

THE RESTORATION OF THE SUPERSTRUCTURE OF THE PROPYLAIA CENTRAL BUILDING*

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ABSTRACT:

The oxidation of the iron elements, installed in the parts of the superstructure of the Propylaia central building which had been restored by Balanos between 1909-1917, made necessary the disassembly of the restored blocks. This enterprise started in 1990 with the disassembly of the beams and coffered slabs of the ceilings (63 blocks). The identification of many groups of adjoining fragments from the coffered slabs and from the ceiling beams allowed to propose the enhancement of the new restoration by extending the ceilings above the central passage-way. To proceed with the new restoration, another 230 blocks, which had been restored by Balanos and were still on the monument, had to be taken down, between 1997-1998 and 2002-2003. It was noted that Balanos had modified the original structural system of the entablature, eliminating their original independence by connecting them not only with iron clamps and dowels but also with lime mortar and cement. Important information came to light, concerning the original structure, which leads us to a new understanding of the procedure of the original construction of the Propylaia. In the ongoing intervention, each block is restored in order to acquire solidity, and sides for proper contact with the neighboring blocks, to which they are bonded by means of titanium clamps and dowels, sheathed in cement. The accuracy with which the ongoing restoration is carried out can be tested in the measurements and drawings of the Ionic capitals of the Propylaia and in the two new Ionic capitals which have been carved by hand.

Before the ongoing project

The first restoration of the Propylaia was conducted by Nikolaos Balanos between 1909-1917 (Balanos. Tanoulas, 1994a, pp. 37-52, drawings 18-43, photos 3-16). In the eastern portico, Balanos restored the architrave, more than half of the frieze and of the cornice, less than half of the pediment, as well as the northern end of the ceiling. In the western hall, he reassembled the extreme eastern column of the northern Ionic colonnade on which, successively, the northeast part of the ceiling was restored.

* On the structural history of the building, see: Bohn. Travlos. Tanoulas, 1987. Tanoulas, 1994b. Tanoulas 1997. On the restoration history of the monument, see: Balanos. Tanoulas-Ioannidou-Moraitou. Tanoulas, 1994c Tanoulas, 1998. Tanoulas-Ioannidou. Proceedings, 245-300, 491-500. Filetici ed al., p. 98-119. Mallouchou-Tuffano.

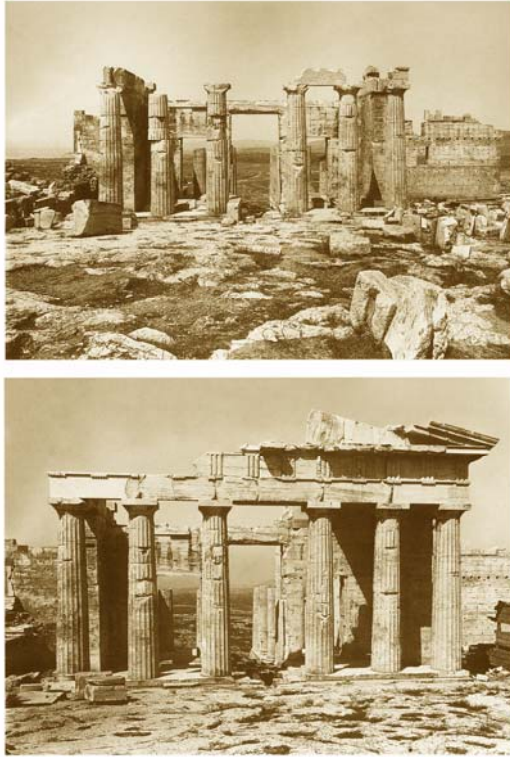


Figure 1. The east front of the Propylaea before and after the restoration by Balanos.

Work under the Committee for the Conservation of the Acropolis monuments

The ongoing project for the restoration of the Propylaea started in the years 1981-1982, with the intervention in the fourth architrave of the east portico, counting from the north (Tzakou-Ioannidou, Tanoulas, 1994a, pp. 42, 54). The problem to be solved was, as in all the other monuments on the Acropolis, the destruction of the marble because of the oxidation of the iron used by Balanos. Between June 1990 and July 1993, all the beams, the coffer slabs, the inter-beam slabs, as well as the Ionic epistyle and capital restored in the west hall were taken down. Their condition, because of the fragmentation due to the oxidized iron, was lamentable. At this stage of the work, only the fragments created by the swollen iron were put together. The rest of the original fragments should be studied for the identification of fragments which belonged to the same original block. This task was imposed by the fact that Balanos, in order to make a restorable architectural member, used to put together fragments which did not belong together; to make them fit together he used to have the broken surfaces trimmed conveniently, a procedure that rendered our task even more difficult.

Study for the restoration of the central building superstructure (see Tanoulas-Ioannidou)

More than 1000 fragments of the coffered ceilings were examined (Tanoulas-Ioannidou, 51-66). The results were spectacular: for the east portico 26 groups of adjoining authentic fragments were identified; for the west hall 216 groups of adjoining authentic fragments were identified. The investigation of the beams fragments produced 11 groups of

adjoining authentic fragments (Tanoulas-Ioannidou, pp. 66-76.). The large number of newly identified authentic fragments for the beams and the coffer slabs allowed the formation of concrete proposals for a new restoration of the superstructure, which envisaged the use of this identified material in order to display the ceilings, which have always been the most admired feature of the architecture of the Propylaea, to best effect. The great number of coffer slabs provided the possibility of extending the restored ceilings above the central passageway, allowing the visitors to enjoy the feeling of an interior space.



Figure 1. Proposed restoration of the ceilings. View from below (above), in the west hall (below left) and in the east portico (below right).

The intervention

After the disassembly of the two coffer-ceiling portions of the east portico and of the west hall in the years 1990-1993, 107 more blocks from the previous restoration were still on the monument (Tanoulas-Ioannidou, pp. 66-76.).

The Acropolis Committee decided to advance with the disassembly of the south end of the east portico, which had been shifted to the south and east by a gunpowder explosion in the past. This work started in 1997 and involved the disassembly and reassembly of 38 blocks (Tanoulas, 2002a, pp. 246-251. Tanoulas, 1998). Important evidence on the original building techniques used in this edifice as well as its structural behaviour came to light. In particular, the extremely high quality of the classical iron joints used, as well as the perfection of the lead sheathing was revealed. The shifting of the wall towards the south and east distorted the double-T clamps that join the blocks horizontally. The clamps were stretched or broken in the middle length-wise that is in their deliberately weakest point. The danger of fractures in the marble was thus kept at bay; the great fractures in some of the blocks are due to their geometric distortion as well as to the great mechanical stresses due to the modified static system of the entire structure.

Many horizontal surfaces of the blocks were eroded in various points due to the opening of joints in the distorted wall. To recover the original cohesion, thin sheets of lead were inserted in the horizontal joints as the blocks were reassembled. Thus, the final height of the wall was equalled to the original one. The vertical joints were never cemented, in order to avoid trapping

water or other sources of energy inside the wall; only in one case where the joint had opened a few millimetres, the gap was filled with lead in order to prevent the blocks from coming closer in case of an earthquake. The work at the south wall of the east portico was completed in 2001.

Disassembly of the blocks which were still on the monuments where Balanos had restored them started on 15 February 2002 (fig. 8). It was soon noted that Balanos had modified the ancient system of construction during re-assembly. After the architrave blocks had been placed above the capitals, the superimposed blocks were 'built in' together with brick, stone and marble fragments bound with mud, cement or lime mortar in addition to the clamps and various iron joints covered with lead or cement. The blocks had thereby lost their original independence which is one of the main characteristics of the original structure.

Once the 107 blocks of the superstructure of the central building were dismantled as planned, we realized that Balanos had dismantled and put back 43 north wall blocks and 24 column drums, without ever reporting this intervention. Therefore we were obliged to dismantle these blocks and column drums as well. When the disassembly work ended in May 2003, instead of the anticipated 107 blocks, we had dismantled 192 blocks.

Another important task was the identification of the surviving fragments of the six original Ionic capitals of the Propylaea in six groups of adjoining fragments. At the same time I produced drawings restoring the original form of the capital in full scale; these drawings proved indispensable for the accurate reproduction of two new Ionic capitals which, as it will become clear later, were required for the new restoration (Tanoulas, 2000b, pp. 283-285, fig. 5-9).

During the work on the north wall of the central building classical clamps and dowels were discovered, the iron of which was clearly of inferior quality since many of the extracted ones were in an advanced state of corrosion, although their lead sheathing had not been disturbed (Tanoulas, 2006a). The poor quality of the iron and lead sheathing in the north wall, contrasted to the high quality of the same elements in the south wall, must be sought after in the historical circumstances after 434 B.C., when financial and time constraints imposed by the Athenians on Mnesikles were combined with a shortage of fine Laconian iron ores, caused by the aggravated relations between Athens and Sparta.

On the upper surfaces of most of the column drums, inscriptions were found consisting of one letter of the alphabet (indicating the column) followed by parallel lines (indicating the position of the column drum) (fig. 12). The letters indicating the columns of the east colonnade are (from north to south): E, Θ, K, Φ, X, Λ.



Figure 1. Classical inscription indicating the position of the fourth drum of the fourth column of the east portico, counting +from the north.

Reassembly of the north wall blocks and drums of the east portico columns began in May 2003. Reproducing the structural characteristics of the original classical structure is one of the most important principles to which the ongoing restoration of the Acropolis monuments aspires. The main bonding element is gravity through the friction developed between the horizontal surfaces of the blocks. In such buildings the architectural blocks are structurally individual, with sides properly shaped for providing sound contact with the neighboring blocks.

Therefore, before being restored back to their positions in the monument, each of the ancient blocks, or each group of fragments from the original blocks, is treated in ways that provide it with the necessary structural qualities, such as: solidity, sides for proper contact with the neighboring blocks and sockets for the installation of clamps and dowels. This means firstly putting together fragments which come from the same original block, with the use of titanium rods and cement. New marble is added when it is necessary for the acquisition of the above qualities.

The restored blocks are put in their places without any mortar, with the addition of clamps and dowels made of titanium, sheathed in cement. It was very important for us to make each of the restored horizontal courses to work as one solid course. For this reason, when it was necessary to leave a gap in the middle of a course, we filled it with lead.



Figure 1. The east front of the Propylaea in March 2007.

In the entablature we used the new blocks inserted in the restoration by Balanos. We used new marble to fill the gaps created after the removal of ancient pieces improperly restored by Balanos. But for the huge beams of the ceilings (they are 6,4 m. long and weigh about 11 tons) Balanos had used almost exclusively ancient fragments which, in most cases, did not belong together; in those cases we had to add new marble to the groups of original fragments which did not make complete blocks. We always restore to each block its individual structural character, giving to it the dimensions it had in the original Mnesikleian structure. This is not always possible with the blocks made by Balanos because, as already mentioned, Balanos did not conceive his restoration as an absolute reproduction of the original building and structure, but as an approximation of the original forms, not caring for the exact dimensions and structural individuality of each architectural member. Also, he did not hesitate to have the classical blocks be trimmed in order to conform to the incorrect dimensions of his new architectural members. We always try to correct these discrepancies not at the expense of the authentic material, but at the expense of Balanos' or of the material we add. This, of course, adds much work on the spot.

As already mentioned, the classical iron double-T-clamps were constructed weaker in the middle so that, in case of an earthquake, the clamp could be deformed and break, without causing the breakage of marble (Tanoulas, 1998, p.p. 34-35.). In order to reproduce this fine quality of the clamps, the long shaft of the double T titanium clamps are made thinner in the middle and the cement sheathing is interrupted in the middle of the shaft.

At the moment, that is the half of June 2007, in the eastern portico the restoration of the columns and the entablature has been completed up to the course of the Doric frieze; inside, three beams and their substructure have been restored. In the western hall the restoration has been completed up to the level of the Ionic epistyles, including two Ionic capitals. The capitals were carved by hand, restoring the original forms according to existing fragments, and their making took, on an average, the work of two men for 27 months (Tanoulas, 2006b). Thanks to the technical ingenuity of our marble technicians, the original design has been rendered with technical integrity worthy of that of the ancient originals. Through this work, invaluable knowledge on the making of such complex an architectural form has been gained.

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Figure 5. One of two modern replicas of the original Ionic capitals of the Propylaea.

The ongoing project concerning the restoration of the superstructure of the Propylaea central building is planned to have been completed before the end of this year. The whole enterprise will have involved the disassembly, conservation and reassembly of 267 blocks and the incorporation in the structure of another 73 blocks; these latter blocks will restore, for the first time, the superstructure of the building above the central passageway. In the end there will have been put up about 340 architectural members the weight of which vary from 0,5 to 10,5 tons.

Future interventions, the studies for which have been completed but not yet obtained final approval from the Ministry of Culture, concern firstly the restoration of 17 identified blocks in the superstructure of the south wall of the western hall of the central building and, later, in the superstructure of the northern and of the southern wings.

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