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Gumbat-Balo Kale, Swat (GBK 1)

A Revised Excavation Report 1

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With a note by R.A. Hatfield

The area of GBK 1

The site is located at the center of the Kandak valley, on the left side (34°37'51"N, 72°10'46"E), at an altitude of approx. 986.00 m asl. The archaeological terraces rise c. 130.00 m above the village of Balo Kalai or Balo Kale, along an ancient track leading SW up to the pass of Kakai-kandao (see on that Biagioli et al. 2016). After the pass the track enters the valley of Kotah at the height of Talang and Sandoka, where other major Buddhist sites were discovered in the recent past (Olivieri, Vidale et al. 2006).

¹ In this Report numbers between square brackets indicate structures [walls, floors, edifices, etc.]; those between angle brackets indicate negative stratigraphic units <pits, razed surfaces, cuts, destruction layers, etc.>; those between round brackets, stratigraphic units (layers of various typologies: deposit, accumulation, filling, etc.).

We avoided diacritics and italic for architectural terms common in archaeological literature (stupa, chattravali, harmika, etc.). Architectural description follows Faccenna and Filigenzi 2007, with the sole exception of the term 'vihara', which is substituted by the more widely accepted 'shrine'.

In this Report measurements are given in m (0.00) if not differently indicated; the following abbreviations have been used: l=length, w=width, d/D.=diameter, h=height; dp=depth; m=meters, m²=square meters, ha=hectares, t=thickness; asl='above the sea level'; compass points are always abbreviated (N, S, E, W).

Part of the sculptural material has been studied in Brancaccio and Olivieri 2019, and in Iori and Olivieri 2020.

Earlier versions of this Report were published in Olivieri ed., 2014, Meister and Olivieri 2012, Di Giulio et al. 2018.

The site of Gumbat (Pashto for 'stupa') was first visited by Sir Aurel Stein in 1926 (Stein 1930), irregularly dug by Barger and Wright twelve years later (Barger and Wright 1941), and then systematically looted for almost a century; it is still potentially a unique heritage resource (Faccenna 2006; Olivieri, Vidale et al. 2006; Spagnesi 2006; Meister and Olivieri 2012; Faccenna 2014; Meister, Olivieri and Vidale, 2016).

The activity reported in this article were part of the 'Archaeology, Community, Tourism – Field School Project' (ACT), a project of the Pakistan-Italian Debt Swap Agreement (PIDSA) managed by the Economic Affairs Division, Govt of Pakistan, and the Italian Embassy in Pakistan, executed by the Italian Archaeological Mission (ISIAO/ISMEO) and by the Provincial Directorate of Archaeology and Museums, Govt of Khyber-Pakhtunkwa, under the vigilance of the Department of Archaeology and Museums, Govt of Pakistan. The project started in 2011 and ended in 2016.

The site is known also as 'Gumbat 1' and labeled as Site 139 in the database of the Archaeological Map of Swat Valley Project (or AMSV; Phase 1; Olivieri, Vidale et al. 2006).

The standing monument, a Buddhist shrine (the Great Shrine, also called 'Great Vihara'), originally hosting a relic, cult statue or votive stupa, has a partially preserved double dome, rising on a monumental platform in a beautiful mountain scenario. In danger of sudden collapse, the shrine was urgently restored in 2011, first by the Pakistani army under the auspices of the ACT project and Zain-ul Wahab, a conservator from Hazara University, and later on by the ACT (whose intervention focused on restoring the staircase) (Spring and Autumn 2011). During the same year in November, we completed a preliminary excavation around the standing monument (GBK 1), the results of which will be illustrated in the following pages. The excavated area underwent extraordinary maintenance works in Spring and Autumn 2012.

The stupa terraces (Plate I)

The area was already known as Gumbat 1, Site 139 (in Olivieri, Vidale et al. 2006). The site covers an area of approx. 14,000 m². The site can be subdivided in three areas (Terraces I-III; see Pl. I). The target of the 2011 excavation was Terrace I (approx. 5,000 m²). The N and W limit of Terrace I is marked by a

stepped retaining wall [100] (c. 54 m l), along the course of a small stream. According to Stein, a major stupa stood in the vicinity on the SE corner of the Terrace I (now Terrace II, see below), while minor stupas lay along the S portion of the terrace. At that time also 'massive walls' were visible to the N section of Terrace I (and Terrace III, see below), possibly the remains of a monastery (Stein 1930: 13-14).

At the time of Stein's visit the site had been already heavily looted by robbers headed by gangs from the village of Nal (Malakand Agency), a place still famous in the region for the 'archaeological' skills of its villagers.

According to Barger and Wright, who hastily excavated some portions of Terrace I in 1938, there were stupas on both the N and S sides of the shrine: a major stupa (w. c. 31') was discovered on the N side (Barger and Wright 1941: 16-18). The two stupas were documented in 2011 (stupa [13] to the N, and stupa [3] to the S of the Great Shrine). In 1938, during the clearance of the site, many sculptural pieces were discovered: 40 were selected and brought to England. 16 of them are now in the Victoria and Albert Museum in London (Ackermann 1975).² According to Barger and Wright, the quality and quantity of the sculptural decoration found at Gumbat was higher than the average found in the area, a fact we confirmed by the recovery in 2011 of a further 110 pieces — even after nearly a century of looting — from the surface of Terrace I.

Terraces II and III were documented during a more detailed survey carried out in Autumn 2000.

Terrace II lies just S of Terrace I, and may be subdivided into two sectors: 'the W [sector] houses also the remains of three stūpas, two of which are large (about 10.00 [m])' (Olivieri, Vidale et al. 2006: 108); the E sector houses the remains of what probably was the Main Stupa.

Terrace III is situated W of the previous one, where the monastery was probably located. 'On Terrace III, more than elsewhere, a substantial amount of pottery has been recorded and sampled. This presence of pottery was probably due to

² Among the many interesting pieces recovered, there was also a metal bell (Barger and Wright 1941: 18, pl. VIII, 3).

the existence of two dwelling units to the S and W of the complex, each about 3,000 m² (ibid.).

On the other bank of the stream we documented some isolated monastic buildings (Site 601) (Olivieri ed., 2014), while ancient quarry areas utilized for the construction of the cultic monuments have been located along both banks of the stream, W of the stupa terraces (Site 602) (ibid.).

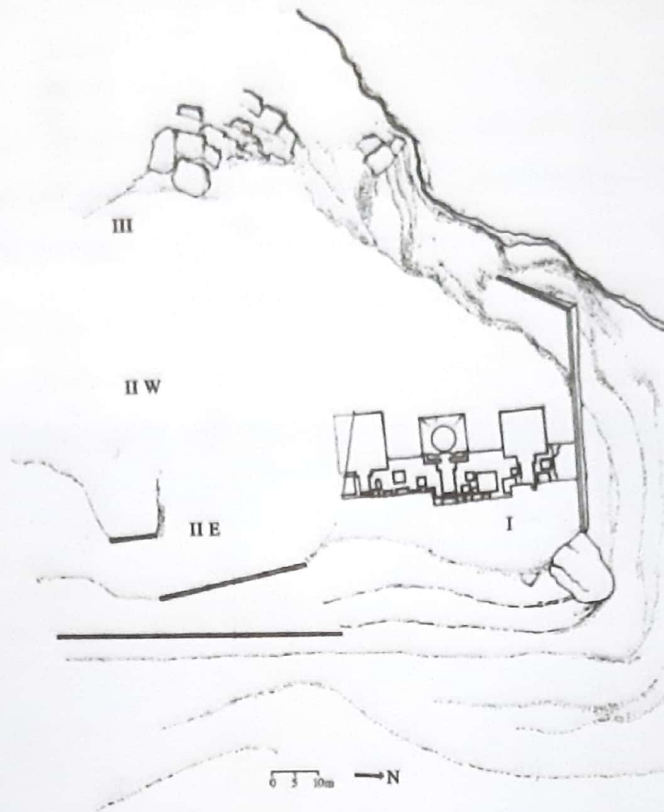
[With MV]



Fig. 1 - Autumn 2011: The Kandak Valley (the hill of Barikot in the background) (Photo by EL).



Fig. 2 – Autumn 2011: The terrace of GBK I seen from N (Photo by EL).



Pl. I - The three Terraces of GBK 1 (Drawings by FM).



Fig. 3 - Inv. No. GBK 1 (gray schist) (Photo by EL).

Introduction to the excavations

In November 2011 we dug a long trench 10x50 with the main axis aligned N-S across Terrace I, and having the Great Shrine as a focus. The trench exposed practically the entire area in front of the monument, including its stone paved floor, including the truncated bases of two other major stupas aligned with the shrine. We excavated the base of the original staircase of the Great Shrine and reconstructed the steps, following the original plan. In addition, we documented twenty minor monuments crammed into the surrounding space.

The site, particularly in the lower stupa-terrace, had been looted for almost a century, given that, already at the time of Stein's visit, the site appeared to have been spoiled by local treasure hunters (Stein 1930: 13). During the excavations we documented fifteen pits recently opened in past and covering almost 90% of the excavated area. In particular the N sector turned out to be disturbed by a cluster of eight large pits, most probably opened and filled up by Barger and Wright in 1938 (Barger and Wright 1941: 17). Only the northernmost sector of the trench had an intact stratigraphy, in an area free of constructions (GBK N). In this area we endeavoured to reach the lowest levels by opening a small trial trench. During the excavation we documented various layers associated with the filling of the artificial terrace. Apparently, the construction of the terrace had obliterated the evidence and structure of protohistoric periods, with the exception of a residual stone platform whose corner was associated to a few protohistoric potsherds (see below). Among the recorded fragments (1492), 185 major decorative and figurative reliefs were inventoried and handed over to the Directorate (from 2011 to 2016). Some of them show close affinities with the pieces collected on the spot by Barger and Wright in 1938.

The Great Shrine [30] (Pls II-IV)

The domed shrine of GBK I is one of the most interesting and best-preserved ancient monuments of the Swat valley. The monument was studied in the 1960s by Domenico Faccenna (Faccenna 2006: figs. 10-11). Later, Abdur Rahman (Rahman and Sardar 1984) suggested a possible link with later temple constructions in the Salt Range and proposed a possible date of 8th-9th century for the monument. Faccenna (2006) associated this monument with the excavated ruins of the 'Great Building' at the N entrance of Butkara I sacred

area, thus indirectly proposing an early-1st century CE chronology for the Great Shrine of GBK 1. The latter is a shrine-category chapel with a square plan and enclosed cloister set on a high podium; its entrance lies to the E. The external walls are separated from the inner cells by a vaulted corridor with windows (one each on S, W, and N sides). This cloister is covered by a sloping lower roof supported by a row of cyma reverse-type brackets.

The square sanctum chamber rises through a cylindrical necking (with slit windows) above the cloister roof, supported by a row of cyma reversa-type brackets, culminating in an oval-outlined dome.

The external ovate dome is thus actually formed by a superimposed double vaulting, a major architectural peculiarity of the monument (see Harle 1994: 522, n. 3). The upper part of this oval vault - which was still visible during Stein's field research (Figs 5, 7) - is missing, and the present external dome ends with a flat horizontal surface. Most probably the missing part was made of perishable materials heavily plastered on the exterior.

The Great Shrine was supposed to host stupa-reliquary (Behrendt 2006: 87), or a large votive stele or statue, 'modelled in stucco' as suggested by Stein (1930: 13; see also Faccenna 2006: 191). Fragments of superimposed blocks of a coarse travertine (kanjur), with poorly preserved remains of stucco modelled on surface, were recovered in the robbing pits and in the associated deposits. These fragments, although almost shapeless and difficult to document, may indicate that large images were worshipped inside or outside the main building.

The only existing architectural comparison in the area is shrine F of Abbasah-china (AMSV 208; Tucci 1958: fig. 33; Spagnesi 2006: fig. 11). This somewhat smaller shrine has the same profile as the Great Shrine of GBK 1, with a tall ovate central tower and lower curved roof, but with no interior cloister. The square sanctum was roofed by a hemispherical ceiling within a taller ovate tower. Stein made measured sketches of the ground plan and section of the Great Shrine, which may be compared with an elevation and section prepared by the Italian Archaeological Mission in 1964. Height discrepancies appear, however, when the widths of both sectional drawings are correlated with Stein's measured ground plan. Reducing the height of the upper dome in the 1964 section made by the Mission would make the inner dome more nearly

hemispherical and the height and profile a closer fit to the one documented by Stein's sketched elevation and photography. This discrepancy may depend on whether the total height of the monument in the 1964 drawing included the 'reconstructed' vs. 'conserved' heights (Faccenna 2006). Stein in 1929 was not aware that there was an upper constructional chamber in the tower, used perhaps to reduce mass and increase height. The 1964 elevation proposed an entry portico and 16-step staircase (Faccenna 2006: fig. 10), which are fully compatible with the surviving structural remains.

Lime plaster samples from the cylindrical necking of the Great Shrine showed the presence of clay binder added to the calcite, while "traces of proteinaceous material have been highlighted as binder in the red painted layers" (Rosa et al. 2019: 50; Olivieri 2019). "Probably the granulose plaster of many artefacts was smoothed with the addition of lime without inerts (*grassello*); later the surface could be painted with pigments. In the sample from Gumbat, GBK 17 B, we noted that the finishing layer is rather thick (1 mm), made with lime but almost completely lost, spread dry (*a secco*) on the surface and then smoothed" (Festa and Pannuzi 2019: 105).

[With MWM and MV]

Table 1. Dimensions of the Great Shrine

podium base		staircase landing		body w at base		corridor S side	
S	8.88	w	3.68	S	8.80	w	1.00
E	9.10	l at base	1.50	E	8.95	l	7.25
N	9.25	h	3.50	N	8.80	W side	
W	9.10	flight of steps		W	8.58	w	0.95
base h	0.32	l at base	5.10	cornice h	0.32	l	7.25
wall h	2.82	w	2.50	wall h max.	5.78	N side	
cornice h	0.10	h	3.30	cornice h	0.15	w	1.00
				proj.	0.22	l	7.90
		steps riser	0.20	door w	1.55	windows h	0.52
		tread	0.30	w	2.45	w/w	0.25/0.37
		nos. of steps	16	h	0.92		0.30/0.54
				jamb t		vault h	0.80
				lower roof w	5.87		
				h max.	2.68		
cell S	3.52	intermediate cylindrical body		intermediate cylindrical body		dome (external) d	5.90
E	3.60						

N	3.60	(internal)		(external)		h	4.80
W	3.55	d	5.90	d	5.30	dome	
h	6.30	h	0.50	h	0.80	(internal)	
lower window		windows		cornice h	0.20	lower dome	
h	0.52	h	0.35	cornice		d	5.00
w/w		w/w	0.60/0.25	proj.	0.30	h	3.45
S	0.20/0.35					upper dome	
N	0.20/0.45					d	2.40
upper window						h	1.50
h	0.35						
w/w	0.25/0.60						



Figs 4-7 - The Great Shrine (clockwise from top left): (Fig. 4) 2010 (photo by LMO); (Fig. 5) 1926 (Stein 1930: fig. 6); (Fig. 6) 1938 (© British Library Board, Barger and Wright 663_1_66); (Fig. 7) 1926 (Stein 1930: fig. 7).

Detail of lower inner dome carpentry in situ

The lintel of the S upper clerestory of the cell consists of two parts, one made of stone, the other made of wood. The two parts are juxtaposed. The wooden joist-like element (labeled as Lintel 4) appears quite interesting, since it is possibly associated with the construction of the cell, and not inserted *ex post*.

Three wooden boards used as cross beams were found supporting the SE corner of the inner ceiling. From the outside they are labeled as Beam 3, 2, 1. The three boards appear to be in physical connection: Beam 3 covers Beam 2 and Lintel 4; Beam 1 is apparently independent. All the wooden parts were made of *Acacia modesta* Wall. (see Di Giulio et al. 2018).

Samples of all the wooden elements were taken for absolute dating and determining the wood species. (see below: *Radiocarbon dating*; Meister and Olivieri 2012; Meister, Olivieri and Vidale, 2016; Brancaccio and Olivieri 2018; Di Giulio et al. 2018).

Conservation Activities

Prominent among the ACT project's several goals is the conservation of the monument, labeled as 'Site 8' in the ACT-Field School project's documents. Judging from the photographs published by Stein, the general condition of the monuments in 2000 had not changed much since 1929 (apart from the top of the external dome, see below). Most of the masonry structures related to the E front (corners, front lower roof, and parts of the aisles) had already collapsed, exposing part of the corridor and inner cell. Severe cracks were already visible in 1929 along the external dome, but in the decade following 2000 the monument's physical condition worsened considerably. Cracks along the dome became longer and wider, and the corridor became partially inaccessible. Furthermore, the architrave of the inner chamber's entrance collapsed. After a survey (September 2010) the structural health of the building was considered at serious risk. A plan of intervention was drawn up by ACT together with the Army authorities. In February 2011, a restoration project was launched. The first step of the work was directed by Dr. Zain-ul-Wahab of Hazara University, Department of Conservation Studies. The project followed the standard of the Italian Mission's 'quick intervention' guidelines. The typology of the intervention focused on cleaning and conservative reconstruction, involving in particular the

filling of all the structural parts at risk of collapse. Therefore: a) the vertical profile of the external walls and related lower roof was reconstructed in order to strengthen the overall structure; b) the inner cell door's architrave and upper masonry wall were reconstructed for the same purpose; c) the podium's missing parts (lateral and frontal) were reconstructed, both to support the building's elevation and to indicate the possible extension of the original plan; d) a new access staircase was built on the E side, in place of the original one, which is now missing, following a sculptural model suggested by both Foucher and Faccenna (Foucher 1905-51, I: fig. 41; Faccenna 2006), in order to provide current access to the monument; e) both the inner cell and corridor were provided with new paved floors to facilitate the visit; f) cross-corner wood pieces that had supported construction of the interior dome - indicated by two surviving examples (SW beam; and part of the SE beam), a rare case in Gandhara - were replaced where they were missing (SE, NW, NE); g) both the inner and outer surfaces of the dome were cleaned; h) the N retaining wall was also cleaned. The standard guidelines provided for the preliminary conservation were basically related to two simple but essential aspects: a) new/reconstructed portions of masonry wall should be distinguishable from old/existing ones by means of offsets; b) use of cement should be avoided in favor of lime mortar.

[With FM]

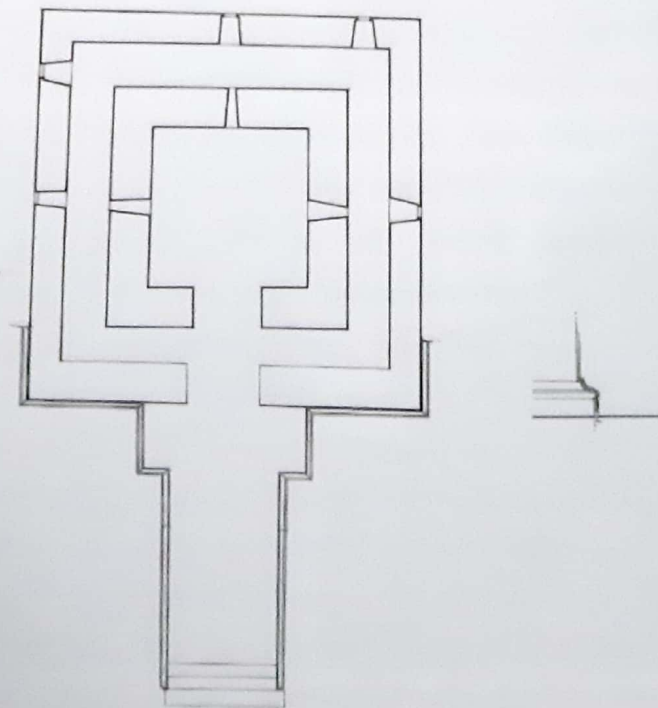


Fig. 8. The Great Shrine. Plan with detail of the podium's moulding. For dimensions and scale, see *Dimensions* above, and Pls III-IV (Drawings by FM).



Figs 9-10 - Conservation in progress (below: a detail of the double domes) (Photos by FM).

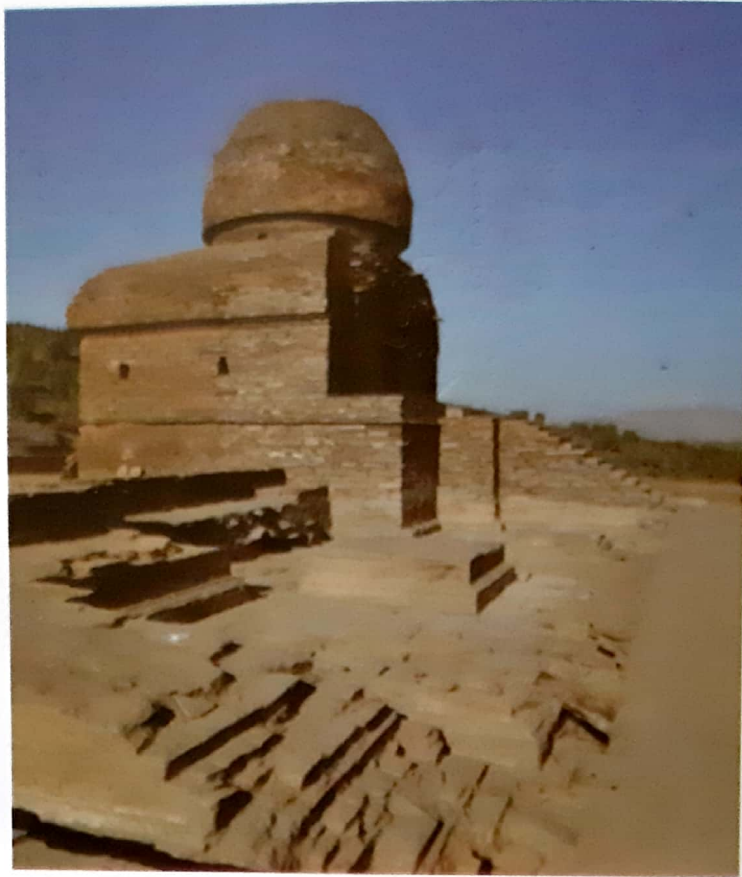


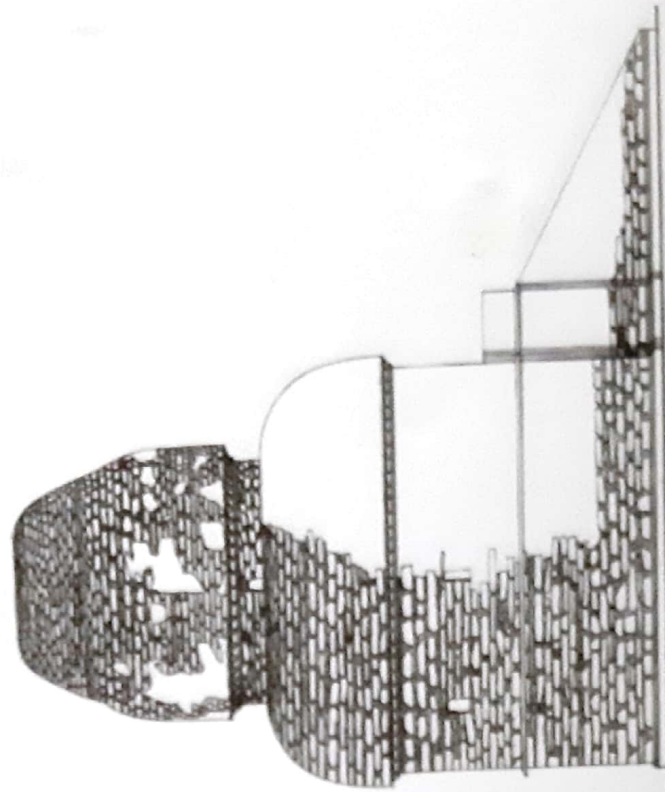
Fig. 11 - The Great Shrine at the end of conservation activities (view from SSE) (Photo by EL).



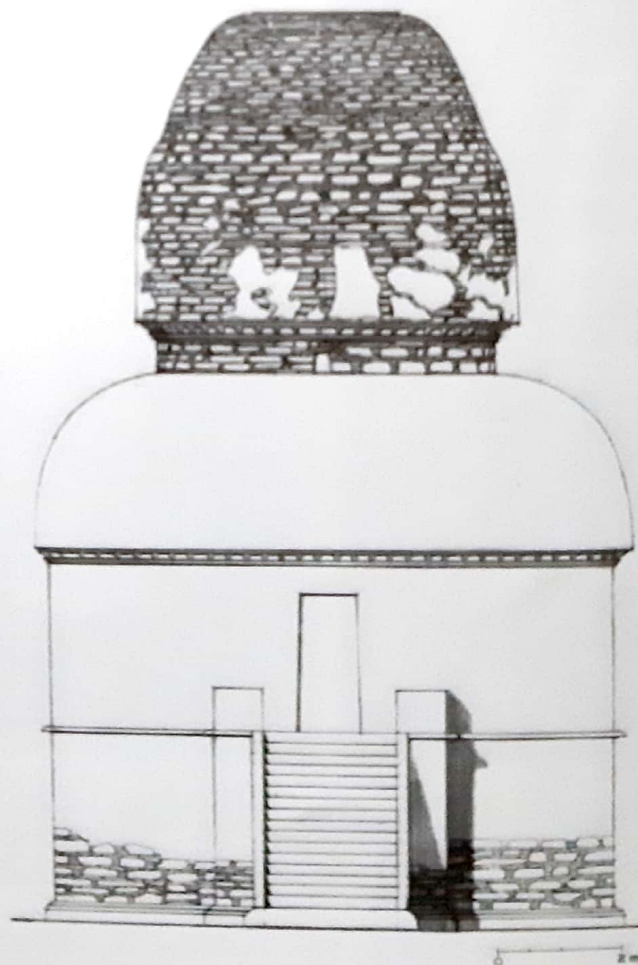
Fig. 12 - The Great Shrine at the end of conservation activities (view from NNE) (Photo by LMO).



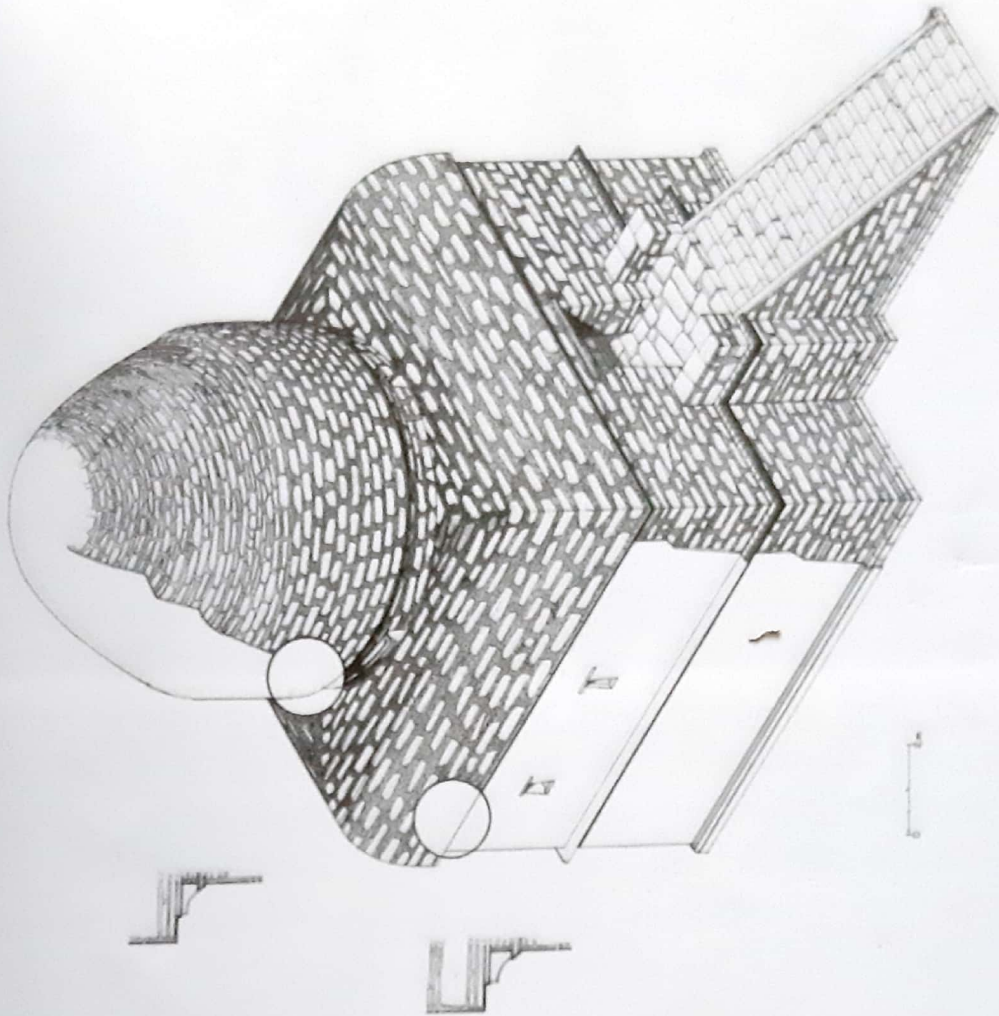
Figs. 13-16 - After the conservation: detail of the set-back masonry and of the corridor (Photo by LMO).



Pl. II - Great Vihara, side prospect (S) (Drawings by FM).



Pl. III. - Great Vihara, frontal prospect (E) (Drawings by FM).



Pl. IV - Great Vihara, axonometry (SSE) with details of coping (Drawings by FM).

Post-intervention Architectural Analysis

The monument has few parallels with other sites in Swat or Gandhara. Faccenna (2006) suggested it could provide a model for the ruined 'Great Building' excavated at Butkara I. Above we have cited the shrine F of Abbasah-china (Tucci 1958: fig. 33; Spagnesi 2006: fig. 11) as a possible comparison because of its square sanctum, crowned by a hemispherical ceiling set within an ovate tower, with a secondary external curved roof (without, however, an internal circumambulatory corridor as at GBK 1). We know of at least two sculptural reliefs from Mardan and Ranigat (Faccenna 2001: pl. 158e) - that represent somewhat analogous shrines, the first with a semicircular dome, corner towers, and attending devotees, the second with a lower roof and taller tower. A small clay model of a circular chapel found at Pir Pai in Gandhara (Nasim Khan 2009: pls 18.1, 18.2) represents a sanctum with a hemispherical interior ceiling set within a taller ovate cap, but lacking a lower roof.

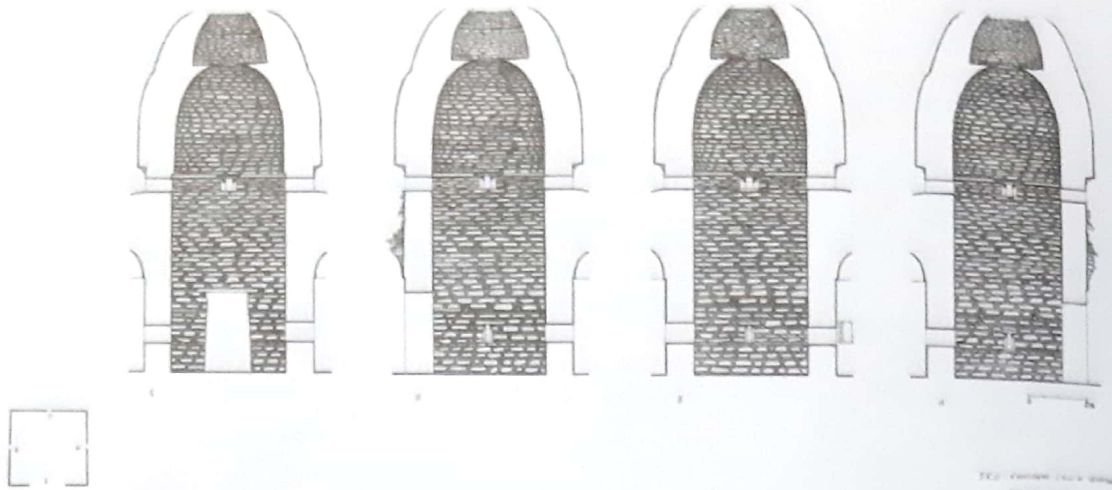


Fig. 17 - Sections of the cella of the Great Vihara (clockwise from E) (Drawings by FM).

The monument's mouldings, ashlar masonry, sloping window slits, and interior dome (constructed above a cantilevered stone ring and corner beams, without squinches) seem compatible with the Gandharan constructional techniques analyzed and documented by Foucher at the beginning of the 20th century (Foucher 1905-51, I). The tall, narrow, vaulted cloisters, however, may well have set a local precedent for those used around the upper domed chambers in Shahi temples built in Swat and the Salt Range in the 10th century (Rahman and Sardar 1984, Meister 2010a, Meister 2010b).

New graphic documentation, conservation of the monument and restoration of the profile of the lower roof and ambulatory walls have considerably simplified and expanded the analysis of the shrine. The monument was originally entirely plastered and colored. Ample traces of plaster are preserved at the base and over the various elements of the roofing. The base of the Great Shrine was finished with white-painted stucco, while the exterior of the ovate dome bears traces of coarse thick red-colored plastering (an analysis of plaster samples is under way with the ISCR). The base is moulded with plinth superimposed by a torus and cavetto. Even when conserved, it is still a truncated monument, with still visible fragmentary remains of the missing E ambulatory aisle and its roofing. It is now quite possible for me to reconstruct the frontal aspect of the original structure photographically, providing a closer parallel to the two Gandharan sculptural models previously proposed, except for the heightened, ovate, double-chambered elevation of its outer dome.



Figs 18-19 - The exposed floor with the other monuments N (top) and S of the Great Vihara
(Photos by EL).

Note by LMO: the asymmetric position of the sloping window slits in the corridor seems to be designed to give light in front when one walks in the corridor clockwise.

[With MWM]

The other monuments of Terrace I

Stupa [13]

N of the Great Vihara [30]. Most probably a stupa, the monument is square in plan, with staircase (staircase and landing) on main axis. The axis follows the orientation of the Great Vihara [30] (E). Only part of the 1st storey is preserved. The base is decorated with plinth, torus and cavetto; traces of plaster.

1st storey	
w at base	8.90
base h	0.58
w at base	3.70
wall h max.	0.30

Stupa [3]

S of Great Vihara [30]. Most probably a stupa. As the monument is rectangular in plan, one may hypothesize the existence of a second staircase. Lower staircase (staircase and landing) on the main axis. The axis follows the orientation of the Great Vihara [30] (E).

Only part of the 1st storey is preserved. The base is decorated with plinth, two tori and cavetto; traces of plaster (see figure next page)

Base	
w at base	
S	11.34
E	10.32
N	11.34
W	10.32
base h	0.50
1st storey	
w at base	
S	11.10
E	10.08
N	11.10
W	10.08
wall h max.	0.44

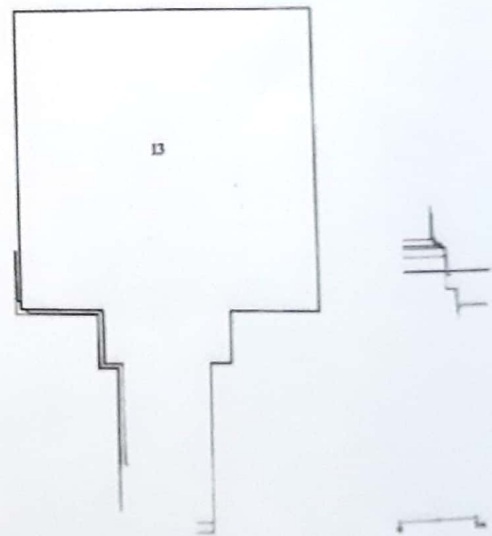


Fig. 20 – Stupa 13: Plan with detail of the podium's moulding (Drawings by FM).

Stupa [9]

The monument is preserved only in its base, square, moulded.

The base is decorated with plinth,

two tori and cavetto; traces of plaster.

<i>1st storey</i>	
w at base	3.42
base h	0.43
w at base	3.70
wall h max.	0.32

Structure [43]

Only the base (for a votive columns?) is preserved: square, moulded and with traces of one pilaster per side, in addition to the corner pilasters. The base is decorated with a plinth, two tori and a cavetto; traces of plaster.

W at base	1.63
base h	0.31
w at base	1.97
wall h max.	0.34

Stupa [27]

The monument is preserved only in its base, square, moulded.

The base is decorated with plinth, two tori and cavetto; traces of plaster.

<i>1st storey</i>	
w at base	1.70
base h	0.33
w at base	1.94
wall h max.	0.43

Stupa [11]

The monument is preserved only in its base, square, moulded.

The base is decorated with plinth, torus and cavetto; traces of plaster.

<i>1st storey</i>	
w at base	2.25
base h	0.37
w at base	2.55
wall h max.	0.33

Stupa [25]

The monument is preserved only in its base, square, moulded.

The base is decorated with plinth, torus, fillet, torus and cavetto; traces of plaster.

<i>1st storey</i>	
w at base	2.35
base h	0.28
w at base	2.57
wall h max.	0.42

Structure [19]

The monument is not preserved.

Stupa [39]

The monument is preserved only in its base, square, moulded.

The base is decorated with plinth, torus and cavetto; traces of plaster.

<i>1st storey</i>	
w at base	1.68
base h	0.26
w at base	1.94
wall h max.	0.20

Structure [45]

The monument is not preserved.

To the left: Fig. 21 – Stupa 3 and other monuments (9, 43, 11, 27, 25, 39, 41, 23) (Drawings by FM).

Stupa [41]

The monument is preserved only in its base, square, moulded. The base is decorated with plinth, torus, cavetto and traces of 2 pilasters (torus, cavetto, cavetto); traces of plaster.

Structure [69]

The monument is not preserved.

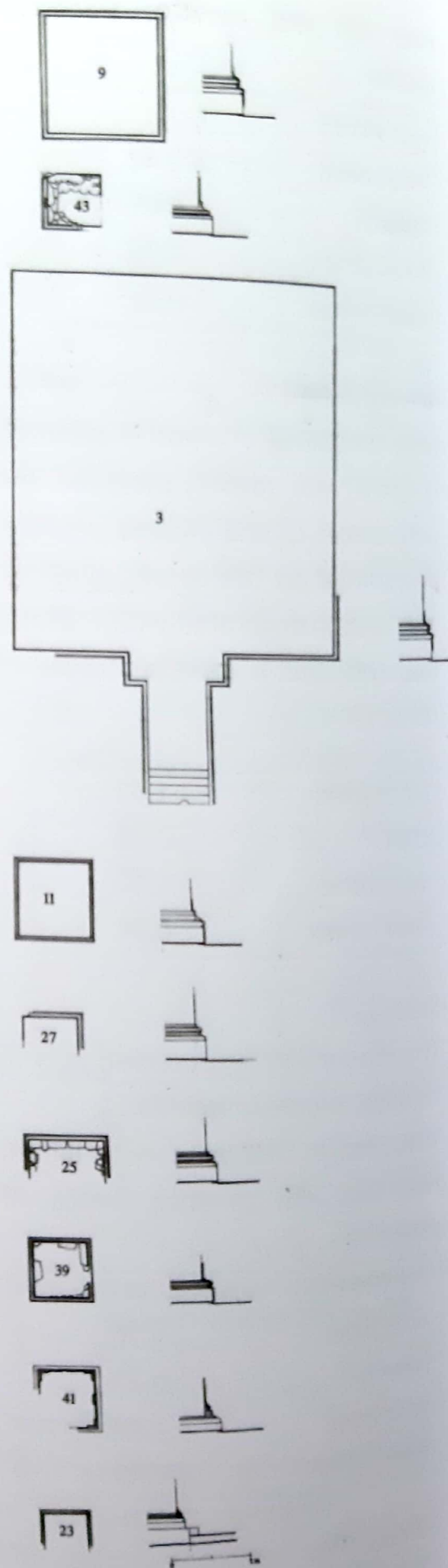
<i>1st storey</i>	
w at base	1.72
base h	0.18
w at base	2.14
wall h max.	0.46

Stupa [29]

The monument is preserved only in its base, square, moulded.

The base is decorated with two plinths; the lower one with scotia and carinated torus; the upper one with scotia and inverted cyma; traces of plaster.

<i>1st storey</i>	
w at base	2.16
base h	0.12
w at base	2.32
cornice h	0.10
coping h	0.02
cornice proj.	0.06
wall h max.	0.12
<i>2nd storey</i>	
w at base	1.80/1.60
base h	0.24
wall h max.	0.10



Structure [31]

Only the base (for a votive columns?) is preserved: square, moulded.

The base is decorated with plinth, torus and cavetto; traces of three pilasters on each side; traces of plaster.

W at base	1.67
base h	0.22
w at base	1.89
wall h max.	0.25

Stupa [23]

Only base preserved: square, moulded. The base is decorated with plinth, torus and cavetto; traces of plaster.

<i>1st storey</i>	
w at base	1.38
base h	0.38
w at base	1.68
wall h max.	0.32

Stupa [21]

Only base preserved: square, moulded. The base is decorated with plinth torus, scotia, torus and cavetto; traces of plaster.

<i>1st storey</i>	
w at base	1.25
base h	0.35
w at base	1.53
wall h max.	0.21

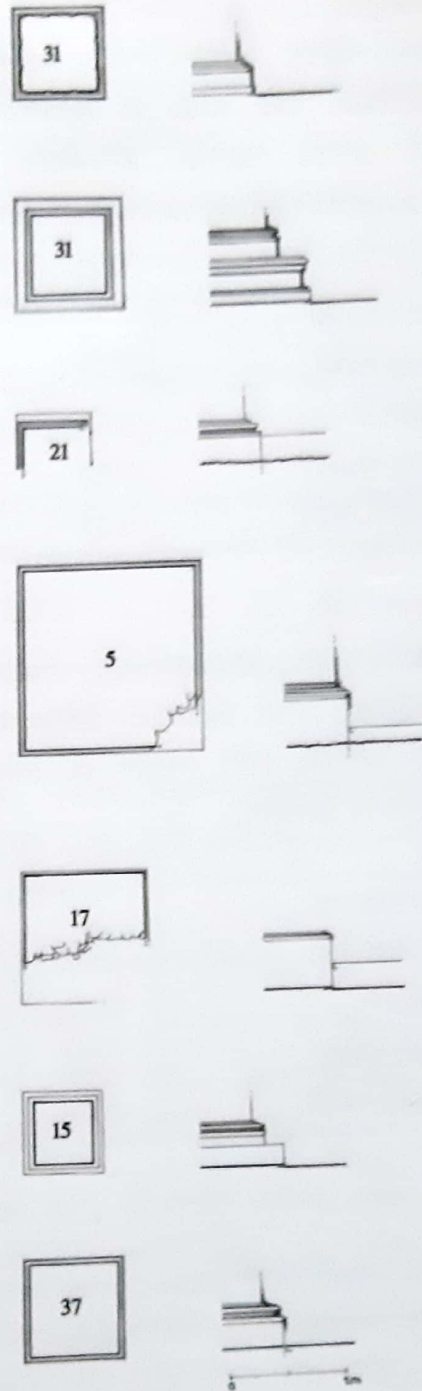


Fig. 22 – Stupa 5 and other monuments (31, 29, 21, 17, 15, 37) (Drawings by FM).

Stupa [5]

Only base preserved: square, moulded. The base is decorated with plinth, scotia, carinated (?) torus and cavetto; traces of plaster.

<i>1st storey</i>	
w at base	3.73
base h	0.50
w at base	3.93
wall h max.	0.22

Stupa [17]

Only base preserved: square, moulded. The base is decorated with plinth, and traces of torus; traces of plaster.

<i>1st storey</i>	
w at base	2.65
base h	0.46
w at base	2.75
wall h max.	0.46

Stupa [15]

Only base preserved: square, moulded. Decorated with double stepped plinth, torus, scotia, torus and cavetto; traces of plaster.

<i>1st storey</i>	
w at base	1.28
base h	0.36
w at base	1.60
wall h max.	0.20

Stupa [37] Only base preserved: square, moulded. Decorated with plinth, torus, scotia, torus and cavetto; traces of plaster.

Structure [35]

The monument is not preserved.

Structure [63]

Floor related to a destroyed structure, a sort of small absidal shrine or precinct.

Note: Almost all the stupas' bases and cornices also show traces of painted stucco decoration. White, red and blue in that order are the dominant colors. [With FM]

List of the Stratigraphic Units

Surface

SU (1) Surface with mixed materials: pottery, architectural fragments, and a protohistoric levigated axe.

Recent pits

SU (6) Blackish mixed clay. Re-filling of <106>.

SU <106> Pit opened from the bottom of <105>; it cuts [3] and [9]; at the bottom a group of decorative fragments labeled as SU (10) was found.

SU (18) Blackish mixed clay. Re-filling of <107>.

SU <107> Pit; extension of <105>.

SU (10) Blackish mixed clay. Re-filling of <105>.

SU <105> Pit; it cuts [3] and [9].

SU (14) Yellowish mixed clay. Re-filling of <100> and <111>.

SU <110> Pit dug around the S side of the staircase of [30].

SU (2) Agricultural layer; recent. Materials as above.

SU <111> Pit dug E of the staircase of [30]. Extension of <110>.

SU (22) Re-filling of <115>.

SU <115> Pit. It cuts [55], (49), (51) and (53).

SU (20) Yellowish mixed clay. Re-filling of <114>.

SU <114> Pit dug around the N side of the staircase of [30]. Extension of <115>. It cuts [29].

SU (14) Blackish mixed clay. Re-filling of >113>.

SU <113> Pit dug around the N side of the staircase of [30] from inside <114>.

SU (4) Blackish mixed clay. Re-filling of <109>.

SU <109> Recent pit; it cuts [39], [19], [11], [25] and the previous pit <108>.

SU (8) Blackish mixed clay. Re-filling of <108>.

SU <108> Pit; it cuts [3] and [11]; cut by <109> and <106>.

SU (12) Blackish mixed clay. Re-filling of <117>.

SU <117> Cluster of various pits. It cuts [29], [31], [69], [23], [21], [5].

SU (34) Yellowish mixed clay. Re-filling of <118>.

SU <118> Pit. Inside <117> it cuts and totally destroys the stupa [33].

SU (36) Mixed soil with gravel and sand. Re-filling of <112>.

SU <112> Pit cut from the bottom

of <114>. It cuts [55], (49), (51) and (53).

SU (28) Blackish mixed clay. Re-filling of <122>.

SU <122> Pit. It cuts [13].

SU (26) Blackish mixed clay. Re-filling of <119>, <120>, <121>, <123>, <126>.

SU <119> Pit. Extension of <122>. It cuts [17].

U <120> Pit. Extension of <122>. It cuts [15].

SU (30bis) Blackish mixed clay. Re-filling of <116>.

SU <116> Pit. Extension of <120>.

SU <121> Pit. Extension of <120>.

SU (16) Blackish mixed clay. Re-filling of <125>.

SU <123>=<125>=<126> Pit. Extension of <122>. It cuts [35], [37],

SU (24) Blackish mixed clay. Re-filling of <124>.

SU <124> Pit. Extension of <123>.

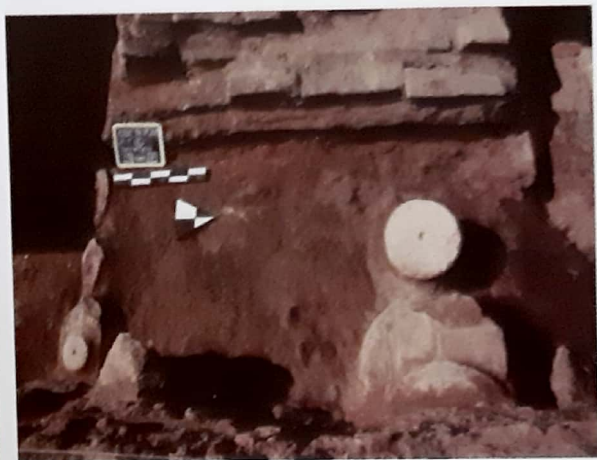
SU (38) Reddish mixed soil. Re-filling of <127>.

SU <127> Large pit. Extension of <126>.

Note: Pits <110> and <111> are probably earlier than all the others in the sector S of the trench. Pits <119>, <120>, <121>, <123>, <126> and their re-filling (26) may correspond to the pits



Fig. 29. (reproduced also below): One of the authors walking on the side of the trench N of the Great Shrine (Photo by MV) excavated by Barger and Wright in 1938 (see below).



Figs. 24-27 - Excavation of recent pits (Photos by MV).

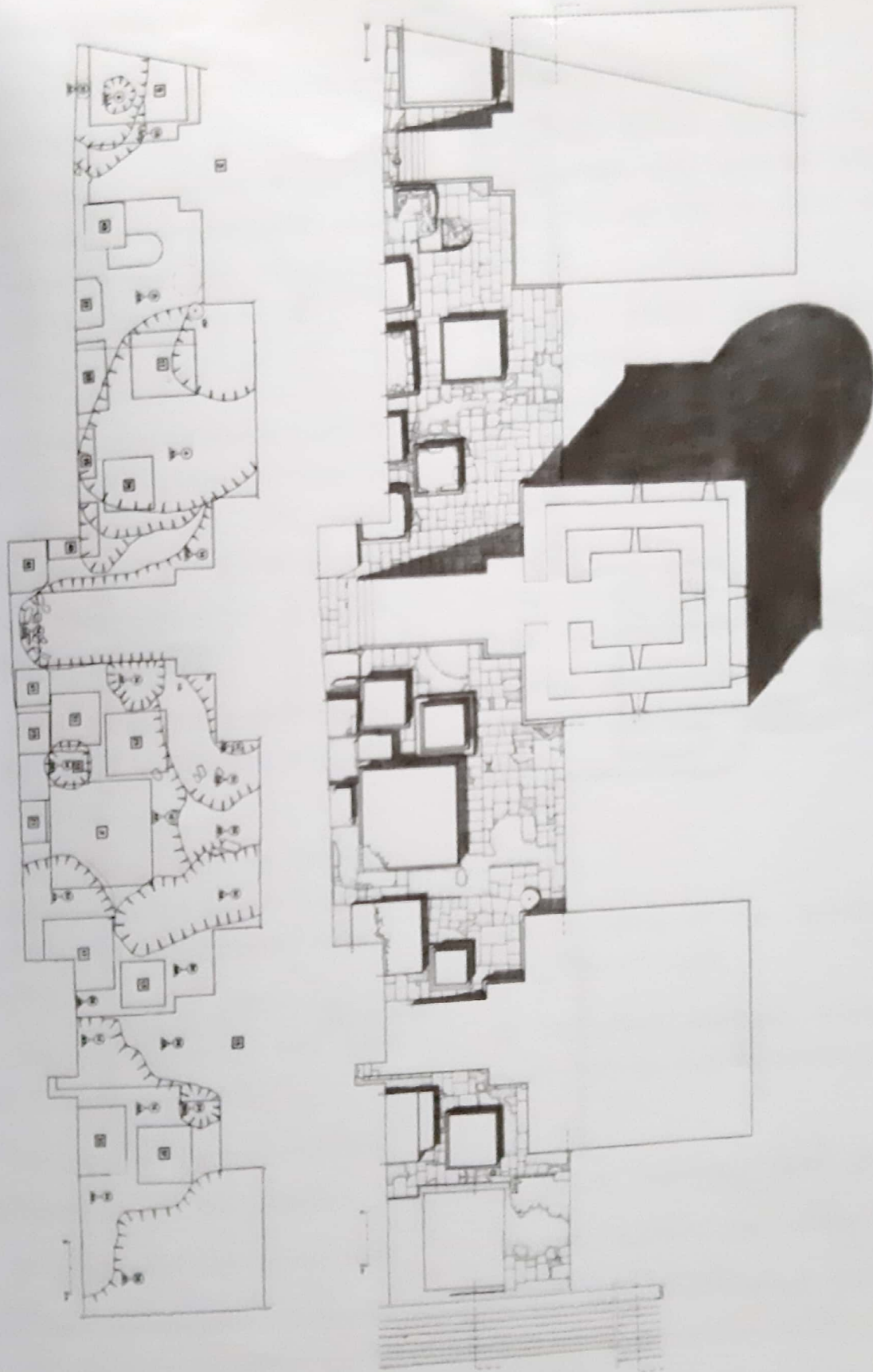


Figs. 28-31 - Pictures from the excavations (clockwise from top left): Trench GBK I side N, and S; the filling of the terrace and the protohistoric layers inside trench GBK N; the same with Pit <58>.

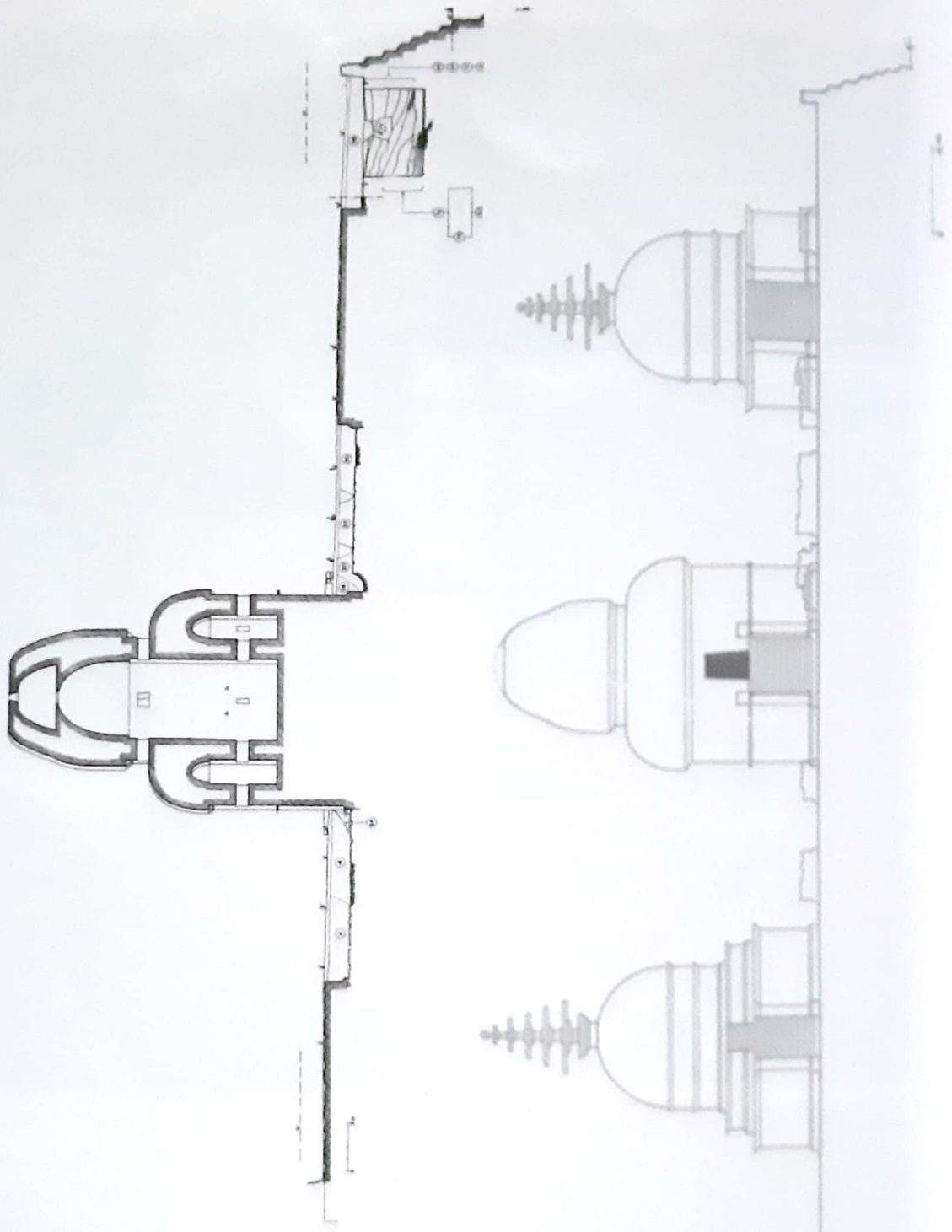
Fig. 32 - Bottom right: the foundation of the floor inside the cella.

(Photos by MV and LMO)





Pls V-VI - Plan of the excavated area (top) and of the robbing pits (bottom) (Drawings by FM).



Pls VII-VIII - Section of the excavated area and graphic restitution of the monuments (view from E)
(Drawings by FM).

Late ancient evidence

SU (60) Mixed clay. Ample traces of ash. Filling of <58>.

SU (62) Mixed materials: stones in sub-vertical position, organics and food waste (bones, eggs, charcoal). Covered by (60). Filling of <58>.

Floors

SU (32) Very limited portion (<0.20 w) of a possible anthropic layer in the NE corner of [30] with minuscule non-diagnostic

SU (66) Thick lens of ash. Covered by (60). Filling of <58>.

SU <58> Small pit excavated in ancient times. It cuts (48), (64), (70) and (72).

SU [57] Paved platform partially removed below the level of floor 7].

SU [55] Paved floor. Covered by [47] and [91].

SU (49) Yellowish silty clay with sand. Subsurface of [55].

SU (51) Layer with gravel and sand.

Substruction of the Terrace I (limited by N retaining wall [100])

SU (64) Yellowish clay mixed with gravel.

SU (70) Yellowish clay, rather sandy.

SU (72) Yellowish clay mixed with gravel.

SU (74) Brownish mixed clay.

fragments of potsherds.

SU [91] Raised paved floor. Documented only between votive stupa [31] and [33], in phase with the first.

SU [47] Raised paved floor. Documented in various parts in the N side of the trench. Covered by [47].

SU (48) Reddish clay. Subsurface of [57]. Cut by <58>

It was bordered on both N and S sides by vertical slabs, which stepped down from the level of [47]. The level of [57] is the same as [55].

Final levelling of the terrace I. Preparation for (49).

SU (53) Base platform made of broken stones. Foundation for [30].

SU (76) Reddish clay mixed with stones at its bottom.

SU (78) Brownish clay and stones.

SU (82) Reddish compact clay.

SU (100) Dark brownish silty compact clay with few stones.

SU (101) Dark yellowish silty compact clay, with flat stones.

SU (102) Dark yellowish silty compact clay, pure, no inclusions.

Protohistoric layers (below the filling of Terrace I)

SU (80) Yellowish fine sand, nearly pure. Abandonment.

two-ee courses of undressed stones.

SU (103) Brownish clay layer(s) with flakes of stone. Anthropogenic layer. It contains potsherds

SU [86] Phyllitic bed-rock. partially crumbled.

SU [84] Stone platform made of

[With NAN and MV]

Interpreting the stratigraphy

The building periods of the excavated area can be summarized as follows:

Period I: Protohistoric. We dug a deep test trench below the great Buddhist terrace (GBK 1 N: Fig. 31). Below a series of thick sloping fillings, at the bottom of the trench, we found the edge of a platform ([84]), consisting of two or three courses of angular rocks filled with a layer of light-coloured, pure phyllitic sand and clay. Platform [84] was constructed on the original bedrock and had the same general orientation of the later Buddhist terraces. This platform seemed to have been purposefully truncated and possibly infilled during the later rebuilding activities of the Early Historic periods. On top of its surface, and in the layers immediately above the bedrock, we found a scatter of protohistoric sherds apparently datable to the late 2nd/mid-1st millennium BCE, and few Northern Neolithic potsherds, hypothetically dated to the 3rd-2nd millennium BCE (see Figs 35-36)³. Period I may correspond to Macrophase 1a of the Barikot sequence (see Olivieri and Colliva 2018, this Journal).

³ In this small assemblage, the most common diagnostic form seems to be the mouth fragment of a coarse globular cooking pot having a distinctively sharp angle in the inner corner point. Similar vessels were common in Stacul's Period I of the Ghalegai sequence (Stacul 1987: fig. 7.a); in the graveyards of Gogdara and Udegram the same form was dated by the means of 14C cal. to the last centuries of the 2nd millennium BCE (Vidale et al. 2015). One of the sherds is definitely the wall of a basket-marked small vase, a production dated by Stacul to Ghalegai Periods III and IV (Stacul 1987: pls IX and XXVII); but similar vessels might be fairly more ancient. Materials of (Ghalegai) Periods III-IV had been previously collected on the surface of GBK (Olivieri, Vidale et al. 2006).

Period II: Construction phase of the stupa-terrace. During this period the N retaining wall [100] was completed, as well as the filling of the terrace. In one of the various layers, we found an erratic fragment of Iron Age pottery (dish-on-stand) (Fig. 37).

Period III: It corresponds to the first stone floor of the terrace [55]: in this period the monuments [30], [3], [13] and [5] were built (early-2nd Century CE, or earlier? See below). Wooden samples for AMS-14C analysis were taken from 4 wooden beams still in situ as part of the construction of the dome of [30] (for the results see below, *Radiocarbon dating*). Period III in terrace I is characterized by three large buildings aligned with their staircases facing E (from S: [3], [30], [13]). The excavated area corresponds only to 1/3 of the ancient terrace, but, given its central location, it can give us a rough idea of the original appearance of a monumental terrace visually marked by three major monuments. This feature resembles closely the Nimogram site stupa-terrace (Raducha 2009). Here the excavations documented three square major monuments, aligned and facing WSW; from N: a stupa-chapel (I), a stupa (II), a shrine (III). Other examples in Swat of stupa-terrace marked by three parallel major monuments are Baligram (Ashraf Khan 1993) and Marjanai (Shah Nazar Khan 1995).



Fig. 33 - The excavation area viewed from W (Photo by EL).

Excluding the Great Shrine, what can we say about the features of the two other major buildings of Gumbat-Balo Kale? Building [3] is rectangular and building [13] is square in shape; unfortunately both are preserved solely to the height of their first storey or podium, so no material elements are available from which to determine whether they were stupas or shrine-class monuments.

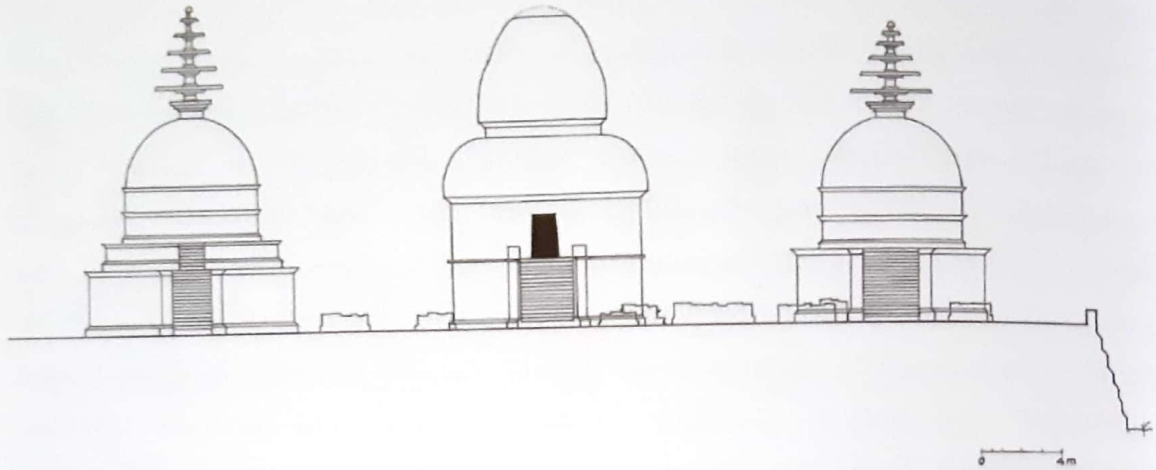


Fig. 34 (= Pl. VIII) - A conjectural reconstruction of the GBK I stupa terrace viewed from E (Drawings by FM).

Any discussion of the typology of these monuments must consider that they were totally destroyed, while the Great Shrine remains preserved. A possible reason for this aspect could be found in the fact that the Great Shrine is an empty monument with an inner cavity. This is a factor that may have contributed to the maintenance of the site, either for physical reasons (it was used as a stable and a shelter for humans; see Stein 1930: 13; Barger and Wright 1941: 16), or for metaphysical reasons (such as fear of *perian*): it is worth noting that in the recent past the *qibla*-oriented cell was used as a mosque by the Gujars, to offer special prayers against drought (see similar re-use of ancient painted shelters in Hazara region in Olivieri 2015).

A possible chronology for the GBK Great Shrine was first proposed by Barger and Wright who, on the basis of their studies of the masonry technique, suggested the date of 2nd Century CE (ibid.: 35). Unfortunately, the Great Shrine, despite its unique features and survival, has been neglected by most scholars, with the exception of H.C. Ackermann, D. Faccenna, H.G. Franz (Franz 1984) and Abdur Rahman. Ackermann studied 16 reliefs from Gumbat: 6 attributed by him to an early Hellenistic group' dated to around mid-1st century

CE, and 4 to a 'late Hellenistic group' he dated to the 2nd half of the 1st century CE (Ackermann 1975: 19, 23). Faccenna was of the opinion that the Gumbat shrine could be linked to the so-called 'Great Shrine' of Butkara I (i.e. Great Stupa Phase 3: c. 20 CE) and therefore inferring an early 1st-century chronology (Faccenna 2006: 189-190, fn. 4); Abdur Rahman was inclined instead to assign it to a later chronology on the basis of elements of composition and construction — narrow vaulted ambulatory aisles, etc. similar to the ones he found in later Hindu-Shahi temples (Id. 1983). MWM's assessment of these common elements, and his comparison with a structure such as the 10th-century 'Gumbat', Talash Valley, Dir (Meister 2010a) led him to the conclusion that the 'earlier tradition may have contributed to the unique configuration of later temples in the region'. Temples at Bilot and Kalar, however, have wooden beams across the corners below their interior domes, and samples of these may eventually make a C14 comparison possible.

On the basis of the data of the recent fieldwork, the hypothesis of two building phases for this double dome has been discussed amongst the authors of the present report. The chronology of **Phase 1 = Period III** is suggested by the C14 age of the wooden lintel of the upper S clerestory window (Lintel 4 = 1840 +/-30 BP = 110 CE), and of a second phase of rebuilding (including the construction of the upper dome?) in **Phase 2 = Period V** (?) as inferred from the C14 ages 1760/1790/1800 BP = mid-3rd Century CE of three wooden planks used as support below the SE corner of the inner dome (= Beams 1-3). Period III may correspond to Macrophase 4a of the Barikot sequence (see Olivieri and Colliva 2018, this Journal).

We admit that, although a close analysis of the inner dome has revealed a difference in the masonry techniques, we have not found any definitive element (such as traces of plaster on the external vaulting of the lower dome) to prove that the dome was doubled in a Phase 2¹.

¹ "According to R.E. Hatfield (Beta Analytic) [see the Note below in *Radiocarbon dating*] the identical 2σ statistics of the three surviving planks of the lower dome mean that they appear to represent the same time (median age c. 240 AD; Olivieri et al. 2014: 311; Meister, Olivieri, and Vidale 2016: 556). The dating suggests the possibility that the dome might have been reconstructed after one of those two destructive earthquakes that shook Barikot and Amluk-dara (see Olivieri and Filigenzi 2018: 80)." (Brancaccio and Olivieri 2019: 127, fn. 13).

Period IV: Corresponding to the second stone floor (layer 47), the one which is visible over the entire excavated surface. During this period the majority of the minor cultic monuments crowding the space around the three major buildings were built, including a small absidal monument (a chapel?), whose lay-out is revealed by a negative outline of the paving slabs.

Period V: The stone floor (layer 91) was raised a few cm in correspondence with monument [31]. In this phase the dome might have been either doubled or repaired (see above, and fn. 4). Period V should correspond to Macrophase 5b of the Barikot sequence (*ibid.*).

Period VI: Late occupation (14th Century CE), documented by the pit <58> and its contents (for the results see below, *Radiocarbon dating*) (Fig. 28).

Period VII: Abandonment (the relative layers were destroyed by early looting activities, *ante*-1929, to which may be ascribed the pits <110> and <111>).

Period VIII: Early excavation (1938). The pits <119>, <120>, <121>, <123>, <126> and their refilling (26) quite certainly correspond to the pits excavated by Barger and Wright in 1938: '[...] It was impossible to clear any of the stūpas on the southern side of the shrine as they were surrounded by fields under cultivation. Accordingly, operations were confined to the stūpa mound to the north of the shrine. Its top had long since been trodden down and was used by the Gujars as a milking place for their cattle. Lower down, patches of wall made it possible to trace the line of the stūpa base which was 31' square. It was found to be surrounded by small stūpas, standing on a pavement which was reached at 5' below the surface' (Barger and Wright 1941: 17). Clearly the latter stupa is our stupa [13], the surrounding stupas were [15], [17], [35] and [37]. In consequence all the materials found in layers (24), (26), (28) and (16) have to be considered as discarded by the two British explorers.

Period IX: Recent activities (including the 1938 fieldwork).

[With MV]

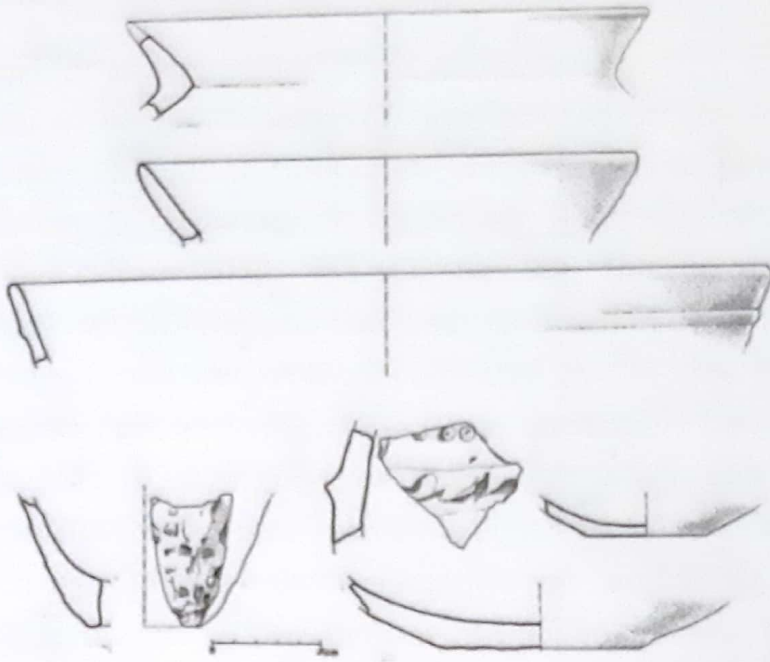


Fig. 35 - Protohistoric pottery from structural Period I, but found in Period II SU (82)
(Sketch drawings by MV and FM).

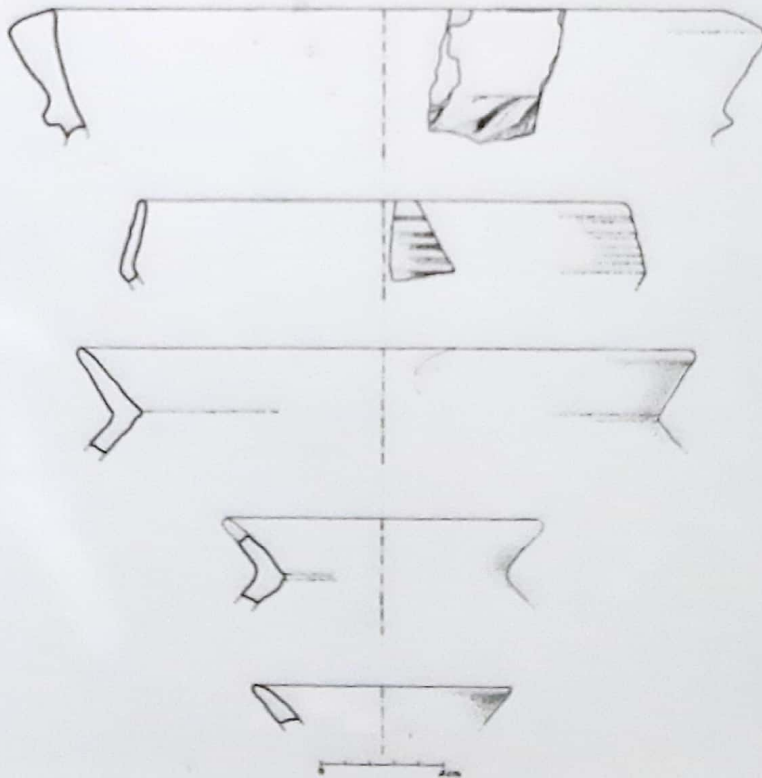


Fig. 36 - Protohistoric pottery from structural Period I, but found in Period II SU (82)

(Sketch drawings by MV and FM).

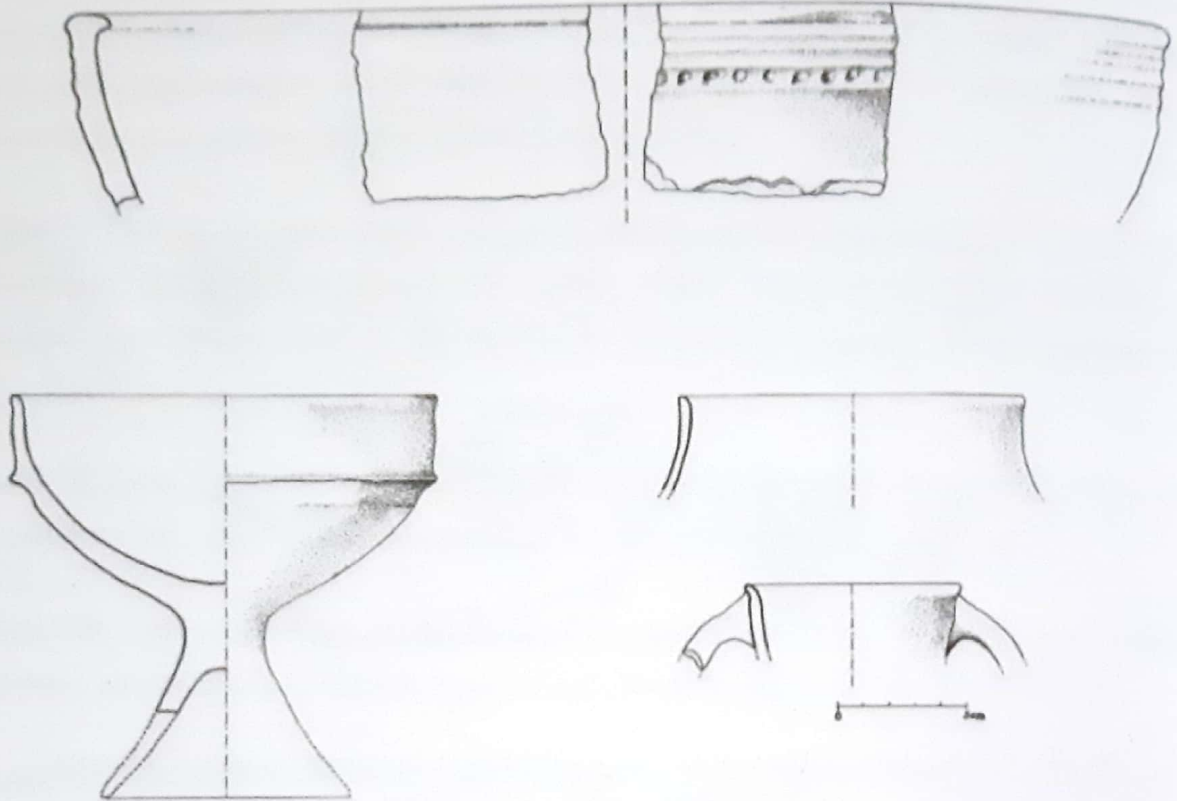


Fig. 37 - Protohistoric pottery from structural Periods I, but found in Period III SU (82) and II (bottom, left) found in Period II SU (64) (Sketch drawings by MV and FM).



Fig 38 - Period III-IV. Jar from Stupa [3] in its original position
(Photo by MV).

A Note on some of the finds

A jar from Stupa [3]

In front of Stupa [3] we found a small jar inserted in the center of a circular hole cut out of the floor [47], just in front of the staircase. The jar belongs to the CAc 1-3 class type, which is common in Gandharan Buddhist devotional contexts (see Callieri and Olivieri 2020: 163-164, fig. 56). This association between shrines, staircases and offering jars had been observed in other Buddhist sacred areas. At Butkara I, two jars were documented at the side of the staircase (respectively on its right and left) of the Great Building 57 (Faccenna 1981-85: 158, fn.3, pls. 353a-b), a shrine-class monument which was associated by Faccenna to the GBK Great Shrine (Faccenna 2006). At Saidu Sharif I, two jars (S 2354 and 2355) were found respectively on the right and left in front of Shrine [35] 28, another one close to the staircase of the Great Stupa (Faccenna 1995: 264-269, figs. 88-91, fig. 84). However, the association is ambiguous. Offering vessels are sometime found near minor stupas. and in front of major stupas, as in the case of the green schist basin in front of the Stupa 1 at Panr I; (Faccenna et al. 1993:154); as well as in the case of the jar S 2257 fixed near the right-hand corner of the 1st staircase of the Main Stupa; (Faccenna 1995: figs. 184-185) (see also Callieri 1997; Callieri and Olivieri 2020).

A curious feature of both pots (Figs. 15-47) is the absence of the bottom: the latter was intentionally removed (to facilitate the drainage of the liquids poured in during rituals?).

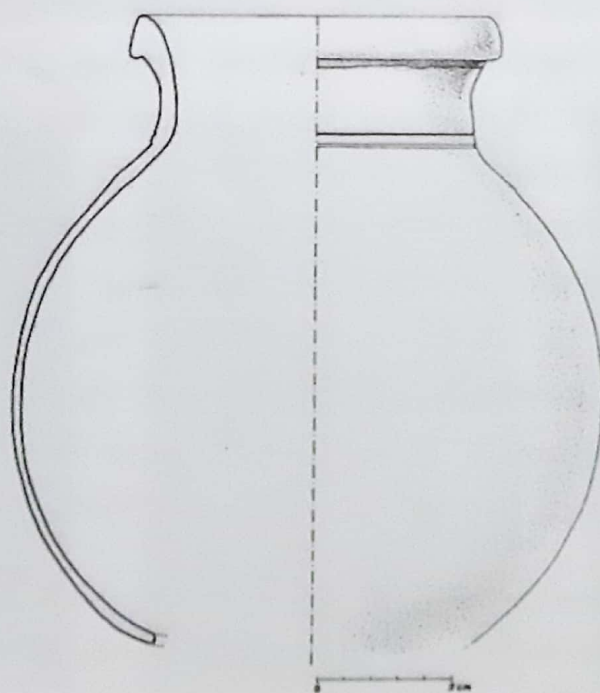


Fig. 39 - Period III-IV: Jar from Stupa [3] (Drawings by MV and FM).

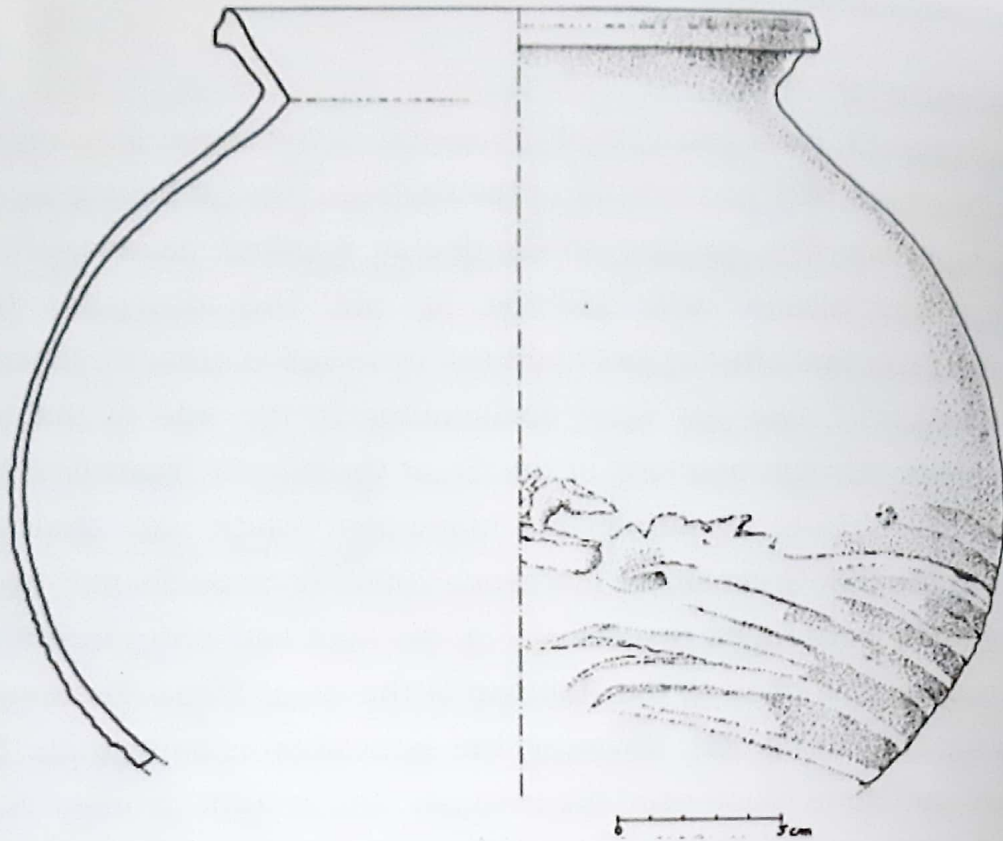


Fig. 40 - Period VI: Jar from Pit <58> (Drawings by MV and FM).

Comparison with the sculptural material recovered in 1938:

The fragments Inv. nos. GBK 4, 5 and 6 found near Stupa [3] apparently belong to the same frieze of I.M. 89-1939 (Victoria and Albert Museum; Ackermann 1975: pl. Vc) and the fragment GBK 7 (surface), belongs to the frieze of I.M. 88-1939 (ibid.: pl. Vb); GBK 19 (surface) clearly belongs to a monument similar to those of I.M. 111-1939 (ibid.: pls. XXIIa-b); GBK 22 (SE of the Great Shrine), can be compared to I.M. 79-1939 (ibid.: pls. XIIb); GBK 24, 28, 30 and 31 have the same features as the frieze I.M. 86 and A-1939 (ibid.: pls. Va). In this case it is worth noting that GBK 24 and 31 were found near Stupa [3], and belong to the same frieze; GBK 28, on the surface; GBK 30 near Stupas [35] and [37] inside (26). Layer (26) corresponds to the refilling of one of the pits opened by Barger and Wright N of the Stupa [13] (Barger and Wright 1941: 17).

For a complete reassessment of the materials, and their relationship with those exported by Barger and Wright and currently in the Victoria and Albert Museum in London, see Brancaccio and Olivieri 2019.



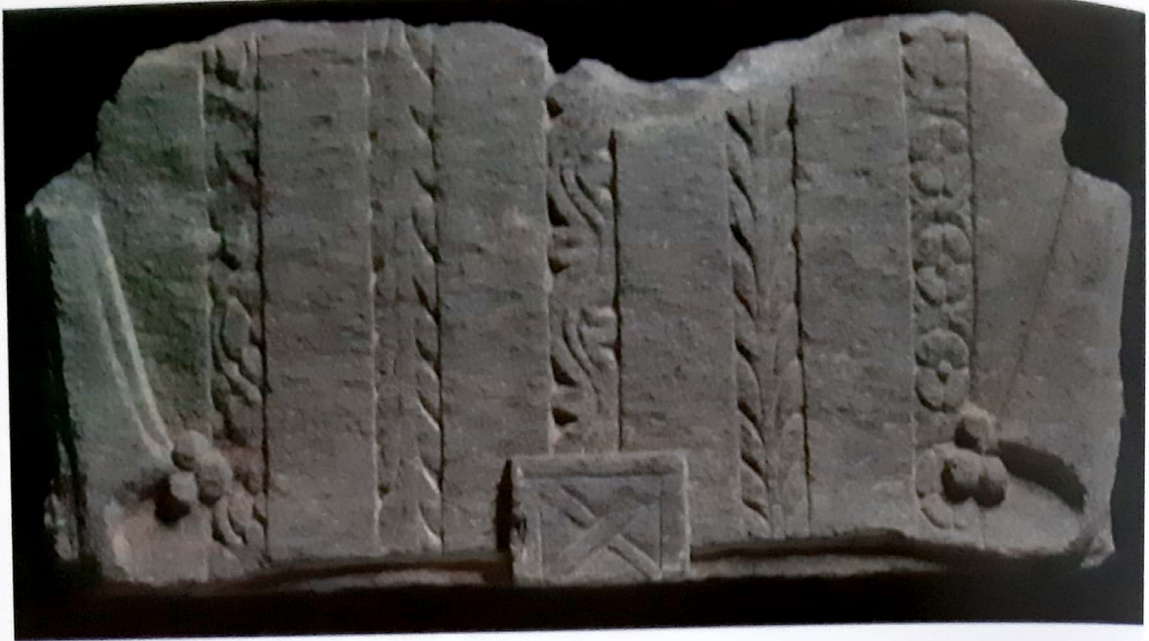
Figs 41-44 – From left, top: Inv. Nos. GBK 4, 5, 6 and 7 (all to the same scale). (Photos by EL)



Fig. 45-49 – From top: Inv. Nos. GBK 22, 24, 28, 30 and 31 (Photos by EL)



Fig. 51-52 – From left: Inv. Nos. GBK 1, 2 and 3 (Photos by EL).



Figs 53-55 – From top: Inv. Nos. GBK 42, 52 and 54 (Photos by EL).

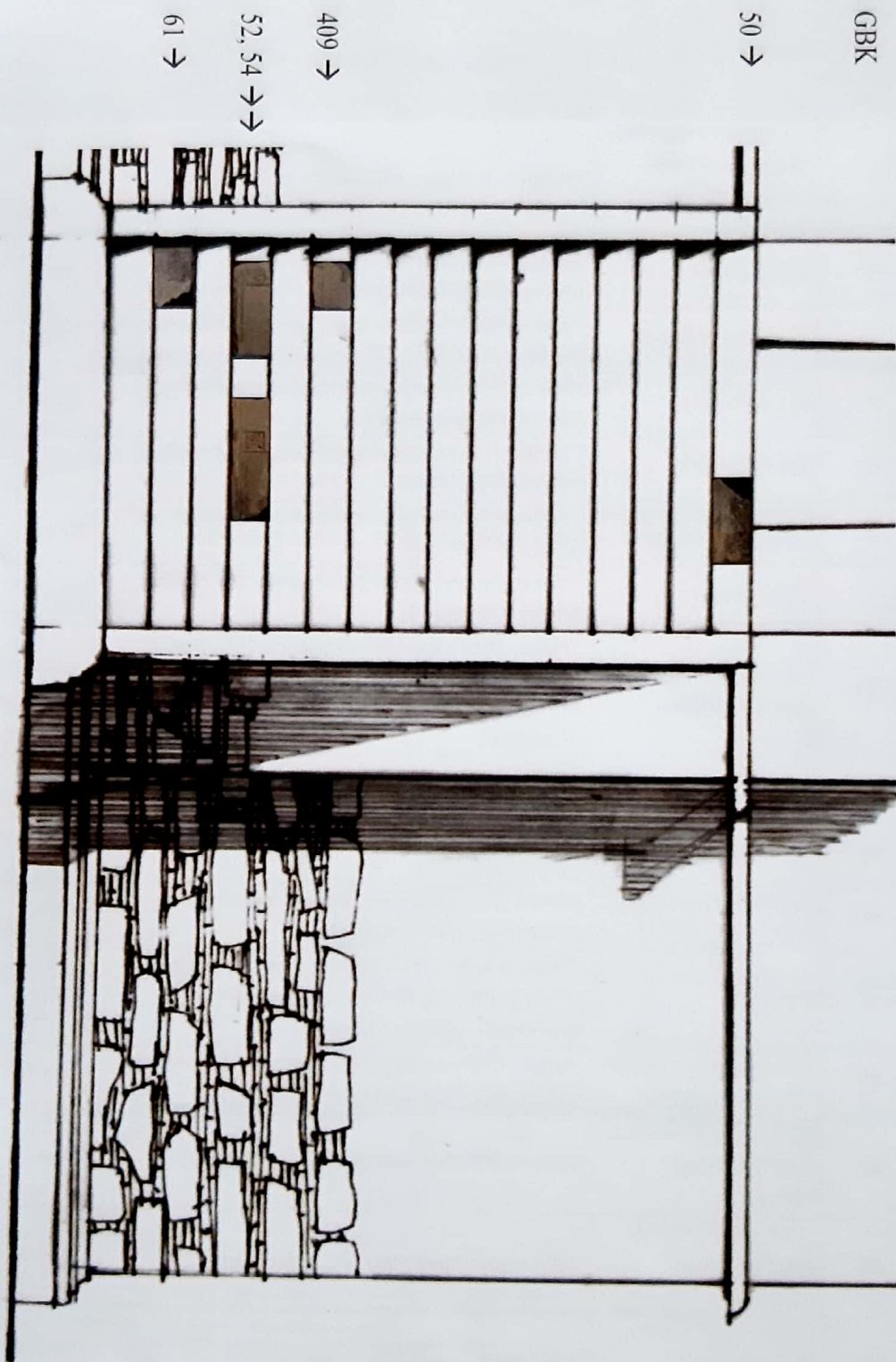


Fig 56 – The step-risers in their context (FM and LMO).

Note: The step-risers of the Great Shrine at Gumbat/Balo Kale have been studied and analyzed in Iori and Olivieri 2020.

Register no.: GBK	Inventory no.	Stratigraphy	Description	Conditions	Material
-	1	Pit 14 North of the Staircase of the main Building corner	Fragment. Head. Buddha.	Good	Black schist
-	2	(2) near [3]	Seated Bodhisattva (Maitreya?) in abhaya mudra. Fragment.	Fair	Black schist
-	3	Layer no 2 south	False gable: in the lower register: sitting Buddha flanked by worshipers. Fragment.	Poor	Black schist
-	4	(2) near [3]	Frieze. Human figures between Corinthian pillars. Fragment.	Fair	Black schist
-	5	(4) near floor	Frieze. Human figures between Corinthian pillars. Fragment.	Fair	Gray schist
-	6	(2) collapse in front of structure [3]	Frieze. Human figures between Corinthian pillars. Fragment.	Good	Gray schist
-	7	(1) surface	Frieze. Human figures between Corinthian pillars. Fragment.	Fair	Gray schist
-	22	(4) South East of main building	Frieze. Three parallel registers: top: human figures; center: vine scroll (?); bottom: human figures between Corinthian pillars. Fragment.	Poor	Gray schist
-	24	Pit 8 Bottom	Frieze. Two busts separated by Corinthian pillar. Fragment.	Poor	
-	28	(1) surface	Frieze. Two busts separated by Corinthian pillar. Fragment.	Fair	Gray schist
-	30	(26) North of [35] - [37]	Frieze. Busts holding flowers between Corinthian pillars. Fragment.	Fair	Gray schist
-	31	Pit (18)	Frieze. Busts, one reading a text and the other holding a flower, separated by Corinthian pillars. Fragment.	Fair	Black schist
-	42	(2) collapse in front of structure [3]	Panel. Throne, legged footstool, draped on both sides, floral bands. Fragment.	Good	Black schist
-	52	(14) - (20) North East of Great Shrine.	Step-riser. Half opened lotus. Fragment.	Poor	Gray schist
-	54	(14) - (20) North East of Great Shrine.	Step-riser. Palmette (?). Fragment.	Poor	Gray schist
-	50	(14) - (20) North East of Great Shrine.	Step-riser. Ivy scroll. Fragment.	Good	Gray schist
409	-	(14) - (20) North East of Great Shrine.	Step-riser. Vegetal motif. Fragment.	Poor	Gray schist

Table 2. List of the material mentioned in this Report (for the dimensions see the scale in Figs. 41-55).

Radiocarbon dating

Wooden materials from Shrine [30], inner cell

Sample 1 (13962011-2), Shrine [30], inner cell: Beam 3

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-24.7:lab. mult=1)

Laboratory number: Beta-315424

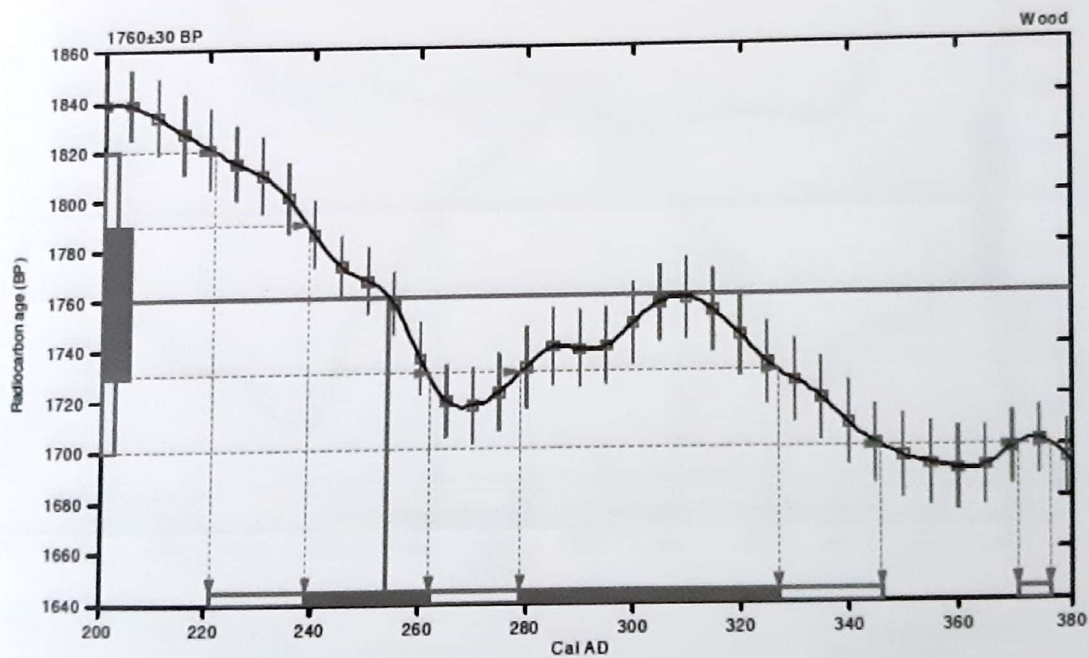
Conventional radiocarbon age: 1760 ± 30 BP

2 Sigma calibrated results: Cal AD 220 to 350 (Cal BP 1730 to 1600) and
Cal AD 370 to 380 (Cal BP 1580 to 1570)
(95% probability)

Intercept data

Intercept of radiocarbon age
with calibration curve: Cal AD 250 (Cal BP 1700)

1 Sigma calibrated results: Cal AD 240 to 260 (Cal BP 1710 to 1690) and
Cal AD 280 to 330 (Cal BP 1670 to 1620)
(68% probability)



References:

Database used
INTCAL09

References to INTCAL09 database

Heaton, et al., 2009, *Radiocarbon* 51(4):1151-1164, Reimer, et al., 2009, *Radiocarbon* 51(4):1111-1150,
Stuiver, et al., 1993, *Radiocarbon* 35(1):137-189, Oeschger, et al., 1975, *Tellus* 27:168-192

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates
Talma, A. S., Vogel, J. C., 1993, *Radiocarbon* 35(2):317-322

Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • E-Mail: beta@radiocarbon.com

Sample 2 (13962011-4), Shrine [30], inner cell: Beam 1

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.4;lab. mult=1)

Laboratory number: **Beta-315425**

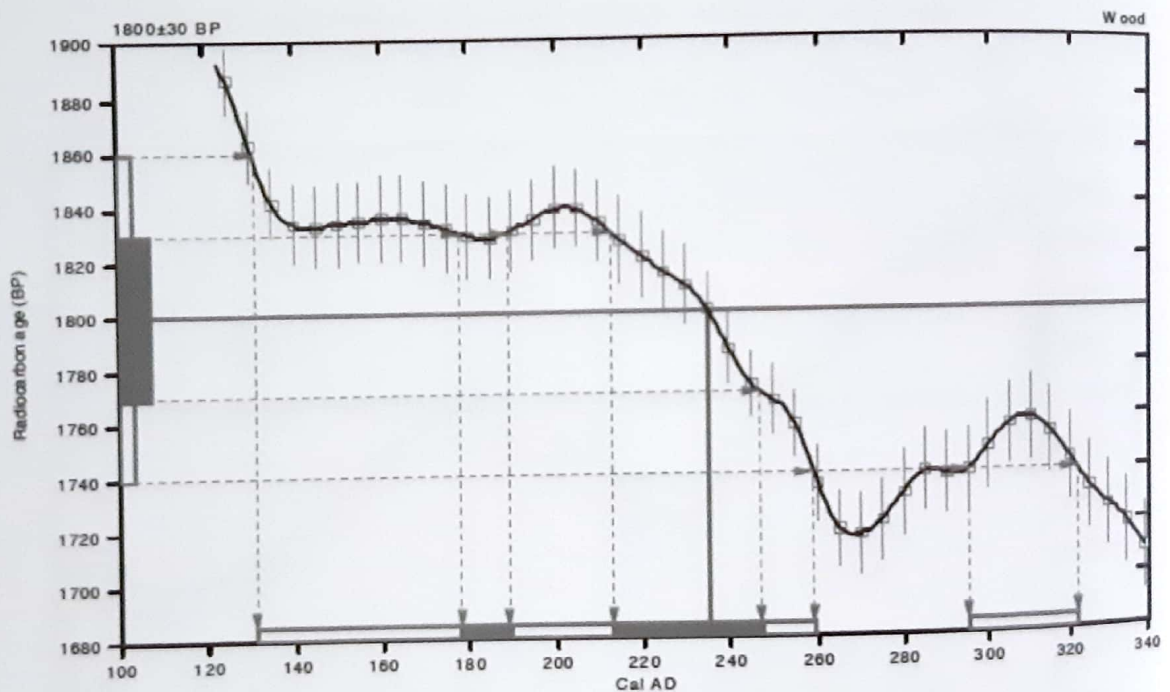
Conventional radiocarbon age: **1800±30 BP**

2 Sigma calibrated results: **Cal AD 130 to 260 (Cal BP 1820 to 1690) and
(95% probability) Cal AD 300 to 320 (Cal BP 1660 to 1630)**

Intercept data

Intercept of radiocarbon age
with calibration curve: **Cal AD 240 (Cal BP 1720)**

1 Sigma calibrated results: **Cal AD 180 to 190 (Cal BP 1770 to 1760) and
(68% probability) Cal AD 210 to 250 (Cal BP 1740 to 1700)**



References:

Database used

INTCAL09

References to INTCAL09 database

*Heaton, et al., 2009, Radiocarbon 51(4):1151-1164, Reimer, et al., 2009, Radiocarbon 51(4):1111-1150,
Stuiver, et al., 1993, Radiocarbon 35(1):137-189, Oeschger, et al., 1975, Tellus 27:168-192*

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

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Sample 3 (13962011-4), Shrine [30], inner cell: Beam 2

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.2;lab. mult=1)

Laboratory number: Beta-315426

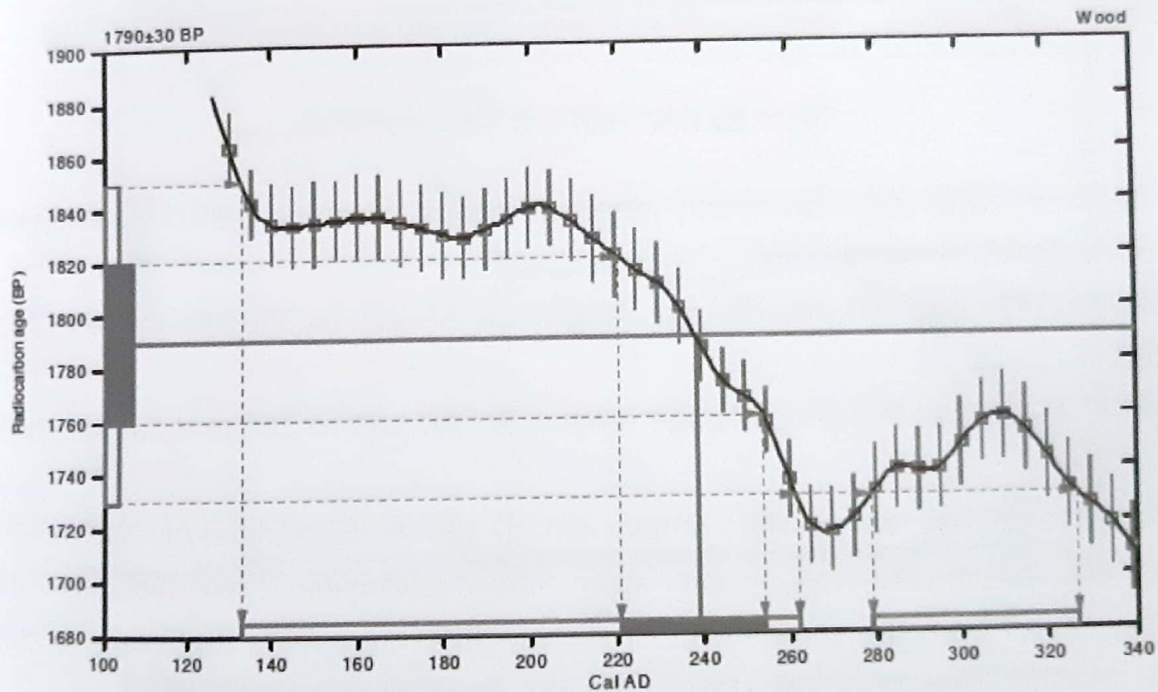
Conventional radiocarbon age: 1790 ± 30 BP

2 Sigma calibrated results: Cal AD 130 to 260 (Cal BP 1820 to 1690) and
(95% probability) Cal AD 280 to 330 (Cal BP 1670 to 1620)

Intercept data

Intercept of radiocarbon age
with calibration curve: Cal AD 240 (Cal BP 1710)

1 Sigma calibrated result: Cal AD 220 to 250 (Cal BP 1730 to 1700)
(68% probability)



References:

Database used
INTCAL09

References to INTCAL09 database

Heaton, et al., 2009, *Radiocarbon* 51(4):1151-1164, Reimer, et al., 2009, *Radiocarbon* 51(4):1111-1150,
Stuiver, et al., 1993, *Radiocarbon* 35(1):137-189, Oeschger, et al., 1975, *Tellus* 27:168-192

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates
Talma, A. S., Vogel, J. C., 1993, *Radiocarbon* 35(2):317-322

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Sample Data	Measured Radiocarbon Age	$^{13}\text{C}/^{12}\text{C}$ Ratio	Conventional Radiocarbon Age(*)
Beta - 315424 SAMPLE : 13962011-2 AMSV(3) ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (wood): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 220 to 350 (Cal BP 1730 to 1600) AND Cal AD 370 to 380 (Cal BP 1580 to 1570)	1760 +/- 30 BP	-24.7 ‰	1760 +/- 30 BP
Beta - 315425 SAMPLE : 13962011-3 AMSV(1) ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (wood): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 130 to 260 (Cal BP 1820 to 1690) AND Cal AD 300 to 320 (Cal BP 1660 to 1630)	1810 +/- 30 BP	-25.4 ‰	1800 +/- 30 BP
Beta - 315426 SAMPLE : 13962011-4 AMSV(2) ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (wood): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 130 to 260 (Cal BP 1820 to 1690) AND Cal AD 280 to 330 (Cal BP 1670 to 1620)	1790 +/- 30 BP	-25.2 ‰	1790 +/- 30 BP

Note by R.A. Hatfield, Beta Analytic:

The three dates give statistically identical results, meaning that they all appear to represent the same time;

Beta-315424 has two possible age ranges: Cal AD 220 to 350 and Cal AD 370 to 380

Beta-315425 has two possible age ranges: Cal AD 130 to 260 and Cal AD 300 to 320

Beta-315426 has two possible ranges: Cal AD 130 to 260 and Cal AD 280 to 330
As one can see the ages all overlap in different ranges. This could mean that they are all from the same event or slightly different events that were so close in time that they cannot be statistically distinguished from each other.

Overlaps:

B-315424 with B-315425 and B-315426 from AD 220 to 260 and with B-315426 from Cal AD 280 to 330

B-315424 with B-315425 from AD 300 to 320

The ages have to be viewed either as calibration overlaps or as Conventional 14C ages: 1800+/-30 - 1790+/-30 - 1760+/-30. Therefore, the 14C ages are all within 2 sigma statistics of each other (+/-60 years), and therefore we can conclude that they all belong to the same dating.

Sample 4 (13962011-1), Shrine [30], inner cell: Lintel 4

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.1;lab. mult=1)

Laboratory number: Beta-304223

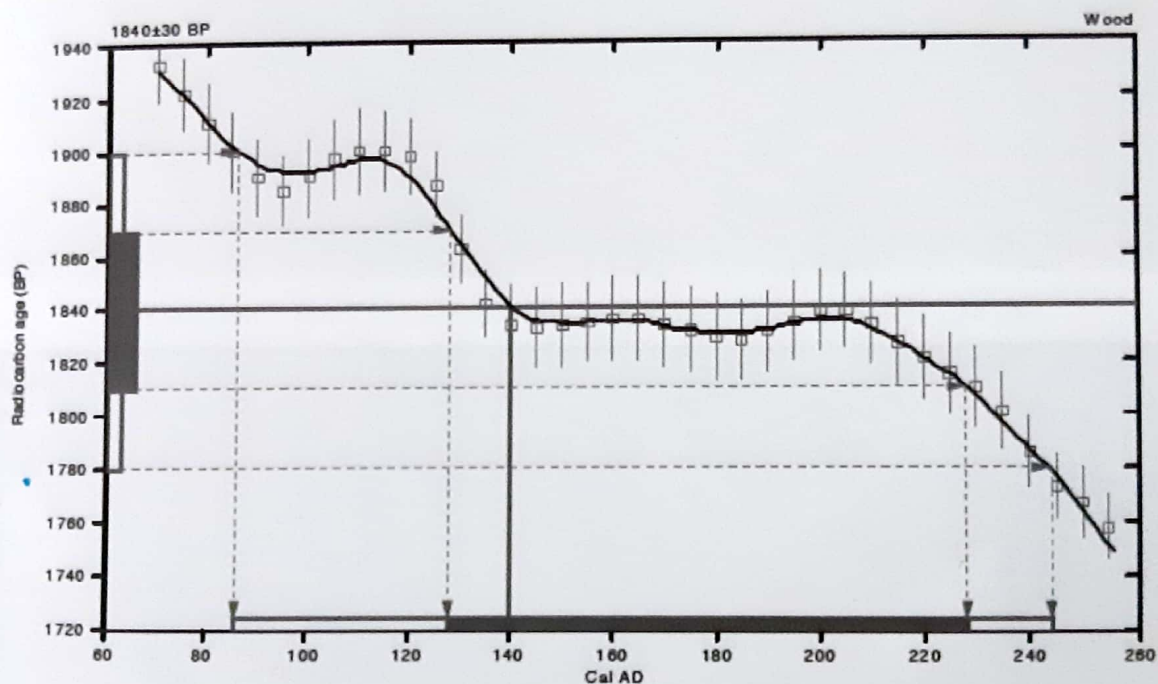
Conventional radiocarbon age: 1840±30 BP

2 Sigma calibrated result: Cal AD 90 to 240 (Cal BP 1860 to 1710)
(95 % probability)

Intercept data

Intercept of radiocarbon age
with calibration curve: Cal AD 140 (Cal BP 1810)

1 Sigma calibrated result: Cal AD 130 to 230 (Cal BP 1820 to 1720)
(68 % probability)



References:

Database used

INTCAL04

Calibration Database

INTCAL04 Radiocarbon Age Calibration

IntCal04: Calibration Issue of Radiocarbon (Volume 46, nr 3, 2004).

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory

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Sample Data	Measured Radiocarbon Age	¹³ C/ ¹² C Ratio	Conventional Radiocarbon Age(*)
Beta - 304223 SAMPLE: AMSV13962011-1 ANALYSIS: RadiometricPlus-Standard delivery MATERIAL/PRETREATMENT: (wood): acid/alkali/acid 2 SIGMA CALIBRATION :	1840 +/- 30 BP	-25.1 o/oo	1840 +/- 30 BP
	Cal AD 90 to 240 (Cal BP 1860 to 1710)		



Fig. 63 - The three SE corner beams and S clerestory lintel (Photo by EL).



Fig. 64 - The same as above with metadata (Processed by LMO).
Note: instead of 'Beam ' 4', read 'Lintel 4'.

Sample 5, Charcoal from GBK 1 N (68)

GBK SU (68)	1310AD (16.5%) 1360AD	
	1380AD (78.9%) 1460AD	
	Radiocarbon Age (BP) (*)	$\delta^{13}C$ (‰) (**)
	505 ± 45	-27.1 ± 0.4

(by CEDAD)

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