Tomb Security in Ancient Egypt from the Predynastic to the Pyramid Age

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Contents

List of Figures and Maps

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Finally, I dedicate this book to my late parents: Captain Donald Reginald Bernard Clark RAMC and his wife Phyllis Mary Clark. I think they would have approved of my endeavours.

Bath, December 2015.

Abbreviations

Archéo-nil........... Archéo-Nil: Bulletin de la société pour l'étude des cultures prépharaoniques de la vallée du Nil.
AJSL................... American Journal of Semitic Languages and Literatures.
ASAE.................. Annales du Service des antiquités de l'Egypte.
BACE.................. Bulletin of the Australian Centre for Egyptology.
BIFAO................. Bulletin de l'Institut français d'archéologie orientale.
BMFA................. Bulletin of the Museum of Fine Arts (Boston).
BMSAES............. British Museum Studies in Ancient Egypt and Sudan.
BSFE.................. Bulletin de la Société française d'Égyptologie.
CDE.................... Chronique d'Égypte; Bulletin périodique de la Fondation Égyptologique Reine Élisabeth.
CCE.................... Cahier de la céramique égyptienne.
CRAIBL.............. Comptes-rendus des séances de l'Académie des Inscriptions et Belles-Lettres.
DE...................... Discussions in Egyptology.
DÖAW................ Denkschrift der Österreichischen Akademie der Wissenschaften in Wien.
EA....................... Egyptian Archaeology, the Bulletin of the Egypt Exploration Society.
GM..................... Göttinger Miszellen.
JEA..................... Journal of Egyptian Archaeology.
JARCE................ Journal of the American Research Center in Egypt.
JEOL.................. Jaarbericht van het Vooraziatisch-egyptisch Genootschap Ex Oriente Lux.
JNES................... Journal of Near Eastern Studies
Kêmi................... Kêmi: revue de philologie et d'archéologie égyptiennes et coptes.
KMT................... KMT: A Modern Journal of Ancient Egypt.
MDAIK............... Mitteilungen des Deutschen Archäologischen Instituts Abteilung Kairo.
MOSAIK............. MOSAIK Journal.
MIFAO................ Mémoires publiés par les membres de l'Institut Français d'Archéology Orientale du Cairo
MIO.................... Mitteilungen des Instituts für Orientforschung.
OMRO................ Oudheidkundige Mededelingen uit het Rijksmuseum van Oudheden.
Pharaon.............. Pharaon Magazine. Le magazine de l'Egypte éternelle.
RdE..................... Revue d'Égyptologie.
Rec. de Trav....... Recueil de traveaux relatifs à la philologie et à l'archéologie égyptiennes et assyriennes.
SAAC.................. Studies in Ancient Art and Civilization.
SAK.................... Studien zur Altägyptischen Kultur.
Sokar.................. Sokar Magazine.
ZÄS..................... Zeitschrift für ägyptische Sprache und Altertumskunde.

Conventions

[123]	Square brackets enclosing numbers in bold in the text accompany each tomb as it is discussed and refer to an individual tomb's allotted number in the tomb catalogue.
[NIC]	Square brackets and 'NIC' in bold in the text indicates that a particular tomb is *not* included in the tomb catalogue.
'Footprint'	The area defined by the perimeter of a structure, which in this book is usually a superstructure.
'Footprint overhang'	The shortest distance from the perimeter of a superstructure (usually the longest edge) to the edge of the void of its underlying pit or substructure.
'Cover'	Cover is a term used to describe the thickness of geological material above the substructure of a subterranean tomb.
'Twin mastaba'	This is a term used to describe a single superstructure with twin offering niches serving two separate substructure systems and burials, usually of the tomb owner and spouse.
'Tonne'	The metric tonne of 1000 kgs, as opposed to the 'Imperial Ton' of the British and American *avoirdupois* system, which is 1,016 kgs.
'Scaled dimension'	Indicates that a particular dimension has been measured from a drawing using a scale rule. In the tomb catalogue this is also indicated using an adjacent asterisk *.
Given dimensions	The dimensions of most tombs are presented in metric form. Where they have been converted from cubits in excavation reports, for convenience, the generally accepted ratio of 1 cubit = 52.5 cm has been used (Arnold 2003: 61).

1. Introduction

Tomb robbery is a well attested phenomenon in Egypt from the earliest times and it soon becomes obvious when looking at the architecture of the Egyptian tomb from the Predynastic Period onwards that physical measures were being taken to deter or prevent it. Tomb security is a topic seldom discussed in scholarly works of an Egyptological nature, and although occasionally included as part of a larger general work or briefly mentioned in individual excavation reports, until now it has not been the sole subject of any in-depth research.

1.1 The purpose of the Egyptian tomb and the need for it to be secure

The overwhelming body of evidence of the investment made by the Egyptians in the construction, decoration and protection of their tombs, suggests that for them the tomb was far more than just a pragmatic method of hygienically disposing of their dead. It is evident, from the Badarian period (*c.* 5000–4000 BC) onwards, judging by the care taken by the Egyptians to respectfully inter their corpses and equip their tombs with grave goods,[1] that they were developing a funerary culture with particular beliefs, but precisely what these were remains open to debate.[2] Moreover, from the tomb security point of view, we know that these Predynastic graves were being systematically robbed of their valuables, almost as soon as they were completed.[3]

We can surmise that by the end of the Predynastic Period, with the emergence of bipartite tombs, which comprised of a substructure for the burial and an aboveground offering place, usually allied with some form of protective superstructure,[4] that the Egyptians believed in a form of afterlife,[5] in which the tomb played an essential part. It did this by both protecting the body and enabling the deceased to be provided with victual offerings by the living, which benefited the former,[6] by providing sustenance in the hereafter.[7] Following on, the Early Dynastic Period saw a rapid upsurge in the numbers of these types of tombs, which now were built in a wide variety of styles and locations. Many of these retained the bipartite form of a concealed substructure to contain the body, and a visible protective superstructure above with an offering place. Additionally, in a few elite necropoleis, some tombs also became storehouses for vast numbers of grave goods, which were concealed in magazines, both above and below ground.[8] However, alongside these developments, it is also apparent that wholesale tomb robbery was still taking place, as is evident from the increasing number of security features, such as reinforced substructures, access route blockings and protective superstructures that were being incorporated in the tombs to protect them.[9]

This investment in tomb security raises two questions: Firstly, what was it in the tomb that needed protecting? Secondly, why did the tomb continue to be used in its bipartite form and remain part visible on the surface, rather than being totally concealed and hidden from view, which would have been a far more effective form of protection? These questions are best answered by looking at those mortuary beliefs and customs of the Egyptians, which may have determined the tomb's design.[10]

Although there is little written evidence from the Early Dynastic Period and the Third and Fourth Dynasties concerning mortuary beliefs,[11] later Old Kingdom texts reveal that the corpse of the deceased was associated with two non-corporeal elements, the *ba* and the *ka,* which were an integral part of a human being in life that separated from it at death.[12] After the burial had been installed, the tomb was intended to act as a repository for the body and a form of dwelling for the *ka* and the *ba*.[13]

[1] See page 15 of this book.
[2] Snape 2011: 8–10.
[3] Spencer 1993: 47. The earliest reported cases date from the Badarian Period (Brunton and Caton-Thompson 1928: 9; Hoffman 1990: 143; Anderson 1992: 60–1).
[4] Tombs 852 **[212]** and 1845 **[212]** at Tarkhan, which date to Naqada IIIA (Hendrickx 2001: 100), discovered by Petrie (1914: 2–3) perhaps are the earliest extant examples of superstructures with offering chapels. The likely origins of the superstructure are discussed in Chapters 3 and 6 of this book.
[5] Ikram and Dodson 1998: 15; Assmann 2005: 10–1; Taylor 2010: preface.
[6] Bárta 2011b: 29–30; Snape 2011: 12–3.
[7] Snape 2011: 21.
[8] For example, the First Dynasty monumental mastaba tombs at Saqqara North, such as S 3504 **[84]**(Emery 1954: 5–13; Porter and Moss 1974-81: 445) and S 3035 **[89]** (Emery 1938: *passim*; Porter and Moss 1974-81: 440–2).
[9] These architectural features are discussed in detail in Chapters 4 to 6 of this book.
[10] These beliefs and their relationship to the tomb are only briefly summarised here, as they were constantly refined, revised and added to over the three millennia of Dynastic rule; they thus form an extremely complex topic in themselves, which space does not permit to be fully explored in this study. For in-depth analyses of these beliefs throughout the history of Pharaonic Egypt, see Lloyd 1989: *passim*; Assmann 2005: *passim* and Taylor 2010: *passim*.
[11] The earliest textual sources concerning Egyptian beliefs about the afterlife are those found in the Pyramid Texts from the latter end of the Old Kingdom, the first examples occurring in the pyramid of Unas (Hays 2012: 1).
[12] Žabkar 1968: 60–1; Bolshakov 1997: 284; Assmann 2005: 87–90 and 96–7. See Lloyd (1989: 118–9) for a succinct summary of the nature of the *ba* and the *ka*.
[13] Reisner 1936: 1; Assmann 2005: 122; Dodson and Ikram 2008: 14;

The Egyptians believed that the *ka* remained in the tomb, along with the corpse, whereas the *ba* could leave during the day to join the world of the living, but had to return at night.[14] However, both had to be able to reunite with the body back in the tomb,[15] on a daily basis,[16] in order to attain the highest desirable form in the afterlife, which was an *akh,* or 'effective' spiritual being, who was able to enjoy an eternal existence, both on earth and amongst the gods in the cosmos.[17] In this context perhaps the tomb was therefore the place, where in a daily re-enactment of this process, Hays suggested: 'the hidden deceased becomes effective after rebirth'.[18] Consequently, it would have been essential for the body, or at least its substitute,[19] to remain *in situ* and undamaged in its tomb, so that this crucial cycle could take place, which was undoubtedly one of the primary reasons that the latter needed to be made secure.

In addition, from early on, personal property in the form of valuables and prized domestic objects,[20] were often included with the burial, as from the Egyptian viewpoint, the deceased was still regarded as an entity in his or her own right and would utilize those items in the afterlife.[21] However, these attracted grave robbers, who sought items of portable wealth that could be easily recycled, such as jewellery and amulets, and copper, silver and gold, although ivory, textiles and furniture, together with fresh oils and unguents, were also desirable.[22] Therefore, dependent on the location of these commodities within the tomb, it also became necessary that appropriate security measures were put in place to protect them.

Finally, both the *ba* and the *ka* could partake of sustenance by absorbing the 'essence' of food offerings provided for them in actual or symbolic form,[23] which were accessed via an interface that was typically marked by a stelae, offering niche or false door. Usually set into a superstructure, this portal formed a liminal zone that connected this world with the world of the dead, and provided a focus where the cult of the deceased could be celebrated, offerings left, and the living could interact with the dead.[24] These visible aboveground elements therefore formed an important focal point and memorial, where the dead, although secure deep within their substructures, were still approachable,[25] and could be cared for and remembered, as an integral part of the living community.[26] One could suggest however, that from the tomb security point of view, the presence of such a conspicuous structure would have drawn unwelcome attention to the tomb. But, undoubtedly aware of this shortcoming, rather than discard the aboveground element altogether, the Egyptians sought the best of both worlds by exploiting the protective potential of the superstructure and used its architecture to increase the tomb's security levels instead.

It would seem therefore, that the choices made by the Egyptians in relation to their tombs' architecture, location, and contents, were partially governed by the pursuit of their beliefs regarding the afterlife, which paradoxically rendered many of these aspects vulnerable to the depredations of tomb robbers,[27] and vandals,[28] or in times of war or civil disorder, perhaps even looters.[29]

Snape 2011: 21–3.

[14] Kanawati 2001: 20 and 24; Taylor 2001: 20–1; 2010: 13, 89 and 104–5. Up until the Fifth Dynasty however, Allen (2006: 10) suggests that the afterlife of the private person was considered to be largely restricted to the confines of the tomb.

[15] Taylor 2001: 21 and 46; Assmann 2005: 101–2.

[16] Allen 2005: 8.

[17] Taylor 2001: 31–2; Allen 2005: 7; Dodson and Ikram 2008: 16.

[18] Hays 2009: 195.

[19] In the event that the body was damaged, a representation of the deceased in the form of a statue or relief, or even just the inscribed name itself, could substitute for it instead (Bolshakov 1997: 210–2; Ikram and Dodson 1998: 15; Taylor 2001: 23–4).

[20] These items varied over time. In the Predynastic Period, dependent on their owner's status, graves might contain variously: stone bead necklaces, mudstone palettes for grinding cosmetics, copper fish-hooks, needles, axe heads; ivory bracelets, pins and spoons; ornamental lithics; stone unguent and cosmetic jars, and gold foil decorated items (Stevenson 2011: 65–92). By the Early Dynastic Period the repertoire of items deposited in high status graves had increased considerably and included: jewellery of gold and semi-precious stones; cosmetic and toilet articles of ivory, bone and stone; ornamental hard stone jars and vases; copper tools and vessels; furniture, games, boxes and weapons in ivory and wood, and woven goods such as linen, clothing and basketwork (Emery 1961: 214–35; Taylor 2001: 107–1; Grajetzki 2003: 7–10).

[21] Snape 2011: 2.

[22] Phillips 1992: 163–4.

[23] Taylor 2001: 95; 2010: 104. The Egyptians frequently supplemented or replaced real items in these situations with model substitutes or images, with the intention that should the regular maintenance of the offering cult cease for any reason, they would magically ensure a continuous supply (Spencer 1982: 63–7; Tooley 1995: 8–10). Although by the Old Kingdom, this substitution had become the usual practice, and the supply of fresh foodstuffs declined until the custom was revived in the New Kingdom (Taylor 2001: 93–5).

[24] Anderson 2000: 129; Dodson and Ikram 2008: 16–7; Taylor 2010: 23.

[25] For example, in addition to communicating with the dead, requests could be made for them to intercede on a relative's behalf with worldly problems, such as an illness or dispute, or pleas could be made for them not to haunt the living (Baines 1991: 152–3; Ritner 1993: 180–3; Taylor 2001: 95). For examples of letters to the dead dating from the Old to New Kingdoms, see Gardiner and Sethe 1928: *passim* and Wente 1990: 210–9.

[26] Lloyd 1989: 129; Assmann 2005: 13 and 181.

[27] Although there is little documentary evidence concerning the motivation of tomb robbers, one could reasonably assume that they were stealing for personal gain in order to enrich their lives. In the late Twentieth Dynasty, for example, it appears from the large number of 'traders in every house' listed in the famous Tomb Robbery Papyri, BM 10068, that the items stolen by the accused necropolis workers (in this case gold, silver and cloth) were frequently bartered with merchants for more mundane goods (Peet 1930: 90–1, note 18). Moreover, in the contemporary papyrus BM10052, it was reported that the gold and silver booty belonging to one of the accused was used to obtain: land, oxen, a slave, spelt, honey and wine (Peet 1930: 144–5). For an in-depth discussion on tomb robbers and their loot, see Phillips 1992: *passim*.

[28] Committing an act of vandalism against someone's tomb by damaging it, or erasing their name, image or inscriptions in an act of *damnatio memoriae*, was considered to be as serious as damaging the body of the incumbent itself, and would result in the destruction of the latter's afterlife (Dodson and Ikram 2008: 77; Ritner 2012: 396–9; Eyre 2013: 335).

[29] For example, textual sources, such as the 'Instruction of Merikare', suggest that the robbing and burning of the First and Second Dynasty

To prevent this happening, and to compensate for their vulnerabilities, they therefore needed to be made more secure by modifying their architecture accordingly, the realisation of which up until the early Fourth Dynasty considerably affected the design and development of the Egyptian tomb, which is the topic explored by this book.

1.2 Aims and objectives

The aim of this work is to examine the architecture of tomb security in Egypt from the Predynastic Period (*c.* 5000–4000 BC), until the end of the reign of Sneferu in the Fourth Dynasty (*c.* 2500 BC), to see what special methods were employed to protect the tomb and concomitantly assess what influence, if any, these security features may have had upon the architecture of Egyptian tombs during the period concerned. After initially discussing an early example of tomb security from the Late Palaeolithic Period (*c.* 21000–12000 BC) the study continues to review the architectural development of the tomb from the Faiyum Neolithic Period onwards (*c.* 5000 BC), and gathers together as much relevant published data on tombs with noteworthy security features as possible, and then analyses the results from the viewpoint of tomb security. Due to the limited data available on tombs from the Predynastic Period, the bulk of the tomb catalogue and analysis centres around the Early Dynastic Period through to the early Fourth Dynasty. Geographically, the main body of the work covers the whole region from Minshat Abu Omar in the Delta to Hierakonpolis in Upper Egypt (Map 1). In the discussion on the earliest tombs, its remit extends as far south as the Sudan and Nubia (Map 2) to include important examples from the Predynastic and Late Palaeolithic Periods.

1.3 Previous scholarship

While for the period under examination there is an abundance of primary publications of tombs in the form of excavation reports, secondary syntheses and discussions, there are very few amongst these that specifically deal with tomb security.

One of the first to link the architecture of the tomb with its security requirements was John Garstang in his 1904 discussion 'The evolution of stairway tombs' in *Tombs of the Third Egyptian Dynasty at Reqâqnah and Bêt Khallâf.* He traced the evolution of the tomb from wood roofed grave pit to entirely subterranean burial chamber, the development of which he recognised: '…seems to have been prompted by the striving for greater security for the body of the deceased'.[30]

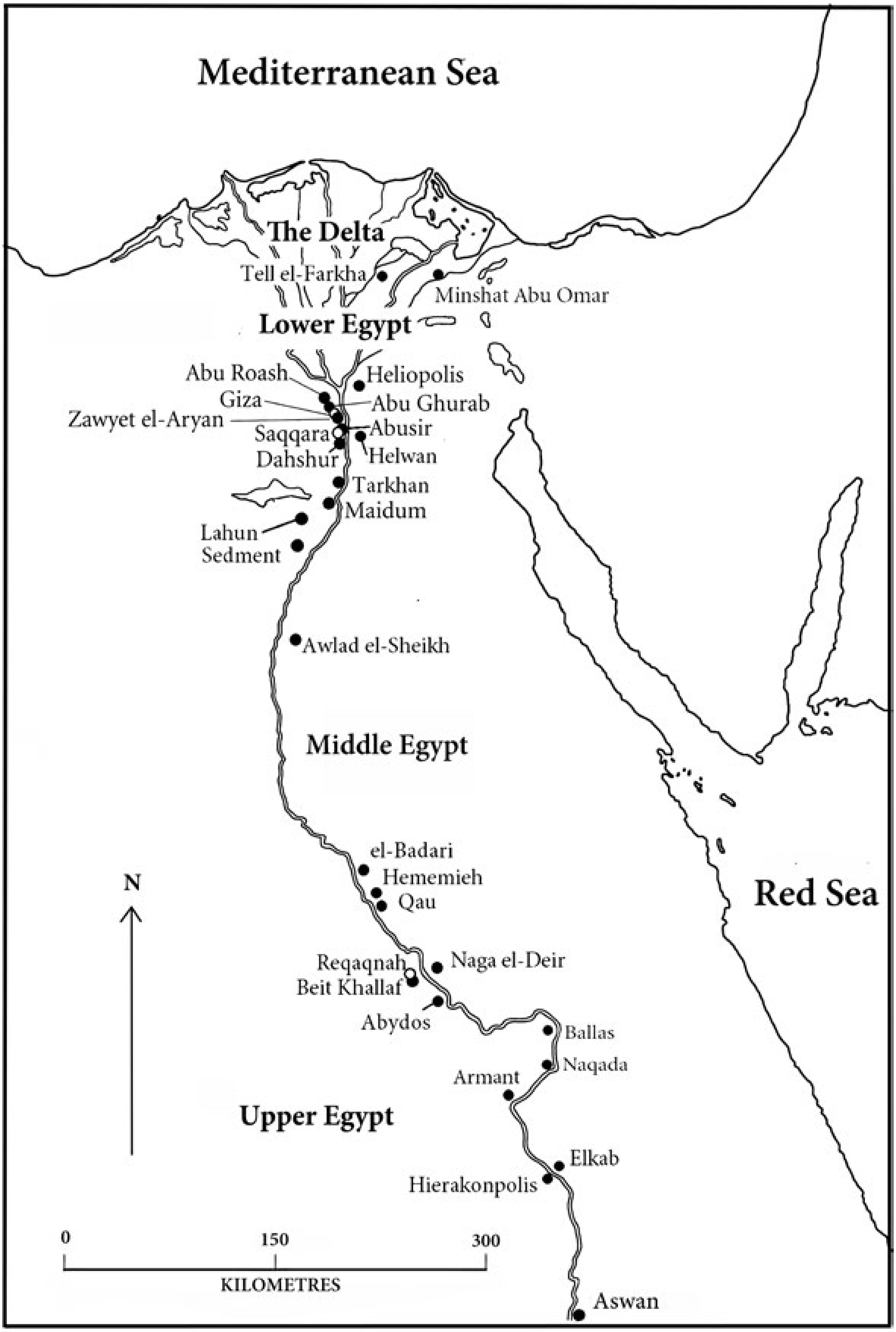
George Reisner in 1936 occasionally tackled aspects of tomb security in his seminal *The Development of the Egyptian Tomb down to the Accession of Cheops*,[31] but concentrated more on the exhaustive cataloguing and typology of the tombs rather than on their defences against robbery.[32] However, he devoted a paragraph to portcullises,[33] and reiterated that one of the major roles of the tomb was: 'to protect the burial and its equipment from damage and destruction'.[34] Additionally, in his 1942 publication *A History of the Giza Necropolis*, Vol. 1,[35] he also covered the topic of shafts and their blockings at this site in his usual extensive detail.

In more recent times, while the architecture of tomb design is covered in general works on royal pyramids,[36] private tombs,[37] and specialist scholarly publications, the list of those who have specifically tackled tomb security is small. One of the first to do so is Jeffery Spencer in his 1982 *Death in Ancient Egypt,* in a chapter entitled 'Security of the tomb'.[38] He encompasses in this chapter the Early Dynastic to the Late Period and discusses a variety of security topics including the security architecture of royal and private tombs, tomb robbing and its associated punishment, coffins and magical protection.

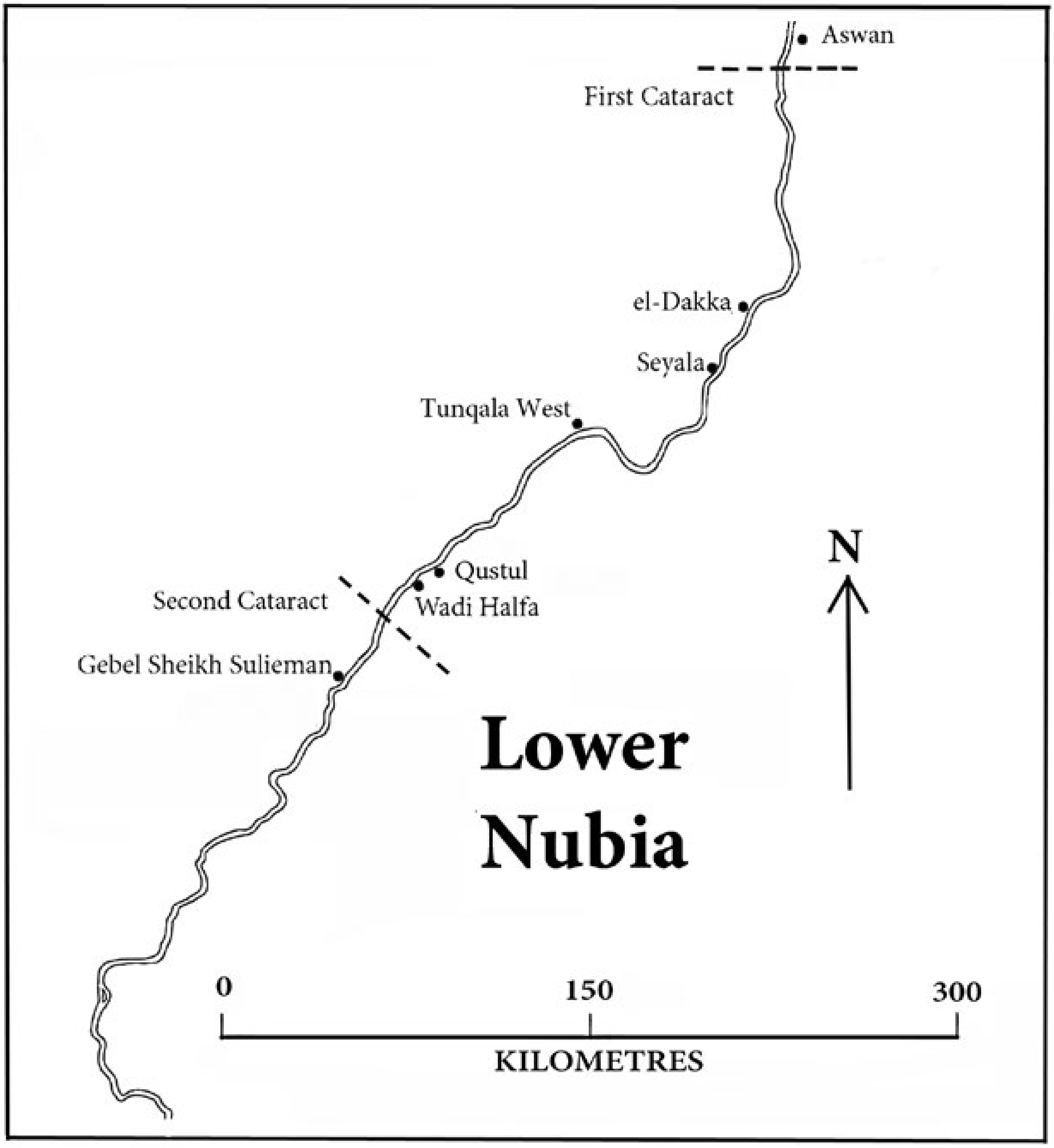
In her 1987 article *The Archaic Stone Tombs at Helwan,*[39] Wendy Wood reviews in detail the Early Dynastic stone tombs at that site excavated by Saad,[40] who believed them important in the history of stone building in Egypt. However, rather than exploring the security aspects of the tombs, she chooses to question Saad's datings and assumptions,[41] and proposes that the choice of stone linings at this site was actually for economic rather than security reasons, as–in her view–mud-brick and wood

royal tombs at Abydos may have occurred during the upheavals and chaos of the First Intermediate Period (Dreyer 2003b: 69; Snape 2011: 114). Moreover, it has been suggested that the plundering of some Middle Kingdom royal pyramids, such as those of Senwosrets II and III and Amenemhat III, could have taken place during the conquests by the Hyksos in the Fifteenth Dynasty, who in addition may also have been responsible for the destruction of the tombs of the Sixteenth Dynasty kings at Thebes and Abydos (Ryholt 1997: 143–8).

30 Garstang 1904: 34–7.
31 Reisner 1936: *passim*.
32 For specific mention of the topic of security in Tomb Development, see Reisner 1936: 1, 3, 56, 170, 245, and 368).
33 Reisner 1936: 185.
34 Reisner 1936: 245. It is worth noting that in his inimitable style he dismissed (1936: 339–40) alternative viewpoints concerning the religious function of the pyramids, and made it quite clear that he regarded their role as purely being there to protect the burial and provide an offering place.
35 Reisner 1942: 85–103 and 168–76.
36 The architecture of pyramids up until the early Fourth Dynasty are discussed by Reisner (1936), Grinsell (1947), Fakhry (1961), Maragioglio and Rinaldi (1963, 1964 and 1965), Lauer (1962: *Passim*; 1979: 355–94), Stadelmann (1985), Edwards (1988), Lehner (1997), Dodson (2003), Verner (2003), Hawass *et al.* (2003) and Dodson & Ikram (2008).
37 Private tomb architecture of the period is covered variously by Reisner (1936) Emery (1961), Kanawati (1987), Dreyer (2003), Grajetzki (2003), Jánosi (2006), Dodson & Ikram (2008) and Snape (2011).
38 Spencer 1982: 74–111.
39 Wood 1987: 59–70.
40 Saad 1947, 1951 and 1969.
41 See Köhler (2005: 27) for a critique of Wood's claims.



Map 1. Map of Egypt
The map shows the key sites in the discussion from Minshat Abu Omar in the Delta to Aswan before the First Cataract. (Drawn by the author after Bard 2007, map 5.4)



Map 2. Map of Lower Nubia
The key sites in the discussion from the first to the second cataracts. (Drawn by the author after Bard 2007, map 5.2)

were the preferred material of choice in tombs of the Archaic Period.[42]

Dieter Arnold in a chapter entitled 'Securing tombs' in his 1991 *Building in Egypt: Pharaonic Stone Masonry,* devotes nearly fourteen pages to the topic of tomb security.[43] He states that the 'sealing of burials for security' begins in the First Dynasty, and while acknowledging the ongoing struggle between tomb robbers and builders over the security of the tomb from that point onwards, he asserts that: 'not a single blocking device remains intact; not one has fulfilled its purpose over time'; further suggesting that tombs only remained undisturbed because their location was lost or forgotten.[44] Two premises which this study will show are mistaken.[45]

[42] Wood 1987: 62.
[43] Arnold 1991: 218–31.

[44] Arnold 1991: 218–9.
[45] There are at least two tombs in the catalogue, whose presence was undoubtedly well known throughout Egyptian pharaonic history, but whose burial chambers remained unbreached due to the effectiveness

Rather than discuss the architecture of tomb security as a whole, he then concentrates on the 'five basic' stone blocking mechanisms used to prevent access to the burial chamber in selected Egyptian tombs, such as that in Djoser's granite sarcophagus, the portcullises of tomb K1 at Beit Khallaf, and the plug-stones and portcullises of the Bent Pyramid and its satellite at Dahshur.[46] He then goes on to selectively cover the blocking mechanisms of the later pyramids up to those of the Middle Kingdom, and discusses the substructure of the tomb of Senwosret III at Abydos, the tomb of Senwosret-Ankh at Lisht and the Saite shaft tombs of the Late Period.[47]

In his 1996 short article *Ingenios y sistemas de seguridad en las tumbas del Antiguo Egipto,*[48] Ignacio Arés Regueras touches on the subject of rubble blockings and portcullises in the first mastabas. Tomb K1 at Beit Khallaf is given slightly more space, with the remainder of the discussion focusing on security measures within a few Middle Kingdom private and royal tombs, the Valley of the Kings, and the shaft tombs of the Twenty-Sixth Dynasty.

One of the few articles to deal specifically with tomb security and a particular architectural element is Michael Birrell's 2000 *Portcullis Stones: Tomb Security during the Early Dynastic Period.*[49] Beginning and ending with a discussion on a Helwan stairway tomb, the author gives a brief overview of the portcullis from Naqada IIIA until the reign of Khufu. Covering instances from the First Dynasty royal tombs at Abydos, he moves on to private tombs and discusses a few examples at Saqqara and Helwan. The discussion on the Second Dynasty is limited to three tombs and two more with static blockings at Saqqara, all excavated by Quibell.[50] He deals with Third Dynasty portcullises in Covington's tomb at Giza and the great tombs at Beit Khallaf and Reqaqnah, as well as a couple from Naga el-Deir. It appears he missed many Third and Fourth Dynasty examples from Abusir, Meidum and Dahshur, since he states: 'Portcullis stones disappear in private tombs during the late Third Dynasty – early Fourth Dynasty, presumably because so many burials had been disturbed.'[51] The discussion of portcullises in Old Kingdom royal tombs is limited to those in the Great Pyramid and beyond, but is compensated for by a brief discourse on the lowering of the stones in general. Moreover, his final assertion that: 'Despite all the measures taken to secure the burials of this period, no private tomb guarded by a portcullis has ever been found intact', [52] is mistaken.[53]

John Taylor in his 2001 *Death and the Afterlife in Ancient Egypt*[54] acknowledges that one of the functions of the tomb was to protect the deceased from 'thieves and scavengers'.[55] He suggests that some of the influences on the development of tomb architecture were the result of the need to defeat tomb robbers. To illustrate this he cites the early relocation of the storage of grave goods from superstructure to substructure, and the blocking of stairways and shafts in the Early Dynastic Period and Old Kingdom by portcullises and rubble, before his discussion moves on to the rest of dynastic Egypt up until the Twenty-first Dynasty.[56]

Access route blockings are discussed by Nina Wolf in her short article *Blockierungssysteme in ägyptischen Pyramiden* (2004).[57] She notes the introduction of primitive blockings of brick or stone in the First Dynasty and summarises the closure methods of the pyramids of the Old and Middle Kingdoms. While Djoser's burial vault and Sekhemkhet's sarcophagus are mentioned in her discussion on the Third Dynasty pyramids, she does not discuss the blockings of the former's pyramid and incorrectly asserts that the latter's substructure lacked a blocking system altogether.[58] She acknowledges the security benefits of the raised pyramid entrances and high level passages introduced during the Fourth Dynasty and observes their incorporation in conjunction with blockings, plug-stones and portcullises amongst selected pyramids of the Old and Middle Kingdoms. Subsequently, in her 2005 *Die Blockierungssysteme in Snofrus Pyramiden*,[59] she discusses the closure methods used in Sneferu's three tombs in far more detail and sums up the results of what she rightly describes as an experimental period in blocking methods.

In 2008 Aidan Dodson and Salima Ikram devoted just over a page to 'Protecting the tomb' in *The Tomb in Ancient Egypt.* After a brief summary of 'Basic precautions' such as 'deepening the location of the burial chamber', blocking methods and the selection of hard stone for substructure construction, they move on to a few examples from the Middle and New Kingdoms, the Late Period and finish with mention of apotropaic curses. [60]

of their defences, these are the Third Dynasty pyramid of Sekhemkhet at Saqqara **[18]** and the 'Inner Mastaba' at Nazlet Batran **[62]**, both of whose defences are discussed in-depth in Chapters 4, 5 and 6 of this book. Of the other fifty-three intact burials included in the catalogue, one can only speculate as to whether they remained visible or had been forgotten about.

[46] Arnold 1991: 219–26.

[47] Arnold 1991: 219–31.

[48] Arés Regueras 1996: 14–21.

[49] Birrell 2000: 17–28.

[50] Quibell 1923: *passim*.

[51] Birrell 2000: 24–5.

[52] Birrell 2000: 27.

[53] There are ten examples of intact tombs in the catalogue with portcullises, they are nos. **[101]**, **[102]**, **[125]**, **[217]**, **[227]**, **[250]**, **[266]**, **[267]**, **[304]** and **[343]**.

[54] Taylor 2001: *passim*.

[55] Taylor 2001: 136.

[56] Taylor 2001: 178–9.

[57] Wolf 2004: *passim*.

[58] Wolf 2004: 159.

[59] Wolf 2005: *passim*.

[60] Monnier 2010: 48–51 and 2011: 14–7.

Franck Monnier discussed security in royal tombs in two brief, but well illustrated, articles. Firstly, in 2010 he contrasted the popular myths concerning tomb security with selected examples of real precautions taken from the Early Dynastic Period until the Old Kingdom in *La protection des sépultures royales. La réalité au-delà du mythe*. Subsequently, in 2011, in the similarly titled *La protection des sépultures royales*, he went on to discuss specific defensive measures from the Middle Kingdom until the New Kingdom, but then concluded his discussion by examining the security arrangements in private shaft tombs of the Saite Period.[61]

The site specific discussion by Joanna Dębowska-Ludwin in 2011, entitled *Early Egyptian tomb security – middle class burials from Tell el-Farkha,* looks in-depth at protection of the burial at the Eastern Kom necropolis during the Protodynastic and Early Dynastic Periods. She details the deep burial chambers and massive brick superstructures with unusual shaft entrances found at the site, and looks at the use of mud-brick rubble and liquid mud as a backfill, noting that extraordinarily only around 5% of tombs at the site show signs of being robbed.[62]

In 2011 Michael Haase examined the Step Pyramid from the security viewpoint in his article *Wahrzeichen mit Sicherheitskonzept: Bemerkungen zum Bau der ersten Stufenpyramide Ägyptens*.[63] He comes to the conclusion that much of the architecture of Djoser's complex was designed to improve the security of the royal tomb in response to robberies that had taken place during the upheavals and civil strife in the Second Dynasty.

Also in 2011, the author of this book covered the topic during the Late Palaeolithic to Predynastic periods with his paper *The early precursors of tomb security*,[64] an extended version of which forms Chapter 3 of this work.

1.4 Methodology

In order to analyse the architecture of tomb security over the period concerned, it was necessary to create a searchable database that would include every published medium or large tomb that possessed noteworthy security architecture that the writer could identify from a drawing or description.[65] Therefore, those tombs under 3 m^2, which might be described as 'small', were not usually included,[66] unless they possessed an exceptional security feature. Once gathered from primary sources these tombs were catalogued by identity, substructure type (Chapter 2), date, geographical location and security features, factors which permitted the analysis of the use, distribution and diachronic development of the security methods employed. The information thus assembled was used as the basis for the thematic analysis of the specific areas of the tomb that were involved with security – namely substructures, access routes, blockings and superstructures. In addition, further data on security features, such as portcullises or stairways, was also collected for use in the charts that accompany each chapter, in order to complement and add to the database on that topic, even if the tomb was excluded from the main catalogue due to lack of available information.

It should be pointed out that there were many published tombs noted during the research that were not accompanied by enough information to include them in the database.[67] This means that the catalogue does not contain all tombs that used tomb security in the period, but only those that have been sufficiently reported by field archaeologists, who may have only selectively published the most interesting examples, which are frequently the tombs of the elite. However, this is a common problem with many thematic syntheses undertaken in our discipline, which are reliant on the not-infrequently random nature of field excavations undertaken in Egypt and their published results.[68] Given the time limits permitted for researching a PhD, it was therefore the best approach to include as many tombs as possible in the database that fit the parameters within the chosen period, and to make the most of that information, while acknowledging its unavoidable bias and subjectivity.

Another problem peculiar to the study of tomb security is that some of the dimensions of a particular feature are important, such as the thickness of a mud-brick liner, depth of a shaft, size of a portcullis, because these factors relate to the effectiveness of the protection offered (as they would in any study of defence technology). In many publications these dimensions are unavailable, so instead, a large number of scaled measurements have been taken from the tomb drawings and added to the database.[69] In many cases this is information that until now was unavailable, such as but not limited to, the footprint overhang of a superstructure,[70] the thickness of

[61] Dodson and Ikram 2008: 45–8.
[62] Dębowska-Ludwin 2011a: 29–36.
[63] Haase 2011: 18–23.
[64] Clark 2011: *passim*.
[65] Reisner (1908:11) in his discussion of the development of tomb types suggested that: '…we must look to the large tombs in order to get the main thread of the development, for they are the tombs of those who most desire security and ostentation and are best able to secure the technical means of obtaining their desires.' More recently, Köhler (2012: 283–4) has pointed out with regard to the Early Dynastic tombs at Helwan: '…significant architectural changes during the Early Dynastic Period tend to be best observed in medium and large sized tombs, as these appear to be most sensitive to innovations and technological developments…'.

[66] By this term I mean the ubiquitous small pit tomb with its usual closure of backfill, which accounts for the vast majority of graves in dynastic Egypt (Jánosi 1999: 27; Dodson and Ikram 2008: 31).
[67] For example the numerous Early Dynastic tombs at Saqqara in Quibell 1923: *passim*.
[68] Redford 1979: 7–8.
[69] These are usually marked with an asterisk* in the catalogue. Where uncertainty as to the accuracy of the dimension given exists this will be prefixed with 'approximate'.
[70] This is the distance in pit tombs between the edge of a superstructure

a substructure's overhead cover,[71] or the size and weight of a particular portcullis. It must be mentioned, however, that these dimensions are dependent on the accuracy of the tomb drawings, some of which are not always reliable,[72] and the inevitable leeway that arises when reading from an architect's scale rule.[73] Similarly, there is often a lack of information regarding the surrounding geology of a particular tomb, which also plays a part in the effectiveness of its defences, where it is available it is recorded, or sometimes supplemented with data from other sources.

1.5 Dating

The chronology followed for the Predynastic, Early Dynastic Periods and the Third and Fourth Dynasties in the book is generally that set out in the individual contributions regarding those periods by Hendrickx, Kahl, Seidlmayer and Verner.[74] While every effort has been made to accurately date the tombs in the discussion, in older publications some of the dates given are often not sustainable in the light of more modern research, which has made a great deal of progress in recent decades.[75] A good example of this type of problem are the Type IIA subterranean stairway tombs in the Bashkatib Cemetery at Lahun[76] that Petrie dated to the mid First Dynasty (S.D. 80–1, Naqada IIIC1–2) from their ceramic and stone vessels.[77] However, more recent scholars have dated tombs of this type at Bashkatib to Naqada IIID[78] or the Second Dynasty,[79] and architecturally the tombs are stylistically typical of this period.[80] Therefore, although the dates given in this study are usually those suggested by the authors of the publications from which they have been extrapolated, in the case of doubt, either a decision has been made based on the architectural style of the tomb,[81] or where a revised dating is proposed in more recent scholarly works, the newer dates are used and referenced appropriately in the accompanying footnotes.

1.6 Database analysis

The catalogued data was originally entered into a 'Filemaker' programme which permitted interrogation of the 366 tombs in the catalogue, each of which was usually accompanied by a tomb drawing. This database forms the tomb catalogue at the end of this book, which generally follows the arrangement in the thematic discussion in Chapters 4 to 6, insofar as royal tombs are placed in chronological order at the beginning and private tombs (Predynastic and Dynastic) are then grouped by necropolis north to south, and within those parameters by date. This provides an easily accessible reference for the reader, who can refer to an individual tomb from the catalogue number in the discussion and instantly see a drawing and all the relevant data.

In addition there are seventeen Excel charts in the appendix, which present specific data relevant to private tombs within the four main chapters. These contain both information from the tomb catalogue and additional information gathered from excavation reports of material not included in the database. Charts A–F contain the statistical information on the burial chambers of all private tomb types by type. Charts G–K are the charts for the stairways, stair-shafts, shafts and corridors of all externally accessed private substructures by type. Charts L–O are the charts pertaining to the superstructures of all private tombs by type in the catalogue that possess them. Finally, Chart P contains the data on portcullises for all the tombs in the catalogue and Chart Q lists all of Quibell's (1923) published shaft tombs at Saqqara that possessed superstructures.

1.7 Structure of the book

Chapter 1 is the introduction, which initially discusses the purpose of the Egyptian tomb and the need for it to be secure, then goes on to explain the scope, aims and methodology of the research and an overview of the previous scholarship.

Chapter 2 is a summary of the typology used throughout the work to describe the substructures of the tombs, and includes an illustrated chart that acts as a reference for the codes applied in the typology.

Chapter 3 uses the limited data available concerning tomb architecture in pre-unification Egypt to 'set the scene' for the remainder of the study by diachronically examining the earliest examples of tomb security from the Late Palaeolithic period until the end of the Predynastic Period. In addition it concurrently traces the changing

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and the underlying substructure discussed in 6.1.1.

[71] The cover is the thickness of geological material above the substructure of a subterranean tomb.

[72] Many of the tomb drawings, for example, in Saad's (1947, 1951 and 1957) publications of the Helwan necropoleis conflict with his descriptions of their dimensions and so must be regarded as a guide rather than absolutely accurate. In the case of doubt, the described dimension is given precedence in the tomb catalogue.

[73] At 1:50 scale, for example, a 1 mm thick ink line on a drawing is the equivalent of 5 cm.

[74] Hendrickx 2006: 56–93; Kahl 2006: 94–115; Seidlmayer 2006: 116–23; Verner 2006: 124–43.

[75] For example, the scholarship on relative chronology by Kaiser 1964: 86–124; Hendrickx 1989: *passim*, 1996: 36–69; Köhler 2004: 299–306; Köhler and Smythe 2004: 123–44.

[76] Petrie, Brunton and Murray 1923: 22–3, tomb register pl. XVI.

[77] Petrie, Brunton and Murray 1923: 24.

[78] Stan Hendrickx (personal communication 26th October 2010) for example dates the Type IIA tomb 785 **[259]** at Bashkatib to Naqada IIID and has kindly pointed out in our correspondence regarding the Bashkatib tombs that Petrie's Sequence Dates from 79–80 onwards are 'especially unreliable'.

[79] Quirke (2005: 4) dates the Bashkatib Type IIA tomb 806 **[254]** to the Second Dynasty.

[80] Wilkinson 1996: 342; Köhler 2004: 300; 2005: 43; 2008b: 125–6.

[81] When considering the tombs of the Early Dynastic Period, for example, the publications by Reisner 1936: *passim*, Wilkinson 1996: 342–3, Kaiser 1998: *passim*; Köhler 2004: 298–306; 2008b: 125–6 are all useful in dating a tomb on stylistic grounds.

architecture of tombs within the evolving cultures that emerged during the period, and finally anticipates the developments to come after the unification.

Chapter 4 utilises the much greater volume of data pertaining to tomb architecture from the Early Dynastic Period until the end of the reign of Sneferu and heralds a change of approach in the format of the book, which now thematically examines the security aspects of the burial chamber. It is divided into two sub-chapters. First, the chronological development of the burial chamber in royal tombs. Secondly, private tombs by substructure type, which are then examined in diachronic and topographical order.

Chapter 5 thematically studies the security of the entrance route in tombs with external access from the mid First Dynasty, when they make their first appearance, up until the end of the reign of Sneferu. It is divided into three sub-chapters; the first examines the protection of access routes. Initially royal tombs are dealt with chronologically, and then private tombs are analysed by substructure type, subdivided diachronically and topographically. The second deals with the securing of access routes with static blockings by type and their occurrence in royal tombs diachronically, and then in private tombs chronologically and by site. The third focuses on the use of simple mechanisms such as portcullises and plug-stones; in it royal tombs are dealt with chronologically, followed by private tombs by substructure type in diachronic and topographical order.

Chapter 6 looks thematically at the security of the superstructure over the whole period and is also subdivided into two sub-chapters. The first considers the superstructures of royal tombs in chronological order, while the second deals with those of private tombs, which are once again grouped by substructure type in chronological order and by site.

Chapter 7 forms the conclusion of the research and draws the findings of chapters 3 to 6 together, examines the significance and implications of the study and recapitulates the part played by the architecture of tomb security within the wider context of the Egyptian tomb.

1.8 Contributions made by this research

This work presents an in-depth analysis of the architecture of tomb security in Egypt from the Predynastic Period until the early Fourth Dynasty by extrapolating data on the security features of published tombs from the whole of Egypt and gathering it together for the first time in one accessible database. Using the information assembled it has added new information to the current body of knowledge concerning the architecture of tomb security and has explained many of the underlying reasons behind their adoption. By thematically analysing these features in order to draw the conclusions it has also demonstrated that many aspects of the evolving architecture of the Egyptian tomb over this period, in both royal and private contexts–whilst subject to changing tastes, needs and ideologies–had originated as the result of the need to protect the tomb or improve its security, rather than the desire to monumentalise or express religious concepts.

2. Substructure and access route typology

In order to discuss the tombs throughout the book it is necessary to provide a typology that can be referred to when examining the substructure and access routes of a particular type of tomb. When considering the classification of the substructures in this work it was tempting to follow George Reisner's typologies for substructures espoused in his *The Development of the Egyptian Tomb down to the Accession of Cheops*[82] and *A History of the Giza Necropolis,* Vol. I,[83] which are often referred to in Egyptological publications. However, in practice his classification is complex and difficult to apply,[84] as Köhler points out when discussing the typology she has adopted for Early Dynastic substructures at Helwan.[85]

Due to the wide variety of substructures that are included in the catalogue, many of which have been published since Reisner's original classifications,[86] it has therefore been decided to broadly adopt Köhler's simplified typology,[87] and to expand and add to it within the tomb catalogue by describing pertinent features within the individual tomb description, rather than adhering to Reisner's extremely complex nomenclature and codifying every minute variation. Therefore, a chart has been prepared below that explains the basic typology adopted in this study, which also contains a concordance of Reisner's original classifications for comparison.[88]

2.1 Tomb types

This research divides tomb types into three categories, First, Type I tombs, whose substructures are usually a pit closed with either a backfill or wooden roof. These are subdivided into further classes by shape and the presence or lack of internal divisions or an external access route. Second, Type II tombs, whose substructures are entirely subterranean and necessarily accessed externally by a variety of slopes, stairs and shafts, or combination of these. Last, Type III tombs, whose substructures are usually constructed of masonry within a backfilled pit or superstructure and accessed by an enclosed sloping corridor.

This typology is applied to both private and royal tombs throughout the study, as until the end of the Early Dynastic Period royal and private practices are broadly similar, for example, a royal pit tomb with external entrance is still a Type ID substructure, or an entirely subterranean tomb accessed by a stairway, such as that of kings Hotepsekhemwy/Raneb at Saqqara remains a Type IIA. However, when the substructures of royal tombs become increasingly complex with the introduction of the pyramid in the Third Dynasty,[89] it becomes more difficult to maintain a common system. Therefore, rather than overcomplicate matters, instead of categorizing a substructure by a particular code (even though Reisner may have devised a classification in *his* typology), because of the limited numbers of royal tombs, the appropriate terminology is applied as necessary in the text when referring to a particular architectural feature, for example, a 'Type III entrance corridor', or a 'Type IIC shaft'.

2.2 Superstructures

A superstructure typology, such as that created by Reisner,[90] is not included since his exhaustive typologies seem to overcomplicate matters and do not add materially to the topic of this book. It being doubtful whether the architects of most of the tombs dealt with in this study were working to a common 'pattern book' when planning their construction. This was perhaps different in the later core cemeteries surrounding the pyramid of Khufu at Giza in the Fourth Dynasty, where the superstructures and necropolis were far more 'regulated' in their layout and appearance.[91] Therefore, the reader is referred to the individual description of each superstructure in the tomb catalogue and the accompanying superstructure charts.

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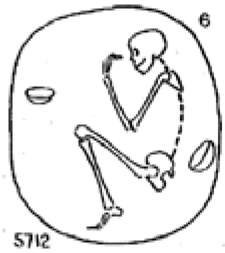
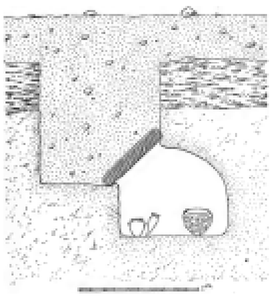
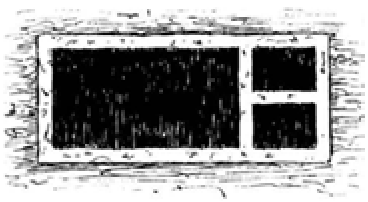
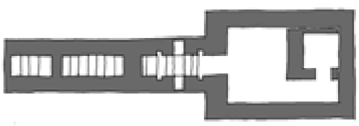
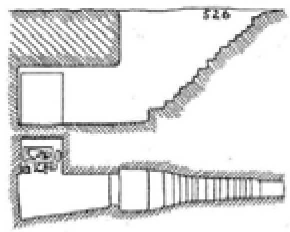
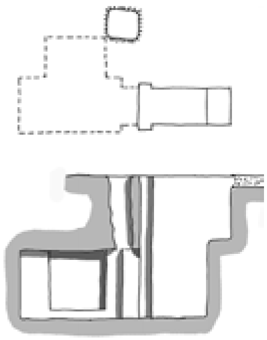
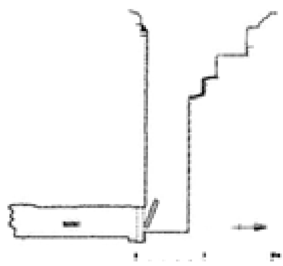
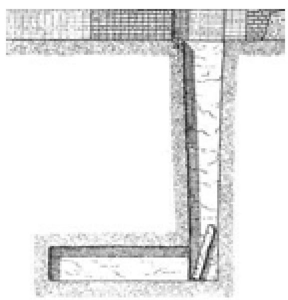
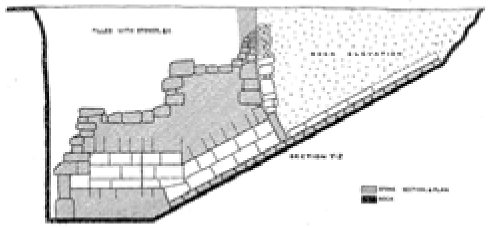
[82] Reisner 1936: 7–8 and 365–9.
[83] Reisner 1942: 87–103.
[84] An example of this complexity can be seen in Reisner's (1942: 87–103) typology of shaft types at Giza, where, not content with his previous single classification of a shaft with burial chamber as a 'Type VI' substructure with perhaps four sub-types 'a–c', in his Tomb Development (1936: 366–7), he then subdivided the shaft types into nine further basic types numbered 1–9, with subdivisions 'a–d' referring to the orientation of the burial chamber. Moreover, he included further subdivisions to this codification for the length of the connecting passage to the burial chamber, whether it sloped or not, and another for the height of the entrance to the burial chamber itself, and yet another for the burial chamber size and so on.
[85] Köhler writes (2008b: 124): '…while George Reisner's fundamental typology of early tombs (Reisner 1936) is certainly important for the understanding of the development of tomb architecture, we have noted, however, that the division into his many subtypes and their distinct distribution between the regions of Egypt may have overly complicated the picture. A key to understanding Early Dynastic private funerary architecture lies in the diversity and individuality of private tombs, especially those at Helwan, that tend to resist a rigid application of Reisner's typology. While his typology does apply in very broad terms, we sense it is more appropriate to refrain from devising too many subtypes and instead to acknowledge that the choice of architecture for a particular tomb was driven by individual preferences…'
[86] For example, the Early Dynastic cemeteries of Abu Roash excavated by Montet, and those of Helwan excavated by Saad and Köhler.
[87] See Köhler 2008b: 125–6, Table 1.
[88] Those listed in Reisner 1936: 7–8 and 365–9.
[89] For example, the Step Pyramid's main shaft/pit was originally accessed via a stairway that would be recognisable as a Type IIA stairway, similar to those used in many Second and Third Dynasty private tombs. Subsequent alterations changed the entrance to an underground passage accessed from within the pyramid temple that rendered the original access route largely redundant, making the pyramid's substructure and entrance route, like those of most of the early pyramids, a 'one off' design and unclassifiable.
[90] Reisner in *Tomb Development* (1936: 367–9) categorised at least twelve main types with further sub-types.
[91] Jánosi 2006: 48–59. Reisner (1942: 37–52) identified eleven types of superstructure at Giza with associated sub-types as follows: I a–b; IIa–b; III i–ii; IV i–iv; V; VI a–e; VII a–e; VIII a–e; IX a–e; X a–e and XI a–e; amounting to forty types in all.

Substructure Typology - Type I pit tombs			
Illustration	**Tomb type**	**Description**	*Reisner Type*
 Brunton and Caton Thompson 1928, pl. IX	**Type IA**	Simple ovoid pit, body placed in contracted position and back-filled to close.	*Type Pdi.*
 Reisner 1936, fig. 28.	**Type IB**	Rectangular open pit, roofed or back-filled to close. Lined or unlined.	*Type IA, ia and IC.*
 De Morgan 1909, fig. 130.	**Type IB/SC*** * **'**SC' refers to side chamber	Pit with excavated subterranean loculus at base. Loculus blocked and pit backfilled to close	*Type ic.*
 Junker 1912, Abb. 22.	**Type IC**	Open pit with internal subdivisions, roofed or back-filled to close. Lined or unlined.	*Type IB, IB (1), IB (2), ib(1) and ib(2).*
 Drawn by the author after Saad 1947, pl. XXVII.	**Type ID**	Open pit lined or unlined and roofed to close, accessed by stairway or slope.	*Type IIA or IIB, IIB(1), IIB(2) or IIC.*

Substructure Typology - Type II subterranean tombs			
 Petrie and Brunton 1924, pl. LXXXI.	**Type IIA**	Excavated subterranean chamber(s), accessed by stairway or slope.	*Type IV, IVA(1) and IVA(2).*
 Drawn by the author after Saad 1957, plan U.	**Type IIB**	Excavated subterranean chamber(s), accessed by 'deep stairway' with 1–3 steps.	*Type IV, IVA(1) and IVA(2).*
 Bárta 2010, fig. 2.2.	**Type IIA-C**	Excavated subterranean chamber(s), accessed by combined stair and shaft (stair-shaft).	*Type IVB.*
 Emery 1970, pl. XX.	**Type IIC**	Excavated subterranean chamber(s) accessed by shaft.	*Type VI (a-c).*

Substructure Typology - Type III tombs			
 Reisner 1936, fig. 100.	**Type III**	Masonry built subterranean chamber(s) in excavated pit accessed by sloping masonry corridor	*Type VA.*

3. The early precursors of tomb security

This chapter traces diachronically the early development of tomb security in Ancient Egypt from the Late Palaeolithic (*c.* 21000–12000 BC) up until the end of the Naqada IIIA period (*c.* 3300–3150 BC), to see what effect, if any, these security precautions had upon the broader architecture of the Egyptian tomb. It concomitantly traces the development of grave architecture as a whole within the context of the various cultures concerned to 'set the scene' for the thematic analysis undertaken in the chapters that follow.

The discussion in this chapter will also extend its remit much further south to include examples from Lower Nubia, where there are examples of tomb security arrangements that help develop the topic, and thus merit their inclusion in this chapter.

Due to lack of adequate information, many tombs in the discussion are not included in the catalogue, but when the Naqada II period is reached, when sufficient data exists to permit a tomb's inclusion, it can be located by referring to the catalogue number in the text shown in bold with square brackets. Tombs that are mentioned, but not included in the catalogue, are marked **[NIC]**.

3.1 The Late Palaeolithic: an early beginning

The earliest intentional burial discovered in the Nile Valley appears to be that of a child found at Taramsa Hill near Qena, which dates to the mid Middle Palaeolithic period (*c.* 55000 BC), and consisted of little more than a scrape in the ground hastily filled with gravel.[92] Later graves from the Upper Palaeolithic Period have also been excavated at Nazlet Khater 4 (*c.* 31000 BC), in Upper Egypt and Wadi Kubbaniya (*c.* 19000 BC) near Aswan.[93]

It is not until the Late Palaeolithic Period (*c.* 21000–12000 BC) that we have perhaps the first evidence of humans in the Nile Valley taking any further steps to protect their dead other than providing a back-filled pit by way of burial. It occurs in some graves found in a cemetery in Lower Nubia. The area, known as Site 117, is situated 3 km north of Wadi Halfa on the east bank of the Nile, and is just south of Jebel Sahaba.[94] Here, some 12000 to 14000 years ago fifty-eight bodies were interred in shallow oval pits. In addition to their soil backfill, in the majority of the burials thin undressed flat sandstone slabs (Fig. 1), varying from 0.25 to 0.5 m in width, had been used to cover the graves.[95] These burials indicate a desire to protect the interment beyond the level one might ordinarily expect at this early date and are indeed the first instance of a culture doing so in the area of the Upper Nile,[96] as most early graves usually consisted of no more than a shallow pit scooped out of the desert that was backfilled and perhaps covered with a mound.[97]

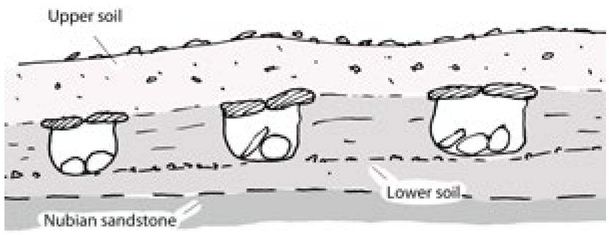


Figure 1 Sketch section of the typical arrangement of stone slabs over the graves at Site 117 at Jebel Sahaba (Drawn by the author after Wendorf 1968, fig. 4.)

As for the purpose of the slabs, one possibility is that they were placed there to protect the burials from the depredation of wild animals, hunting dogs or possibly wind erosion, as due to their shallow nature the graves would have been inherently vulnerable to disturbance. Alternatively, the slabs may have been placed to simply form a memorial, but if their purpose was only that, then there would be no need to cover the entire grave itself, as a simple grave marker would have sufficed.

3.2 The Neolithic and Predynastic Periods

The Faiyum Neolithic Culture

The appearance of this culture occurred in the north of Egypt shortly before 5000 BC, suggesting a complete change in the nature of habitation in the Nile Valley, from what was fundamentally an Epipaleolithic hunter-gatherer society, to an economy based mainly on the production or obtaining of food.[98] However, this society seems not to have established any permanent settlements and rather to have relied on transient cereal cropping and fishing.[99] As a result no evidence has been found of any cemeteries or burials from excavations of the lakeside settlements.[100]

Merimde Beni Salema

Evidence of the very first burials associated with settlements (*c.* 5000 BC), was found at one of the earliest

[92] Vermeersch *et al.* 1998: 475–8.
[93] Wendorf and Close 2005: 12–4.
[94] Midant-Reynes 2000: 63–4.
[95] Wendorf 1968: 954–7.
[96] Geus 1991: 57; Bard 2007: 78.
[97] Dodson and Ikram 2008: 31.
[98] Butzer 1976: 9.
[99] Wenke 1989: 136.
[100] Arkell 1975: 146.

Figure 2 A shallow pit burial at Merimde with the body in a contracted position.
(Junker 1929, Taf. IIa) Courtesy of the Österreichische Akademie der Wissenschaften.

established communities in Egypt that was situated some thirty-seven miles to the northwest of Cairo at Merimde Beni Salema in Lower Egypt.[101] For about one thousand years the inhabitants interred their dead in graves, most probably within the abandoned remains of their settlements.[102] When excavated the graves were found to consist of Type IA shallow oval pits (Fig. 2) in which bodies were placed in a contracted position wrapped either in skins or mats, and sometimes covered with the vestiges of plant remains before backfilling.[103] No other attempt appears to have been made to offer additional protection or security to the burial.

The Badarian Culture

In Upper and Middle Egypt the earliest phase of the Predynastic era is the Badarian, *c.* 5000–4000 BC, named after the Middle Egyptian site at el-Badari.[104] The main sites were Deir Tasa, Hemamieh, Matmar and Mostagedda, which most likely were settled by *c.* 4000 BC.[105] During the Badarian period, the typical burial was made in a Type IA oval or circular pit, with the contracted body being swathed in a mat or goatskin (Fig. 3) and accompanied by an assortment of grave goods.[106] After interment had taken place, the grave would be backfilled

[101] Grajetzki 2003: 1.

[102] Kemp 1968: 22–33.

[103] Midant-Reynes 2000: 116.

[104] Lacovera 1988: 20.

[105] Wenke 1989: 137.

[106] Adams 1988: 17.

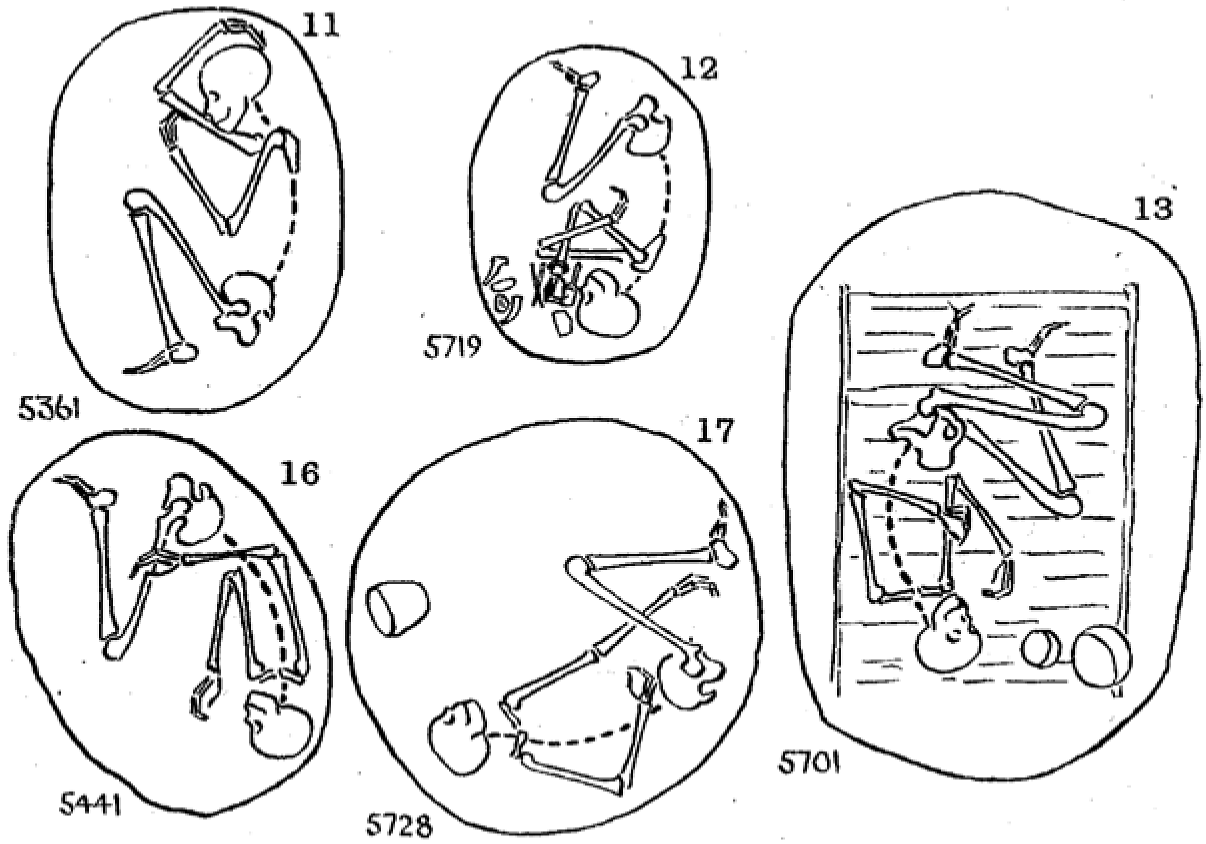


Figure 3 Assorted Badarian graves.
(Brunton & Caton-Thompson 1928, pl. IX) Courtesy of the Petrie Museum of Egyptian Archaeology.

Figure 4 Graves with 'mounding' in 1918 at the Canadian military cemetery at Brookwood. (Courtesy of the Brian Parsons Collection)

and it is generally thought, covered with a mound of gravel or sand.[107]

From the viewpoint of tomb security, Reisner suggested that the function of a mound, during the Predynastic period, might have been both to provide further protection for the burial itself and to act as a focus for the provision of cult offerings for its occupant.[108] He further argued that the mound may have provided the prototype upon which the majority of later Egyptian grave superstructures were based.[109]

Although a mound of gravel would hinder a grave robber or foraging animal to an extent, the purposes behind this practice may have initially been utilitarian. Firstly, the excess soil from the pit would have been greater in volume than that necessary to backfill it, due to the addition of the body and grave goods, and thus was simply piled on top. Secondly, the mound may have been left there so that the extra soil compensated for the otherwise inevitable depression caused by the settling of the backfill over the grave's surface. Such depressions in graves are well known and caused by two factors. 'Primary depressions' caused by settling of the backfill in the pit and 'secondary depressions', which are caused by the decomposition and collapse of the abdominal cavity and the concomitant release of gases.[110] This 'mounding' can be seen in the case of modern graves (Fig. 4) which, once dug and subsequently closed, have the excess fill piled up over the burial to allow for settlement.[111] In addition, the mound also minimises the problem of cracking along the edge of the pit where the looser new fill breaks away from the compacted surround.[112]

Concerning Predynastic burials, the presence of such a mound is still matter of debate,[113] and whether this architectural feature was retained or levelled out is unknown and it is not easy to ascertain today whether it existed at all.[114] In either case, there is ample evidence that contemporary grave robbery was taking place, even at this early date, and was developing into one of the most unfortunate aspects of ancient Egyptian culture.[115] At el-Badari, Brunton reported that a grave at Cemetery 5100 'contained a plundered female body, showing that the robbing of these graves began soon after the actual interments'.[116] Indeed, Anderson, in her quantitative analysis of the Badarian burials excavated by Brunton, has demonstrated that grave robbers were regularly robbing the 'highly visible tombs' of high status individuals during this period. Her statistics show that larger graves possessing in excess of three grave goods were more frequently either robbed or 'disturbed' than those containing less, and that the looting was actually occurring during the Badarian period itself.[117] Therefore, it is evident that tomb robbers were targeting the wealthier graves and becoming a problem even at this early date. As a result it is tempting to wonder whether from the point of view of the security of the tomb, such a 'tell-tale' mound was all that desirable in the long term, and to speculate that perhaps the grave was left to settle out level, as in the cemeteries of today.

[107] Reisner 1936: 1–3; Badawy 1954: 26; Dodson and Ikram 2008: 31.
[108] Reisner 1936: 245.
[109] Reisner 1936: 367.
[110] Dupras *et al.* 2006: 109.
[111] Personal communication by John Clarke of Brookwood Cemeteries Ltd (17th March 2009).
[112] Connor 2007: 109.
[113] Reisner 1936: 1–3; Badawy 1954: 26; Dodson and Ikram 2008: 31.
[114] O'Connor 2009: 153.
[115] Hoffman 1990: 143.
[116] Brunton and Caton-Thompson 1928: 9.
[117] Anderson 1992: 57–61.

Some of these burials excavated by Brunton at el-Badari were found to contain sticks and matting at the sides of the graves, which he concluded might have been the remains of some sort of collapsed 'roofing', intended to prevent sand and gravel from falling on the body. These, Brunton suggested, may have been made into a type of rigid 'tent' to keep the body free of sand, and would explain the apparent lack of any other roofing arrangements in the graves.[118] Another possibility is that this sort of 'tent' structure may have also been introduced to pre-empt other post-interment problems likely to arise with a burial. First, it may have been intended to prevent disruption by animals, which is a common cause of disturbance in burials, as scavenging carnivores, omnivores and rodents are all known to consume corpses.[119] Secondly, perhaps it formed a secondary physical barrier in addition to the backfill to deter the intrusions of grave robbers. Lastly, it could also have circumvented the need for a 'giveaway' mound over the pit, by obviating the inevitable 'depression' over the grave. If we accept this latter scenario, the mound would then no longer be required to replace the settling and compacting fill of the grave pit and would, as a result, offer additional security from the risk of being located by tomb robbers. Alternatively, if the mound *was* indeed considered to be a desirable feature of the grave, and concealment was not an issue, the 'tent' may have possibly been installed as a support to prevent the mound's collapse from the aforementioned effects of primary depression.

El-Omari

In Lower Egypt, just north-east of Saqqara and located at the base of Jebel Tura near Helwan, three settlement sites and two cemeteries dating to around 4000 BC mark the remains of the el-Omari culture.[120] Contemporary with the late phase of Merimde Beni Salema, at el-Omari the dead were buried in Type IA shallow graves or into the remains of old storage pits adjacent to the settlement or the individual habitation.[121] In the graves, some of the bodies found were covered in reed mats and occasionally accompanied by a pot or a sporadic flint. The interments themselves were backfilled with sand or domestic debris. Noteworthy is that a number of the graves were covered by mounds of stones. The limestone blocks used in their construction were randomly placed and varied in size and number, some being quite large, such as in graves F1–11 (Fig. 5).[122] It may be that these stones were intended to protect the grave from disturbance by erosion, animals or robbers; their like is not seen again until the Early Dynastic period, where they are found at Abu Roash.[123]

Figure 5 Burials at el-Omari Cemetery F, showing heaps of stones covering the graves.
(Debono 1990, Taf. 42.1, Abb. 5)
Courtesy of the DAI Cairo.

Figure 6 Burial with grave goods at Maadi, grave No. MA45.
(Rizkana and Seeher 1990, pl. III)
Courtesy of the DAI Cairo.

The Buto Maadi Culture

Also in Lower Egypt, at the start of the fourth millennium BC, evidence of another distinct, but slightly later culture appears with the Buto Maadi Culture, the sites of which are located to the east of the Nile, south of Cairo.[124] The major evidence comes from the three main cemeteries at Maadi, Heliopolis and Wadi Digla where, unlike at Merimde Beni Salema, cemeteries were distinctly separated from the settlement. The 600 burials recorded so far have shown no evidence of any sophisticated grave architecture (Fig. 6), as the majority of the interments were solitary burials in Type IA simple oval pits.[125] It appears from vestiges of wood found in some of the graves that a few of the bodies discovered may have been wrapped in mats and possibly covered

[118] Brunton and Caton-Thompson 1928: 18 and 20.
[119] Connor 2007: 86.
[120] Hoffman 1990: 192.
[121] Mortenson 2005: 717.
[122] Debono and Mortensen 1990: 72–5.
[123] See Klasens 1957: 64–5, Plates VIII.1–2 and IX.1

[124] Seeher 1999: 455.
[125] Rizkana and Seeher 1990: 97; Seeher 1992: 226–8.

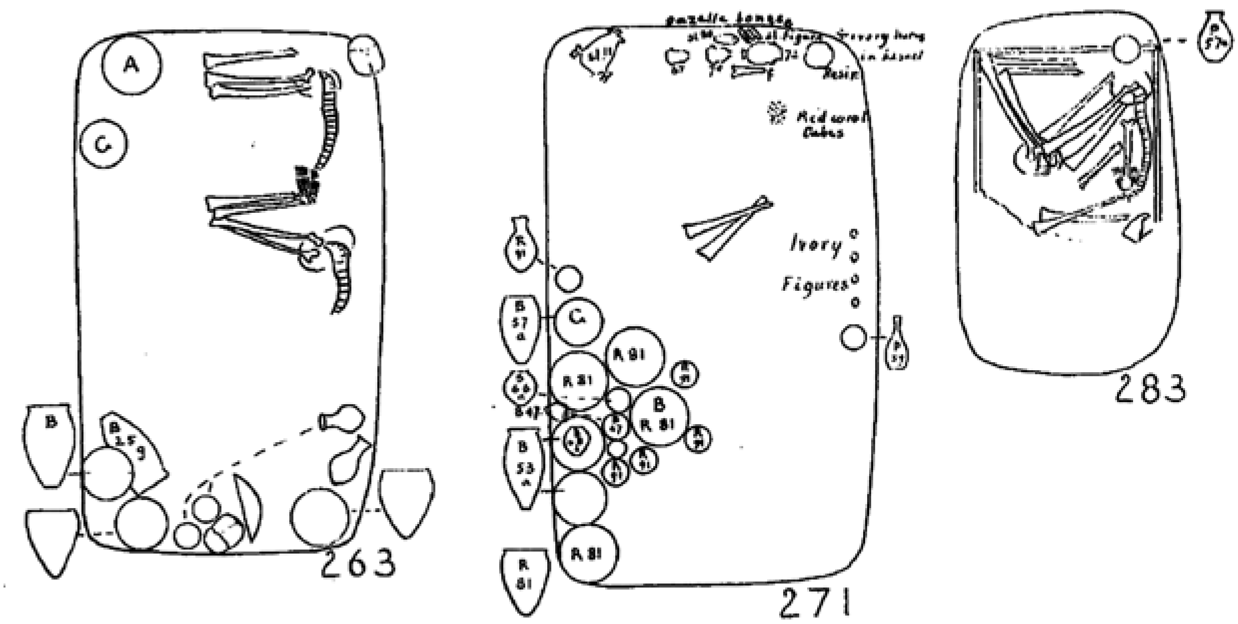


Figure 7 Rectangular shaped graves from Naqada.
(Petrie and Quibell 1896, pl. LXXXIII)

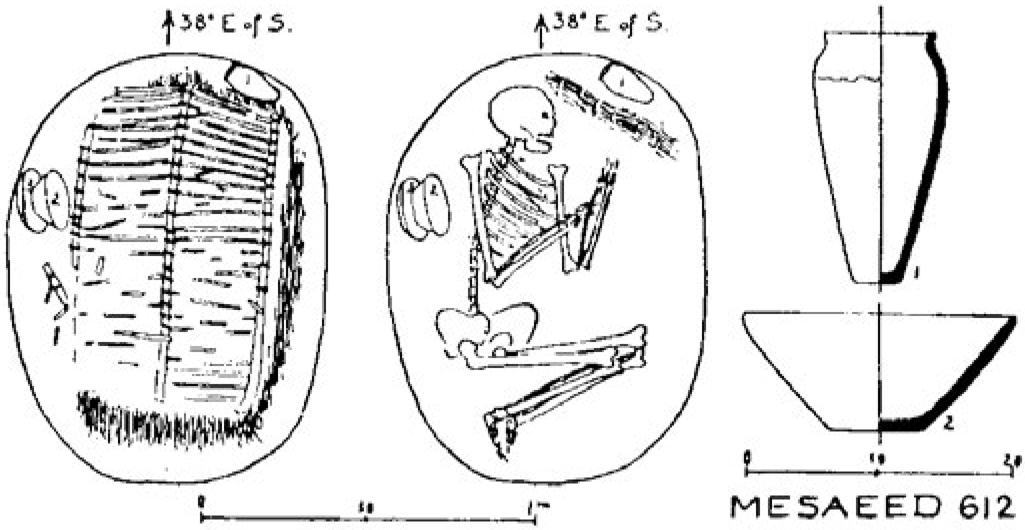


Figure 8 Wood and stick 'roofing' (which Reisner describes as a 'tray') in tomb 612 at Mesaeed, which by its pottery dates to Naqada I-II (For the pottery see MFA Boston Accession numbers: 13-3-1140 and 13-3-1167)
(Reisner 1936, fig. 182)

in branches.[126] However, unlike their contemporaries in Upper Egypt and Nubia, whose burials were now becoming progressively more elaborate, these graves are notable for the comparative paucity of grave goods or personal adornments.[127] In this case no attempt seems to have been made to improve the security of the grave, other than the aforementioned branches, which may have been placed there to thwart scavenging animals.

Naqada I

The next phase of the Predynastic era in Upper Egypt is the Naqada I period, which dates to *c.* 3900–3650 BC.[128] The period was named after the largest site of Naqada, and the majority of related sites can be found along the extent of the Nile from Hierakonpolis, in the south, to Abydos in the north. Although there are other sites at el-

[126] Rizkana and Seeher 1990: 98.
[127] Wengrow 2006: 36.
[128] Hassan 1988: 138.

Badari and the Faiyum, the three key centres are located at Abydos, Hierakonpolis and Naqada.[129]

The majority of burials were simple Type IA oval or Type IB rectangular graves,[130] covered by rudimentary roofs of wood branches and twigs (Figs. 7 and 8) supporting a covering of soil.[131] Petrie and Quibell described the typical tombs as: 'vertical pits, with the body laid on the floor; and the pit in all wealthy tombs was roofed over with beams and brushwood'.[132] The inclusion of these roofs in the grave suggests that the previous discussion regarding the security aspects of the Badarian period applies here too, as it may be that the roof was designed to thwart tomb robbers and scavenging animals, as well as prevent 'primary' and 'secondary depressions'. Therefore, it could be regarded as another form of defensive measure to protect the tomb itself. In addition, the need to support a grave mound, if it existed, should also not be excluded from the realm of possibilities.

Figure 9 A typical section through a late Naqada II grave lined with mud-brick. It is shown here with a wood and brick roof, covered by a mound. (Drawn by the author)

Naqada II

In the Naqada II period (*c*. 3650 to 3300 BC[133]) the majority of burials take the form of the now ubiquitous grave pit, each containing a single body in a crouched position.[134] That, during this period, a number of ordinary, non-elite, graves were also being systematically targeted by robbers is particularly evident from an excavation at Cemetery HK43 at Hierakonpolis, which is dated to Naqada IIA–IIC. Here, the pattern of soil disturbance indicates that the robbers knew exactly where individuals were buried, and that what they were searching for (possibly a copper necklace) was situated around the deceased's neck. In some cases a cut in the fabric and matting surrounding the neck is the only indication that they were at work at all, such was the accuracy of their digging.[135] The likelihood that the graves at HK43 may have been marked with a mound of sand or stones, of which no trace remains today,[136] may just have assisted the robbers in locating their booty.

It is during Naqada II that improvements in construction methods in tombs of the elite also become increasingly discernable, for example, grave walls in some of the more sophisticated tombs were now reinforced with liners. These, when present, were either made of a wattle of sticks and wicker, or wooden boards that kept the surrounding soil or sand away from the body. In both cases the tomb would have been roofed over with mats or sticks and possibly plastered with mud.[137] Whilst linen shrouds or mats were generally preferred to animal skins for wrapping the body during this period, the appearance of 'wealthier' burials also signals the first emergence of coffins. Initially these were made of basketwork, later also clay and eventually wood.[138] Additionally, for perhaps a select few, the use of brick linings in graves was now becoming increasingly frequent,[139] the function of which was to consolidate the sides of the grave, prevent the collapse of the surrounding soil or gravel matrix, and possibly support a roof and perhaps a mound (Fig. 9).[140] In some cases, however, roofs were also constructed without a brick liner to support them, as in the unlined tomb B101 in Cemetery B at Abadiya **[NIC]**,[141] and tombs U-133 and U-149 in Cemetery U at Umm el-Qaab **[NIC]**.[142] In addition, depending on a mud-brick wall's thickness, it may have provided a degree of protection against lateral tunnelling.[143] One of the purposes behind many of these developments, which permitted a larger grave to be constructed, may have been the further segregation of the body from contact with the surrounding ground itself,[144] and to provide additional storage space for grave goods, which were now more often placed further away from the body.[145] However, much as these innovations may have seemed desirable at the time, one unfortunate consequence that resulted from this enlarged capacity for grave goods may have been that of attracting more tomb robbers.

Verification of these developments and their increased levels of sophistication can be seen, for instance, at Naqada with the appearance of a differentiated elite burial

[129] Bard 2005: 31.
[130] Castillos 1982: 173–8.
[131] Hoffman 1990: 146.
[132] Petrie and Quibell 1896: 18.
[133] Hassan 1988: 138.
[134] Midant-Reynes 2000: 187.
[135] Friedman 1997: 2; 1998: 5.
[136] Friedman 2008a: 20.
[137] Ayrton and Loat 1911: 8; Reisner 1936: 1; Baumgartel 1960: 125.
[138] Midant-Reynes 2000: 187.
[139] Wengrow 2006: 122.
[140] Podzorski 2008: 98.
[141] Petrie and Mace 1901: 33.
[142] Dreyer *et al.* 1996: 15–21; Görsdorf, Dreyer and Hartung 1998: 643.
[143] La Loggia 2009: 183.
[144] Spencer 1982: 33.
[145] Brewer 2005: 95.

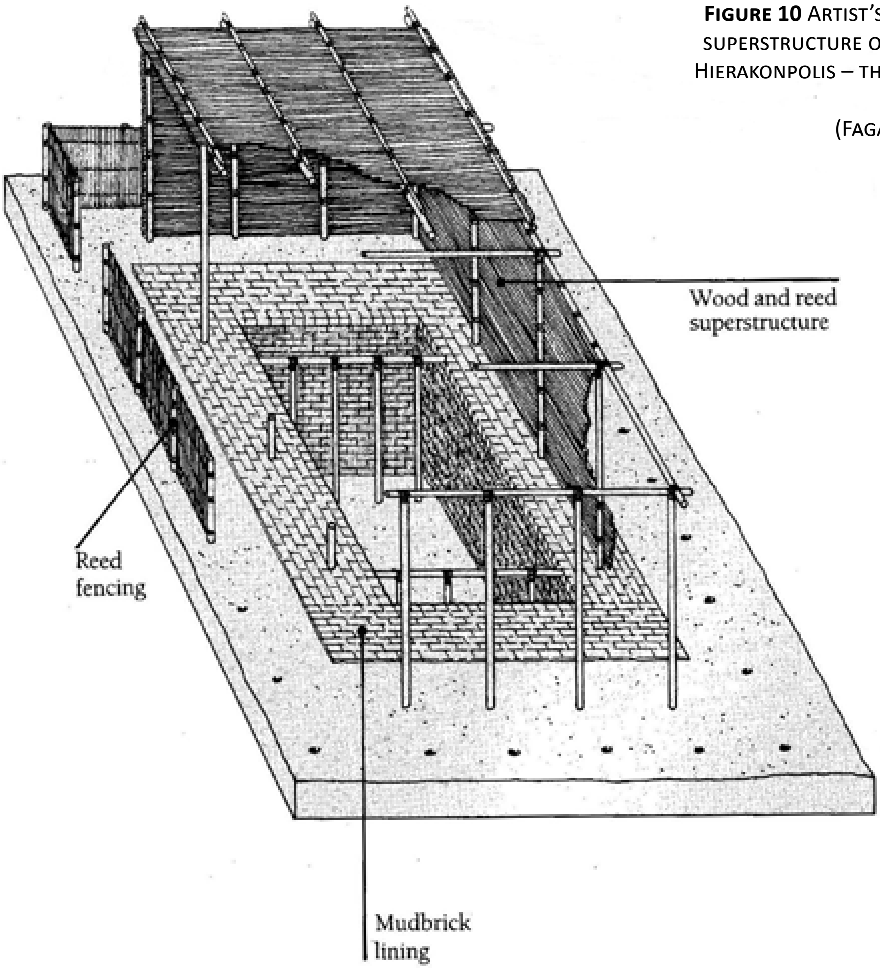


Figure 10 Artist's impression of a lightweight superstructure over tomb 1 at Locality HK6 at Hierakonpolis – this particular example dates to Naqada IIIA.
(Fagan 1992, p. 74, A)

ground known as Cemetery T, dating to Naqada II.[146] The burials located there were generally larger than those of the adjacent non-elite cemeteries and were accompanied by numerous grave goods,[147] notably, the Type IB tombs T10, T15, T20 and T23 **[all NIC]** in which brick linings were employed that no doubt supported beams bearing wooden roofs.[148]

While there is no evidence of a roof *per se* over its burial pit, perhaps the earliest example of an elite or royal grave, and certainly the largest, is that of the Type IB tomb 23 **[347]** found in the elite cemetery at Locality HK6 at Hierakonpolis, which dates to Naqada IIA–B. It possesses one of the first examples of a superstructure and funerary enclosure (in wood and wicker) found to date.[149] Although this superstructure is not definitely identified as a 'temple' for its associated tomb, evidence from its surroundings demonstrates that this tomb definitely belongs to a long established 'ritual precinct'.[150] While these types of decorated lightweight superstructures may not have offered much physical protection to the burial itself (Fig. 10), one might suggest that from the point of view of security, the location of the tomb within a sacred space such as the cemetery would have no doubt offered a degree of protection from disturbance and robbery, at

Figure 11 Tomb 26 at Cemetery HK6 at Hierakonpolis, the ledge for supporting the roofing beams can be clearly seen, along with the surrounding postholes.
(Friedman 2008b, fig. 11) Courtesy of the Hierakonpolis Expedition.

146 Kemp 1973: 42.
147 Bard 1994a: 112.
148 Kemp 1973: 41–2.
149 Adams 2004: 47–50; Friedman 2005: 4–5; 2006a: 7. Fagan (1992, p. 74, A) has published an excellent artist's impression of a lightweight superstructure over tomb 1 at Locality HK6 at Hierakonpolis **[NIC]**, which dates to Naqada IIIA – see fig. 10.
150 Friedman 2008a: 14–8 and 26.

least in times of political stability, when presumably it would have been policed in some form.[151]

A further example of this type of tomb complex, perhaps dating to Naqada IIB, can be seen from the excavations of the newly discovered Type IB tomb 26 **[348]**, also at cemetery HK6. This has revealed remains of wooden boards preserved on a ledge running around the perimeter of the tomb (Fig. 11), suggesting that, like the tombs at Naqada Cemetery T, in this case the burial chamber also had a roof.[152]

Whether these roofs were topped with a mound, perhaps retained with a wooden or wicker wall as Reisner speculated,[153] or surmounted with a lightweight superstructure, as is suggested existed over the earlier tomb 23 at Hierakonpolis, is unknown.[154]

Slightly later in date, and contemporary with the other elite tombs from Cemetery T at Naqada,[155] is the famous decorated tomb 100 at Hierakonpolis **[349]**,[156] which dates to Naqada IIC[157] and was excavated in the 'hard desert sand'. This Type IC tomb almost certainly had a wooden roof, as did many of its neighbours, such as tomb 500 **[350]**, which when excavated, still had the remains of wooden beams and posts to support roof planking.[158] Moreover, the location and architecture of tomb 100, some two kilometres from the elite cemetery HK6, may demonstrate, in addition to its prototypical decorative scheme, a security response to an external threat. Evidence of burning from recent excavations of the complexes of tombs 23 and D9 in Cemetery HK6, has led Friedman to suggest that the relocation of elite or royal burials from their traditional location at HK6 to the cemetery of the Painted Tomb, and the concurrent moving of the previously painted superstructure, decoration and 'chapel' underground, may have been a response to the deliberate burning and destruction of the lightweight superstructures and funerary artefacts.[159] This damage was possibly caused by the destructive results of an unknown political upheaval or some other catastrophic event.[160] That instability and disorder existed during this period is evident from the investment in fortifications for 'royal' cities, such as Hierakonpolis, Naqada and Abydos, which seems to demonstrate the response of these communities to the stimulation of frequent threats.[161]

This change in the level of investment in the above ground to the subterranean complex could be regarded as marking one of the earliest tangible responses to a threat to the security of the elite or 'royal' tomb. Therefore, it may represent a change in approach towards the design of high status and elite tomb architecture from this period onwards, as it would appear that security considerations had now necessarily become an important factor in the future development of tomb design.

Although the incorporation of a roof in a tomb's design was undoubtedly successful in providing concealment and protection for the body and its grave goods, in the long term it would actually prove counterproductive. This was probably because a roof, however strong, made it actually easier to rob the contents, as it was now simply a case of tunnelling sideways into the void of the grave cyst,[162] thus avoiding the roof itself, and then looting it in comfort, rather than having to excavate the whole burial pit of its backfill.[163]

Naqada IIIA to the start of Naqada IIIB

While undoubtedly the simple pit burial remained the norm for the non-elite as before,[164] it is during this period, which begins *c.* 3300 BC,[165] that further developments in high status interments become evident. One example is the mud-brick lined Type IB tomb 11 **[351]** in the elite cemetery HK6 at Hierakonpolis that dates to Naqada IIIA1–2, which had been robbed via trenches in the north-east and south-west edges of its pit that had been deliberately dug to avoid its roof.[166] Similarly, nearby tomb 16 **[352]**, whose restored structure dates to Naqada IIIA2,[167] was fully lined with 'Flemish bonded' bricks and probably had a large central wooden beam of cedar running the length of its burial chamber to support a roof.[168]

Corresponding to and indeed, contemporary with tombs 11 and 16, is the famous Type IC tomb U-j **[325]** in Cemetery U at Umm el-Qaab, which has been dated to Naqada IIIA2.[169] According to U-j's excavators, the layout of this rectangular, brick lined and multi-chambered tomb may have been modelled on a small palace of the period (Fig. 12). It still possesses the vestiges of its roof, made

151 That HK6 probably remained the focus of ongoing ancestor veneration and cult for a considerable time is evident from beer jars found at the site that date to at least the Third Dynasty (Friedman 2008c: 11).
152 Friedman 2008b: 1178–9.
153 Reisner 1936: 5.
154 Friedman 2008a: 18; Friedman, van Neer and Linseele 2011: 187.
155 Kemp 1973: 43.
156 Porter and Moss 1937: 199.
157 Figueiredeo 2004: 19.
158 Quibell and Green 1902: 20–2.
159 Friedman 2006b: 11–2; 2008a: 22; 2008b: 1189 and n. 33.
160 Personal communication by Renée Friedman (7th May 2009).
161 Williams 1994: 278.
162 As for example in the slightly later Tomb 11 discussed immediately below.
163 Spencer 1982: 34.
164 Lacovera 1988: 20; Jánosi 1999: 27; Grajetzki 2003: 4; Dodson and Ikram 2008: 31.
165 Hassan 1988: 138.
166 Adams 1996: 13, fig. 6
167 The tomb originally dated to Naqada IC–IIA, but had a newer brick lined tomb inserted within its old structure (Friedman, van Neer and Linseele 2011: 159).
168 Adams 2004: 41–2. The tomb was surrounded by fence posts of unknown date, like much of the rest of HK6 (Friedman, van Neer and Linseele 2011: 160); recently discovered postholes have suggested that it originally may have been flanked by an aboveground offering chapel dated to Naqada IC–IIA (Friedman 2011: 4–5).
169 Dreyer 1998: 17.

Figure 12 Tomb U-j at Umm el-Qaab showing its thick mud-brick liners and their position below the ancient desert levels.
(Dreyer 1998, Taf. 3b) Courtesy of the DAI Cairo.

of layers of mat and plastered mud-bricks supported by acacia log beams of between 0.15–0.2 m in diameter, which overhung the grave pit by between 0.2 and 0.35 m.[170] The existence of these layers of roofing material and the location of the top of the 0.45 m thick mud-brick liner at 0.6 m below the original desert surface[171] suggests a roof and accompanying backfill of substantial dimensions, which together with the grave's liner, were intended to offer a considerable degree of security for its occupant, who was interred in a wooden shrine in the largest of the chambers (no. 1) and accompanied by numerous grave goods.[172] Therefore, it is possible that, as in the case of tomb 100 at Hierakonpolis, we may be seeing for security reasons a further development of the move underground of the earlier complex superstructure arrangements seen in 'high status' tombs. The return of such superstructures in royal contexts as a 'model palace' above ground does probably not occur again until the reign of Hor-Aha and his successors at Umm el-Qaab in the form of their associated funerary enclosures at nearby Abydos North.[173]

While these developments signal the appearance of larger and more complex elite or high status graves during this period, also of specific interest to this discussion are the contemporary graves just to the north of Hierakonpolis across the Nile on the east bank at El-Kab. Here the remains of a Naqada IIIA cemetery, containing nearly fifty tombs, has been discovered, together with a lesser number of Naqada IIIB–D graves,[174] some of which incorporate security related features. Some of the most important graves (gauged by tomb size and value of the funerary goods) are Type I pit burials that incorporate undressed sandstone slabs. Rectangular in form, these tombs vary in their use of the stone. The slabs were either used to partially line the smaller graves, or as coverings for the graves themselves, where the excavators note that their placement preponderated over the funerary goods.[175]

Of particular interest from this site are two large graves dating to Naqada IIIA2.[176] First, no. 69 **[341]**, which although disturbed, was found partially covered with two stone slabs, the largest one of which was 1.4 m long × 0.3 m wide × 0.14 m thick.[177] Secondly, in much better condition, and undisturbed by tomb robbers, was the larger of the graves, no. 85 **[342]**, which had been roofed over entirely with four large sandstone slabs (dimensions not available) after the grave was backfilled (Fig. 13).[178] Although, the use of stone like this is not generally characteristic for tombs of this period,[179] it provides an interesting addition to the emerging battery of defensive measures in Egyptian tombs. The added benefits of using stone in this fashion to provide increased security are obvious. Whilst Hendrickx has acknowledged that the function of the stones at this site may have been to also act as grave markers, the sheer weight and solidity of the slabs themselves would have provided a physical barrier to the depredations of tomb robbers. Indeed the effectiveness of their use in grave no. 85 is attested by the undisturbed state of its contents, which were found intact. [180]

Concurrently, in Lower Nubia security arrangements similar to those at El-Kab were utilised for the burials of the so called 'princes' of Seyala, at Cemetery 137,[181] half a kilometre from Seyala at Naga Om Agag. Here three generations of nobles and their retainers belonging to the Late A-Group culture, which dates from Naqada IIIA1 to Naqada IIIA2, had their tombs dug into the local clay and alluvium on the east bank of the Nile.[182] Like some of the tombs at El-Kab, they were also roofed with 'sandstone slabs of considerable size and length'.[183] The largest of

[170] Dreyer 1992: 295–6; 1998: 4–6.
[171] Dreyer 1998: 4.
[172] Dreyer 1998: 7–9.
[173] Dreyer 1998: 19.
[174] Wengrow 2006: 154.
[175] Hendrickx and Van Rossum 1994: 149 and 151.
[176] The associated pottery dates both the burials to Naqada IIIA2 (Hendrickx and Van Rossum 1994: 215).
[177] Hendrickx and Van Rossum 1994: 186.
[178] Hendrickx and Van Rossum 1994: 194.
[179] The use of stone to form a protective roof is more common during the First and Second Dynasties, for example, there are small Type I tombs from Abu Roash dating to Naqada IIIB-C1, such as tombs 363 **[NIC]**, 393 **[NIC]** and 394 **[NIC]** in Cemetery 300 (Klasens 1959: 34, Pl. XIX. 1) and the slightly later Naqada IIID tombs 820 **[NIC]** and 836 **[NIC]** from Cemetery 800 (Klasens 1960: 72). From the Second Dynasty there are numerous examples in Upper Egypt, for example, the stone roofed tombs in the catalogue from Es-Seba'iya, El-Qara and El-Masa'id **[339 and 354–5]**, and tombs 4370, 4774 and 4379 **[all NIC]** from Cemetery 3500 at Naga el-Deir (Mace 1909: 20–1, 59–60 and 65). Additionally, there are two further small stone roofed graves at El-Kab, nos. 76 **[NIC]** and 78 **[NIC]** (Hendrickx and Van Rossum 1994: 208–9, 214, pls. LVIII and LXI), which date to Naqada IIIC1.
[180] Hendrickx and Van Rossum 1994: 151–2.
[181] Porter and Moss 1995: 52.
[182] Smith 1994: 361 and 372.
[183] Firth 1927: 201.

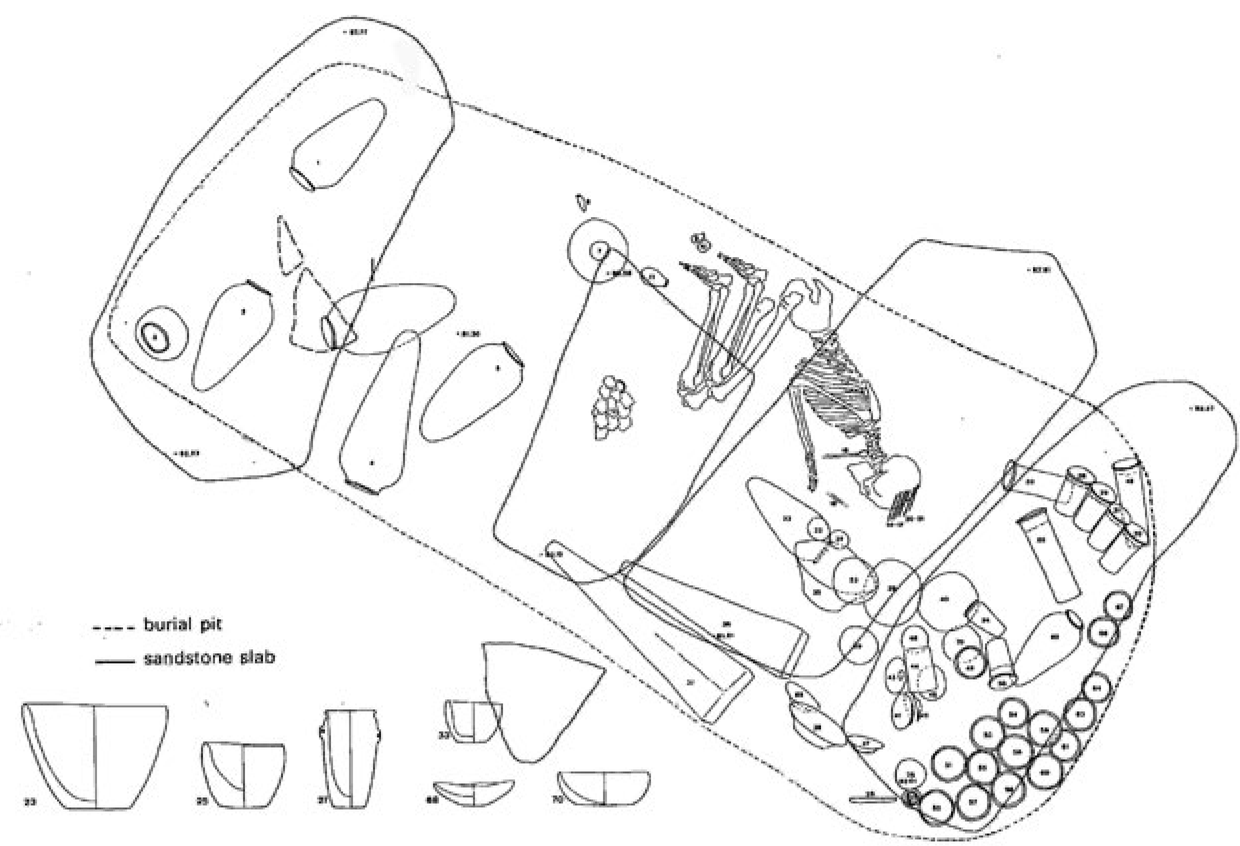


Figure 13 Tomb No. 85 at El-Kab, showing the large sandstone slabs laid over the grave, the pottery dates the burial to Naqada IIIA2.
(After Hendrickx and Van Vossum 1994, pls. LXIII and LXIV)

these Type IB graves, tomb no. 1 **[356]**, was originally roofed over with sandstone slabs,[184] of which one had collapsed into the grave. When during the excavation the slab was finally removed, many artefacts in Egyptian style were revealed, including gold handled maces, copper items, stone vessels and Naqadan pottery.[185] A nearby smaller tomb, no. 6 **[357]**,[186] illustrates the typical roofing arrangement (Fig. 14). Further south there are nine similarly dated graves protected with stone slabs in Cemetery 268 at Tunqala West. A typical example is the Type IB Grave 3 **[358]**, whose pit was protected by sandstone slabs, one of which found *in situ* was 2 m long × 0.88 m wide (Fig. 15). It was, like many of the graves at this site, once protected by a superstructure consisting of a low perimeter wall of fieldstones filled with a sand core.[187]

Meanwhile further south, contemporary with the tombs at Seyala and Tunqala West,[188] several large high status tombs,[189] some of which have been dated to Naqada

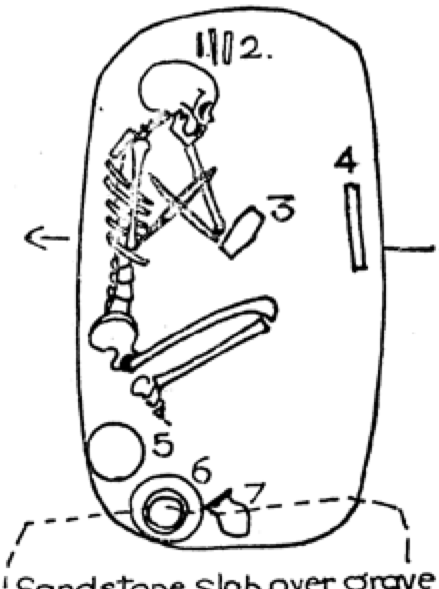


Figure 14 Tomb 6 in Cemetery 137 at Seyala, showing a sandstone slab in position over the grave.
(Firth 1927, 211)

[184] Smith 1994: 363.
[185] Firth 1927: 207–8.
[186] Firth 1927: 213.
[187] Stevenson 2012: 230–241.
[188] Smith 1994: 376.
[189] Wilkinson 1999: 48.

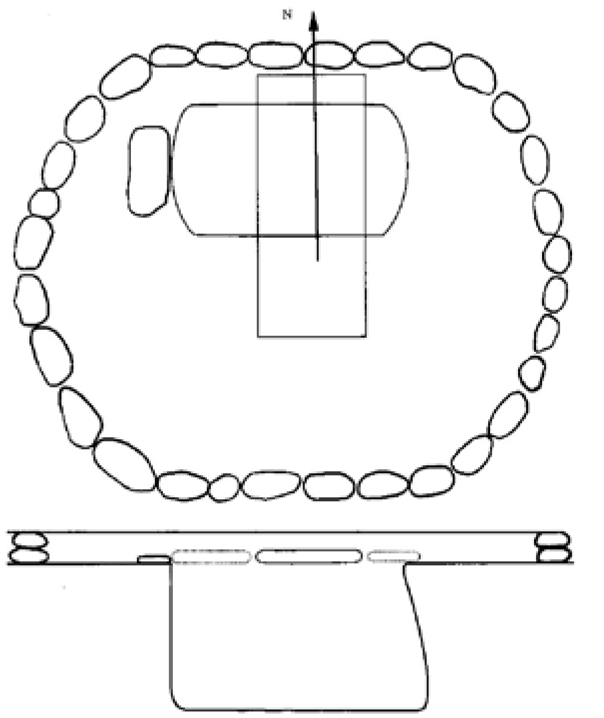


Figure 15 Grave 3 at Tunqala West with large 2 m × 0.8 m sandstone slab over pit.
(Stevenson 2012, fig. 12)

IIIA–B, were being prepared at Cemetery L at Qustul, also in Lower Nubia.[190] The Type IB/SC graves took the form of large rectangular pits excavated into the alluvium, into the sides of which were dug burial chambers or loculi, whose entrances were blocked with layers of enormous stones.[191] Out of the twenty-five tombs found dating to this period, the most notable examples are L2 **[359]**, L5 **[360]**, L9 **[361]**, L11 **[362]**, L19 **[363]**, L22 **[364]**, L23 **[365]** and L24 **[366]**.[192] These are believed to be contemporary with the royal or elite tombs of Locality HK6 at Hierakonpolis, and Williams has suggested that the largest examples, such as L23 are their direct forerunners.[193] The biggest of all, tomb L24, is regarded as broadly contemporaneous with tomb U-j at Umm el-Qaab and dates to Naqada IIIA2. [194] Tomb L23 **[365]**, for example (Fig. 16), consists of a pit with a stepped down side chamber or loculus cut in one end.[195] Apart from the usual soil fill, it is not clear if any special arrangements had been made to close off access to the pit itself,[196] but the side chamber, which contained the burial and other items, had been deliberately sealed off with stone blocks, while the remainder of the tomb was used for the storage of large quantities of grave goods.[197]

While this separation may have been intended to isolate the body from the grave goods, from the tomb security point of view the real benefit of the side chamber type of construction is that it took advantage of the surrounding geology to form a strong natural roof over the burial itself, and thus offered more protection to the body in comparison to a simpler pit grave. Additionally, in order to rob the tomb, the pit would have to be first cleared of its backfill and grave goods and any intervening blocking removed before access could be made to the burial itself.

A comparable and contemporary grave may similarly signal the adoption of the sealed side burial chamber or loculus as a means of security in Upper Egypt. Known as Burial 8 **[340]**, the Type IB/SC grave was found intact by de Morgan at Kom el-Ahmar opposite El-Kab (Fig. 17).[198] It can be dated to Naqada IIIA from its finds.[199] Once the burial had been made and the grave goods installed, the loculus was closed with stone slabs laid to form an angle and sealed with Nile mud and the whole was then concealed by filling the pit with a backfill to the surface.[200] Therefore it appears at both Kom el-Ahmar and Qustul we have some of the earliest examples of a specific architectural attempt being made, to not only enhance the security of the body, but also concomitantly part the corpse from its accompanying funerary provisions by using a separate chamber with a blocking. Notably, both contained a mixture of Naqada III and A-Group pottery,[201] which may indicate a high degree of interaction between the two cultures.[202] Nearby, an example of possibly the earliest use of a stone 'portcullis',[203] occurs in a higher status (in terms of size and location) Type IB/SC tomb of similar design situated at Locality HK6 at Hierakonpolis.[204] Tomb 2 **[353]** possibly dates to Naqada IIIA–B,[205] and was entirely excavated into the surrounding sandstone and shale strata (Figs. 18–9).[206] The tomb's pit descended through a 0.65 m top layer of gravel and silt, into the rock to reach a total overall depth of 3.5 m. Around its upper edge a 0.2 m deep step was cut to accommodate roofing beams (Room A). A hole cut

[190] Williams 1986: 1–2 and 176–9.
[191] Seele 1974: 29.
[192] Williams 1986: 229–358.
[193] Williams 1986: 176.
[194] Wilkinson 1999: 48.
[195] Williams 1986: 344.
[196] Seele 1974: 35.
[197] Williams 1986: 14–20.

[198] Needler 1984: 111.
[199] Amongst the finds were wavy handled Naqada IIIA jars and an A-Group bowl (Williams 1987: 19, n. 38)
[200] de Morgan 1909: 271–2.
[201] Williams 1980: 15. The A-Group cultures' earlier ceramic assemblages demonstrate historically strong associations with Upper Egypt. This is seen in the characteristic types of northern Early A-Group pottery that are found in many of the cemetery and habitation sites at Hierakonpolis (Gatto 2003: 15).
[202] Wegner 1996: (98–100) writes: 'The Lower Nubian A-Group was closely tied to the emerging Predynastic kingdoms of Southern Egypt, probably competitively as well as through trade and other modes of interaction.' Additionally, Gatto (2006: 70–1) suggests that the pottery assemblages, together with the Late A-Groups' adoption of similar animal burial practices and side chambered tomb designs, such as those at Hierakonpolis, points to either a mixed population or a possibly a regional culture that shared common beliefs or a close relationship.
[203] Birrell 2000: 18.
[204] Friedman 2008a: 26.
[205] From the similarity of its animal interments to those of tomb L23 at Qustul (Hendrickx *et al.* 2004: 117).
[206] Adams 2000: 23.

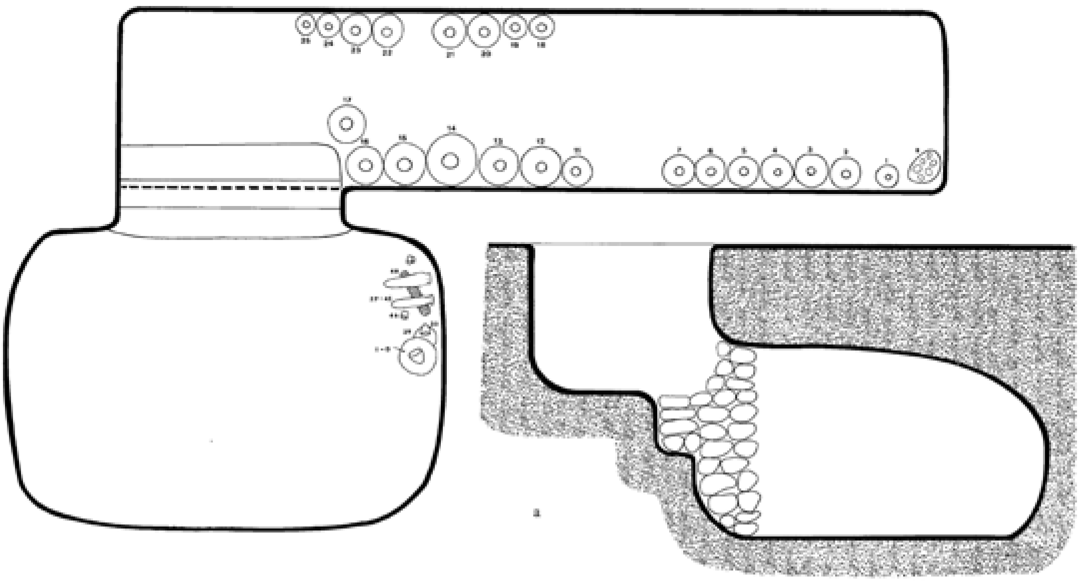


Figure 16 Tomb L23 at Qustul, showing the stone blocking to the burial chamber. (Williams 1986, fig. 159) Courtesy of the Oriental Institute of the University of Chicago.

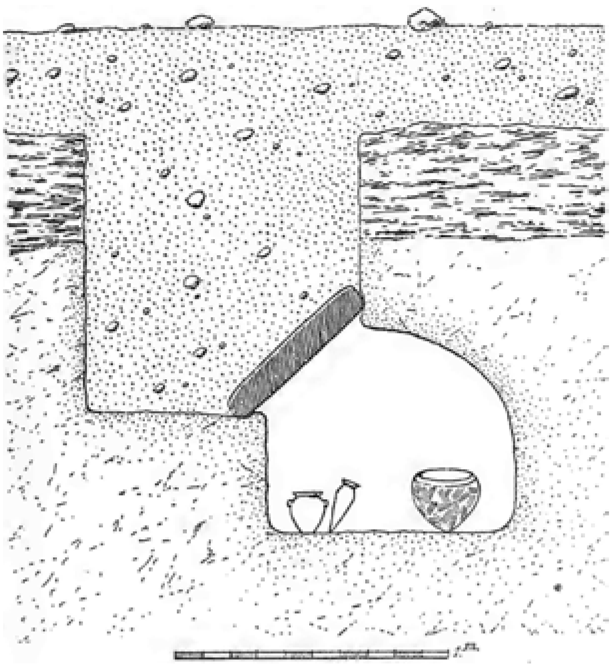


Figure 17 Cross section of tomb no. 8 at Kom el-Ahmar (Naqada III) showing large stone slabs blocking access to the burial niche. (De Morgan 1909, fig. 130)

into the base of Room A, at the south-eastern end (Room B) had a small side chamber excavated on its eastern face (Room C) 1.7 m high that tapered down to 0.5 m.[207] Two portcullises of cherty limestone were found propped up in the tomb.[208] The excavators assumed that these were intended to close off Room C from B in a comparable manner to the stone walling of Tomb L23 at Qustul and presumably Room C would have then contained the deceased.[209] One of the portcullises was 1.4 m long × 0.9 m wide × 0.2 m thick and would have weighed approximately 0.8 metric tonnes.[210] It is also possible, given that the remains of mud plaster were found on the walls,[211] that the portcullises might have been concealed by plastering, which could have increased the security of the burial chamber by concealing it from the view of potential plunderers. Therefore, not only did this tomb benefit from the additional security provided by the natural stone roof created by its niche, but its use of shaped embryonic 'portcullis' slabs to prevent access to the burial also demonstrates a marked evolutionary progression, from the earlier use of dry stone as at Qustul, and the 'lean to' use of stone slabs at Kom el-Ahmar. This was a technological advance that would only be fully realised to its full potential many years later with the development of the sliding portcullis in the Early Dynastic period.

Apart from these exceptional developments, it has to be assumed that the majority of elite Type I pit tombs in Egypt were protected from above by little more than a wooden roof, backfill and possibly a mound, but although details are scarce, there is evidence that the first mud-brick superstructures were just beginning to make an appearance during this period. The Type IB tomb 563.H.11 at Helwan **[NIC]**, which dates to Naqada IIIA2 by its contents, was recorded by Saad in his unpublished field diaries as possessing a mud-brick

[207] Hoffman 1982: 48.
[208] Adams 1996: 2.
[209] Adams 2000: 23.
[210] This is a median figure calculated on the basis of limestone weighing between 1.7 to 2.6 metric tonnes per cubic metre (Arnold 1991: 28).
[211] Adams 2000: 23.

Figure 18 Tomb 2 at Locality 6 Hierakonpolis, showing the niche in the base and side and one of its associated 'portcullis' stones propped up at one end. (Adams 2000, Pl. 6a) Courtesy of Archaeopress Ltd.

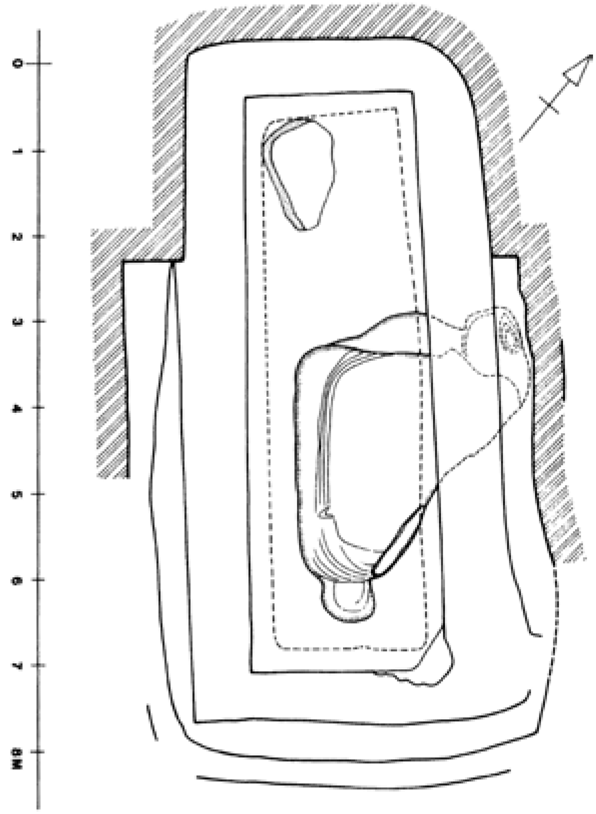


Figure 19 Plan of tomb 2 at Locality 6 Hierakonpolis. (Adams 2000, fig. 2a) Courtesy of Archaeopress Ltd.

superstructure of some kind.[212] In addition small mud-brick walled superstructures were noted by Petrie at Tarkhan overlying the Type IB pit tombs 852 **[212]** and 1845 **[213]**, which also date to this period.[213] These were filled with sand and gravel[214] and would have provided a certain degree of additional protection to the underlying grave, as well as providing a focus for food offerings.[215] These developments signal the emergence of another defensive tool for the protection of the tomb, the mud-brick mastaba, which unlike a tumulus, was designed to be permanent and was soon to become an essential part of a tomb's battery of defences.

3.3 Conclusion

The need for better security arrangements had been accelerated by the emergence of an elite class in a socially differentiated Egypt from Naqada I period onwards. In the larger tombs of the elite, increasing quantities of valuables were being included, leading to the concomitant problem of increased levels of tomb robbery.[216] With the ever-increasing amounts of grave goods being deposited in tombs, providing yet more opportunities for the unscrupulous, it is reasonable to link the development of these early security measures with an urgent need to ward off the predations of grave robbers. This rapid development of architectural solutions to address the problem of tomb security would continue in the Early Dynastic period and Old Kingdom, with even more complex and innovative solutions in both royal and private tombs, which are thematically analysed in the following chapters.

[212] Köhler 2004: 307; Smythe 2004: 328.
[213] Hendrickx 2001: 100; Mawdsley 2012: 229, n. 48.
[214] Petrie 1914: 2–3.
[215] Snape 2011: 11–3.
[216] Hoffman 1982: 146.

4. The defence of the burial chamber

To date there has been no specific in-depth analysis of the measures taken to defend the burial chamber in Egypt within the defined period, with the exception of individual monographs on specific sites, and the broad survey undertaken by Reisner, which focuses on tomb development rather than security.[217] This chapter therefore analyses the security of the burial chamber in royal and private tombs from the Early Dynastic Period until the early Fourth Dynasty, to see what measures were taken to protect them against robbery and what influence they may have had on the development of the Egyptian tomb in general. It is in two parts, 4.1 deals with royal tombs in chronological order, and 4.2 with private tombs, which due to their greater numbers, are subdivided into substructure types arranged in broad chronological divisions that are then further subdivided geographically by site location, north to south.

The geological terms used in this chapter and throughout the study are either those used in the relevant excavation report, or where unavailable, an alternative, if obtainable, from specialist literature on the subject. The substructures of the tombs in this and the following chapter form the core of the catalogue, and therefore by way of introduction, additional topographical and dating information will be included in the discussion where it is of benefit.

Chronology

Due to the wide range of sources used, the chronological terminology in this chapter and throughout, includes both the datings used for the Naqada sequences as detailed in Hendrickx's chronology,[218] and the terms 'Dynasty 0', the First Dynasty etc. The progression of the Early Dynastic Period will follow that suggested by Kahl in which the Abydos-based kings Iry-Hor and Ka of 'Dynasty 0' are the predecessors of Narmer,[219] who is regarded as the founding monarch of the First Dynasty. The dynasty ends with Qa'a, and the Second Dynasty begins with the accession of Hotepsekhemwy and concludes with the demise of Khasekhemwy.[220] With the end of the Early Dynastic Period, the Third Dynasty then begins with Netjerykhet Djoser and ends with Huni,[221] and the early Fourth Dynasty is covered by the reign of Sneferu.

4.1 Royal tombs

4.1.1 Dynasty 0 and the First Dynasty

The first royal tombs of the Early Dynastic Period are situated at Umm el-Qaab in Abydos (Map 3). Along the path of the great wadi to its west, the royal necropolis developed progressively southwards from Naqada I onwards, beginning with Cemetery U in the north and ending with the graves of the last six kings and one queen of the First Dynasty, and the final two kings of the Second. Between them in Cemetery B are the tombs of Dynasty 0 and the earliest kings of the First Dynasty.[222]

The first three tombs are those of the Dynasty '0' kings, Iry-Hor and Ka, followed closely by that of Narmer, the earliest king of the First Dynasty.

Dynasty '0' to the mid First Dynasty (Naqada IIIB–C2)

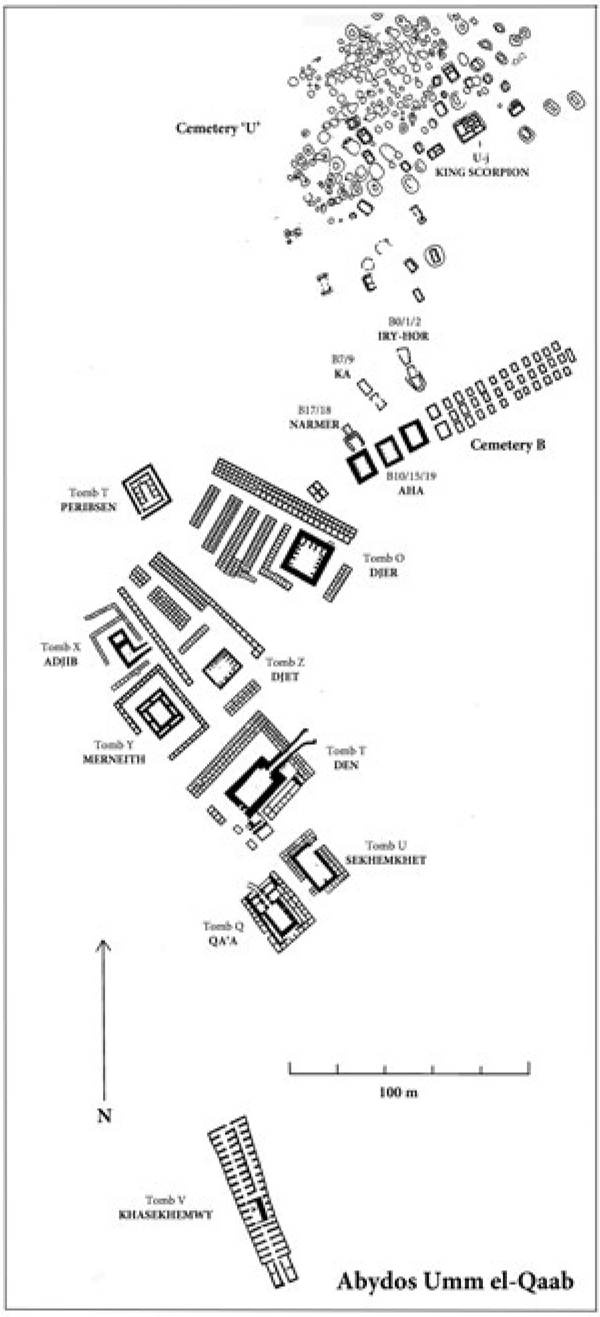
Iry-Hor

Designated as tomb B0/1/2[223] and dated to Naqada IIIB or Dynasty 0,[224] the Type IB pit tomb of Iry-Hor **[1]**[225] comprises of three mud-brick lined chambers, of which B2 is the burial chamber, with B0 and B1 acting as magazines (Fig. 20).[226] The top of the mud-brick lining of

Figure 20 Tomb B0/1/2 the tomb of King Iry-Hor at Umm el-Qaab
(Kaiser and Dreyer 1982, Taf. 55a)
Courtesy of the DAI Cairo.

[217] Reisner 1936: *passim*.
[218] Hendrickx 2006: 56–93.
[219] Kahl 2006: 94–5. It should be noted that Wilkinson (1993: 241–3) denied the existence of King Iry-Hor altogether, and is still hesitant (1999: 55) to accept him in his later work.
[220] Kahl 2006: 102–5.
[221] Seidlmayer 2006: 117–23.

[222] Dreyer 2003b: 64.
[223] Kaiser and Dreyer 1982: 235.
[224] Hendrickx 2006: 88–9.
[225] Porter and Moss 1937: 87.
[226] Kaiser and Dreyer 1982: 225; Dreyer *et al.* 1996: 49, Abb. 1. Originally intended as a two chambered tomb, chamber '0', which was found filled with wine jars, was only added later (Dreyer 2007b: 193–4).



Map 3. Abydos, Umm el-Qaab
The Predynastic Cemetery 'U' in the north, the Dynasty '0' and early First Dynasty Cemetery 'B' lying between it and the main cemetery of the First and Second Dynasties to the south. (After Petrie 1902, Pl. LVIII and Dreyer *et al.* 2000, Abb. 1)

B2, which is only one and a half bricks thick, originally sat 0.8 m under the ancient desert level and supported a wood and mud-brick roof. Although only traces remain, it is assumed it was structurally similar to that found in nearby tombs B16–8/9b and Chamber '*x*'. Therefore, it would have probably been supported on closely spaced crossbars covered with at least two layers of brick that overlapped the pit by 1.25–1.45 m.[227] This roof would then have been covered with a layer of mud that ran into the desert floor, and probably concealed from view by the spoil from the pit, so nothing remained visible.[228]

Ka

Also dated to Naqada IIIB,[229] little remains of the Type IB tomb of King Ka **[2]** numbered B7/9 (Fig. 21).[230] Of its two pits, B7 is considered to be the burial chamber, due to its superior construction, while B 9 was presumably intended for storage. Both were lined with sloping mud-brick walls of one brick's thickness. Kaiser and Dreyer suggest the roof detail, like that of Iry-Hor, comprised of a framework of beams overlaid with one or two layers of brick,[231] which was set at 0.5 m below the level of the desert, where it overlapped the brick lining by 0.5 m all round.[232] Once the burial had taken place, the remainder would then have been filled up to the desert level with backfill from the excavation, as with all of the tombs at Umm el Qaab.[233]

Figure 21 Tomb B7/9 the grave of King Ka.
(Kaiser and Dreyer 1982, Taf. 56b)
Courtesy of the DAI Cairo.

Narmer

Tomb B17/18 is ascribed to Narmer **[3]**,[234] whose reign is dated to Naqada IIIC1.[235] It initially comprised of two

[227] Kaiser and Dreyer 1982: 224–5. In several tombs at Umm el-Qaab the wooden roof beams overlap the brick lining of the very tomb chamber, but this is within the tomb pit (below desert level), which usually is somewhat larger at the top than at the bottom (Personal communication by Günter Dreyer 21st November 2009).

[228] Kaiser and Dreyer 1982: 220.

[229] Hendrickx 2006: 89.

[230] Porter and Moss 1937: 87.

[231] Kaiser and Dreyer 1982: 221–2. Originally reported by Petrie (1901: 7, pl. LIX).

[232] Dreyer *et al.* 2003: 86.

[233] Personal communication by Günter Dreyer (21st November 2009).

[234] Porter and Moss 1937: 88; Kaiser 1964: 100.

[235] Hendrickx 2006: 89–90.

Figure 22 Tomb B17/18, the grave of King Narmer.
(Kaiser and Dreyer 1982, Taf. 56c)
Courtesy of the DAI Cairo.

separate chambers, whose original walls were only a single brick's length in thickness,[236] which now appear to be–due to ancient repairs to the original collapsed wall between the two–a single chamber separated by a dividing wall (Fig. 22). In the burial chamber B18, remains indicate the roof was set 0.3 m below the original desert level and was similar to those of Iry-Hor and Ka. Two post holes in the floor of B17, the adjacent subsidiary chamber, suggest some sort of 'tent' like structure may have been erected within it, but it is unlikely they were intended to support a roof. [237]

The thin brick linings and the compacted sand surrounding these early royal tombs would not have offered much more protection than those of their Predynastic predecessors in Cemetery U, although it is reported that the desert sand surrounding Narmer's tomb was of the consistency of soft sandstone,[238] which implies tunnelling within it would require a certain degree of effort. From the security viewpoint the liners would not have posed much resistance to penetration, but their problem seems to have been their tendency to collapse under lateral pressure,[239] which would have presumably affected the roof as well, thus creating a giveaway depression and possibly inviting the attention of grave robbers. Nonetheless, with their roofs set well down and their pits backfilled and brought level with the desert, they would have been well concealed and probably difficult to enter.

It is with the tombs of the next three monarchs at Umm el-Qaab – Hor-Aha, Djer and Djet that significant changes to the defensive architecture of the royal burial chamber occur, which may have been partly due to the introduction of a protective superstructure (see 6.1). [240]

Hor-Aha

Although basically a Type IB pit grave **[4]**, it is with this king's tomb that we see a marked enlargement in the overall size, strength and solidity of its construction in comparison to its immediate predecessors (Fig. 23). Located in Cemetery B, the chambers B10/15/19 have been attributed to Hor-Aha,[241] of which B15 in the middle of the group, is considered to be the burial chamber,[242] with B10 and B19 functioning as magazines.[243] In addition, for the first time, two other chambers and thirty-five subsidiary tombs accompany the tomb complex

Figure 23 Tomb B10/15/19 the grave of King Hor-Aha.
(Kaiser and Dreyer 1982, Taf. 52)
Courtesy of the DAI Cairo.

[236] Dreyer *et al.* 2003: 85–6. These had collapsed when the nearby deep excavation of tomb B19 'drew in' the southern wall of B18, because only a single skin of bricks had been used to line the pit at too steep a batter (Kaiser and Grossmann 1979: n.12).
[237] Kaiser and Dreyer 1982: 220–221, Abb. 12.
[238] Kaiser and Grossmann 1979: n. 10. This is of course in the Twentieth Century; whether the ground was quite as firm in the Third Millennium BC is open to question.
[239] La Loggia (2009: 175) describes the engineering principles behind the design of successful earth retaining walls in Egyptian pit tombs: 'The design of gravity-retaining earth structures is based on the theory of mass; that is, the greater the thickness of the wall (i.e., the heavier the wall is), the higher the lateral earth pressures that can be resisted by the wall, and the higher it can be built. Furthermore, when the wall is built with a lean-back, the lateral earth distribution on the wall is reduced, allowing it to be built higher with a reduced thickness.'

[240] The possible existence of superstructures at this site is still the subject of some debate – for an overview of the current thinking, see O'Connor 2009: 151–6.
[241] Kaiser 1964: 100.
[242] Kaiser and Grossmann 1979: 160.
[243] Chambers 13 and 14 were probably intended to be the original tomb, but the tomb was extended probably as an expression of the new found status of the king following the unification of Egypt (Dreyer 2007b: 194–5).

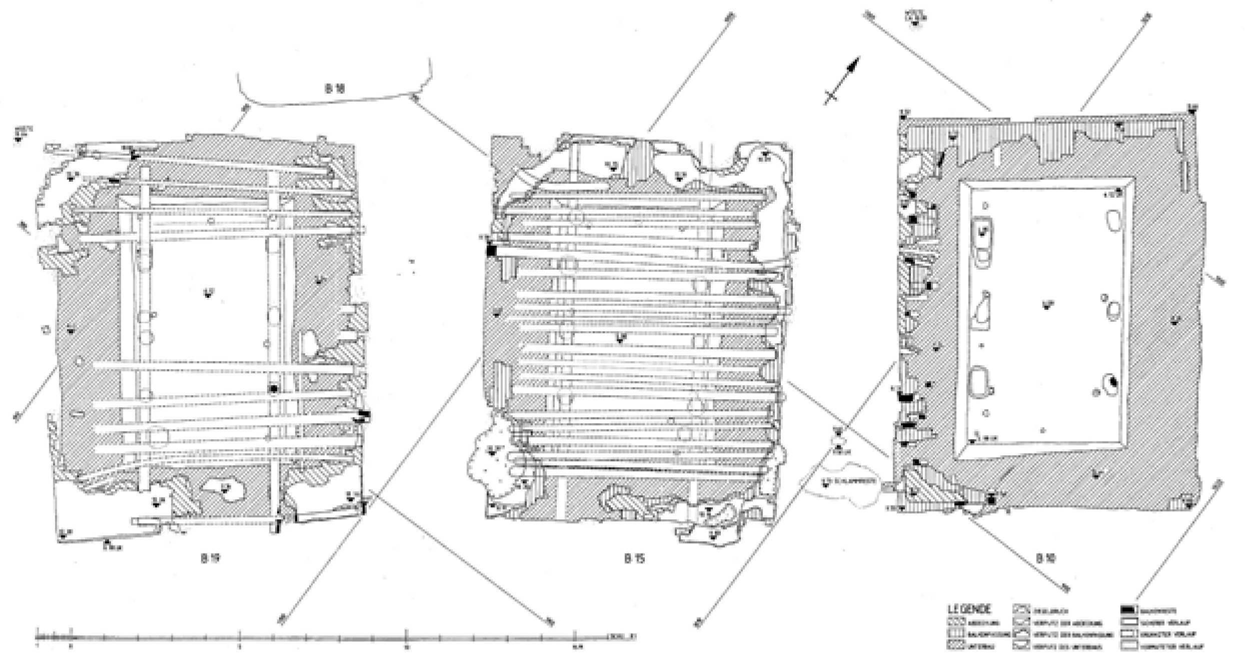


Figure 24 The roof arrangement in tomb B10/15/19, the grave of King Hor-Aha. (Kaiser and Dreyer 1982, Abb. 2) Courtesy of the DAI Cairo.

to its east.[244] In a significant strengthening of the tomb in comparison to the earlier tombs at Umm el-Qaab, these pits were lined with thick sloping mud-brick walls approximately 1.5–2.1 m thick, set 0.6–0.8 m below the ancient desert surface.[245] Internally, the three chambers contained wooden structures or 'shrines', which were supported by columns along the longer side of the pits.[246]

The roof that these liners supported has been reconstructed in the case of the burial chamber B15. It comprised of stout wooden crossbars, which supported a mat overlay, over which further layers of mud-brick were built up to form a slightly curved cover that was perhaps 0.3–0.4 m at its thickest. Finally, the whole roof was mud-plastered down to the desert edge. The other chambers, B17 and 19 were similarly covered, albeit with flatter roofs of a slightly lighter construction (Fig. 24).[247]

In comparison to the tomb's forerunners in Cemetery B, the enormous increase in the thickness of these walls provided several benefits. Firstly, they shored up the surrounding desert matrix and prevented collapse of the tomb's internal walls. Secondly, they provided support for the new stronger and more secure roof,[248] which would have been more resistant to penetration from above and capable of bearing a protective sand tumulus (see 6.1.1).[249] Finally, they provided important lateral protection by hindering any tunnelling through the side of the tomb.[250] Despite these measures, robbers' holes found in the sides of chambers B15 and B19 indicate these defences were circumvented by tunnelling down through the surrounding sand into the side of the tomb.[251]

Djer

In comparison to the tombs of Cemetery B, the tomb of Djer represents a radical change in design. Tomb O **[5]**,[252] is the largest complex at Umm el-Qaab, and was accompanied by over 200 subsidiary burials.[253] Rather

[244] Spencer 1996: 76. Accompanying them were also seven lions (Dreyer 2007b: 195). For a lively discussion on subsidiary burials and their possible purposes, see Morris 2007b: 15–38.

[245] Kaiser and Dreyer 1982: 213–5.

[246] Petrie 1901: 7; Kaiser and Dreyer 1982: 218. Kaiser (1981: 247–54) suggested that these were possibly intended to act as a model palace, or chapel for the king's use in the hereafter. Alternatively they may have been intended to protect their contents from the gaze of profane eyes and the likelihood of damage during construction. This may have been necessary due to the increased time now necessary to close the tomb securely with the stronger roofing after the installation of the burial (Kaiser and Dreyer 1982: 248). Thus they may have protected the contents from interference by the tomb's builders, and also acted, once the tomb was closed, as a final bastion of defence against tomb robbers.

[247] Kaiser and Dreyer 1982: 215–6

[248] Kaiser and Grossmann 1979: 159.

[249] Dreyer (2007: 195) suggests that a sand tumulus protected the grave.

[250] La Loggia (2009: 178) has recently studied fifteen Dynasty 1 tombs at Saqqara and comes to the conclusion that the primary function of the thick mud-brick walls of the burial chambers at that site was connected with security, 'The thickening of these walls did not make them impregnable, but it would have made the task of tunnelling through them more arduous and risky for the tomb robber'.

[251] Amélineau 1899b: 90; Kaiser and Dreyer 1982: 215–7.

[252] Porter and Moss 1937: 78–81

[253] Dreyer 2003b: 67. Interestingly, by the Thirteenth Dynasty the grave had come to be regarded as the tomb of Osiris (Dodson 1997: 45). A reclining basalt figure of the god on a bier (Cairo JE32090) was discovered in the tomb in January 1898 (Amélineau 1904: 187–97), which may have been originally installed during the Second Intermediate Period by King Khendjer of Dynasty 13 (Leahy 1977:

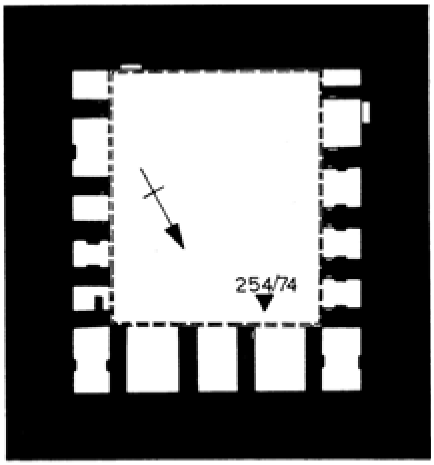


Figure 25 The tomb of Djer at Umm el-Qaab.
(Kaiser 1981, Abb.1)
Courtesy of the DAI Cairo.

Figure 26 The re-excavated substructure of Djer in modern times, with the mud-brick 'tongue' walls clearly visible.
(Photograph by the author)

than two or three separate chambers as before, Djer's tomb was a single large pit lined with substantial mud-brick liners 2.6 m thick,[254] against which mud-brick tongue walls were built on three sides to abut a central wooden shrine.[255] These formed buttress like dividers that functioned as storage magazines for grave goods,[256] provided a support for the roof and internal tumulus, and probably gave additional reinforcement for the inward thrust of the walls (Figs. 25–6). The roof was formed of roof beams 12–24 cm in diameter, which were covered in mats and two layers of mud-brick and sat about 1 m below the ancient desert level.[257] Recent excavations have demonstrated it is possible a hidden sand tumulus up to a maximum of 0.5 m thick may have been built over the shrine, similar to that in the later tomb of Djet,[258] discussed below. Therefore, for its security this substructure relied on the strength of its thick mud-brick liners, a substantial roof and perhaps an internal sand mound.

Djet

The tomb of Djet **[6]**, is similar to that of Djer; known as tomb Z (Fig. 27),[259] it consists of a large pit, which was lined with a substantial mud-brick wall 2.5–2.75 m thick.[260] Projecting internal mud-brick tongue walls created

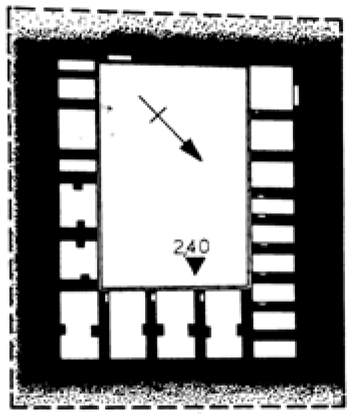


Figure 27 The tomb of Djet at Umm-el Qaab.
(Kaiser 1981, Abb.1) Courtesy of the DAI Cairo

buttress like storage magazines for grave goods,[261] and supported the roof, an internal tumulus and walls, and enclosed a wooden shrine chamber.[262] Over the pit, remains indicate that a wooden roof closed the tomb and after it had been sealed, an encircling battered retaining wall was built over the top, the upper edge of which sat 0.7 m below the ancient desert surface (Fig.

433–4).

[254] Petrie 1901: 14; Dreyer *et al.* 2011: 58.

[255] Dreyer 2009b: 18. Remains of part of this structure were discovered by Amélineau (1904: 197) that included copper nails and carbonised wooden flooring.

[256] Dreyer 2003b: 67. Their unplastered ends and impressions in their mortar of the wood grain from the shrine indicate they were built after the chamber was constructed (Petrie 1901: 8). These chambers when excavated by Amélineau (1904: 156–84) contained numerous remains of funerary goods, including many stone vases. Petrie (1901:16, pl. I) subsequently also discovered gold bracelets (Cairo CG 52008–11) on a mummified arm, which may have belonged to the king himself, hidden in a hole in the brick liner to the rear of the chamber, adjacent to the later added staircase.

[257] Dreyer *et al.* 2011: 58–60.

[258] Dreyer 2010: 21. Dreyer (1991: 100) suggested that from photographs of a low wall seen in Amélineau's (1899a: Pls. I/3, II/5 and III/9 and 12) excavation report, and attributed by him to tomb robbers, that this wall may in fact be a retaining wall for a low tumulus as in the tomb of Djet.

[259] Porter and Moss 1937: 82–3.

[260] Dreyer 1991: 96.

[261] When first excavated some of the recesses were found completely filled up with jars (Amélineau 1899b: 133). In addition within some of these chambers were red painted recesses, some with *s3* signs, which Adams (1994: 186) suggested may have been the early predecessors of the false door and thus 'complement' the use of these chambers to store offerings.

[262] Petrie 1900: 9–10 and 16.

Figure 28 The recently re-excavated battered mud-brick retaining wall surrounding the hidden tumulus in the tomb of Djet.
(Dreyer 2010, Abb. 27) Courtesy of the DAI Cairo.

28).[263] It is assumed the cavity created by this wall was filled with sand creating a form of 'mound', which although possibly there for religious reasons,[264] would have contributed towards the security of the tomb. Indeed Kaiser has suggested its function may have been simply to provide a temporary secure closure, after the burial and before the tomb was complete.[265] This may have been covered with a single brick layer on its surface, but whether it was flat or curved is unknown.[266] The remaining void left in the pit above the 'mound,' was then probably filled with gravel or sand and brought level with the desert surface with a brick and mat roof, possibly supported by timber. Therefore the internal mound would not have been visible from the surface (Fig. 29),[267] although it is possible, as with all the later tombs at Umm el-Qaab that a protective sand mound or superstructure was built above it (see 6.1.1).[268]

The substructure was therefore protected from lateral attack by its thick mud-brick liners and from above by a strong roof supporting the internal sand mound, which was in turn covered with its own wood and mud-brick roof. The sand in this mound, while not forming a resistant barrier in itself, would still have been a troublesome obstacle to deal with, as digging through over 100 m³ of loose sand would have been extremely hazardous.

[263] Dreyer 1991: 96, Abb. 6; 2009: 19, Abb. 27. Petrie (1900: 9) discussed the load bearing capacities of the sort of beams that may have been used to support such a roof. He surmised how that in the tomb of Djet the span needed for wooden beams to support the roof would be 6.09 metres. He calculated, assuming the use of pine beams of a section of 26.6 cm square, that they were capable of bearing 14,159 kgs per m2 and thus easily capable of supporting a depth of 10 m of sand.

[264] The function of this mound, it has been suggested, was a form of 'back-up' tumulus, buried beneath the surface for theological reasons and forming a kind of hidden 'primeval mound' to magically ensure the king's rebirth in the next world (Dreyer 2007c: 198–9). A claim not necessarily supported by others, for a discussion of this topic, see O'Connor 2009: 152–3.

[265] Kaiser 2008: 364.

[266] Petrie 1900: 9; Dreyer 1991: 96.

[267] Dreyer 1991: 97–9.

[268] Dreyer 1993: 11.

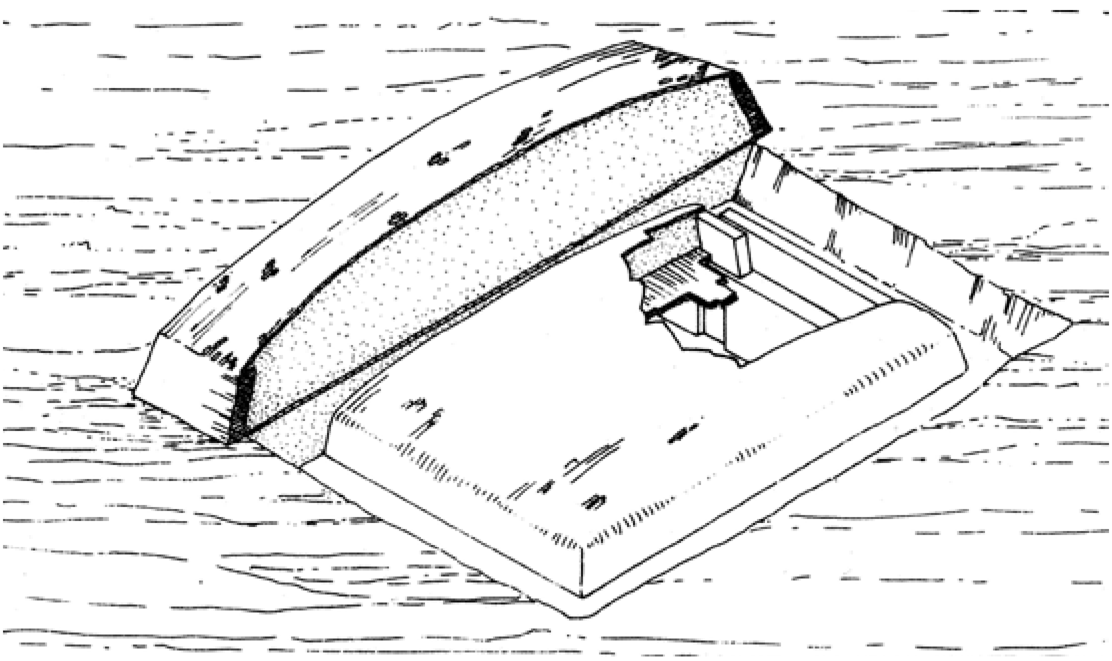


Figure 29 Dreyer's hypothetical reconstruction of the concealed mound in the tomb of King Djet at Umm el-Qaab. Above it is Dreyer's reconstruction of a mud-brick clad sand tumulus.
(Dreyer 1991, Abb.7) Courtesy of the DAI Cairo.

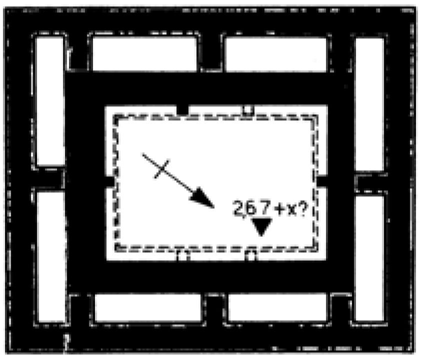


Figure 30 The tomb of Queen Merneith at Umm el-Qaab.
(Kaiser 1981, Abb.1) Courtesy of the DAI Cairo.

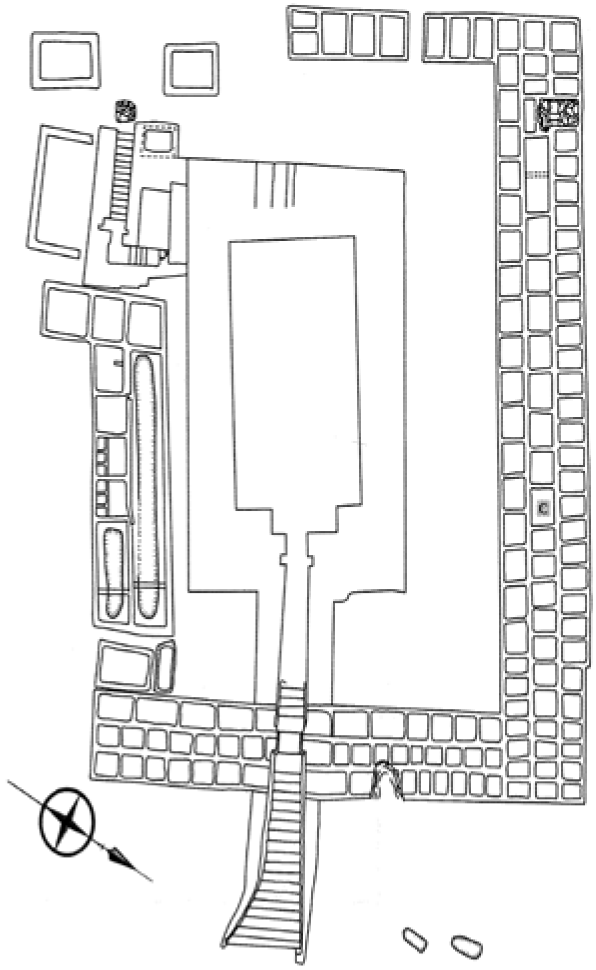


Figure 31 The Type ID tomb of Den at Umm-el-Qaab with its descending stairway and surrounding subsidiary graves.
(Dreyer 2003b, p. 69) Courtesy of the DAI Cairo.

Merneith

The tomb of Queen Merneith **[7]**,[269] the putative successor to Djet,[270] was accompanied by forty-one subsidiary burials. Differing in design to its predecessors, tomb Y comprised of a single burial chamber enclosed by mud-brick walls 1.22–1.32 m thick (Fig. 30). These were in turn encircled by eight rectangular storage magazines,[271] whose mud-brick walls varied between 1.2–1.3 m thick. Like its predecessors, the inner burial chamber contained shallow brick tongue walls, wooden posts and the remains of a wooden floor; faint traces of matting suggest it also had a roof.[272] In all probability the tomb contained a wooden shrine and was covered in a similar manner to its immediate predecessors. Therefore, it would have been protected laterally by its stout mud-brick walls and magazine chambers and from above by a concealed roof, perhaps backed up with a hidden sand tumulus.

The reign of the next king sees the introduction of several innovative elements in both the architecture and security of royal tombs. The most important of these developments is the provision of lateral access to the tomb (Type ID), which enabled the substructure to be entered after the tomb had been completed.

The second half of the First Dynasty (Naqada IIIC2–Naqada IIID)

Den

Designated as tomb T the complex of Den **[8]**[273] covers a surface area of 200 m^2 (Fig. 31),[274] and is partly encircled by 144 subsidiary burials and three storage pits.[275] Entered by a stairway, the burial chamber is lined with massive 4 m thick mud-brick walls,[276] the tops of which sit approximately 1 m below the ancient desert level.[277] They flank the remains of a floor of dressed granite slabs that once covered the entire burial chamber,[278] although it is doubtful if these were intended to provide extra security, as it would be easier to enter the tomb via the walls. On the sides of the chamber it appears mats were hung from a timber framing fixed to the mud-brick liners.[279] Attached to this framing and set in approximately 0.75 m were stout wooden uprights, which supported a large wooden shrine (Figs. 32–3). Excavations have indicated that on top of the shrine a

[269] Porter and Moss 1937: 82.
[270] Dodson and Hilton 2004: 46; Kahl 2006: 97.
[271] Petrie 1900: 10–1.
[272] Petrie 1900: 11.
[273] Porter and Moss 1937: 83–5.
[274] Dreyer 1990: 72.
[275] Dreyer 2003b: 68.
[276] Dreyer *et al.* 1998: 142.
[277] Dreyer 1991: 100.
[278] Petrie 1901: 10–1, pl. LVIA 1. Amélineau (1899b: 124) spoke of the chamber being entirely paved in pink granite with the majority of the stones still being there.
[279] Kaiser 1981: 250.

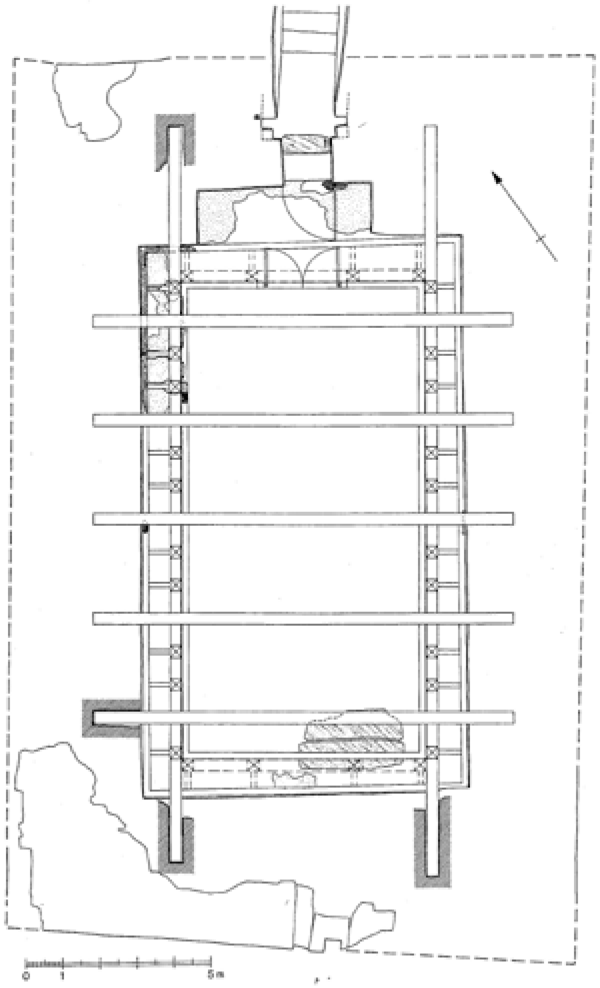


Figure 32 Plan view of the core of the tomb of King Den, showing the mud-brick liner, burial chamber entrance and portcullis emplacement; together with the suggested arrangement of the internal wooden liner, wooden shrine and its supporting beams and framework. (Dreyer *et al.* 1998, Abb. 32) Courtesy of the DAI Cairo.

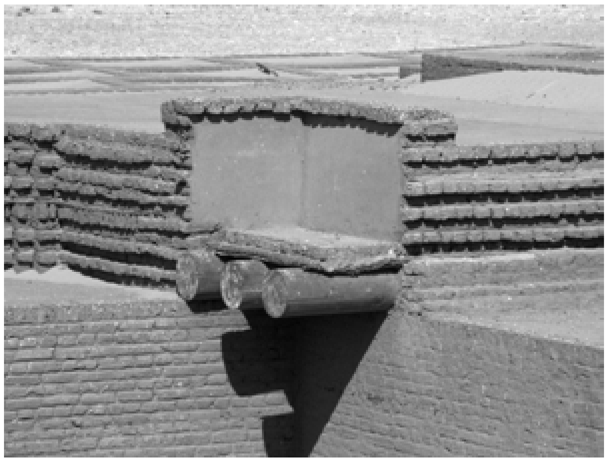


Figure 34 The reconstructed beams and roof that supported the putative tumulus in the tomb of King Den. (Photograph by the author)

hidden sand tumulus and mound (perhaps brick covered) was built, similar to those of Djer and Djet.[280] This was at least 0.85 m thick and supported by beams; its top would have sat just below the ancient desert level (Fig. 34).[281] At the south-western corner of the tomb a staircase leads to an annex built outside the main burial chamber lining. This probably functioned as a 'serdab', designed to permit the king's spirit to access the wadi. Possessing its own security measures,[282] this addition did not permit access to the burial chamber itself.[283]

The defences of this tomb, although similar in nature to those of the tombs of Djer and Djet, were far stronger. The extra thick mud-brick walls of the burial chamber would have deterred lateral penetration and its strong roof with internal sand mound provided protection from above. All were perhaps backed up internally by a substantial wooden shrine.

Adjib

Known as tomb X,[284] the small, and in comparison to its predecessors, simple tomb of Adjib **[9]** is surrounded

Figure 33 . The restored burial chamber of the tomb of King Den, showing the entrance and the beams that supported the shrine and roof. (Photograph by the author)

[280] Dreyer, Hartung and Pumpenmeier 1993: 60.

[281] A corner of the tomb has been restored by the DAI Cairo to give an impression of the structural details. In it two 0.3 m × 0.3 m square section timber baulks have been placed to indicate the position of the beams used to support the shrine. Similarly, three 0.3 m diameter beams mark the position of the roof supports, over which layers of mat and brick form a base for the tumulus. Surrounding this, further brickwork has been used to create a suggested section of the tumulus retaining wall which may have projected 26.2 cm (approximately half a cubit) over the chamber walls, but sat below the desert surface itself (Dreyer *et al.* 2003: 88, Taf. 17b).

[282] It was provided with a wooden portcullis and mud-brick blockings (Dreyer 1990: 76).

[283] Dreyer 1990: 76–8, Abb. 7 and 8; 2003b: 68. O'Connor (2009: 155) suggests that this subterranean structure was related to other above ground brick structures which may have existed in the south-western precincts of the royal tombs and functioned as mortuary chapels.

[284] Porter and Moss 1937: 82.

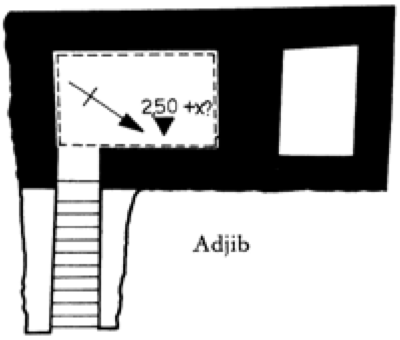


Figure 35 The Type ID tomb of Adjib at Umm el-Qaab.
(Kaiser 1981, Abb 1) Courtesy of the DAI Cairo.

by sixty-four subsidiary graves (Fig. 35).[285] It consists of a burial chamber with a wooden floor accessed by a staircase, and separated from it by a mud-brick divider, a storage magazine.[286] Its 2.46 m deep burial chamber was lined with 1.5 m thick mud-brick walls; an internal plaster level of 1.82 m suggests a roof thickness of 0.44 m (which could have supported a hidden tumulus) with perhaps another 0.2 m to be added to reach the desert level. No evidence of any shrine has been found, although Petrie described finding a wooden support post for a roof, which could have been part of such a structure.[287]

[285] Reisner 1936: 60. Petrie did not give the overall dimensions of the tomb, but Reisner's figures accord with Petrie's (1900: pl. LXI) 1:200 scale drawing.
[286] Petrie 1900: 17.
[287] Petrie 1900: 12–3.

With thin mud-brick walls compared to those of its predecessors, this royal tomb is clearly unexceptional in its security measures, even compared to some private tombs of the period. Admittedly its roof and internal mound would have provided a certain level of defence, but at half the thickness of that of Den, it would not have done a great deal.

Semerkhet

The tomb of King Semerkhet, designated as 'U' **[10]**,[288] was flanked by sixty-seven subsidiary burials and two magazines,[289] all of which, for the first time, abut and encircle the burial chamber walls directly and thus form part of the substructure (Figs. 36–7).[290] These varied in depth between 0.8–1.2 m and seem to have been roofed with reeds.[291] Although the burial chamber is internally of a similar size as that of Den, its mud-brick walls only averaged around 1.5 m thick.[292] Partial remains indicate a wooden shrine, similar to that in the tomb of Qa'a, was erected within the chamber bounded by 0.1 m diameter posts.[293] Recent excavations have demonstrated that the tomb's roof was supported by wooden beams, which were set approximately 0.5 m down from the upper edge of the chamber lining,[294] which would have permitted

[288] Porter and Moss 1937: 85–6.
[289] Engel 2008: 39.
[290] Leaving a gap in the southwest corner, as in the other tombs at Umm el-Qaab, presumably for the king's ka to exit towards the wadi (Dreyer 2007c: 200).
[291] Dreyer 2005: 15.
[292] The burial chamber of Den is 15.2 m long × 8.9 m wide (Dreyer *et al.* 1998: 141–2) and that of Semerkhet 16.65 m long × 7.4 m wide (Dreyer 2005: 13; Dreyer *et al.* 2011: 72; 2014: 72).
[293] Dreyer 2005: 14; Dreyer *et al.* 2011: 72–3.
[294] Remains of one were found in situ on the northwest wall and scorch

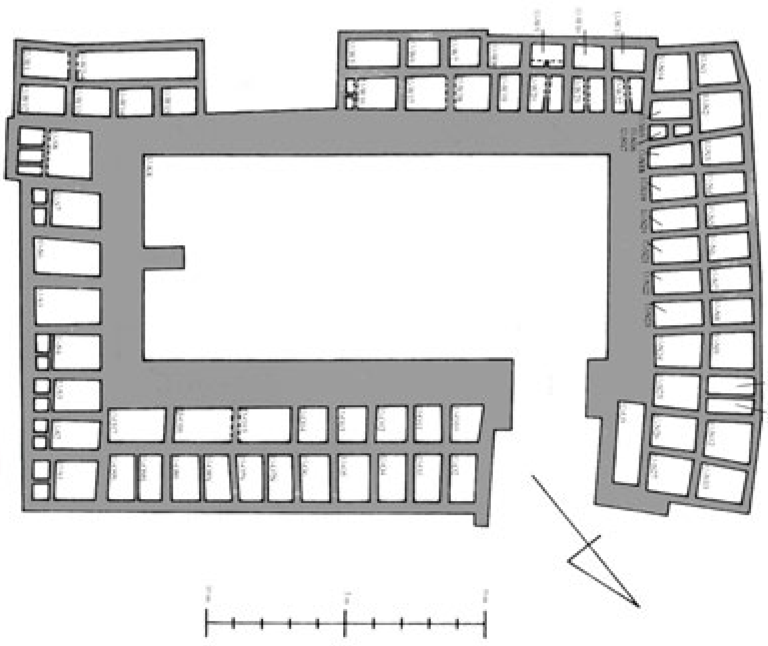


Figure 36 Plan of the tomb of Semerkhet at Umm el-Qaab.
(Dreyer 2005, Abb. 20) Courtesy of the DAI Cairo.

Figure 37 The re-excavated tomb of Semerkhet from the south.
(Dreyer 2005, Abb. 19) Courtesy of the DAI Cairo.

the inclusion of a hidden tumulus, similar to the others mooted at Umm el-Qaab.

Evidently built in a hurry,[295] the tomb, like that of Adjib, was unexceptional in terms of its security features. The defensive capabilities of the wooden roof and possible internal sand mound would have been similar to its forbears, although obviously not as stoutly built as those of Den. In addition, rather like in the tomb of Merneith with its surrounding magazines, it may have benefited from the protection of the encircling subsidiary burials, but as they were only 1.2 m deep, presumably they could be easily tunnelled under.

Qa'a

The sepulchre of the last king of the dynasty, King Qa'a, is known as tomb Q **[11]**.[296] The burial chamber, which is approximately 3 m deep,[297] is surrounded on three sides by shallower storage magazines (Figs. 38–9).[298] Its mud-brick walls are approximately 2 m thick on all but the northern face, which comprises of the 1.2 m thick end walls of the magazines that flank the tomb's descending staircase.[299] Internally the burial chamber was lined with a stout wooden framework, upon which mats or leather panels were probably hung,[300] and within this a wooden shrine was erected, supported by posts up to 0.2 m thick.[301] Impressions of beams in the burial chamber walls demonstrate it was roofed with timbers of up to 0.3 m diameter that spanned the full width of the chamber,[302] smaller sections being used elsewhere over the magazines and subsidiary graves.[303] Over this a hidden sand tumulus was probably constructed, similar to that in the tomb of Djer (Figs. 40–1),[304] with its upper edge set about 0.2 m under the ancient desert surface. Finally, the whole pit was possibly levelled off with the excess sand from the original excavation and finished with a layer of Nile mud.[305]

Figure 38 The tomb of Qa'a at Umm el-Qaab.
(Dreyer *et al.* 1996, Taf. 10a) Courtesy of the DAI Cairo.

marks suggest another in the north wall (Dreyer *et al.* 2006: 94). Strangely, Petrie (1900: 13) did not mention finding any trace of beams set in the wall in his report, but he did find some scattered amongst the general debris.

[295] Engel 2008: 8, n. 24; Dreyer *et al.* 2014: 75.

[296] Porter and Moss 1937: 86–7.

[297] Engel 1997: 5–6.

[298] Dreyer *et al.* 1996: 61.

[299] Dimensions scaled from plan by Dreyer *et al.* (1996: Abb.19).

[300] Engel 1997: 84–7.

[301] Engel 1997: 86–9.

[302] Engel 1997: 6 and 9. In his original excavation report, Petrie (1900: 16) incorrectly suggested that as the beam locations did not line up on the east and west walls, and there was a hole in the burial chamber floor, that a central supporting post was used to support the roof.

[303] Beam diameters vary between 8 cm for magazine N4, 9 cm for subsidiary grave 015, 12–16 cm for magazine N5 and 25 cm for magazine N1 (Engel 1997: 23, 44, 25 and 16 respectively).

[304] Dreyer 1991: 100. Petrie (1900: 16) mentioned a plastered wall over the roof beams 'with a moderate batter, probably to retain the coat of sand, as in the tomb of Zet.'

[305] Engel 1997: 108.

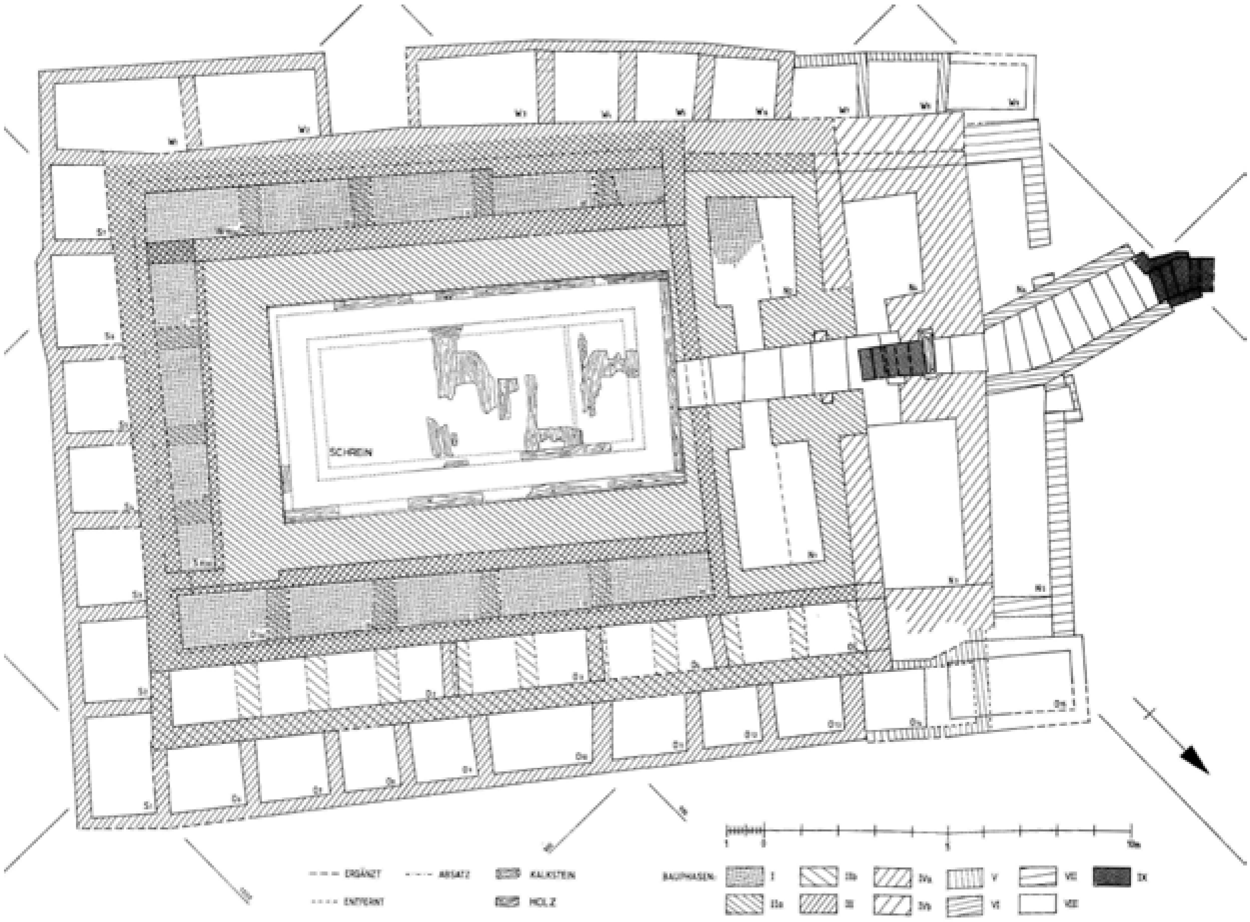


FIGURE 39 PLAN OF THE TOMB OF QA'A, SHOWING THE BUILDING PHASES.
(DREYER *ET AL.* 1996, ABB. 19) COURTESY OF THE DAI CAIRO.

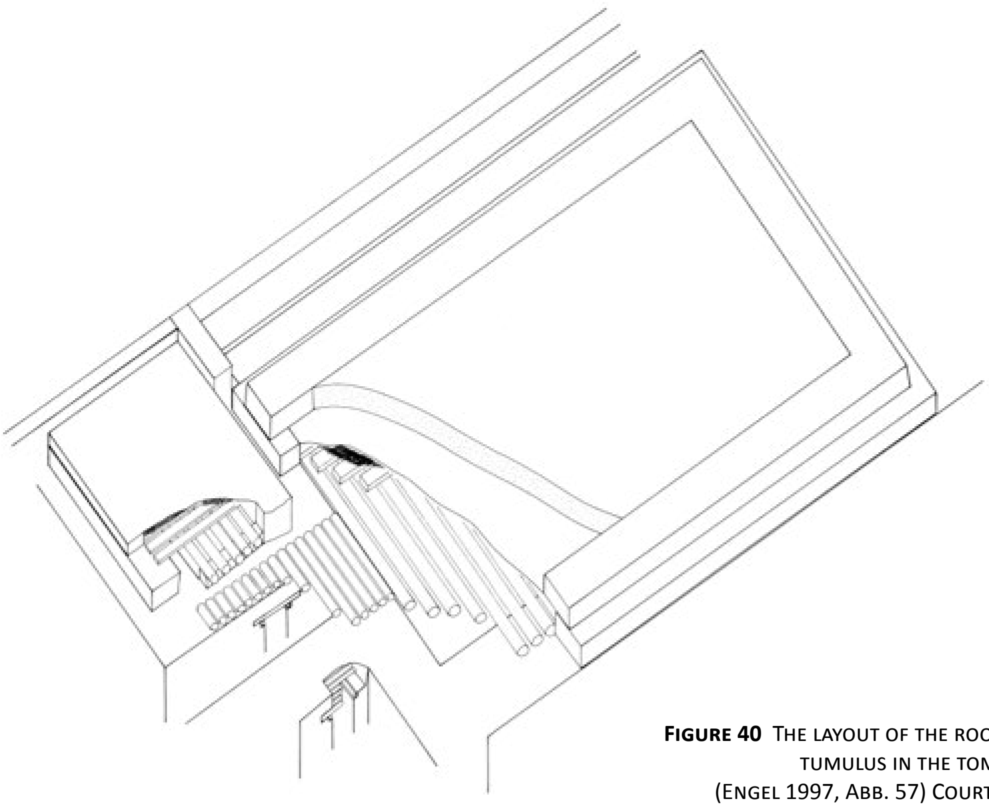


FIGURE 40 THE LAYOUT OF THE ROOFING BEAMS AND HIDDEN TUMULUS IN THE TOMB OF QA'A
(ENGEL 1997, ABB. 57) COURTESY OF E.M. ENGEL.

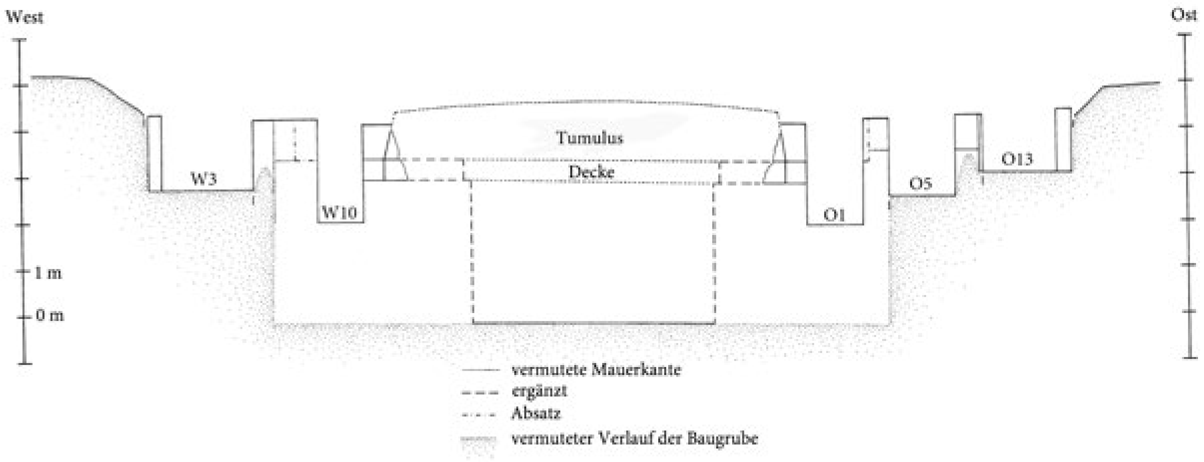


Figure 41 Section through the tomb of Qa'a showing the arrangement of the main pit, roof and possible inner hidden tumulus. The shallower magazines and subsidiary graves are to the sides.
(Engel 1997, Abb. 56) Courtesy of E.M. Engel.

With the exception of the northern entrance wall, the remaining three sides of the burial chamber wall are encircled by long magazines which add roughly another 2–3 m to its width, except on the eastern side where a further row increases it to about 4 m. The entrance wall itself is protected by six large magazines which flank the staircase. The whole of this was then further surrounded by a continuous string of twenty-six mud-brick chambers (apart from a gap in the south-west to permit the exit of the king's *ka* [306]), which were either subsidiary burials or magazines.[307] Although these magazines and subsidiary burials were not of the same depth as the burial chamber, like the tombs of Merneith and Semerkhet they would have provided a degree of extra protection against lateral tunnelling.

In this last royal tomb of the First Dynasty we see a combination of architectural elements used in earlier tombs of the cemetery, brought together into one design. Firstly, an inner burial chamber with thick mud-brick walls, within which was a stoutly built wooden shrine. Secondly, like the tombs of Djer, Djet and Den, there is a substantial roof with hidden tumulus and lastly, like the tombs of Adjib and Semerkhet it was encircled by magazines and subsidiary tombs which made it more difficult to penetrate laterally.[308]

[306] Dreyer 2007c: 200–1.
[307] Engel 2003: 43. At least eight phases of construction have been detected with additional magazines, subsidiary graves and stairs being added as the tomb was expanded to permit more storage (Dreyer *et al.* 1996: 58–61). For an exhaustive description of the construction phases, see Engel 1997: *passim*.
[308] Inevitably however, the tomb had been comprehensively robbed in antiquity; Engel (1997: 110–1, Abb. 70) maps the route of the tomb robbers as they worked through the structure (Fig. 284 in this book), which was attacked from within the access route and via the magazines rather than from the outside, thus suggesting that the external layers of defence and superstructure had achieved their purpose to at least a limited degree.

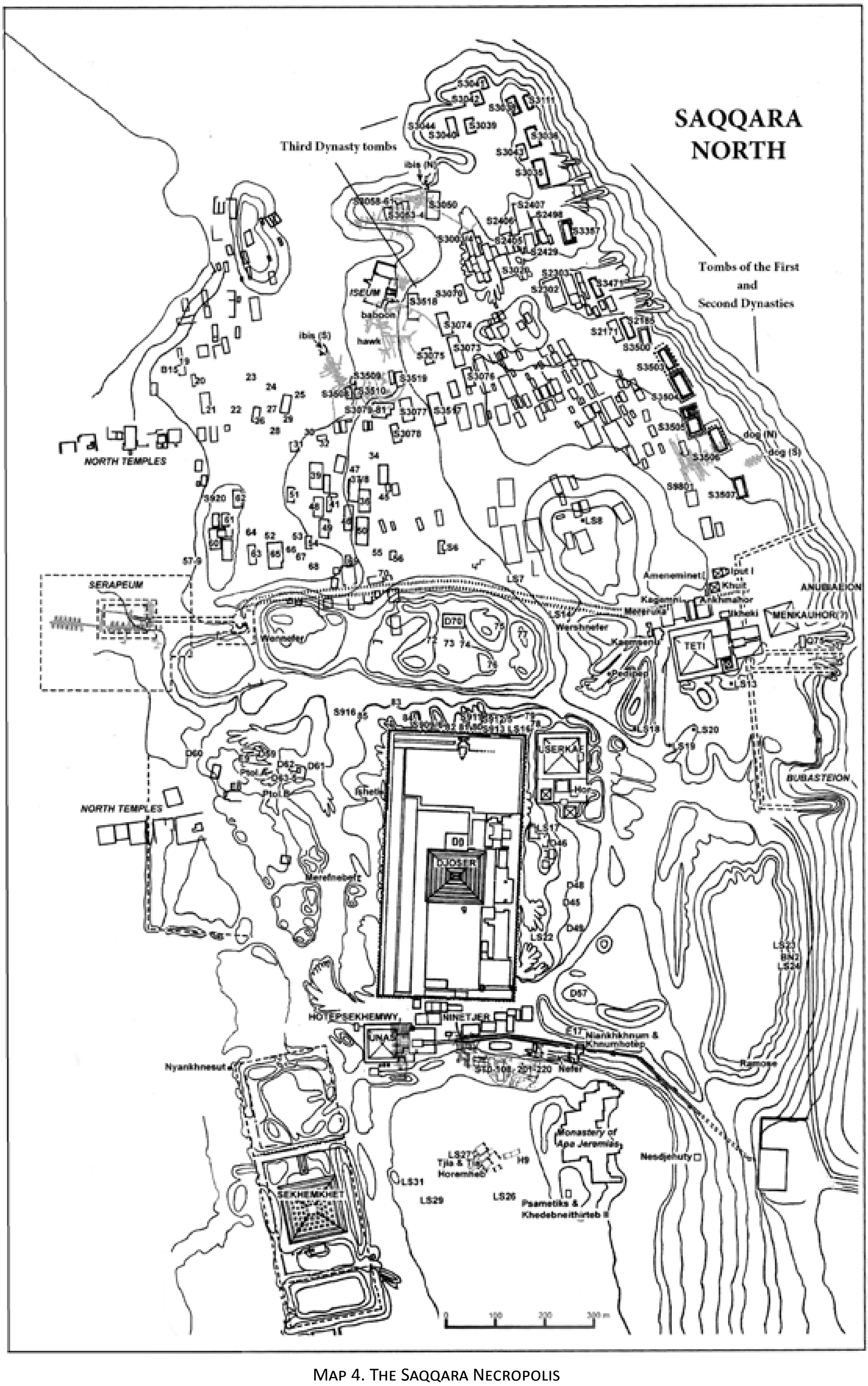
Section summary – Dynasty 0 and the First Dynasty

It appears the Type IB tombs of kings Iry-Hor, Ka and Narmer hardly differ from their Predynastic forbears and were no more solidly built than those of their predecessors in Cemetery U.[309] They too relied on the surrounding sand and thin brick liners for lateral defence and a wood and mud-brick roof to provide protection from above, together with a certain degree of concealment.

With the tombs of Hor-Aha and his successors Djer, Djet and Merneith, a discernable change in the strength of construction becomes evident. Now the tombs were built with more substantial mud-brick liners and magazines designed to both protect the substructure from lateral tunnelling or collapse, and to support the increased load of a more substantial roof and protective internal sand tumulus, and possibly a superstructure.

In the second half of the dynasty, while retaining the same defensive elements, the tomb of Den significantly increased both the size of the burial chamber and its structural components. These improvements were not carried out in the sepulchres of Adjib and Semerkhet where those defensive elements, although present, were comparatively small in size, despite the latter's lateral defences being augmented by its encircling retainer burials. However, the protection offered by adjoining retainer burials was retained in the tomb of Qa'a, where all of the aforementioned protective elements were combined, albeit on a smaller scale than in the tombs of Den and Semerkhet, in the defences of the most complex Type ID tomb of the dynasty.

[309] Dreyer 2007b: 193.



Map 4. The Saqqara Necropolis
The North Saqqara Necropolis showing the royal tombs of the Second and Third Dynasties and the private tombs of the First, Second and Third Dynasties, alongside the later royal and private tombs of the necropolis. (After Dodson and Ikram 2008, map 2D)

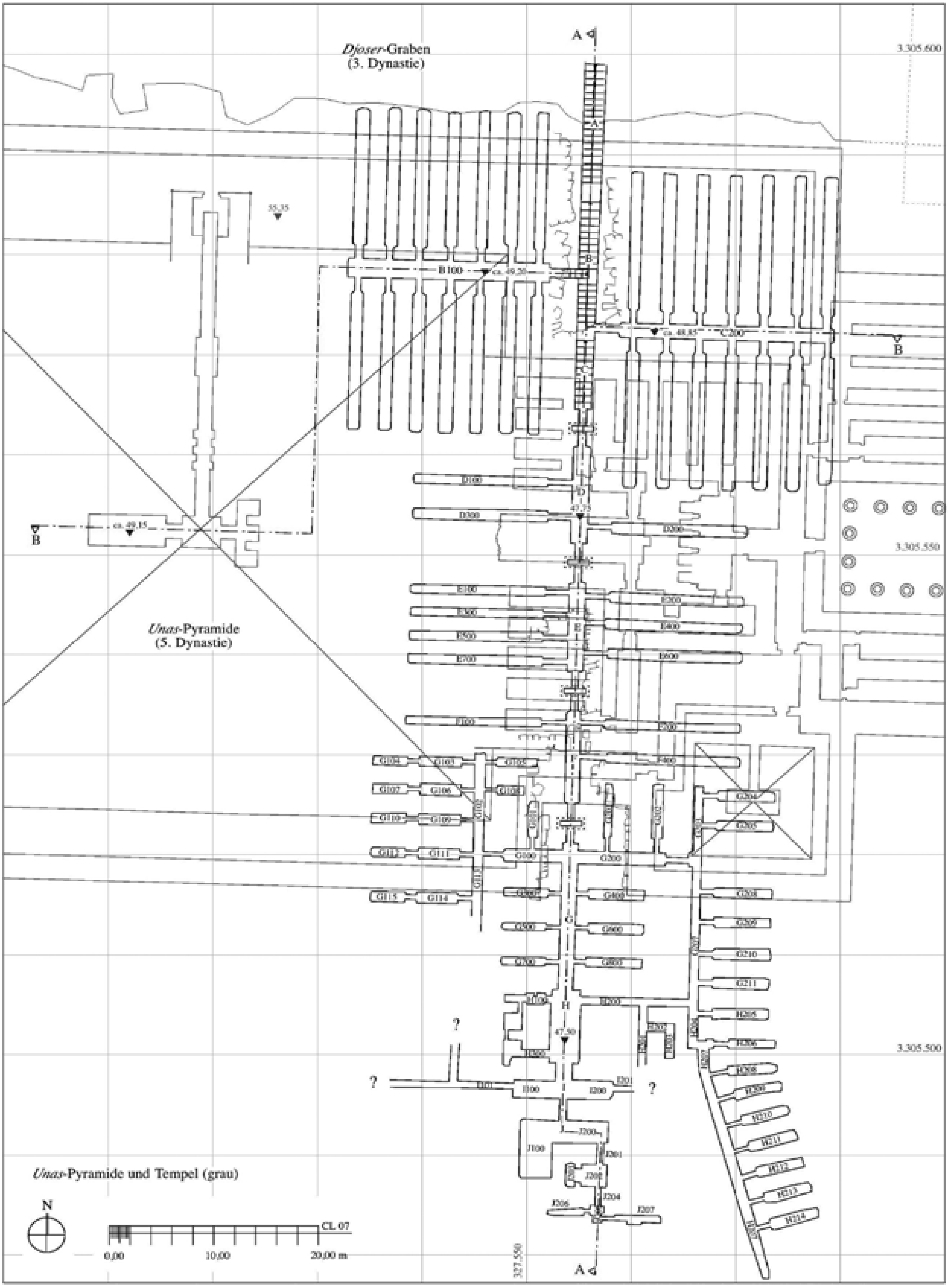


Figure 42 The subterranean tomb of Hotepsekhemwy/Raneb at Saqqara.
(Lacher 2008, Abb. 2)
Courtesy of C. Lacher-Raschdorff.

4.1.2 The Second Dynasty

The first royal tombs at Saqqara

The reason for the move of the royal necropolis from Abydos is uncertain,[310] but the change of location and geology resulted in a radical redesign of the royal substructures of Hotepsekhemwy/Raneb and Ninetjer,[311] which were now excavated deep in the rock and expanded enormously. Undoubtedly, this was done both to increase their security, and to accommodate the ever increasing quantities of funerary goods, which were now required to accompany the royal burials.[312] Located a kilometre south of the existing First Dynasty elite cemetery of North Saqqara (Map 4), the site itself may have been chosen in order to create a *cordon sanitaire* between it and the private First Dynasty tombs at North Saqqara, which lay to its north-east.[313] In addition, the hard limestone of the latter would not have been suitable for the digging of the numerous underground passages and magazines, which were required to accommodate the vast quantity of grave goods securely. Moreover, the area selected with its much softer layer of *tafl* under the rock was probably much easier to excavate.[314] Both substructures were probably protected by superstructures (see 6.1.3) of which nothing remains today.[315]

Hotepsekhemwy/Raneb

The earliest of the royal tombs at Saqqara has been identified from seals[316] as the tomb of either Hotepsekhemwy or Raneb **[12]**.[317] The entrance to the tomb's Type IIA substructure lies in the courtyard just north of the pyramid temple of Unas,[318] and runs under both it and the eastern part of the pyramid itself.[319] The substructure covers an area of over 5,850 m^2, and is approximately 122 m long × 48m wide (Fig. 42), of which around 120 chambers have been identified, whose ceilings vary in height between 2–2.2 m.[320] It was probably built in five stages, which then expanded outwards from its original subterranean core, which is the subject of this section.[321] Access to it was via a trench cut stairway (see 5.1.1) that led to the tomb's fourth portcullis (see 5.3.1.1), which blocked the entrance to the entirely subterranean part of the tomb that formed the original core of the sepulchre and contained the burial (Fig. 43). This, the most secure part of the tomb, comprises of a 40 m long entirely tunnelled complex, whose main axial chambers are denoted, 'G', 'H' 'I' and 'J', amongst which, 'J100' is possibly the burial chamber. Surrounding them a labyrinth of passages and storage magazines lead from these chambers, many more of which may await discovery.[322] Here deep within the rock, the tomb's builders took full advantage of the local geology by setting the substructure's floor level 7.85 m down from the surface, and by excavating its internal passages at between 2–2.2 m high, created an extremely strong rock cover, which would have averaged between 5.65–5.85 m thick.[323]

Ninetjer

Identified as the tomb of Ninetjer from jar seals,[324] the labyrinthine rock cut gallery tomb of the third king of the Second Dynasty **[13]** lies 140 m to the east of Hotepsekhemwy/Raneb. Covering an area of around 3,900 m^2, which is about one third smaller than its neighbour, it measures approximately 77 m × 50.5 m and comprises of 192 separate passages and chambers (Fig. 44).[325] Beyond the tomb's entrance and portcullises (see 5.1.1 and 5.3.1.1), the main corridor between the portcullis slots 'B' and the royal burial chamber 'G' is approximately 33 m long × 2.5 m high (Fig. 45).[326] Branching off this corridor are fifteen side passages, which in turn lead to a maze-like warren of corridors and chambers. The burial chamber probably accommodated a wooden shrine as in the royal tombs at Abydos.[327] The natural rock cover that was formed by these chambers varied in depth from approximately 3 m thick in the area of the portcullis, to around 5 m above the burial chamber.[328]

[310] van Wetering 2004: 1075.
[311] Porter and Moss 1974-81: 613.
[312] During the First Dynasty, a progressive increase in the quantity of grave goods required to accompany the royal burial was already becoming apparent, and by the time of the Second Dynasty, this amount had increased considerably further, resulting in enormous quantities of funerary equipment, furniture and storage vessels that required secure storage (Stadelmann 1985b: 296). Kaiser (1994: 120), while agreeing with the architectural requirement for more storage, also suggested that the tomb's size may be the result of an underlying desire of the kings to exceed and indeed surpass all of the other tombs at Saqqara in monumentality.
[313] Dodson 2010: 806–7. It is probable that, unlike the First Dynasty tombs of the elite and nobles at Saqqara, the royal tombs of the Second Dynasty would not have been visible from the cultivation (Reader 2004: 66), although it can be argued that they would have been equally–if not more– conspicuous to the local populace, as the focus of attention may at that time have been the Abusir Wadi, which at this time was the main approach from the north when the Saqqara Plateau contained the cemetery for the city that was centred around the Abusir lake and valley (Mathieson and Tavares 1993: 26; Jeffreys and Tavares 1994: 150–1, 158–9).
[314] Stadelmann 1985b: 296.
[315] Lauer 1976: 144; Lacher 2008: 431; 2011: 217.
[316] Barsanti 1901b: 250–2; 1902a: 183–4.
[317] Dreyer 2007a: 130. Wilkinson (1999: 84) suggests that Raneb may have either buried his predecessor in this tomb or alternatively usurped it. However, Lacher-Raschdorff (2014: 53) believes the tomb of Raneb lies elsewhere, probably somewhere between Hotepsekhemwy and Ninetjer.
[318] Lauer 1976: 143.
[319] Lacher 2008: 427.
[320] Lacher 2008: 431. The southern section of the substructure is not totally excavated, so there could be more chambers to be added to the plan. For the earliest drawing of the tomb, see Lauer 1936: fig. 2.
[321] Lacher 2008: 441–7.
[322] Lacher 2008: 432–3.
[323] Calculated from levels marked on plans, see Lacher 2008: Abb. 2.
[324] Hassan 1938: 521.
[325] Lacher 2014: 55.
[326] Dreyer 2004: 19.
[327] Dreyer 2007a: 133.
[328] Lacher 2011: 217. It is thought when the tomb builders excavated these passages they may have followed a layer of 0.4 m thick *tafl* to

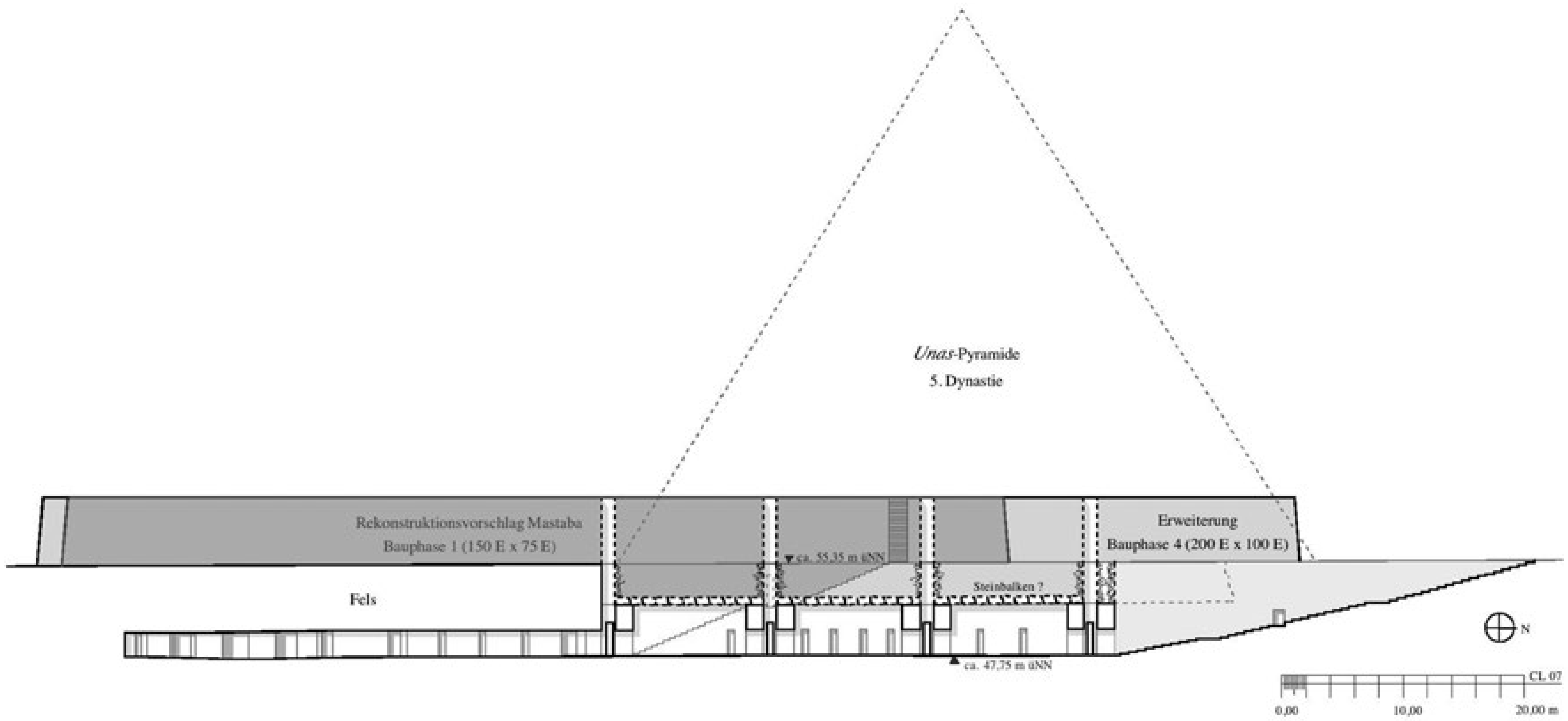


Figure 43 Section looking west of the tomb of Hotepsekhemwy/Raneb with a reconstruction of the superstructure and the tomb's building phases. (Lacher 2008, Abb. 3) Courtesy of C. Lacher-Raschdorff.

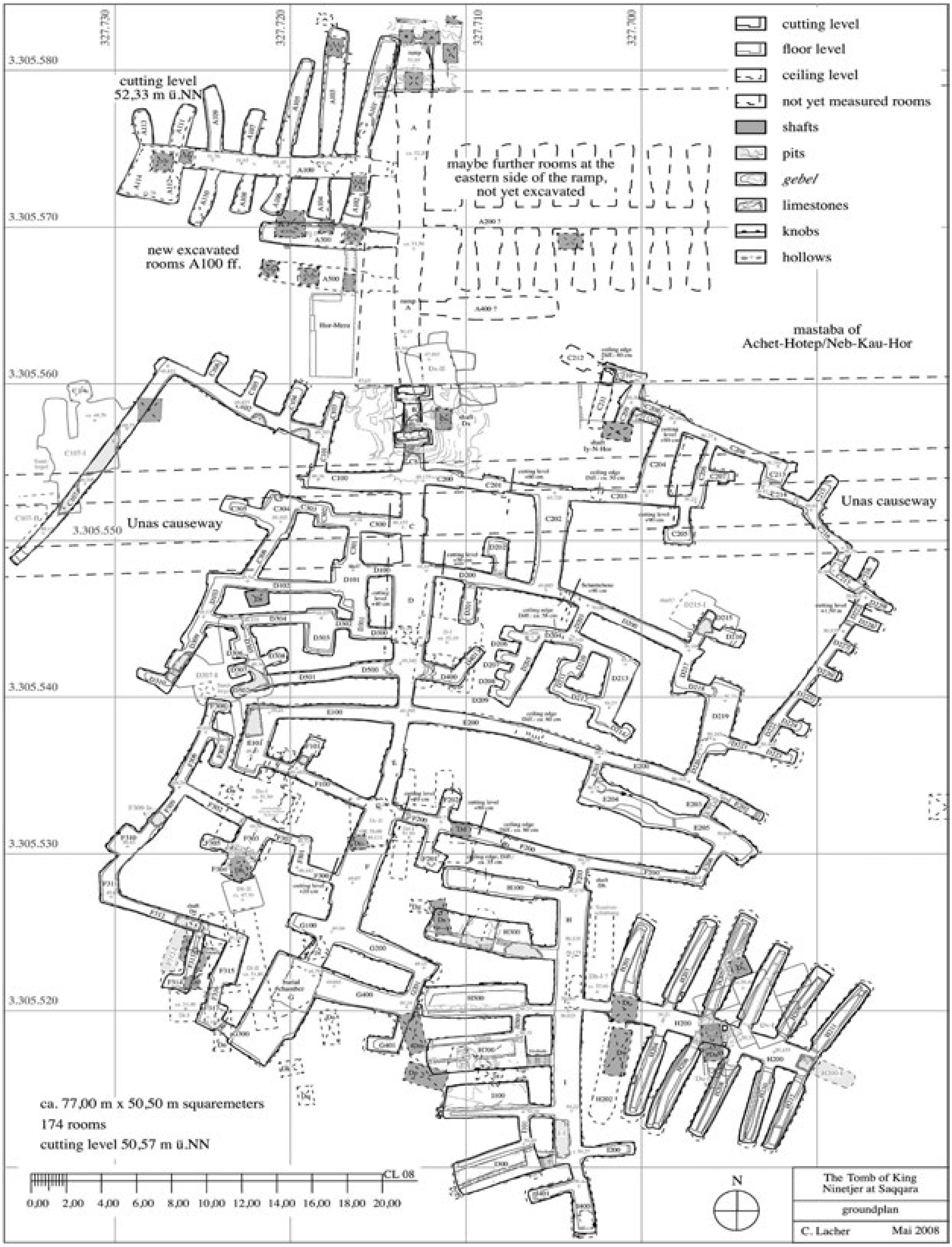


Figure 44 The tomb of Ninetjer at Saqqara.
(Lacher 2011, fig. 2) Courtesy of C. Lacher-Raschdorff.

Figure 45 The main corridor in the tomb of Ninetjer. (Dreyer 2005, Abb. 28) Courtesy of the DAI Cairo.

Like their earlier private counterparts in the First Dynasty, such as the tombs at Cemetery M in Abu Roash and S 3035 **[89]**, S 3120 **[98]** and S 3121 **[97]** at Saqqara discussed below,[329] both of these tombs had taken advantage of the natural geology to gain the maximum protection for their respective burial chambers, but on a greater scale. Now they were protected from above by a solid limestone stratum in excess of 5 m thick and laterally by the same rock to an unlimited degree. Furthermore, their internal layouts were invisible from above and thus offered a good degree of secrecy. On the other hand, the numerous intrusive shafts that pierce their galleries[330] demonstrate that the enormous size of their complexes left them vulnerable to discovery, as there was a reasonable chance of a random *sondage* penetrating a gallery.

Abydos, the return to Umm el-Qaab

Peribsen

The reasons why Peribsen, the owner of the next royal sepulchre, chose to return to Abydos are uncertain.[331]

define their ceiling height, and the irregular geological formation of this strata has led to some of the passages being different in level to the rest of the tomb (Dreyer 2007d: 19). At Saqqara the *tafl* layer is a soft marl that when damp is the consistency of putty and underlies the hard limestone strata at the surface (Martin 1981: 7–8). For an in-depth discussion of the surrounding geology of the tomb, see Lacher-Raschdorff 2014: 69.

[329] Lacher 2008: 433.

[330] Barsanti 1901b: 251–2; Dreyer 2007a: 132; Lacher 2011: 217–8; 2014: 76.

[331] Wilkinson (1999: 89) proposes that the choice of site may be an attempt to confer legitimacy upon the king's reign; likewise van Wetering (2004: 1073) suggests that he wished to associate himself with the rulers of the First Dynasty after a period of political instability. Contra this O'Connor (2009: 156–7) regards this sort of discussion as 'too speculative' and notes that that many later kings chose to be buried

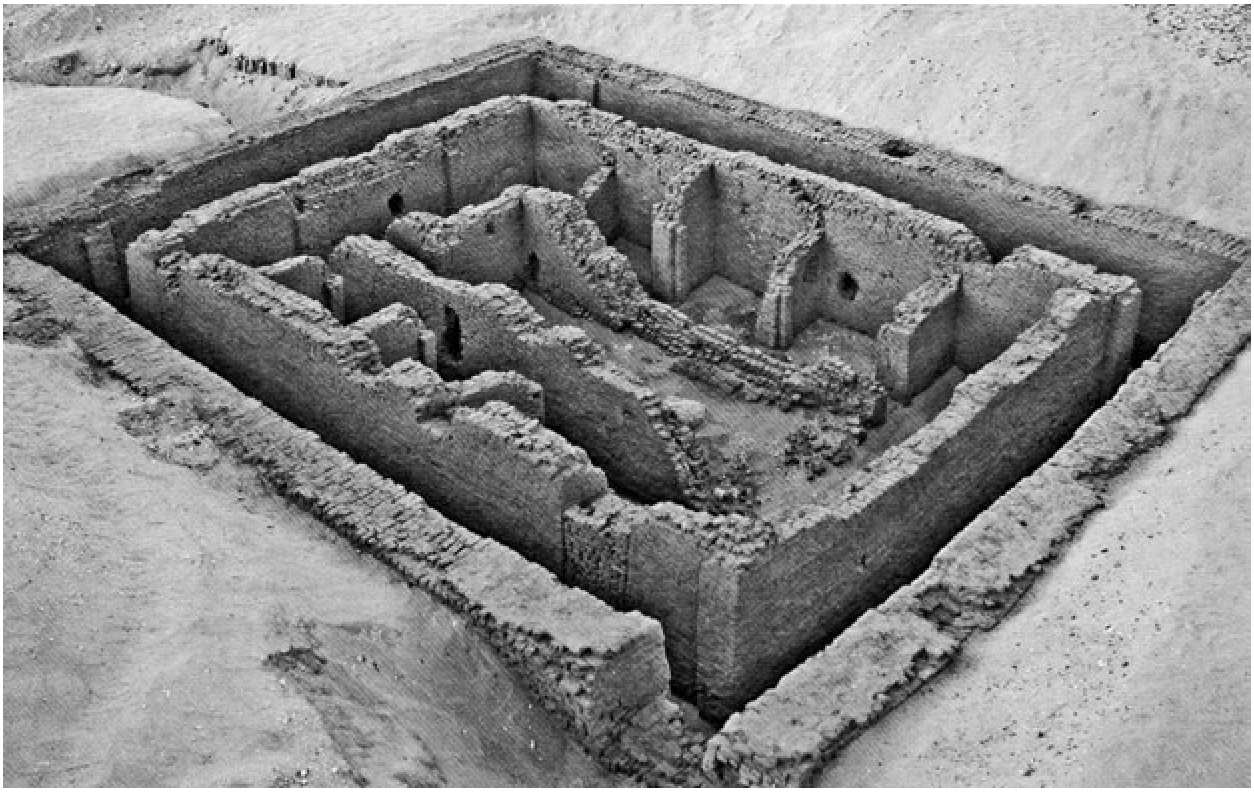


Figure 46 The Type IC tomb of Peribsen at Umm el-Qaab. The partly blocked entrance can be seen in the bottom right corner,
(Dreyer *et al.* 2006, Taf. 22b) Courtesy of the DAI Cairo.

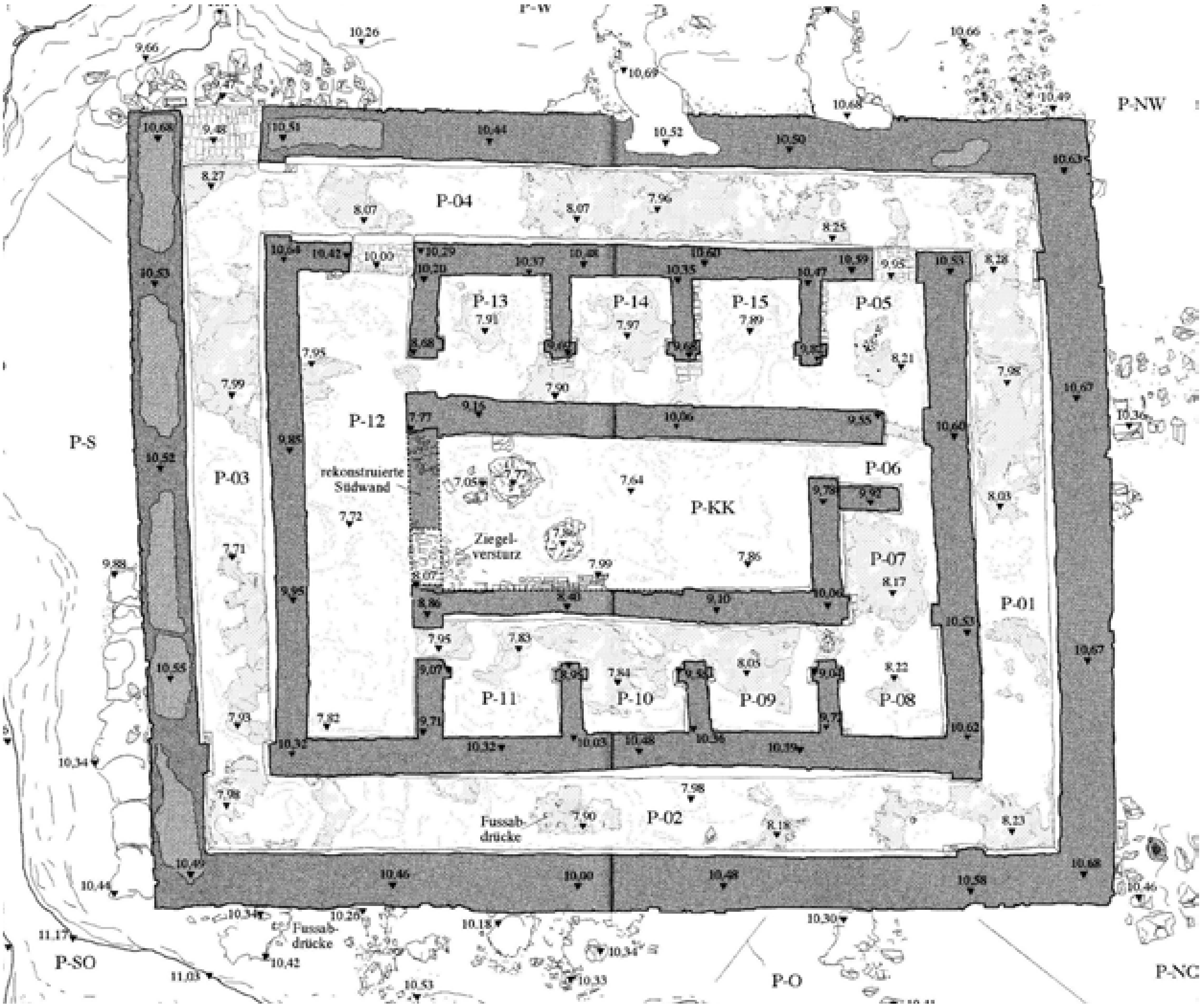


Figure 47 Plan of the tomb of Peribsen, showing chambers, doorways and blockings. The entrance slope is in the top left corner.
(Dreyer *et al.* 2006, Abb. 13) Courtesy of the DAI Cairo.

What is definite, however, is that its design reverted to a Type I pit tomb, like those of its First Dynasty predecessors (Fig. 46).[332] This was probably because of the limitations of the surrounding geology and the materials to hand, although indications that it was built in a hurry,[333] and its small size, may also imply a lack of time or resources. Known as tomb 'P' **[14]**,[334] the grave is built within a pit 3.5–4 m deep and its internal mud-brick structure is formed of three concentric walls, the outer one of which is approximately 1 m thick (Fig. 47). Its entrance was via a roughly paved slope from the desert level into a doorway in the south-western corner.[335] Within the bounds of the external wall a second structure was built, also with a doorway in its south-western corner, thus forming a circulating corridor. Inside this final layer, projecting tongue walls on its longest sides created eight magazines, and within the space formed by them, the burial chamber was built from mud-brick,[336] and probably contained a wooden shrine.[337] The roof, which was supported by wooden beams, was set down 0.5 m from the present desert level and probably brought level with sand.[338]

In comparison to the monumental and more strongly built First Dynasty tombs of Djer, Djet, Den and Qa'a, this tomb offered little in the way of security, although Petrie speculated the outer enclosure corridor may have been a

in pre-existing royal necropoleis for reasons unconnected with politics. See both Dodson (1996: 24–6) and Kahl (2006: 105) for summaries of the scholarship regarding Peribsen's reign.

[332] Dreyer *et al.* 2006: 101–2; O'Connor 2009: 157.

[333] Its shallow foundations, thin walls and roughly applied mud plaster (Dreyer *et al.* 2006: 99–100) contribute to this impression.

[334] Porter and Moss 1937: 81.

[335] Dreyer 2003a: 13.

[336] Dreyer *et al.* 2006: 99.

[337] Amélineau (1904: 245–6) suggested that the layout of this tomb was similar to that of a house, with the external wall forming an enclosure wall and the internal magazines as its storerooms. More recently Dreyer *et al.* (2006: 101) suggests that its principal function was that of a model residence for the dead king.

[338] Dreyer *et al.* 2006: 100–1.

form of 'sand trap', rather like the passage surrounding Campbell's Tomb at Giza[339] or Udjahorresnet's shaft tomb at Abusir,[340] which would have deterred lateral tunnelling into the tomb.[341] However, while feasible, this hypothesis cannot be proven. On the other hand, the 1 m thick external walls would have provided a degree of resistance to lateral penetration, and if the intervening walls and chambers were filled with grave goods, they would have delayed progress into the burial chamber, leaving the putative wooden shrine as the last layer of defence.

339 Vyse 1840a: 216–8, 1840b: 131–2, fig. 7.
340 Bareš 1999: 63–4, figs 2–4.
341 Petrie 1901: 11. Also known as LG84, Campbell's tomb, the Twenty-sixth Dynasty tomb of Pakap, was surrounded by an encircling protective sand filled channel, deeper than the burial chamber, which made it very awkward to tunnel under (Dodson and Ikram 2008: 287).

Khasekhemwy

The last king of the dynasty was also buried at Umm el-Qaab. Tomb V **[15]**[342] is set in a pit, whose floor level

342 Porter and Moss 1937: 87.

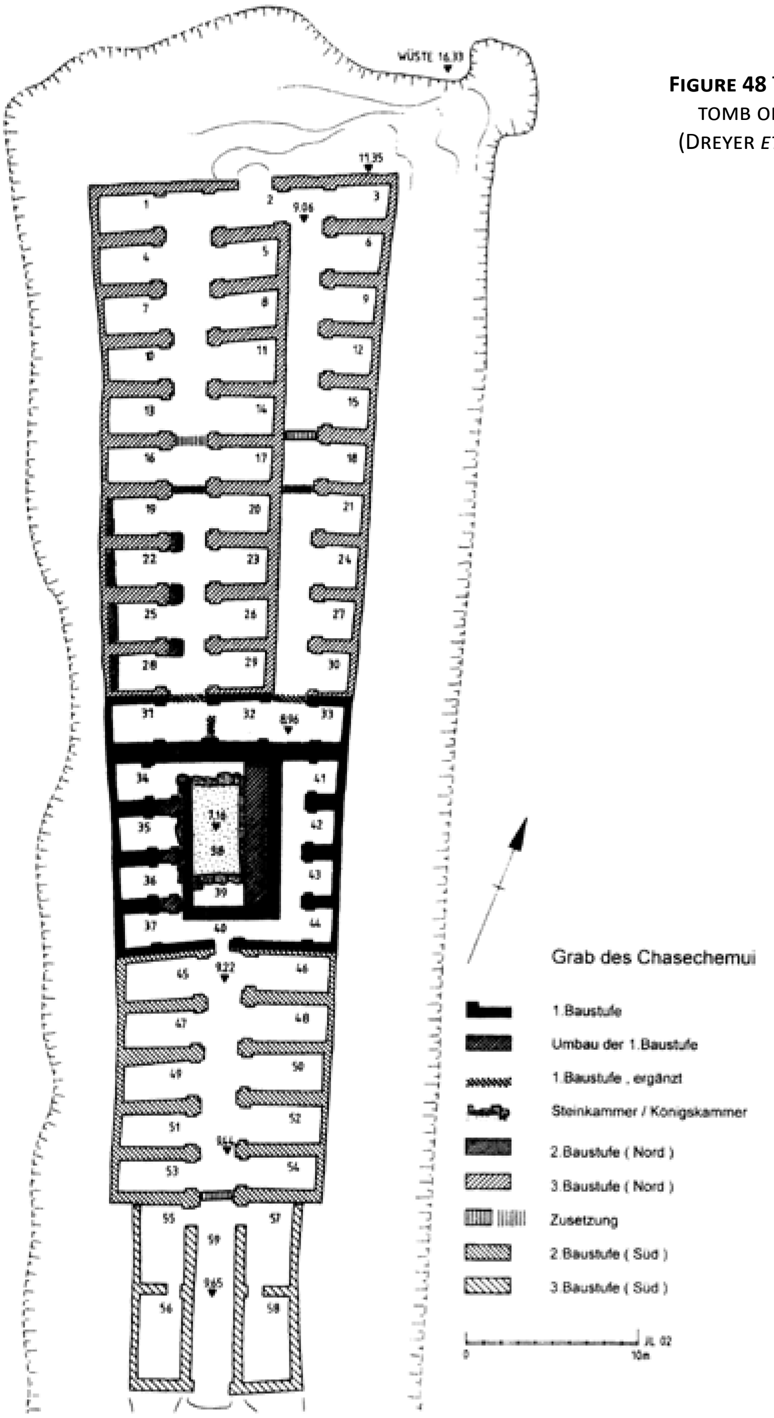


Figure 48 The mud-brick substructure of the tomb of Khasekhemwy at Umm el-Qaab. (Dreyer *et al.* 2003, Abb. 16) Courtesy of the DAI Cairo.

Figure 49 The tomb of Khasekhemwy set 7 m beneath the desert at Umm el-Qaab. (Dreyer 2003a, 77) Courtesy of the DAI Cairo.

is approximately 7.5 m below the desert level.[343] Built in three phases, its original core layout was similar to that of the tomb of Peribsen,[344] and it was undoubtedly enlarged in order to accommodate more grave goods,[345] perhaps reflecting a more successful reign with greater wealth to store. In doing so its final plan resembled the gallery tombs at Saqqara, which it clearly was designed to emulate (Fig. 48).[346] It is roughly 88 m long × 20 m wide and covers an area of 1,760 m^2, which is less than half that of Ninetjer and a third smaller than Hotepsekhemwy.[347] The majority of the mud-brick substructure walls are approximately 2.35 m high and their upper edges finish at about 5 m below the desert surface (Fig 49).[348] Projecting tongue walls subdivide the structure into fifty-eight chambers of varying length, which average 2.1 m wide. Approximately midway down the length of the substructure is the original core of the tomb and within this small magazines surround a slightly off centre compartment where a stone lined burial chamber has been fully sunk into the floor. This has been completely lined with limestone blocks 0.25–0.3 m thick, and traces of paint indicate it originally contained a wooden shrine (Fig. 50).[349] This probably supported a protective stone slab roof that closed the chamber, which was then perhaps completely concealed with a layer of

[343] Dreyer *et al.* 1998: 165.
[344] Dreyer *et al.* 2003: 108, Abb.15.
[345] Kaiser 1994: 117.
[346] O'Connor 2009: 157.
[347] Dreyer 2007c: 203.
[348] Dreyer *et al.* 1998: 165.
[349] Dreyer *et al.* 2003: 108–10.

Figure 50 The concealed limestone burial chamber in the tomb of Khasekhemwy at Umm el-Qaab. (Dreyer *et al.* 2003, Taf. 23a) Courtesy of the DAI Cairo.

Nile mud,[350] thus forming a well camouflaged layer of protection for the burial.

The entire tomb was covered with a huge roof, which comprised of 10–20 cm diameter wooden beams laid closely across the mud-brick walls (Fig. 51). Unlike the First Dynasty tombs, these beams were not covered with layers of mud-brick, but rather with reed matting and a coating of Nile mud. The tomb pit was then filled with a 5 m layer of excavated sand and gravel and brought

[350] Dreyer 2007c: 203.

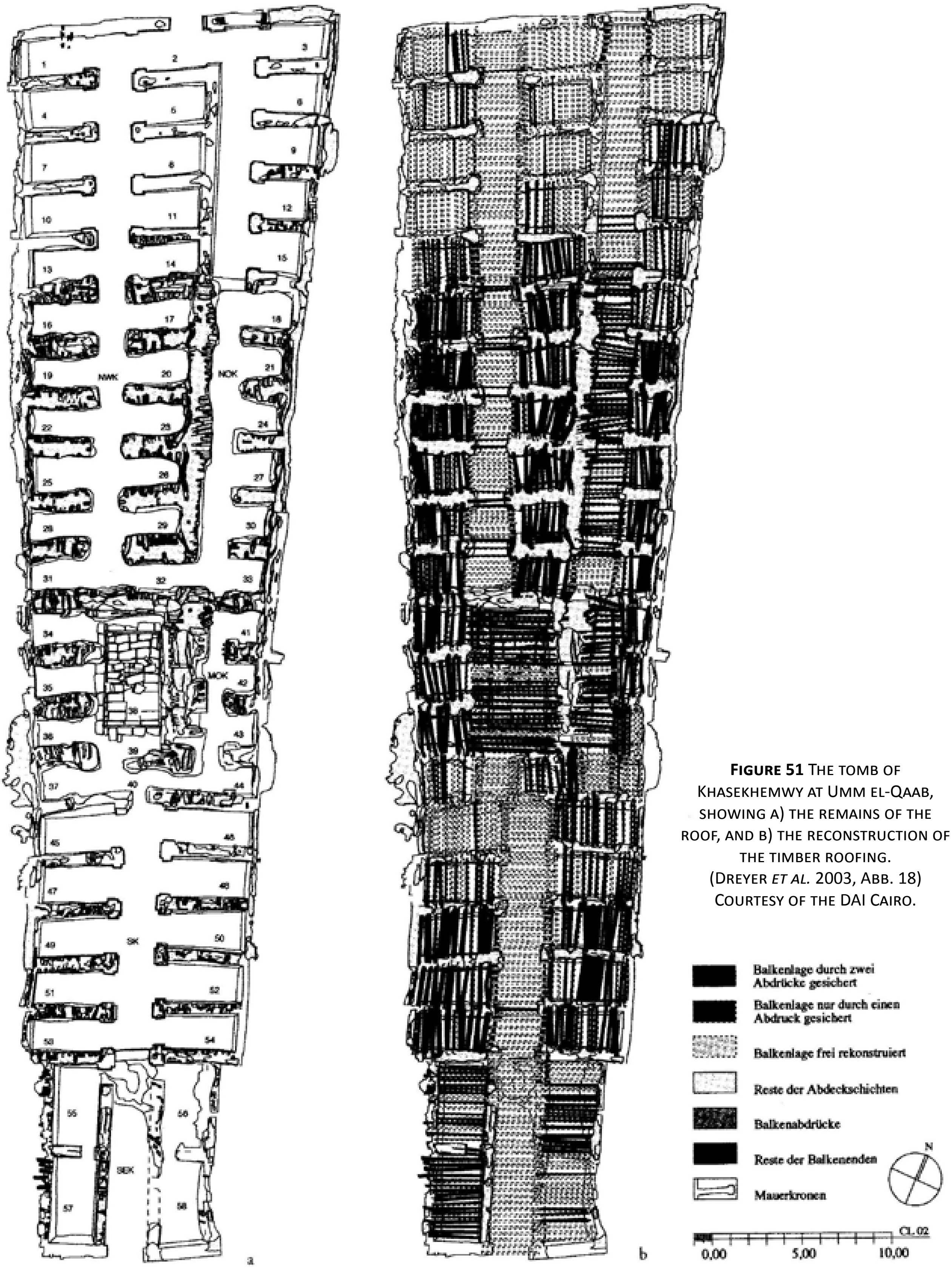


Figure 51 The tomb of Khasekhemwy at Umm el-Qaab, showing a) the remains of the roof, and b) the reconstruction of the timber roofing. (Dreyer *et al.* 2003, Abb. 18) Courtesy of the DAI Cairo.

level with the surface,[351] and probably covered with a protective tumulus (see 6.1.3).[352]

Although smaller than its earlier Saqqara counterparts, a great deal of energy and materials were invested in the building of this tomb, which is the largest at Umm el-Qaab. Unlike the Saqqara tombs, however, the surrounding geology was not solid rock and therefore to obtain a decent standard of security the answer was to create a deep substructure and protect it from above using the local resources to hand. Therefore, the unexceptional thickness of the mud-brick walls and roof covering were compensated for by the use of around 14,000 metric tonnes of sand as a backfill,[353] which would have made tunnelling in this loose and shifting material extremely hazardous. Within the tomb itself, the burial chamber's concealed position would have further hampered its discovery and its limestone walls and internal wooden shrine would have provided a last layer of defence.[354]

Section summary - the Second Dynasty

The tombs of the first three kings of the dynasty exploited the strength of the local limestone and marl geology at Saqqara to improve the security of their enormous substructures. But with the demise of Ninetjer, at some point for unknown reasons the royal necropolis returned to Abydos and from the point of view of tomb security took a retrogressive step, as the tomb of Peribsen reverted to the defensive technology of his First Dynasty forerunners, probably because of the limitations of the local geology and available materials. Although the final ruler of the dynasty, Khasekhemwy, chose to remain at Abydos, his tomb's layout, which had begun like Peribsen's, was expanded to mirror the numerous deep subterranean chambers and axial approach of its rock-cut predecessors at Saqqara, in order to store more grave goods. However, unable to depend on the solidity of the surrounding geology of the latter, this tomb instead relied on the local materials to hand for its security, but to compensate for these disadvantages it was dug deep into the desert and protected by a thick layer of sand, its hidden burial chamber reinforced with stone.

[351] Dreyer *et al.* 2000: 125, Dreyer *et al.* 2003: 112–4.
[352] Dreyer *et al.* 2003: 110.
[353] This is calculated by the tomb's area and depth of backfill which amounts to approximately 8,800 m3 and is based on the basis of sand's bulk density of 16 kN/m3 which equals approximately 1600 kgs/m3 (Cobb 2004: 37).
[354] Nonetheless, even with all of this protection evidence of tomb-robbing has been found. Robbers' holes exist in the separating wall between chambers 6 and 9 (Dreyer *et al.* 1998: 165) and the west walls of chambers 34 and 35, adjacent to the burial chamber (Dreyer *et al.* 2003: 111). Additionally, chambers 56 and 57 were also broken into, and interestingly, it appears from the size of the robbers' holes, that the culprits may have employed children (Dreyer *et al.* 2006: 110–1).

4.1.3 The Third Dynasty[355]

With the reign of Horus Netjerykhet Djoser the site of the royal necropolis returned to Saqqara (Map 4) and the tomb complex of the first king of the dynasty was built just north of the tombs of Hotepsekhemwy/Raneb and Ninetjer.

The Step Pyramid of Djoser

The Step Pyramid of Djoser **[16]**[356] represents a landmark in the design of royal tombs, not only for its architectural innovations and widespread use of stone, but also for the efforts taken to protect the burial of its occupant. Many years after its construction, credit for its design was given to Imhotep, one of the high officials of the king.[357]

Built in several stages,[358] the tomb was initially designed as a mastaba surrounded by an enclosure wall (see 6.1.4).[359] Originally accessed by a descending stairway (see 5.1.1), the tomb's enormous 7 m square × 28 m deep main 'shaft' (or more accurately 'construction pit' as it was never intended to be an access route, but to facilitate the substructure's excavation), was cut into the surrounding rock and its mouth topped with retaining walls that extended it into the body of the superstructure, and permitted the latter's erection around its open aperture (Figs. 52–3).[360] At the base of the shaft, it has been suggested that originally a burial chamber made of decorated limestone blocks may have been built to house the body of the king.[361] Surrounding this chamber were four exits, one on each wall of the shaft, with passages leading to a complex of underground galleries,[362] which comprised of magazines on three sides and to the east, a tiled model 'palace' for the king's use in the afterlife (Fig. 54).[363]

At some point the decision was made to turn the mastaba into a step pyramid and concomitantly improve the protection of the royal burial. During these alterations it is suggested the putative limestone vault in the main shaft was replaced with the granite one that remains

[355] For the purpose of this chapter the sequence of the kings of the Third Dynasty follows Seidlmayer's (2006: 117–23) reconstruction. Starting with Djoser (Horus Netjerykhet) followed by kings Sekhemkhet (Djosert(i) 'ankh), Khaba (?), Nebka (Horus Zanakht) and finally Huni (Horus Qahedjet) the last king of the dynasty.
[356] Porter and Moss 1974-81: 399–415.
[357] Martin 1979: 1.
[358] According to Lauer (1936: 12) the tomb and its superstructure were built in six stages, the first three of which were effectively in the form of a 'mastaba' and the latter three as a step pyramid.
[359] Swelim 1983: 63–5. See Kaiser 1969: 16–7, Abb. 4, for a possible reconstruction of the complex's earliest layout.
[360] Lauer 1936: 30–1.
[361] Lauer 1936: 32, n. 1, 102–4; 1962: 75–6. Disputed by Stadelmann (1996b: 195–205) due to the small size of the limestone blocks; for a possible alternative reconstruction of the original, see Kaiser 1992: 167–90. In addition, Kaiser (1997: 195–205, fig. 2) suggested another plausible reconstruction incorporating those same blocks which seems to overcome those objections.
[362] Lauer 1936: 34–40; 1962: 75–81.
[363] Lehner 1997: 88.

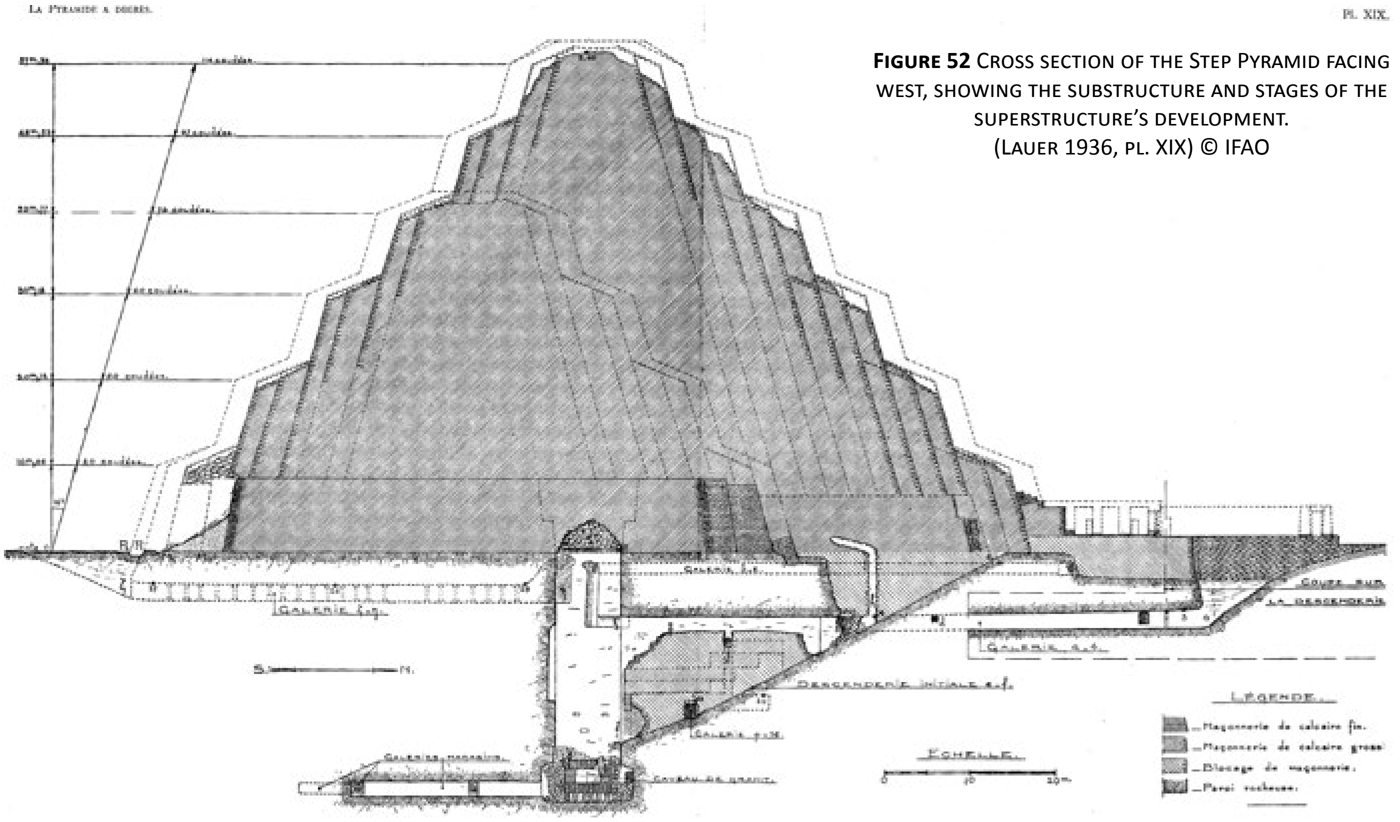


Figure 52 Cross section of the Step Pyramid facing west, showing the substructure and stages of the superstructure's development.
(Lauer 1936, pl. XIX) © IFAO

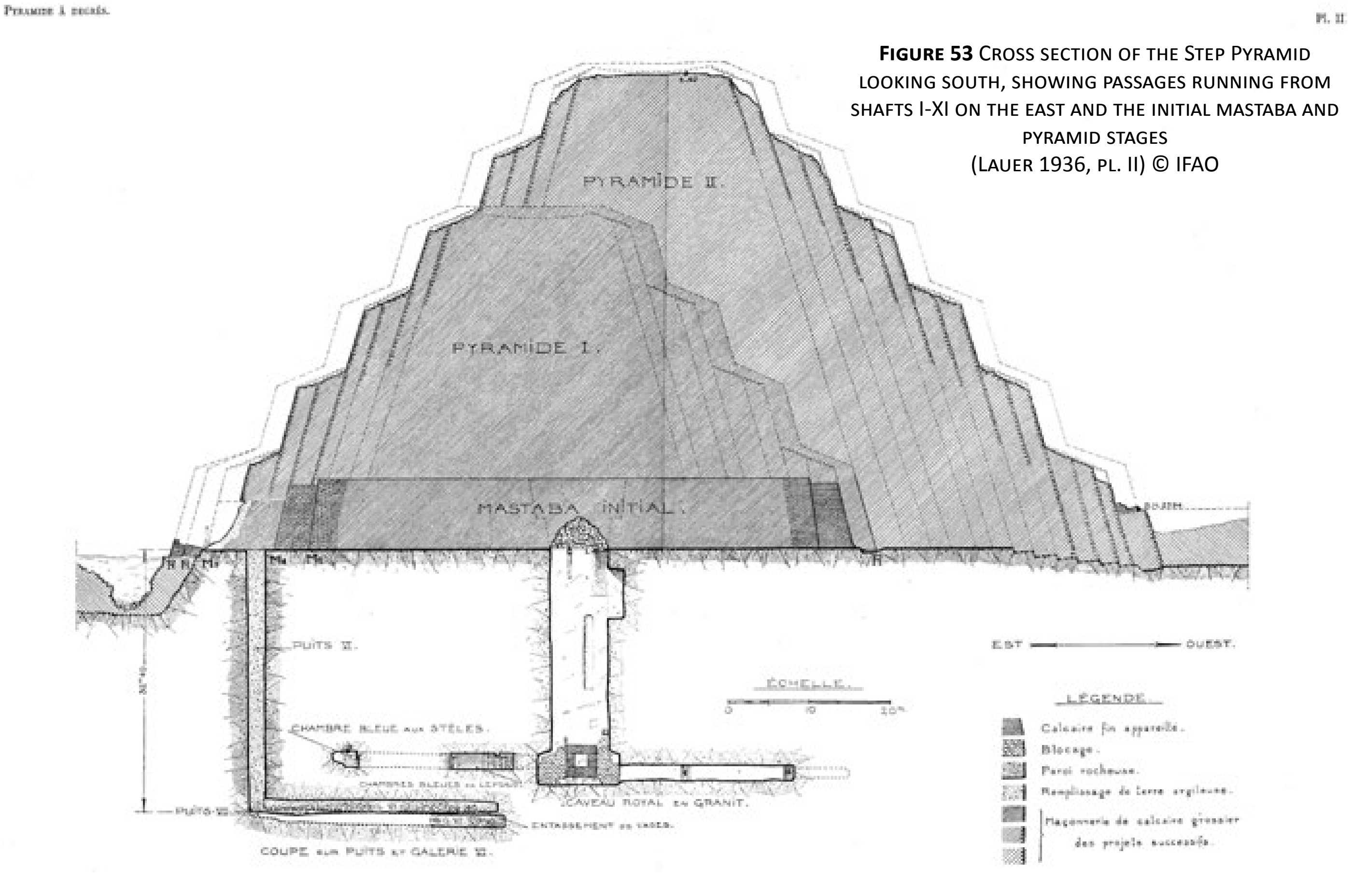


Figure 53 Cross section of the Step Pyramid looking south, showing passages running from shafts I-XI on the east and the initial mastaba and pyramid stages
(Lauer 1936, pl. II) © IFAO

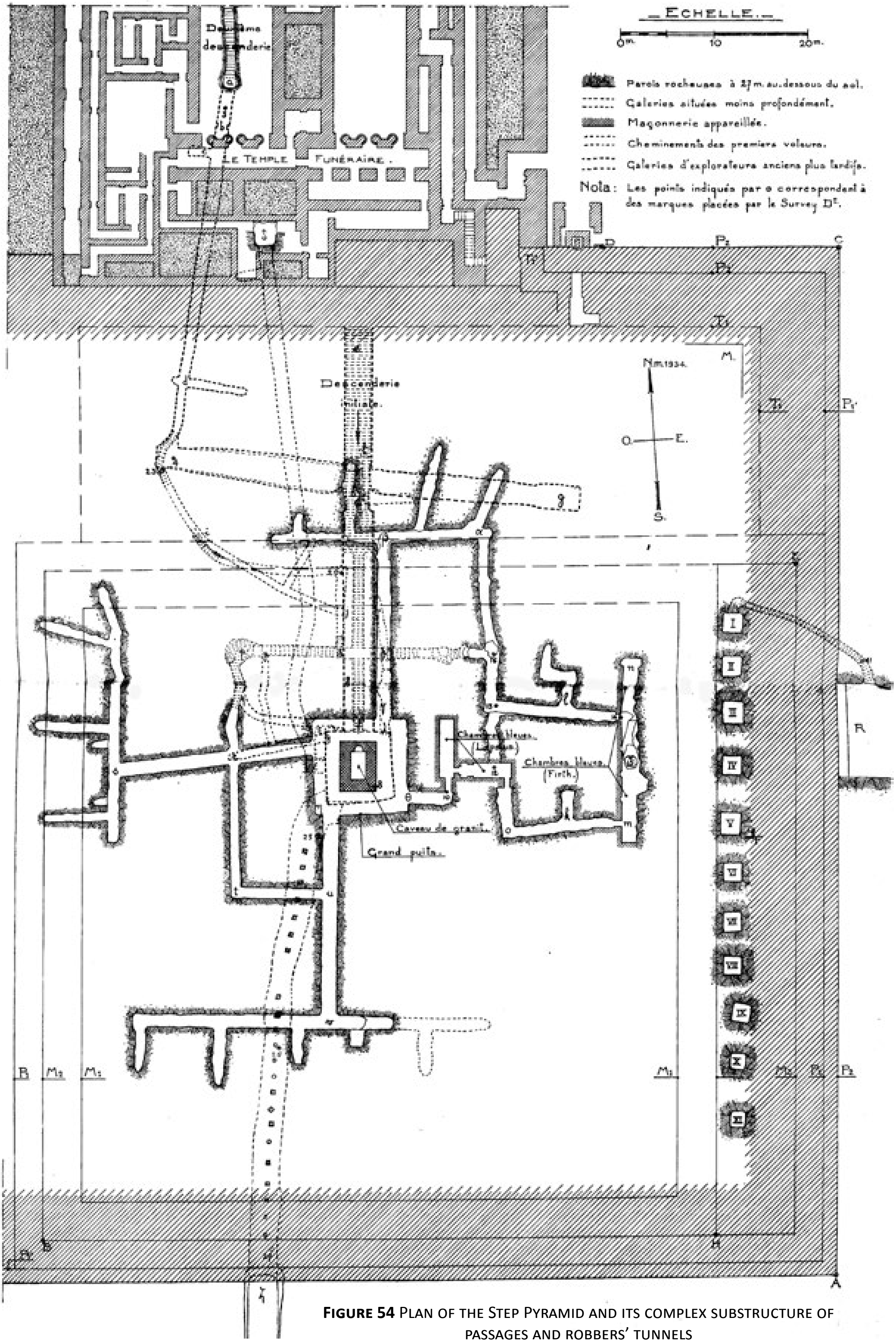


FIGURE 54 PLAN OF THE STEP PYRAMID AND ITS COMPLEX SUBSTRUCTURE OF PASSAGES AND ROBBERS' TUNNELS
(LAUER 1936, PL. XV) © IFAO.

to this day (Figs. 55 and 285).[364] Its sides were built from two layers of enormous granite blocks 1.1–1.2 m thick and roofed and floored with horizontal ashlars of similar dimensions.[365] Its entrance was via a hole in its roof closed by a large granite plug lowered into place by ropes (see 5.3.1.1).[366] To permit this operation and the insertion of the king's body, Lauer suggested a limestone 'manoeuvring' chamber was built over the vault.[367] The remainder of the shaft was then backfilled to a depth of around 25 m with around 1,225 m^3 of rubble consisting of large stones and clay.[368] Once the burial was made, the manoeuvring chamber was paved internally with a 1.5 m thick schist floor overlying a layer of limestone sherds to conceal the vault below,[369] above which a filling of limestone blocks may have been installed to seal the chamber, as in the 'South Tomb' (discussed below).[370]

Partially running under the eastern side of the subterranean complex are eleven horizontal galleries (numbered I–XI) connected by shafts to the surface,[371] which run approximately 30 m west and are protected from above by solid rock approximately 31–33 m thick (Fig. 56). Galleries nos. I–V were panelled with wood and functioned as the tombs of the royal family,[372] whereas, nos. VI–XI comprised of unlined magazine storage, of which nos. VI and VII were particularly notable for containing the remains of around 40,000 assorted stone vessels.[373]

At the southern end of the complex within the Southern Tomb **[17]**,[374] a comparable shaft arrangement is found to that of the main pyramid, which is almost of identical dimensions (Fig. 57). At its base is a similar, but smaller, granite vault,[375] built of four courses of blocks between 0.9–1.25 m wide, whose floor and roof were 0.85 m and 1 m thick respectively.[376] Too small to house a body,[377] the vault's likely contents and purpose are, like the 'tomb' itself, the subject of much debate.[378] Its entrance was, like that of its larger neighbour, sealed with a granite stopper (see 5.3.1.1).[379] Once closed, it too was probably covered by a 1.5 m layer of alabaster spoil and a hard stone pavement.

Above this was then built a 'manoeuvring' chamber in limestone to enable the lowering of the plug (Fig. 58).[380] Roofed with two layers of thick limestone beams of 1.1 m and 0.9 m thick respectively, [381] the chamber's east and west walls were constructed of coursed limestone masonry. However, the north wall comprised of four courses of limestone monoliths 2.5 m long × 1.4 m high × 0.6 m thick, built four layers deep, thus creating a defensive wall 2.4 m thick. Their purpose, Lauer suggested, was possibly to mislead potential tomb robbers into believing the vault was concealed within them. Following the putative 'burial', the room was then sealed by filling it completely with limestone masonry (see 5.2.2.2).[382] Lastly, to secure the tomb from above, the whole shaft was, like the shaft in the pyramid, backfilled with very large stones and clay mortar (Fig. 59).[383]

Like its royal Second Dynasty predecessors at Saqqara, the main substructure in the Step Pyramid took advantage of the natural protection offered by the surrounding geology. Compared to the tombs of Hotepsekhemwy/Raneb and Ninetjer, however, the level of protection was at least four times greater, as the rock cover over its subterranean galleries was around 25 m thick.[384] At

[364] Lauer 1936: 32, n. 1.

[365] This left an internal cavity 2.96 m long × 1.65 m wide × 1.65 m high to accommodate the king's body, scaled dimension from drawing by Lauer (1936: pl. XVII).

[366] Lauer 1936: 31–2.

[367] Lauer 1962: 75–6. Based partly on the extant example found in the 'South Tomb', the actual construction of which is the subject of some debate amongst scholars; see again Stadelmann (1996b) and Kaiser (1992 and 1997) for discussions concerning this area.

[368] Indeed, the remains of this blocking can be still be seen in situ today at the top of the shaft in the body of the superstructure, precariously supported by a few timbers. The majority of it, Lauer (1936: 33) suggested would have been removed during the clearance of the shaft during the Late Period.

[369] Lauer 1936: 33–4 and 41.

[370] Perhaps it was finally closed as Stadelmann (1996b: 304) suggests with the star decorated limestone blocks that were found in situ, which have been the subject of some debate between scholars, see Stadelmann (1996b: *passim*) and Kaiser (1992: *passim* and 1997: *passim*).

[371] Porter and Moss 1974-81: 401.

[372] Lauer 1962: 80–90. They were equipped with limestone sarcophagi (Porter and Moss 1974-81: 401–2). Fragments of two were found in Galleries I and III, as well as two limestone sarcophagus bases in Gallery II, and fragments of alabaster and limestone sarcophagi in Galleries III and IV. Finally, Gallery V contained a handsome alabaster sarcophagus with lid (Lauer 1936: 47–62).

[373] Lauer 1962: 91–2; 1976: 100; Porter and Moss 1974-81: 402–5.

[374] Porter and Moss 1974-81: 408–9.

[375] Its internal dimensions were 1.6 m long × 1.6m wide × 1.3 m high (Lauer 1936: 98; 1962: 122–6). Lauer (1936: 102–3) speculated that this too may have been originally preceded by a limestone vault, such as the one he had suggested was installed in the main pyramid shaft before its replacement by the granite sarcophagus. But that when it was actually built, it also may have been considered too weak to deter robbers and support the weight of the fill.

[376] Scaled from drawings by Lauer (1962: Plan 21).

[377] Lauer 1976: 96.

[378] The vault's likely contents and purpose are, like the 'tomb' itself, the subject of much debate. Lauer (1962: 131–42) discussed the earlier theories in depth. Various ideas abound, amongst the many of which are: that it is a tomb for the king's *ka* (Radwan 2003b: 100); a cenotaph representing the king's tomb at Abydos (Lauer 1962: 141); a tomb to house the canopics and internal organs of the king (Lauer 1976: 98); the latter denied by Dodson (1994: 6, n. 12) who believes this scenario extremely unlikely and that the South Tomb is a direct ancestor of the subsidiary pyramid. A view supported by Fakhry (1961: 31) and Lehner (1997: 92), who also see it as a forerunner of the later satellite pyramids. Lastly, Dodson and Ikram 2008: 147) describe its function as a 'dummy of unknown meaning'.

[379] Lauer 1939: 46–8; 1962: 127.

[380] Lauer 1936: 106.

[381] Lauer 1962: 124.

[382] Found in situ during the excavation of the tomb (Lauer 1936: 101–2).

[383] Firth and Quibell 1935: 18. It can be seen in Firth and Quibell's (1935: pl. 46, 1–4) photographs that these large stones are least as big as a man (fig. 59 in this book), if not larger and thus would have presented a significant obstruction and would have been extremely difficult to move.

[384] Scaled from section drawing by Lauer (1962: pl. 11), the dimension is from the ceiling of the 'model' palace to the surface.

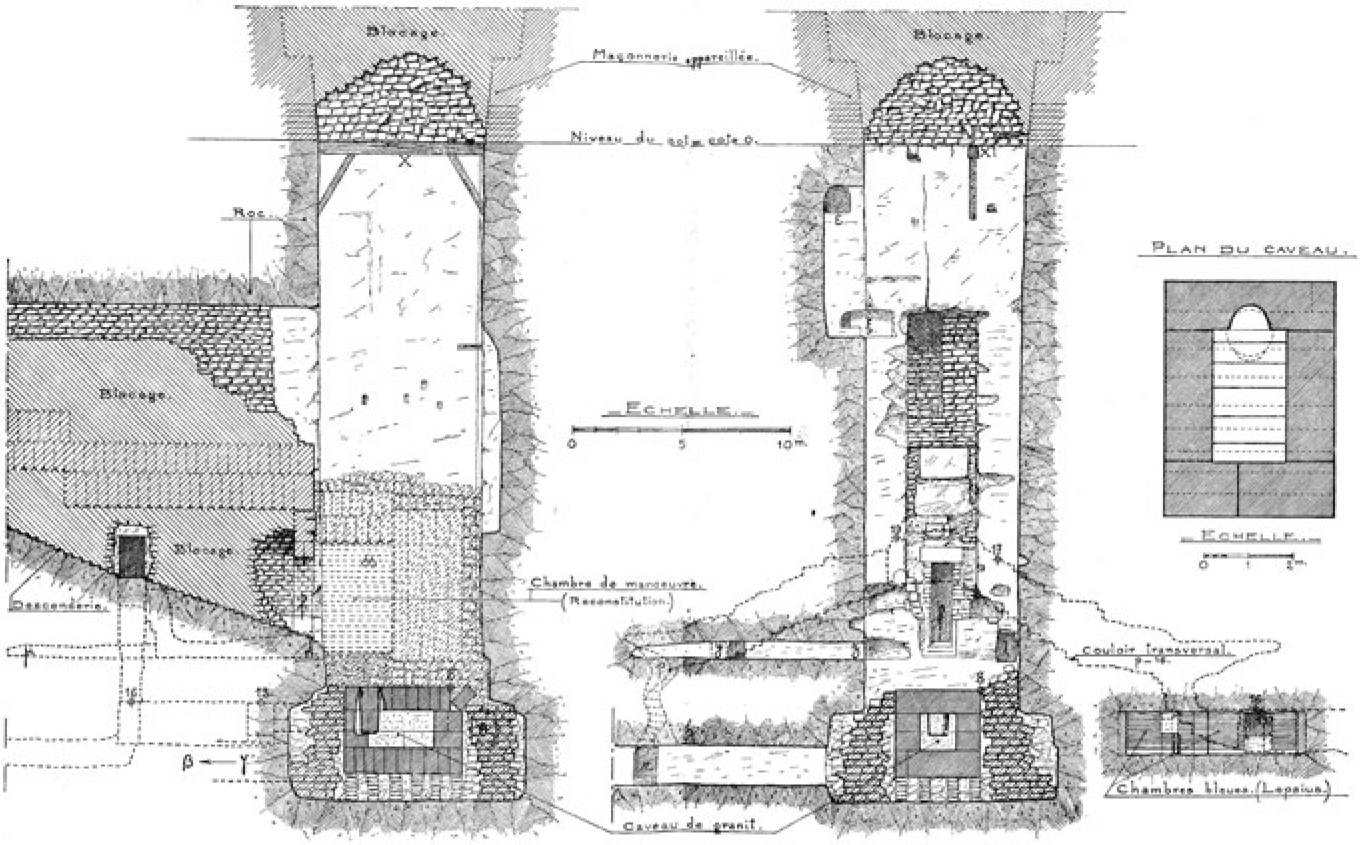


Figure 55 Sections through the shaft of the Step Pyramid showing details of the blocking in the descending passage and the granite vault.
(Lauer 1936, pl. XVII) © IFAO

its core, a further layer of defence for the king's body was provided by the revolutionary granite vault and its limestone manoeuvring chamber; further made inaccessible after the burial by a filling of masonry. The shaft itself was then secured with around 1,900 tonnes of stone and clay backfill.[385]

The Pyramid of Sekhemkhet

Unlike in the nearby Step Pyramid, the two main elements of the substructure of the Pyramid of Sekhemkhet **[18]**,[386] which were the burial chamber and the magazines, were kept separate, but linked via the tomb's descending corridor (Fig. 60). Along the corridor, the first part of the substructure to be reached was an extensive 'U' shaped magazine complex (Figs. 61–2).[387] This contained 132 unused 2 m high storage chambers set out either side of an ambulatory corridor in a staggered arrangement resembling the teeth of a comb.[388] These were protected from above by a roof comprised of the natural rock and the pyramid enclosure's terrace that totalled approximately 17 m thick.[389] However, unlike the burial chamber, they were not accorded the protection of the superstructure's footprint.

Further down at the end of the 72 m descending corridor (see 5.1.1), the entrance doorway to the burial chamber was concealed by an 'impervious mass of rock',[390] which may have been deliberate camouflage intended to conceal its entrance.[391] Beyond it, and the doorway's deep dry-stone blocking, lay a passage leading to a trident shaped complex of crudely cut rooms,[392] and within its central 'prong' was found an alabaster sarcophagus (Fig. 63).

[385] Based on an estimate of 1225 m3 of broken limestone rubble at 1.554 tonnes per m3 (taken from online Specific Gravity of Materials table: http://www.csgnetwork.com/specificgravmattable.html; accessed online 4th September 2011).
[386] Porter and Moss 1974-81: 415–7.
[387] Radwan (2003: 110) has pointed out that the shape of this is similar to that of the determinative for *ka* and thus could have been intended to provide the king with provisions magically as well as it can be interpreted as "nourishment, food and life force".
[388] The east-west corridor measures 152 m and both the north-south 'arms' 107 m (Goneim 1957: 15–6). The rooms branching off it are on average 4.5–4.9 long × 1.8 m wide × 1.9–2 m high (Maragioglio and Rinaldi 1965b: 9).
[389] Dimension extrapolated from drawing by Maragioglio and Rinaldi (1963: Tav. 4).
[390] Goneim 1956b: 113.
[391] Maragioglio and Rinaldi 1964a: 6–7; 1965: 8–9.
[392] Although Maragioglio and Rinaldi (1963: 34) suggested that this room was probably not originally intended to be the burial chamber, as it acts as a hub from which the other passages spring, whereas a burial chamber usually lies at the end of a corridor system. For a detailed plan and elevations, see Maragioglio and Rinaldi 1965: Tav. 5 bis.

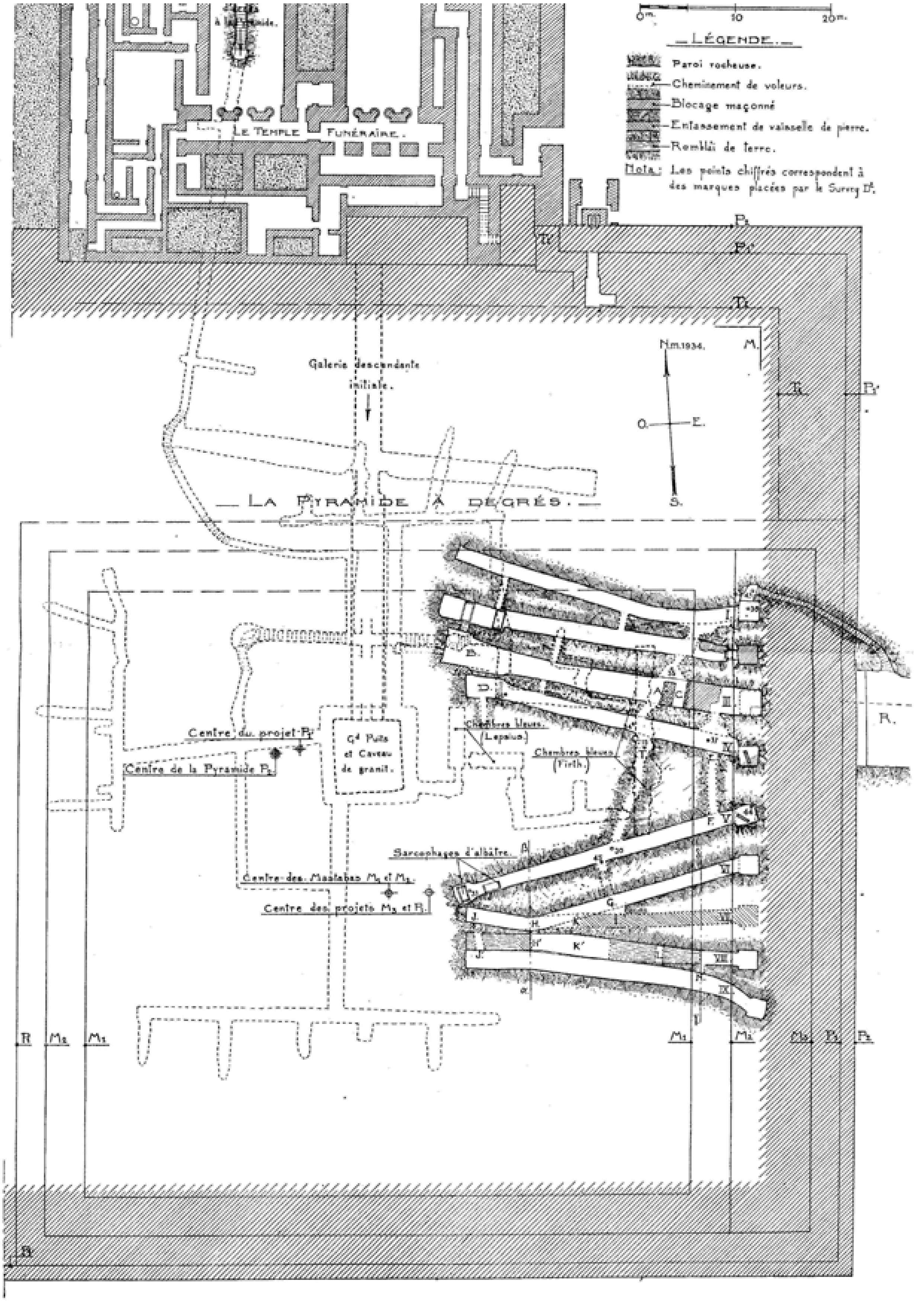


FIGURE 56 GALLERIES I–XI UNDER THE STEP PYRAMID AND THE STAGES OF ITS SUPERSTRUCTURE'S DEVELOPMENT IN PLAN OVER THE UNDERLYING SUBSTRUCTURE.
(LAUER 1936, PL. XLVI) © IFAO

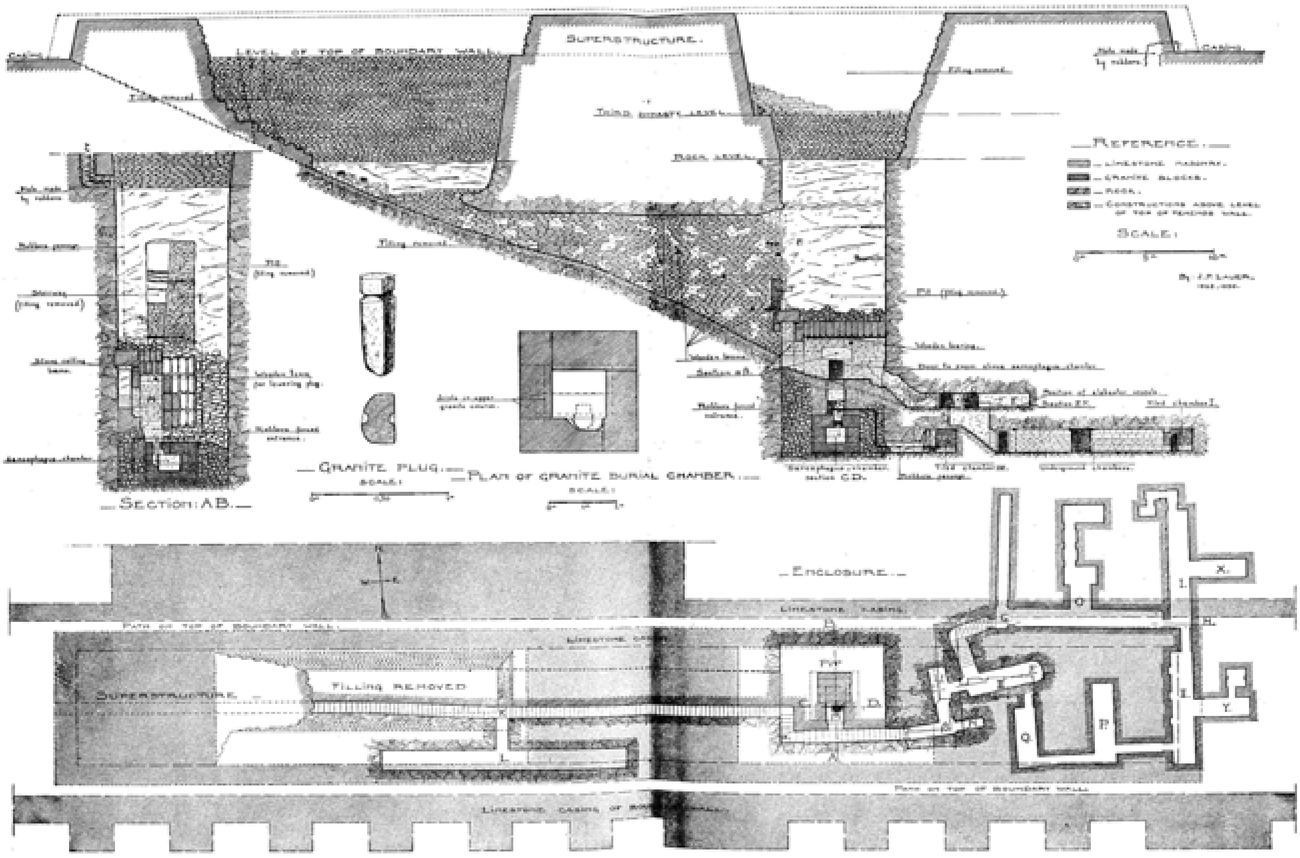


Figure 57 Plan and cross-section of the South Tomb at the Step Pyramid.
(Lauer 1936, pl. XXXI) © IFAO

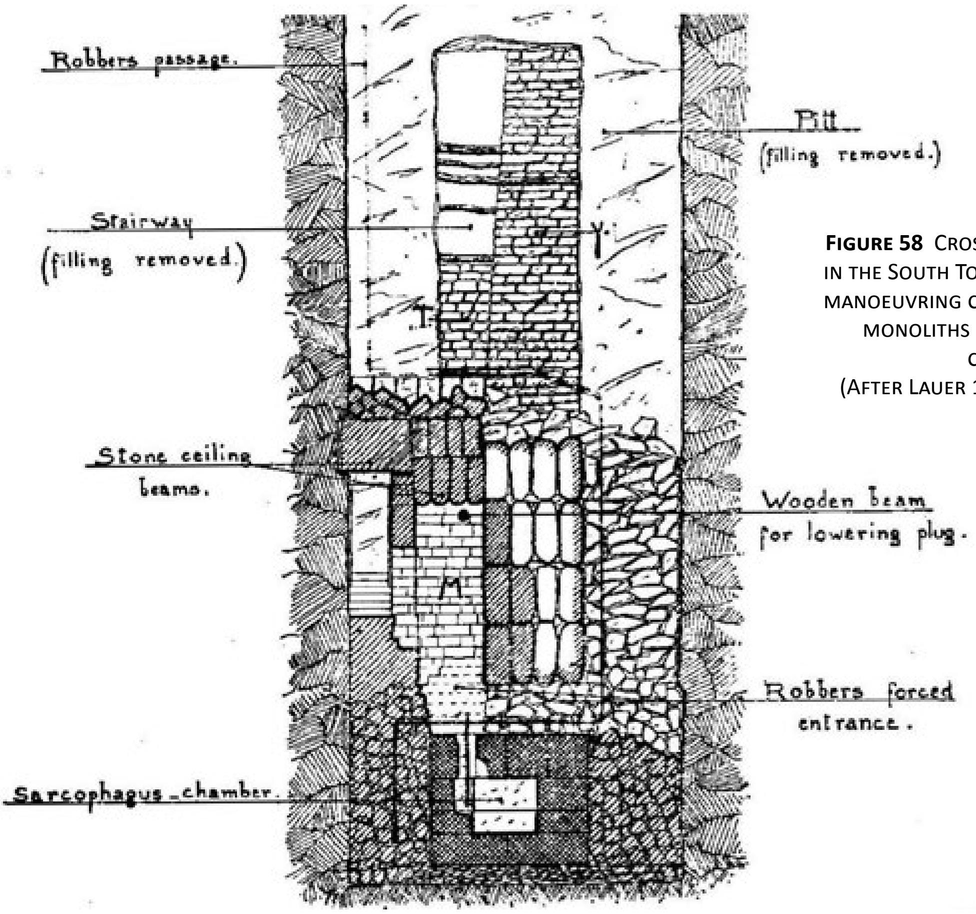
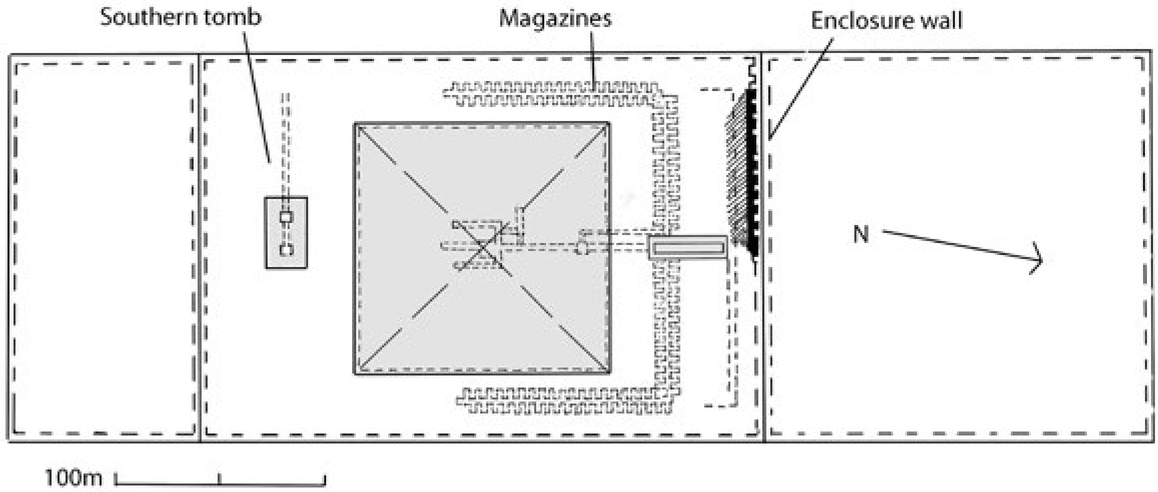


Figure 58 Cross-section of the shaft in the South Tomb showing the vault, manoeuvring chamber and limestone monoliths for protecting the chamber.
(After Lauer 1936, pl. XXXI) © IFAO

FIGURE 59 THE ENORMOUS 'MAN-SIZED' STONES USED FOR THE 'RUBBLE' FILLING IN THE SHAFT OF THE SOUTH TOMB. (FIRTH AND QUIBELL 1935, PL. 46.1)



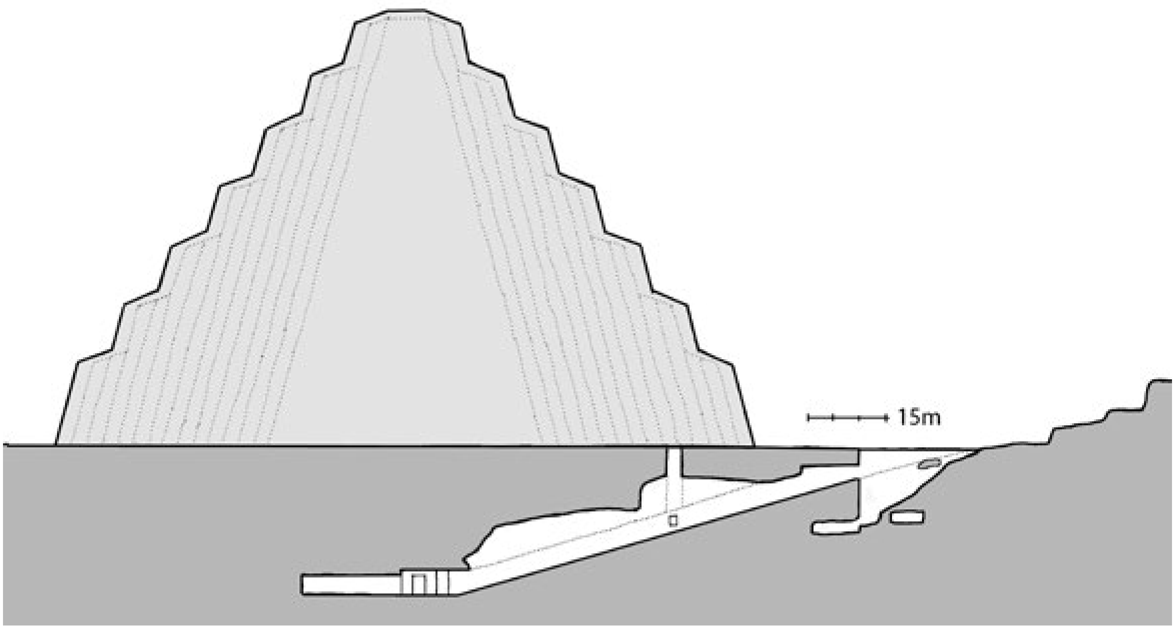


FIGURE 60 THE PYRAMID COMPLEX OF SEKHEMKHET GENERAL PLAN AND SECTION. (DRAWN BY THE AUTHOR AFTER GONEIM 1957, PL. 4 AND LAUER 1979, FIG. 7)

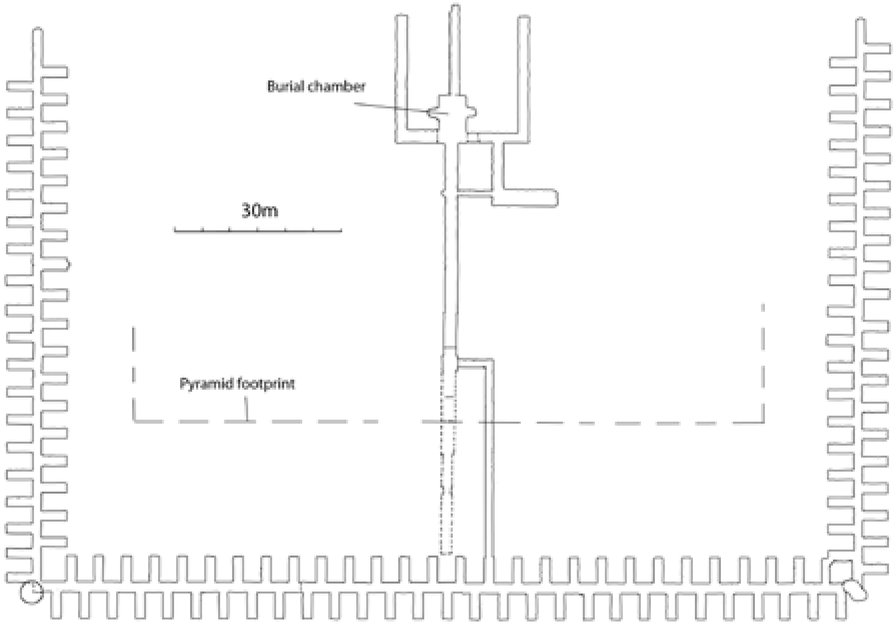


Figure 61 Plan of the substructure and magazines of the Pyramid of Sekhemkhet. (Drawn by the author after Maragioglio & Rinaldi 1963, Tav. 5, fig. 1)

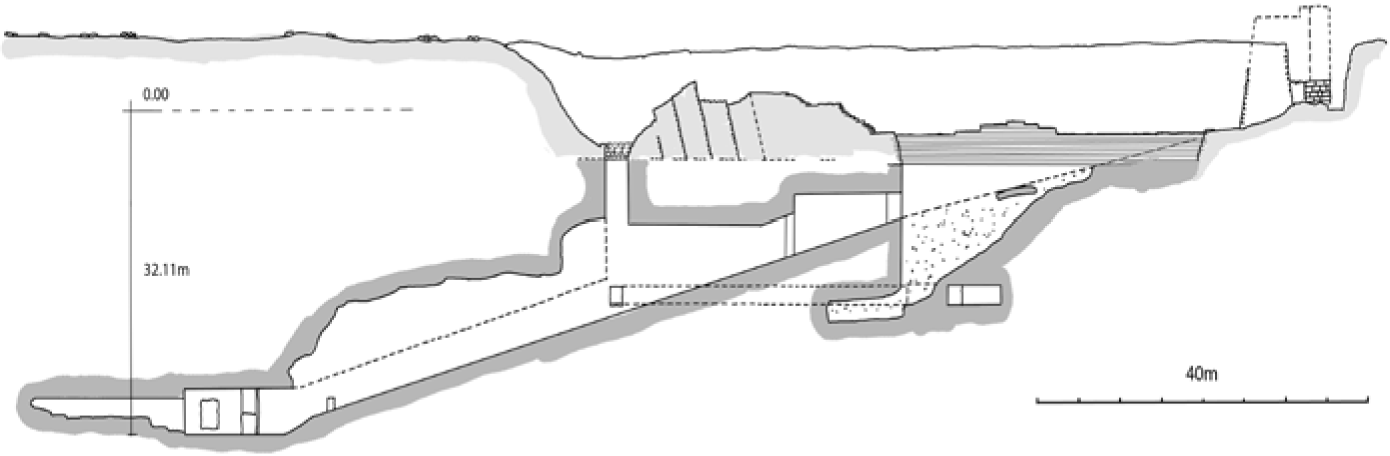


Figure 62 Cross section of the substructure of the Pyramid of Sekhemkhet, the entrance to the magazines lies under the shaft. (Drawn by the author after Maragioglio & Rinaldi 1963, Tav. 4)

At this point, the roof of this chamber was protected by approximately 23 m of solid rock cover,[393] which lay below the centre of the overlying pyramid. The fine alabaster sarcophagus was closed by a 'T' shaped sliding panel in one end,[394] but although apparently sealed in antiquity, when opened was found to be empty.[395]

In addition to the main pyramid, and approximately 25 m south of it, Lauer discovered the buried remains of a 'South Tomb'**[19]**, comparable to that in Djoser's complex (Fig. 64).[396] At the end of its descending corridor and beyond the intervening vertical shaft that met it, a corridor continued and then widened to form what is assumed to be a burial chamber.[397] It would have

[393] A depth of 32.11 m is indicated on the drawing by Maragioglio and Rinaldi (1963: Tav. 4) to the terrace level datum marked '0.00' on the section from which one can deduct 4.79 m to the top of the rock strata and their later dimension (1965: 6) of 4.5 m for the height of chamber 'S'. However, the entire structure was built on a slope and levelled up with a surrounding terrace, so all dimensions have to be approximate at best (Goneim 1957: 10–1; Maragioglio and Rinaldi 1963: 13–4, 19–21).

[394] This was 2.35 m long × 1.13 m wide × 1.05 m high and its internal dimensions were 1.84 m long × 0.6 m wide × 0.62 m high (Goneim 1957: 18–9). Its sides, base and roof scale from the drawings at between 0.2–0.4 m thick (Goneim 1957: pl. LX).

[395] For a discussion of the sarcophagus in detail, see Goneim 1957: 18–9, pls. LI–LX and Wissa 1997: 445–8. Lauer (1962: 194–200) was of the opinion that its empty state was due to the tomb having been robbed in the First Intermediate Period, a suggestion refuted by Maragioglio and Rinaldi (1965b: 3–5).

[396] Unlike in the South Tomb of Djoser, in this case it may have been used for a burial, as in the passage before it the remains of a collapsed wooden sarcophagus were found along with fragments of decorative gold leaf, which had presumably covered its exterior. Within the coffin was found the skeleton of a small child approximately two years old, whom Lauer (1967: 502–5, pl. IVb) assumed to be royal.

[397] Lauer 1968: 100–1. IVa and b, fig. 3; 1969b: 463.

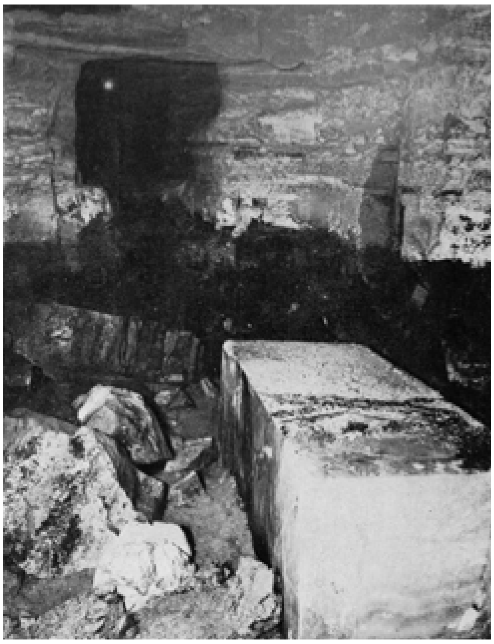


Figure 63 The alabaster sarcophagus found in the burial chamber of the Pyramid of Sekhemkhet.
(Goneim 1957, pl. LI)

been protected from above by a rock ceiling about 24 m thick,[398] the overlying terrace and superstructure and of course, laterally by the surrounding geology.[399]

Set slightly shallower than in the Step Pyramid, the burial chamber complex of Sekhemkhet was surrounded on all sides by 'soft rock',[400] and therefore arguably more secure than the one at the base of the backfilled shaft of the Step Pyramid. On the other hand, its alabaster sarcophagus would have offered an inferior level of physical protection compared to Djoser's granite vault. Although carved from one solid block of alabaster and undoubtedly stoutly built, the thin sliding entrance panel and the fragile nature of the material itself, made this sarcophagus far less secure and in no way comparable to the granite example found in the Step Pyramid, which

[398] Scaled from drawing by Lauer (1972: fig. 1).
[399] Lauer (1969b: 464–5, fig. 1; 1972: 579–80; 1976: 140) speculated during his excavations that, due to the huge quantities of marl found at the site, there may have been a set of subterranean 'comb' magazines attached to the South Tomb akin to those of the pyramid.
[400] Goneim 1957: 8.

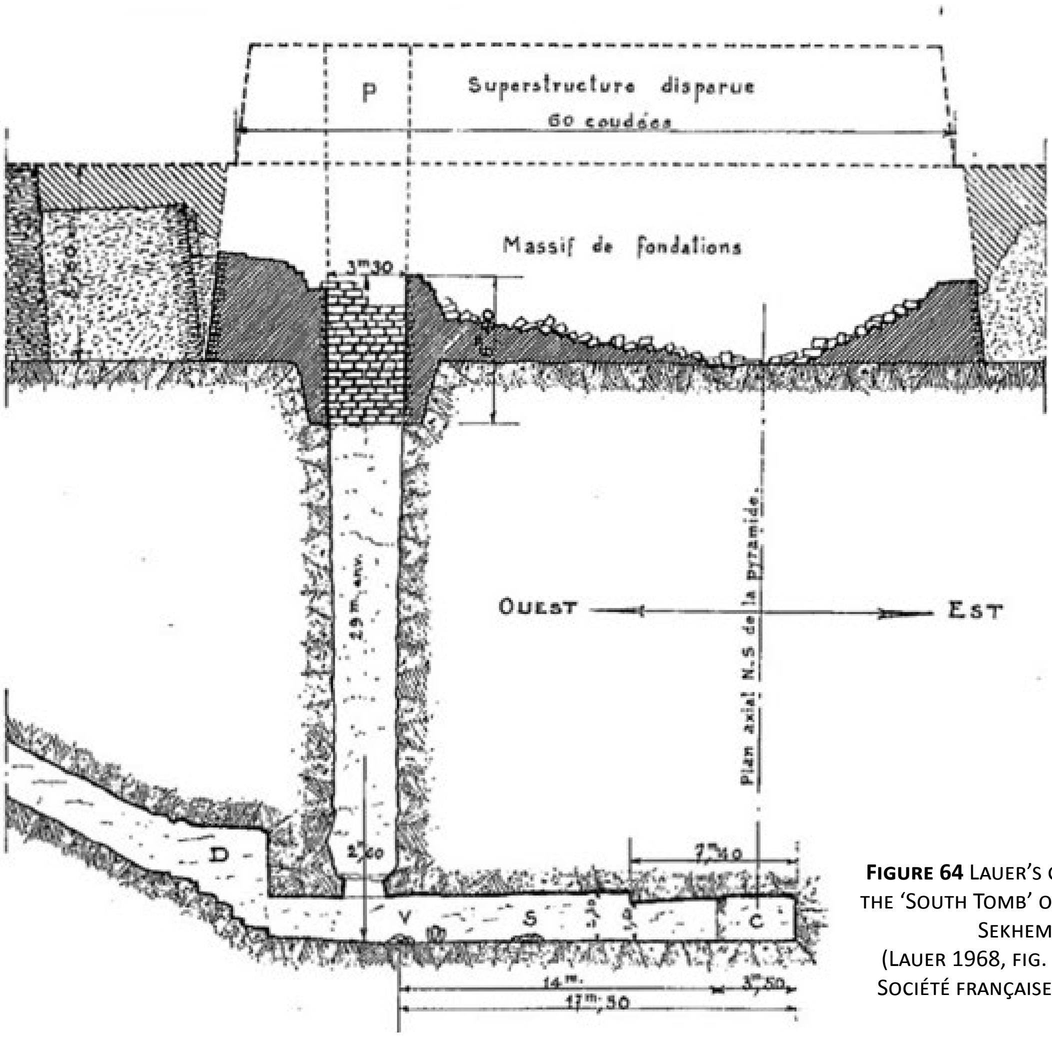


Figure 64 Lauer's cross section of the 'South Tomb' of the Pyramid of Sekhemkhet.
(Lauer 1968, fig. 2) Courtesy of Société française d'égyptologie.

may suggest that the material was chosen for aesthetic or religious reasons rather than security. Another potential security risk was the magazines, as they were not so deep as the burial chamber, nor covered by the protective footprint of the superstructure.[401] Therefore, theoretically, they would have been more vulnerable to tunnelling and would have provided an easy route to the core.[402] As it is, the pyramid's burial chamber was found undisturbed,[403] unlike its southern subsidiary, which had been robbed via its entrance passage, the beginning of which has never been found.[404]

The Layer Pyramid

The next monarch chose Zawiyet el-Aryan as the site for his pyramid **[20]**,[405] where it is located on the edge of an escarpment that leads down to the floodplain (Map 5).[406] Attributed to Khaba,[407] like that of Sekhemkhet, its pyramid, substructure and cult installations were never completed.[408]

In the two excavation reports on the pyramid by Barsanti,[409] and Reisner and Fisher,[410] their approximately 1:1000 drawings conflict extensively as to the layout of the substructure (Figs. 65–6),[411] as also do the dimensions given by Reisner and Barsanti.[412] However, Dodson has successfully demonstrated that Barsanti's layout is probably the correct one,[413] so for the

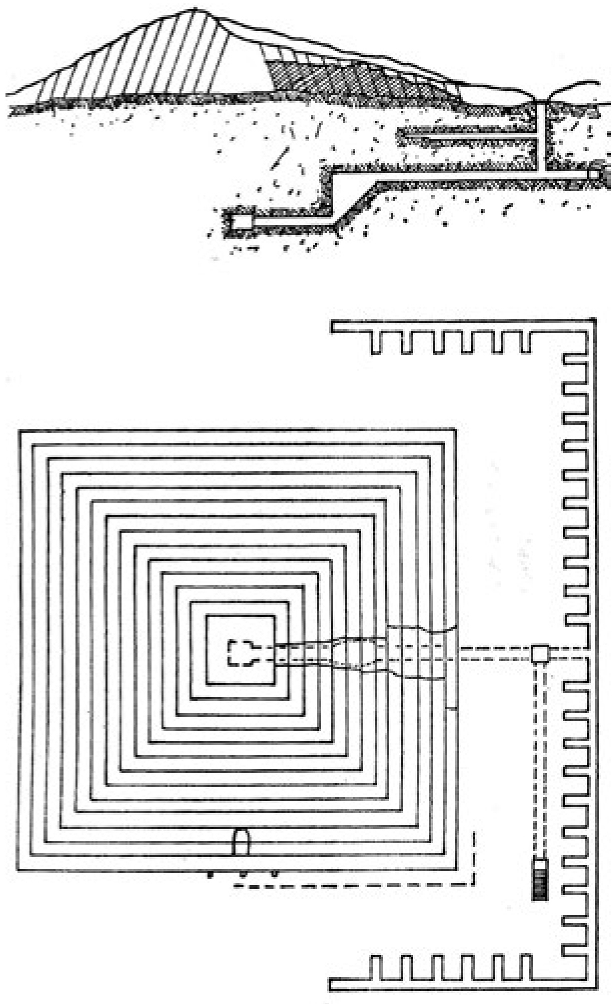


Figure 65 Plan and elevation of the Layer Pyramid according to Reisner and Fisher. (Reisner & Fisher 1911, 58)

purposes of this discussion the Barsanti dimensions are used where possible, albeit they may be contradictory or inaccurate.[414]

Descending down the tomb's shaft, past an upper blind corridor, a further two passages cut on the same level ran independently north and south (Fig. 67). The southern passage proceeded for 20 m where it divides in two at a stairwell; from it an upper corridor ran straight on and ended in another cul-de-sac, but at the base of the stairwell, the lower corridor continued and ended in

[401] Proof that the magazines could theoretically be reached by this route comes from Goneim (1957: 16), who reported that some blocked access or ventilation shafts that led to the surface were found in the corners of the 'U' shaped section, whose entrances had been covered by the enclosure walls. The existence of these shafts was confirmed by Maragioglio and Rinaldi (1964a: 10) in a subsequent visit.

[402] Although from the point of view of providing secure storage it could be argued that they were better defended than the external magazines in the 'Western Massif' of Djoser's Step Pyramid.

[403] Goneim 1957: *passim*.

[404] Lauer 1967: 502–5; 1969b: 463; 1976: 139; 1977: 202–3.

[405] Porter and Moss 1974-81: 313.

[406] Lehner 1997: 95; Dodson 2003: 46. Baud (2002: 214) suggests that its new location may possibly been chosen due to a lack of room at Saqqara, or the desire to start anew with a site solely dedicated to its owner. Dodson (2003a: 46), however, suggests that the pyramid's location may indicate that a less sophisticated arrangement for the king's cult was intended, as remains at the desert's edge suggest a possible valley temple and causeway – thus signalling a change in the design of pyramid complexes.

[407] Unlike at the step pyramids of Djoser and Sekhemkhet, where there is evidence of their owners' names, there is no similar evidence at the Layer Pyramid (Wilkinson 1999: 95–9). However, Reisner and Fisher (1911: 59) found bowls in the nearby cemetery inscribed with Khaba's name, and it seems generally accepted (Edwards 1988: 66; Lehner 1997: 95; Dodson 2003: 46; Seidlmayer 2006: 122) that the pyramid may reasonably be his.

[408] Maragioglio and Rinaldi 1963: 47; Lehner 1996: 511.

[409] Barsanti 1901a: 92–4

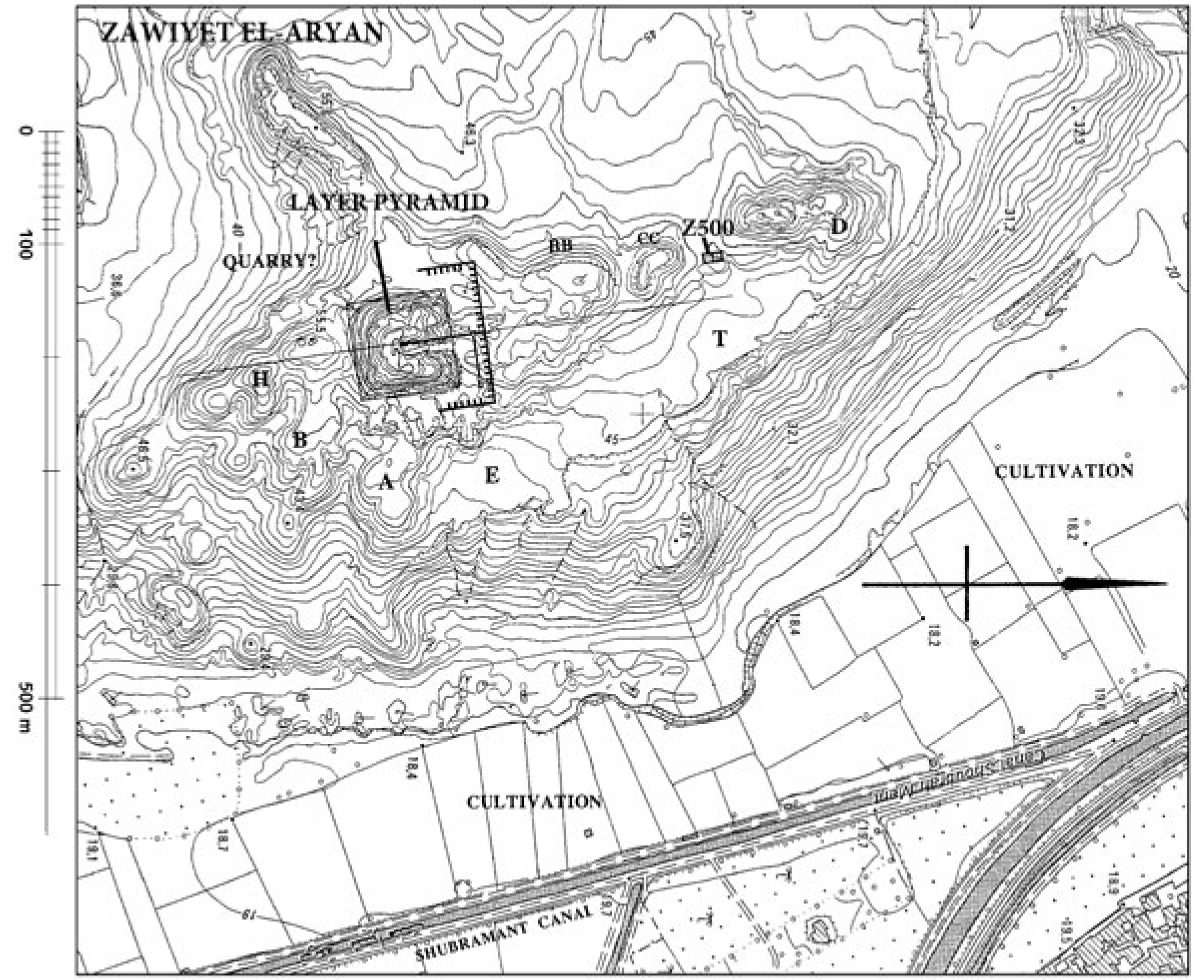
[410] Reisner and Fisher 1911: 54–9.

[411] Maragioglio and Rinaldi 1963: 41 and 44. The description given concerning the substructure by Reisner and Fisher (1911: 54–9) is almost nonexistent, whereas Barsanti's (1901: 92–4) was far more detailed and includes measurements.

[412] For an in depth discussion of this point, see Dodson 2000: 84–7.

[413] Dodson (2000: 81–5, fig. 3) conclusively shows, using an unpublished photograph of the interior of the pyramid (Fig. 242 in this book), that a second corridor exists running parallel and just above the main corridor to the burial chamber as in Barsanti's (1901: 92–4, fig. 2) report, whereas Reisner and Fisher (1911: 54–9) show only a single corridor at low level, a layout which seems to have been generally accepted by many pyramid scholars as correct.

[414] It is not until Reisner's (1936: 134–6) later discussion of the tomb, that detailed dimensions are provided by him which seem to have been extrapolated from Barsanti's (1901: 92–4) article or scaled from his drawing, a point noticed by Maragioglio and Rinaldi (1963: 41) and in the writer's experience quite a common occurrence in Reisner's (1936) *The Development of the Egyptian Tomb*, where it would appear that in the absence of dimensions in the texts of excavation reports from which he was working, he often gave dimensions that are obviously scaled from plans.



Map 5. The Layer Pyramid of Zawiyet el-Aryan
The environs and topography surrounding the Layer Pyramid of Zawiyet el-Aryan, which is raised on the edge of an escarpment that leads down to the floodplain. (After Lehner 1996, fig. 1)

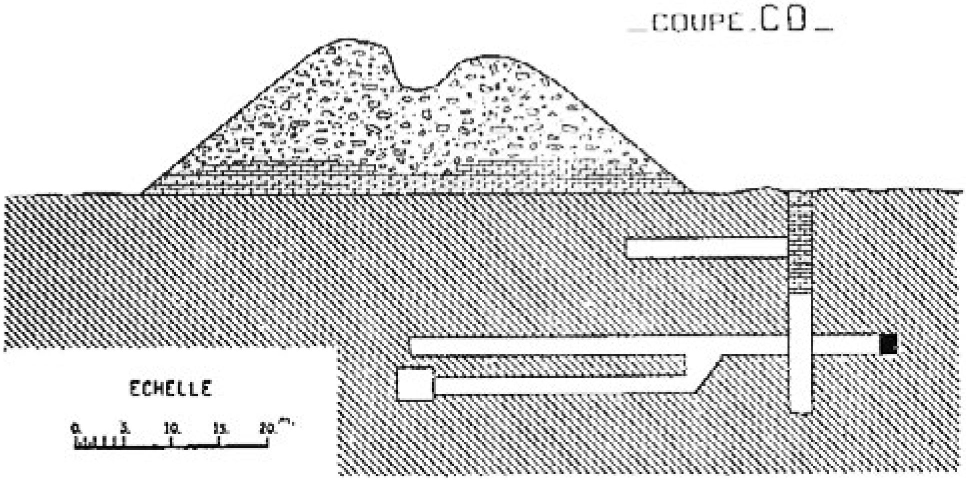


Figure 66 Section of the Layer Pyramid according to Barsanti. (Barsanti 1901, fig. 2)

an empty rock-cut burial chamber 3 m high,[415] right under the centre of the pyramid (see 5.1.1).[416] Barsanti was unclear about the depth of this arrangement, but according to Reisner, its floor would have been 24 m below the surface.[417] Returning back to the shaft, the northern corridor, which is on the same level as

[415] The empty burial chamber suggests that its putative occupant lacked the final shelter of a stone sarcophagus, which further points to the pyramid's unfinished and unoccupied state (Edwards 1988: 66).
[416] Barsanti 1901a: 92–4.
[417] Reisner 1936: 135.

the southern, leads directly to a 'U' shaped magazine complex,[418] similar to that of Sekhemkhet, which lay outside the protective footprint of the pyramid.[419]

Like its predecessors, the burial chamber in the Layer Pyramid was deep underground and relied on the protection of its surrounding geology, described by Reisner and Fisher, 'The rock strata were very bad, some of them being little more than beds of packed sand'.[420] Its depth of cover can be estimated to be at least 21 m thick; less than that of both the step pyramids at Saqqara. The magazines, due to their increased depth would have been a little better protected than those of Sekhemkhet, but due to their exposed position beyond the superstructure, they could still be considered as a potential weak spot.

No tomb is known for the next king of the dynasty Nebka,[421] whose reign is still the subject of discussion.

The Brick Pyramid at Abu Roash

It has been suggested that Huni, the last king of the dynasty,[422] built his Brick Pyramid **[21]**, also known as Lepsius' pyramid no. 1,[423] at Abu Roash,[424] though this is not universally accepted.[425] The pyramid was

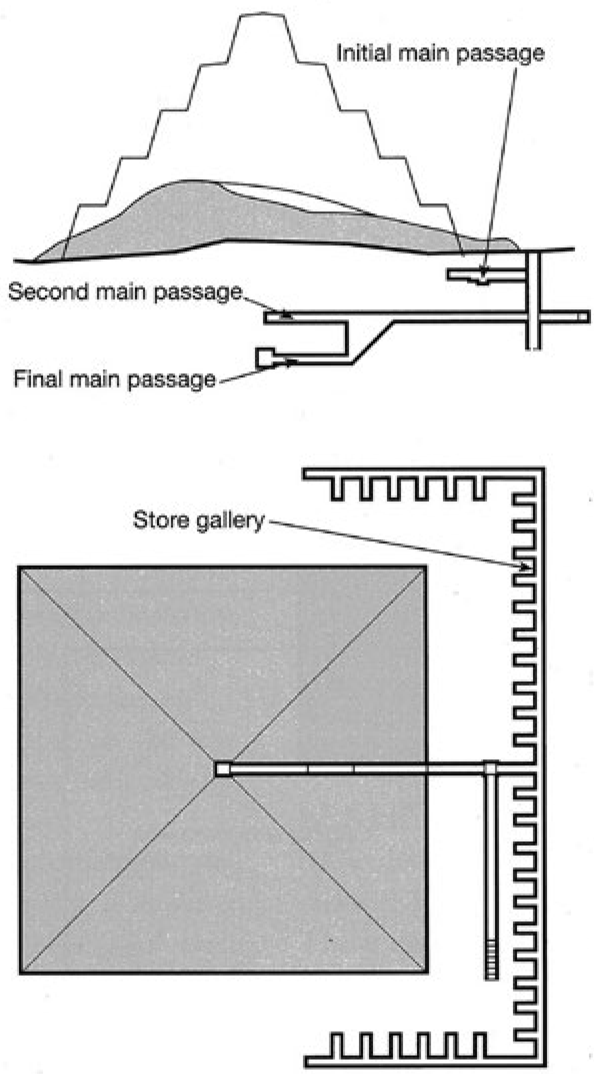


Figure 67 The layout of the Layer Pyramid as proposed by Dodson.
(Dodson 2003, 46)

first mentioned by Vyse who initially noted the ruined brickwork,[426] and later: 'upon a projecting knoll…' a 'building of considerable magnitude and solidity'.[427] Subsequently, it was recorded by Lepsius in 1842–3 (Map 6) who reported the colossal remains of a pyramid of black Nile mud-brick built around a core of rock and noted that a shaft and limestone sarcophagus were still to

418 This was 120 m east-west × 38 m north-south, and unlike the pyramid of Sekhemkhet, its magazines were only orientated towards the pyramid (Barsanti 1901: fig. 3).

419 Barsanti 1901a: 93–4, fig. 3.

420 Reisner and Fisher 1911: 56.

421 Seidlmayer 2006: 21, 23, 117–23. Although Dodson (1998: 30) suggests the brick enclosure of El-Deir at Abu Roash as a possible candidate for Nebka's tomb; see Porter and Moss 1974-81: 9 and Swelim 1983: 36–9, for further information on the monument at El-Deir.

422 Dodson and Hilton 2004: 45.

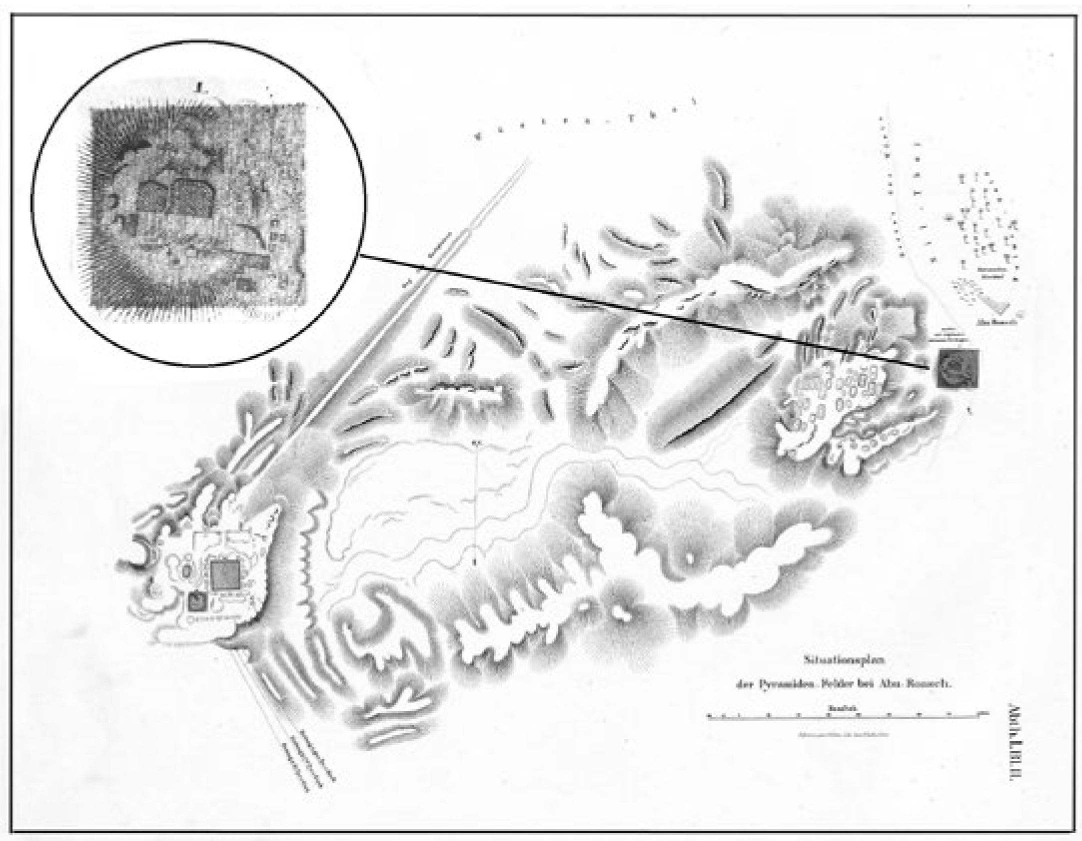
423 Swelim 2002: 444.

424 Swelim 1987: 89; Dodson 1998: 35; 2003 47–8. Lehner (1997: 96) writes referring to the Brick Pyramid, 'A further pyramid is tentatively assigned to Huni' and briefly discusses Swelim's work, but does not include the pyramid in the main corpus of his *Complete Pyramids*. Interestingly, Stadelmann (2007: 425–31) in his article on Huni discusses the epithet *pꜣ qdw sšm* associated with Huni in the Royal Canon of Turin, which may refer to a monumental building. He writes (2007: 425): 'indeed *pꜣ qdw* might most probably mean "the builder" of *sšm* [...]. If this is true, *sšm* [...] must be a certain construction, something extraordinary which was built by Huni.' He continues (2007: 426): 'However, more likely in this context and according to our knowledge of the monuments of this rather dark period is that sSm [...] refers to a visible monument or constructions like the small step pyramids, donjons or lookouts within the royal palaces in or near the capitals of the nomes. For it must have been indeed something visible, outstanding, for which Huni was glorified by Old Egyptian traditions.' Although at no point does Stadelmann consider the Brick Pyramid as a possible candidate for this 'extraordinary' structure, one could perhaps think that this 'visible monument' could be the pyramid under discussion? Perhaps the Brick Pyramid is not suggested by Stadelmann, because in his (2007: 430) article on Huni he associates him with Khaba and suggests the king's tomb was probably the Layer Pyramid at Zawiyet el-Aryan. Yet, the Brick Pyramid's enormous size would certainly qualify it as 'something outstanding'; see the discussion of its superstructure on p. 268.

425 Opposed by Verner (2002: 152) who feels that its location on the floodplain was wrong for an Old Kingdom pyramid, and its subsequent usurpment by private tombs in the Fifth and Sixth Dynasties too hurried; and Edwards (2005: 88) who thought it may have been a large mastaba. However, typologically Dodson (1998: 35) has suggested that: 'The only place it would seem to fit into the overall sequence of pyramid evolution is the late Third Dynasty, when experimentation was continuing in the design of these structures, and when truly massive pyramids were still being projected'. He further writes (2000: 90, n. 44): 'The sheer size of the Abu Rowash Brick Pyramid, and its "mature" substructure makes it impossible to attribute it to other than Huni.' On the other hand, Seidlmayer (2006: 121–2) suggests that a relief showing Horus Qahedjet being embraced by Horus of Heliopolis, and two alabaster sarcophagi from a tomb found near the complex of Senwosret III, may indicate that a Third Dynasty royal funerary complex could be located at Dahshur and that its owner could be Huni.

426 Vyse 1840a: 193–4.

427 Vyse and Perring 1842: 9.



Map 6. The Abu Roash Necropolis
Lepsius' record of the necropolis showing the remains of the Brick Pyramid as he found it in 1842. An enlarged view in plan can be seen inset on the left. The Fourth Dynasty pyramid of Djedefre is in the bottom left corner. (After Lepsius 1897, I, Blatt II)

be seen within its rock core (Fig. 68).[428] Although later second-hand reports exist,[429] the pyramid was finally published by Swelim,[430] who has produced the only in-depth report of the monument. Largely denuded of its brickwork,[431] the site is situated near to the floodplain, where its location would have permitted handy access to the raw materials for its construction.[432]

At the heart of the tomb is a limestone rock knoll (Fig. 69), which is more or less elliptical in plan and approximately 150 m long × 65–100 m wide × 20–25 m high, whose geology comprises 'of thin layer bedding'.[433] It has been cut into various ramps, slopes, terraces and trenches which are orientated north.[434] The most important of these is the second terrace that lies in the centre of the knoll's northern face,[435] in which the entrance to the descending corridor is cut. At the corridor's end, it briefly levels out and then drops 2 m into an offset 5 m high burial chamber, whose middle is located in what would be the centre of the pyramid's plan (Figs. 70–1).[436] Unlike the pyramids of Djoser, Sekhemkhet and Khaba however, the burial chamber was not in the usual location 20–30 m below ground level and linked to accessible subterranean magazines,[437] but set so its floor was level with the floodplain, 13–14 m above sea level,[438] and cocooned within the solid rock core of the projecting knoll. Therefore, predating the later use of natural rock formations under the pyramids of Khufu, Djedefre, Khafre and Senwosret II.[439]

Although the roof of the burial chamber was only theoretically 5 m above the ground level surrounding

[428] Lepsius 1897: 11–2.
[429] See Grinsell 1947: 99, and Klasens 1957: 58.
[430] Swelim 1987: *passim*.
[431] A process noted by Vyse (1842: 193–4): 'A considerable part of the materials have been taken away for modern purposes' and Lepsius (1897: 12) who saw large loads of bricks being carried away – presumably for sebakh.
[432] Dodson (1998: 36) suggests that one reason for the site's nearness to the cultivation may have been in order to easily access the materials necessary for brickmaking.
[433] The surrounding rocky ground is approximately 19.1–24.9 ASL and the summit 44.9 m ASL, which is 27 m above the cultivation (Swelim 1987: 22).
[434] Swelim 1987: 22.
[435] Swelim 1987: 29.
[436] Swelim 1987: 37–41. This helps with the pyramid's dating, as Dodson (2000: 89) writes: 'The entirely-tunnelled form of the substructure makes it impossible to assign this structure to any period other than the end of the Third Dynasty, since such an approach was effectively abandoned after the time of Kheops'.
[437] Stadelmann 1985a: 83.
[438] Personal communication by Nabil Swelim (19th June 2012).
[439] Swelim 1987: 60; Lehner 1997: 109, 120–2 and 175.

Figure 68 The remains of the Brick Pyramid viewed from the north-west at Abu Roash, as seen by Lepsius in 1842.
(Lepsius 1897, Abb. 12)

Figure 69 The limestone knoll at Abu Roash upon which the Brick Pyramid was built, photographed in the 1980s. The pyramids of Giza can be seen on the horizon.
(Swelim 1987, frontispiece)

Figure 70 Left: The interior of the rock-cut descending polar corridor looking towards the burial chamber and Right: the interior of the offset burial chamber of the Brick Pyramid looking up the corridor.
(Swelim 1987, pls. XLI–II)

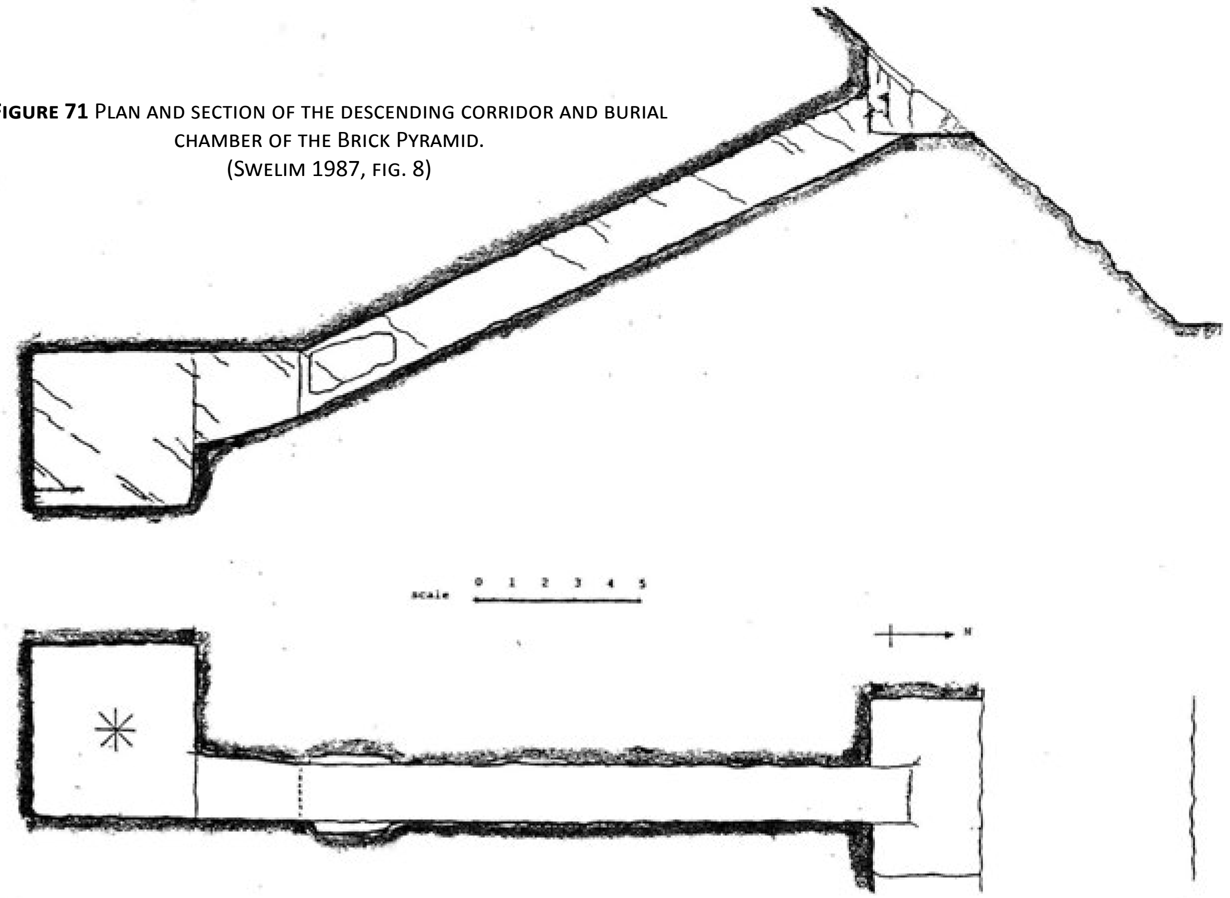


Figure 71 Plan and section of the descending corridor and burial chamber of the Brick Pyramid.
(Swelim 1987, fig. 8)

the pyramid, about 22 m of rock was still between it and the slope of the knoll at its narrowest point.[440] This probably increased to around 30 m at the knoll's summit (Fig. 72),[441] and due to the knoll's elliptical shape was much greater elsewhere. This meant the burial chamber was not only protected by a equivalent thickness of rock cover compared to that of its predecessors, but was also in the perfect position for a descending corridor to enter it at a reasonable and safe angle,[442] via a more inaccessible and thus more secure entrance set high in the face of the superstructure. In addition the whole would have been further shielded by the enormous brick pyramid (see 6.1.4).

Section summary – the Third Dynasty

The builders of the first three pyramids of the dynasty went deep underground to exploit the local geology to secure their substructures from tunnelling, but each in a different way. Whereas the Step Pyramid relied on a limestone chamber and a rubble filled shaft to protect its tough granite burial vault, in Sekhemkhet's tomb more reliance was placed on the living rock, and the sarcophagus became less defensive and more decorative. Similarly at the Layer Pyramid, although lacking a protective sarcophagus, the emphasis was still on going deep underground. But with the Brick Pyramid, the natural mound formed by the rock knoll was employed to provide a similar level of protection for a burial chamber set at ground level, which permitted the introduction of

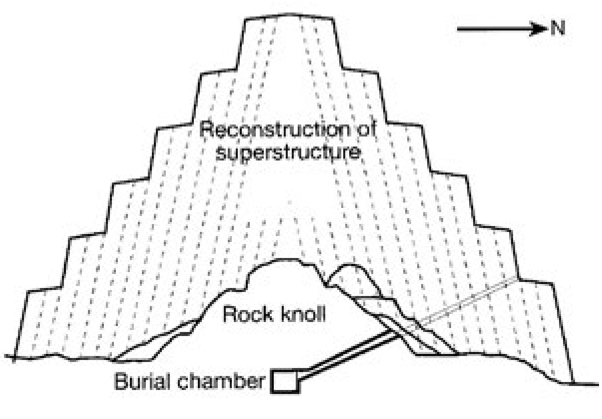


Figure 72 Reconstructed section of the Brick Pyramid from the west showing the rocky knoll, core and conjectural brick superstructure of the pyramid.
(Dodson 2003, 48)

[440] Scaled dimension from the southern face of the slope to the roof of the burial chamber from drawing by Swelim (1987: fig. 13).
[441] Personal communication by Nabil Swelim (19th June 2012).
[442] This optimal angle, known as the 'angle of repose', was possibly chosen to prevent blocking stones from sliding uncontrollably down the corridor, the implications of which are discussed in chapter 5.3.2.

an innovative raised entrance and sloping corridor that increased the access route's security.

4.1.4 The early Fourth Dynasty

The Pyramid of Meidum

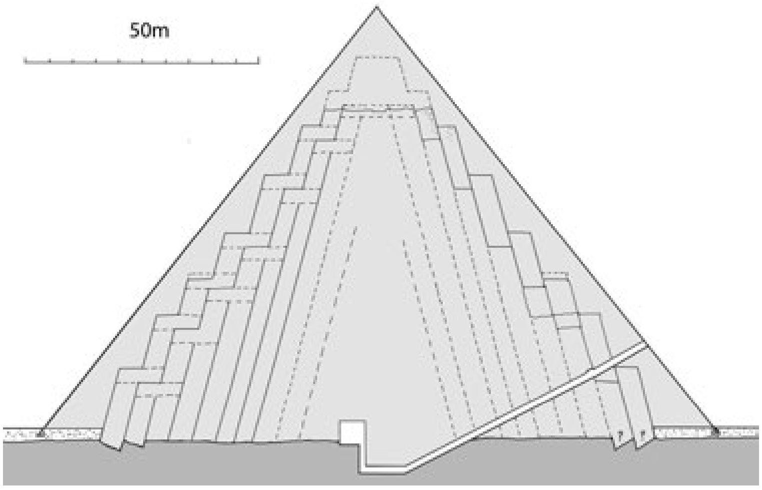


Figure 73 Section view of the Pyramid of Meidum looking west. (Drawn by the author after Maragioglio and Rinaldi 1964b, Tav. 2, fig. 2)

Attributed to Sneferu,[443] the pyramid of Meidum **[22]**[444] was built in several stages on a levelled rock base, into which a north-south orientated trench had been dug to contain the lower end of the stone-lined casing of a descending access corridor and horizontal passage (Fig. 73).[445] This led to a stone lined vertical shaft that entered the floor of the masonry built burial chamber, whose floor, perhaps following the precedent set by the Brick Pyramid, was now located at ground level,[446] and just south of the pyramid's centre offset from its north-south axis (Fig. 74).[447] For the first time in a royal tomb the limestone chamber had a corbelled roof, which was intended to relieve the superincumbent pressure from the superstructure into which it was built.[448] There was no sign of any stone sarcophagus within the burial chamber,[449] but Petrie reported finding fragments of a destroyed wooden coffin in the shaft.[450]

With the majority of the burial chamber being within the 'compact masonry' central core of the pyramid[451] and perhaps because of the soft nature of the underlying rock at Meidum,[452] which would have been vulnerable to tunnelling, its lateral and overhead protection was mainly reliant on the pyramid (see 6.1.5). Its one weak point, apart from its access route,[453] was possibly the floor of the burial chamber, which in theory could have been undermined by tunnelling through the foundations below the superstructure. Although this sounds an unlikely prospect, it was not beyond the bounds of possibility, as Wainwright amply demonstrated when he tunnelled at least 45 m through the rock during his excavations under the pyramid to expose its accretion layers.[454]

The 'Bent' or Southern Pyramid at Dahshur

Abandoning Meidum,[455] Sneferu relocated the royal necropolis at Dahshur[456] and built a second pyramid **[23]**,[457] within which were built two apparently separate substructure systems set at different levels and orientations, each with their own access routes (Fig. 75).[458] Constructed of limestone masonry, the lower of

[443] Stadelmann 1985a: 81–2; Lehner 1997: 97. The ownership of this pyramid has been the subject of long-running debate. Up until the 1950s it was usually attributed to Sneferu, but from then onwards, with the identification of both pyramids at Dahshur as his, other theories developed, usually involving Huni either building the pyramid or at least starting it, and it being finished by Sneferu (Harpur 2001: 23–4). Examples of the latter view include, Fakhry 1959: 16–7; Lauer 1962: 119–20; Murnane 1983: 182; Hayes 1990: 60 and Wilkinson 1999: 104. However, Stadelmann (1980: 442–3) successfully argues that it belonged to Sneferu, which seems to be generally accepted today, see for example, Lehner 1997: 97; Dodson 2003: 49 and Verner 2003: 167.
[444] Porter and Moss 1934: 89–90.
[445] Maragioglio and Rinaldi 1964b: 10, 20–2.
[446] Stadelmann (1985a: 85) sees this as a device to prevent water ingress in the burial chamber from rainfall and compares its function to the so called 'wells' in the royal tombs in the Valley of the Kings, which some believe are there to catch flood water.
[447] Maragioglio and Rinaldi 1964b: 10. Wainwright (Petrie, Wainwright and Mackay 1912: 25) suggested that the burial chamber was built off-centre to avoid the superincumbent pressure of the superstructure bringing about its collapse. Although it should be noted that the burial chamber in the Brick Pyramid is offset from its entrance corridor.
[448] Swelim 1984: 12; Arnold 1991: 186. Recently, further corbel roofed relieving chambers have been discovered at the northern end of the burial chamber and above the horizontal and descending corridors, which were used to bear the load of the pyramid and permit a flat roof in the corridor, see Dormion and Verd'hurt 2000: *passim* and Verd'hurt and Dormion 2003: *passim*.
[449] Maspero 1893: 149. Stadelmann (1980: 444) suggests that the corbelled chamber itself was effectively a stone coffin, and Lehner (1997: 98) subsequently thought it forms: 'a kind of coffer in its own right'.
[450] Petrie 1892: 11. These fragments are in the Petrie Museum, accession nos. UC 30876A–C.

[451] Maragioglio and Rinaldi 1964b: 10–2.
[452] Reisner 1936: 201. Rowe (1931: 6) noted 'the poor quality of the rock at Meydum, the existence of which is unhappily responsible for roof-falls'.
[453] This was the route through which the pyramid had been entered in antiquity (Maragioglio and Rinaldi 1964b: 18).
[454] Petrie, Mackay and Wainwright 1910: 1; Petrie, Wainwright and Mackay 1912: 25.
[455] The reasons for the move are unknown, but Stadelmann (1995: 726) suggests administrative and logistical reasons or simply a desire to keep the workforce employed.
[456] Identified as his by a cartouche within the upper burial chamber (Fakhry 1959: 52).
[457] Porter and Moss 1974-81: 877–82.
[458] There are various theories as to why the second upper burial chamber was built. Stadelmann (1991: 380–7; 1995: 726–7) sees it as the final part of a three chamber system common to all royal tombs, with the lower chambers having chthonic associations and the upper part connected to the king's ascent to the sky, but Lehner (1997: 103)

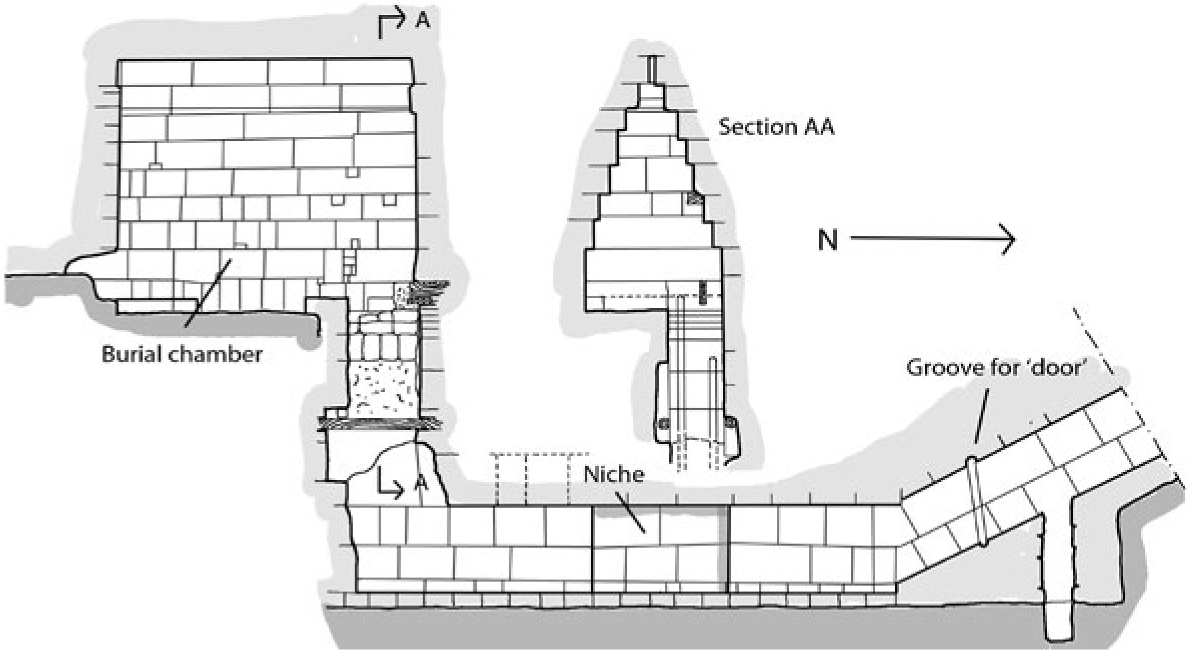
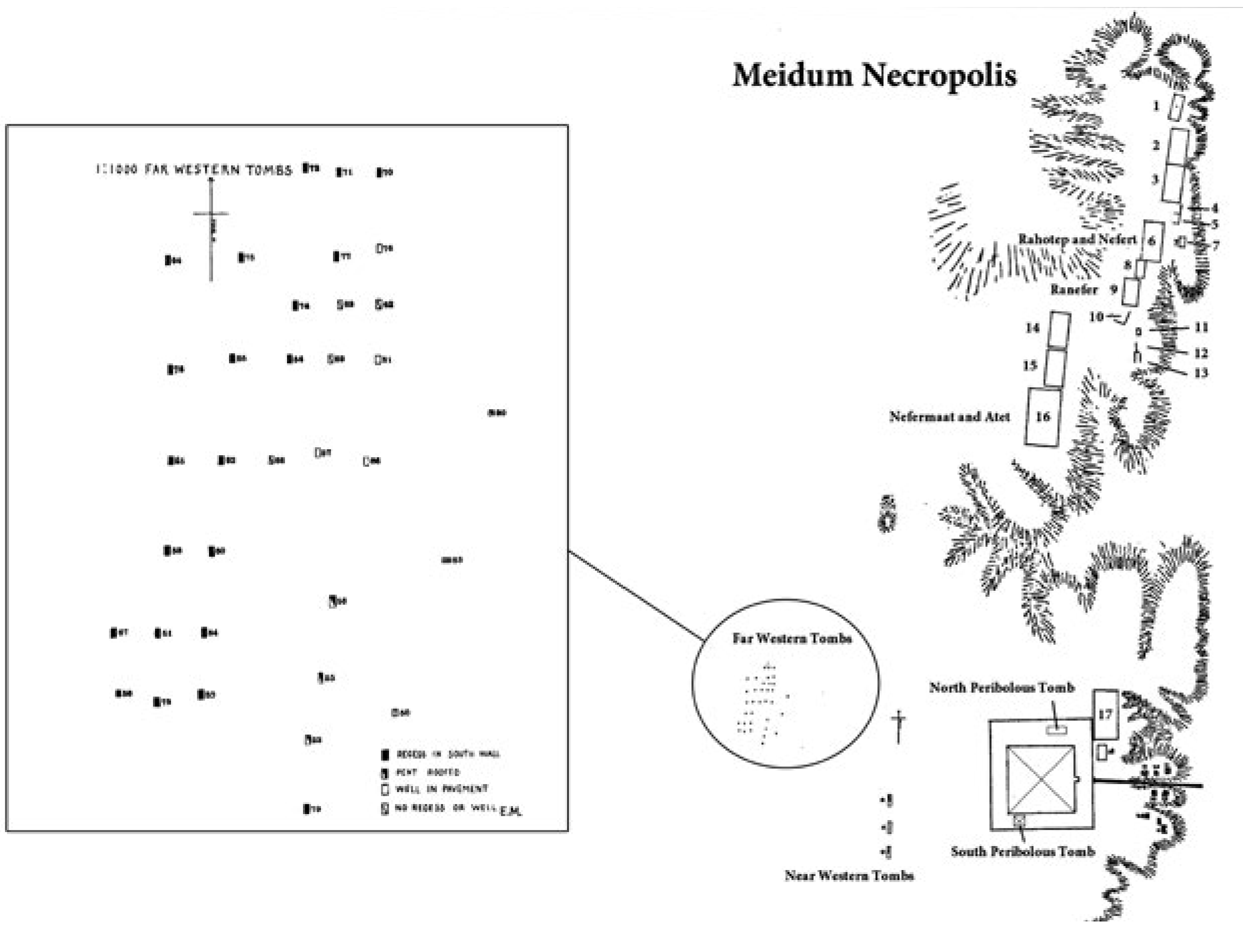


Figure 74 The raised stone lined and corbelled burial chamber of the Pyramid of Meidum. The wooden door blocking can be seen in the first part of the descending passage.
(Drawn by the author after Maragioglio and Rinaldi 1964b, Tav. 4, fig. 6)



Map 7. The Meidum Necropolis
Petrie's drawing of the necropolis showing the pyramid and the principal private tombs with the Far Western cemetery inset at an enlarged scale. (After Petrie *et al.* 1910, pl. XVI)

the two systems was built within a 22.4 m deep trench below ground level,[459] which was dug in the easily cut shale deposits that lay under the thin layer of sand and gravel at the site (Fig. 76).[460] The lower chamber, identified as 'B' in the drawings, is 17.3 m high and its roof, which projects just a couple of metres above ground level, is corbelled on all four sides to relieve the pressure from the surrounding rock and the overlying superstructure. Orientated north-south, it was originally accessed from its northern end via a stone block staircase set within a narrow corbelled antechamber ('A') that sat at the bottom of the trench. This is connected to the pyramid's northern sloping access corridor ('D') that descended from the outside (see 5.1.1).[461] At its southern end, and exactly at the central axis of the pyramid, is a blind ascending shaft 'M', which like the vertical shaft in the pyramid of Meidum, stops at ground level and was perhaps intended originally to link with the upper chamber 'C',[462] thus possibly both chambers 'A' and 'B' could perhaps be antechambers to chamber 'C', rather than a separate system.

The upper chamber 'C', which was presumably intended to be the burial chamber due to its better defences,[463] is built and orientated in a similar manner entirely within the body of the superstructure (Fig. 77), but, like in the pyramid of Meidum, set much higher with its floor above ground level and about 1 m higher than the apex of the lower chamber.[464] It is 16.5 m high and corbelled like the lower chamber.[465] Internally it was found filled with masonry blocks that may have formed part of the

suggests that it may be reminiscent of the south-west orientated South Tomb of Djoser, whereas Dodson (2003: 51) proposes that it was introduced after structural collapses had occurred in the original structure.

[459] Maragioglio and Rinaldi 1964b: 64, Tav. 11, fig 4.

[460] The choice of this location was probably because of the ease with which these excavations could be undertaken in comparison to the more difficult sand gravel layers to the north. However, the unstable nature of this underlying geology and poor foundations led to serious problems with subsidence during the construction, which were visible as internal cracks in the substructure (Maragioglio and Rinaldi 1964b: 100; Stadelmann 1985a: 89; Dorner 1986: 44).

[461] Maragioglio and Rinaldi 1964b: 62–4.

[462] Fakhry 1959: 48; Maragioglio and Rinaldi 1964b: 104 B; Stadelmann 1985a: 92; 1995: 728.

[463] Fakhry 1951: 512.

[464] Maragioglio and Rinaldi 1964b: 108, Tav. 11, fig 4.

[465] Fakhry 1959: 67.

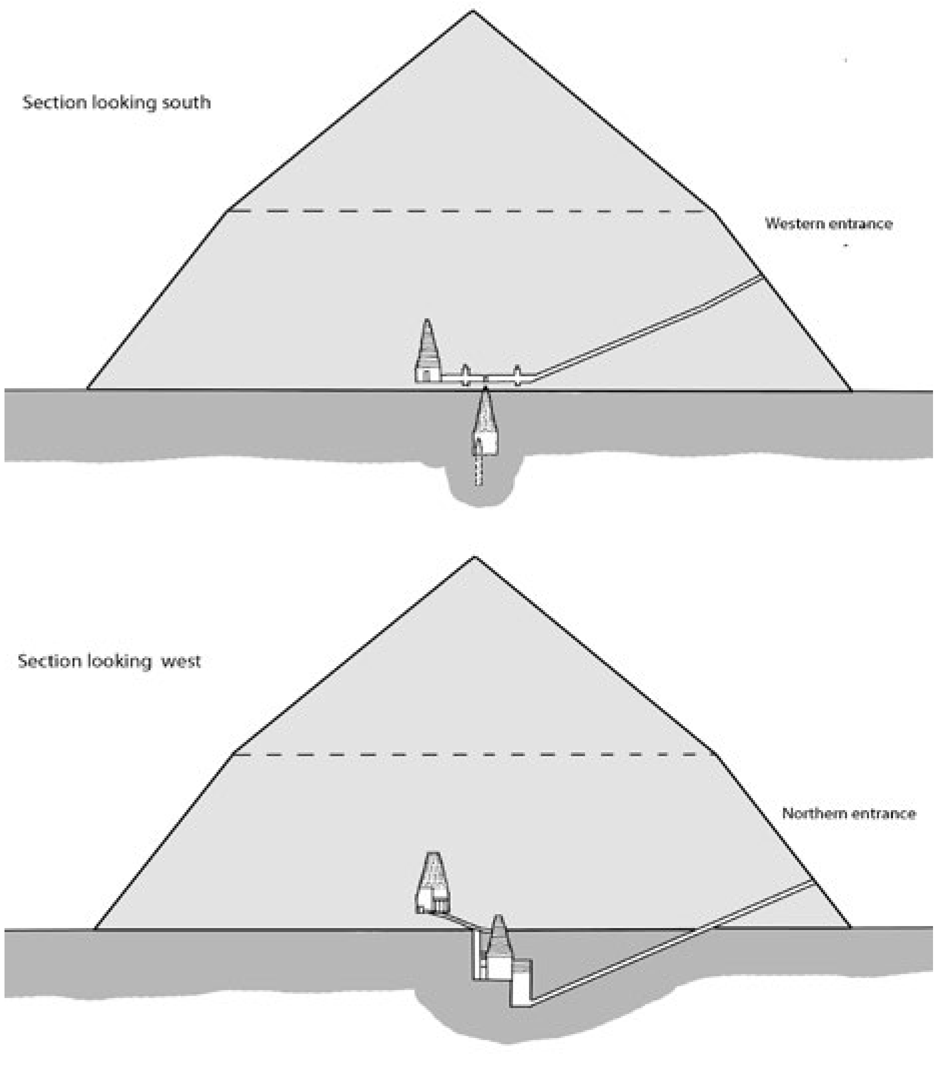


Figure 75 The Bent Pyramid in sections looking south and west. Showing both upper (western) and lower (northern) substructure systems. (Drawn by the author after Fakhry 1959, fig. 33)

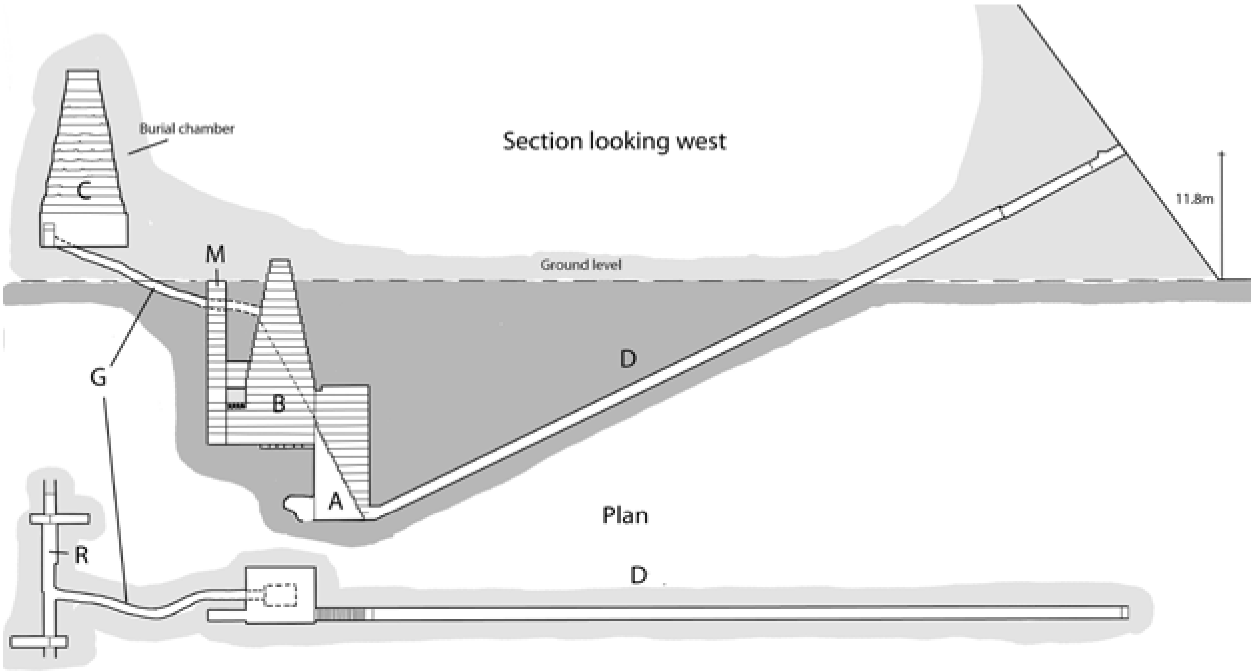


Figure 76 Lower section of substructure of the Bent Pyramid looking west. The putative staircase of small blocks leading to the connecting corridor is visible in chambers 'A' and 'B'.
(Drawn by the author after Maragioglio and Rinaldi 1964, Tav. 11, figs. 3 and 4)

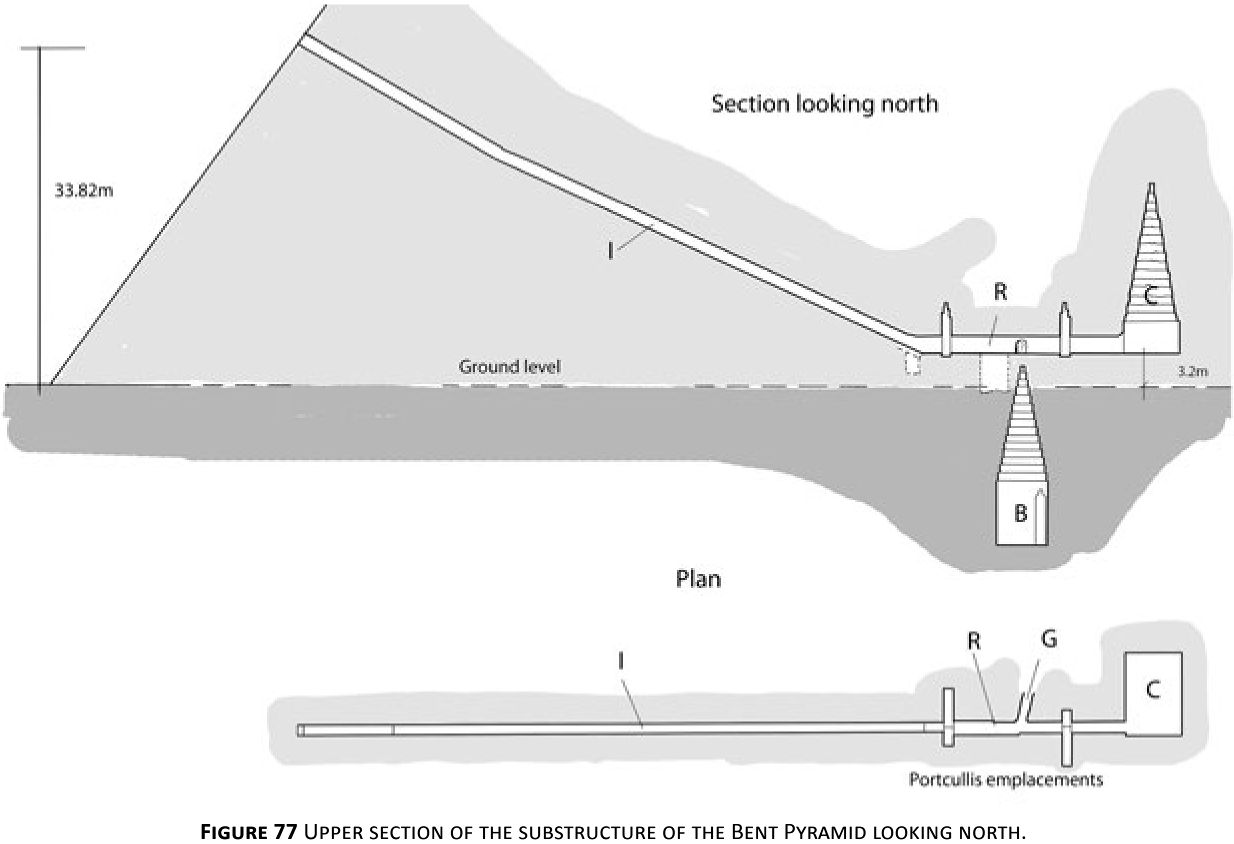


Figure 77 Upper section of the substructure of the Bent Pyramid looking north.
(Drawn by the author after Maragioglio and Rinaldi 1964, Tav. 9, figs. 1 and 2)

tomb's internal blockings and reinforced with cedar beams (see 5.2.2.2),[466] but no sarcophagus was found

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[466] Fakhry 1959: 52–9; figs. 19–24; Maragioglio and Rinaldi 1964b: 72.

Stadelmann (1985: 94); Edwards (1988: 82) and Lehner (1997: 103) suggest that these may have been intended to reinforce the chamber and prevent further cracking of the structure that had occurred as a within it.[467] Although not part of the original design, both chambers were linked at a later date via a tunnelled passage 'G' that was created within the solid masonry after the original structure was finished.[468] This runs between the apex of the upper part of the lower chamber 'B' and the horizontal corridor 'R', which leads to the upper chamber 'C'.[469]

The substructure arrangements in the pyramid are undeniably confusing. While both chambers were protected from above by the mass of the pyramid, the lower chambers, like those at Meidum, would possibly have been vulnerable to lateral tunnelling, as they were set below ground in the surrounding soft rock. However, it can be argued that the decision to separate the two systems for whatever reason better exploited the defensive capabilities of the raised upper chamber. By being set high within the encompassing superstructure, the upper chamber's level of security would have increased accordingly, as it would have taken precise knowledge of its location in both the vertical and horizontal planes to find it.[470] Any benefit gained from this physical separation was however, compromised by the linking passage that was dug between the two systems, which effectively reverted the substructure back to its original concept as part of a three chambered system, where the lower chambers 'A' and 'B' formed the antechambers to the burial chamber 'C'.

To the south of the main pyramid a satellite pyramid **[24]**[471] was built that acted as a 'southern tomb' or 'cult pyramid' (Fig. 320).[472] At the end of its ascending entrance corridor, a raised corbelled 'burial' chamber 6.9 m high, with its floor set 2.8 m above ground level,[473] was protected by the mass of its superstructure in a similar fashion to the main pyramid.

The 'Red' or Northern Pyramid at Dahshur

Sneferu's last pyramid **[25]**[474] is thought to be the final burial place of the king.[475] To avoid the structural problems experienced with the Bent Pyramid, the Red Pyramid was built on firmer ground 4 km to the north that consisted of silicified sand and gravel layers. Its three internal chambers were raised above ground level, which concomitantly enabled its swifter construction,[476] and were built of limestone masonry within the body of the superstructure, which takes the form of a true pyramid (Fig. 78).[477] Access to the burial chamber 'C' is preceded by two north-south orientated antechambers, whose stone floors are both set a few metres above ground level (Fig. 79).[478] Their roofs, like in the burial chamber at Meidum are corbelled inwards on the longest sides. The first of the antechambers 'A' is 12.3 m high (Fig. 80) and is entered from the north by the horizontal end of the descending corridor. It is connected to the second of the chambers via a passage 'P' and beyond this, the second chamber 'B' is of a similar size, and is centrally located under the apex of the pyramid.[479] From it passage 'S', whose entrance presumably was intended to be concealed from view,[480] and at a height inaccessible to robbers,[481] begins 8.6 m up in its southern wall, and leads to the 14.65 m high east-west orientated burial chamber, which was corbelled like its immediate neighbours.[482] Its floor was set 11.3 m above ground level,[483] and may have contained a concealed sarcophagus constructed from masonry under its pavement, which has largely been removed by treasure hunters.[484]

Although already well protected by the pyramid that enveloped them, the placing of the two antechambers above ground level made them inherently less vulnerable to lateral tunnelling under the pyramid's base than those in the lower system of the Bent Pyramid. Moreover, by raising the burial chamber high up within the superstructure, it was further protected from the remote possibility of attack from below. However, the concealed passage to the burial chamber high up within the second antechamber proved to be its downfall as, once discovered, it too was plundered like the Bent Pyramid.

Section summary – The early Fourth Dynasty

The burial chamber of the first of Sneferu's tombs was built above ground within the pyramid itself and relied upon its masonry and the surrounding stone mass of the pyramid for protection. With the move to Dahshur, and

result of structural instability, which was due to the poor ground upon which the pyramid was built.

467 Fakhry 1959: 52.

468 Stadelmann 2004: 16.

469 Maragioglio and Rinaldi 1964b: 66. This could just possibly be a substitute for the aforementioned unfinished shaft 'M', which may have been intended to connect the chambers together but was never finished. Although Stadelmann (1985: 93) thought it may have been an inspection passage designed to access the structurally jeopardised upper chamber. Alternatively, it may have been an 'escape' passage to permit an exit from the upper system, see note 1734.

470 Badawy (1954: 133) suggested that the lower chamber may have been intended to misdirect tomb robbers by letting them think that they had found the main burial chamber, while the real one was concealed elsewhere.

471 Porter and Moss 1974-81: 882.

472 Stadelmann 1985a: 96.

473 Fakhry 1959: 94.

474 Porter and Moss 1974-81: 876.

475 Due both to the remnants of a putative mummy of the king having been found in the burial chamber (Maragioglio and Rinaldi 1964b:146; Stadelmann 2003: 183). For a discussion of the mummy see Batrawi 1951: 435–42, and for the pyramid temple see Stadelmann *et al.* 1993: 259–63.

476 Stadelmann 1985a: 100; Edwards 1994: 160; Jánosi 2004: 67.

477 Maragioglio and Rinaldi 1964b: 128–9.

478 Dorner (1998: 29) gives 3.15 m. Maragioglio and Rinaldi (1964: 130), estimated that the stone pavement and sub-pavement are approximately 1.3 m thick.

479 Dorner 1998: 27.

480 Maragioglio and Rinaldi 1964b: 136; Dodson 2003: 53.

481 Lehner 1997: 105.

482 Vyse and Perring 1842: 64–5; Maragioglio and Rinaldi 1964b: 130.

483 Dorner 1998: 29.

484 Maragioglio and Rinaldi 1964b: 132; Stadelmann 1985a: 104.

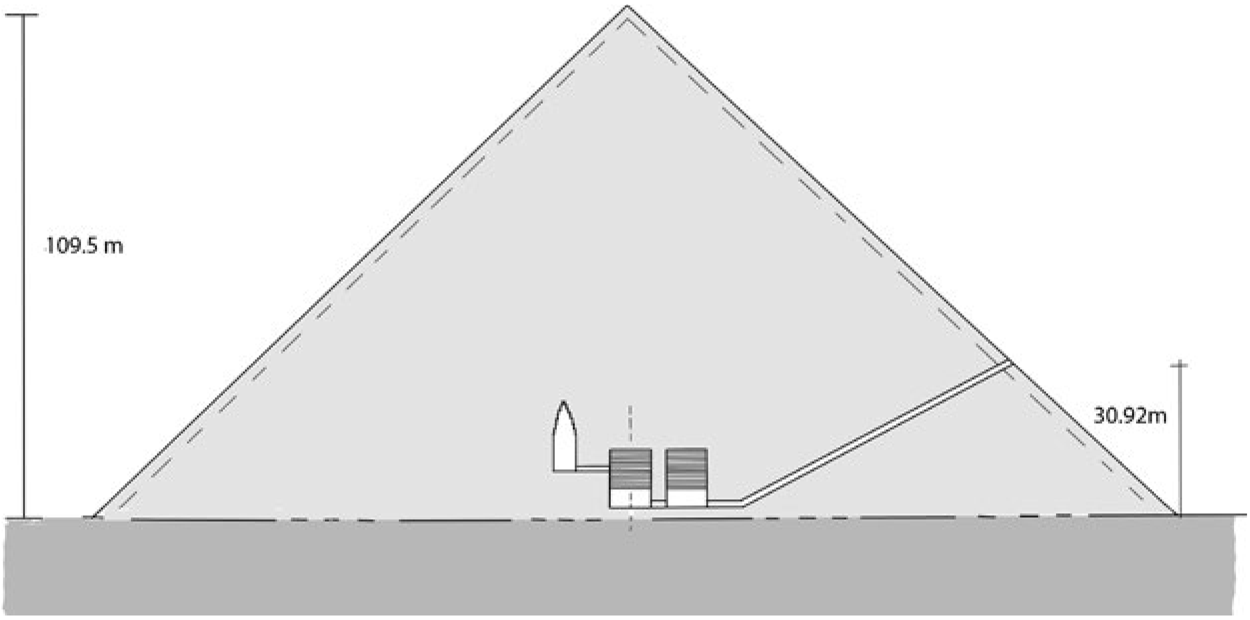


FIGURE 78 SECTION OF THE RED OR NORTHERN PYRAMID OF SNEFERU LOOKING WEST.
(DRAWN BY THE AUTHOR AFTER MARAGIOGLIO AND RINALDI 1964B, TAV 18, FIG. 3)

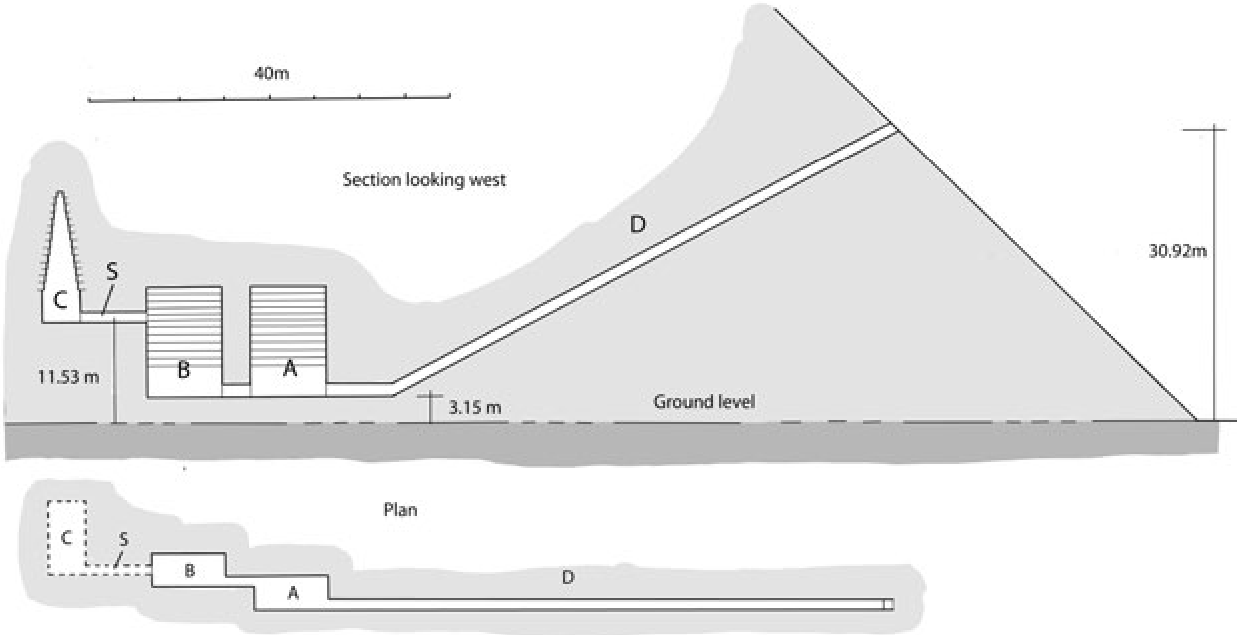


FIGURE 79 ENLARGED SECTION OF THE SUBSTRUCTURE OF THE RED PYRAMID LOOKING WEST, SHOWING THE BURIAL CHAMBER AND ANTECHAMBERS.
(DRAWN BY THE AUTHOR AFTER MARAGIOGLIO AND RINALDI 1964B, TAV.18, FIGS. 4 AND 5)

the construction of the king's second tomb, initially it appears its north-south orientated substructure was intended to follow the same pattern, with subterranean antechambers and an above ground burial chamber within the pyramid. But structural collapses due to the underlying geology resulted in an entirely separate upper burial chamber with its own external access. Abandoning this unsatisfactory half-measure, the architects of Sneferu's third and final northern tomb built both its antechambers above ground on firmer soil and further increased the protection of the burial chamber by raising it high within the body of the pyramid itself.

4.1.5 Conclusion

During the First Dynasty, the desire for more monumental tombs with increased storage facilities and better lateral and overhead protection, led the builders of the royal

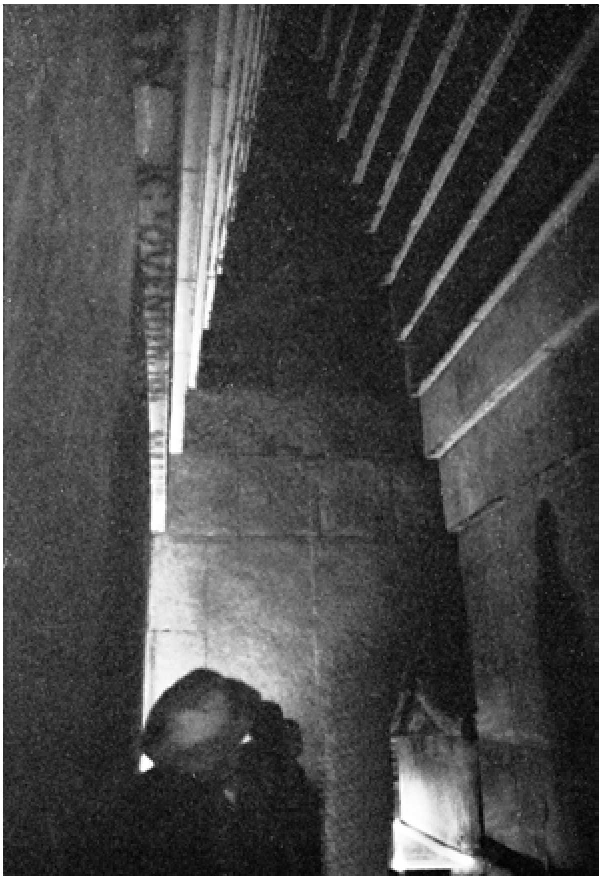


Figure 80 The first corbelled limestone antechamber ('A') in the Red Pyramid showing the corridor leading to the virtually identical chamber ('B') (Photograph by the author)

tombs at Abydos to take measures to strengthen the structure of their burial chambers, which also had to support hidden internal tumuli and overlying protective mounds or superstructures within the limitations of the surrounding desert geology at Umm el-Qaab. They did this by increasing the size and complexity of their liners and roofs, using imported timbers, mud-brick and sand, together with other raw materials close to hand.

The move of the royal necropolis to Saqqara in the Second Dynasty saw the introduction of an entirely subterranean burial chamber within a gallery tomb that required little or no structural architecture, as it relied on the protection provided by the surrounding rock. This brought an increased level of security and secrecy for the tombs of the first three kings of the period. The return to Abydos towards the end of the dynasty marked a brief hiatus in these improvements, with a regression to the less secure pit tomb architecture of the First Dynasty, probably because of the local geology and available resources. However, in the final royal tomb at Umm el-Qaab, a desire for greater storage capacity and better security were reflected a Saqqara style gallery tomb reinterpreted in mud-brick, wood and the desert sand, within which, to compensate for the less resistant architecture and geology, the burial chamber was now built of stone and concealed underground.

The re-establishment of the royal cemetery at Saqqara and its environs in the Third Dynasty, brought major technological advancements in the defence of the burial chamber within the new pyramid complex. In a logical extension of the subterranean technology mastered in the nearby tombs of the Second Dynasty kings, the burial chambers of the first three tombs of the dynasty were set deep underground to exploit the protection offered by the living rock. To bolster their security, initially the royal burials were defended by fortified sarcophagi, but as more structural investment was made in their burial chambers, so the need for them may have declined. A sudden change of approach was seen with the move to Abu Roash of the tomb of the last king of the dynasty, where in a radical change in design that provided a comparable level of protection to those of its predecessors, the burial chamber was raised to ground level within a rocky knoll so that the introduction of a more secure high level entrance and sloping access route could take place.

In the early Fourth Dynasty, the new raised position of the burial chamber was retained within the protective bulk of the superstructure of Sneferu's first pyramid at Meidum, the inner core of which substituted for the former's rocky knoll. This enabled both the innovative raised entrance and sloping access route to be retained, and reduced its exposure to undermining in the friable rock of the pyramid's foundations, but the burial chamber was now necessarily built of masonry and corbelled to cope with the pyramid's superincumbent load. However, the repeated implementation of this successful arrangement on a much larger scale at Sneferu's next pyramid at Dahshur, brought unanticipated structural problems, caused by deep excavations and the soft underlying rock. These bedevilled the satisfactory completion of its antechambers and access routes and forced the creation of the higher western entrance and corridor. The lessons learnt from this compromise are reflected in the design of the final tomb of Sneferu's reign, where raised antechambers were now set aboveground for security and a much higher burial chamber was brought up into the core of the pyramid, thus offering the royal burial greater protection from lateral tunnelling within the protection of the pyramid itself.

The evolution of the architecture of the security of the royal burial chamber was very much linked to the surrounding geology of the chosen royal necropolis. It had evolved from the structural reinforcement of the unsatisfactory geology of the plain of Abydos in the First Dynasty, to the subterranean exploitation of the geology of the plateau at Saqqara during the Second, and then returned again to a compromise that relied on both man made structure and geology at Umm el-Qaab by its end.

But, like their Second Dynasty predecessors at Saqqara, the royal substructures of the Third Dynasty relied once again upon the protection afforded by the rock strata of Saqqara and Zawiyet el-Aryan, which culminated in the exploitation of the rock knoll at Abu Roash and the high level burial chamber cut within it. By the early Fourth Dynasty the flatter topography and softer geology of the new necropoleis at Meidum and Dahshur meant the protection of the now raised substructure would now need to rely upon an architectural solution once again, and this was achieved by constructing it within a man-made mountain of stone.

4.2 Private tombs

This chapter examines the architecture of the private burial chamber in the Type IB, IC and ID pit tombs in the catalogue to analyse what methods were used to defend them and then takes the same approach with those in Type II and III subterranean tombs. It considers at the same time what effect these measures had upon the development of the Egyptian private tomb as a whole.

The security of the whole substructure in Type IB and IC tombs without external access will be discussed, including their internal magazines. For Type ID, II and III tombs with external access the same will apply, but only those chambers immediately adjoining the burial chamber will be included. The access route and any blockings will be dealt with separately in Chapters 5.1, 5.2 and 5.3, as will superstructures, if present, in Chapter 6. Due to the large numbers of tombs involved the chapter deals with them by substructure types that are then arranged in broad chronological divisions, which are:

Dynasty ‘0’ to the mid First Dynasty, from Iry-Hor to Djet (Naqada IIIB–IIIC2).
The second half of the First Dynasty, from Den to Qa‘a, (Naqada IIIC2–IIID).
The Second Dynasty (also Naqada IIID).
The Third Dynasty.
The early Fourth Dynasty to the end of the reign of Sneferu.

They are then subdivided by geographical location and within that framework dealt with in date order. Relevant statistical information (dimensions, geology, etc[485]) for each tomb by substructure type is summarised in the charts, as follows:

Type IB and IC	Chart A
Type ID	Chart B
Type II and IIA	Chart C
Type IIB and IIA-C	Chart D
Type IIC	Chart E
Type III	Chart F

4.2.1 Burial chambers in Type IB, IC and ID pit tombs

The usual method of building a private Type IB or IC pit tomb, unlike the simple Type IA grave, which was the dominant tomb type in dynastic Egypt,[486] and was usually unlined and backfilled with the excavated material from the pit,[487] was to line a rectangular pit with a half or single thickness of mud-brick to consolidate its sides.[488] This acted as a retaining wall that prevented collapse of the surrounding matrix,[489] and additionally provided a degree of security against lateral tunnelling.[490] After the burial was installed, the opening was usually covered with branches or wood and perhaps a layer of mud-brick or mud, before heaping the remaining backfill over the whole, or covering it with a superstructure.[491] However, some tombs went further in the provision of security for their burial chambers and it is these measures that are discussed here.

4.2.1.1 The burial chamber in Type IB and IC pit tombs

Dynasty ‘0’ to the mid First Dynasty (Naqada IIIB–IIIC) Iry-Hor to Djet

Tell el-Farkha

In the Eastern Kom cemetery at Tell el-Farkha, a significant number of Type IB graves were lined with just a single thickness of mud-brick and relied on large superstructures for their security rather than their liners (see 6.2.1).[492] However, there are examples of graves at this site being protected in other ways, such as the Naqada IIIB-C1 mud-brick lined graves 20 **[28]** and 21 **[29]**.[493] Their pits were overlaid by a thin mud-brick cover,[494] which rather than being a visible superstructure, may have just been intended to protect the body underneath.[495] Better defended was the similarly dated

[485] This varies according to tomb type, for example, mud-brick liners and wooden roofs are never found in Type II tombs, so that data is not included; however the latter are protected by a cover of rock, so that depth is given in its stead.

[486] The vast majority of burials of the non-elite throughout Egyptian history would have been in simple graves such as this (Jánosi 1999: 27; Dodson and Ikram 2008: 31).
[487] Reisner 1936: 345.
[488] Spencer 1979: 10.
[489] See La Loggia (2009: 176–96) for an in depth discussion of the engineering use of mud-brick retaining walls in Early Dynastic tombs. It is worth noting that another good reason to consolidate a grave wall may be to prevent its sides collapsing during the funeral. The collapse of a trench that lacks support while someone is working in it can in itself be fatal, as soil averages about 1 metric tonne per m3, which even if only at waist height is enough to damage internal organs (Cooke 2007: 154).
[490] La Loggia 2009: 183.
[491] Many of these substructures may have also been protected by superstructures and, where present, these are dealt with separately in Chapter 6.
[492] For example grave nos. 1, 2, 9 and 86 (Personal communication by Joanna Dębowska-Ludwin 4th February 2011) and Dębowska-Ludwin 2011b: 259–60, 262–3 and 267.
[493] Dębowska-Ludwin 2010: 5.
[494] Dębowska-Ludwin 2009: 457 and 465–6.
[495] Personal communication Joanna Debowska-Ludwin 4th February

intact grave 6 **[30]**,[496] which was protected laterally by mud-brick liners 0.5 m thick and closed with a mud-brick cover of the same dimension (Fig. 81).[497] Even stronger were the liners of contemporary graves 63 **[31]** and 100 **[32]**, which varied between 0.75–1 m,[498] and 1–2 m thick respectively and mirrored the perimeters of their superstructures exactly; those in grave 100 also incorporating woven mats between its courses for reinforcement (Figs. 82–3).[499]

Liquid mud was used in six wealthier graves to improve their security,[500] such as in grave 99 **[33]**, which dates to Naqada IIIB-C1.[501] Excavations have shown that once the body and grave goods were interred the whole was coated in a thick layer of greasy mud, described as, '…a very compact cover that made any robbery hardly effective',[502] thus protecting its contents, and as Dębowska-Ludwin suggests, perhaps acting as a magical security measure.[503] The efficacy of this defence is confirmed in the aforementioned grave 100, which was also protected by a layer of Nile mud. Robbers had attempted to cut into it after digging through the superstructure, but their progress was halted by its density;[504] indeed its ongoing excavation remains a lengthy and difficult process even today.[505]

Tell Ibrahim Awad

Also in the Eastern Delta, at site 'B' at Tell Ibrahim Awad, a younger tomb dating to Naqada IIIC2,[506] not only incorporated stout walls, but also used mud like at Tell el-Farkha (Fig. 84). The Type IB tomb 1 **[39]** was dug in the sand and lined with mud-brick walls that varied between 0.9–1.95 m thick, which also incorporated internal magazines. Although disturbed, the grave was found largely intact,[507] as it was filled with 'tightly packed' clay and roofed with layers of reed mats supported by beams.[508] Like graves 63 and 100 at Tell

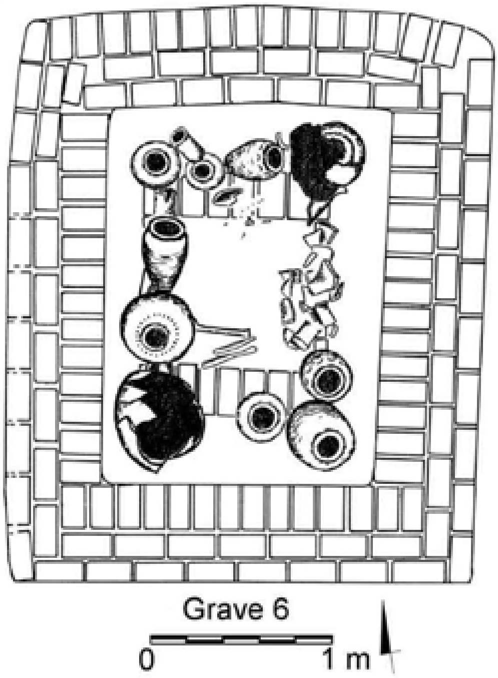


Figure 81 Grave No. 6 at Tell el-Farkha with its 0.5 m thick mud-brick liner. It was closed with a 0.5 cm thick brick cover that matched its perimeter exactly. (Debowska-Ludwin 2009, pl. 3)

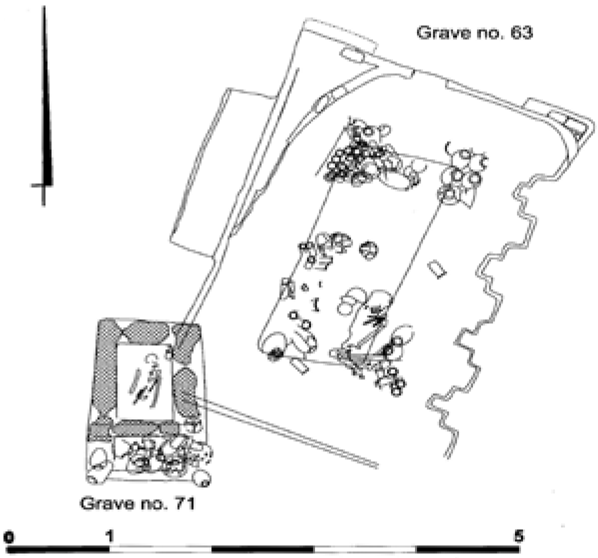


Figure 82 Grave no 63 at Tell el-Farkha with its 0.75–1 m thick walls, which were the same thickness in the substructure and the superstructure. (Dębowska-Ludwin 2011, fig. 3)

2011.
496 Abłamowicz, Dębowska and Jucha 2004: 413.
497 Dębowska 2008: 1111–2; Dębowska-Ludwin (2009: 461) describes this as 'a compact mud-brick cover' in the tomb catalogue, but this could equally be described as superstructure.
498 Scaled from plan by Dębowska-Ludwin (2011b: fig. 3).
499 Dębowska-Ludwin 2011b: 266. Spencer (1979) suggests that mats were probably intended to aid in the bonding of the courses of mud-brick walls by forming a key for the mortar between the bricks. Layers of mats were also inserted every few courses in the walls of Egyptian fortresses to provide reinforcement and spread the load (Vogel and Delf 2010: 19).
500 There are six tombs at Tell el-Farkha that have been protected in this way – Grave nos. 24 **[35]**, 63 **[31]**, 98 **[NIC]**, 99 **[33]**, 100 **[32]** and 114 **[NIC]** (Dębowska-Ludwin 2011a: 33; 2012: 65), but Graves 98 and 114 are not included in the catalogue due to the lack of available information.
501 Dębowska-Ludwin 2011a: 33.
502 Chłodnicki and Ciałowicz 2009: 6–7.
503 Joanna Dębowska-Ludwin (Personal communication March 7th 2011) suggests that the physical protective properties of the mud covering may not have been its only function, as some offering vessels elsewhere at the site in later burials were also found filled with pure mud. In addition the body was covered with a fine layer of sand and red ochre, which also had apotropaic functions.
504 Chłodnicki and Ciałowicz 2009: 8–9; Dębowska-Ludwin *et al.* 2010: 25.
505 Dębowska-Ludwin 2011a: 33.
506 Haarlem 1996: 12.
507 Tassie and van Wetering 2003a: 502.
508 Haarlem 1996: 7–9.

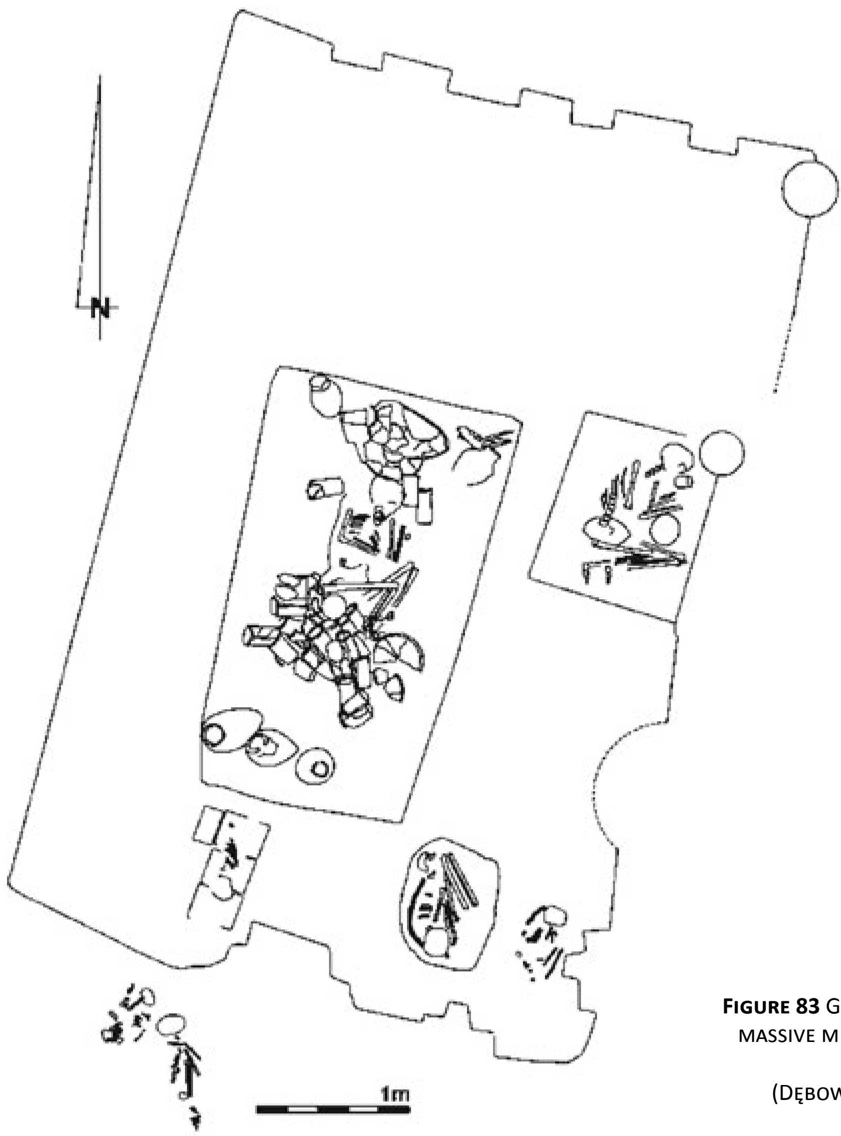


Figure 83 Grave 100 at Tell el-Farkha, with its massive mud-brick walls and intrusive and subsidiary burials.
(Dębowska-Ludwin *et al.* 2010, fig.1)

el-Farkha the grave's liners both mirrored the profile and formed part of its superstructure.[509]

Kafr Hassan Dawood

South-east of Tell Ibrahim Awad at Kafr Hassan Dawood, two large graves dated to the reign of Narmer also used Nile mud to secure their burials.[510] The Type IB Graves 913 **[40]** and 970 **[41]** were dug into the alluvial sand of the Nile terrace, but were entirely unlined.[511] Once their burials were interred they were backfilled with mud, which set rock-hard and protected their contents. At the surface, the graves were finally covered by a simple mound of sand, gravel and silt.[512]

Two out of the three necropoleis discussed above demonstrate the early use of extra thick mud-brick liners in substructures as lateral protection against tunnelling, but all of them occasionally used mud to consolidate and protect the burial within the grave, which seems to be a defensive measure peculiar to the graves of the Eastern Delta.

Abu Roash

Another method to defend a tomb from overhead attack was to reinforce its roof. At some sites this could take the form of a double roof, such as in the large Type IC tomb 389 in Cemetery 300 at Abu Roash **[42]**,[513] which dates to Naqada IIIB–C1.[514] Its 1.8 m deep gravel cut

509 Dębowska-Ludwin 2010: 7.
510 Identified by a serekh on a jar in Grave 913 (Tassie *et al.* 2008: 205).
511 Hassan 2000: 38–9. Their status as elite graves is relative to their immediate surroundings, as the lack of superstructures and mud-brick liners would indicate that they are of a lower social status than the larger graves at Tell el-Farkha and Tell Ibrahim Awad (Tassie and van Wetering 2003a: 133).
512 Tassie and van Wetering 2003b: 500–1.
513 Porter and Moss 1974-81: 8.
514 Tristant 2008b: 328.

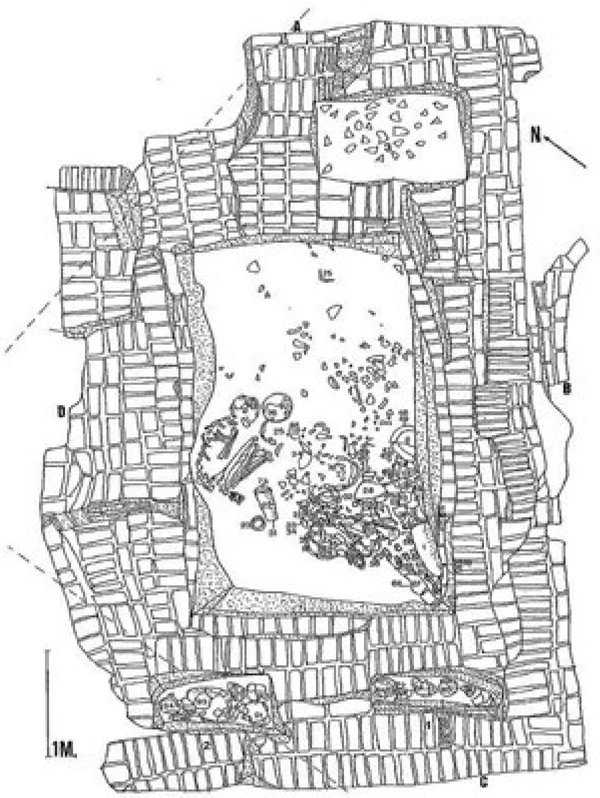


Figure 84 The massive mud-brick walls of Tomb 1 at Tell Ibrahim Awad with internal magazines built within them. (Haarlem 1996, fig. 1)

pit was lined with 0.5 m mud-brick walls into which twin wooden roofs were placed at 1.1–1.3 m and 1.6 m from its base, thus theoretically offering it twice as much protection from overhead attack.[515]

Nazlet Batran

On a much larger scale is the Type IC tomb at Nazlet Batran excavated by Daressy known as Mastaba V **[59]**,[516] which dates to the reign of Djet (Fig. 85).[517] Within a rectangular pit excavated in the gravel, another pit was dug to create the 3 m deep burial chamber, leaving a raised platform at either end for the magazines.[518] The whole was then lined with mud-brick walls approximately 1 m thick, which consolidated the gravel and provided lateral protection. Within the burial chamber, projecting mud-brick walls were built to support a large wooden shrine, as in the tomb of Djet at Abydos. About 2.4 m up from the base of the chamber the whole was then closed with a roof of wooden beams, mats and soil, which would have provided a layer of protection 0.6 m thick and supported the superstructure.[519]

Abu Ghurab

A more basic substructure was used in the Type IC, Mastaba XVII **[68]** at Abu Ghurab (Fig. 86),[520] which

[515] Klasens 1959: 35.
[516] Daressy 1905: *passim*; Petrie 1907: 2–7, pl. II; Porter and Moss 1974-81: 312. Martin (1997: 283) notes that it is 'located somewhere in the area between South Giza and Zâwyet el-'Aryân, but does not seem to be pinpointed on any map'.
[517] Daressy 1905: 99 and 103.
[518] Daressy 1905: 100.
[519] Daressy 1905: 100–1; Petrie 1907: 2–3.
[520] Described as being located at Abusir by Radwan, its excavator, but geographically speaking, more accurately located at Abu Ghurab (Jeffreys and Tavares 1994: 146).

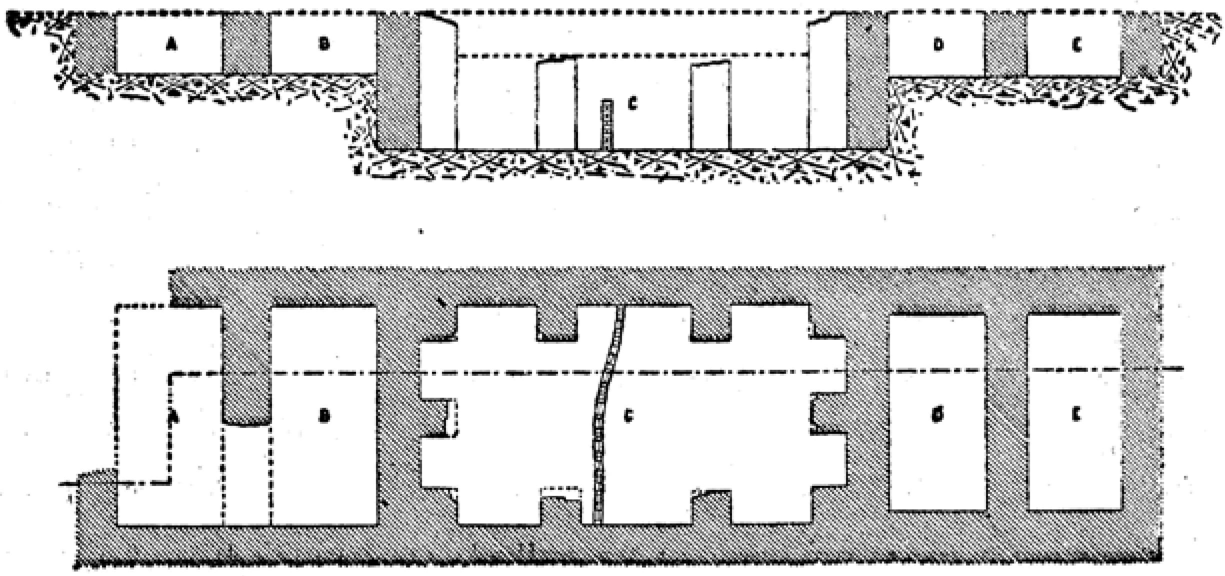


Figure 85 The substructure of the First Dynasty Type IC Mastaba No. 1 at Nazlet Batran. (Daressy 1905, fig. 1)

dates to the mid First Dynasty.[521] It comprised of an offset pit (possibly to mislead tomb robbers?) in the sandy soil that was lined with 0.7 m thick mud-brick walls to consolidate its sides and provide lateral protection, which was further subdivided to provide four magazines. This was then closed with stout wooden beams and a roof and brought level with a substantial layer of *tafl* before being covered with its superstructure.[522]

North Saqqara

Further south at Saqqara the large mastaba tombs of senior officials or members of the royal family occupy the eastern edge of the desert plateau (Map 4),[523] where they are built in a layer of calcareous limestone topped with gravel.[524]

The earliest is the Type IC tomb S 3357 **[81]**,[525] which dates to the reign of Hor-Aha.[526] The substructure comprised of a pit 1.35 m deep excavated through a 0.8 m layer of gravel into the rock beneath (Fig. 87). This was lined with 1 m thick mud-brick walls,[527] which both consolidated the gravel stratum and provided lateral protection against tunnelling, although a robber's tunnel in the burial chamber wall demonstrates this was unsuccessful (Fig. 88).[528] Internally the pit was subdivided by mud-brick walls into compartments that mirrored those in the superstructure above, the central one of which is assumed to be the burial chamber. Once the burial was installed it was closed by a 0.12 m thick wooden roof supported by beams, which was covered with reed mats and plastered with mud; this defended the chambers below and supported the superstructure.[529]

The layout of the Type IC tomb S 3471 **[82]**,[530] which dates to the reign of Djer, [531] is similar. However, in this instance a 1.2 m deep pit was dug in the gravel down to the underlying rock, into which seven separate chambers were then excavated; the burial chamber being in the centre (Fig. 89). The pit was lined with a mud-brick

[521] Radwan 2000: 512.
[522] Radwan 2000: 509–13.
[523] Hendrickx 2008: 82. The debate over the status of the owners of these tombs has continued for some time; see Hendrickx 2008: 62–72 for an up to date summary of the various arguments.
[524] Mathieson *et al.* 1999: 23. The depth of this gravel layer varies from 0.75 to 4 m over the underlying rock (Emery 1958: 4).
[525] Porter and Moss 1974-81: 443–4.
[526] Hendrickx 1999: 77; 2008: 73.
[527] Scaled from drawing by Emery (1939: pl. 2); the slope of the pit's walls means that these mud-brick walls were thinner at the bottom than the top.
[528] Emery 1939: pl. 7 B.
[529] Emery 1939: 10, 15 and 17.
[530] Porter and Moss 1974-81: 444.
[531] Emery 1949: 13.

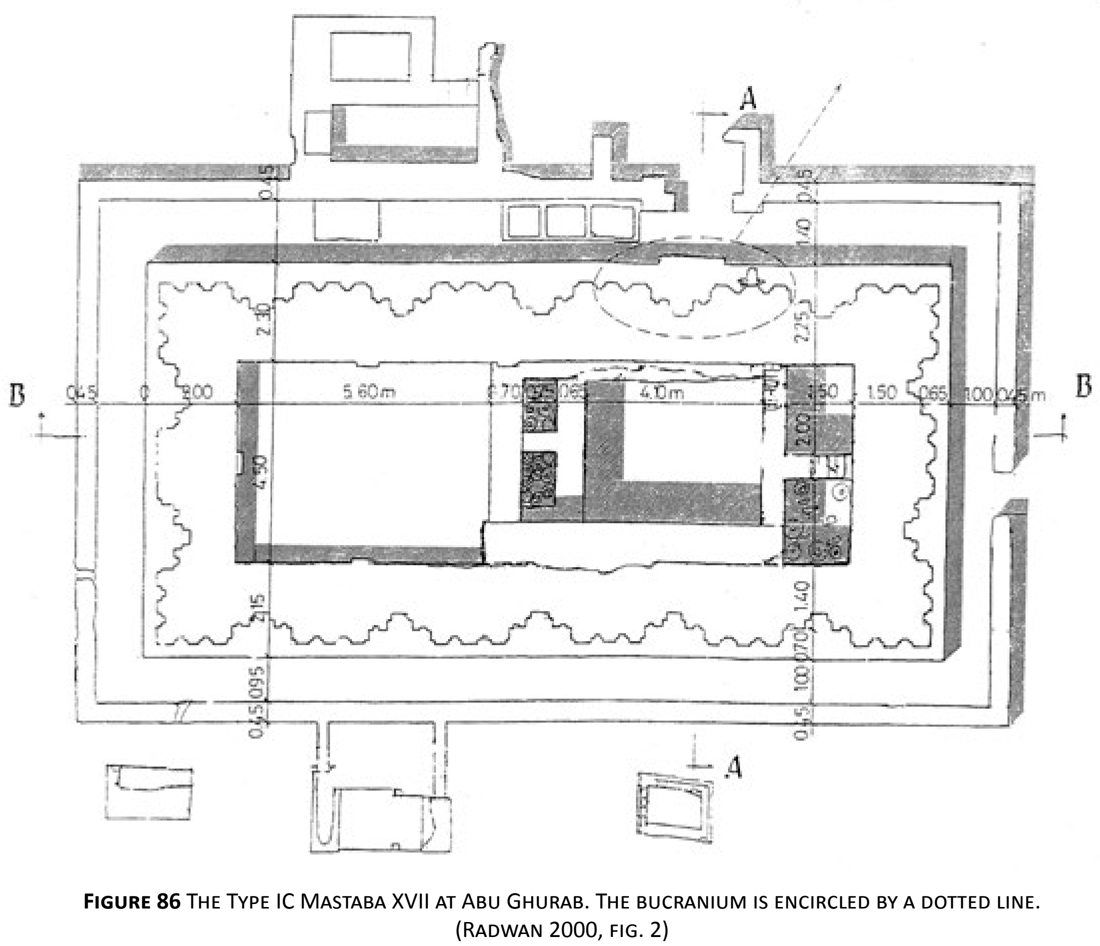


Figure 86 The Type IC Mastaba XVII at Abu Ghurab. The bucranium is encircled by a dotted line. (Radwan 2000, fig. 2)

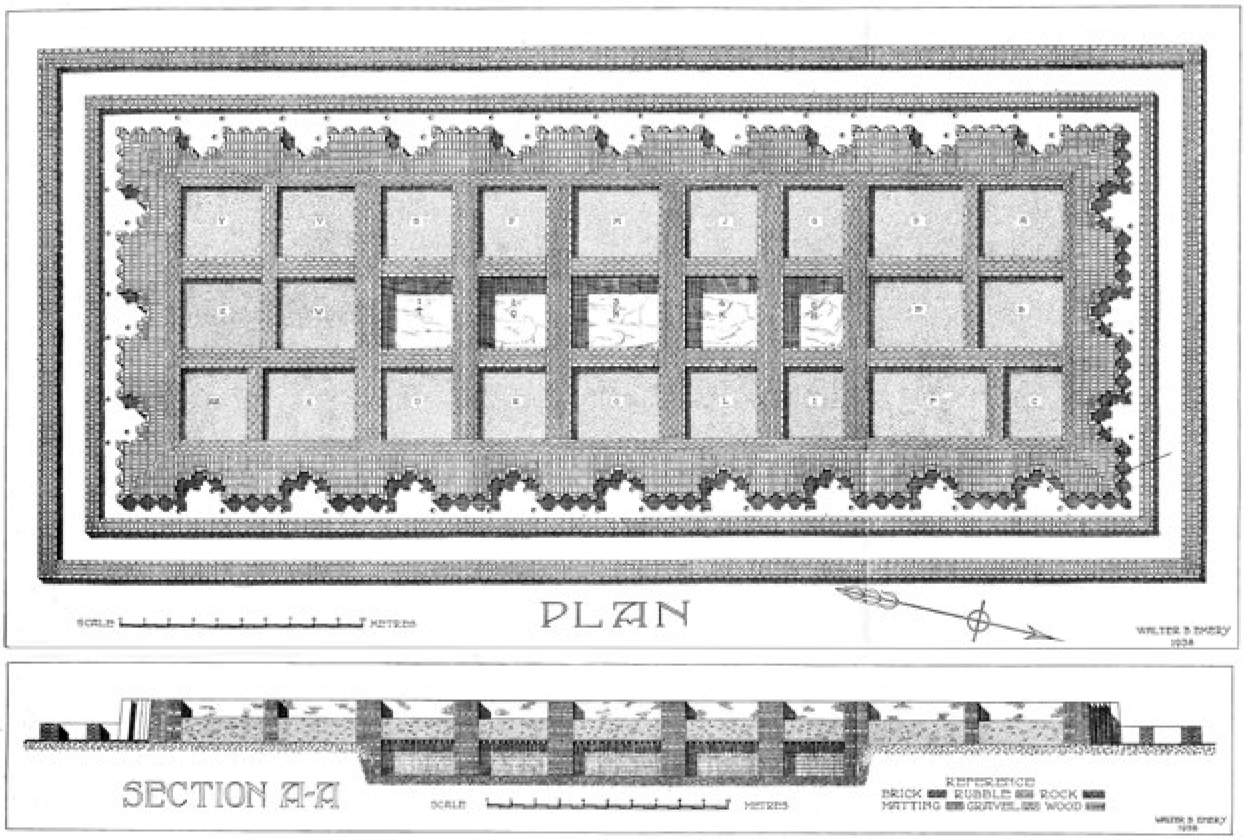


Figure 87 Plan and elevation of the Type IC tomb S 3357 at Saqqara. (Emery 1939, pls. 1 and 2)

wall approximately 1 m thick,[532] which consolidated the gravel and protected against lateral tunnelling. In addition the rock dividers between the chambers were extended in mud-brick to both secure those divisions (albeit unsuccessfully as robbers had tunnelled through them[533]) and support the wooden beams and planks that closed the pit and bore the superstructure.[534]

Perhaps as a response to the vulnerability of the mud-brick linings of the previous tombs, the burial chamber and magazines of the Type IC tomb S 2185 **[83]** (Fig. 90),[535] which dates to the reign of Djer,[536] were reinforced for their protection. They were still cut into the gravel and bedrock, but instead of being lined with mud-brick, were lined and subdivided with coursed masonry to improve their lateral defences.[537] In addition, instead of a wooden roof, stone slabs 0.2–0.32 m thick were used

Figure 88 Robbers' hole in the burial chamber of the First Dynasty Type IC tomb S 3357 at Saqqara. (Emery 1939, pl. 7, b)

532 Scaled dimension from drawing by Emery (1949: pl. 1).

533 The remains of robbers' holes in all the brick dividing walls between these chambers demonstrate graphically how the tomb's plunderers had navigated its interior when robbing the grave. Possibly as a result of their intrusions, only the burnt remains of what Emery (1949: 18) described as 'a gigantic wooden coffin' were found in the central burial chamber (designated 'O'), which perhaps may have been a shine such as those found at Abydos (Emery 1949: 16).

534 Emery 1949: 16–7.

535 Porter and Moss 1974-81: 437.

536 Quibell 1923: 15, pl. VIII.

537 This was perhaps one of the earliest architectural uses of stone in Egypt and predates the better known granite floor in the tomb of Den. Although rough stone cobbles had been used to pave the floor of the Type IB private tomb M13 **[NIC]** in the Temonos Cemetery at Abydos, which dated to the reign of Djer (Petrie 1902: 17, pl. LXXX). However, there is not enough information to include the latter in the survey.

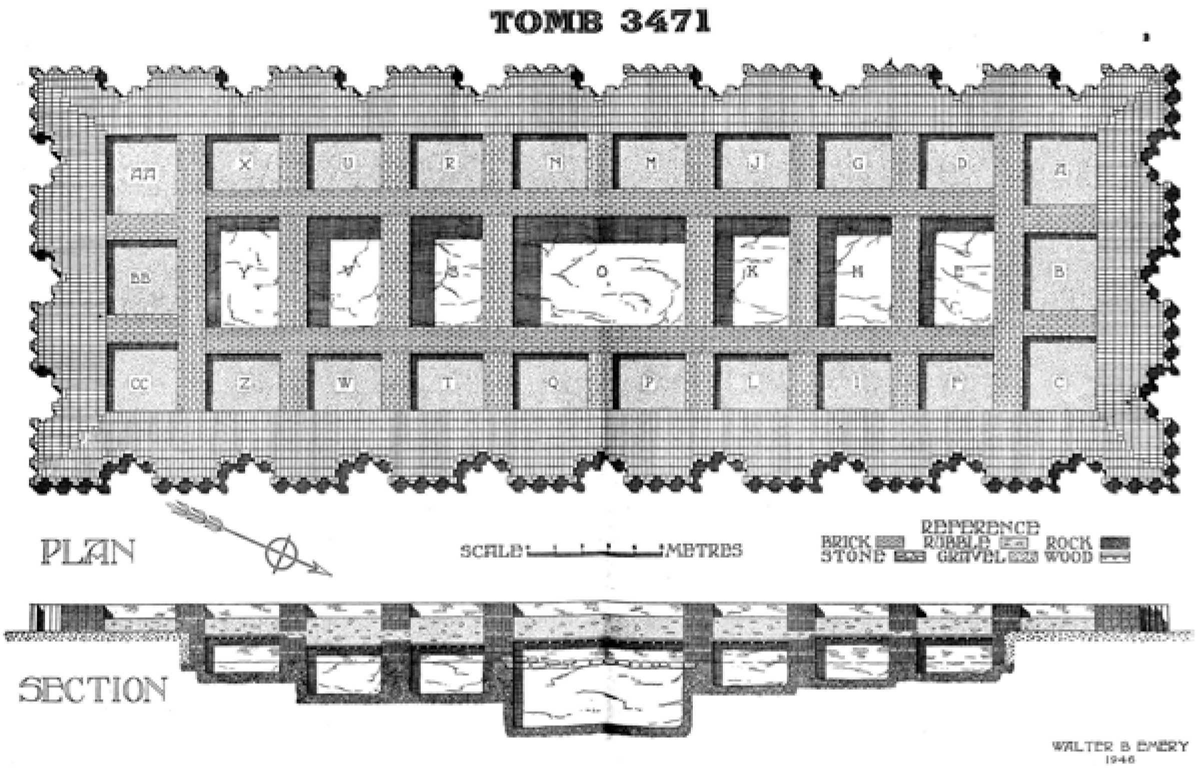


Figure 89 Plan and section of the Type IC tomb S3471 at Saqqara (Emery 1949, pl. 2)

to defend the pit from overhead attack and support the superstructure (Fig. 91).[538] Despite these innovations the tomb had still been plundered by robbers who forced their way from chamber to chamber.[539]

Although the use of stone was one means of bolstering the defences of a burial chamber, other solutions were being developed at Saqqara to address the problem.

The nearby tomb S 3504 **[84]**,[540] dates to the reign of Djet,[541] and resembles S 3471 in its format (Fig. 92). Following an earlier robbery and the destruction of its single wooden roof by fire,[542] the substructure was reconstructed within a single deep pit cut in the gravel and rock, which was subdivided by mud-brick walls 1—1.3 m thick[543] that created a single large burial chamber and assorted magazines.[544] For additional security, a new double wooden roof that 'sandwiched' approximately 1 m of bricks and rubble was built over the burial chamber (Fig. 93),[545] which suggests that the chamber's roof was considered to be a vulnerable point, despite the protection of its superstructure.

Lastly, the Type IC tomb, S 3503 **[85]**,[546] is attributed to the reign of Merneith,[547] and followed the same lines as S 3357 and S 3471, but with fewer compartments (Fig. 94). It was built within a gravel and rock-cut pit and lined with mud-brick walls 0.65–0.8 m thick,[548] then subdivided by cross-walls to form a single burial chamber and four magazines. These were covered by a single wooden roof, which both supported and was protected by the superstructure.[549] In spite of these precautions robbers had tunnelled below ground level into the south-west corner of chamber 'J' and from there north into the burial chamber 'L'.[550]

The large plans and cross sections of these burial chambers would have made them vulnerable to lateral tunnelling and attack from above, but the limestone in which they were cut would have provided a good degree of lateral defence. However, it is evident from the nature of their built defences that the most vulnerable areas

538 Quibell 1923: 5–6, 15–6; Emery 1949: 3.
539 Quibell 1923: 5. Evidence of such a robber's hole was found in chamber 'f' (Quibell 1923: 15).
540 Porter and Moss 1974-81: 445.
541 Emery 1954: 18–9.
542 Access had been gained by tunnelling underneath the substructure and the robbers had set fire to the roof. The resulting collapse of the superstructure from this fire brought about the tomb's restoration during the reign of King Qa'a and its subsequent restocking with grave goods (Emery 1954: 5).
543 Scaled dimensions from drawing by Emery (1954: pl. III).
544 Emery 1954: 7–13.
545 Emery 1954: 9–11.
546 Porter and Moss 1974-81: 444–5.
547 Emery 1954: 128, Hendrickx 2008: 74.
548 Scaled dimensions from drawing by Emery (1954: pl. XXXVIII).
549 Emery 1954: 132–3.
550 Once within the burial chamber, the robbers presumably set fire to the contents and structure on their departure, as when the tomb was excavated the carbonized footprint of a large wooden sarcophagus lay still in the chamber. In addition, further robbers' holes were also found leading into chamber 'K' and between chambers 'M' and 'N' (Emery 1954: 139–42).

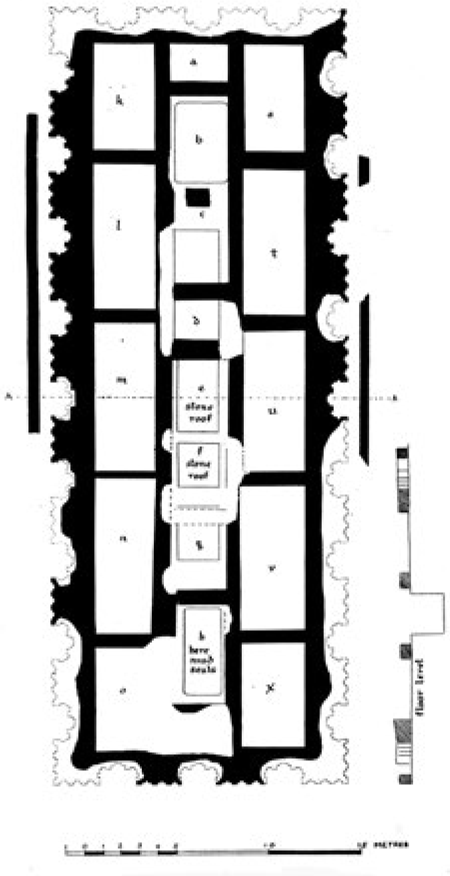


Figure 90 Plan of tomb S 2185 at Saqqara.
(Quibell 1923, pl. V)

Figure 91 The stone lined walls and roof of the subterranean compartments of tomb S 2185 at Saqqara.
(Quibell 1923, pl. 6, 2)

were their wooden roofs and the gravel layer over the limestone stratum.

Helwan

Another method of defending burial chambers in the weaker gravel of the Helwan Cemetery,[551] was to

[551] This comprises of a gravel and sand mixture interspersed with pebbles and boulders that lays over a compact desert clay stratum about 1.3 m below the surface, a further 0.5 m below which is a soft mudstone layer (Jeffreys and Tavares 1994: 152–3).

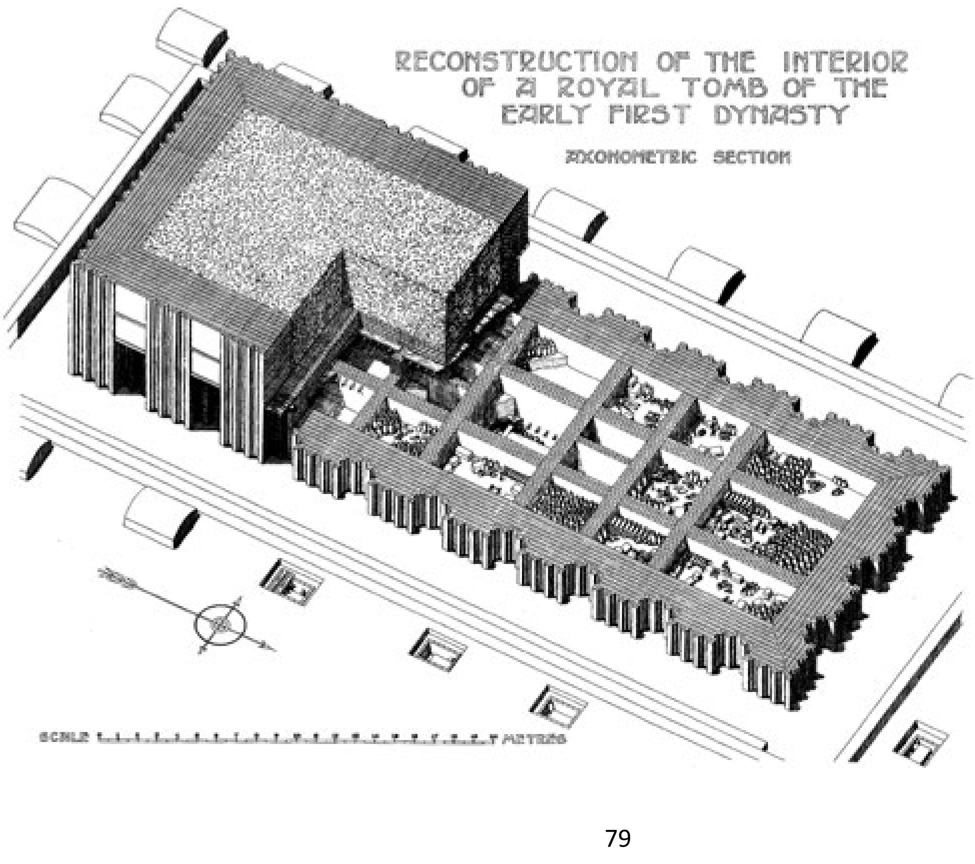


Figure 92 Emery's reconstruction drawing of the Type IC tomb S 3504 at Saqqara.
(Emery 1954, pl. I)
Courtesy of the Egypt Exploration Society.

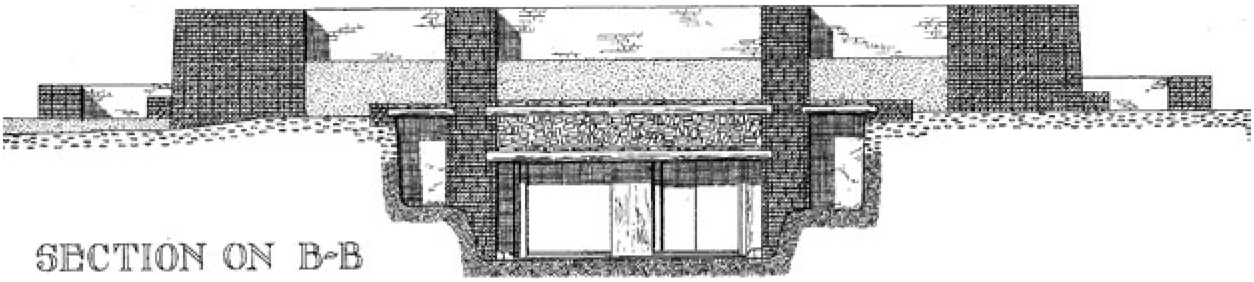


Figure 93 Tomb S 3504, showing detail of its burial chamber's double roof construction and its filling of rubble. (Emery 1954, pl. III) Courtesy of the Egypt Exploration Society.

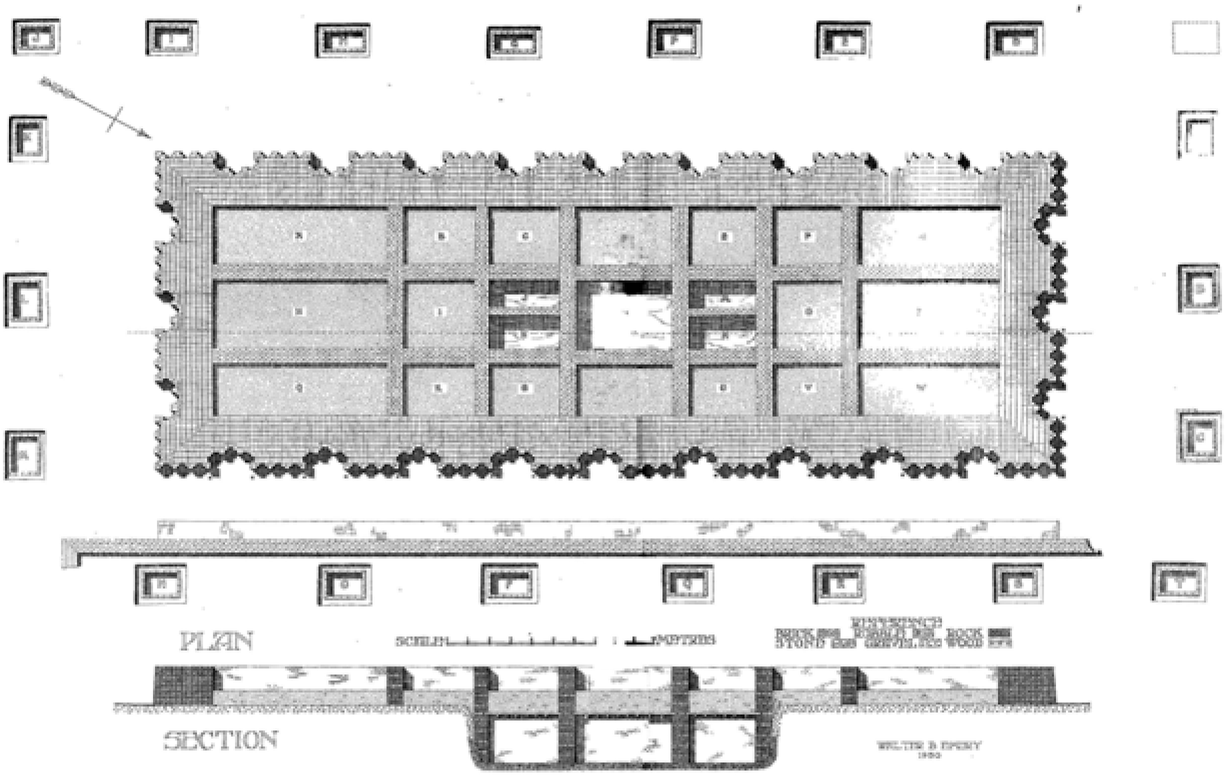


Figure 94 Tomb S 3503 at Saqqara, with its simple rock cut pit substructure at the centre. (Emery 1954, pl. XXXVIII) Courtesy of the Egypt Exploration Society.

protect them with a deep backfill, such as in two mid First Dynasty[552] Type IC examples found by Saad. Tomb 68.H.4 **[138]** was lined with 0.3–0.35 m thick mud-brick walls,[553] which would have consolidated the surrounding gravel and provided lateral protection (Fig. 95). Within the pit, secondary internal ledges 2 m down, formed by a further 0.4 m thick layer of mud-brick, supported the roof and a deep gravel backfill.[554] Of simpler construction, but lacking the lateral protection of a mud-brick liner,[555] was the larger tomb 185.H.4 **[139]**,[556] in which gravel cut ledges set 1.9 m down supported a roof and deep backfill.[557]

By increasing the depth of the backfill, both tombs were made more secure, because any attempt to rob them would involve either digging through the loose backfill and roof for a couple of metres, or tunnelling down further and sideways through the gravel to enter the void of the chamber.

552 Wilkinson (1996: 343) suggests that brick lined tombs at Helwan (either single or multi-chambered) without a staircase entrance can be safely dated to before the reign of Den.

553 Scaled from plan by Saad (1951: Plan 5).

554 Saad 1951: 7, plan 5.

555 As La Loggia (2009: 177) points out, the cut walls of some tombs not built in the 'looser sandy gravel strata' at Helwan are self-supporting and required only the minimum of physical support. This is presumably the case with the unlined tombs at this site, although the lack of a mud-brick liner would deny them any additional lateral protection against tunnelling.

556 Trying to date tomb 185.H.4 from the ceramics found by Saad (1951: 7), such as the 'Type 11' beer jars found in the grave (Saad used Emery's typology), only roughly dates it to the First Dynasty. However, the architecture of the tomb with its internal subdivisions for storage does place it stylistically in the middle of the dynasty (Personal communication by Jane Smythe 7th October 2010).

557 Saad 1951: 7–8, plan 6.

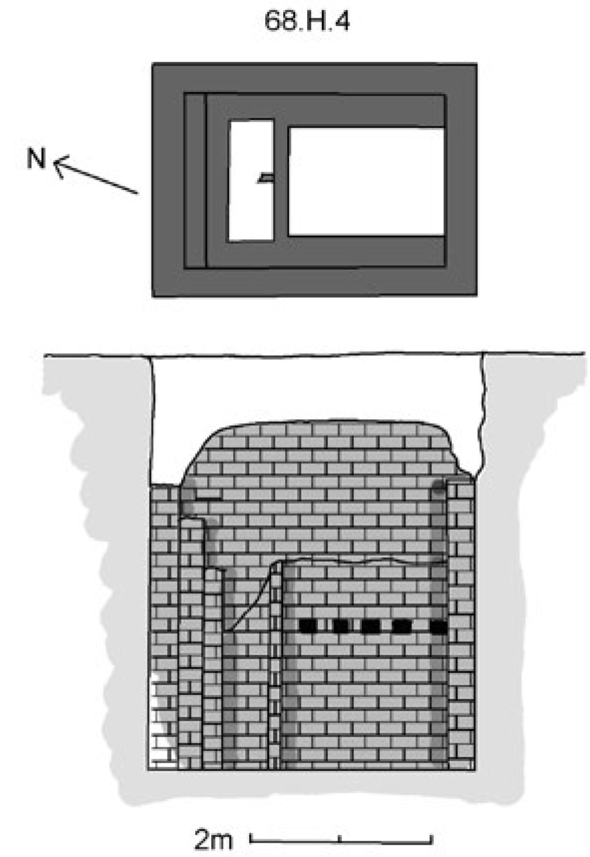


Figure 95 Tomb 68.H.4 at Helwan
(Drawn by the author after Saad 1951, pln. 5)

Tarkhan

The remains of four large mastaba tombs are to be found in the gravel and marly limestone of the 'Hill Cemetery' at Tarkhan.[558] Amongst these is the Type IC Mastaba 1060 **[214]**,[559] which dates to the reign of Djet,[560] and is notable for its use of stone to strengthen its security. Its substructure consisted of a rectangular pit and four magazines excavated into the limestone, all of which were plastered (Fig. 96). A ledge at the top of the burial chamber may have supported a 7.5 cm thick wooden roof, and 30 cm thick protective limestone slabs, the broken remains of which were found in the chamber (Fig. 97).[561] Despite being well defended by the surrounding geology, its stone roof and protective superstructure, robbers still managed to gain access by digging down through the mud-brick at point 'A' on the plan.[562]

Awlad el-Sheikh (Karâra)

In theory, doubling its defences would offer a burial chamber twice the protection from attack. Dated to

[558] The geology of the surrounding land into which they are cut was described by Wainwright as 'soft marly limestone, split with joints and very flaky. Over them are caps of a few feet of gravel and sand.'(Petrie, Wainwright and Gardiner 1913: 20–1).

[559] Porter and Moss 1934: 86.

[560] Petrie, Wainwright and Gardiner 1913: 18; Hendrickx 1996: 60.

[561] The likely thickness of this roof was indicated by a particularly large stone fragment found on site that measured 0.83 m long × 0.45 m wide × 0.3 m thick (Petrie, Wainwright and Gardiner 1913: 15).

[562] Petrie, Wainwright and Gardiner 1913: 13–5.

Figure 97 The burial chamber of Mastaba 1060 at Tarkhan with remains of stone slabs from its roof.
(Petrie *et al.* 1913, pl. XVI.1)

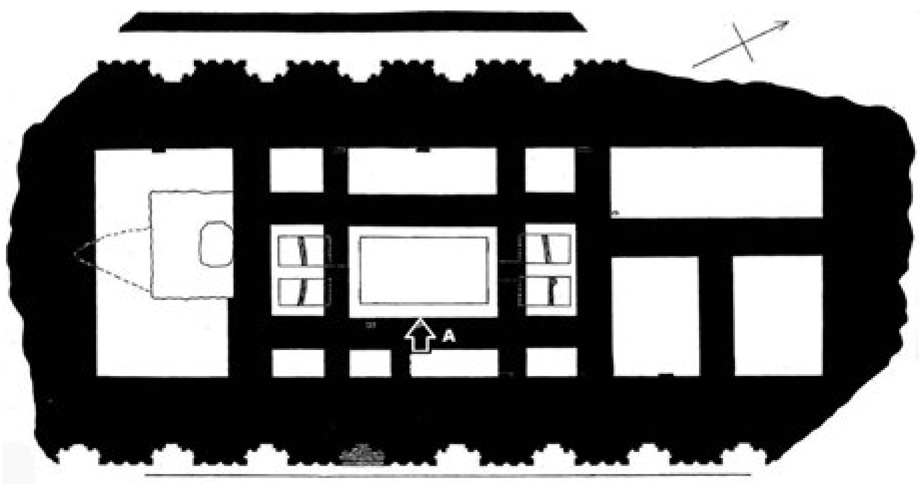


Figure 96 Mastaba 1060 at Tarkhan – the robbers entered the substructure via the mud-brick at point 'A' to avoid the stone roof.
(Petrie *et al.* 1913, pl. XVIII)

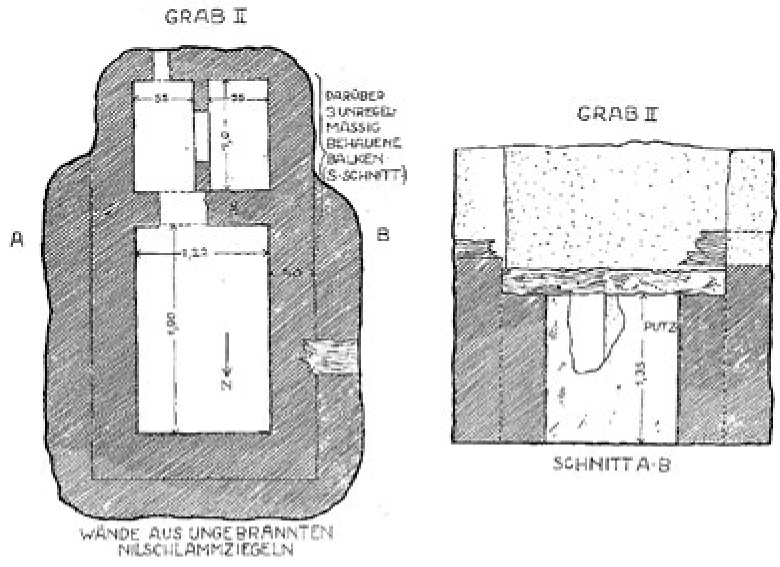


Figure 98 The double roofed Type IIC tomb II at Awlad el-Sheikh, with its two layers of mud-brick liners. (Ranke 1926, Abb. 3-4) Courtesy of Walter de Gruyter GmbH.

the mid First Dynasty,[563] the Type IC tomb II **[272]** at Awlad el-Sheikh[564] had a double roof and double liner (Fig. 98). Within a pit approximately 2.8 m deep, two layers of mud-brick walls that totalled approximately 0.7 m thick formed the burial chamber and two magazines. A ledge formed by the 1.35 m high inner wall supported the wooden beams of the first roof. Beams were then inserted 0.25 m higher in the outer wall for the second roof,[565] and the pit brought level with the surface with around 1 m of gravel. However, even with this twofold layer of protection from both above and the sides, the tomb had still been robbed in antiquity.[566]

Naga el-Deir

Further south in Cemetery 1500 at Naga el-Deir there are two Type IC tombs that date to the reigns of Djer and Djet respectively,[567] with roofs that were reinforced for better security. The first is tomb N 1532 **[285]**, whose 2.7 m deep pit was cut in the sand and gravel and lined with mud-brick walls 0.3–0.4 m thick.[568] From remains found *in situ,*[569] Reisner suggested that the roof of this tomb and its neighbours may have been constructed with as many as ten to fourteen brick courses.[570] Indeed his drawing (Fig. 99) tentatively shows the mud-brick roof at around 1 m thick,[571] which would have left room for a 0.5 m gravel backfill. The second grave is the nearby tomb N 1506 **[286],** which was protected by a double roof (Fig. 100).[572] A 2.3 m deep pit with slightly sloping sides was excavated in the gravel, within which was built a 1.27 m high mud-brick burial chamber and magazines,[573] which supported a layer of tree branches. A brick roof was then laid upon these, which may have been up to seven courses thick (about 0.5 m), and yet another layer of branches and more mud-brick, to provide an extra layer of protection,[574] and support the tomb's superstructure.[575]

Without these strong roofs, these high status graves would have been quite vulnerable to an overhead attack through their backfill, or a lateral approach through the strata of gravel. The effort placed into making them secure becomes understandable when the contents of N 1532 are taken into consideration, as when excavated considerable amounts of gold jewellery were discovered under its collapsed roof.[576]

Abydos

The SCA team working at Abydos have recently excavated an Early Dynastic cemetery approximately 1.5 km south-east of Umm el-Qaab and 0.5 km south of the temple of Sety I.[577] Within it, a large Type IC grave has been revealed, which demonstrates that this type of private tomb was being constructed at Abydos contemporary with the use of the royal cemetery at Umm el-Qaab.[578] Tomb IV **[326]** consists of a pit in which mud-

[563] Ranke (1926: 12 and n. 9) compared the wine jars found in the tomb to that found in N 1532 at Naga el-Deir, and the grave type to N 1624 from the same cemetery, which are dated to the reigns of Djer and Djet respectively.
[564] This site is located south-east of el-Hiba and north-east of Qarara.
[565] Ranke 1926: 8–9, Abb. 3–4. The remains of three roughly hewn wooden beams, 0.2 m × 0.2 m in section, were found over the magazines, which gives an idea of the strength of the roof's construction.
[566] Ranke 1926: 8.
[567] Reisner 1908: 14. Contra this, Kaiser (1998: 74) suggested a later date for N 1506 based upon the pottery and an inscription pointing to the reign of Adjib.
[568] Reisner 1908: 29–33; Reisner 1936: 35.
[569] This comprised of a beam 0.13 m thick and several courses of brick (Reisner 1908: 12).
[570] Reisner 1908: 27–9. For similar tombs, see Reisner 1908: Nos. N 1533, p. 28–9, figs. 50–1 and N 1621, p. 35–6, figs. 63–4 **[all NIC]**.
[571] Reisner 1908: fig. 53.
[572] A similar roof was also used in tomb N 1608 **[NIC]**, see Reisner 1908: 34, figs 57–8.
[573] Reisner 1936: 36–7.
[574] Podzorski 2008: 99.
[575] Reisner 1908: 33–4.
[576] Reisner 1908: 30.
[577] Hussein 2011: 269.
[578] Richards (2002: 85) had suggested that the builders of private

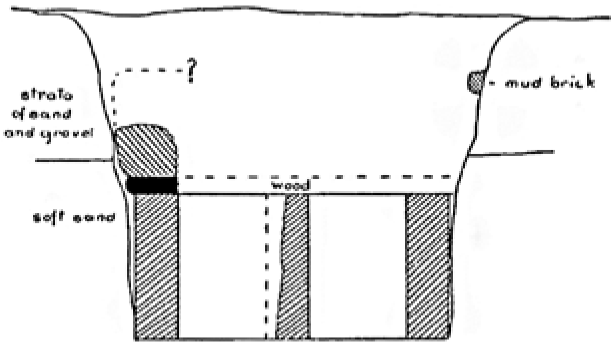


Figure 99 Section through the brick lined pit tomb N 1532 from Cemetery 1500 at Naga el-Deir with its thick mud-brick roof.
(Reisner 1908, fig. 53)

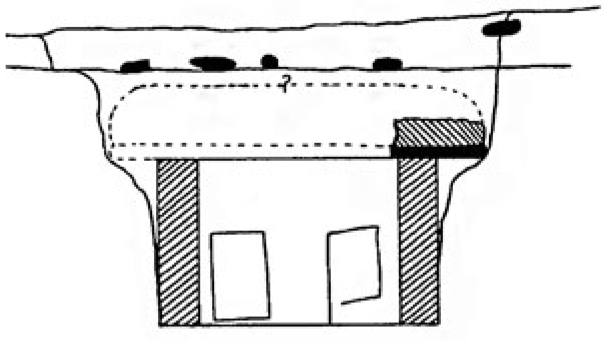


Figure 100 Section through the brick lined tomb N 1506 in Cemetery 1500 at Naga el-Deir with remains of its double roof.
(Reisner 1908, fig. 56)

brick walls approximately 0.5 m thick line either end of the main chamber, which is flanked on both its longest sides by walls 0.5–0.6 m thick and three mud-brick magazines that increase the lateral protection to around 1.3 m in total on the north-west flank and 1.5 m on the south-east.[579] The main pit had been roofed with beams and wooden planks, but the magazines were covered by reeds and mud.[580] The burial chamber had been robbed via a tunnel cut through from the magazine 'G', which suggests that perhaps daunted by the wooden roof, the robbers may have opted for the more vulnerable reed roof of the magazine as the easiest route into the tomb.

Armant

Lastly, two large Type IC tombs are known from Cemetery 1200 at Armant. The earliest elite tombs at this site, they date to Naqada IIIB–C1.[581] Tomb 1207 **[333]** comprised of a large pit cut in the desert[582] that was lined with mud-brick walls 0.2–0.25 m thick, set 0.45 m down from the surface, which may have supported beams for a roof (Fig. 101).[583] On three sides were the remains of projecting 'tongue' walls,[584] which possibly abutted a wooden shrine,[585] such as those in the contemporary tombs of Djer and Djet at Abydos.[586] Nearby tomb 1208 **[334]**, [587] was slightly larger and lined with mud-brick walls 0.1–0.3 m thick. Ledges up to 0.8 m deep from the surface presumably supported a wooden roof.[588] Unlike 1207 it was subdivided by 0.4 m thick mud-brick walls that created a burial chamber and surrounding magazine storage within the pit (Fig. 102). [589] Therefore, while not exceptional in their security arrangements, both tombs would have at least been protected by substantial wooden roofs; albeit unsuccessfully, as both had been systematically and repeatedly robbed.[590]

The second half of the First Dynasty (Naqada IIIC2–IIID) Den to Qa'a

With the introduction of the external access route in the Type ID tomb, the Type IB and IC pit tomb was possibly no longer the most favoured design for tombs of the elite, but its use is still evident and in some cemeteries the burial chamber was protected by additional security features.

Minshat Abu Omar

A graphic illustration of inadequate levels of protection for burial chambers is found in the Type IC elite tombs at Minshat Abu Omar in the Eastern Delta. Dating from the mid to latter half of the First Dynasty,[591] eight tombs have been found in the surrounding sand lined with either mud or mud-brick and usually subdivided into two or three chambers, the largest of which was used for the burial.[592]

cemeteries had eschewed the North Abydos plateau until the Third and Fourth Dynasties when Cemetery 'D' was established near the North Cemetery.

[579] Scaled from plan by Hossein (2011: Fig. 9).

[580] Hossein 2011: 275–8.

[581] Bard (1988: 54–5) suggests that their sudden appearance at this site without architectural precedents, points to them being an introduced, rather than home grown, development.

[582] Marked as 'gebel' on the tomb plans (Mond and Myers 1937: pl. V) this presumably consisted of the Quaternary 'locally derived gravels' of the Armant Formation (Tawadros 2001: 159).

[583] Scaled dimensions from drawing by Mond and Myers (1937: pl. V).

[584] Mond and Myers 1937: 16–20.

[585] The excavators, Mond and Myers (1937: 19–20) also reported two trenches in the soft soil floor of the pit that they speculated may have either been dug by tomb robbers, or alternatively due to their symmetrical layout, could have been original features. Bearing in mind the internal projecting walls, I suggest that these trenches may in fact be impressions of beams used to support a wooden shrine and that the projecting pier walls were intended to abut it.

[586] A rose quartz bowl found at this tomb has been dated to S.D. 80, the reigns of Djer and Djet, which places the tomb in that timeframe (Aston 1994: 65–6 and 127).

[587] Mond and Myers 1937: 16–20.

[588] Scaled dimension from drawing by Mond and Myers (1937: pl. V).

[589] Mond and Myers 1937: 18.

[590] Mond and Myers 1937: 16. There is a robber's tunnel marked on Mond and Myers (1937: pl. V) plan of tomb 1208 in its western corner, which was obviously intended to bypass the roof.

[591] Kroeper 1992: 140.

[592] Kroeper 2005: 638–9. The tombs are nos. 1930 **[NIC]**, 1450 **[NIC]**, 2000 **[NIC]**, 1590 **[27]**, 2275 **[NIC]**, 2650 **[NIC]**, 2899 **[NIC]** and 2897 **[26]**; see Kroeper 1992: 127–50.

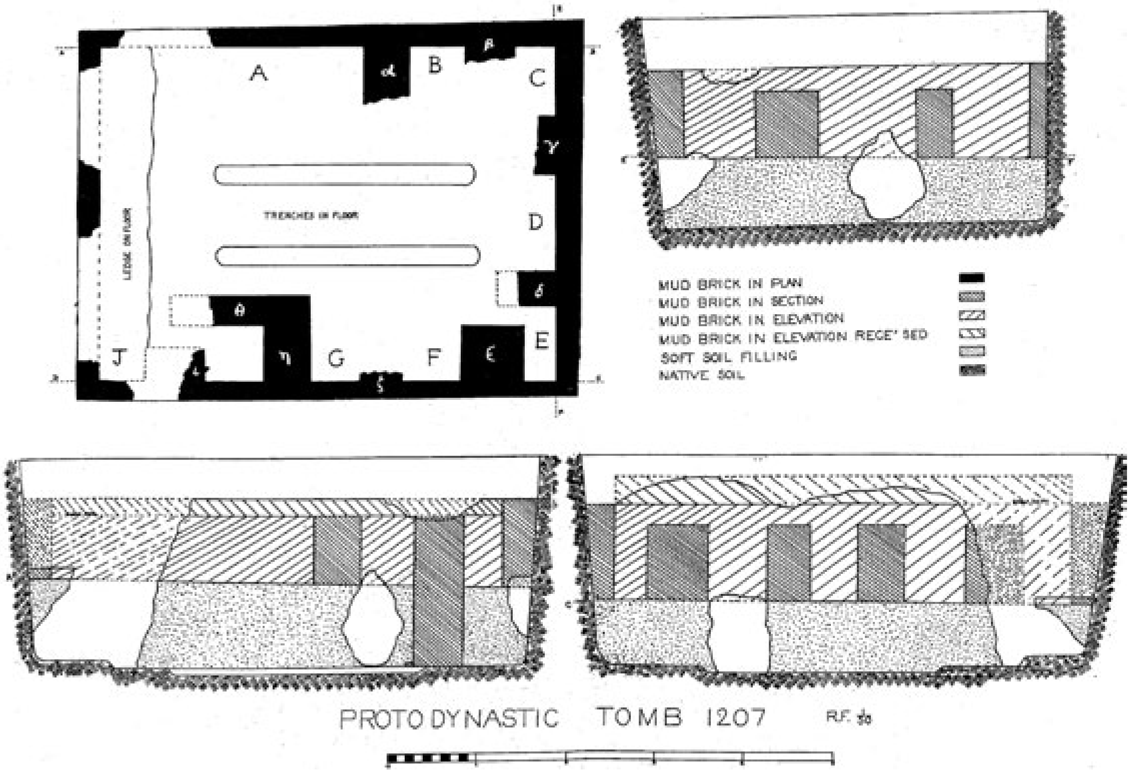


Figure 101 The Type IC tomb 1207 at Armant. Its projecting 'tongue' walls can be clearly seen. (Mond and Myers 1937, pl. V) Courtesy of the Egypt Exploration Society.

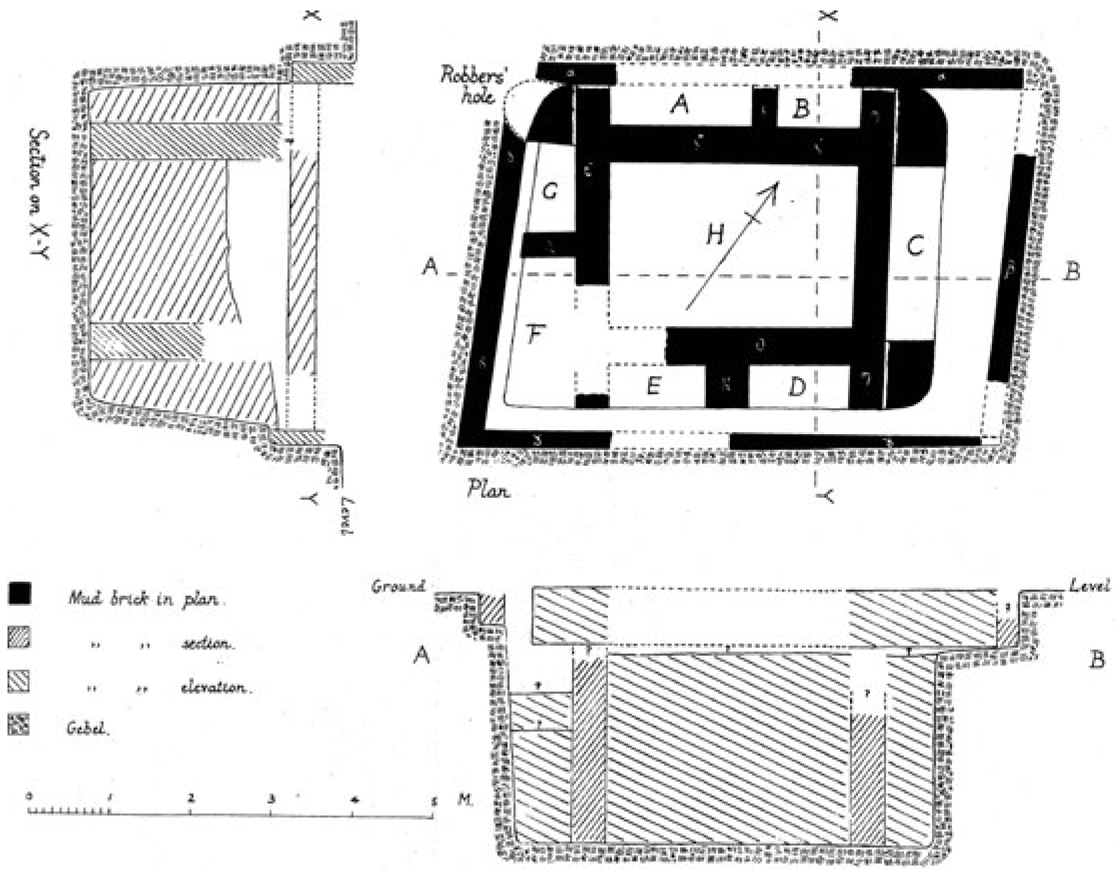


Figure 102 The Type IC tomb 1208 at Armant.
(Mond and Myers 1937, pl. V) Courtesy of the Egypt Exploration Society.

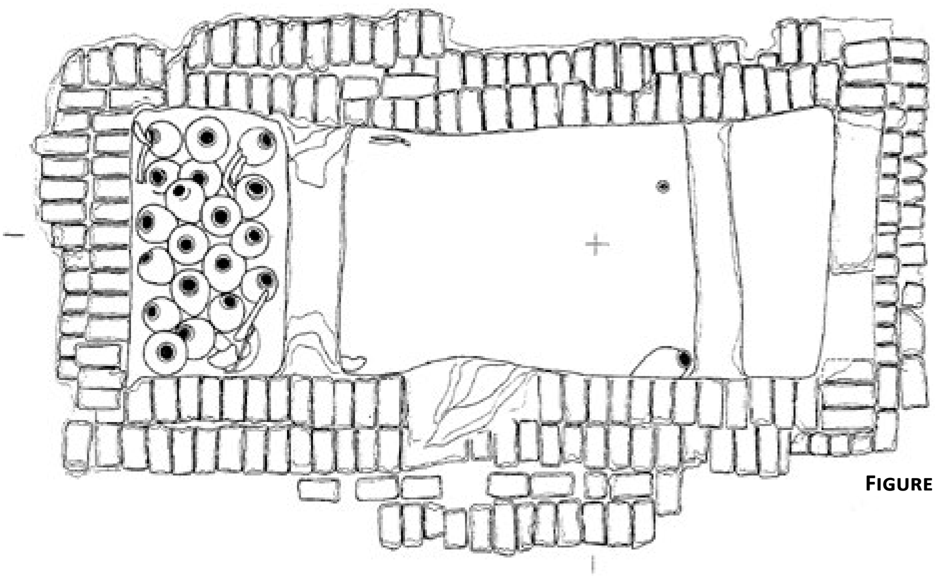


Figure 103 The Type IC Grave 2897 at Minshat Abu Omar. (Kroeper 1992, fig. 12)

The biggest of these is grave 2897 **[26]**, which was lined with walls two bricks thick (Fig. 103). These supported a wood framed roof covered with mats, mud-bricks and mud, which had partially collapsed during the tomb's robbery.[593] No remains of any protective superstructures have been discovered at the site,[594] and although there is debate as to whether or not they existed,[595] it could be that the roofs of most of these tombs were like nearby grave 1590 **[27]**, and set only 10 cm below the original surface.[596]

Excavations have shown that most of the tombs at this cemetery had also been robbed through their roofs,[597] which may have been for two reasons. Firstly, because the thefts occurred soon after the interment, when their locations were still remembered by the robbers,[598] or secondly because when these roofs eventually collapsed the resulting depressions gave away their locations.[599] Whatever was the cause, either scenario demonstrates the vulnerability of wooden roofs when unprotected by sufficient backfill or a superstructure.[600]

Tell el-Farkha

The use of mud-brick lined burial chambers continued at Tell el-Farkha, such as in the Type IC graves 50 **[37]** (Fig. 104) and 55 **[38]**, which date to the latter half of the First Dynasty and perhaps into the Second.[601] To possibly strengthen their lateral protection their mud-brick liners were increased to one and a half bricks thickness, but now rather than being directly capped by their large superstructures as before, there seems to have been a distinct layer of soil between them and the latter, which in the case of grave 50 was approximately 0.4 m deep.[602] This puzzling feature would have made these tombs slightly more vulnerable to lateral tunnelling than their predecessors and the exact reasons for doing so are unknown, although it could be interpreted as a levelled out backfill and an increased reliance on the superstructure's footprint for security.

Abu Roash

In other cemeteries such as Abu Roash, some burial chambers were not only better defended by their surrounding geology, but were provided with double roofs for their protection, such tomb MO25 **[43]**[603] in cemetery M,[604] which dates to Naqada IIIC2.[605] Similar to the earlier tomb 389 in Cemetery 300 **[42]**, this was a Type IC tomb excavated 3 m down into the surrounding rock and lined with clay bricks (Fig. 105). Its lower section was further subdivided to provide a burial chamber with four magazines, which were closed with a planked wooden roof. A further 1.25 m above this, sitting 0.3 m below ground level, ledges were constructed that supported large wooden beams and a second roof that also supported the tomb's superstructure.[606]

593 Kroeper 1992: 138–9 and 141.
594 Kroeper 2005: 639.
595 Kroeper 1992: 144.
596 Kroeper 1992: 133.
597 With the exception of grave 2650 **[NIC]** which was robbed through its western wall and via a magazine into the main chamber (Kroeper 1992: 136).
598 Kroeper 2005: 639.
599 Kroeper 1992: 134.
600 *Contra* this in the reported conference discussion at the end of the paper, both Kaiser and Dreyer (in Kroeper 1992: 144) expressed an opinion that these graves would have been protected by a mound or superstructure of some sort, despite there being no physical evidence of one.

601 Dębowska-Ludwin 2010: 5 and 13.
602 Dębowska-Ludwin 2011a: 31–4; 2011b: 264–6.
603 Porter and Moss 1974-81: 7.
604 This cemetery was probably built for the lesser elite of Memphis, with Saqqara acting as the main necropolis for the closest officials to the king or members of the royal family (Tristant 2008c: 9).
605 Hendrickx 1996: 60; Tristant 2008b: 329.
606 Klasens 1961: 110–1.

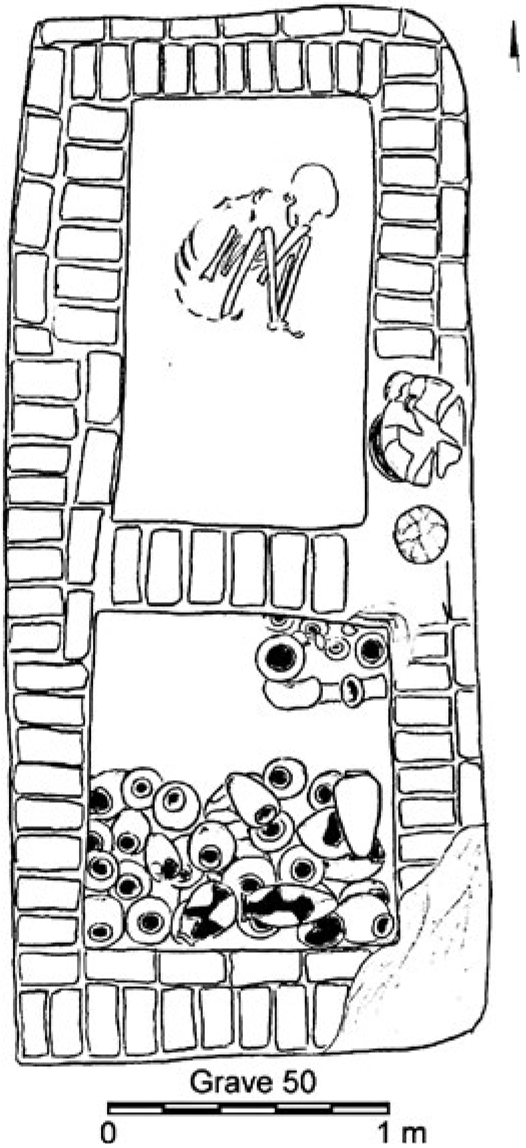


Figure 104 The Type IC Grave 50 at Tell el-Farkha with one and a half brick thick liner. (Dębowska-Ludwin 2009, pl. 3)

North Saqqara

Further south at Saqqara, in the large type IC tomb S 3507 **[86]**,[607] which dates to the reign of Den,[608] a new form of substructure was introduced. Rather than the long and shallow subdivided trench of the previous tombs at this necropolis, the burial chamber was a rock-cut pit roughly a third of their length, but deeper.[609] Mud-brick lined at its top to stabilise the surrounding gravel strata (Fig. 106), at its northern end an internal stairway led to a wooden floor supported by a rock-cut ledge that formed the burial chamber's roof. This created an upper magazine whose floor at one end was covered in stone flags. The entire pit was then closed by a strong wooden roof supported on beams embedded in the gravel. Remarkably, this bore a rectangular mound of rubble and sand clad in a layer of brick (Fig. 107), whose purpose Kaiser has proposed may have been to seal the tomb and make it secure before its superstructure was completed.[610] However, others have suggested that perhaps it was the equivalent of the concealed tumulus in the royal tombs at Abydos, or represented a primaeval mound.[611]

The last example of a Type IC pit substructure from Saqqara is S 3111 **[87]**,[612] which dates to the reign of Adjib.[613] A stepped pit was excavated in the usual manner, and then partially lined with mud-brick down to the rock strata to consolidate the upper layer of gravel and offer lateral protection (Fig. 108). It was then subdivided by mud-brick walls into compartments, the largest of which formed the burial chamber, leaving the rest as magazines. Each chamber was covered by an individual wooden roof and in the burial chamber and the two largest magazines these were supported by beams. The whole was then protected as usual by the tomb's superstructure.[614]

[607] Porter and Moss 1974-81: 447.
[608] Emery 1958: 75.
[609] The length of the pit of S 3507 was 5.25 m, whereas for example S 3503 **[85]** was 14.25 m, S 3357 **[81]** 19.1 m, S 3504 **[84]** 22.6 m, and S 3471 **[82]** 30 m (see Chart A).

[610] Kaiser 2008: 355 and 363.
[611] The purpose of this hidden tumulus at Saqqara has been the subject of much scholarly debate. For further discussion on this topic see, Badawy 1956: 180–3; Edwards 1988: 24; Dreyer 1991: 101–2; O'Connor 1991: 6–9; Lehner 1997: 80; Kemp 2006: 103 and Kaiser 2008: 355.
[612] Porter and Moss 1974–81: 443.
[613] Hendrickx 1996: 60.
[614] Emery 1949: 95–9.

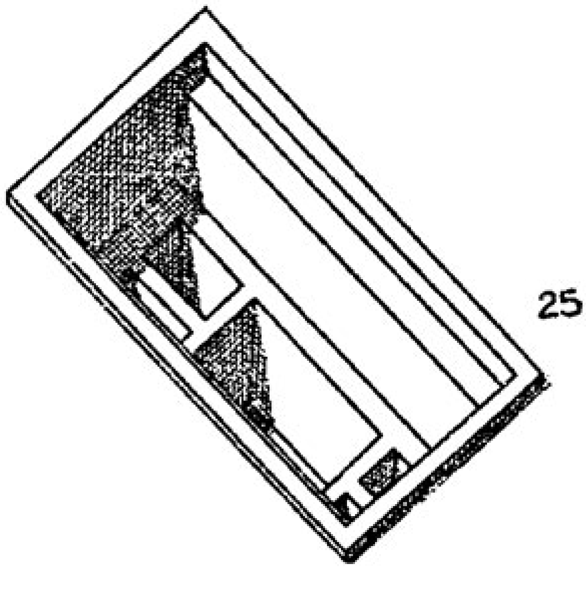


Figure 105 The double roofed Type IC tomb MO25 from Cemetery M at Abu Roash. (Klasens 1961, fig 2) Courtesy of the Rijksmuseum van Oudheden.

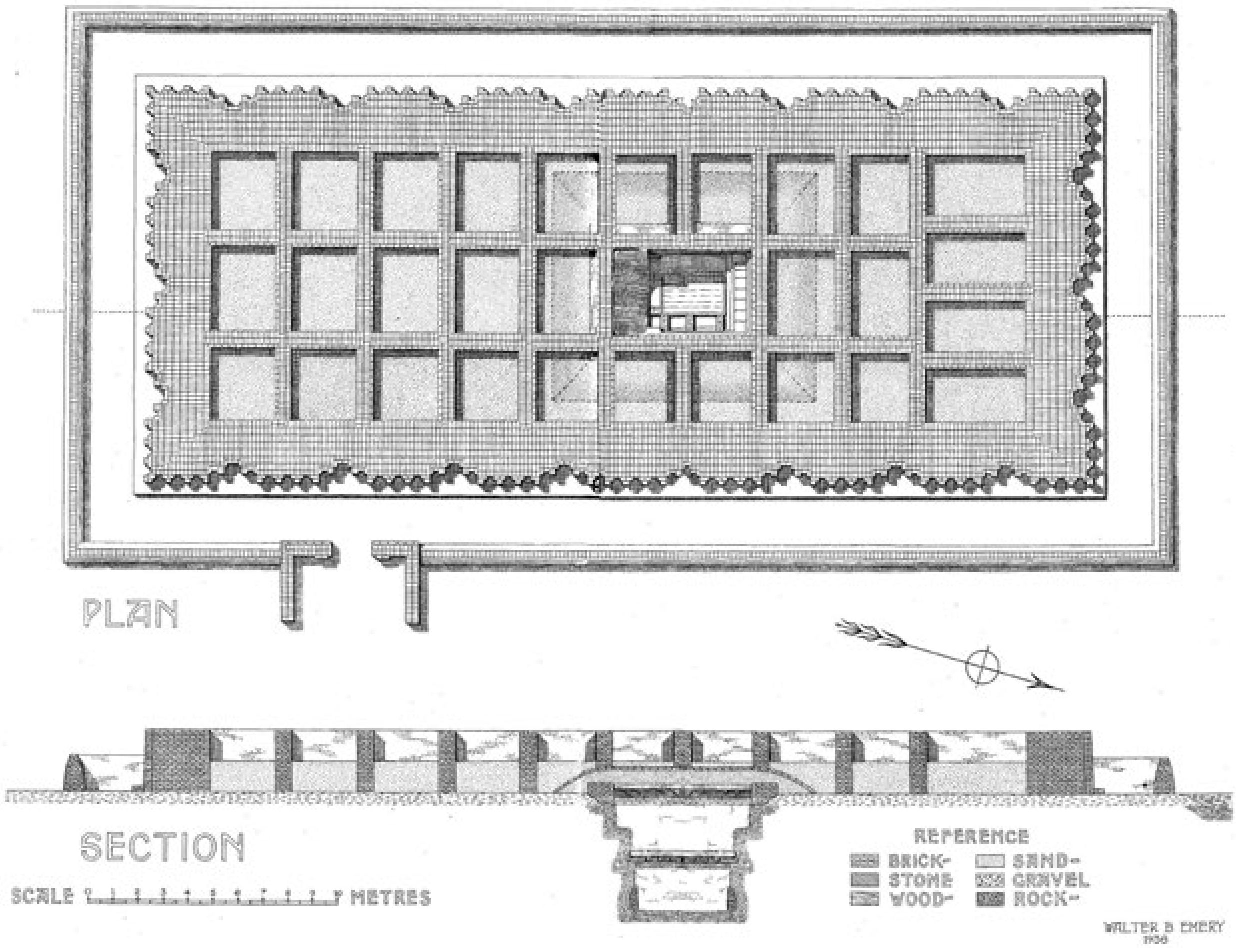


Figure 106 The Type IC tomb S 3507 at Saqqara, with its deeper rock-cut pit and two levels. (Emery 1958, pl. 85) Courtesy of the Egypt Exploration Society.

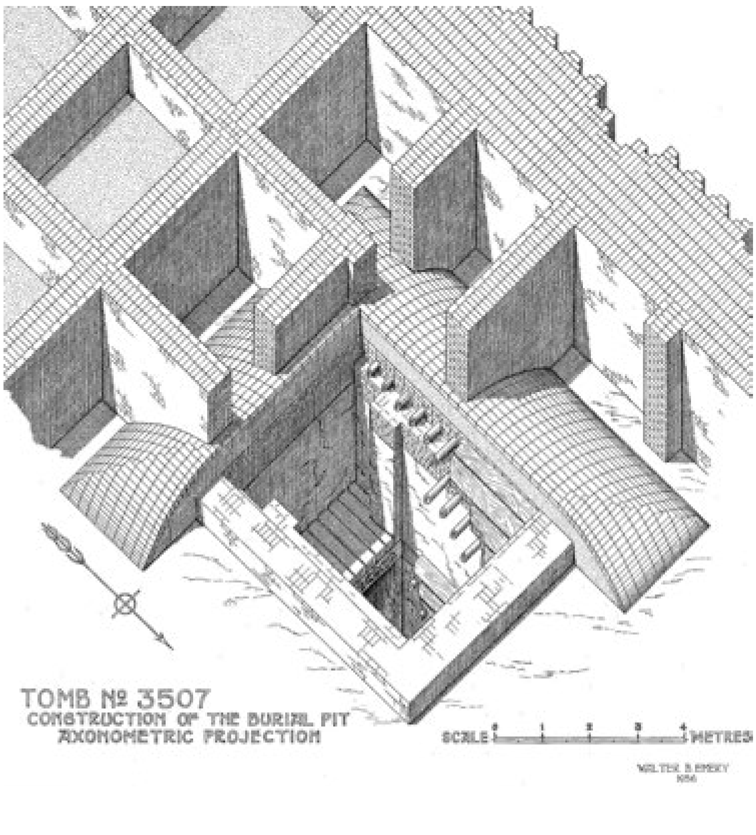


Figure 107 Emery's drawing of tomb S 3507 at Saqqara, showing its internal arrangements with the hidden mound securing the opening now clearly visible. (Emery 1958, pl. 86) Courtesy of the Egypt Exploration Society.

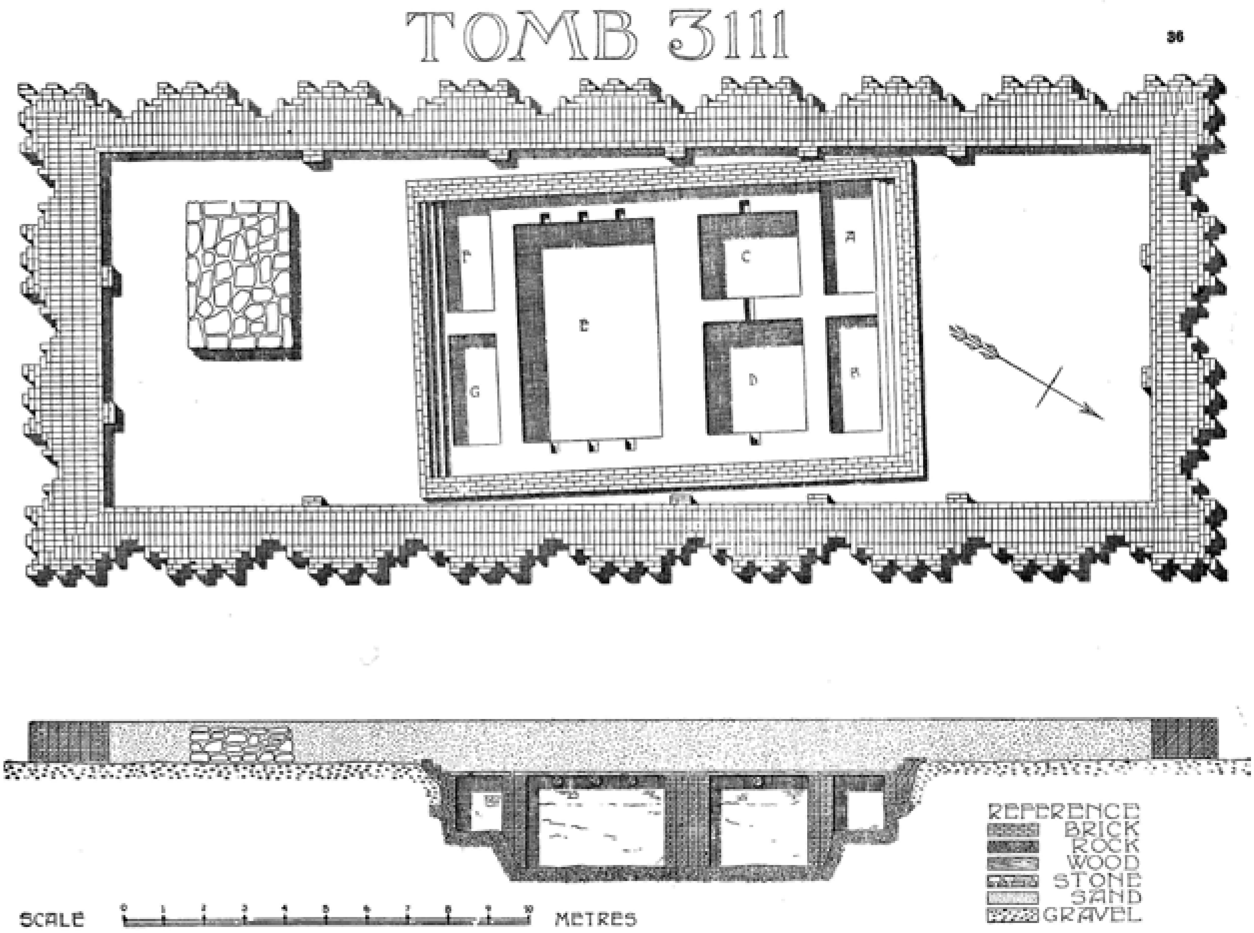


Figure 108 Tomb S 3111, possibly the last monumental Type IC pit tomb at Saqqara. (Emery 1949, pl. 36)

Although the latter's design seems to be almost a step backward in terms of substructure evolution, its predecessor S 3507 **[86]** is one of the first tombs to markedly reduce the cross section and plan of its pit. This brought advantages from a security point of view as it made it more difficult to locate by *sondage* in either direction, as a greater proportion of its superstructure was able to conceal it.

Helwan

Looking at Saad's maps of the Helwan Necropolis, there are undoubtedly many Type IC tombs,[615] although few have been published in detail (Maps 9 and 10).[616] Amongst those that are, one of the most notable security features is the use of stone to reinforce the burial chamber, to compensate for the weak surrounding gravel.[617]

One example that incorporated stone to protect its roof is the large Type IC tomb 423.H.9,[618] which is dated to the reign of Den **[140]**.[619] Saad described the tomb's mud-brick lined burial chamber and four magazines, as 'being roofed with limestone' and therefore 'intended to protect the tomb from robbery',[620] and the remains of some of these slabs can be seen in his photograph (Fig. 109).[621] Although the burial chamber was additionally protected by a superstructure, in order to circumvent both this and its stone roof, robbers had dug three tunnels into the burial chamber from 'outside the wall' and looted it from there.[622]

[615] See Saad 1947: Plans, and Saad 1951: Pls. I, II and III.

[616] Kaiser (1998: 74–5, Abb. 1) had singled out tombs 1349.H.2, 1481.H.2, 174.H.1, 204.H.1, 526 H1, 565.H.1 and 671.H.1, which may fit into this category, but lack of information excludes them from detailed discussion here.

[617] Although statistically they form less than 0.5% of the 10,285 tombs excavated by Saad, the tombs at this necropolis are unrivalled in their use of stone in the Early Dynastic Period (La Loggia 2008: 76).

[618] Apparently, Saad uncovered this tomb in his ninth season, but did not publish a plan of this tomb or the area, personal communication by Christiana Köhler (13th July 2010).

[619] By a clay jar seal (Saad 1969: 22).

[620] Saad 1969: 22.

[621] It is likely that this roof was supported by beams, and indeed the ledges surrounding the burial chamber and magazines, which may have supported them, can be seen in Fig. 109 in this book.

[622] Saad 1969: 22–3.

Figure 109 Stone roofing slabs in situ at tomb 423.H.9 at Helwan, with possibly a robbers' tunnel on the right? (Saad 1969, pl. 11)

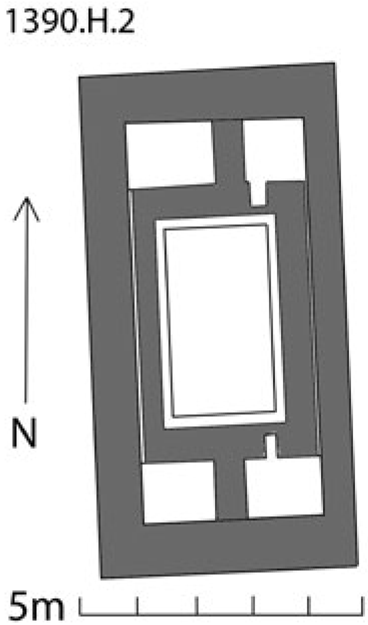


Figure 110 Enlarged plan of Helwan tomb 1390.H.2 from Saad's 1:400 scale map. (Drawn by the author after Saad 1947, Map 3; actually numbered 1389.H.2)

To prevent this sort of tunnelling, stone was used to line the burial chamber of the Type IC tomb 1390.H.2 **[141]**,[623] which dates to the middle of the dynasty.[624] It appears from Saad's necropolis plan and photographs to comprise of a rectangular mud-brick lined pit tomb with magazines at either end (Fig. 110).[625] The central burial chamber was lined with two courses of large limestone orthostats 2.5 m long × 0.8 m high × 0.2 m thick, laid horizontally edge to edge (Fig. 111).[626] Details of its closure are unavailable, but it may have been done in the usual Helwan manner with a wooden roof brought level with rubble to the surface.[627]

Tarkhan

Like the earlier Mastaba 1060, there are two more Type IB tombs at Tarkhan which also relied on the surrounding limestone to protect their burial chambers, both date to the reign of Den.[628] The unlined burial chamber of Mastaba 2050 **[215]** was excavated in the gravel and rock to a depth of approximately 6.1 m,[629] and although no remains were present, it was presumably roofed in wood (Fig. 112). The burial chamber of nearby Mastaba 2038 **[216]** comprised of a 5.58 m deep unlined burial pit into which an access slope descended halfway down (Fig. 113). Due to the pit's lack of a lining, Petrie suggested that perhaps a wooden shrine was installed to contain the burial,[630] which could presumably have supported some sort of roofing.

Figure 111 The stone lining in Helwan tomb 1390.H.2. (Saad 1969, pl. 16)

[623] Wood (1987: 64) suggests that Saad has probably mis-numbered the tomb in his publication, as architecturally the tomb is probably more likely to be 1389.H.2, shown on the folding plan in the 1947 publication of the cemetery. It is equally likely that the identification number of the tomb shown in the on site photograph is the correct one (see Fig. 111), as the photograph was taken on the spot, and the plan is possibly simply mis-numbered?
[624] Köhler 2005: 28.
[625] The tomb is only drawn at 1:400 scale on Saad's (1947: Map 3) plan and from the photograph of the burial chamber in his (1969: pl. 16) publication.
[626] Saad 1969: 28.
[627] Köhler 2008b: 114.
[628] Hendrickx 1999: 79–80. Both Reisner (1936: 70–2) and Grajetzki (2008: 110) place Mastaba 2038 in the same period.
[629] Petrie 1914: 3.
[630] Petrie 1914: 4–5, pl. XVIII.

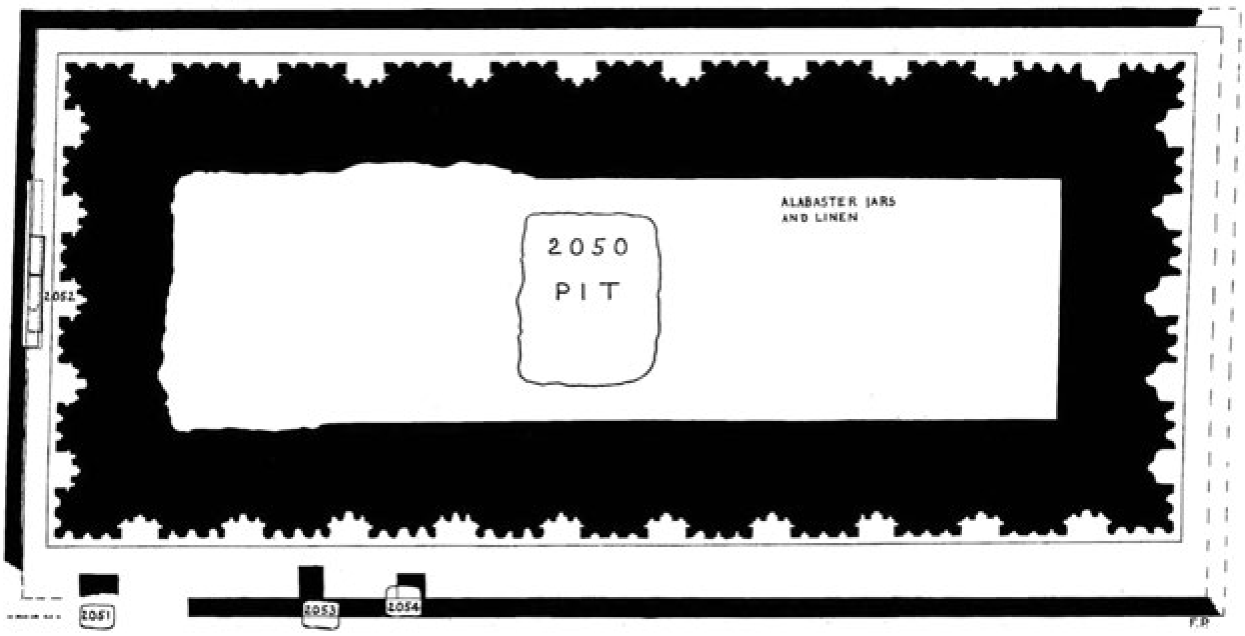


Figure 112 The palace façade superstructure and pit of the Type IB tomb 2050 at Tarkhan. (Petrie 1914, pl. XVIII)

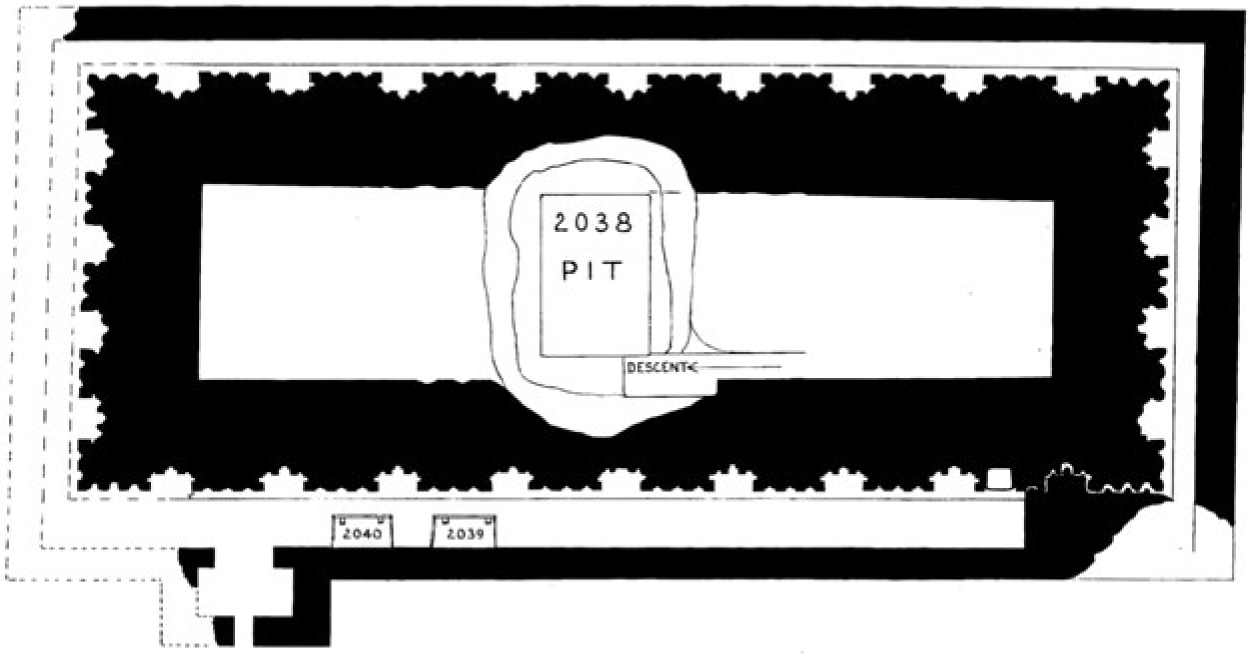


Figure 113 The palace façade superstructure and pit substructure of Mastaba 2038 at Tarkhan (Petrie 1914, pl. XVIII)

Awlad el-Sheikh

In Middle Egypt, stone was used to defend the Type IC tomb III at Awlad el-Sheikh **[273]**, which dates to the mid First Dynasty.[631] It comprised of a rectangular pit roughly 2.8 m deep (Fig. 114),[632] within which a rectangular burial chamber was formed by large dressed limestone slabs, 2 m high × 0.1 m thick and of varying widths. The gaps formed between the pit walls and these slabs were then back-filled with a thick layer of sand, and at one end beyond the slabs, a void was left in which mud-brick walls formed four magazines. The whole was

[631] Köhler 2005: n. 134. Ranke (1926: 12–3) was of the opinion that this tomb dated from either the end of the Third or perhaps the beginning of the Fourth Dynasty, as the use of stone in a private grave before the Third Dynasty appeared to him inconceivable.

[632] Scaled from drawing by Ranke (1926: Abb. 6).

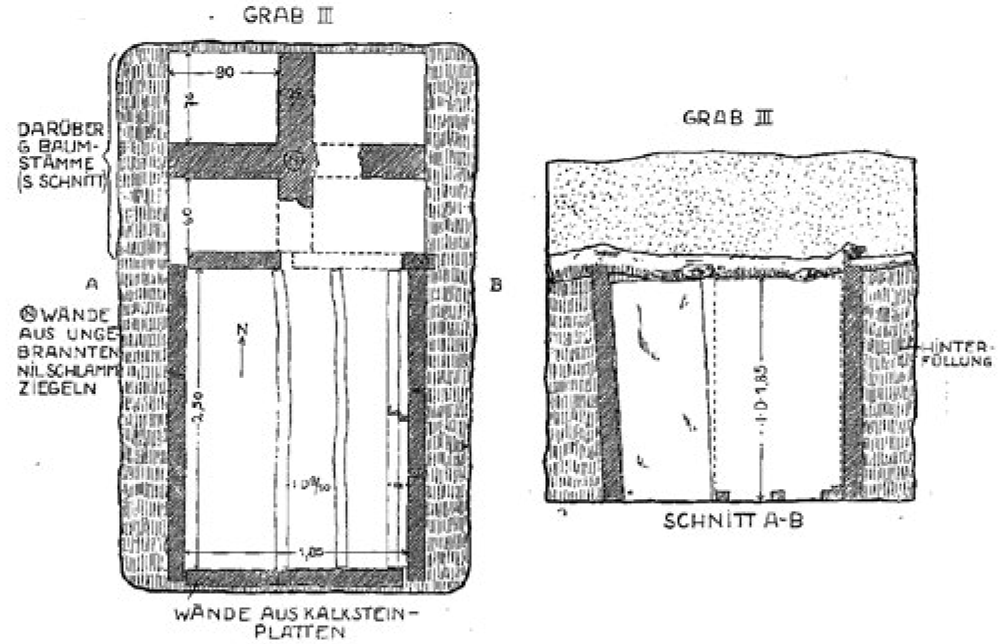


Figure 114 Plan and section of the stone-lined tomb III at Awlad el-Sheikh. (Ranke 1926, Abb. 5–6) Courtesy of Walter de Gruyter GmbH.

roofed with wooden beams that rested on the stone slabs and supported a reed roof coated with mud and sand cement, plus about 1 m of backfill.[633] No trace was found of a superstructure. Despite these defences, the tomb was still looted by robbers, who had pulled down one of the slabs to enter the magazines behind.[634]

The Second Dynasty (Naqada IIID)

Es-Seba'iya

Further south at Es-Seba'iya East, 20 km south-east of Esna,[635] de Morgan described finding a large Type IC tomb roofed with stone slabs **[339]**, which is loosely dated to the Second or Third Dynasty.[636] Its 5.48 m long substructure comprised of a brick liner 0.22 m thick that was partly covered with stone slabs for about 60% of its length. One of these measured an impressive 2.32 m long × 1.23 m wide × 0.32 m thick and the success of this 1.75 tonne monolith as a security measure, can be judged by the fact that de Morgan resorted to the use of dynamite to fracture it.[637]

El-Qara

Further south, a Type IB tomb that employed stone for both its liners and roof was found 7 km north of Edfu at El-Qara; it is loosely dated to the Early Dynastic Period,[638] but stylistically similar to other Second Dynasty structures.[639] Tomb 2 **[354]** comprised of a large gravel cut pit in which a mud-brick lined burial chamber was constructed (Fig. 115). This was in turn lined with stone slabs approximately 0.15 m thick to deter lateral tunnelling. A massive stone roof closed the grave that comprised of three separate slabs approximately 0.25 m thick,[640] the largest of which would have weighed around 1 tonne,[641] which was then covered with a gravel or sand backfill approximately 1.2 m deep. Therefore not only was this tomb 'armoured' with stone on its top and sides, but undoubtedly well concealed as well.

El-Masa'id

South of El-Qara and north of Gebel el-Silsila, a further five tombs with stone slabs were found by de Morgan

[633] Ranke 1926: 10–2.
[634] Interestingly, the robbers had not bothered to plunder further than the first two magazines, which Ranke (1926: 12, n. 1) suggested, inferred that they knew all too well where the valuable grave goods were placed, as the magazines at the back contained only wine jars and vessels.
[635] Needler 1984: 146.
[636] A collection of copper items hidden the outer wall of the grave were dated by Needler (1984: 146) to be no earlier than the Second and possibly as late as the Third Dynasty.
[637] de Morgan 1984: 64–5.
[638] Needler 1984: 122.
[639] For example the small tombs N 4370 **[NIC]**, N 4379 **[NIC]** and N 4774 **[NIC]** in Cemetery 3500 at Naga el-Deir (Mace 1909: 20–1) and Burial 28 at El-Masa'id **[355]** discussed below.
[640] Scaled dimension from drawing by de Morgan (1908: fig. 40). The largest piece was 1.81 m long × 1.42 m wide overall (including the third smaller slab that had broken from its corner). The second smaller slab (with a pointed end) was 1.3 m long × 1.43 m wide (de Morgan 1908: 141; de Morgan 1912: 42).
[641] To be more precise, 0.99–1.07 metric tonnes if one assumes a scaled thickness of approximately 0.22 m and that the bulk density of Gebel el-Silsila sandstone is approximately 1.76–1.91 metric tonnes per cubic metre (Fitzner, Heinrichs and La Bouchardiere 2003: 1093).

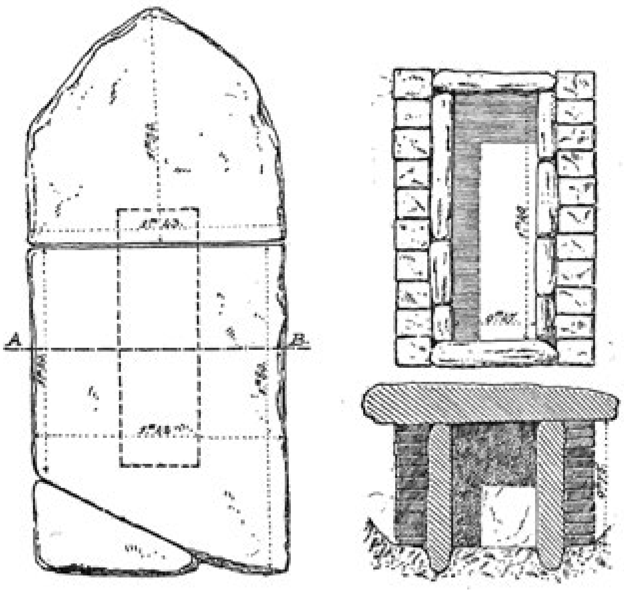


Figure 115 The stone lined and roofed tomb 2 at El-Qara. (De Morgan 1908, fig. 40)

at El-Masa'id,[642] amongst ninety-one tombs that Needler broadly dated to Naqada III.[643] The only one described in detail was the intact Burial 28 **[355]**. It comprised of a 1.8 m deep gravel cut pit into which a backfill had been poured. The first 0.8 m of this fill comprised of a 'compacted mass of cemented pebbles' that formed 'a natural concrete as hard as a breccia', over which two large 0.15 m thick sandstone slabs were placed, which weighed about 0.28 tonnes each [644] and created an impenetrable cover just over 1 m thick.

Section summary – Defending the Type IB and IC burial chamber.

Although the defences of some tombs remained virtually unchanged from those of their Predynastic predecessors, greater efforts were made to protect the substructures of others, and these varied widely dependent on circumstances. In necropoleis with generally weak geology, or strata, attempts were made to defend pits against lateral tunnelling by reinforcing their liners with materials that were locally to hand. This usually took the form of thick mud-brick liners, or more rarely in tombs of high status, quarried stone, such as first seen at Saqqara and later Helwan, although the use of liquid mud as an unyielding and pervasive backfill seems to have been a speciality in the Delta. To defend the burial chamber from above, increased depths of backfill were tried and roofs of greater thickness, or sometimes two roofs for double the protection. These measures brought another benefit, which was that the deeper a roof was, the further down it was that a lateral attack would also have to go. Moreover, where the means to obtain it and the extra protection was deemed desirable, some roofs were also reinforced with or made entirely of stone. Lastly, amongst the monumental tombs at Saqqara we see the beginnings of a move in burial chamber design from an easily located and vulnerable large cross-section and plan, to one of a smaller and less detectable form.

4.2.1.2 The burial chamber in Type ID pit tombs

During the second half of the First Dynasty the Type ID private tomb with external access first appears, presumably following the royal precedent. Largely similar to their Type IB and IC predecessors, the major difference in the burial chambers of these tombs was that they were accessible by a stairway or slope, and there were some discernible improvements in their security measures, which are discussed below.

The second half of the First Dynasty (Naqada IIIC2–IIID) Den to Qa'a

Tura el-Asmant

At Tura el-Asmant, slightly west of the main site of Tura, a number of Type ID tombs are excavated in the gravel and resemble those at Helwan.[645] Many of their burial chambers were protected by strong mud-brick liners such as tomb 1056 **[63]**, whose 0.8 m thick walls were set 0.8 m down from the desert level,[646] where they supported a wooden roof,[647] and presumably a deep gravel backfill (Fig. 116). Nearby, although dimensions are unavailable, tomb 1035 **[64]** had two thick layers of mud-brick liners in its burial chamber, the innermost of which probably also supported a recessed roof and gravel fill,[648] as was the case in the slightly later tomb 986,[649] whose inner walls were set down to form the burial chamber **[65]**.[650]

A few tombs at this necropolis, like those found at Helwan, are notable for their stone linings. The first is tomb 130 **[66]**, whose 2.5 m deep burial chamber was lined with mud-brick walls 0.6–1 m thick, within which large limestone slabs roughly 1.1 m high × 0.1–0.15 m thick lined the floor and walls (Fig. 117).[651] These were probably roofed over with wood and backfilled to the surface.[652] On a larger scale and more heavily defended

[642] The information on the other four tombs is minimal, with the exception of Burial 32, which was also covered with stone slabs and from which Needler (1984: 138) has identified a Naqada III bowl and slate palette from the Brooklyn collection.
[643] de Morgan 1984: 62–3; Needler 1984: 138.
[644] Both slabs were 1.6 m long × 0.6 m wide × 0.15 m thick (de Morgan 1984: 63).

[645] Jeffreys and Tavares 1994: 146.
[646] Scaled dimensions from drawing by Yacoub (1981: pl. XVII).
[647] Yacoub 1981: 160.
[648] Yacoub 1981: pl. XIV.
[649] This can be dated to the reign of Qa'a on stylistic grounds due to the flanking magazines on the stairway. See Kaiser 1998: 78–82, for a discussion of the dating of Type ID substructures.
[650] Yacoub 1981: 160, pl. XX.
[651] Scaled dimensions from drawing by Yacoub (1981: 160, pl. XVIII).
[652] Yacoub 1981: 160.

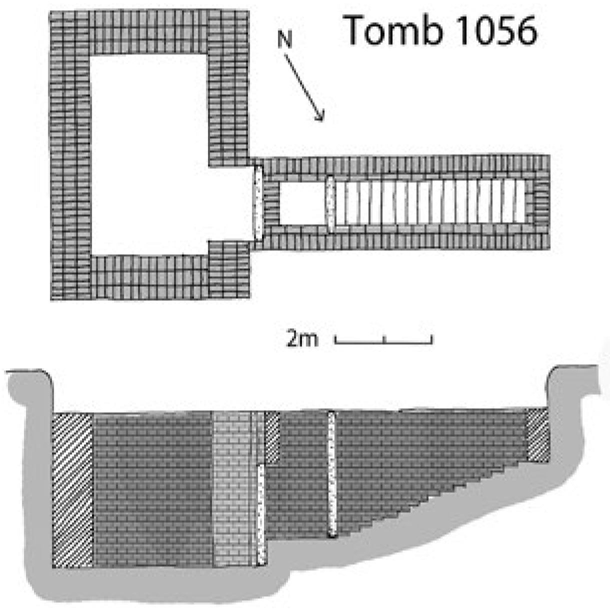


Figure 116 The Type ID mud-brick lined tomb 1056 at Tura el-Asmant with its two portcullises. (Drawn by the author after Yacoub 1981, pl. XVII)

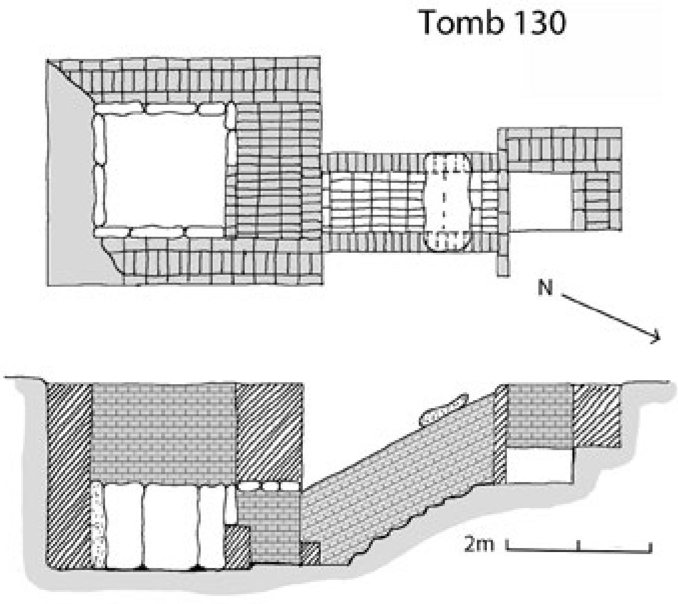


Figure 117 The Type ID stone lined tomb 130 at Tura el-Asmant. (Drawn by the author after Yacoub 1981, pl. XVIII)

is nearby tomb 249 **[67]** (Fig. 118). Although the excavator's drawings are not entirely clear, it appears that a 3.4 m deep pit was cut in the gravel, and lined with stone slabs approximately 2 m high × 0.1 m thick. Above the slabs a ledge was cut in the gravel,[653] presumably to support beams for a wooden roof,[654] and unusually, this too was stone clad, seemingly to prevent vertical tunnelling. From it a mud-brick wall of the same thickness rose approximately 0.9 m that probably formed the superstructure's foundations and enclosed a gravel backfill.

The need for thick mud-brick walls and the unusual stone defences of these burial chambers at Tura el-Asmant indicates an acute awareness of the vulnerability of the surrounding gravel matrix to lateral tunnelling by tomb robbers, which is a similar situation to that found at Helwan, where comparable steps were taken.

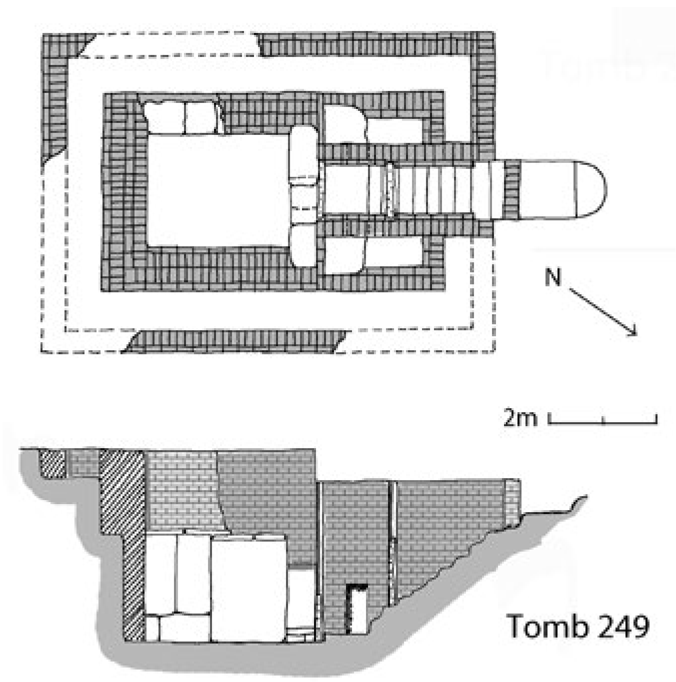


Figure 118 The Type ID stone lined tomb 249 at Tura el-Asmant. (Drawn by the author after El-Khouli 1968, pl. V)

Abu Ghurab

Further south, at Abu Ghurab,[655] two staircase tombs have been published by Radwan. The first is Mastaba IV **[69]**, which he dates to the reign of Den.[656] Although not much information is available, it can be seen from the tomb plan (Fig. 119) that the burial chamber was surrounded by magazines and substantial outer mud-brick walls.[657] This is a similar arrangement to that seen in the tomb of King Qa'a at Abydos, which would have afforded it a good degree of lateral protection. Immediately adjacent and overlying the

[653] Scaled dimensions from drawing by El-Khouli (1968: pl. V).
[654] El-Khouli 1968: 75.
[655] This cemetery is located north of both Abusir and of the Sun Temple of Niuserre (Jeffreys and Tavares 1994: 146).
[656] Radwan 1991: Abb. 1 and Taf. 39a–b; 1995: 312–3, Taf. IIIa,

[657] The structural dimensions scaled from the 1:400 drawing (Radwan 1991: Abb. 1) can only be roughly estimated, see tomb catalogue **[69]**.

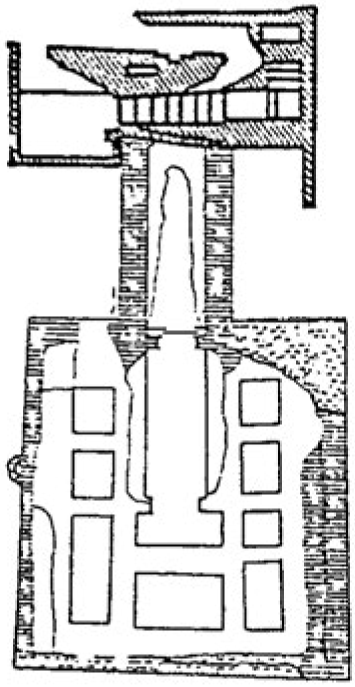


Figure 119 The Type ID Mastabas IV and V and at Abu Ghurab.
(Radwan 1991, Abb. 1)

stairway of Mastaba IV lies Tomb V **[70]**, which from its style[658] and context is certainly of a later date (Figs. 119–20). Internally within its 0.7–1 m thick mud-brick lining,[659] wood remains suggest it was either fitted with a wooden shrine or panelled. Traces of beams indicate that the entire structure was probably covered with a wattle and brick roof that in turn both supported, and was protected by, its superstructure.[660]

North Saqqara

A large number of tombs of this type were excavated by Emery at Saqqara; the thoroughness of his work means that we can examine them in detail. They differ to many of the other Type ID 'elite' tombs elsewhere, as they are usually far larger and more complex due to the high status of their owners.[661]

The first three tombs date to the reign of Den and the designs of their burial chambers vary widely.[662] The

[658] Compare it for example to S 3338 **[93]** at Saqqara, see Emery 1949: 124–9.
[659] Scaled dimension from drawing by Radwan (1991: Abb. 2)
[660] Radwan 1991: 305. There is also another stairway tomb at this site dating to the reign of Qa'a, 'Mastaba XIV', but only two sentences are published on it (Radwan 1995: 313).
[661] Helck 1984: 394–6.
[662] For the dates of these tombs, see the discussions of S 3506 **[88]** (Emery 1958: 37), S 3035 **[89]** (Emery 1938: 1), and S 3036 **[90]**

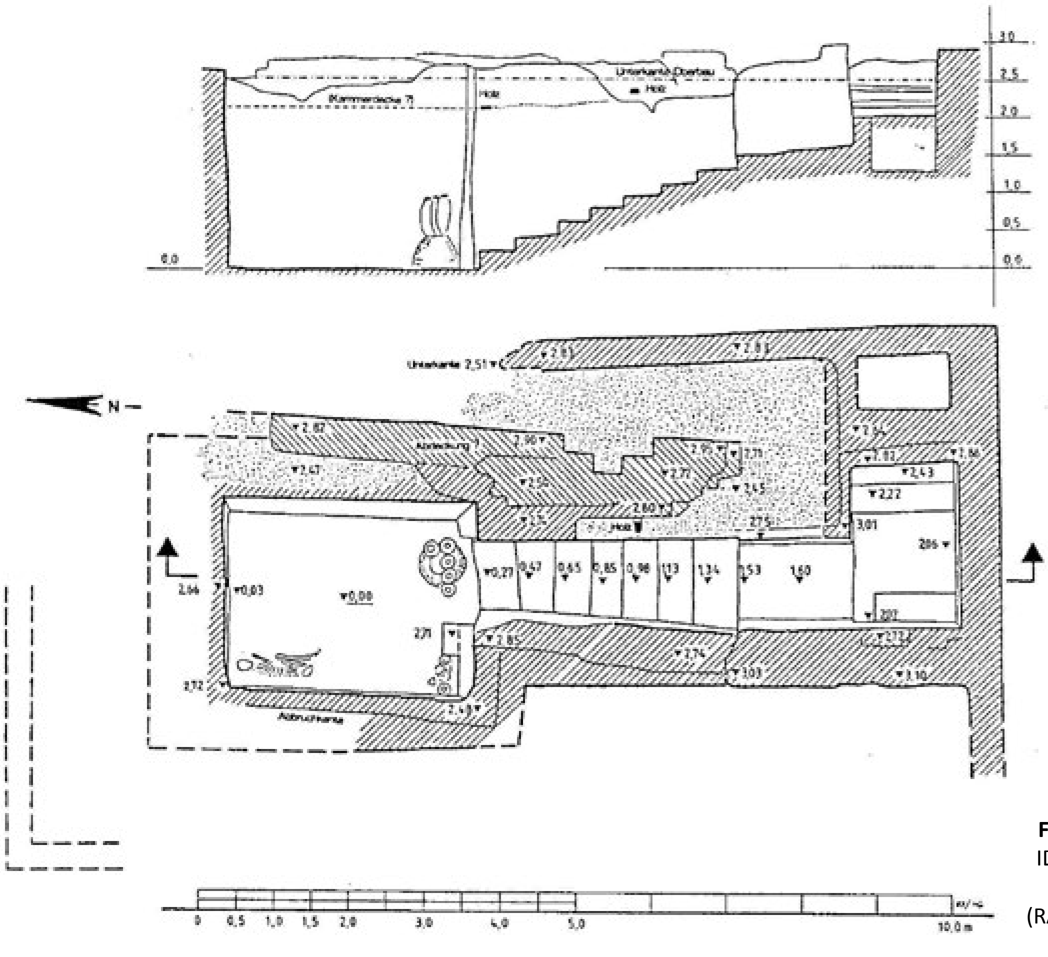


Figure 120 The Type ID Mastaba V at Abu Ghurab.
(Radwan 1991, Abb. 2)

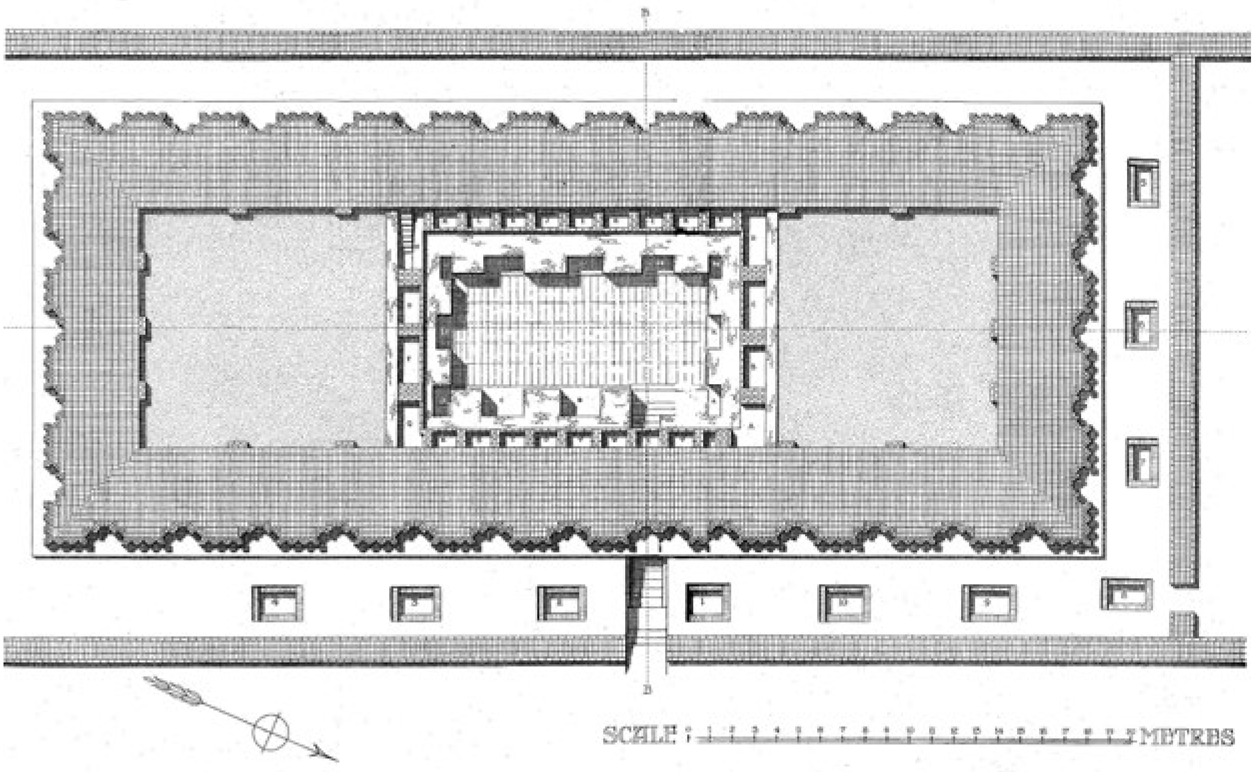


Figure 121 The Type ID tomb S 3506 at Saqqara, plan view.
(Emery 1958, pl. 40) Courtesy of the Egypt Exploration Society.

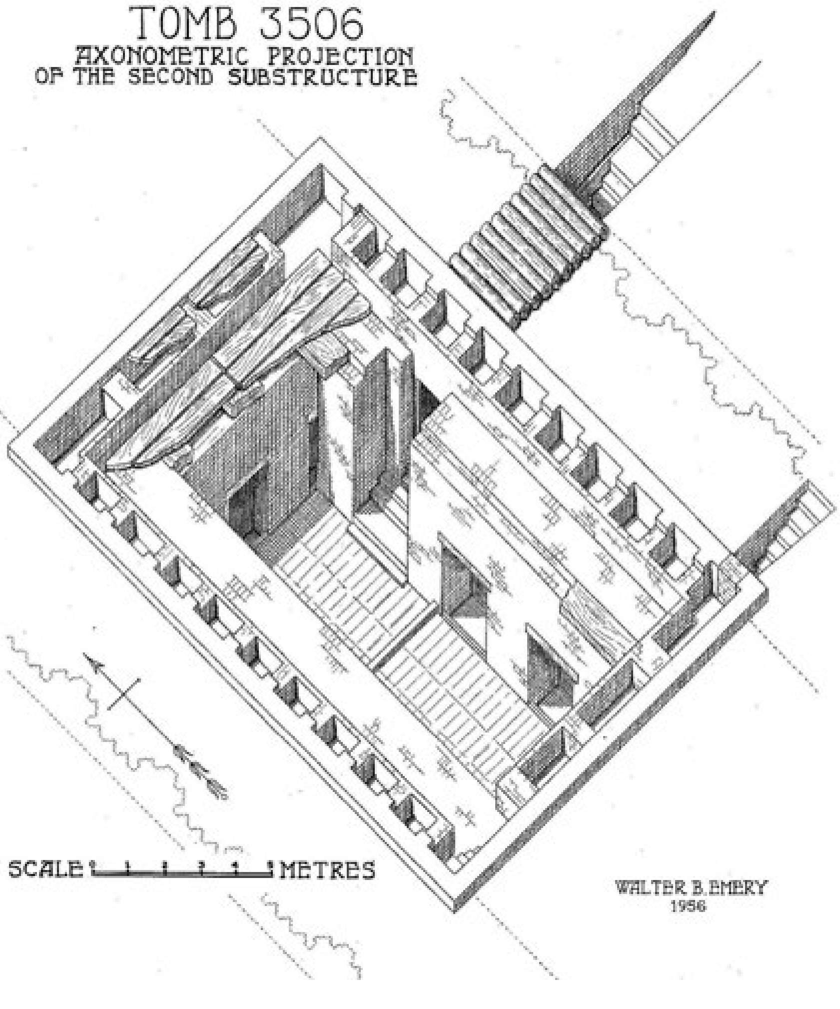


Figure 122 The Type ID tomb S 3506 at Saqqara, axonometric view.
(Emery 1958, pl. 43) Courtesy of the Egypt Exploration Society.

earliest was S 3506 **[88]**,[663] which was built in two separate stages (Figs. 121–2).[664] Initially, it comprised of a large pit excavated 5.15 m into the rock and gravel. At its upper rim, a wide ledge was cut in the surface gravel, which was consolidated and made secure from tunnelling by a buttressed mud-brick wall. In the second stage, a massive brick inner structure 1.35–1.62 m thick was created to line the pit up to the level of the ledge that now supported wooden beams and a substantial planked roof,[665] which both defended the chamber and formed a foundation for the superstructure.[666] Despite their protection the tomb had been robbed in antiquity through the superstructure and the pit's wooden roof.[667]

A different approach was taken in the tomb of Hemaka, S 3035 **[89]**.[668] Following the precedent set by the aforementioned S 3507, its burial chamber's plan was smaller than that of S 3506. Unlike its centrally placed predecessors, in what seems to be an attempt to misdirect tomb robbers, the pit was positioned off centre beneath the south-east section of the superstructure (Fig. 123), and excavated through a 3.5 m thick layer of loose gravel,[669] 5 m down into the solid rock.[670] In the upper edge of the rock layer a ledge was cut and notched for large beams that supported a substantial wooden roof (Fig. 124). Around this rim, a 1–1.7 m thick brick wall was built that both consolidated the loose gravel and provided lateral protection. This rose beyond the surface to form part of a 7 m high shaft within the superstructure, which was probably backfilled with rubble (see 6.2.2).[671] Within the pit, three entrances led to 'satellite' chambers excavated in the rock, one of which Emery hypothesized was the burial chamber.[672] These would have been

(Emery 1949: 71).

[663] This can be assumed from jar seals found in the tomb that bear the names of the officials that owned the following two tombs to be discussed, namely Hemaka and Ankhka, who presumably supervised the installation of the grave goods in S 3506 (Emery 1958: 3, 37).

[664] Porter and Moss 1974-81: 446.

[665] Emery 1958: 38–44.

[666] Emery (1958: 41) also thought, from finds discovered at a later date, that the substructure of the tomb may have possibly been closed with an earth mound or stepped superstructure as in tombs S 3507 **[86]** and S 3038 **[91]**.

[667] Emery 1958: 37 and 46.

[668] Porter and Moss 1974-81: 440–2.

[669] Scaled dimension from drawing by Emery (1938: pl. II).

[670] Emery 1938: 6.

[671] Emery (1938: 7) seemed undecided about the roofing arrangements of the pit and speculated whether wooden beams could be strong enough to support a span of 9.5 m plus the shaft of rubble reaching to the superstructure's roof. Yet, the beams in tomb S 3506 spanned 11.7 m with no apparent difficulty (Emery 1958: 35–42); and the wooden beams in the tomb of Den at Abydos spanned 8.9 m and possibly supported a hidden mound of sand and a superstructure as well (Dreyer *et al.* 1998: 141–5). Although no indication remains of the roof's construction, the author sees no reason why either a double roof or a deep gravel fill as in the other tombs in the vicinity should not have been used. As La Loggia (2009: 180–3) points out, unlike current building practice where the tolerance for the deflection of beams is a concern for conservative modern structural engineers, the Egyptians seemed to have been rather confident with the empirical selection and use of wooden beams to support enormous loads.

[672] Although it seems equally probable that the large chamber performed

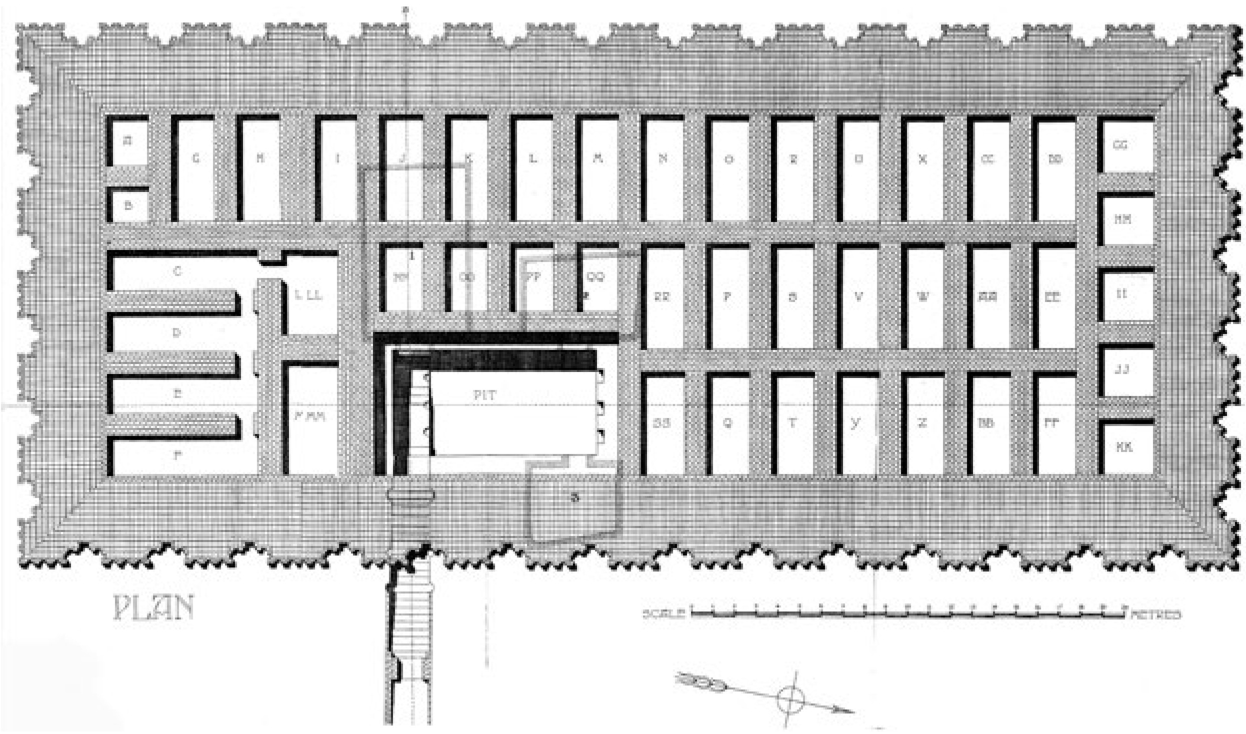


Figure 123 Plan of tomb S 3035 (Hemaka) at Saqqara – the notches for the roof beams are visible in the off-centre burial pit. (Emery 1938, pl. 1)

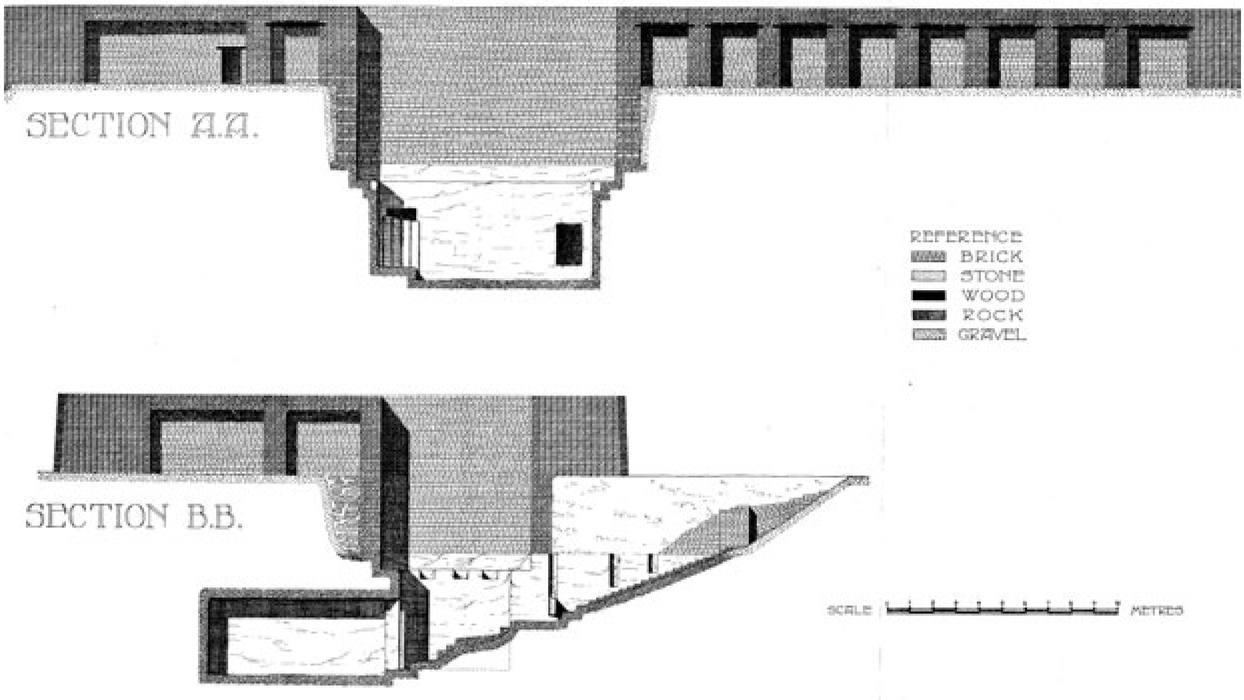


Figure 124 Sections through the tomb of Hemaka S 3035 showing the descending staircase, subterranean magazines and deep shaft rising through the superstructure.
(Emery 1938, pl. 2)

protected from above by approximately 5 m of rock and gravel strata.[673] However, the tomb was still robbed, and probably because of these strong defences, in this instance via its access route (see 5.1.2.1).[674]

Another tomb that incorporated an off-centre burial pit, perhaps for security reasons, is S 3036 **[90]**.[675] Towards the tomb's northern end, a large stepped pit was excavated through the 3.5 m deep gravel layer and within its base, at 90° to the axis of the mastaba, a rectangular burial chamber was dug 3 m into the bedrock beneath (Fig. 125). Within the main pit, 0.7 m thick brick liners both consolidated the gravel and offered lateral protection, but around the burial chamber's rim, 1.2 m thick mud-brick walls were built that rose up into the superstructure,[676] like those in the tomb of Hemaka (Fig. 126), which formed a kind of shaft. The chamber was then closed by a 0.14 m thick wooden roof; over which large beams were set close together to permit mud-bricks to be laid over them, which then may have supported a deep gravel fill in the 'shaft' (see 6.2.2).[677]

The deep gravel layer surrounding this tomb would have been vulnerable to lateral tunnelling and may be the reason why the burial chamber was placed well down within the rock strata. If we assume that the brick 'shaft' over the burial was filled with gravel, the combination of these defences would have provided an extremely effective barrier to attack from all directions. Despite these measures, like the majority of the tombs at Saqqara, the tomb had been totally plundered, and additionally set on fire.[678]

The next three tombs date to the reign of Adjib,[679] and differ widely in their architecture. The first of these is S 3038 **[91]**.[680] At first glance, its overall design appears to incorporate many new features, but in essence it began as the usual pit substructure covered by a superstructure, but with an unusual stepped façade on three sides. However, on two subsequent occasions it was altered, the phases of which ('B' and 'C') Emery analysed in his excavation report and drawings (Fig. 127).[681] The substructure in phase 'A' was a large rectangular pit that was cut through the surrounding 1.7 m thick layer of gravel, at the base of which a smaller burial chamber was dug 2 m into

this function, as in all of the other Type ID tombs at Saqqara, and the rock-cut chambers were perhaps magazines.

673 Scaled dimension from drawing by Emery (1938: pl. II).

674 Emery (1938: 7) noted that the robbers were obviously so daunted by the tomb's defences that they ended up taking the easiest option, which in this instance meant working their way down the staircase and breaking through the portcullises.

675 Porter and Moss 1974-81: 442.

676 Scaled dimensions from drawing by Emery (1949: pl. 15).

677 Emery 1949: 71–5.

678 Emery (1949: 75) reported that the tomb's original excavator Firth had discovered a large quantity of burnt wood during his work on the tomb in 1930.

679 For the dating of each tomb, see the discussions of Nebitka S 3308 **[91]** (Emery 1949: 92), tomb X **[92]** (Hendrickx 1996: 60), S 3338 **[93]** (Hendrickx 1996: 60).

680 Porter and Moss 1974-81: 442.

681 See Emery 1949: 83–92.

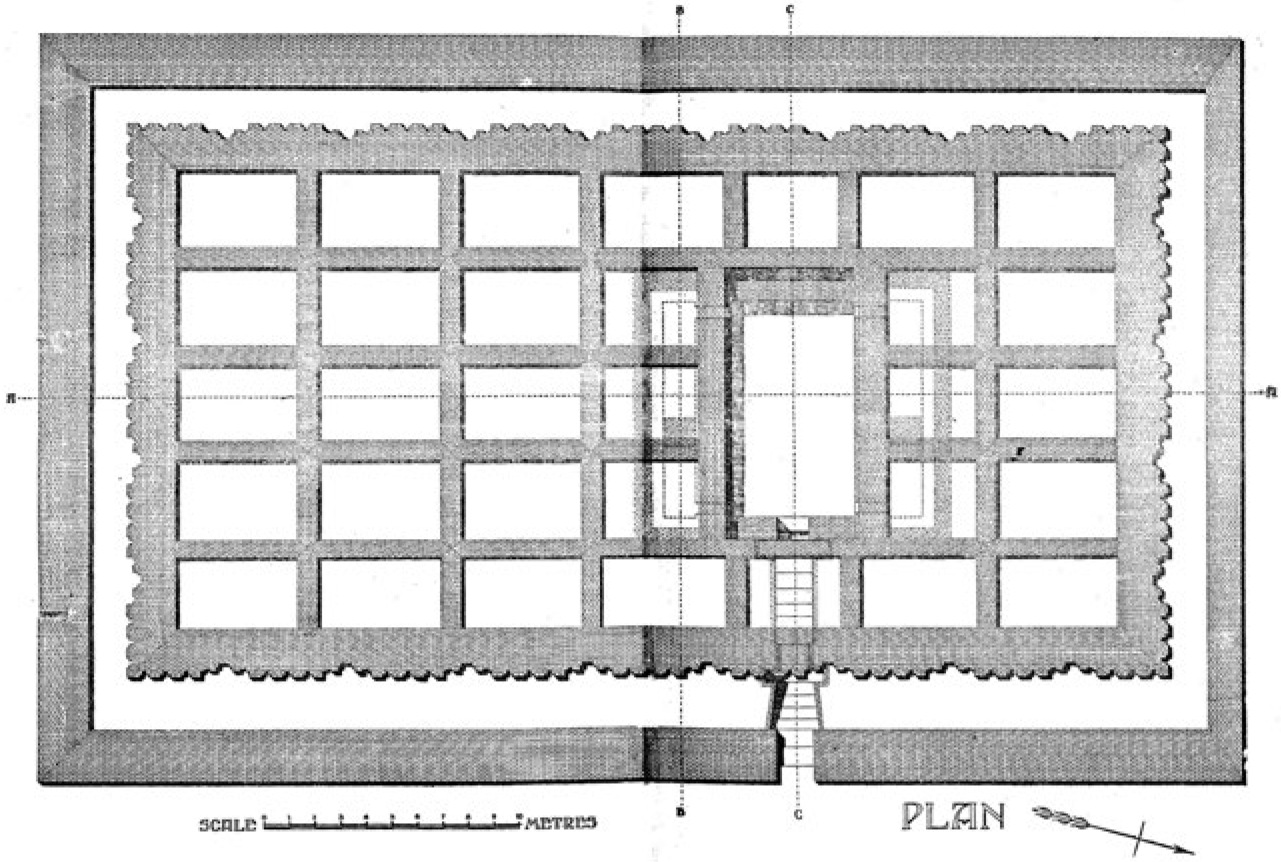


Figure 125 Tomb S 3036 (Ankhka) at Saqqara showing the off centre burial chamber. (Emery 1949, pl. 14)

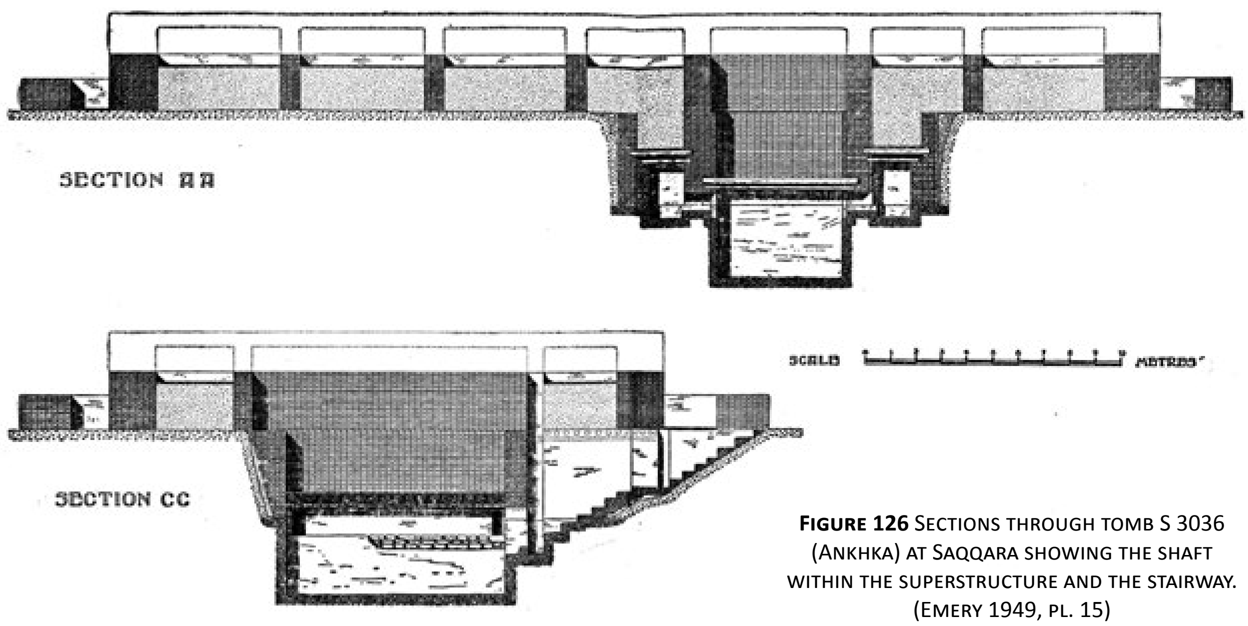


Figure 126 Sections through tomb S 3036 (Ankhka) at Saqqara showing the shaft within the superstructure and the stairway. (Emery 1949, pl. 15)

the rock.[682] Mud-brick walls then lined the larger pit to consolidate the gravel, provide lateral defence and act as a foundation for the overlying superstructure. The space thus created was then subdivided by two substantial cross-walls at either end of the upper edge of the burial chamber pit that ran up into the superstructure and created a 'shaft' over the chamber and magazines at either end.[683] The chamber was then covered with a timber roof just

[682] Scaled dimensions from drawing by Emery (1949: pl. 22).

[683] Each of these magazines were lined with a 'U shaped' platform/shelf and in the northernmost, grain 'bins' were built into this structure (Emery 1949: 85–6).

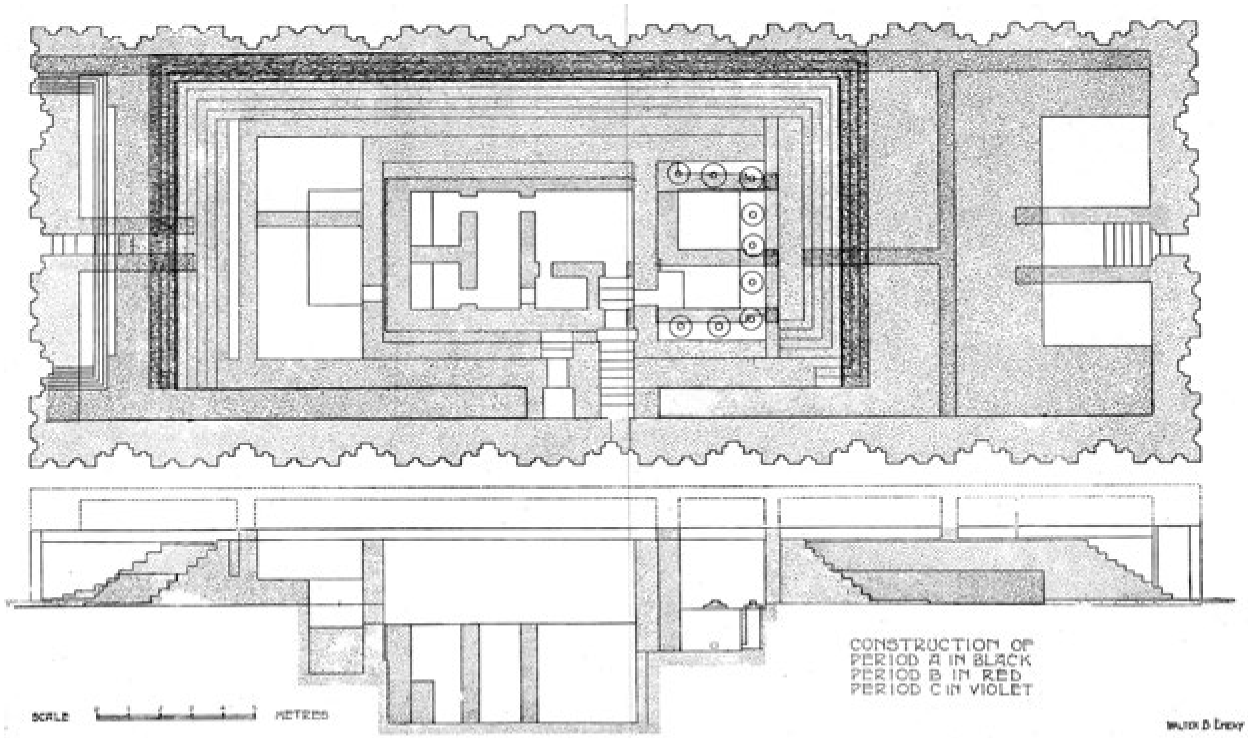


Figure 127 The construction phases of the Type ID tomb S 3038 (Nebitka) at Saqqara.
(Emery 1949, pl. 21)

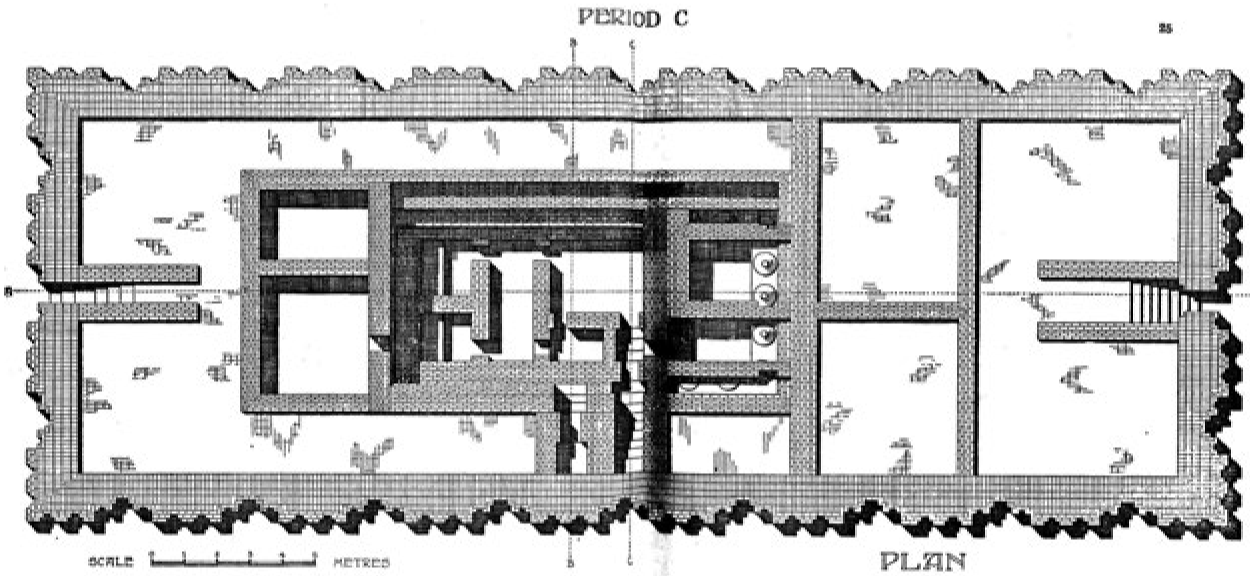


Figure 128 The final plan of tomb S 3038 (Nebitka) in phase 'C'.
(Emery 1949, pl. 25)

below ground level within the 'shaft' that also formed a floor for an upper magazine located in the body of the superstructure.[684] By the time that the final phase 'C' of the tomb was completed, in addition to many above ground alterations (see 6.2.2), the burial chamber had been lined with an extra layer of mud-brick (Figs. 128–9), which would have further improved its lateral security,[685] but left it still comparatively vulnerable from above.

Of a far less complex design was the smaller tomb X **[92]**. Its simple burial chamber was cut through the gravel and rock to a depth of 4.9 m and aligned along its superstructure's axis (Fig. 130). A surrounding ledge on three sides, set 3.35 m above the burial chamber

[684] There are similar twin-storied tombs at Helwan discussed below.

[685] Emery 1949: 88–91.

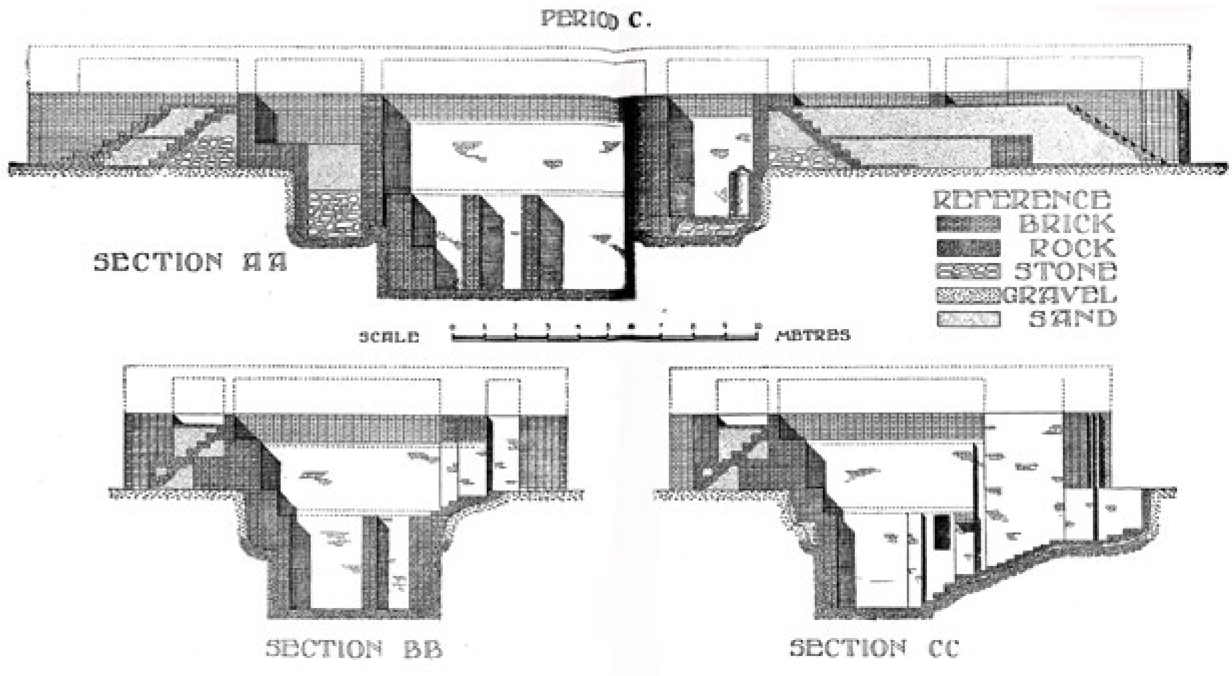


Figure 129 Section drawings of the final layout of tomb S 3038 (Nebitka) in phase 'C'.
(Emery 1949, pl. 25)

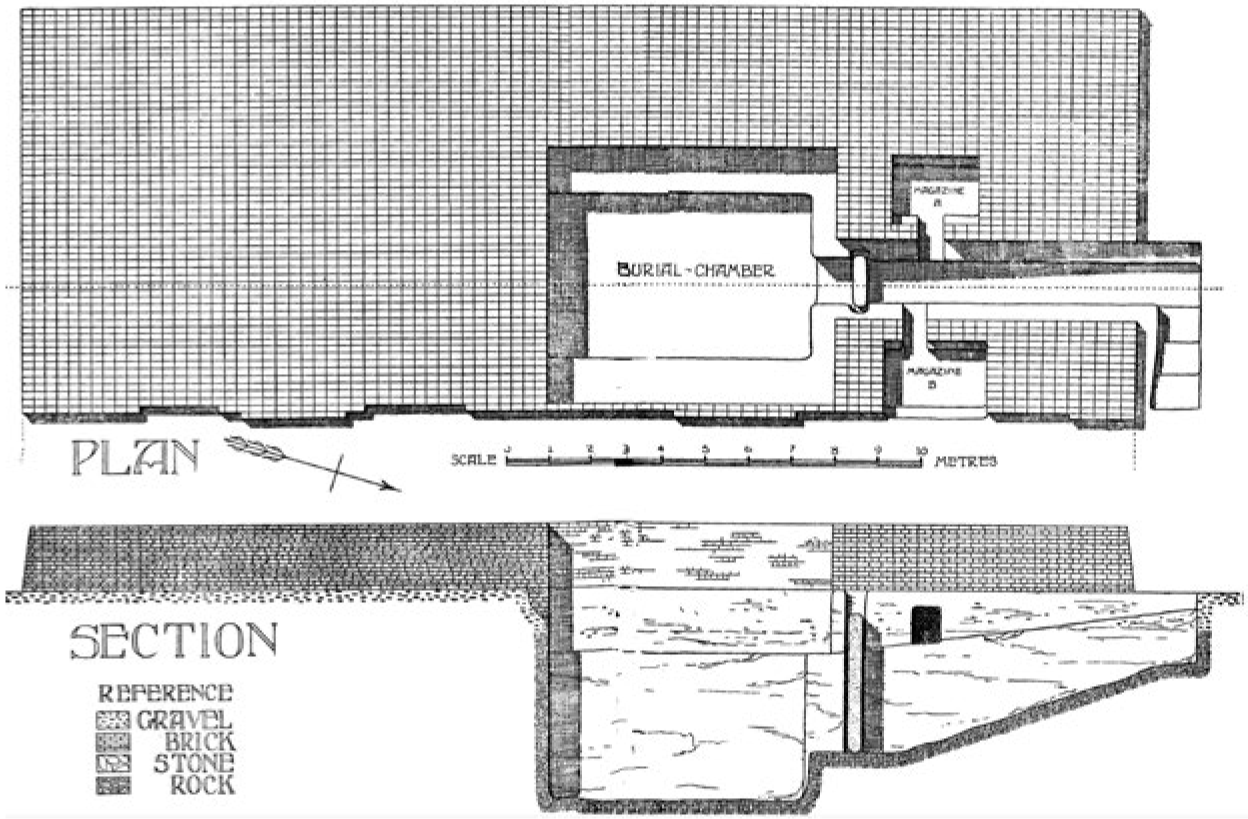


Figure 130 Tomb X at Saqqara showing the deep rock-cut pit and solid mud-brick mastaba.
(Emery 1949, pl. 43.)

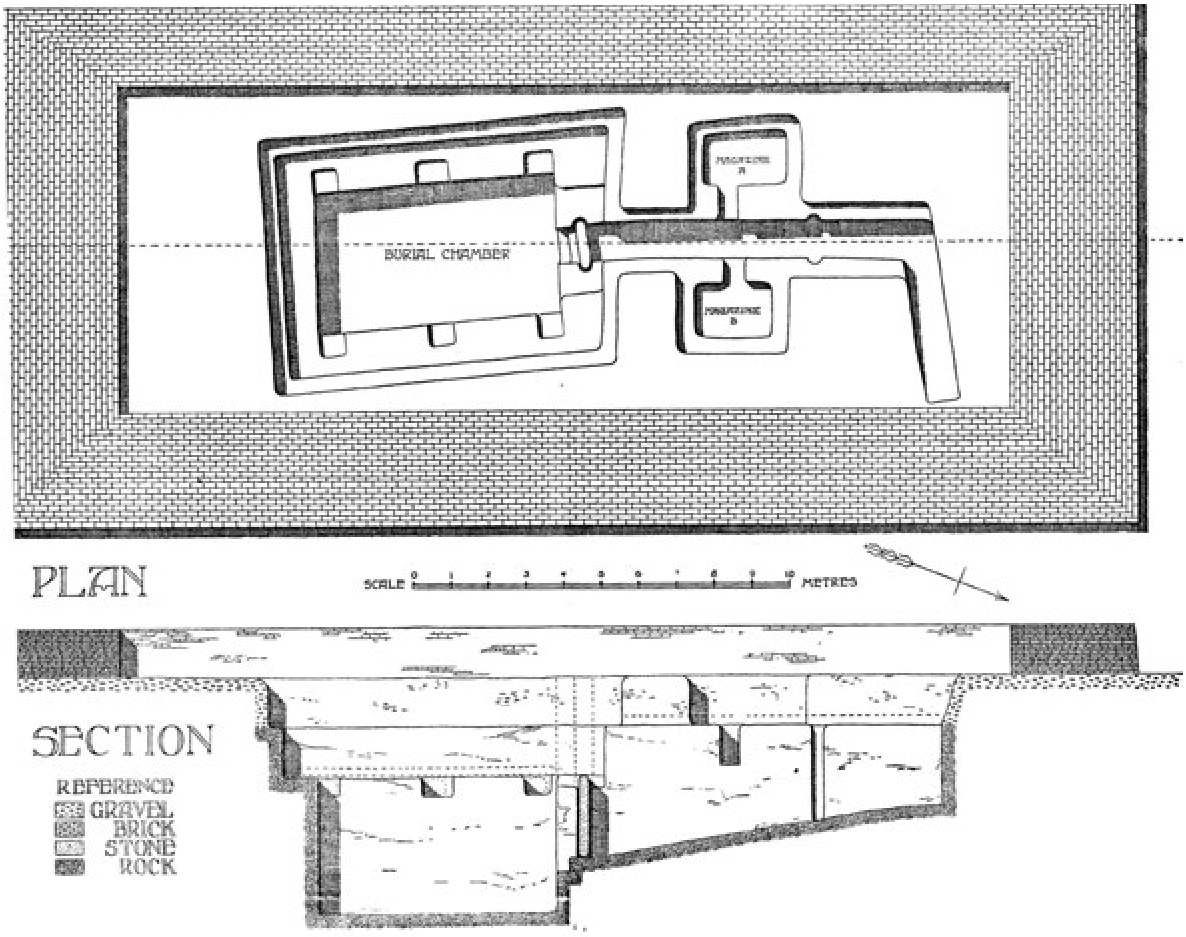


Figure 131 The Type ID tomb S 3338 at Saqqara, notably for the first time its descending access slope was entirely concealed under the superstructure.
(Emery 1949, pl. 55)

floor, probably supported a wooden roof.[686] Unusually, there seem to have been no separate mud-brick liners to consolidate the gravel layer and give lateral protection, but it would appear from Emery's drawing that the solid mud-brick mastaba may have been built down into the recess and performed that function instead.

The burial chamber of S 3338 **[93]** was broadly similar to that of tomb X and aligned in the same direction (Fig. 131). Around the top of the unlined pit, which was sunk through the gravel and rock to a depth of 6.25 m, a ledge intended to support a wooden roof had been cut at 3.55 m from the floor, just below the level of the gravel. Notches carved in this ledge probably supported huge wooden beams that bore both the roof and the enormous weight of the rubble that filled the rest of the pit and superstructure,[687] and possibly obviated the need for mud-brick retaining walls.

The last three tombs all date to the reign of Qa'a,[688] and although their burial chambers are similar to those in S 3338 and S X, unlike them they are all orientated at 90° to their superstructures, thus lessening their pits' cross section and exposure to lateral tunnelling on what would be the most vulnerable edge under an axially orientated superstructure.[689] The burial chamber in tomb S 3500 **[94]**[690] was sunk through the 2 m layer of gravel and 3.2 m into the rock.[691] A ledge was cut in the rock that supported a masonry wall, which was intended to consolidate and reinforce the gravel against lateral attack, and probably support a wooden roof (Fig. 132). That the surrounding gravel stratum was indeed vulnerable is demonstrated by a robber's tunnel that ran through it from the east corridor of the enclosure and into the stone wall above the burial chamber.[692]

Nearby, the largest tomb in the cemetery is S 3505 **[95]**.[693] Its rectangular burial chamber was sunk 5.75 m down

686 Emery 1949: 109.
687 Emery 1949: 125–7.
688 The datings for each tomb are: S 3500 **[94]** (Emery 1958: 103); S 3505 **[95]** (Emery 1958: 5) and S 2105 **[96]** (Reisner 1936: 383).
689 The longest edge of a superstructure normally has the shortest distance to the burial chamber, as the ends are in many cases proportionally much further from the pit than the sides, see 6.2.
690 Porter and Moss 1974-81: 444.
691 Scaled dimension from drawing by Emery (1958: pl. 114).
692 Emery 1958: 99–104.
693 Porter and Moss 1974-81: 446.

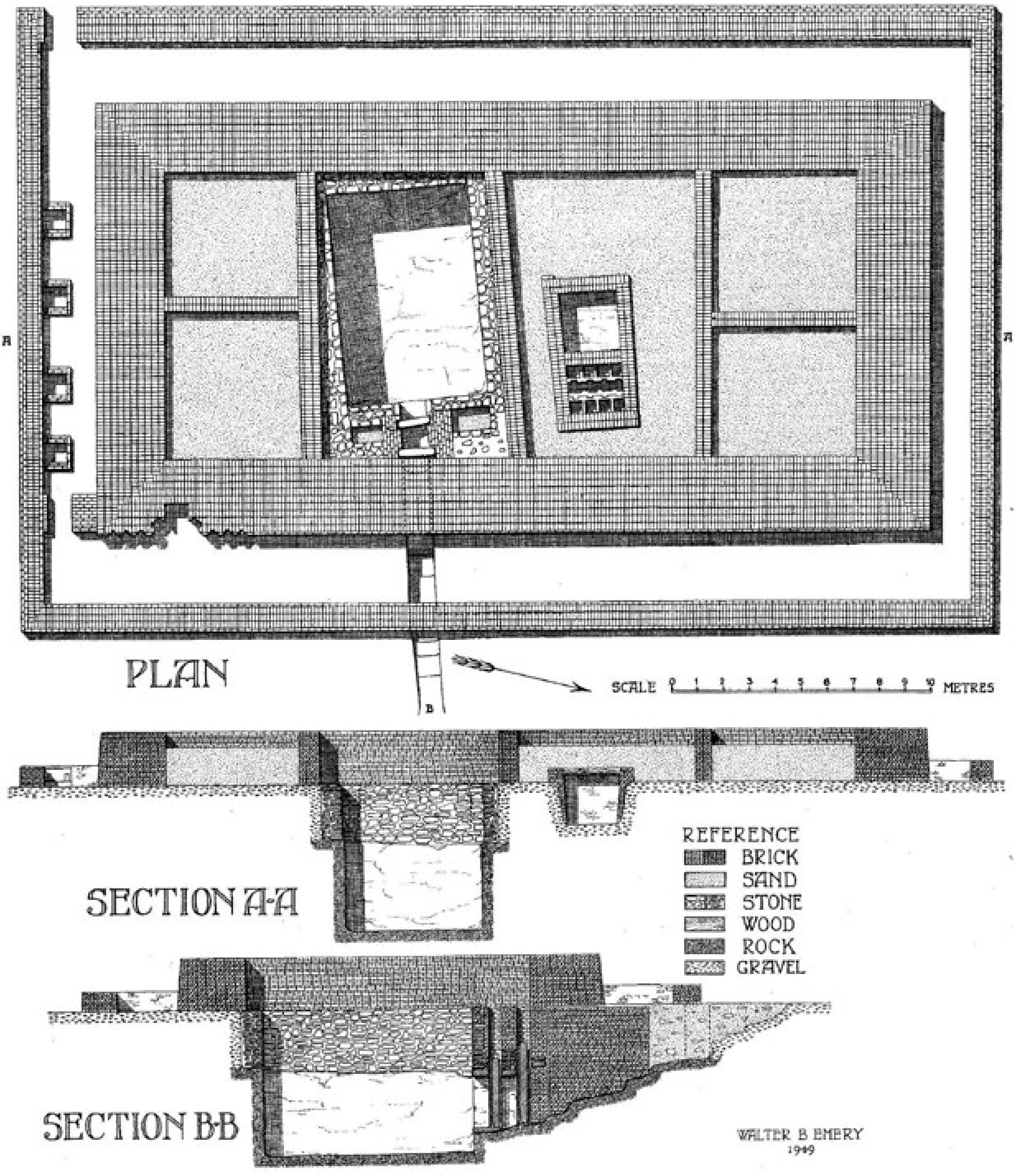


Figure 132 Plans and elevations of the Type ID tomb S 3500 at Saqqara. (Emery 1958, pl. 114) Courtesy of the Egypt Exploration Society.

through the gravel and bedrock (Fig. 133).[694] At high level in the rock, just below the gravel strata, notches and a recess were cut in the chamber to accommodate enormous 0.6 m square section wooden beams and a wooden roof (Fig. 134).[695] The 'planks' which formed this roof were found by Emery (Fig. 135) and were a remarkable 0.3 m thick × 0.9 m wide. These would have provided a significant layer of defence, as would the compacted rubble that filled the pit and superstructure core above them, but to no avail, as the tomb had been completely robbed and ravaged by fire in antiquity.[696]

[694] Emery 1958: 5–7.
[695] Emery (1958: 8–9) once again worried about the load bearing capabilities of these beams, a point which is discussed earlier, see note 671.
[696] Emery 1958: 10–1.

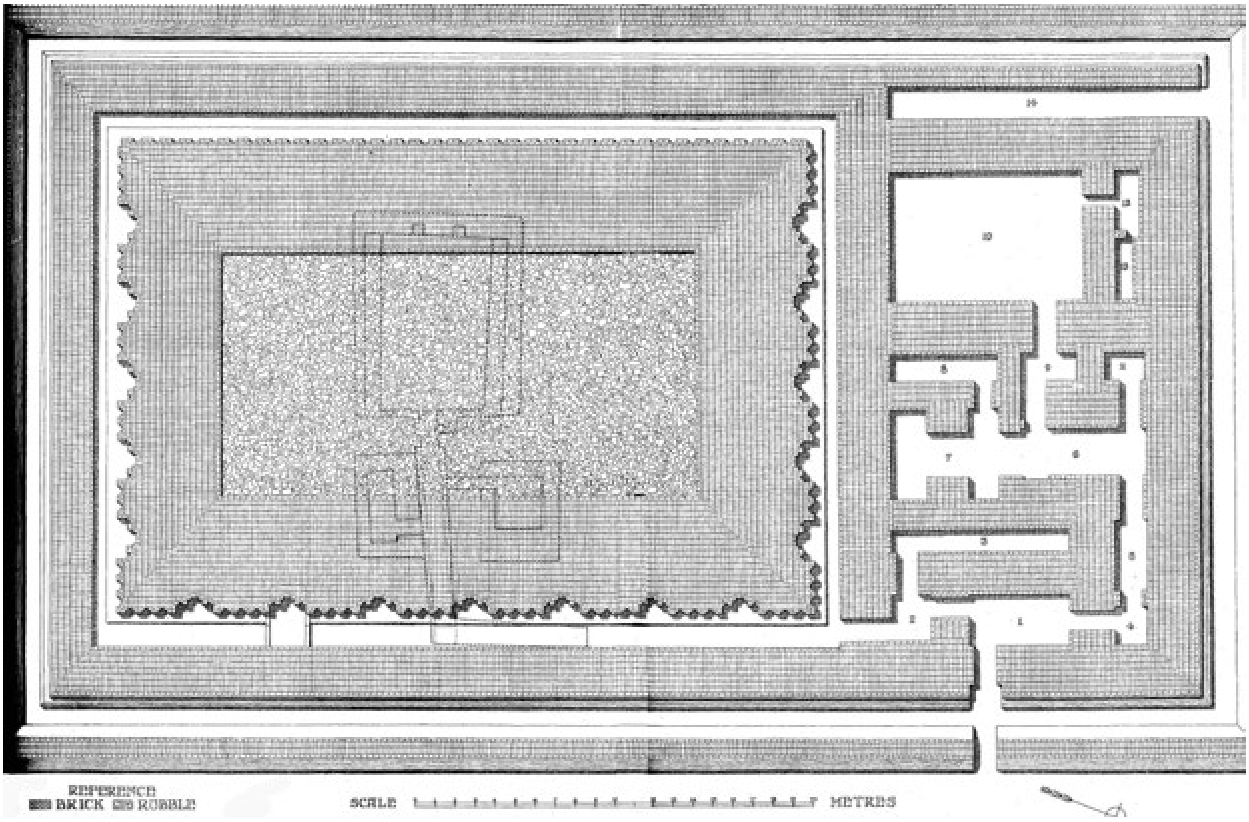
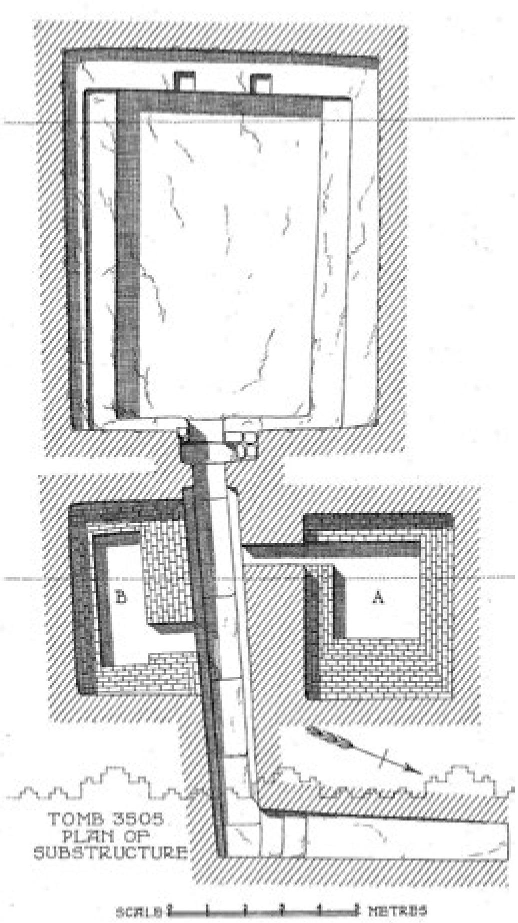


Figure 133 The plan of tomb S 3505 (Merka) at Saqqara.
(Emery 1958, pl. 2) Courtesy of the Egypt Exploration Society.



Finally, and less well documented than in Emery's excavations, Quibell also excavated nearby tomb S 2105 **[96]**, whose burial chamber took the form of a square pit, once roofed by 'timber baulks' that protected the chamber, and probably supported its superstructure's gravel fill.[697]

It is evident from these examples that in the majority of cases the tomb builders used the underlying strata of limestone rock to provide lateral security for their burial chambers and ensured that their roofs were located below or level with it. In addition, the reinforcement of the overlying gravel stratum with mud-brick or stone liners points to its innate susceptibility to lateral tunnelling. It also appears that by varying both the location and orientation of burial chambers and progressively reducing their exposed cross sections and plans that they were being made more difficult to locate. That these chambers remained vulnerable to attack from above, despite their superstructures, is demonstrated by the size of the roofs built to defend them.

[697] Quibell 1923: 19.

Figure 134 The subterranean chambers of S 3505 (Merka)
(Emery 1958, pl. 4) Courtesy of the Egypt Exploration Society.

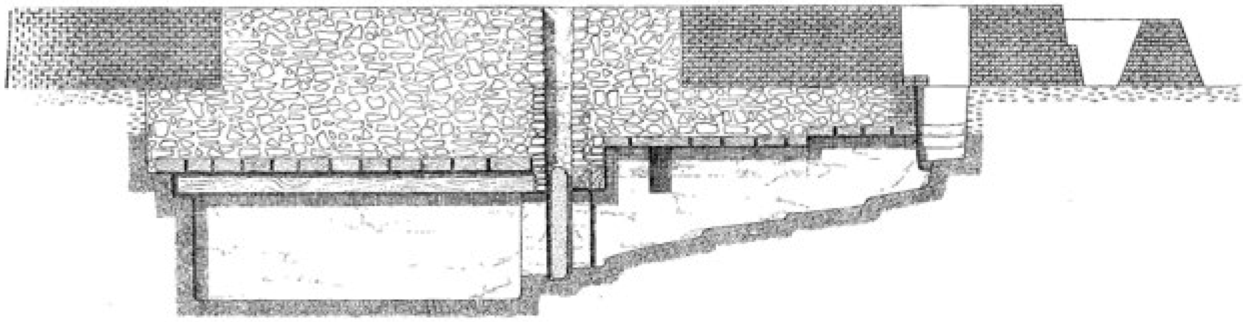


Figure 135 Section through tomb S 3505 (Merka) showing the staircase, portcullis and burial chamber roofed by strong beams and planks up to 30 cm thick.
(Emery 1958, pl. 3) Courtesy of the Egypt Exploration Society.

Helwan

The burial chambers of the Type ID tombs at Helwan vary widely in their architecture and size. Although it can be difficult to date many of these tombs accurately,[698] the majority of them can be broadly dated to Köhler's Naqada IIIC or IIICD.[699] Some are just gravel cut, some are mud-brick lined, and some, more famously, are lined or roofed with stone.

A tomb with minimal protection was 1.H.4 **[142]**, whose unlined gravel cut pit was provided with internal ledges to accommodate wooden beams that would have supported just a shallow roof and the tomb's superstructure (Fig. 136).[700] However, as with Type IC tombs, one way of obtaining greater overhead and lateral protection was to create a deep backfill, such as in the mid First Dynasty tomb 150.H.5 **[143]**,[701] which had a 2 m deep recessed roof supported by gravel cut ledges and wooden posts that supported a deep backfill (Fig. 137).[702]

Many Type ID burial chambers were brick lined to both consolidate the surrounding geology and provide lateral protection, then roofed as usual to protect them from above and support their superstructures,[703] for example, tombs 553.H.3 **[144]**, 559.H.2 **[145]**, 499.H.2 **[146]**, 701.H.3 **[147]**. Exceptionally, tombs 1371.H.2 **[148]** and 1502.H.2 **[149]** are notable for the strength of their liners, which in both cases were between 1–1.7 m thick (Figs. 138–9).[704] In addition, deep recessed roofs were

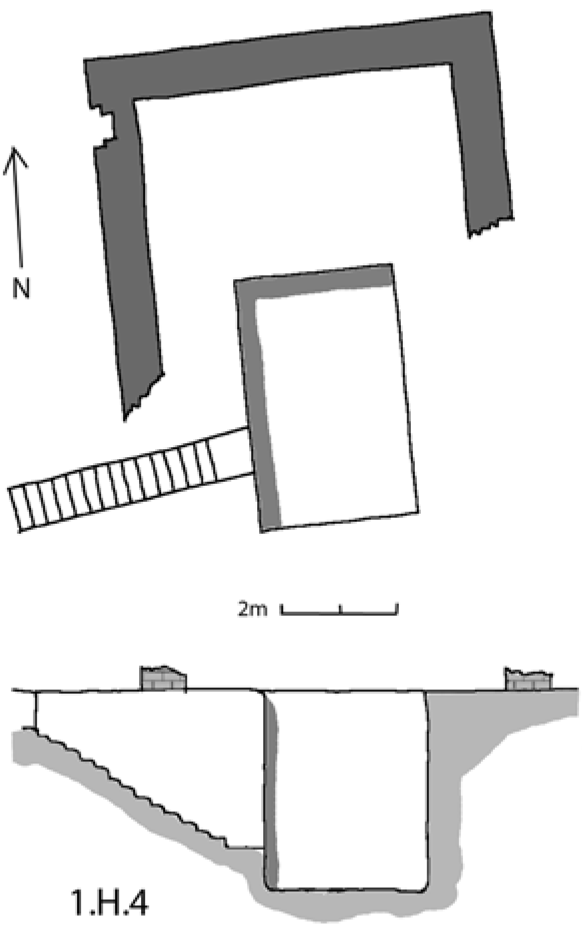


Figure 136 The unlined gravel cut pit and mud-brick superstructure of the Type ID Helwan tomb 1.H.4.
(Drawn by the author after Saad 1951, pln. 3)

[698] This is because unlike at Saqqara, there are a limited number of associated burial assemblages. However, more recent work by Köhler and Smythe (2004: *passim*) and Smythe (2004: *passim*) on establishing a ceramic corpus at Helwan is beginning to redress this situation. It is also possible to group the tombs roughly together on stylistic grounds; thus tombs with an entrance stairway at 90° to the main longitudinal axis of the burial chamber may be attributed to the reigns of Adjib or Semerkhet (Wilkinson 1996: 339–43) and those with flanking magazine chambers either side of the entrance route can loosely be ascribed to the reign of Qa'a (Kaiser 1998: 83; Köhler 2005: 26).

[699] Köhler 2008b: 125, Table 1. Köhler (2004: 300) adopts the term Naqada IIICD for tombs of an indeterminate date at Helwan, as she explains: 'where no decision can be made on an earlier or later stage for tombs within this transitional phase, we refer to them as belonging to Group IIICD.'

[700] Saad 1951: 5–6, plan 3.

[701] Dated by pottery from a secondary burial on the tomb's staircase (Köhler 2005: 26).

[702] Saad 1951: 28–9. La Loggia (2009:182) suggests, however, that rather than roof supports the supporting posts may actually have been associated with the construction of wooden compartments of some form.

[703] Köhler 2008b: 116. Without specific information and dimensions to the contrary in Saad's (1947, 1951 and 1968) publications, the author is making an assumption that they followed the usual pattern.

[704] Scaled dimensions from drawing by Saad (1947: pls. XXXVIII and

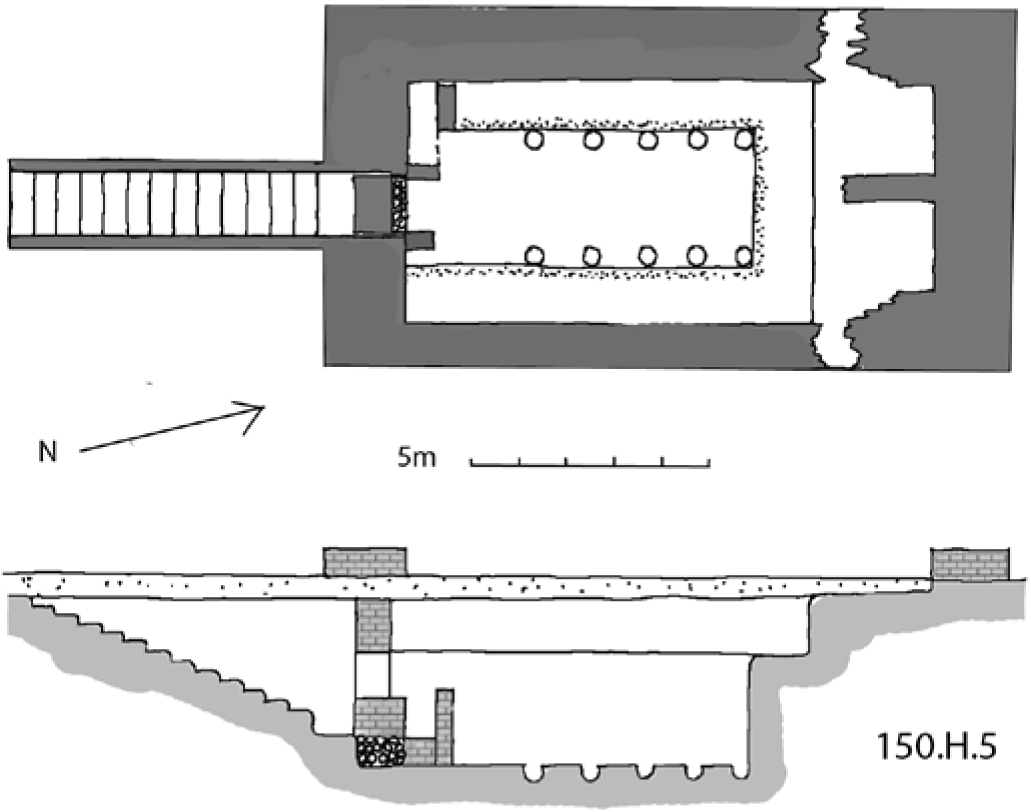


Figure 137 The unlined pit of the Type ID Helwan tomb 150.H.5 and its superstructure.
(Drawn by the author after Saad 1951, pln. 15)

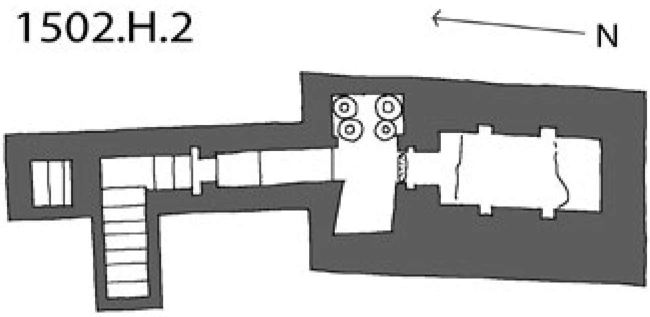


Figure 138 The Type ID Helwan tomb 1502.H.2
(Drawn by the author after Saad 1947, pl. XL)

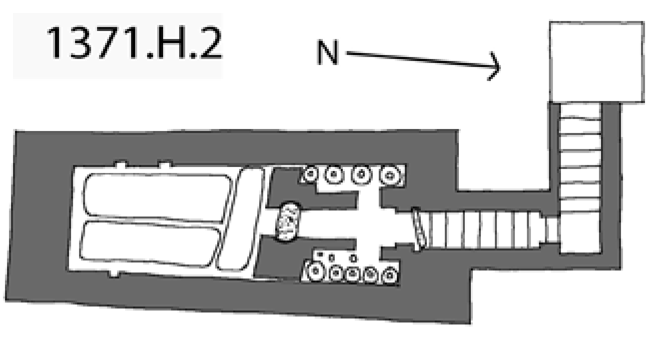


Figure 139 Tomb 1371.H.2 at Helwan, with its stone slab floor.
(Saad 1947, pl. XXXVIII)

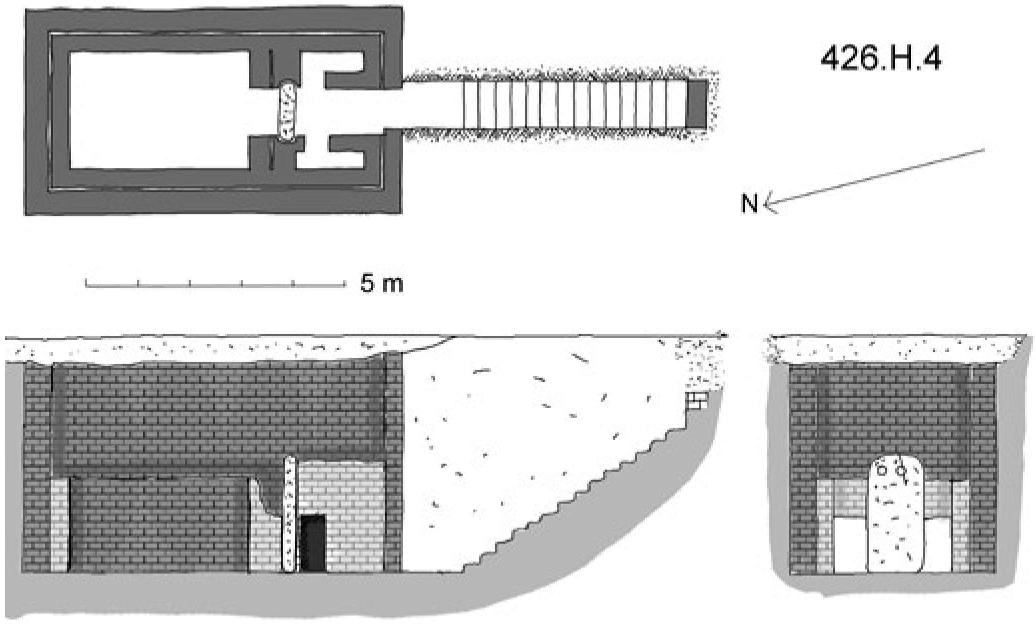


Figure 140 The Type ID tomb 426.H.4 at Helwan, with its second internal brick liner that supported a deep recessed roof and backfill. (Drawn by the author after Saad 1951, pln. 10)

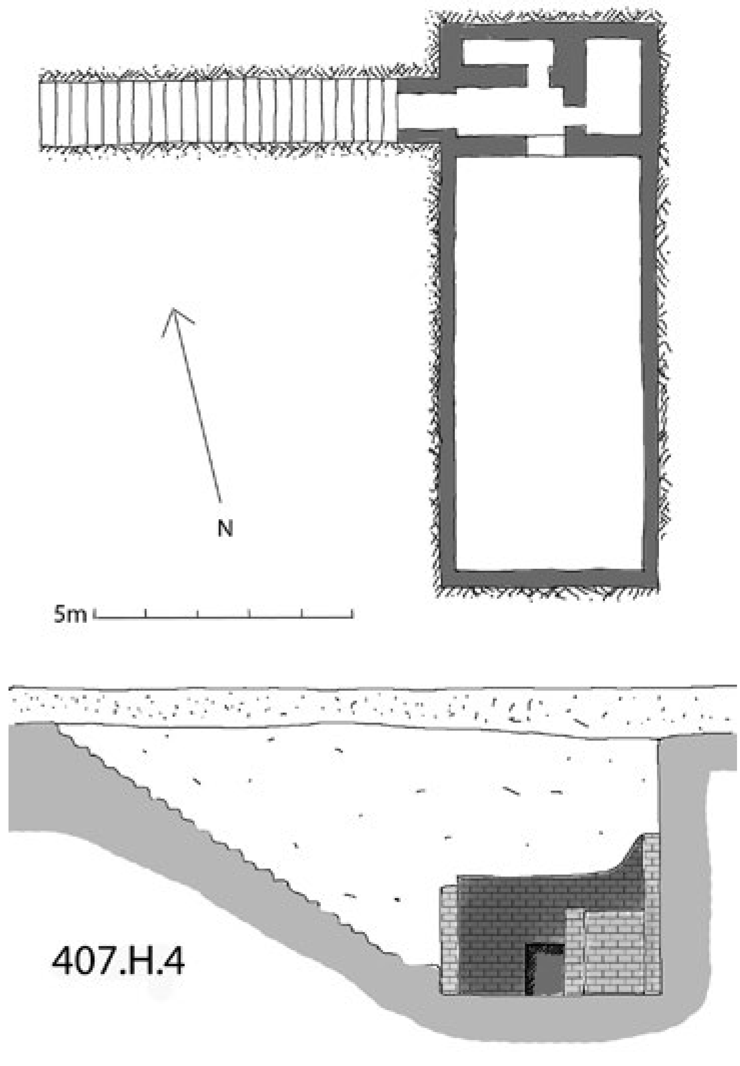


Figure 141 The deep substructure of the Type ID tomb 407.H.4 at Helwan. (Drawn by the author after Saad 1951, pln. 9)

also incorporated in some tombs for further protection, like that in 426.H.4 **[150]**, where a second mud-brick liner was built 2.5 m down from the surface that supported a wooden roof and a deep rubble backfill (Fig. 140).[705] This principle was taken further in the defences of tomb 407.H.4 **[151]**. Although its 5.9 m deep pit was only lined with thin mud-brick walls and wooden planks (Fig. 141),[706] it had a 3.9 m deep recessed roof that would have contained around 121 m^3 of backfill;[707] offering it an unusually high level of protection from overhead and lateral attack.

As with Type IC tombs, a few burial chambers had double roofs, for example 355.H.4 **[152]**, whose 2.9 m deep lined pit had two layers of 0.3 m thick mud-brick liners to support roofing beams (Fig. 142), one set at 1.7 m from the floor the other 0.7 m higher. The lower roof was possibly packed with a layer of rubble or used for storage, and the upper perhaps supported a 0.5 m thick layer of roof and backfill.[708]

In addition, some tombs at Helwan also had several levels to their substructures,[709]

XL).

[705] Saad 1951: 12–3.

[706] Saad 1951: 11–2.

[707] Even if it is assumed that this was just desert sand or loose gravel, bearing in mind the bulk density of either is around 16 kN/m3 (Cobb 2004: 36), this backfill would weigh around 1950 tonnes.

[708] Saad 1951: 8–9, plan 7.

[709] In a similar manner to S 3036 **[90]** and S 3038 **[91]** at Saqqara, discussed above.

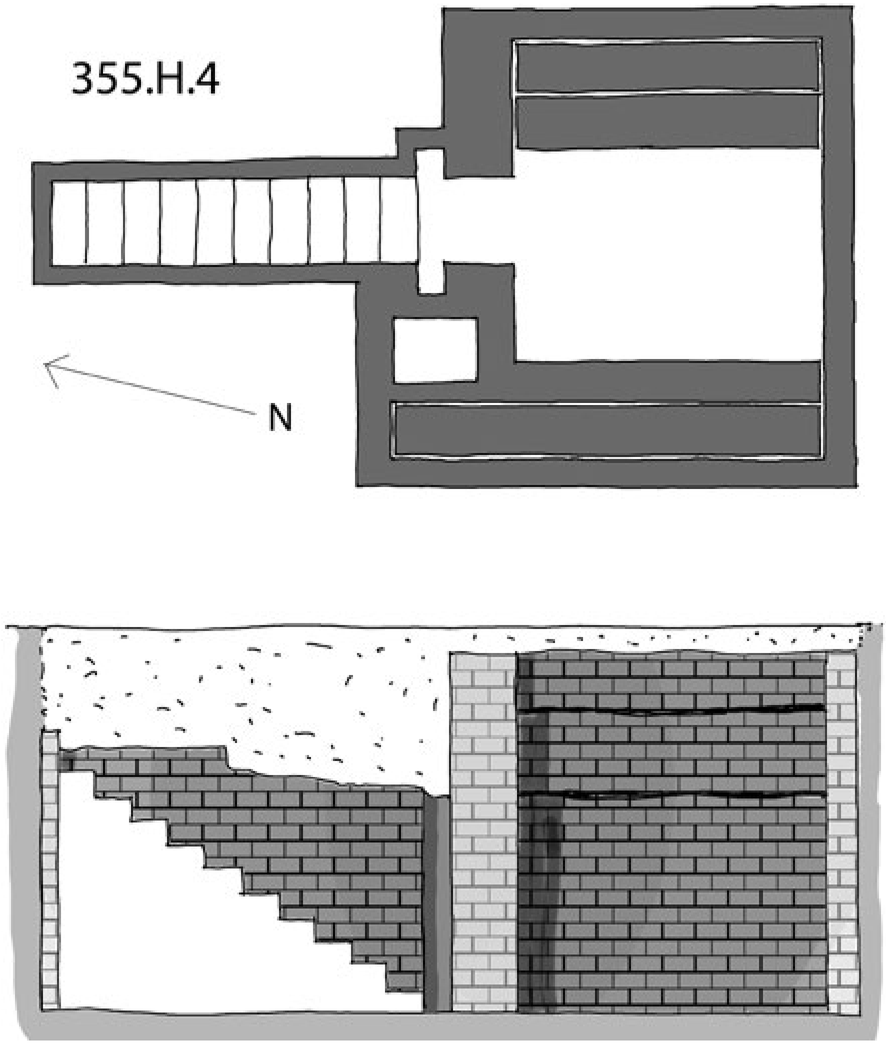


Figure 142 Tomb 355.H.4 at Helwan which had a double roof, the lower one supported on internal ledges.
(Drawn by the author after Saad 1951, pln. 7)

such as 1473.H.2 **[153]**.[710] Although details are limited it can be seen that the burial chamber was set at 90° to the axis of the superstructure and entered by its stairway at the same height as its two magazines, which were set ‘on a higher level’ (Fig 143). Presumably the whole was roofed as usual to form a foundation for the overlying mastaba, but despite these measures the substructure had been pierced by a robbers’ tunnel.[711] In a change of axis, the substructure of the contemporary 785.H.5 **[154]** was aligned in the same direction as its superstructure (Fig. 144). Its 5.5 m deep pit was lined with mud-brick walls around 1.1 m thick,[712] and at its northern end contained two layers of magazines; the whole being roofed with ‘huge blocks of timber’ that secured the pit and supported the superstructure.[713]

Another tomb with possibly two levels is the smaller 649.H.5 **[155]**. Its 5 m deep pit was lined with walls approximately 0.5 m thick,[714] and if the drawings are correct (Fig. 145), at the end of its short staircase, a ledge 2.3 m up from the base of the pit may have supported a roof directly over the burial chamber and its adjacent magazines.[715] This suggests either a second higher level internal magazine, or a very deep protective backfill. A similar high level staircase entry and ledge was found in tomb 680.H.5 **[156]**, which may have taken a comparable approach.[716]

[710] Incorrectly labelled in some of the publications by Saad as 1374.H.2 and corrected by Köhler (2008b: n. 4) from his field diary.
[711] Saad 1947: 110.
[712] Scaled from elevation drawing by Saad (1969: pl. 9).

[713] Saad 1969: 20–2.
[714] Scaled dimension from drawing by Saad (1951: Plan 16).
[715] Saad 1951: 41, plan 16.
[716] The interior of these last two tombs with high level staircases opens up a couple of possible scenarios regarding their burial chambers’ architecture. Firstly, they were just used as construction stairways,

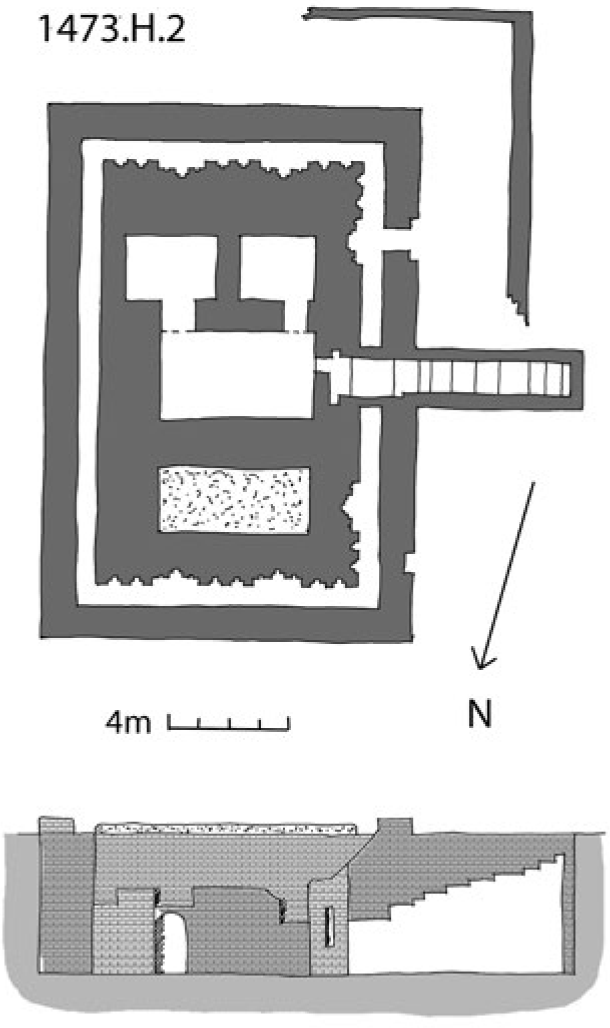


Figure 143 The Type ID tomb 1473.H.2 at Helwan showing the raised magazine level on the south and the tomb's palace façade superstructure.
(Drawn by the author after Saad 1947, pl. XXXIX)

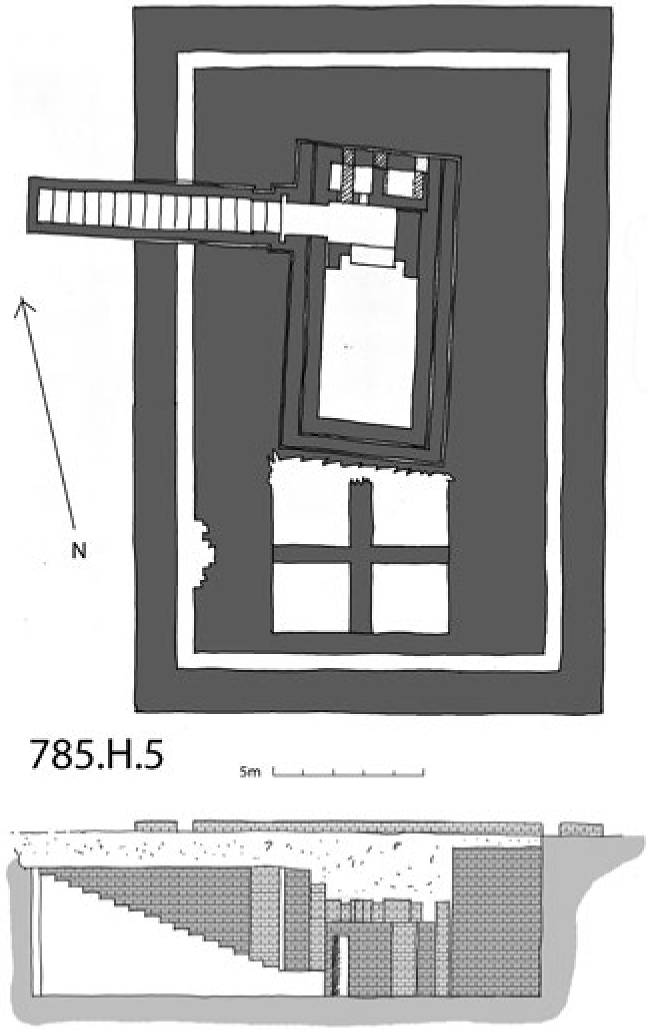


Figure 144 Helwan tomb 785.H.5 with its second storey of magazines.
(Drawn by the author after Saad 1969, pl. 9)

Many Type ID burial chambers at Helwan were reinforced with stone for additional security.[717] Amongst these, 385.H.4 **[157]** is exceptional for the size of its defences.[718] Within a 4.15 m deep pit the chamber was lined with enormous limestone orthostats set on their longest edges (Fig. 146). These were 4 m long × 2 m wide × 0.4 m thick at the narrow ends, and on the longer sides comparable slabs were used, plus shorter sections to fill the gaps. Remarkably, the larger slabs would have weighed between 5.44–8.32 metric tonnes each.[719] A ledge high up on either side of the pit may have supported a stone slab roof and the remainder was presumably backfilled with approximately 1.8 m of rubble and levelled, then probably protected by a superstructure.[720] In spite of the enormous investment in these precautions, the tomb was still robbed via a tunnel dug in the gravel, which ran under the roof level and through a stone slab into the chamber (Fig. 147).[721]

and that after the burial was installed via the staircase, the lower level would have been immediately roofed over and the deep pit that remained filled with at least a couple of metres of rubble. In this case, the burial would have to have been made before the mastaba was built. Or alternatively, there were two internal layers in the burial pit. The lower one for the burial itself, which was either intended to be filled in or covered over with some form of floor after the burial was made, leaving the upper space as a magazine, which was then roofed over and covered with the superstructure. The stairs in this scenario, used to both deliver the body and the grave goods after the tomb was finished. The first option would undeniably have been the more secure; the second would have provided additional storage for grave goods.

[717] A view not shared by Wood (1987: 62) who considered that stone was selected at Helwan for economic reasons as a replacement for the more desirable wood found in royal tombs, but added a postscript that 'a desire for security cannot be discounted'.

[718] This tomb was discussed by Wood (1987: 65–6), who as Köhler (2005: 27) points out, had mistakenly dated it to the late Second Dynasty.

[719] This figure is based upon limestone weighing 1.7 to 2.6 metric tonnes per cubic metre (Arnold 1991: 28).

[720] Saad 1969: 30.

[721] Saad 1951: 9–11.

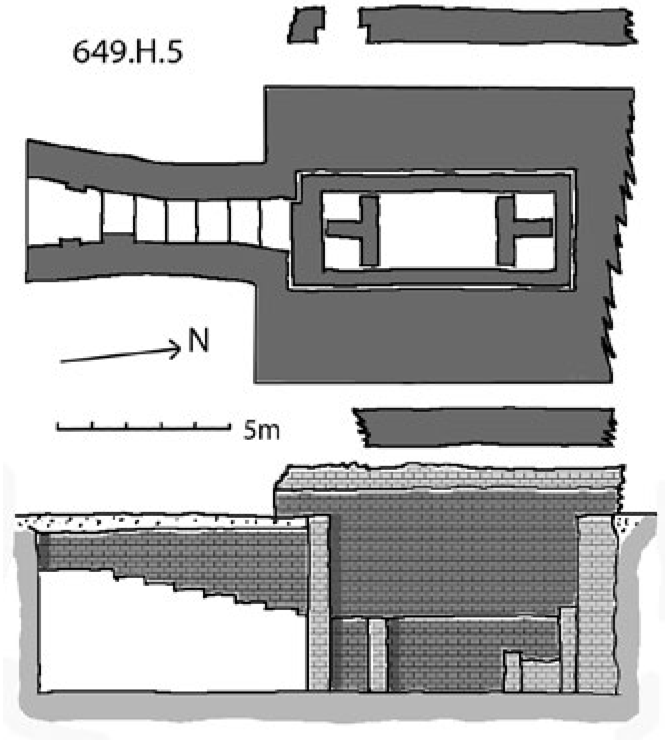


Figure 145 Tomb 649.H.5 at Helwan with its high level staircase leading to the top of the burial chamber and magazines. (Drawn by the author after Saad 1951, pl. 16)

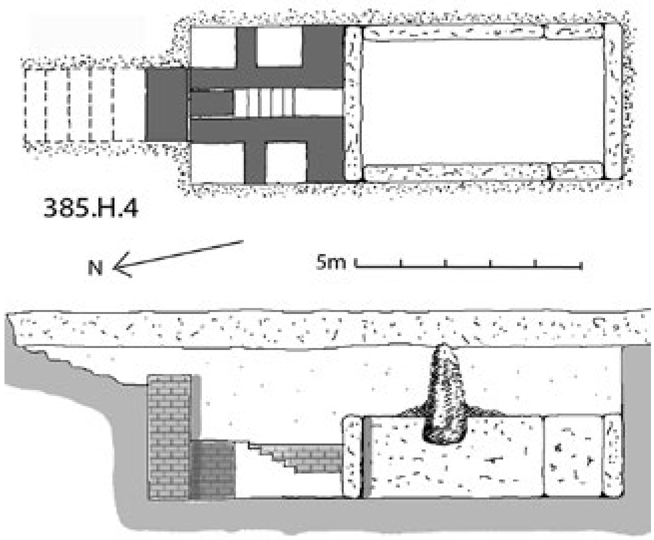


Figure 146 The Type ID stone lined tomb 385.H.4 at Helwan with its 0.4 m thick stone slab liner. (Drawn by the author after Saad 1951, pln. 8)

One of the finest examples of the use of stone as a burial chamber's 'armour' is 40.H.3 **[158]**,[722] which has been recently re-excavated by Köhler (Fig. 148).[723] Within

Figure 147 The stone lined burial chamber of tomb 385.H.4 with its enormous limestone orthostats. The robbers' passage can be seen on the left side of the pit. (Saad 1969, pl. 17)

a pit dug in the surrounding strata of sand, gravel, clay and silt, the cuts were lined with a 0.63 m thick layer of masonry on three sides,[724] which offered a first layer of lateral protection. Against these walls, large stone slabs, the greatest of which is 1.45 m wide × 2.35 m high × 0.26 m thick, were leant and the entrance fitted with enormous 1–1.3 m wide × 2.6 m high × 0.4 m thick stone jambs.[725] It is possible that a stone roof closed the pit, but it is more likely to have been wooden beams covered with mats, mud-bricks and around 100 m^3 of rubble backfill to support the superstructure.[726] However, despite these lavish defences, the tomb had been plundered, and there is evidence that robbers may have gained entry into the adjacent antechamber via its stone walls.[727]

Another similar stone lined tomb was 1.H.3 **[159]**. Inside its deep gravel cut pit, the burial chamber, which was lined with 0.6–1.3 m thick mud-brick walls, was clad with stone slabs approximately 2.7 m high × 1.5 m wide × 0.2 m thick (Figs. 149–50). Just above these, large wooden beams supported a planked roof that held up approximately 1.7 m of gravel backfill,[728] and supported the tomb's superstructure.[729]

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722 For the original publication of the tomb, see Saad 1951: 164–66, Pls. LXII and LXIX–LXX.

723 Köhler 2005: 20–30. Köhler (2008b: 121) renumbers the tomb Op.1/1 in her publication.

724 La Loggia 2008: Table 3.

725 Ingeniously, 0.2 m high stone retaining kerbs had been laid around the slabs at their base to prevent the stone slabs sliding inwards, which in turn were secured in place by a flagstone floor (Köhler 2005: 21–3).

726 Köhler 2005: 23 and 25.

727 Köhler 2005: 22.

728 Dimensions scaled from plans by Saad (1947: Pls. LXI).

729 Saad 1947: 163–4, pls. LXI, LXVII-LXVIII. In her article on stone tombs at Helwan, Wood (1987: 62) queries why wood was used to support the roof of this tomb, yet limestone used to line it. The explanation is probably that wood was capable of carrying a much heavier load than stone over a wider span. This is because timber will deflect under stress without breaking, whereas stone is brittle and will snap if overstressed. See La Loggia's (2009:182–

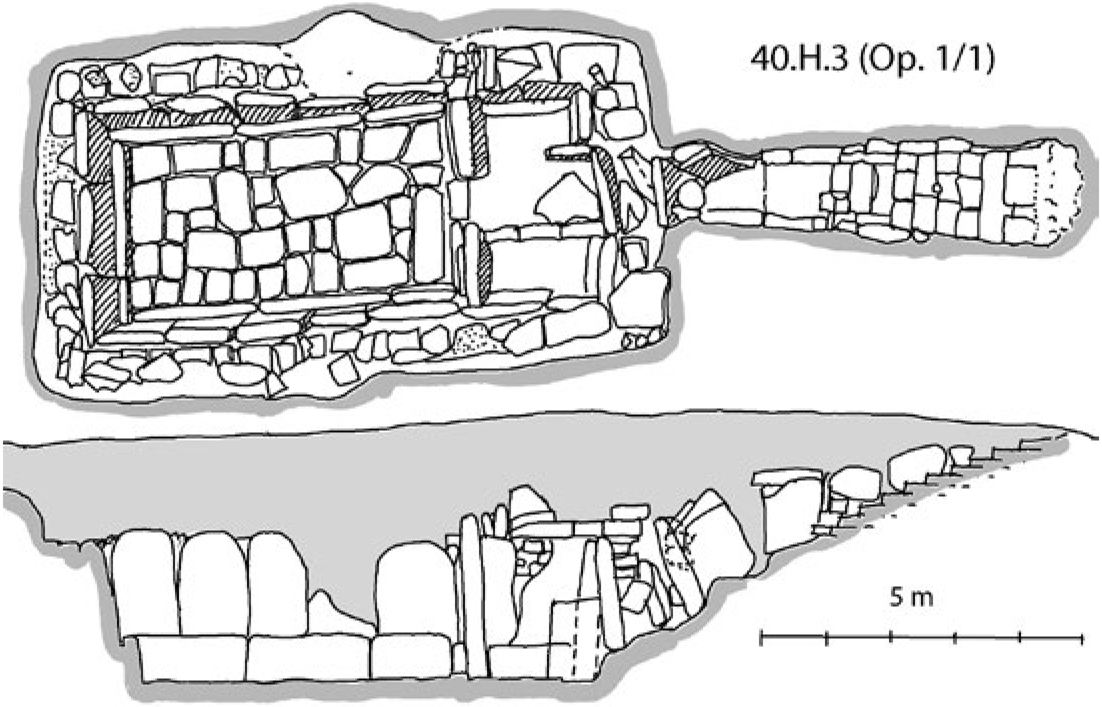


Figure 148 The stone lined tomb 40.H.3 (Köhler's Op. 1/1) (Drawn by the author after Köhler 2005, pl. 13)

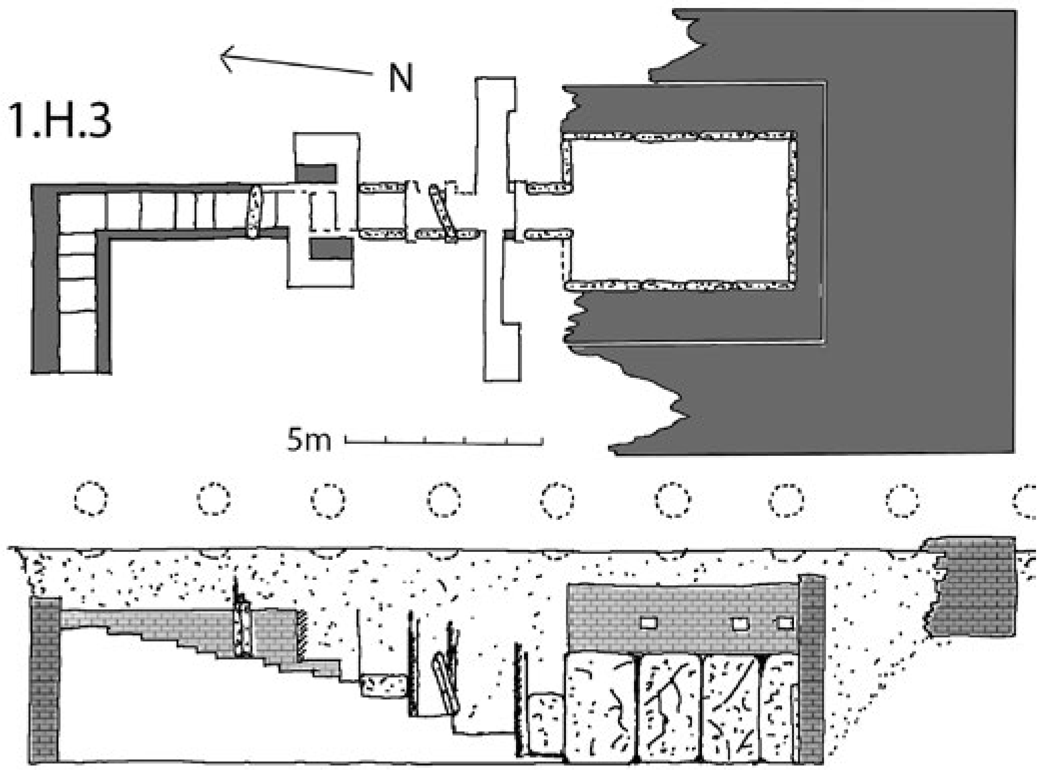


Figure 149 Plan and section of the stone lined Type ID Helwan tomb 1.H.3. (Drawn by the author after Saad 1947, pl. LXI)

The use of a stone roof is visible in Köhler's recently rediscovered photographs of tomb 60.H.1 **[160]**.[730] In them the subdivided burial chamber is seen clad with stone slabs of substantial thickness.[731] Over the pit, stone slabs 0.25 m thick were placed to create a roof (Fig. 151), which would have offered a good level of protection and was strong enough to have supported a 0.4 m deep rubble backfill. [732]

4) detailed analysis of the load carrying capacity of wooden roofs at Helwan for a discussion of this topic.

[730] These were taken at the time of the original excavation and have been recently published by Köhler (2008b: 120, figs. 10–2) who has also renumbered the tomb, as the tomb's original number, which was 601.H.1 relates to a Type IB pit tomb.

[731] Köhler 2008b: 120–1.

[732] Köhler 2008b: 120, figs. 11–2; La Loggia 2009: 180.

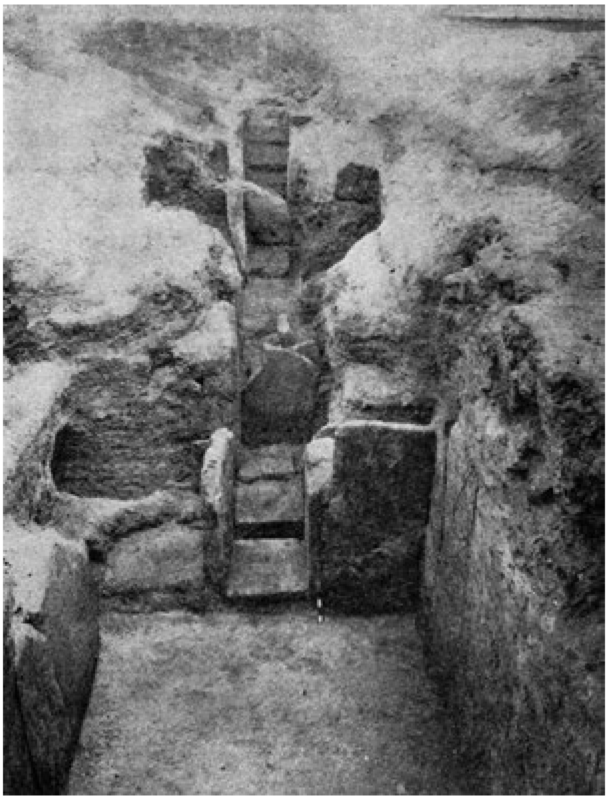


Figure 150 The stone clad substructure of Helwan 1.H.3, the multiple portcullises can be seen in position on the staircase.
(Saad 1947, pl. LXVII)

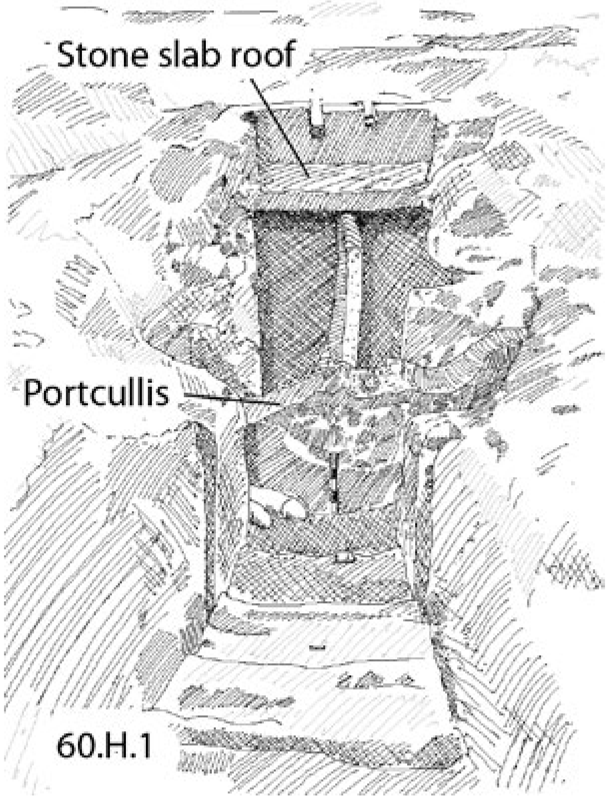


Figure 151 The stone slab rood of Helwan tomb 60.H.1 after excavation.
(Drawn by the author after Köhler 2008b, fig. 10)

Figure 152 The enormous stone lined Helwan tomb 654.H.4.The post holes that may have been part of a shrine are clearly visible.
(Saad 1951, pl. XVa)

Finally a few 'stone tombs' exist that were not so well documented, although some information can be gleaned from Saad's brief descriptions; for example he described the stonework in 9.H.1 **[161]** as,[733]

> 'composed of big limestone slabs carefully cut and well dressed. The floor is paved with blocks of the same stone. The roof was made of two enormous blocks of stone also.'[734]

Similarly, he described the walls of the burial chambers of tombs 589.H.1 **[NIC]** and 601.H.1 **[160[735]]** as,

> 'lined with small pieces of white limestone. These pieces were built against the mud plaster which was above the mud-brick walls.'[736]

Another tomb that may have been stone lined was the enormous 653.H.4 **[162]**, which contained the remains of limestone slabs (Fig. 152). Unusually, its floor also contained forty-two postholes along its perimeter,[737] which may have been part of a wooden shrine, similar to those found in contemporary 'royal' tombs.[738]

Compared to the burial chambers of Saqqara, which benefited from the strength of the surrounding rock, the tombs at Helwan demonstrate a wider variety of security responses to the weaker geology of the necropolis. The

[733] The only drawing by Saad available of 9.H.1 is that on the 1:400 plans in his first publication of the cemetery see, Saad 1947: Plan 2 (Map 9 in this book).
[734] Saad 1947: 28.
[735] In the case of tomb 601.H.1 the tomb has been re-identified by Köhler (2008: 120) as 60.H.1 **[160]** and is discussed immediately above.
[736] Saad 1947: 28.
[737] Saad 1951: 18–20.
[738] Köhler 2005: 28. La Loggia (2009: 182) points out that the positioning of these posts means that they would have been of little use to support a roof.

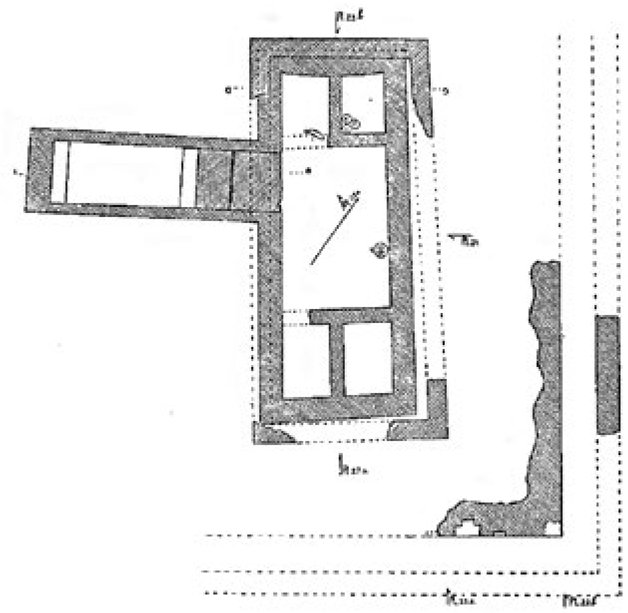


Figure 153 Plan of the Type ID tomb N 1581 from Naga el-Deir, with the remains of its superstructure.
(Reisner 1908, fig. 65)

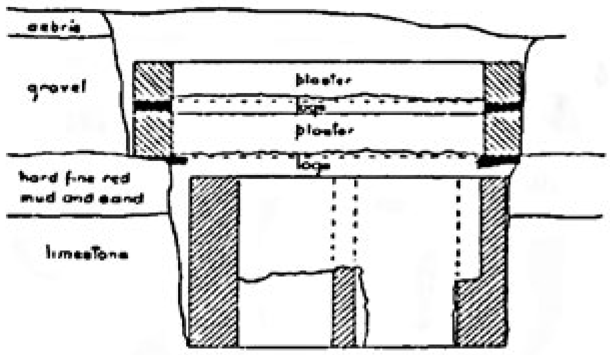


Figure 154 Section of tomb N 1581 from Naga el-Deir showing the deep limestone pit, into which the burial chamber was dug, and the overlying thick mud and wood roof.
(Reisner 1908, fig. 66)

most popular measure seems to be reinforcement of the chamber with thick mud-brick liners, or less frequently, stone to deter lateral penetration; together with a recessed roof to increase the depth of backfill, thus making tunnelling into the chamber more difficult from all directions. On the other hand, less variety is noticeable in the orientation of burial chambers in relation to their superstructures than at Saqqara (see Chart B), probably because of the tombs' generally smaller size, therefore leaving them more vulnerable to *sondage.*

Naga el-Deir

Stone also played a part in the defence of the Naqada IIIC2–D[739] tomb N 1581 **[287]** in Cemetery 1500 at Naga el-Deir, where the underlying rock was exploited to secure the burial chamber (Figs. 153–4). A rectangular pit 3.5 m deep was excavated through the gravel layer into the limestone beneath. Within the limestone layer a mud-brick burial chamber and magazines were built; then sealed with a double roof formed of tree branches heavily plastered with mud.[740] Therefore, with its burial chamber protected by the rock, to gain admittance a robber would have to either attack laterally via the thin mud and sand strata above the rock, or dig down through the twin roofs. Nevertheless, the tomb had still been looted at some time before the New Kingdom.[741] Nearby, according to Reisner, a similar arrangement would have also been used in the contemporary tomb N 1512 **[288]**.[742]

Mahasna

Garstang recorded a rare example of a Type ID tomb in Upper Egypt, which probably dates to the reign of

[739] Reisner 1908: 14.
[740] Reisner 1908: 36–8, figs. 65–7.
[741] This was indicated by the layer of limestone detritus that had emanated from the cutting of the Middle and New Kingdom rock-cut tombs in the hill above, which had completely covered it after the tomb's robbery (Reisner 1908: 37–8.).
[742] Reisner 1908: 38–40, figs. 68–70

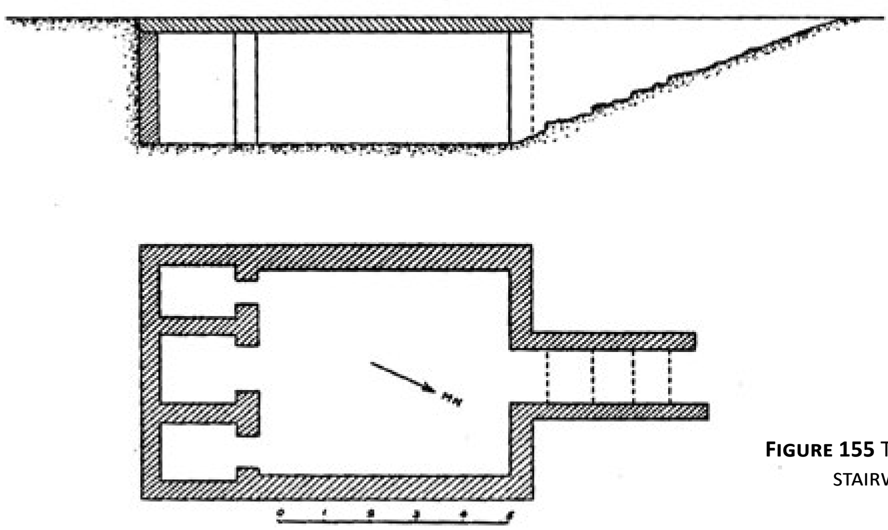


Figure 155 The shallow Type ID mud-brick lined stairway tomb M1 from Mahasna.
(Reisner 1936, fig. 49)

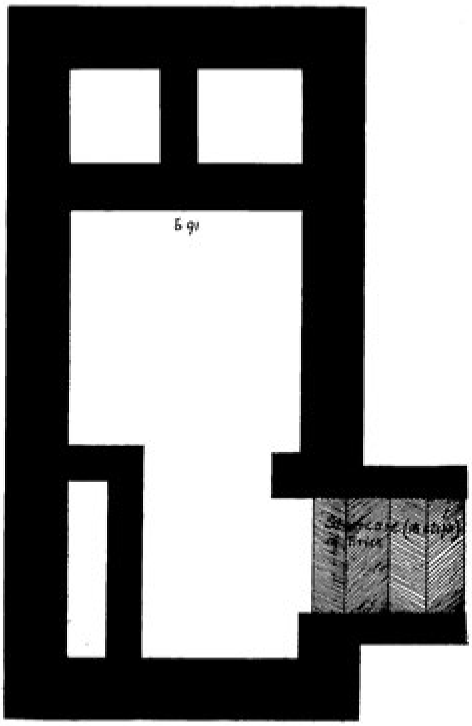


Figure 156 The mud-brick lined tomb b 91 at El-Amrah. (Randall-MacIver and Mace 1902, pl. IV, fig. 8)

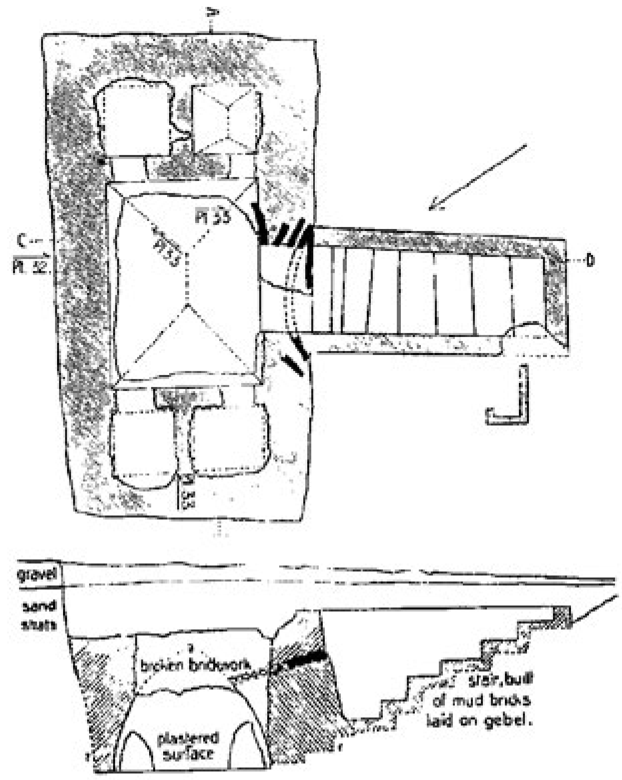


Figure 157 Plan and section of the Type IC mud-brick corbel roofed tomb N 1586 from Naga el-Deir. (Reisner 1908, figs. 71 and 73)

Den.[743] The burial chamber of tomb M1 **[324]** was built in a 2.5 m deep pit dug in the sand and gravel and lined with 0.4 m thick mud-brick walls for consolidation and protection (Fig. 155).[744] Although no traces were found of its roof, Garstang suggested it was probably built of wood and mud.[745]

Abydos

A Type ID tomb has been excavated by the SCA at Abydos in the recently discovered Early Dynastic cemetery.[746] The burial chamber of tomb I **[327]** was 2.8 m deep and lined with substantial mud-brick walls approximately 0.7–0.85 m thick that would have defended against lateral attack and shored up the surrounding desert. The grave was closed by a roof of wooden beams and planks set at an unknown distance below the surface.[747]

El-Amrah

Further south, at El-Amrah, a further uncommon example of a Type ID tomb exists, which dates to the second half of the dynasty. The 1.52 m deep pit of tomb b 91 **[329]** had a 0.4 m mud-brick liner that provided lateral protection and consolidation within the surrounding sand and hard gravel;[748] from above it was protected by a shallow roof built of tree branches and mud (Fig. 156).[749]

The Second Dynasty (Naqada IIID)

Naga el-Deir

During the Second Dynasty another form of closure was introduced almost exclusively at Naga el-Deir, amongst the last of the Type ID pit tombs in the survey. Rather than the wooden roofs used previously at the site,[750] the pits were closed with mud-brick corbelling, which was usually built up individually over each compartment of the substructure in the form of a false vault.[751]

A typical example is tomb N 1586 **[289]** from Cemetery 1500.[752] It comprised of a pit sunk 3.25 m into the alluvium, within which a mud-brick substructure was built in the form of a main burial chamber with magazines at either end (Fig. 157). However, rather than

[743] Garstang (1903: 28) described it as: ‘of the simple character of the earliest stairway tombs…’.
[744] Reisner 1936: 67.
[745] Garstang 1903: 28, pl. XXXIII.
[746] See also the Type IC tomb IV **[326]** from this site, discussed above in 4.2.1.1.
[747] Hossein 2011: 271–3.
[748] Nearby tomb B137 **[NIC]** is described by Randall-MacIver and Mace (1902: 34), as being enclosed by ‘hard gravel and sand’.
[749] Randall-MacIver and Mace 1902: 39.
[750] For example, tombs N 1581 **[287]**, N 1512 **[288]** in Cemetery 1500 and N 3016, N 3062 and N 3071 **[all NIC]** in Cemetery 3000 (Reisner 1908: 36–7 and 69–71).
[751] Spencer 1979: 12.
[752] Reisner 1908: 14.

being covered in wood, the roof of every chamber was built by stepping out each course of mud-brick to form a groined vault, which was then plastered internally. Externally, the main chamber roof was roughly built up with mud and brick to be 0.5 m higher than that of the magazines;[753] then brought level with the surface with about 0.75 m of backfill to support a superstructure. Similarly, there are nine other tombs in Cemetery 1500 built in the same manner, which are: N 1513 **[290]**, N 1514 **[291]**, N 1515 **[292]**, N 1571 **[293]**, N 1572 **[294]**, N 1584 **[295]**, N 1605 **[296]**, N 1611 **[297]** and N 1626 **[298]**, and four more contemporary examples in nearby Cemeteries 3000 and 3500, namely N 3013 **[299]**, N 3017 **[300]**, N 3551**[301]** and N 4990 **[302]**.

The defensive benefits of the corbel were discussed by Reisner. He suggested that the great advantage of the corbel roof over the wood and mud-brick variety was one of increased security,[754] in that the latter was subject to both the strains of bearing the weight of mud-brick and the depredations of moisture, whereas the former was not.[755] This of course did not prevent them being robbed and at least a couple of those that were plundered were found to have been entered by thieves smashing through the main vault.[756]

Section summary – Type ID Burial chambers

As with Type IB and IC tombs, Type ID burial chambers relied on differing methods to reinforce their walls against lateral penetration, the choice of which, while obviously subject to the owner's status, was dependent on the surrounding geology of its necropolis and the resources to hand, most notably in the gravels of Tura al-Asmant and Helwan, where this defence once again took the form of thick mud-brick walls and occasionally linings of stone. In the latter case, an increase is seen in both the size of the orthostats used and the level of sophistication of their execution. Meanwhile, the monumental tombs at Saqqara and Tarkhan still largely relied on the protection of the surrounding limestone for their primary defence. However, to lower the risk from *sondage* still further, the burial chambers at Saqqara were reduced in size and placed deeper into the rock in varying locations and orientations under their superstructures; a luxury not possible amongst the smaller tombs at Helwan. For overhead protection wood and mud-brick roofs and depth of backfill continued to be relied upon,[757] but some stone was used as reinforcement at Tura al-Asmant, Helwan and Tarkhan. At Saqqara, however, enormous wooden roofs remained the pre-eminent choice and supported a superstructure, sometimes with a deep internal shaft of backfill.

4.2.2 Burial chambers in subterranean Type II tombs

Rather than build a wooden roof over an open pit to protect the burial, support the backfill, and possibly a superstructure, a different form of defence was introduced during the reign of Den. It comprised of an entirely subterranean chamber that took advantage of surrounding natural geology to provide its roof and did away with the need to line the chamber. Although this type of self supporting construction was known in the Predynastic Period in elite tombs at both Qustul and Hierakonpolis (see 3.2) and in smaller Early Dynastic Type IB/SC tombs,[758] it only began to be used in larger tombs in three necropoleis in Lower Egypt in the second half of the First Dynasty.

4.2.2.1 The burial chambers in the Abu Roash Type II tombs

The second half of the First Dynasty (Naqada IIIC2–IIID) Den to Qa'a

Abu Roash

The first elite tombs in the Early Dynastic Period to adopt a subterranean burial chamber are found at Cemetery M at Abu Roash, the Type II tombs of which all date to the reign of Den,[759] and are excavated in the surrounding poor quality calcareous rock,[760] where they all take a similar form.

The first example is tomb MO1 **[44]**.[761] The upper part of its substructure comprised of a large rock-cut pit that also formed its principal magazine, which was lined with mud and wooden boards and surrounded by a brick wall (Fig. 158). At its northern end a rudimentary staircase descended west in a shaft to a 2.1 m high, crudely cut, subterranean burial chamber, whose floor was set 4.7 m below ground level. Although it projected beyond the protective footprint of its superstructure, it was, unlike in a pit tomb, protected from above by a natural rock cover approximately 2.5 m thick.[762] The whole of this

[753] Reisner 1936: 129–31. In other tombs, it was sometimes simply built up to form a flat roof or given a further layers of brick for added strength, such as in N 1515 (Reisner 1908: 40).

[754] As material proof of the improved strength and security attained by the use of corbelling, Reisner (1936: 355) continued to cite the evidence of the excellent preservation of the corbelled tombs at Naga el-Deir itself.

[755] Reisner 1908: 12–3. However, he then went on to contradict this statement when discussing tomb N 1513 and the likelihood of possible damage to its roof from water and cracking (Reisner 1908: 48). In addition, research by Blanchette *et al.* (1994: 55–70) into wood decay has demonstrated that wood in Egyptian tombs is subject to brown rot, which is also related to termite attack and was also a major cause of timber failure.

[756] These are N 1513 **[290]** and N 1586 **[289]** (Reisner 1908: 41 and 48). In the majority of these tombs part of the roof of the main corbel chamber seems to have either collapsed or been dug through, the former perhaps due to water ingress and cracking (Reisner 1908: 48), the latter possibly because of tomb robbers or *sebbakhin*.

[757] With the exception of the Second Dynasty tombs at Naga el-Deir, which are not included in the summary as they represent an anomalous development exclusive to that site and el-Amra.

[758] Such as the numerous examples in cemeteries 'O', 300 and 800 at Abu Roash, see Klasens 1957: 66; 1959: 34 and 1960: 70 respectively.

[759] Tristant 2008b: 329.

[760] Tristant 2008a: 137.

[761] Porter and Moss 1974-81: 5–6.

[762] The term 'cover' is defined by the US Bureau of Mines as the: 'Total

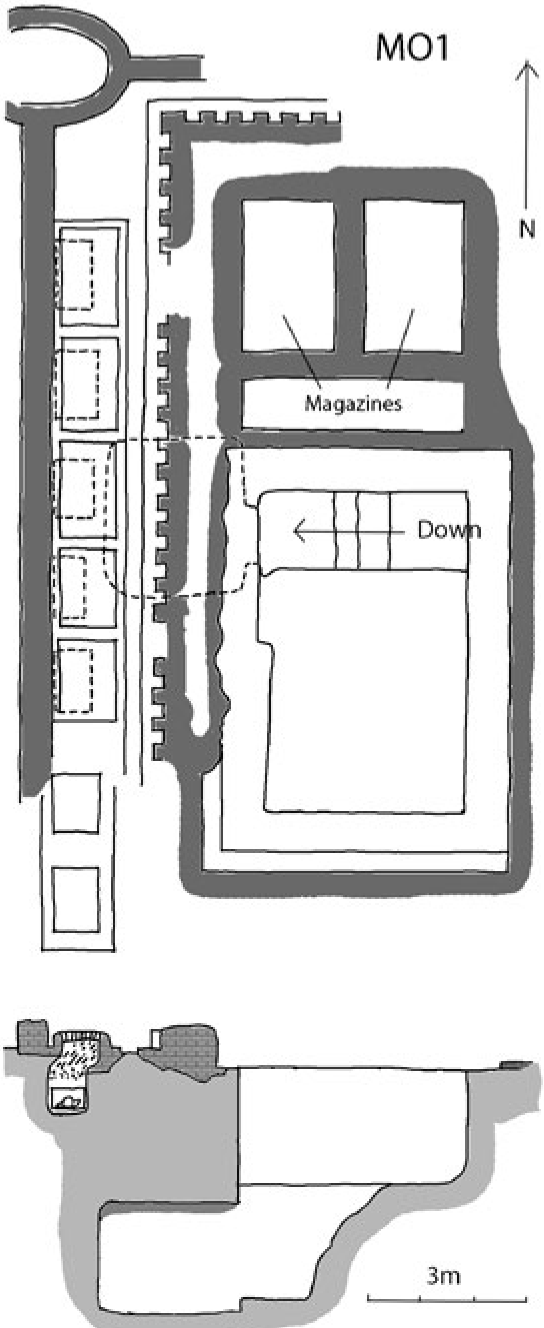


Figure 158 Plan and section of the Type II tomb MO1 at Abu Roash.
(Drawn by the author after Montet 1938, pl. II)

substructure was closed by a composite roof of mud, reeds, sand and mud-brick supported by beams and sheltered by a protective superstructure.[763]

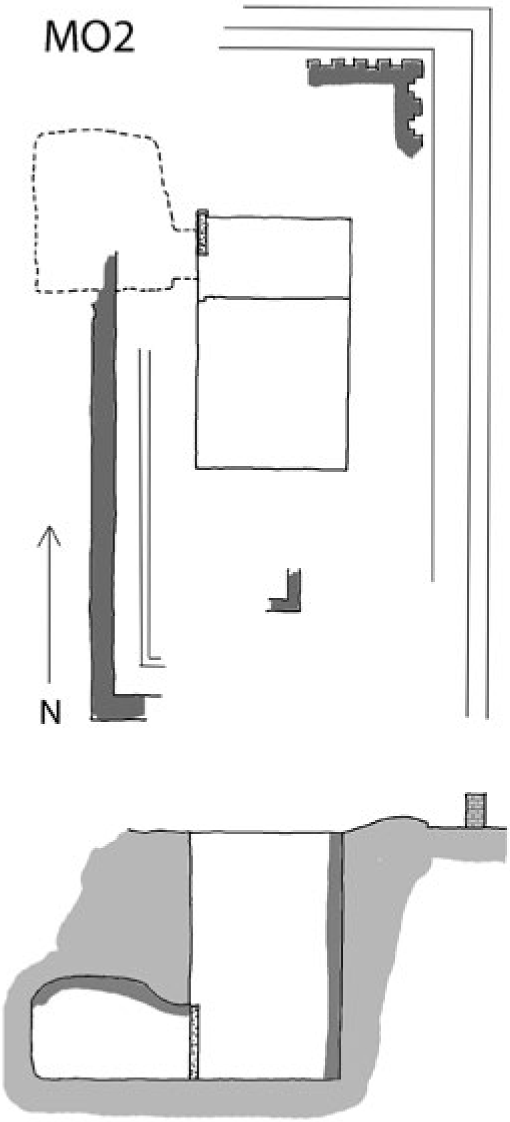


Figure 159 Plan and Section of the Type II tomb MO2 at Abu Roash.
(Drawn by the author after Montet 1938, pl. II)

Tomb MO2 **[45]** is adjacent to its neighbour MO1, and also had a sunken magazine that was probably roofed.[764] Access to its burial chamber was off a deep shaft situated at one end of its magazine, rather than a staircase (Fig. 159), where an entrance led west to the burial chamber, which was 2.4 m high and whose rock cover would have been approximately 3 m thick. Like MO1, the main body of the substructure was also covered with a mud-brick mastaba.[765]

This type of layout is also repeated with variations in the nearby tombs MO3 **[46]**, MO4 **[47]**, MO6 **[48]**, MO7 **[49]**, MO10 **[50]**, MO11 **[51]**, MO12 **[52]**[766] and MO19

thickness of material overlying mine workings or an orebody. See also: burden; mantle; cover rock' (The Staff of the U.S. Bureau of Mines 1996: http://xmlwords.infomine.com/xmlwords.htm; accessed online 11th September 2012).

[763] Montet 1938: 18–20, pl. II; Tristant 2008a: 137.

[764] Most of the larger tombs in Cemetery M were probably built to a similar plan (Tristant 2008b: 330).

[765] Montet 1938: 28–31.

[766] See Montet 1938: 11–69 and Porter and Moss 1974-81: 6–7.

[53].[767] The rock cover over their burial chamber roofs varies in thickness between 1.3 m and 3.2 m (see Chart C), and in some cases they have subterranean satellite magazines that run from their central shafts. In addition, it can be observed, if the varying placement of the burial chambers of tombs MO1, MO2, MO4, MO6 and MO7 in relationship to their superstructures is examined, that both their locations and orientation have been deliberately diversified, presumably in order to conceal their whereabouts and misdirect potential tomb robbers.

As some of the first tombs in the Early Dynastic Period to adopt the entirely excavated burial chamber, these burial chambers were well defended both by their clever placement and the cover of their surrounding geology. As proof of the success of these elements of their defence, in only one example was this rock cover found to have been breached directly (see 6.2.3.1).[768]

4.2.2.2 The burial chambers in Type IIA tombs with stairway access

The second half of the First Dynasty (Naqada IIIC2–IIID) Den to Qa'a

Kafr Ghattati

In the small cemetery of Kafr Ghattati north of Giza, there are five early staircase tombs excavated in the gravel that date to late Dynasty 1 or possibly early Dynasty 2.[769] They are all entered by stairways,[770] but only two tombs are recorded sufficiently to be discussed. Firstly, KG3 **[55]**, whose 1.65 m high trapezoid shaped burial chamber had its floor set 3.65 m from the surface, thus making the depth

[767] Klasens 1961: 109.

[768] In tomb MO19 **[53]**, rather than go through the superstructure and backfill, robbers had tunnelled down through the rock above the northwest corner of the burial chamber that lies between the mastaba and its enclosure wall (Klasens 1961: 109), which suggests that they were aware of its exact location. See also the discussion on page 289.

[769] Engles (1990: 74) bases this dating on the tombs' uncomplicated design and their resemblance to similar types found at Tarkhan and Sedment, which he believes would confirm a dating to the end of the First Dynasty or beginning of the Second.

[770] They are nos. KG3 **[55]**, KG4 **[56]**, KG10 **[57]**, KG 12 **[58]** and KG13 **[NIC]**(Engles 1990: 80–7).

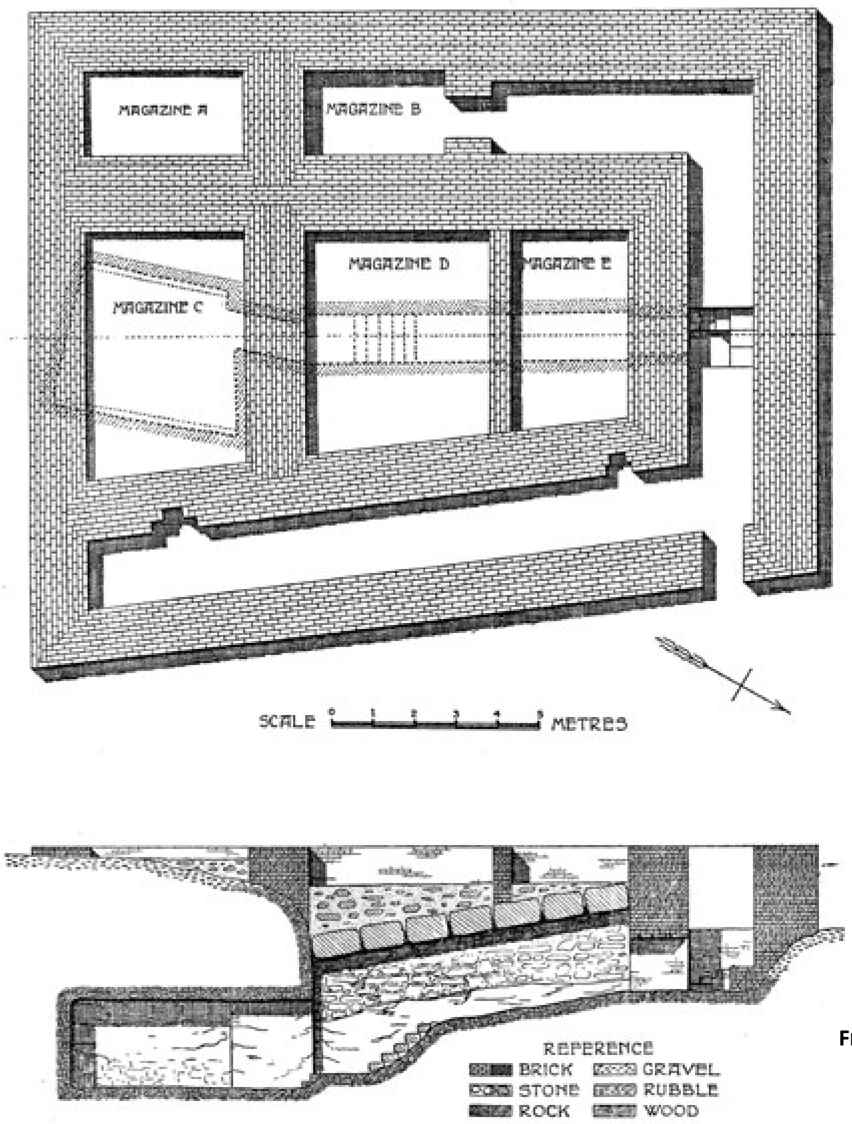


Figure 160 The early Type IIA tomb S 3121 at Saqqara. (Emery 1949, pl. 48)

of gravel cover over the chamber 2 m thick. Secondly, and of greater depth, was KG4 **[56]**, whose burial chamber's floor was excavated to a depth of 6.05 m. [771] Although the burial chamber's height is unrecorded, if it was similar to that of KG3, the depth of the gravel cover above it would have been approximately 4.5 m.[772]

The use of the local gravel geology to protect burial chambers was of limited success in this cemetery, as all were robbed and only two seem to have survived anywhere near intact,[773] the remainder having presumably collapsed.

Saqqara

Two Type IIA tombs sit on the edge of the escarpment in the North Cemetery at Saqqara, which both date to the reign of Qa'a.[774] The earliest of these is S 3121 **[97]**,[775] where taking advantage of the natural topography, its burial chamber was cut into the side of the escarpment (Fig. 160). It was accessed by a sloping passage that descended towards the rock face, into which a trapezoid burial chamber was excavated and reinforced on two sides with masonry.[776] This left a natural rock cover 3.7 m thick,[777] which was further protected by an overlying superstructure. The adjacent tomb S 3120 **[98]** followed much the same plan as its neighbour,[778] but was unlined and less well protected by a sloping rock roof and compensatory layer of rubble (Fig. 161),[779] which at its deepest point was approximately 2.6 m thick.[780]

[771] Engles 1990: 80.
[772] KG4 had been robbed and the only remains found within it were fragments of a pot with worn edges, which Engles (1990: 80–1) suggests may have been used as a digging implement by the tomb's despoilers.
[773] Engles 1990: 80–7.
[774] Emery 1949: 116 and 123.
[775] Porter and Moss 1974-81: 443.
[776] Emery 1949: 116–9.
[777] Scaled from drawing by Emery (1949: fig. 67).
[778] Porter and Moss 1974-81: 443.
[779] Emery 1949: 121–3.
[780] Scaled from drawing by Emery (1949: fig. 67a).

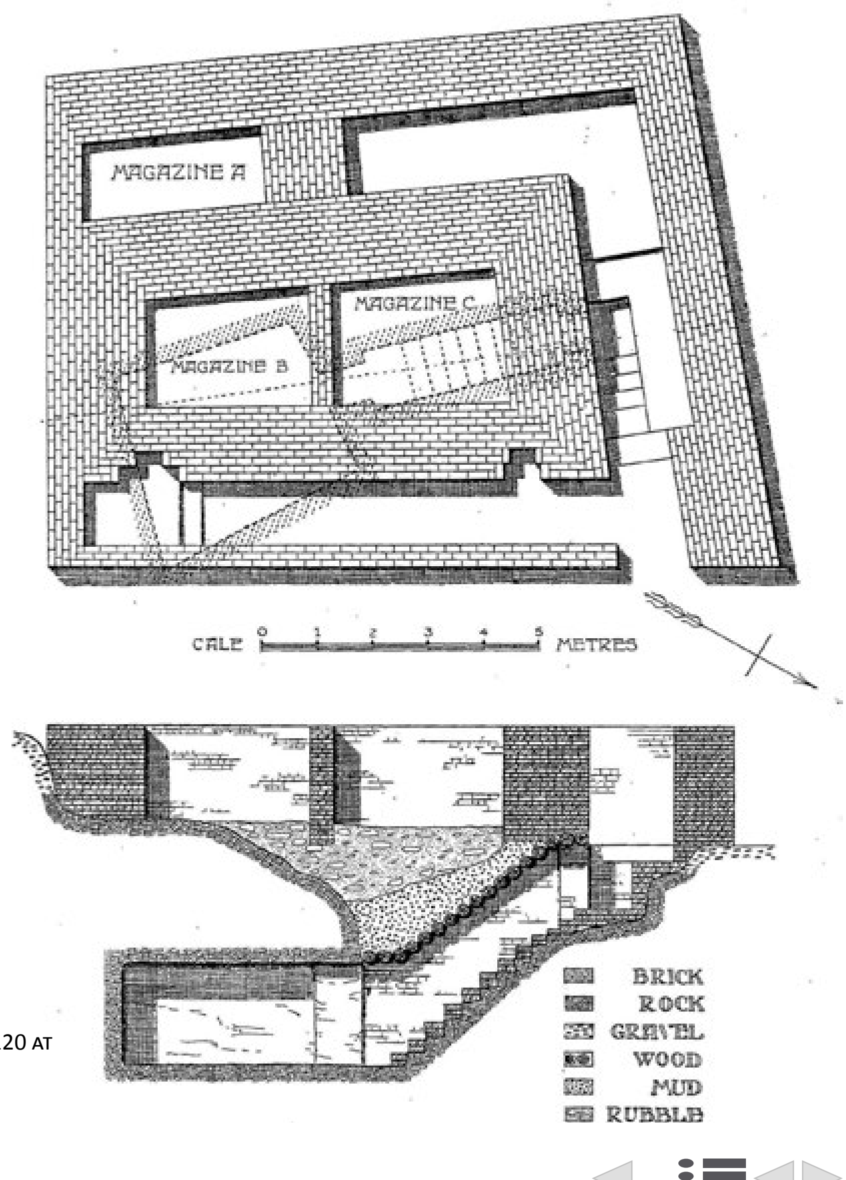


Figure 161 The early Type IIA tomb S 3120 at Saqqara.
(Emery 1949, pl. 53)

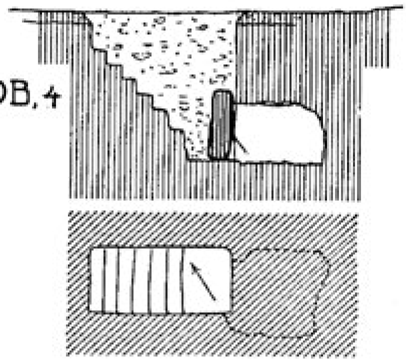


Figure 162 The Type IIA tomb 10B-4 at Abusir with portcullis stone in place. (Bonnet 1928, Taf. 2)

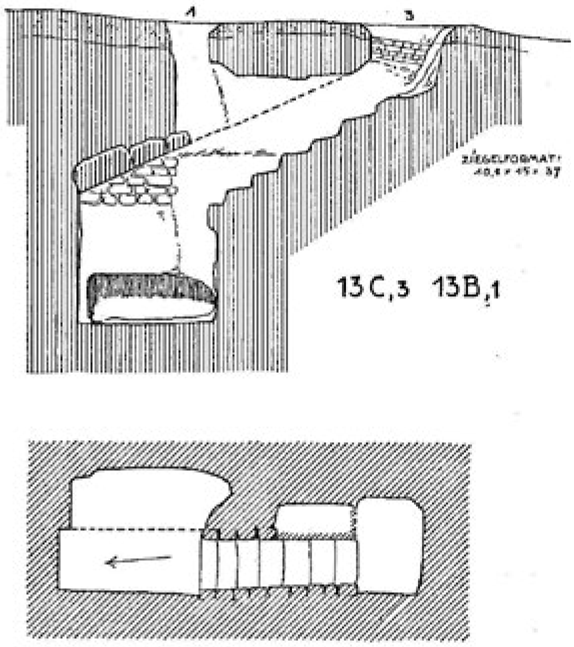


Figure 163 Abusir Type IIA tomb 13 C-3/13 B-1 with its reinforced stone lined roof and robber's tunnel. (Bonnet 1928, Taf. 2)

With their burial chambers well protected by their surrounding rock geology, these tombs mark a transitional phase at Saqqara from the older Type I 'cut and cover' pits, to the entirely subterranean substructures of the Type IIA tomb, a design that was to become commonplace in the tombs in this necropolis and elsewhere during the Second Dynasty.[781]

The Second Dynasty

Abusir

West of Abusir village, on the edge of the present cultivation,[782] Bonnet discovered three Second Dynasty Type IIA tombs,[783] cut in the compact mudstone matrix.[784] Tomb 10B–4 **[71]**, for example, had the floor of its 1 m high burial chamber set 2.6 m from the surface, which left it protected by a roof approximately 1.6 m thick (Fig. 162).[785] Similarly, nearby 10C–3 **[72]** was also protected by a roof 0.1 m shallower. However, of special note is tomb 13C–3/13B–1 **[73]**, whose burial chamber floor was approximately 6 m below ground level. Unusually, the sloping roof of the burial chamber, which varied between 2.5–3.5 m thick[786] followed the slope of its stairway and was reinforced with stone slabs and rubble, presumably to either consolidate the rock, or to prevent tunnelling from above (Fig. 163). Despite this a robber's tunnel descends directly down to the chamber from above, which demonstrates the culprit's familiarity with the tomb's layout.

Saqqara

Located on the eastern edge of the North Saqqara plateau, a large number of Type II tombs dating to the Second and Third Dynasties sit behind the earlier First Dynasty tombs that dominate the escarpment (Map 4).[787] Although, a great number of these tombs still remain unpublished,[788] a limited amount of material is available from Quibell, Reisner and Emery that enables this discussion to take place.[789] Their burial chambers are all excavated within the limestone and marl strata that are characteristic of this site,[790] which provided an excellent level of protection against tunnelling.

Some Type IIA tombs possessed just a single burial chamber, for example tomb S 2101 **[99]**, which had a 5 m long × 3 m wide × 1.55 m high rock-cut chamber set at an unknown depth south of its staircase.[791] On a larger scale, S 3042 **[100]** had three similar sized chambers in a cruciform arrangement accessed by 'a

[781] Emery 1949: 121; 1961: 153.
[782] Jeffreys and Tavares 1994: 149.
[783] Bonnet 1928: 4–6. Taf. 2; Bárta 2000: 338.
[784] Mathieson and Tavares 1993: 24.
[785] Scaled dimensions from drawing by Bonnet (1928: Taf. 2).
[786] Scaled dimensions from drawing by Bonnet (1928: 4–6, Taf. 2).
[787] Jeffreys and Tavares 1994: 147. Quibell (1913: 1) described having 'dug out' some 500 of them in all during his campaigns.
[788] A great deal of unpublished material belonging to Firth and Emery concerning these Saqqara mastabas is now in the custody of Professor Geoffrey Martin (2007: 121–6) and is listed in his article on Firth and Emery's unpublished excavations. He estimates there are approximately 179 mastabas amongst this material, which comprises of notes, notebooks, tomb plans and photographs, from amongst which only twelve tombs were actually published by Emery (Martin 2007: 125).
[789] With regard to the statistical information on the defence of these burial chambers, it should be noted that Quibell (1923) invariably left out their depths and dimensions from his publication and rarely provides a substructure section, leaving us to rely in the main upon just a few tombs published by Reisner (1936) and Emery (1949 and 1962) to catch a glimpse of what must be a much larger picture.
[790] The geology of the North Saqqara necropolis comprises a layer of hard limestone over a stratum of soft marl or *tafl* up to ten metres thick, which is easily cut with a chisel and thus excellent for quickly carving subterranean chambers (Martin 1981: 7–8).
[791] Quibell 1923: 17.

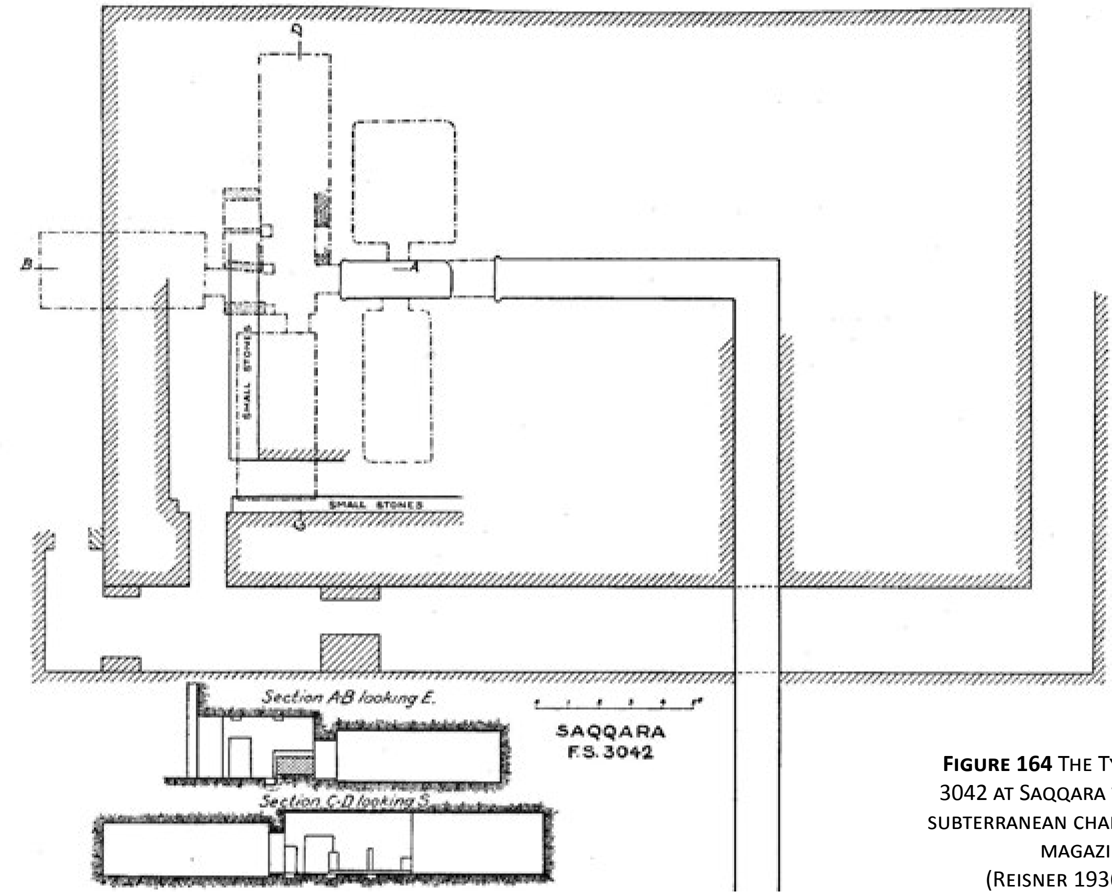


Figure 164 The Type IIA tomb S 3042 at Saqqara with its three subterranean chambers and two magazines.
(Reisner 1936, fig. 67)

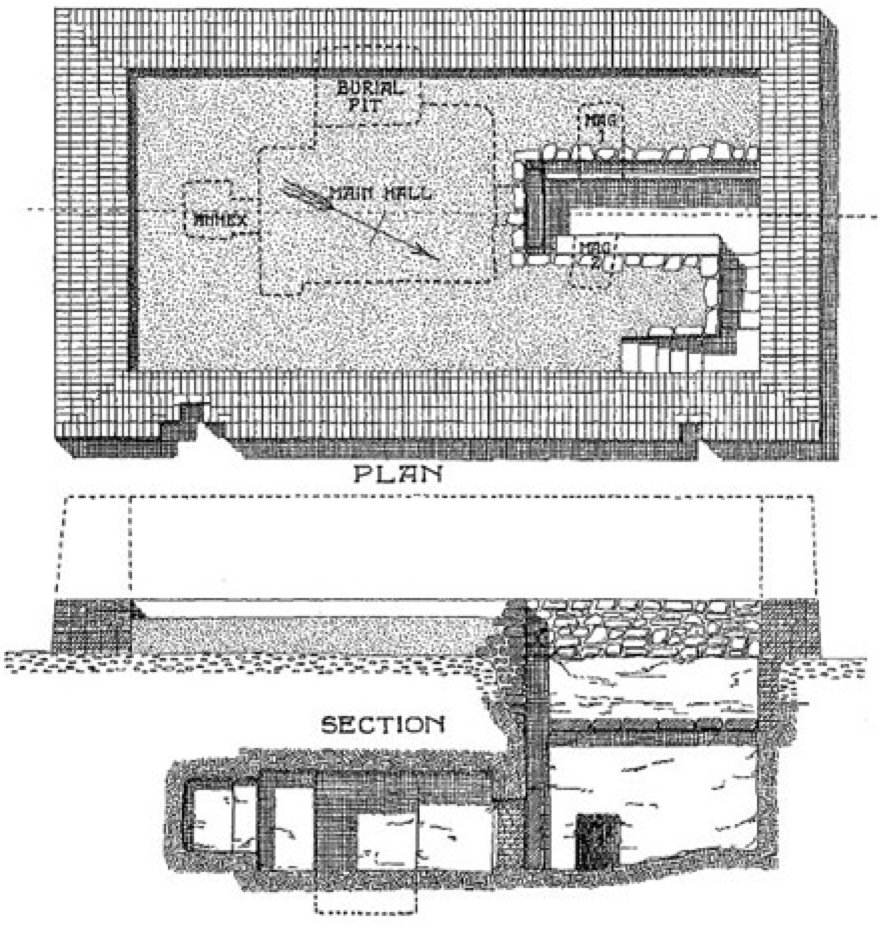


Figure 165 The Type IIA tomb S 3477 at Saqqara.
(Emery 1962, pl. 4) Courtesy of the Nederlands Instituut voor het Nabije Oosten.

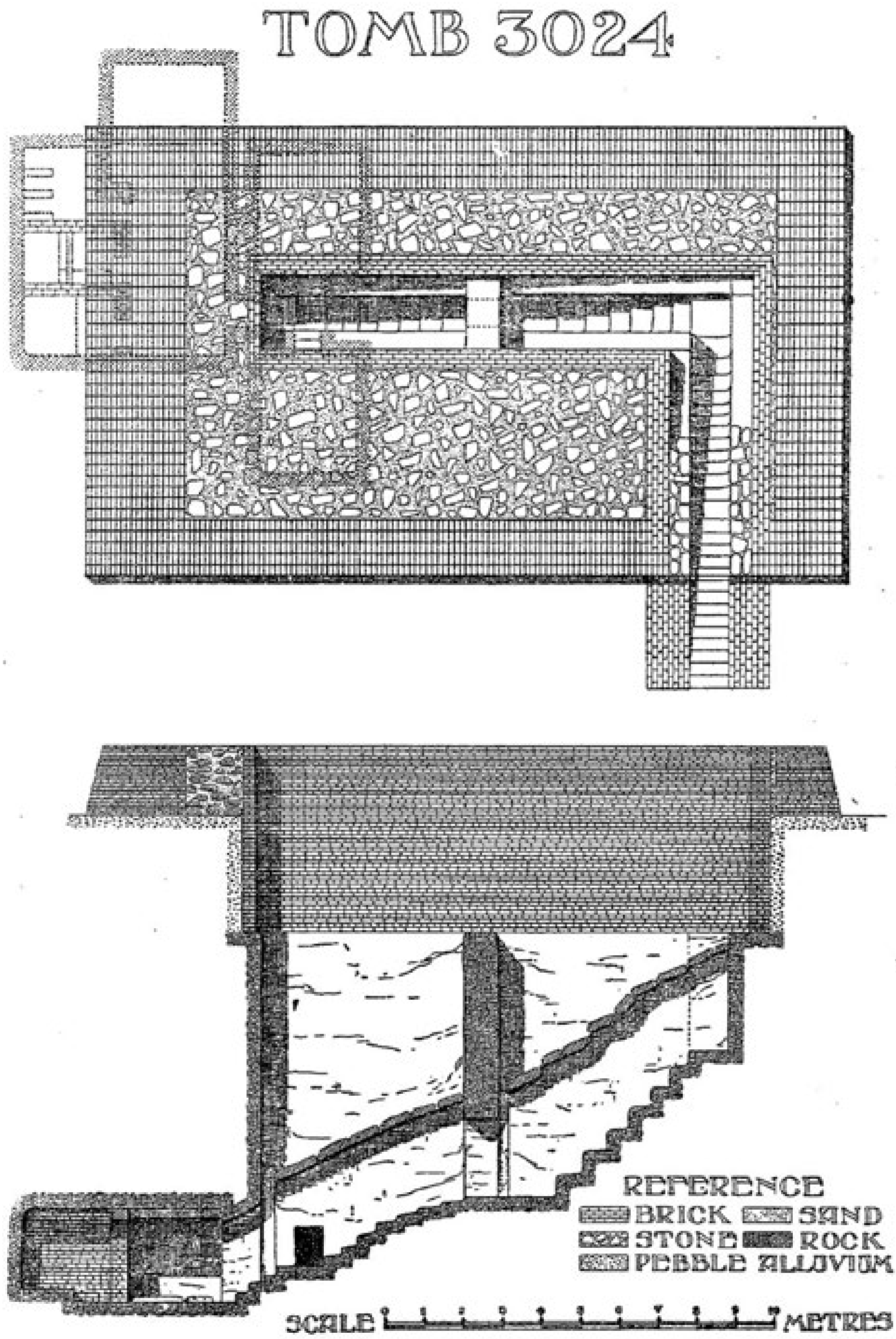


Figure 166 S 3024 an 'early 'Type IIA stairway tomb at Saqqara with its mud-brick partitioned burial chamber set 12.5 m down from the surface. (Emery 1949, fig. 9.)

very deep stairway' of an uncertain depth (Fig. 164).[792] From Quibell's description, the substructure of tomb S 2452 **[101]** was of a similar layout and set at 6.6 m from the surface,[793] whereas the burial chamber of S 3477 **[102]**,[794] which dates to the end of the Second Dynasty, was shallower and contained a recess and small annex (Fig. 165).[795] Internally, it was approximately 2.2 m high,[796] and was protected from above by a rock cover around 1.5 m thick plus a 1 m gravel layer above it.[797]

792 Reisner 1936: 144–5. Firth died before he could publish this information himself so it was gleaned from his notes by Reisner (1936: 383). Like the reports of Quibell, the lack of detail hampers the discussion, as once again there are no dimensions or scaled sections to work from.
793 Quibell 1923: 41–2.
794 Porter and Moss 1974-81: 444.
795 Emery 1962: 4.
796 Scaled dimension from drawing by Emery (1962: pl. 4).
797 Emery 1962: 4. Scaled dimensions from pl. 4.

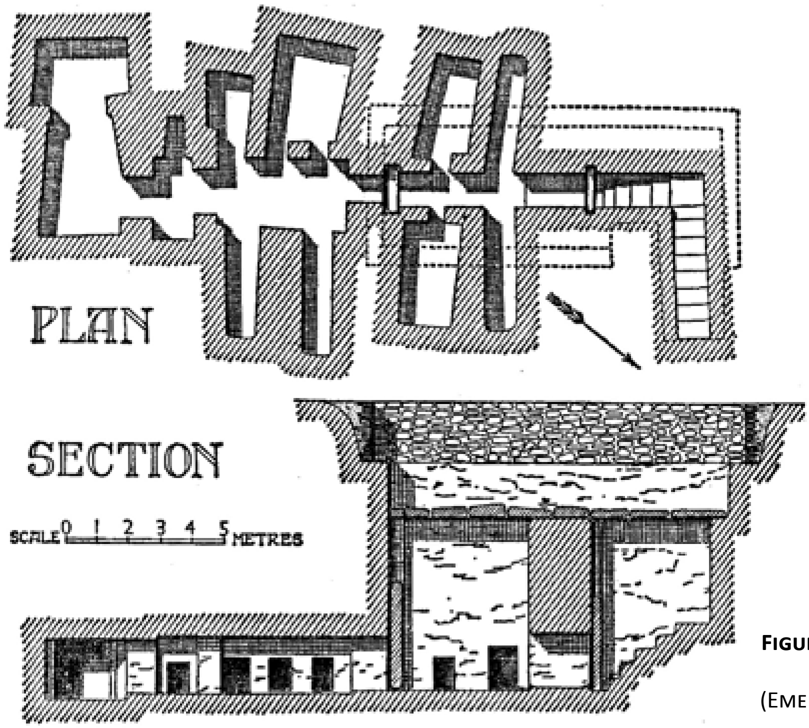


Figure 167 A large unidentified Type IIA 'house type' substructure at Saqqara.
(Emery 1961, fig. 96) Reproduced by permission of Penguin Books Ltd.

Initially, larger tombs had their burial chambers subdivided internally with mud-brick walls,[798] such as tomb S 3024 **[103]**, which dates from the beginning of the dynasty. The floor of the 2.5 m high burial chamber was set approximately 12.5 m from the surface, leaving approximately 7.5 m of solid rock and 2.5 m of gravel as its cover (Fig. 166).[799] However, by the mid Second Dynasty, in an arrangement peculiar to Saqqara,[800] the layout in some of these elite tombs changes to that of the 'house type' with chambers excavated separately in the rock, in what some believe resembles a contemporary dwelling.[801] Although it could be argued that they were simply imitating their royal contemporaries, and using the extra space as a more secure form of storage for grave goods, which in the First Dynasty were previously stored in the superstructure.[802] A typical arrangement is portrayed in Emery's drawing of such an unidentified tomb (Fig. 167), where at the end of the stairwell, protected from above by 7.5 m of solid rock, the tomb's subterranean chambers branch from an axial corridor.[803] Similar examples of this type of substructure (Fig. 307), but of unknown depth, are in tombs S 2171 **[104]**, S 2302 **[105]**, S 2307 **[106]**, S 2322 **[107]**, S 2337 **[108]**,[804] S 2406 **[109]**, S 2429 **[110]** and S 2498 **[111]**.[805]

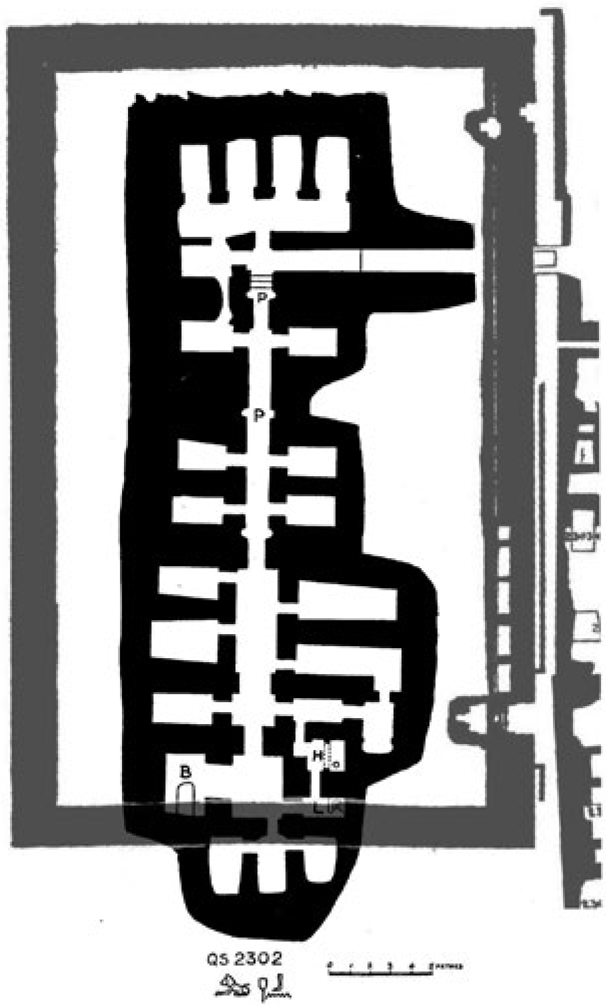


Figure 168 Composite image of the substructure and superstructure of tomb S 2302.
(After Quibell 1923, Pl. XXX and Reisner 1936, fig. 60)

[798] Emery 1949: 12: 1961: 155.
[799] Scaled dimensions from drawing by Emery (1949: fig. 9).
[800] Snape 2011: 23.
[801] Quibell 1923: 12; Bolshakov 1997: 28–30; Tavares 2005: 857.
[802] Kanawati 1987: 59.
[803] Scaled dimension from drawing by Emery (1961: fig. 96).
[804] Quibell (1923: 36) recorded the depth of the grooved portcullis emplacement in S 2337 as being 6.4 m deep, therefore it is likely that the depth of its burial chamber floor would be the same or deeper.
[805] There is also evidence of high status Type II private 'gallery' tombs 1 km to the south of the North Saqqara Second Dynasty tombs, underneath the Eighteenth Dynasty tombs of Meryneith and Maya

The largest of these substructures was in S 2302 **[105]**,[806] whose twenty-three chambers varied between 1.4–1.8 m high and covered an area of over 92 m^2 (Fig. 168).[807] Although the thickness of its rock cover is unascertainable, it is the only Type IIA tomb at Saqqara, where we have the details of how it was robbed. Quibell reported it had been accessed via two robbers' shafts through its mastaba that entered the main corridor, and from there the interior was entered by tunnelling round its blockings and portcullis.[808] Indeed a similar fate had befallen nearly every tomb in the necropolis, as he commented:

> 'It will not escape our notice that the robbers' shaft has been always sunk just at the point where it would drop down on the portcullis and we shall fairly draw the conclusion that the thieves who show so precise an acquaintance with the plan of a large and complicated tomb were not unconnected with its construction.'[809]

Finally, as is clear in Quibell's substructure drawings (Fig. 307), all were orientated north-south and in some cases, such as S 2498 **[111]**, S 3024 **[103]** and S 3042 **[100]**, their chambers projected beyond the protective footprints of their superstructures. This may be because unlike in a Type I pit tomb, where the superstructure was vital to protect the burial chamber's wooden roof and backfill, the natural protection of the rock cover gave the tomb builders extra confidence. From the limited and anecdotal evidence available, this arrangement must have proved successful, even amongst the apparently more vulnerable multi-chambered tombs with their larger areas, as it appears that the preferred route for robbers at Saqqara was via the existing rock-cut shafts and entrances that these tombs necessarily possessed.

(Regulski 2011: *passim*), which have been usurped and considerably altered in antiquity. See Raven *et al.* 2003: 91–109; van Walsem 2003: 117–34 and Raven and van Walsem 2014: 71–4, for the substructure under Meryneith **[NIC]**, and Raven *et al.* 2009: 17–20, fig. 10 and Regulski 2009: *passim*, for that under Maya **[NIC]**.

806 Porter and Moss 1974-81: 437.

807 Reisner 1936: 138.

808 Quibell 1923: 29–30.

809 Quibell 1923: vii–viii.

Helwan

Like at Saqqara, a wide variety of Type IIA substructures have been excavated in the gravel matrix at Helwan.[810] Many were excavated by Saad in his 1945–7 campaigns and published in his *Royal Excavations* series,[811] and *Ceiling Stelae*,[812] but not all were accompanied with

810 0.5 m below the 1.3 m of 'gravel' that forms the upper strata at the site is a mudstone layer, which is occasionally used as the 'roof' in these subterranean chambers (Jeffreys and Tavares 1994: 152–3). For an in depth description of the geology of the cemetery, see Köhler 2005: 7–11.

811 Saad 1951: *passim*. Unlike at Saqqara, a great deal of further information is available regarding these tombs as numerous cross sections, albeit frequently not always to scale, accompany Saad's descriptions and measurements. Although like some of the Type I tombs at the site, many of Saad's published dimensions seem unreliable, probably due to typographical errors, such as in Tomb 393.H.8 (Saad 1957: 59–60, plan H) where the measurements given wildly differ to the un-dimensioned proportions shown on the accompanying tomb drawing.

812 Saad (1957: 3–4) believed that these stelae, which were found in holes in the ceiling of various Second Dynasty tombs that he excavated at Helwan, were the precursors of the false door, intentionally placed in the ceiling when the tomb was originally built. However, current thought is that they were taken from other contexts and were actually re-used in order to block shafts made by tomb robbers and prevent repeated incursions into the burial chambers (Köhler 2003a: 23; Köhler and Jones 2009: 5). Therefore, they could be justifiably viewed, albeit ad hoc and second-hand, as another form of tomb security.

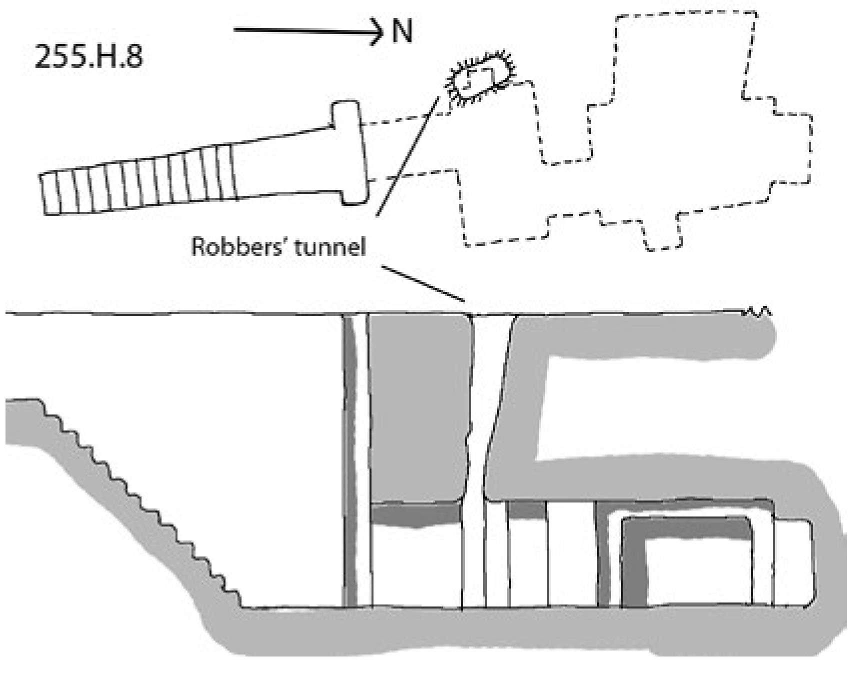


Figure 169 Type IIA Helwan tomb 255.H.8 with its robber's tunnel. (Drawn by the author after Saad 1957, Pln. F)

plans.[813] More recently however, Köhler has also added new tombs to the record.[814]

[813] For details of those without plan drawings, see the following in Saad 1957: 416.H.6, p. 20–1**[171]**; 235.H.8, p. 29 **[172]**; 109.H.9, p. 39 **[179]**; 344.H.6, p. 57 **[NIC]**; 433.H.8, p. 61 **[NIC]**, 757.H.8, p. 61 **[NIC]**, although the latter three do have accompanying plans they do not match the description in the text, see Saad (1957: Plans B, L and K), as Type IIC shaft tombs are shown instead.

[814] Köhler 2003; 2004; 2005; 2008a; 2008b; 2009; 2012 and 2014.

There are twenty-one Type IIA tombs published from Helwan in the catalogue,[815] several of which are without plans and are included on the basis of Saad's description alone. As can be seen on Saad's necropolis maps (Map 10) the majority of the substructures in these tombs are

[815] Like Quibell's (1923) plan of the Saqqara necropolis, at Helwan there are many more Type IIA tombs marked on Saad's (1951) necropolis plans than are published in detail.

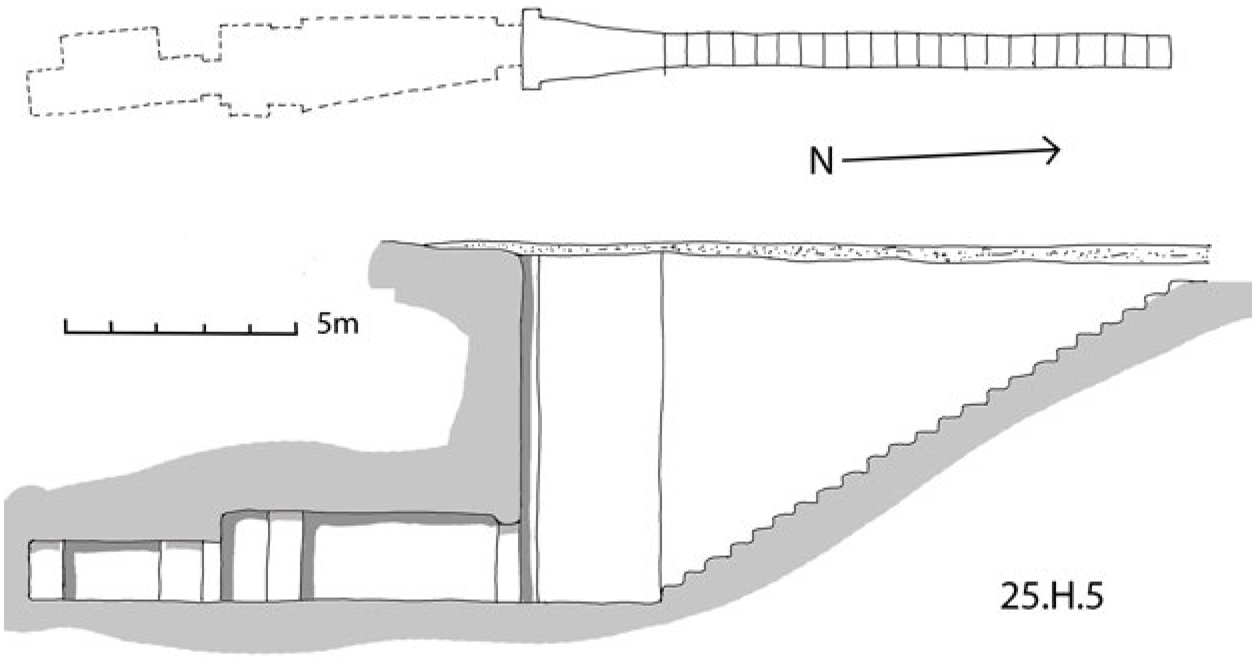


Figure 170 Plan and section of the deep Type IIA Helwan tomb 25.H.5. (Drawn by the author after Saad 1951, pln. 13)

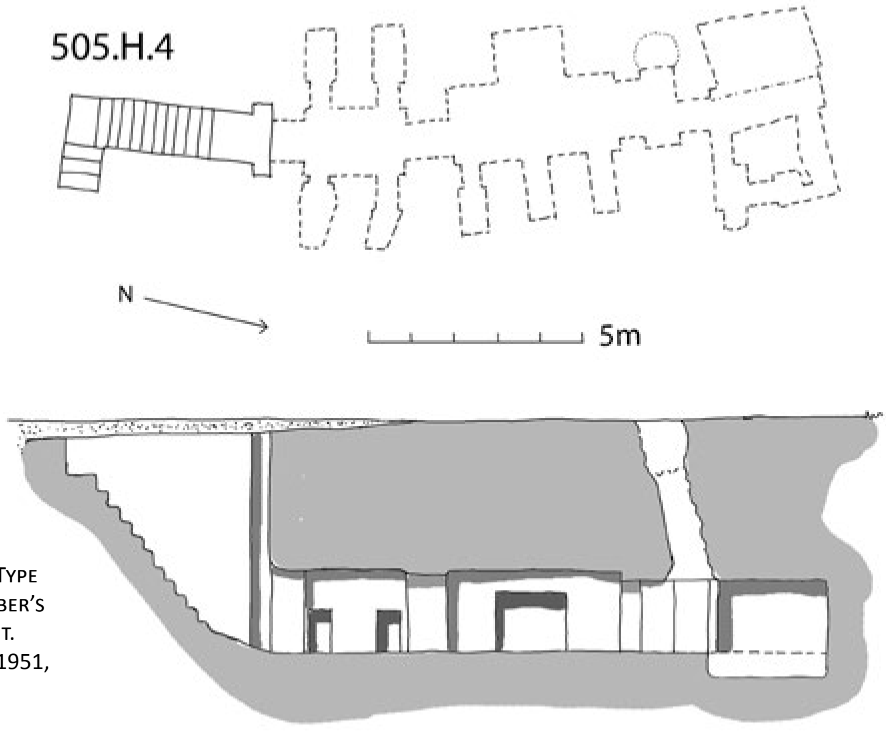


Figure 171 The multichambered Type IIA Helwan tomb 505.H.4. The robber's tunnel can be seen on the right. (Drawn by the author after Saad 1951, pln. 11)

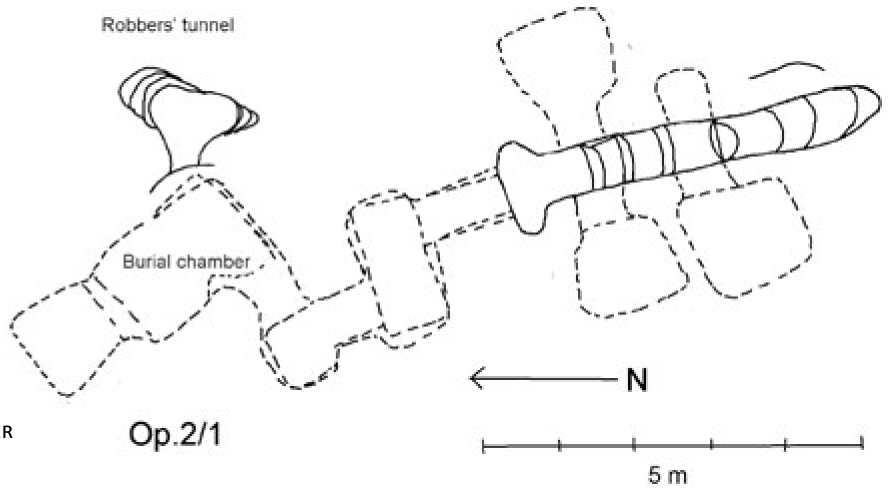


Figure 172 Plan view of Helwan tomb 25.H.4 (Köhler's Op. 2/1). (Drawn by the author after Köhler 2005, pln. 18)

orientated north-south, with their entrances at either end. However, the burials themselves are invariably placed in a loculus on the western side.[816]

A typical layout of this type of substructure was that of 255.H.8 **[163]**. Beyond its entrance portcullis, at a depth of 4.5 m from the surface, a short passage led to a transverse anteroom that connected to a further chamber in which a recess was excavated to hold the burial (Fig. 169).[817] It was protected by a 'gravel' roof approximately 2.3 m thick, but had been plundered via a robber's tunnel from above that had descended into the anteroom.[818]

As at Saqqara, in the search for security some tombs went deep underground, such as in the 10.5 m long substructure of 25.H.5 **[164]**, which was excavated to a depth of 7.8 m,[819] and protected by a gravel cover up to 6.5 m thick (Fig. 170).[820] Although the tomb was robbed, unusually for Type IIA tombs at Helwan there was no robber's tunnel from above, which suggests that its thick roof may have deterred an attack. In comparison the burial chamber at the end of the multichambered substructure of 505.H.4 **[165]**, was protected by a roof almost half the depth at 3.6 m thick (Fig. 171).[821] It had been penetrated by a robber's tunnel from above that precisely targeted the complex below.[822] Similarly, the substructure of tomb 1075.H.8 **[166]** was also protected by a roof approximately 3.4 m thick,[823] but in this instance it had been robbed via two tunnels dug straight down through the gravel.[824] A comparable fate also befell tomb 25.H.4 **[167]**,[825] whose substructure was protected by a roof of 'hard compacted layer of laminated silts', which were approximately 2.4 m thick,[826] through which a robber's tunnel had penetrated the ceiling of the chamber (Fig. 172).[827] Amongst the remaining larger tombs in the catalogue, their roof thicknesses vary between 1.7–2.5 m, and except for Op. 3/1 **[168]**,[828] all of them were

[816] Köhler 2012: 283.
[817] Köhler (2012: *passim*) in her discussion on the orientation of the tombs at Helwan has noted that many of the Type II burial chambers at Helwan have recesses on their west, but has not drawn any definite conclusions as to the significance of this feature.
[818] Saad 1957: 59, plan F.
[819] Saad 1951: 27.
[820] Scaled dimensions from Saad (1951: Plan 13).
[821] Scaled dimension from Saad (1951: Plan 11).
[822] Saad 1951: 15–7, plan 11.
[823] Scaled dimension from Saad (1957: Plan O).
[824] Saad 1957: 61, plan O.

[825] Saad 1951: 6–7, plan 4. This tomb has also been re-numbered Op. 2/1 by the Macquarie University team and published by Köhler (2005: 35–40).
[826] Köhler 2005: 34 and 43. Based on the drawings if one assumes a finished ceiling of approximately 1.8 m (based on Room 7) this would leave a solid roof of around 2.4 m thick.
[827] Köhler 2005: 38–9.
[828] Köhler 2001: 23–5.

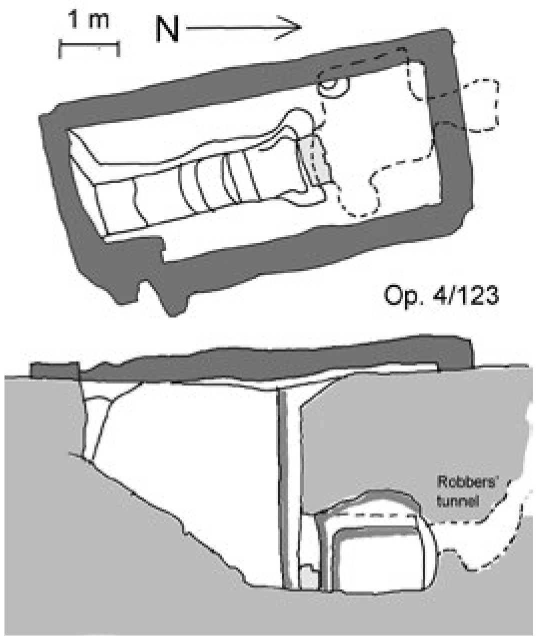


Figure 173 The Type IIA tomb Op. 4/123 at Helwan. The robber's tunnel is at the north end and starts outside the edge of the superstructure.
(Drawn by the author after Köhler 2008a, fig. 2)

robbed in a similar manner. They are 810.H.3 **[169]**, 409.H.8 **[170]**, 416.H.6 **[171]** and 235.H.8 **[172]**.

Many smaller tombs had just a single chamber with a recess. Such as tomb Op. 4/94 **[173]**,[829] where at a depth of 4 m from the surface, a chamber with recess approximately 1.4 m high was excavated, leaving a gravel cover approximately 2.6 m thick. It had been tunnelled into from above in the usual fashion, probably soon after the burial,[830] as well as robbed via its entrance.[831] Nearby Op. 4/123 **[174]** was also robbed in a similar manner (Fig. 173).[832] Amongst the remaining smaller tombs in the catalogue, whose dimensions are available, roofs vary between 1.5–2.1 m thick,[833] and all have invariably been robbed via descending tunnels, with the exception of tomb 68.H.5 **[175]**. They are 473.H.4 **[176]**, 393.H.8 **[177]**, 419.H.8 **[178]**, 109.H.9 **[179]**, 140.H.9 **[180]**, Op. 4/4 **[181]**, Op. 4/19 **[182]** and Op. 4/88 **[183]**.

In comparison to Saqqara, it is apparent from the number of robbers' tunnels that penetrate the weaker geology of this necropolis that the roofs of these burial chambers were more vulnerable to attack than their entrances. In addition, from the accuracy of their tunnelling, it is obvious that the perpetrators were familiar with the layouts of the tombs, which suggests their involvement with their building or the subsequent funeral. Like the Type I tombs at Saqqara, greater size and depth did not guarantee safety at Helwan either; in fact it undoubtedly attracted attention.[834]

Tarkhan

Only two simple staircase tombs are known from Kafr Amar, both have a small west facing burial chamber; just large enough to contain a short wooden coffin for a contracted burial.[835] The protective rock roof of the 3.17 m deep grave 240 **[217]**, was approximately 2.3 m thick (Fig. 174) and that of the 4.57 m deep grave 545 **[218]** was about 3.7 m. Both tombs were found intact.[836]

Lahun

Among the thirty Type IIA tombs at the Bashkatib Cemetery,[837] there are eight examples included in the catalogue. Their substructures often included a side recess and were carved in the soft marl below the upper limestone strata of the hill into which they were dug, which varied in thickness according to location.[838] They can be dated to the Second Dynasty,[839] although Petrie placed them earlier.[840] A typical example is tomb

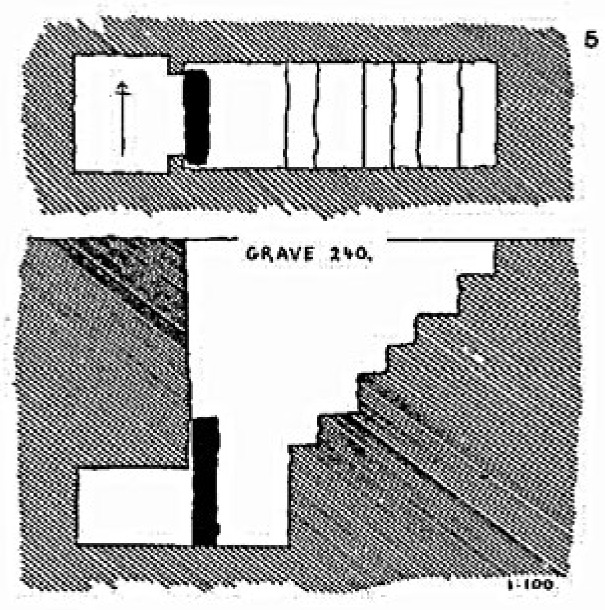


Figure 174 The Type IIA Grave 240 at Kafr Amar. (Petrie and Mackay 1915, pl. XII.5)

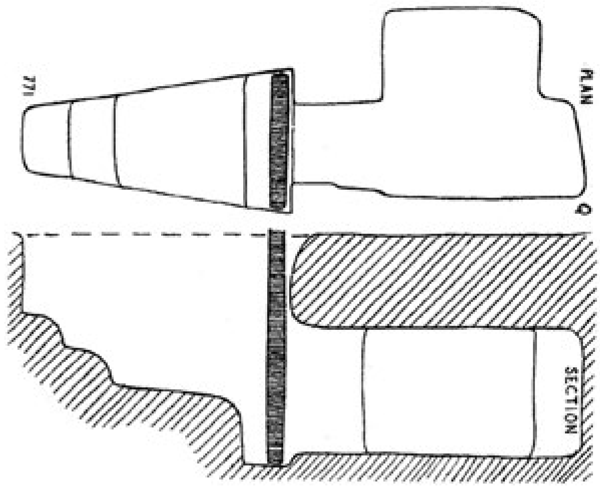


Figure 175 Plan and section of tomb 771 at the Bashkatib Cemetery with its portcullis and 0.75 m thick limestone roof. (Petrie *et al.* 1923, pl. XLII, fig. Q)

[829] Köhler 2007: 193–4.
[830] Judging by the lack of intrusive material in the tunnel and backfill (Köhler and Jones 2009: 13).
[831] Dimensions extrapolated and scaled from plan by Köhler (2007: Fig 2).
[832] Köhler 2008a: 174.
[833] Dimensions seem unreliable for 473.H.4 and 393.H.8, accordingly in the tomb catalogue they are either scaled from the drawing in the former case or extrapolated from Saad's text in the latter case – see note 812.
[834] Köhler (2004: 297) suggests that the larger tombs at Helwan were often robbed soon after the burials were made, sometimes even several times.
[835] Petrie and Mackay 1915: 14–5.
[836] Petrie, Wainwright and Gardiner 1913: 27; Petrie and Mackay 1915: 10, 14–6 and Tomb register pls. XVI–XVII.
[837] See Petrie, Brunton and Murray 1923: Tomb register pl. XLVI.
[838] Petrie 1923: 23. He (1923: 23) described the method of their construction: '…chamber tombs were usually cut where a foot or two of hard limestone covered a softer marl. The chambers were hewn in the marl, and the limestone formed the roof.' Further: 'Where the limestone was deeper, on the hillock to the west and the rise to the north, the descent to the softer stratum was longer…'
[839] See Chapter 1.5 'Dating' and notes 78–9.
[840] Petrie, Brunton and Murray 1923: 24.

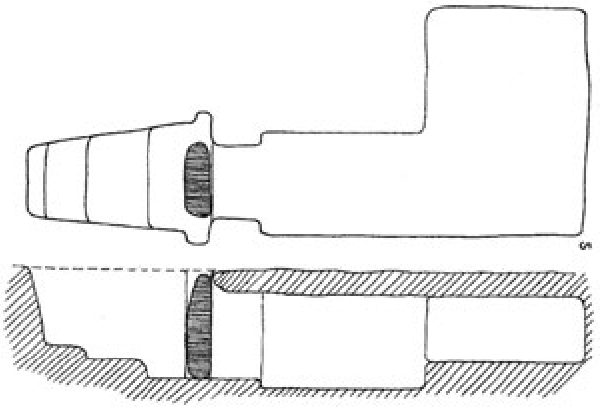


Figure 176 Plan and section of tomb 821 at the Bashkatib Cemetery, Lahun with its thin 0.15 m thick limestone roof. (Petrie *et al.* 1923, pl. XLII, fig. S)

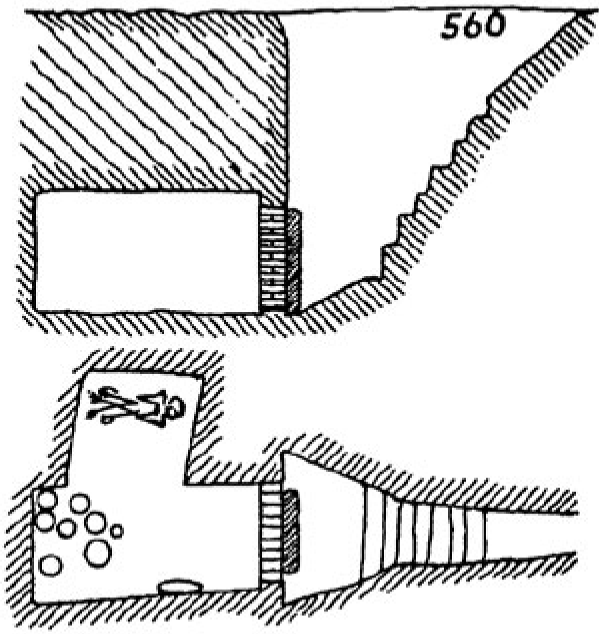


Figure 177 The type IIA tomb 560 at Sedment. (Petrie and Brunton 1924, pl. LXXXI)

771 **[253]**, whose burial chamber floor was about 1.8 m from the surface and was protected by a limestone roof approximately 0.75 m thick (Fig. 175). Others were less well protected by shallower strata, such as tomb 806 **[254]**, whose roof was 0.5 m thick, tomb 734 **[255]** at 0.25 m thick, and tomb 821 **[256]**, which was only 0.15 m (Fig. 176).[841] Some burial chambers were deeper and better protected, such as tombs 760 **[258]**, 785 **[259]**, 770 **[260]** and 740 **[261]**, whose roofs were 3.33 m, 2.74 m, 1.3 m and 0.96 m thick respectively.[842] Singularly, although no further detail is available, the portcullis emplacement of tomb 850 **[NIC]** reached a depth of 6.1 m,[843] which suggests a correspondingly deep and well protected burial chamber.[844] There seems to be no evidence of these burial chambers having been penetrated by robbers' tunnels,[845] which would suggest that they were successfully protected from attack by their limestone roofs. One can therefore suggest that their most vulnerable point must have been their entrances.

Sedment

There are six stairway tombs illustrated in Petrie and Brunton's publication of Sedment,[846] which were cut into the surrounding gravel and marl strata,[847] amongst which the intact tomb 560 **[266]** is the best reported (Fig. 177). Beyond its portcullis, the floor of its 1.37 m high substructure and recess was excavated to a depth of around 3.5 m, leaving a protective roof approximately 2.1 m thick.[848] The remaining tombs 526 **[267]**, 559 **[268]**, 568 **[269]**, and 569 **[270]** are of a similar design, with roofs varying between 0.5–3.3 m thick. However, exceptionally the 2.13 m high burial chamber of tomb 94 **[271]** was set at a depth of 7.62 m, giving it approximately 5.5 m of cover.[849] Like the tombs at Lahun, there is no evidence amongst those tombs that were robbed, nos. 94, 568 and 569, that they had been entered in any other way than via their stairways.

Qau and Badari

South of Sedment, there are four Type IIA tombs cut in the gravel and marl of the cemetery at Qau,[850] and one in the limestone detritus of Badari.[851]

[841] Tomb register pl. XLVI. The depth of cover of tomb 820 **[257]** is unknown.
[842] Petrie, Brunton and Murray 1923: 21–4, Tomb register pl. XLVI.
[843] No drawing is available, nor is it listed in the tomb register (Petrie, Brunton and Murray 1923: 23).
[844] Petrie, Brunton and Murray 1923: 22–4, pl. Tomb register XLVI.
[845] Although looking at the drawing of tomb 734 **[255]**, with its broken 'hatch lines', it appears the roof may have collapsed (Petrie, Brunton and Murray 1923: pl. XII, T), whether this was due to natural causes or disturbance by plunderers is unknown.
[846] Petrie and Brunton's (1924: pl. XXXVI) tomb register lists eight 'stairway' tombs dating to the Second Dynasty, but only five are drawn in detail. Some, such as tombs 568 **[269]** and 569 **[270]** (Petrie and Brunton 1924: pl. LXIII), are included in those plans but do not appear in the tomb register. There are also a further seven stairway tombs at Mayana that had been re-used in the Eighteenth Dynasty but no drawings are available (Petrie and Brunton 1924: 14–5).
[847] Brunton (Petrie and Brunton 1924: 14) described the topography near Mayana as being of 'undulating gravel' and 'there is no good rock near the surface, and the best stratum for tombs is of grey-black marl which is only available here and there.'
[848] Petrie and Brunton 1924: 2, pls. I, 1–17, II and LXXXI; Petrie 1999b: 30, 35–6; 38–9.
[849] Petrie and Brunton 1924: Pls. XXXVI and LXXXI.
[850] One of these, Tomb 438, is excluded from the discussion due to lack of information.
[851] Brunton (1927: 3) described the local geology: 'The soil is unsuitable for graves, being a rather loose alluvial gravel for some depth. The substratum of marl is too deep to be reached by the grave-diggers, and is waterlogged except on the hillside below the rock tombs at the northern horn of the bay. As there was no high ground available, the main Qau cemeteries were placed on the rise to the north of the main wadi, to the south and east of the present village…' And referring to Badari: 'This strip is composed of a series of spurs or foothills of limestone detritus.'

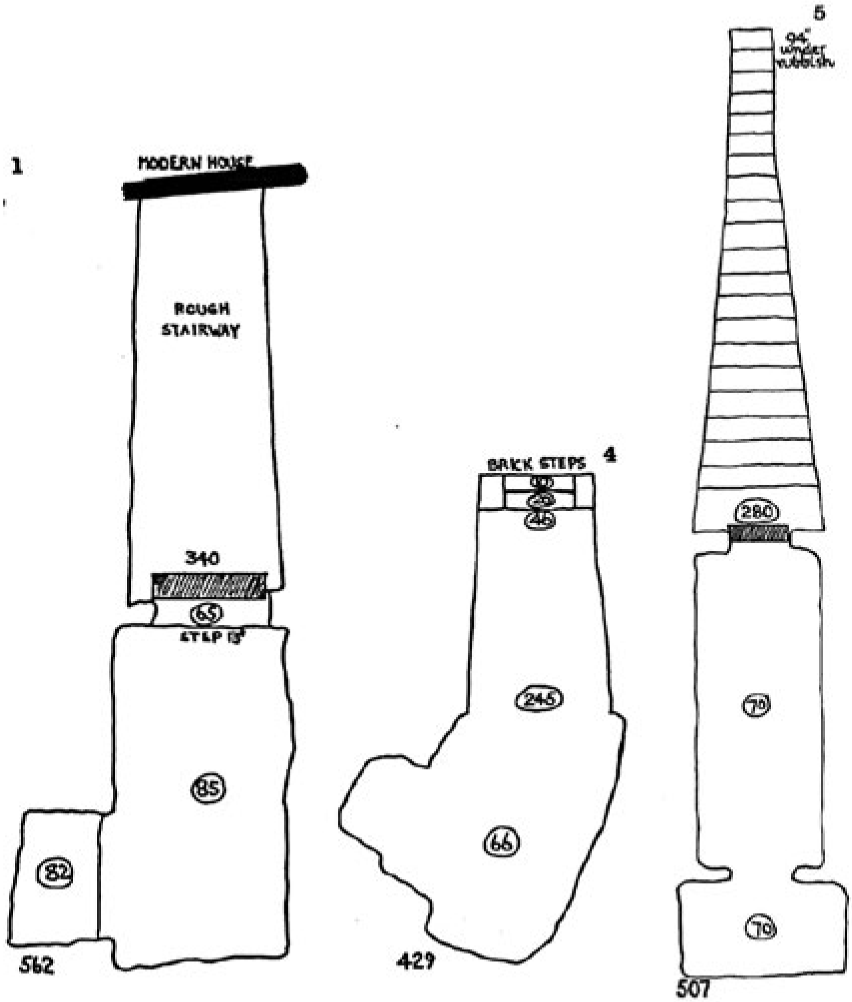


Figure 178 The Type IIA burial chambers of tombs 562, 429 and 507 at Qau. (Brunton 1927, pl. XII, 1, 4 and 5) Courtesy of the Petrie Museum of Egyptian Archaeology.

At Cemetery 400 in Qau, in the search for security, some burial chambers were excavated to considerable depths, such as that in the 8.63 m deep tomb 562 **[274]**, which was protected by a 6.48 m thick gravel roof. Slightly less well defended were the chambers of tombs 429 **[275]**[852] and 507 **[276]**, whose roofs were 4.5 m and 5.35 m thick respectively (Fig 178).[853] Further afield at Spur 5 in Cemetery 3100 at Badari, the 1.6 m high burial chamber of tomb 3112 **[278]**[854] was only defended by a 3.12 m thick cover of the local limestone debris (Fig. 179).[855]

Here at Qau and Badari, the great depth of some of the burial chambers may have been the result of the search for strata solid enough in which to safely excavate a burial chamber. Equally, it could

[852] Porter and Moss 1937: 15.
[853] Brunton 1927: 11–2 and 15, tomb register pl. X. The burial chamber height of tomb 438 **[277]** is unpublished but its floor was 3.04 m from the surface, thus implying an even thinner depth of cover (Brunton 1927: 15. pl. X).
[854] Porter and Moss 1937: 6.
[855] Brunton 1927: 3, 14, 16; tomb register pl. X.

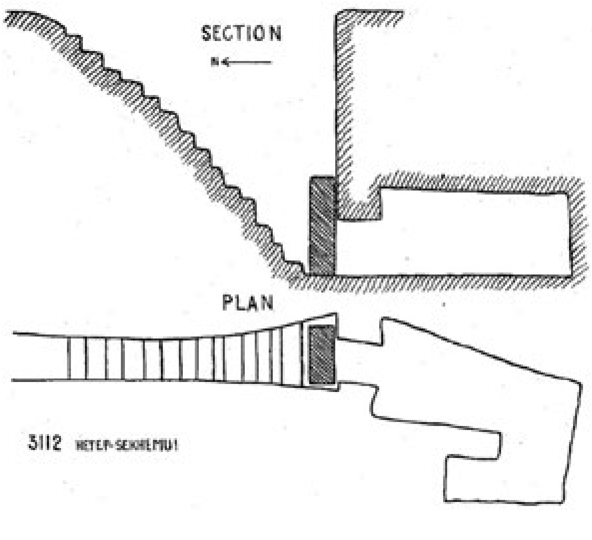


Figure 179 The Type IIA tomb 3112 at Spur 5 in Cemetery 3100 at Badari.
(Brunton 1927, pls. XXIV)
Courtesy of the Petrie Museum of Egyptian Archaeology.

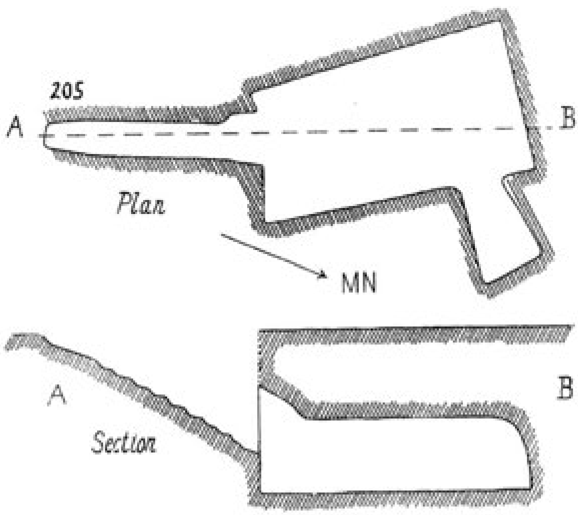


Figure 180 The Type IIA tomb 205 at Armant.
(Myers and Fairman 1931, pls. XVI) Courtesy of the Egypt Exploration Society.

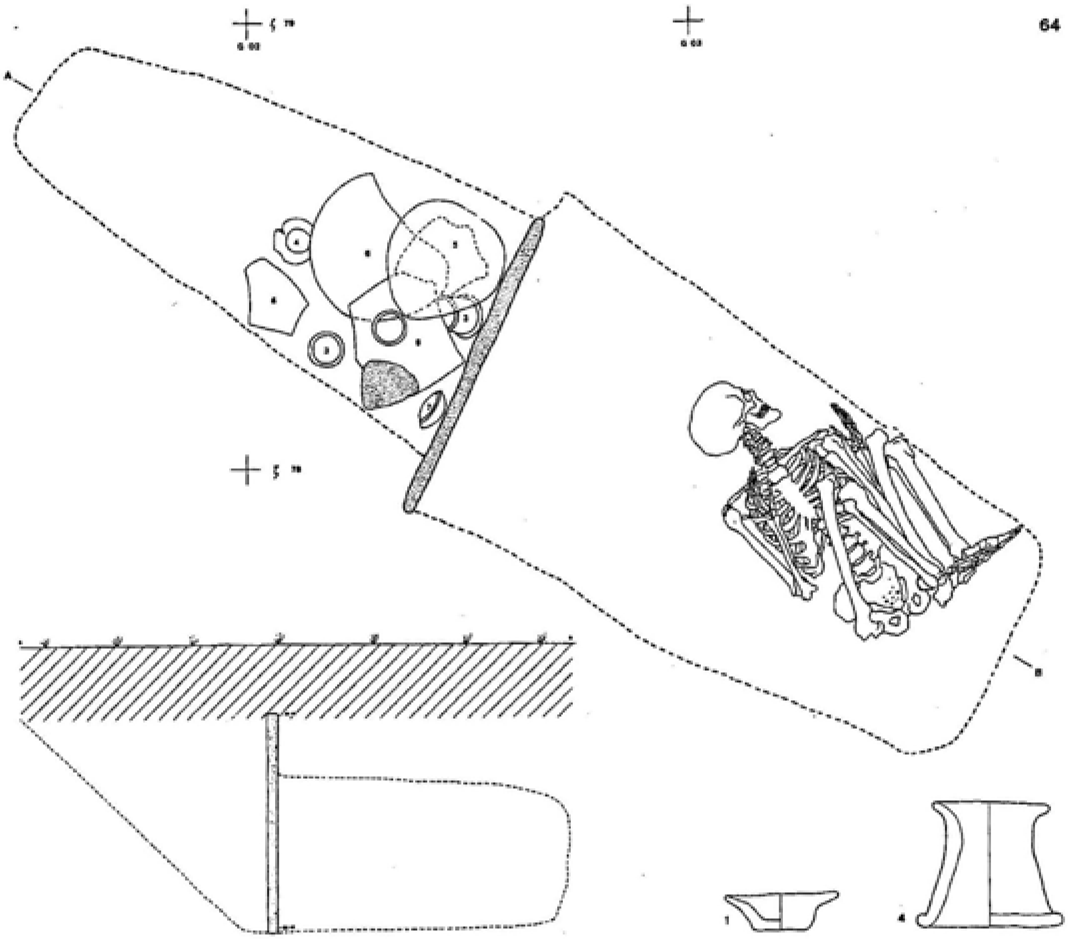


Figure 181 The intact tomb 64 from Cemetery 24 at El-Kab.
(Hendrickx and Van Vossum 1994, pl. LIV)

have been a compensatory depth chosen because of the vulnerability of the local geology to tunnelling, without more accurate information it is difficult to be more precise.

Armant

Four Type IIA tombs have been published from Cemetery 200 at Armant. [856] Their burial chambers take the usual form with a lateral recess, and were presumably cut into the alternating layers of local gravels and fine grained sedimentary rocks that make up the 'Armant formation'.[857] A typical example is tomb 205 **[335]**, whose 1.8 m high burial chamber's floor was set down 4.2 m from the surface and was protected by a solid roof 2.4 m thick (Fig. 180). Similarly, the roofs of tombs 206 **[336]**, 207 **[337]** and 208 **[338]** were 2.8 m, 2.1 m, and 1.2 m respectively.[858]

El-Kab

There are two intact small staircase tombs identified at El-Kab that date to the Second Dynasty; most likely cut into the surrounding Nile silts that form the 'El-Kab formation'.[859] Tomb St. 2 **[NIC]** was excavated by Quibell and is described by him as '…the smallest tomb of the kind that I have seen.' [860] Apparently, its stairway descended for 1 m and led to a burial chamber roughly 1 m square with a very shallow roof, whose feeble defences Quibell succinctly described: 'a robber had only to pierce 20 cm. of soil to get into the chamber through the roof'.[861] The second tomb, known as Grave 64 **[343]**, was found in Cemetery 24, amongst the earlier tombs of the Naqada IIIA periods (Fig. 181).[862] Its burial chamber's floor was set at 1.3 m from the surface and was protected by a roof approximately 0.7 m thick.[863]

Although at first glance the shallow depth of these burial chambers would suggest an increased level of

[856] Myers and Fairman 1931: 224, pl. XLI.
[857] Tawadros 2001: 159.
[858] Scaled from drawings by Myers and Fairman (1931, pl. XLI).
[859] Tawadros 2001: 163.
[860] It is dated to the reign of Raneb by a steatite palette found in the tomb (Wilkinson 1999: 333).
[861] Quibell 1898: 7. This piece of information suggests that no trace of a superstructure was found.
[862] Hendrickx and Van Rossum 1994: 152 and 184.
[863] Scaled from drawing by Hendrickx and Van Rossum (1994: pl. LIV).

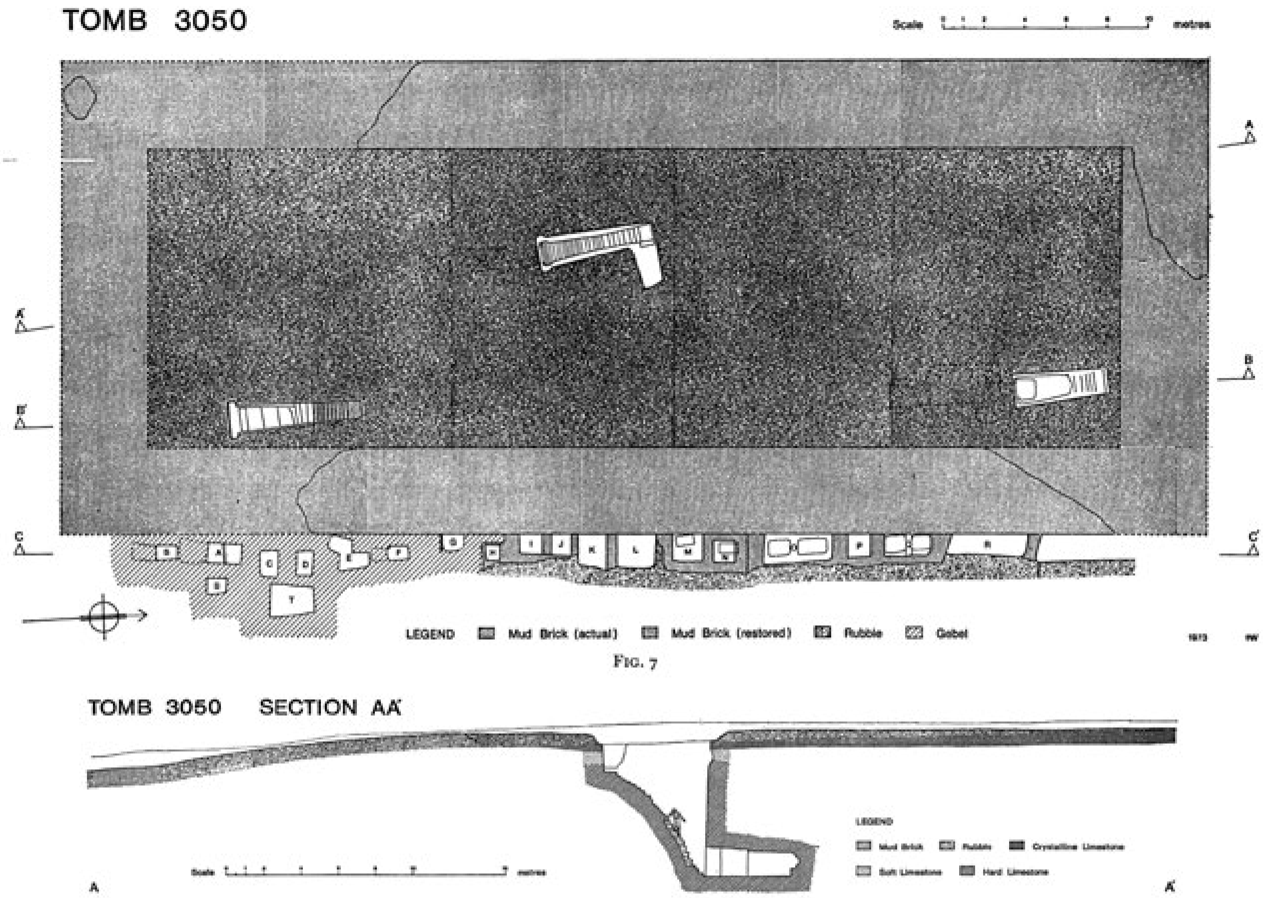


Figure 182 The Type IIA + IIA-C tomb S 3050 from Saqqara, showing the Type IIA burial chamber and descent in section. (NB. The section drawing is reversed by the draughtsman) (After Martin 1974, figs.7 and 8a) Courtesy of the Egypt Exploration Society.

vulnerability to robbery, in fact it may be their very small size and insignificance which eventually saved them.

The Third Dynasty

There are a limited number of Type IIA tombs from the Third Dynasty whose burial chambers are well reported enough to include in the discussion, therefore the gaps in the record are more due to this lack of information than the nonexistence of the tomb type itself.

Saqqara

There are only three Third Dynasty Type IIA tombs at Saqqara that have sufficient data available to be included in the analysis, two of which are in the catalogue. The first is the single tomb S 2301 **[NIC]**, whose small burial chamber floor was set 3.8 m below the surface and was protected by a rock roof 2.8 m thick.[864] The remaining two are 'twin mastabas',[865] the smallest of which is the Type IIA + IIA tomb S 2445 **[117]**. The floor of its northern burial chamber was 3.4 m deep and it was protected by a roof 2 m thick, whereas its southern chamber was unfinished and unused.[866] Far better defended was the northern burial of tomb S 3050 **[118]**, which is a large Type IIA + IIA-C 'twin mastaba', whose centrally placed stairway led to a single main burial chamber that was carved into the hard limestone (Fig. 182). Its floor was set at 9 m from the surface,[867] and well protected by a rock roof approximately 7 m thick.[868]

Although fewer examples are available, it is clear that like their Second Dynasty predecessors, there were wide variations in the level of protection offered to these burial chambers, which were dependent on the depth of their substructures.

Badari

There are three large Third Dynasty[869] stairway tombs located in the Badari Cemetery 3200 at Spur 6 (Fig.

[864] Quibell 1923: 29.
[865] This is a term used to describe a single superstructure with twin offering niches serving two separate substructure systems and burials, usually of the tomb owner and spouse (Reisner 1936: 285).
[866] Quibell 1923: 41; Reisner 1936: 162.
[867] Martin 1974: 23.
[868] Scaled dimension from Martin (1974: fig. 8A).
[869] Brunton 1927: 14; Swelim 1983: 120.

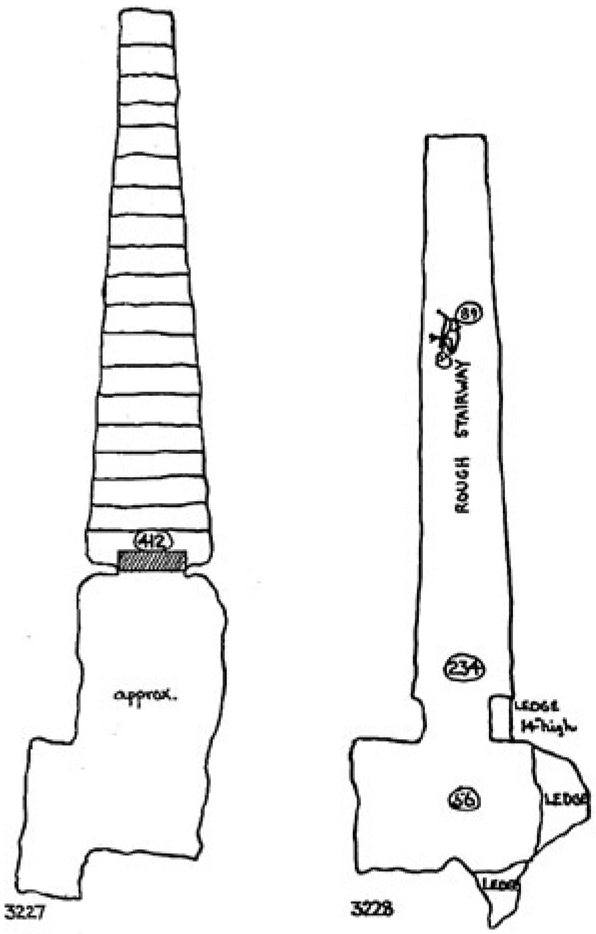


Figure 183 Two of the three Third Dynasty Type IIA tombs at Badari – tombs 3227 and 3228 (Brunton 1927, figs. XII.1 and XII.6) Courtesy of the Petrie Museum of Egyptian Archaeology.

183).[870] Although little is known about the burial chamber of tomb 3229 **[279]** it can be ascertained that its floor was set 6.09 m below the surface and it was protected by a 4.44 m thick solid roof.[871] Tomb 3228 **[280]** was adjacent to it, and unusually had two burial chambers set one above the other. The floor of the lowest chamber was 5.94 m from the surface and the upper 3.6 m, leaving the higher chamber protected by a 2.23 m thick roof and the lower by only the 0.92 m thick dividing layer between them. The upper burial was undisturbed, but the lower had been plundered via a tunnel from the neighboring tomb 3229. Lastly, the floor of tomb 3227 **[281]** was set at the considerable depth of 10.46 m from the surface.[872] Assuming that its burial chamber height was similar to that of its neighbours, it could possibly have been the best protected of all, with a roof approximately 9 m thick.

Therefore, it appears that the builders of these tombs, like those of the nearby Second Dynasty at Qau, were also prepared to go to considerable depths in the search for increased security within the soft limestone detritus that surrounded them.

Naga el-Deir

Four staircase tombs are known from cemetery 500–900 at Naga el-Deir.[873] The simple burial chambers of N 574 **[303]**, N 599 **[304]** and N 689 **[305]** were protected by gravel roofs 4.5 m, 3.5 m and 5.75 m thick respectively; all had been robbed, but their was no evidence of

[870] Brunton 1927: 3.
[871] Brunton 1927: Tomb register pl. XI.
[872] Brunton 1927: 14 and Tomb register Pl. XI.
[873] Reisner 1932: 170.

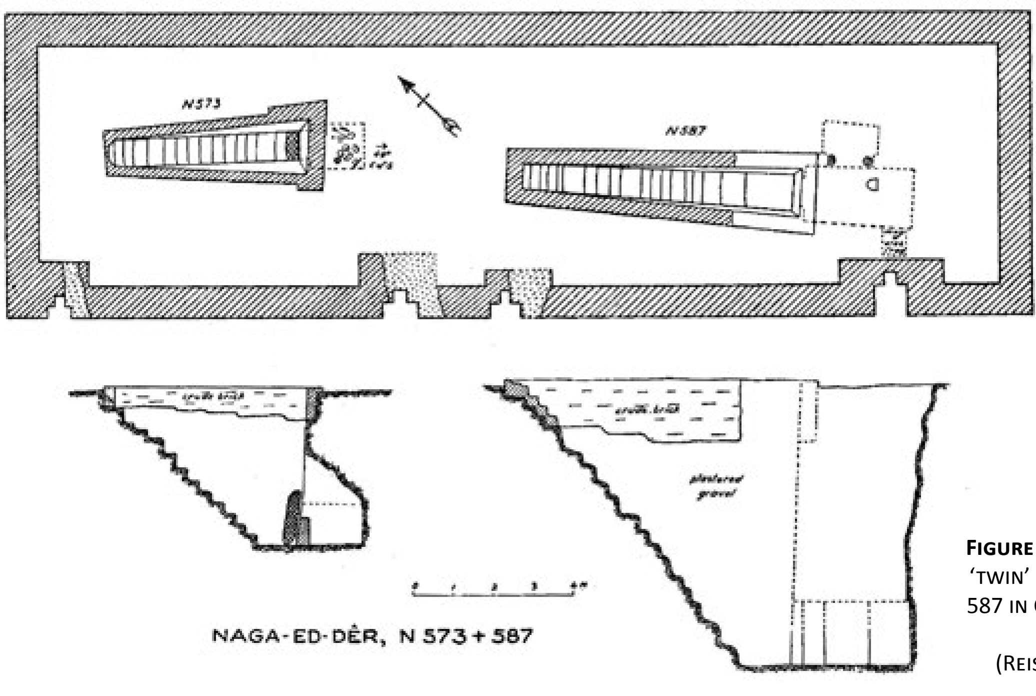


Figure 184 The Type IIA + IIA 'twin' mastaba N573 and N 587 in Cemetery 500–900 at Naga el-Deir (Reisner 1936, fig. 86)

tunnelling.[874] However, the 'twin' mastaba N 573 + 587 **[306]** contained two burial chambers (Fig. 184). The small northern burial chamber (N 573) had its floor set at a depth of 3.75 m and was protected by a gravel roof approximately 2.75 m thick, whereas at the tomb's southern end, the larger chamber and recess (N 587), which can be attributed to the tomb's principle owner, was set far further down at a depth of 7.1m and better defended by 5.1 m of cover.[875] Both however were still robbed, and there is evidence that N 573 had been entered by breaking through its roof over the portcullis.[876]

Like the Third Dynasty stairway tombs at Badari, these burial chambers relied on the depth of the gravel for their protection. That in this cemetery it was effectively used for such a purpose is confirmed by an apparent lack of robbers' tunnels, which suggests the main stairway must have been their preferred route.

Reqaqnah

There are two Type IIA tombs from the necropolis of Reqaqnah that are contemporary with the nearby tombs at Beit Khallaf.[877] Their multi-chambered substructures are substantially larger than those in Naga el-Deir and are excavated in the compact gravel strata which underlie the looser gravel at the surface.[878] The floors of the three chambers of R 1 **[315]** were set at about 8 m from the surface (Fig. 185),[879] and were protected by a gravel roof approximately 6.2 m thick, whereas those of R 40 **[316]** were set at 9 m below the surface,[880] and protected by a roof approximately 7.2 m thick (Fig. 186).[881] That this gravel was vulnerable to tunnelling is evident from Garstang's description of the fate of R 40, which he described as having been robbed via a 'hole' from above.[882]

Beit Khallaf

Just south of Reqaqnah, the tombs of Beit Khallaf also have multi-chambered substructures, some of which were on a much larger scale and far better protected than their neighbours to the north. At the end of the descent of the enormous tomb K1 **[319]**[883] an eighteen chambered complex in excess of 137 m^2 stretched for 25 m south

[874] Scaled dimensions from Reisner (1932: figs. 137b, 157 and 196).
[875] Scaled dimensions from Reisner (1932: fig. 131).
[876] Reisner 1932: 218.
[877] Scaled dimension from drawing by Garstang (1904: pl. IVa).

[878] Garstang 1904: 22.
[879] Garstang 1904: 21–2; Reisner 1936: 179.
[880] Garstang 1904: 22–3; Reisner 1936: 180.
[881] Scaled dimension from drawing by Garstang (1904: pl. IVb).
[882] Garstang 1904: 22. As indeed was tomb R2 **[NIC]** at the same site (Garstang 1904: 30).
[883] Porter and Moss 1937: 37.

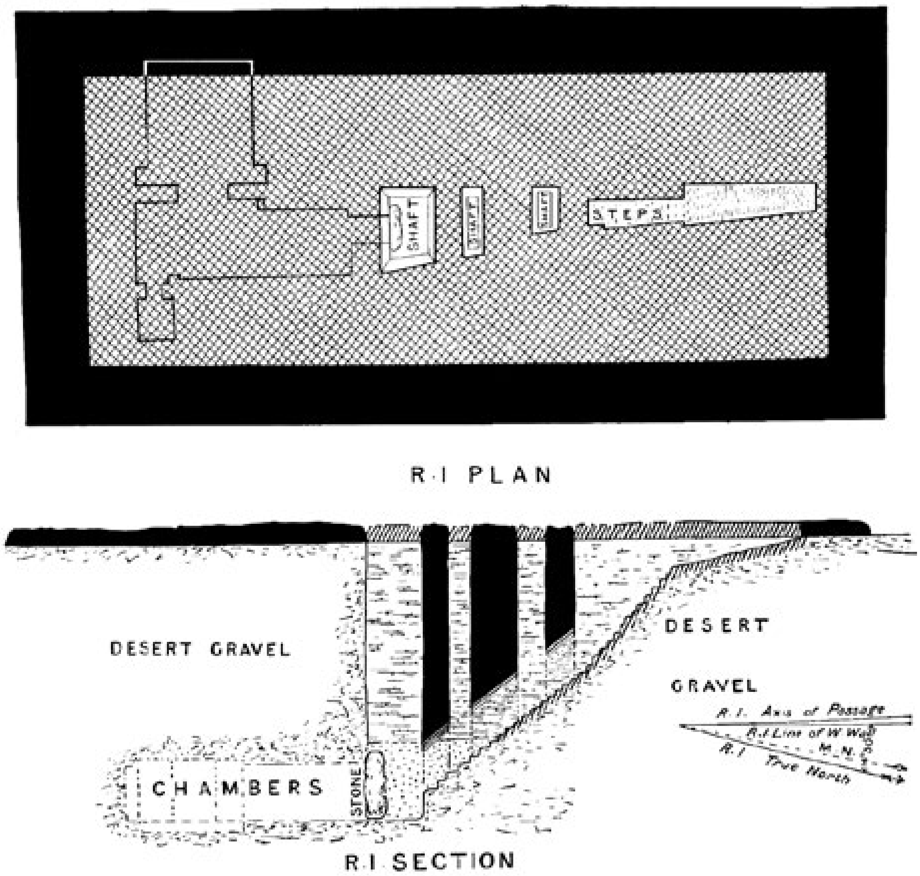


Figure 185 The multichambered Type IIA tomb R1 at Reqaqnah. (Garstang 1904, pl. IVa)

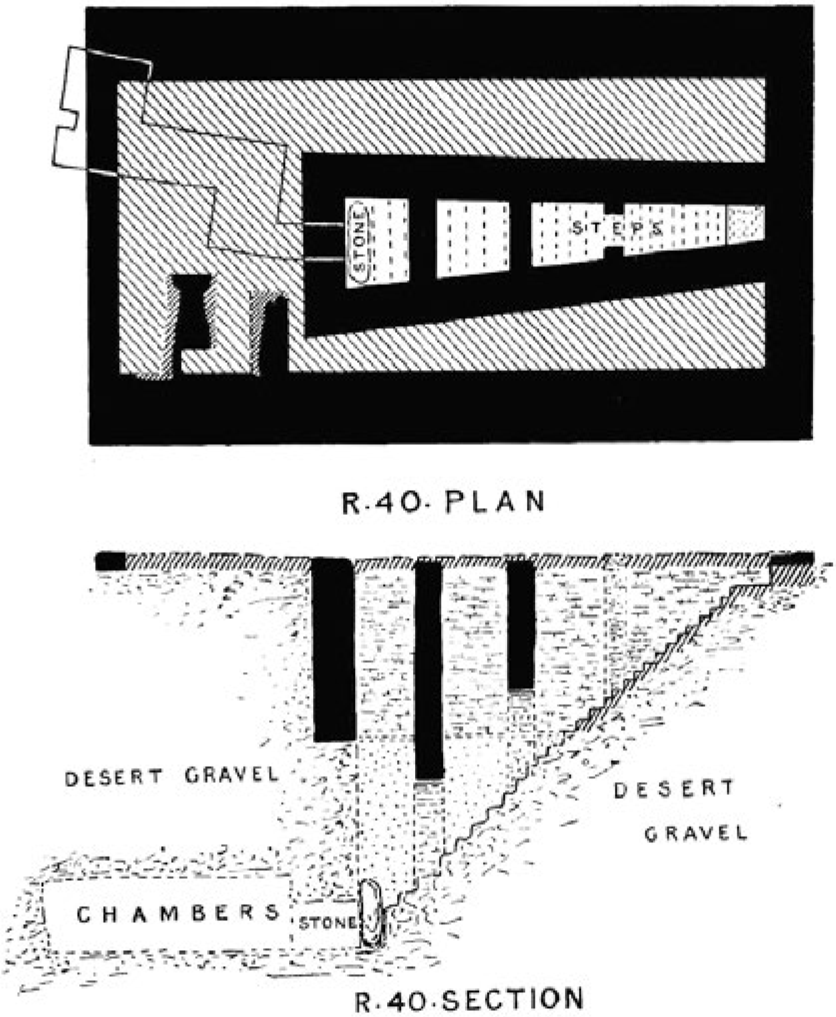


Figure 186 The multichambered Type IIA tomb R 40 at Reqaqnah. (Garstang 1904, pl. IVB)

of its entrance (Fig. 187). Cut into the desert gravel, the floor of its main burial chamber was set at 19.7 m from the surface,[884] and would have been protected by a gravel roof approximately 16.7 m thick.[885] Exceptionally for this necropolis its walls had been lined with large blocks of stone, which could have arguably provided protection against lateral tunnelling, but were probably there for aesthetic reasons, as the roof and remainder of the substructure were not similarly lined and remained vulnerable. Despite the great depth, the burial chamber was still plundered, as Garstang described: 'After making trial attempts in every likely place, these, most skilful of all tombrobbers, had descended by means of a hole so small that the workmen had declared it to be the work of a jackal.'[886]

Nearby, but on a slightly smaller scale, tomb K2 was a Type IIA + IIA 'twin mastaba' **[320]**.[887] The floors of its multi-chambered substructures in its northern and southern complexes were set at 11.5 m and 13.4 m deep respectively (Fig. 188).[888] Unusually for a 'twin mastaba', this means that the secondary burial chamber in the north was better protected with its 12 m thick gravel roof than the southern primary chamber with its 9 m thick roof.[889] In addition the former's smaller area would have made it harder to find by *sondage*.[890] Regardless of this advantage it appears that it was never used, leaving only the northern chamber to be plundered in antiquity.[891]

The remaining three Type IIA tombs of the group, K3 **[321]**, K4 **[322],** and K5 **[323]** contained single

[884] Garstang 1903: 10; Reisner 1936: 174.
[885] Scaled dimension from drawing by Garstang (1903: pl. VII).
[886] The presence of two Roman amphorae suggests a possible date for the robbery (Garstang 1903: 3).

[887] Porter and Moss 1974-81: 437.
[888] Garstang 1903: 11–2; Reisner 1936: 174–6.
[889] Approximate scaled dimensions from drawing by Garstang (1903: pl. XVIII).
[890] 50.3 m2 in comparison to 80.4 m2 in the southern substructure (Reisner 1936: 174–6).
[891] Garstang 1903: 12.

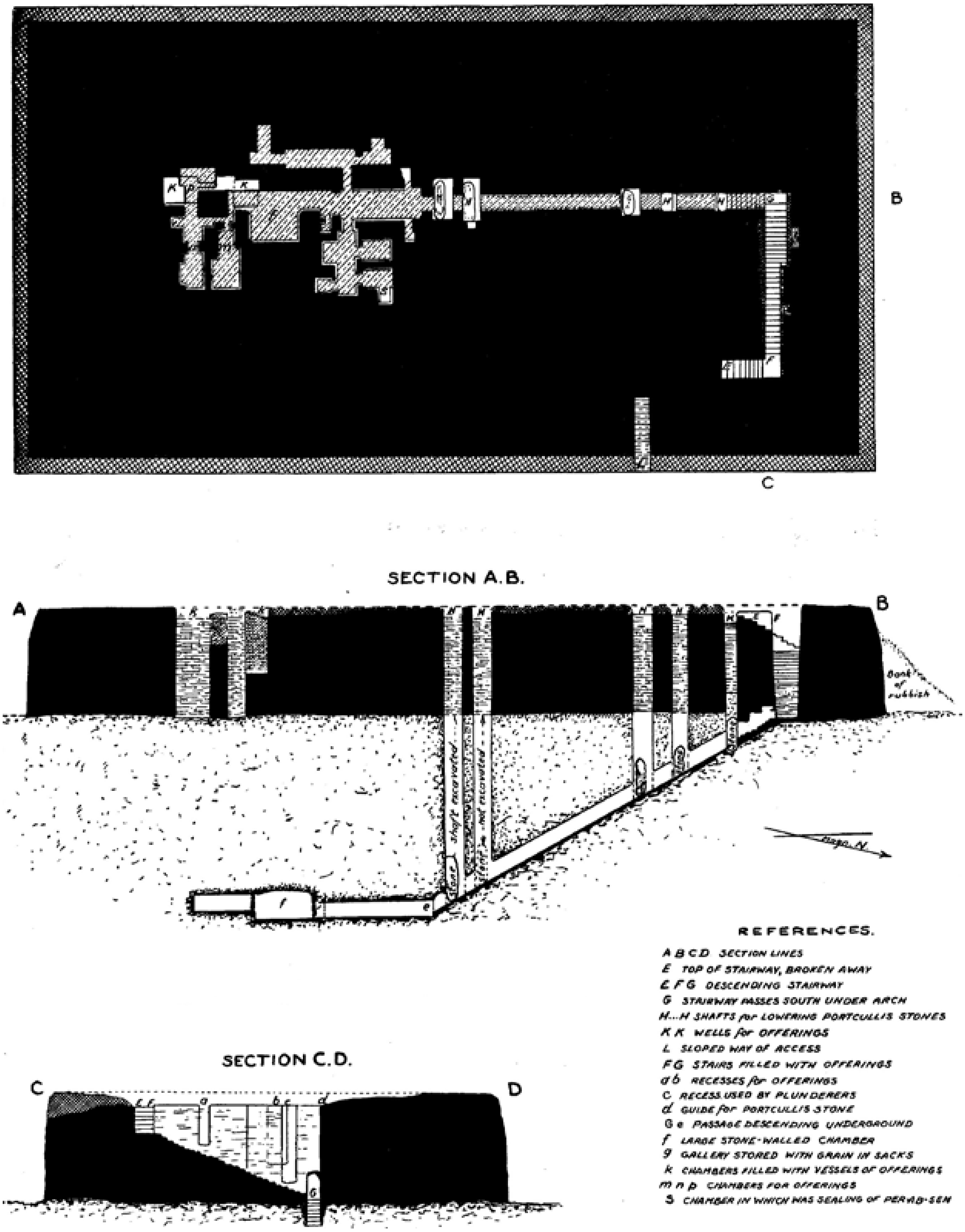


Figure 187 The enormous Type IIA tomb K1 at Beit Khallaf with its 'U' shaped stairway, six portcullises and stone lined burial chamber.
(Garstang 1903, pl. VII) Courtesy of Bernard Quaritch Ltd.

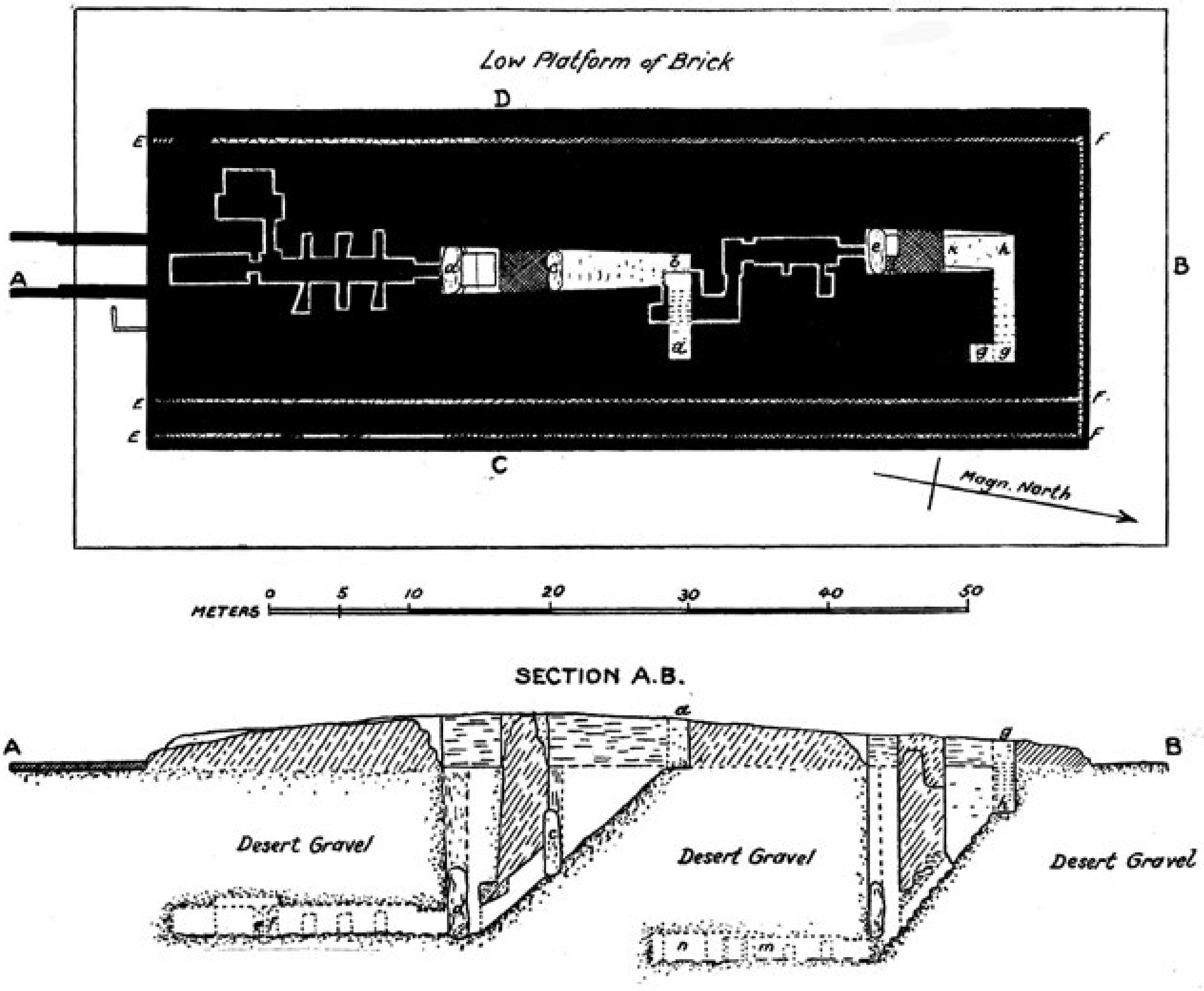


Figure 188 The Type IIA + IIA 'twin mastaba' tomb K2 at Beit Khallaf. (Garstang 1903, pl. XVIII) Courtesy of Bernard Quaritch Ltd.

interments in their multi-chambered substructures.[892] Varying in size, their burial chambers were protected by roofs approximately 8 m, 6 m and 7.5 m thick correspondingly.[893] Although no details are available concerning the fate of the burials of K3 and K4, apparently K5 had been robbed via a vertical tunnel from above.[894]

Despite the great depths to which these burial chambers had been dug, both K1 and K5 graphically illustrate that the surrounding gravel of the necropolis was still not resistant enough to protect them from robbers determined enough to tunnel through it.

The early Fourth Dynasty

The number of Type IIA tombs is greatly reduced in the early Fourth Dynasty, with only three included in the catalogue.

[892] Garstang 1903: 14–6.
[893] Scaled dimensions from drawing by Garstang (1903: pl. XXV).
[894] Garstang 1903: 12.

Reqaqnah

There is a single Type IIA tomb published from Reqaqnah, but no details are available of the depth or height of the burial chamber of tomb R75 **[317]**,[895] which was presumably gravel cut, like those of its younger neighbours discussed above.

Ballas

Of the two staircase tombs found at Ballas from this period,[896] only one has an excavated burial chamber, the other, tomb 353 **[330]**, comprised of only a 6 m deep stairway with a burial made at its foot,[897] which suggests that it is an unfinished stairway rather than a complete tomb (Fig. 189).[898] However, tomb 201 **[331]** took the

[895] Garstang 1904: 31–2.
[896] These tombs are dated to between the Third and Fourth Dynasties (Hendrickx 1998: 119, tab. 4).
[897] Petrie and Quibell 1896: 4.
[898] Rather like the incomplete Second Dynasty stairways found by Lauer (1939: 36–8, fig. 67) in the Step Pyramid complex, which he suggested were the entrances to unfinished tombs.

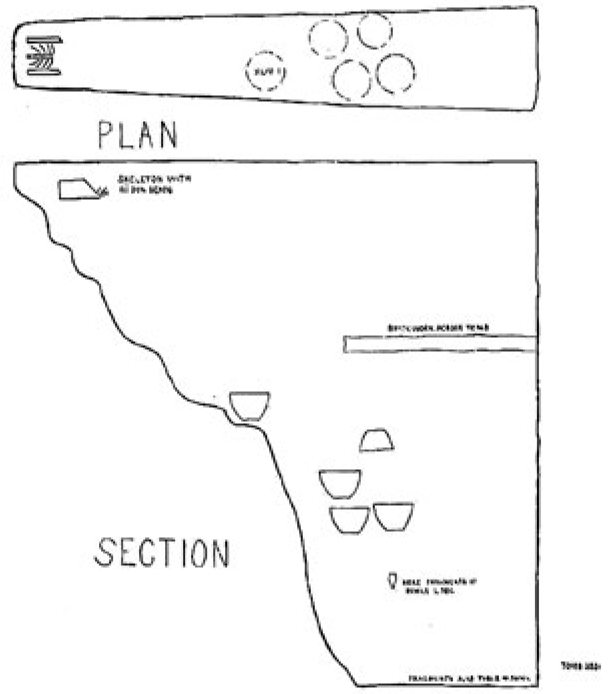


Figure 189 Stairway tomb 353 at Ballas. (Quibell 1896, pl. IV)

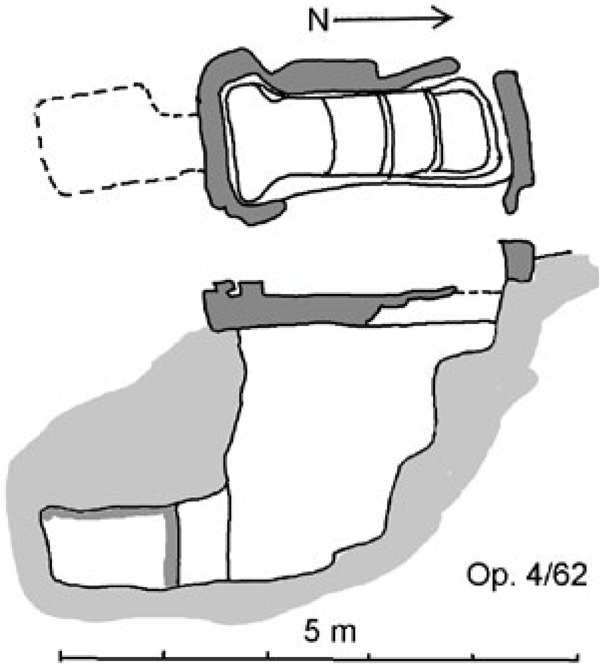


Figure 190 The Type IIB 'deep' staircase tomb Op. 4/62 at Helwan. (Drawn by the author after Köhler 2008b, fig. 6)

usual form of a simple excavated burial chamber at the end of a stairway;[899] it was protected from above by a hard gravel roof approximately 2.6 m thick.[900]

Section summary - Type II and IIA burial chambers

The basic security concept of the Type IIA burial chamber did not change over the four dynasties that saw its use, insofar as its protection was reliant on the surrounding geology into which it was cut. This meant that it was largely dependent on the resistance of its matrix to tunnelling, and the depth to which it was sunk. In addition, theoretically the volume of the chamber would also affect the ease with which it might be located by *sondage.* Evidence of these three factors at work can be seen in the numerous robbers' tunnels which have penetrated the single and multi-chambered burial chambers in the gravels of Helwan, Reqaqnah and Beit Khallaf. However, at Abu Roash, Saqqara, Lahun and Sedment, with their similar sized substructures the comparatively tough geology was deterrent enough to focus the plunderers' attention on the stairways instead, even in the case of the larger complexes.

4.2.2.3 The burial chamber in Type IIB 'deep' staircase tombs

The Type IIB tomb only differs from the Type IIA in the architecture of its staircase, which is abbreviated (see 5.1.2.3). The examples in the catalogue come from the necropoleis of Helwan and Naga el-Deir, although there seem to be tombs of this type at Saqqara, which are not well published.[901]

The Second Dynasty

Helwan

The survey includes five of these tombs from Helwan. There are undoubtedly more, such as those published by Saad,[902] but they lack detailed plans. El-Banna also published sixteen tombs of this type, but provided only cursory drawings and details.[903] Their burial chambers are usually single chambers, with or without a lateral recess. Of the four whose dimensions are available, the best protected were Op. 4/148 **[184]** and Op. 4/62 **[185]**, whose roofs were approximately the same thickness at 2.85 and 2.88 m respectively (Fig. 190).[904] The roofs of nearby Op. 4/103 **[186]** and Op. 4/2 **[187]** were somewhat thinner at 2.2 m and 1.95 m,[905] but that of 173.H.9 **[188]** was only 0.6 m thick.[906] As with many of the Type IIA tombs at this site, all except Op. 4/62 had been robbed via a tunnel from above.

[899] Petrie and Quibell 1896: 5.
[900] Scaled dimension from Petrie and Quibell (1896: pl. IV, 16).

[901] For example tomb S 2442 **[NIC]** fits the description (Quibell 1923: 41), see note 1350.
[902] See Saad 1957: For example tomb nos. 114.H.9, p. 10–1 and 133.H.8, p. 22–3.
[903] See El-Banna 1990: 13–4, Pls. IV and V.
[904] Köhler 2008b: Figs. 6 and 7; 2009: 284, fig. 4.
[905] Köhler 2007: 201–3, fig. 8; 2008b: 88, fig. 7.
[906] Saad 1957: 63, plan U.

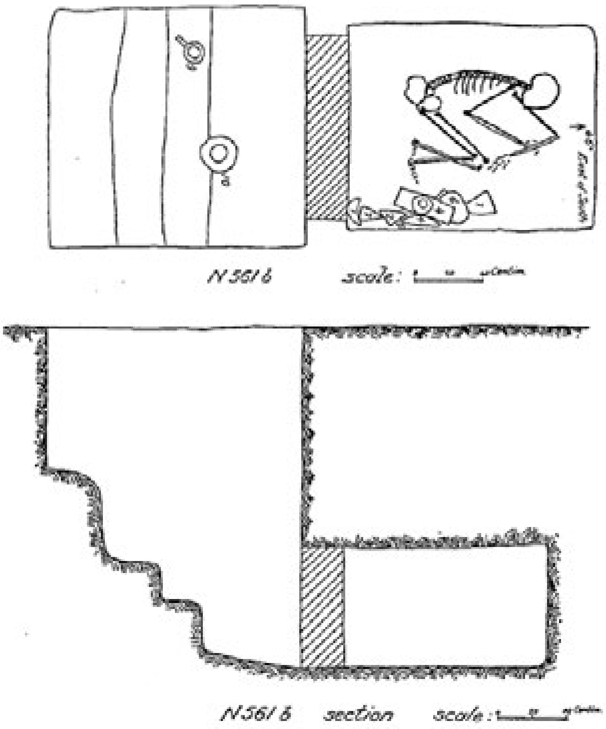


Figure 191 The substructure of the Type IIB 'deep' staircase tomb N561b from Cemetery 500-900 at Naga el-Deir. (Reisner 1932, figs. 124 a-b)

The Third and early Fourth Dynasties

Naga el-Deir

A few of examples of this type of substructure with 'deep' staircases are found in Cemetery 500–900 at Naga el-Deir. Although their burial chambers were substantially the same size, the Third Dynasty tomb N 518 **[307]** and early Fourth Dynasty N 561b **[311]** were protected by gravel roofs of different thickness. In the former's case it was 2.15 m thick and the tomb had been robbed via its stair,[907] but in the latter's case (Fig. 191), the roof was only 1 m thick and the burial was found intact.[908]

Section Summary – Type IIB burial chambers

The only noticeable difference between these tombs, bearing in mind the limited data available, is that the Helwan tombs had been robbed in the usual manner via a tunnel through their roofs and, as is usual in Type II tombs at Naga el-Deir, the single example of robbery was via the staircase.

4.2.2.4 The burial chamber in Type IIA-C stair-shaft tombs

The stair-shaft tomb seems to form a transition between the stairway and true shaft tomb,[909] and is found in limited numbers from the Third to the early Fourth Dynasties. As a Type II tomb, although the architecture of its access route may have changed (see 5.1.2.4) the principle of its burial chamber's defences remain the same, but in some cases are realised on a far greater scale.

The Third Dynasty

Giza

A single example of a Type IIA-C tomb is found at Giza. The two levels of the substructure of the monumental Covington's Tomb **[61]**[910] are excavated deep into the surrounding 'sand stone' and 'clay' strata that lie beneath an upper layer of red sand at the surface (Fig. 192).[911] The uppermost level comprised of a multi-chambered complex, whose ceiling was approximately 8 m below ground level.[912] Within one of the western chambers that branched off the north-south axial corridor, a shaft descended a further 10.5 m, from which a short corridor led to a small burial chamber that was 2 m high,[913] whose floor was now approximately 23.5 m from the surface. As a result the burial would have been extremely well protected by a roof of marly limestone strata roughly 21.5 m thick. Despite these great depths the tomb had still been robbed via its shafts in antiquity, thieves having tunnelled past its portcullises.[914]

Saqqara

Thirteen examples of stair-shaft tombs are included in the catalogue from Saqqara, although undoubtedly many more exist.[915] As mentioned earlier, there is a paucity of information regarding the substructures of Type II

907 Reisner 1932: 197.
908 Reisner 1932: 212–3.
909 See Reisner 1936: 154–5, and Bárta 2006: 1–22 for a discussion of what may be called 'transitional tombs'.
910 Porter and Moss 1974-81: 294. This is also known variously as Tomb no. 1, or Mastaba T (Martin 1997: 281).
911 Covington 1905: 210. According to Covington (1905: 210) the tomb's shaft cut down through an 8 m stratum of 'sand stone' and a further 3 m of 'clay' (presumably marl). This is presumably part of the 'outcrop of the Upper Eocene Maadi Formation' to the south-west of the Giza Plateau discussed by Lehner (1985: 114, figs. 2 and 3a), which is characterised by soft marly limestone strata with inclusive layers of shell beds and sandstones. Apparently, the nearby shaft of the Type IIC 'Small Western Mastaba' **[NIC]** excavated by Kromer (1991: 38) has its substructure cut into similar geology.
912 Covington 1905: 209.
913 Covington 1905: 214.
914 Covington 1905: 210 and 213.
915 Quibell (1923: 20–46) was often ambiguous in his descriptions. Those that include both the words 'stair' and 'shaft' in their description but are not in the catalogue are: S 2112, S 2114, S 2121, S 2162, S 2172G, S 2312A, S 2314 B–F, S 2331B, S 2332, S 2334C, S 2341, S 2349, S 2350, S 2358, S 2446 and S 2509 **[all NIC]**. Indeed, he also described (1923: 38) S 2407 as a mastaba with two shafts, when clearly it is a stair-shaft tomb. There are also a number of tombs listed by Reisner (1936: 165–6) that fit the description of a Type IIA-C stair-shaft tomb (Reisner Type IVB), but are insufficiently reported to be included in the catalogue, they are: S 3002, S 3003, S 3004, S 3007 + 3015, S 3010, S 3017, S 3019 and S 3020 **[all NIC]**. Additionally, Emery (1961: Figs. 94–5) showed two unidentified small tombs with stairways ending in a short shaft that he described as 'middle class' and 'poorer class' tombs, which he ascribed to the Second Dynasty, but there is no further information about them.

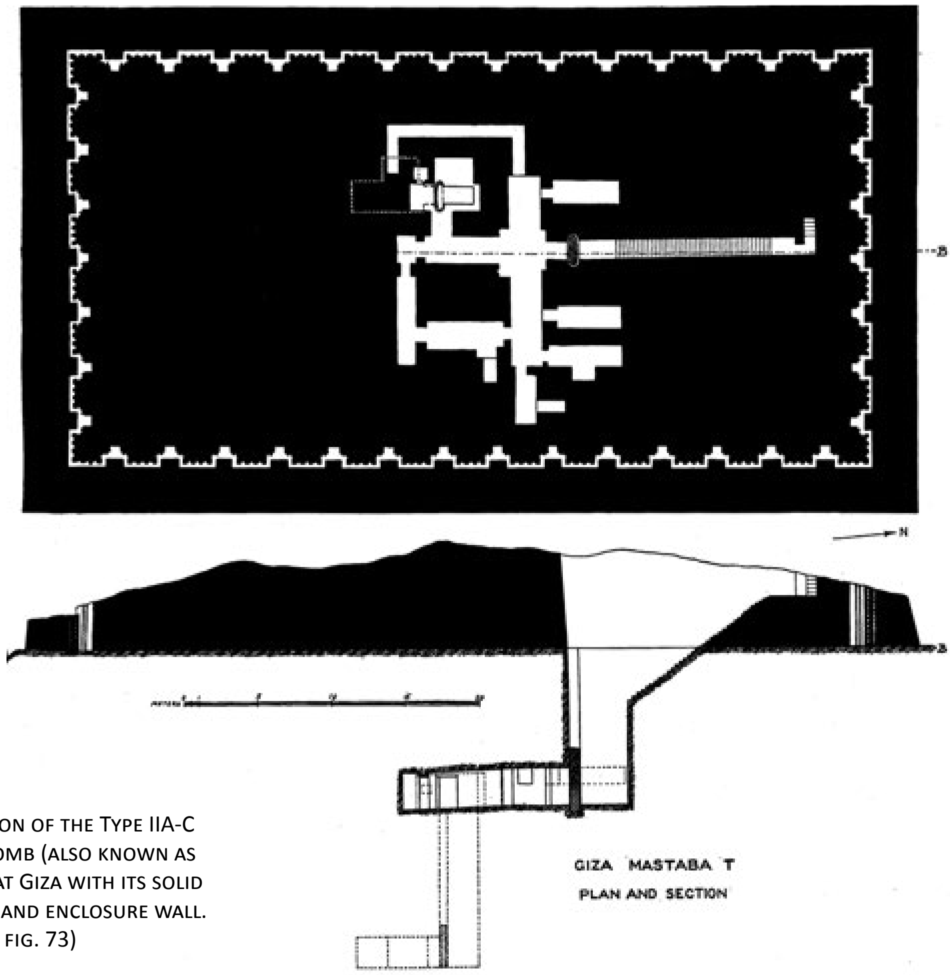


Figure 192 Plan and section of the Type IIA-C stair-shaft Covington's Tomb (also known as Tomb no. 1 or Mastaba T) at Giza with its solid mud-brick superstructure and enclosure wall. (Reisner 1936, fig. 73)

tombs at Saqqara; as a result only four are sufficiently reported to enable their discussion, three of which are included in the catalogue.

The best known of these is S 2405 (Hesyra) **[119]**,[916] which bears a remarkable similarity to Covington's Tomb at Giza (Fig. 193). Its substructure comprised of three levels,[917] the first of which was a multi-chambered complex that contained the burial chamber, which was originally concealed behind a masonry blocked doorway.[918] Its floor was set 10.4 m down from the surface and it was protected by a rock and gravel roof 7.9–8.2 m thick. The floors of the second and third levels, which may also be burial chambers, or possibly later intrusive additions,[919] were further set at 16 m and 23.4 m from the surface and would have in turn been protected by roofs 14.1 m and 22.5 m

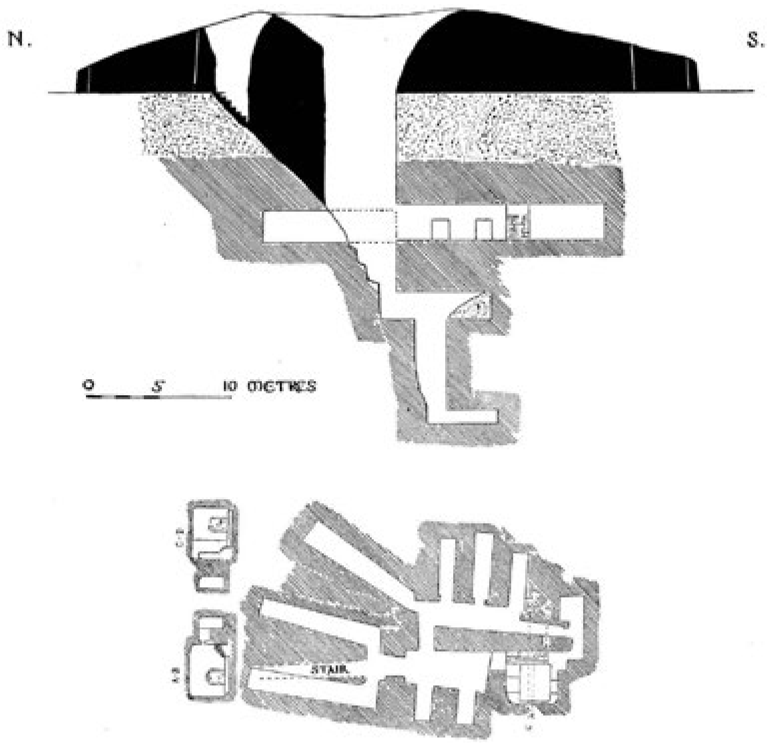


Figure 193 The Type IIA-C stair-shaft tomb of Hesyra at Saqqara with its differing substructure levels and solid mud-brick superstructure. (Quibell 1913, pl. II)

[916] Porter and Moss 1974-81: 437–9.
[917] Quibell 1913: 15.
[918] Quibell 1913: 12 and 37.
[919] Jánosi (2006: 26) suggests that the lower two chambers are the result of Late Period alterations.

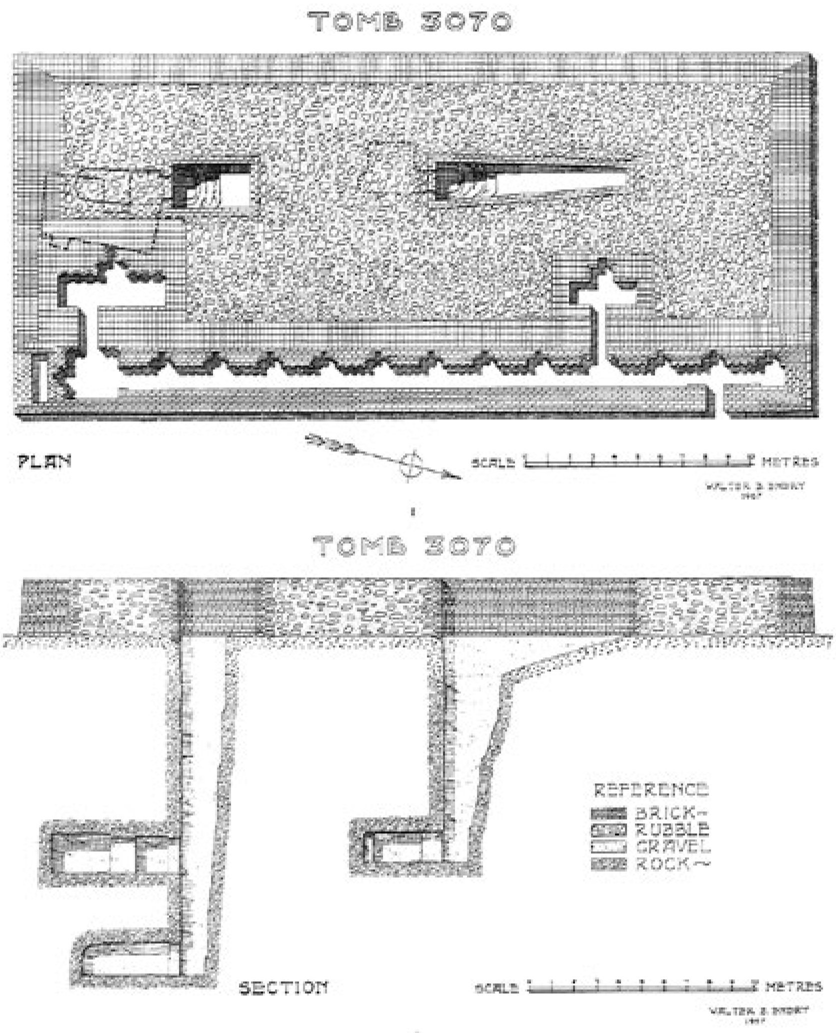


Figure 194 The Type IIA-C + IIC 'twin mastaba' tomb S 3070 at Saqqara, showing southern shaft with burial chambers on two levels on the left and northern stair-shaft on the right with its single chamber. (Emery 1968, pl. II) Courtesy of the Egypt Exploration Society.

thick.[920] Therefore, at their lowest and highest levels, the protection offered to the occupants of these burial chambers would have been at roughly the same level as those in Covington's Tomb. That notwithstanding, as is usual at Saqqara, the tomb had been robbed repeatedly via its access route.[921]

On a smaller scale, the southern substructure plan of the 'twin mastaba' Type IIA-C + IIA-C tomb S 2407 (f) **[126]**,[922] presents a smaller and slightly less complex chamber arrangement of the 'house type' than that of the abovementioned Hesyra (Figs. 307 and 365). The depth of its chambers are unknown.

The third tomb is the Type IIA-C + IIC 'twin' mastaba S 3070 **[120]**,[923] whose northern substructure was accessed by a stair-shaft that led to a single burial chamber set 10.5 m from the surface (Fig. 194). It was protected from above by a gravel and rock roof approximately 8.7 m thick.[924] Presumably, from the lack of any tunnels in Emery's drawings of the tomb, it was robbed via its access route. Finally, on a smaller scale, tomb S 2470 **[NIC]** had its small burial chamber set 4.7 m below ground level and protected from above by 3.7 m of cover.[925]

Naga el-Deir

There are three stair-shaft tombs in Cemetery 500–900 at Naga el-Deir. Cut in the gravel the 1.1 m high single burial chambers of tombs N 585 **[308]**,[926] N 586 **[309]**[927] N 593 **[310]**[928] were protected by roofs approximately 2.4 m, 2.4 m and 2.3 m thick respectively.[929] The similarity of their depths and burial chamber dimensions suggests a certain standardisation in the construction of these three tombs, which seem to be noticeably shallower than most of their Type IIA predecessors at the site.

920 Extrapolated from Reisner's (1936: 158–9) dimensions.
921 Quibell 1913: 3 and 12.
922 Quibell 1923: 38–9; Porter and Moss 1974-81: 439.
923 Emery 1968: 11–3.
924 Scaled from drawings by Emery (1968: pl. II).
925 This tomb is not included in the catalogue due to the paucity of information, see Quibell 1923: 43.
926 Reisner 1932: 17 and 224.
927 Reisner 1932: 17 and 225.
928 Reisner 1932: 17 and 226.
929 Scaled from drawings by Reisner (1932: figs. 143–4 and 149).

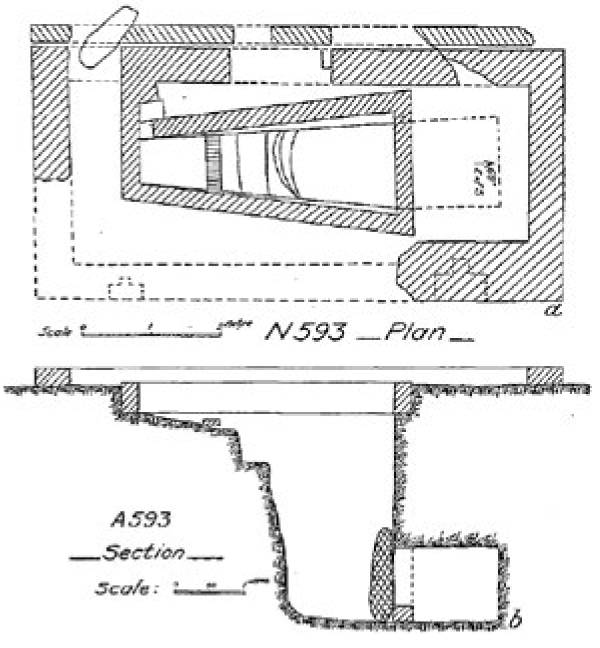
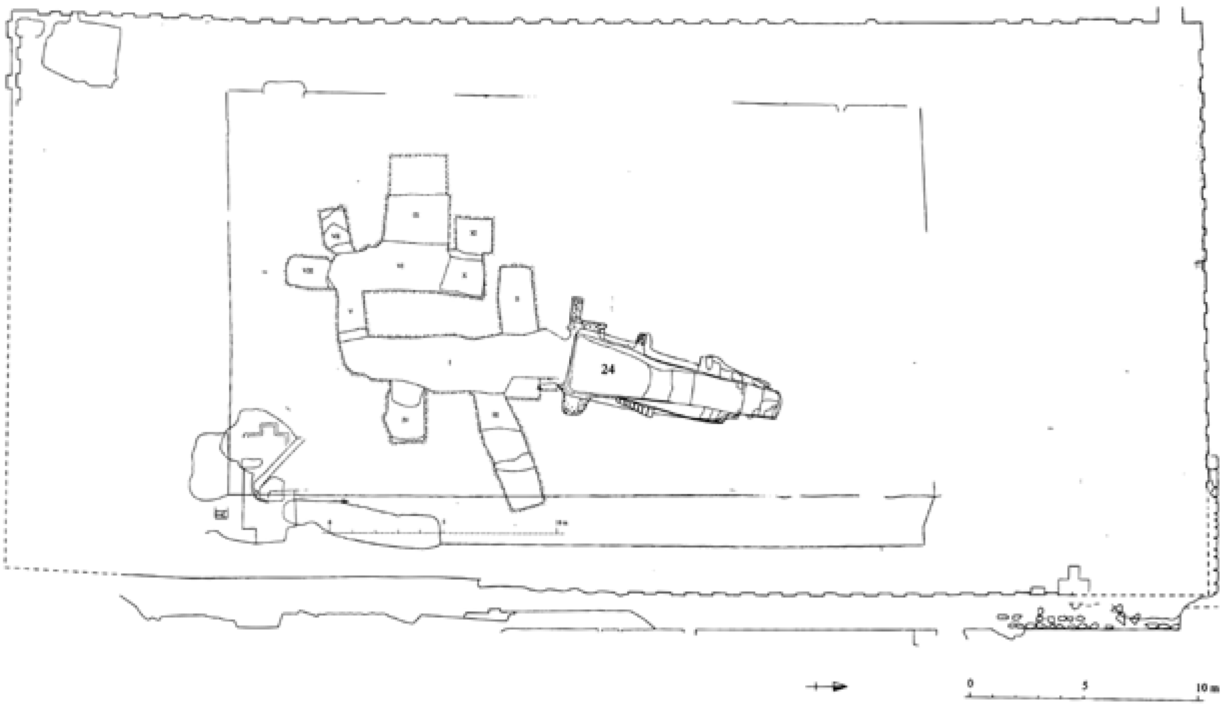


Figure 195 The Type IIA-C tomb N 593 from Naga el-Deir. (Reisner 1932, fig 149)

El-Kab

Lastly, a most unusual location for a mastaba with a stair-shaft is tomb 274 **[344]** at El-Kab (Fig. 195),[930] which is situated at the top of the 50 m high rock necropolis.[931] The floor of the comparatively small 2 m high burial chamber of this tomb was 24.5 m below the summit of the rock, and crudely carved in the poor quality sandstone.[932] This considerable depth meant that it would have been protected by a rock roof approximately 22.5 m thick, which makes it the best protected and deepest Type IIA-C private tomb burial chamber of the period in all Egypt.[933] In spite of all this effort, the tomb had been

[930] I am extremely grateful to Dirk Huyge of the Royal Museums of Art and History in Brussels for kindly providing me with an unpublished survey drawing of the tomb's substructure, from which I have been able to work.
[931] Limme 2008: 23.
[932] It is probably of this size and irregular because the sandstone at this depth is of low quality, highly fissured and contains many inclusions (Personal communication Dirk Huyge 4th September 2012).
[933] Although Hesyra's tomb is in fact deeper overall, the fact that its lower chambers were probably Late Period additions, makes this the main contender.



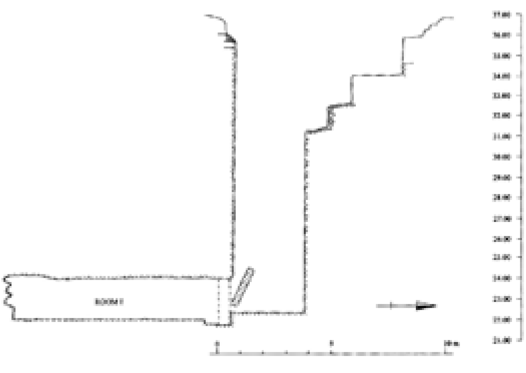


Figure 196 Plan and section of the Type IIA-C stair-shaft tomb AS 33 from Abusir showing its multichambered substructure. (After Bárta 2010, figs. 3.1, 3.18 and 3.21)

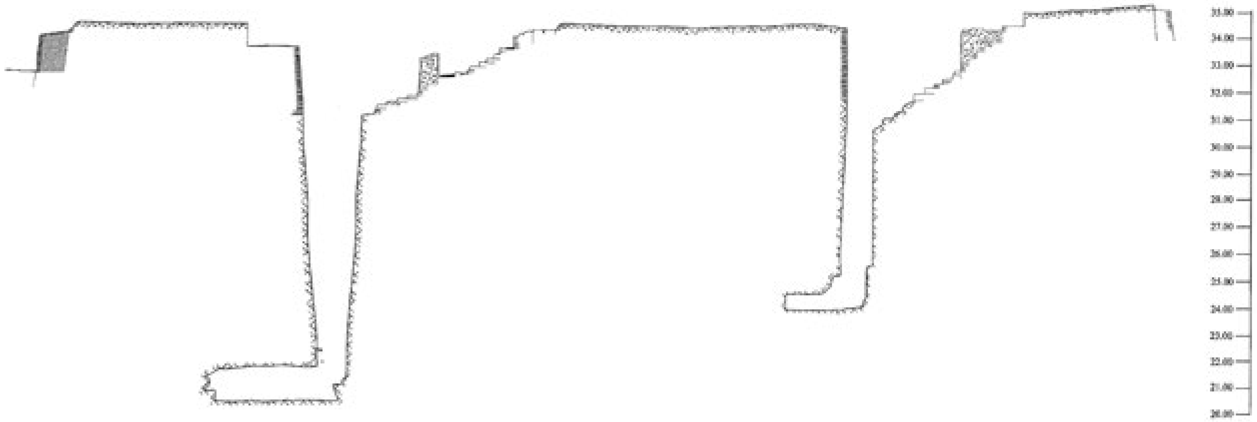


Figure 197 Section looking west of the twin stair-shafts and burial chambers of AS 20, the tomb of Hetepi, at Abusir. (Bárta 2010, fig. 2.2)

systematically plundered via its access route, and had been re-used on more than one occasion right up until Greco-Roman times.[934]

The early Fourth Dynasty

Abusir

Three tombs with stair-shafts are known from Abusir, which their excavator describes as transitional tombs,[935] but only two can be discussed in detail.[936] Within the eleven chambered substructure of the Type IIA–C tomb AS 33 **[77]**, the burial chamber floor (Room IX) is set at a depth of 15.58 m from the surface and was protected by a limestone bedrock roof approximately 13 m thick (Fig. 196).[937] It seems to have been robbed via its access route, presumably due to its daunting depth and the strength of the cover. Nearby is the Type IIA-C + IIA-C 'twin' mastaba AS 20, attributed to Hetepi **[78]**. The floor of its 1.4 m high southern burial chamber was excavated into the *tafl* bedrock 14.75 m from the surface and protected by a roof 13.35 m thick (Fig. 197). Its shallower northern counterpart comprises of a simple rectangular chamber only 0.6 m high set at 11.8 m from the surface and defended by a roof 10.6 m thick. The southern chamber had been wrecked by robbers, and the northern chamber was empty, and with no sign of robbers' tunnels, it may be safe to assume that both were robbed via their entrances.[938]

934 Huyge 2003: 29–30; Limme 2000: 26–31.
935 They are described by their excavator as 'transitional type' tombs because they represent a watershed in tomb design marked by the inclusion of stair shafts and large surface areas for their superstructures (Bárta, Coppens and Vymazalová 2010: 52).
936 There is a Type IIA-C + IIC 'twin mastaba' at Abusir attributed to Ity **[248]**, while it has a stair-shaft entrance to its northern substructure, its subterranean part, seems to have been abandoned as a burial chamber due to the poor quality rock (Verner 1995: 81; Bárta 2001: 9), and thus is not included in this discussion.
937 Bárta, Coppens and Vymazalová 2010: 65–70.
938 Bárta, Coppens and Vymazalová 2010: 12.

Section summary – The burial chambers of Type IIA-C stair-shaft tombs

These types of 'transitional' tombs generally do not seem to have been constructed in weak geology, with the exception of the anomalous examples from Naga el-Deir, which may be due to constructional difficulties, or simply regional preferences. The larger tombs discussed all belonged to high status individuals and their burial chambers were extremely well protected by great depths of rock, as the examples from Giza, Abusir, Saqqara and El-Kab have demonstrated. The success of this strategy is apparent, as in those tombs that have been robbed, the stair-shaft has usually been used to gain admittance, presumably because the depth of the burial chamber made tunnelling unfeasible and the access route was the easier option. However, the picture is necessarily one sided as this assumption does not take into account the numerous smaller examples that were built at Saqqara, where, as we have seen in the single example mentioned, the roof thickness was a great deal less.

4.2.2.5 The burial chambers in Type IIC shaft tombs

Like all Type II tombs, the burial chamber in shaft tombs relies on the same principles for its protection, but unlike in Type IIA-C tombs there seem to be a far wider geographical distribution of the type and a greater variation in the size of the tomb.

The First Dynasty

Batn el-Baqara

Perhaps the earliest remains of a Type IIC shaft tomb are those discovered at Batn el-Baqara during quarrying works in Old Cairo **[54]**,[939] which Boghdady dated to the

939 The quarrying works had destroyed much of the roof of the tomb and the position of its entrance was undetermined (Boghdady 1932: 153, pl. II).

mid First Dynasty.[940] The tomb's substructure comprised of a central corridor with chambers branching from it and, apart from the obvious security offered by the surrounding rock, due to the lack of published detail, not much more can be said.

The Second Dynasty

Abusir

A large number of Second Dynasty graves with shafts were excavated by Bonnet to the west of the present village of Abusir.[941] Cut into the compact mudstone matrix and sand,[942] their substructures averaged between 3–5 m in depth and usually comprised of a small chamber sometimes with a recess.[943] Amongst them only two are drawn in detail and included in the catalogue. The floor of the small rectangular burial chamber of tomb 12B-6 **[74]** was set 3.2 m down from the surface and protected by a roof approximately 2.1 m thick.[944] However, the crudely cut chamber of nearby tomb 11D-2 **[75]** was set deeper at approximately 5.1 m from ground level and defended by a roof of nearly twice the depth.[945] Deepest of all the tombs at the site was 13B-5 **[NIC]**, which reached a depth of 12 m,[946] but no details are available concerning its burial chamber.

Helwan

The majority of the shaft tombs at Helwan are from the latter part of the Second Dynasty.[947] There are fifteen in the catalogue, of which twelve were included in Saad's publication of *Ceiling Stele*.[948] Their single burial chambers are usually small and occasionally include a recess. A typical example is 256.H.8 **[189]**, whose 1.3 m high burial chamber had its floor set at 2.3 m from the surface, thus leaving it protected by a 1 m thick gravel roof (Fig. 198).[949] Like the majority of the tombs in the group,[950] it had been robbed via a tunnel dug through the gravel from above. The roof depths of the remaining tombs in the group, which are: 308.H.6 **[190]**, 527.H.7 **[191]**, 647.H.7 **[192]**, 670.H.7 **[193]**, 379.H.8 **[194]**, 381.H.8 **[195]**, 426.H.8 **[196]**, 788.H.8 **[197]**, 99.H.9 **[198]**, 103.H.9 **[199]** and 132.H.9 **[200]** vary between

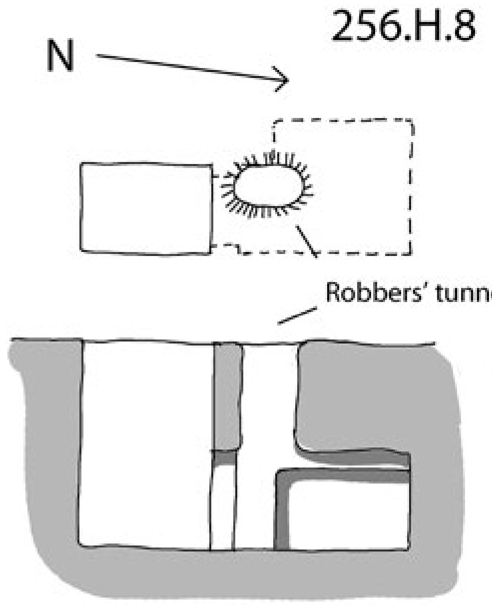


Figure 198 Tomb 256.H.8, a typical Second Dynasty Type IIC shaft tomb from Helwan; the robbers' tunnel into the burial chamber is clearly visible. (Drawn by the author after Saad 1957, pln. G)

0.6–2.1 m (see Chart E).[951] The deepest tomb of all, however, was the unusual intact tomb 1.H.5 **[203]**, which had two burial chambers at the base of its shaft at 90° to each other protected by gravel roofs 2.6 m and 2.7 m thick.[952]

Like the burial chambers of their Type IIA and IIB neighbours, these smaller tombs also suffered from the systematic and remarkably accurate tunnelling of tomb robbers, who were obviously cognisant with their layouts and aware of the ease with which they could penetrate the local geology.

Lahun

Amongst the nineteen 'shallow shafts with chambers' listed by Petrie at Bashkatib,[953] two dated to the Second Dynasty are included in the catalogue.[954] The single burial chambers of the intact tombs 720 **[262]** and 768 **[263]** both took advantage of the surrounding limestone and marl geology in a similar manner to their Type IIA

[940] Boghdady 1932: 160. Although he also placed it in the wider timeframe of Dynasties I–II, it is equally likely it could be from the Second Dynasty, which is a date that Kaiser (1998: 82) favoured. The latter's argument was well founded, especially given the substructure's axial layout, which is similar to tombs at Saqqara and Helwan of that date.
[941] Bárta 2000: 338.
[942] Mathieson and Tavares 1993: 24.
[943] See Bonnet 1928: 1–5, Taf. 1.
[944] Scaled from drawing by Bonnet (1928: Taf. 2).
[945] Scaled from drawing by Bonnet (1928: Taf. 4).
[946] Bonnet 1928: 2.
[947] Köhler 2008b: 126.
[948] Saad 1957: *passim*.
[949] Saad 1957: 59, plan G.
[950] With the exception of Op. 4/115 and 1.H.5.
[951] The heights of the burial chambers of Op. 4/115 **[201]** and Op. 4/153 **[202]** are not published.
[952] Saad 1951: 23–6, fig. 7.
[953] See Petrie, Brunton and Murray 1923: Tomb register pl. XLV.
[954] Petrie, Brunton and Murray 1923: 24) dated tomb 768 to S.D. 82 (Naqada IIID). Bearing in mind the discussion on the dating of the Type IIA tombs at Bashkatib (see Chapter 1.5 and notes 78–9) and given that early Type IIC shaft tombs are also known at Helwan and dated to the Second Dynasty as well (Köhler 2008b: 126, table 1; 2012: 283–4, table 1), it seems that this is also a reasonable chronological placing for the other Bashkatib 'shallow' Type IIC shaft tombs.

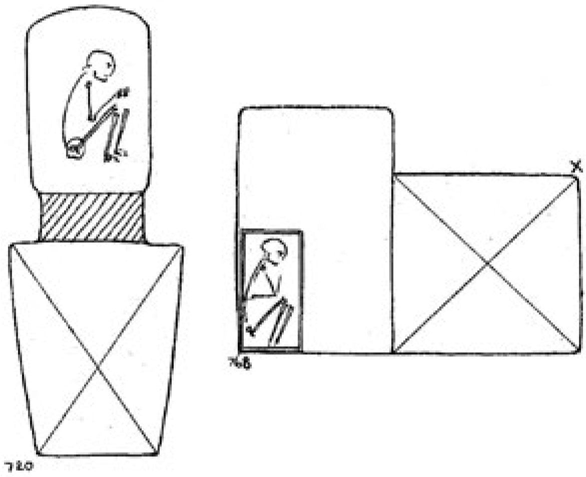


Figure 199 The Second Dynasty Type IIC shaft tombs 720 and 768 from the Bashkatib cemetery at Lahun (Petrie, Brunton & Murray 1923, pl. XLI, J and X)

neighbours, and were protected by rock roofs 0.98 m and 0.87 m thick respectively (Fig. 199).[955]

Hemamieh

Three Second Dynasty[956] shaft tombs are included in the catalogue from Hemamieh. The single burial chambers of tombs 1520 **[282]**, 1561 **[283]** and 1562 **[284]** were dug comparatively deeply, presumably to take advantage of the hard stratum of limestone gravel that lies under the upper layers of the site.[957] Unlike many of their younger equivalents further north at Helwan, all of their burials were found intact protected by their roofs, which in order were 2.06 m, 1.6 m and 2.74 m thick,[958] but whether this is attributable to harder geology, the lack of a superstructure or better concealment is open to question.

The Third Dynasty

Giza

The connecting passage to the burial chamber of the 'Inner Mastaba' **[62]** excavated by Kromer at Nazlet Batran was so well blocked that its burial chamber has never been excavated, even to this day (see 5.2.1.2).[959] However, we can reasonably assume from the widening at the base of its 9.8 m deep shaft, which begins at about 7 m from the surface (see 5.1.2.5),[960] that it would have been protected by a limestone and marl strata roof of

Figure 200 The rock-cut burial chamber of the Third Dynasty Type IIC tomb AS 54 from Abusir. (Bárta 2011a, fig. 4)

at least this thickness.[961] Additionally, judging from the condition of later adjacent intrusive burial chambers of both shallower and deeper depths, which have been robbed via their shafts,[962] this depth of cover at this site was effective against tunnelling.

Abusir

A Type IIC tomb dated from the reign of Huni has been recently discovered at Abusir.[963] At the base of the 12.6 m shaft of AS 54 **[76]** its 2.01 m high burial chamber (Fig. 200), which lies at the end of a short corridor would have approximately 10.5 m of rock cover above it for its protection. Like other tombs at Abusir, it had been robbed via its shaft.[964]

Saqqara

Although Quibell published over ninety Type IIC tombs at Saqqara,[965] he only recorded the substructure depths and burial chamber dimensions of eight of them[966] (see Chart E) and there are no drawings. However, Emery published three large tombs, which increases the number to eleven and allows the topic to be discussed more fully.[967] The roof thicknesses of the single chambered tombs from Quibell's excavations vary from the comparatively shallow 0.77 m of S 2243 **[NIC]**[968] to the fairly deep 6.19 m of S 2319 **[NIC]**,[969] the latter also having the largest burial chamber of the group.

[955] Petrie, Brunton and Murray 1923: Tomb register pl. XLV.
[956] Tomb 1520 can be dated by its pottery to Naqada IIID (Hendrickx 1989: 214; Hendrickx *et al.* 2002: 291–2) and correspondingly all therefore are placed in the Second Dynasty.
[957] Brunton and Caton-Thompson 1928: 72; Holmes and Friedman 1989: 17.
[958] Brunton 1927: 13, Tomb register pl. X.
[959] Kromer 1991: 18.
[960] Kromer 1991: 16.

[961] Presumably the same geology surrounds this burial chamber as that in nearby Covington's tomb, see note 912 above.
[962] Kromer 1991: 26–8, 30–4 and 36–8.
[963] Bárta 2011a: 47.
[964] Bárta 2011a: 45–6.
[965] Quibell 1923: 18–46.
[966] These are S 2110, S 2243, S 2260, S 2319, S 2323C, S 2468, S 2475 and S 2480 **[all NIC]**, but see Chart E for details
[967] Emery 1966; 1968 and 1970.
[968] Quibell 1923: 27.
[969] Quibell 1923: 33.

Amongst those tombs excavated by Emery, probably the best defended Type IIC burial chamber was the lower of the two that ran off the southern shaft in the aforementioned Type IIA-C + IIC 'twin mastaba' S 3070 **[120]**.[970] This was protected by a gravel and rock roof 13.5 m thick (Fig. 194), but the upper chamber was less well protected with only 8.75 m of cover.[971] Moreover, theoretically the latter's larger area would have made it more vulnerable to *sondage* than the lower. Nearby, the northern burial chamber of the similar Type IIC + IIC tomb S 3518 **[131]**,[972] was defended by a 9 m thick roof,[973] but details of its southern chamber are unknown, as the shaft had been interrupted by an intrusive baboon gallery, which made its clearance impossible (Fig. 201).[974] Lastly, the burial chambers of the Type IIC + IIC mastaba S 3517 **[132]**,[975] follow the usual pattern but were shallower; the northern being protected by a 5.25 m thick roof and the southern by 6.75 m of similar cover (Fig. 202).[976]

Helwan

Although Type I tombs at Helwan had been stone lined for additional protection from the mid First Dynasty onwards, with the introduction of the Type II substructure, its use was all but forgotten at that site.

[970] Emery 1968: 11–3.

[971] Scaled dimensions from drawing by Emery (1968: pl. II).

[972] Porter and Moss 1974-81: 448. Dodson and Ikram (2008: 146) suggest that this is a possible candidate for the tomb of Imhotep, on the basis of its date, great size and the fact that it is orientated in the same direction as the Step Pyramid. Emery (1965a: 3 and 8; Emery 1965b: *passim*) had been searching for Imhotep's tomb from the mid 1960s and stressed in his later preliminary report on S 3518 (1970: 10–1), without actually claiming it to be the tomb of Imhotep, the significance of the tomb's orientation, its absolute dating from a jar seal with the serekh of Netjerykhet Djoser, and the anatomical donaria found outside its entrance. Although Martin (1979: 17) writes: 'But of his tomb or cult-area no trace has yet been found in the area of the Sacred Animal Necropolis so far excavated'. Bárta (2003: 8) thinks it improbable in the light of more modern understanding that S 3518 is the tomb of Imhotep. On the other hand, Nicholson (2005: 48) acknowledges that because of Imhotep's association with Thoth, the location selected for the sacred ibis and baboon galleries may have been intentionally chosen to be beneath the Third Dynasty cemetery in which Imhotep's tomb may have been located. Therefore, the tomb's ownership still remains unresolved and the subject of ongoing debate.

[973] Scaled dimensions from drawing by Emery (1971: pl. XX).

[974] Emery 1970: 10; 1971: 3–4.

[975] Emery 1966: 7.

[976] Scaled dimensions from drawing by Emery (1966: fig. 3).

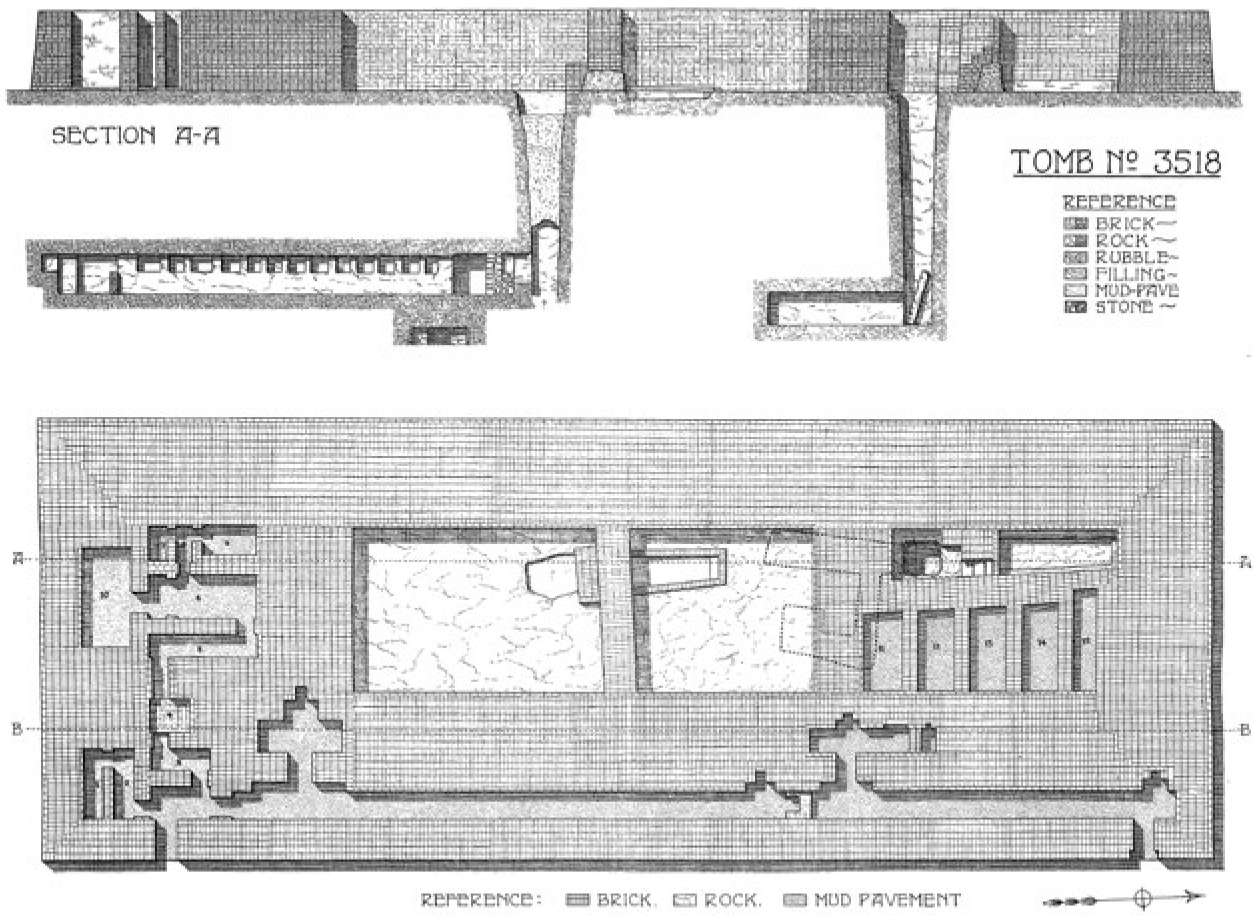


Figure 201 The Third Dynasty Type IIC + IIC tomb S 3518 at Saqqara. The southern shaft is now part of the baboon galleries.
(Emery 1970, pls. XIX–XX) Courtesy of the Egypt Exploration Society.

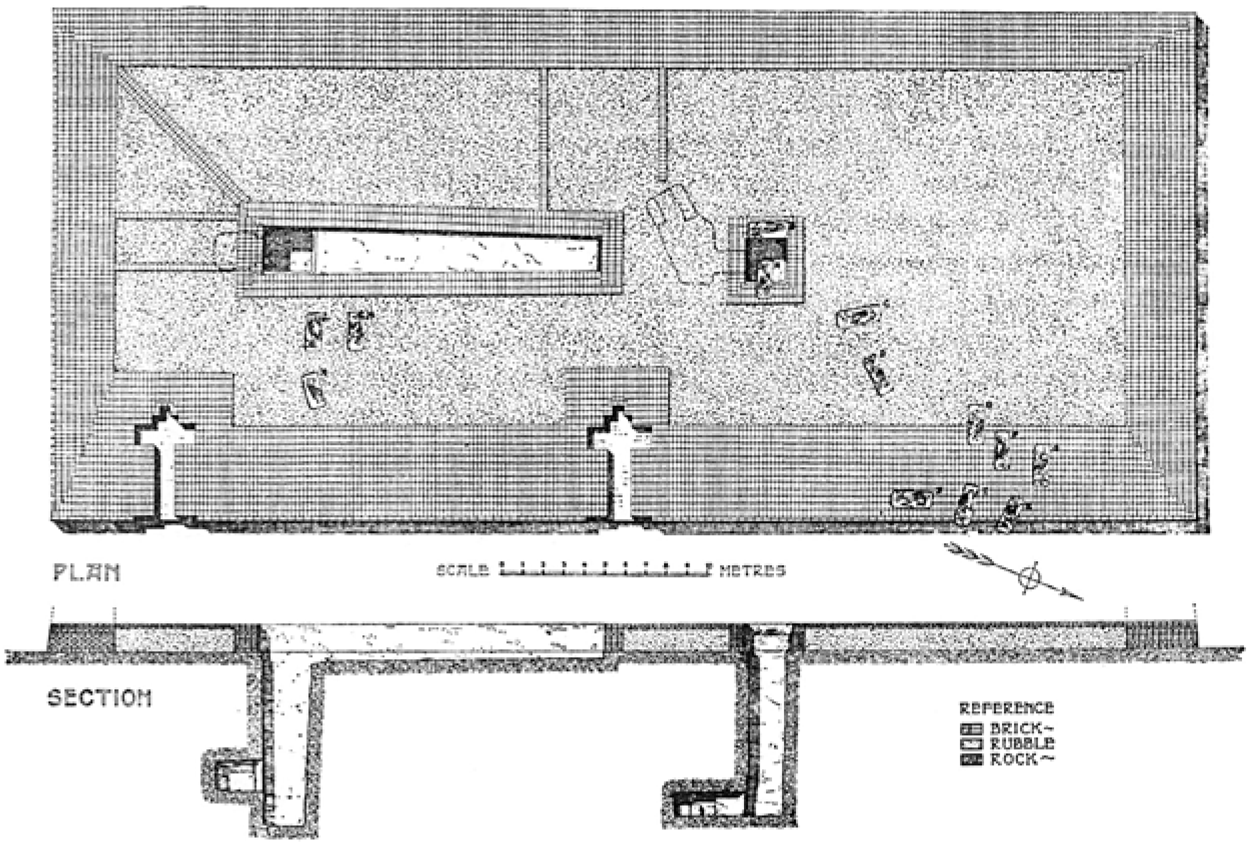


Figure 202 The Third Dynasty Type IIC + IIC tomb S 3517 at Saqqara. (Emery 1966: fig. 3) Courtesy of the Egypt Exploration Society.

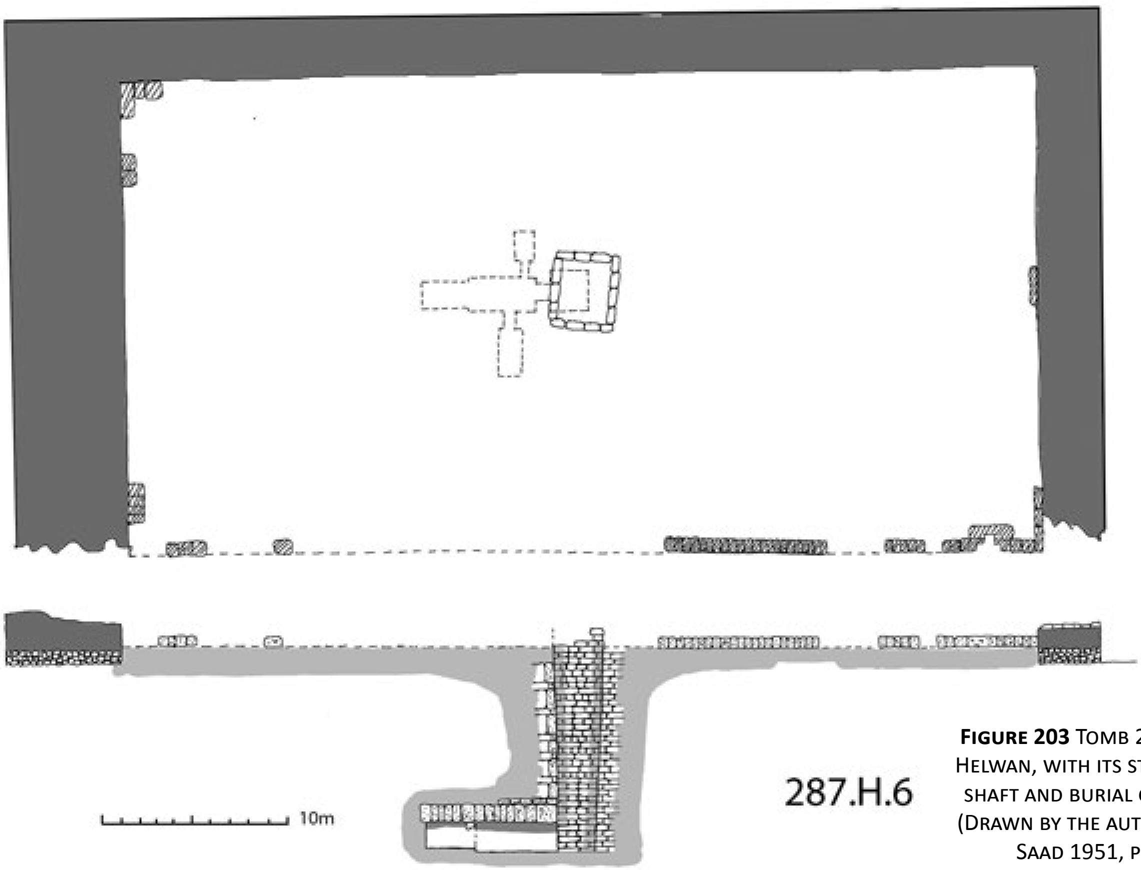


Figure 203 Tomb 287.H.6 at Helwan, with its stone lined shaft and burial chamber. (Drawn by the author after Saad 1951, pl. 2)

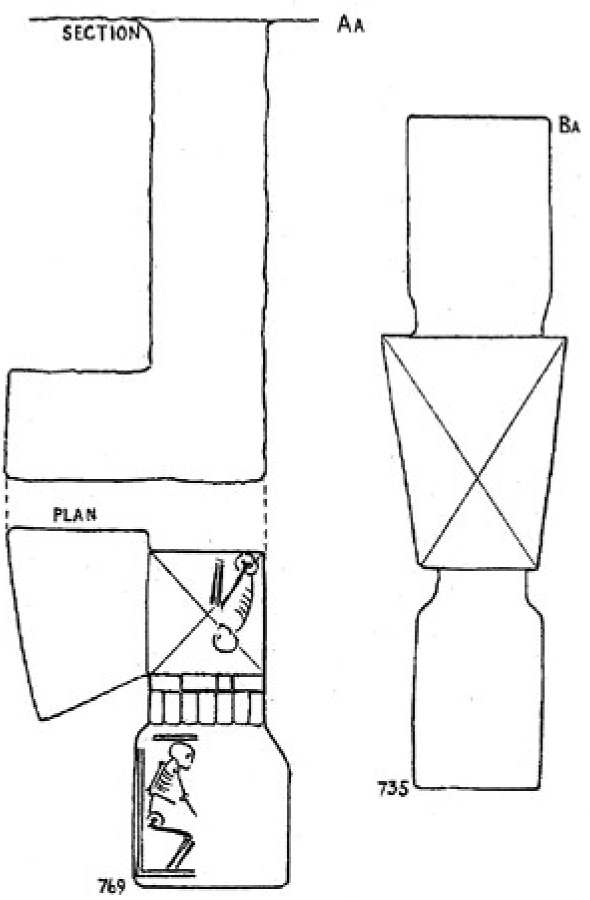


Figure 204 The Third Dynasty Type IIC tombs 769 and 735 at Bashkatib Cemetery in Lahun. (Petrie, Brunton, & Murray 1923, pl. XLIII figs. Aa–Ba)

However, a remarkable Third Dynasty[977] Type IIC tomb was discovered by Saad that marks the reintroduction of stone, perhaps in response to the wholesale plundering of its Second Dynasty predecessors. At the base of its 11 m deep stone lined shaft the substructure of tomb 287.H.6 **[204]**, comprised of a small burial chamber and two magazines running from a 1.5 m high antechamber, which were built entirely out of stone and roofed completely with enormous ashlars 1 m thick (Fig. 203).[978] In addition they were protected by a further 8.5 m of 'gravel' cover, making it by far the deepest substructure at Helwan. Notwithstanding this high level of security, the tomb was still robbed via its western magazine after several unsuccessful attempts to enter via the burial chamber's southern wall.[979]

Lahun

On a much smaller scale at Bashkatib, there are twenty-three Type IIC 'deep shafts with chambers' on the west and north of the cemetery,[980] where the thickest layers of limestone and marl strata are to be found, which permitted shaft depths of 2.4–4.6 m to be cut.[981] Some of these shafts had multiple burial chambers running from them, such as tomb 769 **[264]**, whose two small chambers, which were set at 90° to each other, would have been protected by roofs 2.35 and 2.73 m thick. Similarly, the horizontally opposed chambers of tomb 735 **[265]** were protected by 1.85 m and 1.91 m of cover respectively (Fig. 204).[982]

The early Fourth Dynasty

The focus of attention for high status Type IIC tombs during this period moves away from Saqqara to Abusir and the new royal necropoleis at Meidum and Dahshur.[983]

Abusir

There are two tombs at Abusir with burial chambers accessed by Type IIC shafts. The first is the 'Lake of Abusir tomb 1' **[80]**, which is situated near the causeway of Niussera.[984] At the base of its 8.5 m deep shaft, a short passage leads to a 1.7 m high vaulted burial chamber excavated in the surrounding *tafl* that was entirely lined with a single course of mud-bricks,[985] which presumably provided a certain degree of support and additional reinforcement (Fig. 205). Protected from above by a 6.8 m thick layer of *tafl*,[986] rather than tunnel through it the tomb's robbers entered the burial chamber via its shaft.[987] Similarly, the single burial chamber that connected to the 10 m deep southern shaft of the Type IIC + II-AC tomb of Ity **[79]** was also protected by approximately 8.25 m[988] of *tafl* (Fig. 206).[989] It too had been robbed via its shaft.[990]

The method of robbing both of these tombs therefore demonstrates that their burial chambers were effectively defended by their surrounding geology, which drove their plunderers to opt for the easiest route, which was via their shafts.

[977] Köhler 2005: n. 143. It is probably one of the latest tombs at the necropolis, with the exception of a singular example from the Middle Kingdom (Jeffreys and Tavares 1994: 153).
[978] Scaled dimensions from Saad (1951: Plan. 2).
[979] Saad 1951: 3–5; 1969: 32–7.
[980] See Petrie, Brunton and Murray 1923: Tomb register pl. XLVI.
[981] Petrie, Brunton and Murray 1923: 31.
[982] Petrie, Brunton and Murray 1923: 22–4, tomb register pl. XLVI.
[983] There is little usable material for the purposes of this research on early Fourth Dynasty Type IIC tombs at Saqqara, due to the poor recording of their substructures. Although these tombs did exist, such as, for example, S 3073 (Porter and Moss 1974-81: 449–50). However, in this case the only drawings of the tomb available are a thumbnail sketch of the superstructure by Mariette and Maspero (1885: 71) and close-up plans and elevations of the offering niches in Reisner's (1936: 158–61) discussion of offering chapels and niches.
[984] The tomb is so named because its sits on the western shore of the dried up Lake of Abusir (Bárta 2000: 335).
[985] Bárta 2000: 335–7; 2001: 25. The vault was described by Bárta (2001: ibid) as 'inclined and leaning against the rear wall of the chamber'. For a discussion on mud-brick arches and vaults, see Spencer 1979: 123–5.
[986] Scaled dimensions from drawing by Bárta (2001: fig. 2.3).
[987] Bárta 2001: 25.
[988] Scaled dimension from drawing by Bárta (2001: fig. 1.7).
[989] Verner 1995: 80.
[990] Bárta 2000: 334; 2001: 10.

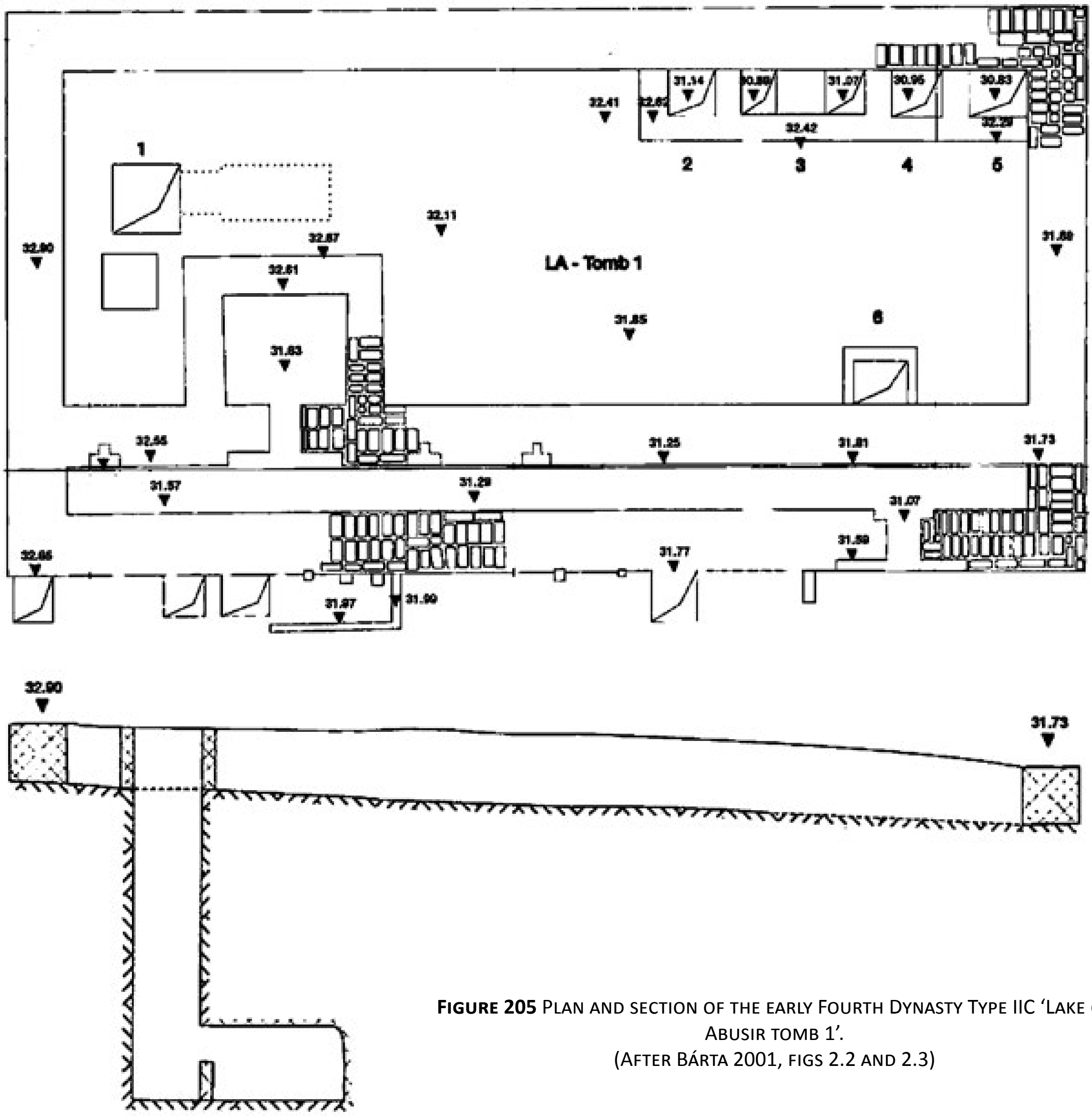


Figure 205 Plan and section of the early Fourth Dynasty Type IIC 'Lake of Abusir tomb 1'.
(After Bárta 2001, figs 2.2 and 2.3)

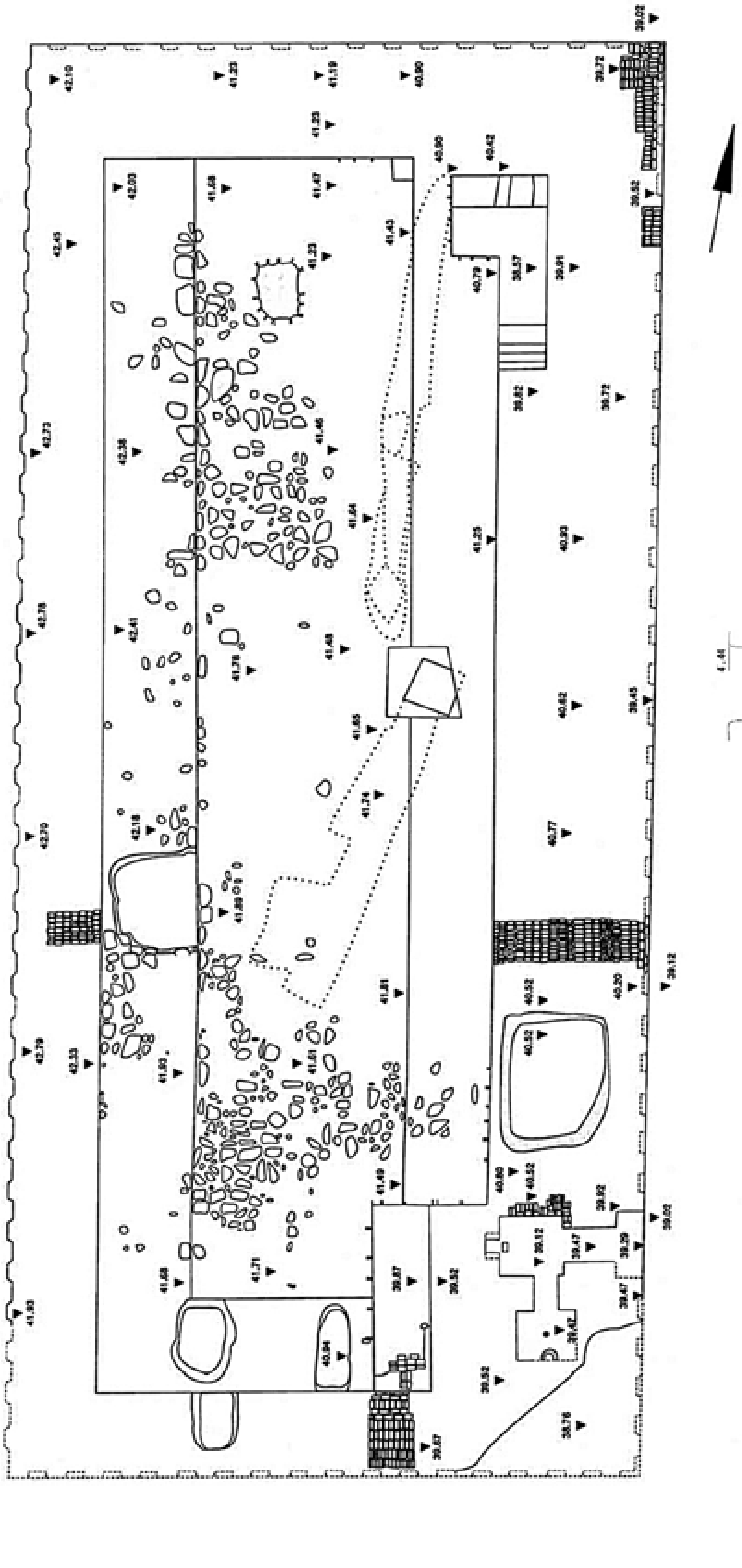
Dahshur

Of the seven Type IIC tombs from Dahshur in the catalogue, there are six whose substructures can be discussed.[991] It appears that due to the friable nature of the surrounding soil and *tafl* strata at the site,[992] for additional security the majority of their burial chambers were stone lined.

The first three of these tombs are spread between opposite ends of the necropolis (Map 8). Most northerly is the burial chamber of tomb no. 1 **[205]**, which is located just south of the pyramid of Senwosret III amongst de Morgan's *'mastabas du sud'* and is dated to the early Fourth Dynasty.[993] It was excavated within what de Morgan described as *'grès argileux',*[994] and was not only built of Tura limestone slabs, but also protected by a corbelled roof of stone as well, which if the drawings are accurate, would have been approximately 1.25 m thick at its apex (Fig. 207). With its floor set 11 m from the surface,[995] the protective cover over the chamber's roof

[991] Seven Type IIC tombs from Dahshur are included in the catalogue, but the substructure of DAS 25-1 **[208]** has not been excavated and is not included in this chapter – for details, see Stadelmann and Alexanian 1998: 305–6.
[992] Jánosi 2006: 37.

[993] Baud 1999: 67.
[994] Presumably he refers to marl, as the French translates to 'Sandstone clay'.
[995] de Morgan 1895: 8–9. De Morgan (1895: 9, fig. 6) also reported that nearby Mastaba No. 5 **[NIC]** (Porter and Moss 1974-81: 890) had a corbelled burial chamber, in which was found the earliest known reserve head (Cairo CG 519).



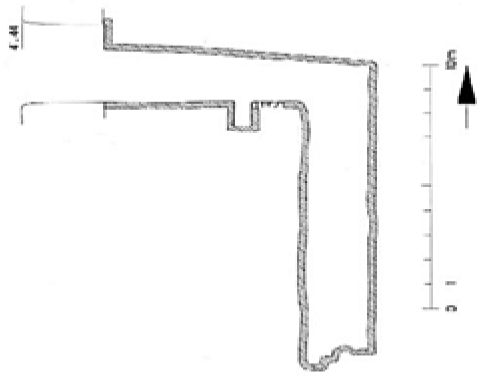
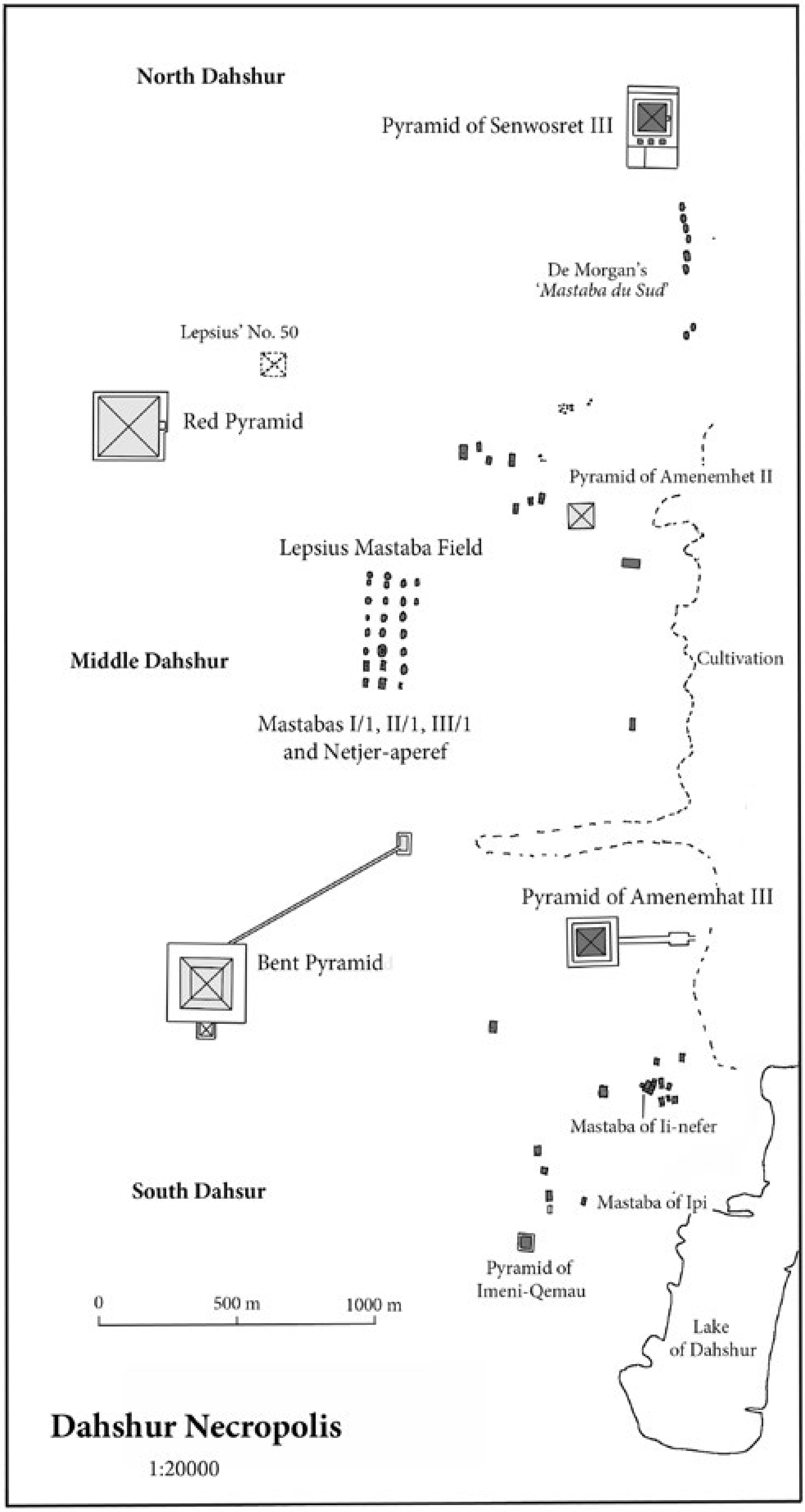


Figure 206 The Type IIC + IIA-C tomb of Ity at Abusir showing section of Type IIC southern shaft and burial chamber. The northern substructure is unfinished. The external walls of the superstructures are mud-brick, with an internal wall of limestone 0.8–1 m thick within which was a limestone rubble core.
(After Bárta 2001, figs. 1.2 and 1.7)



Map 8. The Dahshur Necropolis
The pyramids and main groups of elite private mastaba tombs in the necropolis. (Redrawn by the author after Alexanian 1999, Abb. 1)

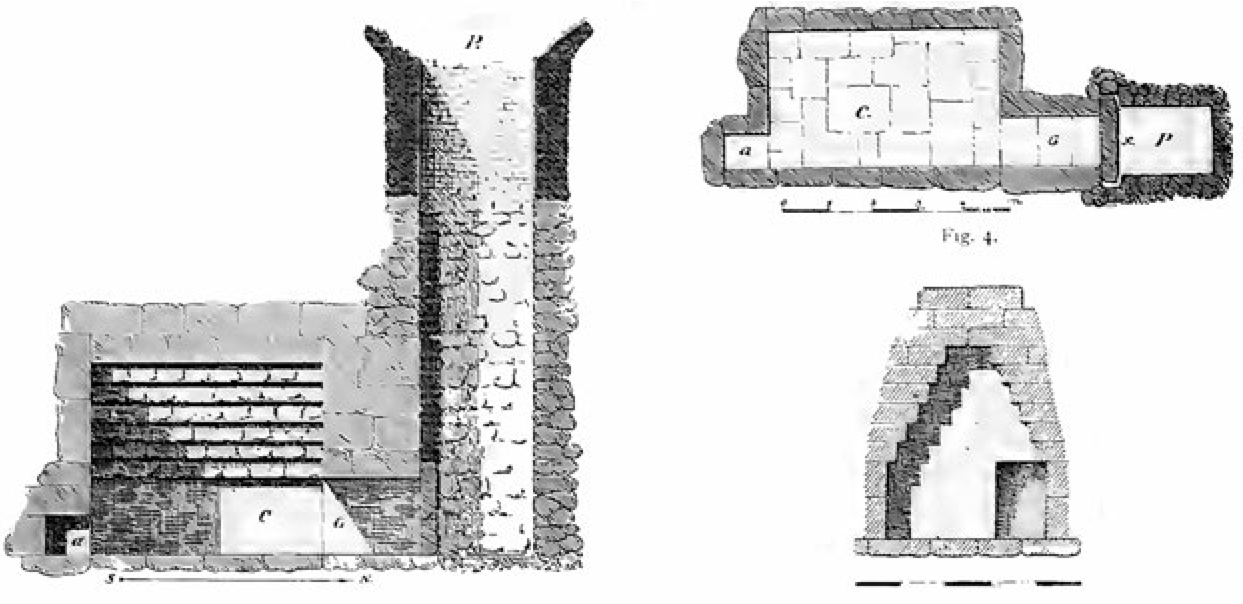


Figure 207 The corbelled burial chamber and brick and stone lined 'T' shaped shaft of tomb no. 1 at Dahshur North, which was located amongst De Morgan's '*Mastabas du sud*'.
(De Morgan 1894, figs. 3-5)

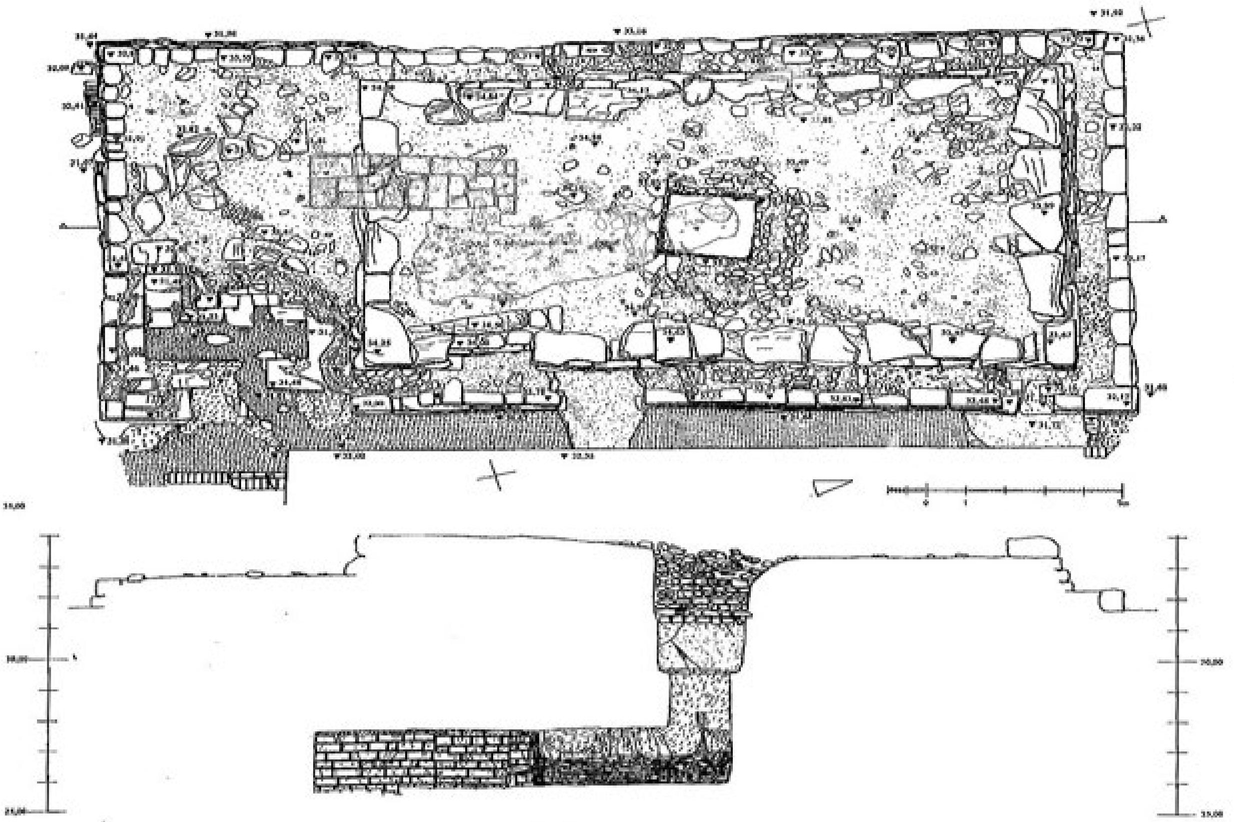


Figure 208 The Type IIC tomb DAS 9 (Ipy) at Dahshur South. The differing strata in the underlying geology can be clearly seen in the substructure section.
(After Alexanian & Seidlmayer 2002, Abb. 1, 4 and 5) Courtesy of the DAI Cairo.

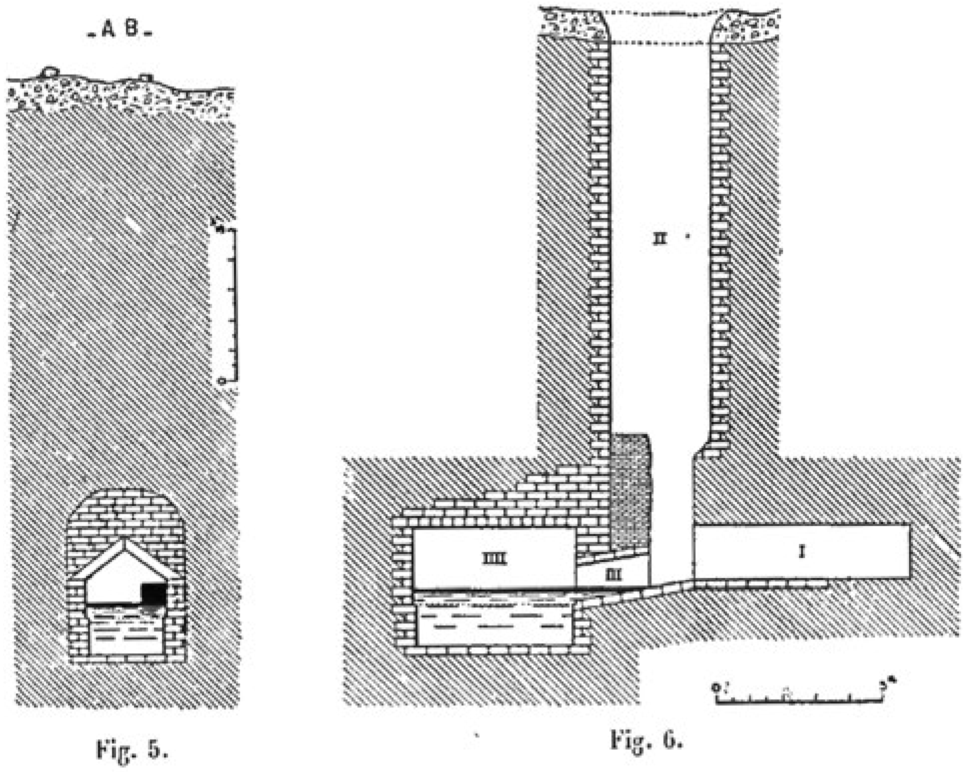


Figure 209 The deep stone lined and saddle roofed burial chamber and shaft of DAS 32-4 (Iinefer) at Dahshur South. (Barsanti 1902, figs. 5 and 6)

at its highest point would have been approximately 6.75 m thick.[996]

At the southern end of the necropolis, south of the pyramid of Amenemhat III, lie DAS 9 (Ipy) **[206]** and DAS 32-4 (Iinefer) **[207]**. [997] The shaft leading to the burial chamber of the former is 7.75 m deep and links to the burial chamber via a 6 m rock-cut passage.[998] Cut into the surrounding limestone and shale strata, the chamber is 1.95 m high and lined with blocks of Tura limestone on its four walls and floor.[999] It would have been protected by a roof approximately 5.8 m thick formed from the limestone stratum. This was undoubtedly considered sufficient protection from above, as it can be clearly seen in the section drawing that the stone walls and flooring were only necessary to protect the chamber in the lower softer shale stratum (Fig. 208). The tomb has been entered on many occasions;[1000] without evidence of any robber's tunnels, presumably this was done via the shaft. A similar, but even deeper arrangement is seen in Barsanti's drawing of nearby DAS 32-4 (Iinefer) **[207]**,[1001] where if the drawing can be relied on (Fig. 209), the burial chamber floor was set at approximately 19 m from the surface.[1002] Its walls and floor were stone lined, but rather than a corbelled roof it was protected by an early saddle roof,[1003] which presumably offered better protection; above this was around a further 14 m of cover,[1004] making it the best protected and deepest burial chamber in the necropolis.

The remaining three tombs are from the 'Lepsius' mastaba field south-east of the Red Pyramid, which they are contemporary to and associated with.[1005] Excavations have revealed that the burial chambers of the first two examples were built at the end of sloping construction trenches, which were necessary in order to manhandle the masonry used to line their burial chambers within the soft *tafl*.[1006] Such as in the 2.19 m high burial chamber and short access corridor of Mastaba I/1 **[209]**, which was set at the base of a 9.5 m deep shaft (Fig. 210). Its walls were constructed of large tightly jointed limestone blocks and roofed and floored with full width slabs of

[996] Scaled dimension from drawing by de Morgan (1895: figs. 3–5).
[997] These are situated some 900 m from the Bent Pyramid, with which they are associated (Stadelmann and Alexanian 1998: 316). The remaining three are from the Red Pyramid's mastaba field (Alexanian 2007: 162–4).
[998] The excavators note that it is similar to the tomb of Ity at Abusir (discussed above) and probably of a similar date (Alexanian and Seidlmayer 2002: 9).
[999] The shale starts at a depth of approximately 6.5 m from the surface (Alexanian and Seidlmayer 2002: 7).
[1000] Stadelmann and Alexanian 1998: 302–3; Alexanian and Seidlmayer 2002: 7.
[1001] Porter and Moss 1974-81: 894.
[1002] Barsanti 1902b: 200–1, figs. 5–6.
[1003] These direct the thrust of the superincumbent weight down and into the side walls of the structure, and were later used on a much larger scale in the Great Pyramid and all the pyramids of the Fifth and Sixth Dynasties (Arnold 1991: 191).
[1004] Scaled dimensions from drawing by Barsanti (1902b: Figs. 5–6).
[1005] Alexanian 2007: 162–4. There is a fourth Type IIC shaft tomb known as Mastaba III/1 **[NIC]** in Stadelmann *et al.* (1993: 290), but it is unlikely that it is contemporary with the three discussed here as it is dated somewhat later.
[1006] Stadelmann *et al.* 1993: 275; Alexanian 1999: 23–4.

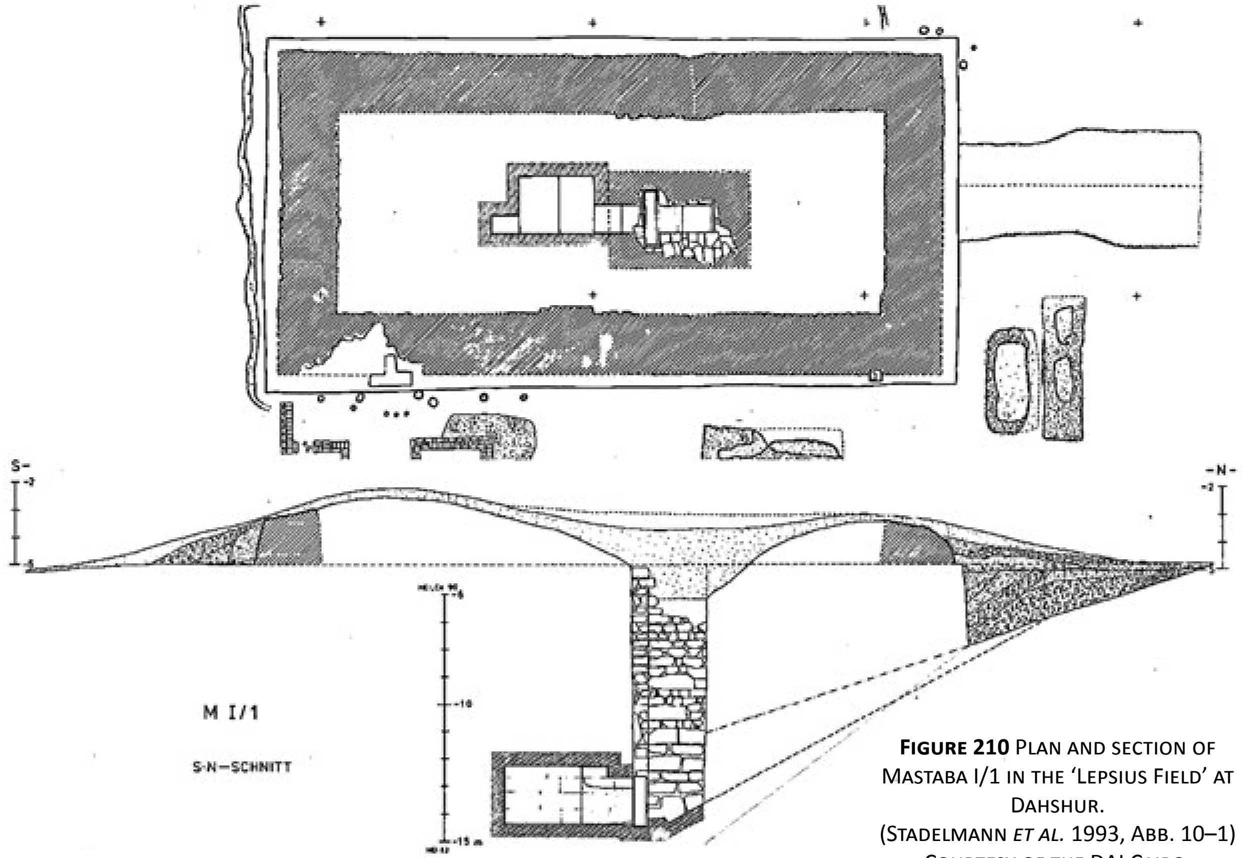


Figure 210 Plan and section of Mastaba I/1 in the 'Lepsius Field' at Dahshur.
(Stadelmann *et al.* 1993, Abb. 10–1)
Courtesy of the DAI Cairo.

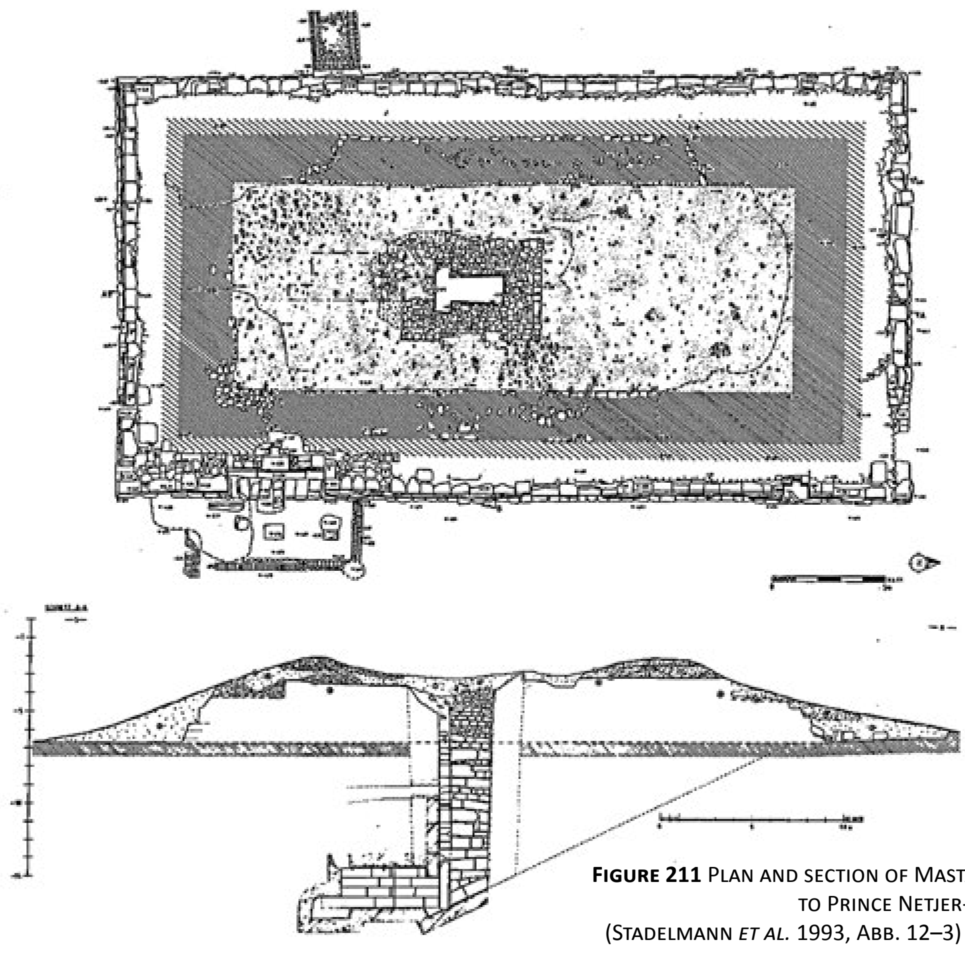


Figure 211 Plan and section of Mastaba II/1, which is attributed to Prince Netjer-Aperef.
(Stadelmann *et al.* 1993, Abb. 12–3) Courtesy of the DAI Cairo.

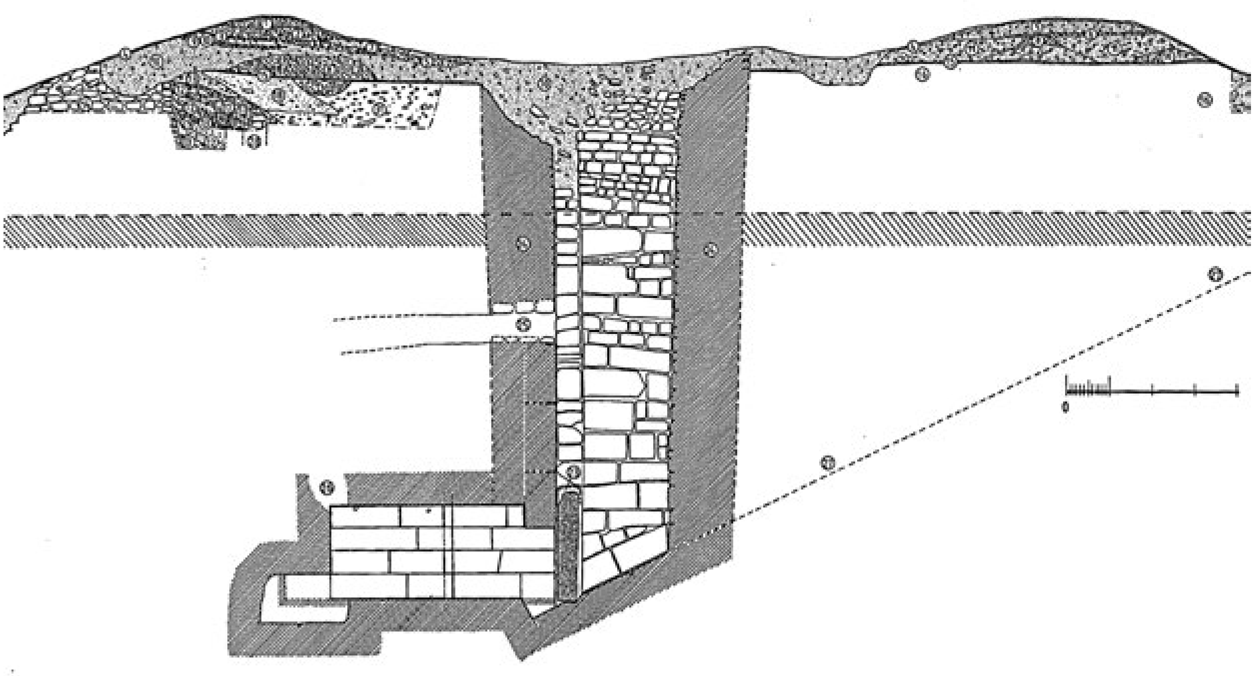


Figure 212 Enlarged view of the stone lined burial chamber and shaft of Mastaba II/1 showing the robber's tunnel penetrating the shaft and burial chamber roof.
(Alexanian 1999, Abb. 5) Courtesy of the DAI Cairo.

the same material.[1007] This combination provided the chamber with about 7.3 m of overhead cover, but despite this protection, damage to the portcullis suggests the tomb was robbed via its shaft instead.[1008] Similarly, the corridor and chamber of nearby Mastaba II/1 **[210]** were built in an almost identical size and manner (Fig. 211), but were slightly less well protected by a shallower depth of cover approximately 6.9 m thick. In this instance the chamber had been robbed both via a tunnel from the shaft, which broke through the south-west corner of the chamber roof, and via a hole in its portcullis (Figs. 212–3).[1009] Lastly, the burial chamber of the slightly later Mastaba I/2 **[211]**,[1010] was constructed in the same way. Although its floor was deeper at 10.8 m from the surface, owing to its 3.2 m high ceiling,[1011] it was only slightly better protected by 7.6 m of cover (Fig. 214). It too had been robbed via its shaft (on numerous occasions[1012]) and a hole in its stone floor leads to a robber's tunnel that runs for a further 4 m to the south.[1013]

Like their slightly earlier predecessors at Meidum (discussed below), the burial chambers of these tombs were deliberately set deep down and lined with stone to compensate for the weak surrounding geology at this necropolis, which was evidently vulnerable to tunnelling. In most cases the main route of attack seems to have been via the shaft, but it appears from the robbers' tunnels discussed above that the fears of the tombs' architects were realised on at least two occasions.

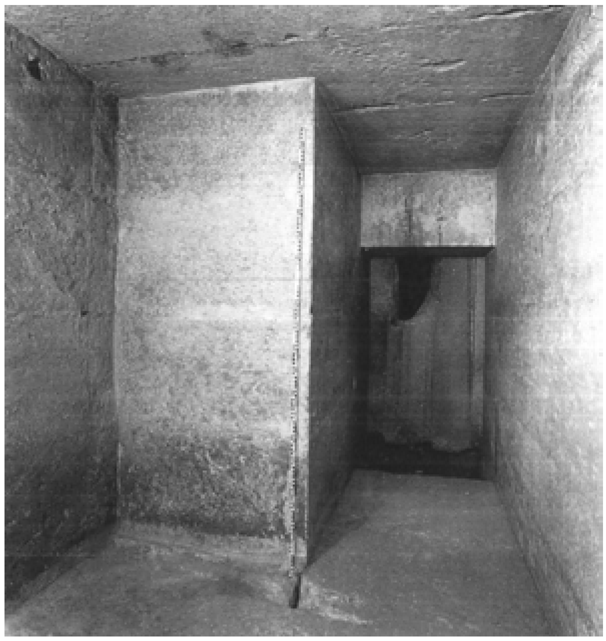


Figure 213 The stone lined burial chamber of Mastaba II/1 at Dahshur showing the breached portcullis.
(Stadelmann *et al.* 1993, Taf. 57c) Courtesy of the DAI Cairo.

[1007] Stadelmann *et al.* 1993: 276. In addition, as with all of these tombs, a small canopic niche was constructed at one end of the chamber, in this case with its own slab cover.
[1008] Stadelmann *et al.* 1993: 275.
[1009] Alexanian 1999: 26.
[1010] Stadelmann *et al.* 1993: 288.
[1011] Stadelmann *et al.* 1993: 285.
[1012] The evidence for these multiple intrusions found on site includes Middle Kingdom and Roman Coptic pottery as well as Arabic graffiti (Stadelmann *et al.* 1993: 285, n. 69).
[1013] Stadelmann *et al.* 1993: 285.

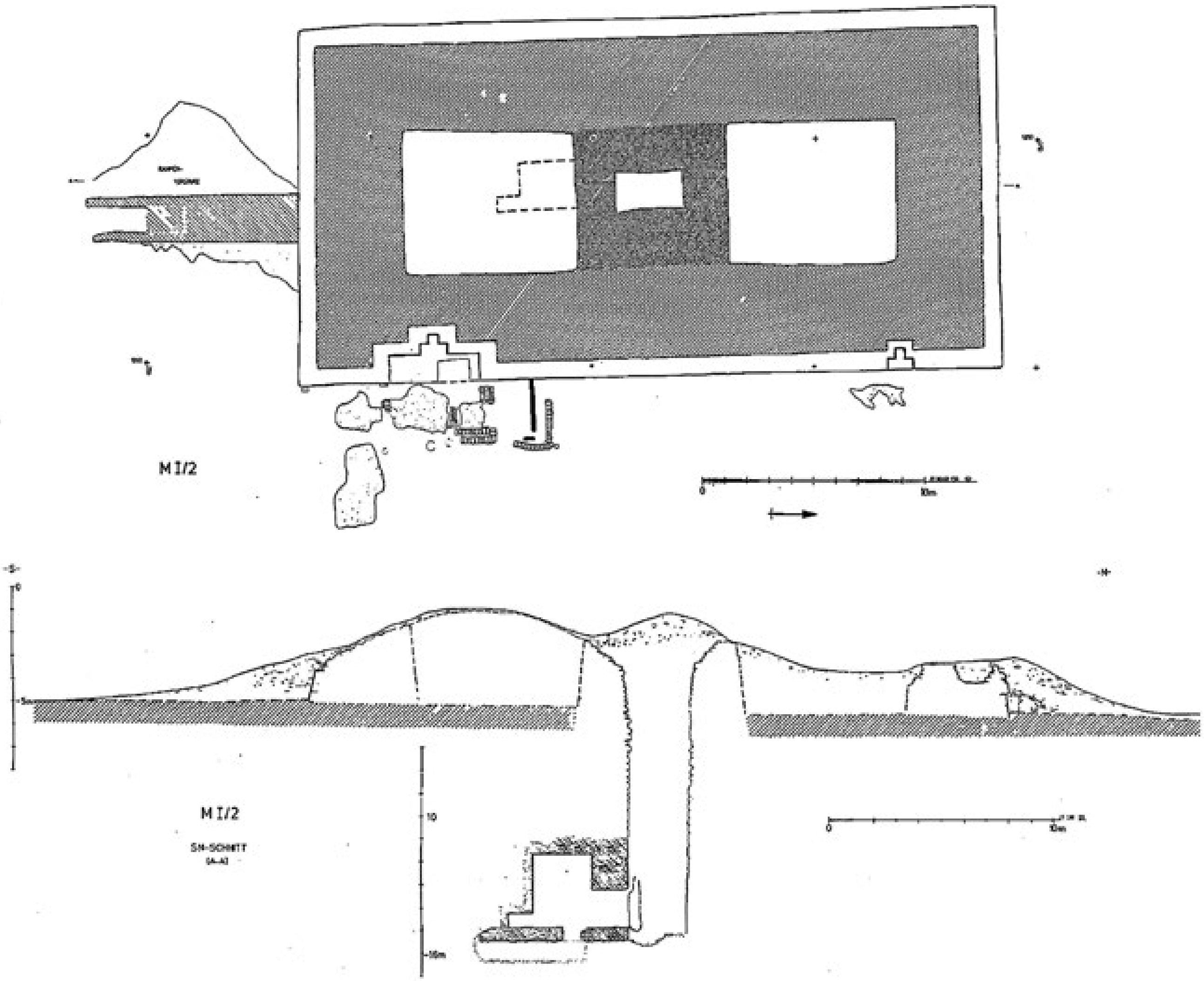


Figure 214 Plan and section of Mastaba I/2 at Dahshur. The robber's tunnel can be seen in the stone floor. (Stadelmann *et al.* 1993, Abb. 16–7) Courtesy of the DAI Cairo.

Meidum

In the tomb catalogue there are twenty-three Type IIC tombs from Meidum; seven are in the North Cemetery **[220–6 and 252]** and the remaining fourteen in the Far Western Cemetery **[227–42]**.

Some of the burial chambers in these tombs were cut directly in the soft rock,[1014] such as that of Atet in the Type III + IIC 'twin mastaba' no. 16, belonging to Nefermaat and Atet **[251]**.[1015] Although its depth cannot be determined (Figs. 215–6), Atet's tomb was described by Wainwright as, 'a large chamber hewn out of the soft marl, without even a stone lining.'[1016] The effectiveness of its defences were untested, as it had been pillaged almost immediately after the burial, perhaps even before the shaft was sealed.[1017] More is known about the rock-cut chambers of the Type IIC + IIC 'twin mastaba' no. 6 of Rahotep and Nefert **[220]** (Fig. 217).[1018] At the end of its connecting passage with its 4.5 m deep shaft, Rahotep's 3.4 m high burial chamber was excavated in the marl at an unexpectedly shallow depth, as its roof was only about 2 m thick.[1019] This was presumably because the tomb's builders relied on the enormous bulk of its overlying brick mastaba to provide its main defence (Fig. 218).[1020] Similarly the adjacent burial chamber of Nefert, was set just below the base of its 5 m deep shaft, but was arguably better protected by a 3.75 m thick layer of rock, plus a 3 m layer of 'pebbles' and

[1014] Mariette (1889: 471, 479–80) noted that the rock at Meidum is of poor quality like that at Dahshur, and Reisner (1936: 220) described it as 'soft crumbly rock'.
[1015] Porter and Moss 1934: 92–4.
[1016] Petrie, Wainwright and Mackay 1912: 26.
[1017] Harpur 2001: 47.
[1018] Petrie 1892: 16–7; Porter and Moss 1934: 90–2.
[1019] Scaled dimension from 1:150 plan (Petrie 1892: pl. VII).
[1020] That the tomb's builders were aware of the friability of the underlying rock strata is evident from the fact that they had built relieving chambers within the mastaba directly above the chamber to allay the pressure from the superincumbent load; see Petrie (1892: 16) for a description of the relieving chamber.

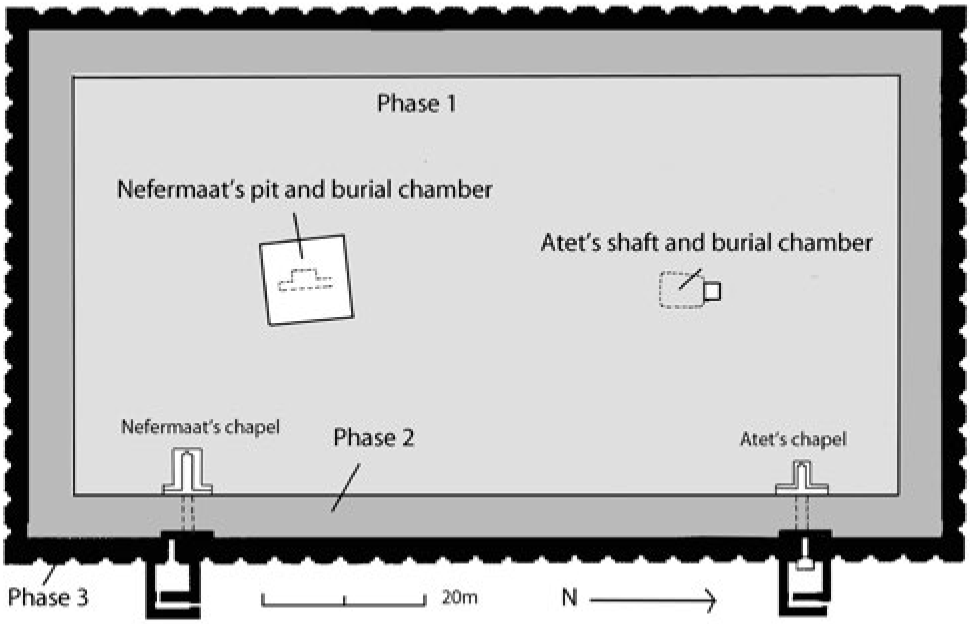


Figure 215 Plan of the Type III + IIC 'twin' Mastaba No. 16 belonging to Nefermaat and Atet at Meidum. (Drawn by the author after Harpur 2001, fig. 38 and Jánosi 2006, Abb. 33)

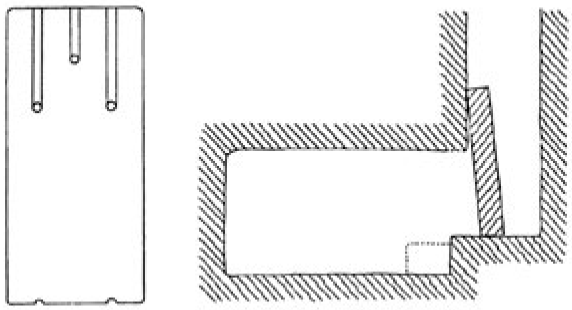


Figure 216 The burial chamber of Atet in Mastaba no. 16 at Meidum, together with its portcullis (Not to scale). (Petrie, Wainwright and Mackay 1912, pl. XV) Courtesy of the Petrie Museum of Egyptian Archaeology.

the huge mastaba.[1021] Both chambers were been robbed in antiquity, but it would seem in this instance some time after their interments.[1022]

Not much is known about the protection offered to the rock-cut burial chamber of Ranefer in the Type IIC +

[1021] Scaled dimension from Reisner (1936: fig. 110). A number of the private substructures at Meidum were excavated by Alan Rowe in the 1930's as part of the Pennsylvania University Museum Expedition and only later published in Reisner's (1936) Tomb Development (Harpur 2001: 251). Therefore, in this section where mention is made of dimensions scaled from a Reisner (1936) figure they will most likely have been taken from a drawing originally made by Rowe.

[1022] Impressions of the coffin remained in the dried remains of the liquid mud that had seeped into the burial chamber when the shafts were sealed with their protective mud slurry, which suggests that, unlike in the tomb of Nefermaat and Atet, the mud had sufficient time to set before the tomb was robbed (Harpur 2001: 53–4). See Harpur (2001: 51–4) for an in depth discussion of the robbing of both tombs.

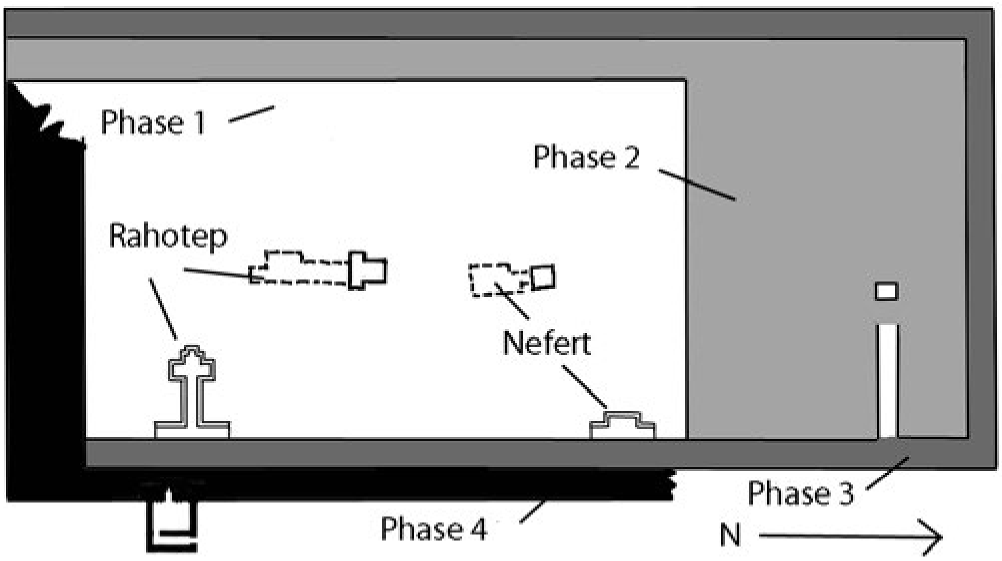
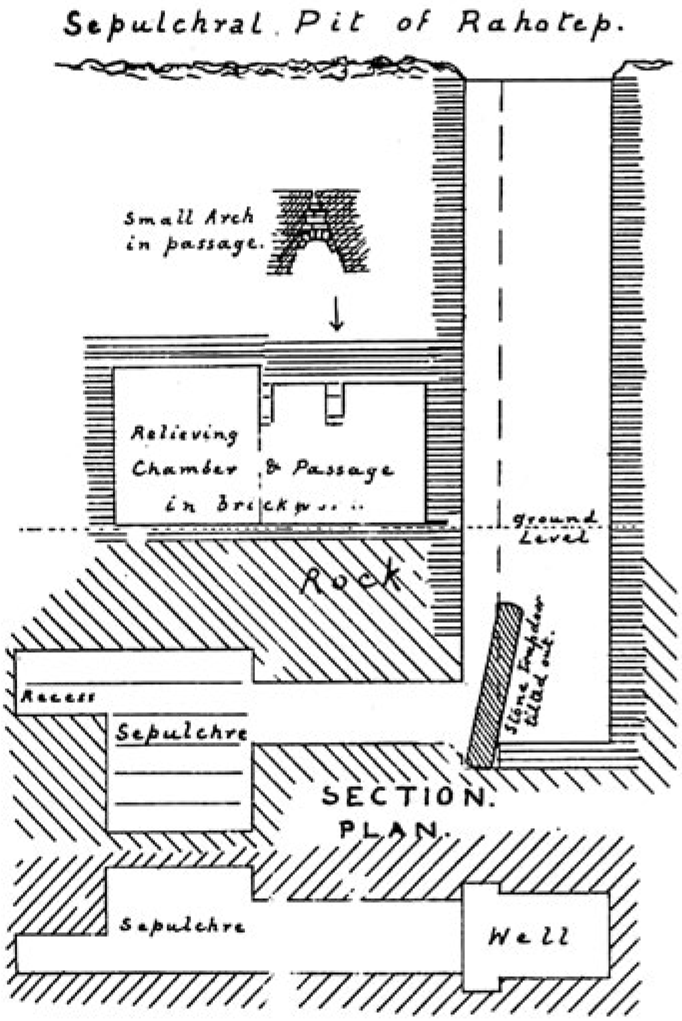


Figure 217 Plan of the Type IIC + IIC 'twin' Mastaba No. 6 of Rahotep and Nefert at Meidum. (Drawn by the author after Harpur 2001, fig. 61)



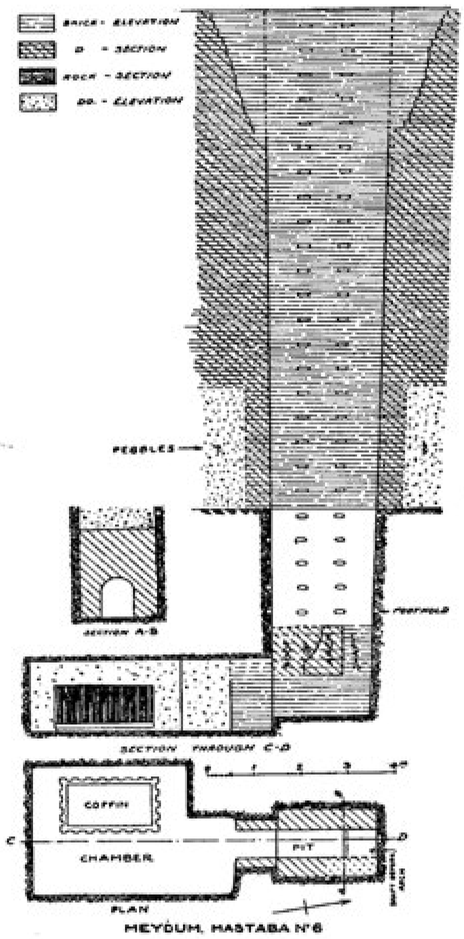
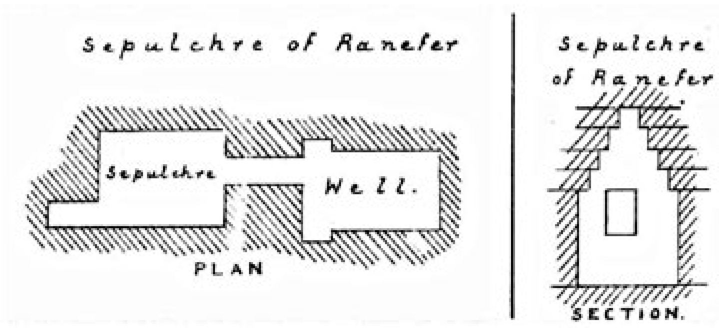


Figure 218 Sections of the Type IIC shafts and burial chambers of Rahotep (on the left) and Nefert (right) in Mastaba No. 6 at Meidum (drawings of different scales)
(Petrie 1892, pl. VII, and Reisner 1936, fig. 110 respectively)

IIC 'twin' Mastaba no. 9 **[221]**,[1023] save that it had been robbed via a tunnel through its floor that originated at the back of the tomb's southern false door,[1024] thus illustrating the soft rock's susceptibility to tunnelling (Fig. 219). However, more information is available regarding the chamber of his spouse, which like its neighbours, was protected by a shallow roof approximately 3 m thick, and relied on its superstructure for its primary defence.[1025] As did the rock-cut burial chamber of the Type IIC Mastaba no. 4 of Heneken **[222]**,[1026] which was defended by a 4.7 m thick roof and a massive mastaba (Fig. 220).[1027] Similarly, the roofs of the southern and northern burial chambers of the nearby Type IIC + IIC Mastaba no. 7 **[223]**[1028] were 5.5 m and 5.2 m thick respectively (Fig. 221).[1029] However, the thickest subterranean protection of all in this group was that in the single burial chamber of tomb no. 416 **[224]**, whose ceiling was protected by 7.7 m of cover (Fig. 222).[1030]

Unusually, the Type IIC + IIC + IIC Mastaba no. 8 **[225]**[1031] had three burial chambers of which the northern and central were entirely rock-cut. Only the depth of the former is known at 11.9 m, but not its height.[1032] The southern chamber was masonry lined with blocks up to 0.5 m thick for additional security and was protected by approximately 2.7 m of rock cover plus its mastaba (Fig. 223). Despite these precautions, a robbers' tunnel was found that started outside the superstructure and had penetrated the chamber through its roof (Fig. 374). [1033] Finally, the burial chamber of Mastaba no. 1 **[226]** was

[1023] Porter and Moss 1934: 92.
[1024] Petrie 1892: 16.
[1025] Scaled dimensions from Reisner (1936: 213, fig. 111).
[1026] Porter and Moss 1934: 90.
[1027] Scaled dimensions from Reisner (1936: 214, fig. 113).
[1028] Porter and Moss 1934: 92.
[1029] Scaled dimensions from Reisner (1936: 213, fig. 112).
[1030] Scaled dimensions from Reisner (1936: 214, fig. 114).
[1031] Porter and Moss 1934: 92.
[1032] Petrie 1892: 18–9.
[1033] Scaled dimensions from Reisner (1936: 212, fig. 109).



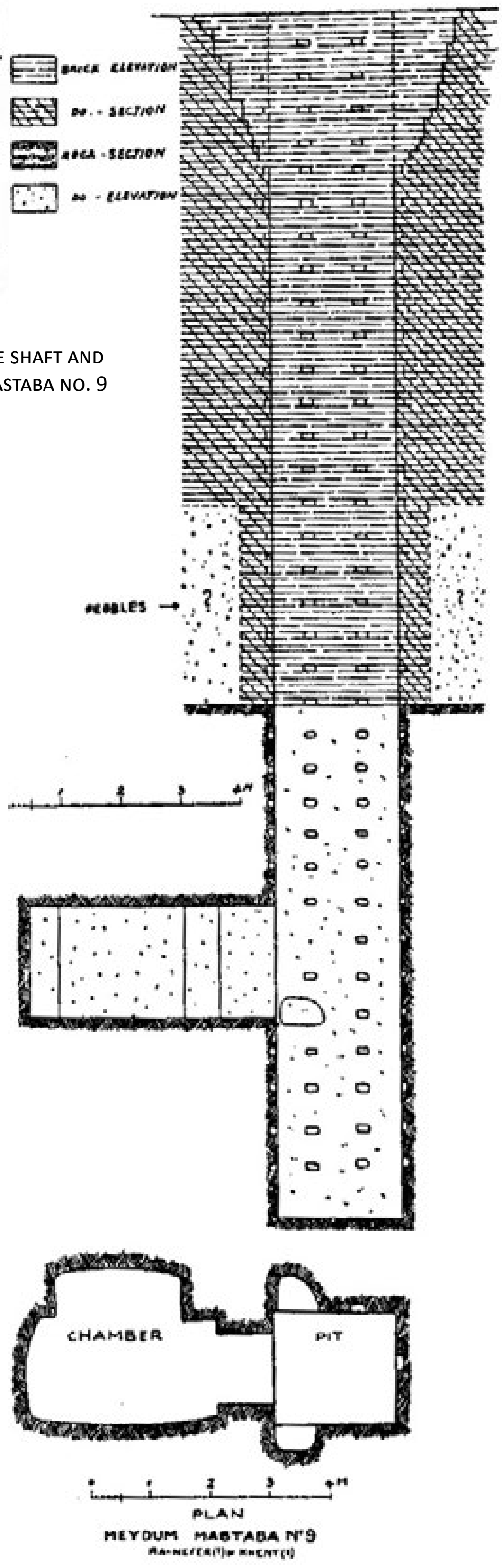


Figure 219 The burial chambers of Ranefer (left and centre) and the shaft and burial chamber of his spouse (right) from the Type IIC + IIC 'twin' Mastaba no. 9 at Meidum (drawings of different scales).
(Petrie 1892, pl. 7 and Reisner 1936, fig. 111 respectively)

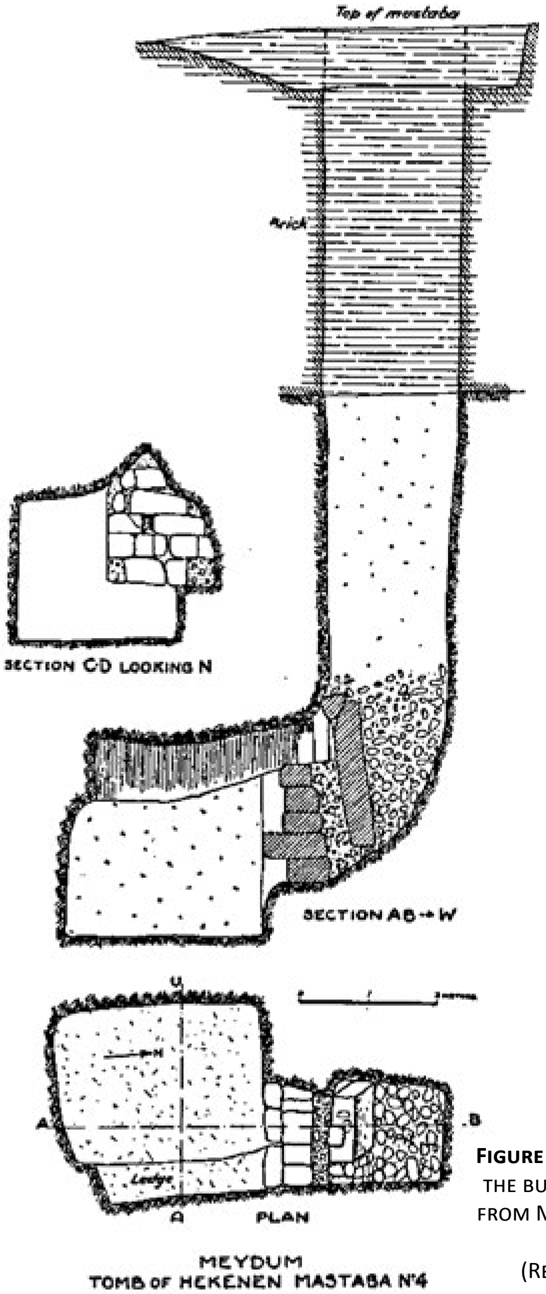


Figure 220 Plan and section of the burial chamber and shaft from Mastaba No. 4, (Heneken) at Meidum.
(Reisner 1936, fig. 113)

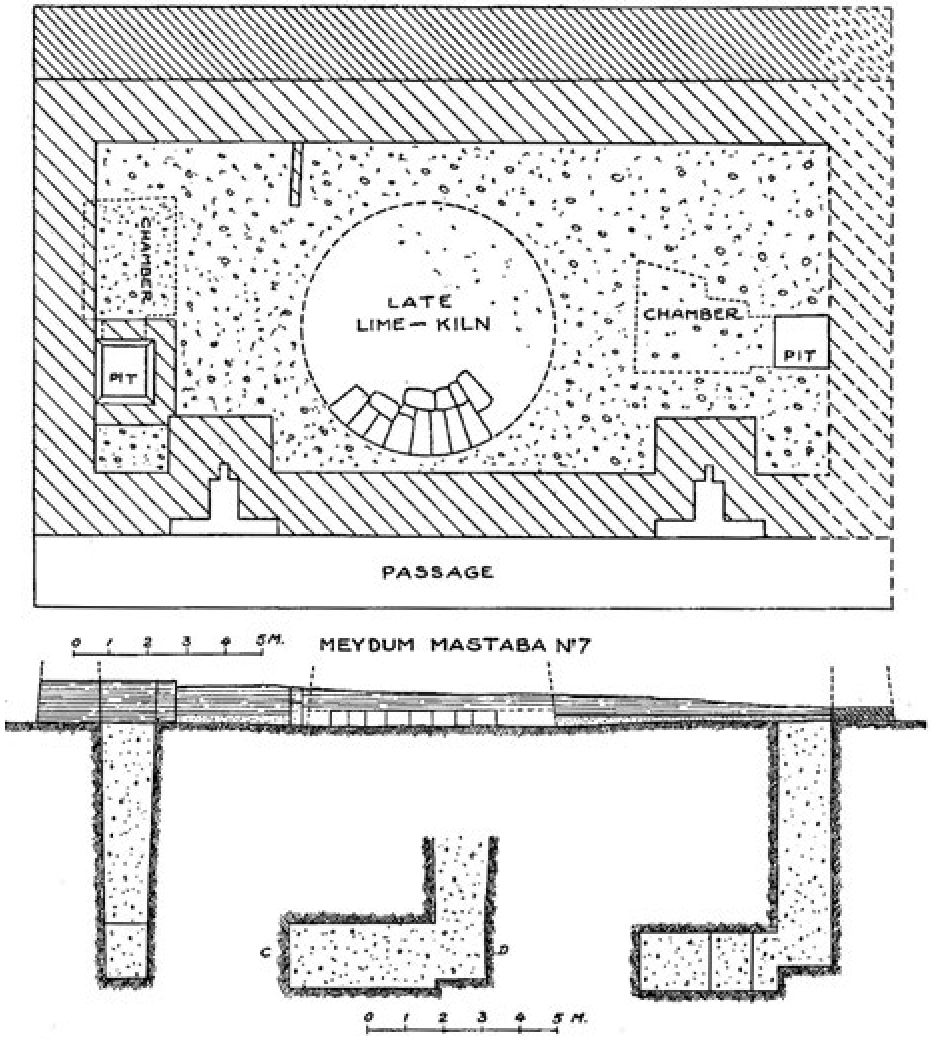


Figure 221 Plan and section of the Type IIC + IIC Mastaba No. 7 at Meidum. (Reisner 1936, fig. 112)

also built of masonry and corbelled. Unlike the previous tombs however, it had been constructed in an open trench specifically dug for the purpose (Fig. 224), therefore its cover was provided by about 3.6 m of backfill instead.[1034]

In the Far Western Cemetery, Mackay reported there were thirty-five shaft tombs set out in rows,[1035] of which sixteen are included in the catalogue **[227–42]**.[1036] The majority of their rock-cut burial chambers were lined with masonry and roofed with wide limestone blocks, then paved with stone floors 0.15–0.25 m thick (Fig 225).[1037] In addition to these linings,[1038] they were protected by the strata of 'loose rock' into which they were cut and a 3.3 m layer of gravel at the surface.[1039] The thickness of cover over these burial chambers varied from 7 m at the shallowest above tomb 66 **[237]** to 10.8 m at the deepest above tomb 51 **[228]**. The depth of cover for the remaining burial chambers, which are: tomb 53 **[230]**, tomb 57 **[233]**, tomb 61 **[234]**, tomb 62 **[235]**, tomb 63 **[236]**, tomb 68 **[238]**, tomb 69 **[239]**, tomb 76 **[240]** and tomb 81 **[242]**, can be found in Chart E and the catalogue. Distinct from these were four examples that were entirely rock-cut, unlined and gable roofed,[1040] of these tomb 50 **[227]** had the shallowest depth of cover at 4.8 m and tomb 56 **[232]** the deepest at 8.9 m, with tombs 52 **[229]** and 55 **[231]** in-between (Fig. 226). Exceptionally, tomb 80 **[241]**, rather than a proper burial chamber, was only provided with a gable roofed rock-cut corridor with just a 2.1 m rock ceiling.

Predating the stone lined tombs at Dahshur, the depth and linings of the burial chambers in the Far Western Cemetery suggest an alternative approach to providing

[1034] Scaled dimensions from Reisner (1936: 212, fig. 108).
[1035] Petrie, Mackay and Wainwright 1910: 24, pl. XVI.
[1036] The ones included in the catalogue are those which are accompanied by individual drawings in Petrie, Mackay and Wainwright 1910: Pls. XVII-XVIII.
[1037] Wainwright (Petrie, Mackay and Wainwright 1910: 24–5) differentiated between tombs with or without 'canopic' recesses in his descriptions, but for the purposes of this discussion these tombs are not differentiated here.
[1038] Mackay (1910: 28) gave sample block dimensions of these wall and roofing stones from selected tombs as examples, but they seem not to include the thickness of the stones and are difficult to comprehend.
[1039] Petrie, Mackay and Wainwright 1910: 24.
[1040] Petrie, Mackay and Wainwright 1910: 26.

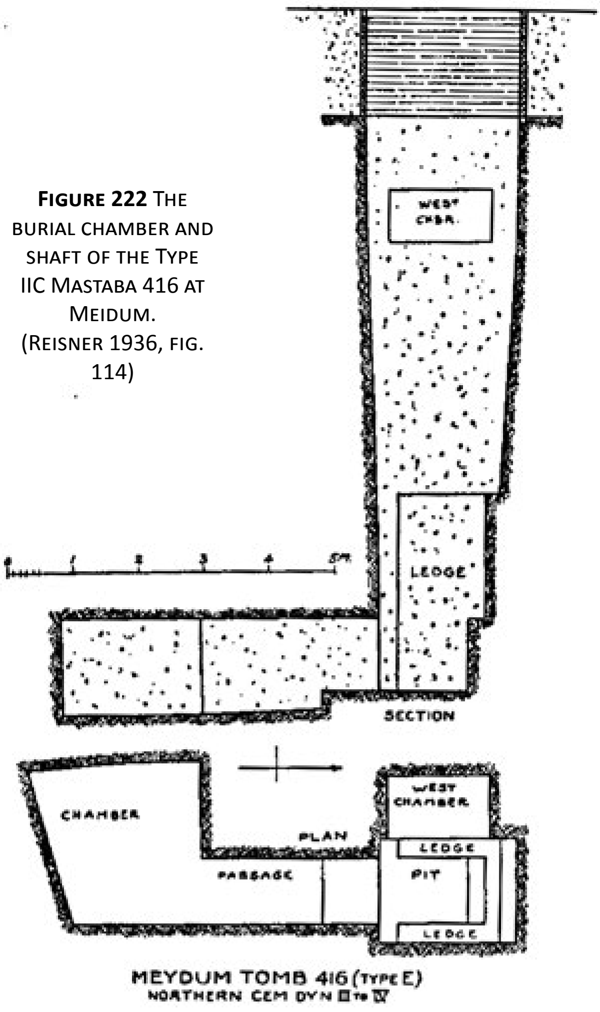


Figure 222 The burial chamber and shaft of the Type IIC Mastaba 416 at Meidum. (Reisner 1936, fig. 114)

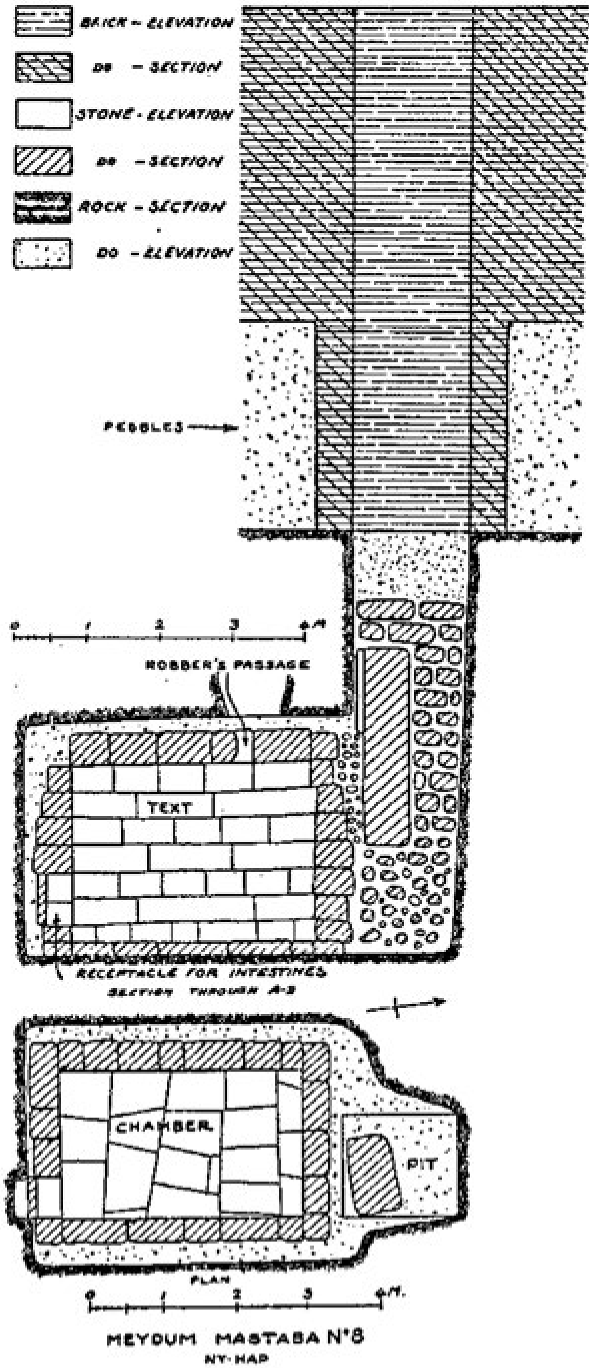


Figure 223 The southern masonry lined burial chamber and rock-cut shaft of the Type IIC + IIC + IIC Mastaba No. 8 at Meidum. (Reisner 1936, fig. 109)

security that relied less on a massive superstructure. Although it is impossible to be sure, as it seems the cemetery was abandoned before its superstructures could be built.[1041] That is with the exception of tomb 50, which was found sealed with its original Third Dynasty burial intact; the remainder of the tombs only being occupied by burials as late as the Twenty-second Dynasty.[1042]

Naga el-Deir

Three examples of shaft tombs are found at Cemetery 500–900 at Naga el-Deir. The simplest of these was N 629 **[312]**,[1043] whose single burial chamber was defended by a gravel roof 2.8 m thick. Better protected, the substructure of the Type IIC tomb N 739 **[313]**[1044] was built via a sloping trench/stairway in a similar manner to Mastabas I/1 and II/1 at Dahshur,[1045] which may suggest a contemporary date (Fig. 227). The burial chamber was protected by a gravel roof approximately 4.6 m thick,[1046] which although unrobbed, had suffered a collapse.[1047] Lastly, the Type IIC + IIC 'twin' mastaba N 546 + N 604 **[314]** also used a construction slope in its southern shaft. Its chambers were protected by gravel roofs 2 m and

[1041] Alexanian 1999: 18.
[1042] Petrie, Mackay and Wainwright 1910: 24. Mackay (1910: 24–8) did not specify which tombs held secondary burials, with the exception of tomb 56 **[232]**, which contained six 22nd Dynasty coffins.
[1043] Reisner 1932: 238–9.
[1044] Porter and Moss 1937: 26.
[1045] See above pages ????.
[1046] Scaled dimensions from Reisner (1932: Fig. 202).
[1047] Reisner 1932: 248.

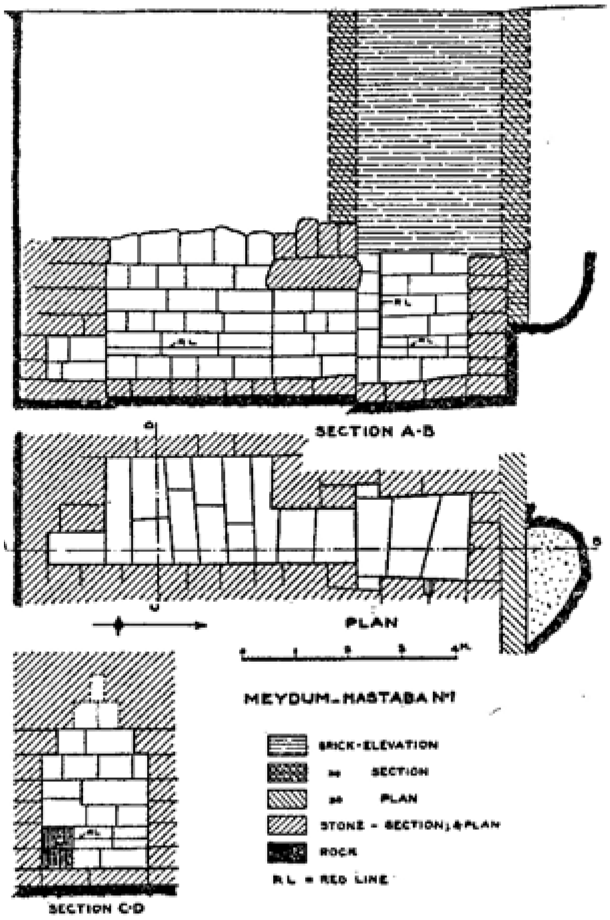


Figure 224 The masonry lined and corbelled burial chamber of Mastaba No. 1 at Meidum, which was accessed by a brick lined shaft, with a stone built base and portcullis emplacement.
(Reisner 1936, fig. 108)

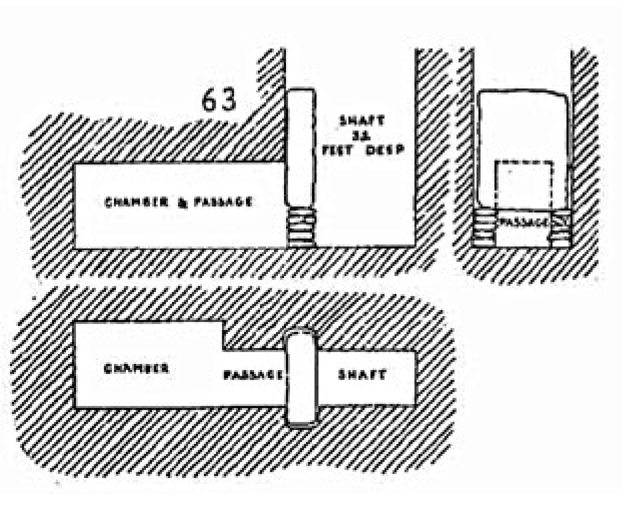


Figure 225 The Type IIC tomb 63 in the Far Western Cemetery of Meidum. Showing a typical stone lined burial chamber and shaft arrangement with portcullis.
(Petrie, Mackay and Wainwright 1910, pl. XVII)

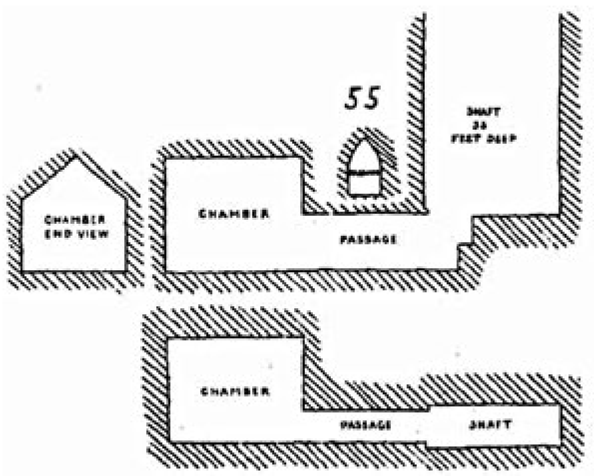


Figure 226 Unlined Type IIC gable roofed rock-cut burial chamber and shaft of tomb no. 55 in the Far Western Cemetery at Meidum.
(Petrie, Mackay and Wainwright 1910, pl. XVIII)

2.3 m thick respectively,[1048] that of N 604 having been robbed via a hole made over its portcullis.[1049]

El-Kab

Amongst the many shaft tombs excavated by Quibell at El-Kab,[1050] only in one example are there details of its substructure. The floor of the burial chamber of Mastaba 'A', the tomb of Kamena **[345]**[1051] was set 4.5 m down from the surface and its walls were entirely lined with slabs of sandstone approximately 7.5–10 cm thick. Its roof was formed of thinner sandstone sheets (Fig. 228), which had collapsed under the weight of the 3.5 m thick Nile sediments above.[1052] It therefore seems to have been well protected from lateral tunnelling, but curiously not so well protected from overhead attack, and was perhaps more reliant on its mastaba for protection.

Section summary - Type IIC burial chambers

During the Second Dynasty, in cemeteries with resistant geology, such as Abusir, Lahun and Hemamieh, the level of physical protection for Type IIC burial chambers remained similar to their Type IIA and IIA-C predecessors, or perhaps increased if greater depths were employed. However, the same problems with tunnelling that troubled the Type IIA and IIB tombs of Helwan with their soft geology, continued with the shaft tombs at that site, which was only solved in the Third Dynasty by the use of stone linings. During that period, the sites of Giza,

1048 Scaled dimensions from Reisner (1932: fig. 161).
1049 Reisner 1932: 208 and 231.
1050 They are Mastabas B, C, Ca, D **[346]**, E, 42, 88, 101, 185, 187, 204, 228, 231, 280, 288, 301, 302, 312 and 318 **[otherwise all NIC]** (Quibell 1898: 4–7).
1051 Porter and Moss 1937: 175.
1052 Quibell 1898: 3–4.

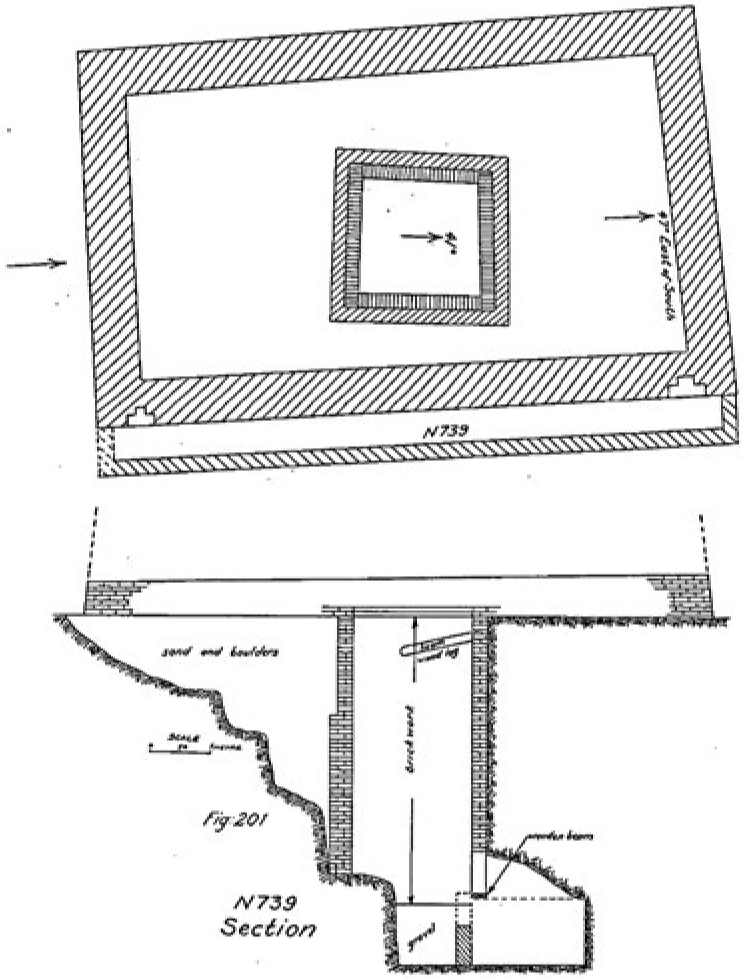
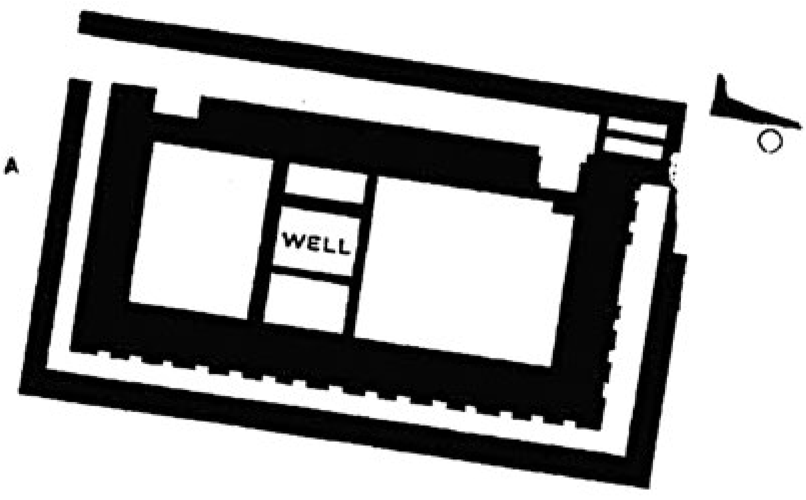


Figure 227 Plan and section of The Type IIC tomb N739 at Cemetery 500-900 in Naga el-Deir showing the shaft's brick lining. (Reisner 1932, fig. 201)



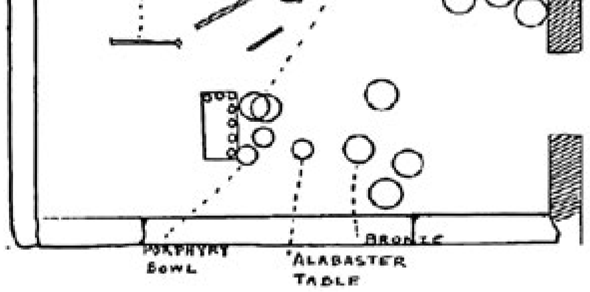


Figure 228 The Type IIC Mastaba of Kamena at El-Kab, with its sandstone lined burial chamber (drawings of different scales). (Quibell 1896, pls. I.4 and XXIII)

Saqqara and Lahun however, remained reliant for their defence on their rock and marl strata and ever increasing chamber depths.

During the Fourth Dynasty the establishment of the two royal necropoleis of Sneferu in the weaker geologies at Meidum and Dahshur, brought varying responses to the problem of defending the burial chambers of the private tombs that accompanied them. At the North Cemetery of Meidum, where substructures were shallow, there was great reliance on large overlying superstructures, and on occasion, the lining of a chamber with stone for extra protection, whereas in the Far Western Cemetery, increased depth of cover and stone liners were used instead. These techniques were successfully re-employed in the private cemeteries associated with the Bent and Red Pyramids when the king and his followers moved to Dahshur. While the use of deep cover was also adopted at Abusir, the harder local geology made the use of stone linings unnecessary, unlike in the tomb of Kamena within the softer Nile silts of El-Kab.

4.2.3 Burial chambers in Type III tombs with sloping corridors

The early Fourth Dynasty

There are nine Type III tombs with sloping access in the catalogue **[243–52]**,[1053] all are from the necropolis of Meidum, and are a development exclusive to that cemetery. Their substructures are usually built of stone within a trench excavated in the soft rock, which was then backfilled and infrequently protected by a superstructure.

Six of the burial chambers in the Great Western Cemetery and its environs are broadly similar. The best documented is tomb A **[243]**. It was entirely built of stone at the base of a 10.5 m deep rock-cut trench (Fig. 229), but for reasons unknown the chamber within the masonry was

[1053] There are actually twenty-one tombs at Meidum with sloping access corridors (Reisner 1936: 21), but only **[243–52]** are accompanied by drawings and thus included in the catalogue.

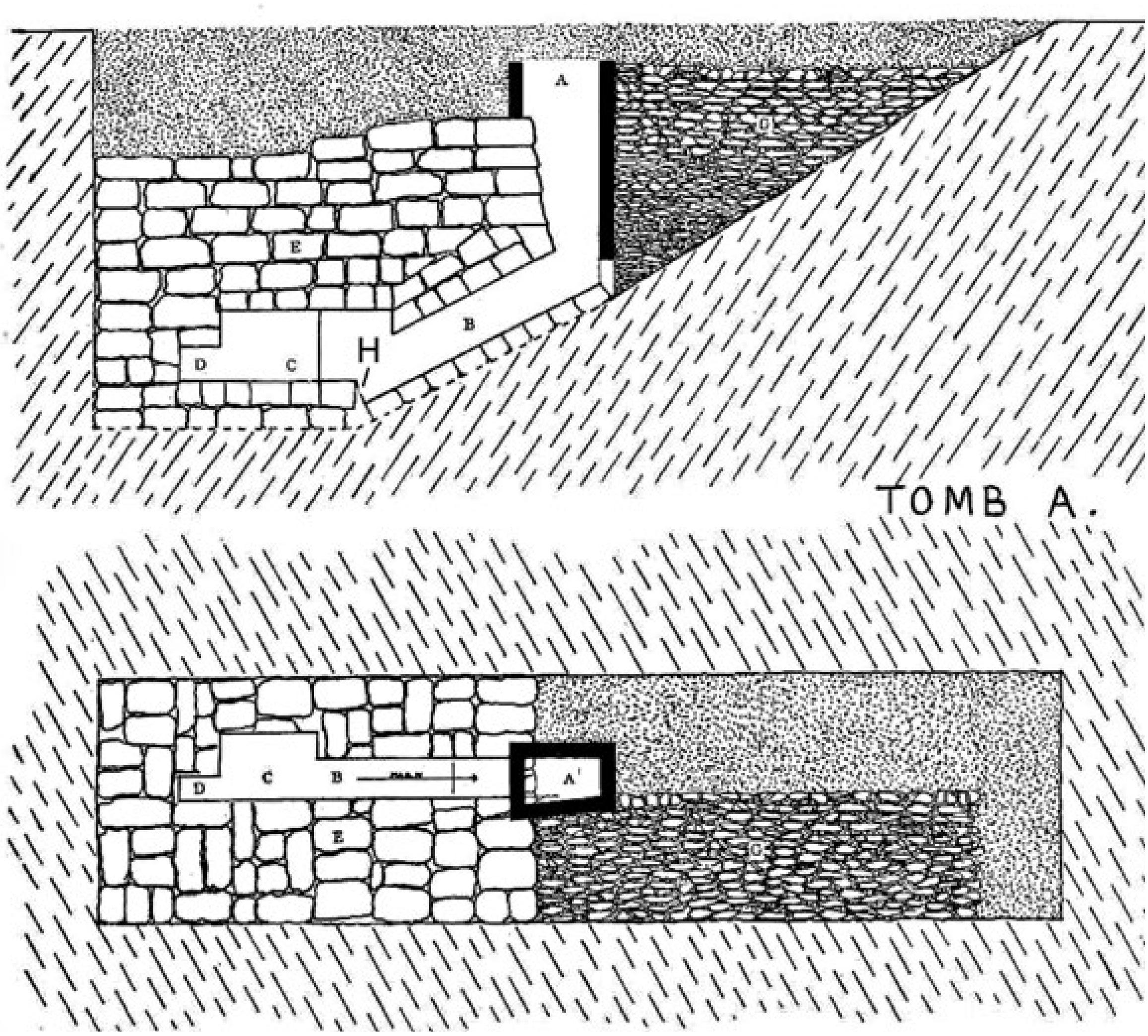


Figure 229 The stone built burial chamber of the Type III tomb A at Meidum. The descending passage has a stone step 'H', which would form a stop for the plug-stones used to seal it.
(Petrie, Mackay and Wainwright 1910, pl. XV)

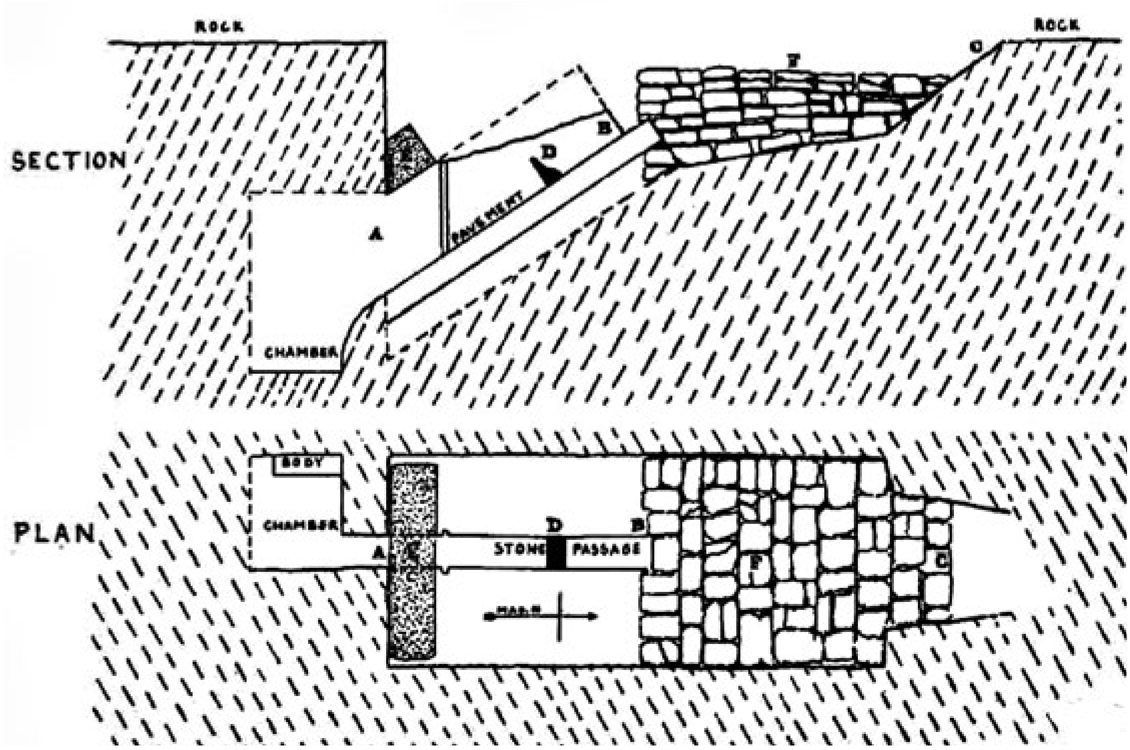


Figure 230 The Type III North Peribolous tomb at Meidum, showing a rock-cut burial chamber that had been dug in the end face of the trench, which contained the stone lined and inclined entrance corridor. (Petrie, Mackay and Wainwright 1910, pl. IX)

off-centre,[1054] so that the protection on the eastern side was 3.5 m thick, which was far greater than the 1.5 m on the western side. In comparison it appears that the back wall was about 3 m thick. [1055] The floor of the 1.8 m high burial chamber was protected by a couple of courses of stone, but its roof consisted of large limestone blocks bedded in mortar, which also acted as a solid backfill for the trench. This may have been brought level to just under the surface, as is seen in some of the neighbouring tombs (see below),[1056] thus giving the chamber about 8 m depth of cover. It appears that tombs B **[244]** and C **[245]** were built in the same manner, but their structural details are not recorded. All three had at some time been robbed via their access routes, the masonry structure being undisturbed.[1057]

The burial chambers of tombs 202 **[246]**, 277 **[247]** and 393 **[248]** are virtually identical, and although not much information is available, the depths of their masonry roofs or backfill can be estimated from Rowe's drawings, which in turn are approximately 7.5 m, 7.4 m and 8.1 m thick.[1058] Another ruined substructure known as the Southern Peribolous tomb **[249]** could have been the substructure of the earliest satellite pyramid,[1059] and may have taken a similar form, but its design is hard to visualise, despite Mackay's detailed proposals.[1060] An anomalous form of this type of burial chamber is found in the Northern Peribolous tomb **[250]**, where a sloping corridor leads into a vertical rock face into which a small burial chamber was excavated (Fig. 230).[1061] This would have been protected from above by a rock roof approximately 3.25 m thick, plus what is described as the 'pyramid rubbish'.[1062]

Lastly, there are two exceptional tombs with sloping access routes that have extremely well protected burial chambers. The first is the Type III + IIC 'twin mastaba' no. 16 of Nefermaat and Atet, the second is Mastaba no. 17.

The 2.37 m high burial chamber of Nefermaat **[251]**[1063] was built on a thick mud foundation at the base of a 4.57 m deep shaft excavated in the rock, and constructed

[1054] Petrie, Mackay and Wainwright 1910: 23.
[1055] Scaled dimensions from Petrie, Mackay and Wainwright (1910: pl. XV).
[1056] The stone 'roof' scales at approximately 4 m deep on the tomb drawing by Petrie, Mackay and Wainwright (1910: pl. XV).
[1057] Petrie, Mackay and Wainwright 1910: 22–4. Petrie (1910: 5) wrote concerning these defences: '...there seems no reason for excavating a trench in the rock twice as wide as necessary for the chamber, and then filling it up with huge blocks of stone;...', which is a statement that seems to overlook the security benefits of such structures.
[1058] Scaled dimensions from Reisner (1936: figs. 100–2).
[1059] Edwards 2009: 90.
[1060] Petrie, Mackay and Wainwright 1910: 10–2.
[1061] Petrie, Mackay and Wainwright 1910: 12.
[1062] Scaled dimension from Petrie, Mackay and Wainwright (1910: pl. IX).
[1063] Porter and Moss 1934: 92–4.

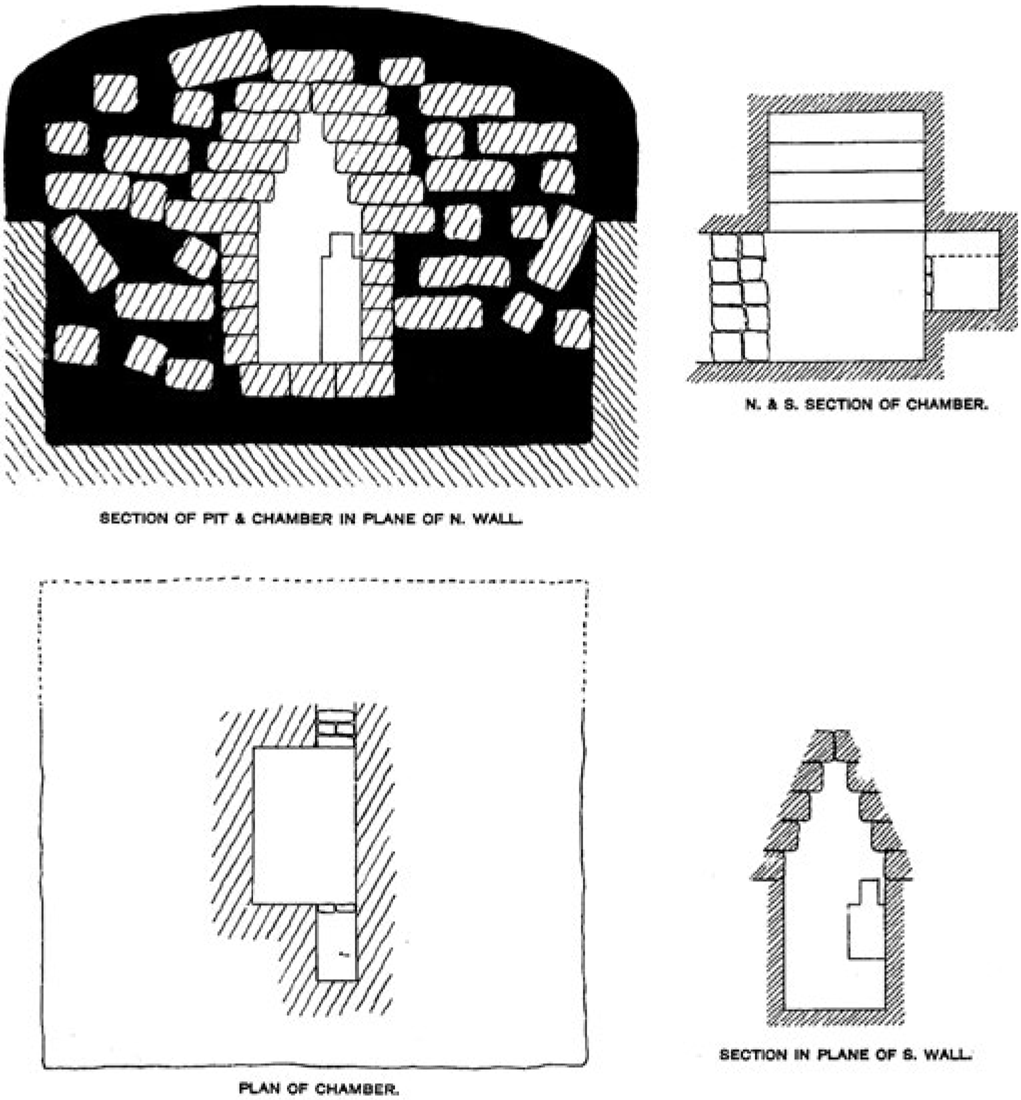


Figure 231 Sections and plan of the Type III stone built corbelled burial chamber of Nefermaat in Mastaba no. 16 at Meidum, sitting in its pit and encased with a protective liquid mud and stone block surround. The blocking to the chamber's entrance can be seen on the plan and the n–s section. (Petrie, Mackay and Wainwright 1910, pl. IV)

with large masonry blocks.[1064] Only discovered after seven weeks of tunnelling by Wainwright through the overlying mud-brick superstructure,[1065] it was one of the earliest private burial chambers to incorporate a stone corbelled roof,[1066] which was similar to that found in the adjacent pyramid (Fig. 231). This was designed to provide a defensive barrier in itself, as well as to relieve the pressure from the mastaba above and the unusual filling that surrounded it in the shaft,[1067] which was, according to Wainwright: '…choked with great masses of roughly squared stones, each about 5 × 3 × 2 feet and all filled up solid with mud.'[1068] These ponderous limestone slabs had probably been set in the mud as it dried in layers,[1069] and undoubtedly this hardened and reinforced conglomerate was intended to create serious difficulties for anyone trying to tunnel between the sides of the shaft and the chamber within. However, these impressive security measures were probably no more than 'window dressing', as when opened by Wainwright, the tomb was found to have been robbed just after the funeral, probably by someone involved in the construction of the tomb before the shaft was filled in.[1070]

[1064] Petrie, Mackay and Wainwright 1910: 21.
[1065] Petrie, Mackay and Wainwright 1910: 18.
[1066] The others at Meidum are Tombs 6, 9, 10 and 15 (Reisner 1936: 201).
[1067] Harpur 2001: 44.
[1068] Petrie, Mackay and Wainwright 1910: 18. In metric dimensions these limestone blocks were 1.52 m × 0.91 m × 0.61 m, and would have weighed a considerable 1.43–2.2 tonnes each.
[1069] Harpur 2001: 283, n. 39.
[1070] Petrie, Mackay and Wainwright 1910: 4 and 18. For a detailed discussion on the possible perpetrators of the robbery, see Harpur

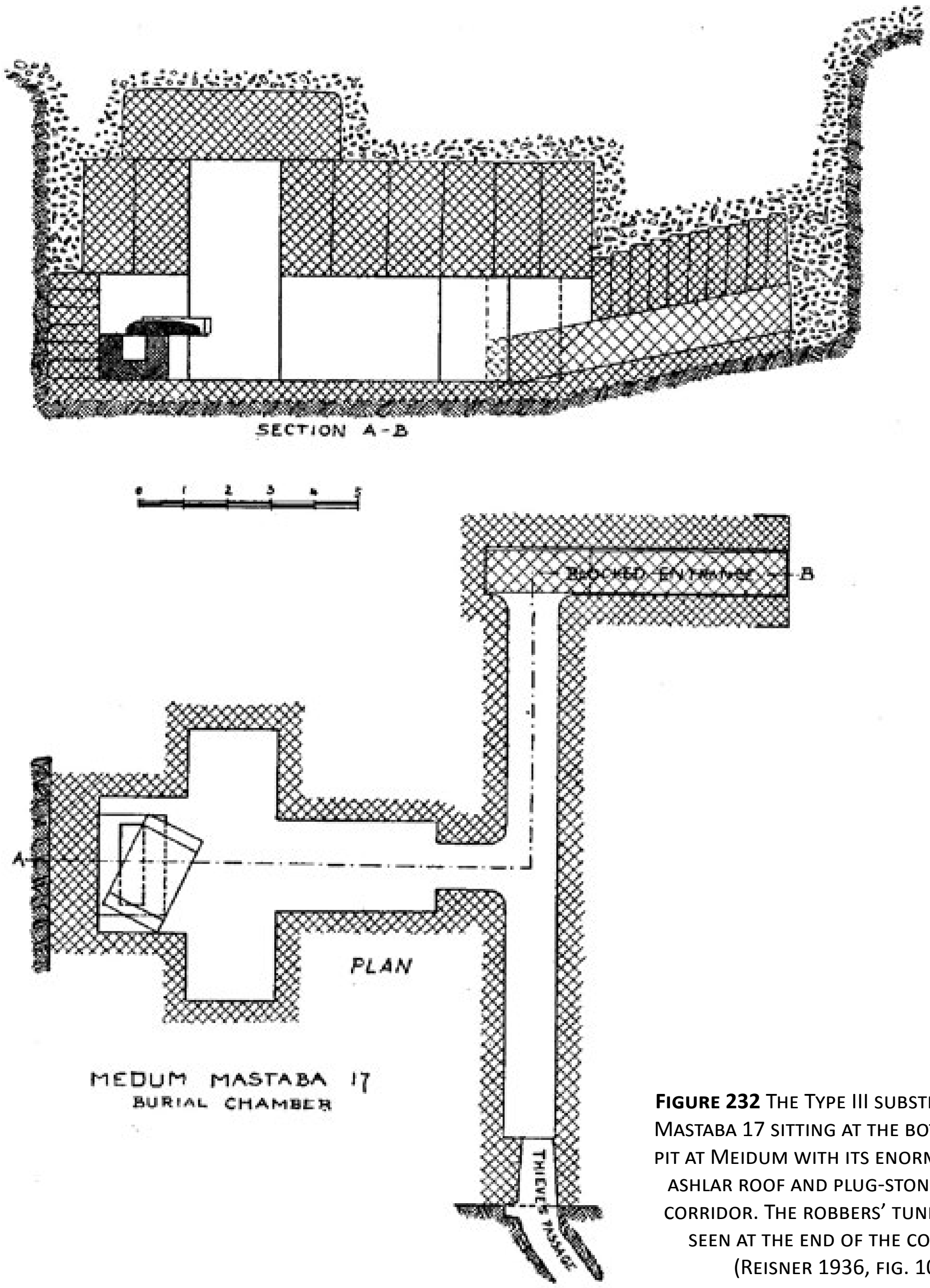


Figure 232 The Type III substructure of Mastaba 17 sitting at the bottom of its pit at Meidum with its enormous stone ashlar roof and plug-stone blocked corridor. The robbers' tunnel can be seen at the end of the corridor. (Reisner 1936, fig. 105)

The second tomb is Mastaba no. 17 **[252]**,[1071] whose defensive burial chamber architecture was on a far greater scale and contained the largest stone ashlars used to date in a private tomb in Egypt. Within a pit created to house the tomb's protective superstructure (see 6.2.4) at bedrock level, another smaller pit was dug, whose base was approximately 11 m from the desert surface, and within that an unusual cruciform substructure was built. The side walls were constructed of large dressed stone blocks, which at the rear of the sarcophagus were about 1 m thick.[1072] Over the top of these a roof was formed from enormous limestone orthostats laid on edge, one of which Wainwright reported as 5.53 m long × 1.27 m thick × 2.63 m high (Fig. 232).[1073] Once this roof had been installed and the funeral had taken place, the remaining void in the pit was then filled with limestone chips, which were continued further up into the core of the overlying superstructure and formed an unstable and formidable defence. However, even with this astonishing

2001: 46.

[1071] Porter and Moss 1934: 94.

[1072] Scaled dimension from Wainwright and Rowe's drawing (Reisner 1936: fig. 105).

[1073] Petrie, Mackay and Wainwright 1910: 17. Remarkably, this one slab can be estimated to have weighed between 31–48 tonnes.

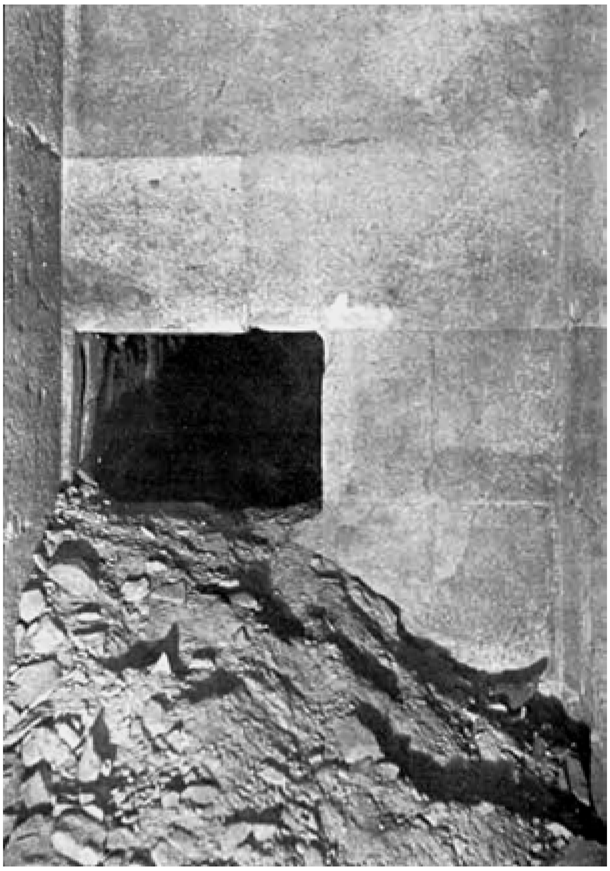


Figure 233 The robbers' tunnel into Mastaba 17; the block had been weakened by fire before being smashed. (Petrie, Mackay and Wainwright 1910, pl. X.5)

level of security the tomb had still been robbed. The perpetrator, who was certainly cognisant of the tomb's layout, had avoided all of these obstacles and tunnelled directly through the soft bedrock from the south of the tomb to the end of the north-south passage wall. Then using fire had shattered the stone to gain admittance (Fig. 233).[1074] That the tomb's builders were expecting robbers to attack from above is apparent from the effort taken to protect it in that direction; what is surprising, bearing in mind the soft rock, is that they had not anticipated an approach from the side.

Section summary – Type III burial chambers

These unusual Type III tombs demonstrate an awareness of the vulnerability of the burial chamber within the surrounding geology at Meidum, and a determination to invest in both materials and labour to hopefully overcome it. That the stone structures themselves were effective as deterrents against tunnelling is demonstrated by the integrity of the remaining structures, as it appears robbers had quickly realised that they would be easier to plunder by their access routes. On a much larger scale the extremely well defended burial chambers of Mastabas 16 and 17, sought in their own ways with vast quantities of mud, gravel and stone to make those chambers and their entrances inaccessible. But even these proved no match for determined robbers, who were obviously familiar with their plans.

4.2.4 Conclusion

If the security of the private burial chamber is considered in purely physical terms, as opposed to its manner of concealment or protection by its superstructure, its defence in the Type IB, IC and ID pit grave was dependent on three factors. First, the level of resistance to penetration offered by the surrounding geology, which offered protection against lateral tunnelling from the perimeter of the tomb. Secondly, the strength of the chamber's liners, if present, which sometimes consolidated the matrix, offered a further layer of lateral defence and supported a roof. Lastly, the level of protection offered by the roof itself and any backfill, the strength and depth of which deterred attack from above and provided a foundation for an additional layer of defence in the form of a superstructure if required.

As a result, in response to the challenges posed by differing geologies of the various necropoleis, during the First Dynasty we see a wide variety of architectural solutions using materials available close to hand. To protect the tomb laterally, this could range from the early use of liquid mud and oversize brickwork in the soil of the Delta, to the more ubiquitous use of mud-brick and less frequent employment of stone linings within the gravels of Tura el-Asmant and Helwan. Similar solutions, although used, played a less dominant role in the already well protected rock-cut pits at Saqqara and Tarkhan. For protection from above, an assortment of wooden roofs, some single, some double and some set at great depths, supported an array of differing materials, backfills or superstructures according to context and location. A few were even roofed in stone, especially at Tura el-Asmant and Helwan. Amongst the last exponents of the Type I chamber in Upper Egypt in the Second Dynasty, some were closed by huge stone slabs, whereas others opted instead for brick corbels, as at Naga el-Deir. In addition, the majority were dependent on some form of concealment from above or a protective superstructure.

Although it is apparent that the choice of a necropolis' location was not always entirely based on the suitability of the underlying geology for a burial chamber's defence, the evidence therefore shows that a tomb's architect could, given access to sufficient labour and suitable materials, compensate to a large degree for those deficiencies by careful design. In addition, by controlling the relationship between the size of the pit's cross-section and plan in relation to its superstructure, where present, the architect could also reduce its exposure to *sondage* and tunnelling.

[1074] Petrie, Mackay and Wainwright 1910: 14.

However, the Type I burial chamber had security weaknesses, as its open cast construction method lacked secrecy. To bolster its defences it was always heavily dependent on large quantities of additional materials, such as mud-brick, wood and stone, which were rarely used in enough depth to offer long term protection against external attack, especially where built in weak geology.

On the other hand, unlike the Type I chamber, the Type II subterranean burial chamber usually required no other structural materials for its entirely excavated construction, as its security was dependent on two simpler factors that were inextricably linked. The first was the resistance to penetration of the surrounding geology, and the second, the depth to which the chamber was excavated, which in turn governed the thickness of its overhead protection. Therefore, in Type II tombs up until the early Fourth Dynasty, assuming that necropoleis were selected in the same way as in Type I tombs, the only decision that the tomb builder needed to make to determine the security of the chamber, was the selection of the plot to make the best of the surrounding geology and deciding the depth to which it would be sunk. This principle applied throughout Egypt, whether in the rock-cut chambers at mid First Dynasty Abu Roash, or in the gravel cut sepulchres of the Third Dynasty at Badari. By the early Fourth Dynasty, even if a site was unsuitable because of the soft matrix into which it was to be dug, the tombmakers' answer was, as at Meidum and Dahshur, to go deeper and revive the old technique of lining it with stone.

Therefore, the adoption of the Type II subterranean burial chamber offered many advantages over the Type I pit chamber, amongst which secrecy, the need for less materials and a theoretically limitless depth of protection were just three. This is made evident by its success in those tombs that had sufficient depth or strong enough geology, as they were usually found to have been plundered via their access routes rather than their roofs.

Although the brief experimentation at Meidum with Type III masonry built chambers in cut trenches can be regarded as a success in most cases for the stone defences with which they were built, the tombs themselves suffered from the same problems as their Type I predecessors and Type II contemporaries, in that they were either robbed via their entrances or tunnelled into via the weak rock from outside.

In summary: From early on, the requirement of the burial chamber to protect the dead and their grave goods from the depredations of tomb robbers within the confines of a necropolis had led to an evolving structural response, which was based upon practical limitations that the surrounding geology would permit, and the materials and resources available to the tomb's creator. This initially took the form of working within an open excavation and then, if the geology demanded it, reinforcing it with other materials it to make it more secure, the level of protection usually related to the tomb owner's status and choice of necropolis. However, with the introduction of Type II subterranean burial chambers, the demand for additional materials lessened and the burial chamber's security became more dependent on the strength of the geology and the corresponding depth to which it was sunk, which restricted the choice of necropoleis. But improvements in stone engineering in the early Fourth Dynasty, meant that in those sites with weak geology, a tomb's architect could compensate by once again using reinforcing technology to secure the deep subterranean tomb.

This chapter has therefore demonstrated how the design and placement of the private burial chamber during this period evolved progressively over time in response to the ever increasing need for better security; the final forms and principles of which, with variations, were still being incorporated in the architecture of Egyptian private tombs right up until the end of the Late Period and beyond.[1075]

[1075] Type II subterranean burial chambers in their 'traditional' Egyptian form were continuously in use from the Early Dynastic Period onwards, and were still being used during the end of the Late Period, such as in the Thirtieth Dynasty Type IIC tombs of Wennefer and Wereshnefer at Saqqara (Arnold 1997: 33–7). Indeed Type II burial chambers were also used in the early Ptolemaic Type IIC substructure of Petosiris at Tuna el-Gebel (Lefebvre 1924: 17–21) and still some 300–700 years later in the assorted Type II tombs in the cemetery of Dush near Kharga, which were accessed by a variety of sloping descents, stairways or shafts and date to the First to early Fifth Centuries AD (Dunand *et al.* 1992: *passim*; Dunand *et al.* 2005: *passim*). For a broad overview of the occurrence of subterranean burial chambers in private tombs in Egypt, from the Early Dynastic Period up until the Greco-Roman Period, see Dodson and Ikram 2008: *passim*.

5. The security of the access route and its blockings

The introduction of external access routes during the mid First Dynasty made it possible to complete the tomb before the burial,[1076] but also brought with it the concomitant problem of how to defend this route from attack, as it provided a ready-made conduit that led to the heart of the tomb.

This chapter therefore examines the security and development of the access route and its blocking methods from the mid First Dynasty until the early Fourth Dynasty and explores what influence these may have had upon the design of the tomb. It does this by separating the topic into three separate sub-chapters: Stairs, shafts and corridors (5.1), backfill and blockwork (5.2), portcullises and plug-stones (5.3).

5.1 Stairs, shafts and corridors

The chapter is divided in two sections. The first examines the access routes of royal tombs, which are dealt with chronologically. The second deals with private tombs, and due to their much larger numbers, explores them by tomb type, which coincidentally defines their entry method, be it stair, stair-shaft, shaft or sloping corridor. Within the latter framework they are then dealt with in chronological and topographical order, north to south.

5.1.1 Royal tombs

The second half of the First Dynasty (Naqada IIIC2-IIID)

Den

The first royal sepulchre to incorporate an external access route is the Type ID tomb of King Den at Umm el-Qaab **[8]**. This comprised of a 23.77 m long mud-brick staircase that descended west directly to the tomb's burial chamber via a single landing and passage.[1077] Bearing in mind the nature of the surrounding ground, which was compacted sand,[1078] the mud-brick construction was essential to form the steps, consolidate the matrix in which it was built,[1079] and house the internal closures. It also would have supported a wood and mud-brick roof over the stairwell (Fig. 234) that protected it from above and formed a foundation for the subsidiary graves that partially concealed it (Fig. 235). Importantly, as the side walls of the stairwell descended beyond these graves they broadened to 1.8 m thick,[1080] which provided protection against lateral tunnelling. Externally, its entrance would have been just below the ancient desert level and was probably hidden by sand.[1081]

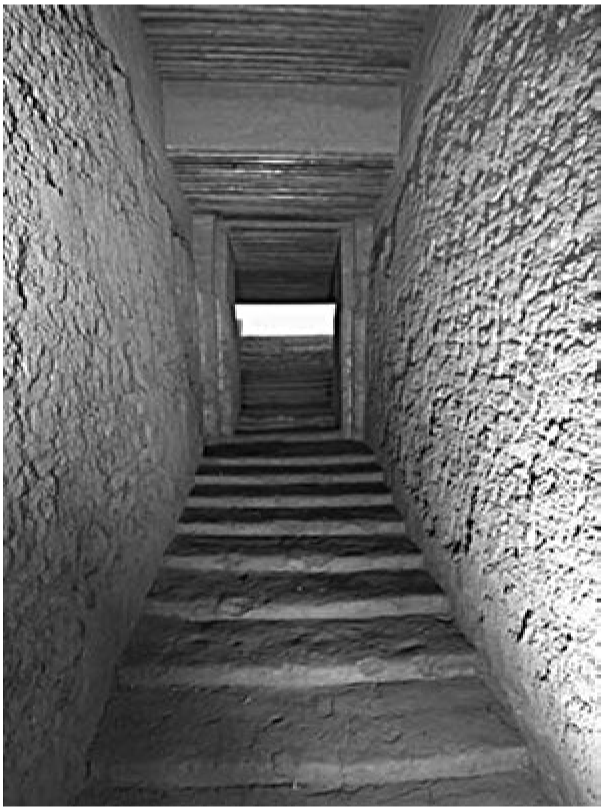


Figure 234 Internal view of the mud-brick lined stairwell of the tomb of Den, with its restored wooden roof. (Dreyer 2010, Abb 34) Courtesy of the DAI Cairo.

Adjib and Semerkhet

The smaller Type ID tombs of Den's successors were entered via less complex descents. The mud-brick stairway of Adjib **[9]** was positioned at the south-eastern corner of the tomb and descended west to a depth of 2.46 m (Fig. 236). Although no roof over its short stairwell was detected,[1082] its entrance was in all probability, like that of Den, concealed by sand.[1083] Even more basic was the approach to the tomb of Semerkhet **[10]**, which was entered on its north-east by an irregular ramp that descended 4 m to the floor of the burial chamber.[1084] Although the descent shows no traces of consolidation with mud-brick,[1085] its final section was flanked by the

[1076] Reisner 1936: 57.
[1077] Petrie 1901: 11.
[1078] The desert sand surrounding the nearby tomb of Narmer is described as being of the consistency of soft sandstone (Kaiser and Grossmann 1979: n. 10).
[1079] Engel 2003: 44.
[1080] Dreyer 1990: 73–4; 1998: 141–2.
[1081] Personal communication by Günter Dreyer (3rd October 2011).
[1082] Petrie 1900: 12–3.
[1083] Personal communication by Günter Dreyer (3rd October 2011).
[1084] Dreyer (2008: 50) suggests that a stairway may have been intended but was never completed as the tomb was completed in a hurry.
[1085] Dreyer *et al.* 2000: 119; 2005: 13–4.

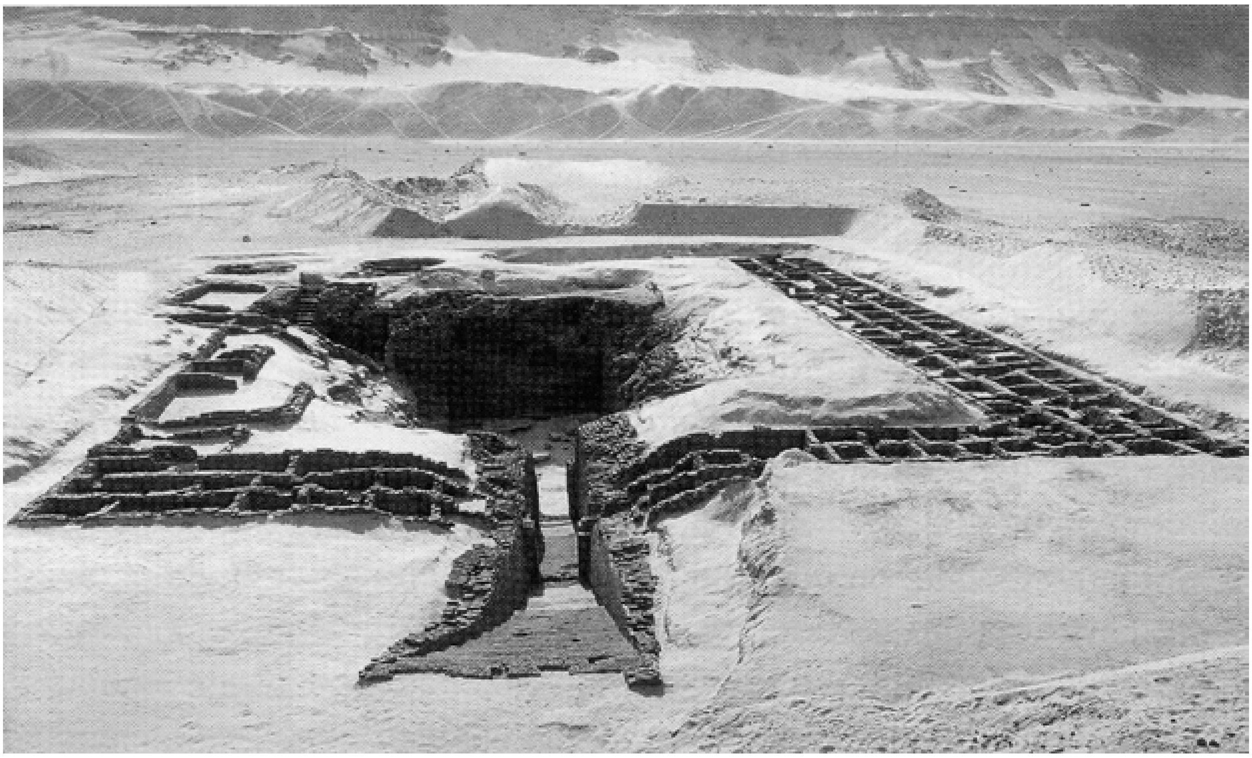


Figure 235 The mud-brick lined stairway descending into the tomb of Den. The subsidiary graves originally ran over and covered the staircase.
(Dreyer *et al.* 1998, Taf. 9a) Courtesy of the DAI Cairo.

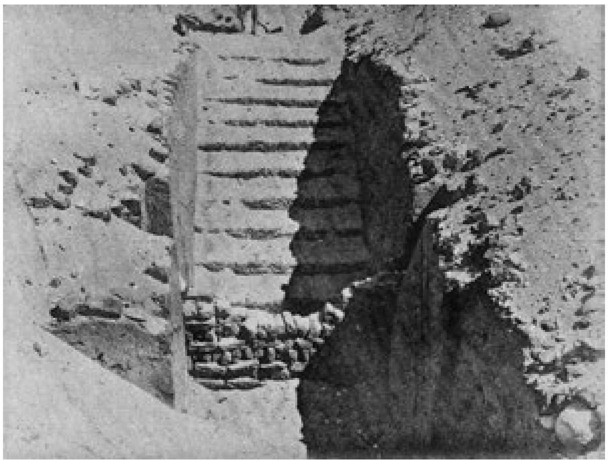


Figure 236 The stairway and mud-brick blocking of the tomb of Adjib exposed by Petrie.
(Petrie 1900, Pl. LXVI-2)

Figure 237 The recently re-excavated mud-brick lined ramp leading to the burial chamber of Semerkhet.
(Dreyer *et al.* 2007, Abb. 18) Courtesy of the DAI Cairo.

mud-brick walls of the tomb's subsidiary burials and the entrance to the burial chamber itself (Fig. 237). Like its forbears, it too was possibly hidden by sand.[1086]

Qa'a

The tomb of Qa'a **[11]**, was entered by a mud-brick staircase at its narrow northern end (Fig. 238). In its final form,[1087] plastered mud-brick stringers defined the beginning of the stairwell as its steps descended and were then bounded by the end walls of two external flanking magazines.[1088] In the roofed passage between

[1086] Personal communication by Günter Dreyer (3rd October 2011).

[1087] At least eight phases of construction have been detected with additional magazines, subsidiary graves and stairs being added as the tomb was expanded to permit more storage (Dreyer *et al.* 1996: 58–61). For an exhaustive description of the construction phases see Engel 1997: *passim*.

[1088] Engel 1997: 5.

Figure 238 The mud-brick staircase of the tomb of Qa'a.
The remains of the limestone portcullis can be seen at the base of the stairs.
(Dreyer *et al.* 1996, Taf. 13a) Courtesy of the DAI Cairo.

these, as the entrance staircase descends, the walls and entrances of four internal magazines enclose the flight of steps which lead to the burial chamber.[1089] These were in turn enclosed on the west by a row of subsidiary burials and on the east by a single magazine and more burials (Fig. 39),[1090] thus the staircase was protected laterally by these structures and from above by a wood and mud-brick roof.[1091] Although the upper steps and stringers of the outer stairway were unroofed, a lack of weathering on their surrounding plasterwork may indicate that they were filled with sand,[1092] and probably concealed from view.[1093]

Notably, all four of these tombs were entered from different positions in relation to their respective burial chamber layouts and orientation, which suggests that their entrance positions were varied for security purposes.

[1089] Engel 1997: 27–8.
[1090] Dreyer *et al.* 1996: 62–4.
[1091] The tomb was robbed from within the staircase, rather than from the outside, so it could be argued that these structures had performed their security role successfully, see also note 308 and page 229.
[1092] Engel 1997: 94.
[1093] Personal communication by Günter Dreyer (3rd October 2011).

The Second Dynasty (Naqada IIID)

The move of the royal necropolis to Saqqara and its different geology saw the introduction of the entirely subterranean royal tomb accessed by a staircase or ramp.

Hotepsekhemwy/Raneb

Access to the tomb of Hotepsekhemwy/Raneb **[12]** was via a rock-cut open staircase that comprises of three flights of steps, marked 'A', 'B' and 'C' in the plan (Fig. 42). From the middle staircase 'B', a doorway leads west to a subterranean passage 'B100', from which symmetrical magazines branch like the teeth of a comb; an arrangement which is mirrored on the next landing in the eastern passage 'B200', before the final staircase 'C'. At the bottom of this staircase, after the portcullis, a 40 m long 'cut and cover' passage was dug, which after its excavation, was probably covered with stone beams and brought level with rubble, thus protecting it from above (Figs. 43 and 239).[1094] Further subdivided into three sections, 'D', 'E' and 'F' by two more portcullises, a further thirteen magazines flank this passage before a fourth portcullis marks the entrance to the entirely

[1094] Personal communication by Claudia Lacher (12th October 2010).

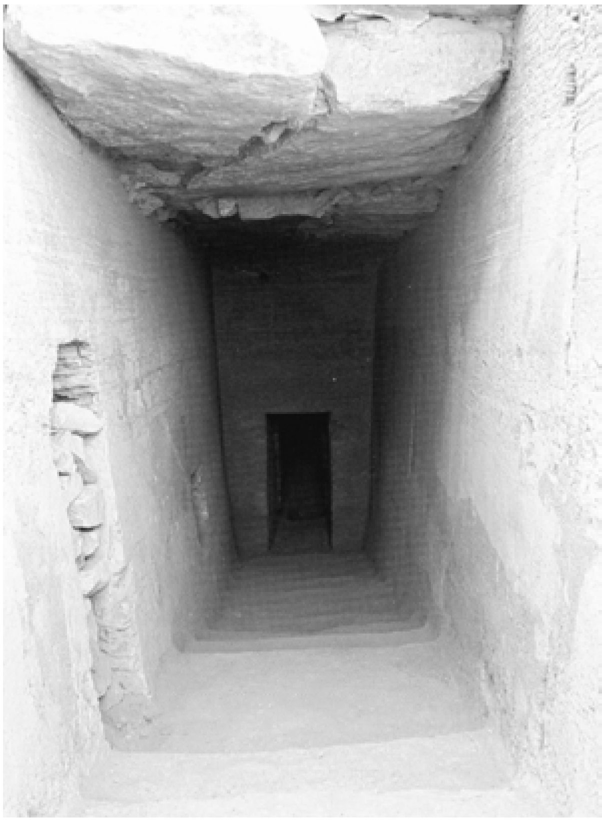


Figure 239 The stone roofing beams over the trench cut stairway 'C' of the Type IIA tomb of Hotepsekhemwy/Raneb at Saqqara. The entrance to magazine C200 can be seen on the left.
(Dreyer 2003b, 74) Courtesy of the DAI Cairo.

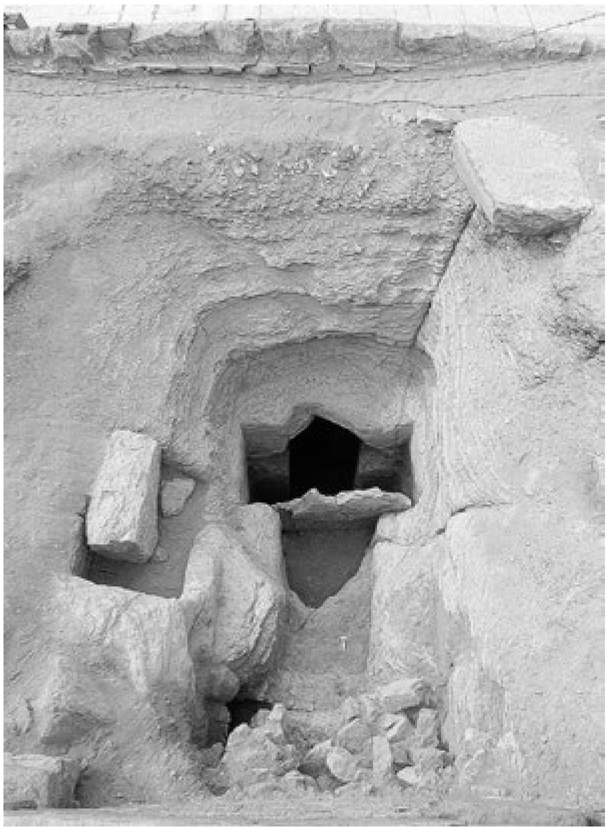


Figure 240 The present entrance to the tomb of Ninetjer, which is via the second portcullis shaft on the south-east corner of the mastaba of Nebkahor Idu.
(Dreyer 2007a, Abb.79) Courtesy of the DAI Cairo.

subterranean part of the tomb, which contained the burial.[1095] The whole may have been covered by a superstructure,[1096] but whether the entrance to the tomb was concealed in antiquity is unknown, although it is certainly visible today.

Ninetjer

The present entrance of the gallery tomb of Ninetjer **[13]** commences under the south-west corner of the mastaba of Nebkauhor Idu via an exposed portcullis shaft between it and the Unas causeway,[1097] which leads into its central north-south corridor (Fig. 240). Although the original entrance to the tomb was by means of an open cast rock-cut ramp and corridor 'A', some 24.5 m to the north, on the other side of the aforementioned mastaba (Fig. 44, C to F).[1098] This ran south, until it met with the portcullis stones that closed off the main subterranean corridor.[1099] Along its length magazines, similar to those in the tomb of Hotepsekhemwy/Raneb, branch from either side of the passage.[1100] It is not known if it was visible when it was built and a proportion of it, like that of its predecessor, may have been protected by a superstructure (see 6.1.3), or simply filled with sand or limestone chips.[1101]

The access routes in both these tombs took advantage of the lateral protection provided by the surrounding rock. However, for overhead protection the first relied on massive stone beams to protect its 'cut and cover stairwell', whereas the second may have only been backfilled, offering it a lower level of protection and secrecy.

Peribsen and Khasekhemwy

With the return of the royal necropolis to Umm el-Qaab, the access routes of the last two kings of the dynasty seem to be devoid of any protective architecture. In the

[1095] Lacher 2008: 431–2.
[1096] Lacher 2008: 446.
[1097] Jeffreys and Tavares 1994: 150.
[1098] Lacher-Raschdorff 2014: 57.
[1099] Lacher 2011: 217.
[1100] Dreyer 2009a: 26. Lacher 2011: 220; Lacher-Raschdorff 2014: 57–8. Amongst the finds within them were over 100 wine jars with seals of Ninetjer in Gallery A500, and a number of flint knives in Gallery A300 (Lacher 2011: 218).
[1101] Lacher 2011: 217. Although the trench is filled with large stones and mud today these may be the foundations of the aforementioned Sixth Dynasty mastaba (Lacher-Raschdorff 2014: 57).

Figure 241 The rough ramp leading down to the northern entrance of the tomb of Khasekhemwy, as viewed from the west. (Dreyer *et al.* 1998, Taf. 13b) Courtesy of the DAI Cairo.

tomb of Peribsen **[14]** the entrance to the substructure is approached by a simple ramp in its south-western corner that had been partly paved with rough limestone (Figs. 46–7).[1102] Similarly, the access ramp of Khasekhemwy **[15]** comprised of a rough 3 m wide slope that descended 7.5 m from the desert level in the northwest corner of the tomb to its northern entrance (Fig. 241).[1103]

Used just as construction ramps and an access route to admit the burial, both of the approaches of these tombs were probably backfilled with sand after the interments were completed,[1104] thus both concealing their whereabouts and offering them the protection of many tonnes of sand.

The Third Dynasty

The Step Pyramid of Djoser

Initially, the tomb of Djoser at Saqqara **[16]** was designed as a mastaba,[1105] and the original route to the substructure began in the north as a 20 m long descending stairway in an open trench,[1106] which then continued for a further 30 m underground until it met the main shaft of the tomb,[1107] approximately 25 m from the surface (Figs. 52 and 54–5). This created a deep subterranean stairwell in the rock with a rock ceiling approximately 7 m thick,[1108] thus offering it a considerable degree of both lateral and overhead protection.

A decision was made to turn the mastaba into a step pyramid that resulted in alterations to the access route. As a result of this expansion, the original stairway was now completely hidden under the pyramid and blocked, and a fresh entrance was needed. This was created within the floor of the western court of the newly built funerary temple, which now abutted the pyramid's north face. It took the form of a concealed staircase and shaft[1109] that descended 8 m from the temple pavement and led southwards via a 40 m long passage with a roughly 7 m

[1102] Dreyer 2003a: 13; Dreyer *et al.* 2006: 92.
[1103] Dreyer *et al.* 1998: 165.
[1104] Personal communication by Gunter Dreyer (3rd October 2011).
[1105] Lauer 1936: 12–6; 1962: 70–2, see also note 360.

[1106] The stairway descends at an angle of approximately 28° for the majority of its length (measured with digital protractor from Lauer (1936: pl. XIX).
[1107] Lauer 1936: 27–8.
[1108] Firth speculated that the thickness of the rock left was necessary to bear the weight of the superstructure (Firth and Quibell 1935: 3).
[1109] Sockets for wooden beams, which may have supported a stone floor were found in the shaft leading from the temple, which suggest that its entrance was concealed under the floor (Firth and Quibell 1935: 27).

thick rock roof.[1110] This joined with a cruciform gallery (marked 4–5 on the plan, Fig. 54), which rejoined the original, but reduced, stairway to the burial shaft approximately two thirds of the way down.[1111]

Under the pyramid's eastern edge, there are eleven 33 m deep shafts that connect with horizontal galleries, which housed the burials of the royal family and provided storage for a vast number of stone vessels (Figs. 53–4).[1112] Numbered I–XI, they are the first use of the shaft as an access route in a royal tomb, and introduced a new level of security for their associated substructures, because of their inaccessibility and their capacity to contain a large volume of backfill (see 5.2.1.2). The entrances to these shafts were all concealed and covered by the pyramid, but there is what Lauer described as an auxiliary access route, which leads to shaft 'I' and whose exact purpose is unknown, although it could have been intended to permit later access to the shafts for the purpose of carrying out the burials of the royal family.[1113]

Lastly, in the Southern Tomb **[17]**,[1114] access to the substructure mirrored the original design of that in the pyramid, except it was orientated east-west to permit it to be concealed within the complex's enclosure wall (Fig. 57). A 30 m long open stairway descended between two battered retaining limestone walls, until it entered the bedrock. At 3.7 m down from the rock layer a doorway opened onto an entirely rock-cut stairwell, within which, the stairs descended for another 20 m before meeting the burial shaft.[1115]

The long history of this pyramid complex and the multiple explorations of its various substructures by robbers,[1116] means it is difficult to assess the success of the security of its access routes. Nevertheless, we have seen that efforts were made aboveground to conceal and protect the entrance using the tomb's innovative stone architecture. Equally at subterranean level, full use was made of the rock-cutting skills learnt during the Second Dynasty to exploit the surrounding rock geology for its protection.

The pyramid of Sekhemkhet

The entrance to the substructure of Sekhemkhet **[18]** was located just outside what may have been a funerary temple north of the pyramid. It was reached via a rock-cut trench lined with battered coursed stone walls,[1117] which began 36.5 m from the northern face of the pyramid and descended southwards (Fig. 62).[1118] At the end of this slope, 10.7 m down from the terrace level, a door in the rock face led to a corridor whose floor continuously descended along its length at a slope of approximately 16°,[1119] but at this point its rock roof was horizontal and 8.36 m thick.[1120] After 13.4 m, stone jambs formed a portal and marked a change of levels for an approximately 11 m thick horizontal rock ceiling,[1121] which covered the remainder of the sloping well formed by the descent. Beyond, the corridor descended for a further 21.5 m until it reached a doorway in its western wall, which led to the tomb's magazine complex.[1122] Immediately above this doorway, a 2.7 m square shaft, originally 12.6 m deep, led to the surface, whose purpose is not entirely clear,[1123] but which would have been covered by the pyramid,[1124] presumably concealing it entirely from view. Finally, the corridor continued its descent until it reached the entrance to the burial chamber, 80.6 m from the entrance, its floor some 32.18 m beneath the terrace of the temple.[1125]

The pyramid also possessed a 'South Tomb' **[19]**, whose original entrance seems to have been via a sloping corridor (Fig. 64),[1126] whose entrance has never been found, despite Lauer's best efforts.[1127] This descended east-west at an angle of 30° until it reached a stairwell and then levelled out and met a vertical shaft approximately 29 m deep.[1128] Beyond the shaft, the corridor continued for approximately 14 m to join with the burial chamber,[1129]

[1110] The passage floor was 8.85 m from the surface and the passage itself was 1.8 m high (Lauer 1936: 29–30).
[1111] Lauer 1936: 29–30. A very detailed description may be found in Firth and Quibell 1935: 27–8.
[1112] Lauer 1962: 82–90.
[1113] Lauer 1936: 47.
[1114] For a brief discussion of the purpose of this structure, see note 378.
[1115] Lauer 1936: 99–100.
[1116] See Lauer (1936: 41–6) for a complete discussion of the explorations of the tomb by robbers and the curious.
[1117] Rather like those in the Southern Tomb of the Step Pyramid, see Fig. 57 in this book.
[1118] Maragioglio and Rinaldi 1963: 21. Underneath this also lies another ramp leading to an unfinished 9 m long corridor, which was probably abandoned due to the poor quality of the rock and filled in and built over (Goneim 1956a: 142, fig. 45).
[1119] Measured with a protractor from drawing by Maragioglio and Rinaldi (1963: Tav. 4).
[1120] Goneim 1956a: 79; 1957: 11; Maragioglio and Rinaldi 1963: 22.
[1121] Maragioglio and Rinaldi 1965b: 4–5. The thickness calculated on the basis of 6.5 m of rock plus the terrace's scaled dimension from drawing by Maragioglio and Rinaldi (1963: Tav. 4).
[1122] Maragioglio and Rinaldi 1965b: 4. From here a passage led 5.3 m west and then north 42.1 m to join an extensive 'U' shaped magazine complex. This contained 132 unused 2 m high storage chambers set out either side of the ambulatory corridor in a staggered arrangement resembling the teeth of a comb (Goneim 1957: 15–6).
[1123] Goneim (1957: 12) suggested that the shaft was probably intended for use during the construction of the substructure as a route for removing waste material during the excavation, whereas Lauer (1962: 189) proposed that its purpose may have been to provide ventilation. Baud (2002: 151) considered, albeit not entirely excluding a religious purpose, that the function of this shaft was to do both. On the other hand, Maragioglio and Rinaldi (1963: 37) speculated that the original purpose of this shaft may have been to enable the lowering of a portcullis, as similar shafts are known from the period at such sites as Beit Khallaf and Reqaqnah. This was supported by Edwards (1988: 60) and Dodson (2003: 45), but there is no concrete evidence to support this theory.
[1124] Goneim 1957: 12.
[1125] Maragioglio and Rinaldi 1963: Tav. 4.
[1126] Lauer 1969b: 464.
[1127] Lauer 1973: 326–7; 1977: 202–3.
[1128] Lauer 1969b: 464.
[1129] Lauer 1968: 100–1.

and at this point would have been protected by a rock ceiling about 23.5 m thick.[1130]

Although aboveground the pyramid was unfinished, when excavated its substructure was found undisturbed.[1131] Therefore, the plan to take advantage of the surrounding geology to provide a defendable route into the depths of the substructure had worked perfectly. Although it could be argued that perhaps this may have been more due to the pyramid's unfinished state than better security, as it would have attracted less attention from tomb robbers. This state of affairs was not matched in the South Tomb, where robbers evidently had more success, having entered via the sloping passage at a still undetermined point.[1132]

The Layer Pyramid

The substructure of Khaba's layer pyramid **[20]**, according to Barsanti (see 4.1.3), was accessed by a steep rock-cut staircase that led to a descending passage 36 m long, which unlike that of Sekhemkhet, ran in an east-west direction from the north-east corner of the pyramid, parallel with its north face (Fig. 67). At its end, lining up centrally with the north axis of the pyramid and about 10 m from its edge, a 1.4 m square shaft descended to the complex below. A short distance down the shaft, an opening led to a 17 m long blind corridor, which ran north-south. Several metres further down the shaft, two more passages cut at the same level ran independently north and south. The northern led to magazines, but the southern continued for 20 m, where it divided into two passages at a stairwell; one a blind corridor that continued straight ahead for 17 m at the upper level (Fig. 242), the other running from the foot of the steep staircase for a further 17 m until it entered the burial chamber.[1133]

Like the descending corridors of its predecessors, the access routes in this pyramid relied on the protected offered by the surrounding rock. On this occasion however, its entrance and corridor were orientated east-west, and this may have been to conceal their true whereabouts for security reasons, bearing in mind its antecedents, whose descending passages were both in the north.[1134] In addition by introducing a shaft other security benefits may have also been gained. One of these was its increased inaccessibility, and another, the relative ease with which it could be blocked.[1135]

Figure 242 The two corridors branching from the stairwell in the core of the Layer Pyramid. The upper passage continues until it reaches a cul-de-sac; the lower is a parallel passage leading to the burial chamber. (Dodson 2000, fig. 3)

The Brick Pyramid at Abu Roash

Swelim suggested that access to the substructure of the unfinished Brick Pyramid **[21]** would have been via the 1.8 m square descending corridor, which is cut in the large rocky knoll that formed the core of the structure (Fig. 69). Working from the tomb's burial chamber outwards, the corridor runs north horizontally for 3.3 m then ascends at an angle of 25° for 19.5 m where it exits the rock (Figs. 70–1).[1136] It would then have run up through the mud-brick superstructure of the pyramid that was built over the knoll, and would have been lined internally with dressed stone.[1137] Its total length was possibly 70 m and it would have exited the pyramid's face 25 m up from the pyramid's base (Fig. 72),[1138] thus creating the first raised entrance in a pyramid, and predating the better known example in the pyramid of Meidum.[1139]

1130 Scaled dimension from drawing by Lauer (1972: fig. 1).
1131 See Goneim 1957: *passim*.
1132 Lauer 1976: 139.
1133 Barsanti 1901a: 92–4, fig. 3.
1134 Alternatively, Dodson (2000: 86–7) suggests that a reason for the eastern approach of the pyramid's entrance may have been to ensure that access to these magazines was made easier for their provisioning, unlike in the pyramid of Sekhemkhet, where its tortuous route that doubled back on itself to reach the magazines would have undoubtedly demanded a far greater expenditure of labour.
1135 Although no blockings were evident in the tomb, it is reasonable to assume if used, that they would have taken the same form as those found at Sekhemkhet and comprised of stones with clay mortar.
1136 Swelim 1987: 39.
1137 Swelim (1987: 31) reported that there is evidence on the second terrace that large masonry roofing blocks were used to extend the polar corridor's extension up through the pyramid's brickwork.
1138 Swelim 1987: 65.
1139 Lehner (1997: 98) however, does not recognise this feature as

Therefore, if it was completed, the pyramid's corridor would have been well protected from external attack along its length by a combination of the surrounding solid rock of the knoll, a stone liner and the brick pyramid itself.[1140] In addition, the concept of locating its entrance high up in the latter's face was revolutionary, as until then all pyramid entrances were situated at ground level,[1141] and in the case of the pyramids of Saqqara, protected by their funerary temples.[1142] This innovation brought several advantages. Firstly, it raised the entrance out of harm's way and made it difficult to find and inaccessible.[1143] Secondly, its new position would have misdirected tomb robbers who usually would expect an entrance somewhere at ground level. Thirdly, the small cross section of its passage would have made it difficult to locate by *sondage* in any direction. Lastly, attempts to enter the pyramid at this raised level would have been extremely visible and liable to detection.

It should be mentioned that some scholars believe that the sloping corridor in a pyramid functioned as a route towards the circumpolar stars,[1144] through which the king could either ascend to the northern sky,[1145] or alternatively descend to the netherworld.[1146] But as the slope of the corridor was also used to aid with the insertion of plug-stones (at least in later pyramids), Edwards has suggested its origins were more likely 'purely practical' and possibly had magical functions ascribed to it at later times.[1147] Indeed, other scholars have confirmed the angle of slope is more likely to aid the descent of plug-stones than to point at a particular star (see 5.1.1 and 5.3.2.1).[1148]

The early Fourth Dynasty

Meidum

Like the Brick Pyramid, the pyramid of Meidum **[22]** was also entered via a descending corridor that began high up on its superstructure (Fig. 243).[1149] The 1.58 m high × 0.81–0.87 m wide entrance[1150] had its threshold set at 18.5 m up from the pyramid's pavement. From here a stone lined corridor, which at 1.55–1.59 m high × 0.82–0.87 m[1151] was smaller in section than that of the Brick Pyramid, and was probably designed to accept plug-stones,[1152] descended at between 27° 36′ and 30° 23′,[1153] to enable the latter's safe installation in a controlled descent.[1154] It runs for 58.75 m down into a trench excavated in the rock,[1155] until it levels out and proceeds horizontally for another 9.2 m until its end.[1156] From this point a vertical shaft then leads 6.65 m up to the burial chamber.[1157] To protect the entrance and corridor from attack, its roof from the entrance down to the outer edge of the last stage of the original step pyramid (*E2*) was reinforced by nine 2.1 m high stone lintels; further reinforced by four layers of similar stones reducing in thickness as they rose in height.[1158] The entrance itself was cleverly concealed by plug-stones intended to appear as part of the stone cladding of the pyramid (see 5.3.2.1).[1159]

occurring until the pyramid of Meidum, probably because he does not discuss the Brick Pyramid in depth in his volume on the pyramids, despite his recognising (1997: 68 and 96) Swelim's publication of it.

1140 Swelim (1987: 2, n. 1) estimated it would have been as large as the pyramid of Khafre.

1141 The reasons for the adoption of the raised entrance in pyramids have been the subject of some debate. Maragioglio and Rinaldi (1964: 40) wrote concerning the raised entrance at Meidum: 'If we think of the difficulties thereby involved both in the construction of the monument and during the funerals, as compared, for instance, to the facility with which the proceedings could have been carried out using a horizontal passage flush with the ground or excavated not too low down, we must conclude that there existed a very important reason for the solution adopted, probably on ritual or religious grounds, not yet fully understood.'

1142 Stadelmann 1985a: 83.

1143 Reisner (1936: 340) in discussing the development of the pyramid suggested that 'the true pyramid was designed to give better concealment of the opening of the passage, lying unmarked in the flat slope extending from base to summit and presenting no easy point of attack.'

1144 Trimble 1964: 184; Badawy 1964: 203–6.

1145 Stadelmann 1985a: 9 and 85; Lehner 1997: 28.

1146 Lehner 1997: 29.

1147 Edwards 1988: 278–9. This has been a subject of much debate since the Nineteenth Century. The great astronomer Sir John Herschel (1851: 191–3) had originally suggested that the angle of the corridors in eight of the pyramids excavated by Vyse at Giza and Abusir was 'doubtless connected' with the astronomical observation of the pole star, but later recanted his views in a letter to Sir Henry James of the Royal Ordnance Survey in September 1892. Herschel wrote (published in the Daily Review Edinburgh, 9th October, 1869; reprinted by Smyth 1870: Appendices 16–7). "The inclination of the passages I used to think quite satisfactorily accounted for by being able to see Alpha Draconis through them; now you have shown a practical and assuredly very natural reason in pointing out 26° as the 'angle of rest', facilitating the sliding down of great weights without incurring a 'down-rush', and directly subserving the intention of blocking up the access to the burial chamber."

1148 Walker 1984: 887; Brück 1995: 161–4; Krauss 2009: 151–60.

1149 The funerary temples that once covered its predecessors' low level entrances at Saqqara now being completely relocated to the pyramid's eastern side (Stadelmann 1985a: 83).

1150 Petrie 1892: 10.

1151 Maragioglio and Rinaldi 1964b: 18.

1152 Rowe 1931: 24–5; Wainwright 1937: 128; Stadelmann 1985a: 85; Lehner 1997: 98.

1153 Maragioglio and Rinaldi 1964b: Tav. 4.

1154 Known as the Angulus Quietis the angle of this slope would naturally prevent a 'down-rush' of a plug-stone (Krauss 2009: 156). Its angle was undoubtedly determined by the exploitation of the coefficient of static friction that prevents objects sliding down an incline of their own accord. In order to work out the forces to slide a limestone block on an unlubricated limestone incline of 28° the calculation: F force to push = $-W \sin \Theta + \mu N$ has to be used. The average angle of tilt for limestone to start sliding on an incline is 36°, which gives it a coefficient of static friction of 0.73 for limestone (Stocks 2003: 195). This equation when applied to our 28° sloping corridor works out to 4.46 kN or about 446 kgs of force required for a 2.6 tonne plug-stone, which would be difficult to apply in the cramped space of the corridor. However, if the slope is lubricated with liquid mortar or mud, the coefficient is reduced to 0.14, about five times less (Stocks 2003: 195), which would mean that the stone could be moved with a fifth of the force, which is about 90 kgs.

1155 Maragioglio and Rinaldi 1964b: 10.

1156 The corridor dimensions vary between 1.55–1.59 m high × 0.82–0.87 m wide, and the liner walls were about 2 cubits or 1.05 m thick at the sides × 0.52 m thick at the floor (Maragioglio and Rinaldi 1964b: 18). Its roofing ashlars have recently been examined and scale at about 1.05–1.1 m from the drawing by Dormion & Verd'hurt (2000: pl. X).

1157 Rowe 1931: 24–5.

1158 Maragioglio and Rinaldi 1964b: 18.

1159 Petrie 1892: 10; Borchardt 1928: 13–4; Rowe 1931: 24; Maragioglio

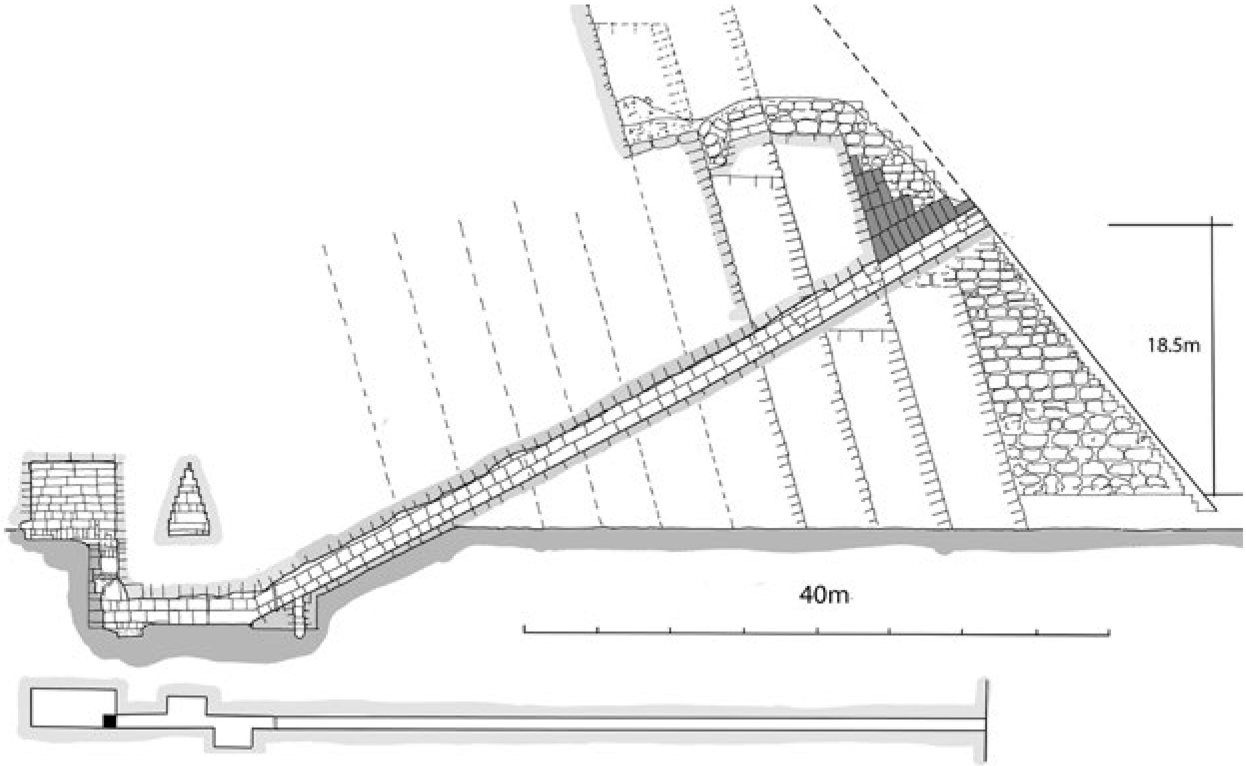


Figure 243 The descending corridor and substructure of the Pyramid of Meidum. The large slabs over the entrance can be clearly seen.
(Drawn by the author after Maragioglio and Rinaldi 1964, Tav 4. fig. 1)

The use of a sloping corridor as a conduit to enable both the descent of, and the housing of, plug-stones, was an innovation that concomitantly offered the benefits of a raised and inaccessible entrance,[1160] and a small cross-section like that of the Brick Pyramid. In addition, the encompassing protection of the enormous stone superstructure and the reinforced liners and roof of the corridor offered the route exceptional levels of protection from external attack. Confirmation of its success is that no robbers' tunnels are evident within the structure, the pyramid having been plundered via its access route, after its blockings had been removed.[1161]

and Rinaldi 1964b: 8
[1160] Stadelmann (1985: 85) admits that the raised position of the entrance increased the pyramid's security.

[1161] Maragioglio and Rinaldi 1964b: 18.

Figure 244 The inaccessible western entrance to the Bent Pyramid (marked by the arrow) 33.32 m up from its base. (Photograph courtesy of A. Dodson)

The Bent Pyramid at Dahshur

Sneferu's second pyramid **[23]** was exceptional as it contained two entrance passages that started at high level, one on the western face and the other on its northern face.

The western passage led to the upper chamber of the pyramid, which was probably the burial chamber.[1162] Its entrance sits at 33.32 m from the pyramid's base and 13.7 m off its centre (Fig. 244). From it a stone lined passage 1.05 m wide × 1.1 m high and 67.66 m long descends at an angle of 30° 4′.[1163] Smaller in section than the corridor in the pyramid of Meidum, it was originally completely blocked with plug-stones.[1164] At its end, where the passage levels out, it proceeds for a further 2.4 m until the tomb's first portcullis is met,[1165] and for 19.98 m beyond where a second portcullis bars the way to the upper chamber (Fig. 77).[1166] Externally, the entrance's location was hidden in the face of the pyramid by a casing block which rendered it undetectable from the outside.[1167] The entrance to the northern passage, which leads to the antechamber and the lower corbelled chamber, is however only 11.8 m from the base of the pyramid (Fig. 76). The 79.53 m long corridor descends at an angle of 25° 24′ and measures 1.1 m high × 1.06 m wide.[1168] It too was also probably blocked with plug-stones and concealed from view.[1169]

Like in the pyramid of Meidum, these descending corridors offered a difficult to detect, inaccessible and well protected route to the core of the pyramid, and their smaller cross sections would have made them even harder to find. Similarly, there is no evidence of them having been breached through the body of the superstructure. However, as the open northern passage demonstrates, like at Meidum the northern passage's weak point turns out to be its blockings, whose scattered remains were found by Perring in 1839.[1170]

The concealed entrance to the adjacent satellite pyramid **[24]** however, was far more vulnerable as it was only 1.1 m above ground level. Its 1.2 m wide × 1.23 m high corridor descended into the underlying rock at angle of about 34° for approximately 11.6 m (Fig. 320). At its end it levelled out and then ascended at 32° 30′[1171] for approximately 15 m[1172] to meet with the 'burial' chamber above,[1173] its height increasing a third of the way up in order to permit access to the interior over the pre-positioned plug-stones that filled its lower part, which were released on the pyramid's closure (see 5.3.2.1).[1174]

The Red Pyramid

Unlike its predecessor, the last of Sneferu's pyramids **[25]** has only a single entrance and corridor. On the north face of the pyramid the entrance starts 3.81 m east of the centre of the pyramid and 30.92 m up from its base (Fig. 79). From it a corridor, which was estimated to be originally 62.63 m long, descends at an angle of 27° 56′. It was 1.05 m wide × 1.2 m high and was lined and paved with stone.[1175] Like the Bent Pyramid, the corridor would have been probably closed with plug-stones and its entrance suitably camouflaged (see 5.3.2.1). At its end a 7.41 m horizontal passage leads to the first of the tomb's three corbelled chambers.[1176]

Like the rest of Sneferu's monuments the access route of the Red Pyramid was suitably protected by its small cross-section, its entrance's concealed and raised position, and the protection of the surrounding superstructure. However, as is apparent from its plundered state, its weak spot was also its blockings.

Section summary - Royal tomb access routes

The earliest tombs such as those of Den and Qa'a, relied on the surrounding desert, mud-brick, wood and sand to defend their access routes from external attack, but with the relocation of the royal necropolis to Saqqara, and the huge subterranean tombs of the Second Dynasty, use was made of the surrounding natural rock, backed up with masonry beams, backfill and possibly cover by a superstructure. However, with the return to Abydos of the last tombs of the dynasty, the built entranceway was eschewed in favour of the concealment and protection of sand. With the return of the royal necropolis to the Memphite region in the Third Dynasty, the access routes of the first pyramids once again relied on natural rock and their superstructures for defence, together with their new funerary complexes. But by the end of the Third Dynasty the relocation of the royal tomb's entrance to high up in the face of the pyramid signalled a complete change in approach. Now the access route to the royal burial chamber was protected by its inaccessibility, the bulk of the superstructure, its blocking and the small

[1162] Fakhry 1951: 512; 1959: 73.
[1163] Fakhry 1959: 46; Maragioglio and Rinaldi 1964b: 66.
[1164] Fakhry 1959: 7 and 49.
[1165] This distance is measured from the ceiling, it scales at 1.5 m at floor level from the drawing by Maragioglio and Rinaldi (1964b: Tav. 13).
[1166] Fakhry 1959: 52.
[1167] Fakhry 1951: 511; 1959: 49.
[1168] Fakhry 1959: 46.
[1169] Maragioglio and Rinaldi 1964b: 94–6. Although Maragioglio and Rinaldi (1964b: 60) suggested that its entrance may have not been as well camouflaged as its western counterpart, as the existence of a large stone architrave above it was visibly perceptible from below.
[1170] Vyse and Perring 1842: 67.
[1171] Just 3° 30′ short of the 36° slope necessary to overcome the 'Angulus Quietis' discussed in note 1154.
[1172] Scaled dimension from drawing by Maragioglio and Rinaldi (1964b: Tav 15, fig. 1)
[1173] Maragioglio and Rinaldi 1964b: 78.
[1174] Fakhry 1959: 94.
[1175] Vyse and Perring 1842: 64; Dorner 1998: 29. Many of these dimensions were checked and confirmed by Maragioglio and Rinaldi (1964b: 128). However, Dorner's (1998: 29) more recent entrance height differs from the other authors, who give 28.65 m.
[1176] Vyse and Perring 1842: 64.

cross section of its passage, which was a basic format that would be retained until the middle of the Fourth Dynasty, and then with variations beyond into the Middle Kingdom.[1177]

5.1.2 Private tombs

This section examines the access route by tomb category, which coincidentally describes the access method, be it Type ID or IIA staircase, Type IIB deep stair, Type IIA-C stair-shaft or Type IIC shaft; within those parameters it deals with them first by date order and then geographical order north to south. Statistical information is summarised for each access route by type in the accompanying appendices, as follows:

Type ID stairways	Chart G
Type IIA stairways	Chart H
Type IIB deep stairways and Type IIA-C stair-shafts	Chart I
Type IIC shafts	Chart J
Type III corridors	Chart K

These provide accompanying information, where pertinent,[1178] on each tomb's location, orientation, reinforcement, surrounding geology and relationship to its superstructure, if present.

5.1.2.1 The access routes of Type ID tombs - the staircase or slope

Like their royal counterparts Type ID tombs are accessed by a trench cut stairway or slope that led to the burial chamber, which was then either roofed over, backfilled or concealed in some manner.

The second half of the First Dynasty (Naqada IIIC2-IIID)

Tura el-Asmant

There are five published Type ID tombs from Tura el-Asmant, all of which have gravel cut[1179] mud-brick lined stairways that would have protected them against lateral tunnelling. Perhaps to prevent discovery they were orientated in differing directions (see Chart G) and in tombs 130 **[66]**, 1035 **[64]** and 1056 **[63]** took offset approaches to their burial chambers,[1180] whereas those in tombs 986 **[65]**[1181] and 249 **[67]**[1182] were axially placed. All the tombs, with one exception, lack any remains of superstructures, so it cannot be established if their stairwells projected beyond them, if they existed. However, the stairway of tomb 249 **[67]** appears to extend approximately 2 m beyond what may be the outer wall of its mastaba (Fig. 118).[1183] That these stairways were considered to be vulnerable is demonstrated by the stone lined tomb 130 **[66]**, whose stairway was roofed by protective stone slabs, one of which was approximately 1.3 m long × 0.7 m wide × 0.15 m thick.[1184]

Abu Ghurab

Two Type ID tomb stairways of differing designs are found at this site.[1185] Mastaba IV **[69]**, has an axially placed mud-brick lined descent leading directly to its burial chamber,[1186] whereas its slightly later neighbour tomb V **[70]**,[1187] which overlies the descent of the former, has an 'L' shaped mud-brick lined stairway that starts west, turns 90° and descends north, axial with its burial chamber (Figs. 119–20). Traces of wood and mud-brick indicate the stairway was probably covered with a wattle and brick roof that was protected by the superstructure.[1188]

Saqqara

There are nine Type ID tombs at Saqqara with descents of differing designs and orientation (see Chart G), although in every instance their overlying superstructures are orientated north-south.

The first three tombs date to the reign of Den,[1189] and have similarly orientated approaches. One of the earliest was S 3506 **[88]** (Figs. 121–2).[1190] On its east side, slightly north of centre, a brick lined stairway began 10.2 m out from the substructure and descended west through the rock to the pit. Its entrance was concealed under the paving within the enclosure walls,[1191] and to bear the weight of the superstructure, its stairwell was roofed with wooden logs.[1192] Nearby, the offset entrance of S 3035 (Hemaka)

[1177] Sloping corridors are used in the majority of royal pyramids up until that of Amenemhat II, as can be seen in Lehner's (1997: 16–7) cross section drawings of the pyramids. However, from the reign of Khufu onwards their entrances are brought down to ground level, probably to permit the introduction of sarcophagi during their construction (Dodson and Ikram 2008: 160).

[1178] In the case of stairways, this is mainly the stairway's descent path, orientation, relationship to superstructure and burial chamber, surrounding geology and liner. With shafts, which are usually within a superstructure's bounds (if present) the information is restricted to location, its relationship to the burial chamber, the surrounding geology and the shaft's dimensions and its entrance's proportion of the superstructure's area (if present).

[1179] The surrounding geology of this cemetery, which is located adjacent to the modern cement factory, is similar to that of Helwan and consists of natural gravel (Jeffreys and Tavares 1994: 146).

[1180] Yacoub 1981: 160, pls. XVIII, XIV and XVII.

[1181] Yacoub 1981: 160, pl. XX.

[1182] El-Khouli 1968: 75, pl. V.

[1183] El-Khouli 1968: pl. V.

[1184] Scaled dimension from drawing by Yacoub (1981: 160, pl. XVIII).

[1185] There is also a third stairway tomb at this site dating to the reign of Qa'a, known as 'Mastaba XIV' **[NIC]**, but it is only briefly described and no drawing is available (Radwan 1995: 313).

[1186] Radwan 1995: 312–3, Taf. III, also Radwan 1991: Abb. 1 and Taf. 39.

[1187] From its context and its design (see note 698), it is obviously of a slightly later date.

[1188] Radwan 1991: 305.

[1189] For the dating of each tomb see, S 3506 **[88]** (Emery 1958: 37); S 3035 **[89]** (Emery 1938: 1) and S 3036 **[90]** (Emery 1949: 71).

[1190] Emery 1949: 5.

[1191] Emery 1958: 46.

[1192] Emery 1958: 39–40.

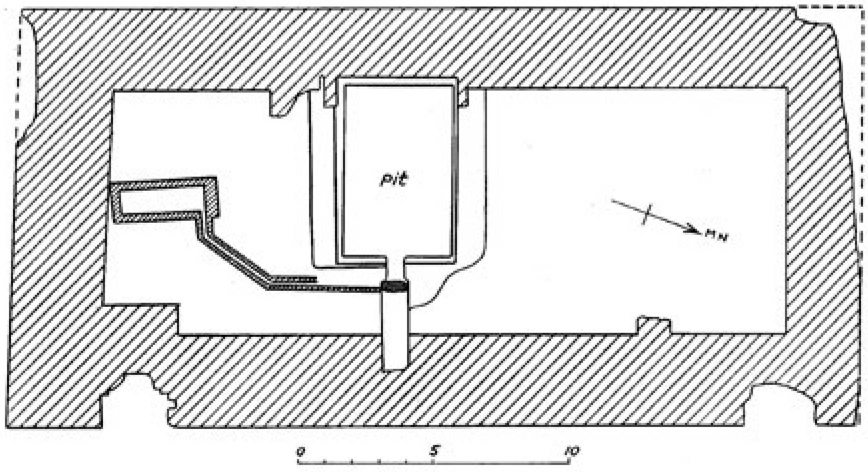


Figure 245 The Type ID tomb S 2105 at Saqqara, showing the stairway entrance concealed under the thick mud-brick walls of the superstructure. (Reisner 1936, fig. 52)

[89], started 9 m from the superstructure's southern end and descended west for 4 m in the gravel, which was consolidated by the stairway's liners (Figs. 123–4). The stairwell became rock-cut 3 m down from the surface and continued to the southern corner of the main pit. [1193] On the other hand, the offset staircase of S 3036 **[90]** was towards the northern end of its mastaba and descended west via a single landing to the burial chamber (Figs. 125–6). Initially lined with mud-brick to a depth of 3.5 m to consolidate the surrounding gravel, the remainder was cut in the rock. It was roofed in either stone or wood and its entrance was hidden under the brick paving of the enclosure ambulatory.[1194]

The next three tombs all date to the reign of Adjib,[1195] and vary their approaches to their substructures. Tomb S 3038 (Nebitka) **[91]**, was exceptional as it was entered by two centrally placed parallel stairways, one for each of the two levels of its substructure (Figs. 127–9). The lower level was reached by the northern staircase, which descended west, and was flanked by stout mud-brick walls. Adjacent to it, a second shorter stairway descended to the burial chamber's roof, which doubled as the floor for an upper storage magazine. Although in the tomb's earliest phase these stairways were initially accessed by doorways in the edge of the superstructure, by the final stage phase of the tomb's construction they were completely concealed by it. [1196]

Taking a completely different approach, tomb X **[92]** was entered from the northern end of its superstructure by steps that descended west and then south via a rock-cut ramp to the burial chamber (Fig. 130). The entrance was probably hidden under the pavement and the remainder of the passage roof covered by the solid mud-brick superstructure. However, although its substructure was of a similar design, the entire 'L' shaped sloping descent of tomb S 3338 **[93]** was concealed within the core of its superstructure (Fig. 131). First descending west in the gravel layer, it then turned and went south into the rock, in line with the axis of the burial chamber. The whole passage was probably roofed with stone blocks,[1197] which would have offering it an even greater level of security.

Finally, the last three tombs all date to the reign of Qa'a,[1198] and revert to entrances on their eastern sides. Tomb S 3500 **[94]** was entered from beyond its enclosure wall via a staircase 9.3 m long, slightly south of centre (Fig. 132). Cut in the deep gravel, it descended under the wall, down into the rock to the burial chamber. Possibly roofed with wood, rather than being mud-brick lined, it appears the whole stairwell was filled with solid mud-brick, which both blocked it and consolidated the surrounding gravel. Although the tomb had been robbed, its entrance remained hidden, as when excavated the stairway was found entirely undisturbed.[1199] However, access to the substructure of S 3505 **[98]** was via the eastern corridor that ran between its superstructure and the inner enclosure wall (Figs. 133–5). Here a ramp ran north-south for 7.65 m before, halfway down the mastaba's length, turning 90° and descending west 9.65 m to the burial chamber. The whole of it was roofed in wood and after the burial, its entrance ramp was backfilled and part concealed by a bench that supported bucrania.[1200] Finally, the less well documented tomb S 2105 **[99]** was entered from the east by a stairway, whose entrance was concealed underneath the thick wall of its mastaba (Fig. 245), its roof probably protected by wood like its burial chamber, and the whole covered by the mastaba's gravel fill.[1201]

[1193] Emery 1938: 5–6.
[1194] Emery 1949: 73–4.
[1195] For the dating of each tomb see the discussion of Nebitka S 3038 **[91]** (Emery 1949: 92); tomb X **[92]** (Hendrickx 1996: 60); S 3338 **[93]** (Hendrickx 1996: 60).
[1196] Emery 1949: 83–91.
[1197] Emery 1949: 126.
[1198] For the dating of each tomb see the discussions of S 3500 **[94]** (Emery 1958: 103); S 3505 **[95]** (Emery 1958: 5) and S 2105 **[96]** (Reisner 1936: 383).
[1199] Emery 1958: 99–103.
[1200] Emery 1958: 5–9.
[1201] Quibell 1923: 19.

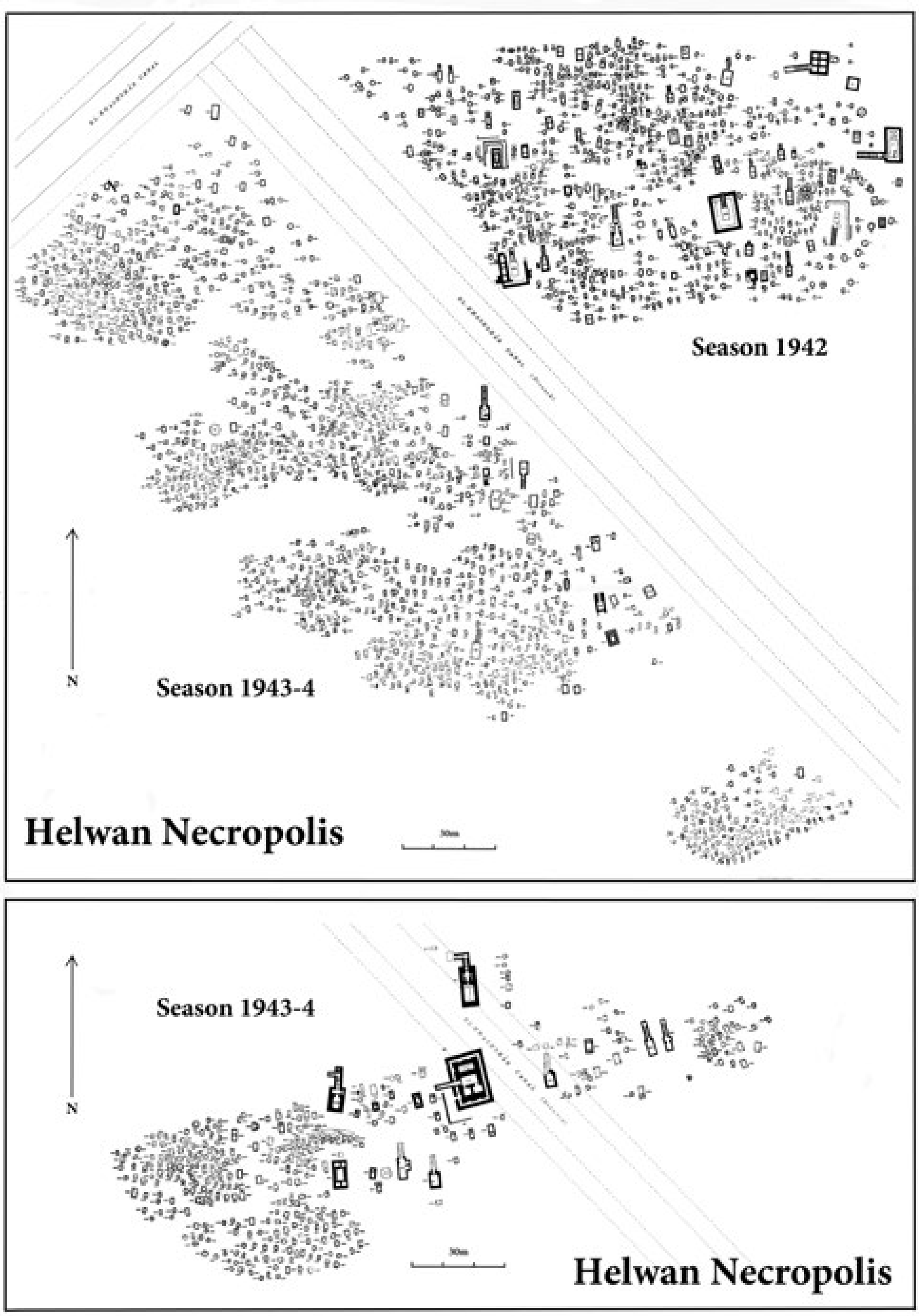
Although the access routes to these tombs at Saqqara would have been well protected laterally by their rock surroundings, it appears from the mud-brick linings used to reinforce their descents that the overlying gravel strata was considered to be a vulnerable area to lateral attack. Attacks from above having been catered for by the use of wood or stone roofing and the protective footprint of the superstructure. However, it seems the area of greatest concern was the concealment of the entrances themselves, which as is demonstrated by their diverse orientations and locations, were deliberately intended to frustrate tomb robbers.[1202]

Helwan

There are twenty-one published Type ID tombs with stairway access at Helwan **[142–162]**;[1203] as at Saqqara their stairways are in differing orientations and positions, although the denudation of the majority of

[1202] Quibell 1923: 3.

[1203] They are largely recorded by Saad (1947, 1951 and 1969), albeit not in quite as much detail as Emery's excavations at Saqqara, with the singular exception of Köhler's (2005) more recent publication of 40.H.3. There are many more tombs plotted on Saad's (1947: plns. 2–3 and 1951: pls. I–III) necropolis plans (see Maps 9 and 10 in this book), but these are merely numbered and generally unmentioned in the body of his publications.



Map 9. The Helwan Necropolis
Saad's excavation maps of Seasons 1942 and 1943-44. (After Saad 1947, plans 2 and 3)

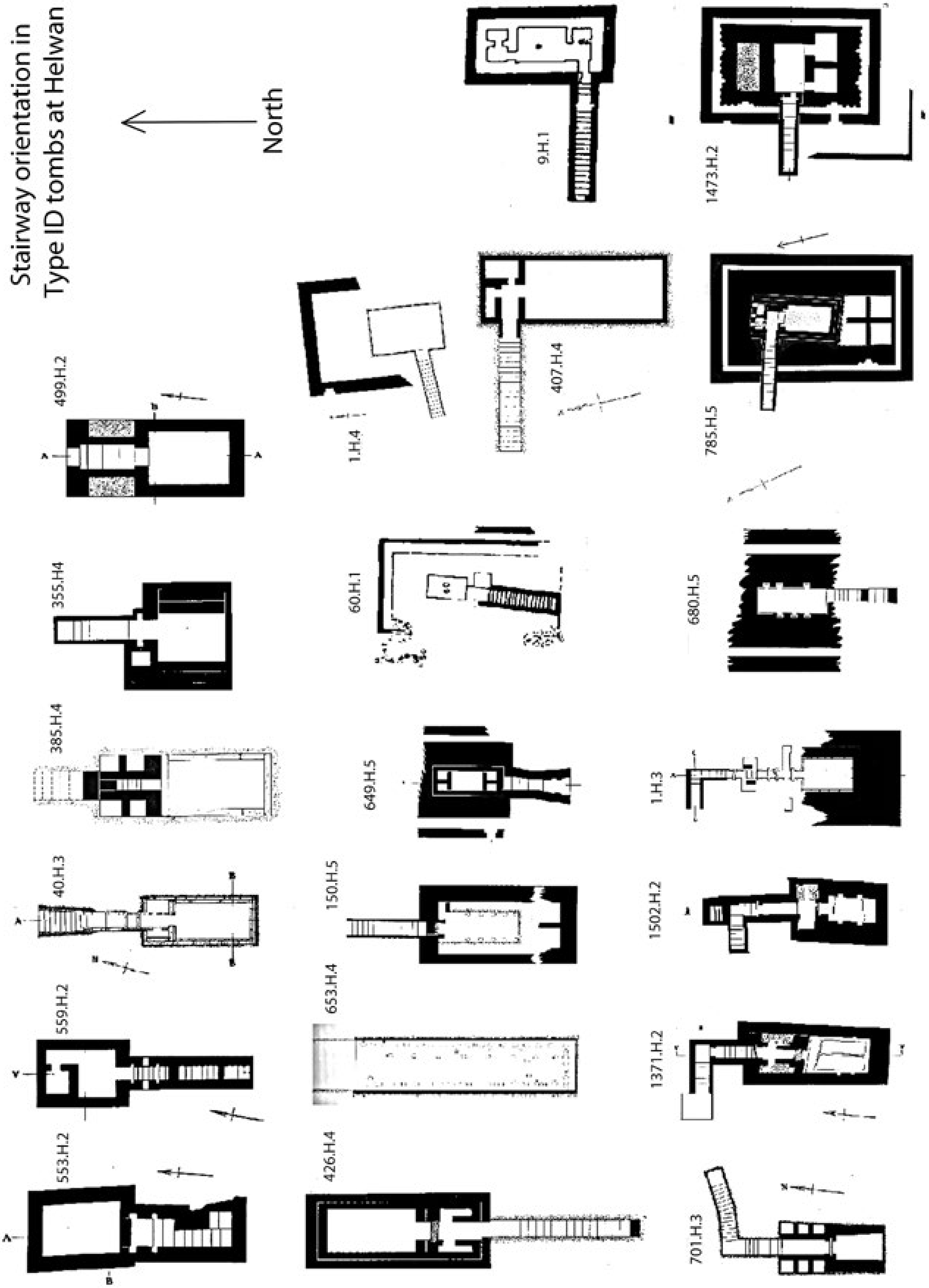


Figure 246 The orientation of stairways in Type ID tombs at Helwan.
(After assorted illustrations taken from Saad 1947, 1951 and 1969 and referenced elsewhere in this book by individual tomb)

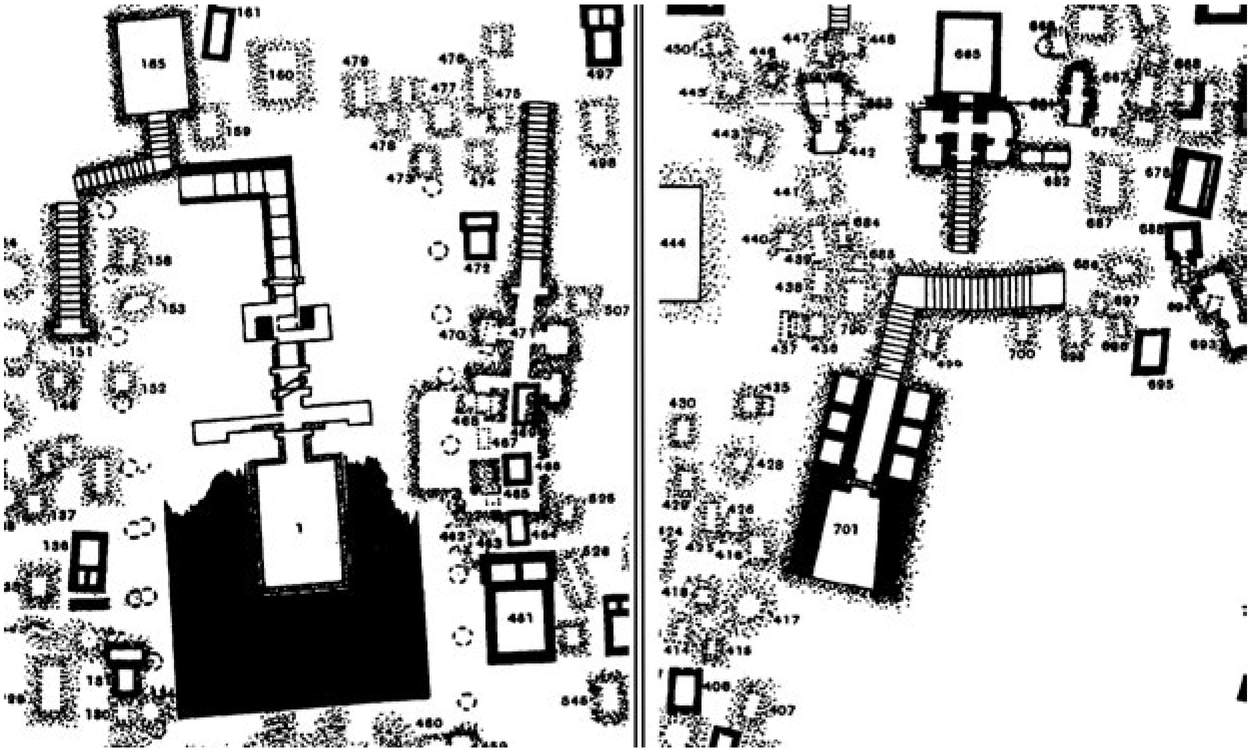


Figure 247 The stairways of the Helwan Type ID tombs 1.H.3 (left) and 701.H.3 (right) possibly placed to avoid other tombs in the necropolis.
(After Saad 1951, pln. 1)

superstructures at Helwan makes it hard to establish their exact relationship to their entrances.[1204]

As can be seen in Fig. 246, however, it is apparent that in all of the tombs, with the exception of 1473.H.2 **[153]**, the longitudinal axis of the burial chamber is roughly north-south. The majority of stairways enter their burial chambers at the narrowest end, in line with their longitudinal axis, with the exception of just a few,[1205] which are at 90° to the axis and at varying positions along the longest edge of the substructure. In five cases the staircase starts with its descent heading in a different direction, four of which are roughly 'L' shaped; three of these start from the west,[1206] and one from the east.[1207] Most unusually, tomb 553.H.2 **[144]** descends south and then changes direction 180°, via a half landing, to head north to its burial chamber.[1208] Although Köhler has suggested the direction of descent of the stairways in Type ID tombs 'does not appear to follow a particular pattern other than accessibility to the site and to the tombs themselves'.[1209] It may well be that in some cases the direction of descent was deliberately placed to either conceal them from grave robbers,[1210] or avoid another grave, such as in tombs 1.H.3 **[159]** and 701.H.3 **[147]** (Fig. 247).

Unlike at Saqqara with its limestone substratum, the surrounding geology of Helwan was a looser gravel matrix,[1211] therefore some of the stairways of tombs such as 1.H.4 **[142]**, 407.H.4 **[151]** and 701.H.3 **[147]**,[1212] which were unlined, would have offered little resistance to lateral penetration. However, a number were reinforced with mud-brick walls of varying thickness, which would have presumably consolidated the matrix and offered a degree of protection against tunnelling. As an example, the stairway of tomb 649.H.5 **[155]** had liners approximately 1 m thick,[1213] whereas those in tomb 1371.H.2 **[148]** varied between 0.3–0.6 m wide.[1214] It is notable in many tombs that the liners are thicker in the areas where grooved portcullis emplacements

[1204] Little remains visible today and the site is largely denuded of its superstructures because of erosion, reuse of materials and the actions of the sebbakhin (Saad 1947: 26–8; Jeffreys 2005: 440; Köhler 2008b: 122).
[1205] Specifically tombs 9.H.1 **[161]**, 1473.H.2 **[153]**, 1.H.4 **[142]**, 407.H.4 **[151]** and 785.H.5 **[154]**.
[1206] 1371.H.2, 1502.H.2 and 1.H.3.
[1207] 701.H.3.
[1208] Saad 1947: 107, pl. XXXVI.
[1209] Köhler 2008b: 117.
[1210] It should be mentioned that those tombs whose stairways were aligned on a north-south axis with the burial chamber would seem to have been particularly vulnerable to sondages on their northern and southern ends, as it seems likely that any digging there would have a good chance of hitting the stairway. From the point of view of tomb security, the alignment of the majority of these tombs on that axis may therefore have been somewhat counter-productive.
[1211] Jeffreys 2005: 440.
[1212] Saad 1951: 5–6;
[1213] Scaled dimension from Saad (1951: Plan 16).
[1214] Scaled dimension from Saad (1947: Pl. XXXVIII).

were situated, which could be interpreted as a form of reinforcement.[1215]

A more substantial and resistive form of lateral protection for the stairways and entrance passages of two tombs at Helwan was a stone lining. The most complex of which is 40.H.3 (Köhler's Op.1/1) **[158]**.[1216] Here an axial stone lined staircase 4 m long with stone steps, descends south to a 2 m long passageway, which is lined on each side with 0.2 m thick stone slabs (Fig. 148). One step down, a shorter stone walled corridor, defined by a portcullis at either end, led to a stone lined anteroom before the burial chamber.[1217] Another 'stone' tomb that also had a stone lined stairway, was the enormous tomb 1.H.3 **[159]** (Figs. 149–50), in which, rather than an axial approach, its substructure was approached by an 'L' shaped staircase with stone steps that was completely lined with mud-brick backed stone slabs.[1218]

There seem to be no reports of any roofs over the stairways in Saad's publications.[1219] Therefore, we are left to guess as to their methods of overhead protection. As at Saqqara, some of the stairway entrances were built within and under the protective footprint of their superstructures, such as in tombs 40.H.3 **[158]** and 60.H.1 **[160]** (see 6.2.2).[1220] It is also probable that some form of protection was built over those stairways lined with mud-brick or stone like at Tura el-Asmant, as it would have been pointless reinforcing them laterally and leaving their roofs vulnerable and exposed. As for the rest, presumably they were just backfilled and concealed by gravel or sand.

Naga el-Deir

Two First Dynasty Type ID tombs from Naga el-Deir can be discussed. Tombs N 1512 **[289]** and N 1581 **[288]** were accessed by gravel cut and mud-brick lined staircases that descended north-east for 5.4 and 5.5 m respectively to meet their laterally orientated burial chambers. There is no sign of their stairwells having been roofed,[1221] most probably because they were protected by their superstructures, which unusually were built over them *after* the interment.[1222] As at Helwan, the use of the mud-brick liner in the stairway presumably demonstrates a need to consolidate the surrounding gravel and provide additional lateral protection.

Mahasna

There is just a single example of a Type ID tomb from Mahasna. The access route of tomb M1 **[324]** consisted of a brick-lined axial staircase that led down to the burial chamber.[1223] Although not much can be said about this stairway, one must assume from the tomb security point of view that its liners were necessary to reinforce the surrounding 'drift' sand and gravel.

Abydos

After an initial 'entrance vestibule', the 3.5 m long mud-brick lined stairway of Tomb I **[327]** in the recently discovered Early Dynastic cemetery at Abydos, entered its substructure from the north in the usual manner. Unusually, the stairway had a corbelled roof, which the tomb's excavator suggests might point to it being a 'later addition'.[1224]

El-Amrah

Further south at El-Amrah, the 7.16 m long gravel cut staircase of tomb of tomb b 91 **[329]** was reinforced with mud-brick and accessed the tomb laterally at the northern end of its western and longest side. Although the tomb had been recently robbed when it was excavated, its excavators noted: 'The modern plunderers had done their work so carelessly that they had failed to discover the staircase…'.[1225]

The Second Dynasty (Naqada IIID)

There is only one site with Type ID stairways in the Second Dynasty, which is Naga el-Deir.

Naga el-Deir

The catalogue includes fourteen Type ID corbel roofed tombs from this site **[289–302]**.[1226] Of the ten at Cemetery 1500, eight of their stairways took a lateral approach to their substructures from the north-east[1227] and were lined with mud-brick, of between ½ –1½ brick's thickness,[1228] with the exception of N 1515 **[292]**, which was plastered.[1229] Their descents varied in length from 2.1 m

[1215] Such as 553.H.2, 559.H.2, 1371.H.2, 1502.H.2 and 649.H.5.
[1216] Saad 1951: 164–6, pls. LXII and LXIX–LXX.
[1217] Köhler 2005: 20–1.
[1218] Saad 1947: 163–4, pl. LXI and LXVII.
[1219] Saad 1947, 1951 and 1969.
[1220] Köhler 2005: 25; 2008b: fig. 8b.
[1221] Reisner 1908: 36–40; 1936: 130–1.
[1222] Reisner 1908: 6.
[1223] Garstang 1903: 28, pl. XXXIII.
[1224] Hossein 2011: 271–3. Indeed, the author has not come across any Type ID tombs with corbelled or arched stairways during his research, and they do not seem to be used until as late as the Third Dynasty in the Type IIA tombs at Beit Khallaf and Reqaqnah, see the discussion of these in Garstang 1904: 28–30. Perhaps the tomb was restored for re-use during the Third Dynasty or later, and the existing stairway 'updated', or alternatively, the entire stairway may have been added to an older Type IC pit tomb for similar reasons.
[1225] Randall-MacIver and Mace 1902: 39, pls. III, 6 and IV, 8.
[1226] There are many more corbel roofed tombs with external access, such as N 1523, N 1562, N 1612, N 1613, N 1614, N 1619, N 1622, N 1630, N 1633 and N 1648 from Cemetery 1500 (Reisner 1908: 58–63) and N 3104, N 3015, N 3031 and N 3053 from Cemetery 3000 (Reisner 1908: 80–2), also N 4598 from Cemetery 3500 (Mace 1909: 20–1), but most do not have properly formed stairways or are too small to be included in this discussion.
[1227] Tombs N 1513 **[290]**, N 1514 **[291]**, N 1571 **[293]**, N 1572 **[294]**, N 1584 **[295]**, N 1586 **[289]** and N 1605 **[296]**.
[1228] For example tombs N 1586 **[289]**, N 1584 **[295]**, N 1572 **[294]** and 1605 **[296]** (Reisner 1908: 41, 52–4).
[1229] Reisner 1908: 47.

to 5 m long.[1230] Unusually, N 1611 **[297]**, although of a similar design, had a south-western descent, as it had been cut into the rising slope of the ground, which determined the orientation of its stairway.[1231] The descents of some smaller tombs were no more than slopes, and took an axial approach, such as that of N 1626 **[298]** in cemetery 1500, which approached its burial chamber from the north-east, where unusually, its mud-brick lined slope was roofed in wood.[1232]

Of the two tombs in nearby Cemetery 3000, the gravel cut stairway of N 3013 **[299]** descended north, and rather than being lined with mud-brick, had been plastered,[1233] and, although it took a lateral approach to its substructure, unusually it entered via its eastern corner, as did the similarly orientated N 3017 **[300]**. The latter being the only tomb in the group found with a superstructure, which unlike the earlier N 1514, did not cover its stairway.[1234] Further west in Cemetery 3500, the stairway of N 3551 **[301]** and the unlined slope of N 4990 **[302]** also took the same lateral approach as the majority in Cemetery 1500, but the former was central to its pit, whereas the latter was in its north-eastern corner.[1235]

It is doubtful if the thin mud-brick walls that flanked the majority of these relatively shallow staircases at Naga el-Deir would have proved much of a defence against lateral tunnelling, as their main function may have been more to consolidate the loose gravel, soil and sand that formed the upper strata at this site.[1236] From the security point of view, the predictability of the orientation of their descents would not have helped much either, especially if they, like N 3017, were built with external stairways.

Section summary – Type ID staircases

The use of an external access route in private tombs flourished from the mid-First Dynasty onwards. Like their contemporaries at the royal cemetery at Abydos, the building of some of these tombs in areas with weak surrounding geology such as Tura el-Asmant, Abu Ghurab, Helwan and Naga el-Deir, meant that their access routes were often necessarily reinforced with more resistive materials such as wood, mud-brick or stone. However, at Saqqara, although theoretically the natural rock at deeper levels offered better lateral protection, the emphasis seems to have been more on concealing the entrance and access route from discovery by varying its placement and camouflage. But by the end of the dynasty, the gradual concealment of the entire stairway within the superstructure at both Saqqara and Helwan becomes more frequent and heralds developments to come.

[1230] Reisner 1936: 129–31.
[1231] Reisner 1908: 57–8.
[1232] Reisner 1908: 55–6.
[1233] Reisner 1908: 74.
[1234] Reisner 1908: 72–4.
[1235] Mace 1909: 19–20 and 68.
[1236] Reisner 1908: 1–4, 65.

5.1.2.2 The access routes of Type IIA tombs - the staircase or slope

As discussed in Chapter 4.2, the introduction of the entirely subterranean burial chamber may have improved the security of the burial chamber from overhead and lateral attack, but it still needed to be accessed. In Type IIA tombs it was usually reached by a well formed staircase that was cut as a trench into the surrounding matrix and permitted a progressive descent. Its entrance either being external to the tomb's superstructure, where present, or located within it.[1237] Once the burial was completed and the burial chamber sealed, the stairwell would normally be backfilled with gravel, sand or rubble.

The second half of the First Dynasty (Naqada IIIC2-IIID)

Kafr Ghattati

The necropolis of Kafr Ghattati contains five staircase tombs, but only four tombs are well recorded enough to be included in the discussion. The first of these is tomb KG3 **[55]**, whose bent staircase turned 60° on the second step to descend north to a depth of 3.65 m, where it entered the burial chamber. The deeper descent of nearby tomb KG4 **[56]** began as a slope, then turned 52° on the first step to descend north to 6.05 m from the surface.[1238] However, the descents of tombs KG10 **[57]** and KG 12 **[58]** comprised of just a straight tapered stairway, the former descending west and the latter north; their depths are not recorded.[1239] All of these descents were unlined and apparently unprotected by a superstructure.[1240]

Saqqara

As mentioned in Chapter 4.2, the first Type IIA tombs at Saqqara took advantage of the surrounding natural topography, and were built on and against the side of the rock escarpment. The earliest of these is S 3121 **[97]**. Access was via a concealed entrance that began in the north corridor of the superstructure and led to a 7.6 m long sloping passage that descended towards the face of the escarpment, which contained the burial chamber (Fig. 160). The lower half of the passage was partially dug in the rock, its upper half built of masonry to consolidate the upper strata of gravel into which it was cut. The whole was roofed and protected by seven large blocks of limestone (Fig. 248), each of which measured approximately 2 m long × 1 m wide × 0.6 m thick,

[1237] Undoubtedly many of these descents and their entrances would have been wholly or partially protected by superstructures, but rather than speculate as to their method of overhead protection, the sub-chapter will only discuss this aspect in depth where there is definite evidence of their existence in the individual tomb's publication.
[1238] Engles 1990: 80.
[1239] Engles 1990: 84 and 87.
[1240] Engles 1990: 80–7. Whether or not these were protected by superstructures from above, long since eroded, or lacked them altogether, is unknown.

Figure 248 Limestone beams protecting the stairwell of the Type IIA tomb S 3121 at Saqqara. (Emery 1949, pl. 49b)

which in turn were protected by the rubble fill of the superstructure.[1241]

The stairway of adjacent tomb S 3120 **[98]** followed much the same plan of its immediate neighbour (Fig. 161), but from its concealed entrance took a longer stepped descent south-west from the superstructure's internal passage and then turned south-east under the superstructure wall. Its 3.5 m long rock-cut stairwell seems to have been entirely lined with mud-brick and supported a wooden roof that bore a mud and rubble backfill between it and its superstructure.[1242]

Both of these stairways would have been well protected by their superstructures, and rubble fills, but they approached their defences in a slightly different way. Although the massive stone slabs over the stairwell of S 3121 would have made this tomb more secure from attack from above than the wooden roof of S 3120, by way of recompense the latter's side walls were rock-cut and less vulnerable to lateral attack than the passage of the former, which was compromised by the gravel strata in its upper levels.

[1241] Emery 1949: 116–9.
[1242] Emery 1949: 121–3.

The Second Dynasty (Naqada IIID)

Abusir

Amongst the four Type IIA tombs at Abusir, only three of their stairways can be discussed in any detail.[1243] The first is tomb 10B–4 **[71]**, whose simple unlined staircase descended south-east to a depth of 2.6 m (Fig. 162).[1244] Nearby the smaller and similarly orientated descent of tomb 10C–3 **[72]** was slightly shallower at 2.3 m,[1245] but was bricklined to consolidate the layer of sand that overlaid the rocky ground in the cemetery.[1246] Exceptionally, the descent of tomb 13 C–3 + 13 B–1 **[73]** descended northwards as an entirely subterranean tunnelled staircase, where it met with its burial chamber at approximately 3.7 m below ground level.[1247] This provided its descent with a solid rock roof, rather than the usual backfilled stairwell, which offered it extra protection (Fig. 163). No trace of any superstructures were found at this site,[1248] which like all Type II tombs in this situation, leaves the protection of their entrances open to question.[1249]

Saqqara

There are fifteen tombs included in the chapter from Saqqara with Type IIA stairways **[99–114]**.[1250] The majority of them, like many of the tombs in Quibell's publication, were protected at ground level by the cores of their mud-brick superstructures, which are usually orientated on a north-south axis (Map 11).

A few, like some of their Type ID predecessors, had their entrances located externally, usually at the northern end of their superstructures. Based on the style of the burial chamber, possibly one of the earliest was S 3042 **[100]**,[1251] where within a descent that totalled 32.6 m, a

[1243] This is because 10C–6 is not drawn in section and is only visible on the cemetery map, see Bonnet 1928: Taf. 1.
[1244] Scaled dimensions from drawing by Bonnet (1928: Taf 2).
[1245] Scaled dimensions from drawing by Bonnet (1928: Taf 2). This tomb is mis-numbered in the illustration as 10C–2, but it is clearly 10C–3 on the cemetery map.
[1246] Bonnet 1928: 1.
[1247] Scaled dimension from drawing by Bonnet (1928: Taf. 2).
[1248] Goedicke 2000: 399.
[1249] Whether these were just backfilled and concealed or covered by mud-brick superstructure, now denuded, is unknown.
[1250] There are many Type IIA staircase tombs in Quibell's (1923) publication, for example S 2187 **[NIC]** (Quibell 1923: 28, pl. I) that are excluded from the discussion because of lack of information and because although their stairways may be visible on the cemetery plan they lack an accompanying superstructure. On the other hand, some tombs such as S 2413 **[NIC]** (Quibell 1923: pl. II) have their stairways and superstructure shown on the necropolis plan, but are not described in the main text, and these are also excluded. Additionally, there are some such as S 2152 **[NIC]** (Quibell 1923: 22) and S 2247 **[NIC]** (Quibell 1923: 28), which are included in the discussion on portcullises and the portcullis chart, but excluded here for comparable reasons.
[1251] Earlier substructures are generally similar in design to their First Dynasty predecessors, with the exception that the subterranean storage magazines and burial chamber are all rock-cut, and where subdivided it is done with mud-brick (Tavares 2005: 857).

20.2 m long staircase descended west from outside of the enclosure wall. At the end of these stairs, a 90° left turn led to an open trench that ended in a rock 'bridge' over a passage, beyond which another open trench, flanked by two magazines, finally reached the underground complex itself (Fig. 164).[1252]

On a smaller scale, tomb S 3024 **[103]** was also accessed by an external rock-cut stairway that descended west before turning south to enter its burial chamber. In addition to the overhead protection offered by its superstructure, the stairwell appears to have been further protected with stone slabs (Fig. 166).[1253] Later in date was the enormous tomb S 2302 (Ruaben) **[105]**, whose stairway descended west to meet an internal passage that led south to its subterranean complex.[1254] For additional protection, the stairwell had also been roofed by stone slabs and was protected by its superstructure's core.[1255]

As can be seen in Map 11, for security reasons many tombs at Saqqara had their stairways concealed in varying locations and orientations within or under their superstructures.[1256] Such as tomb S 2171 **[104]**, whose stairway's unusual 'dogleg' descent began in the north-east quarter of its superstructure and descended south,[1257] as did the straight staircase of S 2101 **[99]**.[1258] Although still located in its superstructure's northern end, in a change of direction, the straight staircase of tomb S 2307 **[106]** descended west to meet its substructure.[1259] In another change of location, the straight stairway of S 2322 **[107]** began further south and continued its descent parallel to the inner western wall of its mastaba.[1260] However, the straight stairways of tombs S 2337 **[108]** and S 2406 **[109]** were axially placed within the northern end of their superstructures and descended south,[1261] as did the descent of S 2452 **[101]**, which began further south from the centre of its superstructure.[1262]

Some tombs had 'L' shaped staircases, such as S 2429 **[110]**, whose brick lined stairway started in the northern end of its superstructure and descended west,[1263] then turned south before it met its portcullis,[1264] as did the stairway in S 2315 **[112]**, which took exactly the same approach,[1265] whereas the stairway of S 2498 **[111]** started close against its eastern wall in the centre of its superstructure and ran north before turning west to reach its destination.[1266] Its stairwell had been roofed with stone slabs for protection (Fig. 279).[1267]

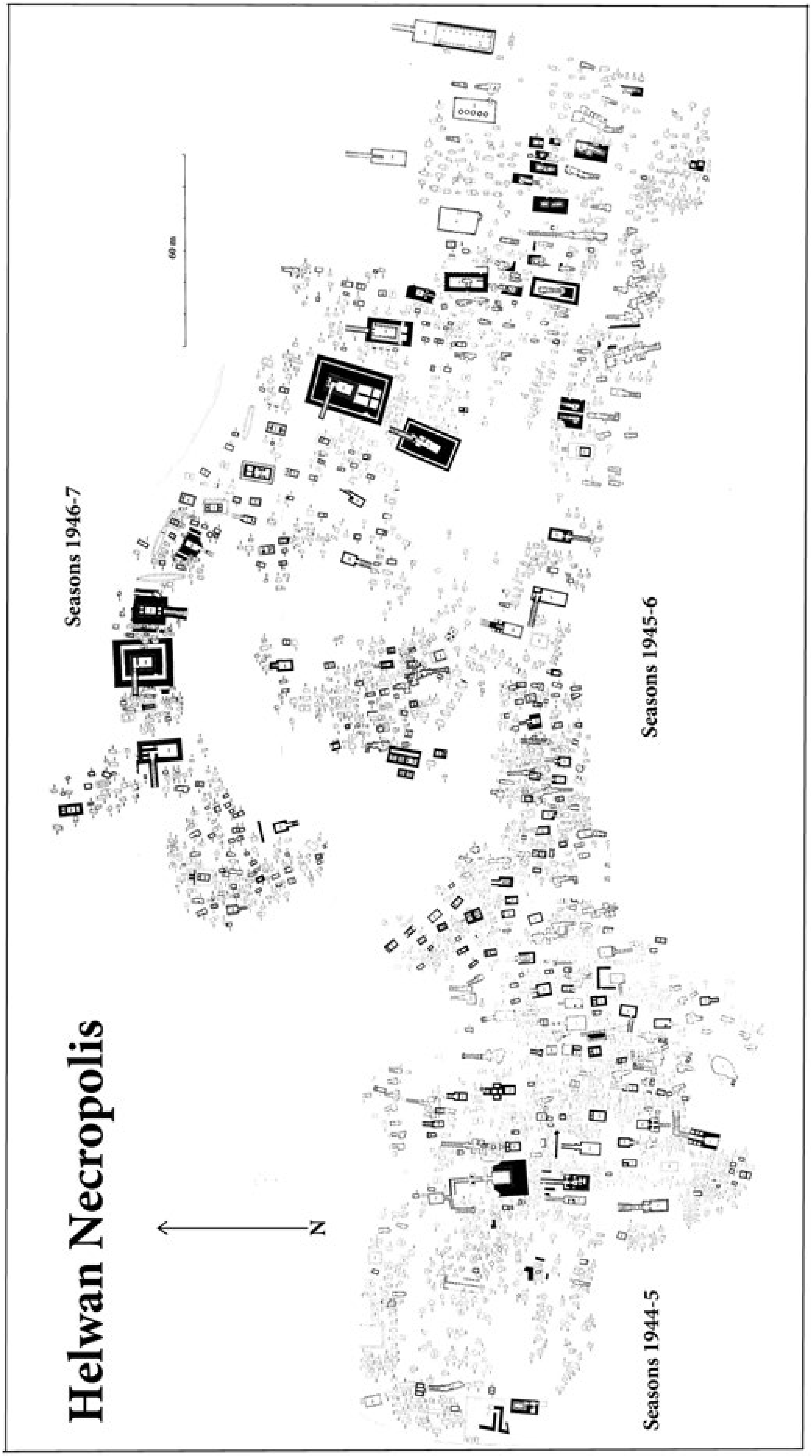
Even more complex are the descents of S 3477 **[102]** and S 2313. In the former, the rock-cut stairway begins in the north-east corner of the superstructure tight against its eastern wall and descends north (Fig. 165), then west, still following the wall, until reaching halfway, where it turned south into a stone roofed corridor that led to the tomb's portcullis and magazines.[1268] In another 'dogleg' approach the 14.3 m long stairs of S 2313 **[113]** also took different directions; first west, then south, then east and finally south; all the way enclosed by thick stone walls that presumably offered additional lateral protection.[1269]

Although earlier tombs were accessed externally, the relatively well preserved superstructures of these tombs enables us to see that in the majority of cases the stairway was concealed within them for additional security. Benefiting from their surrounding rock geology, they were well protected against lateral tunnelling, but within the larger examples, where space permitted, they were placed in varying positions and orientations to make their entrances and stairwells difficult to locate by *sondage*. However, the desire for deeper substructures meant that order to accommodate the descent within the perimeter of the superstructure, it sometimes had to incorporate one or more changes of direction, but this could be self-defeating, as due to the increased plan and cross-section it conversely would be easier to locate.

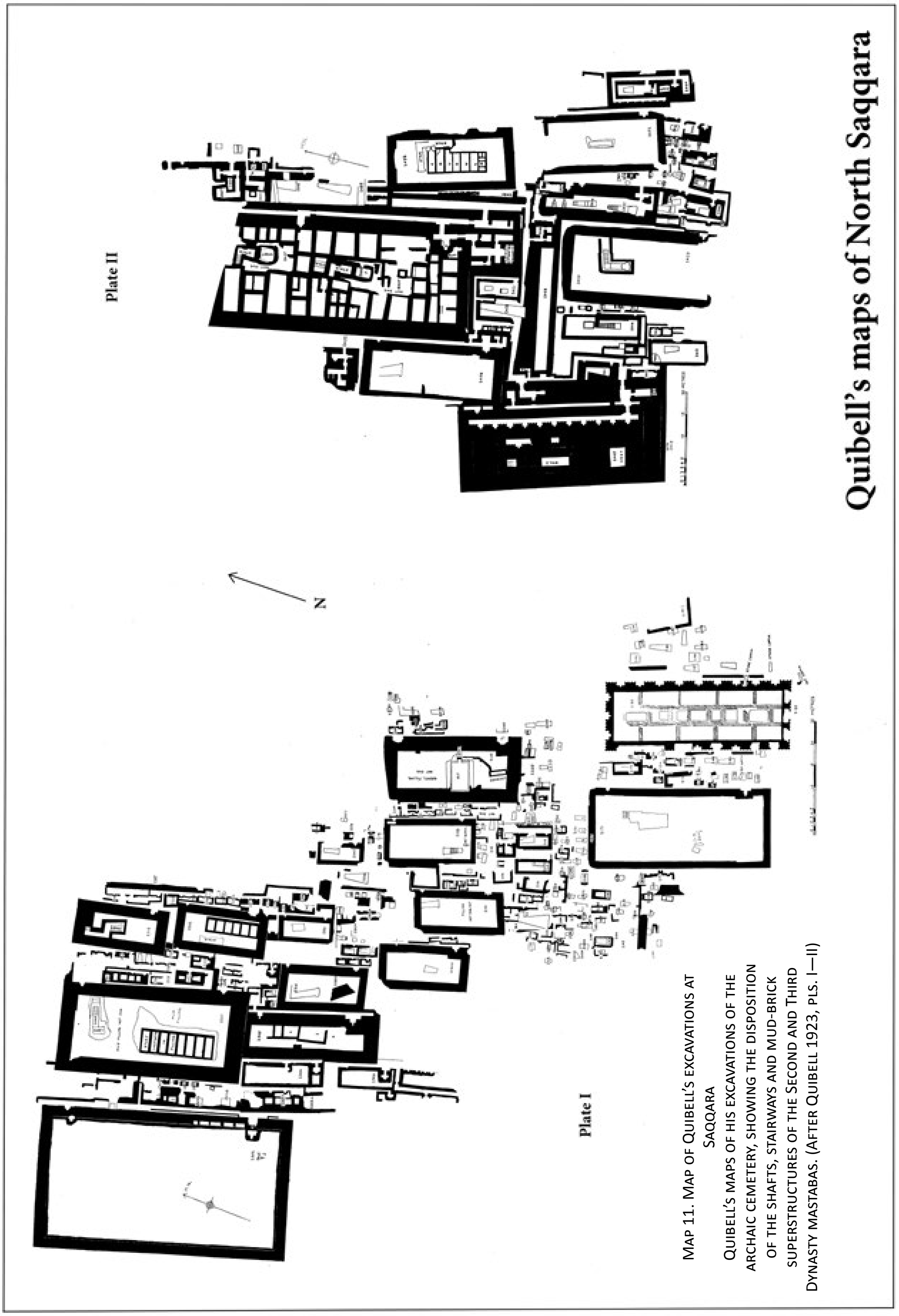
Helwan

There are twenty-one Type IIA tombs with stairways in the catalogue from Helwan **[163–83]**; however, examination of Saad's necropolis maps reveals many more unpublished tombs,[1270] of which ten more can also be associated with superstructures (Fig. 252).[1271] Therefore, despite not being in the main catalogue, the latter are included in the Type IIA stairway Chart H, to permit the topic and their relationship to their superstructures to be discussed more fully. It can be seen from Saad's maps (Map 10) that a large number of Type IIA tombs are distributed throughout the necropolis, the overwhelming majority of which have burial chambers orientated north-south. Of the thirty-one tombs included in the chart, all have the main body of their descent entering the burial chamber axially, and the varying relationships of their staircases and superstructures,

[1252] Reisner 1936: 144–5, fig. 67.
[1253] Emery 1949: 11–2.
[1254] Reisner 1936: 138, See also Emery 1961: 94, fig. 54.
[1255] Quibell 1923: 3, 29.
[1256] Quibell 1923: 3.
[1257] Quibell 1923: 7, 23, pl. XV, 2.
[1258] Quibell 1923: 17; Reisner 1936: 146.
[1259] Quibell 1923: 31; Reisner 1936: 140.
[1260] Quibell 1923: 34; Reisner 1936: 141.
[1261] Quibell 1923: 35–6; 38; Reisner 1936: 141–3
[1262] Quibell 1923: 42.
[1263] According to Quibell (1923: 40) the staircase apparently had a ledge running along both sides of its length, which may suggest that it was roofed with wood or stone.
[1264] Quibell 1923: 40; Reisner 1936: 159–60.
[1265] Quibell 1923: 33; Reisner 1936: 143.
[1266] Quibell 1923: 44–5; Reisner 1936: 139–40.
[1267] Quibell 1923: 10.
[1268] Emery 1962: 4.
[1269] Quibell 1923: 3 and 33.
[1270] In the excavations of seasons 1945–6 and 1946–7 (Saad 1951: pl. III).
[1271] These are 463.H.4, 464.H.4, 612.H.4, 636.H.4, 74.H.5, 8.H.5, 60.H.5, 71.H.5, 501.H.4 and 28.H.5 **[all NIC]**.



Map 10. The Helwan Necropolis
Saad's excavation maps of Seasons 1944-5, 1945-6 and 1946-7. (After Saad 1951, plates I–III)



Map 11. Map of Quibell's excavations at Saqqara

Quibell's maps of his excavations of the archaic cemetery, showing the disposition of the shafts, stairways and mud-brick superstructures of the Second and Third Dynasty mastabas. (After Quibell 1923, pls. I—II) where present, are recorded accordingly (see Chart H). Amongst them, nineteen descend north, seven south, and five begin as 'L' shaped descents then turn north or south. Unlike some of the stairways of Type ID tombs in this necropolis, all are usually unlined, apart from a few examples where the upper edge of the descent has been consolidated with mud-bricks.[1272] The reason for this may be that the linings were found to be ineffective or perhaps the stairways were covered by their superstructures, it is difficult to be sure. It would be easy to suggest that this was because of weaker geology, until one looks again at the necropolis plans (Map 10),[1273] where it can be seen that many Type ID tombs with mud-brick lined staircases co-exist amongst Type IIA tombs with unlined stairways.

The sizes and depths of the stairways at Helwan could vary enormously, from only a few metres long and deep, such as 68.H.5, discussed below, up to the enormous 25.H.5 **[164]**, whose 15 m long gravel cut staircase reached a depth of 7.8 m (Fig. 170).[1274] Presumably due to its length, this tomb's stairway probably began outside its superstructure,[1275] its size, as with all stairways, dependent on the relationship between the desired depth of the substructure, and achieving a safe descent. One small tomb with a superstructure that possessed an external entrance was 68.H.5 **[175]**. Its gravel cut 2.3 m long staircase started just outside the southern end of its small mud-brick mastaba and descended north to its subterranean burial chamber 2.3 m below (Fig. 249),[1276] as did the stairways of Op. 4/88 **[183]**,[1277] and 8.H.5 **[NIC]** (Fig. 252),[1278] but on a larger scale.

Another tomb that may have been accessed externally was Saad's tomb 25.H.4 **[167]** (Köhler's Op. 2/1).[1279] In order to take advantage of the local topography the entrance to this tomb was cut within the slope of the wadi into which its substructure was built (Fig. 250). Its descent consists of nine rock-cut steps, interrupted by a short landing, in a tapering trench that descended at an angle of 45° and led to the tomb's portcullis and substructure.[1280]

Undoubtedly in the interests of security, many tombs at Helwan had their stairways concealed under their superstructures, but few traces of the latter remain today. Amongst the few published examples is Op. 4/94 **[173]**,[1281] whose gravel cut descent comprised of

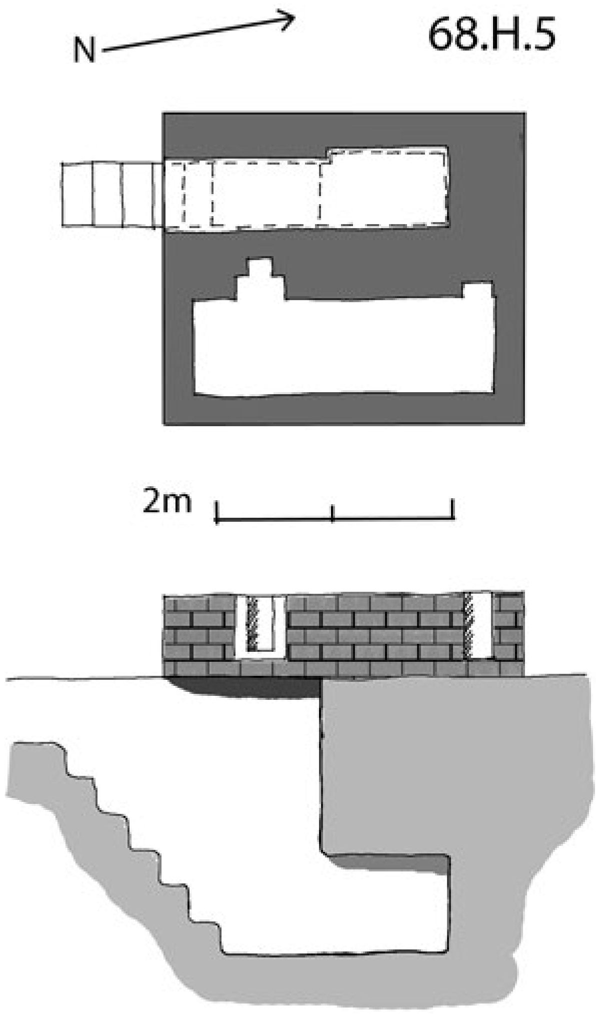


Figure 249 The Type IIA tomb 68.H.5 from Helwan with its external placed stairway.
(Drawn by the author after Saad 1951, pln. 14)

a straight staircase 6.2 m long that descended north to its burial chamber which was 4 m deep.[1282] The whole stairway was completely protected from above by an 11 m long superstructure,[1283] of which only the western edge remains today. Similarly the deeper 4.8 m descent of Op. 4/4 **[181]**, whose mastaba was slightly shorter was also completely protected (Fig. 251).[1284] Although not described by Saad, another six similar examples with superstructures covering their straight staircases are visible on his necropolis map (Fig. 252) but no further details are available.[1285] Whether the other thirteen instances of tombs in the survey with straight staircases were similarly protected is unclear, but probably likely.

[1272] Köhler 2008b: 118–9.
[1273] Saad 1951: pls. II–III.
[1274] Saad 1951: 27.
[1275] If the surrounding tombs are taken into account on the necropolis map (Saad 1951: pl. III), it can be seen that the stairway, would be far too long to be covered with a superstructure, as the latter would need to avoid the adjacent superstructures of 28.H.5 and 29.H.5.
[1276] Saad 1951: 27, Scaled dimension from Saad (1951: Plan 17).
[1277] Köhler 2007: 192.
[1278] Saad 1951: pl. III.
[1279] Saad 1951: 6–7, plan 4.
[1280] Köhler 2005: 36–40.
[1281] Köhler 2007: 192–4.
[1282] Scaled dimensions from drawing by Köhler (2007: fig. 2).
[1283] Scaled dimensions from drawing by Köhler (2007: fig. 1).
[1284] Although unlike Op. 4/94 its burial chamber projected beyond the footprint of its mastaba (Köhler 2000b: 89–90, Fig. 5; 2000a: 39–40; 2003b: 85; 2014: Fig. 30).
[1285] These are 463.H.4, 464.H.4, 612.H.4, 636.H.4 and 74.H.5 **[all NIC]** (Saad 1951: pl. III).

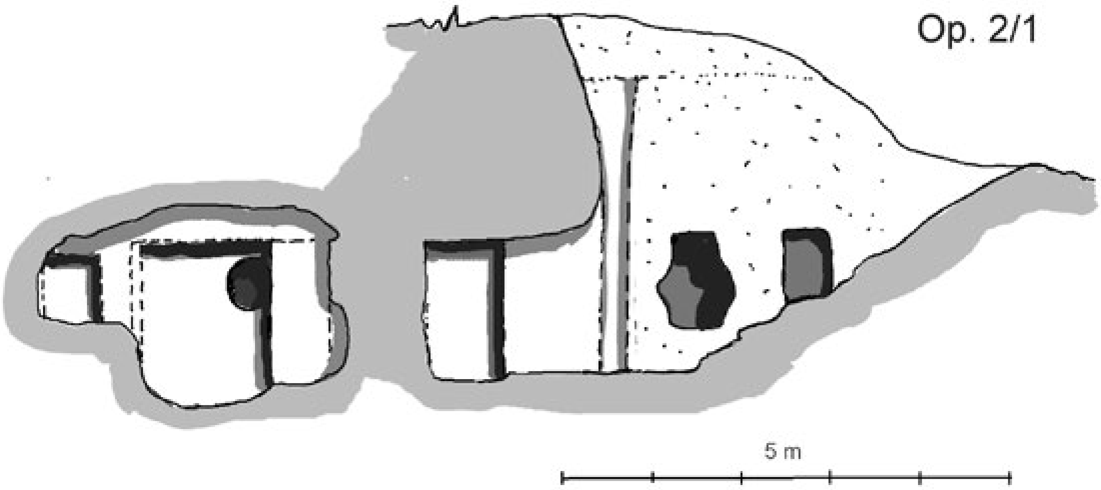


Figure 250 Longitudinal section of the entrance of the Type IIA 25.H.4 (Köhler's Op. 2/1) at Helwan, showing the stairway cut into the slope of the wadi. (Drawn by the author after Köhler 2005, pl. 19)

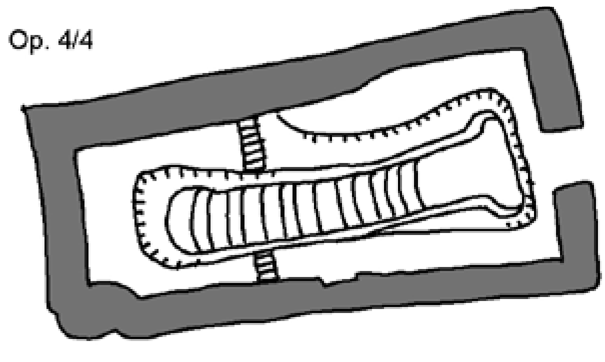


Figure 251 The stairway of the Type IIA tomb Op. 4/4 at Helwan descending within the perimeter of its superstructure. (Drawn by the author after Köhler 2003b, fig. 2)

Only a single example of an 'L' shaped or 'bent' staircase under a superstructure is recorded. Op. 4/123 **[174]** was entered by a gravel cut staircase that initially ran east then turned north and descended 3.76 m to the entrance of its burial chamber,[1286] and was entirely concealed by its 7 m long mastaba (Fig. 173).[1287] Although five other tombs have been published with similar descents,[1288] including the large 505.H.4 **[165]**,[1289] it is unknown whether their staircases were protected by superstructures or not.

The comparison between Op. 4/94 **[173]**, with its 11 m long superstructure, and Op. 4/123 **[174]**, with its 7 m long superstructure, but near similar substructure depths, demonstrates that like at Saqqara, a turn in a descent enabled a stairway to reach a greater depth within the confines of a much shorter space. Unlike at Saqqara however, the smaller size of the Helwan superstructures precluded them from varying the orientation and position of their stairways, which usually descend axially within their perimeters. This meant their stairway locations were probably more easily located by *sondage* than those at Saqqara, and due to the less resistant geology at Helwan,[1290] like their substructures, probably more prone to lateral attack.

Tarkhan

There are just two Type IIA staircase tombs recorded at Tarkhan, grave nos. 240 **[217]** and 545 **[218]**. Devoid of superstructures,[1291] their straight descents are cut into the sand, gravel and marly limestone that make up the hills of the necropolis, and descend west to their substructures to depths of 3.17 m and 4.57 m respectively.[1292]

Lahun

Of the total of thirty Type IIA tombs at the Bashkatib Cemetery,[1293] there are eight examples in the catalogue that are accompanied by drawings. They all seem to be devoid of protective superstructures and are orientated

[1286] Scaled dimensions from drawings by Köhler (2008a: fig. 2; 2008b: fig. 17).
[1287] Köhler 2008a: 172–3; 2008b: 122–3.
[1288] They are 473.H.4 **[176]**, 505.H.4 **[165]**, 235.H.8 **[172]**, 255.H.8 **[163]**, and 409.H.8 **[170]**, see Chart H.
[1289] Saad 1951: 15–7.
[1290] The majority of the cemetery's geology consists of a mixture of gravel and sand interspersed with pebbles and small boulders over a stratum of clay 'bedrock' and mudstone. The latter occasionally being utilised as the 'roof' of some subterranean substructures (Jeffreys and Tavares 1994: 153).
[1291] Grajetzki (2008: 104) suggests that given the spacing between individual graves that many tombs at Tarkhan would have possessed mastabas.
[1292] Petrie, Wainwright and Gardiner 1913: 27; Petrie and Mackay 1915: 9–10.
[1293] See Petrie, Brunton and Murray 1923: Tomb register pl. XLVI.

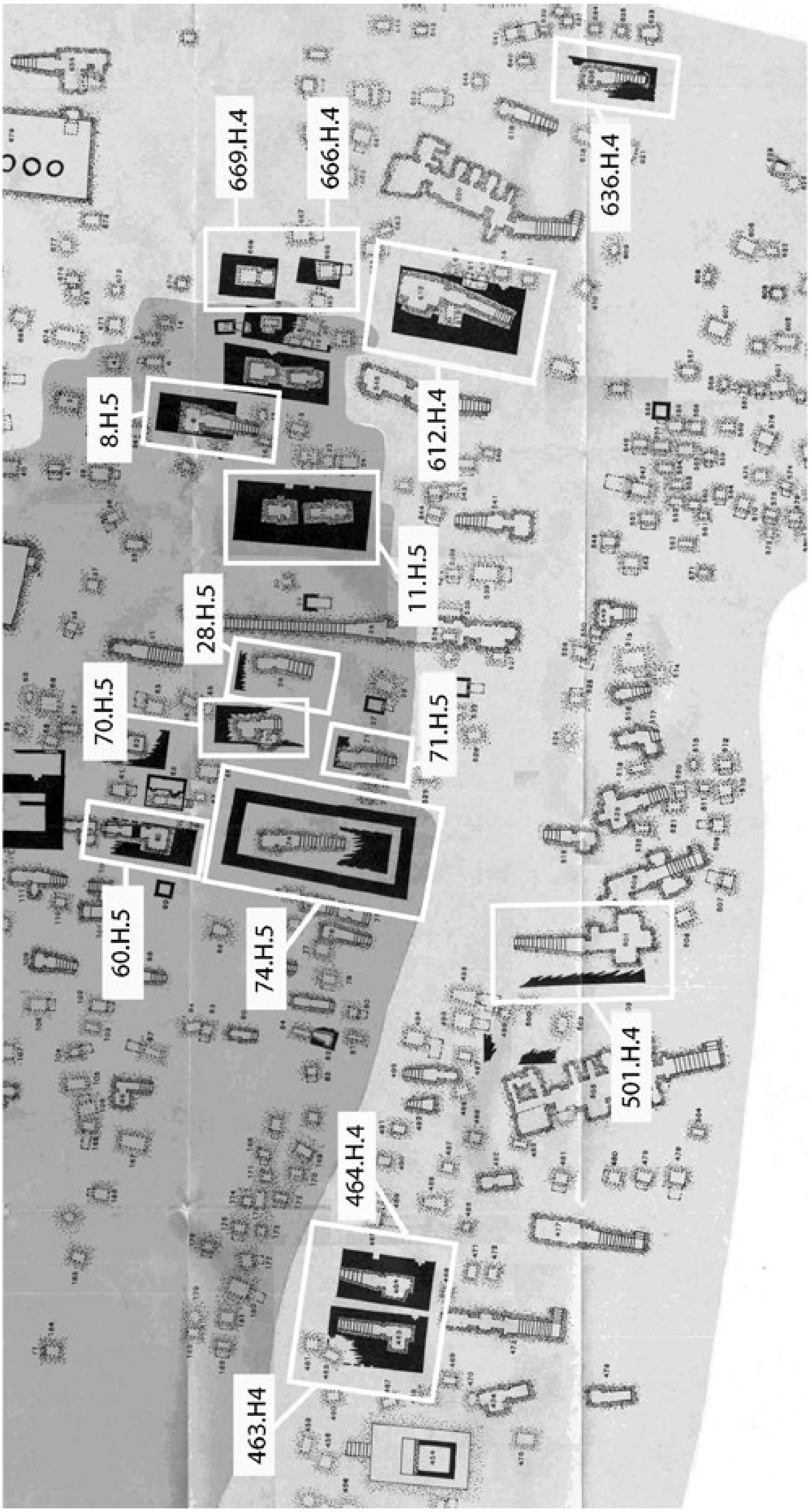


Figure 252 Unpublished tombs with superstructures at Helwan. Type IIA stairway tombs 463.H.4, 464.H.4, 612.H.4, 636.H.4, 74.H.5, 8.H.5, 60.H.5, 71.H.5, 501.H.4 and 28.H.5. Type IIB 'deep staircase' tomb 70.H.5 and Type IIC shaft tombs 11.H.5, 666.H.4 and 669.H.4. (After Saad 1951, pl. III)

in differing directions (see Chart H). Some are quite deep, such as tombs 760 **[258]**, 770 **[260]** and 785 **[259]**, which descended to depths of 4.19 m, 2.23 m and 3.75 m respectively,[1294] whereas others, such as tombs 821 **[256]** and 806 **[254]**, are extremely shallow and only reached depths of 1.21 m and 1.37 m correspondingly.[1295] Exceptionally, tomb 850 **[NIC]** had an 'L' shaped descent and reached a depth of 6.1 m, of which Petrie wrote, 'in one great tomb, 850, there are twenty steps with a landing in the middle, and turning sideways near the top.'[1296]

The advantage that the stairways of these tombs would have had in comparison to those such as at Helwan was that they, like at Saqqara, were cut into solid limestone, which would have offered them plenty of protection from lateral attack, but quite how their entrances were concealed remains unknown.[1297]

Sedment

There are six stairway tombs in the catalogue from Sedment,[1298] cut into the surrounding gravel and marl.[1299] of which tomb 560 **[266]** is the best reported (Fig. 177). It was entered from its northern end by a combined slope and steep staircase, which descended south and ended with another short slope at a depth of around 3.5 m.[1300] With the exception of tomb 94 **[271]**, which was approached by a long 'L' shaped staircase that descended to a depth of 7.62 m,[1301] the remaining tombs nos. 526, 559, 568, and 569 **[267–70]** are of a similar design, with their stairways varying in depth between 1.7 m and 4.2 m. There is no mention of any superstructures associated with these tombs.

Qau and Badari

South of Sedment, there are four Type IIA tombs cut in the sandy gravel of the cemetery at Qau and one in the limestone detritus of Badari.[1302]

At Cemetery 400 in Qau, some of the gravel cut stairways in tombs such as 507 **[276]** and 562 **[274]**, reached the considerable depths of 7.11 m and 8.63 m respectively (Fig. 178).[1303] Although not all were cut with steps, as nearby the 6.22 m descent of tomb 429 **[275]** was built as a steep slope,[1304] as was the 3.08 m descent of tomb 438 **[277]**, its shallower neighbour.[1305] Further afield at Spur 5 in Cemetery 3100 at Badari, tomb 3112 **[278]** was accessed by a 4.72 m deep staircase cut in the local limestone debris (Fig. 179),[1306] which at the surface was surrounded by remains of a rectangular mud-brick wall.[1307] Despite Brunton's assertions to the contrary,[1308] this may well have been the remains of a mastaba that would have concealed and protected it.

Here at Qau and Badari, some of the tombs seem to have exceptionally deep stairways, which because of the nature of the surrounding matrix may have been the result of the search for ground solid enough in which to safely excavate a burial chamber.[1309] Without more accurate information regarding the local geology, it is difficult to be more precise.

Armant

Four Type IIA tombs were found in Cemetery 200 at Armant. These are tombs 205, 206, 207 and 208 **[335–8]**. Three of the four utilise a slope rather than a staircase to approach their substructures, and all vary in their orientation of approach, each of which comes from a different point of the compass (see Chart H), [1310] which could have been for reasons of security, or just coincidental. No superstructures were reported.

El-Kab

There are two small staircase tombs identified at El-Kab that date to the Second Dynasty. Tomb St. 2 **[NIC]** was excavated by Quibell and is described as, '…the smallest tomb of the kind that I have seen.' [1311] Although no other details are available, its stairway was 'a couple of roughly cut steps' that descended only a metre below ground level.[1312] The second tomb is grave 64 **[343]** from Cemetery 24. Here, rather than a staircase, a 1.25 m long sloping descent in the gravel, approximately 1.3 m deep,[1313] widened until it reached the entrance to its burial chamber (Fig. 181). [1314]

[1294] Petrie, Brunton and Murray 1923: 21–4, Tomb register pl. XLVI.
[1295] Tomb register pl. XLVI.
[1296] Petrie, Brunton and Murray 1923: 23.
[1297] Again, the question of whether superstructures were used remains unknown, there are none reported in the excavation report.
[1298] Petrie and Brunton's (1924: pl. XXXVI) tomb register lists eight 'stairway' tombs dating to the Second Dynasty, but only five are drawn in detail. Some, such as tombs 568 **[269]** and 569 **[270]** (Petrie and Brunton 1924: pl. LXIII) are included in those plans but do not appear in the tomb register.
[1299] Brunton (Petrie and Brunton 1924: pl. LXXXI) described the topography near Mayana as being of 'undulating gravel' and 'there is no good rock near the surface, and the best stratum for tombs is of grey-black marl which is only available here and there.'(Petrie and Brunton 1924: 14).
[1300] Petrie and Brunton 1924: 2, pls. I, 1–17, II and LXXXI.
[1301] Petrie and Brunton 1924: pls. XXXVI and LXXXI.
[1302] See note 851 regarding the local geology.
[1303] Brunton 1927: 12, Tomb register pl. X and pl. XII, figs. 2 and 5.
[1304] Brunton 1927: 11–2 and 15, Tomb register pl. X.
[1305] Brunton 1927: 15, Tomb register pl. X.
[1306] Brunton 1927: 3, 14, 16 and Tomb register pl. X.
[1307] This was 15.29 m long × 8 m wide (Brunton 1927: 13).
[1308] Brunton 1927: 15. See also note 2337.
[1309] See again note 851.
[1310] Myers and Fairman 1931: 224, pl. XLI.
[1311] It is dated to the reign of Raneb by a steatite palette found in the tomb (Wilkinson 1999: 333).
[1312] Quibell 1898: 7
[1313] Scaled from drawing by Hendrickx and Van Rossum (1994: pl. LIV).
[1314] Hendrickx and Van Rossum 1994: 152 and 184.

The Third Dynasty

Saqqara

There are undoubtedly numerous Third Dynasty Type IIA tombs at Saqqara in Quibell's excavation report,[1315] but few are accompanied by drawings showing their stairways.[1316] However, four different sized examples are available for discussion. Like their Second Dynasty neighbours, the rock-cut staircases of the first three are all located within the perimeter of their superstructures. That of the larger tomb, S 2416 **[115]**, started at its northern edge and descended within half the length of its superstructure,[1317] whereas in the much smaller S 2317 **[116]**, its shorter stairway virtually filled its entire length.[1318] Lastly, the two stairways in the 'twin' mastaba S 2445 **[117]**, required two much shorter descents, one at its northern end that descended 3.4 m in four deep steps,[1319] the other, starting halfway down, seems to have been a more controlled descent.[1320] Finally, the external stairway of S 3040 **[114]** began at its northern end and descended 4.6 m west, then south for 9.1 m, keeping comparatively close to its superstructure's eastern wall,[1321] thus maintaining an unpredictable descent for greater security.

These four examples, like in some of the earlier examples at Helwan, graphically demonstrate the differing levels of protection that result from the relationship between the size of the stairway and its superstructure. The greater the area and section of the stairwell in comparison to that of its superstructure, the more vulnerable it would be to exploratory *sondages* from above by tomb robbers.

Tarkhan

A single Type IIA tomb from Tarkhan was briefly reported by Petrie that dated to the Third Dynasty. The stairway of tomb 1004 **[219]** comprised of a short wedge shaped descent north that began at 0.4 m wide and widened to 1.27 m in under a metre.[1322]

Badari

There are three Type IIA tombs with long staircases located in the Badari Cemetery 3200 at Spur 6 (Figs. 182).[1323] The descents of tombs 3228 **[280]** and 3229 **[279]** were cut in the limestone detritus to a depth of 5.94

[1315] Quibell 1923: 17–46.

[1316] Reisner (1936: 163) lists S 2151, S 2165, S 2157N, S 2173, S 2176, S 2180, S 2183, S 2187, S 2189 and S 2195, amongst others, as being stairway tombs from the Third Dynasty. But their stairway arrangements are not clear in Quibell's (1923: pls. I and II) cemetery plans (Map 11 in this book); hence their exclusion in this discussion.

[1317] Quibell 1923: 39; Reisner 1936: 162.

[1318] Quibell 1923: 33; Reisner 1936: 163.

[1319] Reisner 1936: 162. This could almost be classed as a Type IIB 'deep staircase' as each of its steps would average out at about 0.7 m high.

[1320] See drawing by Quibell 1923: Pl. II.

[1321] Reisner 1936: 163.

[1322] Petrie, Wainwright and Gardiner 1913: 13 and 27; Petrie 1999c: Tomb Card KA1004.

[1323] Brunton 1927: 3.

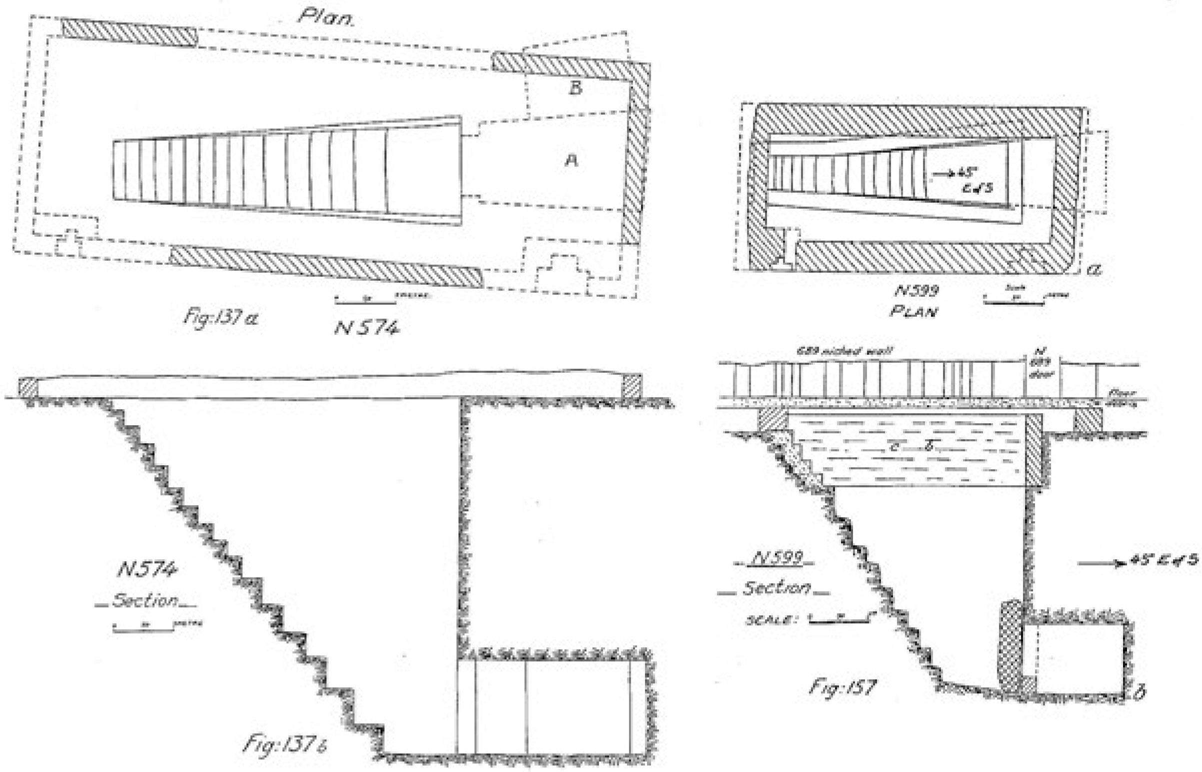
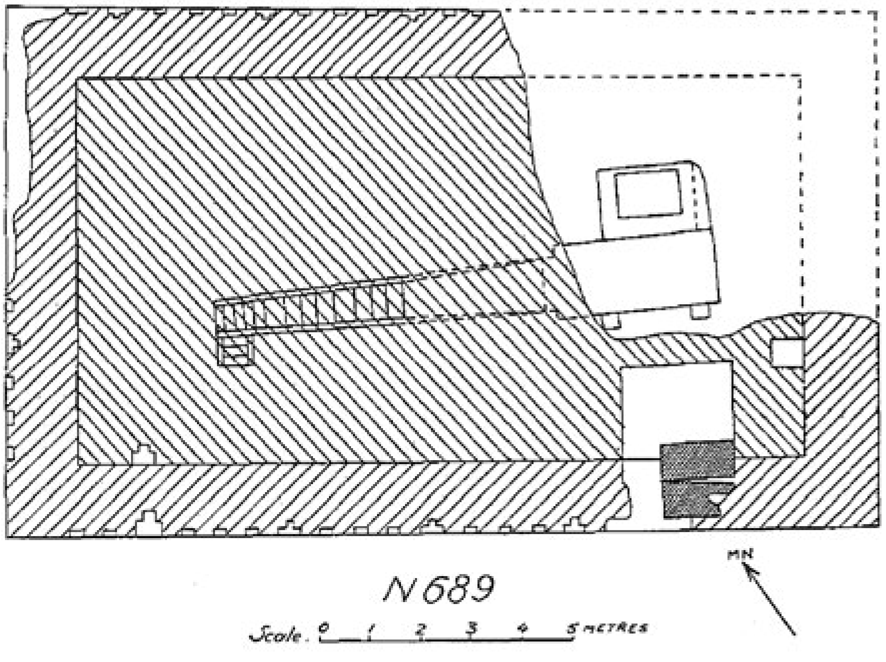


Figure 253 The Type IIA tombs N 574 and N 599 at Cemetery 500-900 at Naga el-Deir, showing their stairways protected by their superstructures.
(Reisner 1932, figs. 137a–b and 157)



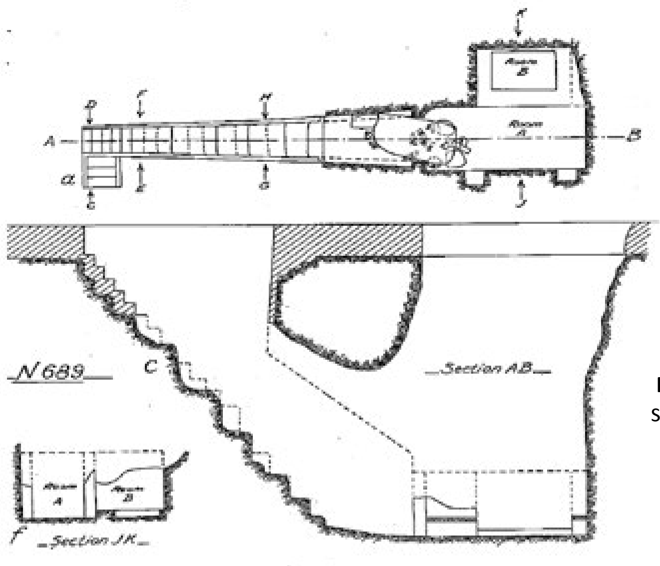


Figure 254 The unusual subterranean stairway of tomb N 689 from Cemetery 500-900 at Naga el-Deir. (Reisner 1932, fig. 195)

m and 6.09 m respectively, [1324] but the most notable of them was that in 3227 **[281]**, whose staircase reached the great depth of 10.46 m.[1325] At the surface it was surrounded by the remains of a rectangular brick wall 22.25 m long, which Brunton suggested was an enclosure wall rather than the side of a mastaba, due to its size.[1326] However, if one discounts Brunton's theory (see p. 292), it is feasible that all of these stairways may once have also been protected by a superstructure.

Naga el-Deir

Four staircase tombs are found at cemetery 500–900 at Naga el-Deir.[1327] The gravel cut stairways of tombs N 574 **[303]** and N 599 **[304]** descended south-east to a depth of 6 m and 4.4 m [1328] respectively, and were both concealed and protected by their superstructures (Fig. 253). [1329] In sharp contrast, the 'L' shaped stairway in tomb N 689 **[305]**, started its descent towards the north-east, then turned south-east for 3.8 m and went entirely underground at a depth of about 3 m. It then continued in a tunnel (in a manner only seen once before in Abusir tomb 13C-3 + 13B-1, discussed above) until it met its burial chamber at a depth of 7.5 m (Fig. 254).[1330] The whole was then protected by the tomb's superstructure.[1331] Lastly, the double or 'twin' tomb N 573 + 587 **[306]** housed two burials. The smaller of the two gravel cut staircases on the northern end (N 573) descended south-

[1324] Brunton 1927: 14, Tomb register pl. XI.
[1325] Brunton 1927: 14 and Tomb register pl. XI.
[1326] Brunton 1927: 15.
[1327] Reisner 1932: 170.
[1328] Scaled dimensions from drawing by Reisner (1932: fig. 157).
[1329] Reisner 1932: 220–21 and 229; 1936: 182.
[1330] Reisner 1932: 243–6; 1936: 181.
[1331] Reisner 1932: 244–5; 1936: 181–2.

east to a depth of 3.85 m, whereas at the northern end, the larger staircase (N 587) reached a depth of 7.1 m.[1332] Above a large mastaba concealed and protected both of them (Fig. 184).[1333]

Like some of the Second Dynasty tombs at Saqqara and Helwan, the gravel cut stairways of three of these tombs are orientated in the same direction, which would have made them vulnerable to lateral and overhead attack, despite their protective mastabas. But tomb N 689 mitigated those risks by reducing the size of its open stairwell and lessening the area of its plan and cross section.

Reqaqnah

There are two Type IIA tombs from Reqaqnah (Figs. 185–6). The largest was tomb R1 **[315]**, whose substructure was accessed by a combined mud-brick slope and steep staircase that started at the northern end of the substructure and descended south to a depth of 7.95 m. Due to the loose nature of the surrounding desert gravel, the stairwell cutting had been battered and its sides brick-lined and shored up with three thick vaulted cross walls of mud-brick over the stairway. Its construction creating both portcullis shafts and providing a foundation for the superstructure.[1334] Slightly smaller, but very similar, was nearby tomb R40 **[316]**, whose 8.4 m deep stairway was similarly designed, orientated and protected.[1335]

The stairways in these tombs were protected from lateral penetration by both their stout brick walls and the potentially hazardous loose desert gravel and sand.[1336] From above their stairwells would have been defended in some way by the superstructures built above them, but denudation of their remains makes it impossible to be precise.

Beit Khallaf

The large tombs at Beit Khallaf possess complex and well defended descents that arguably represent the pinnacle of development of the Type IIA stairway.

Access to the substructure of tomb K1 at Beit Khallaf **[319]** was through the top of the tomb's enormous 85 m long superstructure, via a 57 m long 'U' shaped staircase built within its mud-brick core.[1337] This began in the north-eastern corner of the mastaba and descended north, then west, until it reached desert level (Fig. 187); at that point, it turned south, via a portcullis into a stairway, which then descended at 30° under a mud-brick vault, down into the gravel beneath. After passing five more portcullises, it finally reached the substructure 16 m below the desert surface, some 27 m below the top of the superstructure. Once the burial was installed and the blockings closed the whole stairway was sealed with mud and bricked over to conceal it from view (see 5.2.1.3).[1338]

The adjacent 'twin mastaba' K2 **[320]** contained two staircases within its superstructure (Fig. 188). The northernmost, like in K1, descended in an 18.25 m long 'U' shape from the top of the north-eastern corner of the superstructure, entering the desert gravel on its westward descent, and then proceeded south under a protective 'barrel roofed' mud-brick arch, to its substructure at a depth of 13.4 m from the surface. The southern stairway was a simpler 'L' shape and started midway in the superstructure, descending west and then south through the gravel to its burial chambers. It too was partially protected on its descent by a mud-brick vault.[1339] Like K1, both stairwells were probably backfilled with mud and bricked over to conceal their whereabouts.[1340]

Nearby tombs K3, K4 and K5 **[321–3]** were more conventional in their descents, all of which were straight and, as far as can be established, due to denudation, descended south into the surrounding desert gravel. Their stairways were presumably protected from above by their substantial mud-brick superstructures.[1341]

The changes in direction in the stairways of Mastabas K1 and K2 enabled their descents to descend further within a given perimeter than a straight staircase would have permitted, and thus permitted their complex substructures to be well protected in all directions by the large footprint and bulk of their enormous superstructures, whereas their smaller neighbours remained still vulnerable to overhead and lateral *sondage.*

El-Kab

Although Quibell excavated thirteen stairway tombs at El-Kab,[1342] they are poorly recorded and no drawings are available of their layouts.[1343] They are therefore excluded from the discussion.

The Fourth Dynasty

There are just three Type IIA tombs with stairways in the survey from the Fourth Dynasty.[1344]

Reqaqnah

A single Type IIA tomb is recorded at Reqaqnah. Little is known about R75 **[317]**, save that a third of the way

[1332] Scaled dimensions from drawing by Reisner (1932: fig. 131).
[1333] Reisner 1932: 217–8; 1936: 181.
[1334] Garstang 1904: 21–2; Reisner 1936: 179.
[1335] Garstang 1904: 22–3; Reisner 1936: 180.
[1336] Garstang 1904: 21.
[1337] Reisner 1936: 172.
[1338] Garstang 1903: 3–4 and 8–11.
[1339] Garstang 1903: 11–2; Reisner 1936: 174–6.
[1340] Garstang 1903: 12.
[1341] Garstang 1903: 14–6; Reisner 1936: 176–9.
[1342] Quibell 1898: 3.
[1343] The only drawing available consists of a couple of artist's sketches of an unidentified tomb with a portcullis, see Quibell 1898: 7–8, pl. IX.
[1344] There are undoubtedly more, but there is insufficient published material to include them in the research.

down from its superstructure's northern end, a short stairway descends southwards into a substructure of unknown depth.[1345] Like its predecessors in the same cemetery, presumably its whereabouts was concealed and protected by the superstructure.

Ballas

Quibell reported twenty-nine staircase tombs at Ballas that he dated to the Fourth Dynasty,[1346] of which only two were drawn in detail (Fig. 189). Tomb 353 **[330]** comprised of just a steep rough staircase and slope cut in the hard gravel that descended southwards to a depth of 6.1 m, but unusually there was no burial chamber.[1347] Nearby, the shorter 4 m long staircase of tomb 201 **[331]** descended to a depth of 3.5 m, where more conventionally it led to a subterranean burial chamber. Although the above lacked superstructures, remains of brickwork on the surface demonstrate many of these tombs had originally been protected by mastabas, which had been denuded by erosion.[1348]

Section summary – The Type IIA staircase

The change to an entirely subterranean burial chamber did not affect the security of the stairway in many Type IIA tombs, as often they still took the form of an external trench cut stairwell, which was not much different from the stairwell of a Type ID tomb, and thus liable to attack in much the same way. However, by moving of the stairway's location to within or under the protective body of a superstructure the level of protection was enhanced considerably. In addition, by varying its position and orientation the likelihood of its detection by *sondage* could be considerably lessened. In larger tombs where greater depths were sought for their substructures, incorporating a change in direction could also permit the stairway to go deeper within the perimeter of the superstructure, but with bigger stairwells came the cost of being more exposed to *sondage,* a problem partially resolved with the introduction of the next two types of access routes.

5.1.2.3 The access routes of Type IIB tombs - the 'deep' staircase

In this type of descent, which seems to be limited mainly to Helwan and Naga el-Deir (although an example is known from Saqqara[1349]), access to the substructure is made by a 'deep' staircase with two or three large steps of as much as 1.5 m each.[1350] Its use at Helwan in particular, becomes more frequent during the Second Dynasty, where it seems to form the transition between the staircase tomb and the shaft tomb,[1351] rather than the stair-shaft found at other sites.

The Second Dynasty (Naqada IIID)

Helwan

There are five of these types of staircase included in the catalogue from Helwan, for example tomb Op. 4/103 **[186]**, whose 3.3 m gravel cut descent was formed by two deep steps of about 1 m each that led north to the burial chamber (Fig. 255).[1352] A virtually identical arrangement can be seen in nearby tombs Op. 4/2 **[187]**, and Op. 4/62 **[185]** (Fig. 190), which are of a similar layout and depth.[1353] A much shallower example is 173.H.9 **[188]**, whose 1.8 m long descent was formed by three crude steps that descended to a depth of 2.1 m.[1354] All four

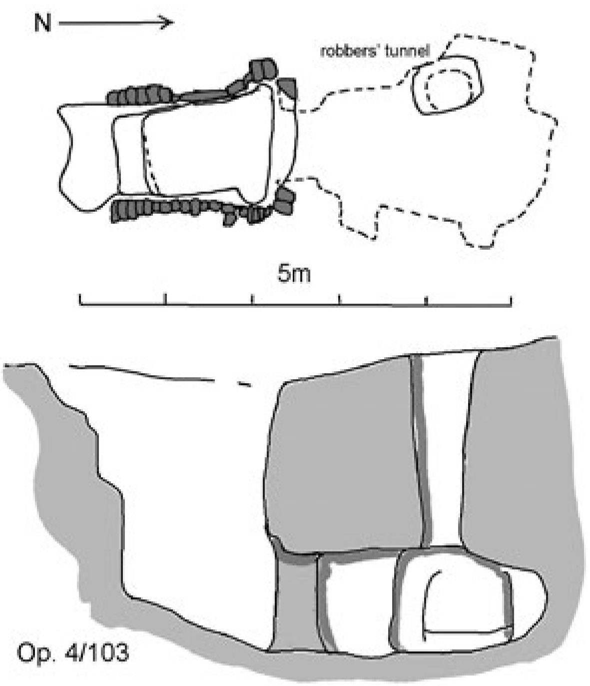


Figure 255 The Type IIB 'deep' staircase tomb Op. 4/103 at Helwan.
(Drawn by the author after Köhler 2007, fig. 8)

[1345] Garstang 1904: 31–2: Reisner 1936: 231.
[1346] Quibell 1896: 3–6. The remainder are tombs 179, 524, 71, 107, 161, 162, 212, 265, 358, 365, 522, 526, 530, 686, 764, 836, 850 and 865. Amongst them were also found some pot burials which can be dated to the Third and Fourth Dynasties (Quibell 1896: pl. XLIV, 2, 3; Hendrickx 1998: 124).
[1347] Quibell 1896: 4, pl. IV, 15. This is probably part of an unfinished Type IIA tomb, like the Second Dynasty stairways found by Lauer (1939: 36–7) in the Step Pyramid complex at Saqqara, whose associated substructures were never completed.
[1348] Quibell 1896: 3.
[1349] Quibell (1923: 41) describes the stairway of S 2442 **[NIC]** as, 'Stair of two large steps, 4 metres deep'. This would suggest that the steps averaged about 1.33 m high each.
[1350] Köhler 2008b: 118.
[1351] Köhler 2007: 202. This is probably what Saad (1947: 28) referred to as a 'symbolic flight of steps either cut in the gravel or also built with mud bricks.'
[1352] Köhler 2007: 201–3, fig. 8.
[1353] Köhler 2000b: 88; 2008b: Figs. 6 and 7; 2014: 133–4, fig. 27.
[1354] Saad 1957: 63, plan U.

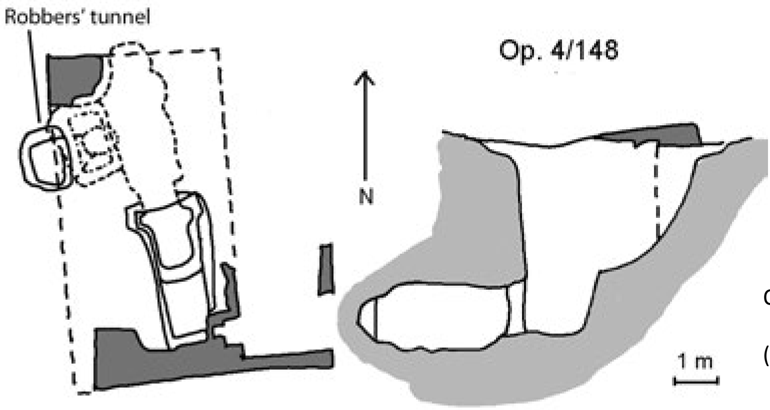


Figure 256 The Type IIB 'deep' staircase tomb Op. 4/148 at Helwan, showing the outline of its superstructure.
(Drawn by the author after Köhler 2009, fig. 4)

tombs were found without superstructures, but the 4.35 m deep stairway and burial chamber of Op. 4/148 **[184]**, was entirely protected by the footprint of its 7 m × 4 m mud-brick mastaba (Fig. 256).[1355]

By descending further within a limited space, the deep staircase at Helwan allowed both it and the burial chamber to be well protected and concealed by a shorter mastaba than would usually have been the case with a traditional staircase, which was a distinct advantage in an already overcrowded necropolis.[1356]

The Third and early Fourth Dynasties

Naga el-Deir

There are just two tombs with 'deep' staircases in Cemetery 500–900 at Naga el-Deir.

Tomb N 518 **[307]** dates to the Third Dynasty. Its descent comprised of three mud-brick steps built in the upper liner of the stairwell that led to a gravel cut deep stairway, which descended via large rough steps to a depth of 2.95m. Although a protective superstructure was mooted over this stairway, it had been entirely denuded by erosion.[1357] Slightly later in date was the early Fourth Dynasty N 561b **[311]**. Its 1.5 m long gravel cut staircase descended via three deep steps to a depth of 2 m, where it met with its burial chamber (Fig 191). It would have been completely concealed and protected by the gravel fill of its mastaba.[1358]

Like at Helwan, these tombs utilised the 'deep staircase' to gain depth within a small area. It can also be seen in N 561b that by placing such a small stairwell within a large mastaba, its entrance would have been hard to locate by *sondage* in comparison to a full length stairway, as in this case its stairwell's opening only occupied 3.5% of the area of the whole superstructure.[1359]

Section Summary – the 'deep' staircase

The real security advantage of a deep staircase is that it permitted its substructure to attain a depth similar to that of a Type IIA tomb with a long staircase, but in a far shorter space. It did this by allowing room for the manoeuvre of the body or coffin in a series of 'lifts' within a limited space, unlike the regular descent provided by a normal staircase, which required a much longer regular tread and rise over a given pitch to be navigable. Therefore it was an attractive choice in cemeteries where limited space was available such as Helwan, but one of its main advantages is that in larger tombs, its smaller cross-section and plan would have made it more difficult to detect by *sondage.*

Its distribution is mainly limited to Helwan and Naga el-Deir, possibly because of the nature of their gravel geology, where a stair-shaft would be difficult to cut, thus it formed a local solution to the problem solved by stair-shafts in those necropoleis with more solid geology, discussed immediately below.

5.1.2.4 The access routes of Type IIA-C tombs - the stair-shaft

The entrance route of this type of tomb usually consists of a combined stairway and shaft and represents a 'transitional' stage between the Type IIA stairway and the Type IIC shaft.[1360] It combines the space saving progressive descent of an abbreviated stairway with the depth of a shaft. Their use begins in the Third Dynasty and runs into the early Fourth.[1361]

[1355] Köhler 2009: 284.
[1356] Köhler (2008b:126) notes that the numbers of both these and Type IIC shaft tombs seem to increase towards the latter end of the Second Dynasty. She suggests the reason for their increase may have been because they were being built at a point in time when the necropolis was becoming overcrowded and thus less room for long staircases was available.
[1357] Reisner 1932: 197.
[1358] Reisner 1932: 212–3.
[1359] The area of the superstructure of N 561b in plan is 62.54 m2 and the 'deep' stairwell 2.15 m2.
[1360] Bárta, Coppens and Vymazalová 2010: 52 and 181. See also Bárta (2006: *passim*) for a discussion on 'transitional tombs' at Saqqara North and Abusir South.
[1361] Emery (1961: 162, figs. 95–6) described unnamed Second Dynasty and late Second Dynasty tombs of the 'middle', 'poor', and 'poorer' class at Saqqara that appear to be stair-shafts, but apart from his

The Third Dynasty

Giza

A single example of a stair-shaft is found at Giza in 'Covington's Tomb' **[61]**, where it led to the upper level of the two storied substructure (Fig. 192).[1362] At the northern end of the tomb's large solid mud-brick superstructure, a short eastern descent of four steps took a 90° turn and descended south as a 12.5 m long stairway, which passed through the mud-brick of the mastaba and into the marly limestone strata beneath. It met the southern wall of its shaft, which was 2.3 m long × 1.26 m wide × 11 m deep, at a point about 7 m up from its base. At the base of the shaft, a portcullis blocked the entrance to the substructure in the south.[1363] It was thus well protected from above and laterally by its superstructure and further down by the bedrock into which it was cut, and had only been entered by the removal of its blockings.

Saqqara

Of the thirteen stair-shaft tombs at Saqqara included in the survey **[118–130]**, S 2405 the tomb of Hesyra **[119]** is probably the best known (Fig. 193). A mud-brick straight staircase descended south from the north-eastern quarter of the solid brick superstructure,[1364] through its brick mass and a layer of gravel into the rock below, until it met with its 5 m long × 2 m wide shaft,[1365] at a distance of about 8 m from the surface. The shaft's south face was now approximately 16 m deep to the floor of the tomb's unfinished second level,[1366] and from here another opening led to the floor of the third level (also unfinished), which was 23.4 m from the top.[1367] Like in Covington's Tomb this route was well concealed and defended by the superstructure and bedrock that surrounded it, but similarly evidence of continuous exploration points to its closures being its vulnerable point.[1368]

As with Type IIA stairways, at Saqqara the descent of a stair-shaft could be located in differing positions for security purposes, especially in the larger tombs, such as S 2103 **[121]**, whose 4 m stairway began in the far south-western corner of its superstructure and descended north to its shaft. Although protected from lateral attack by its bedrock, unlike in Hesyra, its overhead defence was provided by its mastaba's core fill rather than solid mud-brick.[1369] Similarly, tomb S 3043 **[122]** had the northerly descent of its stair-shaft close to the eastern side of its superstructure, but this time placed more centrally.[1370]

The stair-shafts of some smaller tombs such as S 2115 **[123]**, S 2336 **[124]** and S 2428 **[125]**,[1371] seemed to be less imaginatively positioned with their southerly descents placed at the northern ends of their superstructures, which one could just attribute to having less space, if it were not for more varied placements of the stair-shafts in other tombs. An excellent example is the smaller tombs M1, M2 and M3 **[128–30]** located adjacent to the Unas Causeway, which in the search for security adopt a variety of orientations and locations for their stair-shafts. In the case of M1, the stairway itself was concealed by the southern wall of its solid mud-brick superstructure, whereas the other two were protected by their superstructures' gravel cores. [1372]

A number of 'twin' mastabas at Saqqara also included stair-shafts in their substructures, where for security they could take advantage of their size to permit variety in the locations of their descents. One example is the enormous Type IIA-C + IIA-C tomb S 2407 **[126]**, whose two stair-shafts were placed on a central axis within superstructure. Its northern burial was accessed by an 'L' shaped stair in the end of the mastaba that briefly descended east, then south before joining its shaft, whereas the southern descent began in the centre and descended directly south for 9 m before meeting its shaft. On a similar scale, the Type IIA + IIA-C tomb S 3050 **[118]** had its stair-shaft located within the north-eastern corner of its superstructure, close to its perimeter wall, but its Type IIA stairway in the centre (Figs. 182 and 257),[1373] whereas the Type IIA-C + IIC mastaba S 3070 **[120]**, had its stair-shaft set centrally within the northern end of its mastaba's core (Fig. 194).[1374] Although in this case it should be noted, well away from the intrusive offering niches.

As with Type IIA tombs, in smaller 'twin' tombs, the available space also imposed restrictions on the placement and orientation of stair-shafts, such as those in S 2436 + S 2437 **[127]**, which due to lack of space were necessarily axially aligned with their superstructure, and would have been easily locatable by robbers.[1375]

sketches there is no other published information. Perhaps the examples that he mentions are the same types that Reisner (1936: 186) referred to as the Third Dynasty 'stepped shaft', and refer to tombs such as S 2162 **[NIC]**, whose access routes Quibell (1923: 23) described, 'The stair has but a single step, is almost a shaft' and 2331B (1923: 35) 'Stair with two steps to shaft'.

[1362] The lower level being connected to the upper via an internal Type IIC shaft.

[1363] Covington 1905: 195–6, 208–10; Reisner 1936: 155–7.

[1364] This position is only the result of four building phases of the superstructure having taken place. Its original position in its much smaller first stage was just off the N-S axis, but the additional layers to its eastern aspect have moved it correspondingly westward, see Jánosi 2006: 27, Abb. 19 for a discussion and illustration of the stages.

[1365] Reisner 1936: 158.

[1366] Jánosi (2006: 26) suggests that the lower two chambers are the result of Late Period alterations.

[1367] Scaled dimensions from Quibell (1913: pl. II) and Reisner (1936: 158).

[1368] Quibell 1913: 3.

[1369] Quibell 1923: 18; Reisner 1936: 160.

[1370] Reisner 1936: 155.

[1371] Quibell 1923: 21, 25 and 40; Reisner 1936: 161.

[1372] Ghaly 1994: 57–69.

[1373] Martin 1974: 23.

[1374] Emery 1968: 11–3

[1375] Quibell 1923: 40; Reisner 1936: 160–1.

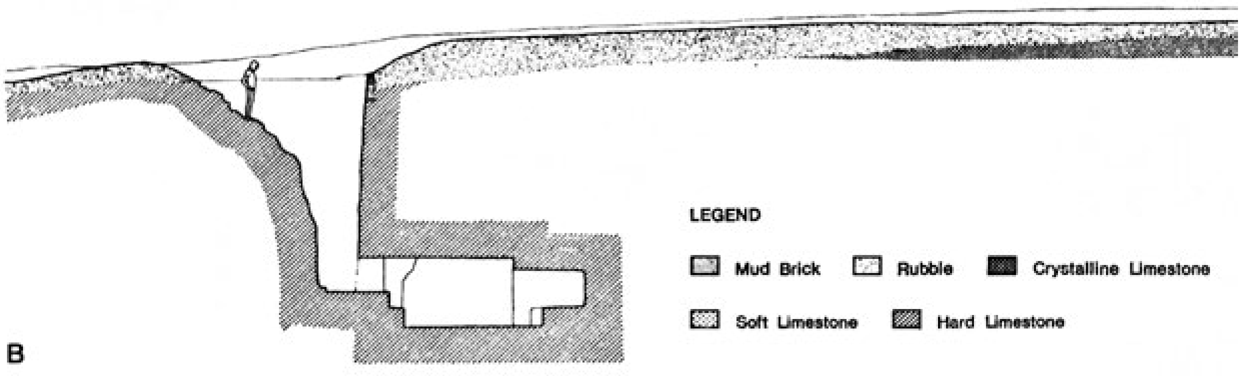


Figure 257 Section of the Type IIA + IIA-C tomb S 3050 at Saqqara, showing the stair-shaft. (Martin 1974, fig. 8) Courtesy of the Egypt Exploration Society.

Here at Saqqara, like at Giza, it can be seen that the full exploitation of the space saving stair-shaft was possible due to the rock geology into which it was cut. For some unknown reason the stair-shaft is not adopted at Helwan, perhaps because of the unsuitable nature of its geology, although as we shall see immediately below, stair-shafts do exist in necropoleis with similar 'gravel' geologies.

Naga el-Deir

There are three stair-shaft tombs at Cemetery 500–900. The substructures of tombs N 585 **[308]**,[1376] N 586 **[309]**[1377] N 593 **[310]**[1378] were all approached by crudely cut steps in the surrounding gravel that joined with their shafts. Although bearing in mind the tombs' comparatively shallow substructure depths of around 3.4–3.5 m, the reduced horizontal lengths of their descents at 3.9 m, 3.2 m and 3.6 m respectively,[1379] could be seen more as a 'token' use of the stair-shaft rather than as a truly effective space saver. This is most noticeable when they are considered together with their superstructures, whose small size devalues their effectiveness in comparison to larger instances of their use at other cemeteries.

El-Kab

Situated up on the summit of the 50 m high rock necropolis a the superstructure of tomb 274 **[344]** contains an 'L' shaped rock-cut stairway in its north-western end that descends to a depth of 10 m, before joining with its 1.75 m square × 24.5 m deep shaft (Fig. 195). Not only is the tomb's location unusual, but the depth to which the stair-shaft was sunk is exceptional for a private tomb.[1380] Effectively protected below ground from lateral attack by its surrounding sandstone geology, the stair-shaft's entrance would have been concealed from above by its mastaba's core.[1381]

The early Fourth Dynasty

A few tombs continue to use stair-shafts into the late Third or early Fourth Dynasties, but it appears elsewhere they are superseded by the Type IIC shaft. Although there are rare examples of their use at Saqqara, such as in S 3073 **[NIC]**,[1382] there is insufficient material to include them in the discussion. [1383]

Abusir

Three tombs at Abusir have stair-shafts. The first is the Type IIA-C + IIA-C 'twin' mastaba AS 20 (Hetepi) **[78]**. Both its stair-shafts are located on the top of the superstructure and they are of an unusual configuration, as they descend in a 'meandering' approach (Figs. 197 and 258–9). The southern stair begins about halfway down the centre of the superstructure and descends to a depth of 4 m through the mastaba's core to join with its 10.75 m deep shaft. Its northern counterpart starts about 5 m in from the north on the same axis and descends for 5 m, where it meets its shallower 6.8 m shaft. Both would have been well protected laterally by the surrounding *tafl* into which they were cut and from above by the mastaba's inner core.[1384] Unlike stairways with half and quarter landings that descend in an 'L' or 'U' shape, the configuration of this type of stairway does not save much space as far as the length of the descent goes, because most of the treads are in the same direction even though the stairway 'meanders'. It may be possible that the purpose behind this design was to prevent the mastaba's loose inner core from 'slipping' down towards their

[1376] Reisner 1932: 17 and 224.
[1377] Reisner 1932: 17 and 225.
[1378] Reisner 1932: 17 and 226.
[1379] Scaled from plans by Reisner (1932: Figs. 143–4 and 149).
[1380] This is probably the deepest single Type IIA-C stair-shaft, with the exception of Hesyra, but as already mentioned according to Jánosi (2006: 26), the lower shafts of the latter may be Late Period additions.
[1381] Limme 2000: 26–31; Huyge 2003: 29–30; Limme 2008: 23–4.
[1382] Porter and Moss 1974-81: 449–50.
[1383] The focus of activity seemingly having moved to Meidum and Dahshur with the accession of Sneferu (Bárta 2000: 341). The decline in building at this necropolis during this period is reflected in the lack of tombs from Saqqara in the catalogue.
[1384] Bárta, Coppens and Vymazalová 2010: 6, 12–7.

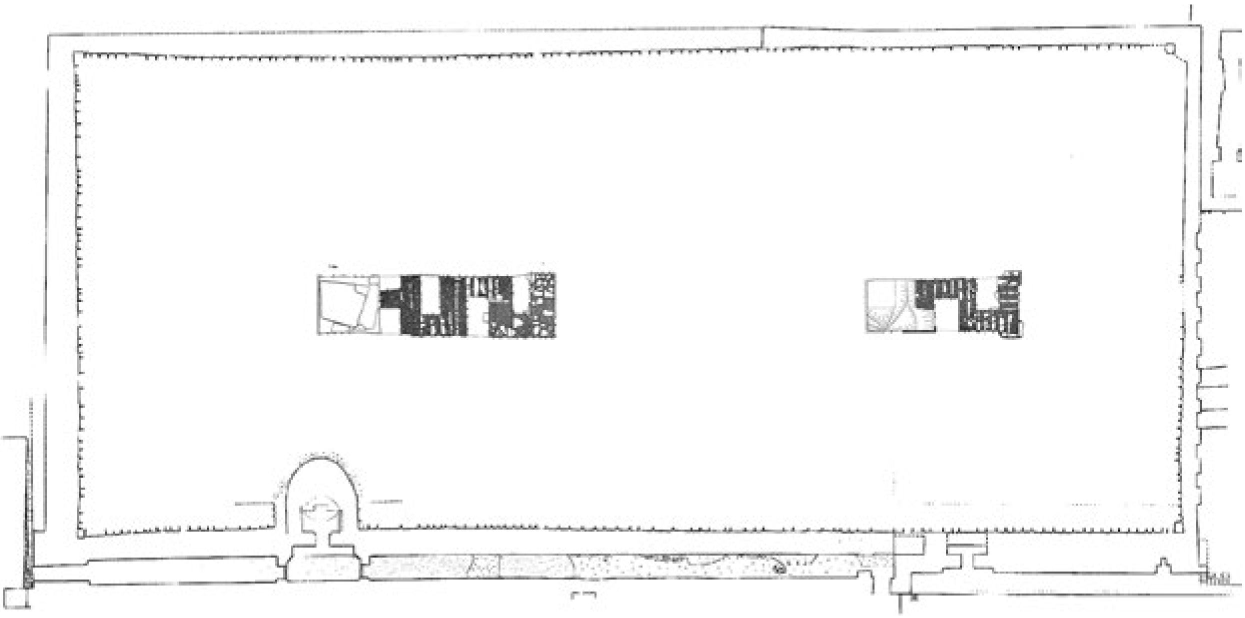


Figure 258 The meandering stairways of the stair-shafts of the Type IIA-C + IIA-C tomb of Hetepi (AS20) at Abusir enclosed in its mud-brick superstructure, with its inner protective limestone wall and core of limestone chips and sand. (Bárta, Coppens and Vymazalová 2010, fig. 2)

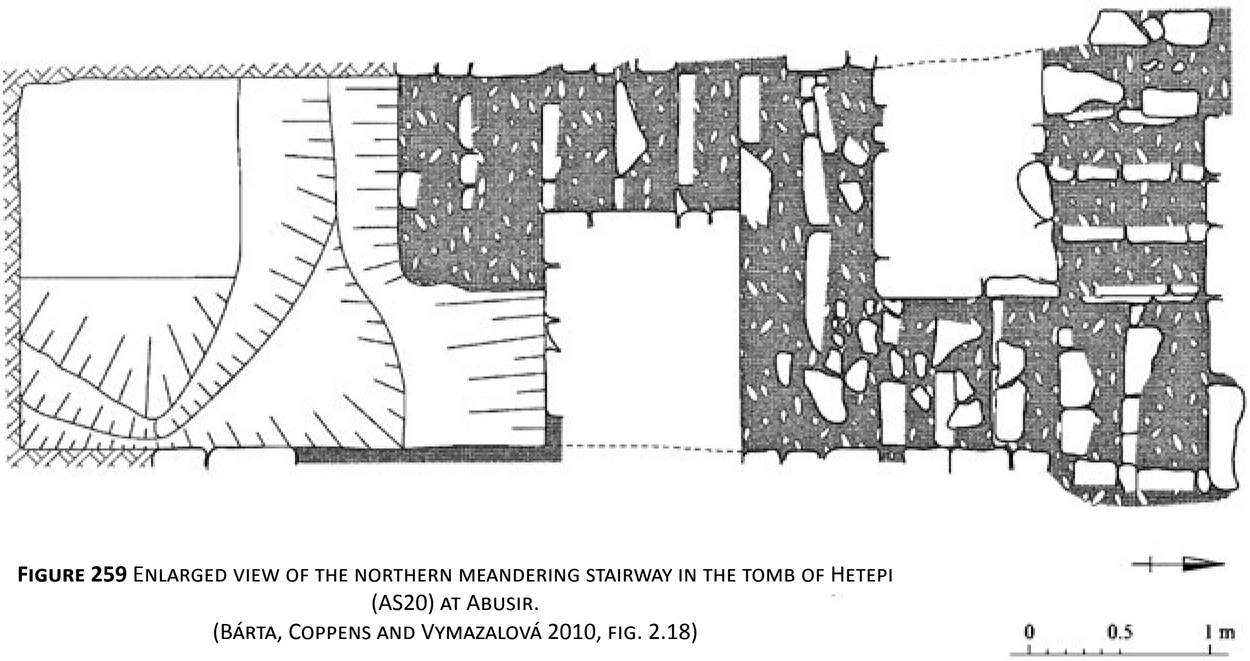


Figure 259 Enlarged view of the northern meandering stairway in the tomb of Hetepi (AS20) at Abusir. (Bárta, Coppens and Vymazalová 2010, fig. 2.18)

shafts during the inevitable settlement of the limestone chip and sand fill, and thus giving away the position of the stair-shafts' entrance from above. Alternatively, one wonders if they were a method of compensating for too steep a rake in the steps, as their many half landings would have made them much safer to descend.

Less complex, the nearby tomb AS 33 **[77]**, which is of a similar size and orientation, has a single straight stairway of just three 'deep' steps located centrally and slightly off the tomb's main axis, which descends south 5.5 m to meets its 9.8 m shaft. Its location and descent were protected in a similar manner to that of its neighbour (Fig. 196).[1385]

Finally, the northern substructure of the Type IIA-C + IIC 'twin mastaba' of Ity **[79]** is accessed by an 'L' shaped stair-shaft, which begins in the far north-eastern corner of the superstructure and descends north to meet with its shaft, at the bottom of which, 5.8 m down from the core of the superstructure, crude steps lead west to the unfinished substructure (Fig. 206).[1386]

[1385] Bárta, Coppens and Vymazalová 2010: 57–65.
[1386] Bárta 2001: 7–8.

In all of these tombs, as with all stair-shafts, a considerable saving in space was achieved by the use of the shortened stairway leading to their shafts, thus making the stairwell less detectable from above and harder to rob.

Section summary – the Type IIA-C stair-shaft

The adoption of a shaft at the end of a stairway would undoubtedly have made robbing the burial chamber more difficult once it had been emptied of backfill, as Reisner suggested: 'The deep shaft at the end of the stairway was no doubt introduced to gain further security for the burial against plundering, a result which was shared by the true shaft type.'[1387] In addition, with the desire to excavate the subterranean burial chamber at ever greater depth to increase its protection, its design permitted the substructure to be accessed over a shorter horizontal distance within the shelter of a superstructure than the descent of a conventional stairway would permit.[1388] With the further benefit that the cross section and plan of its abbreviated stairwell was smaller and less liable to be discovered by *sondage* than a full length staircase, a desirable feature that was to be further exploited by the next access route.

5.1.2.5 The access routes of Type IIC tombs - the shaft

The introduction of the true shaft during the Second and Third Dynasties seems to have run in parallel with the continued use of the Type IIA-C stair-shaft and the Type IIB 'deep' staircase, and often appears alongside them in 'twin mastabas'. However, by the Fourth Dynasty the shaft seems to have become the dominant access route, for reasons which are explored below.

The Second Dynasty (Naqada IIID)

Abusir

Bonnet excavated a number of graves with shafts at Abusir, but only a couple are drawn in detail. They averaged about 3–5 m in depth and were cut into the compact mudstone matrix;[1389] additionally where consolidation of the upper desert strata was necessary many were bricklined.[1390] One unlined example is found in 12B–6 **[74]**,[1391] which unusually had a recessed ledge approximately 1 m down on opposing edges of its 3.2 m deep vertical shaft.[1392] Deeper still was the 5.2 m partly bricklined shaft of 11D–2 **[75]**, which lacked the 'step' of the former,[1393] but the deepest shaft of all was that reported in 13B–5 **[NIC]**, which reached a depth of 12 m.[1394]

Although once cut into the bedrock these shafts would have been protected from lateral tunnelling by the surrounding mudstone geology, they were presumably vulnerable in the areas that needed consolidation. It is difficult to assess how their openings would have been concealed, as they were devoid of superstructures.[1395] One certainty is that their entrances would have been smaller in plan and section than those of the Type IIA stairways at the site and thus less liable to detection.

Helwan

Of the fifteen shaft tombs at Helwan in the catalogue, twelve are published by Saad in his *Ceiling Stele* **[189–200]**.[1396] Amongst the latter, their gravel cut shafts vary in depth between 1.3 to 3.4 metres, with their entrances between 1.3–1.9 m long and 0.8–1.3 m wide. They typically open onto a burial chamber at the base, usually orientated either north or south (see Chart J) and in one case on the west.[1397] A few of these shafts were grooved to accept portcullises,[1398] but when excavated all were devoid of superstructures, although they may have been protected by them originally.[1399]

Recent excavations by Köhler have uncovered the remains of two Type IIC tombs, Op. 4/115 **[201]** and Op. 4/153 **[202]**, whose shafts, which are 3.8 m and 2.4 m deep respectively, are protected by mud-brick superstructures.[1400] Although in both cases there is insufficient published detail to draw conclusions regarding the shafts' exact relationship with their superstructures, it would be safe to assume their entrances were intended to be concealed and protected by them.

The use of the shaft's much smaller opening in the tombs at Helwan would have brought benefits from the security point of view. Firstly, the opening could be concealed by a much smaller superstructure, which was advantageous in the crowded cemetery.[1401] Secondly, and perhaps more

[1387] Reisner 1936: 170.
[1388] Jánosi 2006: 16–7.
[1389] Mathieson and Tavares 1993: 24.
[1390] See Bonnet 1928: 1–5, Taf. 1. It was reported that number of tombs also had small 'step-like' projections carved in their shafts, but lack of detail in Bonnet's (1928) publication makes it difficult to categorise them clearly. They are tombs 9A–1, 10B–5, 10B–8, 12B–2, 12B–3, 12C–I, 13B–3 and 13B–4 **[all NIC]** (Bonnet 1928: 3), and could theoretically be classified as Type IIB 'deep staircases' or Type IIA-C 'stair shafts', if a suitable drawing were available.
[1391] Bonnet 1928: 3, Taf. 2.
[1392] The purpose of this recess is unknown, but it could have been used to support a beam for lowering the portcullis or have been used to retain a blocking or slab. A similar detail is also seen in the later Type IIC tomb DAS 9 (Ipy) **[204]** at Dahshur.
[1393] Scaled dimensions from drawing by Bonnet (1928: 3, Taf. 4).
[1394] Bonnet 1928: 2.
[1395] Goedicke 2000: 399.
[1396] Saad 1957: *passim*.
[1397] An exception to this subterranean format is tomb 1.H.5 **[203]** discovered by Saad, which unusually had a 3.5 m deep shaft with two burial chambers at its base set at 90° to each other (Saad 1951: 23–5).
[1398] Nos. 381.H.8, 379.H.8, 670.H.7 and 738.H.7; see Saad 1957: 17–8, 42–4, 58 and 59 respectively.
[1399] Köhler 2008b: 122.
[1400] Köhler 2008a: 172; 2009: 284.
[1401] Köhler 2008b: 126.

importantly, the smaller size of the shaft's mouth and cross-sections in comparison to Type IIA or Type IIB staircases, offering the benefit of reducing the chance of their detection by *sondage* from above and the side, which was a particular issue at Helwan, because of the ease with which the gravel could be tunnelled into.

Lahun

Amongst the nineteen shallow shaft tombs at Bashkatib,[1402] the two Second Dynasty examples included in the catalogue are the intact tombs 720 **[262]** and 768 **[263]**.[1403] Both had their shafts cut in the local limestone and marl strata and reached depths of 1.87 and 1.89 m respectively.

Hemamieh

Three simple shaft tombs are included in the catalogue from Hemamieh Cemetery 1500–1800. The shafts of the intact tombs 1520, 1561 and 1562 **[282–4]** were cut into the hard gravel, and were between 3.04 and 3.45 m deep with burial chambers on their northern sides.[1404]

The Third Dynasty

Giza

Cut in the sandstone,[1405] a single shaft 9.8 m deep descends to the substructure of the Type IIC 'Inner Mastaba'[1406] at Nazlet Batran **[62]**. Entered via its stone lined mouth, which was 2 m long × 1.8 m wide, and placed slightly off-centre within its superstructure (Figs. 260–1), the shaft descended for about 7 m in the rock until opening out at its base in the softer strata, from where a 1 m high passage filled with rubble led west to the still unexplored burial chamber.[1407] Although the shaft's entrance formed just over 5.4% of the area of its mastaba (see Chart J), it would not have been too difficult to find, but the solidity of the surrounding rock would at least have protected it from lateral *sondages* and penetration.[1408]

Abusir

A single shaft tomb is known from south Abusir that dates to the reign of Huni. The 1.95 m square, 12.6 m deep shaft of AS 54 **[76]** was lined with mud-brick for

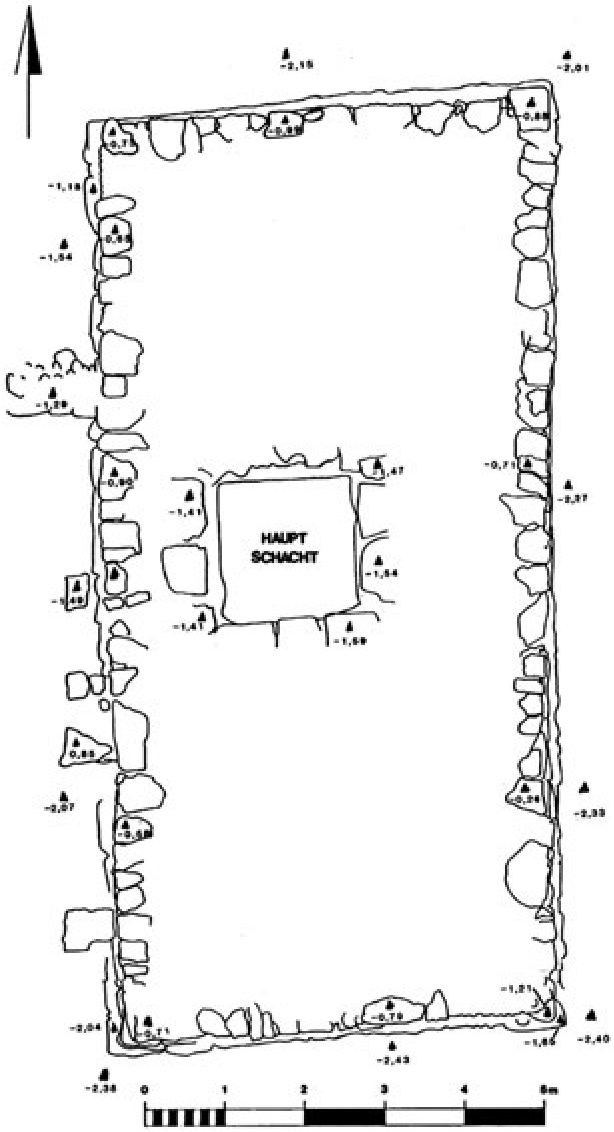


Figure 260 The stone superstructure and shaft mouth of the Third Dynasty Type IIC 'Inner Mastaba' at Nazlet Batran (after Kromer 1991, Pln. 2) Courtesy of the Österreichische Akademie der Wissenschaften.

Figure 261 Photograph of the damaged superstructure and stone lined shaft mouth of the 'Inner Mastaba' at Nazlet Batran. (Kromer 1991, Taf. 4, fig. 1) Courtesy of the Österreichische Akademie der Wissenschaften.

[1402] Petrie, Brunton and Murray 1923: Tomb register pl. XV.
[1403] Petrie, Brunton and Murray 1923: 24.
[1404] Brunton 1927: 13, Tomb register pl. X.
[1405] Kromer 1991: 38.
[1406] So called because it was the original mastaba on the site, which was then added to by intrusive burials with their superstructures over the subsequent years (Kromer 1991: 13–5).
[1407] Kromer 1991: 16–8.
[1408] Interestingly, during the excavations by Kromer (1991: 17–8), the team were unable to clear the lower passage of its blocking, due to the lack of mechanical lifting gear, which testifies to both the effectiveness of a deep shaft as a security measure and the problems that would have to be overcome by tomb robbers to gain access to this type of burial.

the first 5.4 m of its descent. Set in the north of its mud-brick superstructure, its opening began 2.2 m down from the top of the extant remains[1409] and would have occupied only 0.3% of the superstructure's area.

Saqqara

Only a few of the ninety or more Type IIC tombs excavated by Quibell are sufficiently recorded to enable discussion of their individual shafts in detail and most lack dimensions.[1410] However, there are a few tombs published by Emery that permit a more detailed examination,[1411] and a single example by Reisner.[1412] Due to this paucity of information, there are only eight Third Dynasty Type IIC tombs **[120, 131–7]** from the necropolis included in the catalogue.

The deepest shaft recorded by Quibell was that in S 2474 **[NIC]**, which reached a depth of 12.25 m and was covered by a mastaba of unknown dimensions,[1413] whereas the shallowest was that of S 2482 **[NIC]**, which was only 0.6 m deep and formed 'part of a row of small mastabas' (see Chart Q).[1414] One of the few tombs from his publication where limited shaft and superstructure dimensions are both available is S 2464 **[133]**, whose 10.5 m deep rock-cut shaft was protected by an 18.5 m long × 7 m wide superstructure.[1415]

Amongst the better recorded shafts are those in some of the large 'twin mastaba' tombs excavated by Emery. The biggest of these is S 3517 **[132].** Within its bounds, two shafts aligned on the mastaba's central axis penetrated the rock (Fig. 202). The northern was about 21 m in from the end of the superstructure and sunk to a depth of 8 m; the southern was approximately 11.5 m from the opposite end and reached a depth of 8.5 m. Both shafts would have been well protected laterally by the surrounding rock, and their entrances, which were 0.35% and 0.29% respectively of the area of the superstructure, would have easy to conceal and hard to find within its core.

Nearby tomb S 3518 **[131]** was slightly smaller (Fig. 201). Its two shafts were offset west from the superstructure's central north-south axis and just within its perimeter wall. The 9.3 m deep southern shaft was set in about 23 m from its end, to presumably avoid the mastaba's internal offering niche and complex, and the 10.6 m deep northern shaft was approximately 13 m from its respective end.[1416] Protected in a manner like those in S 3517, the entrances of these shafts occupied just 0.54% and 0.26% of the total superstructure area. In another example of the variable position of shafts for security reasons, tomb S 3536 **[134]** had its two shafts placed to the west of its north-south axis, one 7 m from the mastaba's south end and the other 6 m from the north end, well away from the offering niches.[1417] In this case their respective shaft openings occupied just 0.64% and 0.92% of their superstructure's area.

Examining the entrance of the 15.1 m deep southern shaft of the Type IIC + IIA-C 'twin mastaba' S 3070 **[120]** permits a direct comparison of its area to that of the stairwell of its stair-shaft (Fig. 194). Although axially placed near the cruciform offering niche,[1418] which left it vulnerable in some respects, the shaft's mouth was just 0.18% of the area of the superstructure in contrast to the stairwell of its northern stair-shaft, which took up 1.95%.[1419] Graphically demonstrating that the former would have been much harder to locate from above than the latter. However, it must be recognized that not all shaft mouths were small, for example that in tomb S 3044 **[135]** was 5 m × 3 m,[1420] which was nearly 2.5% of its superstructure's area, and thus presented as large a target as a stairwell. Although this apparent vulnerability may have been compensated for by its unexpected position, which was close to the secondary offering niche, rather than the primary, and set very close to the ambulatory corridor.

These larger tombs at Saqqara demonstrate the many locations in which a shaft could be positioned within a superstructure to conceal its whereabouts, and the distinct security advantage that the relatively small size of its entrance and cross-section could offer. This advantage would of course have reduced proportionately in the case of smaller tombs, where superstructures became smaller, but the shaft's cross-section remained necessarily the same.[1421]

Helwan

Even with a small plan and cross-section, parts of the shaft could still be vulnerable to attack in weak geology, especially when that attack came from within it rather than without. As a response to this, the builders of tomb 287.H.6 **[204]** came up with a solution (Fig. 203). Above ground the entrance of the shaft was centrally located within its superstructure and amounted to only 1.17% of its area; making it difficult to locate, but in case of an

[1409] Bárta 2011a: 45–7.
[1410] Quibell 1923: 18–46.
[1411] Emery 1966, 1968 and 1970.
[1412] Reisner (1936: 168) also included S 3039 and S 3009 in his list, but there are no drawings.
[1413] Quibell 1923: 43.
[1414] Quibell 1923: 44.
[1415] Quibell 1923: 42, pl. II.
[1416] Scaled from drawings by Emery (1970: pls. XIX–XX).
[1417] Scaled from plan by Smith and Jeffreys (1977: fig. 1).
[1418] Emery 1968: pl. II.
[1419] The area of the stairwell in plan was 11.06 m2 and the superstructure 568 m2.
[1420] Reisner 1936: 167–8.
[1421] Perhaps the builders of many smaller tombs may have adopted the idea without fully appreciating the original reasoning behind it, although it did enable a much smaller superstructure to be built over it, and, if space was at a premium, this would have been a distinct advantage.

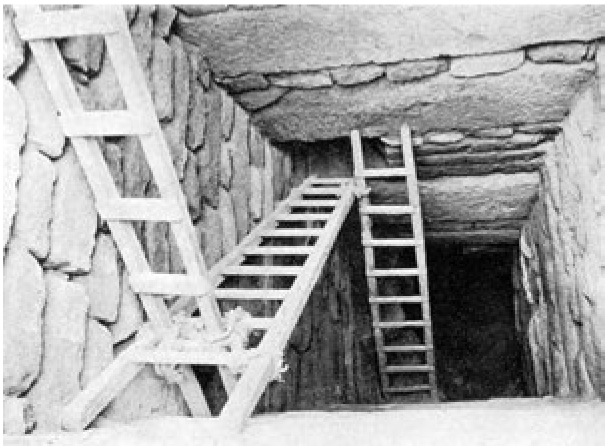


Figure 262 The stone lined shaft of the Third Dynasty Type IIC tomb 287.H.6 at Helwan. The 4.5 m long × 1.1 m high × 0.3 m thick orthostats on the burial chamber side of the shaft can be clearly seen at the top of the photograph. (Saad 1969, pl. 18) Copyright 1969 University of Oklahoma Press. Reproduced with permission. All Rights reserved.

attempt to mount a lateral attack, the 11 m deep shaft was stone lined on three sides with small limestone blocks. However, for additional insurance should that fail, to prevent the burial chamber from being tunnelled into from within the shaft, large 4.5 m long × 1.1 m high × 0.3 m thick orthostats were used to reinforce its full depth on its southern wall (Fig. 262).[1422]

Lahun

There are twenty-three 'deep shafts with chambers' cut into the limestone and marl at Bashkatib,[1423] the shaft depths of which vary between 1.2–4.3 m; some of these had multiple burial chambers running from the shaft, and occasionally at different levels. The examples in the catalogue, nos. 735 **[265]** and 769 **[264]** have shafts that reach a depth of 2.84 m and 3.45 m respectively, and like their neighbours, would have been well protected by the surrounding rock from lateral tunnelling.

The early Fourth Dynasty

The necropoleis of Abusir, Dahshur and Meidum are the main focus in the catalogue for early Fourth Dynasty tombs with shafts. [1424]

Abusir

Two tombs at Abusir possess shaft entrances. The first is the 'Lake of Abusir tomb 1' **[80]**. At the extreme south-eastern end of its mud-brick superstructure a 1.6 m[1425] square shaft descends 8.5 m into the surrounding *tafl* bedrock to meet with its burial chamber on the north (Fig. 205). Its entrance, which was only 0.75% of the superstructure's area, lay adjacent to its cruciform cult chapel, presumably so that the recipient of the offerings gained maximum benefit from the nearness of the offering.[1426] The tomb had been robbed via its shaft,[1427] and the choice of this route demonstrates that, despite its small size offering it protection from discovery, the main weaknesses of a shaft were still its entrance and internal blocking.

The second tomb is the Type IIC + IIA tomb of Ity **[79]**. Lined at the top with limestone blocks, its southern 10 m deep shaft was cut into the low quality limestone bedrock, halfway down and just east of the central north-south axis of the superstructure (Fig. 206). At the surface, the shaft's entrance and whereabouts would have been concealed and protected by its superstructure's unusual limestone core.[1428] Like in tomb S 3070 at Saqqara, the small 1.5 m square shaft mouth,[1429] which amounted to only 0.24% of its superstructure's area, would have made it more difficult to locate than its northern 'L' shaped stairwell, whose plan in comparison amounted to about 1.35 %.[1430] Correspondingly, their relative cross sections would also have widely differed and left the tomb's northern stairwell much more vulnerable to *sondage* than its southern shaft. Both, however, were breached in antiquity, and evidence still remains of repeated *sondages* in the superstructure from the attempts to locate them.[1431]

Dahshur

There are seven tombs from Dahshur with shafts in the catalogue **[205–11]**, the majority of which are stone lined, due to the weak nature of the surrounding soil and *tafl* strata.[1432]

Spread across three sections of the necropolis (Map 8), the most northerly is De Morgan's tomb no. 1 **[205]**, which is situated amongst the '*Mastabas du sud'* in his publication. Its 'T' shaped shaft reached a depth of 11 m and was brick lined for the first 3 m of its descent and stone lined for the remainder (Fig. 207).[1433] At the southern end of the necropolis, the 7.75 m deep shaft of DAS 9 (Ipy) **[206]** is located centrally within the inner limestone core of its superstructure,[1434] and is initially

[1422] Saad 1951: 3–5.
[1423] For details, see Petrie, Brunton and Murray 1923: Tomb register pl. XLVI.
[1424] As mentioned in 4.2.2.5 there is a dearth of usable information for the purposes of this study on Type IIC early Fourth Dynasty tombs at Saqqara due to the lack of information regarding their substructures.
[1425] Scaled from drawing by Bárta (2001: fig. 2.2).
[1426] Jánosi 2006: 34.
[1427] Bárta 2001: 25.
[1428] Bárta 2001: 9–10.
[1429] Scaled from plan by Bárta (2001: fig. 1.2).
[1430] The stairwell's area in plan is about 13 m2 (scaled dimension from drawing by Bárta 2001: 1.2). and the superstructure's area is 941.4 m2 (Bárta 2001: 1).
[1431] Verner 1995: 80.
[1432] Jánosi 2006: 37.
[1433] de Morgan 1895: 8–9.
[1434] The 26.5 m × 12.25 m superstructure has within it an inner 17.95 m

stone lined, until it descends into the strata of limestone and shale into which the rest of the substructure is dug (Fig. 208).[1435] Undoubtedly protected in the usual manner, its upper entrance occupied 1.37% of the entire area of the mastaba, and the rest of the shaft would have been protected laterally by the surrounding geology. Nearby, the stone lined shaft of the much larger DAS 25-1 **[208]** remains unexplored,[1436] but its off-centre entrance can be estimated to have occupied 1.13% of its stone built superstructure's area. On the other hand, Barsanti's section drawing of the substructure of DAS 32-4 (Ii-nefer) **[207]** shows how its 14 m deep shaft was constructed; of interest is that the wall of the shaft adjacent to the burial chamber appears to have been reinforced, presumably to prevent tunnelling through the shaft wall (Fig. 209).[1437] The shaft's entrance can be estimated to be 0.93% of the area of the superstructure.[1438]

The other three tombs are found in the 'Lepsius' mastaba field south-east of the Red Pyramid. Just north of the centre of its superstructure, the 9.5 m deep shaft of Mastaba I/1 **[209]** was 'T' shaped, to accommodate a portcullis,[1439] and stone lined with masonry that increased in size as it went deeper (Fig. 210). On its south side, three wide slabs filled the entire width of the shaft to a height of 4 m above the burial chamber entrance, to prevent tunnelling over the portcullis.[1440] Despite its larger superstructure the 'T' shaped shaft of nearby Mastaba II/1 **[210]** was virtually identical in design and construction, but 0.4 m shallower. Its approximately 1.5 m thick [1441] stone walls were also reinforced on their south side with large blocks to deter tunnelling (Figs. 211–2). Although in this case, robbers had simply dug a passage down into the southern side of the shaft's backfill and tunnelled over the top of them.[1442] Lastly, in a slight change of design, the 10.8 m deep and centrally located shaft of Mastaba I/2 **[211]** began as a rectangular stone lined opening and changed to the characteristic 'T' shape further down to form a 'stopped' portcullis emplacement (Fig. 214).[1443]

Unlike at Saqqara and Abusir, the comparatively weak nature of the geology at Dahshur, made the reinforcement of these shafts with thick stone liners necessary to prevent lateral tunnelling and structural collapse, but to further boost their security, their entrances and shafts were also protected by stone built mastabas (see 6.2.3.5). However the central placement of their entrances within the latter, unlike at Saqqara and Abusir, seems to have been rather predictable, which may have made them easier to locate.

Meidum

There are twenty-three Type IIC tombs at Meidum with shafts in the catalogue; seven are in the North Cemetery **[220–6]** and the remaining sixteen in the Far Western Cemetery **[227–42]**.

In the North Cemetery the 6.9 m deep shaft of Mastaba no. 1 **[226]** appears to have been centrally placed in its superstructure,[1444] and was built within an excavated trench that contained the substructure, which was filled in after construction (Fig. 224). It was brick lined in its upper half, but where it took on the 'T' shape of a portcullis emplacement, for the last 2.4 m of its descent it was masonry built, presumably for extra strength.[1445] In contrast, the upper section of the 12.25 m deep shaft of Mastaba no. 4 (Heneken) **[222]** ran for its first 5.25 m within the mud-brick of its superstructure, and then became rock-cut for the last 7 m of its descent, which unusually curved at its base to meet the burial chamber (Fig. 220).[1446] Another shaft with an unusual base, apparently devoid of a superstructure's protection, is tomb no. 416 **[224]**. Its 10.3 m deep shaft was lined in its upper section with mud-brick, presumably to consolidate the gravel strata at the surface, and was then rock-cut and carved at its base to create an unusual portcullis emplacement (Fig. 222).[1447]

Many of the larger tombs with shafts are 'twin mastabas', such as the Type IIC + IIC Mastaba no. 6 (Rahotep and Nefert) **[220]**.[1448] Within its enormous solid mud-brick superstructure,[1449] two axially placed shafts were built. That of Rahotep was located approximately a third of the way in from the superstructure's southern end and descended for 8.5 m through the mud-brick, before continuing 4.5 m into the rock,[1450] whereas Nefert's shaft was centrally placed and plunged for 12.5 m through the mud-brick, before descending a further 5 m within the rock (Figs. 217–8).[1451] Both would have been well protected and concealed by the bulk of their mastaba, and as Mariette

× 9.2 m limestone built core (Alexanian and Seidlmayer 2002: 3).

1435 Alexanian and Seidlmayer 2000: 292; 2002: 1–8.

1436 This is located directly 900 m east of the Bent Pyramid and due south-west of the pyramid of Amenemhat III on an isolated knoll (Stadelmann and Alexanian 1998: 305–6).

1437 Barsanti 1902b: Figs. 5–6.

1438 The superstructure's dimensions are 34.1 m long × 17.3 m wide (Stadelmann and Alexanian 1998: 304).

1439 It had been originally built, like II/1, within a trench accessed by a sloping descent from the north, as the loose nature of the soil would have made excavating the shaft and the substructure dangerous (Stadelmann *et al.* 1993: n. 49). Once the substructure was built the trench would have been backfilled and the superstructure built over the top.

1440 A deterrent that had worked, as the tomb's robbers had entered via the shaft and broken the top corner of the portcullis to gain admittance (Stadelmann *et al.* 1993: 272–6).

1441 Scaled dimensions from drawing by Alexanian (1999: Abb. 5).

1442 Stadelmann *et al.* 1993: 278–9; Alexanian 1999: 22–6.

1443 Stadelmann *et al.* 1993: 285.

1444 There is a depression marked in the drawing of the superstructure on the necropolis map, see the plan by Petrie 1892: pl. V.

1445 Petrie 1892: 20; Reisner 1936: 212.

1446 Petrie 1892: 20; Reisner 1936: 215.

1447 Reisner 1936: 215.

1448 Petrie 1892: 16–7.

1449 Harpur 2001: 50.

1450 Approximate dimensions scaled from 1:150 drawing by Petrie (1892: pl. VII).

1451 Scaled from Rowe's drawing (Reisner 1936: fig. 110). The varying heights of the mud-brick are probably due to erosion and damage to the superstructure.

and Petrie discovered during their excavations, extremely difficult to locate,[1452] due to their comparatively tiny shaft openings, which amounted to 0.11% and 0.09% of their superstructure's area respectively.

An excellent example of the placing of shafts in differing positions for security purposes can also be seen in the 'twin' Mastaba no. 7 **[223]**. Here, the entrances to the tomb's 6.5 and 6.7 m deep rock-cut shafts were placed at the extreme opposite ends of the superstructure,[1453] where their small size and unexpected location may have offered them some additional protection (Fig. 221).[1454] Although equally, it could be argued that their shafts would have been in a more vulnerable position to lateral attack, due to their proximity to the edge of the mastaba.

In the 'twin' Mastaba no. 9 **[221]**, little is known about the shaft belonging to Ranefer, the tomb's owner, apart from that it was 'T' shaped to accommodate a portcullis and centrally placed in the superstructure. However, his spouse's shaft was located opposite the offering niche, and descended first through 10.5 m of mud-brick mastaba and gravel before penetrating the rock for a further 7.75 m. Internally it took a more unusual form, as the burial chamber entrance was positioned 3 m up from the shaft's base (Fig. 219).[1455] Both entrances would have occupied a tiny proportion of the area of the enormous mastaba, and thus would have been well protected and difficult to find.[1456]

Nearby, Mastaba no. 8 **[225]** was fitted with three shafts axially placed within its superstructure that were equally spaced from the centre.[1457] Little is known about the northernmost shaft, but the central one descended 9.1 m through the mud-brick body of the mastaba and sank 2.73 m into the rock, whereas the southernmost descended for 7.4 m through the mud-brick and 5.8 m in the rock (Fig. 223).[1458]

Lastly, in the largest of the tombs at Meidum, the Type III + IIC Mastaba no. 16 **[251]**, belonging to Nefermaat and Atet, only the latter's burial was equipped with a shaft. Its depth is unrecorded, but its 1.75–1.82 m square[1459] entrance was axially placed about a third of the way in from the superstructure's north end, and being only 0.04% of the latter's area, would have been extremely difficult to locate.[1460]

Finally, in the Far Western Cemetery from amongst the thirty-five shaft tombs of the cemetery, there are sixteen included in the catalogue **[227–42]**.[1461] Cut in the friable rock, the shafts are unlined, unlike those at Dahshur. The majority had 'T' shaped shafts that averaged 2.2 m × 1 m in plan, which were built to accommodate portcullises,[1462] their depths varying between 4.11 m to 11.8 m. Their entrances were probably originally intended to be protected by superstructures,[1463] although none were found by the excavators.[1464]

Here at Meidum, amongst those tombs with superstructures, a large proportion of the shaft was within the body of the solid mud-brick mastaba itself. Whether this is because there is less denudation at Meidum, and we are seeing the greater part of the superstructure denied to us elsewhere, or the friable nature of the surrounding geology determined that the superstructure played a more defensive role than in other sites, is unclear. What is certain is that the shaft provided for many of these tombs a very difficult to find and well protected access route.

Naga el-Deir

A single 3.7 m unlined shaft led to the burial chamber of tomb N 629 **[312]** in Cemetery 500–900 at Naga el-Deir,[1465] whose entrance had been originally concealed by the gravel core of its mastaba. More unusually, the shafts of nearby tombs N 739 **[313]**[1466] and N 546 + N 604 **[314]**[1467] were lined with mud-brick, probably as a result of their construction methods, which involved a sloping access trench. These liners would have offered both consolidation for the surrounding gravel and a degree of lateral protection for the shafts. Although like other shafts, the real benefit was gained from the combination of a small cross section and the concealment offered by a large mastaba.

Reqaqnah

There is a single shaft tomb from this necropolis that can be dated to the reign of Sneferu.[1468] Tomb R64 **[318]**, had its 4 m shaft centrally sunk in the gravel just east of the axis of its solid protective mud-brick superstructure. As a smaller tomb its shaft's entrance would have amounted

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[1452] Petrie (1892: 16) wrote: 'The central pit of the mastaba had been furiously searched for by Mariette's men ; they dug vast holes in the brick body, but never cleared the top; and a trench of theirs cut away one side of the well, without their seeing it. In course of clearing their cutting to examine it my men found the well.'
[1453] Reisner 1936: 214.
[1454] The north entrance is 0.67% of the superstructure's area and the south 0.93%, see Chart J.
[1455] Petrie 1892: 17–8, pls. V and VII; Reisner 1936: 212–3.
[1456] To be precise Ranefer's entrance occupied 0.28% and his spouse's 0.22%, see Chart J.
[1457] Petrie 1892: pl. V.
[1458] Petrie 1892: 18–9; Reisner 1936: 212–3.
[1459] Petrie, Wainwright and Mackay 1912: 26.
[1460] The breadth of its cross section would have amounted to only 1.5% of the length of the superstructure's longest side and 2.5% of the shortest, making it extremely hard to locate laterally.
[1461] The ones included in the catalogue are those accompanied by individual drawings in Petrie, Mackay and Wainwright 1910: pls. XVII--XVIII.
[1462] That is with the exception of Nos. 50 **[227]**, 55 **[231]** and 80 **[241]**.
[1463] Alexanian (1999: 18) suggests that the similarity of the grid like layout of these tombs to those of the Lepsius' mastaba field at Dahshur, may indicate that the Meidum tombs were also intended to have superstructures, which for some reason were never built.
[1464] Petrie, Mackay and Wainwright 1910: 24.
[1465] Reisner 1932: 238–9.
[1466] Reisner 1932: 248–9.
[1467] Reisner 1932: 208 and 231.
[1468] Porter and Moss 1937: 36.

to about 10% of its 40 m^2 mastaba's area, and thus in theory would have been easily discoverable, but in this case when excavated the tomb was found to be intact. [1469]

Abydos

Identical twin 5 m deep shafts led to the substructures of the Type IIC + IIC 'twin' mastaba tomb D135 + D136 **[328]** in Cemetery D at Abydos,[1470] which probably dates to the late Third or early Fourth Dynasty.[1471] The shafts had been bricklined at the top, presumably to consolidate the loose sand layer that covered the underlying 'soft rock',[1472] which comprised of 'solid "water-borne" Pliocene sands'.[1473] The entrances to these shafts accounted for approximately 3.6% of their superstructure's area (see Chart J) and would have been protected in the usual manner by its core and roof.

El-Kab

Only one of the shaft tombs near the enclosure wall of El-Kab can be discussed in any detail, due to a paucity of information about the rest. The 4.5 m deep shaft of Mastaba 'A', the tomb of Kamena **[345]** was centrally positioned within its mud-brick superstructure,[1474] and if the plan is accurate, its entrance 'well' was approximately 4 m × 3 m across,[1475] which may be accounted for by the need to lower the large stone slabs used to line the burial chamber. Well concealed by the superstructure's 'brick earth core', despite its large size the shaft was undisturbed and the tomb found intact.

Section summary – Type IIC shafts

The introduction of the shaft would arguably have made the tomb robbers' already difficult task of plundering a tomb's substructure far more hazardous than negotiating a stairway. The shaft, although easily blocked by the tombmaker, from the robbers' point of view was undoubtedly problematic, as there was always danger of collapse of the backfill when tunnelling through it. This meant in order to overcome that hazard, perhaps the backfill would have to be shored up around the tunnel or completely excavated, which would be an arduous task. That notwithstanding, if the shaft was emptied, which would have been a comparatively safe job while standing on the backfill, returning to the surface would be present further problems, as presumably once the shaft was clear, there would have been little to gain a purchase on, apart from the occasional handhold, and the use of ropes and ladders may have been required. However, I would suggest that from the tomb builder's point of view the real security advantage of a shaft is its reduced profile, at least in larger tombs. This was because with its relatively small cross-section, in comparison to that of a stairway or stair-shaft, it would have been much more difficult to locate by lateral tunnelling. Equally, the entrance of a shaft was much smaller in plan than a stairwell or stair-shaft, and thus far more difficult to find by *sondage*, especially when concealed by a superstructure.

5.1.2.6 The access routes of Type III tombs - sloping corridors

The early Fourth Dynasty

There are ten tombs with Type III sloping corridors in the survey **[243–52]**,[1476] all are from the necropolis of Meidum.

Meidum

Six of the inclined passages of the tombs in the Great Western Cemetery and its immediate vicinity are broadly similar. Tombs A, B, C, 202, 277 and 393 **[243–8]** are entirely stone built within sloping trenches cut in the rock and descend at a similar angle to the descending corridor of the nearby pyramid[1477] to meet with their stone built burial chambers. The void in the pit above them being backfilled to conceal the whole. The construction and dimensions of the corridors is remarkably similar,[1478] and they are all between 1–1.39 m high × 1–1.05 m wide and 4.8–4.94 m long (see Chart K). Presumably, all were once blocked with plug-stones, although only tomb B had direct evidence of this.[1479] However, tombs A **[243]** and 202 **[246]**, rather than approach their corridor entrances directly down their slopes, had vertical shafts built down to their entrances, which were lined with mud-brick (Fig. 229). This would have rendered the use of plug-stones impossible, which suggests an alteration in the design or perhaps a later usurpation? Although none of these passageways were found to be protected by superstructures,[1480] Reisner suggested that they all would have been protected by a mastaba and then accessed via its top.[1481]

Further east within the enclosure wall of the pyramid, the substructure of the 'North Peribolous Tomb' **[250]**

[1469] Garstang 1904: 49–50.
[1470] Porter and Moss 1937: 69.
[1471] The combination of chapel corridor on the eastern side of the superstructure and shaft access to the burial chambers points to this time-frame (Bárta 2000: 337).
[1472] Peet and Loat 1913: 10–1.
[1473] Snape 1986: 3. For a detailed discussion of the geology of the private necropoleis at Abydos, see Snape 1986: 1–4.
[1474] Quibell 1896: 3–4.
[1475] Scaled dimension from plan by Quibell (1896: pl. XXIII).

[1476] There are actually twenty-one tombs at Meidum with sloping access corridors (Reisner 1936: 21), but only a few are accompanied by drawings.
[1477] The angle of slope in Tombs A, 202, 277 and 393 lies between 26° 57′ and 27° 80′ (measured from drawings by Petrie *et al.* (1910: IX and XV) and Reisner (1936: Figs 101–2), whereas the angle of the descending corridor of the pyramid is between 27° 36′ and 30° 23′ (Maragioglio and Rinaldi 1964b: Tav. 4).
[1478] Petrie, Mackay and Wainwright 1910: 22–4; Reisner 1936: 206–8.
[1479] Petrie, Mackay and Wainwright 1910: 24.
[1480] Petrie, Mackay and Wainwright 1910: 22; Reisner 1936: 207.
[1481] Reisner 1942: 150.

was once similarly accessed by a 5.89 m long sloping corridor, which was only 0.7 m wide (Fig. 230). It descended at a steeper slope than its western neighbours to meet with a vertical rock face topped by a large stone lintel, under which the burial chamber entrance was cut. The passage had once been blocked by plug-stones and protected from above by backfill and a superstructure.[1482]

The most unusual of the sloping corridor entrances is that in Mastaba 17 **[252]**. The tomb's substructure is sunk within a rock-cut pit and built of monolithic orthostats. Within the pit and just up from its floor, and thus not accessible from the surface, a stone built corridor begins almost immediately and enters the substructure from the east (Fig. 232). Approximately 1 m square, it descended at an angle of 11° for 4.65 m and was roofed and protected by large stone beams of around 1.2 m × 0.5 m, laid end on.[1483] After the funeral it was filled with plug-stones, and only then was it and the whole substructure in the pit completely backfilled and covered by an enormous protective superstructure.[1484]

It may also be the case that the blocked passage leading to the burial chamber of Nefermaat in Mastaba no. 16 **[251]** was accessed by a sloping corridor,[1485] but as Wainwright went no further than the wooden doorway at its end,[1486] there is no evidence to confirm it. If this was the situation, one could suggest that the arrangement may have been similar to that in Mastaba 17, with just an abbreviated passage, whose entrance lay deep underground.

Section summary - Type IIIC sloping corridors

Judging by the intact remains of the majority of the corridors at Meidum, their walls and roofs of stone protected them from tunnelling attacks from all directions, as once did the backfill and superstructures that covered them. However, despite all of this protection they still proved vulnerable like their royal neighbour, as it was not the corridors themselves, but their plug-stones that were the weakest component in this type of access route.

5.1.3 Conclusion

Royal tombs

The development of entrance routes to royal tombs was inextricably linked with the changes in the design of their substructures in the search for security. Although mud-brick lined and roofed stairways may have been considered sufficient protection for access routes of the tombs of the First Dynasty at Abydos, with the move to Saqqara in the Second Dynasty and the desire for more secure rock-cut subterranean substructures, new techniques were now developed to build equally secure entrances. These advances were applied in the pyramids of the Third Dynasty, whose burial chambers were placed ever deeper into the rock and thus required longer and better defended subterranean passages to connect them to their entrances within the protective precincts of their enclosures. But it is at the end of the Third Dynasty with the relocation of the tomb entrance to high up on the face of the pyramid that we see the greatest change, for now it and its associated corridor, were designed to be difficult to find and inaccessible from all directions and were protected and concealed within the superstructure itself. This development was further refined in the early Fourth Dynasty at Meidum and Dahshur, with smaller and less easily detectable entrances and corridors that relied on their inclines and the utilisation of the physics of the inclined plane to block them with plug-stones, which now became the default form of securing the royal access route that was to continue, with variations, into the Old and Middle Kingdoms.[1487]

Private tombs

In Type ID tombs with external access, due to the vulnerability of the stairwell, with its large cross section and plan, to *sondages* by tomb robbers, it was desirable for the position of that staircase to be unpredictable; hence in some cemeteries we see a multiplicity of positions and approaches. Where the surrounding geology was weak, in larger tombs mud-brick or stone would be used to reinforce the sides of a stairwell, and in all tombs wood or stone could be used to reinforce its roof. That the tombmakers had become aware of these vulnerabilities is most evident at Saqqara with the occasional relocation of the staircase to under the body of the superstructure itself.

With the introduction of the Type IIA subterranean tomb, its still popular external stairway suffered initially from the same problems as its Type ID predecessors, insofar as it remained vulnerable to *sondage* from outside the tomb, and more so in necropoleis with weak geology. By changing the location and building it within or under the superstructure, the stairway benefited from the latter's protective footprint and was made more secure. However, it still had limitations, as the stairwell's large cross section and plan still rendered it vulnerable to

[1482] Petrie, Mackay and Wainwright 1910: 12–3.
[1483] Dimensions scaled from drawings by Petrie, Mackay and Wainwright (1910: pls. XII–XIII).
[1484] Petrie, Mackay and Wainwright 1910: 14–8.
[1485] Harpur 2001: 46 and 284, n. 45.
[1486] Petrie, Wainwright and Mackay 1912: 25.

[1487] The pyramids of Khufu and Khafre at Giza contained sloping corridors with plug-stones (see note 1981), as did that of Menkaure (Perring and Andrews 1839: 8) and some of the pyramids of the Fifth and Sixth Dynasties, for example, the Fifth Dynasty pyramids of Userkaf (Vyse and Perring 1842: 39–40; Lehner 1997: 140) and Niuserre (Vyse and Perring 1842: 17–8) and the pyramid of Pepy II in the Sixth Dynasty (Jéquier 1936: 5–6). Additionally, during the Middle Kingdom the access routes of the pyramids of Amenemhat I and Senwosret I of the Middle Kingdom also incorporated inclined corridors and plug-stones (see note 1988).

lateral tunnelling and location by *sondage* from above, especially in smaller tombs. This problem made worse in those deep tombs whose staircases included changes of direction and landings in order to contain them within the perimeters of their superstructures.

An attempt to reduce the size of this stairwell and attain the same depth of descent was made in Type IIB 'deep staircase' tombs, especially at Helwan, where its design suited the local conditions and permitted smaller superstructures. A concept that was taken further in the Third Dynasty, with the introduction of the Type IIA-C stair-shaft, whose incorporation of a shaft not only made it more inaccessible for tomb robbers, but permitted the greater depths to be attained within the bounds of its superstructure. Although by retaining the stairwell, some of the inherent disadvantages of its substantial cross section and plan at upper levels remained, as it was still susceptible to *sondage.*

A brief interim attempt to solve the problem, by replicating the sloping corridors used in royal tombs, enjoyed only limited success at Meidum, perhaps due to the inherent complexity of its construction. The major advance came with the almost universal adoption of the Type IIC shaft, which discarded the staircase altogether. Now its vertically orientated passageway meant that its interior was not only easier to seal, but more difficult to empty and negotiate afterwards. But the real benefit of the shaft, which is not usually appreciated, was that because of its reduced plan and cross section, its vulnerability to discovery by *sondage* and lateral tunnelling was reduced to the bare minimum.

The overall reduction in the size of the tomb's subterranean entrance in the form of the shaft may have also had other long term implications. Now with more available room within the superstructure, which was previously taken up with concealing stairways, there was extra space for offering niches and chapels, the results of which can be seen in the development of multi-roomed mastabas of the Fifth and Sixth Dynasties.[1488]

The desire to complete a tomb and equip it in its owner's lifetime and to easily install the burial after its owner's death meant that with the introduction of external access to a substructure, both royal and private tombs had become vulnerable to attack via the readymade route, which they had inadvertently provided. From then onwards that route, like the rest of the tomb, required protection, which was either provided by the surrounding geology, or constructed of mud-brick or stone. This chapter has demonstrated that by varying the design of that access route, the application of architecture alone could improve its security, the final developments of which, in the form of the shaft and sloping corridor, were retained in Egyptian tombs for many dynasties to come.

5.2 Backfill to blockwork - the closure of the access route

The technology of blockings developed because of the introduction of external access routes, which needed securing. They varied widely, from at their simplest, static blockings, such as backfills, mud-brick or masonry, which are either poured into a passageway or shaft, or built in place, to simple mechanisms such as portcullises and plug-stones that offered a rapidly installed closure and are dealt with in the following sub-chapter.

Whilst undoubtedly most tombs with external access used one or more of these static methods, only those that have been found *in situ* or have left traces of their existence can be discussed here. They are broken down into two categories. First, backfill, and second, manufactured or built blockings. Each component type is then subcategorised and then discussed in chronological and topographical order, with royal tombs being dealt with first, followed by private tombs.

5.2.1 Backfill

The simplest and most prevalent form of blocking used to secure the access route is a backfill of some kind, which was widely used in stairways and shafts and required no building. It appears, judging by the lack of published information on the topic, that it was not of great interest to excavators in the past,[1489] and its existence or composition is rarely mentioned. However, a few publications do include it and thus enough information exists for the topic to be discussed, albeit incompletely.

To act as a successful blocking material, where security is the main concern, a backfill presumably needed to possess a certain resistance to being dug into or out. In the world of engineering geology this is known as the 'diggability factor'.[1490] Although there is no universally agreed quantifiable measure of 'diggability',[1491] Bell has prepared a chart for modern mechanical excavators, which though designed for use in civil engineering, is helpful in the appreciation of how some materials would be more resistant to digging than others.

It can be seen from the chart that sand and gravel are the easiest materials to dig into, whilst clay and boulders are the hardest and thus presumably the most resistant form of backfill.

[1488] For discussion of the increased incorporation of decorated rooms and spaces in the superstructures of the elite private tombs of the Fifth and Sixth Dynasties and the concurrent changes in their significance see, Jánosi 1999: 34–7; Bárta 2005: *passim*.

[1489] With perhaps the exception of Reisner 1942: 175–6, who discussed the backfill in the shafts of the Fourth Dynasty nucleus cemetery at Giza.

[1490] Bell 2007: 462.

[1491] Bell 2007: 125.

Soil type	Density (Mg m-3)	Bulking factor	Diggability
Gravel, dry	1.8	1.25	E
Sand, dry	1.7	1.15	E
Sand and gravel, dry	1.95	1.15	E
Clay, light	1.65	1.3	M
Clay, heavy	2.1	1.35	M-H
Clay, gravel and sand, dry	1.6	1.3	M

Table Density, bulking factor and diggability of some common soils

Note: E - easy digging, loose, free-running material such as sand and small gravel; M - medium digging, partially consolidated materials such as clayey gravel and clay; M-H - medium hard digging, materials such as heavy wet clay and large boulders.

(After Bell 2007, Table 9.2)

5.2.1.1 Sand[1492]

Royal tombs

In royal tombs, sand only seems to play a part during the Early Dynastic Period and is not used in the pyramids of the Third and Fourth Dynasties.

The second half of the First Dynasty (Naqada IIIC2-IIID)

The mud-brick stairway of the Type ID tomb of King Den at Umm el-Qaab **[8]** was probably backfilled with sand,[1493] as were the stairways of Den's successors, Kings Adjib **[9]** and Semerkhet **[10]**, which were almost certainly secured in a similar manner.[1494] Additionally, an absence of weathering on the plasterwork of the head of the stairway and stringers in the tomb of Qa'a **[11]**, which appears not have been roofed over, suggests it may also have been backfilled with sand.[1495]

The Second Dynasty (Naqada IIID)

There is no concrete evidence to suggest that sand played a part in the security of the rock-cut tombs of the early Second Dynasty kings at Saqqara, but with the return of the royal necropolis to Umm el-Qaab, it re-emerges as a closure method.

Like the nearby tombs of the previous dynasty, the entrance slope of the tomb of Peribsen **[14]** was probably blocked with sand,[1496] and it was undoubtedly used to close the entranceway of the tomb of Khasekhemwy **[15]**, whose burial pit and approaches were backfilled with the material.[1497] Therefore, it would have entirely covered any entranceways and slopes leading to their substructures and offered both protection and concealment of their positions.

Private tombs

Amongst the private tombs examined, surprisingly only two or three tombs are published that were found to have contained sand as a blocking; two are from the First Dynasty, and the other from the Third.

The second half of the First Dynasty (Naqada IIIC2-IIID)

Saqqara

When Emery opened the concealed stairway of the Type ID tomb S 3506 **[88]** it was found filled with clean sand, whose pristine condition indicated that it had been totally undisturbed. Therefore, rather than being wind-blown,[1498] the sand was the original backfill used to close the descent, whose entrance was then hidden under the superstructure's surrounding pavement. The success of this security measure is clearly demonstrated by the fact that the tomb had been robbed via its roof.[1499] Similarly, the upper portion of the stairway of the Type ID tomb S 3036 **[90]**, which ran from under the pavement of the tomb's enclosure corridor, was filled with what Emery described as 'earth',[1500] which given the tomb's location, could reasonably be re-interpreted to mean the local desert sand.

The Third Dynasty

Giza

In Covington's report on the Type IIA-C tomb named after him at Giza **[61]**, the lower half of the shaft that

1492 As with many terms in Egyptological publications referring to soils, the word 'sand' seems to broadly cover a wide range of materials, ranging from fine windblown sand to the loose sand and fine gravel of the surrounding desert, however, its bulk density and grain size are rarely recorded.
1493 Dreyer 1990: 73–4.
1494 Personal communication by Günter Dreyer (3rd October 2011).
1495 Engel 1997: 94.
1496 Personal communication by Günter Dreyer (3rd October 2011).
1497 Dreyer *et al.* 2003: 110–1.

1498 Wind blown sand can easily fill up an open shaft or stairway, as for example Ayrton, Currelly and Weigall (1904: 28) found in their excavations of the tomb of Senwosret III.
1499 Emery 1958: 37 and 46.
1500 Emery 1949: 74.

descended from the base of the tomb's rubble filled stairway was described as, 'filled with somewhat clean sand containing few small stones'. However, he noted the nature of the blocking was, 'distinctly different from that which filled the great stairway.'[1501] Therefore, although it may have been the original fill, it is possible the sand was wind-blown,[1502] as Covington noted that the tomb had been previously penetrated by 'explorers' before his excavation.[1503]

Section summary - Sand

Although the use of sand as a backfill is proposed in Early Dynastic royal tombs, amongst private tombs, only a few examples of its use have been published. However, it would be reasonable to assume it was more commonly used than it appears, despite the evidence. Whilst sand is readily obtainable in Egypt, and easy to pour into trenches and shafts due to its flowing nature, for a robber it would have been almost impossible to manoeuvre through and tiresome to remove, as anyone who has built a 'sand castle' will appreciate. It is easy to dig, but with its fine grain and considerable weight,[1504] in a passage or shaft, it would require a great deal more effort to remove, than to deposit it. Especially as sand has a propensity to flow to its lowest point, unless shored up to prevent it. In addition to this, any disturbance to its surface can change the existing 'angle of repose' beyond its 'maximum angle of stability', causing grains to flow and bringing an avalanche upon the digger.[1505] Therefore, although its use appears somewhat prosaic, the comparatively high level of security obtained for a small effort in sourcing and installation, would have made it an extremely effective backfill.[1506]

5.2.1.2 Rubble

This broad heading includes a whole variety of materials, ranging from rough fieldstones to various waste materials, including stone chippings, loose gravel or soil, either alone or mixed with each other or anything else to hand. A particular rubble's 'diggability' varied depending on the components of the mixture and its bulk density, as rubbles including large stones and clay binders would have been more difficult to excavate than those with smaller particles like sand and gravel.

[1501] Covington 1905: 209.
[1502] Perhaps similar to the wind-blown sand found filling the shaft of the nearby 'Inner Mastaba' **[62]** excavated by Kromer, whose more recent *terminus post quem* was established by a cartridge box a newspaper and the *zambil* baskets possibly left by Petrie's earlier expedition (Kromer 1991: 17–8).
[1503] Covington 1905: 210.
[1504] Dry sand has a bulk density of 16 kN/m3 (Cobb 2004: 37), which is approximately 1.6 tonnes per m3.
[1505] Jaeger and Nagel 1992: 1523.
[1506] Indeed, in later shaft tombs, such as those from the Saite Period, these properties were fully exploited and sand was heavily relied upon to secure the tomb. For an overview and discussion of Saite shaft tombs and their use of sand as a security measure, see Bareš 1999: 21–9.

Royal tombs

Rubble is not reported found as a blocking in royal tombs until the publications of Firth and Quibell,[1507] Lauer,[1508] and Goneim[1509] of the Third Dynasty pyramids at Saqqara, discussed below.

The Third Dynasty

The Step Pyramid of Djoser

The use of different types of rubble and soil is evident in many locations in the Step Pyramid **[16]**, where it was used to close passages and shafts. Its greatest use was to back-fill the pyramid's main pit (see 4.1.3), but it was also found protecting the access routes of the tombs of the royal family and the South Tomb.

Covered by the last stage of the original mastaba (M3) under the pyramid, the eleven 33 m deep shafts that lead to the horizontal galleries under the main substructure were backfilled with rubble. Some of these contained the burials of the royal family whilst others acted as magazines.[1510] In the upper part of shaft I, which may have been used partly as an entrance shaft, the remains of its backfill (two-thirds of which is still *in situ)* comprised of clay, pebbles and limestone waste,[1511] as did the backfill of shaft IV, where the same material was used.[1512] However, the shafts leading to the burials of the royal family were better protected. Shaft II, for example, was filled with a rubble of large stones that also blocked its horizontal gallery for approximately 5 m, beyond which the remains of sarcophagi and funerary furniture were found.[1513] Similarly, shaft III and its gallery were blocked in the same manner, protecting the remnants of sarcophagi and funerary equipment (Fig. 263).[1514] Shaft V contained an earth fill,[1515] whilst shaft VI was blocked with 'clayey soil'.[1516] The choice of a less resistant and more 'diggable' backfill in Shaft VI may have been because its associated gallery, along with gallery VII, contained a vast number of vases rather than burials,[1517] and were perhaps thought less needy of protection. By way of confirmation, shafts VIII to XI and their

[1507] Firth and Quibell 1935: *passim*. Although Lacher-Raschdorff (2014: 57) suggests that the open cast access ramp of Ninetjer may have been filled with limestone chips or possibly even sand.
[1508] Lauer 1936: *passim*.
[1509] Goneim 1957: *passim*.
[1510] Lauer 1962: 82–90.
[1511] Lauer 1936: 47.
[1512] Lauer 1936: 56.
[1513] Lauer 1936: 50; 1962: 84.
[1514] Lauer 1936: 51–6; 1962: 84–6.
[1515] Lauer 1936: 57.
[1516] Lauer 1936: 63.
[1517] Lauer 1962: 92–3. Nos. VI–XI were fully covered by the footprint of the superstructure and comprised of unlined magazine storage, of which nos. VI and VII were particularly notable as they contained the remains of around 40,000 assorted stone vessels (Lauer 1962: 91–2; 1976: 100).

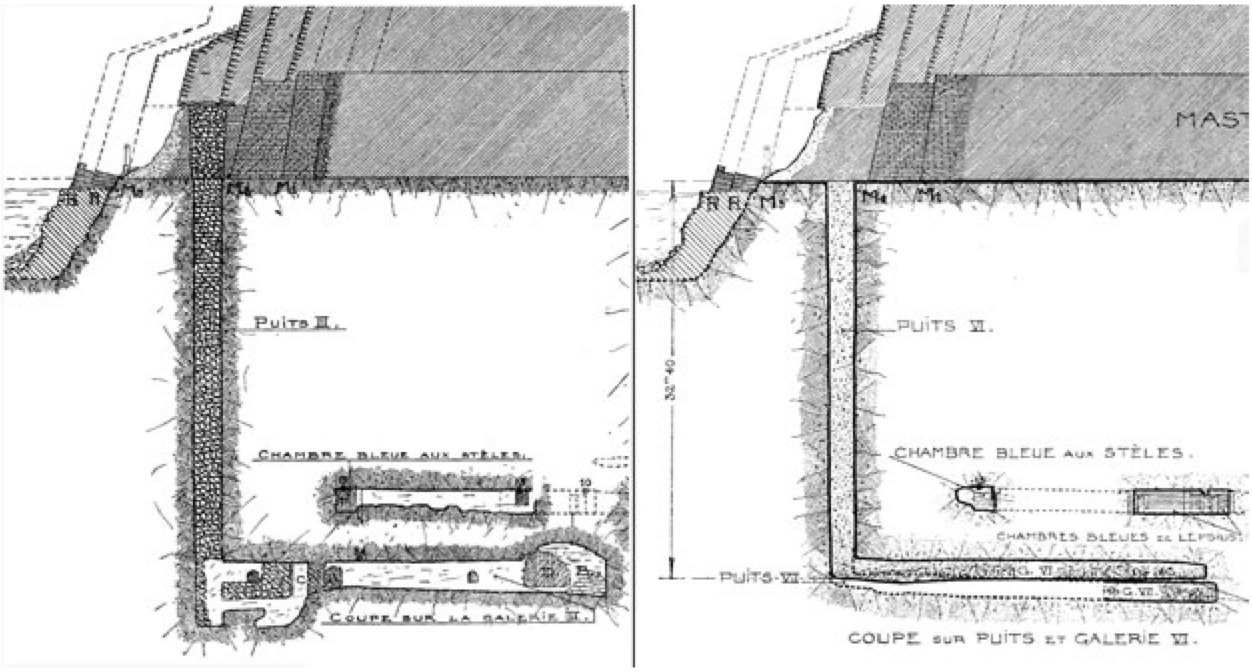


Figure 263 The deep rubble filled shafts III and VI under the Step Pyramid. On the left, the rubble of large stones and clay filled the shaft leading to shaft III containing the burial of a 'royal' family member. On the right, the 'clayey soil' filled shaft VI that protected up to 40,000 vases in both it and its adjacent magazine. (Lauer 1936, pls. II and XX) © IFAO

galleries, which were probably magazines, were similarly backfilled with compacted earth.[1518]

The descending internal staircase of the pyramid's South Tomb **[17]**, already two thirds closed with stone rubble and clay during its construction,[1519] was similarly filled and sealed,[1520] after its 'burial' had been installed,[1521] and the preceding open stairwell backfilled with rubble (Fig. 264). Its success was demonstrated by the route chosen by robbers to attack the tomb, who after a failed attempt to penetrate this blocking, circumvented it entirely and tunnelled into the main shaft to get to the substructure.[1522]

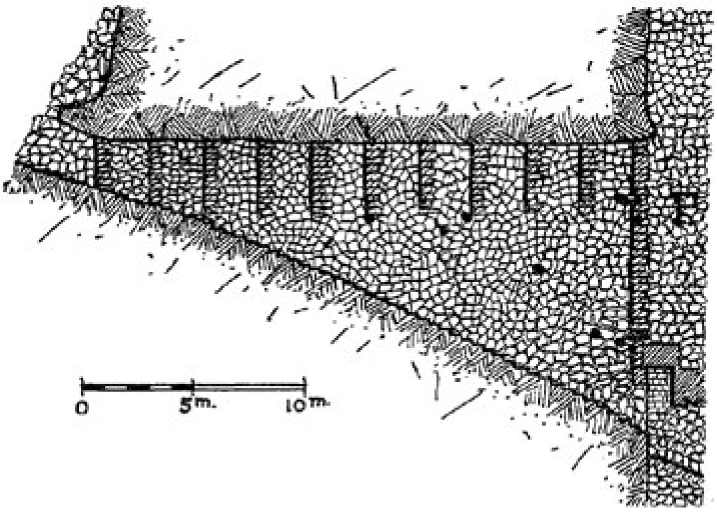


Figure 264 The rubble filled stairwell of the South Tomb of the Step Pyramid.
(Lauer 1936, fig. 85) © IFAO

The pyramid of Sekhemkhet

In the descending corridor of the pyramid of Sekhemkhet **[18]**, 35 m from the entrance, and above the doorway that led to the tomb's magazine complex,[1523] a 2.7 m square shaft led to the surface,[1524] into which large limestone blocks and rubble had been thrown to seal the tomb.[1525] This sealed the shaft and

1518 Lauer 1962: 95–8.
1519 Lauer (1936: 100) used the term 'blocaille' which in French means 'masonry built with different sizes thrown pell-mell into a mortar bed' (Kurtz 2004: 612).
1520 Lauer 1962: 120–1. This rock-cut stairwell, as it descended began at 2 m high and over a distance of 20 m increased to a height of 12 m by the time it reached the shaft. Just under its rock ceiling it was sub-divided at its upper level by ten 3 m high 'shear' walls which held the rubble in position (Lauer 1936: 99–100; 1962: 121–2). These were presumably intended to prevent collapse of the rubble fill.
1521 It is unknown what precisely was buried in this vault, see note 378.
1522 Lauer 1936: 100.
1523 Maragioglio and Rinaldi 1965b: 4.
1524 Goneim (1957:12) suggested that the shaft in question was probably intended for use during the construction of the substructure as a route for removing waste material during the excavation, whilst Lauer (1962: 189) proposed that its purpose may have been to provide ventilation. More recently, Baud (2002: 151) considered, not entirely excluding a religious purpose, that the function of this shaft was to do both.
1525 Goneim 1956b: 98; 1957: 12; Maragioglio and Rinaldi 1964a: 5.

Figure 265 The 5 m thick rubble filled descending corridor of the pyramid of Sekhemkhet. (Goneim 1957, pl. XXIII)

further created a 5 m thick[1526] blockage from floor to ceiling in the descending corridor beyond (Fig. 265),[1527] thus creating a formidable obstacle that would have been dangerous for anyone to remove.[1528]

Further down the corridor, 72 m from its entrance, a solid wall of rock led Goneim, the pyramid's excavator, to believe the passage had come to an end and had been abandoned by the tomb's builders.[1529] He described it: 'ahead of us lay a seemingly impervious mass of rock which at first baffled and depressed us because the corridor led nowhere and there was no burial chamber'.[1530] The clearance took several weeks[1531] and revealed a doorway to the burial chamber beyond.[1532] Its concealment by this 'mass of rock', which was in fact *tafl,* suggests the latter was chosen to deliberately camouflage it,[1533] thus providing both a resistant blocking and an element of misdirection.

Other royal tombs

There is no evidence of the use of rubble in the remaining royal tombs of the Third Dynasty, namely the Layer Pyramid at Zawiyet el-Aryan and the Brick Pyramid at Abu Roash. Although in the case of the Layer Pyramid, it would be reasonable to assume, if used, that it would have been similar to that in both step pyramids at Saqqara. Moreover, there is no indication of rubble's use in the pyramids of Sneferu at Meidum and Dahshur.

Private tombs

Similar to royal tombs, a combination of materials were used as rubble in private tombs. In some cases there is evidence to suggest they were specially selected for their security benefits, whilst in others it appears waste materials were used that were close to hand.

The second half of the First Dynasty (Naqada IIIC2-IIID)

Abu Roash

A single Type II tomb with its rubble blocking intact was found in the elite cemetery 'M' at Abu Roash. In the mid First Dynasty tomb MO19 **[53]**, the pit and shaft leading to the subterranean burial chamber were found entirely blocked with undisturbed stones and rubble. Its effectiveness as a deterrent is demonstrated by the route chosen by the tomb's despoilers,[1534] who rather than dig through it and the mastaba, chose to tunnel down through the rock above the burial chamber instead.[1535]

Saqqara

Although Emery undoubtedly excavated many Type ID tombs at Saqqara in which rubble was used as a blocking, he mentioned only twice finding it *in situ*. Both tombs S 3506 **[88]** and S 3500 **[94]** were discovered to have

Interestingly, Goneim (1957: 12) commented that the shaft was similar to that found at used for the portcullis in tomb K2 at Beit Khallaf; and Maragioglio and Rinaldi (1963: 37) speculated that the original purpose of this shaft may have been to enable the lowering of a portcullis, as similar shafts are known from Beit Khallaf and Reqaqnah. On the other hand, there is no evidence of portcullises being used to block a royal access route since the early Second Dynasty, where they were used in the tombs of Hotepsekhemwy/Raneb and Ninetjer (see p. 229), and they do not appear again until the reign of Sneferu (see p. 231), which makes their theories seem unlikely.

[1526] Goneim 1956b: 99; 1957: 13.

[1527] Goneim (1956a: 88) had earlier contradicted himself and suggested about 10 m depth of rubble, a view with which Maragioglio and Rinaldi (1964a: 11) agreed, as they argued that Goneim's dimension was likely to be at ceiling height and therefore estimated the depth of the sloping mound of rubble to be more like 11m.

[1528] The effectiveness of this method both as a security feature, and the hazards presented to anyone attempting to clear this type of blocking is graphically illustrated by the unfortunate demise of one of Goneim's excavation team, who along with two colleagues had been injured when some of the shaft's rubble and stone blocking collapsed into the corridor below (Goneim 1956a: 84–5).

[1529] Goneim 1956b: 113.

[1530] Goneim 1957: 18.

[1531] Goneim 1956a: 97.

[1532] Goneim 1956b: 114.

[1533] Maragioglio and Rinaldi 1964a: 6–7; 1965: 8–9.

[1534] This also demonstrates that the robbers were probably not only cognisant with the tomb's subterranean layout, but also fully aware of the strength of its internal defences.

[1535] Klasens 1961: 109.

subsidiary construction passages that were filled with 'rubble and sand' and 'rubble' respectively.[1536] In the case of S 3500, Emery noted that it was 'more firmly packed' than the rubble found in the tomb's main passage, which indirectly informs us that, although unreported, it was used to close the latter as well.[1537]

Helwan

On the singular occasion that Saad chose to mention rubble in his publications of Helwan, he described the stairway of the Type ID tomb 355.H.4 **[152]**, as being filled with 'rubble',[1538] but did not go into any further detail. Although this generic term is imprecise, modern excavations at Helwan undertaken by Köhler demonstrate that the 'rubble' at this site can consist of some, or all, of the following: excavated gravel and sand from the tomb pit, debris and refuse, clear sand, pottery fragments, and or, mud and rocks; there seems to have been no hard and fast rule.[1539]

Naga el-Deir

Further south at Cemetery 1500 in Naga el-Deir, the stairway of the Type ID pit tomb N 1581 **[287]** was discovered by Reisner to have been backfilled with gravel and heavy boulders,[1540] the size of the latter suggest that these were intended as a security measure and would have hindered attempts to dig through the blocking (Fig. 266).

The Second Dynasty (Naqada IIID)

Helwan

The more recent excavations of Type IIA tombs at Helwan by Köhler have exposed examples of rubble backfill used in Type IIA stairways. That found in Op. 4/4 **[181]** consisted of loose sandy gravel, complete beer jars and near the portcullis, large quantities of both intact and broken pottery.[1541] Similarly, the lower half of the stairway in Op. 4/94 **[173]** was found to be filled with a 'rubble' consisting of soil and deliberately smashed pottery and stone vessels, together with the bones of cattle, which were probably the remains of offering deposits placed there after the funeral.[1542] Further down at the base of the stairs, the outer layer of the burial chamber's entrance blocking was found to consist of a heap of large stones.[1543] Nearby, a different form of rubble was used to backfill the stairway of the Type IIA tomb, Op. 4/122 **[NIC]**, which was filled with 'hard, densely packed mud and rocks'.[1544]

Figure 266 Large rocks blocking the entrance stairway of the Type ID pit tomb N1581 at Cemetery 1500 in Naga el-Deir. Further down, a mud-brick blocking can be seen at the base of the stairs.
(Reisner 1908, fig. 21)

Naga el-Deir

Amongst the Type ID corbelled tombs at Naga el-Deir, according to Reisner, the brick entrance staircase of N 1586 **[289]** in Cemetery 1500 was filled with 'boulders',[1545] whilst N 1605 **[296]** had been backfilled with a rubble of stones.[1546] Nearby, in tomb N 3551 in Cemetery 3500 **[301]**, Mace described the bottom step of its stairway as, 'being filled in with flint boulders',[1547] whilst the one in N 3013 from Cemetery 3000 **[299]** was filled with mud and limestone chips.[1548]

The Third Dynasty

Giza

Two mastaba tombs at Giza had their substructures protected with rubble. The stairway in the Type IIA-C Covington's tomb **[61]**, was filled with an 'immense mass of heavy debris', which so daunted Covington that rather than clear it he dug a trench to access the stair-shaft from the side. The material used comprised of 'heavy stones in soiled and caked sand' and 'was a constant menace to those using the shaft'. Covington's drawing of the tomb (Fig. 267) shows that this rubble ran down into the shaft itself, and thus it may be rational to suggest the remainder of the shaft was similarly filled.[1549] Further within the tomb, the internal shaft to the burial

[1536] Emery 1958: 39.
[1537] Emery 1958: 100.
[1538] Saad 1951: 8.
[1539] Personal communication by Christiana Köhler (14th July 2010).
[1540] Reisner 1908: 37.
[1541] The soil in the descent presumably comprising of the usual filling of 'layers of sand and gravel' (Köhler 2008b: 116).
[1542] Köhler 2014: 139.
[1543] Köhler 2007: 193–4, pl. Ib and Ic.
[1544] Köhler 2008a: 172.
[1545] Reisner 1908: 42.
[1546] Reisner 1908: 55.
[1547] Mace 1909: 19.
[1548] Reisner 1908: 74.
[1549] As mentioned earlier (see the discussion above concerning sand in this tomb, p. 209), it was then probably replaced with the (wind-blown?) sand discovered by Covington, only after the tomb's defences had been breached in antiquity (Covington 1905: 209).

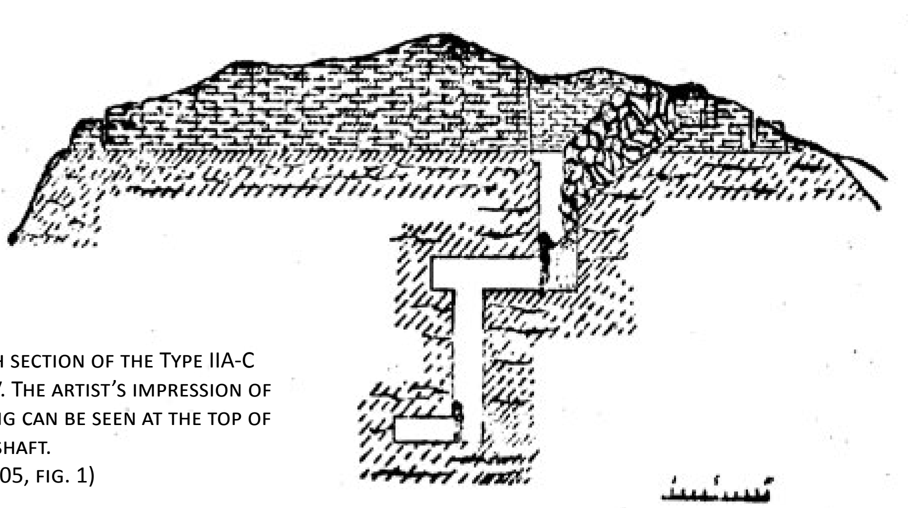


Figure 267 Covington's sketch section of the Type IIA-C Covington's Tomb or Mastaba V. The artist's impression of the heavyweight rubble blocking can be seen at the top of the stair-shaft.
(Covington 1905, fig. 1)

chambers was filled with a 'debris of clay' (*tafl*?),[1550] which according to Covington was so solid that it could be cut into and worked under without fear of collapse. Whether this was the original blocking is not clear, but it had evidently been bypassed when the burial chamber was robbed.[1551]

Nearby, at the base of the shaft of the Type IIC 'Inner Mastaba' **[62]** at Nazlet Batran, the 1 m high horizontal passage that led to the burial was found to be blocked by large quarry stones (Fig. 268). The effectiveness of it as a security measure is confirmed by the inability of the tomb's modern excavators to remove them, which they attributed to the lack of modern lifting equipment. Indeed, evidence of previous attempts to clear the passage in the form of old excavator's baskets (*zambils*), demonstrates that these had probably failed as well.[1552] Therefore, unusually the tomb's occupant probably lies secure in his grave, still protected by its formidable blocking.[1553]

Figure 268 The heavy rubble blocking still barring access to the passage leading to the burial chamber of the Third Dynasty Type IIC 'Inner Mastaba' at Nazlet Batran.
(Kromer 1991, Taf. 5, fig. 2) Courtesy of the Österreichische Akademie der Wissenschaften.

Saqqara

The southern shaft of the largest tomb in the Archaic Cemetery, the Type IIC + IIC 'twin mastaba' S 3518 **[131]**, was found by Emery to be filled with the original rubble that still blocked the shaft.[1554] He described the shaft's fill:

> 'There were indications of the existence of burial chambers leading from the shaft, but these were full of debris which could not be removed because of the overhang of the shaft filling which appeared to be original. Any attempt to dislodge this filling might well have been fatal.'[1555]

This graphically illustrates the potential hazards that awaited tomb robbers, should they attempt to tunnel through such a backfill.

A variety of rubble backfills is evident from three tombs adjacent to the Unas causeway excavated by Ghaly; they date from the Third and early Fourth Dynasties. In the Type IIA-C tomb M2 **[129]**, the upper section of its 6 m deep shaft was found filled with a mixture of sand and limestone chips, and its lower part with *tafl*.[1556] Whilst the shaft of its similar Type IIA-C neighbour, tomb M1 **[128]**, contained limestone chips and broken bricks, as did the shaft of the nearby Type IIC tomb M16 **[137]**,

[1550] This is either the *tafl* waste from the excavation of the burial chambers used as a blocking, which Covington describes as being 'cut throughout from a firm brownish clay, showing at places grey and reddish grey streaks' (Covington 1905: 210). Alternatively, it could just be from the collapsed roof of the various chambers, perhaps washed into the shaft by rainfall.
[1551] Covington 1905: 214–5.
[1552] Kromer 1991: 17–8.
[1553] Kromer 1991: 10.
[1554] Emery 1970: 10, pl. XIX.
[1555] Emery 1970: 10.
[1556] Ghaly 1994: 61.

in which a proportion of brick dust was also found.[1557] Therefore, it would appear that the backfills in these particular tombs, rather than being specifically chosen for their security properties, as in larger tombs, consisted of excavation spoil and rubbish, which had been chosen more for its convenience.

Naga el-Deir

At Cemetery 500–900 in Naga el-Deir, according to Reisner, the northern staircase of the Type IIA + IIA 'twin' mastaba N 573 + 587 **[306]** was backfilled with 'gravel', which was probably the spoil from the tomb's excavation. However, this had not prevented robbers from digging a shaft down through the fill to get to the burial chamber.[1558] This suggests that the less dense backfill in the stairwell was considered an easier option than digging through the surrounding compacted geology, and also demonstrates that the access route provided a convenient route to guide the plunderers to the tomb's core.

El-Kab

Nothing is known about the original rubble backfill that must have filled the deep stair-shaft of the Type IIA-C tomb 274, atop the rock necropolis at El-Kab **[344]**,[1559] which had been entered on several occasions,.[1560] On the other hand, an indication of the quantity of material that would have to be cleared to gain admittance to the tomb, is given by Limme, the tomb's excavator, who tells how it took more than three weeks to just clear the stairs, which descend for 10 m before they join the shaft.[1561]

The early Fourth Dynasty

Abusir

The 8.5 m deep shaft in the Type IIC 'Lake of Abusir tomb 1' **[80]** had been completely blocked with *tafl* backfill, which was presumably the spoil from the substructure's excavation. Robbers had tunnelled down through the shaft's north-east corner to gain access to the burial,[1562] which suggests a certain stability in the *tafl* once it was settled, which may be attributable to its clay like properties and moisture content.[1563] Nearby, in the Type IIA-C + IIC tomb of Ity **[79]**, rather than just *tafl*, the lower part of its northern descending staircase and corridor were secured by a mixture of limestone chips, 'dark' sand and *tafl* covered by a layer of mud.[1564]

Meidum

In the Type IIC + IIC + IIC tomb no. 8 at Meidum **[225]**, two of the tomb's three shafts were backfilled with different materials. The southernmost led to a burial chamber that had already been plundered via a robber's tunnel from above.[1565] This route may have been chosen because the shaft was completely blocked with rubble (Fig. 223), described by Petrie:

> 'We cleared it to near the bottom, but were then foiled by coming on large irregular blocks of stone lying in it. They were too heavy to raise, too large to turn out of the way, and we dare not break them up for fear of shaking down the very rotten and dangerous sides of the well. So risky was it that I abandoned the place, seeing that it had been all disturbed and plundered.'[1566]

On the other hand, the tomb's undisturbed central shaft was filled with chips of 'soft yellow rock' from the substructure's excavation. Although when excavated the burial chamber was discovered to be empty,[1567] which may be the reason for the shaft's less resistant filling.

In Petrie's discussion about the clearing of the shaft of Ranefer in Mastaba no. 9 **[221]**, while its backfill is not specifically mentioned, what is notable is that it took his team two whole weeks to empty it.[1568] Assuming the backfill was rubble, this demonstrates that not was it an extremely effective blocking for a shaft, but also that it takes a great deal of time and effort to remove it.

Naga el-Deir

Two tombs from Cemetery 500–900 at Naga el-Deir were found with rubble closures. In the Type IIC tomb N 739 **[313]**, Reisner noted that its shaft was backfilled with sand and gravel and capped with a layer of mud.[1569] Furthermore, the much smaller Type IIB 'deep' staircase tomb N 561b **[311]** had its stairway filled with small rocks and irregular lumps of limestone, also overlaid with a layer of mud.[1570]

Section summary – rubble

From the limited evidence available it is clear that a wide variety of 'rubbles' could be used to block a stairway or shaft. Although they were often the leftover spoil from a

[1557] Ghaly 1994: 59–61.
[1558] Reisner 1932: 218.
[1559] Personal communication by Dirk Huyge (20th April 2013). Although when excavated in modern times the fill was found to contain several thousand Old Kingdom vase fragments of assorted stones that were probably the remains of the original funerary goods (Huyge 2003: 30).
[1560] Huyge 2003: 29–30; Limme 2008: 23–4.
[1561] Limme 2000: 30.
[1562] Bárta 2001: 24–5.
[1563] Martin 1981: 7.
[1564] Bárta 2001: 8.
[1565] See Reisner 1936: fig. 109.
[1566] Petrie 1892: 19.
[1567] Petrie 1892: 18.
[1568] Petrie 1892: 17.
[1569] Reisner 1932: 248.
[1570] Reisner 1932: 213.

tomb's excavation, or any other waste materials that came to hand, it appears that on occasion these components were specially selected for their resistance to excavation when the status of the tomb owner merited it, which is especially demonstrated by the different rubbles used in the shafts in the Step Pyramid. Moreover, the success of rubble as a blocking material is frequently confirmed by its avoidance by tomb robbers, who rather than tackle it head on, often chose to take an alternative route.

5.2.1.3 Liquid mud

Liquid mud has not been used in royal tombs to block access routes, although it has been found in the stairs and shafts of private tombs from the Third and Fourth Dynasties.

The Third Dynasty

Beit Khallaf

Two tombs at Beit Khallaf used liquid mud as a sealing. Following the discovery by Garstang of the concealed entrance of the enormous Type IIA Mastaba K1 **[319]**, its long staircase was excavated 'somewhat laboriously' and found to be filled with 'hardened Nile-mud', into which were embedded numerous alabaster artefacts.[1571] The effectiveness of this type of blocking can be gathered from Garstang:

> 'The original filling of the stairway had to be hewn out with pick and crowbar. The clearing of the steps was done carefully by hand, but all the more fragile vessels had perished anciently with the throwing in of the tenacious mud filling.[1572]

Similarly, in the nearby Type IIA + IIA 'twin' mastaba K2 **[320]**, Garstang suggested that once the funeral was complete and the portcullises lowered:

> 'The wells were then filled with mud of a hard and tenacious quality. The surface all over was probably bricked up to finally conceal the approaches to the tomb.'[1573]

Not only would this mud have blocked the entranceways to these tombs, but also it would have cemented the portcullises in place, making their removal extremely difficult.

The Fourth Dynasty

Abusir

Liquid mud was used as a blocking in a single tomb from Abusir. In the northern substructure of the abovementioned Type IIA-C + IIC tomb of Ity **[79]**,[1574] both its descending stair-shaft and corridor were filled with a mixture of liquid mud and limestone chips poured over a layer of rubble, which Bárta described as, 'a cement-like mass of filling'.[1575] So effective was it that the tomb's robbers, rather than clear it, chose to gain access via a shaft dug in the stairway instead.

Meidum

In the Type III + IIC tomb no. 16 of Nefermaat and Atet **[251]**, the putative sloping passage leading to the burial chamber of Nefermaat may have been sealed with liquid mud,[1576] some of which had leaked past the stone blockings beyond and into the burial chamber.[1577] Likewise, it was used in the adjacent shaft leading to Atet's burial chamber, where the mud had also seeped past the main blocking and covered the body.[1578] Similarly, in the nearby Type IIC + IIC tomb no. 6 **[220]**, which belonged to Rahotep and Nefert, mud impressions from Nefert's coffin in the burial chamber, demonstrate that the shaft had also been sealed with liquid mud, which had run beyond the shaft and set hard within it.[1579]

El-Kab

The 4.57 m deep shaft in the Type IIC tomb of Kamena **[345]** was found by Quibell filled with 'thick, damp clay', as was the burial chamber, which was: 'full of a very tenacious clay, much of which had to be cut away with a knife, for in so tough a substance a light blow with an adze has no effect'.[1580] Whether this was an intentional security measure, or as a result of flooding is unknown, but it certainly protected the tomb, the contents of which were found still *in situ*.[1581]

Section Summary – liquid mud

Like the mud backfills of the earlier Type IB tombs at Tell el-Farkha and Minshat el-Omar (see 4.2.1.1) liquid mud appears to be a simple material, but once hardened, it could provide a surprisingly high degree of security. Its properties were obviously well understood by the tombmakers who used it, and who probably valued its

[1571] This consisted of 800 assorted offering tables and vases, pottery and wine jars (Garstang 1903: 3).
[1572] Garstang 1903: 10. Although, these peri-funeral offerings were obviously not part of the security arrangements themselves, they no doubt acted as a form of 'aggregate' and helped to bind the mud together.
[1573] Garstang 1903: 12.
[1574] Bárta 2001: 15.
[1575] Bárta 2001: 8.
[1576] Harpur 2001: 46.
[1577] Petrie, Mackay and Wainwright 1910: 18.
[1578] Petrie, Wainwright and Mackay 1912: 26.
[1579] Harpur 2001: 53–4, figs. 199–200.
[1580] Quibell 1898: 3.
[1581] Quibell 1898: 4.

properties, much as we regard the cast concrete used in civil engineering today.

5.2.2 Manufactured or built blockings

These are usually created from manufactured, shaped or graded materials such as mud-brick, dry stone, wood or masonry. Unlike rubble or backfill they are then built carefully into a suitable obstruction.

5.2.2.1 Mud-brick

Mud-brick has sometimes been found as a passage blocking in-depth, although it is more often used as a doorway or entrance closure in the form of a wall. It is often used in conjunction with other closures such as backfill, rubble or masonry, or indeed portcullises, where it acts as a secondary blocking.

Royal tombs

The second half of the First Dynasty (Naqada IIIC2-IID)

The first example of mud-brick as a blocking in a royal tomb is found in the tomb of Den **[8]** at Umm el-Qaab, located inside its stairway on the first landing, between two mud-brick reveals that flank a hinged door. Here, two residual layers of mud-brick suggest the presence of an original blocking intended to seal the opening permanently after the door was closed.[1582]

In the tomb of Adjib **[9]** at the base of the entrance stairway, Petrie found layers of mud-bricks loosely piled as headers against the wooden planks that blocked the burial chamber entrance (Figs. 236 and 269). Similarly, at the base of the sloping ramp in the tomb of Semerkhet **[10]** the entrance was also stopped up with loose bricks, but this time without the benefit of any wooden backing.[1583] During the recent re-excavation of the tomb however, part of a tree trunk was found embedded in the remains of this blocking, which may have been the missing reinforcement.[1584] In the case of these two tombs, one wonders whether the blockings are the originals or not, as just loosely piling the bricks across a doorway seems a rather lax security measure, bearing in mind the time and trouble taken to build the rest of the tomb. Perhaps they are the remnants of a later blocking from the Middle or New Kingdoms, when the tombs were opened again following revived interest in the necropolis.[1585]

In the tomb of Qa‘a **[11]**, Petrie reported a mud-brick blocking at the head of the stairs of the tomb, followed by a ‘buttress’ of mud-brick behind the portcullis.[1586] Although it now appears this ‘buttress’ is more likely to be mud-brick steps from the Middle and New Kingdoms, built to clear the portcullis when access was improved to the tomb.[1587] However, at the bottom of this stairway, and not mentioned by Petrie, the main entrance to the burial chamber was also originally blocked with mud-brick (Fig. 270).[1588]

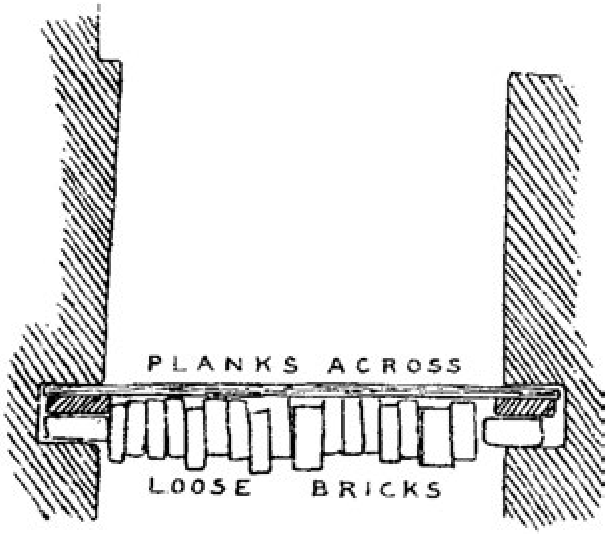


Figure 269 The loose mud-brick walling and wood ‘portcullis’ blocking the entrance to the tomb of King Adjib at Umm el-Qaab.
(Petrie 1900, pl. XV)

Figure 270 The entrance doorway into the burial chamber of King Qa‘a blocked with mud-brick.
(Petrie 1900, pl. LXVI. 5)

[1582] Dreyer 1990: 73.
[1583] Petrie 1900: 12–4
[1584] Dreyer 2005: 14. Dreyer *et al.* 2014: 75.
[1585] Leahy 1977: 424, n. 5; Snape 2011: 120–1. For in-depth discussions of these restorations in the Middle and New Kingdoms, see Dodson 1997: 44–6, and Effland and Effland 2010: 127–58.
[1586] Petrie 1900: 15. Also Amélineau (1899b: 127) who thought the wall was built by despoilers.
[1587] Engel 1997: 27; Dreyer 2007c: 201.
[1588] Engel 1997: 8. These can be seen in Petrie’s (1900: pl. LXVI, no. 5) original excavation photographs.

The Second Dynasty

Mud-brick has been found sealing the entrances of one of the underground magazines flanking the entrance ramp of the tomb of Ninetjer **[13]**,[1589] but otherwise seems not to have been used as a main closure in the subterranean tombs of the early Second Dynasty kings at Saqqara. However, it has been found in the sepulchres of the final kings of the dynasty at Umm el-Qaab, where it closed their substructure doorways. In recent excavations, the main entrance of the tomb of Peribsen **[14]** was found to be still partially blocked with mud-brick, and many of the internal doorways were closed in the same manner (Figs. 46–7).[1590] Similarly, in the tomb of Khasekhemwy **[15]**, the doorways of the main southern corridor were also sealed with mud-brick,[1591] and a double skinned blocking between chambers V53 and V54 still remains intact today.[1592]

Private tombs

A few private tombs have been excavated whose passages or stairways were blocked in-depth with mud-brick, although it seems that usually the blockings were confined to a single wall that sealed the entrance to the burial chamber.

The second half of the First Dynasty (Naqada IIIC2-IIID)

Tura el-Asmant

Mud-brick blockings were found in two of the Type ID staircase tombs at Tura el-Asmant. Notably, at the head of the stairs in tomb 1056 **[63]**,[1593] and in tomb 986 **[65]**, where both the head of the stairway and the entrance chamber at its base were blocked with mud-brick walls.[1594]

Saqqara

Mud-brick blockings were incorporated in two Type ID tombs at Saqqara. In S 3506 **[88]**,[1595] the limestone gateway at the base of the entrance stairs was blocked from the stair end with a mud-brick wall set behind a wooden door.[1596] Defended in much greater depth was the later S 3500 **[94]**.[1597] When excavated the lower section of its entrance passage was found to be entirely blocked with bonded mud-brick (Fig. 271), as was the stone gateway just before the first portcullis.[1598]

Figure 271 The in-depth mud-brick blocking of the stairway of the Type ID tomb S 3500 at Saqqara. (Emery 1958, pl. 120a) Courtesy of the Egypt Exploration Society.

Helwan

Two examples of mud-brick blockings in Type ID tombs at Helwan were recorded by Saad. The entrance to the burial chamber in 407.H.4 **[151]** was blocked at the end of its stairway with a plastered mud-brick wall,[1599] as was the entrance at the bottom of the stairs in 150.H.5 **[143]**, which led to the tomb's unlined burial chamber.[1600]

Naga el-Deir

In Upper Egypt, in Cemetery 1500 at Naga el-Deir, Reisner found the entrance of the burial chamber at the base of the stairs in the Type ID tomb N 1581 **[287]**, blocked by two mud-brick walls.[1601]

The Second (Naqada IIID) and Third Dynasties.

Tura

Junker excavated four Type IIC shaft tombs in Cemetery O at Tura, nos. 28.w.1, 28.w.2, 28.t.3 and 28.x.2 **[all**

[1589] Namely magazine A300. Additionally, others such as A500, A400 and A600 may have also been blocked in a similar manner (Lacher-Rashdorff 2014: 73 and n. 169).
[1590] Dreyer *et al.* 2006: 99, Abb. 13.
[1591] Petrie 1901: 14.
[1592] Dreyer *et al.* 2003: 111.
[1593] Yacoub 1981: 160, pl. XVII
[1594] Yacoub 1981: 160, pl. XX.
[1595] Emery 1958: 4.
[1596] Emery 1958: 46.
[1597] Emery 1958: 98.
[1598] Emery 1958: 99–100.
[1599] Saad 1951: 11–2, plan 9.
[1600] Saad 1951: 28–9.
[1601] Reisner 1908: 36–8, figs. 65–7.

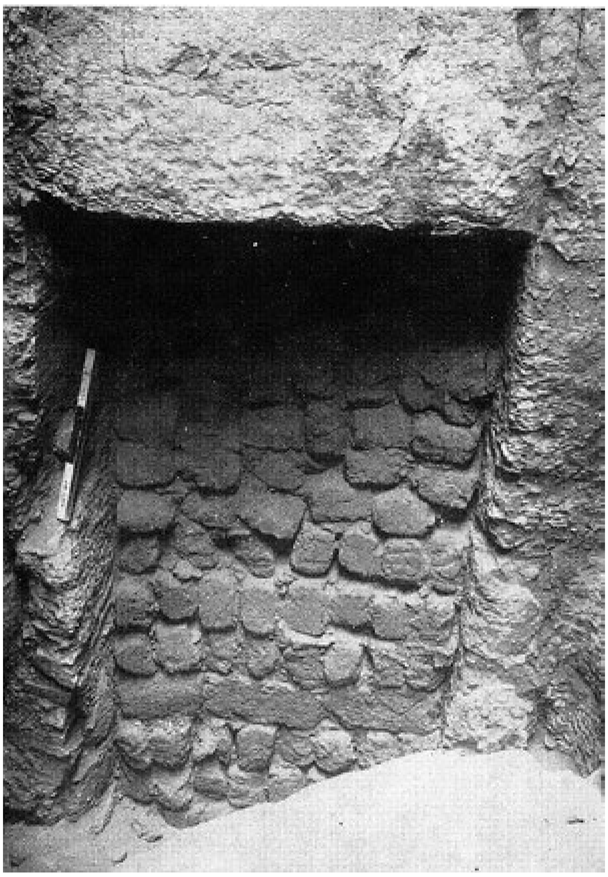


Figure 272 The mud-brick 'secondary' door blocking behind the portcullis of the intact Type IIA tomb S 3477 at Saqqara. (Emery 1962, pl. 5b) Courtesy of the Nederlands Instituut voor het Nabije Oosten.

NIC], which date to the Second and Third Dynasties.[1602] The entrances to their burial chambers that ran off the shafts were all closed with mud-brick walls.[1603]

Saqqara

Eight tombs have been recorded with mud-brick blockings at Saqqara. The intact Second Dynasty Type IIA tomb S 3477 **[102]** had a mud-brick wall directly behind its portcullis, which blocked the entrance to the burial chamber and acted as a secondary closure (Fig. 272).[1604] In addition, Quibell reported that the Type IIC shaft tombs S 2172E, S 2173A, S 2173D, S 2175[1605] and S 2488 **[all NIC]**,[1606] which he dated broadly to the Second and Third Dynasties,[1607] had the entrances to their burial chambers blocked with mud-brick, although little information is available.

[1602] Kaiser 1964: 107, Abb. 5.
[1603] Junker 1912: 24–5.
[1604] Emery 1962: 5.
[1605] Quibell 1923: 24–5.
[1606] Quibell 1923: 44.
[1607] Quibell 1923: 17.

From the Third Dynasty, another rare example of mud-brick blocking in-depth, was found in the Type IIA-C tomb of Hesyra, S 2405 **[119]**, where the majority of the steep access stairway that led down to the shaft was found to have been filled with solid brick,[1608] thus matching and bonding with its surrounding mastaba.

Helwan[1609]

Mud-brick was used in five catalogued Type II subterranean tombs at Helwan to close their substructures, either on its own, or in conjunction with another blocking; they all date from the Second Dynasty.

The entrance of the burial chamber of the Type IIA tomb, Op. 4/123 **[174]** was closed by a mud-brick door blocking, which provided the sole obstruction.[1610] In the Type IIA tomb Op. 4/94 **[173]** three layers of blocking closed the burial chamber entrance, the last of which, after the portcullis, was a mud-brick wall.[1611] Whereas in the Type IIA tombs Op. 4/4 **[181]** and Op. 4/19 **[182]** there was just a single course of mud-bricks behind their portcullises,[1612] but in the case of the former, unusually a mud-brick wall and platform also partially blocked its stairway's descent.[1613] Lastly, in the Type IIC shaft tomb Op. 4/153 **[202]** the sole protection for the burial chamber entrance was a mud-brick door blocking, which had been broken through when the tomb was robbed.[1614]

Tarkhan

At this site Petrie recorded that a single shallow Type IIA staircase tomb, no. 1004 **[219]**, which dates to the Third Dynasty,[1615] was found with its burial chamber entrance blocked with mud-brick.[1616]

Lahun

Four tombs were found that incorporated mud-brick blockings in the Bashkatib cemetery. Two of these are Type IIA staircase tombs, dating to the Second Dynasty.[1617] The substructure entrance at the base of the stairs in tomb 806 **[254]** and its two internal loculi were discovered to be blocked with mud-brick (Fig. 273).[1618] On the other hand in tomb 770 **[260]**, although a

[1608] Quibell 1913: 3.
[1609] There are also some Early Dynastic Type IIA and IIC tombs at Ezbet Kamel Sidqi, slightly north of Helwan, that have mud-brick blockings, but the tombs are not published in detail, see El-Banna 1990: 12–4, pls. IV–V, figs. 21 and 26.
[1610] Köhler 2008a: 172–3, fig. 2 and 2008b: 122–3, fig. 17
[1611] Köhler 2007: Table 1.
[1612] Köhler 2000b: 89; 2014: 139 and 236.
[1613] Köhler 2014: 139.
[1614] Köhler 2009: 284.
[1615] Gashe 2009: 115.
[1616] Petrie, Wainwright and Gardiner 1913: 27. Petrie 1999c: Tarkhan tomb card KA1004.
[1617] Quirke 2005: 4.
[1618] Petrie, Brunton and Murray 1923: Tomb register pl. XLVI and pl. XLII, fig. O.

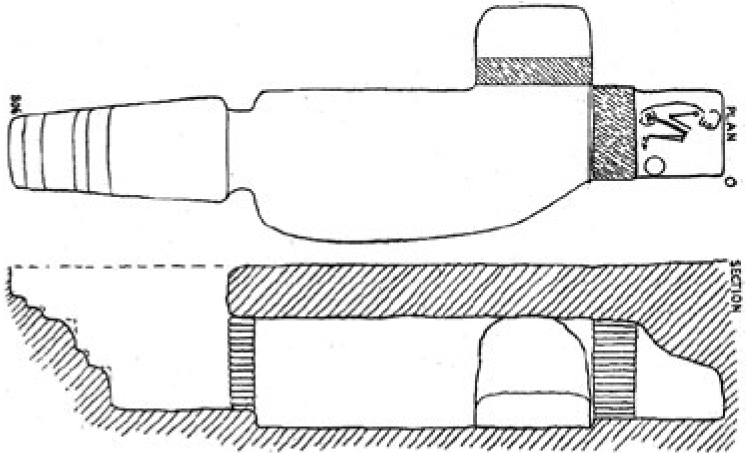


Figure 273 The Type IIA tomb 806 at the Bashkatib Cemetery in Lahun, showing the entrance and loculi blocked with mud-brick. (Petrie, Brunton & Murray 1923, pl. XLII, fig. O)

portcullis emplacement had been prepared, a mud-brick wall was used instead to block its entrance.[1619] Nearby, in the intact Type IIC shaft tombs 720 **[262]**,[1620] and 769 **[264]**,[1621] mud-brick walls were also used to close the entrances of their burial chambers.

Sedment

Behind the small portcullis stone in the intact Type IIA Second Dynasty tomb 560 **[266]** at Sedment a secondary mud-brick closure blocked the entrance to its burial chamber.[1622] Additionally, according to Petrie's field notebook, the Type IIA tomb 559 **[268]** appeared to have a mud-brick blocking before its substructure's entrance, and within the chamber itself, the burial recess was also ostensibly bricked off.[1623]

Naga el-Deir

Reisner reported that many of the burial chamber entrances of the Second Dynasty Type ID corbel roofed tombs at Naga el-Deir were sealed with mud-brick walls. In total this amounted to ten from Cemetery 1500 and seven from Cemetery 3000.[1624] However, unusually tomb N 4598f **[NIC]** from Cemetery N 3500 was blocked with a wall built of a mixture of mud-brick and stones.[1625]

In nearby Cemetery 500–900, five Third Dynasty tombs were found with mud-brick blockings. In the Type IIA tomb N 599 **[304]** a mud-brick wall formed a secondary closure behind the stone slab that blocked the burial chamber's entrance.[1626] Nearby, the portcullis at the entrance to the northern burial chamber of the Type IIA + IIA twin mastaba N 573 + 587 **[306]** was also backed up with a secondary mud-brick closure,[1627] as were the portcullises in the Type IIA-C stair-shaft tombs; N 585,[1628] N 586[1629] and N 593 **[308–10]**.[1630]

The early Fourth Dynasty

Abusir

The entrance to the burial chamber of the Type IIC 'Lake of Abusir tomb 1' **[80]** had been originally closed by a single thickness mud-brick wall,[1631] which presumably was designed to hold back the primary *tafl* blocking of the shaft and prevent it 'flooding' the chamber (Fig. 274).

Dahshur

Just a single example of a mud-brick blocking is known from the necropolis at Dahshur. At the base of the shaft of the early Fourth Dynasty Type IIC tomb, DAS 9 (Ipy) **[206]**, the entrance to the passage and burial chamber was found to be partially blocked with a mud-brick wall; its width was one and a half bricks thick.[1632]

Meidum

In the Far Western Cemetery at Meidum, at the base of the shaft in the intact Type IIC tomb no. 55 **[231]**, the entrance to the rock-cut passageway that led to the burial chamber, was found walled up with mud-brick, which in turn had been plastered with mud.[1633]

[1619] Petrie, Brunton and Murray 1923: 23, Tomb register pl. XLVI and pl. XLII, fig. U.
[1620] Petrie, Brunton and Murray 1923: 22, 24, pl. XLI, 'j' and tomb register pl. XLV.
[1621] S.D. 82, Petrie, Brunton and Murray 1923: Tomb register pl. LXVI
[1622] Petrie and Brunton 1924: pl. XXXVI.
[1623] Petrie and Brunton 1924: pls. XXXVI and LXXXI, Petrie 1999b: 30.
[1624] These were in Cemetery 1500: N 1515 **[292]**, N 1562 **[NIC]**, N 1572 **[294]**, N 1586 **[289]**, N 1611 **[297]**, N 1612 **[NIC]**, N 1619 **[NIC]**, N 1626 **[298]**, N 1630 **[NIC]** and N 1633 **[NIC]** (Reisner 1908: 56–63). In Cemetery 3000: N 3012 **[NIC]**, N 3013 **[299]**, N 3014 **[NIC]**, N 3015 **[NIC]**, N 3017 **[300]**, N 3031**[NIC]** and N 3063 **[NIC]** (Reisner 1908: 72–82) .
[1625] Mace 1909: 19, figs 24–6; Reisner 1936: 192.
[1626] Reisner 1932: 229; 1936: 182.
[1627] Robbers had dug a shaft in the stairwell's gravel fill and tunnelled over the slab to gain access to the burial (Reisner 1932: 218).
[1628] Reisner 1932: 224.
[1629] Reisner 1932: 225.
[1630] Reisner 1932: 226.
[1631] Bárta 2001: 25.
[1632] Alexanian and Seidlmayer 2002: 7.
[1633] Nearby, tomb no. 56 **[232]** was also found with a mud-brick wall closing its burial chamber, but the presence of Twenty-Second Dynasty

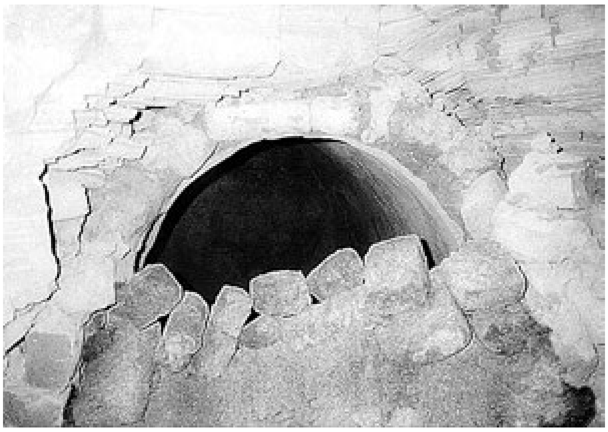


Figure 274 The mud-brick blocking in front of the vaulted burial chamber of the Lake of Abusir tomb 1. (Bárta 2001, pl. XIVa)

Naga el-Deir

Mud-brick was used in some early Fourth Dynasty Type II tombs at Cemetery 500–900 to block the entrances to their substructure, for example, the Type IIB 'deep' staircase tomb N 561b **[311]**, whose 0.25m thick mud-brick closure was found intact, as indeed were its burial and grave goods.[1634] In the Type IIC + IIC twin mastaba N 546 + N 604 **[314]**, mud-brick was used both to close the burial chamber entrance of N 546 and as a secondary blocking behind the portcullis of N 604.[1635] Lastly, in the Type IIC tomb N 739 **[313]**, the entrance to the burial chamber was closed with a mud-brick blocking of just a single brick's thickness.[1636]

Reqaqnah

Garstang found only a single tomb with a mud-brick blocking in the cemetery at Reqaqnah, where it closed the burial chamber entrance in the Type IIC tomb R 64 **[318]**, which was found intact.[1637]

Abydos

The entrances to two of the burial chambers of the Type IIC + IIC tomb D135 + D136 **[328]**, at Cemetery D in Abydos were blocked by walls of mud-brick. That of the southern shaft, D135, had been broken through by the tomb's robbers and partially removed. However, the northern shaft, D136, had two burial chambers at different levels. The upper had been robbed, but the lower (presumably spared because the robbers had thought there was only one burial) was blocked with a mud-brick wall and was intact. [1638]

Section summary – mud-brick blocking

While the strength of mud-brick could be called into question as a security feature, with the exception of its use in-depth, it seems to be fairly ubiquitous as a closure. As a material it is obviously less resistant to attack than stone, but this may have posed few worries to the Egyptians who were content to use it as the universal building material, rather as we use fired brick today. Perhaps, rather than acting as a principal closure method in itself, which may have been the function of the backfill, its main purpose was to act as a secondary blocking to prevent the backfill from collapsing into the substructure, and possibly, as Reisner suggested, to avert rainwater ingress.[1639]

5.2.2.2 Stone walls and blocking

These types of blockings could take the form of rough drystone walls, coursed masonry or fine limestone blockwork, but would have been built, rather than used as backfill like rubble, which was usually thrown in 'pell-mell'.

Royal tombs

There seems to be no evidence of masonry or stone as a passage blocking in royal tombs until the Third Dynasty, when it was incorporated in the tomb of Djoser at Saqqara.

The Third Dynasty

The Step Pyramid

As previously discussed (5.1.1), the original access route to the Step Pyramid's substructure **[16]** was covered when the additional stages of the pyramid were added.[1640] To provide the pyramid with a foundation, the open part of the stairwell was filled in and the underground section, which was 15 m high × 3 m wide where it met the shaft, was carefully packed with large stone blocks and smaller coursed masonry, to create a reduced passageway to the burial chamber (Figs. 52, 55 and 275), which presumably was easier to seal after the funeral.[1641] Despite these elaborate precautions, they were simply bypassed by a complex warren of tunnels over the millennia, whose origins are hard to date or identify.[1642]

The galleries of the deep shaft tombs of the royal family under the east side of the pyramid were also blocked

burials points to this being a much later blocking (Petrie, Mackay and Wainwright 1910: 27).

1634 Reisner 1932: 212–3.

1635 Reisner 1932: 208; 230–1.

1636 Reisner 1932: 248.

1637 Garstang 1904: 49.

1638 Peet and Loat 1913: 16–7.

1639 Reisner 1942: 171–2.

1640 Lauer 1936: 12–16; 1962: 70–2.

1641 Firth and Quibell 1935: 29–31; Lauer 1936: 28–30.

1642 The substructure is riddled with interconnecting passages that are the result of alterations, tomb robbers and early exploration, which makes it difficult establish whether a particular feature is original or not. For a detailed description of the arrangements, see Lauer 1936: 27–30.

Figure 275 The remains of the masonry blocking the stairwell at its juncture with the shaft in the Step Pyramid, looking north. (Lauer 1936, pl. XVIII.1) © IFAO.

Figure 276 The masonry entrance blocking of the descending corridor of the Pyramid of Sekhemkhet looking north.
(Goneim 1957, pl. XXI)

with masonry. Although shaft IV was filled with rubble, its associated horizontal gallery was blocked by several layers of fine limestone masonry to a depth of 1 m, which prevented access to the sarcophagus beyond;[1643] as was the adjacent passage that led from shaft V, which held two more sarcophagi.[1644]

Within the 'Southern Tomb' **[17]**, once the 'burial' had been installed, the manoeuvring chamber above the granite vault was filled in its entirety with limestone masonry bound with clay mortar (found *in situ* during the excavation of the tomb), in order to prevent access to the granite plug in the vault underneath.[1645] To circumvent this, robbers had tunnelled beneath it to gain access to the roof of the vault.[1646] Similarly, the passages beyond, which led to the connecting underground apartments, were also blocked with coursed masonry, whose effectiveness as a deterrent is demonstrated by the robbers' tunnels that avoided them entirely, and run instead through the surrounding rock (Figs. 57–8).[1647]

Figure 277 The masonry blocking of the burial chamber entrance of the Pyramid of Sekhemkhet.
(Goneim 1957, pl. LVIIA)

[1643] Lauer 1936: 56; 1962: 86.
[1644] Lauer 1936: 57–62; 1962: 86–90.
[1645] Lauer 1936: 101–2. This may have been the same in the main pyramid, but there is no definite evidence to support it.
[1646] Firth and Quibell 1935: 19, n. 1. Lauer 1936: 102; 1976: 95.
[1647] Lauer 1936: 106; 1962: 127.

The pyramid of Sekhemkhet

To close the trench that led to the entrance of the Pyramid of Sekhemkhet **[18]** it was filled with substantial masonry blocks and any remaining gaps filled with loose stones.[1648] At the trench's end, both the rock-cut doorway and the corridor beyond were sealed with an 8 m deep stone blocking (found intact), whose manner of construction created two halves: on the east, carefully laid coursed stone which initially closed the passage, and on the west, a more hurriedly built blocking that finally sealed the tomb (Fig. 276).[1649] Further down, beyond the 'impervious mass of rock' that had troubled Goneim,[1650] another rock-cut doorway was revealed that was closed by a 4.72 m deep 'massive blocking' of dry stone masonry,[1651] which sealed the passage leading to the burial chamber (Fig. 277).[1652] Although the success of these blockings in protecting this pyramid's substructure is undeniable, as the king's body was apparently never placed in the tomb,[1653] the reason why all this time and trouble was taken to defend it still remains an unanswered enigma.

No description of any blocking materials is known from the excavations of the remaining royal tombs of the dynasty; the Layer Pyramid at Zawiyet el-Aran,[1654] and the Brick Pyramid at Abu Roash.[1655]

The early Fourth Dynasty

The pyramid of Meidum

At the end of the inclined entrance corridor of the pyramid of Meidum **[22]**, a horizontal passage leads to the vertical shaft that connects to the burial chamber. In the two niches that flank this passage, Rowe found some rectangular limestone blocks that were 0.525 m × 0.42 m × 0.365 m, which it is suggested may have formed part of the original blocking of these lower passages.[1656] Although the precise function of these blocks remains unknown, coincidentally their dimensions would enable them to just fit the horizontal passage beyond the niches, which is 3.65 m long × 0.85 m wide × 1.8 m high,[1657] if stacked lengthways in the passage and two abreast.[1658]

The Bent Pyramid

Describing the lower corbelled chamber in the Bent Pyramid **[23]** at Dahshur, Perring wrote, 'It had been filled up with a masonry of small squared stones, to a level with the top of the passage, which had also been in like manner built up'.[1659] The purpose of these blocks, it has been suggested, was to build an access staircase, which may have led up to the entrance of the connecting passage that leads to the upper substructure (Fig. 76).[1660] Similar blocks were also used to fill the upper burial chamber, almost reaching the base of its corbelled ceiling,[1661] where it is clear that they would not have fulfilled a comparable purpose. However, it is possible that both were intended to act like those in the manoeuvring chamber in the South Tomb of the Step Pyramid, and form a blocking to secure their respective chambers. Therefore, it could be that those in the upper level were intended to protect a sarcophagus or coffin.[1662] Conceivably, it was this impression that prompted Varille to describe the upper burial chamber as being blocked by, '*un mastaba de maçonnerie*'.[1663] If this was the case, the use of such internal blockings would have been an effective security measure to protect the tomb.[1664]

The Red Pyramid

There is no trace of any blockings in the Red Pyramid of Dahshur **[25]**, although Edwards suggested that the high level entrance in the second antechamber, which leads to the burial chamber, was probably once blocked with masonry and concealed from view.[1665]

Private tombs

Only a few private tombs in the survey had built stone blockings in their passages and chambers, those that did date to the Second, Third and early Fourth Dynasties.

[1648] Goneim 1957: 11. Underneath this also lies another ramp leading to an unfinished 9 m long corridor, which was probably abandoned, filled in and built over because of the poor quality of the rock (Goneim 1956a: 142, fig. 45).
[1649] Goneim 1956a: 79; 1957: 11; Maragioglio and Rinaldi 1963: 22.
[1650] Goneim 1956b: 113.
[1651] Goneim 1956a: 98.
[1652] Goneim 1957: 18–9.
[1653] Goneim 1956b: 143.
[1654] Barsanti 1901a: 94–6.
[1655] Swelim 1987: *passim*. Although Swelim (1987: 39, fig. 8) had found the unfinished remains of what he believed may have been intended to be niches either side of the descending corridor, which may have been intended to house a portcullis (Fig. 71 in this book), but possibly could have been intended to function in a similar way to those in the pyramid of Meidum, discussed below.
[1656] Rowe 1931: 25; Verner 2003: 163–4. Although Borchardt (1932: 17) believed these niches were designed to hold portcullises that could be levered into position horizontally, as in the Middle Kingdom pyramid at Mazghuna.
[1657] Rowe 1931: 25
[1658] Although the passage admittedly varies in height down to 1.74 m (Maragioglio and Rinaldi 1964b: Tav. 4, fig. 60) this shift could be due to settlement or earthquake damage, which is clearly evident in nearby Mastaba no. 16 (Harpur 2001: 42, 283 n. 28, 309 n. 24).
[1659] Vyse and Perring 1842: 68.
[1660] Maragioglio and Rinaldi 1964b: 63 and 102.
[1661] Vyse and Perring 1842: 69; Fakhry 1959: 52–9, Figs. 20–3.
[1662] Although, on the removal of these blocks by Hussein in 1946, who was hoping to find Sneferu's burial place, nothing was found (Fakhry 1959: 52).
[1663] Varille 1947: 6. Fakhry (1961: 93) suggested that the sarcophagus itself may have been built of masonry, as were, for example, the granite burial vaults in the Step Pyramid.
[1664] Alternatively, Stadelmann (1985a: 94; 1995: 728) proposes that the blocks could have been installed to provide internal support for the structurally unstable pyramid itself, in order to forestall a collapse of the chambers, which Lehner (1997: 103) suggests had been already shored up with timber beams in order to preclude this possibility.
[1665] Edwards 1988: 90.

Figure 278 The 'end on' flagstones used to block the passage of the Type IIA tomb S 2171 at Saqqara. (Quibell 1923, pl. XV. 1)

Figure 279 The 'end on' flagstones in the passageway of S 2498 in situ with broken slabs from its roof lying above it. (Quibell 1923, pl. XXIV. 2)

The Second Dynasty

Saqqara

The access routes of Two Type IIA tombs at Saqqara were blocked with flagstones using a method that is unique to this necropolis and the period. At the lower end of the rock-cut staircase of S 2171 **[104]** progress was blocked by five large flagstones that were set lengthways, rather than at right angles to the stairs, as might be expected (Fig. 278).[1666] This created an impenetrable 1.5 m deep[1667] obstruction that barred access to the portcullis and substructure beyond. The same method was employed in S 2498 **[111]**,[1668] where stone flagstones were also laid edge on in its descent (Fig. 279). This clever use of materials provided these tombs with a high level of protection for a comparatively small investment in terms of labour and resources that would otherwise had been involved in the installation of masonry or a portcullis.

[1666] Quibell 1923: 7, pl. V, 2.
[1667] Birrell 2000: 22.
[1668] Quibell 1923: 10, 44, pl. XXIV, 2.

Finally, although it is unclear what form they took, Quibell reported that the plunderers of the Type IIA tomb S 2302 **[105]** had found the main passage: '…blocked by large blocks of stone, but burrowed round them and also round the big portcullis.'[1669]

Helwan[1670]

Built stone blockings were incorporated in different positions in two Second Dynasty tombs at Helwan. At the base of the 'deep' staircase of the Type IIB tomb Op. 4/2 **[187]**, a wall made from field-stones formed the first blocking of the tomb's subterranean entrance, beyond which was a secondary blocking of mud-brick.[1671] However, nearby in the shaft of the Type IIC tomb Op. 4/115 **[201]**, its dry stone wall was relegated to behind the portcullis, and thus formed only a secondary closure.[1672]

[1669] Quibell 1923: 29.
[1670] There are also some Early Dynastic Type IIA and IIC tombs at Ezbet Kamel Sidqi that have stone blockings, although they are not published in detail, see El-Banna 1990: 12–3, pls. IV–V, figs. 18 and 23.
[1671] Köhler 2000b: 88, fig. 4; 2008b: fig. 7; 2014: 133.
[1672] Köhler 2008a: 172.

Figure 280 The masonry blocking of the entrance to the burial chamber of S 2405, the tomb of Hesyra. (Quibell 1913, pl. XXV.3)

The Third Dynasty

Saqqara

Quibell mentioned that one of the doors from the entrance corridor to the burial chamber of the Type IIA-C tomb of Hesyra S 2405 **[119]** had been blocked with mortared masonry (Fig. 280), which was still *in situ* when he excavated the tomb; entrance to the chamber having been gained from its other end in antiquity.[1673]

Tarkhan

Only a single example of a stone blocking is known from Tarkhan. Petrie reported that the intact entrance of the burial chamber of the Type IIA stairway tomb 545 **[218]** at Kafr Amar, was made of small blocks of stone that had been bound with mud mortar.[1674]

Qau and Badari

There are three Type IIA staircase tombs from Qau and Badari that may have used stone blockings. The entrance to the burial chamber of tomb 507 **[276]** in Cemetery 400 at Qau, was closed by 'large blocks of fine limestone' across its entrance.[1675] Although not actually described as such in the publication, both nearby tomb 562 **[274]** and tomb 3227 from Badari **[281],** which probably dates to the Third Dynasty, have similar blockings marked on their tomb plans.[1676]

The early Fourth Dynasty

Abusir

Within the Type IIA-C tomb AS 33 **[77]** at Abusir, behind the enormous portcullis at the base of the tomb's shaft, Bárta reported that a 'massive wall built of local limestone chips and irregular blocks' had been installed to act as a secondary blocking to the tomb's subterranean entrance.[1677]

Dahshur

In the Type IIC Mastaba II/1 **[210]** at Dahshur, remains of the original in-depth shaft blocking have been found, which consisted of un-mortared 0.6 m × 0.6 m limestone blocks. To avoid this substantial obstacle, tomb robbers had dug into the face of the shaft wall just above the blockwork and tunnelled directly down to the burial chamber below,[1678] thus bypassing both the blocking and the portcullis, both of which it would appear, were attacked on subsequent occasions.[1679]

Meidum

Amongst the early Fourth Dynasty tombs at Meidum there are four tombs with masonry blockings. In the substructure of the Type III + IIC Mastaba no. 16 of Nefermaat and Atet **[251]**, the doorway and the entire 3.24 m length of the entrance passage to the burial chamber of Nefermaat were found entirely blocked with 'prepared stones', bonded with mortar (Figs. 231 and 281).[1680] Nearby, in Mastaba no. 6, attributed to Rahotep and Nefert **[220]**, Petrie discovered forty-one 0.25 m × 0.25 m × 0.38 m limestone blocks that had been thrown

Figure 281 The masonry blocked entrance to the burial chamber of Nefermaat in Mastaba No. 16 at Meidum. (Petrie, Mackay and Wainwright 1910, pl. I.5) Courtesy of the Petrie Museum of Egyptian Archaeology.

[1673] Quibell 1913: 4, pl. XXV, 1 and 3.
[1674] Petrie, Wainwright and Gardiner 1913: 27; Petrie and Mackay 1915: 15–6, pl. XII.6.
[1675] Brunton 1927: 12, tomb register pl. X and pl. XII, fig. 5.
[1676] Brunton 1927: pl. XII, figs. 1 and 2.
[1677] Bárta, Coppens and Vymazalová 2010: 67.
[1678] Alexanian 1999: 22.
[1679] Alexanian 1999: 26.
[1680] Petrie, Wainwright and Mackay 1912: 25.

by tomb robbers into Rahotep's shaft, each of them weighing about 50 kgs. These had been originally used to block the passage between the shaft and Rahotep's burial chamber, and remains of a plaster mixing vessel in the shaft, suggests they may have been originally bonded with mortar.[1681] Similarly, the passage leading from behind the portcullis to the burial chamber of Mastaba no. 9, belonging to Ranefer **[221]**, was blocked with 'solid masonry' so hard that it had to be cut out with a hammer and chisel to permit access.[1682] Lastly, in a less secure arrangement, the burial chamber entrance of the adjacent Type IIC Mastaba no. 4 **[222]** was blocked after its portcullis with a substantial single skinned stone wall that formed a secondary closure (Fig. 220).[1683]

Section summary – stone walls and blockings

A variety of levels of protection could be offered by a built stone wall or blocking. Some types were no more than their mud-brick equivalents built in stone and just designed to retain their access route's backfill, whereas others were serious attempts at blocking. A drystone wall, by its nature, could easily be disturbed by the removal of a few stones and therefore offered little protection, whereas as we have seen, a mortared and in-depth masonry blocking would present an altogether more daunting prospect, such as those used in the Step Pyramid complex or the later passageway in the private tomb of Ranefer at Meidum.

5.2.2.3 Wooden doors

Although wooden doors are rare in this period,[1684] they sometimes form a closure in a passageway in both royal and private tombs.

Royal tombs

Amongst royal tombs, there are only four examples of wooden doors; they date from the First and early Fourth Dynasties.

The second half of the First Dynasty (Naqada IIIC2–IIID)

Umm el-Qaab

The two earliest doors are from the tomb of Den **[8]**. Midway down the stairway on the first landing, a wooden hinge pivot plate behind mud-brick reveals indicates that a wooden door was placed here to close the opening.[1685] This was presumably locked, although no evidence remains of such a mechanism. Further down, immediately after the 'portcullis', a short passage leads to a doorway at the entrance to the burial chamber, where remains of a wooden hinge bracket and striking plate for a bolt have been discovered flanking the aperture, which suggests that another lockable wooden door was positioned at the burial chamber's threshold.[1686]

The early Fourth Dynasty

Meidum

In the descending corridor of the pyramid of Meidum **[22]**, at a distance of 55.75 m from the entrance, a slot 0.14 m wide and 0.2 m deep runs round the four sides of the passage (Fig 74). Remnants of wood found in the slot in the floor suggest that this accommodated a wooden door, probably like the one in the nearby private tomb of Nefermaat,[1687] the function of which may have been to temporarily seal the passage before the pyramid was made secure.

Dahshur

The remains of a pivot hole in the ceiling near the entrance of the northern descending passage of the Bent Pyramid at Dahshur **[23]**, suggests that it probably had a vertical single leaf wooden door,[1688] and therefore unlike the door at Meidum, it was probably hinged.[1689] Presumably it was designed to function as a temporary closure until the permanent stone blocking was installed.[1690]

Private tombs

Two examples of wooden doors have been found in private tombs, co-incidentally they also date to the First and Fourth Dynasties.

The second half of the First Dynasty (Naqada IIIC2–IIID)

Saqqara

In the Type ID tomb S 3506 **[88]**,[1691] at Saqqara, access to the substructure was via a stairway, which descended to a mud-brick blocked limestone gateway, set 1.2 m above the pit floor. Once the mud-brick was removed, Emery found a closed wooden door behind that had been painted red.[1692]

The early Fourth Dynasty

Meidum

In the Type III + IIC tomb of Nefermaat and Atet, no. 16 **[251]** at Meidum, the end of the stone blocked passage leading from the burial chamber of Nefermaat to the (still undiscovered) external entrance of the tomb, was

[1681] Petrie 1892: 16.
[1682] Petrie 1892: 17.
[1683] Reisner 1936: 214–5.
[1684] There is very little literature on Egyptian wooden doors generally, and most of it covers the Old Kingdom onwards, see for example, Koenigsburger 1936: *passim* and Fischer 1996: 91–102.
[1685] Dreyer 1990: 73.
[1686] Dreyer *et al.* 1998: 141.
[1687] Rowe 1931: 24–5; Harpur 2001: 44.
[1688] Petrie 1883: 145.
[1689] Maragioglio and Rinaldi 1964b: 60.
[1690] Maragioglio and Rinaldi 1964b: 96.
[1691] Emery 1958: 36.
[1692] Emery 1958: 36–42.

Figure 282 The wooden door blocking the entrance to the passage of Nefermaat, behind which the stone blocking continued up into the passage. (Petrie, Mackay and Wainwright 1912, pl. XVI.I) Courtesy of the Petrie Museum of Egyptian Archaeology.

barred by a 0.73 m wide wooden door (Fig. 282).[1693] This was made of two thick planks held together by a couple of dovetailed cross-braces that were locked in place with a 0.406 m thick beam across the door's wooden jambs, and made further secure by a layer of stone blockwork across its top.[1694]

Section summary – wooden doors

Presumably the function of the wooden doors in all of the royal tombs was to form a temporary blocking to secure the interior until the main closure had been completed. On that basis it would seem reasonable to attribute that function to those found in private tombs as well.

5.2.3 Conclusion

The introduction of external access routes created the need for a secure means to close them. Although in many cases little evidence of these methods can be found today, it can be safely asserted that in the majority of tombs, both royal and private, some form of static backfill or blocking was employed, either singularly or in conjunction with another method.

The limited number of royal tombs permits a definite pattern of development to be traced. Perhaps in response to earlier robberies, it can be clearly seen that the selection of the backfill and blockings used to block access routes evolved progressively from sand, wood and mud-brick in the First and Second Dynasties, to greater volumes of specially selected and increasingly resistant materials such as rubble and masonry in the Third Dynasty. By the early Fourth Dynasty, improvements in stone technology seem to have led to a cessation of the use of rubble altogether and the wholesale adoption of masonry blockings and plug-stones, which are discussed in the next chapter.

The much larger numbers of private tombs presents a problem with the analysis of their blockings, as proportionally, because of the lack of reporting, there is statistically less evidence of the methods employed. Therefore, while there may be only one or two types of blocking reported in a necropolis, it does not necessarily mean that either was unique, or commonplace. However, it would be reasonable to assume that in the vast majority of private tombs throughout the period, the principal closure of the tombs must have taken the form of a backfill, which was more or less resistant to penetration, depending on how 'diggable' the chosen material was. This backfill could be used alone, or in combination with another built blocking, such as mud-brick, masonry or even a portcullis, which could either retain it position, act as a secondary closure or provide additional security. As the use of stone architecture became more commonplace in the early Fourth Dynasty, so in high status tombs the use of worked stone to provide a more solid in-depth secondary blocking became more frequent.

From an architectural viewpoint, the use of a static backfill or in-depth blocking would seem not to have affected the design of a tomb or its access route, as its principal role was to act as a resistive space filler and fill the void that was available. Therefore this is one of the few security measures that arguably had little or no effect on tomb architecture.

In the end, depending on the nature of their material, the majority of backfills or blockings in royal or private

[1693] This is probably the earliest extant example of a wooden door found in Egypt (Harpur 2001: 44).
[1694] Petrie, Wainwright and Mackay 1912: 25, pl. XVI. I

tombs could be either dug out or demolished. In the case of the most effective blockings, as is demonstrated by those stairs or shafts still closed by rubble or masonry, in many instances it was simply easier for robbers to bypass such an obstruction than to go through or remove it; they having worked out for themselves the least hazardous and most efficient plan of attack in order to reach their goal.

5.3 Portcullises and plug-stones

Amongst the simple mechanisms that were used to seal the external access routes of the Egyptian tomb, initially the portcullis, and later the plug-stone, played important roles in both royal and private tombs, where they provided a swift and secure method of closure. Overall there is a lack of a detailed study of both in Egyptological works,[1695] with the exception of individual tomb publications. Therefore, this chapter examines their use throughout the period concerned, to see what part they played in the security of the tomb and what influence, if any, they may have had upon the architecture of tomb development.

The chapter is divided in two parts and begins with portcullises followed by plug-stones. In both cases royal tombs are dealt with first by dynasty, followed by private tombs, which are discussed diachronically and in topographical order from north to south.

5.3.1 The portcullis

The earliest prototypes of the portcullis were probably the blocking stones that closed the loculi in elite Predynastic tombs, such as grave 8 **[340]** at Kom el-Ahmar and tomb 2 at HK6 **[353]** in Hierakonpolis (see 3.2). From the mid First Dynasty onwards, they are found in both royal and private tombs in the form of a vertical stone slab, often in a purpose made emplacement, where they closed the passageways and subterranean entrances of tombs with external access.

Accompanying the chapter is a chart listing each tomb in the survey that may have possessed a portcullis (Chart P),[1696] which includes the type of emplacement used and where a stone was found *in situ,* its size, volume, and weight.[1697] For clarity in the discussion the information on each stone is usually limited to the thickness of the slab and its weight,[1698] as the first figure relates to the stone's ability to resist penetration and the second, the difficulty of moving it from its emplacement.

5.3.1.1 Royal tombs

The second half of the First Dynasty (Naqada IIIC2–IIID)

Den

The first royal sepulchre with a portcullis is the Type ID tomb of King Den at Umm el-Qaab **[8]**. At the base of its mud-brick lined stairway, before the burial chamber entrance, there are vertical grooves that formed an emplacement (Fig. 32).[1699] Although no trace has been found of a portcullis,[1700] it is often assumed by scholars that it was made of stone.[1701] However, modern excavations have shown that these grooves have been reduced in width from their original size, and it has been suggested that a smaller *Holzfalltür* or wooden beam blocking may have been used instead,[1702] perhaps similar to that found in the tomb of Adjib discussed below.[1703]

Adjib

The burial chamber of the smaller tomb of King Adjib **[9]** was also accessed by a mud-brick stairway,[1704] which was blocked at its base by a wooden barrier set within vertical grooves. This comprised of 5 cm thick wooden boards laid horizontally and retained in place by vertical planks in the slots, wedged tight in position using mud-bricks. Against these boards, layers of bricks were then loosely piled on the stair side to complete the closure (Fig. 269).[1705]

[1695] Even in Reisner's (1936: 185) Tomb Development there are only a few lines of text devoted to the topic. However, Birrell (2000: *passim*) covers the subject more widely.

[1696] Necessarily, the decision on whether to include a tomb or not in the list is based either upon the existence of a portcullis in the tomb, or the indication of an emplacement built for it in the form of portcullis grooves. This does not mean that those tombs without emplacements did not have portcullises, just that there is no other evidence to indicate it.

[1697] The weight of a particular piece of stone is determined by its density and its volume, which can vary. The overwhelming majority of the portcullises reported here are made of limestone, and as the bulk density of the stone is not usually recorded, the weight of each stone is calculated on the basis of limestone weighing between 1.7 to 2.6 metric tonnes per cubic metre (Arnold 1991: 28).

[1698] The maximum and minimum weights are recorded in the chart. However, for the purpose of clarity, the median weight is the one used in the body of the discussion, but it is possible that the actual weight of the stone could be at either end of the scale in the chart, depending on the stone's bulk density.

[1699] Although not mentioned by Petrie in the excavation report, these are shown in his plan (Petrie 1901: pl. LXII).

[1700] Birrell 2000: 19.

[1701] For example: Reisner 1936: 185 and 353; Seidlmayer 1998: 31; Wilkinson 1999: 203; Birrell 2000: 19; Dodson and Ikram 2008: 137; Tristant 2008b: 346; Bárta 2011b: 70.

[1702] Dreyer *et al.* 1998: 141. Although it could be argued that if this was the case that this may have been a later replacement, see the author's comments on page 217, note 1585, regarding the blockings in the tombs of Adjib, Semerkhet and Qa'a.

[1703] Petrie 1901: 12, Pls. LXV & LXVI. Outside the main substructure, within the much smaller south-west annex, which may have been intended to hold a *ka* statue of the king (Dreyer 2007c: 200–3), there is also provision for a similar arrangement to that in the tomb of Adjib. This, it has been suggested, consisted of wooden planks housed in a vertical portcullis style slot and backed up with a wall of mud-bricks (Petrie 1901: 10; Dreyer 1990: 76).

[1704] Petrie 1900: 17.

[1705] Petrie 1900: 12. This too could be a later Middle or New Kingdom alteration or replacement for an original portcullis stone, see notes 1585 and 1702.

Figure 283 The broken remains of the limestone portcullis in the tomb of Qa'a
(After Dreyer *et al.* 1996, Taf. 13a) Courtesy of the DAI Cairo.

Qa'a

The earliest stone portcullis found *in situ* at Umm el-Qaab was that in the tomb of King Qa'a **[11]** the last monarch of the dynasty.[1706] Eleven steps from the head of its mud-brick stairway, a broken limestone portcullis 0.98 m high[1707] is preserved within mud-brick retaining grooves set in the stairway's walls (Fig. 283).[1708] If we assume that the original height of this portcullis was at least 2 m,[1709] and that it weighed around 1.6 tonnes,[1710] it is clear that it would have been an extremely effective blocking. Indeed, its success is demonstrated in Engel's plan of the route taken by the tomb's robbers (Fig. 284).[1711] The evidence suggests that having entered via the stairway, and once confronted by the portcullis, the robbers bypassed it entirely, rather than attempt to move or breach it. They chose instead to tunnel through the surrounding mud-brick into the flanking magazines and work their way round from chamber to chamber.[1712]

The Second Dynasty (Naqada IIID)

Hotepsekhemwy/Raneb

The rock-cut tomb of Hotepsekhemwy/Raneb **[12]** at Saqqara also incorporated portcullises to block the entrance and passages of its enormous substructure. At the end of the entrance stairways, marked 'C' on the plan (Figs. 42–3), the tomb's first limestone portcullis,[1713] prevented progress into a 40 m long passage of 'cut and cover' construction.[1714] The passage

[1706] Petrie 1900: 15.
[1707] This damage was probably done in the Middle or New Kingdoms to permit easy access to the tomb, when in addition it was bricked over (Engel 1997: 28, n. 43).
[1708] Originally, this was originally closer to the burial chamber, but was then relocated when the staircase was extended during one of the tomb's many building phases, personal communication by Eva-Maria Engel (18th February 2010).
[1709] It is reasonable to estimate the height based on the difference in levels marked on the drawing (Engel 1997: Abb. 19) between the top of the stairwell which is 13.5 m ASL and would have supported the roof and the floor adjacent to the portcullis in the passage which is 11.68 m ASL.
[1710] This is based on scaled dimensions from Engel's (1997: Abb. 19) plan which are 1.24 m wide × 0.3 m thick. The median weight of the stone is approximately 1.6 tonnes (i.e. between 1.26 and 1.93 tonnes) based upon 0.75 m3 of limestone weighing 1.7–2.6 metric tonnes per cubic metre (Arnold 1991: 28).
[1711] Engel 1997: 110, Abb. 70.
[1712] Engel 1997: 110, Abb. 70.
[1713] Stadelmann (1985b: 296) describes this portcullis as made of granite, whilst Claudia Lacher (personal communication 12th October 2010) informs me that these portcullises are actually made from white limestone that probably originated from Tura.
[1714] The tomb's original excavator, Barsanti (1901b: 251) noted that this portcullis had been already been entered via a small hole in its base, which had to be enlarged by his workers to allow him to pass through.

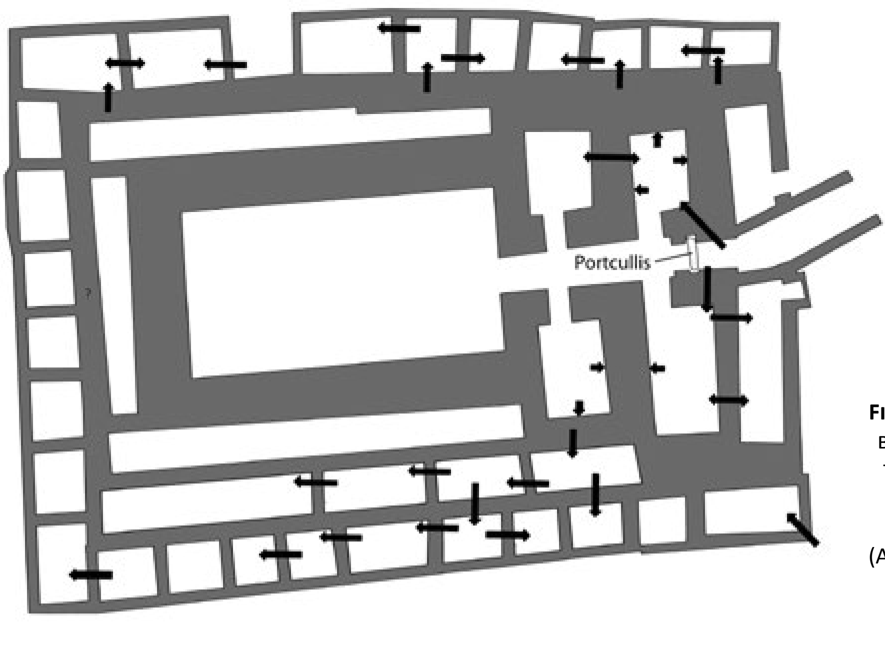


Figure 284 The various routes taken by tomb robbers as they tunnelled through the substructure of the tomb of Qa'a having bypassed the portcullis.
(After Engel 1997, Abb. 70) Courtesy of E.M. Engel.

was further subdivided by two more portcullises[1715] into three sections, 'D', 'E' and 'F' that protected more flanking magazines. Finally, a fourth portcullis blocked the entrance to the original subterranean core of the sepulchre,[1716] which contained the burial chamber.[1717]

Ninetjer

In the nearby tomb of Ninetjer **[13]**, at the southern end of entrance ramp 'A', two high density limestone portcullises, each 3.4 m high × *c.* 1.6–1.75 m wide × 0.5 m thick, possibly from the Tura or Mokkatam quarries, originally blocked access to the tomb at either end of passage 'B' (the current entrance).[1718] Both the passage and the emplacements that housed the portcullises are excavated deep in the rock and form a 'dumbbell' shape with the portcullis slots at either end (Figs. 44 and 240). Each of the stones, given that they are of high density limestone, would have weighed around 7.7 tonnes, which combined with their substantial thickness, would have provided the substructure with a considerable degree of security.

The last two kings of the Second Dynasty, Peribsen and Khasekhemwy returned to Umm el-Qaab to build their tombs, but portcullises played no part in their defence, as both tombs lacked built stairways.

The Third Dynasty

In Third Dynasty royal tombs, portcullises are only found in the Step Pyramid of Saqqara. They seem to be absent from the remaining pyramids of the dynasty, namely those of Sekhemkhet at Saqqara,[1719] the Layer Pyramid at Zawiyet el-Aryan and the Brick Pyramid at Abu Roash.[1720]

Step Pyramid of Djoser

Two examples of closures that may be described as portcullises were found in the Step Pyramid complex **[16]**. They were, however, in reality granite plugs of unique design that closed the vaults containing their respective burials. In the main pyramid, access to the vault was via a hole that was sealed by a 2 m long, 1 m diameter, tapered granite plug, which weighed 3.5 tonnes (Figs. 285–6). Grooves in the top of the plug indicate it was originally lowered into place by ropes.[1721] In order to permit this, Lauer suggested that a 'manoeuvring' chamber had been built over the vault, within which the procedure could take place (see 4.1.3).[1722] Despite the plug's tight fit and enormous weight, it was still bypassed by tomb robbers who broke away a section of the plug and its hole.[1723]

Figure 285 The granite plug in position in the roof of the granite vault of the Step Pyramid of Saqqara. (Lauer 1936, pl. XVIII.2) © IFAO.

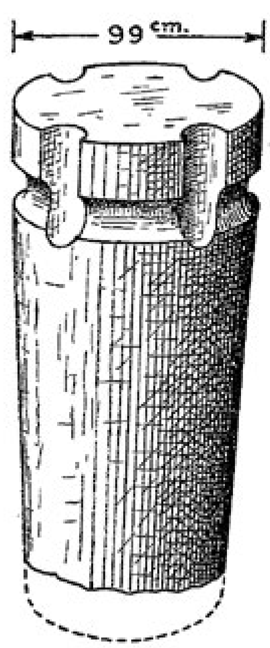


Figure 286 The enormous 3 tonne granite plug used to seal the granite vault in the Step Pyramid – the notches for the lowering ropes can be seen at its head. (Lauer 1936, fig. 16) © IFAO.

1715 Dimensions are not available for any of the portcullis stones in this tomb.
1716 One of the southern portcullises was still in place when Claudia Lacher visited the tomb some time ago and it had apparently been tunnelled through by tomb robbers, but she was unable to ascertain its dimensions (personal communication 12th October 2010).
1717 Lacher 2008: 432–3.
1718 Dreyer 2007a: 132; Lacher-Raschdorff 2014: 58. From the remains of mud-brick walls adjacent to the portcullis emplacements, Lacher-Raschdorff (2014: 58–9) has suggested that these *c.* 8 tonne slabs may have been lowered into position using escaping sand from a shaft formed by the walls, which was released by breaking the walls at the base when the time came to close the tomb.
1719 Although Dodson (2003: 45) suggests a portcullis may have been intended to be used in the vertical shaft of the Pyramid of Sekhemkhet at Saqqara.
1720 However, Swelim (1987: 39) suggests the unfinished niches in the 'Polar Corridor' of the Brick Pyramid may have been intended to hold 'portcullises'. See note 1655.
1721 Lauer 1936: 31–2.
1722 Lauer 1962: 75–6. Based partly on the extant example found in the 'South Tomb', see p. 52. The actual construction of the one in the main pyramid is the subject of some debate amongst scholars; see again Stadelmann (1996b) and Kaiser (1992 and 1997) for discussions concerning this area.
1723 Firth 1925: 153.

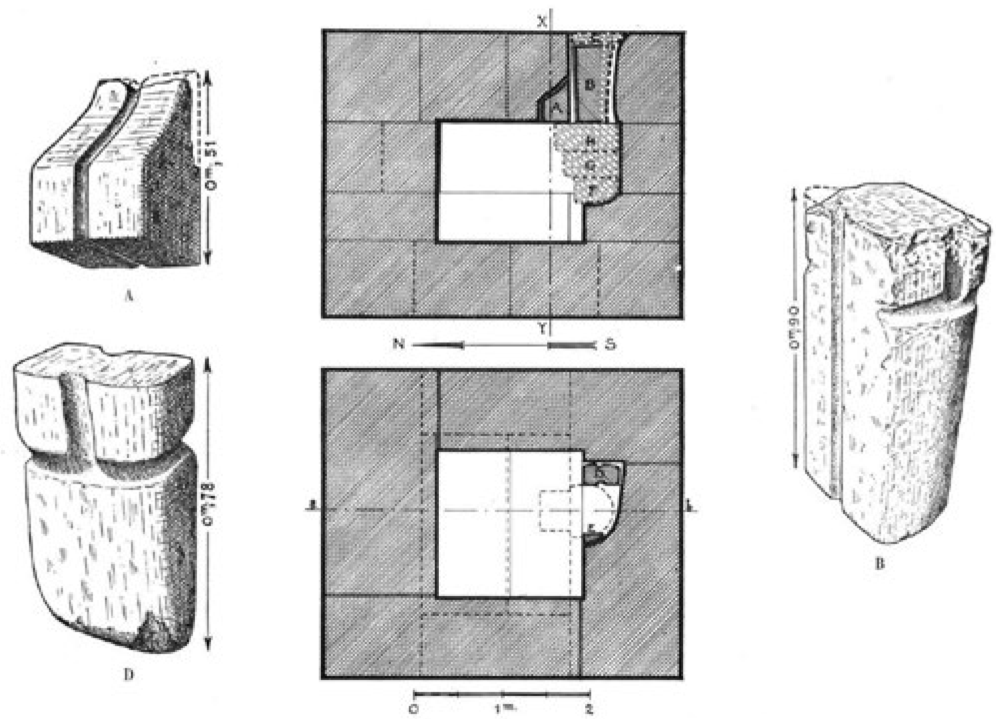


Figure 287 The granite vault in the South Tomb and its multi segmented granite plug assembly. (Lauer 1962, pl. 21) © IFAO.

Similarly, the smaller vault in the South Tomb **[17]** had its semi-circular entrance closed with a granite stopper. Rather than being in one piece, it comprised of eight or nine interlocking segments (Fig. 287),[1724] in the manner of a 'Chinese puzzle'. This had been removed in antiquity by robbers who had tunnelled under the protective pavement of the manoeuvring chamber, and attacked it from there.[1725] Within the manoeuvring chamber itself, a furrowed wooden beam was discovered *in situ*, whose wear marks had been caused by the friction of the ropes used to lower the plug.[1726]

More 'traditional' portcullises were found in some of the deep shaft tombs of the royal family under the eastern edge of the pyramid. Shafts IV and V were provided with large freestanding limestone portcullises, intended to block the entrances to their adjoining galleries.[1727] They were virtually identical and at 0.26 m and 0.27 m thick respectively,[1728] can be estimated to have weighed around 2 tonnes each. Despite their size both had been tipped askew by tomb robbers, who had bypassed them by tunnelling between the two galleries.[1729]

1724 Lauer 1939: 46–8: 1962: 127.
1725 Firth and Quibell 1935: 19, n. 1. Lauer 1936: 102; 1976: 95. Parts of it were later found lying by the pyramid of Unas (Lauer 1962: 126–7).
1726 Lauer 1976: 95–6.
1727 Lauer 1962: 86–87.
1728 Lauer 1936: 56–7. Evidence of wooden beams (0.2–0.3 m in diameter) that were used during the lowering of the portcullises has been found at the head of shaft V (Lauer 1936: 57).
1729 Lauer 1936: 56–7.

The early Fourth Dynasty

Sneferu's first pyramid at Meidum, unlike its associated private cemeteries, was devoid of portcullises,[1730] and it is only with the construction of the Bent Pyramid at Dahshur that they briefly re-emerge.

The Bent Pyramid

Sneferu's second pyramid **[23]** is fitted with two portcullises of a unique design. At the end of the western descending corridor that leads to the upper burial chamber,[1731] it levels out and proceeds for a few metres until progress is blocked by a portcullis (Fig. 288).[1732] This was housed in an unusual corbelled emplacement (Fig. 289) that incorporates a 35° internal ramp,[1733] down which the massive limestone slab was designed to slide. When originally closed, the slab was plastered on both sides and presented the appearance of a solid wall viewed from the approaching passage, but it had been broken through at the top by tomb robbers in antiquity

1730 Both Borchardt and Ricke (1932: 17–8, Taf.11) and Lauer (1962: 214, pl. 28b) were of the opinion that a portcullis was fitted in the vertical shaft leading to the burial chamber, especially as in Borchardt's view there were grooves cut on one face of the shaft (as found on some portcullises), which he suggested were for lowering ropes. Maragioglio and Rinaldi (1964: 44) disagreed, as in their survey of the tomb they noted that a particular block, which Lauer had suggested was part of the portcullis slab, was in fact part of the structure of the passage.
1731 Lehner 1997: 102.
1732 Maragioglio and Rinaldi 1964b: Tav. 13.
1733 This angle is measured by protractor from the plans by Maragioglio and Rinaldi (1964b: Tav.13).

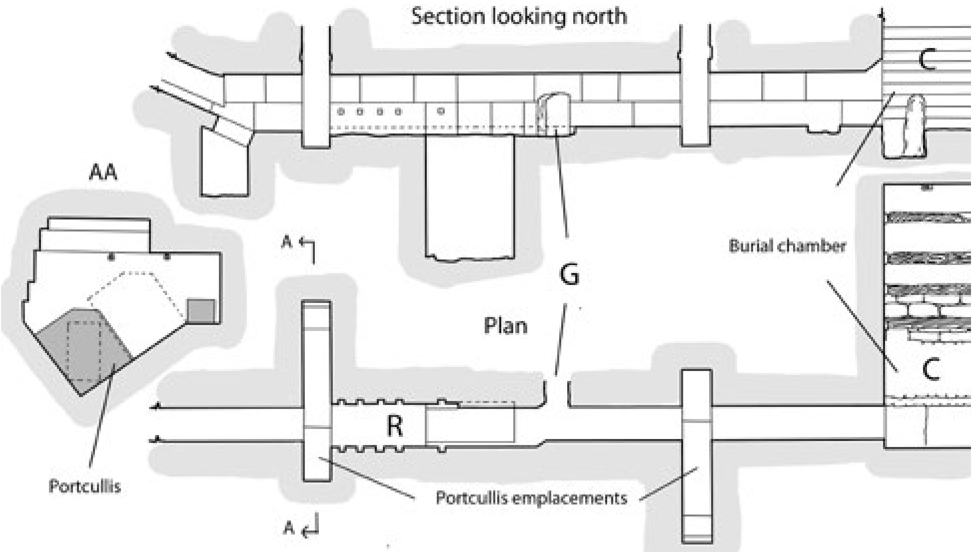


Figure 288 Section and plan of the portcullis emplacements and passages at the end of the western descending corridor in the Bent Pyramid. The 4 m deep pit in the passage, which was floored over, can be seen in the upper elevation drawing. (Drawn by the author after Maragioglio and Rinaldi 1964, Tav. 13, fig. 2)

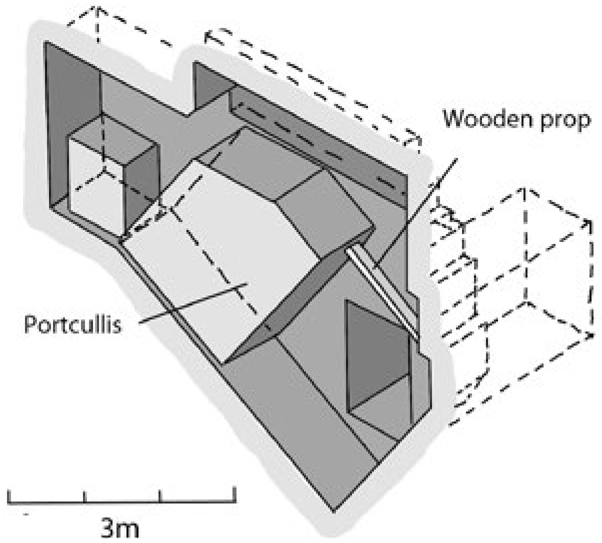


Figure 289 The unusual sloping emplacement of the portcullises in the Bent Pyramid. (Drawn by the author after Fakhry 1959, fig. 26)

Figure 290 The closed portcullis in the western corridor of the Bent Pyramid looking west, with the robbers' hole in its upper half. (Fakhry 1959, pl. X.A)

(Fig. 290). Beyond this, a 20 m passage led to a second portcullis and emplacement, whose ramp sloped in the opposite direction,[1734] perhaps to confuse robbers. For unknown reasons, its stone was never lowered and remains *in situ*, propped up with a piece of timber.[1735] Both portcullises were 0.75 m thick,[1736] and would have weighed about 5.4 tonnes apiece. Although the original passage floor between the portcullises is now missing (Fig. 291), a discoloured line left on the closed portcullis marks its original level and indicates that it would have concealed the base of the stone, thus making it extremely difficult to lever the stone from its emplacement.[1737]

[1734] Vyse and Perring 1842: 69; Fakhry 1959: 52. This also contained the entrance to a descending passage, which connected to the lower corbelled chamber. The purpose of this passage is not entirely clear, although as the first portcullis is plastered on both sides, Fakhry (1959: 52) suggested that one of its functions may have been to act as an escape route, similar to that leading from the Grand Gallery in the Great Pyramid.

[1735] Vyse and Perring 1842: 69.

[1736] Scaled from drawing by Maragioglio and Rinaldi (1964b: Tav.13).

[1737] Similar to the horizontally sliding portcullises found in the Middle

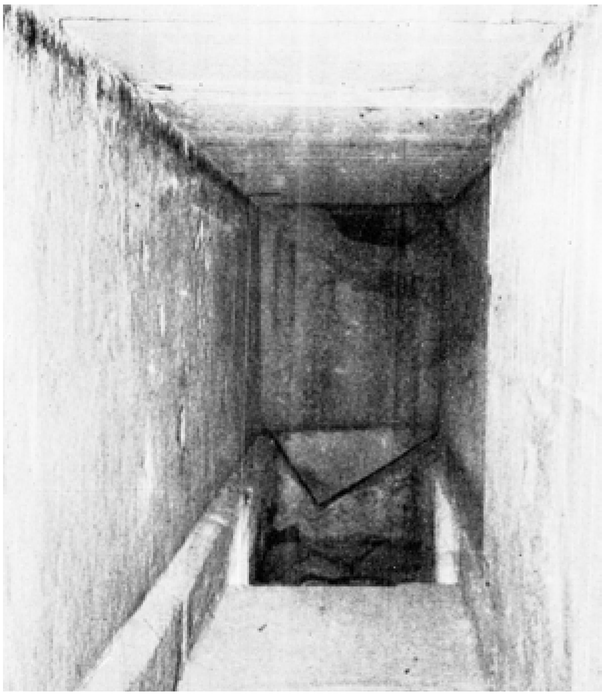


Figure 291 The exposed bottom corner of the portcullis in the Bent Pyramid, after the passage floor had been removed. The horizontal black line across its base shows where the original floor covered the face of the slab and would have made it difficult to lever up.
(Fakhry 1959, pl. IXb)

Section summary – royal tombs

The introduction of the stairway in the tomb of Den in the mid First Dynasty heralds the concomitant appearance of the portcullis and its emplacement in royal tombs, where it formed part of the blocking system. Whether the portcullises in them were made of wood or stone is open to debate, but the tomb of Qa'a was undoubtedly equipped with one made of limestone. In the Second Dynasty, the portcullis was used as the primary closure in the Type IIA royal tombs at Saqqara, where enormous slabs in rock-cut emplacements guarded their subterranean passageways and the vast quantities of grave goods stored within them. Yet, with the return of the royal necropolis to Umm el-Qaab at the end of the Dynasty, the portcullis played no part in the Type ID tombs of Peribsen and Khasekhemwy. The construction of the Step Pyramid at the beginning of the Third Dynasty saw little use of the portcullis proper, which was relegated to protecting the tombs of the royal family, and replaced by granite plugs within the royal burial vaults of the pyramid and its southern tomb. Moreover, the royal tombs of the remainder of the Third Dynasty and the beginning of the Fourth did without the portcullis altogether, and it was not until the construction of the Bent Pyramid at Dahshur, that it reappears within an unusual sloping emplacement, the like of which was not seen again until the Middle Kingdom.[1738]

Kingdom pyramids of South and North Mazghunah (Petrie, Wainwright and Mackay 1912: pls. XXXIX and LXVIII) and that of Ameny Qemau at Dahshur South (Maragioglio and Rinaldi 1968: Tav. LI; Swelim and Dodson 1998: 323–4).

5.3.1.2 Private tombs

From the reign of Den onwards, the private tombs of the elite also incorporated portcullises. To date my research has identified 189 private tombs that either contained portcullises, or at least the architecture to accommodate them.[1739]

However, there is no trace of an attempt to imitate the stone plugs of the Step Pyramid or the sloping emplacements of the Bent Pyramid. Therefore in private tombs, portcullises are usually vertically orientated and either freestanding, wedged in a tapered stairway or shaft, or lowered into place within a specially grooved emplacement.

The second half of the First Dynasty (Naqada IIIC2-IIID)

There are thirty-seven tombs containing portcullises from this period; all are located in Lower Egypt, distributed between the sites of Abu Roash, Tura el-Asmant, Abusir, Saqqara and Helwan. Twenty-seven of them are Type ID pit tombs with staircase access, nine are Type II rock-cut pit tombs with subterranean burial chambers, and one is a Type IIA subterranean tomb with stairway.

Abu Roash

The unusual Type II substructures of the elite tombs of Cemetery 'M' usually had their portcullises placed in front of the entrance to the burial chamber at the base of their access pits. Some of the tombs, such as MO1 **[44]**, MO3 **[46]**, MO4 **[47]** and MO7 **[49]**, were furnished with just a single stone fitted into a grooved emplacement.[1740] Exceptionally, in MO7 the remains of its broken portcullis was found to have semi-circular notches at its base, which were probably intended to accommodate lowering ropes.[1741] Others, such as MO2 **[45]**, MO6 **[48]**, MO10 **[50]**, MO11 **[51]** and MO12 **[52]**, in an unusual arrangement found only at Abu Roash, possessed twin stones placed side by side (Fig. 292),[1742] all of which, with the exception of MO6,[1743] were supported by grooved emplacements. An example of this is tomb MO2, whose burial chamber was originally blocked by twin portcullises set in grooves, of which

[1738] *Ibid*.
[1739] Not all are included in the catalogue and are accordingly marked NIC in the portcullis chart P.
[1740] Montet 1938: 19, 33 and 35.
[1741] Montet 1938: 45.
[1742] Tristant 2008b: 331.
[1743] Montet 1938: 37–8.

FIGURE 292 A TYPICAL TWIN PORTCULLIS ARRANGEMENT FOUND IN TOMB MO11 FROM CEMETERY M AT ABU ROASH. THE TOP HALF OF THE PORTCULLIS HAS BEEN CUT DOWN BY TOMB ROBBERS. THE REBATES IN THE SLABS SUGGEST THEY HAVE BEEN CUT DOWN SO THAT THEY CAN FIT THE GROOVED EMPLACEMENT. (MONTET 1938, PL. XIII.1)

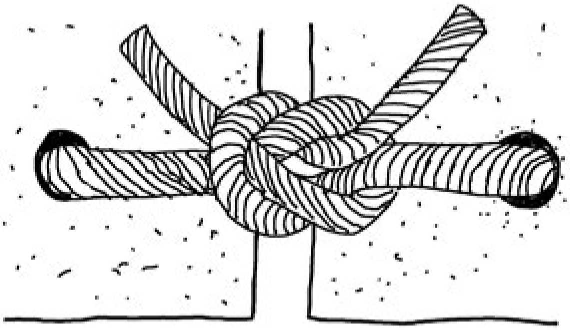


FIGURE 293 HOW THE TWO PORTCULLIS STONES IN TOMB MO2 MAY HAVE ORIGINALLY BEEN TIED TOGETHER. (DRAWN BY THE AUTHOR AFTER MONTET 1938, 30)

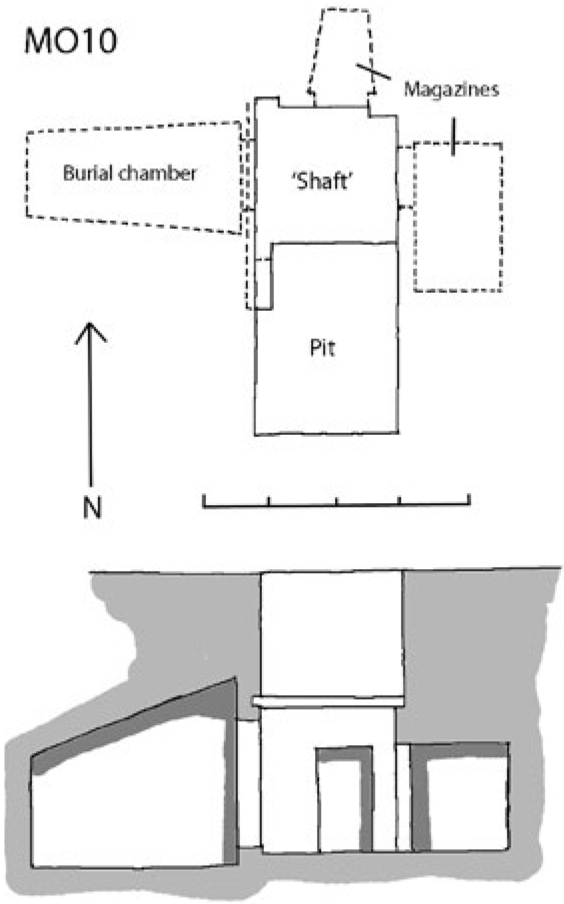


FIGURE 294 PLAN AND SECTION OF TOMB MO10 AT ABU ROASH. (DRAWN BY THE AUTHOR AFTER MONTET 1938, PL. VI)

only the left remained *in situ*. Made of limestone,[1744] this was 0.2 m thick, and would have weighed around 0.55 tonnes, making the weight of the pair just over a tonne. It was pierced at its right hand bottom corner with a 10 cm diameter hole, which Montet suggested would have

[1744] Tristant 2008b: 331.

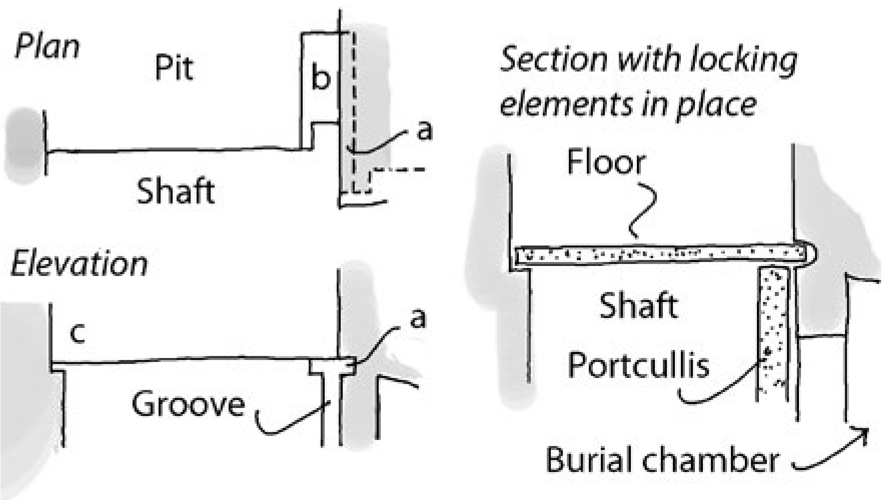


FIGURE 295 EXPLANATORY SKETCHES OF THE LOCKING MECHANISM FOR THE PORTCULLIS IN TOMB MO10 AT ABU ROASH. THE LOCKING SLOT 'A' IS SEEN IN THE PHOTOGRAPH BELOW. (DRAWN BY THE AUTHOR AFTER MONTET 1938, 51–2)

Figure 296 The floor above the shaft in tomb MO10 at Abu Roash. The slot that forms part of the floor locking mechanism for the portcullis is easily discernible as a slot in the centre of the picture.
(Montet 1938, pl. X, 2)

been mirrored on the missing slab, enabling the two to be bound together (Fig. 293).[1745] The slabs of tomb MO6 were also pierced in the same manner.[1746]

Tomb MO10 **[50]** is of importance because of its remarkable method of concealing and securing its portcullises (Fig. 294). In the shaft before the burial chamber were two vertical grooves that Montet suggested would have held twin portcullis stones. Above the entrance to the burial chamber and just below the floor edge of the magazine was a horizontal groove 'a' that was matched on the opposite wall of the shaft by a ledge 'c' (Fig. 295). In this groove 'a', one end of a wood or stone floor would have been inserted, the other end resting on the ledge 'c', thus concealing and securing the two portcullis stones beneath. The purpose of cavity 'b', which sat over the left hand vertical groove and ran into the magazine floor, was probably to house some sort of wooden packing to 'lock' the floor in place. [1747] A photograph taken by Montet helps to explain it in context (Fig. 296).

[1745] Montet 1938: 28–31, pl. II.
[1746] Montet 1938: 38.
[1747] Montet 1938: 50–2.

Tura el-Asmant

There are three Type ID tombs at this site with portcullises. The best protected of these was tomb 1056 **[63]**, whose mud-brick lined staircase was blocked at its end by a 0.18 m thick,[1748]1.1 tonne, limestone portcullis in a grooved emplacement. Further on at the end of a short passage a second portcullis of similar size blocked the burial chamber itself. Nearby, tomb 1035 **[64]** was less well defended, being fitted with only a single portcullis of unascertainable dimensions.[1749] The later stone lined tomb 249 **[67]**,[1750] also had its stairway and passage blocked by two portcullises (of unknown dimensions) set in grooved emplacements.[1751] The first prevented access to the flanking magazines, the second barred access to the burial chamber.[1752]

Abu Ghurab

Further south at Abu Ghurab, although little information is available, a portcullis was used to block access to the burial chamber of the Type ID Mastaba IV **[69]**, where at the end of its stairway, Radwan discovered, 'huge blocks of limestone formed its entrance and its portculli'.[1753]

Saqqara

There are eight Type ID tombs and a single Type IIA tomb at Saqqara with portcullises, or at least the emplacements to accommodate them. Sufficient information is available to discuss seven of them, thanks to Emery's detailed excavation reports.[1754]

The earliest of the Type ID tombs is S 3035 (Hemaka) **[89]**, [1755] which boasts the largest number of portcullises in the necropolis. Beyond a brick gateway, about a third of the way down its descent,[1756] three portcullises set at intervals in grooves in the rock blocked the lower part of the stairway. The upper two stones were missing, but the broken section of the lowest was still *in situ* and was 2.21 m wide × 0.35 m thick. Although damaged by tomb robbers, who had bored through it (Fig. 297), sufficient of it remained to show that it had been grooved on both

[1748] Yacoub 1981: 160 and scaled dimensions from pl. XVII.
[1749] Unfortunately, no measurements are marked on the plan, and although Yacoub (1981: pl. XIV) marked his drawing of tomb 1035 as drawn at a scale of 1:50, comparison to other adjacent illustrations with 1:50 graphic scales suggests that this is not the case and is inaccurate.
[1750] This tomb probably dates to the reign of Qa'a on stylistic grounds (Kaiser 1998: 78–82).
[1751] They are faintly shown on the tomb drawing (El-Khouli 1968: pl. V), but it is almost impossible to take scaled dimensions from them.
[1752] El-Khouli 1968: 75, pl. V.
[1753] Radwan 1995: 312–3, Taf. III, also Radwan 1991: Abb. 1 & Taf. 39.
[1754] Emery 1938, 1949, and 1958.
[1755] Emery 1938: *passim*. Strictly speaking this tomb is a mixture of different 'types' as its substructure is in part a Type ID and a Type IIA as it combines an open pit with rock-cut chambers. It is probably closest to the Type II tombs in Cemetery M at Abu Roash, but of course unlike them, it has external access.
[1756] Emery 1938: 5–6.

Figure 297 The damaged second portcullis at the base of the rock-cut stairway in tomb S 3035 (Hemaka) at Saqqara. The grooves for ropes run right under the base, suggesting that its rope holes may have been at the top, as in the photograph on the right. (Emery 1938, pl. 6, fig. d)

Figure 298 The door to the putative burial chamber of Hemaka blocked by a 2 tonne portcullis. The holes and grooves for lowering ropes can be clearly seen. (Emery 1938, pl. 6, fig. c)

sides to accommodate lowering ropes.[1757] At the end of the staircase, which ran down into the main pit, a doorway that led to a rock-cut chamber[1758] was blocked by a large freestanding portcullis (Fig. 298).[1759] The stone had holes and grooves for lowering ropes and was 0.25 m thick. Damage to its base and top had been caused by tomb robbers,[1760] but even in this condition it can be estimated to weigh about 2 tonnes.

Less well defended was S 3036 (Ankhka) **[90]**. Its descent was blocked by a single portcullis at the base of the stairs (now missing),[1761] whose enormous size can be envisaged from the large grooves built to accommodate it, which were 0.63 m wide and 2.7 m apart (Fig. 126).[1762] Similarly, tomb S 3038 **[91]**, was also missing its single portcullis at the bottom of its staircase. Grooves 0.4 m wide and 1.25 m apart, demonstrate that in comparison to that of S 3036, it would have been of modest dimensions.[1763]

The access ramp of tomb X **[92]** was blocked by a 0.3 m thick, 2 tonne, limestone portcullis (Fig. 299) that had two holes drilled in its base for lowering ropes.[1764] Nearby, in the passage of S 3338 **[93]** vertical grooves were in place for two portcullises, one before the flanking magazines, which was missing, and another at the entrance to the burial chamber, which was 0.25 m thick[1765] and would have weighed approximately 1.4 tonnes. Although the layout of neighbouring S 3505 **[95]** was similar,[1766] its magazines were left unprotected

[1757] Emery 1938: 6. These would have both ensured the stone's verticality and reduced friction on the ropes as they followed the stone into its emplacement, and aided their subsequent removal once the stone was in place (Petrie, Wainwright and Mackay 1912: 26).

[1758] Emery (1938: 7–8) hypothesized that this was the burial chamber, which in the view of the author seems highly unlikely if the effort that had gone into the digging and roofing the enormous main pit is taken into account.

[1759] It seems unlikely that this portcullis was originally placed in this position as there is no evidence of any emplacement or structures to support it. That the portcullis was designed to be lowered is evident from the grooves and holes made in its surface to accept ropes. However, looking at Emery's drawings the portcullis appears too narrow to have fitted in the slots on the main staircase, so it may not have originated from there either. Perhaps the row of holes on the descending slope that leads to the doorway held a timber framework, which would have supported the portcullis, or alternatively, it could possibly have been brought in later from elsewhere to protect an intrusive burial.

[1760] Emery 1938: 7–8.

[1761] In this stairway Emery (1949: 73) mentioned 'a false portcullis groove' under the superstructure, but why he described it as 'false' is not clear. Did he mean it was unused or just for decoration? This grey area opens up the possibility that the tomb could possibly have had two portcullises.

[1762] Emery 1949: 73–4.

[1763] Emery 1949: 84.

[1764] Emery 1949: 107–8.

[1765] Emery 1949: 125–7.

[1766] Emery 1958: 9.

Figure 299 The portcullis in tomb X at Saqqara in its emplacement. The drilled holes for lowering ropes are at its base.
(Emery 1949, pl. 44)

Figure 300 The twin portcullises in situ at the base of the stairway in tomb S 3500. In this case the holes for its lowering ropes are at the top of the lower stone.
(Emery 1958, pl. 119b) Courtesy of the Egypt Exploration Society.

Figure 301 The portcullis of the Type ID tomb S 2105 in situ.
(Quibell 1923, pl. XVI.2)

by its single 2.25 tonne portcullis, which was set in an emplacement at the entrance to the burial chamber. Nearby, tomb S 3500 **[94]**, provides an opportunity to examine portcullises *in situ* (Fig. 300). In the lower part of its staircase were two portcullises, the first and larger of the two was 0.3 m thick and the second, unlike the former, had been drilled with holes to accept lowering ropes.[1767] The stones would have weighed 2.7 and 1.68 tonnes respectively.

[1767] Emery 1958: 101.

Both the Type ID S 2105 **[96]** and the Type IIA S 3121 **[97]** were also fitted with portcullises. Although little detail is available, a photograph of the stone in S 2105 *in situ* (Fig. 301) shows that the top corner had been broken by robbers at some point. On the other hand, the slab in S 3121 had been smashed to pieces, but from the fragmentary remains, Emery was able to ascertain that it had been drilled to accept lowering ropes and had been cut with copper chisels.[1768]

Helwan

There are fifteen Type ID tombs with portcullises or emplacements for them reported from Helwan,[1769] five of which are 'stone tombs'. Although their portcullis arrangements are often poorly recorded, a certain amount of information may be gleaned from the works of Saad[1770] and the recent publications of Köhler.[1771]

The number of portcullises in individual tombs at Helwan varied considerably. Some were protected by just a single stone, others by two, three or four. Tombs with a single portcullis placed just before the burial chamber include 701.H.3 **[147]**, of which few details are available,[1772] and 355.H.4 **[152]**, which was found to be missing its stone.[1773] Although no portcullis is mentioned in Saad's brief report on the stone lined tomb 9.H.1 **[161]**,[1774] portcullis grooves are shown on its staircase in his 1:400 site plan.[1775] Similarly, the plans of tombs 1473.H.2 **[153]**,[1776] and 785.H.5 **[154]**,[1777] show a single grooved emplacement before each of their burial chambers.[1778] Likewise, the flanking magazines and burial chamber of tomb 559.H.2 **[145]** were also protected in the same way.[1779] A single portcullis found *in situ* was that in tomb 426.H.4 **[150]**. At the bottom of its mud-brick stairway, within the pit itself and beyond its internal magazines,[1780] mud-brick grooves held a 0.3 m thick,[1781] 1.7 tonne, limestone portcullis drilled at its top with two holes for lowering ropes.

Figure 302 The portcullis of the Type ID tomb 665.H.3 at Helwan with a single hole drilled in its base for its lowering rope.
(Saad 1947, pl. LXXXVII)

Adding a further stone presumably doubled the security, as two sets of portcullis grooves at the base of the stairs of tomb 553.H.2 **[144]** suggest, although no stones were found *in situ*.[1782] More detail is available for 1371.H.2 **[148]**,[1783] where a 0.15 m thick,[1784] 0.55 tonne portcullis at the base of its stairs prevented access to flanking magazines in the pit beyond. These framed a much larger limestone slab of similar height and width, but 0.55 m thick,[1785] which closed off the burial chamber and weighed around 2.2 tonnes. Similarly, the magazine area of tomb 1502.H.2 **[149]** was protected both by a portcullis at the end of its stairway, and a second between the magazines in the pit before the burial chamber,[1786] as was the case in tomb 665.H.3 **[NIC]**, where its second portcullis was found to have a single hole drilled in its base to accommodate a lowering rope (Fig. 302).[1787]

Portcullises were also found in three Type ID 'stone tombs'. The remains of two broken portcullises were discovered in 40.H.3 (Op. 1/1) **[158]**, located at the end of its stone lined stairway and set in tandem before the magazines and the burial chamber beyond (Fig. 303). Both of the stones were 0.3 m thick and bored to accept lowering ropes.[1788] Assuming they were originally about 2 m high,[1789] they would have both weighed about 1.48

[1768] Emery 1949: 118. Whether Emery means that the portcullis had been broken by these chisels, or that they were the original marks from the stone's shaping and dressing is not clear.
[1769] There are undoubtedly many more if one looks at the maps in Saad (1947 and 1951), but many are not published or mentioned in the text.
[1770] Saad 1947, 1951 and 1969.
[1771] Köhler 1998, 2000a, 2000b, 2005, 2007, 2008a, 2008b and 2009.
[1772] Saad 1947: 173, pl. LXVI. There are no dimensions given for this tomb, nor is there any scale shown on the drawing, so it is impossible to discuss the tomb further.
[1773] Saad 1951: 8–9.
[1774] Saad 1947: 28; Köhler 2005: n. 136.
[1775] Saad 1947: Plan 2.
[1776] Incorrectly labelled in some of the publications by Saad as 1374.H.2 and corrected by Köhler from his field diary (Köhler 2008b: n. 4).
[1777] Saad 1969: 20–2, pl. 9.
[1778] Saad 1947: Pl. XXXIX.
[1779] Saad 1947: 107–8, pl. XLIV. The flanking magazines were inaccessible due to them being hidden behind the mud-brick stairway lining, marked only by what appeared to be a 'serdab' like blank niche (Saad 1947: 108).
[1780] This type of tomb probably was built at the end of the Dynasty, as the placing of these magazines in a similar fashion to those of the tomb of Qa'a in Abydos would suggest a contemporary date (Köhler 2005: 26).
[1781] Scaled dimensions from Saad (1951: Plan 10).
[1782] See Saad 1947: 107, Pls. XXXVI and XLIV.
[1783] Saad 1947: 109–10.
[1784] Scaled dimensions from Saad (1947: Pl. XXXVIII).
[1785] Scaled dimensions from Saad (1947: Pl. XXXVIII).
[1786] The second portcullis is not mentioned by Saad (1947: 110–1) but a second set of grooves can be clearly seen in the plan and elevations accompanying his report, see Saad 1947: Pl. XL.
[1787] Saad 1947: 173, pl. LXXXVI.
[1788] Köhler 2005: 21.
[1789] Köhler 1998: 69.

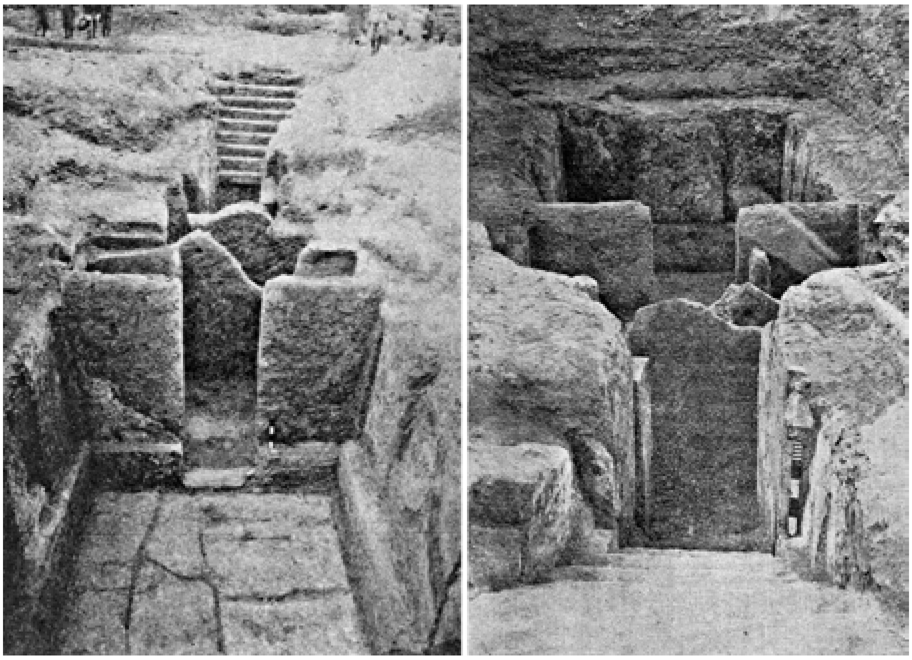


Figure 303 Views south and north of the two portcullises in the stone lined Type ID tomb 40.H.3 (Op. 1/1) at Helwan, which were set before the magazines and burial chamber. (Saad 1947, pls. LXIX–XX)

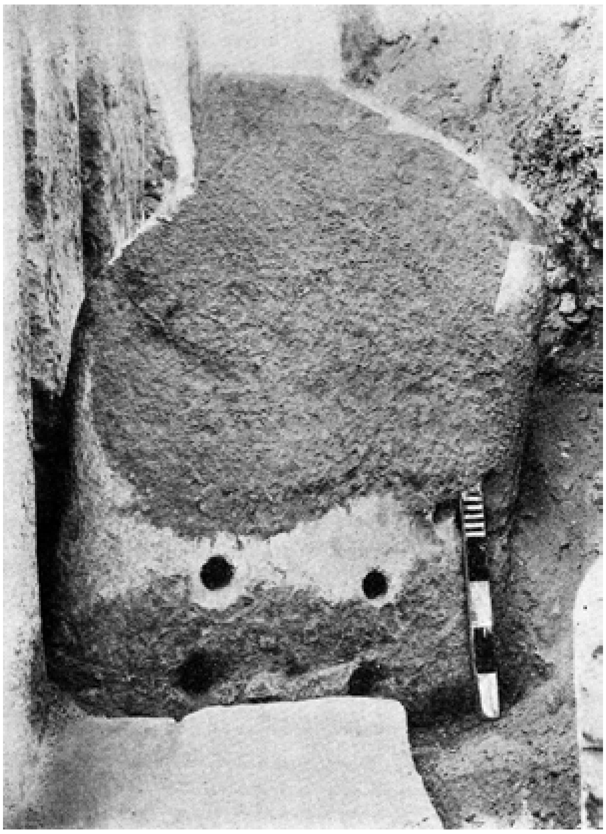


Figure 304 The penultimate portcullis from the stone lined Type ID tomb 1.H.3 at Helwan, the four holes for the lowering ropes can be seen in its base. (Saad 1947, pl. LXVIII)

tonnes. Comparatively little evidence is available for tomb 60.H.1 **[160]**, where at the base of its mud-brick staircase (Fig. 152), a single portcullis protected small flanking niches or magazines and beyond them a second blocked entry to the burial chamber,[1790] but no further details are available. Tomb 1.H.3 **[159]**, has the largest number of portcullises found at Helwan and was secured by four stones of unknown dimensions (Figs. 149–50). From the top of its 'L' shaped staircase, following a 90° turn onto its straight descent, a portcullis blocked access to the passage beyond and its two flanking magazines. Further down, grooves in the wall suggest that an additional portcullis blocked the way, as did another a short distance further on, which was found *in situ.* This was drilled with four holes for lowering ropes in its base (Fig. 304) and protected a further two magazines. Finally, a portcullis barred the entrance to the burial chamber itself.[1791]

Section summary – the First Dynasty

Coinciding with its adoption in royal necropoleis, from the mid First Dynasty the portcullis flourishes in Lower Egypt amongst the Type ID tombs of Abu Ghurab, Saqqara, and Helwan as well as the unusual Type II tombs of Abu Roash. Although it was usually installed as a lone slab set in an emplacement by the entrance to the burial chamber, either in the stairway or the pit itself, in larger tombs the portcullis was sometimes found in twos, threes and fours set in grooves along the length of the access route, or within the pit itself, where it offered additional in-depth protection and occasionally separated the magazines from the burial chamber.

The Second Dynasty (Naqada IIID)

The survey includes sixty-seven tombs with portcullises from this period. The majority, fifty-seven in all, are

[1790] Köhler 2008b: 120–1, figs. 8b and 9–12.
[1791] Saad 1947: 163–4, pls. LXVII–LXVIII.

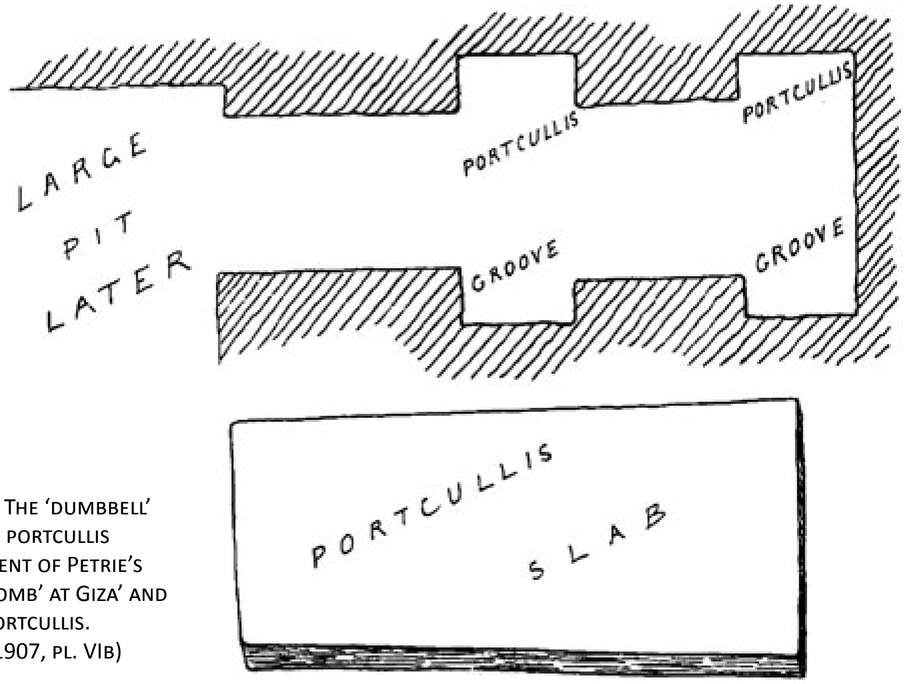


Figure 305 The 'dumbbell' shaped portcullis emplacement of Petrie's 'Unknown Tomb' at Giza and its portcullis. (Petrie 1907, pl. VIb)

Type IIA staircase tombs, four are Type IIB deep staircase tombs and six are Type IIC shaft tombs. Their distribution is more widespread than in the First Dynasty; the majority are still in Lower Egypt, with only ten from Middle Egypt and two from Upper Egypt.

Giza

During his excavations at Giza, Petrie referred to a Type IIA tomb **[60]**,[1792] that he dated to the reign of Ninetjer. Found under the remains of a Twenty-Sixth Dynasty mastaba, a slope leading to a subterranean burial chamber was divided by two pairs of portcullis slots, set 0.91–0.93 m apart (Fig. 305). Although one portcullis was destroyed, the other was found on the surface and was 2.99–3.04 m high × 1.21–1.39 m wide × 0.29 m thick,[1793] and would have weighed approximately 2.6 tonnes.[1794]

Abusir

Bonnet reported that the majority of the Type IIA, IIA-C and IIC tombs that he excavated at Abusir tended to have their entrances blocked by a portcullis.[1795] Although in his publication only two are drawn in detail. These are the Type IIA tomb 10B-4 **[71]** and the Type IIC shaft tomb 12B-6 **[74]**. Both had their burial chamber entrances blocked by freestanding portcullises, which in the case of 10B-4 was approximately 0.4 m thick and in 12B-6 about 0.3 m thick;[1796] they would have weighed around 1.34 tonnes and 0.77 tonnes respectively.

Saqqara

There are fifteen tombs that may have possessed portcullises published from Saqqara, all of them are Type IIA staircase tombs (see Chart P), although many are poorly reported.[1797] However, enough material exists to at least present a sample of their use, placement and distribution, even if it is not comprehensive.[1798]

Three tombs are sufficiently published to permit a discussion of their portcullis arrangements. The first is tomb S 3042 **[100]**, which was excavated by Firth (Fig. 164).[1799] Its 'L' shaped external staircase led into an open trench where a stone portcullis set in grooves would have blocked a short subterranean passage. Beyond this, a further open trench flanked by two magazines led to another portcullis, also set in a grooved emplacement that

1792 Porter and Moss 1974-81: 295.

1793 Petrie 1907: 7. For a discussion of the context of this tomb and other early monuments at Giza see Martin 1997: 279–88.

1794 Bearing in mind the tomb's dating, it is interesting to note that this in tandem or 'dumbbell' arrangement of portcullis grooves in an emplacement is very similar to that in the entrance to King Ninetjer's tomb at Saqqara, see Fig. 240.

1795 Bonnet 1928: 3. See Bonnet 1928: Taf. 1 for a map of the cemetery with tomb numbers.

1796 Scaled from drawings by Bonnet (1928: Taf 2).

1797 The discussion of portcullises in this period is somewhat inhibited by the fact that many Second Dynasty tombs at Saqqara still remain unpublished, see note 788 regarding Emery's unpublished excavations. The majority included in this survey having been excavated by Quibell (1923: *passim*) who gave little detail of the portcullises in the tombs and left few if any dimensions to work from.

1798 There is also a portcullis in the elite Second Dynasty tomb underneath the tomb of Meryneith **[NIC]** (Regulski 2011: 700), but its details are unavailable and the entrance and access route leading to it still awaits discovery.

1799 Firth died before he could publish this material himself, so this information was gleaned from his notes by Reisner (1936: 383).

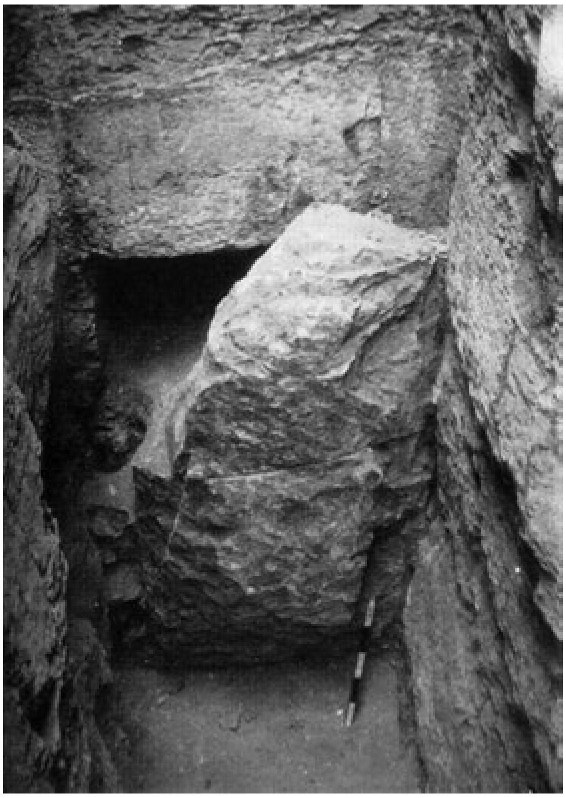


Figure 306 The portcullis blocking the entrance to the substructure of the Type IIA tomb S 3477 at Saqqara. The tomb was found intact and the damage to the stone is attributable to Emery's workmen who cut through it on his instructions. (Emery 1962, pl. 5A) Courtesy of the Nederlands Instituut voor het Nabije Oosten.

blocked the entrance to its subterranean chambers.[1800] The second tomb is the similar S 3024 **[103]**, which was also entered by an external 'L' shaped staircase that led to a landing, where progress was barred by a portcullis set in grooves. Past it, another flight of stairs led to a second landing flanked by two magazines, where the final portcullis rested in its emplacement and blocked the entrance of the burial chamber.[1801] Finally, on a smaller scale is the intact tomb S 3477 **[102]**.[1802] At the end of this tomb's stone entrance passage, beyond its flanking magazines, which remained unprotected, a 0.3 m thick,[1803] 1.97 tonne portcullis was found located in a grooved emplacement blocking progress to the chambers beyond (Fig. 306).

Although a lack of information precludes discussion of the portcullises in many of the tombs published by Quibell, for example S 2152 **[NIC]** and S 2171 **[104]**, it is possible to discuss their positions in some of the larger 'house' type substructures (Fig. 307).[1804] The biggest of these was S 2302 **[105]**. Access was via a stairway that

[1800] Reisner 1936: 144–5, fig. 67.
[1801] Emery 1949: 12.
[1802] Emery 1962: *passim*. The portcullis was intact until Emery (1962: 5) excavated it. He assumed that it had been circumvented already by tomb robbers and ordered his men to cut it to gain access.
[1803] Scaled dimension from Emery (1962: pl. 4).
[1804] Although the layouts of the earlier Second Dynasty tombs are similar in design to those of their predecessors, with the exception that they were rock cut and subterranean, by the mid Second Dynasty, the plan generally changes to that of the 'house type' with the subterranean chambers generally excavated separately in the rock (Tavares 2005: 857).

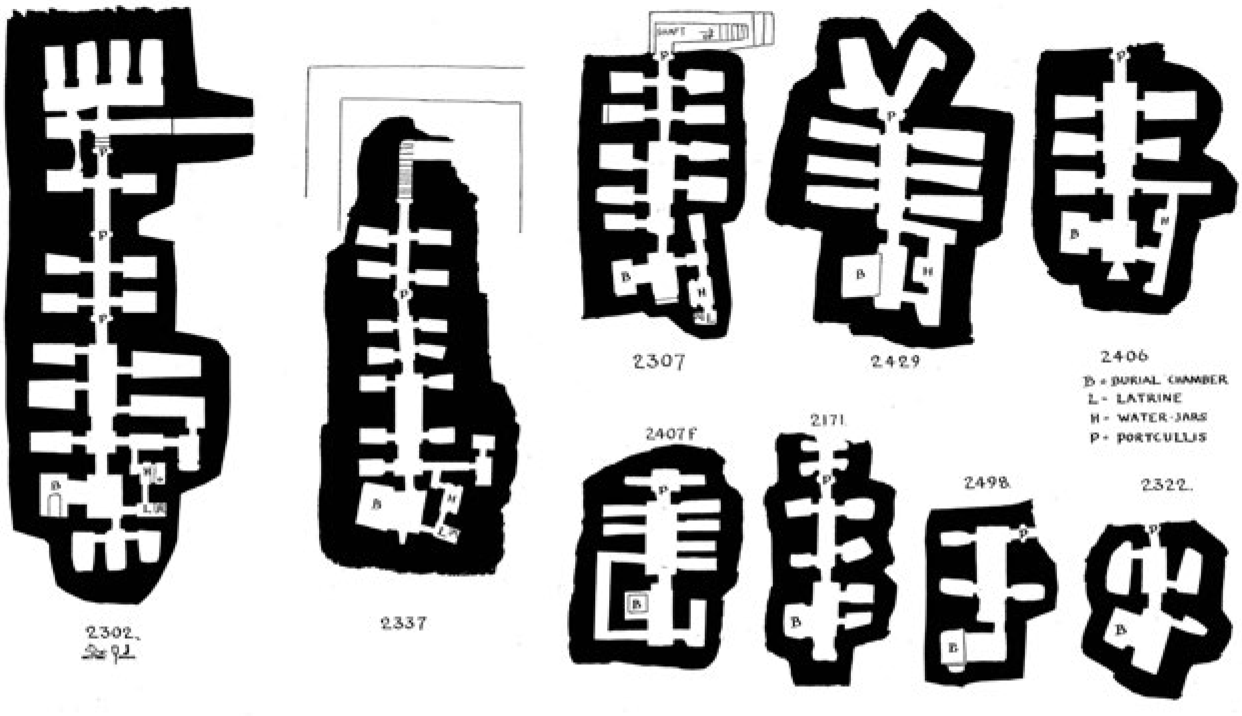


Figure 307 The substructures of assorted Type IIA and IIA-C 'house type' substructures at Saqqara with their portcullis emplacements marked with a letter 'P'.
(Quibell 1923, pl. XXX)

led to a subterranean north-south orientated passage.[1805] To the north and west were open magazines, but southwards the route to the core was blocked by stone and a large portcullis. Despite this obstruction, robbers had circumvented the portcullis by tunnelling through the rock around it into an adjacent magazine.[1806] Further along the central passage, yet another portcullis prevented access to more flanking magazines,[1807] followed by what appears to be a third emplacement marked on the plan (not mentioned by Quibell) that closed off the main complex.[1808] Nearby, tomb S 2337 **[108]** had a similar layout, its first portcullis reportedly set in grooves 6.4 m deep,[1809] beyond which, further down the passage after its flanking magazines, a second portcullis blocked access to the chambers beyond.[1810]

Similar arrangements, but with just a single portcullis are seen in tombs S 2171 **[104]**, S 2307 **[106]**, S 2315 **[112]**, S 2322 **[107]**, S 2406 **[109]** and S 2452 **[101]**. Quibell gave a brief description of the portcullis arrangements in S 2452:

> 'The stair descended nearly 8 metres from the mastaba top, 6 m. 60 cent. from the desert level: the portcullis was in place, a formidable block more than 2 metres high.'[1811]

Despite being difficult to reach and hard to move or penetrate, these portcullises were still overcome by tomb robbers, as Quibell described:

> '...an irregular shaft with dangerously vertical sides has been sunk through the gravel filling. At the bottom we can see the portcullis still standing in position, but if we venture to descend, we shall find on one side of it a hole large enough for a lad to squeeze through. The robbers have mined round the portcullis and penetrated to the subterranean corridors…'[1812]

This example demonstrates that even in the comparatively hard geology of Saqqara, it was often easier to tunnel round a portcullis than to go through or move it.

Helwan

There are thirty-two tombs, either with portcullises or at least their emplacements reported from this site in the catalogue,[1813] although there are undoubtedly many more that remain unpublished.[1814] Twenty-three are Type IIA staircase tombs,[1815] four are Type IIB deep staircase tombs, and five are Type IIC shaft tombs (see Chart P).

Although their access routes vary in their approach, generally their portcullis emplacements are very similar, and in every case at Helwan in the Second Dynasty, where they are present,[1816] there is only provision for one stone. They are sometimes backed up with a secondary blocking of mud-brick or dry stone. Their emplacement's characteristic 'T' shaped slots are usually excavated directly in the gravel or rock by the entrance to the substructure, in contrast to their Type ID predecessors, where they were often formed in the stair lining or the brickwork before the burial chamber. Only eight portcullis stones were found *in situ* amongst the tombs in this survey; presumably the others were removed, recycled, destroyed or never fitted.

Although no plan is available for the Type IIA tomb 809.H.3 **[NIC]**,[1817] there is a photograph of its portcullis (Fig. 308).[1818] Of special interest are the notches carved in its upper half and its base for lowering ropes to be tied round it, which replaced the holes usually seen in portcullises both here and elsewhere. However, not all portcullises took this form, for example the entrance to 505.H.4 **[165]** was blocked by a large portcullis found in a grooved emplacement.[1819] In Saad's photograph of the slab[1820] (Fig. 309), it is noticeable how crude it was in comparison to the finely carved stone of 809.H.3 and that it lacked any method of attaching ropes.[1821]

In the slightly smaller Type IIA tomb 810.H.3 **[169]**, Saad's drawings show the stone *in situ.* They reveal a portcullis approximately 0.4 m thick,[1822] which can be

[1805] Reisner 1936: 138, See also Emery 1961: 94, fig. 54.
[1806] Quibell 1923: 29.
[1807] Quibell 1923: 12.
[1808] Quibell 1923: 29.
[1809] Quibell 1923: 36.
[1810] Reisner 1936: 141–2.
[1811] Quibell 1923: 41.
[1812] Quibell 1923: vii–viii.
[1813] Although not much detail concerning portcullises is available in Saad's (1947, 1951, 1957 and 1969) reports, the many tomb plans included with them do provide material to work with. In addition to this the more recent work by the Australian team from Macquarie University, under the direction of Christiana Köhler, provides a great deal of useful data.
[1814] If one examines the cemetery plans from Saad's publication (1951: Pls. I–III) it is obvious that there are many Type IIA, IIB and IIC tombs that are unpublished, and undoubtedly a great number of them had portcullises. Additionally, there are some tombs, such as the Type IIA 1139.H.11 **[NIC]**, which are not even marked on a necropolis plan (Köhler and Jones 2009: 7), but are mentioned in Saad's field diaries (included in Chart P).
[1815] Three of these are tombs 344.H.6 **[NIC]**, 433.H.8 **[NIC]** and 757.H.8 **[NIC]**, which are included in Chart P and are described as Type IIA stairway tombs (Saad 1957: 57 and 61), but their drawings (Saad 1957: plans B, K and L respectively) incorrectly show Type IIC shaft tombs and clash with their descriptions.
[1816] This does not mean that all tombs at Helwan that lacked grooved emplacements did not possess portcullis stones. The evidence from other sites, for example, Sedment and Lahun, suggests that tombs could have a freestanding stone placed in position, without a grooved emplacement. Indeed the cemetery plans in Saad's publication (1951: Pls. I–III) show many tapered staircases that may have provided 'wedge' shaped portcullis emplacements. However, the presence of grooves in an emplacement does at least indicate a high probability of the intention to install such a blocking, even if it is not present.
[1817] There is a small drawing plotted, however, on the 1:400 necropolis plan, see Saad 1951: Plate 1.
[1818] Saad 1947: 173, pl. LXXXVI.
[1819] Saad 1951: 15–7.
[1820] Shown upside down in the original plate (Saad 1951: Pl. XIc).
[1821] Not that all portcullises had to be lowered into position by ropes, see 5.3.1.3.
[1822] Saad 1947: 172–3, pl. LXV.

Figure 308 The unusual notches in the portcullis from the Type IIA tomb 809.H.3 at Helwan, which were designed to permit lowering ropes to be wrapped around the stone. (Saad 1947, pl. LXXXVI)

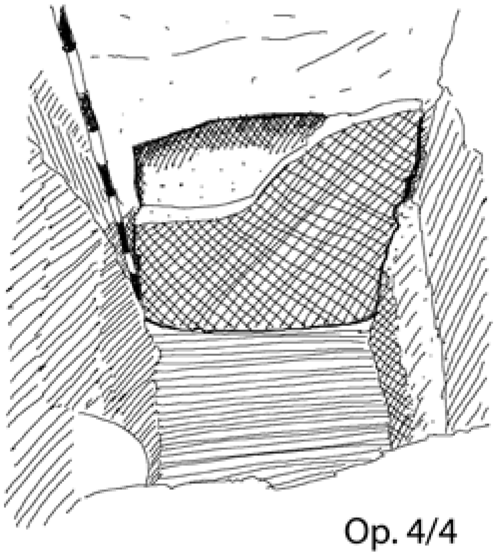


Figure 310 The portcullis in the Type IIA tomb Op. 4/4 at Helwan; the robber's have broken the top left corner and penetrated through the secondary mud-brick blocking behind. (Drawn by the author after Köhler 2000a, 40)

Figure 309 The crude portcullis blocking the entrance to the Type IIA tomb 505.H.4 at Helwan. The 0.5 m measuring stick suggests it is over 2 m high by at least 1.5 m wide. (Saad 1951, pl. XIc)

estimated to have weighed 1.9 tonnes. Unusually, Saad published the dimensions of the 0.26 tonne portcullis in tomb 140.H.9 **[180]**, which was 2.2 m high × 0.55 m wide × 0.1 m thick. Although this seems far too narrow for the tomb's 0.9 m wide stairway and entrance door.[1823] On a smaller scale is Op. 4/94 **[173]**, whose stone was used as part of multi-layered blocking. At the base of its stairway, a heap of large stones covered a portcullis in its grooved emplacement that lay directly in front of the burial chamber's entrance, behind which in turn was a mud-brick wall. Despite all this the tomb was robbed via a hole pierced through the blockings and by a tunnel through its roof.[1824] Similarly, the entrance to the substructure of Op. 4/4 **[181]** was blocked with a 0.13 m thick, 0.33 tonne, limestone portcullis, backed up by a secondary mud-brick blocking.[1825] The tomb had also been robbed; a hole in one corner of the portcullis shows the entry method of the robbers (Fig. 310).[1826]

Of the four Type IIB 'deep' staircase tombs, only Op. 4/148 **[184]** was found with any evidence of a portcullis, whose smashed fragments were found mixed with the rubble in the tomb.[1827]

Lastly, of the five Type IIC shaft tombs with portcullis emplacements at Helwan,[1828] only one was found with its stone *in situ*. The deep shaft of Op. 4/115 **[201]** led down to a broken portcullis, the upper half of which was found missing; behind which a substantial dry stone wall acted as a secondary blocking to the small burial chamber beyond.[1829]

Tarkhan

Amongst the three Type IIA staircase tombs found at Kafr Amar,[1830] only one was discovered with its portcullis still in place. A freestanding stone slab 0.22 m thick,[1831] blocked

[1823] Saad 1957: 63, plan T.

[1824] Köhler 2007: 192–4, fig. 2.
[1825] Köhler 2000b: 89–90, fig. 5; 2000a: 39–40; 2014: 140.
[1826] Birrell 2000: 17.
[1827] Köhler 2009: 284.
[1828] Amongst these tomb 738.H.7 **[NIC]** is without a tomb plan, as the drawing of 670.H.7 **[193]** is in its place (Saad 1957: Pln. E).
[1829] Köhler 2008a: 172.
[1830] Petrie, Wainwright and Gardiner 1913: 27.
[1831] Petrie and Mackay 1915: 15.

the entrance to the burial chamber of grave 240 **[217]**. This would have weighed approximately 0.6 tonnes and was presumably retained in position by the stairway's backfill.

Lahun

Further south at Lahun, in the Bashkatib cemetery, there are twelve Type IIA tombs that possess either portcullises or their emplacements in widely varying arrangements.[1832]

Some of these tombs employed a tapering descent that may have held the portcullis stone by 'wedging' it in position, effectively forming a loose emplacement for the stone without the use of grooves. A typical example is the Type IIA tomb 785 **[259]**,[1833] which was entered by a slightly tapering staircase; at its end a 0.15 m thick portcullis blocked the entrance to the subterranean part of the tomb.[1834] Similarly, tomb 820 **[257]** possessed a more exaggerated trapezoid shaped descent in its staircase to secure its stone,[1835] and an even closer fit is seen in tomb 771 **[253]**, whose 0.56 tonne portcullis was 0.12 m thick.[1836] On the other hand, the portcullis of tomb 740 **[261]**[1837] appears to have been simply propped against its wide entrance, with perhaps nothing but backfill to prevent it being tipped out of position.[1838]

Eight of the tombs had more traditional grooved emplacements to accommodate their portcullises.[1839] Their inclusion in the tomb was not always a success, for example in tomb 734 **[255]**, where the stone was found to be missing,[1840] and in tomb 821 **[256]**, whose portcullis was too small to fit its grooves,[1841] as well as tomb 770 **[260]**, where a replacement mud-brick blocking was substituted instead.[1842] Additionally, although no drawing is available of tomb 850 **[NIC]**, it is notable for the depth of its grooved emplacement, which Petrie described as descending, '…20 feet from the surface'.[1843]

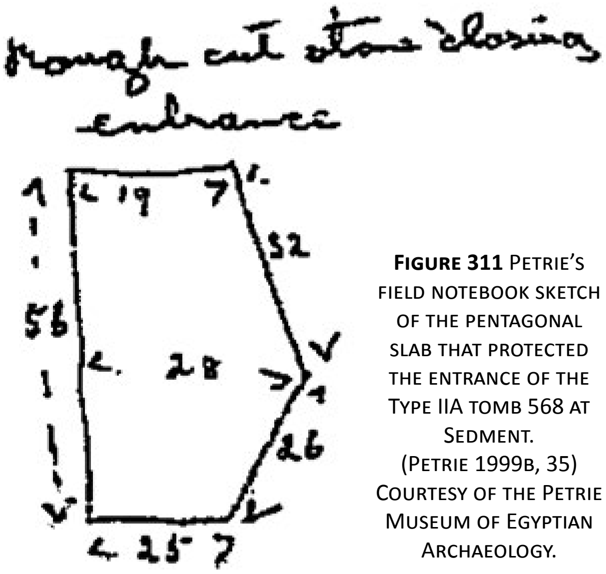


Figure 311 Petrie's field notebook sketch of the pentagonal slab that protected the entrance of the Type IIA tomb 568 at Sedment. (Petrie 1999b, 35) Courtesy of the Petrie Museum of Egyptian Archaeology.

Sedment

There are three Type IIA tombs with portcullises from Sedment. They had tapered stairways, but whether these were intended to form portcullis emplacements as well is unknown. Tomb 560 **[266]**[1844] possessed a small freestanding portcullis stone, which was not as wide as the tomb's entrance; this was backed up by a secondary blocking in the form of a mud-brick wall.[1845] Tomb 526 **[267]** had a portcullis described in Petrie's notebook as, 'white limestone rough cut edges'(sic),[1846] which would have weighed around 0.68 tonnes, and was a loose fit in its 'emplacement'. The unusual 'rough cut' pentagonal slab found in tomb 568 **[269]**, according to Petrie's notebook, was 1.42 m high × 0.71 m wide at its broadest point (Fig. 311), but there are no details of its thickness.[1847] It would have barely covered the offset doorway to its burial chamber, and certainly would not have been retained in position by its tapered 'emplacement'.

Badari

Only a single tomb has been found with a portcullis at Badari. Located at Spur 5 in Cemetery 3100, the burial chamber entrance of the Type IIA tomb 3112 **[278]** was blocked by a large, freestanding limestone portcullis that was 0.43 m thick (Fig. 179).[1848] This would have been supported in place by the tomb's tapered emplacement and would have weighed about 1.63 tonnes.

El-Kab

There are two small Type IIA staircase tombs with portcullises at El-Kab that date to the Second Dynasty. In the tiny tomb St. 2 **[NIC]** Quibell reported that 'a

[1832] Some of these are without plans and only mentioned in Petrie's (1923: pl. XLVI) Tomb register, they are tombs 704 **[NIC]**, 712 **[NIC]**, 717 **[NIC]** and 745 **[NIC]**, see Chart P.
[1833] The stone is not shown in the tomb drawing but is mentioned in the tomb register, see Petrie, Brunton and Murray 1923: Tomb register pl. XLVI.
[1834] Presumably, Petrie's dimensions with a '+' indicate a broken or incomplete slab?
[1835] Petrie, Brunton and Murray 1923: Tomb register pl. XLVI and pl. X.
[1836] Petrie, Brunton and Murray 1923: 23, pl. XII, fig. Q.
[1837] Petrie, Brunton and Murray 1923: 23, pl. XII, fig. R.
[1838] Petrie, Brunton and Murray 1923: 23, pl. XI, fig. N and tomb register Pl. XLVI.
[1839] Petrie, Brunton and Murray 1923: Tomb register pl. XLVI.
[1840] Petrie, Brunton and Murray 1923: 23, pl. XLII, fig. T
[1841] Petrie, Brunton and Murray 1923: 23, pl. XII, fig. S.
[1842] Petrie, Brunton and Murray 1923: 23, pl. Pl. XII, fig. U
[1843] Petrie, Brunton and Murray 1923: 23

[1844] Petrie and Brunton 1924: 2, pl. LXXXI.
[1845] The small size of this tomb's slab is surprising and points to the stone's use in this case as a general purpose barrier to prevent digging, rather than a method of 'hermetically sealing' the tomb.
[1846] Petrie 1999b: 38. The width of the emplacement was 1.19 m and the stone was 0.91 m, thus leaving a 0.14 m margin on either side.
[1847] Petrie and Brunton 1924: pl. LXXXI; Petrie 1999b: 35.
[1848] Brunton 1927: 13–4, Tomb register pl. XI and pl. XXIV.

large stone slab had been placed as a door to the burial chamber,' but no further details are available.[1849] In the second tomb, Grave 64 **[343]**,[1850] a sandstone portcullis was slotted into two specially cut grooves in the sides of its descent; it was 0.12 m thick and would have weighed approximately 0.15 tonnes.[1851]

Section summary – the Second Dynasty

In the Second Dynasty, with the emergence of the Type IIA, IIB and IIC subterranean substructure, the number of tombs found with portcullises compared to the First Dynasty seems to increase, most notably at the necropoleis of Abusir, Saqqara, Helwan, Lahun and Sedment. Rather than using multiple portcullises as in the First Dynasty, a single stone set in a grooved or tapered emplacement became the rule, with the exception of a few larger 'house' type substructures at Saqqara.

The Third Dynasty

Thirty-four tombs from the Third Dynasty are included in the chart that possessed portcullises or the emplacements to hold them. Sixteen of them are Type IIA staircase tombs, seven are Type IIA-C stair-shaft tombs, four are Type IIC shaft tombs and seven are 'twin' tombs, with assorted shaft or stair combinations. Most are from Lower Egypt, but around a third are from Upper Egypt.

Giza

The Type IIA-C Covington's Tomb **[61]** was equipped with two portcullises for its protection. The first was set in a large grooved emplacement at the base of its stair-shaft. The white limestone portcullis was oval in shape with slightly rounded faces, and its top, sides and base semi-circular in profile, rather than a rectangular block. It was a noteworthy 4.5 m high × 1.92 m wide × 0.28 m thick and would have weighed around 5.2 tonnes. It was found embedded 0.5 m down in the 'clay' at the base of the shaft, its top overlapping the entrance door by 1.4 m. Instead of attempting to move or breach it, robbers had dug round it through the rock to gain admittance to the passage ahead.[1852] In the subterranean complex beyond, a further shaft led to a second portcullis in a grooved emplacement. However, this stone was rectilinear in form and of a finer quality limestone than its predecessor; considerably smaller, it still weighed a substantial 2.33 tonnes. The stone was untouched, as robbers had dug a small tunnel over its top into the passage beyond.[1853]

[1849] Quibell 1898: 7.
[1850] Hendrickx and Van Rossum 1994: 216.
[1851] This calculation is based on the median figure of sandstone quarried from nearby Gebel Silsila, which weighs approximately 1.76–1.91 metric tonnes per cubic metre (Fitzner, Heinrichs and La Bouchardiere 2003: 1093).
[1852] Covington 1905: 209–10.
[1853] Covington 1905: 214.

Abusir

A single limestone portcullis was found tipped aside at the bottom of the shaft of the Type IIC tomb AS 54 from Abusir **[76]**. It is 0.25 m thick and weighs around 1.42 tonnes. Bárta reports a rectangular groove in the southern wall of the shaft above the burial chamber entrance, which he suggests was used to assist in the manipulation of the stone.[1854]

Saqqara

There are seventeen tombs published from Saqqara that were equipped with portcullises.[1855] Five of them are Type IIA staircase tombs, four are Type IIA-C stair-shaft tombs, five are 'twin mastabas' with a combination of substructure types, and three are Type IIC shaft tombs (see Chart P).[1856]

The details of the portcullises in the Type IIA tombs S 2429 **[110]** and S 3040 **[114]** are unclear, save that in both cases they must have sat in grooved emplacements.[1857] However, it is apparent that the stones of S 2183, S 2189 and 2199 **[all NIC]**, as well as the aforementioned S 2429 were all found *in situ*. Quibell records that the first two of these were 1.9 m and 2.5 m high respectively; that of S 2189 found 'leaning back from the chamber mouth'.[1858] Similarly, the stone of S 2313 **[113]** was also *in situ*, but was, 'broken away at the sides enough to admit a boy'.[1859]

The majority of the Type IIA-C stair-shaft tombs in the necropolis are, with the exception of S 2405, poorly recorded, although Quibell briefly noted that S 2103 **[121]** still had its portcullis in position, and had been plundered: 'the robbers' way forced round it'.[1860] Although the portcullis in S 2428 **[125]** was also in place, in order to gain further access into the tomb, it 'had to be broken up'.[1861] However, the portcullis in the Type IIA-C tomb S 2405 (Hesyra) **[119]** is more thoroughly reported. At the base of its stair-shaft, the damaged stone was displaced from its emplacement, the grooves of which were still visible in the surrounding rock. The 0.3 m thick slab, even in its damaged state, would have weighed around 1.25 tonnes.[1862]

[1854] Bárta 2011a: 46–7.
[1855] Some tombs cannot be categorised, such as S 2186 (Quibell 1923: 26) and S 3054 and S 3060 (Reisner 1936: 166–7), where no description of the entrance method is found, and are thus left out of the chart altogether.
[1856] Not every example is included in the tomb catalogue, but each is included in the portcullis chart.
[1857] See Quibell 1923: 9, Pls. II, XXIII and XXX; Reisner 1936: 163, fig. 77.
[1858] Quibell 1923: 26.
[1859] Quibell 1923: 32.
[1860] Quibell 1923: 18.
[1861] Quibell 1923: 40.
[1862] Quibell 1913: 3 and 11.

The details are also vague concerning Type IIC shaft substructures at Saqqara, as for example in tomb S 2508 **[NIC]**, which had just a part of its stone *in situ* at the base of its 5.6 m shaft. Equally unclear is the arrangement in S 2474 **[NIC]**, whose fragmented portcullis was found in the backfill at the base of its 12.25 m deep shaft.[1863]

Portcullises or their emplacements were also found in a number of Saqqara 'twin mastabas' with differing substructure types, for example, the Type IIC + IIC + IIC tomb S 2305 **[136]**, where only the most northerly of its three shafts had a portcullis, whose top was set at 4 m from the surface.[1864] In the Type IIA + IIA-C tomb S 3050 **[118]**, both access routes were found to contain portcullis grooves, although the stones were missing,[1865] as also was the case in the Type IIA-C + IIC tomb S 3039 **[NIC].**[1866]

Not every 'twin mastaba' that had portcullises would necessarily have a grooved emplacement. It appears from Quibell's plan of the Type IIA-C + IIA-C tomb S 2407 **[126]**, for example, that only the base of the southern stair-shaft 'f' was built with an emplacement.[1867] Similarly, Emery's drawing of the southern shaft of the large Type IIC + IIC tomb S 3518 **[131]**,[1868] shows that it lacked any form of emplacement, yet still contained a 2.5 m high × 0.3 m thick, 2.4 tonne freestanding portcullis that had been tipped askew by robbers (Fig. 201).[1869]

Naga el-Deir

Five tombs are known with portcullises from Cemetery 500–900, three with Type IIA substructures and two with Type IIA-C. In the smallest of the Type IIA stairway tombs N 599 **[304]** the burial chamber's entrance was blocked by a freestanding 0.35 m thick,[1870] 1.1 tonne, stone slab and a secondary mud-brick wall.[1871] Similarly, the entrance to the burial chamber of the unusual N 689 **[305]**[1872] was also blocked by a 1.7 m high × 1.3 m wide freestanding stone slab and possibly a secondary mud-brick wall.[1873] Access to the northern burial chamber in the 'twin' tomb N 573 + 587 **[306]** was also blocked by a freestanding stone slab and secondary mud-brick blocking.[1874] To avoid the stone, robbers had dug a shaft in the gravel fill from above and tunnelled over the slab to gain entry to the burial chamber.[1875] In the Type IIA-C stair-shaft tombs, a slab of unreported size blocked the entrance to N 585 **[308]**, which was backed up with a mud-brick secondary closure.[1876] Likewise the intact N 593 **[310]**, had its burial chamber entrance sealed with a freestanding portcullis found *in situ* that would have weighed around 0.9 tonnes; it too was also closed with a secondary mud-brick blocking.

Reqaqnah

Three Type IIA tombs with portcullises are known from Reqaqnah.[1877] The largest was R1 **[315]**,[1878] which was accessed by a steep staircase (Fig. 185),[1879] whose brick-lined sides were shored up with thick mud-brick cross-walls that formed barrel vaults over the stairs,[1880] creating three 'shafts', which may have had portcullises lowered through them.[1881] However, only one slab was found *in situ*, placed just in front of the entrance to the burial complex.[1882] Its crudely cut 3.2 tonne stone (Fig. 312) was around 0.6 m thick.[1883] Nearby, tomb R40 **[316]** is of a similar design,[1884] but was dug slightly deeper. At the end of its steep staircase, a deep bottom step formed an emplacement for the large 3 tonne stone portcullis that blocked the substructure's entrance.[1885] In addition, tomb R2 **[NIC]** can briefly be mentioned.[1886] Garstang reported on the removal of its portcullis:

> 'After pulling back the great slab of stone which served as usual for a door a serious subsidence occurred, necessitating the excavation to be renewed from above by removing all the superimposed weight of gravel. It was then found that a plunderer's hole had already been in the same direction.'[1887]

His comments both illustrate a typical tomb robber's technique for bypassing such an obstruction, and suggest the underlying reasons for the choice of an alternative route.

[1863] Quibell 1923: 43 and 46.
[1864] Quibell 1923: 30.
[1865] Martin 1974: 23–4.
[1866] Reisner 1936: 168.
[1867] Quibell 1923: pl. XXX. However, no mention is made of it in the text (Quibell 1923: 38).
[1868] Emery 1970: 10.
[1869] Dimensions scaled from drawing by Emery (1970: pl. XX).
[1870] Scaled dimensions from drawing by Reisner (1932: fig. 157). This dimension assumes that the slab was the full width of the staircase at its base.
[1871] Reisner 1932: 229; 1936: 182.
[1872] Reisner 1932: 229.
[1873] Reisner 1932: 244–45; 1936: 181–2. Because of its unusual stairway arrangement, this is one tomb that would have had its portcullis placed in position manually, rather than lowered, as there was no vertical face in the stairwell against which to lower it.
[1874] Scaled dimension from drawing by Reisner (1932: fig. 131).
[1875] Reisner 1932: 217–8; 1936: 181.
[1876] Reisner 1932: 224.
[1877] Garstang 1904: 11.
[1878] Garstang 1904: 22.
[1879] Reisner 1936: 179.
[1880] Garstang 1904: 22; Reisner 1936: 179–80.
[1881] Reisner 1936: 179.
[1882] The lack of any emplacements to accommodate such a stone on the stairs suggests to the author that this may in fact have been the only one.
[1883] Garstang 1904: pl. IVa.
[1884] Garstang 1904: 21–2.
[1885] According to the drawing (Garstang 1904: pl. IVb), the proportions of this stone were slightly unusual, at about 1.5 m high × 1.9 m wide, whereas the height in most portcullises is normally greater than the width.
[1886] No drawing is available of the tomb and no details are otherwise available.
[1887] Garstang 1904: 30.

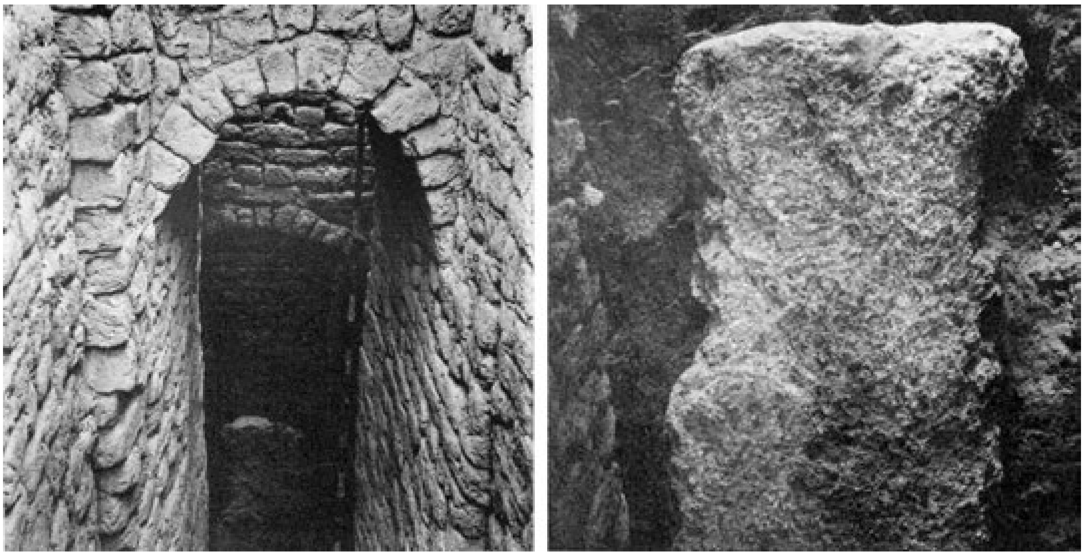


Figure 312 The barrel vaulted cross-walls that formed the 'shafts' for the portcullises of tomb R1 at Reqaqnah. The crudely cut 3.2 tonne slab can be seen at the base of the stairs and on the right hand photograph. (Garstang 1904, pl. V)

Beit Khallaf

The tomb with the largest number of portcullises in the survey is the enormous tomb K1 at Beit Khallaf **[319]**. After descending through the top of the superstructure via an 'L' shaped staircase to the desert level (Fig. 187), a large 0.45 m thick, 4.8 tonne, stone portcullis was intended to block further progress into the tomb, but possessing just a single groove for its emplacement, had fallen askew into the stairway. Beyond it, the stairway descended south into the gravel beneath and was blocked by a further five increasingly large portcullises slotted into grooves, the first of which was some 0.2 m thicker than its fallen predecessor. The shafts that accommodated them were both built into the mastaba itself and cut through the gravel below. Garstang noted that the width of the grooves and the depth of the threshold cut to accommodate the portcullises, ensured that tunnelling around or under them would not only be problematic, but invite collapse of the surrounding matrix. Although the dimensions of the intervening three stones are not available, at the base of the stairs the final portcullis was an remarkable 5 m high × 3 m wide × 0.45–0.6 m thick,[1888] and can be estimated to have weighed between 15–23.5 tonnes, the equivalent of two London double-decker buses.[1889] As an added security measure, once these stones were in position, it seems their 'wells' were filled with Nile mud and their openings bricked over,[1890] which would have literally cemented them into position and made removing them virtually impossible.

The smaller nearby Type IIA + IIA tomb K2 **[320]** was equipped with a total of three portcullises. The stairway of the southern entrance was obstructed halfway by a portcullis of unrecorded dimensions. Further down a second large portcullis blocked access to the subterranean complex beyond (Fig. 313). At 5.18 m high × 2.43–2.74 m wide × 0.61 m thick, its size rivalled that of the largest stone from tomb K1, and can be estimated at between

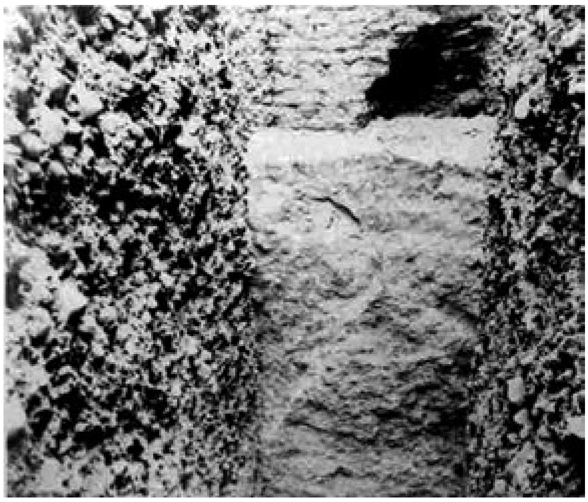


Figure 313 The huge 14.7–22.5 tonne portcullis stone from Mastaba K2 at Beit Khallaf. (Garstang 1903, pl. XVII) Courtesy of Bernard Quaritch Ltd.

[1888] Garstang 1903: 9.

[1889] The famous London Route master double-decker buses weighed between 7.46 tonnes (7 tons 7 cwt [unladen] Imperial) and 11.68 tonnes (11 tons 10 cwt [laden] Imperial). See webpage http://www.routemaster.org.uk/pages/history-2120-RM Accessed 14th January 2013. For comparison 1 metric tonne is 0.98419 UK imperial ton.

[1890] Garstang (1903: 12) wrote concerning his excavation of nearby tomb K2: '...the whole process by which these tombs were designed to be protected was made clear. The funeral ceremony performed, and the pathway laden with offerings, the slender walls of brick were removed, and the great stones fell into position before the successive doors, sliding in their grooves. The wells were then filled with mud of a hard and tenacious quality. The surface over all was probably bricked up, to finally conceal the approaches to the tomb.'

14.72–22.51 tonnes. To get past this monolith, Garstang was forced to burrow a hole under its base, but upon entering the tomb discovered that it had already been robbed in antiquity.[1891] Less well defended, the tomb's northern 'U' shaped staircase descended to a single portcullis that had never been lowered. Notably, the slab was found in a raised position supported by 'slender walls of brick' that were intended to be removed to lower it. If it had been lowered, like its neighbours, it too would have been further secured with liquid mud.[1892]

The remaining tombs at this necropolis, K3, K4 and K5, are typical Type IIA tombs. Although K3 **[321]** and K4 **[322]** were fitted with portcullis grooves, their stones were found to be missing,[1893] whilst the stone of K5 **[323]** was found *in situ.* Garstang managed to get past this portcullis, 'by forcing an entrance from above it'. However, once inside, he found that the tomb had been robbed, this time via a vertical tunnel from above.[1894]

El-Kab

Out of the thirteen Third Dynasty Type IIA tombs discovered by Quibell at El-Kab,[1895] only two examples, St. 9 and St. 12 **[both NIC]**, were reported to have portcullises.[1896] Although little detail is available, Quibell described the methods used by tomb robbers to defeat the blocking of St. 9:

> '…The stone door of the burial chamber was still standing, the robbers having apparently found it easier to force their way through the comparatively soft earth above the great slab. We were frequently able to trace their mode of entrance, and found that they sank their shafts at the deep end of the stairway, never clearing the long flight of steps…'[1897]

Section summary – the Third Dynasty

An expanding variety of substructure types, which more frequently include Type IIA-C stair-shafts and 'twin substructures' now incorporated the portcullis for protection. Though the majority of tombs with portcullises are still found in Lower Egypt, their numbers appear to increase in Upper Egypt, notably in the Thinite cemeteries at Naga el-Deir, Beit Khallaf and Reqaqnah. Amongst the massive high status mastabas at Giza and Beit Khallaf, an increase in both the numbers and size of the stones themselves is also evident, the zenith of which is reached with the six found in Mastaba K1 at Beit Khallaf, one possibly weighing in excess of 20 tonnes.

The early Fourth Dynasty

There are forty-nine tombs with portcullises in the catalogue from the early Fourth Dynasty, forty of which are Type IIC shaft tombs, one is a Type IIA-C stair-shaft tomb, two are Type III sloping corridor tombs and the remaining six are 'twin mastaba' types with an assortment of approaches (see Chart P).

Abusir

Two early Fourth Dynasty tombs at Abusir have portcullises. The first is the Type IIA-C tomb AS 33 **[77]**. At the base of its stair-shaft, a large freestanding portcullis originally obstructed the entrance to the tomb's underground complex (Fig. 196).[1898] Although the 4.35 tonne stone is a substantial 3.9 m high × 1.3 wide × 0.3–0.4 m thick, Bárta found it tipped out of its original position,[1899] presumably by robbers, who must have cleared the slab's retaining backfill to do so.[1900]

Nearby, the 'twin mastaba' Type IIA-C + IIC tomb of Ity **[79]** originally incorporated two portcullises. The tomb's northern stair-shaft descended to a portcullis (missing) that once obstructed the entrance to the substructure.[1901] Lacking an emplacement, the stone was probably retained by the backfill and liquid mud used to seal the stair-shaft. In the southern shaft a 0.3 m thick, 1.7 tonne, freestanding portcullis was found, which had initially closed the entrance to the burial chamber, but like in AS 33, its stone had been tipped askew by robbers bent on gaining admittance.[1902]

Dahshur

Four Type IIC tombs are known from Dahshur with portcullises. The first is in de Morgan's tomb no. 1 **[205]** located amongst his '*mastabas du sud'* in Dahshur North.[1903] Set within a stone built 'T' shaped shaft with full depth slots, its 0.4 m thick,[1904] 3.1 tonne slab was found *in situ* (Fig. 207).

Further south in the 'Lepsius Mastaba Field', Mastaba I/1 **[209]**, was similarly built with a stone lined 'T' shaped shaft and emplacement to accommodate its 3.1 tonne, 0.4 m thick portcullis,[1905] which was also found *in situ* (Fig. 210). For additional security, the stone's base sat in a rebate in the floor of the shaft, making it difficult to lever up. However, a breach had been made by robbers in the upper corner of the slab to gain access to the burial

[1891] Garstang 1903: 11.
[1892] Garstang 1903: 12.
[1893] Garstang 1903: 14.
[1894] Garstang 1903: 15.
[1895] Quibell 1898: 3.
[1896] Quibell 1898: 8.
[1897] Quibell 1898: 8.
[1898] Bárta, Coppens and Vymazalová 2010: 65–7.
[1899] See Bárta, Coppens and Vymazalová 2010: Figs. 3.18–3.20.
[1900] Bárta, Coppens and Vymazalová 2010: 67.
[1901] Bárta 2001: 7–8.
[1902] Bárta 2001: 9–10.
[1903] de Morgan 1895: 8.
[1904] Scaled dimension from drawings by de Morgan (1895: Figs. 3–5).
[1905] Scaled dimension from Stadelmann *et al.* (1993: Abb. 10–1).

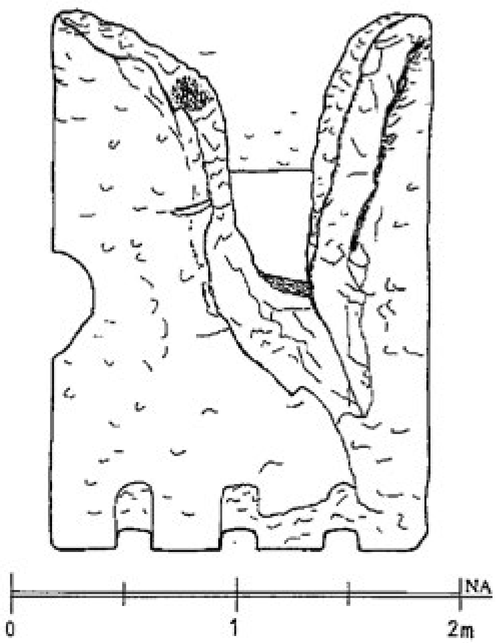


Figure 314 The damaged portcullis in Mastaba II/1 at Dahshur. The grooves for the lowering ropes can be clearly seen in its base. (Alexanian 1999, Abb. 7) Courtesy of the DAI Cairo.

chamber, possibly to avoid the reinforced shaft over the emplacement (see 5.1.2.5).

Within the virtually identical 'T' shaped emplacement of Mastaba II/1 **[210]**,[1906] a 4.5 tonne, 0.52 m thick portcullis was found that was carved with three 16 cm wide × 8 cm deep channels at its base, to accommodate lowering ropes (Fig. 314). Rectangular recesses in the shaft's walls suggest that a wooden beam was used to support the stone before it was closed;[1907] after taking the strain on the portcullis' lowering ropes, it could then have been cut away just before it was lowered into position.[1908]Although the burial chamber had been entered via a passage from the shaft,[1909] the portcullis was additionally breached by robbers who had used fire to assist them (Figs. 212–3).[1910]

The grooves of the emplacement of the slightly later Mastaba I/2 **[211]**,[1911] had a slightly different form. It has been suggested that rather than descend the full length of the shaft, as in Mastabas I/1 and II/1, they were built at an early stage and not all the way to the top of the shaft. Once completed, the portcullis (dimensions unavailable) was then supported by a wooden retainer of some form, before the rest of the shaft and superstructure were completed, without grooves, up to the top.[1912]

Meidum

There are thirty-eight tombs at Meidum that either possess portcullises or an emplacement. Six of them are mastabas, with varying substructure types located near the pyramid, thirty are Type IIC shaft tombs in the Far Western Cemetery,[1913] and two are Type III substructures situated north and west of the pyramid respectively.

The mastabas with portcullises are all located in the North Cemetery. In the Type III + IIC tomb no. 16 of Nefermaat and Atet **[251]**, only the burial of Atet was protected by a portcullis.[1914] At the base of the shaft, a 6.8 tonne, 3.5 m high × 0.55 m thick, freestanding stone was found leaning against the south wall, its upper edge approximately 1.5 m above the burial chamber's entrance (Fig. 216).[1915] This generous overlap was probably intended to prevent tunnelling above it, but the pressure from the enormous weight of its upper edge had born down against the shaft wall and caused the burial chamber's roof to collapse.[1916] The stone had been originally lowered into position using ropes, which ran through three 10 cm holes in its upper edge and were strung round a notched wooden beam. From the outer two holes, grooves ran down the slab's face. They were designed to prevent the ropes from binding against the beam; matching notches in the stone's base provided further anchor points and permitted the withdrawal of the ropes after the stone was in place.[1917]

Another 'twin' mastaba tomb with just a single portcullis was the nearby Type IIC + IIC tomb no. 6 of Rahotep and Nefert **[220]**. At the bottom of Rahotep's shaft, the 6.6 tonne, 2.56 m high × 0.45 m thick stone,[1918] was found to have been tipped out of its 2 m wide 'T' shaped emplacement (Fig. 218),[1919] despite its base also being

[1906] Stadelmann *et al.* 1993: 277.
[1907] Alexanian 1999: 24.
[1908] Alexanian 1999: n. 55.
[1909] Alexanian 1999: 22 and 26.
[1910] Alexanian 1999: 24. This is a method often used to shatter stone in ancient Egyptian quarrying. The technique of setting a fire to first heat stone and pouring cold water on it to render it friable and removable by hand is known from the granite quarry at Aswan (Clarke and Engelbach 1990: 27). In addition, according to Diodorus Siculus in the First Century BC, a similar technique was also used by the Egyptians to break gold bearing rock when mining (Diodorus Siculus in Oldfather 2007: Book III; 12, 2–6).
[1911] Stadelmann *et al.* 1993: 288.
[1912] Stadelmann *et al.* 1993: 285.
[1913] Not all the tombs in the Western Cemetery are included in the tomb catalogue, but they are all included in the portcullis chart.
[1914] Petrie, Wainwright and Mackay 1912: 25–6.
[1915] Scaled dimension from drawing by Petrie, Wainwright and Mackay (1912: pl. XV).
[1916] However, Harpur (2001: 47) considers that the height of the stone was intended to relieve pressure on the roof of the chamber in the friable surrounding marl, a theory that the author finds difficult to accept, especially, as a shorter stone would have placed less pressure on the shaft in terms of weight.
[1917] Petrie, Wainwright and Mackay 1912: 26.
[1918] Dimensions extrapolated from Petrie's (1999a: 20) notebook and applied to scaled plan by Petrie (1892: pl. VII).
[1919] Scaled from drawing by Petrie (1892: pl. VII).

housed in a slot at the bottom of the shaft that was intended to prevent it being levered up.[1920]

Close by, the Type IIC + IIC tomb no. 9 of Ranefer **[221]** was originally fitted with two portcullises, one in each shaft. In the shaft of Ranefer, the stone was found *in situ* in its 'T' shaped emplacement.[1921] Petrie described it: 'The stone trap door like Rahotep's was duly in position; and we cut away the side walls and levered it carefully so as to get behind it.' However, it turned out the burial chamber had still been robbed, via a passage from the mastaba above.[1922] The arrangements are uncertain in the shaft of Ranefer's spouse. Although in Rowe's plan portcullis grooves are drawn (Fig. 219) and mentioned by Reisner,[1923] their depth is unclear and no mention is made of the presence of any stone.[1924]

Only the southern shaft of the Type IIC + IIC +IIC tomb no. 8 **[225]** was equipped with a portcullis,[1925] but the 4 tonne slab was not installed in an emplacement, but left to 'float' as part of the shaft's rubble blocking (Fig. 223).[1926] A similar scenario also occurred in nearby tomb no. 4 **[222]**, whose masonry blocking was protected by a smaller portcullis and a rubble backfill in the shaft above it (Fig. 220).[1927] Nearby, but missing their stones, were tomb no. 1 **[226]** whose 'T' shaped masonry shaft formed an integral part of its stone built burial chamber,[1928] and tomb 416 **[224]**, whose rock-cut emplacement was empty as well.[1929]

In the Far Western Cemetery, away from the pyramid, twenty-nine Type IIC shaft tombs were found with portcullises *in situ*,[1930] and just a single example, tomb 57 **[233]** without a stone at all. Many of these are similar in their arrangements and dimensions (Fig. 315),[1931] and all their shafts, with the exception of tombs 50 **[227]** and 80 **[241]**, are 'T' shaped in plan.[1932] However, within the individual shafts the portcullis stones frequently vary in size and unusually the excavation report gives us many, but not all, of their dimensions (see Chart P).[1933]

The smallest portcullis was the 1.46 tonne example in tomb 68 **[238]**, which at 1.67 m high × 1.16 m wide × 0.35 m thick, barely covered the doorway behind it, and certainly would not have been retained by its oversize portcullis grooves.[1934] On the other hand, the largest stone was that in tomb 63 **[236]** and unlike in tomb 68, appears to have been a close fit within its emplacement. It was 2.57 m high × 1.6 m wide × 0.48 m thick and would have weighed approximately 4.24 tonnes.[1935] However, as can be seen from Chart P, with one or two exceptions the majority of the slabs are between 1.67–2.1m high × 1.06–1.5 m wide, with a volume of somewhere between 0.68–1.29 m^3. Though this in itself does not tell us much, it does suggest that overall there seems to be an optimum average size for a portcullis slab in this cemetery. This assumption, if correct, may have been determined by several factors. Perhaps one of these was the ability of men to physically handle a certain size of stone and lower it into position. Another may be that the size was governed by the optimum size of slab that could be extracted by the local stone quarry. There may also have been a minimum weight and size that was judged to be best for defending a tomb's entrance; or an accepted standard size for a staircase or shaft in a particular cemetery, in the way we standardize windows and doors today. Perhaps rather than make a portcullis to fit the tomb, a prefabricated 'standard portcullis' slab would be obtained from the local quarry and the tomb entrance and emplacement were then built to fit the portcullis.

Of particular note amongst these tombs, is that in the majority of cases the portcullises were never closed, but left raised up supported by small pieces of stone,[1936] in a similar manner to tomb K2 at Beit Khallaf.[1937] Lacking any holes or grooves for lowering ropes, it may be that the portcullises would have been closed by removing them one by one, perhaps after tilting the stones by levering, as has been suggested by Isler (Fig. 316),[1938] or possibly in the manner that Wainwright proposed: 'little or no effort would have been required to lower the portcullises, except to knock away the stone piles beneath

1920 Petrie 1892: 16.
1921 Petrie 1892: pl. VII.
1922 Petrie 1892: 17.
1923 Reisner 1936: 213, fig. 111.
1924 Presumably, as the burial chamber was set approximately 3 m up from the base of the shaft (scaled dimension from Reisner 1936: fig. 111), the grooves stopped level with its floor, and their termination point may be indicated by the notches marked on the elevation. It is possible that the presence of portcullis grooves may just be wishful thinking on behalf of Reisner (1936: 213) and that the notches are precisely that, perhaps intended to support a beam of some sort, which in turn could have supported the portcullis before its final lowering.
1925 Calculated from scaled dimensions from Reisner (1936: fig. 109).
1926 Reisner 1936: 212, fig. 109.
1927 Reisner 1936: 214–5, fig. 113.
1928 Reisner 1936: 212, fig. 108.
1929 Reisner 1936: 215, fig. 114.
1930 See Petrie, Mackay and Wainwright 1910: pls. XVII–XVIII.
1931 Although listed in the Portcullis Chart, not all are included in the tomb catalogue as insufficient data is available in the publication of the cemetery to give dimensions for each tomb. The measurements of many of the tombs' components having been restricted to 'the better finished tombs' (Petrie, Mackay and Wainwright 1910: 28).
1932 The 'T' shaped portcullis emplacement only continues briefly into the early reign of Khufu, and only at Giza Cemetery 2100 in tombs G 2100, G 2110, G 2120, G 2130, and G 2210. It then disappears altogether, the design either having become outmoded or having died out along with the tomb builders who, like the tomb builders at Meidum and Dahshur, had probably served under Sneferu (Der Manuelian 2006: 226–7; Der Manuelian *et al.* 2009: 23–8).
1933 Petrie, Mackay and Wainwright 1910: 28.
1934 Petrie, Mackay and Wainwright 1910: 25–6. 28 and pl. XVII.
1935 Petrie, Mackay and Wainwright 1910: 25, 28 and pl. XVII
1936 Out of all of twenty-nine tombs that possessed a portcullis, only four: nos. 50 **[227]**, 60 **[NIC]**, 69 **[239]** and 80 **[241]**, actually had their portcullises dropped into position. Amongst them, tombs 60, 69 and 80 had been robbed, the stone of 69 having been broken at the top to gain access, whereas tomb 50 was still intact and contained a contemporary burial (Petrie, Mackay and Wainwright 1910: 24–5).
1937 Garstang 1903: 12.
1938 Isler 2001: 71.

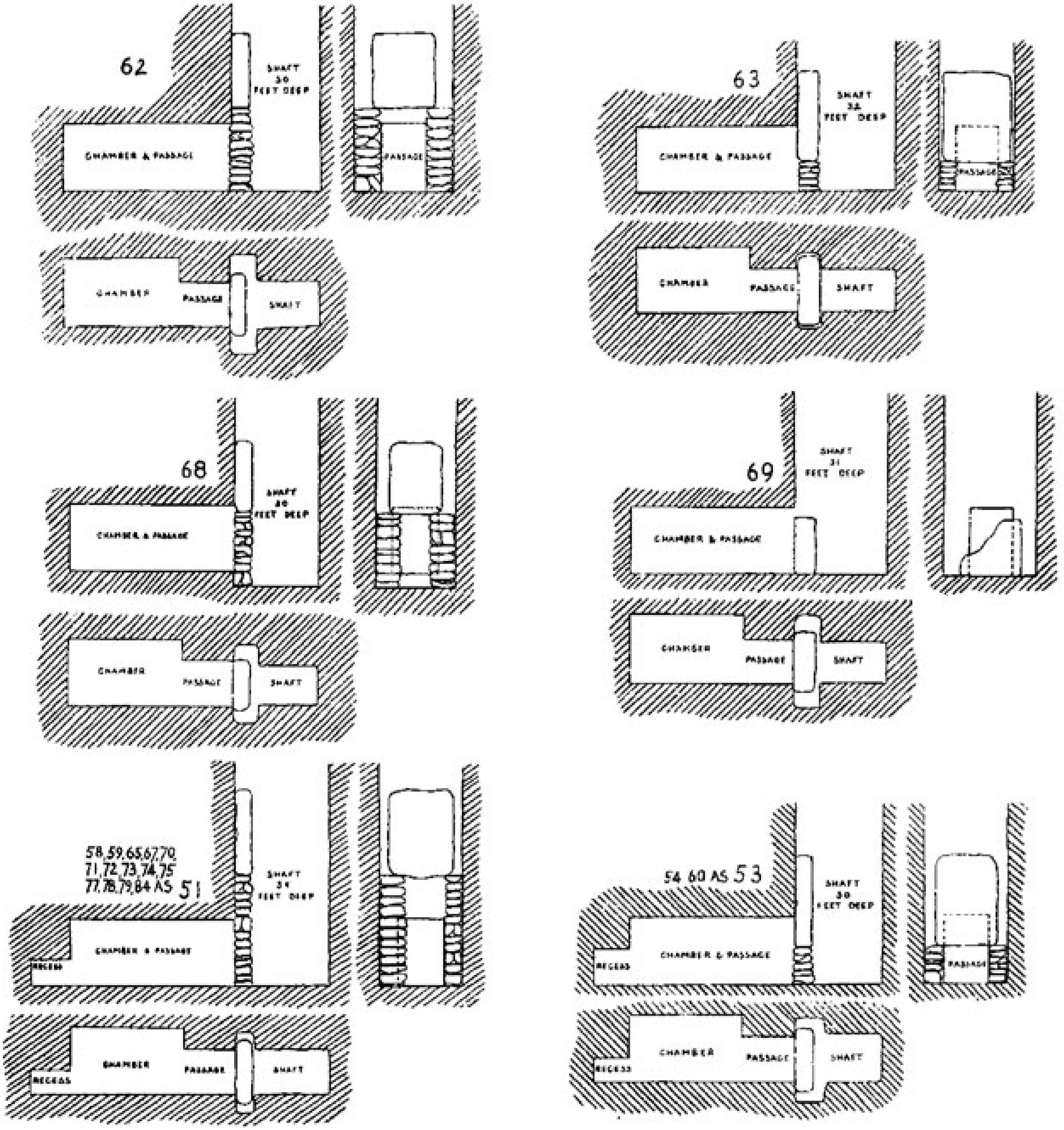


Figure 315 A selection of Type IIC shaft tombs in plan and section from the Far Western Cemetery at Meidum. Their portcullises have been supported in the open position by piles of small stones.
(Petrie, Mackay and Wainwright 1910, Pl. XVII)

them…'[1939] One advantage of this situation however, is that it does present us perhaps with a 'snapshot' of an unfinished pyramid cemetery awaiting its burials, with 'mass produced' portcullises poised in mid-air ready to be closed.[1940]

Finally, two Type III tombs with sloping access were also defended by portcullises, such as at the base of the inclined corridor of the substructure of tomb 277 **[247]**, where a 1.55 tonne, 0.4 m thick, freestanding portcullis was used to block the opening.[1941] Within the pyramid enclosure itself, a similar arrangement can be proposed for the 'North Peribolous Tomb' **[250]**, where an empty

[1939] Petrie, Mackay and Wainwright 1910: 24.

[1940] This situation may answer the question posed by Birrell (2000: 26), which was whether or not portcullis stones were put in place before the superstructure was built, as clearly in this case they were. Although this then brings up the issue of whether the Far Western Cemetery tombs were intended to have superstructures or not, see note 1463.

[1941] Reisner 1936: 207, fig. 100.

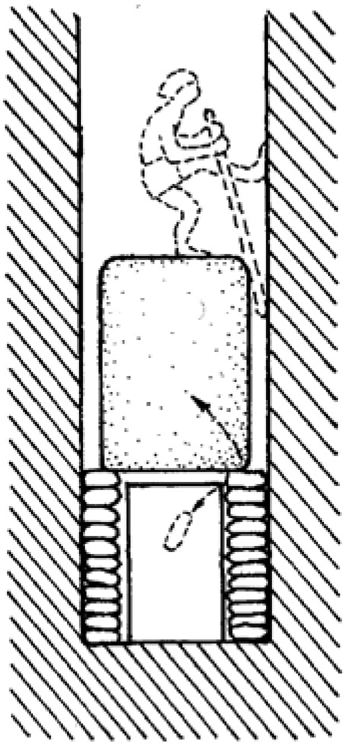


Figure 316 Tipping a portcullis with a lever to enable the underlying supporting blocks to be removed. (Isler 2001, fig. 3.6b) Copyright 2001 University of Oklahoma Press. Reproduced with permission.

grooved emplacement above the entrance to its burial chamber suggests the existence of a portcullis.[1942]

Naga el-Deir

Two tombs from the reign of Sneferu in Cemetery 500–900 possessed portcullises**.** The first was a simple Type IIC shaft tomb, N 629 **[312]**, whose burial chamber was closed by a 0.2 m thick,[1943] 0.43 tonne, freestanding stone, which would have offered comparatively little protection. The second is a Type IIC + IIC twin mastaba tomb N 546 + N 604 **[314]**,[1944] within which, only the shaft of N 604 was closed by a more substantial 0.6 m thick,[1945] 2.2 tonne slab. Tomb robbers had plundered both tombs by tunnelling over their portcullises and breaking through their burial chambers' roofs.[1946]

El-Kab

There are just two tombs at El-Kab with portcullises; both are Type IIC shaft tombs. The first is the tomb of Kamena **[345]**, whose shaft led to a freestanding sandstone portcullis approximately 7.5 cm thick that obstructed the entrance to its stone lined burial chamber.[1947] The second is tomb 288 **[NIC]**, which had been robbed, and although no other detailed information is given by Quibell, its portcullis is described: 'the great slab which had closed the door was thrown over at the bottom of the well'.[1948]

Section summary – the early Fourth Dynasty

With the move of the royal necropolis to Meidum, we see amongst its associated private tombs the almost universal adoption of the Type IIC shaft closed with a portcullis. Furthermore, the majority of them were housed in a 'T' shaped emplacement for added security, and amongst these a standardisation in portcullis size appears to be taking place, although in higher status tombs nearer to the pyramid some larger stones are to be found. When the focus of attention switches to Dahshur and the necropoleis of its two pyramids, the portcullis and its 'T' shaped emplacement were retained amongst the Type IIC tombs of the king's courtiers, where for additional protection, the shaft walls were also reinforced in stone to deter tunnelling.

5.3.1.3 The lowering of portcullises into position

The methods of lowering portcullises in individual tombs have, wherever possible, been discussed above, but it is worth summarising. Whether a stone was lowered before a tomb's superstructure was built remains unclear. It is likely that the larger slabs would have been too heavy to manoeuvre over a mud-brick mastaba,[1949] and may, as demonstrated by the Far Western tombs at Meidum, have been placed in position before the superstructure was built. To enable this to happen it would appear from the cemeteries of Abu Roash, Dahshur, Saqqara, Helwan and Meidum that some portcullises were drilled or grooved to accept lowering ropes.[1950] Judging by the hole and groove sizes in these stones, the ropes would have been of sizeable dimensions, and as an ancient rope of 5.7 cm diameter could carry 6–7 tonnes of weight, with a breaking point of 20 tonnes,[1951] it is evident that the majority of the portcullises in the survey could have been easily lowered by just a single strand. The position of the holes at the top or bottom of the stone seems to have varied, presumably at the whim of the tomb's architect, as for example in tombs X and S 3500 at Saqqara, whose stones were drilled at their tops and bottoms respectively (Figs. 299–300).[1952] However, as we have seen, some portcullises had several holes and or grooves which suggest that more than one rope was used in many cases, and presumably in the case of the larger stones, or those in awkward situations, multiple strands were employed. Amongst those stones that lacked anchor points, it must be assumed they were bound in some form of harness

[1942] Petrie, Mackay and Wainwright 1910: 12.
[1943] Scaled dimension from Reisner (1932: fig. 179).
[1944] Reisner 1932: 208; 230–1.
[1945] Scaled dimension from Reisner (1932: fig. 160–1).
[1946] Reisner 1932: 231 and 238.
[1947] Quibell 1898: 3.
[1948] Quibell 1898: 5.
[1949] Birrell 2000: 26.
[1950] Although it was suggested by Junker (1929: 42–50) that in some Giza mastabas these holes were in fact a form of window, in order that the reserve heads, which had been placed behind them, could look out into the tomb shaft.
[1951] Arnold 1991: 269.
[1952] Emery 1949: pl. 64; 1958: pl. 119b.

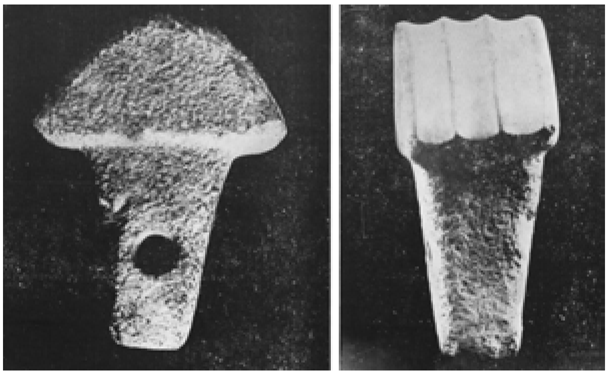


Figure 317 The 'bearing block' found by Hassan at Giza, over which ropes could be run, and which acted as a primitive pulley.
(Hassan 1960, pl. XVII a–b)

or noose. In either case, as the stones needed to move in the vertical plane, and the workforce would be hauling on the horizontal plane, this implies that some type of framework or fulcrum must have been employed over which these ropes could pass and change direction. This may have taken the form of a wooden framework built over the shaft,[1953] or perhaps a bearing stone, such as the basalt example found by Hassan at Giza (Fig. 317).[1954]

An alternative method of lowering a portcullis was by removing stone or mud-brick packings placed under it, such as those found at Beit Khallaf and Meidum.[1955] The stone would initially have been manually placed in position, or lowered by ropes, onto the packing material. Presumably in those staircase tombs that lacked grooved emplacements in which to slide the stones, the slab could just be carried down the stairway and placed in position on top of the packers. Once in position the packings most probably would then have been removed one by one to permit a controlled closure. However, it could just be that the packings were used to bear the weight of the stone and relieve the tension on any lowering ropes until the final moment of closing, in a similar manner to the wooden beams found in the private tombs at Dahshur. Lastly, another method that may have been used to lower the slab in a shaft, was to place it on a bed of sand and then slowly remove it to lower the stone into its emplacement.[1956]

5.3.1.4 The security of the portcullis emplacement

The most secure and the most numerous portcullis emplacements over the entire period were probably the grooved type. These were frequently placed on either side of the passage, stairway or shaft that the stone was intended to block and performed two functions: first they provided an accurate channel for the stone to slide within, thus ensuring that it went where it was intended and was close against the entrance it was blocking, thus forming a tight seal. Secondly, and equally important is that they prevented the stone being tipped askew by tomb robbers. However, their success at preventing this kind of attack was limited by the strength of the geology into which they were cut, or the material of which they were built. A similar function can be ascribed to those Type IIA and IIB tombs with tapering staircases, especially at Helwan and Lahun, where their 'wedge' like shape probably provided both the stone's guide and support, again within the limits of the surrounding geology. Least secure of all would be those tombs where the stone was entirely freestanding, as all that would retain the stone in place would be its weight and the surrounding backfill which, as is evident in some tombs at Abusir, Saqqara and Meidum, permitted the slabs to be easily dislodged by tomb robbers.

5.3.2 Plug-stones

From the early Fourth Dynasty onwards a closure mechanism that suddenly appeared in conjunction with the raised pyramid entrance was the plug-stone (see 5.1.1).[1957] These usually take the form of rectangular cuboid stone blockings, used in numbers, which are specifically designed to closely fit within an inclined descending corridor of uniform section along its length.

5.3.2.1 Royal tombs

The Pyramid of Meidum

Even though no plug-stones were found *in situ* in the descending corridor of the Pyramid of Meidum **[22]**, it is probable that they were used in some form, or at least were intended to be used.[1958] The entrance itself was blocked by plug-stones designed to blend in from

[1953] See Arnold 1991: 74, fig. 3.2 for a suggested method.
[1954] Hassan 1960: 49, pl. XVII a–b. See also Arnold 1991: 283, figs. 6.45–6.46, and Isler 2001: 262, fig. 11.17a.
[1955] It has occurred to the author that there is a possibility that rather than being there to assist in the lowering of the stones, the packings that are found under the portcullises in some of these tombs were possibly placed there by tomb robbers in order to gain access to the burial, as for example those used to prop up the portcullis in the Middle Kingdom tomb of Senwosret-Ankh at Lisht (Arnold 2006: 22). Indeed Belzoni (1835: 417) described that very method when he opened the portcullis in the Pyramid of Khafre: 'The only method to be taken was, to raise it a little at a time; and by putting some stones in the grooves on each side, to support the portcullis while changing the fulcrum of the levers, it was raised high enough for a man to pass.'
[1956] Arnold 1991: 74. Lacher-Raschdorff 2014: 58. See note 1718.
[1957] However, it is within the bounds of possibility that the descending corridor in the Brick Pyramid of Abu Roash may have been intended to be blocked with plug-stones, bearing in mind its regular section and angle of descent.
[1958] Rowe 1931: 24–5; Wainwright 1937: 128; Stadelmann 1985a: 85; Lehner 1997: 98. If one compares the blockings in the nearby Mastaba 17 **[252]** and the North and South tombs **[249–50]** in the Meidum pyramid's peribolous and the arrangements in the western passage of the Bent Pyramid (discussed immediately below), it would seem entirely reasonable to envisage that a portion of the length of the descending passage may have been blocked with plug-stones of some form. If they did exist, whether these would have comprised of single blocks used in succession as in Mastaba 17, or several pieces, one on top of the other, as in the South Peribolous tomb **[250]** (see p. 257) is open to debate.

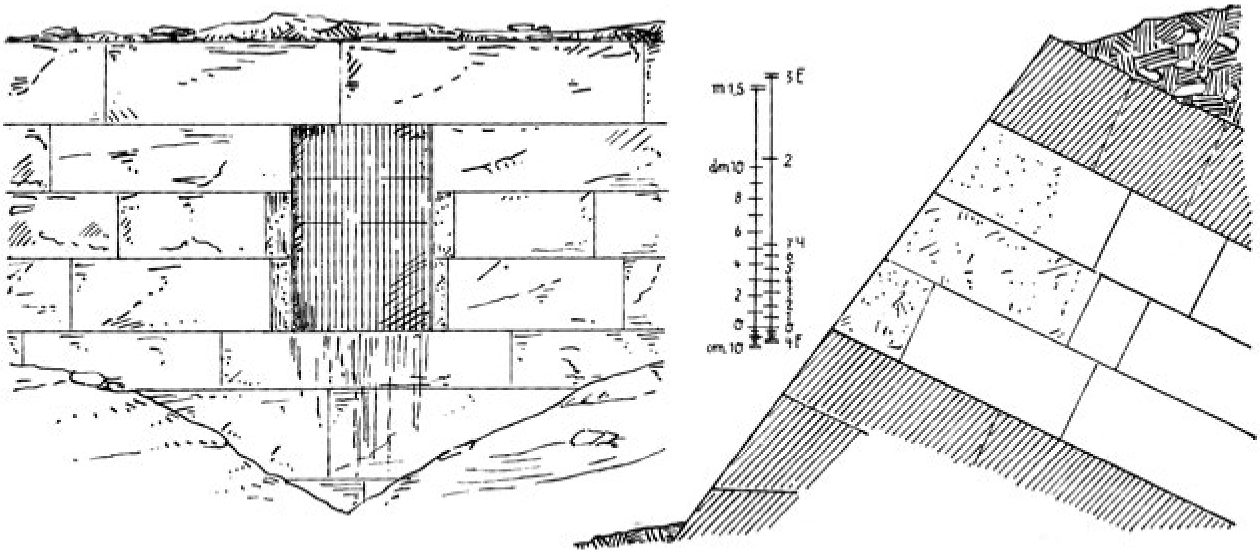


Figure 318 The entrance to the descending corridor of the Pyramid of Meidum, showing the tapered blockwork designed to accommodate the plug-stones in the entrance.
(Borchardt 1928, Abb. 3)

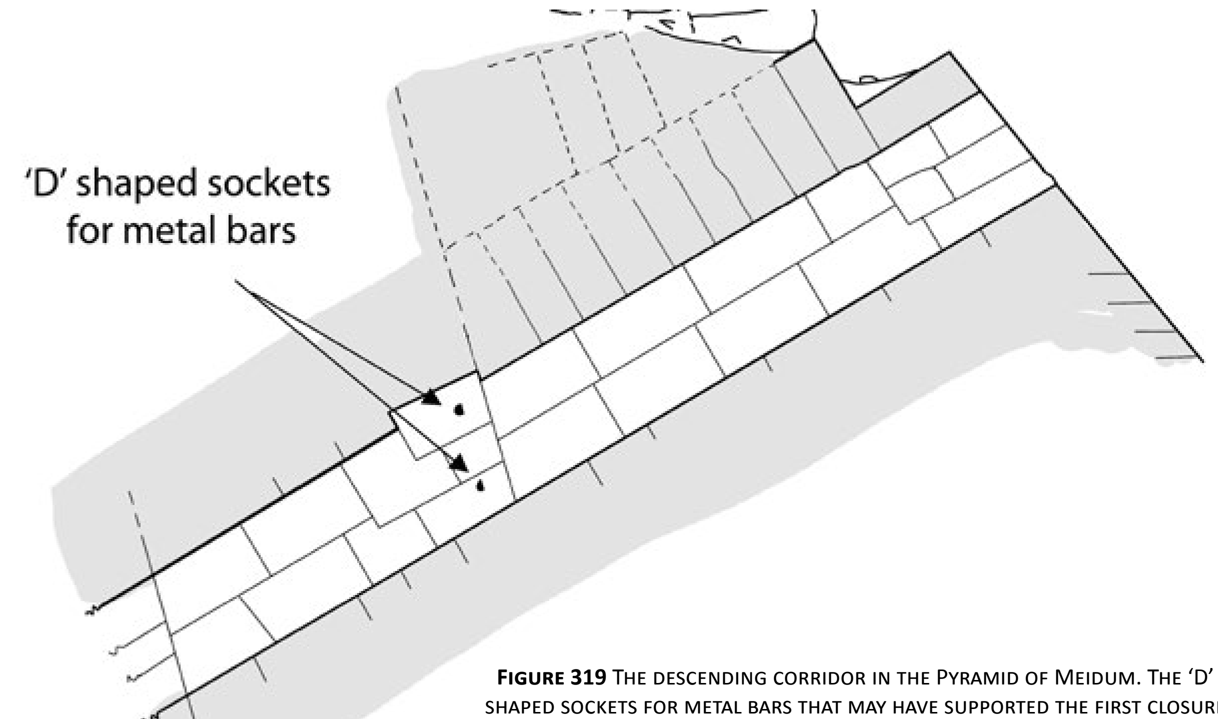


Figure 319 The descending corridor in the Pyramid of Meidum. The 'D' shaped sockets for metal bars that may have supported the first closure are indicated by the arrows.
(Drawn by the author after Maragioglio and Rinaldi 1964, Tav. 4, fig. 4)

the outside and thus appear as a normal part of the stone cladding of the pyramid. This was achieved by tapering the lower two layers of the three courses of stone blocks that flanked the internal edges of the doorway, so that similarly shaped plug-stones would then wedge tightly into the corridor and be prevented from slipping within (Fig. 318).[1959] Although these were not in place when Maspero 'opened' the pyramid in the Nineteenth Century,[1960] having probably been removed in antiquity.[1961] In addition, 'D' shaped notches found in the corridor sides may have accommodated metal bars to prevent some type of plug-stone (see the section

[1959] Petrie 1892: 10; Borchardt 1928: 13–4; Rowe 1931: 24; Maragioglio and Rinaldi 1964b: 8.

[1960] Maspero 1893: 149–50

[1961] Two inscriptions within the corridor dated to the Nineteenth Dynasty demonstrate it was already open and accessible then (Maragioglio and Rinaldi 1964b: 19).

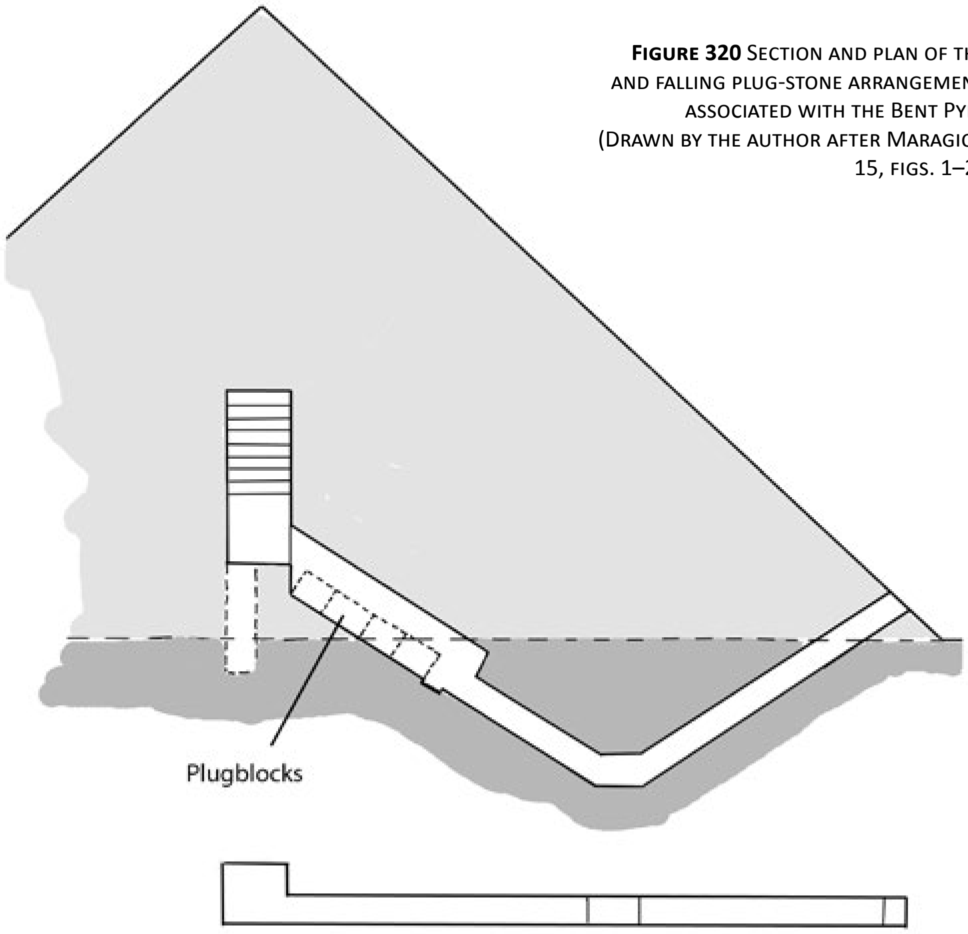


Figure 320 Section and plan of the descending corridor and falling plug-stone arrangement in the satellite pyramid associated with the Bent Pyramid at Dahshur. (Drawn by the author after Maragioglio and Rinaldi 1964, Tav. 15, figs. 1–2)

drawing, Fig. 319) from sliding down the corridor, before the tomb's transition to a true pyramid.[1962] Moreover, at the base of the descending corridor, where the horizontal passage leads to the shaft that connects to the burial chamber there are two full height staggered niches 'A' and 'B' (Fig. 243) flanking this passage.[1963] Their purpose, Edwards suggested, may have been to accommodate even larger plug-stones,[1964] now missing, which were too big to bring down the descending corridor,[1965] but there is little evidence to confirm this.[1966]

[1962] Petrie 1892: 11; Borchardt 1928: 12; Maragioglio and Rinaldi 1964b: 20. This formed the external face in the earlier eighth layer of the stepped pyramid. Additionally, Maragioglio and Rinaldi (1964b: 142) suggested that they may have been there to accommodate beams around which ropes could be placed, in order to permit the controlled lowering of the stones down the passage.
[1963] Rowe 1931: 25; Verner 2003: 163–4.
[1964] Swelim (1987: 39) has noticed some unfinished niches in the polar corridor of the Brick Pyramid at Abu Roash that possibly may have been intended to perform the same function.
[1965] Edwards 1988: 73–4. Lehner (1997: 98) suggests these were for 'plugging blocks' but was not more specific.
[1966] Although Edwards (1988: 73–4) mentions the stones found within the recesses, which he suggests may have been plug-stones, he doesn't take into account that in reality they were quite small at 52.5 cm × 42 cm × 36. 5 cm (Rowe 1931: 25) and thus would have easily been able to be brought down the descending passage.

The Bent Pyramid at Dahshur

When in 1837 Perring explored the Bent Pyramid **[23]**, of the two passage systems, only the western corridor, which leads to the upper corbelled chamber, was found to be still closed with its original plug-stone blocking. He reported:

> 'The greater part of it was closed up with large blocks, which had only been removed for about 60 feet at the lower end. The entrance on the outside of the Pyramid was so well concealed as to have escaped the closest examination, and the blocks within it appeared to have been fitted with the greatest accuracy.'[1967]

These are the earliest examples of plug-stones found *in situ* in a pyramid,[1968] and according to Fakhry, they had been plastered individually as they were inserted[1969] and ran right down to the first portcullis.[1970] Therefore,

[1967] Vyse and Perring 1842: 68–9.
[1968] Arnold 1991: 220.
[1969] Perhaps this plaster was intended to act both as lubrication to enable the blocks to slip down the passage more easily and as a form of mortar, which once set, would hinder their removal, see note 1154 regarding the angle of incline and the overcoming of the co-efficient of friction.
[1970] Fakhry 1951: 512; 1959: 49. However, in neither publication did Fakhry give any indication of the size of the blocks.

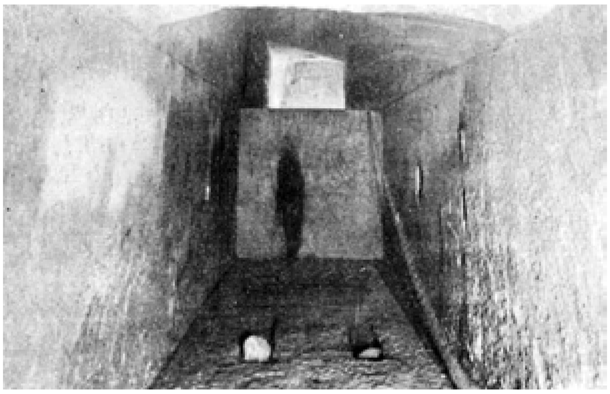


Figure 321 One of the undescended plug-stones still in the corridor in the satellite pyramid of the Bent Pyramid. (Fakhry 1959, pl. XLVc)

it is also probable that the northern passage, which is of a similar section[1971] and leads to the lower corbelled chamber, had once been secured in a similar manner; its stones removed in antiquity by robbers to gain admission to the pyramid. Indeed, the broken remains of these were probably found by Perring when he cleared the corridor.[1972]

South of the main pyramid, a satellite pyramid **[24]** was built, which is of note because it contains a falling plug-stone system that predates the one in the Grand Gallery of the Great Pyramid. The structure was entered by a descending passage, whose entrance was probably closed and concealed with a casing block (Fig. 320). From its base an ascending passage rose that led to the pyramid's 'burial chamber'. Within its upper half, four plug-stones were retained by two wooden props attached to ropes leading outside the pyramid. At the time of the pyramid's closure the ropes were pulled and the blocks permitted to descend under their own weight to the bottom of the passage. Ingenious as this mechanism was, in the event only two blocks arrived in their intended positions, as the upper two jammed halfway in their descent (Fig. 321).[1973]

The Red Pyramid at Dahshur

The descending corridor of Sneferu's northern Red Pyramid may also have been closed with plug-stones **[25].** Although Maragioglio and Rinaldi suggested that only perhaps the upper 4 m of the corridor may have been blocked in this way,[1974] it seems equally rational to assume that it was blocked along its full length, like the western corridor of the Bent Pyramid.[1975] Therefore, the most logical assumption to make is that the passage was built with the intention to house plug-stones and that they have either been removed when the tomb was robbed,[1976] or never put in place, which, as the tomb is mooted to have been Sneferu's burial place,[1977] seems unlikely. Indeed, the next pyramids to be built, those of Khufu and Khafre at Giza, demonstrate clearly that these types of narrow passages in pyramids were usually blocked in such a manner.[1978]

Although the dimensions of the plug-stones found in the Bent Pyramid are not recorded,[1979] and no traces of any were found in the Red Pyramid, it may be possible to hypothesize their size from their descending corridors' dimensions[1980] using the length of the plug-stones found in the later pyramids at Giza.[1981] Working on that basis and averaging out the figures, it can be estimated that the typical plug-stone in the pyramids at Dahshur was probably around 1 m wide × 1 m high × 2 m long, and approximately 2 m^3 in volume, which if made of limestone would have weighed between 3.4–5.12 tonnes.

5.3.2.2 Private tombs

Meidum

The earliest extant examples of plug-stones in private tombs are found amongst the Type III tombs at Meidum.

[1971] Fakhry 1959: 46.

[1972] Vyse and Perring 1842: 67; Maragioglio and Rinaldi 1964b: 94–6, 110.

[1973] Fakhry 1959: 94–6; Maragioglio and Rinaldi 1964b: 114. This jamming was probably caused by a combination of the shaft's angle of incline at 32° 30' being either too shallow or it being insufficiently lubricated, as the average angle of tilt for limestone to start sliding on an un-lubricated limestone incline is 36° (Stocks 2003: 195). See again note 1154 and additionally note 1969 above.

[1974] Maragioglio and Rinaldi (1964b: 128) wrote: 'As visible traces are totally lacking, the original blocking of (D) may have been limited to the upper part of the corridor (about 4 m.) now destroyed.'

[1975] Petrie (1883: 168) was of the opposite opinion: 'In the Pyramids of Daschur, the passages have been filled with desert pebbles, sand, and masons' chips; a filling which could not come in by accident, and would not be put in by design except by the builders. This, therefore, was a filling up to prevent casual access to the inside; but such as could be readily taken out if it was required to be opened. It shows that no stone plugging, or building up, was put in the entrance passage; although a duplicate passage in one of these Pyramids was plugged by blocks.' That notwithstanding, Petrie (1883: 166–7) had also dismissed the idea of the use of plug-stones in the entrance passages in the Pyramids of Giza, preferring the idea that only the entrances alone were concealed, but indeed admitted to their use in the second and third pyramids in 'the duplicate passages not required'.

[1976] There may have been some unrecognised remnants of smashed plug-stones in the corridor in the mid Twentieth Century, as Grinsell (1947: 159) reported on his visit to the pyramid that it was: 'possible to descend to the bottom of the ramp, but increasing quantities of limestone rubble and other debris prevented further penetration for all but the most agile'.

[1977] See note 475.

[1978] Belzoni 1835: 249; Perring and Andrews 1839: 2; Vyse 1840a: 185, 287–8; Grinsell 1947: 76; Maragioglio and Rinaldi 1965a: 144; Lehner 1997: 114.

[1979] Fakhry (1959: *passim*) gives no sizes of those in the Bent Pyramid and no blocks are reported in any publication of the Red Pyramid.

[1980] In the case of the northern and western corridors of the Bent Pyramid their dimensions are 1.1 m wide × 1.06 m high and 1 m wide × 1.1 m high respectively (Fakhry 1959: 46). And similarly, those of the descending corridor of the Red Pyramid are 1.05 m wide × 1.2 m high (Vyse and Perring 1842: 64).

[1981] In the ascending passage of the Great Pyramid for example the length of the granite plug-stones averages out at approximately 1.7 m, based on a calculation of their total length of 5.14 m ÷ 3 (Petrie 1883: 65; Maragioglio and Rinaldi 1965a: 32). In the descending passage of the Pyramid of Khafre, the entrance plug was 3 m long and the remainder between 1.82–2.13 m (Vyse 1840a: 185).

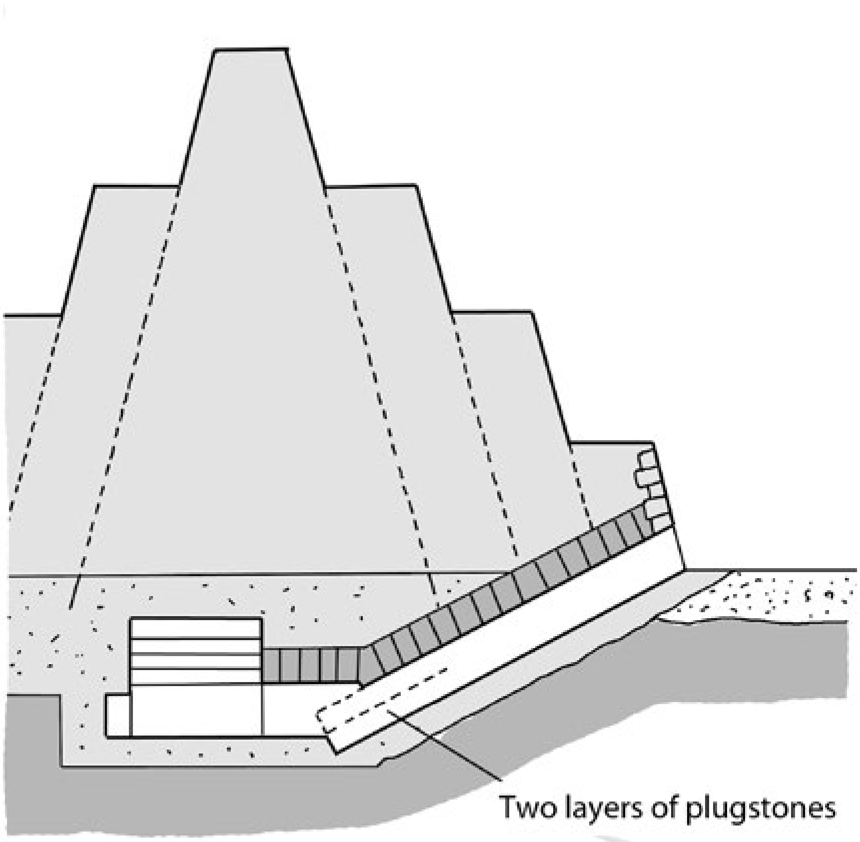


Figure 322 The descending corridor of the 'South Tomb' in the Peribolous at Meidum, which may have been a satellite pyramid, as envisioned by Maragioglio and Rinaldi. Its descending corridor was closed with two layers of plug-stones, the lowest of which were found in situ. (Drawn by the author after Maragioglio and Rinaldi 1964, Tav. 7, fig. 6)

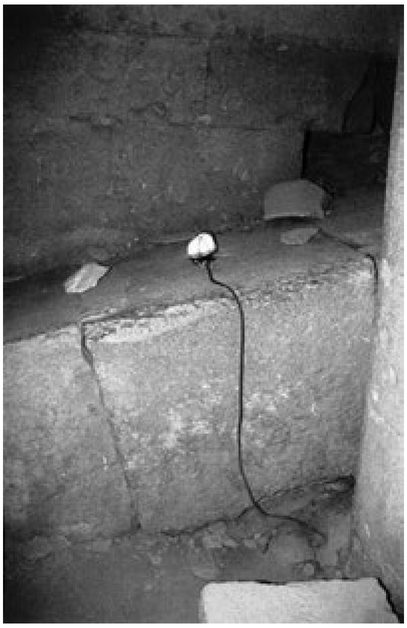


Figure 323 The plug-stones of Mastaba No. 17 at Meidum still *in situ* projecting beyond the end of the tomb's descending corridor. (Jánosi 2006, Abb. 32a)

Remains within the stone lined descending passages of the 'Northern Tomb' **[250]** and the 'Southern Tomb' **[249]** suggest that they were once completely closed in this manner, and in the latter, two layers of stone replaced the usual single block (Fig. 322).[1982] Additionally, the entirely subterranean access passage of nearby Mastaba 17 **[252]** was also found blocked with plug-stones, which are still *in situ* (Fig. 323). [1983] These were probably used to secure the tomb before its surrounding pit was backfilled and the superstructure added for further protection.[1984]

A little further away in the Great Western Cemetery, the stone lined passages of tombs A **[243]**, B **[244]** and C **[245]** were once also similarly blocked, their plug-stones' progress within being halted by a stone step (Fig. 229). Although no doubt difficult to remove and effective in the short term, like their pyramid neighbour it is noticeable that all of the plug-stones at Meidum, with the exception of those in Mastaba 17 with its hidden entrance, are now missing from their shafts.

Section summary – plug stones

At first view the introduction of plug-stones may seem to have been an improved way of securing a tomb's entrance passage. However, they have proved less effective than was perhaps intended, as the majority of tombs that employed them, both royal and private, have been robbed via their corridors, which meant demolishing the plugs to do so.[1985] Perhaps the reason for this is that they

[1982] Petrie, Mackay and Wainwright 1910: 10–3.

[1983] Petrie, Mackay and Wainwright 1910: 13.

[1984] The tomb had been robbed in any case via a tunnel from the south side and entirely avoiding the entrance (Petrie, Mackay and Wainwright 1910: 14).

[1985] Arnold 1991: 223. Reisner (1942: 171) reported an entirely different scenario in those tombs of the Fifth and Sixth Dynasties found with were small in cross-section and confined within a lined corridor, and thus could be attacked at leisure, moreover, unlike in a vertical shaft, their spoil would be relatively easy to remove via the sloping corridor.

5.3.3 Conclusion

Portcullises

Although the architecture of the external access route in tombs from the mid First Dynasty until the early Fourth Dynasty had evolved progressively from stairway to shaft, it can be seen that in the majority of cases the basic design of the portcullis and its emplacement remained largely unchanged. Usually made of limestone, which was the material of choice for all stone portcullises, royal and private, right up until the reign of Khufu,[1986] the mechanics of its use remained essentially the same within stairway or shaft, insofar as gravity lowered it into place and a close fit was needed to follow the stone's profile and ensure a tight and secure seal. This in turn governed the design of the tomb's access route to a certain degree, as its architecture would need to cater both for the portcullis stone and its direction of travel. In addition, the side walls of a passageway, stairwell or shaft often formed or housed a portcullis' emplacement, and needed to be able to accommodate it. Moreover, when a slab was placed before a substructure's entrance, the wall above would need be in the vertical plane to allow the slab to slide down or be laid against it. Indeed, long after the use of the portcullis was discontinued, some of these architectural elements remained a feature of access route design; the original reasons for their inclusion having perhaps been forgotten over time.

From the security point of view the inclusion of a portcullis within a tomb's entrance passage, stair, or shaft offered several benefits. The first, and probably the most important, was that it permitted an instantaneous secure closure of the substructure immediately after the burial, thus preventing interference with its contents before the access route was closed with an in-depth backfill or blocking. Secondly, in the event that the backfill was compromised, it then formed an additional layer of protection, which in terms of its resistance to penetration and removal, was a far more robust defence than a mud-brick or masonry wall. But the strength of its defence was always dependent on other factors. First, the portcullis' weight, which prevented it from being easily moved out of position. Secondly, its thickness and density, which would have determined how easily it could be penetrated or broken. Lastly, the sturdiness of its surrounding emplacement and geology, which were often the alternative subject of a robber's attack when the portcullis proved too heavy or strong to overcome.

Plug-stones

With the introduction of plug-stones during the reign of Sneferu, a more in-depth form of rapid blocking now became available, whose depth of protection, unlike a portcullis, was only limited by its corridor's length. Its use was even more dependent on its surrounding architecture, as the need to tailor passages to specifically accommodate the blocks became essential. Therefore, factors such as ease of access, a uniform cross section and the need for its incline to overcome the coefficient of friction, together with practical limits as to the size of the stone, now had to be considered and incorporated in the design.

The apparent success and popularity of both of these closure methods is reflected in their continuous use right up until the end of the Middle Kingdom.[1987] However, despite the tomb builders' best intentions, regardless of the number, location, size and weight of these portcullises, and the strength of their emplacements, once discovered they could be either bypassed, tipped askew or penetrated by tomb robbers. Similarly, any depth of plug-stones could be removed or bypassed given enough time.

plug-stones, where in the majority of cases robbers had left them in situ, preferring to bypass them by tunnelling around them.

[1986] The author has been unable to find a single example of a granite portcullis in the survey in either private or royal tomb contexts that predates Khufu's reign, with the exception of the stone plugs in the Step Pyramid, which do not take the usual form of a sliding slab.

[1987] Plug-stones are found in the pyramids of Amenemhat I and Senwosret I (Arnold, Arnold and Dorman 1988: I, pl. 89 and 69, fig. 26) and the tomb of Senwosret III at Abydos (Wegner 2009: 125, fig. 16c). In private tombs at Lisht, portcullises are found the tomb of Senwosret-Ankh (Arnold 2006: 22, pl. 7), and both portcullises and plug-stones are found in the nearby tombs of Intef and Senimeru (Arnold 2006: 30, pl. 35 and 72, pl. 134).

6. Mounds, mastabas and pyramids – the security of the superstructure

It seems generally accepted that from the earliest times in Egypt the excess fill from the simple pit grave was used to create a mound, which both protected the grave and acted as a marker for the focus of the deceased's cult.[1988]

As discussed in 3.2, during the Predynastic Period lightweight superstructures were used in the elite cemetery at Hierakonpolis.[1989] There is also evidence of mud-brick 'mastaba' like superstructures at Helwan in the Naqada IIIA2 period,[1990] and at Tarkhan,[1991] but it is not until the Early Dynastic Period that they seem to become a regular feature.[1992] While the significance of such a structure is often the subject of scholarly debate, undoubtedly the additional protection of a superstructure added to the security of a tomb.[1993]

Although superstructures have been a topic of discussion in all their forms and varieties in many Egyptological publications, until now no study has examined them purely from the security point of view. This chapter therefore traces the defensive features of the superstructure within the defined period, in both royal and private tombs, and concomitantly examines what part these played in the architecture of the Egyptian tomb as a whole.

In a similar approach to the previous chapters, this chapter first looks at the superstructures of royal tombs in chronological order and then those of private tombs by tomb type, subdividing that category by period and location north to south.

6.1 Royal tombs

There is little tangible evidence of the existence of superstructures over the tombs of the early kings at Abydos;[1994] therefore, this study relies on recent scholarship concerning the royal cemetery at Umm el-Qaab regarding the form of any such structures. To date none have been proposed for the tombs of the first three kings at Cemetery B, Iry-Hor, Ka and Narmer, but it is reasonable to suggest that their graves would have been covered with some sort of low mound,[1995] even if it were just the excess backfill from the grave pit.

6.1.1 Dynasty '0' to the mid First Dynasty

Hor-Aha

The tomb of Hor-Aha in Cemetery B **[4]** is the earliest royal tomb that shows any sign of a superstructure. Kaiser and Dreyer suggest, due to the lack of erosion of the mud plaster remains on the roofs of its three chambers, that they were probably protected with a single sand tumulus formed from their excavation spoil.[1996] Robbers' tunnels in the sides of chambers B15 and B19,[1997] which start some distance from their edges, suggest it was roughly 40 m long × 16 m wide, and would have appeared as a 2 m high tumulus,[1998] whose 1300 m^3 of sand would have weighed about 2080 tonnes.[1999] Its protective 'footprint'[2000] would have overlapped the chambers' outermost edges by around 2 m, which allowing for the mud-brick liners, would have created a 'footprint overhang'[2001] 3.5–4.1 m wide, forcing a robber intent on tunnelling to start beyond its perimeter. Albeit simple in conception and execution, it provided an effective obstacle to potential despoilers, as any disturbance would have started avalanches of loose sand[2002] flowing towards the tunneller.[2003]

Djer

Although there is no evidence of any superstructure over the tomb of Djer **[5]**, apart from an early photograph of a retaining wall,[2004] which may have surrounded a hidden sand tumulus,[2005] it is possible that one similar to that suggested for the tomb of Djet (see the next tomb discussed) protected the tomb,[2006] and indeed all subsequent royal tombs at Umm el-Qaab.[2007]

1988 Reisner 1936: 1–5; Edwards 1988: 20–1; Dodson 2010: 804–5.
1989 Friedman 2008b: 1157.
1990 Köhler 2004: 307.
1991 Petrie 1914: 2–3.
1992 Edwards 1988: 21.
1993 Reisner 1934: 579.
1994 Dodson and Ikram 2008: 134; Engel 2008: 35; O'Connor 2009: 153.
1995 Dreyer 2003b: 64.

1996 Kaiser and Dreyer 1982: 214–7.
1997 Amélineau 1899b: 90; Kaiser and Dreyer 1982: 217; Dreyer 2007b: n. 1.
1998 Kaiser and Dreyer 1982: 217.
1999 Based upon sand's bulk density of 16 kN/m3, which equals approximately 1600 kgs/m3 (Cobb 2004: 37).
2000 The term 'footprint' is defined in the Dictionary of architecture and construction (Harris 2006: 431) as: 'The area on a plane directly beneath a structure (or piece of equipment), that has the same perimeter as the structure (or piece of equipment)'.
2001 This dimension is referred to in this study from now on as the 'footprint overhang' and is taken as the shortest distance from the outside of the superstructure to the edge of the void of the pit or substructure (usually along its longest edge).
2002 If the angle of repose of part of a resting sand pile is increased above its maximum angle of stability, for example by digging a hole in its surface at some point, the associated particles will start to flow and an avalanche of grains will result (Jaeger and Nagel 1992: 1523).
2003 Reisner (1936: 321) commented that in a superstructure fine sand would present a greater danger to robbers than solid mud-brick.
2004 Dreyer 1991: 100. See discussion in 4.1.1 and note 258.
2005 Dreyer 2010: 21.
2006 Dreyer 1991: 100.
2007 Personal communication by Günter Dreyer (21st November 2009).

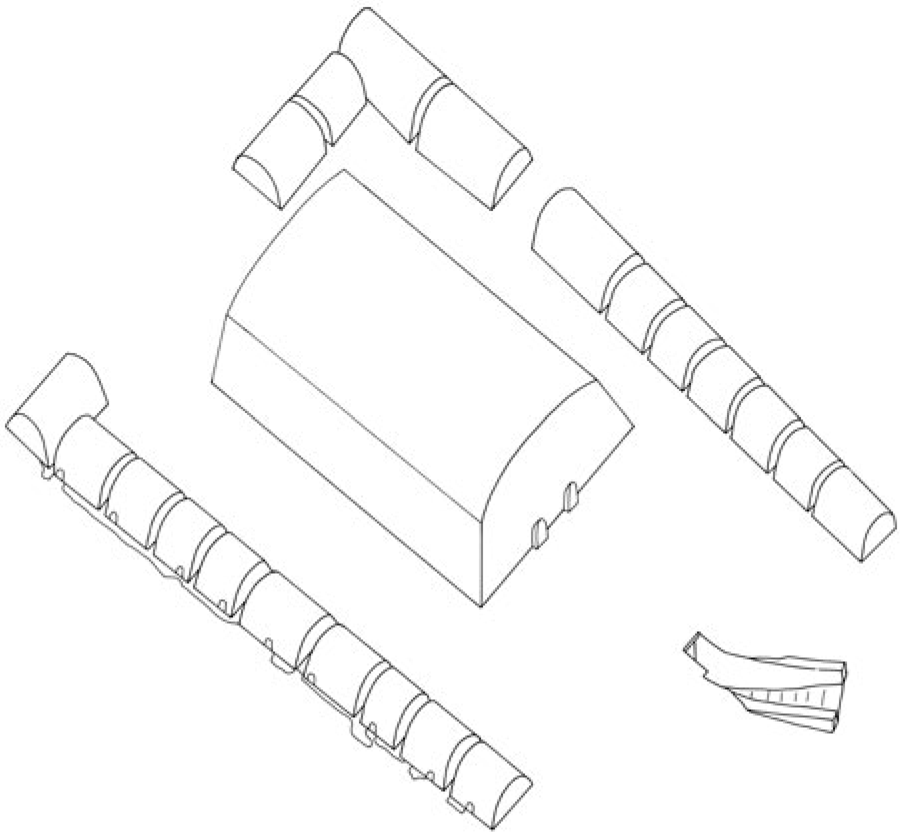


Figure 324 Engel's reconstruction of the superstructure of the tomb of King Qa'a, which probably overlaid his substructure directly. Further out it was surrounded by subsidiary graves, each perhaps with their own individual superstructures. (Engel 1997, Abb. 71) Courtesy of E.M. Engel.

Djet

There are no traces of any superstructure above the tomb of Djet **[6]**,[2008] but Dreyer suggests that the whole substructure, including the tomb's concealed mound, may have been covered with a sand tumulus,[2009] no more than 2.5 m high, possibly sheathed in a slightly curved mud-brick casing, as shown in his reconstruction drawing (Fig. 29).[2010] Such a casing would have not only provided extra protection, but also provided a degree of permanence by consolidated the sand and preventing aeolian drift.

Reisner proposed that an enormous 8 m high mud-brick mastaba, with additional low level layers appended to its sides, formed a stepped pyramid that protected both the tombs of Djer and Djet, and indeed all subsequent royal tombs of the dynasty. Although in the light of more modern research his ideas are now outdated, his basic premise that an expansion of the superstructure's footprint would prevent lateral tunnelling, is of course, still entirely relevant.[2011]

Merneith

Dreyer suggests that the tomb of Queen Merneith **[7]**, like the other royal tombs at Umm el-Qaab, would have probably been protected by a sand tumulus or superstructure of some form, although there are no remains to confirm it.[2012]

6.1.2 The second half of the First Dynasty

Den

Little is known about the superstructure that may have protected the tomb of Den **[8]**, apart from the reconstruction of the supporting roof and hidden tumulus discussed earlier (4.1.1.). Although Dreyer estimates that if all the spoil from the grave pit had been used, the superstructure would have overlapped the outer edge of the pit's 4 m thick brick liner[2013] by around 1 m and have been up to 4 m high,[2014] thus protecting the substructure from lateral tunnelling with a 5 m footprint overhang.

Adjib and Semerkhet

The tombs of Adjib **[9]** and Semerkhet **[10]** were probably also protected by tumuli or superstructures similar to

[2008] Dreyer 1991: 97–9.
[2009] Dreyer 1993: 11.
[2010] Dreyer 1991: 102. However, contra this, Mainz (1993: 42–4) proposes from a study of the deformation of the underlying tongue walls of the substructure that a stone casing is more likely. On the other hand, O'Connor (2009: 155) suggests a slightly smaller mound than Dreyer and a brick chapel to the tomb's south-west.
[2011] Reisner 1936: 322–7, figs. 172–3.
[2012] Dreyer 1991: 100. There are also a couple of alternative, but in the light of Dreyer's work probably outdated, interpretations of how Merneith's superstructure may have looked, such as those proposed by Ricke (1950: Abb. 2) and Lauer (1955: fig. 4).
[2013] Dreyer *et al.* 1998: 142.
[2014] Dreyer 1991: 102, n. 23.

Figure 325 The tomb of Semerkhet at Umm el-Qaab covered by its excavators with a modern protective 'tumulus' of sand consolidated by limestone chips.
(Dreyer and Effland 2009, 272) Courtesy of the DAI Cairo.

their predecessors.[2015] Moreover, it is suggested by some scholars that, due to their close proximity, the subsidiary burials in the tomb of Semerkhet would also have been covered by his superstructure.[2016] However, as the surrounding subsidiary graves were found to be roofed with reeds,[2017] this seems unlikely due to the weight; rather it may be that these graves were individually capped, as suggested for the tomb of Qa'a (discussed next).

Qa'a

Engel suggests, based upon the entrance holes made by tomb robbers into the magazines surrounding the tomb of Qa'a **[11]**, that it was protected by a single superstructure over the burial chamber, and that its encircling subsidiary burials had their own separate covers (Fig. 324). Moreover, based upon her calculations of the load bearing capacity of the roof, she estimates that this structure could have been approximately 13 m long × 9 m wide × 2.5 m high and have contained about 293 m^3 of sand and stones,[2018] which would have weighed approximately 470 metric tonnes.[2019]

Section summary – the royal superstructures of Dynasty 0 and the First Dynasty

From the limited evidence available it seems that the burial chambers of the royal tombs of the First Dynasty were protected by some form of superstructure,[2020] but whether they comprised of poured sand, similar to the recently created protective mound over the tomb of Semerkhet (Fig. 325),[2021] or a mud-brick clad tumulus is uncertain. The latter would certainly have offered a degree of permanency and monumentality. That the core material of these tumuli or superstructures was probably sand perhaps mixed with stones,[2022] rather than solid mud-brick, is confirmed by the enormous quantities of spoil from the excavation of the royal tombs, which still overlie the ancient desert surface.[2023] Whatever their form, these superstructures would certainly have protected their substructures from overhead attack, and their large footprint overhangs would have made lateral tunnelling difficult by extending the start point outwards for such excavations.

6.1.3 The Second Dynasty

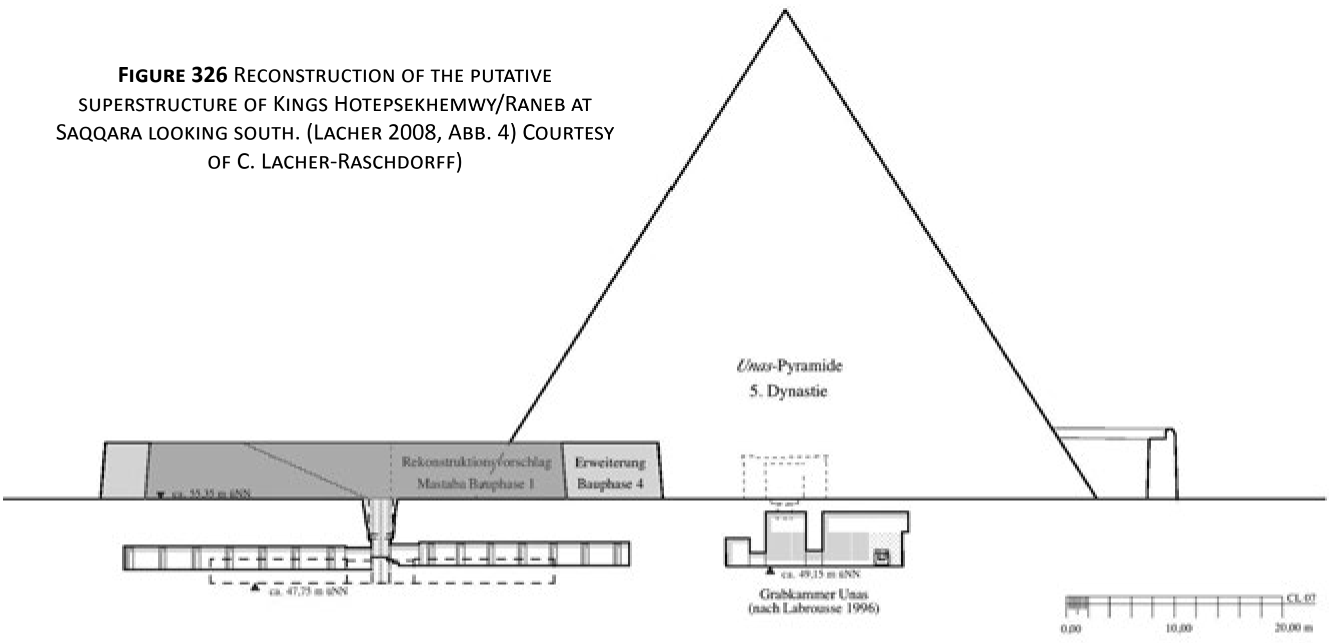
The move to Saqqara of the royal necropolis in the Second Dynasty saw the royal substructure change from an open pit tomb excavated in the desert to a subterranean gallery excavated in the rock. Despite being well defended by their rock roofs, they were still probably further protected by a superstructure.[2024]

Hotepsekhemwy/Raneb

The enormous subterranean complex of Hotepsekhemwy/Raneb **[12]** was probably covered with a superstructure, but this was possibly demolished during the construction

[2015] Dreyer 1991: 100.
[2016] Edwards 1971: 58, Emery 1961: 85, Wilkinson 1999: 80. Contra this, Reisner (1936: 62) suggested they were built against the superstructure.
[2017] Dreyer 2005: 15.
[2018] Engel 1997: 109–12.
[2019] Based on the bulk density of sand at 16 kN/m3 (Cobb 2004: 37).
[2020] Engel (2008: 35, n. 14) suggests, based upon the various locations at Umm el-Qaab that show evidence of the depredations of tomb robbers that only the burial chamber was so protected.
[2021] Dreyer and Effland 2009: 172.
[2022] Engel 1997: n. 155.
[2023] Dreyer 1991: 102.
[2024] Lacher 2008: 431; 2011: 217.

Figure 326 Reconstruction of the putative superstructure of Kings Hotepsekhemwy/Raneb at Saqqara looking south. (Lacher 2008, Abb. 4) Courtesy of C. Lacher-Raschdorff)



of the Unas pyramid, and nothing remains of it today.[2025] Although details of its construction method are unknown,[2026] Lacher has suggested that the mastaba, which was probably built in several stages like its substructure, could have been 104 m long × 52 m wide in its final form (Figs. 43 and 326).[2027] It therefore would have covered the majority of its substructure, partially sheltered its access stairway,[2028] and protected its portcullis shafts. Externally it may have been cased with mud-brick or limestone and was perhaps 5 m high;[2029] its core possibly formed by the spoil from the substructure's excavation,[2030] thus it would have offered its already well defended substructure a considerable degree of extra protection.

Ninetjer

It is assumed that the tomb of Ninetjer **[13]** had a superstructure similar to that of Hotepsekhemwy/Raneb, but no trace of it has been found.[2031] The northern part of it may have been demolished to make way for the causeway of Unas,[2032] and recent work by the DAI team has concluded that any remains were probably cleared away during construction on the site in the reign of Horemheb.[2033] That this superstructure was effective at deterring robbers' tunnels and intrusive burials when it was still *in situ* is demonstrated by the number of shafts that have penetrated the substructure since its removal, the earliest of which date to the Old Kingdom.[2034]

The last two kings of the dynasty returned to Umm el-Qaab to build their tombs and like their First Dynasty predecessors, reverted to pit substructures, but still relied on the superstructure for their overhead protection.

Peribsen

According to Dreyer, the grave of Peribsen **[14]**, like earlier First Dynasty tombs at Umm el-Qaab, was probably covered with a brick clad tumulus formed from the excavated material from its burial pit,[2035] but there is no material evidence to confirm it.

Khasekhemwy

More is known about the tomb of Khasekhemwy **[15]**, where Dreyer suggests, based upon the finding of some anomalous dressed limestone blocks, and the massive

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[2025] Lauer 1976: 144.

[2026] Lacher 2008: 431.

[2027] Lacher 2008: 443–6. More recently, Lacher-Rashdorff (2014: 153–97) has expanded her discussion of the superstructures of both Hotepsekehmwy and Ninetjer and has proposed five different plausible reconstructions of the arrangement. Readers are therefore advised to consult her work to see the possibilities suggested, as publication deadlines prevent the author of this book from expanding on this topic further.

[2028] In the tomb's earliest phase Lacher (2008: 443, Abb. 4) suggests that the substructure may have been accessed via a staircase that descended through the body of the mastaba. Perhaps this took a form similar to that of the Third Dynasty private tombs K1 **[319]** and K2 **[320]** at Beit Khallaf (see p. 194) or its nearby private neighbour at Saqqara, Hesyra **[119]** (see p. 197).

[2029] Scaled dimension from Lacher 2008: Abb. 4.

[2030] Lacher 2008: 441–7.

[2031] Lacher 2011: 217. See also note 2027 immediately above. Excavations by Munro (1993: 50–4) in the 1990s were originally thought to have located part of the superstructure. However, the rock ledge which Munro had discovered actually turned out to belong to the causeway of Unas. Personal communication by Claudia Lacher (12th October 2010).

[2032] Lacher 2011: 215.

[2033] Dreyer 2006: 19; 2007a: 135–6.

[2034] Lacher 2011: 217. For an analysis of the tomb's reuse from the Old Kingdom onwards, see Lacher-Raschdorff 2011: 543–550; 2014: 76–77.

[2035] Dreyer *et al.* 2006: 100–1.

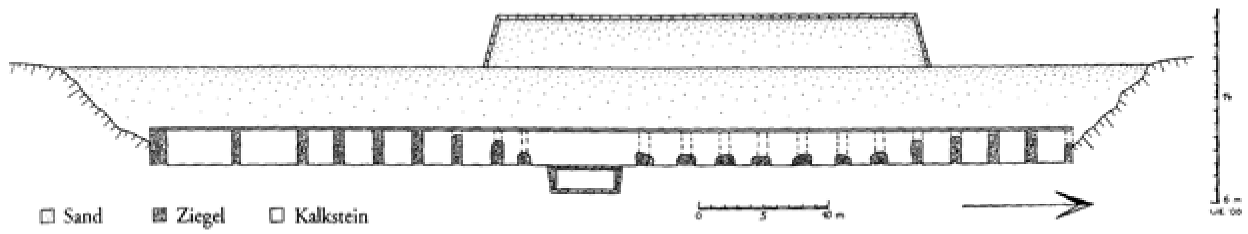

Figure 327 Dreyer's reconstruction of the tumulus/superstructure over the tomb of Khasekhemwy at Umm el-Qaab. As can be seen, the superstructure would have left much of the substructure unprotected. (Dreyer *et al.* 2003, Abb.17) Courtesy of the DAI Cairo.

distortion of the mud-brick walls in the centre of the substructure, that a tumulus may have been built over the backfill.[2036] This may have consisted of a sand cored, mud-brick mastaba approximately 35 m long that was externally clad in dressed limestone (Fig. 327), and would have protected about half the substructure.[2037] Load bearing calculations have demonstrated that the beams of the substructure's roof could have supported a tumulus of this size approximately 3 m high.[2038]

Section summary – the royal superstructures of the Second Dynasty

Even though there is little physical evidence remaining, it appears that the majority of the royal tombs of the Second Dynasty probably protected their substructures with a superstructure of some form, and on a monumental scale. Although it seems that unlike the putative superstructures proposed for the tombs of Hotepsekhemwy/Raneb and Ninetjer at Saqqara, the substructure of the more vulnerable tomb of Khasekhemwy was not wholly covered by its mastaba's footprint, leaving a proportion of it susceptible to overhead penetration.

6.1.4 The Third Dynasty

The Step Pyramid of Djoser

Initially, the superstructure of the tomb of King Djoser **[16]** took the usual form of a large protective mastaba over the royal burial, but was revolutionary as it was constructed entirely of stone. It was built in six stages, the first three in the form of a mastaba and the latter three as a step pyramid (Fig. 328). The first mastaba (M1) comprised of a Tura limestone clad core of limestone rubble bonded with clay mortar that was 62.9 m × 62.9 m × 8 m high (Fig 329). In the second stage (M2) it retained its square plan, but was increased to

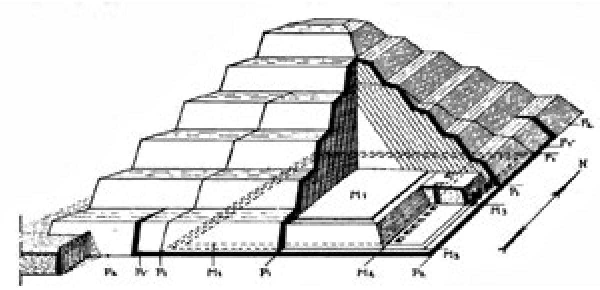

Figure 328 Lauer's diagram of the construction phases of the Step Pyramid of Djoser. (Lauer 1962, fig. 20) © IFAO.

71.5 m × 71.5 m. In the final stage (M3), an 8.4 m thick layer of masonry was added on the eastern side, which covered the tomb shafts of the royal family (see 5.1.1) and created a rectangular structure.[2039] Therefore, at this stage a large stone mastaba now protected the royal substructure, and although the original access shaft that extended up through the mastaba during its construction had been filled in,[2040] in theory the shaft below remained vulnerable to overhead attack.

The second half of the tomb's development was marked by the decision to turn the mastaba into a step pyramid. The reasons behind this change are still the subject of much debate,[2041] but it may be that the frequent experience of tomb robbery in royal sepulchres soon after the burials were made,[2042] drove a desire to provide greater protection to the substructure than that obtainable from a mastaba.[2043] Now built with inclined accretion layers of coursed stonework 2–3 m thick for stability,[2044]

[2036] Petrie (1901: 12) mentioned these deformed walls, but suggested it was due to the walls being constructed of new damp bricks, which had not had time to dry out. More recently, Dreyer (2003: 110) suggests their distortion was possibly created by rainfall seeping into the surrounding ground, and that the extra load of the superstructure had caused their local plastic deformation.
[2037] Dreyer *et al.* 2003: 110.
[2038] Dreyer *et al.* 2006: 114.
[2039] Lauer 1936: 12–16; 1962: 70–2.
[2040] Lauer 1936: 30–1.
[2041] Dodson and Ikram 2008: 142. Suggestions, amongst others, include: its use by the king as a 'stairway to the sky' (Badawy 1956: 182–3; Lauer 1962: 72; Radwan 2003b: 90); that it was built to increase the 'grandeur' and monumentality of the tomb (Stadelmann 1996a: 798) and as '…an increased claim to monumentality' (Arnold 2003: 229). Dreyer (2007c: 204) regards it as a monumentalised form of grave mound.
[2042] Dreyer in Haase 2006: 17–8.
[2043] Stadelmann 1985a: 52. Reisner (1936: 339) suggested that this was a continuance of his 'layer mastaba/stepped pyramid' theory (1936: 332–6) of the preceding dynasties, and although his assumptions are outmoded today, his basic theory that the extended steps provided additional protection, are of course correct.
[2044] Lauer 1962: 72. For a detailed discussion of these masonry

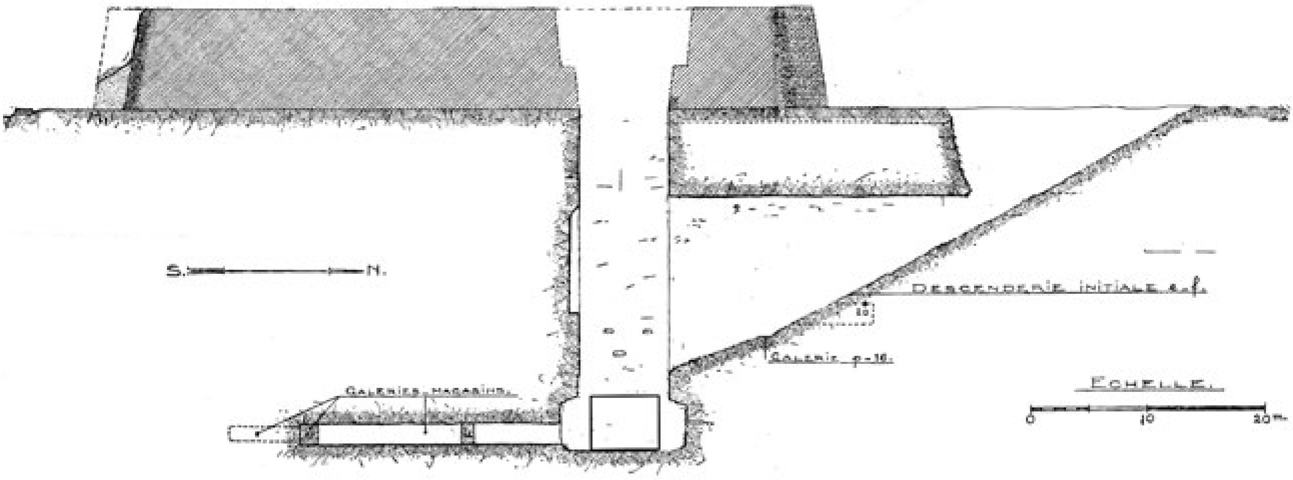

Figure 329 Section of the first stage (M1) of the mastaba of King Djoser at Saqqara looking west. The original descent and construction pit are shown open, as they might have been during construction. (Adapted by the author after Lauer 1936, pl. XIX) © IFAO.

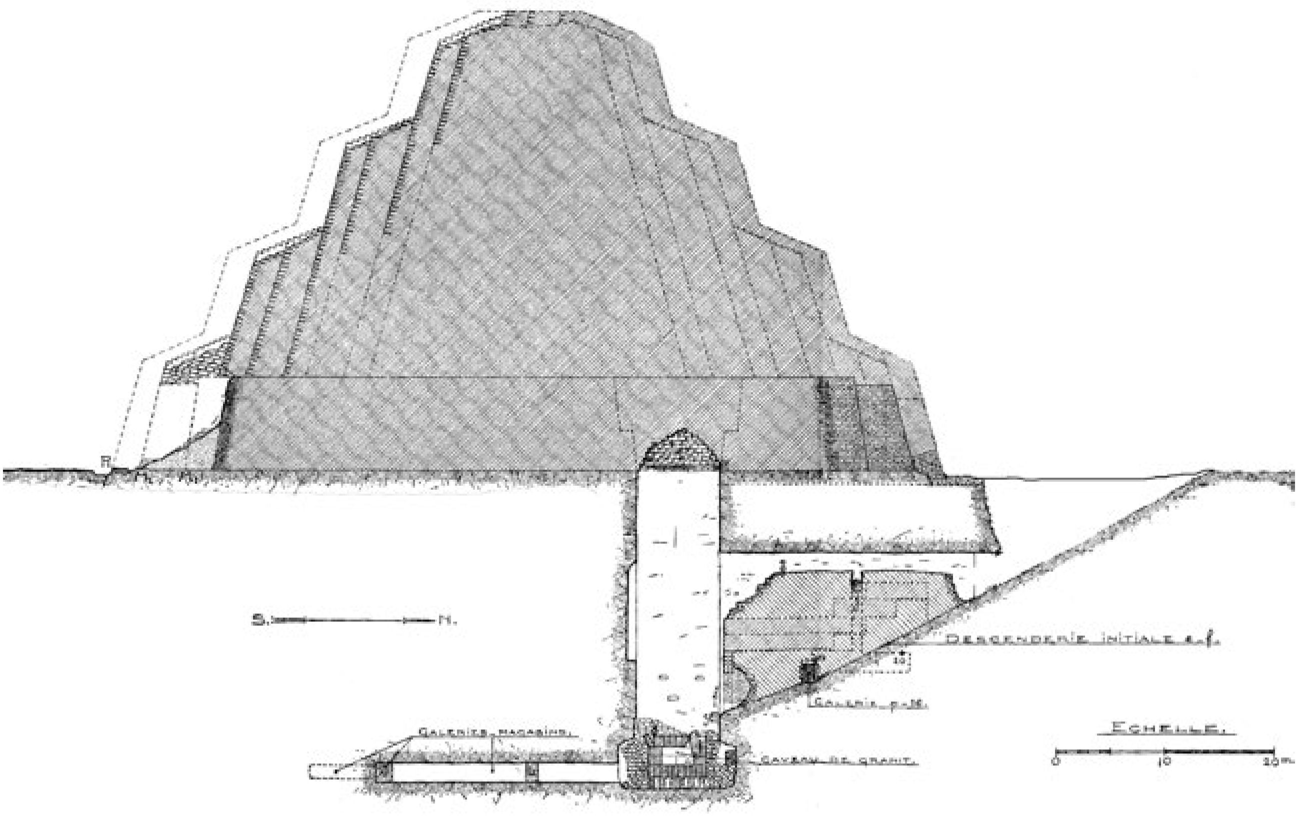

Figure 330 Section of the first phase of the pyramid (P1) of Djoser at Saqqara, looking west. (Adapted by the author after Lauer 1936, pl. XIX) © IFAO.

the first stage of the Step Pyramid (P1) comprised of four steps, which increased the plan of the mastaba (M3) by 5.76 m overall on its two sides,[2045] but its overall height to approximately 42 m (Fig. 330).[2046]

Perhaps unsatisfied by the uneven depth of cover offered by this lopsided arrangement, the architect, who was probably Imhotep,[2047] increased the footprint and volume of the four tiered pyramid enormously in the next stage (P1′), by extending the structure on its northern and western sides and adding a further two steps.[2048] Finally,

arrangements in detail, see Arnold 1991: 148–76 and Sampsell 2000: 2–6.

[2045] So that it was now approximately 77.5 m × 85.5 m (Lauer 1962: 70).

[2046] Lauer 1962: 72.

[2047] Lehner 1997: 84.

[2048] To approximately 104.8 m × 117.9 m (Lauer 1936: 21).

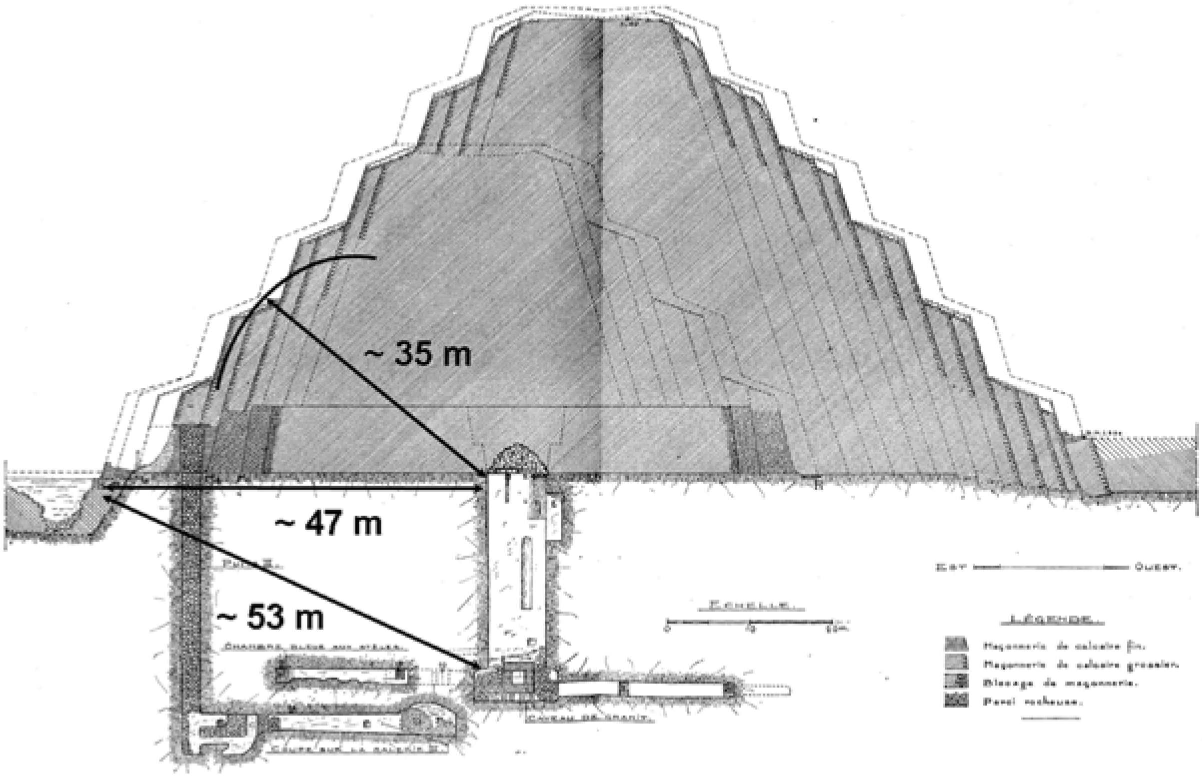

Figure 331 Section of the Step Pyramid in its completed state looking south. Showing approximate dimensions from the edge of the shaft to the closest point on the superstructure; perimeter of the pyramid to the top of the shaft; and burial chamber to the perimeter of the pyramid.
(Adapted by the author after Lauer 1936, pl. XX) © IFAO.

a further layer was added (P2) to protect the original entrance stairway and its flanking cruciform passage that resulted in the structure seen today, which is 121 m long × 109 m wide × 60 m high,[2049] and a hitherto unparalled 330,400 m^3 in volume (Figs. 52–3).[2050]

This new shape was the most economical method, in terms of materials and the available technology, of providing what can be described as an impregnable 'carapace' of protection over the tomb's vulnerable shaft and galleries. This is because there is no advantage in just building a much taller mastaba, because the protection offered vertically from the highest point and horizontally from the widest point are the minimum distances that would need to be tunnelled in order to penetrate via this route, as the upper external edges of such a structure would be superfluous. Therefore, by building a roughly hemispherical or mound-like shape the most efficient degree of cover could be provided, as geometrically any point on a hemisphere's surface is the same distance from the centre of its base as its radius. By using the technology available at the time, a rough approximation of that shape could be provided by building a step pyramid, which concomitantly saved an enormous amount of both labour and materials.

As a result, rather than being vulnerable to attack from above, like the earlier mastabas of the previous dynasties, it can be seen by drawing an imaginary straight line through the pyramid's section (Fig. 331) that an overhead assault from any direction would have to penetrate at least 35 m of stone superstructure before reaching the top of the tomb's shaft.[2051] In addition, any attempt at lateral tunnelling beneath the pyramid's enormous 13,189 m^2 footprint was unfeasible from a robber's point of view,[2052] as it was more than 47 m from its outside edge to the top of the main shaft.[2053] Moreover, the distance from the superstructure's perimeter through the bedrock to the burial chamber, was even further at about 53 m.[2054] Therefore, compared to any previous Egyptian tomb, the

[2049] Lauer 1962: 73.
[2050] Lehner 1997: 17.

[2051] Scaled from section drawing by Lauer (1936: pl. XX).
[2052] Although of course, accessing the shaft by tunnelling under the pyramid laterally is entirely possible, given enough time and resources, as the large passage created under the pyramid during the Saite Period demonstrates (Lauer 1936: 28–32 and 46; Smoláriková 2006: 43).
[2053] Scaled from section drawing by Lauer (1962: pl. 11); looking south, the dimension is from the eastern side of the pyramid to the shaft's mouth. Likewise from the south side it is 49.5 m; west 67 m and north 48 m.
[2054] Scaled from the east-west section drawing of the pyramid looking south by Lauer (1936: pl. XX) the dimension is from the granite chamber to the pyramid's eastern edge. This dimension was originally about 40 m to the pyramid's western edge when the pyramid was at stage P1.

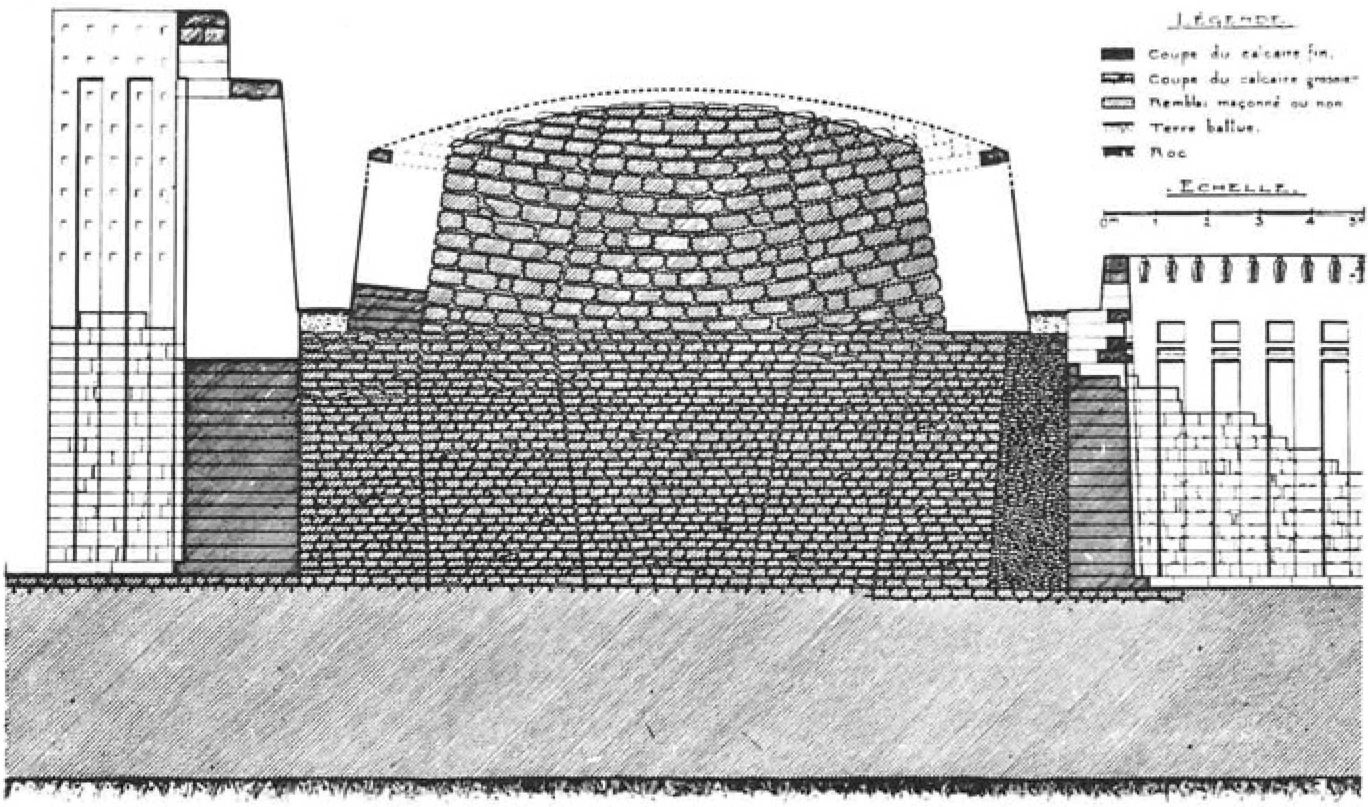

Figure 332 Section looking west of the superstructure over Djoser's 'South Tomb' in the Step Pyramid complex at Saqqara. (Lauer 1955, pl. I.2) © IFAO.

world's first pyramid offered its occupant an unrivalled degree of protection.[2055]

On a smaller scale, the superstructure for the pyramid's 'South Tomb' **[17]** was far simpler. Built as a rectangular mastaba 81.25 m long × 9.85–10.5 m wide, it finished approximately 4 m above the upper terrace of the southern enclosure wall, where clad in white limestone, its core comprised of accretion layers, like those of the pyramid.[2056] Although it protected its underlying substructure to an extent, its footprint, while covering the access stairway and shaft, did not quite lie over the most northerly and easterly of the lower galleries, nor provide a great deal of lateral protection for the shaft on its northern and southern edges (Figs. 57 and 332).

The Pyramid of Sekhemkhet

Within the pyramid complex of Sekhemkhet **[18]**,[2057] Goneim discovered the first stage of an unfinished step pyramid,[2058] approximately 120 m × 120 m across the base and about 7 m high (Fig. 333). Constructed of fourteen sloping limestone accretion layers, bound with clay in a similar manner to the latter stages of the Step Pyramid, it would if completed, have reached a height of around 70 m in seven steps,[2059] making it about 10 m higher than its predecessor. The pyramid's 14,400 m^2 footprint was placed more or less centrally over the burial chamber,[2060] and overlapped the substructure's vertical shaft by 13.2 m,[2061] thus concealing and protecting both it and a large proportion of the descending passage, but still leaving the majority of its subterranean magazines unprotected (Figs. 60–1). In this instance, the shortest distance between the two points that a tunneller would have to dig to access the burial chamber directly from the pyramid's perimeter, would have been around 63 m (Fig. 334).[2062]

[2055] As Lauer (1962: 93) suggested when he discussed the storage of stone vases in the tomb, the security offered by this sepulchre's innovative superstructure and substructure was such that at the point of its creation and the vases' deposition, the tomb was probably considered to be inviolable.

[2056] Lauer 1936: 96–7; 1955: pl. I. 2.

[2057] Situated approximately 144 m southwest of the Step Pyramid a stone terrace, approximately 536 m long × 194 m wide, delineates the boundaries of the complex and is orientated on a north-south axis (Goneim 1957: 1). Originally, it was smaller at approximately 260 m long, its northernmost point now marked by the remains of a palace façade wall, but it was subsequently enlarged to match Djoser's complex (Lauer 1976: 138, fig. 9).

[2058] Maragioglio and Rinaldi 1963: 12.

[2059] Goneim 1957: 8–10. However, Maragioglio and Rinaldi (1963: 37–9) hypothesised that this pyramid may never have been finished and and perhaps, bearing in mind that the shaft would have had to exit through the second step of such a pyramid (and that it had been filled after the burial), that it was more likely that a mastaba built with walls of inclined accretion layers was there instead.

[2060] Lauer 1962: 194; Maragioglio and Rinaldi 1963: 25.

[2061] Goneim 1957: 12.

[2062] Scaled from the drawing looking west by Goneim (1957: pl. IV),

Figure 333 The exposed north-west corner of the unfinished pyramid of Sekhemkhet. (Goneim 1957, pl. XVI)

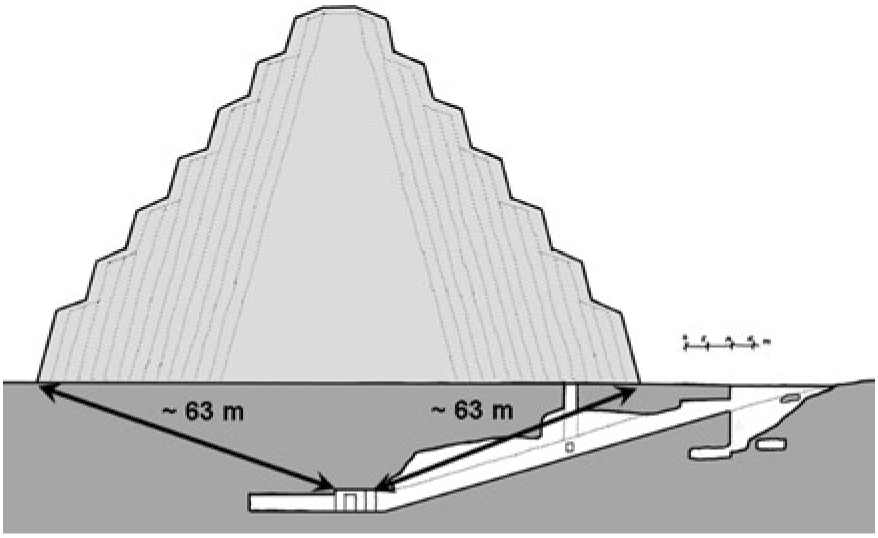

Figure 334 Section through the Pyramid of Sekhemkhet looking west, with approximate distances from perimeter of pyramid to burial chamber. (Drawn by the author after Goneim 1957, pl. 4 and Lauer 1979, fig. 7)

Like the complex of Djoser the pyramid also had its own 'South Tomb'**[19]**, which was protected by an east-west orientated mastaba approximately 32 m long × 16 m wide (Fig. 64). This originally encompassed the underlying shaft and sheltered the final few metres of the entrance passage and burial chamber with its protective footprint;[2063] presumably leaving the majority of its (still unexplored) access passage unprotected to the west.[2064]

The Layer Pyramid

The 'Layer Pyramid' of Khaba at Zawiyet el-Aryan **[20]**, like that of Sekhemkhet, was never completed.[2065] It gains its name from the exposed layers of its internal structure that can be seen on its north face,[2066] and all that exists today are the incomplete remains of what is assumed was intended to be a pyramid (Fig. 335). These consist of around fourteen angled accretion layers of stone against an inner core of masonry, which were bonded with a clay (*tafl*) mortar. If completed they would have created a square structure 78.45 m × 78.45 m across the base,[2067] which may have reached a height of 42–45 m in five steps (Fig. 336).[2068] Like its forbears, its 6,154 m² footprint and its mass would have provided protection for the substructure from attack from above, though owing to its smaller size, arguably less successfully than its predecessors. It can be estimated that the distance that

the dimension is taken from the top of the burial chamber to the northern and southern edges of the pyramid's base.

2063 Lauer 1969a: 124; 1976: 138.

2064 Lauer 1977: 202–3.

2065 Maragioglio and Rinaldi 1963: 47; Lehner 1996: 511.

2066 Dodson 2003: 46.

2067 Maragioglio and Rinaldi 1963: 42–3.

2068 Lehner 1997: 95.

Figure 335 The sloping accretion layers in the unfinished Layer Pyramid at Zawiyet el-Aryan (Reisner and Fisher 1911, 57).

one would have to tunnel from the edge of the pyramid to the burial chamber would be in the region of 43 m by the shortest route, thus not providing quite as much cover as that of its predecessors.[2069] However, due to their outlying positions, both the substructure's entrance shaft and the subterranean magazines were beyond the pyramid's protection and would have remained vulnerable to tunnelling.

The Brick Pyramid at Abu Roash

Lepsius in his recording of the Brick Pyramid at Abu Roash **[21]** noted that its shape and form were quite clear

[2069] Although exact dimensions of the substructure's layout are unclear, this dimension is scaled from the burial chamber's roof on the section drawing by Lauer (1962 pl. 27a.) looking west to both the north and south edges of the pyramid's base.

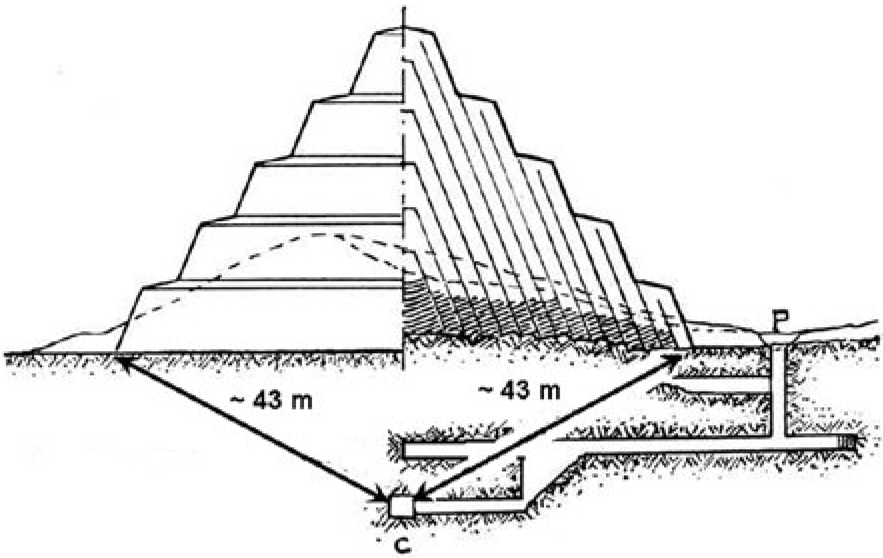

Figure 336 Sectional reconstruction of the Layer Pyramid looking west. Approximate dimensions to the burial chamber from the perimeter of the pyramid are shown.
(After Lauer 1962, pl. 27a) © IFAO.

Figure 337 The 17 m high remains of the Brick Pyramid at Abu Roash as viewed from the south-east by Lepsius in 1842.
(Lepsius 1897, Abb. 12)

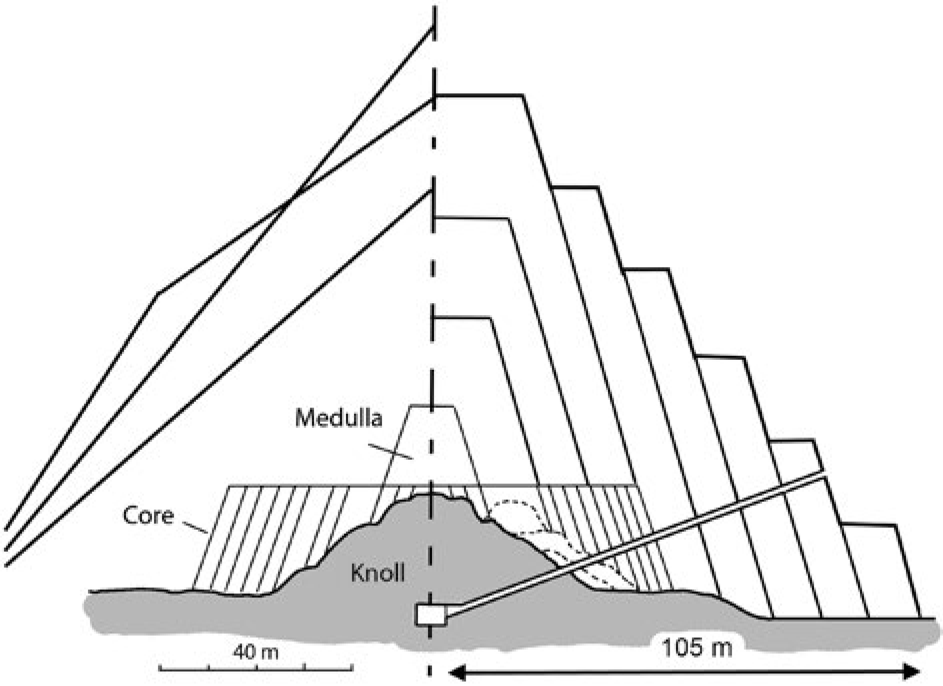

Figure 338 Schematic section of the Brick Pyramid at Abu Roash looking west. The knoll, surmounted by a brick nucleus and medulla, formed the core for either a step pyramid, or less likely, a 'true' pyramid. (After Swelim 1987, figs. 13 and 15)

and that 17 m high remnants of mud-brick walls that formed its original structure were still to be seen (Fig. 337). He considered it to be the largest of all the brick pyramids and estimated it to be 145 m across its base (Map 6, and inset) and around a third bigger than the northern brick pyramid at Dahshur.[2070] As discussed earlier (4.1.3) the underlying core of the pyramid comprised of a 27 m high rock knoll into which the burial chamber and descending corridor had been excavated.[2071] According to Swelim a mud-brick pyramid was built over the whole of this knoll, probably in the form of accretion layers (also noticed by Lepsius[2072]), constructed over terraces cut in the limestone.[2073] Although possibly unfinished,[2074] Swelim suggests that its inner core may have comprised of a rectangular brick structure 150 m long × 100 m wide × 25–30 m high, on top of which a nucleus was constructed, against which the rest of the pyramid was built (Fig. 338). The descending corridor would then have been extended from the knoll through the mud-brick and lined in stone.[2075] He suggested that it was probably a step pyramid (Fig. 72) and calculated that the sides of its base may have been about 215 m and its height anywhere between 107.5–150.5 m, and thus comparable in size to the later pyramids of Sneferu and Khafre.[2076]

[2070] Lepsius 1897: 11–2.
[2071] Swelim 1987: 22.
[2072] Lepsius (1897: 11) wrote: 'Die Ziegel waren in hohen Wänden an einander gelegt, aber sämmtlich im Einzelnen und Ganzen genau nach den Himmelsgegenden orientiert'.
[2073] Swelim 1987: 42.
[2074] Swelim (1987: 61–2, 90) believes that the cutting of the many Old Kingdom tombs that sit on the knoll after the end of the Fifth Dynasty was possible because there were gaps in the unfinished brickwork that allowed access to the core.
[2075] Swelim 1987: 62–5.
[2076] Swelim 1987: 65–6; 88–9.

This would have made it the largest pyramid constructed to date and probably the fourth biggest ever built.[2077] Therefore, with a footprint in the region of 46,225 m^2, it would have offered its substructure a considerable degree of protection from lateral tunnelling. In this case it can be estimated that a tunnel would have to penetrate approximately 105 m through the structure, of which about 30 m would have been the limestone knoll and the balance mud-brick, with even an even greater proportion of rock on its east-west axis.[2078]

Although the brick was undoubtedly less resistant to penetration than stone, the rocky knoll itself was only two-thirds of the size of the stone pyramids of its predecessors, thus the overlying mud-brick pyramid probably more than compensated for its shortfalls, and at least could be built quickly with the conveniently accessible local resources.[2079]

Section summary – the royal superstructures of the Third Dynasty

The introduction of stone rather than mud-brick as the principal material for the royal superstructure during the reign of Djoser was undoubtedly a major step forward in improving the security of the underlying substructure. However, the conversion of Djoser's still vulnerable mastaba into a step pyramid increased its defensive

[2077] Dodson 2003: 47
[2078] This distance is based on an imaginary line from the burial chamber's north to the outside edge of the pyramid's base on a composite section drawing looking west. Scaled from drawings by Swelim (1987: figs. 13 and 15).
[2079] Dodson (2003: 47) suggests that the pyramid's proximity to the floodplain would have allowed for the easy manufacture of mud-brick.

capability enormously. Now the depth of cover provided, which was previously limited by the height of the superstructure, rather than its footprint, could be defined instead by the virtual 'hemisphere' of material that could be theoretically formed within it. This economic use of materials to provide the maximum degree of cover in all directions was emulated by Djoser's successors at Saqqara and Zawiyet el-Aryan, who followed its precedent and built their step pyramids in a similar fashion. On an even greater scale, the Brick Pyramid at Abu Roash, although now additionally providing a facade in which to locate its more secure raised entrance and protection for its innovative descending passage, essentially performed the same function, albeit that much of it was constructed in less resilient mud-brick.

6.1.5 The early Fourth Dynasty

The accession of Sneferu saw the successive establishment of new necropoleis at Meidum and Dahshur and the unparalleled achievement of building three pyramids in one reign.

The Pyramid of Meidum

Within the pyramid of Sneferu's first tomb at Meidum **[22]**, both the burial chamber and its adjoining descending corridor were situated above ground level and protected by the encompassing core of the superstructure, which effectively formed an artificial 'knoll', similar to that of the Brick Pyramid at Abu Roash. The reason behind the retention of this layout, apart from the increased security benefits of the raised entrance, possibly lay in the weakness of the underlying crumbly rock (see 4.1.4).[2080] The pyramid initially comprised of seven steps (Figs. 73 and 339–40) constructed from an inner core of mortared limestone masonry and six sloping accretion layers (E1). This was later expanded by adding another layer to form an eight stepped pyramid (E2), both of which were intended to be finished structures in their own right. In a final construction phase,[2081] these steps were filled in and covered with a limestone cladding that formed the first 'true' pyramid (E3),[2082] the exterior of which has long since collapsed,[2083] and whose shape is still the subject of much scholarly debate.[2084] This increased its size to 144.3 m long × 144.3 m wide × 94.5 m high,[2085] which meant that its burial chamber and descending corridor now relied for their defence on a 638,733 m^3 'mountain' of solid limestone,[2086] whose 20,592 m^2 footprint also offered it exceptional protection against undermining through the underlying soft rock, as the shortest point to the burial chamber from the edge of the pyramid's base was approximately 67 m (Fig. 340).[2087] Moreover, in the unlikely event of an attempt to tunnel through one of the pyramid's faces down to the chamber,[2088] the distance that would need to be travelled was approximately 49 m at its shortest point.[2089]

The 'Bent' or Southern Pyramid at Dahshur

Built on an even larger scale than its forerunner at Meidum, Sneferu's Bent Pyramid **[23]**, was also intended to protect its above ground burial chamber and descending corridors, by enshrouding them in stone and providing them with a protective footprint to

2080 Reisner 1936: 201; Rowe 1931: 6.

2081 Stadelmann (2011: 736–7) suggests that the pyramid may have been remodelled to perhaps provide a 'stand-by' tomb that conformed more with the new thinking on pyramid design, while the work on the Bent Pyramid was ongoing at Dahshur, as the king would have been over fifty years old when the latter's construction commenced in year thirty of his reign.

2082 Maragioglio and Rinaldi 1964b: 10–6. Described by Petrie (1892: 6, pl. II; 1910: 1; 1912: 25, pl. XIV) and then later by Borchardt (1928: 11–4, Taf. 3–4).

2083 Dodson 2003: 49–50. The reasons for this collapse has been the subject of considerable debate amongst scholars, Petrie (1892: 4–5) noted that 'The pyramid of Medum is the quarry of the neighbourhood' and thought that the casing had been partially stripped in the Ramesside Period, the rest having been taken in the Middle Ages and in modern times'. More recently, Mendelssohn (1973: 60–71) blamed heavy rainfall for washing away the pyramid's foundations, whereas others like Edwards (1974: 251–2) thought it may be the result of an earthquake, see also Davey (1976: 178–9) regarding the structural collapse discussion. Finally, Stadelmann (2003: 114) concurs with Petrie and suggests the pyramid has been quarried for stone from the Greco-Roman period onwards.

2084 There are numerous theories: Reisner (1936: 340) was reluctant to accept any religious interpretations and suggested its design was intended to give improved concealment of the entrance to the descending corridor and that its steep slopes made an attack on the pyramid more difficult. Badawy (1957: 183) thought it: 'a monument of solar religion, the most perfect of all ascension devices.' Fakhry (1961: 8) suggested that it was a rendition in stone of the benben and a replacement for the sun's rays that would permit the king to ascend to heaven, whereas Stadelmann (1985: 86) believes it to be a symbolic representation of divine kingship. Edwards (1988: 277) proposed that it was a physical representation of the rays of the sun, which the king used as a ramp to heaven, but Bruck (1995: 164) suggests it was an interpretation of the celestial sphere in stone. Lehner (1997: 35) writes: 'The pyramid is a simulacrum of both the mound of primeval earth and the weightless rays of sunlight, a union of heaven and earth that glorifies and transforms the divine king and ensures the divine rule of the Egyptian household'. Finally, Dodson (2003: 49) considers it to be a solar symbol of the rays of the sun descending from the sky, via which the king could ascend to heaven.

2085 Maragioglio and Rinaldi 1964b: 16. Petrie (1892: 6) gave a height of 91.92 m based upon a slope of 51° 51′, whereas Maragioglio and Rinaldi (1964: 16) measured the slope as 54° 40′ and calculated a height of 94.5 m.

2086 Lehner 1997: 17

2087 Scaled dimension from section drawing by Borchardt looking west (1928: Taf. 4).

2088 This sort of approach is not beyond the bounds of impossibility, as the ancient breach known as the Ma'mūn's Hole in the face of the Great Pyramid of Giza demonstrates (Maragioglio and Rinaldi 1965a: 22), which was probably an enlargement of a robbers' tunnel originally made during the First Intermediate Period (Stadelmann 1985a: 113) that had been sealed in the Ramesside Period and subsequently reopened by the Caliph al-Ma'mūn in the Tenth Century (Cooperson 2010: 1119–22). Elsewhere, at some point robbers had tunnelled from the face of the pyramid of Userkaf at Saqqara horizontally; forcing one tunnel across and down onto the portcullis and another down into the lower end of the inclined corridor (Vyse and Perring 1842: 39–40). Similarly, a passage had been driven into the face of the pyramid of Niuserre at Abusir and downwards into the horizontal corridor to gain access to the substructure (Vyse and Perring 1842: 17–8).

2089 Scaled from the burial chamber's southern end to the south face of the pyramid from the section drawing by Borchardt (1928: Taf. 4) looking west.

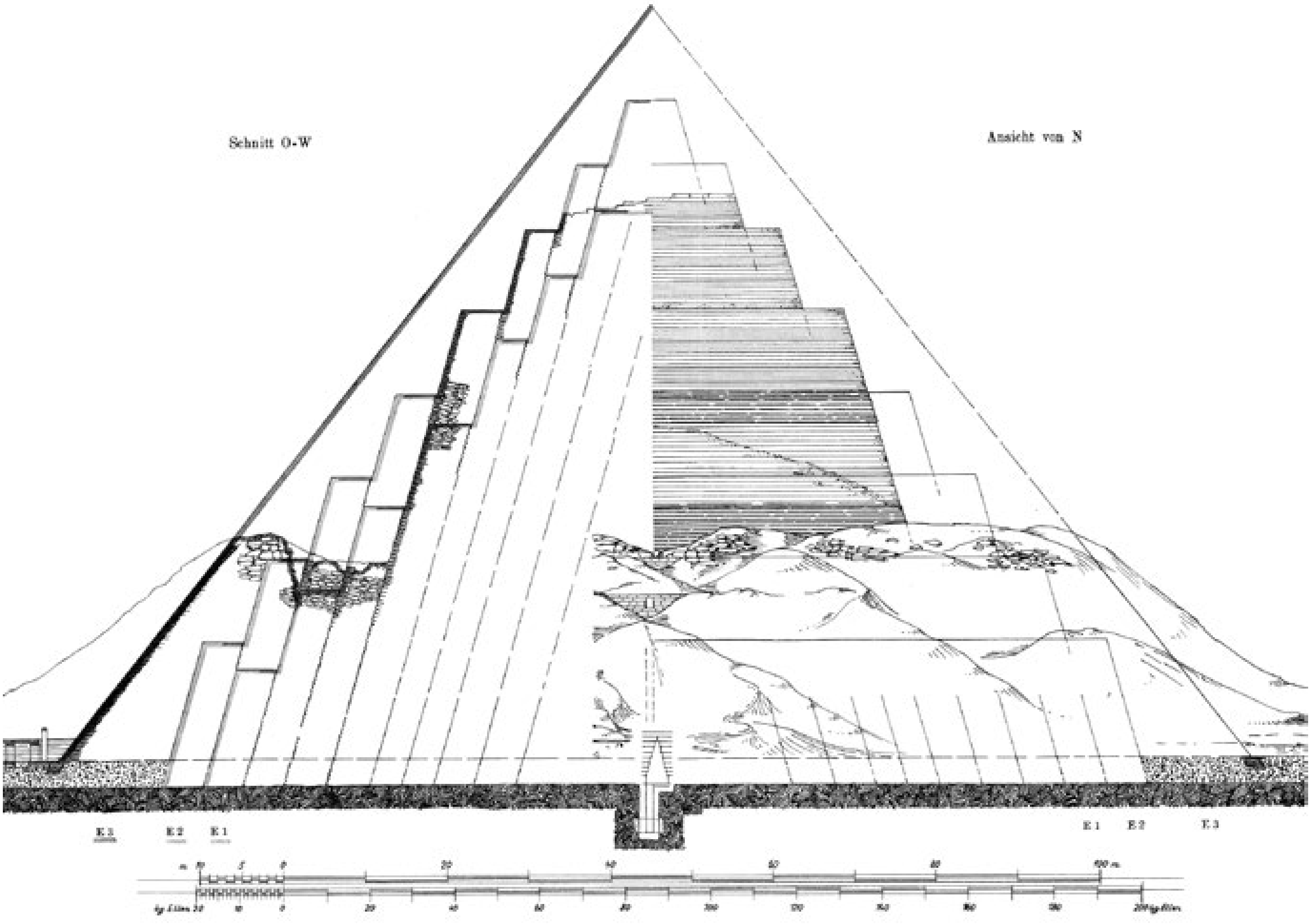

Figure 339 Section through the Pyramid of Meidum looking south, showing the three phases of the pyramid's construction.
(Borchardt 1928, Taf. 3)

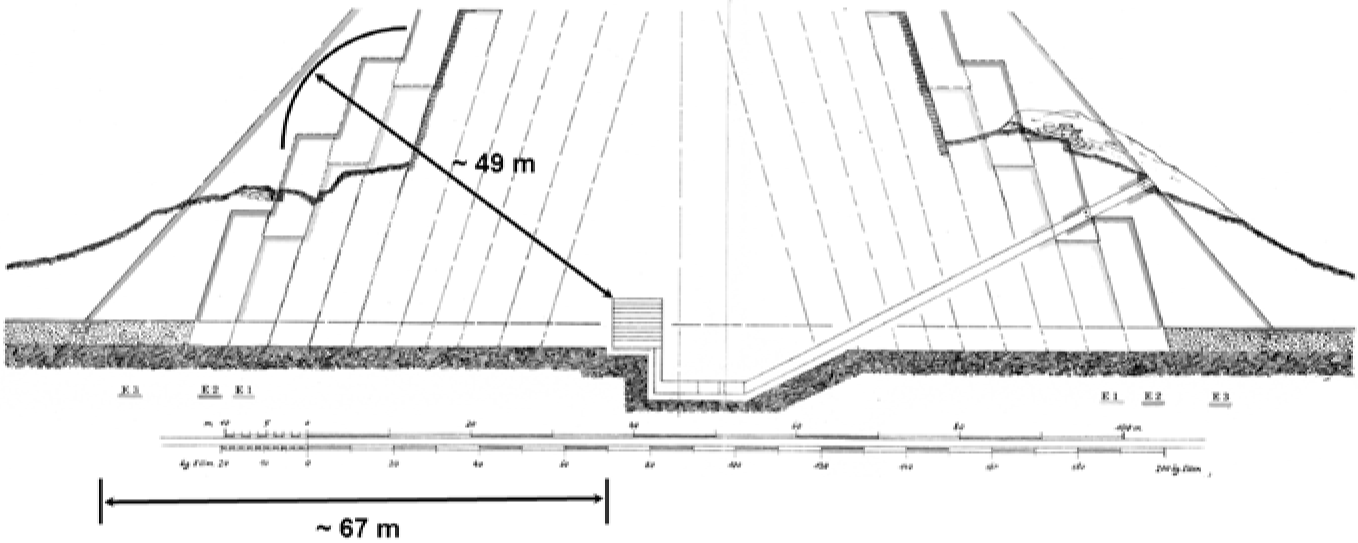

Figure 340 Section drawing of the Pyramid of Meidum looking west showing the three phases of construction and the minimum depth of protection offered by the pyramid to the burial chamber.
(After Borchardt 1928, Taf. 4)

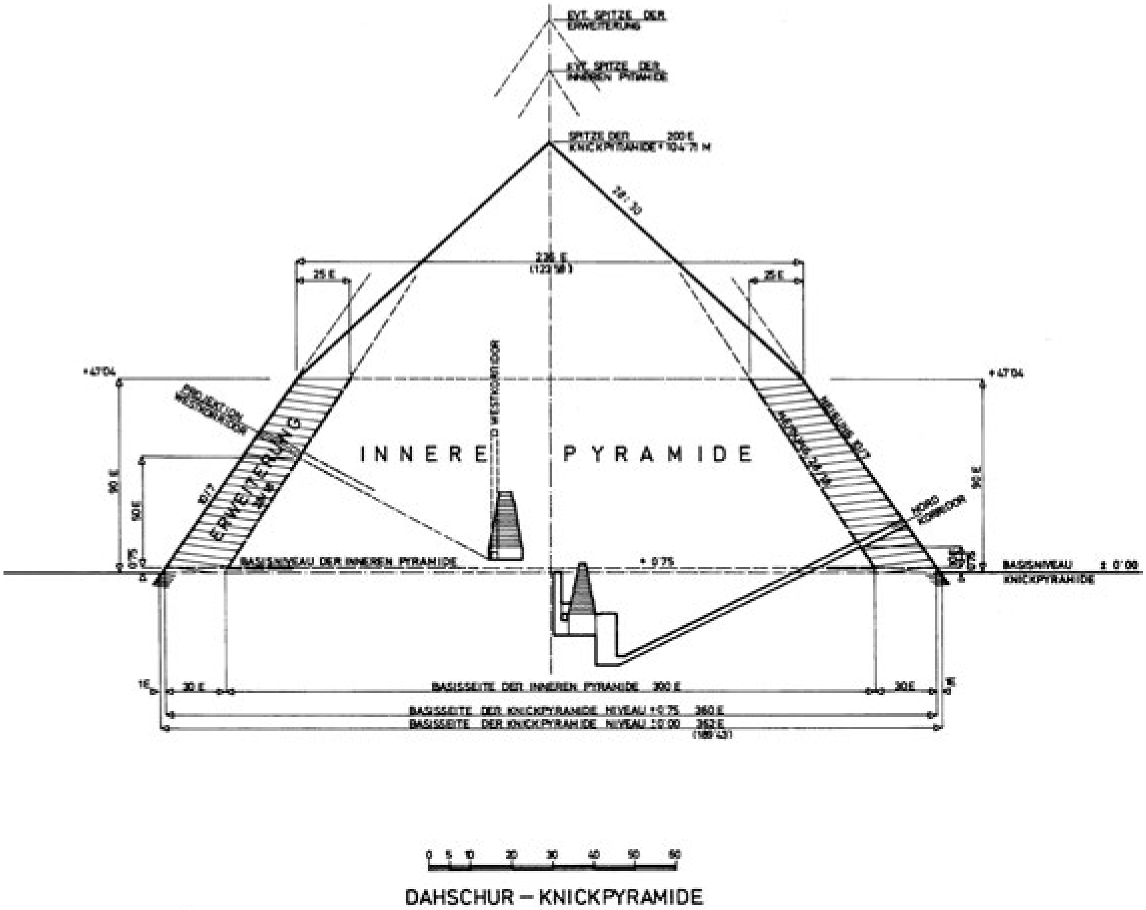

Figure 341 Section drawing of the outer cladding layer applied to the lower half of the Bent Pyramid, together with its dimensions.
(Dorner 1986, Abb. 5) Courtesy of the DAI Cairo.

prevent undermining. Its sloping sides were originally built at a comparable angle to those of the pyramid of Meidum, and similarly comprised of layers of inclined stones. However, the poor quality of the underlying shale led to cracking and subsidence in the substructure during construction; further aggravated by its inner core of rough stone blocks, which were loosely bonded with debris and *tafl* mortar. To remedy these problems an extra layer of masonry was used to girdle the outer section of the existing structure and the angle of slope of the upper half of the structure was decreased in an attempt to stabilise it,[2090] which resulted in the pyramid's characteristic appearance (Fig. 341). In addition, to gain further strength and stability its stone courses were now laid horizontally.[2091] Approximately 189.5 m × 189.5 m × 104.7 m high,[2092] it directly protected its upper burial chamber and western descending corridor with 1,237,040 m^3 of stone, which is nearly double the volume of its predecessor at Meidum.[2093] From the southern upper slope of the pyramid, it would have required a robber's tunnel around 52 m in length at its shortest point to penetrate the burial chamber.[2094] In addition its enormous 35,910 m^2 footprint would have sheltered the subterranean elements of its northern descending corridor and antechambers from lateral tunnelling, as it was now a minimum of around 85 m from the substructure to the pyramid's outer edge (Fig. 342),[2095] which is approximately 25% further than in the pyramid of Meidum,

The adjacent satellite pyramid **[24]**, which was 52.8 m square at its base and 25.75 m high,[2096] protected its internal 'burial' chamber with 23,928 m^3 of limestone,[2097]

[2090] At a height of 47.04 m from the surface the slope was reduced from 55°00′ 30" to 43°01'30" (Dorner 1986: 54).
[2091] Maragioglio and Rinaldi 1964b: 98–100; Lehner 1997: 102; Stadelmann 1985a: 89; Dorner 1986: 44.
[2092] Dorner 1986: 51 and 54.
[2093] Lehner 1997: 17.
[2094] Scaling from Fakhry's (1959: fig. 33) section drawings looking west and south,
[2095] When scaled from the section drawings by Fakhry (1959: fig. 33) looking west.
[2096] Maragioglio and Rinaldi 1964b: 76.
[2097] Author's calculations.

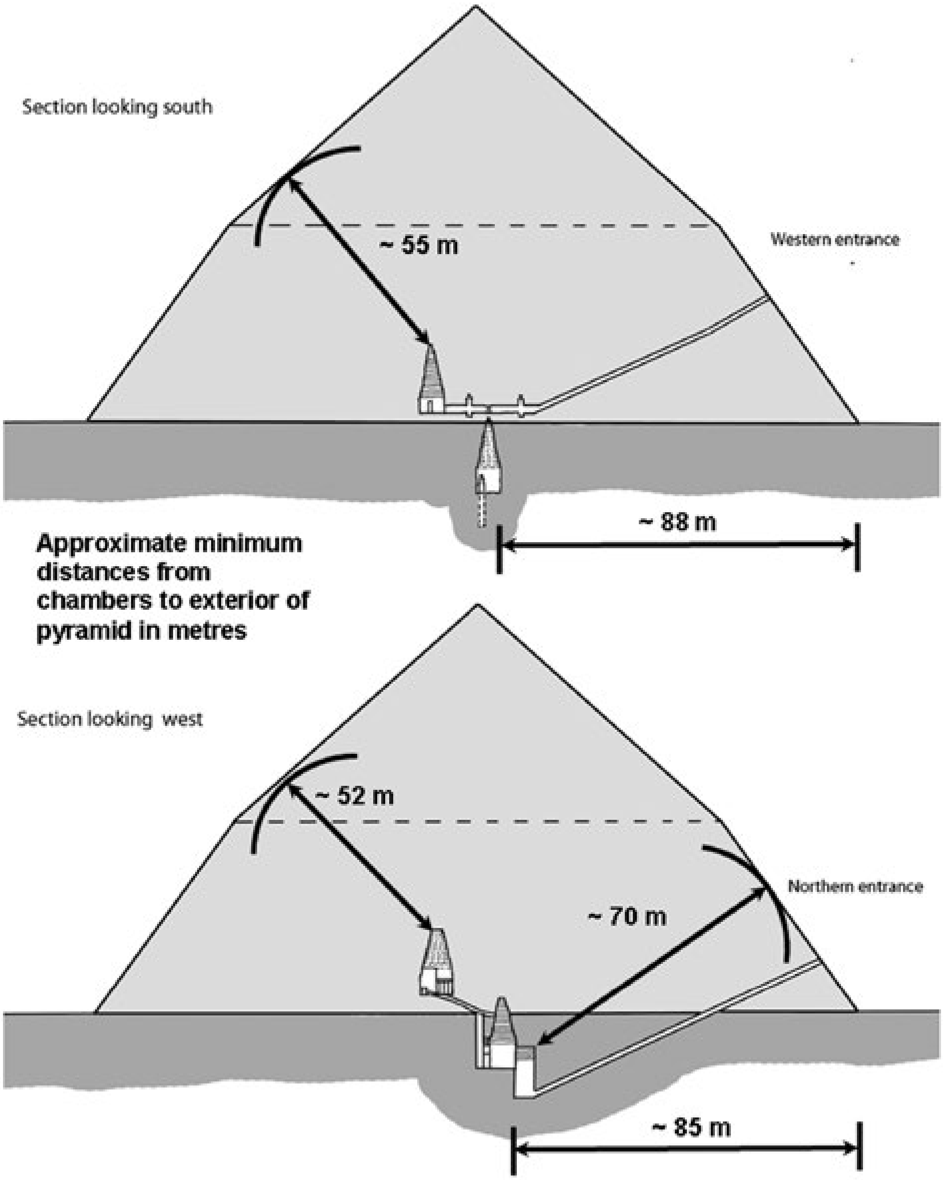

Figure 342 Section drawings of the Bent Pyramid looking south and west, showing minimum depths of protection offered by the pyramid to its 'substructure'. (Drawn by the author after Fakhry 1959, fig. 88)

but only provided about 10 m thickness of protection from its exterior at the shortest point.[2098]

The 'Red' Pyramid at Dahshur

The superstructure of the Red Pyramid **[25]** was also designed, like its predecessors, in such a way that its burial chamber would be protected within its mass (Fig. 78). To avoid the problems that had beset the Bent Pyramid and increase their security, the tomb's descending corridor and antechambers, rather than being set below ground level were, along with the burial chamber, set further up within the fabric of the pyramid (see 4.1.4). Moreover, the structure was built on firmer ground with a shallower slope,[2099] and its masonry was laid in horizontal courses for stability.[2100] By building it to a similar height to its predecessor, the pyramid also had a much larger footprint,[2101] which spread the superincumbent load and relieved pressure on the underlying geology. Approximately 219 m × 219 m across its base and originally 109.5 m high,[2102] it protected its corridor and chambers with 1,694,000 m^3 of limestone,[2103] which was a 37% increase in volume over that of the Bent Pyramid. In this new pyramid the minimum distance that a robber attacking via its sloping face would have to tunnel to reach the burial chamber can be estimated at around 50 m (Fig. 343).[2104] However, its

[2098] Scaled from drawing of the pyramid by Maragioglio and Rinaldi (1964b: Tav 15, fig. 1) looking west.
[2099] This is 44° 44' (Dorner 1998: 25), which is only 1°43' difference from the angle of the slope of the upper half of the Bent Pyramid.

[2100] Stadelmann 1983: 234.
[2101] Stadelmann 1985a: 100
[2102] Dorner (1998: 25) gives a length for the south side of 219.05 m, which is very close to Perring's 219.28 m (Vyse and Perring 1842: 65), but he reconstructs the pyramid to be about five metres higher than Perring's (1842: 65) 104.41 m.
[2103] Lehner 1997: 17.
[2104] Scaled from the drawn section of the pyramid by Maragioglio and

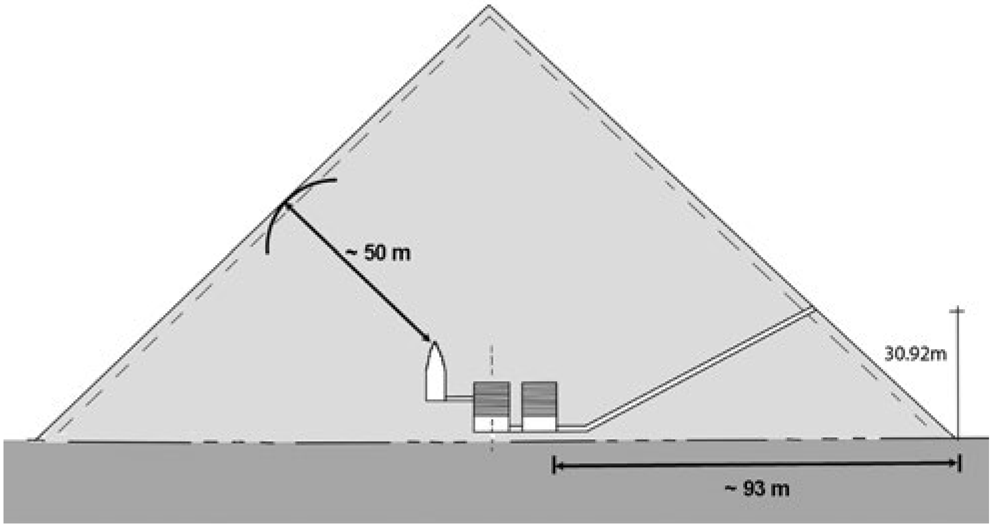

Figure 343 Section drawings of the Red Pyramid looking west showing minimum depths of protection offered by the pyramid to its 'substructure'.
(Drawn by the author after Maragioglio and Rinaldi 1964b, Tav. 18 fig. 3)

47,961 m^2 footprint, although a third larger, did not have quite the same effect on its lateral protection, as due to its different internal design, the distance to its substructure was only approximately 9% greater at approximately 93 m.[2105]

Section summary – the royal superstructures of the early Fourth Dynasty

Following the precedent of the Brick Pyramid at Abu Roash, the architects of the royal tombs of the early Fourth Dynasty retained the latter's raised entrance, descending corridor and above ground burial chamber within the superstructure of their king's new pyramid tombs, presumably for security or ideological reasons. They protected these internal arrangements with progressively larger superstructures, whose external designs probably changed both as a response to new concepts of monumentality in the royal tomb, and the structural and security problems that these demands placed upon the nascent technology of building such large structures in stone on unsuitable geology.

6.2 Private tombs

Amongst the 317 private tombs in the catalogue from the Dynastic Period, only 157 of them were found to have been protected by a superstructure. However, this proportion is misleading, as the vast majority of mastabas were made of mud-brick and many have undoubtedly suffered from denudation, the attentions of tomb robbers or *sebbakhin*. For these reasons it is also difficult to be precise about their original heights, but their dimensions in plan are usually available and are included in the accompanying statistical charts, which are:

Type IB and IC tombs	Chart L
Type ID tombs	Chart M
Type II and IIA tombs	Chart N
Type IIB, IIC, IIA-C and III tombs	Chart O

These also include details of wall thicknesses and material, core fills and dimensions of 'footprint overhangs', where relevant.

6.2.1 Superstructures over Type IB and IC pit substructures

Dynasty '0' to the mid First Dynasty (Naqada IIIB-IIIC2) Iry-Hor to Djet

Tell el-Farkha

Some of the earliest extant protective superstructures are those found in the Eastern Kom Cemetery at Tell el-Farkha, which date to Naqada IIIB-C1,[2106] amongst which there are two distinct categories: The first type was used to protect graves whose pits were poorly defended laterally with just a single mud-brick liner, such as the Type IB grave 9 **[34]** whose 1.07 m high superstructure overlapped its pit by approximately 0.75 m.[2107] Similarly, the substructure of nearby grave 24 **[35]** was defended by a slightly larger superstructure that provided a footprint overhang of around 0.8 m.[2108]

Rinaldi (1964b: Tav. 18, fig. 3) looking west.
[2105] Calculated from the dimensions shown on the pyramid plan of Maragioglio and Rinaldi (1964: Tav. 18, fig. 5) from the pyramid's outer edge to the nearest point under the substructure.

[2106] Dębowska-Ludwin 2010: 5 and 13.
[2107] Dębowska-Ludwin 2009: 462–3; 2011: 259–60. The overhang calculated from the published tomb dimensions plus an allowance for the mud-brick liner.
[2108] Dębowska-Ludwin 2009: 466–7. The overhang calculated from the

Figure 344 The 'shaft' leading down through the massive superstructure of the Type IB grave 94 at Tell el-Farkha, which was backfilled after the burial was made. (Dębowska-Ludwin 2012, fig. 4)

Figure 345 The remains of the palace façade walls of the superstructure of Mastaba V at Nazlet Batran. (Petrie 1907, pl. II)

The second type comprised of superstructures that did not overlap, but matched the dimensions of their substructure's substantial mud-brick liners exactly,[2109] such as Grave 6 **[30]**, which was covered by a 'compact cover' of brick 0.5 m high.[2110] Similar in principle, but in a more monumental style with niche decoration,[2111] are graves 63 **[31]**,[2112] 94 **[36]**[2113] and 100 **[32]**,[2114] whose massive walls were reinforced with mats, and were 0.75–1 m, 1.1–1.6 m and 1–2 m thick respectively.[2115] Their unusual design created an internal 'shaft' that led straight down into their grave pits (Figs. 82–3 and 344),[2116] which suggests their cores may have been backfilled after their burials had been lowered through them, unlike most Type I mastabas, where the whole structure is usually built over an already closed grave.

Tell Ibrahim Awad

Further east at site 'B' in Tell Ibrahim Awad a similar type of superstructure to graves 63, 94 and 100 at Tell el-Farkha,[2117] protected the mid First Dynasty Type IB tomb 1 **[39]**.[2118] Its walls, like those of its substructure, whose outer perimeter it shared, were 0.9–1.15 m thick on its sides and 1.35–1.95 m at its end and reinforced with mats (Fig. 84), offering both its burial and the inbuilt magazines in its walls a considerable degree of protection.[2119]

Nazlet Batran

Further south, the substructure of the Type IC Mastaba V at Nazlet Batran **[59]**,[2120] which dates to the reign of Djet,[2121] was protected by a monumental mud-brick mastaba with a palace façade,[2122] whose walls were up to 1.2 m

published tomb dimensions plus an allowance for the mud-brick liner.

2109 Dębowska-Ludwin 2010: 7. Therefore, the thickness of the walls of the particular superstructure is the equivalent of a 'footprint overhang' even though there is actually no overlap over the pit's liner.

2110 Dębowska 2008: 1111–2; Dębowska-Ludwin 2009: 461.

2111 Dębowska-Ludwin 2010: 9; 2011: 30.

2112 Dębowska-Ludwin 2011b: 260–2.

2113 Dębowska-Ludwin 2011a: 30–1; 2012: 57 and 59.

2114 Dębowska-Ludwin *et al.* 2010: 23–5.

2115 Dębowska-Ludwin 2010: 7–9, and scaled dimensions from respective tomb plans.

2116 Dębowska-Ludwin 2011a: 30.

2117 Dębowska-Ludwin 2011a: 31.

2118 Haarlem 1996: 12.

2119 Haarlem 1996: 7–9; Tassie and van Wetering 2003a: 501–2.

2120 Petrie 1907: 7–8.

2121 Daressy 1905: 103.

2122 There are many scholarly interpretations of the meaning of the palace façade decoration on superstructures: Spencer (1993: 60) sees it as a copy of the façades of the royal funerary enclosures at Abydos, but Hendrickx (2001: 104) suggests that it may be a rendering of the original lightweight structures found at Hierakonpolis. On the other hand, Dreyer (2003: 71) proposes that as the panelling within the niche decoration resembles the serekh hieroglyph, to the Egyptians a tomb decorated with this motif would be regarded as 'a palace where the dead were believed to dwell'. Stadelmann (2005: 370) suggests the niched or palace façade superstructure is an iconographic representation of the royal palace (such as the 'fort' at Hierakonpolis), which high officials and nobility were permitted to copy in their tombs as a demonstration of their status and links with the royal court. However, Jiménez-Serrano (2007: 35) proposes that its use magically endowed the structure with the attributes associated with the niched enclosures used in the royal sed festival and their concomitant associations with rebirth and resurrection. Regarding its possible foreign origins: Frankfort (1941: 329–58) argued that niched architecture was the result of Mesopotamian influences especially during the Uruk and Jemdet Nasr periods. Similarly, Mark (1998: 56–68) proposes that the niched façade may have been the result of Mesopotamian influences from trade contacts in the Early Dynastic period, and that the internal subdivisions seen in some mastabas are similar to those of temples at Uruk. Sievertsen (2008: 798–800) also sees them as having Mesopotamian connections, and additionally, as a symbolic expression of power. Finally, in royal contexts similar shaped structures known

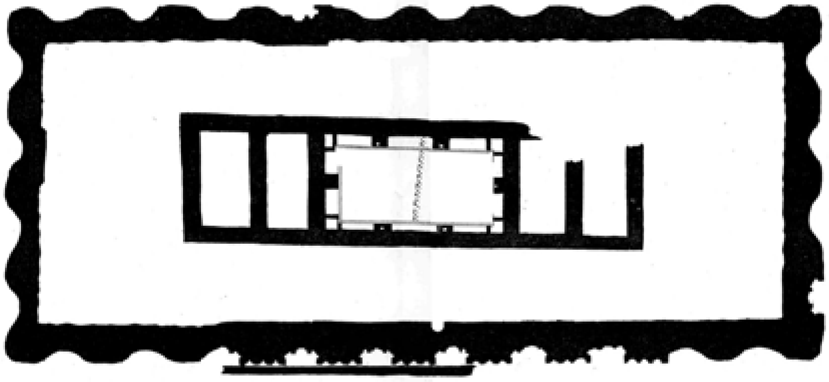

Figure 346 The plan of the large palace façade superstructure of the Type IC Mastaba V at Nazlet Batran. (Petrie 1907, pl. VI)

Figure 347 The excavation of the Type IC tomb S 3357 at Saqqara, which gives a sense of the scale of these structures. (Emery 1939, pl. 3)

thick,[2123] and probably enclosed a core of rubble or sand that sheltered its wooden roof (Figs. 345–6).[2124] Its height is unknown, but its protective footprint overhang can be estimated at approximately 7.75 m on the longer sides,[2125] thus presenting a significant obstacle to lateral tunnelling.

Abu Ghurab

The offset substructure of the mid First Dynasty Type IC Mastaba XVII at Abu Ghurab **[68]**[2126] was protected by a large palace façade superstructure with mud-brick walls approximately 1.8 m thick, surrounded by a plinth with just a single bucranium (Fig. 86).[2127] Its internal core consisted of coarse sand[2128] that would have hampered attempts to dig through it, and its minimum footprint overhang was approximately 1.8 m,[2129] which would have defended it against lateral tunnelling.

North Saqqara

The large superstructures of the elite at Saqqara were built on the eastern edge of the desert plateau,[2130] where

as the 'Fortresses of the Gods' are mentioned on the Palermo Stone and vessel inscriptions. Like the royal funerary enclosures they were of rectangular form and decorated with a palace façade. Their original purpose, it has been suggested, may have been to protect and host the assembled gods of Egypt in the presence of the king, at a ceremony in which the king dedicated taxes and offerings to them that ensured the gods' support for his reign. (Kaplony 1962: 9–16; Arnold 2005: 32–7). For a comprehensive list of superstructures that are decorated with palace facades, see Hendrickx 2001: 87–9.

2123 Scaled dimension from drawing by Petrie (1907: pl. VI).

2124 Daressy 1905: 99–101; Petrie 1907: 2–3.

2125 Calculated from Petrie's description (1907: 2 and 6) and published dimensions.

2126 Radwan 2000: 512.

2127 Bucrania have also been found at Saqqara surrounding the superstructure of tomb S 3504 **[84]**, and are discussed more fully below, see note 2151.

2128 Radwan 2000: 512–3.

2129 Scaled from drawing by Radwan (2000: fig. 2).

2130 Hendrickx 2008: 82.

at between 3–5 m in height,[2131] their fortified walls,[2132] would have dominated the escarpment and been easily seen from the cultivation.[2133]

The earliest of these monuments is the Type IC tomb S 3357 **[81]**, which dates to the reign of Hor-Aha,[2134] whose substructure was protected by 1.75 m high mud-brick palace façade walls 2.4–2.65 m thick, backed by an additional internal 0.4–0.65 m 'skin' wall,[2135] which provided a minimum footprint overhang of approximately 6.3 m on the longest side (Fig. 87).[2136] The sheer scale of this type of superstructure becomes evident in a photograph of the tomb's excavation (Fig. 347). Internally mud-brick cross walls created twenty-seven magazines that provided storage and supported a roof.[2137] In addition, they may also have reduced the pressure on the external walls by compartmentalising the internal core.[2138] These were filled with rubble and sand 1 m deep and, once filled with grave goods, were covered with a wooden roof. Externally, two enclosure walls, estimated at 1.5 m high, surrounded the whole structure.[2139]

Similar in size and design, but slightly later in date,[2140] is the superstructure of tomb S 3471 **[82]**, whose 2–2.75 m thick walls, lacking the internal skin wall of S 3357, were slightly thinner overall (Fig. 89). Its core was subdivided by internal cross-walls that created twenty-nine magazines, which were filled with 0.5 m of rubble and probably also roofed in wood. Although its height is unknown,[2141] its footprint overhang was approximately 5.5 m along its longest sides.[2142]

The substructure of the contemporary S 2185 **[83]**, although stone lined and roofed, was still protected by a conventional mud-brick superstructure with palace façade walls approximately 2.4 m thick,[2143] which may have stood up to 6 m high (Fig. 90).[2144] Probably roofed in wood, internally it contained gravel filled side chambers and a central core of storage magazines that aligned directly with those of the substructure beneath. Its huge area provided a minimum footprint overhang of approximately 7 m[2145] and externally it was surrounded by an enclosure wall not more than 1m high.[2146] Despite these mighty defences, evidence of fire damage throughout the tomb suggests that they had been to no avail.[2147]

The palace façade superstructure of S 3504 **[84]**, which dates to the reign of Djet,[2148] contained forty-five internal magazines separated by cross-walls that held enormous quantities of grave goods and victuals (Figs. 92–3).[2149] Enclosed and protected by walls 2.9 m thick,[2150] they were also surrounded by a kerb covered with bucrania,[2151] and provided a footprint overhang approximately 4.9 m wide.[2152] However, robbers had tunnelled under this and had set fire to the tomb, which caused the collapse of its wooden roof and mastaba core. Restored in the reign of Qa'a, the substructure was re-roofed and the collapsed cross-walls of the mastaba left to act as buttresses.[2153]

Finally, the slightly smaller superstructure of the Type IC tomb S 3503 **[85]**, which dates to the reign of Merneith,[2154] contained twenty-one magazines formed by cross-walls, each filled with approximately 0.75 m of rubble (Fig. 94).[2155] Surrounded by 2.75 m thick palace façade mud-brick walls and an enclosure wall, the minimum footprint overhang of this mastaba was approximately 5.75 m.[2156] However, remains of a robber's tunnel in the south-west corner of one of the subterranean magazines 'J' demonstrates that despite the latter, the tomb's plunderers had tunnelled beneath the mastaba into the heart of the complex.[2157] Emery's reconstruction of the tomb shows how the superstructure may have looked when it was completed and how it may have been provisioned (Fig. 348).

Therefore, in addition to protecting the substructures beneath them, one of the other functions of these massive superstructures at Saqqara was undoubtedly to defend

[2131] Dreyer 2003b: 71.
[2132] Lehner 1997: 79.
[2133] Jeffreys and Tavares 1994: 147.
[2134] Hendrickx 1996: 60.
[2135] Emery 1939: 12. For an in-depth analysis of the construction methods of these brick walls and indeed all of the First Dynasty mastabas at Saqqara, see Spencer 1979: 16–9.
[2136] Scaled from plan by Emery (1939: pl. 1).
[2137] Emery (1939: 15) suggested that it would have been roofed in a similar manner to the tomb of Hemaka, discussed below.
[2138] Kerisel 1993: 3–4. It is apparent that he placing of these cross walls in the centre of the mastaba often coincided with the internal load bearing subdivisions of the compartments below, undoubtedly to support the massive weight.
[2139] Emery 1939: 11–6.
[2140] The pottery from the tomb is dated to the reign of Djer (Hendrickx 1996: 60).
[2141] Emery (1949: 14) was unable to ascertain its original height, due to the immense damage caused by a fire that had brought the roof down, the starting of which he attributed to tomb robbers
[2142] Scaled dimension from drawing by Emery (1949: pl. 1).
[2143] Scaled from drawing by Quibell (1923: pl. V).
[2144] Quibell 1923: 5.
[2145] Scaled dimension from Quibell (1923: pl. V)
[2146] Quibell 1923: 5; Emery 1949: 3.
[2147] Quibell 1923: 15–6.
[2148] Hendrickx 1996: 60.
[2149] See Morris 2007: 174–7 for a discussion of the contents and their significance.
[2150] Emery 1954: 7–8.
[2151] The exact function of these bovine heads is unknown. Lehner (1997: 79) sees them as a symbolic herd of cattle or offerings, whereas Dreyer (2003: 72) believes them to be for the deceased's consumption in the hereafter. Stadelmann (2005: 365) suggests that they may have an apotropaic function or represent cattle for the tomb owner's use in the afterlife; alternatively, Morris (2007a: 172–4) proposes metaphorical associations with bulls and kingship or with Hathor and rebirth. Finally, Hendrickx (2008: 76) looks upon them as not only funerary offerings but also symbols of royal power.
[2152] Scaled dimension from drawing by (Emery 1954: pl. II).
[2153] Emery 1954: 5–6.
[2154] Emery 1954: 128, 141.
[2155] Emery 1954: 128–38.
[2156] Scaled from drawing by Emery (1954: pl. XXXVIII).
[2157] Emery 1954: 139–40. The robbers' route is discussed in note 550.

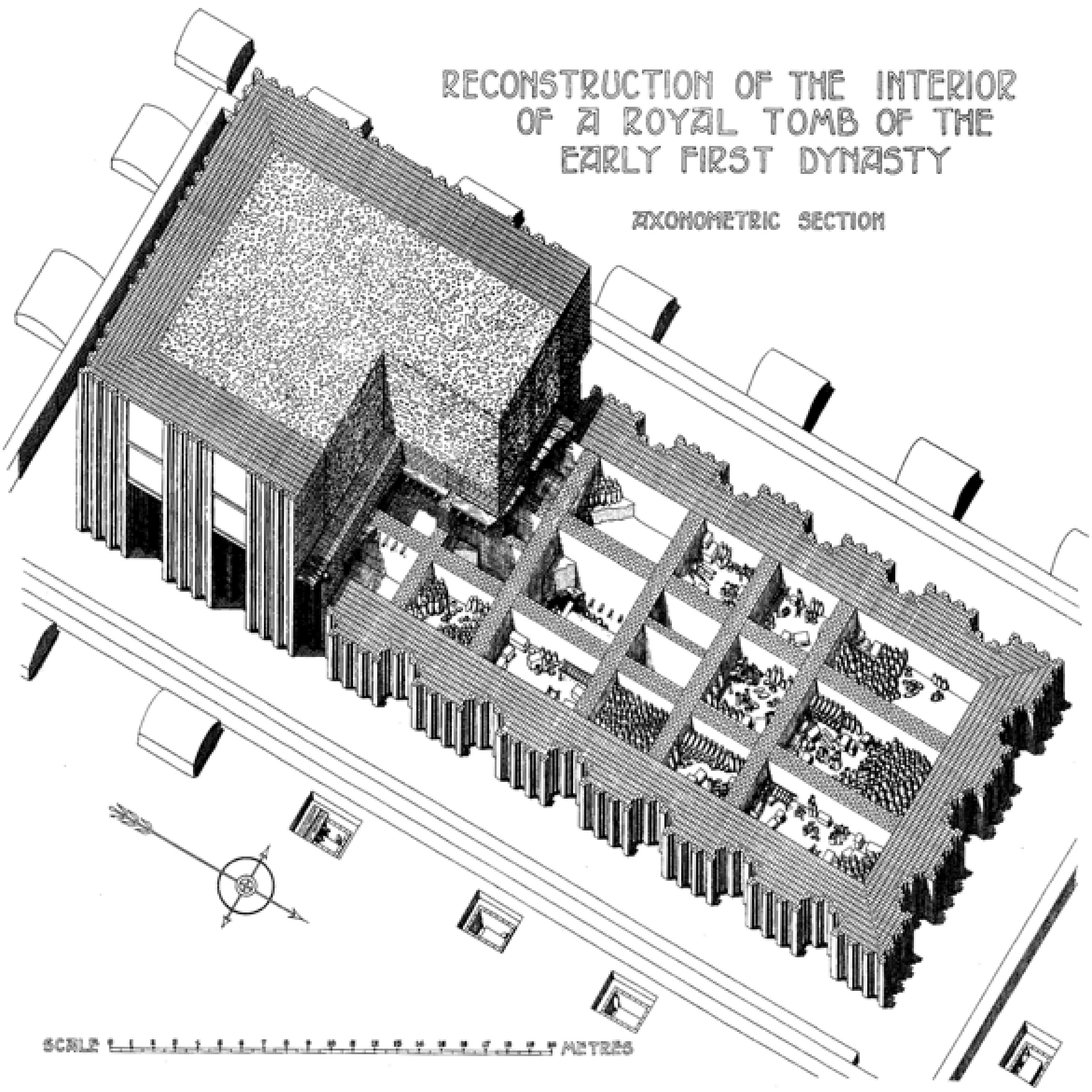

Figure 348 Emery's axonometric reconstruction of the superstructure and stocked magazines of the Type IC tomb S 3503 at Saqqara.
(Emery 1954, pl. XXXIX) Courtesy of the Egypt Exploration Society.

the enormous quantities of grave goods and victuals that were stored within them for the benefit of their owners in the afterlife.[2158]

Tarkhan

Further south at Tarkhan, the substructure of the large Type IC Mastaba 1060 **[214]** that dates to the reign of Djet,[2159] was defended by a palace façade superstructure with 3.4 m thick mud-brick walls,[2160] which provided a footprint overhang approximately 6 m wide on its longest sides (Fig. 96).[2161] Cross-walls divided its interior into compartments, which were filled with sand, and externally it was surrounded by an enclosure wall. In spite of these measures, the substructure had been robbed by tunnelling through its liners, but the attack's starting point is unknown and whether it came through, or under, the superstructure is unclear.[2162]

Naga el-Deir

In Upper Egypt in Cemetery 1500 at Naga el-Deir, although due to denudation and the *sebbakhin,* only a few superstructures were found during Reisner's excavations, doubtless many more had once existed.[2163] Amongst these was the Type IC tomb N 1506 **[286]**,

[2158] Snape 2011: 14–5.
[2159] Petrie, Wainwright and Gardiner 1913: 18; 60; Hendrickx 1996: 60.
[2160] Petrie, Wainwright and Gardiner 1913: 15; Reisner 1936: 31.
[2161] Scaled from plan by Petrie, Wainwright and Gardiner (1913: pl. XVIII).
[2162] Petrie, Wainwright and Gardiner 1913:13–5; Reisner 1936: 31.
[2163] Reisner 1908: 4–5.

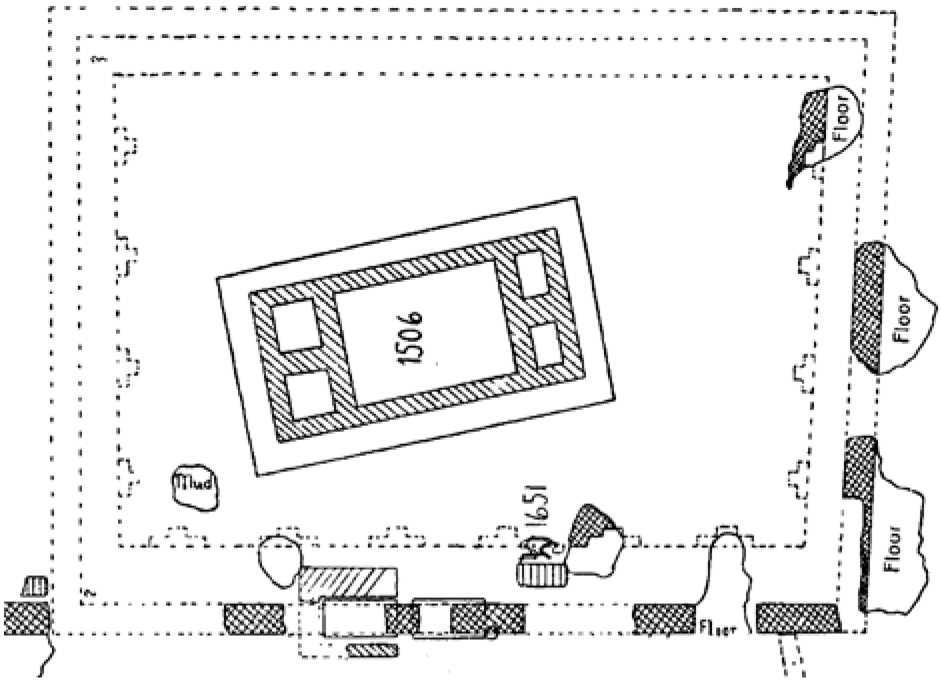

Figure 349 The outline of the palace façade superstructure of the Type IC tomb N 1506 from Cemetery 1500 at Naga el-Deir.
(Reisner 1908, pl. 77, Plan II)

whose substructure was protected by a mud-brick superstructure that was slightly off-centre and orientated at a slightly different angle to its burial chamber (Fig. 349).[2164] Information is scarce, but Reisner described its external walls as 'thick', decorated with 'offering niches' and its core as 'gravel or rubbish'.[2165] Its substructure was protected by a footprint overhang of approximately 2 m,[2166] and the whole was surrounded by an enclosure wall.[2167]

Naqada

One of the earliest monumental superstructures in Egypt was located at Naqada.[2168] Known as the 'Royal Tomb' **[332]** and without a substructure, it relied entirely on its above ground architecture to house and protect its burial and grave goods.[2169] Attributed to Queen Neith-hotep 'A',[2170] the tomb is one of two large monuments at the site,[2171] which are contemporary with the founding of Memphis and its elite necropolis at Saqqara (Figs. 350–1).[2172] Constructed directly upon the gravel of the knoll on which it stood, the tomb was built in two stages without an excavated pit to house its burial compartments, which instead were created above ground as an 'inner core' of mud-brick walls 2.3–3.32 m thick.[2173] This was divided internally into five compartments by mud-brick walls accessed by doorways, the middle one being the burial chamber. Once the burial and grave goods were installed the doorways were sealed and the final phase of the structure completed.[2174] This consisted of a large palace façade mastaba with mud-brick walls 3.8–4 m thick that were linked by cross-walls to the core structure, forming sixteen separate compartments, which were probably filled with gravel or sand.[2175] The remains of burnt beams found by Borchardt, suggest that a wooden roof was built over the whole tomb,[2176] which in combination with its massive mud-brick walls, and their filling of gravel or sand,[2177] provided the tomb's protection and the aboveground equivalent of a 6 m footprint overhang.[2178]

2164 Reisner 1908: 7 and 34.
2165 Reisner 1908: 6.
2166 Scaled from plan by Reisner (1908: Plan II).
2167 Reisner 1908: 7.
2168 Porter and Moss 1937: 118–9.
2169 Spencer 1979: 15.
2170 The putative mother of Hor-Aha and possible wife of Narmer (Dodson and Hilton 2004: 46).
2171 To the south-west of the 'Royal Tomb' de Morgan (1897: 159, fig. 513) mentioned finding another large tomb. Working from de Morgan's map, (Kemp (1967: 24–5, footnote) suggests that this may have been approximately 23 m × 8 m, with a one metre ledge running round its perimeter (presumably to support a wooden roof) and therefore have made it one of the biggest substructure pits ever found, which may have been protected by a mastaba in excess of 33 m × 18 m.
2172 Spencer 1993: 61–2; Wilkinson 1999: 6, 37 and 70.
2173 In reality between 42.15–42.3 m × 39.44–39.49 m. All measurements extrapolated from Borchardt's (1898: pl. XIV) dimensioned plans.
2174 Borchardt 1898: 87–8.
2175 Reisner 1936: 27.
2176 Borchardt 1898: 90. In addition, de Morgan (1897: 153, 158 and Figs. 516–7) found a large quantity of ash in the tomb, presumably also from the burning of this roof, within which were pottery and stone vessels that had deformed under the intense heat.
2177 Kaiser 1985: 26–7.
2178 Scaled from plan by Borchardt (1898: pl. XIV).

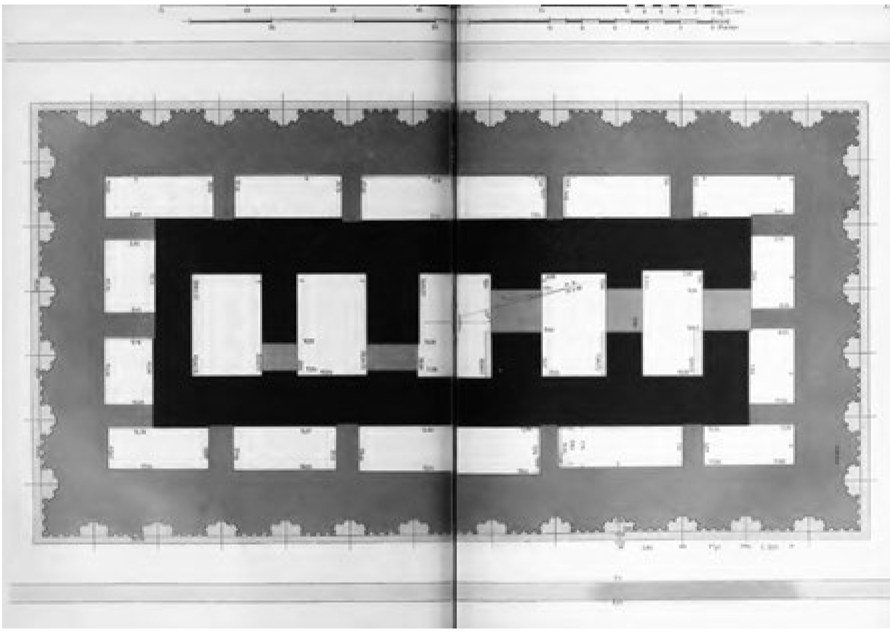

Figure 350 The Naqada 'Royal Tomb' with its palace façade walls enclosing the inner core is (in black). The door blockings are shown in lighter tones. (Borchardt 1898, pl. XIV)

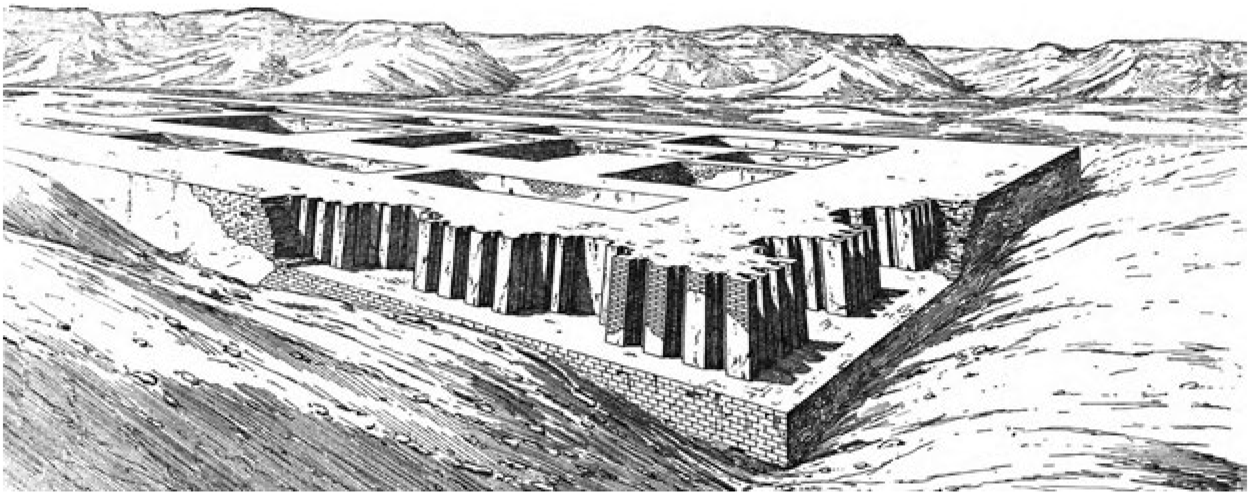

Figure 351 De Morgan's perspective view of the Naqada 'Royal Tomb'. (De Morgan 1897, fig. 521)

This design of tomb seems to have been rapidly superseded by the more conventional pit and superstructure combination, probably because of concerns about the vulnerability of its ground level magazines,[2179] but also to gain more secure storage capacity.[2180]

The second half of the First Dynasty (Naqada IIIC2–IIID) Den to Qa'a

In the second half of the First Dynasty, Type IB and IC tombs were largely superseded by Type ID staircase tombs, but there remained a number of sites where they were still to be found.

[2179] Dodson and Ikram 2008: 136.
[2180] Spencer 1982: 46–7.

Tell el-Farkha

Two tombs with superstructures from the Eastern Kom Cemetery date from the mid First Dynasty to perhaps as late as the Second. Their substructures were protected by a 0.4 m layer of soil and their superstructures, lacking a 'shaft' in their core like their predecessors, were conventionally built over that.[2181] One example is the Type IC tomb 50 **[37]**, which was protected by a large mud-brick mastaba, whose remains were 0.9 m high and overhung its substructure by approximately 0.65 m.[2182] Much larger was the later superstructure of tomb 55 **[38]**,

[2181] Dębowska-Ludwin 2010: 13–4.
[2182] Dębowska-Ludwin 2009: 473–4. The footprint overhang calculated from the published tomb dimensions plus an allowance for the mud-brick liner.

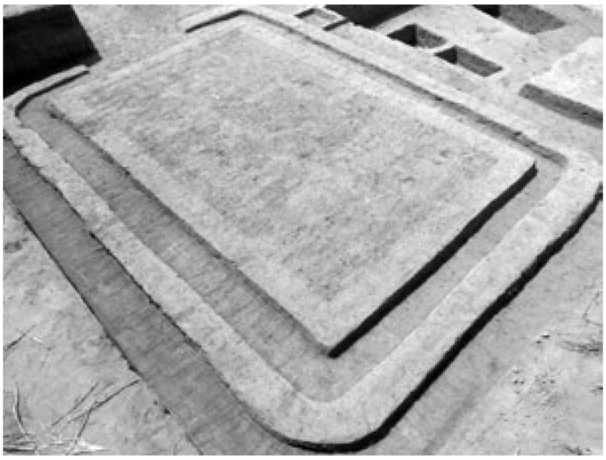

Figure 352 The remains of the massive superstructure and enclosure wall over the Type IC grave 55 at Tell el-Farkha. Its footprint overhang from the substructure's edge is approximately 2 m. (Dębowska-Ludwin 2012, fig. 17)

which dates to the end of the dynasty or possibly into the Second.[2183] Its remains were 1.5 m high, and consisted of a loose mud-brick core held together with soil packing and reinforced with matwork. This was surrounded by an 'adjusting wall' that increased its footprint overhang to an impressive 1.9–2 m (Fig. 352).[2184] An unfinished vertical robbers' tunnel found in the centre of the mastaba over the burial chamber,[2185] suggests that deterred by the large footprint overhang, the perpetrator decided it might be easier to go straight through the superstructure than to undermine it.

Abu Roash

A single Type IC tomb from the reign of Den with a superstructure is known from Abu Roash Cemetery 'M'.[2186] Although details of tomb MO25 **[43]** are scarce, Klasens recorded that its mastaba was built from the local yellow clay and was 6.9 m long × 3.6 m wide.[2187] It can be estimated from the dimensions of its substructure that its footprint overhang at the narrowest point would have been hardly more than 0.75 m.[2188] However, as the substructure was already well protected by a double roof and the surrounding rock, perhaps its builders considered a wide overhang unnecessary.

[2183] Dębowska-Ludwin 2010: 14; 2012: 69–70.
[2184] Dębowska-Ludwin 2011b: 264–66. The footprint overhang calculated from the published tomb dimensions plus an allowance for the mud-brick liner.
[2185] Dębowska-Ludwin 2011a: 34.
[2186] Hendrickx 1996: 60; Tristant 2008b: 329. The remains of a smaller superstructure was found over nearby tomb MO21 **[NIC]**, which were 1.9 m long × 1.55 m wide × 0.26 m high, but lack of further detail precludes its discussion (Klasens 1961: 110).
[2187] Klasens 1961: 108 and 110.
[2188] The footprint overhang calculated from the published tomb dimensions plus an allowance for the mud-brick liner (Klasens 1961: 110).

Saqqara

There are two large Type IC tombs at Saqqara from this period. The superstructure over tomb S 3507 **[86]**, which dates to the reign of Den,[2189] despite the much smaller plan of its innovative substructure (see 4.2.1.1), was similar in size and design to its predecessors and surrounded by an enclosure wall (Fig. 106). It was internally divided with cross-walls that created twenty-nine magazines, which were part filled with sand.[2190] However, these were enclosed by much stronger 4.5–4.7 m thick mud-brick walls that were decorated with bucrania, which created a 6 m wide footprint overhang that would have deterred a lateral assault on the substructure. Its apparent success is demonstrated by the route taken by the tomb's robbers, who probably entered through the superstructure via the protective 'mound' that lay below its roof.[2191]

The final Type IC tomb from Saqqara is S 3111 (Sabu) **[87]**, which dates to the reign of Adjib.[2192] On a smaller scale than its predecessors, its 1.55–1.95 m thick mud-brick palace façade walls were supported by buttresses, and unusually rather than magazine storage, internally its core was filled with sand (Fig. 108).[2193] Its small 2.5 m footprint overhang theoretically would have provided minimal lateral protection to its substructure,[2194] but ironically when excavated, despite evidence of robbers having entered the tomb, the body of its owner was found still *in situ* with a large number of grave goods.[2195]

Helwan

The main body of the tombs of the elite at Helwan are in the north of the cemetery opposite their counterparts on the escarpment at Saqqara.[2196] Although many were originally protected by superstructures, denudation and the *sebbakhin* have taken their toll,[2197] and there are few traces of them today.[2198] Their designs vary, insofar as the earlier examples are inclined to be more intricate in their architecture and often possess a palace façade, while those from Naqada IIID onwards tend to have plain sides and only a couple of niches.[2199] One that we have scant information on is the Type IC tomb 423.H.9 **[140]**,

[2189] Emery 1958: 75.
[2190] Emery 1958: 75–80, pls. 85–113.
[2191] Emery 1958: 79.
[2192] Hendrickx 1996: 60.
[2193] Emery 1949: 95–115.
[2194] Scaled from plan by Emery (1949: fig. 56).
[2195] Emery 1949: 95–9.
[2196] Jeffreys and Tavares 1994: 153. From this vantage point an observer standing by these mastaba tombs would have commanded a view of Memphis and its elite cemetery on the cliffs beyond. Likewise, these Helwan tombs would also been visible from the opposite side (Köhler 2005: 16).
[2197] Regarding the lack of superstructures, Saad (1942: 405–6; 1947: 26) wrote: 'Moreover, the Sebbakhin damaged a great deal of the superstructures of most of the tombs. The people who were digging before we took over the site also destroyed the majority of the tombs which had escaped the plundering of the ancient tomb robbers.'
[2198] Köhler 2008b: 122.
[2199] Köhler 2008b: 127.

Figure 353 The mud-brick palace façade of the superstructure of the Type IC tomb 423.H.9 at Helwan. (Saad 1969, pl. 12)

Figure 354 The interior of the Type IC tomb 423.H.9 at Helwan, which would have been filled with sand, gravel or rubble. The recess for the pit's roof can be clearly seen. (Saad 1969, pl. 13)

which dates to the reign of Den. The tomb's stone roofed substructure was protected by a large mud-brick palace façade mastaba with 2.5 m thick walls surrounded by an enclosure wall, which was presumably filled with gravel, sand or rubble (Figs. 353–4). Saad's dimensions suggest it had an exceptional 11.5 m footprint overhang,[2200] which would have provided a major deterrent to lateral attack. Despite this, and perhaps aware of the substructure's stone roof, robbers had still dug three separate tunnels into the burial chamber from 'outside the wall' and plundered it.[2201]

Tarkhan

Adjacent to the earlier Mastaba 1060 at Tarkhan there are two similar Type IB tombs with palace façade superstructures that date to the reign of Den.[2202] Surrounded by an enclosure wall, the superstructure of Mastaba 2038 **[216]** was constructed with massive mud-brick walls 3.37–3.9 m thick that surrounded an inner core of gravel and sand,[2203] and provided a footprint overhang of approximately 4.5 m (Fig. 113).[2204] Similarly, the 3.8 m thick[2205] mud-brick walls of the slightly larger Mastaba 2050 **[215]** probably also enclosed a core of rubble or sand, as there were no traces of any cross-walls (Fig. 112).[2206] Its footprint overhang at 4.85 m was around the same as that of its neighbour.

Section summary – the superstructures of Type IB and IC tombs

With the exception of the Naqada 'Royal Tomb', which lacked a substructure altogether, Type IB and IC substructures were often protected from overhead attack by a filled superstructure built of mud-brick. By building the superstructure larger than its substructure, it could also provide a 'footprint overhang', to defend against lateral tunnelling. However, at the beginning of the First Dynasty this was not always the case in the Delta, where some graves at Tell el-Farkha and Tell Ibrahim Awad protected their stoutly built substructures with large superstructures that mirrored their plan and dispensed with a footprint overhang altogether. That notwithstanding, for the remainder of the First Dynasty, the majority of Type IB and IC elite tombs relied on generous footprint overhangs to protect their substructures. These were provided by mastabas with fortress like mud-brick retaining walls,[2207] which both contained the back pressure of their core fill and protected it from compromise by external incursions. These cores were formed of either sand, gravel, rubble or mud-brick, each of which had its own intrinsic security benefits and deterred overhead penetration.[2208] Concomitantly,

[2200] This dimension is extrapolated from Saad's (1969: 22–3) dimensions, which give a superstructure dimension of 25 m wide less a burial chamber 2.1 m wide = 22.9 m ÷ 2 = 11.45 m.

[2201] Saad 1969: 22–3, pl. 11–3.

[2202] Hendrickx 1999: 79–80; Grajetzki 2008: 110.

[2203] Petrie 1914: 4.

[2204] Scaled from plan by Petrie (1914: pl. XVIII).

[2205] Scaled from plan by Petrie (1914: pl. XVIII).

[2206] Petrie 1914: 3, 6–7.

[2207] The analogy with a fortress is a reasonable comparison, for example the walls of the Middle and New Kingdom fortress of Buhen were 4.85 m thick (Emery *et al.* 1979: 4). Indeed the majority of Egyptian fortresses were built of mud-brick (Lawrence 1965: 69), as it had both excellent compressive and tensile strength when used in large structures (Vogel and Delf 2010: 18–9).

[2208] Sand and gravel are easily diggable, whereas rubble would be medium to hard digging depending on its makeup (Bell 2007: Table 9.2, see p. 209). All three would need shoring up to avoid collapsing on the digger should their surface slope exceed their particular 'angle of repose', see Cobb (2004: 102) for typical angles of repose for various the massive superstructures of the high officials at Saqqara not only protected their subterranean complexes in the same way, but in addition secured within their walls compartmented interiors that functioned both as storehouses for valuable funerary artefacts and as larders for the important provision of victuals for the afterlife.[2209]

6.2.2 Superstructures over pit tombs with Type ID substructures.

The adoption of external access to the substructure of the pit tomb from the reign of Den onwards brought with it a gradual change in the type of superstructure used to defend it, which now had to protect the burial pit, the head of the portcullis emplacement, where present, and a proportion of the staircase.

The second half of the First Dynasty (Naqada IIIC2–IIID) Den to Qa'a

Tura el-Asmant

Amongst the five Type ID tombs in the catalogue from Tura el-Asmant **[63–7]**, only the stone lined tomb 249 **[67]** was found with remains of its superstructure.[2210] The tomb drawings (Fig. 118) show a rectangular structure with walls approximately 0.4 m thick, of indeterminate height, which would have partially covered the stairway and created a footprint overhang of around 2 m.[2211] No further details are available, but presumably it would have been filled with a core of gravel or sand.

Abu Ghurab

There are two Type ID tombs at Abu Ghurab of differing styles, which are both dated by Radwan to the reign of Den.[2212] The first is Mastaba IV **[69]**, whose substructure, excluding its external stairway, seems to have been

Figure 355 The remains of the superstructure and substructure of the Type ID Mastaba IV at Abu Ghurab.
(Radwan, 1991, Taf. 39a)

Figure 356 The remains of the superstructure of the Type ID Mastaba V at Abu Ghurab showing the offering chapel on its eastern face and the reduced 1 m footprint overhang created by the opening up of the chapel. In the far left corner, what may have possibly been an early serdab is visible.
(After Radwan, 1991, Taf. 40a)

soils. Finally, mud-brick would provide a uniformly resistant matrix that would require a great deal of labour to penetrate, however it probably would not require shoring up when dug into unless unbonded, poorly mortared or loose; see also Chapter 5.2 for a discussion on the merits of each as a blocking material.

2209 Snape 2011: 15.

2210 El-Khouli 1968: 75.

2211 Scaled from plan by El-Khouli (1968: pl. V).

2212 Radwan 1995: 312–3.

entirely covered with a large mud-brick mastaba decorated with a palace façade on its eastern side (Figs. 119 and 355).[2213] From the limited detail on the tomb drawing, its footprint overhang along its northern edge can be estimated at around 1.6 m.[2214] The second tomb is Mastaba V **[70]**, whose burial chamber and stairway were protected by its superstructure (Figs. 120 and 356).[2215] Unusually, it seems to have included an early internal corridor chapel with an offering niche on its eastern side,[2216] and perhaps an early serdab,[2217] which if it was accessible from the outside would have reduced the mastaba's effective footprint overhang to about 1 m.[2218]

North Saqqara

The first three Type ID tombs at Saqqara date to the reign of Den,[2219] and although now accessed by an external staircase, their superstructures remain similar to their Type IC predecessors.

The earliest may be tomb S 3506 **[88]**,[2220] whose 4.2–4.45 m thick mud-brick palace façade walls, rather than enclosing storage magazines, surrounded a core entirely filled with rubble, which like that of S 3111, protected the tomb's substructure from overhead attack (Fig. 121).[2221] Further encircled by a ledge with applied bucrania,[2222] these walls created a 5.5 m footprint overhang to deter lateral tunnelling. In spite of these defences the tomb had been robbed via the superstructure straight down through the wooden roof of the pit.[2223]

The largest superstructure at Saqqara from this period was that of S 3035 (Hemaka) **[89]**, whose 3.75–4.2 m thick mud-brick palace façade walls created a footprint overhang approximately 5 m wide from its offset burial pit (Figs. 123–4).[2224] Internally, it was divided by cross-walls surrounding the main burial chamber that formed forty-five magazines, which were filled with rubble, sand and grave goods, and also supported the beams, planks and four courses of brick that formed its roof.[2225] In a new approach, an internal retaining brick wall was built directly above the burial chamber perimeter that formed a deep shaft 11.1 m long × 7 m wide × 7 m high, which rose up within the superstructure to its roof. This was probably filled with gravel, thus creating an impenetrable and daunting 544 m^3 combined pit backfill and superstructure core.[2226] Its success is demonstrated by the fact that the tomb's plunderers, rather than take an overhead or lateral route, unusually chose to attack the substructure via its heavily defended staircase and three portcullises instead (see 5.3.1.2).[2227]

The 1.8–2 m thick mud-brick walls of the palace façade superstructure of S 3036 (Ankhka) **[90]** surrounded thirty-two internal magazines formed by cross-walls, each of which was filled with 1.85 m of sand and then floored with brick (Figs. 125–6).[2228] Its large footprint provided a minimum of approximately 6.75 m of lateral protection.[2229] In a similar approach to that of Hemaka, a deep shaft was built within the superstructure that rose from the burial chamber's ceiling to the latter's roof[2230] which, assuming that it too was filled with gravel, would have provided it with a comparable degree of protection.

The next three tombs date to the reign of Adjib,[2231] and concomitant with major changes in the architecture of substructures at this time (see 4.2.1.2), their superstructures differ in their designs. Although one common factor binds them together, which is the absence of internal magazines. This may be the result of concerns about the security of their valuable contents,[2232] and heralds a significant change in one of the key functions of the superstructure at this necropolis, which now went from being a well defended storehouse for grave goods, to being more the focus of cult and food offerings.[2233]

The most complex of these is S 3038 (Nebitka) **[91]**. Although its design appears to be innovative, in essence it began as a mud-brick superstructure with an unusual stepped façade on three sides over the usual pit substructure (Fig. 357).[2234] This was subsequently

[2213] Radwan 2003a: 378.
[2214] Scaled from 1:400 plan by Radwan (1991: Abb. 1).
[2215] In a similar fashion to that at S 3338 **[93]** at Saqqara, which dates to the reign of Adjib, see Emery 1949: 124–9. Therefore, this tomb may possibly be of a later date than that proposed by Radwan (1991: 312–3), especially as it sits over the stairway of Mastaba IV.
[2216] Radwan 1991: 305–8.
[2217] Radwan 2003a: 378; Bárta 1998: 67.
[2218] Scaled from drawing by Radwan (1991: Abb. 2).
[2219] For dates of these tombs see: S 3506 **[88]** (Emery 1958: 37); S 3035 **[89]** (Emery 1938: 1) and S 3036 **[90]** (Emery 1949: 71).
[2220] See note 663.
[2221] Emery 1958: 41–4.
[2222] Emery 1958: 41.
[2223] Emery 1958: 37.
[2224] Scaled dimension from drawing by Emery (1938: pl. I).
[2225] Emery 1938: 3–4. These were in fact the only extant examples ever found of a wooden roof from a tomb of this type (Kaiser 1985: 37, n. 22) and could therefore be reasonably considered to be a model of the roofing method used in superstructures of this type.
[2226] Emery 1938: 7. As the bulk density of loose gravel is approximately 16 kN/m3 (Cobb 2004: 36) this would have weighed in the region of 870 tonnes.
[2227] Emery 1938: 7.
[2228] Emery 1949: 71–3.
[2229] Scaled dimension from drawing by Emery (1949: pl. XIV).
[2230] Curiously, not a point noticed by Emery (1949: 71) who described the arrangements as 'The magazines of the superstructure, although built over these subsidiary rooms, do not extend over the pit itself.' Yet, he had (1938: 7) in the earlier publication of Hemaka espoused the extended shaft detail.
[2231] For the dating of each tomb see: Nebitka S 3308 **[91]** (Emery 1949: 92); tomb X **[92]** (Hendrickx 1996: 60); S 3338 **[93]** (Hendrickx 1996: 60).
[2232] Dodson and Ikram 2008: 136.
[2233] Snape 2011: 19.
[2234] This is variously interpreted by scholars as being a 'hidden tumulus' like those at Abydos (Engel 2003: 46; Dreyer 2003b: 72; Tavares 2005: 855) or possibly the precursor of such structures as the Step Pyramid (Emery 1961: 144–5; Lehner 1997: 80–1; Wilkinson 1999: 78 and 233; 2004: 1134); the latter concept denied by Lauer (1962: 37; 1979: 358–9).

Figure 357 The exposed stepped inner superstructure (phase 'A') of the Type IC tomb S 3038 (Nebitka) at Saqqara, seen behind the outer palace façade walls of the final phase 'C' during Emery's excavations. (Emery 1949, pl. 35a)

transformed in two stages into a more secure palace façade mastaba externally similar to its predecessors.[2235] Stage 'A' was a 2.3 m high stepped mud-brick superstructure, with exposed doorways leading to the substructure, and was hardly secure. Two further building phases built on this existing core (Figs. 127–9). In stage 'B', the existing terrace was raised and new ones added to enclose the stepped mastaba up to its fourth tread. The final stage 'C', saw the whole structure enclosed with 1.14–1.55 m thick palace façade walls, and the old stepped structure covered with sand and entirely paved over, forming a roof terrace accessed by external stairs.[2236] The motives behind these alterations are not entirely clear,[2237] but the major benefit was an improvement of the security of the tomb, as the new additions concealed the vulnerable stairway entrances and provided further layers of material to prevent access to the interior.[2238] Additionally, the superstructure's footprint overhang was now at least 4–4.5 metres, which was a significant improvement on the original 2.5 m on the entrance side.[2239]

A radically different approach was taken in the superstructure of tomb X **[92]**, whose simpler substructure was covered by a solid brick mastaba, which entirely lacked internal storage (Fig. 130). This brickwork protected the greater part of the underlying access route and its flanking magazines, and may also have partially filled the grave pit and acted as a kind of backfill. When excavated, the majority of the mastaba's eastern face was largely missing,[2240] but assuming that it was axially placed over its substructure, its protective footprint overhang may have been approximately 4.5 m.[2241]

The design of the substructure of S 3338 **[93]** was similar to that of tomb X, but its access stairway was for the first time entirely within the perimeter of the 2.3–3.4 m thick mud-brick walls of the superstructure, which were devoid of external decoration (Fig. 131).[2242] Therefore, with both its substructure and access route concealed and protected by its rubble core, the superstructure would have offered its burial a high degree of protection that may have compensated for its relatively small 2.4 m footprint overhang.[2243]

The last three tombs of the dynasty date to the reign of Qa'a.[2244] Their substructures are similar to those of tomb X and S 3338; however, rather than being axially orientated, they are set at 90° to their superstructures, thus lessening their exposure to lateral tunnelling under the most vulnerable edge of the superstructure.[2245] Even though the complex of S 3505 **[95]** was the largest in the necropolis, its superstructure was considerably smaller and located within two sets of enclosure walls that also surrounded an adjacent funerary temple (Fig. 133). It consisted of a palace façade mastaba, whose immense mud-brick walls were between 5.15–6 m thick (the strongest at Saqqara), and provided a footprint overhang of approximately 4.5 m.[2246] They surrounded an inner core of packed rubble that protected the tomb's

[2235] These phases were analysed in detail by Emery in his excavation report and multicoloured drawings, see Emery 1949: 82–92.
[2236] Emery 1949: 87–8.
[2237] Kaiser (2008: 355–62) in his detailed discussion of the tomb suggests that one reason may be a desire for an increase in the monumentality of the structure.
[2238] Emery 1949: 88.
[2239] Scaled from plan by Emery (1949: pl. 24).
[2240] Emery 1949: 107–9.
[2241] Dimension taken from the western edge of the superstructure, scaled from plan by Emery (1949: pl. 43).
[2242] Emery 1949: 125–7.
[2243] Scaled from plan by Emery (1949: pl. 55).
[2244] The datings for each tomb are found as follows: S 3500 **[94]** (Emery 1958: 103); S 3505 **[95]** (Emery 1958: 5) and S 2105 **[96]** (Reisner 1936: 383).
[2245] See the discussion in 4.2.1.2.
[2246] Scaled from drawing by Emery (1958: pl. 2).

substructure and the majority of its access route.[2247] On a smaller scale, the superstructure of S 3500 **[94]** consisted of a plain single niched mastaba,[2248] whose external mud-brick walls were 2.6–2.8 m thick,[2249] and provided its substructure with a footprint overhang of approximately 3 m (Fig. 132).[2250] Its core was subdivided into six compartments by cross-walls and filled with sand,[2251] but these were not used as magazines, as a small chamber for that purpose was built to the north of the substructure. Finally, the whole was surrounded by an enclosure wall 0.8 m high.[2252] Undeterred by the footprint overhang, thieves had burrowed under the superstructure from the eastern corridor, through the gravel strata and into the western wall of the burial pit.[2253]

Lastly, the superstructure of the less well reported S 2105 **[96]** was protected by 2.8–3.5 m thick mud-brick walls that provided a 2.8 m footprint overhang,[2254] and enclosed a gravel core, which protected the burial pit and a magazine (Fig. 245). Unusually, the stairway entrance was concealed underneath the eastern wall of the mastaba, as a result the tomb had been robbed via its roof.[2255]

Helwan

There are only a few Type ID tombs with superstructures at Helwan that are sufficiently reported to enable their discussion.[2256] Although it is difficult to date them accurately, they can be grouped together by the positions of their entrances and substructures, the earliest being those with stairways that approach laterally.[2257] One of the earliest examples[2258] is 1473.H.2 **[153]**.[2259] Surrounded by an enclosure wall, its 1.5–2.5 m thick walls were decorated with a palace façade on its front and adjacent sides [2260] and enclosed a core of gravel or rubble (Fig. 143).[2261] They provided a footprint overhang of about 1.5 m and partially protected the stairway.[2262] Likewise, the superstructure of 785.H.5 **[154]** was also surrounded by an enclosure wall and although similarly orientated, may be of a slightly later date.[2263] Its 0.75–3 m thick, mud-brick walls,[2264] enclosed fourteen magazines,[2265] and provided around 3 m of footprint overhang over the pit and its external stairway (Fig. 144).[2266] In contrast the thin 0.75 m thick walls of the superstructure of 1.H.4 **[142]**,[2267] together with its unlined substructure, suggests little investment in the tomb's defences, yet conversely its 2.4 m footprint overhang still provided good lateral protection for the pit and its stairway (Fig. 136).[2268]

Some of the superstructures at Helwan were axially aligned with their substructures and stairways, which suggests they date from the latter end of the dynasty.[2269] The remains of the superstructure of 150.H.5 **[143]**[2270] indicate that its walls were 0.9–1.5 m thick and that it had a footprint overhang of around 2 m (Fig. 137).[2271] Although their walls seem badly damaged, the plans of 1.H.3 **[159]** and 649.H.5 **[155]** show that their substructures would have been protected by substantial superstructures with footprint overhangs of approximately 3 m[2272] and 1.5 m[2273] respectively (Figs. 149 and 145).[2274] Finally, there is evidence that the mud-brick superstructures of tombs 40.H.3 (Op.1/1 Köhler) **[158]**,[2275] and 60.H.1 **[160]**,[2276] not only protected their substructures, but also the entire length of their access stairways. What may be particularly significant, is that in both cases their substructures were protected by stone linings (see 4.2.1.2**)**, thus demonstrating an increased concern for their security that was reflected in the placement of their superstructures.

Naga el-Deir

In Cemetery 1500 at Naga el-Deir, there is one First Dynasty Type ID tomb that can be included in the discussion. The substructure and stairway of tomb N 1581 **[287]** were protected by a large mud-brick mastaba with 1 m thick niched walls surrounding a core of gravel, limestone sherds and 'rubbish' (Fig. 153).[2277] If

2247 Emery 1958: 7–8.
2248 Emery (1958: 98) suggested that the design of this mastaba marked the definitive changeover from the complex palace façade style of the First Dynasty to the plainer style of the Second Dynasty.
2249 Emery 1958: 100.
2250 Scaled dimension from Emery (1958: pl. 114).
2251 Emery 1958: 100.
2252 Emery 1958: 99.
2253 Emery 1958: 104.
2254 Scaled dimensions from Reisner (1936: fig. 52).
2255 Quibell 1923: 19.
2256 There are several large Type ID tombs with superstructures that are not included in Saad's (1951) publication such as 206.H.5, 579.H.5 and 638.H.5 from the 1946–7 season, which are shown on the necropolis map (1951: pls. I–II), with the exception of a brief report of a flint knife found in 579.H.5 (Saad 1951: 43).
2257 Those that date to the reigns of Adjib and Semerkhet normally have lateral stairway approaches, whereas those that are approached axially and have flanking burial chambers can be dated to the reign of Qa'a (Wilkinson 1996: 338–43; Kaiser 1998: 83; Köhler 2005: 26). See also note 698.
2258 Dated on stylistic grounds, because of its palace facade (Köhler 2008b: 127).
2259 Incorrectly labelled in some of the publications by Saad as 1374.H.2, and corrected by Köhler 2008b: n. 4) from Saad's field diary.
2260 Saad 1947: 110.
2261 This assumption is based upon Saad's illustration (1947: pl. XXXIX), which shows what could be reasonably interpreted as gravel or rubble. Köhler (2008b: 122) suggests that the usual core for the mastabas at Helwan would have been either sand, rubble or mud-brick.
2262 Scaled dimensions from drawing by Emery (1961: fig. 86).
2263 Due to its simpler design and single offering niche (Köhler 2008b: 127).
2264 Scaled from drawing by Saad (1969: pl. 9).
2265 Saad 1969: 20–2.
2266 Scaled from drawing by Saad (1969: pl. 9).
2267 Saad 1951: 5–6.
2268 Scaled from drawing by Saad (1951: Plan 3).
2269 Wilkinson 1996: 338–43; Kaiser 1998: 83; Köhler 2005: 26.
2270 Saad 1951: 28–9.
2271 Scaled from drawing by Saad (1951: Plan 15).
2272 Scaled from plan by Saad (1947: pl. LXI).
2273 Scaled from plan by Saad (1951: Plan 16).
2274 Saad 1947: 163–4; Saad 1951: 42.
2275 Saad 1951: 164–6; Köhler 2005: 20–30.
2276 Köhler 2008b: 120.
2277 Reisner 1908: 36–8; 1936: 68–9.

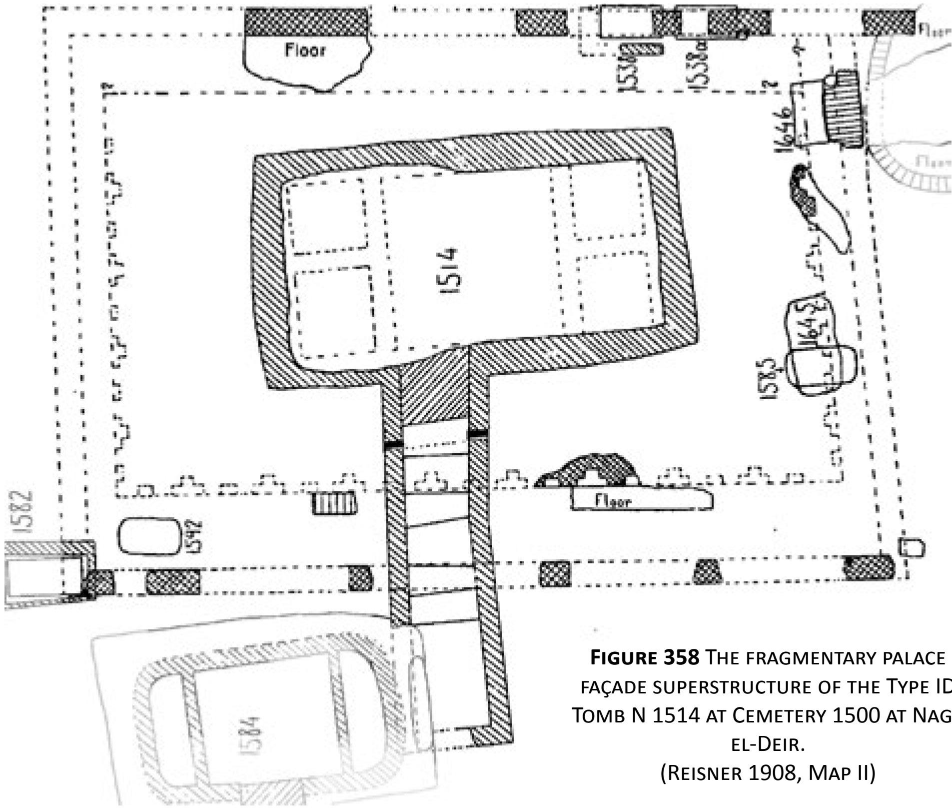

Figure 358 The fragmentary palace façade superstructure of the Type ID Tomb N 1514 at Cemetery 1500 at Naga el-Deir.
(Reisner 1908, Map II)

we assume the substructure was centrally placed (75% of the mastaba is missing) it may be reasonable to suggest a footprint overhang of approximately 2 m.[2278] However, quite unusually for a Type ID tomb, it appears that its superstructure was built after the burial.[2279]

The Second Dynasty (Naqada IIID)

Naga el-Deir

The last Type ID tombs are the Second Dynasty corbelled tombs from Naga el-Deir,[2280] of which there is one example from each of the Cemeteries 1500, 3000 and 3500. The first is N 1514 **[291]** from Cemetery 1500,[2281] which was protected by a mud-brick palace façade superstructure similar to that of N 1581 discussed above. It too had its core filled with gravel and 'rubbish',[2282] but its footprint overhang was only around 1 m (Fig. 358).[2283] Although its superstructure was much smaller, the footprint overhang of N 3017 from nearby Cemetery 3000 **[300]**,[2284] whose mud-brick walls were approximately 0.6 m thick, was also about 1 m.[2285] Finally, as the 0.3 m thick[2286] walls of the still smaller superstructure of N 4990 from Cemetery 3500 **[302]** were almost directly above the corresponding south and west walls of its substructure, its footprint overhang was virtually non-existent.[2287] The stairways of all three tombs were only partially protected, and there is no information regarding the cores of the latter two, but it would be reasonable to assume that a similar fill was used as in tomb N 1514.

Section summary – the superstructures of Type ID tombs

The basic architectural forms of the superstructures of the new Type ID tombs differed little from their Type IB and IC predecessors, insofar as their mud-brick mastabas protected their substructures from attack from above, and their footprint overhangs defended the latter from the side. In addition, for the majority of tombs they now also provided partial cover for their external stairways and concealed the whereabouts of any portcullis emplacements if present. Moreover, with external access to their substructures, unlike their Type IB and IC forbears, they could be largely completed during the lifetime of their owners.[2288] Initially, some superstructures still retained internal magazines for grave goods in necropoleis such as Saqqara and Helwan, and

[2278] Scaled from by Reisner (1936: fig. 51).
[2279] Reisner 1908: 6.
[2280] The tomb catalogue includes thirteen corbel roofed tombs from this site **[289–302]**, and although it is likely that most of them would have been protected by superstructures (Reisner 1908: 7), due to denudation the majority are missing.
[2281] Reisner 1908: 44–5; 1936: 129.
[2282] Reisner 1908: 41.
[2283] Scaled from drawing by Reisner (1908: Map II).
[2284] Reisner 1908: 72–4; 1936: 132.
[2285] Scaled from drawing by Reisner (1908: fig. 138).
[2286] Scaled from drawing by Mace (1909: figs. 27–8).
[2287] Mace 1909: 20 and 68.
[2288] Reisner 1936: 57.

at the former site, a few incorporated deep gravel filled shafts over their burial chambers for added protection as well. However, by the reign of Adjib, in the elite tombs at Saqqara at least, the dual role of the superstructure as a storehouse declined in importance, probably for both security and religious reasons, and its core was fully committed instead to defending the substructure. This search for better security reached its logical conclusion towards the end of the dynasty, with the total concealment of the stairways of some tombs beneath their superstructures at Saqqara and Helwan, which ensured their burials both a high degree of protection, and presaged developments to come.

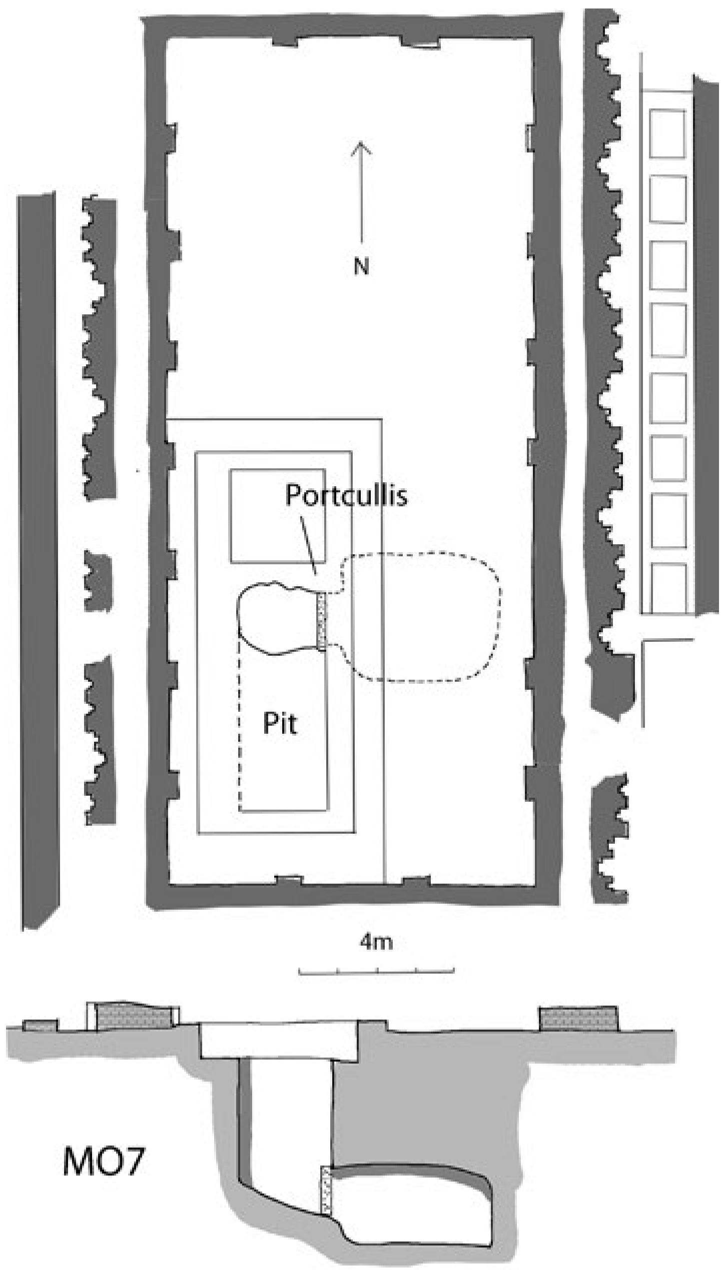

Figure 359 The subterranean burial chamber of tomb MO7 at Cemetery M at Abu Roash; orientated so that it was completely protected by its overlying superstructure.
(Drawn by the author after Montet 1938, pl. V)

6.2.3 Superstructures over Type II tombs with subterranean substructures

This section examines how new architectural developments below ground in Type II tombs affected the development of the protective superstructure above ground. It begins with the first monumental tombs of this type from two necropoleis dating to the second half of the First Dynasty.

6.2.3.1 The superstructures of the Abu Roash Type II tombs

The second half of the First Dynasty (Naqada IIIC2–IIID) Den to Qa'a

Abu Roash

The majority of the atypical Type II rock-cut substructures of the elite tombs of Cemetery M at Abu Roash (see 4.2.2.1) had substructures that were a combination of pit and subterranean tomb originally protected by mud-brick superstructures, although many are denuded as a result of erosion and the attentions of the *sebbakhin*.[2289] Seven are included in Chart N,[2290] but only four can be discussed in detail.

The rock-cut magazine and shaft of tomb MO1 **[44]** was covered by a large palace façade superstructure that contained three internal storage magazines at its northern end (Fig. 158).[2291] Its walls were 1.32 m thick, but as with most of the superstructures at Cemetery M, details of its core are unknown. Its footprint overhang was approximately 2 m to the rock-cut magazine, but this did not cover the subterranean burial chamber, which projected beyond it.[2292] Similarly the magazine and shaft of its immediate neighbour MO2 **[45]** was likewise covered with a mud-brick mastaba,[2293] whose footprint overhang was 1–1.4 m,[2294] and also did not

[2289] Tristant 2008a: 136.
[2290] These are tombs **[44–5, 47–9 and 52–3]**.
[2291] Montet 1938: 18–20.
[2292] Dimensions both extrapolated and scaled from drawing by Montet (1938: pl. II). In this instance, however, it was covered by a row of seven subsidiary graves enclosed by a 0.6 m thick enclosure wall that also surrounded the main body of the superstructure (Tristant 2008a: 137–8).
[2293] Montet 1938: 28–31.
[2294] Scaled from drawing by Montet (1938: pl. II).

cover its burial chamber (Fig. 159). As was the case with the rock cut magazine and shaft of tomb MO19 **[53]**, which was sheltered by an overlying superstructure with walls 1–1.5 m thick, but whose subterranean burial chamber extended eastwards beyond its north-eastern edge. Details of its core are unknown, but judging by the enormous amount of dissolved clay found in the substructure, which Klasens suggested was washed down by rainfall,[2295] it would be reasonable to speculate that it consisted of mud-brick. The burial chamber had been robbed, but not via its superstructure. Instead robbers (who must have been aware of its exact location) had avoided it and tunnelled directly through the rock above the superstructure's north-west corner and plundered it, thus graphically demonstrating one of the hazards of not being fully covered by a protective footprint. However, the footprint of the mastaba of tomb MO7 **[49]**,[2296] whose mud-brick walls were 2.2 m thick and enclosed internal magazines, in theory offered its substructure far more security. This was because it not only covered its rock-cut magazine and shaft, but the burial chamber too, which was orientated east rather than west and was under its footprint (Fig. 359).[2297]

It therefore appears that with the increased security offered by the subterranean burial chamber in the tombs at this site, the relationship of the superstructure to the burial chamber, like in many other later Type II tombs (see below) was less about protecting the burial chamber directly, as was essential with Type I pit tombs, and more about concealing its access route and magazines.

6.2.3.2 The superstructures of Type IIA tombs with staircase access

The second half of the First Dynasty (Naqada IIIC2–IIID) Den to Qa'a

There are just two early Type IIA stairway tombs with superstructures from this period included in the catalogue.

North Saqqara

The unusual substructures of the Type IIA tombs S 3121 **[97]** and S 3120 **[98]**, which date to the reign of Qa'a,[2298] were reflected in the construction of their distinct trapezoid superstructures (Figs. 160–1). Although when viewed externally the upper half of their structures would have presented a level appearance to the viewer, in fact their foundations followed the contours of the escarpment over which they were built. Internally they both contained an 'L' shaped open corridor that led to a single magazine at its end, thus creating a kind of inner protective mastaba. Probably roofed in wood, these inner structures contained magazines that were filled with a sand and rubble backfill, which both protected the roofs of their underlying trench cut stairwells, and concealed the undulating geology that lay over their subterranean burial chambers.[2299]

Like the tombs at Abu Roash, it appears that due to the depth of cover provided by the underlying geology, the builders of these tombs were not too concerned about their burial chambers being entirely protected by the footprints of their mastabas. This is particularly noticeable in S 3120, where although still within the bounds of the exterior wall, its burial chamber's protection was nonexistent where the corridor ran overhead.

The Second Dynasty (Naqada IIID)

North Saqqara

In the catalogue there are fifteen Second Dynasty Type IIA tombs with superstructures from Saqqara, the majority of which are poorly recorded, [2300] with the exception of two published by Emery.[2301] However, it has been possible to glean additional statistical information from Quibell's publication of the archaic tombs,[2302] which is included in the superstructure chart (Chart N) and permits an overview of their use.

Whether or not the majority of the footprints of the superstructures of the Type IIA tombs in the catalogue totally covered their substructures, such as those of S 2307 **[106]** and S 3477 **[102]** (Figs. 360 and 165) is not clear, due to the lack of accurate plans. Although the tomb drawings of S 3042 **[100]** and S 3024 **[103]** certainly demonstrate that not all of them did (Figs. 164 and 166).[2303] This apparent change in strategy suggests that like their First Dynasty predecessors at Abu Roash and Saqqara, the protection of the superstructure's footprint was considered less essential, due to the depth of cover provided by the surrounding geology.

As previously discussed (5.1.2.2), the stairways of many large Type IIA tombs at Saqqara were placed in varied positions within their superstructures' perimeters to make them difficult to find,[2304] and their inner cores were

[2295] Klasens 1961: 109.
[2296] Montet 1938: 38–46.
[2297] As probably did those of MO4 and MO6 **[47–8]**, but the tomb drawings (Montet 1938: Pl. VI) in both cases do not precisely define the perimeter of the long edges of their superstructures.
[2298] Hendrickx 1996: 60.

[2299] Emery 1949: 116–9 and 121–3.
[2300] These are tombs S 2101 **[99]**, S 2171 **[104]**, S 2302 **[105]**, S 2307 **[106]**, S 2313 **[113]**, S 2315 **[112]**, S 2322 **[107]**, S 2337 **[108]**, S 2406 **[109]**, S 2429 **[110]**, S 2452 **[101]**, S 2498 **[111]** and S 3042 **[100]**.
[2301] Tombs S 3024 **[103]** and S 3477 **[102]** (Emery 1949: 11–2 and 1962: *passim*).
[2302] Quibell 1923: *passim*.
[2303] Lacher (2008: 445, n. 38) notes that in her experience in these types of tombs, the superstructure's protective role over subterranean substructures is generally less important than in pit tombs, where it is essential to protect the substructure's roof.
[2304] This idea was mentioned by Quibell (1923: 3) who wrote concerning

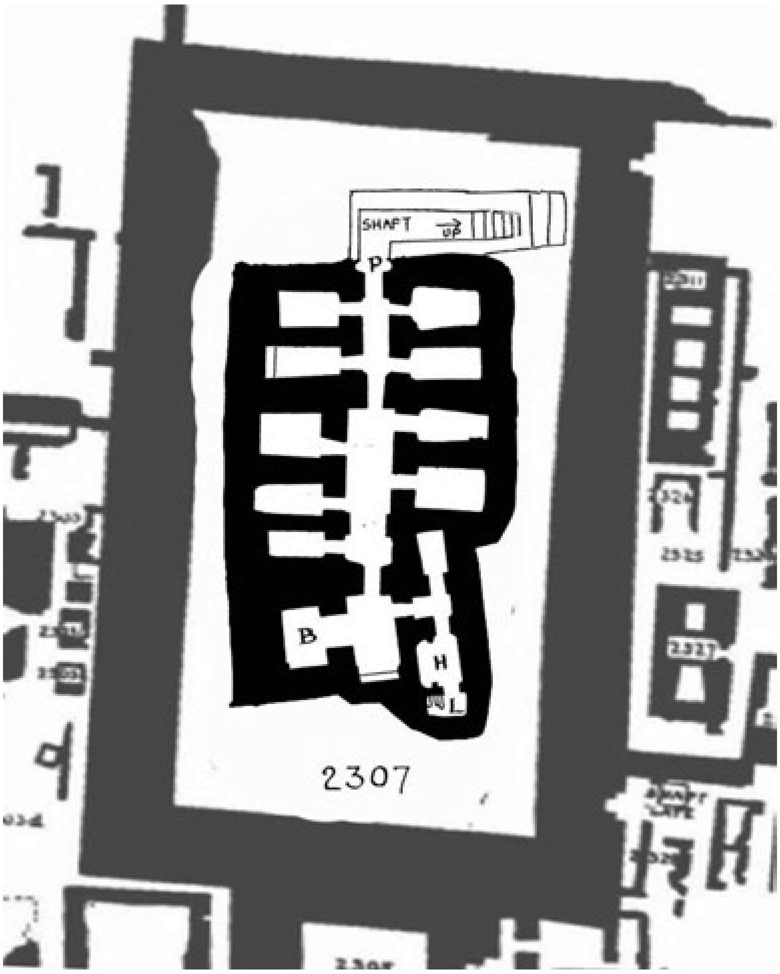

Figure 360 The Type IIC tomb S 2307 at Saqqara, the substructure can be seen to be well protected by the superstructure, with a good footprint overhang. (After Quibell 1923, pls. I and XXX)

used to both conceal and protect them and their portcullis emplacements from the *sondages* of tomb robbers.[2305] Once backfilled after the funeral,[2306] some cores may have been roofed with mud-brick, as tomb S 2350 **[NIC]** demonstrates.[2307] Although Quibell suggested that all this may have been done before the funeral, leaving just a temporary gap to permit access to the stairway, which was blocked and concealed after the burial; the smaller superstructures being built immediately after the funeral, perhaps on the same day.[2308]

Some superstructures still contained a few magazines, although not on the scale of their First Dynasty forerunners, or housed large quantities of food, storage jars and utensils that also required protection (Fig. 361).[2309] The material used in these cores varied, for example, those of S 2101 **[99]** and S 2315 **[112]** consisted of limestone chips,[2310] which were presumably the spoil from their substructures' excavations. In others such as S 2307 **[106]**, S 2313 **[113]** and S 2322 **[107]** the cores comprised of liquid mud that when dried set hard like concrete.[2311] Tomb S 2171 **[104]** was filled with gravel, which was difficult to dig,[2312] whilst tomb S 2302 **[105]** combined both a gravel sub-layer and liquid mud for its enormous core and benefited from the properties of both.[2313] Similarly, the core of S 2337 **[108]** had three different layers of material that consisted initially of stone chips, followed by a 0.6 m layer of fired and green pottery and finally a top coat of sand.[2314] Pottery also featured as a 0.5 m layer in the otherwise unidentified core of S 2452 **[101]**,[2315] whereas the cores of the aforementioned S 3477 and S 3024, consisted of rubble and sand.[2316]

The level of protection offered by this type of core can be demonstrated by using one of the larger tombs such as

S 2105, '…the stairways, are by no means in the same position in each tomb; probably variety was sought as a means of discouraging plunderers.'

2305 The exceptions were S 3024 **[103]**, S 3042 **[100]** and S 2302 **[105]**, whose entrances began outside their mastabas, but whose stairwells once within the mastaba's perimeter would have benefited from its protection.

2306 Emery 1961: 130.

2307 Quibell 1923: 37.

2308 Quibell 1923: VII.

2309 Quibell 1923: 1; Emery 1962: 2.

2310 Quibell 1923: 17 and 33.

2311 Quibell 1923: 3, 21 and 35.

2312 Quibell 1923: 23.

2313 Quibell 1923: 29.

2314 Quibell 1923: 35–6.

2315 Quibell 1923: 41.

2316 Emery 1949: 12; 1962: 4.

Figure 361 Food storage jars and utensils set in the unknown core filling of the superstructure of an unnamed Second Dynasty tomb.
(Emery 1962, pl. 2) Courtesy of the Nederlands Instituut voor het Nabije Oosten.

S 2171 **[104]** as an example. If we assume its height was approximately 5–6 m,[2317] its core can be estimated to have contained as much as 3,900 m^3 of gravel,[2318] which would weigh approximately 6,200 tonnes,[2319] thus presenting a considerable deterrent and obstacle to the tomb robber.

Helwan

There are twenty-one Type IIA tombs in the catalogue from Helwan, but only seven have been published with superstructures,[2320] the remainder probably having disappeared due to recycling, *sebbakhin,* and erosion.[2321] However, it is probable that the majority of these tombs were originally protected by superstructures, and the regular spacing of many substructures and the avoidance by others of the area where one may have been built, suggests that this was indeed the case.[2322] As mentioned earlier (5.1.2.2), Saad's necropolis maps reveal more unpublished tombs, seven of which are shown with more or less complete mastabas (Fig. 252).[2323] Therefore, although not included in the catalogue, the latter are listed in the Type IIA superstructure Chart N to permit the topic to be explored further.

The superstructures at Helwan were built of mud-brick, like their earlier neighbours, and usually filled with a core of sand, rubble or mud-brick.[2324] Amongst the fourteen tombs in the chart, it can be seen that twelve tombs had at least their burial chambers fully covered by their superstructures. These are the four published examples: 25.H.4 (Köhler's Op. 2/1) **[167]**,[2325] 68.H.5 **[175]**,[2326] Op. 4/19 **[182]**,[2327] and Op. 4/123 **[174]**,[2328] and those unpublished tombs marked on the necropolis map (Fig. 252): 463.H.4, 464.H.4, 612.H.4, 636.H.4, 8.H.5, 60.H.5, 71.H.5 and 74.H.5 **[all NIC]**. Although some were well protected by a large footprint, for example 463.H.4, 464.H.4 and 74.H.5, some were barely covered, for example Op. 4/88 **[183]**,[2329] 612.H.4 and 8.H.5 **[both NIC]** from the necropolis map. The superstructure of Op. 4/4 **[181]**,[2330] protected only its stairway and offered its burial chamber no cover at all (Fig. 251). Therefore, it would appear that, as at Saqqara, the once important large footprint overhang of the superstructure was no longer considered to be absolutely vital.

By examining the location of robbers' tunnels in individual tombs in relation to their overlying superstructures, some indication of the success of the superstructure's protective footprint at Helwan can be gained. Although little remains of the superstructure of tomb 25.H.4 (Köhler's Op. 2/1) **[167]** today, a robbers' tunnel that began approximately 2 m north-east of the burial chamber,[2331] suggests that an 8 m long × 5 m wide mud-brick mastaba was built over the tomb, which the robbers had intentionally avoided (Fig. 172).[2332] Similarly, the location of the robber's tunnels in tombs Op. 4/88 **[183]** and Op. 4/123 **[174]** indicates they had also been started from just outside their mastabas' perimeters.[2333] Although the tunnel found in Op. 4/19 **[182]**, which began within the western wall of its superstructure, demonstrates that this was not always the case.[2334] Indeed, if one examines the Type IIA burial chamber chart (Chart N) and accompanying tomb catalogue, it is apparent that many of these tombs have been robbed via accurately driven vertical tunnels. Therefore, if the assumption is made that most of their substructures were protected in some way by superstructures,[2335] it would appear that in the majority of cases their protective footprints either barely covered the burial chambers below them, or if they did, robbers had dug right through them regardless.

Badari

There is evidence to suggest that some Type IIA substructures from El-Badari were protected by

[2317] Quibell 1923: vi.
[2318] This volume is based upon the overall size of the superstructure at 41.7 m long × 18.3 m wide, less 2 m thick walls all round × 6 m height.
[2319] Based upon loose gravel's bulk density of 16 kN/m3 which equals approximately 1600 kg/m3 (Cobb 2004: 36).
[2320] These are Op. 4/4 **[181]**, Op. 4/19 **[182]**, Op. 4/94 **[173]**, Op. 4/123 **[174]**, Op. 4/88 **[183]**, 25.H.4 (Köhler's Op. 2/1) **[167]** and 68.H.5 **[175]**.
[2321] Saad 1947: 22; Jeffreys 2005: 440.
[2322] Köhler 2008b: 122.
[2323] They are 463.H.4, 464.H.4, 612.H.4, 636.H.4, 8.H.5, 60.H.5 and 74.H.5 **[all NIC]** from the excavations of seasons 1945–6 and 1946–7 (Saad 1951: pl. III).
[2324] Köhler 2008b: 122.
[2325] Köhler 2005: 35–44.
[2326] Saad 1951: 27.
[2327] Köhler 2003a: 89; Köhler and Jones 2009: 12.
[2328] Köhler 2008a: 172–3.
[2329] Köhler 2007: 192.
[2330] Köhler 2000b: 89–91.
[2331] Scaled dimension from drawing by Köhler (2005: pl. 17).
[2332] Köhler 2005: 39–40 and 43.
[2333] Köhler 2007: 192; 2008a: 173–4, fig. 2.
[2334] Köhler and Jones 2009: 12.
[2335] Köhler 2008b: 122.

superstructures. Although traces of mud-brick walls around the stairway of tomb 3112 **[278]** were described by Brunton as: 'forming a rectangle 315 × 602 ins' surrounding the entrance,'[2336] he seemed to have underestimated their significance and dismissed them as follows:

> 'Probably the purpose of these brick walls was merely to surround the tomb, as seen in modern cemeteries at Badari today, and not to retain a *mastaba* of rubble. The area enclosed is far too great for that to be likely, being in one case (3227) 73 ft. long in the side…'[2337]

Although if these dimensions are considered along with the known sizes of many of the other superstructures in the survey, the lengths of 15.29 m and 34.5 m for the sides of 3112 and 3227 **[281]** respectively, seem hardly exceptional, and may point to monumental superstructures after all.

The Third Dynasty

Saqqara

There are four Type IIA tombs with superstructures at Saqqara from the Third Dynasty in the catalogue. The mud-brick superstructures of S 2317 **[116]**, S 2416 **[115]** and S 2445 ('twin mastaba') **[117]** are similar to those of their Second Dynasty neighbours and vary in their dimensions. They protected their descending stairways entirely with their cores, of which only that of S 2416 is known to have consisted of gravel.[2338] Little is also known about the large mastaba of S 3040 **[114]**, whose core was concisely described by Reisner as 'filled' and protected both its substructure and the majority of its external stairway; unusually the mastaba's exterior also incorporated an early cruciform chapel (Fig. 362).[2339]

Naga el-Deir

In Upper Egypt, four Type IIA tombs with mastabas are recorded at Cemetery 500–900 at Naga el-Deir. The gravel filled mud-brick superstructures of tombs N 574 **[303]**[2340] and N 599 **[304]**,[2341] fully protected their stairways, but only partially covered their substructures (Fig. 253). On the other hand, the much larger 'twin mastaba' N 573 + N 587 **[306]**,[2342] covered both its stairways, and did so by a reasonable margin (Fig. 184). Better protected was N 689 **[305]**, whose stairway and burial chamber was protected by a 2 m high superstructure of solid mud-brick that provided an even more generous footprint (Fig. 254).[2343] However, despite their protective mastabas, of the four only N 599 remained unrobbed,[2344] the others having been breached from above and entered via their stairways.

Reqaqnah

At Reqaqnah Garstang found few extant remains of the superstructures of tombs R1 **[315]** and R 40 **[316]**.[2345] However, according to Reisner they were conventionally constructed with external mud-brick retaining walls (Figs. 185–6) and 'filled',[2346] presumably with the surrounding desert gravel? What can be ascertained from the plans is that the 1.75 m thick walls of R1 surrounded a core that entirely covered its substructure and stairway,[2347] but the 1–1.75 m thick walls of R 40,[2348] and its core, left its underlying burial chamber partially exposed at its southern end.

Beit Khallaf

There are five large superstructures associated with the Type IIA tombs at Beit Khallaf, amongst which tomb K1 **[319]** is the largest. Its solid brick mastaba is 85 m long × 45 m wide × 8 m high,[2349] and protected its substructure with a considerable 3,825 m^2 footprint (Fig. 187). The 30,600 m^3 of its brick '*massif*' contained the upper portion of the tomb's stairway descent and portcullis shafts, which after the interment were blocked with liquid mud and bricked over (see 5.2.1.3).[2350] Nearby, the smaller solid brick mastaba of tomb K2 **[320]** protected its Type IIA + IIA twin substructure and internal staircases with a 1,531 m^2 footprint, but less effectively because of its smaller dimensions (Fig. 188). Although it was severely denuded, Garstang suggested that like tomb K1, it too would have relied on liquid mud and mud-brick to seal its stairways and portcullis shafts.[2351] The superstructures of nearby tombs K3 **[321]**, K4 **[322]** and K5 **[323]**, while

[2336] Brunton 1927: 13.
[2337] Brunton (1927: 15) wrote regarding 3227: 'The other stairway tombs may have been similarly surrounded, but all traces of brickwork had vanished owing to the constant re-use of the ground in later times. Only one, or at best two, courses of bricks remained: the wall of one (unpublished) was 28 ins. thick. The width of the rectangles enclosed was very slightly more than hall the length of the sides. Probably the purpose of these brick walls was merely to surround the tomb, as seen in modem cemeteries at Badari today, and not to retain a mastaba of rubble. The area enclosed is far too great for that to be likely, being in one case (3227) 73 ft. (34.5 m) long in the side.'
[2338] Quibell 1923: 39.
[2339] Reisner 1936: 163. He considered (1936: 258) that: 'The purpose of these protected chapels was clearly to save the plastered and painted wall surfaces of the offering room from damage either by weather or by malicious visitors.'
[2340] Reisner 1932: 220–1.
[2341] Reisner 1932: 229.
[2342] Reisner 1932: 217–8.
[2343] This mastaba had been built in two phases and the second layer of mud-brick was approximately 1.4 m thick (Reisner 1932: 245).
[2344] This was probably because its superstructure had been built over by the later N 689 (Reisner 1932: 229) and was thus hidden from view.
[2345] Garstang 1904: 21–2.
[2346] Reisner 1936: 179–80.
[2347] Scaled dimensions from Garstang (1904: pl. IVa).
[2348] Scaled dimensions from Garstang (1904: pl. IVb).
[2349] Garstang 1903: 8
[2350] Garstang 1903: 9–10.
[2351] Garstang 1903: 11–2.

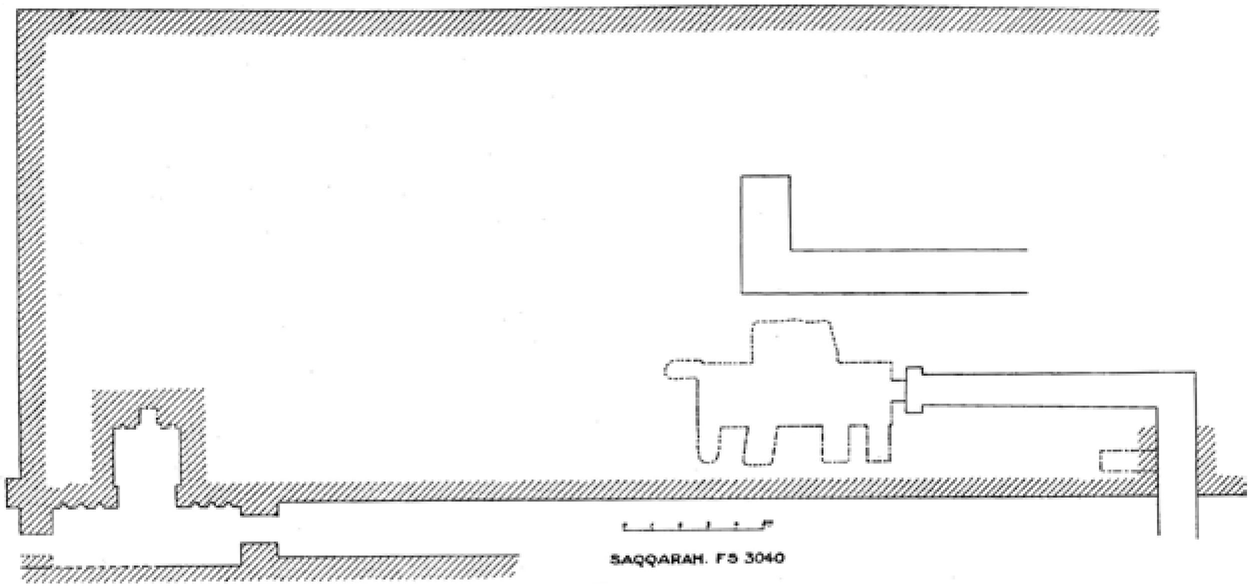

Figure 362 The Type IIA tomb S 3040 at Saqqara, with its substructure and stairway concealed under the eastern edge of the inner chapel wall facing the corridor of its large mud-brick superstructure.
(Reisner 1936, fig. 77)

still of solid brick,[2352] were more conventional, insofar as they were built over their access routes and protected their substructures with their footprints in the usual way. Although it is arguable that the cover provided for tomb K4, whose mastaba barely covered the end of its substructure, would have been less effective than those of K3 and K5, whose footprints were more generous.[2353]

The early Fourth Dynasty

The number of Type IIA tombs is greatly reduced in the early Fourth Dynasty; of the three included in the catalogue only one is associated with a superstructure.

Reqaqnah

The single chambered substructure and stairway of tomb R75 at Reqaqnah **[317]**,[2354] was well protected by a mud-brick mastaba with walls 0.75–1.5 m[2355] thick that both surrounded a 'filled' internal core,[2356] and protected its substructure with a generous footprint.[2357]

Section summary - Type IIA tomb superstructures

The defensive role of the superstructure was altered considerably as a result of the change in the architecture of the Type IIA substructure. Instead of having to defend a wooden roofed or backfilled pit from overhead and lateral attack with its protective footprint and mass, the superstructure now both protected the underlying geology, which acted as a roof for its burial chamber, and often concealed and defended the tomb's stairway. Judging by examples from Saqqara and Helwan, where the burial chambers of some tombs clearly projected beyond their mastaba's protective footprint, the tomb builders' confidence in this geological cover seems to have rendered the once essential large footprint overhang of the superstructure largely superfluous. Even though it seems clear in retrospect, from the many robbers' tunnels found at Helwan, that their confidence in the geology of that particular necropolis was somewhat ill founded. Unlike at Beit Khallaf, where aware of their substructures' vulnerability in the soft geology, the superstructure's mass and footprint was most definitely relied upon.

Whilst some Type IIA stairways still began from beyond their superstructures' perimeters, like their Type ID predecessors, in the majority of cases they were now entirely hidden from view and fully protected by their mastaba's core, along with their portcullis emplacements, where present. In order to fulfil these defensive functions, as in the latter half of the First Dynasty, thick mud-brick walls were still used to retain and secure a variety of protective inner cores such as gravel, sand, rubble, brick and liquid mud. Despite the increasing role of the superstructure as the focus of external cult offerings, some of their cores at Saqqara still concealed magazines and victuals for the afterlife.

Meanwhile in the solid mud-brick *massifs* of the larger Third Dynasty tombs at Beit Khallaf, an entirely different approach was taken, as their descending stairways were created partially within the huge bodies of the mastabas

[2352] Garstang 1903: 14–6.
[2353] Scaled dimensions from drawing by Garstang (1903: pl. XXV). The substructure of K5 had been robbed in antiquity via a tunnel that had been dug straight down from above (Garstang 1903: 15), but whether the superstructure was still intact at that point is unknown.
[2354] Garstang 1904: 49–50.
[2355] Garstang 1904: 31–2.
[2356] Reisner 1936: 231.
[2357] Scaled dimension from drawing by Garstang (1904: pl. XXI).

themselves, leaving just their access routes to be sealed and concealed *post hoc*.

6.2.3.3 The superstructures of Type IIB 'deep' staircase tombs

Essentially the same as their Type IIA contemporaries, except for their much reduced access route, there are just two published examples of Type IIB tombs with superstructures in the catalogue, one from the Second Dynasty, the other from the Fourth.

The Second Dynasty (Naqada IIID)

Helwan

The small deep staircase of Op. 4/148 **[184]** and its substructure were entirely protected by its mud-brick superstructure (Fig. 256). However, a vertical robbers' tunnel had been dug from outside the mastaba's western edge down into the niche of the burial chamber,[2358] which demonstrates, as with many Type II tombs at Helwan, that the tomb builder's confidence in the strength of the surrounding geology and the protection of a minimal footprint overhang was misguided. Similarly, although not published in detail, it can be seen on Saad's necropolis map (Fig. 252) that tomb 70.H.5 **[NIC]** also had a deep staircase that was entirely covered by its superstructure, which however, only partially protected the substructure beneath it.

The early Fourth Dynasty

Naga el-Deir

Built in successive layers, the 0.7 m thick mud-brick walls and internal gravel core of the generously proportioned superstructure of tomb N 561b **[311]** in Cemetery 500–900 at Naga el-Deir, had successfully concealed and protected the small section and plan of its deep staircase and the substructure that lay beneath it, as when excavated its burial was found intact and undisturbed (Fig. 363).[2359]

Section summary - Type IIB tomb superstructures

The superstructures of the few Type IIB tombs in the catalogue seem to be little different to those of their Type IIA counterparts. Their only advantage is that because of the much smaller plan and section of their underlying 'deep staircases', they provided a correspondingly greater deal of protection to their access routes for their relative size, compared to those with longer stairways,

6.2.3.4 The superstructures of Type IIA-C stair-shaft tombs

In what has been described by Bárta as a 'transitional' period in private tomb architecture,[2360] the introduction of the stair-shaft in the Third Dynasty was accompanied by a few changes in superstructure design.

The Third Dynasty

Giza

Situated high up on a knoll to the south of the Giza Pyramids, the enormous solid mud-brick superstructure that protected 'Covington's Tomb'**[61]**, was 54.97 m

[2358] Köhler 2009: 284.

[2359] Reisner 1932: 212–3.

[2360] Bárta (2006: *passim*) suggests that the architecture of a number of tombs at Saqqara, Abusir and Dahshur with mixed access routes, cruciform chapels and large superstructures can be regarded as a transitional phase between the tombs of the Second Dynasty and the later Fourth Dynasty tombs at Meidum, Dahshur and Giza.

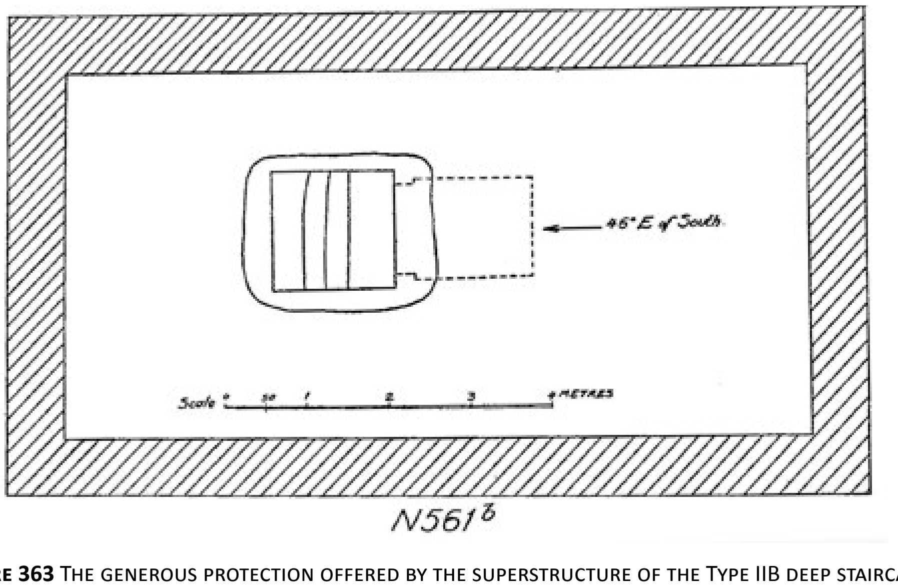

Figure 363 The generous protection offered by the superstructure of the Type IIB deep staircase tomb N 561b at Cemetery 500-900 at Naga el-Deir. (Reisner 1932, fig. 123)

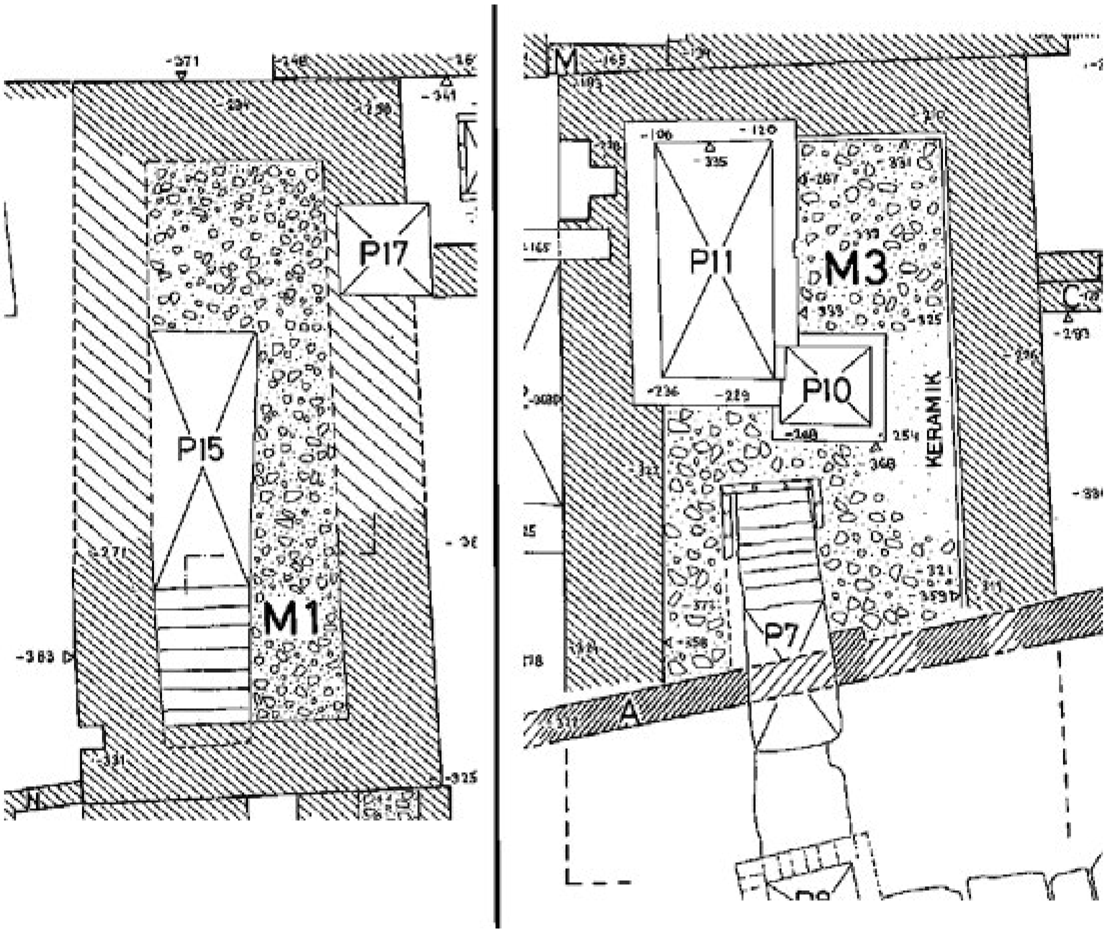

Figure 364 The gravel filled mud-brick superstructures of the Type IIA-C stair-shaft tombs M1 and M3 at Saqqara. (After Ghaly 1994, Abb. 1) Courtesy of F. Arnold, DAI Cairo.

long × 27.99 m wide and decorated on all four sides with a palace façade (Fig. 192).[2361] It was surrounded by an enclosure wall 3 m thick that was possibly 2.7 m high, but did not permit access to the corridor beyond, which was only 0.25 m wide and thus inaccessible, except for the void formed by the niches.[2362] The stair-shaft of the tomb was partially built within the brickwork of the inner mastaba, which was at least 7 m high,[2363] and possibly as much as 10 m.[2364] Like in tombs K1 and K2 at Beit Khallaf, this stairway once backfilled was presumably bricked over and concealed. Positioned like a fortress on a hill, the enormous 1,538 m^2 footprint of the structure and its enclosure wall would have offered its substructure excellent protection from tunnelling, and its bulk would have made its concealed stair-shaft difficult to find. However, despite these precautions, as with many of its contemporaries, it was the latter, once discovered, that proved to be its downfall.[2365]

Saqqara

There are thirteen Third Dynasty Type IIA-C tombs with superstructures in the catalogue from North Saqqara. The smaller ones such as S 2115 **[123]**, S 2336 **[124]**, S 2428 **[125]** and the ‘twin mastaba’ S 2436 + 2437 **[127]**,[2366] were built in a similar manner to their Type IIA predecessors and, although not recorded by Quibell, presumably had mud fillings or gravel cores like their more modest contemporaries adjacent to the Unas Causeway, tombs M1 **[128]** and M3 **[130]** (Fig. 364).[2367] Although the stair-shaft in principle was designed to save space and reduce stairwell (see 5.1.2.4), the limited surface area of these mastabas would not have provided a great deal concealment from exploratory *sondages*, nor would their footprints have given much protection to their stairwells from lateral tunnelling. Unlike the much larger tombs S 2103 **[121]** and S 3043 **[122]**, whose stair-shafts would have been better concealed by the greater area of their mastabas’ cores.

2361 Covington 1905: 196.
2362 Covington 1905: 203–4.
2363 Covington 1905: 198–9.
2364 Jánosi 2006: 20.
2365 Covington 1905: 208–9.

2366 Quibell 1923: 21, 25 and 40.
2367 Ghaly 1994: 57–69.

Figure 365 The massive walls and multi-compartmented superstructure of the Type IIA-C + IIA-C tomb S 2407 at Saqqara, overlying its 'house type' substructure. (After Quibell 1923, pls. II and XXX)

On a far greater scale the stair-shafts and substructures of the huge 'twin mastabas' S 2407 **[126]** and S 3050 **[118]**, whose footprints were in excess of 1500 m^2, were much better defended, as their 3–4 m thick walls enclosed enormous inner cores. That of S 2407, which was divided by internal cross-walls (Fig. 365),[2369] perhaps was a candidate for liquid mud,[2370] and that of S 3050 consisted of sand and rubble (Fig. 182).[2371] In what can be seen as part of the expanding cultic role of the superstructure during the Old Kingdom,[2372] the eastern frontage of S 2407 was also faced with a corridor that led to a northern niche and a southern cruciform chapel, and what appears

[2369] Quibell 1923: 38.

[2370] Although mud was not specifically mentioned as a core for this mastaba, Quibell (1923: 1) had written regarding mud fillings: 'This mud must at first have been introduced in one unbroken mass, retained by the boundary wall alone; but later on this simple method was modified by the insertion of crosswalls dividing up the great mass of mud and much reducing the dangerous thrust on the outer walls.' It is therefore a reasonable assumption that mud may have been used in the fill of S 2407.

[2371] Martin 1974: 23.

[2372] Dodson 2010: 808.

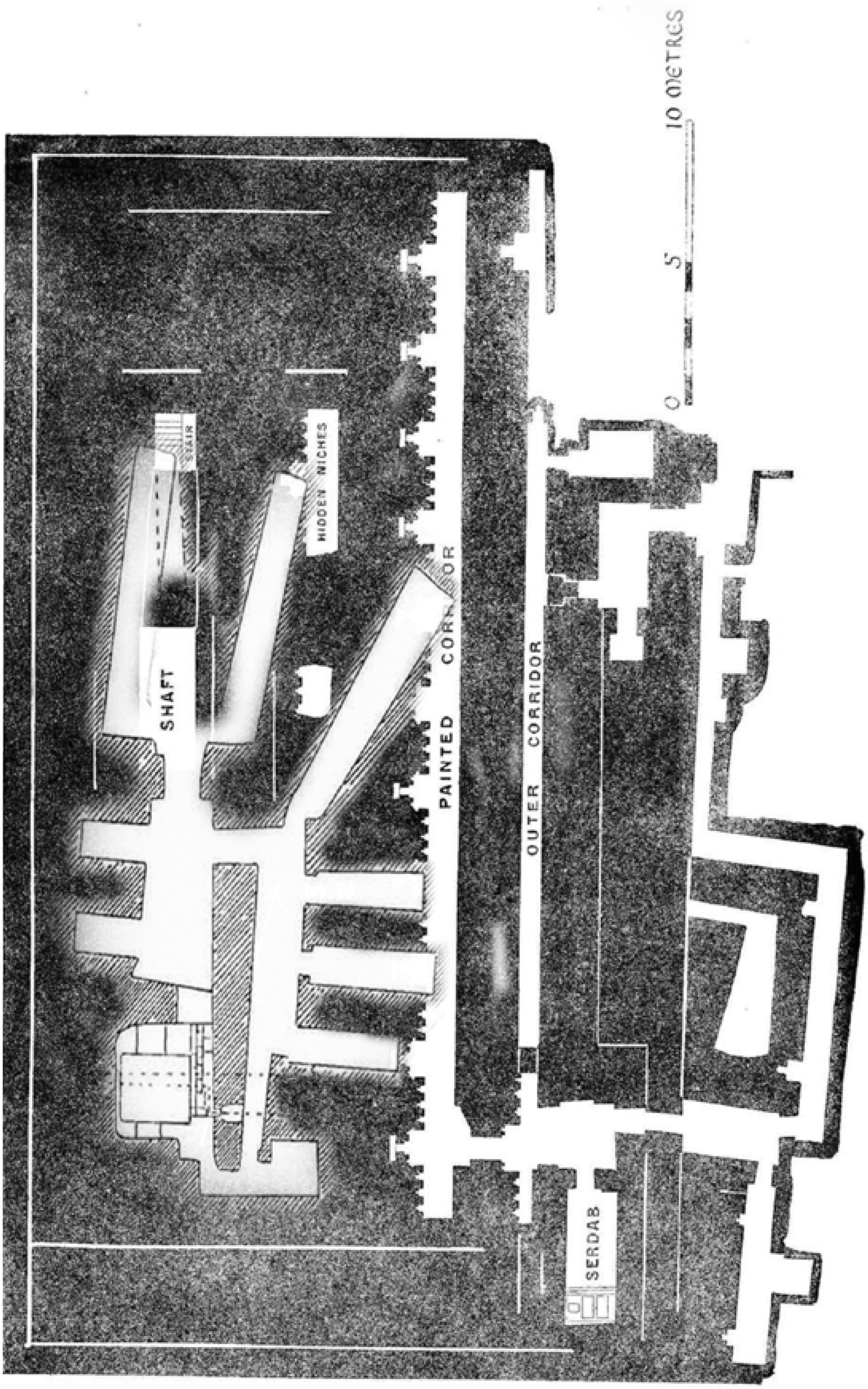

Figure 366 The 43 m long solid mud-brick superstructure of the tomb of Hesyra, S 2405 at Saqqara, showing its underlying substructure. (After Quibell 1913, pls. I–II)

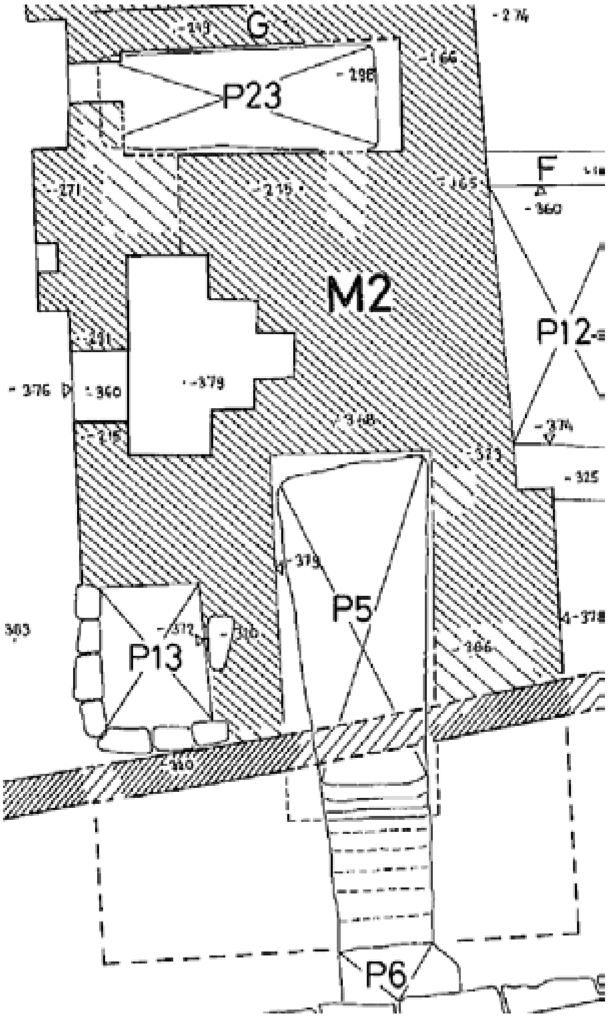

Figure 367 The 9.5 m long solid mud-brick superstructure of the Type IIA-C tomb M2 at Saqqara, whose footprint is just 4.3% of the area of that of Hesyra. (Ghaly 1994, Abb. 1) Courtesy of F. Arnold, DAI Cairo.

to be a separate extension containing a complex of cult rooms, like in the aforementioned S 3505.

Lastly, there are two Type IIA-C tombs with solid mud-brick superstructures of greatly differing dimensions. The larger is S 2405 (Hesyra) **[119]**. Built in three phases that probably matched its substructure's expansion, it was initially developed from a simple mastaba with cruciform chapel that was walled up in the second phase and provided with a larger chapel with a palace façade. Within the chapel wooden panels depicted Hesyra, and more importantly from the tomb security point of view, on the opposite wall painted offering lists provided 'magical' supplies for the benefit of the deceased,[2373] which replaced the real items[2374] and would have been of no interest to tomb robbers.[2375] This structure was then further extended to create another corridor and a serdab. Now over 5 m high and approximately 43 m long × 23 m wide,[2376] the large footprint of its inner superstructure covered most of its substructure (Figs. 193 and 366), and its mass protected the stair-shaft that descended through its body, which once sealed, like its contemporaries at Giza and Beit Khallaf, would have been difficult to find. Finally, the much smaller tomb M2 **[129]**, which lay adjacent to the Unas Causeway,[2377] is noteworthy for its solid mud-brick superstructure (Fig. 367), whose footprint was only 4.3% of the area of that of Hesyra.[2378] Despite its relatively small size it still protected its stair-shaft and contained a small cruciform chapel, thus performing all of the functions of the latter in miniature.

Naga el-Deir

Like some of their Type IIA neighbours, discussed above, the Type IIA-C stair-shafts and burial chambers of tombs N 585 **[308]**,[2379] N 586 **[309]**[2380] and N 593 **[310]**[2381] were entirely protected by their mud-brick walled superstructures. Those of N 585 and N 593 were filled with a gravel core, but N 586 was too ruined to tell.[2382] However, despite their presence, all three had been robbed, their effectiveness possibly reduced by their relatively small footprint areas compared to the wells of their stair-shafts, which perhaps diminished the benefits of using the latter as an access route.

El-Kab

Further south, the superstructure of tomb 274 **[344]**, sits on the summit of the 50 m high Rock necropolis at El-Kab, in a position without precedent in any other Egyptian necropolis (Figs. 368–9).[2383] Its 0.9–1.4 m thick mud-brick walls are decorated with a palace façade and an offering niche on its north-eastern face,[2384] and it is divided internally into two compartments.[2385] One of these enclosed the tomb's 'L' shaped rock-cut stair-shaft, and presumably had been backfilled after the burial,[2386] whereas the other functioned as a magazine and was found filled with beer jars.[2387]

[2373] See Mariette and Maspero 1885: 80–2; Quibell 1913: 2–11, pls. IV–XXIII and XXIX–XXXII; Wood 1978: *passim*; Davis 2003: *passim*.
[2374] Barta 1963: 29; Bolshakov 1997: 34.
[2375] Jánosi 2006: 26.
[2376] Quibell 1913: 3–4, 10–1; Reisner 1936: 270–3; Jánosi 2006: 26–7.
[2377] Ghaly 1994: 63–4.
[2378] Hesyra's footprint area is 989 m2, whereas that of M2 is 42.75 m2.
[2379] Reisner 1932: 224.
[2380] Reisner 1932: 225.
[2381] Reisner 1932: 226.
[2382] Reisner 1932: 225.
[2383] Limme 2008: 23.
[2384] Limme 2000: 27.
[2385] Huyge 2003: 29.
[2386] The tomb had been usurped on several occasions (Limme 2000: 28–9; Huyge 2003: 29–30), and thus the original core must have been disturbed to gain access, as there are no tunnels into the shaft.
[2387] Limme 2000: 27.

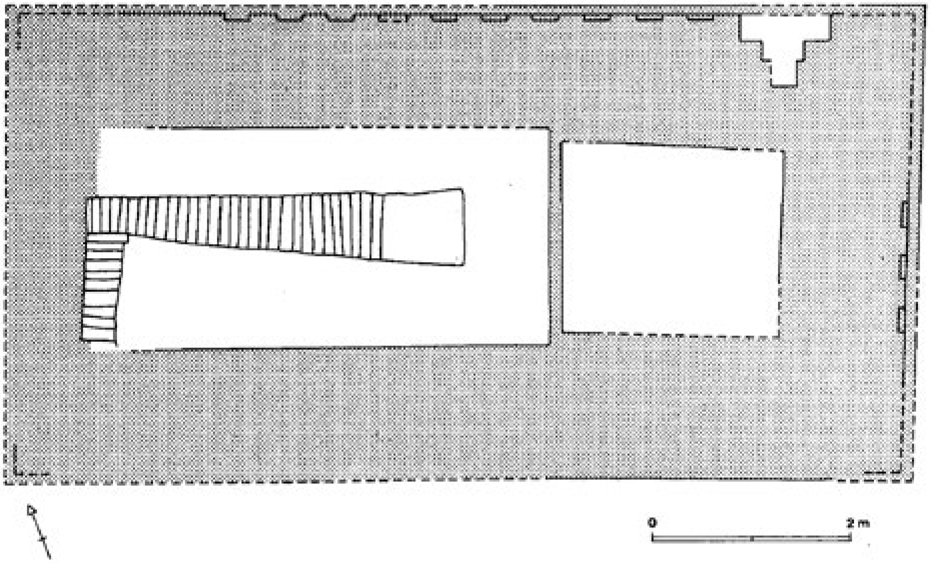

Figure 368 The mud-brick palace façade superstructure of tomb 274 at the rock necropolis in El-Kab with its two magazines and internal stair-shaft. The eastern magazine contained beer jars.
(Limme 2008, fig. 31)
Copyright L. Moelants, F. Roloux & MRAH, Brussels.

Figure 369 The mud-brick palace façade superstructure of tomb 274 atop the 50 m high Rock Necropolis at El-Kab. (Limme 2008, fig. 32) Copyright MRAH, Brussels.

The early Fourth Dynasty

Abusir

Two early Fourth Dynasty Type IIA-C tombs with superstructures are included in the catalogue from Abusir.[2388] The first is the solid mud-brick mastaba of AS 33 **[78]**, which Bárta describes as built on an 'irregular knoll'. Severely denuded today, its original height is unknown,[2389] although sufficient remains to identify a full length corridor on its eastern elevation that enclosed a cruciform chapel and a cult niche (Fig. 196).[2390] As with all large superstructures, its huge area would have helped hide the location of its stair-shaft's entrance and presumably the latter was concealed by bricking it over in the usual fashion. Nearby the slightly smaller Type IIA-C + IIA-C 'twin mastaba' AS 20 (Hetepi) **[77]** was built in a more unusual manner. Its 1–1.6 m thick outer mud-brick walls enclosed an inner wall of limestone 1–1.2 m thick, which offered the mastaba's interior extra lateral protection. This in turn surrounded the core's fill of limestone chips, sherds and sand, which protected and concealed the tomb's stair-shafts (Fig. 258). Externally, two independently accessed corridors were built within the superstructure's eastern face; the southern serviced a stone lined cruciform chapel, the northern led to a small rectangular chapel and a separate offering niche.[2391]

Although it undoubtedly protected its substructure for a while, the mud-brick mastaba of AS 33 suffered badly from the Late Period onwards and was used for the focus of animal cults and for their burials,[2392] whereas AS 20 fared better, perhaps because of its less 'diggable' limestone chip fill.

Section summary - Type IIA-C superstructures

The superstructures of the majority of Type IIA-C tombs protected and concealed their substructures and access routes in a similar way to their Type IIA predecessors with an assortment of infilled sand, gravel, mud-brick, and liquid mud cores retained and protected by their external mud-brick walls. In addition, the smaller plan and cross section of their new stair-shafts enabled the majority of them to offer far more effective protection than their Type IIA forerunners within the given area available.

[2388] Arguably, the Type IIC + IIA-C tomb of Ity is a candidate for this section, but the putative stair-shaft substructure was unfinished, and it is therefore included further on in the section below on Type IIC shaft tombs.
[2389] Bárta, Coppens and Vymazalová 2010: 57.
[2390] Bárta, Coppens and Vymazalová 2010: 60–1.
[2391] Bárta, Coppens and Vymazalová 2010: 6–10.
[2392] Nearly fifty pits with animal burials and bones were found dug into the mastaba's surface (Bárta, Coppens and Vymazalová 2010: 57).

Moreover, a different approach was taken with some high status tombs at Giza and Saqqara, which were protected by solid mud-brick mastabas, which not only defended their substructures, but additionally housed part of their stair-shafts, which were ultimately filled in and concealed from view. Concomitant with these developments, an overall noticeable increase in the space allocated to cult purposes is discernable, which perhaps reflects a change in the nature of the superstructure's role from part secure storehouse for grave goods, to part chapel for the reception of offerings.[2393] These changes may have brought security benefits in themselves, as the magical offerings painted on some of these chapel walls were less attractive to thieves than the portable wealth previously stored within the tomb and the superstructure itself.[2394]

6.2.3.5 The superstructures of Type IIC shaft tombs

The superstructures of many shaft tombs continued to be built as before, but new materials, necropoleis and emphases brought about noticeable changes.

The Second Dynasty

Helwan

Only two shaft tombs from the Second Dynasty are published from Helwan with superstructures, both of which are without plans, although on Saad's necropolis map there are three more that can be included in the discussion.[2395] It is evident from Köhler's excavation reports that both Op. 4/115 **[201]** (Fig. 370) and Op. 4/153 **[202]** had their shafts concealed and defended by their mud-brick mastabas,[2396] but whether their substructures were also protected by their footprints is not clear. However, the necropolis map (Fig. 252) shows that the footprints of the mud-brick superstructures of the Type IIC tomb 669.H.4 **[NIC]** and the Type IIC + IIC 'twin mastaba' 11.H.5 **[NIC]** did cover both their shafts and substructures. This was not always the case, as the largely unprotected burial chamber of tomb 666.H.4 **[NIC]**, which projected beyond the southern end of its mastaba, clearly demonstrates.

The Third Dynasty

Nazlet Batran

The superstructure of the Type IIC 'Inner Mastaba' at Nazlet Batran **[62]** is probably the earliest private superstructure to be built in Egypt entirely of stone (Figs. 260–1).[2397] Much enlarged in later periods,[2398] originally it

Figure 370 The Helwan Type IIC tomb Op. 4/115, whose shaft was completely protected by its overlying superstructure.
(Drawn by the author after Köhler 2008a, pl. I)

was 11.6 m long × 5.73 m wide × 2 m high and constructed of dressed sandstone blocks that surrounded an inner core of rough stones and filler fragments. Although its shaft's opening relative to its area was comparatively large and thus easily detected (see 5.1.2.5), the size of its footprint and the strength of its construction would have offered its shaft and substructure a considerable degree of protection from lateral attack.

Abusir

A large superstructure protecting the shaft of Mastaba AS 54 **[76]**, which is dated to the reign of Huni, has recently been discovered by Bárta. Similar to nearby AS 33, it is built entirely of mud-brick and has a corridor on its eastern face, which leads to a cruciform chapel at the south-eastern end. Exposed by tomb robbers, the shaft's entrance was at its northern end set 2 m down below its upper surface[2399] and presumably was once concealed by mud-brick.

Saqqara

Amongst the ninety Type IIC tombs listed by Quibell at Saqqara,[2400] forty-six are described as possessing superstructures (see Chart Q), but few details are recorded and we have to rely on later excavation reports to fill the gaps. As a result there are only eight examples included in the catalogue (Chart O). Most are 'twin' mastabas and amongst them S 3517 **[132]** was one of the largest.[2401] Approximately 55 m long × 25 m wide, its walls were about 2.5 m thick, with the exception of the eastern elevation, where they were increased to approximately

[2393] Hassan 1932: 5.
[2394] Grajetzki 2003: 14; Jánosi 2006: 25–6.
[2395] Saad 1951: Pl. III.
[2396] Köhler 2008a: 172; 2009: 284.
[2397] Kromer 1991: 42.
[2398] Kromer 1991: 16. It was subsequently added to during the Old Kingdom and expanded as further tombs were built against it (Kromer 1991: 18–41).
[2399] Bárta 2011a: 42–7.
[2400] Quibell 1923: *passim*.
[2401] Emery 1966: 6.

4.5 m to accommodate twin cruciform chapels (Fig. 202).[2402] The walls behind these were further reinforced to prevent access to and support the mastaba's enormous rubble core, which concealed and protected the tomb's small shaft entrances.

Similar in its simplicity, but half the size was S 3536 **[134]**,[2403] whose twin shafts were less well protected by 2.5–3 m thick palace façade mud-brick walls that enclosed a rubble core.[2404] The access routes of the slightly larger Type IIC + IIA-C S 3070 **[120]** were similarly defended, but at some point the superstructure was expanded by the addition of a palace façade to its eastern face and an external wall that created an internal corridor (Fig. 194).[2405] Similar Type IIC tombs with mud-brick walled superstructures, external corridors and assorted substructure combinations include S 2305 **[136]**, S 2464 **[133]** and S 3044 **[135]**, but details of their core fills are unavailable. Possibly the best defended superstructure of this type in the necropolis was that of S 3518 **[131]**, which was 52 m long × 19 m wide (Fig. 201). Its main 4.5–5 m thick mud-brick walls created a central subdivided void that contained its 'southern' shaft and at its northern end, purpose built magazines flanked the other shaft, all of which presumably were concealed and protected with rubble or gravel. Along its eastern face an external corridor led to the usual two sets of cruciform chapels and offering niches, but at the southern end a series of chapels were hidden deep inside the structure.[2406]

At the other end of the scale, a single small Type IIC tomb that lies adjacent to the Unas Causeway is included in the catalogue. At 5.7 m long × 3.3 m wide the solid mud-brick mastaba of M16 **[137]**, protected just a single shaft with its 19 m² footprint,[2407] thus providing the same type of protection to its substructure as its larger neighbours, albeit on a greatly reduced scale (Fig. 371).

That the cores of these mastabas were crucial in the protection of the substructures of these, and indeed all Type II tombs at Saqqara, can be drawn from Quibell's hypothetical reconstruction of the cemetery at the end of the Third Dynasty:

> 'Nearly all seem to have been robbed. Narrow shafts have been sunk through the top and though the sand is quickly filling many of these again, here in one large tomb that has been recently violated we can see the shaft still open. The tomb is twenty feet in height, but on the west side the sand has heaped itself up unhindered and we can walk up the slope to the platform on the top and examine it. It is roughly paved with stone which has been torn up at a point on the middle line and an irregular shaft with dangerously vertical sides has been sunk through the gravel filling. At the bottom we can see the portcullis still standing in position,…'[2408]

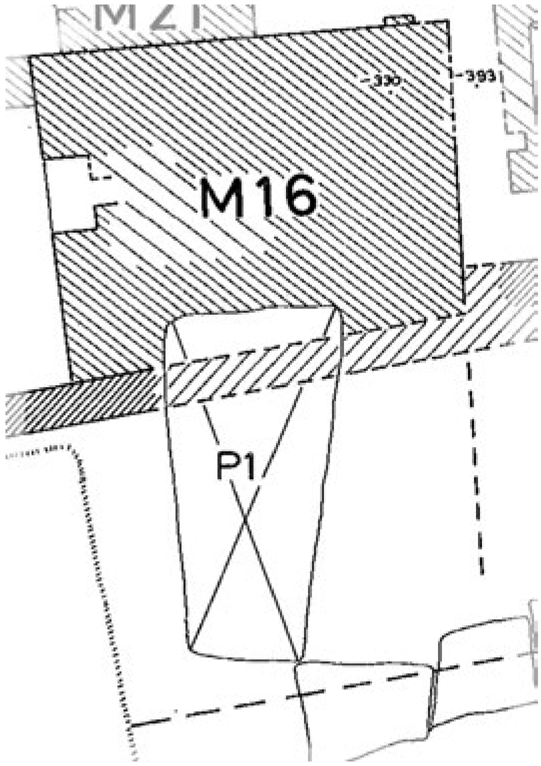

Figure 371 The remains of the solid mud-brick superstructure of the Type IIC tomb M16 at Saqqara, which probably concealed its underlying shaft totally with its 19 m2 footprint. (After Ghaly 1994: Abb.1) Courtesy of F. Arnold, DAI Cairo.

Helwan

The 56 m long × 27.4 m wide superstructure of the large Type IIC stone lined tomb 287.H.6 at Helwan **[204]** was, unusually, also constructed of stone (Fig. 203). Built of small limestone blocks, its exposed eastern face was battered,[2409] but its remaining walls were vertical and enclosed by a mud-brick wall between 3.2–6 m thick,[2410] whose exterior, Saad noted, was further protected by 'larger boulders and unshaped stones.'[2411] Although it is difficult to establish the nature of its inner core,[2412]

[2402] Scaled from drawing by Emery (1966: Fig 3).
[2403] Smith and Jeffreys 1977: 22.
[2404] Scaled from drawing by Smith and Jeffreys (1977: fig. 1).
[2405] Emery 1968: 11–3.
[2406] Emery 1970: 10, pls. XIX–XX; Jánosi 2006: 29.
[2407] Ghaly 1994: 59.

[2408] Quibell 1923: vii–viii.
[2409] Saad 1951: 3; 1969: 32.
[2410] Scaled from drawing by Saad (1951: Plan 2). Although Jeffreys and Tavares (1994: 154, n. 68) suggest following an examination of the structure that 'the stone structure was either left unfinished or stripped to within a course or two of foundation level and partly rebuilt in brick'.
[2411] Saad 1969: 32.
[2412] It is difficult to establish quite how this structure was built. Perhaps it resembled tomb AS 20 (Hetepi) **[78]** at Abusir, and consisted

we can be certain that its shaft and substructure would have been well protected from lateral attack by its large footprint, and that the former's entrance would have been difficult to find.

The early Fourth Dynasty

Abusir

Rather than a solid mud-brick structure, such as the earlier nearby tomb AS 54 **[76]**, the superstructure of the Type IIC 'Lake of Abusir tomb 1' **[80]** was, like its neighbours in North Saqqara, constructed of mud-brick with a filled core (Fig. 205).[2413] Its 1.5 m thick walls surrounded a fill of sand and rubble that protected the tomb's shaft, over which a skin of mud-brick may have been used to form a convex roof.[2414] Externally, a corridor was built on its eastern elevation that led to a cruciform chapel in the south-eastern body of the superstructure. Nearby, at Abusir South, the much larger superstructure of the Type IIC + IIA-C tomb of Ity **[79]** was built of stone to provide its substructure with extra security.[2415] Constructed in several phases, a rectangular outer wall of mortared limestone chunks 0.8–1 m thick was built first that enclosed a core of limestone rubble and sherds, which would have protected both the entrances of the tomb and its underlying substructure (Fig. 206).[2416] This was then enclosed in the second phase by a substantial niched mud-brick wall that housed a cruciform chapel in its south-eastern corner, and finally, the whole may have been roofed with a waterproof layer of *tafl.*[2417]

Dahshur

There are seven Type IIC tombs with superstructures from Dahshur in the catalogue **[205–11]**.

Most northerly is that of Mastaba no. 1 **[205]**, briefly described by de Morgan. He reported a large rectangular core of stones that was originally covered with a stone facing, which had been stripped in antiquity, leaving a shapeless mass in its place. Remains indicated that a mud-brick corridor had been built on its eastern face, which gave access to '*les stèles*'.[2418] Better reported is the superstructure of tomb DAS 9 (Ipy) **[206]** in Dahshur South (Fig. 208). Its heart consisted of a limestone core 17.95 m long × 9.2 m wide, surrounded by a Tura limestone cladding that also enclosed a cruciform chapel and serdab in its south-east corner, which was accessed via a mud-brick corridor on the mastaba's eastern face.[2419] Although a drawing is available of DAS 25–1 **[208]** (Fig. 372), little is known about its 4 m high large stone superstructure, except that its shaft was protected by a substantial stone core faced by a limestone cladding.[2420] Lastly, the Tura limestone clad superstructure of DAS 32-4 (Ii-nefer) **[207]** seems to broadly follow this arrangement.[2421] Though no complete plan is available, Barsanti's sketch of its east elevation shows that its shaft was protected within the body of the mastaba at some distance behind the south-eastern niche (Fig. 373).[2422]

The three remaining superstructures are from the 'Lepsius' mastaba field south-east of the Red Pyramid. The largest is Mastaba II/1 (Netjer-Aperef) **[210]**, whose approximately 5.5 m thick[2423] battered outer walls were constructed of concentric layers of first Tura and then local, limestone bonded with clay mortar (Fig. 211). Within them an inner core consisting of limestone chips, gravel, clay and soil protected the mouth of the tomb's shaft. The superstructure's original height can be estimated to have been around 4 m.[2424] The slightly smaller superstructure of Mastaba I/2 **[211]**, was similarly built, but with thicker 7 m wide walls of local limestone, clad with a mortared Tura limestone casing. In this instance they abutted directly against its stone lined shaft's mouth (Fig. 214) and the voids thus created at each end were filled with a rubble and *tafl* core.[2425] Lastly, on a slightly smaller scale, the superstructure of Mastaba I/1 **[209]** comprised of a 2.25 m thick stone retaining wall that had been plastered with *muna* (Fig. 210). Its inner core consisted of a mixture of *tafl* spoil from the substructure's excavation, building waste and desert sand, which both concealed and protected the tomb's shaft.[2426]

Perhaps because of the innate vulnerability of the friable underlying geology,[2427] it seems that all of these superstructures at Dahshur, like their substructures, incorporated a considerable amount of stone to protect them and their shafts from overhead and lateral attack. That this had been effective as a defence is evident because the majority of these tombs had instead been plundered via their shafts' entrances. On the other hand, this demonstrates the inadequacy of the concealment and protection of the mouths of the latter, despite their relatively small areas (see 5.1.2.5).

of a mud-brick clad stone wall containing an inner gravel fill, or alternatively was once, like the Inner Mastaba at Nazlet Batran **[62]** and the tomb of Ity at Abusir **[79]**, filled with a rough limestone core, but it is impossible to be certain.

2413 Bárta 2000: 335.
2414 Bárta 2001: 21–3.
2415 Bárta 2001: 5.
2416 Verner 1995: 80.
2417 Bárta 2001: 1, 4–5.
2418 de Morgan 1895: 8. He (1895: 9, fig. 6) also reported an identical superstructure in Mastaba No. 5 **[NIC]** with a chapel corridor and a 'T' shaped shaft.
2419 Alexanian and Seidlmayer 2000: 292–3; 2002: 3–5.
2420 Stadelmann and Alexanian 1998: 305–6.
2421 Stadelmann and Alexanian 1998: 303.
2422 Barsanti 1902b: fig. 1.
2423 Scaled dimension from drawing by Alexanian (1999: Abb. 11a).
2424 Stadelmann *et al.* 1993: 280; Alexanian 1999: 30.
2425 Stadelmann *et al.* 1993: 284–5.
2426 Stadelmann *et al.* 1993: 273–4.
2427 Jánosi 2006: 37.

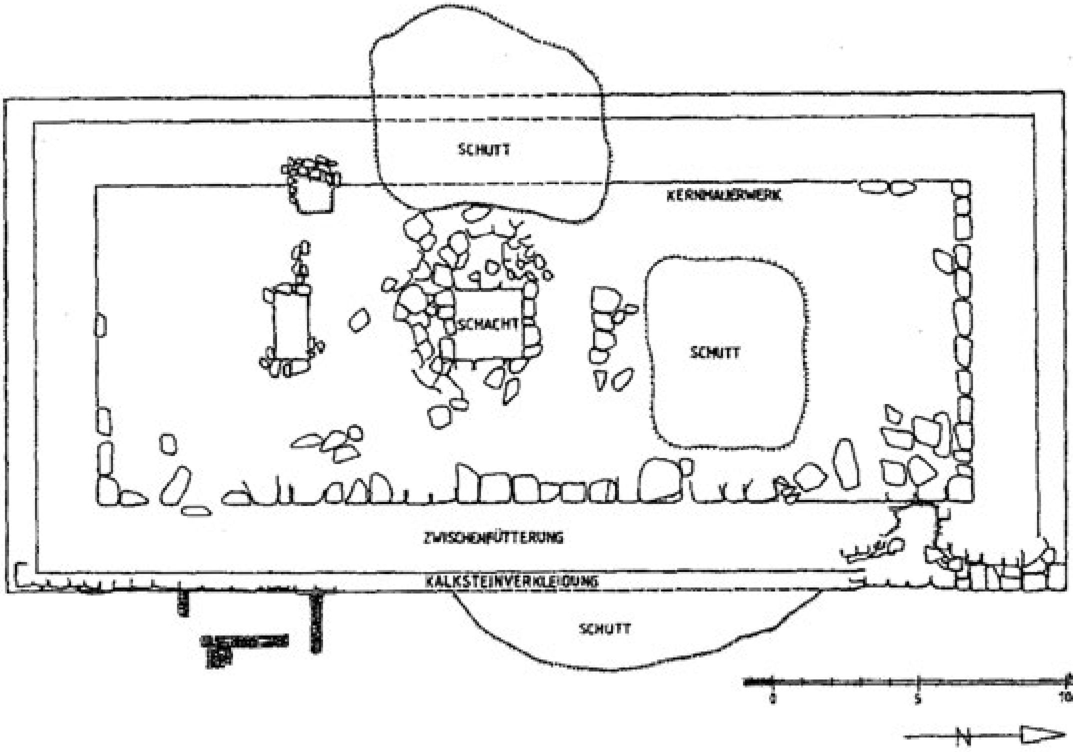

Figure 372 The limestone clad superstructure of DAS 25/1 at Dahshur South. (Stadelmann and Alexanian 1998, Abb. 5) Courtesy of the DAI Cairo.

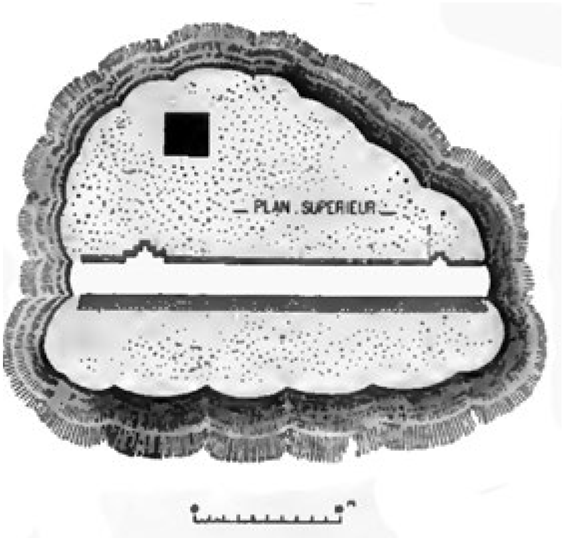

Figure 373 The remains of the superstructure of DAS 32-1 (Iinefer) at Dahshur South, drawn by Barsanti. (Barsanti 1902, fig 1)

Meidum

There are twenty-three Type IIC tombs from Meidum in the catalogue, but only six are associated with superstructures **[220–6]**; amongst those only four are sufficiently well reported to include in the discussion.[2428]

The largest of these is the solid mud-brick superstructure of the Type IIC + IIC 'twin mastaba' tomb no. 6, of Rahotep and Nefert **[220]**. Built in four distinct phases, the original inner mastaba was built of mud-brick reinforced with vertically placed logs 2.5–3 m long, which acted as wooden ties (Fig. 217).[2429] Within it two descending shafts were formed that joined with their underlying rock cut counterparts and led to their burial chambers. On its eastern face a stone lined cruciform chapel in the south was matched by a smaller offering niche in the north.[2430] An extension was added to this completed structure on the northern end, and over that a further two skins of brick on all four walls, which concealed and protected the cruciform chapel,[2431] and its celebrated statues until their discovery in the 19th Century.[2432] Therefore in its final form it reached 82.5 m long × 42 m wide,[2433] and possibly 9–10 m high,[2434] thus offering both its

[2428] The Type III + IIC tomb of Nefermaat and Atet **[251]** is included in the next section on Type III tombs.

[2429] Spencer 1979: 29.

[2430] Petrie 1892: 15–6.

[2431] Reisner 1936: 223; Harpur 2001: 48–51.

[2432] For the discovery of the cruciform chapel and statues of Rahotep and Nefert, see Daninos-Bey 1886: 69–73.

[2433] The dimensions are Reisner's (1936: 223) interpretation of Petrie's (1892: 16) measurements, which Harpur (2001: 50) agrees with. See Harpur 2001: 48–51 for a detailed analysis of the building phases.

[2434] Although Petrie (1892: 15) recorded a height of 6.6 m (260 inches) excluding the missing gravel top of the mastaba, he later wrote (1892: 17), of cutting through '25 feet of the mastaba' (7.62 m) when describing his exploration of its northern extension. This and Rowe's drawing in Reisner (1936: fig. 110) of the shaft of Nefert, which scales at 9 m from the top to the underlying 'pebbles', suggests if around 1 m is allowed for the gravel, as with the nearby tomb of Nefermaat and Atet, that the original height of the superstructure could have been in

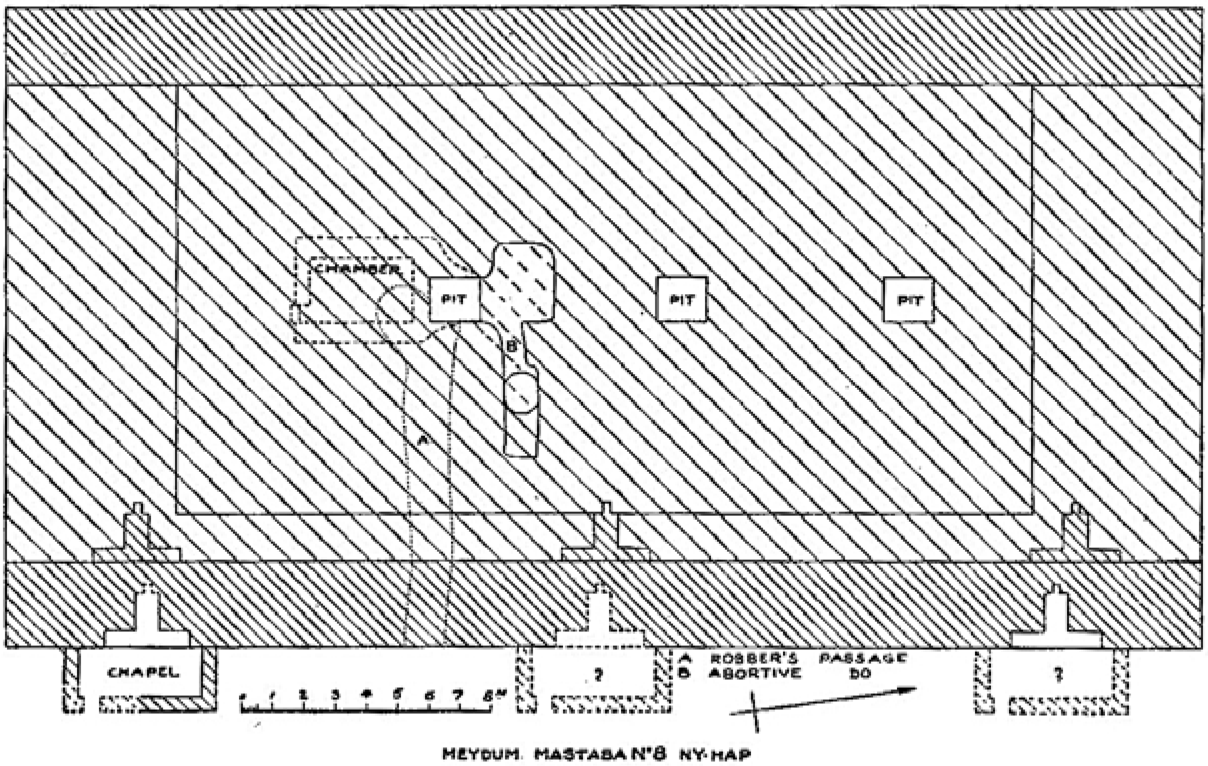

Figure 374 The superstructure of the Type IIC + IIC + IIC Mastaba no. 8 at Meidum. The robbers' tunnel 'A' into the burial chamber is marked on the plan.
(Reisner 1936, fig. 118)

shafts, substructures and chapels an exceptional level of concealment and protection; illustrated by Petrie's comments on Mariette's early attempts to find the shaft:

> 'The central pit of the mastaba had been furiously searched for by Mariette's men; they dug vast holes in the brick body, but never cleared the top; and a trench of theirs cut away one side of the well, without their seeing it.'[2435]

Similarly built of solid mud-brick, the Type IIC + IIC superstructure of Ranefer, no. 9 **[221]** was smaller at 57 m long × 33 m wide.[2436] It too protected its internal descending shafts with at least 7 m of encompassing brickwork before they married with their rock-cut lower sections,[2437] but was further covered by a 1.5 m layer of gravel on its roof. Twin stone lined offering niches were built on its eastern side, in which Petrie discovered a robbers' tunnel leading from the chapel of Ranefer, via which his burial chamber had been robbed.[2438] The route chosen demonstrates both the dangers of permitting access into a chapel within a mastaba, and the familiarity of the robbers with the tomb's layout. The solid mud-brick superstructure of the nearby Type IIC + IIC + IIC, tomb no. 8 **[225]** was similarly designed, but smaller,[2439] and protected its three internal shafts for a depth of approximately 4.95 m before they disappeared into the underlying bedrock (Fig. 374).[2440] Confirmation that these were well hidden is given by Petrie, who noted the difficulty of locating the mouth of the middle shaft as, 'it was covered with a thick coat of brickwork'.[2441] Exceptionally the superstructure of the Type IIC + IIC tomb no. 7 **[223]** was built with 1.75 m thick mud-brick walls, like its contemporaries at Saqqara and Abusir,[2442] which surrounded a core of 'stone chips' that protected and concealed its unusually located shafts (Fig. 221).[2443] Externally it was faced with a corridor that enclosed its offering niches on its front elevation. Petrie described how effectively its core had concealed its shafts, 'No trace of a well could be found, although we trenched three lines all the length of it, down to solid rock.'[2444]

the order of 9–10 m.
2435 Petrie 1892: 16.
2436 Reisner 1936: 223.
2437 Scaled from Rowe's drawing (in Reisner 1936: fig. 111) of the shaft of Ranefer's spouse.
2438 Petrie 1892: 17.
2439 Reisner 1936: 223.
2440 Rowe's drawing of the southern shaft (in Reisner 1936: fig. 109) scales at approximately 4.2 m and Petrie (1892: 18) gave a dimension of 195 inches or 4.95 m.
2441 Petrie 1892: 18.
2442 Scaled dimension from Reisner (1936: fig. 112).
2443 The shafts were at the opposite extreme ends of the superstructure, see 5.1.2.5.
2444 Petrie 1892: 20; Reisner 1936: 224.

Naga el-Deir

Although three Type IIC tombs with superstructures are known from Cemetery 500–900 at Naga el-Deir, only two are sufficiently recorded for discussion.[2445] The shaft and substructure of N 739 **[313]** was protected by a mastaba that had been built after the burial was installed (Fig. 227). Consisting of a 0.75 m thick retaining mud-brick wall surrounding a gravel core, it reached a height of perhaps 1.5 m and had been roofed in brick.[2446] Nearby, the shafts and substructure of the 'twin' mastaba N 546 + N 604 **[314]**[2447] were defended by a superstructure whose walls were only 0.3 m thick;[2448] it too was filled with gravel, but bearing in mind its smaller size and larger number of shafts, it would have offered less protection than found in N 739.

Reqaqnah

Unlike its earlier Type IIA neighbours, which relied on a filled core for their protection, the shaft of the tomb of Shepses, R 64 **[318]** was protected and hidden by a solid mud-brick superstructure 10 m long × 4 m wide that when excavated, still stood about 1 m high. Externally, its battered walls incorporated a cruciform chapel and secondary offering niche on its eastern face.

Abydos

The shafts and substructures of the Type IIC + IIC tomb, D135 + D136 **[328]** were protected by a substantial superstructure with strong mud-brick walls approximately 1.75 m thick.[2449] Although no core material was recorded, presumably the usual sand fill was used, as in the other mastabas at this site,[2450] and the whole bricked over.[2451]

El-Kab

Of the three Type IIC tombs in the catalogue from El-Kab with superstructures, two can be included in the discussion. The internal core formed by the substantial 3 m thick[2452] external walls of Mastaba 'A', the tomb of Kamena **[345]**, was internally divided around the shaft's mouth by cross-walls, which were filled with what Quibell described as 'brick earth' that presumably would have hidden and protected the shaft's entrance (Fig. 228).[2453] Although the mastaba's walls were surrounded by an enclosure wall, it is not clear if this fully enclosed the structure's two offering niches on its eastern face. Nearby Mastaba 'D' belonging to Nefershem **[346]**, which was of a similar form and size, had its core filled with the same material, but its external mud-brick walls were around 1 m thicker.[2454]

Section summary - the superstructures of Type IIC shaft tombs

The basic designs of the superstructures of the Type IIC tombs from the Second Dynasty at Helwan, the Third Dynasty tombs at Saqqara, and those of the early Fourth Dynasty at Naga el-Deir, Abydos and El-Kab continued along the same lines previously established for Type IIA and IIA-C tombs at the major sites. They still relied on the footprints of their superstructures to protect their substructures and access routes from lateral tunnelling, and retained thick mud-brick walls filled with assorted cores to protect their shaft entrances, portcullis emplacements and substructures from above. Contemporary with these, a few solid mud-brick examples were built at Abusir and Saqqara in the Third Dynasty and Reqaqnah in the Fourth. However, whatever their method of construction, overall the smaller size of their shafts' entrances and cross sections meant that relative to their size, all of these superstructures could now conceal their access routes more efficiently than their predecessors with stairways and stair-shafts.

Also in the Third Dynasty, perhaps following the royal precedent, the first stone cored superstructures appear at Nazlet Batran and Helwan, which provided their substructures and access routes with an increased level of protection from overhead attack. This precedent was soon followed in the superstructures of the early Fourth Dynasty tombs at Abusir South and Dahshur, whose extensive use of stone also increased their lateral and overhead defences, dependent on their individual designs. Concomitantly, in a separate line of development, the enormous solid mud-brick superstructures at Meidum continued to expand on the tried and tested designs of their predecessors at Giza, Saqqara and Beit Khallaf; now partially housing their shafts within the main body of their mastabas, where their entrances were sealed and concealed from view.

6.2.4 Superstructures over Type III tombs with sloping corridors

The early Fourth Dynasty

Meidum

Amongst the nine Type III tombs in the survey, all are found at Meidum and are dated to the early Fourth

[2445] The other tomb is N 629 **[312]**, but there are few details and no drawing.
[2446] Reisner 1932: 248.
[2447] Reisner 1932: 208 and 231.
[2448] Scaled from drawing by Reisner (1932: fig. 161).
[2449] Scaled dimension from drawing by Peet and Loat (1913: Pl. XV).
[2450] Peet and Loat 1913: 8–9.
[2451] Although Peet and Loat (1913: 9) speculated whether the shafts may have been left accessible for future burials, which seems rather unlikely.
[2452] Scaled from plan by Quibell (1898: pl. XXIII).
[2453] Quibell 1898: 3.
[2454] Quibell 1898: 5.

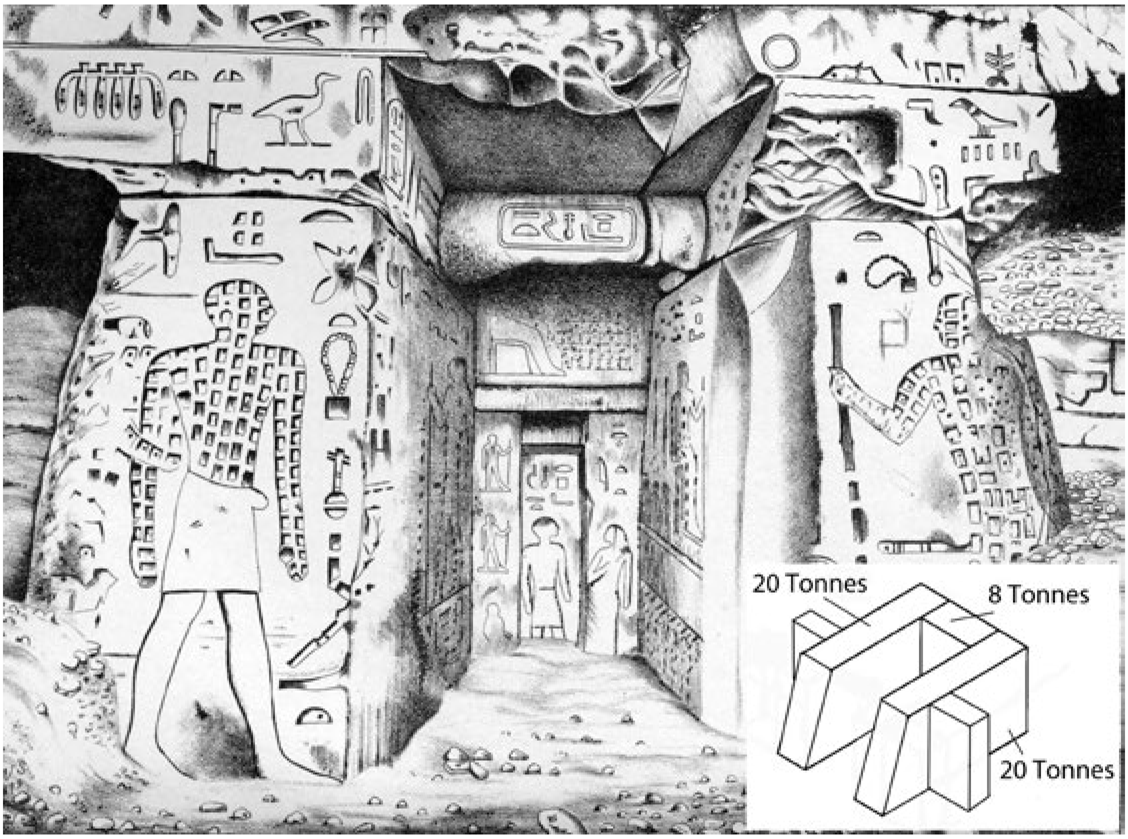

Figure 375 The enormous decorated stone monoliths lining the chapel of Nefermaat in the mud-brick superstructure of tomb no. 16 at Meidum with inset, a sketch showing the approximate weights of the slabs. (After Villiers Stuart 1879, pl. H and Harpur 2001, fig 41)

Dynasty. However, only two of these have superstructures that are sufficiently well published to be included.

The first of these is the enormous Type III + IIC tomb no. 16 **[251]**, which belonged to Nefermaat and Atet. At 120 m long × 68 m wide[2455] and possibly up to 10 m high,[2456] its superstructure is by far the largest of any private tomb included in the catalogue and in Old Kingdom Egypt.[2457] It was built in several phases, the first stage consisted of a mud-brick walled mastaba, whose substructure and access routes were protected by a core of successive layers of liquid mud, which had been poured over time.[2458] Once dried these had set like concrete and provided a high degree of protection, as Petrie described:

> 'The material of hard dried mud was very difficult to examine, as it could scarcely be broken, and the included flints made it wear away chisels quicker than cutting limestone rock.'[2459]

Built into this mastaba's eastern face were two 'U' shaped chapels that were lined and faced with enormous orthostats, the southernmost of which was formed from slabs that weighed between 8–33 tonnes (Figs. 215 and 375).[2460] Although these decorated components were undoubtedly a demonstration of the tomb owner's high status,[2461] it is reasonable to suggest that they may also have had a defensive function, judging by the robbers' tunnels that led from them.[2462] During the mastaba's subsequent enlargement, external access to these chapels was first limited and then stopped altogether as the structure developed.[2463] When completed, the superstructure's roof, according to Petrie, was then covered with 1–1.5 m of sand and gravel intended to

[2455] Reisner 1936: 222.
[2456] Harpur 2001: 37.
[2457] Bárta 2011b: 132.
[2458] Petrie 1892: 14. Layers of aeolian sand between the successive coats of mud demonstrate that the structure took some while to build and that the coats were allowed to dry between them (El-Khouli 1991: 23).
[2459] Petrie, Mackay and Wainwright 1910: 4.

[2460] Petrie (1892: 14–5) reported that the rear wall of the chapel of Nefermaat weighed approximately 8 tonnes, the two side walls 20 tonnes each and the roof a remarkable 33 tonnes. These were removed in 1909 (Petrie *et al.* 1910: 4–5) and now form the entrance, albeit not in their original form, to Room 42 in the Cairo Museum. However, Villiers-Stuart's (1897: Pl. G) earlier drawing (Fig. 375 in this work) shows the slabs still in situ.
[2461] Harpur 2001: 26–9.
[2462] One tunnel led from the southern chapel of Nefermaat 22.8 m north-west towards the axis of the mastaba and another from the southern chamber of the northern chapel of Atet (Petrie 1892: 2 and 14; Harpur 2001: 42).
[2463] Petrie (1892: 14–5) proposed three phases of development, whereas more recent research by Brock (in El-Khouli 1991: 23–4) suggests only two phases, see Harpur 2001: 35–44 for an in-depth discussion of this topic.

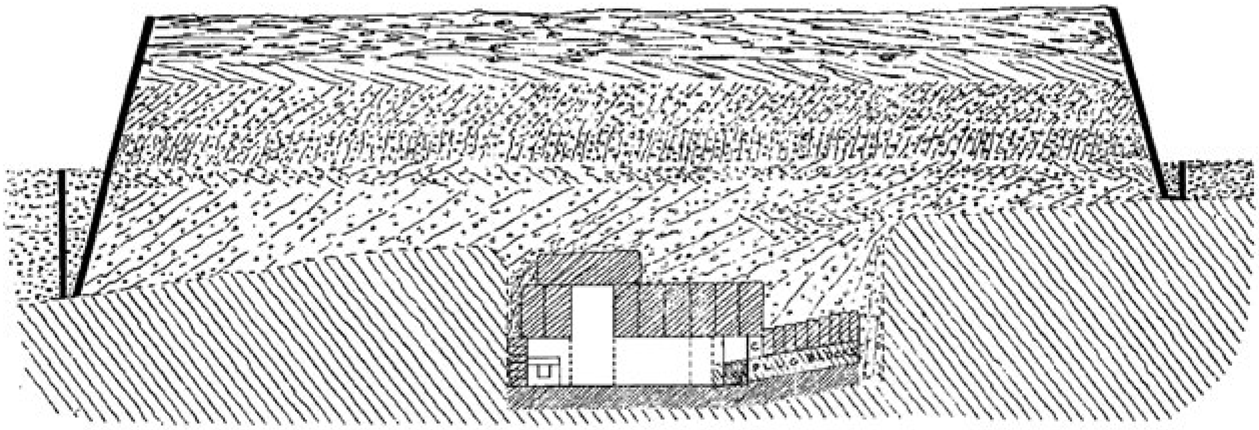

Figure 376 Cross section through Mastaba No. 17 at Meidum. Overlying the substructure already built in its rock-cut pit, the structure was built in a larger overlying pit cut in the gravel, which went down to the bedrock for security and stability. The core consisted of 100,000 tonnes of gravel poured in layers and bounded by mud-brick walls. (Petrie *et al.* 1910, pl. XII)

soak up rain.[2464] Petrie's description of his search for the tomb's shafts demonstrates the effectiveness of the huge bulk of this superstructure at protecting its substructure:

> 'I endeavoured to find the well, or entrance to the chamber, during some weeks of work. The top coat of gravel was removed, and the mud body tested from end to end all along the axis; in the middle, around which Mariette's men had made some wide digging, I cut down to about 20 feet deep, and at the northern part in the axis, behind the north door, I also went down 20 feet deep. But only the same layers of Nile mud were found. I also cleared the N. end down to the ground, but found no trace of an entrance.'[2465]

In fact the pit containing the burial of Nefermaat was only discovered in Petrie's second excavation at Meidum some nineteen years later, after around seven weeks of excavation by Wainwright,[2466] who had discovered the shaft of Atet a little earlier.[2467] Their efforts revealed that despite the ample protection offered by the mastaba, the burials had been robbed well before the latter's completion (see 4.2.3).

The second largest superstructure at Meidum is that belonging to nearby Mastaba 17 **[252]**, whose defensive architecture took a different approach. First, a huge pit was dug down through the level desert to the sloping bedrock below, which was then lined with a mud-brick retaining 'box' wall. This allowed the mud-brick walls of the 103.05 m long × 51.6 m wide[2468] superstructure both to be erected within it directly on strong foundations, and enabled its battered sides to be built at the correct angle from an unlevel footing (Fig. 376).[2469] Once the substructure had been sealed, the superstructure's core was filled with layers of limestone chips and marl that were retained by a series of stone cross-walls to ensure stability.[2470] Petrie estimated there was 100,000 tonnes of this material,[2471] and its effectiveness at concealing its substructure was confirmed by his attempts to find it:

> 'I had already scraped off the surface of the mastaba on the top all along the middle, down to clean firm chips, to search for a well, but in vain. I then sank a large square pit with winding stairway, in the axis of the mastaba, reaching from about the middle to near the latitude of the N. end of the facade. This pit we carried down to 48 feet under the top - a considerable work; but we neither reached a central chamber, nor any passage leading to the chamber, as I had hoped we might have done.'[2472]

Eventually Petrie discovered the location of the substructure by sinking a deep shaft behind the false door,[2473] but because of the danger posed by the enormous quantity of loose material, could only proceed further by trenching through the east wall of the mastaba (Fig. 377).[2474] Wainwright summed up the hazards in his report:

> 'It proved a hard and long job to open No. 17, for we had to dig the great pit shewn in pl. x, as it would have been dangerous for the men to work in any

2464 Petrie 1892: 14.
2465 Petrie 1892: 14.
2466 Petrie, Mackay and Wainwright 1910: 18; Harpur 2001: 18.
2467 Petrie, Wainwright and Mackay 1912: 25–6.
2468 Reisner 1936: 221.

2469 Petrie 1892: 11–2. See also, Isler 2001: 208–9, for a detailed discussion of the method used by the builders to survey and then construct this feat of civil engineering.
2470 These were probably the spoil from the excavation and building of the nearby pyramid (Petrie, Mackay and Wainwright 1910: 13).
2471 Petrie, Mackay and Wainwright 1910: 3.
2472 Petrie 1892: 13
2473 Petrie 1892: 14.
2474 Petrie, Mackay and Wainwright 1910: 3, 13.

Figure 377 The 'great pit' in Mastaba 17 at Meidum, which was created by Wainwright to enable his men to work safely within its 100,000 tonne loose gravel core. (Petrie *et al.* 1910, pl. X, 3)

> smaller space, owing to the continual fall of chips, which would have blocked a smaller pit.'[2475]

It is clear that this superstructure, like that of Nefermaat and Atet, provided an unrivalled level of physical protection for its substructure, as is evident from the route chosen by the tomb's robbers (see 4.2.3), who were undoubtedly fully aware of the impregnability of its defences and circumvented it accordingly.

Section summary – The superstructures of Type III tombs

The superstructures of the two tombs discussed at Meidum not only relied on their bulk and enormous footprints for their defence, but also depended on the different material properties of their inner cores. One utilised the resistant properties of its hardened mud, which would have impeded any digging due to its density, whilst the other took advantage of the hazards presented by its vast quantities of free flowing aggregate. In addition, neither possessed an external access route to compromise their security. Their protective architecture therefore was on the one hand successful, as was demonstrated by the frustration of later excavators, but on the other hand it was effectively a failure, as these very properties had driven well informed tomb robbers to entirely circumvent the defences of both structures in antiquity.

6.3 Conclusion

Royal tombs

From the reign of Hor-Aha onwards at Umm el-Qaab, the roofed pit that formed the royal substructure during the First Dynasty was protected from the attentions of tomb robbers by a tumulus created with the sandy spoil from the tomb's excavation. This ephemeral mound would have deterred attacks from above with its fluid mass and from the side with its protective footprint. Before long it was probably made more permanent by encasing it in mud-brick, thus creating both a stronger defence for its substructure and a more formalised monument. The superstructure was arguably less essential for the security of the rock-cut subterranean royal tombs of the Second Dynasty at Saqqara, but its use was probably retained for protective and monumental purposes. However, with the return of the royal necropolis to Abydos towards the end of the dynasty, the protection of the superstructure once again became vital for the more vulnerable pit graves dug in the sand of Umm el-Qaab, where the mastaba of the final king of the dynasty, Khasekhemwy, was made even more secure by being clad in stone.

At the beginning of the Third Dynasty, the desire for greater security and permanence for the royal tomb was realised in the construction of the mastaba of Djoser at Saqqara, which was now built entirely of stone. Already well defended from lateral attack by the protective footprint of its strengthened superstructure, the limited overhead protection offered to its underlying shaft was increased significantly by adding further layers to create the first step pyramid. The innovative form thus created was then built upon and expanded, in order to shelter the remainder of its extensive substructure with a protective and distinctive 'carapace' of stone. The immediate success of this new structure in both its defensive and monumental roles, is demonstrated by the adoption of the step pyramid for the tombs of Djoser's successors at Saqqara and Zawiyet el-Aryan. At the end of the dynasty, with the building of the Brick Pyramid of Abu Roash, the defensive role of the royal superstructure became even more important, as its mass now directly protected a ground level burial chamber and its new raised access route as well. In the early Fourth Dynasty, these security

[2475] Petrie, Mackay and Wainwright 1910: 13.

features were retained within the three stone pyramids of Sneferu that followed. Their new forms at Meidum and Dahshur reflecting an evolving material technology that was both coping with changing concepts of royal monumentality, while being built on unsound geology; but whose basic function, despite differences in size, architecture and significance was, like the original tumuli of the kings at Umm el-Qaab, essentially to protect the royal burial.

Private tombs

The primary function of the superstructures of private tombs, besides acting as a marker for the burial and as a focus for the cult of the deceased, was to protect their vulnerable substructures from overhead and lateral attack by tomb robbers. To do this during the First Dynasty, the great majority of elite Type I tombs had their roofed pits protected by superstructures. These were built with fortress like external mud-brick walls that were filled with suitably resilient cores, although in some high status tombs at Saqqara, the latter were often replaced by well endowed magazines to provide for their owners' afterlife. In the majority of cases, the protection offered to the underlying pit substructure was determined by the strength and mass of its superstructure and the width of its lateral protection, which was dependant on the size of its footprint overhang.

In the second half of the First Dynasty, with the introduction of the external access route in Type ID tombs, while the role of the superstructure remained essentially the same, to these functions was sometimes added the partial protection of both stairwell and portcullis emplacements. However, at the end of the dynasty, presumably because of security concerns, this protection was increased in a few tombs at Saqqara and Helwan by concealing their stairways in their entirety beneath their superstructures. In all probability for the same reasons, the use of the superstructure's core as a storehouse fell into decline and was instead increasingly dedicated to the substructure's defence, while concomitantly, its exterior's importance as a focus for the tomb owner's cult was on the ascent.

With the introduction of Type II subterranean substructures, a major change in the defensive priorities of the superstructure occurred, despite its physical similarity to those of its predecessors. In the majority of Type II tombs the superstructure's most important defensive role was now the security of the access route and its portcullis emplacement, as the substructure itself, no longer requiring a constructed roof, was protected by its encompassing geology. This meant that its prior reliance on its superstructure's mass and footprint for overhead and lateral defence became less critical, although it undoubtedly still had an important role to play. As some Type IIA tombs went deeper for greater security, their stairwells necessarily grew longer, and their superstructures' cores were often enlarged to conceal the formers' bigger plans and sections from attack. However, amongst those tombs that adopted Type IIA-C stair-shaft and Type IIC shaft access routes, the level of security provided to them by their superstructures correspondingly increased, as their smaller plans and sections were easier to conceal from overhead and lateral *sondage*. The extra space that resulted then permitted more room to be dedicated to cultic functions, a development that was to reach its climax in the multi-roomed mastabas of the Fifth and Sixth Dynasties.

Moreover, in a separate line of development in high status tombs of the Third Dynasty at Giza, Saqqara and Beit Khallaf, the use of mud-brick *massifs* to both shelter the substructure and its access route, presaged their further development during the reign of Sneferu. As at Meidum, where the substructures and access routes of the Type II and III tombs in the necropolis relied on huge mastabas filled with solid mud-brick, or an impenetrable gravel or liquid mud core for their protection. Elsewhere at Nazlet Batran, Abusir, Dahshur and Helwan, the inclusion of stone in the architecture of the superstructures of the elite Third and Fourth Dynasty Type II tombs at those sites, brought with it the benefits of stone's greater resistance to penetration compared with mud-brick. However, even stone failed to provide total protection for their shaft or stairway entrances, which remained the inveterate weak spot in the superstructures of all Type II tombs.

It can be seen, therefore, that the mass and footprint of the private superstructure provided a defence for its substructure, and the latter's access route when present. It also acted as a visible memorial and the focus for the tomb owner's cult. Despite alterations to its architecture over time, in response to its substructure's changing format and the evolving cultic functions demanded of it, the superstructure still remained the first line of protection in a tomb's battery of defences. The effectiveness of these measures being determined by the superstructure's size, core and strength of construction; yet remaining inexorably linked to its substructure's design, access method and surrounding geology.

This chapter has established that during the period concerned, despite shifting emphases to its monumental and cultic role, the primary function of the evolving architecture of the Egyptian tomb superstructure, both royal and private, remained that of protecting its associated burial.

7. Conclusion

The aim of this book was to undertake an in-depth examination of the architecture of tomb security in Egypt from the Predynastic Period until the end of the reign of Sneferu, in order to establish the protective measures that had been taken to defend the tomb. At the same time my research investigated the influences these measures had upon the design of royal and private tombs during the period concerned. These security features were examined diachronically from the Late Palaeolithic until the end of the Predynastic Period, and a thematic analysis of the main architectural elements of the Egyptian tomb from the Early Dynastic Period onwards was undertaken. In doing so the study has contributed new information about the defensive methods employed, while analysing the reasoning behind their use. As a result, my research has demonstrated that many of the architectural features of the Egyptian tomb, while undoubtedly adapted over time to suit changing requirements, tastes and ideologies, were originally the result of the need to protect the tomb and improve its defences, rather than the initial consequence of religious or monumental considerations.

7.1 Findings and conclusions of this research

Early responses to tomb robbery

The architecture of the earliest tombs was examined in Chapter 3 to assess if there was any evidence of efforts being made to defend them. The study found that measures were being taken to protect the grave from the earliest times and that there was evidence that tomb robbery was commonplace in Egypt from the Badarian Period onwards, especially amongst higher status burials. In response to these depredations, simple security measures were employed during this period and Naqada I, which used vegetative materials, such as wood branches, twigs, reeds, and matting to reinforce or support the backfill, and perhaps an ephemeral mound of soil over the whole to protect the underlying grave. Furthermore, by Naqada II, the desire for greater storage for funerary goods had led to elite graves with deeper pits, whose sides were consolidated with mud-brick and supported wooden roofs for overhead protection. However, their roofs could often be tunnelled under by tomb robbers, due to their lack of depth and weak surrounding geology. During the Naqada IIIA period, as a reaction to this problem and continued pillaging, it was suggested that the roofs of some high status tombs were now made deeper to increase their overhead and lateral defences. Alternatively, at a few sites, slabs of stone replaced them for better protection. To exploit the surrounding geology for defence, the first pit tombs with loculi were introduced, which provided natural overhead protection and concurrently heralded the introduction of the earliest stone blockings. This coincided with the emergence of more permanent aboveground defences for the substructure, which in Egypt took the form of mud-brick superstructures, whose introduction presaged future developments in the dynasties to come.

Therefore, it is manifest that many of the elements of early tomb architecture, which were incorporated in the tombs of the Early Dynastic Period and beyond, had developed as a result of the search for improved security during the Predynastic Period, or even earlier.

Chapters 4, 5 and 6 thematically analysed the security architecture of the rest of the defined period under the headings: burial chambers, access routes and their blockings, and superstructures. These chapters revealed a complex pattern of interrelated development between the security features under discussion, which over the dynasties sometimes ran in parallel and sometimes diverged, overlapped, dwindled and re-emerged, or simply vanished altogether. The complexity of this situation can be illustrated by a flow-chart (Fig. 378), which diachronically traces these convoluted developments and assists as a visual aid in this conclusion.

Securing the substructure

The examination of the architecture and security of the burial chamber in Chapter 4 made it clear that at the beginning of the Early Dynastic Period, like their Predynastic forerunners, the majority of both royal and private substructures were still lined and roofed pit tombs. In order to make them secure, a wide variation of architectural solutions had been developed, which were usually contingent upon the surrounding geology, the status of their owner, and the material resources available. They were typically reinforced with mud-brick of varying thicknesses, or less frequently liners of wood or stone, and were closed with a wooden roof or backfill that was either secure in its own right, or capable of supporting a superstructure. Though it was evident, from the numerous robberies in these tombs that their substructures remained susceptible to overhead and lateral attack. These had occurred, despite sometimes complex reinforcements or changes to the tombs' positions or axes, because of their shallow depths and vulnerable roofs.

This study showed that in response to these threats, entirely subterranean substructures had been introduced in the latter half of the First Dynasty, which were almost universally adopted from the Second Dynasty onwards,

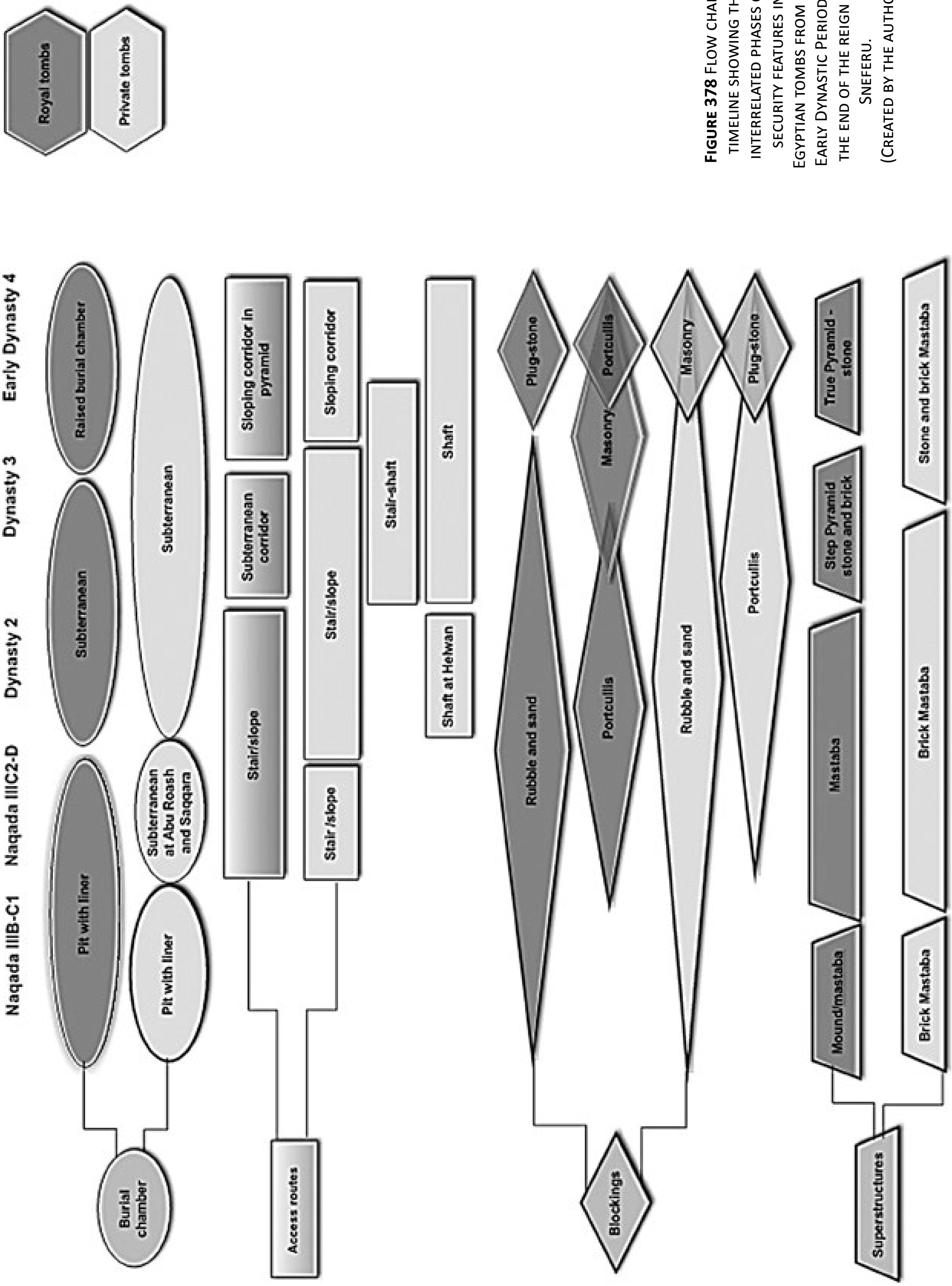

FIGURE 378 FLOW CHART/ TIMELINE SHOWING THE INTERRELATED PHASES OF SECURITY FEATURES IN EGYPTIAN TOMBS FROM THE EARLY DYNASTIC PERIOD TO THE END OF THE REIGN OF SNEFERU. (CREATED BY THE AUTHOR)

in both royal and private tombs. No longer reliant on a built roof or backfill, the effectiveness of these unlined substructures was determined by the density of the surrounding matrix and the depths of their cover, which in royal pyramids of the early Third Dynasty was often tens of metres. However, the many robbers' tunnels at sites like Helwan confirmed that in areas with weak geology, alternative solutions were needed. An answer to this problem was revealed from the analysis of the substructures of the Third and early Fourth Dynasties, where it was demonstrated that an increased expertise in stone engineering meant there was no longer a need for the tomb-builders to rely on just the immediate geology for protection. This was evident both in the magnificent corbelled stone burial chambers of the tombs of King Sneferu, which rather than being set deep underground in the friable rock, were now raised up into the core of his pyramids, and in the burial chambers of the tombs of the private necropoleis that accompanied them, whose stone linings were designed to compensate for the weak surrounding ground.

Although these developments progressively improved their burial chambers' security, it was clear that their resulting impregnability often forced their plunderers to take a different approach, which was usually via the access route.

Protecting the access route

Chapter 5.1 reveals that the introduction of external access routes in the First Dynasty permitted a tomb to be completed before its owner's demise, but brought concomitant problems, as these too required defending and concealment. To protect these new stairways, their positions and axes were frequently varied to avoid detection, and in weaker geologies, they were often reinforced and roofed. Despite these measures, they remained vulnerable and as a result, by the end of the dynasty, the stairways of a few private tombs were concealed under their superstructures to protect them from attack.

This study highlights that with the advent of the more secure subterranean substructure towards the end of the First Dynasty, the stairway's security became even more vital, as it was now was the only practical way into the tomb. Furthermore, during the Second and Third Dynasties, while the descents of some tombs remained external, for better protection many of them were now brought within the perimeter of their superstructures. Although amongst these, as substructures were dug deeper for greater security, their connecting stairways often grew longer and thus needed changes in direction to permit them to fit, which paradoxically made it easier to locate their positions by *sondage*. To solve this problem the stair-shaft was introduced, whose reduced profile and plan allowed even greater depths to be reached within its mastaba's span, and thus increased the substructure's protection. Moreover, it was clear that to improve the access route's security even further, the vertical shaft was now widely used, because its small plan and cross-section were not only harder to locate, but once found more difficult to negotiate. Indeed, its resultant success as a secure access route was confirmed by its extensive adoption for the next 2000 years.

The investigation shows that by the Third Dynasty the access routes of royal tombs had taken a separate path of development and adopted the subterranean descending corridor, which was protected by its pyramid complex and entirely concealed from view. It was noted how in the tomb of the last king of the dynasty, in a change of approach to improve its security, the entrance was raised up in the face of his brick pyramid and made inaccessible; its descent now protected by the pyramid's mass and a passage of stone. Furthermore, this approach was retained in the three pyramids of Sneferu that followed, whose concealed and unreachable entrances now led to descending corridors almost completely enshrouded in stone; their cross-sections progressively smaller for greater security, and their architecture and gradients specifically designed to accommodate their new plug-stones. The effectiveness of this feature, as I proposed, was signalled by its widespread adoption in the majority of royal tombs, and less frequently in some private examples, throughout both the Old and Middle Kingdoms.

The creation of an access route meant that it would need to be secured, and Chapters 5.2 and 5.3 examine both the static and mechanical methods used to seal the access routes in royal and private tombs from the mid First Dynasty onwards. The static forms consisted of a wide variety of blockings that were either loose aggregates or built obstructions, the majority of which were used as void fillers; their effectiveness depending in all cases on their volume and bulk density. Moreover, it was highlighted that from the Third Dynasty onwards, in a search for greater security, more specialised backfills and increasingly resistant closures were chosen for use in royal and high status tombs. While effective as blockings, none of these methods dictated the shape of their surrounding architecture, as they could all be made to fill any zone.

The study also demonstrates that some blockings, such as portcullises and plug-stones, rather than being static, were simple mechanisms that could speedily and effectively secure a tomb. Furthermore, they needed special architecture to permit the installation of their stones, and thus in part governed their access route's design. The results of these requirements, it was argued, were visible in the architecture of the access routes and sloping corridors of private and royal tombs from the period concerned and right up into the Old and Middle Kingdoms.

The protective role of the superstructure

In Chapter 6 the defensive aspects of the superstructure are analysed. It was established that from the reign of Hor-Aha onwards the substructures of royal and private pit tombs were usually protected by a superstructure of some form, but whether in early royal tombs this remained a sand tumulus or was a mastaba of mud-brick, like those of their private contemporaries, remains open to question. However, it is certain from the evidence that the mass and footprint of a superstructure became the standard method to defend a pit tomb's roof and substructure from overhead and lateral attack, and concomitantly, acted both as a monument and the focus for the celebration and maintenance of the tomb-owner's cult. Additionally, it appears that in some private tombs, a superstructure could also function as a secure storehouse for its owner's grave goods, and with the introduction of external access routes in the mid First Dynasty, provide protection for some or all of the stairway and portcullis shaft as well. With the subsequent adoption of entirely subterranean substructures at the end of the dynasty, I propose that this role had become increasingly important, as although no roofs or backfills required protection, access stairways in the Second Dynasty were now often concealed within the mastaba, and were thus the only way in.

In the meantime, whilst the architects of the Third Dynasty royal tombs now relied on the form of the pyramid for the latters' protection, the shrinking size and improved security of access route entrances amongst the private tombs of the Third and early Fourth Dynasties, now permitted a greater architectural exploitation of the internal space within their superstructures. The chapels created were used for the maintenance of the tomb owner's cult and saw the introduction of magical offerings in the form of wall decoration, which replaced hitherto stealable grave goods and thus improved the tomb's security. Additionally, the continued construction of mud-brick *massifs* during this period, demonstrated that a huge footprint and the ability to totally conceal an access route were still considered to be key elements of defence, especially in necropoleis with weak geology. It was also acknowledged that in the latter circumstances, and concomitant with its use in royal pyramids, stone was also being used to provide similar protection on a smaller scale, thus auguring its widespread adoption in the mastaba fields of Giza and elsewhere in the dynasties to come.

Examination of the superstructures of royal tombs establishes that a desire for greater security and an increased engineering ability was marked in the Third Dynasty by the building of Djoser's mastaba at Saqqara, which was the first to be built of solid stone. Despite its new material, its effectiveness against attack was, like those of its private contemporaries, still limited by its low profile. This problem was resolved by adding further layers of masonry, which increased its mass and footprint immensely and protected its substructure omnidirectionally by creating the first step pyramid made of stone. Its resultant success as both protector and monument was then made manifest by its adoption by the kings of the remainder of the dynasty in both mud-brick and stone. By the early Fourth Dynasty more advanced stone technology meant that the royal superstructure could now offer its substructure greater protection, even when the latter's security was compromised by soft ground. This seems to have been achieved in Sneferu's new tombs by drawing their burial chambers up within the body of their superstructures, whose enormous bulk and footprints compensated for their necropoleis' weak geologies, and whose concomitant change in external profile expressed new concepts of kingship, in the form of the first true pyramids.

An evolving architectural response to tomb robbery

This research has found that from the earliest times, a variety of security measures were introduced to protect the grave in Egypt, as a direct response to the constant threat of tomb robbery. However, these architectural elements, rather than following a smooth and progressive timeline, were subject to empirical development and adaptation in the light of experience. Furthermore, their developments were usually interdependent on each other and formed a symbiotic relationship, each new measure having an effect on another in turn. It is also clear from the changes in tomb design that took place over time amongst different necropoleis with varying geologies, that this evolution was inexorably linked to advances in materials, engineering and mining technology, which together with human ingenuity, were used to either exploit, or compensate for, the tomb's surrounding geology to make it secure. [2476]

The effects of these defensive measures are evident in the changing architectural elements of the Egyptian tomb and were certainly the major driving force behind many of them. However, it is undeniable that during this process some components, such as burial chambers and mastabas, were also modified to suit changing requirements, fashions and beliefs. In spite of these many alterations, the fundamental physical purpose of many of these structures, which was to protect the burial, remained largely unchanged.

[2476] For example, the pit substructures of the First and Second Dynasty royal tombs at Abydos were reinforced with mud-brick to compensate for the soft desert geology, and roofed in wood and mud-brick; whereas the Second Dynasty royal gallery tombs at Saqqara were excavated entirely underground in the harder limestone and *tafl* at that site, and needed no additional reinforcement or roofing. But the latter, while not dependent on material technologies like mud-brick and wood architecture, were reliant on newer and different skills, such as mining and accurate surveying. See Chapters 4.1.1 and 4.1.2.

7.2 Significance and implications of the research

It is tempting when studying Egyptian tombs to become absorbed by their religious and monumental aspects, and in doing so it is easy to overlook what the original purpose of an architectural element may have been. By thematically analysing many of these features from the security point of view, the study highlights or re-interprets the influence that some of them had upon the architecture of the Egyptian tomb. The data gathered in the research adds to the existing body of knowledge on tomb security and its interrelationship with tomb architecture in general, and several important aspects have been raised. One of the consistent themes highlighted is the importance of the close relationship between the surrounding geology of a tomb and the design and structural or mining technologies that were employed to defend it, which have been discussed throughout the research. Additionally, analysis of the role of the superstructure's footprint overhang in deterring lateral tunnelling contributes to the appreciation of early mastaba development, as does the broad overview taken of the latter's protective role for access routes and substructures overall. Similarly, the links established between the architecture of the access route and the methods used to block it, may explain some of the underlying influences for the former's design, as does the new interpretation offered of the defensive benefits of the vertical shaft. The research has also undertaken the first comprehensive survey of the use of the portcullis during the period and contributes new data on that previously under reported topic.

The study also re-affirms the findings of previous researchers regarding the function of particular aspects of security architecture, such as the space saved by the stair-shaft espoused by Jánosi,[2477] which ties in with the general trend identified in the research for smaller and less detectable access routes. In addition, the investigation supports the practical reasoning behind the angle of incline in pyramid corridors espoused by Walker, Brück and Krauss.[2478] Reisner's view that much of the early development of tomb substructure architecture was driven by the search for security and the desire for more grandiose tombs,[2479] has been proven to be a reasonable assumption and his notions of the protective nature of the superstructure confirmed,[2480] although his more forthright views on the pyramid's functions as only the provider of security and the recipient of offerings,[2481] are perhaps outdated in the light of more modern scholarship.

[2477] Jánosi 2006: 16–7

[2478] Walker 1984: 887; Brück 1995: 161–4; Krauss 2009: 151–60.

[2479] Reisner 1908: 11.

[2480] Reisner 1936: 245.

[2481] Reisner 1936: 340.

7.3 Securing the eternal afterlife in the Egyptian tomb

We have established that in ancient Egypt, the tomb, far from being just a convenient way to dispose of the dead, was in fact a multipurpose structure. At its most basic, as in any culture, it provided a salubrious method of disposing of a body, but taking the funerary beliefs of the Egyptians into account, we can see that it also provided a vehicle by which those beliefs could be realised and a successful afterlife attained and subsequently maintained.[2482]

The tomb firstly provided physical protection for the body, which needed to remain intact, in order that its other spiritual forms, the *ba* and the *ka*, which had been part of it in life and had separated from it in death, could successfully reunite with it on a daily basis to become an 'effective' being or *akh* in the afterlife. Secondly, it provided a dwelling for the aforementioned entities to inhabit, throughout a perpetual and cyclical process of renewal. Thirdly, it also acted as a repository for those valuables and personal accoutrements that accompanied the deceased for use in the afterlife. Lastly, it also provided a visible monument to the deceased, whose offering place was a liminal zone, an interface, by which the aforementioned spiritual entities could access the outside world and partake of offerings supplied by the living, and through which the latter could also interact and communicate with the dead.

However, in order that all these vital functions could continue undisturbed, the tomb needed to remain both intact and its contents secure. But from early on, its visibility meant it was subject to the constant depredations of tomb robbers, vandals and the fortunes of war, which meant that structural measures had to be introduced to improve its security.

This research has established that many aspects of the architecture of the Egyptian tomb originate from those security measures that were initially introduced to defend it from tomb robbery. Moreover, as these security features evolved, during what can best be described as an ongoing 'arms race' between tomb builders and tomb robbers, they were widely adopted and absorbed into the general corpus of mortuary architecture. As a result, many of these innovations largely go un-noticed today, but what is often forgotten is that when they were introduced, they were 'cutting edge' security technologies that in combination with the tomb itself and its funerary cult, were intended to ensure the tomb owner's eternal enjoyment of the afterlife.

[2482] See Chapter 1.1, page 1.

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Cat No	Identity	Location	Period	Type	Overall Dimensions of substructure	Surrounding geology	Liner	Liner Thickness	Roof type	Roof/back-fill depth in m	Relation to s/structure	References	Robbed
	Dynasty 0												
28	Grave no. 20	Tell el-Farkha	Dynasty 0, Naqada IIIB-C1	IB	1.8 m long X 1.14 m wide X 0.95 m deep	Compact ground'	Mud-brick	0.5 brick	Skin of mud-brick	?	N/A	Dębowska-Ludwin 2009: 465–6.	No
29	Grave no. 21	Tell el-Farkha	Dynasty 0, Naqada IIIB-C1	IB	2.6 m long X 1.28 m wide X 1.06 m deep	Compact ground'	Mud-brick	0.5 brick	Skin of mud-brick	0.11	N/A	Dębowska-Ludwin 2009: 465–6.	No
30	Grave no. 6	Tell el-Farkha	Dynasty 0, Naqada IIIB-C1	IB	3.45 m long X 2.56 m X 1.45 m deep.	Compact ground'	Mud-brick	0.5 m	Mud-brick	0.5 m	Axial	Dębowska 2008: 1107-12.	No
31	Grave no. 63	Tell el-Farkha	Dynasty 0, Naqada IIIB-C1	IB	4 m long X 2.5 m wide X ??? deep	Compact ground'	Mud-brick	0.75-1 m*	Hardened greasy mud	?	Axial	Dębowska-Ludwin 2011b: 260-2	No
32	Grave no. 100	Tell el-Farkha	Dynasty 0, Naqada IIIB-C1	IB	6.2 m long X 4.1 m wide X 1.9 m deep	Compact ground'	Mud-brick	1-2 m	Backfill?	?	Axial	Chłodnicki & Ciałowicz 2009: 8-9	No
33	Grave no. 99	Tell el-Farkha	Dynasty 0, Naqada IIIB-C1	IB	4 m long X 2 m wide X ??? m deep	Compact ground'	Mud-brick	N/A	Hardened greasy mud (Nile silt)	?	?	Chłodnicki & Ciałowicz 2009: 6–7	No
34	Grave no. 9	Tell el-Farkha	Dynasty 0, Naqada IIIB-C1	IB	2.04 m long X 0.96 m wide X 1.29 m deep	Compact ground'	Mud-brick	0.5 brick	Backfill?	?	Axial?	Dębowska-Ludwin 2009: 462-3.	No
35	Grave no. 24	Tell el-Farkha	Dynasty 0, Naqada IIIB-C1	IB	2.46 m long X 1.6 m wide X 1.35 m deep	Compact ground'	Mud-brick	0.5 brick	Burial and grave goods encased in liquid mud.	?	Axial?	Dębowska 2009: 466-7.	No
36	Grave no. 94	Tell el-Farkha	Dynasty 0, Naqada IIIB-C1	IB	4.8 m long X 2.8 m wide X ??? m deep	Compact ground'	None	1.1-1.6 m	Deep backfilled internal shaft in s/structure	?	Axial	Dębowska 2010: 7-9; 2011: 30	No
	Dynasty 1												
26	Grave 2897	Minshat Abu Omar	Dynasty 1, Naqada IIIC2-D	IC	4.9 m long X 3.25 m wide X 1.1 m deep	Sand	Mud-brick	1.5-2 bricks	Wood roof, covered in mats, mud-brick and mud	?	N/A	Kroeper 1992: 138-9 and 141.	Yes, via roof
27	Grave 1590	Minshat Abu Omar	Dynasty 1, Naqada IIIC2-D	IC	4.5 m long X 2.35 m wide X 1.3 m deep	Sand	Mud slabs	0.04-0.75 m	Wood roof, covered in mats, mud-brick or mud	0.1 m	N/A	Kroeper 1992: 131-4 and 141.	Yes, via roof
37	Grave no. 50	Tell el-Farkha	Dynasty 1, Naqada IIIC2-D	IC	3.75 m long X 1.7 m wide X ??? deep	Compact ground'	Mud-brick	1-1.5 bricks	Plain earth backfill	0.4	Axial?	Dębowska-Ludwin 2009: 473-4.	No
38	Grave no. 55	Tell el-Farkha	Dynasty 1, Naqada IIIC2-D	IC	4.9 m long X 2.3 m wide X ??? deep	Compact ground'	Mud-brick	1.5-2 bricks	Plain earth backfill	0.4	Axial?	Dębowska-Ludwin 2011: 34-6.	No
39	Tomb No. 1 Site B	Tell Ibrahim Awad	Dynasty 1, Naqada IIIC2	IB	8 m long × 4.5 m X 1.25 m deep	Sand	Mud-brick	0.9–1.15 m	Wooden beams, mud and reed mats	0.2	Axial	Haarlem 1996: 7-34.	Partially
40	Grave 913	Kafr Hassan Dawood	Dynasty 1, Naqada IIIC1	IB	6 m long X 4 m wide X 0.75 m deep	Allluvial sand	None	N/A	Nile mud backfill	?	N/A	Tassie & Wetering 2003: 500-1	No
41	Grave 970	Kafr Hassan Dawood	Dynasty 1, Naqada IIIC1	IB	6 m long X 4 m wide X 0.75 m deep	Alluvial sand	None	N/A	Nile mud backfill	?	N/A	Tassie & Wetering 2003: 500-1	Yes
42	Tomb 389, Cem. 300	Abu Roash	Dynasty 1, Naqada IIIB-C2.	IC	5.27 m long X 3.11 m wide X 1.8 m deep	Gravel	Mud-brick	0.5 m	Double wood roof	0.2?	Axial	Klasens 1959a: 35	Yes
43	Tomb MO25, Cem. M	Abu Roash	Dynasty 1, Naqada IIIC2	IC	5.98 m long X 2.92 m wide X 3 m deep	Rock	Mud-brick	0.26-0.48 m	Double wood roof	0.3	Axial	Klasens 1961: 110-1.	Yes
59	Mastaba V	Giza, Nazlet Batran	Dynasty 1, Naqada IIIC2, Djet.	IC	10.8 m long X 5.6 m wide X 3 m deep	Sand & rock	Mud-brick	1 m	Wooden beams, mats and soil	0.6	Axial	Daressy 1906: 99-106.	Yes
68	Mastaba XVII	Abu Ghurab	Dynasty 1, Naqada IIIC1-C2.	IC	8.1 m long X 4.5 m wide X ??? deep	Sandy soil'	Mud-brick	0.7 m	Wooden beams, roof and tafl	?	Axial	Radwan 2000: 509-13; 2003: 378.	Yes
81	S 3357	Saqqara	Dynasty 1, Naqada IIIC1, Hor-Aha	IC	19.1 m long X 2.9 m wide X 1.35 m deep	Gravel & rock	Mud-brick & plaster	1 m	Wood roof + rubble + sand	0.12	Axial	Emery 1939: 10-8.	Yes
82	S 3471.	Saqqara	Dynasty 1, Naqada IIIC1, Djer.	IC	30 m long X 4 m wide X 1.2-3.5 m deep	Gravel & rock	Mud-brick	1 m	Wood roof + rubble	0.07	Axial	Emery 1949: 13-7. .	Yes
83	S 2185	Saqqara	Dynasty 1, Naqada IIIC1, Djer.	IC	34.2 m long × 4.8 m wide × 1.5 m deep	Gravel & rock	Stone masonry	N/A	Stone slabs	0.2-0.32	Axial	Quibell 1923: 5-6, 15-6.	Yes
84	S 3504	Saqqara	Dynasty 1, Naqada IIIC2, Djet	IC	22.6 m long X 10.2 m wide X 3.1 m deep	Gravel & rock	Mud-brick	1-1.3 m	Double wood roof 'sandwiching' 1 m rubble core	1	Axial	Emery 1954: 5-13.	Yes
85	S 3503	Saqqara	Dynasty 1, Naqada IIIC2, Merneith	IC	14.25 m long X 4.5 m wide X 2.9 m deep	Gravel & rock	Mud-brick	0.65-0.85 m	Wooden roof + rubble + sand	?	Axial	Emery 1954: 128-58.	Yes
86	S 3507	Saqqara	Dynasty 1, Naqada IIIC2, Den	IC	5.25 m long X 3.25 m wide X 4.75 m deep	Gravel & rock	Partial mud-brick	1 m	Twin wooden roofs + mud-brick 'tumulus'	?	Axial	Emery 1958: 75-80.	Yes
87	S 3111 (Sabu)	Saqqara	Dynasty 1, Naqada IIIC2, Adjib	IC	10.45 m long X 6 m wide X 2.55 m deep	Gravel & rock	Mud-brick	0.55-1.1 m	Wood roof	?	Lateral	Emery 1949: 95-9.	Disturbed
138	68.H.4	Helwan	Dynasty 1, Naqada IIIC1-2	IC	3.6 m long X 2.6 m wide X 3.6 m deep	Gravel	Mud-brick	0.3-0.35 + 0.4 m	Wood roof + gravel	2	N/A	Saad 1951: 7.	Yes
139	185.H.4	Helwan	Dynasty 1, Naqada IIIB-CI	IC	5 m long X 4.3 m wide X 4.1 m deep	Gravel	None	N/A	Wood roof + gravel?	1.9	N/A	Saad 1951: 7-8	Yes
140	423.H.9	Helwan	Dynasty 1, Naqada IIIC2, Den	IC	7 m long X 2.1 m wide X 3.8 m deep	Gravel	Mud-brick	Unknown	Wood roof + stone slabs	?	Axial	Saad 1969: 22-4.	Yes
141	1390.H.2 (1389.H.2)	Helwan	Dynasty 1, Naqada IIIC2-D	IC	9.5 m long × 4.8 m wide X 1.6 m deep	Gravel	Stone & mud-brick	Stone slabs 0.2 m	Wood roof + gravel?	?	Axial	Saad 1969: 22-4, pl. 16.	Yes
214	Mastaba 1060	Tarkhan	Dynasty 1, Naqada IIIC2, Djet	IC	4.72 m long X 2.59 m wide X 2.26 m deep	Gravel & limestone	Mud-brick	Unknown	Wood roof + stone slabs	0.375	Axial	Petrie et al. 1913: 13-20.	Yes
215	Mastaba 2050	Tarkhan	Dynasty 1, Naqada IIIC2, Den	IB	5.4 m long X 4.5 m wide X 6.1 m deep	Gravel & limestone	None	N/A	Wood roof?	?	Lateral	Petrie 1914: 3, 6-7.	Yes
216	Mastaba 2038	Tarkhan	Dynasty 1, Naqada IIIC2, Den	IB	4.96 m long X 3.22 m wide X 5.58 m deep	Gravel & limestone	None	N/A	Wood roof?	?	Lateral	Petrie 1914: 4-5.	Yes
272	Tomb II	Awlad el-Sheikh	Dynasty 1, Naqada IIIC1	IC	4.4 m X 3.4 m X 2.8 m deep	?	Mud-brick	0.7 m	Double wood roof + gravel	1.45	N/A	Ranke 1926: 8-9.	Yes
273	Tomb III	Awlad el-Sheikh	Dynasty 1, Naqada IIIC2	IC	4.6 m long X 2.9 m wide X 2.85 m deep	?	Stone & mud-brick	Stone slabs 0.1 m	Wood roof + gravel	0.85	N/A	Ranke 1926: 9-12.	Yes
285	N 1532, Cem. 1500	Naga el-Deir	Dynasty 1, Naqada IIIC1-2	IC	5.6 m long X 2.6 m wide X 2.7 m deep	Gravel	Mud-brick	0.3-0.4 m	Wood + mud-brick + gravel	1.5	N/A	Reisner 1908: 29-33.	Possibly
286	N 1506, Cem.1500	Naga el-Deir	Dynasty 1, Naqada IIIC1–2, Djer/Djet	IC	4 m long X 2.23 m wide X 1.27 m deep	Gravel	Mud-brick	0.3 m	Double wood roof + mud-brick	?	Skew axial	Reisner 1908: 33–4; 1936: 35-7.	Yes
326	Tomb IV	Abydos	Dynasty 1, Naqada IIIC1–2,	IC	4.9 m long X 3.75 m wide X 1.3 m deep	Desert sand?	Mud-brick	0.5 m	Wood + backfill?	?	Lateral	Hossein 2011: 275-8.	Yes, via mag.
333	Tomb 1207, Cem.1200	Armant	Dynasty 1, Naqada IIIB-C1	IC	5.1 m long X 3.86 m wide X 2.4 m deep	Desert gravel?	Mud-brick	0.20-0.25 m	Wood roof + mud-brick?	0.45	N/A	Mond & Myers 1937: 16-20.	Yes
334	Tomb 1208 Cem. 1200	Armant	Dynasty 1, Naqada IIIB-C1	IC	6.3 m long X 4.75 m wide X 3.1 m deep	Desert gravel?	Mud-brick	0.1–0.3 m*	Wood roof + mud-brick?	0.8	N/A	Mond & Myers 1937: 16-20	Yes
	Dynasty 2												
339	Brick tomb	Es-Seba'iya	Dynasty 2	IC	5.48 m long X 1.48 m wide X 0.25 m deep	?	Mud-brick	0.22 m	Stone slab roof	0.32 m	N/A	de Morgan 1984: 64–5.	Partially
354	Tomb 2	El Qara	Dynasty 2	IB	9 m long X 4.2 m wide X 2.14 m deep.	?	Stone & mud-brick	0.5 brick+0.15 m stone	Stone slab roof + gravel	1.44	N/A	de Morgan 1908: 141; 1912: 42.	No
355	Burial 28	El Masa'id	Dynasty 2	IB	1.2 m X 0.58 m X 1.8 m deep	?	None	N/A	Stone + hardened backfill	?	N/A	de Morgan 1984: 62–3.	No

Cat. No.	Identity	Location	Period	Substructure Type	Overall dimensions of substructure	Geology	Liner	Liner thickness in bricks or metres	Roof Type	Roof/back-fill depth	Relationship to superstructure	Reference	Robbed
	Dynasty 1												
63	Tomb 1056	Tura el-Asmant	Dynasty 1, Naqada IIIC2-D	ID	5.7 m long × 4.1 m wide × 3 m deep	Gravel	Mud-brick	0.8	Wood roof + backfill?	0.80	N/A	Yacoub 1981: 160	Yes
64	Tomb 1035	Tura el-Asmant	Dynasty 1, Naqada IIIC2-D	ID	Dimensions not available or scaleable	Gravel	Mud-brick	?	Wood roof + backfill?	?	N/A	Yacoub 1981: 160	Yes
65	Tomb 986	Tura el-Asmant	Dynasty 1, Naqada IIIC2-D	ID	4.4 m long × 3.6 m wide × 3 m deep	Gravel	Mud-brick	0.5 + 0.5 m	Wood roof + backfill?	?	N/A	Yacoub 1981: 160.	Yes
66	Tomb 130	Tura el-Asmant	Dynasty 1, Naqada IIIC2-D	ID stone tomb	3.4 m long X 3 m wide X 2.5 m deep	Gravel	Stone & mud-brick	Stone.0.1-0.15, Brk. 0.6-1.1 m	Wood roof + backfill?	1.40	N/A	Yacoub 1981: 160.	Yes?
67	Tomb 249	Tura el-Asmant	Dynasty 1, Naqada IIID - Qa'a	ID stone tomb	4.2 m long X 3.8 m wide X 3.7 m deep	Gravel	Stone & mud-brick	Stone 0.1 m, brick 0.75 m	Wood roof + stone slabs?	0.90	Axial	El Khouli 1968: 75.	Yes
69	Mastaba IV	Abu Ghurab	Dynasty 1, Naqada IIIC2	ID	12.8 m long X 11.2 m wide X ??? deep	Sandy soil'	Mud-brick	0.8-1.2	?	?	Axial, east end	Radwan 1995: 311-4.	Yes
70	Tomb V	Abu Ghurab	Dynasty 1, Naqada IIIC2	ID	5 m long X 4.1 m wide X 2.1 m deep	Sandy soil'	Mud-brick & wood	N/A	Wattle and mud-brick roof	0.40	Axial, north end	Radwan 1991: 305-8.	Yes
88	S 3506	Saqqara	Dynasty 1, Naqada IIIC2 - Den	ID	14.4 m long X 8.5 m wide X 5.15 m deep	Rock	Mud-brick	1.35–1.62	Wood	0.2	Axial, central	Emery 1958: 37-42.	Yes, via roof
89	S 3035 (Hemaka)	Saqqara	Dynasty 1, Naqada IIIC2, -Den	ID	9.5 m long X 4.9 m wide X 5 m deep	Gravel & rock	None	N/A	Wood roof + 32 m3 gravel ?	3.5	Axial, offset south-east corner	Emery 1938: 3-13.	Yes
90	S 3036	Saqqara	Dynasty 1, Naqada IIIC2 - Den	ID	8.55 m long X 4.8 m wide X 3 m deep	Gravel & rock	Mud-brick	0.7 & 1.2	Wood roof + mud-brick	3-4.65*	Lateral, offset north of centre	Emery 1949: 71-81.	Yes
91	S 3038 (Nebitka).	Saqqara	Dynasty 1, Naqada IIIC2 - Adjib	ID	7.8 m long X 4.75 m wide X 6.1 m deep	Gravel & rock	Mud-brick	0.45-0.7	Double wood roof	?	Axial, central	Emery 1949: 82-92.	Yes
92	S X	Saqqara	Dynasty 1, Naqada IIIC2-D	ID	6.45 m long X 3.75 m wide X 4.9 m deep	Rock	None	N/A	Wood roof + rubble fill	1.55	Axial	Emery 1949: 107–9.	Yes
93	S 3338	Saqqara	Dynasty 1, Naqada IIIC2 - Adjib	ID	6.5 m long X 3.75 m wide X 6.25 m deep	Gravel & rock	None	N/A	Wood roof	2.7*	Axial, south of centre	Emery 1949: 124-9.	Yes
94	S 3500	Saqqara	Dynasty 1, Naqada IIID - Qa'a	ID	8.2 m long X 5.4 m wide X 3.2 m deep	Gravel & rock	Dressed masonry	0.6-0.8	Wood	2	Offset lateral, south of centre	Emery 1958: 98-102.	Yes, laterally
95	S 3505	Saqqara	Dynasty 1, Naqada IIID - Qa'a	ID	8.7 m long X 5 m wide X 5.75 m deep	Gravel & rock	None	N/A	Planks 0.3 m thick + backfill	2.4	Lateral central, just west of centr	Emery 1958: 5-13.	Yes
96	S 2105	Saqqara	Dynasty 1, Naqada IIID - Qa'a	ID	6 m long X 3.8 m wide X ??? m deep	Gravel & rock	None	N/A	Wood roof	?	Lateral central	Quibell 1923: 19.	Yes
142	1.H.4	Helwan	Dynasty 1, Naqada IIIC2-D	ID	4.3 m long X 2.6 m wide X 3.4 m deep	Gravel	None	N/A	Wood roof	?	Axial	Saad 1951: 5-6.	Yes
143	150.H.5	Helwan	Dynasty 1, Naqada IIIC2	ID	8.5 m long × 5.2 m wide × 4.2 m deep	Gravel	None	N/A	Wood + gravel backfill	2	Axial	Saad 1951: 28-9.	Yes
144	553.H.2	Helwan	Dynasty 1, Naqada IIIC2-D	ID	3 m long × 2.2 m wide × 3 m deep	Gravel	Mud-brick	0.4	Wood roof + gravel backfill?	?	N/A	Saad 1947:107	Yes
145	559.H.2	Helwan	Dynasty 1, Naqada IIIC2-D	ID	4.8 m long × 3.5 m wide × 3.8 m deep	Gravel	Mud-brick	0.5-0.7	Wood roof + gravel backfill?	1.3?	N/A	Saad 1947: 107-8.	Yes
146	499.H.2	Helwan	Dynasty 1, Naqada IIIC2-D	ID	3.8 m long × 3.1 m wide × 3.4 m deep	Gravel	Mud-brick	0.5	Wood + backfill?	?	?	Saad 1947: Pl. XLI	Unspecified
147	701.H.3	Helwan	Dynasty 1, Naqada IIIC2-D	ID	9 m long × 4.7 m wide × 5.4 m deep	Gravel	Mud-brick	N/A	Wood roof	?	Axial?	Saad 1947: 173.	Yes
148	1371.H.2	Helwan	Dynasty 1, Naqada IIIC2 - Adjib	ID stone floor	12.5-13 m long × 5-5.7 m wide × 3.8 m deep	Gravel	Mud-brick	1-1.7	Wood roof + backfill?	?	?	Saad 1947: 109-10.	Yes
149	1502.H.2	Helwan	Dynasty 1, Naqada IIIC2	ID	7.7-8 m long × 5 m wide × 3.25 m deep	Gravel	Mud-brick	1-1.70	Wood roof + backfill?	?	?	Saad 1947: 110-1.	Yes
150	426.H.4	Helwan	Dynasty 1, Naqada IIIC2-D	ID	7.3 m long × 4 m wide × 4.6 m deep	Gravel	Mud-brick	0.8	Wood + gravel backfill	2.5	?	Saad 1951: 12-3.	Yes
151	407.H.4	Helwan	Dynasty 1, Naqada IIIC2-D	ID	10.9 m long × 4.3 m wide × 5.9 m deep	Gravel	Mud-brick	0.3	Wood	3.9	?	Saad 1951: 11-2.	Yes
152	355.H.4	Helwan	Dynasty 1, IIIC2-D	ID	3.4-4 m long × 3.8 m wide × 3.1 m deep	Gravel	Mud-brick	0.25-1	Double wood roof	0.5	?	Saad 1951: 8-9.	Yes
153	1473.H.2	Helwan	Dynasty 1, Naqada IIIC2-D	ID	Dimensions not available or scaleable	Gravel	Mud-brick	1.5-2	Wood roof + backfill?	?	Lateral central	Saad 1947: 110.	Yes
154	785.H.5	Helwan	Dynasty 1, Naqada IIIC2-D	ID	10 m long × 5.4 m wide × 5.4 m deep	Gravel	Mud-brick	1.1	Huge blocks of timber'	?	Axial offset	Saad 1969: 20-2.	Yes
155	649.H.5	Helwan	Dynasty 1, Naqada IIIC2-D	ID	8.5 m + long × 3.3 m wide × 5 m deep	Gravel	Mud-brick	0.5	Wood + gravel backfill (dbl.)	2.7	Axial	Saad 1951: 41.	Yes
156	680.H.5	Helwan	Dynasty 1, Naqada IIIC2-D	ID	Dimensions not available or scaleable	Gravel	Mud-brick	0.3	Wood	?	Axial	Saad 1951: 42.	Yes
157	385.H.4	Helwan	Dynasty 1, Naqada IIIC2-D	ID stone tomb	9.6 m long × 4 m wide × 4.15 m deep	Gravel	Stone	0.4	Stone slabs + gravel	2.25	?	Saad 1951: 9-10.	Yes, laterally
158	40.H.3 (Op. 1/1)	Helwan	Dynasty 1, Naqada IIIC2-D	ID stone tomb	10 m long × 5 m wide × 4 m deep	Gravel	Stone	Varies	Wood roof	?	Axial?	Saad 1951: 164–6.	Yes
159	1.H.3	Helwan	Dynasty 1, Naqada IIIC2-D	ID stone tomb	5.7 m long X 3.9 m wide X 5.4 m deep	Gravel	Stone & mud-brick	0.2, 0.6-1.2	Wood + backfill	1.7	Axial	Saad 1947: 163-4.	Yes
160	60.H.1	Helwan	Dynasty 1, Naqada IIID	ID stone tomb	Dimensions not available or scaleable	Gravel	Stone	0.4	Stone	?	Axial	Köhler 2008b: 120.	Yes
161	9.H.1	Helwan	Dynasty 1, Naqada IIIC2, Den	ID stone tomb	Dimensions not available	Gravel	Stone & mud-brick	N/A	Stone	?	Axial	Saad 1947: 28.	Yes
162	653.H.4	Helwan	Dynasty 1, Naqada IIIC2-D	ID	25.5 m long × 6.3 m wide × 6.75 m	Gravel	Stone?	N/A	Wood, supported by posts?	?	?	Saad 1951: 18-20.	Yes
287	N 1581, Cem. 1500	Naga el-Deir	Dynasty 1, Naqada IIIC2-D	ID	8.3 m long X 3.3 m wide X 1.8 m deep.	Gravel	Mud-brick	0.5	Dbl. wood & brick roof + fill	1.5	Axial	Reisner 1908: 36-8.	Yes
288	N 1512, Cem. 1500	Naga el-Deir	Dynasty 1, Naqada IIIC2-D	ID	2.1 m long X 3.45 m wide X 1.9 m deep.	Gravel	Mud-brick	0.5	Wood + backfill?	1.5	?	Reisner 1908: 38-40.	Yes
324	M1	Mahasna	Dynasty 1, Naqada IIIC2-D	ID	8.4 m long X 5.4 m wide X 2.5 m deep	Sand & gravel	Mud-brick	0.4-0.55	Wood + mud	0.35	?	Garstang and Sethe 1903: 28.	Yes
327	Tomb I	Abydos	Dynasty 1, Naqada IIIC2-D	ID	5.75 m long X 4 m wide X 2.8 m deep	Desert Sand	Mud-brick	0.7-0.85	Woofd + backfill?	?	Axial	Hossein 2011: 271-3.	Yes
329	b 91	El Amrah	Dynasty 1, Naqada IIIC2-D	ID	6.96 long × 3.48 m wide × 1.5 m deep	Sand & gravel	Mud-brick	0.4	Wood + mud	?	Axial	Randall-MacIver & Mace 1902: 39.	Yes in 20th cent.
	Dynasty 2												
289	N 1586, Cem. 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	7.83 m long X 4.3 m wide X 3.25 m deep	Gravel	Mud-brick	0.6-1	Mud-brick corbel + gravel	0.72	?	Reisner 1908: 41-2.	Yes
290	N 1513, Cem. 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	8.15 m long X 4.1 m wide X 3.1 m deep	Gravel	Mud-brick	0.5-0.7	Mud-brick corbel + gravel	?	?	Reisner 1908: 48-9.	Yes
291	N 1514, Cem. 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	7 m long X 3.8 m wide X 3.1 m deep	Gravel	Mud-brick	0.5-0.7	Mud-brick corbel + gravel	?	Axial	Reisner 1908: 44-5.	Yes
292	N 1515, Cem. 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	8.5 m long X 4.9 m wide X 3.35 m deep	Gravel	Mud-brick	0.5-0.8	Mud-brick corbel + gravel	0.65	?	Reisner 1908: 45-6.	Yes
293	N 1571, Cem. 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	8.57 m long X 4.2 m wide X ? m deep	Gravel	Mud-brick	0.8	Mud-brick corbel + gravel	?	?	Reisner 1908: 43-4.	Yes
295	N 1584, Cem. 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	4.9 m long X 3.3 m wide X 2 m deep	Gravel	Mud-brick	1 brick	Mud-brick corbel + gravel	0.55	?	Reisner 1908: 52.	Yes
295	N 1572, Cem. 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	5.8 m long X 4.3 m wide × 2.63 m deep	Gravel	Mud-brick	?	Mud-brick corbel + gravel	0.13	?	Reisner 1908: 53-4.	Yes
296	N 1605, Cem. 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	6.2 m long X 3.45 m wide X 3.9 m deep	Gravel	Mud-brick	0.5-0.75	Mud-brick corbel + gravel	0.8	?	Reisner 1908: 54-5.	Yes
297	N 1611, Cem. 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	4.35 m long X 2.3 m wide X 2 m deep	Gravel	Mud-brick	0.5-1.3 m	Mud-brick corbel + gravel	0.3	?	Reisner 1908: 57-6.	Yes
298	N 1626, Cem. 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	4.9 m long X 2.1 m wide X 2.7 m deep	Gravel	Mud-brick	0.3-0.8	Mud-brick corbel + gravel	0.7	?	Reisner 1908: 55-6.	Yes
299	N 3013, Cem. 3000	Naga el-Deir	Dynasty 2	ID Corbel roof	3.55 m long X 2.05 m wide X 2.8 m deep	Gravel	Mud-brick	0.6-1	Mud-brick corbel + gravel	?	?	Reisner 1908: 74-5.	Yes
300	N 3017, Cem. 3000	Naga el-Deir	Dynasty 2	ID Corbel roof	5.15 m long X 3.7 m wide X 2.8 m deep	Gravel	Mud-brick	0.7-1.1	Mud-brick corbel + gravel	?	Axial	Reisner 1908: 72-4.	Possibly
301	N 3551, Cem. 3500	Naga el-Deir	Dynasty 2	ID Corbel roof	5.5 m long X 3.6 m wide X circ. 2.5 m deep	Gravel	Mud-brick	0.4-0.5	Mud-brick corbel + gravel	?	?	Mace 1909: 19.	Yes
302	N 4990, Cem. 3500	Naga el-Deir	Dynasty 2.	ID Corbel roof	2.92 m long X 1.6 m wide X 1.8 m deep	Gravel	Mud-brick	0.3	Mud-brick corbel + gravel	?	Axial	Mace 1909: 20 and 68.	Yes

Type II

Cat. No.	Identity	Location	Period	Substructure Type	Burial chamber dimensions	Surrounding geology	Roof thickness in metres	Reference	Robbed
	Dynasty 1								
44	Tomb MO1, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2	II	3 m long X 2.7 m wide X 2.7 m high	Rock	2.50	Montet 1938: 15-28; Tristant 2008a: 136-140	Yes, via shaft and portcullis
45	Tomb MO2, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2	II	3.4 m long X 2.8 m wide X 2.4 high	Rock	3.00	Montet 1938: 28-34.	Yes, via shaft and portcullis
46	Tomb MO3, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2	II	4.3 m long X 2.2 m wide X 2.4 m high	Rock	2.25	Montet 1938: 32-4.	Yes, via shaft & north magazine avoiding portcullis
47	Tomb MO4, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2	II	2.4 m long X 2.8 m wide X 2.8 m high	Rock	1.90	Montet 1938: 35.	Yes, via shaft and portcullis
48	Tomb MO6, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2	II	2.5 m long X 3.0 m wide X 2.2 m high	Rock	3.00	Montet 1938: 37-8.	Yes, via shaft and portcullis
49	Tomb MO7, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2	II	4.4 m long X 3.0 m wide X 2.0 m high	Rock	3.20	Montet 1938: 38-46; Tristant 2008a: 140-4	Yes, via shaft and portcullis
50	Tomb MO10, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2	II	3.1 m long X 1.2-1.7 m wide X 1.7-2.7 m high	Rock	1.5-2.6	Montet 1938: 50-53.	Yes, via concealed shaft and portcullis
51	Tomb MO11, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2	II	4.1 m long X 2.5 m wide X 2.0-2.4 m high	Rock	1.30	Montet 1938: 53-4.	Yes, via shaft and hole cut in portcullis
52	Tomb MO12, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2	II	?	Rock	?	Montet 1938: 54-8.	Yes, via shaft and hole cut in portcullis
53	Tomb MO19, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2	II	3.4 m long X 2.3 m wide X 2.5 m high	Rock	2.00	Klasens 1961: 109.	Yes, via tunnel from above
54	Batn el Baqara	Old Cairo	Dynasty 1, Naqada IIIC2	II	6.2 m long X 3.2 m wide X ? m Overall	Rock	2.00	Boghdady 1932: 153-160.	Yes

Type IIA

Cat. No.	Identity	Location	Period	Substructure Type	Burial chamber dimensions	Surrounding geology	Roof thickness in metres	Reference	Robbed
	Dynasty 1								
55	Tomb KG4	Kafr Ghattati	Dynasty 1, Naqada IIIC2-D	IIA	2.20 m long X 1.30-1.50 m wide X 1.65 m high	Gravel	4.50	Engles 1990: 80.	Yes
56	Tomb KG3	Kafr Ghattati	Dynasty 1, Naqada IIIC2-D	IIA	1.3 × 1.10–1.25 m m wide X 1.65	Gravel	2.00	Engles 1990: 80.	Yes
97	S 3121	Saqqara	Dynasty 1, Qa'a	IIA	3.5-3.6 m long X 3.5-4.5 m wide X 2.15 m high	Rock	3.70	Emery 1949: 116-9.	Yes, via smashed portcullis
97	S 3120	Saqqara	Dynasty 1, Qa'a	IIA	3.3-3.9 m long X 2.85-3.5 m wide X 1.85 m high	Rock	2.60	Emery 1949: 121-3.	Yes
	Dynasty 2								
71	Tomb 10B-4	Abusir	Dynasty 2	IIA	1.5 m long X 1.5 m wide X 1 m high	Sand over rock	1.60	Bonnet: 1928: 4-5.	?
72	Tomb 10C-3	Abusir	Dynasty 2	IIA	1.6 m long × 1 m wide X 1 m high	Sand over rock	1.50	Bonnet: 1928: 4.	?
73	Tomb 13C-3 + 13B-1	Abusir	Dynasty 2	IIA	2.8 m long X 1.20 m wide X 2.5-3.5 m high	Sand over rock	2.20-3.50	Bonnet: 1928: 4-5.	Yes, from above
100	S 3042	Saqqara	Dynasty 2	IIA	?	Rock	?	Reisner 1936: 144-5.	Yes
102	S 3477	Saqqara	Dynasty 2	IIA	5.20 m long X 3.49 m wide X 2.2 m high	Rock	2.50	Emery 1962: 1-14.	No
103	S 3024	Saqqara	Dynasty 2	IIA	7.5 m long X 5 m wide X ? m high	Rock	10.00	Emery 1949: 11-2.	Yes
163	255.H.8	Helwan	Dynasty 2	IIA	3.1 m long X 1.30 m wide X 1.3	Gravel	2.50	Saad 1957: 59.	Yes, via tunnel from above
164	25.H.5	Helwan	Dynasty 2	IIA	3.1 m long X 0.95 m wide X 1.25 m high	Gravel	6.55	Saad 1951: 27.	Yes, via entrance?
165	505.H.4	Helwan	Dynasty 2	IIA	2.6 m long X 2.40 m wide X 2.5 m high	Gravel	3.60	Saad 1951: 15-17.	Yes, via tunnel from above
166	1075.H.8	Helwan	Dynasty 2	IIA	1.6 m long X 1.1 m wide X 1.6 m high	Gravel	3.40	Saad 1957: 61.	Yes, via two tunnels from above
167	25.H.4 (Op.2/1 Köhler)	Helwan	Dynasty 2	IIA	1.9-2.13 m long X 1.18-1.35 m wide X 2.25 m high	Gravel	2.40	Saad 1951: 6–7, Pln. 4; Köhler 2005: 35-41.	Yes, via tunnel from above
168	Op. 3/1	Helwan	Dynasty 2	IIA	?	Gravel	?	Köhler 2001:25	?
169	810.H.3	Helwan	Dynasty 2	IIA	1.8 m long X 1.5 m wide X 3 m high	Gravel	2.30	Saad 1947: 172-3 1957: 15-17.	Yes, via tunnel from above
170	409.H.8	Helwan	Dynasty 2	IIA	1.7 m long X 0.9 m wide X 1.5 m high	Gravel	1.70	Saad 1957: 60.	Yes, via tunnel from above
171	416.H.6	Helwan	Dynasty 2	IIA	5 m long X 3 m wide X 2 m high	Gravel	?	Saad 1957: 20-2	Yes, via tunnel from above
172	235.H.8	Helwan	Dynasty 2	IIA	3.4 m long X 1.6 m wide X 2.5 m high	Gravel	?	Saad 1957: 29-31	?
173	Op. 4/94	Helwan	Dynasty 2	IIA	2.1 m long X 2.10 m wide X 1.4 m high	Gravel	2.60	Köhler 2007: 192-194.	Yes, through roof and portcullis
174	Op. 4/123	Helwan	Dynasty 2	IIA	2 m long X 1.9 m wide X 1.2 m high	Gravel	2.50	Köhler 2008a: 172–3; 2008b: 122–3.	Yes, through roof and portcullis
175	68.H.5	Helwan	Dynasty 2	IIA	1 m long X 0.65 m wide X 0.8 m high	Gravel	1.50	Saad 1951: 27.	No
176	473.H.4	Helwan	Dynasty 2	IIA	2 m long X 1.05 m wide X 1.15m high	Gravel	3.80	Saad 1957: 57.	Yes, via tunnel from above
177	393.H.8	Helwan	Dynasty 2	IIA	1.7 m long X 1 m wide X 4 m high	Gravel	1.7?	Saad 1957: 59-60.	Yes, via tunnel from above
178	419.H.8	Helwan	Dynasty 2	IIA	1 m long X 1.6 m wide X 1.6 m wide	Gravel	2.10	Saad 1957: 60.	Yes, via tunnel from above
179	109.H.9	Helwan	Dynasty 2	IIA	1.7 m long X 1.4 m wide X 1.55 m high	Gravel	2.35	Saad 1957: 39-40.	Yes, via tunnel from above
180	140.H.9	Helwan	Dynasty 2	IIA	1.5 m long X 1.1 m wide X 1.3 m high	Gravel	3.30	Saad 1957: 63.	Yes, via tunnel from above
181	Op. 4/4	Helwan	Dynasty 2	IIA	2.6 m long X 1.4 m wide X 1.4 m high	Gravel	3.40	Köhler 2014: 139-40.	Yes via portcullis
182	Op. 4/19	Helwan	Dynasty 2	IIA	2.2 m long X 1.5 m wide X 1.5 m high	Gravel	1.75	Köhler 2003: 89.	Yes, via tunnel from above
183	Op. 4/88	Helwan	Dynasty 2	IIA	?	Gravel	?	Köhler 2007: 192.	Yes, via tunnel from above
217	Grave 240	Tarkhan (Kafr Amar)	Dynasty 2	IIA	1.21 m long X 0.99 m wide X 0.81 m high	Rock	2.30	Petrie 1913: 27; Petrie & Mackay 1915: 10 and 15	No
218	Grave 545	Tarkhan (Kafr Amar)	Dynasty 2	IIA	1.52 m long X 1.04 m wide X 0.88 m high	Rock	3.70	Petrie 1913: 27; Petrie & Mackay 1915: 15-16.	No
253	Tomb 771	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	0.83 m X 1.32 m wide X 1.06 m high	Rock	0.75	Petrie, Brunton & Murray 1923: 22-4, Pl. XLVI.	Yes
254	Tomb 806	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	2.05 m long X 1.6 m wide X 1.06 m high	Rock	0.50	Petrie, Brunton & Murray 1923: 22-4, Pl. XLVI.	No
255	Tomb 734	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	1.47 m long X 1.57 m wide X 1.2 m high	Rock	0.25	Petrie, Brunton & Murray 1923: 22-4, Pl. XLVI.	No? roof may have collapsed/
256	Tomb 821	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	3.6 m long X 1.27 m wide X 1.06 m high	Rock	0.15	Petrie, Brunton & Murray 1923: 22-4, Pl. XLVI.	?
257	Tomb 820	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	2.46 m long X 1.16 m wide X ??? m high	Rock	?	Petrie, Brunton & Murray 1923: 22-4, Pl. XLVI.	?
258	Tomb 760	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	0.88 m long X 0.78 m wide X 0.86 m high	Rock	3.33	Petrie, Brunton & Murray 1923: 22-4, Pl. XLVI.	Yes
259	Tomb 785	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	1.65 m long X 0.96 m wide X 1.01 m high	Rock	2.74	Petrie, Brunton & Murray 1923: 22-4, Pl. XLVI.	Yes
260	Tomb 770	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	1.82 m X 0.81 m wide X 0.93 m high	Rock	1.30	Petrie, Brunton & Murray 1923: 22-4, Pl. XLVI.	Yes
261	Tomb 740	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	3.35 m long X 2.99 m wide X 1.04 m high	Rock	0.96	Petrie, Brunton & Murray 1923: 22-4, Pl. XLVI.	Yes

Cat No.	Identity	Location	Period	Substructure Type	Burial chamber dimensions	Surrounding geology	Roof thickness in metres	Reference	Robbed
266	Tomb 560	Sedment	Dynasty 2	IIA	2.5 m long X 1.3 m wide X 1.37 m high	Gravel and Marl	2.13	Petrie and Brunton 1924: 2 and tomb register Pl.XXXVI.	No
267	Tomb 526	Sedment	Dynasty 2	IIA	2.48 m long X 1.27 m wide X 1.54 m high	Gravel and Marl	1.88	Petrie and Brunton 1924: Tomb register Pl.XXXVI	No
268	Tomb 559	Sedment	Dynasty 2	IIA	1.44 m long X 1.27 m X 1.25 m high	Gravel and Marl	3.30	Petrie and Brunton 1924: Tomb register Pl.XXXVI	No
269	Tomb 568	Sedment	Dynasty 2	IIA	1.72 m long X 0.99 m wide X 1.1 m* high	Gravel and Marl	0.52	Petrie 1999: 35.	Yes
270	Tomb 569	Sedment	Dynasty 2	IIA	2.08 m long X 0.99 m wide X 1.11 m high	Gravel and Marl	1.48	Petrie 1999: 36.	Yes
271	Tomb 94	Sedment	Dynasty 2	IIA	6.35 m long X 2 m wide X 2.13 m high	Gravel and Marl	5.48	Petrie and Brunton 1924: Pls. XXXVI and LXXXI.	Yes
274	Tomb 562, Cemetery 400	Qau	Dynasty 2 - 3	IIA	3.88 m long X 2.03 m wide X 2.15 m high	Gravel	6.48	Brunton 1927: 12 and Tomb register Pl. X.	Yes
275	Tomb 429 Cemetery 400	Qau	Dynasty 2 - 3	IIA	3.04 m long X 1.85 m wide X 1.67 m high	Gravel	4.50	Brunton 1927: 11-12 and 15, Tomb register Pl. X.	Yes
276	Tomb 507, Cemetery 400	Qau	Dynasty 2 - 3	IIA	3.80 m long X 1.52 m wide X 1.77 m high	Gravel	5.35	Brunton 1927: 12 and Tomb register Pl. X.	Yes
277	Tomb 438, Cemetery 400	Qau	Dynasty 2	IIA	1.90 m long X 1.77 m wide X ? m high	Gravel	?	Brunton 1927: 15, Tomb register Pl. X.	Yes
278	Tomb 3112, Cemetery 3100	Badari	Dynasty 2	IIA	3.68 m long X 1.95 m wide X 1.60 m high	Limestone detritus	3.12	Brunton 1927: 14, 16 and Tomb register Pl. X.	Yes, via entrance
335	Tomb 205	Armant	Dynasty 2	IIA	6.4 m long X 3.3-3.8 m wide X 1.8 m high	Gravel and rock	2.40	Myers and Fairman 1931: 224	Yes
336	Tomb 206	Armant	Dynasty 2	IIA	5.5 m long X 2-2.3 m wide X 1.6 m high	Gravel and rock	2.80	Myers and Fairman 1931: 224	Yes
337	Tomb 207	Armant	Dynasty 2	IIA	5 m long X 2.3 m wide X 2 m high	Gravel and rock	2.40	Myers and Fairman 1931: 224	Yes
338	Tomb 208	Armant	Dynasty 2	IIA	3.5 m long X 3.4-4.4 m wide X 2 m high	Gravel and rock	1.20	Myers and Fairman 1931: 224	Yes
NIC	St. 2	Elkab	Dynasty 2	IIA	1 m long X 1 m wide X 0.80 m high	Nile silts	0.20	Quibell 1897: 7.	No
343	Tomb 64	Elkab	Dynasty 2	IIA	1.5 m long X 0.6 m wide X 0.7 high.	Nile silts	0.60	Hendrick× 1994: 152 and 184.	No
	Dynasty 3								
114	S 3040	Saqqara	Dynasty 3	IIA	7 m long × 1.2 m wide × ??? M high	Rock	?	Reisner 1936: 163.	?
NIC	S 2301	Saqqara	Dynasty 3	IIA	1.5 m long X 1.5 m wide X 1 m high	Rock	2.80	Quibell 1923: 29; Reisner 1936: 163.	?
117	S 2445 North	Saqqara	Dynasty 3	IIA + IIA	1.6 m long × 1 .6 m wide X 1 .4 m high	Rock	2.00	Quibell 1923: 41; Reisner 1936: 159-60.	?
"	" South	"	"	"	Unfinished	Rock	?	"	?
118	S 3050	Saqqara	Dynasty 3	IIA + IIA-C	6.25 m long × ??? m wide X 1.8 m high	Hard Limestone	7.00	Martin 1971: 2; 1974: 21–5.	Yes
219	Tomb 1004	Tarkhan	Dynasty 3	IIA	1.42 m long X 1.01 m wide.	Gravel	?	Petrie, Wainwright and Gardiner 1913: 13 and 27.	No
279	Tomb 3229, Cemetery 3200	Badari	Dynasty 3	IIA	2.08 m long X 1.95 m wide X 1.65 m high	Limestone detritus	4.44	Brunton 1927: 14, Tomb register Pl. XI.	Yes and into adjacent 3228 via tunnel
280	Tomb 3228, Cemetery 3200	Badari	Dynasty 3	IIA	Upper burial chamber 0.63 m long X 1.09 m wide X 1.37 m high. Lower burial chamber 1.9 m long X 1.6 m wide X 1.42 m high	Limestone detritus	2.23 and 0.9	Brunton 1927: 14 and Tomb register Pl. XI.	Yes, via tunnel from adjacent tomb 3229.
281	Tomb 3227, Cemetery 3200	Badari	Dynasty 3	IIA	3.7 m long X 1.8 m wide	Limestone detritus	9.00	Brunton 1927: 14 and Tomb register Pl. XI.	Yes
303	N 574, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA	2.8 m long × 1.7 m wide (+ niche) × 1.5 m high	Gravel	4.50	Reisner 1932: 220–1; 1936: 182.	Yes
304	N 599, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA	1.65 m long × 1.4/1.1 m wide × 1.2 m high	Gravel	3.40	Reisner 1932: 229; 1936: 182.	No
305	N 689	Naga el-Deir	Dynasty 3	IIA	3.25 m. long X 1.49 m wideX 1.50 m high	Gravel	5.75	Reisner 1932: 243–6; 1936: 181.	Yes
306	N 573 + 587, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA + IIA	N 573 - 1.3 m long X 1.1 m. wide X 1 m high.	Gravel	3.85	Reisner 1932: 217–8; 1936: 181.	Yes, through the roof of the chamber.
"	"	"	"	"	N 587 - 2.7 m. long X 1.4-1.5 m wide X 1.6m high	Gravel	5.10	" "	
315	R 1	Reqaqnah	Dynasty 3	IIA	Approx. 1.75 m high	Gravel	6.20	Garstang 1904: 22; Reisner 1936: 179–80.	Yes
316	R 40	Reqaqnah	Dynasty 3	IIA	Approx. 1.75 m high	Gravel	7.25	Garstang 1904: 21-3; Reisner 1936: 180.	Yes, via a 'hole' from above.
319	K1	Beit Khallaf	Dynasty 3	IIA	5 m long X 5 m wide X 3 m high	Gravel	16.70	Garstang 1903: 3-4; 8-11; Reisner 1936: 172-4.	Yes, via a robber's tunnel into burial chamber
320	K2	Beit Khallaf	Dynasty 3	IIA + IIA	Northern chamber	Gravel	9.00	Garstang 1903: 11-12; Reisner 1936: 174-6	Yes
"	"	"	"	"	Southern chamber	"	12.00	"	
321	K3	Beit Khallaf	Dynasty 3	IIA	Approx. 2.5 m high	Gravel	8.00	Garstang 1903: 15-16; Reisner 1936: 177-8	Yes
322	K4	Beit Khallaf	Dynasty 3	IIA	Approx. 1.45 m high	Gravel	6.00	Garstang 1903: 14-15: Reisner 1936: 178-9	Yes
323	K5	Beit Khallaf	Dynasty 3	IIA	Approx. 3.75 m high	Gravel	7.50	Garstang 1903: 15-16; Reisner 1936: 176-7.	Yes, by passage from above
	Dynasty 4								
317	R75	Reqaqnah	Dynasty 4, Sneferu	IIA	Approx. 3.5 m long X 3.5 m wide	Gravel	?	Garstang 1904: 31-2; Reisner 1936: 231 .	No
330	Tomb 353	Ballas	Dynasty 4	IIA	6.15 m long X 1.4 m wide X 6.1 m deep	Hard gravel	2.00	Quibell 1896: 4	?
331	Tomb 201	Ballas	Dynasty 4	IIA	1.3 m long X 0.9 m wide X 0.9 m high	Hard gravel	2.60	Quibell 1896: 5.	?

	Type IIB								
Cat. No.	Identity	Location	Period	Substructure Type	Burial chamber dimensions	Surrounding geology	Roof thickness in m	Reference	Robbed
	Dynasty 2								
184	Op. 4/148	Helwan	Dynasty 2	IIB	3.1 m long X 1.2/2.5 m wideX 1.5 m high	Gravel	2.85	Köhler 2009: 284.	Yes, via tunnel from o/s mastaba into niche
185	Op. 4/62	Helwan	Dynasty 2	IIB	0.8 m	Gravel	2.88	Köhler 2008c: 118.	?
186	Op. 4/103	Helwan	Dynasty 2	IIB	1.1 m high	Gravel	2.20	Köhler 2007: 201-202.	Yes, via tunnel through burial chamber roof.
187	Op. 4/2	Helwan	Dynasty 2	IIB	1.5 m long X 1.2 m wide X 1.35 m high	Gravel	1.85	Köhler 2000b: 88; 2014: 133-4	Yes, via the stairwell and from above
188	173.H.9	Helwan	Dynasty 2	IIB	2.4 m long X 1 m wide X 1.5 m high	Gravel	0.60	Saad 1957: 63.	Yes, via tunnel from above
	Dynasty 3								
307	N 518, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIB	1.2 m long × 1.2 m wide × 0.8 m high	Gravel	2.15	Reisner 1932: 197.	Yes
	Dynasty 4								
311	N 561b, Cemetery 500-900	Naga el-Deir	Dynasty 4, Sneferu	IIB	1.45 m long X 1.2 m. wide × 1 m. high	Gravel	1.00	Reisner 1932: 212-3	No

	Type IIA-C								
Cat. No.	Identity	Location	Period	Substructure Type	Burial chamber dimensions	Surrounding geology	Roof thickness in m	Reference	Robbed
	Dynasty 3								
61	Tomb no. 1 Covington's Tomb (Mastaba T).	Giza	Dynasty 3	IIA-C	5 m long X 2 m wide X 2 m high	Sandstone and marl	21.5	Covington 1905: 219-233; Petrie 1907: 7-8.	Yes, via stair-shaft and shaft
118	S 3050 North	Saqqara	Dynasty 3	IIA + IIA-C	5 m long × ?? m wide X 1.2-1.5 m high	Rock	5	Martin 1971: 2; 1974: 21-5.	Yes, via stair-shaft
119	S 2405 (Hesy-ra)	Saqqara	Dynasty 3	IIA-C	2.2-2.5 m high	Rock	7.9-8.2	Quibell 1913: passim; Reisner 1936: 158-9.	Yes, via stair-shaft
NIC	S 2470	Saqqara	Dynasty 3	IIA-C	1.2 m long X 1 m wide X 1 m high	Rock	3.7	Quibell 1923: 43	?
120	S 3070 North	Saqqara	Dynasty 3	IIA-C + IIC	3.2 m long X 2.2 m wide X 1.75 m high	Rock	8.7	Emery 1968: 11-3	Yes, via stair shaft
308	N 585, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA-C	1.6 m long X 1.3-1.5 m wide X 1.1 m high	Gravel	2.4	Reisner 1932: 224.	Yes, via stair shaft?
309	N 586, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA-C	1.6 m long X 1.35 m wide X 1.1 m high	Gravel	2.4	Reisner 1932: 225.	Yes, via stair shaft
310	N 593, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA-C	1.5 m long X 1.25 m wide X 1.1 m high	Gravel	2.3	Reisner 1932: 226.	Yes, via stair shaft?
344	Tomb 274, The Rock Necropolis	Elkab	Dynasty 3	IIA-C	3 m long × 1.7 m wide X 2 m high	Rock	22.5	Limme 2000: 26-31; Huyge 2003: 29.	Yes and reused and refilled
	Dynasty 4								
77	AS 33	Abusir	Dynasty 4	IIA-C	2.51 m wide X 3.7 m long X 2.5 m high.	Limestone bedrock	13.35	Barta 2010: 57-182.	Yes, via stair-shaft
78	Tomb of Hetepi (AS 20)	Abusir	Dynasty 4	IIA-C + IIA-C	Southern 3.7 m long X 1.5-2 m wide X 1.4 m high	Tafl bedrock	13.38	Bárta, Coppens and Vymazalová 2010: 3-56	Yes, via stair-shafts
"	"	"	"	"	Northern 1.8 m long X 1 m wide X 0.6 m high.	"	10.6	"	"

Chart D

Cat. No.	Identity	Location	Period	Substructure Type	Burial chamber dimensions	Surrounding geology	Roof thickness in metres	Liner	Reference	Robbed
	Dynasty 2									
74	Tomb 12B-6	Abusir	Dynasty 2.	IIC	1.4 m long X 1.2 m wide X 1.1 m high	Mudstone	2.1		Bonnet 1928: 3	No
75	Tomb 11D-2	Abusir	Dynasty 2	IIC	1.8 m long X 1.2 m wide X 1.5 m high.	Mudstone	3.9		Bonnet 1928: 3.	No
189	256.H.8	Helwan	Dynasty 2	IIC	1.5 m long X 1.3 m wide X 1.3 m high.	Gravel	1		Saad 1957: 59.	Yes, via tunnel from above.
190	308.H.6	Helwan	Dynasty 2	IIC	2.5 lm long X 1.4 m wide X 1.7 m high	Gravel	1.40		Saad 1957: 57	Yes, via tunnel from above burial chamber.
191	527.H.7	Helwan	Dynasty 2	IIC	1.5 m long X 1.2 m wide X 1.2 m high.	Gravel	1.7		Saad 1957: 58.	Yes, via tunnel from above.
192	647.H.7	Helwan	Dynasty 2	IIC	0.9 m long X 0.6 m wideX 0.7 m high.	Gravel	0.6		Saad 1957: 58.	Yes, via tunnel from above.
193	670.H.7	Helwan	Dynasty 2	IIC	1.6 m long X 1.1 m wide X 1.1 m high	Gravel	2.1		Saad 1957: 58.	Yes, via tunnel from above burial chamber.
194	379.H.8	Helwan	Dynasty 2	IIC	1.5 m long X 0.7 m wide X 1.2 m high	Gravel	0.8		Saad 1957: 42-43.	Yes, via hole in ceiling of burial chamber
195	381.H.8	Helwan	Dynasty 2	IIC	1.4 m long X 1 m wide X 1.25 m high	Gravel	1.95		Saad 1957: 17-18	Yes, via tunnel above burial chamber
196	426.H.8	Helwan	Dynasty 2	IIC	1.3 m long X 0.9 m wide X 1 m high.	Gravel	1.2		Saad 1957: 60-1.	Yes, via tunnel from above burial chamber.
197	788.H.8	Helwan	Dynasty 2	IIC	1.9 m long X 1.1 m wide X 1.1 m high	Gravel	1.1		Saad 1957: 61.	Yes, via tunnel from above burial chamber.
198	99.H.9	Helwan	Dynasty 2	IIC	2.15 m long X 1.1 m wide X 1.15 m high	Gravel	1.15		Saad 1957: 62.	Yes, via tunnel from above burial chamber.
199	103.H.9	Helwan	Dynasty 2	IIC	1.4 m long X 1 m wide X 1.2 m high.	Gravel	1.65		Saad 1957: 62.	Yes, via tunnel from above burial chamber.
200	132.H.9	Helwan	Dynasty 2	IIC	1.6 m long X 0.85 m wide X 1.4 m high.	Gravel	1		Saad 1957: 63.	Yes, via tunnel from above burial chamber.
201	Op. 4/115	Helwan	Dynasty 2	IIC	2 m long X 1.7 m wide	Gravel	?		Köhler 2008a: 172.	Yes, route unknown
202	Op. 4/153	Helwan	Dynasty 2	IIC	1.6 m X 1.9 m	Gravel	?		Kohler 2009: 284.	Yes, via door blocking and through the roof.
203	1.H.5	Helwan	Dynasty 2.	IIC	1.55 m long X 1.1 m wide X 0.9 m high.	Gravel	2.7		Saad 1951: 23-26	No
262	Tomb 720	Lahun, Bashkatib Cemetery	Dynasty 2	IIC	0.86 m long X 1.27 m wide X 0.91 m high	Limestone and marl	0.98		Petrie, Brunton & Murray 1923: 22-4, Pl. XLVI.	No
263	Tomb 768	Lahun, Bashkatib Cemetery	Dynasty 2	IIC	1.04 m long X 1.67 m wide X 1.09 m high	Limestone and marl	0.87		Petrie, Brunton & Murray 1923: 22-4, Pl. XLVI.	No
282	Tomb 1520 Cemetery 1500-1800	Hemamieh	Dynasty 2	IIC	1.62 m long X 1.34 m wide X 0.91 m high	Limestone gravel	2.06		Brunton 1927: 13 and Tomb register Pl. X.	No
283	Tomb 1561 Cemetery 1500-1800	Hemamieh	Dynasty 2	IIC	1.27 m long X 0.76 m wide X 0.71m high	Limestone gravel	2.74		Brunton 1927: 13 and Tomb register Pl. X.	No
284	Tomb 1562 Cemetery 1500-1800	Hemamieh	Dynasty 2	IIC	1.44 m long X 0.76 m wide X 0.71 m high	Limestone gravel	1.6		Brunton 1927: 13 and Tomb register Pl. X.	No
	Dynasty 3									
59	The inner mastaba	Giza, Nazlet Batran	Dynasty 3	IIC	?	Sandstone and marl	7		Kromer 1991: 16-8.	No - excavator unable to move blockings.
76	AS 54	Abusir	Dynasty 3	IIC	3 m long × 2.04 m wide × 2.01 m high	Rock	10.1		Bárta 2012: 50-4	Yes , via shaft
120	S 3070 South	Saqqara	Dynasty 3	IIA-C + IIC	Dogleg' upper chamber 1.6-1.8 m high; lower 3.5 m long	Limestone	8.7 & 13.5		Reisner 1936: 166; Emery 1968: 11-3	Yes, via shaft
131	S 3518 South	Saqqara	Dynasty 3	IIC + IIC	No dimensions - now upper baboon gallery?	Limestone	?		Emery 1970: 10; 1971: 1, 3-4	Yes, intruded upon from upper baboon gallery
"	" North	"	"	"	6 m long X 1. 5 m wide X 1.5 m high	Limestone	9		"	Yes, via shaft
132	S 3517 South	Saqqara	Dynasty 3	IIC + IIC	1.8 m long X 1.7 m wide X 1.4 m high	Limestone	5.25		Emery 1966: 7, Fig. 3	Yes, via shaft
"	" North	"	"	"	5 m long X 2.5 m wide X 1.1 m high	Limestone	6.75		"	Yes, via shaft
NIC	S 2110	Saqqara	Dynasty 3	IIC	1.4 m long X 0.7 m wide X 1.4 m high	Limestone	1.1		Quibell 1923: 19	?
NIC	S 2243	Saqqara	Dynasty 3	IIC	1.26 m long X 0.9 m wide X 0.98 m high	Limestone	0.77		Quibell 1923: 27	?
NIC	S 2260	Saqqara	Dynasty 3	IIC	1.3 m long X 1 m wide X 1 m high	Limestone	1.6		Quibell 1923:28	? Although burial found
NIC	S 2319	Saqqara	Dynasty 3	IIC	3 m long X 2 m wide X 2.1 m high	Limestone	6.9		Quibell 1923: 33	?
NIC	S 2323C	Saqqara	Dynasty 3	IIC	1.2 m long X 0.8 m wide X 0.6 m high	Limestone	2.4		Quibell 1923: 35	No
NIC	S 2468	Saqqara	Dynasty 3	IIC	0.8 m long X 0.8 m wide X 0.8 m high	Limestone	1.7		Quibell 1923: 43	?
NIC	S 2475	Saqqara	Dynasty 3	IIC	1.1 m long X 1 m wide X 0.7 m high	Limestone	2.3		Quibell 1923: 43	?
NIC	S 2480	Saqqara	Dynasty 3	IIC	1.2 m long X 1.2 m wide X 0.8 m high	Limestone	1.6		Quibell 1923: 44	?
204	287.H.6	Helwan	Dynasty 3	IIC	4.7 m long X 1.7 m wide X 1.5 m high	Gravel	8.5		Saad 1951: 3-5	Yes, via western magazine
264	Tomb 769	Lahun, Bashkatib Cemetery	Dynasty 3	IIC	Burial chamber west: 1.47 m long X 0.88 m wide X 0.81 m high. South: 2.13 m long X 1.06 m wide X 1.19 m high.	Limestone and marl	2.35 & 2.73		Petrie, Brunton & Murray 1923: 22-4, Pl. XLVI.	No
265	Tomb 735	Lahun, Bashkatib Cemetery	Dynasty 3	IIC	North: 1.65 m long X 1.04 m wide X 0.99 m high. South:	Limestone and marl	1.85 & 1.91		Petrie, Brunton & Murray 1923: 22-4, Pl. XLVI.	
	Dynasty 4									
79	Tomb of Ity South	Abusir (South)	Dynasty 4, Early	IIC + IIA-C	3.5 m long X 2.7 m wide X 1.75 m high	Soft limestone	8.25	Tafl	Verner 1995: 78-90; Barta 2001: 1-16	Yes, via shaft
80	Lake of Abusir Tomb 1	Abusir	Dynasty 4	IIC	2.5 m long × 1.30 m wide × 1.7 m high	Tafl bedrock	6.8	Mud-brick	Bárta 2000: 335-9; 2001: 21-8	Yes via tunnel through north-east corner of shaft
205	Tomb No. 1	Dahshur	Dynasty 4	IIC	5.1 m long X 3 m wide X 4.25 m high	?	6.75	Stone	De Morgan 1895: 8-9	?
206	DAS 9, Ipy	Dahshur (South)	Dynasty 4, Sneferu	IIC	5.26 m long X 1.72 m wide X 1.95 m high	Limestone and shale	5.8	Stone	Alexanian & Seidlmayer 2002: 3-9.	Yes
207	DAS 32-4 (Ii-nefer)	Dahshur	Dynasty 4, Sneferu	IIC	4.5 m long X 2.5 m wide X 3.5 m high	?	14	Stone	Barsanti 1902: 198-201.	Yes
209	Mastaba I/1	Dahshur	Dynasty 4, Sneferu	IIC	2.73 m long X 2.12 m wide X 2.19 m high	Tafl bedrock	7.3	Stone	Seidelmayer & Alexanian 1993: 272-78	Yes, via upper corner of broken portcullis stone.
210	Mastaba II/1, Netjer-Aperef	Dahshur	Dynasty 4, Sneferu	IIC	2.88 m long X 2.06 m wide X 2.18 m high	Tafl bedrock	6.8	Stone	Seidelmayer & Alexanian 1993: 278-83	Yes, via hole in portcullis.
211	Mastaba I/2	Dahshur	Dynasty 4, Sneferu	IIC	2.73 m long X 2.12 m wide X 3.2 m high	Tafl bedrock	7.8	Stone	Seidelmayer & Alexanian 1993: 284-88.	Yes, via floor of burial chamber.
220	Mastaba No. 6 Rahotep	Meidum	Dynasty 4, Sneferu	IIC + IIC	2.7 m long X 2 m wide X 3.4 m high	Soft marl	2		Petrie 1892: 16-7	Yes
"	" Nefert	"	"	"	4.3 m long X 3.13 m wide X 1.8 m high	Soft marl	3.75		"	No
221	Mastaba No. 9 Ranefer	Meidum	Dynasty 4, Sneferu	IIC + IIC	2.8 m long X 1.6 m wide X 3.8 m high	Soft marl	?		Petrie 1892: 17; Reisner 1936: 212-3	Yes, via tunnel from false door
222	Mastaba No. 4 Heneken.	Meidum	Dynasty 4, Sneferu	IIC	3 m long X 2.5 m wide X 2.8 m high	Soft marl	4.7		Petrie 1892: 20; Reisner 1936: 214-5	Yes
223	Mastaba No. 7 North	Meidum	Dynasty 4, Sneferu	IIC + IIC	1.4 m long X 1.3 m wide X 1.7 m high	Soft marl	5.5		Petrie 1892: 20; Reisner 1936: 214.	Yes , details unknown.
"	" South				3 m long X 2.9 m wide X 1.5 m high	"	5.2		"	"
224	Tomb 416, Northern Cemetery	Meidum	Dynasty 4, Sneferu	IIC	2.5 m long × 2.5 m wide X 1.4 m high	Soft marl	7.2		Reisner 1936: 215.	
225	Mastaba No. 8 South	Meidum	Dynasty 4, Sneferu	IIC + IIC + IIC	3.35 m long X 2.1 m X wide X 2.5 m high.	Soft marl	2.7	Stone	Petrie 1892: 18-19; Reisner 1936: 212	Yes
"	" Spouse	"	"	"	3.1 m long X 1.6 m wide X 1.7 m high	"	3		"	Yes
226	Mastaba No. 1	Meidum	Dynasty 4, Sneferu	IIC	3.1 m long X 2 m wide X 3.6 m high	Soft marl	3.6	Stone	Petrie 1892: 20. Reisner 1936: 212.	Yes, by tunnel from southern false door.
251	Mastaba No. 16 Atet	Meidum	Dynasty 4, Sneferu	III + IIC	5.3 m long X 3.53-4.11 m wide X ? M high	Soft marl	?		Petrie, Mackay and Wainwright 1910: 4-6, 18-22	Yes, in antiquity via tunnel under burial chamber

Type IIC Burial Chamber Chart

Cat. No.	Identity	Location	Period	Substructure Type	Burial chamber dimensions	Surrounding geology	Roof thickness in metres	Liner	Reference	Robbed
227	Tomb 50, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	4.8 m long X 2.5 m wide X 1.6 m high	Gravel & loose rock	4.8		Petrie, Mackay and Wainwright 1910: 6, 26 and 28.	No
228	Tomb 51, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	2.65 m long X 1.29m wide X 1.56 m high	Gravel & loose rock	10.2	Stone	Petrie, Mackay and Wainwright 1910: 26 and 28.	?
229	Tomb 52, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	2.48 m long X 0.61 m wide X ??? m high	Gravel & loose rock	?		Petrie, Mackay and Wainwright 1910: 27.	No
230	Tomb 53, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	2.6 m long X 1.5 m wideX 1.5 m high	Gravel & loose rock	7.6	Stone	Petrie, Mackay and Wainwright 1910: 26.	?
231	Tomb 55, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	2.48 m long X 0.61 m wide X 2.13 m high	Gravel & loose rock	6.25		Petrie, Mackay and Wainwright 1910: 27.	No
232	Tomb 56, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	2.69 m long X 2.05 m wide X 2.43 m high	Gravel & loose rock	8.9		Petrie, Mackay and Wainwright 1910: 27.	No
233	Tomb 57, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	2.61 m long X 1.56 m wide X 1.57 m high	Gravel & loose rock	7.9	Stone	Petrie, Mackay and Wainwright 1910: 26-7.	No, but contained six secondary 22nd Dynasty burials
234	Tomb 61, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	2.6 m long X1.5 m wide X 1.5 m high	Gravel & loose rock	7.6	Stone	Petrie, Mackay and Wainwright 1910: 26 and 28.	?
235	Tomb 62, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	2.70 m long X 1.60 m wide X 1.58 m high	Gravel & loose rock	8.7	Stone	Petrie, Mackay and Wainwright 1910: 25 and 28.	?
236	Tomb 63, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	2.50 m long X 1.52 m wide X 1.54 m high	Gravel & loose rock	8.2	Stone	Petrie, Mackay and Wainwright 1910: 25 and 28.	?
237	Tomb 66, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	2.08 m long X 1.58 m wide X 1.52 m high	Gravel & loose rock	7	Stone	Petrie, Mackay and Wainwright 1910: 26.	?
238	Tomb 68, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	2.64 m long X 1.57 m wide X 1.56 m high	Gravel & loose rock	7.5	Stone	Petrie, Mackay and Wainwright 1910: 25-6 and 28.	?
239	Tomb 69, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	2.61 m long X 1.6 m wide X 1.56 m high	Gravel & loose rock	7.8	Stone	Petrie, Mackay and Wainwright 1910: 26.	?
240	Tomb 76, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	2.64 m long X 1.56 m wide X 1.56 m high	Gravel & loose rock	7.2	Stone	Petrie, Mackay and Wainwright 1910: 26 and 28.	?
241	Tomb 80, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	Passage 0.93 m wide X 1,93 m high	Gravel & loose rock	2.1		Petrie, Mackay and Wainwright 1910: 27-8.	Yes, via two tunnels into passage
242	Tomb 81, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	2.64 m long X 1.56 m wide X 1.52 m high	Gravel & loose rock	7.6	Stone	Petrie, Mackay and Wainwright 1910: 26 and 28.	?
312	N 629, Cem. 500-900	Naga el-Deir	Dynasty 4, Sneferu	IIC	1.5 m long X 1.3-1.5 m wide X 1.1 m high	Gravel	2.8		Reisner 1932: 238-9.	Yes
313	N 739	Naga el-Deir	Dynasty 4, Sneferu	IIC	1.85 m long X 1.85 m wide X 1.1 m high.	Gravel	4.6		Reisner 1932: 248.	Yes, via shaft
314	N 546 + N604, Cem. 500-900 North	Naga el-Deir	Dynasty 4, Sneferu	IIC	1.2 m long X 1 m wide X 1 m high	Gravel	2		Reisner 1932: 208 and 231.	Yes
"	" South	"	"	"	1.35 m long X 1.5 m wide X 1.5 m high	"	2.2		"	Yes, via tunnel over portcullis
345	Mastaba A, Kamena	Elkab	Dynasty 4, Sneferu	IIC	1.35 m long X 0.7 m wide X 1 m high	Nile sediments	3.5	Stone	Quibell 1896: 3-4; Reisner 1936: 229.	No

Chart E2

Cat. No.	Identity	Location	Period	Substructure Type	Burial chamber dimensions	Surrounding geology	Roof/backfill thickness in metres	Liner	Reference	Robbed
	Dynasty 4									
243	Tomb A, Great Western Cemetery	Meidum	Dynasty 4, Sneferu	III	2.5 m long X 1.8 m wide X 1.8 m high	Soft rock	7.5	Stone	Petrie, Mackay and Wainwright 1910: 22-3.	Yes, via sloping passage
244	Tomb B, Great Western Cemetery	Meidum	Dynasty 4, Sneferu	III	2.69 m long X 1.81 m wideX 1.85 m high	Soft rock	?	Stone	Petrie, Mackay and Wainwright 1910: 23-4.	Yes, via sloping passage
245	Tomb C, Great Western Cemetery	Meidum	Dynasty 4, Sneferu	III	2.59 m long X 1.9 m wide X 1.86 m high	Soft rock	?	Stone	(Petrie, Mackay and Wainwright 1910: 24.	Yes, via sloping passage
246	Tomb 202.	Meidum	Dynasty 4, Sneferu	III	2.62 m long X 1.82 m wide X 1.8 m high	Soft rock	7.6	Stone	Reisner 1936: 207.	Yes, via sloping passage
247	Tomb 277, west of pyramid enclosure	Meidum	Dynasty 4, Sneferu	III	2.6 m long X 1.8 m wide X 1.8 m high	Soft rock	7.4	Stone	Reisner 1936: 206-7.	Yes, via sloping passage
248	Tomb 393.	Meidum	Dynasty 4, Sneferu	III	2.62 m long X 1.82 m wide X 1.8 m high	Soft rock	8.5	Stone	Reisner 1936: 207.	Yes, via sloping passage
250	North Peribolos tomb	Meidum	Dynasty 4, Sneferu	III	2.31 m long × 1.93 m wide × 3.93 m high	Soft rock	3.25	Stone	Petrie, Mackay and Wainwright 1910: 12-3.	yes via sloping passage
251	Mastaba 16, Nefermaat and Atet	Meidum	Dynasty 4, Sneferu	III + IIC	3.15 m long X 2.05 m wide	Soft rock	2.2	Stone	Petrie, Mackay and Wainwright 1910: 4-6, 18-22; 1912	Yes, in ancient times
252	Mastaba 17, owner unknown	Meidum	Dynasty 4, Sneferu	III	6.27 m long X 2.08 m wide X 5 m high	Soft rock	11	Stone	Petrie 1892: 11-14.	Yes, via robbers tunnel in bedrock avoiding gravel fill.

Chart F

Cat. No.	Identity	Location	Period	Tomb Type	Entrance location relative to super-structure	Relationship of descent to axis of super-structure	Main approach to axis of burial chamber	Descent path	Direction of main descent	Stairwell construction	Reference
	Dynasty 1										
63	Tomb 1056	Tura el-Asmant	Dynasty 1, Naqada IIIC2-D	ID	?	?	Offset	Straight	East	Mud-brick lined	Yacoub 1981: 160.
64	Tomb 1035	Tura el-Asmant	Dynasty 1, Naqada IIIC2-D	ID	?	?	Offset	Straight	East	Mud-brick lined	Yacoub 1981: 160.
65	Tomb 986	Tura el-Asmant	Dynasty 1, Naqada IIIC2-D	ID	?	?	Axial	Straight	North-east	Mud-brick lined	Yacoub 1981: 160.
66	Tomb 130	Tura el-Asmant	Dynasty 1, Naqada IIIC2-D	ID stone tomb	?	?	Offset	Straight	South-east	Mud-brick lined	Yacoub 1981: 160.
67	Tomb 249	Tura el-Asmant	Dynasty 1, Naqada IIID	ID stone tomb	External	Axial	Axial	Straight	South-east	Mud-brick lined	El Khouli 1968: 75.
69	Mastaba IV	Abu Ghurab	Dynasty 1, Naqada IIIC2	ID	External?	Axial	Axial	Straight	West	Mud-brick lined	Radwan 2000: 509-13.
70	Tomb V	Abu Ghurab	Dynasty 1, Naqada IIIC2	ID	Inside mastaba?	Axial	Axial	L' shaped	West then north	Mud-brick lined	Radwan 1991: 305-8.
88	S 3506	Saqqara	Dynasty 1, Naqada IIIC2 - Den	ID	External	Lateral offset	Lateral offset	Straight	West	Mud-brick lined stone	Emery 1958: 37-42.
89	S 3035 (Hemaka)	Saqqara	Dynasty 1, Naqada IIIC2 - Den	ID	External	Lateral offset	Lateral offset	Straight	West	Mud-brick lined gravel and stone	Emery 1938: 3-13.
90	S 3036	Saqqara	Dynasty 1, Naqada IIIC2 - Den	ID	External	Lateral offset	Axial	Straight	West	Mud-brick lined gravel and stone	Emery 1949: 71-81.
91	S 3038 (Nebitka).	Saqqara	Dynasty 1, Naqada IIIC2 - Adjib	ID	External	Lateral offset	Lateral offset	Straight	West	Mud-brick lined gravel and stone	Emery 1949: 82-92.
92	S X	Saqqara	Dynasty 1, Naqada IIIC2 - Adjib	ID	External	Axial	Axial	L' shaped	West then north	Rock-cut	Emery 1949: 107–9.
93	S 3338	Saqqara	Dynasty 1, Naqada IIIC2 - Adjib	ID	Inside mastaba	Internal	Axial	L' shaped	West then north	Gravel and rock-cut	Emery 1949: 124-9.
94	S 3500	Saqqara	Dynasty 1, Naqada IIID - Qa'a	ID	External	Offset	Axial	Straight	West	Gravel and rock-cut	Emery 1958: 98-102.
95	S 3505	Saqqara	Dynasty 1, Naqada IIID - Qa'a	ID	External	Offset	Axial	L' shaped	South then west	Rock-cut	Emery 1958: 5-13.
96	S 2105	Saqqara	Dynasty 1, Naqada IIID - Qa'a	ID	Under mastaba wall	Offset	Axial	Straight	West	?	Quibell 1923: 19.
142	1.H.4	Helwan	Dynasty 1, Naqada IIIC2-D	ID	External	Lateral	Lateral offset	Straight	East	Gravel cut	Saad 1951: 5-6.
143	150.H.5	Helwan	Dynasty 1, Naqada IIIC2	ID	External	Axial	Axial	Straight	South	Gravel cut	Saad 1951: 28-9.
144	553.H.2	Helwan	Dynasty 1, Naqada IIIC2-D	ID	?	?	Axial	U' Shaped	South then north	Mud-brick lined	Saad 1947: 107.
145	559.H.2	Helwan	Dynasty 1, Naqada IIIC2-D	ID	?	?	Axial	Straight	North	Mud-brick lined	Saad 1947: 107-8.
146	499.H.2	Helwan	Dynasty 1, Naqada IIIC2-D	ID	?	Axial	Axial	Straight	South	Mud-brick lined	Saad 1947: Pl. XLI.
147	701.H.3	Helwan	Dynasty 1, Naqada IIIC2-D	ID	?	?	Axial	L' shaped	West then south	Gravel cut	Saad 1947: 173.
148	1371.H.2	Helwan	Dynasty 1, Naqada IIIC2 - Adjib	ID stone floor	?	?	Axial	L' shaped	East then north	Mud-brick lined	Saad 1947: 109-10.
149	1502.H.2	Helwan	Dynasty 1, Naqada IIIC2	ID	?	?	Axial	L' shaped	East then south	Mud-brick lined	Saad 1947: 110-11.
150	426.H.4	Helwan	Dynasty 1, Naqada IIIC2-D	ID	?	?	Axial	Straight	North	Gravel cut	Saad 1951: 12-13.
151	407.H.4	Helwan	Dynasty 1, Naqada IIIC2-D	ID	?	?	Lateral offset	Straight	East	Gravel cut	Saad 1951: 11-12.
152	355.H.4	Helwan	Dynasty 1, Naqada IIIC2-D	ID	?	Axial	Axial	Straight	South	Mud-brick lined	Saad 1951: 8-9.
153	1473.H.2	Helwan	Dynasty 1, Naqada IIIC2-D	ID	External	Lateral axial	Axial	Straight	East	Mud-brick lined	Saad 1947: 110.
154	785.H.5	Helwan	Dynasty 1, Naqada IIIC2-D	ID	External	Lateral offset	Lateral offset	Straight	East	Mud-brick lined	Saad 1969: 20-2.
155	649.H.5	Helwan	Dynasty 1, Naqada IIIC2-D	ID	External	Axial	Axial	Straight	North	Mud-brick lined	Saad 1951: 41.
156	680.H.5	Helwan	Dynasty 1, Naqada IIIC2-D	ID	External?	Axial?	Axial	Straight	North-east	Mud-brick lined	Saad 1951: 42.
157	385.H.4	Helwan	Dynasty 1, Naqada IIIC2-D	ID stone tomb	?	Axial	Axial	Straight	South	Gravel and mud-brick	Saad 1951: 9-10.
158	40.H.3 (1/1 Köhler)	Helwan	Dynasty 1, Naqada IIIC2-D	ID stone tomb	Internal	Axial?	Axial	Straight	South	Stone steps and lining	Saad 1951: 164–66.
159	1.H.3	Helwan	Dynasty 1, Naqada IIIC2-D	ID stone tomb	External?	Axial	Axial	L' shaped	East then south	Mud-brick and stone lined	Saad 1947: 163-4.
160	60.H.1	Helwan	Dynasty 1, Naqada IIID	ID stone tomb	Inside mastaba	Axial	Axial	Straight	North	Mud-brick lined	Köhler 2008: 120.
161	9.H.1	Helwan	Dynasty 1, Naqada IIIC2, Den	ID stone tomb	External	Lateral offset	Lateral offset	Straight	East	Mud-brick lined	Saad 1947: 28.
162	653.H.4	Helwan	Dynasty 1, Naqada IIIC2-D	ID	?	?	Axial	Straight	South	Gravel cut	Saad 1951: 18-20.
287	N 1581, Cemetery 1500	Naga el-Deir	Dynasty 1, Naqada IIIC2-D	ID	External	?	Lateral offset	Straight	North-east	Mud-brick lined	Reisner 1908: 36-38; Reisner 1936: 68–9.
288	N 1512, Cemetery 1500	Naga el-Deir	Dynasty 1, Naqada IIIC2-D	ID	?	?	Lateral offset	Straight	North-east	Mud-brick lined	Reisner 1908: 38-40; Reisner 1936: 68–9.
324	M1	Mahasna	Dynasty 1, Naqada IIIC2-D	ID	?	?	Axial	Straight	South	Mud-brick lined	Garstang and Sethe 1903: 28, Pl. XXXIII.
327	Tomb I	Abydos	Dynasty 1, Naqada IIIC2-D	ID	?	Axial	Axial	Straight	South-east	Mud-brick lined	Hossein 2011: 271-3.
329	Tomb b91	El-Amrah	Dynasty 1, Naqada IIIC2-D	ID	?	?	Lateral offset	Straight	East	Mud-brick lined	Randall-MacIver and Mace 1902: 39.
	Dynasty 2										
289	N 1586, Cemetery 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	?	?	Lateral axial	Straight	North-east	Mud-brick lined	Reisner 1908: 41-42.
290	N 1513, Cemetery 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	?	?	Lateral offset	Straight	North-east	Mud-brick lined	Reisner 1908: 48-49.
291	N 1514, Cemetery 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	External	Lateral offset	Lateral offset	Straight	North-east	Mud-brick lined	Reisner 1908: 44-5.
292	N 1515, Cemetery 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	?	?	Lateral axial	Straight	North-east	Cut in *gebel* and plastered	Reisner 1908: 45-46.
293	N 1571, Cemetery 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	?	?	Lateral offset	?	North-east	?	Reisner 1908: 43-44.
294	N 1572, Cemetery 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	?	?	?	Straight	North-east	Mud-brick lined	Reisner 1908: 53-4.
295	N 1584, Cemetery 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	External	Lateral axial	Lateral axial	Straight	North-east	Mud-brick lined	Reisner 1908: 52.
296	N 1605, Cemetery 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	?	?	Lateral axial	Straight	North-east	Mud-brick lined	Reisner 1908: 54-5.
297	N 1611, Cemetery 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	?	?	Lateral	Straight	South-east	Mud-brick lined	Reisner 1908: 57-8.
298	N 1626, Cemetery 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	?	?	Axial	Straight	North-east	Mud-brick lined	Reisner 1908: 55-6.
299	N 3013, Cemetery 3000	Naga el-Deir	Dynasty 2	ID Corbel roof	?	?	Lateral offset	Straight	North	Cut in *gebel* and plastered	Reisner 1908: 74-5.
300	N 3017, Cemetery 3000	Naga el-Deir	Dynasty 2	ID Corbel roof	?	?	Lateral offset	Straight	North-east	Mud-brick lined slope	Reisner 1908: 72-4.
301	N 3551, Cemetery 3500	Naga el-Deir	Dynasty 2	ID Corbel roof	?	?	Lateral axial	Straight	North-east	Gravel cut	Mace 1909: 19 and 57.
302	N 4990, Cemetery 3500	Naga el-Deir	Dynasty 2	ID Corbel roof	External	Axial	Lateral offset	Straight	North-east	Gravel cut	Mace 1909: 20 and 68.

Cat. No.	Identity	Location	Period	Tomb Type	Entrance location relative to superstructure if present	Relation-ship of final descent to axis of super-structure	Main approach to axis of burial chamber(s)	Descent Path	Direction of main descent	Stairwell construction	Reference
	Dynasty 1										
55	Tomb KG3	Kafr Ghattati	Dynasty 1, Naqada IIIC2-D	IIA	?	?	Axial	Bent	North-east then north	Gravel cut stairway	Engles 1990: 80.
56	Tomb KG4	Kafr Ghattati	Dynasty 1, Naqada IIIC2-D	IIA	?	?	Axial	Bent	North-east then north	Gravel cut stairway	Engles 1990: 80.
57	Tomb KG10	Kafr Ghattati	Dynasty 1, Naqada IIIC2-D	IIA	?	?	Axial	Straight	West	Gravel cut stairway	Engles 1990: 84.
58	Tomb KG12	Kafr Ghattati	Dynasty 1, Naqada IIIC2-D	IIA	?	?	Axial	Straight	North	Gravel cut stairway	Engles 1990: 87.
97	S 3121	Saqqara	Dynasty 1, Qa'a	IIA	Internal, but accessible	Axial	Axia offset	L' shaped	South-west then south-east	Gravel and rock cut stairway	Emery 1949: 116-9.
98	S 3120	Saqqara	Dynasty 1, Qa'a	IIA	Internal, but accessible	Axial	Axial	L' shaped	South-west then south-east	Gravel and rock cut stairway	Emery 1949: 121-3.
	Dynasty 2										
60	Petrie's unknown tomb	Giza	Dynasty 2	IIA	?	?	?	?	?	Rock cut slope	Petrie 1907: 7
71	Tomb 10B-4	Abusir	Dynasty 2	IIA	?	?	Axial	Straight	South-east	Rock cut stairwell	Bonnet: 1928: 4-5.
72	Tomb 10C-3	Abusir	Dynasty 2	IIA	?	?	Axial	Straight	South-east	Rock cut stairwell	Bonnet: 1928: 4-5.
73	Tomb 13C-3 + 13B-1	Abusir	Dynasty 2	IIA	?	?	Axial	Straight	North	Stairway tunnelled in rock	Bonnet: 1928: 4-5.
99	S 2101	Saqqara	Dynasty 2	IIA	Internal	Axial offset	?	Straight	South	Rock cut stairway	Quibell 1923: 17; Reisner 1936: 146
100	S 3042	Saqqara	Dynasty 2	IIA	External	Lateral	Axial	L' shaped	West then south	Rock-cut stairway and trench	Reisner 1936: 144-5.
101	S 2452	Saqqara	Dynasty 2	IIA	Internal	Axial	Axial	Straight	South	Rock cut stairway	Quibell 1923: 41-2; Reisner 1936: 143
102	S 3477	Saqqara	Dynasty 2	IIA	Internal	Axial	Axial	U' shaped	North, then west, then south	Rock cut stairway	Emery 1962: 4.
103	S 3024	Saqqara	Dynasty 2	IIA	External	Lateral offset	Axial	L' shaped	West then south?	Rock cut stairway	Emery 1949: 11-2
104	S 2171	Saqqara	Dynasty 2	IIA	Internal	Axial offset	Axial	Dogleg	South	Mud-brick steps in gravel & rock-cut	Quibell 1923: 7, 23-4. Reisner 1936: 145.
105	S 2302	Saqqara	Dynasty 2	IIA	External	Lateral offset	Lateral	Straight	West	Rock cut stairway	Quibell 1923: 29-30; Reisner 1936: 138.
106	S 2307	Saqqara	Dynasty 2	IIA	Internal	Lateral offset	Axial	L' shaped	West	Rock cut stairway	Quibell 1923: 31; Reisner 1936: 140.
107	S 2322	Saqqara	Dynasty 2	IIA	Internal	Axial offet	Axial?	Straight	South	Rock cut stairway	Quibell 1923: 34. Reisner 1936: 141.
108	S 2337	Saqqara	Dynasty 2	IIA	Internal	Axial	Axial	Straight	South	Rock cut stairway	Quibell 1923: 35-6.
109	S 2406	Saqqara	Dynasty 2	IIA	Internal	Axial	Axial	Straight	South	Rock cut stairway	Quibell 1923: 38; Reisner 1936: 143, 145.
110	S 2429	Saqqara	Dynasty 2	IIA	Internal	Axial	Axial	L' shaped	West then south	Brick lined stairway	Quibell 1923: 40; Reisner 1936: 159-60.
111	S 2498	Saqqara	Dynasty 2	IIA	Internal	Lateral	Lateral	L' shaped	North then west	Rock cut stairway	Quibell 1923: 10, 44-5; Reisner 1936: 145.
112	S 2315	Saqqara	Dynasty 2	IIA	Internal	Lateral	?	L' shaped	West then south	Rock cut stairway	Quibell 1923: 33. Reisner 1936: 145.
113	S 2313	Saqqara	Dynasty 2	IIA	Internal	Axial	?	Dogleg	West, then south, then east and south	Rock cut stairway	Quibell 1923: 3, 32.
163	255.H.8	Helwan	Dynasty 2	IIA	?	?	Axial	L' shaped	North	Gravel cut stairway	Saad 1957: 59.
164	25.H.5	Helwan	Dynasty 2	IIA	?	?	Axial	Straight	North	Gravel cut stairway	Saad 1951: 27.
165	505.H.4	Helwan	Dynasty 2	IIA	?	?	Axial	L' shaped	West then north	Gravel cut stairway, mud-brick steps	Saad 1951: 15-7.
166	1075.H.8	Helwan	Dynasty 2	IIA	?	?	Axial	Straight	North	Gravel cut stairway	Saad 1957: 61.
167	25.H.4 (Op.2/1 Köhler)	Helwan	Dynasty 2	IIA	External	Axial	Axial	Straight	North	Gravel cut stairway	Saad 1951: 6–7, Pln. 4; Köhler 2005: 35-41.
168	Op. 3/1	Helwan	Dynasty 2	IIA	?	?	Axial	Straight	North	Gravel cut stairway	Köhler 2001: 23-5
169	810.H.3	Helwan	Dynasty 2	IIA	?	?	Axial	Straight	South	Gravel cut stairway	Saad 1947: 172-3 1957: 15-7.
170	409.H.8	Helwan	Dynasty 2	IIA	?	?	Axial	L' shaped	???? then south	Gravel cut stairway	Saad 1957: 60.
171	416.H.6	Helwan	Dynasty 2	IIA	?	?	Axial?	Straight?	North	Gravel cut stairway	Saad 1957: 20-22
172	235.H.8	Helwan	Dynasty 2	IIA	?	?	Axial?	L' shaped	West then north	Gravel cut stairway	Saad 1957: 29-31
173	Op. 4/94	Helwan	Dynasty 2	IIA	Internal	Axial	Axial	Straight	North	Gravel cut stairway?	Köhler 2007: 192-194.
174	Op. 4/123	Helwan	Dynasty 2	IIA	Internal	Axial	Axial	L' shaped	East then north	Gravel cut stairway?	Köhler 2008a: 172–3; 2008b: 122–3.
175	68.H.5	Helwan	Dynasty 2	IIA	External	Axial	Axial	Straight	North	Gravel cut stairway	Saad 1951: 27.
176	473.H.4	Helwan	Dynasty 2	IIA	?	?	Axial	L' shaped	West then north	Gravel cut stairway	Saad 1957: 57.
177	393.H.8	Helwan	Dynasty 2	IIA	?	?	Axial	Straight	North	Gravel cut stairway	Saad 1957: 59-60.
178	419.H.8	Helwan	Dynasty 2	IIA	?	?	Axial	Straight	South	Gravel cut stairway	Saad 1957: 60.
179	109.H.9	Helwan	Dynasty 2	IIA	?	?	Axial?	Straight?	North	Gravel cut stairway	Saad 1957: 39-40.
180	140.H.9	Helwan	Dynasty 2	IIA	?	?	Axial	Straight	North	Gravel cut stairway	Saad 1957: 63.
181	Op. 4/4	Helwan	Dynasty 2	IIA	Internal	Axial	Axial	Straight	North	Gravel cut stairway	Köhler 2000b: 89-91.
182	Op. 4/19	Helwan	Dynasty 2	IIA	?	?	Axial	Straight	South	Gravel cut stairway?	Köhler 2003: 89.
183	Op. 4/88	Helwan	Dynasty 2	IIA	External	Axial	Axial	Straight	North	Gravel cut stairway?	Köhler 2007: 192.
NIC	463.H.4	Helwan	Dynasty 2	IIA	Internal	Axial	Axial	Straight	South	Gravel cut stairway?	Saad 1951: Plate III
NIC	464.H.4	Helwan	Dynasty 2	IIA	Internal	Axial	Axial	Straight	South	Gravel cut stairway?	Saad 1951: Plate III
NIC	612.H.4	Helwan	Dynasty 2	IIA	Internal	Axial	Axial	Straight	North	Gravel cut stairway?	Saad 1951: Plate III
NIC	636.H.4	Helwan	Dynasty 2	IIA	Internal	Axial	Axial	Straight	North	Gravel cut stairway?	Saad 1951: Plate III
NIC	74.H.5	Helwan	Dynasty 2	IIA	Internal	Axial	Axial	Straight	North	Gravel cut stairway?	Saad 1951: Plate III
NIC	8.H.5	Helwan	Dynasty 2	IIA	External	Axial	Axial	Straight	North	Gravel cut stairway?	Saad 1951: Plate III
NIC	60.H.5	Helwan	Dynasty 2	IIA	?	Axial	Axial	Straight	South	Gravel cut stairway?	Saad 1951: Plate III
NIC	71.H.5	Helwan	Dynasty 2	IIA	?	Axial	Axial	Straight	North	Gravel cut stairway?	Saad 1951: Plate III
NIC	501.H.4	Helwan	Dynasty 2	IIA	?	Axial	Axial	Straight	South	Gravel cut stairway?	Saad 1951: Plate III
NIC	28.H. 5	Helwan	Dynasty 2	IIA	?	Axial	Axial	Straight	North	Gravel cut stairway?	Saad 1951: Plate III

Cat. No.	Identity	Location	Period	Tomb Type	Entrance location relative to superstructure if present	Relation-ship of final descent to axis of super-structure	Main approach to axis of burial chamber(s)	Descent Path	Direction of main descent	Stairwell construction	Reference
217	Grave 240	Tarkhan (Kafr Amar)	Dynasty 2	IIA	?	?	Axial	Straight	West	Gravel and rock cut stairway	Petrie 1913: 27; Petrie & Mackay 1915: 10 and 15
218	Grave 545	Tarkhan (Kafr Amar)	Dynasty 2	IIA	?	?	Axial	Straight	West	Gravel and rock cut stairway	Petrie 1913: 27; Petrie & Mackay 1915: 15-16
253	Tomb 771	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	?	?	Axial	Straight	South	Rock cut stairway	Petrie, Brunton & Murray 1923: 22-24, Pl. XLVI.
254	Tomb 806	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	?	?	Axial	Straight	North	Rock cut stairway	Petrie, Brunton & Murray 1923: 22-24, Pl. XLVI.
255	Tomb 734	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	?	?	Axial	Straight	West	Rock cut stairway	Petrie, Brunton & Murray 1923: 22-24, Pl. XLVI.
256	Tomb 821	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	?	?	Axial	Straight	North	Rock cut stairway	Petrie, Brunton & Murray 1923: 22-24, Pl. XLVI.
257	Tomb 820	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	?	?	Axial	Straight	North	Rock cut stairway	Petrie, Brunton & Murray 1923: 22-24, Pl. XLVI.
258	Tomb 760	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	?	?	Axial	Straight	South	Rock cut stairway	Petrie, Brunton & Murray 1923: 21-24, Pl. XLVI.
259	Tomb 785	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	?	?	Axial	Straight	South	Rock cut stairway	Petrie, Brunton & Murray 1923: 21-24, Pl. XLVI.
260	Tomb 770	Lahun, Bashkatib Cemetery	Dynasty 2	IIA	?	?	Axial	Straight	South	Rock cut stairway	Petrie, Brunton & Murray 1923: 21-24, Pl. XLVI.
266	Tomb 560	Sedment	Dynasty 2	IIA	?	?	Axial	Straight	South	Gravel and rock cut stairway	Petrie and Brunton 1924: 2, tomb register Pl.XXXVI.
267	Tomb 526	Sedment	Dynasty 2	IIA	?	?	?	?	?	Gravel and rock cut stairway	Petrie and Brunton 1924: Tomb register Pl. XXXVI.
268	Tomb 559	Sedment	Dynasty 2	IIA	?	?	?	?	?	Gravel and rock cut stairway	Petrie and Brunton 1924: Tomb register Pl.XXXVI.
269	Tomb 568	Sedment	Dynasty 2	IIA	?	?	Axial	Straight	South	Gravel cut stairway	Petrie 1999: 35.
270	Tomb 569	Sedment	Dynasty 2	IIA	?	?	?	?	?	Gravel and rock cut stairway	Petrie 1999: 36.
271	Tomb 94	Sedment	Dynasty 2	IIA	?	?	Lateral offset	L' shaped	?	Gravel and rock cut stairway	Petrie and Brunton 1924: Pls. XXXVI and LXXXI.
274	Tomb 562 Cemetery 400	Qau	Dynasty 2 - 3	IIA	?	?	Axial	Straight	South	Gravel cut stairway	Brunton 1927: 12 and Tomb register Pl. X.
275	Tomb 429 Cemetery 400	Qau	Dynasty 2 - 3	IIA	?	?	Axial	Straight	South	Brick steps and steep slope	Brunton 1927: 11-12 and Tomb register Pl. X.
276	Tomb 507 Cemetery 400	Qau	Dynasty 2 - 3	IIA	?	?	Axial	Straight	South	Gravel cut stairway	Brunton 1927: 12 and Tomb register Pl. X.
277	Tomb 438, Cemetery 400	Qau	Dynasty 2	IIA	?	?	Axial	Straight	South	Brick steps and steep slope	Brunton 1927: Tomb register Pl. X.
278	Tomb 3112, Cemetery 3100	Badari	Dynasty 2	IIA	?	?	Axial	Straight	South	Stairway cut in limestone detritus	Brunton 1927: 14, 16 and Tomb register Pl. X.
335	Tomb 205	Armant	Dynasty 2	IIA	?	?	Axial	Straight	North	Slope	Myers and Fairman 1931: 224
336	Tomb 206	Armant	Dynasty 2	IIA	?	?	Axial	Straight	East	Slope	Myers and Fairman 1931: 224
337	Tomb 207	Armant	Dynasty 2	IIA	?	?	Axial	Straight	West	Stairway	Myers and Fairman 1931: 224
338	Tomb 208	Armant	Dynasty 2	IIA	?	?	Axial	Straight	South	Slope	Myers and Fairman 1931: 224
NIC	St. 2	Elkab	Dynasty 2	IIA	?	?	Axial	Straight	?	Stairway	Quibell 1892: 7.
343	Tomb 64	Elkab	Dynasty 2	IIA	?	?	Axial	Straight	?	Slope	Hendrickx 1994: 152 and 184.
	Dynasty 3										
114	S 3040	Saqqara	Dynasty 3	IIA	External	Axial	Axial	L' shaped	South	Rock cut stairway?	Reisner 1936: 163.
115	S 2416	Saqqara	Dynasty 3	IIA	Internal	Axial	?	Straight	South	Rock cut stairway?	Quibell 1923: 39; Reisner 1936: 162.
116	S 2317	Saqqara	Dynasty 3	IIA	Internal	Axial	?	Straight	South	Rock cut stairway?	Quibell 1923: 33; Reisner 1936: 163.
117	S 2445	Saqqara	Dynasty 3	IIA + IIA	Internal	Axial	?	Straight	South	Rock cut stairway?	Quibell 1923: 41; Reisner 1936: 162.
118	S 3050 South	Saqqara	Dynasty 3	IIA + IIA-C	Internal	Axial	Axial	Straight	South	Rock cut stairway	Martin 1971: 2; 1974: 21-5
219	Tomb 1004	Tarkhan (Kafr Amar)	Dynasty 3	IIA	?	?	Axial	Straight	North	Short stair	Petrie, Wainwright and Gardiner 1913: 13 and 27.
279	Tomb 3229, Cemetery 3200	Qau, Badari and Hemamieh	Dynasty 3	IIA	?	?	Axial	Straight	South	Stairway cut in limestone detritus	Brunton 1927: 14 and Tomb register Pl. XI.
280	Tomb 3228, Cemetery 3200	Qau, Badari and Hemamieh	Dynasty 3	IIA	?	?	Axial	Straight	South	Stairway cut in limestone detritus	Brunton 1927: 14 and Tomb register Pl. XI.
281	Tomb 3227, Cemetery 3200	Qau, Badari and Hemamieh	Dynasty 3	IIA	Internal?	Axial?	Axial	Straight	South	Stairway cut in limestone detritus	Brunton 1927: 14 and Tomb register Pl. XI.
303	N 574, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA	Internal	Axial	Axial	Straight	Southeast	Gravel cut stairway	Reisner 1932: 220–1; 1936: 182.
304	N 599, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA	Internal	Axial	Axial	Straight	Southeast	Gravel cut stairway	Reisner 1932: 229; 1936: 182.
305	N 689	Naga el-Deir	Dynasty 3	IIA	Internal	Axial	Axial	L'shaped	Northeast then southeast	Brick-lined & tunnelled in gravel	Reisner 1932: 243–6; 1936: 181-2.
306	N 573 + 587, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA + IIA	Internal	Axial	Axial	Straight	Southeast	Gravel cut stairway	Reisner 1932: 217–8; 1936: 181.
315	R 1	Reqaqnah	Dynasty 3	IIA	Internal	Axial	Axial	Straight	South	Gravel cut mud-brick lined stairway	Garstang 1904: 22; Reisner 1936: 179–80.
316	R 40	Reqaqnah	Dynasty 3	IIA	Internal	Axial	Axial	Straight	South	Gravel cut mud-brick lined stairway	Garstang 1904: 21-3; Reisner 1936: 180.
319	K1	Beit Khallaf	Dynasty 3	IIA	Internal	Axial	Axial	U' shaped	North, then west, then south	Mud-brick stairway in mastaba then gravel cut	Garstang 1903: 3-4; 8-11; Reisner 1936: 172-4
320	K2	Beit Khallaf	Dynasty 3	IIA + IIA	Internal	Axial	Axial	U' shaped	North, then west, then south	Mud-brick stairway in mastaba then gravel cut	Garstang 1903: 11-12; Reisner 1936: 174-6
"	"	"	"		"	"	"	"	West then south	"	"
321	K3	Beit Khallaf	Dynasty 3	IIA	Internal	Axial	Axial	Straight	South	Gravel cut stairway	Garstang 1903: 15-16; Reisner 1936: 177-8
322	K4	Beit Khallaf	Dynasty 3	IIA	Internal	Axial	Axial	Straight	South	Mud-brick and gravel cut stairway	Garstang 1903: 14-15: Reisner 1936: 178-9
323	K5	Beit Khallaf	Dynasty 3	IIA	Internal	Axial	Axial	Straight	South	Gravel cut and brick-lined stairway	Garstang 1903: 15-16; Reisner 1936: 176-7.
	Dynasty 4										
317	R75	Reqaqnah	Dynasty 4	IIA	Internal	Axial	Axial	Straight	South	Gravel cut?	Garstang 1904: 31-2; Reisner 1936: 231.
330	Tomb 353	Ballas	Dynasty 4	IIA	?	?	Axial	Straight	South	Gravel cut	Quibell 1895: 4
331	Tomb 201	Ballas	Dynasty 4	IIA	?	?	Axial	Straight	South	Gravel cut	Quibell 1895: 5.

Type IIB 'deep staircase'											
Identity	Location	Period	Tomb Type	Entrance location relative to superstructure if present	Relationship of final descent to axis of superstructure	Main approach to axis of burial chamber(s)	Descent Path	Direction of main descent	Stairwell construction	Additional notes	Reference
Dynasty 2											
Op. 4/103	Helwan	Dynasty 2	IIB	?	?	Axial	Straight	North	Gravel cut	Brick liner at top of stair	Köhler 2007: 201-202.
Op. 4/2	Helwan	Dynasty 2	IIB	?	?	Axial	Straight	North	Gravel cut	Brick liner at top of stair	Köhler 2000b: 88
Op. 4/62	Helwan	Dynasty 2	IIB	?	?	Axial	Straight	South	Gravel cut	Brick liner at top of stair	Köhler 2008c: 118.
Op. 4/148	Helwan	Dynasty 2	IIB	Internal	Axial	Axial	Straight	North	Gravel cut		Köhler 2008a: 6.
173.H.9	Helwan	Dynasty 2	IIB	?	?	Axial	Straight	South	Gravel cut		Saad 1957: 63.
Dynasty 4											
N 518, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIB	?	?	Axial	Straight	South-east	Gravel cut	Brick liner at top of stair	Reisner 1932: 197.
N 561b, Cemetery 500-900	Naga el-Deir	Dynasty 4, Sneferu	IIB	Internal	Axial	Axial	Straight	South-east	Gravel cut		Reisner 1932: 212-3

Type IIA-C 'stair-shaft'											
Identity	Location	Period	Tomb Type	Entrance location relative to superstructure if present	Relationship of final descent to axis of superstructure	Main approach to axis of burial chamber(s)	Descent Path	Direction of main descent	Stairwell construction	Additional notes	Reference
Dynasty 3											
Covington's Tomb (Mastaba T).	Giza	Dynasty 3	IIA-C	Internal	Axial, offset	Axial	L' shaped	South	mud-brick and rock cut	Shaft 11 m deep	Covington 1905: 219-233; Petrie 1907: 7-8.
S 2405 (Hesy-ra)	Saqqara	Dynasty 3	IIA-C	Internal	Axial	Axial	Straight	South	mud-brick and rock cut	Shaft 8 , 16 and 23.4 m deep	Quibell 1913; Reisner 1936: 158-9.
S 2103	Saqqara	Dynasty 3	IIA-C	Internal	Axial, offset	?	Straight	North	Rock cut?		Quibell 1923: 18; Reisner 1936: 160
S 2336	Saqqara	Dynasty 3	IIA-C	Internal	Axial	?	Straight	South	Rock cut?	Shaft 4.75 m deep	Quibell 1923: 25; Reisner 1936: 161.
S 2428	Saqqara	Dynasty 3	IIA-C	Internal	Axial	Axial	Straight	South	Rock cut?	Burial chamber under stair	Quibell 1923: 25; Reisner 1936: 161.
S 2115	Saqqara	Dynasty 3	IIA-C	Internal	Axial	?	Straight	South	Rock cut?		Quibell 1923: 21; Reisner 1936: 161
M1	Saqqara	Dynasty 3	IIA-C	Internal	Axial, offset	Axial	Straight	South	Rock cut		Ghaly 1994: 57-69.
M2	Saqqara	Dynasty 3	IIA-C	Internal	Axial	Axial	Straight	South	Rock cut	Stair under wall of mastaba	Ghaly 1994: 57-69.
M3	Saqqara	Dynasty 3	IIA-C	Internal	Axial	Axial	Straight	North	Rock cut		Ghaly 1994: 57-69.
S 3043	Saqqara	Dynasty 3	IIA-C	Internal	Axial, offset	?	Straight	North	Rock cut?	?	Reisner 1936: 155-6.
S 2407	Saqqara	Dynasty 3	IIA-C + IIA-C	Internal	Axial	?	L' shaped in north	South	Rock cut?	Twin mastaba	Quibell 1923: 38; Reisner 1936: 157.
" shaft 'f'	"	"	"	"	"	Axial	Straight	South	"	"	" "
S 2436 + 2437	Saqqara	Dynasty 3	IIA-C + IIA-C	Internal	Axial	?	Straight	South	Rock cut?	Shaft 5 m deep	Quibell 1923: 40; Reisner 1936:
"	"	"	"	"	"	"	"	"	"	?	"
S 3050	Saqqara	Dynasty 3	IIA-C + IIA	Internal	Offset	Axial	Straight	South	Rock cut?	Shaft 6 m deep	Martin 1971: 2; 1974: 21–5.
S 3070	Saqqara	Dynasty 3	IIA-C + IIC	Internal	Axial	Axial	Straight	South	Gravel cut slope, rock cut shaft	Shaft 10.5 m deep	Emery 1968: 11-3
N 585, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA-C	Internal	Axial	Axial	Straight	South-east	Gravel cut	Shaft 1.5 m deep	Reisner 1932: 224.
N 586, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA-C	Internal	Axial	Axial	Straight	South-east	Gravel cut	Shaft 2 m deep	Reisner 1932: 225.
N 593, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA-C	Internal	Axial	Axial	Straight	South-east	Gravel cut	Shaft 2.2 m deep	Reisner 1932: 226.
Rock Necropolis Mastaba	Elkab	Dynasty 3	IIA-C	Internal	Axial	?	L' shaped	South-east	Rock cut	Shaft 24 m deep	Limme 2000: 26-31;Huyge 2003: 29–30.
Dynasty 4											
Tomb of Hetepi	Abusir	Dynasty 4	IIA-C + IIA-C	Internal	Axial	Axial	Meandering	South	Stone	Southern Shaft 6.8 m deep	Bartá et al. 2010: 3-56
"	"	"	"	"	"	"	"	"	"	Northern Shaft 10.75 m deep	"
AS 33	Abusir	Dynasty 4, Sneferu	IIA-C	Internal	Axial offset	Axial	Straight	South	Rock cut	Shaft 9.8 m deep	Bartá et al. 2010: 57-182.

Chart I

Cat. No.	Identity	Location	Period	Substructure Type	Shaft location within superstructure	Shaft depth in metres	Shaft entrance length in m	Shaft entrance width in m	Super-structure area in m2	Percentage of super-structure's area	Burial chamber orientation relative to shaft	Surrounding geology	Reference
	Dynasty 2												
74	Tomb 12B-6	Abusir	Dynasty 2.	IIC	No superstructure	3.2	1.40	1.10			South	Mudstone	Bonnet 1928: 3.
75	Tomb 11D-2	Abusir	Dynasty 2	IIC	No superstructure	5.1	1.60	1.00			North-east	Mudstone	Bonnet 1928: 3.
189	256.H.8	Helwan	Dynasty 2	IIC	No superstructure	2.3	1.55	1.30			North	Gravel	Saad 1957: 59.
190	308.H.6	Helwan	Dynasty 2	IIC	No superstructure	3.1	1.40	1.20			South	Gravel	Saad 1957: 57.
191	527.H.7	Helwan	Dynasty 2	IIC	No superstructure	2.9	1.60	1.10			North	Gravel	Saad 1957: 58.
192	647.H.7	Helwan	Dynatsy 2	IIC	No superstructure	1.3	1.30	1.00			South	Gravel	Saad 1957: 58.
193	670.H.7	Helwan	Dynasty 2	IIC	No superstructure	3.2	1.60	1.00			South	Gravel	Saad 1957: 58.
194	379.H.8	Helwan	Dynasty 2	IIC	No superstructure	2	1.60	0.90			North	Gravel	Saad 1957: 42-43.
195	381.H.8	Helwan	Dynasty 2	IIC	No superstructure	3.2	1.90	1.00			North	Gravel	Saad 1957: 17-18
196	426.H.8	Helwan	Dynasty 2	IIC	No superstructure	2.2	1.50	1.00			North	Gravel	Saad 1957: 60-1.
197	788.H.8	Helwan	Dynasty 2	IIC	No superstructure	2.2	1.60	0.80			West	Gravel	Saad 1957: 61.
198	99.H.9	Helwan	Dynasty 2	IIC	No superstructure	2.3	1.80	0.85			North	Gravel	Saad 1957: 62.
199	103.H.9	Helwan	Dynasty 2	IIC	No superstructure	2.85	1.60	1.10			South	Gravel	Saad 1957: 62.
200	132.H.9	Helwan	Dynasty 2	IIC	No superstructure	2.4	1.90	0.80			North	Gravel	Saad 1957: 63.
201	Op. 4/115	Helwan	Dynasty 2	IIC	Internal	3.8	?				South	Gravel	Köhler 2008b: 172.
202	Op. 4/153	Helwan	Dynasty 2	IIC	Internal	2.4	?				North	Gravel	Kohler 2008a: 6
203	I.H.5	Helwan	Dynasty 2	IIC	No superstructure	3.5	1.55	0.90			West and south	Gravel	Saad 1951: 23-6
262	Tomb 720	Lahun	Dynasty 2	IIC	No superstructure	1.89	1.29	0.88			North	Limestone and marl	Petrie et al. 1923: 22 and tomb register XLV.
263	Tomb 768	Lahun	Dynasty 2	IIC	No superstructure	1.87	1.27	1.21			West	Limestone and marl	Petrie et al. 1923: 24 and tomb register XLV.
282	Tomb 1520 Cemetery 1500-1800	Hemamieh	Dynasty 2	IIC	No superstructure	3.35	1.52	1.16			North	Gravel	Brunton 1927: 13 and tomb register Pl. X.
283	Tomb 1562 Cemetery 1500-1800	Hemamieh	Dynasty 2	IIC	No superstructure	3.04	0.86	0.61			North	Gravel	Brunton 1927: 13 and tomb register Pl. X.
284	Tomb 1561 Cemetery 1500-1800	Hemamieh	Dynasty 2	IIC	No superstructure	3.45	1.16	0.91			North	Gravel	Brunton 1927: 13 and tomb register Pl. X.
	Dynasty 3												
63	The 'Inner Mastaba'	Giza, Nazlet Batran	Dynasty 3	IIC	Internal central	9.8	2.00	1.80	66.46	5.42	West	Rock	Kromer 1991: 16-18
76	AS 54	Abusir	Dynasty 3	IIC	Internal location unknown	12.6	1.95	1.95	1251.00	0.30	South	Unknown	Bárta 2011: 50-4.
120	S 3070 North	Saqqara	Dynasty 3	IIC + IIA-C	Internal 6.5 m from south	15.1	1.00	1.00	568.00	0.18	South	Rock	Emery 1968: 11-13
131	S 3518 North	Saqqara	Dynasty 3	IIC + IIC	Internal 13 m from north	10.6	1.70	1.50	988.00	0.26	South	Rock	Emery 1970: 10; 1971: 1 3-4
"	" South	"	"	"	Internal 23 m from south	9.3	2.30	2.30	988.00	0.54	South	"	
132	S 3517 North	Saqqara	Dynasty 3	IIC + IIC	Internal 21 m from north	8.5	2.00	2.00	1375.00	0.29	South-west	Rock	Emery 1966: 7, Fig. 3
"	" South	"	"	"	Internal 11.5 m from south	8	2.4	2	1375.00	0.35	South	"	
133	S 2464	Saqqara	Dynasty 3	IIC	Internal axial	10.4					South	Rock	Quibell 1923: 42
134	S 3536 North	Saqqara	Dynasty 3	IIC + IIC	Internal 6 m from north	?	1.60	1.40	351.00	0.64	?	Rock	Smith & Jeffreys 1977: 22
"	" South	"	"	"	Internal 7 m from south	?	1.80	1.80	351.00	0.92	?	"	"
135	S 3044	Saqqara	Dynasty 3	IIC	Internal, north-east	?	5	3	605	2.48	South	Rock	Reisner 1936: 167-8.
136	S 2305	Saqqara	Dynasty 3	IIC + IIC + IIC	Internal location unknown	4					?		Quibell 1923: 30; Reisner 1936: 384
137	M16	Saqqara	Dynasty 3 - 4	IIC	Internal central?	3					South	Rock	Ghaly 1994: 59.
204	287.H.6	Helwan	Dynasty 3	IIC	Internal central	11	4.00	4.50	1534.00	1.17	South	Gravel	Saad 1951: 3-5
264	Tomb 769	Lahun, Bashkatib Cem.	Dynasty 2	IIC	No superstructure	3.45	0.91	0.86			West and south	Limestone and marl	Petrie, Brunton & Murray 1923: 22-24, Pl. XLVI.
265	Tomb 735	Lahun, Bashkatib Cem.	Dynasty 2	IIC	No superstructure	2.84	1.72	0.93-1.29			North and south	Limestone and marl	Petrie, Brunton & Murray 1923: 22-24, Pl. XLVI.
	Dynasty 4												
79	Tomb of Ity	Abusir	Dynasty 4, Early	IIA + IIC	Internal central	10	1.50	1.50	941.40	0.24	South	Limestone bedrock	Verner 1995: 78-90; Bárta 2001: 1-16
80	Lake of Abusir - Tomb 1	Abusir	Dynasty 4, Early	IIC + IIC	Internal south-east end	8.5	1.60	1.60	336.00	0.76	North	Tafl bedrock	Bárta 2000: 335-9; 2001: 17-28.
205	Tomb No. 1	Dahshur	Dynasty 4	IIC		11	2.03	1.55			South	Unknown	De Morgan 1894: 8-9.
206	DAS 9, Ipy	Dahshur	Dynasty 4, Sneferu	IIC	Internal axial north of centre	7.75	2.35	1.90	326.00	1.37	South	Limestone and shale	Alexanian & Seidlmayer 2002: 3-9.
207	DAS 32-4 Ii-nefer	Dahshur	Dynasty 4, Sneferu	IIC	Internal	14.00	2.50	2.20	589.00	0.93	South	Unknown	Barsanti 1902: 198-200.
208	DAS 25-1	Dahshur	Dynasty 4, Sneferu	IIC	Internal axial south of centre	?	2.65	2.35	549.00	1.13	?	Unknown	Stadlemann 1993: 305-6
209	Mastaba I/1	Dahshur	Dynasty 4, Sneferu	IIC	Internal axial north of centre	9.5	2.65	1.05	334.00	0.83	South	Soil and *tafl*	Seidelmayer & Alexanian 1993: 272-78
210	Mastaba II/1, Netjer-Aperef	Dahshur	Dynasty 4, Sneferu	IIC	Internal axial south of centre	9.1	3.00	1.45	663.00	0.66	South	Soil and *tafl*	Seidelmayer & Alexanian 1993: 278-283; Alexanian 1999: *passim.*
211	Mastaba I/2	Dahshur	Dynasty 4, Sneferu	IIC	Internal central	10.8	3.00	1.50	502.00	0.90	South	Soil and *tafl*	Seidelmayer & Alexanian 1993: 284-88.
220	Mastaba no. 6, Rahotep	Meidum	Dynasty 4, Sneferu	IIC + IIC	Internal axial	8 + 4.5	2.50	1.50	3570.00	0.11	South	Mud-brick & friable rock	Petrie 1892: 16-17.
"	" Nefert	"	"	"	Internal axial central	12.5 + 5	2.10	1.60	3570.00	0.09	South	"	Reisner 1936: 213.
221	Mastaba no. 9, Ranefer	Meidum	Dynasty 4, Sneferu	IIC + IIC	Internal location unknown	?	2.80	1.60	1617.00	0.28	?	Mud-brick &Friable rock	Petrie 1892: 17; Reisner 1936: 212-3.
"	" Spouse north shaft	"	"	"	" "	10.5 + 7.75	2.00	1.75	1617.00	0.22	?	Mud-brick & friable rock	"
222	Mastaba no. 4, Heneken.	Meidum	Dynasty 4, Sneferu	IIC	?	12.25	1.60	1.40			?	Friable rock	Petrie 1892: 20; Reisner 1936: 214-5
223	Mastaba no. 7 North	Meidum	Dynasty 4, Sneferu	IIC + IIC	Internal axial extreme north	6.5	1.40	1.30	273.00	0.67	South	Friable rock	Petrie 1892: 20; Reisner 1936: 214.
"	" South	"	"	"	Internal axial extreme south	6.7	1.70	1.50	273.00	0.93	West	Friable rock	"
224	Tomb no. 416	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	10.3	2.25	1.50			South	Friable rock	Reisner 1936: 215.
225	Mastaba no. 8 North	Meidum	Dynasty 4, Sneferu	IIC + IIC + IIC	Internal axial - north of centre	?	1.60	1.40	639.51	0.35	?	Mud-brick & friable rock	Petrie 1892: 18-19; Reisner 1936 : 212-3.
"	" Central	"	"	"	Internal axial - central	9.1 + 2.73	1.60	1.40	639.51	0.35	South	Mud-brick & friable rock	"
"	" South	"	"	"	Internal axial - south of centre	7.4 + 5.8	1.60	1.40	639.51	0.35	South	Mud-brick & friable rock	"
226	Mastaba no. 1	Meidum	Dynasty 4, Sneferu	IIC		6.9	2.10	1.50			South	Friable rock	Petrie 1892: 20. Reisner 1936: 212.
227	Tomb 50, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	6.4	1.75	1.72			South	Loose rock	Petrie, Mackay and Wainwright 1910: 26 and 28.
228	Tomb 51, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	11.8					South	Loose rock	Petrie, Mackay and Wainwright 1910: 26 and 28.

Cat. No.	Identity	Location	Period	Substructure Type	Shaft location within superstructure	Shaft depth in metres	Shaft entrance length in m	Shaft entrance width in m	Super-structure area in m2	Percentage of super-structure's area	Burial chamber orientation relative to shaft	Surrounding geology	Reference
229	Tomb 52, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	9.75					South	Loose rock	Petrie, Mackay and Wainwright 1910: 27.
230	Tomb 53, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	9.14					South	Loose rock	Petrie, Mackay and Wainwright 1910: 26.
231	Tomb 55, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	10.05	2.51	0.80			South	Loose rock	Petrie, Mackay and Wainwright 1910: 27.
232	Tomb 56, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	10.36	2.87	0.75			South	Loose rock	Petrie, Mackay and Wainwright 1910: 27.
233	Tomb 57, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	10.36					South	Loose rock	Petrie, Mackay and Wainwright 1910: 26.
234	Tomb 61, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	9.14					South	Loose rock	Petrie, Mackay and Wainwright 1910: 26 and 28.
235	Tomb 62, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	10.36					South	Loose rock	Petrie, Mackay and Wainwright 1910: 25 and 28.
236	Tomb 63, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	9.75					South	Loose rock	Petrie, Mackay and Wainwright 1910: 25 and 28.
237	Tomb 66, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	8.53					South	Loose rock	Petrie, Mackay and Wainwright 1910: 26.
238	Tomb 68, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	9.14					South	Loose rock	Petrie, Mackay and Wainwright 1910: 25-6 and 28.
239	Tomb 69, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	9.44					South	Loose rock	Petrie, Mackay and Wainwright 1910: 26.
240	Tomb 76, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	8.83					South	Loose rock	Petrie, Mackay and Wainwright 1910: 26 and 28.
241	Tomb 80, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	4.11	1.42	1.27			South	Loose rock	Petrie, Mackay and Wainwright 1910: 27-8.
242	Tomb 81, Far Western Cemetery	Meidum	Dynasty 4, Sneferu	IIC	No superstructure	9.14					South	Loose rock	Petrie, Mackay and Wainwright 1910: 26 and 28.
251	Mastaba no. 16, Atet	Meidum	Dynasty 4, Sneferu	III + IIC	Internal	?	1.80	1.60	8160.00	0.04	South	Mud-brick & marl	Petrie, Mackay and Wainwright 1910: 4-6, 18-22; 1912: 25-6.
312	N 629, Cemetery 500-900	Naga el-Deir	Dynasty 4, Sneferu	IIC	?	3.7	1.10	1.00	28.08	3.92	South	Gravel	Reisner 1932: 238-9.
313	N 739, Cemetery 500-900	Naga el-Deir	Dynasty 4, Sneferu	IIC	Internal central	5.7	2.00	1.80	65.20	5.52	North	Gravel	Reisner 1932: 248-9.
314	N 546 + N604, Cemetery 500-900 North	Naga el-Deir	Dynasty 4, Sneferu	IIC	Internal north	3	1.40	1.20	31.15	5.39	South	Gravel	Reisner 1932: 208 and 231
"	"	"	"	"	Internal south	3.3	1.35	1.15	31.15	4.98	"	"	"
318	R64 Tomb of Shepses	Reqaqnah	Dynasty 4, Sneferu	IIC	Internal central east of axis	4	2.00	2.00	40.00	10.00	South	Gravel	Garstang 1904: 49-50.
328	Tomb D135 + D136	Abydos	Dynasty 4, Sneferu	IIC + IIC	Internal north	5	1.50	1.40	117.00	1.79	South	Solid gravel/sand	Peet and Loat 1913: 9, 15-7.
"	"	"	"	"	Internal south	5	1.50	1.40	117.00	1.79	North and west	"	"
345	Mastaba A : Kamena	Elkab	Dynasty 4, Sneferu	IIC	Internal central	4.5	4.00	3.00	416.00	2.88		Nile silt?	Quibell 1896: 3-4; Reisner 1936: 229.
346	Mastaba D: Neferseshem	Elkab	Dynasty 4, Sneferu	IIC	Internal central	?	2.20	2.00	416.00	1.06		Nile silt?	Quibell 1896: 5.

Chart J2

Type III sloping corridors

Cat No.	Identity	Location	Period	Substructure Type	Passage height	Passage width	Passage length in m (from top)	Angle	Orientation	Notes	Reference
	Fourth Dynasty										
243	Tomb A, Great Western Cemetery	Meidum	Dynasty 4, Sneferu	III	1.39	1.04	4.92	26° 57'	North	Shaft entrance	Petrie, Mackay and Wainwright 1910: 22
244	Tomb B, Great Western Cemetery	Meidum	Dynasty 4, Sneferu	III	?	1.05	4.94	?	North	Plug stones	Petrie, Mackay and Wainwright 1910: 22
245	Tomb C, Great Western Cemetery	Meidum	Dynasty 4, Sneferu	III	1.02	1.05	4.93	?	North		Petrie, Mackay and Wainwright 1910: 24
247	Tomb 277, west of pyramid enclosure	Meidum	Dynasty 4, Sneferu	III	1.30	1.00	4.8	26° 51'	North		Reisner 1936: 206-7.
246	Tomb 202.	Meidum	Dynasty 4, Sneferu	III	1.35	1.05	4.9	27° 80'	North		Reisner 1936: 207.
248	Tomb 393.	Meidum	Dynasty 4, Sneferu	III	1.25	1.00	6 + 2	27° 50'	North		Reisner 1936: 207.
249	South Peribolos tomb (satellite pyramid)	Meidum	Dynasty 4, Sneferu	III	1.16	1.2	?	25° 68'	North		Petrie, Mackay and Wainwright 1910: 10
250	North Peribolos tomb	Meidum	Dynasty 4, Sneferu	III	?	0.72	5.89	33° 64'	North		Petrie, Mackay and Wainwright 1910: 12-13
251	Mastaba 16 Nefermaat	Meidum	Dynasty 4, Sneferu	III + IIC	?	?	?	?	South	?	Harpur 2001: 46 and 248, n. 43.
252	Mastaba 17	Meidum	Dynasty 4, Sneferu	III	1.00	1.00	4.5	11°		Plug stones	Petrie, Mackay and Wainwright 1910: 14-8

Chart K

Type IB and IC Superstructure Chart

Cat. No.	Identity	Location	Period	Substructure Type	Superstructure size	Minimum Footprint O/H in m	External mud-brick wall thickness in m	Core material	Reference
	Dynasty 0-First half Dyn. 1 Naqada IIIB-C2								
30	Grave no. 6.	Tell el-Farkha	Dynasty 0, Naqada IIIB-C1	IB	3.45 m long X 2.56 m wide X 0.5 m high (remains)	0.5	?	Brick	Dębowska 2008: 1107-12; 2009: 461.
31	Grave no. 63	Tell el-Farkha	Dynasty 0, Naqada IIIB-C1	IB	4 m long X 2.5 m wide X ??? M high	0.75	0.75	Soil?	Dębowska 2011: 260-2.
32	Grave no. 100	Tell el-Farkha	Dynasty 0, Naqada IIIB-C1	IB	6.2 m long X 4.1 m wide X approx. 3 m high	0.9	0.9	Soil?	Chłodnicki and Ciałowicz 2009: 8-9 .
34	Grave no. 9	Tell el-Farkha	Dynasty 1, Naqada IIIB-C1	IB	4.13 m long X 2.18 m wide X 1.07 m high.	0.75	?	Brick	Dębowska-Ludwin 2009: 462-3; 2011: 259-60
35	Grave no. 24	Tell el-Farkha	Dynasty 0, Naqada IIIB-C1	IB	4.5 m long X 3 m wide X 0.33 m high (remains).	0.8	?	Brick	Dębowska 2009: 466-7.
36	Grave no. 94	Tell el-Farkha	Dynasty 0, Naqada IIIB-C1	IB	4.8 m long X 2.8 m wide	1.10	1.10	Soil?	Chłodnicki and Ciałowicz 2009: 6–7.
39	Tomb No. 1, Site B	Tell Ibrahim Awad	Dynasty 1, Naqada IIIC2	IB	8 m long X 4.5 m wide X 1.25 m high (remains)	0.9	0.9	?	Haarlem 1996: 7-34.
59	Mastaba V (Petrie 1907)	Giza, Nazlet Batran	Dynasty 1, Naqada IIIC2, reign of Djet	IC	48.18 m long X 21.1 m wide	6.66	0.90–1.15 m +1.35–1.95	Gravel?	Daressy 1906: 99-106. Petrie 1907: 2-7.
68	Mastaba XVII	Abu Ghurab	Dynasty 1, Naqada IIIC1-C2	IC	17.3 m long X 8.2 m wide	1.80	1.20	Sand	Radwan 2000: 509-14.
81	S 3357	Saqqara	Dynasty 1, Naqada IIIC1, reign of Hor-Aha	IC	41.6 m long X 15.5 m wide X 1.75 m high	6.3	2.4–2.65 + 0.4–0.65	Cross-walls and sand	Emery 1939: 10-8.
82	S 3471.	Saqqara	Dynasty 1, Naqada IIIC1, reign of Djer.	IC	41.2 m long X 15.15 m wide	5.50	2-2.75	Cross -walls and gravel	Emery 1949: 13-7.
83	S 2185	Saqqara	Dynasty 1, Naqada IIIC1, reign of Djer	IC	42 m long X 16 m wide	7	2.4	Cross-walls and gravel	Quibell 1923: 5-6, 15-6, Pls. V-X; Emery 1949: 3.
84	S 3504	Saqqara	Dynasty 1, Naqada IIIC2, reign of Djet	IC	49.5 m long X 20 m wide	4.7	2.9	Cross-walls and gravel	Emery 1954: 5-13.
85	S 3503	Saqqara	Dynasty 1, Naqada IIIC2, reign of Merneith	IC	42.6 m long X 16 m wide X 2.2 m high	5.75	2.75	Cross-walls and gravel	Emery 1954: 128-58.
214	Mastaba 1060	Tarkhan	Dynasty 1, reign of Djet	IC	34.03 m long X 15.62 m wide.	6.5	3.4	Cross-walls and sand	Petrie, Wainwright & Gardiner 1913: 13-20.
286	N 1506, Cemetery 1500	Naga el-Deir	Dynasty 1, Naqada IIIC1–2, reigns of Djer and Djet	IC	2.5 m long X 7.5 m wide	2	2	Gravel or 'rubbish'	Reisner 1908: 33–4; 1936: 35-7.
332	Royal Tomb	Naqada	Dynasty 1, Naqada IIIC1	None	53.3 m long X 26.03 m wide	N/A	6	Cross-walls and gravel?	de Morgan 1897: 145-202. Borchardt 1898: 87-105.
	Second Half Dyn. 1 Naqada IIIC2-D								
37	Grave no. 50	Tell el-Farkha	Dynasty 1, Naqada IIIC2-D	IC	4.92 m long X 2.36 m wide X ca. 0.9 m high	0.75	?	?	Dębowska-Ludwin 2009: 473-4; 2010: 5.
38	Grave no. 55	Tell el-Farkha	Dynasty 1, Naqada IIIC2-D	IC	7.96 m long X 5.44 m wide X ca. 0.9 m high.	1.9	?	Mudbrick and soil	Dębowska-Ludwin 2011: 34-6; 2011b: 264-6.
43	Tomb MO25 Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2	IC	6.9 m long X 3.6 m wide.	0.75	?	?	Klasens 1961: 110-1.
86	S 3507	Saqqara	Dynasty 1, reign of Den	IC	37.9 m long X 15.85 m wide X 2.5 m high.	6	4.5-4.7	Cross-walls and sand	Emery 1958: 75-80.
87	S 3111 (Sabu)	Saqqara	Dynasty 1, reign of Adjib	IC	29.25 m long X 12.1 m wide	2	1.55–1.95	Sand	Emery 1949: 95-9.
140	423.H.9	Helwan	Dynasty 1, reign of Den	IC	40 m long X 25 m wide	11.5	2.5	Gravel, sand or rubble?	Saad 1969: 22-4.
215	Mastaba 2050	Tarkhan	Dynasty 1, Naqada IIIC2, reign of Den	IB	35.38 m long X 15.13 m wide,	4.85	3.8	Gravel or sand?	Petrie 1914: 3, 6-7; Reisner 1936: 38.
216	Mastaba 2038	Tarkhan	Dynasty 1, Naqada IIIC2, reign of Den?	IB	32.13 m long X 12.95 m wide.	4.5	3.37–3.90	Gravel and sand	Petrie 1914: 4-5.

Chart L

	Identity	Location	Period	Substructure Type	Superstructure size	Minimum Footprint O/H in m	External mud-brick wall thickness in m	Core material	Reference
	Naqada IIIC2 -D								
67	Tomb 249	Tura el-Asmant	Dynasty 1, Naqada IIID, reign of Qa'a	ID	8.5 m long X 6 m wide	2	0.4	?	El Khouli 1968: 75.
69	Mastaba IV	Abu Ghurab	Dynasty 1, Naqada IIIC2	ID	12.8 m long X 11.2 m wide	?	1.6	?	Radwan 1995: 311-4.
70	Tomb V	Abu Ghurab	Dynasty 1, Naqada IIIC2	ID	13.3 m long X 7.2 m wide	?	1	?	Radwan 1991: 305-8.
88	S 3506	Saqqara	Dynasty 1, Naqada IIIC2, reign of Den	ID	47.5 m long X 19.5 m wide X 2 m high (remains)	5.5	4.2-4.45	Rubble	Emery 1958: 37-42.
89	S 3035 (Hemaka)	Saqqara	Dynasty 1, Naqada IIIC2, reign of Den	ID	57.3 m long X 26 m wide X 3.45 m (remains).	5	3.75–4.20	Rubble	Emery 1938: 3-13.
90	S 3036 (Ankh-ka)	Saqqara	Dynasty 1, Naqada IIIC2, reign of Den	ID	41 m long X 22 m wide	6.75	1.8–2	Cross-walls and sand	Emery 1949: 71-81.
91	S 3038 (Nebitka).	Saqqara	Dynasty 1, Naqada IIIC2 , reign of Adjib	ID	37 m long X 13.85 m wide.	4–4.5	1.14–1.55	Sand	Emery 1949: 82-92.
92	S X	Saqqara	Dynasty 1, Naqada IIIC2-D, reign of Adjib	ID	26 m long X 12 m wide X 1.5 m high (remains).	4.5	Solid	Mud-brick	Emery 1949: 107–9.
93	S 3338	Saqqara	Dynasty 1, Naqada IIIC2-D, reign of Adjib	ID	30.5 m long X 14 m wide.	2.4	2.30–3.40	Rubble	Emery 1949: 124-9.
94	S 3500	Saqqara	Dynasty 1, Naqada IIID, reign of Qa'a	ID	31.90 m long X 15.90 m wide X 2 m high (remains)	3	2.6-2.8	Cross-walls and sand	Emery 1958: 98-102.
95	S 3505	Saqqara	Dynasty 1, Naqada IIID, reign of Qa'a	ID	35.2 m long X 24.3 m wide X 2 m high (remains).	4.5	5.15-6	Rubble	Emery 1958: 5-13.
96	S 2105	Saqqara	Dynasty 1, Naqada IIID, reign of Qa'a	ID	32 m long X 15 m wide	2.8	2.8-3.5	Gravel	Quibell 1923: 19.
142	1.H.4	Helwan	Dynasty 1, Naqada IIIC2-D	ID	? m long X 7m wide	2.1	0.75	Gravel, sand or mudbrick?	Saad 1951: 5-6.
143	150.H.5	Helwan	Dynasty 1, Naqada IIIC2	ID	14.8 m long X 7.2 m wide.	2	0.9-1.5	Gravel, sand or mudbrick?	Saad 1951: 28-9.
153	1473.H.2	Helwan	Dynasty 1, Naqada IIIC2-D	ID	14 m long X 8.5 m wide	1.5	1.5-2.5	Gravel, sand or mudbrick?	Saad 1947: 110.
154	785.H.5	Helwan	Dynasty 1, Naqada IIIC2-D	ID	20 m long X 12 m wide	3	0.75-3	Gravel, sand or mudbrick?	Saad 1969: 20-2.
155	649.H.5	Helwan	Dynasty 1, Naqada IIIC2-D	ID	10.2 m + long X 8.5 m wide	1.5	1.5-2.75	Gravel, sand or mudbrick?	Saad 1951: 41.
156	680.H.5	Helwan	Dynasty 1, Naqada IIIC2-D	ID	?? m long X 6.5 m wide	?	2.5	Gravel, sand or mudbrick?	Saad 1951: 42.
158	40.H.3 (Op.1/1 Köhler)	Helwan	Dynasty 1, Naqada IIIC2-D	ID	20 m long X 10 m wide (estimated).	?	?	Gravel, sand or mudbrick?	Saad 1951: 164–66, Köhler 2005: 20-30.
159	1.H.3	Helwan	Dynasty 1, Naqada IIIC2-D	ID	?? m long X 11 m wide	3	2.0-5.0	Gravel, sand or mudbrick?	Saad 1947: 163-4. Pls. LXI, LXVII-LXVIII.
160	60.H.1	Helwan	Dynasty 1, Naqada IIID	ID	15 m long X 7.5 m wide	2.75	?	Gravel, sand or mudbrick?	Köhler 2008b: 120.
287	N 1581, Cemetery 1500	Naga el-Deir	Dynasty 1, Naqada IIIC2-D	ID	13–15.8 m long X 9.75 m wide X 0.5 m high.	2	1	?	Reisner 1908: 36-38; 1936: 68–9.
	Dynasty 2								
291	N 1514, Cemetery 1500	Naga el-Deir	Dynasty 2	ID Corbel roof	12 m long X 6.5 m wide	1	?	?	Reisner 1908: 44-5; 1936: 129.
300	N 3017, Cemetery 3000	Naga el-Deir	Dynasty 2	ID Corbel roof	6.2-6.8 m long X 4 m wide	1	0.6	?	Reisner 1908: 72-4; 1936: 132.
302	N 4990, Cemetery 3500	Naga el-Deir	Dynasty 2	ID Corbel roof	3.9 m long X 2.4 m wide	0	0.3	?	Mace 1909: 20 and 68.

Chart M

Type II and IIA Superstructures Chart

Type II

Cat No.	Identity	Location	Period	Substructure Type	Superstructure size	Burial chamber covered by footprint	Access route covered by structure	External mud-brick wall thickness in m	Core material	Reference
	Dynasty 1									
44	Tomb MO1, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2, reign of Den	II	?	Partially	Yes	1.32	?	Montet 1938: 15-28; Tristant 2008a: 136-140
45	Tomb MO2, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2, reign of Den	II	13.25 m long X 6.7 m wide.	Partially	Yes	?	?	Montet 1938: 28-34.
47	Tomb MO4, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2, reign of Den	II	?	?	Yes	?	?	Montet 1938: 35.
48	Tomb MO6, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2, reign of Den	II	16.2 m long X 8 m? wide	Yes	Yes	?	?	Montet 1938: 37-8.
49	Tomb MO7, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2, reign of Den	II	25 m long X 14 m wide	Yes	Yes	2.2	?	Montet 1938: 38-46; Tristant 2008a: 140-4
52	Tomb MO12, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2, reign of Den	II	?	?	Yes	?	?	Montet 1938: 54-8; Tristant & Smythe 2011: 331-2.
53	Tomb MO19, Cemetery M	Abu Roash	Dynasty 1, Naqada IIIC2, reign of Den	II	9.4 m long X 5.4 m wide	Partially	Yes	1-1.5	Mudbrick ?	Klasens 1961: 109.

Type IIA

Cat No.	Identity	Location	Period	Substructure Type	Superstructure size	Burial chamber covered by footprint	Access route covered by structure	External mud-brick wall thickness in m	Core material	Reference
	Dynasty 1									
97	S 3121	Saqqara	Dynasty 1, Qa'a	IIA	18.9-19.1 m long X 13.6-15.75 m wide	Yes	Partially	1.35-1.8	Rubble and sand	Emery 1949: 116-9.
98	S 3120	Saqqara	Dynasty 1, Qa'a	IIA	11.4-13.2 m long X 8.8-10 m wide	Partially	Partially	1.4	Rubble and sand	Emery 1949: 121-3.
	Dynasty 2									
99	S 2101	Saqqara	Dynasty 2	IIA	21 m long X 10 m wide	?	Yes	1.6-1.8	Limestone chip	Quibell 1923: 17; Reisner 1936: 146
100	S 3042	Saqqara	Dynasty 2	IIA	29.45 m long X 18.3 m wide	Partially	Partially	2	?	Reisner 1936: 144-5.
101	S 2452	Saqqara	Dynasty 2	IIA	25.86 m long X 13.17 m wide.	?	Yes	1.6-1.8	Unknown + broken pots	Quibell 1923: 41-2; Reisner 1936: 143
102	S 3477	Saqqara	Dynasty 2	IIA	16.5 m long X 9.3 m wide.	Yes	Yes	1.25-1.7	Rubble and sand	Emery 1962: 1-14
103	S 3024	Saqqara	Dynasty 2	IIA	19.5 m long X 11.5 m wide	Partially	Partially	1.5-2.5	Rubble and sand	Emery 1949: 11-2.
104	S 2171	Saqqara	Dynasty 2	IIA	41.7 m long X 18.3 m wide	?	Yes	1.6-2	Gravel	Quibell 1923: 7, 23-4. Reisner 1936: 145.
105	S 2302	Saqqara	Dynasty 2	IIA	58 m long X 32.64 m wide	Probably	Partially	2.8-3	Mud and gravel	Quibell 1923: 29-30; Reisner 1936: 138
106	S 2307	Saqqara	Dynasty 2	IIA	42 m long X 21 m wide	Probably	Yes	2.8-3.8	Black mud	Quibell 1923: 31; Reisner 1936: 140.
107	S 2322	Saqqara	Dynasty 2	IIA	21 m long X 10.5 m wide	?	Yes	2	Mud	Quibell 1923: 34. Reisner 1936: 141.
108	S 2337	Saqqara	Dynasty 2	IIA	?	Probably	Yes	?	Sand, broken pots and limestone chips.	Quibell 1923: 35-6; Reisner 1936: 141-2
109	S 2406	Saqqara	Dynasty 2	IIA	30 m long X 13.8 m wide	?	Yes	0.4-2	?	Quibell 1923: 38; Reisner 1936: 143 and 145.
110	S 2429	Saqqara	Dynasty 2	IIA	34 m long X 18.5 m wide.	?	Partially	3.2	?	Quibell 1923: 40; Reisner 1936: 159-60.
111	S 2498	Saqqara	Dynasty 2	IIA	27 m long X 14 m wide	Probably partially	Yes	1.8-2.2.	?	Quibell 1923: 10, 44-45; Reisner 1936: 145.
112	S 2315	Saqqara	Dynasty 2	IIA	19.8 m long X 10.4 m wide	?	Yes	1.6-2	Limestone chip	Quibell 1923: 33. Reisner 1936: 145.
113	S 2313	Saqqara	Dynasty 2	IIA	21.5 m long X 10.1 m wide	?	Yes	2.2-2.5	Liquid mud	Quibell 1923: 3, 32; Reisner 1936: 143
167	25.H.4 (Köhler's Op. 2/1)	Helwan	Dynasty 2	IIA	8 m long X 5 m wide	Yes?	No	?	Sand, rubble or mud-brick?	Saad 1951: 6–7; Köhler 2005: 35-41.
173	Op. 4/94	Helwan	Dynasty 2	IIA	?	Partially	Yes	?	Sand, rubble or mud-brick?	Köhler 2007: 192-4.
174	Op. 4/123	Helwan	Dynasty 2	IIA	7 m long X 3.6 m wide.	Yes	Yes	?	Sand, rubble or mud-brick?	Köhler 2008a: 172–3; 2008b: 122–3.
175	68.H.5	Helwan	Dynasty 2	IIA	3.3 m long X 2.65 m wide	Yes	Yes	?	Sand, rubble or mud-brick?	Saad 1951: 27.
181	Op. 4/4	Helwan	Dynasty 2	IIA	8.6 m long X 4.5 m wide	No	Yes	?	Sand, rubble or mud-brick?	Köhler 2000b: 89-91. 2003: 85; 2014: 139-40.
182	Op. 4/19	Helwan	Dynasty 2	IIA	6.6 m long × 5.0 m wide	Yes	Yes	?	Sand, rubble or mud-brick?	Köhler 2003: 89; 2009: 12-3; 2014: 236-7.
183	Op. 4/88	Helwan	Dynasty 2	IIA	8.2 m long X 4.5 m wide	Partially	Partially	?	Sand, rubble or mud-brick?	Köhler 2007: 192.
NIC	463.H.4	Helwan	Dynasty 2	IIA	8 m long X 4.5 m wide	Yes	Yes	?	Sand, rubble or mud-brick?	Saad 1951: Plate III
NIC	464.H.4	Helwan	Dynasty 2	IIA	7.75 m long X 4 m wide	Yes	Yes	?	Sand, rubble or mud-brick?	Saad 1951: Plate III
NIC	612.H.4	Helwan	Dynasty 2	IIA	10.2 m long X 4.7 m wide	Yes	Yes	?	Sand, rubble or mud-brick?	Saad 1951: Plate III
NIC	636.H.4	Helwan	Dynasty 2	IIA	7 m + long X 2.5 m wide	Yes	Yes	?	Sand, rubble or mud-brick?	Saad 1951: Plate III
NIC	8.H.5	Helwan	Dynasty 2	IIA	6 m long X 3 m wide	Yes	No	?	Sand, rubble or mud-brick?	Saad 1951: Plate III
NIC	60.H.5	Helwan	Dynasty 2	IIA	7 m + long X 3 m wide	Yes	?	?	Sand, rubble or mud-brick?	Saad 1951: Plate III
NIC	74.H.5	Helwan	Dynasty 2	IIA	15 m long X 6.75 m wide	Yes	Yes	?	Sand, rubble or mud-brick?	Saad 1951: Plate III
278	Tomb 3112, Cemetery 3100	Badari	Dynasty 2	IIA	15.29 m long X 8 m wide	?	Possibly	?	?	Brunton 1927: 13-4, 16 and Tomb register Pl. X.

Chart N1

Type II and IIA Superstructures Chart

Cat No.	Identity	Location	Period	Substructure Type	Superstructure size	Burial chamber covered by footprint	Access route covered by structure	External mud-brick wall thickness in m	Core material	Reference
	Dynasty 3									
114	S 3040	Saqqara	Dynasty 3	IIA	45 m long X 18.3 m wide.	Yes	Partially	?	'Filled'	Reisner 1936: 163
115	S 2416	Saqqara	Dynasty 3	IIA	9.8 m long X 5.9 m wide	?	Yes	?	Gravel	Quibell 1923: 39; Reisner 1936: 162.
116	S 2317	Saqqara	Dynasty 3	IIA	4.8 m long X 2.4 m wide	?	Yes	?	?	Quibell 1923: 33; Reisner 1936: 163.
117	S 2445	Saqqara	Dynasty 3	IIA + IIA	7.8 m long X 3.9 m wide	?	Yes	?	?	Quibell 1923: 41; Reisner 1936: 162.
303	N 574, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA	10.4 m long X 3.9 m wide	Partially	Yes	0.30	Gravel	Reisner 1932: 220–1; 1936: 182.
304	N 599, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA	5.8 m long X 2.77 m wide.	Partially	Yes	0.30	Gravel	Reisner 1932: 229; 1936: 182.
305	N 689, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA	17.4 m long X 10.5 m wide X approx. 2 m high	Yes	Yes	1.4	Mud-brick	Reisner 1932: 244–6; 1936: 181.
306	N 573 + 587, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA + IIA	25·8 m long X 5·6 m wide	Yes	Yes	0.8	Gravel	Reisner 1932: 217–8; 1936: 181.
Cat No.	**Identity**	**Location**	**Period**	**Substructure Type**	**Superstructure size**	**Burial chamber covered by footprint**	**Access route covered by structure**	**External mud-brick wall thickness in m**	**Core material**	**Reference**
315	R 1	Reqaqnah	Dynasty 3	IIA	24.9 m long X 12 m wide	Yes	Yes	1.75	Filled'	Garstang 1904: 22; Reisner 1936: 179–80.
316	R 40	Reqaqnah	Dynasty 3	IIA	17.3 m long X 10.4 m wide	Partially	Yes	1-1.75	Filled'	Garstang 1904: 21-3; Reisner 1936: 180.
319	K1	Beit Khallaf	Dynasty 3	IIA	85 m long X 45 m wide X 8 m high	Yes	Yes	Solid	Mud-brick	Garstang 1903: 3-4, 8-11; Reisner 1936: 172-4.
320	K2	Beit Khallaf	Dynasty 3	IIA + IIA	64.9 m long X 23.6 m wide	Yes	Yes	Solid	Mud-brick	Garstang 1903: 11-12; Reisner 1936: 174-6
321	K3	Beit Khallaf	Dynasty 3	IIA	44.25 m long X 21.8 m wide	Yes	Yes	Solid	Mud-brick	Garstang 1903: 15-16; Reisner 1936: 177-8
322	K4	Beit Khallaf	Dynasty 3	IIA	18.8 m long X 9.6 m wide	Yes	Yes	Solid	Mud-brick	Garstang 1903: 14-15: Reisner 1936: 178-9
323	K5	Beit Khallaf	Dynasty 3	IIA	61.7 m long X 29.8 m wide	Yes	Yes	Solid	Mud-brick	Garstang 1903: 15-16; Reisner 1936: 176-7.
	Dynasty 4									
317	R75	Reqaqnah	Dynasty 4, Sneferu	IIA	23.6 m long X 12 m wide.	Yes	Yes	0.75-1.5	Filled'	Garstang 1904: 31-2; Reisner 1936: 231 .

Chart N2

Cat No.	Identity	Location	Period	Substructure Type	Superstructure size	Burial chamber covered by footprint	Access route covered by structure	External mud-brick wall thickness in m	Core material	Reference
	Type IIB									
	Dynasty 2									
184	Op. 4/148	Helwan	Dynasty 2	IIB	7 m long X 4 m wide	Yes	Yes	?	Sand, rubble or mud-brick?	Köhler 2009: 284.
NIC	70.H.5	Helwan	Dynasty 2	IIB	7 + m X 3 m wide	Partially	Yes	?	Sand, rubble or mud-brick?	Saad 1951: Map III.
	Dynasty 4									
311	N 561b	Naga el-Deir	Dynasty 4, Sneferu	IIB	10.6 m long X 5.9 m wide.	2 m	Yes	0.75m*	Gravel	Reisner 1932: 212-3
	Type IIA-C									
Cat. No.	**Identity**	**Location**	**Period**	**Substructure Type**	**Superstructure size**	**Burial chamber covered by footprint**	**Access route covered by structure**	**External mud-brick wall thickness in m**	**Core material**	**Reference**
	Dynasty 3									
61	Covington's Tomb (Mastaba T/Tomb no. 1).	Giza	Dynasty 3	IIA-C	54.97 m long X 27.95 m wide X 7 m +	Yes	Yes	Solid	Mud-brick	Covington 1905: 219-233; Petrie 1907: 7-8.
118	S 3050	Saqqara	Dynasty 3	IIA-C + IIA	60 m long X 25 m wide.	Yes	Yes	4.5	Sand and rubble	Martin 1971: 2; 1974: 21–5.
119	S 2405 (Hesy-ra)	Saqqara	Dynasty 3	IIA-C	43 m long X approx. 17.4 m wide X 5 m + high	Probably	Yes	Solid	Mud-brick	Quibell 1913: passim; Reisner 1936: 158-9 .
120	S 3070	Saqqara	Dynasty 3	IIA-C + IIC	35.5 m long X 16 m wide	Yes	Yes	1.3-1.7	Rubble	Reisner 1936: 166; Emery 1968: 11-3
121	S 2103	Saqqara	Dynasty 3	IIA-C	20.7 m long X 10.1 m wide	?	Yes	1-1.5	Gravel	Quibell 1923: 18; Reisner 1936: 160.
122	S 3043	Saqqara	Dynasty 3	IIA-C	33.5 m long X 17 m wide	?	Yes	?	?	Reisner 1936: 155-6.
123	S 2115	Saqqara	Dynasty 3	IIA-C	8.3 m long X 3.6 m wide	?	Yes	0.75	?	Quibell 1923: 21; Reisner 1936: 161.
124	S 2336	Saqqara	Dynasty 3	IIA-C	11.95 m long X 4.48 m wide	?	Yes	?	?	Quibell 1923: 25; Reisner 1936: 161..
125	S 2428	Saqqara	Dynasty 3	IIA-C	9.5 m long X 4.5 m wide	?	Yes	?	?	Quibell 1923: 40; Reisner 1936: 161.
126	S 2407	Saqqara	Dynasty 3	IIA-C + IIA-C	55 m long X 27.5 m wide.	Probably	Yes	3	Liquid mud?	Quibell 1923: 12, 38; Reisner 1936: 157.
127	S 2436 + 2437	Saqqara	Dynasty 3	IIA-C + IIA-C	20.3 m long X 6.3 m wide	?	Yes	2.5	?	Quibell 1923: 40; Reisner 1936 160-1.
128	M1	Saqqara	Dynasty 3	IIA-C	7.25 m long X 3.75 m wide	Yes	Yes	0.7-0.9	Rubble	Ghaly 1994: 57-69.
129	M2	Saqqara	Dynasty 3	IIA-C	9.5 m long X 4.5 m wide	Yes	Yes	Solid	Mud-brick	Ghaly 1994: 57-69.
130	M3	Saqqara	Dynasty 3	IIA-C	8.5 m long X 5 m wide	Partially	Yes	1	Rubble	Ghaly 1994: 57-69.
308	N 585, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA-C	11.1 m long × 4.1 m wide	Yes	Yes	0.5	Gravel	Reisner 1932: 17 and 224.
309	N 586, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA-C	7.25 m long X 3.6 m wide	Yes	Yes	0.3	?	Reisner 1932: 17 and 225.
310	N 593, Cemetery 500-900	Naga el-Deir	Dynasty 3	IIA-C	7.6 m long X 3.6 m wide	Yes	Yes	0.5	?	Reisner 1932: 17 and 226.
344	Tomb 274 Rock Necropolis	Elkab	Dynasty 3	IIA-C	20 m long X 10 m wide	Yes	Yes	0.9-1.4	?	Limme 2000: 26-31; Huyge 2003: 29.
	Dynasty 4									
77	AS 33	Abusir	Dynasty 4, early	IIA-C	53.53 m long X 23.25 m wide.	Yes	Yes	Solid	Mud-brick	Bárta 2010: 57-182.
78	Tomb of Hetepi (AS 20)	Abusir	Dynasty 4, early	IIA-C + IIA-C	49.7 m long X 23.22 m wide.	Yes	Yes	brick 1-1.6 m stone 1-1.2 m	Sand, limestone chips and waste	Bárta, Coppens and Vymazalová 2010: 3-56
	Type IIC									
Cat No.	**Identity**	**Location**	**Period**	**Substructure Type**	**Superstructure size**	**Burial chamber covered by footprint**	**Access route covered by structure**	**External mud-brick wall thickness in m**	**Core material**	**Reference**
	Dynasty 2									
201	Op. 4/115	Helwan	Dynasty 2	IIC	10 m long X 6 m wide	?	Yes	?	Sand, rubble or mud-brick?	Köhler 2008a: 172.
202	Op. 4/153	Helwan	Dynasty 2, Late?	IIC	3.5-4 m long X 1.8 m wide	?	Yes	?	Sand, rubble or mud-brick?	Köhler 2009: 284.
NIC	666.H.4	Helwan	Dynasty 2, Late?	IIC	3.5 m long X 2 m wide	Partially	Yes	?	Sand, rubble or mud-brick?	Saad 1951: Map III.
NIC	669.H.4	Helwan	Dynasty 2, Late?	IIC	4.5 m long X 3.25 m wide	Yes	Yes	?	Sand, rubble or mud-brick?	Saad 1951: Map III.
NIC	11.H.5	Helwan	Dynasty 2, Late?	IIC + IIC	10.75 m long X 4 m wide	Yes	Yes	?	Sand, rubble or mud-brick?	Saad 1951: Map III.
	Dynasty 3									
62	The inner mastaba	Giza, Nazlet Batran	Dynasty 3	IIC	11.6 m long X 5.7m wide X 2 m high	?	Yes	Solid	Sandstone	Kromer 1991: 16-8.
76	AS 54	Abusir	Dynasty 3	IIC	52.6 m long X 23.8 m wide	?	Yes	Solid	Mud-brick	Bárta 2012: 41-50.
131	S 3518	Saqqara	Dynasty 3	IIC + IIC	52 m long X 19 m wide.	Yes	Yes	4.5-5 m	Rubble?	Emery 1970: 10; 1971: 1, 3-4.
132	S 3517	Saqqara	Dynasty 3	IIC + IIC	55 m long X 25 m wide.	Yes	Yes	2.5–4.5 m	Rubble	Emery 1966: 7.
133	S 2464	Saqqara	Dynasty 3	IIC	18.5 m long X 7 m wide	?	Yes	?	?	Quibell 1923: 42.
134	S 3536	Saqqara	Dynasty 3	IIC + IIC	26 m long X 13.5 m wide	?	Yes	2.5-3 m	Rubble and sand core	Smith & Jeffreys 1977: 22.
135	S 3044	Saqqara	Dynasty 3	IIC	35 m long X 17.3 m wide.	Yes	Yes	?	?	Reisner 1936: 167-8.
136	S 2305	Saqqara	Dynasty 3	IIC + IIC + IIC	35.5 m long X 12.5 m wide	?	Yes	3-3.5	?	Quibell 1923: 30; Reisner 1936: 171.
137	M16	Saqqara	Dynasty 3	IIC	5.7 m long X 3.3 m wide	Yes	Yes	Solid	Mud-brick	Ghaly 1994: 59.
204	287.H.6	Helwan	Dynasty 3	IIC	56 m long X 27.4 m wide	Yes	Yes	3.2-6	?	Saad 1951: 3-5; 1969: 32
	Dynasty 4									
79	Tomb of Ity	Abusir (South)	Dynasty 4	IIC + IIA-C	49.50 m long X 20.6 m wide	Yes	Yes		Limestone	Verner 1995: 78-90; Barta 2001: 1-16.
80	Lake of Abusir Tomb 1	Abusir	Dynasty 4	IIC	25.65 m long X 13.1 m wide X 1.5 m high	Yes	Yes	1.5	Tafl, rubble and sand core	Barta 2000: 335-9; 2001: 21-8.

Cat No.	Identity	Location	Period	Substructure Type	Superstructure size	Burial chamber covered by footprint	Access route covered by structure	External mud-brick wall thickness in m	Core material	Reference
205	Tomb No. 1	Dahshur (South)	Dynasty 4	IIC	?	?	?	?	Stone	De Morgan 1895: 8-9 .
206	DAS 9, Ipy	Dahshur (South)	Dynasty 4, Sneferu	IIC	26.5 long X 12.15 m wide	Yes	Yes	?	Stone	Stadelmann & Alexanian 1998: 202-3; Alexanian & Seidlmayer 2002: 3-9.
207	DAS 32-4 (Ii-nefer)	Dahshur (South)	Dynasty 4, Sneferu	IIC	34.1 m long X 17.3 m wide	?	Yes	?	Stone	Barsanti 1902: 198-201; Stadelmann & Alexanian 1998: 304.
208	DAS 25-1	Dahshur (South)	Dynasty 4, Sneferu	IIC	36.2 m long X 16.85 m wide X 4 m high	?	Yes	Solid?	Stone	Stadelmann 1998: 305-6.
209	Mastaba I/1	Dahshur	Dynasty 4, Sneferu	IIC	25.5 long X 13.1 m wide	Yes	Yes	2.25	Tafl, rubble and sand core	Stadelmann & Alexanian 1993: 272-8.
210	Mastaba II/1, Netjer-Aperef	Dahshur	Dynasty 4, Sneferu	IIC	35.1 m long X 18.9 m wide X 4 m.	Yes	Yes	5.5	Limestone chips, gravel, clay and	Stadelmann & Alexanian 1993: 278-83; Alexanian 1999.
211	Mastaba I/2	Dahshur	Dynasty 4, Sneferu	IIC	31.8 m long X 15.8 m wide.	Yes	Yes	7	Tafl, rubble and sand core	Stadelmann & & Alexanian 1993: 284-8.
220	Mastaba No. 6, Rahotep and Nefert.	Meidum	Dynasty 4, Sneferu	IIC + IIC	82.5 m long X 42 m wide × 9-10 m high?	Yes	Yes	Solid	Mud-brick	Petrie 1892: 16-7; Reisner 1936: 211 and 213.
221	Mastaba No. 9, Ranefer	Meidum	Dynasty 4, Sneferu	IIC + IIC	54.88 m long X 29.48 m wide X 8.5 m high?	Yes	Yes	Solid	Mud-brick	Petrie 1892: 17; Reisner 1936: 212-3.
223	Mastaba No. 7	Meidum	Dynasty 4, Sneferu	IIC + IIC	22.75 m long X 12 m wide (core)	Yes	Yes	1.75	Gravel	Petrie 1892: 20; Reisner 1936: 214.
225	Mastaba No. 8	Meidum	Dynasty 4, Sneferu	IIC + IIC + IIC	40.89 m long X 15.64 m wide X 4.97 m high.	Yes	Yes	Solid	Mud-brick	Petrie 1892: 18-9; Reisner 1936 : 212.
313	N 739	Naga el-Deir	Dynasty 4, Sneferu	IIC	10.35 long X 6.3 m wide X 1 .5 m high	Yes	Yes	0.75	Gravel	Reisner 1932: 248.
314	N 546 + N 604	Naga el-Deir	Dynasty 4, Sneferu	IIC + IIC	8.95 long X 3.5 m wide	Yes	Yes	0.3	Gravel	Reisner 1932: 208 and 231.
318	R 64 Tomb of Shepses	Reqaqnah	Dynasty 4, Sneferu	IIC	10 m long X 4 m wide.	Yes	Yes	Solid	Mud-brick	Garstang 1904: 49-50.
328	D 135 + D136	Abydos	Dynasty 4, Sneferu	IIC + IIC	13 m long X 9 m wide	?	Yes	1.75	Sand?	Peet and Loat 1913: 9, 15-7.
345	Mastaba A, Kamena	Elkab	Dynasty 4, Sneferu	IIC	29 m long X 14.75 m wide.	?	Yes	3	Brick earth'	Quibell 1896: 3-4; Reisner 1936: 229.
346	Mastaba D, Nefershem	Elkab	Dynasty 4, Sneferu	IIC	28.25 m long X 14.75 m wide.	?	Yes	4	Brick earth'	Quibell 1896: 3-4; Reisner 1936: 229.
	Type III									
	Dynasty 4									
251	Mastaba No. 16, Nefermaat and Atet	Meidum	Dynasty 4, Sneferu	III + IIC	120 m long X 68 m wide X 10 m high (E)	Yes	Yes	2.46-3	Liquid mud	Petrie, Mackay and Wainwright 1910: 4-6, 18-22; 1912: 25-6.
252	Mastaba No. 17, owner unknown	Meidum	Dynasty 4, Sneferu	III	103.05 m long X 51.6 m wide X 10 m high (E)	Yes	Yes	?	Gravel	Petrie 1892: 11-4; Petrie, Mackay and Wainwright 1910: 3-4.

Chart O2

Cat. No.	Identity	Location	Substructure Type	Period	Emplacement	Stone (s)	H	W	Th.	M3	Lower weight in tonnes	Upper weight in tonnes	Median weight in tonnes	Reference
	Dynasty 1 (Naqada IIIC2-D)													
	Royal tombs													
8	Tomb T, King Den	Abydos, Umm el-Qaab	ID	Dynasty 1, Naqada IIIC2, Den	Grooves in staircase	Wooden *Holzfalltur*								Petrie 1901: 9-11.
9	Tomb X, King Adjib	Abydos, Umm el-Qaab	ID	Dynasty 1, Naqada IIIC2, Adjib	Grooves at b/c entrance	Wooden boards								Petrie 1900: 12-3.
10	Tomb U, King Semerkhet	Abydos, Umm el-Qaab	ID	Dynasty 1, Naqada IIIC2/D Semerkhet	None, doorway reveals	Wooden boards								Petrie 1900: 13-4.
11	Tomb Q, King Qa'a	Abydos, Umm el-Qaab	ID	Dynasty 1, Naqada IIID, Qa'a	Grooves in staircase	1, broken	0.98	1.24	0.30	0.36	0.62	0.95	0.78	Petrie 1900: 14-6.
	Private tombs													
44	Tomb MO1 Cemetery M	Abu Roash	II	Dynasty 1, Naqada IIIC2	Grooves at b/c entrance	1, missing								Montet 1938: 15-28.
45	Tomb MO2, Cemetery M	Abu Roash	II	Dynasty 1, Naqada IIIC2	Grooves at b/c entrance	LH 1 of 2 side by side	1.60	0.80	0.20	0.26	0.44	0.67	0.55	Montet 1938: 28-34.
46	Tomb MO3 Cemetery M	Abu Roash	II	Dynasty 1, Naqada IIIC2	Grooves at b/c entrance	1, missing								Montet 1938: 32-34.
47	Tomb MO4 Cemetery M	Abu Roash	II	Dynasty 1, Naqada IIIC2	Grooves at b/c entrance	1								Montet 1938: 35.
48	Tomb MO6 Cemetery M	Abu Roash	II	Dynasty 1, Naqada IIIC2	Free stg. at b/c entrance	2 side by side								Montet 1938: 37-38.
49	Tomb MO7 Cemetery M	Abu Roash	II	Dynasty 1, Naqada IIIC2	Grooves at b/c entrance	1, notched and broken								Montet 1938: 38-46.
50	Tomb MO10, Cemetery M	Abu Roash	II	Dynasty 1, Naqada IIIC2	Grooves at b/c entrance	2 side by side, missing								Montet 1938: 50-3.
51	Tomb MO11, Cemetery M	Abu Roash	II	Dynasty 1, Naqada IIIC2	Grooves at b/c entrance	2 side by side								Montet 1938: 53-4.
52	Tomb MO12, Cemetery M	Abu Roash	II	Dynasty 1, Naqada IIIC2	Grooves at b/c entrance	2 side by side								Montet 1938: 54-8.
63	Tomb 1056	Tura el-Asmant	ID	Dynasty 1, Naqada IIIC2-IIID	Grooves in stairway and b/c entrance	1 of 2	2.41	1.15	0.20	0.55	0.94	1.44	1.19	Yacoub 1981: 160
"	"	"	"	"	"	2 of 2	2.00	1.35	0.18	0.49	0.83	1.26	1.04	"
64	Tomb 1035	Tura el-Asmant	ID	Dynasty 1, Naqada IIIC2-IIID	Grooves at b/c entrance	1								Yacoub 1981: Pl. XIV.
67	Tomb 249	Tura el-Asmant	ID	Dynasty 1, Naqada IIID, Qa'a	Grooves in stairway and b/c entrance	2								El Khouli 1968: 75.
69	Mastaba IV	Abusir	ID	Dynasty 1, Naqada IIIC2?	Limestone door surround.	1								Radwan 2000: 509-13.
89	S 3035 (Hemaka)	Saqqara	ID	Dynasty 1, Naqada IIIC2, Den	3 × Grooves in stairway and 1 × freestanding before burial chamber/magazine	No. 4 of 4, 2 missing, 1 broken	2.50	1.53	0.25	0.96	1.63	2.49	2.06	Emery 1938: 3-13.
90	S 3036 (Ankh-ka)	Saqqara	ID	Dynasty 1, Naqada IIIC2, Den	Grooves in stairway and b/c entrance	2 missing								Emery 1949: 71-81.
91	S 3038 (Nebitka).	Saqqara	ID	Dynasty 1, Naqada IIIC2, Adjib	Grooves in stairway	1, missing								Emery 1949: 82-92.
92	S X	Saqqara	ID	Dynasty 1, Naqada IIIC2-IIID, Qa'a?	Grooves at b/c entrance	1	2.75	1.15	0.30	0.95	1.61	2.47	2.04	Emery 1949: 107–9.
93	S 3338	Saqqara	ID	Dynasty 1, Naqada IIIC2, Adjib	Grooves in passage and at b/c entrance	2 of 2, 1 missing	2.15	1.20	0.25	0.65	1.10	1.68	1.39	Emery 1949: 124-9.
94	S 3500	Saqqara	ID	Dynasty 1, Naqada IIID, Qa'a	Grooves in stairway and at b/c entrance	1 of 2	3.10	1.35	0.30	1.26	2.13	3.26	2.70	Emery 1958: 98-102.
"	"	"	"	"	"	2 of 2	2.60	1.20	0.25	0.78	1.33	2.03	1.68	"
95	S 3505	Saqqara	ID	Dynasty 1, Naqada IIID, Qa'a	Grooves at b/c entrance	1	3.00	1.40	0.25	1.05	1.79	2.73	2.26	Emery 1958: 5-13.
96	S 2105	Saqqara	ID	Dynasty 1, Naqada IIID, Qa'a	Grooves at b/c entrance	1								Quibell 1923: 19.
97	S 3121	Saqqara	IIA	Dynasty 1, Naqada IIID, Qa'a	Unknown	1, smashed								Emery 1949: 116-9.
144	553.H.2	Helwan	ID	Dynasty 1, Naqada IIIC2-IIID	Grooves in stairway and at b/c entrance	Both missing								Saad 1947: 107
145	559.H.2	Helwan	ID	Dynasty 1, Naqada IIIC2-IIID	Grooves in stairway and b/c entrance	Both missing								Saad 1947: 107-8
146	499.H.2	Helwan	ID	Dynasty 1, Naqada IIIC2-D	Unclear	1								Saad 1947: Pl. XLI
147	701.H.3	Helwan	ID	Dynasty 1, Naqada IIIC2-IIID	Grooves at b/c entrance	1								Saad 1947: 173
148	1371.H.2	Helwan	ID stone floor	Dynasty 1, Naqada IIIC2, Adjib	Grooves in passage and at b/c entrance	1 of 2	1.70	1.00	0.15	0.26	0.43	0.66	0.55	Saad 1947: 109-10.
"	"	"	"	"	"	2 of 2	1.80	1.05	0.55	1.04	1.77	2.70	2.23	
149	1502.H.2	Helwan	ID	Dynasty 1, Naqada IIIC2-IIID	Grooves in stairway and b/c entrance	2 , 1 missing								Saad 1947: 110-11
150	426.H.4	Helwan	ID	Dynasty 1, Naqada IIIC2-IIID	Grooves at b/c entrance	1 in passage	2.30	1.15	0.30	0.79	1.35	2.06	1.71	Saad 1951: 12-3
152	355.H.4	Helwan	ID	Dynasty 1, Naqada IIIC2-IIID	Grooves at b/c entrance	1								Saad 1951: 8-9.
153	1473.H.2	Helwan	ID	Dynasty 1, Naqada IIIC2-IIID	Grooves at b/c entrance	Missing								Saad 1947: 110
154	785.H.5	Helwan	ID	Dynasty 1, Naqada IIIC2-IIID	Grooves at b/c entrance	Missing								Saad 1969: 20-2
158	40.H.3 (1/1 Köhler)	Helwan	ID stone tomb	Dynasty 1, Naqada IIIC2-IIID	Grooves in passage before b/c formed by slabs?	2, broken	1.00	1.15	0.30	0.35	0.59	0.90	0.74	Saad 1947: 164-6; 2005: 21-2.
159	1.H.3	Helwan	ID stone tomb	Dynasty 1, Naqada IIIC2-IIID	3 × Grooved emplacements in stairway and 1 × b/c entrance	4, 2 missing								Saad 1947: 163-4
160	60.H.1	Helwan	ID stone tomb	Dynasty 1, Naqada IIID	Unclear, located in passage and before entrance	2								Köhler 2008b: 120.
161	9.H.1	Helwan	ID stone tomb	Dynasty 1, Naqada IIIC2, Den	Possible grooves in staircase	Missing								Saad 1947: 28, Plan 2.
NIC	665.H.3?	Helwan	ID	Dynasty 1, Naqada IIIC2-IIID	Grooves in passage and at b/c entrance	2, 1 missing								Saad 1947: 173, pl. LXXXVIIII
	Dynasty 2 (Naqada IIID)													
	Royal tombs													
12	King Hotepsekhemwy/Raneb	Saqqara	IIA	Dynasty 2	4 × Grooves in passageway	4								Barsanti 1901: 250–2.
13	King Ninetjer	Saqqara	IIA	Dynasty 2	2 × Grooves in passageway	2	3.40	1.75	0.50	2.98	5.06	7.74	6.40	Lacher Raschdorff 2014: 58.
	Private tombs													
60	Unknown tomb	Giza	IIA	Dynasty 2	Unclear, grooves for emplacements × 2	2, 1 missing	3.04	1.39	0.29	1.23	2.08	3.19	2.63	Petrie 1907: 7.
71	Tomb 10B-4	Abusir	IIA	Dynasty 2.	Freestanding emplacement	1	1.30	1.20	0.40	0.62	1.06	1.62	1.34	Bonnet 1928: 3.
74	Tomb 12B-6	Abusir	IIC	Dynasty 2.	Freestanding emplacement	1	1.20	1.00	0.30	0.36	0.61	0.94	0.77	Bonnet: 1928: 4-5.
104	S 2171	Saqqara	IIA	Dynasty 2	Grooved emplacement in passage.	1								Quibell 1923: 7, 23-4.
NIC	S 2247	Saqqara	IIA	Dynasty 2	Unknown	1								Quibell 1923: 28.
105	S 2302	Saqqara	IIA	Dynasty 2	Grooves in passage + poss. 2 more in passages on drwg.	1								Quibell 1923: 29-30.

Cat. No.	Identity	Location	Substructure Type	Period	Emplacement	Stone (s)	H	W	Th.	M3	Lower weight in tonnes	Upper weight in tonnes	Median weight in tonnes	Reference
111	S 2498	Saqqara	IIA	Dynasty 2	1 × Grooved emplacment at base of stair on drwg.	1								Quibell 1923: 10, 44-5.
99	S 2101	Saqqara	IIA	Dynasty 2	Grooves at b/c entrance	1								Quibell 1923: 17.
100	S 3042	Saqqara	IIA	Dynasty 2	2 × Grooves in passageway	2								Reisner 1936: 144-5.
101	S 2452	Saqqara	IIA	Dynasty 2	Unclear	1	2 +							Quibell 1923: 41-2.
102	S 3477	Saqqara	IIA	Dynasty 2	Grooves at b/c entrance	1	1.80	1.70	0.30	0.92	1.56	2.39	1.97	Emery 1962: 1-14.
103	S 3024	Saqqara	IIA	Dynasty 2.	Grooves on staircase and at b/c entrance	2, both missing								Emery 1949: 11-12.
106	S 2307	Saqqara	IIA	Dynasty 2	Grooves at b/c entrance	1								Quibell 1923: 31.
107	S 2322	Saqqara	IIA	Dynasty 2.	Grooves at b/c entrance	1								Quibell 1923: 34.
108	S 2337	Saqqara	IIA	Dynasty 2	Grooves at b/c entrance	2								Quibell 1923: 35-36.
109	S 2406	Saqqara	IIA	Dynasty 2	Grooves at substructure entrance	1								Quibell 1923: 38.
115	S 2315	Saqqara	IIA	Dynasty 2	Grooves at b/c entrance	1								Quibell 1923: 33.
NIC	S 2152	Saqqara	IIA	Dynasty 2	Unclear	1								Quibell 1923: 22
163	255.H.8	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	Missing								Saad 1957: 59.
164	25.H.5	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	Missing								Saad 1951: 27.
165	505.H.4	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	1								Saad 1951: 15-7.
166	1075.H.8	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	Missing								Saad 1957: 61.
167	25.H.4 (Op.2/1 Köhler)	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	Missing								Köhler 2008a: 172.
168	Op. 3/1	Helwan	IIA	Dynasty 2.	Grooves at b/c entrance	Missing								Köhler 2001: 23-5.
169	810.H.3	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	1	1.70	1.30	0.40	0.88	1.50	2.30	1.90	Saad 1947: 172-3.
171	416.H.6	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	Missing								Saad 1957: 20-2
172	235.H.8	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	Missing								Saad 1957: 29-31
173	Op. 4/94	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	1								Köhler 2007: 192-4.
176	473.H.4	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	Missing								Saad 1957: 57.
177	393.H.8	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	Missing								Saad 1957: 59-60.
178	419.H.8	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	Missing								Saad 1957: 60.
179	109.H.9	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	Missing								Saad 1957: 39-40.
180	140.H.9	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	1	2.20	0.55	0.10	0.12	0.21	0.31	0.26	Saad 1957: 63.
181	Op. 4/4	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	1	1.29	0.91	0.13	0.15	0.26	0.40	0.33	Köhler 2014: 139-40.
182	Op. 4/19	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	1, Broken	1.01	1.00	0.12					Köhler 2014: 236-7.
183	Op. 4/88	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	Missing?								Köhler 2007: 192.
NIC	809.H.3	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	1								Saad 1947: 173.
NIC	1139.H.11	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	Missing								Köhler and Jones 2009: 7.
NIC	433.H.8	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	Missing								Saad 1957: 61.
NIC	344.H.6	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	Missing								Saad 1957: 57.
NIC	757.H.8	Helwan	IIA	Dynasty 2	Grooves at b/c entrance	Missing								Saad 1957: 61
184	Op. 4/148	Helwan	IIB	Dynasty 2	Grooves at b/c entrance	1 , fragmentary								Köhler 2009: 284.
185	Op. 4/62	Helwan	IIB	Dynasty 2	Grooves at b/c entrance on drwg.	Missing								Köhler 2008b: 118.
186	Op. 4/103	Helwan	IIB	Dynasty 2	Grooves at b/c entrance on drwg.	Missing								Köhler 2007: 201-202.
188	173.H.9	Helwan	IIB	Dynasty 2	Grooves at b/c entrance	Missing?								Saad 1957: 63.
193	670.H.7	Helwan	IIC	Dynasty 2	Grooves at b/c entrance	Missing								Saad 1957: 58.
194	379.H.8	Helwan	IIC	Dynasty 2	Grooves at b/c entrance	Missing								Saad 1957: 42-43.
195	381.H.8	Helwan	IIC	Dynasty 2	Grooves at b/c entrance	Missing								Saad 1957: 17-18
201	Op. 4/115	Helwan	IIC	Dynasty 2	Grooves at b/c entrance	1								Köhler 2008a: 172.
NIC	738.H.7	Helwan	IIC	Dynasty 2	Grooves at b/c entrance	Missing								Saad 1957: 59.
217	Grave 240	Tarkhan (Kafr Amar)	IIA	Dynasty 2 (Petrie)	Freestanding emplacement	1	1.32	0.96	0.22	0.28	0.47	0.72	0.60	Petrie 1913: 27.
253	Tomb 771	Lahun, Bashkatib Cemetery	IIA	Dynasty 2	Tapered emplacement before b/c entrance	1	1.98	1.09	0.12	0.26	0.44	0.67	0.56	Petrie et al. 1923: 22-4.
255	Tomb 734	Lahun, Bashkatib Cemetery	IIA	Dynasty 2	Grooves at b/c entrance	Missing								Petrie et al. 1923: 22-4.
256	Tomb 821	Lahun, Bashkatib Cemetery	IIA	Dybasty 2	Grooves at b/c entrance	1	1.37	0.84	0.28	0.32	0.54	0.83	0.69	Petrie et al. 1923: 22-4.
257	Tomb 820	Lahun, Bashkatib Cemetery	IIA	Dynasty 2	Tapered emplacement before b/c entrance	1	1.95	1.42	0.15	0.42	0.71	1.08	0.89	Petrie et al. 1923: 22-4.
259	Tomb 785	Lahun, Bashkatib Cemetery	IIA	Dynasty 2	Tapered emplacement before b/c entrance	1	0.89	0.91	0.15	0.12	0.21	0.32	0.26	Petrie et al. 1923: 22-4.
260	Tomb 770	Lahun, Bashkatib Cemetery	IIA	Dynasty 2	Grooves at b/c entrance	Mud-brick instead								Petrie et al. 1923: 22-4.
261	Tomb 740	Lahun, Bashkatib Cemetery	IIA	Dynasty 2	Freestanding portcullis	1	1.39	0.94	0.12	0.16	0.27	0.41	0.34	Petrie et al. 1923: 22-4.
NIC	Tomb 704	Lahun, Bashkatib Cemetery	IIA	Dynasty 2	Grooves at b/c entrance	Missing								Petrie et al. 1923: Pl. XLVI
NIC	Tomb 712	Lahun, Bashkatib Cemetery	IIA	Dynasty 2	Grooves at b/c entrance	1								Petrie et al. 1923: Pl. XLVI
NIC	Tomb 717	Lahun, Bashkatib Cemetery	IIA	Dynasty 2	Grooves at b/c entrance	1								Petrie et al. 1923: Pl. XLVI
NIC	Tomb 745	Lahun, Bashkatib Cemetery	IIA	Dynasty 2	Grooves at b/c entrance	1								Petrie et al. 1923: Pl. XLVI
NIC	Tomb 850	Lahun, Bashkatib Cemetery	IIA	Dynasty 2	Grooves at b/c entrance	?								Petrie et al. 1923: 31.
266	Tomb 560	Sedment	IIA	Dynasty 2	Tapered emplacement before b/c entrance, stone freestanding	1	1.2	0.9	0.175	0.19	0.32	0.49	0.41	Petrie and Brunton 1924: 2 .
267	Tomb 526	Sedment	IIA	Dynasty 2	Tapered emplacement before b/c entrance	1	1.65	0.91	0.21	0.32	0.54	0.82	0.68	Petrie and Brunton 1924: Pl. XXXVI.
269	Tomb 568	Sedment	IIA	Dynasty 2	Tapered emplacement before b/c entrance	1	1.42	0.71	?					Petrie 1999: 35.

Cat. No.	Identity	Location	Substructure Type	Period	Emplacement	Stone (s)	H	W	Th.	M3	Lower weight in tonnes	Upper weight in tonnes	Median weight in tonnes	Reference
278	Tomb 3112, Cemetery 3100	Badari	IIA	Dynasty 2	Tapered emplacement before b/c entrance	1	1.78	0.99	0.43	0.76	1.29	1.97	1.63	Brunton 1927: 14, 16.
NIC	St. 2	Elkab	IIA	Dynasty 2	Unclear	1, sandstone?								Quibell 1892: 7.
343	Tomb 64	Elkab	IIA	Dynasty 2	Grooves at b/c entrance	1, sandstone	1.00	0.70	0.12	0.08	0.15	0.16	0.15	Hendrickx 1994: 152 and 184.
	Dynasty 3													
	Royal tombs													
16 and 17	Step Pyramid	Saqqara	IIC	Dynasty 3	Granite plugs in pyramid and south tomb	2								Lauer 1936 passim.
16	Step Pyramid	Saqqara	IIC	Dynasty 3	Freestanding emplacement in shafts IV and V	1 of 2	2.60	1.35	0.27	0.95	1.61	2.46	2.04	Lauer 1936: 56-7.
"	"	"	"	"	"	2 of 2	2.53	1.37	0.26	0.90	1.53	2.34	1.94	"
	Private tombs													
61	Covington's Tomb	Giza	IIA-C	Dynasty 3	2 grooved emplacements	1 of 2	4.50	1.92	0.28	2.42	4.11	6.29	5.20	Covington 1905: 219-233.
"	"	"	"	"	"	2 of 2	2.65	1.46	0.28	1.08	1.84	2.82	2.33	"
76	AS 54	Abusir	IIC	Dynasty 3	Freestanding emplacement	1	2.20	1.20	0.25	0.66	1.12	1.72	1.42	Bárta 2012: 50-4
110	S 2429	Saqqara	IIA	Dynasty 3	Grooves precise location unclear	1								Quibell 1923: 40.
113	S 2313	Saqqara	IIA-C	Dynasty 3	Grooves at b/c entrance	1								Quibell 1923: 3, 32.
114	S 3040	Saqqara	IIA	Dynasty 3	Grooves at b/c entrance	1								Reisner 1936: 163
118	S 3050	Saqqara	IIA + IIA-C	Dynasty 3	Grooves in each shaft	Both missing								Martin 1971: 2; 1974: 21–5.
119	S 2405 (Hesy-ra)	Saqqara	IIA-C	Dynasty 3	Grooves at substructure entrance	1	1.60	1.20	0.30	0.58	0.98	1.50	1.24	Quibell 1913.
121	S 2103	Saqqara	IIA-C	Dynasty 3	Unclear	1								Quibell 1923: 18.
125	S 2428	Saqqara	IIA-C	Dynasty 3	Unclear	1								Quibell 1923: 40.
126	S 2407	Saqqara	IIA-C + IIA-C	Dynasty 3	Unclear, emplacement shown on substructure plan	1, but not reported								Quibell 1923: 38, Reisner 1936: .
131	S 3518	Saqqara	IIC + IIC	Dynasty 3	Freestanding emplacement north shaft	1	2.50	1.50	0.30	1.13	1.91	2.93	2.42	Emery 1970: 10.
136	S 2305	Saqqara	IIC	Dynasty 3	Unclear	1								Quibell 1923: 30.
NIC	S 2183	Saqqara	IIA	Dynasty 3	Unclear	1	1.90							Quibell 1923: 26.
NIC	S 2189	Saqqara	IIA	Dynasty 3	Unclear	1	2.50							Quibell 1923: 26.
NIC	S 2199	Saqqara	IIA	Dynasty 3	Unclear	1 broken								Quibell 1923: 27.
NIC	S 3053	Saqqara	IIA + IIA	Dynasty 3	Freestanding in both cases	2								Reisner 1936: 163.
NIC	S 3039	Saqqara	IIA-C + IIC	Dynasty 3	Grooves in each shaft	Missing								Reisner 1936: 168.
NIC	S 2474	Saqqara	IIC	Dynasty 3	Trapezoid shaft	1 fragmentary								Quibell 1923: 43.
NIC	S 2508	Saqqara	IIC	Dynasty 3	Trapezoid shaft	1 broken								Quibell 1923: 46.
304	N 599, Cemetery 500-900	Naga el-Deir	IIA	Dynasty 3	Tapered emplacement before b/c entrance	1	1.50	1.00	0.35	0.53	0.89	1.37	1.13	Reisner 1932: 229.
305	N 689	Naga el-Deir	IIA	Dynasty 3	Unclear	1	1.70	1.30	?					Reisner 1932: 245-6
306	N 573 + 587, Cemetery 500-900	Naga el-Deir	IIA + IIA	Dynasty 3	Only N 573 has freestanding emplacement	1								Reisner 1932: 217–8
308	N 585, Cemetery 500-900	Naga el-Deir	IIA-C	Dynasty 3	Freestanding emplacement	1								Reisner 1932: 224.
310	N 593, Cemetery 500-900	Naga el-Deir	IIA-C	Dynasty 3	Freestanding emplacement	1	1.30	1.10	0.30	0.43	0.73	1.12	0.92	Reisner 1932: 226.
315	R 1	Reqaqnah	IIA	Dynasty 3	Shaft with freestanding emplacement	1	1.90	1.30	0.60	1.48	2.52	3.85	3.19	Garstang 1904: 22.
316	R 40	Reqaqnah	IIA	Dynasty 3	Shaft with freestanding emplacement	1	1.50	1.90	0.50	1.43	2.42	3.71	3.06	Garstang 1904: 21-3.
NIC	R 2	Reqaqnah	IIA	Dynasty 3	Unknown	1								Garstang 1904: 50.
319	K1	Beit Khallaf	IIA	Dynasty 3	6 × No shafts with grooved emplacements	1 of 6	3.30	1.50	0.45	2.23	3.79	5.79	4.79	Garstang 1903: 3-4; 8-11.
"	"	"	"	"	"	2 of 6	3.30	1.50	0.65	3.22	5.47	8.37	6.92	"
"	"	"	"	"	"	6 of 6	5.00	3.00	0.60	9.00	15.30	23.40	19.35	"
320	K2	Beit Khallaf	IIA + IIA	Dynasty 3	2 × Nth. + 1 × Sth. grooved emplacements	1 of 3	5.18	2.74	0.61	8.66	14.72	22.51	18.61	Garstang 1903: 11-2.
321	K3	Beit Khallaf	IIA	Dynasty 3	Grooves at b/c entrance	Missing								Garstang 1903: 15-6.
322	K4	Beit Khallaf	IIA	Dynasty 3	Freestanding emplacement	Missing								Garstang 1903: 14-5.
323	K5	Beit Khallaf	IIA	Dynasty 3	Freestanding emplacement	1								Garstang 1903: 15-6.
NIC	St. 9	Elkab	IIA	Dynasty 3	Unknown	1								Quibell 1892: 8.
NIC	St. 12	Elkab	IIA	Dynasty 3	Unknown	1								Quibell 1892: 8.
	Dynasty 4													
	Royal tombs													
	Bent Pyramid	Dahshur	III	Dynasty 4, Sneferu	Corbelled emplacements with 35 degree slope	2				2.50	4.25	6.50	5.38	Vyse and Perring 1842: 69.
	Private tombs													
77	AS 33	Abusir	IIA-C	Dynasty 4, Sneferu	Freestanding emplacement	1	3.90	1.30	0.40	2.03	3.45	5.27	4.36	Barta 2010: 57-182.
79	Tomb of Ity	Abusir (South)	IIAC + IIC	Dynasty 4, Early	Both unclear	2, 1 missing	2.20	1.20	0.30	0.79	1.35	2.06	1.70	Verner 1995: 78-90. Barta 2001: 1-16.
205	Tomb No. 1	Dahshur	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1	2.00	1.80	0.40	1.44	2.45	3.74	3.10	de Morgan 1895: 8-9.
211	Mastaba I/2	Dahshur	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1								Seidelmayer & Alexanian 1993: 284-8.
210	Mastaba II/1, Netjer-Aperef	Dahshur	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1	2.41	1.68	0.52	2.11	3.58	5.47	4.53	Stadelmann & Alexanian 1993: 278-83.
209	Mastaba I/1	Dahshur	IIC	Dynasty 4, Sneferu	Stopped 'T' shaped grooves at b/c entrance	1	1.80	2.00	0.40	1.44	2.45	3.74	3.10	Stadelmann & Alexanian 1993: 272-8
220	Mastaba 6, Rahotep and Nefert.	Meidum	IIC + IIC	Dynasty 4, Sneferu	Rahotep T' shaped emplacement , Nefert f/stg	1 of 2, 2nd missing	2.56	2.00	0.60	3.07	5.22	7.99	6.60	Petrie 1892: 16-7; 1999c: 20.
221	Mastaba 9, Ranefer	Meidum	IIC + IIC	Dynasty 4, Sneferu	T' shaped emplacement	1 of 2, spouse's missing								Petrie 1892: 17.
222	Mastaba 4, Heneken.	Meidum	IIC	Dynasty 4, Sneferu	Freestanding	1	2.10	0.95	0.35	0.70	1.19	1.82	1.50	Petrie 1892: 20; Reisner 1936: Fig 113.
224	Tomb 416, Northern Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	Missing								Reisner 1936: 215.
225	Mastaba 8	Meidum	IIC + IIC + IIC	Dynasty 4, Sneferu	Southern shaft only, freestanding emplacement	1	2.80	1.10	0.60	1.85	3.14	4.80	3.97	Petrie 1892: 18-9. Reisner 1936: Fig. 109

Cat. No.	Identity	Location	Substructure Type	Period	Emplacement	Stone (s)	H	W	Th.	M3	Lower weight in tonnes	Upper weight in tonnes	Median weight in tonnes	Reference
226	Mastaba 1	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	Missing								Petrie 1892: 20.
227	Tomb 50, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	Freestanding emplacement at b/c entrance	1	2.08	1.06	0.40	0.88	1.50	2.29	1.90	Petrie et al. 1910: 26, 28 and PL. XVIII.
228	Tomb 51, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	1.72	1.50	0.50	1.29	2.19	3.35	2.77	Petrie et al. 1910: 26, 28 and Pl. XVII..
230	Tomb 53, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	2.10	1.30	0.40	1.09	1.86	2.84	2.35	Petrie et al. 1910: Pl. XVII.
NIC	Tomb 54, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	?								Petrie et al. 1910: Pl. XVII.
233	Tomb 57, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	Missing								Petrie et al. 1910: 26, Pl. XVIII.
NIC	Tomb 58, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	?								Petrie et al. 1910: 28, Pl. XVII.
NIC	Tomb 59, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	2.08	1.29	0.40	1.07	1.82	2.79	2.31	Petrie et al. 1910: 28, Pl. XVII.
NIC	Tomb 60, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	1.70	1.37	0.40	0.93	1.58	2.42	2.00	Petrie et al. 1910: 28, Pl. XVII.
234	Tomb 61, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	1.67	1.37	0.40	0.92	1.56	2.38	1.97	Petrie et al. 1910: 26, 28 and Pl. XVII.
235	Tomb 62, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	1.67	1.29	0.43	0.93	1.57	2.41	1.99	Petrie et al. 1910: 25, 28.
236	Tomb 63, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	2.57	1.60	0.48	1.97	3.36	5.13	4.24	Petrie et al. 1910: 25, 28 and Pl. XVII.
NIC	Tomb 64, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	1.95	1.37	0.36	0.96	1.63	2.50	2.07	Petrie et al. 1910: 26, 28 and Pl. XVII.
NIC	Tomb 65, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	1.98	1.49	0.42	1.24	2.11	3.22	2.66	Petrie et al. 1910: 28 and Pl. XVII.
237	Tomb 66, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	1.85	1.57	0.38	1.10	1.88	2.87	2.37	Petrie et al. 1910: 26, Pl.XVIII.
NIC	Tomb 67, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	1.93	1.37	0.45	1.19	2.02	3.09	2.56	Petrie et al. 1910: 28 and Pl. XVII.
238	Tomb 68, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	1.67	1.16	0.35	0.68	1.15	1.76	1.46	Petrie et al. 1910: 25-6 and Pl. XVII.
239	Tomb 69, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, broken	1.20	1.20	0.50	0.72	1.22	1.87	1.55	Petrie et al. 1910: 25-6, 28 and Pl. XVII.
NIC	Tomb 70, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	1.73	1.37	0.33	0.78	1.33	2.03	1.68	Petrie et al. 1910: 28, Pl. XVII.
NIC	Tomb 71, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	1.98	1.34	0.35	0.93	1.58	2.41	2.00	Petrie et al. 1910: 28, Pl. XVII.
NIC	Tomb 72, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	1.98	1.37	0.38	1.03	1.75	2.68	2.22	Petrie et al. 1910: 28, Pl. XVII.
NIC	Tomb 73, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	?								Petrie et al. 1910: Pl. XVII.
NIC	Tomb 74, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	?								Petrie et al. 1910: Pl. XVII.
NIC	Tomb 75, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	?								Petrie et al. 1910: 28, Pl. XVII.
240	Tomb 76, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	2.05	1.37	0.45	1.26	2.15	3.29	2.72	Petrie et al. 1910: 26, 28 and PL. XVII.
NIC	Tomb 77, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	?								Petrie et al. 1910: Pl. XVII.
NIC	Tomb 78, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	?								Petrie et al. 1910: Pl. XVII.
NIC	Tomb 79, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	1.98	1.37	0.38	1.03	1.75	2.68	2.22	Petrie et al. 1910: 28 and Pl. XVII.
241	Tomb 80, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	Freestanding emplacement at passage entrance	1								Petrie et al. 1910: 27-8, Pl.XVII.
242	Tomb 81, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	1, propped up	2.07	1.34	0.40	1.11	1.89	2.88	2.39	Petrie et al. 1910: 28 and Pl. XVII.
NIC	Tomb 84, Far Western Cemetery	Meidum	IIC	Dynasty 4, Sneferu	T' shaped grooved emplacement at b/c entrance	?								Petrie et al. 1910: Pl. XVII.
247	Tomb 277, west of pyramid enclosure	Meidum	III	Dynasty 4, Sneferu	Freestanding at entrance to sloping corridor	1	1.50	1.20	0.40	0.72	1.22	1.87	1.55	Reisner 1936: 206-7.
250	North Peribolos tomb	Meidum	III	Dynasty 4, Sneferu	Sloping passage with grooves at b/c entrance	Missing								Petrie et al. 1910: 12-3
251	Mastaba 16, Nefermaat and Atet	Meidum	III + IIC	Dynasty 4, Sneferu	Atet only - shaft with freestanding emplacement	1 drilled for ropes	3.50	1.65	0.55	3.18	5.40	8.26	6.83	Petrie et al. 1910: 4-6, 18-22.
314	N 546 + 604	Naga el-Deir	IIC + IIC	Dynasty 4, Sneferu	Freestanding at b/c entrance in N 604	1	1.60	1.05	0.60	1.01	1.71	2.62	2.17	Reisner 1932: 231.
312	N 629	Naga el-Deir	IIC	Dynasty 4, Sneferu	Freestanding at b/c entrance	1	1.00	1.00	0.20	0.20	0.34	0.52	0.43	Reisner 1932: 238-9.
NIC	Tomb 288	Elkab	IIC	Dynasty 4, Sneferu	Unclear	1, sandstone								Quibell 1896: 5
345	Tomb of Kamena	Elkab	IIC	Dynasty 4, Sneferu	Freestanding at entrance to burial chamber	1, sandstone								Quibell 1896: 3-4

Chart P4

Saqqara Type IIC shaft tomb data from Quibell (1923)

Tomb no.	Depth of shaft in m	Superstructure	Quibell 1923 page no.	Tomb No.	Depth of shaft in m	Superstructure	Quibell 1923 page no.
S 2101B			18	S 2351A			37
S 2102B	2.3	Yes	18	S 2352	2		37
S 2104 b		Yes	18	S 2353	2.8	Yes	37
S 2104 h		Yes	19	S 2361			37
S 2110	2.5	Yes	19	S 2371	1.4	Yes	38
S 2111		Yes	20	S 2372			38
S 2116			21	S 2373			38
S 2118	3.2		21	S 2426.1	0.8	Yes	39
S 2119		Yes	21	S 2426.2	0.8	Yes	39
S 2126			22	S 2426.3	1		39
S 2137			22	S 2448		Yes	41
S 2145			22	S 2458	2.2		42
S 2146			22	S 2461	3.8	Yes	42
S 2149		Yes	22	S 2462	1.5	Yes	42
S 2155			22	S 2463	3	Yes	42
S 2168	1	Yes	23	S 2464	10.7	Yes	43
S 2169			23	S 2468	2.5		43
S 2172A	3.4	Yes	24	S 2470	4.7	Yes	43
S 2172B-C	2		24	S 2474	12.25	Yes	43
S 2172 E			24	S 2475	3		43
S 2172H	1.2	Yes	25	S 2476		Yes	43
S 2175	3.35	Yes	25	S 2477	2.6	Yes	43
S 2178 N			25	S 2478	2.6		44
S 2179		Yes	25	S 2480	2.6	Yes	44
S 2192		Yes	27	S 2481	2.6	Yes	44
S 2193			27	S 2482	0.6	Yes	44
S 2196A	1.6		27	S 2485	0.7	Yes	44
S 2241	2.8		27	S 2487	1.4	Yes	44
S 2243	1.75		27	S 2488		Yes	44
S 2246			28	S 2495	4		45
S 2259	2.1	Yes	28	S 2497	4	Yes	46
S 2259E	3.1	Yes	28	S 2501	2		46
S 2260	2.6	Yes	28	S 2503		Yes	46
S 2262			28	S 2504	1.6	Yes	46
S 2263			28	S 2508	5.6	Yes	46
S 2267			29				
S 2304C			30				
S 2305	4 +	Yes	30				
S 2311			32				
S 2314 B	3	Yes	33				
S 2314 C			33				
S 2318			33				
S 2319	9	Yes	33				
S 2323C	3		35				
S 2331A			35				
S 2331S			35				
S 2338		Yes	36				
S 2338N		Yes	36				
S 2344A	2.7		36				
S 2344B	3.6		37				
S 2345			36				
S 2347B			37				
S 2348B	2.5		37				
S 2349B	1.9	Yes	37				
S 2350	4.8	Yes	37				

Chart Q

Tomb Catalogue

Tomb catalogue table of contents

Saqqara

Catalogue No. 1

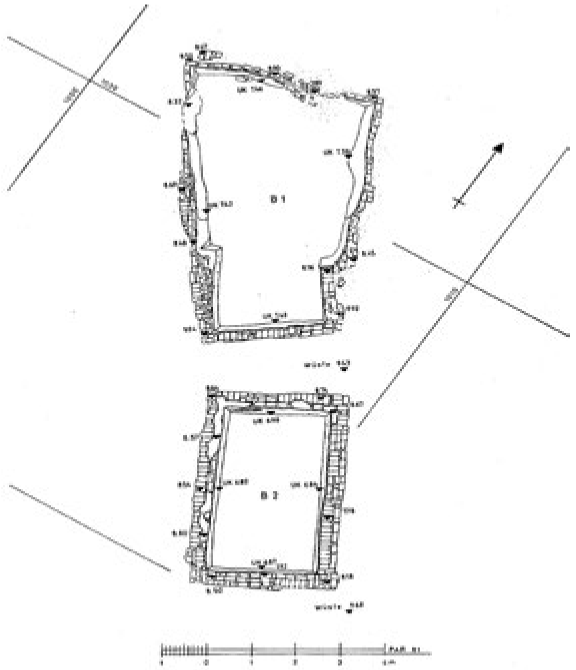


Illustration: Kaiser and Dreyer 1982: Abb. 4. Courtesy of the DAI Cairo.

Identity: Tomb B0/1/2, King Iry-Hor

Location: Abydos, Cemetery B

Period: Dynasty 0, Naqada IIIB

Substructure Type: IB

Liner: Mud-brick. **Thickness:** 0.36 m (1.5 bricks)

Superstructure: No

Footprint O/H: N/A

Security Features: Pits excavated in compacted desert. Burial chamber (B2) lined with mud-brick liner. Wood and mud-brick roof, set 0.80 m under ancient desert level, supported on crossbars overhanging the pit, spaced at 5–10 cm centres and covered with two layers of brick overlapping the pit by around 1.25–1.45 m. Pit then brought level with sand and concealed from view.

Tomb statistics: Substructure: Three mud-brick lined chambers. Burial chamber B2 4.3 m long × 2.4 m wide × 1.8 m deep. B0 and B1 act as side chambers or magazines.

Robbed: Yes

References: Petrie 1901: 7, pl. LIX; Porter and Moss 1937: 87; Kaiser and Dreyer 1982: 222-5; Dreyer *et al.* 1996: 49.

Catalogue No. 2

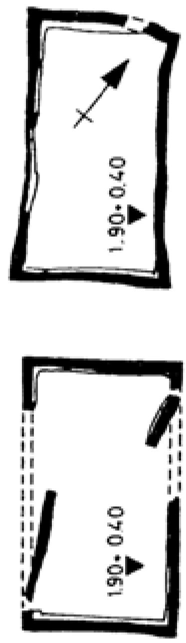


Illustration: Kaiser And Dreyer 1982: Abb. 12. Courtesy of the DAI Cairo.

Identity: Tomb B 7/9, King Ka

Location: Abydos, Cemetery B

Period: Dynasty 0, Naqada IIIB

Substructure Type: IB

Liner: Mud-brick. **Thickness:** 0.26 m (1 brick)

Superstructure: No

Footprint O/H: N/A

Security Features: Pits excavated in compacted desert. Burial chamber lined with mud-brick walls. Wood and mud-brick roofs set 0.50 m under ancient desert level, then brought level with sand and concealed from view.

Tomb statistics: Substructure: Burial chamber B7 approximately 6 m long × 3.1 m wide × 1.8 m deep. Chamber B 9, magazine storage, 5.75 m long × 3.1 m wide × 1.8 m deep.

Robbed: Yes

References: Petrie 1901: 7, pl. LIX; Porter and Moss 1937: 87; Kaiser and Dreyer 1982: 221-2; Dreyer *et al.* 2003: 86.

Catalogue No. 3

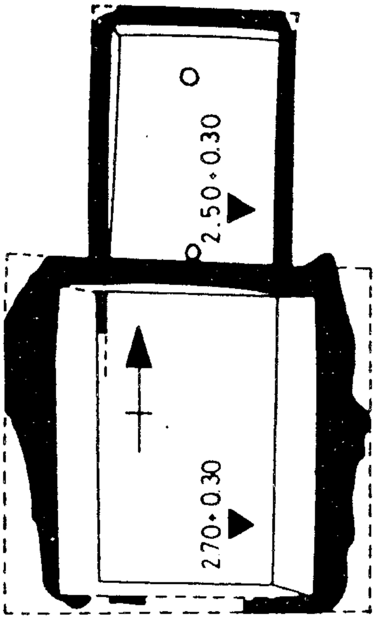


Illustration: Kaiser and Dreyer 1982: Abb. 12. Courtesy of the DAI Cairo.

Identity: Tomb B17/18, King Narmer

Location: Abydos, Cemetery B

Period: Dynasty 1, Naqada IIIC1

Substructure Type: IC

Liner: Mud-brick **Thickness:** 0.25 m (1 brick)

Superstructure: No

Footprint O/H: N/A

Security Features: Originally 2 × no. Type IB pits excavated in compacted desert. Both chambers lined with mud-brick walls of single brick's length in thickness. Collapse of separating ground and walls in B18 led to repair with single wall. Wood and mud-brick roofs set 0.3 m under ancient desert level, brought level with sand.

Tomb statistics: Substructure: Overall approximately 10 m long × 3 m wide × 2.5–2.8 m deep. Burial chamber B18 5.6 m long × 3.25 m wide (larger than the original because of repairs).

Robbed: Yes

References: Petrie 1901: 8, pl. LIX; Porter and Moss 1937: 88; Kaiser and Grossman 1979: 157-8; Kaiser and Dreyer 1982: 220-1; Dreyer *et al.* 2003: 85-6.

Catalogue No. 4

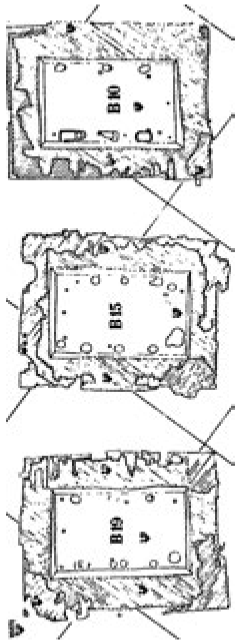


Illustration: Kaiser and Grossman 1979: Abb. 1. Courtesy of the DAI Cairo.

Identity: Tomb B10/15/19, King Hor-Aha

Location: Abydos, Cemetery B

Period: Dynasty 1, Naqada IIIC1

Substructure Type: IB

Liner: Mud-brick **Thickness:** 1.5–2.1 m

Superstructure: Yes

Footprint O/H: Approx. 3.5–4.1 m

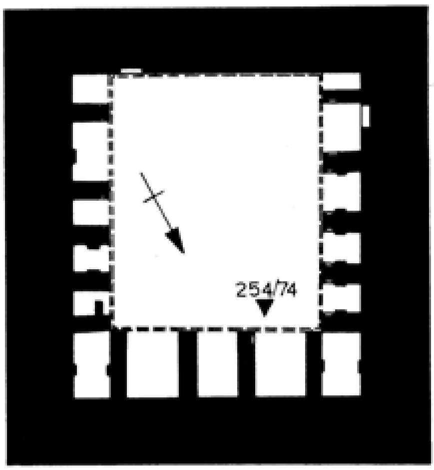
Security Features: Pits cut in compacted desert lined with mud-brick walls 1.50–2.1 m thick × 3.5-3.6 high, set 0.6-0.8 m beneath ancient desert level. B15 burial chamber with wooden shrine. Roof of wooden beams of diameters between 0.15–0.30 cm supported a mat overlay topped with 3–4 layers of mud-brick, plus further 2–5 layers of mud-brick for final cover and brought level with sand. Covered by single sand mound over all three chambers. Remote funerary enclosure.

Tomb statistics: Substructures: 3 × no. chambers approx. 11.5–12 m long × 9–9.5 m wide × 4 m deep. Superstructure: (sand tumulus) possibly 40 m long × 16 m wide?

Robbed: Yes

References: Amélineau 1899b: 88-102; Petrie 1901: 7-8, pl. LIX; Porter and Moss 1937: 88; Kaiser and Grossman 1979: 159-61; Kaiser and Dreyer 1982: 213-20; Dreyer 1990: 62-4; Dreyer *et al.* 1996: 48-57; Dreyer *et al.* 1998: 138-41; Dreyer *et al.* 2000: 90-7.

Catalogue No. 5



Djer

ILLUSTRATION: KAISER 1981: ABB. 1. COURTESY OF THE DAI CAIRO.

Identity: Tomb O, King Djer

Location: Abydos, Umm el-Qaab

Period: Dynasty 1, Naqada IIIC1

Substructure Type: IC

Liner: Mud-brick **Thickness:** 2.6 m

Superstructure: Possibly.

Footprint O/H: Unknown

Security Features: Pit cut in compacted desert lined with massive brick liners and tongue walls forming magazine storage. Internal wooden shrine. Roof of beams 12-24 cm diameter and covered with mats and 2 layers of mudbrick. Possible concealed sand mound? Possible brick encased superstructure incorporating sand mound. Remote funerary enclosure.

Tomb statistics: Substructure: Pit 13.2 m long × 11.88 m wide × 2.74 m deep. Burial chamber: to contain wooden shrine 10.4 m long × 9.2 m wide × 2.54 m deep. Superstructure: Dimensions unknown.

Robbed: Yes

References: Amélineau 1899a; Petrie 1901: 8-9, pls. LX-LXI; Amélineau 1904: 149-23; Porter and Moss 1937: 78–81; Dreyer 1991: 100; 2003b: 67; 2009b: 18; 2010: 21. Dreyer *et al.* 2011: 55-60.

Catalogue No. 6

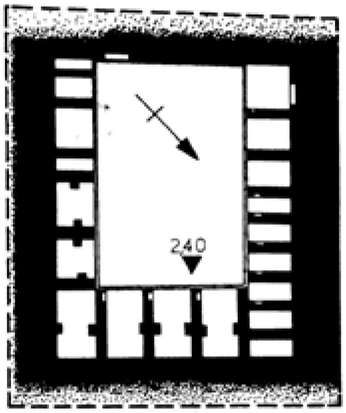


ILLUSTRATION: KAISER 1981: ABB. 1. COURTESY OF THE DAI CAIRO. .

Identity: Tomb Z, King Djet

Location: Abydos, Umm el-Qaab

Period: Dynasty 1, Naqada IIIC2

Substructure Type: IC

Liner: Mud-brick **Thickness:** 2.5–2.75 m

Superstructure: Possibly

Footprint O/H: N/A

Security Features: Pit cut in compacted desert lined with massive brick liners and tongue walls that form magazines. Internal wooden shrine. Wood roof supported by beams which sat 0.7 m below the ancient desert surface and incorporated a hidden sand mound. Over this probably another wood, brick and mat roof supported by beams supporting a putative brick encased sand mound. Remote funerary enclosure.

Tomb statistics: Substructure: Internal measurements 11.93–12.23 m long × 9.37–9.38 m wide × 2.28–2.42 m deep. Burial chamber to contain wooden shrine 8.94 m long × 5.79 m wide × 1.93 m high. Superstructure: Dimensions unknown.

Robbed: Yes

References: Amélineau 1899b: 129-144; Petrie 1900: 9-10 pl. LXI; Porter and Moss 1937: 82-3; Dreyer 1991: 96; 1993: 11; 2009: 19.

Catalogue No. 7

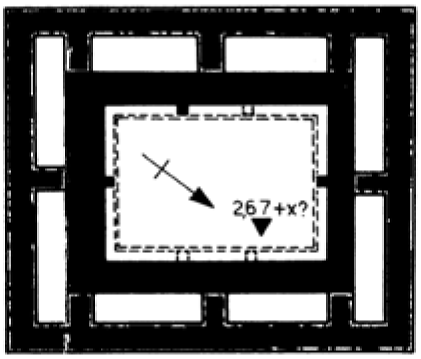


Illustration: Kaiser 1981: Abb. 1. Courtesy of the DAI Cairo.

Identity: Tomb Y, Queen Merneith

Location: Abydos, Umm el-Qaab

Period: Dynasty 1, Naqada IIIC2

Substructure Type: IC

Liner: Mud-brick. **Thickness:** 1.22–1.32 m

Superstructure: Possibly

Footprint O/H: N/A

Security Features: Pit lined cutin compacted desert with thick brick liners 1.22–1.32 m thick. Storage magazines surround additional internal layer of mud-brick walling. Possible internal wooden shrine. Probable wood roof supported by beams over which a brick encased superstructure may have incorporated a sand mound. Remotely located funerary temple.

Tomb statistics: Substructure: Internal measurements 8.99 m long × 6.35 m wide × 2.66 m deep. Magazines measure 4.06–5.46 m × 1.22 m wide × 1.98 m deep. Superstructure: Dimensions unknown.

Robbed: Yes

References: Petrie 1900: 10-1, pl. LXI; Porter and Moss 1937: 82.

Catalogue No. 8

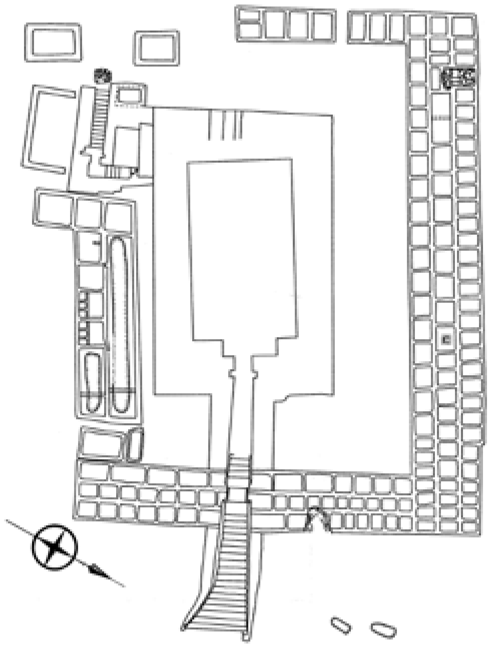


Illustration: Dreyer 2003: p. 69. Courtesy of the DAI Cairo.

Identity: Tomb T, King Den

Location: Abydos, Umm el-Qaab

Period: Dynasty 1, Naqada IIIC2

Substructure Type: ID

Liner: Mud-brick. **Thickness:** 4m

Superstructure: Possibly.

Footprint O/H: Approx. 5 m.

Security Features: Concealed staircase entrance under sand. 28.77 m long mud-brick stairway runs under subsidiary graves backfilled with sand. Door in passage and brick blocking on landing. Wooden Holzfalltür or stone portcullis (missing) at base of stairs. Burial chamber pit cut in compacted desert lined with 4 m thick mud-brick walls. Internal wooden shrine Wood and brick roof supported by beams containing concealed sand tumulus. Possible brick encased superstructure incorporating sand mound. Possible remotely located funerary temple?

Tomb statistics: Substructure: Pit 23.75-24.5 m long × 15.5 m wide.* Burial chamber 15.2 m long × 8.9 m wide × 6 m deep. Wooden Shrine 12.6 m long × 7.56 m wide. Superstructure: Dimensions unknown.

Robbed: Yes

References: Petrie 1901: 9-11; Porter and Moss 1937: 83-5; Dreyer 1990: 72-9; Dreyer, Hartung and Pumpenmeier 1993: 57-60; Dreyer *et al.* 1998: 141-7; Dreyer 2003: 68-9; 2010: 20-3.

***Scaled dimensions**

Catalogue No. 9

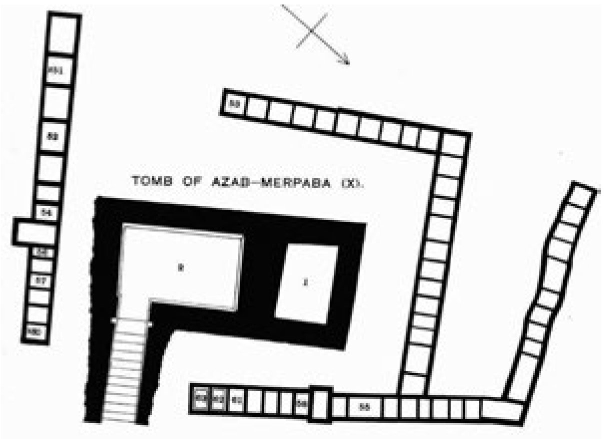


Illustration: Petrie 1900: Pl. LXI.

Identity: Tomb X, King Adjib

Location: Abydos, Umm el-Qaab

Period: Dynasty 1, Naqada IIIC2

Substructure Type: ID

Liner: Mud-brick **Thickness:** 1.5 m

Superstructure: Possibly

Footprint O/H: N/A

Security Features: Stairway entrance concealed and blocked by sand? 'Portcullis' at base comprising 5 cm thick wooden boards retained by vertical boards in the slots, wedged tight by mud-bricks. Burial chamber cut in compacted desert lined with approximately 1.5 m thick mud-brick walls. Wooden roof supported by beams. Possible brick encased superstructure incorporating sand mound. Possible remotely located funerary temple?

Tomb statistics: Substructure: 15.1 m long × 7.2 m wide overall. Burial chamber 6.55 m long × 4.19 m wide × 2.46 m deep. Storage magazine 2.45 m long × 4.19 m wide. Superstructure: Dimensions unknown.

Robbed: Yes

References: Petrie 1900: 13-4; Porter and Moss 1937: 82.

Catalogue No. 10

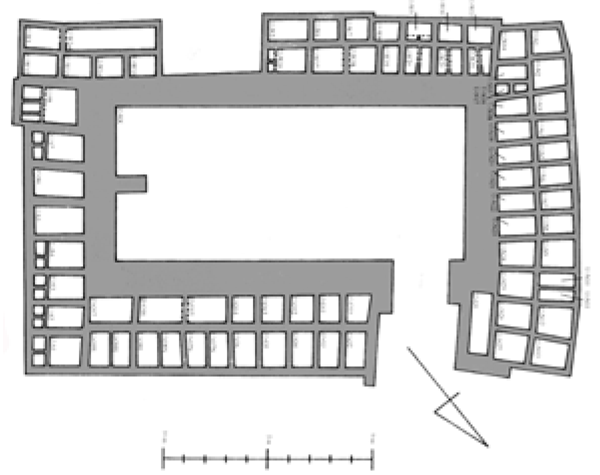


Illustration: Dreyer 2005: Abb. 20. Courtesy of the DAI Cairo

Identity: Tomb U, King Semerkhet
Location: Abydos, Umm el-Qaab

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 1.52 m

Superstructure: Possibly

Footprint O/H: N/A

Security Features: Sloping entrance passage concealed and blocked by sand? Brick and wood door 'portcullis' at base. Burial chamber pit cut in compacted desert lined with mud-brick walls. Internal wooden shrine. Subsidiary graves offer further layer of defence. Roof supported by beams. Possible concealed sand mound. Possible remotely located funerary temple?

Tomb statistics: Substructure: Overall dimensions 26.5 m long × 17 m wide. Burial chamber: 16.65 m long × 7.4 m wide × 3.9 deep. Superstructure: Dimensions unknown.

Robbed: Yes

References: Petrie 1900: 13-4; Porter and Moss 1937: 85; Dreyer *et al.* 2000: 119-21; Dreyer 2005: 13-5. Dreyer *et al.* 2006: 93-5.; 2011: 72-6.

Catalogue No. 11

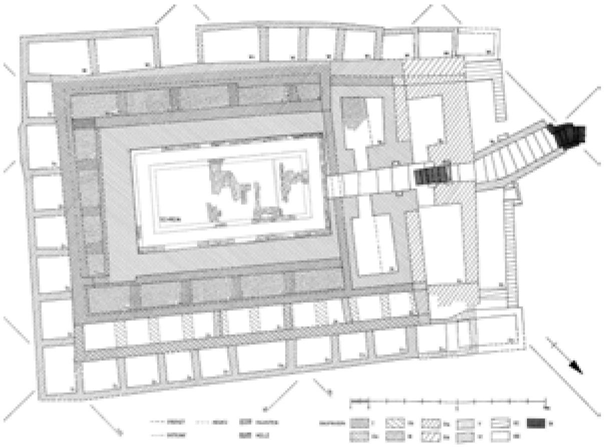


Illustration: Dreyer *et al.* 1996: Abb. 19. Courtesy of the DAI Cairo.

Identity: Tomb Q, King Qa'a

Location: Abydos, Umm el-Qaab

Period: Dynasty 1, Naqada IIID

Substructure Type: ID

Liner: Mud-brick **Thickness:** 2m

Superstructure: Possibly

Footprint O/H: N/A

Security Features: Concealed staircase entrance? Staircase access blocked by limestone portcullis. Burial chamber cut in compacted desert with 2 m thick mud-brick liners,* surrounded by shallower magazines and subsidiary burials. Internal wooden shrine. Sand mound on roof supportedby large beams, over which possible brick encased superstructure. Perhaps remotely located funerary temple? Broken in situ portcullis actual dimensions: 0.98 m high × 1.24 m wide × 0.3 m thick* Estimated when complete to be 2 m high × 1.24 m wide × 0.3 m thick and to have weighed approx. 1.6 tonnes.

Tomb statistics: Substructure: Overall dimensions approximately 30 m long × 20 m wide. Burial chamber: 10.8 m long × 5.8 m wide × 3 m deep. Possible superstructure: 13 m long × 9 m wide × 2 m high.

Robbed: Yes

References: Petrie 1900: 14-6, pl. LX; Porter and Moss 1937: 86-7; Dreyer *et al.* 1996: 57-66; Engel 1997: *Passim*.

Catalogue No. 12

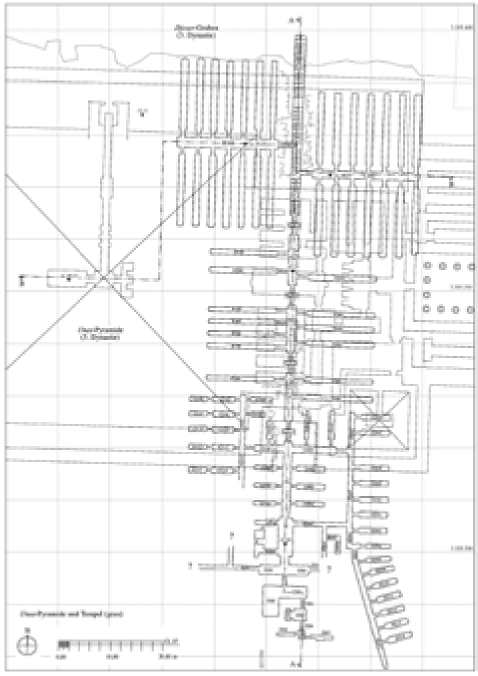


Illustration: Lacher 2008: Abb. 2.

Identity: King Hotepsekhemwy/Raneb

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Possibly

Footprint O/H: N/A

Security Features: Entrance via rock-cut staircase covered by stone slabs with entirely rock-cut flanking subterranean magazines branching from it. Beyond a portcullis (dimensions N/A) blocks entrance to a 'cut and cover' passage and two limestone portcullises (dimensions n/a) and further subterranean magazines. Final portcullis (dimensions n/a) blocks access to entirely subterranean burial chamber and further magazines. Solid natural rock 'roof' over final subterranean section approx. 5.65–5.85 m thick. Possibly mud-brick superstructure over.

Tomb statistics: Substructure: Approx. 122 m long × 48 m wide. Subterranean passages including burial chamber and further magazines approx. 2–2.2 m high. Superstructure: Estimated at 104 m long × 52 m wide?

Robbed: Yes

References: Barsanti 1901: 250–2; Lauer 1936: 5-6; Porter and Moss 1974-81: 613; Lacher 2008: 427-52.

***Scaled dimensions**

Catalogue No. 13

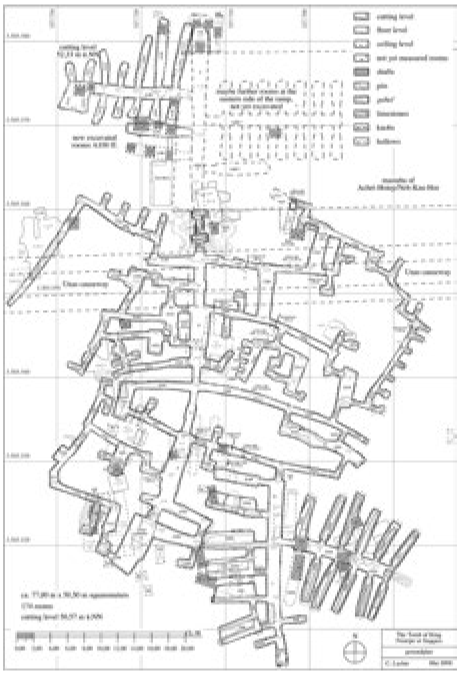


Illustration: Lacher 2011: Fig. 2.

Identity: King Ninetjer

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Possibly

Footprint O/H: N/A

Security Features: Ramp with flanking batteries of magazines leads to two limestone portcullises in passage blocking entrance to entirely subterranean burial chamber and magazine complex. Natural rock roof varies between 3 m near portcullis to 5 m over burial chamber.

Portcullises 3.4 m high × *c.* 1.6–1.75 m wide × 0.5 m thick Estimated weight approx. 6.4 tonnes.

Tomb statistics: Substructure: Approx. 77 m × 50.5 m. Burial chamber approx. 7.1 m long × 3.12 m wide. Superstructure: Dimensions unknown.

Robbed: Yes

References: Hassan 1938: 521; Porter and Moss 1974-81: 613; Dreyer 2007a: 130-8; Lacher 2011: 213-31; Lacher-Raschdorff 2011: 537-50; 2014: *Passim.*

Catalogue No. 14

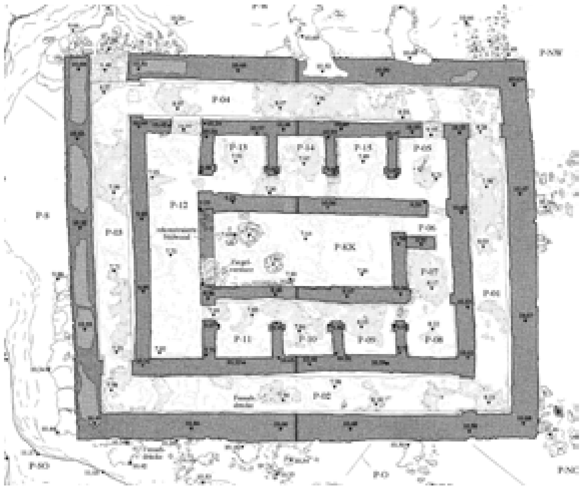


Illustration: Dreyer *et al.* 2006: Abb. 13. Courtesy of the DAI Cairo.

Identity: Tomb P, King Peribsen

Location: Abydos, Umm el-Qaab

Period: Dynasty 2

Substructure Type: ID

Liner: Mud-brick **Thickness:** 1m

Superstructure: Possibly

Footprint O/H: Unknown

Security Features: Pit 3.5-4 m deep excavated in sand, and lined with mud-brick substructure in three concentric layers. Outer wall 1 m thick. Possible wooden shrine. Wooden roof supported by beams set 0.5 m below desert level. Concealed sand mound? Possible brick clad superstructure? Remote funerary enclosure.

Tomb statistics: Substructure: External wall 18 m long × 15 m wide × 2.6 m high; 'Corridor' wall approx. 13m long × 9.85 m wide; Inner burial chamber approx. 7.8 m long × 4.25 m wide × 2.6 m high. Superstructure: Dimensions unknown.

Robbed: Yes

References: Amélineau 1898b: 51-8; Petrie 1901: 11-2; Porter and Moss 1937: 81; Kaiser & Grossman 1979: 161-2; Dreyer *et al.* 2006: 98-102.

Catalogue No. 15

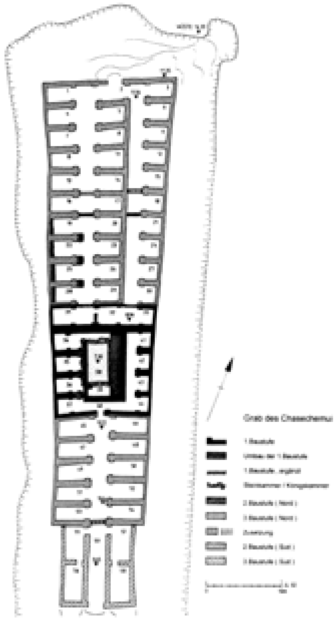


Illustration: Dreyer *et al.* 2003: Abb. 16. Courtesy of the DAI Cairo.

Identity: Tomb V, King Khasekhemwy

Location: Abydos, Umm el-Qaab

Period: Dynasty 2

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.27–0.54 m

Superstructure: Yes

Footprint O/H: Unknown

Security Features: Pit 7.5 m deep excavated in sand and filled with multichambered mud-brick structure with external walls 0.27–0.54 m thick. Concealed burial chamber sunk in floor and lined with stone 0.25–0.3 m thick. Wooden shrine supporting stone roof. Load-bearing internal walls 0.67–0.81 m thick form surrounding magazines. 10–20 cm diameter wooden beams support roof of reed matting and Nile mud. Pit then brought level with 5 m layer of sand and gravel. Possible limestone clad superstructure above.

Tomb statistics: Substructure: Overall dimensions approx. 88 m long × 20 m wide. Burial chamber: 5.25 m long × 3.3 m wide × 1.8 m deep. Wooden shrine: Approx. 4.7 m long × 3.65 m wide × 1.5 m high. Superstructure: Approximately 35 m long × ?? m wide × ?? m high.

Robbed: Yes, via side walls.

References: Petrie 1901: 12-4; Porter and Moss 1937: 87; Dreyer 2003a: 76 -7; Dreyer 2007 c: 203; Dreyer *et al.* 1998: 164-5; 2000: 122-5; 2003: 108-114; .

Catalogue No. 16

Illustration: Photograph by the author.

Identity: The Step Pyramid of Djoser

Location: Saqqara

Period: Dynasty 3

Substructure Type: Various

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Approx. 47 m*

Security Features: Descending passage with entrance concealed under pyramid temple leads to masonry blocked stairway to deep shaft cut in rock. At its base granite burial chamber closed with 3 tonne granite plug protected by masonry blocking in ‘manoeuvring’ chamber. Shaft backfilled with rubble. 11 × No. shafts on the west backfilled with selected rubbles to galleries housing burials of royal family and grave goods protected by deep rock roof. Step pyramid over. Edge of pyramid to burial chamber approx. 53 m.*

Tomb statistics: Substructure: Central shaft 7 m long × 7 m wide × 28 m deep. Superstructure: 121 m long × 109 m wide × 60 m high

Robbed: Yes, on multiple occasions via various routes.

References: Firth and Quibell 1935: *passim*; Lauer 1936: *passim*; 1962: 66-176; Porter and Moss 1974-81: 399-415; Stadelmann 1985a: 35-72; Lehner 1997: 84-91; Dodson: 2003: 41-3.

***Scaled dimensions**

Catalogue No. 17

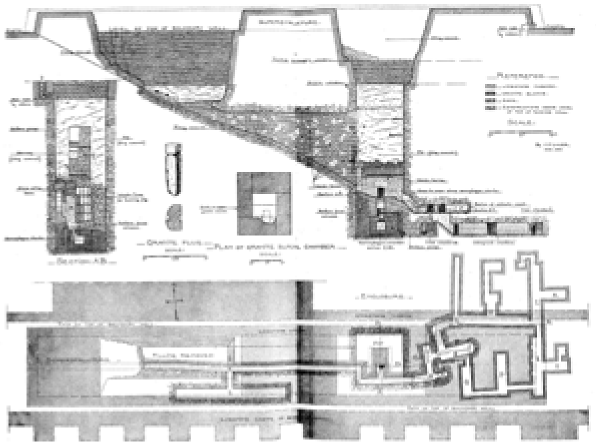


Illustration: Lauer 1936: Pl. XXXI. © IFAO.

Identity: The Step Pyramid, South Tomb.

Location: Saqqara

Period: Dynasty 3

Substructure Type: Various

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Descending stairway within superstructure (built as part of enclosure wall) leads to rock cut doorway and entirely subterranean staircase to shaft blocked with clay and rubble. At its base monolithic limestone slabs 2.5 m long × 1.4 m high × 0.6 m thick create 4m thick north wall of limestone manoeuvring chamber with two limestone beam roofs 1.1 m and 0.9 m thick. Below granite burial chamber closed with segmented granite plug. Chamber floored with basalt pavement and filled with limestone masonry blocking . Main shaft over entirely backfilled with rubble and clay.

Tomb statistics: Substructure: Central shaft 7 m long × 7 m wide × 28 m deep. Superstructure: 81.25 m long × 9.85–10.5 m wide × approx. 4 m high.

Robbed: Yes, via tunnel through main shaft.

References: Firth and Quibell 1935: 18-20; Lauer 1936: 94-112; 1962: 117-143; Porter and Moss 1974-81: 408–9; Lehner 1997: 92-3.

Catalogue No. 18

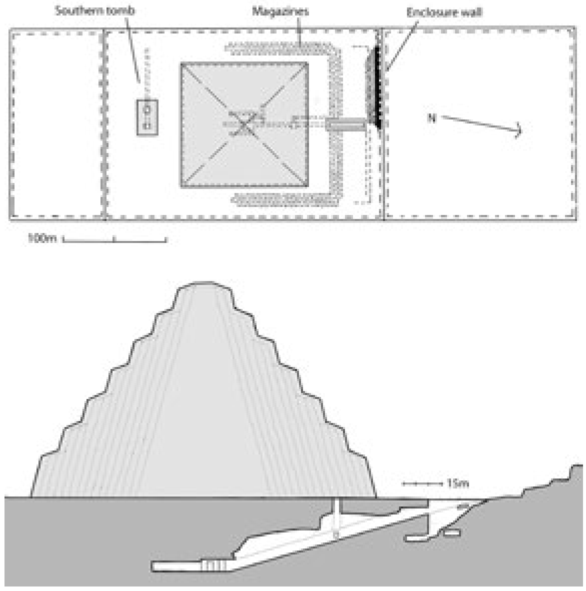


Illustration: Drawn by the author after Goneim 1957, pl. 4 and Lauer 1979, fig. 7

Identity: Pyramid of Sekhemkhet

Location: Saqqara

Period: Dynasty 3

Substructure Type: Various

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Entrance concealed under pyramid temple leads to rock cut doorway blocked with stone; beyond 80.6 m long corridor descends at a slope of approx. 16°. Past the vertical construction shaft that joins it, the corridor is further blocked with rubble for 5 m. At the corridor's end an additional layer of *tafl* camouflaged a stone blocked entrance to burial chamber containing an alabaster sarcophagus (empty). Depth of rock cover over burial chamber approx. 23 m. Unfinished limestone step pyramid over. Edge of pyramid to burial chamber approx. 63 m.*

Tomb statistics: Substructure: Burial chamber 8.9 m long × 5.22 m wide × 4.55 m high. Superstructure: Estimated, if completed, 120 m long ×120 m wide × 70 m high.

Robbed: No

References:

Goneim 1956: *passim*; 1957: *passim*; Porter and Moss 1974-81:415–7; Stadelmann 1985a: 72-5; Lehner 1997: 94; Dodson 2003: 44-5; Radwan 2003b: 110.

***Scaled dimensions**

Catalogue No. 19

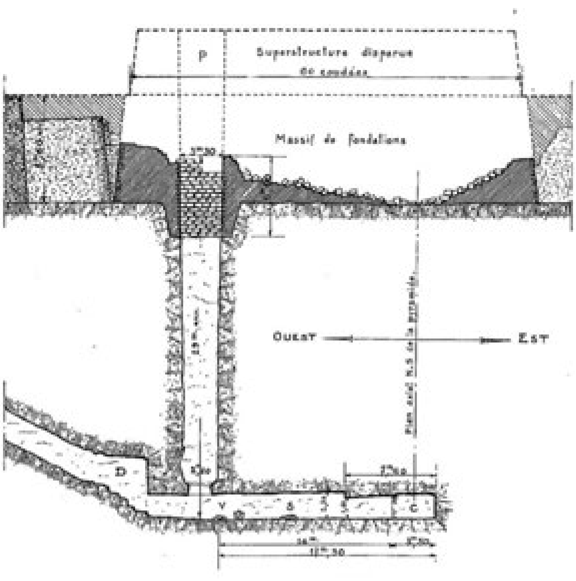


ILLUSTRATION: LAUER 1968: FIG. 2. COURTESY OF SOCIÉTÉ FRANÇAISE D'ÉGYPTOLOGIE.

Identity: Pyramid of Sekhemkhet, South Tomb

Location: Saqqara

Period: Dynasty 3

Substructure Type: Various

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Descending corridor (entrance location unknown) leads to vertical construction shaft filled with rubble. Beyond this a passage leads to a subterranean burial chamber protected by a rock roof 24 m thick. Limestone superstructure over.

Tomb statistics: Substructure: Burial chamber: Approx. 3.5 m long × 1.6 m high. Superstructure: 32 m long × 16 m wide × ??? high.

Robbed: Yes

References:

Lauer 1967: 496-509; 1968: 97-107; 1969a: 48-9: 1969b: 463-5; 1972: 579-80; 1973: 326-7; 1976: 140; 1977: 202-3; Porter and Moss 1974-81: 471.

Catalogue No. 20

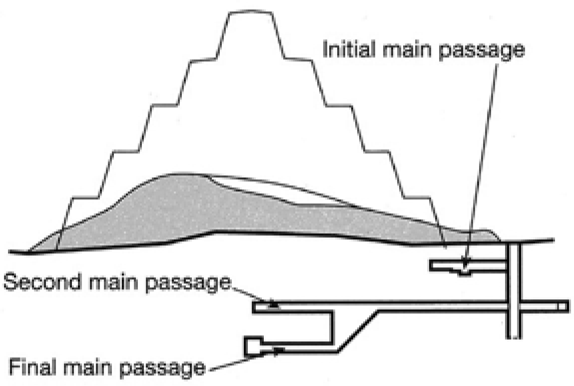


ILLUSTRATION: DODSON 2003: FIG. 46.

Identity: The Layer Pyramid

Location: Zawiyet el-Aryan

Period: Dynasty 3

Substructure Type: Various

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 26 m long ramp descends east-west to externally located shaft from which blind passage exits at higher level. Second lower level passage leads to corridor and stairway and divides into two levels. Upper is blind passage, 17 m long, lower leads to burial chamber. Depth of rock cover over burial chamber approx. 24 m. Unfinished step pyramid over formed of limestone accretion layers. Edge of pyramid to burial chamber approx. 43 m.*

Tomb statistics: Substructure: Burial chamber: 3.63 m long × 2.65 m wide × 3m high. Superstructure: Estimated 78.45 m long × 78.45 m wide × 40-45 m high.

Robbed: Unfinished

References: Barsanti 1901a: 92–4; Reisner and Fisher 1911: 54–9; Maragioglio and Rinaldi 1963: 41-9; Porter and Moss 1974-81: 313; Lehner 1997: 95; Dodson 2000: 81-90; 2003: 46-7.

***Scaled dimensions**

Catalogue No. 21

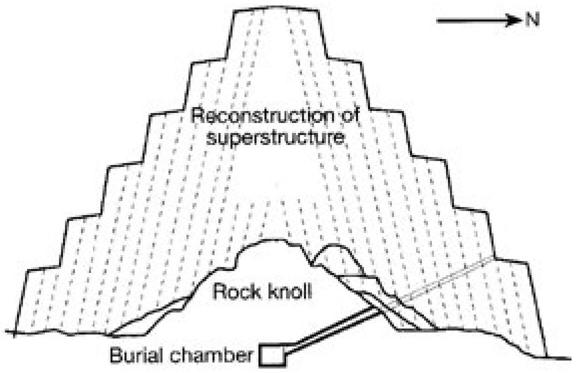


ILLUSTRATION: DODSON 2003: P. 48.

Identity: The Brick Pyramid - Huni?

Location: Abu Roash

Period: Dynasty 3

Substructure Type: N/A

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Approx. 105 m*

Security Features: Raised entrance possibly 25 m from ground level in face of pyramid enters sloping corridor possibly 70m long and descends through face of mud-brick pyramid entering rock core of knoll and continuing to meet rock cut burial chamber at ground level. Mud-brick pyramid over. Depth of rock cover within knoll approx. 22m at narrowest point. Large mud-brick pyramid over. Edge of pyramid to burial chamber approx. 105 m (estimated).

Tomb statistics: Substructure: Burial chamber: 5.5 m long × 5.5 m wide × 5 m high. Superstructure: Estimated 215 m long × 215 m wide × 107.5–150.5 m high?

Robbed: Yes

References: Lepsius 1897: 11–2; Swelim 1987: *passim*; Lehner 1997: 96; Dodson 1998: 35-6; 2003: 47.

***Scaled dimensions**

Catalogue No. 22

ILLUSTRATION: PHOTOGRAPH BY THE AUTHOR

Identity: Pyramid of Meidum

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: Various

Liner: Stone **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: Approx. 67 m*

Security Features: Entrance 18.5 m high in face of pyramid concealed by plug-stones leads to 58.75 m long descending corridor possibly blocked with plug-stones. Beyond horizontal corridor with masonry blocking that leads to vertical shaft, which rises to corbelled stone burial chamber set above ground level within protective body of pyramid. Edge of pyramid to burial chamber approx. 67 m.*

Tomb statistics: Substructure: Burial chamber: 5.9 m long × 2.65 m wide and 5.05 m high. Superstructure: 144.3 m long × 144.3 m wide × 94.5 m high.

Robbed: Yes

References: Petrie 1892: 5-11; 1910: 6-9; Borchardt 1928: *passim*; Rowe1931: *passim*; Porter and Moss 1934: 89-90; Maragioglio & Rinaldi 1964b: 6-52; Lehner 1997: 97-100; Dodson 2003: 49.

***Scaled dimensions**

Catalogue No. 23

Illustration: Photograph by the Author.

Identity: The Bent Pyramid

Location: Dahshur

Period: Dynasty 4, Sneferu

Substructure Type: Various

Liner: Stone **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: Approx. 85 m*

Security Features: Two separate entrance corridors through pyramid. Northern system leads via raised entrance 11.8 m from ground level with pivoted wooden door to 79.53 m long descending corridor blocked with plug-stones to two antechambers set in trench below ground level. Upper western system leads via higher raised entrance 33.32 m from ground via 67.66 m long descending corridor blocked with plug-stones to 2 × No. portcullises in sloping emplacements. Beyond, burial chamber set above ground level within body of pyramid. Edge of pyramid to burial chamber approx. 85 m.* Portcullises weight estimated at 5.38 tonnes.

Tomb statistics: Substructure: Upper burial chamber 6.7 m long × 5.2 m wide × 16.3 m high. Superstructure: 189.5 m × 189.5 m × 104.7 m high.

Robbed: Yes

References:

Fakhry 1959: *passim*. Maragioglio and Rinaldi 1964b: 54-123; Porter and Moss 1974-81: 881-82; Stadelmann 1985a: 87-94; Dorner 1986: *passim*; Lehner 1997: 102-4; Dodson 2003: 50-2.

***Scaled dimensions**

Catalogue No. 24

Illustration: Photograph by Aidan Dodson.

Identity: The Bent Pyramid, Satellite Pyramid

Location: Dahshur

Period: Dynasty 4, Sneferu

Substructure Type: Internal

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Concealed entrance in face of limestone pyramid, perhaps blocked with plug-stones, leads to descending corridor 11.6 m long × 1.2 m wide × 1.23 m high that leads to ascending corridor approx. 15 m long* with raised ceiling. This section housed 4 × No. plug-stones intended to descend under their own weight into lower part of corridor. Small internal corbelled 'burial' chamber set 2.8 m above ground level.

Tomb statistics: Substructure: 'Burial' chamber 2.6 m long × 2.4 m wide × 6.9 m high. Superstructure: 52.8 m long × 52.8 m wide × 25.75 m high.

Robbed: Yes

References: Fakhry 1959: 89-98; Maragioglio and Rinaldi 1964b: 74-80 and 112-8; Porter and Moss 1974-81: 882; Dorner 1986: 43-56; Stadelmann 1985a: 96; Dodson 2003: 51-2.

***Scaled dimensions**

Catalogue No. 25

Illustration: Photograph by the author

Identity: The Red Pyramid

Location: Dahshur

Period: Dynasty 4, Sneferu

Substructure Type: Various

Liner: Stone **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: Approx. 93 m*

Security Features: 30.92 m high entrance in pyramid to descending corridor 62.63 m long blocked by plug-stones. Two ante chambers and corridor at 3.15 m above surface level lead to raised (blocked?) passage leading to raised burial chamber 11.3 m above ground level. Edge of pyramid to burial chamber approx. 93 m.*

Tomb statistics: Substructure: Burial chamber 8.35 m long × 4.18 m wide × 14.67 m high. Superstructure: 219 m long × 219 m wide × 109.5 m high

Robbed: Yes

References:

Vyse and Perring 1842: 63–5; Maragioglio and Rinaldi 1964: 124-38; Porter and Moss 1974-81: 876; Stadelmann 1985a: 98 -104; Lehner 1997: 104-5; Dorner 1998: *passim*; Dodson 2003: 52-3.

Catalogue No. 26

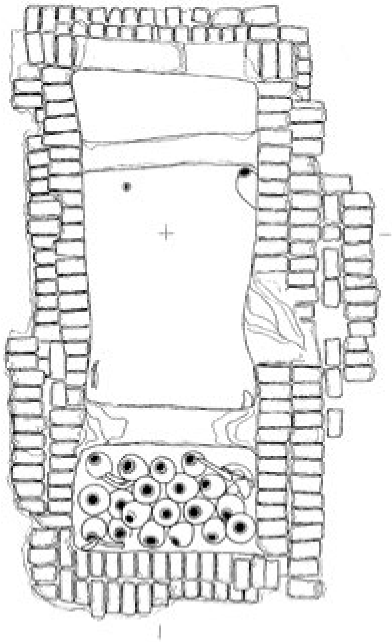


Illustration: Kroeper 1992: Fig. 12.

Identity: Grave 2897

Location: Minshat Abu Omar

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: IC

Liner: Mud-brick **Thickness:** 1.2-2 bricks

Superstructure: No

Footprint O/H: N/A

Security Features: Grave pit excavated in sand lined with two courses of mud-brick. Closed with wooden roof covered in mats, mud-brick and mud.

Tomb statistics: Substructure: Pit 4.9 m long × 3.25 m wide × 1.1 m deep.

Robbed: Yes, through roof .

References: Kroeper 1992: 138-9 and 141.

***Scaled dimensions**

Catalogue No. 27

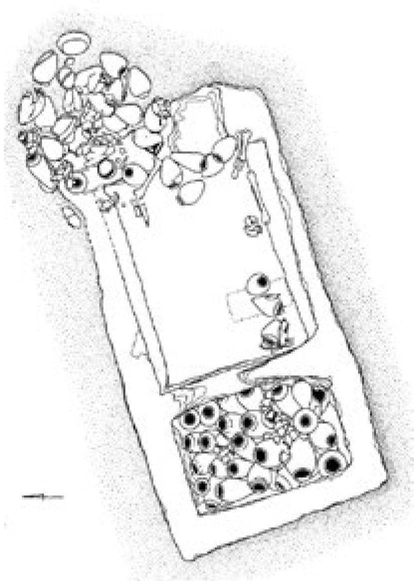


Illustration: Kroeper 1992: Fig. 6.

Identity: Grave 1590

Location: Minshat Abu Omar

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: IC

Liner: Mud-brick **Thickness:** 0.04-0.75 m

Superstructure: No

Footprint O/H: N/A

Security Features: Grave pit excavated in sand lined with slabs of mud. Closed with wooden roof covered in reed mats, mud or mud-brick. Roof perhaps only 0.10 m thick

Tomb statistics: Substructure: Pit 4.5 m long × 2.35 m wide × 1.3 m deep

Robbed: Yes, through roof.

References: Kroeper 1992: 131-4 and 141.

Catalogue No. 28

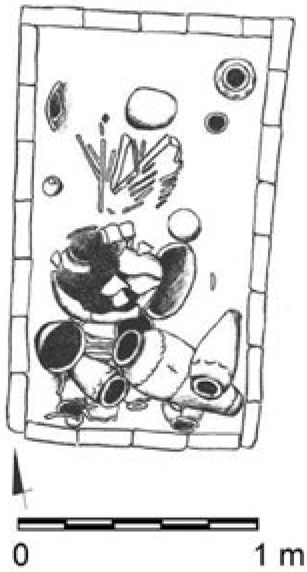


Illustration: Debowska-Ludwin 2009: Pl. 4.

Identity: Grave no. 20

Location: Tell el-Farkha

Period: Dynasty 0, Naqada IIIB-C1

Substructure Type: IB

Liner: Mud-brick **Thickness:** 0.5 brick

Superstructure: No

Footprint O/H: Unknown

Security Features: Pit dug in 'compact ground' lined with single skin of mud-brick. Possibly closed with a thick layer of mud-brick.

Tomb statistics: Substructure: Pit 1.8 m long × 1.14 m wide × 0.95 m deep.

Robbed: No

References: Debowska-Ludwin 2009: 465–6; 2012: 53.

Catalogue No. 29

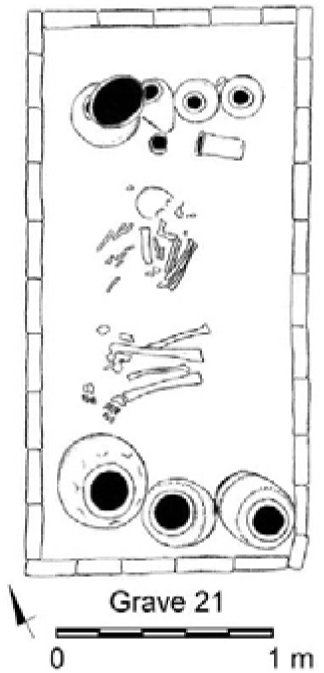


Illustration: Debowska-Ludwin 2009: Pl. 4.

Identity: Grave no. 21

Location: Tell el-Farkha

Period: Dynasty 0, Naqada IIIB-C1

Substructure Type: IB

Liner: Mud-brick **Thickness:** 0.5 brick

Superstructure: No

Footprint O/H: None

Security Features: Pit dug in 'compact ground' lined with single skin of mud-brick. Roofed with 0.11 m thick layer of mud-brick that acted as a protective cover.

Tomb statistics: Substructure: Pit 2.6 m long × 1.28 m wide × 1.06 m deep

Robbed: No

References: Debowska-Ludwin 2009: 465–6; 2010: 7.

Catalogue No. 30

Illustration: Debowska-Ludwin 2009: Pl. 3.

Identity: Grave no. 6.

Location: Tell el-Farkha

Period: Dynasty 0, Naqada IIIB-C1

Substructure Type: IB

Liner: Mud-brick **Thickness:** 0.5 m (2 bricks)

Superstructure: Yes

Footprint O/H: N/A

Security Features: Pit grave dug in 'compact ground' with substantial mud-brick liners, closed with a thick mud-brick cover/superstructure of similar dimensions.

Tomb statistics: Substructure: External dimensions: 3.45 m long × 2.56 m × 1.45 m deep. Internal dimensions: 2.02 m long × 1.44 m wide × 1.45 m deep. 'Superstructure': External dimensions: 3.45 m long × 2.56 m wide × 0.5 m high (preserved).

Robbed: No

References: Ablamowicz *et al.* 2004: 498; Debowska 2008: 1107-12; 2009: 461; Debowska-Ludwin 2012: 62-3.

Catalogue No. 31

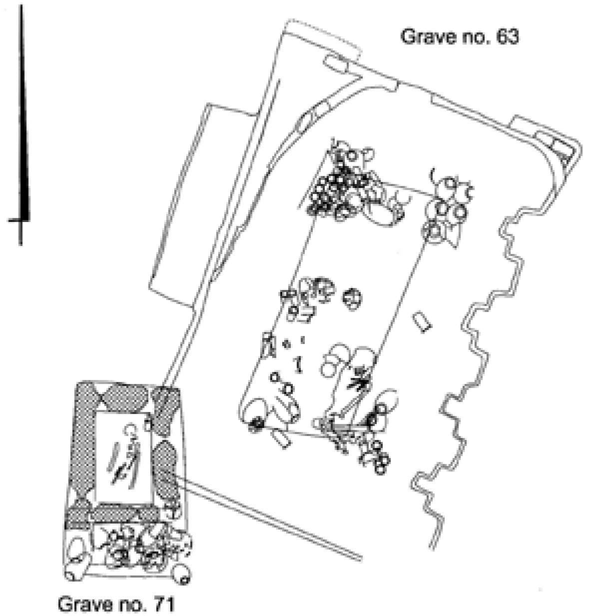


Illustration: Debowska-Ludwin 2011b: Fig. 3.

Identity: Grave no. 63

Location: Tell el-Farkha

Period: Dynasty 0, Naqada IIIB-C1

Substructure Type: IB

Liner: Mud-brick **Thickness:** 0.75-1 m*

Superstructure: Yes

Footprint O/H: Approx. 0.75*

Security Features: Pit dug in 'compact ground' lined with thick mud-brick walls, burial and grave goods protected by layer of 'greasy mud' mud-brick superstructure of same size as substructure over. Internal 'shaft' in superstructure for burial, backfilled after interment.

Tomb statistics: Substructure: 4 m long × 2.5 m wide × ?? m deep.

Superstructure: 4 m long × 2.5 m wide × 0.3 m high (preserved).

Robbed: No

References: Debowska-Ludwin 2011b: 260-2.

***Scaled dimensions**

Catalogue No. 32

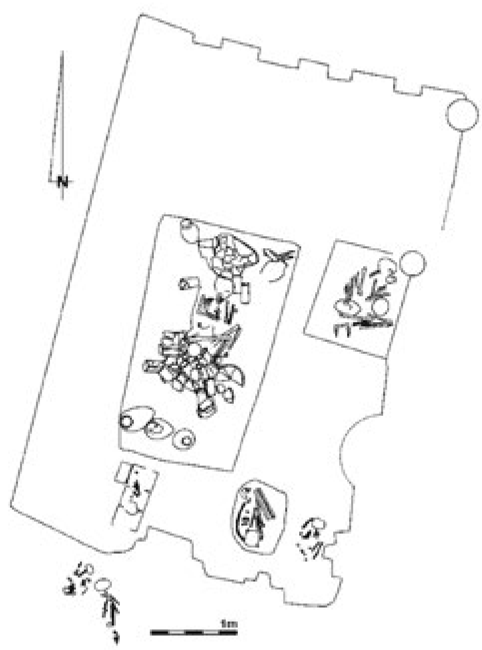


Illustration: Debowska-Ludwin *et al.* 2010: Fig. 1.

Identity: Grave no. 100

Location: Tell el-Farkha

Period: Dynasty 0, Naqada IIIB-C1

Substructure Type: IB

Liner: Mud-brick **Thickness:** 1-2 m

Superstructure: Yes

Footprint O/H: Approx. 1 m*

Security Features: Pit dug in 'compact ground' lined with massive mud-brick liners. Substructure of same size as Mud-brick superstructure over. Internal 'shaft' in superstructure for burial, backfilled after interment. Four subsidiary graves in walls.

Tomb statistics: Substructure: External 6.2 m long × 4.1 m wide. Burial chamber internal 2.7 m long × 1.6 m wide × 1.9 m deep. Superstructure 6.2 m long × 4.1 m wide × approx. 3 m high?

Robbed: No

References: Chlodnicki and Cialowicz 2009: 8-9; Debowska-Ludwin *et al.* 2010: 23-5; Debowska-Ludwin 2012: 60-1.

***Scaled dimensions**

Catalogue No. 33

Illustration: Photograph courtesy of J. Debowska-Ludwin.

Identity: Grave no. 99

Location: Tell el-Farkha

Period: Dynasty 0, Naqada IIIB-C1

Substructure Type: IB

Liner: Mud-brick **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: N/A

Security Features: Mud-brick lined pit dug in 'compact ground'. Burial and funerary artefacts encased in layer of hardened greasy mud (Nile silt) for protection. Layer of red ochre for 'magical' protection.

Tomb statistics: Substructure: 4 m long × 2 m wide. Superstructure: Unknown

Robbed: No

References: Chlodnicki and Cialowicz 2009: 6–7; Debowska-Ludwin 2010: 9; 2011a: 33; 2102: 60.

Catalogue No. 34

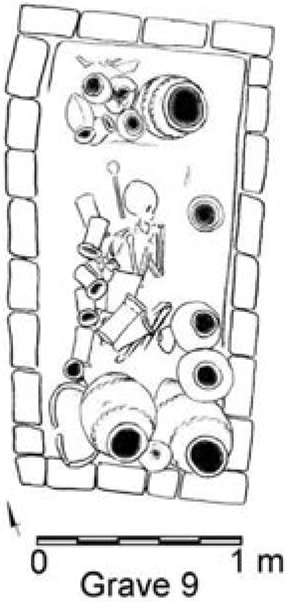


Illustration: Debowska-Ludwin 2009: Pl. 3.

Identity: Grave no. 9

Location: Tell el-Farkha

Period: Dynasty 0, Naqada IIIB-C1

Substructure Type: IB

Liner: Mud-brick **Thickness:** 0.5 brick

Superstructure: Yes

Footprint O/H: Approx. 0.6 m

Security Features: Pit dug in 'compact ground' lined with mud-brick, closed by mud-brick superstructure/closure.

Tomb statistics: Substructure: Pit 2.04 m long × 0.96 m wide × 1.29 m deep. Superstructure: 4.13 m long × 2.18 m wide × 1.07 m high.

Robbed: No

References: Debowska-Ludwin 2009: 462-3; 2011b: 259-60.

Catalogue No. 35

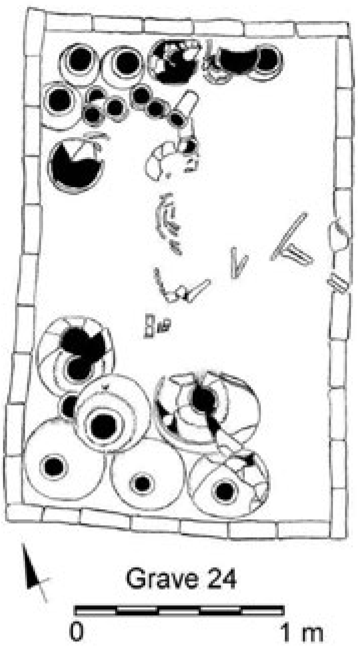


Illustration: Debowska-Ludwin 2009: Pl. 4.

Identity: Grave no. 24

Location: Tell el-Farkha

Period: Dynasty 0, Naqada IIIB-C1

Substructure Type: IB

Liner: Mud-brick **Thickness:** 0.5 brick

Superstructure: Yes

Footprint O/H: Approx. 0.8 m

Security Features: Mud-brick lined pit dug in 'compact ground', burial and grave goods encased in liquid mud. Mud-brick superstructure over

Tomb statistics: Substructure: Pit 2.46 m long × 1.6 m wide × 1.35 m deep. Superstructure: 4.5 m long × 3 m wide × 0.33 m high (remains).

Robbed: No

References: Debowska-Ludwin 2009: 466-7; 2011a: 33; 2012: 53.

Catalogue No. 36

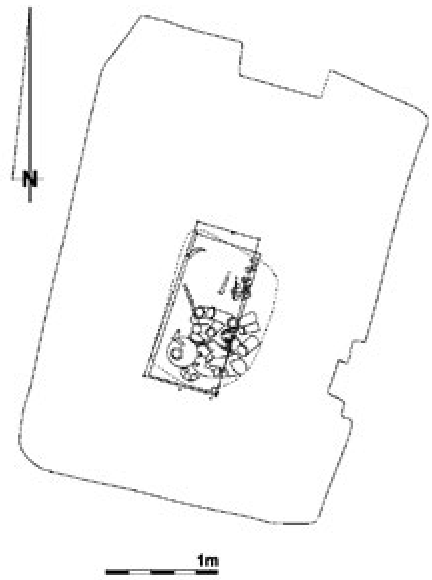


Illustration: Debowska-Ludwin 2010: Fig. 3.

Identity: Grave no. 94

Location: Tell el-Farkha

Period: Dynasty 0, Naqada IIIB-C1

Substructure Type: IB

Liner: None **Thickness:** 1.1-1.6 m*

Superstructure: Yes

Footprint O/H: 1.1 m*

Security Features: Pit grave dug in 'compact ground' protected by massive mud-brick superstructure, with internal shaft in superstructure leading to burial pit, backfilled after interment.

Tomb statistics: Substructure: 4.8 m long × 2.8 m wide* Burial chamber internal dimensions 1.72 m long × 0.9 m wide. Superstructure: 4.8 m long × 2.8 m wide*

Robbed: No

References: Debowska 2010: 7-9; 2011: 30.

***Scaled dimensions**

Catalogue No. 37

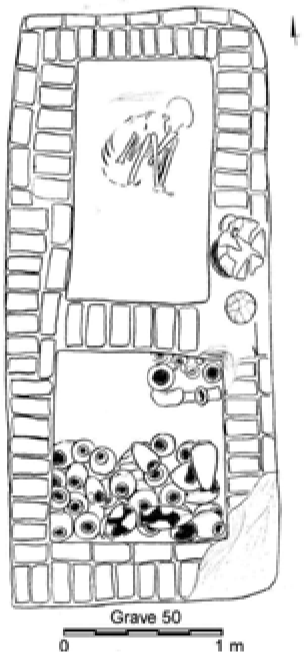


Illustration: Debowska-Ludwin 2009: Pl. 3.

Identity: Grave no. 50

Location: Tell el-Farkha

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: IC

Liner: Mud-brick **Thickness:** 1-1.5 bricks

Superstructure: Yes

Footprint O/H: Approx. 0.75 m

Security Features: Pit dug in 'compact ground' lined with mud-brick closed by 0.4 m backfill and protected by 0.9 m high mud-brick superstructure.

Tomb statistics: Substructure: Pit 3.75 m long × 1.7 m wide*

Burial chamber 1.5 m long × 0.86 m wide × 0.79 m deep.

Magazine 1.25 m long × 1.2m wide × 0.92 m deep.

Superstructure: 4.92 m long × 2.36 m wide × ca. 0.9 m high.

Robbed: No

References: Debowska-Ludwin 2009: 473-4; 2010: 5; 2012: 68-9.

***Scaled dimensions**

Catalogue No. 38

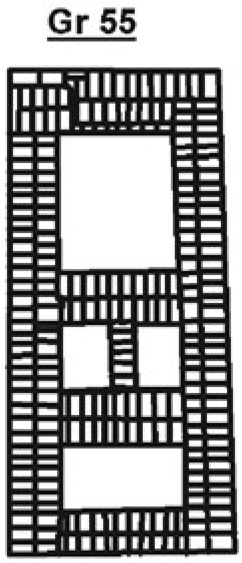


Illustration: Debowska-Ludwin 2011b: Fig. 1.

Identity: Grave no. 55

Location: Tell el-Farkha

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: IC

Liner: Mud-brick **Thickness:** 1.5 bricks

Superstructure: Yes

Footprint O/H: Approx. 1.9-2 m

Security Features: Pit dug in 'compact ground' lined with mud-brick closed by 0.4 m backfill and protected by 1.5 m high mud-brick superstructure interleaved with mats. Surrounded by perimeter wall.

Tomb statistics: Substructure: Approx. 4.9 m long × 2.3 m wide*

Superstructure: 7.96 m long × 5.44 m wide × ca. 1.52 m high.

Robbed: No

References: Debowska-Ludwin 2011a: 34-6; 2011b: 264-6; 2012: 69-70.

***Scaled dimensions**

Catalogue No. 39

Illustration: Haarlem 1996: Fig. 1.

Identity: Tomb No. 1 Site B

Location: Tell Ibrahim Awad

Period: Dynasty 1, Naqada IIIC2

Substructure Type: IB

Liner: Mud-brick **Thickness:** 0.9–1.15 m (3-6 bricks)

Superstructure: Yes

Footprint O/H: 0.9 m

Security Features: Pit dug in sand lined with mud-brick walls and filled with 'tightly packed clay'. Wooden beams support roof of mud and reed mats 0.2 m thick. Mud-brick superstructure over the whole that is same size as substructure.

Tomb statistics: Superstructure and substructure: 8 m long × 4.5 m wide overall.

Burial chamber: Internal 3.75 m long × 2.1 m wide × 1.25 m deep.

Robbed: Partly

References: Haarlem 1996: 7-34.

Catalogue No. 40

Illustration: Photograph courtesy of the Egyptian Cultural Heritage Association. © ECHO

Identity: Grave 913

Location: Kafr Hassan Dawood

Period: Dynasty 1, Naqada IIIC1

Substructure Type: IB

Liner: None **Thickness:** N/A

Superstructure: Mound

Footprint O/H: N/A

Security Features: Pit dug in alluvial sand and backfilled with Nile mud. Covered with mound of sand and gravel.

Tomb statistics: Substructure 6 m long × 4 m wide × 0.75 m deep.

Robbed: No

References: Hassan 2000: 38-9; Tassie & Wetering 2003: 500-1.

Catalogue No. 41

Illustration: courtesy of the Egyptian Cultural Heritage Association. © ECHO

Identity: Grave 970

Location: Kafr Hassan Dawood

Period: Dynasty 1, Naqada IIIC1

Substructure Type: IB

Liner: None **Thickness:** N/A

Superstructure: Mound

Footprint O/H: N/A

Security Features: Pit dug in alluvial sand and backfilled with Nile mud. Covered with mound of sand and gravel.

Tomb statistics: Substructure 6 m long × 4 m wide × 0.75 m deep.

Robbed: Yes

References: Hassan 2000: 38-9; Tassie & Wetering 2003: 500-1.

Catalogue No. 42

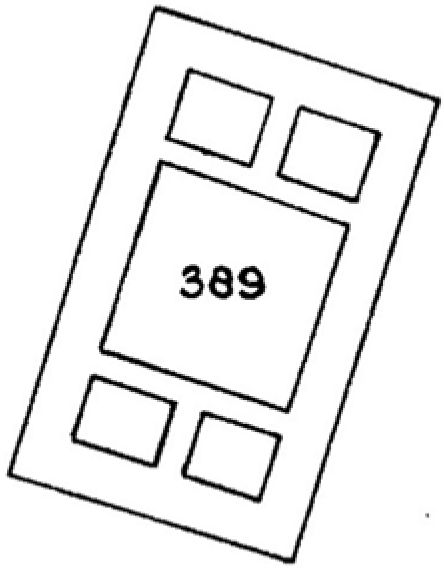


Illustration: Klasens 1959a: Fig. 12. Courtesy of the Rijksmuseum van Oudheden.

Identity: Tomb 389

Location: Abu Roash, Cemetery 300

Period: Dynasty 1, Naqada IIIB-C2

Substructure Type: IC

Liner: Mud-brick **Thickness:** 0.5 m

Superstructure: No

Footprint O/H: N/A

Security Features: Gravel cut pit lined with mud-brick. Pit closed by double roofs, the lower set at 1.1-1.3 m from base the upper at 1.6 m. Roof 0.2 m thick?

Tomb statistics: Substructure: Pit 5.27 m long × 3.11 m wide × 1.8 m deep.

Robbed: Yes

References: Klasens 1959a: 35; Porter and Moss 1974-81: 8.

Catalogue No. 43

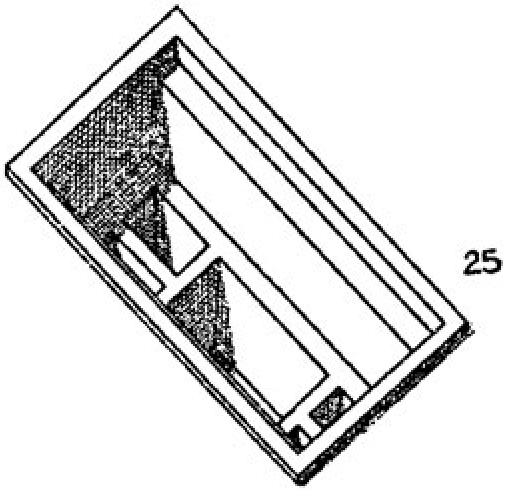


Illustration: Klasens 1961: Fig. 2. Courtesy of the Rijksmuseum van Oudheden.

Identity: Tomb MO25 Cemetery M

Location: Abu Roash

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: IC

Liner: Mud-brick **Thickness:** 0.26-0.48 m

Superstructure: Yes

Footprint O/H: Unknown

Security Features: Pit excavated in rock and lined with mud-brick to form burial chamber and magazines. Closed with planked wooden roof. Second roof at higher level supporting superstructure 0.3 m thick. Mud-brick mastaba at surface.

Tomb statistics: Substructure: 5.98 m long × 2.92 m wide × 3 m deep. Superstructure: 6.9 m long × 3.6 m wide.

Robbed: Yes

References: Klasens 1961: 110-1; Porter and Moss 1974-81: 7.

Catalogue No. 44

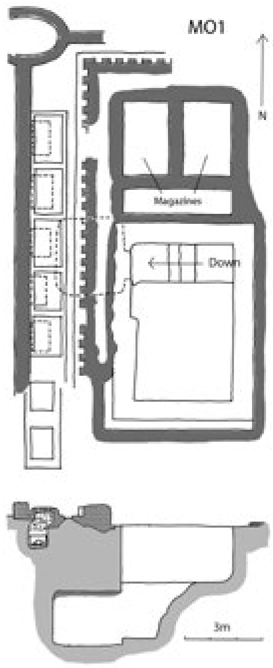


Illustration: Drawn by the author after Montet 1938: Pl. II.

Identity: Tomb MO1, Cemetery M

Location: Abu Roash

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: II

Liner: Mud-brick **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: N/A

Security Features: Rock cut pit forms magazine chamber leading to shaft to portcullis stone in grooved emplacement (stone missing) obstructing entrance to burial chamber. Subterranean rock-cut burial chamber with 2.5 m thick rock ceiling. Pit roofed with mud, reeds, sand and mud-brick supported by beams. Mud-brick mastaba with 1.32 m thick walls and internal storage magazines. Burial chamber protrudes beyond mastaba footprint.

Tomb statistics: Substructure: Burial chamber 3 m long × 2.7 m wide × 2.7 m high. Magazine chamber 6.6 m long × 3.8 m wide × 2.8 m deep. Superstructure: Dimensions N/A

Robbed: Yes,via shaft and portcullis

References: Montet 1938: 15-28; Porter and Moss 1974-81: 5-6; Tristant 2008a: 136-140; 2008b: 329-334.

Catalogue No. 45

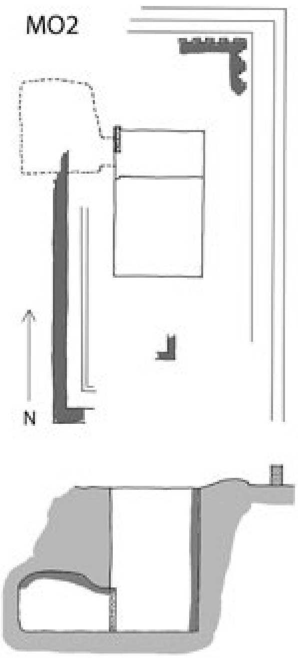


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER MONTET 1938: PL. II.

Identity: Tomb MO2, Cemetery M

Location: Abu Roash

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: II

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Rock cut pit forms magazine chamber leading to shaft to 2 × No. portcullis stones (one in situ, other missing but possibly tied to other) in grooved emplacement obstructing entrance to burial chamber. Subterranean rock-cut burial chamber with approx. 3 m thick rock ceiling. Roof over pit? Mud-brick mastaba over. Single left hand portcullis: 0.8 m wide × 1.6 m high × 0.2 m thick. Estimated weight approx. 0.55 tonnes.

Tomb statistics: Substructure: Burial chamber approx. 3.4 m long × 2.8 m wide × 2.4 high.* Shaft 3 m long × 1.7 m wide × 5.4 m deep. Magazine pit 5.35 m long × 3 m wide. Superstructure: 13.25 m long × 6.7 m wide.

Robbed: Yes, via shaft and portcullis

References: Montet 1938: 28-31; Tristant 2008b: 329-334..

***Scaled dimensions**

Catalogue No. 46

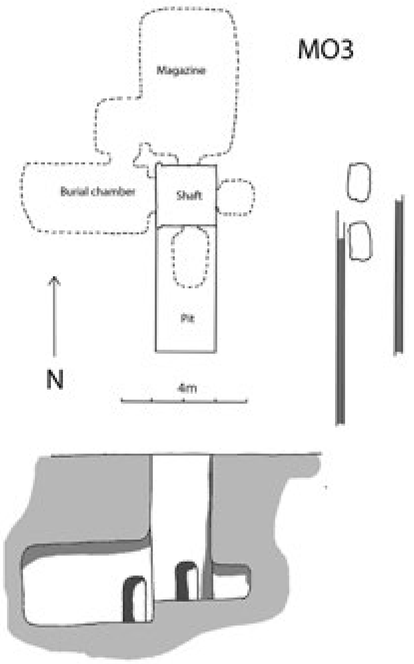


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER MONTET 1938: PL. III.

Identity: Tomb MO3, Cemetery M

Location: Abu Roash

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: II

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Rock cut pit forms magazine chamber leading to shaft with portcullis in grooved emplacement (stone missing) obstructing burial chamber entrance. Subterranean rock-cut burial chamber with approx. 2.25 m thick rock roof and 3 × No satellite subterranean magazines. Roof over pit? Mud-brick mastaba.

Tomb statistics: Substructure: Burial chamber approx. 4.3 m long × 2.2 m wide × 2.4 m high.* Shaft approx. 1.9 m long × 1.9 m wide × 4.4 m deep.* Magazine (inc. shaft) approx. 6 m long × 1.9 m wide × 2.5 m deep.

Robbed: Yes, portcullis bypassed via north magazine

References: Montet 1938: 32-4; Porter and Moss 1974-81: 6 Tristant 2008b: 329-334.

***Scaled dimensions**

Catalogue No. 47

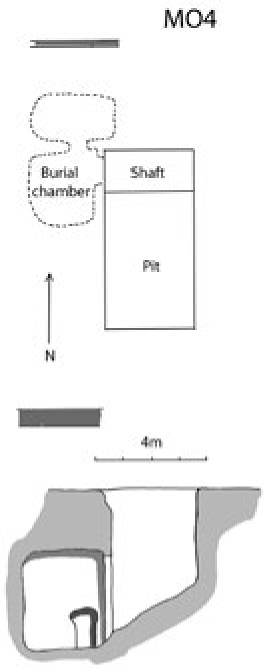


Illustration: Drawn by the author after Montet 1938: Pl. IV.

Identity: Tomb MO4, Cemetery M

Location: Abu Roash

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: II

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Unknown

Security Features: Rock cut pit forms magazine chamber leading to shaft with portcullis (tipped over) in grooved emplacement obstructing entrance to subterranean rock-cut burial chamber with approx. 1.9 m thick* rock roof. Satellite subterranean burial chamber. Roof over pit? Mud-brick mastaba over.

Tomb statistics: Substructure: Burial chamber 2.4 m long × 2.8 m wide × 2.8 m deep. Shaft 3.2 m long × 1.6 m wide × 4.3 m deep. Magazine 5.99 m long × 3.2 m wide (including shaft). Superstructure: internal length 14 m no other dimensions available.

Robbed: Yes, via shaft and portcullis

References: Montet 1938: 35-6; Porter and Moss 1974-81: 6 Tristant 2008b: 329-334.

***Scaled dimensions**

Catalogue No. 48

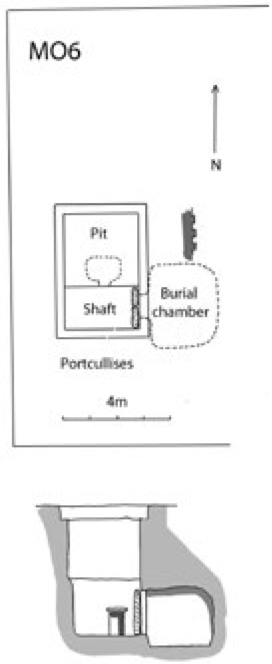


Illustration: Drawn by the author after Montet 1938: Pl. IV.

Identity: Tomb MO6, Cemetery M

Location: Abu Roash

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: II

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Unknown

Security Features: Rock cut pit forms magazine chamber leading to shaft to 2 × No. free-standing portcullises (one in situ one tipped over) with holes for tying together obstructing burial chamber entrance. NB. No portcullis grooves. Subterranean rock cut burial chamber probably entirely under mastaba with approx. 3 m thick rock roof. Roof over pit? Mud-brick mastaba over.

Tomb statistics: Substructure: Burial chamber approx. 2.5 m long × 3 m wide × 2.2 m deep.* Magazine 4.4 m long × 3.4 m wide × 2.7 m deep overall.

Superstructure: 16. 2 m long × 8 m wide?

Robbed: Yes, via shaft and portcullis

References: Montet 1938: 37-8; Porter and Moss 1974-81: 6; Tristant 2008b: 329-334.

***Scaled dimensions**

Catalogue No. 49

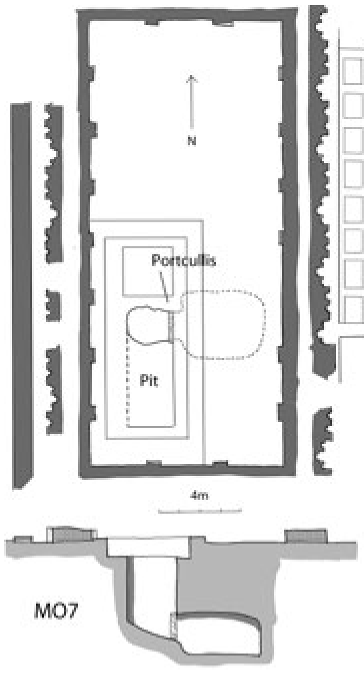


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER MONTET 1938: PL. V.

Identity: Tomb MO7, Cemetery M

Location: Abu Roash

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: II

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Offset rock-cut magazine chamber with roof, leading to shaft with sloped bottom. Entrance to burial chamber blocked by in situ portcullis (broken) in grooved emplacement. Subterranean rock-cut burial chamber entirely under mastaba with rock roof approx. 3.2 m thick. Roof over rock cut magazine? Mud-brick mastaba with walls 2.2 m thick.

Tomb statistics: Substructure: Burial chamber 4.4 m long × 3 m wide × 2 m high. Shaft 1.7 m long × 1.7 m wide × 4 m deep. Magazine 10 m long × 2.1 m wide × 1 m deep. Superstructure: 25 m long × 14 m wide

Robbed: Yes

References: Montet 1938: 38-46; Tristant 2008a: 140-4; 2008b: 329-334.

Catalogue No. 50

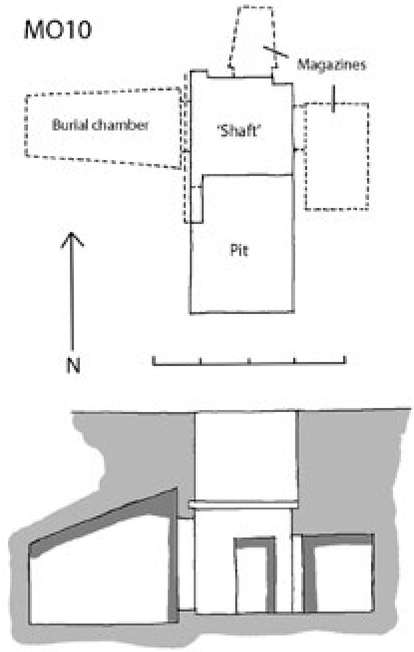


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER MONTET 1938: PL. VI.

Identity: Tomb MO10, Cemetery M

Location: Abu Roash

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: II

Liner: None **Thickness:** N/A

Superstructure: Possibly

Footprint O/H: N/A

Security Features: Rock cut pit forms magazine chamber leading to shaft to 2 × No. portcullis stone(s) in grooved emplacement obstructing entrance to burial chamber (stones missing). Rock-cut burial chamber with 1.5-2.6 m* thick rock roof. Two satellite subterranean magazines. NB. Ledge just below level of magazine chamber in shaft and opposite matching notch over portcullis may have supported floor to conceal shaft. Rock cut magazine chamber roofed? Possible mastaba over?

Tomb statistics: Substructure: Burial chamber approx. 3.1 m × 1.2-1.7 m wide × 1.7-2.7 high.* Shaft 2.2 m long × 1.8 m wide × 2.05 m deep. Rock-cut magazine 5.1 m long × 2.25 m wide × 2.2 m deep (including shaft).

Robbed: Yes, via concealed shaft and portcullis

References: Montet 1938: 50-3; Tristant 2008b: 329-344.

***Scaled dimensions**

Catalogue No. 51

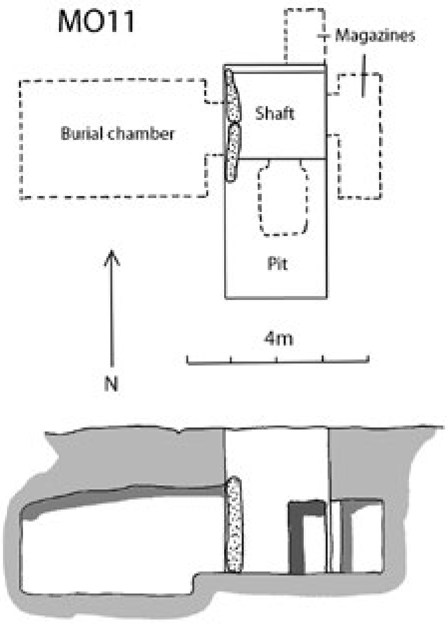


Illustration: Drawn by the author after Montet 1938: Pl. VI.

Identity: Tomb MO11, Cemetery M

Location: Abu Roash

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: II

Liner: None **Thickness:** N/A

Superstructure: Probably

Footprint O/H: Unknown

Security Features: Rock cut pit forms magazine chamber leading to shaft to 2 × No. portcullises in grooved emplacement obstructing burial chamber entrance. Subterranean rock-cut burial chamber with rock roof 1.3 m thick.* Three satellite subterranean magazines. Rock-cut magazine roofed? Possible mud-brick mastaba over?

Tomb statistics: Substructure: Burial chamber approx. 4.1 m × 2.5 m × 2-2.4m high.* Magazine 5.1 m long × 2.25 m wide × 2.1 m deep.

Robbed: Yes, via hole cut in LH portcullis by tomb robbers

References: Montet 1938: 53-4; Porter and Moss 1974-81: 6 Tristant 2008b: 329-344.

Catalogue No. 52

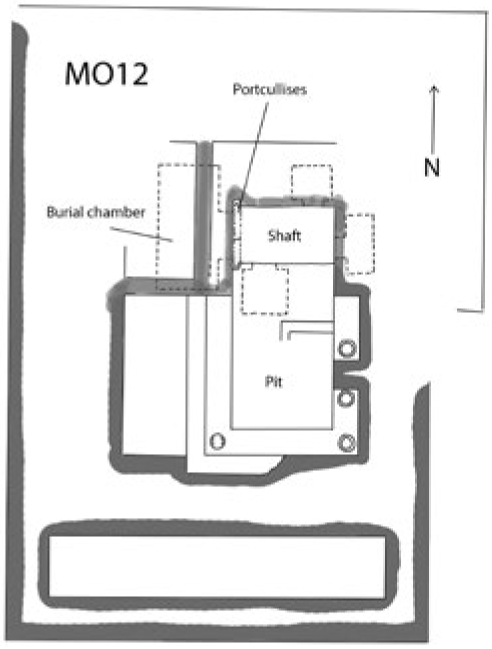


Illustration: Drawn by the author after Montet 1938: Pl. VII.

Identity: Tomb MO12, Cemetery M

Location: Abu Roash

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: II

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Unknown

Security Features: Rock cut pit forms magazine chamber leading to shaft to 2 × No portcullis stones in grooved emplacement (dimensions unknown) obstructing entrance to burial chamber. Subterranean rock-cut burial chamber with roof of unknown depth. 3 × No subterranean magazines from shaft. Mud-brick mastaba over.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: Dimensions N/A .

Robbed: Yes, via shaft and portcullis.

References: Montet 1938: 54-8; Porter and Moss 1974-81: 7; Tristant 2008b: 329-344; Tristant and Smythe 2011: 331-2.

***Scaled dimensions**

Catalogue No. 53

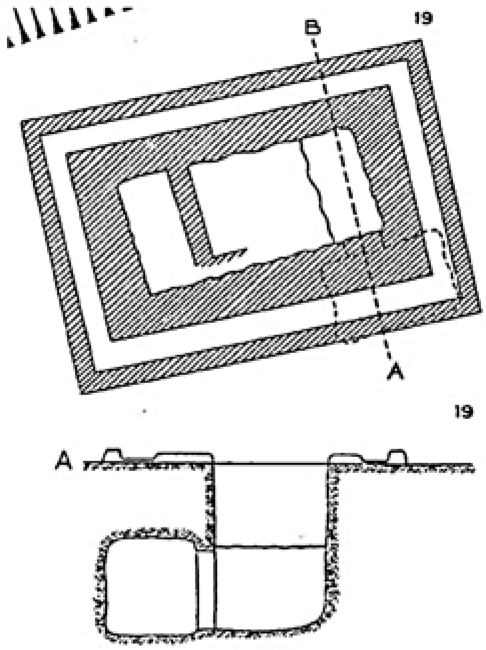


ILLUSTRATION: KLASENS 1961: FIG. 1.COURTESY OF THE RIJKSMUSEUM VAN OUDHEDEN.

Identity: Tomb MO19, Cemetery M

Location: Abu Roash

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: II

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Subterranean rock-cut burial chamber with rock roof approx. 2 m thick accessed via shaft leading from rock-cut subdivided magazine chamber. Entirely backfilled with stones and rubble. Mud-brick mastaba over.

Tomb statistics: Substructure: Burial chamber approx. 3.4 m long × 2.3 m wide × 2.5 m high.* Shaft 2.35 m long × 1.6 m wide × 2.2 m deep. Rock-cut magazine 6.8 m long × 3.5 m wide × 2.15 m deep. Superstructure: 9.4 m long × 5.4 m wide.

Robbed: Yes, via tunnel from above into burial chamber.

References: Klasens 1961: 109; Tristant 2008b: 334.

Catalogue No. 54

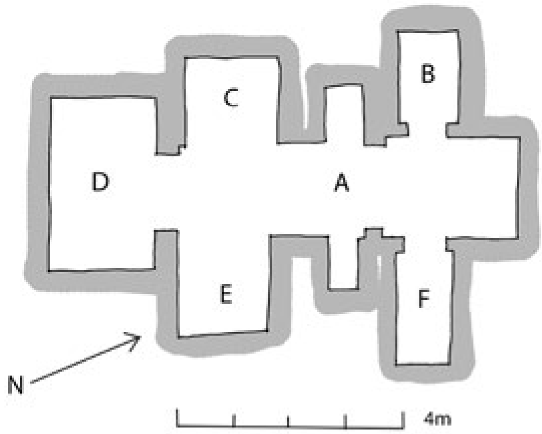


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER BOGHDADY 1932: 154.

Identity: Batn el-Baqara tomb

Location: Old Cairo

Period: Dynasty 1, Naqada IIIC2

Substructure Type: II

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Possibly rock-cut shaft access at point 'A' to subterranean rock-cut tomb with multiple chambers. Roof missing due to quarrying.

Tomb statistics: Substructure: 6.2 m long × 4.4 m overall.

Robbed: Yes

References: Boghdady 1932: 153-160.

***Scaled dimensions**

Catalogue No. 55

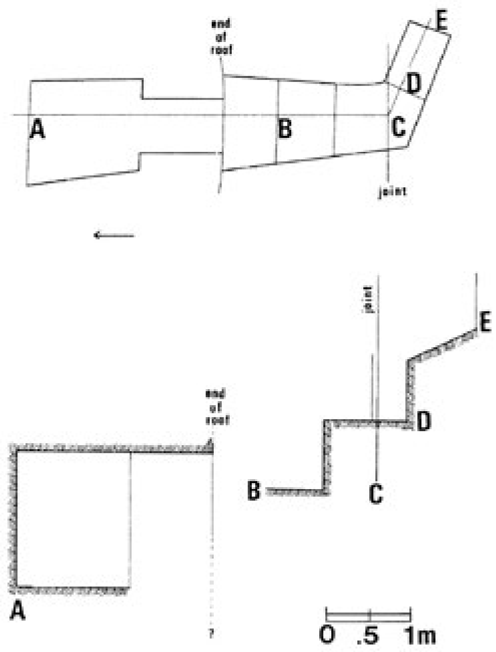


ILLUSTRATION: ENGLES 1990: FIG. 13. COURTESY OF THE AMERICAN RESEARCH CENTER IN EGYPT.

Identity: Tomb KG3

Location: Kafr Ghattati

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Bent staircase 3.12 m long cut in gravel, leading to burial chamber 3.65 m from surface. Burial chamber with natural gravel roof 2.0 m thick.

Tomb statistics: Substructure: Burial chamber 1.3 m long × 1.1–1.25 m wide × 1.65 m high.

Robbed: Yes

References: Engles 1990: 80.

Catalogue No. 56

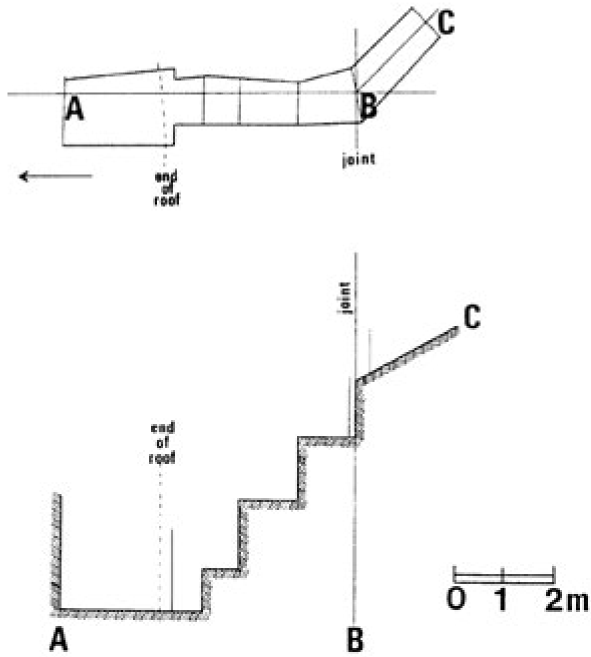


ILLUSTRATION: ENGLES 1990: FIG. 14. COURTESY OF THE AMERICAN RESEARCH CENTER IN EGYPT.

Identity: Tomb KG4

Location: Kafr Ghattati

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Bent staircase 4.95 m long cut in gravel, leading to burial chamber 6.05 m from surface. Burial chamber with natural gravel roof, possibly 4.5 m thick

Tomb statistics: Substructure: Burial chamber 2.2 m long × 1.3-1.5 m wide × 1.65m ? high.

Robbed: Yes

References: Engles 1990: 80.

Catalogue No. 57

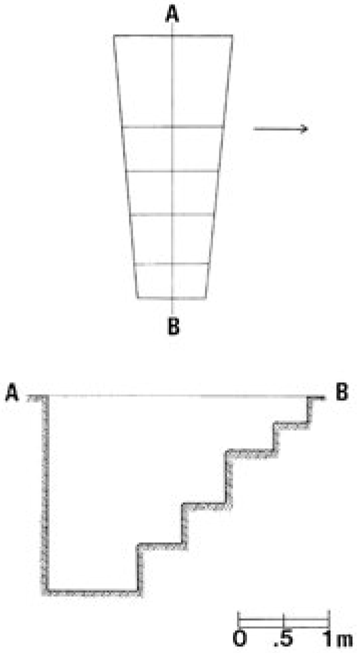


ILLUSTRATION: ENGLES 1990: FIG. 24. COURTESY OF THE AMERICAN RESEARCH CENTER IN EGYPT.

Identity: Tomb KG10

Location: Kafr Ghattati

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Gravel cut staircase 1.86 m long, leading to a burial chamber set at a depth of 2.1 m. Thickness of roof indeterminable.

Tomb statistics: Substructure: Burial chamber 0.98 m long × 1.31 m wide × ? m high

Robbed: Yes.

References: Engles 1990: 84.

Catalogue No. 58

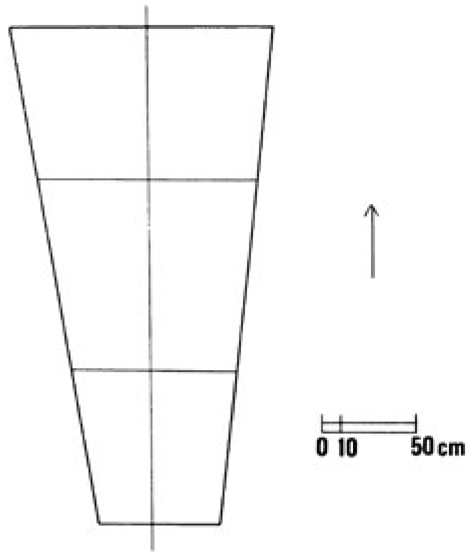


ILLUSTRATION: ENGLES 1990: FIG. 27. COURTESY OF THE AMERICAN RESEARCH CENTER IN EGYPT.

Identity: Tomb KG12

Location: Kafr Ghattati

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Gravel cut staircase 1.86 m long, leading to a burial chamber set at a depth of 2.10 m. Thickness of roof indeterminable.

Tomb statistics: Substructure: Burial chamber 1.4-1.16 m long × 0.8 m wide × ? m high

Robbed: Yes

References: Engles 1990: 87.

Catalogue No. 59

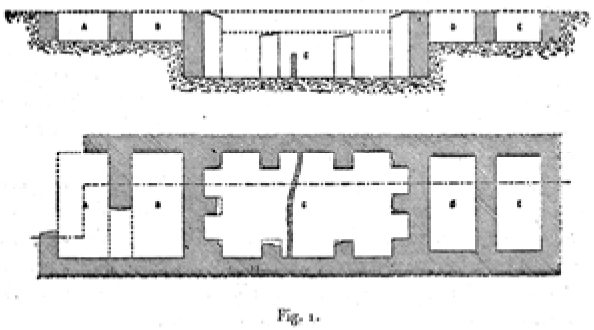


ILLUSTRATION: DARESSY 1906: FIG. 1.

Identity: Mastaba V (Petrie 1907)

Location: Giza, Nazlet Batran

Period: Dynasty 1, Naqada IIIC2, reign of Djet

Substructure Type: IC

Liner: Mud-brick **Thickness:** 1m

Superstructure: Yes

Footprint O/H: 7.75 m*

Security Features: Pit tomb in sand and rock with mud-brick lined substructure with internal subdivisions and mud-brick piers possibly supporting a shrine protected by roof of wooden beams, mats and soil 0.6 m thick. Mud-brick mastaba superstructure over with walls up to 1.2 m thick,* filled with gravel or sand.

Tomb statistics: Substructure: Main pit approx. 10.8 m long × 5.6 m wide × 3 m deep. Shallower magazines at either end 5.58 m long × 2.64 m wide × 0.83 m deep. Wooden shrine? 9.04 m × 4.16 m. Superstructure 48.18 m long × 21.1 m wide.

Robbed: Yes

References: Daressy 1906: 99-106. Petrie 1907: 2-7; Porter and Moss 1974-81: 312.

Catalogue No. 60

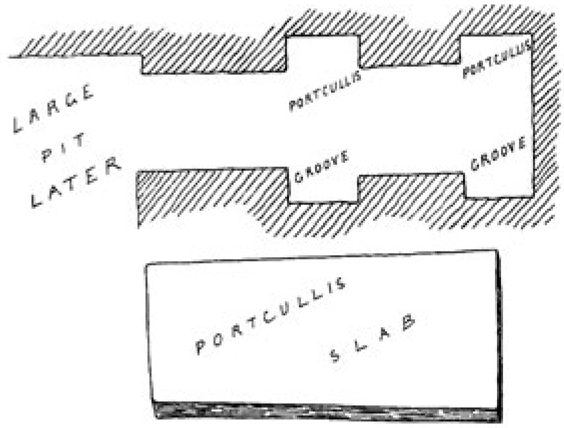


ILLUSTRATION: PETRIE 1907: PL. VIB.

Identity: Petrie's unknown tomb

Location: Giza

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Sloping passage leads to two portcullises barring access to subterranean burial chamber. Portcullis found on surface measures: 2.99-3.04 m high × 1.21-1.39 m wide × 0.29 m thick. Estimated weight approx. 2.63 tonnes.

Tomb statistics: Substructure: Dimensions N/A.

Robbed: Yes

References: Petrie 1907: 7; Porter and Moss 1974-81: 295.

***Scaled dimensions**

Catalogue No. 61

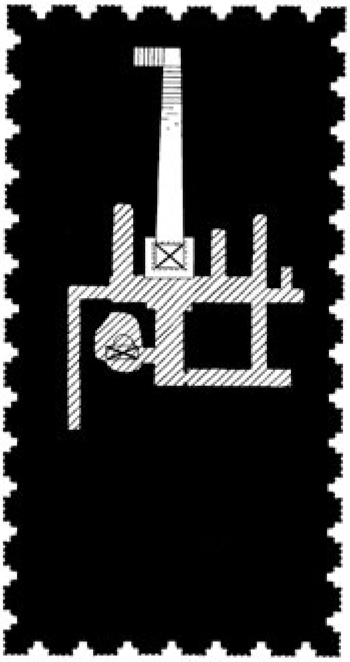


Illustration: Petrie 1907: Pl. VII

Identity: Tomb no. 1, ‘Covington’s Tomb’ (Mastaba T).

Location: Giza

Period: Dynasty 3

Substructure Type: IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Rubble and sand filled stair-shaft approx. 11 m deep to portcullis in grooved emplacement obstructs entrance to upper level of subterranean complex. Internally, second clay debris filled shaft approx. 10.5 m deep leads to another portcullis in grooved emplacement that obstructs entrance to burial chambers carved in the marly limestone strata. Solid mud-brick mastaba over with surrounding 3 m thick protective enclosure wall. Limestone Portcullises: Entrance shaft: 4.5 m high × 1.92 m wide × 0.67 m thick. Estimated weight 5.2 tonnes. Internal shaft: 2.65 m high × 1.46 m wide × 0.28m thick estimated weight 2.33 metric tonnes.

Tomb statistics: Substructure: Multiple upper chambers: 2.62 m high Lower Burial chamber: 5 m long × 2 m wide × 2 m high . Superstructure: 54.97 m long × 27.95 m wide × 7 m + high

Robbed: Yes, via stairway and internal shafts

References: Covington 1905: 219-33; Petrie 1907: 7-8; Porter and Moss 1974-81: 294; Jánosi 2006: 19-21.

Catalogue No. 62

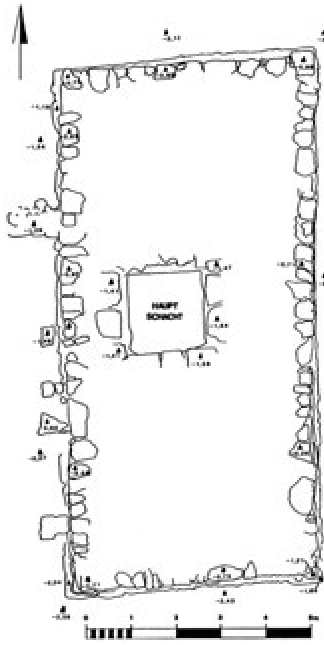


Illustration: Kromer 1991: Plan 2. Courtesy of the Österreichische Akademie der Wissenschaften.

Identity: The ‘Inner Mastaba’

Location: Giza, Nazlet Batran

Period: Dynasty 3

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Unknown

Security Features: 9.8 m deep shaft in marly limestone strata leads to north-west horizontal passage entirely obstructed by large stones then to burial chamber beyond? Solid stone mastaba over.

Tomb statistics: Substructure: Dimensions N/A

Superstructure 11.57-11.6 m long × 5.7-5.73 m wide, preserved up to 2 m high

Robbed: No - rubble blocking remains intact.

References: Kromer 1991: 16-8.

Catalogue No. 63

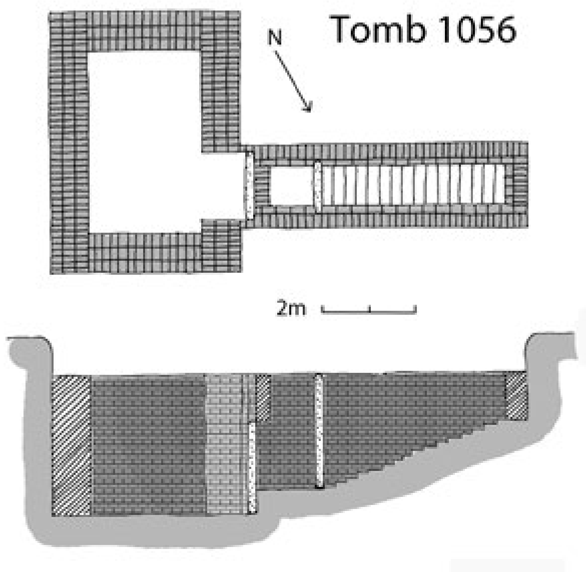


Illustration: Drawn by the author after Yacoub 1981: Pl. XVII.

Identity: Tomb 1056

Location: Tura el-Asmant

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.8 m*

Superstructure: No

Footprint O/H: N/A

Security Features: Mud-brick lined staircase obstructed by two limestone portcullises in grooved emplacements to gravel cut pit lined with mud-brick. Wooden roof over with backfill? Portcullises: 1 × No 2.4 m high × 1.15 m wide × 0.18 m thick* 1 × No 2 m high × 1.35 m wide × 0.18 m thick* Estimated weight: Approx. 1.14 and 1.09 tonnes respectively.

Tomb statistics: Substructure: Approx. 5.7 m long × 4.1 m wide × 3 m deep.* Burial chamber approx. 3.9 m long × 2.4 m wide × 3 m deep.*

Robbed: Yes

References: Yacoub 1981: 160.

Catalogue No. 64

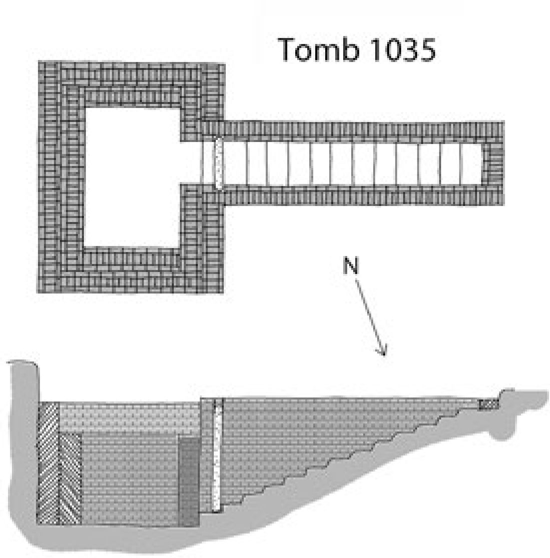


Illustration: Drawn by the author after Yacoub 1981: Pl. XIV.

Identity: Tomb 1035

Location: Tura el-Asmant

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** Unknown

Superstructure: No

Footprint O/H: N/A

Security Features: Mud-brick lined staircase obstructed by limestone portcullis in grooved emplacement to gravel cut pit lined with mud-brick two layers of mud-brick walls, lower set down to support wooden roof?

Tomb statistics: Dimensions not available or scaleable

Robbed: Yes

References: Yacoub 1981: 160.

***Scaled dimensions**

Catalogue No. 65

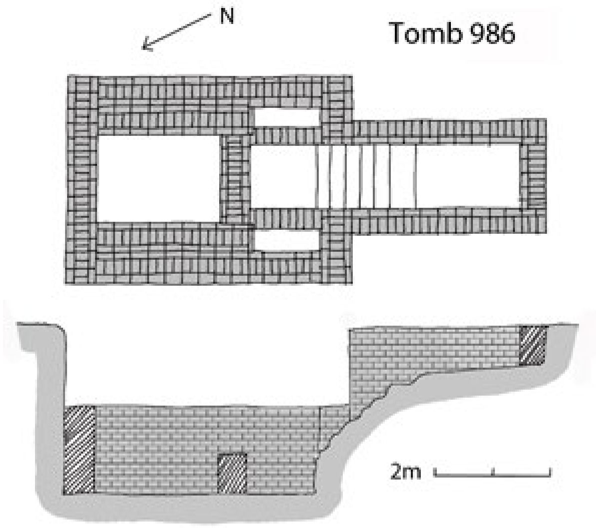


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER YACOUB 1981: PL. XX.

Identity: Tomb 986

Location: Tura el-Asmant

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.5 m + 0.5 m*

Superstructure: No

Footprint O/H: N/A

Security Features: Mud-brick lined staircase with mud-brick blockings at top and bottom to gravel cut pit lined with mud-brick. Wooden roof? + backfill approx. 1.5 m depth?

Tomb statistics: Substructure: Approx. 4.4 m long × 3.6 m wide × 3 m deep*

Burial chamber: Approx. 2.1 m long × 1.5 m wide × 1.5 m deep*

Robbed: Yes

References: Yacoub 1981: 160.

***Scaled dimensions**

Catalogue No. 66

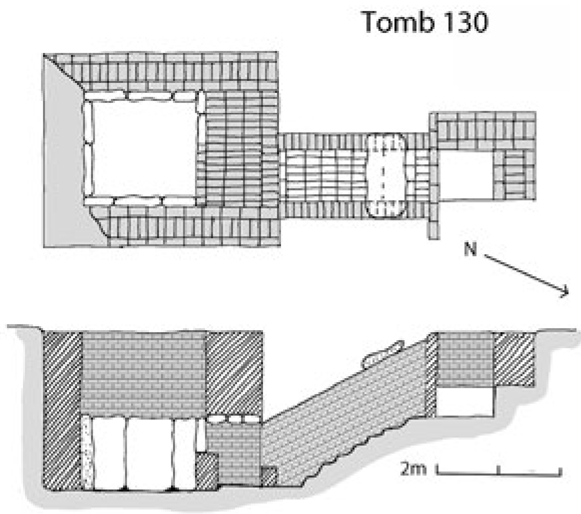


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER YACOUB 1981: PL. XVIII.

Identity: Tomb 130

Location: Tura el-Asmant

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID stone tomb

Liner: Stone and mud-brick **Thickness:** Mud-brick 0.6-1.1 m*

Superstructure: No

Footprint O/H: N/A

Security Features: Brick-lined and stone slab roofed staircase leads to gravel cut pit lined with mud-brick and stone slab lining approx. 1.1 m high × 0.1-0.15 m thick.* Limestone floor. Wooden roof and backfill approx. 1.4 m deep?

Tomb statistics: Substructure: 3.4 m long × 3 m wide × 2.5 m deep* Burial chamber approx. 2 m × 1.8 m × 1.1 m deep*

Robbed: Yes?

References: Yacoub 1981: 160.

***Scaled dimensions**

Catalogue No. 67

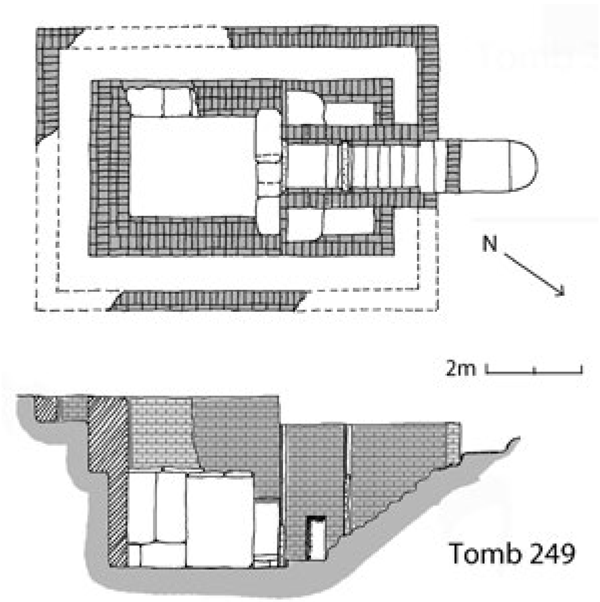


Illustration: Drawn by the author after El Khouli 1968: Pl. V.

Identity: Tomb 249

Location: Tura el-Asmant

Period: Dynasty 1, Naqada IIID, reign of Qa'a

Substructure Type: ID stone tomb

Liner: Stone and mud-brick **Thickness:** Mud-brick 0.75 m*

Superstructure: Yes

Footprint O/H: Unknown

Security Features: External brick lined stairway with flanking magazines obstructed by two portcullises (in situ? dimensions unknown) leads to gravel cut pit 3.5 m deep* with 0.75 m ledges. Interior of chamber and ledges lined with with stone slabs approx. 0.1 m thick* Mud-brick liners built upon ledges. Wooden beams support stone roof over and gravel backfill? Mud-brick mastaba over with walls.

Tomb statistics: Substructure: Pit approx. 4.2 m long × 3.8 m wide × 3.7 m deep* Burial chamber: Approx. 2.7 m long × 2.1 m wide × 1.9 m high. in 2.2 m deep sub-pit.* Superstructure approx. 8.5 m long × 6 m wide.*

Robbed: Yes

References: El Khouli 1968: 75.

***Scaled dimensions**

Catalogue No. 68

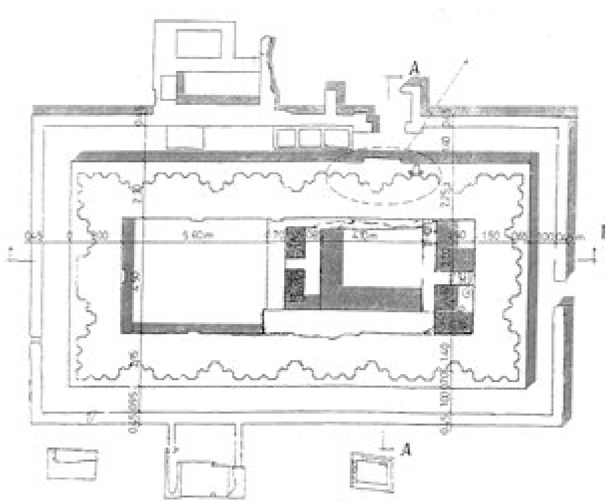


Illustration: Radwan 2000: Fig. 2.

Identity: Mastaba XVII

Location: Abu Ghurab

Period: Dynasty 1, Naqada IIIC1-C2

Substructure Type: IC

Liner: Mud-brick **Thickness:** 0.7 m

Superstructure: Yes

Footprint O/H: 1.8 m*

Security Features: Mud-brick lined pit cut in 'sandy soil' with four magazines offset under superstructure. Wooden roof and mud-brick mastaba over with walls approx. 1.8 m* thick + plinth surrounding an internal coarse sand core.

Tomb statistics: Substructure: 8.1 m long × 4.5 m wide × ??? m deep. Superstructure: 17.3 m long × 8.2 m wide

Robbed: Yes

References: Radwan 2000: 509-13; 2003: 378.

***Scaled dimensions**

Catalogue No. 69

IV

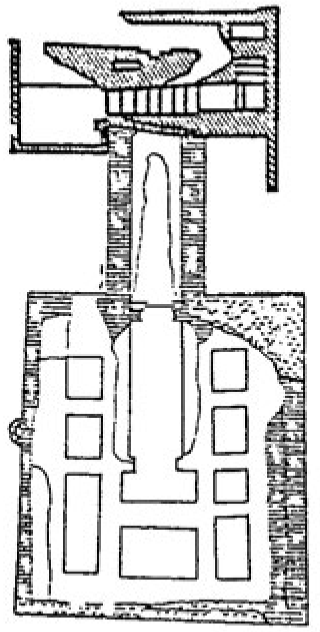


Illustration: Radwan 1991: Abb. 1.

Identity: Mastaba IV

Location: Abu Ghurab

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.5 m*

Superstructure: Yes

Footprint O/H: 1.2 m*

Security Features: Sloping descent/stairway? To limestone portcullis and door surround of unknown dimensions obstructing entrance to substructure. Mud-brick substructure and burial chamber built in 'sandy soil' surrounded by subterranean magazines and roofed. Large mud-brick mastaba over, filled with sand.

Tomb statistics: Substructure: Approx. 16 m long × 13-14 m wide* Superstructure: Approx. 17 m long × 14-15 m wide*

N.B. Scaled from 1:400 plan and Radwan 1991: Taf. 39a

Robbed: Yes

References: Radwan 1991: 305-6; 1995: 311-4; 2003a: 378.

***Scaled dimensions**

Catalogue No. 70

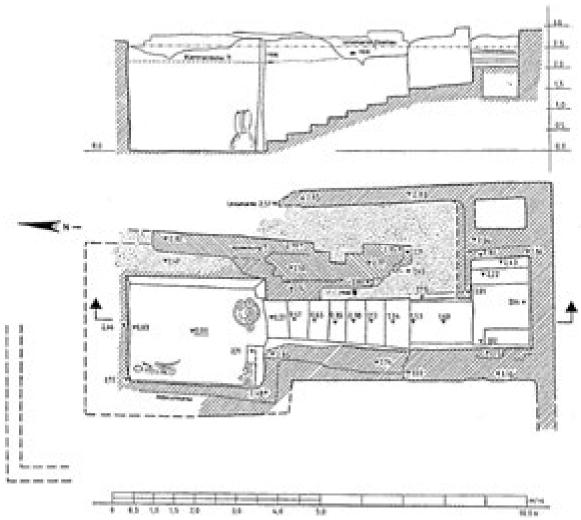


Illustration: Radwan 1991: Abb. 2.

Identity: Tomb V

Location: Abu Ghurab

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: ID

Liner: Mud-brick and wood **Thickness:** 0.7–1m*

Superstructure: Yes

Footprint O/H: N/A

Security Features: 'L' shaped mud-brick staircase to pit cut in 'sandy soil'. Mud-brick lined burial chamber, internal wooden shrine or panelling. Wattle and mud-brick roof supported by beams approx. 0.4 m thick. Mud-brick superstructure over with internal offering niche.

Tomb statistics: Substructure: Pit approx. 5 m long × 4.1 m wide × 2.1 m deep* Burial chamber: 3 m long × 2.3 m wide × 2.1 m deep* Superstructure: Approx. 13.3 m long × 7.2 m wide*

Robbed: Yes

References: Radwan 1991: 305-8; 1995: 312-3; 2003a: 378.

***Scaled dimensions**

Catalogue No. 71

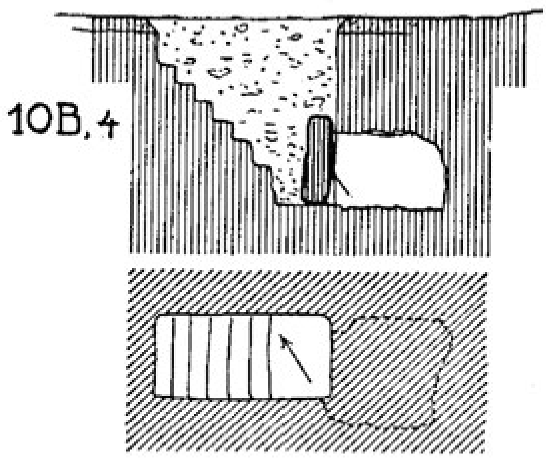


Illustration: Bonnet 1928: Taf. 2.

Identity: Tomb 10B-4

Location: Abusir

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Staircase 2.6 m deep excavated in rock to in situ portcullis obstructing entrance to rock-cut burial chamber. Natural rock roof approx. 1.6 m thick.* Portcullis: Approx. 1.3 m high × 1.2 m wide × 0.4 m wide. Estimated weight approx. 1.34 tonnes.

Tomb statistics: Substructure: Burial chamber approx. 1.5 m long × 1.5 m wide × 1 m high*

Robbed: ?

References: Bonnet: 1928: 4-5.

***Scaled dimensions**

Catalogue No. 72

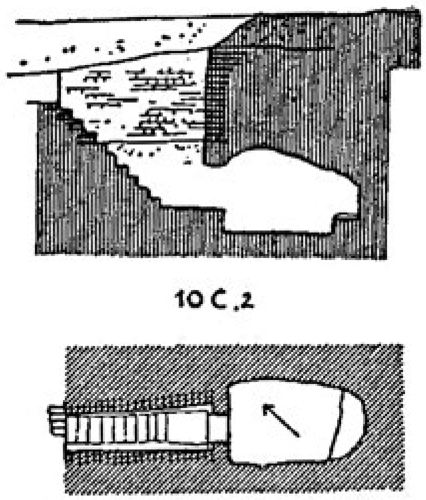


Illustration: Bonnet 1928: Taf. 2.

Identity: Tomb 10C-3

Location: Abusir

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Brick lined stairs approx. 2.3 m deep to rock cut subterranean burial chamber. Natural rock roof approx. 1.5 m thick*

Tomb statistics: Substructure: Burial chamber approx. 1.6 m long × 1 m wide × 1 m high.*

Robbed: ?

References: Bonnet: 1928: 4.

***Scaled dimensions**

Catalogue No. 73

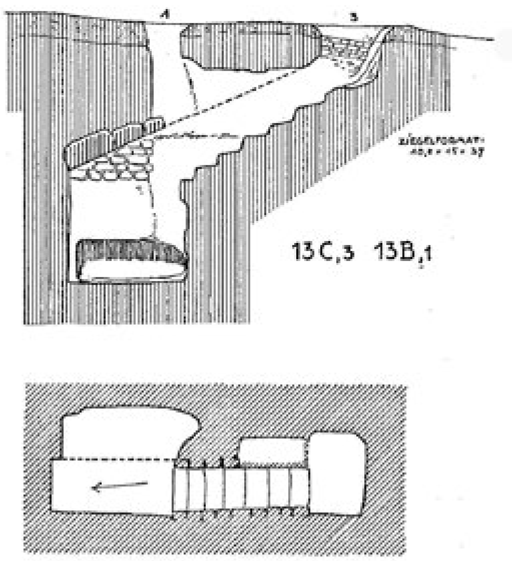


ILLUSTRATION: BONNET 1928: TAF. 2.

Identity: Tomb 13C-3 + 13B-1

Location: Abusir

Period: Dynasty 2

Substructure Type: IIA

Liner: Stone and flags **Thickness:** Unknown

Superstructure: No

Footprint O/H: N/A

Security Features: Brick lined sloping stairway passage cut in the rock. Burial chamber with recess. Side walls reinforced with rough stone walling and its ceiling with flagstones. Natural rock roofing approx. 2.2-3.5 m* thick.

Tomb statistics: Substructure: Burial chamber 2.8 m long × 1.2 m wide × 2.5-3.5 m high*

Robbed: Yes

References: Bonnet: 1928: 4-5.

***Scaled dimensions**

Catalogue No. 74

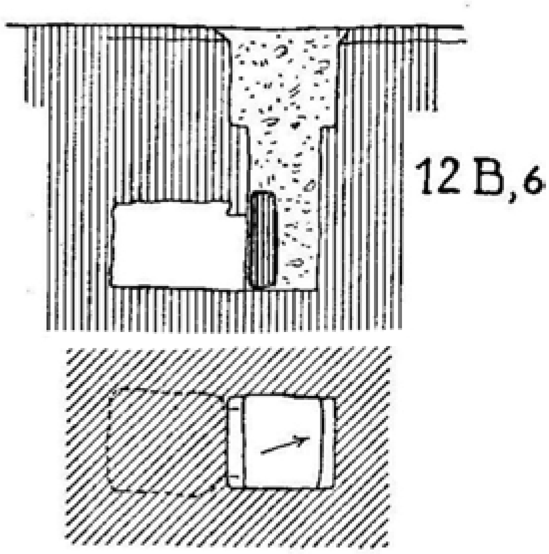


ILLUSTRATION: BONNET 1928: TAF. 2

Identity: Tomb 12B-6

Location: Abusir

Period: Dynasty 2.

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 3.2 m* deep with ledge leads to in situ portcullis obstructing entrance to burial chamber. Natural rock roof approx. 2.1 m thick* Portcullis: Approx. 1.2 m high × 1 m wide × 0.3 m wide. Estimated weight approx. 0.77 tonnes.

Tomb statistics: Substructure: Burial chamber approx. 1.4 m long × 1.2 m wide × 1.1 m high*

Robbed: ?

References: Bonnet: 1928: 3.

***Scaled dimensions**

Catalogue No. 75

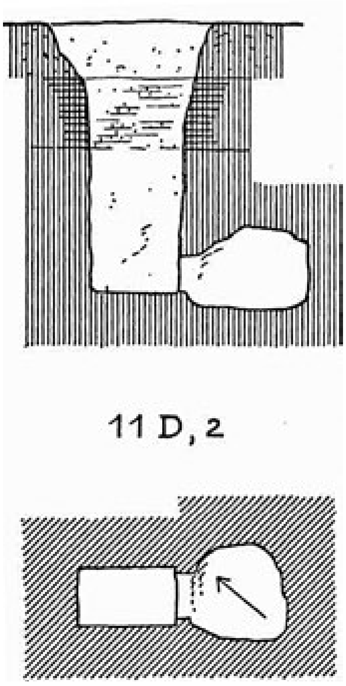


Illustration: Bonnet 1928: Taf. 4.

Identity: Tomb 11D-2

Location: Abusir

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Part brick-lined shaft approx. 5.1 m deep to burial chamber. Natural rock roof approx. 3.9 m thick*

Tomb statistics: Substructure: Burial chamber approx. 1.8 m long × 1.2 m wide × 1.5 m high.*

Robbed: ?

References: Bonnet 1928: 3.

Catalogue No. 76

Illustration: Bárta 2011a: Fig. 1

Identity: AS 54

Location: Abusir

Period: Dynasty 3

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Unknown

Security Features: 12.6 m deep shaft, of which upper 5.4 m is brick lined, to freestanding portcullis obstructing entrance to burial chamber with roof 10.1 m thick. Solid mud-brick mastaba over with corridor and niche. Portcullis 2.2 m high × 1.1 wide × 0.25 m thick. Estimated weight 1.42 tonnes.

Tomb statistics: Substructure: Burial chamber 3 m long × 2.04 m wide × 2.01 m high. Superstructure: 52.6 m long × 23.8 m wide .

Robbed: Yes, via shaft, portcullis found tipped aside.

References: Bárta 2011a: 50-4.

***Scaled dimensions**

Catalogue No. 77

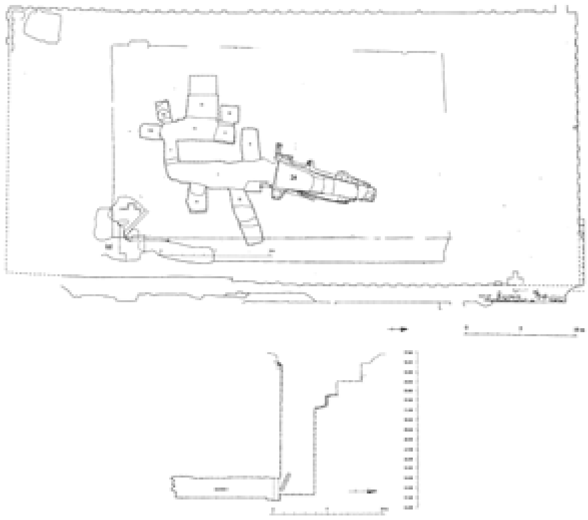


Illustration: After Bárta 2010: Figs. 3.1, 3.18 and 3.21

Identity: AS 33

Location: Abusir

Period: Dynasty 4, early

Substructure Type: IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Stair descends 5.55 m and meets shaft 9.8 deep (total 15.35 m) to large freestanding portcullis obstructing entrance to underground complex. Behind this further large additional wall of limestone chips and rough blocks acts as secondary closure. Burial chamber floor set at 15.58 from surface (room IX) roof approx. 13.08 m thick. Mud-brick mastaba over with limestone chip core. Portcullis: 3.9 m high × 1.3 wide × 0.3-0.4 m thick. Estimated weight 4.36 tonnes.

Tomb statistics: Substructure: Burial chamber (Room IX) 2.5 m wide × 3.7 m long × 2.5 m high. Superstructure: 53.53 m long × 23.25 m wide.

Robbed: Yes, via stair-shaft

References: Bárta 2010: 57-182.

Catalogue No. 78

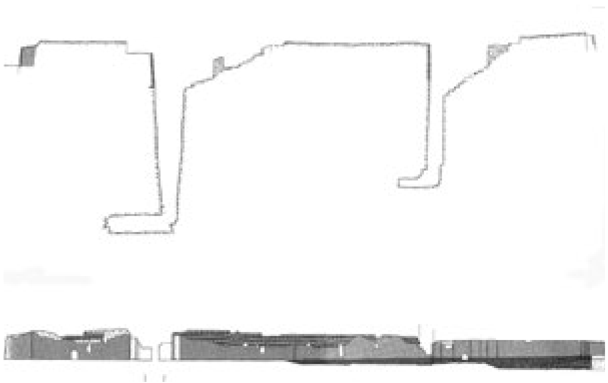


Illustration: Bárta 2010: Fig. 2.2.

Identity: Tomb of Hetepi (AS 20)

Location: Abusir

Period: Dynasty 4, early

Substructure Type: IIA-C + IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Twin mastaba. Southern 'meandering' staircase descends 4 m to meet shaft 4.2 m × 4.5 m × 10.75 m deep to burial chamber at a depth of 14.75 m with *tafl* bedrock roof 13.35 m thick. Northern 'meandering' staircase descends 5 m to meet shaft 6.8 m deep to burial chamber at a depth of 11.8 m with *tafl* bedrock roof 10.6 m thick. Mud-brick skinned (1-1.6 m thick) limestone walls 1-1.2 m thick surrounding rubble core of sand and limestone chips and waste.

Tomb statistics: Substructure: Southern burial chamber: 3.7 m long × 1.5-2 m wide × 1.4 m high. Northern burial chamber: 1.8 m long × 1 m wide × 0.6 m high. Superstructure 49.7 m long × 23.22 m wide.

Robbed: Yes, via stair-shafts

References: Bárta, Coppens and Vymazalová 2010: 3-56.

Catalogue No. 79

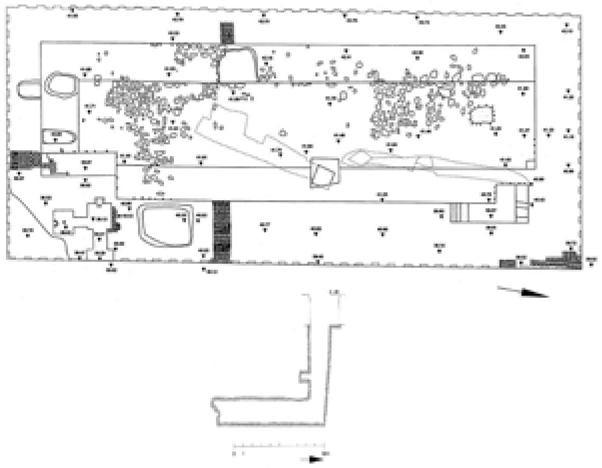


ILLUSTRATION: BÁRTA 2001: FIG. 1.2.

Identity: Tomb of Ity

Location: Abusir (South)

Period: Dynasty 4, early.

Substructure Type: IIA-C + IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Twin mastaba: Northern - Unfinished Type IIA-C 'L' shaped stair-shaft originally sealed with liquid mud and limestone chips descends to portcullis (missing) obstructing entrance to subterranean gallery excavated in *tafl* filled with sand, *tafl* and limestone chips, hole in floor leads to second gallery below and parallel to upper gallery. Southern - Type IIC 10 m shaft with large portcullis stone at base obstructing entrance to passage and burial chamber. Burial chamber protected by 8.25 m thick soft limestone cover. Mud-brick faced mastaba over with limestone core covering the subterranean compartments and possibly roofed with *tafl*. Southern portcullis 2.2 m high × 1.2 m wide × 0.3 m thick. Estimated weight approx. 1.7 tonnes.

Tomb statistics: Substructure: Burial chamber North - unfinished; South 3.5 m long × 2.7 m wide × 1.75 m high. Superstructure: 49.5 m long × 20.6 m wide × 1.8 m high (as found).

Robbed: Yes, via shaft.

References: Verner 1995: 78-90; Bárta 2001: 1-16.

Catalogue No. 80

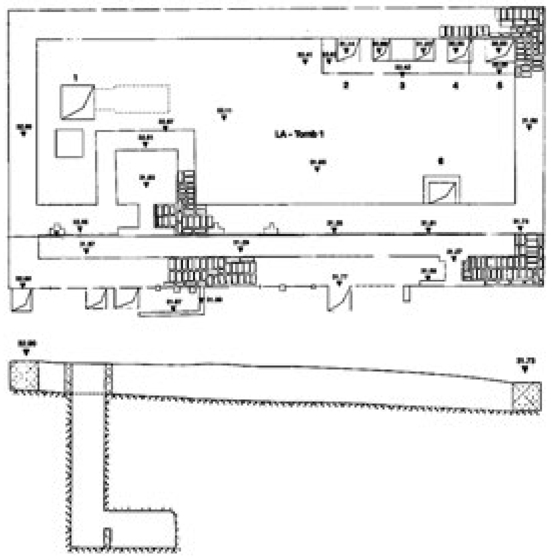


ILLUSTRATION: BÁRTA 2000: FIG 2.

Identity: Lake of Abusir Tomb 1

Location: Abusir

Period: Dynasty 4, early

Substructure Type: IIC

Liner: Mud-brick **Thickness:** 1 brick

Superstructure: Yes

Footprint O/H: N/A

Security Features: Shaft 8.5 m deep cut through superstructure and *tafl* rock and backfilled with *tafl*. Mud-brick blocking entrance to burial chamber, which was mud-brick lined and vaulted. Solid *tafl* roof to burial chamber approx. 5.3 m thick. Mud-brick mastaba over with walls 1.5 m thick filled with a *tafl*, rubble and sand core.

Tomb statistics: Substructure: Burial chamber 2.5 m long × 1.3 m wide × 1.7 m high. Superstructure: 25.65 m long × 13.1 m wide × 1.5 m high (remains).

Robbed: Yes, via tunnel through north-east corner of shaft

References: Bárta 2000: 335-9; 2001: 21-8.

Catalogue No. 81

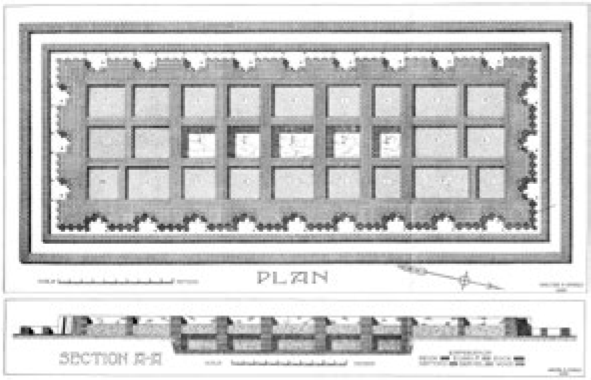


ILLUSTRATION: EMERY 1939: PL. 1.

Identity: S 3357 (Hor-Aha).

Location: Saqqara

Period: Dynasty 1, Naqada IIIC1, reign of Hor-Aha

Substructure Type: IC

Liner: Mud-brick & plaster **Thickness:** Approx. 1 m*

Superstructure: Yes

Footprint O/H: Approx. 6.3 m*

Security Features: Pit excavated in gravel and rock subdivided by mud-brick walls into subterranean magazines and burial chamber and covered by beams and wood roof 0.12 m thick. Large mud-brick mastaba over, surrounded by two enclosure walls. External walls of superstructure between 2.4–2.65 m and backed by an additional internal 'skin' wall between 0.4–0.65m thick. Within it internal multiple internal magazines containing 1 m deep layer of rubble and sand.

Tomb statistics: Substructure: Pit 19.1 m long × 2.9 m wide × 1.35 m deep. Burial chamber: 3.5 m long × 2.85 m wide. Superstructure: 41.6 m long × 15.5 m wide × 1.75 m high.

Robbed: Yes, via hole in burial chamber wall - see Emery 1939: pl. 7

References: Emery 1939: 10-8; Porter and Moss 1974-81: 443–4.

***Scaled dimensions**

Catalogue No. 82

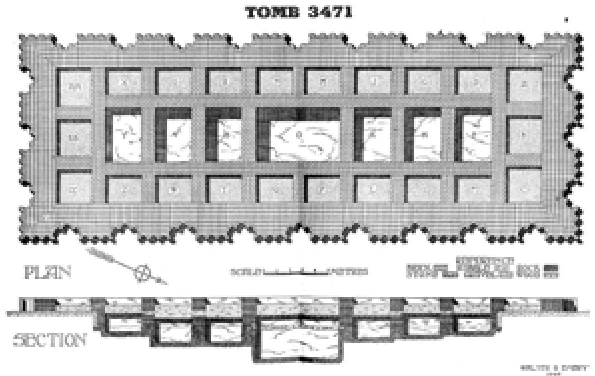


ILLUSTRATION: EMERY 1949: PL. 1.

Identity: S 3471.

Location: Saqqara

Period: Dynasty 1, Naqada IIIC1, reign of Djer

Substructure Type: IC

Liner: Mud-brick **Thickness:** Approx. 1 m*

Superstructure: Yes

Footprint O/H: Approx. 5.5 m*

Security Features: Pit sunk 1.2 m deep in gravel and then seven rock-cut chambers cut in solid rock. Possible internal wooden shrine? Beams support wooden roof 7 cm thick. Large mud-brick mastaba over with walls 2-2.75 m thick containing multiple internal with 0.5 m layer of rubble, and probably roofed in wood.

Tomb statistics: Substructure: Pit 30 m long* × 4 m wide × 1.2-3.5 m deep. Burial chamber 6.3 m long × 4 m wide × 3.5 m deep. Superstructure: 41.2 m long × 15.15 m wide.

Robbed: Yes

References: Emery 1949: 13-7; Porter and Moss 1974-81: 444.

***Scaled dimensions**

Catalogue No. 83

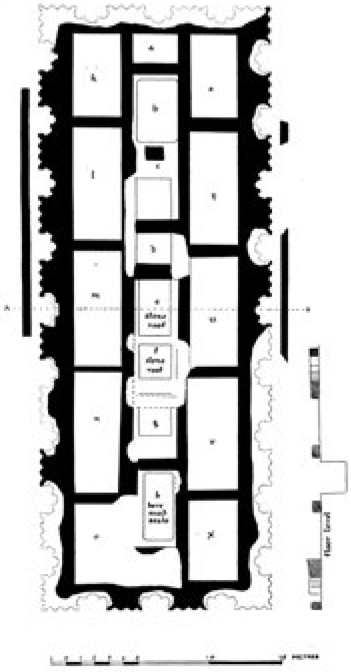


Illustration: Quibell 1923: Pl. V.

Identity: S 2185

Location: Saqqara

Period: Dynasty 1, Naqada IIIC1, reign of Djer

Substructure Type: IC

Liner: Stone masonry **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: Approx. 7 m*

Security Features: Pit cut in gravel and rock. Lined and subdivided with stone masonry walls. Covered with stone slab roof 0.2-0.32 m thick. Mud-brick mastaba with 2.4 m thick* walls and gravel filled internal magazines.

Tomb statistics: Substructure: 34.2 m long × 4.8 m wide × 1.5 m deep. Burial chamber: approx. 4 m long × 2.2 m wide × 1.5 m deep* Superstructure: 42 m long × 16 m wide × ? high.

Robbed: Yes

References:

Quibell 1923: 5-6, 15-6, Pls. V-X; Reisner 1936: 30; Emery 1949: 3; Porter and Moss 1974-81: 437.

***Scaled dimensions**

Catalogue No. 84

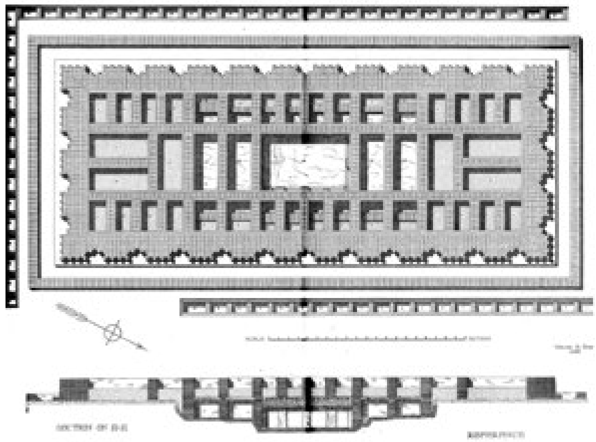


Illustration: Emery 1954: Pls. II & III. Courtesy of the Egypt Exploration Society.

Identity: S 3504

Location: Saqqara

Period: Dynasty 1, Naqada IIIC2, reign of Djet

Substructure Type: IC

Liner: Mud-brick **Thickness:** 1-1.3 m

Superstructure: Yes

Footprint O/H: Approx. 4.9 m*

Security Features: 3.1 m deep 'shelved' pit excavated in gravel and rock subdivided with 1-1.3 m thick* mud-brick walls into surrounding subterranean magazines and burial chamber. Double wooden roof 'sandwich' containing 1 m thick layer of rubble over burial chamber. Large mud-brick mastaba over with walls 2.9 m thick and fifty-three internal magazines partially filled with rubble.

Tomb statistics: Substructure: Pit 22.6 m long × 10.2 m wide × 3.1 m deep. Burial chamber originally 7.1 m long × 5.7 m. After 'restoration' 4·5 m long by 3 m wide. Superstructure: 49.5 m long × 20 m wide.

Robbed: Yes, by tunnel under superstructure

References: Emery 1954: 5-13; Porter and Moss 1974-81: 445.

***Scaled dimensions**

Catalogue No. 85

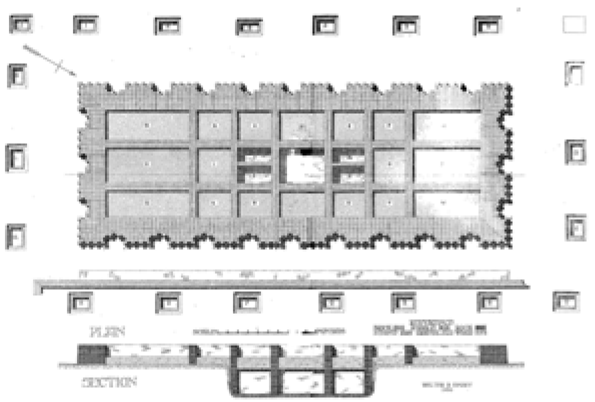


ILLUSTRATION: EMERY 1954: PL. XXXVIII. COURTESY OF THE EGYPT EXPLORATION SOCIETY.

Identity: S 3503

Location: Saqqara

Period: Dynasty 1, Naqada IIIC2, reign of Merneith

Substructure Type: IC

Liner: Mud-brick **Thickness:** 0.65-0.85 m

Superstructure: Yes

Footprint O/H: Approx. 5.75 m*

Security Features: Pit excavated in gravel and rock lined with mud-brick and subdivided into subterranean magazines and burial chamber; with wooden roof. Large mud-brick mastaba with 2.75m thick walls, with twenty-one internal magazines, filled with 0.75 m layer of rubble.

Tomb statistics: Substructure: Pit 14.25 m long × 4.5 m wide × 2.9 m deep. Burial chamber: 4.8 m long × 3.5 m wide × 2.9 m deep. Large wooden sarcophagus 2.7 m × 1.8 m. Superstructure: 42.6 m long × 16 m wide × 2.2 m high.

Robbed: Yes

References: Emery 1954: 128-58; Porter and Moss 1974-81: 444–5.

***Scaled dimensions**

Catalogue No. 86

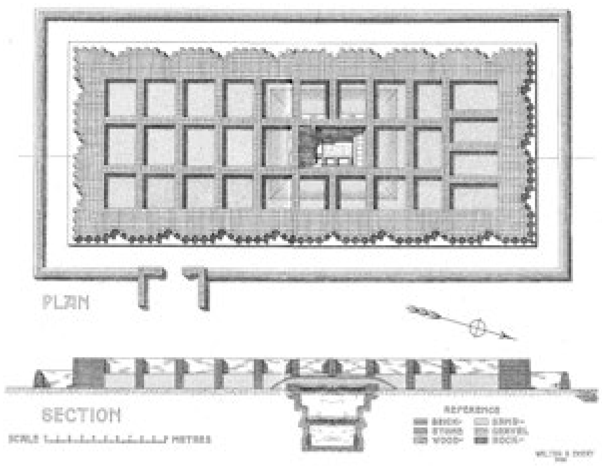


ILLUSTRATION: EMERY 1958: PL. 85. COURTESY OF THE EGYPT EXPLORATION SOCIETY.

Identity: S 3507

Location: Saqqara

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: IC

Liner: Partial mud-brick **Thickness:** 1m

Superstructure: Yes

Footprint O/H: Approx. 6 m*

Security Features: Deep rock-cut pit, partially lined at top to consolidate gravel. Internal stairway at northern end leads to lowest wooden roof. Closed by two thick wooden roofs, lower level made of stone at southern end. Mud-brick covered mound over upper roof. Large mud-brick mastaba with place facade walls 4.5-4.7 m thick, internally divided into 29 magazines with 1.25 m deep sand fill. Large wooden shrine in burial chamber

Tomb statistics: Substructure: Pit 5.25 m long × 3.25 m wide × 4.75 m deep. Shrine/coffin: 2.65 m long × 1.7 m wide Brick-clad mound: 10.5 m long × 9.2 m wide × 1.05 m high. Superstructure: 37.9 m long × 15.85 m wide × 2.5 m (remains).

Robbed: Yes

References: Emery 1958: 75-80; Porter and Moss 1974-81: 447.

***Scaled dimensions**

Catalogue No. 87

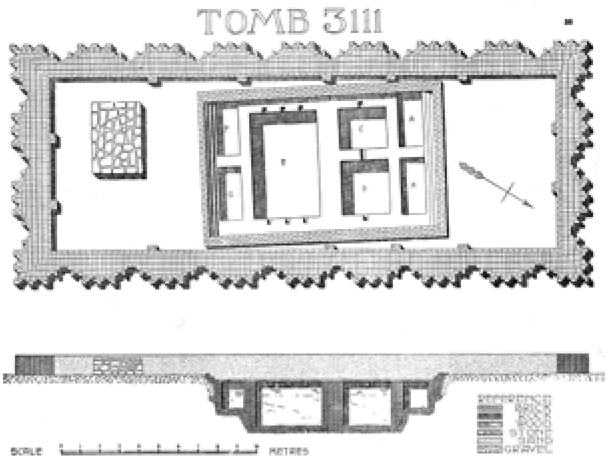


Illustration: Emery 1949: Pl. 36.

Identity: S 3111 (Sabu)

Location: Saqqara

Period: Dynasty 1, Naqada IIIC2, reign of Adjib

Substructure Type: IC

Liner: Mud-brick **Thickness:** 0.52-1.1 m*

Superstructure: Yes

Footprint O/H: Approx. 2.5 m*

Security Features: Mud-brick consolidated pit excavated in rock and gravel, with wooden roof. Mud-brick mastaba with walls 1.55–1.95 m thick and sand core.

Tomb statistics: Substructure: Overall 10.45 m long × 6 m wide × 2.55 m deep. Burial chamber: 5.4 m long × 3.4 m wide × 2.55 m deep. Superstructure 29.25 m long × 12.1 m wide.

Robbed: Disturbed

References: Emery 1949: 95-9; Porter and Moss 1974-81: 443.

***Scaled dimensions**

Catalogue No. 88

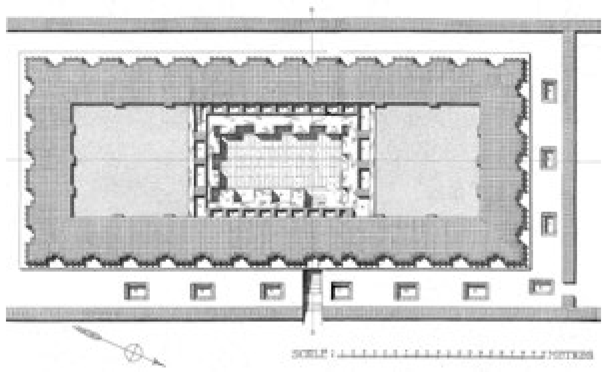


Illustration: Emery 1958: Pl. 40. Courtesy of the Egypt Exploration Society.

Identity: S 3506

Location: Saqqara

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: ID

Liner: Mud-brick **Thickness:** 1.35–1.62 m

Superstructure: Yes

Footprint O/H: Approx. 5.5 m*

Security Features: Entrance via stairs concealed under pavement. Long sand filled stairway to wooden door and mud-brick walling obstructing entrance to rock-cut burial chamber lined with mud-brick structure. Possibly large wooden shrine 5 m × 6 m.× 0.2 m thick wooden roof over pit supporting mud-brick mastaba with walls 4.20–4.45 m thick and wooden roof, internal core filled with rubble.

Tomb statistics: Substructure: Pit 14.4 m long × 8.5 m wide × 5.15 m deep, lined with mud-brick that reduced space to 11.7 m long × 5.25 m wide. Superstructure: 47.5 m long × 19.5 m wide × 2 m high (remains)

Robbed: Yes, via superstructure and the burial chamber's wooden roof.

References: Emery 1958: 37-42; Porter and Moss 1974-81: 446.

***Scaled dimensions**

Catalogue No. 89

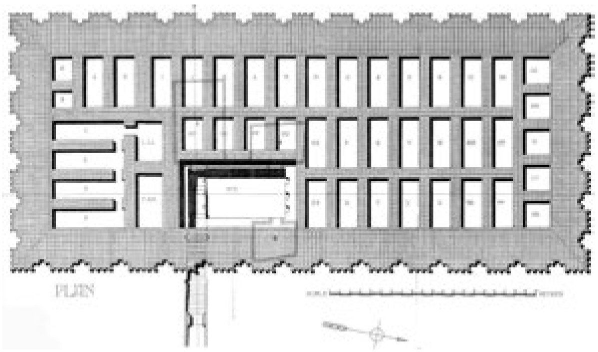


Illustration: Emery 1938: Pl. 1.

Identity: S 3035 (Hemaka)

Location: Saqqara

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: ID

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Approx. 5 m*

Security Features: Access by concealed external stairway obstructed by three portcullises (possibly four?) two in situ. Off-centre deep gravel and rock-cut central pit with three satellite rock cut chambers. Mud-brick liner around rim of pit consolidates gravel and runs into superstructure. Main pit closed by wooden roof and 32m3 of gravel in ascending shaft within rock and superstructure. Mud-brick mastaba with walls 3.75–4.20 m thick and 45 internal magazines with rubble fill? Roofed with wood and mud-brick. Second broken portcullis found in situ. Fourth freestanding portcullis in situ: 2.5 m high × 1.53 m wide × 0.25 m thick. Estimated weight 2.06 tonnes.

Tomb statistics: Substructure: Pit 9.5 m long × 4.9 m wide × 5 m deep. Superstructure: 57.3 m long × 26 m wide × 3.45 m (remains).

Robbed: Yes

References: Emery 1938: 3-13; Porter and Moss 1974-81: 440-2.

***Scaled dimensions**

Catalogue No. 90

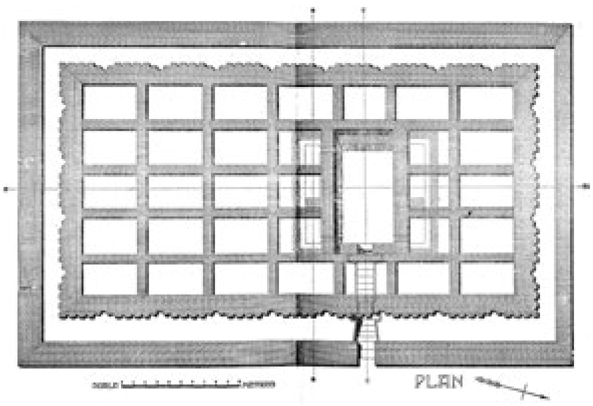


Illustration: Emery 1949: Pl. 14.

Identity: S 3036 (Ankhka)

Location: Saqqara

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.7 & 1.2 m

Superstructure: Yes

Footprint O/H: Approx. 6.75 m*

Security Features: Access by external stairway with concealed entrance under pavement filled with 'earth' and obstructed by two portcullises (missing) in grooved emplacements. Pit cut through 3.5 m thick gravel strata below which smaller burial pit cut in rock with flanking high level magazines. Internal mud-brick cross walls form 'shaft' over burial chamber running up into superstructure. Burial chamber closed by wooden roof with perhaps 4.65 m depth of rubble fill above? Large mud-brick mastaba with walls 1.8–2 m thick containing multiple internal magazines with 1.85 m sand fill floored with brick.

Tomb statistics: Substructure: Pit 8.55 m long × 4.8 m wide × 3 m deep. Superstructure: 41 m long × 22 m wide.

Robbed: Yes

References: Emery 1949: 71-81; Porter and Moss 1974-81: 442.

***Scaled dimensions**

Catalogue No. 91

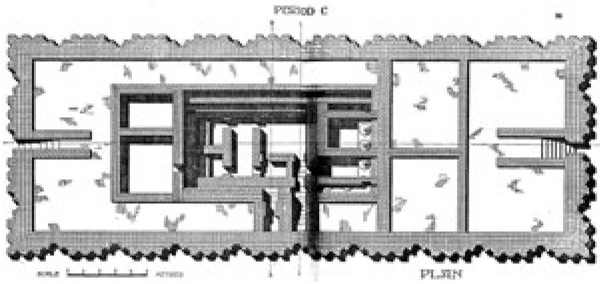


Illustration: Emery 1949: Pl. 25.

Identity: S 3038 (Nebitka).

Location: Saqqara

Period: Dynasty 1, Naqada IIIC2, reign of Adjib

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.45-0.7 m

Superstructure: Yes

Footprint O/H: Approx. 4–4.5 m*

Security Features: Tomb built in three stages. Final stage has two concealed staircases. One descends to portcullis (stone missing) obstructing access to mud-brick lined gravel and rock-cut burial chamber with wooden roof. Second staircase descends to wooden floor of ground level magazine, which has its own roof in superstructure. Original concealed stepped mud-brick superstructure hidden by final phase of large palace facade mastaba with 1.14–1.55 m thick mud-brick walls, brick roof and sand fill.

Tomb statistics: Substructure: 7.8 m long × 4.75 m wide × 6.1 m deep. Stepped original Superstructure: 22.7 m long × 10.5 m wide. Final palace facade Superstructure: 37 m long × 13.85 m wide.

Robbed: Yes

References: Emery 1949: 82-94; Porter and Moss 1974-81: 442.

***Scaled dimensions**

Catalogue No. 92

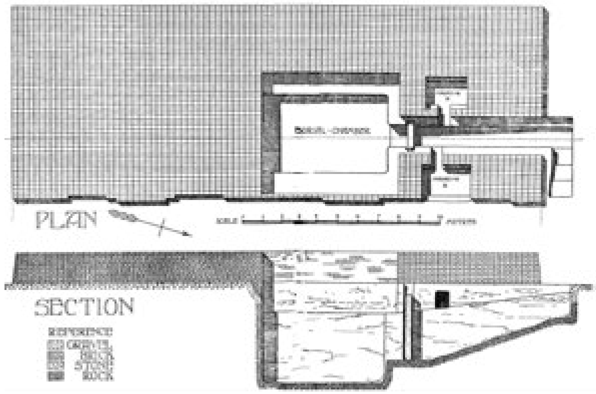


Illustration: Emery 1949: Pl. 43.

Identity: Tomb X

Location: Saqqara

Period: Dynasty 1, Naqada IIIC2, reign of Adjib

Substructure Type: ID

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Approx. 4.5 m* on west

Security Features: Concealed 'L' shaped rock-cut access stairs/slope initially descending west then south. Large portcullis in grooved emplacement obstructing entrance to rock-cut burial chamber with wooden roof supporting rubble fill. Solid mud-brick mastaba over. Portcullis 2.75 m high × 1.15 m × 0.3 m thick. Estimated weight approx. 2.04 tonnes.

Tomb statistics: Substructure: Pit 6.45 m long × 3.75 m wide × 4.9 m deep. Superstructure: 26 m long × 12 m wide (part missing) × 1.5 m (remains).

Robbed: Yes

References: Emery 1949: 107–9.

***Scaled dimensions**

Catalogue No. 93

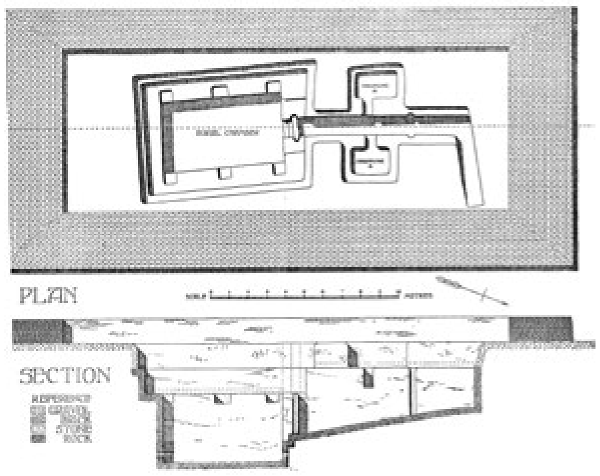


ILLUSTRATION: EMERY 1949: PL. 55.

Identity: S 3338

Location: Saqqara

Period: Dynasty 1, Naqada IIIC2, reign of Adjib

Substructure Type: ID

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Approx. 2.4 m*

Security Features: Internal 'L' shaped rock cut sloping passage with stone slab roof with two portcullises (first missing, second present) in grooved emplacements leading to sunken rock-cut burial pit with wooden roof. Roof + backfill approx. 2.7 m* over burial chamber. Mud-brick mastaba with walls 2.3–3.4 m thick filled with rubble fill concealing entrance. Portcullis: 2.15 m high × 1.2 m wide × 0.25 m thick. Estimated weight approx. 1.39 tonnes.

Tomb statistics: Substructure: Pit 6.5 m long × 3.75 m wide × 6.25 m deep. Superstructure: 30.5 m long × 14 m wide × 1.3 m high (remains).

Robbed: Yes

References: Emery 1949: 125-9.

***Scaled dimensions**

Catalogue No. 94

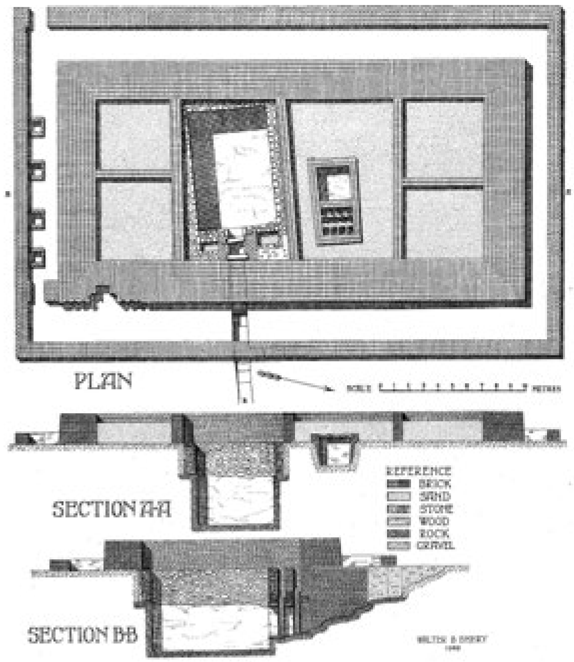


ILLUSTRATION: EMERY 1958: PL. 114. COURTESY OF THE EGYPT EXPLORATION SOCIETY.

Identity: S 3500

Location: Saqqara

Period: Dynasty 1, Naqada IIID, reign of Qa'a

Substructure Type: ID

Liner: Dressed stone masonry **Thickness:** 0.6-0.8 m

Superstructure: Yes

Footprint O/H: Approx. 3 m*

Security Features: Concealed external staircase cut in gravel and rock obstructed by mud-brick and two portcullises in grooved emplacements. Pit excavated in deep gravel and rock to form burial chamber and roofed with wood; internally dressed stone liner at higher level to consolidate gravel. Mud-brick mastaba over with 2.6–2.8 thick mud-brick walls. Portcullis dimensions: 1 × No. 3.1 m high × 1.35 m wide × 0.3 m thick. 1 × No. 2.6 m high × 1.2 m wide × 0.25 m thick. Estimated weight 1.26 and 0.78 tonnes respectively.

Tomb statistics: Substructure: Pit Approx. 8.2 m long × 5.4 m wide × 3.2 m deep* Superstructure: 31.9 m long × 15.9 m wide × 2 m high (remains).

Robbed: Yes, through the gravel layer

References: Emery 1958: 98-102; Porter and Moss 1974-81: 444.

***Scaled dimensions**

Catalogue No. 95

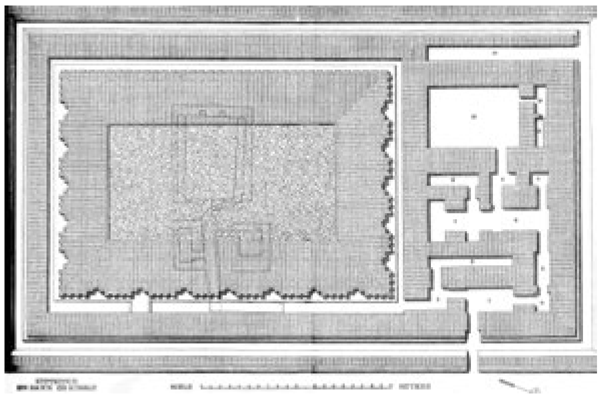


ILLUSTRATION: EMERY 1958: PL. 2. COURTESY OF THE EGYPT EXPLORATION SOCIETY..

Identity: S 3505

Location: Saqqara

Period: Dynasty 1, Naqada IIID, reign of Qa'a

Substructure Type: ID

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Approx. 4.5 m*

Security Features: Concealed entrance in corridor pavement and fender; leading via back-filled 'L' shaped sloping passage to limestone portcullis in grooved emplacement obstructing entrance to burial chamber. Pit cut in gravel and rock forms burial chamber roofed with planks 0.3 m thick and covered with compacted rubble to height of superstructure. Mud-brick mastaba with walls 5.15–6 m thick filled with rubble. Portcullis: 3 m high × 1.4 m wide × 0.25 m thick. Estimated weight 2.26 tonnes.

Tomb statistics: Substructure: 8.7 m long × 5 m wide × 5.75 m deep. Complex overall: 65.2 m long × 40 m wide. Superstructure: 35.2 m × 24.3 m × 2 m (remains).

Robbed: Yes

References: Emery 1958: 5-13; Porter and Moss 1974-81: 446.

***Scaled dimensions**

Catalogue No. 96

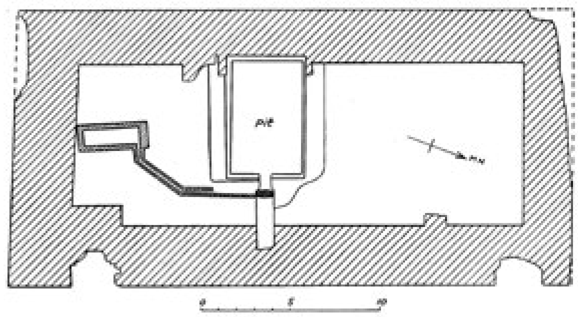


ILLUSTRATION: REISNER 1936: FIG. 52.

Identity: S 2105

Location: Saqqara

Period: Dynasty 1, Naqada IIID, reign of Qa'a

Substructure Type: ID

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Approx. 2.8 m*

Security Features: Entrance concealed under wall of superstructure. Stairway 3.7 m long obstructed by in situ portcullis (dimensions unknown) in unknown emplacement leads to gravel and rock-cut burial chamber roofed with wooden beams. Mud-brick mastaba with walls 2.8-3.5 m thick*, with gravel filled internal core.

Tomb statistics: Substructure: Pit approx. 6 m × 3.8 m* Superstructure: Approx. 32 m × 15 m*

Robbed: Yes

References: Quibell 1923: 19.

***Scaled dimensions**

Catalogue No. 97

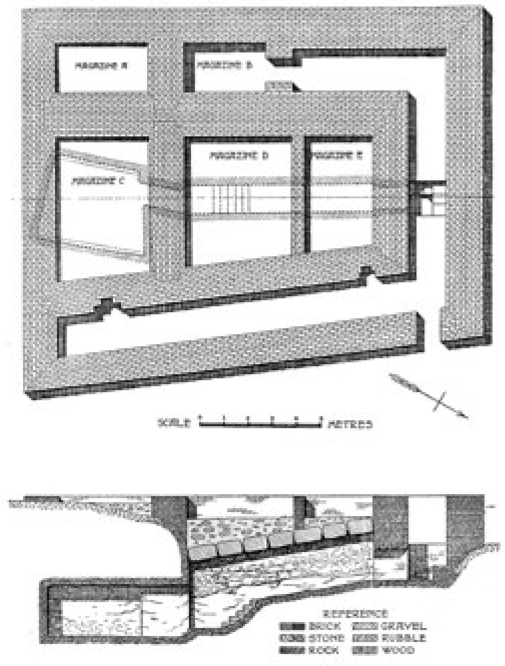


Illustration: Emery 1949: Pl. 48.

Identity: S 3121

Location: Saqqara

Period: Dynasty 1, Naqada IIID, reign of Qa'a

Substructure Type: IIA

Liner: Stone **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Access via concealed entrance in pavement via 7.6 m long 'L' shaped rock-cut and stone lined passage roofed with large stone blocks leading to portcullis (smashed) obstructing entrance to burial chamber in cliff face. Rock-cut burial chamber lined with masonry on east and west walls with natural ceiling of rock approximately 3.7 m thick*. Mud-brick combined enclosure and mastaba disguise topography beneath. Inner mastaba walls 1.35-1.8 m thick filled with rubble and sand core.

Tomb statistics: Substructure: Burial chamber 3.5-3.6 m long × 3.5-4.5 m wide × 2.15 m high. Superstructure: 18.9-19.1 m long × 13.6-15.75 m. wide

Robbed: Yes, via smashed portcullis

References: Emery 1949: 116-9; Porter and Moss 1974-81: 443.

***Scaled dimensions**

Catalogue No. 98

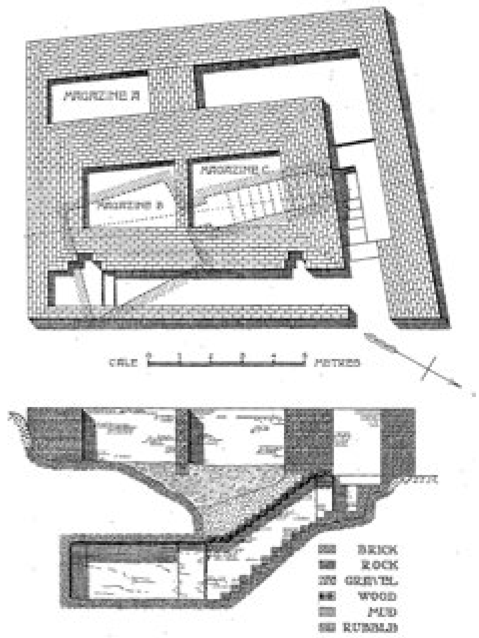


Illustration: Emery 1949: Pl. 53.

Identity: S 3120

Location: Saqqara

Period: Dynasty 1, Naqada IIID, reign of Qa'a

Substructure Type: IIA

Liner: Stone **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: N/A

Security Features: Access via concealed entrance in pavement. Wood and mud/rubble roofed 3.5 m long descending passage leading to rock-cut burial chamber in cliff face with 2.6 m* thick sloping natural rock roof and rubble. Mud-brick combined enclosure and mastaba.

Tomb statistics: Substructure: Burial chamber 3.3-3.9 m long × 2.85-3.5 m wide × 1.85 m high. Superstructure: 11.4-13.2 m long × 8.8-10 m wide.

Robbed: Yes

References: Emery 1949: 121-3; Porter and Moss 1974-81: 443.

***Scaled dimensions**

Catalogue No. 99

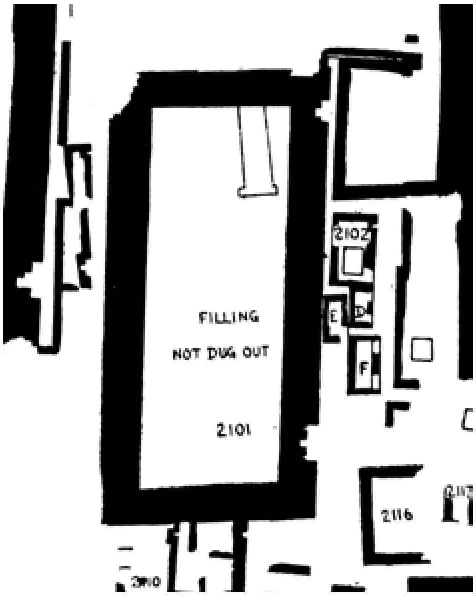


ILLUSTRATION: QUIBELL 1923: PL. I.

Identity: S 2101

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 4 m long rock-cut stairway concealed entirely by superstructure, leading to in situ portcullis (dimensions unknown) in grooved emplacement obstructing entrance to subterranean burial chamber. Mud-brick mastaba with walls approx. 1.6-1.8 m thick* and limestone chip core.

Tomb statistics: Substructure: Burial Chamber 5 m long × 3.8 m wide × 1.55 m high. Superstructure: Approx. 21 m long × 10 m wide*

Robbed: ?

References: Quibell 1923: 17; Reisner 1936: 146.

***Scaled dimensions**

Catalogue No. 100

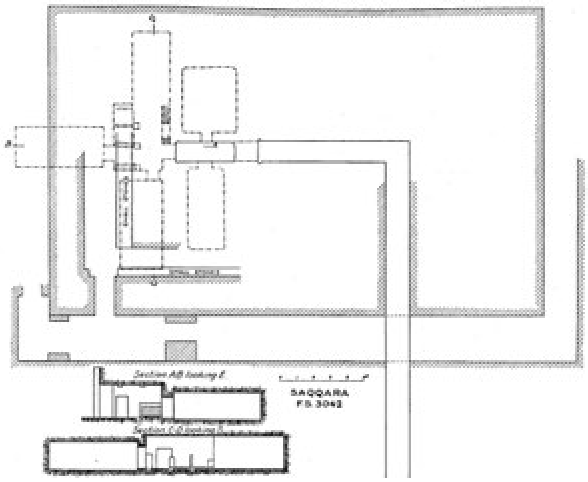


ILLUSTRATION: REISNER 1936: FIG. 67.

Identity: S 3042

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: External 'L' shaped long stairway and rock cut trench lead toportcullis (details unknown) in grooved emplacement obstructing magazine area, beyond second portcullis (details unknown) in grooved emplacement obstructs entrance to rock-cut underground complex. Large mud-brick mastaba over with walls 2 m* thick.

Tomb statistics: Substructure: Subterranean chambers 5.2 m long × 2.2 m wide + 5.3 m long × 2.2 m wide + 5.2 m long × 2.4 m wide between 1.6-2 m high. Superstructure: 29.45 m long × 18.3 m wide.

Robbed: Yes

References: Reisner 1936: 144-5.

***Scaled dimensions**

Catalogue No. 101

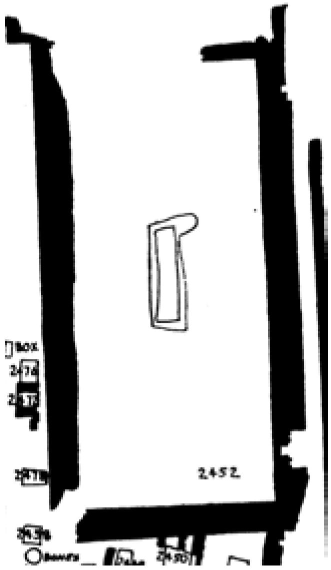


Illustration: Quibell 1923: Pl. II.

Identity: S 2452

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Staircase within core of mastaba descends 6.6 m to portcullis over 2 m high in unknown emplacement obstructing access to main burial chamber with three satellite magazines. Mud-brick mastaba with walls approx. 1.6-1.8 m thick. Within the unknown core was a 0.5 m deep bed of broken pottery.

Tomb statistics: Substructure: Unknown. Superstructure: 25.86 m long × 13.17 m wide.

Robbed: No

References: Quibell 1923: 41-2; Reisner 1936: 143; Porter and Moss 1974-81: 440.

***Scaled dimensions**

Catalogue No. 102

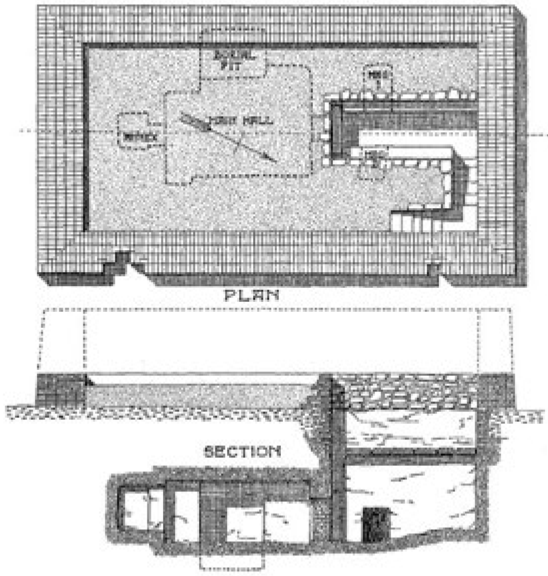


Illustration: Emery 1962: Pl. 4 . Courtesy of the Nederlands Instituut voor het Nabije Oosten.

Identity: S 3477

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 'L' shaped staircase concealed under superstructure leads to stone slab covered trench flanked by magazines. Portcullis in situ in grooved emplacement and mud-brick wall block access to subterranean chambers. Natural rock roof approx. 2.5 m thick.* Mud-brick mastaba over with walls approx. 1.1-1.6 m thick* and rubble core. Portcullis 1.8 m high × 1.7 m wide × 0.3 m thick. Estimated weight approx. 1.97 tonnes.

Tomb statistics: Substructure: Burial chamber approx. 5.2 m long × 3.49 m wide × 2.2 m high* Superstructure: 16.5 m long × 9.3 m wide.

Robbed: No

References: Emery 1962: 1-14; Porter and Moss 1974-81: 444.

***Scaled dimensions**

Catalogue No. 103

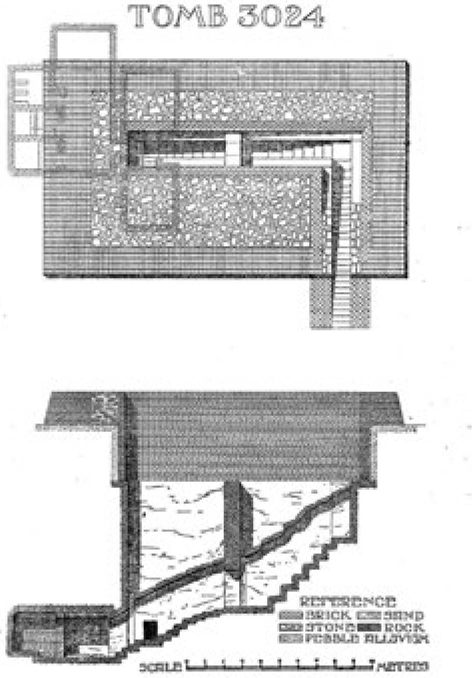


ILLUSTRATION: EMERY 1949: FIG. 9.

Identity: S 3024

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: External 'L' shaped rock cut stairway with stone slab roof descends to portcullis (details unknown) in grooved emplacement. Beyond further stairs flanked at base by rock-cut magazines. Second portcullis (details unknown) in grooved emplacement obstructing burial chamber entrance. Rock cut burial chamber with 10 m thick roof of rock and gravel. Mud-brick mastaba with walls 1.5-2.5 m thick* filled with rubble core.

Tomb statistics: Substructure: 'L' shaped burial chamber 7.5 m long × 5 m wide × 2.5 m high* Superstructure: 19.5 m long × 11.5 m wide*

Robbed: Unknown

References: Emery 1949: 11-2.

***Scaled dimensions**

Catalogue No. 104

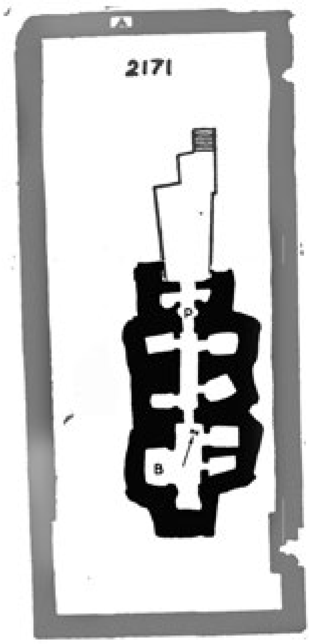


ILLUSTRATION: AFTER QUIBELL 1923: PLS. I AND XXX.

Identity: S 2171

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Brick staircase in gravel and rock cut staircase 10.37 m long concealed by superstructure and blocked by five flagstones laid lengthways leads to passage and portcullis (dimensions unknown) in grooved emplacement. Obstructing entry to multiple subterranean rock-cut chambers. Large mud-brick mastaba with walls approx. 1.6-2 m thick,* and gravel core.

Tomb statistics: Substructure: Dimensions N/A . Superstructure 41.7 m long × 18.3 m wide.

Robbed: Yes?

References: Quibell 1923: 7, 23-4,pls. I and XXX; Reisner 1936: 145; Porter and Moss 1974-81: 436.

***Scaled dimensions**

Catalogue No. 105

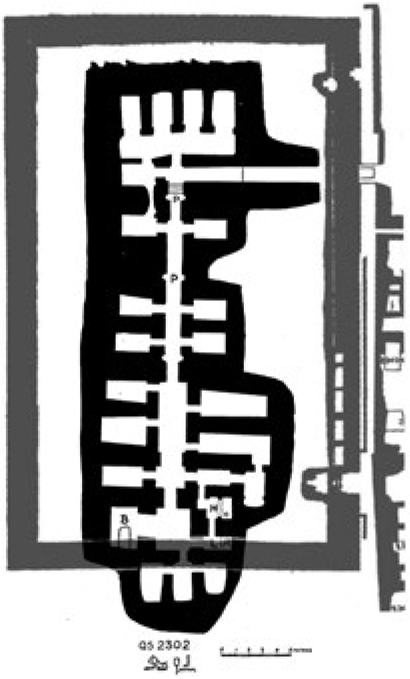


Illustration: After Quibell 1923: Pls. I and XXX.

Identity: S 2302

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 11.93 m long external rock-cut stair, roofed with stone slabs leads to portcullis in situ in grooved emplacement obstructing entrance. Further two portcullises block access to multiple underground rock-cut chambers. Large mud-brick mastaba over with double skinned walls approx. 2.8-3 m thick*, surrounding dense black mud core over a layer of gravel.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 58 m long × 32.64 m wide.

Robbed: Yes, by passage circumventing portcullis

References: Quibell 1923: 29-30; Reisner 1936: 138; Porter and Moss 1974-81: 437.

*Scaled dimensions

Catalogue No. 106

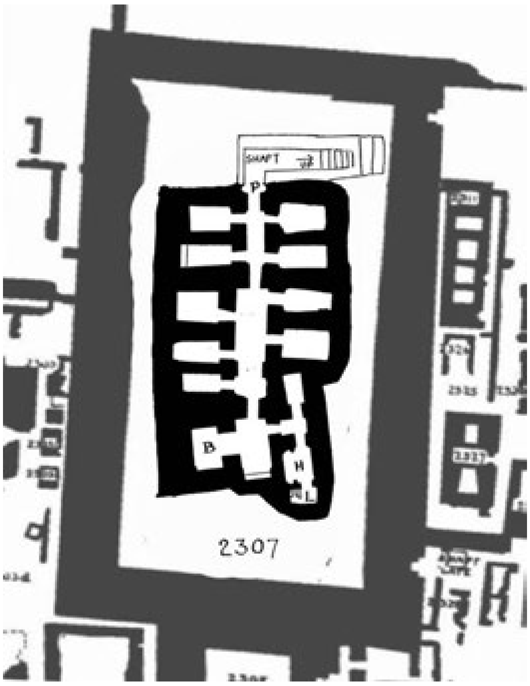


Illustration: After Quibell 1923: Pls. I and XXX.

Identity: S 2307

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 8.5 m long stairway concealed under body of superstructure leads to portcullis (details unknown) in grooved emplacement obstructing entrance to multiple subterranean rock-cut chambers. Large mud-brick mastaba with walls 2.8-3.8 m thick* Core contained internal magazines, and filled with black mud.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 42 m long × 21 m wide.

Robbed: Yes, via shaft through mastaba.

References: Quibell 1923: 31; Reisner 1936: 140.

*Scaled dimensions

Catalogue No. 107

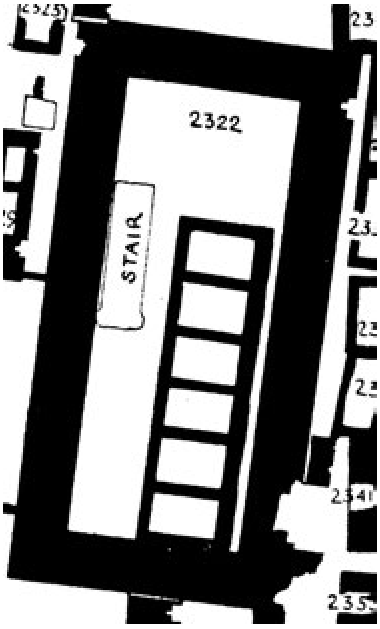


Illustration: Quibell 1923: Pl. I.

Identity: S 2322

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Stair concealed in body of superstructure, adjacent and parallel to western wall, leads to subterranean portcullis (details unknown) in grooved emplacement obstructing entrance to multiple rock-cut subterranean chambers. Large mud-brick mastaba over with 2 m thick* walls contained internal magazines and mud filling.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 21 m long × 10.5 m wide.

Robbed: Yes

References: Quibell 1923: 34, pls I and XXX; Reisner 1936: 141; Porter and Moss 1974-81: 437.

***Scaled dimensions**

Catalogue No. 108

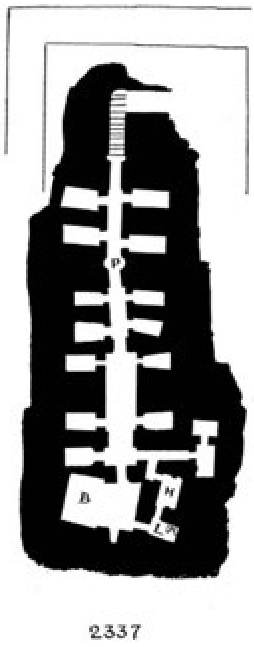


Illustration: Quibell 1923: Pl. XXX.

Identity: S 2337

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Trench cut stairway to portcullis (details unknown) in grooved emplacement obstructing entrance to multiple subterranean rock-cut chambers. Large mud-brick mastaba filled with layers of sand, 0.6 m layer of fired and unfired pots and limestone chips. Portcullis grooves measure 6.4 m deep, which may be depth of burial chamber.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: Dimensions N/A.

Robbed: Yes

References: Quibell 1923: 35-6, pl. XXX; Reisner 1936: 141-2.

***Scaled dimensions**

Catalogue No. 109

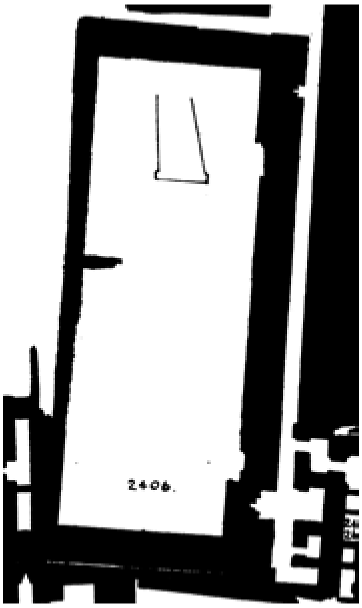


ILLUSTRATION: QUIBELL 1923: PL. II.

Identity: S 2406

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Stairway concealed by superstructure leads to portcullis (details unknown) in grooved emplacement obstructing entrance to multiple subterranean rock-cut chambers. Large mud-brick mastaba with walls 0.4-2 m thick,* filled with with unknown core.

Tomb statistics: Substructure: Dimensions N/A.

Superstructure: 30 m long × 13.8 m wide.

Robbed: Yes

References: Quibell 1923: 38, pl. XXX; Reisner 1936: 143 and 145.

***Scaled dimensions**

Catalogue No. 110

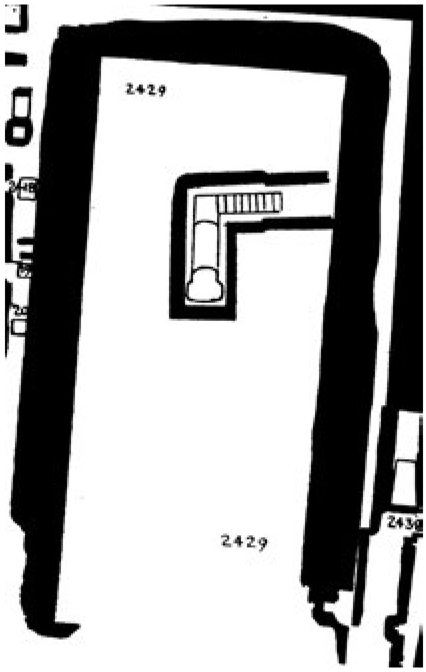


ILLUSTRATION: QUIBELL 1923: PL. II.

Identity: S 2429

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Internal 'L ' shaped stairway descends west then south and is concealed by superstructure, leads to in situ portcullis in grooved emplacement blocking entrance to multiple rock-cut chambers. Large mud-brick mastaba with walls approx. 3.2 m thick.*

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 34 m long × 18.5 m wide.

Robbed: Yes

References: Quibell 1923: 40, pl. XXX; Reisner 1936: 159-60, pl. XXX; Porter and Moss 1974 -81: 440.

***Scaled dimensions**

Catalogue No. 111

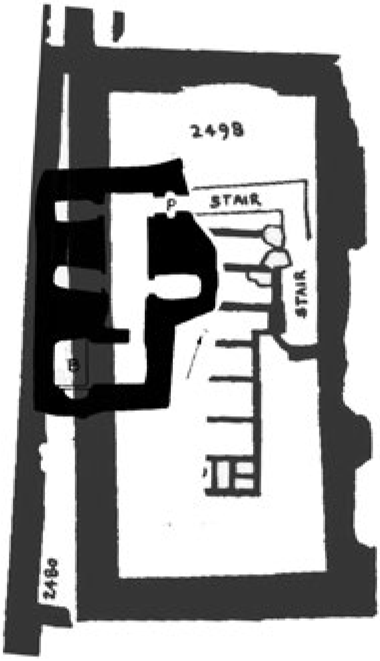


ILLUSTRATION: AFTER QUIBELL 1923: PLS. II AND XXX.

Identity: S 2498

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Internal 'L' shaped stone covered stairway blocked by stones laid edgeways runs from under east wall north and parallel to it, then west to portcullis? (details unknown) in grooved emplacement obstructing access to subterranean rock-cut chambers. Large mud-brick mastaba with walls 1.8-2.2 m thick*. Core with unknown fill and internal magazines.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 27 m long × 14 m wide.*

Robbed: Yes

References: Quibell 1923: 10, 44-5, pls. II and XXX; Reisner 1936: 145; Porter and Moss 1974-81: 437.

***Scaled dimensions**

Catalogue No. 112

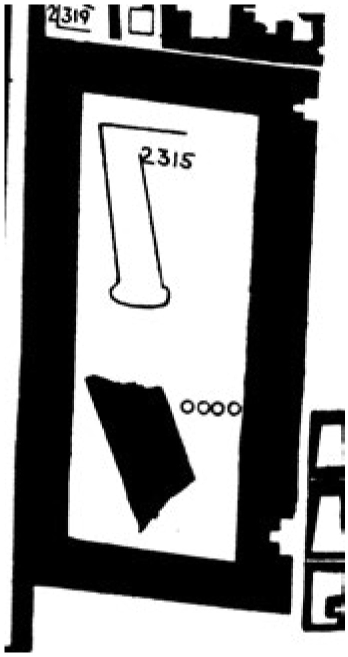


ILLUSTRATION: QUIBELL 1923: PL. I.

Identity: S 2315

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 'L' shaped staircase concealed under superstructure leads to portcullis in grooved emplacement (dimensions unknown) obstructing access to seven chamber subterranean complex. Mud-brick mastaba with walls 1.6-2 m thick*, core filled with limestone chips.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 19.8 m long × 10.4 m wide* [Quibell (1923: 33) gave 16 m × 6.5 m, but this is the core dimension and the drawing scales to the above, as Reisner (1936: 145) concurs].

Robbed: ?

References: Quibell 1923: 33, pls. I and XXX. Reisner 1936: 145.

***Scaled dimensions**

Catalogue No. 113

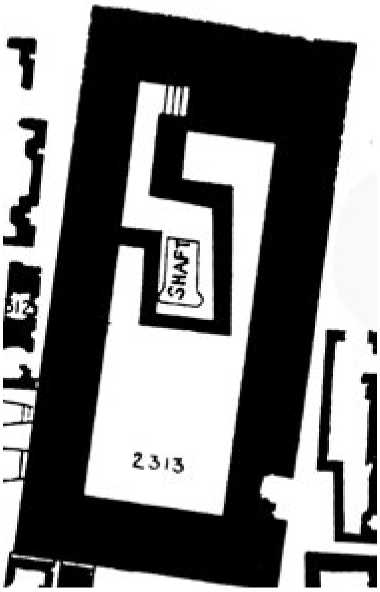


ILLUSTRATION: QUIBELL 1923: PL. I.

Identity: S 2313

Location: Saqqara

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 'Dogleg' shaped 14.6 m long stairway protected by stone walls leads to portcullis found in situ (dimensions unknown) in grooved emplacement. Mastaba with walls approx. 2.2-2.5 m thick* filled with liquid mud.

Tomb statistics: Substructure: Dimensions N/A. Superstructure Approx. 21.5 m long × 10.1 m wide.

Robbed: Yes, via hole broken in side of portcullis..

References: Quibell 1923: 3, 32, pl. I; Reisner 1936: 143.

Catalogue No. 114

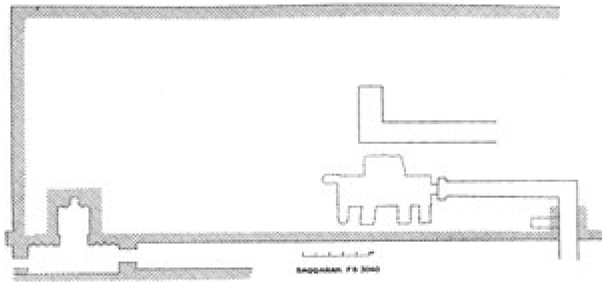


ILLUSTRATION: REISNER 1936: FIG. 77.

Identity: S 3040

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: External 'L' shaped stairway descends 4.6 m west then 9.1 m south to portcullis (dimensions unknown) in grooved emplacement, obstructing access to subterranean burial chamber with niche magazines. Large mud-brick mastaba over with internal corridor and offering niche. Rock roof, thickness unknown.

Tomb statistics: Substructure: Burial chamber 7 m long × 2.2 m wide. Superstructure: 45 m long × 18.3 m wide.

Robbed: ?

References: Reisner 1936: 163.

***Scaled dimensions**

Catalogue No. 115

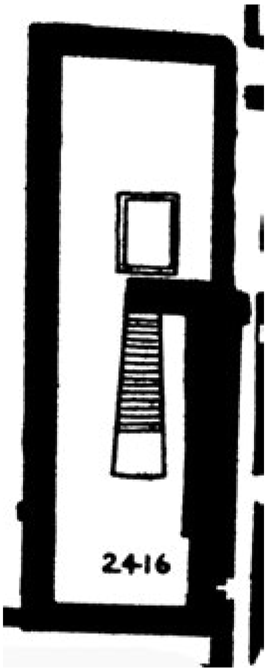


ILLUSTRATION: QUIBELL 1923: PL. II.

Identity: S 2416

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Rock-cut stairway 4.4 m long concealed within superstructure descends to substructure. Mud-brick superstructure over with gravel core.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 9.8 m long × 5.9 m wide

Robbed: Yes

References: Quibell 1923: 39, pl II; Reisner 1936: 162.

Catalogue No. 116

ILLUSTRATION: QUIBELL 1923: PL. I.

Identity: S 2317

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Unknown

Security Features: Rock-cut stairway concealed within superstructure descends to substructure. Mud-brick superstructure over.

Tomb statistics: Substructure: Dimensions N/A

Superstructure: 4.8 m long × 2.4 m wide.

Robbed: Yes

References: Quibell 1923: 33, pl. I; Reisner 1936: 163.

Catalogue No. 117

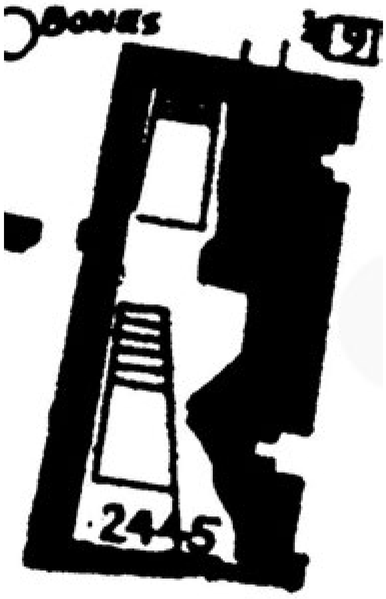


ILLUSTRATION: QUIBELL 1923: PL. II.

Identity: S 2445

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA + IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 'Twin mastaba' North rock-cut stairway 3.4 m deep concealed within superstructure descends to burial chamber with rock roof 2 m thick. South stairway descends to unfinished chamber. Mud-brick superstructure over.

Tomb statistics: Substructure: Northern burial chamber 1.6 m long × 1.6 m wide × 1.4 m high. Southern chamber dimensions N/A.Superstructure: 7.8 m long × 3.9 m wide

Robbed: Yes

References: Quibell 1923: 41, Pl. II; Reisner 1936: 162.

Catalogue No. 118

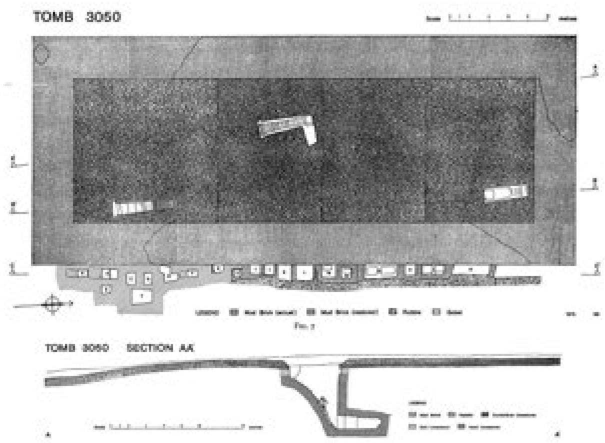


ILLUSTRATION: MARTIN 1974: FIG. 7. COURTESY OF THE EGYPT EXPLORATION SOCIETY.

Identity: S 3050

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA + IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 'Twin mastaba'. Southern: Steep stair to portcullis (missing) in grooved emplacement obstructing entrance to 'main' burial chamber with gravel and rock roof approx. 7 m thick.* Northern: Stair-shaft 6 m deep to portcullis (missing) in grooved emplacement blocking entrance to 'secondary' burial chamber with gravel and rock roof approx. 5 m thick.* Large mastaba over with mud-brick walls 4.5 m thick* and sand and rubble core.

Tomb statistics: Substructure: Northern burial chamber 5 m long × ? wide × 1.3-1.5 m high.* Southern burial chamber 6.25 m long × ? m wide × 1.8 m high* Superstructure: Approx. 60 m long × 25 m wide.

Robbed: Yes, via access routes

References: Martin 1971: 2; 1974: 21–5.

***Scaled dimensions**

Catalogue No. 119

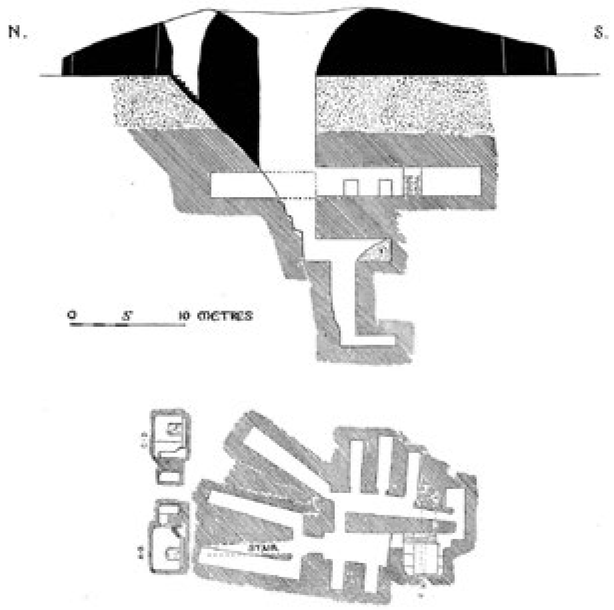


Illustration: Quibell 1913: Pl. II.

Identity: S 2405 (Hesyra)

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Deep stair/shaft, upper half mud-brick filled, lower found filled with loose rubble, obstructed by portcullis (broken) in grooved emplacement at its base. Beyond three levels of chambers. Burial chamber in upper level protected by rock and gravel roof between 7.9-8.2 m thick. From N-S passage magazine entrances originally concealed by plastered limestone blocking. Second and third levels protected by roofs 14.1 m and 22.5 m thick respectively. Solid mud-brick mastaba over, with complex offering niches and passage. Broken portcullis 1.6 m high × 1.2 m wide × 0.3 m thick. Estimated weight 1.25 tonnes.

Tomb statistics: Substructure: Upper level: 2.2-2.5 m high; mid level 1.9 m high; lower level 0.9 m high Superstructure: 43 m long × approx. 17.4 m wide × 5 m + high.

Robbed: Yes, via stair-shaft.

References: Quibell 1913: *passim*; Reisner 1936: 158-9; Porter and Moss 1974-81: 437–9; Jánosi 2006: 23-8.

Catalogue No. 120

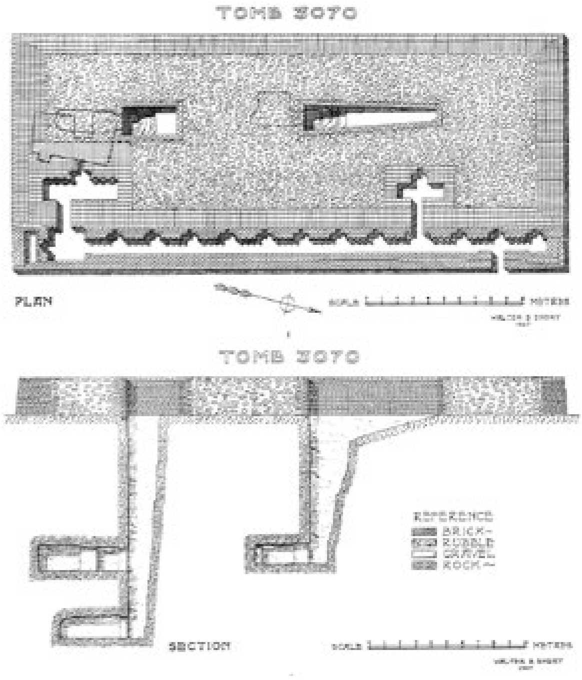


Illustration: Emery 1968: Pl. II

Identity: S 3070

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA-C + IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Twin mastaba. Northern: Slope to approx. 10.5 m deep* shaft with burial chamber at base. Rock roof over burial chamber approx. 8.7 m* thick. Southern. Shaft 15.1 m deep* with two burial chambers. One at base of shaft, the floor of the upper approx. 11 m* down from surface. Rock roof over upper burial chamber approx. 8.7 m* thick; over lower chamber approx. 13.5 m thick* Mud-brick mastaba over, mud-brick walls 1.3-1.7 m thick* with rubble core.

Tomb statistics: Substructure: Northern chamber approx. 3.2 m long × 2.2 m wide × 1.75 m high* Southern upper chamber approx. 1.6-1.8 m high*; lower approx. 3.5 m long × 1.5 m wide × 1.5 m high* Superstructure: 35.5 m long × 16 m wide.

Robbed: Yes, via access routes.

References: Reisner 1936: 166; Emery 1968: 11-3; Jánosi 2006: 30.

***Scaled dimensions**

Catalogue No. 121

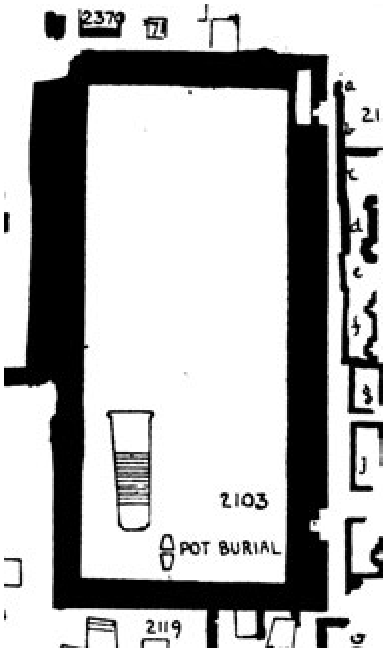


ILLUSTRATION: ILLUSTRATION: QUIBELL 1923: PL. I.

Identity: S 2103

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Stair-shaft leading to in situ portcullis (dimensions unknown) in unknown emplacement obstructing entrance to rock-cut burial chamber. Mud-brick mastaba with walls approx. 1-1.5 m thick* and internal gravel core.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 20.7 m long × 10.1 m wide.

Robbed: Yes, entry forced round portcullis

References: Quibell 1923: 17; Reisner 1936: 160.

Catalogue No. 122

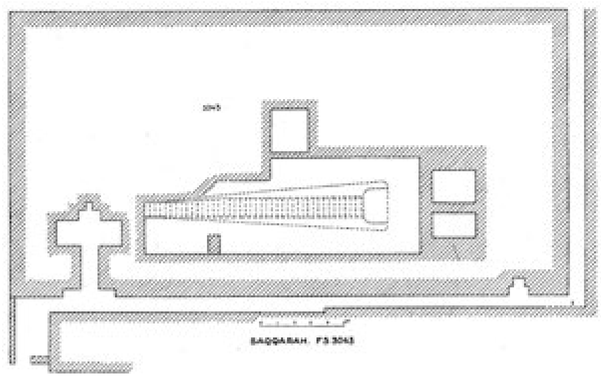


ILLUSTRATION: REISNER 1936: FIG. 72.

Identity: S 3043

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Stair-shaft 6.5 m long × ? deep leads to six room substructure of unknown layout.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 33.5 m long × 17 m wide.

Robbed: ?

References: Reisner 1936: 155-6.

***Scaled dimensions**

Catalogue No. 123

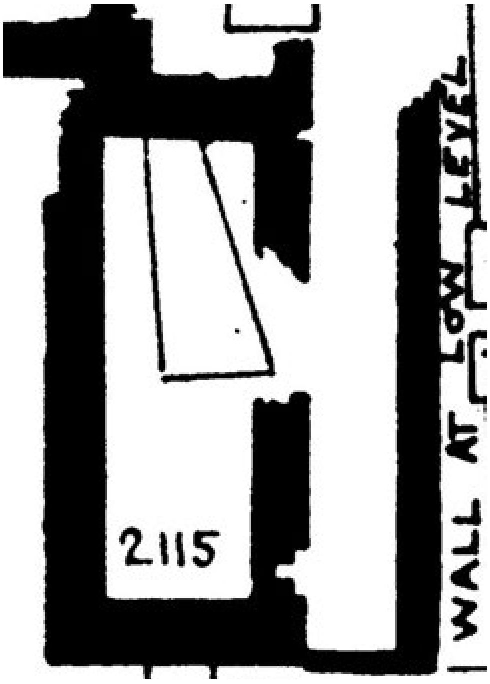


ILLUSTRATION: QUIBELL 1923: PL. I

Identity: S 2115

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Stair-shaft 4.6 m deep to burial chamber. Mud-brick mastaba over with walls approx. 0.75 m thick*

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 8.3 m long × 3.6 m wide.

Robbed: ?

References: Quibell 1923: 21; Reisner 1936: 161

Catalogue No. 124

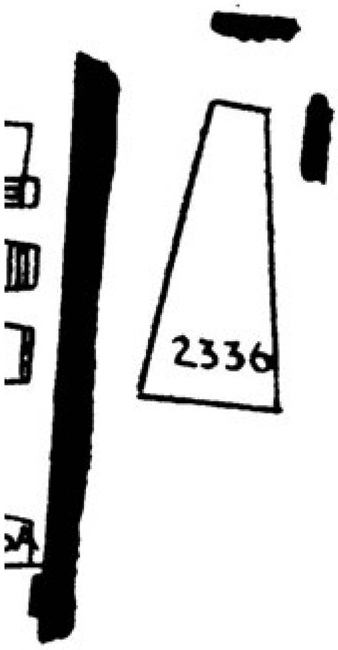


ILLUSTRATION: QUIBELL 1923: PL. I.

Identity: S 2336

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Stair 5.2 m long with shaft 4.75 m deep to substructure. Mud-brick mastaba over.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 11.95 m long × 4.48 m wide.

Robbed: ?

References: Quibell 1923: 25; Reisner 1936: 161.

***Scaled dimensions**

Catalogue No. 125

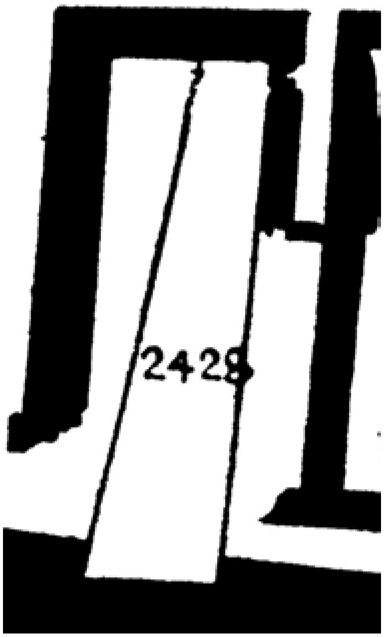


Illustration: Quibell 1923: Pl. II.

Identity: S 2428

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Stair-shaft 8.5 m long to portcullis found in situ (no dimensions as broken up by excavators), burial chamber unusually under stair, thus keeping it under footprint of superstructure? Mud-brick mastaba over.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 9.5 m long × 4.5 m wide.

Robbed: No

References: Quibell 1923: 40; Reisner 1936: 161.

Catalogue No. 126

Illustration: After Quibell 1923: Pls. II and XXX..

Identity: S 2407

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA-C + IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 'Twin tomb' 2 × No internal stair shafts. Northern 'L' shaped stair-shaft leads to unknown substructure. Southern stair-shaft 'f'' to portcullis (emplacement present, stone missing) obstructing access to rock-cut subterranean chambers at unknown depth. Large mud-brick mastaba over with approx. 3 m* thick walls, internal corridor to niches, and multiple internal magazines.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 55 m long × 27.5 m wide.*

Robbed: Yes

References:

Quibell 1923: 12 and 38; Reisner 1936: 157; Porter and Moss 1974-81: 439.

***Scaled dimensions**

Catalogue No. 127

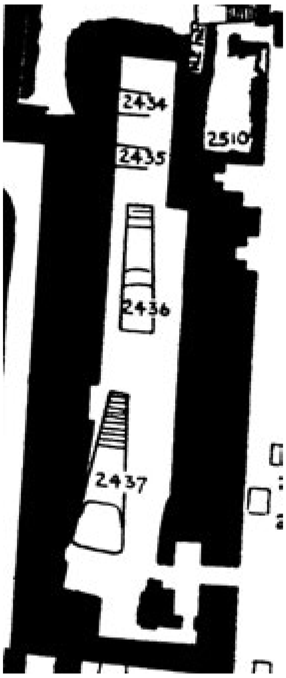


Illustration: Quibell 1923: Pl. II.

Identity: S 2436 + 2437

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA-C + IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Twin mastaba. Northern tomb: Stair-shaft 4.6 m long and 5 m deep to subterranean burial chamber Southern Tomb: Stair-shaft 6.2 m long of unknown depth. Mud-brick superstructure over with walls up to approx. 2.4 m thick* enclosing unknown core,

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 20.3 m long × 6.3 m wide.

Robbed: ?

References: Quibell 1923: 40; Reisner 1936: 160-1; Porter and Moss 1974-81: 440.

*Scaled dimensions

Catalogue No. 128

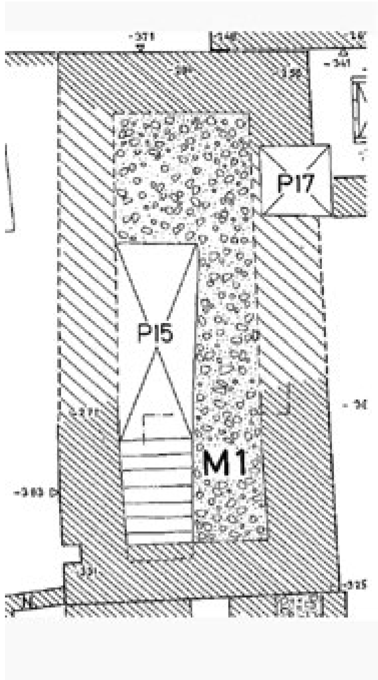


Illustration: Ghaly 1994: Abb. 1. Courtesy of F. Arnold, DAI Cairo.

Identity: M1

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Stair-shaft leads to subterranean burial chamber, mud-brick mastaba over with walls approx. 0.7-0.9 m thick* and rubble core.

Tomb statistics: Substructure: Burial chamber approx. 2.5 m long × 1.1 m wide* Superstructure: Approx. 7.25 m long × 3.75 m wide*

Robbed: ?

References: Ghaly 1994: 57-69.

*Scaled dimensions

Catalogue No. 129

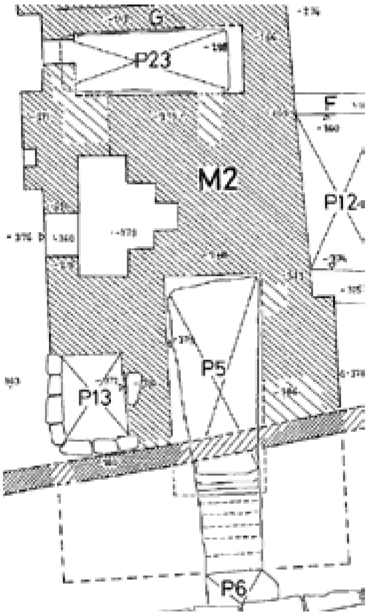


ILLUSTRATION: GHALY 1994: ABB. 1. COURTESY OF F. ARNOLD, DAI CAIRO.

Identity: M2

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Backfilled stair shaft (concealed by mastaba) leads to subterranean burial chamber 6 m deep with mud-brick blocking. Solid mud-brick mastaba over. Secondary burial in shaft at base of offering niche.

Tomb statistics: Substructure: Burial chamber approx. 3 m long × 2.5 m wide* Superstructure: Approx. 9.5 m long × 4.5 m wide*

Robbed: Yes

References: Ghaly 1994: 57-69.

***Scaled dimensions**

Catalogue No. 130

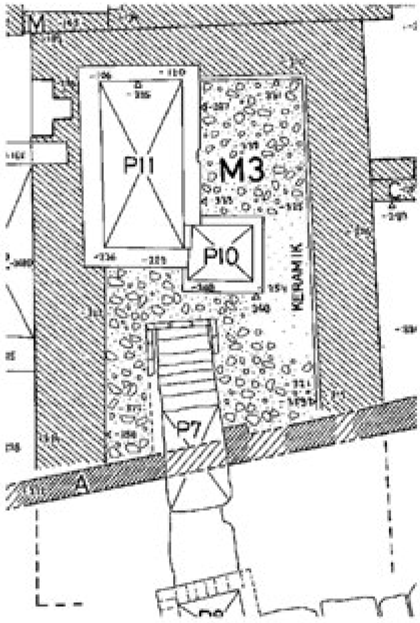


ILLUSTRATION: GHALY 1994: ABB. 1. COURTESY OF F. ARNOLD, DAI CAIRO.

Identity: M3

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Stair-shaft concealed by mastaba leads to subterranean burial chamber, mud-brick mastaba over with walls approx. 1 m thick* and rubble core.

Tomb statistics: Substructure: Burial chamber approx. 1.5m long × 1 m wide* Superstructure: Approx. 8.5 m long × 5 m wide*

Robbed: Yes

References: Ghaly 1994: 57-69.

***Scaled dimensions**

Catalogue No. 131

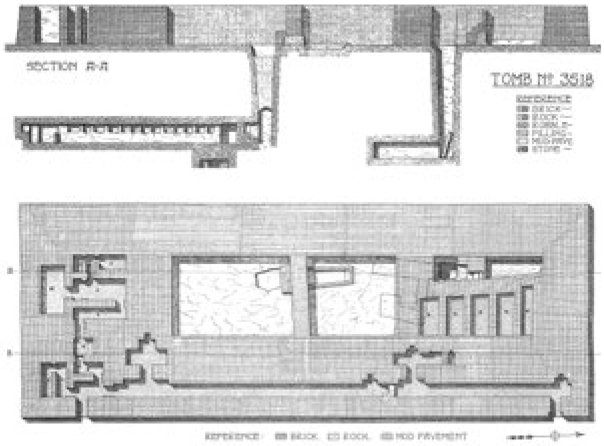


Illustration: Emery 1970: Pl. XX. Courtesy of The Egypt Exploration Society.

Identity: S 3518.

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIC + IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Twin shafts to substructure. Southern shaft 9.3 m deep* backfilled with rubble, connects to upper baboon galleries. Northern shaft 10.6 m deep to burial chamber obstructed by freestanding portcullis and protected by 9 m thick rook roof. Mud-brick mastaba over with walls 4.5-5 m thick and rubble core? Portcullis approx. 2.5 m long × 1.5 m wide (assuming same width as shaft) × 0.3 m thick.* Estimated weight 2.42 tonnes.

Tomb statistics: Substructure: Northern burial chamber: 6 m long × 1. 5 m wide × 1.5 m high plus eastern extension. Superstructure: 52 m long × 19 m wide.

Robbed: Yes, northern via shaft, southern by upper baboon galleries

References:

Emery 1970: 10; 1971: 1 and 3-4; Porter and Moss 1974-81:

448; Jánosi 2006: 28-9.

***Scaled dimensions**

Catalogue No. 132

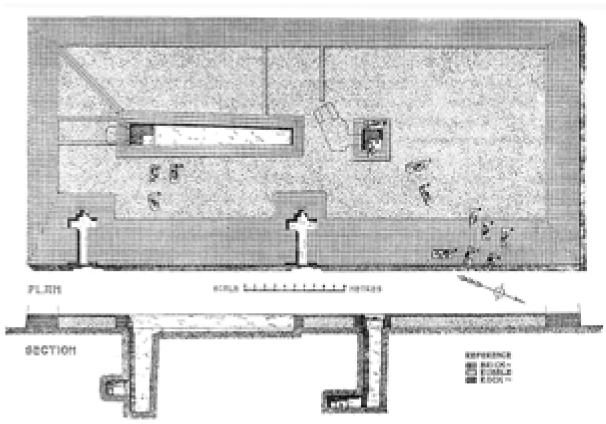


Illustration: Emery 1966: Fig. 3. Courtesy of The Egypt Exploration Society.

Identity: S 3517

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIC + IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Twin mastaba . Southern shaft approx. 8.5 m deep to burial chamber set 6.5 m down shaft, with 5.25 m thick rock roof.* Southern shaft approx. 8 m deep to burial chamber with 6.75 m thick rock roof.* Mud-brick mastaba over with walls 2.5–4.5 m thick* filled with rubble core.

Tomb statistics: Substructure: Southern burial chamber approx. 1.8 m long × 1.7 m wide × 1.4 m high* Northern, approx. 5 m long × 2.5 m wide × 1.1 m high*

Superstructure: Approx. 55 m long × 25 m wide.*

Robbed: Yes, via shafts

References: Emery 1966: 7; Jánosi 2006: 31, Abb. 25.

***Scaled dimensions**

Catalogue No. 133

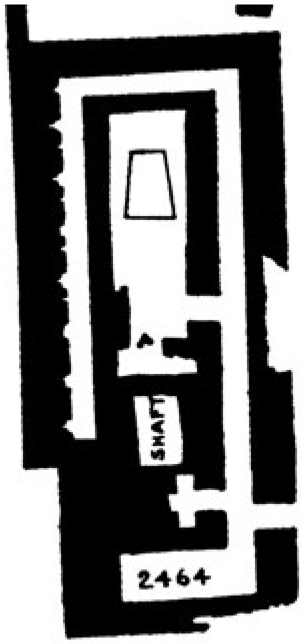


ILLUSTRATION: QUIBELL 1923: PL. II.

Identity: S 2464

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Unknown

Security Features: 10.4 m deep shaft leading to two burial chambers, one north and one south. Mud-brick mastaba over with unknown core surrounding internal corridor.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: Approx. 18.5 m long × 7 m wide*

Robbed: ?

References: Quibell 1923: 42.

***Scaled dimensions**

Catalogue No. 134

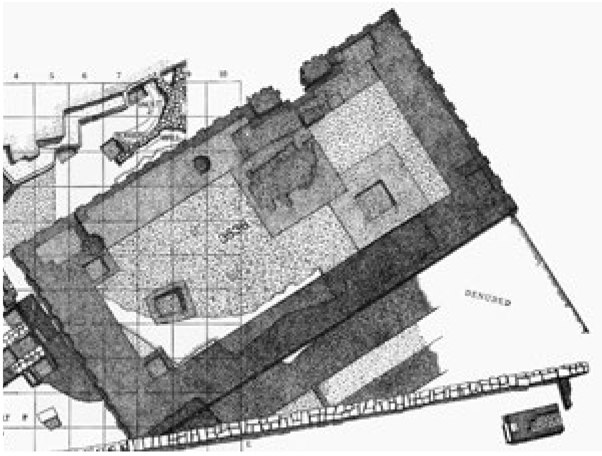


ILLUSTRATION: SMITH & JEFFREYS 1977: FIG. 1. COURTESY OF THE EGYPT EXPLORATION SOCIETY.

Identity: S 3536

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIC + IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Unknown

Security Features: Twin mastaba with two shafts -details of substructure unknown. Mud-brick mastaba over with walls 2.5-3 m thick* and rubble and sand core.

Tomb statistics: Substructure: Dimensions N/A.

Superstructure: 26 m long × 13.5 m wide*

Robbed: Yes

References: Smith & Jeffreys 1977: 22.

***Scaled dimensions**

Catalogue No. 135

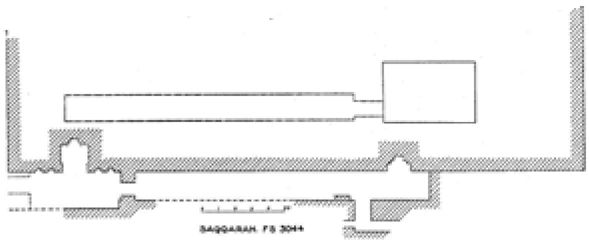


ILLUSTRATION: REISNER 1936: FIG. 78.

Identity: S 3044

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Shaft of unknown depth with mouth 5 m long × 3 m wide to burial 'corridor'. Mud-brick mastaba over with unknown wall thickness and core.

Tomb statistics: Substructure: Burial chamber 17m long × 1.5 m wide.

Superstructure: 35 m long × 17.3 m wide.

Robbed: ?

References: Reisner 1936: 167-8.

Catalogue No. 136

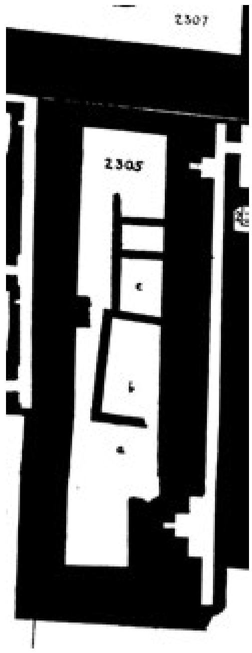


ILLUSTRATION: QUIBELL 1923: PL. I.

Identity: S 2305

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIC + IIC + IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 3 × No. shafts to unknown substructures. Northern shaft 4 m deep to top of portcullis (emplacement and stone details unknown). Mud-brick mastaba with walls 3-3.5 m thick,* and unknown core External corridor to offering niches. Within core of mastaba internal 'tank' magazines.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: approx. 35.5 m long × 12.5 m wide.*

Robbed: ?

References: Quibell 1923: 30; Reisner 1936: 171.

***Scaled dimensions**

Catalogue No. 137

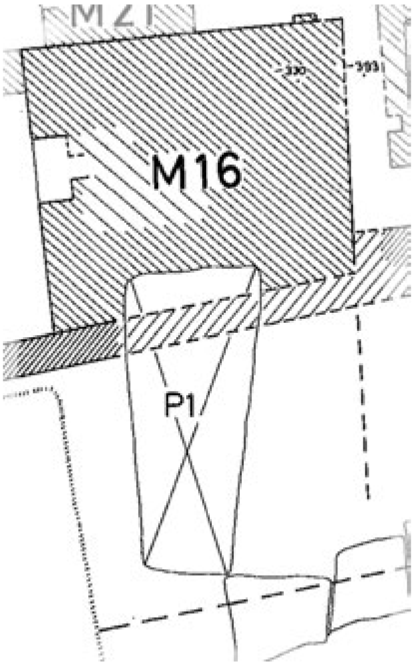


Illustration: Ghaly 1994: Abb.1. Courtesy of F. Arnold, DAI Cairo.

Identity: M16

Location: Saqqara

Period: Dynasty 3

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 3 m shaft filled with a backfill of limestone chips, broken bricks and brick dust, solid mud-brick mastaba over.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: Approx. 5.7 m long × 3.3 m wide.*

Robbed: ?

References: Ghaly 1994: 59.

***Scaled dimensions**

Catalogue No. 138

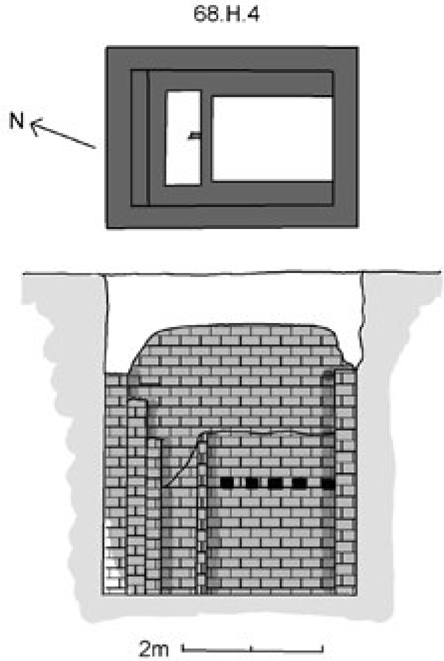


Illustration: Drawn by the author after Saad 1951: Plan 5.

Identity: 68.H.4

Location: Helwan

Period: Dynasty 1, Naqada IIIC1-2

Substructure Type: IC

Liner: Mud-brick **Thickness:** 0.3-0.35 + 0.4 m

Superstructure: No

Footprint O/H: N/A

Security Features: Pit cut into gravel. Lined with mud-brick walls 0.30-0.35 m thick, with second layer 0.4 m thick forming ledges 1.6 m above the pit's floor on long sides to support roof. Recessed wooden roof supporting a 2 m deep gravel backfill.

Tomb statistics: Substructure: Pit approx. 3.6 m long × 2.6 m wide × 3.6 m deep* Burial chamber 2.5 m long × 1.2 m wide × 1.6 m deep.

Robbed: Yes

References: Saad 1951: 7.

***Scaled dimensions**

Catalogue No. 139

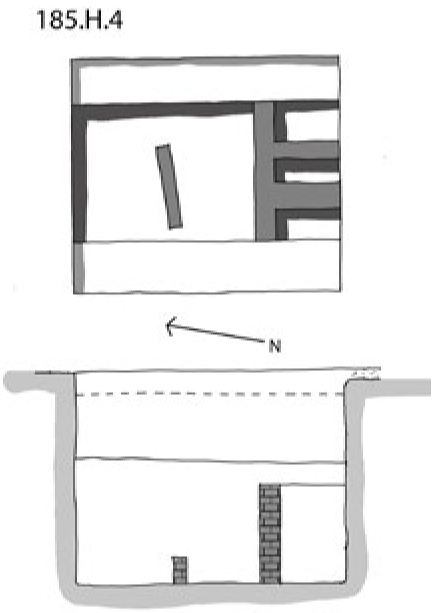


Illustration: Drawn by the author after Saad 1951: Plan 6.

Identity: 185.H.4

Location: Helwan

Period: Dynasty 1, Naqada IIICI-2

Substructure Type: IC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Unlined gravel cut pit with three internal magazines formed by mud-brick dividers. Roof beams rest on 0.7 m ledges 2.2 m high and support recessed wooden roof with 1.9 m depth of gravel backfill.*

Tomb statistics: Substructure: Pit approx. 5 m × 4.3 m × 4.1 m deep*

Burial chamber 3.4 m long × 2.5 m wide × 2.2 m deep.

Robbed: Yes

References: Saad 1951: 7-8.

***Scaled dimensions**

Catalogue No. 140

Illustration: Saad 1969: Pl. 11. Copyright 1969 University of Oklahoma Press. Reproduced with permission. All Rights reserved.

Identity: 423.H.9

Location: Helwan

Period: Dynasty 1, Naqada IIIC2, Den

Substructure Type: IC

Liner: Mud-brick **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: Approx. 11.5 m

Security Features: Mud-brick pit substructure with four magazines and burial chamber covered with stone slab roof (supported by wood?). Large mud-brick mastaba with 2.5 m thick walls filled with gravel core?. External enclosure wall.

Tomb statistics: Substructure Approx. 7 m long (allowing for magazines 1.3 m at either end × 2.1 m wide × 3.8 m deep. Burial chamber 4.1 m long × 2.1 m wide × 3.8 m deep.

Superstructure Approx. 40 m long × 25 m wide

Robbed: Yes, via three lateral tunnels.

References: Saad 1969: 22-4.

***Scaled dimensions**

Catalogue No. 141

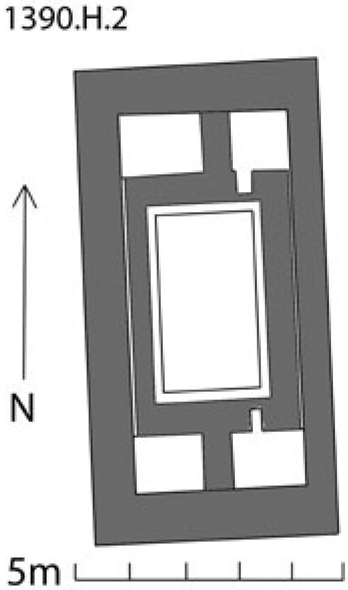


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER SAAD 1947: MAP 3.

Identity: 1390.H.2 (actually 1389.H.2)

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: IC Stone tomb

Liner: Stone and mud-brick **Thickness:** Stone slabs 0.2 m

Superstructure: No

Footprint O/H: N/A

Security Features: Pit tomb lined with mud-brick walls and subdivided into four magazines and burial chamber. Burial chamber lined with massive stone slabs 2.5 m × 0.8 m × 0.2 m thick. Presumably closed with a wooden roof and gravel backfill?

Tomb statistics: Dimensions: Approx. 9.5 m long × 4.8 m* Burial chamber 4 m long × 2.5 m wide ×1.6 m deep*

NB Scaled dimensions from 1: 400 necropolis plan (Saad 1947: map 3) and from the photograph of the slabs.

Robbed: Yes

References: Saad 1969: 22-4, pl. 16.

***Scaled dimensions**

Catalogue No. 142

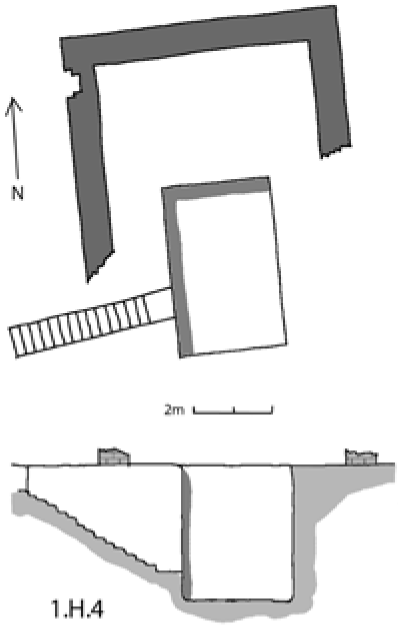


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER SAAD 1951: PLAN 3.

Identity: 1.H.4

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: 2.1 m*

Security Features: Access via gravel cut stairs to gravel cut unlined burial chamber with roof supported by beams. Mud-brick mastaba with 0.75 m thick* walls over.

Tomb statistics: Substructure: Pit 4.3 m long × 2.6 m wide × 3.4 m deep. Superstructure: ??? m long × 7 m wide*

Robbed: Yes

References: Saad 1951: 5-6.

***Scaled dimensions**

Catalogue No. 143

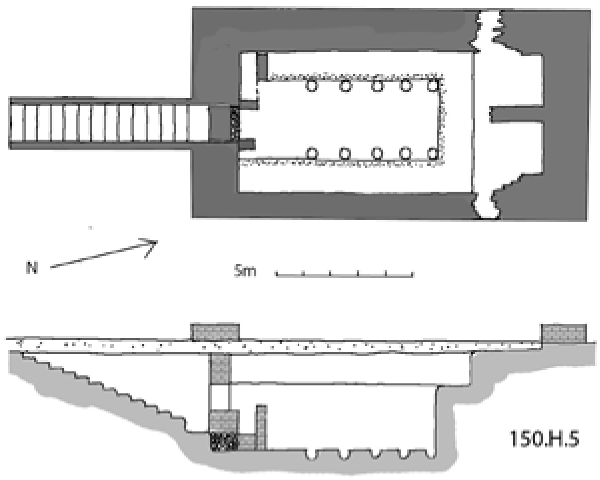


Illustration: Drawn by the author after Saad 1951: Plan 15.

Identity: 150.H.5

Location: Helwan

Period: Dynasty 1, Naqada IIIC2

Substructure Type: ID

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: 2 m*

Security Features: External gravel cut steps to mud-brick blocking. Gravel cut pit with 0.5 m ledges 2.2 m up from base of pit. Additional wooden posts to support beams and wooden roof and gravel fill 2 m thick. Mud-brick mastaba over with walls 0.9-1.5 m thick* with gravel fill?

Tomb statistics: Substructure: Pit approx. 8.5 m long × 5.2 m wide × 4.2 m deep* Burial chamber 7.5 m long × 3.2 m wide × 2.2 m deep. Superstructure: 14.8 m long × 7.2 m wide.

Robbed: Yes

References: Saad 1951: 28-9.

***Scaled dimensions**

Catalogue No. 144

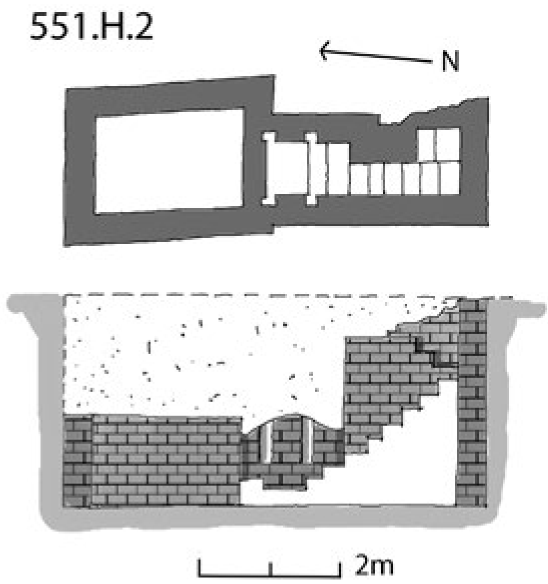


Illustration: Drawn by the author after Saad 1947: Pl. XXXVI.

Identity: 553.H.2

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.4 m

Superstructure: No

Footprint O/H: N/A

Security Features: Mud-brick lined stairs with 180 degree turn descending to mud-brick lined passage obstructed by two portcullises (emplacement present, stones missing). Gravel cut burial chamber lined with mud-brick walls. Wood roof with gravel backfill? Of unknown depth.

Tomb statistics: Substructure: Pit approx. 3 m long × 2.2 m wide × 3 m deep* Burial chamber: Approx. 2.1 m long × 1.4 m wide.*

Robbed: Yes

References: Saad 1947: 107.

***Scaled dimensions**

Catalogue No. 145

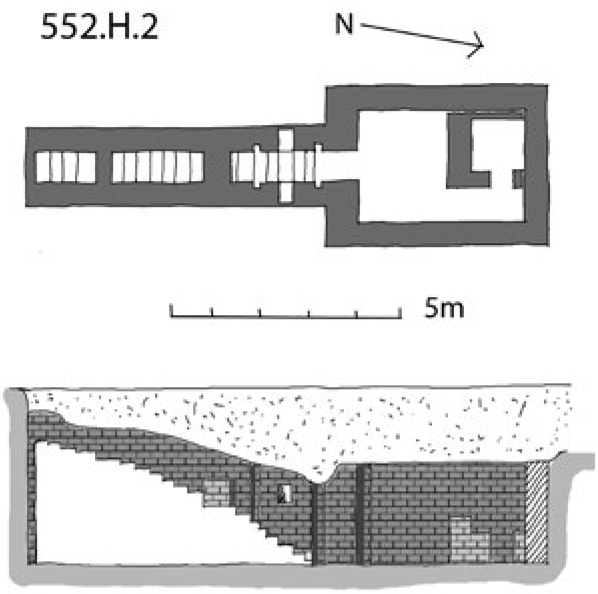


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER SAAD 1947: PL. XXXVII.

Identity: 559.H.2

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.5-0.7 m

Superstructure: No

Footprint O/H: N/A

Security Features: Mud-brick lined mud-brick stairs blocked by two portcullises either side of flanking magazine niches (emplacement present, stones missing) leading to mud-brick lined burial chamber. Internal mud-brick room, pit closed with wood roof and gravel fill possibly 1.3 m depth?

Tomb statistics: Substructure: Pit approx. 4.8 m long × 3.5 m wide × 3.8 m deep* Burial chamber: Approx. 3.6 m long × 2.4 m wide × 2.5 m deep*

Robbed: Yes

References: Saad 1947: 107-8.

***Scaled dimensions**

Catalogue No. 146

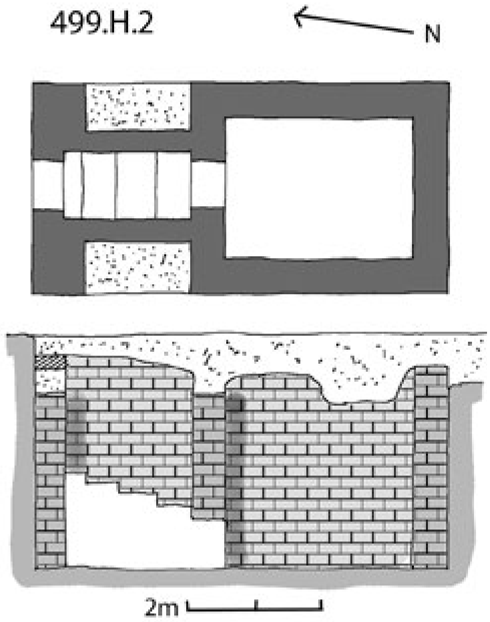


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER SAAD 1947: PL. XLI.

Identity: 499.H.2

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.5 m

Superstructure: No

Footprint O/H: N/A

Security Features: Stairs to portcullis (missing) fitted in 'opening made for portcullis' (Saad 1947: Pl. XLI) obstructing entrance to gravel cut mud-brick lined burial chamber closed by wooden roof and gravel backfill of unknown dimensions.

Tomb statistics: Substructure: Pit Approx. 3.8 m long ×3.1 m wide × 3.4 m deep* Burial chamber 2.75 m long × 2.1 m wide × 3 m deep.*

Robbed: ?

References: Saad 1947: Pl. XLI.

***Scaled dimensions**

Catalogue No. 147

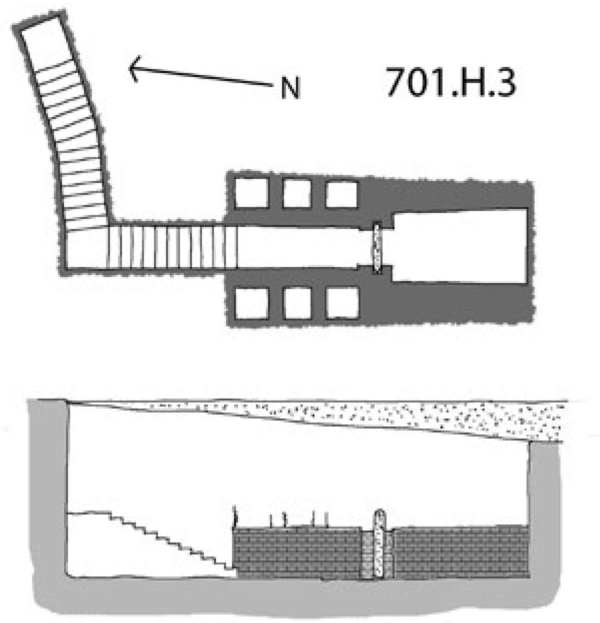


Illustration: Drawn by the author after Saad 1947: Pl. LXVI

Identity: 701.H.3

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: 'L' shaped gravel cut staircase to mud-brick passage with magazine storage. Portcullis (of unknown size) in grooved emplacement obstructs access to gravel cut pit with mud-brick lined burial chamber. Wood roof with gravel fill over?

Tomb statistics: Substructure: Pit approx. 9 m long × 4.7 m wide × 5.4 m deep* Burial chamber: Approx. 4 m long × 2.2-2.54 m wide.* NB. Scaled from 1:200 necropolis plan (Saad 1951: Pl. 1) and tomb drawing, which lacks graphic scale.

Robbed: Yes

References: Saad 1947: 173; 1951: Pl. 1.

***Scaled dimensions**

Catalogue No. 148

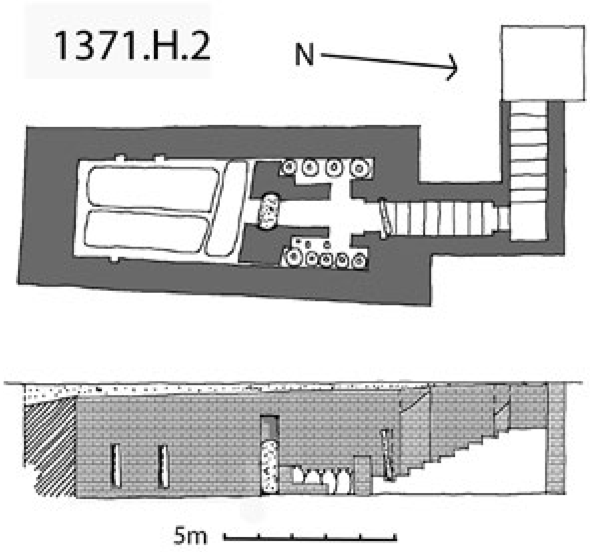


Illustration: Drawn by the author after Saad 1947: Pl. XXXVIII.

Identity: 1371.H.2

Location: Helwan

Period: Dynasty 1, Naqada IIIC2, reign of Adjib

Substructure Type: ID, with stone floor

Liner: Mud-brick **Thickness:** 1-1.7 m

Superstructure: No

Footprint O/H: N/A

Security Features: 'L' shaped stairs to portcullis obstructing passage. Beyond doorway to burial chamber obstructed by stone slab/portcullis. Gravel cut burial chamber lined with mud-brick walls. Stone slab floor. Closed with wooden roof and backfill? Of unknown depth. Portcullises: 1 × No. 1.7 m high × 1 m wide × 0.15 m thick* 1 × No. 1.8 m high × 1.05 m wide × 0.55 m thick* Estimated weight 0.55 and 2.23 tonnes respectively.

Tomb statistics: Substructure: Pit approx. 12.5-13 m long × 5-5.7 m wide × 3.8 m deep* Burial chamber approx. 5.3-5.7 m long × 3-3.4 m wide*

Robbed: Yes

References: Saad 1947: 109-10.

***Scaled dimensions**

Catalogue No. 149

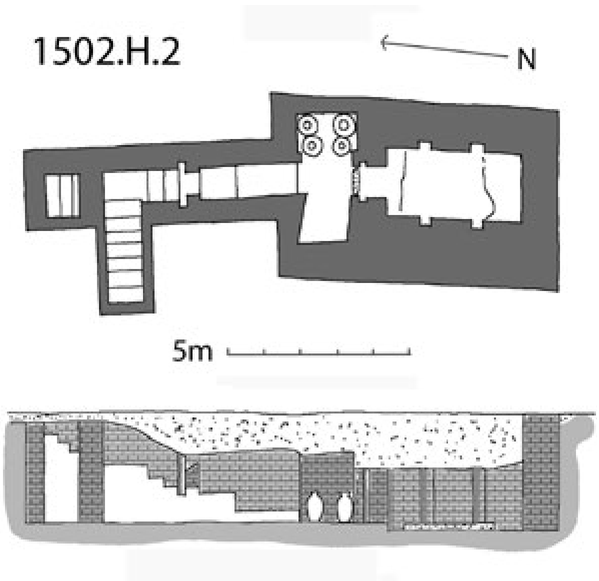


Illustration: Drawn by the author after Saad 1947: Pl. XL.

Identity: 1502.H.2

Location: Helwan

Period: Dynasty 1, Naqada IIIC2

Substructure Type: ID

Liner: Mud-brick **Thickness:** 1-1.7 m*

Superstructure: No

Footprint O/H: N/A

Security Features: 'L' shaped mud-brick lined staircase to portcullis obstructing entrance to passage (emplacement present, stone missing) with flanking magazines. Beyond limestone portcullis found in situ (size unknown) in grooved emplacement obstructing entrance to burial chamber. Burial chamber with massive mud-brick walls stone slab floor and wooden beams supporting roof and backfill of unknown depth.

Tomb statistics: Substructure: Pit 7.7-8 m long × 5 m wide × 3.25 m deep* Burial chamber internal approx. 3.7 m long × 1.9 m wide*.

Robbed: Yes

References: Saad 1947: 110-1.

***Scaled dimensions**

Catalogue No. 150

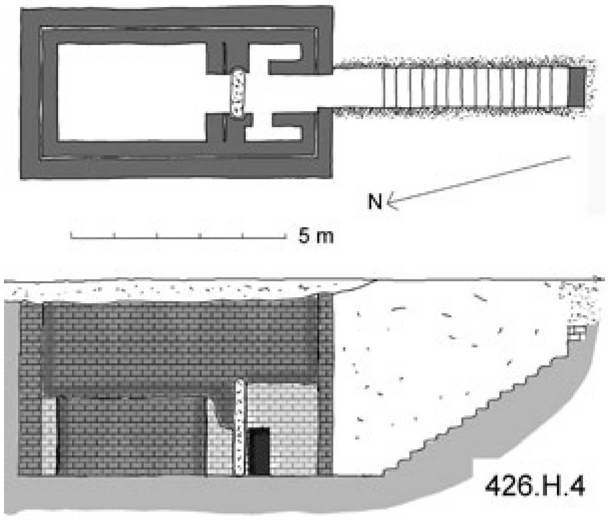


Illustration: Drawn by the author after Saad 1951: Plan 10.

Identity: 426.H.4

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.8 m

Superstructure: No

Footprint O/H: N/A

Security Features: Back-filled steps in gravel lead to passage with flanking magazines. Limestone portcullis set in mud-brick emplacement obstructs entrance to mud-brick lined burial chamber with two skins of mud-brick walls. Recessed wooden roof supported by beams, rubble fill approx. 2.5 m deep to surface. Portcullis 2.3 m high × 1.15 wide × 0.3 m thick* Estimated weight approx. 1.71 tonnes.

Tomb statistics: Substructure: Approx. 7.3 m long × 4 m wide × 4.6 m deep* Burial chamber 3.5 m long × 2.35 m wide × 2.1 m high.

Robbed: Yes

References: Saad 1951: 12-3.

***Scaled dimensions**

Catalogue No. 151

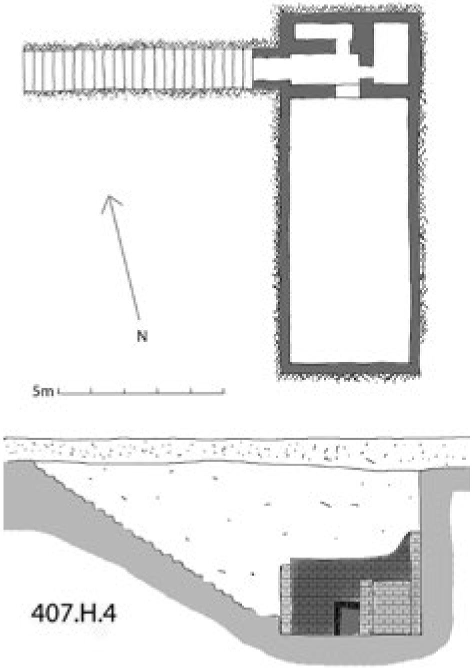


Illustration: Drawn by the author after Saad 1951: Plan 9.

Identity: 407.H.4

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.3 m*

Superstructure: No

Footprint O/H: N/A

Security Features: Back-filled? Steps in gravel lead to mud-brick blocked doorway, which opens to mud-brick magazines and burial chamber. Burial chamber lined with 0.3 m thick* mud-brick walls clad in wood. Closed with wooden roof supported by beams and rubble fill totalling 3.9 m deep*

Tomb statistics: Substructure: Pit approx. 10.9 m long × 4.3 m wide × 5.9 m deep* Burial chamber: 8.1 m long × 3.85 m wide × 2 m high.

Robbed: Yes

References: Saad 1951: 11-2.

***Scaled dimensions**

Catalogue No. 152

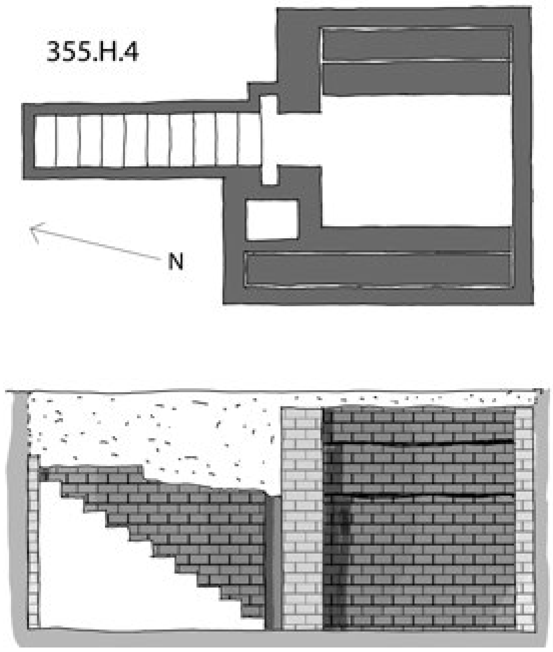


Illustration: Drawn by the author after Saad 1951: Plan 7

Identity: 355.H.4

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.25-1 m*

Superstructure: No

Footprint O/H: N/A

Security Features: Rubble filled gravel cut and mud-brick lined staircase blocked by portcullis (emplacement present, stone missing). Gravel cut pit with mud-brick lining. Two recessed wooden roofs supported on ledges at 1.7 m and 2.4 m from floor with approx. 0.5 m gravel fill over.

Tomb statistics: Substructure: Pit approx. 3.4-4 m long × 3.8 m wide × 3.1 m deep* Burial chamber: 2.5 m long × 1.9 m wide × 2.9 m deep.

Robbed: Yes

References: Saad 1951: 8-9.

***Scaled dimensions**

Catalogue No. 153

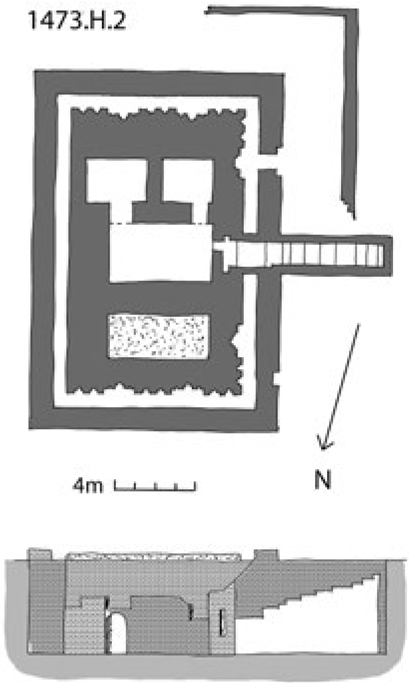


Illustration: Drawn by the author after Saad 1947: Pl. XXXIX.

Identity: 1473.H.2

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 1.5-2 m*

Superstructure: Yes

Footprint O/H: 1.5 m*

Security Features: External staircase with portcullis obstructing entrance (emplacement present, stone missing) to gravel cut mud-brick lined burial chamber. Internal magazines at high level. Wood roof? Mud-brick mastaba with walls 1.5-2.5 m thick and gravel core.

Tomb statistics: Substructure: Pit overall dimensions unknown. Burial chamber: Internal Approx. 5 m long × 3 m wide × 5 m deep* Superstructure: Approx. 14 m long × 8.5 m wide.*

Robbed: Yes

References: Saad 1947: 110; Emery 1961: 147.

***Scaled dimensions**

Catalogue No. 154

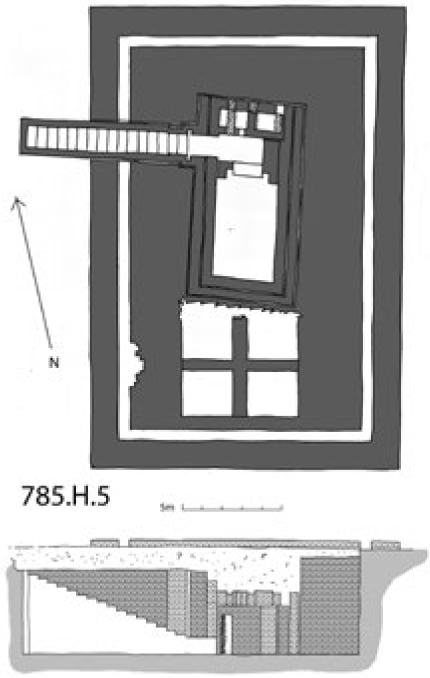


Illustration: Drawn by the author after Saad 1969: Pl. 9.

Identity: 785.H.5

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 1.1 m

Superstructure: Yes

Footprint O/H: 3 m*

Security Features: External staircase to portcullis in grooved emplacement (stone missing) obstructing entrance to gravel cut and mud-brick lined burial chamber. Two layers of magazines in substructure. Wooden roof over stairs, magazines and burial chamber ‘made of huge blocks of timber’. Large mud-brick mastaba over with walls 0.75-3 m thick enclosing 14 internal magazines. Surrounding enclosure wall.

Tomb statistics: Substructure: Pit approx. 10 m long × 5.4 m wide × 5.4 m deep* Burial chamber: 5.2 m long × 3.2 m wide × 2.7 m high. Superstructure: 20 m long × 12 m wide.

Robbed: Yes

References: Saad 1969: 20-2.

***Scaled dimensions**

Catalogue No. 155

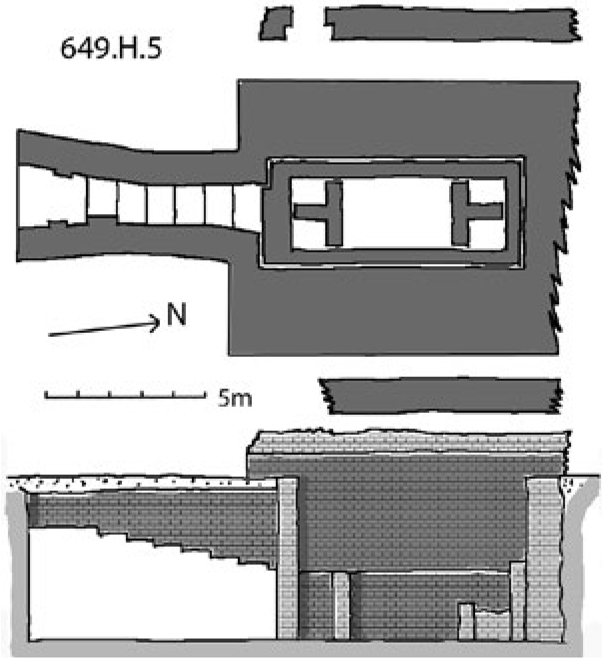


Illustration: Drawn by the author after Saad 1951: Plan 16.

Identity: 649.H.5

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.5 m*

Superstructure: Yes

Footprint O/H: 2m?

Security Features: External mud-brick lined staircase to gravel cut pit with mud-brick lined burial chamber and magazines. Internally either single roof with rubble fill 2.7 m deep or double roofed to form magazine. Mud-brick mastaba over with walls approx. 1.5–2.75 m thick.* Surrounding enclosure wall .

Tomb statistics: Substructure: Approx. 8.5 m + long × 3.3 m wide × 5 m deep* Burial chamber 3.3 m long × 2.1 m wide × 2.3 m deep. Superstructure: Approx. 8.5 m wide × 10.2 m + long*

Robbed: Yes

References: Saad 1951: 41.

***Scaled dimensions**

Catalogue No. 156

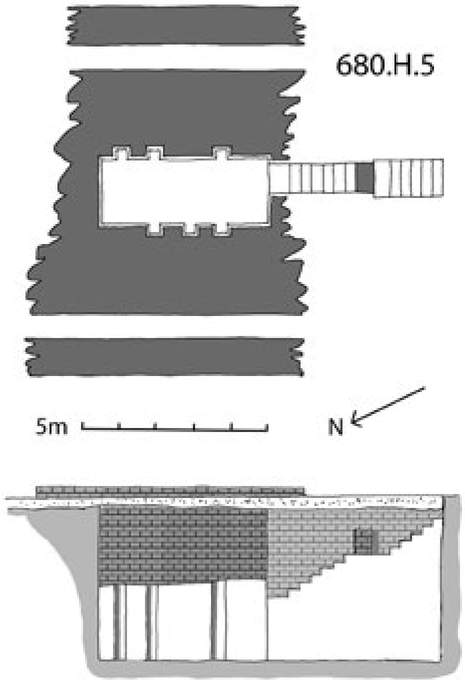


Illustration: Drawn by the author after Saad 1951: Plan 17.

Identity: 680.H.5

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.3 m

Superstructure: Yes

Footprint O/H: N/A

Security Features: External gravel cut staircase to burial chamber cut in 'soft rock'. Ledges 0.3 m wide to support beams for wood roof. Mud-brick liners above ledges. Mud-brick mastaba with side walls 2.4 m thick.* Enclosure wall.

Tomb statistics: Substructure: Pit dimensions unascertainable. Burial chamber 4.5 m × 1.75 m wide × 4.4 m deep* Superstructure: ? long × 6.5 m wide*

Robbed: Yes

References: Saad 1951: 42.

***Scaled dimensions**

Catalogue No. 157

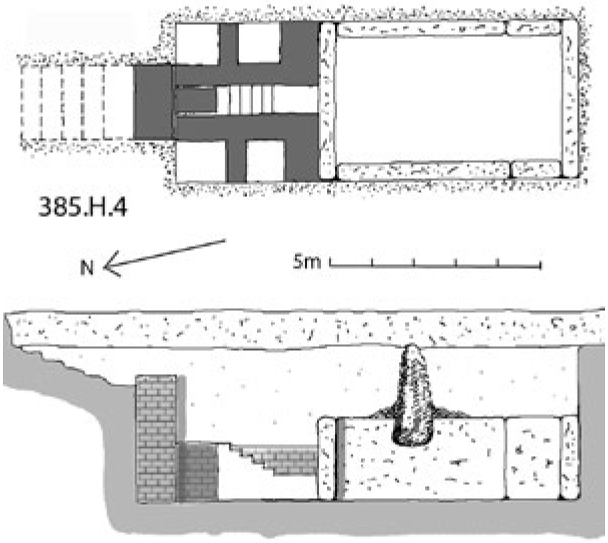


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER SAAD 1951: PLAN 8.

Identity: 385.H.4

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID stone tomb

Liner: Stone **Thickness:** 0.4 m

Superstructure: No

Footprint O/H: N/A

Security Features: Gravel slope leads to mud-brick steps flanked by two magazines. No doorway to burial chamber. Gravel cut burial chamber lined with enormous limestone slabs 4 m long × 2 m wide × 0.4 m thick. Probably roofed with stone slabs and rubble fill to ground level. Approx. 2.25 m deep.

Tomb statistics: Substructure: Pit approx. 9.6 m long × 4 m wide × 4.25 m deep* Burial chamber: 5.22 m long × 4 m wide × 2 m deep

Robbed: Yes, through tunnel through east side.

References: Saad 1951: 9-10: 1969: 29-32.

***Scaled dimensions**

Catalogue No. 158

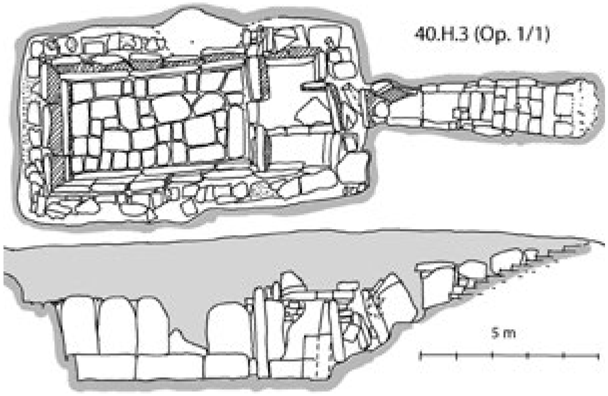


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER KÖHLER 2005: PL. 13.

Identity: 40.H.3 (Op. 1/1 Köhler)

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID stone tomb

Liner: Stone **Thickness:** Varies

Superstructure: Yes

Footprint O/H: N/A

Security Features: Stone lined staircase with stone steps to stone lined passage. Entrance obstructed by 2 × No. portcullises obstructing way to stone lined magazines and burial chamber with stone floor. Probably wooden roof supported by beams. Mud-brick superstructure over? Portcullises: 2 × No. 1 m high (broken) × 1.15 m wide × 0.3 m thick. Estimated weight if slabs were complete at 2 m high to be approx. 1.48 tonnes each.

Tomb statistics: Substructure: Pit approx. 10 m long × 5 m wide × 4 m deep* Burial chamber: 4.9 m long × 2.5 m wide × 2.35 m high. Superstructure: Estimated at 20 m long × 10 m wide.

Robbed: Yes

References: Saad 1951: 164–6, Köhler 1998: 65-72; 2005: 20-30.

***Scaled dimensions**

Catalogue No. 159

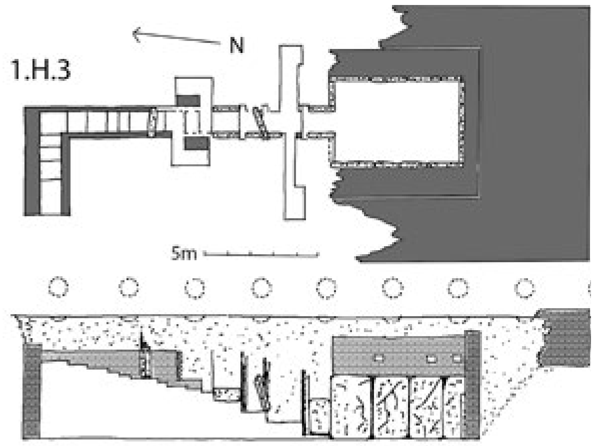


Illustration: Drawn by the author after Saad 1947: Pl. LXI.

Identity: 1.H.3

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID stone tomb

Liner: Stone and mud-brick **Thickness:** 0.2 m /0.6-1.2m

Superstructure: Yes

Footprint O/H: Approx. 3 m*

Security Features: L' shaped mud-brick and stone lined staircase, with stone step. Three portcullises in grooved emplacements before magazines, and one before burial chamber (two stones in situ). Gravel cut mud-brick and stone lined burial chamber. Lined with limestone slabs approx. 2.7 m high × 0.2 m thick.* Wooden roof supported by beams and approx. 1.7 m backfill.* Mud-brick mastaba over with walls (where present) 2m + thick.*

Tomb statistics: Substructure: Pit approx. 7.5 m long × 6.5 m wide × 5.4 m deep* Burial chamber approx. 5.7 m long × 3.9 m wide × 2.75 m deep* Superstructure: Approx. 11 m wide × ??? long.

Robbed: Yes, burnt.

References: Saad 1947: 163-4, Pls. LXI, LXVII-LXVIII.

***Scaled dimensions**

Catalogue No. 160

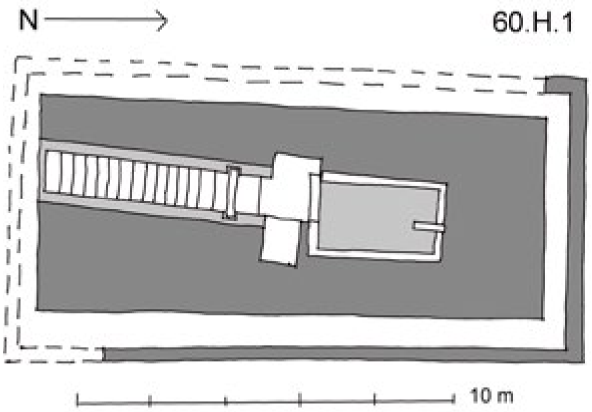


Illustration: Drawn by the author after Saad 1947: Pln.2 and Köhler 2008b: Fig. 8b.

Identity: 60.H.1

Location: Helwan

Period: Dynasty 1, Naqada IIID

Substructure Type: ID stone tomb

Liner: Stone **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Approx. 2.75 m*

Security Features: Mud-brick staircase entirely concealed within superstructure, leads to two portcullis stones found in situ (dimensions unknown). Stone lined burial chamber with stone slab roof 0.25 m thick and 0.4 m thick rubble fill over. Mud-brick mastaba over with surrounding enclosure wall.

Tomb statistics: Substructure: Pit dimensions not available. Burial chamber: approx. 3 m long × 2 m wide. Superstructure: Approx. 15 m long × 7.5 m wide*

Robbed: Yes

References: Saad 1947: 28; Köhler 2008b: 120; La Loggia 2009: 180.

***Scaled dimensions**

Catalogue No. 161

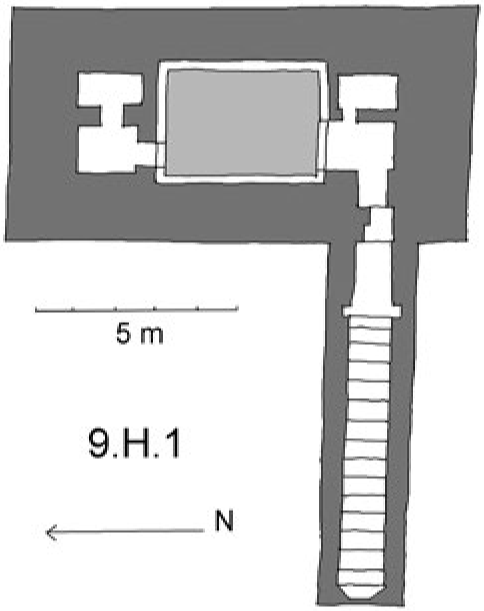


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER SAAD 1947: PLN. 2 AND KÖHLER 2008B: FIG. 8C.

Identity: 9.H.1

Location: Helwan

Period: Dynasty 1, Naqada IIIC2, Den

Substructure Type: ID stone tomb

Liner: Stone and mud-brick **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Staircase to portcullis in grooved emplacement (no details of stone)? Mud-brick lined substructure with stone lined burial chamber, floor and roof. Ancillary magazines at either end.

Tomb statistics: Substructure: Pit approx. 9.5 m long × 4 m wide* Burial chamber approx. 3.5 m long × 2.5 m wide* Superstructure: Approx. 11 m long × 6 m wide.* Dimensions taken from 1:400 necropolis plan (Saad 1947: plan 2).

Robbed: Yes

References: Saad 1947: 28; Köhler 2008b: 119.

***Scaled dimensions**

Catalogue No. 162

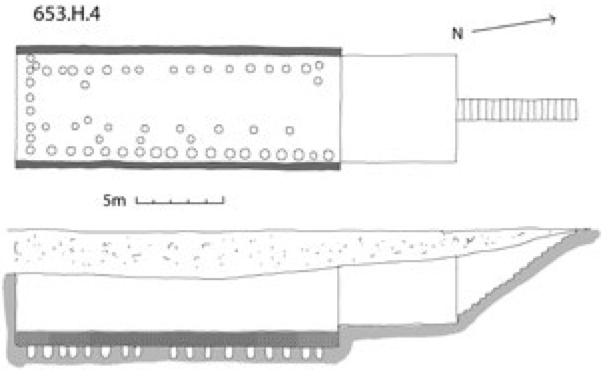


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER SAAD 1951: PLAN 12

Identity: 653.H.4

Location: Helwan

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID stone tomb?

Liner: Stone? **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Gravel cut staircase to very large burial pit with possible limestone slab lining? Post holes may have supported wooden shrine or wood roof.

Tomb statistics: Substructure: Approx. 25.5 m long × 6.3 m wide × 6.75 m deep* Burial chamber: Approx. 18.75 m long × 6.3 m wide × 6.25 m deep*.

Robbed: Yes

References: Saad 1951: 18-20.

***Scaled dimensions**

Catalogue No. 163

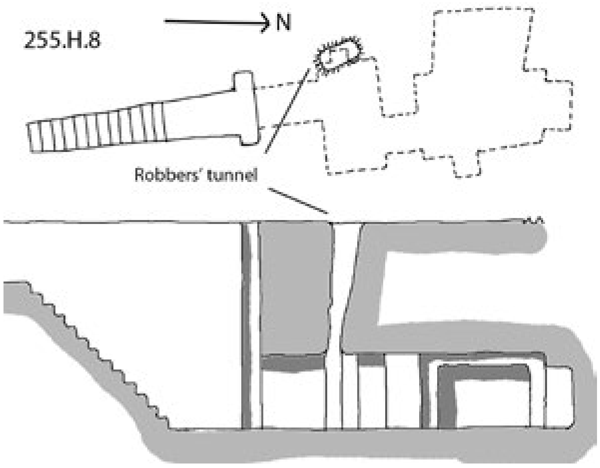


Illustration: Drawn by the author after Saad 1957: Plan F.

Identity: 255.H.8

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Gravel cut staircase descends 4.5 m to portcullis in grooved emplacement (stone missing) obstructing access to gravel cut substructure and burial chamber with recess. Gravel roof approx. 2.2 m high?

Tomb statistics: Substructure: Ante room: 2.7 m long × 1.8 m wide × 2.3 m high recess: 2.1 m long × 1.3 m wide × 3.1 m* high.#

Perhaps this is a ‘typo’ by Saad and should read 2.1 m?

Robbed: Yes, via tunnel from above

References: Saad 1957: 59.

Catalogue No. 164

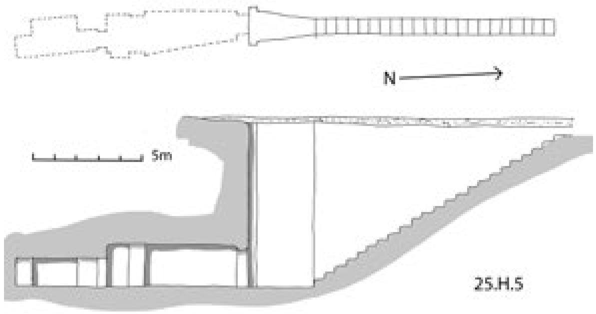


Illustration: Drawn by the author after Saad 1951: Plan 13.

Identity: 25.H.5

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Staircase in gravel leading to portcullis in grooved emplacement (stone missing). Beyond subterranean passage to burial chamber with recess. Natural ‘gravel’ roof approx. 6.55 m thick over burial chamber.

Tomb statistics: Substructure: Burial chamber with recess 3.1 m long × 0.95 m wide × 1.25 m high. Recess 2 m long × 0.9 m wide × 1.25 m high.

Robbed: Yes, via entrance

References: Saad 1951: 27.

Catalogue No. 165

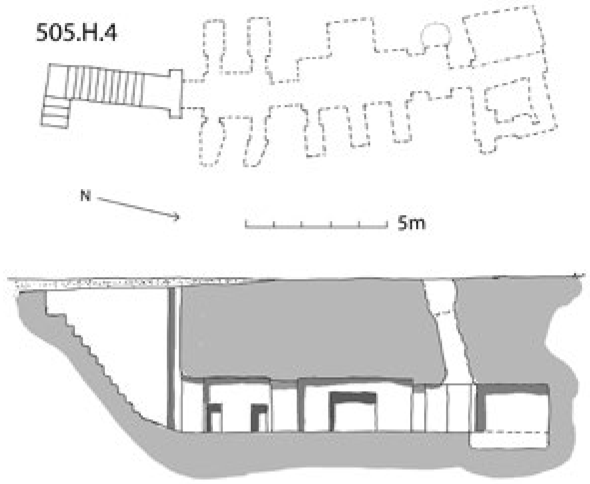


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER SAAD 1951: PLAN 11.

Identity: 505.H.4

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: 'L' shaped mud-brick stepped staircase cut in gravel. Portcullis found in situ (dimensions unknown) in grooved emplacement obstructing entrance to multi-chambered subterranean complex. Natural gravel roof 3.6 m thick.

Tomb statistics: Substructure: Burial chamber?: 2.6 m long × 2.4 m wide × 2.5 m high.

Robbed: Yes, via tunnel from above

References: Saad 1951: 15-7.

Catalogue No. 166

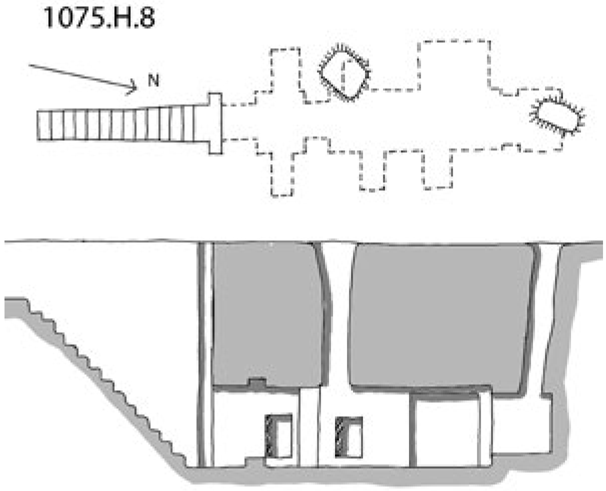


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER SAAD 1957: PLAN O.

Identity: 1075.H.8

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Gravel cut staircase 4.6 m long to portcullis in grooved emplacement (stone missing) obstructing access to multichambered subterranean complex, and burial chamber with recess. Gravel roof approx. 3.4 m thick.*

Tomb statistics: Substructure 1.8 m high: West burial chamber 1.5 m long × 1.1 m wide × 1.3 m high; north burial chamber 1.6 m long × 1.1 m wide × 1.6 m high.

Robbed: Yes, via two vertical shafts into both burial chambers

References: Saad 1957: 61-2.

***Scaled dimensions**

Catalogue No. 167

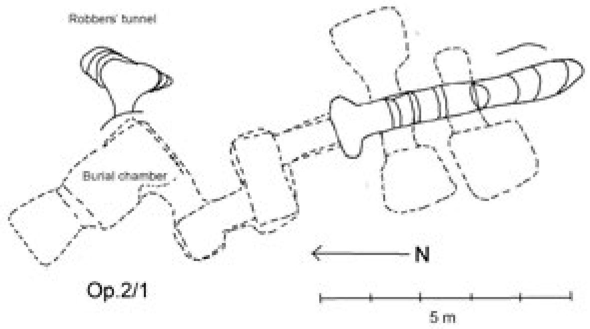


Illustration: Drawn by the author after Köhler 2005: Pl. 18.

Identity: 25.H.4 (Köhler's Op. 2/1)

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Unknown

Security Features: Gravel cut staircase with flanking magazines to single portcullis (emplacement present, stone missing) obstructing entrance to multi-chambered subterranean gravel and rock-cut complex beyond. Raised burial niche at end. Natural rock/gravel roof approx. 2.4 m thick. Mud-brick mastaba over.

Tomb statistics: Substructure: Main burial chamber (8) 1.9-2.13 m long × 1.18-1.35 m wide × 2.25 m high. Superstructure: Estimated at 8 m long × 5 m wide.

Robbed: Yes, via tunnel from above.

References: Saad 1951: 6–7; Köhler 2005: 35-41.

Catalogue No. 168

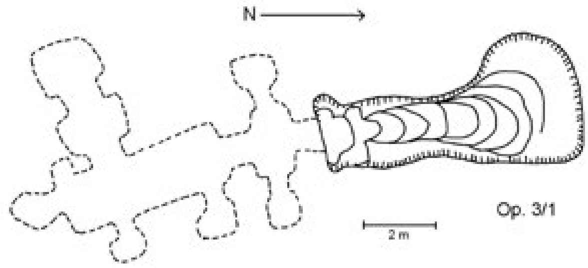


Illustration: Drawn by the author after Köhler 2001: Fig. 1.

Identity: Op. 3/1

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Gravel cut staircase to portcullis (missing) in grooved emplacement obstructing entrance to multi-chambered subterranean complex.

Tomb statistics: Main chamber 5 m long.

Robbed: Yes

References: Köhler 2001: 23-5.

Catalogue No. 169

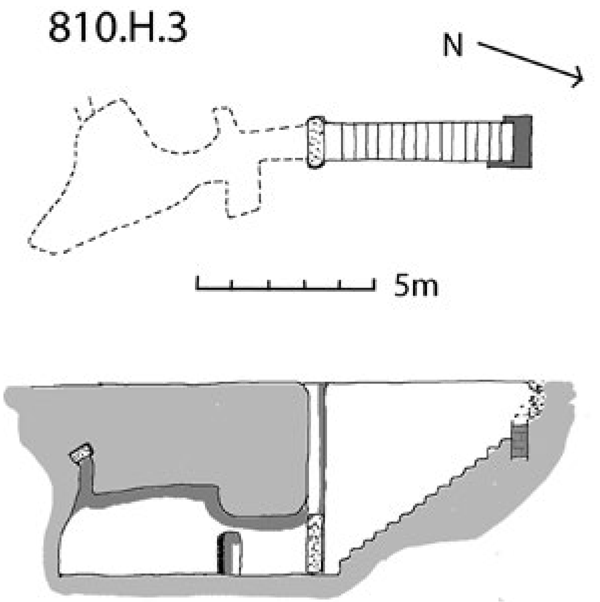


Illustration: Drawn by the author after Saad 1947: Pl. LXV.

Identity: 810.H.3

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Gravel cut staircase 8.5 m long × 5.3 m deep to portcullis in grooved emplacement obstructing access to gravel cut subterranean burial chamber, niche and side magazines. Main chamber roof approx. 2.3 m thick.*

Portcullis 1.7 m long × 1.3 m wide × 0.4 m thick.* Estimated weight 1.9 tonnes.

Tomb statistics: Substructure: Burial chamber approx. 1.8 m long × 1.5 m wide × 3 m high.*

Robbed: Yes, via tunnel from above

References: Saad 1947: 172-3; 1957: 15-7.

Catalogue No. 170

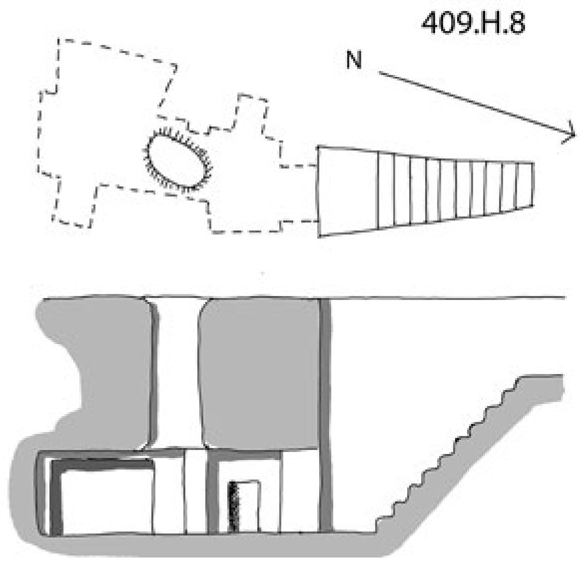


Illustration: Drawn by the author after Saad 1957: Plan I.

Identity: 409.H.8

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Gravel cut 'L' shaped staircase 3.5 m deep to substructure and burial chamber with recess. Gravel roof approx. 2 m thick.

Tomb statistics: Substructure 1.8 m high. Burial chamber 1.7 m long × 0.9 m wide × 1.5 m high.

Robbed: Yes, via tunnel from above

References: Saad 1957: 60.

***Scaled dimensions**

Catalogue No. 171

Illustration: Figure of the owner of Tomb 416.H.6, *Ka-khet* (After Saad 1957: Fig. 15) No tomb plan available.

Identity: 416.H.6

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Staircase 8.5m long to portcullis in grooved emplacement (stone missing) to burial chamber. Solid gravel roof to burial chamber.

Tomb statistics: Substructure: Burial chamber 5 m long × 3 m wide × 2 m high.

Robbed: Yes, via tunnel above burial chamber.

References: Saad 1957: 20-2

Catalogue No. 172

Illustration: Figure of the owner of Tomb 235.H.8, *Sakhu* (After Saad 1957: Fig. 23) No tomb plan available.

Identity: 235.H.8

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: 'L' shaped staircase 1.8 m + 5.95 m long to portcullis in grooved emplacement (stone missing) to burial chamber. Solid gravel roof to burial chamber.

Tomb statistics: Substructure: Burial chamber 3.4 m long × 1.6 m wide × 2.5 m high.

Robbed: Yes, via tunnel above burial chamber.

References: Saad 1957: 29-31.

Catalogue No. 173

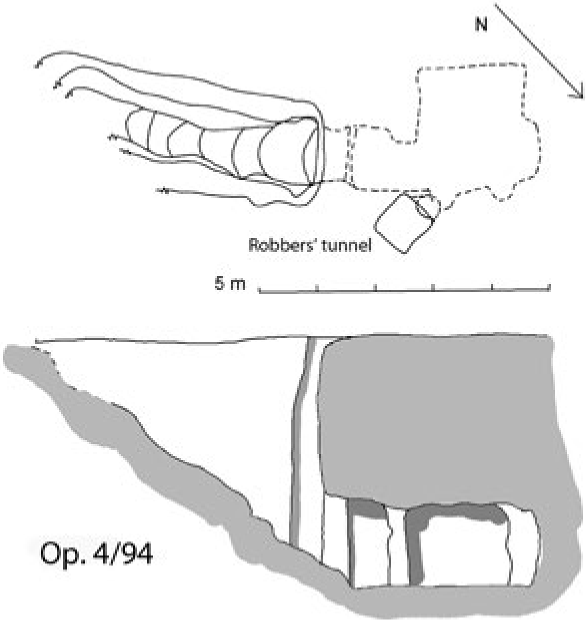


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER KÖHLER 2007: FIG. 2.

Identity: Op. 4/94

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Gravel cut staircase concealed within superstructure leads to multiple layer closure consisting of loose large rocks, a single portcullis (dimensions unknown) and a mud-brick wall before subterranean burial chamber with recess. Natural gravel/rock? roof approx. 2.6 m thick.*

Tomb statistics: Substructure: Burial chamber 2.1 m long × 2.1 m wide × 1.4 m* high.

Robbed: Yes, through roof and portcullis.

References: Köhler 2007: 192-4; 2009: 13.

***Scaled dimensions**

Catalogue No. 174

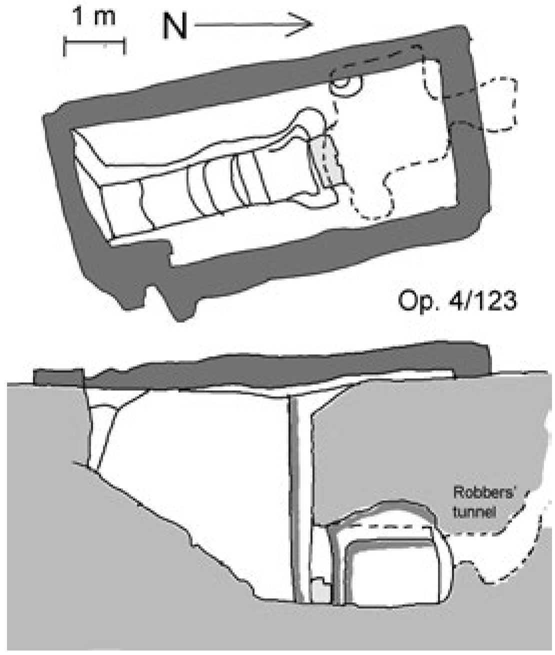


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER KÖHLER 2008B: FIG. 17.

Identity: Op. 4/123

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 'L' shaped staircase concealed within body of superstructure. Mud-brick blocking to entrance of subterranean burial chamber with recess. Natural gravel/rock roof. approx. 2.5 m thick*

Tomb statistics: Substructure: Burial chamber: 2 m long × 1.9 m wide × 1.2 m high* Superstructure: 7 m long × 3.6 m wide.

Robbed: Yes, via portcullis and tunnel from north of superstructure.

References: Köhler 2008a: 172–3; 2008b: 122–3.

***Scaled dimensions**

Catalogue No. 175

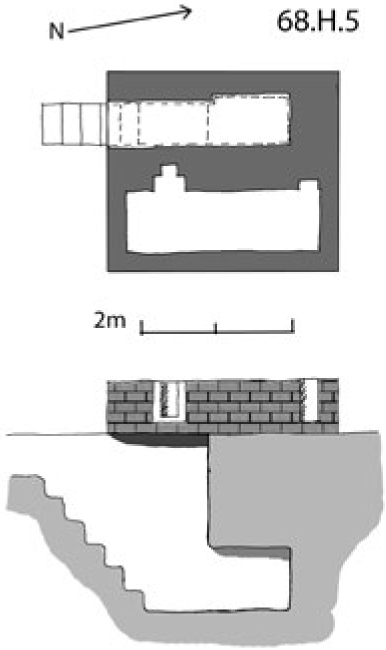


Illustration: Drawn by the author after Saad 1951: Plan 14.

Identity: 68.H.5

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: External steep staircase to single gravel/ rock cut burial chamber. Natural rock/gravel roof approx. 1.5 m thick.* Mud-brick mastaba over.

Tomb statistics: Substructure: Burial chamber 1 m long × 0.65 m wide × 0.8 high. Superstructure: 3.3 m long × 2.65 m wide.

Robbed: No

References: Saad 1951: 27.

***Scaled dimensions**

Catalogue No. 176

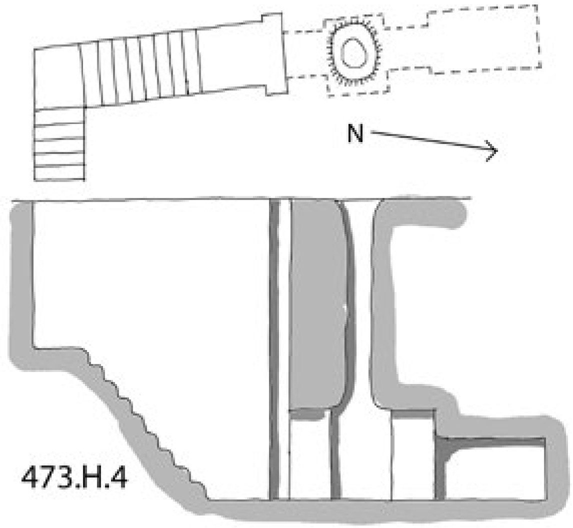


Illustration: Drawn by the author after Saad 1957: Plan A.

Identity: 473.H.4

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: L' shaped gravel cut staircase to portcullis slab in grooved emplacement (stone missing) obstructing entrance to subterranean ante room and burial chamber. Gravel roof over approx. 3.8 m thick.*

Tomb statistics: Substructure: 1.7 m high. Burial chamber 2 m long × 1.05 m wide × 1.15 m high.

Robbed: Yes, via tunnel from above

References: Saad 1957: 57.

***Scaled dimensions**

Catalogue No. 177

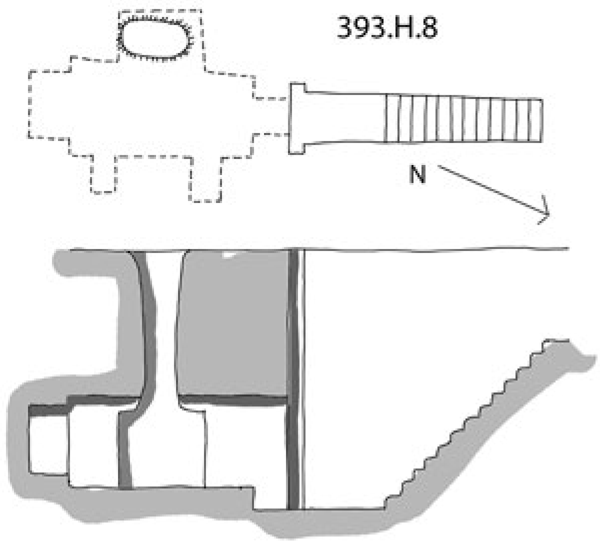


Illustration: Drawn by the author after Saad 1957: Plan H.

Identity: 393.H.8

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: 5.3 m long gravel cut staircase descends to 5.7 m below surface, to portcullis in grooved emplacement (stone missing) obstructing access to substructure and burial chamber with recess. Solid gravel roof 1.7 m high (extrapolated from Saad's given dimensions).

Tomb statistics: Substructure: 4 m high. Burial chamber 1.7 m long × 1 m wide × 4 m high.

Robbed: Yes, via tunnel from above.

References: Saad 1957: 59-60.

Catalogue No. 178

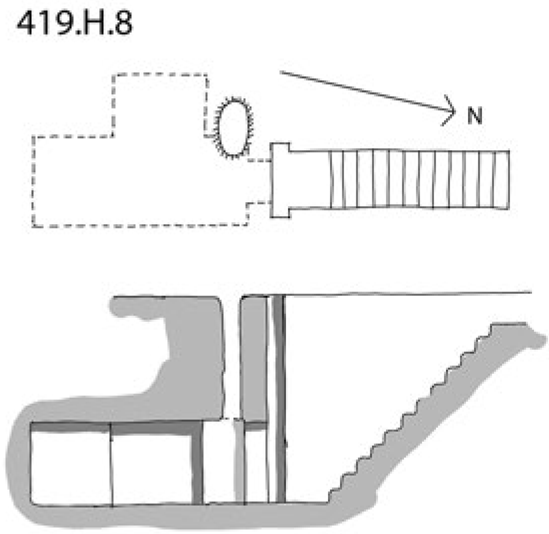


Illustration: Drawn by the author after Saad 1957: Plan J

Identity: 419.H.8

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Gravel cut staircase 3.7 m deep to portcullis in grooved emplacement (stone missing) obstructing access to burial chamber with recess. Gravel roof 2.1 m thick.

Tomb statistics: Substructure: Burial chamber 1 m long × 1.6 m wide × 1.6 m high.

Robbed: Yes, via tunnel from above.

References: Saad 1957: 60.

Catalogue No. 179

ILLUSTRATION: FIGURE OF THE OWNER OF TOMB 109.H.9, *IU-SEN-JET* (AFTER SAAD 1957: FIG. 28) NO TOMB PLAN AVAILABLE.

Identity: 109.H.9

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Stairway 5.2 m long × 3.9 m deep to portcullis in grooved emplacement (stone missing) to burial chamber. Solid gravel roof to burial chamber 2.35 m thick.

Tomb statistics: Substructure: Burial chamber 1.7 m long × 1.4 m wide × 1.55 m high.

Robbed: Yes, via tunnel from above

References: Saad 1957: 39-40.

Catalogue No. 180

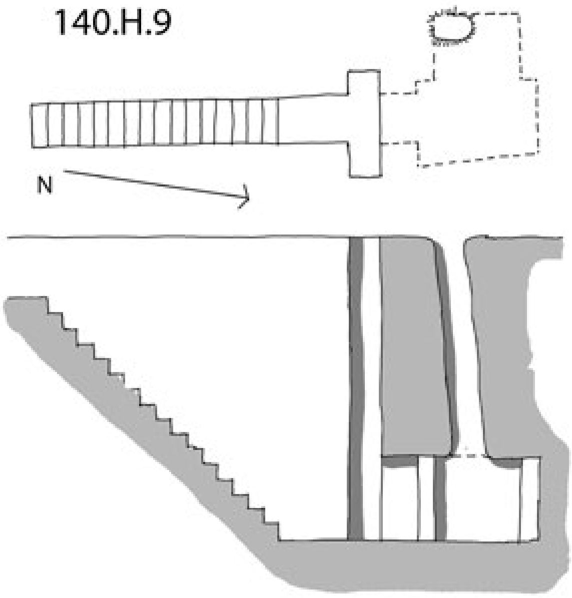


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER SAAD 1957: PLAN T

Identity: 140.H.9

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Gravel cut staircase 6.4 m long to limestone portcullis found in situ in grooved emplacement obstructing access to burial chamber with recess. Gravel roof approx. 3.3 m thick?* Portcullis: 2.2 m high × 0.55 m wide × 0.1 m thick, weighing approx. 0.26 tonnes.

Tomb statistics: Substructure: Burial chamber 1.5 m long × 1.1 m wide × 1.3 m high.

Robbed: Yes, via tunnel from above

References: Saad 1957: 63.

***Scaled dimensions**

Catalogue No. 181

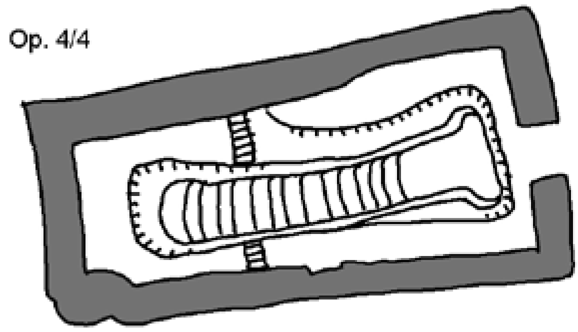


Illustration: Drawn by the author after Köhler 2003b: Fig. 2

Identity: Op. 4/4

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Staircase descends to depth of 4.8 m and is concealed by superstructure. Portcullis found in situ obstructing entrance to rock-cut subterranean burial chamber. Secondary wall of mud brick behind portcullis. Roof thickness approx. 3.4 m thick. Mud-brick mastaba over. Portcullis 1.29 m high × 0.91m wide × 0.13 m thick. Estimated weight 0.33 tonnes.

Tomb statistics: Substructure: Burial chamber 2.3 m long × 1.45 m wide × 1.40 m high. Superstructure: 8.6 m long × 4.3 m wide × 0.8 m (preserved).

Robbed: Yes, via portcullis

References: Köhler 2000b: 89-91. 2003b: 85; 2014: 15 and 139-40.

Catalogue No. 182

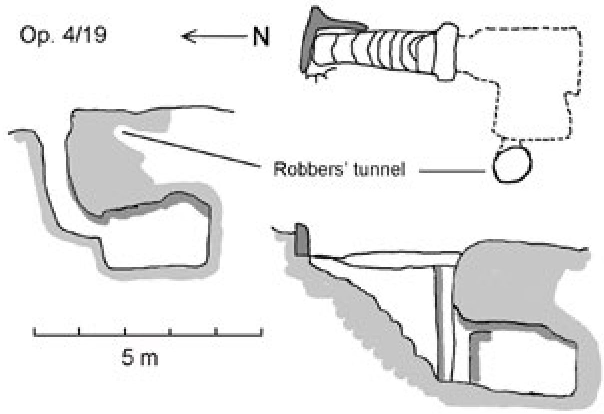


Illustration: Drawn by the author after Köhler 2003b: Fig. 4.

Identity: Op. 4/19

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Staircase 3.5 m long to portcullis in grooved emplacement (stone broken) and mud-brick secondary blocking obstructing subterranean burial chamber with recess. Gravel roof approx. 1.75 m thick.* Broken remains of portcullis 1.01 m high × 1.00 m wide × 0.12 m thick.

Tomb statistics: Substructure: Burial chamber approx. 2.7 m long × 1.5 m wide × 1.3-1.6 m high. Superstructure: 6.60 m long × 5.00 m wide (estimated).

Robbed: Yes, via portcullis and tunnel from above from west wall of mastaba.

References: Köhler 2003b: 89; 2009: 12-3; 2014: 19 and 236-8.

***Scaled dimensions**

Catalogue No. 183

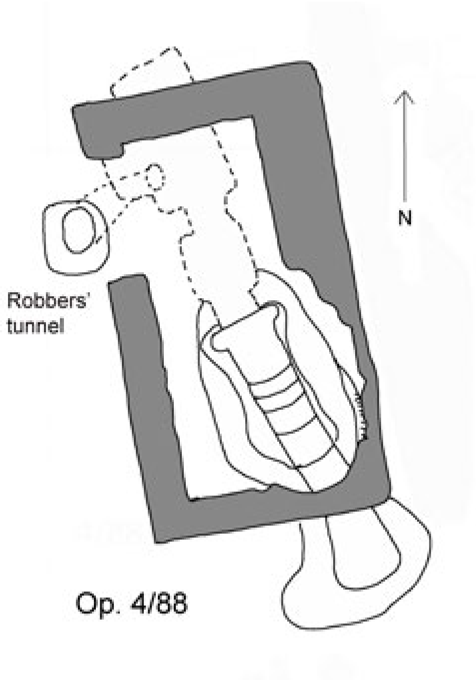


Illustration: Drawn by the author after Köhler 2007: Fig. 1.

Identity: Op. 4/88

Location: Helwan

Period: Dynasty 2

Substructure Type: IIA

Liner: Mud-brick **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Staircase partially concealed by superstructure to portcullis (missing?) in grooved emplacement obstructing entrance to subterranean burial chamber with recess. Mud-brick mastaba over with unknown core.

Tomb statistics: Burial chamber: Dimensions N/A. Superstructure: 8.2 m long × 4.5 m wide.

Robbed: Yes, via tunnel from outside western edge of mastaba into burial chamber.

References: Köhler 2007: 192.

Catalogue No. 184

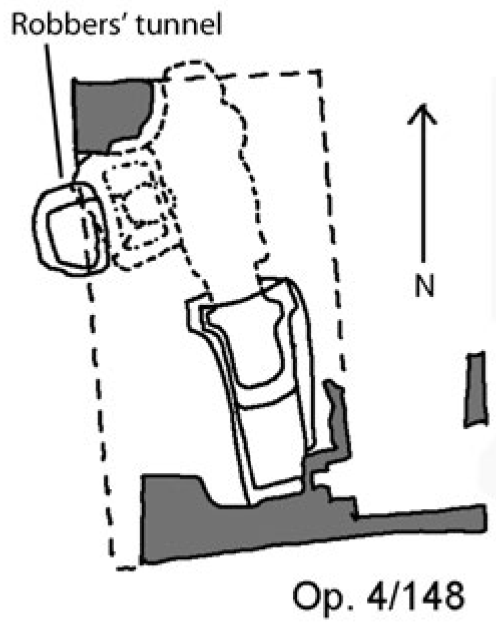


Illustration: Drawn by the author after Köhler 2009: Fig. 4.

Identity: Op. 4/148

Location: Helwan

Period: Dynasty 2

Substructure Type: IIB

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Deep staircase 4.35 m deep concealed by mud-brick superstructure to portcullis (fragmentary) in grooved emplacement obstructing subterranean burial chamber with recess. Natural rock/gravel roof approx. 2.85 m thick.*

Tomb statistics: Substructure: Burial chamber approx. 3.1 m long × 1.2-2.5 m wide × 1.5 m high.* Superstructure: 7 m long × 4 m wide.

Robbed: Yes, via tunnel from outside western edge of mastaba into burial chamber niche and via portcullis

References: Köhler 2009: 284.

***Scaled dimensions**

Catalogue No. 185

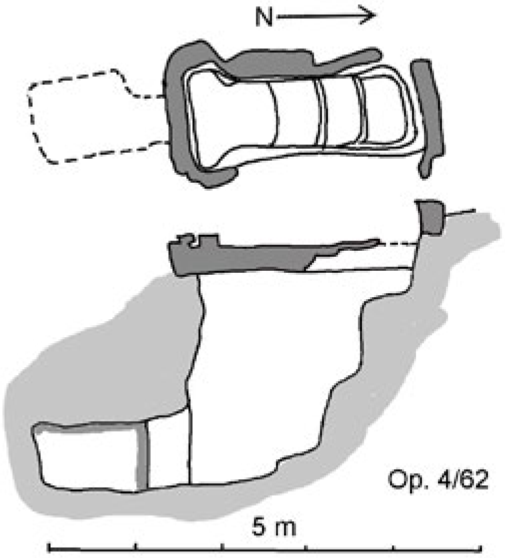


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER KÖHLER 2008B: FIG. 6.

Identity: Op. 4/62

Location: Helwan

Period: Dynasty 2

Substructure Type: IIB

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Deep staircase descends to a depth of 3.68 m. Portcullis in grooved emplacement (stone missing) to subterranean burial chamber with recess protected by 2.88 m thick gravel roof.*

Tomb statistics: Substructure: Burial chamber approx. 1.2 m long × 0.9 m wide × 0.8 m high *

Robbed: ?

References: Köhler 2008b: 118.

***Scaled dimensions**

Catalogue No. 186

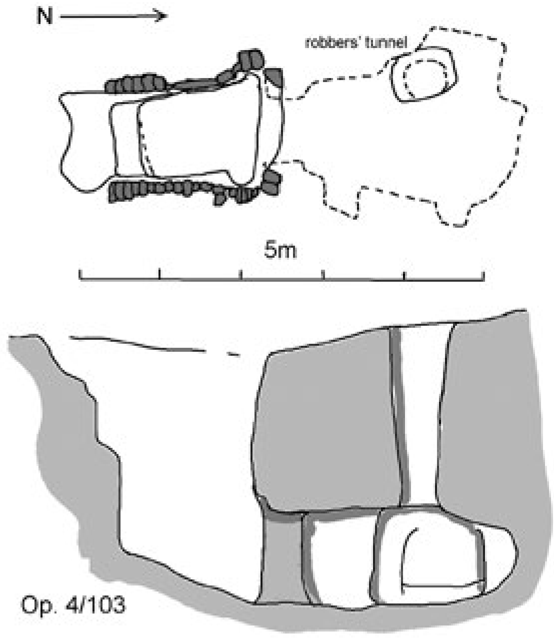


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER KÖHLER 2007: FIG. 8.

Identity: Op. 4/103

Location: Helwan

Period: Dynasty 2

Substructure Type: IIB

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Deep staircase 3.3 m deep to portcullis in grooved emplacement (stone missing) to subterranean rock/gravel cut burial chamber with recess. Natural rock/gravel roof approx. 2.2 m thick.*

Tomb statistics: Substructure: Burial chamber irregular shape approx. 1.1 m high*

Robbed: Yes, via tunnel through burial chamber roof.

References: Köhler 2007: 201-2.

***Scaled dimensions**

Catalogue No. 187

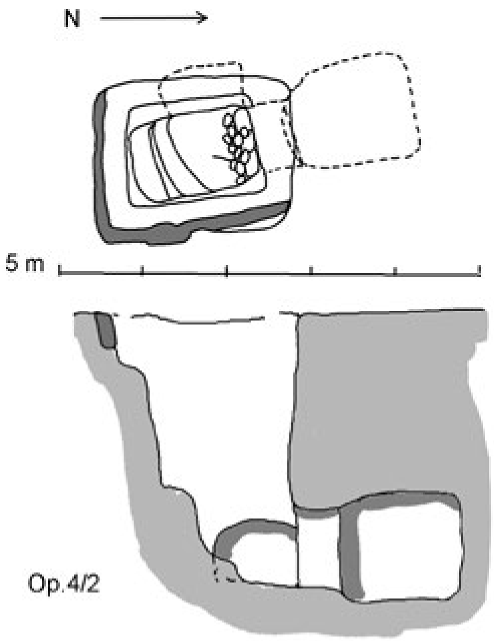


Illustration: Drawn by the author after Köhler 2008b: Fig. 7.

Identity: Op. 4/2

Location: Helwan

Period: Dynasty 2

Substructure Type: IIB

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: Unknown

Security Features: Deep staircase 3.14 m deep to rough stone blocking and mud-brick wall obstructing entrance to subterranean burial chamber. Gravel roof approx. 1.95 m thick.

Tomb statistics: Substructure: Burial chamber approx. 1.5 m long × 1.2 m wide × 1.2 m high*

Robbed: Yes, via the stairwell and from above .

References: Köhler 2000: 88; 2014: 133-5.

Catalogue No. 188

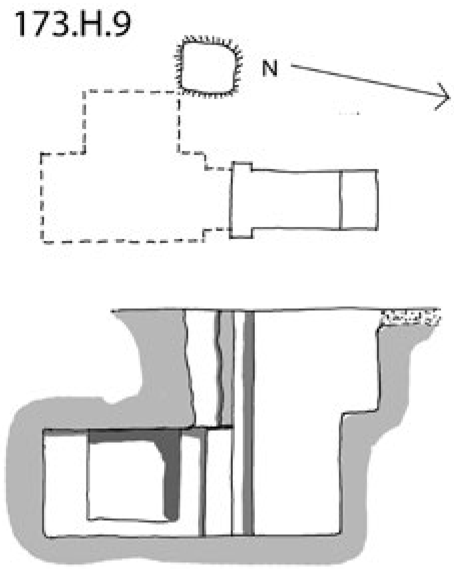


Illustration: Drawn by the author after Saad 1957: Plan U.

Identity: 173.H.9

Location: Helwan

Period: Dynasty 2

Substructure Type: IIB

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Deep staircase with three steps descends 2.1 m to portcullis in grooved emplacement (stone missing) obstructing entrance to subterranean burial chamber with recess. Gravel roof over burial chamber 0.6 m thick.

Tomb statistics: Substructure: Burial chamber 2.4 m long × 1 m wide × 1.5 m high.

Robbed: Yes, via tunnel from above

References: Saad 1957: 63.

***Scaled dimensions**

Catalogue No. 189

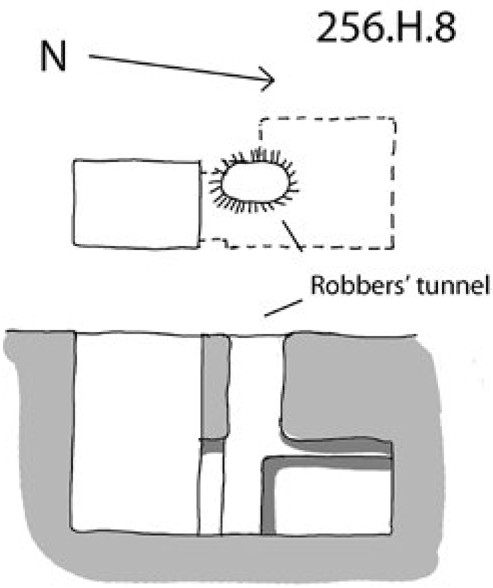


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER SAAD 1957: PLAN G.

Identity: 256.H.8

Location: Helwan

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 2.3 m deep in gravel to subterranean burial chamber with recess. Natural gravel roof 1 m thick.

Tomb statistics: Substructure: Burial chamber 1.5 m long × 1.3 m wide × 1.3 m high.

Robbed: Yes, via tunnel from above.

References: Saad 1957: 59.

Catalogue No. 190

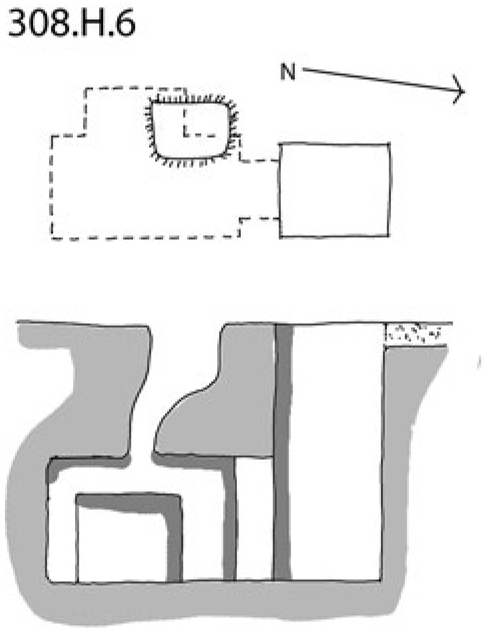


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER SAAD 1957: PLAN B.

Identity: 308.H.6

Location: Helwan

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 3.1 m deep? In gravel to subterranean burial chamber with recess. Natural gravel roof 1.4 m? thick. Note: In Saad's (1957) publication the shaft depth is described at 130 cm, which seems to be a typographical error, as the burial chamber would be higher than the shaft.

Tomb statistics: Substructure: Burial chamber 2.5 m long × 1.4 m wide × 1.7 m high.

Robbed: Yes, via tunnel from above.

References: Saad 1957: 57.

Catalogue No. 191

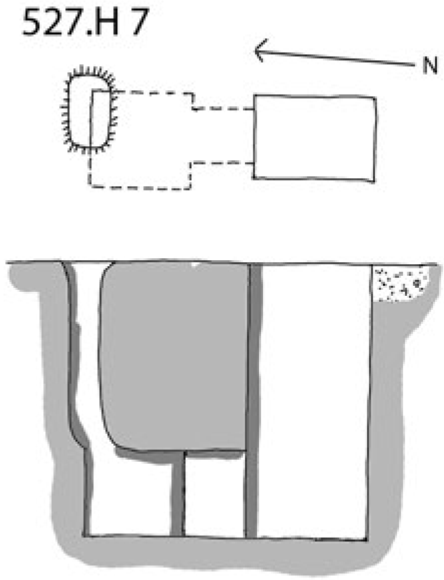


Illustration: Drawn by the author after Saad 1957: Plan C.

Identity: 527.H.7

Location: Helwan

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 2.9 m deep in gravel to subterranean burial chamber. Natural gravel roof 1.7 m thick.

Tomb statistics: Substructure: Burial chamber 1.5 m long × 1.2 m wide × 1.2 m high.

Robbed: Yes, via tunnel from above.

References: Saad 1957: 58.

Catalogue No. 192

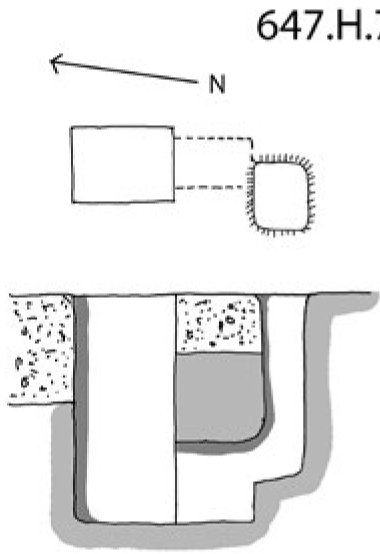


Illustration: Drawn by the author after Saad 1957: Plan D.

Identity: 647.H.7

Location: Helwan

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 1.3 m deep in gravel to subterranean burial chamber. Natural gravel roof 0.6 m thick.

Tomb statistics: Substructure: Burial chamber: 0.9 m long × 0.6 m wide × 0.7 m high.

Robbed: Yes, via tunnel from above.

References: Saad 1957: 58.

Catalogue No. 193

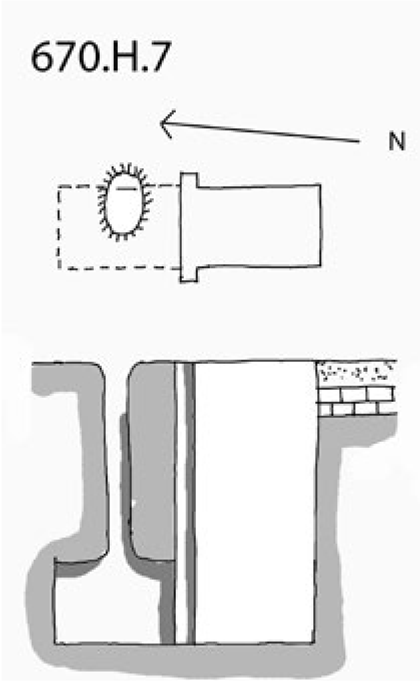


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER SAAD 1957: PLAN E.

Identity: 670.H.7

Location: Helwan

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 3.2 m deep to portcullis in grooved emplacement (stone missing) obstructing access to subterranean burial chamber. Natural rock roof approx. 2.1 m thick.

Tomb statistics: Substructure: Burial chamber 1.6 m long × 1.1 m wide × 1.1 m high.

Robbed: Yes, via tunnel from above burial chamber.

References: Saad 1957: 58.

Catalogue No. 194

ILLUSTRATION: FIGURE OF THE OWNER OF TOMB 379.H.8 *NISI-NEITH* (AFTER SAAD 1957: FIG. 30) NO TOMB PLAN AVAILABLE.

Identity: 379.H.8

Location: Helwan

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 2 m deep to portcullis in grooved emplacement (stone missing) obstructing entrance to burial chamber. Solid rock/gravel roof 0.8 m thick

Tomb statistics: Substructure: Burial chamber 1.5 m long × 0.7 m wide × 1.2 m high.

Robbed: Yes, via hole in ceiling of burial chamber

References: Saad 1957: 42-3.

Catalogue No. 195

Illustration: Figure of the owner of Tomb 391.H.8 *Heken* (After Saad 1957: Fig. 14) No tomb plan available.

Identity: 381.H.8

Location: Helwan

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 3.2 m deep to portcullis in grooved emplacement (stone missing) to burial chamber. Solid gravel roof to burial chamber 1.95 m thick.

Tomb statistics: Substructure: Burial chamber 1.4 m long × 1 m wide × 1.25 m high

Robbed: Yes, via tunnel above burial chamber

References: Saad 1957: 17-8

Catalogue No. 196

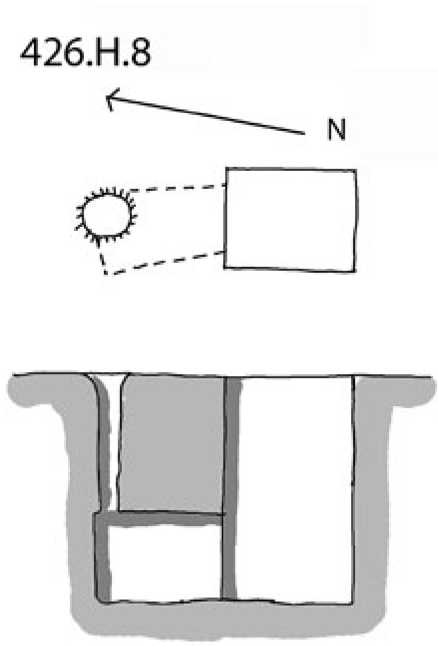


Illustration: Drawn by the author after Saad 1957: Plan K.

Identity: 426.H.8

Location: Helwan

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 2.2 m deep in gravel to subterranean burial chamber. Natural gravel roof 1.2 m thick.

Tomb statistics: Substructure: Burial chamber 1.3 m long × 0.9 m wide × 1 m high.

Robbed: Yes, via tunnel from above burial chamber.

References: Saad 1957: 60-1.

Catalogue No. 197

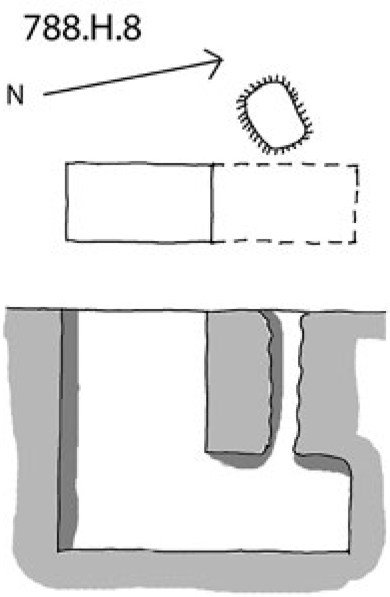


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER SAAD 1957: PLAN M.

Identity: 788.H.8

Location: Helwan

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 2.2 m deep in gravel to subterranean burial chamber. Natural gravel roof 1.1 m thick.

Tomb statistics: Substructure: Burial chamber 1.9 m long × 1.1 m wide × 1.1 m high.

Robbed: Yes, via tunnel from above burial chamber.

References: Saad 1957: 61.

Catalogue No. 198

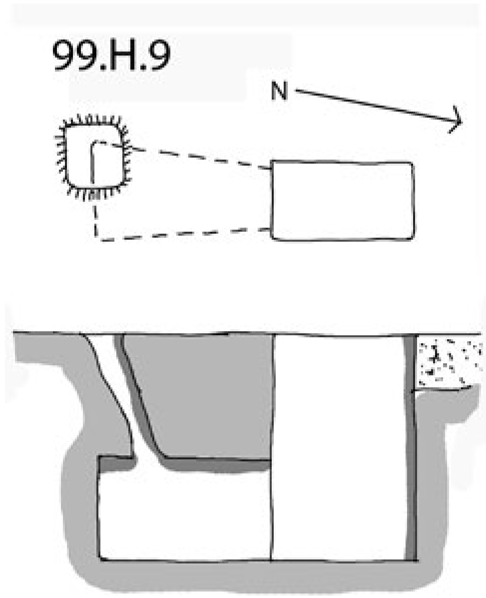


ILLUSTRATION: DRAWN BY THE AUTHOR AFTER SAAD 1957: PLAN Q.

Identity: 99.H.9

Location: Helwan

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 2.3 m deep in gravel to subterranean burial chamber. Natural gravel roof 1.15 m thick.

Tomb statistics: Substructure: Burial chamber 2.15 m long × 1.1 m wide × 1.15 m high.

Robbed: Yes, via tunnel from above burial chamber.

References: Saad 1957: 62.

Catalogue No. 199

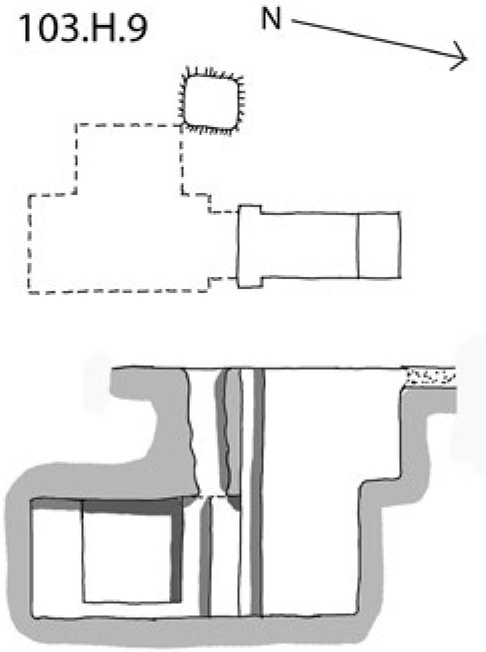


Illustration: Drawn by the author after Saad 1957: Plan R.

Identity: 103.H.9

Location: Helwan

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 2.85 m deep in gravel to subterranean burial chamber with recess. Natural gravel roof 1.65 m thick.

Tomb statistics: Substructure: Burial chamber 1.4 m long × 1 m wide × 1.2 m high.

Robbed: Yes, via tunnel from above burial chamber.

References: Saad 1957: 62.

Catalogue No. 200

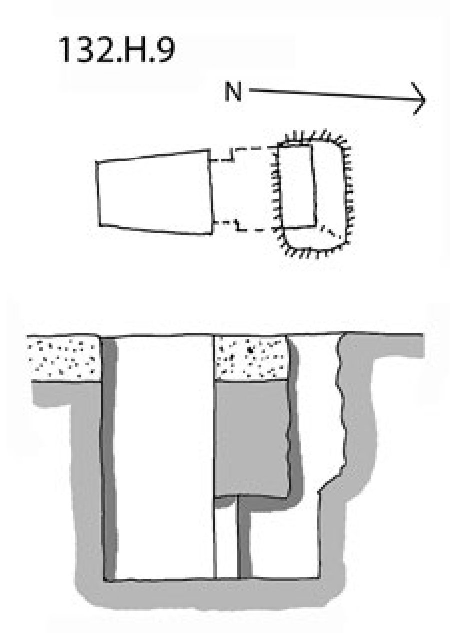


Illustration: Drawn by the author after Saad 1957: Plan S.

Identity: 132.H.9

Location: Helwan

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 2.4 m deep in gravel to subterranean burial chamber. Natural gravel roof 1 m thick.

Tomb statistics: Substructure: Burial chamber 1.6 m long × 0.85 m wide × 1.4 m high.

Robbed: Yes, via tunnel from above burial chamber.

References: Saad 1957: 63.

Catalogue No. 201

Illustration: Drawn by the author after Köhler 2008a: Fig. 1.

Identity: Op. 4/115

Location: Helwan

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Shaft 3.8 m deep leads to portcullis (lower half *in situ* dimensions unknown) and dry stone wall blocking access to burial chamber. Burial chamber roof thickness unknown. Mud-brick mastaba over.

Tomb statistics: Substructure: Burial chamber 2 m long × 1.7 m wide. Superstructure: 10 m long × 6 m wide

Robbed: Yes, via broken portcullis.

References: Köhler 2008a: 172.

Catalogue No. 202

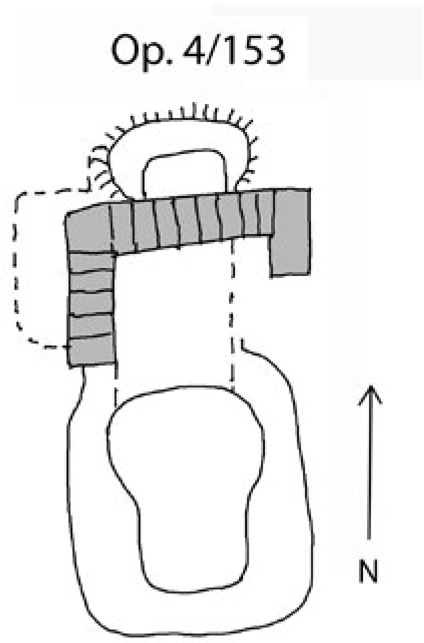


Illustration: Drawn by the author after Köhler 2009: Fig. 1.

Identity: Op. 4/153

Location: Helwan

Period: Dynasty 2, Late?

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 2.4 m deep shaft to mud-brick blocking at entrance to burial chamber.

Tomb statistics: Substructure: Burial chamber 1.6 m × 1.9 m × ? m high. Superstructure: 3.5-4 m long × 1.8 m wide

Robbed: Yes, via door blocking and through the roof.

References: Köhler 2009: 284.

Catalogue No. 203

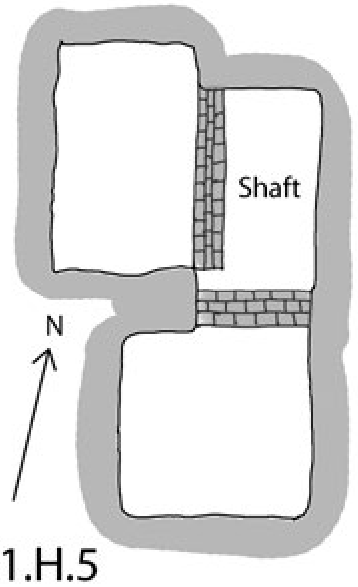


Illustration: Drawn by the author after Saad 1951: Fig 7.

Identity: 1.H.5

Location: Helwan

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 3.5 m deep leading to two burial chambers set at 90 degrees to each other both blocked with mud-brick. 2.6-2.7 m thick natural gravel roof over.

Tomb statistics: Substructure: Western burial chamber: 1.55 m long × 1.1 m wide × 0.9 m high. Southern burial chamber: 1.5 m long × 0.9 m wide × 0.8 high

Robbed: No

References: Saad 1951: 23-6

Catalogue No. 204

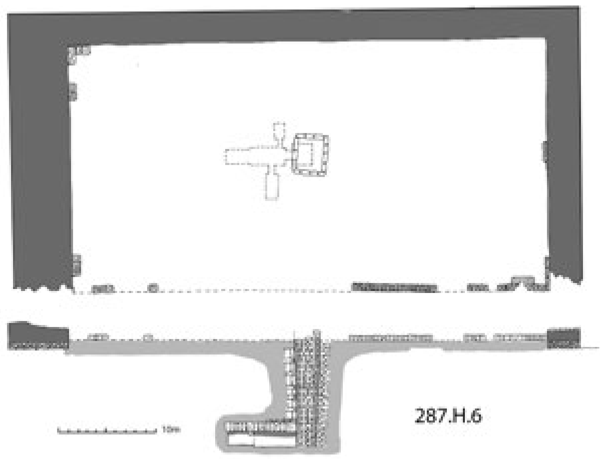


Illustration: Drawn by the author after Saad 1951: Plan 2

Identity: 287.H.6

Location: Helwan

Period: Dynasty 3

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: N/A

Security Features: 11 m deep* shaft cut in gravel with stone lining. Large 0.3 m thick ashlars on southern (burial chamber) side leads to stone ashlar roofed and stone lined and floored burial chamber and magazines. Solid 1 m thick stone roof with 8.5 m overhead 'gravel' cover. Mud-brick walls of superstructure 3.2-6 m thick surround limestone inner walls except for exposed (robbed?) eastern elevation. Unknown internal core.

Tomb statistics: Substructure: Burial chamber approx. 6 m long × 1.7 m wide × 1.5 m high* Superstructure: 56 m long × 27.4 m wide.

Robbed: Yes, via tunnel into magazine

References: Saad 1951: 3-5; 1969: 32-7.

***Scaled dimensions**

Catalogue No. 205

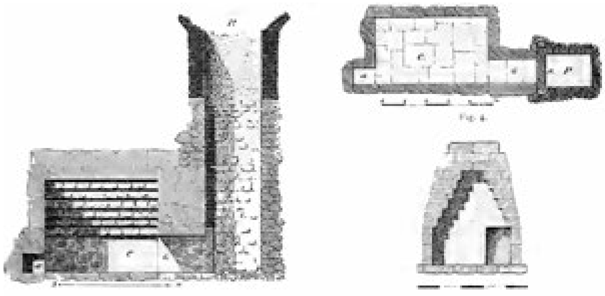


Illustration: De Morgan 1895: Figs. 3-5.

Identity: Tomb No. 1

Location: Dahshur North (amongst de Morgan's 'mastabas du sud')

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: Unknown

Security Features: Stone lined shaft 11 m deep to portcullis obstructing entrance to stone lined passage and burial chamber with stone corbelled roof. Burial chamber roof and geology over approx. 6.75 m thick. Stone walled and cored superstructure over with mud-brick corridor on east face. Portcullis Approx, 2 m high × 1.8 m wide × 0.4 m thick*, Estimated weight approx. 3.1 tonnes.

Tomb statistics: Substructure: Burial chamber: 5.1 m long × 3 m wide × 4.25 m high* Superstructure: Dimensions N/A

Robbed: Yes, via shaft?

References: De Morgan 1895: 8-9; Baud 1999: 67.

Catalogue No. 206

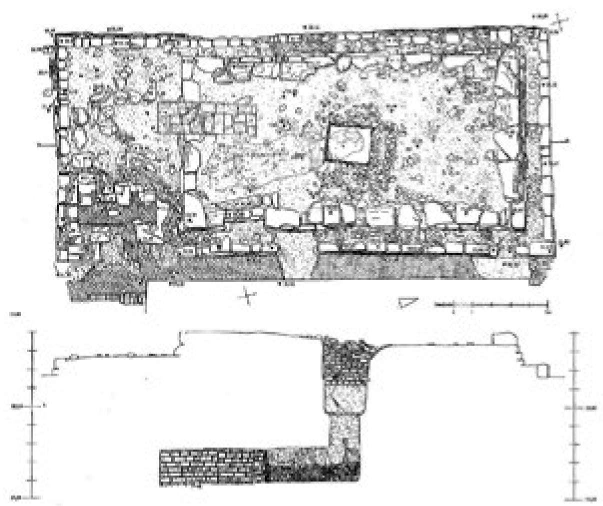


Illustration: After Alexanian & Seidlmayer 2002: Abb. 1 and 4. Courtesy of the DAI Cairo.

Identity: DAS 9, Ipy

Location: Dahshur (South)

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: Yes

Footprint O/H:

Security Features: 7.75 m deep rock-cut shaft (upper 2.5 m stone lined) to passageway obstructed by a 1.5 brick thick mud-brick wall. Burial chamber walls and floor lined in Tura limestone masonry. Burial chamber protected by roof cover of limestone and shale approx. 5.8 m thick. Stone cored mastaba over with external corridor and cruciform chapel clad with stone wall.

Tomb statistics: Substructure: Burial chamber 5.26 m long × 1.72 m wide × 1.95 m high. Superstructure: 26.5 m long × 12.25 m wide.

Robbed: Yes, via shaft on numerous occasions.

References: Stadelmann & Alexanian 1998: 202-3; Alexanian & Seidlmayer 2000: 292-3; 2002: 3-9; Alexanian 2007: 163-5.

***Scaled dimensions**

Catalogue No. 207

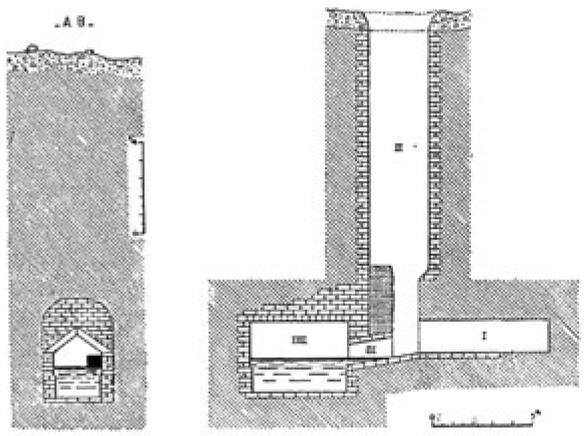


Fig. 5. Fig. 6.

Illustration: Barsanti 1902: Figs. 5 and 6.

Identity: DAS 32-4 (Iinefer)

Location: Dahshur (South)

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: N/A

Security Features: 17 m deep shaft* lined with stone to depth of 10 m and reinforced over entrance to burial chamber. Stone lined passage leads to burial chamber with saddle roof made of stone slabs. Additional passage, which is probably the remains of the original trench excavations and descending slope used for construction.

Tomb statistics: Substructure: Burial chamber 4.5 m long × 2.5 m wide × 3.5 m high* Superstructure: 34.1 m long × 17.3 m wide.

Robbed: Yes, via shaft

References: Barsanti 1902: 198-201; Porter and Moss 1974-81: 894; Stadelmann & Alexanian 1998: 304; Baud 1999: 83.

Catalogue No. 208

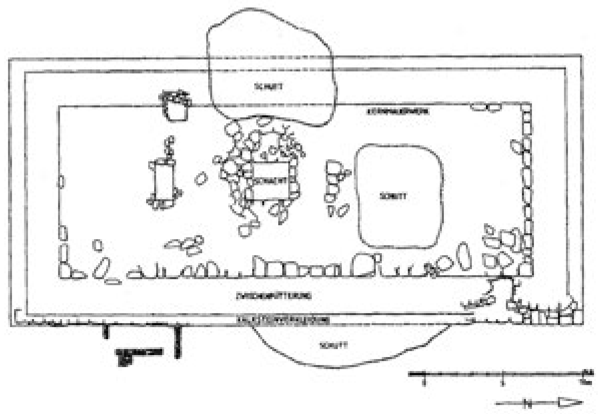


Illustration: Stadelmann and Alexanian 1998: Abb. 5. Courtesy of the DAI Cairo.

Identity: DAS 25-1

Location: Dahshur

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Unknown **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: Unknown

Security Features: Stone lined shaft to unknown substructure. Limestone clad mastaba over.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 36.2 m long × 16.85 m wide.

Robbed: Yes

References: Stadelmann and Alexanian 1998: 305-6.

***Scaled dimensions**

Catalogue No. 209

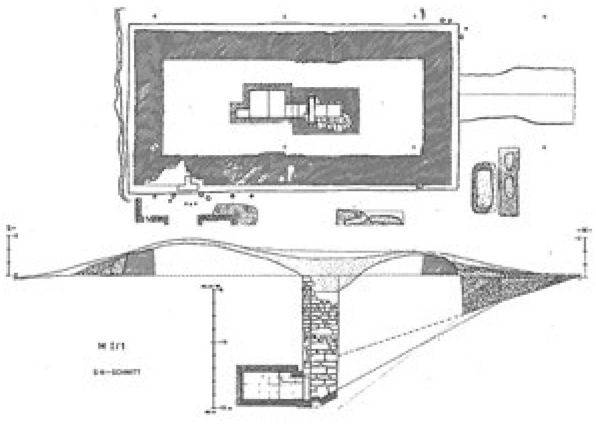


ILLUSTRATION: STADELMANN *ET AL.* 1993: ABB. 10--1. COURTESY OF THE DAI CAIRO.

Identity: Mastaba I/1

Location: Dahshur

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: N/A

Security Features: Stone lined shaft 9.5 m deep to portcullis found in situ in grooved emplacement obstructing entrance to stone lined passage and burial chamber. Internal canopic niche with closure slab. Stone and *tafl* roof approx. 7.3 m thick over burial chamber. Extra stone reinforcement in the form of three solid slabs totalling 4 m high over burial chamber door to prevent tunnelling. Mastaba over, with limestone walls 2.25 m thick. Core filled with *tafl*, rubble from shaft excavation and desert sand. Portcullis: 1.8 m high × 2 m wide × 0.4 m thick. Estimated weight 3.1 tonnes.

Tomb statistics: Substructure: Burial chamber 2.73 m long × 2.12 m wide × 2.19 m high. Superstructure: 25.5 long × 13.1 m wide.

Robbed: Yes, via upper corner of broken portcullis stone.

References: Stadelmann *et al.* 1993: 272-8

Catalogue No. 210

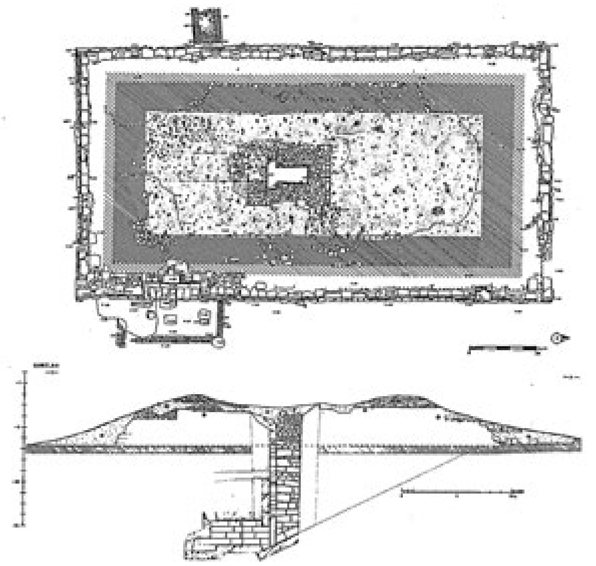


ILLUSTRATION: STADELMANN *ET AL.* 1993: ABB. 12-3. COURTESY OF THE DAI CAIRO.

Identity: Mastaba II/1, Netjer-Aperef

Location: Dahshur

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: 8m

Security Features: Stone lined shaft 9.1 m deep to portcullis (grooved for ropes) in 'T' shaped emplacement obstructing entrance to stone lined passage and burial chamber. Internal canopic niche with closure slab. Extra stone reinforcement in the form of three limestone blocks above entrance to burial chamber to prevent tunnelling from shaft. Stone and *tafl* roof over burial chamber approx. 6.9 m thick. Mastaba over, with limestone walls thick surrounds core filled with limestone chips, gravel, clay and soil. Portcullis: 2.41 m high × 1.68 m wide × 0.52 m thick. Estimated weight 4.53 tonnes.

Tomb statistics: Substructure: Burial chamber 2.88 m long × 2.06 m wide × 2.18 m high. Superstructure: 35.1 long × 18.9 m wide × 4 m high?.

Robbed: Yes, via passage from shaft into burial chamber + via portcullis.

References: Stadelmann *et al.* 1993: 278-83; Alexanian 1999: *passim*; Jánosi 2006: 46-8.

Catalogue No. 211

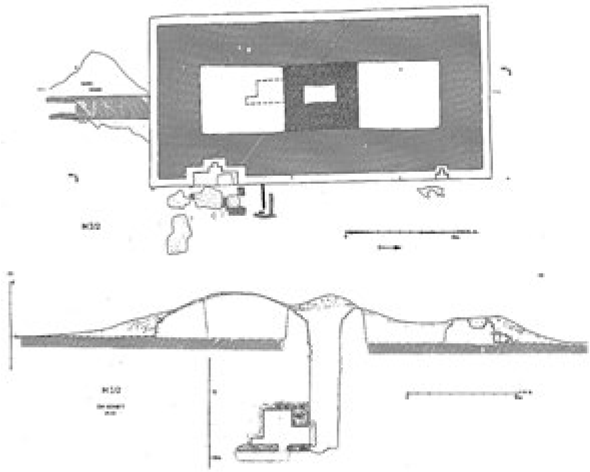


Illustration: Stadelmann *et al.* 1993: Abb. 17. Courtesy of the DAI Cairo.

Identity: Mastaba I/2

Location: Dahshur

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: N/A

Security Features: Stone lined shaft 10.80 m deep to portcullis (dimensions unknown) in emplacement obstructing entrance to stone lined passage and burial chamber. Internal canopic niche with closure slab. Extra stone reinforcement in the form of thick passage roof to prevent tunnelling from shaft to burial chamber. Roof of burial chamber protected by approx. 8 m thick cover of stone and *tafl*. Mastaba over, with limestone walls 7 m thick. Core filled with *tafl* from shaft excavation, rubble and desert sand.

Tomb statistics: Substructure: Burial chamber 2.73 m long × 2.12 m wide × 3.2 m high. Superstructure: 31.8 m long × 15.8 m wide.

Robbed: Yes, via floor of burial chamber.

References: Stadelmann *et al.* 1993: 284-8.

Catalogue No. 212

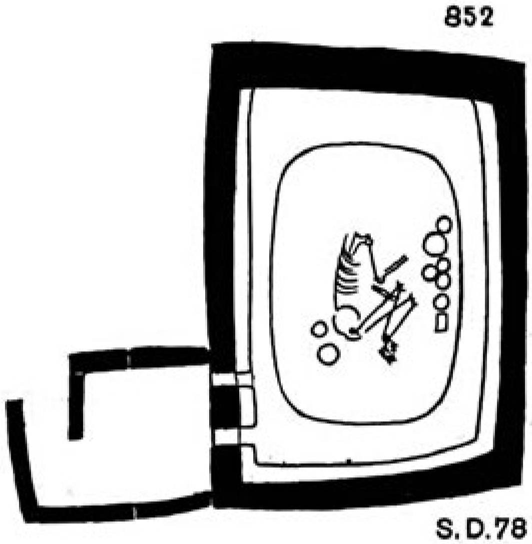


Illustration: Petrie 1914: Pl. XIV.

Identity: Mastaba 852

Location: Tarkhan

Period: Naqada IIIA

Substructure Type: IB

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: 0.45 m*

Security Features: Pit grave excavated in gravel with gravel backfill. Mud-brick mastaba over with gravel fill approx. 1 m deep.

Tomb statistics: Substructure: Pit 1.85 m long × 1.3 m wide* Superstructure: 3-2.8 m long × 2.1 m wide*

Robbed: Yes

References: Petrie 1914: 2–3; Grajetzki 2008: 104-5; Bárta 2011: 29-30; Snape 2011: 11–3.

***Scaled dimensions**

Catalogue No. 213

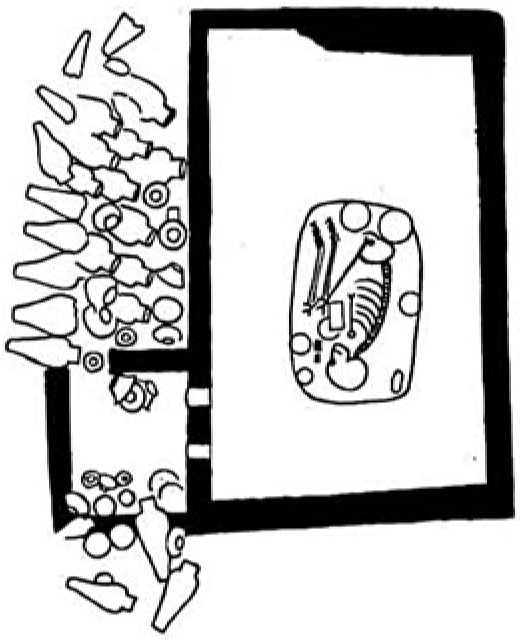


Illustration: Petrie 1914: Pl. XIV.

Identity: Mastaba 1845

Location: Tarkhan

Period: Naqada IIIA

Substructure Type: IB

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: 0.5 m*

Security Features: Pit grave excavated in gravel with gravel backfill. Mud-brick mastaba over with gravel fill approx. 1 m deep.

Tomb statistics: Substructure: Pit 1.2 m long × 0.75 m wide* Superstructure: 3-3.10 m long × 1.85-2.00 m wide*

Robbed: No

References: Petrie 1914: 2–3; Grajetzki 2008; 104-5; Bárta 2011: 29-30; Snape 2011: 11–3.

***Scaled dimensions**

Catalogue No. 214

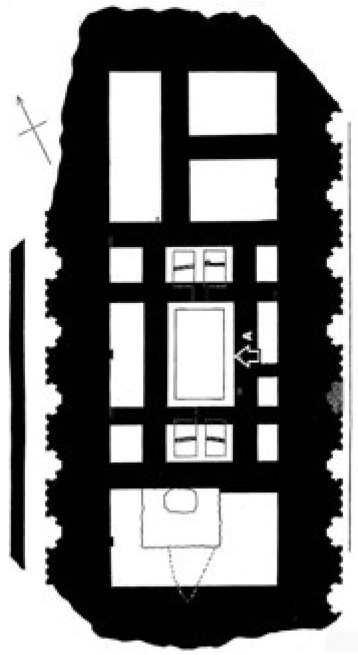


Illustration: Petrie, Wainwright & Gardiner 1913: Pl. LVI

Identity: Mastaba 1060

Location: Tarkhan

Period: Dynasty 1, Naqada IIIC1-2, reign of Djet

Substructure Type: IC

Liner: Mud-brick **Thickness:** 1.14 m

Superstructure: Yes

Footprint O/H: Approx. 6 m*

Security Features: Pit and four magazines excavated into gravel and marl bedrock. Burial chamber lined with mud-brick and closed with a 7.5 cm thick wooden roof. Possibly protective 0.3 cm thick stone slab cover over. Mud-brick mastaba with with 3.4 m thick walls, internal chambers filled with sand.

Tomb statistics: Substructure: Pit 13.3 m long × 4.92 m wide × 2.26 m deep. Burial chamber: 4.72 m long × 2.59 m wide × 2.26 m deep. Superstructure: 34.03 m long × 15.62 m wide × 0.68 m (remains).

Robbed: Yes, via robbers tunnel through brick walls

References: Petrie, Wainwright & Gardiner 1913: 13-20; Porter and Moss 1934: 86.

***Scaled dimensions**

Catalogue No. 215

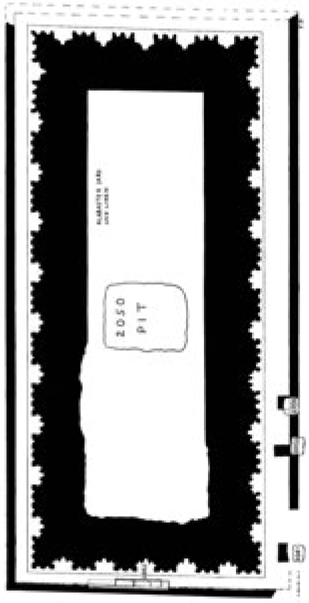


Illustration: Petrie 1914: Pl. XVIII.

Identity: Mastaba 2050

Location: Tarkhan

Period: Dynasty 1, Naqada IIIC2, reign of Den

Substructure Type: IB

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Approx. 4.85 m*

Security Features: Unlined burial chamber excavated in gravel and rock to a depth of approx. 6 m. Presumably roofed in wood? Large mud-brick mastaba with walls approx. 3.8 m thick* presumably filled with a sand or gravel core.

Tomb statistics: Substructure: Burial chamber 5.4 m long × 4.5 m wide × 6.1 m deep. Superstructure: 35.38 m long × 15.13 m wide.

Robbed: Yes

References: Petrie 1914: 3, 6-7; Reisner 1936: 38.

***Scaled dimensions**

Catalogue No. 216

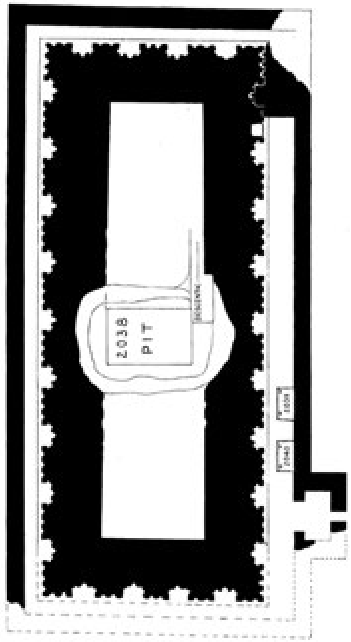


Illustration: Petrie 1914: Pl. XVIII.

Identity: Mastaba 2038

Location: Tarkhan

Period: Dynasty 1, Naqada IIIC2, reign of Den?

Substructure Type: IB

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Approx. 4.5 m*

Security Features: Burial pit excavated in rock and gravel. Internal access slope descends internally to 2.54 m from chamber's base. Possibly filled with wooden shrine chamber. Mud-brick mastaba over with 3.37–3.9 m thick walls and a gravel or sand fill.

Tomb statistics: Substructure: Pit/burial chamber 4.96 m long × 3.22 m wide × 5.58 m deep. Superstructure: 32.13 m long × 12.95 m wide.

Robbed: Yes

References: Petrie 1914: 4-5.

***Scaled dimensions**

Catalogue No. 217

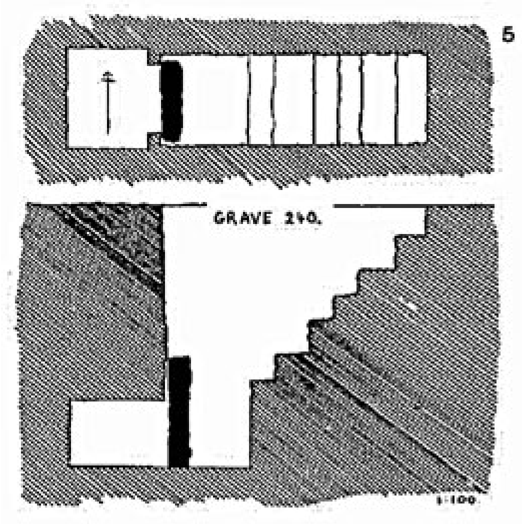


ILLUSTRATION: PETRIE & MACKAY 1915: PL. XII.5.

Identity: Grave 240

Location: Tarkhan (Kafr Amar)

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Stairs 3.17 m deep to freestanding portcullis obstructing entrance to burial chamber with natural rock roof approx. 2.3 m thick. Portcullis 1.32 m high × 0.96 m wide × 0.22 m. Estimated weight approximately 0.6 tonnes.

Tomb statistics: Substructure: Burial chamber 1.21 m long × 0.99 m wide × 0.81 m high.

Robbed: No

References: Petrie 1913: 27; Petrie & Mackay 1915: 10 and 15.

Catalogue No. 218

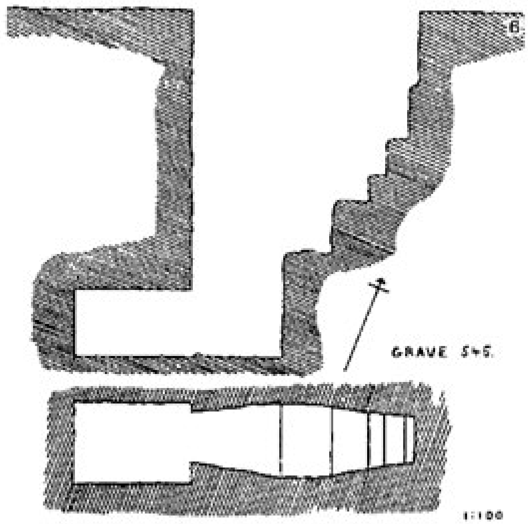


ILLUSTRATION: PETRIE & MACKAY 1915: PL. XII.6.

Identity: Grave 545

Location: Tarkhan (Kafr Amar)

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Stairs 4.57 m deep to small blocks of stone obstructing entrance to burial chamber with natural rock roof 3.7 m thick.

Tomb statistics: Substructure: Burial chamber 1.52 m long × 1.04 m wide × 0.88 m high

Robbed: No

References: Petrie 1913: 27; Petrie & Mackay 1915: 15-6.

Catalogue No. 219

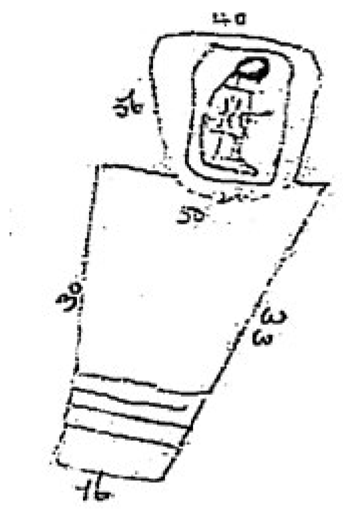


Illustration: Petrie 1999: Tarkhan tomb card KA1004. Courtesy of the Petrie Muesum of Egyptian Archaeology.

Identity: Tomb 1004

Location: Tarkhan

Period: Dynasty 3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Short stairway to wedge shaped stairwell to mud-brick blocking of entrance to subterranean burial chamber. Basket burial.

Tomb statistics: Substructure: Burial chamber 1.42 m long × 1.01 m wide × ??? m high.

Robbed: No

References: Petrie, Wainwright and Gardiner 1913: 13 and 27; Petrie 1999c: Tarkhan tomb card KA1004

Catalogue No. 220

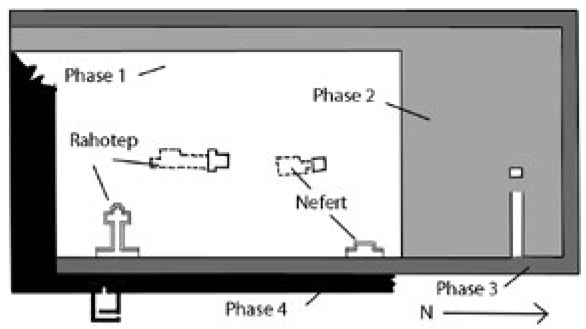


Illustration: Drawn by the author after Harpur 2001: Fig. 61.

Identity: Mastaba No. 6, Rahotep and Nefert.

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC + IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Rahotep: Shaft approx. 8 m deep* through mastaba meets approx. 4.5 m deep* rock cut shaft originally blocked with stone masonry, leads to portcullis in 'T' shaped emplacement obstructing entrance to rock cut burial chamber. Solid *tafl* roof approx. 2 m high* Nefert: Shaft approx. 12.5 m deep* through mastaba meets 5 m deep* rock cut shaft to burial chamber. Solid *tafl* roof approx. 3.75 m thick* + pebbles? Shaft had been sealed with liquid mud. Solid mud-brick mastaba over reinforced with wooden logs, stone lined cruciform chapel and offering niches concealed by up to two additional layers of mud-brick. Portcullis 2.56 m high × approx. 2 m wide × 0.45 m thick.* Estimated weight 6.6 tonnes.

Tomb statistics: Substructure: Rahotep burial chamber: 2.7 m long × 2 m wide × 3.4 m high* Nefert burial chamber: 4.3 m long × 3. 2 m wide × 1.8 m high* Superstructure: 81.45 m long × 39.31 m wide × 9 m high?

Robbed: Yes

References: Petrie 1892: 16-7; 1999a: 20; Reisner 1936: 211 and 213; Porter and Moss 1934: 90-2; Harpur 2001: 48-54.

***Scaled dimensions**

Catalogue No. 221

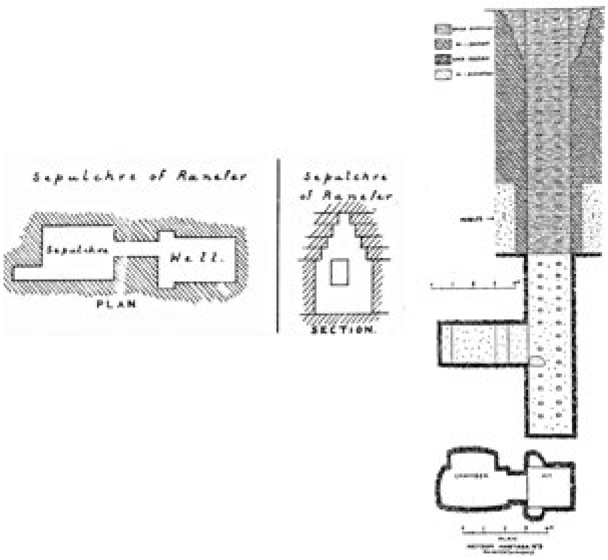


Illustration: Petrie 1892: Pl. VII; Reisner 1936: Fig 111.

Identity: Mastaba No. 9, Ranefer

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC + IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Ranefer: Shaft to portcullis (dimensions unknown) in grooved emplacement obstructing entrance to passage that was entirely blocked with masonry. Rock cut burial chamber with corbelled roof? Spouse: Shaft through 10.5 m of mud-brick mastaba and gravel to further 7.75 m rock = 18.25 m in all* Portcullis (missing) in 'T' shaped emplacement? Burial chamber floor set 3 m from base of shaft and protected from above by 3 m rock roof. Mud-brick mastaba over with 1.65 m thick external wall and gravel core .

Tomb statistics: Substructure: Ranefer's Burial chamber: 2.8 m long × 1.6 m wide × 3.8 m high* Spouse's burial chamber: 3.1 m long × 1.6 m wide × 1.7 m high* Superstructure: 54.88 m long × 29.48 m wide.

Robbed: Yes

References: Petrie 1892: 17; Porter and Moss 1934: 92; Reisner 1936: 212-3.

***Scaled dimensions**

Catalogue No. 222

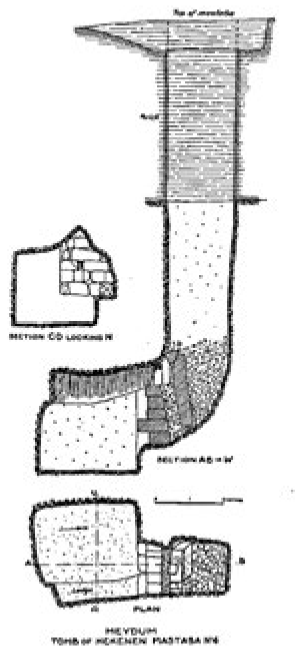


Illustration: Reisner 1936: Fig. 113.

Identity: Mastaba No. 4, Heneken.

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Shaft 5.25 m through mud-brick superstructure + 7 m deep rock-cut with rubble blocking and large free-standing portcullis slab obstructing entrance to stone blocked doorway to rock cut burial chamber. Rock roof of burial chamber approx. 4.7 m thick.* Mud-brick mastaba over. Portcullis 2.1 m high × 0.95 m wide × 0.35 m thick. Estimated weight 1.5 tonnes.

Tomb statistics: Substructure: Burial chamber 3 m long × 2.5 m wide × 2.7 m high* Superstructure: Dimensions N/A

Robbed: Yes

References: Petrie 1892: 20; Porter and Moss 1934: 90; Reisner 1936: 214-5.

***Scaled dimensions**

Catalogue No. 223

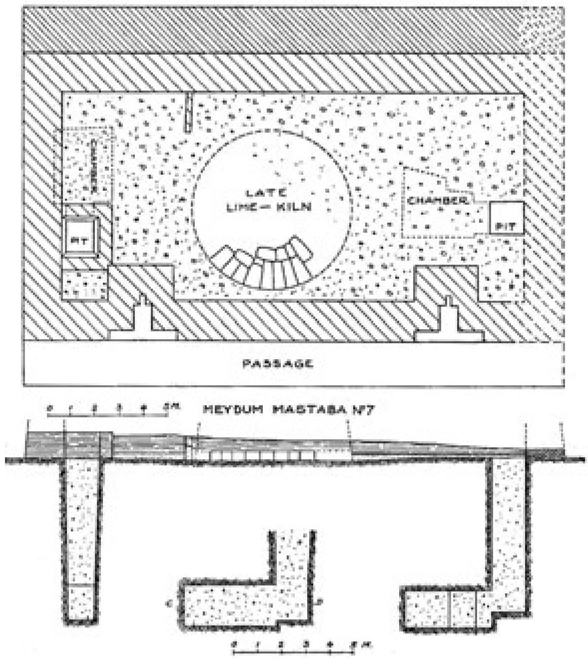


Illustration: Reisner 1936: fig 112.

Identity: Mastaba No. 7

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC + IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Southern rock-cut shaft 6.7 m deep* to rock cut burial chamber, with 5.5m thick natural rock roof.* Northern rock-cut shaft 6.5 m deep to rock cut burial chamber, with 5.2 m thick natural rock roof.* Mud-brick mastaba over with walls 1.75 m thick and 'stone chip' core.

Tomb statistics: Substructure: Southern burial chamber: 1.4 m long × 1.3 m wide × 1.7 m high* Northern burial chamber: 3 m long × 2.9 m wide × 1.5 m high* Superstructure: 22.75 m long × 12 m wide (core)*

Robbed: Yes

References: Petrie 1892: 20; Porter and Moss 1934: 92; Reisner 1936: 214 and 224.

***Scaled dimensions**

Catalogue No. 224

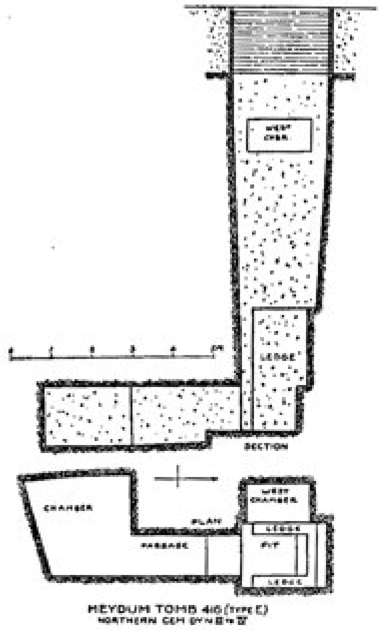


Illustration: Reisner 1936: Fig. 114.

Identity: Tomb 416, Northern Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 10.3 m deep* with portcullis (missing) in rock cut 'T' shaped emplacement only at lower end of shaft obstructing entrance to rock-cut passage and burial chamber. Rock roof of burial chamber 7.2 m thick.*

Tomb statistics: Substructure: Burial chamber approx. 2.5 m long × 2.4 m wide × 1.4 m high*

Robbed: ?

References: Reisner 1936: 215.

***Scaled dimensions**

Catalogue No. 225

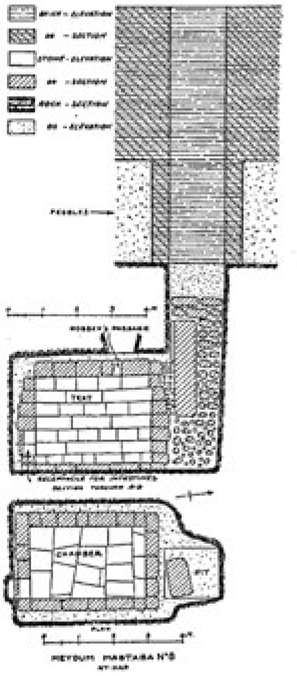


Illustration: Reisner 1936: Fig. 109.

Identity: Mastaba No. 8

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC + IIC + IIC

Liner: Mud-brick **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 3 × No shafts through body of superstructure into bedrock. Southern shaft (illustrated): 7.5 m deep in mastaba + 5.8 m in bedrock. Lower section in bedrock filled with large 'floating' slab/portcullis and large stones obstructing access to stone lined burial chamber. Rock roof over burial chamber 2.7 m thick. Portcullis 2.8 m high × 1.1 m wide × 0.6 m wide. Estimated weight 3.97 tonnes. Middle shaft: 9.1 m deep in mastaba + 2.73 m in bedrock entirely filled with 'yellow rock' chips blocking access to empty burial chamber. Northern shaft: shaft to burial chamber, depth and filling unknown. Solid mud-brick mastaba over.

Tomb statistics: Substructure: Southern burial chamber 3.35 m long × 2.1 m wide × 2.5 m high*. Middle burial chamber: 1.6 m long × 1.4 m wide. Northern burial chamber: 1.98 m long × 2.46-2.2 m wide. Superstructure: 40.89 m long × 15.64 m wide × 4.97 m high.

Robbed: Yes, southern via tunnel through roof

References: Petrie 1892: 18-9; Porter and Moss 1934: 92; Reisner 1936 : 212.

***Scaled dimensions**

Catalogue No. 226

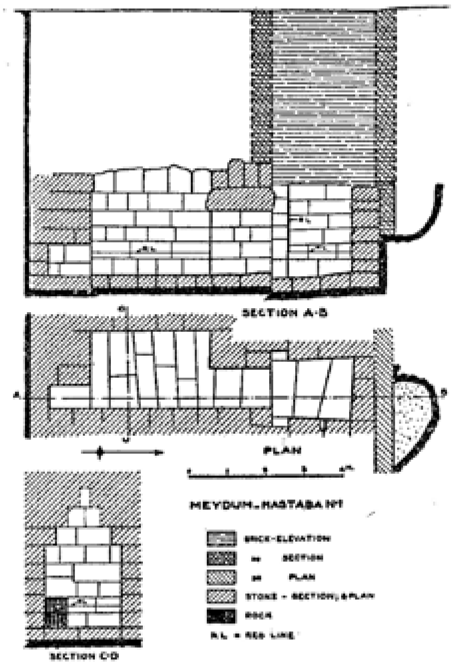


Illustration: Reisner 1936: Fig. 108.

Identity: Mastaba No. 1

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: N/A

Security Features: Tomb built in trench. Brick and stone lined shaft 6.9 m deep* to portcullis (missing) in 2.4 m deep 'T' shaped emplacement obstructing entrance to stone built passage and burial chamber. Corbelled roof to burial chamber.

Tomb statistics: Substructure: Burial chamber 3.1 m long × 2 m wide. Superstructure: Dimensions N/A

Robbed: Yes, by tunnel from southern false door.

References: Petrie 1892: 20; Reisner 1936: 212.

***Scaled dimensions**

Catalogue No. 227

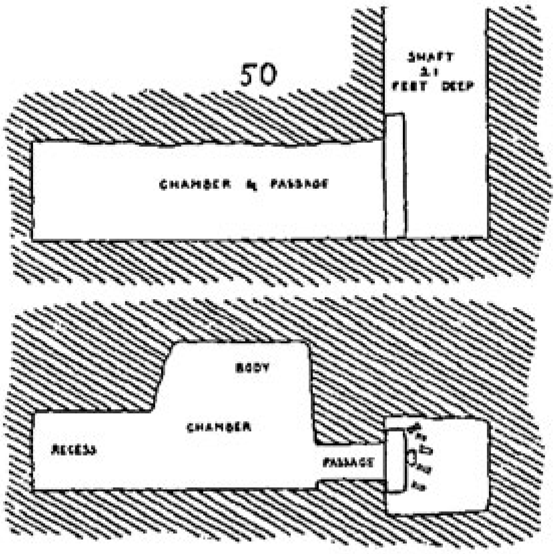


ILLUSTRATION: PETRIE, MACKAY AND WAINWRIGHT 1910: PL. XVIII.

Identity: Tomb 50, Far Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: None

Footprint O/H: N/A

Security Features: Shaft 6.4 m deep to freestanding portcullis obstructing entrance to rock-cut passage and burial chamber. Gravel and loose rock over burial chamber approx. 4.8 m thick. Portcullis: 2.08m high × 1.06 m wide × 0.4 m thick. Estimated weight 1.9 tonnes.

Tomb statistics: Substructure: Burial chamber: 4.8 m long × 2.5 m wide × 1.6 m high.

Robbed: No

References: Petrie, Mackay and Wainwright 1910: 6, 26 and 28.

Catalogue No. 228

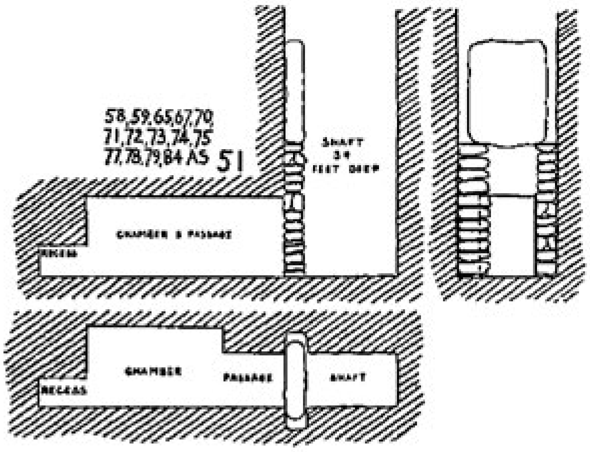


ILLUSTRATION: PETRIE, MACKAY AND WAINWRIGHT 1910: PL. XVII.

Identity: Tomb 51, Far Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: None

Footprint O/H: N/A

Security Features: Shaft 11.8 m deep to portcullis in 'T' shaped emplacement obstructing entrance to stone lined passage and burial chamber with canopic recess. Stone liner + gravel and loose rock roof over burial chamber approx. 10.2 m thick. Portcullis: 1.72 m high × 1.5 m wide × 0.5 m thick. Estimated weight 2.77 tonnes.

Tomb statistics: Substructure: Burial chamber 2.65 m long × 1.29m wide × 1.56 m high

Robbed: ?

References: Petrie, Mackay and Wainwright 1910: 26 and 28.

Catalogue No. 229

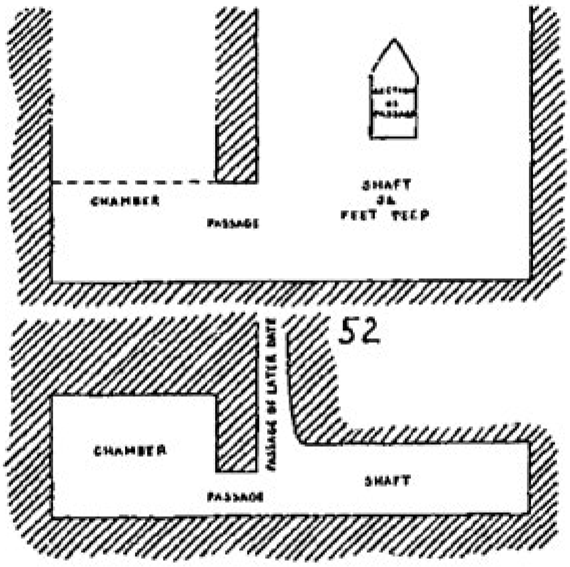


Illustration: Petrie, Mackay and Wainwright 1910: Pl. XVIII.

Identity: Tomb 52, Far Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: None

Footprint O/H: N/A

Security Features: Shaft 9.75 m deep to mud brick blocking obstructing entrance to rock-cut passage and gable roofed burial chamber.

Tomb statistics: Substructure: Burial chamber 2.48 m long × 0.61 m wide × ? m high.

Robbed: No

References: Petrie, Mackay and Wainwright 1910: 27.

Catalogue No. 230

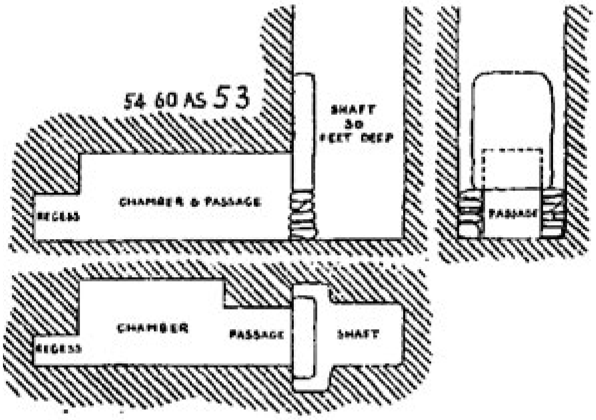


Illustration: Petrie, Mackay and Wainwright 1910: Pl. XVII.

Identity: Tomb 53, Far Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: None

Footprint O/H: N/A

Security Features: Shaft 9.14 m deep to portcullis in 'T' shaped emplacement obstructing entrance to stone lined passage and burial chamber with canopic recess. Stone liner + gravel and loose rock roof over burial chamber approx. 7.6 m thick Portcullis: Approx. 2.1 m high × 1.3 m wide × 0.4 m thick* Estimated weight 1.85-2.83 tonnes.

Tomb statistics: Substructure: Burial chamber approx. 2.6 m long × 1.5 m wide × 1.5 m high*

Robbed: ?

References: Petrie, Mackay and Wainwright 1910: 26.

***Scaled dimensions**

Catalogue No. 231

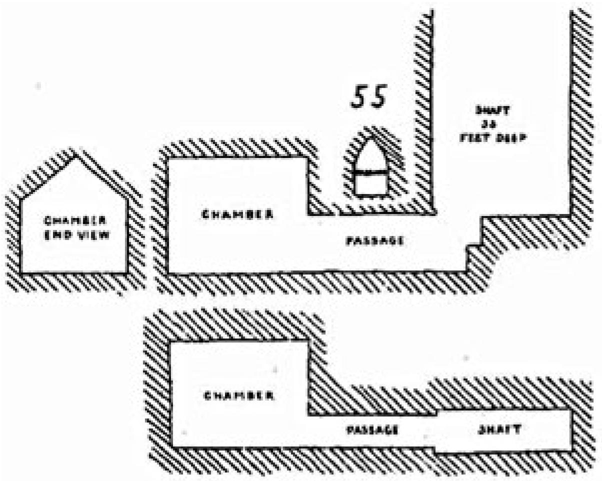


Illustration: Petrie, Mackay and Wainwright 1910: Pl. XVIII.

Identity: Tomb 55, Far Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: None

Footprint O/H: N/A

Security Features: Shaft 10.05 m deep to mud brick blocking obstructing entrance to rock-cut passage and gable roofed burial chamber. Gravel and loose rock over burial chamber approx. 9 m thick.

Tomb statistics: Substructure: Burial chamber 2.48 m long × 0.61 m wide × 2.13 m high.

Robbed: No

References: Petrie, Mackay and Wainwright 1910: 6 and 27.

Catalogue No. 232

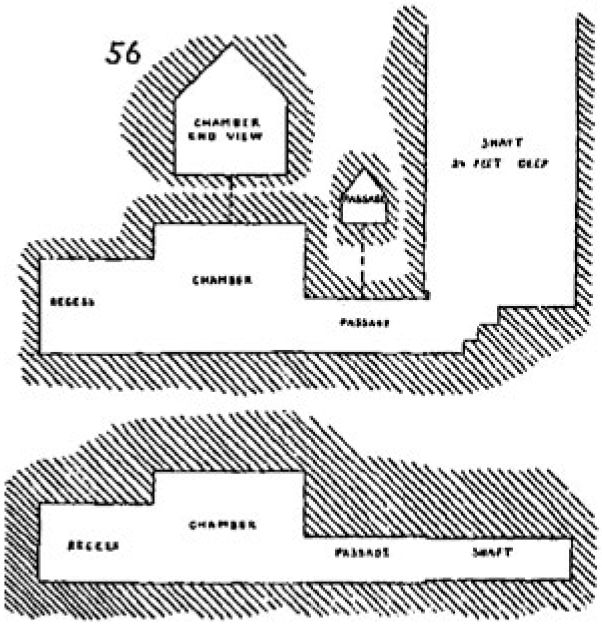


Illustration: Petrie, Mackay and Wainwright 1910: Pl. XVIII.

Identity: Tomb 56, Far Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: None

Footprint O/H: N/A

Security Features: Shaft 10.36 m deep to mud-brick blocking (dating from Dynasty 22) obstructing entrance to rock-cut passage and gable roofed burial chamber and recess. Gravel and loose rock over burial chamber approx. 8.9 m thick.

Tomb statistics: Substructure: Burial chamber 2.69 m long × 2.05 m wide × 2.43 m high.

Robbed: No, but contained six secondary 22nd Dynasty burials

References: Petrie, Mackay and Wainwright 1910: 27.

Catalogue No. 233

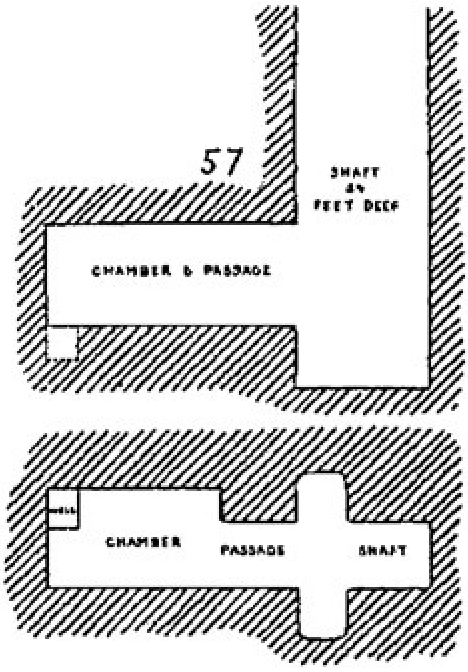


ILLUSTRATION: PETRIE, MACKAY AND WAINWRIGHT 1910: PL. XVIII

Identity: Tomb 57, Far Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: None

Footprint O/H: N/A

Security Features: Shaft 10.36 m deep to portcullis (missing) in ‘T’ shaped emplacement obstructing entrance to stone lined passage and burial chamber with canopic recess in floor. Stone liner + gravel and loose rock roof over burial chamber approx. 7.9 m thick.

Tomb statistics: Substructure: Burial chamber 2.61 m long × 1.56 m wide × 1.57 m high.

Robbed: ?

References: Petrie, Mackay and Wainwright 1910: 26.

Catalogue No. 234

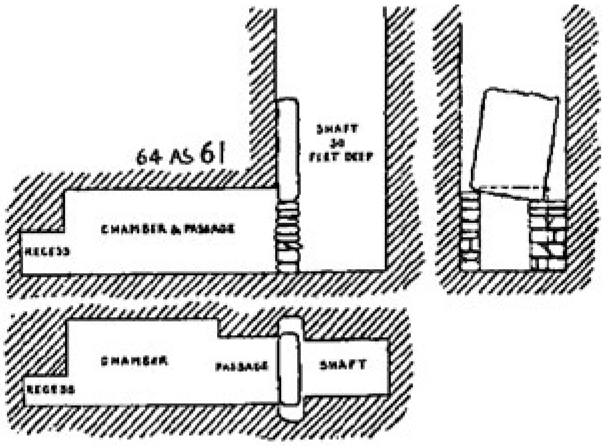


ILLUSTRATION: PETRIE, MACKAY AND WAINWRIGHT 1910: PL. XVII.

Identity: Tomb 61, Far Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: None

Footprint O/H: N/A

Security Features: Shaft 9.14 m deep to portcullis in ‘T’ shaped emplacement obstructing entrance to stone lined passage and burial chamber with canopic recess. Stone liner + gravel and loose rock roof over burial chamber approx. 7.6 m thick. Portcullis: 1.76 m high × 1.29 m wide × 0.38 m thick. Estimated weight 1.97 tonnes.

Tomb statistics: Substructure: Burial chamber approx. 2.6 m long × 1.5 m wide × 1.5 m high*

Robbed: ?

References: Petrie, Mackay and Wainwright 1910: 26 and 28.

***Scaled dimensions**

Catalogue No. 235

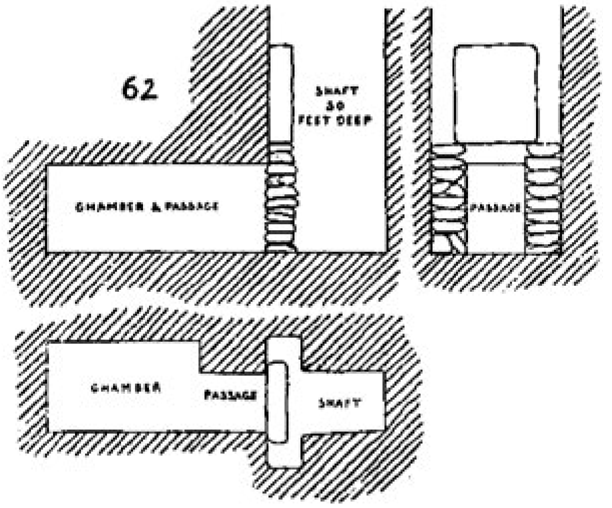


Illustration: Petrie, Mackay and Wainwright 1910: Pl. XVII.

Identity: Tomb 62, Far Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: None

Footprint O/H: N/A

Security Features: Shaft 10.36 m deep to portcullis in 'T' shaped emplacement obstructing entrance to stone lined burial chamber. Stone liner + gravel and loose rock roof over burial chamber approx. 8.7 m thick.

Portcullis: 1.67 m high × 1.42 m wide × 0.43 m thick. Estimated weight 1.99 tonnes.

Tomb statistics: Substructure: Burial chamber 2.7 m long × 1.6 m wide × 1.58 m high.

Robbed: ?

References: Petrie, Mackay and Wainwright 1910: 25 and 28.

Catalogue No. 236

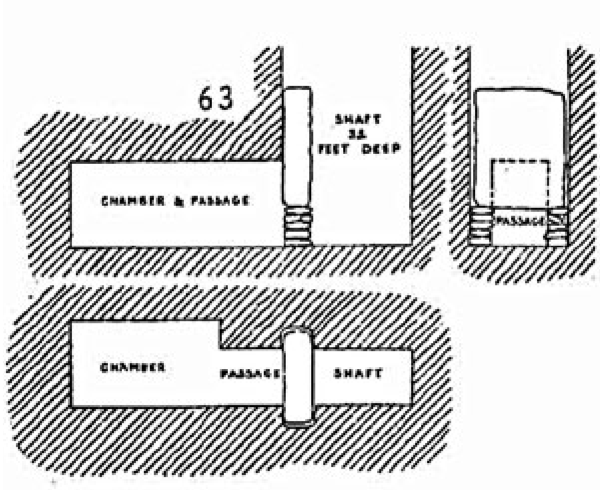


Illustration: Petrie, Mackay and Wainwright 1910: Pl. XVII.

Identity: Tomb 63, Far Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: None

Footprint O/H: N/A

Security Features: Shaft 9.75 m deep to portcullis in 'T' shaped emplacement obstructing entrance to stone lined passage and burial chamber. Stone liner + gravel and loose rock roof over burial chamber approx. 8.2 m thick. Portcullis: 2.57 m high × 1.6 m wide × 0.48 m thick. Estimated weight 4.24 tonnes.

Tomb statistics: Substructure: Burial chamber: 2.5 m long × 1.52 m wide × 1.54 m high.

Robbed: ?

References: Petrie, Mackay and Wainwright 1910: 25 and 28.

Catalogue No. 237

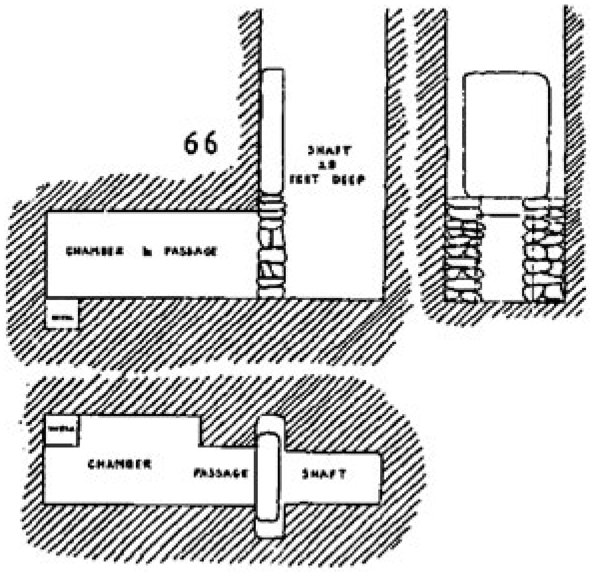


Illustration: Petrie, Mackay and Wainwright 1910: Pl. XVIII.

Identity: Tomb 66, Far Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: None

Footprint O/H: N/A

Security Features: Shaft 8.53 m deep to portcullis in 'T' shaped emplacement

obstructing entrance to stone lined passage and burial chamber

with canopic recess in floor. Stone liner + gravel and loose rock

roof over burial chamber approx. 7 m thick.

Portcullis: 1.85 m high × 1.57 m wide × 0.38 m thick.

Estimated weight approx. 2.37 tonnes.

Tomb statistics: Substructure: Burial chamber 2.08 m long × 1.58 m wide × 1.52 m high

Robbed: ?

References: Petrie, Mackay and Wainwright 1910: 26.

Catalogue No. 238

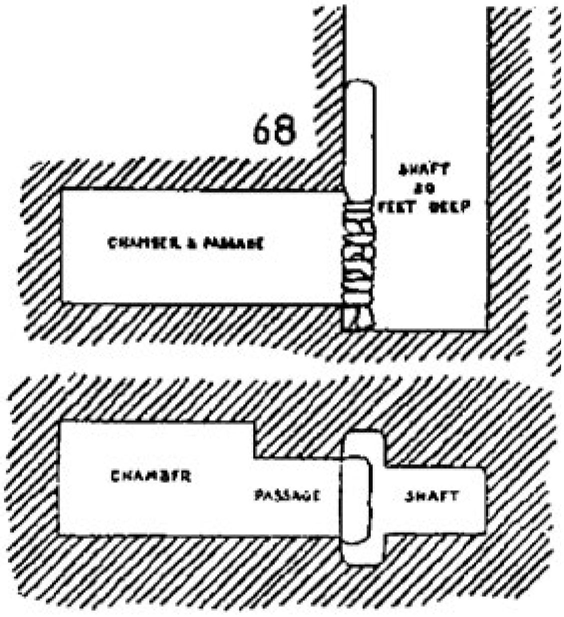


Illustration: Petrie, Mackay and Wainwright 1910: Pl. XVII.

Identity: Tomb 68, Far Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: None

Footprint O/H: N/A

Security Features: Shaft 9.14 m deep to portcullis in 'T' shaped emplacement obstructing entrance to stone lined passage and burial chamber. Stone liner + gravel and loose rock roof over burial chamber approx. 7.5 m thick. Portcullis: 1.67m high × 1.16 m wide × 0.35 m thick Estimated weight 1.46 tonnes.

Tomb statistics: Substructure: Burial chamber 2.64 m long × 1.57 m wide × 1.56 m high.

Robbed: ?

References: Petrie, Mackay and Wainwright 1910: 25-6, 28.

Catalogue No. 239

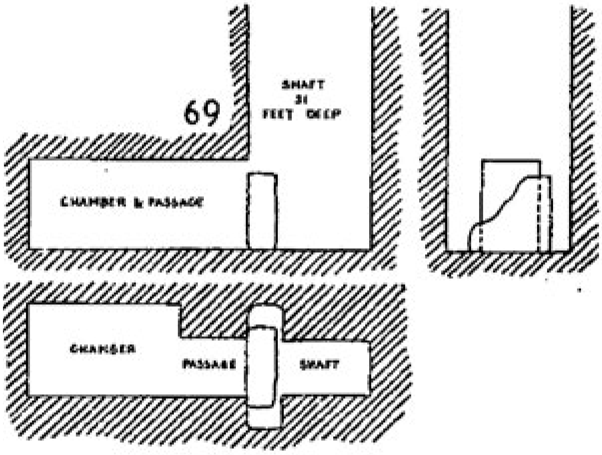


Illustration: Petrie, Mackay and Wainwright 1910: Pl. XVII.

Identity: Tomb 69, Far Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: None

Footprint O/H: N/A

Security Features: Shaft 9.44 m deep to portcullis in 'T' shaped emplacement obstructing entrance to stone lined passage and burial chamber. Stone liner + gravel and loose rock roof over burial chamber approx. 7.8 m thick. Broken portcullis: Approx. 1.2 m high × 1.2 m wide × 0.5 m thick* Estimated weight 1.55 tonnes.

Tomb statistics: Substructure: Burial chamber 2.61 m long × 1.6 m wide × 1.56 m high.

Robbed: ?

References: Petrie, Mackay and Wainwright 1910: 26.

Catalogue No. 240

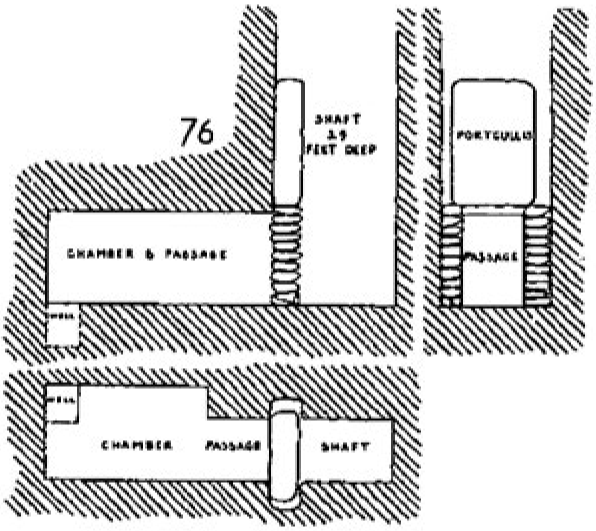


Illustration: Petrie, Mackay and Wainwright 1910: Pl. XVIII.

Identity: Tomb 76, Far Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: None

Footprint O/H: N/A

Security Features: Shaft 8.83 m deep to portcullis in 'T' shaped emplacement obstructing entrance to stone lined passage and burial chamber with canopic recess in floor. Stone liner + gravel and loose rock roof over burial chamber approx. 7.2 m thick. Portcullis: 2.05m high × 1.37 m wide × 0.45 m thick. Estimated weight: 2.72 tonnes.

Tomb statistics: Substructure: Burial chamber 2.64 m long × 1.56 m wide × 1.56 m high.

Robbed: ?

References: Petrie, Mackay and Wainwright 1910: 26 and 28.

***Scaled dimensions**

Catalogue No. 241

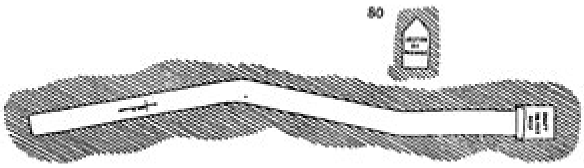


Illustration: Petrie, Mackay and Wainwright 1910: Pl. XVII.

Identity: Tomb 80, Far Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: None

Footprint O/H: N/A

Security Features: Shaft 4.11 m deep leads to free-standing portcullis (dimensions unavailable) blocking entrance to gable roofed passage 13.79 m long. Gravel and loose rock over burial chamber approx. 2.1 m thick.

Tomb statistics: Substructure: Passage/burial chamber? 0.93 m wide × 1.93 m high.

Robbed: Yes via two tunnels into passage

References: Petrie, Mackay and Wainwright 1910: 27-8.

Catalogue No. 242

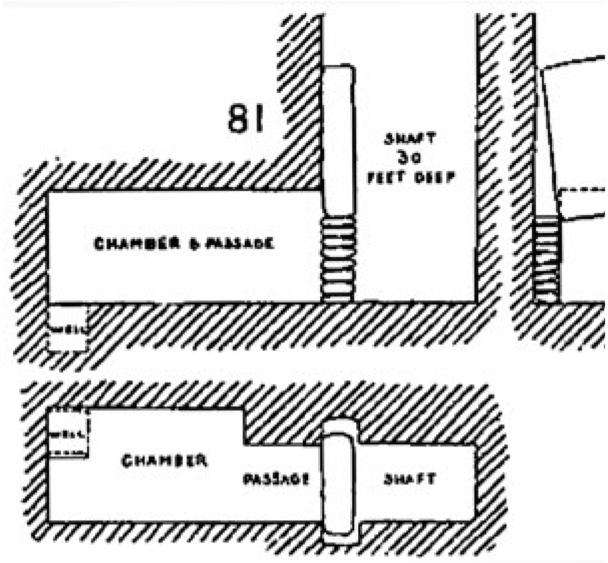


Illustration: Petrie, Mackay and Wainwright 1910: Pl. XVIII.

Identity: Tomb 81, Far Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: None

Footprint O/H: N/A

Security Features: Shaft 9.14 m deep to portcullis in 'T' shaped emplacement obstructing entrance to stone lined passage and burial chamber with canopic recess in floor. Stone liner + gravel and loose rock roof over burial chamber approx. 7.6 m thick. Portcullis: 2.07 m high × 1.34 m wide × 0.4 m thick. Estimated weight 2.39 tonnes.

Tomb statistics: Substructure: Burial chamber 2.64 m long × 1.56 m wide × 1.52 m high.

Robbed: ?

References: Petrie, Mackay and Wainwright 1910: 26 and 28.

Catalogue No. 243

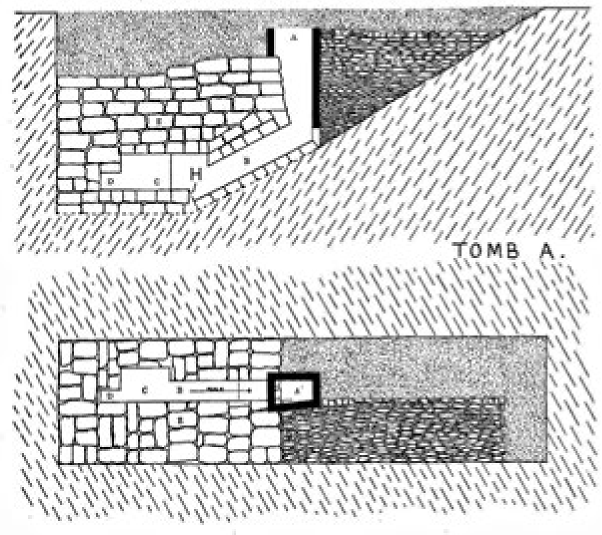


Illustration: Petrie, Mackay and Wainwright 1910: Pl. XV.

Identity: Tomb A, Great Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: III

Liner: Stone **Thickness:** 1.5-3.5 m

Superstructure: No

Footprint O/H: N/A

Security Features: Substructure built within trench. Brick-lined shaft 6.04 m deep leads to descending stone lined corridor 4.92 m long obstructed by plug blocks. Offset stone built burial chamber built to fill trench void with 4 m + thick stone block roof.* Chamber protected by tone roof/backfill approx. 7.5 m thick. Partial rough stone filling on north-east of shaft, rest of backfill sand. Plug blocks approx. 1.95–3 tonnes each.

Tomb statistics: Substructure: Trench: 25.9 m long × 6.62 m wide × approx. 10.75 m deep. Burial chamber 2.5 m long × 1.8 m wide × 1.8 m high.

Robbed: Yes

References: Petrie, Mackay and Wainwright 1910: 5 and 22-3.

Catalogue No. 244

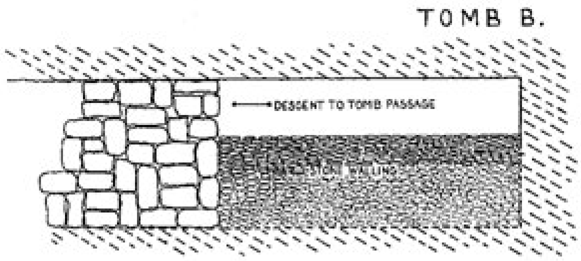


Illustration: Petrie, Mackay and Wainwright 1910: Pl. XV.

Identity: Tomb B, Great Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: III

Liner: Stone **Thickness:** Unknown

Superstructure: No

Footprint O/H: N/A

Security Features: Substructure built within trench. Offset sloping path to descending stone lined corridor 4.94 m long obstructed by plug blocks. Stone built burial chamber built to fill trench void with thick stone block roof. Partial rough stone filling on east of descent slope, rest of backfill sand. Plug blocks approx. 1.95–3 tonnes each.

Tomb statistics: Substructure: Burial chamber 2.69 m long × 1.81 m wide × 1.85 m high.

Robbed: Yes

References: Petrie, Mackay and Wainwright 1910: 5 and 23-4.

***Scaled dimensions**

Catalogue No. 245

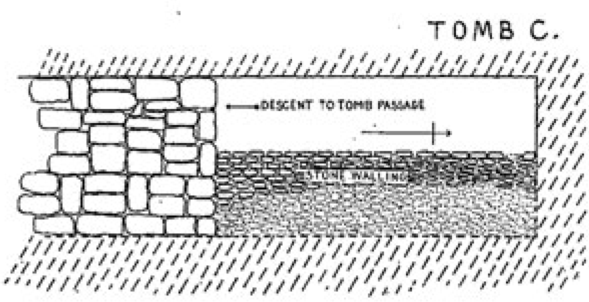


ILLUSTRATION: PETRIE, MACKAY AND WAINWRIGHT 1910: PL. XV.

Identity: Tomb C, Great Western Cemetery

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: III

Liner: Stone **Thickness:** Unknown

Superstructure: No

Footprint O/H: N/A

Security Features: Substructure built within trench. Offset sloping path to descending stone lined corridor 4.93 m long obstructed by plug blocks. Stone built burial chamber built to fill trench void with thick stone block roof and backfill. Partial rough stone filling on east of descent slope, rest of backfill sand. Plug blocks approx. 1.95–3 tonnes each.

Tomb statistics: Substructure: Burial chamber: 2.59 m long × 1.9 m wide × 1.86 m high.

Robbed: Yes

References: Petrie, Mackay and Wainwright 1910: 5 and 24.

Catalogue No. 246

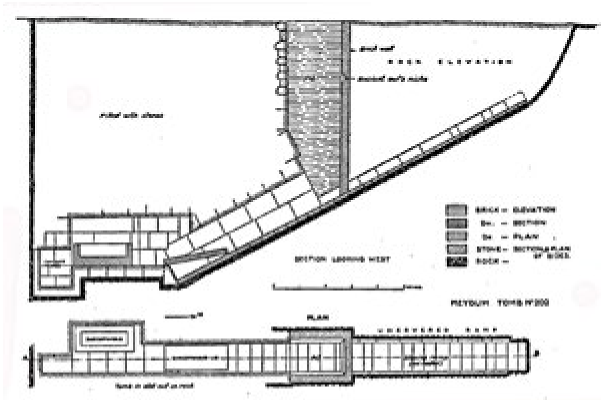


ILLUSTRATION: REISNER 1936: FIG. 101.

Identity: Tomb 202.

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: III

Liner: Stone **Thickness:** Unknown

Superstructure: No

Footprint O/H: N/A

Security Features: Substructure built within 10 m deep* trench. Stone paved slope, built over by brick shaft, to descending stone lined corridor 6.2 m* long. which leads to stone built burial chamber with canopic niche built to fill trench void. Stone block roof and stone sarcophagus. Stone roof/backfill over chamber approx. 7.5 m* thick.

Tomb statistics: Substructure: Trench: 28.25m long × 1.53 m wide × approx. 10 m deep.* Burial chamber 2.62 m long × 1.82 m wide × 1.8 m high.*

Robbed: Yes, via shaft.

References: Reisner 1936: 207.

***Scaled dimensions**

Catalogue No. 247

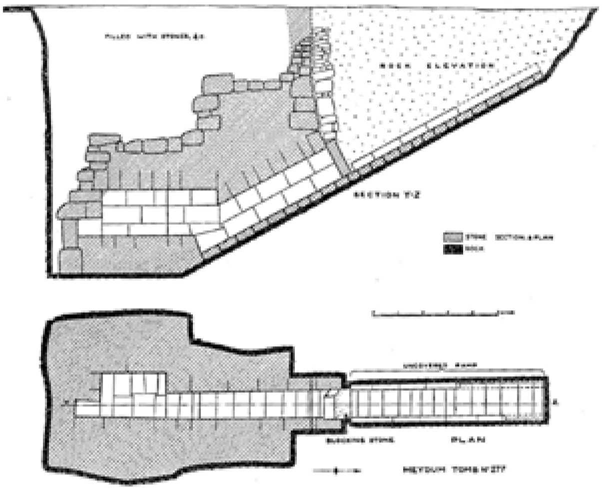


Illustration: Reisner 1936: Fig. 100.

Identity: Tomb 277, west of pyramid enclosure

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: III

Liner: Stone **Thickness:** Varies

Superstructure: No

Footprint O/H: N/A

Security Features: Substructure built within 10.75 m* deep trench. Stone paved slope to freestanding portcullis slab obstructing descending stone lined corridor 6.3 m* long, to stone built burial chamber built to fill trench void with stone block roof. Stone roof/backfill over chamber approx. 7.6 m* thick. Portcullis approx. 1.5 m high × 1.2 m wide × 0.4 m thick.* Estimated weight 1.55 tonnes.

Tomb statistics: Substructure: Trench: 19.75m long × 1.53 m wide × 10.75 m.* Burial chamber 2.6 m long × 1.8 m wide × 1.8 m high.*

Robbed: Yes, via shaft

References: Reisner 1936: 206-7.

***Scaled dimensions**

Catalogue No. 248

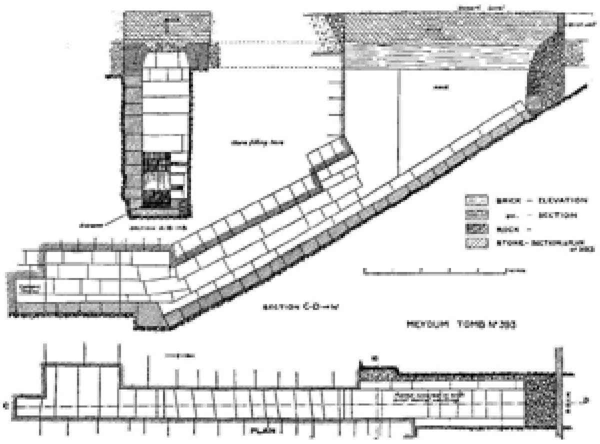


Illustration: Reisner 1936: Fig. 102.

Identity: Tomb 393.

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: III

Liner: Stone **Thickness:** Unknown

Superstructure: No

Footprint O/H: N/A

Security Features: Substructure built within trench 10.6 m deep. Stone paved slope covered by by vaulted brick arch leads to descending stone lined corridor approx. 8 m* long. which leads to stone built burial chamber with canopic niche, built to fill trench void. Stone block roof and stone sarcophagus. Stone roof/backfill over chamber approx. 8.4 m* thick.

Tomb statistics: Substructure: Burial chamber 2.62 m long × 1.82 m wide × 1.8 m high*

Robbed: Yes

References: Reisner 1936: 207.

***Scaled dimensions**

Catalogue No. 249

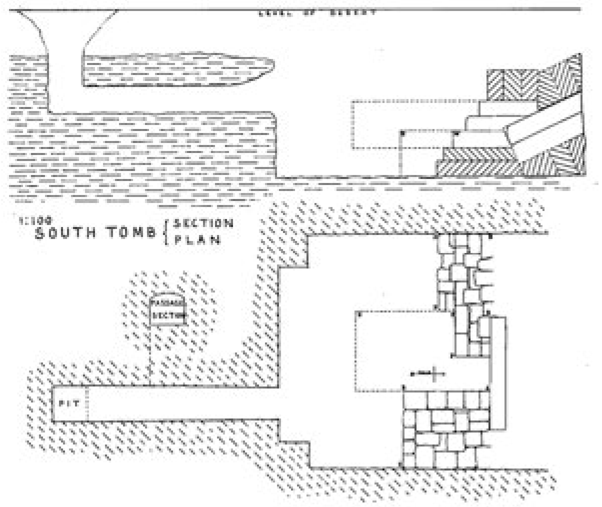


Illustration: Petrie, Mackay and Wainwright 1910: Pl. IX.

Identity: South Peribolous tomb (satellite pyramid)

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: III

Liner: ? **Thickness:** N/A

Superstructure: Yes

Footprint O/H: Unknown

Security Features: Stone lined sloping passage filled with two layers of stone forming plug blocks leads to limestone block lined burial chamber. Possibly pyramid over.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: Possible pyramid base 27 m × 27 m.

Robbed: Yes

References: Petrie, Mackay and Wainwright 1910: 10; Edwards 2009: 90.

Catalogue No. 250

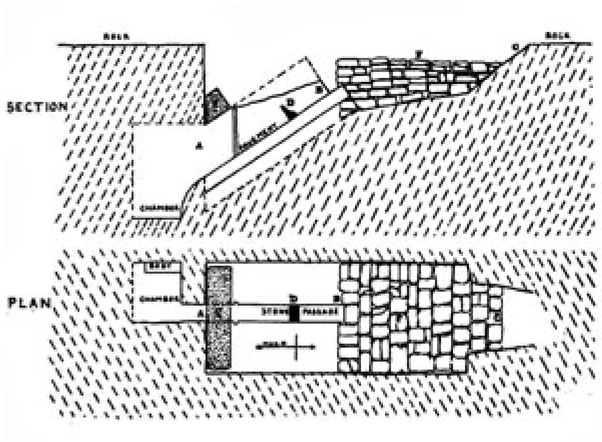


Illustration: Petrie, Mackay and Wainwright 1910: Pl. IX

Identity: North Peribolous tomb

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: III

Liner: None **Thickness:** N/A

Superstructure: Missing

Footprint O/H: Unknown

Security Features: Sloping passage 5.89 m long blocked by plug stones leads to portcullis (missing) in grooved emplacement obstructing progress to entirely rock cut burial chamber, with approx. 3.25 m thick* rock roof + 'pyramid rubbish'. Possibly mud-brick mastaba over, now destroyed.

Tomb statistics: Substructure: Burial chamber: 2.31 m long × 1.93 m wide × 3.93 m high (estimated).

Robbed: No

References: Petrie, Mackay and Wainwright 1910: 12-3.

***Scaled dimensions**

Catalogue No. 251

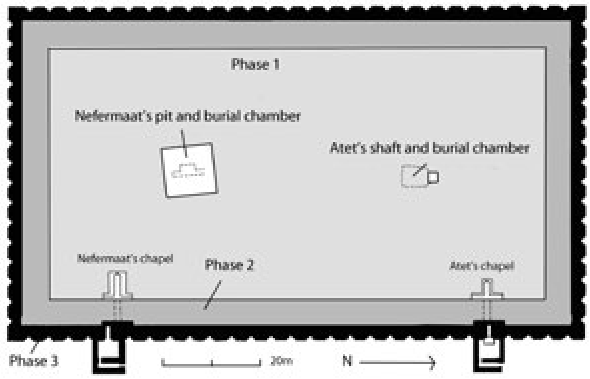


Illustration: Drawn by the author after Harpur 2001, fig. 38 and Jánosi 2006, Abb. 33

Identity: Mastaba No. 16, Nefermaat and Atet

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: III + IIC

Liner: Stone/ Rock-cut **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: *Nefermaat:* Type III Sloping passage filled with liquid Nile mud leads to wooden door. Beyond mortared stone masonry blocking passage and entrance to corbelled stone built burial chamber built at the bottom of a 4.57 m deep mud and stone slab filled shaft. *Atet:* Deep mud filled shaft of unknown depth to large freestanding portcullis obstructing entrance to rock-cut burial chamber. Mastaba over with hardened liquid mud and stone chip core. Niche chapels lined with stone monoliths concealed by addition of further outer two layers of mud-brick. 1 m thick gravel and sand roof. Portcullis: 3.5 m high × 1.65 m wide × 0.55 m thick* Estimated weight 6.83 tonnes.

Tomb statistics: Substructure: Nefermaat burial chamber: 3.15 m long × 2.05 m wide × 2.37 m high. Atet burial chamber: Approx. 5.3 m long × 4 m wide × 2.9 m high.* Superstructure: 120 m long × 68 m wide × 10 m high.

Robbed: Yes, before tomb was closed

References: Petrie, Mackay and Wainwright 1910: 4-6, 18-22; 1912: 25-6; Porter and Moss 1934: 92–4; Harpur 2001: *passim*; Jánosi 2006: 39-43.

***Scaled dimensions**

Catalogue No. 252

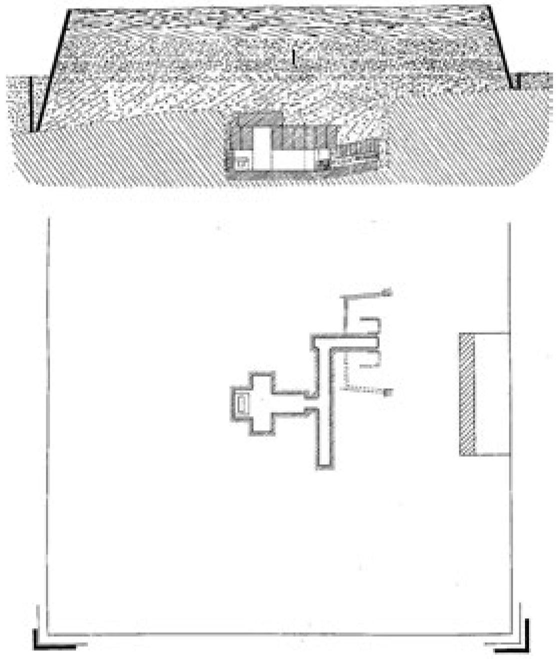


illustration: Petrie, Mackay and Wainwright 1910: Pl. XII

Identity: Mastaba No. 17, owner unknown

Location: Meidum

Period: Dynasty 4, Sneferu

Substructure Type: III

Liner: Stone **Thickness:** 1 m at rear of b/chamber

Superstructure: Yes

Footprint O/H: N/A

Security Features: Entirely built within a rock-cut pit a descending sloped passage obstructed by stone plug blocking and roofed with stone beams set on edge leads to a stone lined horizontal passage. Beyond a stone lined burial chamber and passage roofed with large 38 tonne monoliths up to 5.53 m long × 2.16 m high × 1.27 m thick for protection. Granite sarcophagus with lid (possibly earliest known). Mud-brick mastaba over filled with with 100,000 tonnes of layered limestone chip core . Internal dry stone cross walls offer bracing against the core's collapse and provide hazard to tunnellers.

Tomb statistics: Substructure: Main hall 6.27 m long × 2.08 m wide × 5 m high. Superstructure: 103.05 m long × 51.6 m wide.

Robbed: Yes, via robbers tunnel in bedrock avoiding gravel fill, then through burial chamber wall.

References: Petrie 1892: 11-4; Petrie, Mackay and Wainwright 1910: 3-4, 13-8. Porter and Moss 1934: 94; Reisner 1936: 209; Jánosi 2006: 37-9.

Catalogue No. 253

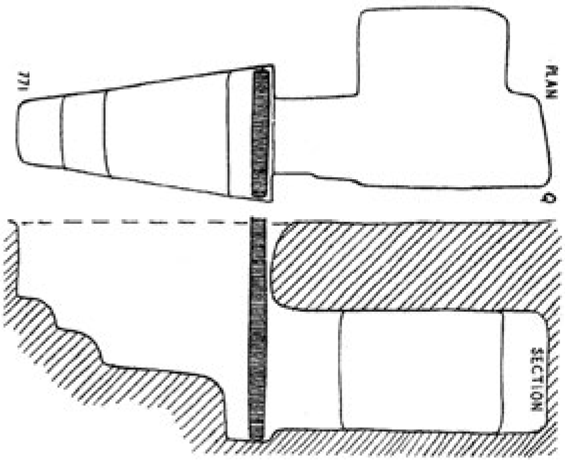


Illustration: Petrie, Brunton & Murray 1923: Pl. XLII, fig. Q.

Identity: Tomb 771

Location: Lahun, Bashkatib Cemetery

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Deep rock-cut staircase descends to depth of 1.39 m. Portcullis slab found in situ in wedge shaped emplacement obstructs entrance to rock-cut substructure with recess. Natural limestone roof approx. 0.75 m thick.* Portcullis 1.98 m high × 1.09 m wide × 0.12 m thick. Estimated weight 0.56 tonnes.

Tomb statistics: Substructure: Burial chamber 0.83 m long × 1.17 m wide × 1.06 m high .

Robbed: Yes

References: Petrie, Brunton & Murray 1923: 22-4, pl. XLVI.

Catalogue No. 254

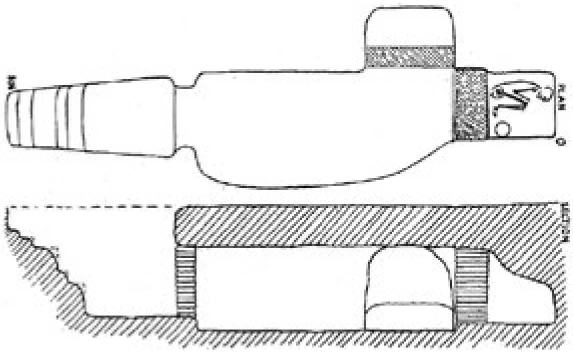


Illustration: Petrie, Brunton & Murray 1923: Pl. XLII, fig. O.

Identity: Tomb 806

Location: Lahun, Bashkatib Cemetery

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Rock-cut staircase descend to a depth of 1.37m. Mud-brick blocking obstructs entrance to rock-cut burial chamber with two mud-brick blocked recesses. Natural rock roof 0.5 m thick.

Tomb statistics: Substructure: Burial chamber 2.05 m long × 1.6 m wide × 1.06 m high

Robbed: No

References: Petrie, Brunton & Murray 1923: 22-4, pl. XLVI.

***Scaled dimensions**

Catalogue No. 255

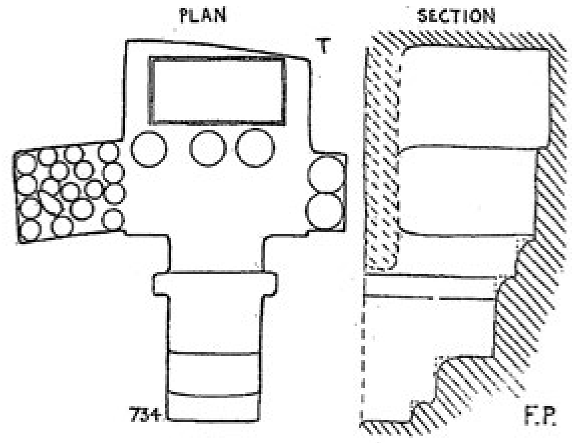


Illustration: Petrie, Brunton & Murray 1923: Pl. XLII, fig. T.

Identity: Tomb 734

Location: Lahun, Bashkatib Cemetery

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: 1.09 m deep rock-cut staircase to portcullis (missing) in grooved emplacement. Rock-cut cruciform burial chamber with recesses. Solid limestone roof 0.25 m high* over burial chamber.

Tomb statistics: Substructure: Burial chamber 1.47m long × 1.57 m wide × 1.2 m* high.

Robbed: No? Roof may have collapsed...

References: Petrie, Brunton & Murray 1923: 22-4, pl. XLVI.

Catalogue No. 256

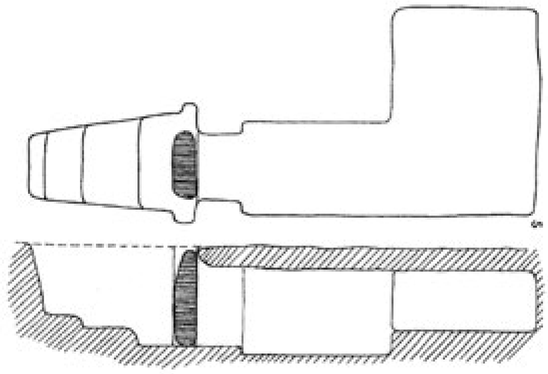


Illustration: Petrie, Brunton & Murray 1923: Pl. XLII, fig. S.

Identity: Tomb 821

Location: Lahun, Bashkatib Cemetery

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: 1.95 m long stairway descends to a depth of 1.21 m. Stoneportcullis in grooved emplacement obstructs entrance to burial chamber with recess. Natural rock roof 0.15 m thick. Portcullis 1.37 m high × 0.83 m wide × 0.27 m thick. Estimated weight 0.69 tonnes.

Tomb statistics: Substructure: Burial chamber 3.6 m long × 1.27 m wide × 1.06 m high

Robbed: ?

References: Petrie, Brunton & Murray 1923: 22-4, pl. XLVI.

***Scaled dimensions**

Catalogue No. 257

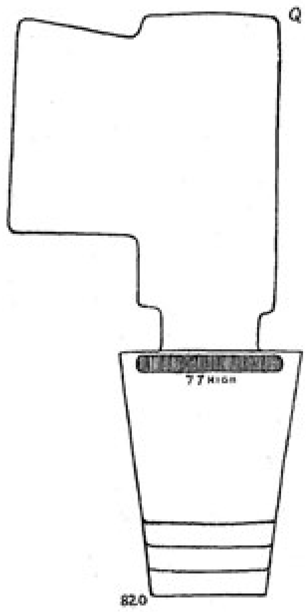


Illustration: Petrie, Brunton & Murray 1923: Pl. XLII, fig. Q.

Identity: Tomb 820

Location: Lahun, Bashkatib Cemetery

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Staircase descends to depth of 3.3 m leads to freestanding stone portcullis in wedge type emplacement obstructing entrance to burial chamber with recess, roof depth unknown. Portcullis 1.95 m high × 1.42 m wide × 0.15 m* Estimated weight 0.89 tonnes.

Tomb statistics: Substructure: Burial chamber 2.46 m long × 1.16 m wide × ??? m high

Robbed: ?

References: Petrie, Brunton & Murray 1923: 22-4, pl. XLVI.

Catalogue No. 258

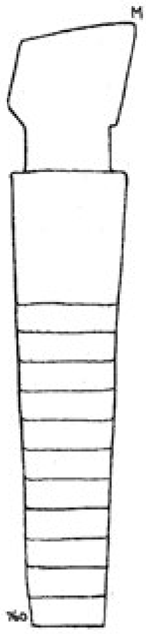


Illustration: Petrie, Brunton & Murray 1923: Pl. XLI, fig. M.

Identity: Tomb 760

Location: Lahun, Bashkatib Cemetery

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: 3.68 m long staircase descends to a depth of 4.19 m to rock-cut burial chamber. Natural rock roof over burial chamber approx. 3.33 m thick.

Tomb statistics: Substructure: Burial chamber: 0.88 m long × 0.78 m wide × 0.86 m high.

Robbed: Yes

References: Petrie, Brunton & Murray 1923: 22-4, pl. XLVI.

***Scaled dimensions**

Catalogue No. 259

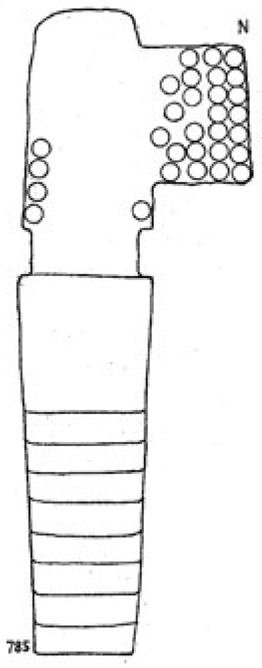


Illustration: Petrie, Brunton & Murray 1923: Pl. XLI, fig. N.

Identity: Tomb 785

Location: Lahun, Bashkatib Cemetery

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: 2.81 m long staircase descended to a depth of 3.75 m. Freestanding portcullis (broken) in wedge shaped emplacement obstructing entrance to rock-cut burial chamber with recess. Natural rock roof over burial chamber 2.74 m thick. Portcullis 0.89 + m (broken) high × 0.91 m wide × 0.15 m thick. Estimated weight 0.26 tonnes +

Tomb statistics: Substructure: Burial chamber 1.65 m long × 0.96 m wide × 1.01 m high.

Robbed: Yes

References: Petrie, Brunton & Murray 1923: 22-4, pl. XLVI.

Catalogue No. 260

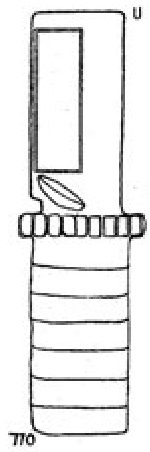


Illustration: Petrie, Brunton & Murray 1923: Pl. XLII, Fig U.

Identity: Tomb 770

Location: Lahun, Bashkatib Cemetery

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Rock-cut staircase 2.23 m deep to mud-brick wall built within grooved portcullis emplacement (no stone) obstructing entrance to rock-cut burial chamber with recess. Natural limestone roof 1.3 m thick.

Tomb statistics: Substructure: Burial chamber 1.82 m × 0.81 m wide × 0.93 m high .

Robbed: Yes

References: Petrie, Brunton & Murray 1923: 22-4, pl. XLVI.

Catalogue No. 261

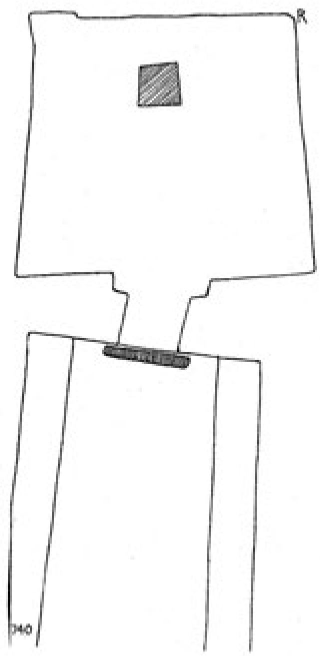


ILLUSTRATION: PETRIE, BRUNTON & MURRAY 1923: PL. XLI, FIG. R.

Identity: Tomb 740

Location: Lahun, Bashkatib Cemetery

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Wide slope 2 m deep to freestanding portcullis slab in front of entrance to burial chamber with natural rock roof 0.96 m thick. Portcullis 1.39 m high × 0.94 m wide × 0.12 m thick. Estimated weight 0.34 tonnes

Tomb statistics: Substructure: Burial chamber 3.35 m long × 2.99 m wide × 1.04 m high.

Robbed: Yes

References: Petrie, Brunton & Murray 1923: 23, pl. XLVI.

Catalogue No. 262

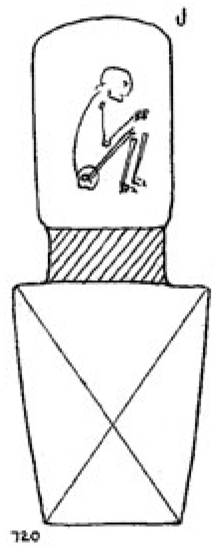


ILLUSTRATION: PETRIE, BRUNTON & MURRAY 1923: PL. XLI, FIG J.

Identity: Tomb 720

Location: Lahun, Bashkatib Cemetery

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Rock-cut shaft 1.89 m deep to mud-brick blocked entrance of rock-cut burial chamber. Natural rock roof 0.98 m thick.

Tomb statistics: Substructure: Burial chamber 1.27 mm long × 0.86 m wide × 0.91 m high

Robbed: No

References: Petrie, Brunton & Murray 1923: 22-4, pl. XLVI.

Catalogue No. 263

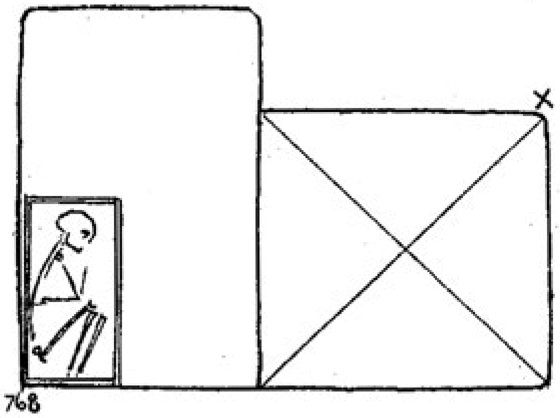


Illustration: Petrie, Brunton & Murray 1923: Pl. XLI, fig. X.

Identity: Tomb 768

Location: Lahun, Bashkatib Cemetery.

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Rock-cut shaft 1.87 m deep to rock-cut burial chamber. Natural rock roof 0.87 m thick.

Tomb statistics: Substructure: Burial chamber 1.04 m long × 1.67 m wide × 1.09 m high.

Robbed: No

References: Petrie, Brunton & Murray 1923: 22-4, pl. XLVI.

Catalogue No. 264

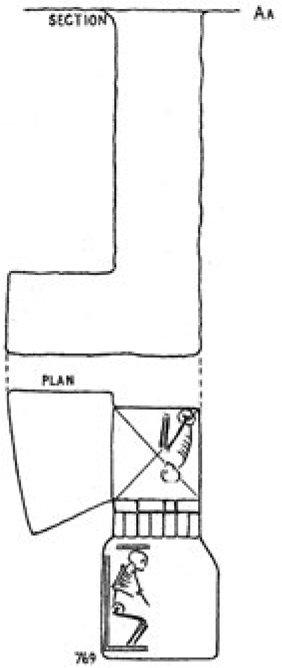


Illustration: Petrie, Brunton & Murray 1923: Pl. XLIII fig. AA.

Identity: Tomb 769

Location: Lahun, Bashkatib Cemetery

Period: Dynasty 3

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: 3.45 m deep rock-cut shaft to two burial chambers, one blocked with mud-brick. West chamber protected by limestone and marl roof 2.73 m, south chamber by roof 2.35 m thick.

Tomb statistics: Substructure: Burial chamber west: 1.47 m long × 0.88 m wide × 0.81 m high. South: 2.13 m long × 1.06 m wide × 1.19 m high.

Robbed: No

References: Petrie, Brunton & Murray 1923: 22-4, pl. XLVI.

Catalogue No. 265

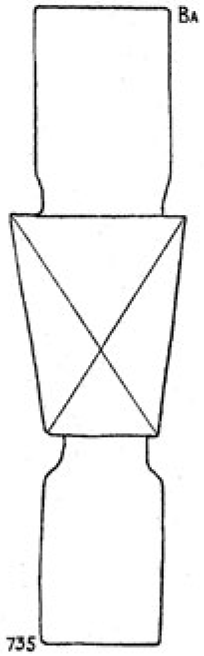


Illustration: Petrie, Brunton, & Murray 1923: Pl. XLIII fig. BA.

Identity: Tomb 735

Location: Lahun, Bashkatib Cemetery

Period: Dynasty 3

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Trapezoidal shaft 2.84 m deep to two horizontally opposed burial chambers. Natural rock roof approx. 1.85-1.91 m thick.

Tomb statistics: Substructure: Northern burial chamber 1.65 m long × 1.04 m wide × 0.99 m high. Southern 1.65 m long × 0.96 m wide × 0.93 m high.

Robbed: Yes

References: Petrie, Brunton & Murray 1923: 22-4, pl. XLVI.

Catalogue No. 266

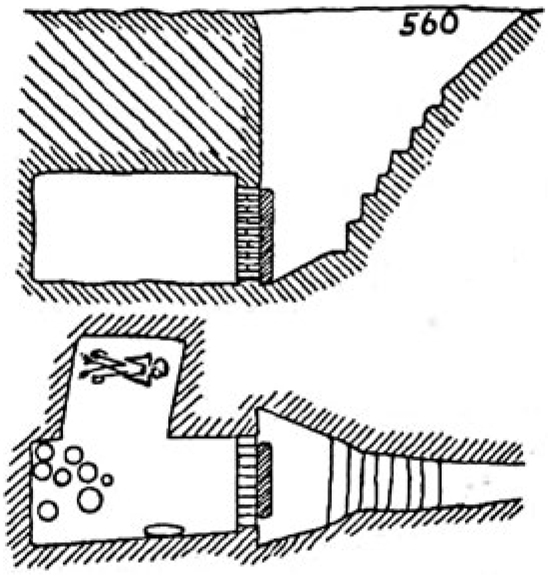


Illustration: Petrie and Brunton 1924: Pl. LXXXI.

Identity: Tomb 560

Location: Sedment

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Slope and steep staircase approx. 4.7 m long and approx. 3.5 m* deep to entrance blocked by freestanding portcullis slab backed by mud-brick wall. Chamber with recess. Natural gravel and marl roof approx. 2.16 m thick. Portcullis approx. 1.2 m high × 0.9 m wide × 0.175 m thick* Estimated weight approx. 0.41 tonnes.

Tomb statistics: Substructure: Burial chamber approx. 2.5 m long × 1.3 m wide* × 1.37 m high.

Robbed: No

References:

Petrie and Brunton 1924: 2 and tomb register pl. XXXVI; Porter and Moss 1934: 115.

***Scaled dimensions**

Catalogue No. 267

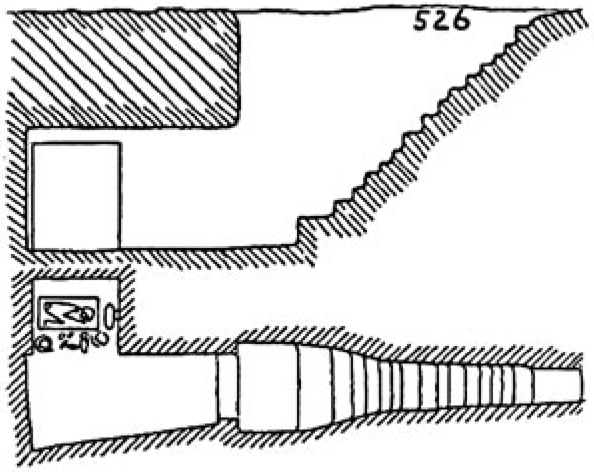


Illustration: Petrie and Brunton 1924: Pl. LXXXI.

Identity: Tomb 526

Location: Sedment

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Steep staircase 4.69 m long and 3.32 m deep to freestanding limestone portcullis (found in situ) obstructing entrance to chamber with internal burial recess. Natural gravel and marl roof 1.88 m thick. Portcullis 1.47–1.65 m high × 0.91 m wide × 0.15–0.21 m thick. Estimated weight 0.68 tonnes.

Tomb statistics: Substructure: Main chamber: 2.48 m long × 1.27 m wide × 1.54 m high.

Robbed: No

References: Petrie and Brunton 1924: Tomb register pl. XXXVI; Porter and Moss 1934: 115; Petrie 1999b: 38-9.

Catalogue No. 268

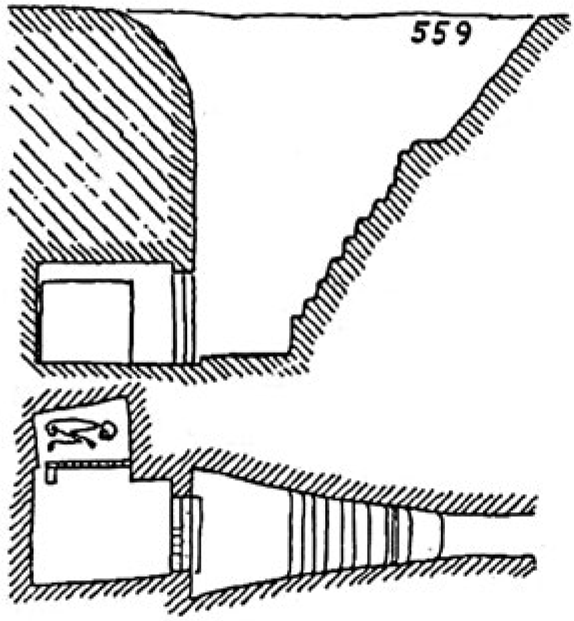


Illustration: Petrie and Brunton 1924: LXXXI.

Identity: Tomb 559

Location: Sedment

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Steep staircase 4.95 m long and 4.26 m deep to entrance blocked by mud-brick wall? Chamber with internal burial recess separated by mud-brick wall. Natural gravel and marl roof approx. 3.3 m thick.

Tomb statistics: Substructure: Main chamber: 1.44 m long × 1.27 m × 1.25 m high.

Robbed: No

References: Petrie and Brunton 1924: Tomb register pl. XXXVI; Porter and Moss 1934: 115; Petrie 1999b: 30.

Catalogue No. 269

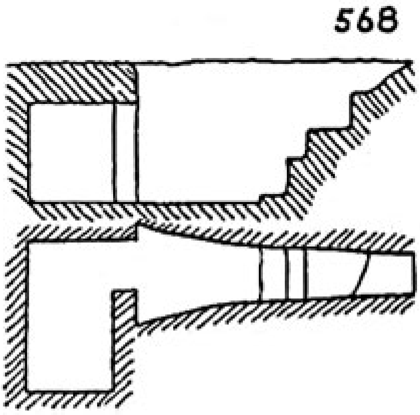


Illustration: Petrie and Brunton 1924: Pl. LXXXI

Identity: Tomb 568

Location: Sedment

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Staircase 2.5 m long and 1.7 m deep to pentagonal limestone portcullis slab obstructing entrance to burial chamber. Natural gravel and marl roof approx. 0.6 m thick. Portcullis overall 1.42 m high × 0.71m wide × ? m thick.

Tomb statistics: Substructure: Burial chamber 1.72 m long × 0.99 m wide × 1.1 m* high.

Robbed: Yes

References:

Petrie and Brunton 1924: Pl. LXXXI; Porter and Moss 1934: 115; Petrie 1999b: 35.

Catalogue No. 270

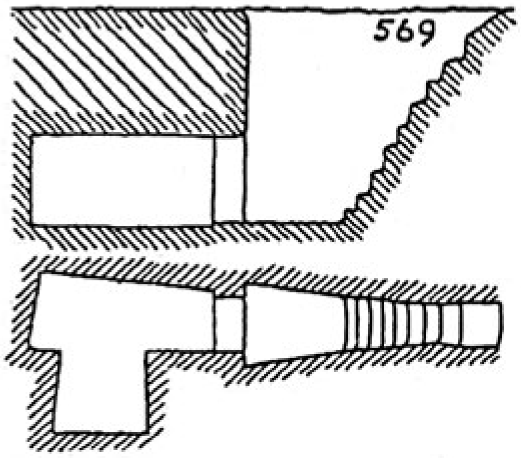


Illustration: Petrie and Brunton 1924: LXXXI.

Identity: Tomb 569

Location: Sedment

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Staircase 3 m long and 2.59 m deep to to burial chamber with recess. Natural rock roof approx. 1.48 m thick.

Tomb statistics: Substructure: Burial chamber 2.08 m long × 0.99 m wide × 1.11 m high.

Robbed: Yes

References: Petrie and Brunton 1924: Pl. LXXXI; Porter and Moss 1934: 115; Petrie 1999b: 36.

***Scaled dimensions**

Catalogue No. 271

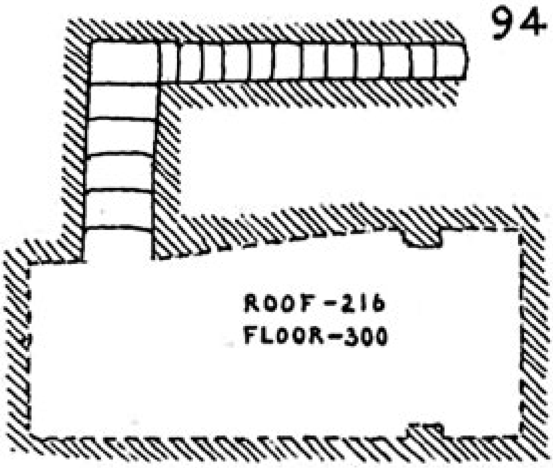


Illustration: Petrie and Brunton 1924: Pl. LXXXI.

Identity: Tomb 94

Location: Sedment

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: 'L' shaped staircase approx. 6.5 m long* and 7.62 m deep to subterranean burial chamber. Natural gravel and marl roof 5.48 m thick.

Tomb statistics: Substructure: Burial chamber 6.35 m long × 2 m wide × 2.13 m high. Burial chamber floor 7.62 m from surface.

Robbed: Yes

References: Petrie and Brunton 1924: Pls. XXXVI and LXXXI; Porter and Moss 1934: 115.

***Scaled dimensions**

Catalogue No. 272

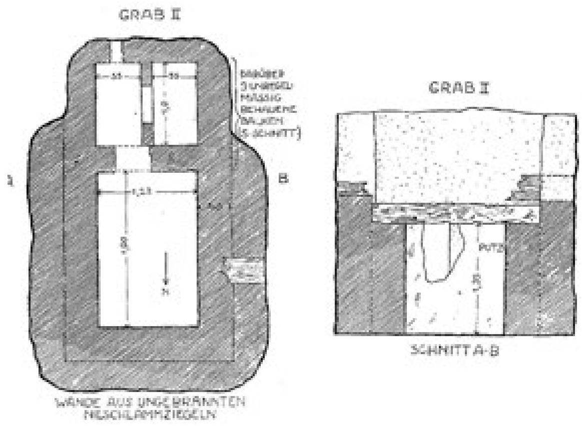


Illustration: Ranke 1926: Abb. 4. Courtesy of Walter de Gruyter GmbH.

Identity: Tomb II

Location: Awlad el-Sheikh

Period: Dynasty 1, Naqada IIIC1

Substructure Type: IC

Liner: Mud-brick **Thickness:** 0.7 m

Superstructure: No

Footprint O/H: N/A

Security Features: Pit tomb lined with two layers of mud-brick walls approximately 0.7 m thick.* Divided by 0.3 cm mud-brick wall, leading to two magazines, each 1m long × 0.55 m wide. Inner walls form ledge and support 1.45 m thick double wooden roof and gravel fill over pit.

Tomb statistics: Substructure: Pit approx. 4.4 m × 3.4 m × 2.8 m deep* Burial chamber 1.9 m long × 1.22 m wide × 1.35 m deep.

Robbed: Yes

References: Ranke 1926: 8-9.

***Scaled dimensions**

Catalogue No. 273

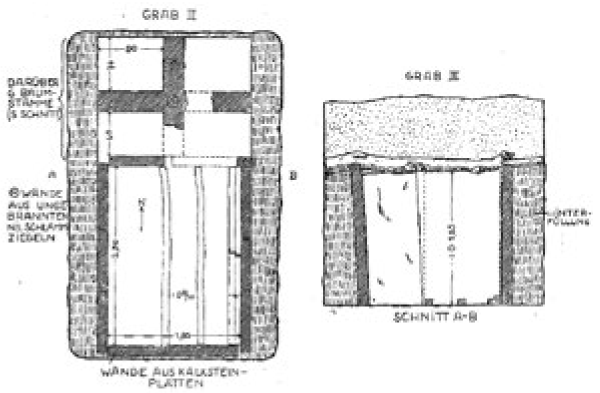


ILLUSTRATION: RANKE 1926: ABB. 6. COURTESY OF WALTER DE GRUYTER GMBH.

Identity: Tomb III

Location: Awlad el-Sheikh

Period: Dynasty 1, Naqada IIIC2

Substructure Type: IC

Liner: Stone **Thickness:** 0.1 m

Superstructure: No

Footprint O/H: N/A

Security Features: Pit lined with stone slab slabs 2 m high × 0.1 m thick to form burial chamber, up to 0.6 m thick sand fill in void between slabs and pit. Recessed wood, reed and Nile mud roof and gravel fill over approx. 0.85 m deep.

Tomb statistics: Substructure: Pit approx 4.6 m long × 2.9 m wide × 2.85 m deep.* Burial chamber 2.5 m long × 1.85 m wide × 2 m high.

Robbed: Yes

References: Ranke 1926: 9-12.

Catalogue No. 274

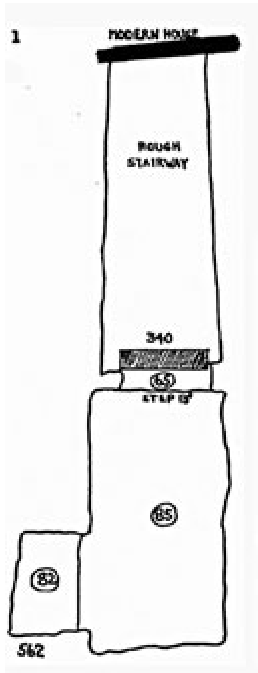


ILLUSTRATION: BRUNTON 1927: PL. XII, FIG. 2. COURTESY OF THE PETRIE MUSEUM OF EGYPTIAN ARCHAEOLOGY.

Identity: Tomb 562, Cemetery 400

Location: Qau

Period: Dynasty 2-3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Rough stairway to depth of 8.63 m to to portcullis or stone? Obstructing doorway to subterranean burial chamber with recess. Natural gravel roof 6.48 m thick.

Tomb statistics: Substructure: Burial chamber 3.88 m long × 2.03 m wide × 2.15 m high

Robbed: Yes

References: Brunton 1927: 12 and Tomb register pl. X.

***Scaled dimensions**

Catalogue No. 275

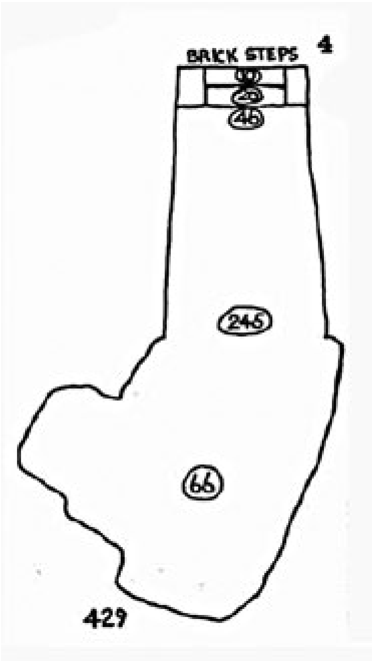


Illustration: Brunton 1927: Pl. XII, fig. 4. Courtesy of the Petrie Museum of Egyptian Archaeology.

Identity: Tomb 429 Cemetery 400

Location: Qau

Period: Dynasty 2-3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Couple of brick steps and extremely steep slope descends to a depth of 6.22 m to gravel cut burial chamber. Natural gravel roof approx. 4.5 m thick.

Tomb statistics: Substructure: Burial chamber 3.04 m long × 1.85 m wide × 1.67 m high.

Robbed: Yes

References: Brunton 1927: 11-2 and 15, Tomb register pl. X; Porter and Moss 1937: 15.

Catalogue No. 276

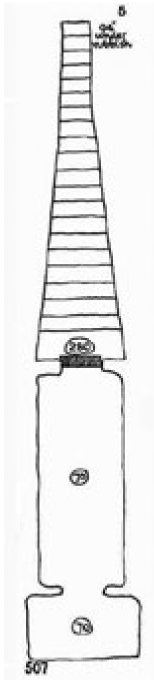


Illustration: Brunton 1927: Pl. XII, fig. 5. Courtesy of the Petrie Museum of Egyptian Archaeology.

Identity: Tomb 507, Cemetery 400

Location: Qau

Period: Dynasty 2-3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Long stairway descends to depth of 7.1 m to limestone blocks obstructing entrance to burial chamber. Natural gravel? Roof approx. 5.35 m thick.

Tomb statistics: Substructure: Burial chamber 3.8 m long × 1.52 m wide × 1.77 m high.

Robbed: Yes

References: Brunton 1927: 12 and Tomb register pl. X.

Catalogue No. 277

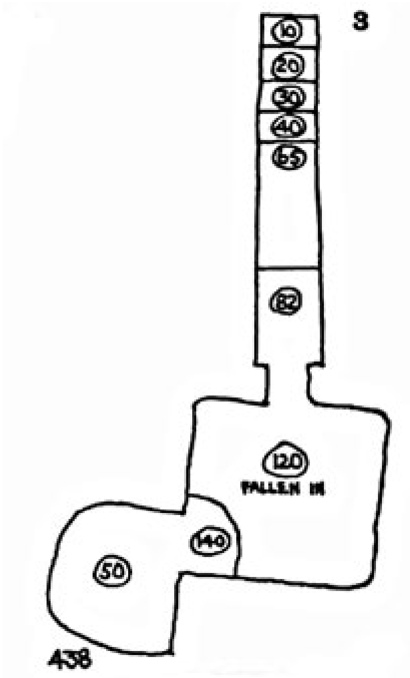


ILLUSTRATION: BRUNTON 1927: PL. XII, FIG. 3. COURTESY OF THE PETRIE MUSEUM OF EGYPTIAN ARCHAEOLOGY.

Identity: Tomb 438, Cemetery 400

Location: Qau

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Stairs and slope to subterranean burial chamber with recess. Floor of burial chamber 3.04 m from surface.

Tomb statistics: Substructure: Burial chamber 1.9 m long × 1.77 m wide × ??? m high.

Robbed: Yes

References: Brunton 1927: 15, Tomb register pl. X.

Catalogue No. 278

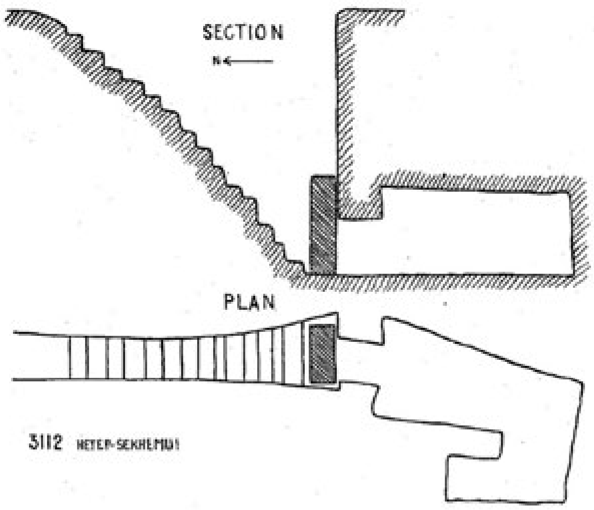


ILLUSTRATION: BRUNTON 1927: PL. XXIV. COURTESY OF THE PETRIE MUSEUM OF EGYPTIAN ARCHAEOLOGY.

Identity: Tomb 3112, Cemetery 3100

Location: Badari

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Possibly

Footprint O/H: N/A

Security Features: Long staircase 4.72 m deep leads to limestone portcullis in wedge shaped emplacement obstructing entrance to burial chamber with recess. Limestone detritus roof 3.12 m thick. Portcullis 1.78 m high × 0.99 m wide × 0.43 m thick. Estimated weight approx. 1.63 tonnes.

Tomb statistics: Substructure: Burial chamber 3.68 m long × 1.95 m wide × 1.6 m high.

Brick wall (possible superstructure) 15.29 m long × 8 m wide

Robbed: Yes, via entrance but stone replaced in position again

References: Brunton 1927: 13-4, 16 and Tomb register pl. X; Porter and Moss 1937: 6.

Catalogue No. 279

Illustration: Brunton 1927: Pl. VIII. Courtesy of the Petrie Museum of Egyptian Archaeology.

Identity: Tomb 3229, Cemetery 3200

Location: Badari

Period: Dynasty 3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Stairway 6.09 m deep to burial chamber cut in limestone detritus. Burial chamber protected by solid roof 4.44 m thick

Tomb statistics: Substructure: Burial chamber 2.08 m long × 1.95 m wide × 1.65 m high

Robbed: Yes and into adjacent 3228 via tunnel.

References: Brunton 1927: 14, Tomb register pl. XI.

Catalogue No. 280

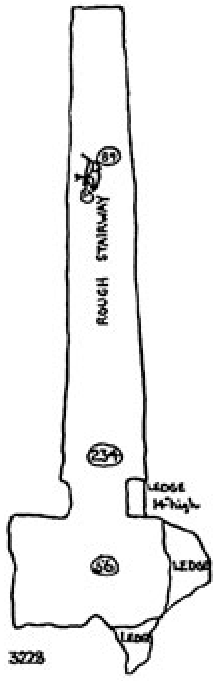


Illustration: Brunton 1927: Pl. XII, fig. 6. Courtesy of the Petrie Museum of Egyptian Archaeology.

Identity: Tomb 3228, Cemetery 3200

Location: Badari

Period: Dynasty 3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Rough stairway 5.94 m deep (with intrusive burial) leads to two subterranean burial chambers at different levels. Floor of lowest chamber 5.94 m from surface, roof 0.92 m thick. Floor of upper chamber 3.6 m from surface. Roof 2.16 m thick.

Tomb statistics: Substructure: Upper burial chamber 0.63 m long × 1.09 m wide × 1.37 m high. Lower burial chamber 1.9 m long × 1.6 m wide × 1.42 m high.

Robbed: Yes, via tunnel from adjacent tomb 3229.

References: Brunton 1927: 14 and Tomb register pl. XI.

Catalogue No. 281

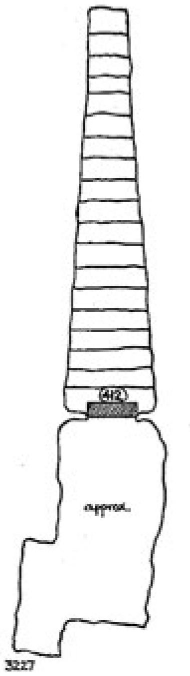


Illustration: Brunton 1927: Pl. XI, fig. 1. Courtesy of the Petrie Museum of Egyptian Archaeology.

Identity: Tomb 3227, Cemetery 3200

Location: Badari

Period: Dynasty 3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Possibly

Footprint O/H: Unknown

Security Features: Long stairway descends to depth of 10.46 m. Limestone blocking? Obstructs entrance to subterranean rock-cut burial chamber with recess. Burial chamber floor 10.46 m below surface. Natural rock roof estimated at possibly 9 m thick. Low level enclosure wall at the surface approx. 22.25 m long.

Tomb statistics: Substructure: Burial chamber approx. 3.7 m long × 1.8 m wide* Superstructure: 22.25 m? long

Robbed: Yes

References: Brunton 1927: 14 and Tomb register pl. XI.

Catalogue No. 282

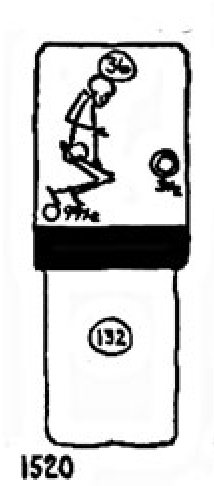


Illustration: Brunton 1927: Pl. XII, fig. 16. Courtesy of the Petrie Museum of Egyptian Archaeology.

Identity: Tomb 1520 Cemetery 1500-1800

Location: Hemamieh

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 3.35 m deep cut into gravel mud-brick blocked burial chamber. Burial chamber roof 2.06 m thick.

Tomb statistics: Substructure: Burial chamber 1.62 m long × 1.34 m wide × 0.91 m high.

Robbed: No

References: Brunton 1927: 13 and Tomb register pl. X.

***Scaled dimensions**

Catalogue No. 283

Illustration: Brunton 1927: Pl. XII, fig. 15. Courtesy of the Petrie Museum of Egyptian Archaeology.

Identity: Tomb 1561 Cemetery 1500-1800

Location: Hemamieh

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 3.45 m deep to burial chamber. Burial chamber roof 2.74 m thick.

Tomb statistics: Substructure: Burial chamber 1.27 m long × 0.76 m wide × 0.71 m high.

Robbed: No

References: Brunton 1927: 13 and Tomb register pl. X.

Catalogue No. 284

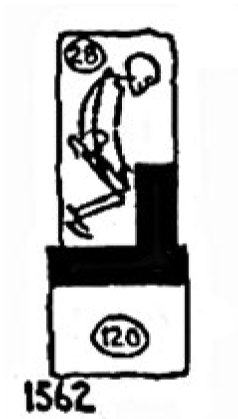


Illustration: Brunton 1927: Pl. XII, fig. 14. Courtesy of the Petrie Museum of Egyptian Archaeology.

Identity: Tomb 1562 Cemetery 1500-1800

Location: Hemamieh

Period: Dynasty 2

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Shaft 3.04 m deep to mud-brick blocked burial chamber. Burial chamber roof 1.6 m thick.

Tomb statistics: Substructure: Burial chamber 1.44 m long × 0.76 m wide × 0.71 m high.

Robbed: No

References: Brunton 1927: 13 and Tomb register pl. X.

Catalogue No. 285

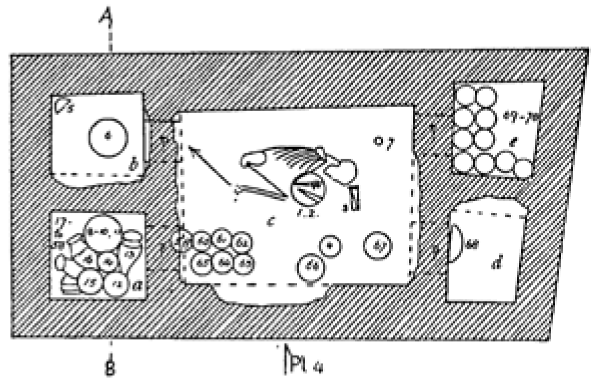


ILLUSTRATION: REISNER 1908: FIG. 53.

Identity: N 1532 Cemetery 1500

Location: Naga el-Deir

Period: Dynasty 1, Naqada IIIC1-2

Substructure Type: IC

Liner: Mud-brick **Thickness:** Approx. 0.3-0.4 m

Superstructure: No

Footprint O/H: N/A

Security Features: 2.7 m deep pit cut in alluvium and sand with mud-brick lined burial chamber and four magazines. Wooden beams support mud-brick roof 1 m thick? backfilled with 0.5 m? Deep gravel fill.

Tomb statistics: Substructure: Burial pit: 5.6 m long × 2.6 m wide × 2.7 m deep.

Robbed: Possibly

References: Reisner 1908: 29-33.

Catalogue No. 286

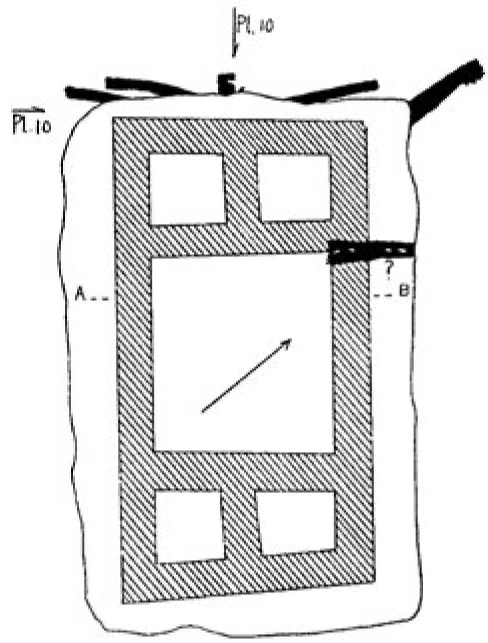


ILLUSTRATION: REISNER 1908: FIG 55.

Identity: N 1506, Cemetery 1500

Location: Naga el-Deir

Period: Dynasty 1, Naqada IIIC1-2, reigns of Djer and Djet

Substructure Type: IC

Liner: Mud-brick **Thickness:** Approx. 0.3 m*

Superstructure: Yes

Footprint O/H: Approx. 1.5 m*

Security Features: Pit in gravel lined with mud-brick closed with double wood and mud-brick roof. Mud-brick mastaba over.

Tomb statistics: Substructure: Pit 4 m long × 2.23 m wide × 1.27 m deep. Superstructure: 12.5 m long × 7.5 m wide.

Robbed: Yes

References: Reisner 1908: 33–4; 1936: 35-7.

***Scaled dimensions**

Catalogue No. 287

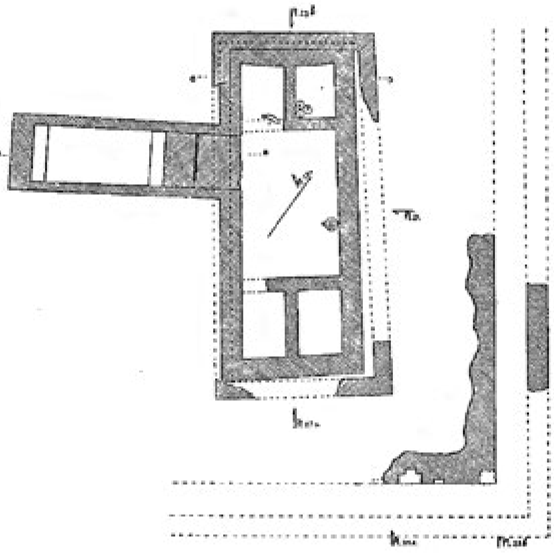


ILLUSTRATION: REISNER 1908: FIG. 65.

Identity: N 1581, Cemetery 1500

Location: Naga el-Deir

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.5 m*

Superstructure: Yes

Footprint O/H: Approx. 2 m*

Security Features: Staircase blocked with gravel and rocks with two mud-brick walls at base. Leads to pit 3.5 m deep excavated in gravel and limestone strata and lined with mud-brick. Two mud plastered wooden roofs over burial totalling 1 m thick. Approx. 0.5 m gravel fill above.* Mud-brick mastaba over with 1 m thick walls and core of gravel, limestone sherds and 'rubbish'. External enclosure wall.

Tomb statistics: Substructure: Pit 8.3 m long × 3.3 m wide × 1.8 m deep. Burial chamber: 3.5 m long × 2.35 m wide × 1.8 m deep. Superstructure: Estimated at 13–15.8 m long × 9.75 m wide × 0.5 m high.

Robbed: Yes

References: Reisner 1908: 36-8; 1936: 68–9.

***Scaled dimensions**

Catalogue No. 288

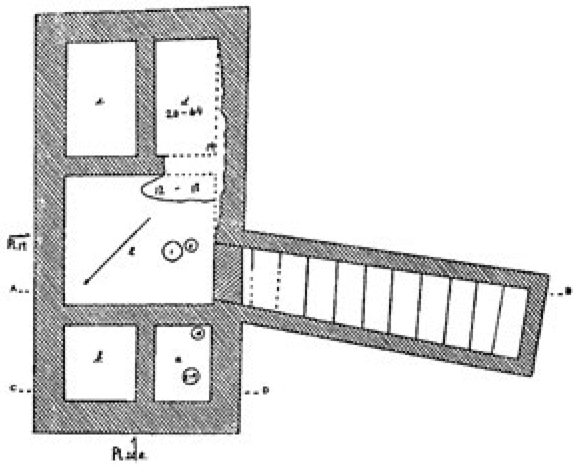


ILLUSTRATION: REISNER 1908: FIG. 68.

Identity: N 1512, Cemetery 1500

Location: Naga el-Deir

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.5 m*.

Superstructure: No

Footprint O/H: Unknown

Security Features: 5.4 m long staircase to 3.4 m deep gravel and limestone cut pit lined with mud-brick. Wooden roof and backfill?

Tomb statistics: Substructure: 6.9 m long × 3.4 m wide × 1.9 m deep.

Robbed: Yes

References: Reisner 1908: 38-40; Reisner 1936: 68–9.

***Scaled dimensions**

Catalogue No. 289

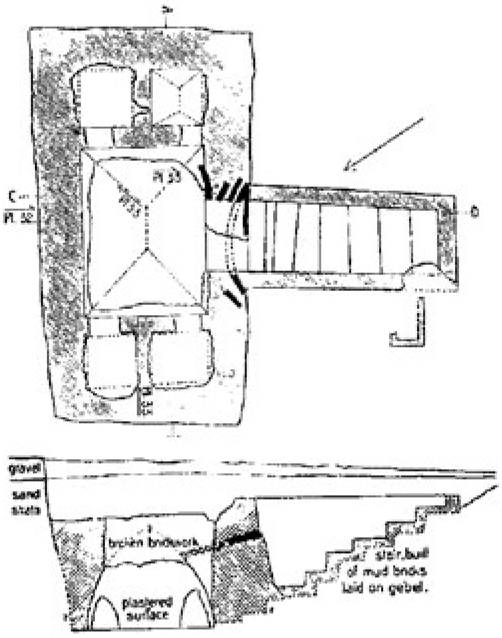


ILLUSTRATION: REISNER 1908: FIG. 72.

Identity: N 1586, Cemetery 1500

Location: Naga el-Deir

Period: Dynasty 2

Substructure Type: ID Corbel roof

Liner: Mud-brick **Thickness:** 0.6-1 m.*

Superstructure: Possibly

Footprint O/H: N/A

Security Features: Stairway entrance blocked by mud-brick wall and rocks. Pit excavated in alluvial strata and mud-brick lined with burial chamber and four magazines. Closed with corbelled mud-brick roof with groined vaults 2.53 m high. Gravel backfill 0.72 m deep. Mud-brick mastaba?

Tomb statistics: Substructure: Pit 7.83 m long × 4.3 m wide × 3.25 m deep.

Robbed: Yes

References: Reisner 1908: 41-2; 1936: 129.

***Scaled dimensions**

Catalogue No. 290

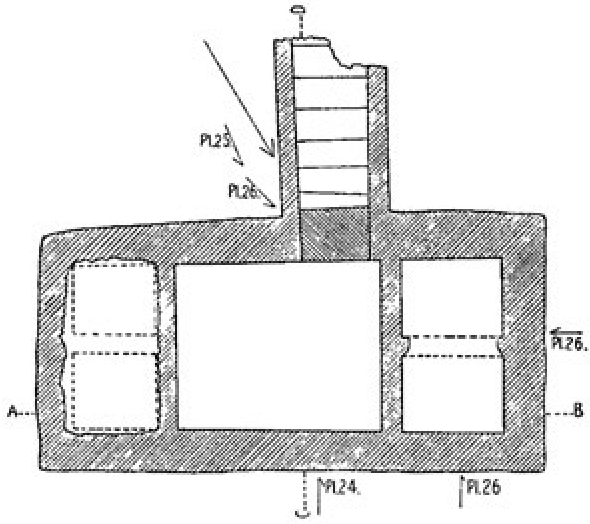


ILLUSTRATION: REISNER 1908: FIG. 83.

Identity: N 1513, Cemetery 1500

Location: Naga el-Deir

Period: Dynasty 2

Substructure Type: ID Corbel roof

Liner: Mud-brick **Thickness:** 0.5-0.7 m*

Superstructure: Possibly

Footprint O/H: Unknown

Security Features: 2.8 m long stairway leads to pit approx. 3.1 m deep* with mud-brick lined burial chamber and four magazines. Closed with corbelled mud-brick roof with groined vaults.

Tomb statistics: Substructure: 8.15 m long × 4.1 m wide × 3.1 m deep.*

Robbed: Yes, via the corbel vault

References: Reisner 1908: 48-9; 1936: 129 and 131.

***Scaled dimensions**

Catalogue No. 291

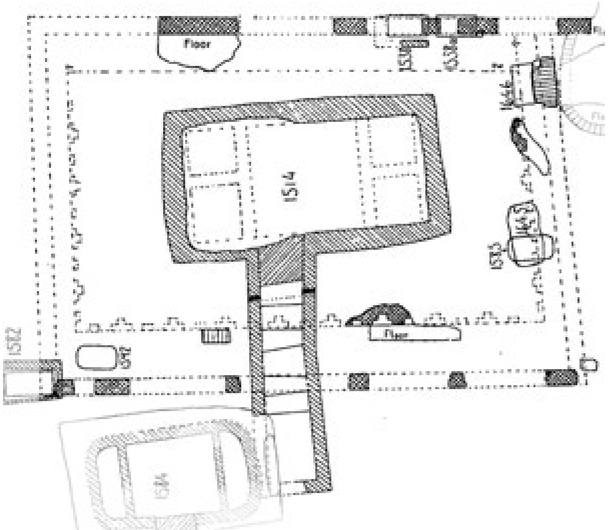


Illustration: Reisner 1908: Map II.

Identity: N 1514, Cemetery 1500

Location: Naga el-Deir

Period: Dynasty 2

Substructure Type: ID Corbel roof

Liner: Mud-brick **Thickness:** Approx. 0.5-0.7 m*

Superstructure: Yes

Footprint O/H: Approx. 1 m*

Security Features: 5.3 m long stair to pit approx. 3.1 m deep excavated in sand and lined with mud-brick. Closed with mud-brick corbel roof with groined vaults. Mud-brick mastaba over with walls of unknown thickness and unknown core.

Tomb statistics: Substructure: Pit approx. 8.18 m long × 4.52 m wide × approx. 3.1 m*. Superstructure: approx. 13.5 m long × 7.5 m wide.

Robbed: Yes

References: Reisner 1908: 44-5; 1936: 129 and 131.

***Scaled dimensions**

Catalogue No. 292

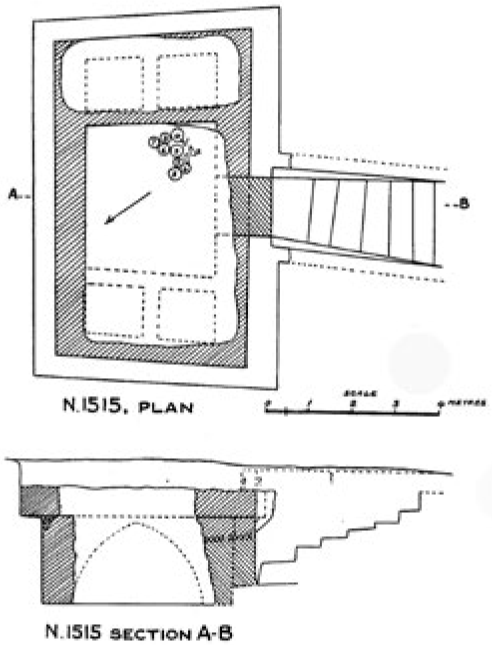


Illustration: Reisner 1936: Fig. 56.

Identity: N 1515, Cemetery 1500

Location: Naga el-Deir

Period: Dynasty 2

Substructure Type: ID Corbel roof

Liner: Mud-brick **Thickness:** 0.5-0.7 m*

Superstructure: Possibly

Footprint O/H: Unknown

Security Features: Stairway led to 3.35 m deep pit with mud-brick lined burial chamber (destroyed) and four magazines. Closed with corbelled mud-brick roof with groined vaults 2.7 m high with 0.65 m deep gravel backfill.

Tomb statistics: Substructure: 8.5 m long × 4.9 m wide × 3.35 m deep.

Robbed: Yes

References: Reisner 1908: 47-8; Reisner 1936: 131.

***Scaled dimensions**

Catalogue No. 293

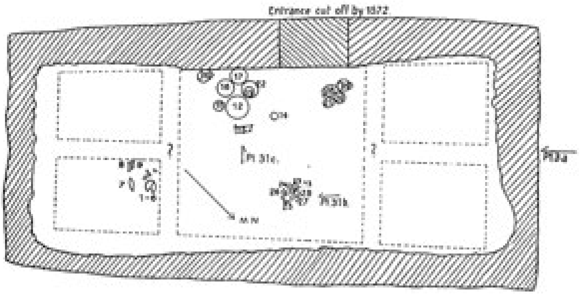


ILLUSTRATION: REISNER 1908: FIG. 76.

Identity: N 1571, Cemetery 1500

Location: Naga el-Deir

Period: Dynasty 2

Substructure Type: ID Corbel roof

Liner: Mud-brick **Thickness:** 0.8 m*

Superstructure: Possibly

Footprint O/H: N/A

Security Features: Stairway (destroyed) originally led to pit of unknown depth with mud-brick lined burial chamber and four magazines. Closed with corbelled mud-brick roof with groined vaults.

Tomb statistics: Substructure: 8.57 m long × 4.2 m wide × ? m deep.

Robbed: Yes

References: Reisner 1908: 43-4; Reisner 1936: 131.

Catalogue No. 294

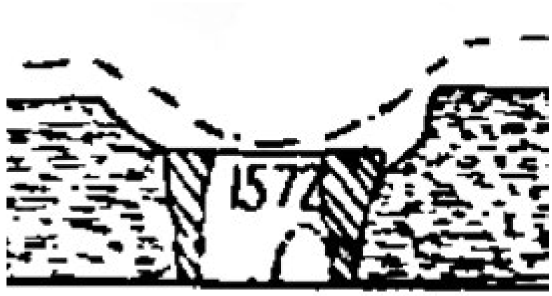


ILLUSTRATION: REISNER 1908: MAP I.

Identity: N 1572, Cemetery 1500

Location: Naga el-Deir

Period: Dynasty 2

Substructure Type: ID Corbel roof

Liner: Mud-brick **Thickness:** Unknown

Superstructure: Possibly

Footprint O/H: N/A

Security Features: 5 m long stairway entrance to mud-brick lined with burial chamber and two magazines. Closed with corbelled mud-brick roof with groined vaults 2.5 m high and 0.13 m gravel (sic).

Tomb statistics: Substructure: 5.8 m long × 4.3 m wide × 2.63 m deep.

Robbed: Yes

References: Reisner 1908: 53-4: 1936: 130-1.

***Scaled dimensions**

Catalogue No. 295

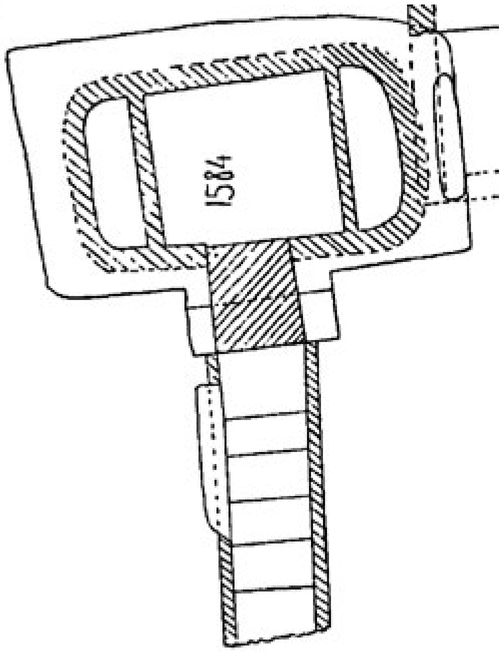


Illustration: Reisner 1908: Map II

Identity: N 1584, Cemetery 1500

Location: Naga el-Deir

Period: Dynasty 2

Substructure Type: ID Corbel roof

Liner: Mud-brick **Thickness:** 1 brick

Superstructure: No

Footprint O/H: N/A

Security Features: Stairs to 2.55 m deep pit with mud-brick lined burial chamber with two magazines and corbel roof 2 m high, leaving 0.55 m deep gravel backfill.

Tomb statistics: Substructure: Pit approx. 4.9 m long × 3.3 m wide × 2.4 m* deep.

Robbed: Yes

References: Reisner 1908: 52; 1936: 130-1.

*Scaled dimensions

Catalogue No. 296

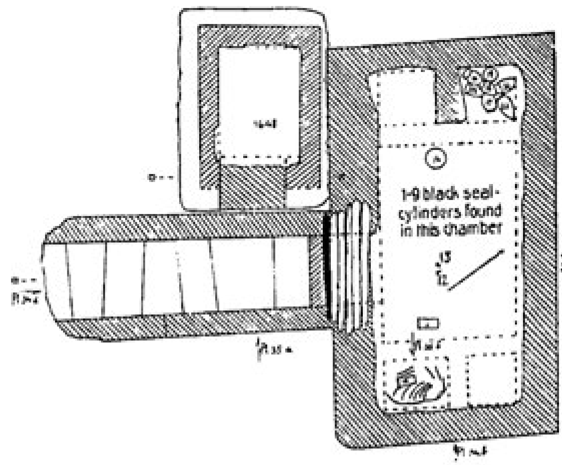


Illustration: Reisner 1908: Fig. 91.

Identity: N 1605, Cemetery 1500

Location: Naga el-Deir

Period: Dynasty 2

Substructure Type: ID Corbel roof

Liner: Mud-brick **Thickness:** 0.5-0.75 m*

Superstructure: Possibly

Footprint O/H: Unknown

Security Features: Stairway backfilled with stones, leads to 3.9 m deep pit with mud-brick lined burial chamber and four magazines. Closed with corbelled mud-brick roof with groined vaults 3.1 m high and 0.8 m deep gravel backfill.

Tomb statistics: Substructure: 6.2 m long × 3.45 m wide × 3.9 m deep.

Robbed: Yes

References: Reisner 1908: 54-5; 1936: 129 and 131.

*Scaled dimensions

Catalogue No. 297

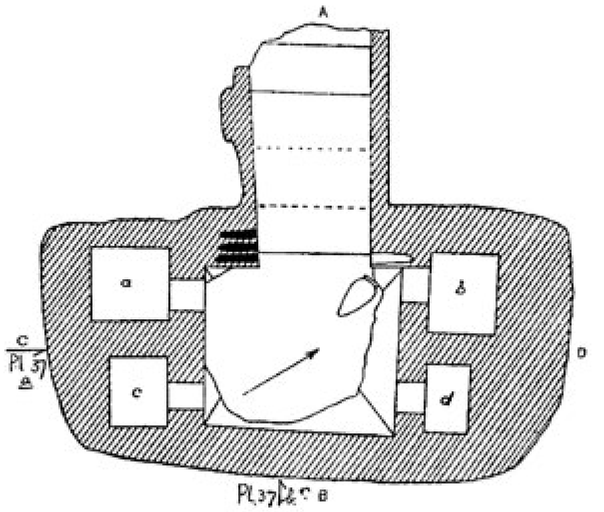


ILLUSTRATION: REISNER 1908: FIG. 95.

Identity: N 1611, Cemetery 1500

Location: Naga el-Deir

Period: Dynasty 2

Substructure Type: ID Corbel roof

Liner: Mud-brick **Thickness:** 0.5 -1.3 m*

Superstructure: Possibly

Footprint O/H: Unknown

Security Features: Stairway led to mud-brick lined burial chamber and four magazines. Closed with corbelled mud-brick roof with groined vaults 1.7 m high with 0.3 m gravel backfill (estimated).

Tomb statistics: Substructure: 4.35 m long × 2.3 m wide × 2 m deep.

Robbed: Yes

References: Reisner 1908: 57-6.

*Scaled dimensions

Catalogue No. 298

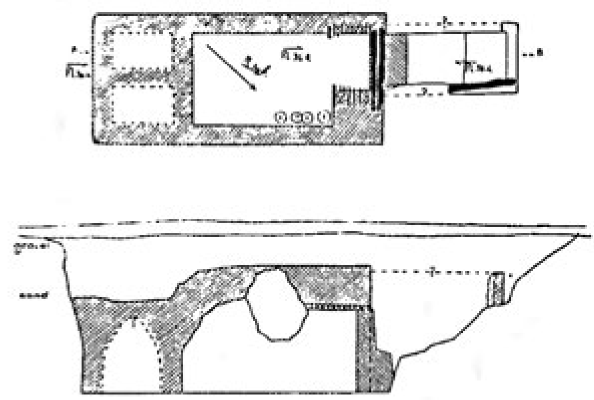


ILLUSTRATION: REISNER 1908: FIGS. 93 AND 94.

Identity: N 1626, Cemetery 1500

Location: Naga el-Deir

Period: Dynasty 2

Substructure Type: ID Corbel roof

Liner: Mud-brick **Thickness:** 0.3-0.8 m*

Superstructure: Possibly.

Footprint O/H: Unknown

Security Features: Wood roofed stairway descends to 2.7 m deep pit in gravel with mud-brick lined burial chamber and two magazines. Closed with corbelled mud-brick roof with groined vaults 2 m high and 0.7 m deep gravel backfill.

Tomb statistics: Substructure: 4.9 m long × 2.1 m wide × 2.7 m deep.

Robbed: Yes

References: Reisner 1908: 55-6; 1936: 131.

*Scaled dimensions

Catalogue No. 299

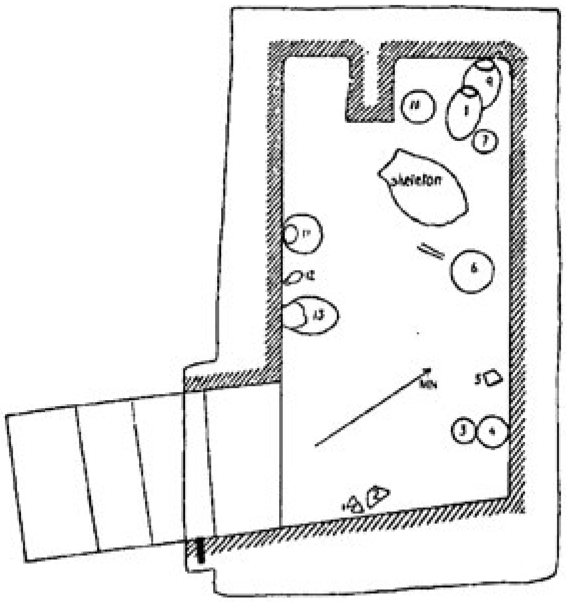


Illustration: Reisner 1908: Fig. 140.

Identity: N 3013, Cemetery 3000

Location: Naga el-Deir

Period: Dynasty 2

Substructure Type: ID Corbel roof

Liner: Mud-brick **Thickness:** 0.6-1 m*

Superstructure: No

Footprint O/H: N/A

Security Features: Stairway backfilled with limestone chips and mud leads to plastered mud-brick blocking entrance to mud-brick burial chamber with corbel roof.

Tomb statistics: Substructure: 3.55 m long × 2.05 m wide × 2.8 m high.

Robbed: Yes

References: Reisner 1908: 74-5.

***Scaled dimensions**

Catalogue No. 300

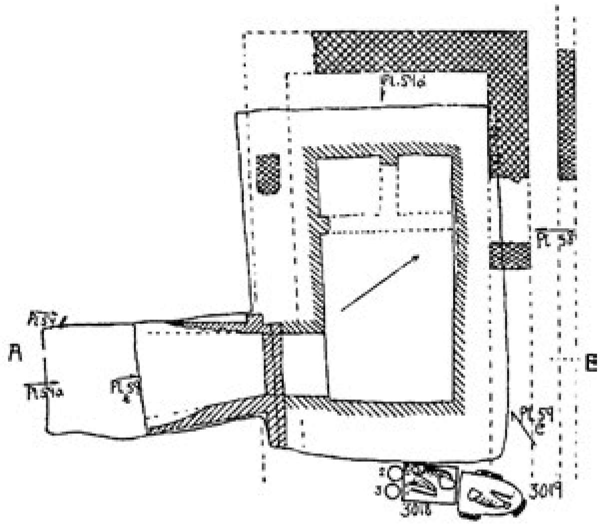


Illustration: Reisner 1908: Fig. 138.

Identity: N 3017, Cemetery 3000

Location: Naga el-Deir

Period: Dynasty 2

Substructure Type: ID Corbel roof

Liner: Mud-brick **Thickness:** 0.7-1.1 m*

Superstructure: Yes

Footprint O/H: Approx. 1 m*

Security Features: Mud-brick lined sloping descent leads to plastered mud-brick wall blocking entrance to mud-brick burial chamber and two magazines with corbel roof with groined vaults set in the gravel. Backfill depth unknown. Mud-brick superstructure over.

Tomb statistics: Substructure: 5.15 m long × 3.7 m wide × 2.8 m high. Superstructure: 6.3-6.8 m long × 4 m wide.

Robbed: Possibly

References: Reisner 1908: 72-4; 1936: 132.

***Scaled dimensions**

Catalogue No. 301

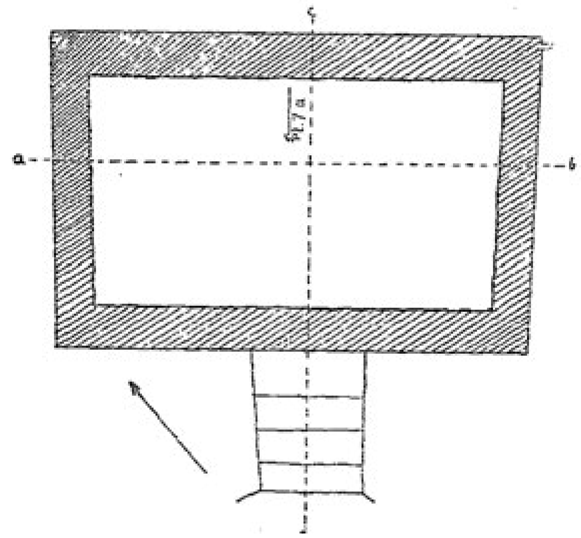


ILLUSTRATION: MACE 1909: FIG. 21.

Identity: N 3551, Cemetery 3500

Location: Naga el-Deir

Period: Dynasty 2

Substructure Type: ID Corbel roof

Liner: Mud-brick **Thickness:** 0.4-0.5 m*

Superstructure: No

Footprint O/H: Unknown

Security Features: Mud-brick stairway filled with boulders? Leads to large mud-brick lined pit covered by corbel roof?

Tomb statistics: Substructure: Pit 5.5 m long × 3.6 m wide × circ. 2.5 m deep.

Robbed: Yes

References: Mace 1909: 19 and 57.

***Scaled dimensions**

Catalogue No. 302

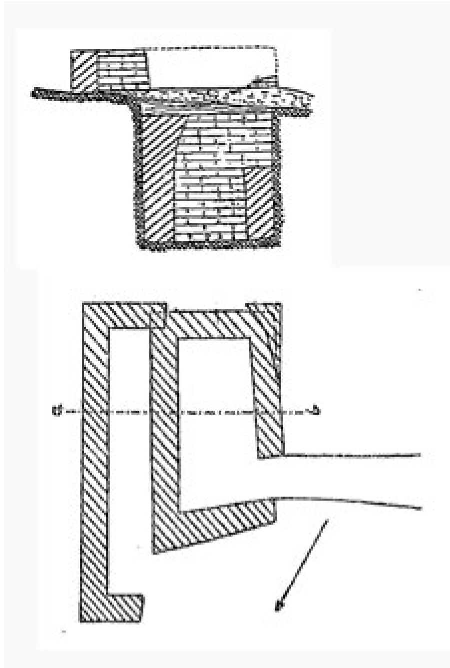


ILLUSTRATION: MACE 1909: FIGS. 27-8.

Identity: N 4990, Cemetery 3500

Location: Naga el-Deir

Period: Dynasty 2

Substructure Type: ID Corbel roof

Liner: Mud-brick **Thickness:** Approx. 0.3 m*

Superstructure: Yes

Footprint O/H: Zero

Security Features: Slope leading from west probably blocked with mud-brick walling and stones enters northern end of pit lined with mud-brick with mud-brick corbel roof. Mud-brick mastaba over, with 0.3 m thick* walls and zero footprint overlap on entrance side.

Tomb statistics: Substructure: Pit 2.92 m long × 1.6 m wide × 1.8 m deep.

Superstructure: 3.9 m long × 2.4 m wide*

Robbed: Yes

References: Mace 1909: 20 and 68.

***Scaled dimensions**

Catalogue No. 303

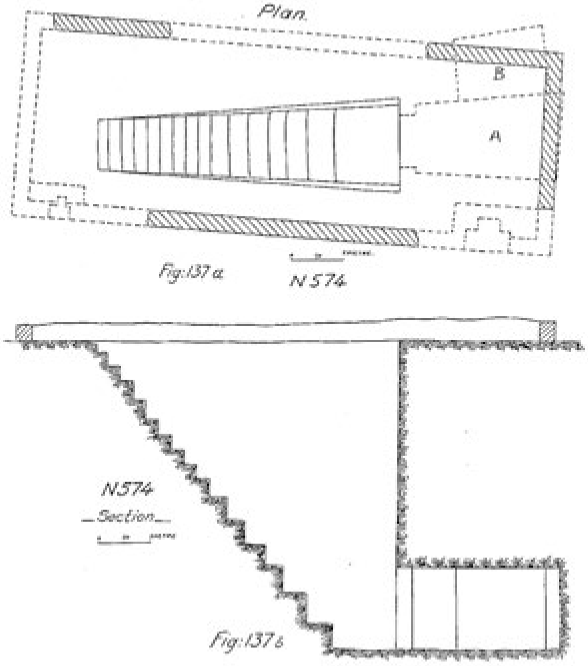


Illustration: Reisner 1932: Figs. 137 a and b.

Identity: N 574, Cemetery 500-900

Location: Naga el-Deir

Period: Dynasty 3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Gravel cut staircase concealed within mastaba descends to 6 m deep burial chamber with gravel ceiling approx. 4.5 m* thick. Mud-brick mastaba with walls approx. 0.3 m thick* and gravel core.

Tomb statistics: Substructure: Burial chamber approx. 2.8 m long × 1.7 m wide (+ niche) × 1.5 m high.* Superstructure: 10.4 m long × 3.9 m wide.

Robbed: Yes

References: Reisner 1932: 220–1; 1936: 182.

***Scaled dimensions**

Catalogue No. 304

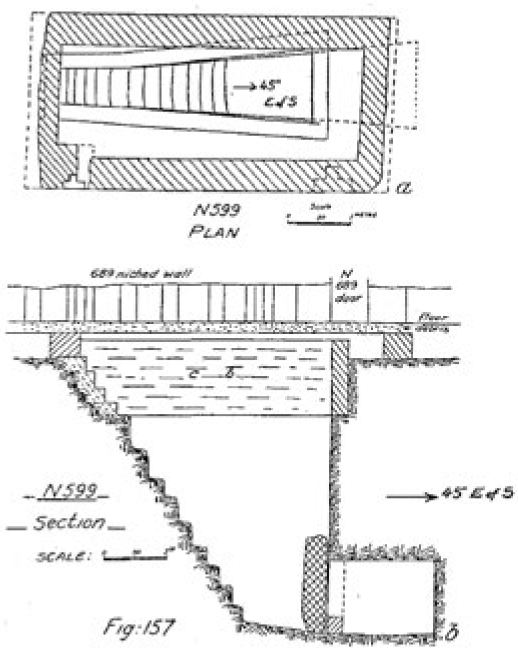


Illustration: Reisner 1932: Fig. 157.

Identity: N 599, Cemetery 500-900

Location: Naga el-Deir

Period: Dynasty 3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Staircase concealed slightly under and within mastaba to large freestanding stone portcullis in tapered emplacement obstructing entrance and mud-brick blocking 4.6 m deep burial chamber with gravel ceiling approx. 3.4 m* thick. Mud-brick mastaba with walls approximately 0.3 m thick* and gravel core over. Portcullis 1.5 m high × 1 m wide × 0.35 m thick.* Estimated weight 1.13 tonnes.

Tomb statistics: Substructure: Burial chamber 1.65 m long × 1.1/1.4 m wide × 1.2 m high. Superstructure: 5.8 m long × 2.77 m wide.

Robbed: No, overbuilt by N 689

References: Reisner 1932: 229; 1936: 182.

***Scaled dimensions**

Catalogue No. 305

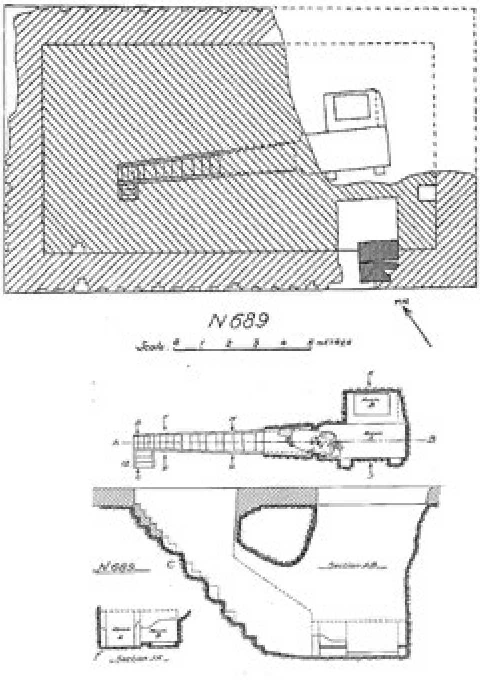


ILLUSTRATION: REISNER 1932: FIGS. 195-6.

Identity: N 689, Cemetery 500-900

Location: Naga el-Deir

Period: Dynasty 3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 'L' shaped brick-lined staircase descends in open cutting then tunnels down to burial chamber with recess. Entrance obstructed by freestanding portcullis and mud-brick wall. Burial chamber gravel roof 5.75 m thick. Large solid mud-brick mastaba over. Portcullis 1.7 m long × 1.3 m wide × ? m thick.

Tomb statistics: Substructure: Burial chamber 3.25 m. long × 1.49 m wide × 1.5 m? high.

Superstructure: 17.4 m long × 10.5 m wide × approx. 2 m high

Robbed: Yes

References: Reisner 1932: 244–6; 1936: 181.

***Scaled dimensions**

Catalogue No. 306

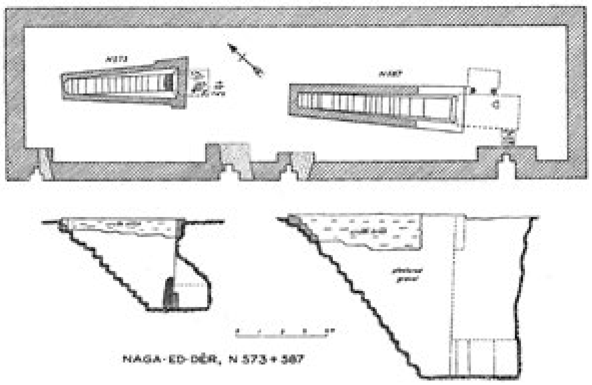


ILLUSTRATION: REISNER 1936: FIG. 86.

Identity: N 573 + 587, Cemetery 500-900

Location: Naga el-Deir

Period: Dynasty 3

Substructure Type: IIA + IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Two gravel cut staircases within body of mastaba. N 573 leads to stone slab and mud-brick blocking before burial chamber with 2.75 m thick* gravel roof. N587 leads to burial chamber with recess and 5.1 m thick* gravel roof. Both covered by gravel filled mastaba with 0.8 m thick mud-brick walls.

Tomb statistics: Substructure: Burial chamber N 573 - 1.3 m long × 1.1 m. wide × approx. 1 m high. N587 - 2.7 m. long × 1.4-1.5 m wide × approx. 1.6 m high. Superstructure: 25·8 m long × 5·6 m wide.

Robbed: Yes

References: Reisner 1932: 217–8; 1936: 181; Jánosi 2006: 31, Abb. 25.

***Scaled dimensions**

Catalogue No. 307

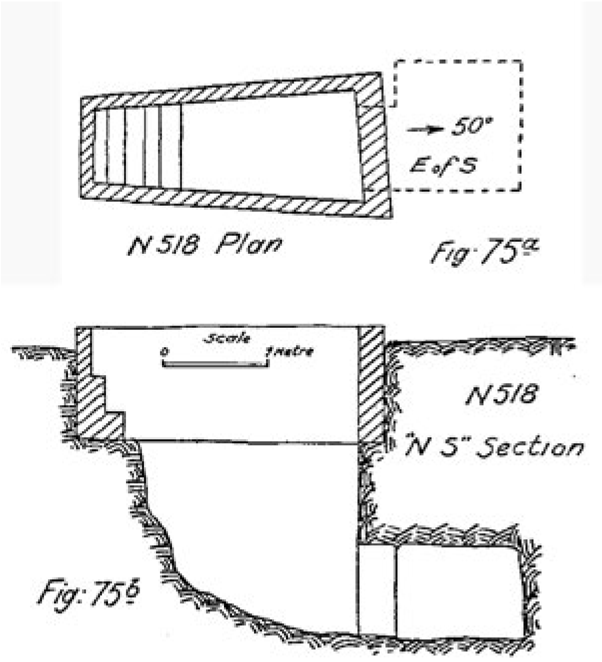


Illustration: Reisner 1932: Figs. 75a and b.

Identity: N 518, Cemetery 500-900

Location: Naga el-Deir

Period: Dynasty 3

Substructure Type: IIB

Liner: None **Thickness:** N/A

Superstructure: Yes, but denuded

Footprint O/H: N/A

Security Features: Deep staircase 2.6 m long descends to depth of 2.95 m to subterranean burial chamber, with 2.15 m thick gravel roof. Mud-brick superstructure over.

Tomb statistics: Substructure: Burial chamber 1.2 m long × 1.2 m wide × 0.8 m high. Superstructure: dimensions N/A.

Robbed: Yes, via access route

References: Reisner 1932: 197.

Catalogue No. 308

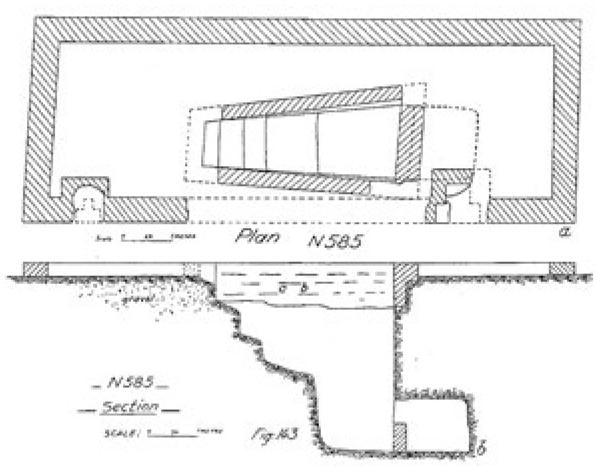


Illustration: Reisner 1932: Fig. 143.

Identity: N 585, Cemetery 500-900

Location: Naga el-Deir

Period: Dynasty 3

Substructure Type: IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Gravel cut stair-shaft 3.5 m deep* to stone slab (dimensions n/a) and secondary mud-brick blocking entrance to burial chamber. Gravel roof approx. 2.4 m* thick. Mud-brick superstructure over with walls 0.5 m* thick and gravel core.

Tomb statistics: Substructure: Burial chamber 1.6 m long × 1.5-1.3 m. wide × 1.1 m high. Superstructure: 11.1 m long × 4.1 m wide.

Robbed: Yes, via access route?

References: Reisner 1932: 17 and 224.

***Scaled dimensions**

Catalogue No. 309

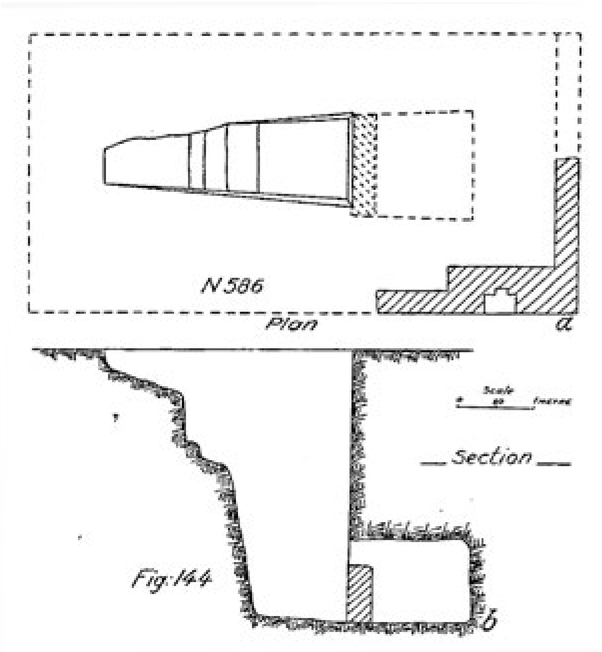


ILLUSTRATION: REISNER 1932: FIG. 144.

Identity: N 586, Cemetery 500-900

Location: Naga el-Deir

Period: Dynasty 3

Substructure Type: IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Gravel cut stair-shaft 3.5 m deep* to mud-brick blocking entrance to burial chamber. Gravel roof approx. 2.4 m* thick. Mud-brick superstructure over with walls 0.3 m* thick and unknown core.

Tomb statistics: Substructure: Burial chamber 1.6 m long × 1.35 m. wide × 1.1 m high. Superstructure: 7.25 m long × 3.6 m wide.

Robbed: Yes, via access route

References: Reisner 1932: 17 and 225.

***Scaled dimensions**

Catalogue No. 310

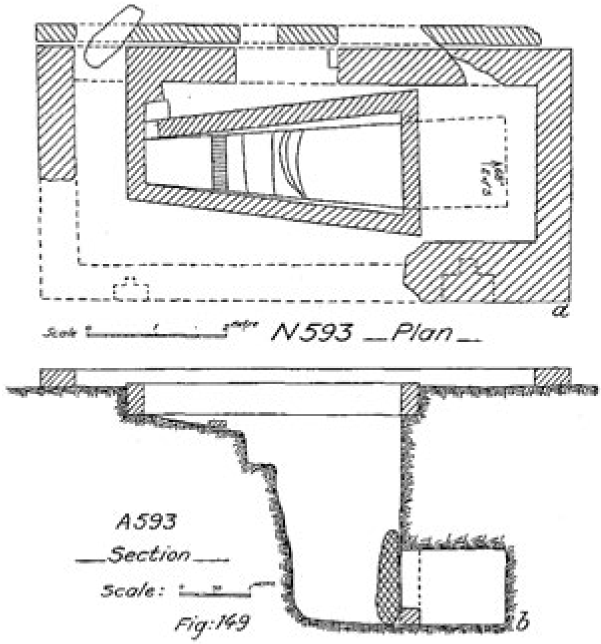


ILLUSTRATION: REISNER 1932: FIG. 149.

Identity: N 593, Cemetery 500-900

Location: Naga el-Deir

Period: Dynasty 3

Substructure Type: IIA-C

Liner: None **Thickness:** 0.5 m

Superstructure: Yes

Footprint O/H: N/A

Security Features: Gravel cut stair-shaft 3.4 m deep* to portcullis blocking entrance to burial chamber with mud-brick secondary closure. Gravel roof approx. 2.3 m* thick. Mud-brick superstructure over with walls 0.3 m* thick and unknown core. Portcullis 1.3 m high × 1.1 m wide? × 0.3 m thick* Estimated weight approx. 0.92 tonnes.

Tomb statistics: Substructure: Burial chamber 1.5 m long × 1.25 m wide × 1.1m. high. Superstructure: 7.6 m long × 3.6 m wide.

Robbed: Yes, via access route?

References: Reisner 1932: 17 and 226.

***Scaled dimensions**

Catalogue No. 311

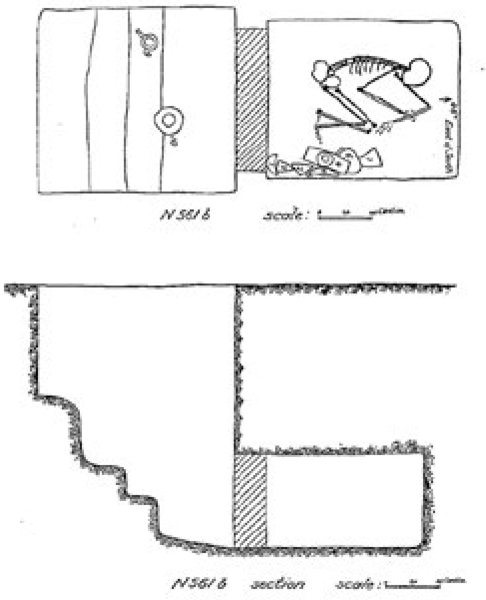


Illustration: Reisner 1932: Figs. 124 a and b.

Identity: N 561b, Cemetery 500-900

Location: Naga el-Deir

Period: Dynasty 4, Sneferu

Substructure Type: IIB

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Deep staircase backfilled with small rocks and irregular lumps of limestone to 25 cm thick mud-brick blocking entrance of burial chamber. Roof of burial chamber 1 m thick. Mud-brick mastaba over with walls approx. 0.75 m thick* surrounding a gravel filled core.

Tomb statistics: Substructure: Burial chamber 1.45 m long × 1 m. wide × 1 m high. Superstructure: 10.6 m long × 5.9 m wide.

Robbed: No

References: Reisner 1932: 212-3.

***Scaled dimensions**

Catalogue No. 312

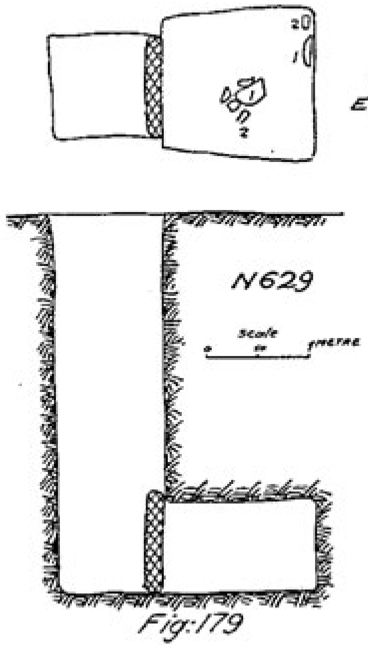


Illustration: Reisner 1932: Fig. 179.

Identity: N 629, Cemetery 500-900

Location: Naga el-Deir

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 3.7 m deep shaft to portcullis obstructing entrance to burial chamber with 2.8 m thick* gravel roof. Mud-brick superstructure over with gravel core. Portcullis 1 m high × 0.95 m wide × 0.2 m thick* Estimated weight approx.0.43 tonnes.

Tomb statistics: Substructure: Burial chamber 1.5 m long × 1.3-1.5 m wide × 1.1 m high. Superstructure: 7.2 m. long × 3.9 m wide.

Robbed: Yes, tunnel dug from shaft over portcullis stone.

References: Reisner 1932: 238-9.

***Scaled dimensions**

Catalogue No. 313

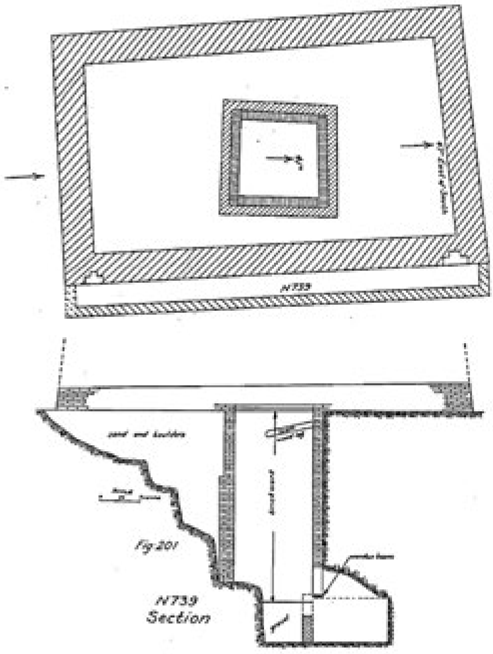


ILLUSTRATION: REISNER 1932: FIGS. 200-1.

Identity: N 739, Cemetery 500-900

Location: Naga el-Deir

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Substructure built in trench with construction stair, backfilled with rocks and sand. Mud-brick lined shaft 5.7 m* deep backfilled with gravel and sand to mud-brick blocking in front of entrance to burial chamber. Gravel roof over burial chamber approx. 4.6 m* thick. Mud-brick mastaba over with 0.75 m thick walls surrounding a gravel core, roofed with mud-brick.

Tomb statistics: Substructure: Burial chamber 1.85 m long × 1.85 m wide × 1.1 m high. Superstructure: 10.35 long × 6.3 m wide × 1.5 m high.

Robbed: No, but roof had collapsed.

References: Reisner 1932: 248-9; Porter and Moss 1937: 26.

***Scaled dimensions**

Catalogue No. 314

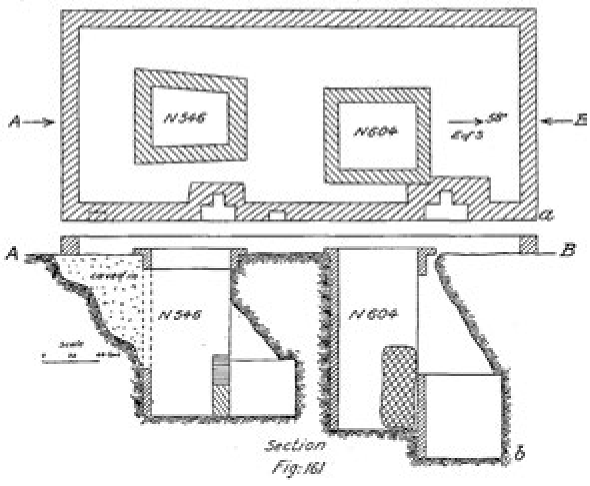


ILLUSTRATION: REISNER 1932: FIG. 161.

Identity: N 546 + N 604, Cemetery 500-900

Location: Naga el-Deir

Period: Dynasty 4, Sneferu

Substructure Type: IIC + IIC

Liner: Mud-brick in shaft only **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Twin mastaba. N 546 - 3 m deep brick-lined shaft to mud-brick blocking to burial chamber with 2 m thick gravel roof. N 604 - 3.3 m deep brick-lined shaft to large portcullis stone and mud-brick blocking to burial chamber with 2.2 m* thick gravel roof. Mud-brick mastaba over with 0.3 m* thick walls and gravel core. Portcullis in N 604: 1.6 m high × 1.05 m wide × 0.6 m wide. Estimated weight approx. 2.17 tonnes.

Tomb statistics: Substructure: Burial chambers N 546 1.2 m long × 1 m wide × 1m high. N 604: 1.35 m long × 1.5 m wide × 1.5 m high. Superstructure: 8.95 m long × 3.5 m wide.

Robbed: Yes, N 604 robbed via passage dug through shaft over portcullis

References: Reisner 1932: 208 and 231.

***Scaled dimensions**

Catalogue No. 315

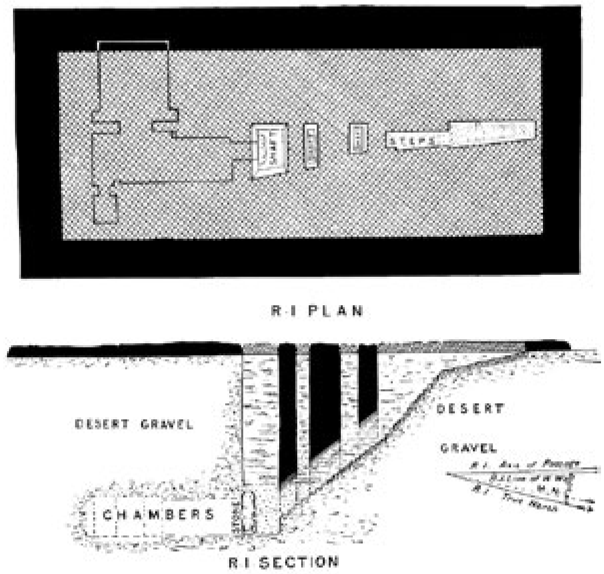


Illustration: Garstang 1904: Pl. IVa

Identity: R1

Location: Reqaqnah

Period: Dynasty 3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Steep staircase leads to burial chamber complex with floor set at 7.95 m from surface. Entrance obstructed by a large portcullis in brick formed shaft. Gravel roof over, approx. 6.2 m thick*. Mud-brick mastaba with walls approx. 1.75 m thick* surrounding 'filled' core. Portcullis approx. 2 m high × 1.5 m wide × 0.6 m thick* Estimated weight 3.19 tonnes.

Tomb statistics: Substructure: Burial chamber complex approx. 1.75 m high* Superstructure: 24.9 m long × approx. 12 m wide*

Robbed: ?

References: Garstang 1904: 22; Reisner 1936: 179–80.

*Scaled dimensions

Catalogue No. 316

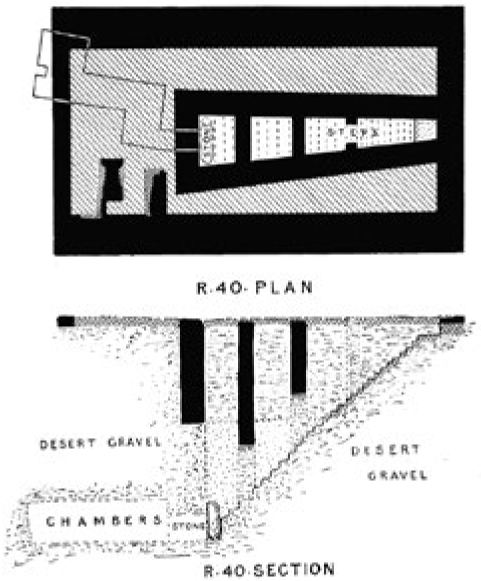


Illustration: Garstang 1904: IVb.

Identity: R 40

Location: Reqaqnah

Period: Dynasty 3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Steep staircase 8.4 m deep leads to burial chamber complex with floor set at 9 m below surface. Entrance obstructed by large portcullis in brick formed shaft. Gravel roof over approx. 7.25 m thick*. Mud-brick mastaba with walls approx. 1-1.75 m thick* surrounding 'filled' core. Portcullis approx. 1.5 m high × 1.9 m wide × 0.5 m thick* Estimated weight 3.06 tonnes.

Tomb statistics: Substructure: Burial chamber complex approx. 1.75 m high* Superstructure: 17.3 m long × 10.4 m wide*

Robbed: Yes, via a 'hole' from above.

References: Garstang 1904: 21-3; Reisner 1936: 180.

*Scaled dimensions

Catalogue No. 317

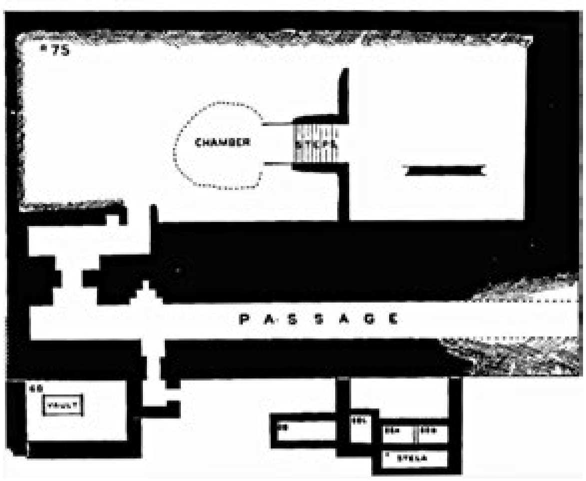


ILLUSTRATION: GARSTANG 1904: PL. XXI.

Identity: R75

Location: Reqaqnah

Period: Dynasty 4, Sneferu

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Stairs descend south to gravel cut subterranean burial chamber depth unknown. Mud-brick mastaba with walls 0.75-1.5 m thick.*

Tomb statistics: Substructure: Burial chamber approx. 3.5 m long × 3.5 m wide* Superstructure: 23.6 m long × 12 m wide.

Robbed: No

References: Garstang 1904: 31-2; Reisner 1936: 231.

***Scaled dimensions**

Catalogue No. 318

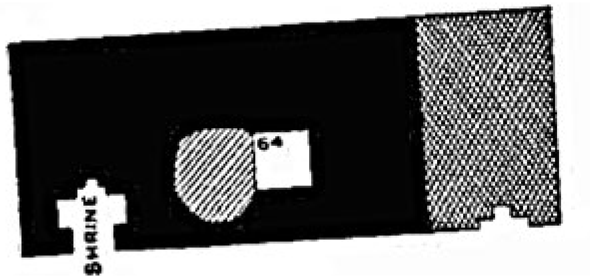


ILLUSTRATION: GARSTANG 1904: PL. XXI.

Identity: R 64 Tomb of Shepses

Location: Reqaqnah

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 4 m deep shaft to mud-brick blocking entrance of burial chamber. Solid mud-brick mastaba over.

Tomb statistics: Burial chamber: Dimensions N/A. Superstructure: 10 m long × 4 m* wide × 1 m high.

Robbed: No

References: Garstang 1904: 49-50; Porter and Moss 1937: 36.

***Scaled dimensions**

Catalogue No. 319

Illustration: Photograph by A. Dodson.

Identity: K1

Location: Beit Khallaf

Period: Dynasty 3

Substructure Type: IIA

Liner: Stone in burial chamber **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: N/A

Security Features: 'U' shaped staircase backfilled with liquid mud descends through superstructure to desert level. Six large portcullises in brick and gravel shafts block progress via passage to substructure with 18 rooms set at 19.7 m below the surface. Burial chamber excavated in gravel strata lined with stone blocks and protected by 16.7 m thick gravel ceiling. Enormous solid mud-brick mastaba provides minimum of 11m lateral cover over substructure. First portcullis (1 of 6), 3.3 m high × 1.5 m wide × 0.45 m thick. Estimated weight 4.79 tonnes. Largest portcullis (6 of 6), 5 m high × 3 m wide × 0.45-0.6 m thick. Estimated weight 19.35 tonnes.

Tomb statistics: Substructure: Burial chamber 5 m long × 5.m wide × 3 m high. Superstructure: 85 m long × 45 m wide × 8 m high.

Robbed: Yes, via robbers tunnel into burial chamber

References: Garstang 1903: 3-4, 8-11; Reisner 1936: 172-4; Porter and Moss 1937: 37; Jánosi 2006: 21-3.

Catalogue No. 320

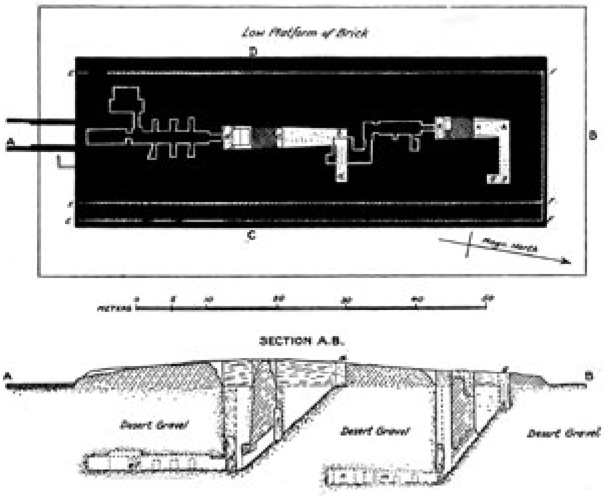


Illustration: Garstang 1903: Pl. XVIII. Courtesy of Bernard Quaritch Ltd.

Identity: K2

Location: Beit Khallaf

Period: Dynasty 3

Substructure Type: IIA + IIA

Liner: None **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: N/A

Security Features: Twin substructure. Southern 'L' shaped staircase descends within superstructure and is obstructed halfway by portcullis in grooved emplacement. Further down second large portcullis (unclosed) in grooved emplacement blocks access to subterranean complex set at 11.5 m from surface. Approx. 9 m* thick gravel roof over burial chamber. Northern 'U' shaped staircase descends within superstructure to single portcullis (never closed) in grooved emplacement obstructing entrance to subterranean complex set at 13.4 m to surface. Approx. 12 m* thick gravel roof over burial chamber. Solid mud-brick mastaba over. Largest portcullis 5.18 m × 2.43-2.74 m × 0.61 m thick. Estimated weight approx. 18.61 tonnes.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 64.9 m long × 23.6 m wide

Robbed: Yes

References: Garstang 1903: 11-2; Reisner 1936: 174-6; Porter and Moss 1974-81: 437.

***Scaled dimensions**

Catalogue No. 321

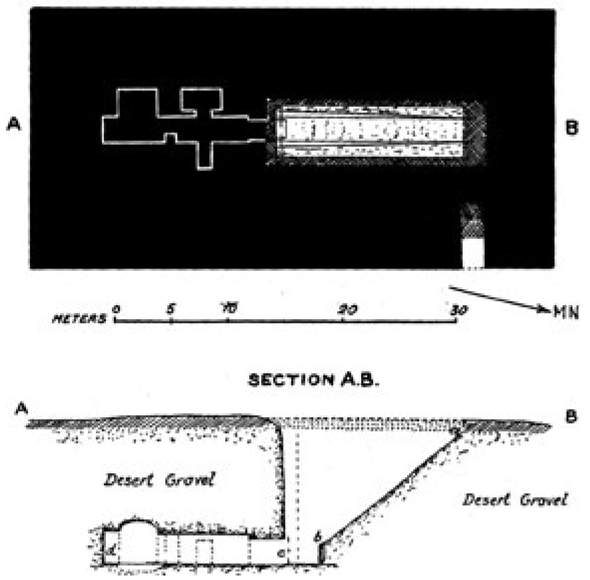


ILLUSTRATION: GARSTANG 1903: PL. XXV. COURTESY OF BERNARD QUARITCH LTD.

Identity: K3

Location: Beit Khallaf

Period: Dynasty 3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Staircase descends to portcullis in grooved emplacement (stone missing) obstructing access to subterranean complex set at 11.5 m from surface. Natural gravel roof approx. 8 m thick.* Mud-brick mastaba over.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 44.25 m long × 21.8 m wide.

Robbed: Yes

References: Garstang 1903: 15-6; Reisner 1936: 177-8.

***Scaled dimensions**

Catalogue No. 322

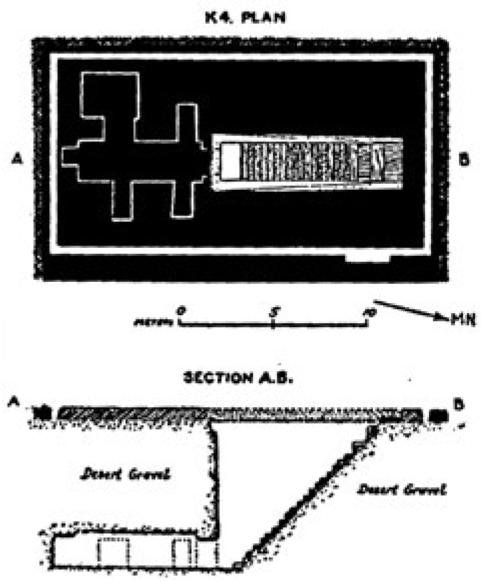


ILLUSTRATION: GARSTANG 1903: PL. XXV. COURTESY OF BERNARD QUARITCH LTD.

Identity: K4

Location: Beit Khallaf

Period: Dynasty 3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Staircase descends to freestanding portcullis (stone missing) obstructing access to subterranean complex set 7.44 m from surface. Natural gravel roof approx. 6 m thick.* Mud-brick mastaba over.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 18.8 m long × 9.6 m wide.

Robbed: Yes

References: Garstang 1903: 14-5: Reisner 1936: 178-9.

***Scaled dimensions**

Catalogue No. 323

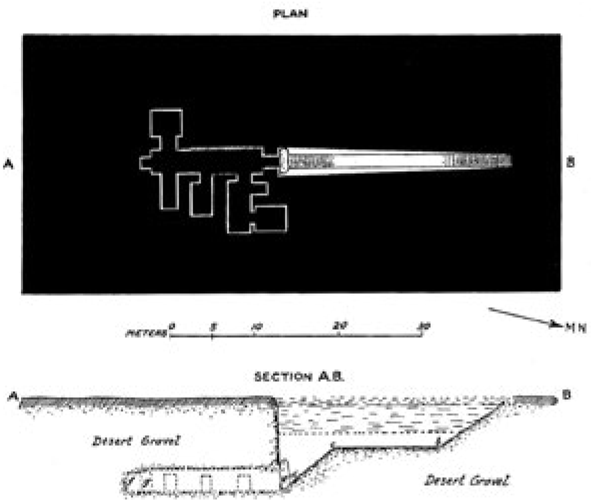


Illustration: Garstang 1903: Pl. XXV. Courtesy of Bernard Quaritch Ltd.

Identity: K5

Location: Beit Khallaf

Period: Dynasty 3

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Staircase with landing and second staircase descends to large freestanding portcullis (dimensions unknown) obstructing access to subterranean complex, set down approx. 11.25 m.* Natural gravel roof approx. 7.5 m thick.* Mud-brick mastaba over.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 61.7 m long × 29.8 m wide.

Robbed: Yes, by vertical passage from above.

References: Garstang 1903: 15-6; Reisner 1936: 176-7; Porter and Moss 1974-81: 437.

***Scaled dimensions**

Catalogue No. 324

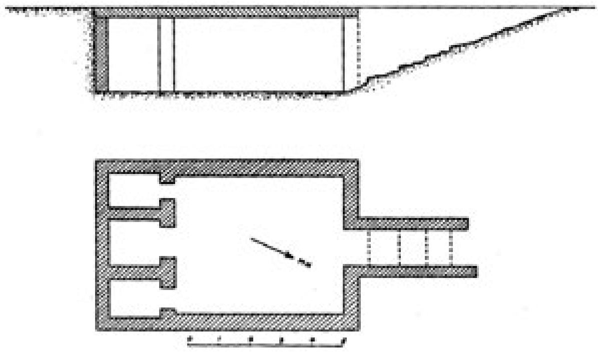


Illustration: Reisner 1936: Fig. 49.

Identity: M1

Location: Mahasna

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.4-0.55*

Superstructure: No

Footprint O/H: N/A

Security Features: Stair to mud-brick lined 'drift sand and gravel' cut pit with wood and mud roof 0.35 m thick*

Tomb statistics: Substructure: Pit 8.4 m long × 5.4 m wide × 2.5 m deep.

Robbed: Yes

References: Garstang and Sethe 1903: 28; Reisner 1936: 67.

***Scaled dimensions**

Catalogue No. 325

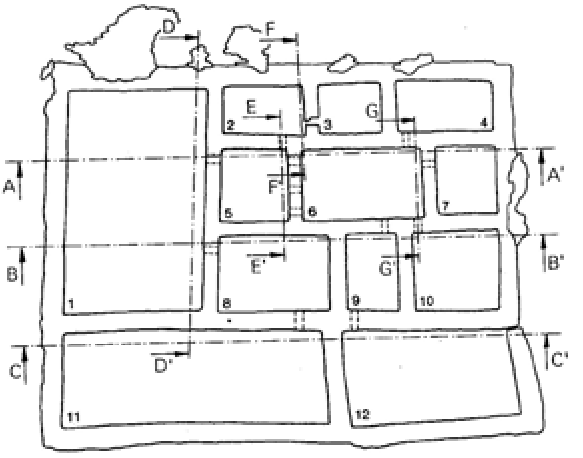


Illustration: Dreyer, Hartung and Pumpenmeier 1998: Abb. 3. Courtesy of the DAI Cairo.

Identity: U-j

Location: Abydos, Cemetery U

Period: Naqada IIIA2

Substructure Type: IC

Liner: Mud-brick **Thickness:** 0.45 m (2 bricks)

Superstructure: No

Footprint O/H: N/A

Security Features: Mud-brick lined pit cut in 'compact sand'. Subdivided by internal walls. Internal wooden shrine in chamber no. 1 contained burial. Wood and mud-brick roof, supported by 0.15 m diameter beams set 0.6 m under ancient desert surface and brought level with desert.

Tomb statistics: Substructure: 10.1-10.6 m long × 8-8.25 m wide × 1.4-1.57 m deep. Burial chamber (No. 1): 4.85 m long × 3 m × 1.5 m deep.

Robbed: Yes

References: Dreyer, Hartung and Pumpenmeier 1998: *Passim*.

Catalogue No. 326

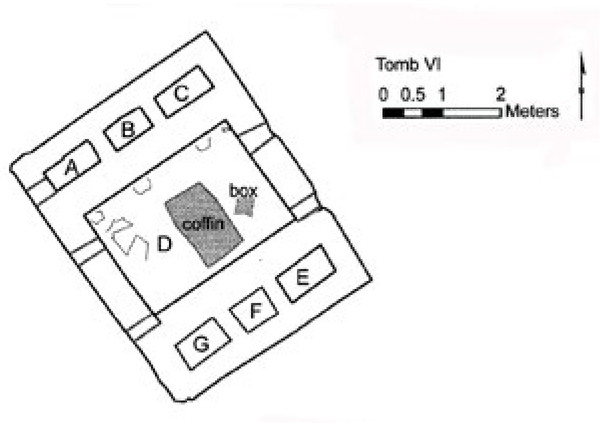


Illustration: Hussein 2011: Fig. 9.

Identity: Tomb IV

Location: Abydos

Period: Dynasty 1, Naqada IIIB-C2

Substructure Type: IC

Liner: Mud-brick **Thickness:** Approx 0.5 m*

Superstructure: No

Footprint O/H: N/A

Security Features: Pit to mud-brick lined burial chamber with six adjacent magazines. Wooden roof and backfill of unknown depth.

Tomb statistics: Substructure: 4.9 m long × 3.75 m wide × 1.3 m deep. Burial chamber 2.8 m long × 2 m wide.

Robbed: Yes, via passage cut through from magazine 'G'.

References: Hussein 2011: 275-8.

***Scaled dimensions**

Catalogue No. 327

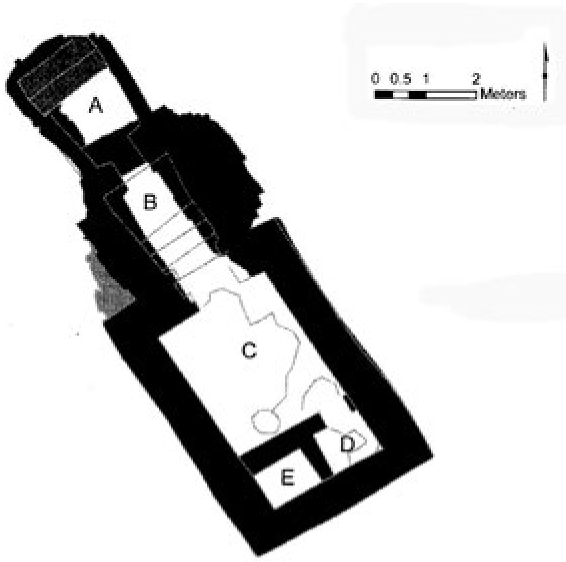


Illustration: Hussein 2011: Fig. 4.

Identity: Tomb I

Location: Abydos

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** Approx 0.75 m*

Superstructure: No

Footprint O/H: N/A

Security Features: Entrance 'vestibule' with mud-brick blocked doorway leads to an approximately 3.5 m long mud-brick lined and corbel roofed stairway descending to a mud-brick lined burial chamber with internal magazines. Wooden beams support planked roof over.

Tomb statistics: Substructure: Approx. 5.75 m long × 4 m wide × 2.8 m deep. Burial chamber 2.9 m long × 2.5 m wide, × 2.8 m deep.

Robbed: Yes

References: Hussein 2011: 271-3.

***Scaled dimensions**

Catalogue No. 328

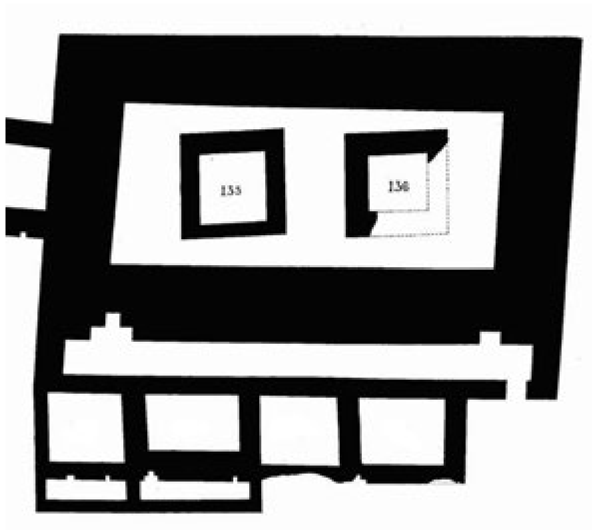


Illustration: Peet and Loat 1913: Pl. XV.

Identity: The 'Great Mastaba' D 135 + D136

Location: Abydos, Cemetery D (Peet).

Period: Dynasty 4, Sneferu?

Substructure Type: IIC + IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 'Twin mastaba' D 135 - 5 m deep shaft brick-lined at top to consolidate sand layer to mud-brick blocking entrance to single burial chamber cut in 'rock ' (solid Pliocene gravel/sand deposit). D 136 - 5 m deep brick-lined shaft brick-lined at top to two burial chambers, one northern, one western cut in 'rock '(solid gravel/sand deposit). Mud brick superstructure over with corridor chapel. Walls 1.75 m thick*, core fill unknown, but probably 'sand and rubbish'.

Tomb statistics: Substructure: dimensions not available. Superstructure: 13 m long × 9 m wide.

Robbed: Yes

References: Peet and Loat 1913: 9, 15-7; Porter and Moss 1937: 69.

***Scaled dimensions**

Catalogue No. 329

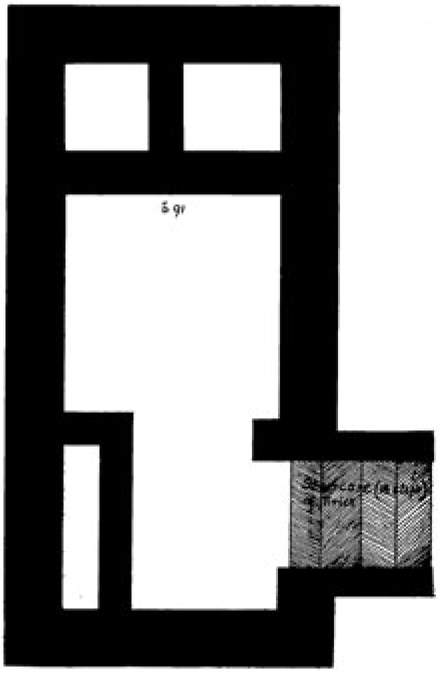


Illustration: Randall-MacIver and Mace 1902: Pl. IV, fig. 8.

Identity: Tomb b 91

Location: El-Amrah

Period: Dynasty 1, Naqada IIIC2-D

Substructure Type: ID

Liner: Mud-brick **Thickness:** 0.4 m *

Superstructure: No

Footprint O/H: N/A

Security Features: 7.16 m long mud-brick lined staircase to pit cut in hard gravel and sand and lined with mud-brick. Burial chamber subdivided with three internal magazines. Closed by wood and mud roof.

Tomb statistics: Substructure: Pit 6.96 m long × 3.48 m wide × 1.5 m deep. Burial chamber: 2.6 m long × 2.3 m.

Robbed: Yes, in 20th Century

References: Randall-MacIver and Mace 1902: 39;Reisner 1936: 37.

***Scaled dimensions**

Catalogue No. 330

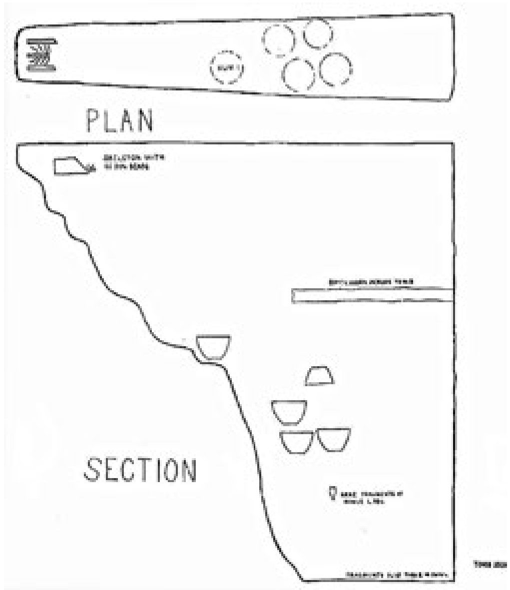


Illustration: Quibell 1896: Pl. IV, 15.

Identity: Tomb 353

Location: Ballas

Period: Early Dynasty 4

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Possibly

Footprint O/H: Unknown

Security Features: Staircase 4.75 m long* then rough slope descends to depth of 6.1 m.* Mud-brick 'shelf' 2.3m* from surface formed burial chamber 'roof' or base for intrusive 12th Dynasty burial?

Tomb statistics: Substructure: 6.15 m long × 1.4 m wide × 6.1 m deep*

Robbed: ?

References: Quibell 1896: 4.

***Scaled dimensions**

Catalogue No. 331

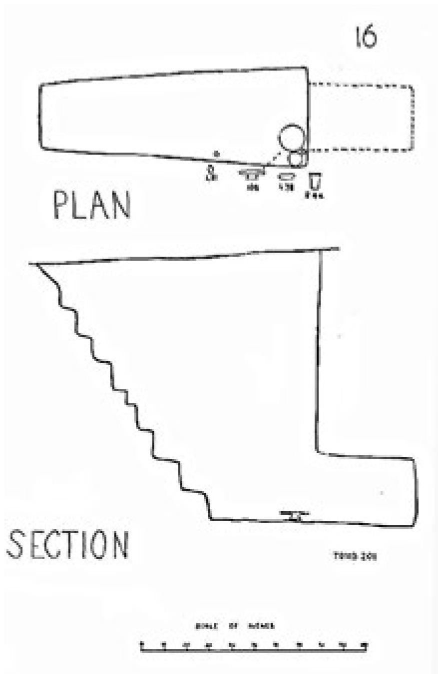


Illustration: Quibell 1896: Pl. IV, 16

Identity: Tomb 201

Location: Ballas

Period: Early Dynasty 4

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: Possibly

Footprint O/H: Unknown

Security Features: Staircase 4 m* long descends to subterranean burial chamber 3.5 m deep.* Hard gravel roof over burial chamber approx. 2.6 m* thick.

Tomb statistics: Substructure: Burial chamber 1.3 m long × 0.9 m wide × 0.9 m high*

Robbed: ?

References: Quibell 1896: 5.

Catalogue No. 332

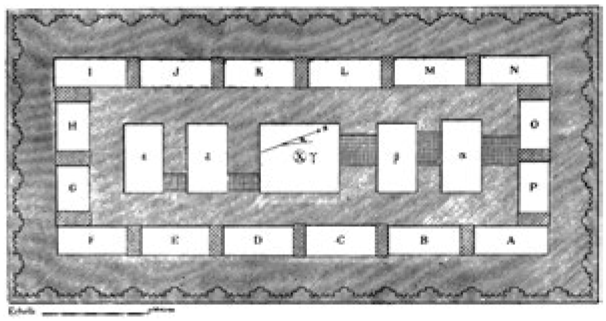


Illustration: De Morgan 1897: Fig. 518.

Identity: 'Royal tomb', Queen Neith-hotep

Location: Naqada

Period: Naqada IIIC1

Substructure Type: None, built at surface

Liner: Mud-brick **Thickness:** 2.3-3.32 m

Superstructure: Yes

Footprint O/H: 6 m

Security Features: Built entirely above ground. Mud-brick inner core with walls that varied in thickness between 2.3–2.99 m at its ends and 3.05–3.32 m at its sides containing burial chamber and four magazines. Superstructure with wooden roof and 4 m thick mud-brick walls subdivided into compartments filled with gravel/sand.

Tomb statistics: Substructure: Internal core 39.5 m long × 12.75 m wide. Superstructure: Approx. 53.3 m long × 26.03 m wide.

Robbed: Yes

References: de Morgan 1897: 145-202. Borchardt 1898: 87-105; Porter and Moss 1937: 118-9.

***Scaled dimensions**

Catalogue No. 333

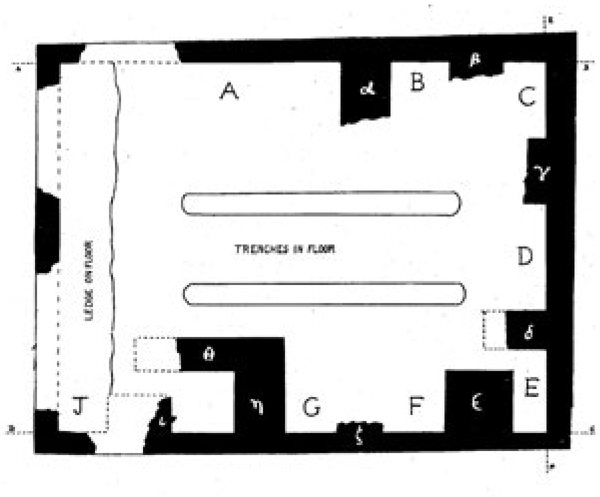


Illustration: Mond and Myers 1937: Pl. V. Courtesy of the Egypt Exploration Society.

Identity: Tomb 1207, Cemetery 1200

Location: Armant

Period: Dynasty 1, Naqada IIIB-C1

Substructure Type: IC

Liner: Mud-brick **Thickness:** 0.2-0.25 m*

Superstructure: No

Footprint O/H: N/A

Security Features: Mud-brick lined pit cut in the desert. Wooden beams resting on ledge approximately 0.45 m* deep? Supported mud-brick roof? Tongue walls perhaps supported an internal wooden shrine?

Tomb statistics: Substructure: Pit 5.1 m × 3.86 m × approx. 2.4 m deep.* Burial chamber indeterminable.

Robbed: Yes

References: Mond and Myers 1937: 16-20.

***Scaled dimensions**

Catalogue No. 334

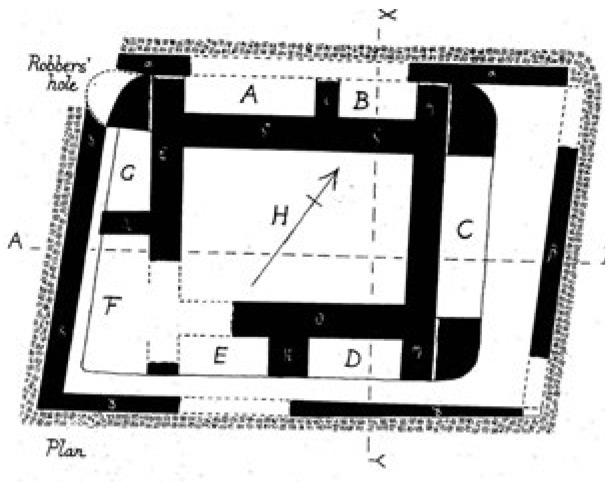


Illustration: Mond and Myers 1937: Pl. V. Courtesy of the Egypt Exploration Society.

Identity: Tomb 1208, Cemetery 1200

Location: Armant

Period: Dynasty 1, Naqada IIIB-C1

Substructure Type: IC

Liner: Mud-brick **Thickness:** 0.1–0.3 m*

Superstructure: No

Footprint O/H: N/A

Security Features: Mud-brick lined pit dug in desert. Wooden beams on ledge supported mud-brick roof? Internal cross walls approximately 0.4 m* thick form burial chamber. Wooden roof and backfill approx. 0.8 m deep.*

Tomb statistics: Substructure: 6.3 m long × 4.75 m wide × approx. 3.1 m* deep. Burial chamber 3.02 m long × 2.02 m wide.

Robbed: Yes

References: Mond and Myers 1937: 16-20.

***Scaled dimensions**

Catalogue No. 335

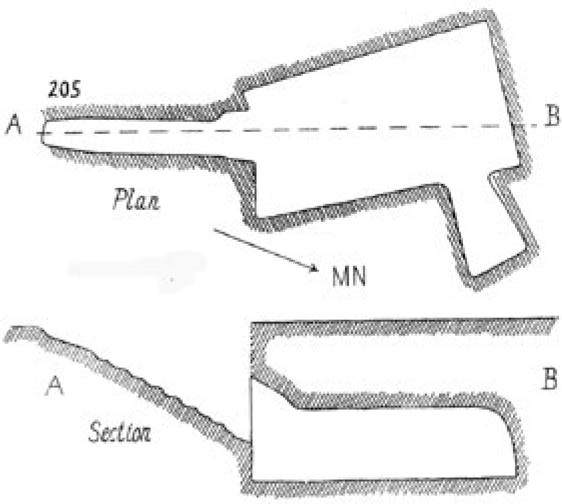


Illustration: Myers and Fairman 1931: Pl. XLI. Courtesy of the Egypt Exploration Society.

Identity: Tomb 205

Location: Armant, Cemetery 200

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Rough stair/slope 3 m deep to subterranean burial chamber with recess set 4.2 m from surface. Solid gravel and rock roof? Approx. 2.4 m thick.*

Tomb statistics: Substructure: Burial chamber 6.4 m long × 3.2-3.8 m wide × 1.8 m high*

Robbed: Yes, and reused.

References: Myers and Fairman 1931: 224.

***Scaled dimensions**

Catalogue No. 336

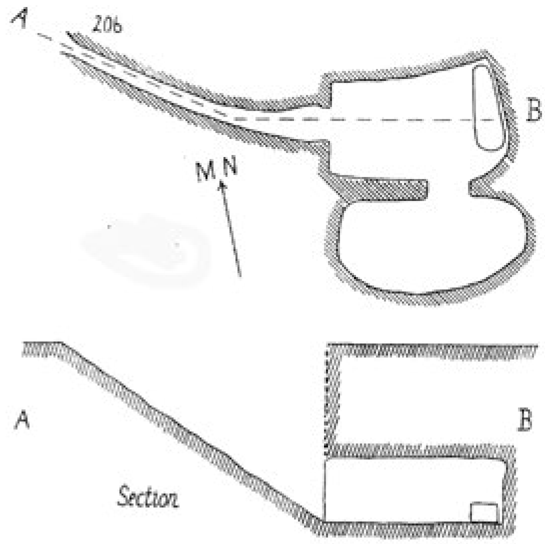


Illustration: Myers and Fairman 1931: Pl. XLI. Courtesy of the Egypt Exploration Society.

Identity: Tomb 206

Location: Armant, Cemetery 200

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Sloping passage 4.6 m deep to subterranean burial chambers set 4.6 m from surface. Solid rock and gravel roof? Approx. 2.8 m thick.*

Tomb statistics: Substructure: 1st chamber approx. 5.5 m long × 2.2-3m wide × 1.6 m high* 2nd chamber approx. 4.8 m long × 2.2 m wide.*

Robbed: Yes, and reused.

References: Myers and Fairman 1931: 224.

***Scaled dimensions**

Catalogue No. 337

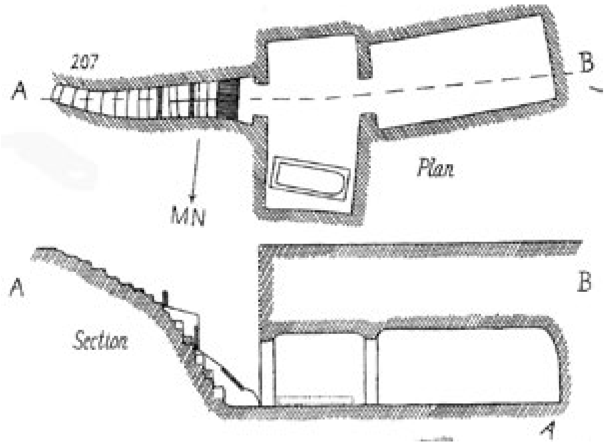


ILLUSTRATION: MYERS AND FAIRMAN 1931: PL. XLI. COURTESY OF THE EGYPT EXPLORATION SOCIETY.

Identity: Tomb 207

Location: Armant, Cemetery 200

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Stairs 4.6 m deep* to subterranean burial chambers, solid rock and gravel roof? Approx. 2.4 m thick.*

Tomb statistics: Substructure: Anteroom: Approx. 2.3 m long × 5 m wide × 2 m high.* Burial chamber?: Approx. 5 m long × 2.2 m wide × 2.2 m high.*

Robbed: Yes, and reused.

References: Myers and Fairman 1931: 224.

***Scaled dimensions**

Catalogue No. 338

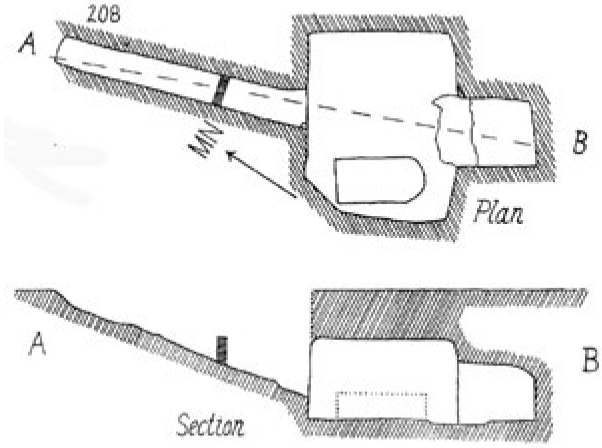


ILLUSTRATION: MYERS AND FAIRMAN 1931: PL. XLI. COURTESY OF THE EGYPT EXPLORATION SOCIETY.

Identity: Tomb 208

Location: Armant, Cemetery 200

Period: Dynasty 2

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Sloping passage 2.6 m deep* to subterranean burial chamber with recess, set 3.2 m* from surface. Solid rock and gravel roof? Approx. 1.2 m thick.*

Tomb statistics: Substructure: Burial chamber approx. 3.5 m long × 3.4-4.4 m wide × 2 m high*

Robbed: Yes, and reused.

References: Myers and Fairman 1931: 224.

***Scaled dimensions**

Catalogue No. 339

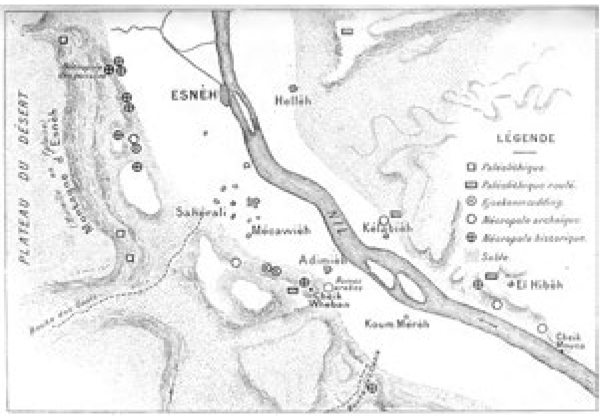


Illustration: De Morgan 1908: Fig 35. Map of archaeological sites in the environs of Esna. No tomb plan available.

Identity: Es-Seba‘iya brick tomb

Location: Es-Seba‘iya.

Period: Dynasty 2

Substructure Type: IC

Liner: Mud-brick **Thickness:** 0.22 m

Superstructure: No

Footprint O/H: N/A

Security Features: Pit with mud-brick liner. Closed with sandstone slabs totalling 3.5 m long. Largest slab 2.32 m long × 1.23 m wide × 0.32 m thick weighing approx. 1.75 tonnes

Tomb statistics: Substructure: 5.48 m long × 1.48 m wide × 0.25 m (sic) deep.

Robbed: Yes, but only the uncovered parts.

References: de Morgan 1984: 64–5. Needler and Churcher 1984: 146-7.

Catalogue No. 340

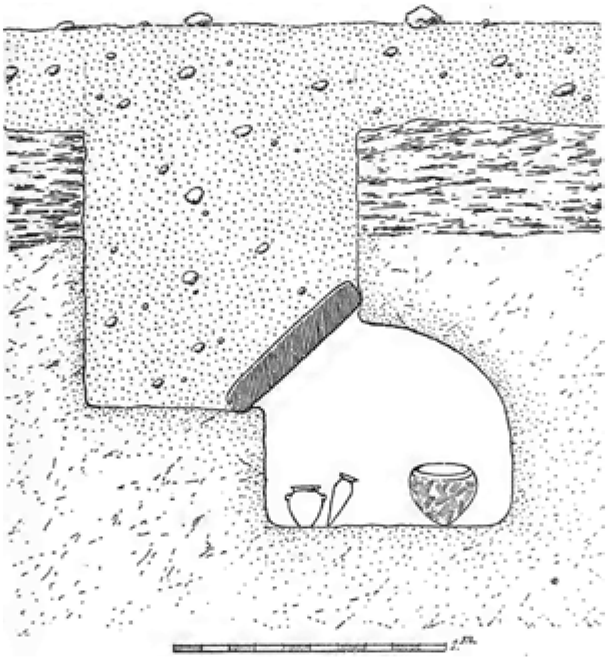


Illustration: De Morgan 1909: Fig. 130.

Identity: Burial 8

Location: Kom el-Ahmar

Period: Naqada IIIA

Substructure Type: IB/SC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Pit leads to loculus blocked by stone slab, pit backfilled after interment. Solid rock/gravel roof? 0.75 m thick*

Tomb statistics: Substructure: Pit 2.25 m long × 1.05 m wide × 1.53 m deep. Loculus: 0.9 m wide × 0.45 m deep.

Robbed: No

References: de Morgan 1909: 271-2; Needler 1984: 111.

***Scaled dimensions**

Catalogue No. 341

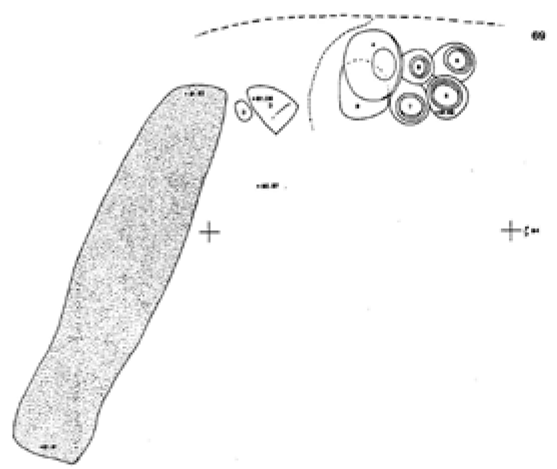


Illustration: Hendrickx and Van Rossum 1994: Pl. LVI.

Identity: Tomb 69

Location: El-Kab

Period: Naqada IIIA2

Substructure Type: IB

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Sandstone slab roof over pit grave. Slab 1.4 m long × 0.3 m wide × 0.14 m thick found in situ.

Tomb statistics: Substructure: Pit 2 m long × 1 m wide.

Robbed: Yes

References: Hendrickx and Van Rossum 1994: 186.

Catalogue No. 342

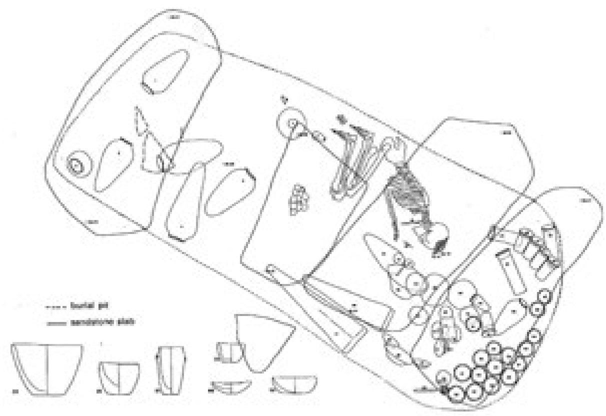


Illustration: After Hendrickx and Van Rossum 1994: Pl. LXIII and LXIV.

Identity: Tomb 85

Location: El-Kab

Period: Naqada IIIA2

Substructure Type: IB

Liner: None **Thickness:** N/A

Superstructure: None

Footprint O/H: N/A

Security Features: Pit grave with protective sandstone slab roof.

Tomb statistics: Substructure: Pit 3.1 m long × 1.25 m wide × 1.5 m deep.

Robbed: No

References: Hendrickx and Van Rossum 1994: 194.

Catalogue No. 343

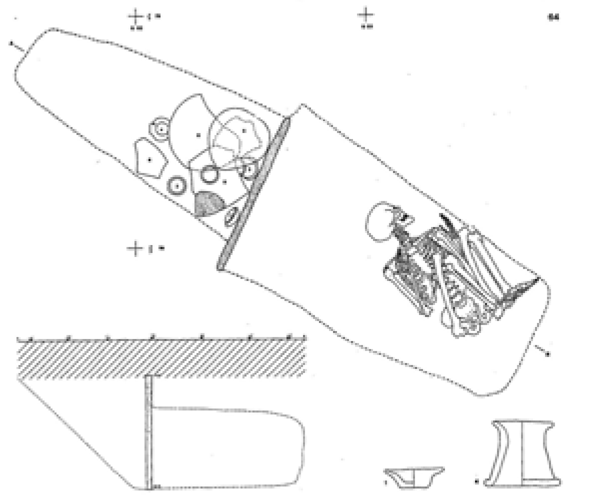


Illustration: Hendrickx and Van Rossum 1994: Pl. LIV.

Identity: Tomb 64

Location: El-Kab

Period: Dynasty 2, Naqada IIID

Substructure Type: IIA

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Backfilled steep slope 1.3 m deep to portcullis found in situ in grooved emplacement blocking subterranean burial chamber with Nile sediment? roof 0.6 m thick. Portcullis 1 m high × 0.7 m wide × 0.12 m thick. Estimated weight approx. 0.15 tonnes.

Tomb statistics: Substructure: Burial chamber 1.5 m long × 0.6 m wide × 0.7 high.*

Robbed: No

References: Hendrickx and Van Rossum 1994: 152 and 184.

Catalogue No. 344

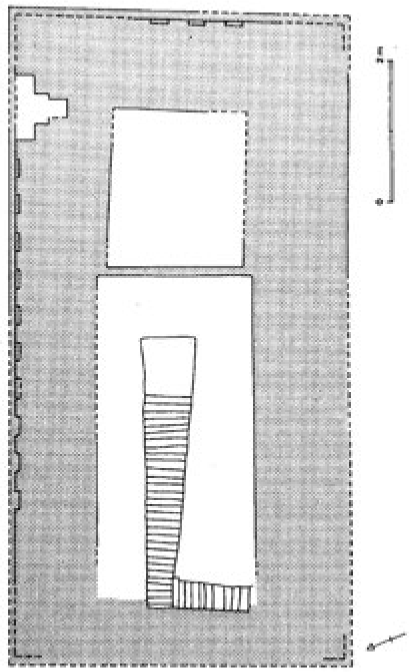


Illustration: Limme 2008: Fig. 31.

Identity: Tomb 274, Rock Necropolis

Location: El-Kab

Period: Dynasty 3

Substructure Type: IIA-C

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: 'L' shaped staircase descends 10.5 m and leads to deep shaft with burial chamber at base set at 24.5 m from summit. Solid rock roof over burial chamber 22.5 m thick. Mud-brick mastaba over with walls 0.9-1.4 m thick.

Tomb statistics: Substructure: Burial chamber: 3 m long × 1.7 m wide × 2 m high. Superstructure: 19 m long × 10 m wide.

Robbed: Yes and reused and refilled.

References: Huyge 2003: 29-30; Limme 2000: 26-31; 2008: 23-4; Limme *et al.* 1997: 3-6.

***Scaled dimensions**

Catalogue No. 345

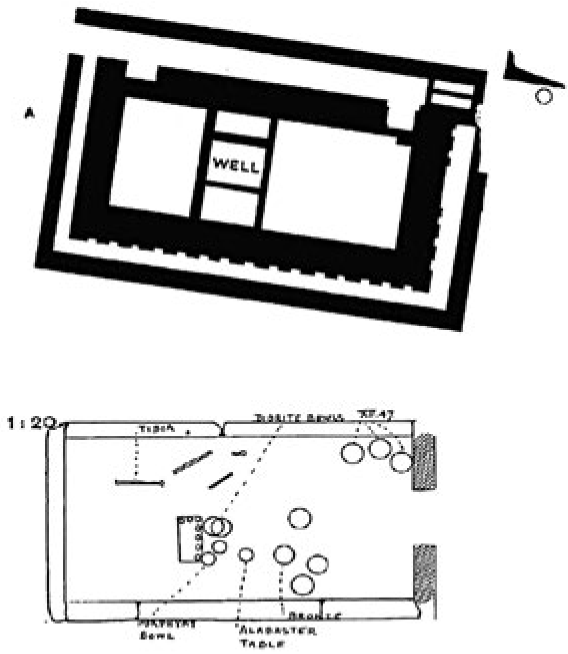


Illustration: Quibell 1896: Pls. I.4 and XXIII.

Identity: Mastaba A, Kamena

Location: El-Kab

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: Stone **Thickness:** Unknown

Superstructure: Yes

Footprint O/H: N/A

Security Features: 4.5 m deep shaft filled with 'tenacious clay' (*tafl*?) to sandstone slab 7.5 cm thick obstructing entrance to sandstone slab lined and roofed burial chamber. Burial chamber roof approx. 3.3 m thick of Nile sediments below surface. Mud-brick mastaba over with walls approx. 3 m thick* and 'brick earth core'. Surrounding boundary wall.

Tomb statistics: Substructure: Burial chamber 1.35 m long × 0.7 m wide × approx. 1 m high.* Superstructure: 29 m long × 14.75 m wide.

Robbed: No

References: Quibell 1896: 3-4; Reisner 1936: 229; Porter and Moss 1937: 175.

***Scaled dimensions**

Catalogue No. 346

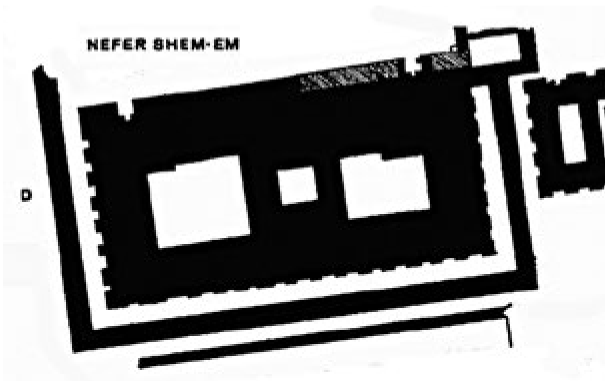


Illustration: Quibell 1896: Pl. XXIII.

Identity: Mastaba D, Nefershem

Location: El-Kab

Period: Dynasty 4, Sneferu

Substructure Type: IIC

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Shaft to burial chamber. Mud-brick mastaba over with walls approx. 4 m thick* and 'brick earth core'.

Tomb statistics: Substructure: Dimensions N/A. Superstructure: 28.25 m long × 14.75 m wide.

Robbed: No

References: Quibell 1896: 3-4; Reisner 1936: 229; Porter and Moss 1937: 175.

***Scaled dimensions**

Catalogue No. 347

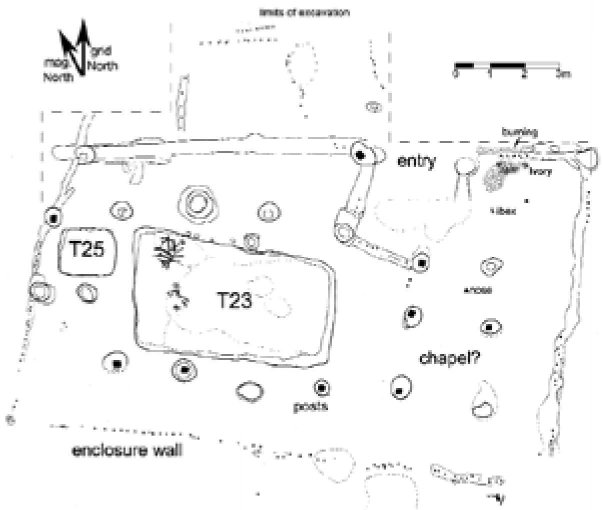


Illustration: Friedman 2005: 4. Courtesy of the Hierakonpolis Expedition.

Identity: Tomb 23, Locality HK6

Location: Hierakonpolis

Period: Naqada IIAB

Substructure Type: IB

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Pit cut in bedrock, details of closure unknown. Lightweight superstructure and enclosure above.

Tomb statistics: Substructure: Pit 5.4 m long × 3.1 m wide × 1.17 m deep. Superstructure: Wood and wicker exact dimensions unknown.

Robbed: Yes

References: Adams 2004: 47–50; Friedman 2005: 4-6; 2006a: 7-8; 2008a: 13-4

Catalogue No. 348

Illustration: Friedman 2008b: Fig. 11. Courtesy of the Hierakonpolis Expedition.

Identity: Tomb 26, Locality HK6

Location: Hierakonpolis

Period: Naqada IIB

Substructure Type: IB

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Rock-cut burial pit with 0.5 m deep ledge to accept recessed wooden roof. Possible protective mound over with wicker revetment?

Tomb statistics: Substructure: Pit 3.3 m long × 1.45 m wide × 1.07 m deep.

Robbed: Yes

References: Friedman 2008b: 1178-9.

Catalogue No. 349

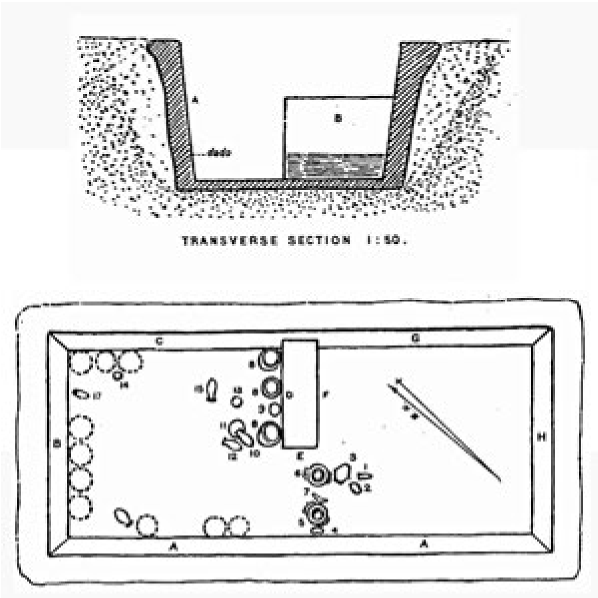


ILLUSTRATION: QUIBELL AND GREEN 1902: PL. LXVII.

Identity: Tomb 100

Location: Hierakonpolis

Period: Naqada IIC

Substructure Type: IC

Liner: Mud-brick **Thickness:** 0.09-0.23 m

Superstructure: No

Footprint O/H: N/A

Security Features: Pit excavated in 'hard desert sand' and mud-brick lined with internal divider. Closed with wooden roof. Decorated plaster finish.

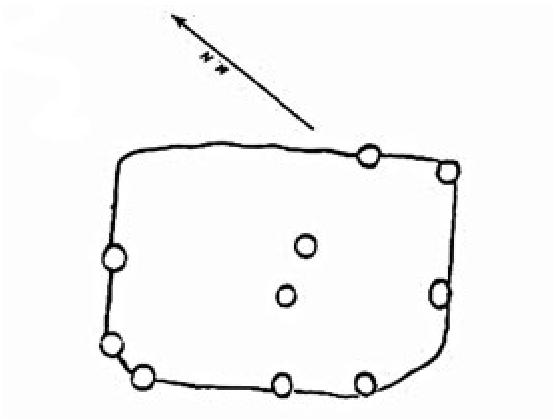
Tomb statistics: Substructure: Pit 4.5 m long × 2 m wide × 1.5 m deep.

Robbed: Disturbed

References: Quibell and Green 1902: 20-2; Porter and Moss 1937: 199; Case and Payne 1962: *passim*; Kemp 1973: *passim*.

***Scaled dimensions**

Catalogue No. 350



1:50 GRAVE 500. SHOWING SOCKETS FOR POSTS.

ILLUSTRATION: QUIBELL AND GREEN 1902: PL. LXVII

Identity: Grave 500

Location: Hierakonpolis

Period: Naqada IID

Substructure Type: IB

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Unlined pit in 'hard desert sand' with wood roof supported by beams and wooden posts.

Tomb statistics: Pit: Approx. 2.1 m long × 1.45 m wide*

Robbed: ?

References: Quibell and Green 1902: 22.

***Scaled dimensions**

Catalogue No. 351

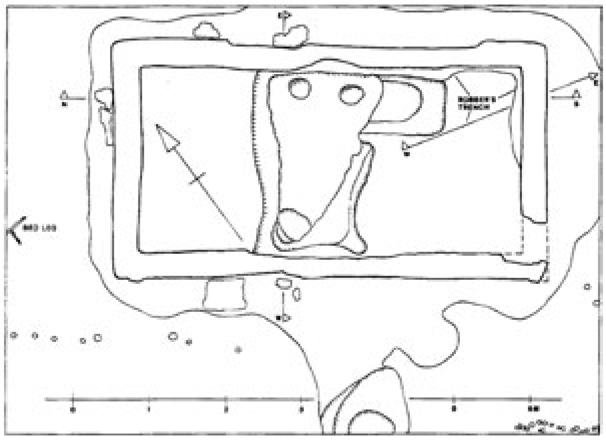


Illustration: Adams 2000: Fig. 5a. Courtesy of British Archaeological Reports Ltd.

Identity: Tomb 11, Locality HK6

Location: Hierakonpolis

Period: Naqada IIIA1-2

Substructure Type: IB

Liner: Mud-brick **Thickness:** 3 bricks

Superstructure: Possibly

Footprint O/H: N/A

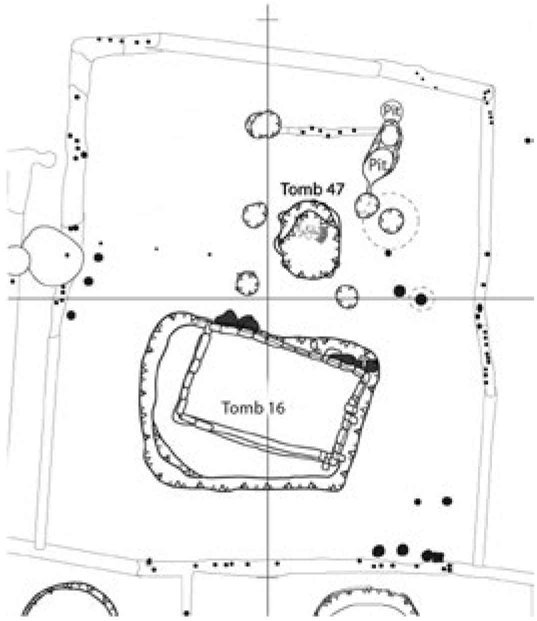
Security Features: Rock cut pit with wooden roof possibly covered with mound and lightweight superstructure.

Tomb statistics: Substructure: Pit 5 m long × 2.4 m wide.

Robbed: Yes, via mud-brick liner then via a robber's trench on the north-east.

References: Adams 1996: 13-4, 2000: 26-7.

Catalogue No. 352



llustration: Drawing courtesy of the Hierakonpolis Expedition.

Identity: Tomb 16, Locality HK6

Location: Hierakonpolis

Period: Naqada IIIA2

Substructure Type: IB

Liner: Mud-brick **Thickness:** 1 brick

Superstructure: No

Footprint O/H: N/A

Security Features: Pit grave excavated into the hard desert and lined with mud-brick. Wood roof, supported by longitudinal wooden beam.

Tomb statistics: Substructure: Pit originally 4.3 m long × 2.6 m wide × 1.45 m deep with restored intrusive insert 2.97m long × 1.89 m wide × 1.21 m deep.

Robbed: Yes

References: Adams 2004: 41-2; Friedman, van Neer and Linseele 2011: 159.

Catalogue No. 353

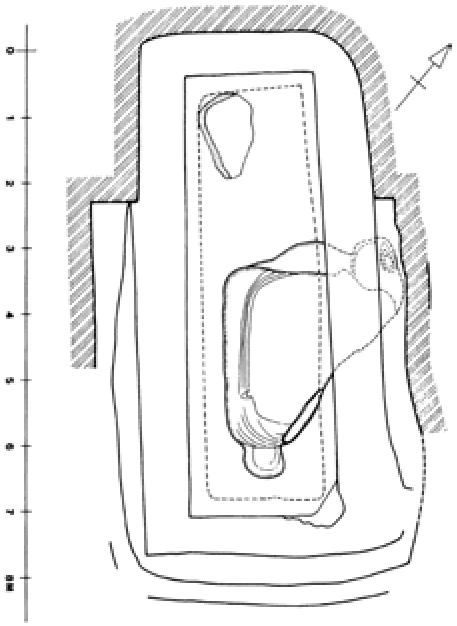


Illustration: Adams 2000: Fig. 2a. Courtesy of British Archaeological Reports Ltd.

Identity: Tomb 2, Locality HK6

Location: Hierakonpolis

Period: Naqada IIIA2-B

Substructure Type: IB/SC

Liner: Mud plaster **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Pit excavated in sandstone and shale strata leads to combined pit and loculus. Ledge supported beams and wooden roof. 'Portcullis' blocked loculus (possibly concealed by plaster?). Portcullis: 1.4 m long × 0. 9 m wide × 0.2 m thick. Estimated weight approx. 0.8 metric tonnes.

Tomb statistics: Substructure: Pit 6.25 m long × 2.1 m wide × 2.1 m deep (Room A) Opening in pit: 3 m long × 1.35 m wide × 1.75 m deep (Room B). Loculus: 1.75 m long × 1.5 m wide × 1.7 m high (Room C).

Robbed: Yes

References: Hoffman 1982: 48. Adams 1996: 1-15; 1999: 374; 2000: 23-4.

Catalogue No. 354

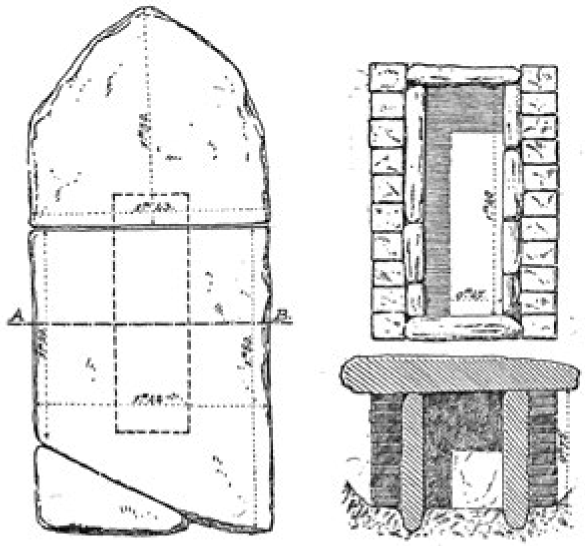


Illustration: de Morgan 1908. Fig. 40

Identity: Tomb 2

Location: El-Qara

Period: Dynasty 2, Naqada IIID

Substructure Type: IB Stone tomb

Liner: Stone and mud-brick **Thickness:** 0.5 brick + 0.15 m stone.

Superstructure: No

Footprint O/H: N/A

Security Features: Pit lined with mud-brick and 0.15 m thick stone slabs. Tomb closed with massive stone slab roof approx. 0.22 m thick and back-filled with approx. 1.2 m gravel. Stone slabs 1 @ 1.81 m long × 1.42 m wide weighing approx. 1 tonne. 1 @ 1.3 m long × 1.43 m wide.

Tomb statistics: Substructure: Pit 9 m long × 4.2 m wide × 2.14 m deep. Burial chamber 1.4 m long × 0.47 wide × 0.66 m deep.

Robbed: No

References: de Morgan 1908: 141; 1912: 42.

Catalogue No. 355

Illustration: Cylindrical vase from El-Masa'id of a type found in Burial 28 by de Morgan. Terracotta, Brooklyn Museum, Charles Edwin Wilbour Fund, 09.889.671 - No tomb drawing available.

Identity: Burial 28

Location: El-Masa'id

Period: Naqada III - probably Dynasty 2

Substructure Type: IB

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Pit filled with a hardened backfill covered by 2 × no. sandstone slabs, both 1.6 m long × approx. 0.6 m wide × 0.15 m thick. Each weighing between 0.25-0.28 metric tonnes.

Tomb statistics: Substructure: Pit 1.2 m × 0.58 m × 1.8 m deep

Robbed: No

References: de Morgan 1984: 62–3.

Catalogue No. 356

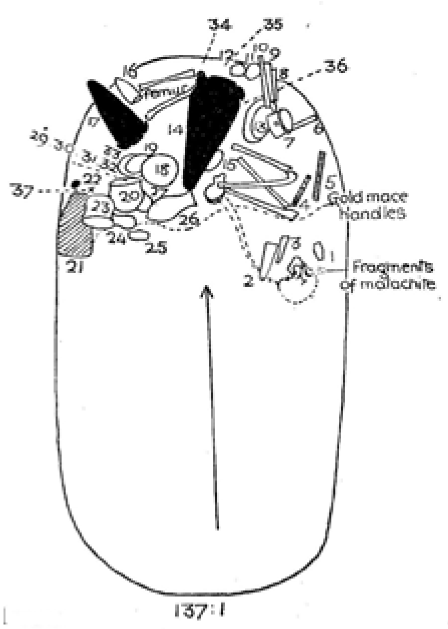


Illustration: Firth 1927: 208.

Identity: Tomb No. 1, Cemetery 137

Location: Seyala

Period: Naqada IIIA1-2

Substructure Type: IB

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Pit originally protected by sandstone slab roof of unknown dimensions.

Tomb statistics: Substructure: Pit 2.85 m long × 1.5 m wide × 1.7 m deep.

Robbed: No

References: Firth 1927: 207-8; Porter and Moss 1995: 52.

Catalogue No. 357

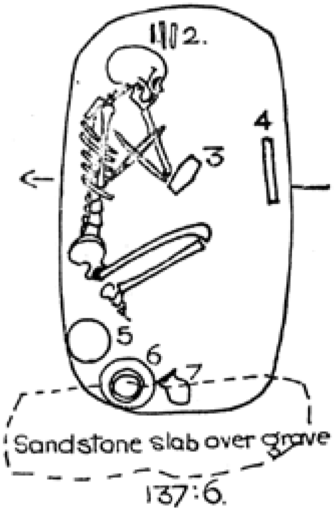


Illustration: Firth 1927: 211

Identity: Tomb No. 6, Cemetery 137

Location: Seyala

Period: Naqada IIIA2

Substructure Type: IB

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Pit grave protected by sandstone slab roof.

Tomb statistics: Substructure: Pit 1.4 m long × 0.8 m wide × 1.2 m deep.

Robbed: No

References: Firth 1927: 211; Porter and Moss 1995: 52.

Catalogue No. 358

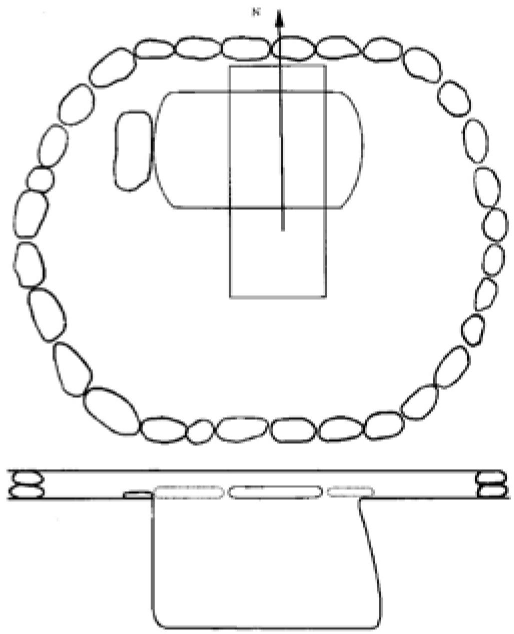


Illustration: Stevenson 2012: Fig. 12.

Identity: Grave 3, Cemetery 268

Location: Tunqala West

Period: Naqada IIIA-B

Substructure Type: IB

Liner: None **Thickness:** N/A

Superstructure: Yes

Footprint O/H: N/A

Security Features: Pit cut into clay and protected by sandstone slabs and covered by stone retaining wall and sand cored superstructure.

Tomb statistics: Substructure: Pit 1.8 m long × 1 m wide. Superstructure: 4.4 m long × 3.15 m wide.

Robbed: Yes

References: Stevenson 2012: 240.

Catalogue No. 359

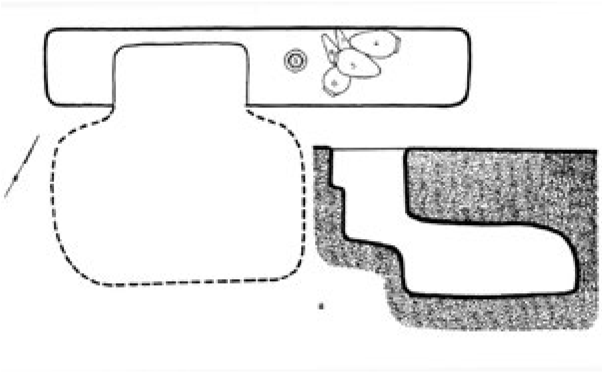


Illustration: Williams 1986: Fig. 64. Courtesy of the Oriental Institute of the University of Chicago.

Identity: L2

Location: Qustul

Period: Naqada IIIA-B (just pre-dating Iry-Hor)

Substructure Type: IB/SC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Pit cut in gravel to loculus. Loculus gravel roof 1.25 m thick.

Tomb statistics: Substructure: Trench: 6.35 m long × 1.26 m wide × 0.7 m deep Loculus: 5.9 m long × 2.68 m wide × 1 m high (bottom 2.25m from surface).

Robbed: Disturbed

References: Williams 1986: 204-24.

Catalogue No. 360

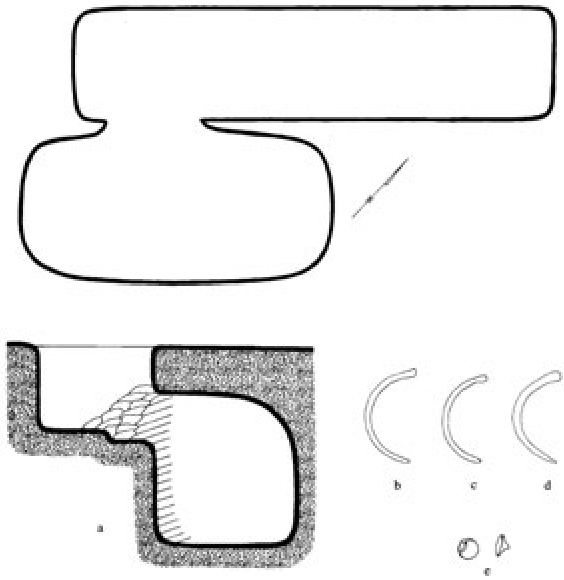


Illustration: Williams 1986: Fig. 80. Courtesy of the Oriental Institute of the University of Chicago.

Identity: L5

Location: Qustul

Period: Naqada IIIA-B

Substructure Type: IB/SC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Pit in gravel to dry stone blocked loculus. Loculus gravel roof 1 m thick.

Tomb statistics: Substructure: Trench: 6.2 m long × 1.5 m wide × 1.1 m deep. Loculus: 4 m long × 2 m wide × 1.6 m high (floor 2.6 m below surface).

Robbed: Yes, intrusive burial

References: Williams 1986: 228-33.

Catalogue No. 361

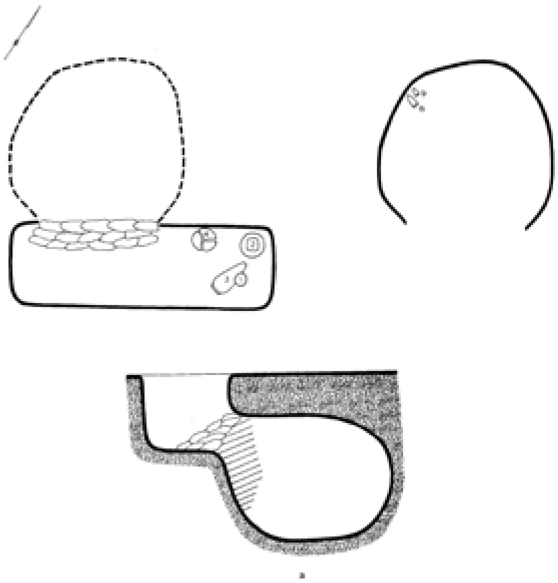


ILLUSTRATION: WILLIAMS 1986: FIG. 90. COURTESY OF THE ORIENTAL INSTITUTE OF THE UNIVERSITY OF CHICAGO.

Identity: L9

Location: Qustul

Period: Naqada IIIA-B

Substructure Type: IB/SC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Pit cut in gravel to drystone blocked loculus. Loculus gravel roof 0.55m thick.

Tomb statistics: Substructure: Trench: 4.05 m long × 1.3 m wide × 1.05 m deep. Loculi: 2.65 m long × 2.3 m wide × 1.95 m high (floor 2.5 m below surface).

Robbed: ?

References: Williams 1986: 241-64.

Catalogue No. 362

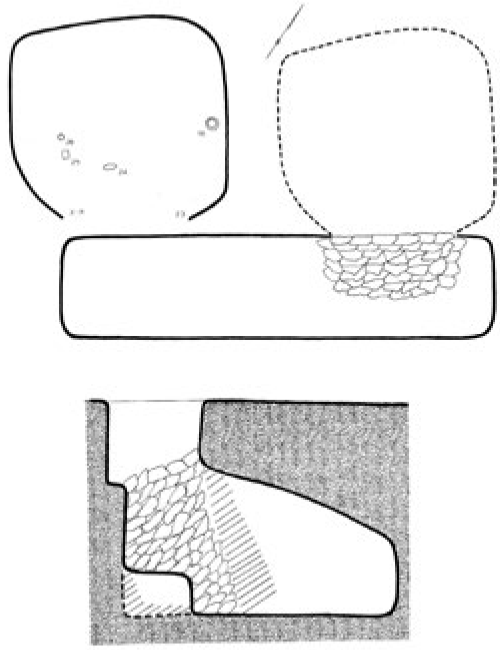


ILLUSTRATION: WILLIAMS 1986: FIG. 110. COURTESY OF THE ORIENTAL INSTITUTE OF THE UNIVERSITY OF CHICAGO.

Identity: L11

Location: Qustul

Period: Naqada IIIA-B

Substructure Type: IB/SC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Pit cut in gravel leads to drystone blocked loculus. Loculus gravel roof up to 1.9 m thick maximum.

Tomb statistics: Substructure: Trench: 7.15 m long × 1.7 m wide × 1.45 m deep. Loculus: 4.7 m long × 3.4 m wide × 1.7 high (floor 3.6 m below surface).

Robbed: ?

References: Williams 1986: 269-90.

Catalogue No. 363

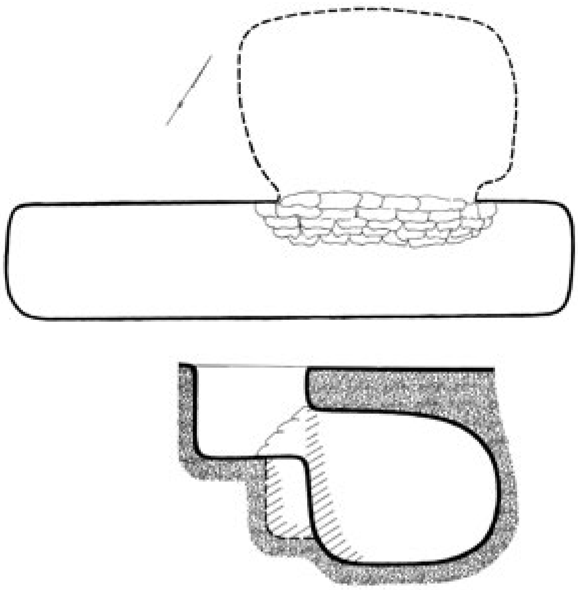


Illustration: Williams 1986: Fig. 140. Courtesy of the Oriental Institute of the University of Chicago

Identity: L19

Location: Qustul

Period: Naqada IIIA-B

Substructure Type: IB/SC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Pit cut in gravel to large dry stone blocked loculus, with gravel roof 0.6 m thick.*

Tomb statistics: Substructure: Trench: 7.4 m long × 1.5 m deep × 1.2 m wide. Loculus: 3.7 m long × 2.25 m wide × 2 m deep (set at 2.6 m from surface).

Robbed: ?

References: Williams 1986: 313-32.

Catalogue No. 364

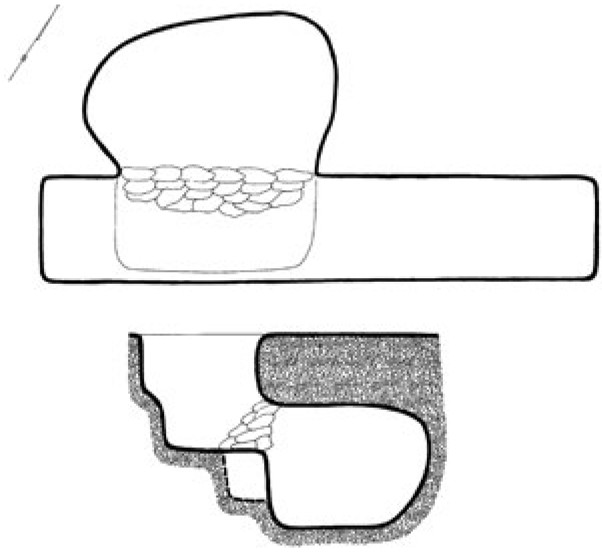


Illustration: Williams 1986: Fig. 154. Courtesy of the Oriental Institute of the University of Chicago.

Identity: L22

Location: Qustul

Period: Naqada IIIA-B

Substructure Type: IB/SC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Pit cut in gravel to drystone blocked loculus. Loculus gravel roof 1.4 m thick.

Tomb statistics: Substructure: Trench: 6.95 m long × 1.2 m wide × 1.4 m deep Loculus: 3.15 m long × 2 m wide × 1-1.1 m high (floor 2.4 m below surface).

Robbed: ?

References: Williams 1986: 334-42.

***Scaled dimensions**

Catalogue No. 365

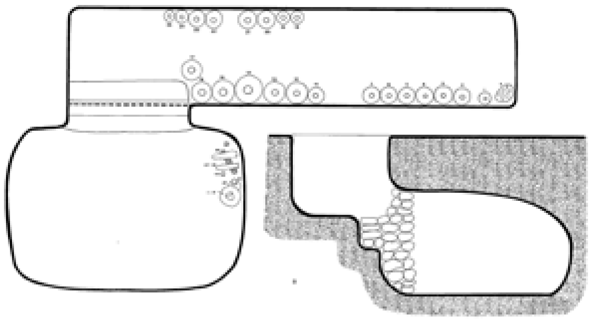


ILLUSTRATION: WILLIAMS 1986: FIG. 159. COURTESY OF THE ORIENTAL INSTITUTE OF THE UNIVERSITY OF CHICAGO.

Identity: L23

Location: Qustul

Period: Naqada IIIA-B

Substructure Type: IB/SC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Pit cut in gravel to dry stone wall blocked loculus. Gravel roof of burial chamber approx. 1 m thick.*

Tomb statistics: Substructure: Trench: 9.25 m long × 2 m wide × 1.5 m deep. Loculus: 4.8 m long × 3.3 m wide × 2.2 m deep.

Robbed: No

References: Williams 1986: 343-57.

Catalogue No. 366

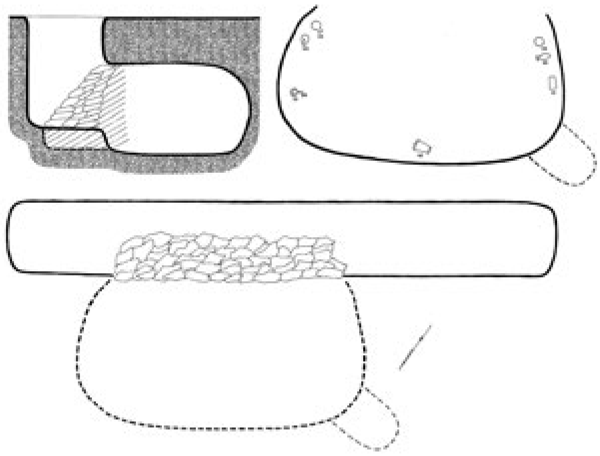


ILLUSTRATION: WILLIAMS 1986: FIG. 170. COURTESY OF THE ORIENTAL INSTITUTE OF THE UNIVERSITY OF CHICAGO.

Identity: L24

Location: Qustul

Period: Naqada IIIA2

Substructure Type: IB/SC

Liner: None **Thickness:** N/A

Superstructure: No

Footprint O/H: N/A

Security Features: Pit cut in gravel to dry stone blocked loculus. Loculus gravel roof 0.9 m thick.

Tomb statistics: Substructure:

Trench: 10.8 m long × 1.5 m wide × 0.35-0.7 m deep. Loculus 5.6 m long × 3 m wide × 1.8 m high (floor 2.7 m below surface)

Robbed: Yes, via shaft leading to south-west corner of burial chamber.

References: Williams 1986: 358-75.

***Scaled dimensions**

Index