

# **Conservation of the Monuments of Sneferu at Dahshur**

by Rainer Stadelmann Project Director

Description of the work executed from November 2005 till end of November 2006 in the Bent Pyramid and in the valley temple of King Sneferu at Dahshur, as well as an additional restoration work of the pyramidion of the Red Pyramid

Dahshur is beside the pyramid fields of Sakkara and Giza the most important necropolis of the Old Kingdom. The great pyramids of Sneferu and their cult installations form in the development of the pyramids and the mortuary temples the link between Djoser's precinct at Sakkara and the Great Pyramids of Giza. Earlier excavations by Ahmed Fakhry from 1951 to 1955 were incomplete, as Dahshur became since 1956 military zone. The German Institute of Archaeology conducted excavations since 1982 directed by the applicant. The site of Dahshur has only become open for the public since 10 years. Since some years the Red Pyramid can be visited by tourists, the number of visitors is increasing, the site is an ideal place for touristic visits and also for a pleasant recreation for residents of Cairo. Till now only restricted restoration work has been done and a site management has not been undertaken. There is no protection of the site, the parking beside both pyramids is bothering the view, and any educational signage is missing.

The project aimed for a continuation of the archaeological work around the valley temple of the Bent Pyramid including a partially re-excavation of the causeway and an up-to-day survey of the corridors and Chambers inside the Bent Pyramid. (fig. AA) This work had been completed until end of December 2005 as well as the complete mapping of the temple remains. Then the fragile floor of the open court of the temple had been covered by a layer of sand in order to protect the floor from visitors. A surrounding brick wall built on the foundations of the ancient temenos wall of the time of Sneferu serves for the same purpose. The western and eastern part of this brick wall had been already completed in the campaign 2005. During the first weeks of the present campaign we have completed the temenos wall on the south and north parts. In front of the south facade of this temple and inside the temenos wall the two large stelae of the valley temple have been re-erected and restored.

In December 2005 the rather eroded pyramidion of the Red Pyramid had been dismantled again, the stone fragments treated and then restored. Regrettably visitors have already scratched their names on the restored surfaces of the pyramidion. We will have to clean it again. In a future project we intend to protect the whole area of the mortuary temple by rows of large limestone blocks from the casing of the pyramid. The brick walls of the mortuary temple to the east of the Red Pyramid will then also be treated and better conserved.

During spring 2006 a study of the remains of the valley temple and a proposal for a partial reconstruction and consolidation of the walls and the pillars using the existing stone material had been prepared by the architect Dr. Nairy Hampikian and discussed with the applicant. During the present campaign we are already executing parts of the proposed working program, the consolidation and partial rebuilding of the temple walls and the architectural representation of the pillared porch in front of the six chapels. This includes the rebuilding of a full set of blocks, which we found dispersed in the open court, around two limestone foundations of the pillars (see detail) and reproducing the body of the resting 8 pillars by a border of regular modern limestone blocks and a sand filling. In a future project I would like to insert a modern limestone pillar on one of these socles.

When mapping the walls of the temple we were able to use the most modern methods of a photogrammetrical scan done by Dr. Tarek el-Murri, a highly experienced engineer in this technique proposed by Dr. Nairy Hampikian. With his design we can enlarge any part of the walls and determine the remains of the relief decoration on the walls. After a new study of the relief fragments of the court and the pillars and a search for their actual place we might be able in future

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to reconstruct relief scenes on paper and even place in cooperation with the Supreme Council of Antiquities copies of the relief fragments on the walls of the temple.

Description of the work done in detail:

Practical conservation activities on the walls of the temple:

**a** : areas with structural instability which need a stabilization/ reinforcement: in each case an explanation for the extensive damages on the blocks had to be found. The ensemble of the structural situation and the general geological picture of the area produces an explanation on the structural disorder of the walls in the temple and explain the masonry defects in other structures in Dahshur. An investigation of the soil layers might be of great help. The main aim of this investigation, no matter to which level we can raise it, is to secure the structural stability.



**Fig. 1** foundation problems in the walls caused by the slight slope of the ground on which the temple was built



**Fig. 2** the new foundation

By supporting the wall with new foundation blocks of a small size the wall could be stabilized.

**b** consolidation work on the pillared porch:

The **porch** consists of two rows of each of **five right-angled monolithic pillars** (front row 1.20m thick, back row 1.40m, while the breadth varied between 1.85 and 2.10m ... According to Fakhry, the back pillars were broader because they had to carry slabs on both directions ... Peculiar bases with bevelled edges ... The Faces of the pillars were ornamented with relief with the exception of the side of the front row facing the chapels ...



**Fig. 3 and b** Panoramic views of the porch area today with the limestone foundations of the pillars



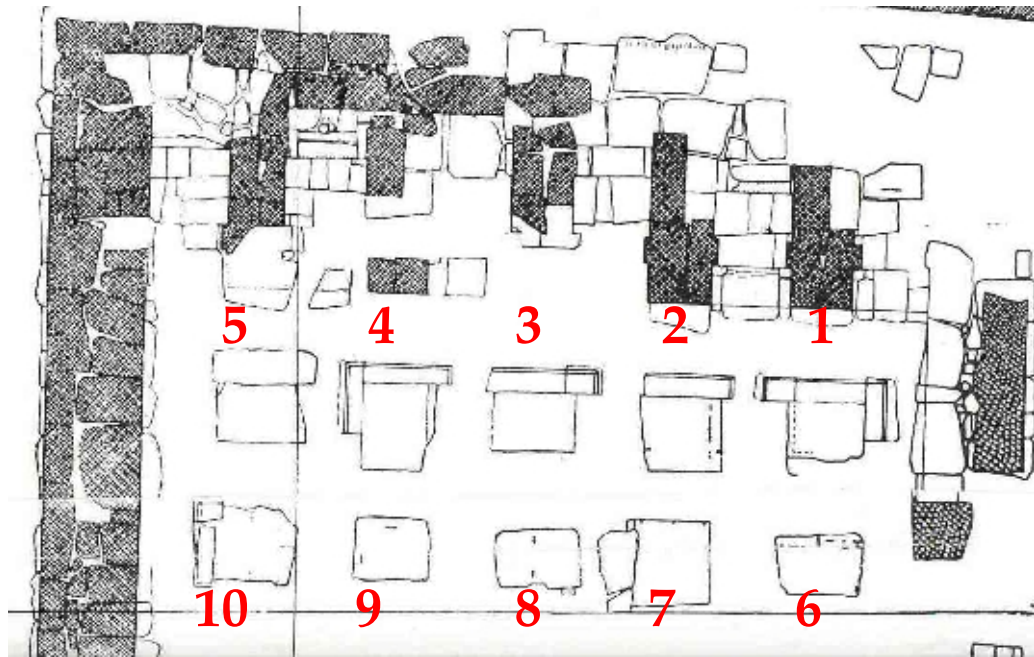


Fig. 4 Plan of the basis of the pillars in the porch

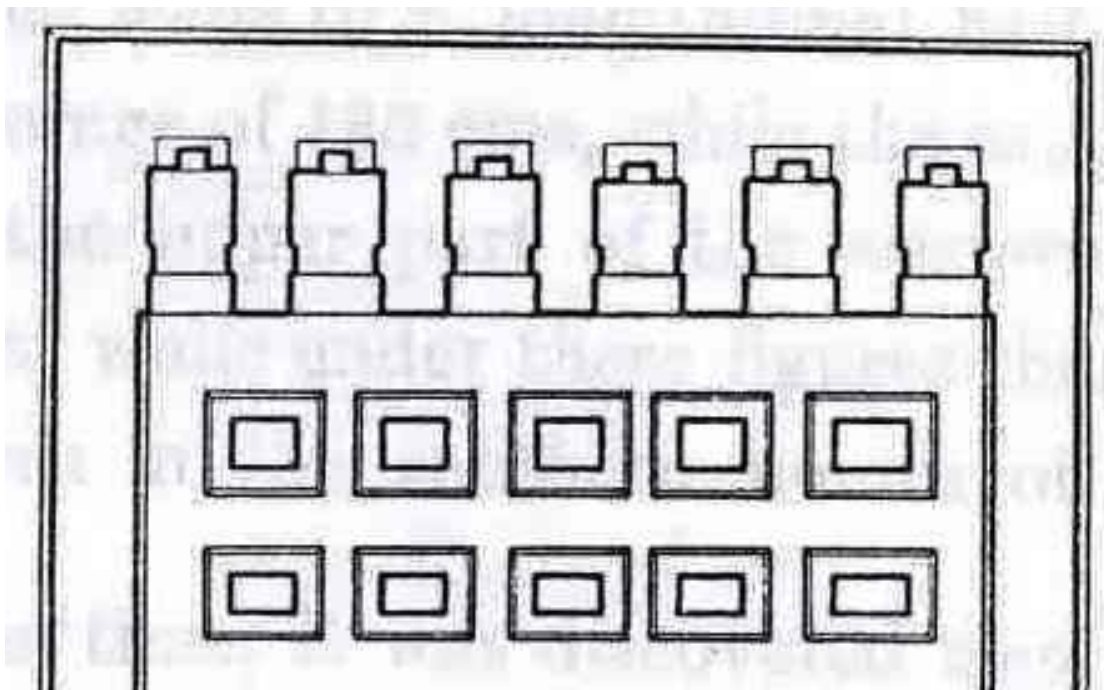


Fig. 5 The porch and the six chapels behind the porch. Reconstruction by H. Ricke

H. Ricke in Fakhry's publication has translated the archaeological survey to an architectural plan, which we have also done and the results were very similar with some differences that are mentioned below.

For our convenience, we have numbered the pillars according to Ricke/Fakhry's drawings.

We agree with Fakhry's explanation of how the pillars were built. Dr. Nairy Hampikian will try to animate these steps into simple diagrams that enables visitors live this experience as they walk through the temple.

Our survey:

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According to our survey the blocks in situ, as well as the signs left by the master-planner masons of the temple on them, we have confirmed that the westernmost and easternmost 4 pillars measured 2.16 m in length, while the middle remaining 6 pillars measured only 1.65m. But the breadth of the pillars were not categorically different from one row to the other, as these varied between 1.45m to 1.36m, contrary to Fakhry's estimations. As a result of this first investigation the plan presented below was produced.

Information written on a simplified version of the archaeological survey map recently prepared by the team of archaeologists on site includes:

a number of the pillars,

b the shape of the base blocks of the pillars,

incised, painted or painted and incised marks left by the masons during the planning of the structure, indicates the height of the existing surrounding blocks from the base block of the pillar, and, the difference of the level of the base blocks, where zero level is arbitrary decided by us to be the level of base block of pillar No. 1.

From this survey it was possible to recognize the blocks in situ and the approximate size and details of the missing ones.



**Fig. 6** blocks of the framing of the pillars assorted according the measurement of the limestone bases

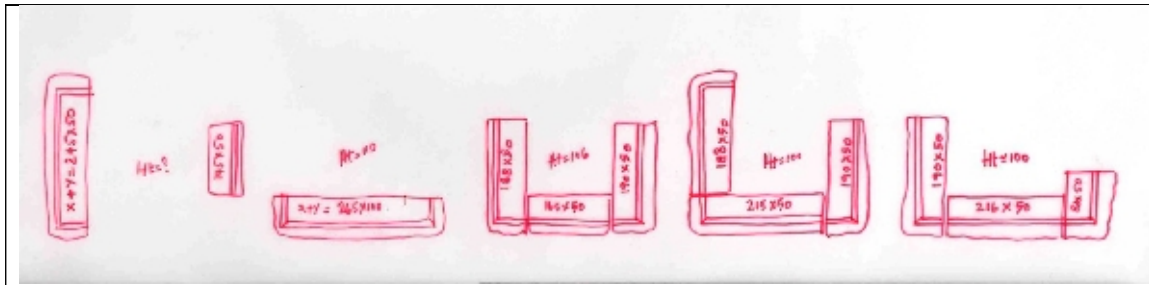


Fig. 7

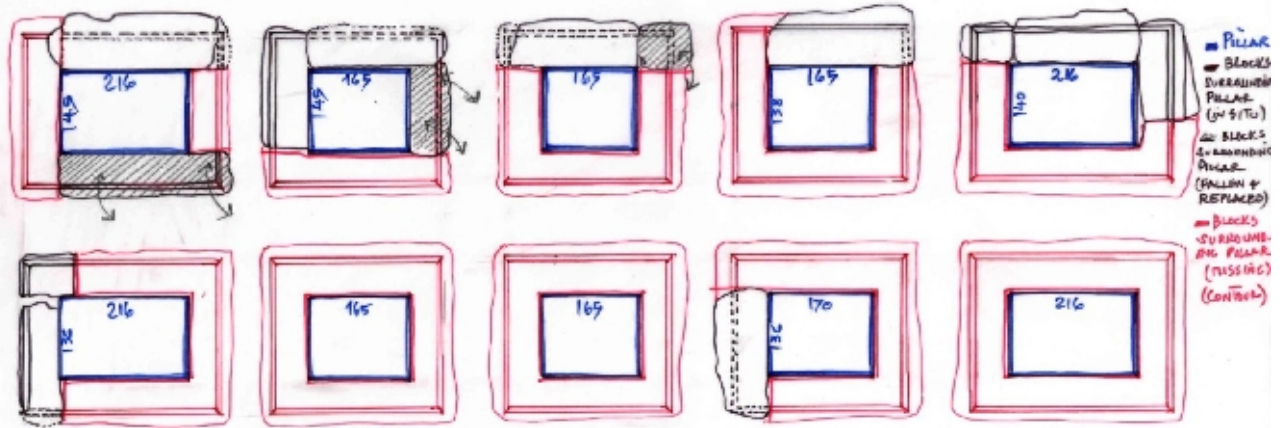


Fig. 8

A reconstruction where all missing blocks are drawn in red. The lower drawing presents the missing blocks without any separations, while the upper drawing is an attempt to divide the missing blocks of the northern row to manageable smaller blocks. For example: to complete the blocks around pillar No. 1, one needs to arrange three blocks as shown in the upper figure measuring 190 x 50, 215 x 50, and 80 x 50 each. The figure above gives just one possibility, many others can be produced. This gives the architect the advantage of having at least a possibility at hand for the matching from the scattered blocks in the area and so with some sense to categorize. Moreover, this kind of theoretical reconstruction sets the criteria for matching:

- Three dimensions are essential to satisfy the matching: the length, breadth and the height of the block.
- Type of the cut and the arrangements in situ might also serve as a clue. For examples in some cases blocks which are short on height are raised over debris to compensate for the shorter height.
- The angle of inclination of the sloped section of the blocks is also a last check before the execution of the works.

Finally, the architect Nairy Hampikian prepared a scheme of reconstruction for each of the pillars. Below, we have produced in the report the reconstruction of one pillar (number 1). The pillar is composed of a wide base, which is set and used as a planning platform to incise or paint or both on it the axes of the pillar. Once placing the pillar, at least six blocks are arranged around its four sides to add to the width of its base and by pushing with the blocks policed similarly around the pillar located on all sides of each pillar, a kind of continuous foundation is reproduced; perhaps the oldest



of its kind. These surrounding blocks have a slope on the opposite side from the pillar they hold. Structurally, the slopes in this direction give the impression of being bearing walls around the pillar. The upper left figure depicts all that has reached us in situ of pillar No.1. The blue drawing is a theoretical reconstruction of the pillar, where one meter of its shaft, if monolithic, is buried under the ground and reinforced from all sides by the framing blocks. If these are 5m above the ground, it means that nearly 29 percent of the exposed height is buried under the ground, which is again a fair portion of the pillar..

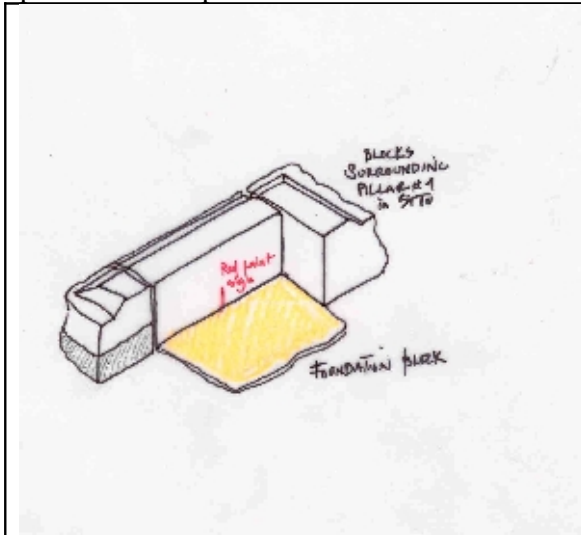


Fig. 9a

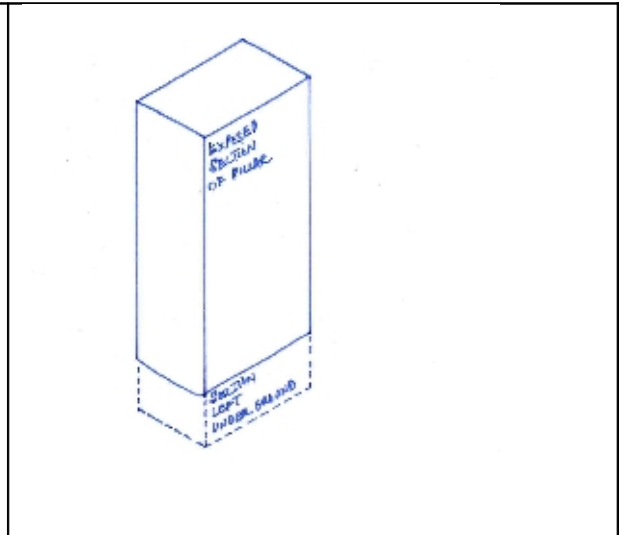


Fig. 9b

## Beginning of the work of rebuilding two frames of the pillars

After having determined the kind of the construction of the pillars we decided to rebuild the first layers of the pillars with modern limestone blocks in order to give an impression of the porch.



Fig. 10 Rebuilding the frame of a pillar with modern blocks



Fig. 11 The existing framing blocks of the pillars were put around the pillar foundations



**Fig. 12** The open court refilled with sand and the pillars of the porch

**c Work at the south façade of the temple and re-erecting the two stelae**

The western stela was found lying in a deep sand bed. Fakhry had still discovered the top of the stela crowned with the name of Senefru. This part may be found in the so-called Fakhry magazine, a sealed mastaba tomb at Giza. We are hoping to be allowed to see this magazine in the near future and search for the relief.



**Fig. 13** Re-erecting the western stela. On both side of the stela one recognizes the heavy frame stones. Inscriptions on these frames indicate that the stela was erected late in the year 29/30 of Senefru

Beside the eastern stela we discovered in the debris parts of the top of the stela. We reconstructed the stela according to the stela of Senefru in the garden of the Egyptian Museum.





**Fig. 14** The south façade of the valley temple with the two stelae re-erected



**Fig. 15** restoring the temenos wall of the temple

#### **d** Restoration work at the Northern, the Red Pyramid of Sneferu: the Pyramidion

The pyramidion of the Northern Pyramid of Sneferu had been found during the excavations campaign 1985. The measurements were taken by J. Dorner and later on it was restored by the restorer family Abd el-Qrety of Sakkara. During long years the pyramidion was misused by soldiers of the near army camp and visitors as a place to be used for inscribing their names on it. In autumn 2005 the pyramidion was dismantled again, cleaned and reconstructed according to the measurements on a high socle in order to prevent visitors to misuse it again.



**Fig. 16 a** measuring the fragments of the pyramidion



**b** The restored pyramidion of the Northern Pyramid

#### **e** Cleaning and measuring inside the Bent Pyramid:

During the campaign 2005 the cleaning of the corridors of the pyramid was nearly completed. A new survey of all corridors and chambers was undertaken by Dr. Josef Dorner and Christian Perzlmeier. Some few measurements have to be added in spring 2008

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**Fig. 17** Measuring inside the pyramid: a the corridor, b the porticuli, and c the modern ladder leading up to the upper chamber

### Project stuff

Rainer Stadelmann	Egyptologist	project director
Nairi Hampikian	architect	responsible for reconstruction
Myriam Seco Alvarez	Egyptologist	deputy director and surveyor
Miguel Angel Lopez Marcos	archaeologist and restorer	
Josef Dorner	archaeologist and surveyor	
Christian Perzlmeier	Egyptologist	surveyor documentist
Eriko Kamimura	Egyptologist	surveyor documentist

The restorers and surveyors as well as the architects were assisted by local specialists.

### Conservation methods

Cleaning in traditional ways with distilled water, micro blast with carbonate calcium.  
Connecting with stainless steel or tefal preferred glues are Hilti products