

# Giza Occasional Papers 5

## Giza Plateau Mapping Project

Season 2009

## Preliminary Report

edited by Mark Lehner

Ancient Egypt Research Associates, Inc.

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Season 2009  
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**Season 2009**  
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Mark Lehner, editor

SERIES EDITORS

Wilma Wetterstrom

and

Alexandra Witsell



**A E R A**

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Cover photo: Stairways of the Khentkawes Valley Complex ascending to the Northern Lateral Ramp, marked by the rising ledge cut into the bedrock face (below). Remains of House E lie exposed halfway to the monumental Khentkawes tomb, with the Menkaure Pyramid in the background (above). Photo by Mark Lehner.

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## Bibliographic Abbreviations

ASAE	<i>Annales du Service des Antiquités de l'Égypte</i> (Cairo)
BAR	British Archaeological Reports (Oxford)
BIFAO	Bulletin Institut français d'archéologie orientale (Cairo)
BSAE	British School of Archaeology in Egypt (and Egyptian Research Account) (London)
EES	Egypt Exploration Society
FIFAO	Fouilles de l'Institut français d'archéologie orientale (Cairo)
GOP1	<i>Giza Plateau Mapping Project, Season 2004: Preliminary Report</i> , ed. by M. Lehner, M. Kamel, and A. Tavares. Boston: Ancient Egypt Research Associates, Inc. 2009.
GOP2	<i>Giza Plateau Mapping Project, Season 2005: Preliminary Report</i> , ed. by M. Lehner, M. Kamel, and A. Tavares. Boston: Ancient Egypt Research Associates, Inc. 2006.
GOP3	<i>Giza Plateau Mapping Project, Season 2006–2007: Preliminary Report</i> , ed. by M. Lehner, M. Kamel, and A. Tavares. Boston: Ancient Egypt Research Associates, Inc. 2009.
GOP4	<i>Giza Plateau Mapping Project, Season 2008: Preliminary Report</i> , ed. by M. Lehner, M. Kamel, and A. Tavares. Boston: Ancient Egypt Research Associates, Inc. 2009.
GR1	<i>Giza Reports, The Giza Plateau Mapping Project, Vol. 1: Project History and Survey, Main Street, Gallery III.4, and Ceramics</i> , ed. by M. Lehner and W. Wetterstrom. Boston: Ancient Egypt Research Associates, Inc. 2007.
GR2	<i>Giza Reports, The Giza Plateau Mapping Project, Vol. 2: The Royal Administrative Building Excavations</i> (working title), ed. by M. Lehner and F. Sadarangani. Boston: Ancient Egypt Research Associates, Inc. Forthcoming.
IFAO	Institut français d'archéologie orientale (Cairo)
JARCE	<i>Journal of the American Research Center in Egypt</i> (Boston and New York)
JEA	<i>Journal of Egyptian Archaeology</i> . Egypt Exploration Society (London)
MASCA	<i>Museum Applied Science Center for Archaeology</i> (Philadelphia)
MDAIK	<i>Mitteilungen des deutschen archäologischen Instituts, Abteilung Kairo</i> (Wiesbaden)
OIR	<i>Oriental Institute, Annual Reports</i> . Univ. of Chicago (Chicago)
SAK	<i>Studien zur Altägyptischen Kultur</i> (Hamburg)

## AERA Abbreviations

AERA	Ancient Egypt Research Associates
ARCE	American Research Center in Egypt
AIC	Amelia's Interface Cut
asl	above sea level
cm	centimeters
DSR	Data Structure Report
EB	Early Buildings
EOG	East of Galleries
ESA	Egyptian Survey Authority
ETH	Eastern Town House
GI	Khufu Pyramid
GII	Khafre Pyramid
GII.VT	Khafre Valley Temple
GIII	Menkaure Pyramid
GIII.VT	Menkaure Valley Temple
GIS	Geographical Information System
GLSS	Giza Laser Scanning Survey
GOP	Giza Occasional Papers
GPMP	Giza Plateau Mapping Project
HeG	Heit el-Ghurab
KKT	Khentkawes Town
KKT-AI	Khentkawes Town - Amelia's Interface
KKT-E	Khentkawes Town - East
KKT-F	Khentkawes Town - Foot
KKT-N	Khentkawes Town - North
LBB	Lower Buried Building
LOE	limit of excavation
m	meters
MoLAS	Museum of London Archaeology Service
MVT	Menkaure Valley Temple
NEH	Northeastern Hole
NLR	Northern Lateral Ramp
NSGH	North Street Gate House
RAB	Royal Administrative Building
SCA	Supreme Council of Antiquities
SFW	Soccer Field West
SFW.H1	Soccer Field West House Unit 1
SoE	Survey of Egypt
SLR	Southern Lateral Ramp
WComp	Western Compound
WoC	Wall of the Crow
WD	Western Dump

In AERA literature, feature numbers are indicated in square brackets, for example: [29,904].

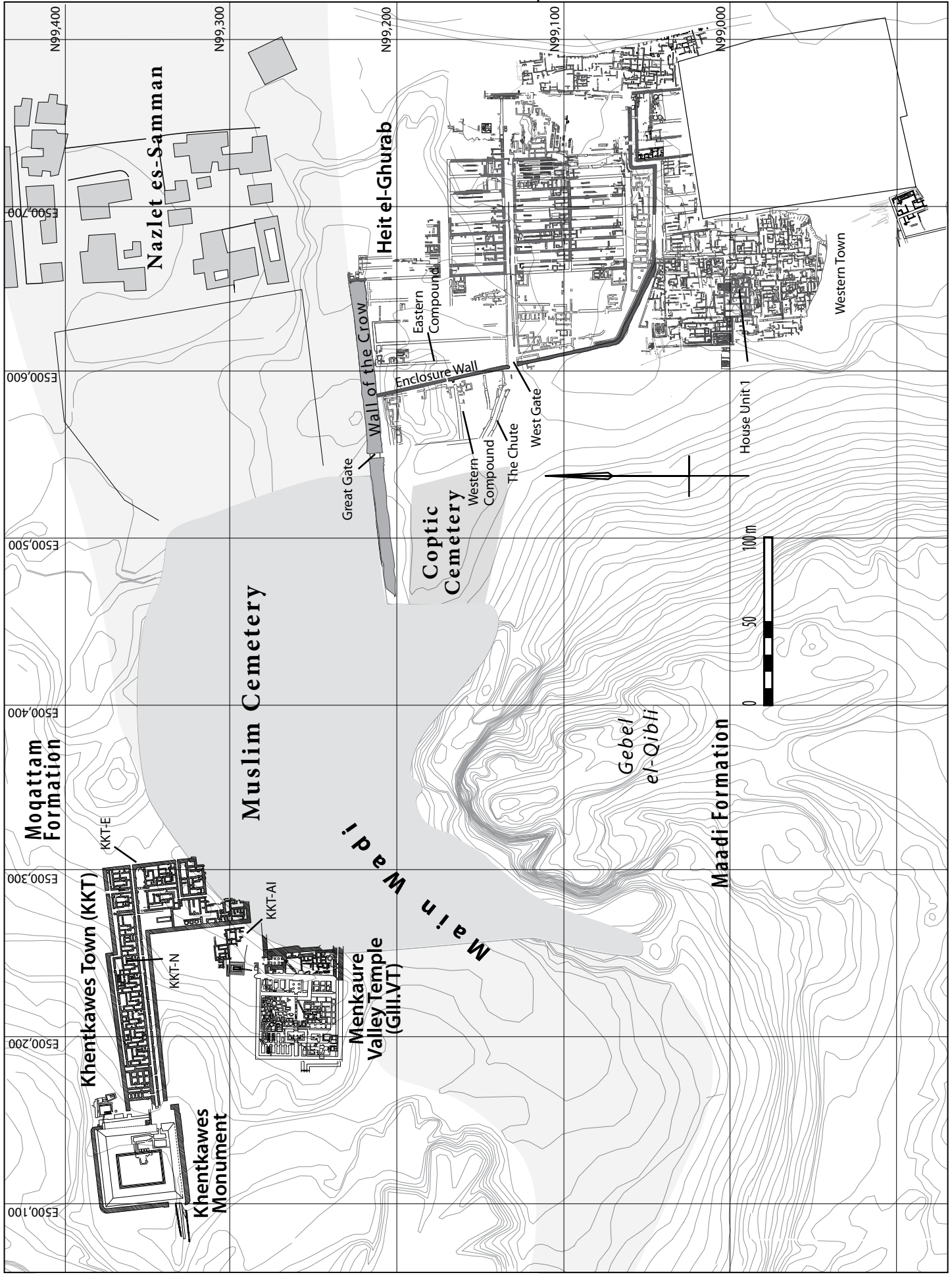


Figure 1.1. The Giza Plateau showing the locations of the Khentkawes monument, Khentkawes town site, Menkaure Valley Temple, and Heit el-Ghurab site. Map prepared by Wilma Wetterstrom.

# 1. Introduction: Season 2009 Overview and How We Construct the Record

Mark Lehner, Mohsen Kamel, and Ana Tavares

Our eighteenth season of excavation, from January 31 to May 7, 2009, marked 20 years of archaeology at Giza. We surveyed and excavated at our two sites, the Khentkawes Town (κκτ) and our flagship site, *Heit el-Ghurab* (HeG, “Wall of the Crow”) (fig. 1.1). Field Directors and Field School Directors Mohsen Kamel and Ana Tavares held the second session of the AERA-ARCE Advanced Field School for Supreme Council of Antiquities (SCA) Inspectors. To celebrate 20 years of GPMP (Giza Plateau Mapping Project) work at Giza, on March 14 and 15 we held an open-site day and a colloquium, “AERA Study Day,” generously hosted by Vice-Minister of Culture and SCA Chairman, Dr. Zahi Hawass at the Ahmed Pasha Hall in the SCA Zamalek headquarters. Excavations ended in early April. Richard Redding, Chief Research Officer, and Mary Anne Murray, Director of Archaeological Science, carried on with a team at work in the Giza Field Laboratory through May.

## Return to the “Lost City” Site: HeG

After a two-year hiatus because of the rising water table, we resumed excavations in our main site, HeG. We chose the western, high area of the site, the Western Compound (WComp), just south of the Great Gate that opens onto the site through the Wall of the Crow. The surface of this relatively unknown part of the 4<sup>th</sup> Dynasty settlement had remained high and dry as the rising ground water pooled in the lowest parts of the saturated areas of the Gallery Complex, the Royal Administrative Building, and the Western Town. However, by the end of 2008 the ground water had receded, leaving the HeG site relatively dry, thanks to a series of pumps continuously drawing water from the area of the Sphinx into the Cairo sewage system. This system was installed by a Cairo University team working under Dr. Reda M. el-Damak from the Center of Designs for Water Projects and Dr. Hafez Abd el-Azim Ahmed from the Engineering Center for Archaeology and Environment.

The lowered ground water allowed us to resume excavations in House Unit 1 in the Western Town (SFW.H1). House 1 is one of the large residential compounds that may have housed administrators of the settlement. A team under Yukinori Kawae and Freya Sadarangani undertook excavations on the last remaining unexcavated part of the compound, the economic production unit or “bakery” spanning the eastern end of House Unit 1. Our excavations here remain unfinished, and so we report here our

progress to date. The full report on the bakery will appear in a future *Giza Occasional Papers* (GOP).

In the Western Compound, Freya Sadarangani, James Taylor, and Jessica Kaiser supervised archaeologists and students of AERA’s Advanced Field School. They excavated scores of graves of the Late Period (around 664–525 BC) in order to reach the 4<sup>th</sup> Dynasty (c. 2500 BC) floors and walls. The WComp excavations were not easy. A season-long effort to scientifically excavate fragile human burials from hard, crusty, ashy settlement layers, 2,000 years older than the burials, gave new insights into the westward expansion of the Pyramid Age settlement, and into how its builders artificially built-up and terraced the western zone inside the huge gate of the Wall of the Crow. Ashraf Abd el-Aziz supervised excavations in the Chute, a corridor enclosed by two thick, parallel fieldstone walls, which curves to the northwest from the area west of the West Gate through the Enclosure Wall. The goal was to answer the question: Does this corridor connect to a path through the Great Gate in the Wall of the Crow, or lead beyond?

## Carrying on in the Khentkawes Town

Our other site at Giza, the Khentkawes Town (κκτ) and monument, lies across the central wadi between the Moqattam and Maadi Formation outcrops of limestone bedrock. Here we combined salvage work, to gain more information from a settlement that Selim Hassan dug in 1932 (Hassan 1943), with new excavation focused on specific questions.

East of the Khentkawes Town (κκτ-Ε), we discovered the heretofore unknown valley complex of Khentkawes 1, an enigmatic queen who may have ruled as king. Supervisors Daniel Jones and Kasia Olchowska oversaw excavations that revealed terraces, ramps, stairways, and a long eastward-running corridor surrounding a deep basin that descends to a level lower than our best estimates for the 4<sup>th</sup> Dynasty Nile floodplain to the east. In this basin we may indeed have a deeply dredged harbor at the end of the Khentkawes causeway, an arrangement that would be the equivalent of the kings’ valley temples connected to their pyramids by long causeways.

To the north of the causeway (κκτ-Ν), Lisa Yeomans and Hanan Mahmoud thoroughly mapped and excavated Building Ε, one of the ten houses originally laid out in a unified plan—one of the earliest examples of town planning in Egypt. We discovered that over time Building Ε “intermingled” with the adjacent houses, as the residents



of the houses on both sides of Building E exchanged or usurped rooms. This finding falsifies the assumption that what we perceive as one house block, based on the architecture, represents one household at all periods.

To the south, Mike House, James Taylor, Kate Liska, and Hanan Mahmoud, assisted by students of the 2009 Advanced Field School, cleared, mapped, and probed with excavation trenches the interface (KKT-AI) between the Khentkawes Town and the valley temple of the Menkaure Pyramid (GIII.VT), revealing new details about the broad approach ramp, the enormous Water Tank 2, and a canyon-like cut that may reflect, along with evidence from KKT-N, that people abandoned the settlement for a period and reoccupied the KKT near the end of the Old Kingdom.

In the Giza Field Laboratory, Mary Anne Murray directed AERA's Archaeological Science Program. The international team of analysts focused on material culture from six years of excavations in the Royal Administrative Building (RAB). Through workshops and study sessions the excavation and lab teams integrated macro- and micro-archaeology to reveal patterns of life within the storage and administrative center of the Lost City site in advanced of its final publication.

### Constructing the Data: Fieldwork Records

As our excavation project has evolved, we now draw together and summarize data in *Giza Occasional Papers* from two kinds of field reports: the Data Structure Report (DSR) and site diaries. The DSR follows a fairly standard format that comes to our project from British contract salvage archaeology. Area Supervisors prepare DSRs at the end of each season from:

- “pro-forma recording sheets with prompts” for all data essential for post-excavation analysis (Farid 2000: 25),
- pre-excavation plans,
- 1:20 single context plans of each stratigraphic feature,
- post-excavation plans,
- stratigraphic matrices,
- material culture registers,
- photographs,
- interim reports that all team members file at the end of each week during the field season.

After excavation ceases, Area Supervisors first sort the hundreds of single features (deposits, cuts, walls, etc.) into groups. Then they organize feature groups into phases designated by numbers and letter subdivisions, using labels, such as “Occupation,” “Post Occupation,” and “Abandonment.” The narrative part of their DSRs consists of the stratigraphic summary by phase and feature

groups, from earliest to latest, and then the phased narrative, which involves more discussion and interpretation of each phase, again from earliest to latest.

So far, most Area Supervisors write DSRs in a predominantly objective voice, even though it is inescapable that the degree of interpretation increases with each step, from the edge of the trowel to the final phase narrative. The DSR phasing plays an important role in subsequent analyses—for example, prioritizing deposits for material culture analysts in the field lab, and preparing preliminary and final reports in publications such as *GOPS*.

Several of our senior archaeologists also work for Ian Hodder's archaeological project at Çatalhöyük in Turkey with field director Shahina Farid, which called our attention to what that team has written and published about excavation and recording. In 2000 Farid wrote, “the methodologies have adapted and changed over the last three seasons and will no doubt continue to develop” (2000: 19). This sounds familiar to AERA's field methods over the years, as does Farid's statement, “for the field team the uncertainty and discontinuity can be disconcerting, frustrating, and disempowering, but also a challenge” (2000: 19).

While we now regard the DSR's format, honed in British contract archaeology, as indispensable for front-line reporting—a standard practice within that certain sphere of archaeology—we also recognize other forms for presenting and discussing archaeological information (Hodder 2000). At Çatalhöyük as well as Giza, it can sometimes be “misleading to compare ‘off-the-shelf’ methodologies such as those used on rescue excavations in Britain” (Farid 2000: 21) to methods in a research excavation safeguarded, for the time being, by an Egyptian Supreme Council of Antiquities concession within a protected archaeological preserve.

Following Hodder's (2000) theoretical perspective, his Çatalhöyük team has been concerned with “alternative voices in the construction of data.” In our work so far, “alternative voices in the construction of data” include those of the site journals, diaries, and dispatches of Project Director Mark Lehner and Field Directors Mohsen Kamel and Ana Tavares. These documents are “narrative recordings” (Farid 2000) following the course of excavation from the top down during the season or from season to season, or by using general topographic descriptions of given areas (like KKT-E) as “archaeological tableaux” (Kemp 1986), rather than as a strict sequence of deposits resulting from discrete events. This is a format perhaps more familiar to traditional archaeology in Egypt.

Archeologists immersed in British contract archaeology tend not to rely on diaries. This is because, as at Çatalhöyük, “the many demands placed upon the field team meant that they became self-selective and addressed

what was personally most urgently required, invariably the digging and site recording” (Farid 2000: 25). Farid wrote a paragraph, with a reference to Barker (1993), that summarizes the issues and tension between the two modes of data construction:

In British contract archaeology virtually all recording is done on pro-forma recording sheets with prompts to insure that all essential data for post excavation analysis is recorded. The use of diaries for more narrative recording (even if only by the supervisor) is not widespread as the emphasis is on the excavation and the creation of an immediately useable archive. Narrative essays are seen as unnecessary and those who have tried to publish from notebook records of the past have sometimes found them to be unwieldy narratives which Barker characterizes as “prose whose loose format invites the writer to confuse the stages of recording, deduction, interpretation, and speculation” (1993) and are sometimes totally lacking in any data or interpretation. The inevitable time constraints, both on site and at the end of the waged working day, limit additional forms of recording. This has, however, led to a loss of awareness by contract archaeologists of the importance of impressions and interpretations and, how they came to their conclusions. (2000: 25)

The two modes of data building (for it is our records that are the data, not the “things in themselves”) manifest also in the graphic record.

### Graphic Records

The phased sequence of a DSR differs from the archaeological tableau description in both the structure of its narrative and its graphics, and this is reflected in the following articles and illustrations of *GOP5*. The text and graphics of tableau descriptions treat the more general forms of major features. The drawings, such as the general plans of areas like  $\kappa\kappa\tau\text{-E}$  and  $\kappa\kappa\tau\text{-AI}$ , are form-line maps. Drawn to scale and with spot heights, they show the terrain of a defined place or area. For many years, Lehner drew 1:50 and 1:100 scale maps of all excavation areas at the end of each season, which allowed him to map a large area on one drawing board, while using the round scale for easy measurements to a certain level of accuracy. These maps are similar to what British contract archeology might call “multi-context plans,” but they are not, strictly speaking, multi-context maps<sup>1</sup> because they do not show feature boundaries, only general shapes and forms.

The end-of-season multi-context maps of an area might be the ideal overall map for a summary of results like those in the *GOPs*. However, the Area Supervisors most often draw separate maps for each  $5 \times 5$ -meter square on separate pre-cut mylar pages. We introduced this standardization in order to facilitate filing drawings in the database, each with a separate drawing number, and for digitizing these drawings for eventual stitching in GIS (Geographical Information System). Stitching together these separated drawings has not proved a facile task, because maps of individual grid squares for a given area might have been drawn by different hands for other reasons, and with different levels of rendered detail. With each season our methods evolve, and we may consider returning to end-of-season multi-context maps on large sheets covering several squares or a general area, or making stitching the post-excavation maps a high priority.

The top priority of our GIS in recent seasons has been to digitize all single context maps from excavation, then to put these together in phase maps for a given area. These phase maps strictly adhere to those features for which the archeologists drew single context maps, and because the top and bottom elevations are essential for bringing these maps together in a stratigraphic sequence, the phase maps will bias only those features actually excavated. We will often clear a sandy, modern overburden to expose underlying settlement ruins covering a wider area than the actual area of excavation, which might be limited to a small trench. Again, Area Supervisors might include the wider exposure of the ruins in their “pre-x” or “post-x” multi-context maps. But for general areas these must be stitched together from separate pro-forma sheets for each  $5 \times 5$ -meter square.

The phase maps that our GIS team generates will only, and must only, show the exposure of a given feature within the limits of excavation (LOE). For example, the map of the  $\kappa\kappa\tau$  northeastern area outlines the very early phase that produced the bedrock surface on which the settlement was founded, revealing the exposed bedrock in a half-tone or some other chosen convention. Thin, linear, unshaded blank shapes run through the shaded area where the walls of later phases cover the bedrock exposure. Maps of subsequent phases will detail these walls, and so someone experienced with such phase maps might consider such shapes self-evident. Other long, thin, linear but shaded areas show where the excavators exposed the bedrock within the limits of a narrow trench. If this is not stated in the text or caption, readers could assume these shapes are walls.

1. Most archaeologists call these small-scale drawings of surfaces and boundaries “plans.” Surveyors with whom I have worked prefer “maps” and suggest “plans” are what we do for future events, like vacations. I think “map” is the more unambiguous term.

The graphics that follow in this volume show both kinds of drawings: strict phase plans and general form-line maps, as well as at least one elevation (face-view) of the Southern Lateral Ramp in  $\kappa\kappa\tau$ -E. With this introduction to how we generate information—or what modern-

ists might say is how we record facts, and post-modernists might declare is how we construct data—the reader may recognize those reports, or parts of reports, that derive from these two modes of documenting our interactions with archaeological reality.

## Excavations: Khentkawes Town





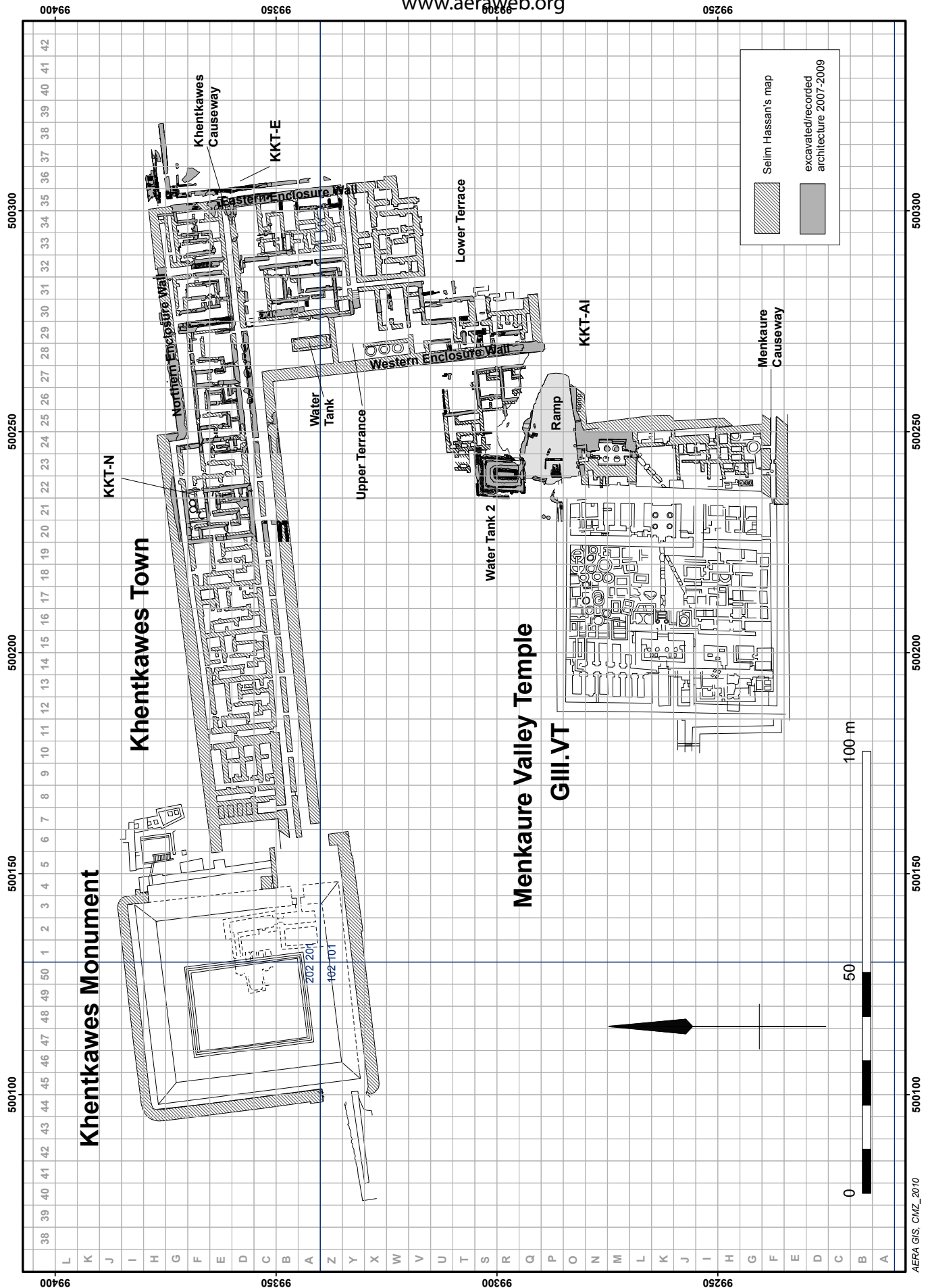


Figure 2.1. The Khentkawes Town and the Menkaure Valley Temple area. Map prepared by Camilla Mazzucato, AERA GIS.

## 2. KKT-E: Valley Complex for Khentkawes I

Mark Lehner

**E**gyptians of the Old and Middle Kingdoms interred the bodies of their pharaohs in the core of pyramids high upon a desert plateau at the end of an elaborate complex. A temple stood at the eastern base of the pyramid, approached by a long causeway leading up from a valley temple, a combination landing platform and monumental gatehouse. Egyptologists have long pictured in front of the valley temple a quay or harbor that allowed delivery of the royal body for the embalming and funerary rites, and later, the delivery of offerings.

During the Pyramid Age, Egyptians buried their queens in less grand, but still impressive structures: under mastabas (giant bench-shaped superstructures) or small pyramids situated alongside the far more gigantic one of their king, each with their own small temple or chapel. For Queen Khentkawes, they built an unusual stepped mastaba the size of a queen's pyramid, standing alone far from the kings' pyramids, with a causeway leading 150 m due east. Queens normally did not get their own causeways (fig. 2.1).

### A Queen Who Ruled as King?

Ever since Selim Hassan excavated her complex in 1932, Egyptologists have suspected Khentkawes was not an ordinary queen. Her ambiguous title, inscribed on the granite jambs of her chapel entrance, can be read either, "Mother of the Two Kings of Upper and Lower Egypt," or, "Mother of the King of Upper and Lower Egypt and King of Upper and Lower Egypt." Was Khentkawes one of those rare queens who, sometimes at the end of a dynasty, took the throne as king in their own right? Possibly one of Menkaure's wives, or his daughter and the wife of his successor Shepseskaf, Khentkawes I at Giza (for another Khentkawes II with the same titles was buried under a pyramid at Abusir in the following dynasty), may have ruled for some time between these two last kings of the 4<sup>th</sup> Dynasty.

Kings not only had pyramids, upper temples, causeways, and valley temples, they also had pyramid towns that housed those who served their memories along the lines of both god's house and ancestral shrine. Hieroglyphic texts on stelae (stone plaques) and papyrus inform Egyptologists of these settlements attached to pyramids, but the KKT is one of very few examples actually excavated.

### Discovering the Complex to the East

Its builders laid out the Khentkawes Town in an L-shape, ending abruptly on the east, where it turns to the south. Why does the town turn? In 2007 Lisa Yeomans found the answer: a deep vertical drop to the bedrock that quarrymen left as they removed limestone farther to the east (GOP3: 7–12). The Eastern Enclosure Wall runs flush along the upper edge of the quarry cut. Below lay the massive ruins of a building, which we sometimes call the Lower Buried Building (LBB), buried under clean drift sand, evidently founded on a lower terrace along the northern and western sides of an even deeper depression. In 2008 we found a ramp leading up from the south against the bedrock face to the threshold of the Khentkawes causeway (GOP4: 9, 33–45). But it was not until our 2009 season that we unveiled an eastern ascent via corridors, ramps, and stairs from a lower L-shaped terrace around the western and northern side of a deep basin (fig. 2.2, volume cover). The northern terrace, walls, and corridor (see below) extend east beyond the eastern limit of our excavation. We refer the reader here to foldout 1, Lehner's form-line map of KKT-E as of the end of our 2009 season.

Our discovery of a valley complex for Khentkawes I adds one more element to the royal features of her unusual tomb and memorial complex.

Because of the immensity of the sand deposit and the lower elevation of the terrace and basin, we had to clear to a very great depth to expose the lower approach. At the beginning of our Season 2009, the sand mounded as high as elevation 24.00 m above sea level (asl). Our deepest excavation through the sand filling the depression reached 14.6 m asl, where we had to stop because we reached the water table. The drop of 9.4 m made this one of the deepest, most dramatic excavations we have ever undertaken at Giza, almost double the depth of our 2004–05 excavations through essentially the same sand deposit north of the Wall of the Crow (GOP1: 45–54). From the bedrock floor at the northeastern corner of the KKT (20 m asl) the surface drops 5.40 m to the lowest point we could excavate in the depression, and 7.57 m to the deepest point (12.43 m asl) reached in the bottom of the basin by auguring through the remaining sand.

As we removed the sand, we saw gradually emerging a dark grey mass of toppled mudbrick up against the northwestern corner of the cut into the bedrock. Within the



Figure 2.2. The KKT-E operation. The Khentkawes monument looms in the background. View to the west. Photo by Mark Lehner.

mass of the mudbrick ruins, descending at a steep slope into the depression, we could clearly see the continuation of the  $\kappa\kappa\tau$  Northern Enclosure Wall (Feature [29,008]) running thick and strong to the east at a slight downward slope. We could also make out the eastward continuation of a parallel wall forming a corridor. A deep, irregular erosion channel (“the Gully”) begins at the top of the mud ruins through a wide doorway in the Northern Enclosure Wall. The running water that most probably created this channel cut down to bedrock through the entire sloped mudmass, including the corridor wall.

During the 2009 season Daniel Jones and Kasia Olchowska supervised excavations into the mass of

mudbrick, beginning in the northwestern corner. Jones worked to the south excavating and recording the stairs, lateral ramps, and terrace. Olchowska worked toward the east, excavating parts of the corridor, the Northern Enclosure Wall, and the access through it.

In the following report, Jones describes components of the lower approach in sequence with the phases from the Jones and Olchowska (2009) DSR and the integrated phases that Jones and Yeomans (2010) worked out recently for both  $\kappa\kappa\tau$  and  $\kappa\kappa\tau$ -E. Jones presents plans and describes the features of the individual phases from earliest to latest.

### 3. KKT-E: The Mystery of the “Lower Buried Building”

Daniel Jones

As part of the AERA 2007 field season, Lisa Yeomans carried out exploratory excavations at the eastern limit of the Khentkawes causeway (GOP3: 7–12; Yeomans 2007) (see fig. 2.1). She discovered that the northeastern extent of the Khentkawes Town (KKT) sat at the edge of an extensive vertical cut in the limestone bedrock and that the town’s Northern Enclosure Wall extended farther east (beyond the corner of the town’s turn to the south) than previously thought. Coupled with these interesting finds was the discovery of mudbrick architecture on a lower level abutting the cut. Poking through what appeared to be substantial mudbrick collapse that sloped down from the upper edge of the cut in the bedrock was an L-shaped corridor, doorway, and plastered mudbrick walls, providing a tantalizing glimpse of previously unrecorded and unpublished archaeological remains. These discoveries appeared to confirm that the Khentkawes mortuary complex extended farther east. Investigating the nature, function, spatial distribution, and relationship over time of this Lower Buried Building (LBB) to KKT became the primary aim of the coming seasons.

In 2008, building on Yeomans’ work, Mark Lehner and Kasia Olchowska began a targeted investigation of the LBB, designated Khentkawes Town East (KKT-E) (GOP4: 33–45). They uncovered telltale signs of previous archaeological activity: grid markers and circular and oblong trenches cutting the archaeological remains. It appeared that archaeologists, most likely a crew working under Selim Hassan, explored the area twice. It is possible that these investigations did not feature in Hassan’s publication because as work proceeded to the west toward the tomb of Khentkawes, KKT-E became buried once again under sand. Therefore, the area was no longer visible when Hassan produced his map of the town (Hassan 1943).

The 2008 excavations in KKT-E not only shed light on events during the past 70 years, but also exposed more of the architecture. The mudbrick remains sloped down at approximately 30° from the edge of the cut to the east and from the extension of the Northern Enclosure Wall toward the south. These inverted L-shaped remains measured approximately 40.0 m north-south and 15.0 m east-west. What caused this fairly uniform 30° angle “slice” across the architecture was a mystery, but erosion was certainly a candidate. The cross-section through the mudbrick ruins revealed a possible ramp running parallel to the bedrock cut and leading up from the south to the

north and the entrance of the causeway. For the first time it appeared that there was an answer as to how the causeway was accessed from the east. Still the LBB remained an enigma, and another year would have to go by before it began to reveal its secrets.

#### *Summary of the 2009 Excavations*

The aim of the 2009 season was two-fold:

- Excavate the LBB to gain information on the nature, function, and spatial distribution of the remains over time.
- Integrate the results in KKT-E to understand how the LBB relates to the wider Khentkawes complex.

These aims were rather ambitious considering that our exposure of the ruins covered an area of over 2,300 m<sup>2</sup>. However, the ongoing degradation of the upper level KKT area at its interface with KKT-E was erasing links between the two. This justified the decision to undertake such a wide, intrusive investigation.

By the end of the season, nine phases of activity in KKT-E were provisionally assigned. The following report outlines these results and the information gained on the ingenious and creative way the ancient Egyptians manipulated the landscape to achieve specific goals.

#### **A Changing Landscape**

Erosion down to the limestone bedrock combined with excavation offered insights into the way the local environment was utilized before the building of KKT. The limestone bedrock (Phase 1) was only visible in certain areas of KKT-E, primarily in the southern part of the area. To the north, only patches of bedrock were visible at the bottom of a north/south erosion channel (Feature [30,826]) and at certain points where it projected from foundation deposits [30,852], [30,853], and [32,419]. In most of these exposures the bedrock appeared to be a natural formation. To the south the bedrock possibly showed signs of quarrying.

One of the four manual drill cores undertaken during the season through the saturated sand at the base of the KKT-E area put the lowest level of the bedrock at 12.43 m above sea level (asl) (fig. 3.1).

By removing substantial mudbrick collapse, a greater extent of the north-south aligned vertical bedrock drop [28,849] between the upper level KKT settlement and the

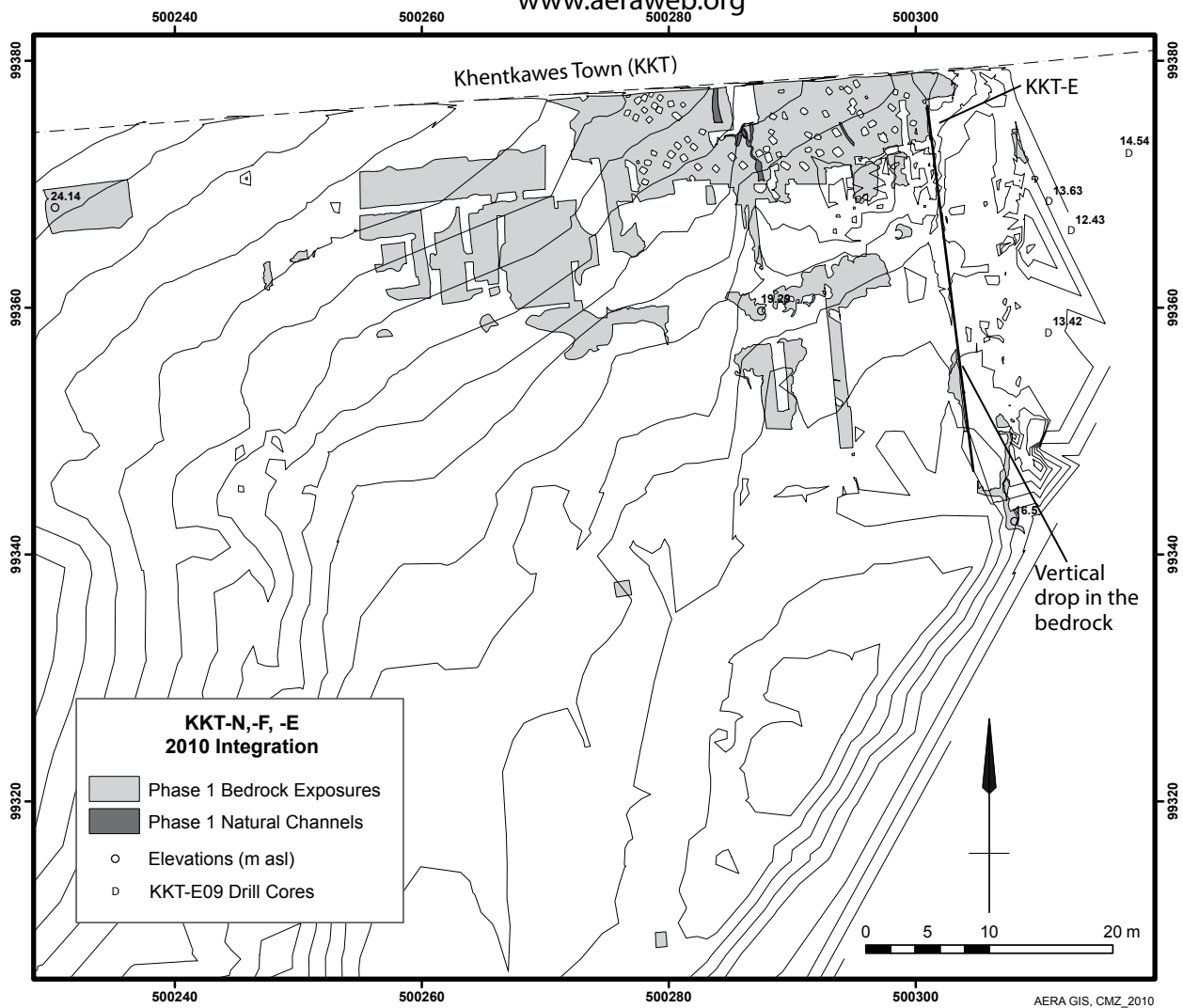


Figure 3.1. Khentkawes Town, Phase 1. Map prepared by Camilla Mazzucato, AERA GIS.

LBB was exposed. Aside from a few undulations, the bedrock face is, on the whole, vertical and uniform. Diagonal chisel marks cover the bedrock face. Since its discovery, [28,849] has been referred to as a quarry cut. However, it is difficult at this point to establish to what extent the chisel marks and this surface resulted from quarrying work prior to building the LBB, or from the preparation and subsequent alterations for the construction of the LBB itself. One thing is certain: a ledge [30,809] was carved out of the vertical face in preparation for the construction of the Northern Lateral Ramp (NLR), described below. The chisel marks above the ledge are, therefore, more than likely related to this activity rather than to quarrying.

Possible evidence of quarrying (Phase 2) was observed on the exposed bedrock in the southern end of KKT-E. The surface of the bedrock here was level and extended 3.5 m east from cut [28,849] where it dropped down into a vertical surface. Into this surface a slot 1 m × 40 cm east-west was made. It is possible that this linear slot either represents an attempt to remove blocks of limestone that was not completed, or is the remnant of a slot originally made

to remove blocks of stone higher up. If this work was a result of quarrying, then it may have occurred during quarry work that created the surface on which the upper KKT was founded.

### The LBB Comes into Being

As to why and when quarrying activity ceased and building activity commenced in KKT-E still requires further investigation. One hypothesis comes from the 2007 work in the higher level KKT area. Prior to the construction of the first settlement (built of mudbrick), Yeomans (2007) uncovered evidence of a possible intervening phase (3) in the form of two east-west limestone walls, one with associated rendering and plaster, and a possible floor surface (see color plate 1). Yeomans believed that they might have formed part of a separate system of structures due to the fact that they were limestone rather than mudbrick. These limestone walls overlaid remnants of quarrying work, suggesting that either quarrying had ceased or was moved elsewhere to make way for construction. Although there is currently no stratigraphic link, and no similar limestone

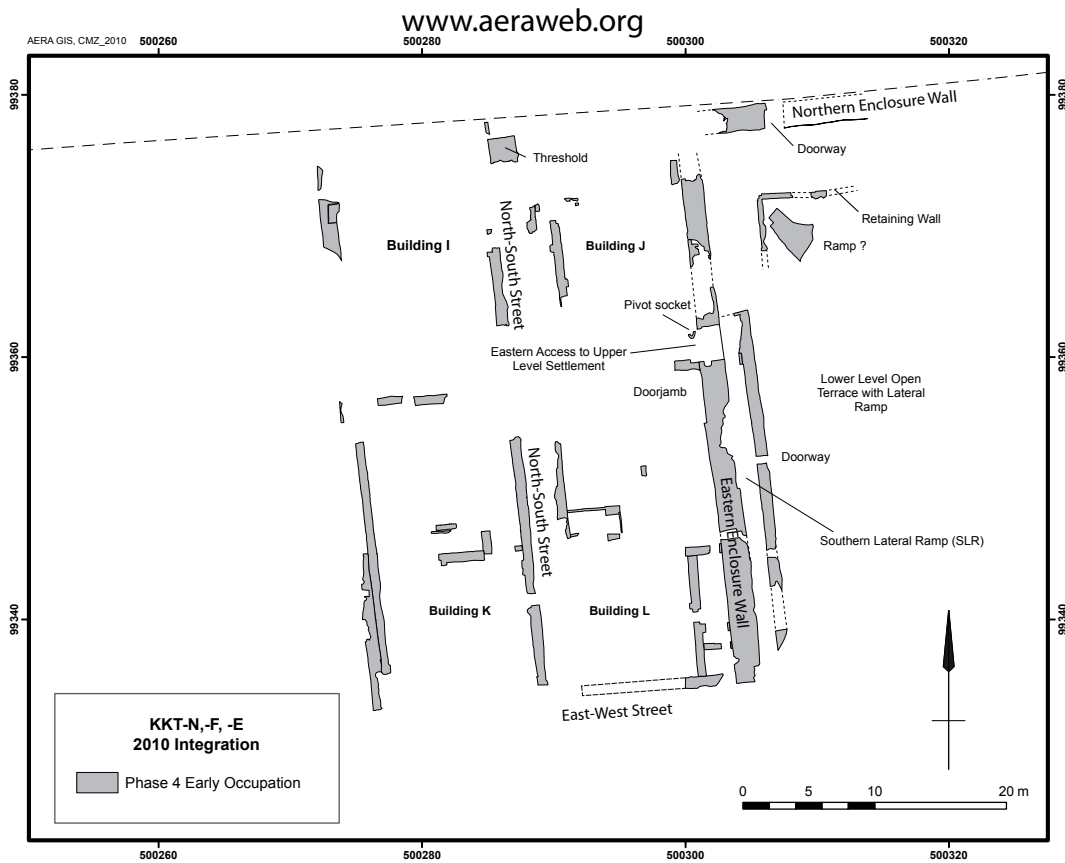


Figure 3.2. Khentkawes Town, Phase 4. Map prepared by Camilla Mazzucato, AERA GIS.

features were uncovered in KKT-E, it could have been at this time that building work began in the KKT-E area.

A ramp (designated the Southern Lateral Ramp, SLR) that provided access from the LBB to the higher level KKT settlement is one of the most striking features of the LBB (see Lehner, Chapter 4, this volume; foldout 1). The SLR sloped up from south to north against the eastern face of the bedrock cut. Excavation and the erosion slice (mentioned in the introduction) along the eastern limit of the remains reveal that the ramp went through modification during its use. Its earliest form is yet to be established, but the erosion has exposed a number of layers that make up the ramp. One of these layers comprised of crushed limestone and marl may be an earlier surface. If this proves to be the case, then an early form of the ramp was 11.2 m in length, much shorter than its later, modified form, which combined with a corridor element measured 28.6 m. The longer ramp/corridor system appears to be associated with the early mudbrick upper level KKT settlement, and subsequently, the Khentkawes mortuary complex. If there was an earlier, shorter ramp, then what was it associated with, and when was it built? One hypothesis is that a ramp was required to access the higher level area and the newly built limestone walls/structure of Phase 3 (color plate 1).

Further excavation is required to establish the full phasing of the SLR. However, even with full phasing, due to spatial distance and heavy erosion, it will be challeng-

ing to establish if a stratigraphic link exists between an early ramp and the early limestone walls.

It therefore appears that the first LBB (Phase 4) comprised an inverted L-shaped open terrace upon which was built a ramp (SLR), which provided access from the lower terrace to the higher level KKT settlement (fig. 3.2). The structure was bounded on the west by a combination of the Eastern Enclosure Wall and a vertical cut in the bedrock, and to the north, by an extension of the Northern Enclosure Wall.

#### ***A Retaining Wall***

Construction on the lower level comprised a substantial deposit (approximately 1.13 m in height) of crushed limestone and marl (the likely remains of early quarrying activity) and pottery fragments to provide a level surface for construction over the undulating bedrock. Such a thick deposit, it appears, was required to ensure that the open terrace and SLR were raised sufficiently to avoid water erosion (see below). An inverted L-shaped stepped construction cut was then made along the southern and eastern limit of the foundation deposit for a mudbrick retaining wall. Remains of this wall are visible in the northwest, especially a cross-section exposed by a later north-south erosion channel. It is not known at present how far the wall extended to the east, but it did continue beyond the 2009 limit of excavation (Square 201.G38, see fig. 2.1). However, on the west,

1.96 m from the edge of the north-south erosion channel, the wall turned at a right angle towards the south and is visible for a length of 3.62 m. The stepped construction of this wall suggests that its primary function was structural support for the deposit now contained between it and the vertical cut in the bedrock to the west. The upper limit of the mudbrick wall did not extend above the surface of the deposit; it was, in fact, sealed by a floor surface, adding further support to the idea that the wall acted as a retaining structure.

No architectural remains were uncovered this season in the area east and south of the retaining wall, which was filled by a deposit of ancient clean sand containing scattered remains of pottery, charcoal, and mudbrick. This sand was excavated to a depth of 1.31 m from the surface of the open terrace (16.42 m asl), at which point the water table was reached. The manual drill cores indicated that the bedrock was on average 13.51 m asl (see foldout 1 for drill core placements). Since the retaining wall seen in the east-facing section of the erosion channel was 1 m high, the bedrock was approximately 1.91 m lower than the base of the retaining wall. The absence of any building activity to the east and south of the wall suggests that not only were the east- and south-facing elevations of the retaining wall exposed to the elements, but perhaps the whole area was also open down to the bedrock. Why was the foundation constructed in this particular way? Could it be that the structure surrounded a basin accessed from the east? Cutting a channel to feed such a basin from the Nile across accumulated levees would have been a monumental undertaking. However, it is possible that water at a depth of approximately 1.91 m could have stood in this area without eroding the wall.

The current 30° angle of the foundation deposit was possibly created when the structure fell out of use, and the unmaintained retaining wall eroded. Hence under pressure from the structures above, which probably at this time included collapsed elements of the Eastern and Northern Enclosure Walls, the foundation deposit “slumped-out” along its weakest points. The melted mudbrick deposit currently adhering to the foundation deposit may be the remains of the retaining wall.

In the northwest corner, where the retaining wall turns to the south, the east-facing section of the north/south erosion channel also revealed a compact limestone deposit. This deposit slopes up from the southeast to the northwest and was built up against the retaining wall. A mudbrick feature (ramp or stairway) lined in marl was built onto the limestone deposit. It may have been constructed to provide access from the basin to the terrace surface above.

The Northern Enclosure Wall of the LBB appears to have been built upon the foundation deposit described

above. However, the relationship between the two is yet to be clarified, as later structures obscure the bottom of the wall. It appears that there was an entrance through this wall for access to the LBB from the north, but currently only the east-facing elevation of this entrance can be seen. The east-facing side remains locked under unexcavated deposits. However, judging by the monumental nature of the wall, the entrance could be fairly wide (c. 1.70 m). During the 2009 season the Northern Enclosure Wall was exposed for a length of c. 10 m; it continues further east.

The SLR exposed in 2009 had been modified, probably during the construction and use of the Khentkawes mortuary complex. The earliest surface reached relates to the initial modification, and the later surface to the construction of the Northern Lateral Ramp (NLR). At the top of the ramp, the early surface is 16 cm below the cut in the bedrock, which acted as a step up to the doorway in the Eastern Enclosure Wall. The doorway, 2.3 m wide, is comprised of a limestone door socket on the north and an east-west doorjamb on the south. A combination of the vertical cut in the bedrock and the east-facing elevation of the Eastern Enclosure Wall bounded the ramp on the west. A mudbrick wall approximately 80 cm in width bounded it on the east, and included a north-south doorjamb located at the top of the ramp. The SLR's internal space was 1.30 m wide. The exact height of the bounding walls and whether the SLR was roofed cannot be determined. At the top of the ramp the surface of the SLR (18.21 m asl) was level where it met the opening in the Eastern Enclosure Wall, and then sloped down beyond the doorway toward the south. The surface leveled out again (16.85 m asl) at a doorway in the SLR's eastern wall. This level surface appears to continue to the point where it meets another east-west street (Squares 101.Z36 and 101.Y36, fig. 2.1), which separated Building M from Buildings K and L of the KKT settlement. Therefore, the 28.6 m length of this corridor/ramp system comprises 17.4 m of corridor and 11.2 m of ramp.

By combining the results of the 2007, 2008, and 2009 excavations it is possible to build a picture of this early settlement (see fig. 3.2). The 2007 work demonstrated that the settlement was aligned north-south and comprised Buildings I, J, K, and L (their relationship with Building M is uncertain). A north-south wall bounded the settlement to the west, the Northern Enclosure Wall to the north (see below), the Eastern Enclosure Wall to the east, and to the south, the southern walls of Buildings K and L.

Access to the settlement appears to have been from the north, south, and east. The Northern Enclosure Wall had two entrances: one to the east opening onto the lower terrace mentioned above, and another opening onto the upper portion of the settlement. Although the Northern Enclosure Wall had eroded away in this area (Squares 201.



H31 and 201.H32, fig. 2.1), Yeomans uncovered the remains of the 2.04 m-wide entrance way. A series of large white limestone blocks (the largest of which is  $1.27 \times 56$  cm) laid into the bedrock formed a threshold. In the southeast corner, a pivot socket, 36 cm in diameter, bore into the limestone. A large door would have rotated on this socket and, when closed, would have abutted a doorjamb carved into the opposing limestone block. The northern side of the threshold may have held additional uprights of wood or robbed-out stone positioned in shallow, rectangular sockets. From this entrance one could access North-South Street, which bisected Buildings I and J, and K and L.

Erosion down to the bedrock at the northern extent of Buildings I and J makes it impossible to establish for certain the true northern layout of these two buildings. Yeomans was able in 2007 to establish stratigraphically that the Northern Enclosure Wall (of the later expanded settlement) overlaid the western bounding wall of Building I (Yeomans 2007: 16). However, there are still unknowns; How far did Buildings I and J extend to the north? Did the earlier western bounding wall of Building I turn to the east to form a northern bounding wall for Buildings I and J? Do the current remains of the extension to the Northern Enclosure Wall into KKT-E and the LBB date to the early settlement or later modifications? Therefore, the stratigraphic positioning of the northern stone threshold is problematic. The threshold may have been built when the early settlement was constructed, providing access to North-South Street separating Buildings I and K from J and L to the north, and continued in use when the settlement expanded. But this rests on the assumption that there was a northern bounding wall to the early settlement. Or, the threshold may have been built as part of an expansion of the settlement.

At present and pending further investigation, the current hypothesis is that the early settlement had a northern bounding wall (that extended into KKT-E) with a threshold that functioned along with the limestone door socket to the east of the settlement. The fact that the Northern Enclosure Wall of the modified settlement overlaid the western bounding wall of Building I indicates that remodeling took place possibly on the same alignment as an earlier wall.

Like the Northern Enclosure Wall, the Eastern Enclosure Wall also had two access points: the first at the top of the SLR and the second at the southern limit of the SLR, where it meets a possible East-West Street. Once on the street one could turn right halfway down and enter North-South Street between Buildings K and L. This access point appears to have been blocked later. It is not currently known where the SLR leads to the south, and if its southern limit could be accessed from the east. What is known is that one could access the SLR from the lower

terrace through a doorway in the eastern wall of the SLR, where one could either turn left (south) and go along the corridor, or turn right (north) and climb up the ramp. Once at the top of the ramp, one turned left and stepped up into the doorway with the limestone pivot socket and opposing doorjamb situated 2.6 m back from the edge of the step, effectively creating a porch. The thick plaster on the eastern extent of the doorjamb suggests that the door opened outwards onto the porch.

Since 2007 it was assumed that one would have entered an east-west street when walking through the doorway at the top of the SLR. However, there is no evidence to support this view at present. The western limit of the east-west doorjamb that formed part of the doorway in the Eastern Enclosure did not continue west, but turned at a right angle to the south, suggesting there was no wall running to the west bounding a street. The construction phases of Buildings I, J, K, and L need to be carefully investigated, but it appears that one entered an open area bounded to the west by a Western Enclosure Wall, to the north by Buildings I and J, to the east by the Eastern Enclosure Wall, and to the south by Buildings K and L.

What was the function of this early settlement and when was it constructed? We currently have no evidence for the relationship of Buildings K-L to the southern East-West Street and to Building M. Moreover, we are unaware at this point how far east the northern part of the LBB extended. The positioning of the settlement may provide a tentative clue. Its closest neighbor is the Valley Temple of Menkaure to the south. It is possible that this KKT settlement was built at the same time as Menkaure's Valley Temple was being completed in mudbrick by his successor Shepseskaf in order to house the personnel who maintained the mortuary cult of Menkaure. The basin in KKT-E could have been the access point for goods required for this function to reach the settlement from the east. The settlement could also have been built earlier at the time of the stone-working phase of the Menkaure Valley Temple, again to house the personnel responsible for this work, changing to the aforementioned function when the temple was completed.

What also requires consideration is the relationship of the settlement to the outcrop of bedrock to the west that was to become the tomb of Khentkawes. The doorway in the Eastern Enclosure Wall at the top of the SLR is in direct alignment with the entrance to the tomb's chapel. Therefore, whether built in conjunction with the stone-working or mudbrick phase of the Menkaure Valley Temple, it is possible that the intention for the settlement to ultimately form part of the Khentkawes mortuary complex was already there when the settlement was initially built.



## Change is Afoot

How long the  $\kappa\kappa\tau$  settlement functioned in this form is difficult to ascertain, but recording and excavation revealed that the settlement went through some modifications (Phase 4-5) (color plate 2). Whether the modifications to the LBB coincide with those in Buildings I and J is uncertain and will require further investigation. The construction of several internal walls within Buildings I and J may have been either modifications to pre-existing architectural components of the buildings, or the second phase of construction when the buildings were first built.

The LBB was structurally altered, restricting access as a result of the blocking of eastern access from the open terrace to the SLR. Once the mudbrick blocking in the eastern entranceway to the SLR was in place, the internal elevation of the east bounding wall of the ramp was treated with lime wash, effectively covering any evidence that the doorway existed. The SLR was also resurfaced at this time. It is not known how the lower open terrace was accessed with these two blockings in place, but it is clear that the SLR could still be accessed from the south.

The next changes to the settlement sees it expand substantially to ultimately function as Khentkawes' mortuary complex. It is possible that the modifications of the previous phase were part of that decision to expand the settlement, and either occurred at the same time as the next phase or were precursor work. Construction of the mortuary complex appears to have happened over three phases (Phase 5ai, 5aii, and 5c). The first of these involved the construction of the complex's bounding enclosure walls, the Northern Causeway Wall which cut across North-South Street between Buildings I and  $\kappa$  and J and L, the outer bounding wall of Building E (and quite possibly Buildings A, B, C, D, F, G, H, and Building M, if it was not already part of the earlier settlement), and an underpass cut into the aforementioned North-South Street (color plate 3).

The second phase involves significant structural expansion on the open terrace on the north end of the LBB (color plate 4). Two substantial load-bearing mudbrick walls were built directly on the surface of the terrace; one [29,050] oriented north-south (9.1 m long  $\times$  1 m wide  $\times$  1.07 m high) with its southern limit abutting (and wrapping round) the northern limit of the SLR. The northern end of this wall formed one side of a 1 m-wide entranceway (Square 201.G35) with the second wall, [29,047 = 30,838], oriented east-west (17.4 m long  $\times$  1 m wide  $\times$  84 cm high). The eastern limit of the second wall is unknown at present; it continues beyond the limits of the 2009 excavation. Along the south-facing elevation of the Northern Enclosure Wall a mudbrick retaining wall [29,057 = 32,410] was constructed covering the doorway blocking. The con-

struction of these walls created a 1 m-wide L-shaped space, the surface of which was raised 1 m. In effect, a higher level corridor was created, which could be accessed from the open terrace by a series of six mudbrick steps leading to the doorway mentioned above. Once through the doorway, one could either turn left into a room, 8.7 m long, or turn right, then right again (through a set of doorjambs) and go east through the higher level corridor. All surfaces, including the walls, corridor floor, doorjambs, steps, and the open terrace surface, were treated in a marl render followed by lime wash.

In the upper level area of the complex the Southern Causeway Wall was built, the eastern end of which was constructed over the doorjamb at the entrance through the Eastern Enclosure Wall. Also, all the internal walls of the buildings in this part of the complex were constructed.

During a period of use of the LBB in this form (Phase 5b, color plate 5), several repairs were made to the floor surface within the corridor, and the floor at the base of the steps was resurfaced. The presence of the steps indicates that the open terrace was accessible, possibly from the basin.

A remarkable feature of this phase was a concentrated deposit of ceramics situated over and partially around the stairway leading to the corridor. Vessels were first placed against the south-facing elevation of the stairway (in the corner where this elevation meets the new north-south wall) as the assemblage grew over time, it spread out across the terrace surface and the bottom three steps of the stairway. The deposit mainly comprised miniature plates, miniature jars, and beer jars. A larger fragment of a beer/bread basin was also recovered among the 295 pots in the deposit. According to Anna Wodzińska (Chapter 17, this volume) the pieces date to the 4<sup>th</sup>/5<sup>th</sup> Dynasty and were probably votive offerings. These vessels were only associated with this part of the LBB; no such vessels were found associated with the SLR.

This phase also sees minor architectural modifications within the structures of the upper level of the complex. These modifications, although not linked stratigraphically to the use of the LBB, appear to demonstrate the continued occupation and use of this part of the settlement.

The next (and third) phase sees the final structural alterations to the LBB and the upper part of the complex (color plate 6). Again, the temporal relationship between these sets of changes is unknown at present, as well as whether they represent the final building phase of the complex. In the north, another ramp was installed (designated the Northern Lateral Ramp, NLR) in the area previously occupied by the 8.7 m-long space to the left of the doorway at the top of the stairs. The ramp, with a newly laid surface, provided access from the north end of the

LBB to the causeway and, with the SLR, created a double ramp system.

In order to build the NLR, the east face of the limestone bedrock was cut away (maximum depth of 40 cm) to a flat vertical surface that would line up with the east-facing elevation of the Eastern Enclosure Wall in this area and the internal east-facing elevation of the SLR. When the cut was made, a shelf/ledge of bedrock sloping down from the causeway entrance and the doorway at the top of the stairs to the north was left in order to indicate the desired inclination of the new ramp. The surface of the NLR was, however, not as steep as that of the SLR. Therefore, the surface of the SLR was raised to reduce its incline and create a sense of symmetry across the two ramps. The surface of the NLR was treated in marl that extended over the entire extent of the corridor, now sloping up gradually from east to west.

It is also at this time that an assemblage of ceramics similar in nature to those from around the steps was uncovered in the higher level corridor. It comprised small votive vessels, such as plates and jars, accompanied by bread trays, tall stands, and beer jars. Some of the fragments showed signs of charring which might be associated with burnt offerings. Like the earlier assemblage, these ceramics are dated to the 4<sup>th</sup>/5<sup>th</sup> Dynasty (Wodzińska, Chapter 17, this volume), which demonstrates the short temporal span between the two phases. They are more than likely associated with the function of the LBB in its final phase, but where those associated practices took place is currently unknown. The reason for placing the ceramics in the corridor is rather obscure. The mixed nature of the deposit suggests that the ceramics were taken from their primary deposit site and dumped in the corridor.

In summary, it is reasonable to assume that blocking the eastern access to the SLR and sealing off the LBB Northern Enclosure Wall (Phase 4/5) were precursors to the expansion that this structure went through in Phase 5a, 5a<sup>ii</sup>, and 5c to become the mortuary complex of Khentkawes. The fact that the entranceway in the Eastern Enclosure Wall was an access point for the causeway suggests that the LBB was still required and meant to form an integral part of the complex. Was the LBB still needed for its original function? Or was it necessary to renovate it to take on a new role? The two blocked entranceways indicate that access to the LBB was altered and, therefore, the LBB was destined to change its function at the time the causeway was beginning to be constructed. Yeomans (2007: 18) suggested the limestone door socket might have fallen out of use at this time because the protection that the door afforded was no longer required, as access to the complex may have been restricted to the east. The 2009 season demonstrated that indeed, access was restricted: the block in the Northern Enclosure Wall sealed off the

entrance from the north, while the block in the SLR's eastern entrance further restricted access to the higher level area. These blocks and structural alterations signify a change in function of the LBB.

The ceramics offer additional evidence that the Phase 5 LBB functioned differently than the earlier phases of the structure. The votive vessels seen in Phase 5 are not found in the earlier phases (Wodzińska, Chapter 17, this volume). The miniature plates and jars, basin, and beer jars were most likely used as votive offerings, suggesting that the later LBB had a ritual/cultic function.

If the KKT settlement was now functioning as part of the mortuary complex of Khentkawes and the LBB structure an integral part of it, what religious or ritual function was the LBB meant to perform? Its position at the lower eastern end of a monumental causeway with ramps down into a deep basin, its votive ceramics, and its builder—a woman who possibly ruled as king—indicate that this structure may have functioned as a valley temple. It appears certainly to be a valley complex, but whether or not it was a temple will require further research.

### The Sun Sets on the LBB

The next phase (6a) of activity associated with the LBB was restricted to the northern part of the structure and indicates the cessation, or gradual cessation, of its primary function. The southern doorjamb at the western extent of the higher level corridor collapsed face down onto the corridor surface. Notwithstanding this event, the corridor continued to be maintained and utilized. In the space between the NLR's surface remains and the corridor/ramp's eastern north-south bounding wall were the remains of an obscure oblong cut, one that truncated the ramp's surface as well as its bounding wall. The fill was identical to later collapse, and due to the fragmentary nature of the cut, it is difficult to ascertain its function. This cut had, in turn, truncated a circular cut (30 cm in diameter and 11 cm deep) situated near the center of the ramp's surface. Contained within it were the remains of two successive fires, the uppermost containing what appeared to be copper fragments. It is quite likely that this particular cut had originally been made higher up, again through the ramp surface. Apart from truncating the ramp's surface, these cuts also truncated the bedding layer required for the ramp, and, in the case of the second cut, the foundation deposit for the earlier corridor. A third intrusion, rectangular in shape, was made through the blocking in the Northern Enclosure Wall. This feature, which continued to the north beyond the limit of excavation, was devoid of any material culture that would indicate possible function.

Following these activities (Phase 6b), the Northern Enclosure Wall collapsed into the structure, which probably knocked down the southern east-west wall of the high-

er level corridor in a domino effect. No sand or debris was found between the collapsed material and the floor surfaces on which it was situated, indicating this was a very sudden event. The area occupied by the blocked doorway in the Northern Enclosure Wall became the access point for water to carve a channel down to the T-shaped basin, eroding what remained of the structural elements in this area.

Although the NLR was now blocked to the north, its eastern north-south bounding wall and the Eastern Enclosure Wall probably still stood due to several discrete activities that took place in the ramp's internal space. This space must still have been accessible from the south (top of the SLR), and possibly by climbing over the collapsed rubble to the north. Attempting to understand the sequence of events that took place in the area occupied by the NLR (which is still under excavation) in relation to the LBB's history of use proved a challenging undertaking in 2009. This was mainly due to pre-2007 exploratory pits sunk into the remains, probably by Selim Hassan's workers. However, even taking this into consideration, it is clear that the space had been heavily cut into prior to Hassan's excavations, which complicated matters further.

This area still requires further investigation, but it is apparent that the NLR and the earlier corridor were heavily cut for various reasons after the ramp fell out of use. One of the events was the deposition of a deceased human (see Kaiser, Chapter 18, this volume). The twisted remains of a human skeleton (Burial 461), possibly a female between the ages of 25–35, lay face down as though thrown. She had been suffering from a severe infection (osteomyelitis)

to her left tibia and appeared to be holding a stone in her right hand (Kaiser, Chapter 18, this volume). Nearby, in the same deposit as the human remains, were six copper coins tentatively dated to the late 7<sup>th</sup>–early 8<sup>th</sup> century AD. Additional human remains appeared in the south-facing section of a pre-2007 trench at a lower level and have not yet been excavated. The structural collapse that sealed these events and the SLR appears to have only comprised the upper portion of the Eastern Enclosure Wall, as the wall was still standing to some height when Hassan began his excavations (Hassan 1943: pl. XIXe).

After the collapse of the architecture, with no further activity immediately east of the SLR, NLR, and northern extent of the LBB, successive windblown sand deposits began to cover the area. However, the sand did not cover the area completely as the coins mentioned above suggest that a part of the LBB was certainly visible and accessible right up to the early Islamic Period.

### **Concluding Remarks**

Integrating the information gathered on the LBB with the work carried out in the wider Khentkawes complex has been a challenging undertaking, due to the size of the site, its ongoing degradation, and the volume of information retrieved to date. The provisional phasing and supporting narrative has not only facilitated a greater understanding of the Khentkawes site, but has also helped to formulate a number of hypotheses. Therefore, in coming seasons, excavation and recording will be targeted to specific areas with the aim of testing these hypotheses, and bringing about a more securely grounded interpretation of the site.

## 4. KKT-E: SLR Elevation View (Foldout 2)

Mark Lehner

**D**uring our 2008 season we recognized the Southern Lateral Ramp (SLR) in the “mudmass” banked against the bedrock ledge east and south of the end of the Khentkawes Town causeway, but we did not excavate the eroded and tumbled mudbrick. In 2009, Daniel Jones supervised the excavation of the SLR to the base of its slope and its continuation southwards as a more horizontal corridor between the bedrock ledge and the corridor wall (see Jones, Chapter 3, this volume).

### Drawing the East Face of the SLR

Builders created the SLR in a corridor between the bedrock face and a parallel mudbrick wall (Feature [29,904]) at least 90 cm thick. They filled the corridor with layers of crushed limestone and Nile silt to create roadbeds ascending in a gradual slope up to the causeway.

Erosion shaved the corridor wall and face of the SLR into a 30° slope, exposing the inner fill and structure of the ramp (fig. 4.1). Two layers of crushed limestone and marl revealed in the fill appear to be the make-up or bedding of two phases of the SLR. The lower layer (Level 1 in fig. 4.2) may mark an early phase when the ramp was shorter and steeper. The higher crushed limestone layer appears to be part of the make-up for the alluvial silt roadbed into which people dug oblong trenches along the upper bedrock ledge [28,849] prior to 2007. Jones excavated in order to expose what remained of this level (fig. 4.2). At the end of the 2009 season, the latest, highest SLR floor was indicated by a thin crushed limestone layer and by the bottom of the latest marl plaster on the vertical bedrock face (fig. 4.2). Jones excavated through this latest floor to expose the earlier second floor (Level 2).



Figure 4.1. Dan Jones sits on the lower terrace and contemplates the layers of marl and crushed limestone, showing where erosion cut through the eastern wall of the Southern Lateral Ramp. View to the north. Photo by Mark Lehner.

In order to capture what our excavations revealed by the close of the 2009 season, I drew the east face of the SLR at 1:20 (shown in this volume at 1:25, see foldout 2). This was a bit of an awkward drawing; erosion left the eastern wall and shoulder of the SLR at that 30° slope between the eastern edge of the second floor or roadbed, and what remained of the vertical face of the eastern corridor wall where the mudbrick tumble had protected it, face down, close to the lower terrace on which the SLR was founded.

### The Floors and Slopes of the SLR

The white sloping layers of crushed limestone ([29,912] and [29,897]) present in the eroded surface signaled to us in 2008 that this bank of mudbrick ruins was once a ramp sloping up from south to north to the causeway threshold (fig. 4.2).

#### Earliest SLR Floor

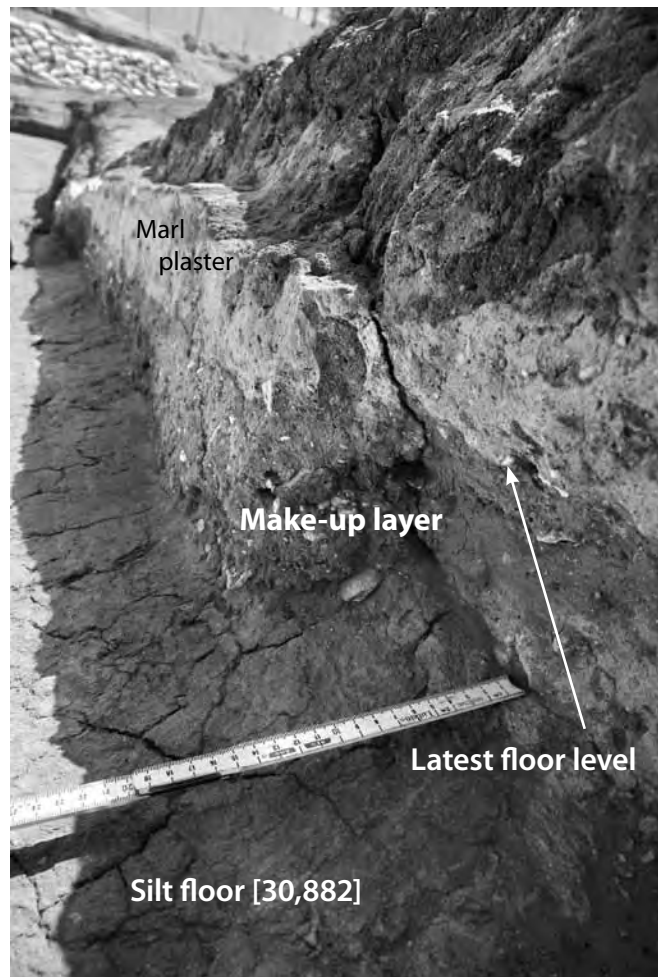
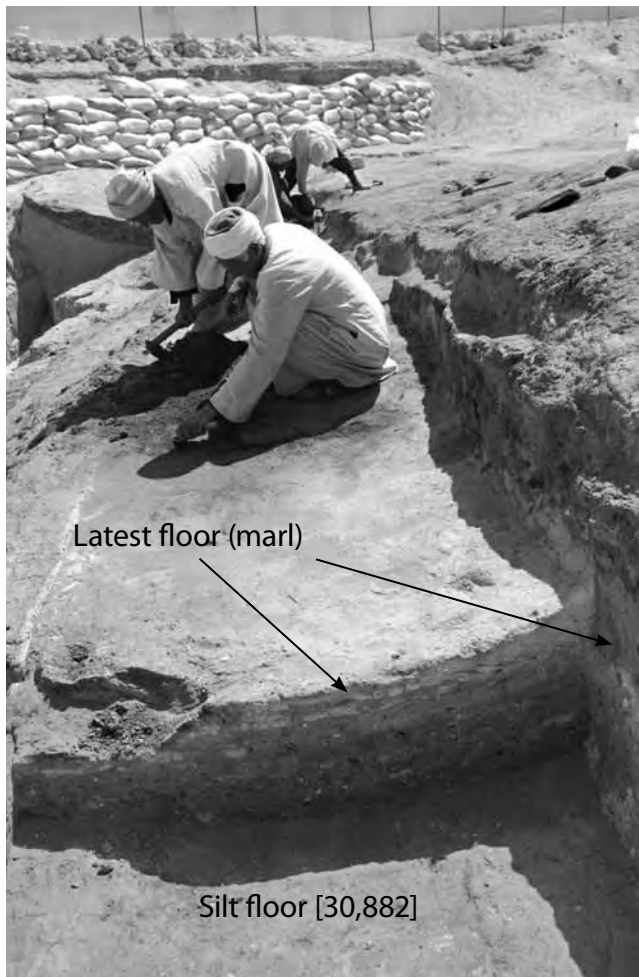
Toward the top of the slope, we can discern two layers of crushed limestone, an upper one [29,912] with more silt that directly overlays a cleaner layer of crushed limestone and marl clay [29,897]. The latter slopes up to its highest

level just under the alluvial silt paving of the level platform at the top of the SLR in front of the causeway threshold. The upper layer ([29,912]; green in foldout 2) begins about 1.2 m south of the southern edge of the causeway, and for 1.8 m of horizontal distance the two layers are in direct contact. At a point 3 m south of the southern side of the causeway, the lower layer [29,897] continues as a marl line or seam in the sloped bank of the SLR. The two layers separate 3.52 m south of the southern side of the causeway, parted first by mudbrick fragments, and then by two courses of bricks laid either as headers or stretchers.

The upper crushed limestone layer (green) must be part of the make-up for the second floor or roadbed (blue). The lower crushed limestone and marl layer ([29,897]; yellow) probably marks the first roadbed of the SLR, when it sloped 14° over a horizontal distance of about 6.3 m. The marl line and its slope ends about 18 cm above the floor of the terrace, about 1.14 m north of the marl plaster line [29,917] that marks a doorway or passage from the terrace into the base of the SLR. It is possible the doorway functioned with the SLR in its earliest phase, at the base of the sloping bed marked by layer [29,897].



Figure 4.2. Erosion reveals possible phases of the Southern Lateral Ramp. A lower sloping layer of crushed limestone (1) may be the earliest phase. A higher crushed limestone layer with a thick silt paving (2) is designated Phase 4. The line between gray silt and marl render on the vertical face (3) marks the floor of the final Phase 6. Photo by Mark Lehner.



Left: Figure 4.3. Excavation of the latest SLR floor, which shows as a thin marl layer in section, view to the south.

Right: Figure 4.4. The latest SLR floor shown in section against bedrock, view to the south. Photos by Mark Lehner.

### ***Intermediate SLR Floor***

By March 10, 2009, Dan Jones had excavated what remained of the upper floor and its make-up layer after the pre-2007 trenching. Jones's excavations freed the surface of a thick, silty underlying floor [30,882] that slopes for a distance of more than 5.7 m from its high point down to near grid point 201.C35, marked by a vertical stake in the drawing (foldout 2). The roadbed slopes from an elevation of 18.24 to 17.18 m asl, a drop of 1.06 m over a run of 5.7 m, giving a slope of around 11°. The roadbed dips slightly to the east; hence, much of it shows in the straight-on elevation drawing (blue). The roadbed dips slightly in cross-section to the center. Is this a concavity worn by use? At the upper slope just south of the doorjamb, traffic wore through the silty render to expose an underlying marl render over the crushed limestone make-up layer. The lower part of the roadbed is not so worn.

The SLR rises about 1.10 m above the terrace at its high point in front of the causeway. Jones determined that the intermediate SLR floor begins its downward slope just south of the causeway and levels out near the blocked

doorway through the corridor wall, for a slope of 11° along a length of 11.2 m.

### ***The Latest SLR Floor***

The latest, outermost marl render on the bedrock face [28,849], up to 17 cm thick, lipped down onto the surface of the latest, highest floor of the SLR (figs. 4.3, 4.4). As measured from my 1:20 elevation drawing (shown in this volume at 1:25, see foldout 2), this floor sloped between 8–10° on a make-up layer of alluvial silt and limestone chips 14 cm thick near the top and 22 cm thick near the bottom. The drawing shows this make-up layer because the excavations cut through it; leaving some of it adhering to the bedrock face flush with the marl plaster above, with the same thickness. On the western side of the SLR, this silty make-up surface rested directly upon the smooth silty render [30,882] of the ramp floor that Jones exposed by removing the upper floor and its make-up layer.

On the bedrock face, the boundary between the outermost marl render and the silty make-up marks the sloping line of the latest SLR floor. Lenses of very thin crushed

limestone run along the bottom of the marl render, just where it lipped onto the uppermost ramp floor. From the causeway threshold to about 2.08 m downslope to the south, the marl plaster and silty make-up layer were missing, but if projected, the line of this latest floor comes to the very rim of the bedrock ledge at the causeway. The lower floor [30,882] that Jones exposed levels off to a kind of compact silt platform 16 to 18 cm below the bedrock threshold at the end of the causeway.

#### ***Doorway into the SLR***

A marl line 8.84 m south of the southern side of the causeway marks the doorway through the corridor wall. Here a marl plaster face [29,917] runs east-west across the corridor wall. The marl plaster face turns 90° south, as does the marl plaster on the western face of the corridor wall [29,918]. The east-west marl face marks the southern side of the doorway through the corridor wall, which was later blocked. However, we have not articulated the northern side of this doorway. After people blocked the doorway, they plastered the western face of the corridor wall [29,904 + 29,918] across the blocking.

#### ***Back (Northern) End of the SLR***

The SLR ends on the north about 1.18 m north of the northern side of the causeway at an obvious seam in the mud brickwork. This seam, which leans into the south, is the back end [29,040] of the corridor wall that contains the SLR before the NLR was later built up against it. The back end of the SLR was plastered with marl before the builders filled the northern corridor with the NLR. Because erosion scoured away the outer, eastern face of the SLR, seven to eight courses of mudbrick show underneath the marl plaster of the back end.

At first, the SLR alone ascended to the causeway without a Northern Lateral Ramp (*GOP4*: 15, fig. 6). The builders extended the SLR 1.18 m beyond the causeway and made a buttress-like back, plastered on its outer northern face, leaning in to retain the fill between the SLR corridor wall and the bedrock ledge. At a later date, they built corridor wall [29,050] on the north up against the leaning back end of the SLR corridor wall [29,904], but not flush with its eastern face. The eastern face of the northern wall [29,050] is set forward (to the east) 20 cm from the eastern face of the southern corridor wall [29,904].

## 5. KKT-E: Notes and Reconstructions (Foldout 3)

Mark Lehner

To illustrate and reconstruct the end result of the phased sequence of Khentkawes Town East (KKT-E) features that Jones describes in this volume (Chapter 3), I prepared a schematic, isometric drawing of the lower approach and the northeastern corner of the upper town (foldout 3). The drawing reconstructs features known as of the end of the 2009 season. I based the ground plan of Buildings I, J, K, L, and M on Selim Hassan's (1943) map, then drew some walls and surfaces in the Valley Complex (Jones, Chapter 3, refers to this as the LBB, Lower Buried Building) to the height of the physical remains as we found them. Other structures I completely reconstructed, such as the Northern Lateral Ramp (NLR) and the retaining walls of the lower terrace. A reconstructed footprint of the KKT based primarily on our recording, supplemented by walls from Hassan's map where they have completely disappeared, remains a work in progress.

The following numbers of the notes are labeled on the drawing of foldout 3. I base these notes on those written during the 2009 season (Lehner 2009b) and on the Data Structure Reports of Olchowska (2008), Jones and Olchowska (2009), and Yeomans (2007).

### NOTES

1. The quarrymen left bedrock 2.1 m wide, extending 2.62 m (5 cubits) farther east than the eastern side of the KKT Enclosure Wall and bedrock ledge (GOP4: 33–34). They embedded this protrusion into the continuation of the Northern Enclosure Wall. This bedrock extension, and the corner it forms with the bedrock ledge running flush under the KKT Eastern Enclosure Wall, suggests that either the Eastern and Northern Enclosure Walls already existed when the quarrymen cut the vertical bedrock face, or that the builders already intended to build those walls when the quarrymen made their cut.
2. The causeway opens 1.6 m wide through the Eastern Enclosure Wall. It narrows slightly, to about 1.51 m, and widens on its run to the west to about 1.72 m. It is probable the builders intended the width as 3 cubits (1.57 m). The causeway and its opening replaced an earlier entrance into a corridor, 2.38 m wide, with a door that fitted into a large jamb on the south and a large limestone pivot socket on the north, which would have left only a one-meter passage with the southern causeway wall (GOP3: 9–11; GOP4: 34–36). The pivot socket is much too large for the narrow causeway, and it rests on a lower, older floor than that of the causeway. The jamb and socket belong to an earlier, wider door that left a passage 2.26 m wide between the jamb and the northern wall, and 1.72 m between the jamb and the pivot socket—about the width of the later causeway.
3. Thin remains of the western wall of Building I pass under the remnant of the southern wall of the causeway. The residue of the western wall of Building I also continues north where it would have run under the Northern Enclosure Wall, now entirely eroded away. Buildings I and J on the north and K and L on the south existed prior to the construction of the causeway. Lisa Yeomans (2007) concluded that the original settlement was aligned north-south, incorporating Buildings I and J and at least Buildings K and L, with their relationship to Building M uncertain. In short, the “foot” of the KKT existed before the “leg.”
4. A north-south avenue, about 2 m wide, ran between Buildings I and J and between K and L (GOP3: 11). The eastern wall of Buildings I and K, and the western wall of Buildings J and L, defined the sides of the street. A doorway with a limestone threshold opened to the street through the Northern Enclosure Wall. After the queen's builders made the causeway, it crossed and cut off North-South Street. They quarried a tunnel out of the bedrock that allowed passage underneath the causeway by means of steps on the north and a sloping incline on the south.



5. An entrance existed through the original width (1.86 m) of the Northern Enclosure Wall of the Valley Complex. The marl plaster line of the northern side of this access is clear in the ruins, with a single brick jamb at the northern end of the western side. But we have not yet satisfactorily articulated the structure of the eastern side of the entrance. A single large brick on the northern end of the eastern side might form a jamb complementing one on the western side, forming a restricted doorway about 70 cm wide. This entrance was filled and blocked when builders added the accretion along the southern face of the Northern Enclosure Wall (see note 6).
6. The accretion added to the Northern Enclosure Wall was a series of rebuilds. At the eastern end of our excavation of the corridor, the accretion is 67 cm thick, which added to the thickness of the wall (here about 1.9 m), makes a total width of 2.57 m, nearly 5 cubits. Toward the east, people seem to have been struggling with the bowing and collapsing of the southern face of the Enclosure Wall. They mortared large collapsed chunks back onto the eastern face, with the marl plaster faces turned inward. These add to the laminations we see in the horizontal erosion cut through the wall. In fact, Kasia Olchowska found the lower part of the last plastered face bellying out into the corridor, left in near-collapse after the upper part of the wall had toppled and filled the corridor with mudbrick debris.
7. Khentkawes' builders founded her town upon a natural geological plane that the quarrymen left exposed as they removed higher bedrock layers along one of softer, marly beds. Therefore the whole town slopes to the south-southeast. The bedrock ledge, which defines the eastern KKT boundary and the western side of the Valley Complex, slopes 6° down from north to south. The slope results in a drop on the north of 2.50 m from the base level of the KKT to the corridor of the Valley Complex (from 20.07 to 17.57 asl), and 3.4 m to the lower terrace.
8. The Northern Corridor runs east between the Northern Enclosure Wall and the corridor wall. The corridor is 1.2 m wide between two jambs added on the western end. We have excavated the corridor for a length 12.4 m to the east of the corner where the corridor turns south to the NLR, or 13.85 m east of the higher bedrock ledge. The corridor continues yet farther east. The floor level slopes slightly down to the east, from 17.57 m to 16.79 m asl as far east as Olchowska excavated down to contemporary floors, a drop of 78 cm over 11 m. The floor is generally 50 to 76 cm higher than the floor level of the lower terrace.
9. I have reconstructed the slope and roadbed of the Northern Lateral Ramp (NLR) based on the sub-ledge that the builders cut into the higher bedrock face to accommodate the width of the NLR. The sub-ledge shows a rise of 40 cm over a run of 8.41 m, giving a slope of around 4°. Builders abutted the NLR corridor wall up against the end of the corridor wall containing the Southern Lateral Ramp (SLR). The eastern face of the northern corridor wall projected 20 cm east beyond the eastern face of the southern corridor wall. Like its counterpart on the south, the NLR sloped up within a corridor 1.42 m wide, between the marl-plastered face of the ledge on the west, and a parallel mudbrick wall 1.01 m wide on the east. Khentkawes' builders filled the corridor with mud to support the sloping roadbed. They prepared the surface of the ramp with a bedding of crushed limestone, topped by a thick layer of alluvial silt and a paving of desert marl clay. People later trenched out the fill of the NLR corridor, partly for human burials, leaving the sub-ledge as testimony that the NLR once sloped up to the causeway threshold.
10. Builders created the SLR in a corridor between the higher bedrock ledge running north-south at the eastern edge of the KKT town terrace and a parallel mudbrick wall 90 cm thick. They filled the corridor with crushed limestone to make a floor surface ascending to the causeway. The SLR ended on the north about 1.18 m north of the northern side of the causeway, at a mudbrick retaining wall that leaned to the south. At first the SLR sloped 14° over a horizontal distance of about 6.3 m from the northern end to a doorway or passage (10a) through the eastern wall into the corridor from the east. Later the queen's builders blocked this doorway, lengthened the ramp to 11.20 m, and raised it to the north to level off at a platform of compact silt just below the bedrock threshold of the causeway. At that point the ramp

rose 1.06 m at a slope of around 11°. Finally, they raised the ramp again with a plaster surface upon a thin layer of crushed limestone that sloped 8° to 10°, arriving at the same level as the causeway threshold. Then they re-plastered the interior west wall of the corridor with a thick coat down onto the previous surface of the ramp. At this point in time the corridor measured 1.25 m wide between the marl render, 16 cm thick, on the bedrock face, and the corridor wall. At the top of the ramp, just south of the causeway threshold, a jamb projects from the corridor wall. This restricted the passage to a width of 1.05 m (2 cubits). At first, the SLR ascended to the causeway alone, without the Northern Lateral Ramp. The builders extended the SLR 1.18 m beyond the causeway and made a buttress-like back plastered on its outer northern face, leaning in to retain the fill between the corridor wall and the bedrock ledge. See the Chapter 4 text accompanying the SLR elevation drawing for more details.

11. The upper terrace on which the KKT is founded slopes from north to south following the natural dip of the limestone bedrock strata, while the lower terrace is roughly level. The result is that edge of the upper terrace rises higher, up to 3.44 m, above the lower terrace on the north. At the end of the causeway, the upper terrace bedrock is about 1.89 m above the lower terrace bedrock. Builders added the lateral ramps to ascend this difference in level. It is practically certain that the SLR corridor continues south as its slope decreases to meet the end of the east-west corridor leading through the “foot” of the KKT. We exposed but did not excavate the eastern end of this corridor. When we project the gradual slope of the SLR corridor to the junction with the east-west corridor, the threshold of the corridor is about half a meter higher than the SLR corridor. We did not excavate the junction in 2009.
12. The bedrock base of the KKT slopes gradually from north to south. In the eastern and southern “foot” of the KKT, the surface steps down from west to east along the line of a thick north-south wall or series of wall segments (see note 23) built up against the limestone debris on the west. From the lower level on the east of the KKT “foot,” people ascended a short stairway to the higher western level at the end of the east-west corridor, which is about 26 m long and 1.60 m wide. One entered the corridor through the opening in the Eastern Enclosure Wall at the junction with the SLR corridor (see note 11).
13. The junction between the corridors accessing the KKT—the SLR corridor (10) running north and the corridor running west to the stairs (12) and upper terrace—draws our attention to Building M, lying west and south of this point of access. The walls of this building, according to Selim Hassan’s map, are considerably thicker than the walls of the other KKT buildings, and while the rooms are generally larger, they are configured like rooms in those buildings we regard as houses. Perhaps this was a residence of unusual importance. The turn to the east of the thick enclosure wall at the southeastern corner of Building M is an important detail on Selim Hassan’s map (*GOP4*: 43–44, fig. 42). The distance from the northern face of this turn to Northern Enclosure Wall of the valley complex is close to 52 m (100 cubits), which is very close to the width of the Menkaure Valley Temple. The eastward continuation of the Enclosure Wall from the corner of Building M possibly marks the boundary of the Khentkawes Valley Complex and its basin.
14. The lower terrace extends south about 2 m from the base of the Northern Corridor Wall and 1.8 m east from the base of the NLR Corridor Wall. The terrace slopes from north to south but much more gradually than the upper terrace and the base of the KKT, from 16.66 m asl near the base of the stairs at the northeast corner of the lower terrace level to 16.44 m asl about 19 m to the south. The terrace shows a greater slope from west to east, from 16.60 m asl at the foot of the stairs to 16.29 m asl about 8 m to the east. Along the north side, the terrace runs 97 cm below the floor of the Northern Corridor on the west and about 50 cm below it at the eastern extent of our excavations. The difference is due to the fact that the corridor floor slopes more than the terrace. Near the stairs, the terrace shows three distinct floor layers. The stairs descend 70 cm through a passage 96 cm wide and 1.06 m long, through the Corridor Wall from the northern end of the NLR corridor to the lower terrace.

15. Two yellow marl plaster lines running through the mudmass at an angle about 30° to the north-south line of the terrace mark a banister on the southwestern side of a ramp ascending from the basin to the lower terrace on the opposite side of this ramp. A stony revetment built up against the terrace holds back the limestone debris fill of the ramp and extends over three steps in the bedrock emerging at the base of the revetment. We have not dissected the southern side of the ramp which merges with the “Glacis” slope of silty and crushed limestone material. It could be that the silty rendering hides another retaining wall that holds the ramp in place on this side. We articulated three or four steps at the top of this ramp. The remainder of the steps, if they existed, might have been worn away. The lower ramp is 3.90 m long on the horizontal plane and around 2.10 m wide at the top. It descends from elevation 16.48 m asl, flaring out slightly at the bottom. We did not find the base in the clean, wet sand filling the basin. The part of this ramp that we cleared ascends 1.45 m at a slope of 20°.
16. Our excavations of the northwestern corner of the terrace at the top of the lower stairway ramp exposed, under three layers of plastering, mudbrick walls that retained crushed limestone debris, which the builders dumped over the bedrock to build the terrace. The east-facing section of an erosion channel that cut the terrace immediately east of the lower ramp cross-sectioned the mudbrick retaining wall that runs north-south. In the section the wall extends down 90 cm, narrowing from 39 cm at the top to 21 cm at the bottom. This wall forms a corner with a wall of the same thickness running south at the head of the lower ramp. These are not very substantial walls, but it is possible that they formed the upper sides of the basin, as I indicate in the drawing where the wall is rendered along the top rim of the basin. For much of the 2009 season we thought that the 4<sup>th</sup> Dynasty builders purposely left the crushed limestone at a 30° slope for a glacis. We later thought that this angle was the product of erosion, which cut the walls and toppled mudbrick higher up flush at the same angle. After the retaining walls fell over, the mudbrick from the collapse decayed or vanished, the debris slumped, and forces of erosion subsequently shaved it all into the very regular glacis-like slope down into the basin. On the other hand, the builders might indeed have left the limestone debris below the terrace at a slope, rendered with silt, as a purposeful glacis that descended deeper into the basin than the bottom of the terrace retaining wall. That the builders intentionally constructed a glacis here may be indicated as well by the fact that to the south, the face of the bedrock underneath the crushed limestone also slopes. In the drawing I indicate this glacis at the base of the western side of the terrace. The slope would have helped protect the terrace from being undermined by water and by the weight of the architecture upon it. We exposed the “Glacis” down to elevation 15.00 m asl.
17. To the south we found the bedrock foundation of the terrace exposed where the plastering and limestone debris had eroded away. Short channels and notches that cut into the sloping bedrock face might indicate where another stairway or ramp ascended as a compliment to the lower ramp in the northwest corner. Between the channels, the sloping bedrock face rises in a hump 1.60 m wide. This is the width of the Northern Corridor, the Khentkawes causeway, and the corridor running west along the northern side of Building M. The top of the lower stairway ramp in the northwestern corner begins 8 m north of the northern side of the causeway. The top of the northern channel in the sloping face of the bedrock is 8.40 m south of the southern side of the causeway; so the position of these cuttings is about right for a stairway ramp roughly symmetrical with respect to the one we found on the north. Also, the two channels and hump are oriented slightly southwest-northeast, thus a mirror image of the northwest-southeast orientation of the northern lower stairway ramp. A doorway through the corridor wall in an early phase of the SLR would be just above the hypothetical southern ramp. People later blocked the doorway.
18. The bedrock descending into the basin might be stepped. The bedrock exposed under the northeastern side of the lower stairway ramp descends in irregular steps. At the end of our 2009 season, the basin remained full of sand, wet with ground water below elevation 15 m asl. We drilled four boreholes to find the bottom. The drawing shows in dashed lines a possible bedrock step along the northern side at elevation 14.54 m asl, where Borehole D stopped at a hard surface.

19. The drawing shows in dashed lines a possible bedrock step along the western side of the basin. Borehole c, in front of the lower stairway ramp, hit a hard surface at elevation 13.63 m asl. Borehole A ran into a hard surface at elevation 13.54 m asl, about 9.5 m to the south.
20. Borehole B was located farthest east of the four we carried out through the sand filling the basin. It hit a hard surface at elevation 12.43 m asl, which is as deep as the best estimates for the level of the Nile floodplain in the Old Kingdom (GOP3: 142). It is possible that the bottom of the basin slopes or steps down even deeper.
21. The dotted lines correspond to elevations 14.00 and 14.50 m asl, the range of our best estimate for the highest water during the peak of the annual Nile flood (GOP3: 142). The bottom of the mudbrick retaining wall immediately east of the lower stairway ramp reaches elevation 15.60 m asl. The higher estimate of the flood is more than a meter lower. The water at the peak estimate would fill the basin to a depth of 1.5 to 2 m, the lower value being the average depth of the flood over the floodplain in the 19<sup>th</sup> century (Willcocks 1889: 44). To receive floodwater, the basin would have needed a connection to the edge of the floodplain or to the Nile itself. The river is estimated to have been around 200 m east of the end of the Wall of the Crow in the Old Kingdom (GOP3: 140), which is about 325 m east of our exposure of the Khentkawes Valley Complex, so the closest position of the river is more than 500 m east of the basin.
22. In Selim Hassan's plan the walls in the southern end of Building L cross each other in ways that do not make sense for chambers and passages. Hassan's cartographer mapped walls of different phases, to which Hassan makes passing mention. When the occupants took walls down to rebuild with a new plan, they left residual outlines of the original walls on the ground. Even after the later walls eroded down to a height of less than a meter or only centimeters, some in the last 76 years since Hassan's excavation, we can still see the overlap of the wall residues from the different builds. The drawing shows the remnant of walls in the southern part of Building L as we mapped them in 2009. They correspond roughly, but not exactly with those in Hassan's (1943) map. The walls in the northern part of Building L do correspond to Hassan's map.
23. The builders founded the western part of the "foot," or southern part of KKT on a raised terrace of dumped, limestone debris. The boundary between the upper level on the west and lower town is not indicated on Hassan's map, except as a dotted line. The boundary shows very distinctly on site as a large mudbrick wall, up to 1.7 m thick (GOP4: 18–21). Although it might have been built in segments, this thick wall runs for the entire north-south length of the KKT "foot." It forms the western wall of House κ, which is thinner in Hassan's map. In 2008 we found evidence that the occupants of the settlement leveled the southern part of the wall flush with the top of the upper terrace in order to build a new, thinner wall (84 cm thick) directly upon the older one, with the eastern faces flush. Hassan's map might indicate the thinner wall.
24. The higher terrace in the western part of the KKT "foot" was devoted to storage, with granary silos, magazines, and a water tank. Grain might have been better stored under the drier conditions of the raised terrace, which might also have been well guarded. The wall pattern of later phases allowed access only via the long east-west corridor and stairway, which people might have monitored from Building M. The water tank is positioned to catch rainwater that ran down the road parallel to the causeway, and then south down the natural slope into a broad court.



## 6. KKT-N: Building E 2009 Introduction

Mark Lehner

The long northern part of the town of Khentkawes I consists of one row of buildings lining the northern side of the causeway leading from this queen's funerary monument to an eastern approach and ascent via corridors, stairs, and ramps (KKT-E) (fig. 6.1). The team designated this part of the settlement Khentkawes Town North (KKT-N). Interpreted commonly as “priests” houses, Lisa Yeomans in 2007 designated these buildings A through J (2007; *GOP3*: 7–11). In Selim Hassan's (1943) map, Buildings A–H share a fairly modular footprint, while Buildings G–J are smaller due to a jog southward of the Northern Enclosure Wall. Yeomans designated house-like units south of the eastern end of the causeway K, L, and M.

### Excavating A Single “House”

For our 2009 work in the “leg” of the KKT, or the row of settlement running west along the northern side of the Khentkawes causeway, we chose to excavate a discrete house unit, Building E; one of ten house-like units north of the causeway.

During 2007 and 2008, we progressively cleared southwards across the foot of the town and westward along the causeway, while excavating the remains of

structures to the north in increments determined by grid squares. In 2007, Lisa Yeomans and Pieter Collet recorded the scanty remains of the two houses farthest north (I–J), where many of the walls had been scoured away down to bedrock. During our 2008 season, Collet continued clearing and mapping KKT-N westward in a north to south strip 10 m wide and 30 m long, adjacent to the area recorded in 2007 (*GOP4*: 13–14, fig. 5). Because the boundaries of Collet's cleaning and mapping were those of our grid squares (line E500,250; Range 24 in Grid 201, fig. 2.1), rather than the boundaries of the houses, his work took in only the eastern part of Building F.

The decision to completely excavate Building E at the beginning of our 2009 season meant we jumped to the west, leaving 5 to 7.5 m unexcavated between the 2008 and 2009 work, which took in the western side of Building F. Lisa Yeomans and Hanan Mahmoud cleared and mapped this intervening strip, but limited the excavation of ancient deposits to Building E (fig. 6.2, Chapter 7, this volume).

The 2009 excavation of Yeomans and Mahmoud encompassed an area from about 2.3 m west of line E500,240 to E500,225 and north to south from line N99,375 to N99,355, about 12.7 m east-west by 15 m north-south. After

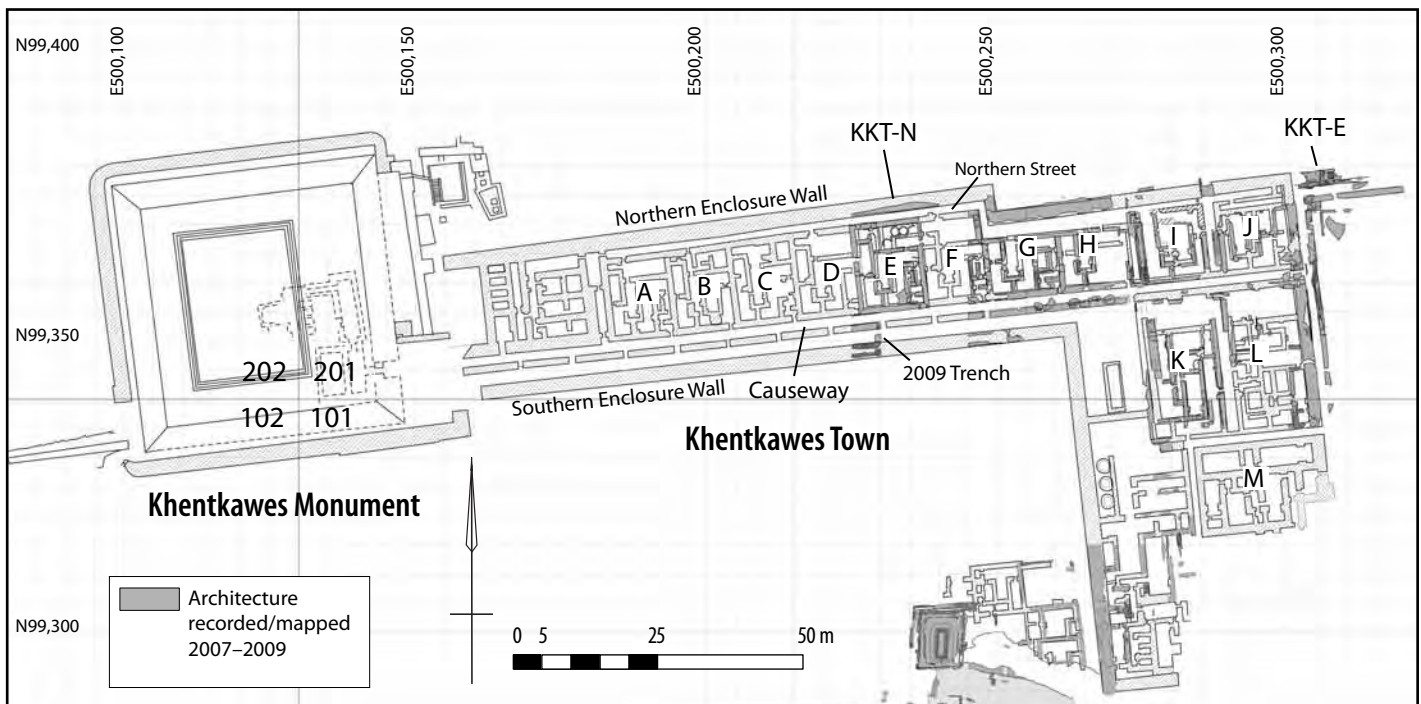


Figure 6.1. The Khentkawes Monument and Town showing AERA's 2007–09 excavations. Map prepared by Camilla Mazzucato, AERA GIS.



Figure 6.2. Building E. View to the south. We selected Building E for excavation partly because of the relatively good preservation of the walls, as seen here with the highest walls on the west side of the structure. Photo by Jason Quinlan.

Yeomans left at the end of March 2009, Mahmoud continued an exposure from the southern wall of Building E across the causeway, just over 10 m north-south  $\times$  5 m east-west (between lines N99,555 to N99,345 and E500,225 to E500,230) (Mahmoud 2009). She excavated a trench, 96 to 98 cm wide, along the west side of line E500,230.

### Size and Area of Building E

Building E takes in the rooms that on his map Selim Hassan designated 76 (southeast entrance), 77, 74, 79, 80, 73, 71, 70 (entrance on northwest), 68 (bedroom with niche turned to east?), and 69 (fig. 6.3).

From the external faces of its boundary walls, Building E extends 15.7 m north to south along the eastern side, 12.05 m east to west at the northern end, and 12.07 m east to west at the southern end, for an area of about 189 m<sup>2</sup>. Building E is about the same area as House Unit 3 (197 m<sup>2</sup>) in the Western Town of the HeG site (GOP3: 73–74, fig. 13), which is about mid-range between the area of two other houses at the HeG site, the Eastern Town House (100 m<sup>2</sup>) and House Unit 1 (400 m<sup>2</sup>), the largest house we mapped and excavated so far (Lehner and Tavares 2010: 211; and Chapter 14, this volume). Building E is slightly smaller than Building K, the western of two buildings south of the causeway in KKT, which covers 213 m<sup>2</sup> (GOP3: 13).

The preservation of the walls of Building E is much better than the walls of the buildings at the eastern end

of KKT-N. In Building E, Yeomans and Mahmoud found walls standing 30 to 32 cm high at the western side, 9 to 10 cm high at the eastern side of the northern end, and 50 cm high at the southeast corner (fig. 6.2). The walls stood higher, 75 cm, down to the limestone crush foundation layer at the southwest corner due to the pronounced slope to the south and (purposive) deepening at the southern side of the southern rooms.

### Roadways

The northern road and causeway, both running east-west, border Building E on the north and south respectively. We measured the width of the northern road as 1.62 m wide on the west, where we did not see the plaster faces, and 1.52 m wide on the eastern side of Building E between the plaster faces. The causeway in Mahmoud's trench measured 1.62 to 1.64 m wide. Another roadway runs east-west parallel to the causeway, between the causeway southern wall and the Southern Enclosure Wall of the town. We measured the southern roadway at 2.22 m wide at the western end of the cleared area south of Building E, and 2.21 m wide in Mahmoud's trench.

### Walls and Doorways

The northern, eastern, and western boundary walls of Building E measure about 85 cm wide. The southern wall, which is the same as the northern causeway wall, is 1.1 m

wide. The widths of the internal walls are 63 cm to 64 cm. At the end of the season, Lehner (2009b) took the measurements and notes on the doorways shown in table 6.1.

Like most of the doorways in Building κ (see *GP4:17*), the widths of most of the doorways in Building ε ranged close to 70 cm. We suggest that most of the doors of Building ε opened south on the basis of the rebates and pivot sockets located on that side. This might suggest that the main access route for practical everyday purposes was from the north, and that the northern street was the more profane, practical access route to all the houses. The only

doorway in the southeast corner of the building that could be closed off was the entry between the building and the causeway. This door opened to the north, which we might expect for movements connected with the (ritual?) use of the causeway.

### Room Function

The main entrance of Building ε is on the southeast, opening to a zigzag succession of small chambers (76, 77, 80) typical of other Old Kingdom houses and shrines, a configuration that shielded the inner parts of the building

**Table 6.1. Measurements and Notes on Building E Doorways**

Location	Width	Rebates	With rebate	Opened
1. Northwest, far west end	70 cm	24 cm on east	94 cm	south
2. North, 2 m east of northwest corner	73 cm	24 × 24 cm on west	1.05 m	south
3. North end of Room 71	69 cm	21 cm	90 cm	south
4. South wall broad room (79)	70 cm	30 × 40 cm	1.14 m	south
5. West end Room 74	74 cm	none	–	?
6. South end Room 69	68 cm	32 × 40 cm	1 m	north
7. North from west to Room 69	71 cm	none	?	open
8. South from west to Room 69	57 cm	none	?	open
9. Room 80 to 74	70 cm	South face, west side worn	?	south
10. Room 80, wall	52 cm	–	–	west?
11. Rooms 77–80	–	–	–	open
12. Rooms 76–77	–	North face	–	north
13. Causeway to Room 76	–	–	–	north

- This doorway had sockets and a hole for a vertical bolt, as Yeomans and Mahmoud suggest.
- This doorway opened through the northern wall [31,093]. It is not shown on Selim Hassan's map probably because it was later blocked. It gave entry into the northeast corner of the broad space (79) that was later used for the silos.
- From the western end of the broad space later used for silos into Room 71 through wall [31,091]. The rebate is on the east side, for a socket stone or bolt as Yeomans suggests.
- This doorway opened from the broad room (79) to the south. The hole where Yeomans removed the socket is 30 cm north-south by 40 cm north-south.
- No rebates show on the corners, which are intact. This may be a passage without a door.
- This doorway opened north from Room 69 into Room 68. The rebate is on the northern face of the doorway. The hole for the pivot socket is on the corner between this doorway and the southern doorway from the west, so although it might have served either, it was probably for the swinging door between Rooms 68 and 69; this doorway is rebated, while the other is not.
- No rebates show on the eastern face. The limit of 2009 excavations runs along the western line of the wall. Yeomans and Mahmoud cleared to expose the western line of the wall to the northern side of this doorway, but they did not excavate to the floor level on the western face. No rebates show in Selim Hassan's map. This might have been a passage from Room 65 of the next house to the west (Building D) without a door. It suggests free flow between the houses.
- Yeomans cleared back 40 cm from the western face of the western wall of Building E. No corner rebates were obvious. This opening might have been without a door, again suggesting free flow between Room 67 of Building D to the west and Room 69.
- 9–13. The doorways at the south-southeast part of Building E were badly pitted, then refashioned with later phase rebuilds. The excavators had taken out the later phase rebuilds when Lehner wrote these notes.



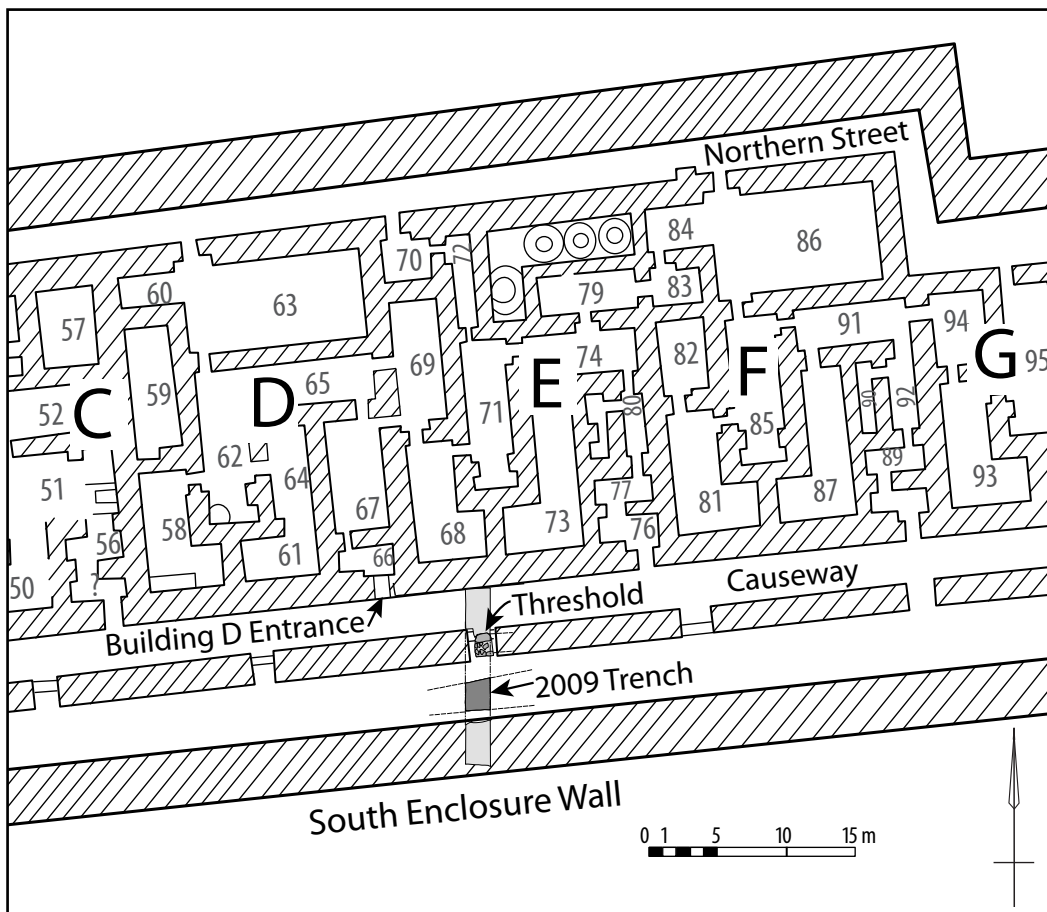


Figure 6.3. Khentkawes Town detail showing Building E and adjacent structures, based on Hassan's 1943 map. Map prepared by Camilla Mazzucato, AERA GIS.

from the outside, in this case from the causeway (fig. 6.3). The entryway leads to a central, transversal room (74), 2 m wide, which may have been a vestibule, possibly left unroofed. A doorway opens north to what was an open courtyard (72/79), 4 m wide, at the back of the house. Another doorway opened south into an L-shaped "kitchen" (73), 2 m wide, and a third doorway lead to an elongated room (71) that is 2 m wide at the northern end and 2.08 m wide at the southern end.

Selim Hassan designated the L-shaped room (73) and its common counterpart in the similar houses as the "kitchen." Felix Arnold (1998: 11–12) believed that those who designed this house pattern saw the cooking and other food preparation in sacerdotal terms—a liturgical meeting of daily need—and so he sees Room 73 linked thematically with the small, locked in, zigzag entrance chambers wrapped around on the east, connected by Room 74 (an open court?) on the north. Yeomans and Mahmoud (Chapter 7, this volume) report substantial evidence of burning that left thick ash over the floor and led to damage of the western wall. The floor of this room slopes to the south even more than the general slope of the house. At the southern end of this room and into its turn

to the west is a kind of niche, about 2.14 m wide (north-south). The floor is very rough and irregular, with more dark, ashy evidence of cooking. Given the extent of fire-related activity in this room, it is very possible it was unroofed, or only partially covered with a light roof, to allow smoke to escape.

Room 73 is nearly symmetrical with Room 68 to the west, with the foot of the L, or the niche of the same width, turned east instead of west. Hassan designated Room 68, 2.15 m wide, and oblong Room 69, 2.13 m wide directly north of it, as the bedrooms. However, Yeomans and Mahmoud (Chapter 7, this volume; Yeomans 2009: 11) found a number of hearth features against the eastern wall of Room 69, opposite the doorway from Room 67 in Building D to the west. A hearth in the southeast corner contained fish bone.

Yeomans and Mahmoud could not assign these burnt features to a particular phase. A hearth might have provided heat for a bedroom, but together these features suggest Room 69 contained cooking facilities that seem to have been shared with whoever lived in Building D. We might note the similarity between oblong Room 69 along the western side of the house, and the oblong Rooms F and

J along the western side of House Unit 3 in the Western Town of the HeG site, where pot emplacements, bread pots, and two makeshift hearths indicated cooking and bread production (GOP2: 73–74, fig. 13). Room 68, however, could have been a bedroom, with a bed in the niche. We have found bed platforms within niches that turn off a main room in the HeG site, in the Eastern Town House for example (GOP1: 16–17, fig. 8), and bed platforms within niches are known from ancient Egyptian houses at other sites (Lehner and Sadarangani 2007). We might note that anyone sleeping in the niche was one 60 cm-thick wall away from the cooking hearths in the parallel niche of Room 73—the kitchen. Could the wall have transferred heat on cold winter nights?

Selim Hassan described Room 71, 6.30 m long north to south, as the “living room.” Arnold (1998: 12–13) made a compelling case that in this room, the head of the house, seated in the niche formed by pilasters attached to the walls at the southern end, received visitors. The niche is the width of the room (2.08 m) and 78 to 80 cm deep. Arnold points out that the lord of the house seated here, or an assistant at his or her side, had a view of anyone entering the easternmost of the two northern doorways and the court (79).<sup>1</sup> In Building E, after occupants added the thin wall [31,092] that separated the northern court (Room 79) from the northwestern corner space, it created a corridor (Room 72) from the eastern access through the northern wall straight to the northern doorway of Room 71. Yeomans (2009) put this corridor wall [31,092] into Phase 5c, and so too the blocking of the northern doorway into Room 71, but it is hard not to believe that the corridor must have functioned for some time to channel people directly from outside into Room 71.

The pilasters in the southern end of Room 71 created a formal separation between master and guest or servant. Arnold (1998: 14) suggested the pilasters framed the niche like a door, which may have been crowned by an architrave with a drum roll. As a possible audience hall, Room 71 is one doorway from Room 68, with a possible sleeping niche, similar to the proximity of private rooms and sleeping rooms behind audience emplacements for the master in houses and palaces of other times and other sites.

Building K south of the causeway included a large rectangular central room (Room 129) measuring 7.4 by 2.6 m, oriented, like Room 71, north-south, with pilasters at the southern end defining a niche (Hassan’s Room 125) 1 m wide (GOP4 : 14–17). Room 129 is backed on the west by the niche of an L-shaped room (126) similar to the configuration of Rooms 68 and 71 in Building E.

What we found in House Unit 1 in the HeG site, compelled us to leave open the possibility that such central rooms with southern niches in Building K and other houses were sleeping rooms. The north-south-oriented Space 10,780 in the center of House Unit 1, was also configured with two pilasters defining a niche in the southern end (Kawae 2009b: 88–91). Space 10,780 was one of the largest rooms of the house, measuring 8.50 m north-south and 3 m east-west. The southern niche contained a bed platform, 1.32 m wide and 1.96 m long. The platform sloped down from west to east ending in a kind of “footboard” (Kawae 2009b: 90, fig. 37). A large deposit of molded marl fragments on the floor that bore red paint on some surfaces. These could derive from a molded architrave above and forward of the niche and bed platform, such as Arnold (1998: 14, fig. 7 DD) reconstructed at the top of the frame of the niches in the KKT houses.

The bed platform in House Unit 1 prompted us to wonder if the oblong central rooms with southern niches in the KKT houses might have likewise been the main bedrooms. However, in addition to the similarities of these rooms to the central rooms in the houses north of the Khentkawes causeway, we need to consider important differences. No doorway exists in the northern wall of Space 10,780 in House Unit 1, nor in the northern wall of Room 129 in Building K (GOP4: 16, fig. 7a). Instead, in Space 10,780 a doorway opens immediately beside the bed platform, giving access to a corridor between two utilitarian spaces at the far southern ends of the house.

### Room Size, Walls, and Roof

For questions of the roof of Building E and the possibility of a second story, we have to consider the thickness of walls and the widths of rooms. We might take as a rule of thumb that ancient Egyptian roofs of palm or acacia logs, cross poles, reed matting, and clay could not span areas wider than about 3.5 m (Kemp 2000: 93). Except for the northern space, “Room” 79, which was probably an open court, the widths of the larger rooms in Building E range from 2.00 to 2.15 m. The builders probably followed a standard width of 4 cubits of 52 cm, as Arnold (1998: 7, fig. 3) indicated. A flat roof of wood beams, cross poles, reed mats, and clay could have easily spanned these rooms.

However, the builders might well have intended the thickness of the walls for some function other than insulation against outside heat and cold.

While a second story is probably not the purpose of the thick walls in these houses along the north of the Khentkawes causeway, we cannot automatically discount

1. Hassan’s (1943) map does not include the western of the two entrances through the northern wall, so Arnold (1998) does not include it in his analysis of this house type.

the possibility. El-Saidi and Cornwell (1986: 21–25) report evidence of a second story for one of the houses, Gate Street No. 8, in the Workmen’s Village at Amarna. The rows of contiguous houses in this settlement bear some similarity to the layout of houses north of the Khentkawes causeway. Lower and upper layers of collapsed material that filled the Middle Room showed distinctions in the kind of material (grasses) and the color of the clay. The different layers probably collapsed from two roofs of two stories. Especially compelling for a second story, parts of a wooden window frame lay within the upper deposits of collapse. The window this frame fitted makes sense in the wall of a second story looking over the lower roof of a rear northern room. The boundary walls of Gate Street No. 8 were only 40 cm thick, at most, around the middle and rear rooms (El-Saidi and Cornwell 1986: 2, fig. 1.1). This might seem too insubstantial for a second story or even for a roof of the appreciable weight of acacia wood beams and cross poles, such as the excavators actually found in the fill. However, they pointed out:

At first sight, the weight of such a roof seems excessive compared to the strength and often careless construction of the house walls. But it must be remembered that lateral forces were neutralized by the roofs of adjoining houses. The finished village, with its almost continuous roofing, had something like a cellular construction, held rigid by the thick enclosure wall. (El-Saidi and Cornwell 1986: 11)

The houses of the KKT were also somewhat cellular in construction. The bounding walls, 85 cm thick, and especially the 1.1 m-thick common southern wall (the northern wall of the causeway), provided bracing for the roofs of Buildings A through J.

Having given the possibility consideration, it seems unlikely that those houses lining the northern side of the Khentkawes causeway included a second story. Among other considerations, these houses had to articulate with the causeway, which might also have been roofed, very possibly by mudbrick vaulting like the causeway of Shepseskaf at South Saqqara (Jéquier 1928: 19–21, pl. x), that was nearly contemporary with Khentkawes, and like the vaulted roof over the massive mudbrick lower causeway that the German mission recently discovered leading east from the so-called Valley Temple of the Bent Pyramid (Alexanian et al. 2010).

Instead of the flat roofs that covered the Amarna Workmen’s Village houses and other New Kingdom houses, Arnold reconstructed vaulted roofs in scale elevation drawings over most of the rooms in the standard plan of Buildings A–H in the KKT (Arnold 1998: 13–15, figs. 7–8). He leaves unroofed the northern court (79), the vestibule

(74), and partially covers the “kitchen” (73) with a flat roof that allowed smoke to escape. Invoking Junker (1955: 40–41), who observed that vaulted roofing was common to almost all rooms and corridors in the mudbrick mastabas of the Giza cemeteries, Arnold based his reconstruction of the vaulted roofing for the Khentkawes house type on examples of vaulted roofs found in mudbrick structures in the cemeteries (1998: 13, n. 30). Closer in function to the KKT houses, he (1998: 13, n. 29) cites a mudbrick building attached to the Sun Temple at Abusir. This building, like the KKT buildings, may have housed priests. At least one room was covered by a vaulted roof that reportedly survived until the early 1900s (Ricke 1965: 27). According to Arnold, the walls of the KKT priests’ houses were thick in order to support the weight of the mudbricks in the vaulted ceilings. He points out that the long rooms, a little more than 2 m wide, are ideal for vaulted roofs and probably designed to be covered by vaults. His reconstructions leave rooftops over these houses that vary in height from 2.50 m (entryway) to 3.50 m (Arnold 1998: 14, n. 31).

We have to keep Arnold’s very plausible reconstruction in mind as we continue to map what is left of these houses lining the northern side of the KKT.

### Intermingling of Houses

As part of the complex that included the causeway and enclosure walls, Buildings A–H appear to have been conceived as fairly modular and functionally redundant houses, an expression of some authority’s idea of a social and economic order. Yeomans and Mahmoud (Chapter 7, this volume) show that during the occupation, proprietary residence may have extended across and between the prior boundaries that separated units, reflecting a changing social, economic, and administrative organization within the settlement. Blocking of doorways and new walls reflect these changes (Tavares and Yeomans 2009), and must have impacted or changed the functions of the rooms. For example, once the doorway into the northern end of Room 71 was blocked, a proprietor still might have received visitors, but no longer from the northern exterior entrance and “public” court (Room 79), rather only after they had passed through the zigzag entrance and vestibule of Room 74.

The two doorways into Room 69 appear not to have been rebated, which is significant for our understanding of whether we are dealing with distinct social units in what we distinguish as houses. We have not yet excavated to floor level on the western side of the west wall of Building E, that is, within Building D, so we might find sockets for bolts and pivots. But without rebates, it is likely that no doors were installed in these openings, allowing free passage from Rooms 65 and 67 in Building D.

We should also note, for the idea that Rooms 68 and 69 are bedrooms, i.e., the most intimate rooms of the house, that a doorway with a swinging (probably wooden) door provided the only way from Room 71 to the west into Room 68. During all phases, to get into Room 69 from the entrance into the Building E on the northwest, one had to pass through two other doors via Room 68. To get to Room 69 from the entrance to Building E on the southeast one had to pass seven doorways. On the other hand, two openings offer access directly into Room 69 from Rooms 65 and 67 of Building D immediately to the west. These openings are directly north of the main southeastern entrance to Building D. One could enter Room 69 via only one or two doorways after the southeastern entrance of Building D. In other words, Rooms 68 and 69, while “intimate” (as innermost) for Building E, were most directly accessed from the interior of Building D. The southern of the two passages was blocked in a later phase (5b) of occupation.

On the other hand, Room 79, in all but the last phase of building use, was completely open to the northern end of Building F to the east. In fact this is one very long court, 4 m wide, which continues east of Building E to span the entire width of Building F. Selim Hassan’s map shows the most direct access into this court was a doorway from North Street into that part of the court that spans Building F. At some point the occupants built walls to subdivide the western end of this court within Building F into two small chambers, Rooms 83 and 84. In our 2009 intensive excavation and phasing we jumped over the western half of Building F, leaving 5 to 7.5 m unexcavated between the 2008 and 2009 work. This unexcavated strip takes in the western side of Building F, so we do not know when in the building sequence people made the walls of Rooms 83 and 84, but for now we suspect it was in the last period that they occupied the town, Yeomans’s (2009) Phase 6 of Building E, when people made the thin north-south wall [31,072] that screened off Room 79, now with silos. Even at this point in time the access into the court and silos,

probably granaries, at the northern end of Building E was through the doorway in the northern wall of Building F.

Yeomans’s (2009: 8–12) preliminary chronological phasing suggests that people blocked both of the two doorways through the northern wall of Building E in Phase 5b, and then, in Phase 5c, they built the silos and screened this storage off from the northwestern corner of Building E with a thin wall. They also blocked the doorways between Rooms 72–71, as well as the doorway through the southern wall of the silos court (Room 79) into the rest of Building E via Room 74. If this chronological phasing of the doorway blockings is correct, by the time people made the silos they were completely inaccessible through Building E, while remaining completely open to Building F, an opening later restricted to a doorway during Phase 6, but still inaccessible to Building E.

Selim Hassan’s (1943) map of KKT indicates no lateral access by way of doorways between Buildings A, B, and C. However, doorways or openings allowed passage from Buildings D to E (by way of the openings between Rooms 65 and 67 of Building D to Room 69 of Building E), from Building E to F, and from Building F to Building G. In summary, one could pass through four houses, D to G, without going into the northern street or the causeway on the south. Could what we perceive as four separate house plans, on the basis of the thickness of the walls and the repeating room patterns, have been occupied by one extended household at some periods? Unfortunately, we cannot completely trust Hassan’s map for doorways and access since we found two doorways through the western end of the northern wall of Building E (both blocked in Phase 5b), whereas Hassan shows only the one farthest west.

Yeomans and Mahmoud have shown through their 2009 excavations and analysis that, while we had planned to investigate a single house, the changes in Building E suggest that the houses and probably households intermingled, most likely reflecting changing propriety and residence through time.



## 7. KKT-N: Building E and the Adjacent Khentkawes Causeway

Lisa Yeomans and Hanan Mahmoud

### Excavation in the 1930s

When Selim Hassan first excavated the Khentkawes Town in 1932 (Hassan 1943), his workers removed the overburden of sand and emptied the rooms of collapsed mudbrick. The basic outline of the town was subsequently mapped (see fig. 2.1). Located to the south is the Menkaure Valley Temple, excavated by George Reisner (1931). Hassan excavated an annex on the eastern front of Menkaure's Valley Temple, describing this addition as the Khentkawes Valley Temple.

Hassan (1943: 38) notes how six of the western buildings constructed along the Khentkawes causeway had, with some internal variation, the same general plan. These are understood to be houses for people serving the cult of Khentkawes. Here we report on excavations carried out during 2009 in one of these houses, Building E. Hassan mentions that in Building E the reception room had been occupied by a granary and suggests that as the house is opposite the mastaba of Ierw, the Overseer of the Granary, it may have been Ierw's residence. Aside from this information, no further details of the early excavation were published. Arnold (1998), in his analysis of the layout of the town on the basis of the plans generated by Hassan's work, notes how the buildings along the causeway were undoubtedly the houses of the priesthood and provides important comparisons with other Old Kingdom priestly settlements. The other buildings, built alongside the north-south street of the settlement (fig. 7.1), including Buildings I and J according to Hassan's plan, had no direct access to the funerary complex and probably housed people tasked with supporting the queen's cult, both economically and administratively. Arnold indicates that this difference can be seen archaeologically in the greater numbers of granaries and other economic structures in the southern part of the town.

Hassan's (1943) plan of the settlement, and Arnold's (1998) interpretation of the layout, assume one phase to the settlement. Modern excavation approaches employed by the current project reveal that the settlement was more complex, with a number of phases of remodeling as well as developments within individual buildings. This evidence initially came from our work conducted in the 2007 and 2008 field seasons. Over the course of these field seasons we mapped the northeastern part of the settlement. Stratigraphic analysis of the remains of the settlement, badly eroded in the 76 years since Hassan's excavation, and

our targeted intensive excavation, show that the settlement expanded in a number of distinct episodes, developing into the form shown in Hassan's plan. After a period of occupation, individual buildings were modified. These changes corresponded to developments to the east of the town in Area KKT-E, where new excavations have shown the presence of additional buildings and an approach to the town via a ramp (see Jones, Chapter 3, this volume).

### New Evidence for Settlement Organization

It is necessary to briefly expand on the results of the 2007 (Yeomans 2007) and 2008 seasons to document the changes in the settlement and to show the overall development of the town. Selim Hassan divided the settlement into three blocks according to the layout of buildings. These were the larger "mansions" in the southeast (Buildings K, L, and possibly M), four smaller houses to the north reached by the underpass (G-I), and six larger buildings with a similar basic layout to the west near Khentkawes' monument (A-F) (fig. 7.1). Without stratigraphic excavation, Hassan interpreted these groups as different types of buildings; he believed that the "plan of the city shows that it was designed as a whole" (1932: 35). Our evidence suggests that the original settlement was aligned north-south, incorporating Buildings I, J, and at least Buildings K and L. Their relationship to Building M remains uncertain until further excavations are undertaken to explore this structure. The most conclusive evidence for the multiple phases of the settlement is the early north-south aligned wall [27,880] stratigraphically below the southern wall of the causeway. This is only seen in a small area to the west of Building I, where an earlier wall, possibly marked on Hassan's plan as a dotted line to the west of Building K, was built over by the southern wall of the causeway. This wall may have functioned as an earlier phase of an enclosure wall around the settlement before the causeway and the associated priests' buildings were constructed.

Prior to the construction of the causeway, a north-south street ran between Buildings K and L to the north, passing between Buildings J and I. Examination of Hassan's plan shows that the street was the same width along its length as the aligning walls on either side of the underpass. After the construction of the causeway, an underpass had to be built. However, the width of the underpass was not the same as the street and it only used the eastern side, leaving dead space on the western side be-

tween Building I, the northern side of the causeway, and the underpass.

Buildings A–H on the west were built after the construction of the causeway, and each one has an entrance in the southeast corner providing access onto the causeway. Since the underpass was constructed so that the residents could easily move between the northern and southern parts of the eastern town by passing underneath the causeway, it seems contradictory that the buildings to the west had direct access onto the causeway. One possible explanation is that these buildings were occupied by (or were designed for) priests associated with the cult of Khentkawes. The underpass allowed them access to the southern settlement when conducting day-to-day business, while people in the southern settlement could use the underpass to gain access to the priests' houses without entering the causeway. This is consistent with the stratigraphic evidence that suggests the original boundary to the site, before the construction of the causeway, was to the west of Building I (Yeomans 2007).

Additional buildings were added after the construction of the mortuary monument for Khentkawes. It is important to note that the entrances in the southeast corner of each of the buildings (apart from Building H) open onto a zigzag passageway into the house, a common style of entrance in ancient Egyptian houses that provided privacy. This assured that the interiors of the Khentkawes Town

houses could never be seen from the causeway. Although the original layout of each of the buildings is very similar, the houses were modified in different ways during the course of their occupation. The buildings (I and J) in the northeast would presumably have been modified to conform to the requirements of a priest's house. However, the buildings at the eastern end of the causeway are extensively eroded; little of the walls survived above the bedrock to be documented.

After a period of abandonment, the northern part of the town was reoccupied, requiring an extensive phase of repair and additions to the pre-existing structures.

### Aims of the 2009 Season

Excavations during the 2009 season within the KKT-N area were conducted within Building E, one of the series of buildings connected to the causeway leading to the tomb of Khentkawes (fig. 7.1). The aim was to determine the phases of construction, modification, and occupation within one building, provide material evidence from the building's occupation, and to test Hassan's (1943) theory that the Khentkawes Town, built at the end of the 4<sup>th</sup> Dynasty or beginning of the 5<sup>th</sup> Dynasty, may have continued in use until the end of the 6<sup>th</sup> Dynasty with minimal modification throughout. To this end, we cleared the eroded material that had built-up since Hassan's excavation in 1932 over an area covering Building E, the fifth building from the west

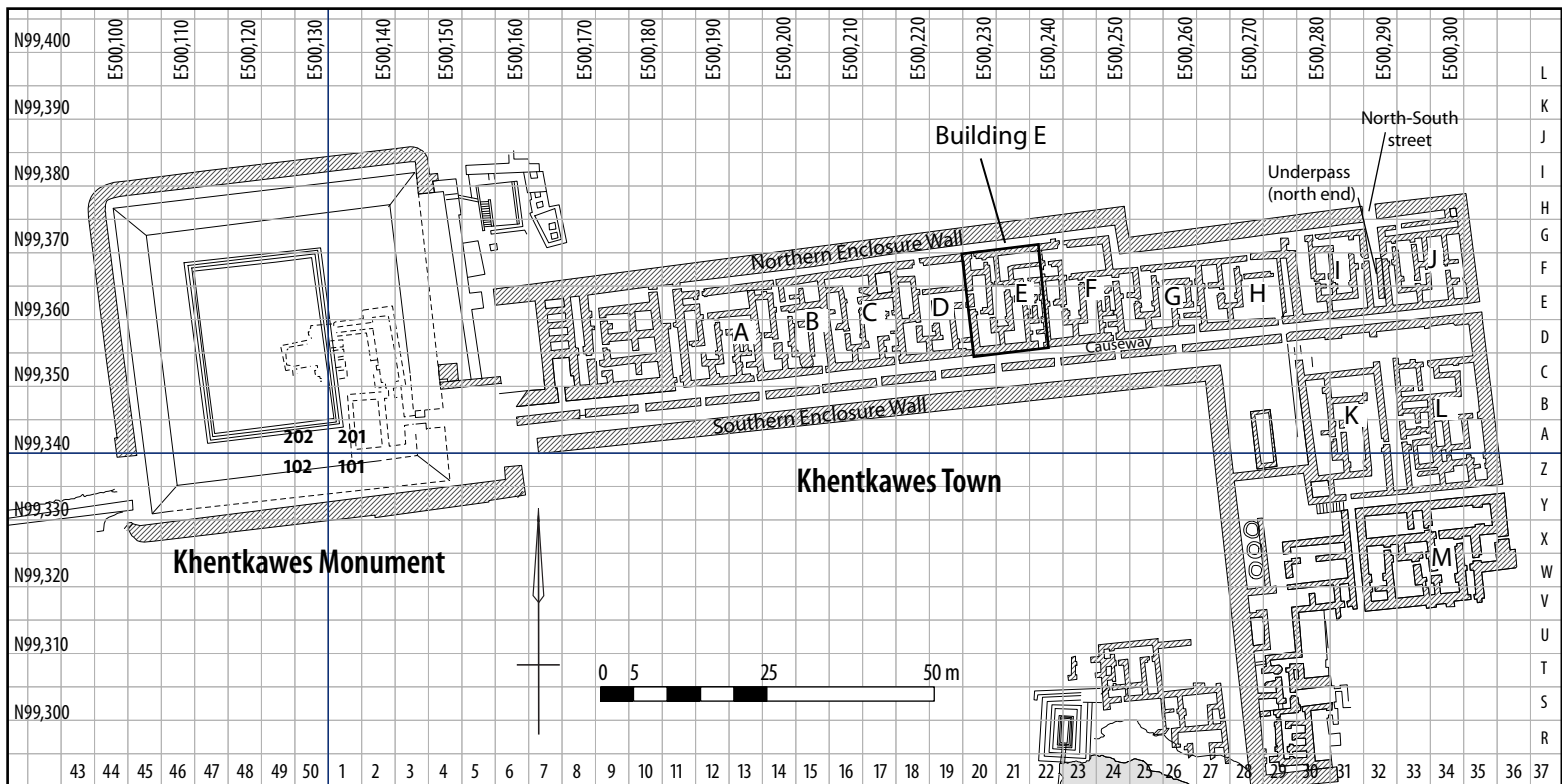


Figure 7.1. The Khentkawes Monument and Town showing the location of the KKT-N area. Map prepared by Camilla Mazzucato, AERA GIS.



Figure 7.2. Building E after the removal of overburden and eroded material that had built up since Selim Hassan's excavation. View to the west. The Khentkawes Monument (left) and Khafre Pyramid (right) dominate the background. For a view to the south, see Figure 6.2. Photo by Jason Quinlan.

(fig. 7.2), and excavated a transect through the causeway adjacent to the building. Excavation was conducted within this area stratigraphically, removing the deposits until the point at which the phase and methods of construction could be fully understood.

Building E was selected for its relatively high level of preservation, and because it was among the next structures slated for excavation as AERA progressed from east to west in  $\kappa\kappa\tau$ . The level of building preservation probably increased to the west due to long periods of horse, camel, and carriage riders crossing the eastern end of the site on their way out into the desert. While Hassan (1943: 39) also noted that preservation increased from east to west during his original excavations, he did not backfill the site, leaving the walls to erode since the 1930s with the most severe damage to the east. As a result, Building E was the first building encountered during the renewed work with a high level of preservation. In future seasons, additional excavation of buildings to the west will provide further evidence of construction, modification, and use.

### Construction of Priests' Houses and the Causeway

Building E (figs. 7.1, 7.2, 7.3) was one of eight similar houses

constructed along the northern side of the causeway belonging to the mortuary complex of Khentkawes. The bedrock on which the houses were constructed had an appreciable slope from north to south; the result of earlier limestone quarrying. The highest elevation taken on the underlying bedrock was 24.25 m asl, and the lowest 22.31 m asl. Each building had a standard width of 20 cubits (10.5 m), but varied in length along the north-south axis since the Northern Enclosure Wall was not parallel with the causeway. This was probably the result of pre-existing architecture imposing limitations on the northern spread of the complex at the time the settlement was laid out. Building E measured 24.5 cubits (12.8 m) internally from north to south.

In order to compensate for the slope of the bedrock, the lowest course of the eastern [31,075] and western [31,112] walls was only built at the southern end of the wall. Each successive course extended farther to the north, thereby forming walls that accommodated the slope but maintained roughly horizontal coursing. The western and eastern external walls were bonded into the causeway wall [31,108] at their southern end. All the bricks in the causeway used to enclose walls and buildings are Nile clay bricks of standard dimensions (c.  $36 \times 18 \times 12$



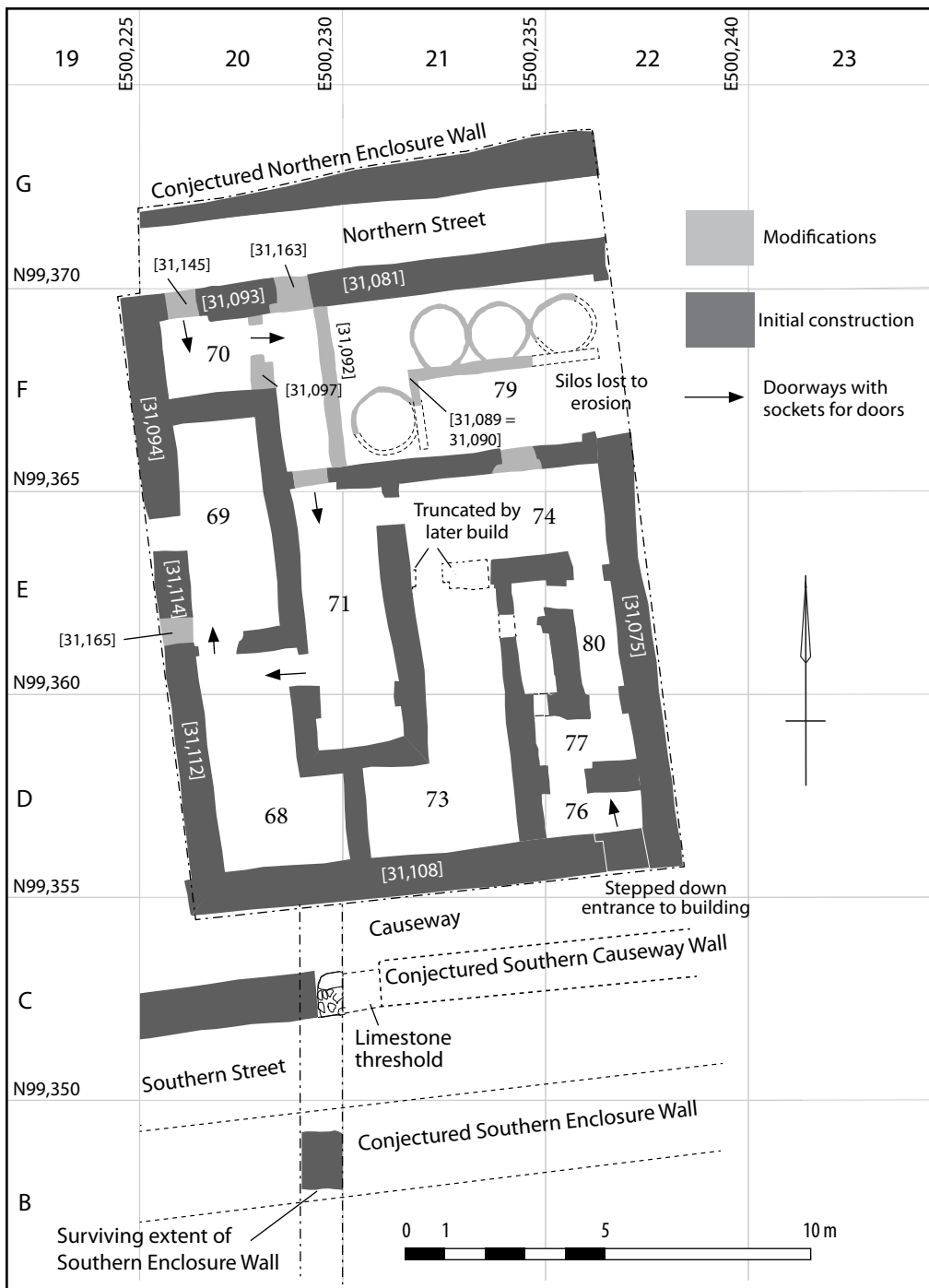


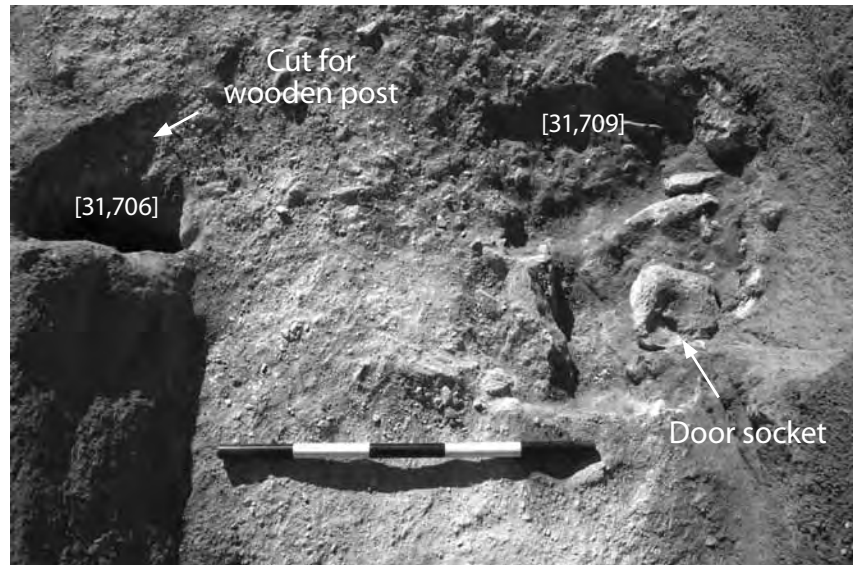
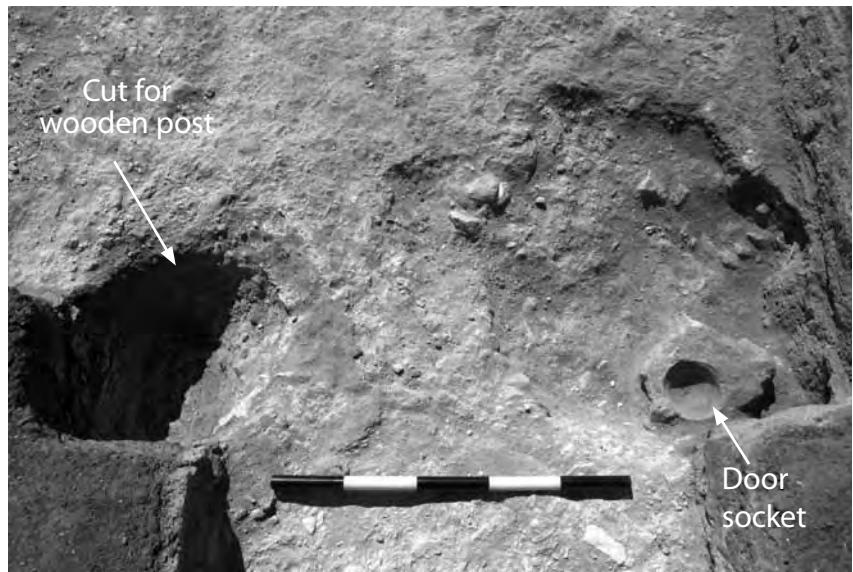
Figure 7.3. Plan of Building E and the adjacent part of the causeway showing the layout after the initial construction and features modified during the course of occupation. Room numbers follow Hassan 1943. Map prepared by Camilla Mazzucato, AERA GIS.

cm). The western external wall (also forming the eastern wall of Building D) was built as three separate segments ([31,112], [31,114], [31,094]) to form two entrances between Buildings D and E. The eastern wall did not extend as far north, leaving a wide gap in the northern wall of the building. The builders cut [31,158] through a layer of crushed limestone waste [31,146] from the earlier quarrying that had not been cleared in the northern part of the building. We exposed this layer only in a small area excavated in order to understand the sequence of deposits between the building and the Northern Enclosure Wall. The construc-

tion cut varied in width depending on where the builders founded walls and where they left gaps for the entrances. The builders laid a concreted clay-bedding layer [31,679] into the base of the cut extending into the internal space of the building. After they built the two northern wall segments [31,093] and [31,081], they backfilled the cut with a potsherd-rich deposit to provide packing. The primary wall plaster [31,153] lipped over the top of this deposit indicating that the pottery comes from a secure context for dating the construction of the building. Each wall measured 82–84 cm in width with the exception of the south-

ern wall which is thicker, since it also forms the northern wall of the causeway. A single buttress [31,851] was added against the inside of the southern wall. To partially counteract the slope of the bedrock in the internal area, the builders dumped a deposit of limestone rubble and silty clay against the southern wall of the building. This deposit [31,716 = 31,720], up to 38 cm in depth, was comprised of limestone fragments with a maximum size of 35 cm and occasional pottery sherds. Additional dumps [31,704] of smaller limestone fragments partially sealed this layer and the internal walls were built on these preliminary leveling deposits.

After the initial leveling deposits, the internal walls of the building were constructed with the north-south aligned walls following the same construction technique mentioned above, whereby the lowest course was only laid at the southern end and successive courses extended farther north to maintain more horizontal coursing while accommodating the slope of the ground. A thin preparatory plaster ([31,715] and [31,722]) was applied to the walls in Rooms 68 and 71 and extended to cover the leveling layers. This plaster was not an occupation surface, as it is very thin and substantially lower than the level from which door sockets were cut. In Rooms 68 and 71 a compact layer of crushed limestone material, [31,713] and [31,721] respectively, was then laid, forming an even base. Despite all the make-up layers used to level the building, there was still a slight north to south slope within each room. The walls and floors of some rooms in the building were subsequently plastered. Rooms that formed what Arnold (1998) called the “priest’s private chambers” (Rooms 68 and 69) and those for receiving visitors (Rooms 70, 71, and 79) were plastered. The best preserved was Room 68, which was coated with a marl plaster [31,714] about half a centimeter thick. Initially this would have covered the floor, and indeed, the wall plaster can be seen lipping out over the limestone



Top: Figure 7.4. The door socket and door retaining socket arrangement in the doorway between Rooms 70 and 71. Photo by Lisa Yeomans.

Above: Figure 7.5. The door socket and door retaining socket in the entry route between Rooms 68 and 71. Photo by Lisa Yeomans.

crush at the edges of the room; but the floor plaster inside has not survived since Selim Hassan exposed it.

Several of the doorways would have had doors. Door sockets (fig. 7.4) were typically comprised of a pivot stone set into a cut on one side of the recessed area surrounding the door, with a posthole in the opposing recessed area. This allowed an upright to be inserted into the posthole, jamming the door closed. For example, on the west side of the entry route between Rooms 68 and 71, two cuts truncated the upper, crushed limestone deposit [31,713]. The larger (65 × 52 × 26 cm) cut [31,709] on the north side was filled with packing material that included one substantial

limestone block, measuring  $41 \times 32 \times 13$  cm (fig. 7.5). This formed a stable construction for a pivot socket. The pivot socket was made in a limestone fragment measuring  $13 \times 14 \times 4$  cm that had been wedged between the upper packing limestone fragments in the cut. The pivot socket itself measured 6.5 cm in diameter with a depth of 2 cm. The socket seems to show limited signs of use-wear. It was still symmetrical, in its initial condition, rather than displaying uneven wear that would be expected from long-term use of a door partially rotating in the socket. However, this needs to be examined in more detail. On the opposite side of the doorway, a smaller, narrow cut [31,706] would have held a wooden post, inserted to keep the door closed while it was shut. The other door sockets were constructed in a similar manner, with two exceptions: the entrance from the causeway and the door between Rooms 68 and 69. In these cases, because of the slope within the room, gravity was sufficient to hold the swinging doors closed and an opposing posthole was not necessary (fig. 7.3).

Building E initially included an open courtyard with no boundary between it and the courtyard of the adjacent building to the east. Inside Building E, individual rooms were constructed according to the same plan for all of the houses along the causeway, and each room conformed to the ratio of length to width of either 1:3 or 2:5 (Arnold 1998). This resulted in long, narrow rooms, which Arnold (1998) suggests would support a brick barrel-vaulted roof.

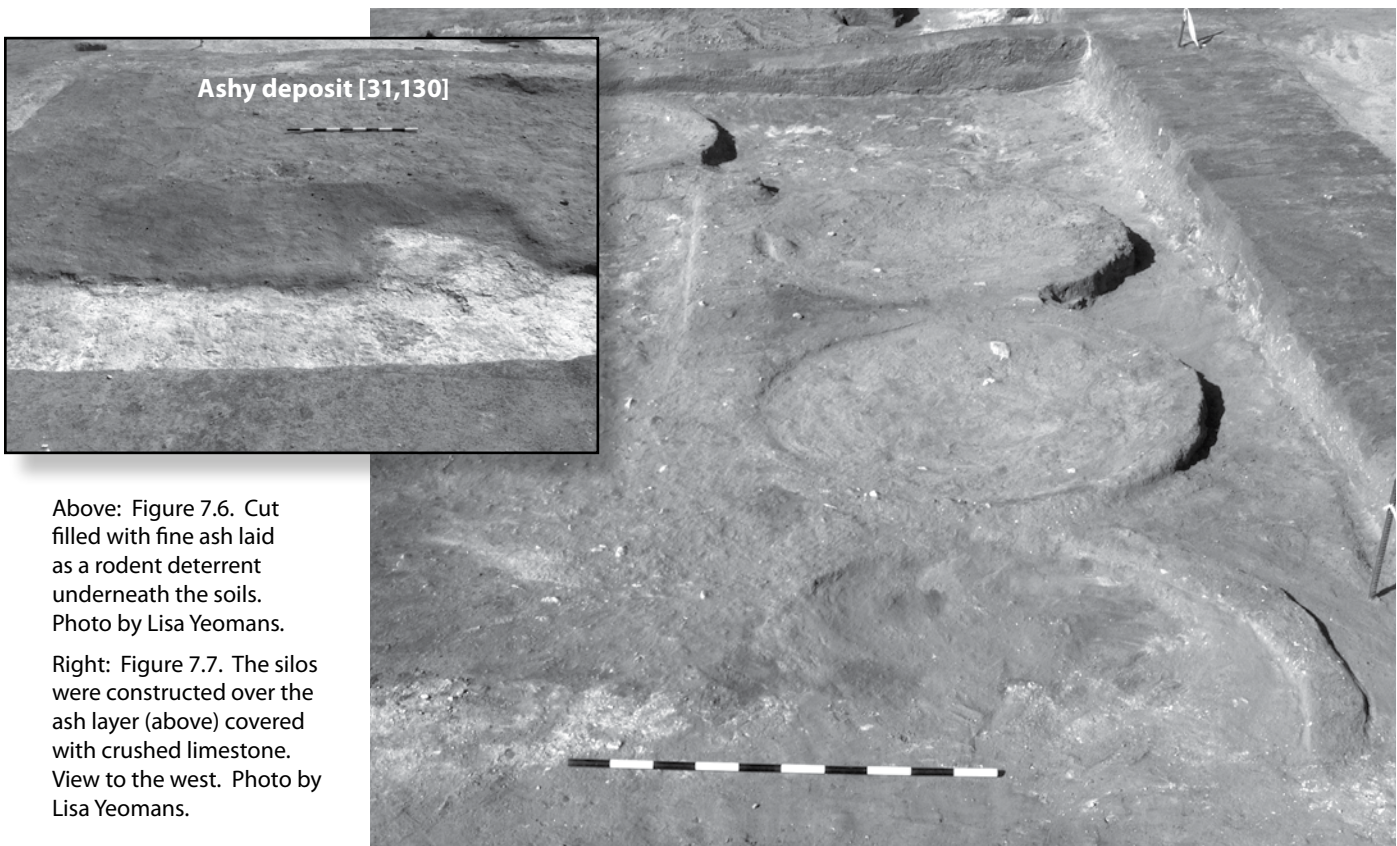
The external face of the northern wall was also plastered, forming a surface that continued across the northern street and onto the southern face of the Northern Enclosure Wall. We only exposed part of the Northern Enclosure Wall [31,081 = 31,083] within the excavation area. Here it was constructed from the same type of Nile clay bricks as a priest's house and was constructed at the same time. To the south of the settlement, the Southern Enclosure Wall was constructed approximately 6.2 m from the southern face of the northern wall of the causeway. The wall [32,028] was badly eroded, but from what survives in areas to the east, it would have been substantially wider than seen in the sondage. As in Rooms 68 and 69, a preparation plaster was spread over the external face of the Northern Causeway Wall. The area between the Northern Causeway Wall and Southern Enclosure Wall was then raised with a deposit of crushed limestone [32,026], on top of which the Southern Causeway Wall [31,878] of Nile clay bricks was built. This formed a causeway 1.64 m wide and a southern street 2.2 m wide. Eleven openings, evenly distributed down the length of the Southern Causeway Wall, formed access points between the southern street and the causeway. A sondage that took in the opening through the Southern Causeway Wall south of Building E revealed a threshold of roughly hewn limestone blocks. The construction sequence of the

causeway, like that of the building, initially involved laying the main architecture and then adding more leveling and deposits. Subsequent to the construction of the threshold, further leveling deposits were laid across the causeway and plastered over. This more detailed work took place after the main effort of laying out the building and the southern street, probably when the internal divisions of the buildings were erected, and represents the final work before the buildings were occupied.

### Modifications During the Occupation of the Building

Building E witnessed a number of modifications during the time it was occupied, as the use of space within the building changed (fig. 7.3). All of these modifications (with the exception of the silos) were constructed from Nile clay bricks with the same dimensions as those used in the original building construction. The north entrance was blocked off with Nile clay bricks [31,145]. It is also assumed that the other entrance through the northern wall was blocked off at the same time, again with Nile clay bricks [31,163], although there is no stratigraphic evidence that the two blockings occurred simultaneously. To close off the room, two segments of Nile clay wall were built across Room 70 abutting the primary plaster. The larger wall [31,097] formed the main division, with a door jamb [31,170] added onto the northern wall of the building. A pair of cuts for the door mechanism were dug through the original floor surface and set against the eastern side of the dividing walls in corner recesses. The cut [31,160] to the north had a socket ground into the bedrock exposed at the base of the cut [31,174], which would have held the post inserted to stop the door from coming ajar. The new room was replastered [31,156] across the walls and the floor, and traces of red pigment were found coating the middle of the floor.

A further blocking [31,165] was inserted within a doorway providing access between adjacent buildings (Building D and Room 69 of Building E) in the western wall of Building E. Stratigraphically there is no evidence to suggest that it occurred at the same time as other external blockings, but it has been assigned to the same phase as other modifications that limited the number of access points into the building. It was also built of the same Nile clay mudbricks as the other door blockings. By the end of the occupation, however, the northwestern corner of the building had gone out of use, and the area was completely blocked off. During this phase the silos were constructed, but access to them must have been from the open courtyard of Building F to the east. There was no route into Building E from the northern street; it could only be accessed from the causeway and from Building D to the west. This questions whether the building itself was still



Above: Figure 7.6. Cut filled with fine ash laid as a rodent deterrent underneath the soils. Photo by Lisa Yeomans.

Right: Figure 7.7. The silos were constructed over the ash layer (above) covered with crushed limestone. View to the west. Photo by Lisa Yeomans.

occupied, or if areas such as the open courtyard were used only by residents of adjacent buildings.

The construction of the silos themselves was a considerable undertaking. A large, but relatively shallow cut [31,138] was dug through the limestone crush and bedrock. The cut, measuring 5.9 m east-west  $\times$  2.9 m north-south with a depth of 8 cm, ran through a limestone crush foundation deposit [31,139] and the northern bedrock. The cut was then deliberately filled with a fine, black, ashy deposit [31,130] that had been collected from elsewhere (fig. 7.6). It was clearly not the result of *in situ* burning, since neither the underlying crushed limestone nor bedrock were scorched. This ash was then capped with a layer of limestone crush [31,128] to form a firm basis for the construction of the silos (fig. 7.7). The north-south aligned Nile clay wall [31,092] was built over this cut, confirming that the silos were not part of the occupation after abandonment (see below), as their bounding wall was built using the same construction materials as the initial building construction. The silos were erected over the limestone crush cap and abutted an L-shaped wall [31,089 = 31,090]. All four silos and the L-shaped wall were constructed from small mudbricks formed of compact, gray, silty sand. This material was presumably chosen for some special properties. The northern three silos [31,122] were built as one structure. Triangular gaps were left between the silo walls

and the associated L-shaped wall [31,089 = 31,090] and filled with the same fine black ash [31,115], ensuring that as much of the silos as possible were surrounded by this ash deposit.

Ash is known to be a very effective deterrent to insects; it is one of a number of inert dusts that damage their protective epicuticular lipid layer by absorption and, to a lesser extent, abrasion, leading to dehydration (Hakbijl 2002; Panagiotakopulu, Buckland, and Day 1995). Archaeological evidence for the use of ash as an insecticide may have been often overlooked, but at Amarna, quern stones set above a loose ash layer on top of pedestals were interpreted as a method of keeping insects away from the processing area (Miller 1987). The evidence from Building E is indisputable as an example of a construction technique utilizing the properties of ash to keep insects away from stored products. Ash with a high silica concentration is known to be the most effective, and, in due course, the archaeobotanical evidence will show how far the silo builders' knowledge extended in terms of which ashes should be used and how they should be prepared.

### Function and Use of the Space in the Priest's House

Access to the causeway from the priest's house required one to pass through several doorways linking small inter-

connecting rooms that formed a visual barrier between the house and the causeway. To the side of the corridor, a small side room may have functioned as a bathing area, allowing the priest to cleanse himself before carrying out official duties. Selim Hassan found water jars in this room in two of the houses (Arnold 1998). Both Hassan (1943) and Arnold (1998) argue that Room 73 was the kitchen area. Evidence for cooking included scorching along the walls in the southern part of the room and built-up ash-rich deposits. A large pit [31,119], previously excavated by Hassan, occupied the center of the narrow northern part of the kitchen area and probably functioned as a pot emplacement, allowing water to be stored next to the cooking place. Arnold (1998) has suggested that since the kitchens were located next to the causeway, the causeway itself must have been roofed to prevent cooking odors from drifting into the ritual space.

The main hall of Building E would have been Room 71, which, before the various modifications, could have been accessed from the northern street and the causeway. It provided access into the private chambers of the priest to the west. The two pilasters set against the eastern and western walls at the southern part of the room likely formed a niche in which the master of the house would sit to receive guests who entered the house from the north (Arnold 1998). The personal chambers would be to the west of the main hall in Rooms 68 and 69. More effort had been expended on constructing a flat plastered floor surface and plastering the walls in these two rooms than the rest of the house. The sleeping area was probably the southeast corner of Room 68. Room 70 was a later subdivision of the entranceway and Room 79 would have initially been an open forecourt until the granary was constructed in the area. This would have been accessed from Building F in the final phase of building use.

### Abandonment and Rebuild

A major phase of rebuilding, utilizing completely different materials, may have marked the re-establishment of occupation in Building E after a period of abandonment. Rebuilding was not confined to this building; it also transformed the Southern Enclosure Wall. The same construction has been seen in all the buildings thus far exposed to the east. Many walls (fig. 7.8) were cut down right to their base and rebuilt with small, brown, sandy mudbricks retaining a core of silty clay with various inclusions, including pottery and limestone fragments. The same type of mudbricks and large limestone blocks were used to reconstruct the northern and southern faces of the Southern Enclosure Wall. Within the building, the construction cuts of this phase truncated the earlier walls down to the floor level indicating that the walls were very deteriorated by the time of the rebuild, or had badly eroded during the pe-

riod of abandonment. The resurgence of building activity also hints at a completely different occupation within the settlement as a whole. The walls in the southeastern part of Building E were plastered after the rebuilding, but no additional plastering was done in the western part of the building.

Not all of the rebuilding was done simultaneously. The rebuild of the eastern bounding wall of Building E was set in a cut crossing the whole width of the eastern external wall of Building E. Since the wall also linked into the stratigraphy for Building F, this rebuild was not removed, but used as a limit of excavation so as to preserve the stratigraphic relationships in Building F. Small (21 × 11 × 7 cm) brown, sandy mudbricks were used to form the eastern and western faces, with a core of dark gray, ashy silt containing moderate quantities of pottery fragments filling the interior of the wall. The wall was plastered with a sandy marl plaster [31,711] that extended over the floor surface in Rooms 76, 77, and 80. The plaster was stratigraphically earlier than an alternation [31,710] to the doorway in the main southeastern entrance to the building, and was subsequently covered by a limestone make-up [31,131] layer that must have been for the construction of a later plaster floor [31,151] in the southeast corner of the building. The limestone make-up layer [31,131] was also earlier than a different type of repair to the north-south western internal wall of Building E. This repair [31,702] was made of various brick types, including Nile clay and small sandy bricks, as well as limestone and pottery fragments. The repair relates to wall damage, or scorched mudbrick, caused by fires in Room 73, the kitchen. The southern, western, and northern walls of this room were similarly damaged, but the damage had not been serious enough to warrant repair. The nature of the burning in the room is unclear, but it appears to have been widespread and resulted in a 10 cm-thick deposit of silty ash [31,117] building up in the southern part of the room. The burnt wall on the eastern side was repaired by a rebuild within the construction cut. This rebuild extended across the north face of the Northern Enclosure Wall and was built from the same small brown sandy bricks with an infilled core of silty clay with brick and pottery fragments. A similar rebuild [31,105] to the entrance of the building extended around the eastern part of the southern external wall and completely reconstructed the top of the east-west internal wall dividing Rooms 76 and 77. To the north, parts of the walls of the small side room in the corridor were repaired. The room's eastern side repair [31,148]—again of small brown sandy bricks—had traces of plaster [31,150] lipping into Room 80 and would have continued as a plaster floor [31,151]. The rebuild [31,141] of the room's western wall also had traces of a plaster floor [31,143] and wall plaster [31,142] on its eastern side.





occupation or the occupation after abandonment. Hearths found in Rooms 69 and 71 may have functioned as a source of heat in the cold winter months. In Room 69 a number of hearths were located against the eastern wall. One small hearth cut [31,135] was filled by silty ash with occasional charcoal fragments [31,134]. There was also an area of *in situ* burning [31,133], which produced an ashy deposit with occasional pottery and bone. In the southeast corner of the room, a substantial (60 cm in diameter × 28 cm in depth) hearth cut [31,124] was filled with ash with moderate inclusions of burnt fish bone.

## Conclusions

The excavation of Building E provides a case study of one of the fairly modular KKT houses, showing how the building was constructed and modified and possibly abandoned and rebuilt. In due course, these results will be supplemented by analysis of environmental evidence and artifacts from the building in order to date these developments and provide more information on the activities taking place within the building (for a discussion of the ceramics, see Wodzińska, Chapter 17, this volume). Preliminary results of the archaeobotanical analysis have shown that plant remains are exceptionally well preserved and abundant (El-Gendy and Murray 2010). The bulk of the material was wood charcoal and cereal processing waste that had been used as fuel. Weeds found amongst the cereal processing waste were also present and can be used to increase our knowledge of weeds found amongst the cereal crops (El-Gendy and Murray 2010). Future excavation of additional buildings along the causeway will provide an indication of the variation between buildings and more evidence of the nature and date of the phases of occupation. It is clear from the archaeobotanical results that, despite the previous excavations in the settlement, there is still much that can be gained from future work in additional buildings.

One interesting aspect of how the building changed throughout its occupation is the way in which space was

transformed from a single household entity to a component in a complex of intermingled houses (Tavares and Yeomans 2009). Arnold (1998) argues that the access routes are the organizing factor within the Khentkawes settlement, ordering the ground plan. Access routes lead from both outside areas, those north and south of the buildings, into the interior of the house. Building E could also be accessed from the building to the west, although one of these doorways could be shut. Building E and Building F shared the open courtyard space to the north of the building. So even though each house had the necessary complement of rooms to fulfill the various functions internally, there seems to have been a degree of cooperation and sharing between adjacent houses from the outset, and this aspect was designed into the layout of the houses. As each building was modified during its occupation, the communal nature of the houses became more established. By the end of the main occupation there was no longer access into House E from the northern street. The entrance-way was blocked off and the silos were constructed.

The silos may have served a number of the adjacent housing units, reflecting a change in the way the houses were supplied with food, or that more long-term storage was required within the immediate area. After the reoccupation of the buildings, the silos were enclosed by a wall from the courtyard area in Building F, although the access routes were maintained. This may suggest that the function of the buildings did not vary significantly from that during the late phase of the initial occupation. Future seasons of excavation in other buildings along the causeway may allow us to address more questions concerning this community, presumably of priests serving the memory and cult of Khentkawes. Did they live alone or with families? What may have been the differences between the occupants of the houses? At present there is insufficient evidence to address these questions, but there is much potential in the settlement remains to further our understanding of the community of people who lived here.

## 8. KKT-AI: Between Khentkawes Town and the Menkaure Valley Temple

Mark Lehner

We began work in Khentkawes Town (KKT) in 2005 with a principal goal to investigate the area between the Khentkawes Town and the Menkaure Valley Temple (GIII.VT). We called this zone the “Interface.” Amelia Fairman supervised the first major clearing, excavation, and recording of this area in Season 2008 (see fig. 2.1). We dubbed it “Khentkawes Town Amelia’s Interface,” and so, KKT-AI.

We know from Reisner’s (1931) publication of his excavations in 1908–10 that 30 m south of KKT people occupied the settlement within and in front of the Menkaure Valley Temple for the entire Old Kingdom, more than 300 years. Evidence is now coming in from both KKT-AI and KKT-N (see below, and Yeomans and Mahmoud, Chapter 7, this volume) that the Khentkawes Town was likewise occupied into the late Old Kingdom, very possibly in two major phases or periods, like the Menkaure Valley Temple (GIII.VT) community.

Our 2005 clearing exposed in the interface between the two settlements a broad mud-paved ramp, which Hassan mentioned but no one had mapped (GOP2: 15–16). We hoped to trace the stratigraphic relationships between the south end of the KKT settlement and the GIII.VT, and to investigate the Ramp between the two complexes.

During Season 2008 we cleared the second vestibule of the GIII.VT. This vestibule, situated in the northern end of the Ante-town built onto the eastern front of the GIII.VT, opens north onto the broad upper end of the Ramp via a recessed bay and portico (GOP4: 21–33). In 2008 we found the “Cut”—a broad, irregular, west to east trench, backfilled in ancient times with sandy limestone gravel between the GIII.VT and KKT, that cut many of the stratified relationships that were our objective in KKT-AI. We also cleared part of the houses composed of mudbrick and fieldstone walls west of the Enclosure Wall of the KKT. The Cut sliced right through the southernmost of these structures.

In 2008, we left a large swath of post-1932 sandy overburden covering the northern upper end of the Ramp and covering Water Tank 2, although we did expose the southern shoulder of the Water Tank (GOP4: 27).

### **KKT-AI Overview**

Season 2009 was very enlightening about the interface between the KKT, the GIII.VT, and its settlement, particularly the Ante-town, because the team, under Mike House and later James Taylor, removed the rest of the post-1932 over-

burden and excavated trenches focused at strategic spots. Kate Liska, Hanan Mahmoud, and Nagwan Bahaa also worked at KKT-AI during the 2009 season.

Now we are in a better position to review, from north to south and east to west, the major features of the interface between these two 4<sup>th</sup> Dynasty complexes (fig. 8.1; foldouts 4, 5). These remarkable features comprise a truly monumental landscape, albeit built in limestone debris, mudbrick, and small-block limestone masonry rather than the large limestone and granite blocks that characterize the pyramid complexes of Khufu, Khafre, and Menkaure.

### **Components of the Interface**

We have described some of the major components of the interface between the KKT and the GIII.VT in previous *Giza Occasional Papers* (GOP1–4): the large hole (NEH) through the top of the Ramp at the northeastern corner of the GIII.VT; the annex or Ante-town built onto the eastern front of the GIII.VT; the second Vestibule in the northern part of the Ante-town, turned to open north to the top of the Ramp (Vestibule 2); and the steep slope of the eastern face of the reinforced eastern wall of the Ante-town (the Glacis).

Here we describe those components of the interface that we cleared and mapped during the 2009 season: the southwestern corner of the southern part of the KKT, the “KKT Foot,” the extramural Fieldstone Houses, Water Tank 2, the Ramp, the Podium, and the Cut.

### **KKT Foot Southwestern Corner**

In 2009 the workers under Mike House cleared as far as they could along the Western Enclosure Wall (2.3 m thick) of the “foot” of the Khentkawes Town (KKT-F). They exposed the very southwestern corner of the Enclosure Wall, where it turns to run to the east. Selim Hassan’s (1943) map shows that his forces were able to follow the wall for about 13 m to the east, picking up as well the complex of chambers and small magazines built into the interior of this corner of the KKT.

The thick post-1932 overburden that supports the road around the modern cemetery (see map, fig. 1.1) only allowed us to see the southern side of the corner for a length of 1.8 m. Even at this, our cut into the post-1932 debris of the roadbed was dangerous, especially when numerous groups of tourists on horse and camel passed above.



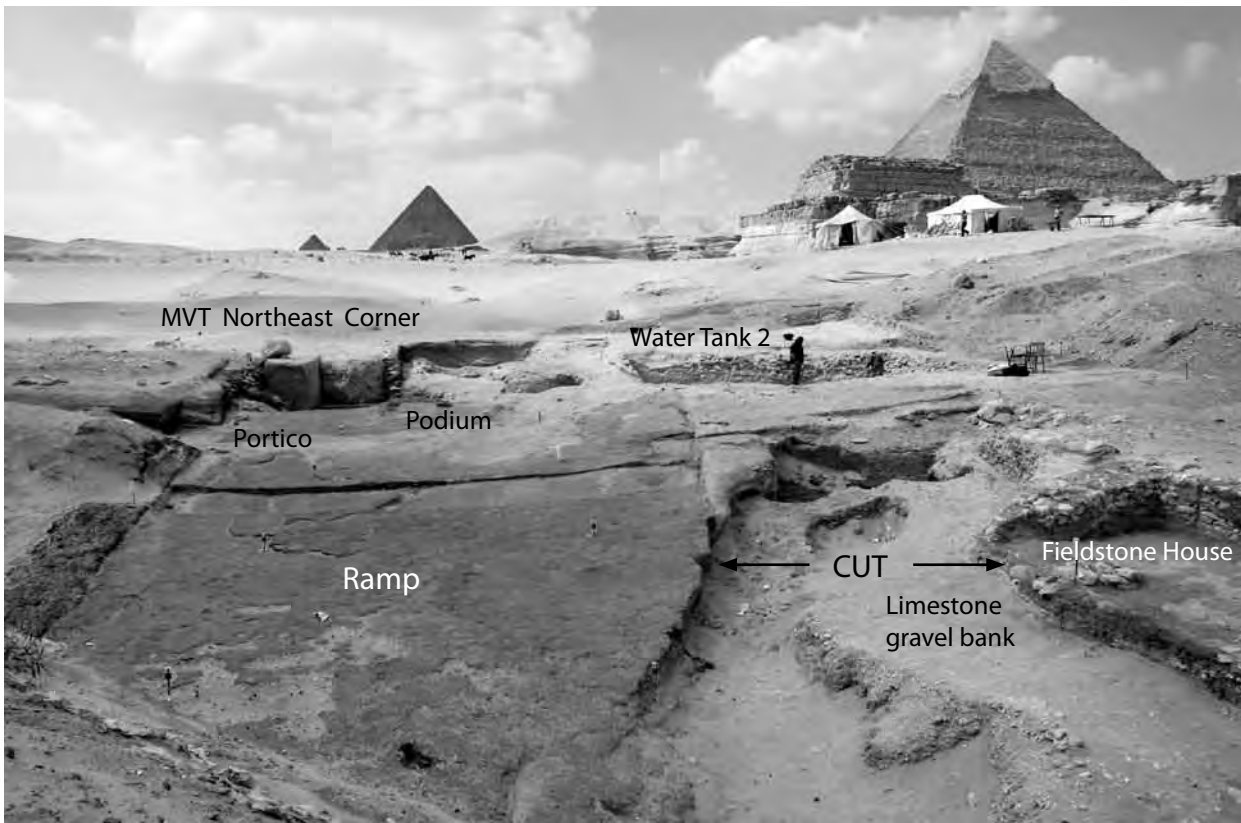


Figure 8.1. Area KKT-AI near the beginning of the 2009 season. General view to the west from the modern road embankment above the southwestern corner of the "foot" of the Khentkawes Town (KKT). Photo by Mark Lehner.



Figure 8.2. General view to the southeast of Area KKT-AI, with Water Tank 2 in the left foreground and the corner of the KKT foot (KKT-F) at the far left with the modern road around the Muslim cemetery above and the Gebel el-Qibli at the top right. Photo by Mark Lehner.

(When team members worked at the corner, we had to put workers as spotters to keep riders as far as possible against the new high security wall around the cemetery and away from the edge of the roadbed) (fig. 8.2).

Trench C, in Square 101.P28,\* was essentially the excavation of a triangular patch,  $1.86 \times 2.18 \times 2.52$  m, of ancient surfaces down along this short stretch of the southern face of the KKT-F Enclosure Wall, with our cut into the modern embankment on the southeast and the drop into the ancient Cut on the northwest (see below). Mike House found the Enclosure Wall preserved to a height of around 60 cm at the corner. In this short exposure of the southern face, the Enclosure Wall shows a rectangular projection, or buttress, thrust forward 34 cm on the west and 46 cm forward on the east, with a width of 74 cm only 44 cm from the corner. At some point people built out the southern face east of and flush with this projection, but they did not fill in the corner, leaving it notched or rebated by 44 cm.

It became apparent after our 2009 clearing and mapping that the KKT-F Western Enclosure Wall strikes a near perfect perpendicular to the southern wall of the Ramp, which continues west as the northern wall of the Antetown. This suggests that builders created the Ramp and the KKT-F along the same axis or orientation, with the same shift about  $6^\circ$  west of true north that we see in the whole KKT. (The general orientation slightly west of north is shared by the entire Heit el-Ghurab settlement south of the Wall of the Crow). This orientation is noticeably different than that of the GIII.VT, which, like the whole GIII Pyramid Complex, and like the Khufu (GI) and Khafre (GII) Pyramids, is oriented closer to the true cardinal directions.

### Extramural Fieldstone Houses

Hassan's (1943) map shows two small buildings laid out diagonally northwest and southeast off a north-south wall between the KKT-F and Water Tank 2. We have cleared and mapped the remains of most of the southeasterly building and some of the walls of the one to the northwest. Our clearing exposed and mapped ephemeral traces of walls in the rectangular space between these units on the northeast in our Squares U-T26-27 (fig. 2.1). These traces indicate walls that once filled this open space and made the two units basically one overall layout. On Hassan's map more walls extend west of the northwestern unit and north of Water Tank 2. Farther west lie the deflated walls of another fieldstone building, about the size of these units, which Cairo University excavated in 1980. So the extramural set-

tlement, of fieldstone and mudbrick walls, might have been fairly continuous along the entire northern side of the GIII.VT, as Glen Dash's radar results might indicate (2009: 155, pls. 28.2, 29.1).

The easternmost fieldstone unit forms a street or corridor, 2.50 m wide, with the Western Enclosure Wall of the KKT-F. Mike House excavated Trench B, 1 m wide, in Square R28, across this corridor.

The Cut (AIC) truncated the eastern Fieldstone House through the entire vertical height of its walls, which remain standing (up to 1 m), as well as the floor of this unit and the layers upon which it was founded.

### Water Tank 2

In *GOP4*, we stated that the builders of Water Tank 2 cut the tank down into the limestone bedrock, as they did Water Tank 1 in the western side of the foot of the Khentkawes Town (*GOP4*: 27-29). *GOP4* covered the results of our 2008 season when we had exposed only the southern face of the Southern Partition Embankment (see below). In 2009 we cleared the entire Water Tank 2 of the post-1932 fill and overburden (fig. 8.3, see foldout 6). We can now give a full description of this feature.

The builders set Water Tank 2 into the southeastern slope of limestone quarry debris piled between the GIII.VT and the northern part of KKT. The builders terraced the debris, stepping the surface down into the masonry-lined tank in four main levels.

#### Level 1: The Upper Perimeter

The overall upper perimeter is highest in the northwest, where the surface ranges from 20.09 to 20.20 m asl, and lowest toward the southeast corner, where the upper bank is 19.18 m asl just beside the AI-Cut (fig. 8.4).

We see the remains of a mudbrick wall, up to half a meter thick, on the upper north and west sides, and at the northeastern corner. This wall may have once enclosed the upper perimeter over an east-west width of 10 m. On the west side this wall tapers out after a run of 7.2 m south. At the northeastern corner the wall runs south for a short stub of 1.5 m. So we do not know if this wall continued along the rest of the eastern side, nor whether it bounded the upper rim of the Water Tank depression along the south.

Just inside this wall, on the west and north, the surface drops by 1.16 m over 1.13 m (from 19.80 to 18.64 m asl in the northwestern corner) (fig. 8.5). In the face of this bank a band of broken limestone pieces shows through finer crushed limestone—"limestone crush" as we came

\* The full designation for our excavation squares is the grid number, square letter, and number, as in 101.P28. For simplicity we drop the grid number through the remainder of the article. All of our KKT-AI operation fell within Grid 101. The grid numbers are shown in fig. 2.1.



Figure 8.3. Water Tank 2, general view to the southeast. Photo by Mark Lehner.

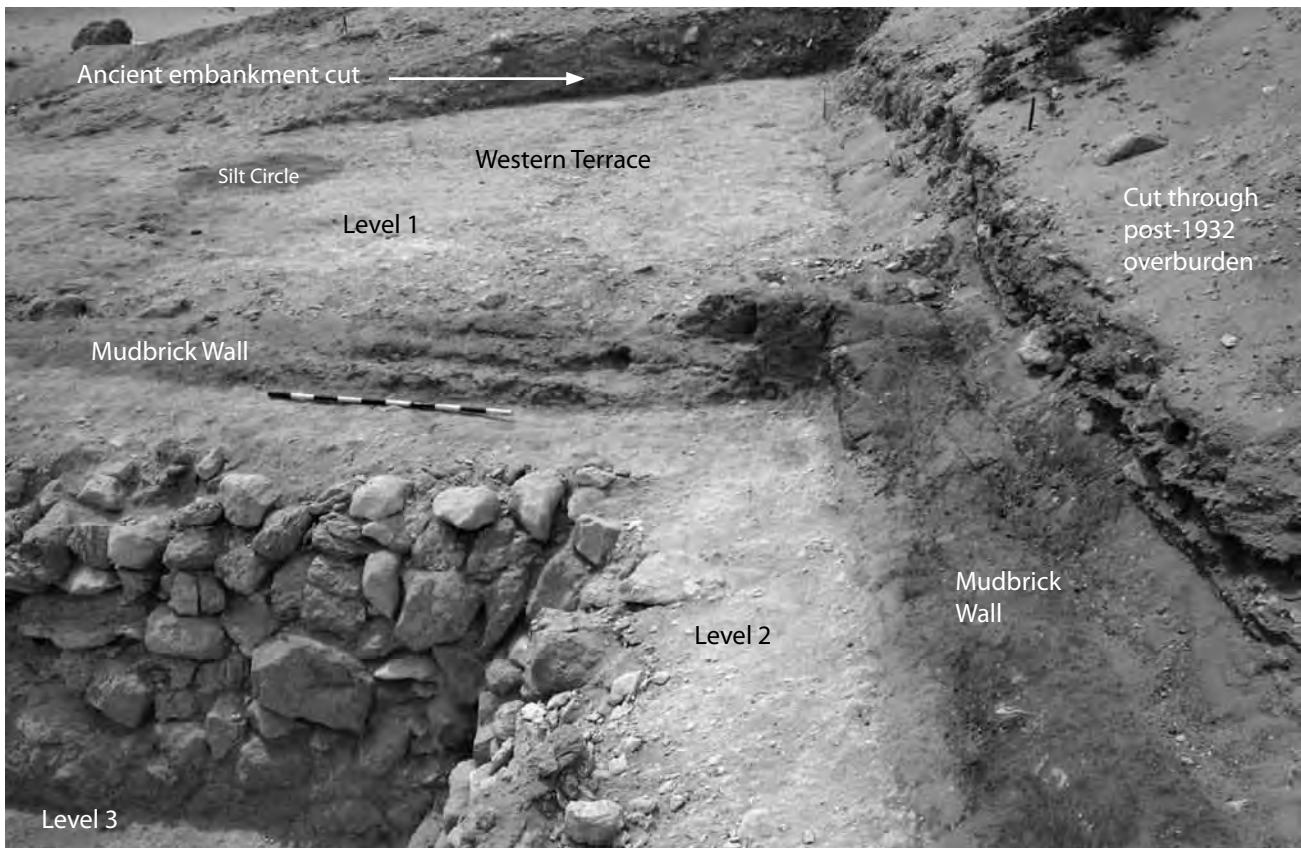


Figure 8.4. Detail of upper northwestern corner of Water Tank 2, showing the remains of the mudbrick wall that once ran between Levels 1 and 2. View to the west. Photo by Mark Lehner.

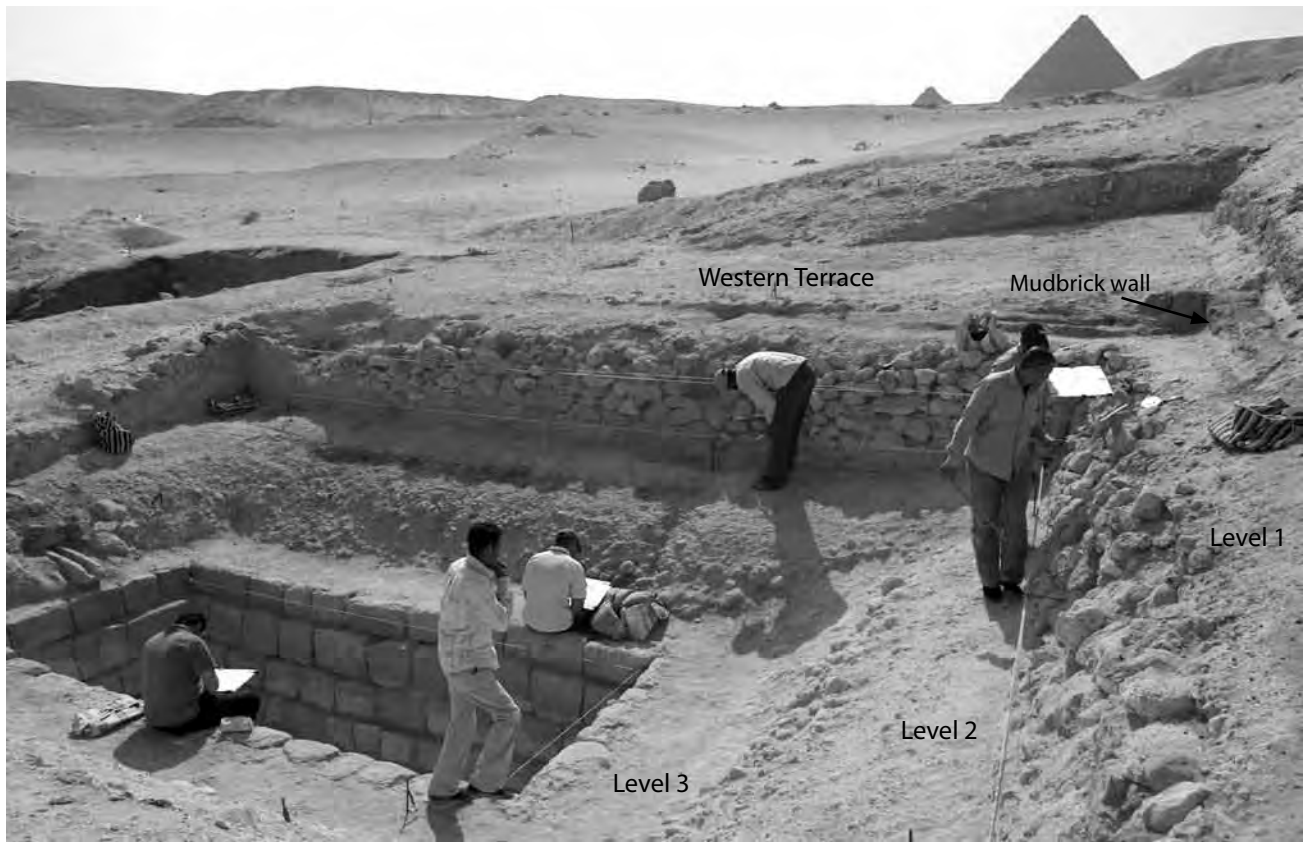


Figure 8.5. High northwestern corner of Water Tank 2, view to the west. Photo by Mark Lehner.

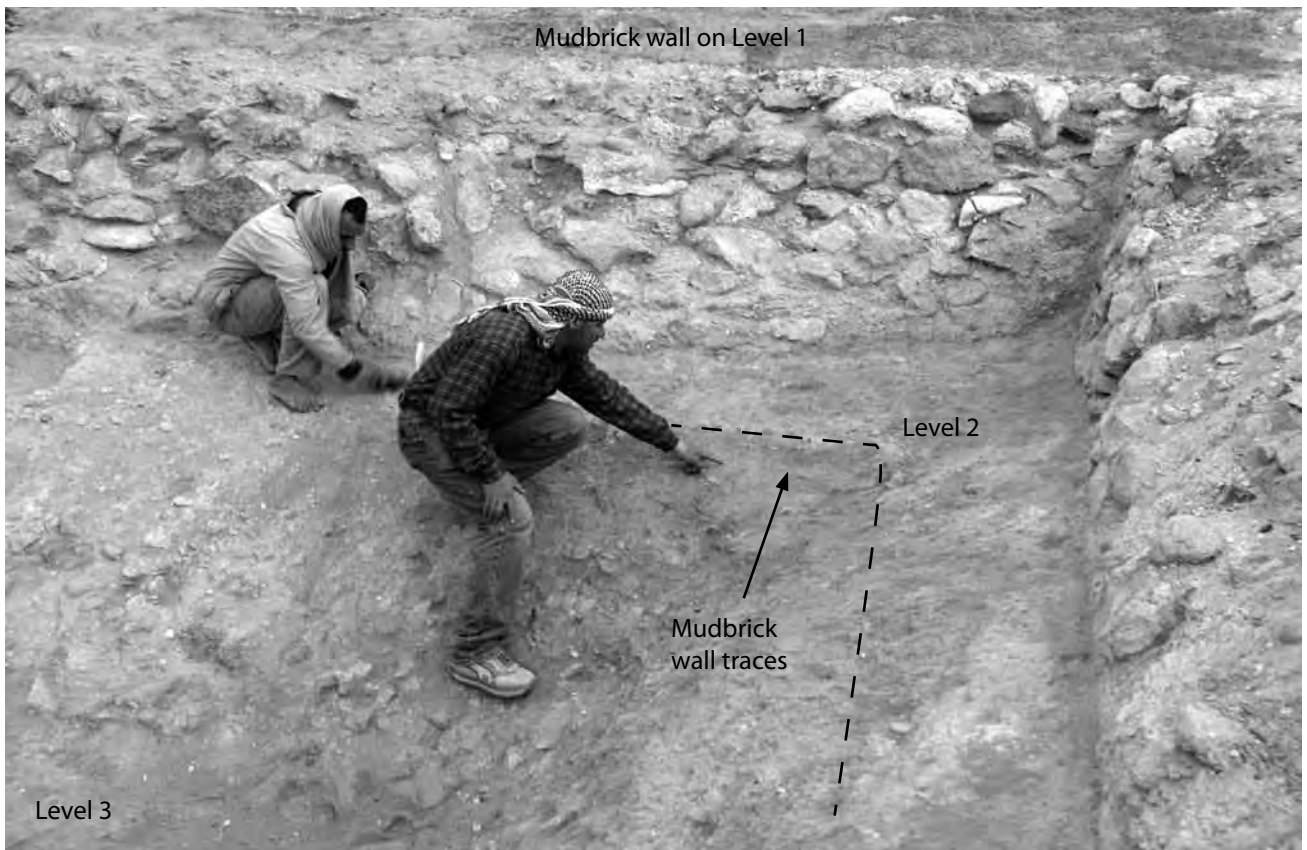


Figure 8.6. Overseer of Workers Sayed Talbiya points to traces of the mudbrick wall in the northeastern corner around the upper shoulder of Level 2 in Water Tank 2. View to the north. Photo by Mark Lehner.

to call this foundation material so prevalent in *ККТ-А1* and *ККТ-Е*.

### **Level 2: Inner Perimeter**

The top of the next level down, 18.64 m asl on the north-west, 18.66 m asl on the northeast, 18.70 m asl on the southwest, and 18.53 m asl on the southeast just before the channel of the Cut, is level to within 17 cm over a slightly trapezoidal rectangle 17 m east-west × 9 m north-south (see foldout 6). Traces of another mudbrick wall remain on the northern, western, and eastern sides of this terrace, built into a slight leveling of the slope (fig. 8.6). Only parts of a single, lowest course of mudbricks remain of this wall. These are mostly headers, about 17 × 31–32 cm. A thin trace of this course of bricks remains for a stretch of 1.4 m at the western side of the southern end of this terrace. Here the “wall” trace meets a broader patch of alluvial mud 2.1 m east-west and 55 cm wide. This patch coats the limestone crush of the terrace just above the outlet of the limestone drain on the next level down (foldout 4). The channel of the Cut would have taken out any trace of this course of bricks that might have existed on the eastern side of the southern end of this terrace.

### **Level 3: The Silt-Paved Terrace**

From Level 2, the surface drops about a meter to Level 3, a relatively flat, level surface paved with gray Nile silt around the masonry-lined tank. The elevations on the Nile silt paving at the corners vary by only 6 cm (17.66 m asl in the northwestern corner, 17.63 in the southwestern corner, 17.69 in the southeastern corner, and 17.68 in the northeastern corner).

The face of the bank that drops from Level 2 to 3 shows a more irregular, steeper edge with coarser limestone debris showing through the limestone crush, especially on the northern side. This irregularity might be caused by erosion (from lapping water?) or simply the slipping and collapse of a limestone crush render on the face of the bank.

This erosion of the bank between Levels 2 and 3 may have taken away parts of the perimeter of the alluvial silt paving around the masonry-lined tank. As it is, the flat, silt-paved level measures about 4 m east-west × 6.30 m north-south.

The limestone Drain emerges at Level 3 from under the southern embankment and from under the silt-paved patch on Level 2 (figs. 8.7, 8.8). A single limestone piece of the Drain, about 23 cm long and 90 cm wide, emerges from under a small limestone piece set as a “lintel” just under the above-mentioned silt patch of Level 2 (fig. 8.5). The Drain channel is 9 cm wide. A limestone piece, 43 cm wide, lies on the floor of the masonry-lined tank (Level 4; fig. 8.9). It too is carved with a channel, 18 cm wide.

This broader piece may have been set as a cover over the Drain, similar to the construction of a limestone drain at the southwestern corner of the Khufu (*G1*) Pyramid, or the construction of the so-called air channels extending toward the outside of the pyramid from the King’s Chamber and so-called Queen’s Chamber in that pyramid (<http://www.cheops.org/startpage/thefindings/thefindings.htm>).

The silt paving of Level 3 meets the back of the flagstones that form the upper perimeter of the masonry-lined tank. The masons dressed these stones on the sides facing into the tank, but set them with minimal contact on the joined sides. They left the backsides very irregular.

In the center of Level 3, the stone-lined tank opens 2.00 to 2.05 m wide east-west by around 5.07 m north-south. The opening is slightly trapezoidal, and like the upper terraces of Water Tank 2, very slightly east of north, unlike most of the lines of the *ККТ*, which are oriented west of north.

The silt-paved terrace shows a slope down to the masonry-lined rim of the tank, by as much as 20 cm, but this slope is not consistent because the top of the limestone slab lining of the tank is uneven, varying itself by 20 cm or more.

### **Level 4: The Bottom of the Tank**

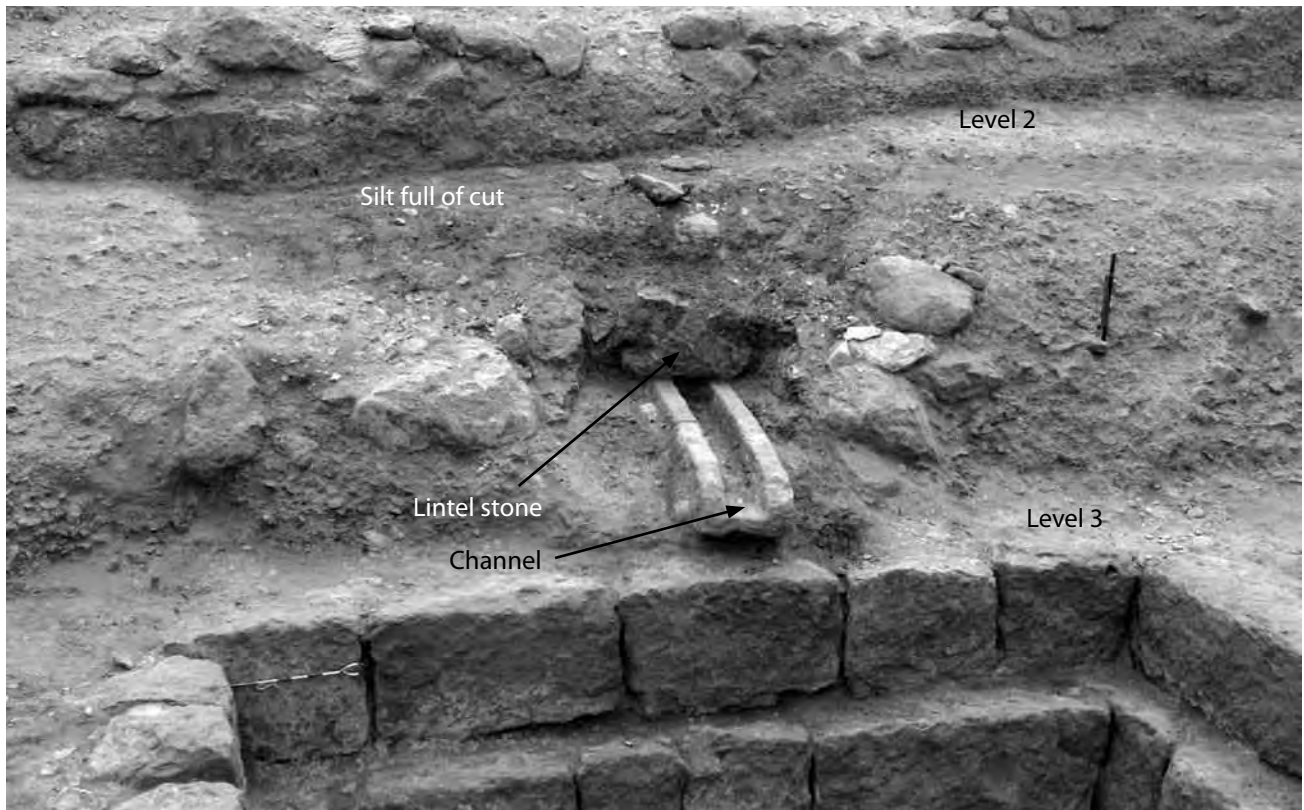
The tank bottoms out on a floor of compact, crushed limestone, 93 cm to 1.03 m wide (east-west) and 3.91 m long (north-south) at elevations ranging from 16.32 m asl in the far northeast corner to 16.20 midway along the eastern side. Overall, the floor shows a very slight dip down from north to south by about 11 cm.

Kate Liska (2009) reported:

The foundation of the basin is [30.961], which is a marl or *tafla*-like surface that appears at the base of the basin. Interestingly, this is the same type of material that appears at the base of Sondage A [32,459], and the base of Sondages C and D. [Editor’s note: see pp. 83–87]

The elevation of the floor, around 16.30 m asl, contributes to a kind of benchmark for 4<sup>th</sup> Dynasty terraces in the HeG and *ККТ* settlements. It is commensurate with the elevation, 16.30, of the crushed limestone terrace north of the gate in the Wall of the Crow, and with the elevation of the terrace at the bottom of the stairs and along the northern side of the basin east of the Khentkawes Town (*ККТ-Е*; see Lehner, Chapter 5, this volume). I have suggested elsewhere (Chapter 5, this volume) that the elevation 16.50 to 16.30 m asl might have been the general “docksides” level above deep cuts that brought water into the eastern edge of these monumental complexes at the southeastern interface of the Giza Plateau with the low desert and cultivation. But the fact that the bottom of Water Tank 2 arrives at this benchmark is probably coincidence.





Above: Figure 8.7. The northern end of the Drain inside Water Tank 2. View to the south. Photo by Kate Liska.

Right: Figure 8.8. The northern end of the Drain in Water Tank 2. View to the north. Photo by Mark Lehner.

The total depth of the masonry-lined tank is 1.56 m from the highest point on the upper edge to the lowest point on the crushed limestone floor. Masons set five courses of limestone slabs to the faces of this drop (fig. 8.10). As I note above, the masons did not square these slabs, except for the inward facing side, and they used slabs in irregular shapes and sizes, ranging from pieces 17 × 18 × 19 cm to 31 × 35 × 73 cm. The heights of the slabs in each of the successive courses are fairly even, from top down, in the range of 29, 36, 32, 25, and 28 cm. From the top, courses two through five step inward by 6 to 17 cm; a variance due to the degree of irregularity of the front faces. The masons dressed these faces somewhat, but not exactly flat.

#### ***The Funnel of Water Tank 2***

Overall, Water Tank 2 narrows, funnel-like, from around 20 × 20 m at the upper perimeter to about 1 × 4 m at the very bottom of the masonry-lined tank, and drops about 3.8 m from an upper rim elevation of around 20 m to 16.20 m asl. Why did its builders begin so wide and drop so deep?

With the Drain emerging from under the Partition Embankment just above Terrace 3 at the edge of the





Left. Figure 8.9. Limestone piece of the Drain on the floor inside Water Tank 2. Photo by Kate Liska.

Below. Figure 8.10. Five courses of limestone slabs on the eastern side of the lower part of Water Tank 2. View to the east. Photo by Kate Liska.



masonry-lined tank, we take the impression that the builders intended the lowest level would be the main reservoir of water—assuming, as our name Water Tank 2 implies, that water catchment and storage is the main function. The lowest masonry-lined tank could have contained a little more than 6.10 m<sup>3</sup>, or 6,100 liters, of water (1.56 m deep × 1 m × 3.91 m).

Moving up, the lowest level combined with the depth between Level 2 and 3 could have contained 6.10 m<sup>3</sup> + 25.2 m<sup>3</sup> (drop of 1 m [between Levels 2 and 3] × 4 × 6.30 m). If water filled the tank up to the brim of Level 2, it would have comprised more than 31,300 liters.

The capacity between Levels 1 and 2 amounts to 100.8 m<sup>3</sup> (depth of 1.16 × 7 × 8 m). Adding this to the capacity between Levels 2 and 4 gives 132,100 liters. This is enough water for 400 people over 165 days if each consumed 2 liters a day.

Did the builders of Water Tank 2 plan for the contingency of unusually high volumes? If the inhabitants purposefully filled the tank with water from the Nile or canals to the east, they would have transported the water up in pots and shoulder poles (or skins?). Or, did the builders have in mind the contingency of water coming from episodic, extreme rain and consequent desert wadi flooding,

flowing in from the west? For this question, we have to consider the landscaped features to the west and south.

### ***The Western Terrace***

A relatively open area, 5 m east-west × 11.50 m north-south, extends immediately west of the upper west edge of Water Tank 2 (see fig. 8.4, foldout 5). The surface here slopes up slightly to the west, from 20.12 to 20.80 m asl on the north and from 19.96 to 20.35 on the south.

An irregular ridge of limestone debris forms the western side of this terrace. The ridge rises a little more than a meter, from 20.8 to 21.86 m asl at the northern end, and slopes down to the south. Beyond this, to the west-northwest, rises the great mound of quarry debris that fills and separates the rectangular area between the “leg” of the Khentkawes Town (ΚΚΤ-Ν) and the ΓΗΛΥΤ. The ridge turns a crude corner on the northwest to run east where it meets the northern side of the mudbrick wall bounding the northern side of Water Tank 2.

The point of drawing attention to these details is that any rainwater coming into Water Tank 2 from the west would have to flow down the mound of quarry debris and over the ridge and Western Terrace. We presume any such flow would hit the mudbrick wall that lined the western side of Level 1.

A shallow gully cuts through the southern low end of the ridge, just where it thins out to meet the surface of the Western Terrace, indicating that at some point some water might have flowed here (foldouts 4, 5). The Western Terrace slopes down from 20.56 m on the north to 20.08 m on the south to the edge of the Cut channel. So any water coming onto the terrace would divert to the south more than flow directly east to the mudbrick enclosure wall of the Water Tank.

A large circle of dark silt, 1.22 m in diameter, shows in the crushed limestone matrix near the center north end of the Western Terrace (figs. 8.4, 8.5). We did not excavate this or other features of the terrace or the Water Tank 2 beyond clearing post-1932 backfill and mapping at scales 1:20 and 1:100.

### ***The Partition Embankment***

Our exposure of what we thought was the southern side of Water Tank 2 in 2008 (G0P4: 27–29) was actually the southern side of a tall, thick embankment that separates Levels 1 and 2 of the Water Tank from the top of the Ramp.

Those who landscaped the interface between the ΚΚΤ and the ΓΗΛΥΤ built a wide embankment, a bar of quarry debris retained by fieldstone walls, between the top of the Ramp and Level 2 of Water Tank 2.

The top of this embankment is, in effect, the continuation southward, and turn to the east of the Western Terrace and upper edge (Level 1) of the Water Tank 2 (fig.

8.11). The fieldstone wall retaining the northern side of the Partition Embankment runs very slightly south of due east, while the fieldstone wall retaining the southern side of the embankment runs north of due west, like the northern wall of the Ramp, although it does not align to that wall. Rather, the southern fieldstone wall of the embankment ends at the Drain, about 5 m south of an alignment with the northern side of the Ramp (foldouts 4, 5). At this point, the Drain opens through the embankment. East of this opening, those who made the enclosure around the low podium cut back the southern side of the Partition Embankment to build the thin northern mudbrick wall of the little enclosure. This cutback turned the southern side of the embankment to more of an east-west orientation, even slightly south of due west, like the southern side of the Water Tank 2 upper edge.

The highest point on top of the embankment, as far as we cleared it to the west (the western side of our Square Q21), is 20.03 m asl, about the same level as the terrace west of the Water Tank 2. The top of the embankment slopes down slightly to the east, to elevation 19.50 to 19.42 just above the western edge of the cut for the Drain. East of the Drain, elevations on the embankment range from 19.21 to 18.71. From here to the east, the top of the embankment shows a much steeper slope to the east. The break of the slope shows an edge, probably created by erosion, and here begins a runnel in the crushed limestone bed of the Ramp, becoming more pronounced where the runnel meets the intact alluvial silt paving about 5.50 m east and downslope from the Podium enclosure. This runnel appears to have been an offshoot of the main channel, which we relate to the Cut, that runs across the northern side of the embankment and across the southeast corner of the Water Tank 2 upper level.

It appears that at one time the paving of the Ramp sloped up at an even grade to meet the top of the embankment, about at the sharply eroded break in slope that we now see in the underlying bedding of limestone crush. This silty paving remains intact along the base of the northern wall of the Ramp all the way to the upper northeast corner of the Water Tank 2 (foldouts 4, 5).

The embankment is 4.3 m wide from its southern fieldstone wall to the southwest corner of the Water Tank 2 and 5.2 m (10 cubits) wide from the upper southeastern corner of the Water Tank 2 to the thin northern mudbrick enclosure wall of the Podium. The embankment stands 1.17 to 1.37 m above the top of the roadway extending west from the top of the Ramp.

On the western part of our cleared area, the surface of the roadway (18.66 m asl) lies at about the same level (18.70) as the top of Level 2 in the southwestern corner of Water Tank 2 on the other side of the embankment. The top of the Ramp, north of the Podium, lies at around the



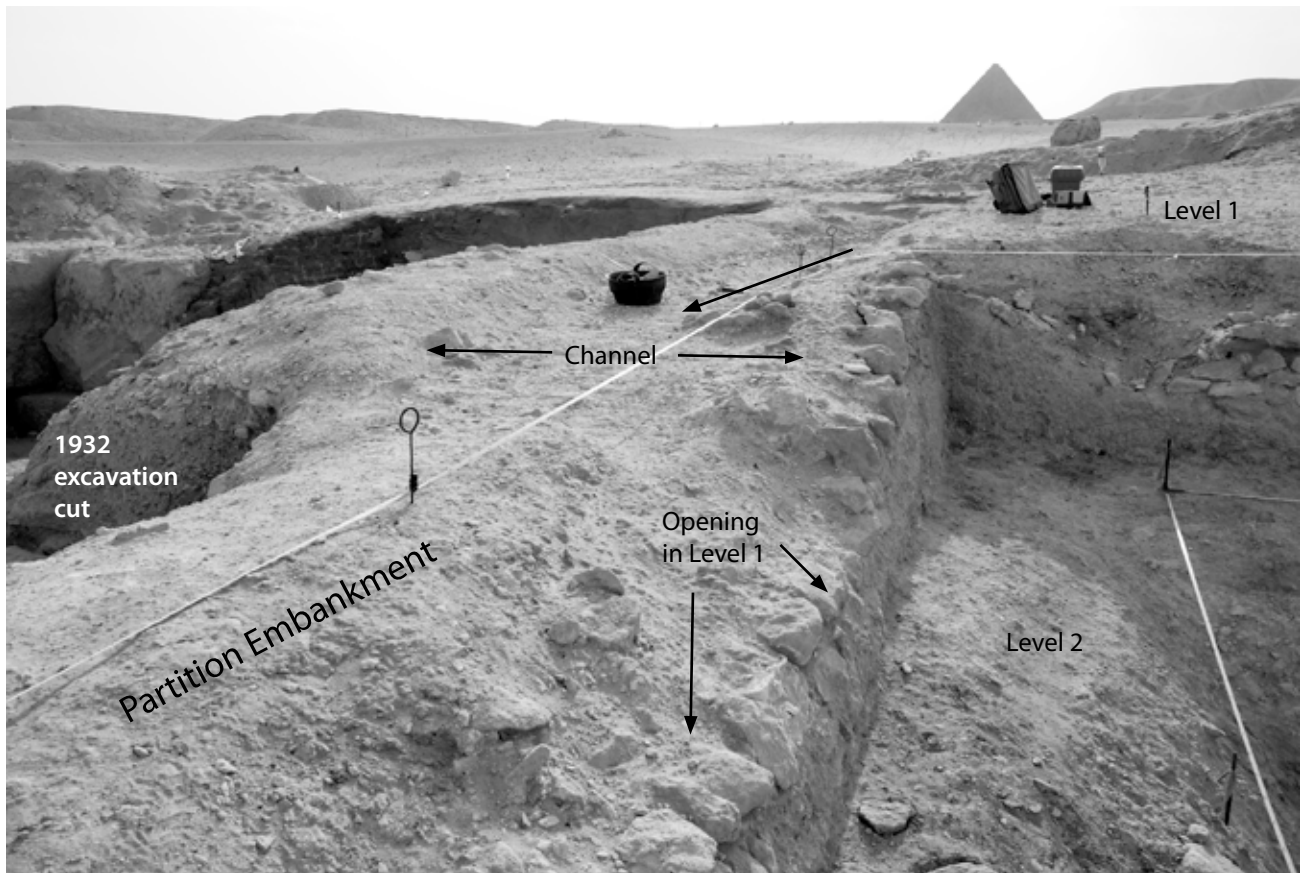


Figure 8.11. The Partition Embankment, view to the west-southwest. A shallow channel runs along the top of the embankment, then turns to cut the upper edge of Level 1 of Water Tank 2. View to the west. Photo by Mark Lehner.

same level (18.39 m asl) as the top of Level 2 (18.32 m asl) in the southeastern corner of the Water Tank.

A shallow channel, 1.5 to 2 m wide, and around 40 cm deep, cuts longitudinally across the top of the embankment (fig. 8.11). The channel runs west to east, and slopes down to the east. Immediately south of the southern edge of Water Tank 2 the channel becomes more diffuse. One branch turns to the northeast and cuts the upper southern rim (Level 1) of the Water Tank. We believe this shallow channel is the upper, western, beginning of the A1-Cut (see below), which continues as a narrow channel cut down into the surface of Level 2 inside the Water Tank, and grows ever deeper as it continues east-northeast diagonally across the far southern end of the eastern upper rim of the Water Tank 2. Another, more subtle branch probably continued across the top of the embankment to the slope down to the runnel eroded into the surface of the Ramp. The trench that exposed the top of the drain (see below) cut this branch of the channel.

### The Drain

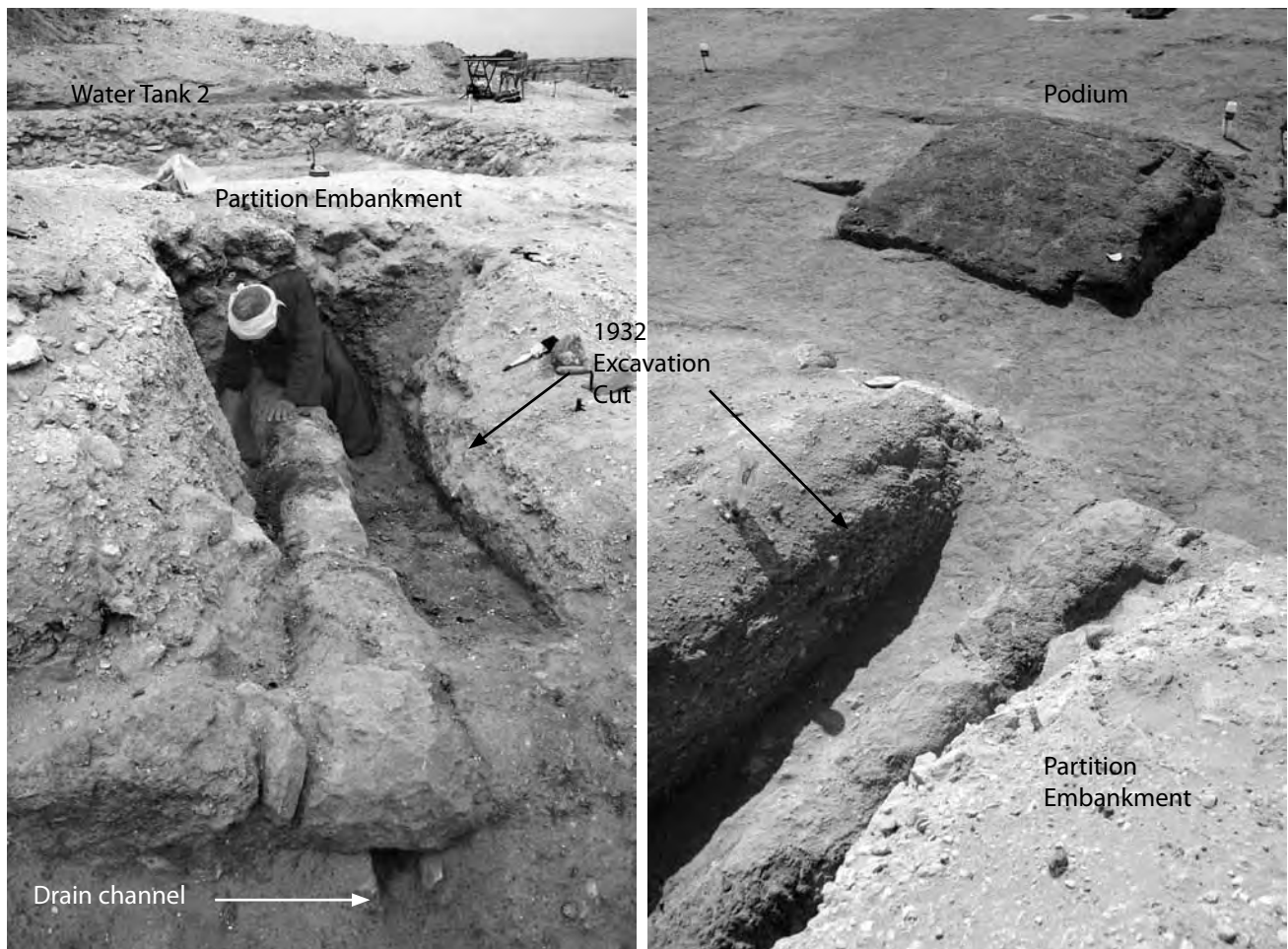
The builders installed a Drain running for 6.70 m at a slightly greater angle east of north than Water Tank 2.

Kate Liska (2009) observed:

The Drain leads into the basin on the south side and it hangs over the edge. It was constructed in three major sections, the basin of the Drain made of limestone [30,963], the cover of the Drain ([30,962], now fallen),<sup>1</sup> and the Nile silt sealing the top of the Drain, possibly to make it watertight [30,971]. These three features can be seen at the other side of the Drain as well in 101.P22 and 101.Q22.

Builders fashioned the Drain as a kind of pipe. They laid a line of limestone pieces as the base, 26 cm wide, and cut a small channel, 9 cm wide, in the upper surface of these pieces. The bottom of this little channel slopes 34 cm down from its southern end (18.20 m asl) to its northern end (17.86 m asl) where the drain emerges on Level 3 at the upper edge of the masonry-lined tank, with the bottom

1. When Selim Hassan had excavated the drain originally, the drain's lid was still *in situ* (Hassan 1943: 53). This collapse occurred post-Selim Hassan.



Left. Figure 8.12. The southern end of the Drain and its relationship to the Podium at the top of the Ramp, view to the northwest. Photo by Mark Lehner.

Right. Figure 8.13. View to the southeast. Photo by Mark Lehner.

channel, 16 cm above the upper course of masonry lining (figs. 8.7, 8.8, 8.12, 8.13). Upon the base they laid broader limestone pieces, 35 to 41 cm wide, as a cover that they coated with gray alluvial silt. They then covered the Drain with the embankment that partitions the Water Tank from the top of the Ramp and the roadway running west. We see three meters of the length exposed on its southern end at the bottom of a trench that someone, probably Selim Hassan's workers, cut through the Partition Embankment to follow the Drain. The trench diggers left two meters of the embankment intact on the north up to the upper edge of Water Tank 2 (foldout 4).

Our recording of the Water Tank 2 and this drain force us to modify our previous hypothesis that if water filled the basin or tank "up to the level of the roadbed, water could be let out through a drain ... leading southward across the roadbed toward an installation with a bench [the Podium, see below] in front of the northeast corner of the GIII.VT" (GOP4: 29). As Selim Hassan understood, the slope of the Drain down to the north indicates its builders intended for any water or other fluid to flow from the

roadbed into Water Tank 2. They intended the Drain to drain from the top of the Ramp behind the Podium into Water Tank 2.

What is remarkable in the arrangement is the diminutive size of the Drain and its channel compared to the immense capacity of Water Tank 2. Yet given the rise of the quarry debris to the west and north of the tank, and the height and the thickness of the southern Partition Embankment, the builders seem not to have built into the landscape any other option for water to flow into their great basin. The channel across the top of the Partition Embankment and the deep and broad Cut leading downslope to the east from the southeastern corner of Water Tank 2 might suggest that water did flow through this alternative route, or that people created the channel and Cut as a conduit for such flow, albeit not one that corresponded to the original design and building.

### Ramp

Selim Hassan referred to the Ramp between the KKT and the GIII.VT as a "broad causeway running westward from

the valley... ” (1943: 53). In 2005 our clearing of the post-1932 overburden exposed 9 m of the length of the Ramp. By the end of the 2008 season we had cleared the Ramp for a length of 21 m. We exposed its southern edge all the way to the large hole at the northeastern corner (NEH) of the GIII. VT, but left the overburden at the upper, northern side of the Ramp (GOP4: 22–24).

### **Shoulder Walls**

Low walls frame the broad roadbed of the Ramp on the north and south. The northern wall is oriented northwest to southeast, about 10° north of cardinal west. The southern wall is oriented slightly southwest to northeast, about 7° south of due west, an orientation shared with the northern face of the Ante-town (GOP4: 21–22) and the portico entrance into Vestibule 2. The southern wall of the Ramp is therefore very close to perpendicular to the KKT Western Enclosure Wall, which runs about 6° west of north, one indication that the KKT and the Ante-town might have been planned and built together.

The Cut [30,028] removed most of the northern shoulder wall of the Ramp, but it remains for a length of 11.60 m, fashioned into the crushed limestone that forms the foundation of the Ramp. The shoulder wall rises about half a meter above the latest roadbed. We saw the eastern end of this length in our 2008 clearing (GOP4: 29, fig. 23). Traces of an alluvial silt render remain near the upper, western end of this segment. Otherwise, the top of the shoulder wall shows bare limestone crush. Along this preserved length, the Cut took away the northern side of the north shoulder, except, perhaps near the southern end (Square Q25), where the width approaches 1.7 m. The section in Trench A (see below) showed us that the wall is simply a molding in the top of the limestone debris forming the massive foundation of the Ramp. If we project the line of the southern side of the northern shoulder wall on its orientation to the east-southeast, it comes exactly to the outside corner of the KKT Enclosure Wall, where a kind of notch or rebate in the corner defines a buttress or projection (see below, Trench C; and foldout 4). However, we must consider the relationship just mentioned in connection with the earlier southern shoulder wall revealed in Trench E at a point 1.02 to 1.48 m south of the southern face of the latest southern shoulder wall.

We gave some description of the southern shoulder wall of the Ramp in GOP2 (see GOP2: 15–16) and GOP4 (see GOP4: 22). Erosion has scoured away most of the southern face of the wall, but at its eastern end, just before its truncation by the Cut (Square O27), we see a width of at least 1.55 m. The wall, as preserved, rises about half a meter above the latest roadbed. On the west, this wall merges with the mass of mudbrick forming the eastern wall of the Ante-town and its possible accretions. It looks like

the southern Ramp wall abuts the Ante-town wall, but we have not scraped and articulated the mudbrick to ascertain this relationship. Hanan Mahmoud’s deep probe at the southern end of Trench E showed that the northern face of this wall is founded at elevation 15.92 asl, 1.94 m deeper than the roadbed of the Ramp. The northern face is rendered with marl plaster for a depth of 55 cm. The great depth to the base indicates the wall, built of alluvial mudbricks, served from the beginning of the earliest phase of the Ramp as a retaining wall for the limestone debris filling the core of the Ramp. As noted in GOP2 and GOP4, on its southern side this wall drops from elevation 17.75 to 16.00 m asl, down to the lowest level that we have so far exposed at the base of the “Glacis” forming the eastern front of the Ante-town (GOP2: 16; GOP4: 21, fig. 13).

It is very possible that both lateral walls of the Ramp rose higher than the low shoulders we see today. On the other hand, the fact that both rise about half a meter above the latest roadbed, and that we see some alluvial silt render on the top of the southern shoulder, may indicate they were always low walls, about this height.

### **Ramp Dimensions**

During 2009, Mike House supervised the workers who cleared the entire width, 12.20 m, of the top of the Ramp, between the southern face of the northern shoulder wall of the Ramp to the northern face of the Vestibule 2. We do not know how far the Ramp originally extended east passing the Southern Enclosure Wall of the KKT, not only because its continuation lies under the modern road around the modern cemetery, and possibly under the cemetery itself, but also because this season we found that the Cut [30,028] turns south at the KKT Western Enclosure Wall and truncates the lower end of the Ramp. We also lack the full width of the Ramp at this truncation, because the Cut, on its run before the southward turn, took out the shoulder wall and northern edge of its roadbed. However, the northern shoulder and side of the roadbed remain at the upper western end. If we project this line down to the east where the Ramp disappears under the modern road embankment (see foldout 4), here it was 7 m wide.

The Ramp, thus, narrows by 5 m over the 20 m length on its rise from the Cut on the east to a line between the southeastern corner of the Water Tank 2 and the facade of the Vestibule 2 on the west. This line corresponds roughly to the thin eastern wall of the small enclosure around the Podium (see below).

### **Ramp Slope and Cross-Section**

Over this distance the latest surface of the Ramp shows a total rise of 1.23 m at slightly more than 6°, from the lowest elevation that we recorded at 17.09 m asl to the highest elevation at 18.32 m asl, west of the Podium.



Figure 8.14. Laminations showing near the surface of the eastern end of the Ramp. Photo by Mark Lehner.



Figure 8.15. View to the southwest across the surface of the Ramp, showing the camber of its roadbed to the north (right), where the great Cut [30,028] removed its northern edge, and concavity and slope to the south and east. Photo by Mark Lehner.

At the lower eastern end of the Ramp it is hard to be certain if people laid down laminations intentionally as new surfaces, or whether thin, intercalated gravelly and silty layers result from erosion by wind, water, and possibly human and animal traffic (figs. 8.14, 8.15).

Mike House (2009b) wrote of the Ramp:

In Square 101.P24, the exposure revealed a series of layered deposits creating the road. These consist of a sequence of make-up or leveling deposits (limestone crush)

capped with silty compacted surfaces, indicating continued maintenance of the road over an extended period. All levels have suffered erosion truncation running from the high northern elevation of 18.51 m (in Square 101.Q24) to 17.87 m asl in the south. Moreover, there also appears to have been a natural camber to the road on the northern edge. This camber may have been created to elevate the road to the height of Water Tank 2 at 19.09 m asl.

At the higher western part of the ramp, the latest surface shows a slight concavity. Along the line of the cross-section given by Trench E from 10 to 12 m west of its truncation by the Cut, the surface dips lowest between 1.45 m to 5.05 m from the southern side. The northern edge of this nadir corresponds to one of the channels formed into the latest surface, as noted in *GOP4* (see *GOP4: 22–24*, fig. 15). On the far south the latest surface rises about 12 cm above the nadir while on the far north of the roadbed, at the base of the shoulder of the Ramp, the surface rises about 34 cm above the nadir. Trench E showed at least five alluvial silt or marl pavements of the roadbed (see below).

### **High Road, Low Road, and Vestibule 2**

The top northern side of the Ramp, for a width of 5 m from its northern shoulder, slopes up more steeply than the roadbed on the south. This steeper slope merges with the top of the Partition Embankment. On this ascent, erosion, probably by water, cut a sharper break of slope about on line with the upper end of the northern shoulder. From here, flowing water eroded a shallow channel into the last surface of the road bed, northwest to southeast, slightly diagonal to the axis of the roadbed.

The northern shoulder of the Ramp extends to the very southeastern corner of Water Tank 2, and beside it the roadbed retains its dark alluvial silt paving in a patch 2.5 m wide, but narrowing to a point at the termination of the shoulder.

House (2009a) wrote:

In Grid 101.Q24, the northern limit of the road continues east and west. The mudbrick curb or retaining wall for the limestone crush to the north is in a very poor state. Also of note in this square is a second partial mudbrick structure [30,946] and projecting 1.80 m south onto the road with a 60 cm easterly return wall stub [30,948]. This skim of mudbrick appears very late in the sequence. It may belong to a phase of partial abandonment of the road or represent a complete change in the road's function, because the orientation of the wall appears slightly off with the angle of the northern limit of the road. It could have functioned independently of the road in a phase of post-abandonment.

House refers to a structure with a floor inside an enclosure, about 2.10 m (4 cubits) wide and more than 5 m long (in

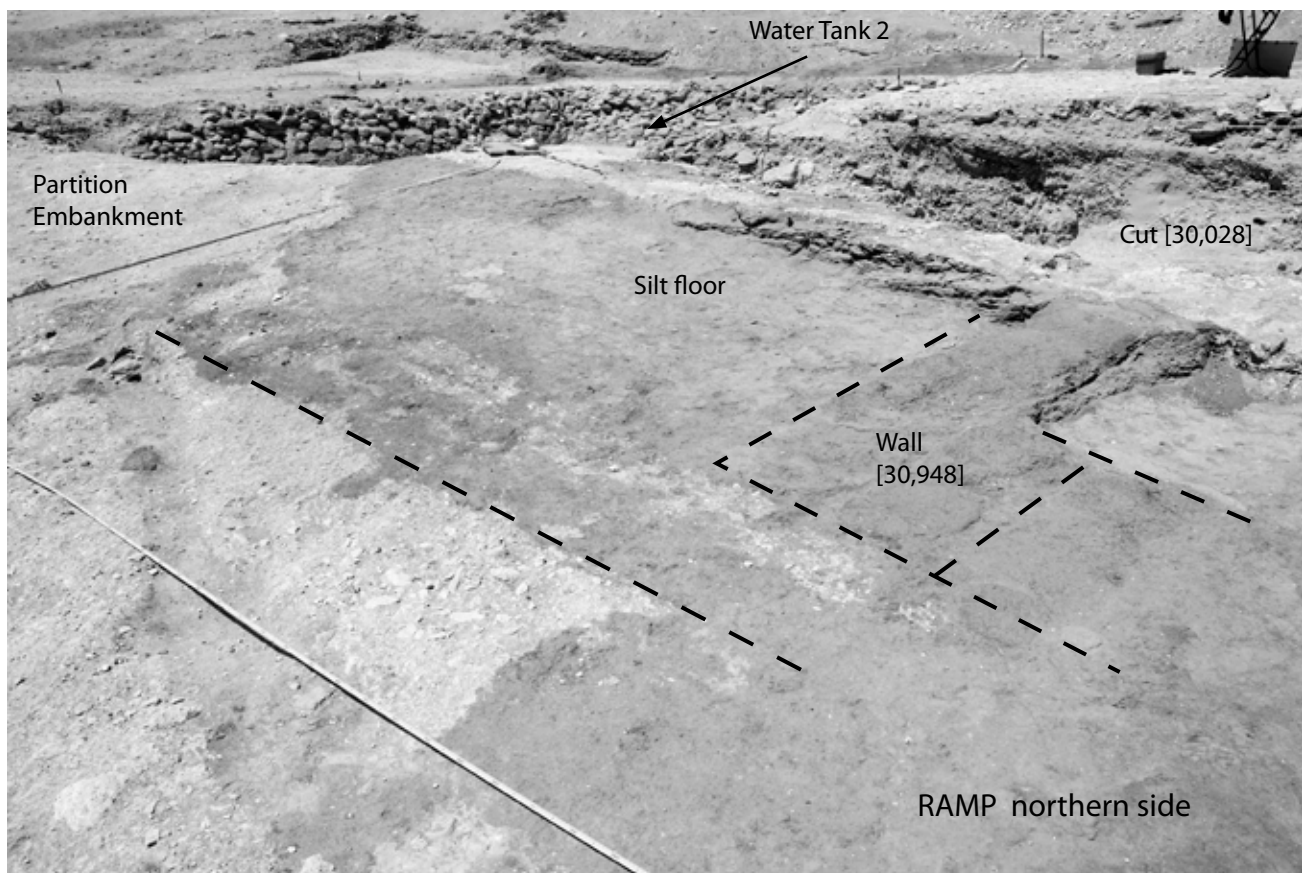


Figure 8.16. Remains of a structure, including mudbrick wall [30,948] enclosing a silt-paved floor, attached to the northern shoulder wall at the upper northwestern end of the Ramp. View to the northwest. Photo by Mark Lehner.



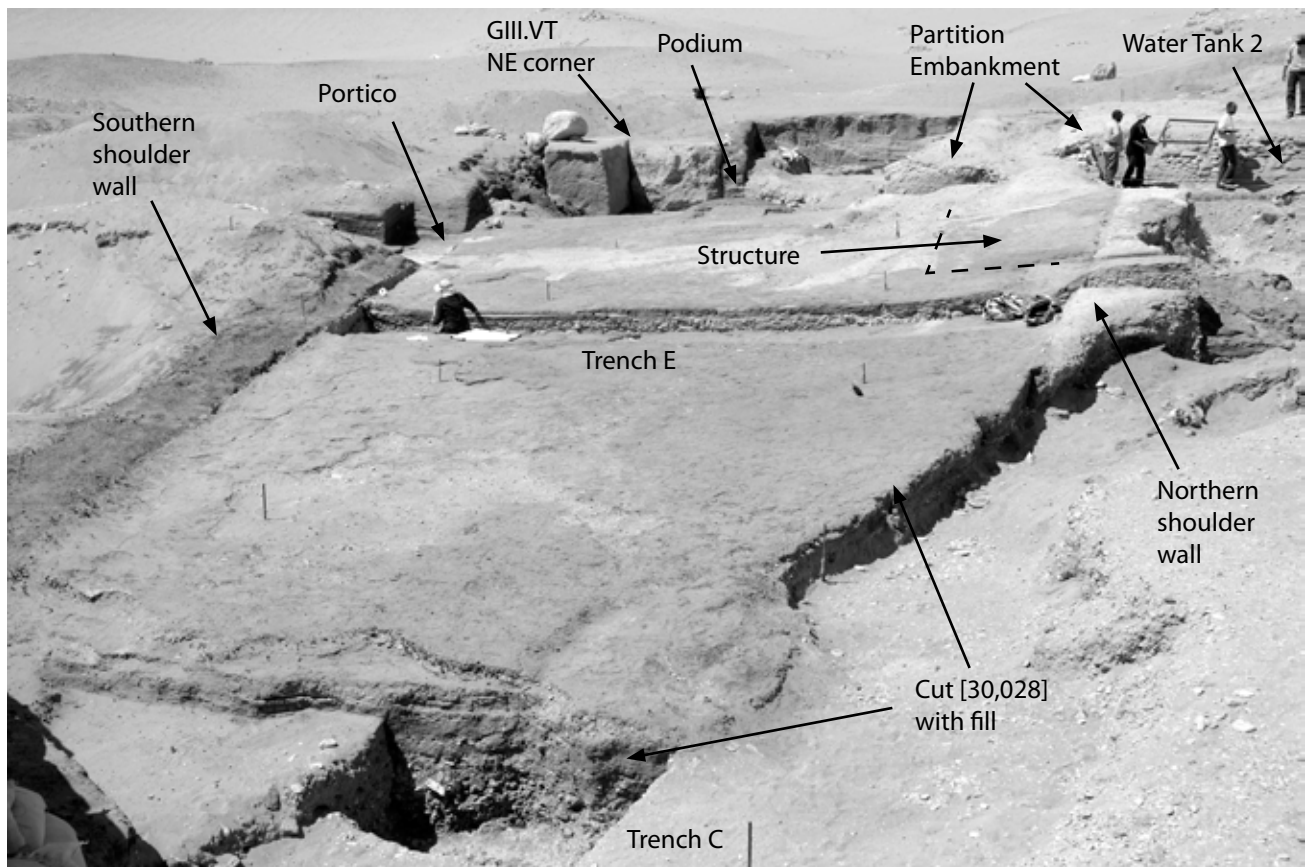


Figure 8.17. The context of the structure at the upper northwestern end of the Ramp where people might have controlled access to the Partition Embankment and to the upper perimeter (Level 1) of Water Tank 2. View to the west. Photo by Mark Lehner.

Square Q.24; fig. 8.16, foldout 4). In plan, the bricks of the eastern wall of this structure show possibly two phases: a more easterly patch of bricks 70 cm wide, accreted by another brick patch, 50 cm wide on the west of the first. Together these two wall traces extend at a slightly sharp angle northeast-southwest, from the southern shoulder of the Ramp. Only a line in the alluvial paving with faint traces of mudbricks and some parallel lines of limestone crush or marl suggest the southern wall of the enclosure, extending roughly parallel to the north shoulder of the Ramp for about 3 m west of the eastern wall of the enclosure.

These scant traces remain from a structure where people might have monitored access up onto the Partition Embankment, and to Level 1 along the southern and western upper perimeter of Water Tank 2 and the Western Terrace.

At the upper center of the Ramp, the roadbed extends about 5.80 m farther west than the front eastern side of the Podium enclosure (Square P.22). About 1.5 m beyond the backside of the Podium, the bed steps up by 7 to 8 cm to a slightly higher surface that is less rendered or paved. The Drain opens at the farthest western extension of the slightly lower alluvial silt paving of the roadbed of the Ramp. From the step up to the west, the surface is more mottled, showing crushed limestone and limestone debris

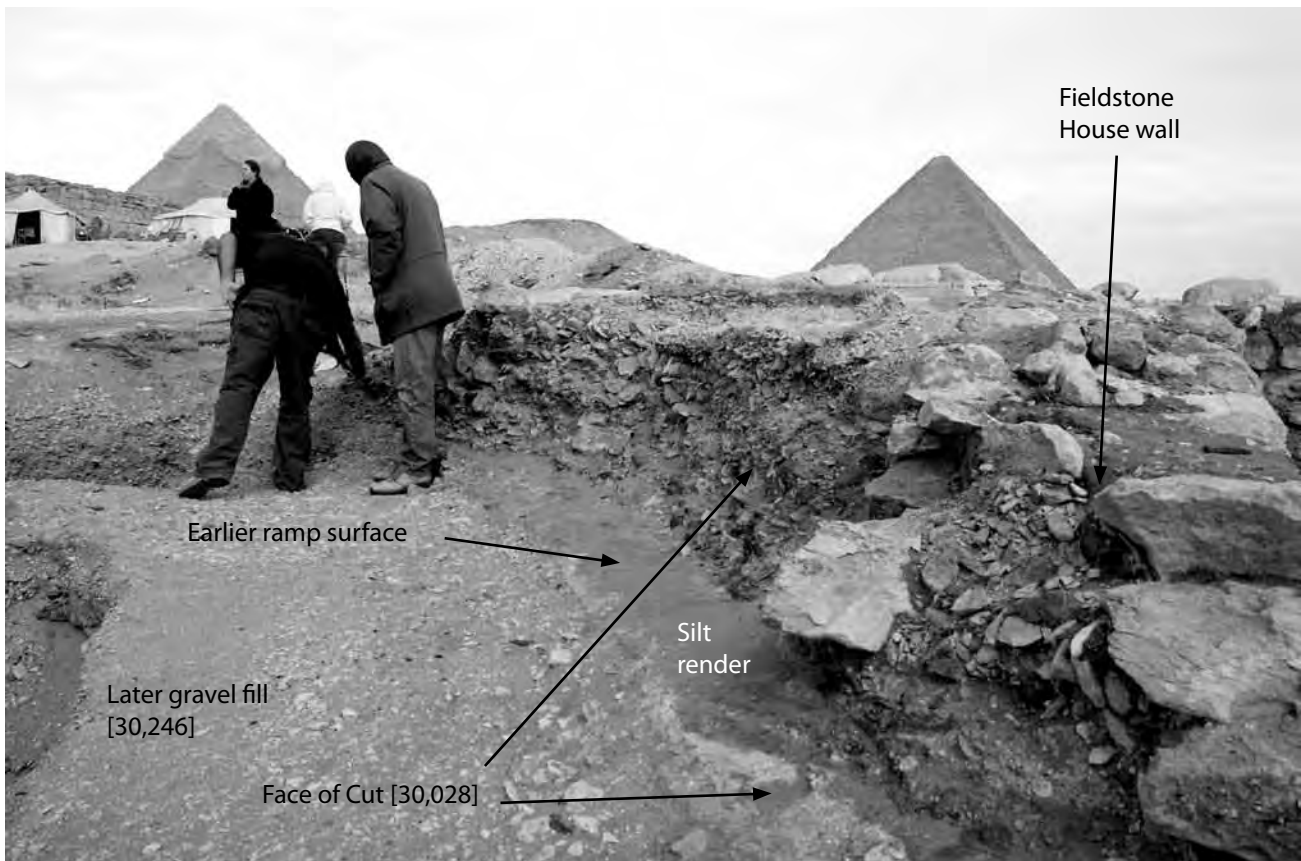
with alluvial silt spots and scattered pottery fragments. This surface slopes up slightly to the west, from 18.33 m at the step down onto the silt surface of the Ramp roadbed to 18.78 m at the western limit of our 2009 clearing of the post-1932 overburden (Square P.21).

Just here we found a pair of limestone column bases, 84 cm (northern) and 78 cm in diameter (southern), from 13 to 30 cm thick (foldout 4). Although they lie side by side north-south, the column bases do not seem implanted in the ground. Their bases show the extra stock of stone splaying out as the undressed foundation that should have been implanted flush with some surface. It is possible that Reisner or Hassan removed the bases from some other place and left them here during their excavations. On the other hand, the bases might be further evidence, like the traces of a mudbrick enclosure noted above, of an architectural arrangement on the paths running west beyond the top of the Ramp.

On the south, the great NEH hole truncates the upper end of the roadbed (*GOP4*: 22), but left 1.40 m of the lower, less paved, roadbed on its continuation to the west along the southern base of the Partition Embankment. West of the NEH, the full width, 4.20 m, of the lower roadbed remains between the Partition Embankment and the mudbrick casing on the northern wall of the GIII.VT. A kind



Above and below. Figures 8.18 and 8.19. Mohsen Kamel and Mike House discuss the silt-rendered surface of an upward-sloping layer of crushed limestone showing in the northern side of the great Cut [30,028]. Photos by Mark Lehner.



of revetment or glacis of alluvial silt, crushed limestone, and limestone fragments, 1.30 m wide at the base, narrows the road. However, the southern face of the Partition Embankment steps back, somewhat lessening the restriction. Where we stopped clearing the post-1932 overburden (at GPMP grid line E500,230), the roadbed is 4.8 m wide between the embankment and the mudbrick casing on the northern wall of the GIII.VT.

In summary, it appears that at its upper end, the broad Ramp split into high and low roads running west. On the high road, on the north, anyone could ascend to Level 1, over the Drain, along the upper rim of Water Tank 2, and turn right (north) into the open terrace outside the mudbrick wall along the western side of the Tank. The low road led from behind the Podium, at a slightly higher level than the top of the Ramp roadbed, to the west along the northern side of the GIII.VT.

### Earlier Ramp in Cut?

A very compact layer of crushed limestone may be the bed of an older, deeper-lying ramp surface that ascended west to the north of the Ramp (figs. 8.18, 8.19). This layer is exposed in the northern side of the Cut. It projects from the northern section of the Cut under the western side of the Fieldstone House (Square Q26), where the surface is 17.40 m asl, all the way to the western end of the Cut just before the Cut narrows at the southeastern corner of Water Tank 2 where the surface is 18.42 m asl, a rise of 1.02 m over 13 m (on a straight line), for a slope a little less than 5°. At its upper western end, the surface of this limestone crush layer appears to have been worn smooth. From the Fieldstone House for about 8 m up the slope a thin alluvial silt render covers the crushed limestone layer.

Whatever force made the Cut, it stepped out slightly to expose the top of this earlier silt-render on a white layer of crushed limestone laid over the usual compact limestone

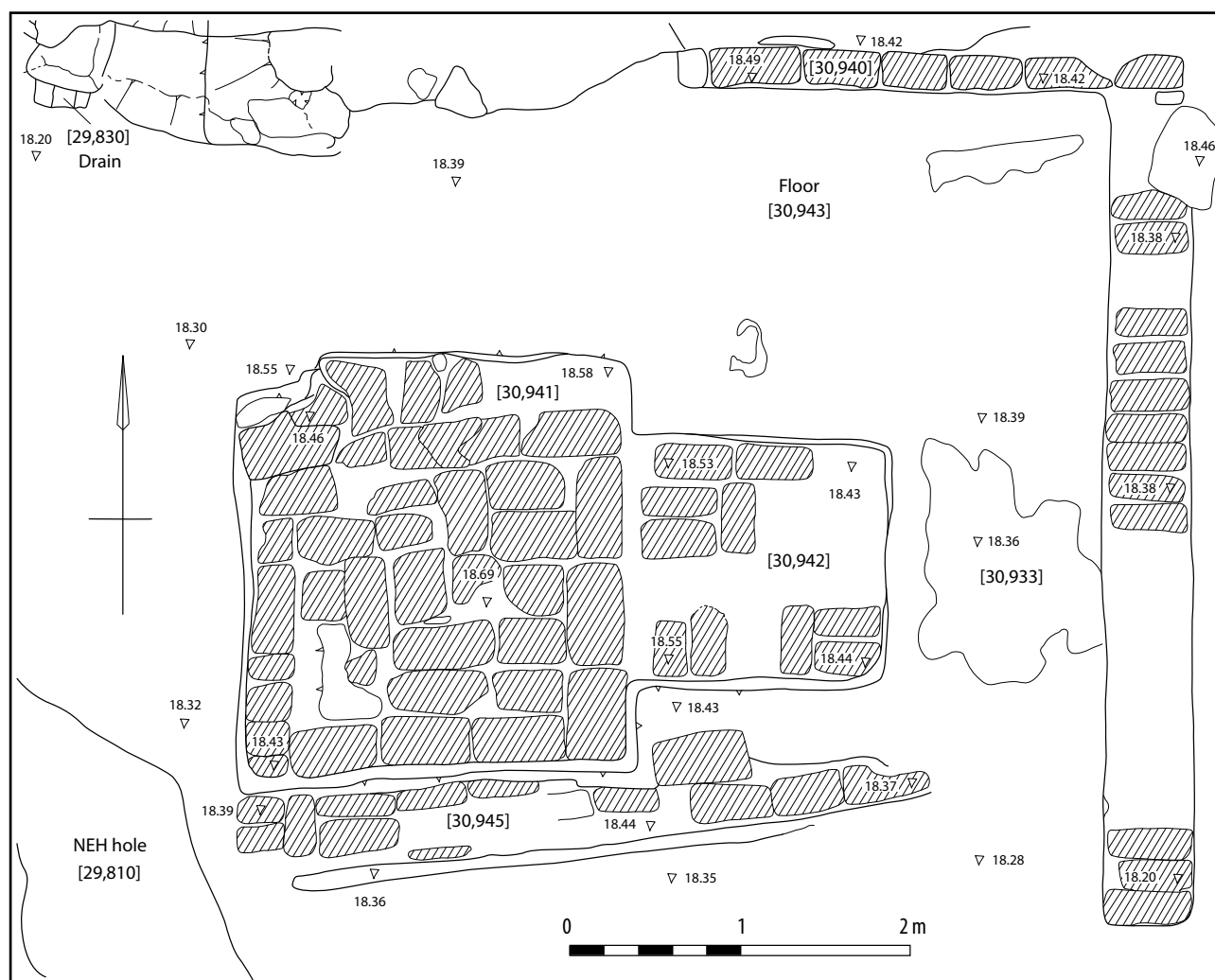


Figure 8.20. Plan of the Podium and its enclosure at the top of the central-southern part of the Ramp, after original field drawings (2009-67, 2009-74) by Mike House and Kate Liska, digitization by A. Witsell. Triangular marks represent elevation points.



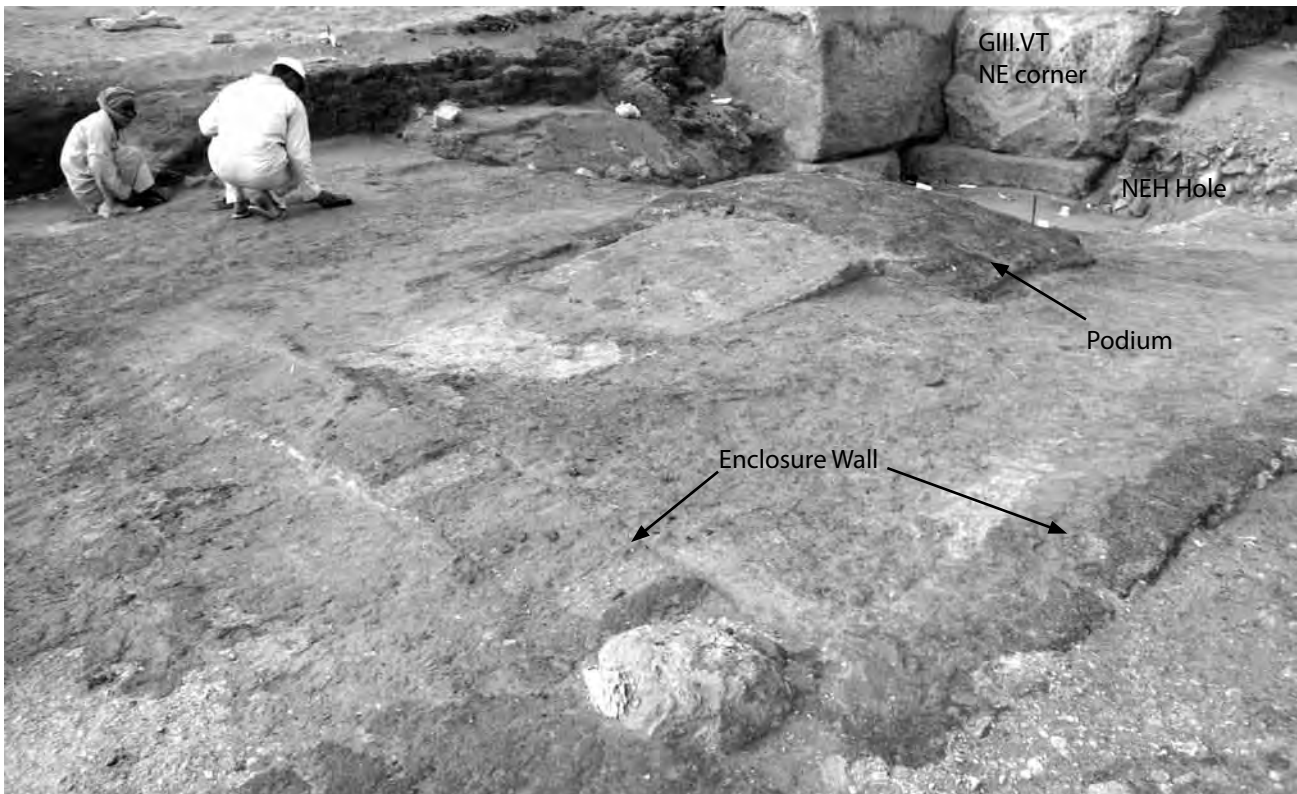


Figure 8.21. The Podium and its enclosure. View to the southwest. Photo by Mark Lehner.

debris foundation material. Later people filled the Cut with a finer limestone debris that they banked up against the stepped-out face of the Cut.

### Podium

A low bench or podium, built of mudbricks, remains at the top western end of the Ramp (figs. 8.1, 8.17, 8.20, 8.21). Mike House (2009b) described this feature:

It consists of a square mudbrick plinth or platform [30,941] 1.90 m × 1.70 m at 18.70 m asl with an additional mudbrick extension (30,942) to the east ... Within [the enclosure around the platform], a small amount of a marl plaster floor survived (18.40 m asl) to the north and east extending up to an enclosing wall [30,940] and [30,939] (represented solely by a single mudbrick course).

To the south of the platform structure, there appears to be an out-of-phase wall [30,945], which appears at first inspection to be truncated by the platform [30,941]. However, the plaster on the outside of the platform continues down between the wall [30,945] and the platform [30,941]. This phasing sequence leads me to believe that the wall [30,945] may in fact be a form of partial articulated collapse, which appears on Hassan's plans as a wall.

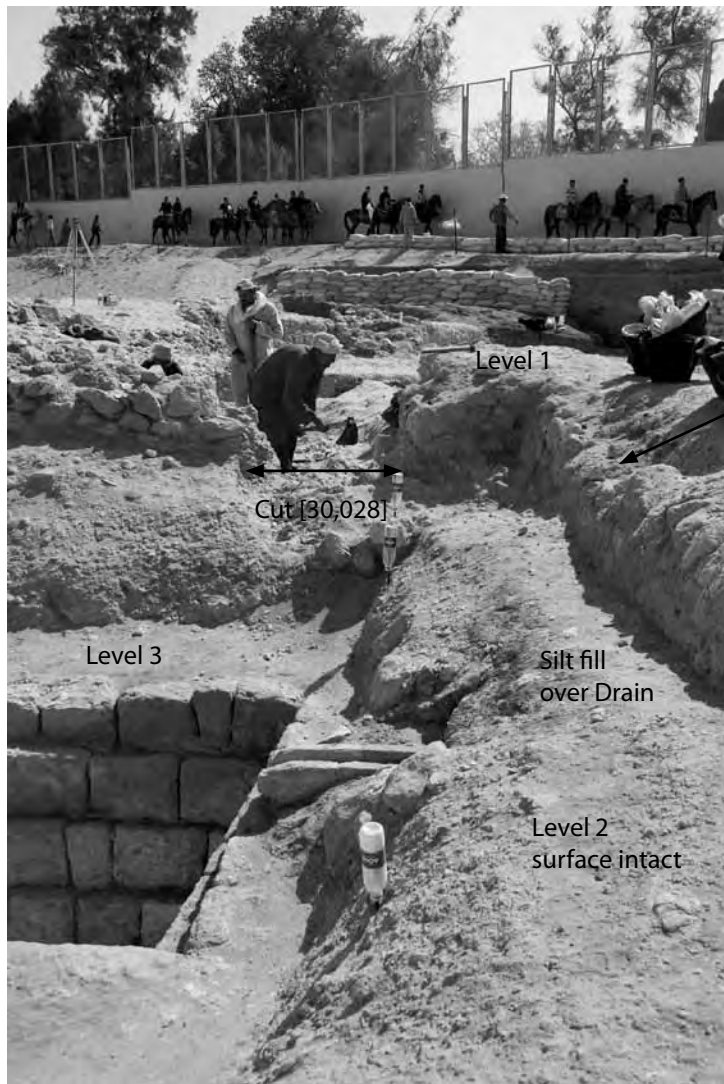
The main part of the Podium rises in the center about 30 cm from the surface of the Ramp, while the edges rise only 7 to 19 cm above the surrounding surface. This slight

mounding is probably due to erosion. A projection from the center east side extends 1.16 m for a width of 1.14. The top of this projection slopes down to the east by 10 to 11 cm, giving the appearance of a little ramp. A marl plaster covers the sides of the Podium and its extension.

Thin, low walls on the north, east, and south define an enclosure 3.70 m north to south (the length of the eastern wall) around the Podium. The L-shaped northern and eastern walls, which survive to a height of only 2 to 10 cm, appear to be of a different phase, that is, they probably were built and functioned at a different time than the southern wall.

A single row of brick headers, 36 cm wide, forms the eastern wall [30,939] of the Podium enclosure, running 2.10 m east of the Podium, and 96 cm from the eastern end of its ramp-like projection. This wall appears to have ended on the south without turning, which would have left the southern side of the enclosure open to anyone ascending the southern side of the Ramp. Perhaps this open side connected the Podium in function to the Portico and Vestibule 2, which open about 4 m to the south (foldout 5).

On the other hand, if the southern wall of the Podium enclosure is of the same period as the northern and eastern walls, it would have left an opening about 78 cm wide. What makes us think this wall belongs to a different period than the other two is the fact that it runs at a slight northeast-southwest angle to those walls and to the Podium. The southern wall [30,945] rises only 9 to 17 cm



Channel on  
Partition  
Embankment  
slopes into  
upper edge of  
Level 1 here

Cut [30,028]

Level 3

Silt fill  
over Drain

Level 2  
surface intact

Figure 8.22. Workers remove the last gravel fill [30,246] from the Cut [30,028] at the southeastern corner of Water Tank 2 where the Cut breached Levels 1 and 2. Most of the Level 2 surface on south remains intact. The channel slopes into the upper edge of Level 1 on the south (right). View to the east. Photo by Mark Lehner.

from the surface, and it appears to have been eroded or otherwise truncated on its eastern end. The line of a marl plaster remains along its southern face. In addition to its angle oblique to the Podium and the enclosure, it appears that the bricks of the northern side of this wall pass under the base of the Podium, which would make the wall earlier than the Podium. However, as House pointed out (above), the plaster on the southern side of the Podium in the seam between it and the southern wall suggests the Podium predates the wall.

We have so far only cleaned and mapped the Podium and its associated walls. The details of an excavation would probably indicate the phasing of the different periods or builds of these features. An earlier phase of the Podium enclosure might be indicated by the plastered face of a segment of wall embedded in the surface of the Ramp a

short distance to the east and down the slope from the Eastern Enclosure Wall [30,939] of the Podium.

This trace of what might be an earlier eastern front to the Podium enclosure turned up late in our 2009 season.

Kate Liska (2009) noted:

On the post-excavation plans of Square 101.P24, the top of what seems to be a stone wall [32,467] appeared from multiple cleanings of the area. Similarly, on the last day of recording at the site, a strange, angled mudbrick plastered wall(?) appeared oriented north-south in 101.P24. It was about a meter in length. These two elements indicate that there were earlier features on the western part of the Menkaure ramp/road that were probably razed for repaving of the road and the construction of the platform and building now present in 101.P23.<sup>2</sup>

2. Unfortunately, the strange, angled mudbrick wall was not recorded on the post-excavation plan due to time constraints, but Lehner mapped it into his general form-line map of KKT-AI (see foldout 4).



Figure 8.23. Cut [30,028] beginning near the southeastern corner of Water Tank 2. The surface of Level 2 slopes down from the intersection of the Partition Embankment channel on the south (right) to the beginning of the Cut. View to the east. Photo by Mark Lehner.

### Cut

In 2009 we excavated more of the limestone gravel fill of the long, canyon-like trench that we called the A1-Cut (A1C) in 2008 (GOP4: 29–31). This trench runs in an irregular course from the southeastern corner of Water Tank 2 to the east alongside the northern edge of the Ramp which the Cut partially removed. Mike House excavated Trench A across the Cut and through its fill roughly halfway between Water Tank 2 and the Fieldstone House (Squares Q25, R25). Kate Liska supervised the excavation of the secondary limestone gravel fill between Trench A and the southeastern corner of Water Tank 2 (see below). We are therefore in a better position after Season 2009 to describe this major feature of the Interface between the KKT and the GIII. VT. We summarize the findings of Trench A after a general description of the Cut.

#### *Upper Beginning of the Cut*

It appears that the Cut begins west of the limit of our clearing of the post-1932 overburden. We pick up (Squares Q21, Q22) a fairly shallow channel, about 2 m wide, in the Level 1 surface of the terrace west of the Water Tank 2 and the Partition Embankment. This channel shows a turn to the northeast where it cuts the upper, Level 1 edge of Water

Tank 2 roughly at the center of the southern side of the tank. Over this run of about 10 m the southern side of the channel shows a low slope, while the northern side is steeper, to depths ranging from 53 to 22 cm, with the shallower part closer to where the Cut intersects the southern edge of Water Tank 2.

#### *Subsidiary Southern Channel*

Just at the turn into the Tank, the channel bifurcates slightly. The southern prong of this fork shows as a very subtle channel, interrupted by the (1932?) trench that exposed the Drain running under the embankment. No channel shows in the embankment surface on the opposite, eastern side of this trench. Rather, here we have the sharp break eroded (by water?) into the built-slope of the top of the embankment down to the roadbed of the Ramp, and then, to the east, another narrow channel, 50 cm wide, begins and runs southeast on a diagonal to the axis of the Ramp south of the mudbrick enclosure line built against the northern shoulder wall of the Ramp (Squares Q23, Q24, P24; see foldout 4). This channel cut down into the crushed limestone foundation of the roadbed and widens to a meter until it meets the last alluvial silt paving of the roadbed (in Square P24). It is possible this paving sealed and repaired the channel.



Figure 8.24. Surveyor Mohamed Abd El-Basat and Hanan Mahmoud take elevations in Trench E. The mound of settlement and mudbrick debris lies in the Cut just beside the traces of a mudbrick structure on the high northwestern end of the Ramp. View to the southwest. Photo by Mark Lehner.

We will return to this channel when discussing the dynamics of water flow across the site in terms of how the Cut was formed (see below).

#### ***Southeastern Corner of Water Tank 2***

We pick up the Cut again at the far southern end of the eastern side of Water Tank 2 (Squares Q23, R23). Here, the Cut went through the entire height, 85 cm, from Level 1 to Level 2, and 24 cm down into the surface of Level 2 for a width of 1.30 m tight inside the southeastern corner of Level 2, but sparing 30 to 40 cm of the Level 2 surface against the southern side (figs. 8.22, 8.23).

The Level 2 surface remains intact immediately to the west of this corner. In the center of the southern side, the alluvial silt fill in the cut in which the builders laid in the Drain remains intact (fig. 8.22). This fact indicates that if flowing water created the Cut, the water either flowed down a slope upon fill that covered this Level 2 surface but left the southeastern corner exposed, or that water flowed into and filled the Tank up to the brim of Level 1, then broke through the far southern end of the eastern side between Levels 1 and 2. On the other hand, if people made the Cut, they simply started making it steep and deep at this point. We leave, for now, the question of whether this

steep and deep cut through the southern end of the eastern side of Water Tank 2 was formed by the same event(s) that made the shallower, more gently sloping channel on the top of the Partition Embankment.

#### ***Cut to the East***

By excavating the secondary gravel fill of the cut, Mike House and Kate Liska exposed the contours of the breach of the Cut through the revetment wall of limestone debris at the southern end of the eastern side of the Water Tank 2 between Levels 1 and 2. This breach is only 70 to 90 cm wide, but took out, as noted above, the entire 85 cm height between the two levels (fig. 8.23).

From here to the east, the clearing of the secondary gravel fill revealed that the Cut broadens out, first to 2.5 m at the top, between the high (19.15 m asl) limestone debris surface on the north and the northern shoulder of the Ramp (19.09 m asl) on the south. The Cut took away the northern edge of the northern Ramp shoulder. Here the base of the Cut is only about 1 m wide. We left some of the gravelly fill in the deepest part of the channel, so we do not have its lowest contours (fig. 8.24). We left the bottom at elevation 17.91 to 18.11 m asl, so the Cut in this narrow breach is more than 1.24 m deep.



Figure 8.25. The mound of mudbrick and settlement debris against the southern side of the Cut [30,028], partially sectioned by Trench A. At the end of the 2009 season we left some secondary gravel fill in the channel at the bottom of the Cut. Trench D indicates that the Cut extends much deeper. View to the west. Photo by Mark Lehner.

The Cut broadens around 3 m east of Water Tank 2 to more than 6 m wide (see foldout 4). Further excavation of the fill might reveal that the northern edge possibly swings farther to the north (more clearing of the surface would tell).

On the north, the Cut left protruding as a kind of terrace a very compact layer of crushed limestone at elevation 17.84 here, but generally sloping up from east to west. The projecting surface is smooth as though it might have been water-washed. This could be part of the foundation bed for an older ramp or incline that we see in the northern side of the Cut under the Fieldstone House, as noted above (see figs. 8.18, 8.19). The northern side of the Cut makes a meander, bowing out in what looks like an oxbow cut-off in stream development (foldout 4). High in the section, a single large limestone piece protrudes, left hanging above the crushed limestone surface below.

On the south our removal of the secondary gravel fill exposed a large deposit of dumped or toppled alluvial mudbrick debris [30,925], extending along the southern edge of the Cut for 12.3 m and north into the canyon of the Cut for a width of 2.7 m (figs. 8.25, 8.26).

In the sample of this material from Trench A, we retrieved pottery sherds that appear to be late Old Kingdom.

This material mounds up 69 cm, from 17.38 to 18.07 m asl, against the southern edge of the Cut, and so it must have been deposited after the cut was formed. This material, occupation debris and mudbrick, possibly derives from the mudbrick structure that stood upon the Ramp immediately south of the north shoulder wall (figs. 8.16, 8.17). The material may have fallen into the Cut when it took out and undercut the northern side of the northern shoulder wall of the Ramp. Between this material and the northern edge of the Cut, the channel bottom measures only 1.6 m wide, narrowing to 1 m as the Cut begins a slight turn to the southeast (fig. 8.25).

East of Trench A the overall plan (foldout 4) at the end of Season 2009 shows the secondary gravelly fill, which we described and partially excavated in 2008 (*GOP4*: 30–32, fig. 24). This season we determined that this limestone gravel, which is much sandier with smaller and sharper chips than the limestone debris of the foundation material, banks up against the northern edge of the Cut. The alluvial mud and mudbrick deposit [30,925] tails out on the east at two patches of soft clean sand that interrupt the gravelly limestone chip fill. Another long patch of soft sand shows through the secondary gravel at the northern base of the Cut below the Fieldstone House. We do not



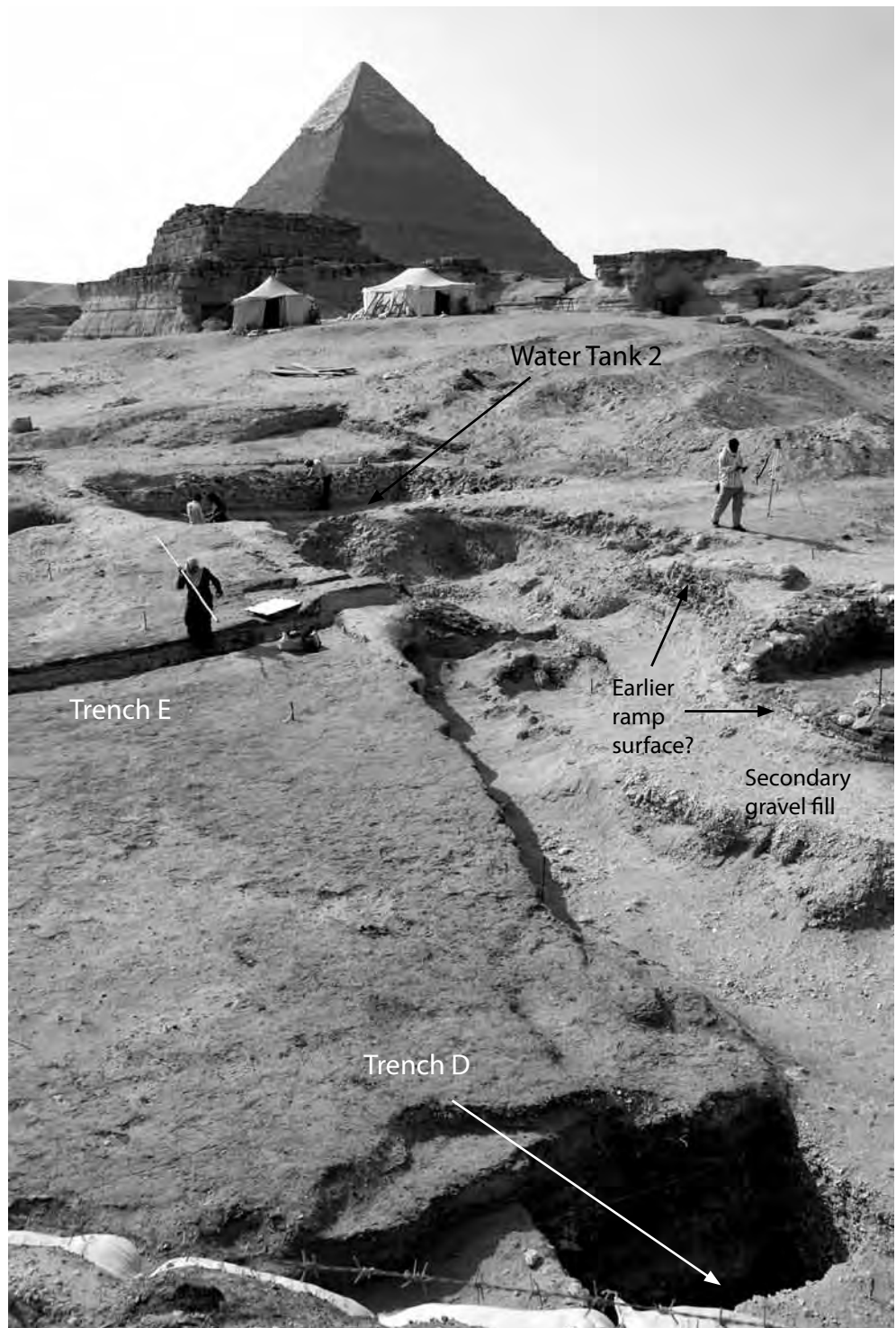


Figure 8.26. The Cut turns south. View to the west-northwest. Photo by Mark Lehner.

know if the sand belongs to an underlying layer showing through breaks in the gravel fill, or if these are pockets of sand included in the fill. We only partially excavated the gravel filling this part of the Cut. The top of the gravel is about 20 to 30 cm deeper than the floor level of the Fieldstone House.

The remarkable aspect of this part of the Cut is how it cleanly truncated the walls of the Fieldstone House. The fill of the rooms of the house that we removed con-

sists mostly of post-1932 sandy material. It is unclear what Selim Hassan's diggers found inside. Had the walls already toppled, filling the rooms with collapsed material before the Cut truncated the house?

Another aspect of this stretch of the Cut worth noting is that its northern section is undercut where it bows out to the north as it passes under the house. This, and some degree of undercutting at the northward bend just outside the Water Tank 2, and the undercutting of the southern

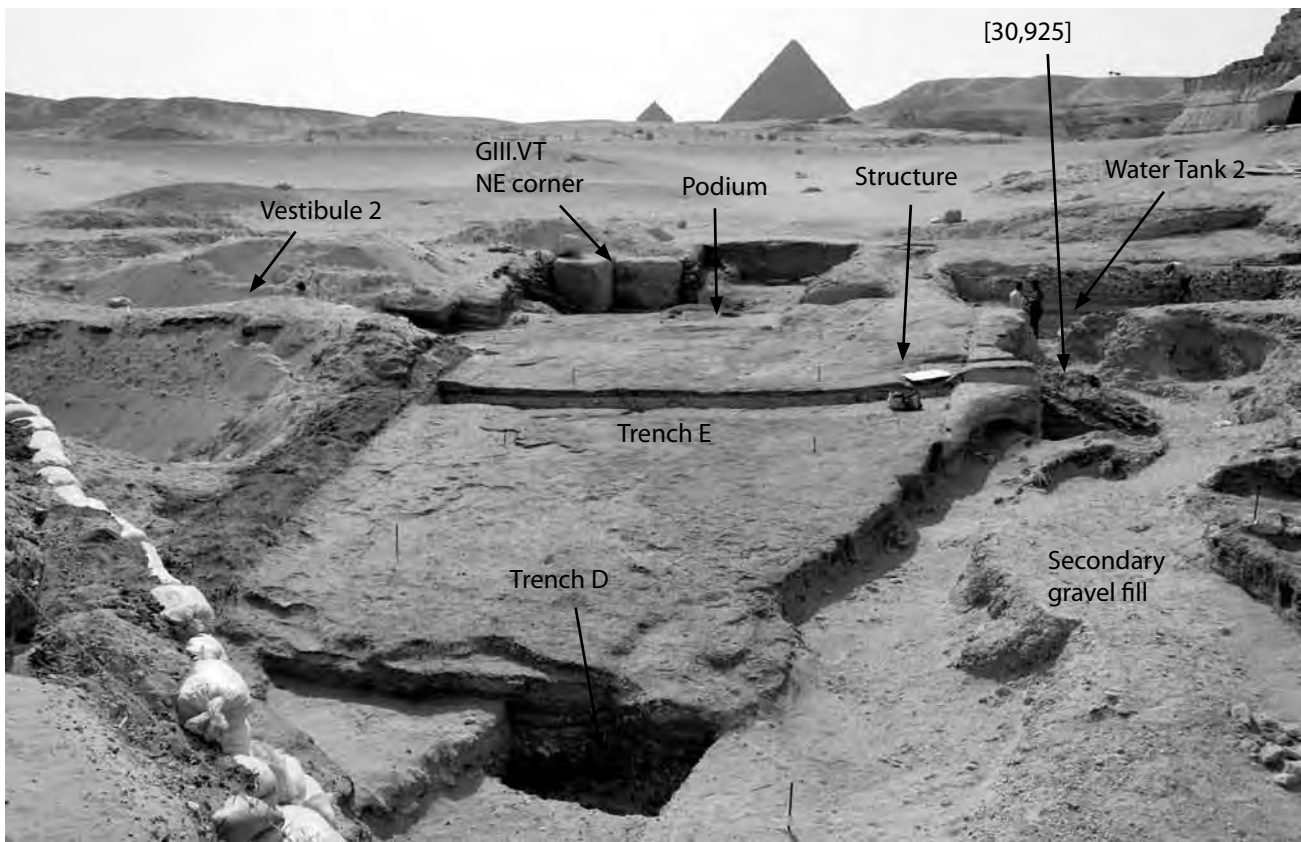


Figure 8.27. General view of Area KKT-A1 to the west. The broad Cut turns south to truncate the lower end of the Ramp. Photo by Mark Lehner.

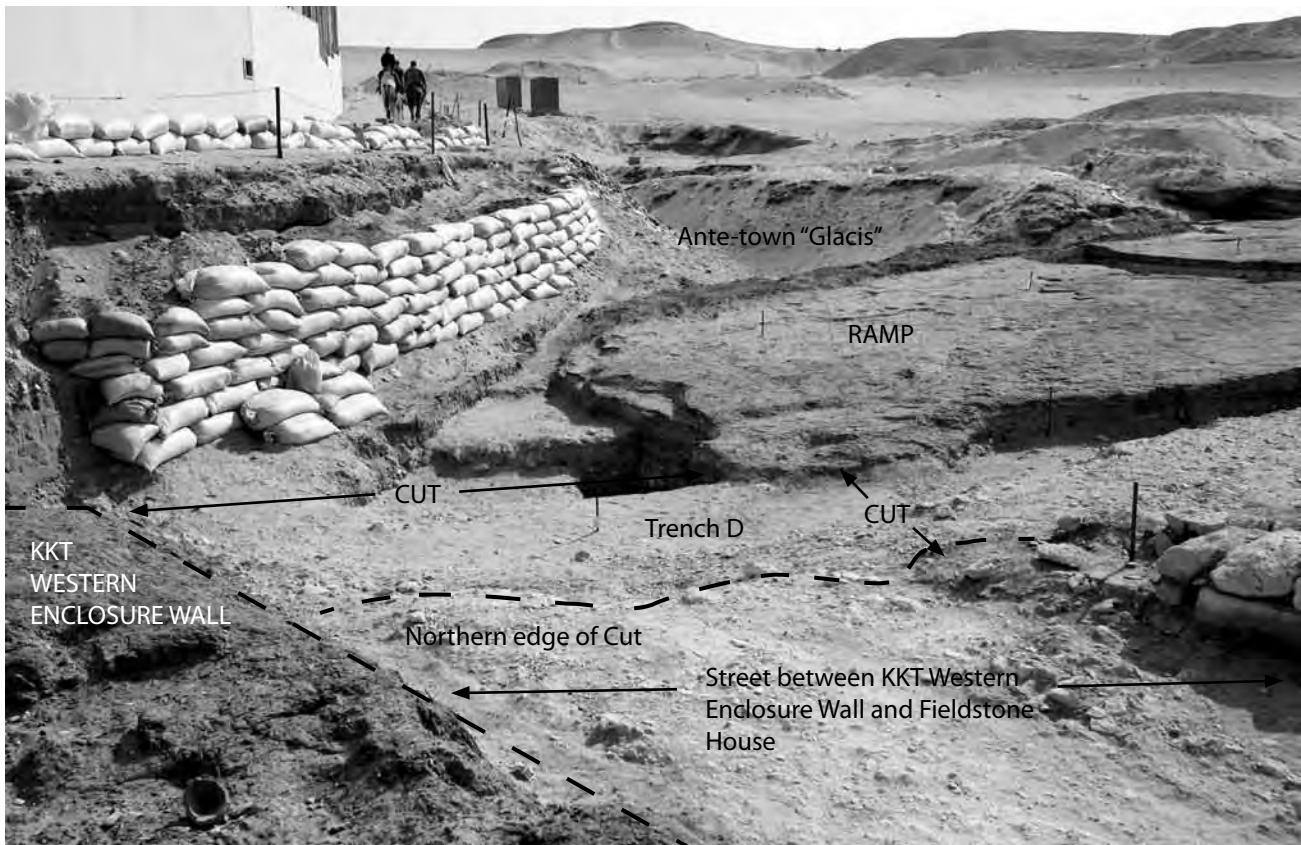


Figure 8.28. The turn of the Cut, view to the south, where it truncates the lower end of the Ramp and runs under the embankment of the modern road around the cemetery. Photo by Mark Lehner.

side (see above, fig. 8.24), may show that flowing water did at least partially contribute to the Cut, perhaps over time as opposed to a single event. Streams commonly undercut the outside of bends.

The canyon of the Cut narrows slightly to 3.50 m opposite the western wall of the Fieldstone House, and then broadens, with the northern section curving northward, to a width of 6 m between the eastern wall of the house and what the Cut left of the northern edge of the Ramp.

### **Turn of the Cut**

We count as one of the remarkable discoveries in Area KKT-AI this season the turn of the Cut to the south where it meets the Western Enclosure Wall of the KKT (figs. 8.26, 8.27, 8.28). At this turn, the Cut, 4.6 m wide, truncated the eastern end of the Ramp but spared the Western Enclosure Wall. It is hard to imagine that, if flowing water created the Cut, it would have left the base of the mudbrick Enclosure Wall unscathed.

James Taylor's Trench D at the northeastern corner of the truncated end of the Ramp indicates the Cut is 1.75 m deep, with a bottom at 15.00 m asl, and maybe lower. This is a meter deeper than the lowest point we have measured (16.00 m asl) at the base of the Glacis east of the Ante-town (GOP2: 16; GOP4: 22). At bottom, the material consists of dumped limestone debris such as the builders used to landscape the entire area between the KKT and GIII.VT.

We could not track the Cut farther east because it runs into the thick post-1932 overburden and under the modern cemetery. With its turn sharply to the south, it is likely that the Cut opened out eventually into the deep channel of the wadi between the Moqattam and Maadi Formation outcrops at some point under the modern cemetery (fig. 1.1).

### **KKT-AI Excavations 2009**

In KKT-AI 2009 we excavated the following trenches (see foldouts 4, 5 for location):

- **Trench A:** Mike House excavated Trench A, 2 m wide, spanning the width of the Cut at around two-thirds its length between the leg of the KKT and Water Tank 2 in Squares Q24 and R24. The purpose was to understand the shape of the Cut itself, the underlying material, and the deposits that filled it.
- **Trench B:** Mike House excavated Trench B, 1 m wide, across the corridor between the Fieldstone House and the Western Enclosure Wall of the KKT-F to establish the stratigraphic relations between these structures.

- **Trench C:** Mike House and James Taylor excavated Trench C in the tight corner between the bank of overburden (mostly modern) supporting the road around the modern cemetery and the southwestern corner of the KKT, that is, the far southern end of the Western Enclosure Wall. We exposed this corner for the first time, as far as we know, since Selim Hassan's 1932 excavations, during our 2009 Season. Trench C opened on the west onto the Cut where it turns to run south.

- **Trench D:** James Taylor excavated Trench D at the far eastern end of the Ramp, on the opposite side of the Cut from Trench C, to ascertain the depth of the cut after its turn to the south, and to see the layers that comprise and support the Ramp (figs. 8.26, 8.27, 8.28).

- **Trench E:** Hanan Mahmoud continued the excavation of a north-south trench that Amelia Fairman and Mike House began in 2008 across the Ramp between the Ante-town and the Cut. Trench E was 1 m wide × 12 m long, with a deeper probe on the south. The trench ended on the south at the Ante-town wall [30,452] and on the north at the north shoulder of the Ramp and the Cut [30,028].

Kate Liska excavated the upper end of the Cut from Trench A to the eastern side of the Water Tank. She removed layers of fill for a length of about 6.50 m and cleared the shoulders of the Cut for a width of around 7.50 m.

### **Trench A**

Mike House positioned Trench A in Squares Q24 and R25 between the limits of Cut [30,028] so as to align with and continue the north-south section started in 2008 (GOP4: 24), designated Trench E in 2009. The aim was a stratigraphic link in the lower deposits from the Ante-town and Vestibule 2 across the Ramp separating the Khentkawes settlement and GIII.VT and to try and gain an understanding of the form and profile of the Cut (fig. 8.29).

House completed Trench A in the first week of the season. He summarized his findings from Trench A in his weekly report of February 15, 2009 (2009b):

The Cut channel [30,028] had near vertical sides and a relatively flat base at 16.59 m asl, to the north it cut through several of the structures and a deep sequence of roughly coursed limestone rubble make-up layers which were leveling deposits for the Khentkawes Town under which was a layer (unexcavated) of marl chunks/lumps which formed the base of the Cut. This marl deposit sloped off



◀ SOUTH

NORTH ▶

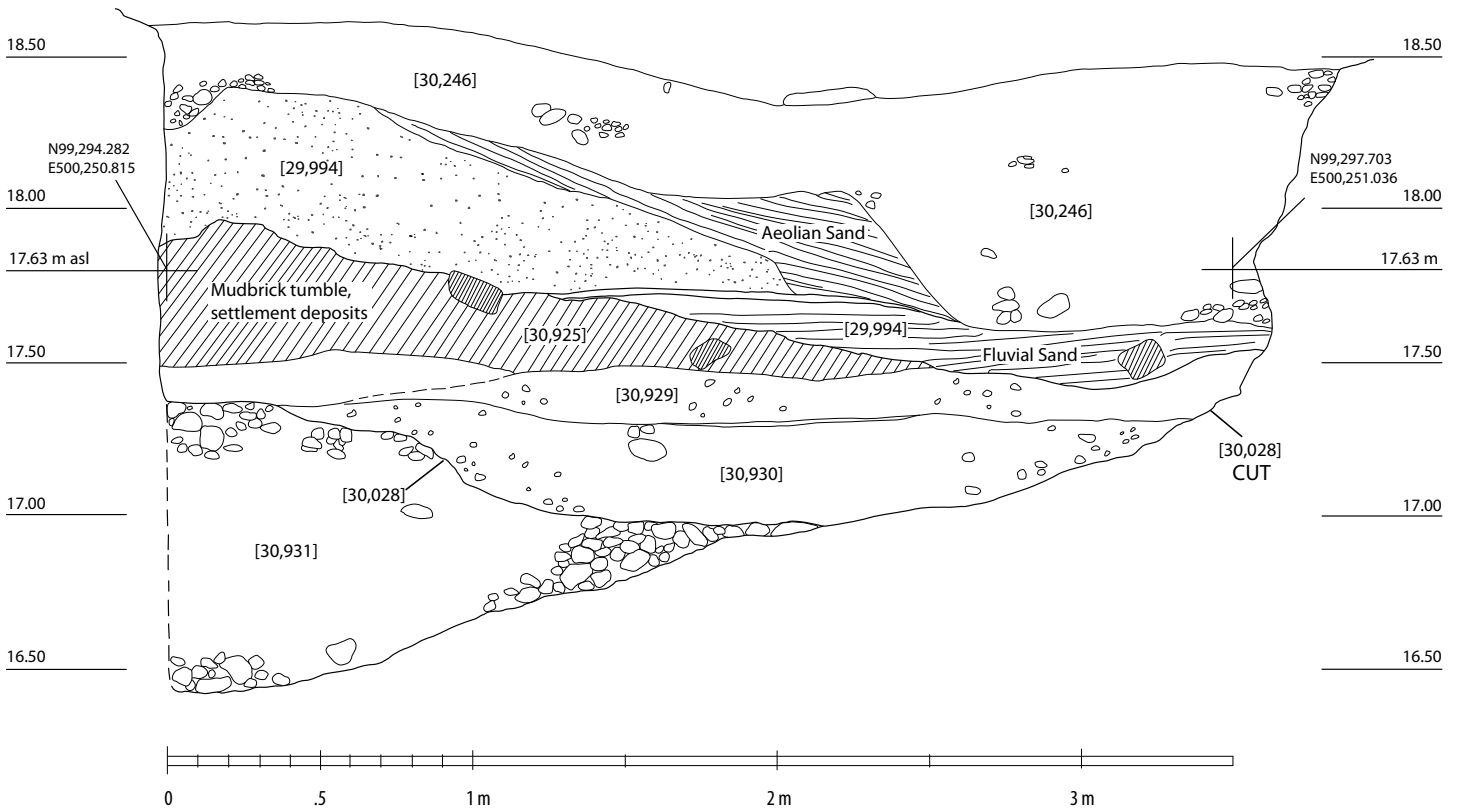


Figure 8.29. East-facing section of Trench A through the fill of the large Cut [30,028], after original field drawing (2009-66) by Mike House, digitization by A. Witsell.

**Table 8.1. Pottery from Deposits in the Cut in Trench A**

Feature Number	Ceramics	Date/ Dynasty
29,994	Large tray on high foot, "Meidum" bowl – 6th Dynasty, Beer jar and bread molds wall parts	6
30,246	Mixed. Two "Meidum" bowls – 6th Dynasty, One flat plate – 6th Dynasty, Votive plates, Wall sherds of many beer jars	6
30,925	Maybe mixed. Several "Meidum" bowls from the late 6th Dynasty	6
30,929	"Meidum" bowls from 5th–6th Dynasties	5–6
30,930	Much eroded. Beer jars and small bowl fragments	6?

to the south below layer [30,931], one of the early make-up layers for the road/ramp consisting of large lumps of limestone and occasional coarse abraded ceramic sherds (non-diagnostic). This deposit formed the base of the Cut in the southern half of the sondage. The primary fill [30,930] of the Cut was a deposit 35 cm thick consisting of limestone gravels in a sand matrix. The layer above [30,929] was almost identical with smaller gravels and slightly more frequent ceramics which included several diagnostic rim shards of Meidum bowls from the 5<sup>th</sup> or 6<sup>th</sup> Dynasties. Sealing this in the northern end of the trench were a sequence of collapse deposits ([30,928], [30,927], and [30,926]). To the south was a larger spread of collapse or dumped mudbrick and silt [30,925]. Ashraf [Abd el-Aziz] had a cursory look at these partial bricks and said they were of similar size and consistency to those in Lisa's area (the east-west leg of the Khentkawes settlement) used in later phase repairs and blocking events. This deposit also contained a rather nice limestone collared jar and several beads. These deposits were then capped by a thick deposit of mostly windblown sand [29,994]. This sand was relatively clean containing occasional ceramics and appears to have blown in from the north accumulating against the southern wall of the trench. This layer was sealed by more limestone gravels [30,246]. However, these chips of limestone are unlike the lower deposits.

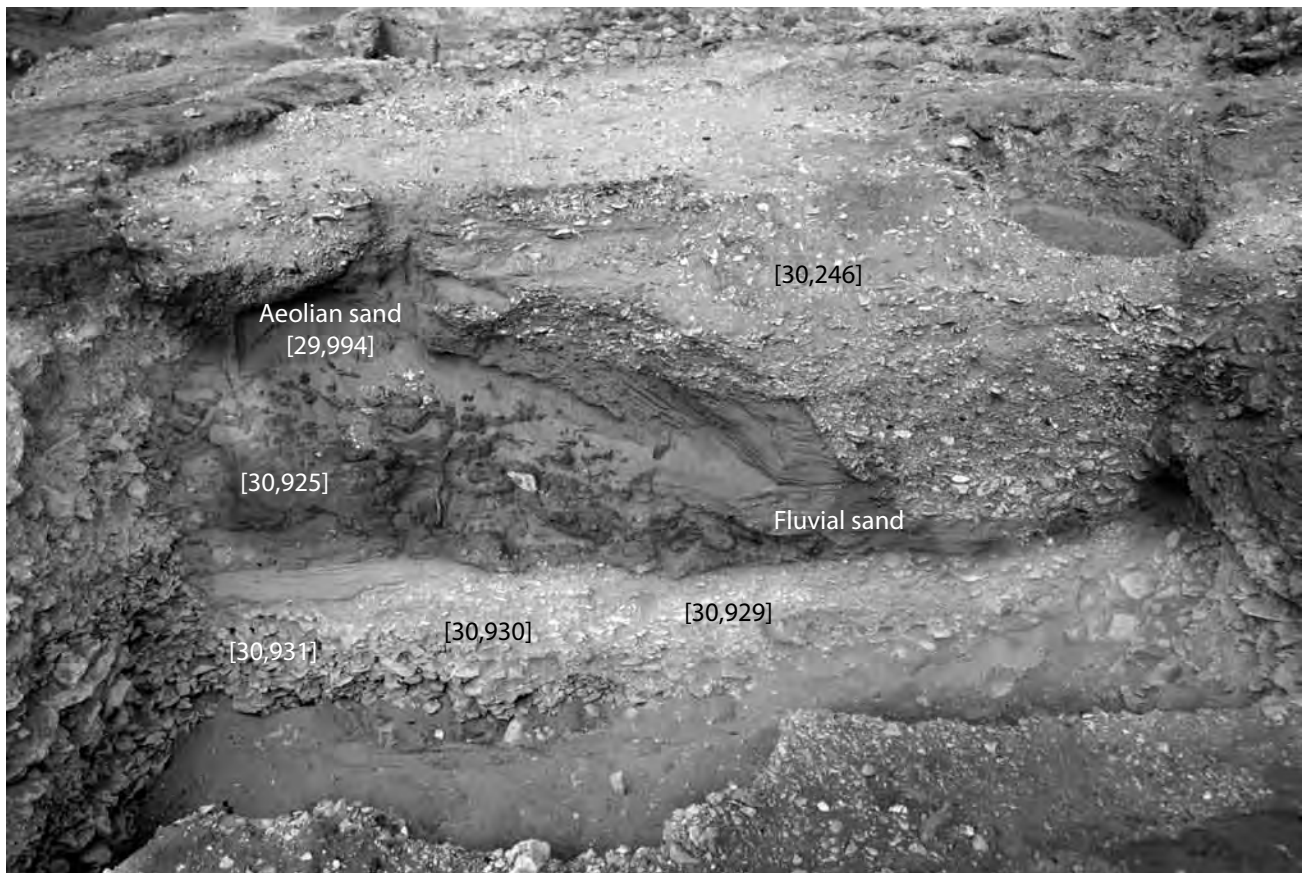


Figure 8.30. South-facing section of Trench A showing fluvial sand near bottom of the fill of the Cut [30,028] and higher aeolian sand (both designated [29,994]) covering mudbrick collapse layer [30,925] and covered by limestone chip deposit [30,246]. The bottom of the Cut is under limestone chip layer [30,930]. Limestone debris layer [30,931] forms the foundation of the northern shoulder of the Ramp. Photo by Mark Lehner.

They are far less abraded, with some very angular. The context also contained several types of exotic stone chips and lumps including pink granite, alabaster, dolerite, and basalt. This deposit may well represent the waste material from a stonemasons yard, being dumped in a linear feature no longer in use, or at least not serving its primary function.

Having finished the sondage, the aims were still not really addressed. The depth of the Cut [30,028] was surprising, at 1.35 m and the only linking deposits are very low in the sequence. If we have the time we may well cut a second sondage further to the west closer to the water basin. Next week we will continue to expose this area and empty the basin.

Anna Wodzińska (2009a; 2009b; Chapter 17, this volume) identified pottery fragments as belonging to 6<sup>th</sup> Dynasty vessels in five of the deposits filling the Cut in Trench A (table 8.1). We should note that the sand deposited over the thin northern edge of the mudbrick “tumble” deposit [30,925] shows multiple, tightly spaced, thin horizontal beds with sorted fine limestone chips (figs. 8.29, 8.30). This sand, designated as Feature [29,994], may have

been laid down by water, whereas the sand higher on the slope over the mounded mudbrick tumble [30,925] shows thin beds (ephemeral wet/dry surfaces) that angle up to the south, suggesting that wind blew this sand in from the north. The windblown sand was also designated and excavated as [29,994]. Most probably people, rather than natural forces, deposited the sandy limestone gravel with sharp chips [30,246] above the sand layers [29,924], which might indicate a period when people neglected the Cut, just after the collapse of the mudbrick into the southern side, and before people decided to infill the cut with the limestone gravel [30,246].

***Extension of the Excavation from Trench A to Water Tank 2***

Beginning March 3, Kate Liska continued the excavation of the fill within the Cut from Trench A to the far southern end of the eastern side of Water Tank 2. The area covered parts of five squares (R24, R25, Q23, Q24, and Q25) and measured approximately 8 meters east-west × 6 meters north-south (Liska 2009).

Before dealing with the voluminous fill of the Cut in the area between Trench A and the Water Tank, Liska removed a number of modern cuts and fills with modern inclusions that post-date Selim Hassan's 1932 excavations. The removal of these brought the excavation down to a limestone gravel deposit [30,997] securely devoid of modern contamination. "Under the limestone gravel and sand, context [30,997], a large layer of wind blown sand [31,001] covered about half of the excavation area" (Liska and Mahmoud 2009).

When the team removed the sand [31,001] they exposed

two discrete contexts. Along the northern side of [the] Cut [30,028], we found mudbrick collapsed material, which incorporated frequent amounts of ceramics, bone, lithics, and exotics ([31,015], [31,016], [31,017]). These contexts raked greatly to the south, demonstrating that they had been dumped into the large cut from above. (Liska and Mahmoud 2009)

After the excavation of these silty features, and the removal of small cuts and fills, the team was

able to focus on the next huge context of limestone gravels (50%) mixed with sand (50%), [31,018]. This context overlaid this entire intervention in the cut. This context is identical to [30,246] in Sondage A. Like [30,246], this layer included a large number of exotics that seems to be some kind of mason's debris. One piece of granite appeared to be worked. Moderate amounts of ceramics, bone, and lithics also came from these contexts ... This context also included ... a part of a sinusoidal vessel. (Liska and Mahmoud 2009)

Liska and Mahmoud's end-of-season summary of these excavations continues:

Throughout the Cut [30,028], there has been dumping from either the north or the south sides. From this point on in the stratigraphic matrix, the north-vs.-south-dumping is very prominent.

On the northern face of [30,028] in 101.R24, we ... came down upon two more discrete mudbrick collapses with frequent ceramics, charcoal, bone, and some lithics [31,038] and [31,039]. Both contexts are raked significantly to the south and stuck to the side of the cut (rather than to its base). [31,039] even seemed to be strategically

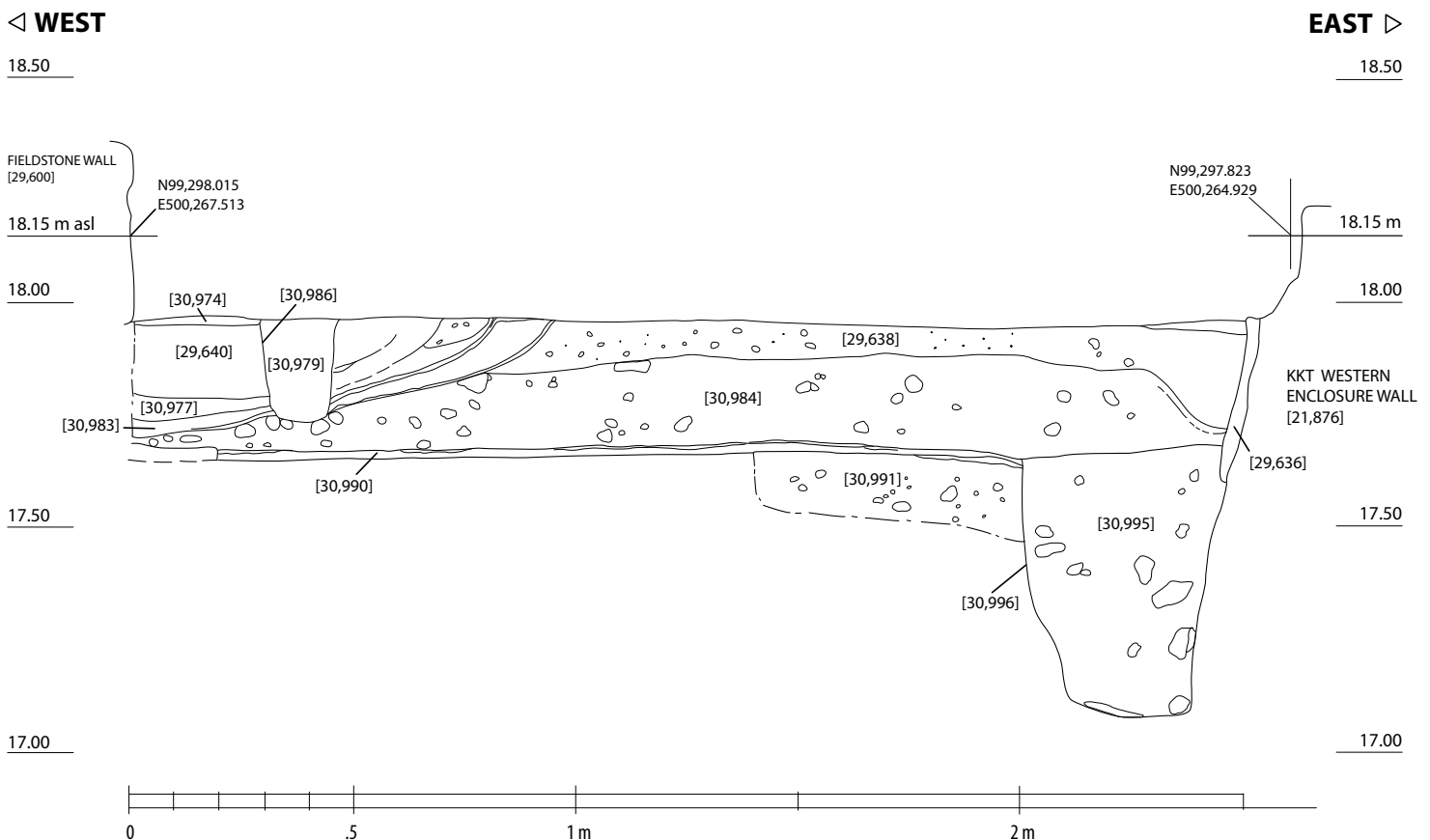


Figure 8.31. South-facing northern section of Trench B, after original field drawing 2009-70 by Mike House, digitization by A. Witsell.

inset into part of the wall of the Cut that left a vertical gap between two breaks. Furthermore [31,039] lipped and curved under at its base.

Stratigraphically beneath [31,038] and [31,039], but significantly higher than these two contexts was another layer of limestone gravels (50%) mixed with sand (50%) [31,041]. [31,041] was compact, and inset into the Cut. After [31,041] was removed, it was clear that the Cut curved inward greatly at that point, revealing two large undulating sides that could have been some type of uneven surface. The base of the cut still continues downward in the center, but these three contexts ([31,038], [31,039], [31,041]) are not directly connected with the base of [30,028].

On the southern half of the excavations, we came down onto a large layer of windblown sand [31,037]. This context is identical to [29,994] in Sondage A. As seen clearly in the section of Sondage A [see fig. 8.29], the top part of the sand has diagonal laminations from windblown activity, while the bottom part has horizontal laminations indicating a small amount of water. This layer included occasional ceramics that are likely inclusions from the ceramic-rich layer below [30,925] and [31,040].

In Sondage A, this sand opened onto three tiny discrete dumps in its northern face [30,926], [30,927], and [30,928] that were also oddly attached to the side of the cut.

The removal of the sand [31,037 = 29,994] yielded a large layer of mudbrick collapse with frequent ceramics, charcoal, bone, complete mudbricks, and perhaps small objects. This layer is [30,925] in Sondage A, which is identical to [31,040] in the larger excavations of the cut. [31,040] was not excavated in the 2009 season due to a lack of time. It is the next context to be removed. This context is likely not the collapse of a wall because of the frequent cultural material mixed into it. This material was clearly dumped from the southwest side, and gently raked downward. When this material was dumped, it must have been semi-solid, a little of it flowed towards the northeast, but it did not go very far. There are large voids on the top of the mixture. The northern edge of the context seems to have a firm side that lips under, displaying an edge that drops about 10 centimeters lower.

The mudbrick collapse contexts ([30,925] and [31,040]) open sharply onto two more layers of limestone gravels mixed with sand. The above layer is [31,047], which is identical to [30,929] in the Sondage. In Sondage A [30,929] was divided from [30,930] because the compaction of the gravels and the quality of the sorting of the gravels had changed. As we see in Sondage A, [30,930] marks the base of our cut in that area. (Liska and Mahmoud 2009)

Although Liska and Mahmoud doubted that the mudbrick collapse ([30,925] and [31,040]) derived from a wall, the overall map of KKT-A1 shows that the mound of silty mudbrick [30,925] lies in the southern side of the Cut just opposite the traces of walls defining some kind of structure that once stood against the northern shoulder of the Ramp (fig. 8.27). Above we discuss the relationship of this structure to the steeper and higher ascent that continued from the top of the Ramp up onto the Partition Embankment and thence to the Western Terrace of Level 1 along the western side of Water Tank 2. It is very possible that the mudbrick tumble [30,925] is the remains of this structure, and any occupation deposits it might have contained, collapsed into the Cut after the forces that made the Cut degraded the northern shoulder wall of the Ramp.

We might ask if the forces that made the Cut continued after this collapse. The Cut bows out to the north as though the forces that made it (flowing water?) moved around the mound of mudbrick collapse [30,925]. The deeper channel at the bottom of the Cut also seems to bend northward around the mound of silty debris [30,925] (figs. 8.25, 8.27). Is it possible that these forces were gradual or episodic water flows? Could the fluvial sand with horizontal bedding and fine limestone chips along the bottom of the mound have been left by the last of these flows?

## Trench B

Mike House began work in Trench B in Square R28 on March 8. He placed Trench B, 1 m wide, across the width of the road, 2.60 m (about 5 cubits), between the Western Enclosure Wall of the KKT and the Fieldstone House to the west in order to ascertain the stratigraphic relationship between these structures (foldout 4).

House found part of a crushed limestone bed [30,990] that predated the construction of the KKT Western Enclosure Wall [21,876] as indicated by the fact that this layer [30,990] stops at the cut [30,996] for the foundation of the wall (fig. 8.31). This cut is 90 cm wide and 1.20 m deep. The KKT Enclosure Wall rests on the bottom, at level 15.99 m asl, but the marl plaster [29,636] on the face runs only slightly below the top of the foundation trench and its fill [30,995]. People built the Fieldstone Houses in some later period. A trench [30,978] runs along the eastern wall of the house through layers [30,984] and [29,638] that had been laid down up against the plastered western face of the KKT Enclosure Wall. It is uncertain if the eastern house wall [29,600] is set down into the bottom of this rather broad trench, extending 1.90 m eastward from the base of the wall [29,600], or at the level of the thin layer [30,974] that runs up to the base of this wall.

### Trench C

Mike House found the far southern end of the Western Enclosure Wall preserved to a height of around 60 cm where it turns the corner to run east (foldouts 4, 5). House could expose the southern face of the Enclosure Wall for a length of only 1.75 m before it disappears under the embankment of the road around the modern cemetery (fig. 8.32). In this short exposure of the southern face, the Enclosure Wall shows a rectangular projection, 34 cm on the west and 46 cm forward on the east, with a width of 74 cm only 44 cm from the corner (fig. 8.33). At some point people built out the southern face of the wall to the east of the projection so that the wall became flush with the projection, but they did not fill in the corner, leaving it notched or rebated by 34 cm at the base.

We designated as Trench c, in Square P28, the excavation of a triangular patch,  $1.86 \times 2.18 \times 2.52$  m, of ancient surfaces down along this short stretch of the southern face of the KKT-F Enclosure Wall, in a corner with the modern embankment on the southeast and the Cut on the west. Ancient layers remained in this corner, exposed in the west-facing section of the side of the Cut (fig. 8.34).

House began to excavate Trench c on March 15. When he had to leave on March 17, Liska and James Taylor con-

tinued to excavate these deposits during March 18 and March 19.

The layers seen in the west-facing section left here by the Cut range from 17.46 to 16.93 m asl, while similar layers in the east-facing section through the Ramp left by the Cut (in Trench D, see below; figs. 8.35, 8.36) range from 17.05 to 16.33 m asl. Given that the Ramp slopes from west to east, it appears possible that these are the same layers, that is, the Ramp sloped all the way to the southwest corner of the KKT Enclosure Wall, as possibly indicated as well by the fact that the southern shoulder wall of the Ramp strikes a perpendicular with the Western Enclosure Wall of the KKT (foldout 4). The projection might have formed the northern side of some kind of doorway to the Ramp.

The section given by the Cut [30,028] shows that the builders laid down silty floor layers ([31,020] and [31,022]) upon a limestone debris layer [31,026] which is probably the same layer as the foundation of the Ramp. Here this limestone debris forms the foundation for the projection. A lens of sand [31,019] upon the silty floors may derive from short term windy conditions. People must have leveled the slope of this layer with dark brown silt [31,009] over which they laid a firm surface of sandy marl clay [31,014]. This was followed by a series of layers, sandy silt [31,012], and



Figure 8.32. Mike House prepares the successive silty floors and their bedding layers for excavation in the tight corner between the KKT Western Enclosure Wall (left), the modern overburden (above), and the Cut [30,028]. View to the southeast. Photo by Mark Lehner.

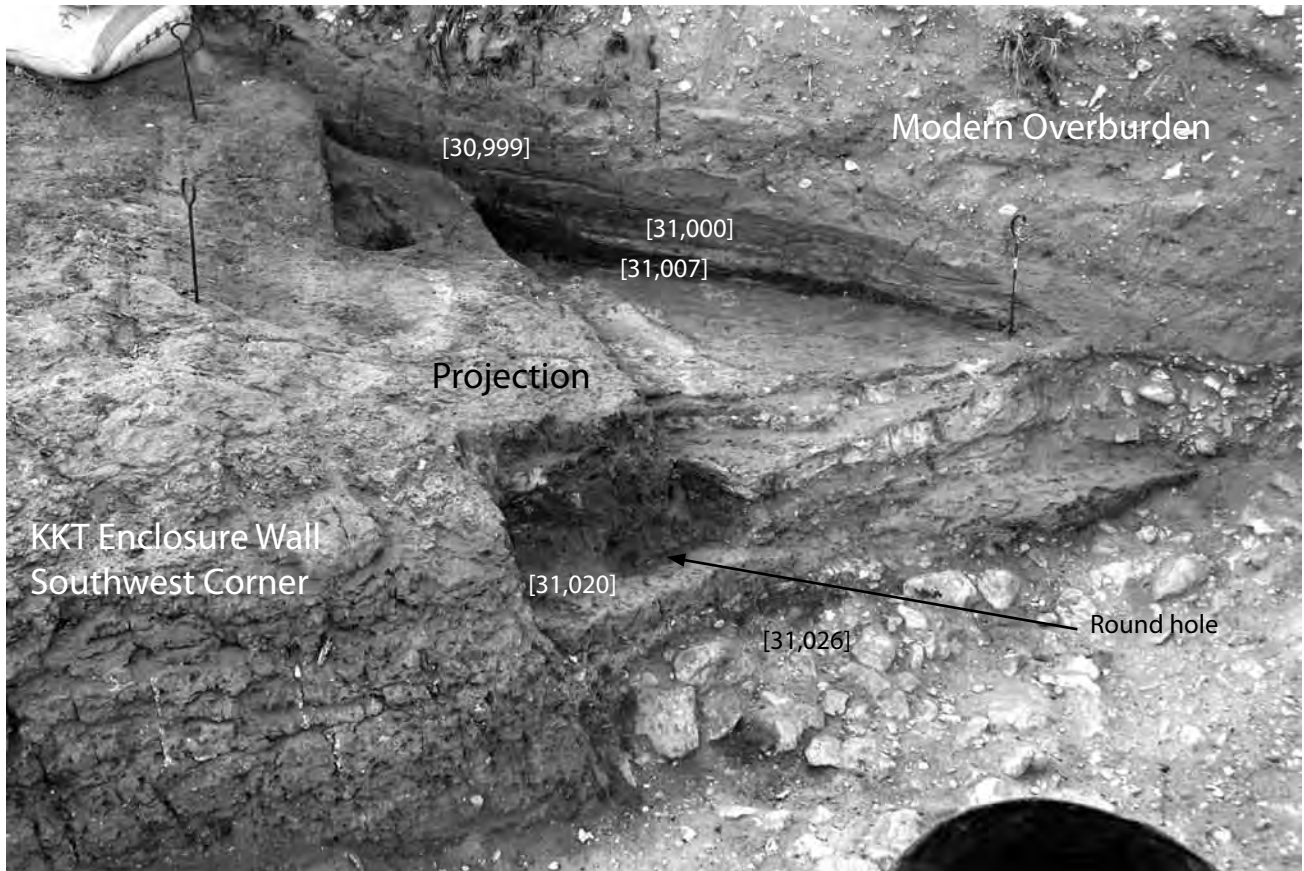


Figure 8.33. Trench C, view to the southeast after excavating features [30,999], [31,000], and [31,007]. Photo by Mark Lehner.

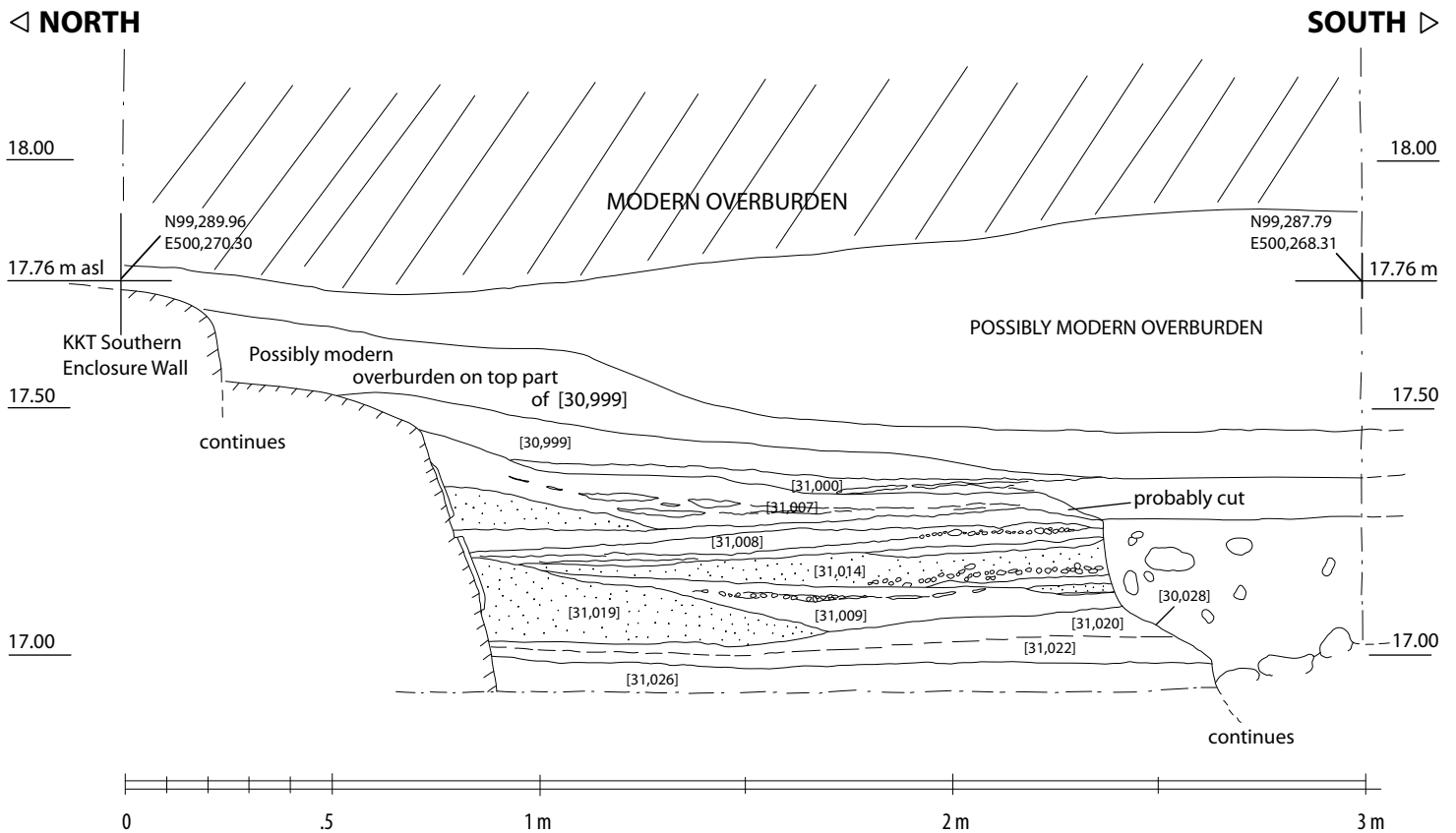


Figure 8.34. Trench C section, after original field drawing (2009-71) by James Taylor, digitization by A. Witsell. "North" is actually northeast and "south" is southwest.



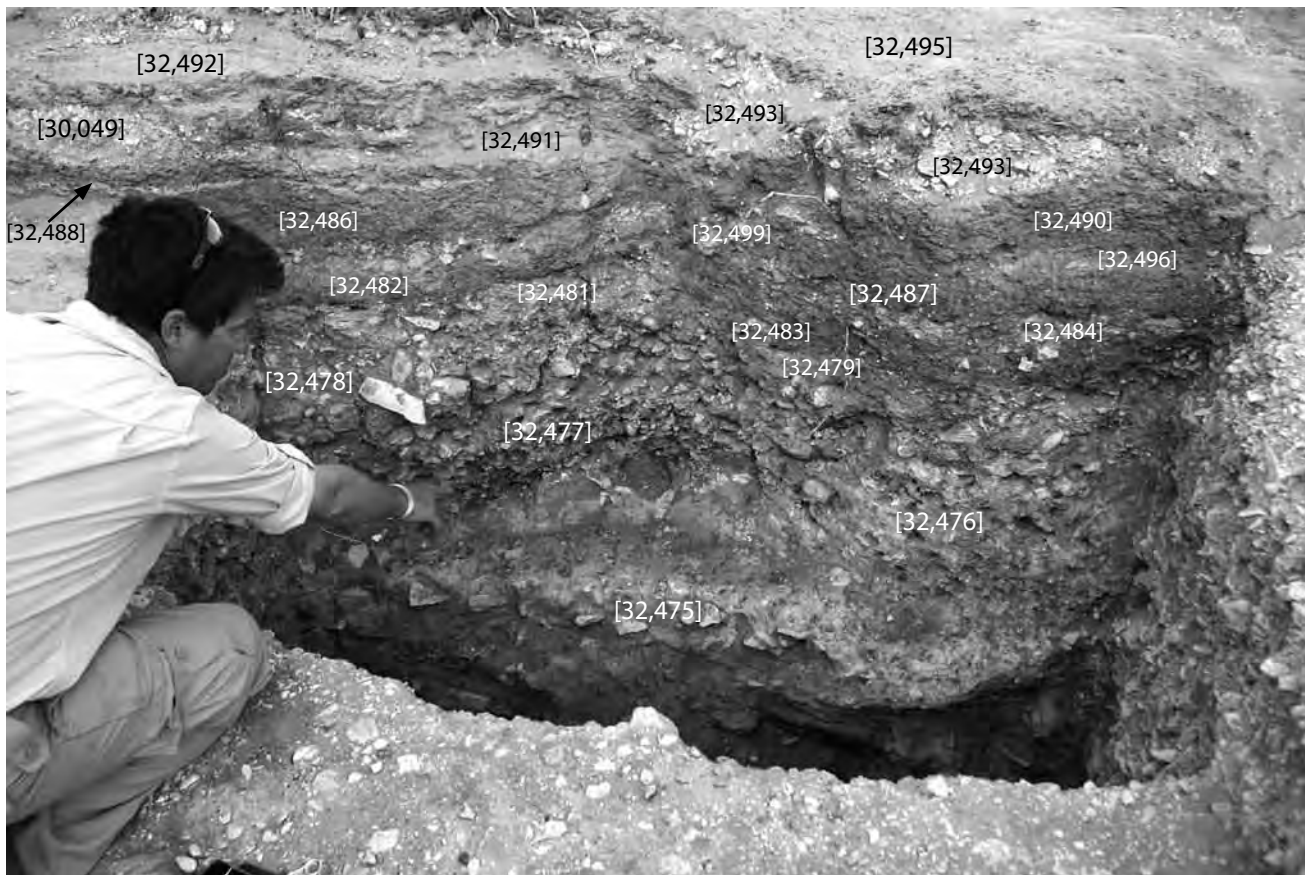


Figure 8.35. Trench D east-facing section. James Taylor points to limestone debris layers comprising the foundation of the Ramp in the section that the great Cut [30,028] left when it truncated the lower eastern end of the Ramp. View to the west. Photo by Mark Lehner.

a higher silty bedding and floor [31,008]. Another lens of windblown sand banked against the projection from the wall. This sand was covered by what Mike House interpreted as a beaten silt floor [31,007] with some thin lenses of marl clay as shown in the section that James Taylor recorded (fig. 8.34), leaving this layer open to interpretation as a time of deterioration of the marl plaster, remnants of which remained in place on the face of the projection. A higher layer of dark Nile silt [30,100] might have been the final floor surface at the meeting of the Ramp and the southwestern corner of the  $\kappa\kappa\tau$ . A final, highest layer of silt [30,999] most likely derived from the deterioration of the mudbrick walls of the  $\kappa\kappa\tau$  Enclosure Wall, as this layer partially covered the southern end of that wall.

Cutting through the upper layers, Mike House found a round hole, 50 × 28 cm wide and 28 cm deep, immediately at the southwestern corner of the  $\kappa\kappa\tau$  Enclosure Wall, against the notch created by the projection (figs. 8.32, 8.33). This feature may have been the socket for a post or upright that could have functioned with some kind of door or entrance to the Ramp. This post may have worked together with the purpose of another cut, a small semicircular linear cut or depression with about the same depth (16.98 to 17.24 m asl).

### Trench D

Near the end of the 2009 fieldwork, James Taylor began Trench D, 3 m long east-west × 2 m long north-south, at the northeastern corner of the truncated lower end of the Ramp in Square 028 (figs. 8.35, 8.36). The aim was to examine the composition of the Ramp, taking advantage of the section given by the western side of the great Cut [30,028]. Because time was short, Taylor took the excavations to the bottom of the Cut only at the western end of Trench D, for a maximum width of 1 m.

The depth of the Cut below the surface of the Ramp, 1.75 m, was surprising, with its bottom at 15.37 m asl. The dumped limestone debris of the Ramp foundation, used by the builders to landscape and terrace the whole area of the  $\kappa\kappa\tau$  and the interface with the  $\text{GIII.VT}$ , extends even deeper.

The section (figs. 8.35, 8.36) showed the layered structure of the Ramp which developed from its construction and use. The massive foundation, more than a meter thick, consisted at base of a layer, half a meter thick, of marl (*tafla*) and limestone debris [32,475] paved by a possible surface of thin marl plaster. If so, and if the surface would indicate an early phase of the Ramp or a roadway



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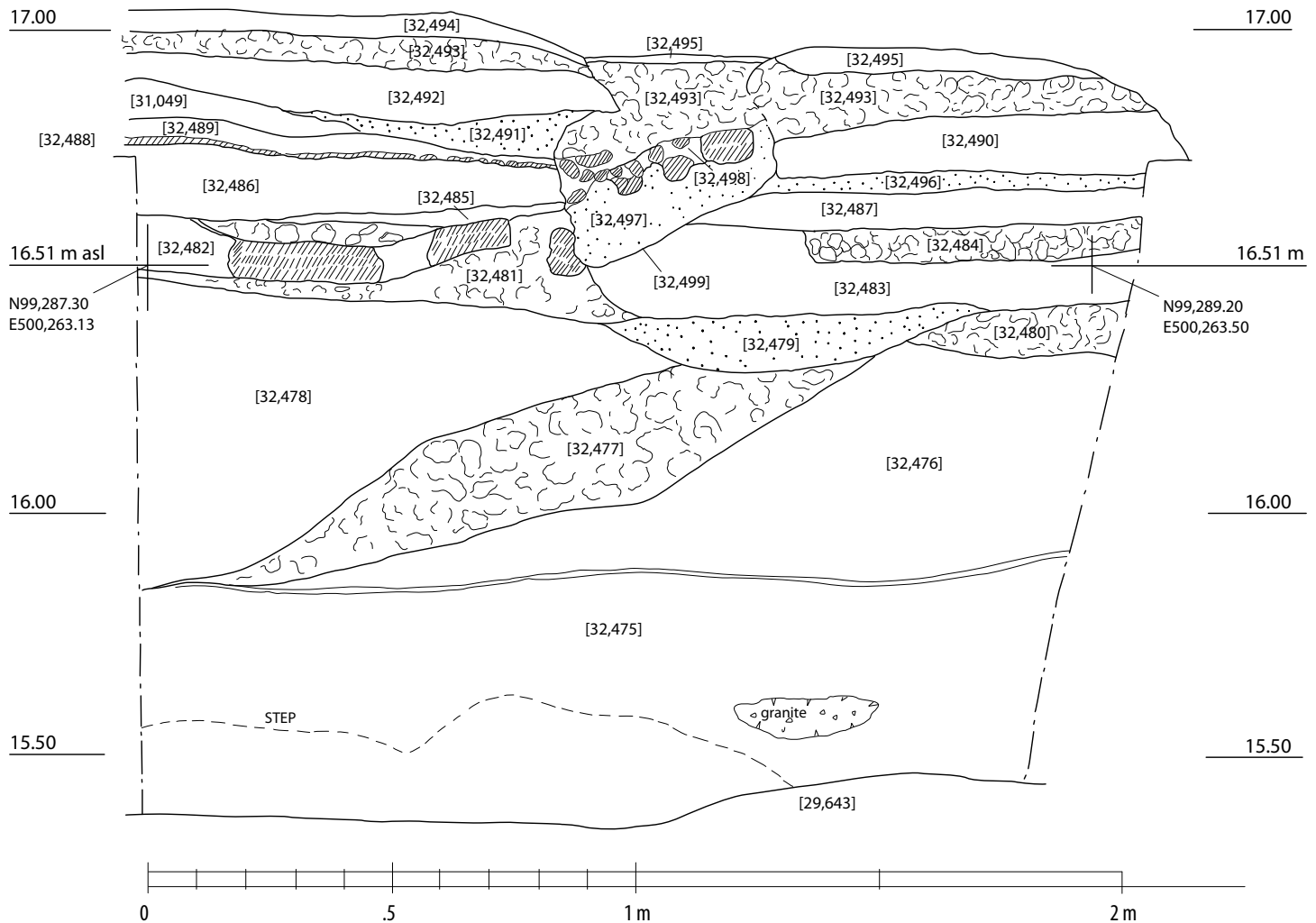


Figure 8.36. East-facing section in Trench D showing bedding and paving layers ([32,481]–[32,483] to [32,495]) where the Cut [30,028] truncated the lower eastern end of the Ramp. After original field drawing (2009-76) by James Taylor, digitization by A. Witsell.

in this place, it is very early and deep, about 1.20 below the final Ramp surface.

Next, people dumped a series of layers to raise the Ramp 60 cm higher: Feature [32,476], dense marl and limestone with “tip-lines” angled down from north to south showing the direction and sequence of the dumping; [32,477], a layer of finer limestone chips; and [32,478], consisting of coarser limestone and marl debris with larger fragments. A sandy lens with limestone chips [32,479], which may have been deposited by wind and blowing sand, fills a slight depression, which was covered by [32,481], mudbrick and Nile silt, and [32,483], also dumped silt with limestone chips.

The slight depression filled with sand [32,479] is just below a pronounced, irregular cut [32,499], 42 cm deep, 45 cm wide, that Taylor detected in the approximate center of the section coming down from the top and cutting the

higher layers. This may be a channel cut by running water, like the erosion channels in the surface of the Ramp higher up. The cut [32,499] is filled with sandy silt and limestone chips [32,497], Nile silt brick fragments [32,498], and limestone chips in a sand matrix [32,493].

The channel or disturbance [32,499] cut through a series of thick Nile silt layers on limestone chip beds, successive make-up layers, and Ramp surfaces, to which Taylor assigned separate numbers on either side of the cut [32,499]. One of the final Nile silt floor pavings [32,495] covered the erosion(?) cut [32,499].

### Trench E

During the 2008 season, Amelia Fairman and Mike House began a north-south trench across the roadbed of the Ramp in Squares O–P–Q.25, which, in 2009, we designated Trench E. At 2 m wide, Trench E is on the same alignment

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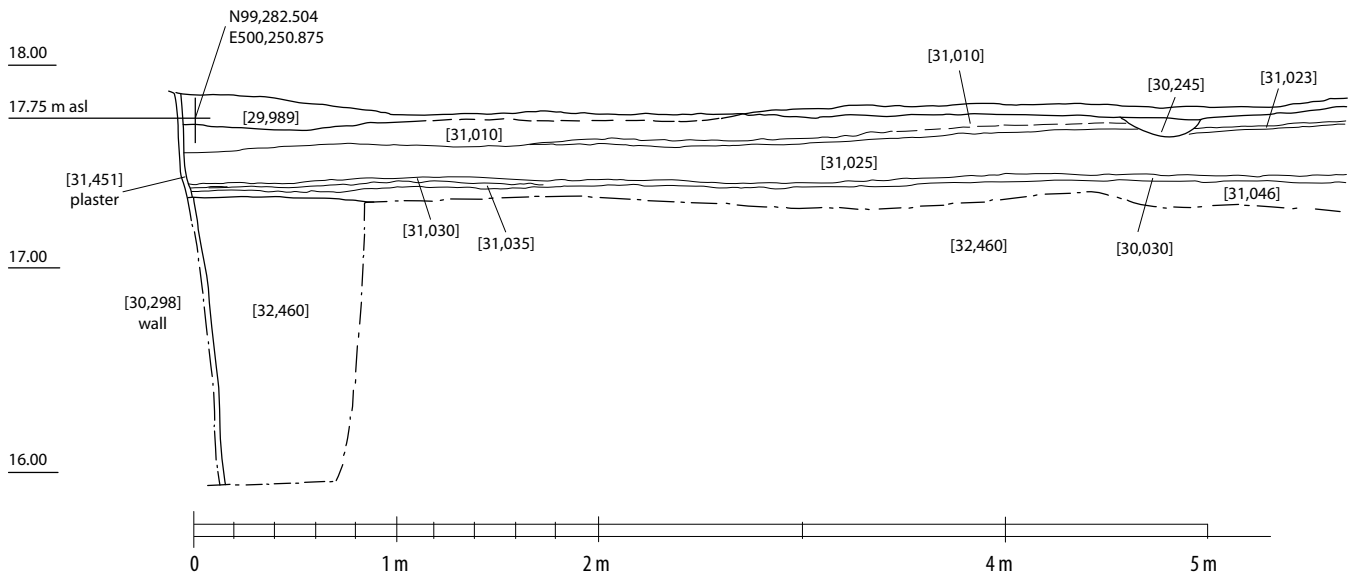


Figure 8.37. Southern end of the east-facing section of Trench E, with the deep probe through the Ramp foundation layer of dumped limestone debris [32,460] to the base of the southern shoulder wall [30,298]. Based on original field drawing by Hanan Mahmoud, digitization by A. Witsell.

with Trench A in Squares Q–R.25, which House excavated through the fill of the Cut [30,028] (fig. 8.30; foldouts 4, 5). The original purpose in 2008 was to use these trenches for a stratigraphic link between the III.VT, by way of its Antetown and Vestibule 2, across the Ramp, the Cut, and to the remains of the Fieldstone Houses on the northern side of the Cut. Fairman and House excavated for the full two-meter width of the trench two pavements of the roadbed, with a combined thickness of 13 cm. They exposed the top of a third pavement with narrow, shallow channels running down the slope of the surface (GOP4: 22–24, fig. 15).

At the end of the 2009 season Hanan Mahmoud took charge of excavating Trench E, March 16–30. She deepened the western one-meter side of Trench E to obtain a continuous east-facing section on line with that of Trench A through the fill of the great Cut [30,028]. She also took the excavations through the remains of the northern shoulder wall of the Ramp, resulting in a trench that spanned nearly the full 11.80 m width of the Ramp (figs. 8.24, 8.27; foldouts 4, 5). At the far southern end, Mahmoud excavated a deep probe, 1 m<sup>2</sup>, down the face of the southern shoulder wall of the Ramp (fig. 8.37).

### **Stratigraphic Narrative of Trench E**

Mahmoud first removed a circular scorching mark [31,002] from the northern side of the Ramp in Square Q25. Here

late in the history of the Ramp's use, someone lit a fire on the latest silt surface [31,010] laid over its bed of limestone crush. Farther south, Mahmoud recorded three narrow and shallow channels ([31,013], [30,245], and [30,247]) made for, or caused by, running water, each at a slightly different angle following the slope of the Ramp from west down to east. Fairman and House recorded the two more southerly of these channels in 2008 (GOP4: 22–24, fig. 15).

“After those three contexts were removed, [31,010] was excavated from the south side of the sondage to the ‘later’ retaining wall [30,019], which it abuts” (Liska and Mahmoud 2009). The “retaining wall” is a silty or mud-brick accretion laid against what Mahmoud interpreted as a cut [31,044] into the southern base of northern shoulder wall [32,327] of the Ramp. This accretion [30,019] may have simply been to regularize and straighten the base of the northern shoulder after it had been somewhat eroded.

Mahmoud cut Trench A through the northern shoulder wall. It was formed upon a layer only 2 cm thick of “bright white limestone” [32,329] that may have once extended further south where Mahmoud sees that this thin layer was truncated by the cut [31,044] for building the accretion [30,019]. On the north the great Cut [31,008] truncated this thin layer along with the whole thickness of the northern side of the Ramp. Mahmoud and Kate Liska cited evidence that this crushed limestone layer may have

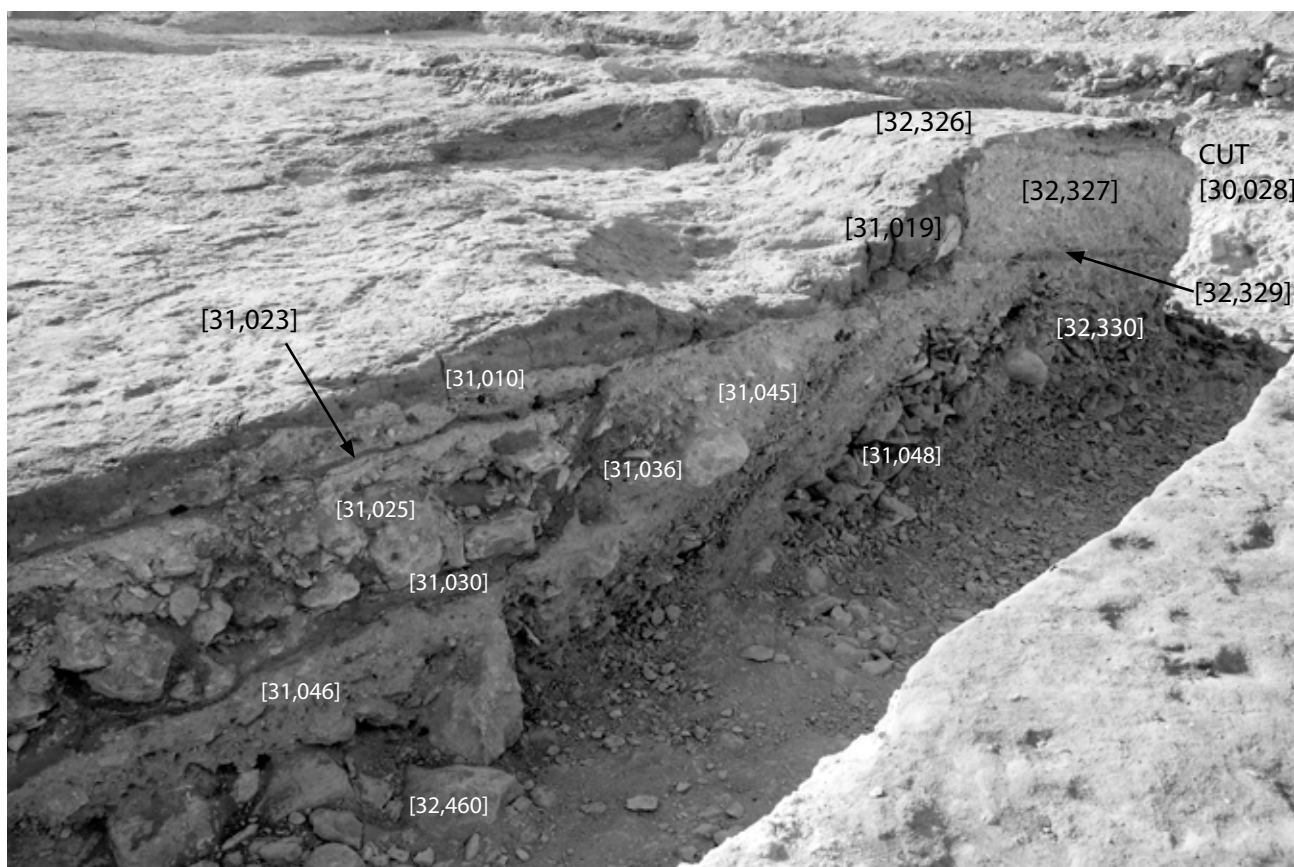


Figure 8.38. Northern end of the east-facing section of Trench E, showing the earlier northern shoulder of the Ramp ([31,036] + [31,045]). View to the northwest. Photo by Mark Lehner.

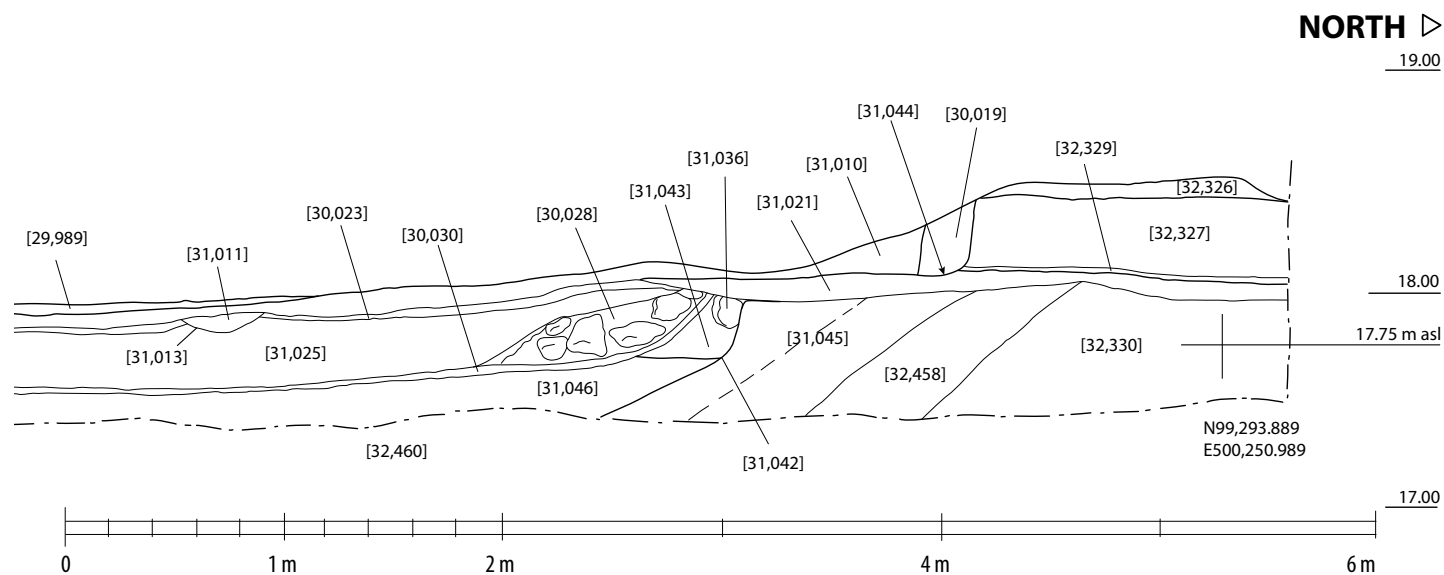


Figure 8.39. Northern end of east-facing section of the west side of Trench E. After original field drawing (2009-145) by Hanan Mahmoud, digitization by A. Witsell.

once continued several meters farther north and that it may have been the crushed limestone surface that sloped up to the west toward the Water Tank 2 (see figs. 8.18, 8.19):

Significantly, on the north side of [30,028], there is a similar bright white limestone floor-like surface [31,434] that appears in the section drawing 2009-79. The northern floor is approximately 17.90 m asl. Because [32,329] slopes downward to the north and because the two floors are only ... meters apart from one another, it is likely that they were once connected. This may be one stratigraphic link between both sides of the Cut [30,028]. But it is also worth mentioning, that a similar white line appears about 20 centimeters higher under the Fieldstone Houses. This line does not appear in the north side of Sondage A and it is not in that section drawing. Instead it starts about 30 centimeters to the east in 101.R25 continuing into 101.R26 and 101.R27. This feature can be seen in the post-photos. (Liska and Mahmoud 2009)

In Trench E, under the thin crushed limestone layer [32,329] Mahmoud excavated another layer of crushed limestone [31,021], which may have been the bedding for the “bright white floor.” This layer [31,021] thinned out to the south over a thin layer of silt [31,023] that runs under the latest silt paving [31,010] mentioned above. In patches where these silty floors ([31,023] and [31,010]) have worn away, a lower bedding of limestone gravel [31,025] shows through.

This floor [31,023] also suffered from an erosion ... by water in 101.P25. This erosion flowed from west to east, downhill (about 30 centimeters wide). It seems that water occasionally ran over part of this road/ramp in small quantities. (Liska and Mahmoud 2009)

The northern edge of the silt paving [31,023] stops at an older northern shoulder wall [31,036] of the Ramp, located about 80 cm south of the later northern shoulder wall [32,327]. Under the thick limestone gravel layer [31,025] another thin surface of silt [31,030] lips up to form the plaster or render on the face of this earlier shoulder wall [31,036]. This surface extends all the way to the southern wall [30,298] of the Ramp. Liska and Mahmoud (2009)

report that “this floor [31,023] was very compact and not denuded in any of the excavated sections.”

The early north shoulder [31,036] is preserved at the latitude of Trench E about 32 cm high. The builders made this low wall against a series of limestone gravel dumps ([31,045], [32,458], and [32,330]), which show “tip-lines”—inclinations—down to the south, indicating people dumped the material from the north. After raising the roadbed for the Ramp and a linear hump along the northern side, they cut [31,042], the corner for the base of the shoulder wall and top of the roadbed. Then they filled out the cut with finer crushed limestone in a silty sand matrix [31,043] and built out the base of the shoulder wall with limestone pieces [31,036] to just where they wanted it. Finally, the builders plastered the surface of the roadbed and the face of the wall with a thin layer of Nile silt [31,030].

Later, just before builders raised the roadbed by laying down the layer of limestone gravel [31,025], they deposited large limestone pieces [31,028] against the rendered face [31,030] of the older shoulder wall.

The crushed limestone roadbed [31,046] and the silt paving [31,030] extends south to abut the southern shoulder [30,298] of the Ramp. Starting about 1.10 m north of the southern shoulder wall, Mahmoud picked up a thin marl plaster floor [31,035] immediately under [31,030].

Under the roadbed [31,046] “is a large layer of unsorted limestone [32,460]. This limestone was so soft that it had the consistency of marl. It may have acted as the original, very large make up layer for the ramp/road” (Liska and Mahmoud 2009).

At the southern end of Trench E, Mahmoud excavated a deep probe into the thick marl limestone debris foundation of the Ramp against the face of the southern shoulder wall. Her deeper excavation extended 1 m from the face of the wall for the one-meter width of the western side of Trench E. The wall is founded about 1.80 from the highest surface of the roadbed, at elevation 15.99 m asl. The material up against the wall was coarse marl limestone debris with large limestone fragments [32,460]. The marl plaster [31,451] on the face of the wall [30,298] stops just where the silt [31,030] and marl floors [31,035] and crushed limestone bedding [31,046] abut the wall, suggesting that these formed the first and oldest surfaces of the Ramp.

## Postscript: The Cut, the Climate, and the Occupation

We do not know exactly when the Cut [30,028] was made. It must have been late in the occupation sequence, in fact, during the 6<sup>th</sup> Dynasty, on the basis of the provisional dating of the pottery in the upper deposits that filled the Cut (Trench A): the settlement debris [30,925], the sand that

covered it [29,994], and the limestone gravel [30,246] that people dumped into the Cut apparently to purposefully fill the breach through the site that it created (figs. 8.29, 8.30).

Nor are we certain whether people or natural forces created the Cut. Among natural forces that might have

made the Cut, perhaps the only candidate is flowing water. This possibility returns us to George Reisner's finding the results of a violent wadi flash flood in the GIII.VT one hundred years before us. Water breached the back western wall of the Valley Temple, cut a deep gully through the rear chambers and carried pottery, copper vessels, and fragments of stone statues to where it pooled in the court, damaging the small mudbrick bins, grain silos, and other domestic chambers that people—probably those attendant to and dependent on the largess of Menkaure's cult—had already begun to build inside the temple within the 5<sup>th</sup> Dynasty (Reisner 1931: 44–45).

People later rebuilt the temple, probably in the 6<sup>th</sup> Dynasty on the basis of a decree issued in the name of the last king of that dynasty, Pepi II, dated most likely to the sixty-second year of his long reign, renewing the exemption of the people in the temple community from taxes. In its second phase, the GIII.VT was basically a walled village fronting a memorial sanctuary for Menkaure at the back, with its western and northern sides reinforced with thick fieldstone walls, apparently to withstand any more wadi floods.

Reisner believed the flash flood that cut the temple flowed down along the northern side of the GIII causeway before it breached the western side of the Valley Temple. He could, a hundred years ago, see much of what we see today upon the plateau in the topography between the GIII.VT and the GIII Menkaure Pyramid:

The Mycerinus Valley Temple was in a fatal situation standing free on a low gravel bank on the edge of the desert, at the northern side of the mouth of a wide wady and deflecting with its causeway the branch channel which drains the limestone plateau west of the Second Pyramid. As long as the causeway and corridor stood, all rain water discharged by the branch channel flowed down the northern side of the causeway to the back of the valley temple. There its only outlet, aside from an inadequate drain under the causeway corridor, was around the northern face of the temple. (1931: 44)

Reisner could not see what Selim Hassan excavated some 22 to 26 years later along the northern side of the Valley Temple, nor could he see the Old Kingdom features further north and east. Today, we unfortunately cannot see the deposits that Hassan's excavations removed from these areas, and we have little record of these deposits, but we do see the surfaces that Hassan's excavation exposed. In *GOP4* we pointed out that the Cut "begins on its upper west end about on line with, maybe slightly north of, the path that Reisner projected for the damaging water" (see *GOP4*: 31).

Now, after our 2009 season, we find that a road runs west along the northern side of the GIII.VT. About 1.50 m beyond the backside of the Podium, the roadbed steps up from the Ramp surface by 7 to 8 cm to a slightly higher surface that is less rendered or paved. The Drain opens at the farthest western extension of the slightly lower alluvial silt paving of the roadbed of the Ramp. The Drain extends under the massive Partition Embankment, which is 4.30 m wide and stands 1.17 to 1.37 m above the top of the roadway.

While the roadbed, as far as we have exposed it, slopes slightly down from west to east, it does not show signs of flowing water—no obvious runnels, cuts, or channels leading to the mouth of the Drain. Nor do we see channels or cuts extending further east along this line down the slope of the latest roadbed of the Ramp. (An erosion cut and channel exists to the north, on line with the Partition Embankment—see below). Had water flowed along this route and over this surface with any force, we might expect it would have removed completely the low mudbrick Podium (figs. 8.1, 8.17; foldout 5).

Instead, what we find is that the Cut [30,028] proper begins as a fairly narrow but very deep slice through Levels 1 and 2 at the far southern end of the eastern side of Water Tank 2 (foldout 5). The same water flow that made this dramatic Cut may have created the shallow channel with gently sloping sides on top of the Partition Embankment.

However, if this is true, why did the water flow over the top of the Partition Embankment, and not down along the roadbed, immediately to the south and more than a meter lower? Perhaps the answer is that when the water began to flow, windblown sand and debris had already filled the 4.20 m width of the lower roadbed between the Partition Embankment and the mudbrick casing on the northern wall of the GIII.VT. This might also explain why erosion, probably from flowing water, created the sharper break in slope, between the top of the Partition Embankment and the Ramp roadbed, and the runnel in the same direction and alignment lower on the latest Ramp surface.

Reisner anticipated the effects of such sand fill as we propose immediately north of the valley temple:

Any deposit of sand or debris north of the temple was bound to increase the accumulation of water in the angle between the causeway and the temple, while the flow of water around the temple hastened the decay of the exterior wall and the deposit of mud debris. (1931: 44)

If sand and debris blocked the road north of the valley temple, any flash flooding would have put stream pressure on the back of the GIII.VT, and, evidently, forced the water to bifurcate, with a second powerful stream diverting to the north, flowing around or past this corner and to

the east, creating the channel in the higher surface of the Partition Embankment.

If the road between the valley temple and Partition Embankment was sanded up, and if subsequently wadi flooding, like that Reisner documented in the archaeological record inside the valley temple, created the channel and the Cut, why did this flow not damage more of Level 2 at the southern side of Water Tank 2?

The answer to this question may have lain embedded in the deposits that filled Water Tank 2, which Selim Hassan's workers removed. It is possible that at the time of the Cut, sand had completely filled Water Tank 2 to some point between Levels 1 and 2. Either the natural flow of the water, or people, created the shallow channel on top of the Partition Embankment to direct the water to the upper, southern edge of the tank, which, if filled with sand, may have been more of a sloping depression, rather than the steep-sided and terraced basin that we now see. Perhaps the surface of the sand or debris filling Water Tank 2 carried the water to the far southern end of the eastern side of Level 1. Perhaps water episodically flowed through the channel in the top of the Partition Embankment and into Water Tank 2 (over any sediments that may or may not have filled the tank) up to Level 2, until it was let out through the breach near the southeastern corner. Occasionally water also flowed down the eastern slope of the Partition Embankment, eroding its face and carving the little gully into the surface of the Ramp.

Why is the Cut so severe immediately at the southeast corner of Water Tank 2 and why does it become so drastically wide and deep beyond to the east?

It is hard to believe that natural forces made the deep, narrow breach in the southern end of the eastern side of Levels 1 to 2. The channel on the Partition Embankment suggests water did not flow with much down-cutting force there, and even if water had backed up in the catchment of the Water Tank—over whatever fill it may have contained—it would not have produced localized pressure to force such a breach. So it is perhaps most likely that people made this cut, in action and with tools probably similar to those our workers used when they cleared the secondary gravel fill from this breach (figs. 8.22, 8.23). Did occupants, late in the history of the site, make this breach to let out water that had accumulated in Water Tank 2?

We have to ask this because beyond the breach through the upper, eastern edge of Water Tank 2 several major attributes of the Cut compel us to think that running water was an active agent. The irregular boundaries appear natural, not anthropogenic; the outward curves of the northern edge suggest oxbows or bends of stream formation; the irregular edge where the Cut took out the northern shoulder ramp is a mindless line of natural force; the undercutting on both the northern and south-

ern sides also suggest flowing water, and not the outward angle of slope, or straight-edge, we would expect from people's intentional top-down excavation and trimming. It is also hard to suppose that people would so mindlessly cut right through the walls of the Fieldstone House structures. (Even if running water made the Cut, we have to wonder if material, perhaps from the collapse of the walls, already filled the rooms between the extruded walls.)

One salient fact that suggests people made the Cut is the fact that it comes to the western face of the κκτ Western Enclosure Wall without undercutting that wall, and then turns roughly 90° to run south, truncating the lower end of the Ramp. But even here we have to ask: If people made the Cut (to channel episodic wadi flooding?), why bring the canyon all the way to the κκτ Enclosure Wall? And why truncate the Ramp with the turn to the south? Why not instead trench along the Ramp, conducting the canyon downslope eastward between the Ramp and the southern face of the κκτ Enclosure Wall?

Another fact that might suggest people made the Cut is the extreme depth indicated in Trench D. It is hard to imagine natural forces eroding a conduit so deep. On the other hand, Reisner found that his "gully" through the middle of the valley temple cut "down through more than a meter of sand and debris that had accumulated against the exterior faces of the western and northern walls and down through the western walls to the foundation" (1931: 44–45).

The location, form, and direction of the Cut do not make much sense on the hypothesis that this was a quarry for limestone rubble for building, landscaping, or general fill elsewhere.

Our best suggestion is that the great, irregular, canyon-like Cut was formed from a combination of people and natural forces—water flow. In this scenario, people did make the breach near the southeastern corner of Water Tank 2, perhaps to let out water, and maybe began a conduit for the water to the east, down along the northern base of the Ramp. But then, over time, repeated episodes of flowing water, perhaps from wadi flash flooding, cut away the sides of the channel, and undercut the sides, in an irregular fashion. After such episodes, people occupying the desert settlements of the Menkaure and Khentkawes Valley Complexes may have cleared the channel and dug it deeper, and this might suggest a time when the wadi between the Moqattam and Maadi Formation outcrops at Giza was more active, like other wadis in the region.

Again, in the GIII.VT immediately to the south of κκτ-AI, Reisner saw the effects of actions that people took against intermittent wadi flooding:

The effect of the water discharged by the branch channel is well-shown by the device adapted in the second

crude brick temple to protect the building; for a rubble embankment over a meter high was built along the bottom of the northern and western walls of the temple, to protect them against erosion by water. (1931: 44)

It is probable that the major extent of the Cut was made before and during the 6<sup>th</sup> Dynasty, because the layer of settlement collapse [30,295] against its southern side and the two layers of fill above contain 6<sup>th</sup> Dynasty pottery. In mapping the mounded, silty, mudbrick settlement debris [30,295], the hard, crusty surface on its lower slope and edges gave the impression that these surfaces had been wetted and dried, perhaps repeatedly. Also, we have the impression that water might have episodically flowed around this collapsed and mounded silty debris in the deeper channel at the bottom of the greater Cut canyon (see fig. 8.25). Similarly on the northern side of the Cut, the extruded surface of a layer of compact, crushed limestone that may be the bedding for an earlier ramp (see figs. 8.18, 8.19, 8.26) appears to have been compacted and smoothed by water.

At some point, people intentionally filled the canyon of the Cut with the secondary limestone gravel [30,246]. Where we excavated part of this very extensive deposit in Trench A, it also contained pottery of the very late Old Kingdom, 6<sup>th</sup> Dynasty. People carried out this extensive infilling after some minor water flow through the base of the Cut and around the mound of collapsed settlement material [30,295], as indicated by the fluvial sand that covered it (lower part of layer [29,994]; see figs. 8.25, 8.26, 8.29), and after a period during which wind blew in more sand (upper part of layer [29,994]). Perhaps these layers represent a period during which conditions in the wadi stabilized; that is, a period of sufficient length that the occupants no longer had much concern with flash flooding from the west. These sandy deposits—first fluvial and later aeolian—may correspond to a time when people abandoned the settlement. Later, people filled the great breach through their site by dumping in the “secondary” limestone gravel [30,246], which is so distinct from the primary limestone debris that the initial builders (some three centuries earlier) used to landscape and terrace the interface between the KKT and the GIII.VT.

In broad strokes, this scenario of the origin and formation of the Cut within the deposition and occupation history of KKT-AI fits with the history and sequence Reisner deduced from his excavation of the GIII.VT. We will have to assess this reconstruction in light of evidence we have from our excavation of House E in KKT-N (see Yeomans and Mahmoud, Chapter 7, this volume), and with evidence from our detailed survey and mapping elsewhere in KKT-N, that people may have abandoned the KKT for some

time, and then returned to rebuild many of its walls. With the return, they seem to have wanted to repair the Cut.

On a larger scale, this reconstruction also fits with increasing evidence of a major climate shift at the end of the African Humid Period within the time-frame of the Old Kingdom, a climate shift perhaps more gradual and later in the north than heretofore thought (Kröpelin et al. 2008)—perhaps as late as the transition between the 4<sup>th</sup> Dynasty and later Old Kingdom.

The processes, both human and natural, that created the great Cut in KKT-AI may relate to processes that down-cut the 4<sup>th</sup> Dynasty HeG silty settlement site. These processes came with the transition from wetter conditions at the end of the African Humid Period (also known as the Saharan Wet Period), with relatively more rain, to drier conditions with increased movement of sand and its deposition in catchments. Once the transition from humid to arid was complete in the highlands flanking the Nile Valley, desert conditions stabilized.

From her work the length of Egypt and up into the Sudan, Judith Bunbury notes the climate transition specifically in desert wadis:

During the Saharan Wet Period, grasses, shrubs, and other plant life stabilized the wadis by holding and absorbing the rainwater in the soil. When the rain belt began to move south, hinterland vegetation collapsed, and the now more intermittent rains destabilized the denuded wadi sands, washing them into the floodplain. (2009: 54)

Recently, Duffton and Branton, students of Judith Bunbury, summarized her understanding of the changes in wadi behavior concomitant with climate shift in early Egypt:

When the climate was warmer, all of Egypt was greener with scrub in the wadis sustained by seasonal rains, something like the environment in the present-day Eastern Desert. However as the climate cools, the rains fail and the tropical vegetation dies. While the occasional rains can support the less significant sahel vegetation, the wadi floors become less stable at times of rainfall resulting in wadi wash-out, where the wadi moves as a slurry of stones and water carrying away buildings or other occupations . . . . Eventually, with continued cooling, rainfall ceases altogether and the wadis re-stabilise but with no vegetation, forming desert conditions as in the Sahara today. (2010: 36)

It was the phase transition—the change between two stable states—that produced the cutting edge, literally, in the case of this great Cut, which was created perhaps



during the same time as the same conditions were cutting down the ruins of the abandoned HeG settlement.

The great Cut [30,028] may reflect the unstable conditions in the wadi between the Moqattam and Maadi Formations at Giza, conditions that the pyramid builders may have exacerbated by cutting back both formations for obtaining building stone and limestone debris for ramps and embankments. The evidence shows that people who occupied the site struggled with these conditions within the Old Kingdom, but sometime after the 4<sup>th</sup> Dynasty.

Given the monumental scale of the Ramp and Water Tank 2 between the Khentkawes Town and the Menkaure

Valley Temple settlement, this interface between communities attached to the two last royal complexes at Giza may have become the principle post-4<sup>th</sup> Dynasty conduit up into the necropolis, and this may be why these people lived so long in these communities, staying, or possibly reoccupying, after the royal house under Pepi II renewed their exemptions. Our further investigation promises to shed more light on the history of their occupation, and also on the timing of major climate shifts in the Third Millennium BC, and the local effects on the ground of those shifts for people in communities at Giza.

## Excavations: the Heit el-Ghurab Site





## 9. Excavation in the Northwest Territory: *Terra Incognita* of the HeG Site

Mark Lehner

When we started planning for the 2009 field season in May 2008, the site was in crisis from a high water table, which had risen so dramatically since 2005 that the Heit el-Ghurab (HeG) had become a land of lakes and ponds (Wetterstrom and Tavares 2008). The site was completely saturated and dotted with ponds when I left in late June at the end of a very long 2008 season.

When I returned in October 2008, the site was dry, thanks to the continuously-operating pumps installed by the Cairo University team of Dr. Hafiz Abd el-Azim Ahmed, from the Engineering Center for Archaeology and Environment, and Dr. Reda M. el-Damak, from the Center of Studies and Designs for Water Projects (Lehner 2008). Their crew had placed three pumps east of the Sphinx and Khafre Valley Temple, and two more east of KKT. They planned four more pumps, all in the HeG site, three to the south and one to the north, which we welcomed. From the Sphinx and KKT areas alone these pumps were removing 800 m<sup>3</sup> per day to keep the water table down (Hafiz Abd el-Azim Ahmed, personal communication 2008).

With the groundwater back down to earlier levels, we were able to include in the 2009 season an area in SFW (Soccer Field West) that had been waterlogged. We also continued with our plans to work in the high, dry Western Compound. Thus we spread our forces over two distinct excavation zones:

1. The Western Compound and Chute just south of the Wall of the Crow and outside the Enclosure Wall to the west (fig. 9.1)
2. House Unit 1, possibly the residence and work place of an administrator, in Area SFW (west of the soccer field) much farther to the south in the Western Town

### The Eastern and Western Compounds

Although the main site to the east had dried before our 2009 season, we stuck to our goal to finally explore what lay inside the gate to the site because up to this time the expansive area just inside the tunnel-like gate through the Wall of the Crow had remained *terra incognita*. Thick fieldstone walls that show through the surface of a blanket of gritty sand define two broad enclosures, which we named the Eastern and Western Compounds. These are separated from each other by the even thicker Enclosure Wall (fig.

9.2). The surfaces within these compounds are higher than the general surface of the ruins of the Gallery Complex, Eastern Town, and Western Town to the east and south.

At the northern end of the Eastern Compound we see the ends of thick fieldstone walls running a short distance south before we lose them in the gritty sand cover. They appear to partition the Eastern Compound into four long, north-south zones 11.2 to 12.0 m wide. North Street Gate House (NSGH), a kind of guardhouse at the entrance of North Street between Gallery Sets I and II, occupies part of the Eastern Compound. In 1991 and 2001 we excavated small chambers, hearths, and the remains of a bakery in the northern part of the westernmost strip of the Eastern Compound (Sharman 2003).

In 2001, our surface clearing also revealed ambiguous patterns of fieldstone walls in the northern end of the Western Compound. In the southern triangular end of the Western Compound, two thick fieldstone walls showed flush with the sand surface, running east-west between the Enclosure Wall and a corridor that we call “the Chute” (fig. 9.2). Thinner fieldstone walls form small chambers off the southern side of the northern of these two walls.

### Big Blank Spaces: A Veil of Sand and Skeletons

Even with these structures mapped, the interiors of the Eastern and Western Compounds remained mostly blank on our site map because a thick blanket of gritty sand, deposited in ancient times and very crusty at the top (as though it had been wet and then dried repeatedly), veils whatever lies at the level of the ruins of the mudbrick and fieldstone walls of the Gallery Complex to the east, and at the general level of the Eastern Town and the Western Town to the south (fig. 9.1). We mapped the walls of those areas by simply removing a soft sandy overburden, much of it turned over in modern times. But the gritty sand in the Eastern and Western Compounds appeared to be undisturbed since ancient times, punctuated by numerous burials dating some 2,000 years after the 4<sup>th</sup> Dynasty. So we left it intact.

We saw this thick blanket of gritty sand in the southern end of the Deep Trench up against the southern side of the Wall of the Crow, which Augusta McMahon excavated in 1991 in the trapezoidal space between the Eastern and Western Compounds (Lehner 1993: 58–60). When Paul Sharman (2003) extended the Deep Trench in 2001,

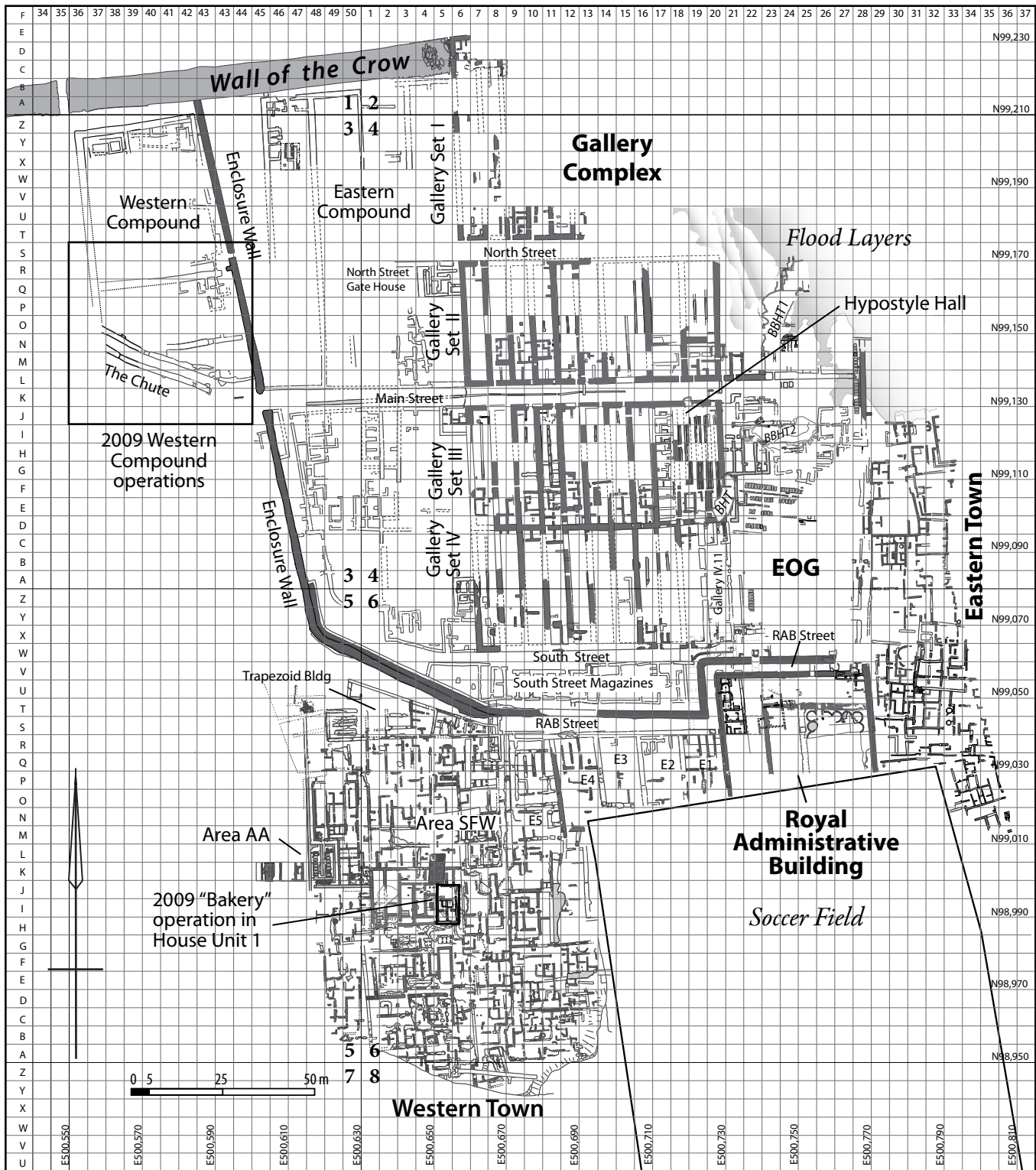


Figure 9.1. The map of the HeG (Heit el-Ghurab, Arabic for the “Wall of the Crow”) site. Prepared by Peggy Sanders (Archaeological Graphics Service) and Wilma Wetterstrom.

he found gritty sand accumulated against the southern slope of a massive deposit of limestone chips, left against the Wall of the Crow by masons as they dressed its southern side. The gritty sand built up the floor surface for a thickness of 1.40 m, until it raised the surface flush with

the thick bank of masons’ debris (Lehner 2001; Lehner and Tavares 2010: 176–78).

The base of the stone Wall of the Crow exposed in the Deep Trench lies around 15.55 m asl, slightly lower than the lowest floors of the Galleries (around 15.57 m asl).

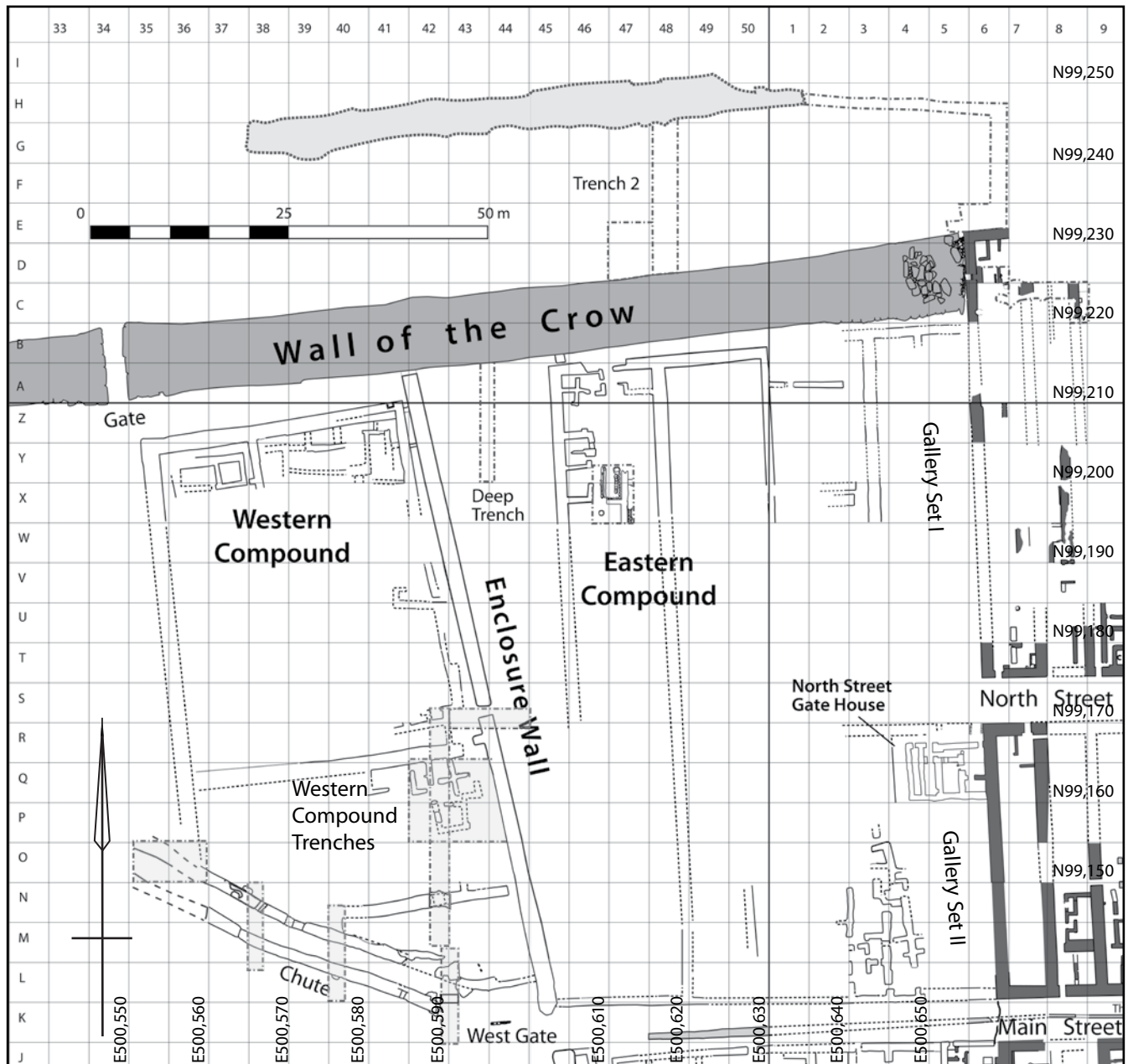


Figure 9.2. Map of the northwest sector of the HeG site showing the area of the 2009 Western Compound operations. The 2009 trenches are shown in light gray. Prepared by Peggy Sanders (Archaeological Graphics Service) and Wilma Wetterstrom.

However, we know from other trenches that the builders made the Wall of the Crow later than the Gallery Complex. To make the foundation trench for the stone wall, they cut through a marl paved floor [3208] at elevation 15.80 asl, which might be in phase with the Gallery Complex. The floor level in the Eastern Compound, either before or after the Wall of the Crow was built, must lie in the range of a meter and a half lower than the top of the thick blanket of gritty sand, and as much as 2.50 m lower than the surface of the crusty sand in the Western Compound.

The layer of gritty sand over the original ground level of the Western Compound must be even thicker than that over the Eastern Compound. The surface steps up from 1

to 1.50 m (from around 17 m asl to 18.50 m asl) along the line of the Enclosure Wall ruins, which appear as a white spine of compact fieldstone running south-southeast between the Eastern and Western Compounds. This stepping up suggests that while standing, the Enclosure Wall acted as a barrier against the windblown gritty sand. At the same time, there is probably an underlying natural slope up to the west toward the *Gebel el-Qibli*, possibly augmented by stone debris that workers dumped in the 4<sup>th</sup> Dynasty.

The path emerging from the southern side of the Great Gate in the Wall of the Crow is yet higher than the general level inside the Western Compound. The fieldstone

walls forming the northwestern corner of the Western Compound are founded much lower than the top of the debris banked against the southern side of the Wall of the Crow, and these walls appear to have been built against a cut into that debris. The path is simply worn into the surface of the banked quarry and masonry debris, which consists of limestone chips and granite dust, sloping from a level about 19.20 m asl south of the gate down to a prepared compact surface at 16.30 m asl out north of the gate (Lehner and Tavares 2010: 181). To the south, this path must have been elevated above the original floor or ground level within the Western Compound.

### The Puzzling Chute

The Chute, a corridor defined by two parallel fieldstone walls, forms the southern boundary of the Western Compound and stops 12 m short of West Gate. The only known entrance in the Enclosure Wall, West Gate is at the far western end of the east-west thoroughfare we call Main Street. The Chute runs northwest and disappears at the limit of our clearing. Since 2001, when we found and mapped the Chute, we have drawn a dashed line on the site map from the western end of the Chute to the gate in the Wall of the Crow, thinking the Chute could have framed the continuation of the principle path from the gate into the site.

In 2009 we set out to excavate the Chute in order to learn more about its date and purpose. We also needed to answer the question of whether the Chute does indeed turn north to feed into the beaten, sloping path through the gate in the Wall of the Crow.

### Hypotheses of Animal Control

The Chute reminded us of modern cattle chutes, the narrow passageways through which animals are driven. This similarity, and the fact that the passage between the walls

is so constricted and then simply stops at an open area 12 m before West Gate, lead to the hypothesis that those in charge of the settlement used it to control and perhaps count the animals brought to the site, and possibly even to funnel them into the open area for slaughter. In the following article, Richard Redding (fig. 9.3) expands on this hypothesis.



Above: Figure 9.3. Richard Redding checks fragments of ancient animal bone against his reference collection. He finds high numbers of cattle, sheep, and goat across the HeG site. Photo by Mark Lehner.

Right: Figure 9.4. Sheep graze on the dried flats of a desert-edge lake near the pyramids of the 4<sup>th</sup> Dynasty pharaoh Sneferu, at Dahshur. Herds must have similarly grazed close to the HeG site. Photo by Mark Lehner.







Figure 9.5. Cattle delivered from the villages and estates of the Old Kingdom nobleman Ptah-hotep, in a scene from his tomb at Saqqara. Photo by Mark Lehner.

When we excavate, we meticulously collect every scrap of animal bone. By wet-sieving the dirt, we retrieve even the micro-faunal evidence, the tiny bones of fish and birds. Redding, AERA/GPMP faunal analyst, sees patterns of animal consumption in the bone distribution at HeG that correlate with different areas of the site: high frequencies of prime, meat-bearing cattle bone near the large houses in the Western Town; ratios favoring pig, generally regarded as a village animal (Redding 1991), in the Eastern Town; and a preponderance of goat bone in the Galleries (Redding 2009).

Redding reports here that the HeG site yields significantly large numbers of cattle, sheep, and goat bones, with high ratios of cattle to sheep and goat, and high numbers of young, male cattle. These results suggest that the state authority, the royal house, culled their herds to provision the HeG site with these animals, which must have been delivered on the hoof (figs. 9.4, 9.5). Redding lays out the evidence that significant numbers of animals must have been delivered and butchered on or near this site. Where were these animals penned and butchered?

Based on the idea that the Western and Eastern Compounds were in fact largely empty at the ground level of the Gallery Complex during the time that people occupied the Galleries, we question whether these served as holding areas for animals. Did the authorities assign the long partitioned zones in the Eastern Compound as storage and production units for certain groups occupying the Galleries (say, the four or five labor units called *zaa-phyle* in Greek—operative in the 4<sup>th</sup> Dynasty [Lehner 2004a; Roth 1991])?

The Western Compound lies just inside the gate in the Wall of the Crow, which might make it a fitting location for holding animals on the hoof after people delivered them from the prepared terrace we found north of the wall (GOP1: 51–52), then herded them up the 3-meter rise through the Great Gate, 2.6 m (5 cubits) wide—about the same width as the Chute—and into the settlement. The curious thing is that the path coming from the southern side of the gate is open, as far as we know, over the compact slope of quarry or masonry debris. If the path does lead to the Chute, why would animals—or people—need to be forced again into a corridor 5 cubits wide? And why does this corridor end in an open space 10 to 15 m west of the gate that feeds into Main Street?

Was the purpose of the Chute to control and count animals before delivering them to holding areas? Or was it a chute as in an *abattoir*, a slaughterhouse, for singling out animals to be slaughtered near West Gate? Did the HeG inhabitants butcher animals outside of West Gate, or inside the two large Eastern and Western Compounds to the north?

We can test these hypotheses against what we find both in terms of material culture and architecture on the site. Objects such as flint knives and tethering stones would go far toward supporting a picture of animal-holding and butchering in a given space, but so would the tiny flint flakes from sharpening butcher knives, or ratios of plant remains expected from animal dung, or even preserved bits of dung such as we have recovered from other parts of the site.

From outside West Gate, people could have delivered meat along the outside of the Enclosure Wall and into RAB Street, which opens like a funnel. There they may have picked up supplies on their way to the “Royal Administrative Building” (RAB) or to the broad series of enclosures (E1–5) west of the RAB, or south into the Western Town (Lehner and Tavares 2010: 213–14). At the northwestern corner of the Western Town, where RAB Street opens up, an open court at the western end of the Trapezoid Building could have been a smaller holding area for live animals. Or, people could have taken meat or small animals through West Gate into the Gallery Complex by going straight down Main Street, or, with a sharp right turn, by proceeding along the inside of the Enclosure Wall and into South Street and the South Street Magazines.

Our focus in the far northwest territory of the HeG site had us thinking about animals, animal delivery, control, and processing, which must have been, given the evidence of the animal bone from across the site, major activities contributing to the sounds, smells, and waste accumula-

tion of the daily life in this city of the pyramids. Redding discusses further the implications of the evidence of meat consumption on the HeG site that he has found over many seasons.

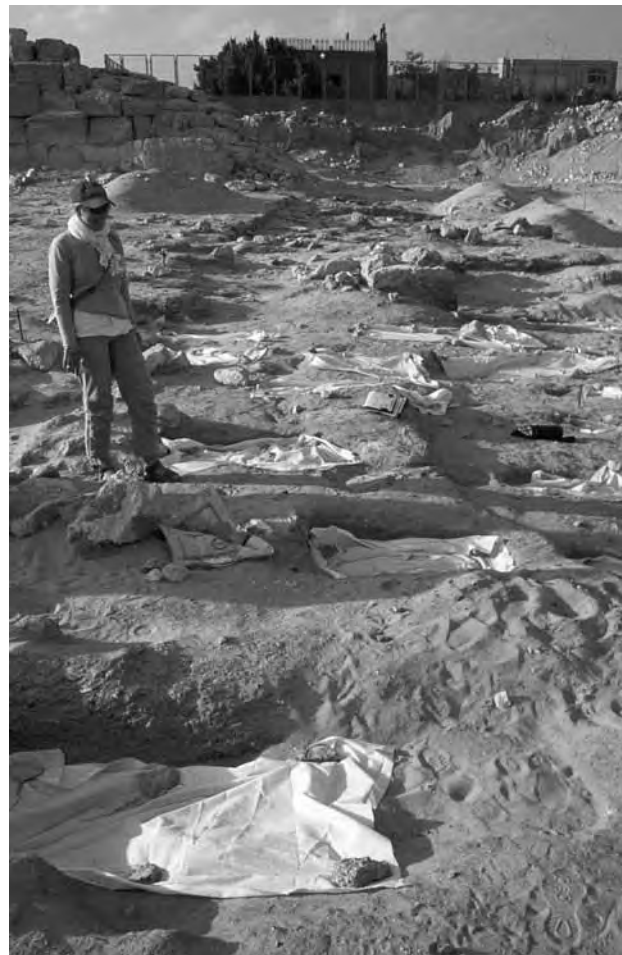
Additional questions included: Did people store water in the compounds, like the water storage areas known from the entrance to the Workmen’s Village at the New Kingdom capital of Amarna dating 1,200 years later (Hulin 1984)? Or did the Western Compound simply contain an expansion of the food production facilities, especially bakeries, so well attested to the east in a late phase of occupation?

### Northwest HeG as a Burial Ground

Prior to the 2009 season, we knew very well that before we could find answers to our questions by excavating Old Kingdom living floors and occupation deposits, we would first have to deal with human burials from later periods. Thousands of burials punctuate the gritty sand layer. Dug 2,000 years after anyone walked on those lowest lying floors, the graves make up a cemetery dating from the Late



Left: Figure 9.6. Workers clear our protective sand cover to map burials in a range of 5-meter grid squares in 2005. Fieldstone walls make the northwest corner of the Eastern Compound in lower right of view. View to the south. Photo by Mark Lehner.



Right: Figure 9.7. Jessica Kaiser looks over burials covered with protective fabric. View to the north. Photo by Mark Lehner.

Period (712–332 BC) into Roman times and maybe later. The dead lay between us and the 4<sup>th</sup> Dynasty living floors. Jessica Kaiser and the osteological team had already excavated close to 400 burials, mostly from the northwestern area of the HeG site. The excavated burials are themselves an important archaeological achievement, a corpus of human remains from 2.5 millennia ago, systematically excavated with identified pathologies, that draws the attention of medical researchers and anthropologists.

In 2005 Kaiser cleared our own protective sand cover from four of the 5-meter ranges—north-south rows of grid squares—in the Eastern Compound in order to map the burial “cuts” (upper edges of the graves) and get an estimate of the total number of the burials in this place (figs. 9.6, 9.7, color plate 7a). When her team excavated burials from grid squares in this zone, they found on average seven times more burials than what showed at the surface. Kaiser estimates that the area north of Main Street in the Eastern and Western Compounds contains as many as 5,670 burials (Kaiser 2006: 77–79; Kaiser and Westlin 2005).

### Goals of the 2009 Season

With our hypotheses and an awareness of the challenges this part of the site presents, we entered our 2009 season of fieldwork with these general goals:

- Establish the chronology, phasing, and function of the Western Compound
- Find the path of “the Chute,” a corridor of fieldstone walls curving northwest from an alignment with West Gate at the western end of Main Street

We entrusted the excavations in the Western Compound to Advanced Field School supervisors Freya Sadarangani, James Taylor, Essam Mohamed Shehab, and Rabea Eissa Mohamed and to their students who were concentrating on advanced excavation techniques.

### Western Compound Transect 2009

In order to get information about the layout of the Western Compound, as well as information about the depth of deposit and layers in this area, we cleared down to the Old Kingdom floor levels along a transect, a line of excavation squares or trenches 2.5 m wide in the shape of an upside-down “L”.

The Western Compound transect began on the north in our (5 × 5 m) Square 3.S42 where we saw a break through the Enclosure Wall (fig. 9.2). Because this break roughly aligns with North Street, 60 m to the east between Gallery Sets I and II, we thought the opening in the wall might be a gate. We thought it possible that North Street continues west, bounded by fieldstone walls, through the Eastern Compound and to this opening in the same way

that Main Street continues west to West Gate. The east-west part of the transect crossed the Enclosure Wall, and took in the step up (from elevation 17.03 to 18.55 m asl) into the Western Compound. The transect turned south to run through the 42 range, north-south grid squares 3.M42 through 3.R42. This leg of the transect crossed two thick fieldstone walls that run east-west across the southern end of the Western Compound and ended on the south at the eastern end of the Chute in Square 3.L42. We hoped this transect would give us a stratigraphic section across all these Old Kingdom structures.

The team under Ashraf Abd el-Aziz excavated two trenches across the axis of the Chute and one immediately east of where the Chute terminates (fig. 9.2). Toward the end of the season they excavated broader exposures in squares as far west as we were able to clear the heavy overburden, close onto the wall around the modern Coptic cemetery.

Unfortunately for testing our hypotheses, we excavated more of a Late Period cemetery than an Old Kingdom settlement.

### Late Period Burial Excavations 2009

Although we expected that burials would lie between us and the Old Kingdom, we did not expect that Jessica Kaiser, Scott Haddow, and the Advanced Field School Human Osteology team would have such a busy season. The density of burials, and the fact that many had fragile, delicately painted mud coffins that required careful excavation, consolidation, and lifting, meant that progress was, at times, frustratingly slow. The team excavated a total of 38 burials; 17 in the Western Compound, 19 in the Chute (see below), and 1 in Khentkawes Town (see Kaiser, Chapter 18, this volume). The Egyptian Field School students accrued invaluable experience to help them in the future when as Supreme Council of Antiquities inspectors, they encounter and have to excavate ancient burial grounds that lie in the path of modern development.

We began excavating the underlying Old Kingdom settlement after the osteo team had meticulously removed the 37 burials in the path of our planned transect, although at least 5, and probably more, were left unexcavated.

The area looked like a World War I battle zone, riddled with burial pits instead of foxholes. These pits devastated the eastern side of the Enclosure Wall, and the team was unable to unscramble the material that resulted from the collapse of the upper parts of this wall. Our suspected North Street Gate was simply one of the intrusive holes, 1.70 m north-south × 1.20 m east-west. At this specific place 75 cm remained of the lower part of the Enclosure Wall. Here it was founded on sand with limestone chips.

Jessica Kaiser (Chapter 19) reports on eight dog mummies, which have no known parallels at Giza and trun-

cated a child burial in the excavations that we conducted to find the western continuation of the Chute. In the Late Period people buried thousands of mummified ibis birds, falcons, baboons, cats, cows, bulls, shrews, small reptiles and amphibians, jackals, and dogs at various sites throughout Egypt. Such animal cemeteries are large and numerous at Saqqara, the national cemetery of ancient Egypt, 30 km south of Giza. In the Late Period, Giza was, indeed, an extensive cemetery with elite tombs and temples dedicated to Isis, Osiris, and the Sphinx as a form of Horus (Zivie-Coche 1991), but caches of animal mummies are rare at Giza. Petrie (1907: 29) found tombs full of animal bones, mainly cats, but also three wild dogs and a fox, in the Late Period cemetery in the Southern Field. Selim Hassan (1953a: 43) found ibis burials in the burial chamber of a tomb cut into the rock face of the western side of the Central Field. He found the bones of shrews in pottery jars buried against the back wall of the Amenhotep II Temple near the Sphinx (Hassan 1953b: 40, fig. 29; Zivie-Coche 1991: 292). These are the only other instances of animal burials at Giza. Our discovery, although only a single burial, merits further study.

### Compound Walls and More Bakeries

James Taylor (Chapter 11) reports on the discovery by the 2009 team of a north-south wall, running parallel to the Enclosure Wall, possibly forming a corridor. This wall attached to the eastern end of the northern of the two east-west fieldstone walls crossed by our transect. Just where the north-south wall would connect with the east-west walls in a corner, a large dump of Old Kingdom pottery disturbed by Late Period burials made it unclear whether the two walls do make a roughly 90° corner, or whether the builders left a gap, perhaps a formal entrance, about 2 m wide. At some point people blocked this gap after they had dumped vast quantities of broken pottery.

The gap opened into the southeastern corner of a large space extending 45 m to the north and 34 m to the west, a subdivision of some 1,315 m<sup>2</sup> taking up the northern two-thirds of the Western Compound, enclosed by walls 1.84 m thick.

After the southern wall of this subdivision had stood for a long while, people built thinner fieldstone walls up against it, forming small chambers. We had mapped these walls eight or nine years earlier in 2000–01, when we first exposed the surface of the settlement ruins. Our work this season revealed that these thin walls, which form small, roughly square chambers, have very little depth. They consist only of the bases of walls that people built very late in the occupation of this part of the site, as evidenced by the fact they were founded on a substantial dump of pottery sherds. Dark ash and fragments of bread pots filled

the scant remains of these chambers, which were most likely bakeries. If so, we can add these to the dozens we have located elsewhere across the site.

### Character of the Western Compound Revealed in 2009

At the end of our 2009 probing into the *terra incognita* of the big, open northwest quarter of our site, we are left with a preliminary, general impression. The southeastern corner of the large enclosure in the northern part of the Western Compound contains massive dumps of pottery waste and ash. People built fieldstone walls and chambers *ad hoc* as they dumped, so that some of these structures rest upon already-dumped waste, and such waste also covered the structures.

In this respect, the Western Compound is similar to Area EOG, “East of the Galleries.” EOG was an industrial yard, with unmistakable bakeries on the west and north (see especially, *GOP1*: 16; *GOP2*: 35–37; also *GOP3*: 44–59). Similarly, in past seasons we saw the surface of thick, concentrated ashy dumps of pottery waste embedding undistinguished fieldstone structures in the Eastern Compound, south of the Wall of the Crow and east of the Enclosure Wall. One of those structures was also a bakery that we excavated in 1991 (Lehner 2007: 24–25, fig. 1.15). Now we have found broadly similar deposits in the Western Compound outside the Enclosure Wall. Was the Western Compound basically a compounding, if you will, of the extensive production facilities, especially bread-baking, that surrounded the central Gallery Complex?

The people who lived in the HeG settlement during its later years seem to have turned toward bread-baking on a massive, industrial scale. They organized much of that production in long north-south strips (such as Gallery IV.11 and the Eastern Compound) or broad open enclosures (EOG and the Western Compound). It may be historically significant that the intensification of production, and the signs of its control, occur in the later phase of occupation, not long before people abandoned this site.

### Chute Findings 2009 and Animal Organization

Ashraf Abd el-Aziz, who supervised Noha Hassan Bolbol, Amy McMahan, and May Al-Haik, reports on the 2009 findings at the Chute in this team’s excavation of three trenches across this corridor (Chapter 12). In Trench B, at the eastern end of the Chute, they found material that we can use to directly address our hypotheses about animal control.

Trench B confirmed that the space outside West Gate remained an open area in which a series of trampled surfaces were formed upon layers that contained large quantities of animal bone. Richard Redding’s initial im-

pression is that the bone from an upper compact layer contained cattle and sheep bone. The bone from a lower layer derives mostly from sheep, according to Redding's first impression. These layers might indicate that, indeed, people butchered animals in front of West Gate. However, the walls of the Chute were built over these trampled surfaces. The 2009 results indicate at best that inhabitants of the HeG site might have slaughtered animals in this area.

### Where Goes the Road?

To answer this question we pushed our clearing of the thick, sandy upper layers as close as we could to the modern Coptic Cemetery on the west in order to get on line with the gate in the Wall of the Crow to the north. Abd el-Aziz (Chapter 12, this volume) reports that we found two disturbed humps of stone lying 2.80 to 2.90 m apart, almost the same as the width of the path between the Chute walls. The Chute continues at least this far on its trajectory to the northwest, 8.2 m farther than we had previously mapped. It runs for at least 40 meters from its eastern end. The western side of our extension visually aligns with the center of the gate in the Wall of the Crow. Perhaps this is already too far west-northwest to make a turn toward the Gate. Unfortunately, the end of digging was upon us before we could resolve this question.

### Old Kingdom Burials

Amongst scores of burials dating two millennia after people occupied the HeG site, Kaiser (Chapter 18) reports on one human burial dating to the Old Kingdom, close to the time people lived in the HeG settlement to the east. This burial lay south of the massive east-west limestone wall, under the small chambers belonging to the later phases of Old Kingdom occupation, in Squares 3.P42 and 3.Q43 (see Taylor, Chapter 11, this volume).

Additional human remains underlying the Old Kingdom occupation, visible only in the walls of the much more recent Late Period burial cuts and as of yet unexcavated, suggest that there may be several of these early interments in the area. The deceased interred in these simple burials, which predate the Old Kingdom limestone structures that are possibly bakeries, may have been poor people. At the time of the burials this area was perhaps outside of the main settlement as defined by the Enclosure Wall. When builders expanded the settlement with the Western Compound and its auxiliary structures, they built over earlier graves.

We must add these to eleven other burials of the Old Kingdom that we have found farther to the south and east in the HeG settlement site and which could be outliers to the crowded "Workers' Cemetery" that Dr. Zahi Hawass and the Giza Inspectorate have excavated up the slope

from our site on the eastern face of the Maadi Formation escarpment.

### Old Kingdom Landscaping

As noted above, before our 2009 season we were well aware of the thick layer of undisturbed, crusty sand that came down in premodern times over much of the large, open areas in the corner between the Gallery Complex and Wall of the Crow. The gritty sand layers in the Western Compound are higher than those east of the Enclosure Wall.

As much as the numerous Late Period burials hindered a broader exposure of the Old Kingdom structures, the sections through ancient layers in the sides of the graves gave us valuable historical information, even if we could not get the master section we had hoped for in our transect. We could see in the burial cuts "tip-lines" dipping to the east. We call these tip-lines after the idea that people tipped the baskets holding the material they brought to dump. In so doing, they raised the surface two to three meters higher than the floor level inside the Gallery Complex.

From our 2009 excavations in the Western Compound we learned:

- People began to raise the surface in the northwestern area of the HeG site before they built the Enclosure Wall, which was founded here on sand with limestone chips.
- The opening in the Enclosure Wall on line with North Street is not an entrance or gate, rather a burial that cut through the wall.
- People built the Western Compound after the construction of the Enclosure Wall.
- People, and not natural forces, continued to raise the area west of the Enclosure Wall by dumping sandy material.

### Deep Probe and Ancient Landscaping

Could there have been an older Chute, buried by sand? Abd el-Aziz reports on the evidence from a small probe trench that Noha Hassan Bolbol and May Al-Haik excavated under his supervision to assess this possibility. They sunk this probe 2 m below the base of the Chute walls, just off the northeast corner of the southern wall. The probe descended from elevation 18.32 m asl to 15.11 m, about 40 cm lower than the general floor level at the lower northern ends of the Galleries.

Under the layers containing animal bone, the probe showed layers of sand bedding, then dark silt, more sand, and lower, a thick layer of compact debris composed of fragments of buff-colored desert marl clay (*tafla*) and crushed limestone up to 1.50 m thick. Scattered bits of

charcoal and spots of dark, alluvial mud belie the fact that people dumped this material.

The evidence for ancient landscaping is one of the most important results of our excavations in the northwest territory of the HeG. The dumped layers of desert clay under the eastern end of the Chute and the dumped sand layers under the Western Compound show how drastically people altered the terrain. We now combine this evidence with ancient landscaping evidenced for other parts of the site, near and far from the Chute and Western Compound. Along the northern side of the Wall of the Crow we found a broad, gently sloping terrace formed of dumped limestone debris (*GOR3*: 20–29, 129–31). We now see that a much higher bank of masons' debris up against the southern side of the Wall of the Crow (Lehner and Tavares 2010: 176–78) may be an initial stage of dumping the gritty sand,

such as we now see under the Enclosure Wall and building up the interior of the Western Compound. Far to the southeast, deep pits close to the eastern and northern walls of the Royal Administrative Building (RAB), as well as later “sand-mining” pits within the RAB (Sadarangani 2009: 62–63), show deep, thin strata of clean sand interspersed with darker sand, the result of people dumping (in this case, down from north to south) to build up the surface before constructing the RAB while leaving a depression for a sunken court surrounded by round mud-brick silos, probably for storing grain (Lehner 2002a: 67).

We should not be surprised at the impressive scale of the artificial landscaping in a settlement of Giza pyramid builders, for the pyramids and their quarries themselves represent human intervention on a geological scale.

## 10. Why We Excavate Where We Do: The Western Compound and the Chute

Richard W. Redding

The mantra of news reporters is known as the Five Ws and an H: who, what, when, where, why, and how. As archaeologists, we act as investigative reporters of the past. We seek to answer the same questions—the who, what, when, where, why, and how—about the ancient societies we study. When AERA began research at Giza our initial goal was to answer the “who.” The monuments at Giza stood alone, isolated from their human context, and the result has been a wide range of speculation and mystification among the general public regarding their origin. Our initial hypothesis was that the Old Kingdom residents of Egypt built these tomb complexes. As an initial test of this hypothesis, we sought to find the remains of the settlements the Old Kingdom builders would have occupied. Our discovery of the Heit el-Ghurab settlement (HeG), the Lost City of the Pyramid Builders, presented us with a complex Old Kingdom site administered by the central authority. Excavation promised to yield answers to innumerable questions. We have exposed over eight hectares of the site and mapped the tops of walls (Lehner 2002a, 2007). In several areas we have excavated rooms and areas to answer specific questions or to test specific ideas about these structures (what, where, how, and why?). The northwestern corner of the site, immediately inside and south of the gate through the Wall of the Crow, remained enigmatic. We refer to this area as the Western Compound, an enclosure defined by thick fieldstone walls, which extends south to a curving corridor, also defined by thick fieldstone walls, that we called the Chute (see fig. 9.2).

The Western Compound lies to the west of the Enclosure Wall that surrounds the Galleries and to the north of the western gate at the end of Main Street. The remnants of walls defining a large enclosure are apparent, and this open, relatively flat area contained smaller, more ephemeral structures. Just to the south of this area, curving northwest from an alignment with the western gate of Main Street, is the narrow walled structure of the Chute.

The Chute consists of two parallel walls forming a curving passage running from southeast to northwest. Our 2009 results suggest that prior to the construction of the Chute walls, probably contemporary with the construction of the structures of the Western Compound, this was an open area. We found a series of trampled surfaces with large quantities of animal bone in front, to the west of the entrance in the Enclosure Wall, at the west end of Main Street.

As we looked at the Western Compound and the Chute, we asked, what was the function of this area? What did people do here? What was the purpose of the Chute? In 2009 we began to excavate the area in order to test some hypotheses regarding function. The results of these excavations are presented in the following three chapters.

It is well understood by most field archaeologists that how and where we excavate determines the data we obtain. But, it is less well understood that the data we wish to obtain in order to test our ideas should determine how and where we excavate. Our work in the Western Compound can only be understood by appreciating the hypotheses, the ideas, which we were trying to test.

### Our Operating Hypothesis

Feeding the pyramid builders was a problem that the Old Kingdom administrative system had to address. Thousands of workers would have required the mobilization of large amounts of food and materials. Given the amount of animal bone recovered in our excavations, particularly cattle, sheep, and goats, animal protein was an important source of energy and protein for the workers (Redding 1992, 2007a, 2007b, 2010). Where did these animals come from? How were they brought to the site? Where were they slaughtered? How were they distributed? We have identified bakeries and silos in our excavation of the Lost City of the Pyramid Builders (GOP3: 44–48, 75–76; Lehner 2007: 24–27, 44–45), but have not located animal pens or abattoirs. The open area of the Western Compound seems to be an ideal area for holding animals and slaughtering them. The Chute could be a funnel for leading animals from the western desert into the site. At the end of the Chute the animals could be counted and sorted. So, one of our initial operating hypotheses was that the Chute and Western Compound functioned as a holding area and abattoir. Is this a reasonable hypothesis?

### The Need for Protein

Humans need 20–25 grams of protein a day simply to keep up with what is lost in normal muscle cell replacement (Fisher and Bender 1979: 58). This is an absolute minimum for individuals, because even low levels of activity will catabolize muscle tissue. Humans involved in physical labor require more, and a minimum requirement of 45–50 grams/day is recommended (Fisher and Bender 1979: 58). But this is protein that has a Biological Value (BV) of 100%,



and only eggs and human milk have a BV of 100% (Fisher and Bender 1979: 60). Since most meats, including beef and fish, contain protein that has a BV of 75% (Fisher and Bender 1979: 60), humans need about 67 grams of protein every day. To obtain their 67 grams of protein, humans need to consume about 370 grams of meat, as each 100 grams of meat only contains about 18 grams of protein (Pellet and Shadarevian 1970: 23–24).

The residents at HeG were undoubtedly consuming several sources of protein. They consumed fish and plants that contained substantial amounts of protein, such as lentils and beans. Due to limitations on the production of milk and the cost of transport, it is unlikely the workers consumed milk and cheese. The other source of protein would have been the meat from cattle, sheep, and goats. Hence, if I assume that only half of the protein requirements were satisfied by consumption of cattle, sheep, and goats, this is 185 grams of meat from these animals per person per day.

If I estimate that 10,000 individuals were working on the pyramids, this means the central authority needed to provide 1,850 kg of meat per day from cattle, sheep, and goats. Lehner (2004a) and I disagree about the number of individuals that could have been housed in the barracks that composed the Galleries. However, even 10,000 probably exceeds the number of individuals that could have lived in the area of the HeG site we have so far exposed, but the excess might have lived in the settlement that we know lies to the east. It is also possible that seasonal, ephemeral camps existed on the plateau.

The faunal evidence shows that the residents consumed large numbers of young (less than two years) sheep, goat, and cattle (Redding 2010). Young males of the indigenous breed of cattle yield about 120 kg of beef (Williamson and Payne 1978: 215). Young males of the indigenous breeds of sheep and goats yield about 16.2 kg of meat, a number derived from numerous studies on unimproved breeds in the Middle East (Redding 1981: 93). The ratio of sheep/goat to cattle in the Galleries, a residence for workers, is about 12:1. For the North Street Gate House, which might have been a guard's or overseer's residence, the ratio is about 0.8:1; for the whole site, the ratio is about 3.5:1 (Redding 2010). If we use a figure of 3.5 sheep/goats for every bull/cow, in order to provide 1,850 kg of cattle, sheep, and goat meat daily, the administrators would had to have slaughtered 10.5 cattle and 36.75 sheep/goats every day. This is 74 cattle and 257 sheep and goats weekly.

These estimates are very rough, but they indicate the magnitude of a practical problem for administrators. Where did this number of cattle come from, and how were they brought to the site, and where were they stored or penned? Birth rates among unimproved breeds of local animals are about 0.6 per year for cattle (Redding, unpub-

lished data) and 0.8 per year for sheep (Elshennawy 1995; Redding 1981), based on a number of studies on unimproved breeds in the Middle East. The number of female cattle needed to supply young males to workers would have been about 6,413, and the number of ewes, 16,705. Each of these figures needs to be doubled to take into consideration young individuals and adult males. So in reality, I estimate the herd size for cattle to be 12,826 and for sheep/goats to be 33,410.

It is unlikely that herds of such size could have been maintained close to the pyramids. Good estimates of carrying capacity in ancient Egypt are not available and estimates for modern Egypt are difficult to find. Using data from other areas, I have calculated a carrying capacity of one animal per hectare for cattle and three per hectare for sheep/goats, based on unimproved breeds managed extensively on natural forage in tropical areas (data from Mulindwa et al. 2009). This agrees with rough estimates of carrying capacity provided by Ruf (1993: 200) for Egypt between 1885 and 1935.

Using these estimates, I calculate that 128 square kilometers was required to support the cattle herd, and an additional 111 square kilometers to support the sheep/goat herd that would have been necessary to sustain the off-take of animals to feed the 10,000 residents. The total comes to 240 square kilometers, and I think this is an absolute minimum. This does not include areas for rearing animals for local consumption, nor land for gardens/grain agriculture, wasteland, or settlement. I would triple the number as a very rough estimate. This is 720 square kilometers: a square nearly 27 kilometers on each side. The Nile Delta at present is 25,000 square kilometers (Ward 1993: 229), so the 720 square kilometer figure represents only 3% of the modern Nile Delta land. Even if the Old Kingdom Delta had been smaller (e.g., Bietak 1975; Butzer 2002; Stanley and Warne 1993), it is clear that land is not a limiting factor in maintaining herds large enough to feed the occupants of the Workers' Town.

Labor may have been a more important limiting factor than carrying capacity. From personal observation, I have found that one individual can control and manage six cattle. Ward (1993: 254) states that at present in the Nile Delta most cattle are held in small herds of one to two animals. An individual can manage 50 sheep/goats (Redding 1981). Hence, 2,138 herders would have been required, full-time, to tend the cattle herds and another 668, full-time, to tend the flocks of sheep/goats necessary to supply the 10,000 workers. To this estimate of about 2,800 herders supported by the central authority, we must add their meat requirements and those of their families to the estimate of land needed. But more important are the numbers. If Butzer's (1976: 85) estimate, admittedly rather speculative, of an Old Kingdom population of 1,100,000

is correct, then 2,800 herders with families would have been 1% of the population. Clearly more work is needed on the topic, but, if there is a limiting factor, labor appears to have been more limiting than land.

The animals were delivered to the HeG settlement from long distances. Sheep, goat, and cattle were probably reared at sites like Kom el-Hisn in the Nile Delta. Kom el-Hisn appears to have been a cattle-rearing center in the Old Kingdom (Wenke et al. 1988). Young male cattle and sheep/goats were collected from sites such as Kom el-Hisn and consumed at centers like that at Giza (Redding 1992; Wenke et al. 1988). The site of Kom el-Hisn is near the western edge of the Nile Delta and is about 100 kilometers in a direct line from the Giza Plateau.

The next question is, how did they get animals to Giza? Within the AERA team there are two camps on this: the boaters and the walkers. The boaters, arguing from tomb scenes showing cattle being transported on boats (e.g., Harpur and Scremin 1987, pl. 165; Martin 1987, pl. 11), suggest that cattle were brought on boats via the Nile to a harbor and then driven on the hoof to the site. The harbor may have been just north of the Wall of the Crow, at the foot of the Giza Plateau and east of the Sphinx and Khafre Valley Temple area. The walkers—myself included—argue that cattle drives were organized and the herds delivered over land. I would argue that the cattle, sheep, and goats were driven down the west side of the Delta and Nile Valley along the boundary between the Nile floodplain/Delta and the Western Desert. The low desert may have extended farther east during the Old Kingdom (Lehner 2009a). Also during the 4<sup>th</sup> Dynasty, the desert would have been more savannah-like and would have provided graze (Kröpelin et al. 2008; Stanley et al. 2003). These factors, combined with the convex profile of the floodplain and a river channel that was much farther west than in recent times, would have created a series of swamps and marshy areas along the western edge of the Nile Valley. As herds were driven from north to south, or from south to north towards Giza, they would have encountered this string of marsh/lakes, of which Birket Dahshur is the last example. The herds, driven slowly, would have fattened on the rich pasture en route and arrived in good condition at the town. Herds could have moved along this route timed so as to arrive every few days. Any herd driven to the settlement could have come from the west down the Main Wadi, just south of the Menkaure Pyramid between the Moqattam and Maadi Formations, and entered the town from the west. This may have been the first “just in time” logistics system.

### Testing the Hypothesis

What are we looking for in order to test the hypothesis that herds were brought into the Western Compound via the

Chute for slaughter; what will indicate that the area was a corral and abattoir?

The first question is, what did an abattoir look like in the Old Kingdom? Any place where animals are slaughtered should have two separate areas. Animals must have an area to rest and drink that is separate from the slaughtering area. Animals exposed to the smell of blood, and traumatized by nearby slaughtering activities, will have increased levels of glycogen, which will adversely effect meat quality and increase the likelihood of spoilage (Lawrie 1976: 431).

We have at least one slaughterhouse in a royal installation for the Old Kingdom. It consists of a courtyard and series of rooms in front of the 5<sup>th</sup> Dynasty pyramid of Raneferef (Verner 1986, 2006). The courtyard contained limestone tethering stones, and in a nearby room there was a chopping pedestal. Other rooms may have had a second floor that Verner (2006: 94) suggests was used for hanging meat. A corridor led into the courtyard, but it is not clear that any space beyond the courtyard included a corral.

We have a large number of slaughtering scenes from Old Kingdom tombs. They seem to take place in mostly open-air sites. Some evidence of architecture is illustrated where scenes of jointing the meat are shown. In a few of these scenes we see an enclosed area with columns on which a line is strung for hanging the butchered joints, making these structures for slaughter appear quite ephemeral (Ikram 1995: 82). I have also examined Middle Kingdom house models in the Louvre and at the Cairo Museum. These too tend to have a columned structure open to the air or partially roofed, the floor of which has multiple small grooves or ditches that sometimes lead to a small depression. Excavations by the Metropolitan Museum at Thebes recovered a model of a slaughterhouse from the tomb of Meketre, described and discussed by Gilbert (1988) and Arnold (2005). The model consists of an open courtyard with columns, a room, and a balcony overlooking the room with columns. Cuts of meat hang from lines stretched between the “walls.”

Additional architectural evidence of a slaughter area might come from pens used to hold animals. I know of only one Old Kingdom site for which we have such evidence. In Area A at Kom el-Hisn we found parts of at least two corral structures (fig. 10.1).

One might expect that fragments of bone from cattle, sheep, and goats would provide evidence of where butchering occurred. On many sites I have looked for distal limb elements and horn cores as indications of slaughter. But, given that almost every part of the animal was consumed or utilized in ancient Egypt (Ikram 1995), it is unlikely that any particular pattern of animal bone would be indicative of slaughter.

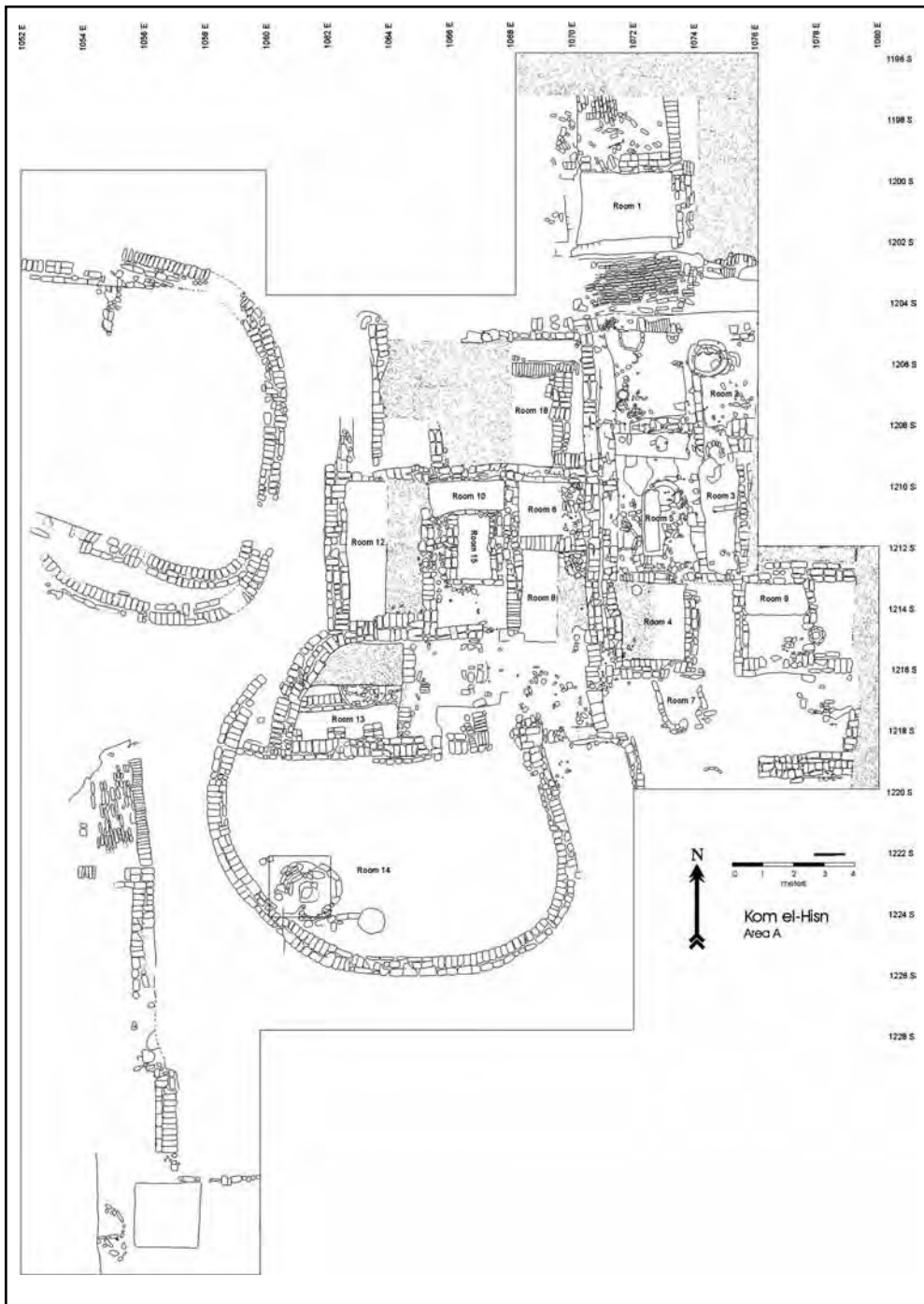


Figure 10.1. Architectural plan of Area A at Kom el-Hisn, a Nile Delta village dating to the 5th and 6th Dynasties. Note the two large, rounded, mud-brick structures that were probably corrals for sheep, goats, and cattle. Map courtesy of Robert Wenke.

We may be better off looking for objects as evidence of butchering. Large flint knives are illustrated in tomb scenes as tools for butchering (Ikram 1995, fig. 14). We have found such knives in other areas of the HeG site, such as the Royal Administrative Building. I found a flint knife on the surface in the area of the Western Compound in 2004, but since it has no context we cannot tie it to any period or area of the site. Another object associated with butchering is the *sšm*, or knife sharpener. This object is frequently illustrated in the Old Kingdom tucked

into the waist of individuals using the large flint knives. A final object associated with butchering is the tethering stone. These large pierced rocks are known from the Old Kingdom.

### Other Hypotheses

We are also considering the hypothesis that the Chute was used to control the movement of workers between the galleries and the work area up on the plateau. Controlling the movement of people within the HeG settlement

was clearly an important issue here, as suggested by large walls segregating different areas of the town, constrictions along pathways running between these areas, gatehouses at access points, and bed platforms for guards at critical doorways (Lehner and Tavares 2010). The Western Compound also may have been a large work yard for baking bread on a massive scale.

We are also looking at other areas as possible abattoirs. An interesting candidate is the area of the site referred to as EOG (East of the Galleries) and the nearby Hypostyle Hall (see fig. 9.1). The Hypostyle Hall has a series of alternating troughs and benches that is unique on the site (Lehner 2002a: 42–48). Further, the floor was littered with impressed fish fins. The Hypostyle Hall also has columns that could have been used to support a line for hanging cuts of meat, as pictured in tomb scenes (Gilbert 1988: 82; Ikram 1995: 83). Out in EOG workers may have butchered livestock. In 2004 Ashraf Abd el-Aziz discovered a cache of animal bone that included numerous teeth and other non-meat-bearing bone—remains that butchers discard—located next to a line of pedestals similar to those found elsewhere across the HeG site. Lehner (2004b: 67) suggest-

ed that the pedestals may have been used for butchering, among other functions.

It is possible that the Western Compound may have been a holding area and that cattle, sheep and goats, as needed, were herded down Main Street to EOG, where they were slaughtered. The resultant cuts of meat were taken to the Hypostyle Hall where they were jointed and hung up.

### **The Future**

The two reports that follow on the 2009 excavations in the Western Compound and the Chute detail our attempts to test the hypothesis that the area was dedicated to bringing animals into the settlement for holding and slaughtering. We clearly need to continue work in the area, as the results in 2009 do not falsify nor support the hypothesis. This is largely due to the number of intrusive human burials that consumed much of our time in 2009. We will excavate further to search for architecture and material culture to test our hypothesis. But, without the hypothesis directing our work in the area, our excavations would have been directionless and would have led to an *ad hoc*, “just-so-story” approach to explaining the area.



## 11. Excavations in the Western Compound, 2009

James Taylor

**E**xcavations of the Western Compound began on February 7 and ended on April 1 as part of the AERA-ARCE Advanced Field School for training Supreme Council of Antiquities (SCA) Inspectors in archaeological field techniques and methods of recording. This part of the Heit el-Ghurab (HeG) site was poorly known, but walls and other features offered a challenge to the Advanced Field School students.

The Western Compound is that part of the HeG site directly west of the Enclosure Wall and south of the Wall of the Crow, bounded to the west by the modern Coptic cemetery and to the southwest by the “Chute,” excavated by Ashraf Abd el-Aziz (see Chapter 12, this volume) (fig. 11.1).

One L-shaped trench was excavated to obtain a transect that would provide the stratigraphic relationships of walls and deposits from the Enclosure Wall to the Chute (fig. 11.2). The main part of the trench ran north-south and measured approximately 29.5 m long × 2.5 m wide (in Squares 3.M42, 3.N42, 3.O42, 3.P42, 3.Q42, 3.R42, and 3.S42). The east-west leg was approximately 12.5 m long × 2.5 m wide (in Squares 3.R42, 3.R43, 3.R44, 3.S42, 3.S43, and 3.S44). During the course of excavation we extended the trench to the east (to include Squares 3.P43, 3.P44, 3.Q43, and 3.Q44). But the new extension revealed too many Late Period burials to be logistically viable, so the excavation was finally refocused upon the old trench limits.

### Aims and Objectives for the Western Compound

The aims and objectives of the work carried out in the trench comprised the following:

- To train selected Supreme Council of Antiquities inspectors in archaeological field techniques and methods of recording
- To identify the functions of the Western Compound and test the hypothesis that it may have been holding pens for animals
- To understand the relationship between the Western Compound and the Chute
- To understand the relationship between the Western Compound and the settlement to the east
- To establish the local chronology and phasing of the Western Compound

### Excavation History

AERA team members have excavated in a number of places in the northwestern part of the HeG site, but mostly to the east and north of the Western Compound (fig. 11.1).

- **1991:** The A8 Bakery, excavated by Augusta McMahon in the area designated the “Eastern Compound” (Lehner 1993: 58–60; Lehner 2007: 24–25, fig. 1.15).
- **1991–2001:** In 1991 Augusta McMahon excavated the “Deep Trench” up to the southern face of the Wall of the Crow in the space between the Eastern and Western Compounds. In 2001 Paul Sharman (2003) re-cleared this trench and extended it to the south (Lehner 1993: 58–60; Lehner 2001; Lehner and Tavares 2010: 176–78).
- **2001:** Fiona Baker and Paul Sharman (2003) cleared and mapped the surface of the settlement ruins in a swath 15 m from the southern base of the Wall of the Crow extending for 70 m (Lehner 2001). Baker and Sharman’s exposure of the latest ancient surfaces extended through the gate in the Wall of the Crow and took in the northwestern corner of the Western Compound formed by the thick walls of broken limestone.
- **2005:** Jessica Kaiser mapped the burial pits showing in alternate north to south 5 m-wide ranges of the GPMP grid in the northwestern part of the HeG site, but mostly in the area of the Eastern Compound to Main Street on the south (Kaiser 2006: 77–79; Kaiser and Westlin 2005) (see color plate 7a). As Kaiser reported, her team could not map many of the burials to the west—the area of the Western Compound and Chute—because of an overburden of undisturbed sand deposited in ancient times that the AERA team left during their broad clearing of the overburden between 1999–2002.

The AERA team has carried out a number of excavations across and along the Enclosure Wall, another part of which we exposed at the northern end of the 2009 transect in the Western Compound.

- **2001:** As part of their broad exposure along the southern base of the Wall of the Crow, Fiona Baker

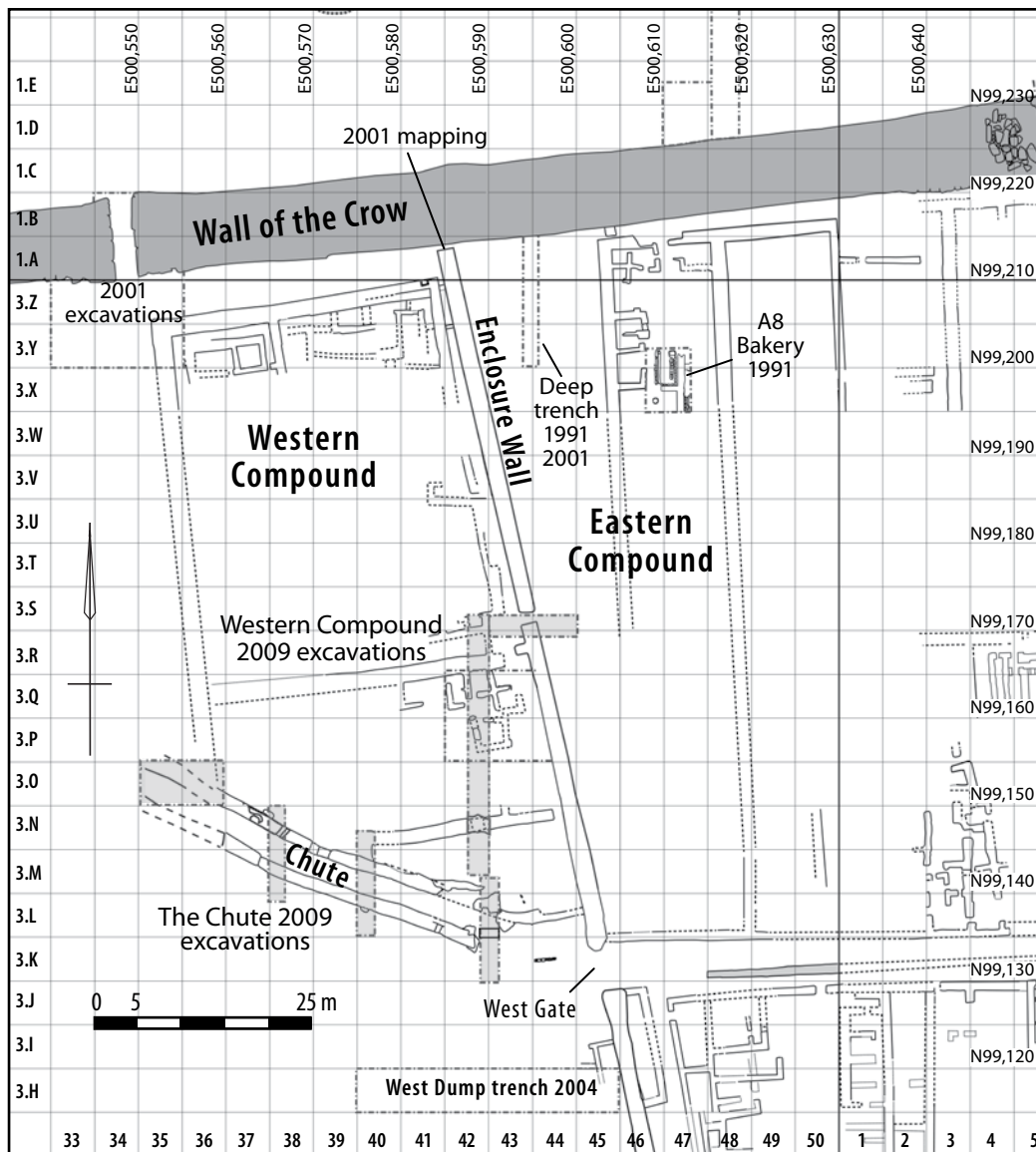


Figure 11.1. The northwestern sector of the HeG site showing the 2009 excavations and earlier operations. Map prepared by Camilla Mazzucato, AERA GIS.

and Paul Sharman (2003) mapped the northern end of the Enclosure Wall where it stops 60 cm from the southern face of the Wall of the Crow. Limestone debris with more of a marl matrix than the composition of the Enclosure Wall fills this gap (Lehner and Tavares 2010: 182).

- **2004:** In Area WD, or the West Dump—named for the dumped material on the slope to the west of the main settlement—Lauren Bruning and Adel Kelany excavated an east-west trench through the dumped deposits up to the southern face of the Enclosure Wall (GOP2: 9–10).
- **2004–2005:** Anies Hassan and Banu Aydınoğlugil (2005) excavated a trench that cut the Enclosure Wall in Area BBNW, north of the northwestern

corner of the enclosure dubbed the Royal Administrative Building (RAB) (GOP2: 40–41). In 2004 and 2005 Ana Tavares, Astrid Husser, and Anies Hassan excavated a trench that cut the western wall of the RAB up to the Enclosure Wall where it runs south to north (GOP2: 41–42).

- **2005:** Dan Hounsell (2005) supervised excavation of a trench from north of the Enclosure Wall, across RAB Street, and into the northern end of the Western Town (GOP2: 63–68).

The findings from previous excavations along the course of the Enclosure Wall are summarized and reviewed by Lehner and Tavares (2010: 182–84, 188–90).



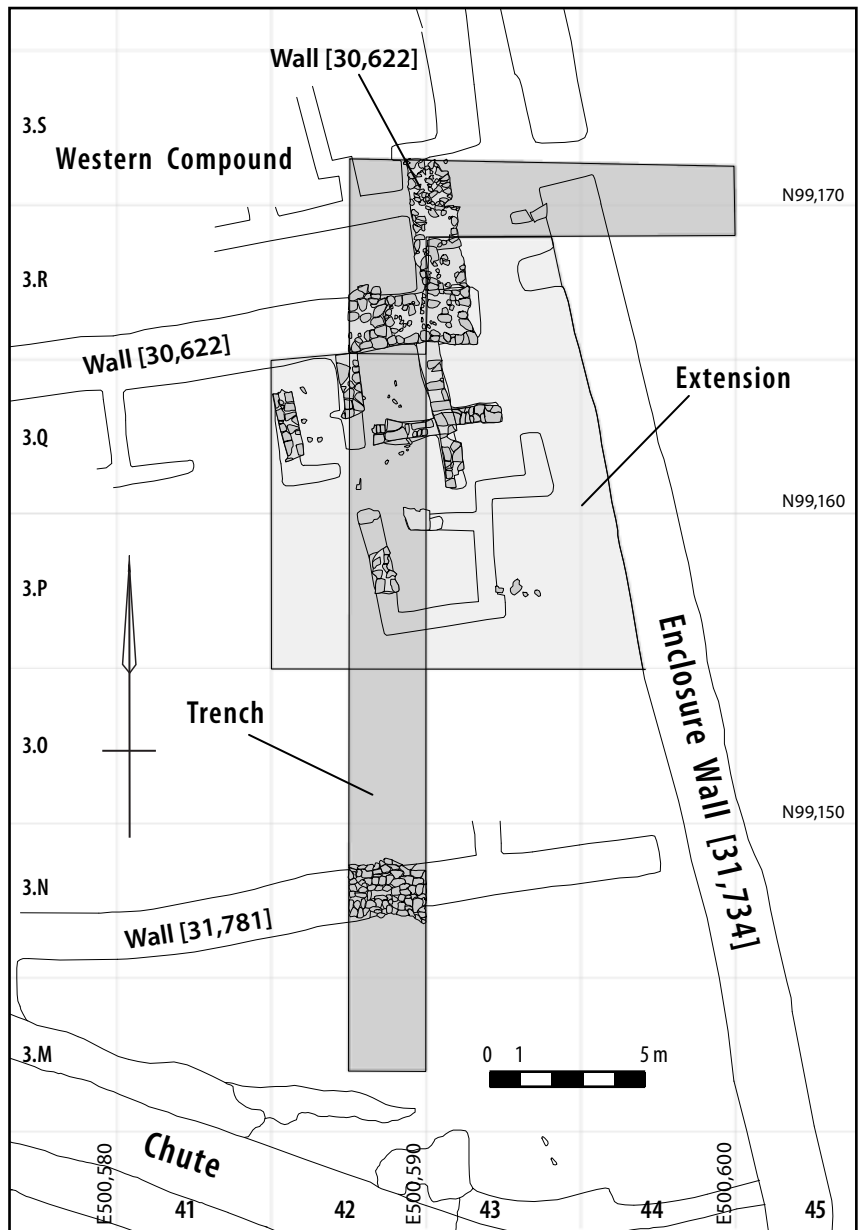


Figure 11.2. The Western Compound operations. Map prepared by Camilla Mazzucato, AERA GIS.

**Phased Narrative**

The local phasing for the Western Compound area, identified during the 2009 excavations, is shown in table 11.1.

**Phase I: Earliest Material (Dumping)**

This phase was not excavated; it actually refers to that material only seen in section in the excavated Late Period burial cuts. We could not tie stratigraphically these early features to later deposits identified and excavated in plan. As such, relatively little can be said about these deposits; mostly they have been identified as dumped deposits underlying the later structural phases. This is very clear in some instances because of distinctive tip-lines (invariably sloping down from west to east) that could be seen in the sections. It seems very likely that the ground here

**Table 11.1. List of Phases**

Phase I	Earliest Material (Dumping)
Phase II	Old Kingdom Cemetery
Phase III	Construction of Earliest Limestone Walls
Phase IV	Occupation i
Phase V	Dumping and Preparation
Phase VI	Construction of Later Limestone Walls
Phase VII	Occupation ii
Phase VIII	Abandonment
Phase IX	Late Period Cemetery
Phase X	Modern Activity

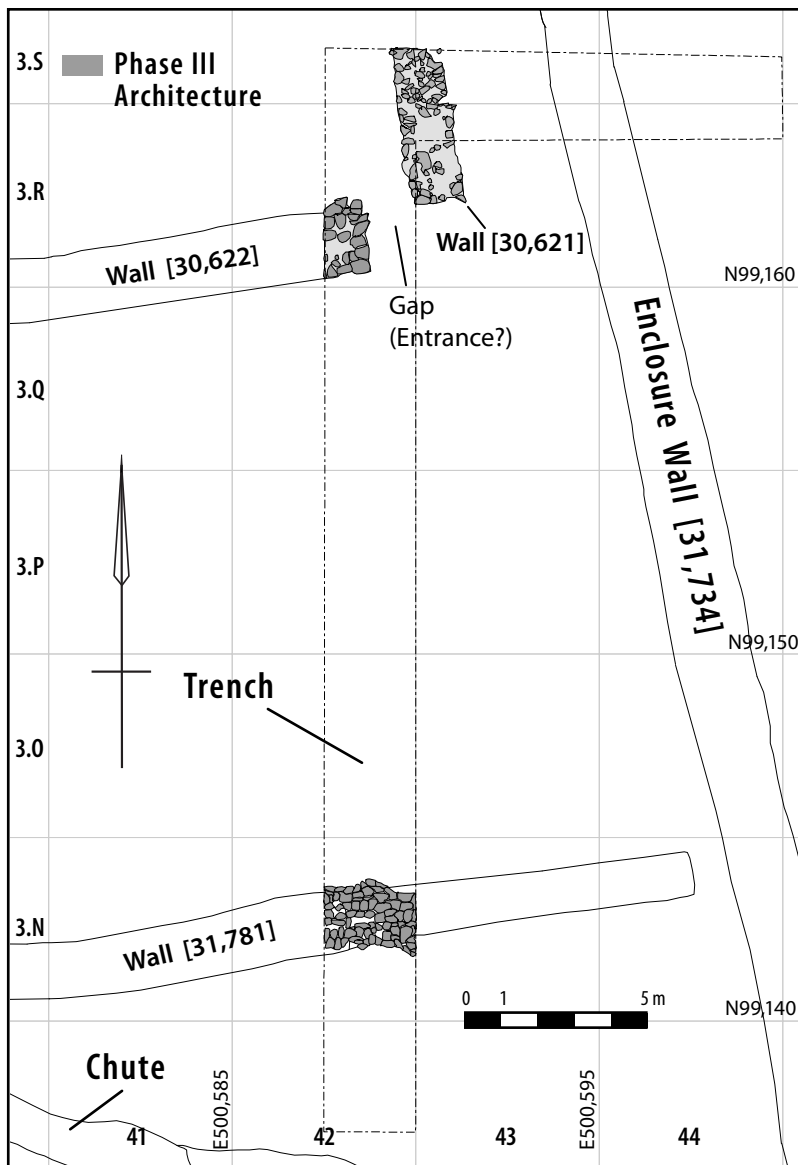


Figure 11.3. Phase III plan. Map by Camilla Mazzucato and Rebekah Miracle, AERA GIS.

was artificially raised, perhaps in preparation for the later structural modification of the area. The tip-lines were more evident (though not exclusively) towards the eastern part of the excavated area, perhaps reflecting the higher western and lower eastern parts of an underlying slope across the area.

#### **Phase II: Old Kingdom Cemetery**

The use of this area as an Old Kingdom burial ground is somewhat speculative. However, it is worth noting that one definite burial (493) and one possible Old Kingdom burial (cut [30,654]) were conclusively sealed by Old Kingdom abandonment deposits (see Kaiser, Chapter 18, this volume). Unlike all the other burials identified in the area in Phase IX, these cuts of burial pits could not have been Late Period. Although one confirmed burial does not

tell us much, the implications of this are potentially quite interesting. It may be that this area, to the west of the main settlement (prior to the construction of the large limestone structures that define the Western Compound), was a marginal zone at this time reserved for the burial of the dead, perhaps by the early occupants of the town.

The stratigraphic relationship between these early burials and the area-wide dumping remains ambiguous (because the dumping was only seen in the sections of later burial pits), but the older burial pits appeared to cut the artificially dumped layers.

#### **Phase III: Construction of Early Limestone Walls**

##### ***The Main Enclosure Wall***

This phase is characterized by the earliest architecture in the Western Compound, first defined by the main

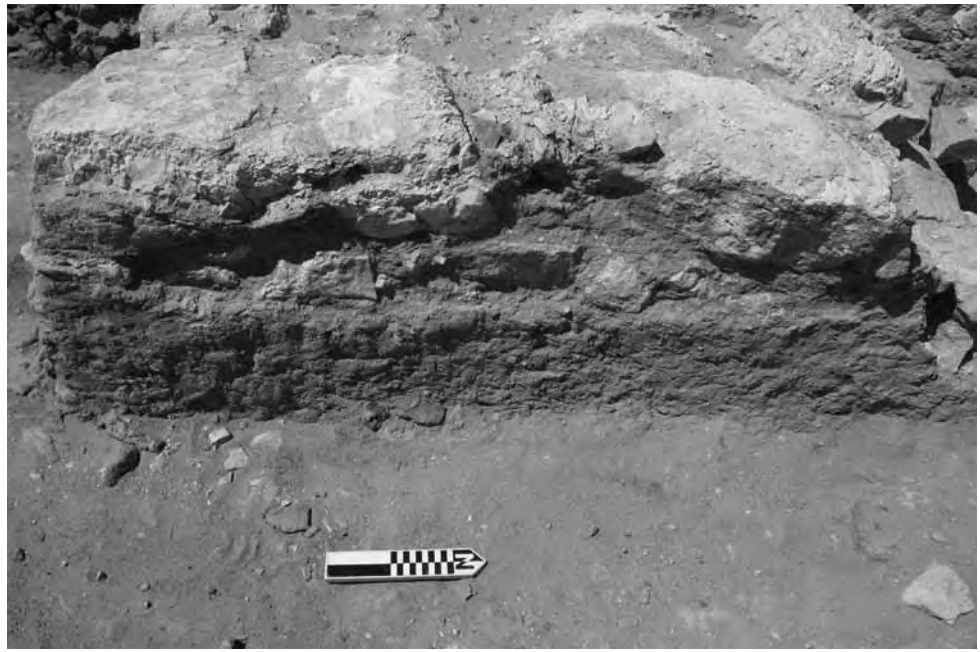


Figure 11.4. The eastern terminus of the east-west wall [30,622]. View to the west. Photo by Waleed Semida Sabir.

settlement “enclosure wall” as well as a series of thick and massive limestone walls (fig. 11.3). The Enclosure Wall [31,734] formed the eastern boundary of the overall Western Compound. It is 95 cm wide  $\times$  80 cm high, surviving to a height of 18.03 m asl. The Enclosure Wall was not excavated during this season; its total height was measured in the section of a later burial (number 477) that truncated the western side of the wall. It seems likely that the thick east-west walls are stratigraphically later than the Enclosure Wall, although this has not yet been conclusively proven by excavation.

The Enclosure Wall is well documented (see outline of previous work above), and is clearly visible in plan even when the site is backfilled, extending around the western and southern limits of the main formal settlement south of the Wall of the Crow. Earlier excavations suggest that although the wall is clearly meant to enclose the main settlement, it actually post-dates the construction of the Gallery Complex and the Wall of the Crow itself (Lehner and Tavares 2010).

How the Enclosure Wall relates to the Old Kingdom burials identified in Phase II remains very speculative. The relationship between these early burials has not been established stratigraphically. Therefore it is unclear whether the Enclosure Wall was meant to separate the main settlement from an earlier burial ground or postdates a cemetery, reflecting a complete change of function.

#### *The Massive Limestone Walls*

At some point, presumably but not conclusively, after the construction of the Enclosure Wall, the area to the west of the main settlement was developed and two thick walls

were built of broken limestone, broadly contiguous in their use (dubbed the “massive” walls by the excavators). These two walls partitioned the southeastern corner of a much larger compound or building.

The two massive limestone walls ([30,622] and [30,621]) were exposed in the northern end of the trench, both located in Square 3.R42. The first of these, [30,622], was oriented east-west and extended into the western limit of excavation. As such, the visible extents (within the trench) were 2.5 m long  $\times$  1.16 m  $\times$  50 cm high, up to a height of 18.49 m asl. This wall was faced with a silty render [31,830], approximately 2 cm thick on its southern side and its eastern terminus (fig. 11.4).

To the east of the terminus of wall [30,622] a second limestone wall [30,621] extended north-south, consisting of four courses with visible extents (within the trench) of 4.50 m long  $\times$  1.84 m wide, the top being at 18.47 m asl (fig. 11.5). This wall was contiguous with the Enclosure Wall and abuts the Phase 6 limestone wall (blocking) [30,626] from the south. The first wall [30,622] extended into the western limit of excavation, whilst the second [30,621] extended into the northern one.

It was clear in plan that both of these massive walls, [30,621] and [30,622], extended north and west respectively, and formed (at this phase at least) an entrance into or passage alongside the southeastern corner of a much larger enclosure, as yet ill-defined.

The exact extent and layout of this phase is not clear from the current extent of excavation. However, the walls that show from clearing and excavation in 2001 and 2002 suggest that the Western Compound was substantial. There are indications that thick limestone walls continue

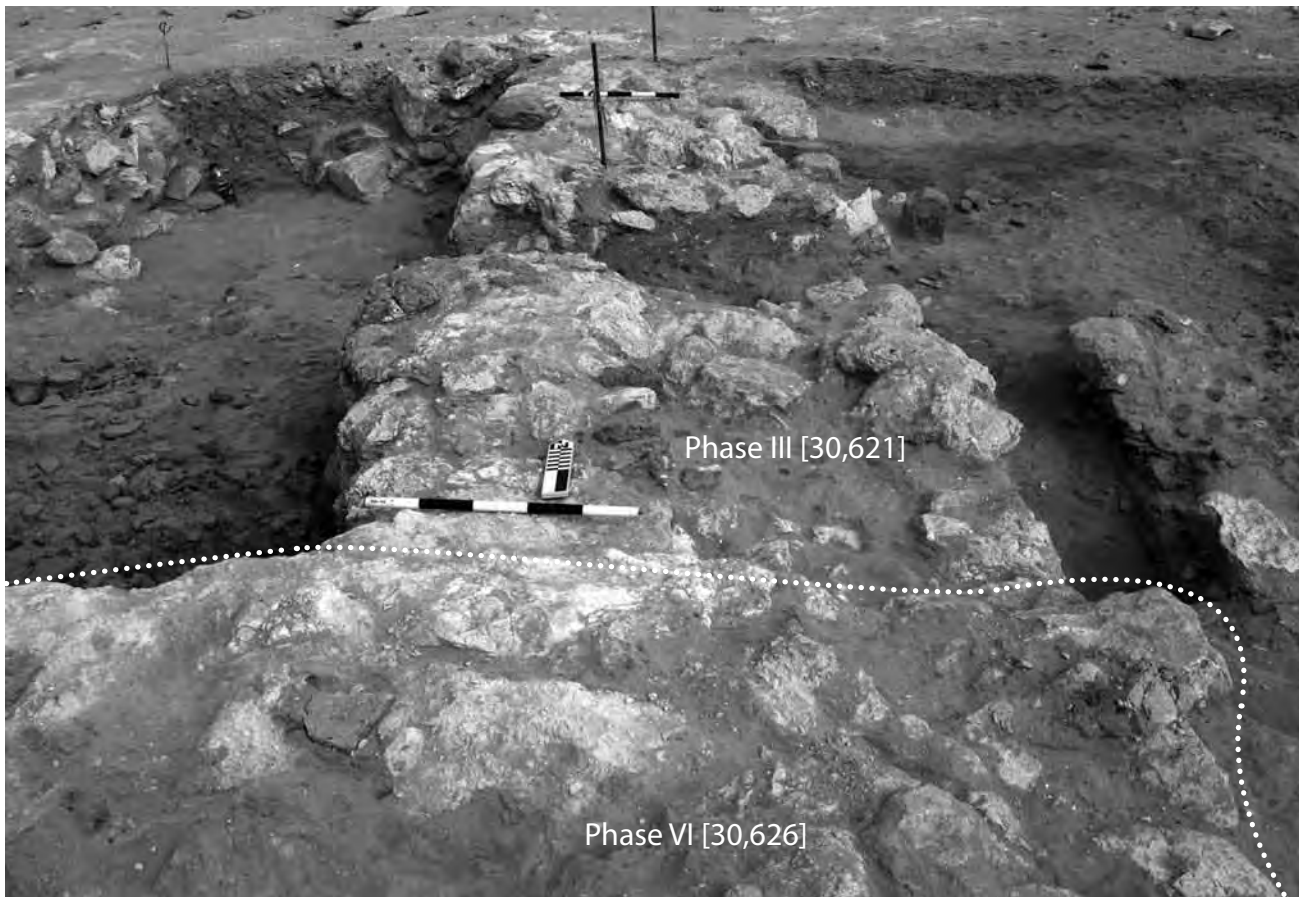


Figure 11.5. The massive stone wall [30,621], showing the older construction and the blocking segment added in Phase VI. View to the north. Photo by Mansour el-Badry Mustafa Ali.

some 45 m north and 34 m west of the 2009 excavation area. The whole building or compound probably covered an area of some 1,315 m<sup>2</sup>.

Little can be said at this point about the purpose or function of this structure, but a few salient points are worthy of note. As far as we know, the two massive walls were not connected (either physically or stratigraphically). In fact, there would have been a space of some 1.3 m between the eastern terminus of the east-west wall [30,622] and the southern terminus of the north-south wall [30,621] (figs. 11.2, 11.3). Provisionally, given the absence of any other obvious structures, this gap has been interpreted as an entrance at the compound's southeast corner.

That said, it cannot be ruled out that there was a third (perhaps robbed) wall, sprung off and returning from the eastern terminus of the southern wall (perpendicular to the eastern wall), which would have formed the actual corner of the compound. If this were the case, then the hypothetical return and the parallel eastern wall might have formed a corridor, or roadway, along the eastern side of the compound, which is interesting given that there would already have been a similar space (about 4.35 m

wide) between the compound and the main Enclosure Wall of the site. The 1:100 surface plans of the Western Compound would seem to indicate that this throughway (if it really is so) would have tapered to an almost unmanageably narrow space (< 1.00 m) at the northwestern corner of the structure.

The southern end of the trench crossed another massive wall, [31,781], oriented east-west in Square 3.N42. It was 2.5 m long × 1.65 m wide × 1.77 m high, to a height of 18.29 m asl. Unfortunately, the limited exposure of this trench makes it hard to consider the function of this structure. In plan there is some small indication that it may abut the main Enclosure Wall at its eastern end. There were slightly clearer indications that it may have abutted the northern wall of the Chute area to the west. However, what precisely this wall demarcated or enclosed remains unclear.

Finally, it is worth noting that although many of the stratigraphic relationships between the walls and the soft deposits that seal them were clearly demonstrated this season, at present we do not really understand the construction phase of these walls.



Figure 11.6. In the northern end of the transect, the ash-laden sherd deposits dumped in Phase V. View to the south. Photo by Mansour el-Badry Mustafa Ali.

#### ***Phase IV: Occupation I***

This phase represented the earliest occupation identified within the trench, almost all associated with the massive limestone walls identified in Phase III above. None of the deposits were excavated this season, as they marked a good stopping point for fieldwork.

The most obvious of these Phase III occupation deposits was a silty surface associated with the plaster on the terminus of the east-west orientated wall [30,622] of the large structure at the northern part of the area (fig. 11.4). This wall may not be the first surface associated with the structure, but it clearly demonstrated that the terminus functioned as part of a throughway (either a door or corridor) at this point in time.

Most of the rest of the occupation deposits in this phase consisted of slightly clay-silty floors that we could see in the section of the Late Period burials (from Phase IX) that cut these floors. The fact that they were mostly seen in section means that the true stratigraphic relationship of the floors remains ambiguous and the phasing may change subject to further work.

#### ***Phase V: Dumping and Preparation***

This phase represented a complex sequence of sandy silt

deposits, pure ash, and ash containing pottery sherds (mostly bread molds). We found these deposits across the transect, and we interpreted them as dumps. Notably the ash and ceramic dumping seemed to have been intrinsically linked. The pottery appears to have been laid with ash concentrated to the north of the area, possibly even mounded up slightly around the “massive” limestone walls (fig. 11.6).

At some point this dumping ceased, but the ash continued to be laid to the south of the Phase III walls. As such, we interpret most of this dumping as preparation for the next phase of construction and remodeling of the area in Phase VI. The ceramic ash and dumping is similar to dumps elsewhere on the HeG site during periods of abandonment and remodeling. Much of this dumped material probably derives from waste from the bread-baking industry. The ceramic sherds in particular probably made a solid foundation for the structural elements constructed in Phase VI below.

#### ***Phase VI: Construction of Later Limestone Walls***

This phase was defined by the blocking [30,626] of the space between the two Phase III limestone walls, [30,621] and [30,622], and the construction of a series of smaller

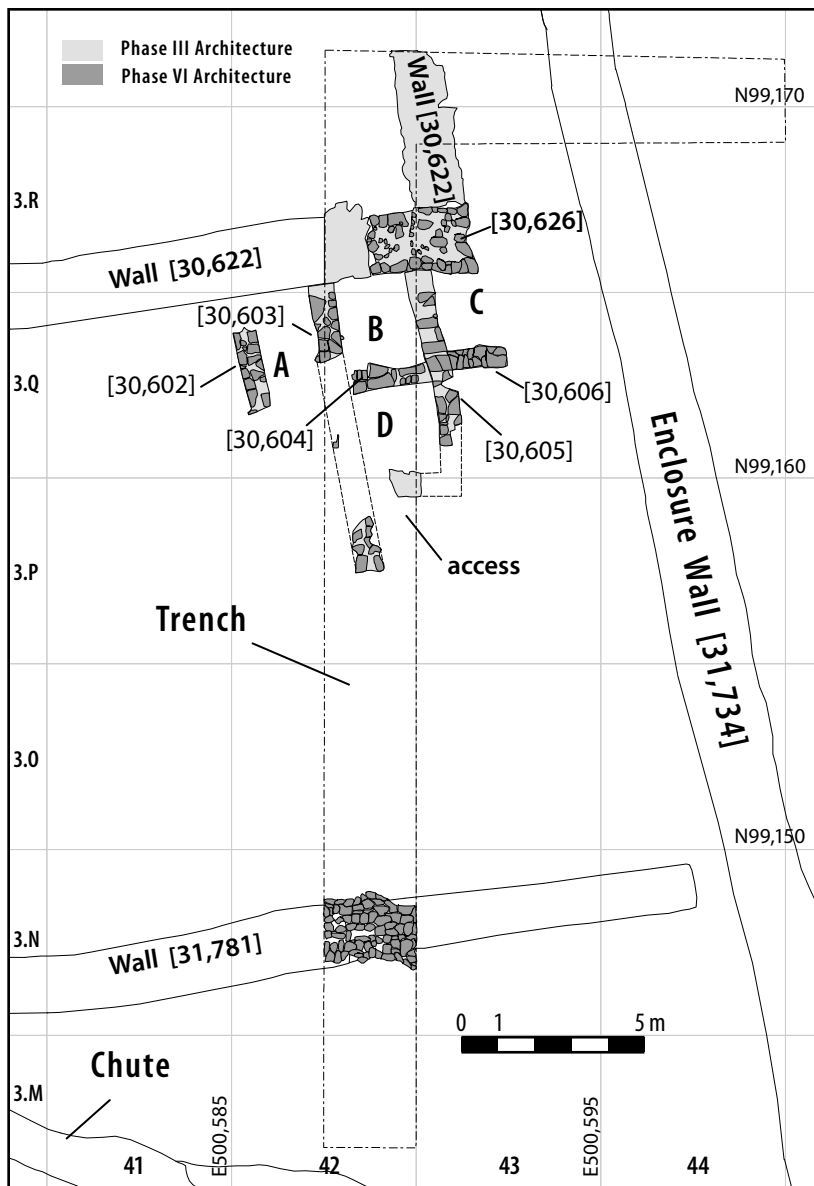


Figure 11.7. Phase VI map. Prepared by Camilla Mazzucato, AERA GIS.

limestone walls outside of the newly modified existing structures (figs. 11.7, 11.8). All of these structures were founded on the dumped ceramic deposits (fig. 11.6) identified in the previous phase, suggesting that this period of construction was conceived as a single remodeling event.

The first feature in the construction sequence was the blocking in [30,626] of the gap in the southwest corner of the structure identified in Phase III (fig. 11.5). This extension to the eastern terminus of massive east-west limestone wall [30,622] was indistinguishable from the form in plan. However, excavation revealed that the terminus of wall [30,622] was rendered and that build [30,626] was clearly additional. It consisted of two limestone courses, was not rendered, and was c. 2.90 m long × 1.60 m wide × 30 cm high. Crucially, this extension also abutted the massive limestone wall [30,621] to the north, thus closing the gap between the two structures. This effectively

blocked access into the structure from the southeastern corner. Whatever the case, the dynamics of the area around this corner of the building changed significantly. As the limestone blocking was very similar to the earlier walls that it modified, it would suggest that these walls were most definitely in use when the blocking took place.

After the gap between the two walls was blocked, a number of narrower walls were constructed to the south of the structure. These walls formed a small complex of at least four to five rooms.

The north-south limestone walls all shared a number of common attributes. All survived to no more than two courses high, apparently destroyed or eroded to that level. Coursing, however, was largely irregular because the limestone blocks used as building materials were very roughly hewn (tending to be slightly flattened to facilitate bedding). All were founded at the same level and clearly

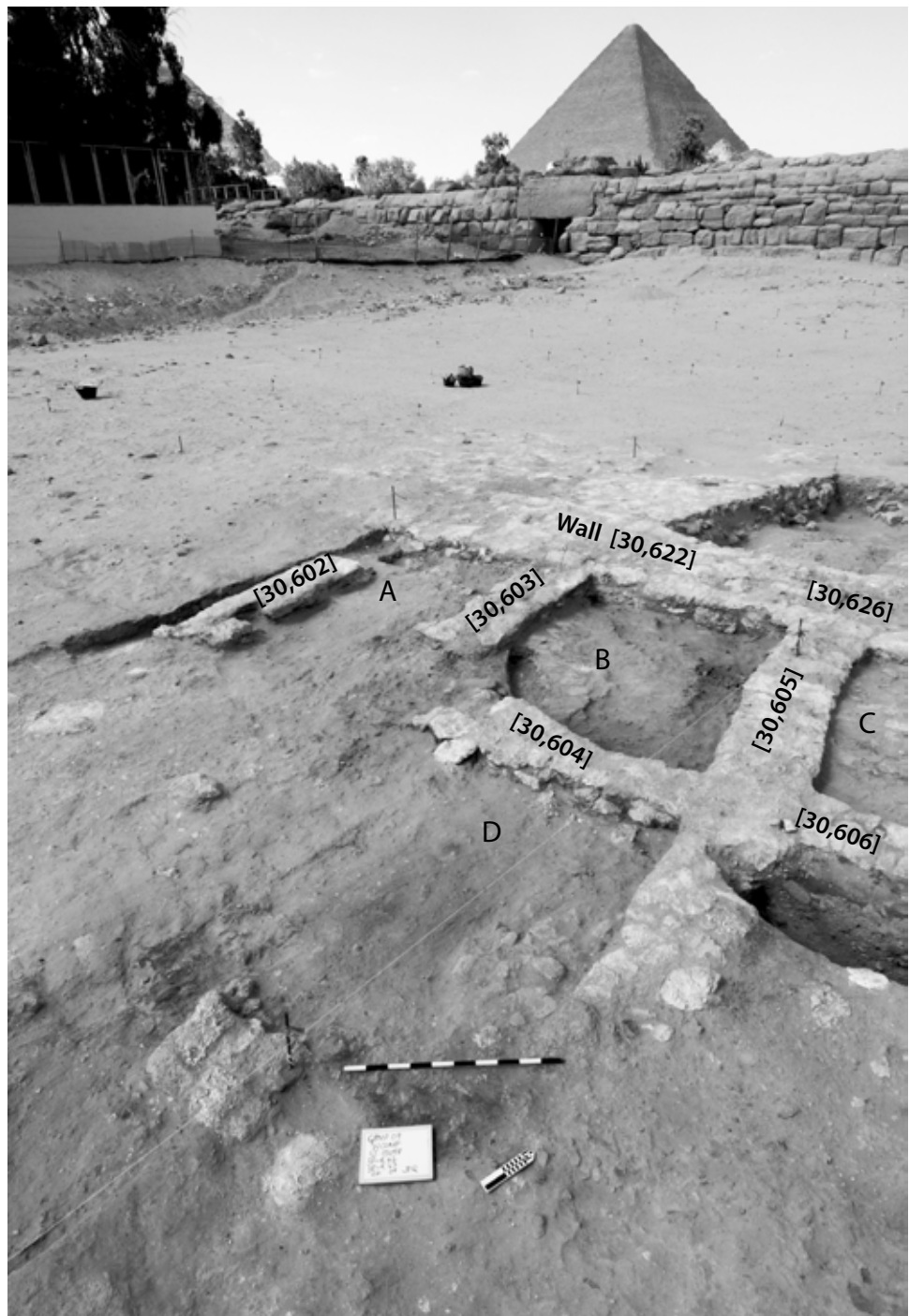


Figure 11.8. The later stone walls built in Phase VI. View to the northwest. Photo by Mark Lehner.

formed a single multi-chambered structure on a broadly north-south alignment, which was appended to the south side of the massive limestone walls constructed in Phase III. A construction pattern for the walls was hard to determine, since they appeared to be keyed in at a structural level. All of the new builds in this phase were founded upon the Phase v pottery dump [30,627] (fig. 11.6).

Wall [30,602] was orientated north-south and formed the western boundary of the structure (as it was seen and understood within the area of excavation). It was c. 2.30 m long  $\times$  66 cm wide  $\times$  22 cm high. The northern end of

this wall may have been truncated by a later burial, and consequently did not have a direct relationship with the Phase III walls identified above. A similar wall, [30,603], c. 1.90 m long  $\times$  70 cm wide  $\times$  26 cm high, was located to the east, also on a north-south alignment. By contrast this wall clearly abutted the earlier massive limestone wall (Phase III) [30,622].

To the east again, a further north-south limestone wall, [30,605], c. 4.8 m long  $\times$  64 cm wide  $\times$  20 cm high, was located in the west side of the Square 3.Q43, 3.R43. This wall was sprung off the southern face of the east-



west massive limestone wall [30,626]. This eastern room was completed (c. 2 m<sup>2</sup>) by the presence of an east-west limestone wall [30,604] with the same morphology as the others. The wall, 2.10 m long × 50 cm wide × 20 cm high, was located in the east side of Square 3.Q42, continuing into the west side of Square 3.Q43. This wall was keyed in and contiguous with the aforementioned wall [30,605]. Between the limestone walls [30,603] and [30,604] was an entrance into the space, in the southwest corner, approximately 75 cm wide.

The southern (east-west orientated) wall [30,604] continued to the east of its north-south counterpart, [30,605], as [30,606]. This leg was c. 1.56 m long × 50 cm wide × 14 cm high, but was not excavated this season.

It should be noted that the preservation of these walls was quite poor, especially to the south, so it remains possible that more rooms existed here before the walls eroded away. We found no boundary walls on the south, so it is difficult to state conclusively the size of this additional structure. The walls that could be identified covered an area around 64 m<sup>2</sup>. Despite the common construction level, and given the lack of entrances to the larger northern structure, it seems unlikely that these additional rooms shared any functional relevance to the former. Perhaps they represented extramural or ephemeral activity outside of the main enclosed area of the Western Compound.

Three rooms were clearly identifiable in the northern part of this structure (Rooms A–C). Traces of walls suggest a fourth room (D). It is not clear how the rooms related to one another functionally; only one definite access between the rooms was identified (complete with threshold structure, see Phase VII below) in the southwestern corner of Room B. It is possible that the more ephemeral limestone walls in the south of the area may represent other rooms, but this remains unclear at the time of writing.

### **Phase VII: Occupation II**

This phase represents occupation associated with the new architecture of Phase VI. Occupation features consist of a pottery make-up layer [30,625], a silty floor [30,612], and plaster identified in Room B, as well as an associated threshold structure [30,613] in the southwest corner of the room. The threshold structure [30,613] was founded upon the ceramic dump [30,625]. It was only one course thick and consisted of just three mudbricks (c. 27 cm long × 12 cm wide × 10 cm high). As such, the dimensions of the threshold were c. 40 cm long × 40 cm wide × 11 cm high. Stratigraphically it was founded upon the silty floor [30,612], effectively abutting the western facing of the limestone wall [30,604].

No other occupation material could be directly associated with Phase VI structures. The floor identified in Room B was not particularly well preserved, showing signs of

heavy wear. While this might be associated with the later abandonment of the site (the structures, in general, did not survive to a great height), it cannot be ruled out that the pattern of wear (combined perhaps with the overall scarcity of occupation material in the building) may suggest heavy use, perhaps even an industrial function. Unfortunately we found no *in situ* material culture to support this, except for a small number of flint knife blades that may have a provenience in this phase (although technically they have been attributed to the basal boundary of the overlying abandonment deposits).

### **Phase VIII: Abandonment**

This phase represents the abandonment, apparently after all of the structures fell out of use. For the most part, Phase VIII material includes silty dumps with increasing limestone inclusions in the northern half, which turn into layers and lenses of laminated aeolian sand towards the south. The limestone debris tended to be localized, either adjacent to the Enclosure Wall or inside the corner formed by limestone walls which dominated the northern end of the transect. Here, massive amounts of limestone debris (including large boulders) were quite unlike the southern and eastern deposits in and around the later and more lightweight walls.

The density of heavy limestone debris inside the corner on the north of the transect is surprising because one might expect the debris to fall more evenly on either side of an abandoned wall. This might suggest that the more massive wall fell before the later structures, tacked onto the outside on the south. Stratigraphically it is impossible to say how and in what order the walls collapsed. The southern elements of the structure might have gone out of use first. When the “massive” walls collapsed they were inclined to fall into the spaces left inside on the north where material had not necessarily built up. The different times of collapse might simply have been due to the difference in relative strength between the large and small walls. Or, people may have deliberately demolished the walls. If so, it seems more likely that the larger walls were pushed into the spaces they defined. This might indicate in turn that the area to the south and east was out of use and the spaces in this structure already backfilled. But at the time of writing, this hypothesis remains speculative.

### **Phase IX: Late Period Cemetery**

This phase represents Late Period activity after the abandonment of the main settlement. It is well documented that the northwest part of the site became a large cemetery, apparently focusing upon and radiating out from the Wall of the Crow. (Details of this cemetery in our Western Compound operation area can be found in Kaiser, Chapter 18, this volume, and Kaiser 2009b).



Figure 11.9. Threshold [30,613] in the southwest corner of Room B dating from Phase VII. It abuts the western face of wall [30,604]. The hole in the foreground on the left was Burial 473. View to the south. Photo by Rabea Eissa Mohamed.

In summary, 32 burials or possible burials were distributed fairly evenly throughout the area, with no obvious patterning. All Late Period burials in the area cut through the Old Kingdom abandonment deposits, indicating that no structural elements of the site were in use, or visible, at this time.

#### **Phase X: Modern Activity**

This phase is represented by the build-up of aeolian sand that covered the whole area of the trench. Often this sand was mixed with silt and formed a crust, or erosion surface. Pitting might be attributable to animal activity or possibly early undocumented archaeological work. This would suggest that the site was exposed at this level in recent times.

#### **Conclusions**

The 2009 season's excavations in the Western Compound area have been largely inconclusive, at least in terms of solidly establishing the stratigraphic relationships between the Western Compound, the main site (to the east of the Enclosure Wall), and the Chute area to the immediate south.

This is due largely to delays caused by the presence of numerous Late Period burials throughout the area, which prevented the excavation team from getting the depth of stratigraphy required to ascertain these relationships. Likewise, little can be said about the actual function of the Western Compound for the same reason.

However, the excavations highlighted a number of significant findings. For example, sections given by the Late Period burials across the area, while holding back the overall depth and exposure of the archaeology, did provide a useful window into the underlying stratigraphy, enabling us to at least get a cursory understanding of the chronology of the area.

We can say that the area of the Western Compound crossed by our transect does not show any evidence for major structural phases below that which was seen in plan and excavated this season. Furthermore, many of the deposits that underlay later structures appear to be large-scale artificial dumps displaying telltale tip-lines, which are increasingly common towards the eastern side of the area close to the Enclosure Wall, suggesting that this area needed to be built up more than the west. People saw the need to level the natural slope of the underlying ground, which rises toward the base of the nearby *gebel* to the west in preparation for the development of the area.

Two phases of construction were identified. The first was the large square limestone enclosure that dominates the northern half of the Western Compound. The function of this structure remains a mystery, but the scale of the walls suggests that it was a major building or enclosure. It appears to have been there for some time before the lighter structures of the second phase were built abutting the outside southern wall.

## **Acknowledgments and Credits**

The team included Ahmed Mohamed Sayed Ahmed, Ahmed Shukri Mohamed Omar, Hoda Mohamed Meraazi, Hussein Rekaby Hamid, Mansour el-Badry Mustafa Ali, Mohamed Ahmed Abd el-Rahman, Nagwan Bahaa Fayez, Noha Hassan Bolbol, Shimaa Montaser Abu el-Hagag, Waleed Semida Sabir, Freya Sadarangani, Essam Mohamed Shehab, and Rabea Eissa Mohamed.

## 12. Excavations in the Chute Area, 2009

Ashraf Abd el-Aziz

**I**n AERA's 1999–2002 marathon seasons (the Millennium Project), while clearing the sandy overburden on the west side of the site, we exposed the top of two parallel limestone walls that formed a passage, which we dubbed “the Chute” (Lehner 2007: 41; here fig. 12.1). Starting about 12 m west of the only opening in the Enclosure Wall surrounding much of the settlement, the Chute curves to the northwest for a distance of about 40 m and disappears on the northwest at the limit of our clearing (see fig. 9.2).

This season, with the assistance of Noha Hassan Bolbol, Amy McMahon, and May Al-Haik, I excavated three north-south trenches perpendicular to the Chute (figs. 12.2, 12.3). Our goals were to determine the stratigraphic sequence of the Chute and its phases, the Chute's function, and its relationship to adjacent features in the settlement. We hoped to learn how the Chute was related to the Enclosure Wall and to Main Street, which ends at the West Gate in this wall. We also aimed to ascertain the

function of the open area between the Chute and Main Street. In addition, we wanted to see if the Chute turned north to feed into the gate in the Wall of the Crow, thinking it could be a major conduit into the settlement. Our final goal was to examine the unique orientation of the Chute. It runs diagonally northwest-southeast at roughly 30° north of west, while the site's main transportation corridors run more or less north-south or east-west. Why does the Chute not conform to the expected layout?

The two parallel walls of the Chute, each approximately 1.45 m wide, form a passage 2.40 to 2.80 m wide. The walls are built of uncoursed limestone blocks, with two skin walls holding a core of mixed material, including stone, sand, and broken pottery.

Trench A, located 11 m west of Trench B along the length of the Chute, measured 12 m long × 2 m wide × 81 cm deep (fig. 12.3). Trench B, just beyond the east end of the Chute, was located in order to explore the open area



Figure 12.1. The parallel limestone walls of the Chute showing on the surface of the HeG site. Ashraf Abd el-Aziz (with white drawing board) stands on the southern wall of the Chute. The eastern end of the Wall of the Crow shows in the background. Photo by Jason Quinlan.



Figure 12.2. The Chute and excavation trenches. Beyond the far end of the Chute, Main Street and the Enclosure Wall appear in the background. The photo clearly shows that the Chute seems to lead right into Main Street via an opening in the Enclosure Wall. View to the east. Photo by AERA team member.

between the Enclosure Wall and the Chute. It measured 12 m long  $\times$  2 m wide  $\times$  55 cm deep. In order to determine if there was an older chute, we excavated a small probe in Trench B, 2 m east-west  $\times$  1 m north-south and about 2 m below the base of the Chute walls. Trench C, 8 m west of Trench A, measured 11 m long  $\times$  2 m wide  $\times$  80 cm deep. In order to determine the trajectory of the Chute on the west—that is, to see if it turned north in the direction of the Great Gate in the Wall of the Crow, a portal into the settlement, or continued in a northwesterly path—we excavated two squares (3.035–36) to the west. We exposed the top of the Chute walls, but because of the plethora of Late Period burials we encountered we halted excavations at around 18.50 m above sea level (asl).

The stratigraphy of the Chute has so far revealed ten phases of discrete activity (table 12.1).

### Phase I: Dumping

We saw Phase I mainly in the small exposure of the deeper probe of Trench C (fig. 12.4). Here, at a level of 15.22 m asl, alluvial silt fragments [30,766] sealed windblown sand [30,767]. Mark Lehner suggested the alluvial silt may have been dumped from the silt laden valley floor, about 300 m to the east (personal communication 2009). A very thick deposit of windblown sand [30,765] sealed the alluvial silt. The sand, in turn, was sealed with a very thick deposit of sandy *tafla* gravel [30,764], which appears to have been

**Table 12.1. List of Phases**

Phase I	Dumping
Phase II	Pre-Chute Occupation
Phase III	Chute Construction
Phase IV	Chute Occupation
Phase V	Possible Collapse from Chute Walls
Phase VI	Latest Occupation
Phase VII	Large Scale Collapse
Phase VIII	Late Period Burials
Phase IX	Final Disuse of Area
Phase X	Modern Activity

dumped because it contained lenses of sandy *tafla*, of varying sizes, with some cultural inclusions. We suspect that the gravel may have been dumped from the west as it slopes down towards the east (17.03–16.73 m asl) in tip-lines. The gravel may be from quarrying the Maadi Formation to the west.

We include in Phase I a deposit of crushed limestone [30,736] containing cultural material that we found in Trench C. This may have also been debris from quarrying or limestone workshops to the west. The northern part of our exposure of this deposit showed a trampled surface [30,716].

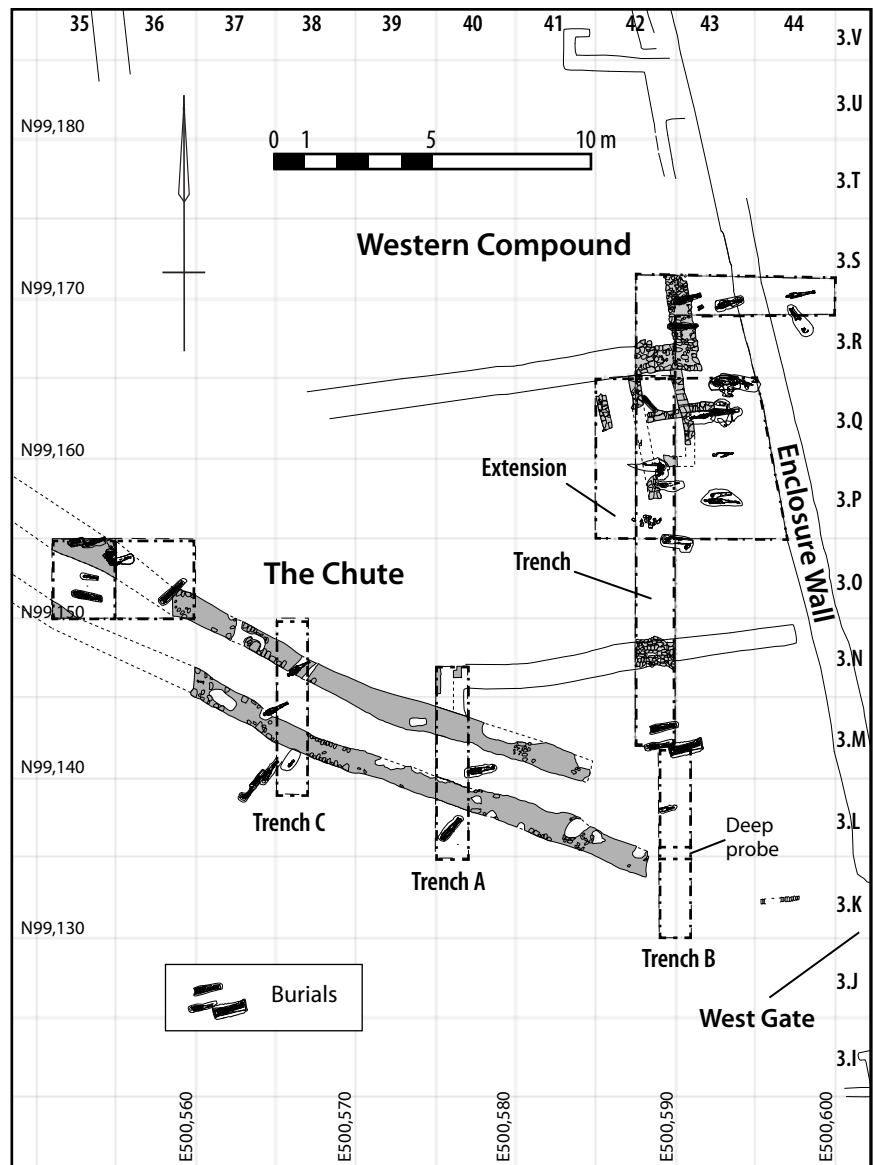


Figure 12.3. Overview of the Chute and Western Compound areas. Map prepared by Camilla Mazzucato, AERA GIS.

### Phase II: Pre-Chute Occupation

Phase II was represented by sequences of occupation deposits that pre-date the construction of the Chute. These included surfaces in Trench B ([30,761], [30,760], [30,753], [30,756 = 30,742], [30,733], and [30,734]), and in Trench A ([30,712], [30,770]). At this point we do not know how this phase relates to site-wide phasing, whether these surfaces are contemporary with the Enclosure Wall or whether they pre-date it. We found no pre-Chute architecture in Trenches A, B, and C. Although this may be due to limited exposure, it could also suggest that before the construction of the Chute this was a large open area. Animal bones—a few larger than 10 cm—littered the pre-Chute surface [30,753]. Richard Redding (personal communication 2009) identified the bone as sheep and goat. Analysis of these bones may reveal evidence of butchering.

A deposit of compact sandy limestone gravel [30,742 = 30,756] lay exposed for some time and formed a surface.

This deposit sealed an earlier deposit [30,753] that may have also been exposed for some time, forming a surface. It contained bones of cattle, sheep, and goat (Redding, personal communication 2009).

In Trench A we recorded the surfaces of deposits [30,712] and [30,770] to the south of and within the Chute, underlying the southern Chute wall. These deposits were very similar to a limestone gravel surface of Main Street that we found in Squares 4.K-L 9 and 11, 4.K8, and 4.K13 (Abd el-Aziz 2007).

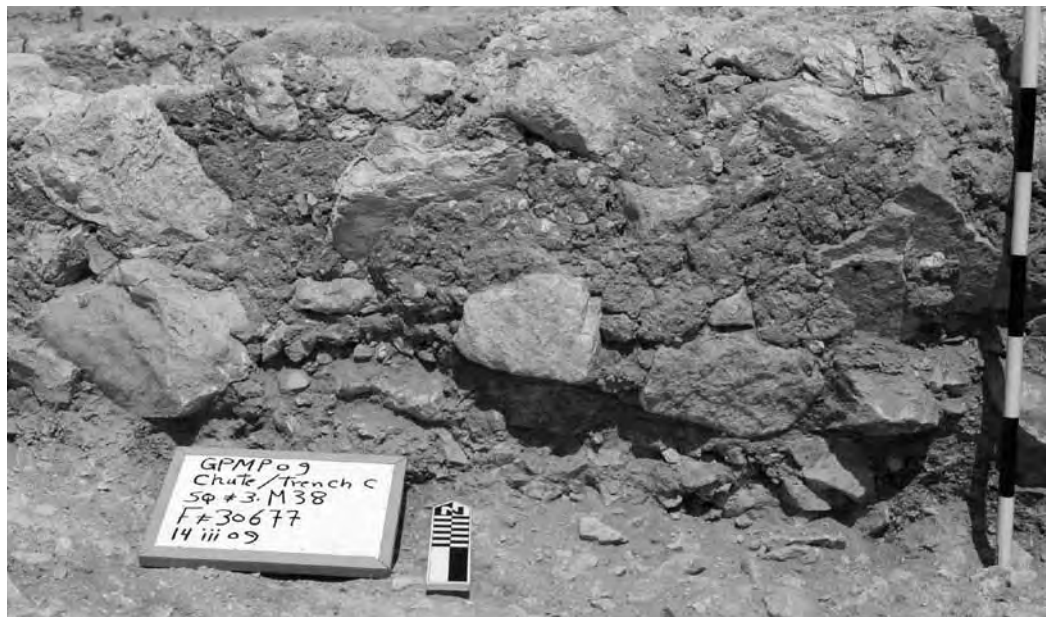
### Phase III: Chute Construction

Builders constructed the two Chute walls ([30,677] and [30,679]–[30,750]) from roughly hewn limestone. They built two casings, 20–35 cm wide; then filled the wall core with limestone, sand, *tafla*, sherds, crushed limestone, and occasional fragments of red granite, alabaster, and dolerite fragments (fig. 12.4). They shoddily bonded the faces of the





Above: Figure 12.4. Trench C, east section of the south wall. View to the east. Photo by Ashraf Abd el-Aziz.



Right: Figure 12.5. Trench C, south face of the north wall. Photo by Ashraf Abd el-Aziz.

walls to the wall core and then rendered the wall faces with *tafla* or sandy silt (fig. 12.5). Elsewhere, where we exposed the tops of the ruins of the Chute walls, we saw that deposits with many ceramic fragments filled the core of the walls (fig. 12.4). It is possible that the deposits fill pits cut into the wall, or, were an intentional fill between the outer wall casings.

The Chute is 2.65–2.70 m (about 5 cubits) wide and its walls survive to a height of 81 cm. The Chute walls are 1.40–1.45 m thick, within the same range of thickness (1.30–1.57 m) as the walls within the Gallery Complex (see fig. 9.1). However, the Chute walls are wider than the field-stone walls along the section of Main Street extending west of the Galleries.



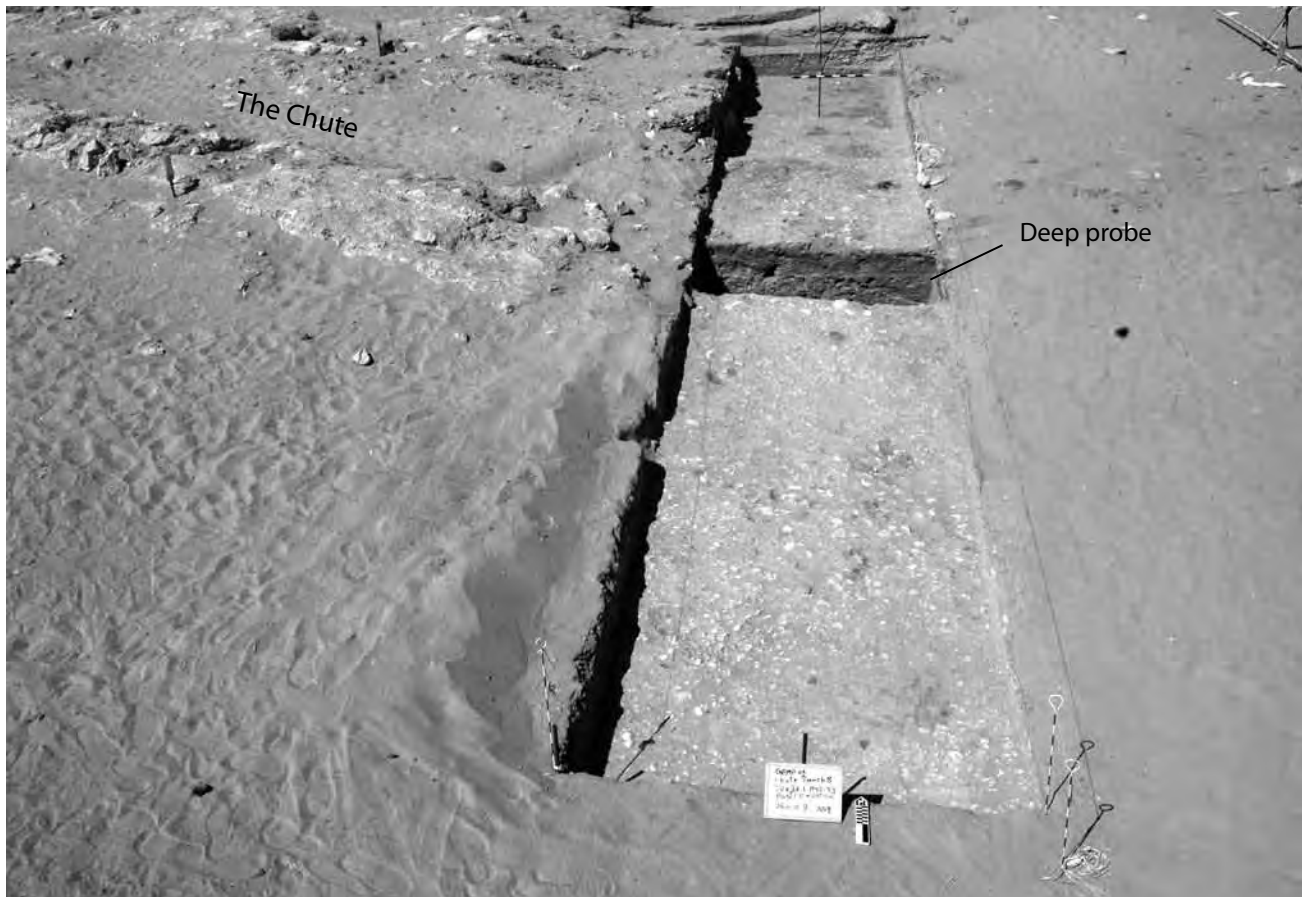


Figure 12.6. Trench B. No traces of the Chute walls appeared in this trench. View to the north. Photo by Noha Hassan Bolbol.

In Trench A, builders erected the Chute walls on the uppermost surfaces of the previous phase, and in Trench C, on crushed limestone. The use of the previous surfaces may have continued, in part, after the construction of the Chute. In Trench A, we found a clear opening through the northern Chute wall, indicating that there had been an access into the Western Compound. North of the opening, in the northern part of Trench A, we uncovered two mudbrick walls, [30,775] and [30,776], which may have formed a narrow north-south corridor, 80 cm wide. But we could not determine if this structure related in some way to the opening in the Chute. At some point the opening seems to have been deliberately blocked. But we did not fully investigate the deposit before the end of the season. It might be nothing more than collapse of the northern wall of the Chute.

We found no evidence of the Chute within Trench B off the eastern end of the Chute walls (fig. 12.6). Either the Chute terminated here, to the west of Trench B, or the walls have been entirely eroded or robbed. The Phase IV occupation sequence could be part of a pre-Chute occupation (Phase II) and the Phase V collapse could represent robbing or erosion debris.

At the western end of Square 3.035 we exposed two limestone lumps on the same axis as the Chute walls,

indicating that the Chute extended as far west as Square 3.034. We found no indication that the Chute curved and turned north toward the gate in the Wall of the Crow as previously thought (see fig. 9.2). As such, the Chute does not seem to link up with the north-south wall that forms the northwestern corner of the Western Compound a short distance southeast of the gate in the Wall of the Crow. Instead, the Chute seems to continue farther to the northwest, and may have functioned as a roadway providing access from the northwest into the main settlement. However, to completely confirm this, further excavation is required. This road may have been made at the same time that the Western Compound was built in order to direct traffic around the compound.

#### Phase IV: Chute Occupation

Since we found no traces of the Chute walls in Trench B, we do not know whether certain surfaces ([30,748], [30,704], [30,707], and [30,720]) found there relate to the Chute occupation or pre-date the construction of the Chute. (However, we do know that those deposits that contained animal bone ([30,753], [30,742 = 30,756]) do predate the construction of the Chute walls; see above).

In Trench C, we found between the walls of the Chute a surface of compact, sandy limestone gravel [30,747] that



Figure 12.7. Trench C with the rough metallized surface exposed. View to the north. Photo by Ashraf Abd el-Aziz.

lipped up onto the southern face of the northern Chute wall (fig. 12.7). It was a rough metallized surface at the same level in Trench c (18.08–13 m asl) as the pre-Chute surface [30,770] in Trench A (18.06–13 m asl).

South of the Chute we uncovered surfaces, both rich in silt [30,696] and in limestone gravel [30,710]. The fact that people prepared surfaces here is potentially significant. They clearly did not intend the area to be “dead space,” but used and maintained it until refuse from the Western Dump (a trash midden at the western edge of the settlement) encroached on it. About 78 cm south of the Chute, we found a firing pit [30,724], around which the floor was scorched red. A black ashy deposit [30,717], very rich with the remains of burnt organic materials, filled the pit.

We found large deposits of reddish burnt soil ([30,695], [30,703], and [30,715]) south of the southern wall of the Chute. These dumped deposits respected the southern face of the southern Chute wall and underlay material ([30,676] and [30,700]) that had collapsed from the Chute wall. Thus, the material landed here while the Chute was still standing and possibly still in use. This dump was very rich in ceramics, but no wasters were found to indicate it was pottery manufacturing waste. Rather, it derives from the daily life activities of the main settlement, such as waste from cooking and heating, which probably tumbled down from the Western Dump.

In Trench c we found evidence that workers fired gypsum in a pit [30,768] located approximately 1 m north of the northern Chute wall. The western side of the pit was coated with yellow *tafla* plaster [30,771], most of which had become scorched reddish because of the firing inside the pit. The raw material of gypsum is a gypsum crystal mixed with *tafla*, as seen in the natural veins in the local limestone of the Maadi Formation outcrop (the Gebel el-Qibli) to the west of the site.

#### **Phase V: Material Possibly Collapsed from the Chute Walls**

This phase included a localized area of limestone collapse [30,702 = 30,712 = 30,722] from the northern limestone wall of the Chute, which we only found in Trench b.

#### **Phase VI: Latest Occupation Phase in the Chute Area**

Three beaten silty-sandy patches ([30,797], [30,798], and [30,711]) remain from what probably was the latest occupation phase in the Chute area. We exposed a similar surface of this same phase in Trench b.

#### **Phase VII: Larger Scale of Collapse**

Limestone that collapsed from the Chute walls littered the whole area. The collapsed material ([30,676] and [30,700])

respected the southern face of the southern Chute wall [30,677] and the northern face of the northern Chute wall [30,679]. The inside of the Chute was filled with sandy limestone collapse ([30,678], [30,688], [30,706], and [30,725]) 80 cm thick. Lenses of marl (*tafla*) plaster ([30,678] and [30,688]) that overlay and sealed the interior Chute surface indicate that the Chute walls collapsed as a sheet, marl-plastered face first. Perhaps one catastrophic event toppled the walls while the Chute was still an active passageway.

We found similar evidence of a single collapse, rather than gradual deterioration, with the walls of Main Street between Gallery Sets II and III (Abd el-Aziz 2007). We can tell that the collapse inside the Chute came from both the north and south Chute walls because it sloped from north and south down into the center of the Chute. The collapsed material to the north and south outside the Chute was stony, likely deriving from the faces of the walls. The collapsed material inside the Chute ([30,678], [30,688], [30,706], and [30,725]) included stony material with *tafla* lenses, sand with limestone and pottery, and limestone lenses. The material from the core of the Chute walls, therefore, collapsed into the Chute interior after the wall casings toppled into the passageway. This limestone collapse contained chunks of red granite of various sizes, small dolerite and alabaster fragments, and pottery as part of the construction material of the Chute walls.

In Trench A to the north of the Chute, collapsed limestone material [30,680] sealed collapsed mudbrick debris [30,681]. Loose, fine clean sand with ceramics and small stone fragments ([30,691 = 30,692] and [30,675]) sealed the limestone collapse to the south of the southern Chute wall.

### Phase VIII: Late Period Burials

During the Late Period, the Chute area was used extensively as a cemetery. We encountered five burials in Trench B, three in Trench A, four in Trench C, one in Square 3.L37, one in Square 3.036, and seven in Square 3.035 (on the burials see Kaiser, Chapter 18, this volume).

### Phase IX: Final Disuse of the Chute Area

This phase contained loose, fine sand ([30,683] and [30,690]) that sealed the Late Period burials in Trench B.

Wind, or possibly rainwater washing off the slope of the escarpment just to the west, deposited the sand over the area.

### Phase X: Modern Phase

This phase was represented by an irregular cut [30,743] that workers carved in 2002 while excavating the surface to expose the top of the Chute walls.

### Conclusions

Our excavations found no obvious connection between the Chute and animal herding and slaughter. We determined that the space between the Chute and West Gate in the Enclosure Wall was an open area. Here a series of trampled surfaces had formed upon layers littered with sheep and cattle bone. The bone might indicate that people slaughtered livestock in front of the gate, but the Chute would have played no role in moving the animals here since it was built later. The walls stand upon the later trampled surfaces and therefore date after the layers that contain the animal bone.

In our 2009 excavation, we were not able to resolve the issue of the Chute's destination on the west. If it turned and ran north to the gate in the Wall of the Crow it could be part of a conduit into the town from the massive stone wall to West Gate and Main Street. The lumps of stone we uncovered in Squares 3.035 and 3.036 seem to indicate that the wall continued its northwest-southeast trajectory too far to turn and align with the gate in the Wall of the Crow, but we were unable to fully excavate the area because of the many Late Period burials that turned up near the end of the field season.

In our deep probe in Trench B we discovered one of the most significant findings of the season. Below the base of the Chute walls, below the animal bone layers, at a level well below the floor level of the Gallery Complex to the east, the probe showed thick dumped deposits of desert clay. People had intentionally remodeled the landscape with fill layers, not just in this immediate area, but apparently in much of the Western Compound as well (Taylor, Chapter 11, this volume).



### 13. Bakery or Brewery in House Unit 1?

Mark Lehner

The rising of the water table between 2005 and 2008 flooded the depression we call the Lagoon in Area sfw (Soccer Field West, fig. 13.1) of the Heit el-Ghurab (HeG) site (see fig. 9.1). The risen ground water saturated that adjacent part of the ancient settlement we call the Western Town, including House Unit 1, making it difficult to continue the building excavations that we had carried out from 2004 through 2007. The fact that the water table was lowered several months before the 2009 season allowed us to resume work on House Unit 1.

House Unit 1 is the largest house we have so far found on the HeG site, covering 400 m<sup>2</sup> with approximately twenty rooms or spaces. Some rooms are very large (e.g., 8.5 m × 3.5 m), and a few display remains of red and black paint on the base of the plastered walls. The features include a double sleeping platform in the master bedroom, as well as different kinds of storage bins and well-laid floors (GOP3: 87–91).

Since 2004, we have referred to a rectangular series of chambers on the east as the “bakery” because of what appeared to be outlines of ceramic vessels and vats in a dark ashy fill of the chambers (GOP1: 34). By 2009, the eastern bakery remained the last unexcavated component within what we defined as the boundaries of this house. So that season Yukinori Kawae, assisted by Manami Yahata, resumed the excavations of House Unit 1 that they had carried out over four seasons between 2004 and 2007. Freya Sadarangani supervised work from the middle to the end of the season, with advanced Field School students Hussein Rekaby Hamid and Ahmed Shukri Omar supplementing the team. Sadarangani and Kawae describe their excavations in the following chapter.

The boundaries between what we have designated as houses (1, 2, and 3) in the Western Town are not entirely clear. None of these “houses” stand completely free and clear of other walls (fig. 13.1). We designated separate units on the basis of long runs of walls that are comparatively thicker. The wall separating the bakery from the rest of House Unit 1 is 64 cm thick, which is equal to the thickness of what we have taken as the southern boundary wall of House Unit 1. The southern wall of the bakery, 62–65 cm thick, is a continuation of this southern wall of House Unit 1. The eastern wall of the bakery is badly truncated, as though someone trenched along it, leaving its northern extent unclear. Traces of this wall show from the southeastern corner northward to Square 6.J6, where it is com-

pletely cut away. Where we can measure, it is 46–50 cm wide; less substantial than the western and southern walls of the bakery. Strictly speaking, the possibility exists that the bakery is part of structures that continued farther east.

Since 2004, when the team first exposed this area by removing the sandy overburden and scraping the surfaces of the settlement ruins, we could see vats, pot emplacements, and hearths within the dark ashy fill of five small chambers that subdivide this rectangular bakery complex (fig. 13.1 inset). The interior extends 9.65 m north-south and 4.80 m east-west. Measured from the outside edges of the walls, the bakery is 10.80 m long (north-south) and 6.10 m wide (east-west). Note that if we measure from the interior face of the western wall to the exterior face of the eastern wall (where discernible on the south), the width of the bakery is 5.25 m, exactly 10 cubits. A similar measurement for the length gives around 10.18–10.35 m. It is probable the intended length was 20 cubits (10.50 m).

Due to time constraints, the team was unable to complete the excavation of this eastern part of House Unit 1 in 2009. Still, they identified at least four phases of remodeling and occupation, exposing structures of the uppermost, latest occupation phases. These features must stand on floors at higher elevations (16.91 m asl) than the floors (at 16.31 m asl) in the much more spacious rooms of House Unit 1. The occupants may have allowed waste ash to accumulate within the eastern chambers, unlike their well-maintained rooms to the west.

In the later periods that people used these chambers, it appears that only one entrance gave access into the complex at the far southern end of the western side. This doorway opened from the end of a corridor running along the south of House Unit 1. Another entrance must exist because at some point someone knocked through the north-south center wall to allow access from the southwestern to the southeastern chambers. The southeastern chamber must have been initially accessible from an entrance on the eastern side.

The room on the north spanned the width of the bakery. Kawae and Sadarangani describe the oven and a vat side by side in the southwestern corner of this room. These features became embedded in a layer that filled a rectangular bin, 1.56 m wide (north-south) × 3.38 m long (east-west), which the occupants built later along the southern and western sides of the room using a single line of bricks

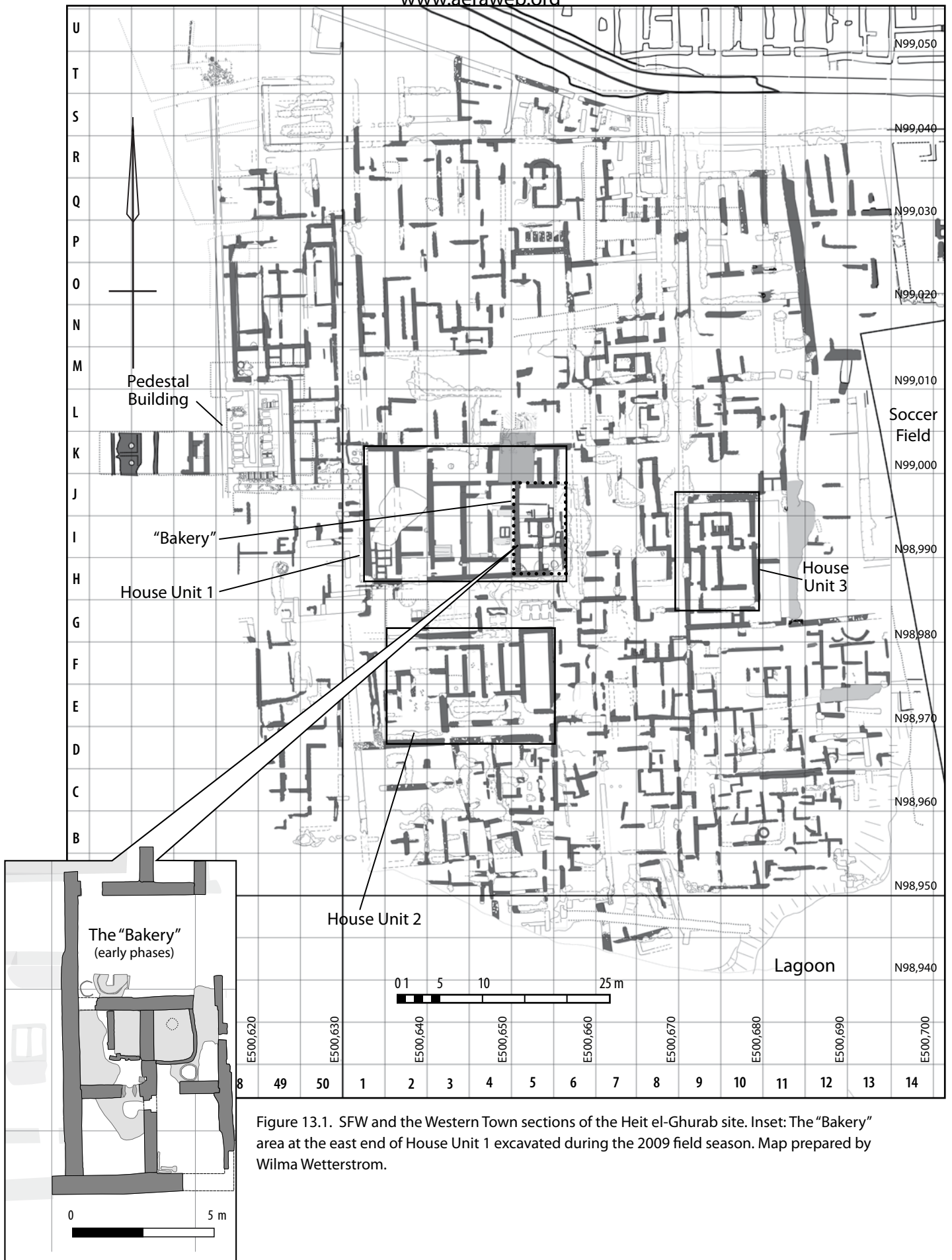


Figure 13.1. SFW and the Western Town sections of the Heit el-Ghurab site. Inset: The "Bakery" area at the east end of House Unit 1 excavated during the 2009 field season. Map prepared by Wilma Wetterstrom.

to make low northern and eastern rims. Later still, they made a smaller bin with a hole in the center, in which they had once stuck a small vat, 1.07 m × 38 cm, against the eastern side of the large one. Eventually the room filled, and within a higher floor level the occupants built another small bin, 70 cm long (east-west) × 70 cm wide (north-south), directly over the top of the oven, the vat, and the large bin. Such rebuilding and accumulation is why the latest floors within the bakery are higher by 60 cm than the other floors across House Unit 1.

Cross walls divide the southern area of the bakery into four smaller chambers of near equal size to one another. The two northern of these four chambers, which take up the middle strip of the bakery, contain more low bins with low outer rims of a single course of bricks. The bin in the eastern middle room was more like a basin, with a sunken floor sloping down to a center hole where the occupants probably stuck a small pottery vat. Another vat—still in place—and a smaller set of two bins were added later in the narrow floor space between the basin and the southern and eastern walls of this chamber.

Kawae and Sadarangani point out that the basin, vat socket, and small bins in the eastern middle room are very similar to installations in the bakery we found east of the Pedestal Building in Area AA during our 2006 and 2007 field seasons (*GOP3*: 70, 75–77, figs. 30, 35). This chamber in the House Unit 1 bakery must have had the same function as the basin and Bakery Room in Area AA. One hypothesis for this function is that it served in the malting process, a procedure in which emmer wheat or barley grains are sprouted in order to develop sugars. The grains are soaked in water and then spread out moist to allow sprouting, which activates enzymes that convert starches to sugars. The sprouted grain is subsequently spread out to dry in warm air so as to arrest the growth of the seedling before it consumes the sugars (Lehner 2009c). People might have used vats sunk into the floor of these basins for soaking grain, which they then spread out across the basin within the low rim, while excess water drained back to the vat in its socket.

The southern rooms seem to have been used for hearths rather than bins and basins. Scorching in the southeastern corner of the southwestern chamber may have resulted from a hearth during the later periods when people used this chamber. They allowed ash with pottery and bone to fill the corner. In the northwestern corner the team found a simple platform, 55 cm wide, made of two pieces of limestone and one of granite. In the southeastern chamber people lined a hearth with mud accretions, 65 cm long against the southern wall and 85 cm long against the western wall. The structure of this hearth is very simi-

lar to that of the hearths built against the southeastern corners of the bakeries we excavated in 1991 in the northern end of Gallery IV.11 in Areas A7d and A7e (*AERAGRAM* 1996; Lehner 1992: 8–9, fig. 8; 1993: 60–65). Like the A7e hearth, this one may feature large objects added at the ends of the accretions; namely, a fragment of limestone on the northwest and a large pottery sherd on the southeast. But we will not know until we can complete the excavation of this hearth in a future season. However, the bottoms of two or three upside-down bread pots show in the ashy fill along with a piece of the dark, hard stone called dolerite. One of the bread pots might form an outer fourth (northeastern) corner post of the hearth, like the hearth in the western (A7d) of the two bakeries we found in 1991.

### **Bakery or Brewery?**

The low bins and vats in the House 1 eastern complex lead to a suspicion that the bakery may have had as much to do with malting, hence brewing, as baking. Other evidence also suggests people might have devoted this complex to steps in the process of beer production. A long corridor along the southern side of House Unit 1 leads from the far southwestern corner to the only known entrance into the bakery. A set of eight more bins defined by very low rims are built into the southwestern corner of House 1 (Kawae 2009b: figs. 36, 38). Immediately south of this corridor the team excavated Pottery Mound and found that a preponderance of this massive dump of waste material consists of beer jar fragments (*GOP2*: 69–72). Although the main dumping that produced Pottery Mound appears to have occurred after the walls of the southern end of House 1 began to collapse (Kawae 2009b: 90–91), the preponderance of beer jars suggests they are waste from prior activity not too distant. The dumps of Pottery Mound covered a set of pedestals, similar to those in the Pedestal Building in Area AA. One set of hypotheses we proposed (see *GOP3*: 65–73, Lehner 2009c) is that jars and pedestals functioned together to effect evaporative cooling for malting, which requires a step during which the grain is kept cool and moist for sprouting. We found two more similar sets of pedestals in a court or open area south of the eastern end of the southern corridor of House Unit 1, and another south of its bakery (*GOP1*: 33, fig. 20).

If we could ascertain some degree of specialized work with brewing or malt production in the eastern end of House 1 or Area AA, these would be the first, and so far only, facilities for beer production that we have found across the HeG site, whereas we have found dozens of bakeries. It will be interesting to see how this evidence of specialized beer production associated with House Unit 1 plays out in our continued excavations.





## 14. Soccer Field West, House Unit 1, 2009

Freya Sadarangani and Yukinori Kawae

The structural footprint of House Unit 1 was first revealed during the large-scale Soccer Field West “scrape and plan” season in 2004. In 2005 Yukinori Kawae and Tove Bjork’s excavation of Pottery Mound to the south of the unit defined the stratigraphic relationship between that accumulation of rubbish and the collapse of the southern bounding wall of House Unit 1. During the 2006 season, Kawae, Chaz Morse, Banu Aydinoglugil, and Manami Yahata excavated the northern and western sides of House Unit 1 to ascertain its extent and the stratigraphic relationships between the unit and the westerly adjacent building—the Pedestal Building (also known as Area AA). In 2007 Kawae and Yahata excavated in the central portion of the house.

Prior to the 2009 season excavation we had established the following with regard to House Unit 1 (fig. 14.1):

- **The extent of House Unit 1:** The house is approximately 25 m (east-west) × 16 m (north-south), covering a total area of 400 m<sup>2</sup>.
- **The spatial configuration of most of the unit:** Within the central and western portions of the house we had exposed the spatial configuration of the building down on to the uppermost floors. Within these areas we revealed a total of thirteen spaces, or rooms, and corridors. These contain, amongst other features, an impressive bedchamber in the building’s central space, a distinctive bin filled with beer jars, an L-shaped bench, and a series of bins in the southwest corner. This left the area to the east (previously dubbed the “Bakery Area”) and the portion beneath a small unexcavated mastaba tomb less well defined.
- **The stratigraphic link between House Unit 1 and its neighboring areas:** We had established the relationship between House Unit 1 and Pottery Mound as well as the relationship between House Unit 1 and the Pedestal Building (AA) (see fig. 13.1).

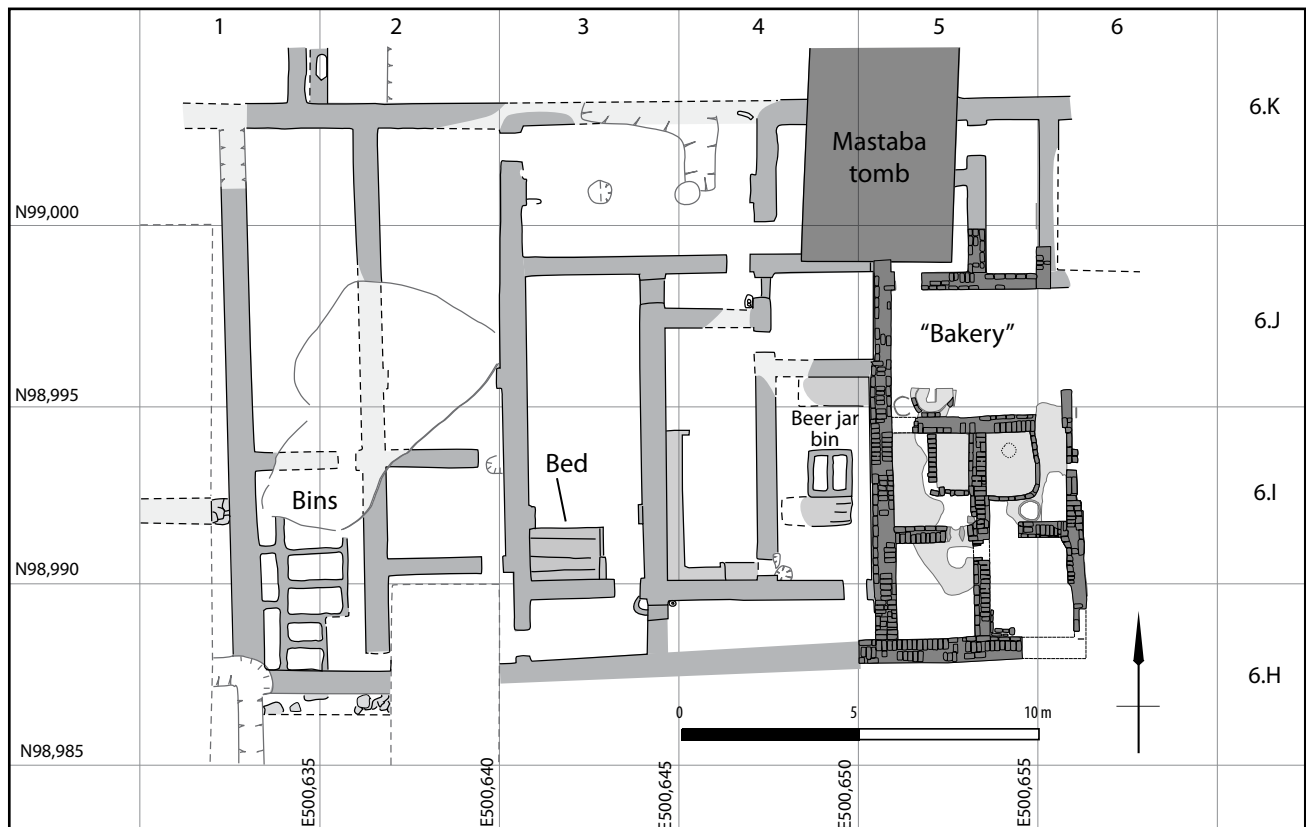


Figure 14.1. House Unit 1, SFW, Heit el-Ghurab site. Map prepared by Wilma Wetterstrom and Camilla Mazzucato.

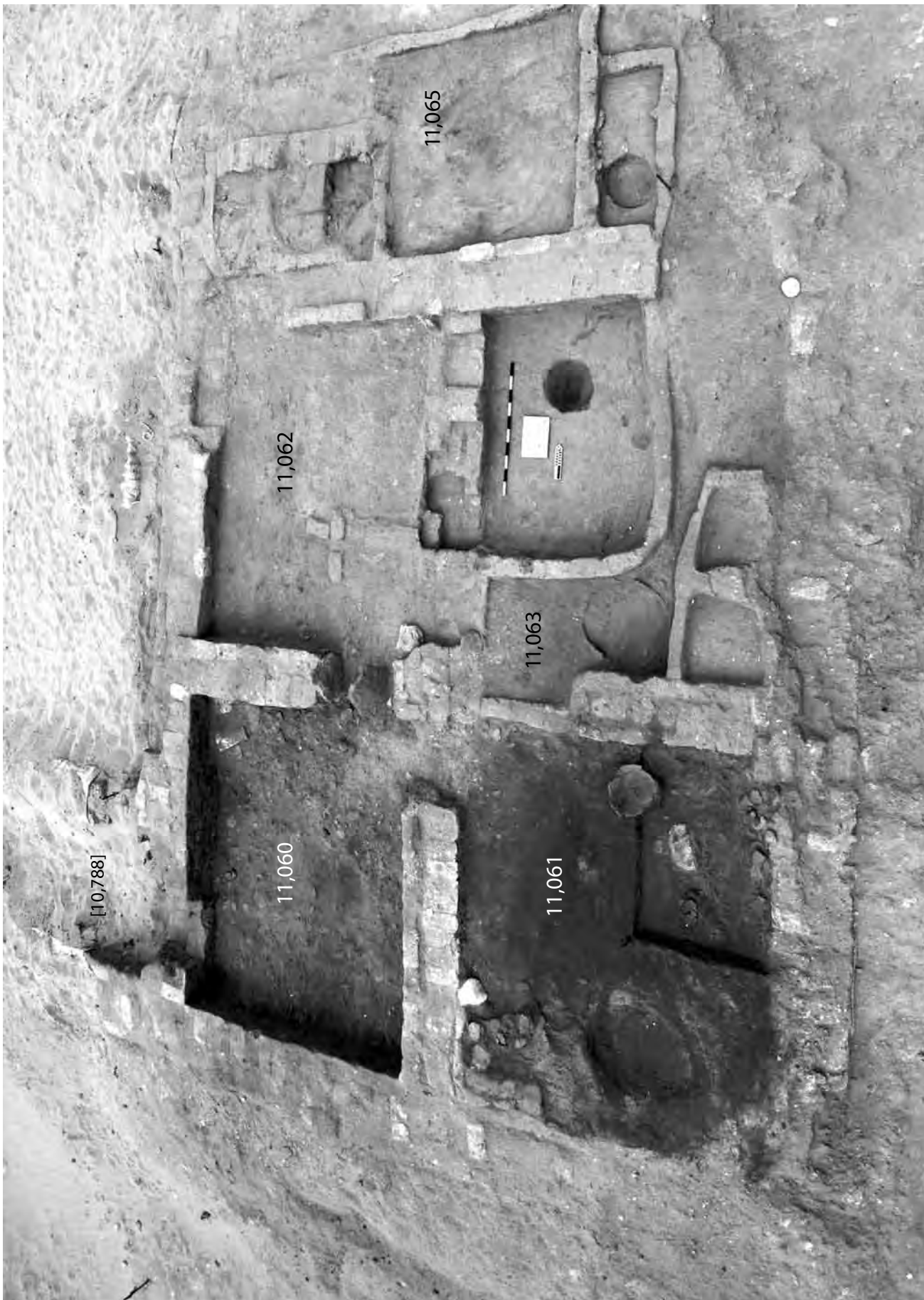


Figure 14.2. The "Bakery" at the eastern end of House Unit 1. View to the west. Photo by Jason Quinlan.

## 2009 Research Questions

Prior to 2009, the eastern end of the building, along with the portion beneath the unexcavated mastaba tomb, were the only areas within House Unit 1 where the uppermost surfaces had not been reached or the structural footprint not fully exposed. It was clear from the 2004 surface scraping that these spaces to the east were markedly different in content, character, and function than the rest of the building. Rooms filled with dark ash and pottery, hearths, and pot emplacements were all visible prior to excavation. In order to understand the house as a fully functioning unit, it was important to understand the eastern end better.

Specific research questions were generated by what could be seen on the surface. The presence of ash, hearths, and concentrations of pottery led to the hypothesis that this end of the unit functioned as a bakery. The fact that bread and beer production are so closely linked and the presence of numerous beer jars in the dump called Pottery Mound and in the aforementioned bin led to the idea that evidence of beer-making may also be present.

Sadarangani, Kawae, Yahata, and two Advanced Field School students, Hussein Rekaby Hamid and Ahmed Shukri Omar, supervised the 2009 excavations of House Unit 1. We focused at the eastern end of the unit, mainly within Squares 6.H5, 6.H6, 6.I5, 6.I6, 6.J5, and 6.J6 (fig. 14.1).

As of the end of the season we had reached and excavated the uppermost floors and uppermost occupation sequence within this area (fig. 14.2). We had also identified an underlying phase of structural modification to the building. It became clear that the eastern end of House Unit 1 had considerably more complex phasing than the main body of the house. To fully understand the function of these eastern rooms and the development of the building, we will need another season to excavate down and through the primary floors and features of this building.

## Stratigraphic Summary

The stratigraphy and phasing of the 2009 excavation have not yet been integrated with the excavations of 2006 and 2007. The following phases (table 14.1) are therefore entirely local, applicable only to the eastern end of the building.

Phase 1, the construction of House Unit 1, is a relatively arbitrary allocation since we did not reach the phase of construction. Phase 2 represents the earliest occupation so far reached in our excavations; Phase 3 is a phase of structural remodeling; and Phase 4 is a phase of occupation and use. Phase 4a represents a localized phase of remodeling solely within Space 11,065. Phase 5 represents the “abandonment” of the unit and comprises structural collapse, robbing of walls, and post-occupational dumping.

## Spatial Configuration: Phase 1

Our 2009 excavations did not reach the construction phase of House Unit 1, nor the earliest occupation sequence. Here Phase 1 represents the earliest observed structural footprint at the eastern end of the building, and Phase 2 represents the earliest reached occupation within that footprint. Further excavation will certainly expose earlier underlying occupation phases, possibly interspersed with phases of structural alteration. We hope to explore this underlying sequence in subsequent excavation seasons.

In total, the team exposed five spaces or rooms within this season's limit of excavation: 11,060, 11,061, 11,062, 11,063, and 11,065 (figs. 14.2, 14.3). These spaces were bounded on the south by the southern wall [21,579] of House Unit 1, 65 cm wide, and to the west by the long north-south wall [4655], which runs along the length of the building at 65 cm wide in the south and slightly narrower at 45 cm in the north. This western wall [4655] had formed the eastern limit of excavation in previous seasons. To the east, a mudbrick wall [31,254], 46 cm wide, seems to be the eastern boundary of House Unit 1. However, since the area to the east was so severely cut away, this was difficult to establish conclusively. The mudbrick wall [31,254] was truncated to the south, either by robbing or erosion, and had been entirely cut away to the north, in Square 6.J6.

Internal mudbrick walls formed at least five spaces or rooms. Space 11,060 measures 2.64 m (about 5 cubits) (north-south) × 2.20 m (east-west) and is located in the southwest corner of the area. In the southwest corner of Space 11,060, a stepped gap 58 cm wide (fig. 14.4), opening into Space 10,788 was the sole identifiable access linking the eastern end with the main building of House Unit 1. Another opening in the northeast corner, 58 cm wide, lead into Space 11,062. Two roughly hewn, large red granite stones were positioned within and bordering the access, [31,274] (fig. 14.5). These stones were set on edge, possibly to act as a support for a door frame.

**Table 14.1. Phasing of Eastern End of House Unit 1**

Phase No.	Description
1	Construction of House Unit 1
2	Earliest Reached Occupation
3	Minor Structural Alterations Additions
4	Occupation
4a	Localized Structural Alterations with Local Occupation (Space 11,065)
5	Dumping, Robbing, and Collapse of House Unit 1 (“Post-Abandonment”)

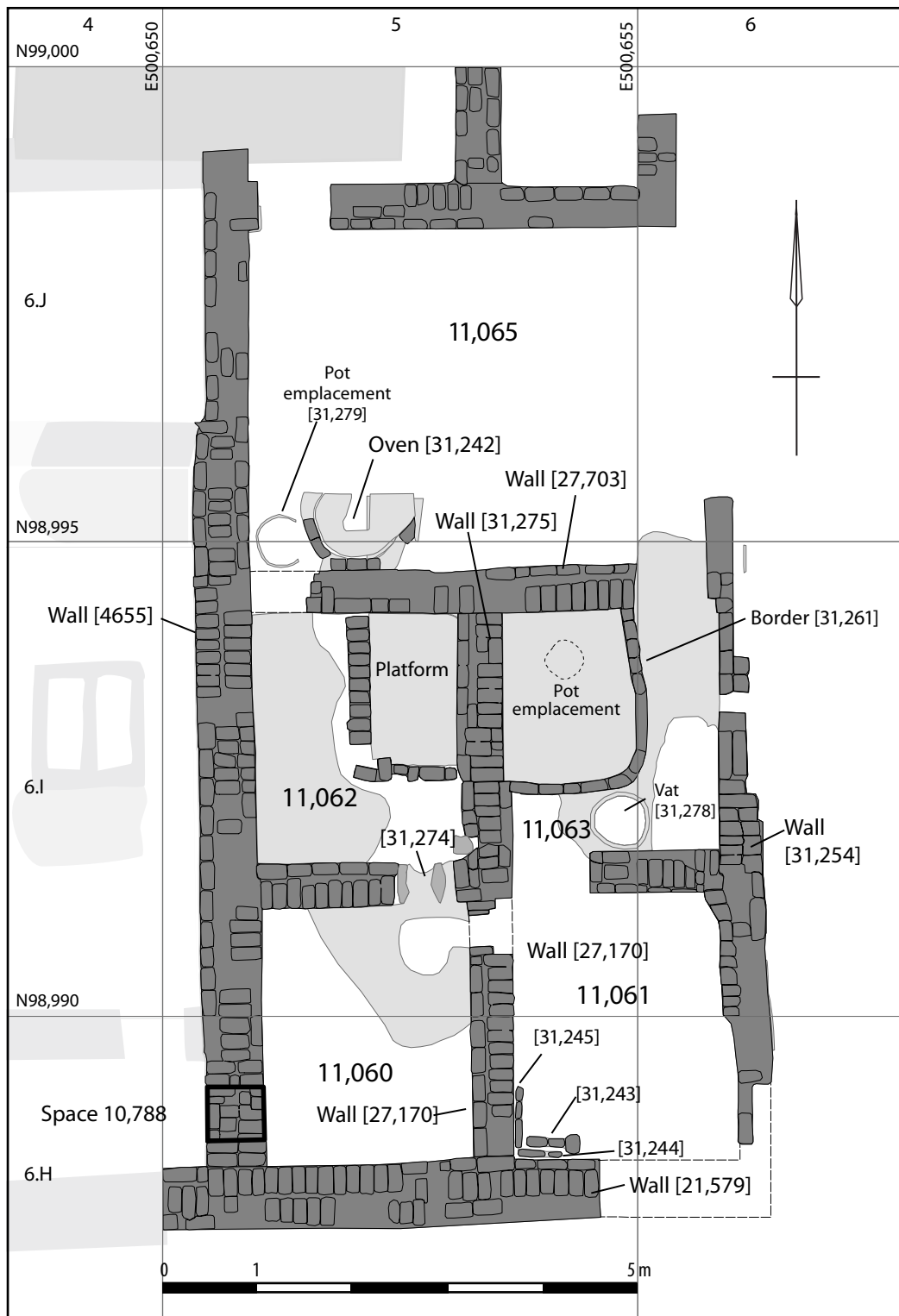


Figure 14.3. "Bakery" area of SFW House Unit 1 Phases 1 and 2 showing the structural footprint and earliest occupation that we reached. Map prepared by Camilla Mazzucato, AERA GIS.

To the north, Space 11,062 measures 2.64 m (about 5 cubits) (north-south)  $\times$  2.16 m (east-west). A limestone door socket within Space 11,062 was associated with the access south into Space 11,060, indicating that the door would have swung north into Space 11,062 (fig. 14.5). The team identified a rectangular structure, possibly a platform, in the northeast corner of the room that enclosed a

space 1.74 m (north-south)  $\times$  1.02 m (east-west).

Space 11,061 is located in the very southeast corner of the building. The room measures 2.80 m (north-south)  $\times$  2.20 m (east-west). An opening in the northwest corner of the room, 72 cm wide, gives access to Space 11,063.

To the north, Space 11,063 measures 2.56 m (a little less than 5 cubits) north-south  $\times$  2.28 m east-west. There



Figure 14.4. Manami Yahata (left) and Yukinori Kawae at work on one of the ash- and pottery-rich deposits filling Space 11,060. Kawae brushes the stepped gap opening into Space 10,788, the corridor behind him. View to the west. Photo by Jason Quinlan.

is an additional access in the northeast corner of the room, 76 cm wide. This leads north into Space 11,065. The team identified a slightly sunken area or basin in the northwest corner of the room. The base of this sunken space is approximately 20 cm deeper than the level of the surrounding surface. A curved mudbrick border [31,261] had been constructed around the top rim of the basin. This border enclosed a space 1.84 m (north-south)  $\times$  1.40 m (east-west), creating an eastern corridor 80 cm wide, and a southern corridor 66 cm wide.

To the north, Space 11,065 measures 4.10 m (east-west)  $\times$  3.40 m (north-south). The eastern and southern walls that bound this space had been extensively cut away.

Specific routes of access connected certain rooms in the original footprint of the building. In Phase 1 Spaces 11,060 and 11,062 were connected with no clear operational access from these rooms to the rooms on the east and north. Sole access into these two rooms originated from the building to the west, via the southern corridor (Space 10,788) (figs. 14.2, 14.3). These two rooms, therefore, should be viewed as spatially connected and possibly functionally associated with the main body of the building. Within this layout, Space 11,062 would have been the “back room” of the building and one of the most private spaces. The door socket and granite doorway support the idea that Space 11,062 was a “special” room, and that access into it was private or secured.

The rooms to the east and to the north were spatially unrelated to Spaces 11,060 and 11,062. These rooms must have been originally accessed from entrances either obscured by the unexcavated mastaba to the north or from the northeast, where the eastern bounding wall was entirely truncated.

### Platforms, Ovens, Basins, Hearths, and Vats: Phase 2

The function of Space 11,062 in the earliest phase that we reached in 2009 remains a little unclear. The rectangular structure in the northeastern corner of the room seemed to be the only defining feature or installation. Although we have not yet defined the details of this feature by excavation, it appears to be a platform with a flat top and a slightly clayey, silty sand floor with a length identical to the sloping “sleeping platform” in House Unit 1’s central space (Kawae 2009b: 89–90, fig. 37). The team recorded an ashy, pottery-rich deposit in the western half of the room, which at 16.62 m asl was commensurate with the level of the northeastern “platform.”

To the south, the room (Space 11,060) linking the corridor (Space 10,788) and Space 11,062 was filled with a spread of pottery that sealed a partially exposed marl surface. In the southeast corner of the room there were clear signs of localized scorching on the northern and western faces, respectively, of mudbrick walls [21,579] and [27,170].

To the east, in Space 11,061, the defining feature was a hearth located in the southwestern corner that showed signs of heavy use. The team identified at least three phases of use separated by two phases of structural consolidation or repair. Scorching on the north face and east face of walls [21,579] and [27,170], respectively, indicated the first phase of use. A north-south and east-west mudbrick border, [31,245] and [31,244], which abutted the earlier scorching, indicated the second phase. The northern and eastern faces of this border also show scorching. An added mudbrick border, [31,243], orientated east-west and abutting the scorching on the north face of border [31,244] indicated

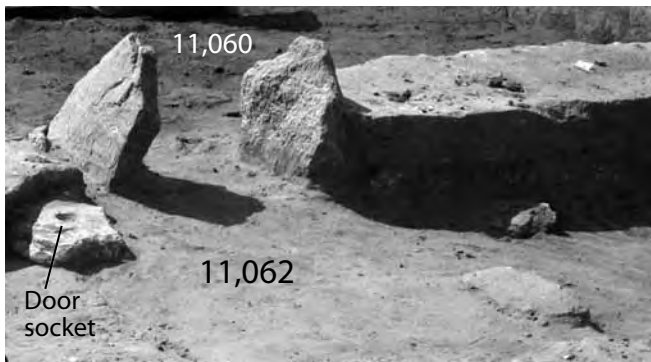


Figure 14.5. House Unit 1. An opening [31,274] in the south wall of Space 11,062 was lined with two red granite stones, possibly to act as a support for a door frame. The limestone door socket indicates that a door once stood here. View to the south-southwest. Photo by Manami Yahata.

the third phase. The north face of hearth border [31,243] was also scorched. Elsewhere in the room we halted excavation once we came down onto a level ashy, sandy trodden surface at 16.66 m asl.

Within Space 11,063 to the north we found clear evidence for some sort of “processing.” The team identified scorching on the north face of the southern wall associated with a large vat [31,278], 60 cm in diameter, set within the floor. The vat was associated with an ashy surface that spread throughout much of the corridor but was sealed by unexcavated features and a Phase 3 threshold, [31,176]. Within the basin, a sandy, clayey silt render had been applied to the mudbrick border, to the sides of the basin, and to the south and east faces of mudbrick walls [27,703] and [31,275], respectively. This render also formed the floor of the basin at an elevation of 16.39 m asl. At the northern end of the basin, the floor dipped down to form the lining of a robbed pot emplacement (fig. 14.6). This void had a diameter of 40 cm and a depth of 30 cm.

The features within Space 11,063, seen in conjunction with Space 11,061 to the south, were remarkably similar to the footprint and installations recorded within the AA East Bakery Complex (GOP3: 70, fig. 30, 75–77, fig. 35). Here too, a well-used hearth was located in the southern room (the Bakery Room), associated with an almost rectangular space (with a rounded corner) to the north (the Basin). Although not sunken, the Basin was demarcated using a relatively high clay lip to the south and to the west. In the center of the Basin, the AA excavation team found a plaster-lined pot emplacement. Within AA, these sets of associated features have been interpreted as elements of the bread-baking process, with the Basin used as a mixing area and the rooms to the south as the baking areas. Lehner (2009c) offered the hypothesis that these basins functioned with vats set into the center sockets for soaking and sprouting grain as part of the malting process.

To the north of Space 11,063, Space 11,065 was largely obscured by unexcavated Phase 3 architecture. At the northern end of the space it was clear that at least three surfaces, including marl, clay, and silt-rich floors, predated the Phase 3 bin walls. In the southwest corner, the

team partially exposed a circular oven and pot emplacement sealed by Phase 3 bin architecture. The circular oven [31,242] had a diameter of at least 1.34 m and a mudbrick surround with extreme scorching on the inside. The oven was filled with pottery and sandy silt containing moderate amounts of burnt mudbrick and occasional burnt pottery and charcoal. Immediately to the west of this was an associated *in situ* pottery vessel with a diameter of c. 50 cm [31,279] set within the floor.

#### **Bins, Access, Baking, and Brewing(?): Phases 3 and 4**

Phase 3 was characterized by a number of structural additions, mainly in the form of bin walls in Spaces 11,065 and 11,063. The subsequent phase of occupation (Phase 4) was characterized by a sequence of ash-rich deposits in Space 11,060; the use of the hearth in the adjoining room, Space 11,061; processing activities in Space 11,063; and the use of the newly constructed bins to the north in Space 11,065 (fig. 14.7).

Phase 3 saw a major change made to the flow of access through the house. In the southeastern corner of the building, the wall [27,170] dividing Spaces 11,060 and 11,061 was knocked through at the northern end, creating an access 54 cm wide that linked previously unassociated portions of the building. This “knock through” was not delicately done, leaving roughly cut bricks on either side.

#### **A Room Filled With Ash and Pottery**

A 25 cm-thick sequence of ash-rich deposits filled Room 11,060. This sequence was slightly different than the laminated, sterile ash deposits common to the bakeries elsewhere at the settlement. Rather, the deposits in Room 11,060 were thicker and relatively level. Many of the deposits were very pottery-rich; in some cases, sherds made up to 60% of the total deposit (fig. 14.4). The deposits were also remarkably rich in animal bone. We found a number of clay sealings in most of these deposits. Because all of these deposits were relatively level, they did not seem to result from a sequence of dumping events. It is possible that the material may have been dumped within the space





Figure 14.6. SFW House Unit 1 “Bakery” area. Freya Sadarangani studies the pot emplacement within the basin in Space 11,063. On the left the bins built in Phase 3 can be seen. View to the south-southwest. Photo by Mark Lehner.

and then subsequently become working, trodden surfaces. Midway through the ash and pottery-rich sequence, there had clearly been an attempt to lay a more formal marl surface.

Next door, in Space 11,062 to the north, the platform that had been operational in the northeast corner during the previous phase went out of use. Instead, a loose, silty sand surface spanned the room and sealed the platform.

To the east, in the access between Spaces 11,061 and 11,063, a mudbrick threshold [31,176] was constructed abutting the west face of the east-west wall [27,702] and the east face of the north-south wall [31,175]. The threshold comprised one row of stretchers and survived to one course high, commensurate with the height of wall [27,702].

#### ***A Kitchen? Hearths, Pits, and Pots***

The team identified an interesting assemblage of features within Space 11,061 of Phase 3 that seemed to smack of either baking or of a more general “kitchen” (color plate 7b). A trodden, thick, ash-rich surface had been laid down, spreading throughout the room. In the northeast corner we found an *in situ* jar [31,198] that had been placed on the underlying floor. The new ash-rich surface had then been piled up to the level of the rim of the jar. The jar was therefore functioning with this newly created surface and the hearth located in the southwest corner. A shallow circular pit, 80 cm across × 17 cm deep, cut into the southeast corner, may have held a pottery vat for mixing. In the hearth we found a deposit of mudbrick that seemed to function as a support for an *in situ* pottery assemblage within the hearth. The bases of two small upturned bread molds, a small dish, and one pot stand were embedded in the mudbrick-rich deposit (color plate 7b).

#### ***The Twin Bin***

Two bins were constructed in Phase 3, nestled in the southeast corner of Room 11,063. The common north-south wall of these bins bonded into two short east-west walls. The complete installation measured 1.40 m (north-south) × 60 cm (east-west). The southern bin space measured 44 cm (north-south) × 46 cm (east-west) and was slightly rounded at its northern end. The northern bin space measured 50 cm (north-south) × 44 cm (east-west). A clay mud render had been applied to the internal bin faces. The bin walls survived to 23 cm high. There was no indication of their original height. The construction of these bins marked the end of the previous hearth activity in the southeast corner. Their construction may also have marked the end of the use of the large vat.

After the bins had been built, the corridor around the basin was filled with make-up deposits, sealing the large vat. The leveling foundation was then capped with a clay floor that only survived as a small remnant patch to the north of threshold [31,176].

#### ***Multi-bins***

A series of bins was also built to the north in Space 11,065. These included a large rectangular bin, 3.40 m × 1.64 m, bounded on the north and east by thin mudbrick walls [31,231] and [31,234], both surviving 6 cm high. It is possible that the oven structure [31,242] (fig. 14.3) was constructed within and functioned with the large rectangular bin. A smaller rectangular bin, 1.06 m (north-south) × 40 cm (east-west), was adjoined to the larger bin on the east, and was bounded on the north and east by mudbrick walls

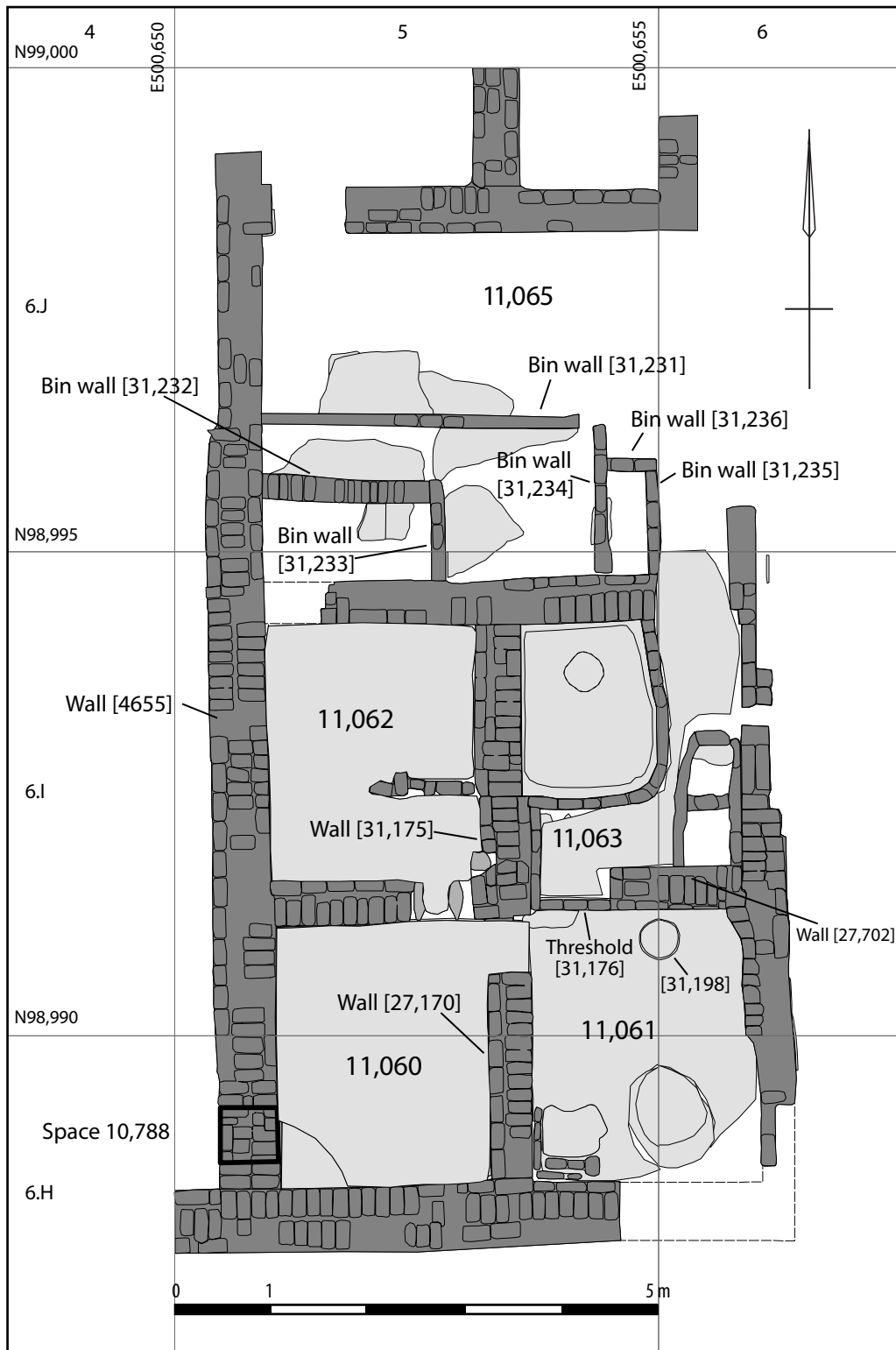


Figure 14.7. Phases 3 and 4 in the Bakery of House Unit 1 showing structural alterations and subsequent occupation. Map prepared by Camilla Mazzucato, AERA GIS.

[31,236] and [31,235]. The walls of this bin survived to 6 cm high. We found no indication of the original height of these walls.

In the southwest corner of the large rectangular bin, additional bin walls appeared to have been built after the initial construction of the large rectangular bin. These “new” walls, which were built c. 16 cm higher than the oven

[31,242], formed a smaller bin 1.76 m (east-west) × 70 cm (north-south), bounded on the north and east by bin walls [31,232] and [31,233]. The walls of this bin only survived to 6 cm high. Some of the mudbricks in the walls of this smaller bin were heavily burnt throughout, suggesting that they had been taken from the superstructure of the underlying oven. The larger rectangular bin and the later smaller bin in

its southwest corner both had clay floors. The team also found silty floors to the north of the large rectangular bin.

The absence of any formally created access into any of the bin spaces suggests that the walls of the bins must have been relatively low, or at least low enough to be stepped or bent over.

### ***Baking and Brewing***

In Space 11,063, the sunken basin continued to function in Phase 4. Its use was in some way associated with the use of the two new small square bins. As noted above, a similarly demarcated space (dubbed the “Basin”) was identified in the AA Bakery, complete with a pot emplacement and associated with rooms that were clearly used for baking. The Basin seemed to be used for mixing ingredients; thus in the case of House Unit 1, the bins in Space 11,063 may have been used to store ingredients, the basin to mix them, and the hearth in Space 11,061 to bake them. Equally, the installations within Space 11,063 may be best understood as associated with the bins in the northerly adjacent room. Although the bins in Space 11,063 may have been used for storage of some kind, they may in fact have been used in some sort of processing activity.

The idea that bread and beer-brewing go hand in hand may help explain the use and presence of these bins. The bins may have been used in the production of malt as an ingredient in beer. Malting is a labor-intensive process, requiring particular temperatures, moisture, stirring, and various other factors (Samuel 2000: 552). According to Samuel “malt may have been made by being laid out on mats, in wide shallow bins, or in shallow ceramic or wooden vats” (Samuel 2000: 552). The introduction of heat would also have been required during the production of malt in order to produce caramel-style flavors (Samuel 2000: 569). Lehner (2009c) described malting processes that might have involved the use of structures and spaces like the bins, basins, and ovens found together in Area AA and the eastern end of House Unit 1.

### **More Bins: Phase 4a**

Phase 4a is a localized phase that represents the alteration to the bins in Space 11,065 (fig. 14.8). The smaller, southwestern bin of the previous phase was replaced by at least two small bins. The walls [31,219] and [31,220] of these bins were severely truncated. The large rectangular space defined by walls [31,231] and [31,234] may have continued to be used, but with a smaller capacity. The small bin to the east went completely out of use, being replaced by a pot emplacement [31,224] located immediately adjacent to the access between Spaces 11,065 and 11,063. The vessel was filled with a loose white substance that on site we provisionally recorded as sandy lime (color plate 8a). This material was bagged for analysis and identification.

### **Dumping, Robbing, and the Collapse of House Unit 1 (Phase 5)**

We group as Phase 5 the structural collapse of the building, some dumping, robbing of walls, and possibly erosion. The pre-excavation topography of the area showed extreme robbing and/or erosion to the north, to the east, and to the southeast. To the north, the unexcavated mastaba tomb sat almost directly upon House Unit 1 floor surfaces, showing that the building had been extensively scoured out by the time the mastaba was built. To the east, what seemed to be a north-south, linear erosion or robbing cut had severely damaged the eastern wall as well as architecture farther to the east. This cut was approximately 2.00 m wide and ran parallel to the building. To the west, the top of this cut had an elevation of c. 16.51 m asl; to the east it was a little lower at 16.44 m asl. The base had a recorded elevation of c. 16.05 m asl.

The team found that during this phase some of House Unit 1’s mudbrick walls had been deliberately and precisely extracted for use elsewhere. This architectural robbing was also a feature of the original construction, since some mudbricks in the Phase 1 walls had plaster adhering to individual brick faces embedded within the wall, not on the exterior face of the wall.

Within Spaces 11,060 and 11,061, we encountered occupation deposits at the very surface, commensurate with the surviving height of the surrounding walls. Where occupation deposits were a little deeper (as in Space 11,062), we found a 40 cm-thick sequence of interspersed collapse and dumped deposits (pottery and discard deposits with much animal bone). The presence of occupation waste material interleaved with the structural collapse could suggest not a single demolition event, but rather that part of the building at least was left derelict to collapse over time. Alternatively the occupation debris may have emanated from the roof, as waste generated during processing activities on the roof. As the walls of the space collapsed, the material on top of the roof may have collapsed though, interspersing with the continued degradation of the walls. The lack of any substantial aeolian sand accumulation suggests that this process may have been an extremely short one. Or could this waste have fallen from processing activities on the roof?

### **Conclusion**

The 2009 excavation focused on the eastern end of House Unit 1. Where occupation deposits were seen on the surface prior to excavation, it was clear that this end of the building contained types of features that were markedly different from those exposed elsewhere in the unit. On the whole, the main body of the building was relatively “clean.”

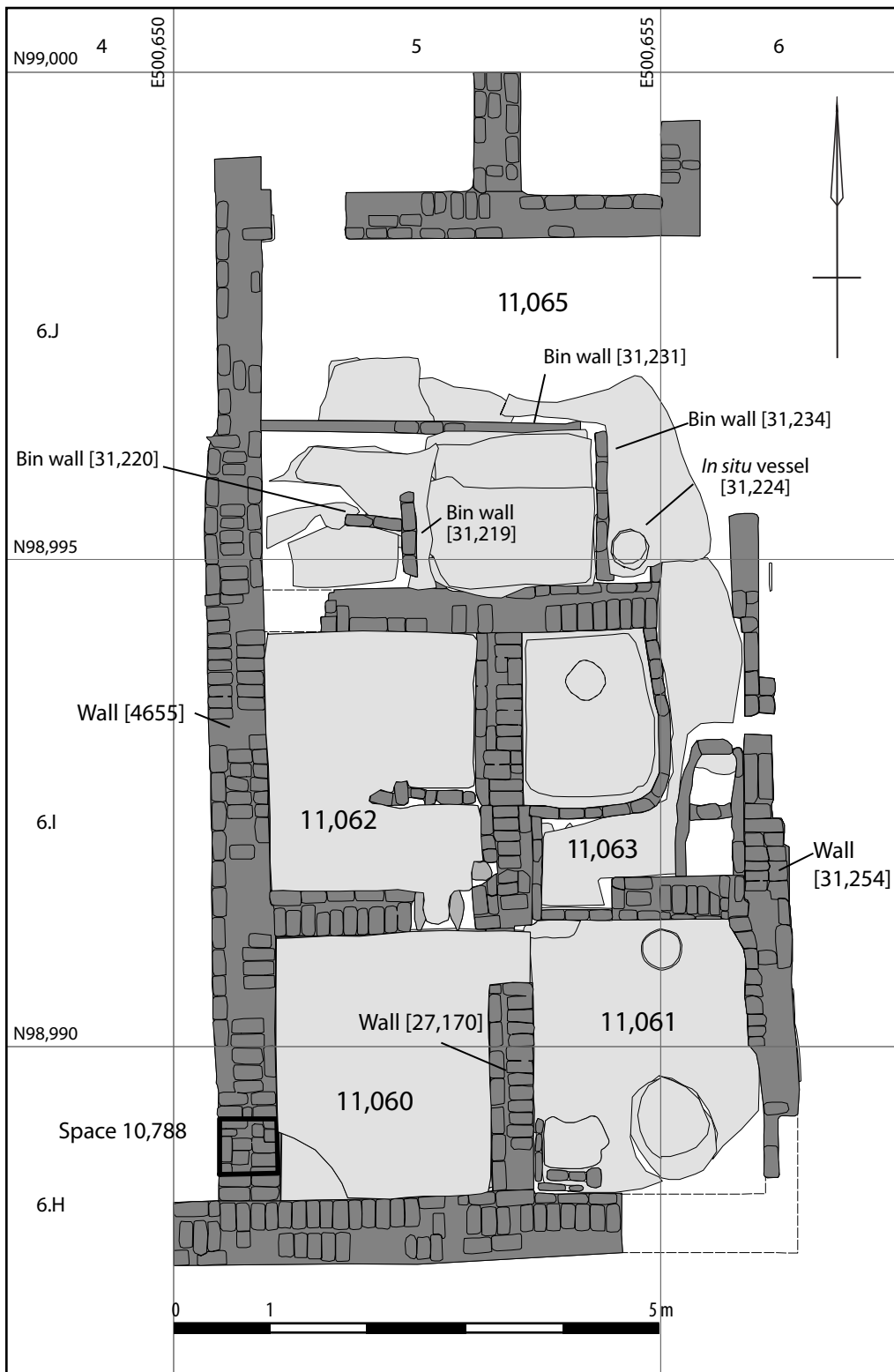


Figure 14.8. Phase 4a showing localized structural alterations in the Bakery of House Unit 1. Map prepared by Camilla Mazzucato, AERA GIS.

Other than the bins in the southwest corner, the “sleeping platform” in the central space, the bench, the bin filled with beer jars, and the limestone doorjambs, we found relatively few defining features or installations within each space. The walls had all been properly plastered, often painted, and the floors had all been properly laid. By contrast, in

the eastern end of the unit we found signs of hearths in at least three of the rooms, two filled with ash and pottery-rich deposits. We found pot emplacements and a distinct absence of well-plastered walls. Furthermore, the relative height at which these features were encountered on the surface (at 16.91 m asl as opposed to 16.36 m asl in the westerly

adjacent rooms) suggested that there may have been considerably more “build up” during the occupation and use of the spaces within the eastern end of the building.

Excavation revealed at least two phases of occupation, separated by a phase of structural alterations and additions. The earliest phase of occupation that we reached in 2009 saw a spatial and probably functional division between the two southwestern rooms and the rooms to the north in the eastern end of House 1. In this way, Spaces 11,060 and 11,062 seemed to be spatially married to the main body of the building. With its limestone doorjamb and granite doorframe support, the access into the northern of these rooms (Space 11,062) appears to have been restricted, suggesting the significance of the space. The room contained what seemed to be a level platform, exactly the same length as the sloping sleeping platform in the central area. The rooms to the east were markedly different. A heavily used and consolidated hearth was located in the southeastern room (Space 11,061). From here the only accessible space was to the north, wherein installations included a large vat emplacement, hearth activity, and a sunken basin with a raised mudbrick border and a socket for a vessel, probably a pottery vat, in its base. This assemblage, combined with the “hearth room,” is almost identical to the AA

bakery (GOP3: 74–77). To the north, within House Unit 1, a mudbrick circular oven was partially exposed; its phase of construction and use was not understood as of the end of the season.

The structural alterations and additions of Phase 3 included the knocking through of the wall separating Spaces 11,060 and the hearth room (Space 11,061), thereby creating an open flow of access from the main body of the building to the eastern “bakery” rooms. Further additions included the construction of bins within the “basin room” (Space 11,063) and a series of bins in the northerly room (Space 11,065). The bins in the northern “bin room” were different from those seen elsewhere in the unit. Unlike the plastered bins in the southwest corner of the unit and the mud-rendered bins in the “mixing room,” these were devoid of any surface treatment. Although the bin room may have been used for some sort of storage, it is possible that these structures functioned as trays for bread or beer production, or more specifically as containers for malt in its various processing stages. The different bin sizes may represent different stages in the malting process, and may in some way be connected with the use of the sunken basin in the adjacent room.



## Specialist Reports







## 15. Archaeological Science 2009: Eye on the RAB, Mind on Questions and Hypotheses

Mark Lehner

*“One of the major challenges of field archaeology at Amarna is to break the blandness of the artefactual reporting of the past.” Barry Kemp (1989: 56)*

### Finding RAB

In 2001, at our Heit el-Ghurab (HeG) site we had just completed mapping the general outlines of the Gallery Complex, four huge blocks of mudbrick galleries 150 m long—a barracks for workers is an operating hypothesis. At the end of that season we found immediately southeast of the Galleries the northwestern corner of another immense structure. Two parallel limestone walls, 2 m thick, turned the corner and framed a road (RAB Street) (fig. 15.1). In 2002 we discovered that these walls belong to the northern end of a building nearly 50 m wide east to west. Most of the compound lies yet buried underneath a modern sports club and soccer field. In 2002 we began to excavate a complex of small rooms in the northwestern corner. We found hundreds of clay sealings impressed with hieroglyphic texts, some of which bore the names Khafre and Menkaure, the pharaohs who built the second and third Giza Pyramids. That season we also found the remains of large round mudbrick silos, probably used to store grain. The sealings and silos prompted me to name this compound the Royal Administrative Building (RAB).

In 2004 and 2005, Freya Sadarangani and James Taylor found under the structures in the northwestern corner of the RAB older walls forming a different room structure (GOP1: 19–22; GOP2: 43–63). Sadarangani named the later complex, which we found first in 2002, Structural Complex 1, and the older, underlying layout Structural Complex 2. It became convenient to use the term Early Buildings (EB, not to be confused with Early Bronze Age) as distinct in time from RAB. Sadarangani continued to excavate the EB, as well as the northern court of the later RAB during the back-to-back 2006 and 2007 seasons. The transformation between the two major phases and the relationship to changes over the entire HeG site became a major interest.

### Publishing RAB: A Fieldwork/Publication Train

I believe it was in our fall 2006 season that we thought it might be possible to link the choice of major excavation areas of the HeG site each season to a sequence of analyses in the field lab followed by publication out of the AERA Bos-

ton office. The idea was to focus in the lab on the analysis of material culture from the area where we had excavated the previous season and, inspired by publication programs of other archaeological missions that excavate ancient Near Eastern sites, publish the excavation report along with the complete analysis of the major classes of material culture. We would key the analysis to the phased stratigraphic sequence and target deposits of a given area, established by the excavator of that area.

Such a program required that the archaeological science team members focus on given areas according to a schedule. The analysis had to be carried out in our Giza Archaeological Field Laboratory, generously provided by the Supreme Council of Antiquities Giza Inspectorate. Already we had tried for such a publication in our first volume of *Giza Reports* (Lehner and Wetterstrom 2007), which was in preparation in 2006. Our initial thought was that the *Giza Reports* would be more preliminary, and therefore less complete sets of reports. However, our GOP series took on the purpose of seasonal preliminary reports, and we decided that the planned successor volumes of *Giza Reports* were to serve as the final reports for the given areas.

Attempting to move forward with such a program, we had to catch up with the major areas where we had been ideally employing, more or less, the single context excavation and recording characterized by Museum of London Archaeology, formerly Museum of London Archaeology Service (see Museum of London Archaeology Service 1994; and <http://www.museumoflondonarchaeology.org.uk>). For this ambitious publication goal we chose areas RAB (the Royal Administrative Building), ETH (the Eastern Town House), and AA (an area in the west of the HeG site centered on the Pedestal Building).

RAB was first up on this list because it was the most extensive, the broadest area of systemic excavation, and because we had compiled excavation records and material culture over six seasons: 2001, 2002, 2004, 2005, 2006, and 2007. We carried out the first major excavation in RAB in 2002, when Fiona Baker excavated the sunken court of silos from under tons of stone debris toppled from walls,

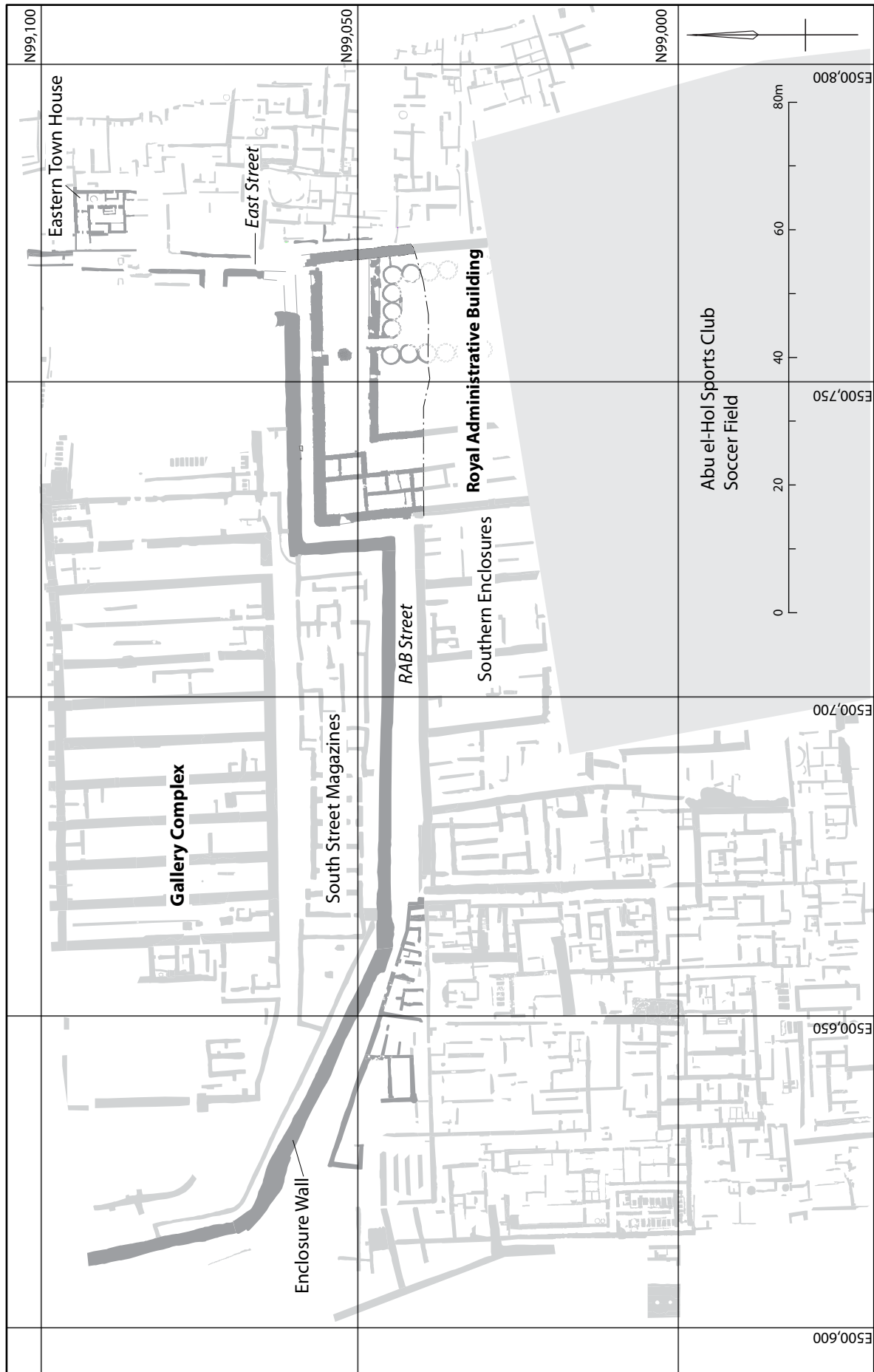


Figure 15.1. Map of the general area of the Royal Administrative Building within the Heit el-Ghurab site. Map prepared by Camilla Mazzucato, AERA GIS.

Susan Bain and Bob Will excavated the mudbrick structures in the northwestern corner of the RAB, and Paul Sharman and Stephanie During excavated the northeastern corner of the RAB and its interface with the domestic structures of the Eastern Town (*AERAGRAM* 2002; Lehner 2002a).

However, the primary reason we chose RAB as the first of a final publication series was the masterful execution of the excavation and recording since 2004 in this area by Freya Sadarangani (2005, 2007, 2009), and the fact that she had largely completed the phasing, analysis, and phase plans comprised of thousands of stratigraphic features ex-

cavated over six seasons in a Data Structure Report that could serve as a guide for the material culture analysts.

We made it a priority in 2008 and 2009 to complete as much as possible the analysis of the material culture from the RAB. Mary Anne Murray, AERA's Director of Archaeological Science, managed a team in the Giza lab with a concentrated focus on RAB material. Murray directed team meetings with Sadarangani, before and during the 2009 season, to review results and patterns in the data over time and within specific areas of the RAB. In the following article, Murray previews salient results.



## 16. Archaeological Science 2009

Mary Anne Murray

In advance of publishing a final report on the Royal Administrative Building (RAB) at the Heit el-Ghurab site (HeG) (fig. 16.1), specialists worked during the 2009 season to complete their analyses of the material culture recovered from RAB. The goal was to integrate these analyses with the RAB excavation report on the architecture and phasing (Sadarangani 2008). In April 2009, specialists and the excavator, Freya Sadarangani, met for a day-long workshop during which they discussed their final results. The summary I present here is drawn from preliminary reports prepared by the specialists at the end of the 2009 season. The full RAB report, with final conclusions by the specialists, will be published in a forthcoming *Giza Reports* monograph.

The material culture is critical for understanding the function of the RAB and to flesh out life in this complex with evidence of administrative activity; tool use; craft-working; and provisioning, preparing, and consuming food; as well as the use of various fuels. The material culture and architectural remains suggest that there was little segregation between working and living areas, some continuity in craft-working from the earliest occupation to the final days of the compound, but a shift in emphasis to baking in the later phases.

### The Royal Administrative Building

Located in the southeastern sector of HeG (fig. 16.1), this enclosure, defined by a 2 m-thick wall of broken limestone, first emerged during the 2001 season of our Millennium Project, a marathon of clearing down to the tops of walls and mapping in order to capture the footprint of the site (Lehner 2002b: 53–56, 2002c: 59–64, 2007: 45.) Over four more seasons we carried out intensive excavations, exhaustively examining the entire area within our limits of excavation down to the oldest level (GOP1: 19–22, GOP2: 43–60, GOP3: 59–65). Early on we discovered a set of large silos, a large courtyard, and a complex of small chambers located along the western side of the compound. The large granaries, along with the clay sealings and clay tokens that we found in the excavations, suggested a central storage and distribution center, hence the name “Royal Administrative Building.” The thick limestone wall that encloses the compound adds to the sense that it was an important structure with goods to protect. We do not know how far south the Enclosure Wall extends as our excavation area is bounded on the south by the modern Abu el-Hol sports

club soccer field. However, we learned through a geophysical survey in 2003 that the compound stretches to the south for perhaps another 100 meters (Dash 2004a: 7–8). Thus we may have only about a quarter of the enclosure, most likely the back end. The main entrance was probably located on the south side.

During our 2005 field season we discovered that the enclosure we designated the RAB was a later configuration, the second of two major building phases (GOP2: 43–54). We uncovered an earlier enclosure bounded by a single mudbrick wall. Two complexes occupied the earlier enclosure: a set of small chambers, probably workshops and possibly living quarters, on the northwest, and on the northeast, an extension of the Eastern Town, a village-like district along the east edge of HeG (fig. 16.2). At some point, ancient Egyptian workers demolished these two complexes and erected the mudbrick and limestone architecture of the RAB (fig. 16.3). Subsequently the builders erected the thick limestone Enclosure Wall that encircles a portion of the site, extending it around two sides of the compound. Finally, people abandoned the RAB complex and workers demolished it. Long after the demise of the HeG settlement, people began robbing stone from the collapsed remains of the outer wall and the Enclosure Wall along its northern and western sides. Freya Sadarangani (forthcoming), and earlier excavators, established 12 phases plus multiple sub-phases within the RAB, encompassing construction, occupation, remodeling, demolition, and abandonment (table 16.1).

We refer to the Early Buildings as Structural Complex 2 and designate the RAB itself as Structural Complex 1. However, the term RAB will be retained to describe both structures and the area.

### The Material Culture

The excavations of RAB produced one of the largest assemblages of material culture found in any area of HeG to date: more than 48,000 diagnostic pottery sherds, 95,400 identified plant items, 32,800 fragments of animal bone, 26,000 identifiable pieces of wood charcoal, 12,500 chipped stone tools and associated debitage, a sample of 1,500 mudbricks, 100 pigment specimens and related materials, over 1,000 objects, and nearly 700 registered clay sealings.

A brief description of the classes of material is included here and the results of the specialists’ findings from



Figure 16.1. The Royal Administrative Building (RAB) in the context of the Heit el-Ghurab site, with 1-meter contours. Map prepared by Julia Jarrett.

the EB (the Early Buildings, Structural Complex 2) and the RAB (the later structure, Structural Complex 1) will then be discussed.

### Clay Sealings

Dr. John Nolan and Alexandra Witsell (2010), our sealings team, finished registering and photographing 683 clay sealings from RAB, the third largest assemblage found at HeG—eclipsed only by Pottery Mound and Area AA—and the fourth richest trove of sealings and related material from Old Kingdom Egypt. Among the RAB sealings, 285 bore impressions of cylinder seals and 105 had traces of deliberate incisions. Another 293 pieces were bits of sealing clay left over from the process of making and applying

sealings in some way. Nolan and Witsell hope that these sealings will not only help to identify the administrative actors associated with RAB and shed light on the extent to which they may or may not have been acting on behalf of the king and the central government, but they are also looking for any indications of the kinds of sealed items that were opened in the RAB and—indirectly—where these items might have come from.

### Ceramics

The ceramics team, headed by Dr. Anna Wodzińska (2009c), analyzed 48,039 diagnostic sherds, the largest ceramic assemblage from any area of HeG thus far. Most of the pottery, recovered in the Courtyard, was primarily



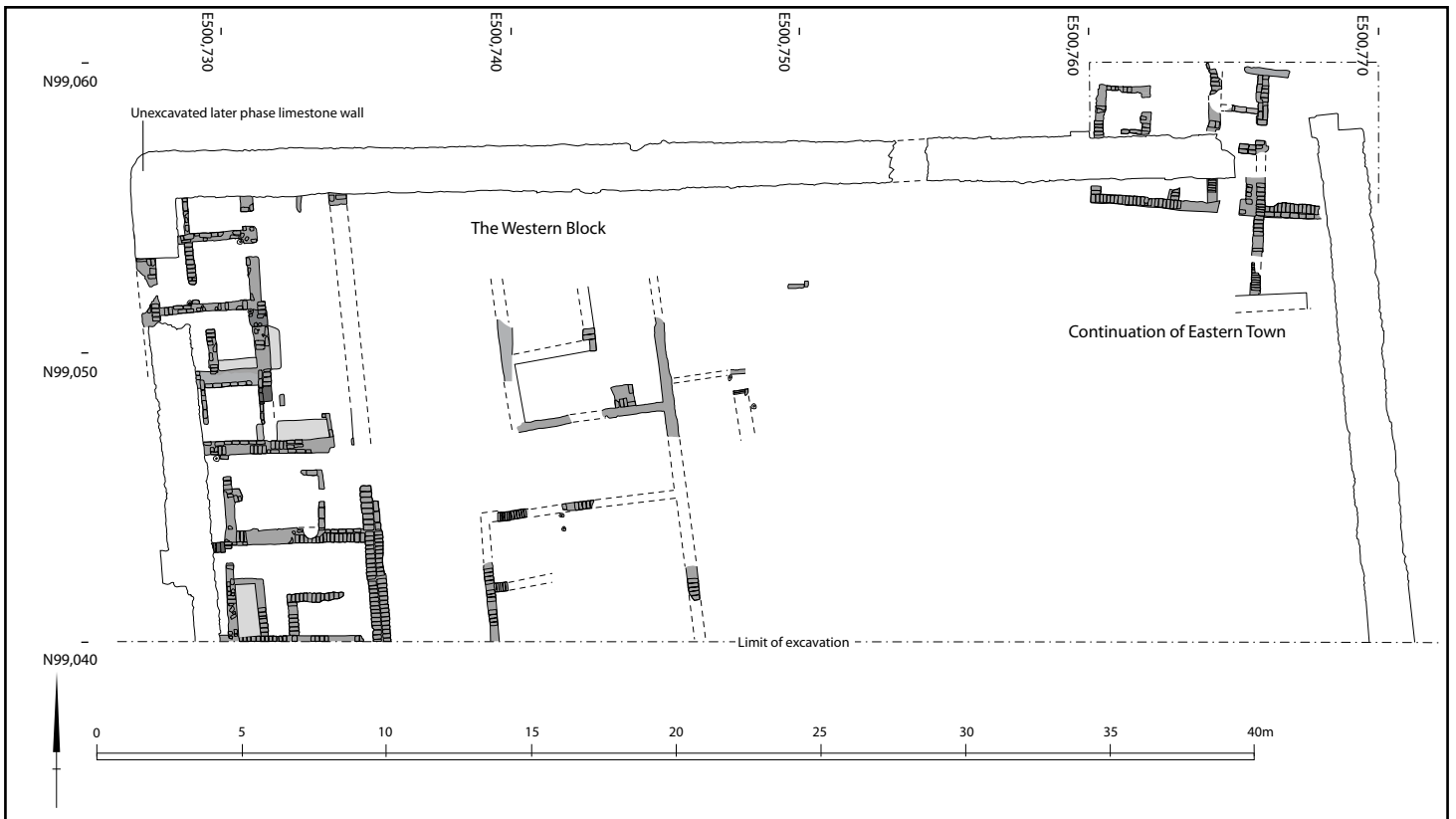


Figure 16.2. Map of Structural Complex 2, the Early Buildings of the RAB. Map prepared by Julia Jarrett.



Figure 16.3. Map of Structural Complex 1, the later RAB. Map prepared by Julia Jarrett.

**Table 16.1. Phasing of Area RAB**

Area RAB Phases	RAB Phase Number	Phase Description
The Early Buildings	1	Preparing the surface
	2	Construction of Eastern Town and Western Buildings
	3	Occupation of Eastern Town and Western Buildings
RAB Construction	4	Demolition of the Early Buildings; construction of the Royal Administrative Building
The Life of RAB	5, 6	Localized occupation and remodeling, possibly contemporary with the final stages of construction
	7, 8	Occupation of the Royal Administrative Building interspersed with structural remodeling sub-phases
Abandonment of RAB	9	Ritual decommissioning of the Silo Compound; collapse of RAB
Late Period	10	Robbing and sand deposition within the RAB area
	11	Stone mound; water damage of the RAB area; possibly modern?
Modern	12	Pitting, postholes, aeolian sand, and refuse accumulation

associated with dumping and discard and came from the periods of collapse and from the leveling and preparation phases in general.

#### **Artifacts**

Ana Tavares and Emmy Malak analyzed the artifact assemblage, 1,010 objects, the largest so far recorded in full detail from HeG (Malak and Tavares 2009). Most of the object categories found at the overall settlement occur here. They reflect the three broad roles of the EB/RAB complex; i.e., as an administrative center, an area of craft workshops, and as a domestic living space. These artifacts include querns; grinding stones; abraders; anvils; whetstones; burnishers; pounders; weights; palettes; household items; drills; stone vessels; metals; faience; beads; bracelets; fragile/fine objects; gaming pieces; tokens; inscribed, painted, or incised objects; and re-cut pot sherds later used as tools.

#### **Lithics**

Marina Milić (2009) analyzed the RAB lithics: the chipped stone tools, flakes, and other debris produced during the manufacture of stone tools. Of the 12,550 pieces of chipped stone recovered from the area, most came from the RAB building, with large numbers from the period during which the silos and the RAB walls were constructed, as well as the phase of structural collapse.

#### **Animals**

Dr. Richard Redding (2009), AERA archaeozoologist, recorded more than 32,807 pieces of animal bone, including mammals, fish, birds, and reptiles. The bulk of the faunal remains he utilized in his analyses were recovered in rooms and spaces of the RAB occupation.

#### **Plants**

Dr. Mary Anne Murray (2009) and Claire Malleson analyzed the plant remains, all of which were preserved by charring and recovered by machine flotation. They recorded 95,413 individual plant parts, the highest number of plant items from any area of HeG. Of these, 91% were from the later RAB complex.

#### **Wood Charcoal**

Rainer Gerisch (2009), our wood analyst, identified 26,412 pieces of charcoal, the majority of which are from the RAB complex itself. Nile acacia (*Acacia nilotica*) dominates the wood charcoal assemblage (99.5%), as it does throughout HeG.

#### **Pigments**

Dr. Laurel Flentye (2009), AERA pigment specialist, analyzed 97 pigment samples, 6 fragments of painted plaster, and 21 mineral specimens. She found that the most common pigment materials were red hematite and yellow ochre, along with a variety of other colors. The presence of pigments, painted plaster, and minerals suggests that raw materials, prepared pigments, and painted surfaces were an important aspect of the EB/RAB complex, particularly in the phases of the Structural Complex 2, the Early Buildings.

#### **Geology**

Dr. Philip LaPorta (2009), geologist, identified nine broad categories of stone raw material amongst the building, quarrying, and carving tools; drill bits; pigments; grinding stones; and other objects, such as stone vessels, statuary, small jars, plates, beads, and

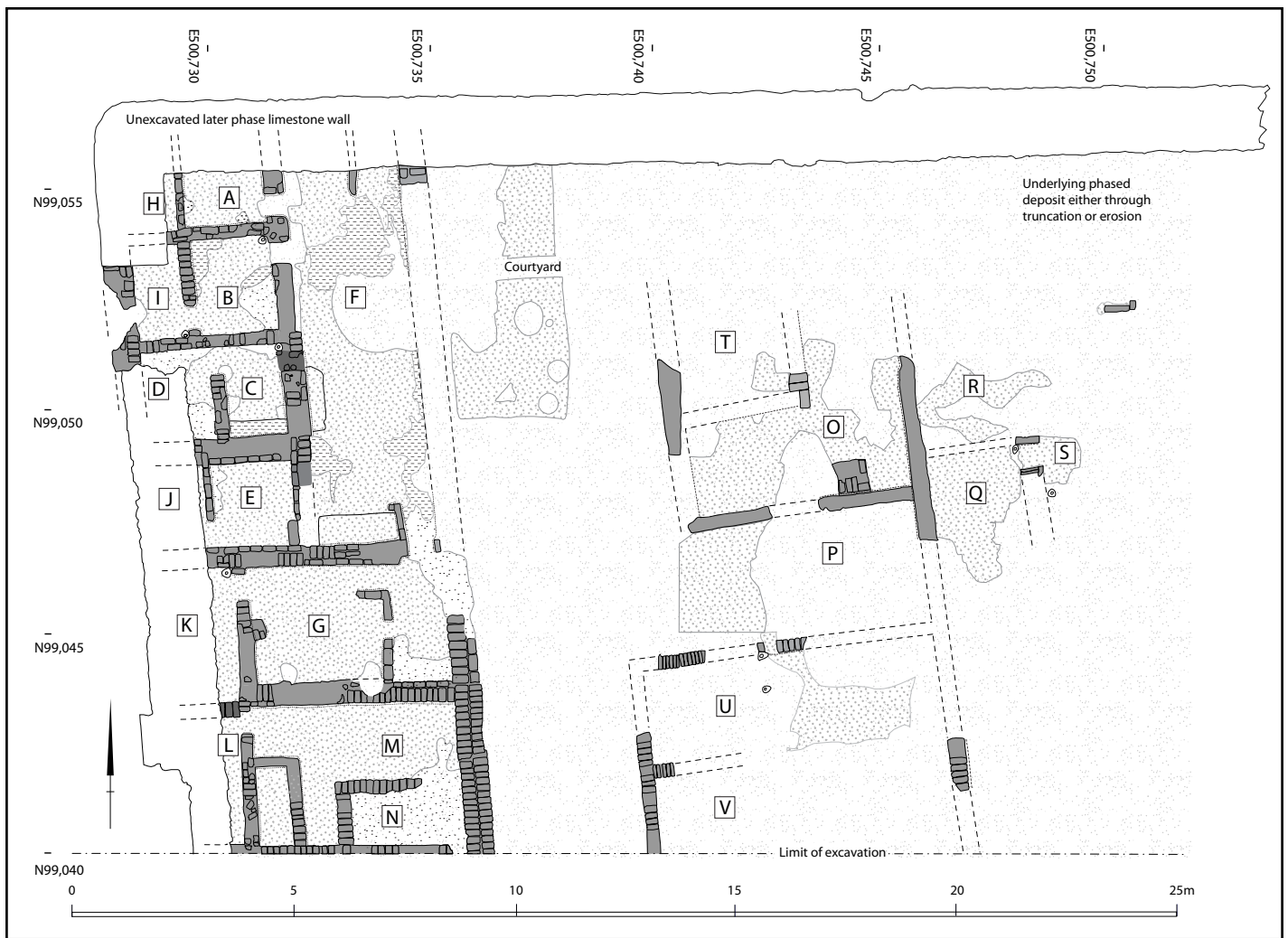


Figure 16.4. Map of rooms in the Western Buildings of the RAB, Structural Complex 2, Early Buildings. Map prepared by Julia Jarrett.

bracelets. While some of these raw materials were locally available, others may have come from as far as Aswan.

### **Mudbrick**

In 2005, Sadarangani dismantled walls of Structural Complex 1, the RAB structures, to uncover the earlier phases. Ashraf Abd el-Aziz (2008) analyzed the resulting large collection of 1,576 mudbricks. He found that four broad categories of brick types were used to build the RAB. When he broke up the bricks to examine the inclusions, he found a wide array of materials: ceramics, lithics, clay sealing fragments, bead fragments, bits of other artifacts, animal bones, shells, wood charcoal, fossils, possible fragments of roofing material, red and yellow pigments, slag, and various types of rocks and minerals.

## **What the Material Culture Reveals**

### **The Early Settlement, Structural Complex 2**

#### ***Phase 3 - Occupation of Western Buildings and Eastern Town Extension***

Little material culture survives from the early phases of preparing the surface and the earliest construction of the Western Buildings and the Eastern Town extension (Phases 1 and 2) (fig. 16.2). By Phase 3, however, during the later construction and occupation phase of the Western Buildings and Eastern Town extension, several lines of evidence suggest a place of industry within these newly laid out areas.

#### ***Phase 3.i - Occupation of Western Rooms***

The western rooms of Structural Complex 2 (fig. 16.4) include workshops (Rooms A, B, C, D, E, H, I, J), areas for living and/or administrative activity (Rooms G, K, L, M, N), a large common vestibule (Room F), a courtyard, and the

truncated Rooms O, P, Q, R, S, T, U, V (Sadarangani forthcoming) that builders badly damaged while constructing the later RAB complex. These phases include Phases 3 and 4a.

### **Administrative Activity**

The sealing evidence from Phase 3 is scant. Nolan and Witsell (2010) report that just 16 sealings and sealing-related objects were found in this phase, which is the earliest phase to produce any sealings in RAB. More importantly 14 out of the 16 sealings discovered here come from mud that actually made up the floors in the courtyard and not the debris that was produced by activity in the courtyard. These pieces say more about the local materials used to pave the courtyard than they say about what might have been done there afterwards. However, three of these 16 pieces bear seal impressions made by what we call “Official Seals.” “Official Seals” in the Old Kingdom are finely crafted cylinder seals that typically bear six or more vertical columns of text. These columns usually alternate between one of the king’s names written inside a kind of heraldic device representing the royal palace called a *ser-ekh*, and titles of the owner of the seal. The name of the seal’s owner does not appear on an Official Seal. Since the king named on these seals is the king who reigned when the seal was carved, the seal impressions made by Official Seals help us to get a handle on the date when these seal impressions were made. The three seal impressions made by Official Seals in RAB’s Phase 3 all bear the name of Khafre, builder of the second main pyramid at Giza and the immediate predecessor of Menkaure, the king most commonly associated with the Heit el-Ghurab site. The existence of these three sealings—and the absence of any bearing the name of Menkaure—suggest that the floors in the Courtyard were laid down either in the reign of Khafre, or very early in the reign of Menkaure, before his seals were distributed and used.

### **Crafts, Tools, and Workshops**

Various lines of evidence suggest a series of workshops operated in the small paired rooms (A-H, B-I, C-D, and E-J) in the complex of Western Rooms (fig. 16.4). On the floors in these rooms we found tools and raw materials suggesting that workers produced and applied pigments, perhaps to finish sculptures, and possibly carry out other crafts activities. The vestibule in this building, Room F, was also of interest since it contained a probable sleeping platform like those found in Gallery Set III.4 and elsewhere at HeG (Abd el-Aziz 2007; Lehner and Sadarangani 2007; Sadarangani 2007). The location of the platform ensured full visibility of the room, its southern access point, and access into each pair of workshops, making it likely that it may have been used by a guard to monitor the security of the workshops (Lehner and Sadarangani 2007; Sadarangani forthcoming).

In Rooms A and H workers may have ground pigments. The floors yielded a hand grinder, lumps of pigment, hematite, a whetstone, and an axe. In Room B we found evidence of two different activities. In the northwest corner, stone tools associated with grinding, whetting, or abrading—two whetstones, an abraded/whetstone, a pounder, a grinder, a quern, and an axe—surrounded four *in situ* pots. The pots, including a large storage jar, may have been used for storing materials or perhaps to hold water for wet-grinding. In the southern half of the room workers may have processed pigment. The assemblage included a large piece of hematite, a large chunk of possible brown ochre, a sandstone palette, and a collection of six sandstone abraders and/or whetstones.

The assemblages in Room C suggested flint-knapping and stone-working. The artifacts were confined to the southern half of the room near a low bench, possibly a work area where the objects were used and discarded, including a core and flakes and ground stone tools: pounders, abraders and/or whetstones, a hammer stone, and a sandstone palette. Room D offered additional evidence of knapping and stone-working, including chert flakes, a granite axe, a limestone anvil, and a pounder (fig. 16.5).

Room E may have been a pigment workshop. Pigments and raw materials occurred on the floor along with tools used to prepare pigments: a palette, whetstone, and whetstone/abraded. In addition, two storage jars set into a permanent installation of mudbrick were probably used for the craft activity in the room.

Rooms D and E also may have served as workshops for manufacturing something shaped or pounded on an anvil, as a limestone anvil was found on the floor of each chamber.

To the east, in Rooms o–v, badly damaged by demolition, the team found more signs of craftwork, including abraders and chipped stone tools and waste flakes.

The significance of the remains in the workshops only became apparent when all the specialists data was studied together as an integrated group. The specialists looked at which artifacts were associated with each other and their relationship to installations within the rooms.

### **Phase 3.ii - Occupation of the Eastern Town Extension**

This area in the northeast corner of Structural Complex 2 (fig. 16.2) contained fewer remains of all classes of material culture. There were no clay sealings, no hand-picked wood charcoal, nor pigments, and very little chipped stone material. What we did recover from this area were building and demolition tools: a small number of pounders and axes; sharpening tools, such as whetstones, a pillow stone or anvil; as well as bead and bracelet fragments. We also found small amounts of pottery, including bread molds, beer jars, bowls, and a pot stand. Botanically, this

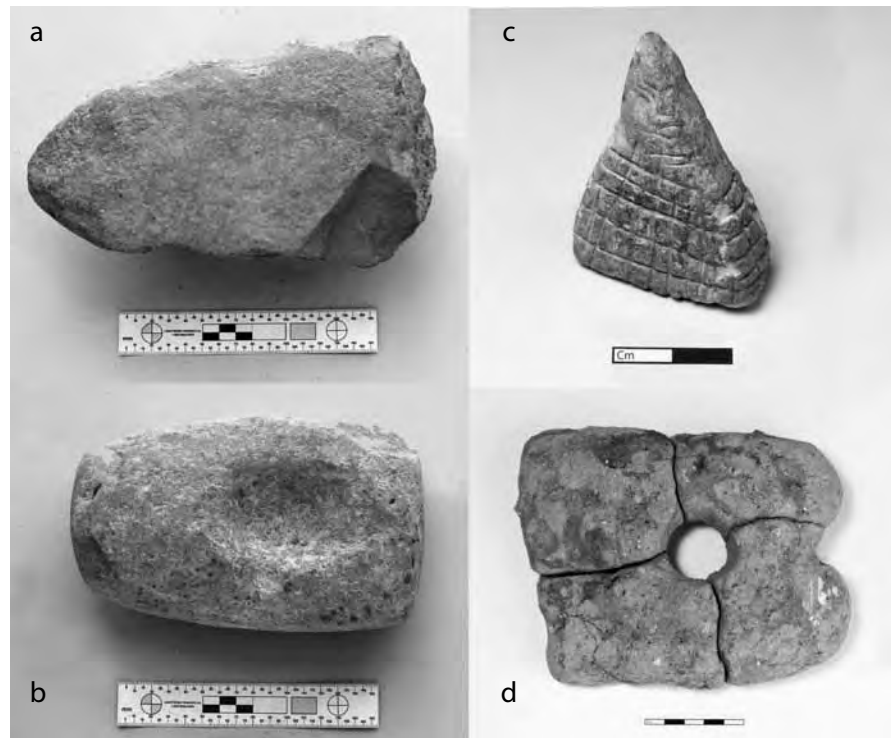
Figure 16.5. Objects from RAB.

a) Yellow-orange quartzite boat-shaped quern base, from Phase 4a, Room B. Object number 1522. Photo by Yukinori Kawae.

b) Block-shaped limestone anvil with a depression on the top surface, from Room F (demolition of Early Building). Object number 1534. Photo by Yukinori Kawae.

c) Pyramidal-shaped limestone gaming piece with net pattern on its surfaces, from Phase 3i (Early Building), Room J. Object number 1665. Photo by Jason Quinlan.

d) Fragile unfired mud counter weight, from Phase 8, the courtyard (Room 10). Object number 3203. Photo by Jason Quinlan.



area had a lower than average density of plants and number of taxa, as well as a higher than average fragmentation and density of wood charcoal (extracted from the botanical samples). There were no cereal grains or chaff present and, as in all phases and rooms in Structural Complex 2 of the RAB, and wild/weed taxa were found in the highest densities. The assemblage from this area most resembles the background noise of scattered spent fuel—wood (and/or wood charcoal), cereal processing residues, and fragments of charred animal dung, another common ancient Egyptian fuel.

#### **Phase 4 - Demolition of Structural Complex 2 and Construction of RAB, Structural Complex 1**

Phase 4 has been broken down into Phase 4a–f to mark the various construction and leveling phases associated with the demolition of the Early Buildings (Structural Complex 2), and the construction of Structural Complex 1, the RAB. Here, these are largely grouped for the purposes of our discussion although elements of individual phases are also addressed. Although we cannot be certain that the demolition layers derive from the Early Buildings, the excavator noted continuity between the artifacts in both surface and dumping layers here, suggesting that workers used the demolition debris to level the sloping area and create a new surface on which to erect the RAB complex (Sadarangani forthcoming). In Phase 4, following the demolition of Structural Complex 2 and preparation of a new surface, workers constructed the silo court, then built the large limestone wall around the RAB (Structural

Complex 1), and finally the mudbrick walls of the rooms along the west side of the structure (fig. 16.6).

#### **Administrative Activity**

Nolan and Witsell noticed that five of the six sub-phases of Phase 4 produced sealing evidence. When considered together these five sub-phases yielded 108 registered sealings or sealing-related objects, of which 52 bear discernible seal impressions. However, it is striking that just 16 of these were made by Official Seals. “Informal” seal impressions—impressions made by seals bearing graphical arrangements of animals and hieroglyphs, or crudely carved administrative titles—are twice as common, numbering 32. Broadly speaking, Phase 4 seems to continue the trend of Phase 3 at RAB in which sealings impressed by Official Seals—a marker of the central authority of the Egyptian state—are rare.

Despite the scarcity of royal names on the impressed sealings from Phase 4, one sealing from sub-phase 4b represents the earliest attestation of Menkaure’s name discovered in the RAB corpus. This affirms that, although Khafre’s name continues to be present on impressions of Official Seals as late as Phase 9, sub-phase 4b was likely deposited in the reign of Menkaure and certainly not in the reign of Khafre.

#### **Crafts and Tools**

Phase 4a, the demolition of the Early Buildings, had the second highest concentration of construction and/or demolition tools, such as hammers, axes, and pounders. It

also had the second highest number of tools related to grinding, including two querns with hematite staining, as well as the highest number of tools related to abrasion/whetting, construction/demolition, and manufacturing (e.g., the highest number of anvils).

The majority of anvils in RAB were also from the earliest demolition phase and indicated the manufacture of fine materials, such as beads, and metalworking (LaPorta 2009: 5). The highest concentrations of pigments (red and yellow), red-painted plaster, and related materials were found in the northwest corner of the area during this phase. Evidence of weaving was also most prevalent in this phase, as was drilling associated with stone vessels. Most of the craft work appears to have been done in the courtyard. Household or domestic objects included the highest number of architectural elements from any phase, such as a headrest, door socket, and a table or stool, all made of limestone.

### ***Food and Fuel***

The southwest corner of the Western Buildings may have been living quarters attached to the workshops. The rooms, larger than the workshop chambers, were almost entirely devoid of artifacts, but the demolition layers over the Western Buildings point to possible household activities. The most frequent ceramic types, conical bread molds and beer jars, suggest that people were making bread here and storing/drinking beer and perhaps brewing it. Another common pottery type, the flat bread tray, lends support to the view that people may have baked bread here. Bowls, also abundant, were probably used to serve food. Pottery stands, found in the space just east of Room F, may also have been used for this purpose. In Room O, one of the chambers where the team found the walls reduced to only a few centimeters, a single ash deposit produced bowls and several miniature plates that belong to a class of domestic miniatures used only in settlements (Wodzińska 2009c: 212–13).

Animal bones recovered from Structural Complex 2 offer evidence that food was served and perhaps prepared here. The bone fragments came from occupation surfaces and the demolition debris above them. Cattle were dominant in the animal bone remains, outnumbering sheep/goat by four or five to one in terms of meat. The cattle, mostly young males, were likely to have been provisioned by a central authority. The sheep and goats, also young animals, would have been provisioned as well (Redding forthcoming).

The evidence for this is pervasive across most of the HeG settlement. Redding has found predominantly young male cattle, sheep, and goats, indicating that authorities must have been culling large state-controlled herds, rather than drawing livestock from local popula-

tions (Redding 2010). Small local herds could not have supplied large numbers of young males continuously for years.

On the other hand, the pig, which follows cattle, sheep, and goat here in abundance, was not part of the state economy, but was raised in individual households in ancient Egypt (Redding 1991). Redding suggested that people in Structural Complex 2 supplemented their diet with pork from the Eastern Town, where he has proposed that the residents raised pigs (2009, 2010). Among the fish remains, catfish, followed by Nile perch, was the most common type.

Overall, the faunal remains from these early phases reflect a relatively high status diet, higher than that seen in the later Structural Complex 1 phases (Redding 2010). The dominant meat in the Early Buildings, beef from young animals, was the premier ancient Egyptian meat. The sheep and goat meat also came from the preferred young livestock, while the choicest fish, Nile perch, was the second most common species. The occupants of Structural Complex 2 also ate relatively well compared with residents in other areas of the town. They had far more beef and perch than the workmen of the Gallery Complex (Redding 2007a), who were probably doing their rotation of service to the king (Lehner 2007: 43–44). They also had access to gazelle, hunted game, which by the 4<sup>th</sup> Dynasty was a high-status food (Redding 2009). On the other hand, they ate a relatively high proportion of goat compared with sheep, the preferred caprine. Goat bone fragments outnumbered sheep by two to one, but in other areas and the later phases of the RAB sheep bones exceeded goat by much greater numbers. Although the residents of Structural Complex 2 had access to much of the favored meat, their diet was not as rich as that of the residents of the Western Town, a district of larger, perhaps more affluent, homes (*GOP1*: 31–44; *GOP2*: 69–74; *GOP3*: 65–92).

The plant remains from Structural Complex 2 were sparse compared with other areas of HeG and badly fragmented. All charred, these remains include emmer wheat, hulled barley, lentils, and fig, but the majority are wild/weed taxa, primarily wild grasses and large and small legumes that grow as field weeds. Harvested with the crops, these weeds were separated, along with straw and chaff, from the grain through several operations, including winnowing, sieving, and finally hand-sorting. In ancient Egypt the residues that result from cereal processing were an important by-product in their own right, used in a number of ways, including as fuel, fodder, and temper (Murray 2000). The high frequency of wild grasses in Structural Complex 2 samples may indicate that they were not only by-products from cleaning the cereals, but were perhaps also specifically gathered, possibly for use as tinder. The majority of the samples are most likely derived

from secondary deposits since ovens and hearths would have been periodically cleared of spent fuel and other debris, and these contents would then have been dumped into ash middens or pits, often accumulating in other features.

In Phase 4, following the demolition of Structural Complex 2 and preparation of a new surface, workers constructed the silo court, then built the large limestone wall around the RAB (Structural Complex 1), and finally the mudbrick walls of the rooms along the west side of the structure.

### Structural Complex 1 The Life of RAB: Early Phases

#### *Phases 5 and 6 - Localized Occupation and Remodeling of RAB*

The earliest occupation of the RAB (Structural Complex 1) is in Phase 5. Phases 5 and 6 together encompass a period of occupation and remodeling. At this time construction continued on the RAB, which was later to be fully occupied during Phase 7. Both periods are also possibly contemporary with the final stages of construction. There is some evidence that at least some of the residents were workmen in the process of constructing the RAB.

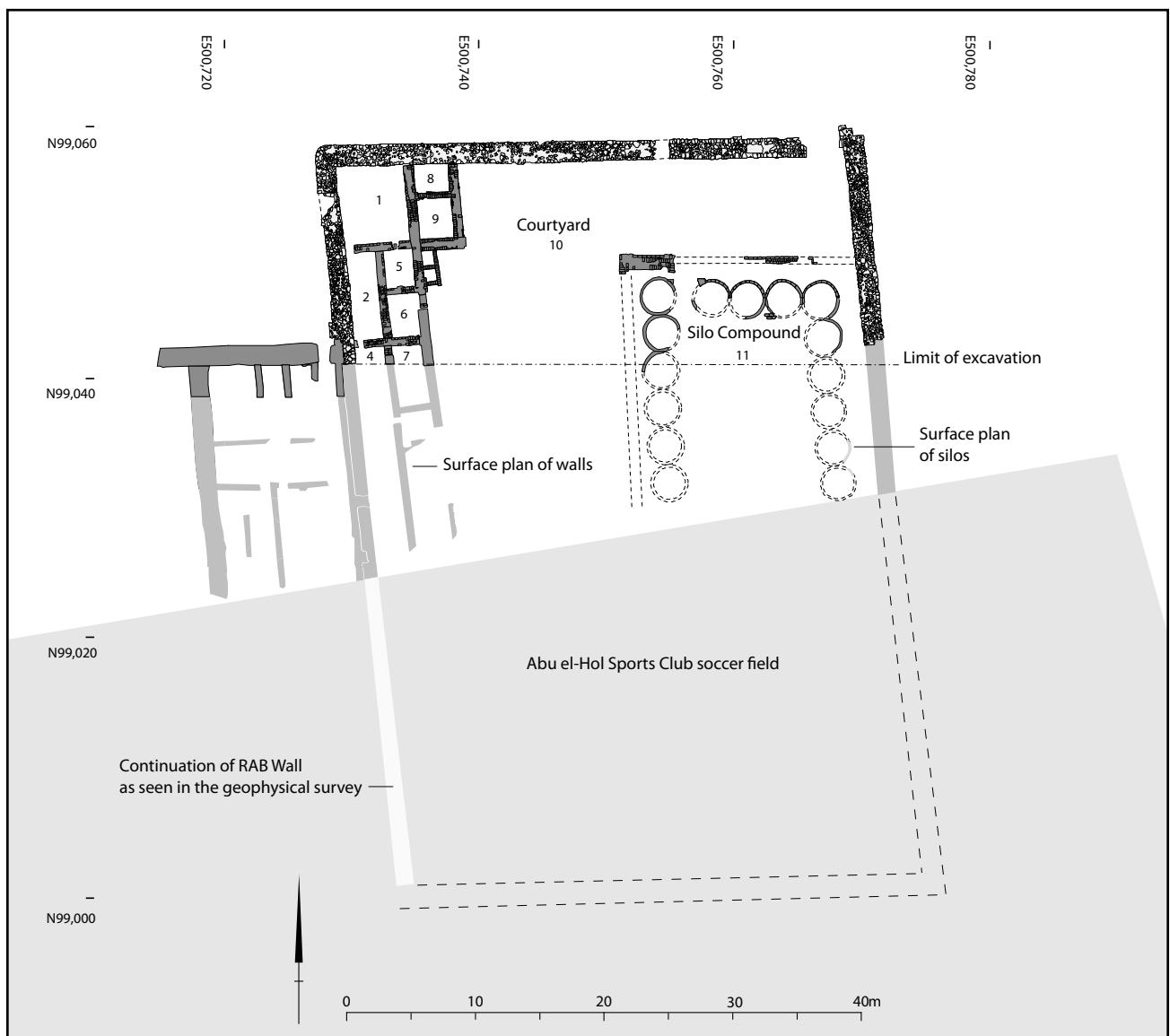


Figure 16.6. Royal Administrative Building. Phase 4 map showing the silos. Prepared by Julia Jarrett.



### **Administrative Activity**

The sealings from Phases 5 and 6 continue the patterns seen in Phases 3 and 4. In general, both phases produced only small quantities of sealings and relatively few seal impressions made by Official Seals were found. According to Nolan and Witsell (2010), Phase 5 yielded a total of 19 sealings or sealing-related objects, and Phase 6 contained 34. Only 2 of the 12 impressed sealings in Phase 5 might have been impressed by an Official Seal whereas just 3 of the 17 impressed sealings in Phase 6 were impressed by an Official Seal. It is important to realize, however, that the seals other than Official Seals still represent administrative actors. They just do not reflect the central administration of the state apparatus. Instead, it is likely that these seal impressions reflect the actions of lower ranking people acting either on their own account or in their relationship to other, higher officials. We cannot discount that they may have been operating in an “official” capacity as low-level government officials, but they may also have been acting as members of a household, or perhaps even both. Only a closer analysis of these “informal” seal impressions and their archaeological context can hope to reach a more detailed understanding of these seals and how they were used.

### **Crafts and Tools**

Objects, sparse in Phases 5 and 6, largely reflect weaving, abrasion/whetting, and construction/demolition activities in the courtyard. During Phase 5, the earliest occupation of the complex, two pieces of pigment were found in the northwest part of the area where a number of pigments from the time of Structural Complex 2 were also found, possibly suggesting the continuity of that location as a place where pigment was processed and or used (Flentye 2009). The team also found pigments in Phase 6 deposits within Rooms 1 and 2, adding to the evidence of long-term pigment production or use in the northwest corner of the site, evident in the earlier phases, particularly Phase 4a.

Of interest, a study of the mudbrick from the early phases of the RAB structure indicates that the most abundant brick type was tempered with sand, as well as fragments of ceramics, limestone, flint pebbles, lithics, bone, clay sealing fragments, and charcoal. If straw was used as temper at all, it has long disappeared (Abd el-Aziz 2009). Most of the ceramics in the bricks dates to the late 4<sup>th</sup> Dynasty, the same period as the main pottery corpus from RAB (Wodzińska 2005). It seems likely that the builders of Structural Complex 1 used the settlement debris from Structural Complex 2 in their mudbricks.

### **Food and Fuel**

The faunal remains, which came primarily from pits in the courtyard, show that residents were provisioned from a

central authority, as in the earlier phases. But the diet was poorer, of lower status, and statistically identical to that of the workers in Gallery III.4. The ratio of cattle to caprines (sheep and goat) is very low in Phases 5 and 6. Indeed, these are the only phases in which caprines contributed more meat than cattle (Redding 2009: 27). Less desirable fish, such as catfish (*Synodontis* sp.), predominate, while the highly desirable Nile Perch (*Lates nilotica*) was rare. Pigs were also rare. Perhaps some of the residents at this time were workmen constructing the RAB (Redding 2009: 27–28), people who would most likely receive the lower status foods.

In the courtyard refuse pits, bowls, probably used for eating, were the most common ceramic type, followed by conical bread molds and beer jars, suggesting that baking, and probably brewing, were done nearby (Wodzińska 2009c: 33).

A possible kitchen in Room 6 lends support to the idea that this was a living area (fig. 16.7). The kitchen consisted of a hearth and pot emplacements. Near the hearth, located in the northwest corner, a storage jar had been set into the ground. It was truncated by a pot emplacement for a spouted basin (a CD22 vessel), which the residents may have used as a mixing vat (fig. 16.8). About 4 cm from the vat, a concave spread of clay may have supported a bowl or plate. However, there were no faunal remains, suggesting that the hearth may not have been used for household cooking, but for a more specialized task. Plant remains were scant, consisting primarily of weeds, which were likely to have been crop processing by-products used for fuel.

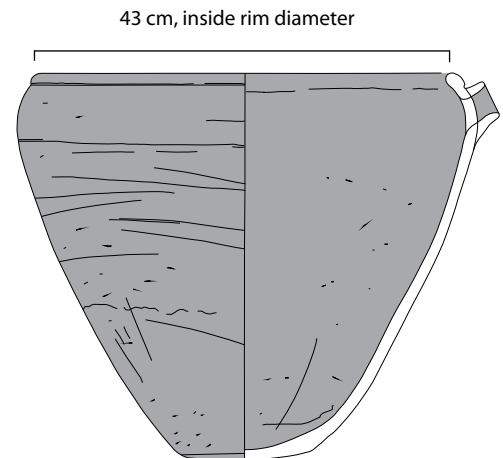
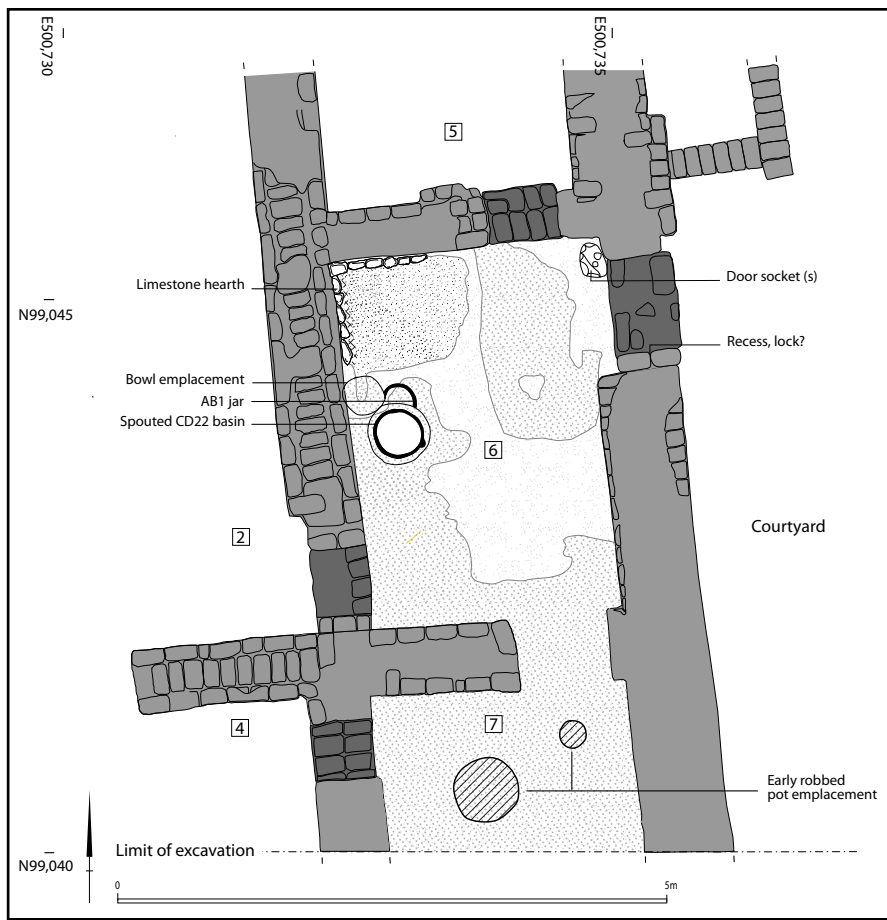
## **The Life of the Fully Operational RAB**

### **Phase 7 - Occupation of the RAB Interspersed with Structural Remodeling Sub-Phases**

By Phase 7 the RAB (Structural Complex 1) was fully operational, although some remodeling continued. The courtyard seems to have been divided into discrete areas: the southwest portion allied with the Western Rooms (1–7); and the northern section allied with the Annex (Rooms 8 and 9), the RAB entrance, and possibly the silos (fig. 16.6). Rooms 8 and 9 may have operated together as a bakery. Room 6 appears to have remained a domestic space, while Rooms 1, 2, and 5 may have been used for storage (Sadarangani forthcoming).

### **Food and Fuel**

Rooms 8 and 9 in Phase 7Ai appear to have been a bakery complex. Room 8 contained a hearth and possible baking-pit depressions, as well as a thick accumulation of ash, which had the highest density of plant items of any area in the RAB (295 items per liter of deposit) (fig. 16.9).



Left: Figure 16.7. Royal Administrative Building, Room 6, Phase 5. Map prepared by Julia Jarrett.

Right: Figure 16.8. CD22 spouted vessel found in Room 6. Drawing by Will Schenck and Anna Wodzińska.

The ash deposits were most likely the remains of spent fuel dumped in the room, probably from the hearth. The low fragmentation of the plant remains here suggests that the accumulated ash was little disturbed after being dumped. The ash deposit also had a higher than average density of wood charcoal recovered from flotation samples. This ash, most likely spent fuel, consisted primarily of cereal processing residues, principally wild grasses and legumes, wood (Nile acacia), and animal dung.

The most interesting single feature in RAB, in terms of items per liter (IPL) and taxa diversity, is an ash deposit (Feature [5567]) in Room 8 from Phase 7Ai. Four of the five samples from RAB with the highest relative density of plant remains were all taken from [5567]. The plant densities in this group ranged from 277.4 to 311.3 (IPL), with the average for the feature being 295.4 (IPL). Apart from two features elsewhere at HeG, these are the highest densities of plant items found at the HeG site thus far. Feature [5567] also had the highest diversity of plant types (31). These included comparatively large amounts of barley (7 IPL) and emmer wheat (13 IPL) and large numbers of the usual field weeds we find throughout the RAB assemblage.

This ash deposit was also important for clay sealing material as well (see below).

During excavation, Sadarangani (2008) had the impression that Rooms 8 and 9 might have operated together as a bakery. Room 8, full of ash—thick layers of spent fuel continuously building up—was the baking chamber, while adjacent Room 9, characterized by pot emplacements, was kept relatively clean as the mixing chamber. A similar scenario of an ashy baking room and a clean mixing room was found in the bakery complex in Area AA in the Western Town (GOP3: 75–77). Plant densities were low in Room 9; the few charred plant remains found there may have encroached into the room from Room 8. Overall there was very little ash in the chamber (Sadarangani forthcoming).

A material we call “textured fragments” was also found in the highest densities in Room 8 in Phase 7Ai, and these have been associated with other bakeries elsewhere at HeG. They appear to be a matrix with inclusions, especially barley and wild grasses, which would be difficult to remove from the barley crop. Are these the remains of bread or the mash from beer-brewing? We hope to solve the puzzle with further analysis.



Figure 16.9. Accumulation of ash in Room 8, Phase 7 as seen in the section profile. Photo by 2002 excavation team.

In addition, emmer grain was found in higher densities here than barley, unlike the majority of the RAB deposits. The predominance of emmer may be considered additional evidence that the area was a bakery, as wheat was the preferred cereal for bread.

The presence of animal dung in the Room 8 deposits may provide additional evidence of a bakery. Dung is rarely found at HeG and in RAB only in Rooms 8 and 4 (see below) in Phase 7Ai and in the courtyard in Phase 7Aii. There is historical and ethnographic evidence from traditional societies in the Middle East and Africa of dung fuel or dung ash associated with bread-baking in *tabūn* and *tannur* bread ovens (e.g., Palmer 2002, Lyons and D'Andrea 2003). At RAB and the nearby area of the Eastern Town House, bread-baking appears to be associated with animal dung (Murray forthcoming).

Finally the ceramic corpus in the courtyard adjacent to Rooms 8 and 9 was dominated by beer jars and bread molds, either as a result of the ceramics having been used for consumption or production here or having been discarded from Rooms 8 and 9.

Room 4, also in Phase 7Ai, may have been another bakery (Sadarangani 2007). Bread molds were the most common ceramic type here. We found no hearth, but the limits of excavation cut the room off so that we only see

the north end. As in Room 8, thick ash deposits had accumulated, dense with the spent fuel of cereal processing residues, wood, and animal dung. Here, too, emmer grain was found in higher densities than barley—a rare scenario in the RAB assemblage.

Room 6, which appeared to be a living area in the first phase of the RAB, continued as a domestic space in Phase 7 (Sadarangani forthcoming). A hearth first put into use in the early phase continued to provide heat and probably cooking facilities. The main ceramic types were bowls, suggesting food was prepared and served here. The plant remains, as before, were dominated by crop processing debris, most likely indicating fuel. But, unlike the fuel remains in the possible bakery rooms, it was badly fragmented, as though it had been raked or charred repeatedly. In the ash deposits within the probable baking areas of RAB, and elsewhere at HeG, the fragmentation figures are generally lower than in other areas, suggesting that the ash in the bakeries was dumped in batches and left as is.

The faunal evidence from Phase 7 is statistically identical to that from Structural Complex 2 in certain ways. Cattle and caprines were consumed in large numbers with cattle providing four to five times the amount of meat as caprines. The cattle were likely to have been provisioned. However, the older age of the sheep/goat indi-

cates that they probably did not come through the same channels, but were obtained from elsewhere. The Phase 7 residents may have been obtaining meat from the Eastern Town rather than a central authority, as may have been the case in Phases 3i to 4b. Pigs may also have come from the Eastern Town. Almost all of the bird and fish remains were recovered from the courtyard, suggesting that the area was used to process food, among other activities. Phase 7 faunal remains may reflect a medium-status diet that was partly provisioned and perhaps partly acquired elsewhere (Redding forthcoming).

#### *Administrative Activity*

Outside of Phases 8 and 9, to be considered below, the combined sub-phases of Phase 7 produced the most registered sealings and sealing-related material from RAB. All told, 162 pieces were registered from Phase 7, of which 69 are impressed sealings, 33 are incised sealings, and 50 are sealing-related objects. All of the sealings from Phase 7 come from the western rooms and the Courtyard (Room 10). Notably there are no registered sealings from the later features in Phase 7 of the Courtyard (Phases 7Gii and 7Hii), and registered sealings are completely lacking in Phase 7 from the Silos (Phases 7Aiii, 7Biii, and 7Ciii) and the area near the “Entrance” (Phases 7Biv, 7Div, 7Fiv, and 7Giv).

Nolan and Witsell (2010) saw a striking pattern in the spatial distribution of the sealings within the Western Rooms. Of the 162 sealings registered from all of the sub-phases of Phase 7, 141 come from just three rooms in the western rooms: Room 1 (31 sealings), Room 8 (43 sealings), and the Courtyard (67 sealings). These high concentrations of sealings fit the excavator’s overall interpretation of the Western Buildings. Room 1 apparently served an “informal role within the complex” and may have acted as “little more than a through route between ... Room 5 [and] 9...” (Sadarangani 2008). Room 8, with its thick layers of ash, apparently housed an active bakery. Bakeries similar to this have contained rich deposits of sealings mixed in with the ash elsewhere at the Heit el-Ghurab site. The Courtyard represents the nearest known expanse of exterior space accessible to the western rooms. All three of these rooms represent the most likely areas for the disposal of garbage from the six southernmost rooms in the western complex. By contrast, these six rooms—Rooms 2, 3, 4, 5, 6 and 7—produced a combined total of just 19 registered sealings.

The types of sealings and the kinds of seals that impressed them also shed some light on the function of the western rooms in Phase 7. Of the 162 pieces registered for Phase 7, 102 were either impressed or incised sealings. Although 27 of these had no discernible sealing type, 55 were either clear jar sealings or were either jar sealings

or bag sealings. The seals used to impress these sealings were predominantly “informal,” since just 16 sealings bore impressions likely made by the Official Seals used by officials in the central government. Whereas seven of these sealings with Official Seal impressions are either jar or possible container sealings—closely conforming to the types of sealings from Phase 7 overall—five of the six papyrus document sealings excavated from Phase 7 bear the impressions of Official Seals. The predominance of Official Seal impressions on the papyrus document sealings may indicate that, while most of the administrative actors associated with the Western Complex in Phase 7 may not have been high officials of the central government, such high officials did occasionally send correspondence to the western rooms. Supporting this conclusion, the single door sealing from Phase 7, bears the impression of a graphical seal design with closely packed wavy lines, demonstrating that at least one official with an “informal” seal was responsible for sealing one of the doors in the Western Complex during Phase 7.

The sealings from Phase 7 also seem to span the period from the end of the 4<sup>th</sup> Dynasty into the beginning of the 5<sup>th</sup> Dynasty. Of the ten sealings from Phase 7 that bear royal names, six preserve the name of Menkaure, and two others show the name of Khafre, but two sealings have traces of the name of Userkaf, the first ruler of the 5<sup>th</sup>



Figure 16.10. Triangular scraper and flakes from Feature [21,648] from Phase 7 in the RAB. Photo by Yukinori Kawae.

Dynasty. The impressions on these two sealings mark the first certain instances of the names of any king outside the 4<sup>th</sup> Dynasty at HeG.

### ***Crafts and Tools***

Evidence of flint-knapping is found primarily in the central portion of the courtyard where knives were the principal product, while the re-sharpening of tools, primarily scrapers, took place in the western portion. These activities can also be seen in some of the rooms of the Western Complex. A good example of re-sharpening comes from Feature [21,648], which contained two large fan scrapers (recovered from dry sieving) and c. 30 flakes made of the same raw material with a distinctive white cortex (recovered from wet sieving) that refit onto one of the scrapers (fig. 16.10).

Overall, throughout the RAB sequence, there is more burnt lithic material in the western rooms than in the courtyard and these are likely to “be associated with dump/garbage deposits exposed to burning activities” (Milić 2009: 15).

Phase 7 had the highest numbers of abrasion/whetting, as well as weaving tools (along with Phase 8). It also had the most evidence for jewelry and drilling.

### ***Phase 8 – Interface Between Occupation and Abandonment, Including Structural Remodeling***

By Phase 8 the RAB was in decline, although still occupied. The phase is characterized by the accumulation of refuse strewn across the whole of the courtyard and Room 1. In the previous phases, accumulated refuse was comparatively well contained and managed. For most classes of material culture, the largest amounts of material were found in the discarded debris of Phase 8.

### ***Administrative Activity***

In many ways, the patterns that Nolan and Witsell (2010) see in the sealings from Phase 8 seem to reflect an intensification of those from Phase 7. Phase 8 produced 181 registered sealings and sealing-related objects, the highest number of registered pieces of any phase in the RAB, and all but four of them come from either Room 1 or the Courtyard (Room 10), the two major dumping areas in Phase 7. Like the sealings from Phase 7, over 71% of the sealings from Phase 8 are possible container and jar sealings when they can be classified. In addition, two of the four sealings that bear the name of Userkaf, the first king of the 5<sup>th</sup> Dynasty, come from Phase 8. These two examples of Userkaf’s name are the last so far attested in the RAB. Furthermore, sealings with “informal” impressions are twice as common as those with impressions made by Official Seals, and the two lone examples of papyrus document sealings were both apparently impressed by

Official Seals. Even the single door sealing from Phase 8 bears the remains of a few quickly incised hieroglyphs, supporting the view that the local administration of the Western Complex in Phase 8, while connected to the central administration through correspondence, was much less formal.

Two other trends in the sealings for RAB are first seen in Phase 8. First, five different sealings in Phases 8 and 9 appear to have been impressed by the same seal. These five sealings are the only “replicates” from RAB. The seal that was used on these sealings was either an “Administrative Seal” (a seal that bears just the title of the seal bearer) or a “*Beamtensiegel*” (a seal that bears the name of the seal owner and his title) and preserved an otherwise unattested administrative title, which can be read as “Porter at the will of the King of Upper and Lower Egypt.” While the replication of this seal on five sealings—all but one of which were found in Room 1—suggests that this official may have been present in the Western Complex, the small number of seal impressions he left behind is puzzling.

Second, four other sealings—three from Phase 8 and one from Phase 9—while all clearly impressed by different seals, all appear to preserve, in whole or in part, the title “Elder of the Estate.” While little is known about the functions of these administrative officials, a later inscription from the First Intermediate Period suggests that Elders of the Estate were in charge of grain disbursements at rural agricultural estates. If these officials also had the same role earlier in the 4<sup>th</sup> and 5<sup>th</sup> Dynasties, then these four sealings might indicate that the RAB received shipments from at least four different estates during the later phases (Nolan and Witsell forthcoming).

### ***Crafts and Tools***

Phase 8 has one of the richest object assemblages from RAB. Nearly all of the crafts, tools, and activities are represented here, primarily in the courtyard.

Phase 8 had one of the highest number of tools used for grinding and weaving. Weaving is reflected in these phases by artifacts, including loom weights, bone needles, spindle whorls, and pointed tools, making Phase 8 the phase with the highest number of weaving tools. All of these tools were found in the courtyard, while the abrading/whetting and grinding tools also occurred in Room 1 and the courtyard. Lentoid ceramic objects, found throughout the sequence, are also associated with weaving tools (Tavares 2004). We find a negative correlation between these lentoids and other ceramic tools, such as burnishers/scrapers, which might suggest that these two sets of tools were used on different materials or in different stages of the polishing/abrading process. Phase 8 also had the highest number of items of jewelry, gaming pieces/mud tokens, and, together with Phase 9, the high-

est number of vessels. All but one pigment specimen from Phase 8 were found in the courtyard, which may attest to continued pigment processing in this open space. A single piece of painted plaster was recovered and, unlike all the other specimens found in the RAB, it was a bluish-gray color, rather than the usual red color.

#### ***Food and Fuel***

The animal bone was markedly different in Phase 8 than all other phases. The ratio of sheep to goat was higher than in other phases, and pig and the preferred Nile catfish were relatively abundant. On the other hand, bones of hunted mammals were less common than in earlier phases. The pattern suggests what Redding (2009) calls a “medium-status diet,” relying primarily on sheep and probably not entirely provisioned. The age structure of the bone assemblage, and the possibility that pre-butchered cuts of meat or prepared meals were being consumed at RAB, may suggest a continued economic tie to the Eastern Town where the caprines are older than in all other areas of the site except RAB.

The plant remains from Phase 8, recovered from Room 1 and the courtyard, occur in about the same density in both spaces. The fragmentation of the remains, however, is far less in Room 1 compared to the courtyard, suggesting that the remains in the courtyard may have been repeatedly burned and/or disturbed after dumping. Emmer and barley grains were more abundant in Room 1 than in the courtyard, while the density of cereal chaff is higher in the courtyard, possibly suggesting cereal processing in this space, where the cereals were probably pounded to remove the hulls that bind the grain with the residues being discarded on a fire. Wild/weed plants were ubiquitous throughout and, as in earlier phases of Structural Complexes 1/2, the most abundant taxa group.

The fuels found in the phase include wood charcoal primarily of Nile acacia, but also the wood and bark of *Tamarix* (Gerisch 2009). Cereal processing debris was extensively used, but there is no evidence for the use of animal dung in this phase.

#### ***Phase 9 - Abandonment of RAB - Collapse of the RAB Complex, End of the Silo Compound***

In this phase the large Structural Complex 1, occupied during Phases 7 and 8, collapsed or was deliberately dismantled and abandoned. The silos were intentionally decommissioned. Phase 9 deposits included debris from the deliberate dismantling of the area.

#### ***Administrative Activity***

Phase 9 was also rich in registered sealings. According to Nolan and Witsell (2010), 143 sealings or sealing-related objects were registered for Phase 9, 47 of which were im-

pressed sealings and 16 were incised sealings, while the remaining 80 pieces were sealing-related objects. All told 103 of these pieces were sealings (some sealing-related objects are typologically important sealings that have no seal impressions or incisions per se, but still were used to seal containers or doors). Although 45 of these sealings could not be classified, 56 were either possible container or jar sealings, continuing the trend of the dominance of these sealing types. In a departure from the trends of earlier phases, seal impressions of Official Seals actually outnumber those of other kinds of seals for the first time at RAB. While most of the sealings from Phase 9 continue to be found in Room 1 (73) and the Courtyard (Room 10 and 11) (56), sealings also come from Room 2 (8), Room 5 (4), Room 7 (1), and Room 9 (1), unlike the distribution of sealings in Phase 8. Another difference between Phase 9 and Phase 8 is that only the royal names of Menkaure and Khafre are attested on the impressed sealings from Phase 9; the name of Userkaf, attested on four sealings in Phases 7 and 8, no longer appears.

#### ***Crafts and Tools***

After Phase 8, the largest numbers of objects came from Phase 9 and included fragments of statuary and other objects not found in other phases. Phase 8 deposits produced the highest number of beads and bracelets; grind stones; gaming pieces/tokens; vessels; architectural elements; and tools for weaving, construction/demolition, abrasion/whetting, drilling, and fishing.

Evidence from this phase also suggested the possibility of a designated area for drilling vessels. In the courtyard, we recovered one drill bit and five vessels/bowls of calcite, gneiss, and limestone. Other objects of interest included a bone bracelet in the manufacturing stage, a gaming piece with red banding, a conical quartzite drill bit, an unusual burnt limestone vessel, a copper fish hook, an anchor-shaped limestone net weight, and a small clay animal statuette.

In the Phase 9 deposits, two pigment specimens were found in the eastern portion of the complex. A fragment of blue-gray painted plaster was also found, interestingly, in an area adjacent to where the blue-gray plaster fragment was found in Phase 8. No other related minerals were recovered from deposits of this phase.

#### ***Food and Fuel***

In Phase 9, plant remains were recovered from Room 9 and the Silo Compound. During this period marking the decommissioning of the Silo Compound, the plants here consisted of mixed charred debris with a higher ubiquity and density in the silo area than in Room 9 for nearly all classes of plant material. In both areas, the deposits were primarily composed of weeds with small amounts of cere-

als and chaff. There was no evidence of stored grain from the silo samples in this or any other phase. The fragmentation of these deposits as a group in both areas was lower than average, suggesting that the deposits may have been dumped and left as is.

The fauna from Phase 9 showed a shift away from the predominance of sheep to the same ratio of sheep to goat as was found in Phase 7. Among the fish remains, the Black Nile catfish (*Bagrus*) was more abundant than earlier, while the North African catfish (*Clarias gariepinus*) declined. This may signal a change in fishing practices since the latter species lives in shallow water and can be taken in large numbers during the annual inundation, while Black Nile catfish is a deep water species. The difference may reflect a shift towards fishing in deeper waters, especially as there is also an increase of another deep water fish, Nile perch (*Lates niloticus*), relative to the North African catfish (*Clarias gariepinus*).

As in all other phases, the fuel was predominantly Nile acacia, but *Tamarix* was also present here. Cereal processing debris was extensively used, or at least discarded, throughout, but there is no evidence for the use of animal dung fuel in this phase.

## Discussion: Continuity and Change

The various lines of evidence from the material culture of the Royal Administrative Building point to predominant themes that prevail throughout the life of the complex from the activities in its earliest buildings to its twilight years and demise. The three main functions of both Structural Complex 1 and 2 were likely an administrative center, a workshop and craft-working area (possibly for funerary as well as everyday items), and a living space for domestic activity. Differences in the architecture and material culture throughout the life of the building also reflect changes within these three important functions.

### Administrative Activity

The role of Structural Complexes 1/2 as a focus of administrative activity is reflected in the large assemblage of clay sealings used to seal documents, jars, boxes, doors, and other containers. Unlike other excavation areas in the Heit el-Ghurab site, the seals expressed on the RAB sealings are predominantly Administrative Seals, *Beamtensiegel*, and those with unique graphical compositions. While these sealings certainly indicate a high level of administrative activity, the primary actors are not the high state officials of the central government, although in some phases the existence of papyrus document sealings indicates that such high officials had an interest in the functions of the RAB.

The royal names on the sealings help to give a chronological framework to the development of the RAB. First,

the earliest levels in Phase 3 contained only the royal names of Khafre, suggesting that these features were deposited in his reign or very early in the reign of his successor, Menkaure. From that point on, the royal names of both Menkaure and Khafre are attested in all of the succeeding phases. Second, starting in Phase 7cii and ending in Phase 8, four sealings bearing portions of the names of Userkaf, the first king of the 5<sup>th</sup> Dynasty appear. Nolan and Witsell (forthcoming) concluded that this scant but positive evidence clearly indicates that the 5<sup>th</sup> Dynasty had begun by the time that Phase 7cii was deposited.

### Crafts and Tools

The team found evidence for craft-working and tools throughout the sequence of Structural Complexes 1 and 2, although the numbers of artifacts are greater in the later phases. There appears to be some zoning for certain activities; for example, drilling only takes place in the courtyard, often in association with stone vessels. Overall, the evidence from the objects suggests a continuity of activities between the two structural phases. The activities taking place in the workshops of both complexes included stone vessel manufacturing, weaving, stone-working, pigment preparation, carpentry and woodworking, bone and metalworking, as well as probable working of soft/organic materials, such as reed or leather (Malak and Tavares 2009: 6).

At RAB, much of this activity is found in the courtyard and in the Western Rooms. The team found most pigments and abrasers concentrated in this northwestern part of the RAB, which may suggest that this area was specifically used in the preparation of pigments. Most of the painted plaster samples were from the earlier structures and were primarily red (Flentye 2009; Sadarangani 2008). Some of the tools associated with the pigments show hematite staining, the raw material of pigments, and they appear to be largely recycled, primarily broken querns and grinding stones.

In all, we can associate over 60 objects with grinding, including querns and hand stones that were used to grind grain and other food/plant material as well as pigments and softer materials in small quantities for craft production. Small hand grinders or palettes were also used in processing materials for food and for craftwork. For example, palettes were probably used to grind material, such as pigments, for wall decoration or statuary; ingredients used in faience manufacture; or even cosmetics. In the Early Buildings, grinding tools appeared to be most often associated with pigments. In the later complex, grain milling was likely to have been a significant activity associated with the Silo Compound. Malak and Tavares (2009) believe that most of the tools from the Phase 9 demolition deposits correspond to activities during the oc-



cupation of Structural Complex 1. The final phases, 10 and 11, and the earlier demolition deposits of Phases 4 and 8 produced high numbers of grinding tools.

Most of the querns and hand stones were retrieved from Phase 4a and the later phases of the RAB, although they appear in nearly all phases. These were valued objects, important for grinding grain into flour to make daily bread. People would have carried away complete grinding stones when they abandoned the site, only leaving behind ones that were damaged beyond repair. Some of the quartzite used to manufacture the grind stones may have been quarried some distance away from the settlement, while the distinctive red-to-purple quartzite used for much of the assemblage probably came from the quarry of Gebel el-Ahmar, northeast of modern Cairo.

Tools for abrasion and whetting were common and were the only tools in evidence in all phases except for the late Phases 10 and 12. Abraders could be used on both hard and soft material and whetstones, for sharpening copper tools. Both might suggest woodworking as well as stoneworking; i.e., for cutting, abrading, polishing, and finishing pieces, such as wooden boxes, furniture, stone vessels, and wooden and stone statuary (Malak and Tavares 2009: 5). There also may have been a foundry nearby, since a by-product of this process appears to be a weakly magnetic sand, which in turn can be gathered, mixed with an ointment, placed into a cloth, and employed as an abrasive for grinding and polishing statuary (LaPorta 2009). The phases with evidence for the highest abrasion/whetting activities were Phase 4, the demolition of the Early Buildings, and Phases 7Eii, 8, and 9. Most of this activity took place in the courtyard.

RAB excavations yielded more large builders' tools used for construction and/or demolition, such as pounders, axes, and hammers, than smaller tools. The larger tools were most numerous in Phase 4a, the demolition of Structural Complex 2, followed by Phase 9, the decommissioning of the silos. Anvils that were probably used in manufacturing faience beads, copper sheeting, leather sandals, and so on (LaPorta 2009) were also primarily found in Phase 4a and in the courtyard. Drilling, too, seems to have been carried out in the courtyard during several phases. Drill bits, similar to those found in the RAB, are associated at other sites with the production of stone vessels and other stone objects, many of which were made of alabaster (Tavares 2008). Large fragments of alabaster are found at RAB (Sadarangani forthcoming). Axes and mattocks would have been employed for splitting the stone parallel to its grain and dressing it prior to the production of jars and bowls (LaPorta 2009).

Everyday household objects included headrests, bed platforms, tables and stands, possible gaming pieces, as well as architectural elements, such as faience tiles and

limestone door sockets. The evidence for weaving includes spindle whorls and bone tools such as needles. Lentoid ceramic objects are also found associated with these weaving tools (Tavares 2004). We also find evidence for fishing (hook and fishing weights) from Structural Complex 1, but not in the Early Buildings or their demolition phases (Tavares and Malak forthcoming).

Beads, bracelets, and other items for personal adornment were recovered from Phases 4, 8, and 9. Many of the beads are faience but, the stone beads are primarily made of blue feldspar, which may have originated in the Eastern Desert (LaPorta 2009). The minerals used for the tools and stone objects may have come from the margins of the regions known to the residents, such as granites from Aswan. Aragonitic calcite, from which some of our small objects are made, may have been quarried to the south of Amarna or above the Aswan High Dam (LaPorta 2009: 3–4). These minerals may have been procured as part of the provisioning apparatus seen at the settlement or as tributes and taxes from the provinces.

### Food and Fuel

The round storage silos in Structural Complex 1 were the first architectural components of the complex, built in Phase 4b, indicating their importance to the building from its inception, and, it appears, the importance of centralized storage of commodities, most likely grain for the settlement. At roughly the same time, bakeries multiplied across the site (see Lehner, Chapter 9, this volume). Yet there is almost no evidence of grain storage anywhere else at the HeG settlement, except for some small, round silos in the Eastern Town. The appearance of the silos and the proliferation of bakeries at the same time suggest that the community was baking on an industrial scale and that the cereal for the bread was stored and dispersed by a central authority.

The two cereals ubiquitous at HeG, emmer wheat (*Triticum dicoccum*) and hulled barley (*Hordeum sativum*), were almost certainly the commodities stored in the silos. The two important products made from these cereals, bread and beer, were the main staples in the diet of the pyramid builders. Emmer was primarily used to make bread, but also used in beer-brewing, while barley was most suitable for the latter. Brewing facilities have yet to be found at HeG (but see Lehner, Chapter 13, and Sadarangani and Kawae, Chapter 14, this volume), but the profusion of beer jars is only superseded by the vast quantity of bread molds.

The silos would have once held a considerable quantity of grain that was likely dispersed from this central storehouse, protected behind the double walls of the RAB. There are at least ten mudbrick silos in the Silo Compound and probably more beneath the Abu el-Hol soccer field to

the south. The silos are relatively uniform with an internal diameter of 2.60 m (or 5 cubits) and external diameters of 2.90–3.00 m. The silo walls were 16–20 cm thick and each was attached to the adjacent silo (Sadarangani 2008: 30). We cannot determine the volume of the silos since we do not know their original height. However, we can estimate a possible range of volumes. If the silos were as high as they were wide—5 × 5 cubits—the volume of one silo would have been about 14 m<sup>3</sup>; if the silos were 3 cubits high the volume would have been 8.3 m<sup>3</sup>. A 6-cubit-high silo would have held 16.6 m<sup>3</sup>. How much grain could a silo of these volumes have held? Using the figure of 218 kg per m<sup>3</sup>, which Kooistra (1996: 98) determined for emmer stored in the spikelets (rather than hulled), one silo 6 cubits high could hold about 3.6 metric tons (3,600 kg) of emmer; one 5 cubits high could hold about 3 metric tons; and at 3 cubits high, about 1.8 metric tons. The ten silos could have held from 18 to 36 metric tons. The potential quantities of emmer stored in just the ten silos that we excavated would have been a very large volume of cereal. For barley, the figures would have been somewhat higher as stored barley would include less waste.

In addition to being a storage depot, Structural Complex 1 might have been the site where much of the grain was milled into flour. No one area of the compound has been identified as a designated site for large scale cereal processing, but the complex produced a higher than average number of objects associated with grinding, such as querns and hand stones (although many of these may have been reused for other purposes). Grinding was clearly important in both Structural Complexes 1 and 2, especially when compared with other areas of HeG. In the Early Buildings, these artifacts appear to be most closely associated with grinding pigments, while cereal processing was most likely associated with the Silo Compound. Most of the querns and hand stones are from the later phases of Structural Complex 1, Phases 8 and 9, although they appear throughout the sequence. No apparent quern emplacements have been found in the complex. Since the plant remains present were preserved by charring, there is no direct correlation between their presence *in situ* with that of querns, except where ash was disposed of in the same spaces where grind stones were found.

Overall the archaeobotanical record of Structural Complex 1 is richer in plant remains with a greater diversity of species than any other area of the site, apart from the Eastern Town House. The majority of plant groups were also found in more samples in Structural Complex 1 than in most other areas—including cereal grains, as well as legumes, oil/fiber plants, wild grasses, wet-loving taxa, tubers, and wild/weed taxa in general. There are also the curious “textured fragments,” which may relate to bread-

baking or beer-brewing, particularly in Room 8 in Phase 7Ai, a probable bakery.

Emmer wheat and barley were both common throughout the complex. For the most part, barley grain is found in higher densities than, or occasionally equal to, emmer wheat grain by any variable—feature, room, phase, phase in room, etc. This is also a feature common to HeG overall. Cereal chaff, primarily from emmer, was also a common component of the samples and may reflect an initial step in milling emmer: pounding the cereal spikelets to break apart the tough glumes that bind the grain. In ancient Egypt, cereals were most likely stored in their husks, which protected them from insects, fungi, and other pests and diseases to some extent. Before the grains could be ground into flour they had to be freed from the husks through the laborious process of pounding, followed by further winnowing and sieving (Murray 2000: 527; Samuel 2000: 560). The charred plant assemblage from Structural Complex 1 principally reflects the use and disposal of fuel, i.e., wood and/or wood charcoal (primarily Nile acacia), cereal processing residues, other household debris, and animal dung (although dung does not appear to have been a common fuel). Other materials, such as wild grasses, may also have been specifically gathered, possibly for use as tinder. The combination of weeds, straw, and other items suggests that much of this material came from the later stages of cereal processing, i.e. final sieving and hand-sorting of the grain. This processing could have been done on site or nearby, with the residues subsequently being used as fuel. These residues of cereal processing, best described as a “by-product,” were, and still are, a valuable commodity in their own right in Egypt as a fuel, temper, etc. (Murray 2000: 509–10, 526). Indeed, at the HeG settlement the authorities may have distributed cereal processing residues to the residents to use as tinder, since as non-farmers, they probably did not have access to this valuable resource.

The faunal data recovered from the Early Buildings offer clues about the people who worked and possibly resided here. It appears that meat was provisioned and that it was almost as good as what the occupants of the “high status” Western Town ate; that is, rich in young beef and Nile perch, but with a higher proportion of sheep and goat. The craftsmen working in the RAB, therefore, had access to higher status resources than those inhabiting the Gallery Complex and the Eastern Town, as well as having a higher quality diet than the occupants of the later phase Structural Complex 1.

A comparison of Structural Complex 1 to the Eastern and Western Towns as well as the Galleries at HeG provides insight into the relative quality of diets in these areas. During Phases 5 and 6 the composition of the RAB

faunal remains was statistically identical to that of fauna from the Galleries; i.e., the diets were very similar. Are we seeing laborers from the Galleries employed in clearance and construction? The faunal data from the other phases also suggest that food was provided for the RAB residents, but they seem to have been supplementing their diet.

The faunal remains also suggest that the relationship between RAB and the Eastern Town changed through time. It appears that people in the RAB obtained pig and sheep meat from the Eastern Town during Phases 3i to 4b, but almost none during Phases 5 and 6. The economic relationship between Structural Complex 1 and the Eastern Town seemed to become closer again during Phases 7 through 8, where it is strongest. It becomes slightly more distant thereafter in Phase 9.

### **Conclusion**

The integration of the stratigraphic and architectural evidence of Structural Complexes 1 and 2 with the material culture and plant and animal data provides insight into the complexity of this important area of the Heit el-Ghurab settlement. A wide array of evidence attests to administrative activity; the use of tools and craft-working; the provisioning, preparation, and consumption of food; as well as the use of various fuels. The evidence suggests some continuity between the two main phases of occupations, particularly in terms of craft-working and food and fuel use, but also a shift in emphasis from crafts to cereal storage, distribution, and possibly processing in the later Complex 1.

The sealings from RAB suggest that grain might have been collected from a number of provincial estates and sent to the RAB in jars and other containers. These jars were opened in the RAB and disposed of in a few well-defined locations. In some periods high officials carried on a limited correspondence with the residents of the RAB who likely carried on their own internal administration using informal seals and incised sealings. Evidence for domestic activity can be seen throughout in the remains of bread molds, beer jars, and bowls that were likely to be used for eating and drinking, while other ceramics may reflect the small-scale storage of goods.

Bread, and perhaps beer, was probably prepared here, particularly in Structural Complex 1. The plant and animal remains reflect the preparation, consumption, and disposal of food, while the archaeobotanical record also indicates the use and disposal of fuel from various sources. The provisioning of goods is also apparent from the earliest phases—meat, Nile acacia wood, and possibly cereal residues for fuel. There also appears to have been no major segregation between working areas and living areas since tools for a variety of tasks were found in the same areas with remains of domestic activity. These work activities included grinding grain, pigments, and other materials; weaving; whetting/abrading of stone objects; drilling stone vessels; manufacturing small objects, such as beads and other jewelry; as well as the construction, remodeling, and demolition of Structural Complexes 1 and 2 of RAB.



## 17. Khentkawes Town 2009: Pottery Overview

Anna Wodzińska

When Selim Hassan published his 1932 excavations of the Khentkawes Town (κκτ) in 1943, he did not document pottery except for photographs of a few complete vessels ranging in date from the Old Kingdom, Late Period, and Roman times, but without provenience.

Between 2005 and 2009 AERA team members re-cleared areas that Hassan had excavated. Although the remains of the settlement had severely deteriorated, sometimes removed down to bedrock, in some places it was still possible to document phases of building and rebuilding, as well as to retrieve pottery from undisturbed contexts.

The town was built in the late 4<sup>th</sup> Dynasty or perhaps slightly later, towards the beginning of the 5<sup>th</sup> Dynasty. It is located east of the Khentkawes monument, just north of the Menkaure Valley Temple (see map, fig. 2.1). Late in the occupation of the settlement, probably during the late 6<sup>th</sup> Dynasty, people rebuilt parts of the Khentkawes Town. In the late 6<sup>th</sup> Dynasty people also rebuilt the Menkaure Valley Temple and houses within the temple.

Three areas of the Khentkawes Town were excavated during the 2009 season:

- **κκτ-AI:** The area immediately south of κκτ, between the town and the Menkaure Valley Temple, which includes 4<sup>th</sup> Dynasty original structures and later 6<sup>th</sup> Dynasty additions (Lehner, Chapter 8, this volume)
- **κκτ-E:** The area on a lower level east of the town: an approach consisting of ramps, stairs, and a terrace along the western and northern sides of a basin (Jones, Chapter 3, this volume)
- **κκτ-N:** The area north of the Khentkawes causeway where AERA work focused on the remains of a series of houses (Yeomans and Mahmoud, Chapter 7, this volume)

The excavations yielded a certain amount of pottery from each of these three areas. Due to Selim Hassan's 1930s excavations and to the later deterioration of the site, only a few untouched contexts with ceramics were uncovered in the upper town (as opposed to κκτ-E). However, the entire assemblage proved to be interesting, especially when compared with pottery from the Heit el-Ghurab (HeG) site (Wodzińska, forthcoming).

### κκτ-AI

The excavations of undisturbed deposits in Area κκτ-AI yielded 967 diagnostic pottery fragments. Some deposits contained ceramics from the 4/5<sup>th</sup> Dynasty (fig. 17.1), and other deposits contained 6<sup>th</sup> Dynasty forms (fig. 17.2). Only a few features seem to be uniformly 6<sup>th</sup> Dynasty without contamination from 4/5<sup>th</sup> Dynasty pots. Some of the features contain only 4/5<sup>th</sup> Dynasty material.

One feature [31,018] is especially interesting because it contained a fragment of a jar with an undulating body shape, possibly dating to the Middle Kingdom (fig. 17.3). It is made of NB2 fabric (Nordström and Bourriau 1993: 171–73) with a red mat slip on the outside. Comparable forms have been found in Abydos in the mortuary temple of Senwosret III (Wagner 2007: type 42, figs. 102, 243–44). Wagner states that jars of this type—bottles—are well known, especially in funerary contexts of the Harageh-Riqqeh region near the Fayum entrance. The Middle Kingdom is not well represented at Giza. Only a few artifacts can be connected to this period, such as two possible Middle Kingdom statues found in the Giza central field (Zivie-Coche 1976: 43–49).

### κκτ-E

The AERA team excavated 36 deposits with pottery, including 1,991 diagnostic pieces in Area κκτ-E. All of them can be well dated to the 4/5<sup>th</sup> Dynasty; that is, the time when the Khentkawes Town was constructed.

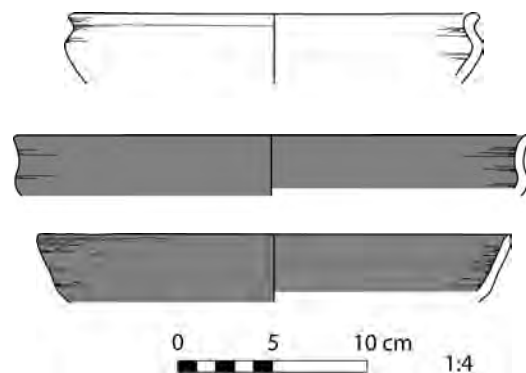


Figure 17.1. A selection of the 4th Dynasty pottery from Area κκτ-AI. Drawings by Edyta Klimaszewska-Drabot.

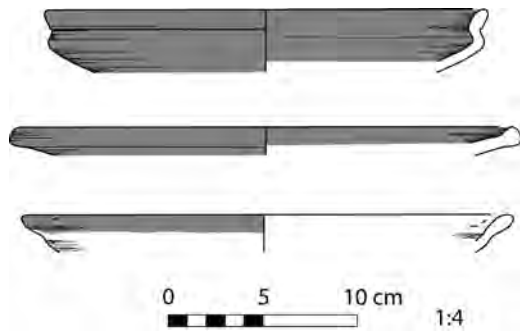


Figure 17.2. Selection of 6th Dynasty pottery from Area KKT-AI. Drawings by Edyta Klimaszewska-Drabot.

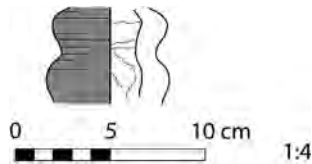


Figure 17.3. Middle Kingdom bottle body sherd from KKT-AI. Drawing by Sherif Mohamed and Anna Wodzińska.

Two *in situ* deposits in KKT-E are especially interesting because of the pottery they contained. The first, Feature [30,829], belonging to Jones and Olchowska's (2009) Phase 6, a period of occupation and use, lay beside and partly covered the steps leading up to the Northern Corridor and Northern Lateral Ramp (fig. 17.4). The pottery, which dates to the 4/5<sup>th</sup> Dynasties, consists of miniature plates (fig. 17.5), miniature jars, and beer jars (fig. 17.6) with a larger fragment of a beer/bread basin, type CD22 (fig. 17.7). Altogether this feature [30,829] contained parts of 295 vessels.

Kasia Olchowska excavated the second deposit (Features [30,840] and [30,845]) in the Northern Corridor running east-west near the eastern limit of the 2009 excavations (fig. 17.8; Jones, Chapter 3, this volume; Jones and Olchowska 2009: 17). The assemblage included a total of 493 vessels, consisting of mostly complete pots and sherds. Within the assemblage were 326 complete or nearly complete miniature plates and jars, types CDM10 and ABM10-11 (fig. 17.9). Also common were beer jars, AB4; large serving plates, CD1 (fig. 17.10); and E stands, especially tall ones (fig. 17.11) (although parts of low stands were also present, fig. 17.12). Other pottery vessels are represented by a single rim fragment of a red carinated bowl with rounded shoulders, CD6B, and seven fragments of flat bread trays.

Tall stands found together with flat trays can be clearly connected to funeral/sacral contexts. Trays with pot stands could form offering tables (Rzeuska 2006: 398).

Marchand and Baud discovered that miniature deposits were found in many Old Kingdom contexts, especially those connected to the royal funerary complexes

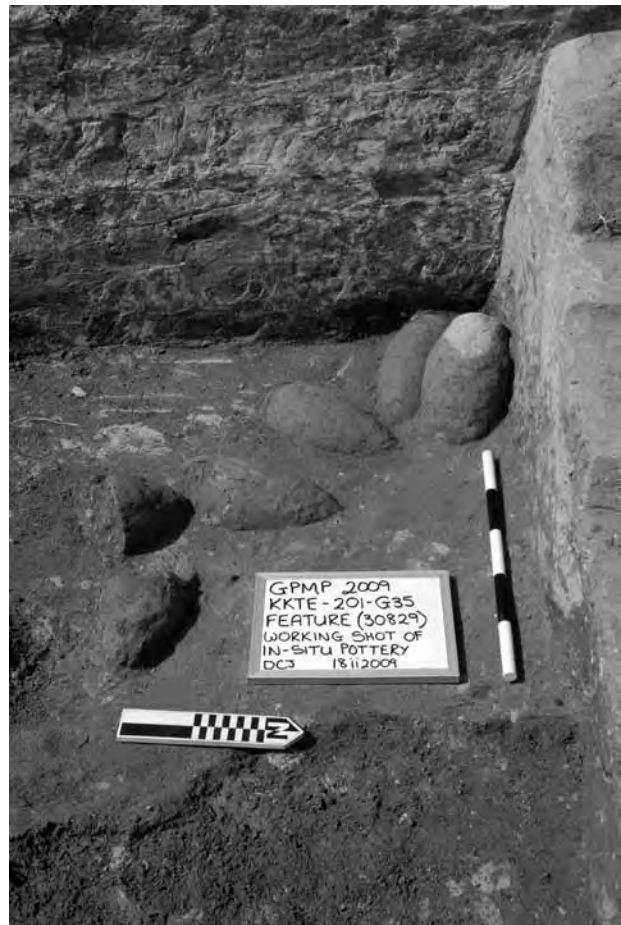


Figure 17.4. Beer jars found in Feature [30,829], part of a votive deposit. Photo by Daniel Jones.



Figure 17.5. Miniature plates from Feature [30,829]. Photo by Anna Wodzińska.

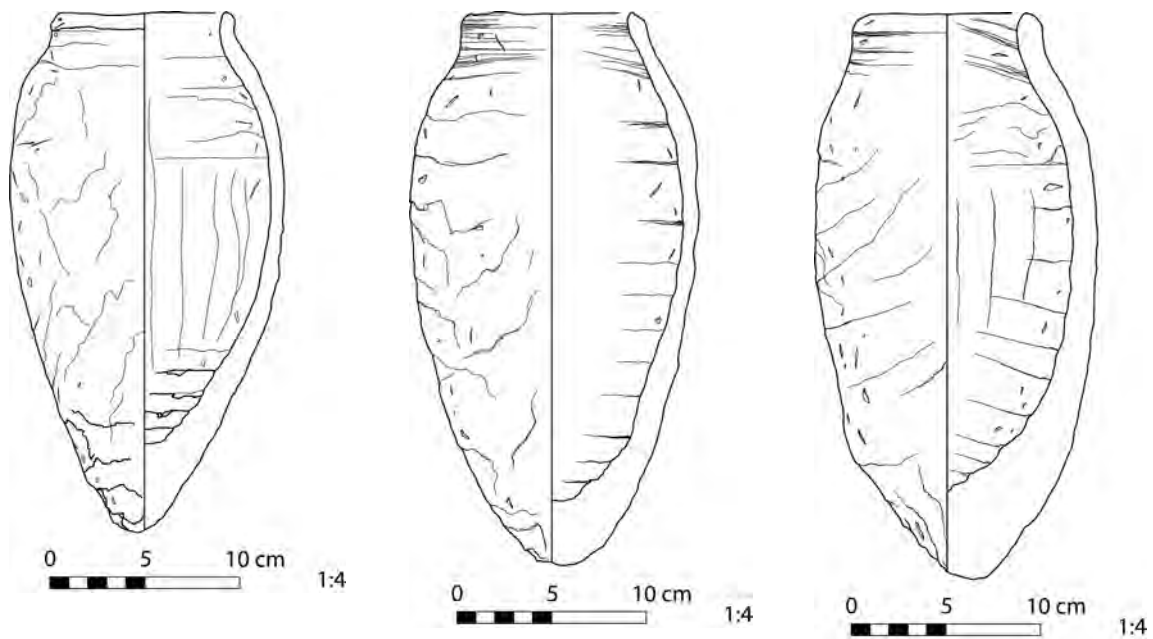


Figure 17.6. Beer jars from KKT-E, Feature [30,829]. Drawing by Edyta Klimaszewska-Drabot and Anna Wodzińska.

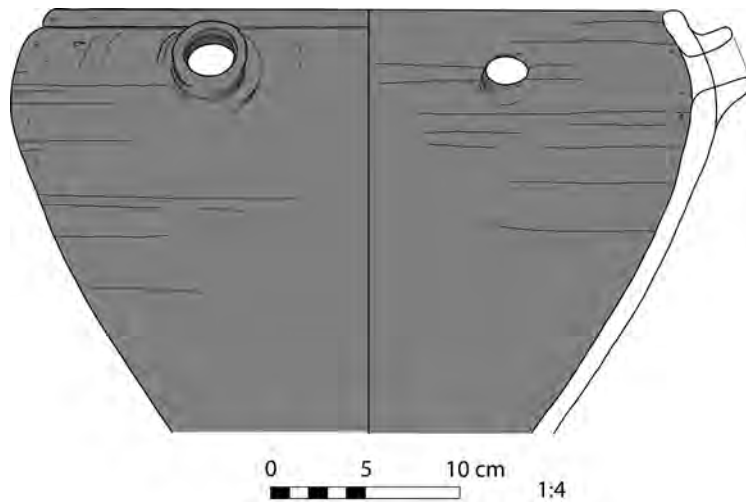


Figure 17.7. A deep basin with a spout, Feature [30,829]. Drawing by Edyta Klimaszewska-Drabot.

(1996: 267–68, fig. 5), including Djedefre in Abu Roash, Menkaure in Giza, Shepseskaf in Saqqara, and Raneferef in Abusir.

They suggested, on the basis of the specimens at Abu Roash, that miniatures must have been part of a ritual performed in the mortuary temple. Once used, they were subsequently discarded outside the temple near its lateral entrances (Marchand and Baud 1996: 267). Miniatures have been found mostly in mortuary temples, but also in valley temples, including the valley temple of the southern pyramid of Sneferu in Dahshur. It is very possible that

Egyptians left deposits of miniature vessels in other valley temples, but since most of the valley temples are not well known or preserved, we cannot be sure. Miniature vessels are also very common in mastaba tombs (Bárta 1995). They must have been used during rituals performed not only in royal funerary complexes, but also in tombs of officials and less prominent people (see for instance Rzeuska 2006: 424–27).

The Khentkawes deposits of miniature vessels at the eastern approach to her town and tomb complex indicate a kind of cult service for the queen in the KKT-E site that





Figure 17.8. A long corridor with votive pottery deposits [30,840] and [30,845]. Photo by Kasia Olchowska.

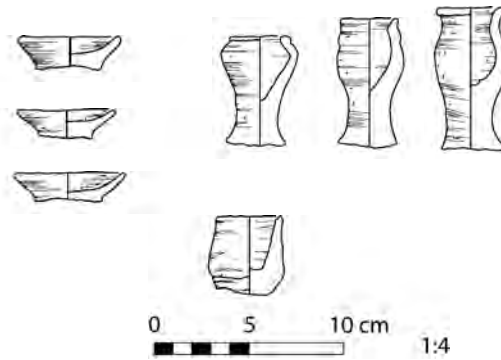


Figure 17.9. Miniature plates and jars from Area KKT-E, Features [30,840] and [30,845]. Drawings by Edyta Klimaszewska-Drabot.

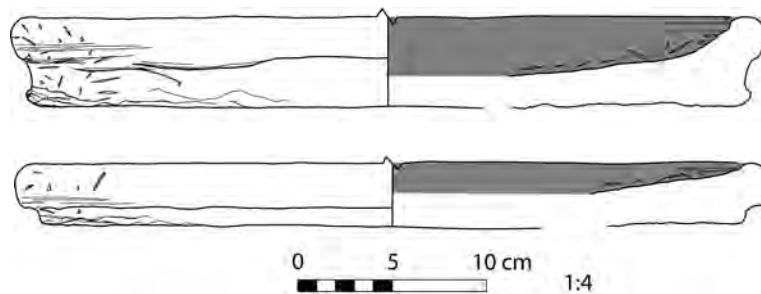


Figure 17.10. Large plates from KKT-E, Feature [30,840]. Drawings by Edyta Klimaszewska-Drabot.

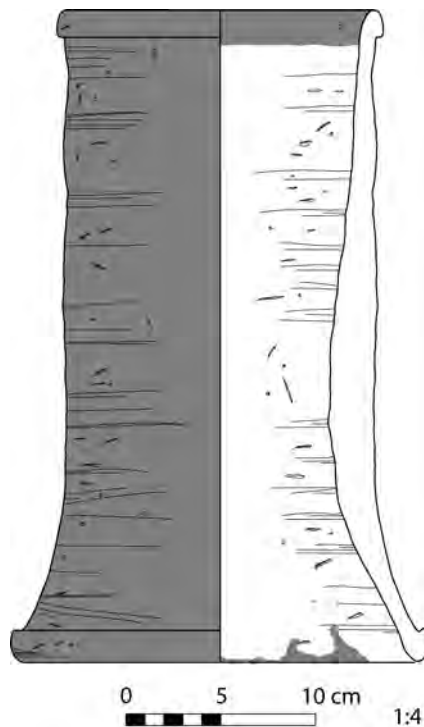
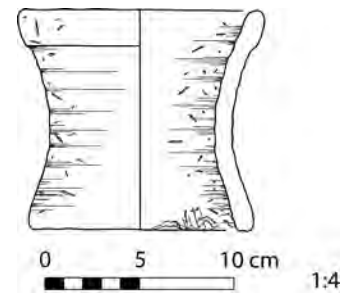


Figure 17.11. A tall stand from KKT-E, Feature [30,840]. Photo by Anna Wodzińska, drawing by Edyta Klimaszewska-Drabot and Anna Wodzińska.



Figure 17.12. A low stand from KKT-E, Feature [30,840]. Drawing by Edyta Klimaszewska-Drabot.



perhaps functioned as her valley temple (Jones and Olchowska 2009). It appears that pots did not accumulate over time but were deposited here during a couple of dumping events. They might have been associated with later cult rituals performed here for the queen.

One of the pots from the second KKT-E deposit seems to be unique (fig. 17.13). It is a hemispherical bowl with a slightly cut inner rim and trimmed base. Its shape resembles Middle Kingdom hemispherical cups. If the pot can, in fact, be dated to the Middle Kingdom, it appears that the Old Kingdom deposit was visible later. Perhaps the bowl can be associated with the people who left the heretofore mentioned bottle with undulating body (fig. 17.3).

During the 2008 season, ceramics dating from the late Old Kingdom, or perhaps even First Intermediate Period, were found in KKT-E (GOP4: fig. 41). They included a complete, almost cylindrical bread mold (fig. 17.14) made of rough Nile fabric. The white paint on the internal part of the rim indicates that the pot was for ritual use, not for

actual baking. White-painted pots that were ritually purified are known from funeral contexts at Saqqara (Rzeuska 2003: 134; 2006: 513–15). The KKT-E bread mold used as an offering vessel could indicate that the eastern part of the Khentkawes Town was still associated with a cult and still saw cultic rituals performed.

### KKT-N

Area KKT-N is the designation for the modular houses along the northern side of the Khentkawes causeway, including the causeway and the road along its southern side, and the Northern and Southern KKT Enclosure Walls (fig. 6.1). During the 2009 season, work in KKT-N focused on Building E, one of the modular houses distinct for the fact that its northern court contained small silo granaries. Lisa Yeomans and Hanan Mahmoud, who re-excavated what remained of Building E some 77 years after Selim Hassan's excavations, retrieved pottery, including 578 diagnostic fragments, from 41 deposits. All of the fragments derive

from vessels that can be dated to the late 4<sup>th</sup>/early 5<sup>th</sup> Dynasty (fig. 17.15), except for some modern pottery fragments (fig. 17.16).

Feature [31,080] consists of a very pottery-rich material that was used as backfill for a cut. Although this is clearly a secondary use of discarded material, the ceramics must have come from a nearby area of domestic activity. The pottery assemblage includes fragments of vessels probably used for the consumption of food, and possibly also bread-baking, but on a small scale.

The pottery-rich deposit [31,080] also contained some Arabic newspapers and one modern plate (fig. 17.16). The modern intrusion indicates that Selim Hassan saw the deposit during his work in the 1930s, but fortunately he left it in the ground. Although a fragment of the modern plate and newspaper contaminated this material, we believe that for the most part it retains its original composition and pottery. Indeed the pottery assemblage looks very homogeneous in terms of dating and can be ascribed to the late 4<sup>th</sup> Dynasty (fig. 17.17).

Feature [31,130], also a pottery-rich deposit, was used during construction as the bedding of a silo. The assemblage, laden with ash, contains numerous flat and conical bread molds (fig. 17.18) and trays. The material used during construction must have been taken from bakery debris. No bakery was found in Building E, but we can assume that

bread must have been baked in the town. There may have been no separate bakeries, but perhaps bread was baked in the kitchens of the houses.

### Khentkawes Town Comparison

When we combine the ceramic data from the three areas described above in a simple diagram (fig. 17.19), we can see that Area KKT-AI is clearly different on the basis of relative frequencies of the simplest ceramic classes: jars, bowls, pot stands, and bread molds. Since the ceramics from this area are chronologically mixed, let me concentrate on the other two, KKT-E and KKT-N. They seem to be similar with significant quantities of bowls. But we have to remember that KKT-E as the potential Valley Temple of Khentkawes is characterized by many votives. KKT-N, on the other hand, is a domestic area with many bowls that were used during preparation, serving, and consumption of food.

### Heit el-Ghurab–Khentkawes Town Comparison

In order to compare ceramics from the HeG site and Khentkawes Town, the relative frequencies of some ceramic types dated to the late 4<sup>th</sup> Dynasty, those that are characteristic of the HeG settlement, can be put side by side (figs. 17.20–24). The diagrams include pottery from occupation phases only.

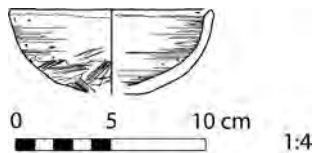


Figure 17.13. A bowl from KKT-E, Features [30,840] and [30,845]. Drawing by Edyta Klimaszewska-Drabot.

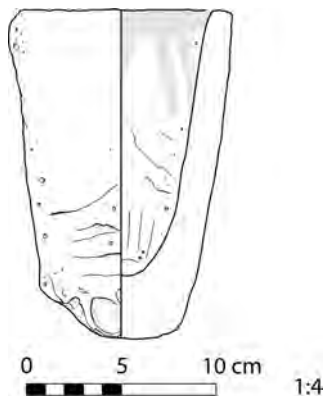


Figure 17.14. Late Old Kingdom–FIP (?) bread mold from KKT-E, Feature [29,858]. Drawing by Edyta Klimaszewska-Drabot and Aleksandra Książak.

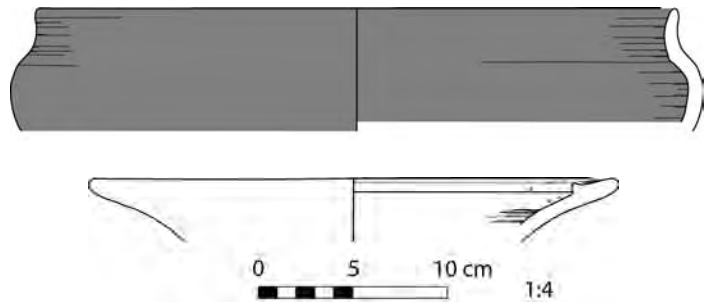


Figure 17.15. 4th Dynasty bowls from Area KKT-N. Drawing by Edyta Klimaszewska-Drabot.



Figure 17.16. Example of modern (but probably from the time of Selim Hassan) plate.

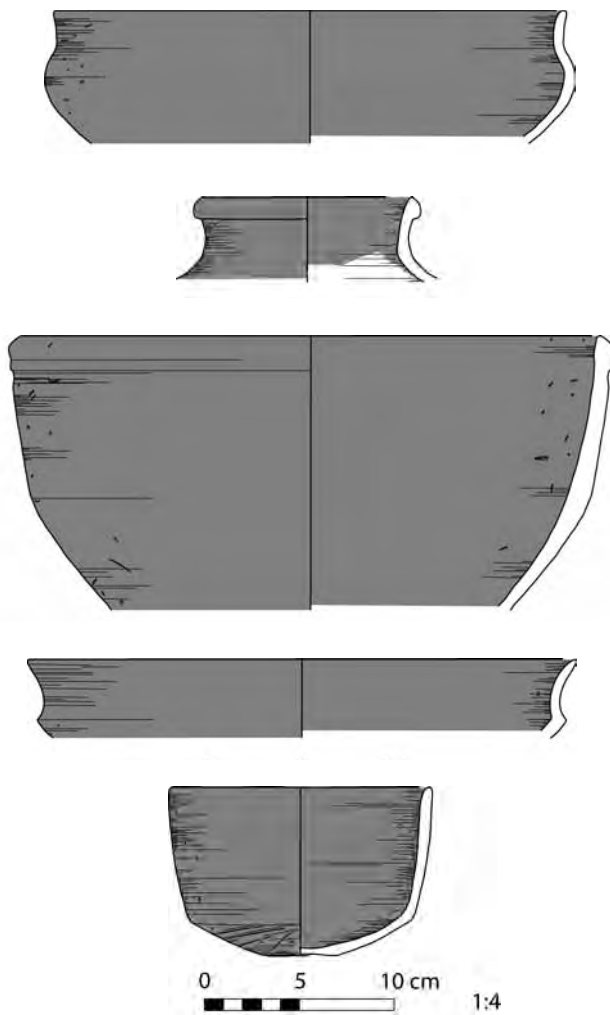


Figure 17.17. A selection of ceramic vessels from KKT-N, Feature [31,080]. Drawings by Edyta Klimaszewska-Drabot.

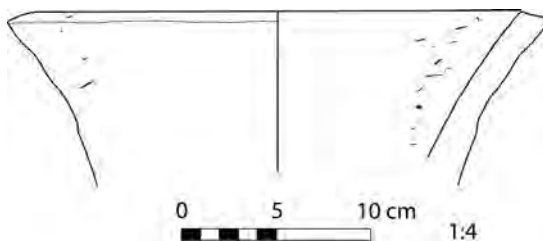


Figure 17.18. A conical bread mold from KKT-N, Feature [31,130]. Drawing by Sherif Mohamed and Anna Wodzińska.

- **CD1:** a flat plate, known from both settlements, serving a different function in each one (fig. 17.20). At HeG it was used as a plate for serving food, while in Khentkawes Town it played a ritual role as a votive vessel.
- **CD7:** a white carinated bowl associated with the HeG site, especially the Gallery Complex, which may have served as a barracks. I have suggested that the CD7 was used as a food dish/ration bowl by workmen housed in galleries (Wodzińska 2006) (fig. 17.21). CD7 bowls were also found in Khentkawes Town, but only in House E. These bowls are not known from clear funeral or sacral contexts.
- **CDM10:** votive miniature plates found in great number in Khentkawes Town, in KKT-E in particular (fig. 17.22). Some also appeared in the HeG site, but only in mixed contexts.
- **E:** stands, especially the low type, occur in both settlements (fig. 17.23). Khentkawes Town, however, is characterized by medium-height stands which were clearly connected to rituals performed in Area KKT-E, together with votive miniature vessels and shallow plates.
- **F1 and F2:** flat and conical bread molds very common at the HeG site (fig. 17.24). They were found in galleries, bakeries, and in small homes and large houses of residential areas, as well as a possible administrative center. They also occurred in Khentkawes Town, especially in a domestic context of KKT-N.

## Conclusions

The two settlements, KKT and HeG, have similar pottery dating from the late 4<sup>th</sup> Dynasty. The HeG site has a richer corpus than the one we have excavated thus far at Khentkawes Town. But that impression may be incorrect, given the small number of preserved pots that we recovered from Khentkawes Town. Selim Hassan cleared out much of the material culture when he excavated here. However, HeG is a larger, more complex site with a number of districts that appear to have had different functions, including the galleries mentioned above; the Western Town, a neighborhood of large homes; and the Eastern Town, a village-like maze of small houses and courtyards; as well as storage magazines, bakery complexes, grain silos, craft workshops, and work yards. The pottery and other artifacts from these areas reflect their various functions. For example, the large houses produced abundant fine serving vessels as well as numerous beer jars.

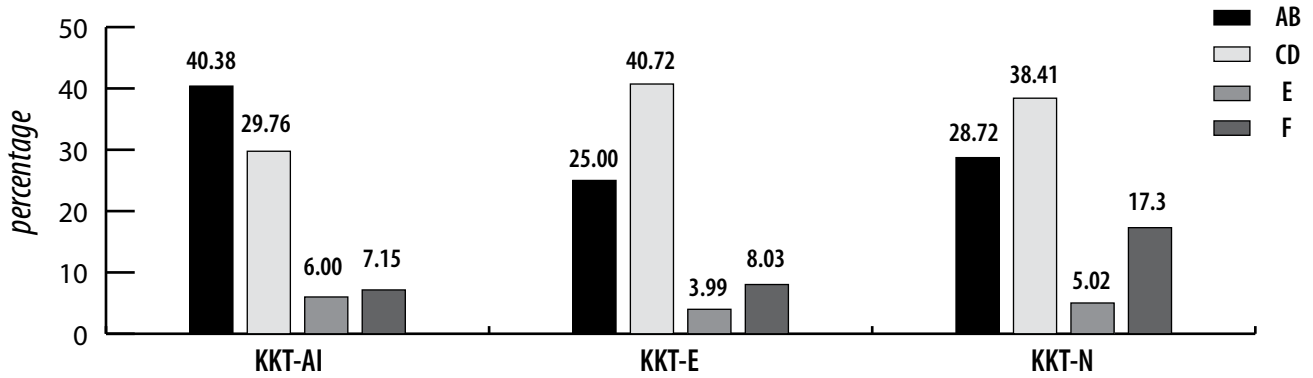


Figure 17.19. Relative frequencies of main pottery groups: AB – jars, CD – bowls, E – stands, F – bread molds, within three excavated areas of the Khentkawes Town.

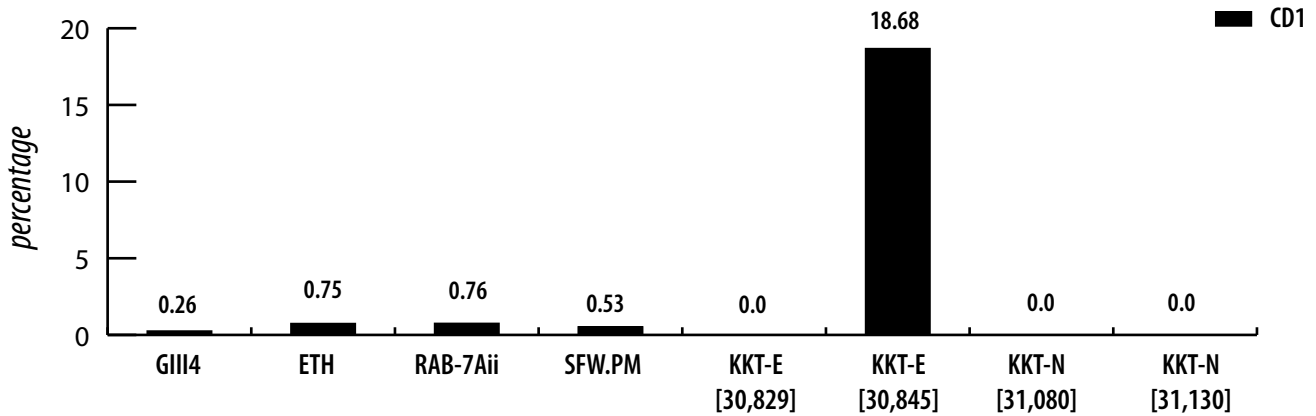


Figure 17.20. Relative frequencies of flat trays, CD1, in Heit el-Ghurab site areas (GIII.4 = Gallery III.4; ETH = Eastern Town House; RAB-7aII = Royal Administrative Building, Phase 7aII; SFW.PM = Pottery Mound in Soccer Field West) and Khentkawes Town (KKT-E, KKT-N).

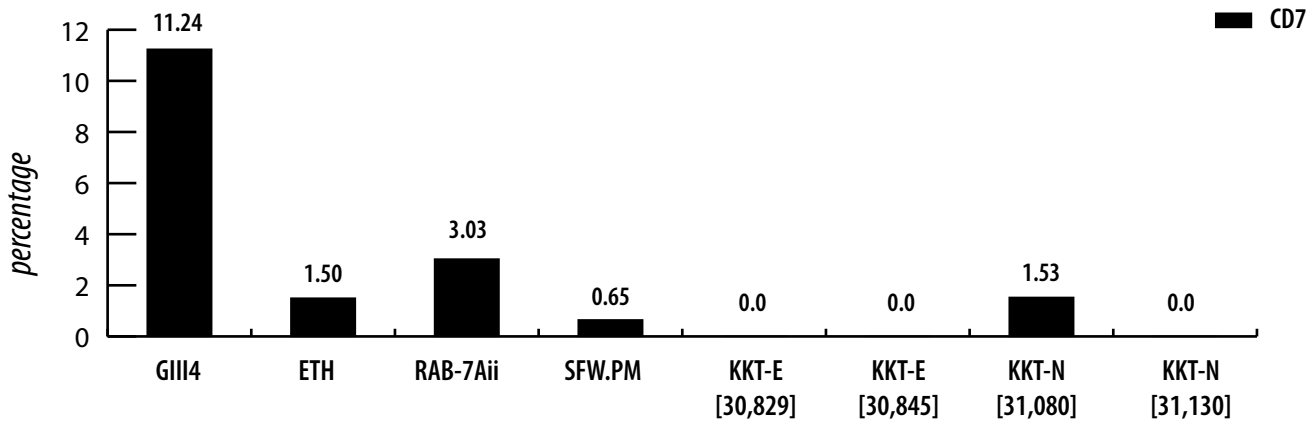


Figure 17.21. Relative frequencies of white carinated bowls, CD7, in Heit el-Ghurab site areas (GIII4, ETH, RAB-7Aii, SFW.PM) and Khentkawes Town (KKT-E, KKT-N).

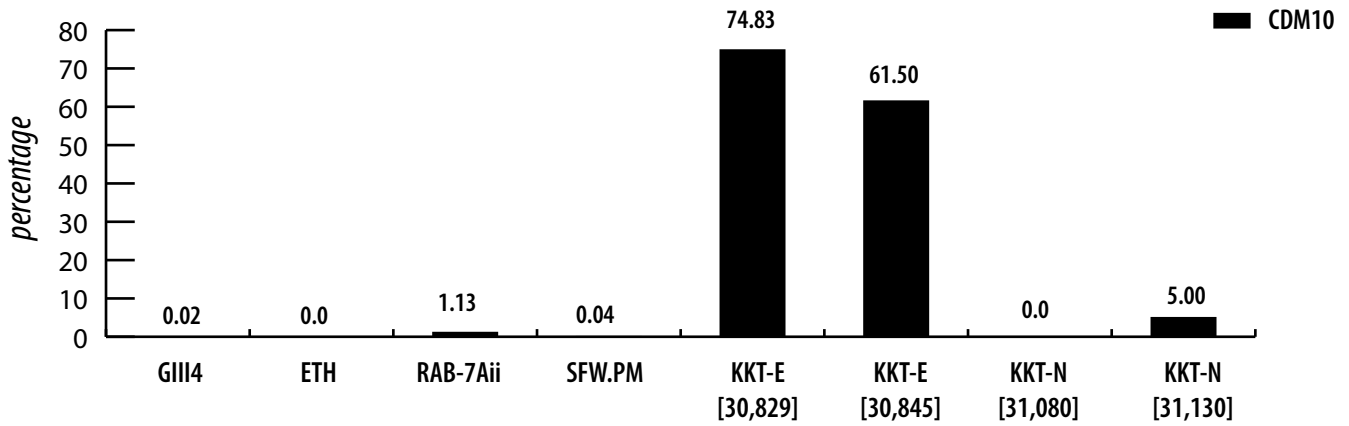


Figure 17.22. Relative frequencies of votive miniature plates, CDM10, in Heit el-Ghurab site areas (GIII4, ETH, RAB-7Aii, SFW.PM) and Khentkawes Town (KKT-E, KKT-N).

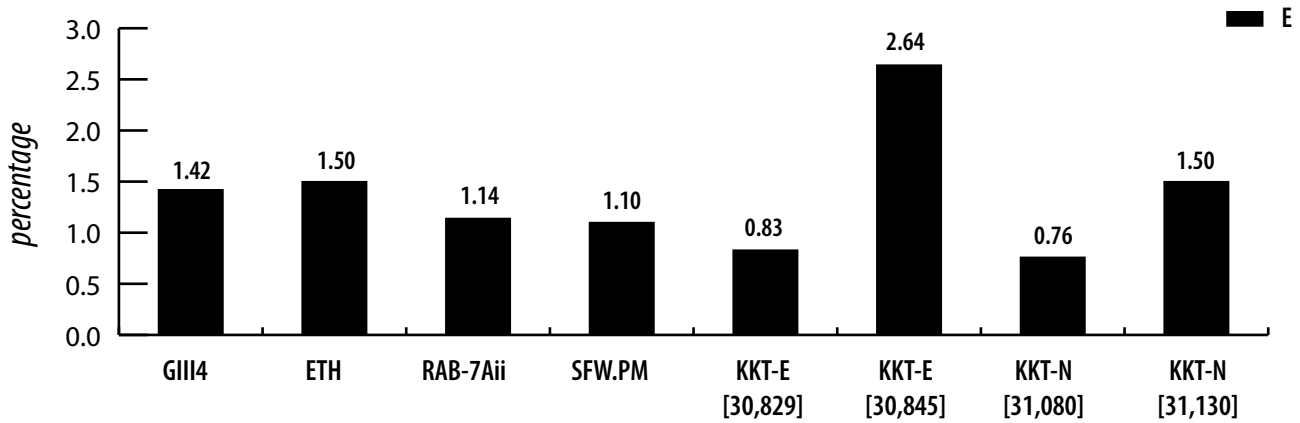


Figure 17.23. Relative frequencies of pot stands, E, in HeG and KKT.

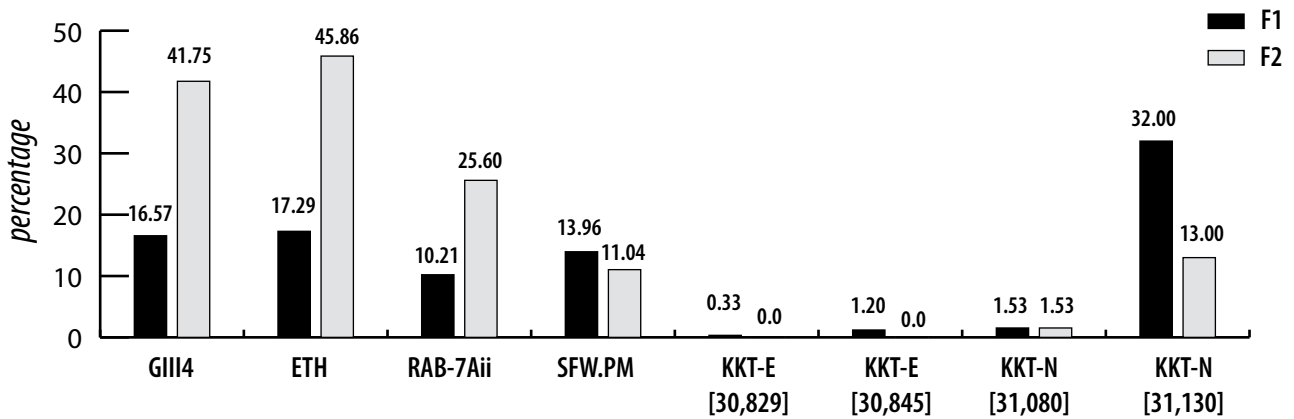


Figure 17.24. Relative frequencies of flat bread trays, F1, and conical bread molds, F2, in HeG and KKT.

On the other hand, Khentkawes Town, connected to the queen's monument, was part of the sacred world of the Giza Plateau. The houses were home to priests serving the memory of the queen (Arnold 1998). We would not expect to see work yards and craft workshops, nor housing for laborers. But we would expect domestic goods in the homes of priests, as we see in the ceramics from Building E; the

pottery includes vessels for cooking, baking bread, and serving food. In addition, the ceramic material seems to be of a slightly higher quality than that from the Western Town. Area κκτ-ε has no parallels at the secular HeG settlement. The caches of votive vessels suggest that cult rituals were conducted at the foot of the harbor fronting κκτ.



## 18. Human Osteology 2009

Jessica Kaiser

In 2009, the Osteology and Bioarchaeology concentration in the second AERA-ARCE Advanced Field School was the main focus of the AERA Osteological team for the season. Besides myself as team leader, the 2009 team included Scott Haddow and SCA inspectors Affaf Wahba Abd el-Salam, Ahmed Gabr, and Zeinab Saiad Hashesh. At the end of the season, Alexandra Jacobsen was a welcome addition to the Osteo team. This report covers the findings of the 2009 Field School excavations.

### Aims and Objectives

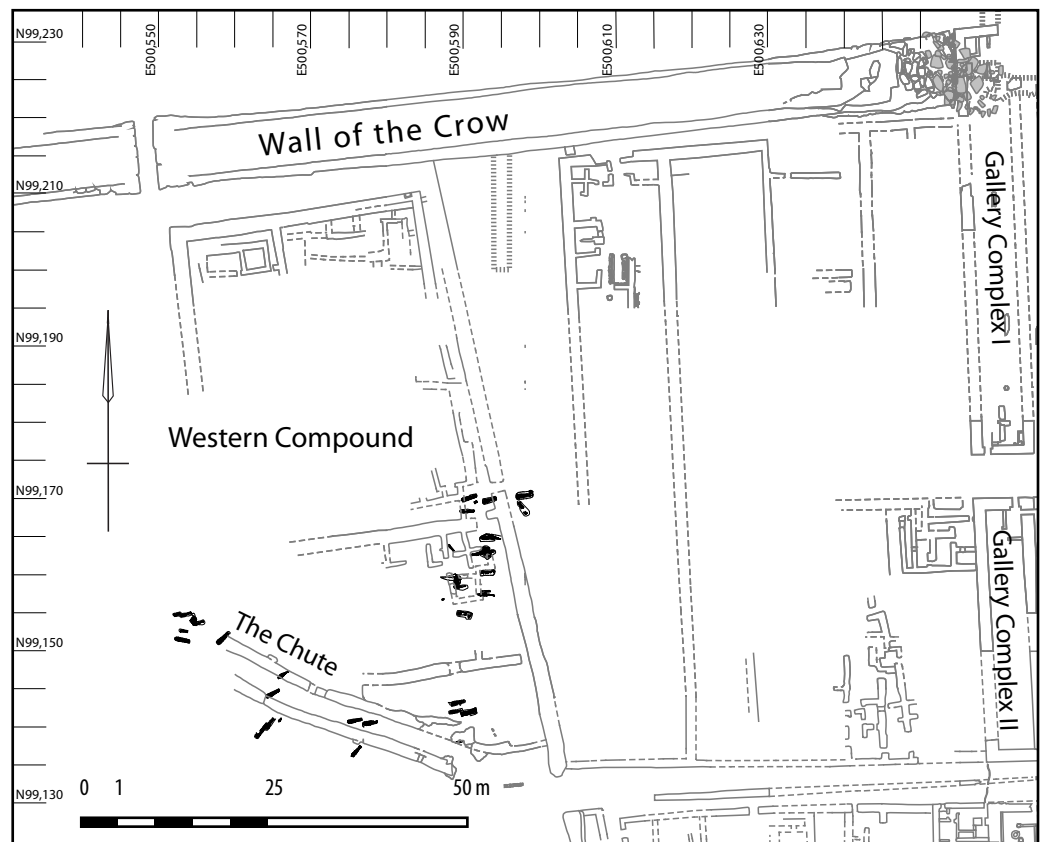
In terms of the larger AERA project, the aims of the cemetery excavations have always been to scientifically remove and record the human burials overlying the Old Kingdom Heit el-Ghurab (HeG) settlement, which is the main focus of the AERA excavations (Kaiser 2005, 2009b). In terms of mortuary archaeology, the skeletal assessment aims to determine age, sex, and stature, as well as any pathological conditions from which the individuals may have suffered. Osteological analysis centers on determining the demo-

graphic profile of the assemblage, based on the assessment of sex, age, and stature, as well as measurements and non-metric traits. This information is crucial in order to determine the occurrence of disease types and age-related changes and identify gender dimorphism in occupation, lifestyle, and diet, as well as the role of different age groups in society.

### Methodology

As is general practice on AERA projects, bone specialists are involved in all excavation of human remains. (For a more detailed overview of excavation methodology, see Kaiser 2005). This is necessary due to the poor preservation of the bone. Without the specialized knowledge of an osteologist, information would be lost. Further, and also according to AERA procedure, we carry out a large part of the skeletal analysis *in situ*, due to the fragmentary nature of the remains. In many cases, only bone stains are left in the grave, and measurements have to be taken before lifting the skeletal elements. The excavation procedure follows

Figure 18.1. Location of the Chute and Western Compound burials at the Heit el-Ghurab site. Map prepared by the Osteo team.



the guidelines set forth in the *MoLAS Manual* (Museum of London Archaeology Service 1994), and while the skeletal recording system is site-specific, it is largely adapted from *Standards* (Buikstra and Ubelaker 1994). All of the burials are photographed and recorded by a total station system, and then the burials are drawn with a computer mapping program so that they can be imported into the overall plans of the site and the final reports.

### Areas

The 2009 Field School excavation focused on the north-west section of the HeG site, in the areas dubbed the Chute and Western Compound (figs. 18.1–3), although we excavated one burial, Number 461, in the Khentkawes Town (κκτ) on the Giza Plateau (see Jones, Chapter 3, this volume) prior to the start of the Field School excavations.

The Advanced Field School osteology and excavation groups were placed in the same area, because we had expected that other areas of the main site would be too damp

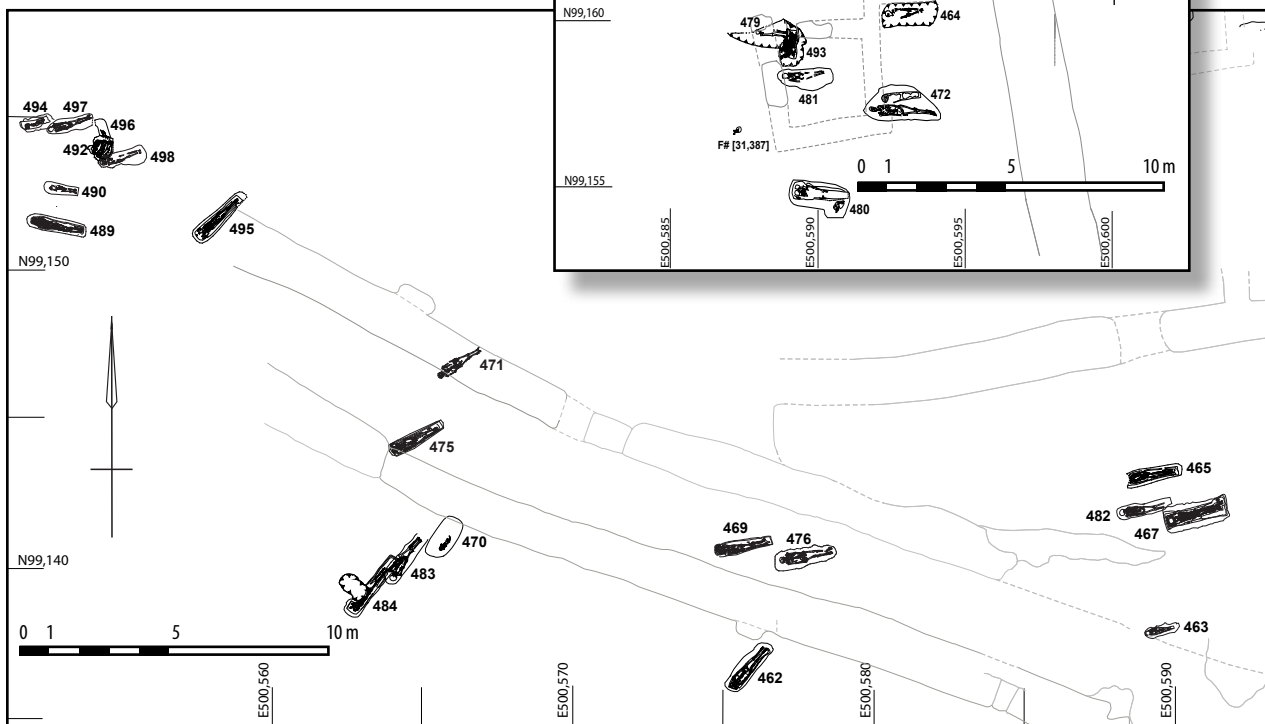
to excavate as a result of the rising water table (see Lehner, Chapter 9, this volume). However, since the main concentration of burials on the site is in the northern part of the site, the result was that not only the osteology students, but also the excavation students were excavating burials for a large portion of the season (the latter with the assistance of an osteology student and/or supervisor). Because the burials were stratigraphically later than the Old Kingdom HeG settlement, they had to be removed first, and thus the graves effectively blocked the Old Kingdom excavation in several areas of the site. Unfortunately, this added pressure on the students to excavate quickly.

### The Skeletal Material

Thirty-eight primary burials (461–498) were opened during the 2009 season. Of these, one (461) was located in the Khentkawes Town (κκτ) area, nineteen in the Chute area (fig. 18.2), and eighteen in the Western Compound (fig. 18.3).

Below: Figure 18.2. Location of the 2009 Chute Burials. Map prepared by the Osteo team.

Right: Figure 18.3. Location of the Western Compound 2009 burials. Map prepared by the Osteo team.



**Table 18.1. Age Distribution**

Burial	Age	Age Group
461	25–35 years	Adultus
462	18–25 years	Juvenilis
463	5–6 years	Infans I
464	18–25 years	Adultus
465	12–20 years	Juvenilis
466	45+ years	Maturus
467	18–44 years	Adultus
469	60+ years	Senilis
470	9 mo +/-3	Infant
471	25–35 years	Adultus
472	35–45 years	Maturus
473	3 years +/-1	Infans I
474	12 years +/-3years	Juvenilis
475	35–45 years	Adultus
476	45+ years	Maturus
477	25–35 years	Adultus
478	45–55 years	Maturus
479	18–79 years	Adult
480	45–55 years	Maturus
481	35–45 years	Adultus
482	45+ years	Maturus
483	25–35 years	Adultus
484	35–45 years	Maturus
485	25–35 years	Adultus
486	25–35 years	Adultus
487	35–45 years	Maturus
488	25–35 years	Adultus
489	15 years +/- 36 mo	Juvenilis
490	4 years +/- 12 mo	Infans I
491	17–25 years	Juvenilis
493	17–25 years	Juvenilis
494	9mo +/-3 mo	Infant
495	25–35 years	Adultus
496	6–18 months	Infans I
497	44–54 years	Maturus
498	9 years +/- 12	Infans II

In addition, one burial, Number 468, had to be left unexcavated due to time constraints, and one burial, Number 492, contained the remains of eight canines rather than a human interment (see Kaiser, Chapter 19, this volume).

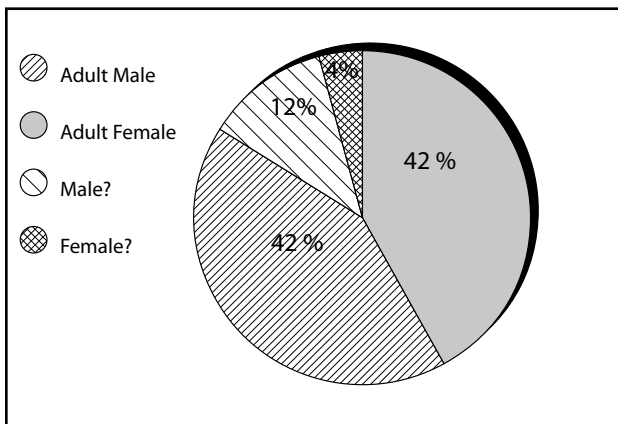
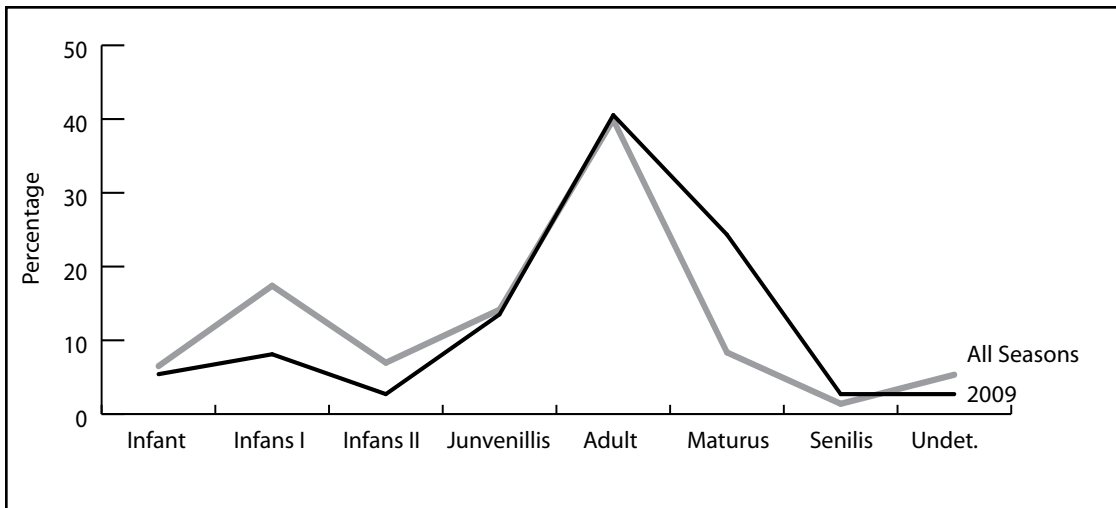
This report is a brief summary of the archaeological and osteological findings of the 2009 season, with a few burials deemed to be of special interest discussed in more detail.

Age was assessed using standard osteological methods: for non-adults, this included dental eruption (Ubelaker 1978: 64), epiphyseal closure (Brothwell 1981: 66), and long-bone length (Bass 1987). For adults, we used dental wear (Brothwell 1981: 72), pelvic morphology (Acsádi and Nemeskéry 1970; Brooks and Suchey 1990; Lovejoy et al. 1985), sternal end rib ossification (Iskan, Loth, and Wright 1984, 1985) and sutural closure (Acsádi and Nemeskéry 1970; Key, Aiello, and Molleson 2005). Each skeleton was given an age range in years, and was also assigned to an age group according to Sjøvold's (1978) classifications: Infant (0–1 years), Infans I (0–7 years), Infans II (5–14 years), Juvenilis (10–24 years), Adultus (18–44 years), Maturus (35–64), and Senilis (50–74).

Since developmental patterns of the bones and teeth are fairly stable regardless of environment, it is easier to assess age from a growing skeleton, and the age of younger individuals can usually be determined with greater accuracy than that of adults. In a fully-grown skeleton, the osteologist is limited to looking at degenerative patterns, which are much more dependent on lifestyle and individual propensities. Therefore, it is not always possible to assign an age more specific than “Adult” for some individuals, especially when the preservation is poor. This was true for Burial 479, which was assigned to “Adult,” 18–79 years. The age distribution of the 2009 material is detailed by burial in table 18.1. Since the 2009 sample is so small—only 36 human interments—no statistical conclusions can be drawn with any certainty. Nevertheless, the age distribution percentages in the Chute and Western Compound conform nicely to the age distribution of the HeG cemetery as a whole (fig. 18.4), with one notable difference: Mature adults (Groups Maturus and Senilis) make up 28.6% of the 2009 sample, while the representation of these groups in the entire assemblage is much lower, only 9.8%.

Thus, it is possible that the western portion of the HeG site was used as a final resting place for the older individuals in the population, even though an equally likely explanation is that this discrepancy is due to incomplete excavation; only a very limited area was fully cleared of burials. On a similar note, age-related spatial variation or incomplete excavation are both possible explanations for the higher incidence of child burials in the western extension of the Chute area, Square 3.035 (color plate 8b). In this square, five of seven burials (71.4%) were children, while the remaining two interments belonged to a mature adult male (Burial 497) and the votive canines mentioned above (Burial 492).

In the 2009 sample as a whole, 20% of the burials contained children under the age of 10, which points to a slight underrepresentation of non-adults, both generally and as compared to the 31% of the Giza material as a whole. In



Above: Figure 18.4. Age distribution of the 2009 Chute and Western Compound sample compared to the Heit el-Ghurab site cemetery material as a whole. Burial 461 has been omitted, as it was the only one in the Khentkawes Town area, and the groups Adultus and Adult have been combined, as the designation Adult encompasses the Adultus group.

Left: Figure 18.5. Adult sex distribution of the 2009 burials.

any archaeological skeletal sample (a death sample that should not be compared with modern child mortality figures, which are calculated based on live births), less than 30% children typically raises eyebrows, as child mortality rates in ancient societies were so much higher than they are today. Percentages under 30% are usually interpreted as a biased sample, whether from incomplete excavation, uneven preservation or differential burial (Buckberry 2000; Grauer 1991). The latter was also quite common in ancient Egypt, where children were often interred either in a separate space of the burial ground (Bruyere 1937: 10–13; David 1996 [2003]: 250; Meskell 1994; Scott 1992), or completely away from the cemetery. At settlement sites, for example, it is quite common to find small children buried under house floors (Baker, Dupras, and Tocheri 2005: 12). In the Giza sample, definite differential burial patterns have already been noted with the higher representation of children’s graves around the eastern end of the Wall of the Crow (Kaiser, forthcoming), and thus the possibility of age related spatial patterning in the 2009 sample is not surprising.

### Sex Distribution

Sex assessment was primarily based on pelvic and cranial

morphology, according to standard osteological methods (Bass 1987; Brothwell 1981; Buikstra and Ubelaker 1994; Novotny 1983; White and Folkens 2000, 2005). Features in the pelvis and skull reflect the sexual dimorphism that develops between males and females as the individual matures, and there are no reliable methods with which to assess the sex of juvenile remains. Sex assessment was therefore limited to adult individuals, for whom it is relatively accurate; success rates of 95% have been shown in tests on known sex samples (Lovell 1989; Phenice 1969). Sexable features were assigned on a sliding scale of 0–5 (Buikstra and Ubelaker 1994), resulting in an assessment of Male, Probable Male (Male?), Undetermined, Probable Female (Female?) or Female.

The distribution of males and females in the 2009 sample (fig. 18.5) was fairly even—42% each if only the securely assessed individuals were counted, compared to 54% vs. 46% if the “probable” group was included. The latter example brings us to a sex ratio (number of males per 100 females) of 117, very close to the sex ratio of the material as a whole, which is 116. This sex ratio displays a slight shortfall of women, as a sex ratio of 105 is usually presented as the normal number (Jacobsen, Møller, and Mouritsen 1999). The deficit of women could be due to

sex-selective abandonment or infanticide, but is probably more likely the result of something more prosaic, such as environmental factors or incomplete excavation of the cemetery. As age-related burial patterns have already been attested in the HeG cemetery, it is possible that a similar division based on gender, with sections mainly reserved for women, exist outside the excavated areas of the site, but no such patterning has been evident in the material so far. In fact, the distribution of males and females in the 2009 material is almost entirely even (color plate 8b).

### Pathologies

The analysis of skeletal and dental manifestations of disease can provide a vital insight into the health and diet of past populations, as well as their living conditions and occupations. Nineteen individuals (51%) in the 2009 material (twenty if the KKT burial is included) displayed evidence of illness or trauma, with a total of thirty-six pathological occurrences. This is higher than the average for the HeG material as a whole, where only 36% of the individuals showed these signs.

The majority of the recorded pathological lesions in the 2009 HeG material were arthritic in nature, affecting 28% of the 2009 individuals. This is slightly higher than the corresponding number for the material as a whole, which was 18%, but still not surprising, given that arthritic change is one of the three main causes of lesions in archaeological assemblages (Ortner and Putschar 1985: 545). Several individuals exhibited lesions on the spine (lippling and osteophytic growth). Vertebral osteoarthritic changes are directly attributable to spinal stress, and can be viewed as one of the costs of the fully erect bipedal posture of humans, in that we are more susceptible to spinal stress than quadrupedal vertebrates (Roberts and Manchester 1995: 105). Studies of relatively modern skeletal samples have shown that osteophytic growth in the spine occurred in a large proportion of the individuals by the third decade of life and in all individuals by age 50 (Nathan 1962). An individual engaged in hard physical labor is more likely to develop osteophytic growth of the spine than a sedentary worker, and thus the more active lifestyle in antiquity probably contributed to an earlier development of vertebral osteoarthritis (Roberts and Manchester 1995: 107).

In skeletal materials from ancient Egypt, a pattern of osteoarthritic changes to the lower (lumbar) spine in men and to the cervical spine in women is often observed. This has been interpreted as evidence of men engaging in more heavy lifting and hard manual labor and women carrying heavy loads on their heads. In the 2009 material, the majority of the lower spine lesions were indeed found in males, while the majority of upper spine lesions were found in females. The lower spine lesions also include one occurrence of Schmorl's nodes, a condition most com-

monly attributed to acute spinal trauma (Fahey et al. 1998), in the young male of Burial 493. Though the small number of occurrences in the 2009 material (nine in total) does not allow for any definitive conclusions, what we can say is that the pattern of arthritic changes to the spine by sex conforms to the pattern of the material as a whole, pointing to a difference in lifestyle between the sexes.

Another group of pathologies where sex-related differences can point to diversity in lifestyle is trauma, which was also the second most common pathology group in the 2009 material. Differences in the frequency and location of trauma between men, women, and children may, for example, suggest variations in the division of labor between the sexes (Meiklejohn et al. 1984), interpersonal violence (Walker 2001), or child abuse (Lewis 2007). Our 2009 sample, as well as the HeG sample as a whole, appear to have been a fairly pacifist lot: the majority of fractures seem to have been the result of accidents rather than aggression. For example, there were no incidences of craniofacial injury, which would be expected in interpersonal violence (Walker 2001), but instead several instances of Colle's wrist fracture of the radius, with associated compression of the ulnar styloid process—an injury that most commonly occurs when someone braces their fall forward with their hands (Roberts and Manchester 1995: 179).

Other examples of trauma included a healed broken rib, vertebral disk hernia (Schmorl's nodes) in a young man, and multiple examples of broken toes. Evidence of trauma occurred in 18% of the 2009 individuals, all adults or older juveniles, a number and spread that can be considered normal compared to other known archaeological samples (Angel 1974; Burrell, Maas, and Van Gerven 1986; Robb 1997), but that is significantly higher than what has been recorded for the material as a whole, where only 8% of the skeletons showed similar injuries. The majority of the 2009 individuals with traumatic lesions (71%) were male, which is also consistent with previous studies and with the entire HeG sample. Thus, though there is no evidence for excess violence or abuse, there does appear to have been a difference in lifestyle amongst the men and women of the Giza population, most likely in the division of labor (Meiklejohn et al. 1984), where men were engaged in day-to-day activities that rendered them more likely to have bone-breaking accidents.

After trauma, diseases of the dentition were the most common pathological finding in 2009, with 16% of the 2009 individuals affected. In the material as a whole, dental disease is the second most common affliction after joint disease, involving 23% of the sample population. Thus, the lower incidence of dental disease in 2009 is somewhat unexpected, considering the comparatively high proportion of mature adults. The majority of these individuals suffered from periodontal disease, such as ante-mortem

tooth loss or severe calculus; perhaps not surprising since most of the affected individuals were older adults. There was one case of Enamel Hypoplasia in a young female, suggesting a period of systemic stress, such as serious illness or malnutrition (King, Humphrey, and Hillson 2005), in her childhood. One case of Caries also appeared in the 2009 material. This may seem low, but cavities are in fact quite uncommon in this collection. Most ancient Egyptians developed extensive dental wear as they aged, due to the high level of sand and grit in the food—desert sand is still ubiquitous in Egypt, and in ancient times the flour was ground on millstones, introducing even more stone particles in the bread—and the flat surfaces of highly worn teeth do not present a very good environment for cavity forming bacteria. Furthermore, the people buried in the HeG cemetery were not members of the elite—far from it, judging from the scarce grave goods—and could probably not have afforded much honey, the sweetener of the day.

Three individuals, two men and a female, exhibited *Cribrra Orbitalia*, the pitting of the orbital roof. In the female, the lesions were also present on the parietal bones, or the sides of the cranium. The exact cause of this lesion is unknown, although most scientists favor anemia, either due to thalassemia, sickle-cell, or most commonly cited, iron deficiency (Aufderheide and Rodriguez-Martin 1998: 349–50). Thus, *Cribrra Orbitalia* has traditionally often been linked to nutritional deficiencies, more specifically to lack of iron in the diet (Powell 1988), or to stress caused by breast feeding (for the mother) or infant weaning (for the child) (Fairgrieve and Molto 2000). However, recent studies have shown that in addition to iron deficiency, other possible causes for this lesion include infection, osteoporosis, and prolonged pressure to the bone (Wapler, Crubezy, and Schultz 2004). Thus, it is difficult to say exactly which condition plagued these HeG individuals, other than the fact that their bodies were under sufficient stress prior to death for it to leave its mark in their skeletons.

One individual in the Chute area had suffered from an infection involving the right zygomatic (cheek) bone and mastoid process, the bony projection behind the ear (color plate 9). The most likely cause for the lesion is Otitis media, or a middle-ear infection, with resulting mastoiditis. This is a condition in which an ear infection spreads to the honeycombed interior of the mastoid process of the skull, causing fever, ear pain, and headache, and possibly hearing loss. In severe cases, the pus inside the bone can force an opening in the bone and drain outwardly. Mastoiditis is hard to treat even today, and complications without antibiotics can be severe. An untreated mastoid infection can cause not only facial paralysis or deafness, but also meningitis or fatal septicemia (Aufderheide and

Rodriguez-Martin 1998: 253). It is therefore possible that this infection caused the woman's death.

Though not technically part of the 2009 main site material as it was excavated in the KKT area, Burial 461 still deserves a mention (color plate 10a). Located at the eastern end of the Khentkawes causeway, Burial 461 contained a woman between 25–35 years of age. At the time of her death, she suffered from a severe case of active suppurative osteomyelitis of the left tibia, an inflammation caused by pus-producing bacteria that involves both the bone and the marrow cavity. The bone was severely enlarged due to the reactive bone surface, with a cloaca (a channel through which the pus can drain, often penetrating the skin causing a fistula) approximately midway down the shaft of the bone. Since no traumatic injuries were apparent, the infection was probably hematogenous, meaning bacteria present in the blood from an infection elsewhere in the body invaded the bone through the nutrient foramen rather than from a fracture. The mortality rate of the condition before the advent of antibiotics was approximately 20%, and could be fatal rapidly (Aufderheide and Rodriguez-Martin 1998: 172–75). Hence, it is quite possible that this infection was the cause of death.

The severe infection was not the only interesting feature of this burial, however. When it was first recognized, the skeleton appeared to be lying in a tightly flexed position, consistent with the burial customs of the Old Kingdom. However, as the excavation progressed, it became clear that the woman in Burial 461 had not been intentionally buried at all. Instead, her body was lying on a sloped surface, without a burial pit, in a very awkward position (color plate 10b). Tightly gripped in her right hand was a piece of limestone. Strangely, then, it appears she fell, maybe clutching at a nearby limestone surface to stop the fall, died, and was subsequently covered in deposits without being found. When exactly this happened is unclear, as no items were associated with the body. However, a deposit of coins dating to the 8<sup>th</sup> century AD was found nearby, implying that this body may be considerably later than the Khentkawes Town. Why she was left uncovered is also unclear. She could, of course, have been pushed, but was more likely overcome by the infection while walking across the plateau on her own, her death being perfectly natural. Still, this begs the question: Why was a sick and likely weak woman out walking in the desert by herself?

### **Bodily Treatment**

Though the level of preservation at the HeG site is such that no organic material survives in the burials, skeletal and other evidence suggests that many of the individuals in the cemetery received at least a cursory attempt at mummification. First, many of the skeletons have steeply angled clavicles, suggesting that they were tightly wrapped

at the time of burial. Second, at least one of the burials in the 2009 material, Burial 486, had packing material in the form of mud inside the thorax and remnants of a black material on the bones, which tells us that the body had received treatment before burial, i.e., the thoracic cavity had been stuffed and the body covered in resin of some sort. Third, the coffins are often so narrow that it would be impossible to fit a fully fleshed individual into them, meaning that the bodies were most likely at least partially desiccated before burial. Finally, one burial in the 2009 material, Burial 495 (color plate 11), showed signs of extensive post-mortem manipulation.

This coffin burial, one of the last to be excavated during the 2009 season, belonged to a male between 25 to 35 years of age. However, he was not alone. At the foot end of the coffin was an extra set of articulated legs and feet, and a left tibia of a third person was inserted where the vertebral column of the primary individual should have been. The young man in this burial was also missing his sacrum, a bone that connects with the rest of the pelvis through the strong, weight-bearing sacroiliac joint, a synovial joint with irregular surfaces that enables the interlocking of the two bones. It is hard to imagine an accident that would rob someone of the spine and sacrum only; a more likely explanation is that this young man's body had been allowed to decompose significantly before burial, loosening the sacroiliac joint connection and allowing the sacrum and spine to detach. The "extra" tibia inserted in the place of the spine was probably intended to stabilize the body. It is harder to explain the "extra" legs, which, judging from the articulation, retained at least some soft tissue at the time of burial.

We know that mummification became more accessible to the middle and lower classes during the later period of Egyptian history (David 2001). It was probably this heightened demand that initiated a rise of the veritable funerary "industry" operating even into early Christian period Egypt. Granted, with a larger customer base also came less attention to detail, and the 25<sup>th</sup> Dynasty is often seen as the beginning of the end of fine mummification (Ikram and Dodson 1998: 128). Large workshops known as *w<sup>c</sup>bt*, or "place of purification" (Brovarski 1977; Hoffmeier 1981), probably housed in tents, were set up close to the burial grounds (David 2001; Shore 1992) and were likely capable of processing a significant number of bodies at a time. It is perhaps not surprising, then, that a few body parts would go missing and others would appear. In fact, quite a few "composite" mummies, with too few or too many body parts, are known from the period (Aufderheide 2003: 246–47). Perhaps the articulated "extra" legs in Burial 495 were put there simply due to lack of a better place to dispose of them. After all, the body

would have been returned to the family with its mummy-wrappings applied, leaving the mourners none the wiser.

### Seasonal Variation

Another feature that may elucidate the burial customs of the cemetery population is orientation of the graves. If we assume that the head of a skeleton was aligned intentionally according to the position on the horizon of the setting sun (Brown 1983; Kendall 1982; Rahtz 1978; Strouhal and Bareš 1993), then any disparity in orientation is quite possibly due to the season in which the deceased was interred, since the movement of the earth during the year changes the relative position of the sun in the sky. Allowing for the change in the sun's position relative to the earth, this would tell us that burials with the head 78.75–101.25° west of north were interred during spring or autumn; the burials at 78.75–50° west of north during winter; and the burials between 101.25–130° west of north during the summer months (Strouhal and Bareš 1993: 76–77). It should be noted that although the majority of the Late Period burials at the site are indeed aligned east-west, we also have a number of burials in which the problem of space, particularly with regard to the underlying pre-existing structures, appears to have determined orientation.

Interestingly, the two areas excavated this season do not appear to have been in use during the same seasons. The northern part of the 2009 area, Western Compound (color plate 12a), seems to have been receiving burials mainly during the fall or spring, while the majority of the burials in the Chute area (color plate 12b) were likely interred during summer. Though not conclusive, this could suggest that the two areas were not used during the same time period.

### Objects

Twelve burials from the 2009 season yielded objects such as beads, a scarab, and other jewelry. However, the vast majority of these objects were not directly associated with the bodies in the graves, and were most likely accidentally included in the grave fill during interment. Because the burials are so densely deposited throughout the HeG site, it is quite common that burials intercut, allowing objects from an earlier grave to be accidentally redeposited in a later burial. In one instance, a small piece of metal or metal slag was found near the body, but it was so corroded that it was impossible to determine whether or not it was an actual object. Only four burials, three in the Chute (Burials 470, 490, and 494) and one in the Western Compound (Burial 473), contained objects that were deliberately buried with the grave owners and found *in situ* on the body of the deceased. In all four cases, the burials belonged to young children. This is not surprising given that the vast majority of burials with objects (60%) in the Giza material belong to children.



Similar patterns have been noted in other non-elite Third Intermediate to Late Period cemeteries at Matmar and Mostagedda in Middle Egypt (Grajetzki 2003: 107), but also closer to Giza at sites such as the Ptahshepses Cemetery in Abusir, where 63% of the burials yielding objects were those of children (Strouhal and Bareš 1993: 23–43), and in the Anubeion Cemetery in Saqqara, where this figure was even higher, 75% (Giddy 1992: 43). It should be noted that these numbers refer to the percentage of burials with objects, and not to the total number of objects. If an exact calculation of the total number of objects were to be made in the Giza material as well as in the Saqqara and Abusir counterparts, the proportion included in the children's graves would be even higher, since objects included in adult burials usually are limited to a single tubular bead, shell, or simple amulet per grave, while children frequently are equipped with several amulets, earrings, bracelets, and a large number of cowrie shells (Giddy 1992: 45–61; Strouhal and Bareš 1993: 23–43). The preponderance of funerary items and amulets in the graves of the very youngest could mean that children were thought to need more protection on the perilous journey to the afterlife. Whatever the case may be, the comparatively high level of care that was lavished on child burials suggests that children in ancient Egypt were seen as individuals in their own right at a very young age.

In the four burials from 2009 that contained deliberately deposited grave items, one, Burial 473, contained a single bead found at the neck of the grave's owner, a small child of approximately three years old. Burial 470, which belonged to an infant, 6–12 months old, contained a single bead and a cowrie-shell, also found at the neck of the skeleton. It is possible that the beads in both burials were originally strung on a cord around the neck of the children, as parallels are known from both Saqqara and Abusir (Giddy 1992; Strouhal and Bareš 1993).

The remaining two burials that contained items were slightly richer: The three- to five-year old in Burial 490 was interred with a single metal earring; bracelets on both wrists made of cowrie-shells; a blue-colored bead, most likely lapis lazuli, on the left arm; and a red-colored bead, possibly carnelian or glass, and a small *Wd<sup>3</sup>.t* eye, probably made of red jasper, on the right arm (color plate 13a). A small red bead, possibly red jasper as well, was also found in the burial fill.

The *Wd<sup>3</sup>.t*-amulet derives from the Osiris myth and represents the healthy eye of the falcon-god Horus, restored by the god Thoth after the chaos-god Seth (who was also Horus' uncle) had torn it out during one of their

many battles over the throne of Egypt. The *Wd<sup>3</sup>.t*, a common protective amulet, is often found in funerary contexts, but is not the only form of symbolism contained in the bracelets, as the materials used to manufacture the beads and amulets carried their own meaning. The word for red jasper in Egyptian, *hnm.t*, is related to the verb *hnm*, “to delight,” thus associating the stone with all the good qualities of the color red, which was associated with the life-giving force of blood, and by extension, life itself (Andrews 1994: 103). Similarly, *hsbd*, the word for lapis lazuli, was in the Late Period used interchangeably with the words for “joy” and “delight,” therefore giving the stone, which also represented the night sky, a positive connotation. By contrast, carnelian,<sup>1</sup> which was often mined in the Eastern desert, represented the fratricidal desert- and chaos-god Seth, murderer of his brother Osiris. Consequently, the word for the stone, *hrs.t*, was often used in the Late Period as a synonym for “sadness” (Andrews 1994: 102).

Similar to Burial 490, Burial 494, the last of the four burials with items, also contained a stylized *Wd<sup>3</sup>.t* eye amulet, and a small lapis bead just under the chin. In addition, the small child (around one year old) in this grave had been interred with not only a large number of cowrie-shells, but also two unusually large examples of the same (color plate 13b). Though the significance of the size of the shells is unknown, cowries were thought to have amuletic properties due to their similarity to female genitalia, and were thus associated with fertility, childbirth, and regeneration (Andrews 1994: 42), making them suitable for funerary purposes as well, since death was seen as a transition to the regeneration thought to take place in the afterlife. The shells' connection with pregnancy and childbirth is probably also the reason they were so frequently interred in children's graves in particular. In addition to the two large cowries on the right side of the skull in this burial, a large concentration of cowries sat under and around the top of the cranium, possibly originally fastened to some sort of head-dress or cap (color plate 13b).

### Coffins

Twenty-two of the thirty-six burials, approximately 60%, had coffins, which is consistent with the Late Cemetery as a whole. Also consistent with previous findings is that the coffins were evenly distributed between males and females wherever sex assessment was possible.

One difference stands out when the 2009 material is compared to the sample as a whole: the distribution of coffins across age groups (fig. 18.6). Although the graphs

1. The items from the 2009 season have not yet been registered and integrated in the artifact database. However, if the bead is not carnelian, it is probably glass intended to mimic this mineral.

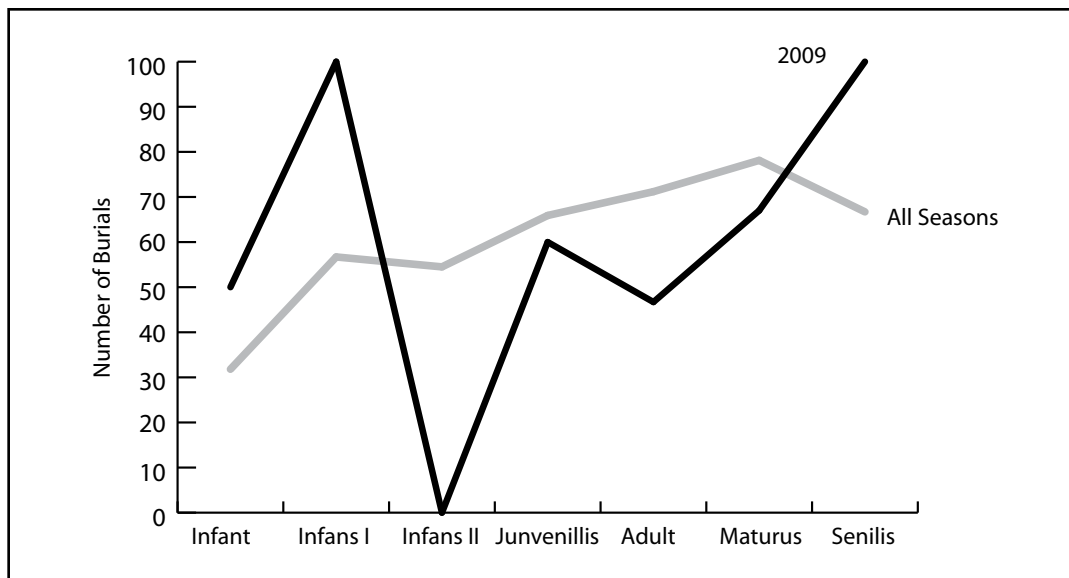


Figure 18.6. Coffin burial distribution across age groups.

follow the same general pattern, all of the children in the 2009 “Infans I” group (0–7 years) were equipped with coffins, compared to fewer than 50% in the material as a whole, yet none of the children in the “Infans II” age group were interred in a funerary receptacle, compared to 40% in the material as a whole.<sup>2</sup> Lisa Giddy (1992: 43) suggests in her discussion of the Anubeion sample that the high prevalence of burial items within children’s burials was a compensation for a lack of proper burial receptacles for small children. In the 2009 Giza material, however, this is not the case, as 75% percent of the small children that were equipped with burial items also received a coffin. This is an interesting contrast, but the small size of the 2009 sample prevents any final conclusions from being drawn from the coffin distributions.

Sixteen of the coffins (77%) were anthropoid in shape, and one of these, Burial 467, was equipped with an outer coffin as well. The remaining coffins were rectangular or sub-rectangular in shape. Unfortunately, the high water level on the Giza Plateau in recent years has greatly affected the coffins on the site, and the 2009 examples were invariably very poorly preserved. However, sufficient material survived to show that the 2009 coffins conformed to what has previously been excavated on the site: all were made of plastered and painted finely levigated mud with molded masks and wigs. As in previous seasons, some of

the coffins retained fabric impressions in the plaster, suggesting that the mud was covered in linen before it was painted, which would have lent support to the otherwise fairly flimsy construction. It is also likely that the coffins originally had some sort of internal support, as remnants of wood have been found in the space between the mud-layers in the coffin walls in burials elsewhere on the site, but none were preserved in the 2009 sample. In the instances where the head-end of the coffins were preserved, all of the 2009 coffins had masks with molded facial features, painted in red, white, or yellow with the eyes and eyebrows outlined in black (color plate 14a). Wigs, sometimes monochrome black, sometimes striped in red, yellow, black, or blue, with vertical bands across the bottom of the lappets, and sometimes with a painted feathered headdress across the top (color plate 14b), surrounded the masks. Three coffins had traces of inscriptions, but were so poorly preserved that the text was illegible.

Similar coffins have been reported by Giddy (1992: 35–42) from the Anubeion cemetery and by the Louvre expedition from the Akhethetep mastaba cemetery (Janot et al. 2001), both in Saqqara, and wooden coffins with decoration similar to the Giza material have been excavated in Abusir (Strouhal and Bareš 1993: 49–54). All of the previously mentioned cemeteries appear to date to the same general period as the Giza cemetery (i.e., mainly

2. The age categories used for the GPMP material is based on Sjøvold 1978, and allows for some overlap. This is due to the fact that assigning exact age to a skeleton is impossible, and usually an age-range is quoted for each individual. However, when an age-range is assigned, the individual is most likely closer to the middle than to the extremes of that range. The age ranges are as follows: Infant: Under one year, Infans I: 0–7 (but most likely 1–5), Infans II: 5–14 (but most likely 6–12), Juvenilis: 10–24 (but most likely 13–18), Adultus: 18–44, Adult: 18–79 (when no closer age range can be determined), Maturus: 35–64 (but most likely under 60), and Senilis: 50–74 (but most likely over 60).

Late Period, with some evidence of Roman use as well at Abusir), and all are considered to be non-elite necropoleis. The closest parallel to the coffins from the Giza cemetery are Giddy's Types 6 and 7 (1992: 37), coffins where no wood has survived (Type 7), or with haphazard wooden supports inserted into the coffin walls (Type 6). The patterns on the Giza coffins are also similar to the Anubeion sample, with striped, feathered, or monochrome wigs, sometimes with dotted details, and a broad *Wsh*-collar with several bands of a triangular, teardrop, rosette, or checkerboard pattern.

When inscriptions occur in the Giza cemetery as well as in the Anubeion, Akhetetep, and Abusir cemeteries, they are written in a single band down the lid of the coffin. These inscriptions often give the impression that someone who was not literate copied them, since signs are often distorted and sometimes hard to decipher. When the inscriptions are legible, they usually consist of an offering formula invoking a local form of Osiris, Lord of Rosetau.

Giddy attempted to construct a typology of the Anubeion coffins based on stratigraphy, but found no apparent development of types over time. The same is true for the Giza material, and appears to apply to the Akhetetep and Abusir materials as well. However, the Anubeion samples are highly variable in material and workmanship, with some coffins partially or completely made of wood and with carved wooden masks separately attached to the coffin lids, such as in the Abusir and Akhetetep materials. By contrast, the Giza coffins, though with a high variability of patterns and colors, are all of the very crudest kind, corresponding to only the very simplest examples from Anubeion. Thus, it appears that the Giza cemetery deserves the dubious distinction of being the poorest of the non-elite cemeteries in the Memphite region.

A few coffin burials deserve their own mention. As stated at the beginning of this chapter, there was one example of a double coffin in Burial 467. Though this in itself is not unique in the cemetery, Burial 467 stands out because the outer coffin was rectangular rather than anthropoid, and it was fairly expertly decorated (color plate 15a).

The inner coffin of Burial 467 retained a fairly intricate multicolored checkerboard pattern, interspersed with bands of white rosettes on a red and yellow background, similar to Giddy's band-types 9d and 8a-b, respectively (Giddy 1992: 41). The mask and wig were very poorly preserved, but it was possible to make out the molded facial features of the mask, surrounded by a striped wig painted in yellow, blue, and white.

The outer coffin was better preserved, probably because it appears to have had a fairly substantial internal wooden frame, which is unusual in the Giza coffins. While the wood itself had deteriorated, clear traces of wooden boards were visible under the body and inner coffin. Judging from the decoration and shape, this box-

coffin is probably a "cheaper" version of the box-coffin with vaulted lid that became very popular in the 25<sup>th</sup> and 26<sup>th</sup> Dynasties (Grajetzki 2003: 112). An example of a more elaborate coffin of this type can be seen in color plate 15b.

In the turbulent times during the Third Intermediate Period and early Late Period, political and economic stress had made it increasingly difficult to build a new tomb, and more and more of the essentials for a successful afterlife were included in the immediate funerary receptacles, which evolved to represent imagery and religious texts that had previously been reserved for tomb walls. These coffins were designed to represent a model of the cosmos, alluding to the divine status the deceased could hope to attain in the afterlife (Strudwick 2006: 258–59). Though the Giza example lacks the vaulted lid and corner posts, and the lines of texts are represented only as stylized bands of red and blue, the deities flanking the sides of the coffin are very similar to those in the more elaborate example (color plate 15b). These divine figures could be representations of the Four Sons of Horus, the gods charged with guarding inner organs of the deceased, who were sometimes depicted on the walls of coffins (Wilkinson 2003: 88), after canopic jars ceased to be used in funerary equipment during the 21<sup>st</sup> Dynasty, but it is more likely that they symbolize some of the "Judgment Deities" from the Book of the Dead. There were 42 of these little known deities, each responsible for judging one of the specific crimes that the deceased had to deny before their tribunal in the Hall of Justice by way of 42 "negative confessions" outlined in Spell 125. These gods, with names such as "Nosey," "Eater of Entrails," "Hot-foot," and "Bone Breaker," assessed the innocence of the deceased with regards to offenses such as robbery, murder, stealing, and the killing of sacred bulls, but also in matters more obscure, such as "wading in water" (?), "babbling," or "hoodwinking." Representative selections of these gods were often illustrated in religious texts related to the Book of the Dead and on coffins such as Hor's in color plate 15b (Wilkinson 2003: 84).

The second coffin worth mention is the child-coffin in Burial 472, not because of its decoration, but because it did not contain a body at all. This in itself is not unique, since several examples of empty coffins have been excavated during previous seasons, among them one of the richest burials in the material, Burial 285, which consisted of an empty adult-size coffin interred with three votive pilgrim flasks, a large number of cowrie-shells and beads, an ivory disk, carved shell disks, and a copper bracelet. These burials are most likely a form of cenotaph, intended to make up for the loss of the body of a loved one on the journey to the afterlife. What sets Burial 472 apart is that the child-size coffin was interred within an adult skeletal inhumation, belonging to an adult male over the age of 45 (color plate 16a). Did whoever buried this individual forgo a cof-

fin for the adult male in favor of a reminder of a lost child, or could he or she simply not afford a large-enough coffin, reasoning that a too-small one was better than nothing?

### **Old Kingdom Burial (493)**

The last burial to be dealt with here was not part of the Late Period cemetery, as it predates it by almost 2,000 years. Burial 493 (color plate 16b) was found in the Western Compound, and belonged to an adult male between 25 to 35 years of age. The body was lying on its right side in a tightly flexed position, oriented with the crown of the skull to the north, the normal burial position for non-elites during the Old Kingdom (Grajetzki 2003: 25). There were no grave goods, but traces of reed matting were preserved both above and below the body. Examples of similar funerary receptacles are known from Tarkhan, where examples dated to the 1<sup>st</sup> to 4<sup>th</sup> Dynasty were excavated by Petrie (Petrie, Wainwright, and Gardiner 1913: 26–27) (color plate 17a).

Despite his fairly young age, this individual displayed ample evidence of degenerative joint disease to the spine, with large depressions in the endplates of lumbar vertebrae 1–3, as well as smaller depressions in thoracic vertebrae 4–8, accompanied by slight osteophytic growth. Color plate 17b shows a detail of the large defect on the caudal aspect of the first lumbar vertebrae, or Schmorl's nodes, mentioned above. It is caused by a vertical disk hernia—when the hernia protrudes into the trabecular bone of the endplate causing a depression (Aufderheide and Rodriguez-Martin 1998: 97)—and is common in individuals who habitually put great strain on their lower backs (Waldron 2009: 45). Schmorl's nodes can also occur as a result of acute trauma, particularly that involving axial loading of the spine (Fahey et al. 1998). The individual in this grave, it seems, was no stranger to strenuous physical activity.

Burial 493 is not the first Old Kingdom burial to be excavated on the HeG site. However, the eleven Old Kingdom burials excavated during previous seasons were all in the southern parts of the site, close to the “Workers’ Cemetery” that is currently being excavated by Dr. Zahi Hawass. Further, they were all buried in the rubble of the settlement after the HeG site had been abandoned, and belong to a later phase than the structures themselves. Thus, these southern burials are probably poor outliers of the more elite cemetery to the southwest.

Our Western Compound burial is different not only because it is the only Old Kingdom burial encountered north of Main Street (see map, fig. 9.1), but more importantly because it actually pre-dates the building activity in the Western Compound. Hence, there are at least two phases of Old Kingdom funerary activity at the HeG site, separated by the building, use, and abandonment of the

main settlement site. Burial 493 was fairly deep, sealed by a *tafla* layer underlying the earliest construction phase in the area. It would not have been discovered had it not been for the fact that a Late Period burial truncated it and left some of the bones exposed. Other visible pits at the same level—seen in the sides of Late Period grave-cuts—with what appears to be human bone in the fill, suggest that there may be more than one of these early burials. If that is the case, it could be that the area was used as a cemetery for the non-elite in the early 4<sup>th</sup> Dynasty, prior to the building of the Gallery Complex and the massive Wall of the Crow. However, since the Western Compound is seemingly the very latest addition to the main settlement site, added after the building of the galleries, an even more intriguing possibility is that the area was used as a necropolis for the actual inhabitants of the galleries before the expansion of the settlement covered it. With only one burial it is too early to tell, but if Burial 493 indeed represents a cemetery for the site's actual occupants, it would definitely open a myriad of new avenues of research for the AERA team.

### **The Pottery**

Only four burials in the 2009 material—464, 478, 480, and 486—all in the Western Compound, contained non-intrusive ceramic material. The pottery from Burial 480 still awaits analysis. Burial 486, at the northeastern extreme of the excavated area, was a coffin burial with a single large storage jar at the foot-end of the coffin (color plate 18a), dated to the 25<sup>th</sup>–26<sup>th</sup> Dynasty (Sabine Laemmel, personal communication, May 2010). The bottom of the jar was filled with a dark, fatty sand, suggesting that it had once held some sort of organic matter; perhaps embalming material used in the preparation of the body of the grave-owner, as embalming caches inside this type of jar are sometimes found in 26<sup>th</sup> Dynasty burials (Grajetzki 2003: 113).

More intriguing was the pottery deposit in Burial 478, a coffin burial located approximately 8 m southeast of Burial 486. The burial belonged to a mature female, over 45 years of age, interred in a poorly preserved mud-coffin painted in red and black. The coffin was placed on top of a row of six large storage jars oriented perpendicular to the body. Mudbricks had been placed under the coffin to keep it level on the jars. Three additional jars and a large dish were placed to the north and south of the coffin (color plate 18b). This is the largest deposit of pottery in any of the burials excavated so far, and to date we have not been able to find any parallels for the use of storage jars in this way, almost like a funerary bier. The burial had been truncated at the head-end by the grave cut of another burial, 474, which initially caused some stratigraphic confusion, as whoever interred the young girl in the later grave had decided to re-use the storage jar they had damaged as

protection for her skull, which consequently was shoved into the westernmost jar belonging to Burial 478. Sabine Laemmel, who analyzed the pottery, favors a 25<sup>th</sup> Dynasty date for the pottery in the grave.

The last burial that contained pottery was Burial 464, 2 m south of Burial 478. Interestingly, it contained a very eroded amphora of early Roman date (Sabine Laemmel, personal communication, May 2010) (color plate 19), making it approximately 700–800 years later than Burial 478. However, there is one more feature that sets this burial apart, and that is the use of several distinct deposits to fill the grave, with a layer of limestone approximately halfway down. Almost all the burials containing Roman pottery (excavated during the 2004, 2006, and 2007 seasons) were filled in this manner, but it has not been noted in any of the earlier (25<sup>th</sup>–26<sup>th</sup> Dynasty) burials. Thus, it is possible that the burials without pottery where this technique has been employed also belong to the Roman period. In the 2009 material, three additional burials, numbers 466, 477, and 491, had a limestone layer. Interestingly, they are all skeleton burials without coffins. They were all very deep, and they are all located on the same north-south axis, approximately 5 m apart. It is possible, then, that these three burials also belong to the Roman period, though this date is tentative at best due to the lack of ceramics in the grave-fill.

### Summary and Conclusions

Osteological and archaeological analysis of the relatively small sample excavated during the 2009 season mainly confirmed conclusions drawn from the Giza population sample to date, and did not differ from previously excavated burials in any considerable way. However, some divergence was noted.

As in the material as a whole, there is a slight shortfall of females in the sexed burials, but none that is statistically significant. The age distribution also follows a curve similar to the entire population, save for the fact that mature adults are more common in the 2009 material than has been noted before. Furthermore, the western extension of the Chute area also yielded a higher proportion of non-adults than would be expected. These discrepancies could point to a possible age-related differentiation in burial, particularly in light of the fact that this sort of demarcation has been noted elsewhere on the site in respect to children, but with a sample size this small no definitive conclusions can be drawn.

There was a slightly higher incident of pathological lesions in the 2009 sample than previously noted, especially regarding traumatic lesions, which were more than twice as common in the 2009 material than in the material as a whole. However, since several of the traumatic injuries consisted of nothing more dramatic than broken toes,

we may just be dealing with a particularly clumsy subset of the Late Period population. Joking aside, the small sample size once more prevents any conclusions specific to the 2009 material. What can be said is that the 2009 sample again conforms to the entire sample in the sense that the proclivity for traumatic lesions in males, coupled with the differential pattern of osteoarthritic changes to the neck in females and the lower back in males, point to a difference in lifestyle between the sexes. Further, the occurrence of lesions stemming from systemic stress in several individuals implies that life was not always easy for this population, whether from lack of adequate nutrition, disease, or both.

Other notable patterns, though few in number in 2009, nevertheless further support previous findings: bodily treatments suggestive of at least cursory mummification, and the almost complete lack of burial items in graves belonging to all but the very youngest.

An intriguing difference between the 2009 material and previous excavation is the apparent discrepancy in seasonal use between the two excavated areas. Though the small sample size limits the interpretation, it may suggest that the areas were used at different points in time. Another interesting distinction is the difference in coffin distribution with respect to child burials, where only the younger children were thus equipped. This stands in contrast to the material as a whole, in which the child coffins were more evenly distributed. Two funerary receptacles from this season also deserve mention: the Old Kingdom reed coffin in Burial 493, which is unique to the site, and the square sarcophagus of Burial 467, also the first of its kind.

But the most important contribution to our knowledge of the Heit el-Ghurab cemetery from the 2009 excavations stems not so much from the material itself as from the fact that the associated ceramic material from the entire cemetery was finally thoroughly analyzed. This cemetery study, ten years in the making, brought some important insights, and we are very grateful to Sabine Laemmel, who analyzed the pottery in 2010, for her contribution. In terms of the 2009 burials, her study showed that the Late Period component of the site might be slightly earlier than what was previously thought, more consistent with a 25<sup>th</sup> Dynasty date than the later Saite period. The presence of the above-mentioned box coffin also supports this conclusion, since it was a popular type during the 25<sup>th</sup> Dynasty. Furthermore, the pottery analysis showed that the Roman period burials were not, as previously thought, restricted to the North Street Gate House (see *GOP1*: 10-13; map, fig. 9.1). Though one single burial does not a Roman cemetery make, several burials of the same distinct type as Burial 464, with several discrete layers of clearly different fills separated by a layer of limestone pieces, were

excavated in close proximity to the Western Compound area and south of the Wall of the Crow in previous seasons. Though we already knew from the stratigraphy that this burial type likely belonged to one of the later phases of cemetery use, the ceramic analysis confirmed that all of the pottery originating from the layered burial type was Roman, suggesting that the practice of using limestone

pieces to protect the body of the deceased was a Roman peculiarity. This insight will be immensely useful in the interpretation of the cemetery as a whole, as it gives us additional means to, at least tentatively, date burials with no otherwise datable features, and may contribute to future studies of similar non-elite cemeteries elsewhere in Egypt.



## 19. Gifts for the Gods: Votive Dog Mummies at Giza

Jessica Kaiser

**D**uring the last week of excavation of the 2009 season, the AERA Osteo team was called in to excavate a number of burials encountered when Ashraf Abd el-Aziz extended his Chute operation (Chapter 12, this volume) to the west, toward the edge of our concession. Surprisingly, this part of the Late Period cemetery at the Heit el-Ghurab (HeG) site proved to contain not only human burials (see Chapter 18, this volume), but also a deposit of several dogs (Burial 492) (fig. 19.1). Initially, only two dogs were visible (color plate 20a), but as we continued the excavation it became clear that there were a total of eight canines in the burial, layered on top of each other and of various ages and states of preservation (color plate 20b). It should be noted that no formal osteological analysis has been done on the animals. The information in this article is based on observations made during excavation only and may have to be amended once a full analysis is carried out.

The two topmost dogs, labeled 1 (blue) and 2 (green) (color plate 20b), both showed evidence of mummification. They were both lying on their right side, facing west, and with their heads to the north. A black substance with imprints of linen wrappings, possibly the remains of soft tissue and balms, enveloped the skeletons of both animals. The body positions of the dogs also suggest mummification, in that they appear to have been tightly wrapped. Both dogs had their back legs drawn up with the tail between them and their front legs extended along the chest, similar to the dog mummies from the Cairo Museum described by Gaillard and Daressy (1905: 91) and the Abydene dog mummies reported on by Kathleen Haddon (1914). Based on the fully fused long bones, both dogs were adults, but Dog 1 appears to have been the oldest of the animals, as evidenced by slight dental wear.

Though Dogs 1 and 2 both appear to have received at least a cursory mummification treatment, remnants of maggots or pupae in the stomach area of Dog 1 show that the animal had started to decompose at the time of burial (color plate 21a). The presence of insects in the body cavity may also suggest that Dog 1 was eviscerated, as a cut in the skin would have provided easier access for egg-laying flies. No insects were present in the body cavities of the other dogs.

Dog 3 (in purple, color plate 20b) was slightly to the west of Dogs 1 and 2, with its legs half-extended underneath them, tail between the hind legs folded along the chest. Dog 3 was also oriented in the opposite direction

from 1 and 2—lying on its right side but with the head toward the south, resting on the hindquarters of Dog 4 (in red). The vertebral epiphyseal plates of Dog 3 were still unfused, suggesting a young age. Dog 4 was found directly under Dogs 1, 2, and 3, but in a different position and orientation—lying on its left side with its limbs half-extended, and oriented northeast-southwest with the skull to the northeast. All bones appeared to be fused, but no dental wear was noted, suggesting a young adult animal. The body positions of Dogs 3 and 4 show that they were not tightly wrapped. However, a gray substance (color plate 21b) adhering to the bones of both dogs may suggest that they received some sort of cursory bodily treatment. It is possible that these two animals were prepared in a similar way to the dog mummies recovered by Peet (1914) from the dog catacombs in Abydos some hundred years ago. These mummies were described as lying on their side, loosely wrapped in a single piece of plain white cloth and treated only with a small amount of embalming material that Peet describes as bitumen (Peet 1914: 100–101).

Underneath Dogs 3 and 4 and at the lowest level of the burial pit were also the remains of several small puppies (in orange, color plate 20b). They were covered with the same gray substance that was found in association with Dogs 3 and 4. Due to the small size of these last dogs, the preservation was extremely poor, and it was very difficult to determine body positions. However, duplicates of the same bone in different sizes suggest at least four individual canines, bringing the total number of dogs to eight. The four puppies appear to have been deposited one on top of the other, perhaps wrapped in the same piece of cloth.

Square 3.035, where the dog burial (Burial 492) was found, also contained several Late Period human inhumations, and we originally assumed that the dogs were associated with these graves. However, two of the human burials were truncated by Burial 492, which tells us that the dog burial is later than at least two of the human burials, numbers 496 and 498 (fig. 19.1). The damaged skull of the skeleton in Burial 498, a young girl, is visible at the bottom center of color plate 20a. However, as grave markers are exceedingly rare in the Late Period cemetery, the two truncated burials could have been damaged by mistake, and the dog burial could be associated with one of the adjacent burials. Nevertheless, we could also be dealing with human inhumations of separate phases. Perhaps the two truncated burials belonged to an earlier



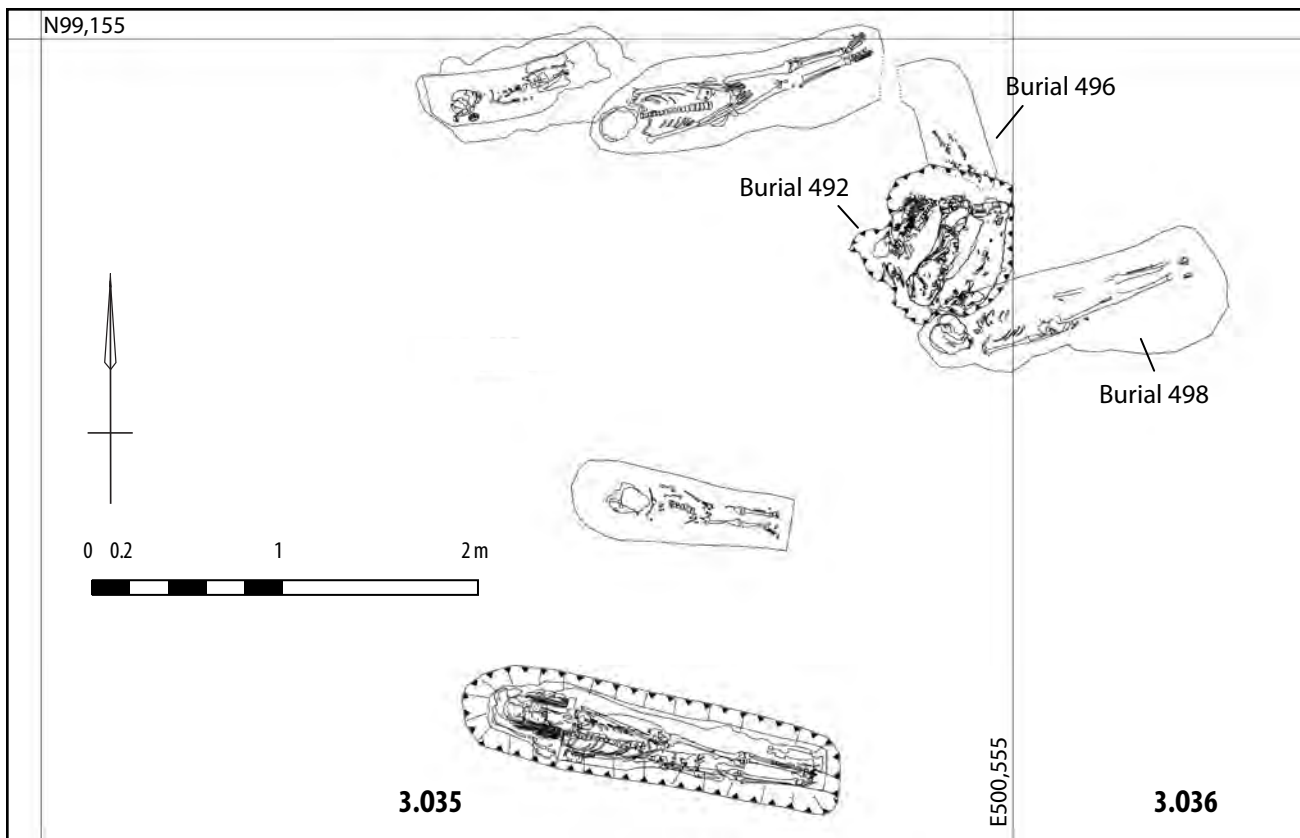


Figure 19.1. Overview of Square 3.035. Drawing by Ahmed Gabr, Affaf Wahba, Zeinab Hashesh, and Ayman Damarany.

phase of the cemetery, forgotten by the time the dogs were buried there. As both damaged burials appear to have been skeletonized by the time they were cut into, the latter scenario is perhaps the most likely.

Although this is the first burial of its kind in the Late Period cemetery at HeG, dog burials are known from as early as the Predynastic period in Egypt. Dogs have been found buried in their own graves in the very early (c. 4800 BC) Merimde culture, or even within human burials at the slightly later sites of Naga ed-Deir and Abadiyeh (Brewer, Clark, and Phillips 2001: 28). These animals may have been pets; we know that later, starting in the Old Kingdom (Ikram 2005a: 1–2), pet or hunting dogs are depicted alongside their owners in tomb paintings. For some, even their names—“Blackie,” “Brave One,” “North Wind”—are recorded on the tomb walls (Brewer, Clark, and Phillips 2001: 43)! Several examples of well mummified pets—dogs as well as baboons, gazelles, and other animals—survive today (Ikram 2005a: 2–4).

Not all animal mummies were pets, however. Cuts of meat or poultry were sometimes mummified and placed within the tomb to provide food for the afterlife, a practice most common in the New Kingdom. The Cairo Museum has a large collection of such victual or food mummies, all from the Theban necropolis (Ikram 2005a: 3; Ikram and Iskander 2002: ii).

Some animal mummies were sacred animals, such as the Apis bull, sacred to Ptah and Osiris, or the crocodiles at Kom Ombo, sacred to Sobek. These animals, often chosen for their distinctive markings, were seen as individual personifications of their respective gods, worshipped as gods during their lifetimes, and buried with splendor worthy of royalty upon their deaths (Ikram 2005a: 5; Ikram and Iskander 2002: iii). Specific animal cults, such as that of the Apis bull, are attested as early as the 1<sup>st</sup> Dynasty, but cults of other animals grew in importance from the end of the New Kingdom onward, reaching a peak in the Late Period (Kemp 2006: 374).

By far the largest numbers of animal mummies belong to a fourth category: the votive mummy. Although these animals were associated with a specific god—cats with Bastet, ibises with Thoth, for example—they were not individually unique. Votive mummies were most commonly deposited in dedicated catacombs attached to temples, where they served to reinforce prayers for eternity (Ikram and Iskander 2002: iii). By the Late Period, this type of mummy had become a veritable industry, with animals literally being bred for slaughter and mummification (Dunand and Zivie-Coche 2004: 332; see Kessler 1989 for an opposing view). Various levels of mummification were available; essentially one for every budget (Dodson 2009). Animal cemeteries with vast numbers of mummies

sprung up across the country, sometimes in newly built catacombs, and sometimes in re-used tombs from earlier periods (Kemp 2006: 374–75). Cemeteries dedicated to canids are known from several sites in Egypt, the most prominent ones located in Abydos, Asyut, Saqqara, and Cynopolis (Brewer, Clark, and Phillips 2001: 44–47; Ikram 2005b: xviii–xix). Many votive mummies were prepared by pouring vast amounts of embalming materials over partially desiccated animals, often without evisceration. This was a cheaper method of mummification, but depending on the animal's size and age, this often resulted in partial or complete dissolution of the soft tissue, leaving a black, powdery substance in its place (Ikram 2005c: 21).

The sheer number of dogs in Burial 492 and the fact that at least five were juveniles suggest that they belong to the votive category of animal mummies, as it is unlikely that as pets they would have all died of natural causes at the same time. Since dogs, though sacred to Anubis and Wepwawet, were never regarded as gods in their own right, and were not on the menu of the ancient Egyptians (Brewer, Clark, and Phillips 2001: 44–45), it also seems fairly safe to assume that these dogs were neither sacred animals nor food mummies. Further, if the dogs were indeed intended as votive mummies, the heterogeneous methods of mummification could perhaps be explained as a case of the donor not being able to afford more than two properly wrapped votives—not surprising, considering the comparative-

ly poor human burials in the Late Period cemetery. The cheaper method of mummification may also account for the poor preservation of the puppies, and the gray powdery substance adhering to the bones of Dogs 3 through 8.

Votive dog mummies would have been associated with Anubis, or perhaps less likely Wepwawet, who were both ancient Egyptian canid deities associated with funerary beliefs and ritual. Before the rise of Osiris, Anubis was in fact the most prominent funerary deity in Egyptian religion (Wilkinson 2003: 187–88), and he continued to be important throughout ancient Egyptian history as the protector of the dead and the patron of embalmers, becoming especially popular in the Late Period. Wepwawet, a lesser-known god whose name literally means “Opener of the Ways,” was described in funerary texts as the deity who would guide the dead on the way to the netherworld (Wilkinson 2003: 191) and was sometimes associated with Anubis. Thus, to find a votive deposit of dogs in a Late Period cemetery is not in itself that surprising, even though they were normally interred in dedicated cemeteries separate from human inhumations. What is curious is that while these dogs displayed some—however cursory—attempts at mummification, the adjacent human burials showed none. The dogs in Burial 492 may represent a last gesture of care and affection by family members who could afford to mummify animals, but not a loved one.



## Sub-Project





## 20. Coordinate Systems and Archaeological Grids Used at Giza

Ana Tavares

Locating accurately the results of excavations is a priority in archaeological projects (Barker 1977; Kemp and Garfi 1993; Weeks 1981). The work of the Giza Plateau Mapping Project (GPMP) began in 1984 with the establishment of a survey network over the plateau. David Goodman and Mark Lehner (Goodman and Lehner 2007) have described this network in detail. In 1988–89 when excavations began in the Heit el-Ghurab (HeG) settlement, an excavation grid was laid out, but an expansion of the GPMP excavation grid was required when in 2005 the AERA team began the excavation and recording of the Khentkawes Town (KKT) area. In this article I describe the overall GPMP excavation grid now covering both the HeG and the KKT sites, and briefly review maps and other grids that researchers have applied to the Giza Plateau.

To record their work, a number of archaeological projects at Giza have used the GPMP survey network that David Goodman and Mark Lehner established in 1984–85 (fig. 20.1): the Cairo University-Brown University Expedition (Brovarski, Handoussa, and Phillips 2007; Phillips 2006), the German Institute's work in the Quarry Cemetery west of Khafre's Pyramid (Dreyer 2002: 17–18, 2003: 15–16), and Cemetery G2100 in the *Giza Mastabas Series* (Manuelian 2009).

The findings of excavations at Giza by the Supreme Council of Antiquities (SCA) have also been integrated into the GPMP coordinate system, such as the Rowad Trench 2004, named after the company that excavated into the dumps of the pyramid builders northwest of the Khufu Pyramid (G1) to construct the modern gate and ticket offices; the Menkaure (GIII) causeway excavations in 2004; excavations east of the Khafre Valley Temple (GII.VT) in 2002 and 2009 to 2010; and excavations north of the Menkaure (GII) causeway from 2004 to 2009.

The GPMP grid extends south to include the SCA work around the tomb of Tary in the Southern Field (Porter and Moss 1994: 296–97), the Old Kingdom Workers' Cemetery at the Gebel el-Qibli, and north to include the recording of the Rowad Trench.

The AERA team participated in a number of remote sensing and laser scanning projects that used the GPMP survey network for the basic recording:

- AERA-Birmingham University-National Geographic 2003 Geophysical Survey Project (Dash 2004a; Watters, Barratt, and Wilkes 2003)
- Tremaine and Associates' survey of the Central Wadi between the Maadi and Moqattam Formation outcrops at Giza, as part of the 2003 Giza Geophysical Survey Project (Dash 2004a, 2004b)
- AERA-Tokyo Institute of Technology-Gangoji Institute-Osaka University-Tohoku University of Art and Design Giza Laser Scanning Survey (GLSS) of the Khentkawes monument (Kawae 2007, 2009a: 166–75)

The AERA team also located within the GPMP coordinate system recent boreholes drilled by the Cairo University Engineering Department in the low eastern part of the plateau and at the Sphinx for pizeometers and pumps as part of a system to lower the ground water (Lehner 2008).

### Coordinate Systems and Grids Used at Giza

Archaeological projects of the previous century often benefited from the services of professional surveyors from the Egyptian government Survey Department. The first survey agency, under the Public Debt Department, was established in 1878 in order to survey agricultural land for tax assessments (Arnauld 1989). After a hiatus (1889–98), the Survey Department was created under the direction of H. G. Lyons (1908), regrouping the Revenue Survey, the Hydraulic Survey, and the Geological Survey (Arnauld 2005a, 2005b). In 1919 the Survey Department became the Survey of Egypt (SoE) and it is now the Egyptian Survey Authority (ESA).

The SoE produced the most authoritative and reliable maps, including topographic and cadastral series often used as base maps for archaeological publications. Until recently the main geodetic reference for these maps was the Survey of Egypt national grid (Craig 1910; Lyons no date), which has a notional (not on the ground) point of origin in the southwestern Egyptian desert, approximately 12 km west of Giza and not, as often assumed, at the summit of the Great Pyramid. This grid, designated as “quadrant” or “standard”, originates at the intersection of meridian 31°E (= 615 km E), and parallel 30°N (810 km N), and has an observed primary origin at the Moqattam Observatory station N 30° 01' 43.52", E 31° 16' 33.60" (Jeffreys and Tavares 2000). The 1922 cadastral and topographic maps use a “kilometric” or “normal” grid, a subdivision of the “quadrant” grid with an arbitrary origin 810 km south and 615 km east of the quadrant grid origin.

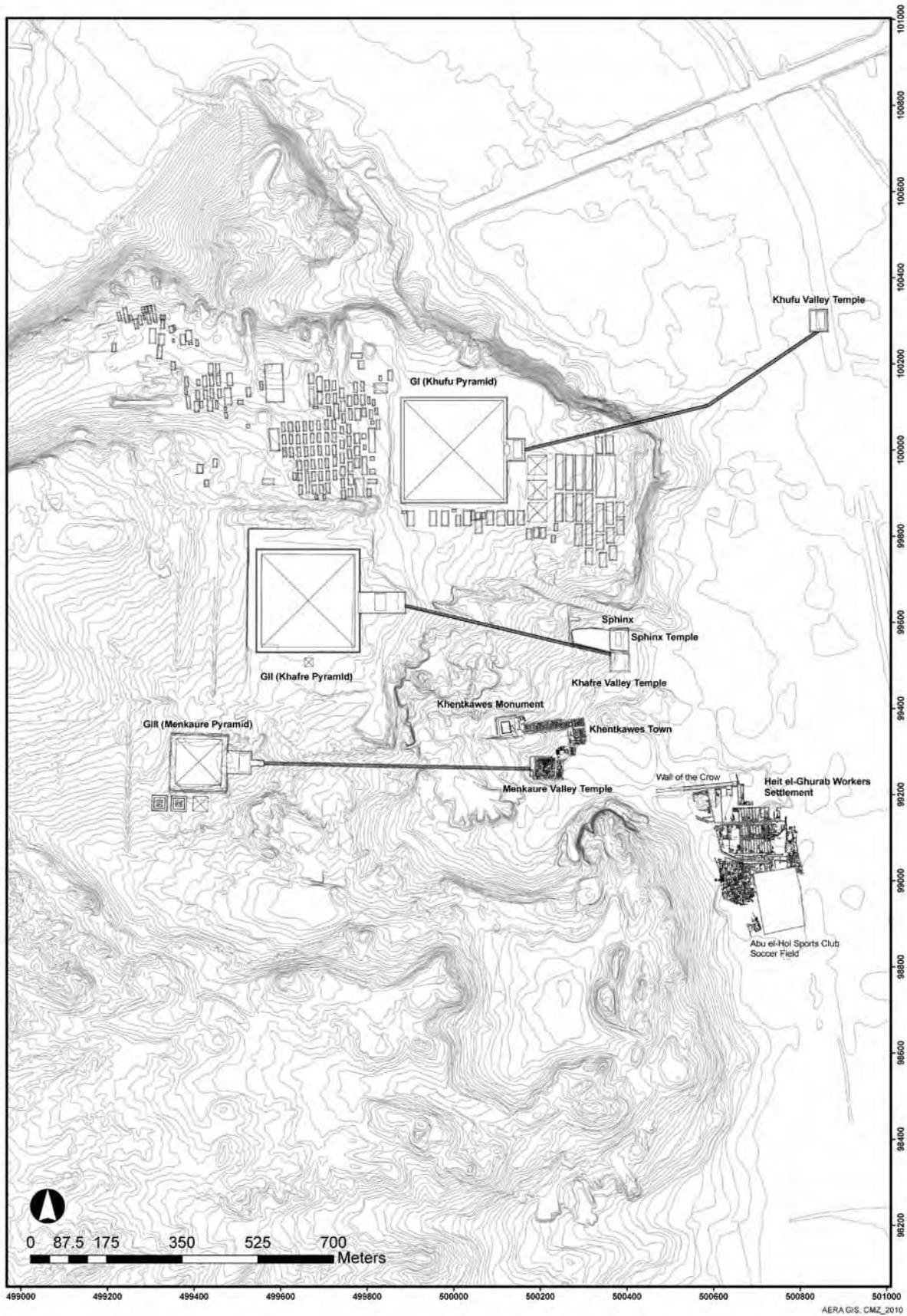


Figure 20.1. The Giza Plateau showing the location of the settlements at Heit el-Ghurab, Khentkawes Town, and the Menkaure Valley Temple. Topographic contours from the “Ministry of Housing and Reconstruction” (*Wazarat al-askan wa'l-ta'mir*) 1978 1:5,000 map series, Cairo, sheets F17-F18. The coordinate values given are those of the Giza Plateau Mapping Project (GPMP) grid. Map prepared by Camilla Mazzucato, AERA GIS.

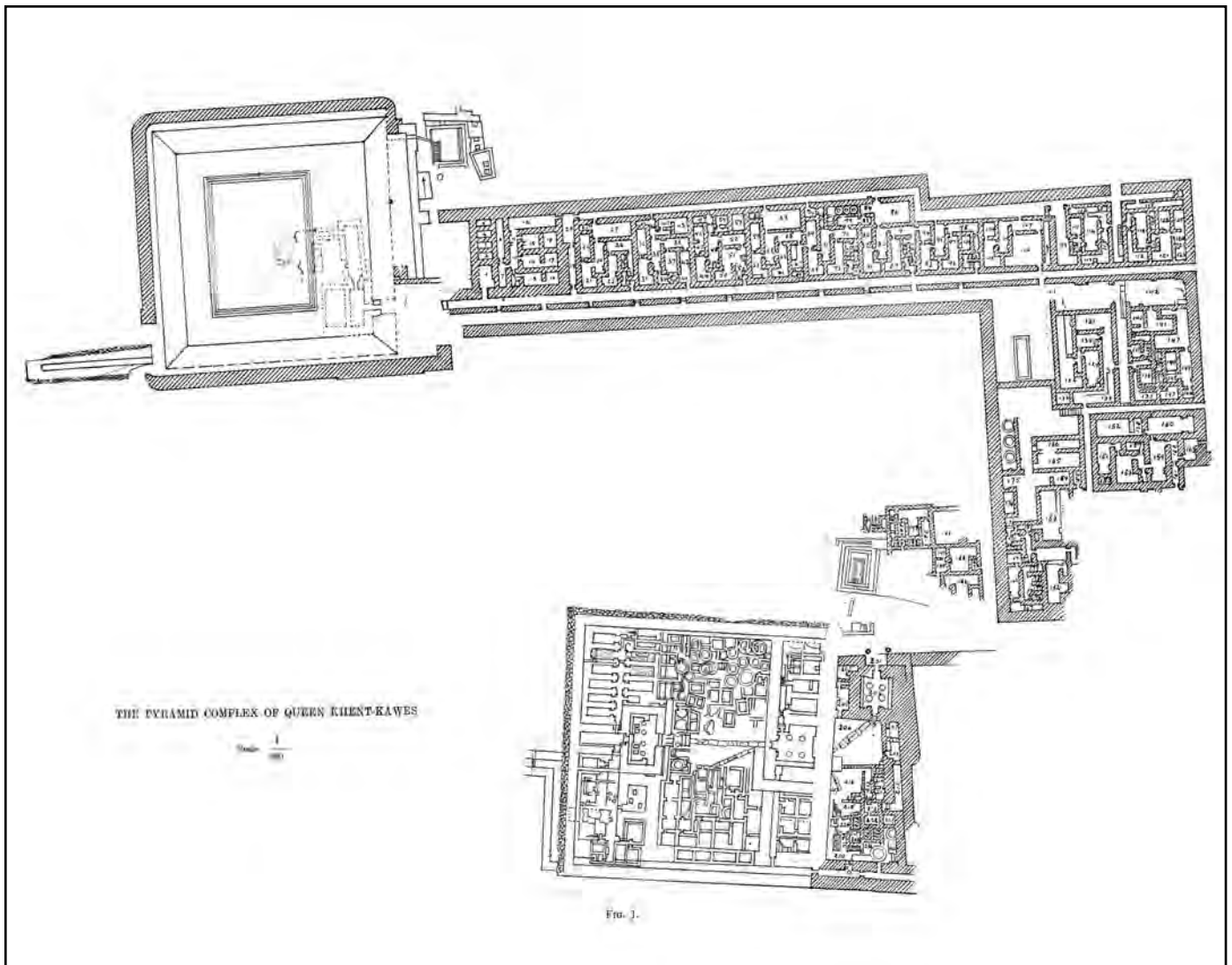


Figure 20.2. Overall plan of the Khentkawes Town and the Ante-town of Menkaure as excavated by Hassan in 1932–33 (Hassan 1943, fig. 1). Reisner’s plan of Menkaure’s Valley Temple is included, but was not resurveyed. Published at scale 1:200, the map lacks a north arrow, grid, coordinate values, and altimetry. The map shows room numbers which are referred to in the text.

The Giza Plateau and its monuments, specifically the Great Pyramid, played a role in modern surveys of Egypt (Lyons 1909: 135). The soE located one of their main traverse points, E1, on top of the Great Pyramid (E1, which is not however the soE grid origin) (Arnauld 2005c) and a leveling datum on the north face of the Great Pyramid (benchmark 472P at elevation 61.72 asl) (Goodman 2007: 98). soE surveyors also worked in conjunction with archaeologists in the 1930s and 1940s producing various base maps.

Strictly speaking, maps and plans differ in that conventional symbols are used to designate some features because the scale on maps is too small to allow every feature to be clearly and precisely represented (UNESCO 2008). Commercial “maps” designate scale drawings of real world areas generally of 1:10,000 scale or greater, while “a ‘plan’

is anything from 1:1 up to that scale” (<http://www.custom-maps.com.au/faq.html>).

The distinction is more fluid in archaeology. We often designate detailed site recording drawings as “plans” (standard scales being 1:20, 1:50, and 1:100) and multiple-site drawings as “maps.” So for instance, Hassan’s “plan” of the Khentkawes site is at scale 1:200 (fig. 20.2), while Hassan’s “map” 1932–33 (multi-site) (color plate 22) is at scale 1:600.

### **Survey and Mapping**

Until the mid-1970s the ESA had a monopoly on map-making in Egypt (Arnauld 2005b). Recently different ministries have produced diverse maps often in conjunction with foreign agencies. This is the case of the maps produced for the Ministry of Housing and Reconstruction (MHR) in 1978 by the French consortium SFS/IGN (Institute Géographique



Nationale). These cover the Greater Cairo area and include the desert edge for the entire Old Kingdom “Capital Zone” (from Dahshur to Abu Roash). The maps at scale 1:5,000 were prepared from aerial photographs taken in April 1977 at a scale of 1:15,000. They are particularly useful for archaeologists as they include topographic contours at one meter intervals with values above sea level (asl). They also show ancient monuments, modern features, and the extent of urban development as of 1977. The grid is given in Universal Transverse Mercator (UTM) values (International Spheroid Helmert 1906, UTM 36 European Datum 1950) with half-kilometer intersections. Sheets F17–18 cover the Giza Plateau. The UTM values for the HeG site are E320,500 and N3,317,095 (fig. 20.3).

The use of a shared coordinate system in an archaeological site or area enables the results of different projects to be accurately located, easily compared, and integrated. This approach has been particularly successful at Saqqara, where David Jeffreys (Egypt Exploration Society’s Survey of Memphis Project) and Ian Mathieson (National Museums of Scotland Saqqara Survey Project) made available a network of survey markers with published UTM and World Geodetic System (WGS) coordinates (Jeffreys and Tavares 2000; Jeffreys, Bourriau, and Johnson 2000). These survey stations have enhanced the use of the Ministry of Housing and Reconstruction (MHR) 1978 map as a base map for archaeological projects (Hays 2010; Yoshimura, Kawai, and Kashiwagi 2005; Zivie 2009). The use of the MHR maps has been further extended as missions working beyond Saqqara integrate and publish their results within this base map (Alexanian et al. 2006; Bárta et al. 2009; MAFS 2010; Jeffreys and Nicholson 2002).

At Giza we provide survey data to other missions whenever possible, as the value of a survey system in an archaeological context lies in the integration of disparate datasets. The MHR map has been used in Giza as the base map for the contour model of the plateau (Lehner 1999) and the GPMP GIS (Brown 2006) (color plate 23).

### Satellite Imagery

The release of American and Russian military satellite imagery (<http://www.omnimap.com/catalog/int/egypt.htm>; <https://zulu.ssc.nasa.gov/mrsid>; <http://earth-info.nga.mil/gns/html>) has spurred national agencies to “unrestrict” many of their maps and imagery. In Egypt archaeologists took advantage of satellite images taken between 1965–70 by the Corona, Argon, and Lanyard satellites to analyze and identify ancient sites (e.g., <http://www.deltasinai.com/image-00.htm>; Parcak 2009). Landsat and QuickBird made current satellite imagery accessible (and affordable) to archaeologists (Bloxam and Storemyr 2005: 39; Cooper 2009: 37; Parcak 2005: 8). Such images were used for analysis of part of the necropolis of the Old Kingdom “Capi-

tal Zone” (Bárta and Brúna 2006). A further valuable and very accessible tool is provided by Google Earth images (<http://www.googleearth.com>). Many archaeologists now use these images to locate and illustrate (with reference to geographic coordinates) their sites (Cooper 2009: 40; Graham 2010: 28). The use of Global Positioning Systems (GPS) also allows sites to be easily surveyed into well known coordinate systems (mostly latitude and longitude using the WGS84 geodetic datum).

### SoE Markers

One of the most informative map series produced by the SoE is the cadastral series, at a scale of 1:2,500, which were used until recently by the SCA for defining officially recognized antiquities land. The ground markers for the cadastral survey are sections of iron rail driven into the ground. These markers are spread across desert edge sites and near cultivation, and are most useful for archaeology. Unlike many other survey markers, these iron posts are resilient. In certain archaeological sites, such as Saqqara, SoE markers are integrated into current survey networks (Mathieson and Tavares 1983) and were occasionally shown on older archaeological maps (Macramallah 1940). As far as I know, at Giza none of the SoE markers are shown on archaeological maps, even when those maps were prepared from the Survey of Egypt base map. This is the case in the map published by Reisner (1942) (fig. 20.4 here) showing monuments and excavations of the Giza Necropolis, which is based on the map prepared by the SoE and the aerial photographic mosaic of the 1936 Egyptian Royal Air Force. Despite these very accurate sources, the archaeological map itself has no coordinate values, grid references, or altimetry (elevations).

One exception is the SoE marker on an Early Dynastic mastaba (Covington’s tomb) at south Giza which was integrated into the GPMP survey network as point GP3A (Goodman and Lehner 2007: 61) (fig. 20.5). Incredibly, this point was physically removed around 2006. Another SoE point still *in situ* is located in the Central Wadi between the Moqqatam and Maadi Formation outcrops, north of the rock escarpment Gebel el-Qibli, and west of the western edge of the modern Islamic cemetery.

### Archaeological Maps of Giza

Although coordinate values were understandably absent from 19<sup>th</sup> century maps (see above), interestingly they indicate true north as well as the magnetic declination, which later maps dispense with. This is the case of the map prepared by J. Perring and published by Howard Vyse (1840) (color plate 24 here), which gives magnetic variation readings for both April and June 1837 (Perring 1839, 1840, and 1842), and the map published by Lepsius titled *Situationsplan des Pyramidenfeldes von Giseh*, signed

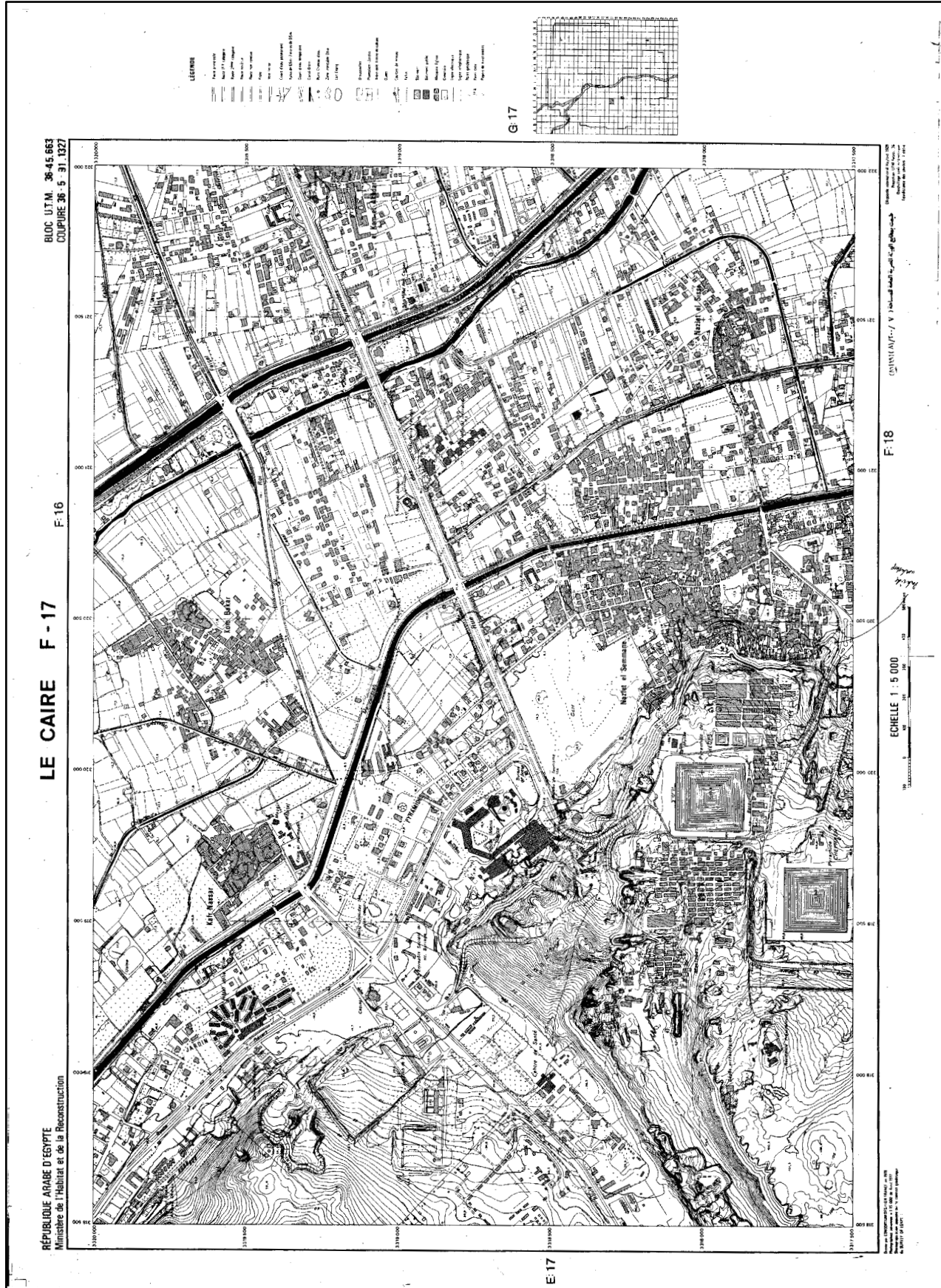


Figure 20.3. Detailed map of northern Giza showing contours, archaeological monuments, and modern features. Map sheet F17 of the Ministry of Housing and Reconstruction (MHR) 1978 1:5,000 map series. The topographic contours are given at one meter intervals with values above sea level (asl). The grid is given in Universal Transverse Mercator (UTM) values (International Spheroid Helmert 1906, UTM 36 European Datum 1950) with half-kilometer intersections.

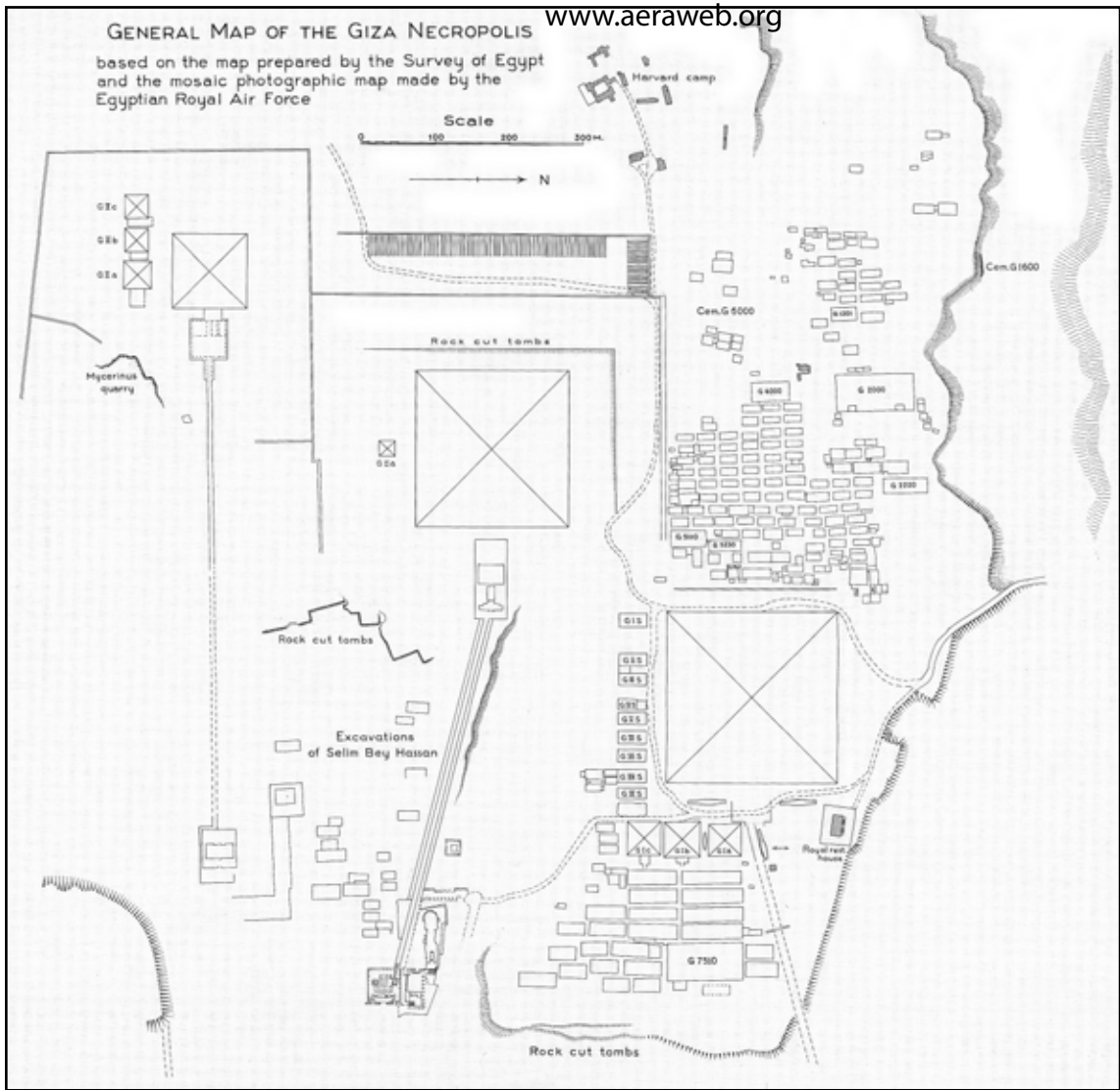


Figure 20.4. General Map of the Giza Necropolis, showing monuments in the central Giza area, published by Reisner in 1942 (MFA Giza Archives EG002027). The escarpment edge is indicated with hachures and the northern edge of the Gebel el-Qibli is shown. Courtesy of Peter Der Manuelian, the Giza Archives, Museum of Fine Arts, Boston.



Figure 20.5. David Goodman surveying in the area of Covington's tomb in south Giza. The instrument is set over GPMP point GP3A, an iron rail driven into the ground by the Survey of Egypt (SoE) as a marker for their cadastral survey. Photo by Mark Lehner.

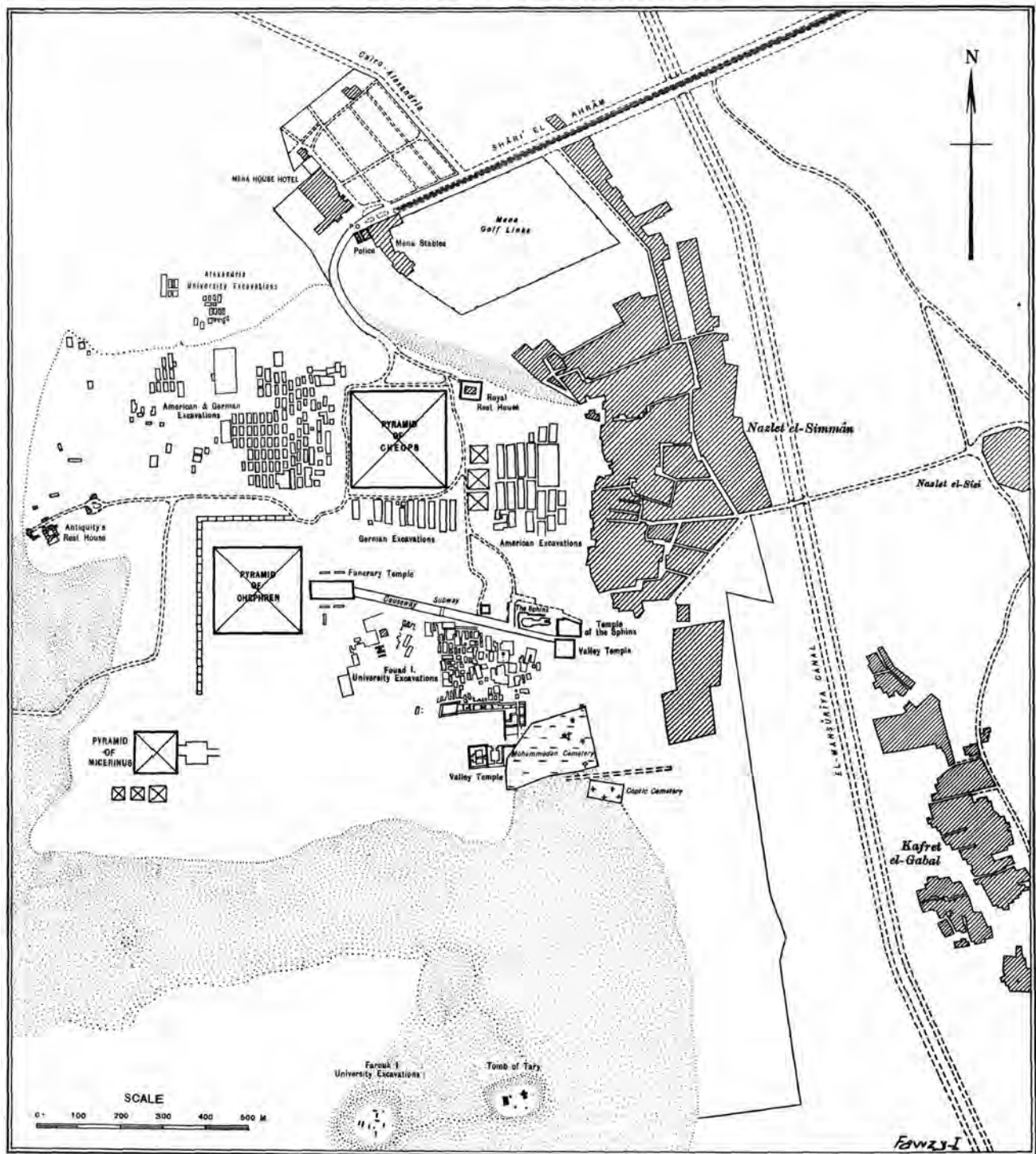


Figure 20.6. Map of the Giza area, showing main monuments as well as modern settlement, canals, and roads along the east (Abu-Bakr 1953, frontispiece). The towns of Nazlet es-Semman and Kafret el-Gebel are shown. The map also shows details of south Giza with the tomb of Tary and excavations of Farouk I University indicated. The Gebel el-Qibli knoll and the wadi are indicated with stippling. The map is signed by Fawzy I.

by G. G. Erbkam and V. G. Rebuke (1849: pl. 14) (color plate 25 here).

The lack of coordinate values (either latitude, longitude, or national grid values) as well as an absence of altimetry (elevations) is the norm for most of the overall maps of

Giza. This is also the case in the more detailed archaeological maps, including Reisner's plans (1942, maps 1-3), the map published by Abu-Bakr (1953, frontispiece) (here fig. 20.6) and the map of the German/Austrian concession (Junker 1955, frontispiece *Gesamt-Plan*) (here fig. 20.7).

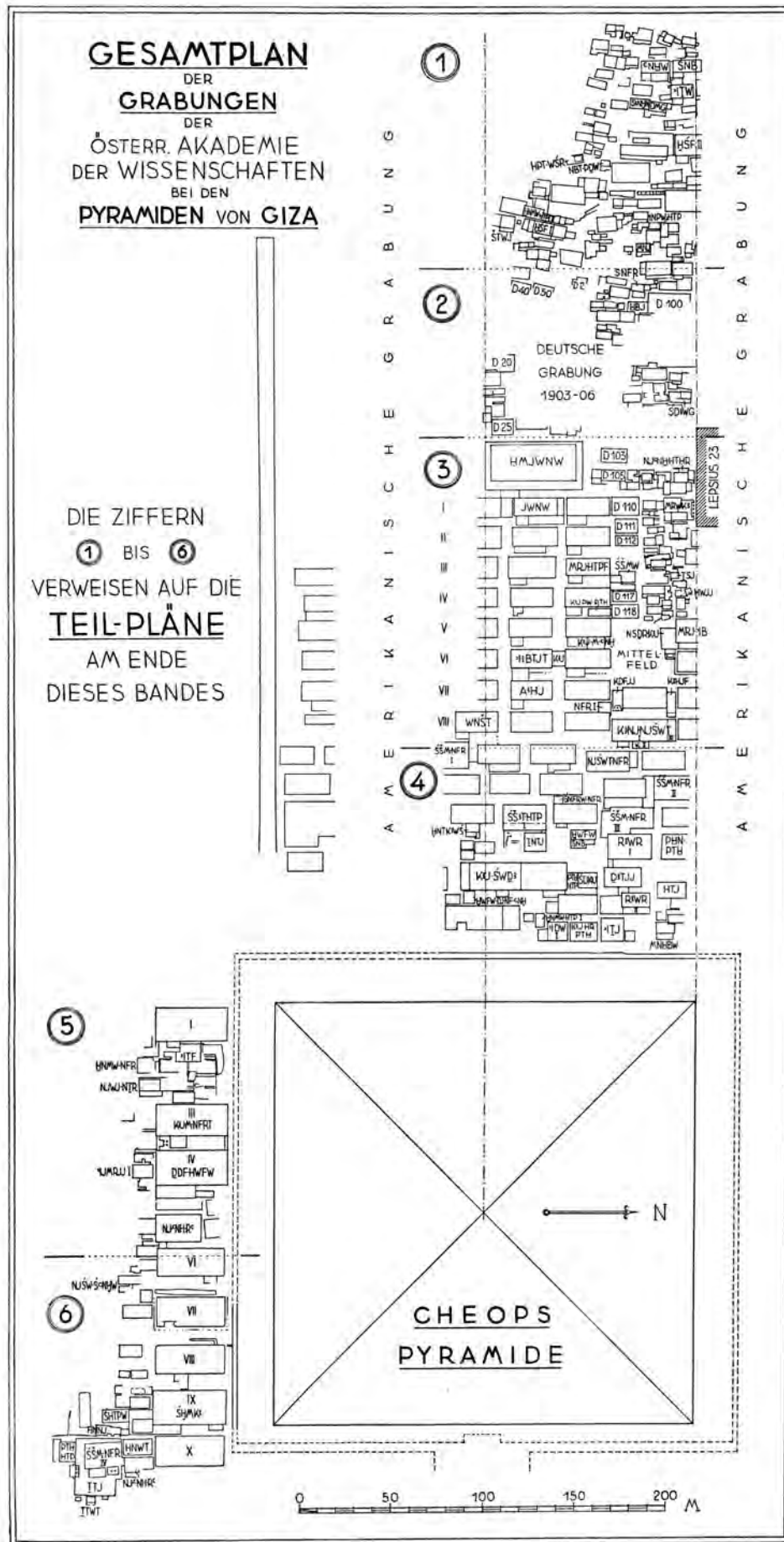


Figure 20.7. Archaeological map of the German/Austrian concession published by Junker (1955, frontispiece). The map shows mastabas in the Western Cemetery, central strip (Cemetery 4000), and the G1-South Cemetery. Six excavation areas are delineated with tombs named and/or numbered. North is indicated but no coordinate values or altimetry are shown.



Reference publications, such as the *Topographic Bibliography* (Porter and Moss 1994, plans xx–xxiii) use grids to enable easy reference to tombs and other monuments discussed in the text. These grids are not related to the ground or to coordinate systems.

### **Excavation Grids**

Both Clarence Fisher and Selim Hassan published excavation grids (Fisher 1924, plans 1–2; Hassan 1960, frontispiece) (here see figs. 20.8, 20.9, color plate 26). Fisher's grid seems to have been laid out prior to excavation, while Hassan's grid was used to survey areas after excavation in preparation for publication. Although professional surveyors probably surveyed these grids, they seem not to have marked the grids on the ground and they apparently did not explicitly link the grids to known coordinate systems (see above). Only the plan of Cemetery 3000, excavated by Clarence Fisher in 1915, gives elevation values, but they are relative to the "upper end of Mena House road" (Fisher 1924, plans 1–2). Unusually, Fisher's plan shows a scale in Egyptian ells as well as metric values. Here "ells" refers to the ancient Egyptian unit of measurement the cubit (Arnold 1991: 296; Gardiner 1973: 266), corresponding approximately to 52 cm.

### **Bates 1908**

Peter Der Manuelian brought to our attention a grid that Oric Bates constructed for Reisner's excavations of the Menkaure Valley Temple (GIII.VT) in 1908 (Giza Archives, MFA unpublished doc #EG025773) (color plate 27 here). Bates was field director of the GIII.VT excavations in 1908. C. S. Fisher completed the excavations in 1909–10. The map is titled "Harvard University Museum of Fine Arts: Excavations at Gizeh," with the subtitle "Sketch Plan of Easternmost Trench, showing mud wall etc. etc.," dated June 21, 1908, and signed by Oric Bates. The 1:200 (metric) map bears the legend "Mud Walls," and covers an area of 50 m east-west and 36 m south-north. Bates shows a 2 × 2 m grid, labelled A–Q south-north and 1–25 (showing square 26) east-west. The grid aligns to magnetic north with the top of the drawing as south. The map shows the two parallel mudbrick walls of the causeway, some of the internal walls of the GIII.VT, and the back (west) fieldstone wall of the temple. Hachures indicate predicted but unexcavated walls.

Reisner (1931) does not refer to these grid squares in his final publication. He does refer to excavation strips 1–5 in the diary entries and locates objects using room numbers assigned for the publication and shown on the published plans (Reisner 1931: 35–38, pls. VIII, IX).

### **Hassan 1930–37**

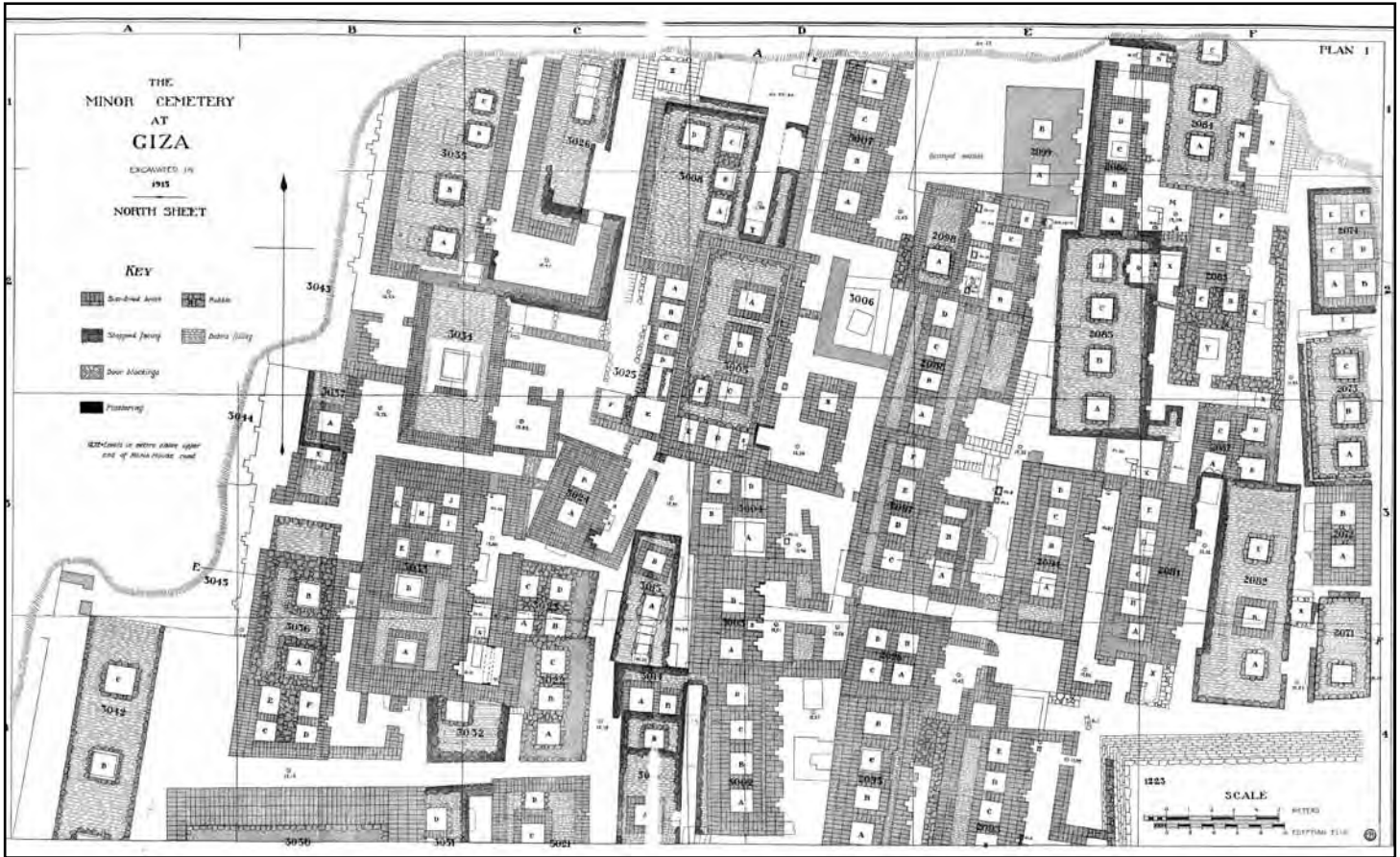
Surveyors from the Survey of Egypt department prepared

the archaeological maps for Hassan's work (Hassan 1932: v–vi, 1936: v). The surveyors signed these maps. They also laid out a local grid that appears in the map of his second season, 1930–31 (Hassan 1936, frontispiece). This grid is divided into 20 × 20-m squares and expands from square A1 at the northwest to H9 on the southeast. It only covered the excavation area around the mastaba of Rawer in the Central Field (Hassan 1936, frontispiece) and needed to be expanded to cover the work of later seasons.

The following season, 1931–32, was published in 1943. The hiatus between excavation and publication allowed Hassan's surveyors to lay out an overall grid covering all the excavations between 1932 and 1937. This grid does not seem to have been marked on the ground. It is partially shown in the frontispiece Hassan's *Excavations at Giza, Vol. IV* (1943), and subsequent publications, and fully shown in the frontispiece of his *Excavations at Giza, Vol. IX* (1960). The grid is divided into 25 × 25-m squares with alphabetic designations along the x-axis and numeric along the y-axis. The letter designations increase from west to east but the numerical values increase towards the south. The grid runs from square A1 at the northwest, to include Khafre's Mortuary Temple, to square B20 at the southeast, which includes the work east of the Sphinx, Sphinx Temple, and Khafre Valley Temple, and may have been identified by Lehner as iron stakes set into the bedrock surface (personal communication 2010).

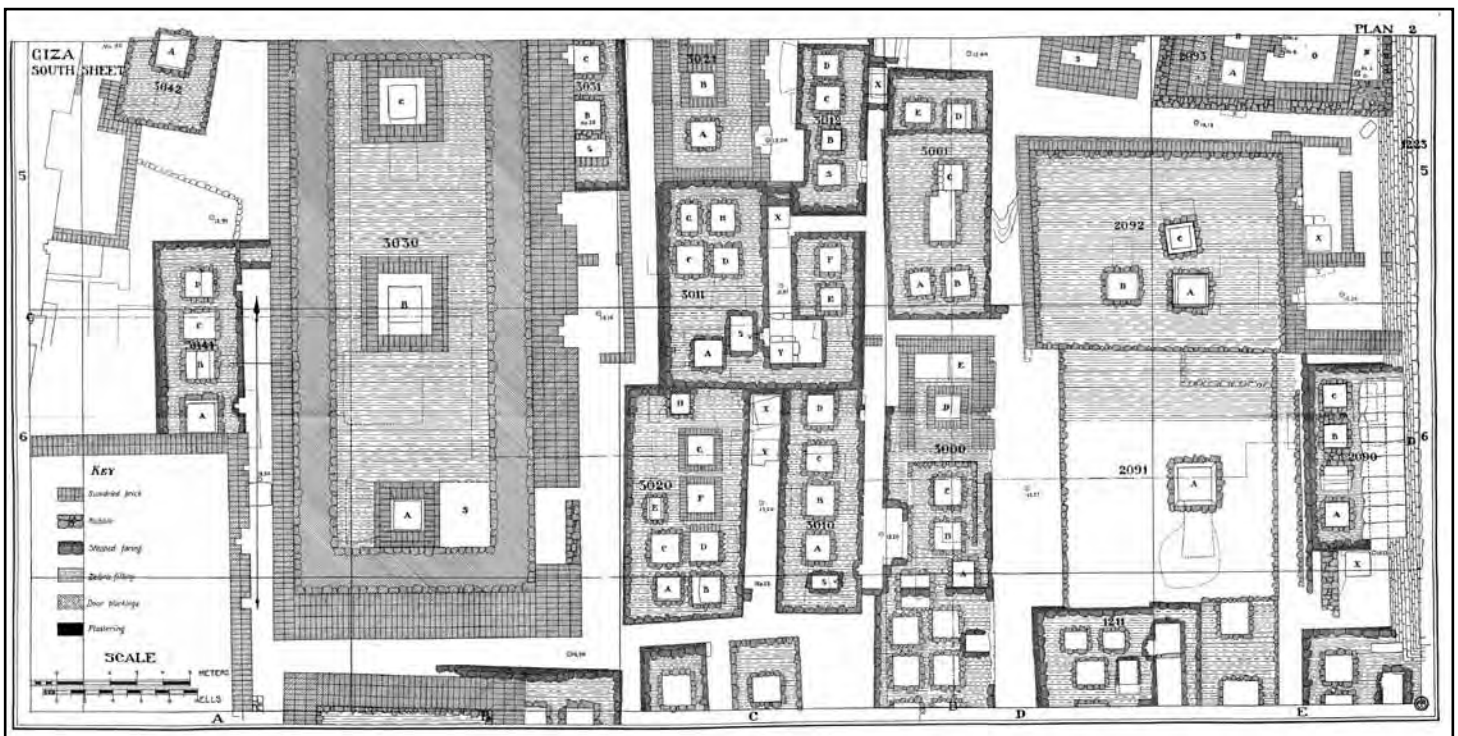
One of our main aims in working in the Khentkawes Town is to record in greater detail the structures originally excavated by Selim Hassan (*GOP2*: 10–16; *GOP3*: 7–12; *GOP4*: 9–46). The area is shown in Hassan's map, entitled "Site Plan of the Excavations" (1943) (see color plate 22 here). The map, at a scale of 1:600, shows the overall grid, but has no geographic or SOE coordinate values, and no altimetry (elevations). The grid squares run from square E7 at the northwest to square X20 at the southeast. Hassan's grid is aligned to true north, and given that the x-axis aligns with that of the GPMP grid, it might use the calculated center of the Great Pyramid as a main grid point (see fig. 20.10). However, Hassan's grid was neither marked on the ground nor used for recording during excavation, as no grid references are given in the text. The grid was merely used to assemble, for publication, the excavation plans from different seasons.

Conversely the excavation plan, "The Pyramid Complex of Queen Khentkawes" (Hassan 1943) (fig. 20.2 here), drawn at a smaller scale (1:200), has numerical room designations to which Hassan refers in his text to describe architecture and the provenience of finds. However, this plan shows no grid or north arrow, and, of course, no coordinates or altimetry. The scale is too large for the archaeological detail on the ground and the surveyors often misinterpreted wall lines and excavation cuts (*GOP4*: 9–43). We are



Above: Figure 20.8. Detailed archaeological map of Cemetery 3000 excavated by Fisher in 1915 and published in 1924 (plans 1 and 2, Giza Archives MFA numbers EG010049, EG010050). Different building materials are shown (sun-dried bricks, masonry, rubble, and plaster). Hachuring indicates the limit of the excavation area. Elevations are given in meters above “upper end of Mena House road.” The excavation grid is 10 × 10-m grid squares, labeled A to F along the X-axis increasing to the east, and labelled 1 to 6 along the Y-axis, increasing southwards. A metric and ellis (ancient Egyptian cubit) scale is shown.

Below: Figure 20.9. Plan 2, Fisher 1924.



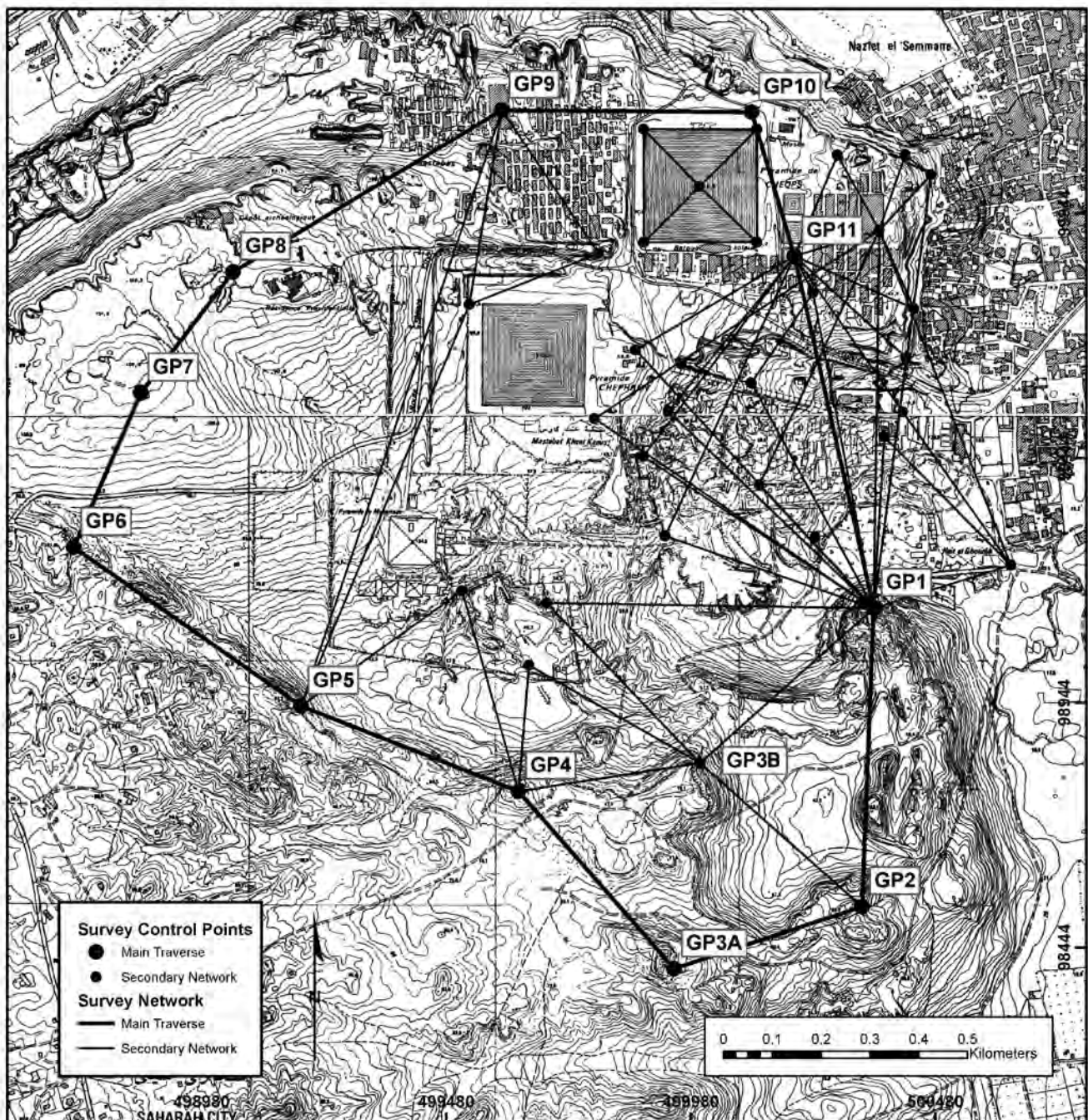


Figure 20.10. The GMP survey network with main traverse points (labeled) and some of the auxiliary survey points. The GMP polygon (GP1 to GP10) consists of a series of markers set in prominent locations, with good intervisibility, surveyed to a high degree of accuracy (Goodman and Lehner 2007). The network encircles the main archaeological areas and allows for auxiliary points to be established when needed for specific localized excavation areas.

fortunate that parts of the town have not been totally eroded and can be re-recorded at a more suitable scale (color plate 28).

### *The Unknown Grid*

During our work in the KKT area we have found no traces of Hassan's published grids. We did however find a series of survey monuments, each consisting of small nails in wooden survey markers set in a white plaster fill of a shal-

low pit, laying out 10-m squares over the debris mound south of the Khentkawes causeway and extending just east of the Khentkawes Town in the area of KKT-E (G0P4: 38–40, figs. 35–36). This grid is not aligned to magnetic north. The magnetic declination at Giza in 1932 was  $0^{\circ} 01'E$  (changing by  $0^{\circ} 03'E$  per year),  $1^{\circ} 32'E$  in 1970, and  $3^{\circ} 31'E$  currently. The grid of wooden stakes set in white plaster aligns  $6^{\circ}$  west (+) of true north. The alignment could have been taken from the Khentkawes monument itself, per-



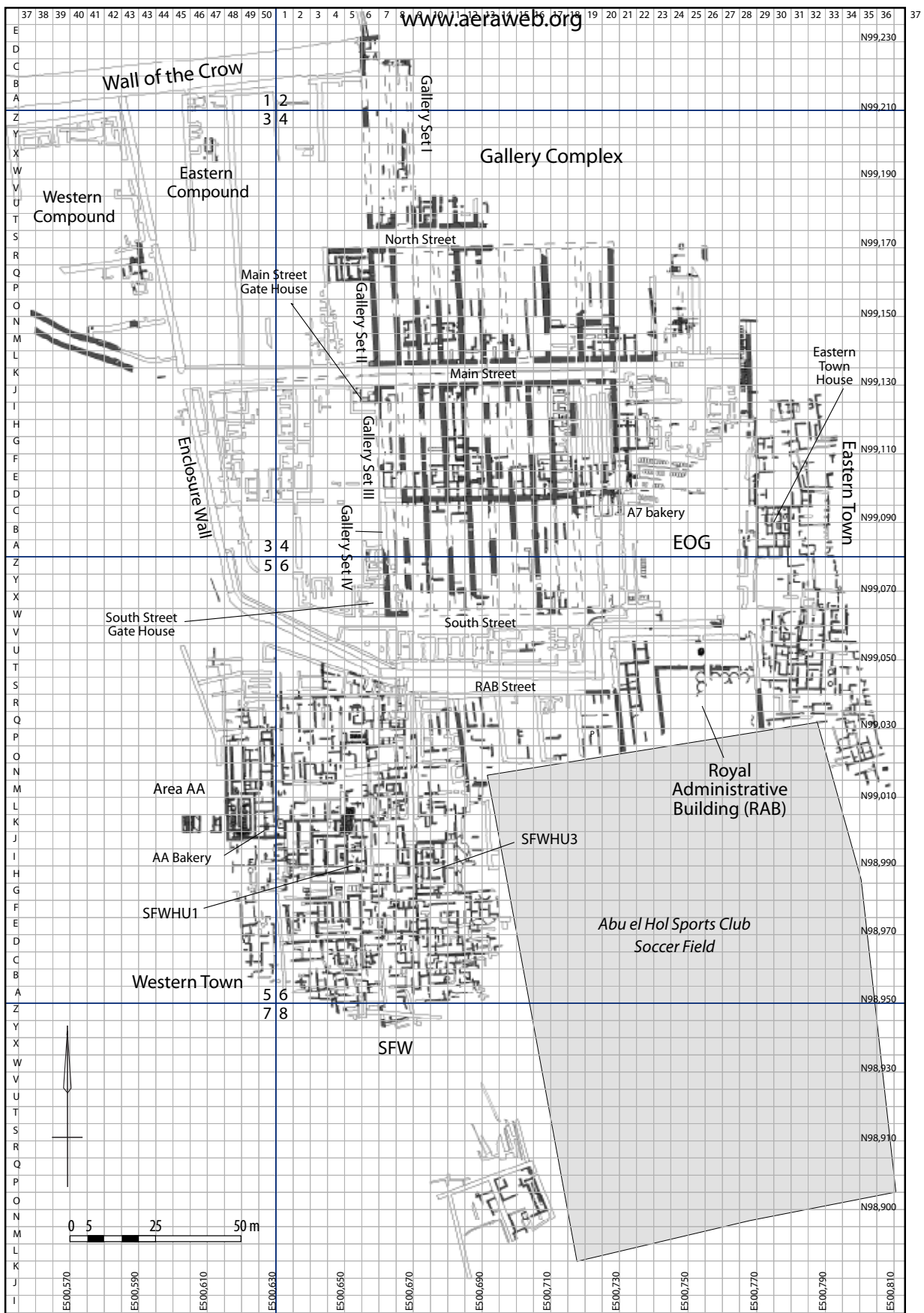


Figure 20.11 Excavation grid blocks on the HeG settlement site with corresponding GPMP coordinate values. Grid blocks are numbered 1–8 (used as a prefix in the square designations), subdivided into 5 x 5-m excavation squares with alphanumeric designations. Each grid block has 26 squares along the Y-axis (labeled A–Z) and 50 squares along the X-axis (numbered 1–50). Grid block numbers pre-fix alphanumeric square designations (i.e., 6.W19 is Square W19 in grid block 6). Map prepared by Wilma Wetterstrom.



Figure 20.12. Location of Square 6.W19 to the northwest of the Royal Administrative Building (RAB). A quirk of the GPMP excavation grid is that the northeastern peg designates the square, so for instance the peg with coordinates E500,725/N99,065 designates Square 6.W19.

haps the southern face. The grid runs nearly parallel to the northern part of the Khentkawes Town suggesting that this part of the site had already been exposed when the grid was laid out.

This local grid, with relatively small squares (10 × 10 m), might have been laid out prior to new excavations in the area. One possibility is that it was set out by Cairo University in 1980 for work in the Khentkawes area, or possibly by the Johns Hopkins-Wheaton College mission, working in 1972–74 near the southeast corner of the Khafre Valley Temple. However it seems more likely that the later mission would take their grid alignment from the GIII.VT rather than a monument so much farther to the southwest.

#### **Lehner 1979**

To record the Great Sphinx, from 1977 to 1979 Lehner and Ulrich Kapp established a grid marked on the floor of the sanctuary around the Sphinx. Later, as the project expanded to include the recording of the Sphinx Temple and the GIII.VT, Lehner and ARCE Sphinx Project Surveyor Attila Vas expanded this grid to include the Sphinx Temple and Khafre Valley Temple (GII.VT). The east-west axis of this grid was aligned on the axis of the Sphinx Temple and elevations were recorded from a local datum. In 1981 this datum was tied to the bench mark on the north side of the Great Pyramid (Bench Mark Summary 1936) so that values could be converted to elevations asl by adding 9.33 m (Lehner 1980, 1991: 80–84).

#### **GPMP Survey System**

The GPMP excavation grid is oriented to true north, taking

its origin from the calculated center of the Great Pyramid, (G1), which was defined as E500,000 and N100,000. The recorded latitude and longitude of this point are N 29° 58' 44.3830" and E 31° 07' 57.0194" (Helmert Spheroid of Reference). The main traverse stations were designated GP1 to GP11 (fig. 20.10), while auxiliary points were given area codes (Goodman 2007; Goodman and Lehner 2007).

The GPMP polygon consists of a series of markers set in prominent locations, with good intervisibility, surveyed to a high degree of accuracy (Goodman and Lehner 2007). As the AERA team carries out excavation and survey work in new areas, we survey new auxiliary points into the network. These are sufficiently accurate to record archaeological work, but were understandably not surveyed to the same degree of accuracy as the main polygon. Each season, if possible, we check the condition of the survey markers. Over the years some of the points have been damaged or removed altogether, so the network needs to be upgraded regularly.

With recent projects we have been able to add World Geodetic System (WGS) 84 values (Latitude, Longitude, and Ellipsoidal Height) as well as Universal Transverse Mercator (UTM) values (International Spheroid Helmert 1906; UTM 36 European Datum 1950) for some of the GPMP survey points (Kawae 2009a: 167–75).

The AERA team also records GPMP excavations using this coordinate system; for instance, in the excavations of Area c, Petrie's so-called "Workmens' Barracks" west of the second pyramid (Conard and Lehner 2001); in Area A (the HeG settlement); and the area of Khentkawes Town and the GIII.VT.

### **The Original GPMP Excavation Grid**

Long strings of numbers are difficult to remember and handle, so it is common practice in archaeology to label grids with short alphanumeric designations. It is much simpler to refer, for example, to Square 6.W19 rather than to use a long descriptive designation—“the narrowing at the east end of South Street” or its coordinates—E500,725 and N99,065. The GPMP grid therefore designates 5 × 5-m squares alphabetically south to north and numerically west to east.

However the HeG settlement is vast. Currently we have recorded structures over an expanse of 10 hectares, in an area more than 380 m north-south × 280 m east-west. An alphabetic designation only allows for 26 squares (A–Z, covering 130 m north-south), so the GPMP grid expands into blocks labeled with a numerical prefix. In Area A, to the south of the Wall of the Crow (woc), blocks are numbered 1–8 (fig. 20.11). Each block has 26 squares along the y-axis (labeled A–Z) and 50 squares along the x-axis (numbered 1–50). So, a square reference of 6.W19, for example, consists of the block number prefix (6) followed by a letter (w, the forty-seventh square to the north) and a number (19, the nineteenth square to the east) (fig. 20.11).

Our recording system for features, drawings, samples, burials, and objects includes both the grid designation as well as coordinate values. This is essential to be able to manipulate the data in GIS or for plotting spatial distribution patterns of specialists' data (such as burials, ceramics, and objects). Using both grid references and coordinate values also minimizes mistakes.

It is standard practice that the peg at the southwestern corner of a grid square designates that square (Bettes 1984: 17; Museum of London Archaeology Service 1994). This follows from the fact that grids originate at the southwest, with values increasing towards the east (x-axis) and the north (y-axis). It is a quirk of the GPMP system that the northeast grid peg labels that square. So, for example, peg E500,725/N99,065 designates Square 6.W19 (fig. 20.12). Although this is at times puzzling for Field School students and archaeologists new to the project, if made explicit and applied consistently, it is not a major drawback in recording.

### **Expansion of the GPMP Excavation Grid**

With the expansion of work into the Khentkawes area in 2005, we fell outside our excavation grid blocks, as Grid 1 ends to the northwest of the woc (GOP2: 11–16). The original HeG blocks 1–8 can be expanded to the east and south

but they run out to the north of the woc and to the west of the site. The original grid blocks needed to be expanded north and west without using negative values. We decided to duplicate the blocks from the grid origin in a clockwise direction, creating four quadrants: the southeast quadrant has the original grid blocks with prefix 1 onward (that is, Blocks 1–99), the southwest quadrant has blocks with prefix 101 (Blocks 101–199), the northwest quadrant has blocks with prefix 201 onwards (Blocks 201–299), and the northeast quadrant with prefix 301 (Blocks 301–399) (color plate 29).

The HeG settlement falls within the southeast quadrant, and the KKT area straddles the southwest and the northwest quadrants (Blocks 101 and 201). A grid square in Block 101 would be, for example, Square 101.X29, and in Block 201, Square 201.F34. Work under the modern bus parking lot or in the area of the GII.VT and the Sphinx would fall within the northeast quadrant (Block 300s).

Following the original excavation grid, each grid block has a number prefix such as 101, 102, 201, 202, and consists of fifty squares along the x-axis (1–50) and 26 squares along the y-axis (A–Z). Because the four quadrants expand outwards from a common grid origin, the grid blocks expand west to east in both the southeast and the northeast quadrants, and east to west in both the southwest and northwest quadrants.

Squares within the 100s grid block are numbered higher from east to west (so Block 102 is to the west of Block 101) and from north to south, mirroring the HeG blocks. Blocks 200s and 300s increase from south to north as mirror images of Blocks 1–99 and Blocks 101–99 (color plate 29).

### **Conclusion**

The establishment of a survey network lies at the origin of the GPMP and AERA's work at Giza. The first step in understanding monuments in their landscape context is the positioning of a survey control network and of archaeological grids. It is then possible to record landscape features and archaeological evidence in three dimensions. Archaeological surveying at Giza reflects a wider pattern of recording in Egypt, moving from an early interest in surveying monuments within their landscape (*Descriptions d'Egypte* 1829 and Lepsius 1849) to recording monuments floating in space with no contours or geographic references (Hasan 1943; Junker 1955; Reisner 1942), and then to a “revival” in recording and understanding monuments within their context (Lehner 1985a, 1985b).

## AERA 2009 Team List

### **PRESIDENT AND TREASURER**

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### **SENIOR STAFF**

John Nolan, *Chief Financial Officer, Associate Director, Egyptologist, Sealings Specialist*

Dr. Richard Redding, *Chief Research Officer, Archaeozoologist*

Mohsen Kamel, *Co-Field Director*

Ana Tavares, *Co-Field Director*

Dr. Mary Anne Murray, *Director of Archaeological Science, Archaeobotanist*

Erin Nell, *Business Manager*

Mari Rygh, *Archivist*

Brian Hunt, *Website Manager*

Farrah Brown, *GIS Manager*

Dr. Wilma Wetterstrom, *Science Editor*

### **ARCHAEOLOGISTS**

Ashraf Abd el-Aziz, *Area Supervisor*

Lisa Yeomans, *Area Supervisor*

Mike House, *Area Supervisor*

Daniel Jones, *Area Supervisor*

Yukinori Kawae, *Area Supervisor*

Freya Sadarangani, *Archaeologist, Post-Excavation Manager*

Kate Liska

Hanan Mahmoud

Amy McMahan

Kaisa Olchowska

Manami Yahata

Alexandra Jacobsen, *Trainee*

### **OSTEOARCHAEOLOGY TEAM**

Jessica Kaiser, *Team Leader*

Scott Haddow

Zeinab Hashesh

Afaf Wahba, *s.c.A*

Ahmed Gabr, *s.c.A*

Gillian Knox, *Volunteer*

### **PHOTOGRAPHY**

Jason Quinlan, *Photographer, Videographer*

### **GIS TEAM**

Farrah Brown La Pan, *Team Leader*

Camilla Mazzucato

Rebekah Miracle

### **GIZA IT TEAM**

Jack Tavares

Mohamed Said

### **ARCHAEOLOGICAL SCIENCE TEAM**

Dr. Mary Anne Murray, *Director of Archaeological Science*

#### **Archaeobotany**

Dr. Mary Anne Murray, *Team Leader*

Claire Malleson

#### **Archaeozoology**

Dr. Richard Redding, *Archaeozoologist*

#### **Ceramics**

Dr. Anna Wodzińska, *Team Leader*

Edyta Klimaszewska, *Ceramicist*

Aleksandra Ksiezak, *Ceramics Assistant*

Meredith Brand, *Ceramics Assistant*

Sherif Mohamed Abd el-Monaem, *Ceramics Assistant*

#### **Objects**

Ana Tavares, *Team Leader*

Emmy Malak, *Objects Registrar*

Ahmed Ezz, *Objects Team, s.c.A Inspector*

Sabine Harding, *Objects Volunteer*

#### **Pigment Analysis**

Dr. Laurel Flentye, *Pigment Specialist*

#### **Lithic Analysis**

Marina Milić, *Lithics Specialist*

#### **Geology**

Dr. Philip LaPorta, *Geologist*

#### **GIZA ARCHIVES TEAM**

Mari Rygh, *Archivist*

Manami Yahata, *Data Entry*

Soha Kamil, *Archives Assistant*

Kaya Fraser, *Volunteer*

Sam Walton, *Volunteer*

#### **CAIRO PROJECT MANAGER**

Amir Abdel Hamid

#### **2009 ADVANCED FIELD SCHOOL FACULTY**

Mohsen Kamel & Ana Tavares

*Co-Field School Directors*

#### **Survey**

Ana Tavares

Mohamed Abd el-Baset

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Teodozja Rzeuska

Janine Bourriau

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Mohamed Ali Abd el-Hakim

Sherif Mohamed Abd el-Monaem

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Rabea Eissa

James Taylor

Freya Sadarangani

Essam Shihab

#### **Osteoarchaeology**

Jessica Kaiser

Ahmed Gabr

Afaf Wahba

Scott Haddow

Zeinab Hashesh

#### **Archaeological Illustration**

William Schenck

Yasser Mahmoud Hossein

#### **BOSTON OFFICE**

Alexandra Witsell, *Assistant Editor, Sealings Assistant*

James Schnare, *Communications Associate*

Aparna Das, *Boston Office Archivist*



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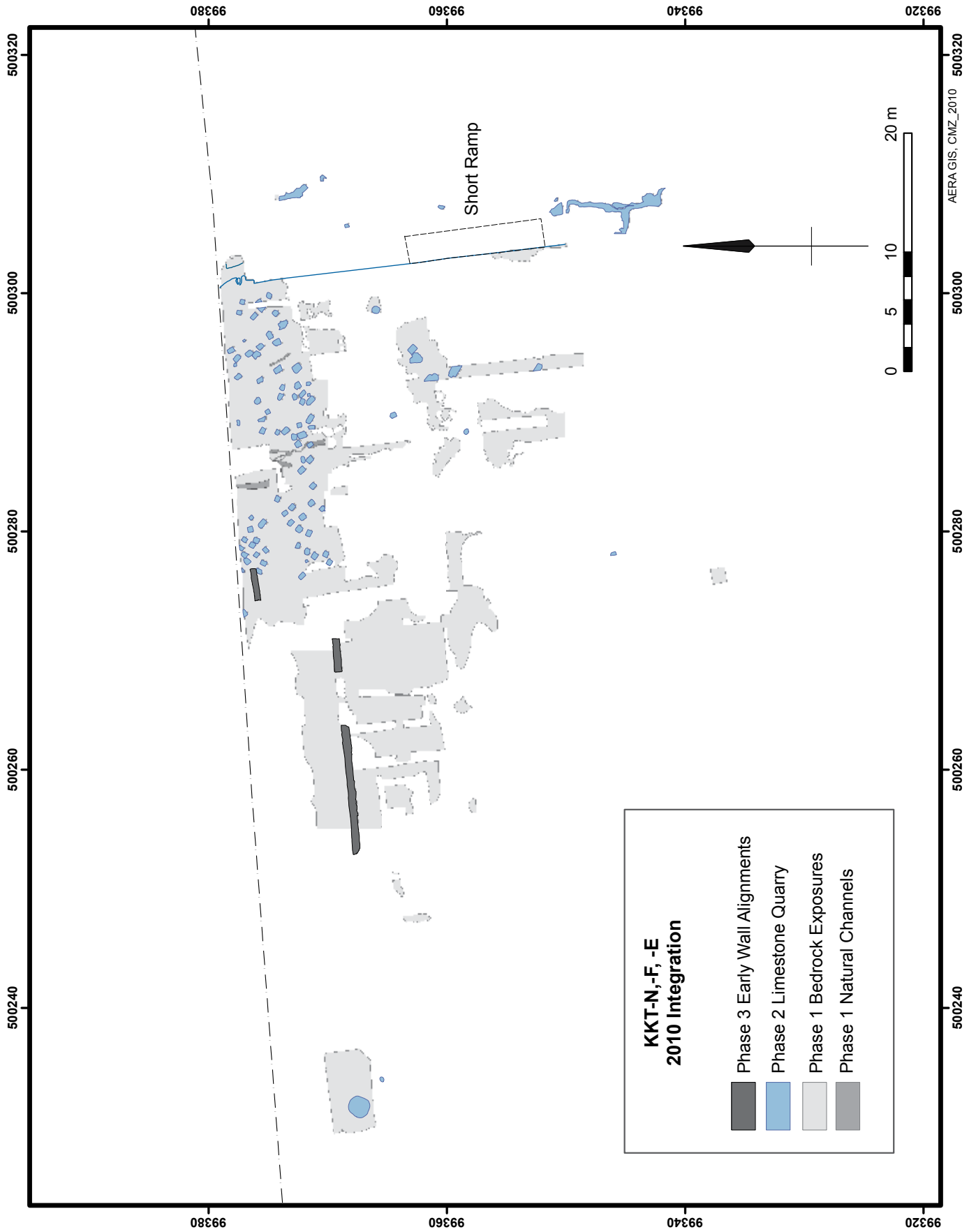
Workers Cemetery. *See* burials: Workers Cemetery



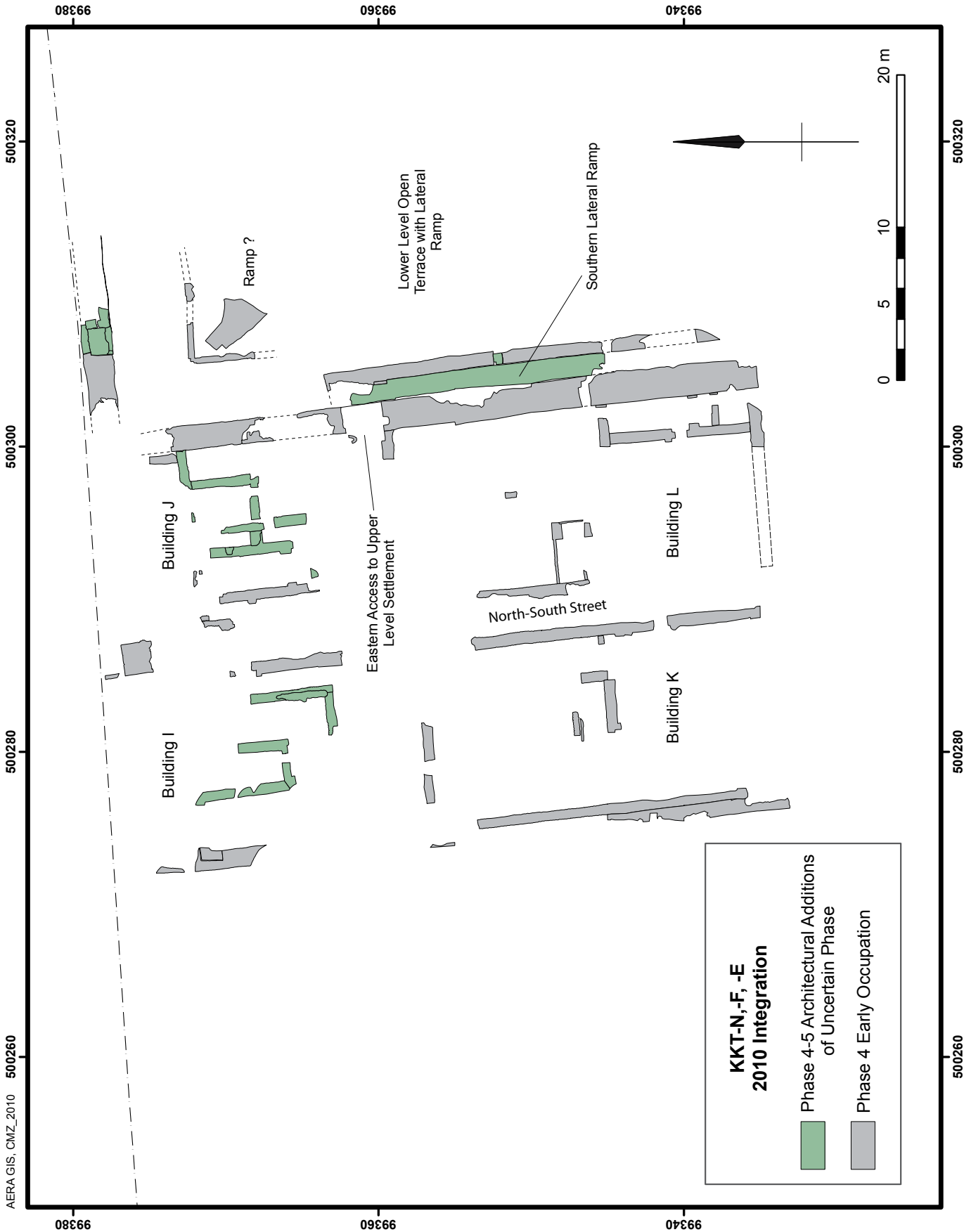
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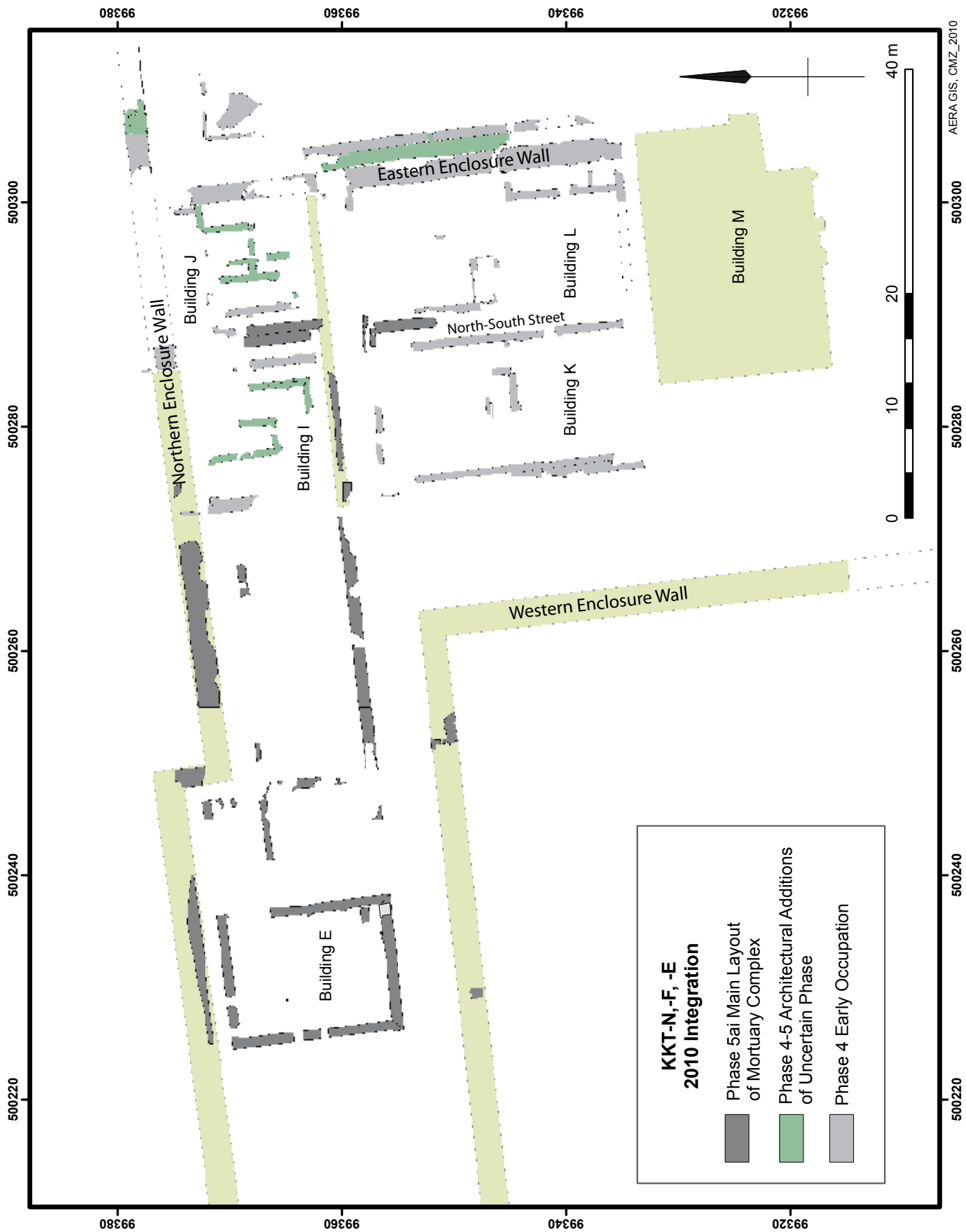
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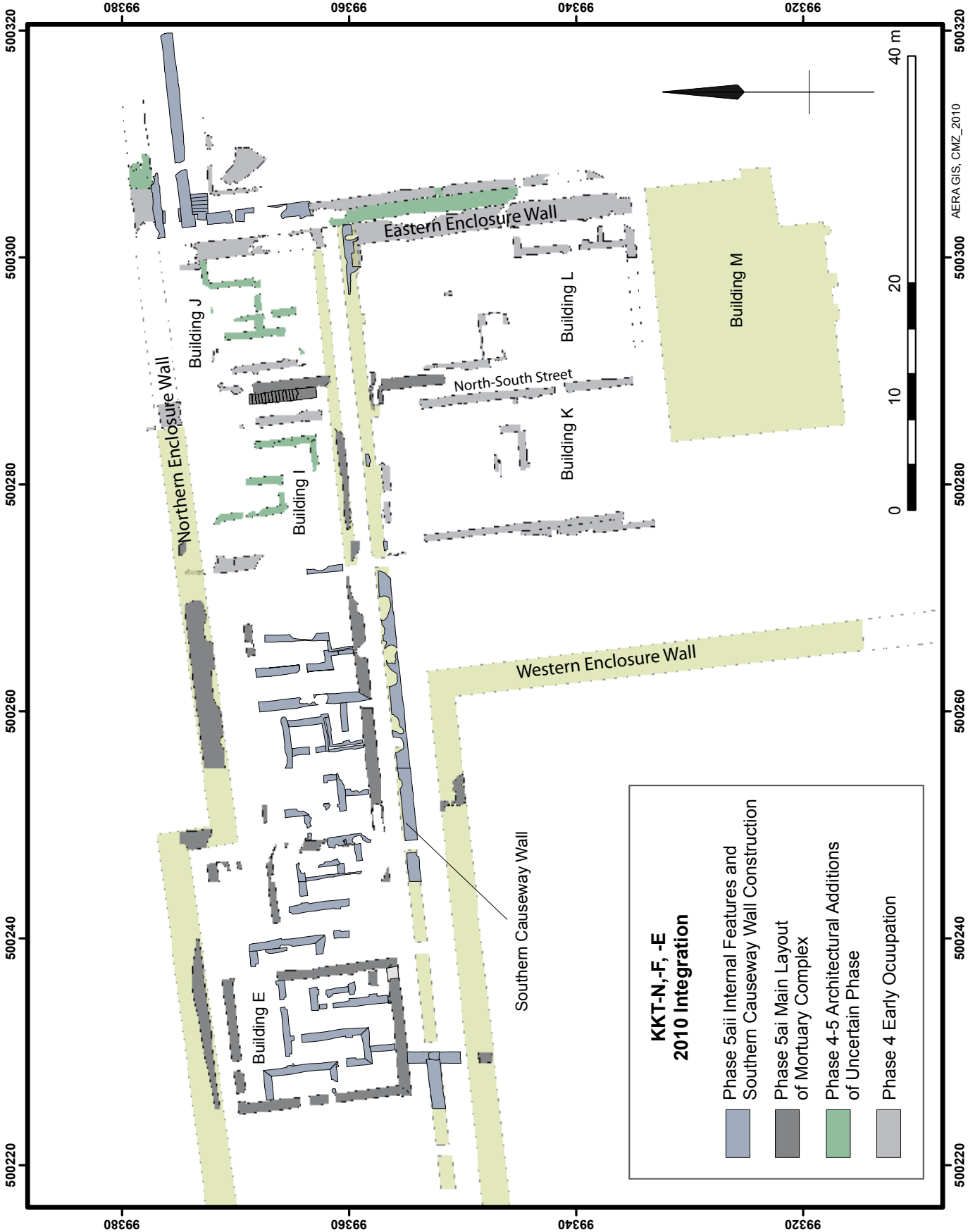
Color Plate 1. Khentkawes Town, Phases 1, 2, and 3. Map prepared by Camilla Mazzucato, AERA GIS.



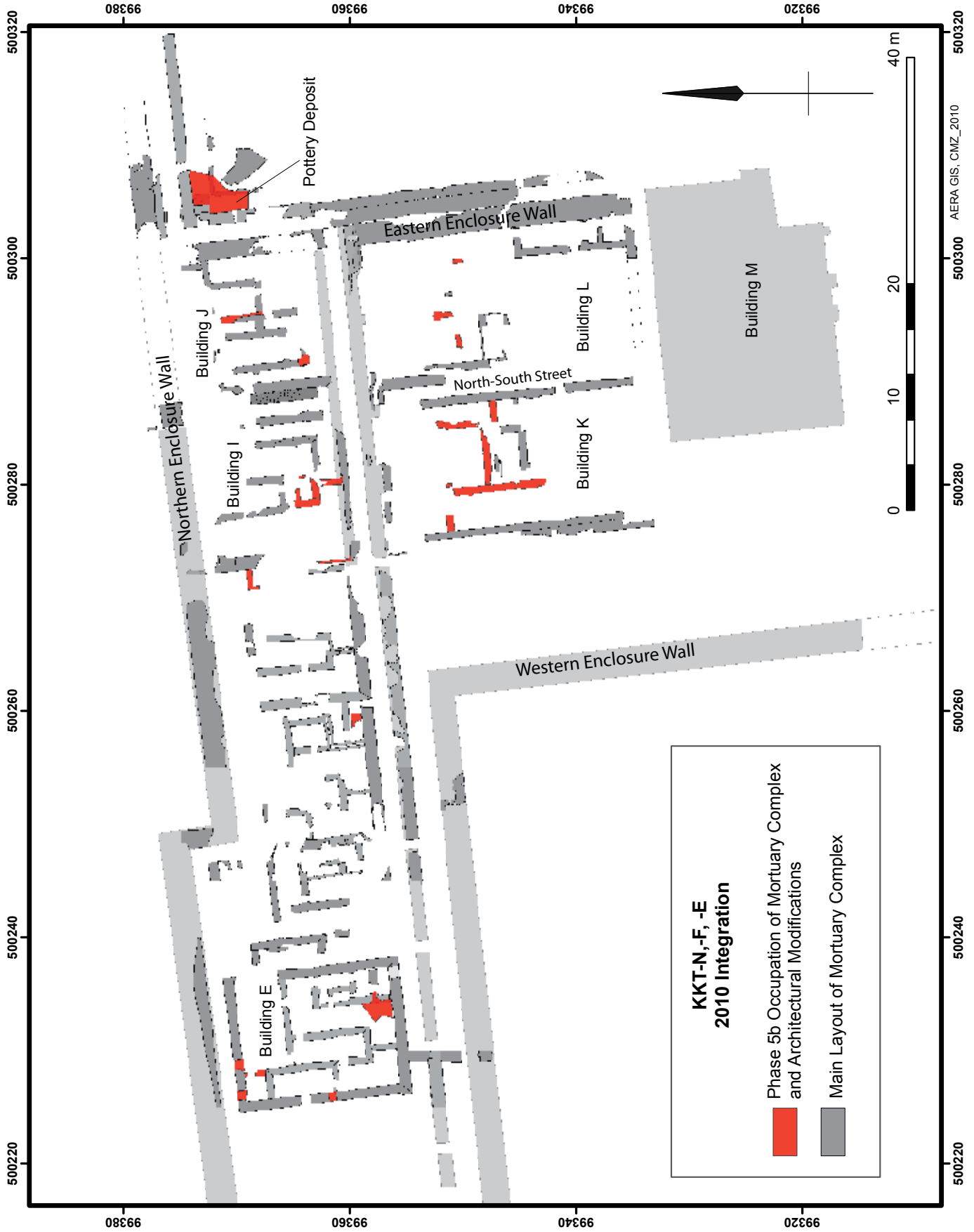
Color Plate 2. Khentkawes Town, Phases 4 and 5, with modifications of an uncertain phase. Map prepared by Camilla Mazzucato, AERA GIS.



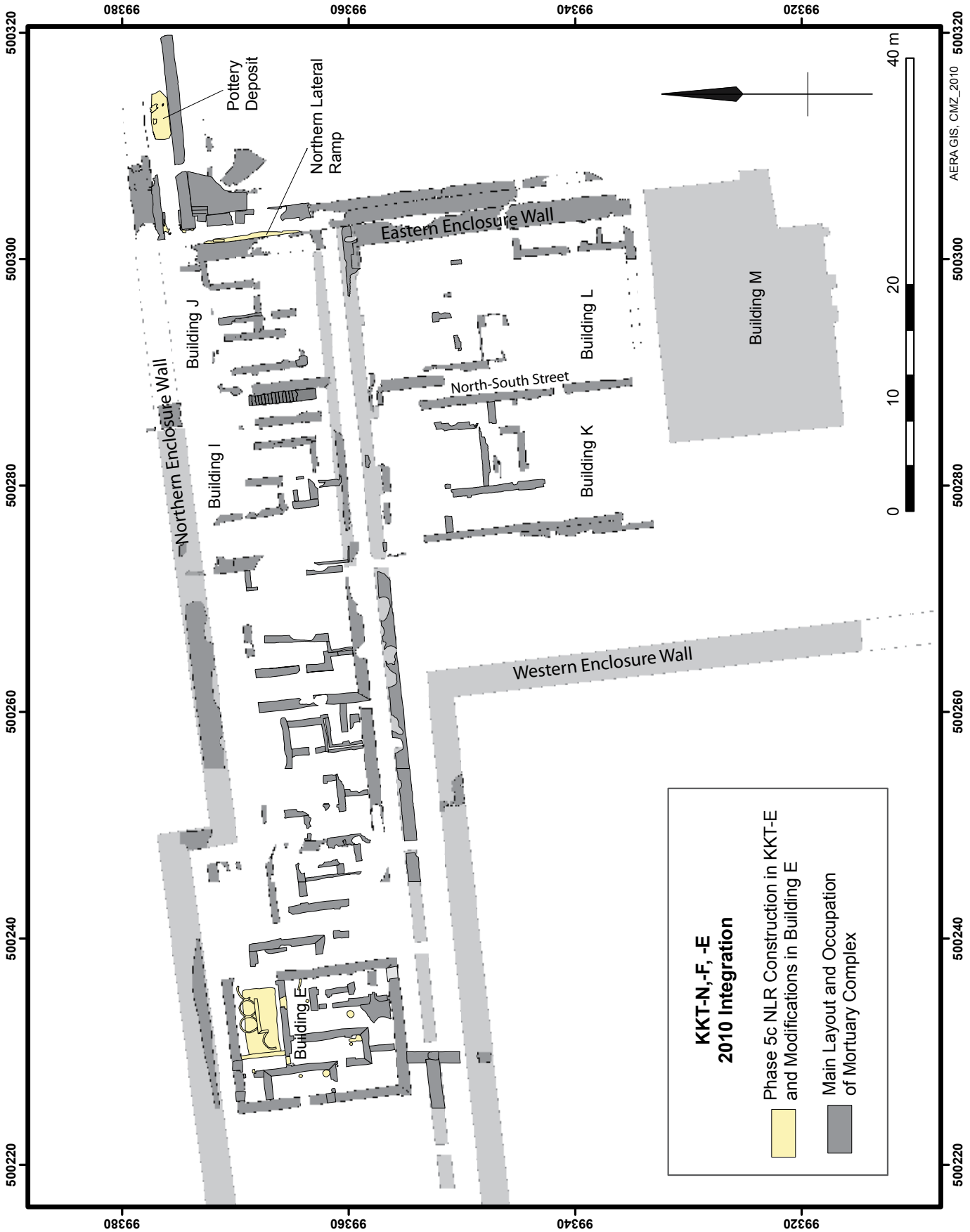
Color Plate 3. Khentkawes Town, Phase 5ai. Map prepared by Camilla Mazzucato, AERA GIS.



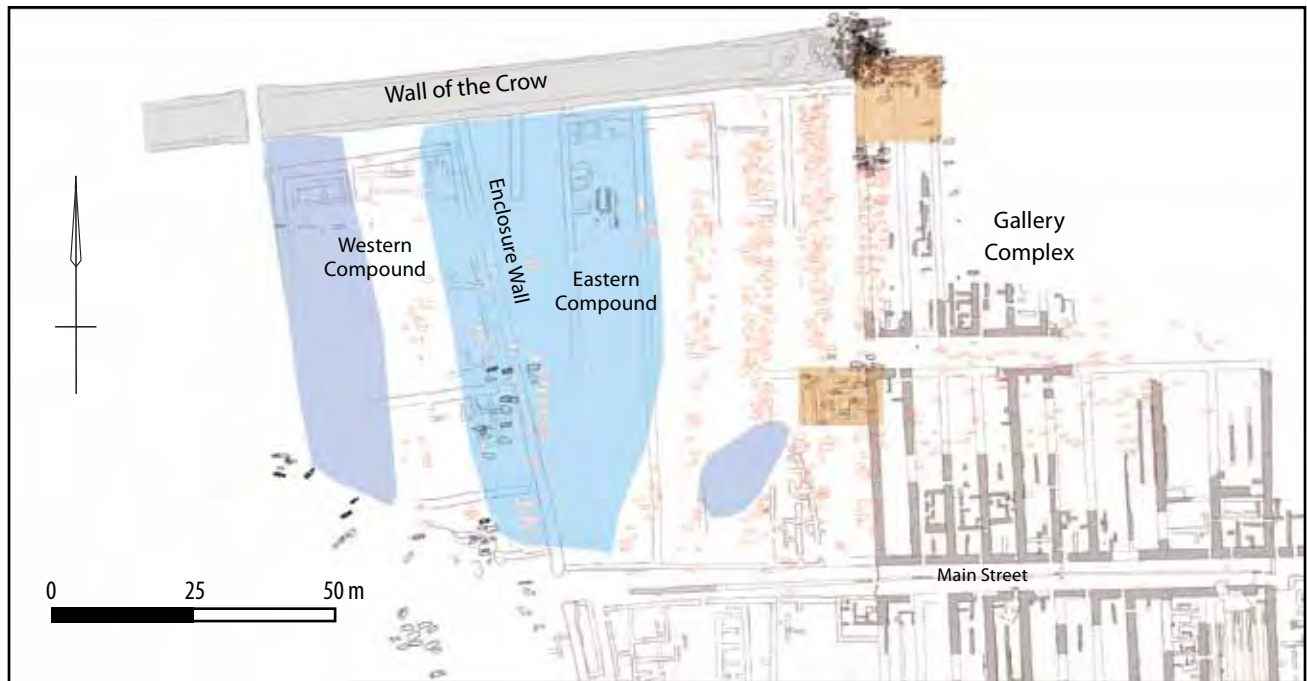
Color Plate 4. Khentkawes Town, Phase 5a.ii. Map prepared by Camilla Mazzucato, AERA GIS.



Color Plate 5. Khentkawes Town, Phase 5b. Map prepared by Camilla Mazzucato, AERA GIS.



Color Plate 6. Khentkawes Town, Phase 5c. Map prepared by Camilla Mazzucato, AERA GIS.

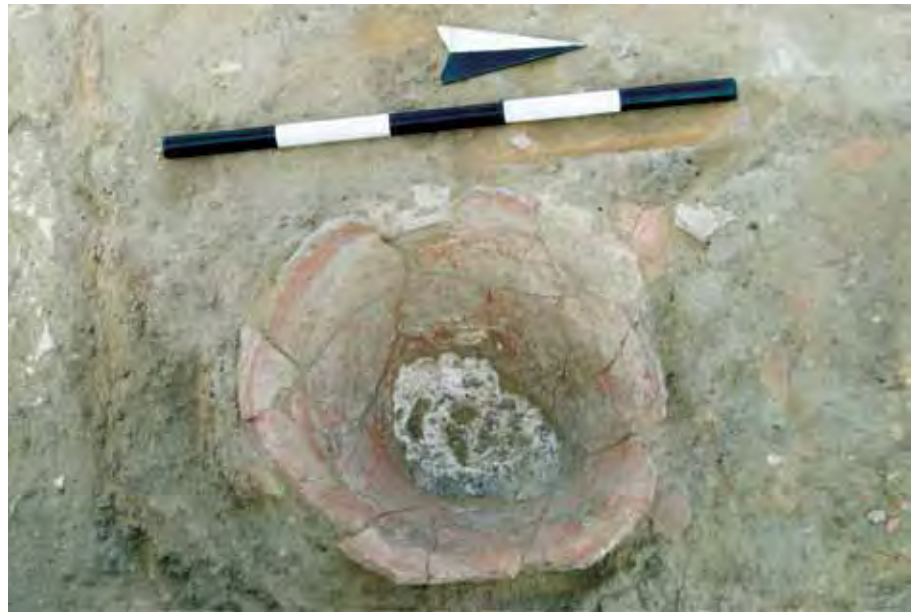


Color Plate 7a. Burials mapped in every other grid range in the northwestern part of the HeG site during 2005. The burials shown in black have been excavated. Those in red have been recorded via survey, but not yet mapped. Purple denotes areas covered by overburden or dump-piles. Blue denotes the area partly covered in aeolian sand. Orange denotes previously excavated areas (from Kaiser and Westlin 2005: 38, fig. 20).

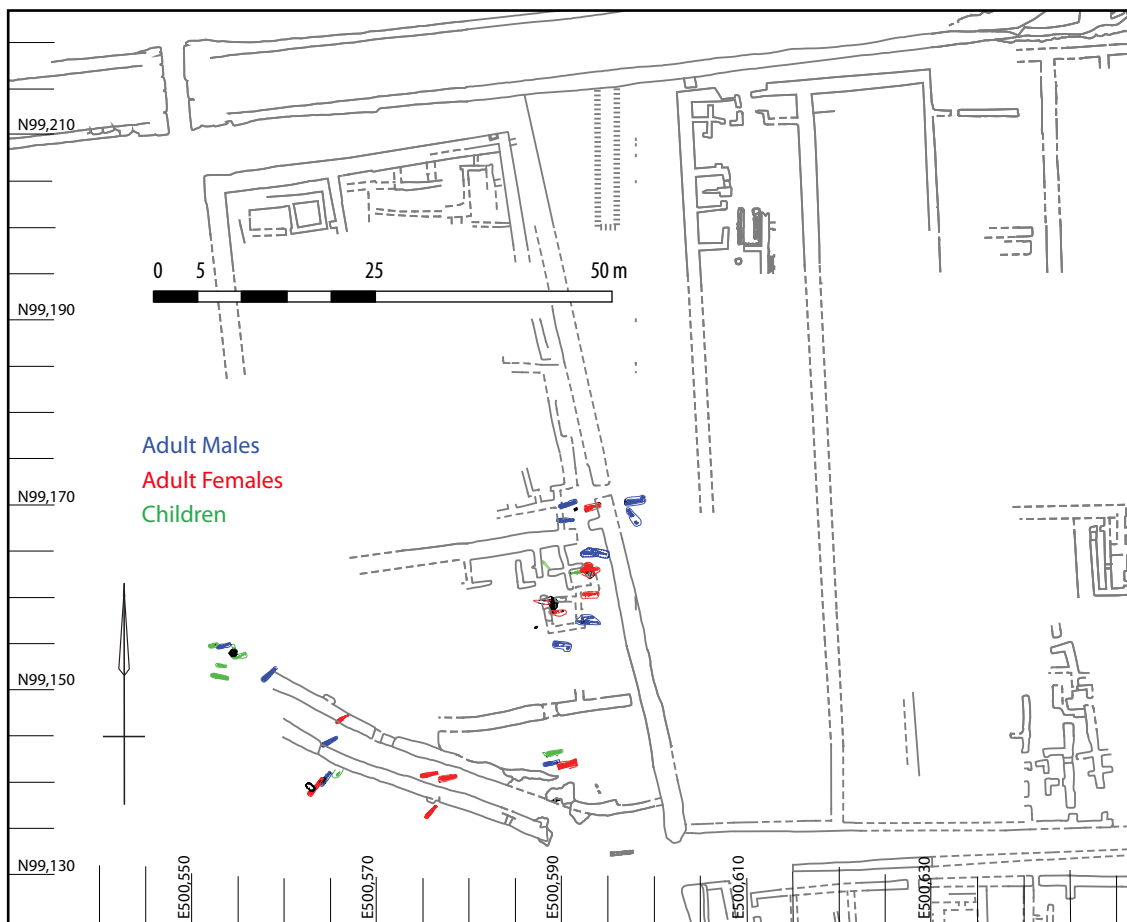


Color Plate 7b. House Unit 1, Space 11,061, Phase 3. An *in situ* jar [31,198] functioning with the hearth and ash-rich surface covering the floor. The shallow circular pit may have held a pottery vat for mixing. View to the west. Photo by Hussein Rekaby Hamid.





Color Plate 8a. House Unit 1, Space 11,065, Phase 3. *In situ* vessel [31,224] with the possible lime fill. West Facing. Photo by Hussein Rekaby Hamid.



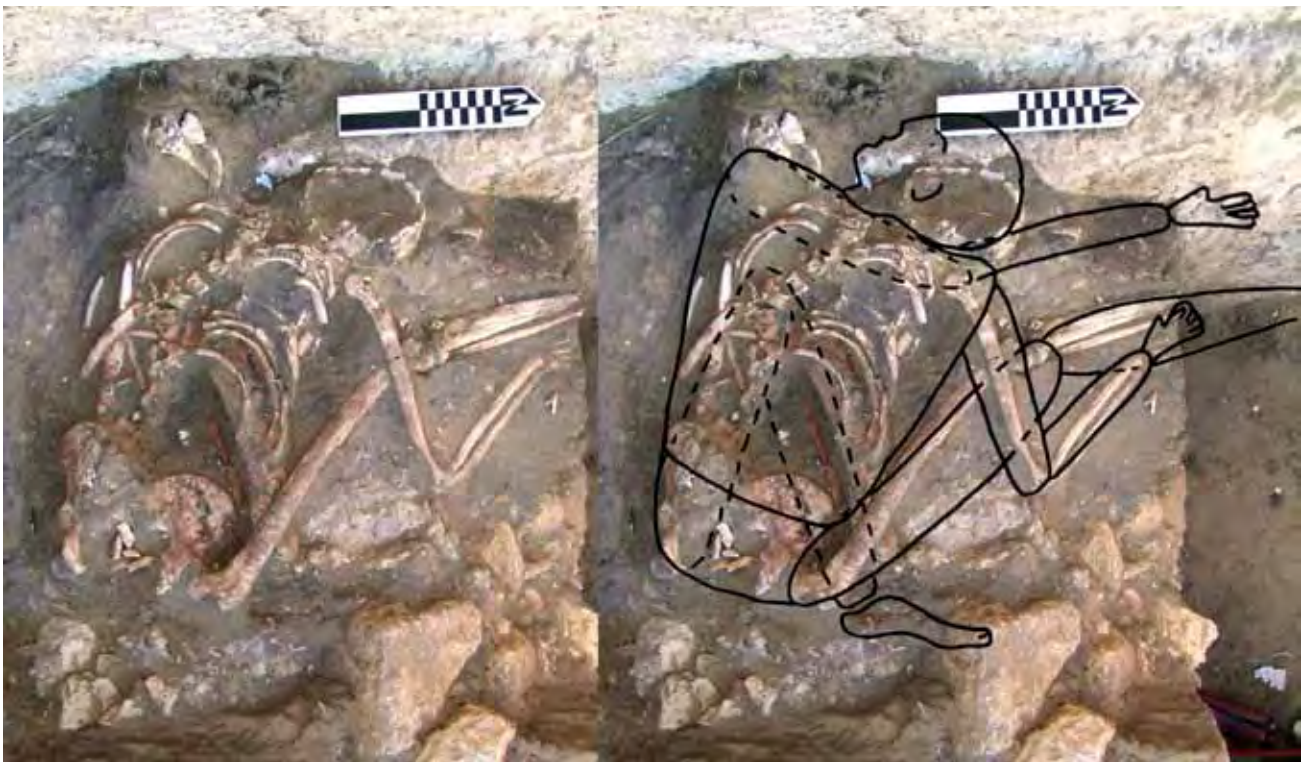
Color Plate 8b. Age and sex distribution of the 2009 sample. Digitized drawing adapted by Jessica Kaiser.



Color Plate 9. Right mastoid process of the individual in Burial 471 showing evidence of infection. The most likely cause for the lesion is Otitis media, or a middle-ear infection, with resulting mastoiditis. Mastoiditis is hard to treat even today, and complications without antibiotics can be severe. Thus, it is possible that this infection caused the woman's death. Photo by Jessica Kaiser.

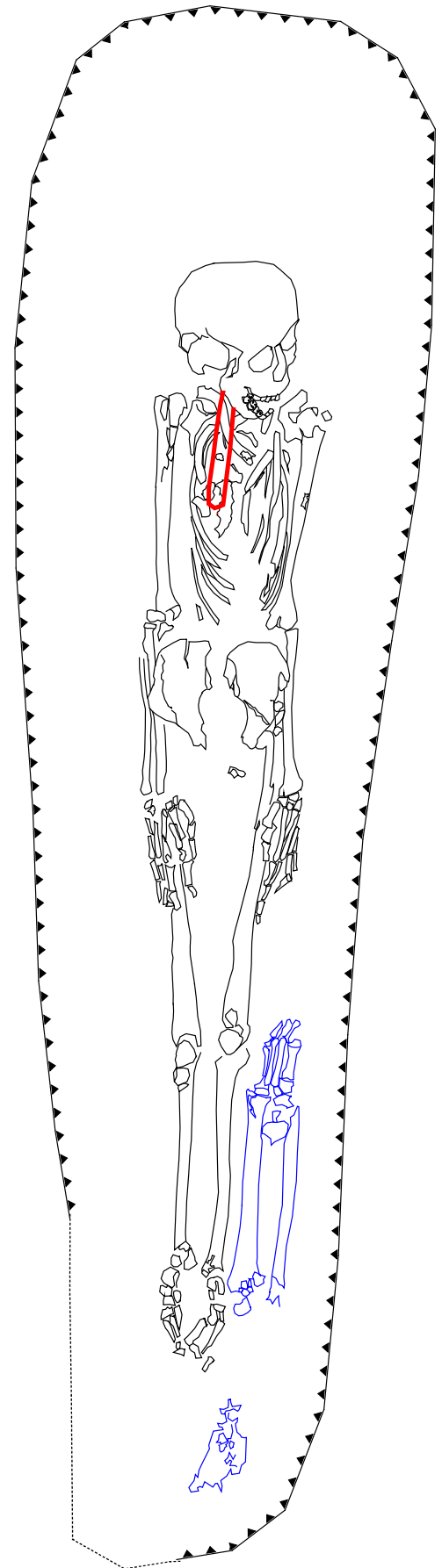


Color Plate 10a. Burial 461 located at the eastern end of the Khentkawes causeway. The woman, between 25 to 35 years of age, suffered from a severe case of active suppurative osteomyelitis of the left tibia, an inflammation that involves both the bone and the marrow cavity. The inset show the severely enlarged bone. Photo by Ahmed Gabr.

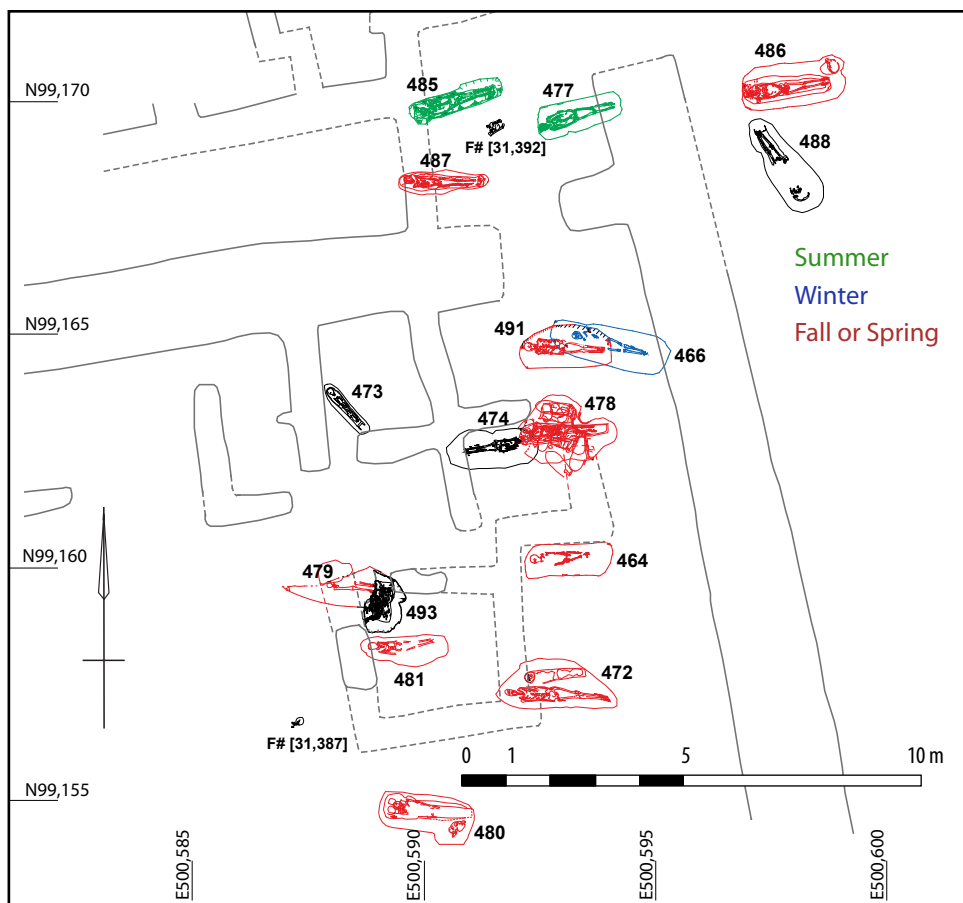


Color Plate 10b. Burial 461 with a reconstruction of the original burial position superimposed (right). The woman's body in Burial 461 was lying on a sloped surface, without a burial pit, in a very awkward position. Tightly gripped in her right hand was a piece of limestone. It appears she fell, maybe clutching at a nearby limestone surface to stop the fall, died, and was subsequently covered in deposits without being found. Photos and drawing by Ahmed Gabr.

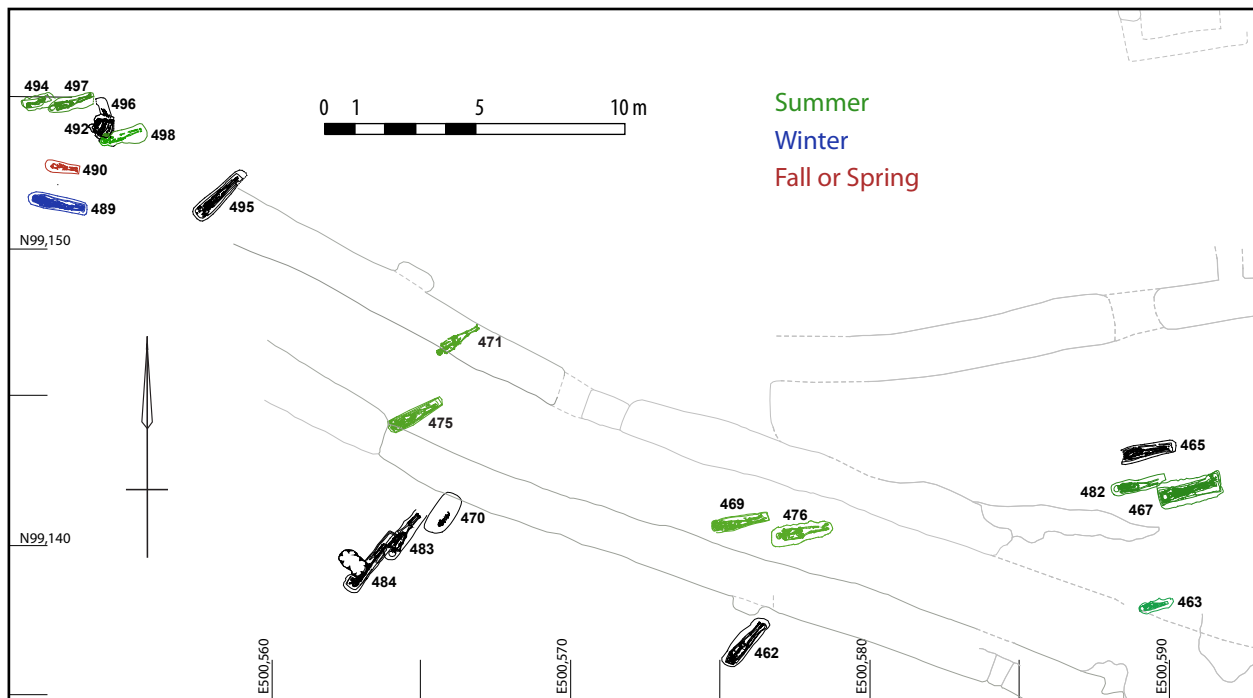




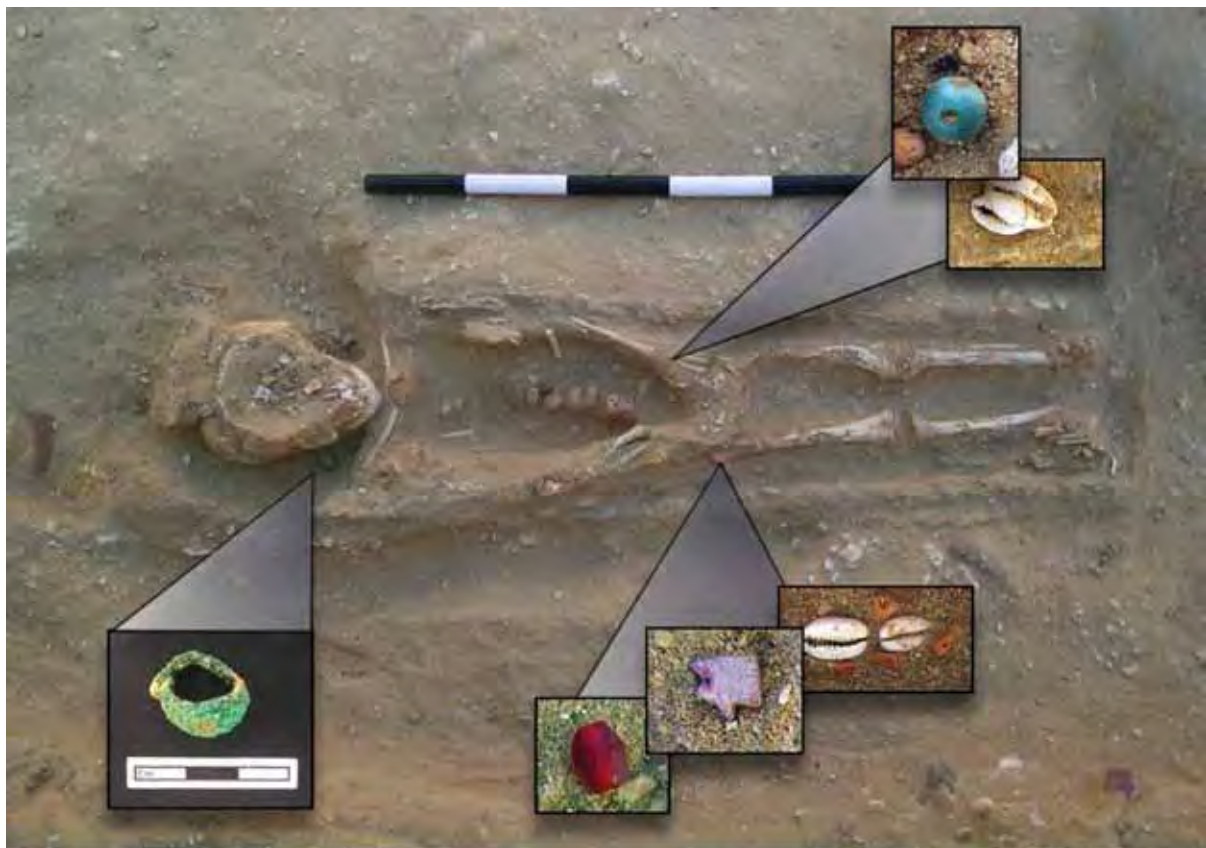
Color Plate 11. Burial 495, a coffin burial of a male 25–35 years old. The body showed signs of extensive post-mortem manipulation. An extra set of articulated legs and feet were placed at the foot end of the coffin, and the left tibia of another person was inserted where the vertebral column should have been. In addition, the individual lacked a sacrum. Most likely the body had decomposed significantly before burial, enabling the sacrum and spine to detach. Digitized drawing by Zeinab Hashesh.



Color Plate 12a. Seasonal variation in the Western Compound. Digitized drawing adapted by Jessica Kaiser.



Color Plate 12b. Seasonal orientation of the Chute. Digitized drawing adapted by Jessica Kaiser.



Color Plate 13a. Burial 490: A three-to-five-year-old child with a single metal earring; cowrie-shell bracelets on both wrists; a blue bead, most likely lapis lazuli, on the left arm; and a red bead, possibly carnelian or glass, and a small *Wdꜣt* eye, probably made of red jasper, on the right arm.



Color Plate 13b. Burial 494: a child, about one year old, with a stylized *Wdꜣt* eye amulet, a small lapis bead under the chin, and a large number of cowrie-shells. The concentration of cowries around the cranium may have originally fastened to a headdress or cap. Photos by Alexandra Jacobsen and Jessica Kaiser.

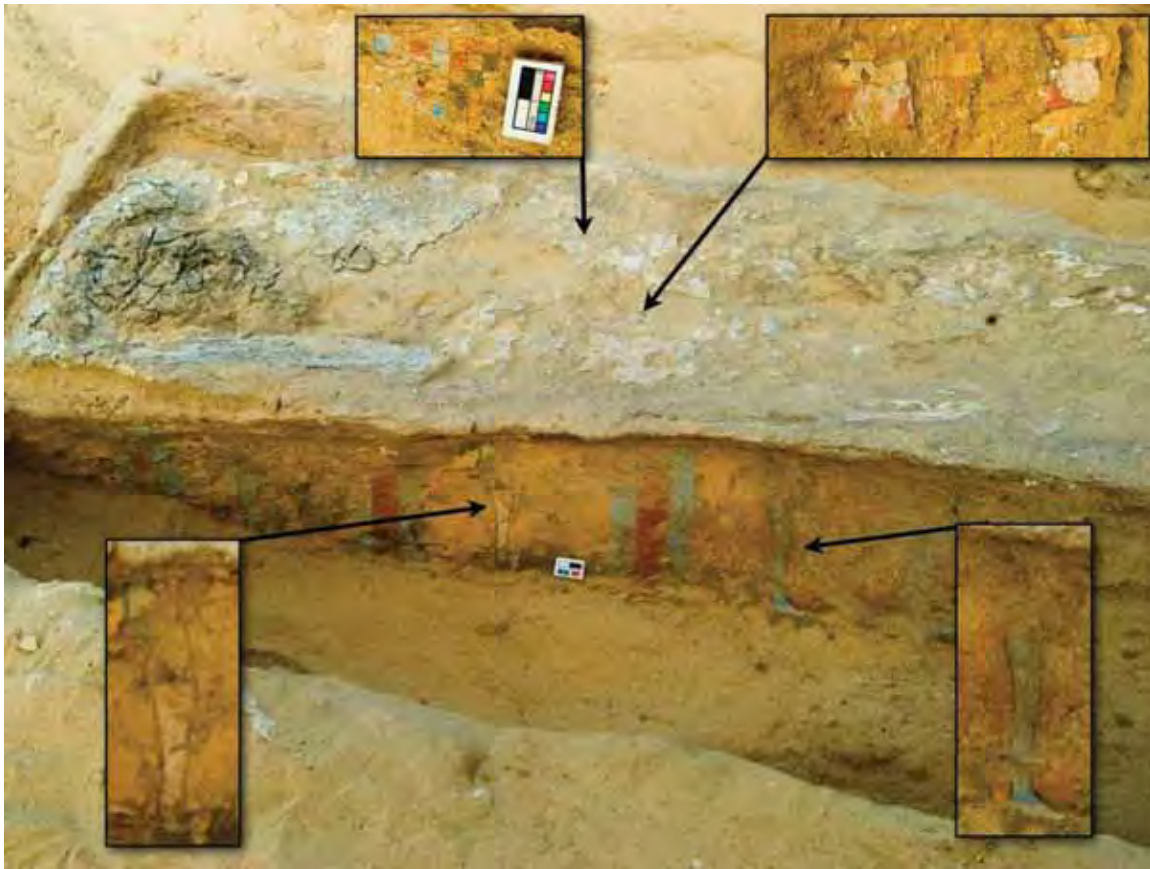




Color Plate 14a. Mask and wig of Burial 487. Like this coffin, all of the 2009 coffins had masks with molded facial features painted in red, white, or yellow, with the eyes and eyebrows outlined in black. Photo by Jason Quinlan.

Color Plate 14b. Burial 476, with traces of a painted feathered headdress and checkerboard pattern at the end of the wig lappets. Photo by Jessica Kaiser.





Color Plate 15a. The double coffin in Burial 467. Double coffins were not unusual, but this one stands out because the outer coffin was rectangular rather than anthropoid, and it was fairly expertly decorated. Photos by Scott Haddow.



Color Plate 15b. Outer coffin of Hor, priest of Montu. From Thebes, 25th Dynasty. The box-coffin in Burial 467 was probably a "cheaper" version of the box-coffin with vaulted lid, which became very popular in the 25th and 26th Dynasties. Photo © The Trustees of the British Museum.





Color Plate 16a. Burial 472, with drawing of the child-size coffin interred within an adult male inhumation superimposed. Did whoever buried this individual forgo a coffin for the adult male in favor of a reminder of a lost child, or could he or she simply not afford a larger coffin? Photo by Jessica Kaiser.



Color Plate 16b. Burial 493, an Old Kingdom burial with matting (left) and with the upper layer of matting removed (right). Photo by Ahmed Gabr.



Color Plate 17a. Old Kingdom reed coffin from Tarkhan. Petrie found the burial at Tarkhan in 1913, in association with Mastaba 2050. The mastaba itself dates to the 1st Dynasty, but this burial may be somewhat later since it was intrusive. Photo © The Trustees of the British Museum.



Color Plate 17b. Detail of lumbar vertebra 1, Old Kingdom Burial 493, showing evidence of Schmorl's nodes, a condition most commonly attributed to acute spinal trauma. Photo by Jessica Kaiser.





Color Plate 18a. Burial 486, a coffin burial with a single large storage jar, dated to the 25th–26th Dynasty. The bottom of the jar was filled with a dark, fatty sand, suggesting that it had in the past held some sort of organic content. Photo by Ayman Damarany.



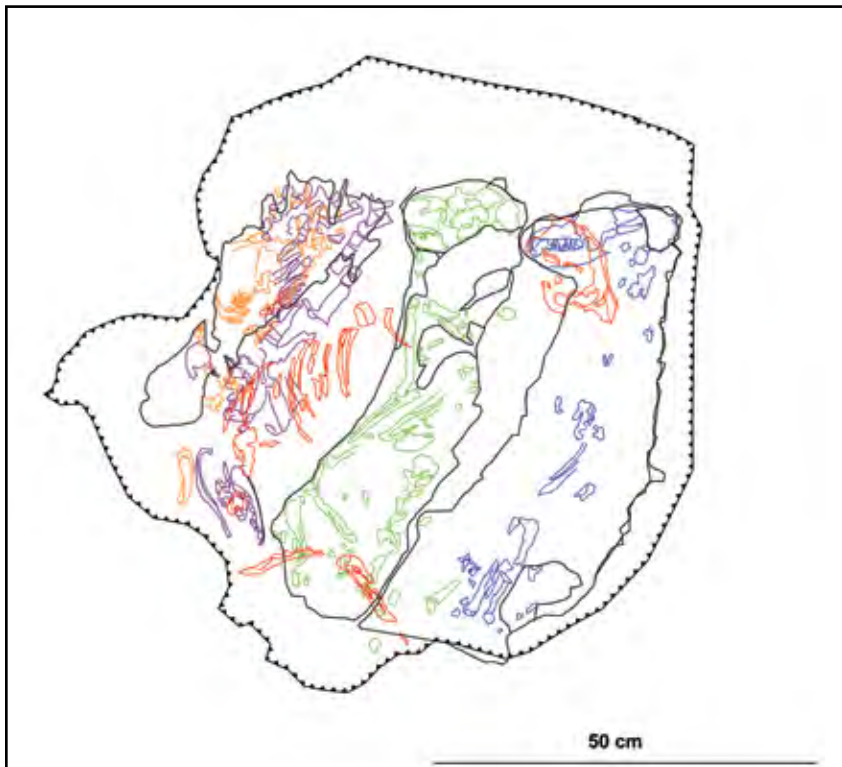
Color Plate 18b. The pottery in Burial 478, with a drawing of the coffin and skeleton superimposed. The coffin was placed on top of a row of six large storage jars, oriented perpendicular to the body. Three additional jars and a large dish were placed to the north and south of the coffin. Photo by Jessica Kaiser, and digitized drawing by Maha Abd el-Tawab Hassan Sayah.



Color Plate 19. The early Roman amphora in the fill of Burial 464. Photo by Ahmed Gabr.



Color Plate 20a. Overview of Burial 492 at beginning of excavation. Photo by Ayman Damarany.



Color Plate 20b. Color-coded drawing of Burial 492 by Ahmed Gabr and Ayman Damarany. Dog 1 shown in blue, Dog 2 in green, Dog 3 in purple, Dog 4 in red, and Dogs 5–8 in orange.

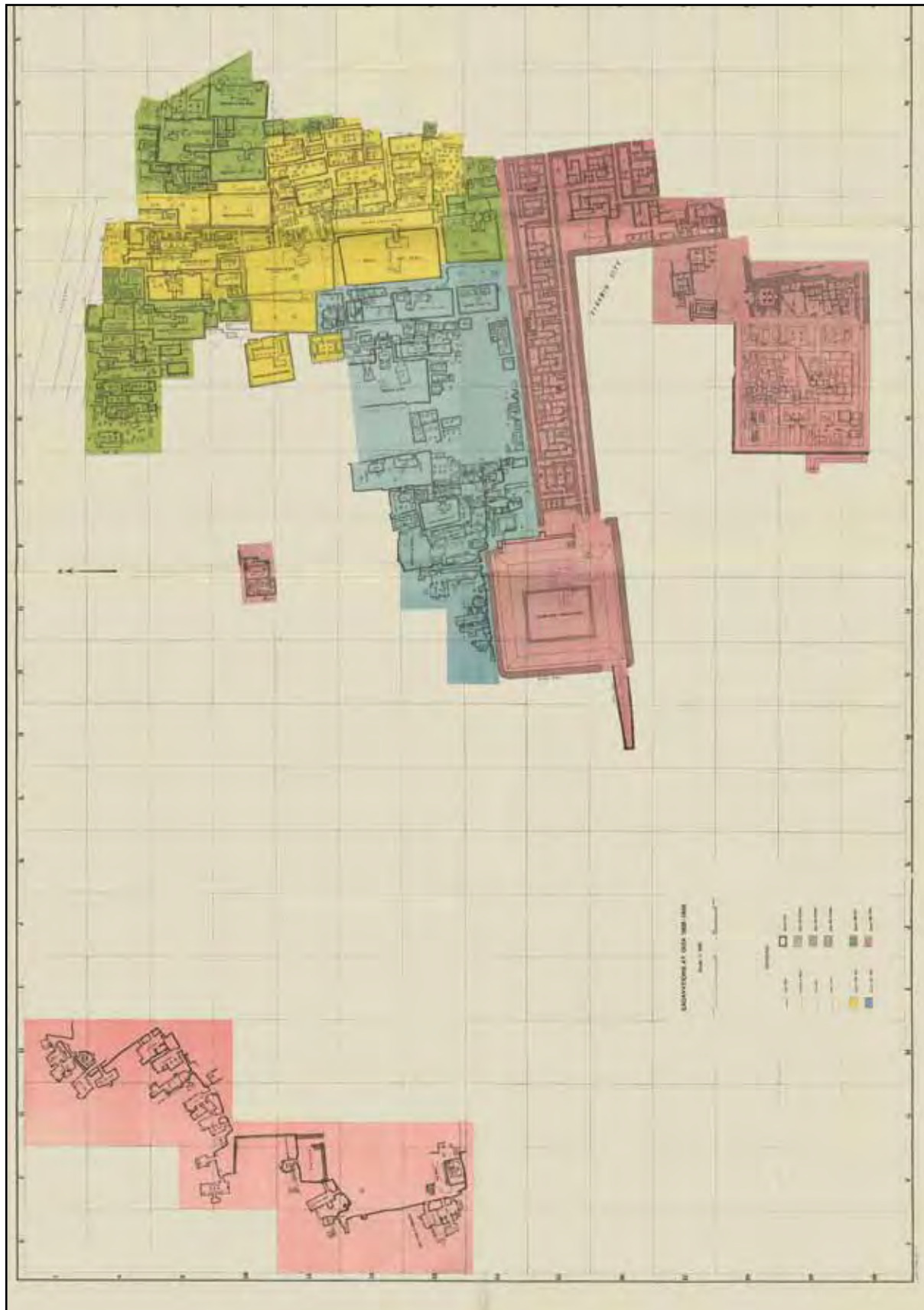




Color Plate 21a. Macro photo showing maggots/pupae in the stomach cavity of Dog 1. Photo by Ayman Damarany.

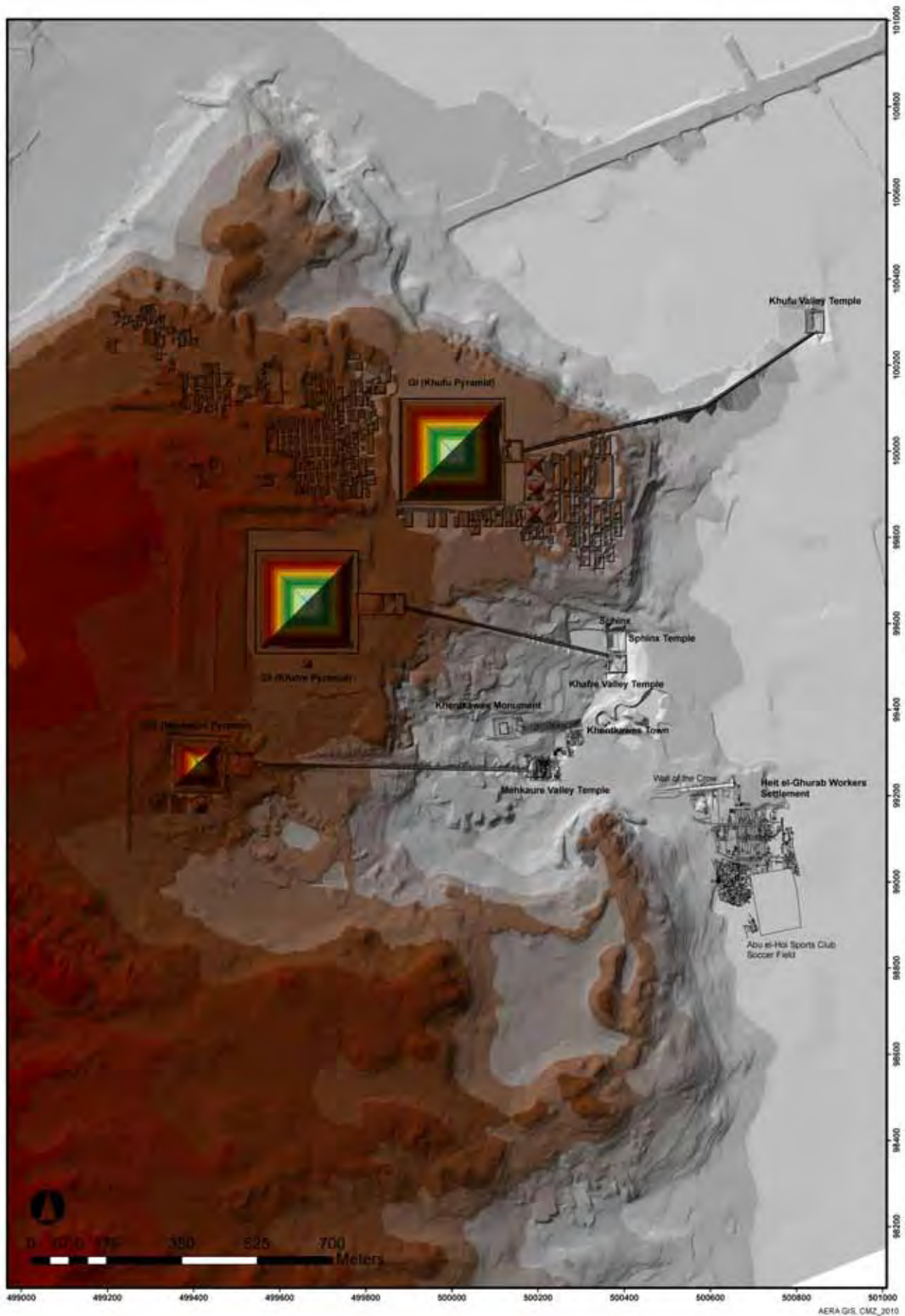


Color Plate 21b. Overview of Dog 3, showing the gray substance covering the bones. Photo by Ayman Damarany.



Color Plate 22. Overall map of Selim Hassan's excavations during 1932-33 (Hassan 1943). This map is at scale 1:600, with no geographic or Survey of Egypt (SoE) coordinate values, and no altimetry (elevations). A grid of 25m squares is shown. Square designations are alphabetic along X-axis and numeric along Y-axis. Square references are not given in the text. The survey was probably carried out after the excavations in order to assemble the various structures for publication. The grid was laid out professionally; it is aligned to true north. The map is dated to 1942 and may have been surveyed by a SoE surveyor. The signature (bottom left) reads "S. of F. 1942 (42/160)". This map is an assemblage of detailed excavation plans drawn at a smaller scale (possibly soon after the work), such as Hassan 1943, fig. 1, hence its usefulness.





Color Plate 23. The Giza Plateau contour surface, created from the MHR 1978, 1:5,000 maps sheets F17-18, with GPMP coordinate values. The Valley Complexes of Khufu, Khafre, Khentkawes, and Menkaure, as well as the Heit el-Ghurab settlement are shown. Map extracted from the AERA GIS (Brown 2006) which assembles and integrates maps, survey information, excavation data, and specialist databases.



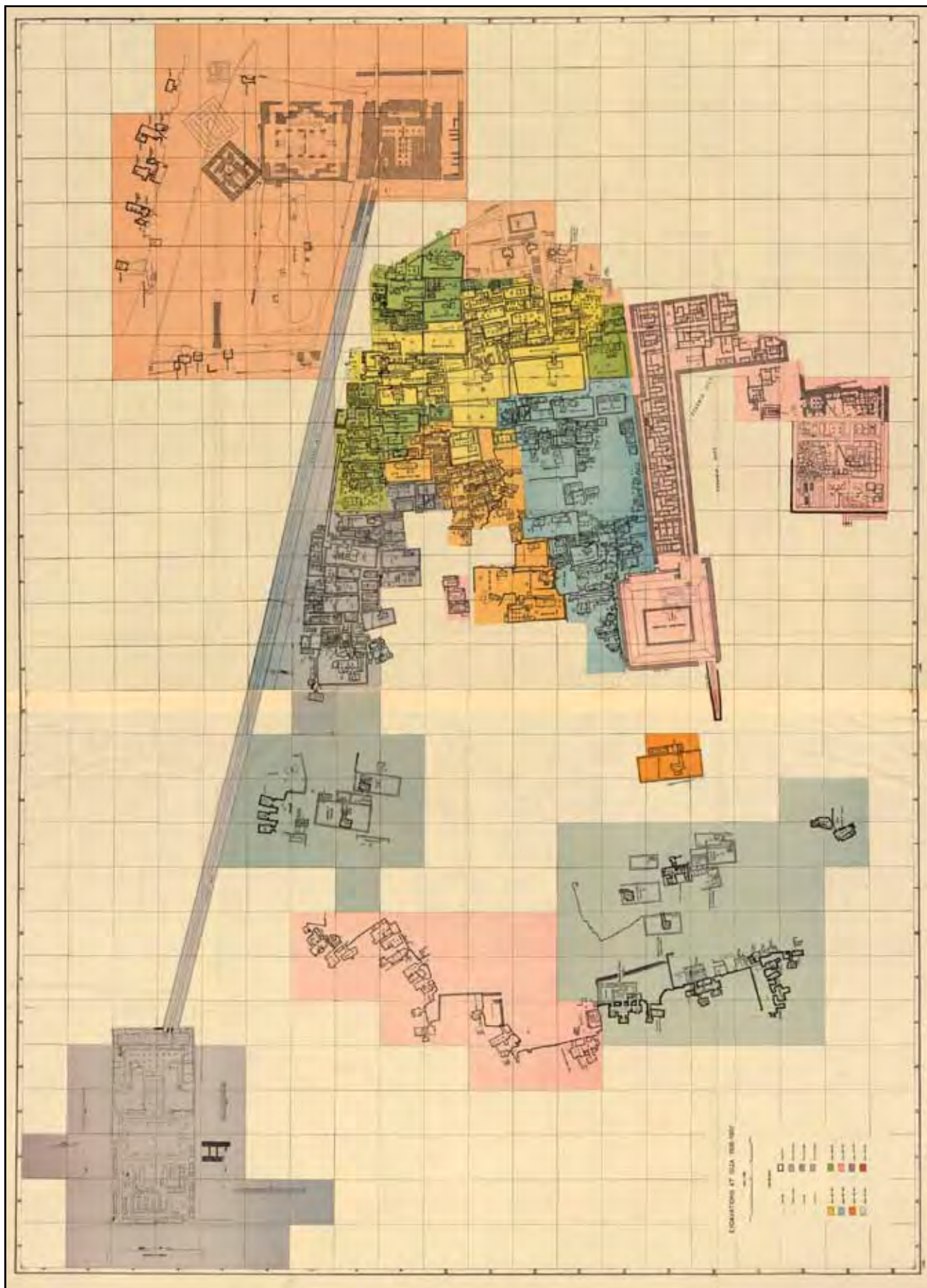


Color Plate 24. Overall map of the Giza Plateau and its monuments prepared by J. Perring in 1837 and published in Vyse 1940. The map is oriented and labeled facing east, with north to the left, as if viewing the plateau from the pyramids towards the cultivation. Relief is shaded and a variety of features labeled. These include “basalt pavement” to the south of Khufu’s causeway across the escarpment edge; “pits” on the Gebel el-Qibli and southern Giza; the funerary monument of Khentkawes labeled “pyramidal structure,” and a linear structure to the south of the access wadi labeled “foundation.” The Wall of the Crow is shown and labeled “south causeway & bridge.” To the north of the Gebel el-Qibli knoll, palm trees, sycamores, and a well are indicated. Magnetic variation readings are given for both April and June 1837 (Variation April 20, 10 21’ [W], June 1, 8 36’ [W]) and true north indicated.

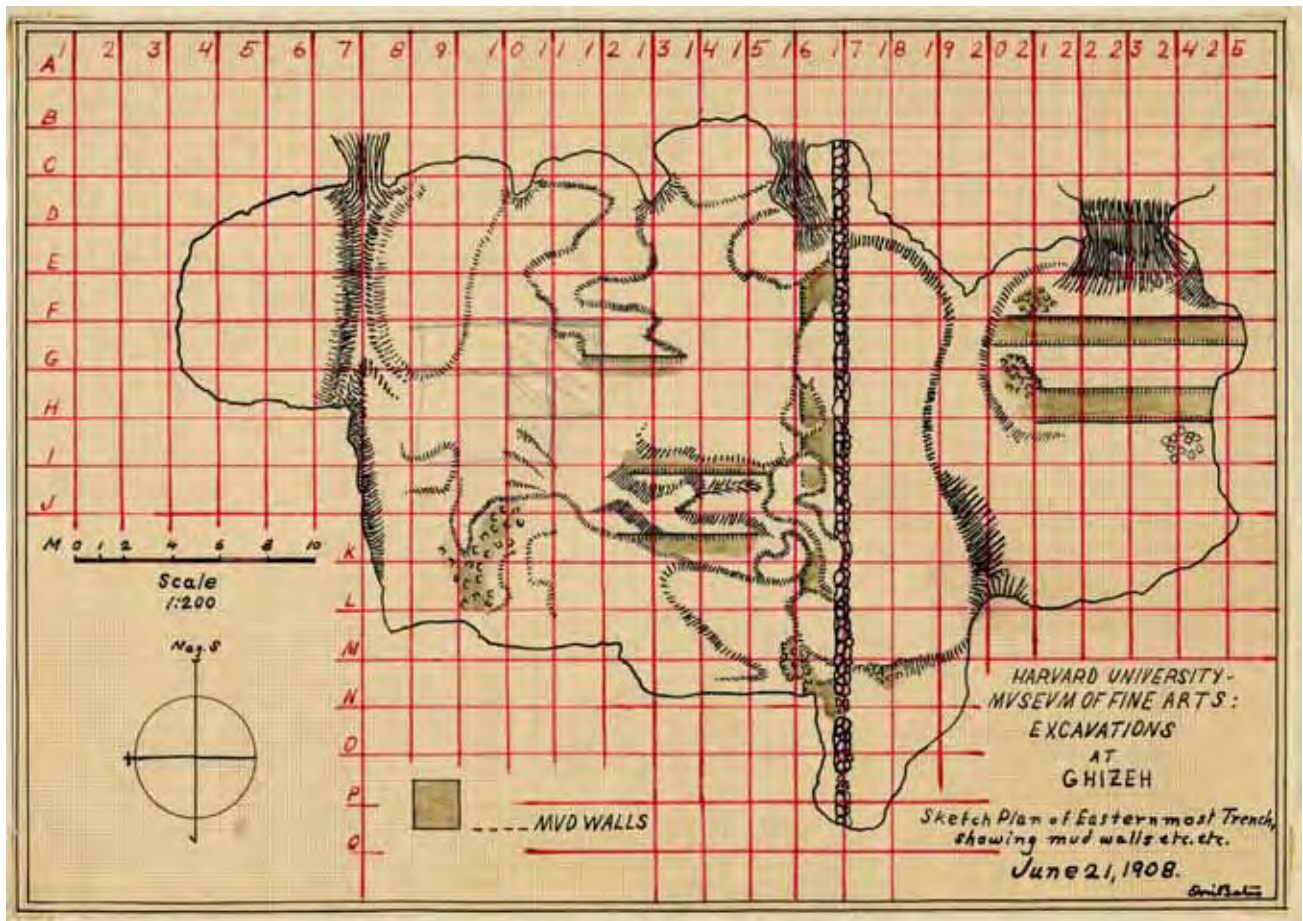


Color Plate 25. Overall map of the Giza Plateau published by Lepsius (1849, pl. 14) entitled "Situationsplan des Pyramidenfeldes von Giseh," signed by G. G. Erbkam and V. G. Rebuke and dated to 1843. Landscape relief is shown with hachures. The scale is metric, the main monuments are labeled, and various tombs are numbered. Tombs on the Gebel el-Qibli and southern Giza are indicated and numbered. Trees are shown below the northern edge of the Gebel el-Qibli escarpment. The Coptic and Muslim modern cemeteries developed around these. The Wall of the Crow and Khufu's causeway are shown, the later running to the edge of the modern town ("Bebautes Terrain"). Access to the plateau is from the east towards the northeastern corner of the Great Pyramid. Both true north and magnetic north are indicated. The magnetic north declination is  $8^{\circ} 30''$  west of north taken on 28th January, 1843. Lepsius 1849, pl. 14.



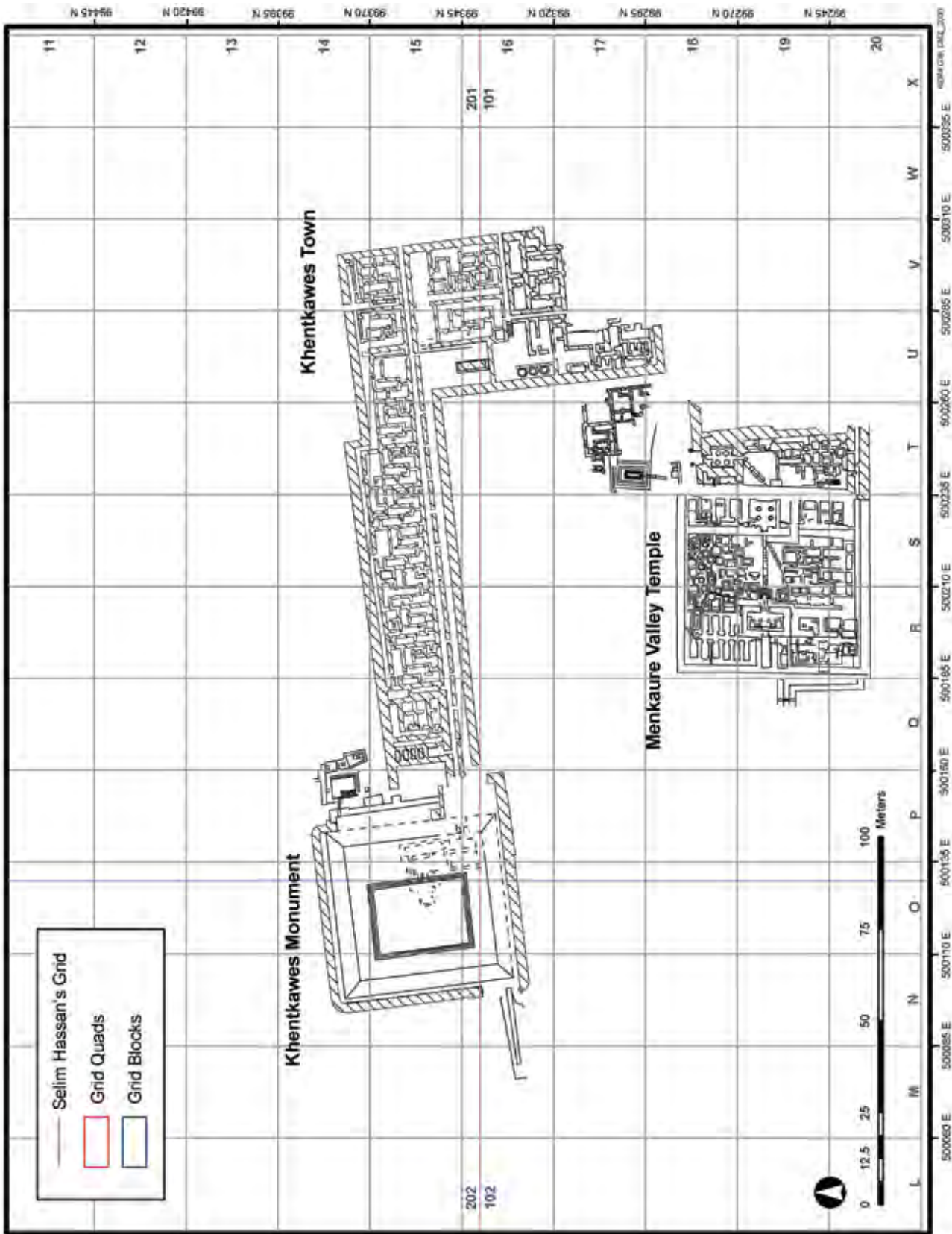


Color Plate 26. Overall plan of Selim Hassan's excavations south of Khafre's causeway (Central Field), with colors highlighting specific excavation seasons, published fully in Hassan 1960, frontpiece (Giza Archives MFA number EG019924 [[http://www.gizapyramids.org/code/emuseum.asp?newpage=hassan\\_giza9planzoomify](http://www.gizapyramids.org/code/emuseum.asp?newpage=hassan_giza9planzoomify)]). The grid is divided into 25 x 25 m squares with alphabetic designations along the X-axis and numeric along the Y-axis. The letter designations (A to Z squares, extended by two further squares A-B) increase from west to east but the numerical values (squares 1 to 20) increase toward the south. The grid is aligned to true north, but no coordinate values or altimetry are given. The map is numbered (bottom left 55/496) but not signed.

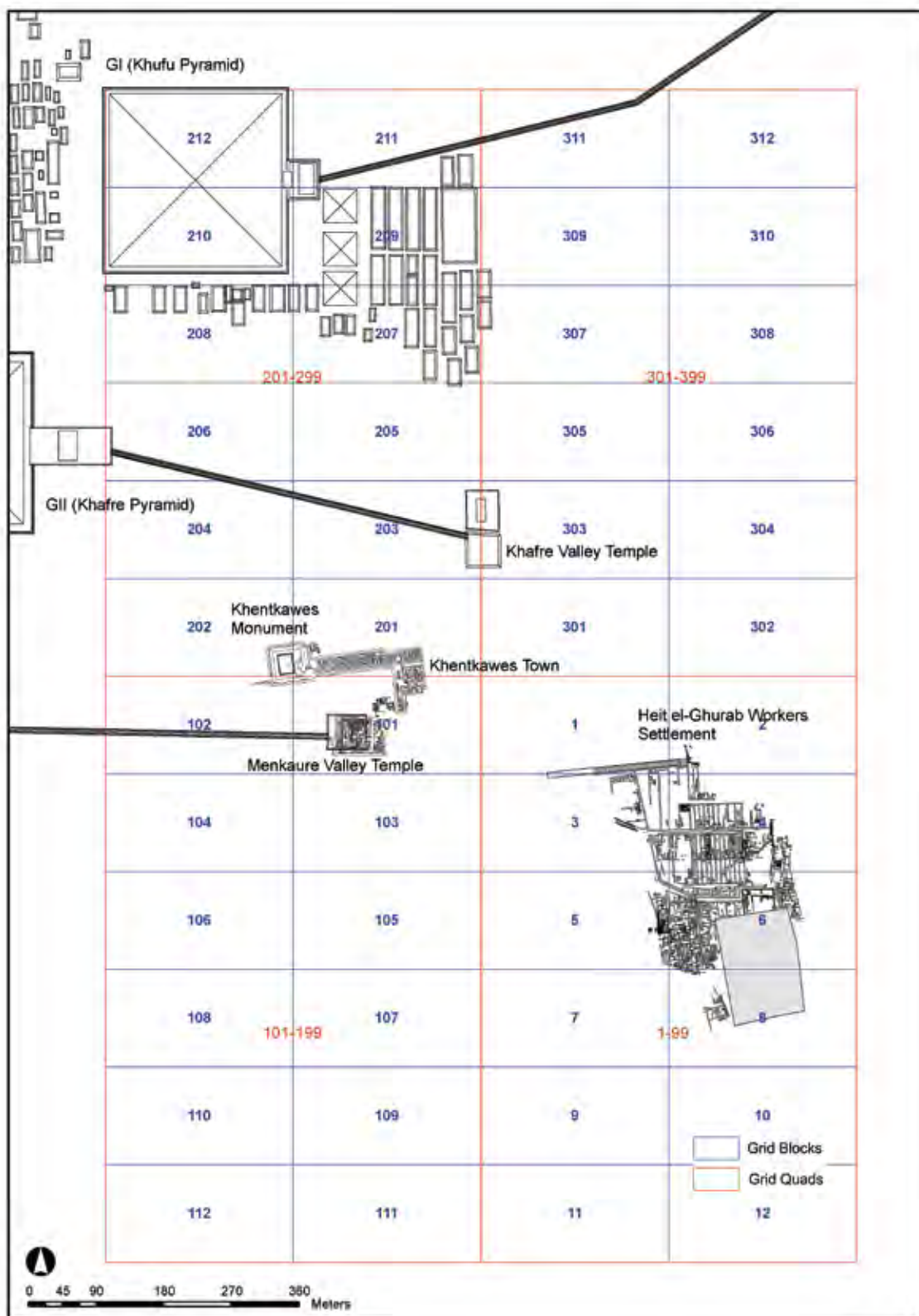


Color Plate 27. Unpublished map prepared by Bates in 1908 for excavations over the Menkaure Valley Temple, Giza Archives Project, Museum of Fine Arts, Boston (unpublished doc #EG025773). The grid, of 2 x 2m squares, aligns to magnetic north with south to the top of the drawing. Squares are labeled A–Q, from south to north, and 1–25 from east to west. Hachures indicate predicted but unexcavated walls. This grid is not used in the final publication. Courtesy of Peter Der Manuelian, Giza Archives, Museum of Fine Arts, Boston.





Color Plate 28. Plans of the Khenkaws Town (KKT) and the Menkaure Valley Temple (GIII.VT) published by Hassan overlaid with the GPMP grid. As we re-excavate and record parts of the town the original map is adjusted to fit the actual position of walls and other features. Map prepared by Camilla Mazzucato, AERA GIS.



Color Plate 29. The expanded GPMP excavation grid, with additional grid quadrants 100, 200, and 300. The work in the Khenkawas area required the original grid blocks to be expanded north and west. We duplicated the blocks from the grid origin, in a clockwise direction, creating four quadrants. The HeG settlement falls within the southeast quadrant (Blocks 1 to 8), the KKT and GIII.VT straddles the southwest and the northwest quadrants (Blocks 101 and 201) and the Khafre Valley Temple and the Sphinx fall within the northeast quadrant (Block 303). Map prepared by Camilla Mazzucato, AERA GIS.

