PROBLEMS, ASPECTS AND METHODS FOR THE ANASTYLOSIS OF THE EAST RETAINING WALL AT THE ANCIENT THEATRE OF DODONI

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ABSTRACT

The retaining wall of the eastern parodos at the ancient theatre of Dodoni supports the kerkis and its stairs and determines the northern edge of the area of that parodos. It is the only part of the construction where the inclination of that retaining wall can still be recorded, despite the intense decay of the structure, the limestone blocks and the later interventions. The project of the study for the recording of the whole monument and the partial restoration of the ancient theatre was executed by a team of engineers and scientists and it had been focused on the lower eastern part of the monument, as that part incorporates problems and characteristic aspects of interventions which could be also applied to the rest of the theatre later on. The main issues of the anastylosis were related to the preservation of the original traces of the inclination, the presentation of the authentic geometry, forms and structure, the capability of the reuse of the monument and the conservation of the rapidly decaying limestone. For the intervention on the retaining wall and the parapet were used authentic pieces of stone blocks in relevant positions, as well as new curved stones according to the recorded geometry of the original ones. A part of less than 50% of the construction had to be disassembled to conserve the severely damaged stone blocks. Moreover some small inaccurate repositionings of the intervention of the 1960’s were corrected.

INTRODUCTION

The retaining wall of the eastern parodos at the ancient theatre of Dodoni, in Epirus, supports the adjoining kerkida and its narrow scale. Besides that, it determines the northern edge of the space of that parodos. It is the only part of the construction where the inclination of that retaining wall can still be recorded, despite the intense decay of both the structure and the limestone blocks.

The project of the study for the recording of the whole monument and the partial restoration of the ancient theatre was executed by a team of various engineers and scientists, after a commission granted by T.D.P.E.A.E. and was approved by the Central Archaeological Council. The coordinator of that team was the architectural firm Architectoniki Ltd-P. Grammatopoulos-X. Panousakis and the members were the Surveyor Engin. Dr. E. Vozikis, the Civil Engineer K. Chatziantoniou Msc,
the Prof. P. Theoulakis Dr. Mineral Engineer, the Ass. Prof. in archaeology N. Katsikoudis and the author of this paper. The project had been focused on the lower eastern part of the monument, as that part incorporates problems and characteristic aspects of interventions which could be also applied to the rest of the theatre later on, incorporated in future funding programmes.

The main issues of the anastylosis of that part of the construction were related to the preservation of the original traces of the inclination, the presentation of the authentic geometry, forms and structure, the capability of the reuse of the monument [1] and last but not least with the conservation of the rapidly decaying limestone of many of the stone blocks which form that retaining wall as well. [2]

**DESCRIPTION AND ANALYSIS**

_Brief Description of the Monument_

The whole theatre expands on an area of approximately 12.500 m² and originally it could accept more than 18.000 spectators. It was constructed partially inside a natural rocky cavity at the north western area of the ancient sanctuary of Zeus. This sanctuary is situated almost in the centre of the valley of Dodona. Some parts of that rocky cavity were reshaped and formed as pieces of the cave of the theatre. The monument is oriented to the south (Fig. 1) and the parts of its cave which are built higher than the natural surroundings are supported by impressive retaining walls. Four towers more than 12 m high strengthened the great retaining walls at the south façade. The rest of the retaining walls are reinforced by a kind of ribs on their masonry.

**Figure 3:** Plan of the theatre (SE sector-2005) a. Parodos, b. Scene, c. Ionic portal d. Aetolian plateau, e. Stairway, f. Towers, g. Eastern retaining wall, h. Tier of seats (kerkis), o. Orchestra z. Diazoma

The cave is separated into two zones by the relevant corridors- diazomas. Another perimetrical corridor at the higher end – the peridromos- was determined by a semicircular wall. There were opened at least two stepped exits and the existence of two more originally could be concluded. The main passages to the cave were the circular orchestra itself and originally the two edges of the
middle diazoma. Later on, two more passage ways were formed at the edges of the lower diazoma. These edges were, and still are, leading at the two impressive stairways with parapets, attached on the south retaining walls. The accesses of the stairways are at the lower part of these walls, at the parodoi of the theatre, which are also the main ground level passage ways to the orchestra. The building of the scene determines the south edge of the parodoi. The parodoi of the theatre were shaped during the various constructional phases of the monument. They incorporate characteristic features of these phases as well as of the various recent interventions, applied just after the archaeological excavations which revealed that remarkable monument.

The Constructional Phases of the Theatre

The original phase is dated between 297-292 B.C. [6] incorporating the orchestra, the cave, the retaining walls, the impressive stairways and the older part of the scene. During that phase the parodoi were longer than they appear today, and the stairways started from that part of the monument. The interpretation of the numerous constructional evidences -i.e. curvings on the retaining walls, (Fig. 11) pieces of the natural rock formed as foundations etc - leads to the conclusion about the existence of single or double opening portal gateways -thyromata or thyrones[13]-(Fig. 6, 7) at both parodoi, relevant to well known similar constructions in other ancient theatres, as in Epidaurus [10], Delos [9] etc. One of these evidences was also recorded in the drawings of the 1960’s. The detailed study and interpretation of these traces can verify an extremely important feature of the architecture of this theatre which was attached on the relevant retaining walls. The lower part of the cave was laid with the rows of the seats of limestone definitely during that phase.

Several architectural elements testify that the upper zone of the cave was totally formed during the second constructional phase which took place after the invasion of the Aetolians in Epirus in 219 B.C. and the destruction of the sanctuary of Dodona. [6] Many traces on the remaining parts of the theatre testify that this monument suffered as well after that invasion. A plateau - called the Aetolian ‘Backfill’- supported by a low retaining wall, was formed at the south east side, just off the relevant retaining wall and embodied the pieces and stones ruined after that invasion [6]. This construction incorporated with in situ some part of the eastern external stairway. The relevant section of the stadium, which was built in that period [6], embodied a small part of the western stairway as well. The lower parts of both external stairways were dismantled providing the adequate space for the new, wider, parodoi. New twin ionic portal gateways were constructed then between the short new retaining walls -perpendicular to the theatre- and the reformed building of the scene. After all these modifications, the access to the external monumental stairways was made through the stadium at the western side and via the Aetolian ‘backfill’ at the eastern side.

Some repairs must have been made after the raid of Aemilios Paulus at 168 B.C. [6]. The next constructional alternations on the theatre were made during the Roman era, between 27 B.C. and 14 A.D., when it was transformed to an Arena [6], like most of the ancient Greek theatres. The building of the scene, the lower part of the cave and the parodoi were the parts of the monument which were reformed at the most. The main feature of this phase is the elliptical wall of the arena, made by the dismantled pieces of the lower parts of the cave, of the scene and some stones from the parapets of the stair ways. It was plastered with lime mortar and blocked both parodoi. There, only two narrow doors were left open for the entrance of the gladiators [6]. The access to the cave was being done only by the external stairways and the doorways at the peridromos.

Excavations and the Recent Interventions
In 1875 started the first archaeological research by K. Karapanos [4] which was finally completed after a systematic excavation from 1955 until 1959 by D. Euaggelidis and S. Dakaris [6]. Just after the completion of the excavation (Fig. 2), started the restoration project aiming to the reuse of the theatre in the August of 1960. Therefore the intervention started from the area of the cave – *temporary placement* [4]- and provided the adequate seats for that. Issues of that project have been described at a technical report of Ch. Mpouras in 1961 [11] and analyzed in details in the relevant part of our study of 2005 [1]. The anastylosis and reconstruction of the retaining walls and the main part of the stairways took place in 1963-4 [7, 8], after a detailed study of the architect V. Charisis [5]. Minor restoration works of smaller scale have been made in the late 1960s’ under the supervision of the local archaeological service. [14]

**Figure 4:** The retaining wall before the intervention of 1960. (V. Charisis)

**Figure 5:** The elevation illustrating the types of the intervention of 1960. (V. Charisis) in yellow the disassembled parts in blue the reconstructed

**Recording Issues**

A detailed recording of the intervention of the 1960’s documented the parts which had been disassembled then and the miss positioned stone blocks which were put in a relevant place but some of them were disturbing the layout of the adjoining ancient stair steps. Moreover the serious decay of the original and repositioned stone blocks was recorded. It was also determined the outline of the in situ part and the stone blocks which have been dismantled in 1960 as well.

In addition to that, an extremely detailed architectural recording, aided also by digital techniques as a DTM, testified not only the exact degree of the inclination of the wall [3] but also the probable existence of a portal construction between the retaining wall and the building of the scene, as it was mentioned before.

**Figure 6:** Representation of the portal and the 1st phase of the stairway (on a background representing the 2nd phase)

**Figure 7:** 3D representation of a possible outline of the portal.
Unfortunately, due to the limitations of the contract for that project, it was not possible to incorporate any proposals about the construction, the layout and the form of that portal, which probably should have had two openings, according to the width of the original *parodos*.

**Figure 8:** The traces of the authentic inclination  
**Figure 9:** The structural layouts of the parapet

The use of photogrammetric techniques resulted in the documentation of the original geometry of parts of the wall of the Roman arena which had been removed in 1960 and made possible their incorporation to the restoration proposal. [3] Modern digital techniques were also used to record valuable data of pieces of the construction which have already been considered as parts of the parapet of that retaining wall in a way that they could be embodied to the anastylosis.
**Figure 10:** The actual state of the retaining wall of the eastern parodos and its pathology. The outlines of the original missing parts are indicated in gray and red.

**Figure 11:** The decayed stones which preserve the original inclination.

**Figure 12:** The lower part of the retaining wall and the trace for the attachment of the original portal.

**Figure 13:** Pieces of cover stones of the wall recorded by V. Charisis in 1960

**Figure 14:** Elevation of the actual state of the wall (2005)

**THE ANASTYLOSIS**

**Aims and Principals**

One of the main aspects of the intervention was to preserve and present the various elements of that part of the monument which are incorporated to the various constructional phases of the theatre and coexisted with the roman-last phase of the monument. They testify vividly the continuous use of the theatre for a period of five centuries. These parts are the lower stone block rows of the retaining wall, the parapet which still keeps the traces of a repair that has been made most probably at the early roman period [6] and the impromptu built wall determining the modification of the theatre to a roman arena in the years of Augustus. [6] The intervention on the lower part of the retaining wall and on the parapet, contributes as well to the preservation and
protection of the only original stone blocks where the authentic inclination has survived. Up today the entrance of most spectators of the lower rows stepped over the two in situ stones which preserve that original inclination.

It is obvious that the reconstruction of limited parts of the retaining wall and the parapet, assures the understanding of the original structure and form of that section of the monument. The size of the reconstructed part is also determined by the principal for application of a low percentage of new material in comparison with the existing original stone blocks.

The Works of the Intervention

For the intervention on the retaining wall and the parapet were used authentic pieces of stone blocks in relevant positions, as well as new curved stones according to the recorded geometry of the relevant original parts. For the case of the wall of the roman arena, many stones were attributed to their original position, before the partial dismantling in 1960 made for the widening of the opening of the parados.

A part of less than 50% of the construction had to be disassembled to conserve the severely damaged stone blocks. That part is related with the part that the intervention of 1960 by V. Charisis was applied. In addition to that, some small inaccurate repositions of the intervention of the 1960’s were corrected.

![Figure 15. The south elevation drawing illustrating the various works for the anastylosis.](image)

The percentage of the new stone blocks used is less than 35% of the total at that lower part of the eastern retaining wall. The geometry of the reconstructed part of the construction occurred after the application of the guidelines of the existing areas of the wall. Similarly the cover stones which support the parapet were formed in relevant ways as the original pieces. That formation refers to the two different layouts for the attachment of these stone blocks to the main body of the retaining wall.

The works for the project of the conservation and anastylosis of the retaining wall and their sequence are:

- **Dismantling** of the stones blocks and part of the backfills after numbering the stones and
detailed recording key points for their repositioning.

- **Consolidation**, where it is necessary, of the exposed backfills of the intervention of the 1960s.
- **Arrangement** and storage of the stone blocks which will not be reused again in a certain area for that purpose inside the archaeological site.
- **Conservation** of the material of the ancient stone blocks. That procedure refers to various treatments as the cleaning of the surfaces, the consolidation of the insecure parts, grouting of the cracks and small cavities, hydrophoby of the surfaces with special solution e.a. The application of these works, the methods and the materials used are according the specialized study by P. Theoulakis [12]
- **Bonding** of the broken ancient stone blocks with the use of threaded titanium joints of various diameters according each case. This work is applied differently in the cases where there is a complement of the missing or removed part of the stone block. There the joints are related with the reinforcement of the complement and a smaller diameter is being applied. In both cases the holes will be drilled with slow rotation and an aqueous mortar of special composition will be applied. [12]
- **Completion** of the missing or removed parts of the ancient stone blocks. The complement is made by the selected local limestone from the region of Ioannina (see below). Titanium joints - made of threaded or not bars- are being used for the bonding with the ancient piece. Unfortunately is not possible to consolidate some of the highly decayed parts of the limestone, and these parts will be removed and will be replaced with a completion piece.
- **Reassembling** of the dismantled and the new stone blocks. All the disassembled part will be separated from the *insitu* by a thin continuous led ribbon – 5 cm wide-, slightly visible between the blocks. Small pieces of led ensure as well the proper and tight bedding for the reassembled blocks.
The material for the new stone blocks was proposed to be local limestone from the region Ioannina which presents very similar characteristics to the ancient stone [12]. The dimensions of the stone blocks will have at least 2.5 cm. uncurved zones- aperga on each side, the minimum necessary size for the secure shaping to the final dimensions. All the new blocks would have the external visible surfaces processed with chisels either with fine texture or with moderate (thrapina or ntsilidiko).

In the anastylosis project some new stone blocs embodied to the intervention are either the pieces which were documented in 1960 and has not been found during the study, or pieces documented from their original ones incorporated to the wall of the arena. Both categories are indicated with a different darker colour in Fig. 15.

The metallic pieces of the intervention for that part of the monument are titanium bars of various diameters and are either threaded for the diameters more than 6 mm on not threaded for the diameters of 6mm and smaller. The led ribbons used for the separation-distinguish of the restored parts and for the proper bedding during the reassembling are made of led sheets 5mm thick, cut in a way according to the various needs in each case.
Figure 20: The joints for a broken stone block.

Figure 21: A top stone with a grove for the cover stone (that of Fig. 19)

The titanium joints used at the places of ancient joints – i.e. at the parapet stones- are specially designed in a relevant form to the ancient ones, but also in a way which permits a proper application of led cover of the gap between the metal joint and the grove of the stone. (see Fig. 17) The vertical joints between the cover stones of the wall (Fig. 18, 19) and the blocks of the parapet are similarly applied.

An important issue of the intervention was the application or not for an artificial weathering on the visible surfaces of the new stone blocks. The extensive decay of the ancient stones along with the special properties of the stone ensured the extreme differentiation between the ancient and the new pieces. Few samples applied on specific surfaces will be the guide for the final decision for the extensive application.

All the presented works were approved by the Central Archaeological Council, after two sessions in Athens and one on site in Dodoni in November 2006. A relevant Minister’s verdict was issued for both cases.

Figure 22: View of the approved anastylosis of the retaining wall from the orchestra

Figure 23: General view of the actual state of the retaining wall of the eastern parados
CONCLUSIONS

The methods and the techniques applied for that anastylosis are adjusted to all the principles of restoration and interventions mentioned in the international charts for the protection of the monuments, as the Chart of Venise and the of Granada. Not only the amount of the new material used is as less as possible, but also the purpose of the application for the new material is mainly the protection of the monument and less the presentation of the original structure and form. The extent of the anastylosis was limited only to the parts where the ancient structure and form was precisely known, avoiding any hypothetical interventions. All the adequate efforts were done to preserve as much as possible of the decayed ancient parts and the materials used are sympathetic to the original construction. Moreover, the techniques for the bonding and the completion of ancient stone blocks are the well known, documented and tested methods testified through the Greek and international experience. They assure a great amount of reversibility to the intervention. This issue is extremely important in this case, since some documented – by V. Charisis- pieces have not been found and their replicas were incorporated to the anastylosis. The aesthetic issues were also discussed quite extensively since the intervention on the retaining wall as well as that at the cave of the theatre interference to the well known existing impression of the theatre.

All the experience gained after that project of anastylosis, which has already being applied, will contribute to a further study of the padodoi of the ancient theatre of Dodoni. Moreover it will help the restoration of the western padodos in the near future. Moreover, it will be the guide procedure to many restoration issues at the rest part of the monument.

REFERENCES


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