

# The reconstructions of the Layer Monument Sinki

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## **Introduction**

My paper was about the reconstructions of the layer monument of Snofru at Seila; it was being prepared for the Festschrift of Gaballa. I was unaware of these proceedings. Nevertheless, since there are seven layer monuments during the early Old Kingdom which I am researching I present an article on the “Layer Monument Sinki at Abydos”.

This article will show that this layer monument was left unfinished. I shall browse on its geographical location, the investigations hitherto achieved and suggests how it would have looked if it were finished. The results published in MDAIK 38 are the bases of the argument presented here.

## **1. Geographical location**

The monument is located in the 8th nome Abydos on the edge of the western cultivation. Today as seen on Google Earth is surrounded by land reclamation.

It is located 5.5 km, SE of the Temple of Seti the 1<sup>st</sup>, west of the village of Nag Ahmed Khalifa. The pre-dynastic site of Nag el <sup>C</sup>Amrah lies 4 km south east of the layer monument.

At this point the western mountains are at the closest distance (1 km) to the cultivation then they retreat to the SW into wadi Beni Hemil. The shortest distance between this monument and the river is 5.5 km in a NW direction.

The course of the river at this area between the islands of Naqnaq and Nasirat flows in semicircular way: SW, NW and N for a distance of 16 km. the layer monument Sinki, however, is west of the area where the river alters course from SW to NW.

## **2. Investigations**

Gunter Dreyer had found out that a small pyramid was known to a few Egyptologists in the 1880 and 1900 namely: Charles Wilbour (mentioned in our article in MDAIK 38), James Quibell, and Flinders Petrie. All of them mentioned it as the Abydos pyramid and the mastaba pyramid of el <sup>C</sup>Amrah in their reports.

These reports seem to have remained unnoticed until October 26 1977 when the monument was rediscovered with the local name Sinki.

Wilbour<sup>1</sup> together with Maspero, Naville, and Brugsch, investigated the layer monument El Kula in January 31 to February 6, 1882 and visited Sinki on March 29, 1883. In a personal letter to his mother, Wilbour mentioned their similarity to one another. Jean Capart published these letters in 1936 and erroneously identified Sinki with an 18th Dynasty pyramid dating to king Ahmose, today it is locally called 'Kom el Sheikh Mohamed'<sup>2</sup>.

*"The Abydos Pyramid:*

*The Pyramid which is just in front of the south horn of the mountain as seen from Abydos turned out to be a miniature edition of the little pyramid we paid so much attention last year, and like the Pyramid of Koolah (el Kula) its north side turns so far west as almost to lose its northness--in fact, 42 degrees. The highest stones remaining are only sixteen feet (4.88 meters) above the level and it is about sixty Feet Square (18.29 meters) rising in four well-defined steps. They have dug into the centre and down to the rock and found nothing, as we did last year at Mohameereeyeh (el Kula). Two little brick walls either side the north entrance are puzzling. Maspero suggests they indicate an attempt at a temple, but I have thus far seen Pyramid temples only on the east side"*<sup>3</sup>.

In 1900, Quibell<sup>4</sup> working on the Hieraconpolis temple at el Kom el <sup>C</sup>Ahmar, describes a revetment:

*"Pl. IV. Revetment of temple basement. -The sides of this excavation are of undisturbed earth not yet removed: the stick in the foreground is two metres in length. At the back is the revetment of rough stones, which retained the earth upon which the temple was built. This revetment ran round in a curved or almost circular form. It is similar in the style of its material and construction to the rough stone*

1 J. Capart 1936, pp. 242-243.

2 Randall-Maciver D., Mace A. C. 1899-1901, pp. 75-76.

3 The orientation of the monument by corners to the cardinal points is unique for el Kula and Sinki. The measurement of the side length is accurate for layer 2, the nucleus. We have no information on the level from which Wilbour worked. His measurement of the height is a little less than ours; is remarkable and may tell us that Sinki perhaps, suffered no loss in height in the last 120 years. The robber's trench and the two brick walls (of a construction ramp) on the northwest side of Sinki were not buried in 1883 as they were in 1977. The four steps mentioned cannot result from layers; my reconstruction allows for only three. The first step is about 4.5 meters above the site level. This is close to the total height estimated by Wilbour. The four steps were probably the outer appearance of some destruction in layers 2 and 3.

4 J. E. Quibell, 1900, p. 6.

*mastaba pyramids of el Kulah, Nubt, el Amrah etc. which are now known to belong almost certainly to the IIInd Dynasty”.*

Petrie<sup>5</sup> followed this trend in 1901 in an architectural journal:

*“It is probably, therefore, to the latter half of the Second Dynasty, 4350-4200 B.C., that a series of rough stone pyramids must be assigned which stand at el Amrah, Nubt, and el Qula. These are all built of unhewn blocks found loose on the desert cliffs (concretions). Each has successive faces of external finish, which have been coated over with added masonry. At Nubt the faces are still undressed, merely being selected for their flat fractures. At el Amrah (Sinki) the faces are moderately dressed. All of these are, however, built at the mastaba angle of four rises on one of base, and have and never had their successive coats covered with one uniform casing, like a pyramid. The chamber at Nubt was a mere hole in the soft sand”<sup>6</sup>.*

### 3. Rediscovery and excavation of Sinki

In October 1977, I spent some time with Omm Sethi (the late Mrs Bulbul Abdel Megeed) at Abydos and enjoyed the hospitality of Dr. Hani el Zeni, the director of the sugar refinery at Nag Hammadi. On the 26th of October 1977 he lent me a jeep, which took me on a desert track from Nag el <sup>C</sup>Amrah to Abydos. Unexpectedly I noticed a few blocks of inclined masonry projecting out of the sandy surface; these were the ruins of the layer monument Sinki. Shortly after that I announced the discovery of Sinki in lectures arranged by the Hungarian Cultural Centre in Cairo and the Archaeological Society of Alexandria.

In April 1979 on completing an excavation of the layer monument at Elephantine, W. Kaiser and G. Dreyer, made their famous trip surveying the layer monuments. Kaiser and Dreyer drove from Aswan to Cairo and published their observations<sup>7</sup>.

Following that Kaiser realised the importance of excavating Sinki. Everything was set for a DIA (The German Institute of Archaeology in Cairo) excavation: starting on Nov. 12, 1980 until Feb. 5, 1981<sup>8</sup>. At the beginning of the excavation,

5 W. M. F. Petrie, The sources and growth of Architecture in Egypt, *Journal of the Royal Institute of British Architects*, Vol. VIII, Third Series, No. 14, 25 May 1901.

6 I do not know how Quibell and Petrie dated the layer monuments mentioned to the second dynasty.

7 G. Dreyer, W. Kaiser, *MDAIK* 36 (1980) 43-59.

8 During the excavation of the layer monument Sinki: G. Dreyer and N. Swelim were doing the archaeological work. B. Pargätzi and B. Mauer did the plan drawing; the former fell ill and had

nothing was to be seen of its faces or base. The debris consisting of: fallen stones, mortar and blown sand reached the uppermost courses of masonry and even higher, except the southwest side which was covered with pebbles.

Building methods and evidence found later at the layer monument Seila have increased our understanding the layer monuments in general. The suggestions presented here go beyond the unfinished ruins already standing, to the ultimate intended shape. From our investigation on the site and the aerial view drawn by Pargätzi - Maurer, one can see that: Sinki was an accretion layer structure built in a slightly sloping pit over a thick layer of mortar spread on its bottom.

The plan of the core, layer 1 and 2 appear to be composed of faulty square-plans, which are disoriented from the cardinal points in a clockwise direction. Layer three, has a fairly square plan with corners oriented close to the cardinal points. The plan, orientation and alignments of the monument were set by means of control points marked with brick settings. The brick markers were placed over the mortar lining in the initial pit every time a layer was added. The core, layer 1 and 2 were successively built by manual lifting of building material to achieve a small stepped structure. To continue building, when manual lifting was too high, ramps were introduced. A reconstruction was published with our archaeological report in 1982.

#### 4. The reconstruction of 1981

The reconstruction of 1981 considered the core, layer 1, and layer 2, as a stepped structure with horizontal platforms above each step. The top of the first step of layer 2 on the SW side of the monument is too close to layer 1, this is the highest point of the ruin<sup>9</sup>. It cannot be so because the destruction accrued all around. A surrounding pavement was considered.

In this reconstruction, Sinki, like Elephantine, was supposed to have the 1<sup>st</sup> step 10 cubits high, and side angles of the core adjusted to reach some interesting formulae, where, the horizontal platforms will measure half the vertical height of the step below them.

In other words: the first step, 10 cubits high will be topped by a horizontal platform of 5 cubits; the second step, 10 + 8 cubits high will be topped by a horizontal platform of 4 cubits.; the third step, 18 + 6 cubits high will be topped by a horizontal platform of 3 cubits and consequently, since there are no more steps, the top of the structure will be a horizontal platform measures 6 x 6 cubits.

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to return to Cairo on Dec. 4 1980. D. Johannes was a part time photographer and U. Kapp was a part time photogrammeter. The inspectors of antiquities were the late Rifat Abd Allah Farag 1980 and Ahmed Mohammed Ali 1981; and the following report was published: G. Dreyer, N. Swelim, *MDAIK* 38 (1980) 83-93.

9 This occurs also at the layer monument at Elephantine at the same position on the south side.

The section reveals how layer 1 grows thinner between the  $14^\circ$  slope of layer 2 and the suggested, steeper angle of the core.

All in all the height of the reconstruction of 1981 ( $> 12$  metres) exceeds half the base length ( $> 9$  metres). This is found when a pyramid or benben property turns into a modern tower; which does not consider the angle of repose for its heights. Thus this reconstruction has to be reconsidered.

### 5. Reconsideration of the intended shape

The layer monument Sinki was left unfinished. This conclusion was reached for the following reasons: the construction ramps were found starting a few meters on the surrounding desert crossing over the foundation of layer 3 and reaching layer 2 which had been partly constructed, and layer 2 must have reached some height above the present ramps.

Consequently neither a pavement surrounding, nor an outer facing covering the monument were built. To what extent was the nucleus completed is not known? To investigate what the builders had prepared for the intended shape, we have to consider: the side angles, the thickness of the layers, the profile, and the aerial view.

These facts will be followed by arguments on the layers and other considerations.

Layer	Side	Location	Between courses	Side angle
2	All sides	All sides	All sides	$13^\circ 30' - 15^\circ$
1	Northeast	North section	3 <sup>rd</sup> and 11 <sup>th</sup>	$13^\circ 30' - 14^\circ$
1	Northeast	South section	3 <sup>rd</sup> and 10 <sup>th</sup>	$14^\circ$
1	Northwest	-	-	None
1	Southeast	East section	8 <sup>th</sup> and 12 <sup>th</sup>	$10^\circ$
1	Southeast	East section	13 <sup>th</sup> and 15 <sup>th</sup>	$17^\circ 30'$
1	Southwest	North section	14 <sup>th</sup> and 16 <sup>th</sup>	$16^\circ$
1	Southwest	North section	12 <sup>th</sup> and 15 <sup>th</sup>	$14^\circ 30'$
1	Southwest	South section	11 <sup>th</sup> and 15 <sup>th</sup>	$16^\circ - 16^\circ 30'$
Core	Northwest	Robbers' trench 1	4 <sup>th</sup> and 10 <sup>th</sup>	$10^\circ$
Core	Northeast	Robbers' trench 2		$14^\circ - 15^\circ$
Core	Southwest	Imbedded	-	Estimated $11^\circ$
Core	Southeast	Imbedded	-	Estimated $5^\circ$

Looking at the side angle variation we notice that: with layer 2 the variation is  $1^\circ 30'$ , with layer 1 the variation is  $4^\circ 30'$ , and with the core the variation is  $10^\circ$ .

Layer	Side	Result	Meters	Cubits
Core	All sides	Estimated	>8	>15
1 <sup>st</sup>	Robbers trench 2	Measured	2.62	5
1 <sup>st</sup>	Southeast	Calculated	2.62	5
1 <sup>st</sup>	Southwest	Calculated	2.62	5
1 and 2	Robbers trench 1	2 layers integrated	5.35	10
2	Northeast	Measured	2,60	5
2	Southeast	Presumed	2.62	5
2	Southwest	Presumed	2.62	5

Looking at these figures we see that the core will measure 15X15 cubits at desert level. The general layer thickness is 5 cubits, except the integration.

## 6. The profile

To consider how Sinki was intended to look like, we need to study the profile carefully. The basic profile was drawn by U. Kapp using a photogrammetric method. The maximum height of the ruin is a little more than 9 cubits above the pavement level.

As one sees in the icon this general profile runs over: the profile of layer 3 near the north corner, the elevation of layer 2 and layer 1 in a destruction closer to the NE-SW axis, and continues as: the profile of the NE side of the core, an outline of the tops of the tops of the core, layers 1, 2, and 3, of the SW side.

The level of the pit on which the monument was built was one cubit higher on the SW side than the level on the NE side. The desert level which is one cubit higher is considered the datum line or pavement level for my reconstruction.

## 7. The nucleus: core, layers 1, 2 and 3

In the aerial view the core has a clear separation with layer 1 on all sides. Apparently the builders maintained a 5 cubits layer thickness around, but the variation of the side angles swayed as they grew. The irregularities of the square shapes of: the core plus the increasing errors of layers 1 and 2; resulted in the situation we see in the aerial view.

Layer 1 has a clear separation with layer 2 on all except the NW side. On this side they are combined, though at foundation level on the pit bottom, there were

bricks showing where a separation should have been<sup>10</sup>. Between layers 2 and 3 the separation is clear.

At the SW side near the west corner of layer 1, an elongated block projects out of it into layer 2. It looks as if the builders were aware of an increasing error of their plan. This was a reminder of how far back the face of layer 1 was receding. This block tells us also that there is a sequence of building the layers outwards.

Both pyramids and layer monuments were stripped of their fine stone facing. Yet some of the lower courses have been preserved under the destruction rubble<sup>11</sup>.

Sinki being left unfinished had no fine stone to take away. In the reconstruction of 1981, recognition of layer 3 is ignored. I do not believe that it was built as a pavement or a retaining belt around the nucleus to hold it together<sup>12</sup>; to the contrary: Layer 3 is a two course foundation for the intended outer facing.

A fairly accurate square- plan with corners oriented to the cardinal points can accommodate the final shape and contain faults and irregularities within. (See the aerial view). These types of foundations and their appearance have an absolute similarity, with that at Seila, Hebenu and the remains of the destroyed one at Elephantine. Thus I shall consider: layer monuments Seila, el Kula and Elephantine, built on unlevelled bed rock, and Hebenu, Sinki, Nubt, and el Ghenimiya, built on a levelled desert surface; as constructed with an outer facing<sup>13</sup>.

#### 8. At Sinki the outer facing to be and brick markers

At Sinki, the top surface of layer 3 is sloping by 8° inwards and is coated with a thick layer of mortar to receive the outer facing masonry in the traditional inclined manner of the 3<sup>rd</sup> dynasty. At Sinki, mud brick markers were imbedded or set at the side of layer 3 as reference to: the *alignment* of the sides of layers, the positioning of the *corners* of the square-plan of the layers 2 and 3, and the inclination of the outer facing masonry.

#### 9. The ramps

The builders of Sinki abandoned their project short off the work of the first of 3 steps of the ultimate shape. If they had begun building the first step, they would have had to partly or totally remove the present nucleus-ramps. This would be

10 See the aerial view; the robber's trench in the NW part of the monument, I have noted no separation Layers 1 and 2 are combined.

11 Many at Giza, Saqqara, Dahshur, Meidum, Seila and Hebenu.

12 Foot note 28 in: Dreyer and Swelim, *MDAIK*, Mainz, 1982.

13 Foundation are perfectly preserved at Hebenu and Sinki; but we do not know at Nubt and el Ghenimiya because they have not been excavated. At monument built on the unlevelled rock, the foundation of the outer facing is fairly preserved at Seila and Elephantine, while completely scattered and lost at el Kula. Following the removal its outer facing and a supposed pavement, no surrounding desert was there to keep the masonry in place.

necessary to make way for building the outer facing of layer 3; by means of a set of other ramps. These would start further out in the desert reaching layer 3. In other words the ramps discussed below are the ones for only building the core and nucleus, not the outer facing.

On all four sides of the nucleus, running from the surrounding desert over the foundation of layer 3, were the remains of the nucleus ramps. These ramps were composed of a filling between 2 walls. In all walls of the ramps the brick courses are not laid horizontally but slope upward toward layer 2 at an angle of about 15°-16°; an ascending ratio of a distance of < 4 to a rise of 1. I believe, however, that ramps rising at that slope would be too steep for heavy material. For a more gentle climb, a ratio of 6 to 1 = 10° or even 10 to 1 = 6° is more suitable.

The nucleus-ramps were constructed for supplying concretions, stone blocks and building material for the lower part of the nucleus. Layer 3 becomes the outer facing of the first step, above that layer 2 becomes the outer facing of the second

step. Above the second step layer 1 becomes the outer facing of the third step. The core will remain embedded and will create a square platform at the summit of the step pyramid option. Consequently fewer ramps would be used to complete the work. A similar situation would have been in the benben option. In this case the core would be completely imbedded, see below under reconstruction.

Although the remains of nucleus-ramps are not well preserved, it appears that those on the northeast and southeast sides were supported and built better than those on the northwest and southwest sides. This perhaps could indicate that the latter ramps were only used at the beginning of construction.

The best-preserved ramp is the one on the northeast side. It has a height of 1.35 meters bringing it to the sixth course of masonry of layer 2. It could be traced over a length of 12 meters. The walls and fill widen from 3 meters on the surrounding desert surface to an estimated 5.25 meters where it would have rested on layer 2.

The fill near layer 2 measures 3 meters and at a distance of 3.50 meters away from it, measures 2.20 meters. The north brick wall is one header and one stretcher thick, 0.40 meters, while the south brick wall is 2 header and one stretcher thick, 0.60 meters. It is built on stone courses over the foundation of layer 3. Brick supports reinforce the sides of the ramp. The robbers destroyed part of the southern wall while digging their northeast trench.

Two mud brick walls stand with no support or filling between on the northwest side. At the beginning of our work in 1980 they were completely buried. It is surprising that during the visit of Wilbour in 1883 they were clear enough to be identified. Each of the remaining parts of the 2 walls measure 3.75 meters long, crossing the edge of the foundation of layer 3. There are 2 stone blocks in line with the western wall 8.5 meters from the nucleus. An empty area 2-2.5 meters wide separates the walls. The thickness of the walls is a mixture of headers and stretchers measuring 0.50 meters

This was probably the earliest plundering of Sinki. After the filling between the 2 walls was removed, the destruction continued into the nucleus creating the robbers

northwest trench. The ramp on the southeast side was completely buried at the beginning of our work it runs over the foundation of layer 3 also. It is reinforced by stonework, 3 courses on the east side and 2 courses on the west side. The brick walls above are only one header and one stretcher thick about 0.45 meters. The width of the ramp between the walls widens: 3 meters wide at layer 2 and 2.35 meters wide, 3.5 meters away.

One wall and a few bricks of the other were found during our investigation. They were completely covered with pebbles thrown at a particular concretion during contemporary rituals. The length of the preserved wall was 5 meters; its width was 0.45 meters and the distance between the two walls was 2.80 meters. The Ramp on meters. It had a height of 1.20 meters reaching the fourth course of layer 2.

### 10. Concerning the reconstruction process

The following questions present themselves: how did the builders correct the irregularities of the side angles? How can we reconstruct the shape of the step of the pyramid or benben? How high could the steps rise above one another?

Like Seila, Sinki differs from Hebenu, Nubt, el Kula, el Ghenimiya and Elephantine, by having layers of a thickness of 5 cubits instead of 4. The side angle of the layers varies but eventually  $76^\circ$  (seked of 7); as it is common to Netjerykhet, Seila and Hebenu. Unlike the horizontal top, of the step, at Meidum; I prefer the shapes at Netjerykhet and Seila.

The slope begins from the vertical level (above the pavement or step below) and rises to meet the side of the step above. This process results in a square platform over the uppermost step. Applying these considerations to the profile and the square drawn on the aerial view; we have a balanced appearance<sup>14</sup>.

In the step pyramid option, the layers of 5 cubits thickness and the  $14^\circ$  angle from the upright would allow for a monument of only three steps. Layers 3, 2, and 1 would create the first, second, and third step. The core would rise to create a square platform over the third step and each step would measure 8 cubits high.

The slope above the first, second and third steps would be equal in length to the rise of the slope over the first and second step. Above the third step the core is a square platform measuring 4 X 4 cubits.

In the benben option, the outer faces of layers 3 would create the first, step. The outer face of layer 2 would create the shaft carrying the pyramidion. Layer 3 would create the first step, which would be cased, Layer 2 would create the shaft carrying the pyramidion, which would be cased, Layer 1 would rise to be topped as part of the pyramidion. The core would remain imbedded in the nucleus.

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<sup>14</sup> I have to mention that at the step pyramid of Netjerykhet some of these considerations are not found.

In both options the faulty nucleus would be rectified or contained within layer 3, as if the core was square with a side angles of  $14^{\circ}$ , the layers were 5 cubits thick and had side angles of  $14^{\circ}$  also. A pavement is considered surrounding the monument at the top level of the foundation of layer 3 (10.4 meters; 0 cubits).

The final monument of the step pyramid option would have: a base length of = 46 cubits, (< 25 metres), a height of = > 26 cubits (> 14 metres), a side angle of = Seked 7 ( $76^{\circ}$ ), an axis bearing  $315^{\circ}$ . Google Earth coordinates:  $26^{\circ} 09' 28.10''$  N;  $31^{\circ} 57' 58.91''$  E.

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Fig. 1: The east corner of Sinki showing Layer 3 surrounding the monument, the remains of the nucleus and two construction ramps (DIA photo).

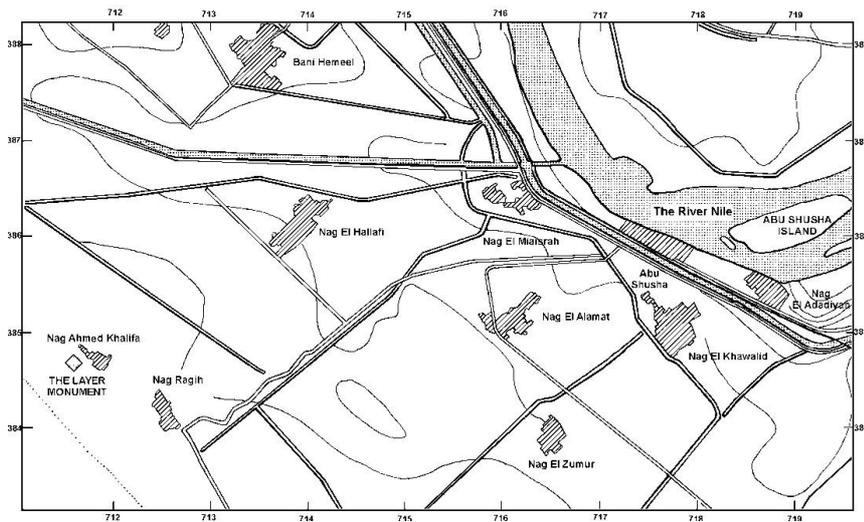


Fig. 2: Abu Shusha and Nag Hammadi  
(this layer monument is not recorded on the maps of Egypt).

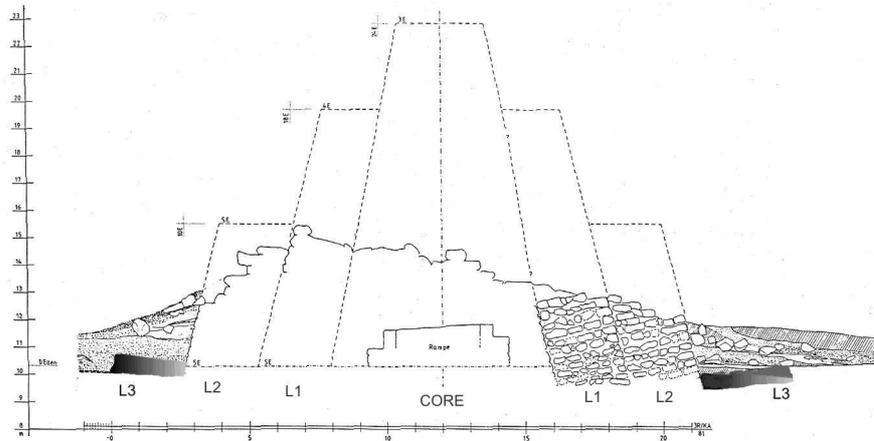


Fig. 3: Dreyer's reconstruction of 1981. Layer 3 has been highlighted here.

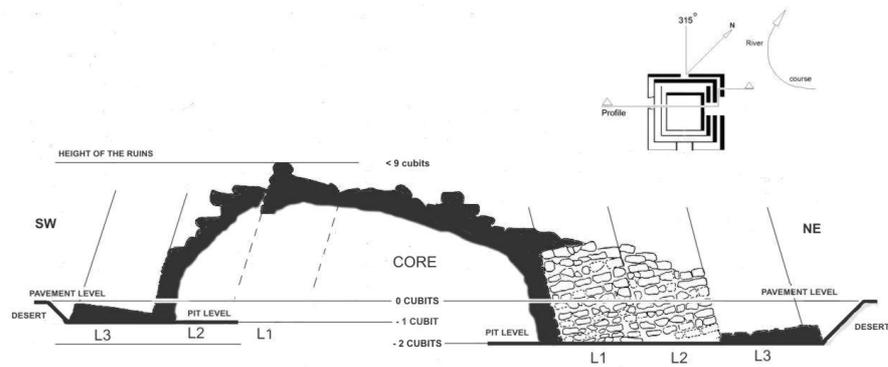


Fig. 4: Profile of Sinki.

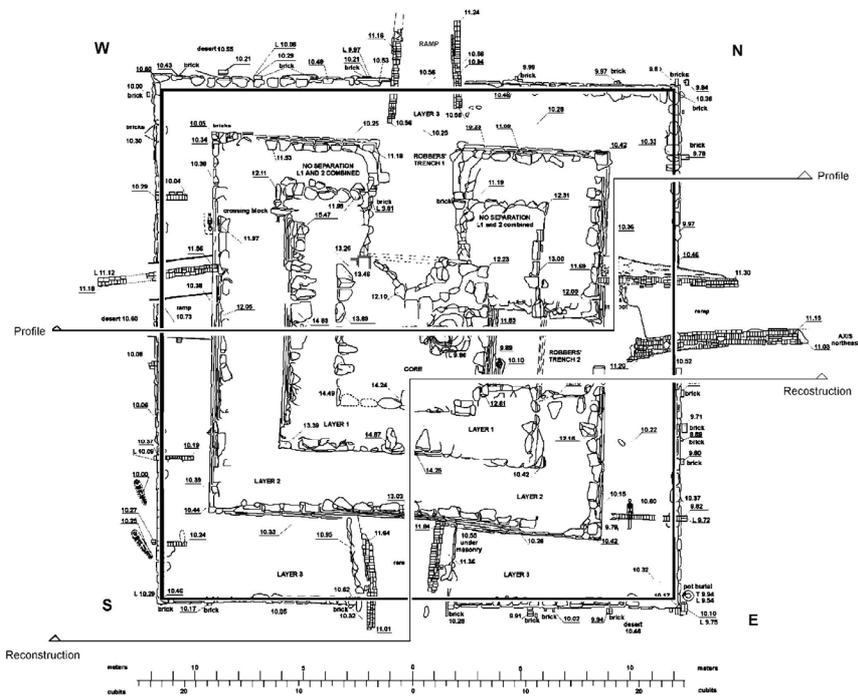


Fig. 5: The aerial view of the Layer Monument Sinki by Pargätzi – Maurer (Redrawn by Swelim, 2000).

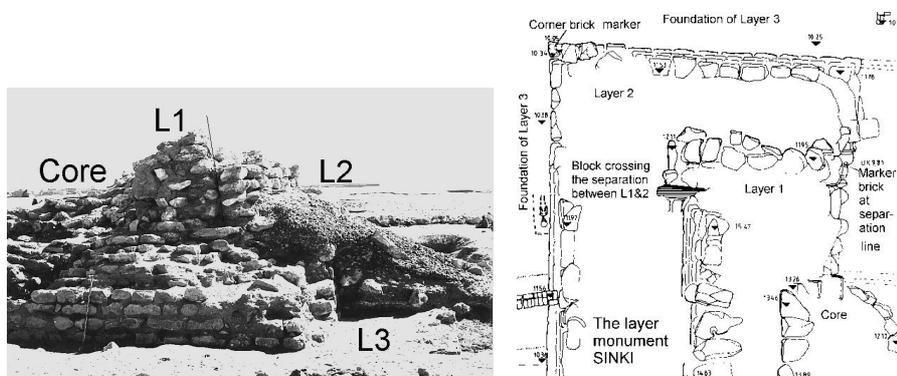


Fig. 6: West corner. The upper metre rod is set on the block crossing over the separation between Layers 1 and 2 on the SW side.



Fig. 7: Layer 3 foundation for outer facing at Sinki NW side (a), Seila east side (b) Hebenu north side (c) and Elephantine east side (d).

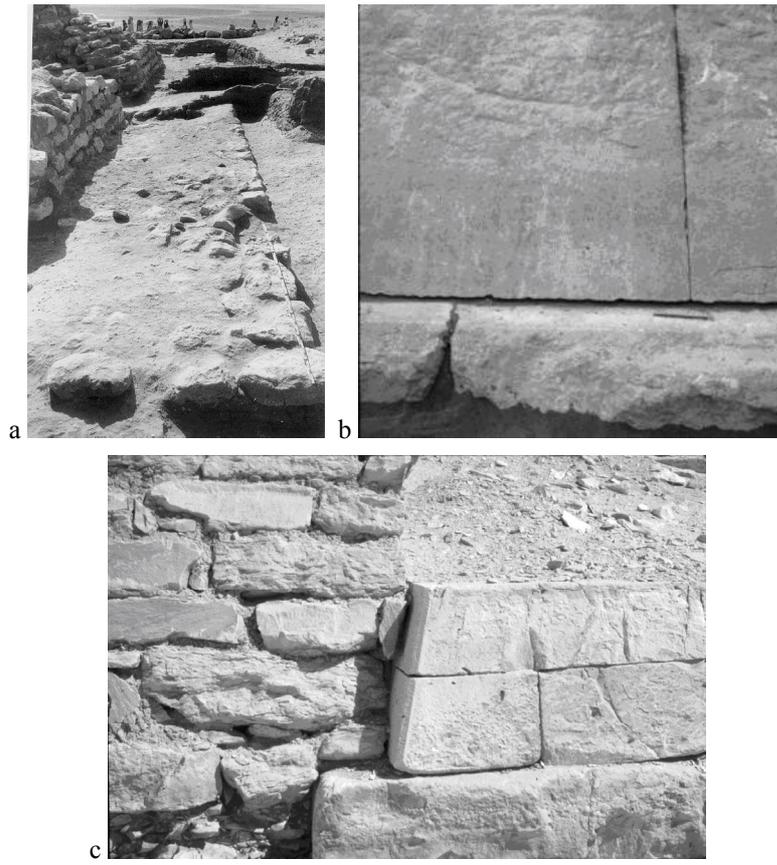


Fig. 8: Sinki north corner foundation for facing (a); Red Pyramid east side foundation and facing (b); Netjerykhet initial mastaba NW corner foundation and facing.

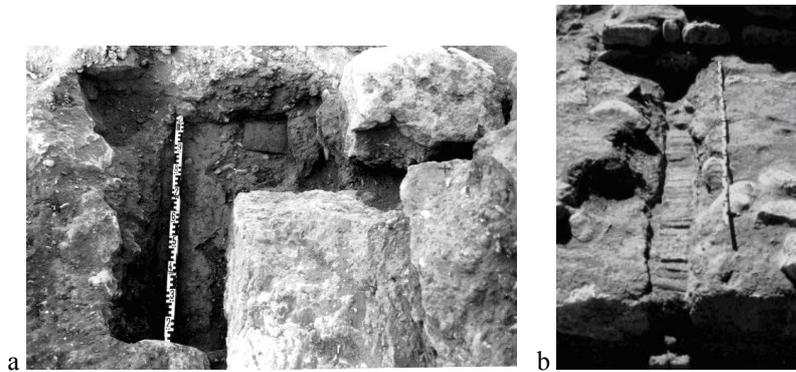


Fig. 9: Sinki alignment (a) and inclination (b) markers.



Fig. 10: Sinki ramp on the NE side.



Fig. 11: Sinki ramp on the NE side.

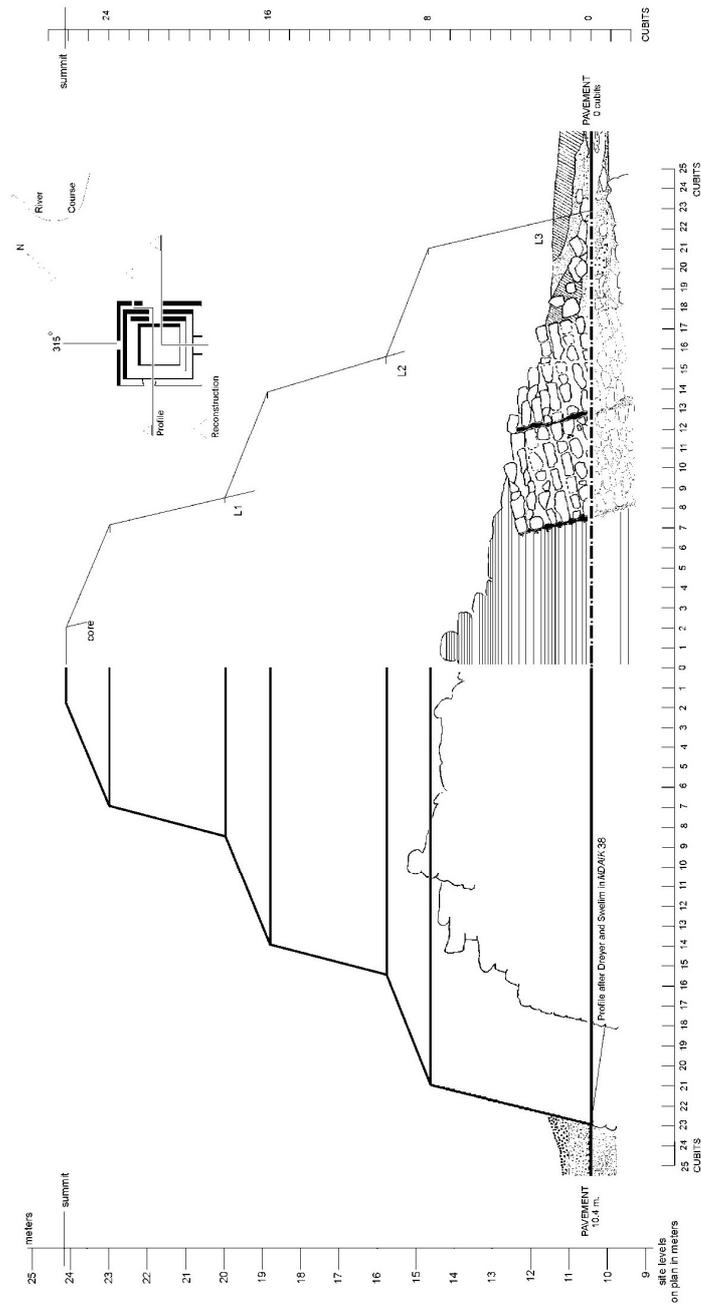


Fig. 12: Sinki reconstruction.