ΠΡΑΚΤΙΚΑ | PROCEEDINGS

3ο Διεθνές Συνέδριο Αρχαίας Ελληνικής και Βυζαντινής Τεχνολογίας

19-21 Νοεμβρίου 2024

ΜΕΓΑΡΟΝ ΜΟΥΣΙΚΗΣ ΑΘΗΝΩΝ

3rd International Conference Ancient Greek and Byzantine Technology

19-21 November 2024

MEGARON THE ATHENS CONCERT HALL

ΟΡΓΑΝΩΣΗ

ΕΤΑΙΡΕΙΑΣ ΔΙΕΡΕΥΝΗΣΗΣ ΤΗΣ ΑΡΧΑΙΟΕΛΛΗΝΙΚΗΣ ΚΑΙ ΒΥΖΑΝΤΙΝΗΣ ΤΕΧΝΟΛΟΓΙΑΣ

NOESIS
ΚΕΝΤΡΟ ΔΙΑΔΟΣΗΣ ΕΠΙΣΤΗΜΩΝ & ΜΟΥΣΕΙΟ ΤΕΧΝΟΛΟΓΙΑΣ

Το Διοικητικό Συμβούλιο της Εταιρείας Διερεύνησης της Αρχαιοελληνικής και Βυζαντινής Τεχνολογίας (ΕΔΑΒυΤ) ανέλαβε την ανάρτηση στην ιστοσελίδα της (www.edabyt.gr), σε ψηφιακή μορφή, των εργασιών του 3ου Διεθνούς Συνεδρίου Αρχαιοελληνικής και Βυζαντινής Τεχνολογίας (Αθήνα 19-21 Νοεμβρίου 2024).

Οι εργασίες είχαν γίνει αντικείμενο κρίσεων και σχολιασμού από την Επιστημονική Επιτροπή. Επι πλέον, έγιναν κι άλλες παρατηρήσεις και σχόλια κατά την συζήτηση που ακολούθησε μετά την προφορική τους παρουσίαση στο Συνέδριο.

Οι εργασίες αναρτώνται όπως κατατέθηκαν από τους συγγραφείς μετά την ολοκλήρωση του Συνεδρίου. Οι συγγραφείς φέρουν την ευθύνη του περιεχομένου της εργασίας τους, τόσο ως προς τις απόψεις τους όσο και ως προς την ακρίβεια και την ορθότητα των στοιχείων που παραθέτουν.

The Board of Directors of the Association for Research on Ancient Greek and Byzantine Technology (EDAByT) undertook the posting on its website (www.edabyt.gr) of the papers presented at the 3rd International Conference on Ancient Greek and Byzantine Technology (Athens, November 19-21, 2024).

The papers had been subject to reviews and comments by the Scientific Committee. Additionally, further observations and comments were made during the discussion that followed their oral presentation at the Conference.

The papers are posted as submitted by the authors after the conclusion of the Conference. The authors are responsible for the content of their work, both in terms of their views and the accuracy and correctness of the data they present.

«PHIDIAS WORKSHOP» IN OLYMPIA NEW DATA AND NEW INTERPRETATIONS

Themistoklis Bilis
German Archaeological Institute,
Magnisali -Bilis Studio
email: themisbilis@yahoo.gr

Summary. The subject of this article is the presentation of new data and new interpretations concerning one of the most important monuments of Olympia, the so-called "Workshop of Phidias". It is a peculiar typologically, quite enigmatic and perhaps for this reason particularly fascinating monument, which has a rich history with a use that starts in classical era and ends in the Byzantine one. A.Mallwitz in the 1950s, systematically investigated the monument and his research yielded reliable stratigraphic data and impressive archaeological finds related to the construction of the statue of Zeus, such as clay moulds, bone tools of goldsmiths, as well as glass sheets. From the 1950s to the present day, various scholars have occasionally contributed to the issues of the monument (glass finds or with the pottery) and the interpretation of the building is taken for granted. In 2019 new research on the monument was organized by the German Archaeological Institute with the aim of carrying out a complete restoration study of the ruin. The new survey included a complete architectural documentation not only of the ruins but also of the relevant architectural members, a geotechnical study and a study of the analysis of building materials and conservation. The architectural documentation revealed the identification of the original locations of many of the stones. Based on these new data, a systematic commentary of the findings of the Mallwitz excavation was made and a new interpretation of the classical building was formulated, and a study of an accurate reconstruction of the Byzantine phase was carried out. Among other things, especially for the classical building, the question of the representation of its roof, the question of the so-called 'scaffolding' and the role of a well within its contour will be analysed. In this article new evidence will be presented for the identification of phases and the dating of the so-called Roman walls of the monument.

Key words: Phidias Workshop, Olympia, Basilica in Olympia

1 Introduction[1]

Proper archaeological research requires the complete and timely publication of excavation data. In this area Mallwitz's work has set an unsurpassed standard. The way in which the findings and observations are presented, and the thoughts developed, in his long and detailed text, are unique. It was not our intention from the outset to renegotiate the representation of Phidias' workshop. The aim of the new research that the German Archaeological Institute initiated at the monument in 2019 was a restoration study of a monument with many historical phases. But a restoration study of an ancient monument often has to answer questions of a complete documentation of the architectural elements with a view to implementation, namely a complete understanding of the monument. Through the current study into the monument, and the newfound documentation of the architectural members of all its phases, the need arose for some definitive answers to issues that had not been resolved (such as, for example, the graphic restoration of the basilica's colonnades). As the research progressed, some questions were raised in relation to Mallwitz's considerations for the classical phase of the monument and considering new conclusions that modern research has reached in almost 70 years since the excavation. Thus arose the need to visualize all these observations in a new representation as a new contribution to the ongoing, and perhaps impossible to answer definitively, scientific question of the representation of this enigmatic monument.

The Mallwitz reconstruction of Phidias' workshop was based on the interpretation of the data obtained from the excavation research and after considerations from the study of both the ruins and the architectural elements found in the excavation.

1.1 History of research[2]

Since the years when travelers visited Olympia, an important task was the search for the buildings described by Pausanias and especially the famous Workshop of Phidias (fig1,2*****). Most people believed that it was located south of the temple of Zeus. The substantial study of the monument began already in the early years of systematic archaeological research because of the central position of the monument in the site, a short distance and west of the ruins of the temple of Zeus, and probably because some visible parts of the walls stood above the deposits that over the years had covered almost the entire area of Olympia. Indeed, the excavation at the site of the monument took place simultaneously with the excavation of the ruins of the temple of Zeus as early as 1827 and for 6 weeks by A. Blouet and the famous French Scientific Mission of Moria. However, the ruin that was uncovered (with the conventional name Building H) was not identified as the workshop of Phidias. Only in 1846 did Leake place the workshop in the specific location west of the temple. The interest in "Building H" remained undiminished and, when the German excavations in Olympia began (1877), the old French excavation continued.[3] The revelation of the classical foundation of the

---

[1] I would like to thank the director of the German Archaeological Institute of Athens Katja Sporn, the former director of the DAI excavation in Olympia Reinhard Senff for the trust and the funding of the necessary studies. Also, I would like to thank for the spirit of cooperation the head of the Ephorate of Antiquities of Ilia, Mrs. Erofili-Irida Kollia and the current director of the DAI excavation in Olympia Oliver Pilz.

[2] Mallwitz - Schiering 1964, 1- 7, Bauer et al, 3-14, Bilis 2020 (2021), 11-16, Bilis 2024,286-290.

***** General Note: The author placed all the Figures at the end of the article text.

[3] See the famous publications of excavations of Olympia I-V from Curtious–Adler in period 1876-1882 and publication of the excavation's notebooks, see: Bauer et al, 92-100.

building and the verification of its phases, as well as the parallel results of the research into the historical topography of Olympia, led to the identification of the ruin with the workshop of Phidias (Adler) - this view has been consolidated ever since. Besides, Pausanias' reference to Leonidaion as a point of orientation leaves no doubt about the specific location:
«*...ἔστι δὲ οἴκημα ἐκτὸς τῆς Ἄλτεως, καλεῖται δὲ ἐργαστήριον Φειδίου, καὶ ὁ Φειδίας καθ' ἕκαστον τοῦ ἀγάλματος ἐνταῦθα εἰργάζετο: ἔστιν οὖν βωμὸς ἐν τῷ οἰκήματι θεοῖς πᾶσιν ἐν κοινῷ. ὀπίσω δὲ ἀναστρέψαντι αὖθις ἐς τὴν Ἄλτιν ἐστὶν ἀπαντικρὺ τοῦ Λεωνιδαίου...*»[4].

This view was challenged only by W. Dörpfeld, who argued that the workshop was a neighboring building (Bau C) and not the central building of the building complex (Bau A) south of Theokoleon and Heron. Mallwitz returned to the monument in the 1950s, and not only investigated in depth the workshop of Phidias but also extended his systematic research to the surrounding area and mainly to the south. Mallwitz presented his conclusions in the *Olympische Forschungen* series with an extensive publication with text, drawings and photographic plates. For the first time the ruin of the building was presented with architectural drawings based on precision measurements (fig.3-6). After Mallwitz, interest turned to the study of the Byzantine phase. The monument was included in the study programme of late Olympia under the direction of U. Sinn. In the context of this research, field photographs, a floor plan and a catalogue with comments on the architectural members were made. The study, prepared by F. A. Bauer, A. Oepen and K. Papanastasis, although never printed, is now freely accessible on the internet.[5] In 1995 J. Heiden's study on the rooftiles of Olympia was published, commenting on the relevant findings from the workshop of Phidias. Heiden classified the findings into groups corresponding to 2 or 3 roofs. Thus, he concluded that very soon after the building was erected, a major repair of the roof took place, following damage to the building, which is confirmed both by the observation of the classical base and by the new documentation drawings. In 2009 new observations were added in relation to the archaeological glass findings of the monument by Mrs Ignantiadou. According to Mrs Ignantiadou there are some doubts about the identification of some glass findings.[6]

1.2 Research of 2019[7]

The German Archaeological Institute, responding to the request of the Ministry of Culture and Tourism regarding the maintenance of the walls of the monument, proposed a comprehensive approach to the issues of protection and enhancement of the monument. From the research in the archives of the German Archaeological Institute it became clear that there were no architectural drawings sufficient in terms of quantity (views of all the sides of the walls) and information that could support a modern multidisciplinary restoration programme on a monument of this importance and in accordance with the specifications of the Ministry of Culture of Greece (Geotechnical research, conservation study, etc.). Some small sections in the ground took place for the geotechnical survey of the monument. The ruin was fully documented and the plans incorporated elements not visible today from publications of the earlier excavations. All the stones of the southern stylobate, floor stones found in a deposit of architectural parts east of the monument, and other parts kept in the Museum of Olympia were located and documented. A total of 160 architectural elements were documented. The field

[4] Papahatzis 1999,270-272 (Παυσανίου, *Ελλάδος Περιήγησις* V.15,1-3).
[5] Bauer et al.
[6] Ignantiadou 2009, 78.
[7] Bilis 2020-2021 and Bilis 2024, 293-296.

measurements were carried out using modern and traditional methods by the writer, A. Sotiropoulos, conservator DAI, D. Giannoulis and A. Kampouris, architects. Finally, in the context of this new architectural study and research, new observations were made, related to the many, still open, issues of representation of the building phases and key details of the monument (fig.7, 29-30).

1.3 The history of the workshop complex according to Mallwitz[8].

The history of the complex begins in the third quarter of the 5th century BC. Originally it was an independent building, without additions (fig.3). On the north side it was adjacent to the east with its contemporary 'Theokoleon', which served as the house of the priests of Altis, and for a smaller part to the west with the also contemporary building known as the 'Heroon'. A retaining wall was erected to the south at the same time as the building. The workshop had a rectangular shape and dimensions of 32.18 x 14.50 m. The symmetry axis of the building followed the east-west direction, and its entrance was located on the narrow eastern side. Over time, small and large buildings were gradually added to the immediate surroundings of the workshop, which became part of a large building complex. After the collapse of the ancient world, between 435 and 451 AD, a Basilica, was erected on the ruins of the workshop. At that time there were many times when ancient buildings or their ruins were modified to take on this new use. The building type of the early Christian Basilica was easily adapted to the rectangular shape of the pre-existing building. The strong Roman walls were stable and, with a few modifications, such as new openings, were integrated into the new architectural plan.

2 Mallwitz's reconstruction of the roof and related issues

Before we begin our commentary on Mallwitz's reconstruction of Phidias' workshop, let us summarize his arguments. Mallwitz has dedicated almost 4 pages to support the proposed form of the roof.[9] For Mallwitz the question of the form of the roof is related to the question of the role of the internal supports. At the outset he rejects the possibility that the building had a Gaggera type roof according to Hodge, namely there are no beams rest on the gables of the narrow sides, due to the long length of the building and the absence of the possibility of multiple supports (fig.4).[10]

Then he mentions the example of the building inscription of the arsenal of Philo (*σκευοθήκη του Φίλωνος*) which refers to the incredible even today dimensions of the beams (0,74 x 0,666 m) for bridging a distance of only 3,30 m. He also considers that the prescribed requirements of the classical era cannot be satisfied by modern static calculations, so the designer must only assess the issue of ancient roofs by comparing the sizes of definite examples such as the roof of *σκευοθήκη.* By simple analogy from the example of the *σκευοθήκη* in Phidias' workshop for a roof of similar design (beam on post) he assumes that for twice the opening the section of the beam should be of twice the dimensions.[11] With this reasoning Mallwitz is led to the assumption that in Phidias' workshop the cross-section of the beam of such a roof exceeds the surface area of 1 m2, which is something that does not exist.

---

[8] Mallwitz–Schiering 1964.

[9] Mallwitz–Schiering 1964, 81-84.

[10] Mallwitz–Schiering 1964, 82.

[11] Mallwitz–Schiering 1964, 82 "…Verglichen aber mit ihren Balken műssten die der Werkstatt, entsprechend der mehr als doppelt so grossen Spannweite mindestens auch doppelt so gross gewesen sein…".

With this reasoning he comments, always in comparison with *σκευοθήκη* that the beam of the roof of the temple of Zeus with dimensions of 0,50 x 0,60 m is minimal for an opening of 7 m. and thus proposes the solution of the truss over the solution of beam on pole, as it appears in old publications.[12] For Coulton, the 11.70 m central opening of the Parthenon is also considered to be a point at which a transition from the beam-on-post roof system to the truss form is observed.

Through these considerations Mallwitz arrives at the formulation of a rule that in constructions dating later than the classical period, roofs are resolved by applying the truss technique. So, the step that the architect of the workshop had to take was to choose the already known since the 5th century, but rarely practicable, solution of the truss roof. Such a roof is indeformable and responds equally well to the conversion of vertical forces into lateral pulls to which the rafters and joists are subjected. This construction makes it possible to house spaces with large openings without internal columns and responds well to compression and lateral forces. It thus solves all the difficulties posed by workshop roofing. Nor, according to Mallwitz, is there any need to return to the unstable internal supports or to consider complicated solutions for the square space of the vestibule, which, according to Mallwitz, at the classical era has no supports. For both spaces (lobby and main space), this roof solution is ideal. Of particular importance is the integration of his thinking. He mentions that similar buildings of the Hellenistic era used the truss roof. He then points out that Hodge has shown, indeed, that its use in *Magna Graecia* began as early as Archaic times. He thus concludes that it is no longer unlikely that this type of roof was applied to a particular building such as the workshop with its given width and plan, a type which, of course, for reasons unclear in Mainland Greece, as he points out, found late and very limited application in building construction technology.

At this point it appears that the choice of the type of truss roof for the workshop is made through general reasoning through which the example of the *σκευοθήκη του Φίλωνος* is used as the only sure way of establishing the application of a particular cross-section of a wooden beam for bridging a given opening. Then it applies simple proportional law of a linear relationship between opening and cross-section. This logic by simple analogy is a purely theoretical approach with little practical value. Issues such as the question of the use of each building, the possibility of finding suitable timber, or the related issue of budget, which play such a big role even today in construction, are not expressed in the form of a simple proportional use of wooden sections and openings. Also, many traces in the entablatures of ancient monuments help us, now, to have an accurate picture of the cross- sections of wooden beams in a number of monuments. It is on this evidence that Hodge's research and Coulton's observations were based. Hansen, in calculating the cross-sections of the timbers of the roof of the temple of Apollo at Delphi, did not use a linear analogy with the *σκευοθήκη* (cross-section with a bridge opening) but used this example only for comparison. Technically, however, the view is correct that the only possible solution for bridging an opening of the order of 12.00 m such as the workshop, without taking into account the contribution of the internal colonnade in receiving roof loads, is the use of trusses.

The choice of the type of the specific roof is also made on the condition that a building such as the workshop of Phidias justifies in any case the rare for Greece application of the solution of the truss, as he explicitly mentions, and the challenge of bridging an opening that does not

[12] The study of roofs at that time before contributions by Gruben on Ionic roofs and Coulton had not progressed to any significant degree.

exist either in the temple of Zeus or in the Parthenon. At this point it seems that Mallwitz's choice of roof is related firstly to the given use of the building as a workshop for Phidias and secondly to his position that the inner colonnade could not bear part of the loads of the roof. We shall return to this matter later.

Since the 1960s, when the Mallwitzs paper was published, much new evidence has emerged. It has been shown that even in Hellenistic times the solution of the truss was the exception and not the rule. Coulton on the subject of the form of roofs in ancient Greek architecture wrote: " A look at Greek architecture in general, not just at stoas, shows that in all types of buildings, and even in the Hellenistic period, long spans were avoided in most parts of Greece. Usually spans of c. 7m (and some considerably less than 7 m) were divided into two or three parts by internal columns, unless there was a special reason for not doing so, as there was in Parthenon..." The difficulty of bridging large openings in ancient Greek architecture was emphasized by Mallwitz who, describing the Heroon of Olympia, whose plan is circular (dome) with a diameter (opening) of 8m inscribed in a square frame, states that the square shape is for a four-pitch roof and first of all necessary for the configuration of the roof with an opening of 8m which was by no means easy to solve in ancient times.

Finally, we cannot but ask the following question: if the solution of the truss roof was feasible for a utilitarian and transient building then why did it not influence ancient Greek architecture in general and did not appear in other more formal buildings of greater importance to the Greek world? Another related question is the following: Would it be possible to order scarce wood to bridge a large opening for a utilitarian building, especially in the case where the architect had already chosen to construct interior colonnades, which could more simply be reinforced, raised for another floor and thus greatly reduce the opening and the cost of construction according to the established technique of ancient Greek architecture? Why should he choose the expensive and unique solution for Greece when he could have followed the usual ancient Greek way of construction in a simple way? It is reasonable to argue that a monumental sculpture workshop needs a large opening of space for the movement of massive objects. In this case it is surprising that a doorway was constructed in this building limits the movement of large objects anyway.

3 The workshop colonnade: The scaffolding for the Statue

For the interpretation of the inner colonnade Mallwitz devoted almost 5 pages describing his general view on the subject and also presenting details from the finds of the drums to proceed to a proposal for the height of the colonnade. He begins by stating that the issue of internal supports is directly related structurally to the roof. It also points out that their existence until Roman times is not understandable, either as necessary elements for a repair of the roof or for aesthetic reasons. For Mallwitz the purpose becomes understandable if the question of the location of the monumental statue of Zeus is raised. Since all relevant evidence has been destroyed Mallwitz assumes that the statue stood between the colonnades. He then states that a scaffolding was necessary to complete the work on the statue. Thus, for Mallwitz the colonnades are the supports for the scaffolding. He then poses the question whether such a solution is practical. He thinks that the scaffolding system should be supplemented with secondary wooden scaffolding which would be fixed to the stone columns so that the artists could work in proximity around the sculpture. He also notes that the columns need to be fitted with a stone architrave, which, when attached to the wall, will provide stability. The subsequent search to locate the architraves did not bear any results, since, as he suggests, it is likely that these stones were probably reused in the Roman phase (fig.9).

The same applies to the capitals. Five capitals were found which have some similarity but only one of them belongs with certainty to the set of columns in the workshop, because the cuttings on the upper and lower surface of the capitals are similar to those on the drums found in the monument, which are unique to Olympia. The surfaces of the echinus were reworked later and were covered with mortar. The remaining capitals, which were found at Palaestra, are much less certain to belong to the workshop. Their material is a stone associated with Late Classic buildings of Olympia but it is possible that they belong to the Roman phase of the building. According to Mallwitz from this particular group of 4 capitals, the fact that they are somewhat smaller is evidence that may be due to their further rework for later uses. However, this observation certainly does not apply to the upper surfase of the capitals since already the heights of the abacuses are 1 to 2 cm higher than the considered original. The capital that belongs with certainty to the columns of the workshop has a diameter of 0.472 m, a height of 0.483 m, an abacus length of 0.545 m and an abacus height of 0.095 m. The issues Mallwitz then discussed were related to the number of floors of scaffolding and its height. From the study of the drums he concluded that the lower diameter is 0.585 m and the smallest documented (upper) diameter is 0.41 m. Of the 8 drums, i.e. the drums of the original phase an average reduction for each running meter is calculated to be 0.0175 m. The reduction is minimal. From observation of the drums it appears that the workshop column would have a 3 to 6m column height. It then concludes for a scaffolding with three floors (including the ground floor) with a height of 4.36 m. by calculating the height of the space to be 13.088 m. i.e. 40 ft. With the proposal to separate the floors and heights of the columns the following question arises: Applying the reduction calculation and given the bottom diameter and the diameter of the column, it appears that the column height is quite high. Theoretically, the height of the column is estimated at 6.45 m, i.e. a fairly slender one.[13] With the proposed separation of the floors and in relation to the Mallwitz observation for average column reduction, the capitals can only be placed on the second floor and assuming that the columns of the second floor will have a similar thickness, which, however, does not follow from the dimensions of the drums e and d. The obstacle could be overcome by a matter which could be pointed out. The accuracy of building construction realization allows or does not allow for reliability in measurements to the nearest millimeter or half millimeter. To answer this we will draw again from the Mallwitz documentation. After detailed documentations Mallwitz concluded that there is a relative tolerance in the width of the aisles. The southern one ranges from 2.32 to 2.34 m and the southern one from 2.27 to 2.30 m. The average value of the deviation in the placement of the columns ranging from 7 to 2 cm is 4 cm, a remarkable deviation, for a aisle width of almost 2 m in a building of the classical period. Mallwitz then summarizes the individual conclusions in order to finalize the reconstruction. For the height of the building he quotes calculations resulting from the heights of the columns and the multiples of the length of the foot which was the result of the metrological analysis. He considers the width of the door a strong indication of the height of the building since by applying the rule of simple proportions 1:2 of the ancient doorway with a documented width of 4.60 m. (4.58 m.) this height is calculated at 9.16 m.

[13] 20 feet, that is, twice the intercolumnation space, almost 12 unter diameters. At Sagri, temple of Demeter there is a column in marble 6.74 m i.e. 13.3 unter diameters.

3.1 New representation of the workshop colonnade

Thus, two equivalent possibilities exist either the colonnades with a given tolerance are as Mallwitz designed them or there is only one floor on which all architectural members are placed with the same tolerance. The indication of the slenderness of the column is clear. If we assume that the case of the workshop column follows the proportions of the pillar or in the "generalized" use of the word *κίονες* in the inscription of the Philo 1: 10.5[14] then the height of the column is calculated to be 6.195 m. This dimension has an interesting metric relationship with the monument since it is exactly the 1/3 of the distance between the western and the inner wall of the building (19 feet) or 5/3 of the axial spacing of the collumns.[15] On this hypothetical column we can place, with great precision, 22 documented drums of the building. The under diameter is estimated at 0.59 m, and therefore the tapering is calculated at 0.02 m per m.[16] The distance between the axis of the columns is exactly 6 ¼ times the unter diameter of the column (fig.10,11).

3.2 The issue of the shallow foundation of the internal columns of the Workshop

The basic foundation technique in ancient architecture is to construct a strong enclosed foundation wall almost always stronger than the foundations of internal elements (walls, columns). This technique was used as early as the Mycenaean period for buildings of various uses. Especially in the Archaic period, the internal foundations were placed at a higher level than the foundation level of the perimeter walls, as in the temple of Iria of Naxos, the Heraion of Samos and the Pisistratio *τελεστήριο* in Eleusis. Later, deeper layers of earth were sought with greater care for the foundations of the walls and internal columns. However, even in the classical period, the foundations of the walls of the cellas were always constructed with smaller stones than those used in the construction of the foundations of the external collonades. In the workshop the foundations of the transverse walls, especially the southern one, and the internal columns are not founded at the same depth as the foundations of the perimeter walls. In any case, the picture of the foundation's points to an earlier construction of the 430/420 B.C. period, when the presence of Phidias at Olympia is placed, although we must always know the use of the building before making such generalizations, because the standards of temples, at least in the Classical period, were superior to those of other buildings. This development in time of the technique of foundation could be added as a comment on Mallwitz's observation that, referring to the foundation of the columns of the workshop, he considers it shallow compared with the foundation of the columns of the *παλαίστρα* (3rd century BC). Thus, we believe that the placement of the foundations at a greater height should not be surprising, nor should it automatically lead us to a firm conclusion about the loads carried by the columns. It was a matter of procedure and site economy. At the same time it is certainly an indication that the loads of the columns would not be particularly large enough to require special care.

[14] Korres 1998, 102 and n. 58. There are posts with height 10 unter d. Megara Foundain of *Θεαγένης.*

[15] 5/3 or 1,66. At the Heraion in Olympia the same ratio at pronaos collumn is 1,60.

[16] 0,0175 m. according Mallwitz is the tapering of the column. 0,018 m. is the tapering of the pillars at σκευοθήκη at Athens according to M. Korres. Korres 1998, 102.

4 The problem of the shaft

Mallwitz presents the observations in relation to the shaft revealed in the northern part of the excavation on two pages.[17] From the sides of the square shaft with dimensions of 0.96 x 0.97 m, two rows of rectangular stones of the same quality as the building, but from the dismantling of an earlier construction, are preserved.[18] The shaft was excavated quite deep. The upper base of the shaft (-6.00) is almost 3 m lower than the base of the foundation of the columns (-3.27).[19] The excavation revealed that stones were later removed from the shaft and only the lower layers were salvaged because their removal was impossible due to the water table. This process of bringing in hard-to-recover stones is not unusual in Olympia. The stratigraphic survey revealed at this site that the shaft is older than the foundation of the inner colonnade. It is also clear that the inner colonnade rests on building rubble from the construction of the base of the walls. Finally, from the observation of the relationship between the shaft and the western wall, it finally emerged that the building and the shaft were constructed at the same time and its destruction can be dated to 400 BC.[20] From the comments above, it appears that the internal supports were added after the completion of the construction, probably soon afterwards.

4.1 Comments on the shaft

The issue of the presence and interpretation of the role of the shaft in construction is of central importance. According to recent geotechnical observations, it is not a well but a shaft leading waters to water-permeable geological strata. Three possibilities exist, either the shaft was dug for construction purposes in order to drain water from the site pit, or the shaft was needed for the needs of Phidias' workshop and the construction of the building, or the shaft was intended to drain water from a courtyard area. Its careful construction does not support the first possibility. As a rule, these temporary structures are made with wooden frames. The possibility that it was needed for the needs of the workshop is not unlikely. At the same time, it is not excluded that it is a permanent water drainage structure to drain an enclosed courtyard. Mallwitz's point about the destruction of the shaft raises some questions. A condition for the destruction of the shaft is that the building was already a ruin in 400 BC, which is not consistent with the general development of the surrounding area with continuous additions until the Roman period. If the building was a ruin it is possible that the new buildings would have been constructed on the foundations of Phidias' workshop or at least the architects would have used all the available stones from the building from more accessible places than to dig looking for the stones of the shaft.

Why would people looking for stones go to the trouble of digging to get a few stones when there were more accessible and many more in the exact same place? The possibility of modifying the shaft could be a solution. At a later time when water drainage was no longer deemed satisfactory the site users removed the stone frames of the shaft and installed wooden ones to allow water to drain more efficiently from the layer of fill. After the final abandonment of the site and the modifications, the wooden frames were destroyed without leaving any traces. The possibility that the shaft was in use for a long period of time is also

[17] Mallwitz -Schiering 1964, 40-42.

[18] Traces at the surfaces indicates that the original position was orizontal and no vertical. Mallwitz–Schiering 1964, 41.

[19] Mallwitz–Schiering 1964, 41, fig.17.

[20] Mallwitz–Schiering 1964, 41.

suggested by the layout of the complex in the Byzantine period, in which the enclosed courtyard at the entrance to the basilica was in the form of a basin due to differences in the height of the deep levels. Such an arrangement could not have been functional if there had been no provision for the drainage of rainwater in the shaft. The use of the ancient shaft would have been the ideal and perhaps the only solution.

5 Mallwitz's conclusions

After Mallwitz completed the description of the individual elements he outlined the conclusions in which he tries to ascertain from the data more specifically that the building is the workshop. In the beginning he started with a one page introduction.[21] According to Mallwitz, from the observation of the strata it is clear that building A is the earliest building in this area, an observation confirmed by the excavations to the south. The southern retaining wall, which is a precondition for the building and the landscaping of the surrounding area, is also the earliest structure for the sequence of buildings to the south. The survey also showed that Building C and the Contemporary Building G are the building is dated later than originally thought. This building is worthy of study as a workshop building mainly for its large dimensions, which are a prerequisite for such a structure, but the date derived from the pottery places it chronologically in the third quarter of the 5th century, a date that does not match the statue.
1. According to Mallwitz's description of the construction it appeared that Dörpfeld's argument that the building is particularly strong for a workshop is not solid. One could argue this with the buttresses and the unity of materials in the base construction. Besides, the base with its recesses and protruding cover plate could look strange since until the Mallwitz survey we only knew the building from the outside. Thus, according to Mallwitz immediately when the excavation began internally not a few (several) peculiarities appeared, which were considered as oversights but nevertheless not accidental.

1.1. The fact that no crowbar were used during the placement of the orthostats is due less to the weight of the stones than to the fact that internally the wall the stones do not come into contact which is a requirement not only for cult buildings and it is futile to search for parallel examples.

1.2. Equally unusual is the fact that the large entrance door does not open inwards but outwards.[22]

1.3. The explanation only by sheer negligence for the so different axes and different distances from the walls to the inner columns.

2. Also, the excavator states that concern causes the fact that the stone floor, dissolved already in ancient times and that the findings within the perimeter of the building such as the ovens and the shaft were constructed after the building was constructed.[23]

3. The excavator's conclusion is also that the Roman phase of the building was not completed.

4. He also comments that the form of the south retaining wall is not consistent with a possible cultic character of the building. Specifically, he emphatically states that what committee would accept such crude retaining walls for a cult building.

Let us comment in particular on these conclusions:

[21] Mallwitz–Schiering 1964, 74.

[22] Mallwitz–Schiering 1964, 75.

[23] Mallwitz–Schiering 1964, 75.

1. The constructional peculiarities such as the lack of traces of crowbars, the door opening outwards, and especially the misalignment between the axes of the internal columns and the long walls are not consistent with the construction of a building of the classical period.

2. Another conclusion is that the stone flooring was removed from the structure already in ancient times or that the stones of the shaft were removed means that the building was abandoned and was subject to material extraction. This hypothesis, however, is in stark contrast to the findings of the excavation which show that numerous structures were added around the workshop of Phidias during the Hellenistic and Roman eras and that the only activity that took place within the perimeter of the building was the unfinished so-called Roman phase.[24] If the building had been abandoned and was of a utilitarian nature, such as a workshop, then all the ascertained needs for space that arose in later eras would have been housed in the abandoned workshop building. On this Mallwitz states that it is not usual to demolish workshops and because of one hole he thinks that the building would probably continue to meet some minor needs as workshop. In other words, the excavator believes that the building, although deteriorated, remained in some use over the next few hundred years. Does this retention of use point to some other explanation for the original use of the building?

3. A further consideration is that the Roman phase was never completed. The organization of the site of the Roman phase is puzzling. How is it possible to demolish the walls of the classical building, to build the walls up to a certain height, to place the columns of the Roman phase, to build even a water pont in the center of the courtyard and still the Roman phase is not complete? Besides, without a weight to support these slender columns, they could not even be placed. But even if the Roman phase was not completed, it is clear that its architect intended to build round the pont a courtyard, not a covered space.

4. The view that a retaining wall must be of a neat appearance to serve a cult building is not tenable. Many great cult buildings of the Classical period did not have elaborate-looking retaining walls. The temple of Apollo at Figalia had a retaining wall of a simple stonework with small stones. The temple of Hephaestus at Athens did not even have a wall, since the luxurious retaining wall that surrounded it is of a later date. According to M. Korres, the Parthenon on the south side received a monumental retaining wall only with the later rise of the Acropolis wall. Therefore, the image of the retaining wall cannot be considered to be related to the importance of the building above.

5.1 New Interpretation of the classical phase

The answer to these questions will help us in the broader commentary on the evolution of the monument. Let us now attempt another series of thoughts and assumptions about the form and construction of the building. The introduction of the concept of an enclosed covered building of a workshop raises some issues of constructional interpretation. The proposed, in the representation, wooden roof with a 12 m opening between the long walls raises a particular construction issue. That is, in this particular building we have the construction of the largest roof opening since the opening of the Parthenon in mainland Greece. It is a constructional achievement unique for a non-cult building in ancient Greek architecture. This roof, which would have caused admiration within a short period of time, served a building with no particular function. Without further explanation, the issue of the shaft within the roofed building

[24] Mallwitz–Schiering 1964, 103 «...Trotz dieser Veränderungen hat sich an der durch die Werkstatt einmal gegebenen Bestimmung dieser Gegend in den nachfolgenden Jahrhunderten nichts geändert…».

remains. If we assume that the building was never fully housed we can explain many of the problems left unresolved in the Mallwitz reconstruction.

In this context we suggest that the perimeter walls are simply an enclosure, an *ἕρκος* for the altar of all the deities, returning to Dörpeld's theory.[25] According to the stratigraphic data from the Mallwitz excavation, the perimeter wall was constructed first, then the shaft, and then the colonnades were added. The structure is divided into two parts a simple square courtyard and another which is formed by a three-part arrangement with shallow colonnades. The central zone where the shaft was located suggests that the central zone was uncovered. There, an altar must have been placed there, the altar of all the deities known from Pausanias. In Roman times the existing contour of the square courtyard was modified with a central impluvium and new porticoes. The workshop with this new proposal was placed in the southern zone of the building, where later new workshops took the place of the older one, and more importantly, in the location where the finds associated with Phidias' workshop were found. The proposal I am proposing resolves some issues of key importance for the constructional consideration of the monument:

1. The shaft is interpreted as a drainage stucture for yard runoff into the geologic substrate that is permeable to water, as recent geologic investigations have shown. Note that the shaft is not associated with water flow i.e. not associated with water pumping.

2. With the solution we propose, we no longer need to consider that a special wooden roof was constructed, which would have been a technical achievement, a solution unique to ancient Greek architecture, and especially for a temporal use. If this roof had existed, the building would certainly have changed its use or, more likely, it would have remained as a place for the public to visit, since in Olympia various structures served the memory (for example Metroon etc.). Statue workshops in sanctuaries, as a rule, have left no architectural remains; they are mainly temporary structures. For example, the workshop of the bronze statue at Kalapodi was totally open-air and does not even have any architectural remains.

3. All the peculiarities commented by the excavator and which are difficult to accept for a building of the classical period are resolved. Constructional peculiarities or oddities such as the lack of traces for crowbars, the door opening to the outside, and especially the misalignment of the distances between the axes of the internal columns and the long walls are not a problem for the architecture of a courtyard. Also, the form of the foundation of the perimeter wall with the irregular arrangement of the stepped recesses internally was commented by the excavator who states that it is more suggestive of a retaining wall than a foundation of a foundation of a classical period building. This observation agrees with the new reconstruction.

4. The shallow foundation of the interior columns according to Mallwitz is an indication that the column loads would not be particularly large requiring special care. This observation is consistent with the new reconstruction. The same is true if we assume that the columns carry the loads of a single-storey portico. The differences in the depths of the galleries would not be any structural or aesthetic problem in the solution of the courtyard porticoes. The new representation avoids the Mallwitz scaffolding hypothesis, which is another unique example in ancient architecture. The typical rule in architecture is that scaffolding should consist only of light wooden elements in the past, now metal elements.

5. The suggestion of an enclosed shingled outdoor space for the altar may seem strange because of its size, but it is not unique. According to Torsten, a courtyard with altars of the

[25] *Φραγμός, περίβολος, περίφραγμα, περιτείχισμα,* see: Orlandos - Travlos 1986, 119.

same width as the neighbouring temple was found in the sanctuary of Heraclius at Cleones[26] and he considers it to belong to a group of structures such as the temenos of Samothrace, the enclosure south of the temple L and the sanctuary Y at Epidaurus[27] or the *Κερατών* of Delos. An example from Selinoundas is the small-scale enclosure of an Archaic altar dating from the end of the 6th century or up to the middle of the 5th century. One question that arises is whether all these examples from the Peloponnese can be argued to be related to a specific local tradition.

6. Architecturally I would like to comment that the conception of the Roman phase is consistent with an earlier configuration of a courtyard open space rather than the configuration or modification of an enclosed building.

7. The scale of the akroteria identified in the excavation are not consistent with a roof of monumental proportions but a roof of smaller size. Of the two large pediments that would have been present according to the Mallwitz reconstruction, not a single stone from the necessary horizontal or downward geisa was found. Also, the luxury of the akroteria and sima which exceeds the luxury of many cult buildings, is surprising for a workshop.

8. The thickness of the wall of the classical building (a 1.10 m wall of mudbricks with a stone base) according to Mallwitz was related to a construction of a more than 10 m high wall, enough for the placement of the statue of the enthroned Zeus, inside. However, the thickness of the sekos wall at Heraion,1.18m thick has a height half that of the assumed height of the workshop. Furthermore, in ancient Greek architecture the width of the foundations of an enclosure is not associated only with the height of the wall but also with the decorative configuration of projections and recesses, derived from the image of small-scale perivolos architecture. Therefore, the possibility that the particular base of the wall may bear an enclosure cannot be excluded.[28]

In conclusion, the new reconstruction proposal is fully consistent with the excavation and stratigraphic data presented by the excavator (fig. 8-11). The only difference is the avoidance of hypotheses that are exceptions for ancient Greek architecture, all of which concern this specific building. I refer mainly about the huge span of the roof, about the stone-colonnade scaffolding. The new proposal explains the existence of the shaft within the outline of the structure. More generally, the new proposal is more compatible with the architectural conception of the Roman phase, with the orientation of the building, and with the continuity of the cult in Byzantine times at this ruin. According to Vitruvius, "...the altars should face the east and should always be placed lower than the idols of the gods in the temple, so that those who offer sacrifice will look upwards when they see the deity, and - because of the difference in height - will bow to their god with dignity..."[29]

6 Issues of early Byzantine techniques

After the collapse of the ancient world, between 435 and 451 AD, the ruins of the workshop were chosen to receive the most important building of the Byzantine settlement, the central building of Christian worship. There are not a few times when ancient buildings or their ruins were modified at that time to take on this new use. The building type of the early Christian

[26] Torsten 2015, 81, fig. 22.

[27] *Περίβολος Υ*. See: Lembidaky 2003, 396-410 and *Περίβολος Κ,* Lembidaky 2003, 392-395.

[28] At Palaistra Olympia, the thickness of the wallbasis is 0,78m for a height of wall uperstructure 4,40 m, in case of ridge roof 1:7. In case of shed roof this ratio is 1:11,6.

[29] Lefas 1997, 261.

basilica was easily adapted to the rectangular shape of the pre-existing building. The strong Roman walls[30] were solid, which, with a few modifications such as the cutting of new openings, were integrated into the new architectural plan. Of course, the new layout required, as was usually the case in such cases, some removals and additions. The entrance to the church was probably placed in the place of an earlier window in the western part of the south wall. In front of the entrance and to the south was added a square-shaped pillar with piers at the corners and arched passages. The niche was placed to the east where the original opening was located, which was widened to form the sanctuary and had four arched windows formed by three marble supports with marble amphitheater bases and suffixes. A transverse wall was constructed to form the western boundary of the temple. It had three doors in a symmetrical arrangement leading to the respective naves (north, central, south). The old excavations that persistently searched for inscribed stones or mainly the deeper classical layers brought about large-scale destruction of the early Christian phase. As can be seen from the observation of old photographs and drawings, many elements of the church were sacrificed for the sake of research progress (niche, altar, stylobate of the south colonnade, narthex colonnade, walls of the west apartments). At the same time, it should be pointed out that despite the radical nature of the earlier research, the completeness of the Byzantine elements of the old founders of the archaeological research (Adler) with drawings and photographs, already from the distant 1877, offer us the opportunity and the responsibility of the correct restoration of the monument after about 140 years since the first excavations. The byzantine walls were made of spolia like all the other parts of the church (columns, pulpit, etc.). The columns of five columns ending in walls at the ends supported six arches that formed the typical division of the interior of the church into three aisles. The ornate marble chancel contrasted with the simple cubic built altar which had been in place until it was demolished for the purpose of a survey of the building. The core of the pulpit still remains in place. To the west, the narthex was formed by five arches supported by the long walls and four marble columns. At the time of the French excavations it seems that this element was preserved intact. Christian inscriptions were found on the floor of the church, which give us information about the marble flooring. The basilica of Olympia is considered to be the oldest known early Christian church in Elis.

The western wall of the church, the pillar and the niche were constructed with the use of ancient stones. The pieces were carefully chosen. Drums and other orthogonal stones and small stones were used in the foundations, i.e. in the non-visible parts of the walls. Orthogonal stones were used in the visible parts of the walls. The thickness of the western wall was determined by the thickness of the ancient stones that were used. The passages were formed with stones placed alternately some in the same way as they were in the ancient structure some with a 90° rotation. The stylobate was constructed with two rows of ancient stones placed in relatively wide joints. The characteristics of the Byzantine walls in the basilica of Olympia are the attempt to minimize the carving work on the stones and the careful selection of the sizes of the ancient stones in relation to the structural elements of the construction (fig12-15).

6.1 The chronology of the so called Roman brickwork masonry

All the previous studies refer to a peculiarity of the walls made of the roman brickwork masonry. On the stone base, two sides of brick walls were erected, the gap between which

[30] See 6.1 The chronology of the brickwork masonry.

was filled with brick fragments and rich mortar. The thickness of the mortar layers ranges up to 0.045 m and exceeds the thickness of the bricks, which ranges from 0.035 m to 0.04 m. The length of the bricks varies sporadically: Even if the average length averages 0.29 m, fragments appear significantly shorter. This heterogeneity of the bricks allows us to assume that the structural material is at least partly reused. Strikingly, this characteristic changes from layer 15 onwards. From this layer the brick layers progress into the mass of the wall, which is particularly well understood in the later entrance to the western part of the south wall. Furthermore, the thickness of the mortar between the rows of bricks is reduced which varies between 0.02-0.03 m. which is thinner than the thickness of the bricks which varies from 0.035 m to 0.04 m. The excavators of the church interpreted this difference between the brickwork as an indication of two phases…".[31]

In order to verify the issue as part of our study we carried out mortar analyses. According to conservator of DAI Athen A. Sotiropoulos the examined mortars have the same consistency. For this issue Sotiropolous noted: " Comparing the results of the analyses of the mortars and more specifically of the mortars of the structure of the brickworks with the code OB2 and OB5, we observe similarities both macroscopically and microscopically. The sample OB2 comes from the low layers of the wall while OB5 comes from the high layers. More comparatively, the analyses on porosity, water absorption and mechanical tensile strengths show very similar results. Furthermore, observing the two samples microscopically they are rich in lime with fine-grained and sizeable rounded pebbles while the fragmented tile is absent. Based on the above we can safely say that it is the same building mortar and conclude that the two parts of the walls with brickwork were constructed in a chronological phase in the monument…".[32] So the Mallwitz's view was verified, i.e., the brickwall is a one-phase with two stages of work, namely with different quality bricks but the exact same mortar consistency (fig.16-17).

Another peculiarity of the brick masonry is the interruption of the bricks by a zone of rubble masonry which is consisted of river pebbles, stones, pieces of tiles with rich mortar. These bands does not penetrate the corners, and was placed at a certain distance from the window openings, as seen in the northern opening of the wall. We observe, therefore, an inversion of the *opus mixtum*, a technique typical for other Roman buildings of Olympia and elsewhere. walls of brick masonry. This technique do not seem to belong structurally to the group of the known Roman buildings at Olympia, and probably due to the transitive form of the wall and the use of recycled bricks belong much better to a later building project related to the construction of an early Christian basilica of the 4th or early 5th c. AD. Continuing this thought, the Roman phase of the building must be understood with the known modification, namely the addition of impluvioum, the columns round of it and with the reuse of the ancient walls of mudbricks, with the necessary additions.

Furthermore, there are many indications that the ruin of the church that the visitor sees today is not the exactly the ruin of the original first Christian church that modified the ancient structure. In the investigation of the architectural members, fragments of colonettes were found that are related to an early Christian altar with ciborium and not to the built altar that existed until the excavation of the 19th century. The templon gives the impression of a crude reuse of marble from the early Christian period. The way in which the parapets abuts the colonnade is indicative that the templon was designed for a church of other dimensions. In addition, cuttings were found in an ancient column similar to typical cuttings for the insertion of wooden elements found in conversions of other ancient buildings into churches. The

[31] Bauer et al, 15.

[32] A. Sotiropoulos unpublished report for DAI, 24.9.21.

problem of identifying the design of the first basilica is not simple. Most probably the first basilica retained the basic lines of the building with a sanctuary in the original. Very soon a niche was added, the windows of which have similarities with the large windows of the walls.

6.2 Research on scattered stones of the Basilika

For the needs of the new research, 160 architectural elements were recorded that are scattered, in situ, in deposits inside and outside the monument, in places where they fall from restored parts and finally in the Olympia Museum (fig.18-28).
The architectural elements, depending on their form, their dimensions and their material, are divided into smaller groups of similar stones.
These groups are as follows:

- the mullions of the Byzantine church (*αμφικιονίσκοι*)
- Stones from the floor of the basilica
- Column bases
- Drums of columns
- Capitals

6.2.1 Mullions (*αμφικιονίσκοι*)

The research for this study revealed that of the architectural elements recorded, 7 are mullions, i.e. the central supports of double-arch windows in the church. These stones are easily identified since they follow a common form. They are 17 cm thick, and with visible semi-circular edges. Of the 7 mullions, the majority of which are in an intact form, 6 are of similar dimensions and come definitely from the church. One is probably from a building in the courtyard, the walls of which were demolished at the end of the 19th century, for the sake of excavations.

6.2.2 Stones from the floor of the basilica

In the deposit to the south of the church, stones belonging to the basilica floor were identified by the writer. These stones came from the dismantling of ancient floors, conversion of ancient architectural members and pedestals of votive offerings. According to the research, 30 stones belong to this group in both intact and in fragmentary form. The stones are identified because they are slabs in form, have a visible upper surfaces flat and their below surfaces is the result from the fragmentation of stones without any other special carving. Two stones of the floor are inscribed with the famous Byzantine dedicatory inscriptions, known from the previous documentations (fig.26).

6.2.3 Stones from the stylobate of the basilica and bases

An interesting fact that emerged from the research for the 2019 study is that 100% of the stones from the southern and northern stylobate of the church's colonnades were identified. These stones are identified by their material which is soft limestone, by their dimensions and by their rectangular shape since they are considered by previous scholars to be stones of the walls of the Sicyonian treasury. Of this group of 28 stones, 4 are less than 35 cm high and were probably used as bases for the marble columns. Similar bases are preserved in situ at the 4 symmetrical positions of the altar. Of the remaining stones, 22 are intact and only 2 are in fragmentary form (fig.28).

The examination of the columns revealed that there is a pair of columns of greater height than the other columns. This pair is in fact certain to have rested on the first layer of stylobate stones with a relative circular cutting of the stones of the second layer. A stone with these kind of traces was found in the documentation of the scattered stones (fig.19,28).

Three Ionic bases and a composite one with plinth were found in the monument in various locations and roughly placed. Four more bases were found on site in symmetrical positions of the sanctuary, which have an Ionic section and an oval general shape of form. After observation of the excavation plan by Adler we assume that the base is placed at position 1 (numbering from west) of the north stylobate (BS1).

6.2.4 Columns - column drums

The large number of drums and columns preserved in the monument is impressive. A total of 67 pieces of various types of stones and marble were documented.
Of this total, 37 are considered to belong to the classical phase of the building due to their material, construction details and dimensions.
The marble and granite columns belong to the Byzantine phase. The 30 columns of the Byzantine phase columns are divided into 5 groups with different characteristics corresponding, as we shall see, to the various positions these architectural elements had in the monument.

The first group consists of marble columns of 2,945 m height, which had Ionic capitals and belong with certainty to the narthex, as is clear from the impression drawings of the French excavators. All four columns are preserved, one of them intact and three in fragments.

There is also a second group of eleven drums, thicker in diameter, which can be safely attributed to the supporting columns of the basilica. This group is subdivided into pairs with common characteristics: the columns of the pairs were obviously arranged symmetrically in the Christian building. Some are parts of originally larger Corinthian columns. Others are parts of the dismantling of two or three Doric columns of the late Hellenistic or Roman period. A characteristic feature of all the sets resulting from the study of column drums and fragments is that their overall height varies considerably. For constructional reasons it is to be expected that the height of the columns should not vary significantly at the level of the springer of the archs. In order to meet this specification, the Byzantine architect placed two of them, i.e. those with the greatest height, in the first layer of the pillar base, so that the differences in the heights of the columns would be equalized.

The bearing columns of the basilica also include the group of roman fenster mullions, the position of which we know with certainty from the positions of the bases which have been preserved on the spot symmetrically of the templon. Nine pieces were documented, one of which belongs to a Byzantine repair. The third group of drums are three fragments belongs with certainty to the colonettes of ciborium.

7 Conclusion

The questions raised by this monument cannot be answered in the context of an article. Thus, the presentation in many places has been brief and focused only on issues of ancient Greek and Byzantine constructional technology. The new findings presented in the article can be summarized as follows: New reconstruction of the classical phase of the workshop based on new observations on issues of ancient building technology. New data on the identification of the phases and the chronology of the so-called Roman walls. Graphic reconstruction of the

basilica with identification of the original positions of the scattered marbles and analysis of issues of Byzantine building technology. Once again, this example reveals that a restoration can be an opportunity for further understanding of our architectural history.

Bibliography

Bauer, F.A.-Oepen A. K.-Papanastasis K. *Die Kirche von Olympia*. In: https://www.academia.edu/42713574/Die_Kirche_in_der_Werkstatt_des_Phidias_in_Olympia [visit 4.9.24]

Bilis, Th. 2024. Ολυμπία. Εργαστήριο Φειδία - Παλαιοχριστιανική Βασιλική Παρελθόν, Παρόν και Μέλλον. In: Ειρ. Δημητριάδου και Ν. Δημάκης (ed.) ΚΑΛΛΙΝΙΚΟΣ, Honorary Volume for Professor Panos Valavanis by his Students. Athens: ΚΑΠΟΝ, p. 285-298.

Bilis, Th. 2020-2021. Wiederherstellung der Phidiaswerkstatt-frühchristlichen Basilika in Olympia. AHENEA, p. 112-115.

Coulton, J. 1976. *The architectural development of the Greek stoa*. Oxford: Clarendon Press

Korres, M. 1998. Από τον Σταυρό στην Αρχαία Αγορά, *HOROS* 10-12 (1992-1998) Ελληνική Επιγραφική Εταιρεία, Athens, p. 83-104, Pl. 15-20

Klein, L. N. 1998. Evidence for West Greek influence on Mainland Greek Roof construction and the creation of the truss in the Archaic Period, *Hesperia* 67.4, p.335-374.

Heiden, J. 1995. *Die Tondächer von Olympia*. Berlin: DAI.

Ignantiadou, D. 2009. Υαλουργική τεχνολογία προρωμαϊκών χρόνων: εννέα πλάνες περί την αρχαία υαλουργία. In: Υαλος, ημερίδα συντήρησης, ΑΜΘ, p. 69-84.

Lefas, P. 1997. *Βιτρουβίου Περί Αρχιτεκτονικής. Βιβλία I-V*, Athens: Plethron.

Mallwitz A.-Schiering W. 1964, *Die Werkstatt des Phidias in Olympia. Teil 1*, Olympische Forschungen 5, Berlin: DAI.

Orlandos, A.-Travlos, N.I. 1986, *Λεξικό Αρχαίων Αρχιτεκτονικών όρων,* Βιβλιοθήκη της εν Αθήναις Αρχαιολογικής Εταιρείας, 94, Athens: Arch. Etaireia.

Papahatzis, N. 1999, *Παυσανίου Ελλάδος Περιήγησις Β.4,5,6 Μεσσηνιακά και Ηλιακά* Athens: Εκδοτική Εταιρεία Αθηνών.

Torsten, M. 2015, *Das Herakles-Heiligtum von Kleonai: Architektur und Kult im Kontext*, Wiesbaden: Reichert Verlag.

Figure 1. Olympia. Workshop of Phidias. The Basilika. Interior photos from archives 1877,1938 and 2019

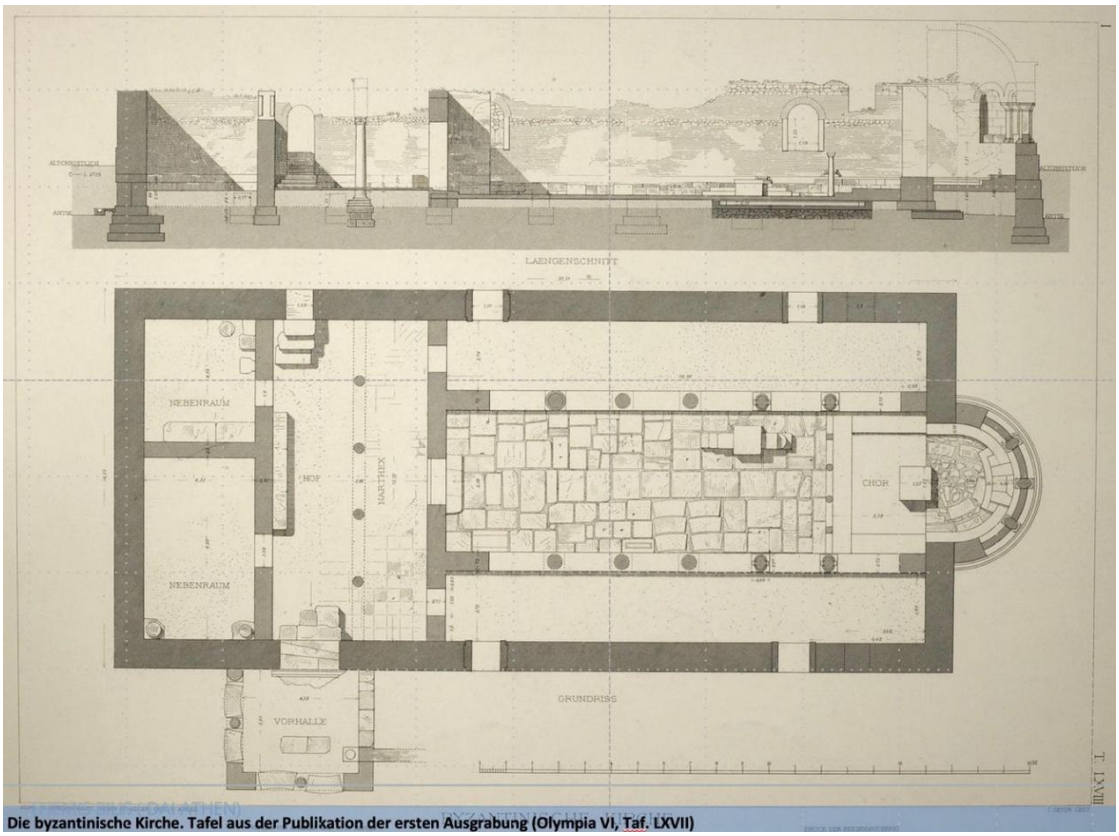


Figure 2. Olympia. Workshop of Phidias. The Basilika. Documentation of the first excavation. Many byzantine constructons has been demolished for the sake of excavations (Adler)

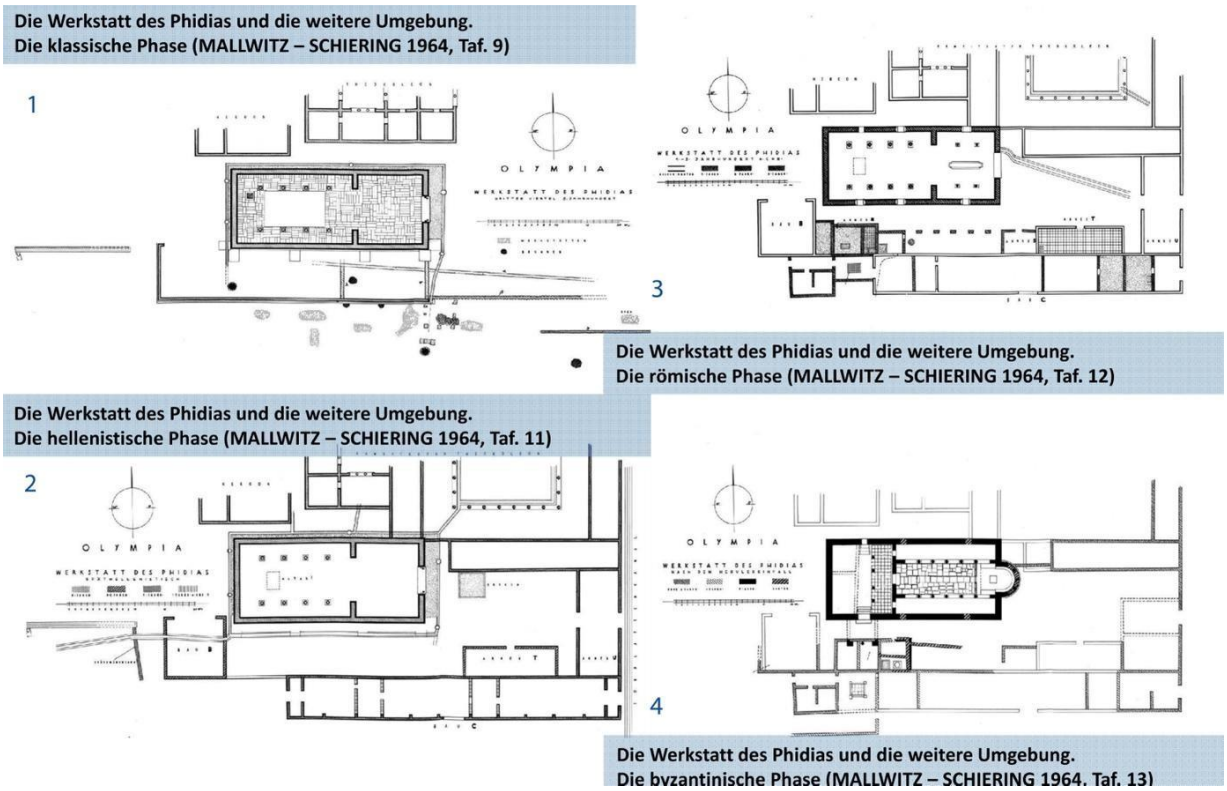


Figure 3. Olympia. Workshop of Phidias. Historical evolution of the building according to Mallwitz

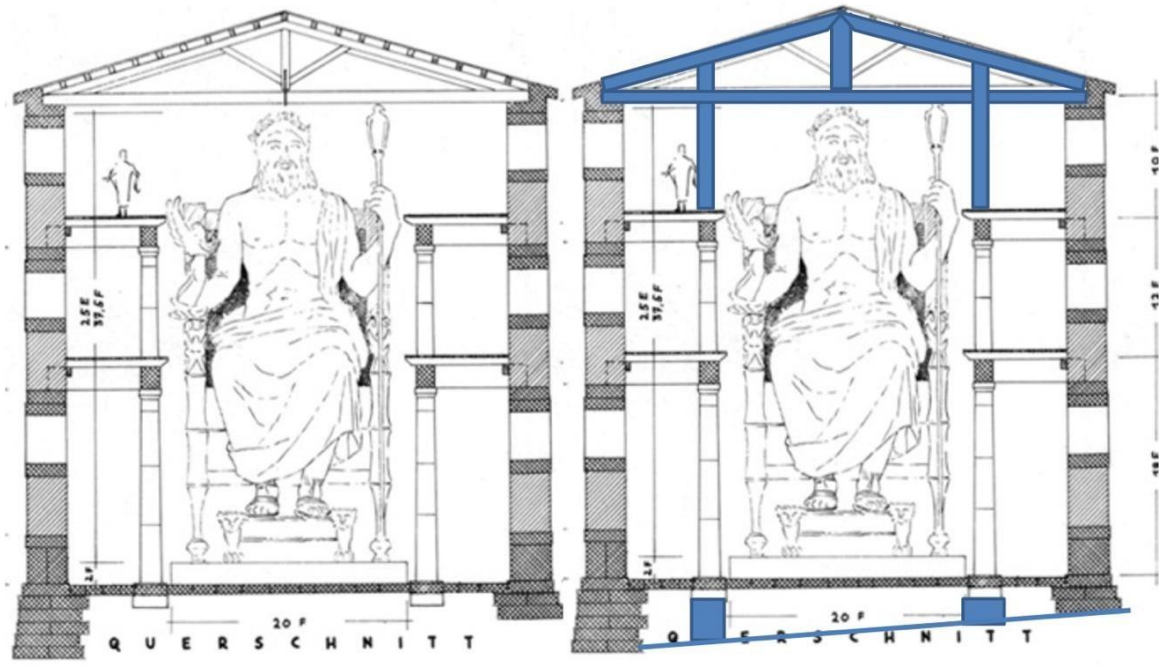


Figure 4. Olympia. Workshop of Phidias. Graphic reconstruction of the classical phase (Mallwitz). It's strange that the ancient architect prefered the rare truss solution (left) instead of the common post and beam solution (right, with necessary blue additions) (Th. Bilis)

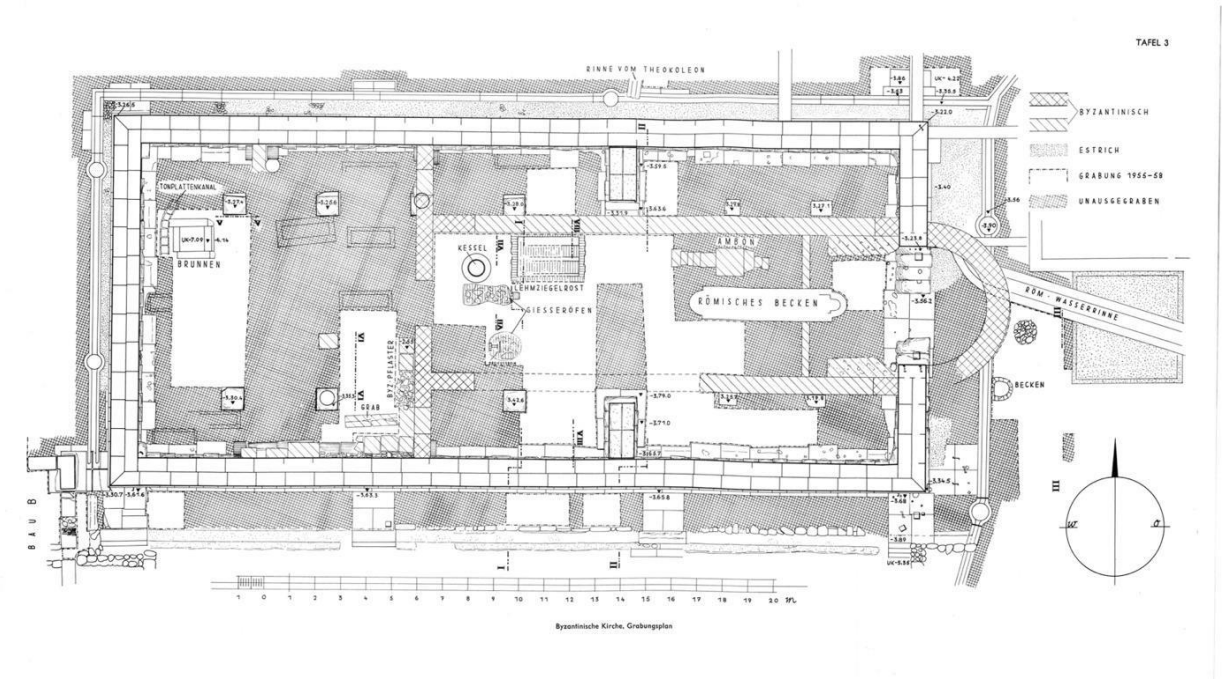


Figure 5. Olympia. Workshop of Phidias. Plan of the excavations (A. Mallwitz)

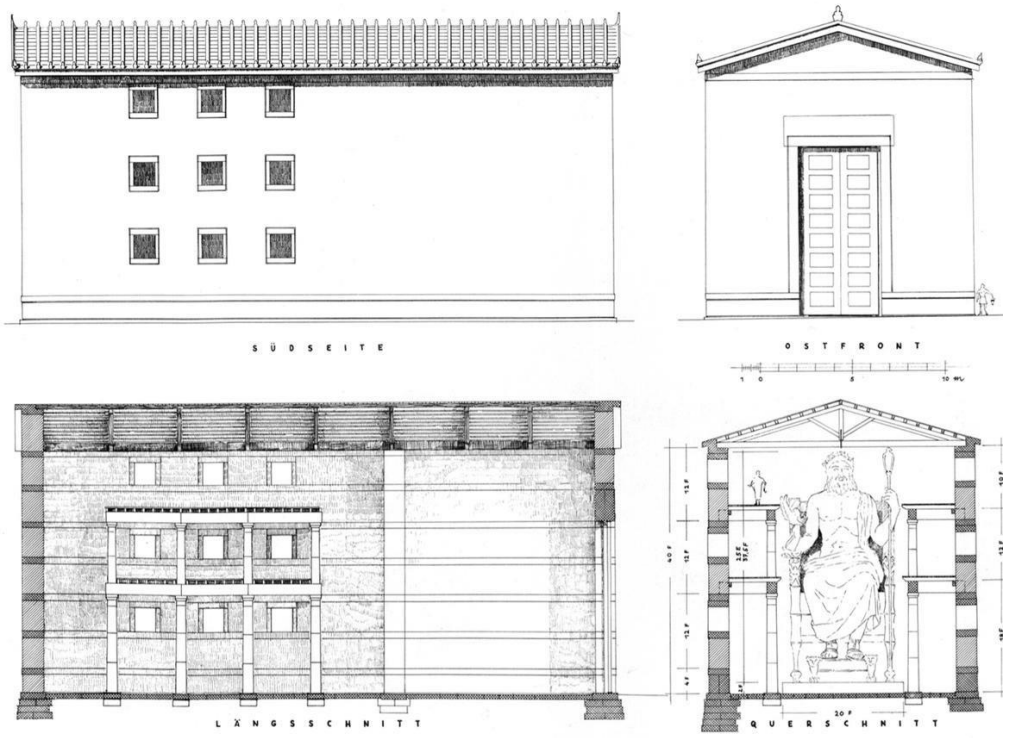


Figure 6. Olympia. Workshop of Phidias. Graphic reconstruction of the classical phase (A. Mallwitz).

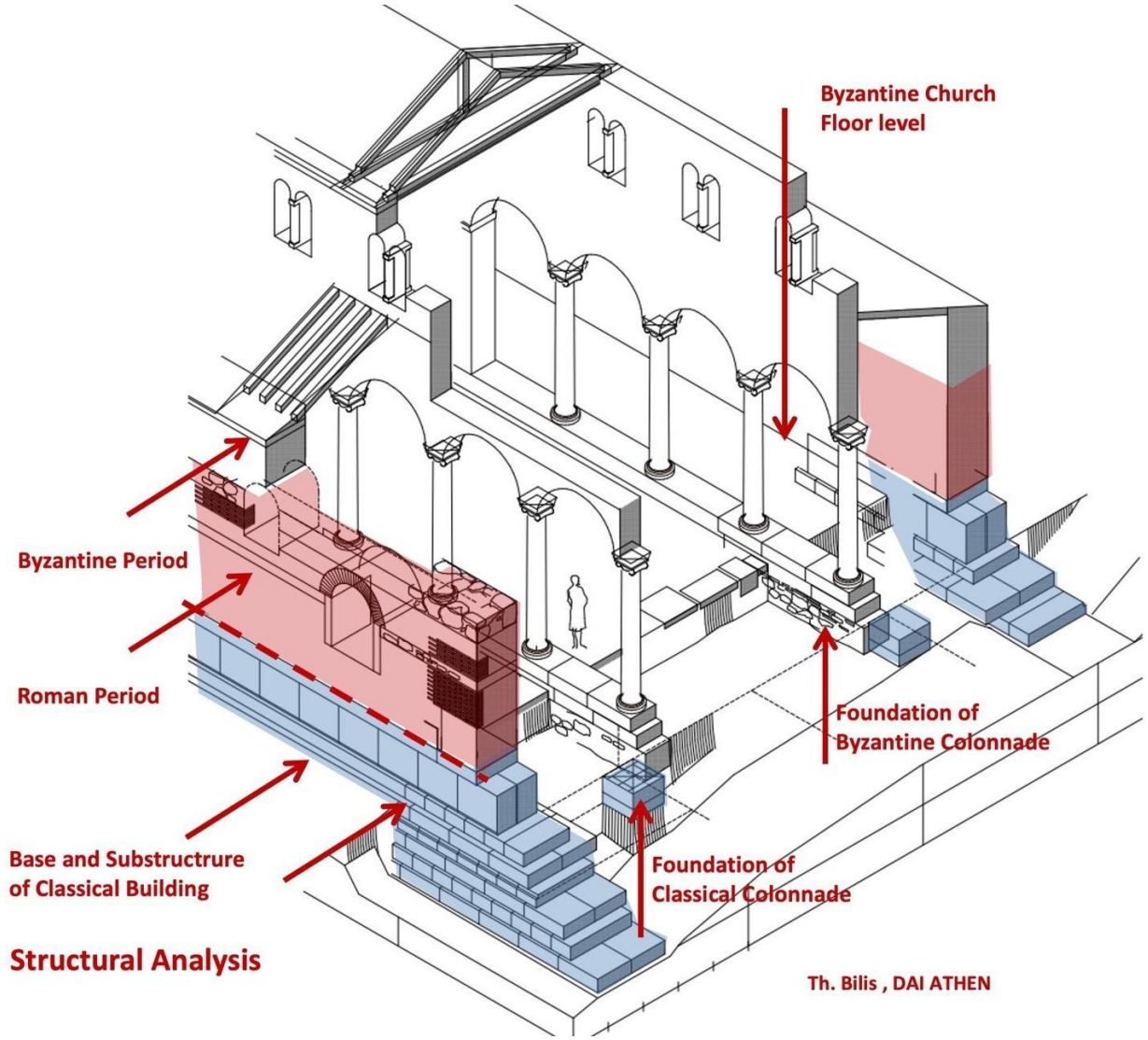


Figure 7. Olympia. Workshop of Phidias. The Basilika. Structural analysis (Th. Bilis)

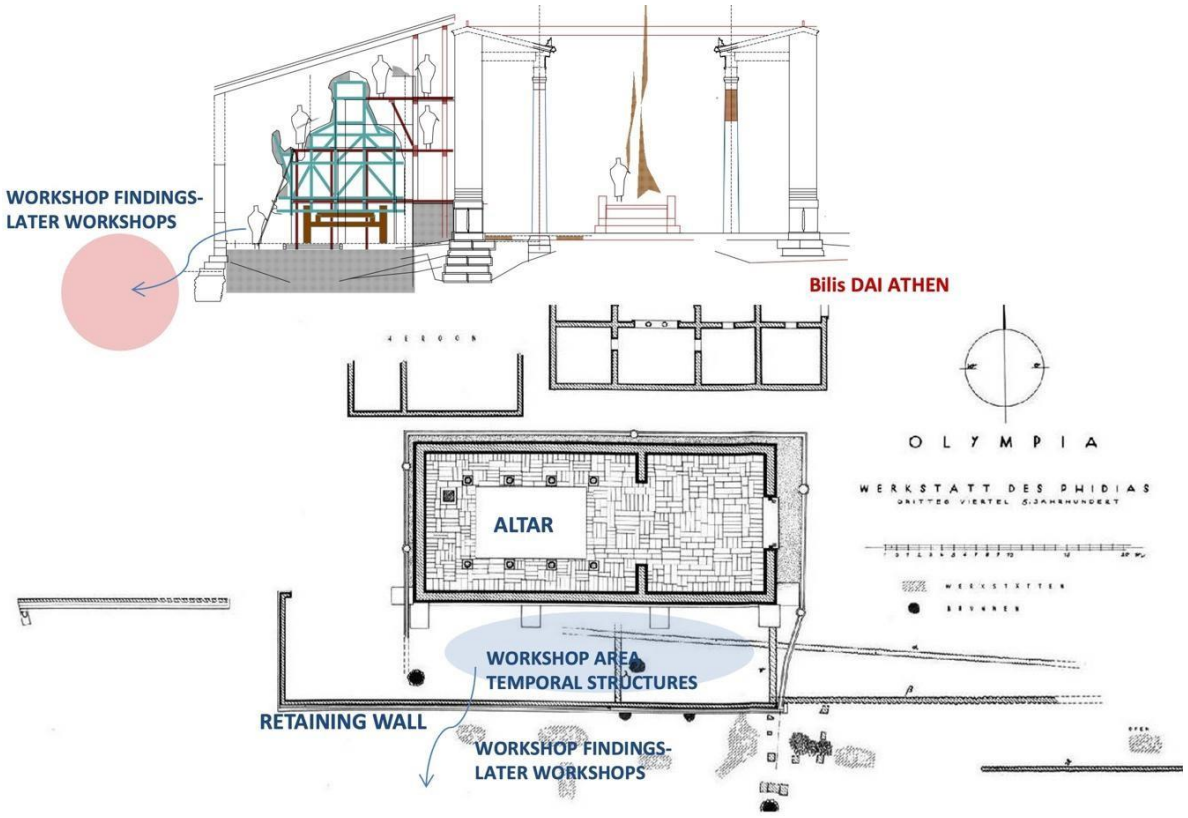


Figure 8. Olympia. Workshop of Phidias. The new graphic reconstruction of the classical phase. The workshop (temporal stuctures) located south, and the enclosed structure (building A) is an *ἕρκος,* where an Altar located. The location of the temporal workshop corresponds to the location of the findings and to Pausanias testimony: «...Outside the Altis there is a building *called* the workshop of Phidias, where he wrought the image of Zeus *piece by piece.* In the building is an altar to all the gods in common. Now return back again to the Altis opposite the Leonidaeum... ». For Pausanias the word *building* corresponds to the building complex of the 2c AD (fig.3, 3). Pausanias use the word *called* the workshop of Phidias and no *exists* or *is*, namely for Pausanias the building complex refered to the workshop, in accordance to the living memory of roman era. Furthermore, for the location of the workshop area note the lack of the drainage along the south wall of the building A, or the so-called Phidias Workshop (Th. Bilis).

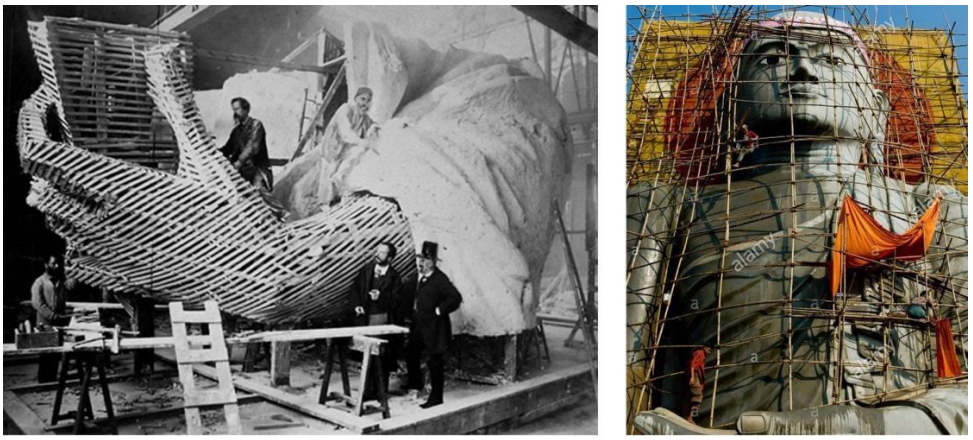


Figure 9. Scaffoldings for monumental sculpture. Note the *piece-by-piece* structure (left) and the light wooden scaffolding in close contact to the statue (right) (source: Internet).

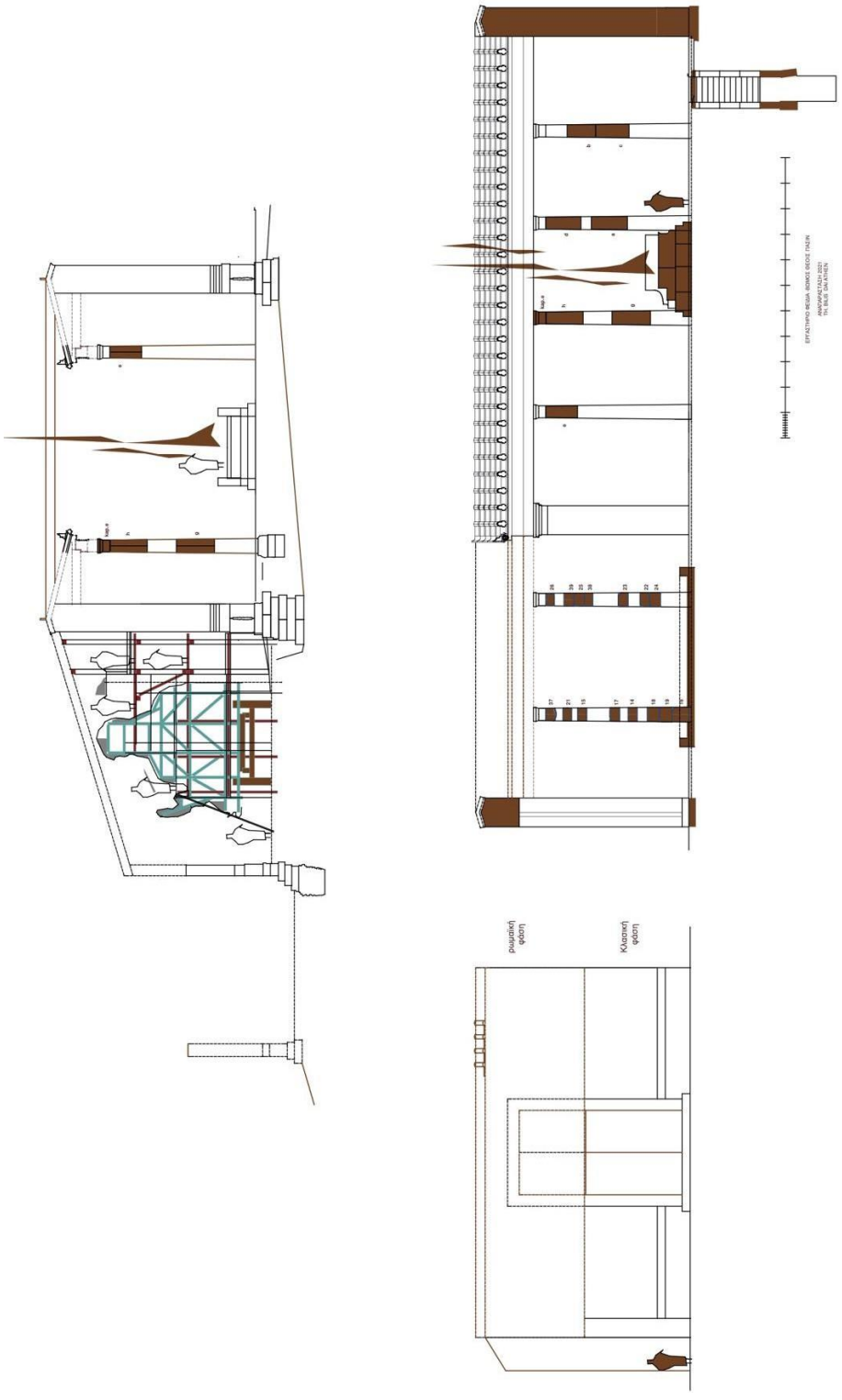


Figure 10. Olympia. Workshop of Phidias. The new graphic reconstruction of the classical phase (Th. Bilis).

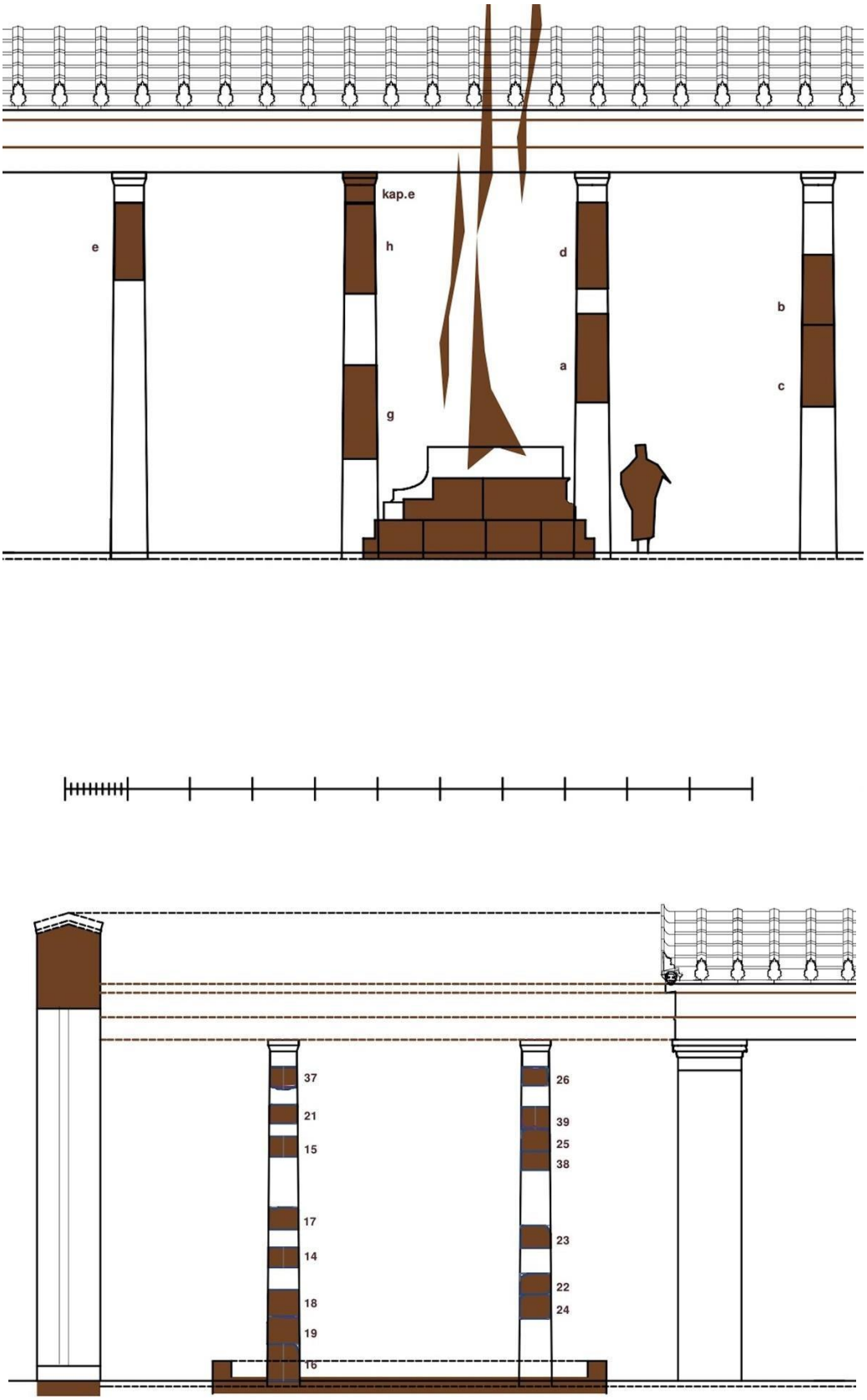


Figure 11. Olympia. Workshop of Phidias. The new graphic reconstruction of the columns of the classical phase (Th. Bilis).

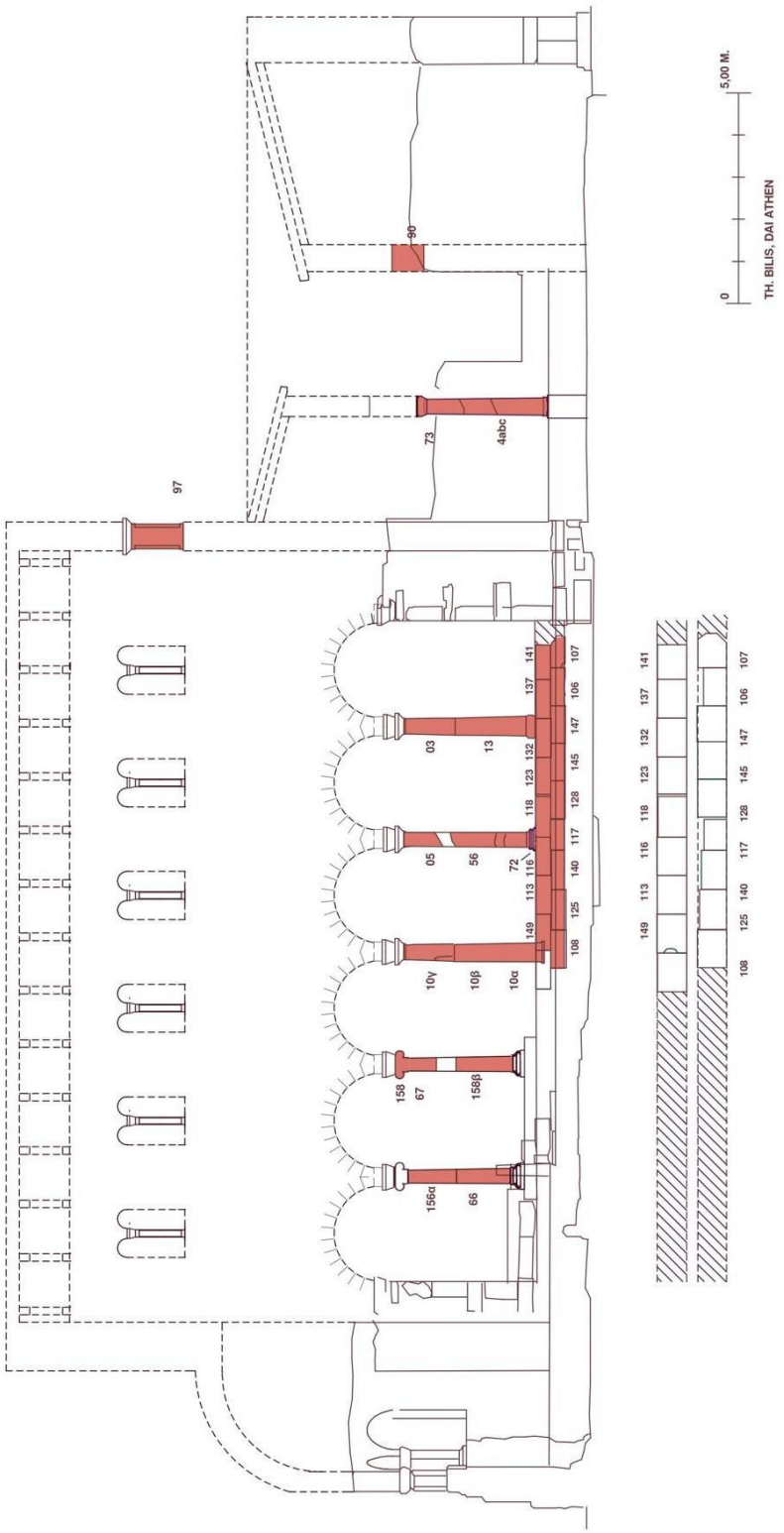


Figure 12. Olympia. Workshop of Phidias. The new graphic reconstruction of the columns and stylobate of the Byzantine phase (Th. Bilis).

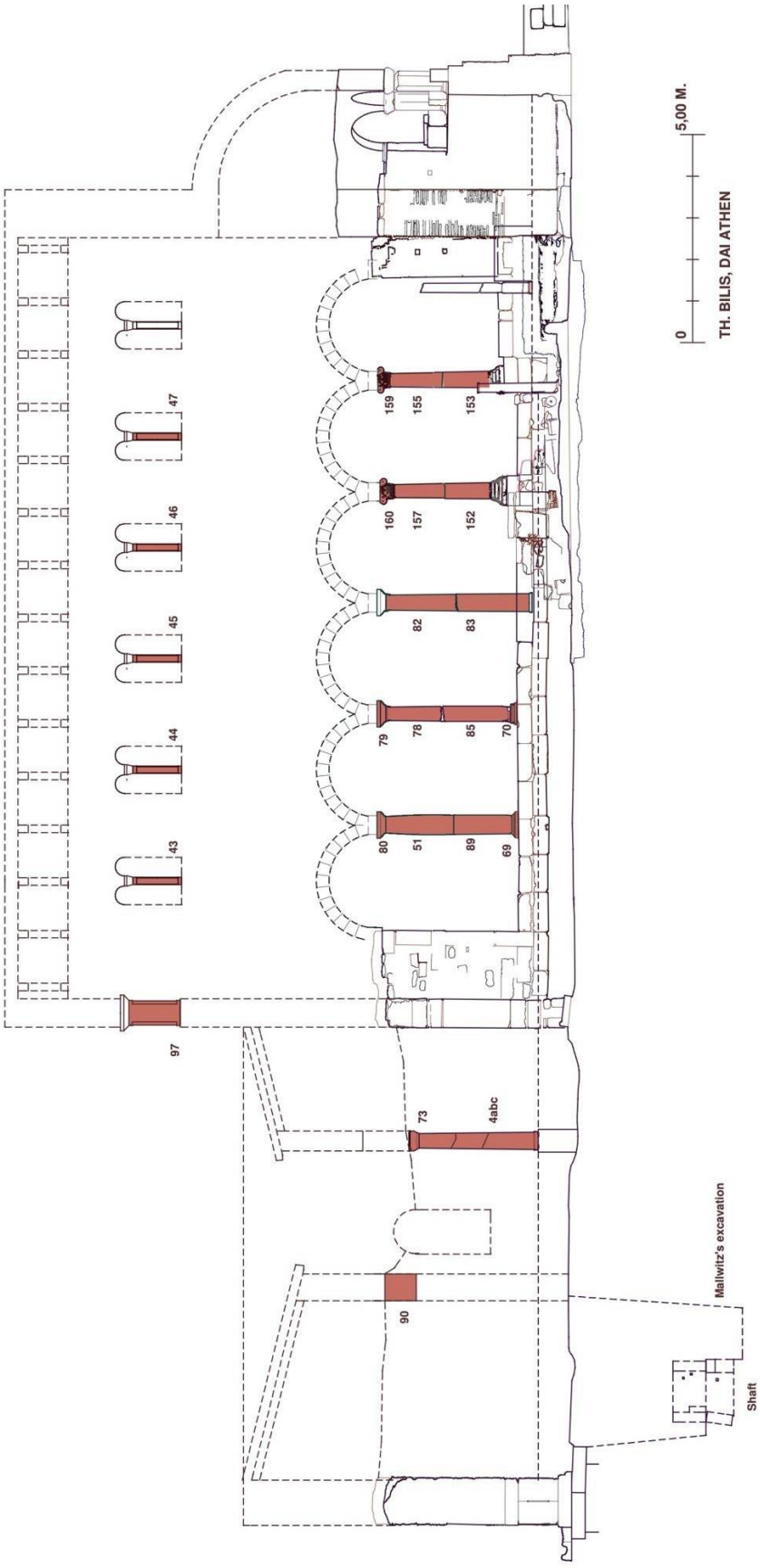


Figure 13. Olympia. Workshop of Phidias. The Basilika. Elevation.The new graphic reconstruction of the byzantine phase (Th. Bilis).

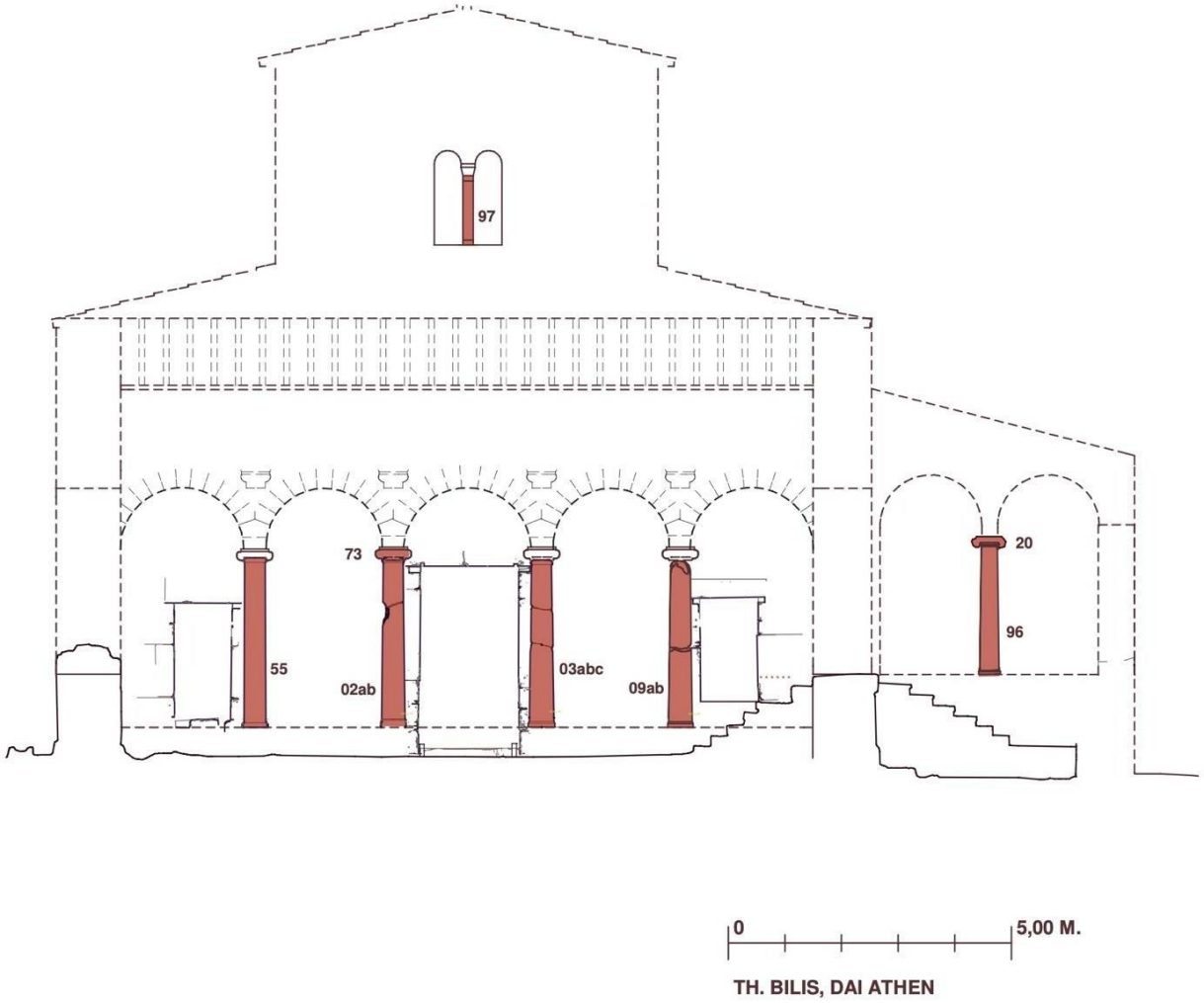


Figure 14. Olympia. Workshop of Phidias. The Basilika. West façade of the church. The new graphic reconstruction of the byzantine phase (Th. Bilis).

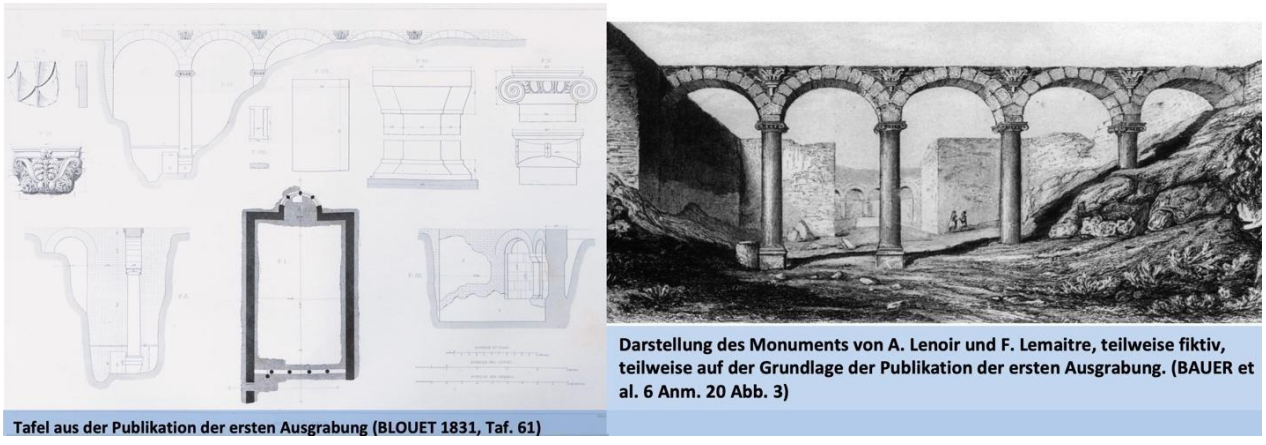


Figure 15. Olympia. Workshop of Phidias. The Basilika. West façade of the church. Documentation of 19th c. (A. Blouet, A. Lenoir, F. Lemaitre).

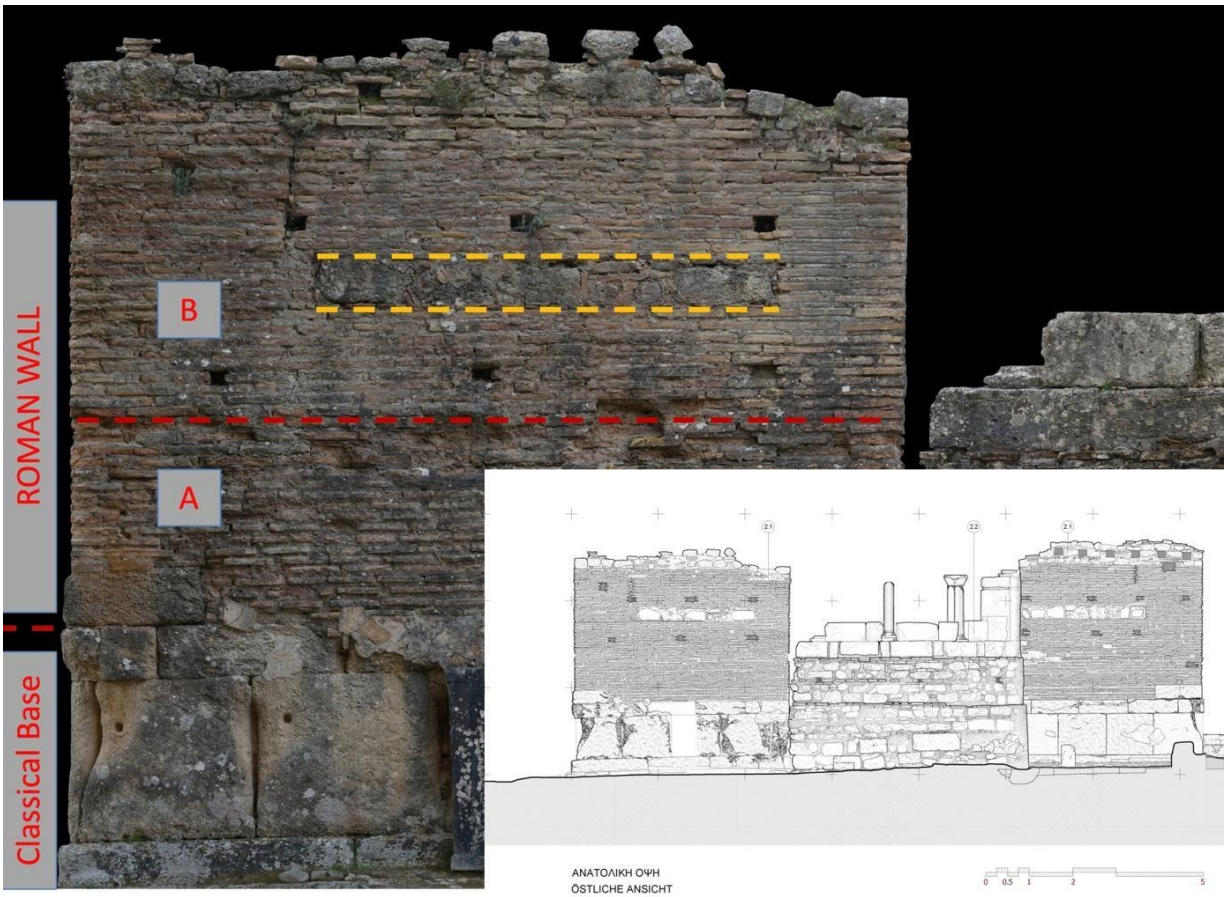


Figure 16. Olympia. Workshop of Phidias. The Basilika. The brickwork masonry. *Opus testaceum* with bands of rumble masonry. The two sections A and B present differences (Th. Bilis).

Συγκεντρωτικός πίνακας αποτελεσμάτων αναλύσεων κονιαμάτων.

Κωδικός Δείγματος	Περιγραφή	Πορώδες		Βαθμός υδατ/ας %	Κοκκομετρία Εύρος Ø Μέσος κόκκος	Αναλ/α Σ:Α	Φαινόμενο Ειδικό Βάρος (ΦΕΒ) gr/cm³	Μηχανικές αντοχές εφελκυσμού		
		Ολικό %	μ.μεγ. πόρου Ø(μm)					Εφελκ/ός (KPα)	Θλίψη 28/90ημ (MPα)	Κάμψη 28/90ημ (MPα)
OB1	Κονίαμα αρμολογήματος. Συνεκτικό υπόλευκο κονίαμα Περιέχει λεπτόκοκκα έγχρωμα αδρανή.	25,32	0,52	18,49	75μm-2mm 0,25 mm	2:3	1,57	111	-	-
OB2	Κονίαμα δομής οπτοπλινθοδομής. Συνεκτικό ασβεστοκονίαμα με λεπτόκοκκα αδρανή και βότσαλα Ø 1-2εκ	28,49	0,19	21,38	75μm-16mm 0,6 mm	3:2	1,56	339	-	-
OB3	Κονίαμα δομής / χωματολάσπη	-	-	-	75μm - 4,75mm 0,18 mm		1,34			
OB4	Κονίαμα δομής. Συνεκτικό πλούσιο αρμολόγημα με χαράξεις (καλά πατημένο)	17,72	0,45	15,16	75μm–2mm	1,8:1	1,74	151,01		
OB5	Κονίαμα δομής οπτοπλινθοδομής. Συνεκτικό ασβεστοκονίαμα με λεπτόκοκκα αδρανή και βότσαλα Ø 1-2εκ. Ψηλές στρώσεις των τοίχων	24,21	0,54	18,15	75μm–4,75mm	2,5:1	1,71	384,89		

Δείγμα OB2 Κονίαμα δομής οπτοπλινθοδομής. Χαμηλές στρώσεις.

Δείγμα OB5 Κονίαμα δομής οπτοπλινθοδομής. Υψηλές στρώσεις.

Figure 17. Samples of the mortars from the brickwork masonry (A. Sotiropoulos, DAI Athen).

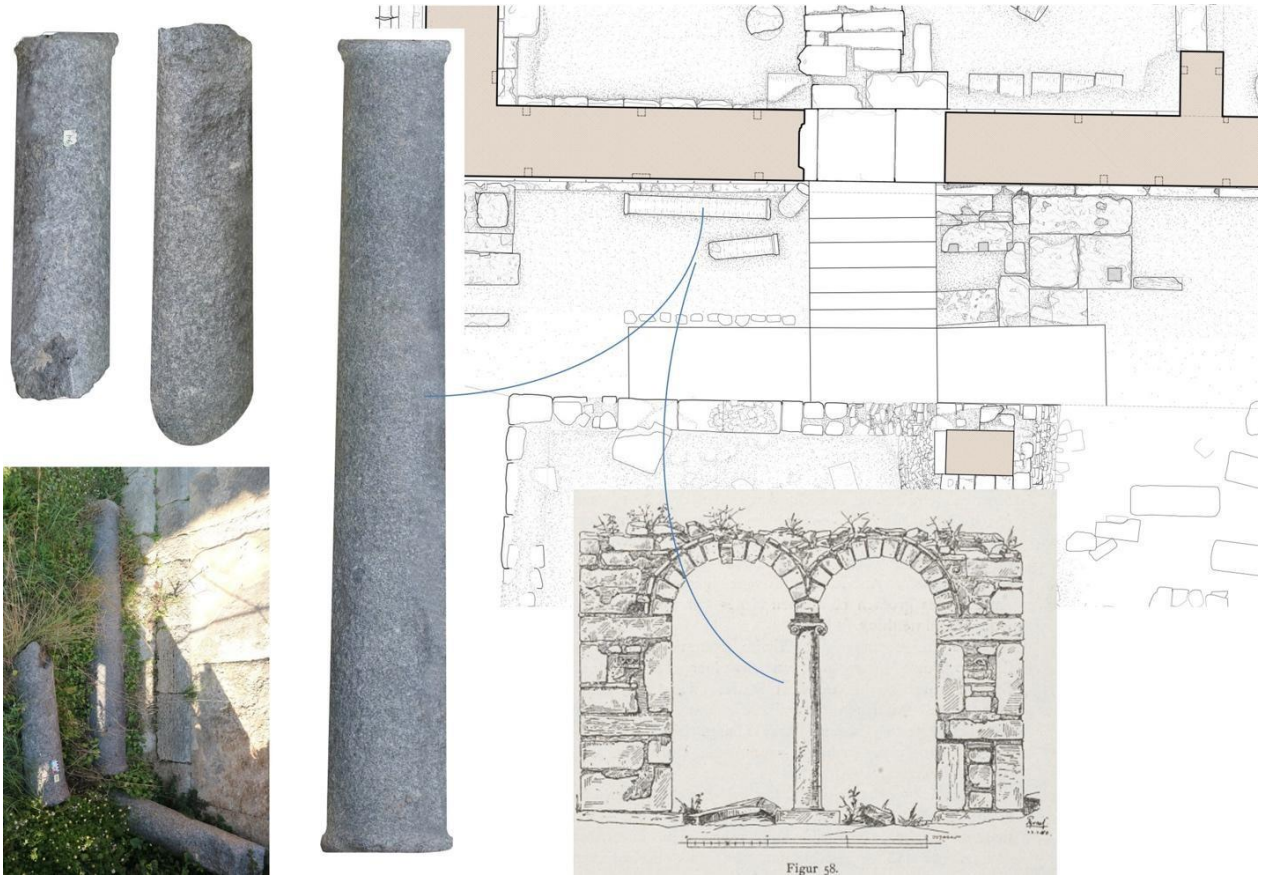


Figure 18. Olympia. Workshop of Phidias. Granite column from the byzantine entance. Adler drawing and the location of the column 2019 (Th. Bilis)

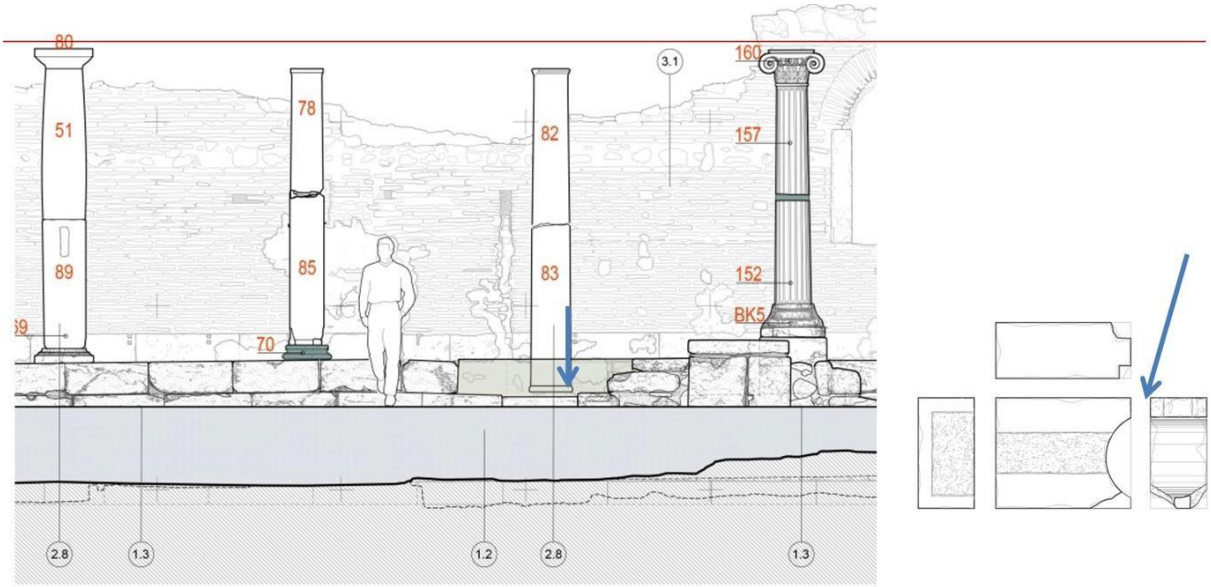


Figure 19. Olympia. Workshop of Phidias. Basilika. The cutting on the stone of the byzantine stylobate for the erection of the column (Th. Bilis).

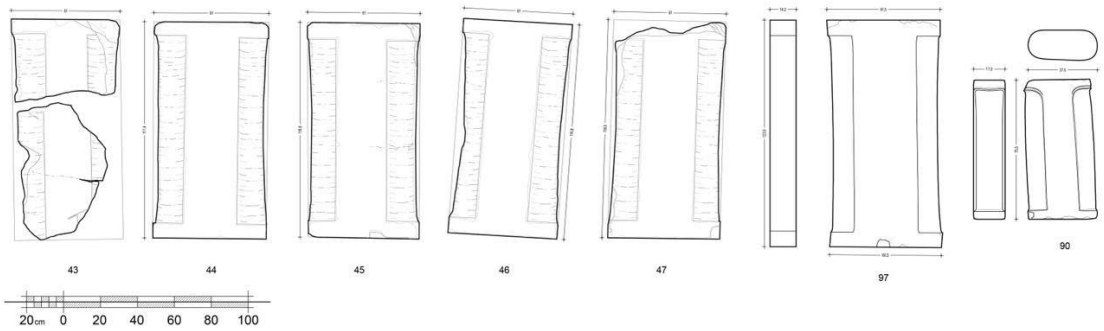
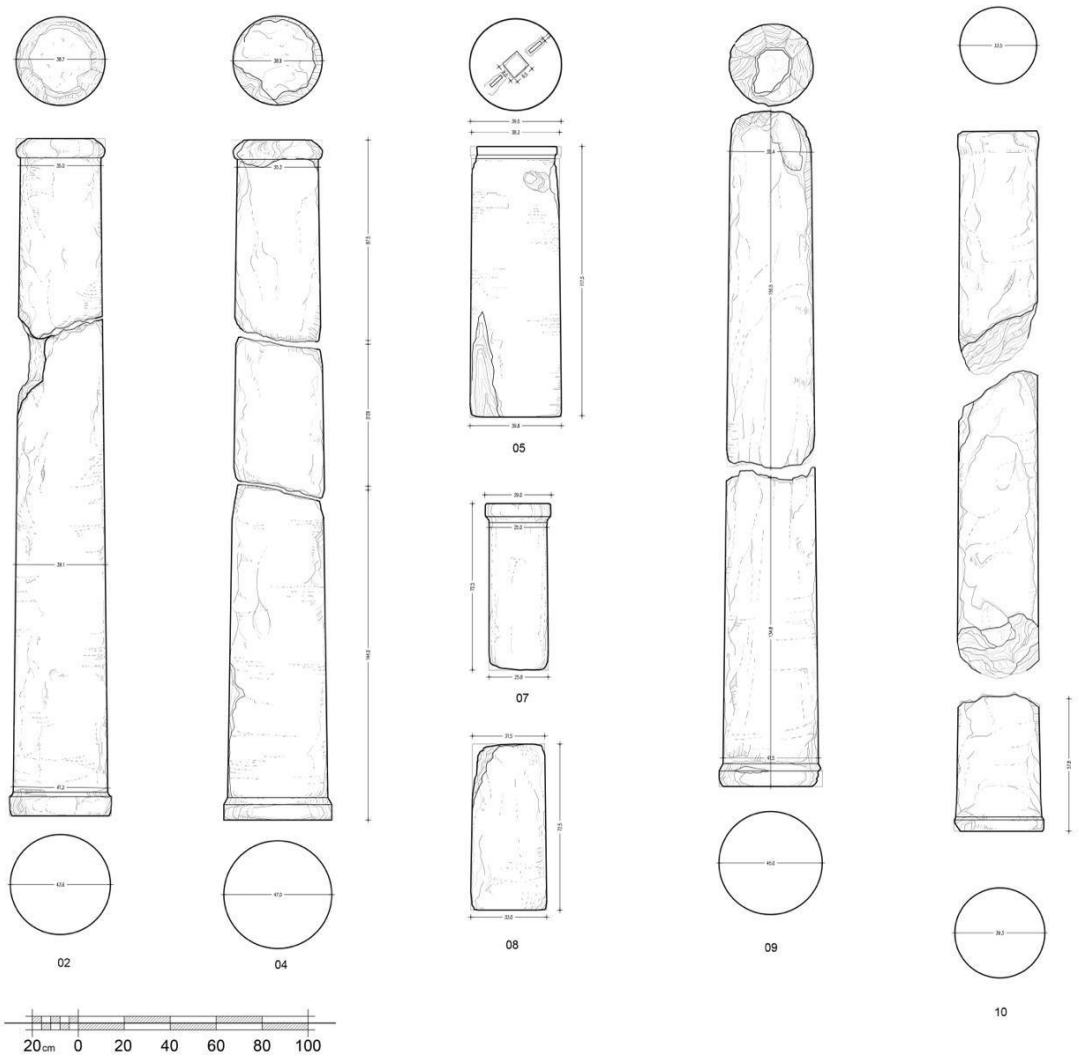


Figure 20. Olympia. Workshop of Phidias. The Basilika. Byzantine Mullions (Th. Bilis, Imantosis)



).

Figure 21. Olympia. Workshop of Phidias. The marble columns 1 (Th. Bilis, Imantosis, DAI Athen).

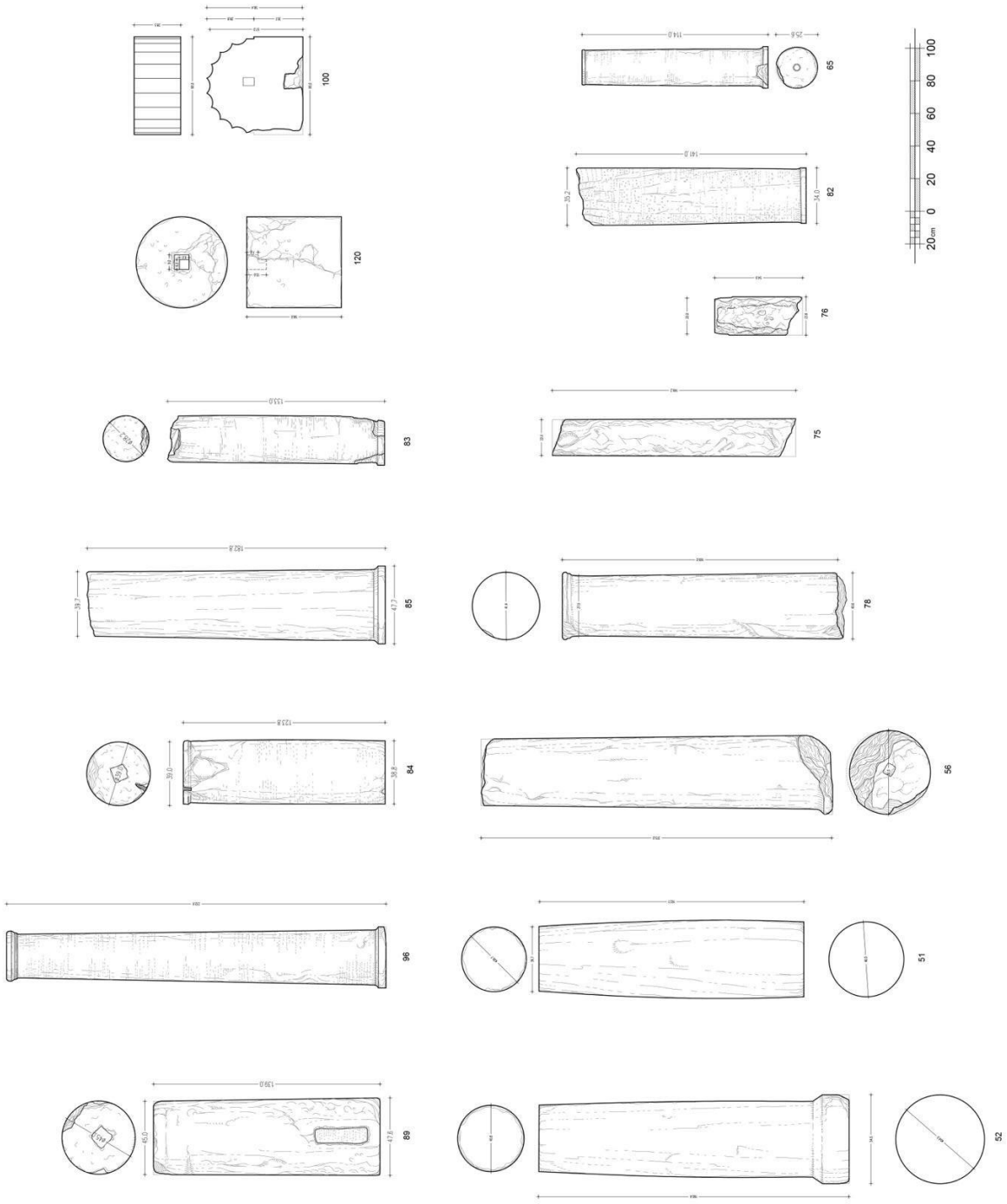


Figure 22. Olympia. Workshop of Phidias. The marble columns 2 (Th. Bilis, Imantosis, DAI Athen).

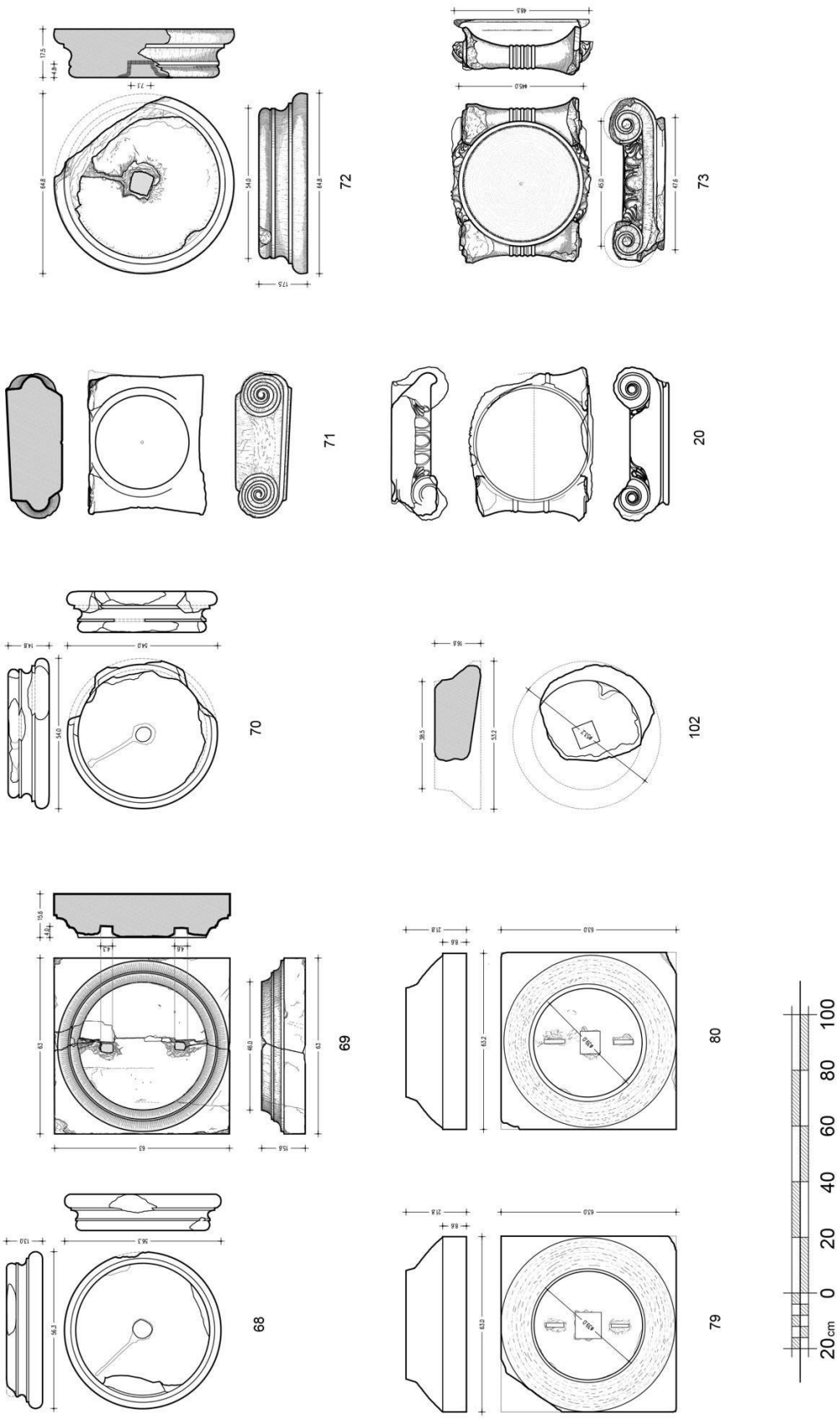


Figure 23. Olympia. Workshop of Phidias. Capitals and bases (Th. Bilis, Imantosis, DAI Athen).

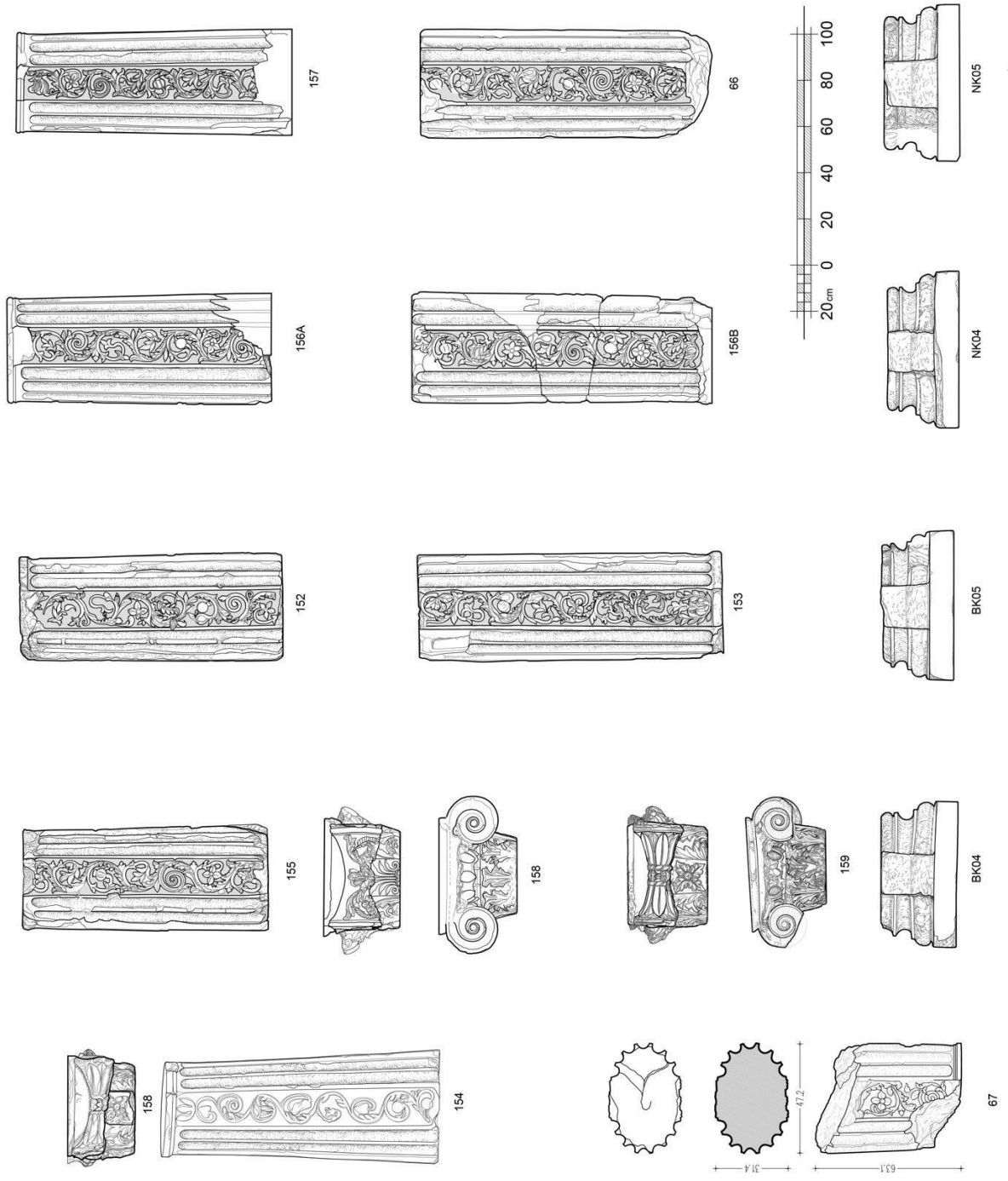


Figure 24. Olympia. Workshop of Phidias. Columns and capitals around the altar (Th. Bilis, Imantosis, DAI Athen).

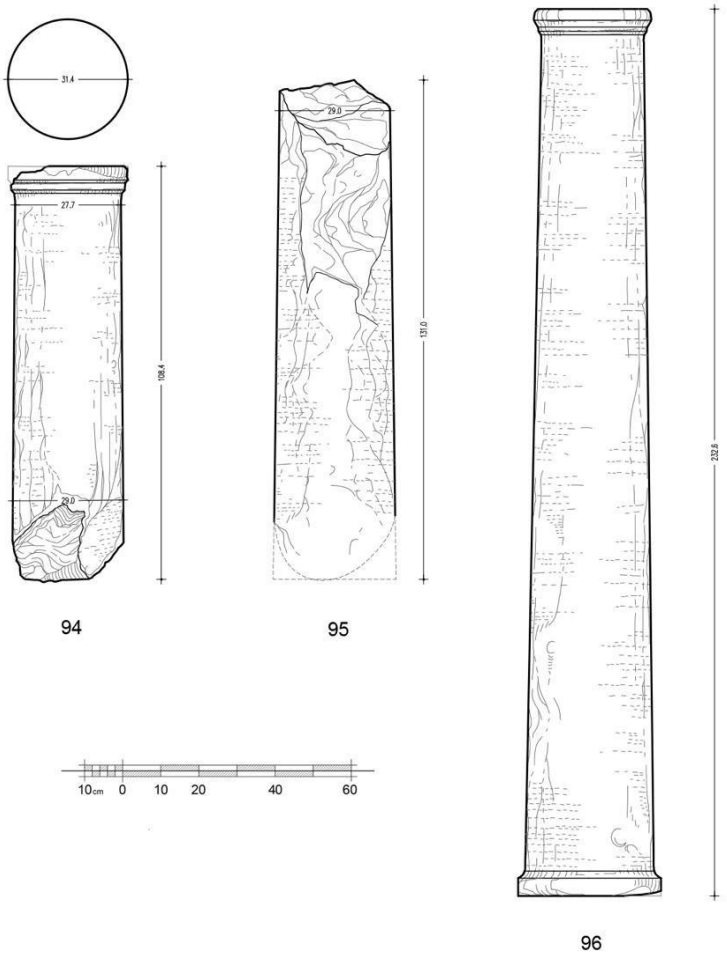


Figure 25. Olympia. Workshop of Phidias. Granite columns from the entrance structure of the byzantine complex (Th. Bilis, Imantosis, DAI Athen).

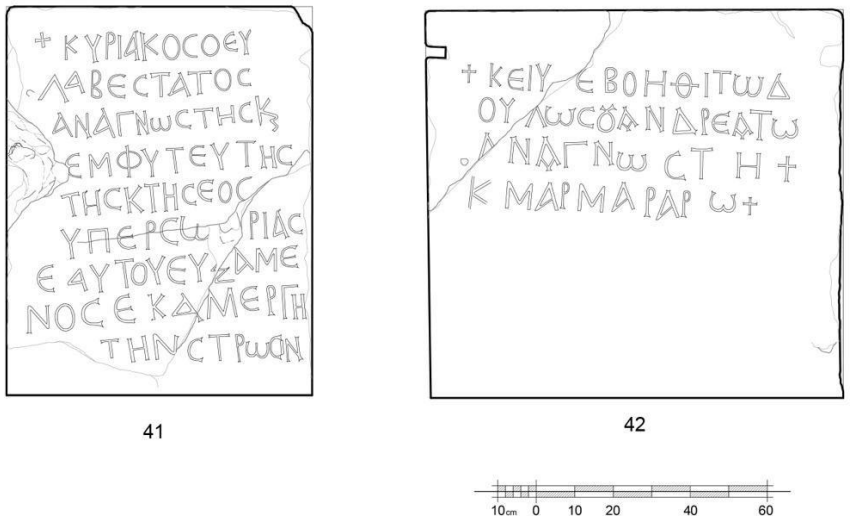


Figure 26. Olympia. Workshop of Phidias. Byzantine inscriptions (Th. Bilis, Imantosis, DAI Athen).

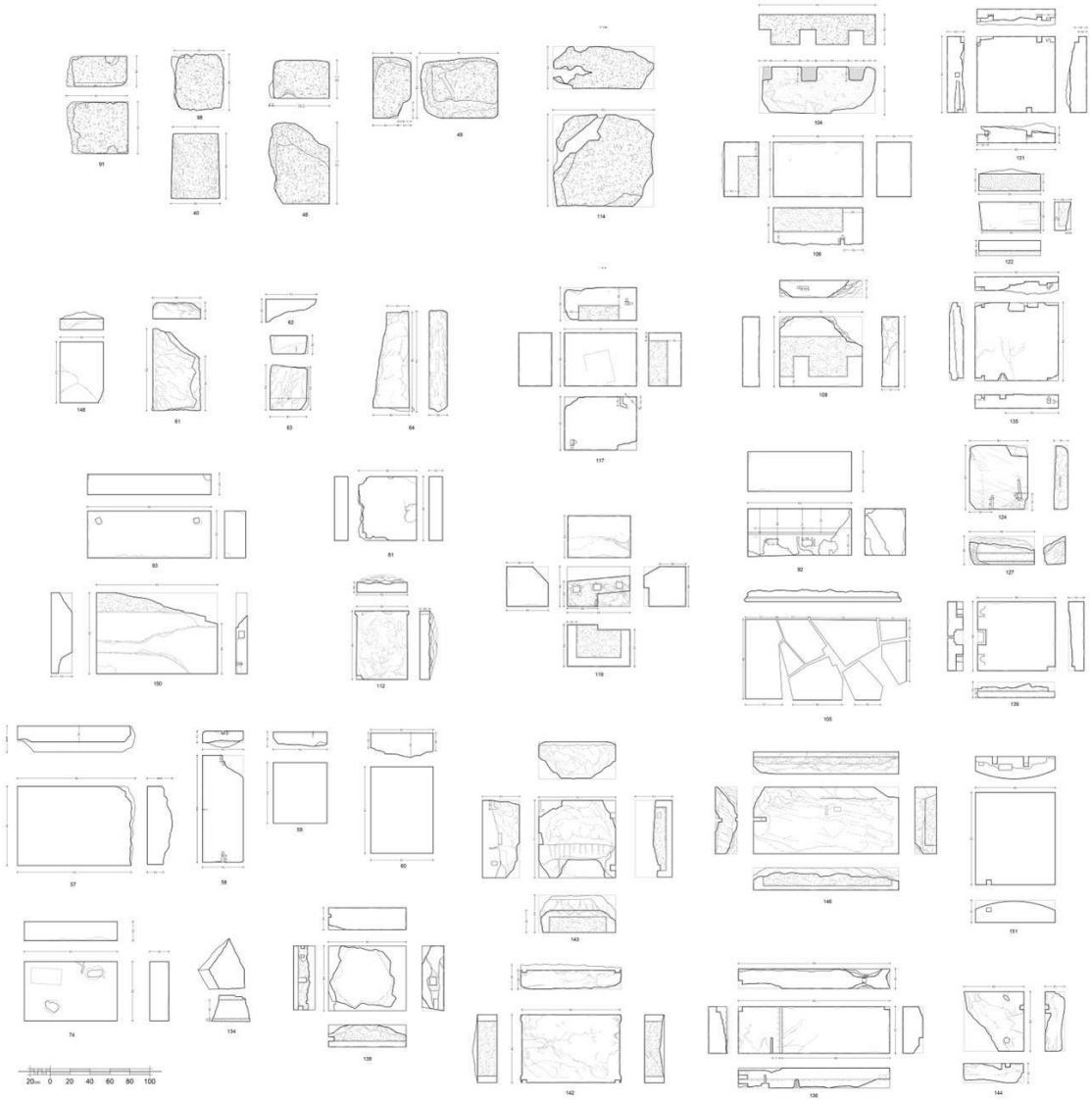


Figure 27. Olympia. Workshop of Phidias. Stones from the byzantine floor of the church (Th. Bilis, Imantosis, DAI Athen).

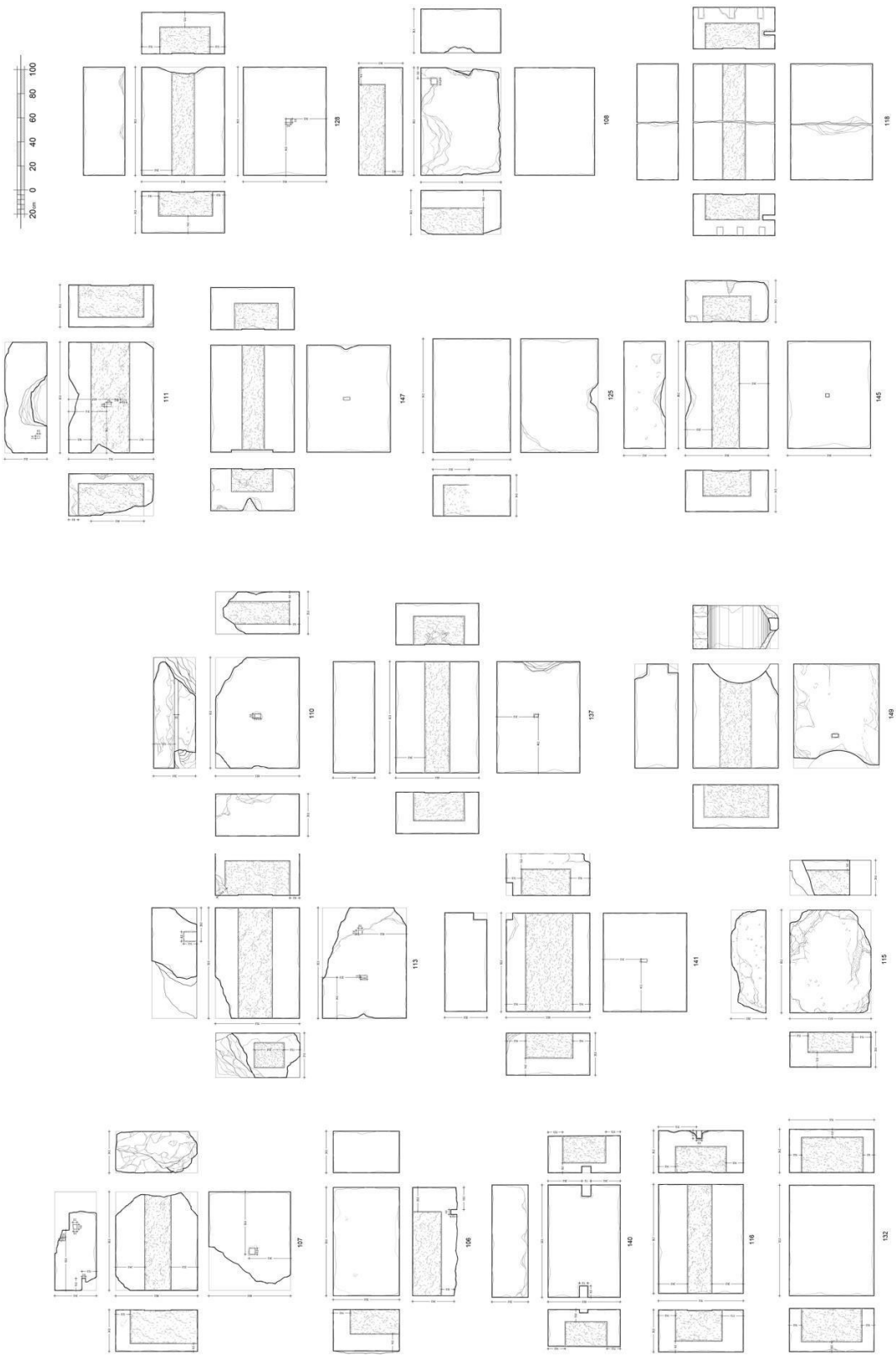


Figure 28. Olympia. Workshop of Phidias. Stones from the byzantine stylobates. Note the block 149 with hemicycle cutting, for the position of a column (Th. Bilis, Imantosis, DAI Athen).

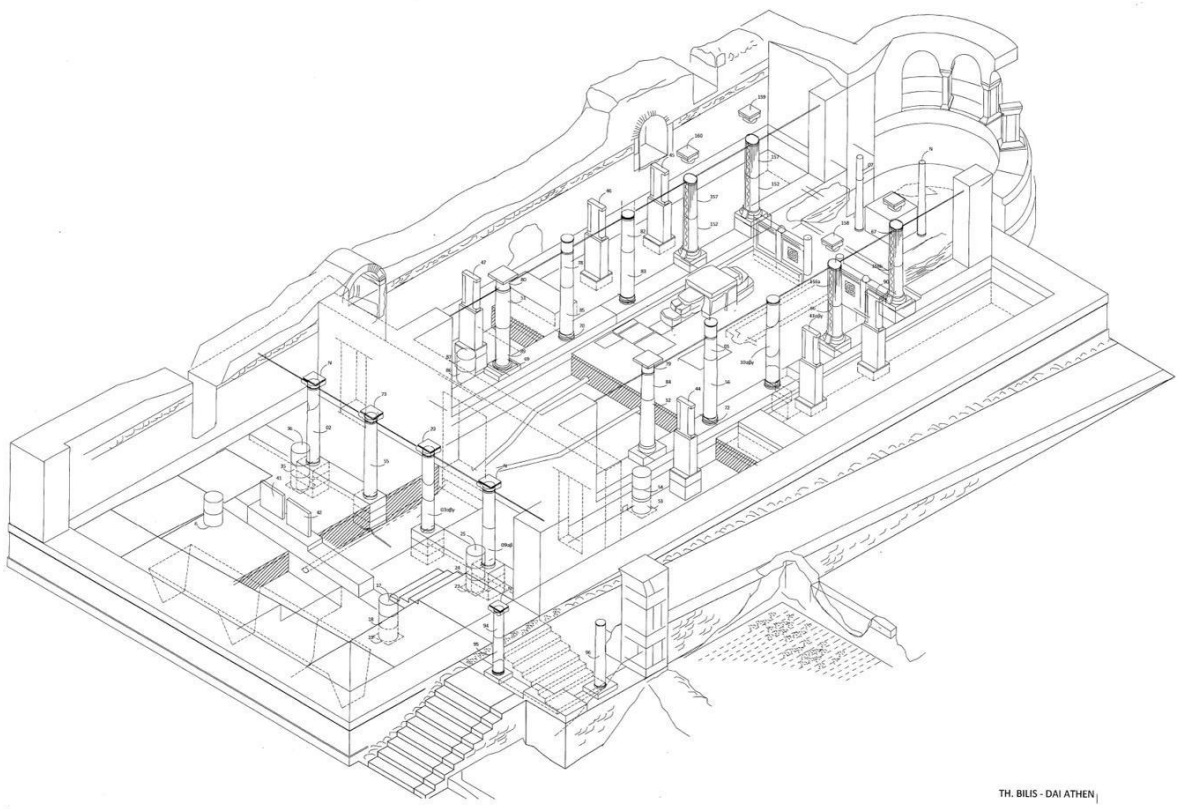


Figure 29. Olympia. Workshop of Phidias. Restoration proposal (Th. Bilis).

Figure 30. Olympia. Workshop of Phidias. Restoration proposal. Detail (Th. Bilis).

ΑΙΓΙΔΑ

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
Υπουργείο Πολιτισμού

ΧΟΡΗΓΟΙ

ΥΠΟΣΤΗΡΙΞΗ