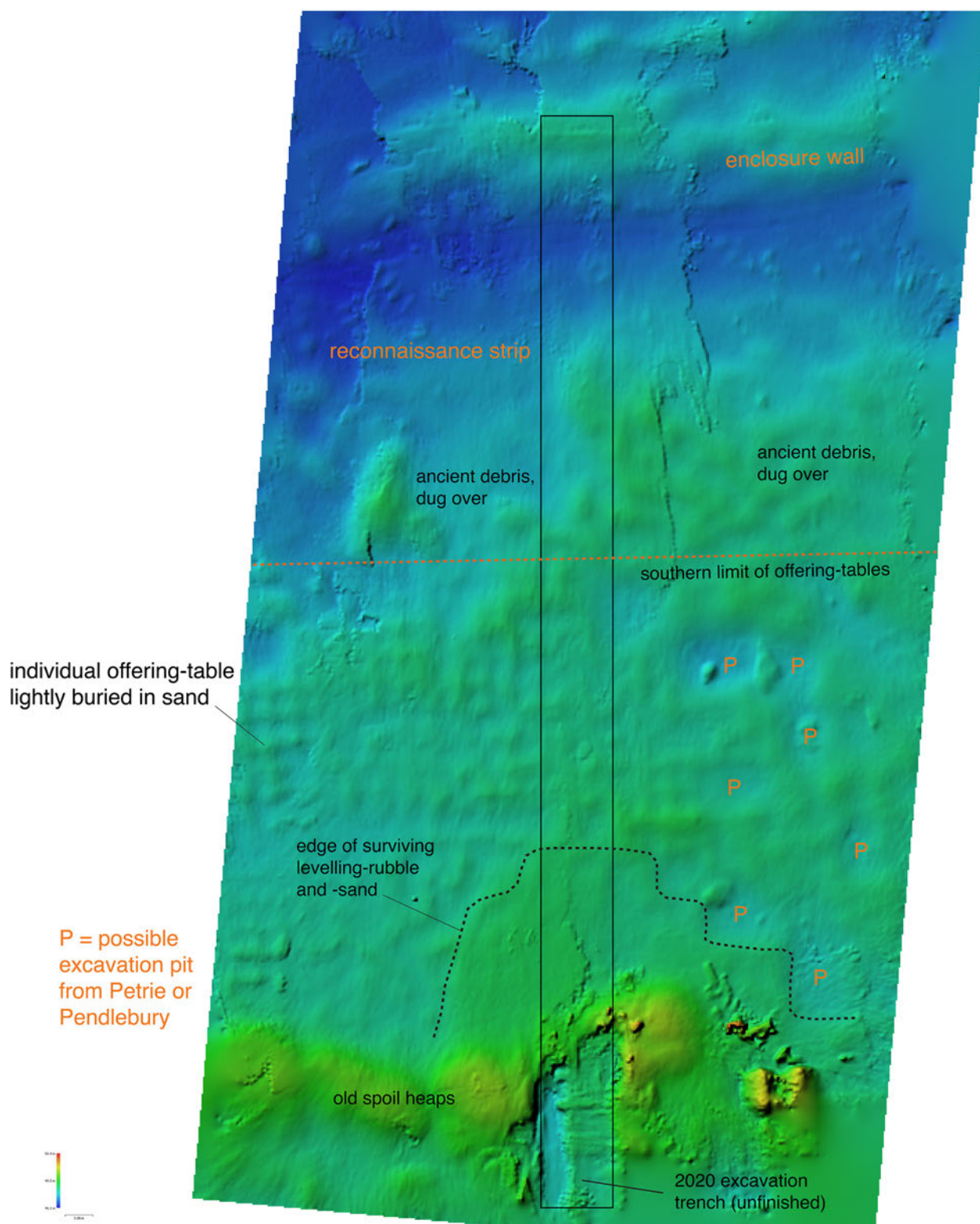
Photogrammetry was also used to record the trench on the south of the temple wall where four offering-tables were excavated (area 2). A top view orthophoto was derived from the 3D model (Figures 7, right; and 8) along with profiles of the trench walls (Figure 7, left). These can aid in the interpretation and subsequent illustration of the trench particularly where it is possible to remove elements of the structure for clarity.

The trench is positioned on the northern edge of the huge field of mud-brick offering-tables, the existence of which has been known since the excavations of Petrie in 1891/2 (Petrie 1894, 19, Pl. XXXVII), supplemented by those of Pendlebury in 1932 (COA III, 15–16, Pls. I, III, IV; also the EES photograph 1932/40: <https://www.amarnaproject.com/documents/pdf/EES-photographs-1932.pdf>). In previous seasons of the current work the remains of some of them have been revealed across the front of the temple (for one, see pp. 6–7 and Figure 5) and on the north side, although only for a short distance towards the east.

The excavation of the trench in area 2 uncovered four well-preserved mud-brick offering-tables and the places where two others built from limestone blocks had been set up and later removed. The good state of preservation was because, during the Amarna Period, the offering-tables and surrounding ground had been buried by brick rubble and clean sand, a continuation of the practice already encountered in the front of the temple. This had served to raise the level of the ground surrounding the new and enlarged stone temple which was begun in or after Akhenaten's regnal year 12. As already pointed out (page 10), whilst rubble had been used at the northern end of the trench, much of the fill in the southern part was sand, probably reflecting how the likely source of the rubble (a temporary revetment wall) was coming to an end.

The removal of the old spoil heap from above the eastern half of the trench (squares U24–U27) and the removal of most of it over the western half, opens up the possibility of continuing the examination of the ground to the south. To this end, a photogrammetric reconnaissance was carried out across a broad strip of ground as far as the line of the southern enclosure wall and a little beyond. Figure 34 shows the result, as a false-colour image in which colour variation is a measure of height. The southern extension of the excavation trench is marked as a long rectangle. The ground to the east (in the green sector) is partly occupied by a distinctive grid-like pattern which is also very visible on aerial photographs. The conclusion seems unavoidable that it has been caused by the presence of the offering-tables. To the west of the rectangle they continue, but the pattern has been disturbed to a greater extent, especially by roughly rectangular areas of low ground. These could be areas of past excavation. The lack of disturbance to the pattern over the large area to the east, by contrast, suggests an absence of past excavation. Even a carefully laid out set of excavation pits would not produce a result as regular as this. Each rise must represent an offering-table, the intervening small depressions being the intervening spaces.

This interpretation would only be valid, however, if the offering-tables, so revealed, had not been deliberately buried. The answer is perhaps given by the appearance of the ground as it emerges beyond the line of large modern spoil heaps, and especially where it is crossed by the survey rectangle. The surface of the ground is flat and smooth and at a very slight elevation above the ground to the south. We now know, from the excavation of



**Figure 34.** Photogrammetric map of part of the south-west sector of the Great Aten Temple enclosure. North is towards the bottom. The reconnaissance strip is a southwards extension of the excavation trench of 2020. Colouring and shading are entirely topographic. The absence of the colour variation of the desert surface, in part created by shallow deposits of village rubbish, allows the slight undulations of the surface to be more clearly visible. Some of the annotations are provisional interpretations only. The irregular lines especially in the top right part of the image are 'noise' from incomplete processing of the data. Photogrammetry by Paul Docherty.

area 2, what this surface is: it is the top of the ancient levelling-material, now largely composed of sand. It follows that the irregular edge to this flat area could be the actual edge of the levelling-material. This would imply that those responsible for the work of burying the offering-tables only partially completed the task, leaving most of the tables exposed, after which they were left to erode and be gradually buried in wind-blown sand.

#### *North wall trench (area 3)*

During excavation of the northern wall of the first court of the temple the remains of a juvenile were found. This was also captured for 3D reconstruction with the dSLR being used in this instance in order to record the remains in more detail.

#### *Tomb recording*

On the 14th March a visit to the Northern Tombs took place which offered an opportunity to capture the inside of the tombs belonging to Panehsy and Meryra. Internal photogrammetry relies heavily on good lighting, and without an appropriate lighting rig the images will normally have additional noise and colour casts that will impact the quality of the 3D reconstructions. The Osmo Pocket was used to capture the outer chambers of both tombs and coped extremely well with the reduced lighting. The pole mount was utilised where appropriate in order to maintain a regular distance from the wall surfaces and achieve the necessary height. The resulting 3D visualisations of the interiors of these two tombs were generally successful as to the methods used, and serve to identify ways in which future recording should be carried out.

#### **Object recording**

Other than large numbers of fragments of carved stonework from the temple, the season produced few objects. One of them is a rectangular slab of fine-grained limestone (object no. 43535, Figure 35) where a start has been made on carving a human face in profile, perhaps that of an Amarna princess. When found, the back and sides of the slab were encrusted with mud and pebbles firmly cemented to the stone with salt. This deposit has not yet been removed. The place of finding (U26 (19406)) was within the levelling-sand in the trench where the offering-tables were found (area 2). The artist has rapidly sketched the profile of a face with a few flowing black ink lines. The purpose looks as though it was to help him to fit the face to the existing slab, filling the surface with the important features whilst omitting the rear part of the head. The carving was started with one or more fairly narrow chisels, following some but not all of the ink lines. The two black dots on the right side presumably were to help position the ear lobe. The part that has been most worked includes the cheek and eye, the latter beginning to be shaped as a slight bulge in the stone. The piece offers an instructive lesson in how sculptors worked during the Amarna Period. The dimensions are 14 cm (width) x 18.5 cm (height) x c. 5.3 cm (thickness), the dimensions including the mud surround.

As the excavation proceeded, fragments of carved stone were a regular find, many of them in spoil heaps from earlier excavations, but some also in the undisturbed fill of the foundation trench for the north wall of the temple. One example of the latter is S-13422, from AC35 (19309) (Figure 36). The material is quartzite, and the deep moulding at the top suggests it comes from a horizontal balustrade. The inscription belongs to a common formula at Amarna. In referring to the Aten come the epithets 'lord of heaven, lord of earth in...'. What normally follows is the name of a building. This is commonly the 'House of the Aten'; one alternative (from Maru-Aten) is 'The Sunshade of...'. (COA I, Pls. XXXIV.1, 2; LVI). In the case of fragment S-13422 the name of the place begins with the signs for *l* and *ḥ* and then breaks off. A tiny area on the broken edge, towards the top, shows what might be the beginnings of a deliberate cut from another sign. The tentative restoration suggested here is the word *ḥt*, the common meaning of which is 'mound' (Wb I, 26.9–15). The term could also be extended to cover sacred places





Figure 35. Limestone sculptor's practice piece, object no. 43535. Photo, Amarna Project. Inked version by Andy Boyce.

more generally, so that the small temple at Medinet Habu was, after the end of the New Kingdom, referred to as 'The genuine mound of the West' (Murnane 1980, 76–7; *Lexikon* III, 1256–8). In Ramesside times the term was applied to a place in or near the temple of Ptah at Memphis (Schulman 1963, 181, note 's'). Closer to Amarna in meaning but not in time is the use of the word as a synonym for 'horizon' on a late Middle Kingdom stela from Abydos (Smither and Dakin 1939, 158, note 7). (I am indebted to Marsha Hill for help with references.) If this is the correct reading, could it refer to a real rather than an imagined place at Amarna? A positive answer could be found in the fact that the Sanctuary building at the rear of the Great Aten Temple enclosure had been constructed on a low artificial mound, of which portions of the sloping banks around the edge still survive (see the previous section of the report) .



Figure 36. Quartzite fragment S-13422, with possible reconstruction of missing signs. Photo, Amarna Project.

Some of the fragments from the temple are stone inlays. An example is S-14362, a surface find. Its material is grano-diorite. The back is smooth and convex, the preserved edges rounded. The top surface is covered with deeply cut ridges which fan out from the shorter edge. It can be reconstructed as a fragment from a much larger inlay which represented the whole head covering of a *nemes*-headdress of a king, perhaps with lappet attached (see Figure 37 for a reconstruction). It is more common to find pieces of stone inlay than pieces of the stone reliefs into which they had been fitted. There is also a contrast between the quality of inlays (and the presumed quality of the parent relief) and the rough execution of many of the fragments of wall decoration in ordinary limestone.



**Figure 37.** Part of an inlay in grano-diorite, no S-14362. It is part of a much larger inlay which showed the nemes-headdress of a king. Drawing by Juan Friedrichs.

Other finds are a very worn bronze coin, perhaps of the Late Roman Period (no. 43439, Figure 38); two simple bronze earrings made of wire from the child's burial in the north wall trench (no. 43520, Figure 39) and probably also of the Late Roman Period; an incomplete faience ring bezel with the *wedjat*-eye design (no. 43498, Figure 40) from one of the spoil heaps at the Butchers' Yard site.




**Figure 38 (left).** Bronze coin (no. 43439), probably Late Roman Period. Little of the design remains. **Figure 39 (right).** Pair of bronze earrings (no. 43520) from a child's burial, probably Late Roman Period. Photos, Amarna Project.



**Figure 40.** Faience ring bezel (no. 43498) decorated with the *wedjat*-eye design. Photo, Amarna Project.

#### *Quartzite fragments from the Stela site*

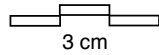
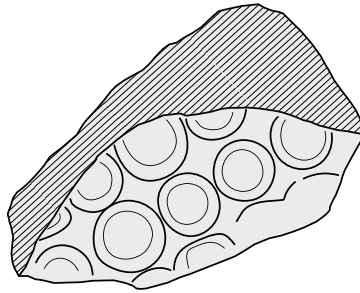
The site of the Stela and Butchers' Yard contains several spoil heaps which were formed either during the Petrie / Carter excavation of 1891/2 or during the excavations of Frankfort in 1926/7 and Pendlebury in 1933/4. They have protected the surface of the ground ever since. In the latter part of the season the excavation team began to remove some of them, sieving the dusty sand in the process. This resulted in the finding of several hundred fragments of carved quartzite, to be added to those found previously. A few derive from statues but the bulk are from flat surfaces carved with hieroglyphs and scenes in sunk relief, sometimes cut deeply.

The site has long been identified with pictures of a platform on which stands a round-topped object assumed to be a stela which occur on the walls of the rock tombs of Meryra (twice: *RT* I, Pls. XI, XXXIII), Panehsy (*RT* II, Pl. XIX) and Ahmes (*RT* III, Pl. XXX) at Amarna. No label beside the pictures provides a name but a connection to something called 'The Mansion of the Benben in the House of the Aten' is provided by a text in the tomb of Meryra which applies the hieroglyphic determinative  to the word *bnbn* in this phrase (Fairman in *COA* III, 194, the reference in the tomb of Meryra being *RT* I, Pl. XXX).

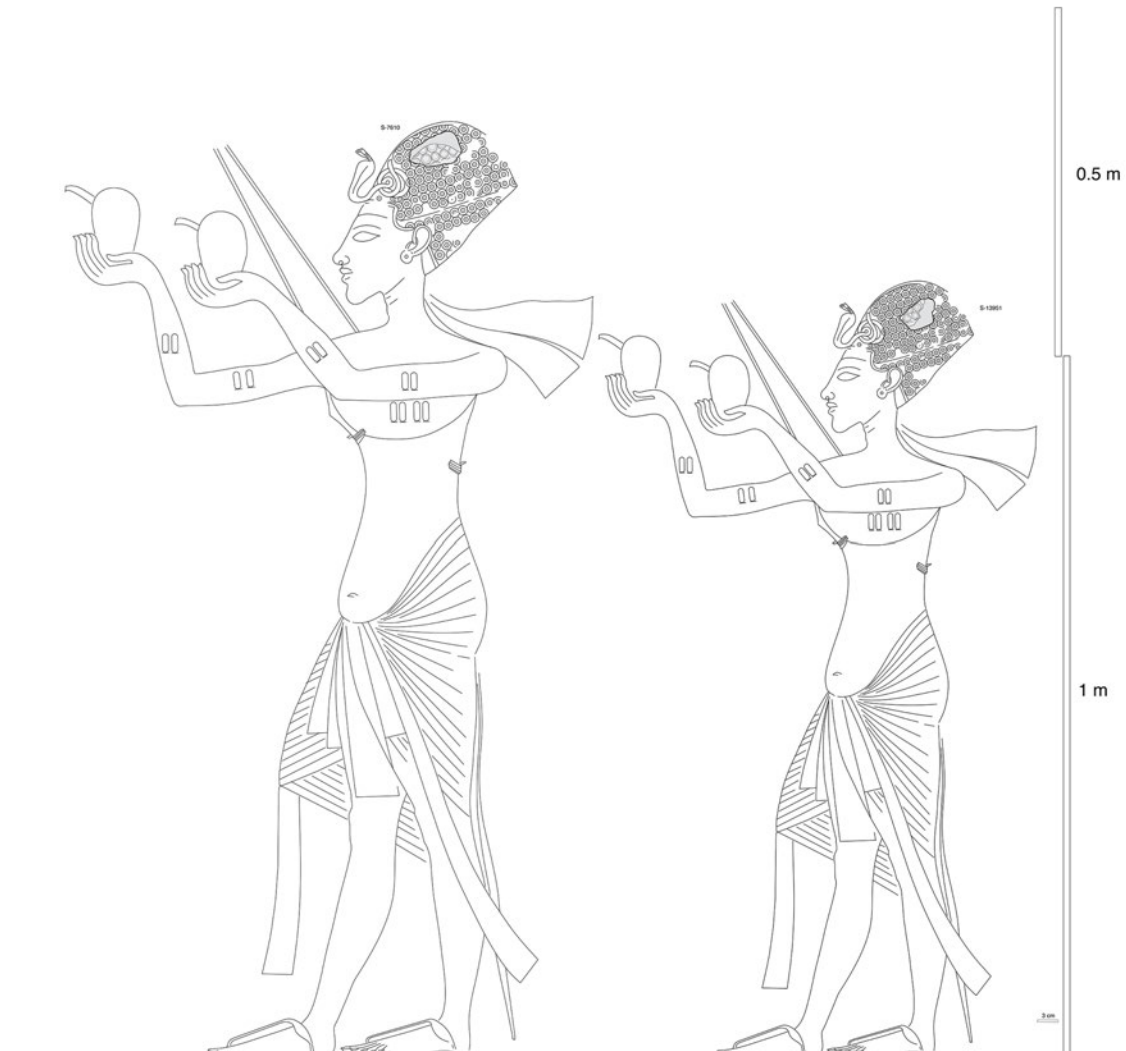
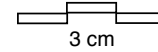
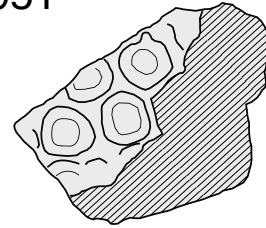
The fragments are relatively small yet derive from carvings which were relatively large. Direct joins are hardly ever to be made, and study of the fragments quickly reveals that most of the original decorated stone surface is missing. A two-stage approach to their study (by Miriam Bertram) has been adopted. The first stage is a catalogue entry for each piece, accompanied by a photograph and drawing. The second stage involves creating a series of outline models of Amarna figures and details traced from publications, including scenes in the rock tombs. The



S-7610



S-13951



**Figure 41.** Two fragments of carved quartzite from the Stela site (S-7610 and S-13951), each with part of the pattern of the blue crown. The scale and style of the carving differ, implying the existence of two separate figures of the king dressed in this way. The figures of Akhenaten (below) have been scaled to match the fragments, producing figures of different heights. The figures are composites in which the head from a sculptor's trial piece in the National Museum of Scotland, Edinburgh (Freed, et al, 1999, 219, 52, reversed) has replaced the missing head in a figure in the tomb of Tutu at Amarna (RT VI, Pl. XVI).

digital vehicle for this is Adobe Illustrator, which offers a working surface ('artboard') of up to 577 x 577 cm. One by one, digitised copies of individual fragments are placed on the artboard and their scale held constant at 1:1. The outline models, sometimes of the royal family in formal attitudes, sometimes of design elements including cartouches and other hieroglyph groups, are added and scaled up until they match the details of the individual fragments. Where necessary, the outline models are reversed, so that left-facing becomes right-facing and vice-versa. An example of the process is given in Figure 41.

## Magazine Inventory

The Ministry of Tourism and Antiquities maintains a storehouse (magazine) for material retained for study purposes on a site adjacent to the Amarna expedition house. In 2018 it was subject to a detailed inventory by the local antiquities inspectorate. In continuation of this, the expedition has begun a revision and updating of shelf lists, a process begun many years ago by Ann Cornwell. During March of this year, Sue Kelly completed new shelf lists of material from the Great Aten Temple excavations held in the outer magazine. The intention is to continue the process through the remaining magazine space. At the same time, additional shelving was installed in both the outer magazine and the pottery magazine.

Throughout the season members of the mission worked in the magazine alongside the two inspectors assigned to the magazine, recording objects from the current work and from previous seasons. One large project was the recording (by Miriam Bertram) of the hundreds of carved quartzite fragments from the Stela site. Another was the study (by Anna Hodgkinson) of material excavated in 2014 and 2017 at the house group M50.14–16. Margaret Serpico continued her study of incense/resin samples; Alexandra Winkels continued her study of gypsum samples from the Great Aten Temple site.

## Abbreviations

AR: *Amarna Reports*, ed. B.J. Kemp. 6 vols. London, EES 1984–95.

COA: *City of Akhenaten*. 3 vols. Vol. I, by T.E. Peet and C.L. Woolley; Vol. II by H. Frankfort and J.D.S. Pendlebury; Vol. III, by J.D.S. Pendlebury. London, EES 1923, 1933, 1951.

JEA: *Journal of Egyptian Archaeology*

JNES: *Journal of Near Eastern Studies*

Lexikon: W. Helck and E. Otto (later W. Helck and W. Westendorf), eds, *Lexikon der Ägyptologie*. 7 vols. Wiesbaden, Harrassowitz 1975–92.

RT: N. de G. Davies, *The Rock Tombs of El Amarna*. 6 vols. London, Egypt Exploration Fund 1903–08, reprinted as 3 vols 2004.

Wb.: A. Erman and H. Grapow, *Wörterbuch der ägyptischen Sprache*. 12 vols in 10. Leipzig, Hinrichs 1926–63.

## References

Docherty, P., 2019. 'Photogrammetry at Amarna.' *Horizon* 20 (Autumn 2019), 18–19.

Frankfort, H., (1927). 'Preliminary report on the excavations at Tell el-'Amarnah, 1926–7.' *JEA* 13, 209–18.

Freed, R.E., Y.J. Markowitz and S.H. D'Auria, eds, *Pharaohs of the Sun; Akhenaten, Nefertiti, Tutankhamen*. Boston, Museum of Fine Arts 1999.

Kemp, B., 2012. *The City of Akhenaten and Nefertiti; Amarna and its People*. London, Thames & Hudson; Cairo, AUC Press.

Kemp, B., 2014. 'Tell el-Amarna, 2014.' *JEA* 100, 1–33.

Kemp, B.J. and S. Garfi, 1993. *A Survey of the Ancient City of El-Amarna*. London, EES.

Legge, A.J. 2012. 'Animal remains at the Stone Village.' In A. Stevens, *Akhenaten's Workers: The Amarna Stone Village Survey, 2005–2009*. Volume II. *The Faunal and Botanical Remains, and Objects*. London, EES, 9–13.

Murnane, W., 1980. *United with Eternity: a Concise Guide to the Monuments of Medinet Habu*. Chicago, Oriental Institute and Cairo, AUC Press.

Payne, P., 2006. 'Recovering animal bone at the house of the High Priest Panehsy.' In B. Kemp, et al, 'Tell el-Amarna 2005–06.' *JEA* 92, 45–52.

Payne, P. 2007. 'Re-excavation at the Amarna house of Panehsy.' *Egyptian Archaeology* 30, 18–20.

Petrie, W.M.F., 1894. *Tell El Amarna*. London, Methuen.

Schulman, A.R., 1963. 'A cult of Ramesses III at Memphis.' *JNES* 22, 177–84.

Shepperson, M., 2012. 'The stela emplacement.' In B. Kemp, et al., 'Tell el-Amarna, 2011–12.' *JEA* 98, 19–26.

Smither, P.C. and A.N. Dakin, 1939. 'Stelae in The Queen's College, Oxford.' *JEA* 25, 157–65.

Stimpson, C., 2016a. 'Bird bone study at Amarna.' *Horizon* 17 (Spring 2016), 2–4.

Stimpson, C., 2016b. 'Bird-bone study at Amarna.' In B. Kemp, et al, 'Tell el-Amarna 2016.' *JEA* 102, 2–6..