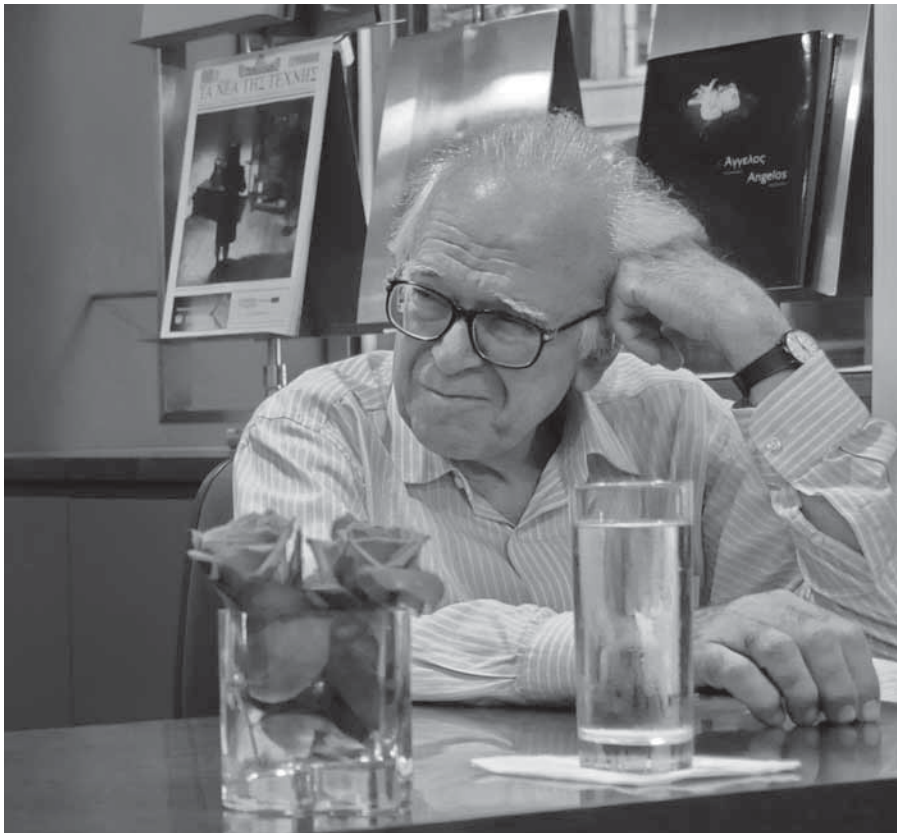
The Acropolis Restoration News

16 • September 2016

The Acropolis viewed from the west. Photo T. Souvlakis, 2016

A hero founder



Charalambos Bouras (1933-2016). Photo G. Triantafyllou

Charalambos Bouras is no longer with us, yet his work, whose traces can even be found within ourselves, embraces and surrounds us. We are surrounded by his knowledge of the History of Architecture and his ideas he did not only cultivate, but also generously and effectively placed at everyone's disposal. However, although this academic field existed even before Bouras, owing to the efforts of his predecessors, the Protection and Restoration of monuments are domains that had never developed in our country on a national level, as until the time of the work of Orlandos and Travlos, only isolated personal cases had diligently tried to work within this field.

The way the field of action of these pioneers evolved into an academic/professional speciality within Greece, and achieved to attain a satisfying institutional safeguarding and a collective recognition, was also among Charalambos Bouras' achievements. The older ones among us already know the story. We might not know the very moment such thoughts came to our teacher's mind, but in March 1967, only months after his appointment as a Professor in the School of Architecture of the University of Thessaloniki, Bouras had his renowned "Three Suggestions" ready. Being still quite young but of a recognised academic status he had managed to present and discuss these suggestions in the 1st Archaeological Conference and then had them published in the Technical Chronicles. These suggestions referred to the need for a highly reliable documentation and diagnosis on the conditions of the monuments, the creation and effective storage of appropriate archives and finally the introduction of postgraduate studies in the School of Architecture to provide students with the opportunity to have an advanced scientific and professional specialisation.

At the same time, because his environment was not entirely mature yet, he initiated the implementation of these ideas by taking personal action. Having already gained professional recognition and having devoted a lot of time to writing texts, letters and reports, he had, for decades, managed to obtain scholarships for postgraduate studies abroad in order to assist the best young architects, who, despite the existing building boom of that period and the guarantee of potential professional success, preferred the not so profitable adventure of working in the monuments. Year after year the number of students was increasing and by the time relevant programmes were finally introduced into Greece about one hundred students had already benefitted by expanding their studies. During the same long-lasting period the Professor was progressively cultivating the right conditions in undergraduate level by offering optional subjects equivalent with those of the best technical universities of Europe. Alongside, he also played a leading role in the most important restoration works of the country, (always pro bono) and as such his teaching always corresponded to real needs and conditions, supported by his vast practical and construction knowledge which was also combined with a perfect legal and protocol knowledge.

Finishing, we can say that Charalambos Bouras had a great impact on many young architects, who excelled in a profession that recognises him as being the decisive factor for its strict scientific and principles-based development in Greece. In other words, Charalambos Bouras was the hero founder of that activity that unites and makes us useful members of our world. A hero founder, who according to its ancient meaning was the founder of a city or generally of a collective institution. In that new scientific field, already in existence for quite some time, with the oldest of us now retired, after having a lot transmitted to the next generation, Charalambos Bouras inspired to all of us also the appropriate ethos: companions not rivals!

Yet, as time wears on, conditions change and our strength is questioned, and although Charalambos Bouras is not here any longer, and he might still have had many things to offer and derive pleasure from, his numerous writings preserve their value, while his advice, thoughts and methods seem to exert such strong influence that can pleasantly and beneficially accompany our own journey.

Athens, 29 July 2016

Manolis Korres

Forty years since its formation and nonstop operation, the Committee for the Conservation of the Acropolis Monuments can be considered as a successful advisory body. This is mainly due to the responsibility its members feel for the serious work they have undertaken and also because of its interdisciplinary composition. It is all too natural that forty years of shared working experience result not only in shared memories of important events but also in the need for self-evaluation and reflection.

The reasons behind the beginning and continuation of the consolidation/restoration interventions in the classical monuments of the Acropolis are well known. The Committee, once it set out the principles for the interventions, extending those of the Venice Charter, organises and monitors the studies of the programmes, submits work proposals for their approval to the Central Archaeological Council and then supervises their execution. In 1999, in accordance to a Presidential Decree, the Acropolis Restoration Service was founded. Being in operation until today its Head is responsible for proposing the studies of the new programmes to the Committee and suggesting the required steps that need to be taken for their implementation.

Among the principles the Committee developed were the ones concerning the transparency of the works and the dissemination of information to the public. Thus, it organised six International Meetings for the restoration of the Acropolis monuments, distributed many studies and reports of the completed works, and most importantly publishes an annual Newsletter where all the members of the Service can contribute with their writings.

The Committee also inaugurated a thorough documentation of the monuments before and during the interventions, the preservation of the structural autonomy of the architectural members and the prevention of any chiselling off of the architectural members. All these aim at applying the principle of "reversibility", according to which the architectural members can be taken back to the condition they had before the intervention.

The quality of the works in the Acropolis has gained the Committee considerable prestige both in Greece and abroad. During the 70s though, it received some negative criticism by some English and Italian publications, however, documented answers were given. In Greece there have recently been some criticisms concerning the general strategy and scheduling of the works, in particular they have focused on the fact that some anastelosis works preceded other conservation works. However, it is well known that the works of restoring monuments, especially those of the classical period, such as the ones in the Acropolis, cannot be scheduled in the same way as new constructions because quite often, unexpected structural damages appear demanding immediate repair. This results in delays since every architectural member has to regain its initial strength, so the existing timetable needs readjustment.

The remaining works to be implemented on the Parthenon were fully presented in the proceedings of the 6th International Meeting for the restoration of the Acropolis monuments, in 2013.

The Committee hopes that these works will have been completed in the following years without departing from the principles and methods applied during the last forty years.

Athens, 31 May 2016

Charalambos Bouras
Emeritus Professor of NTUA
ESMA President

The Acropolis viewed from Lycabettus hill, April 2016. Photo T. Souvlakis

2016, The progress of restoration works on the Acropolis

In 2016 we paid our last respects to our teacher Charalambos Bouras, the President of ESMA for thirty years. The last time he visited the Acropolis was on 19th November 2015, when together with other members of the Committee he went to inspect the progress of the works as the restoration programmes within NSRF 2007-2015 were about to be completed. During that visit the extent of the existing problems in other areas of the monuments was estimated, while at the same time they set the priorities concerning future interventions.

Charalambos Bouras, till the end, served meticulously the restoration works of the Acropolis monuments. He examined, as he used to, and commented on the most recent studies that had been completed from the scientific personnel of YSMA during 2016. He was also responsible for submitting them for approval by the Central Archaeological Council (KAS) after they had been discussed and unanimously approved by ESMA. These were the studies related to the restoration of the west pediment and the north wall of the Parthenon, as well as the north Wall of the Acropolis, and which define the areas where the interventions of the next funding programme will concentrate.

2016 was a transition period between NSRF 2007-2013, which was completed, and NSRF 2014-2020, expected to start at the beginning of 2017. The Service, downsized to its 1/3 of its staff, dealt mainly with the preparation of the new restoration programmes and the rearrangement of the worksites so as to facilitate future works. An additional-emergency funding from the National Investments Programme allowed the realisation of a series of necessary works on the Parthenon worksite.

The Head of the Parthenon works is the architect R. Christodoulopoulou, while since 1.1.2016 the scientific personnel consists only of the architects Dr L. Lambrinou, V. Manidaki and A. Papandropoulos. Until the end of 2015 and within the context of preparing restoration studies, the following studies had been completed after having been discussed and approved during the 29th/2.8.2016 meeting of the Central Archaeological Council: "Study for the restoration of the tympanum orthostat of the west pediment of the Parthenon", by V. Manidaki and the civil engineer L. Paleologos, and "The restoration of the Parthenon west tympanum backing wall", by K. Skaris. In addition, last June the study "The restoration of the west wall of the Parthenon cella, final architectural and static study" was completed and submitted for approval to the Central Archaeological Council thanks to the voluntary work of K. Skaris and the civil engineer A. Vrouva.

Parthenon, viewed from the west, April 2016. Photo T. Souvlakis

At the same time the rearrangement of the worksite installations and equipment was examined, paying special attention to the transfer of the crane from the west side to the Parthenon cella. After the unsuccessful effort to acquire a new worksite crane it was decided to move the crane, which since 2002 had been used at first in the restoration of the north side of the monument and then on its west; simultaneously the removal of the crane, that had been placed in the cella since 1983, was planned. The removal was judged necessary after its persistent and unpredictable breakdowns that delayed the work and obstructed the possibility of adhering to a programme. The study, concerning the transfer and placing of the POTAIN crane to a new position, was prepared by R. Christodoulopoulou and V. Manidaki with the assistance of the retiree mechanical engineer S. Oikonomopoulos, and of Professor M. Korres. The crane on its new position will be placed on a travelling base on rails, whose length was calculated to be 36 m, so that it could accommodate all kinds of work even during the most adverse conditions of lifting loads, such as the central orthostat of the west pediment (a weight of 8,5 tons for a distance of 20,5 m) and the south architrave of the east porch (a weight of 6,3 tons for a distance of 16,5 m). The crane's base will extend to the west wall of the cella.

The scheduled transfer of the cranes dictated the removal of a large number of architectural members, accumulated during the last years inside and outside the Parthenon, because they had to be within the range of the crane's capacity, which was now in a new position. Therefore, 88 blocks and other architectural members were transferred from the south side to the north-east corner of the Parthenon, 5 coffer slabs from the open space western of the Parthenon to the platform on its north side, and final-

Professor Ch. Bouras during a visit in the Parthenon restoration works.
Photo L. Lambrinou, 2008

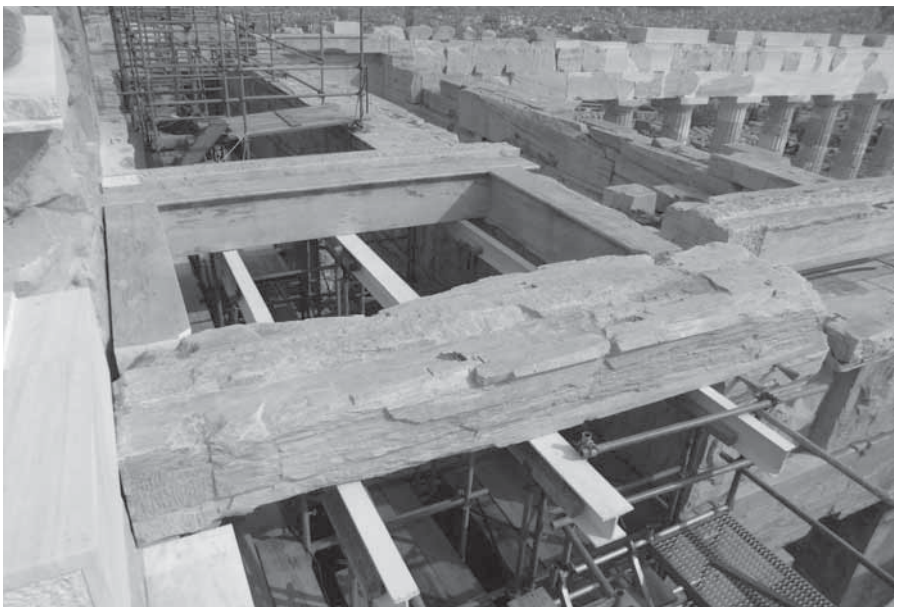
ly three beams of the west colonnade from the area north of the temple were moved and placed inside on its south colonnade.

In order to place the crane to its new position and facilitate the scheduled works on the west wall it was necessary to dismantle first and transfer the workshops that had been placed on the west side of the cella. Two worksite cabins used by the people of the Restoration Section working on the Parthenon marble surface were transferred to the worksite area north of the monument. The materials of the metal shelter-loft will be used in the construction of a platform for placing architectural members on the north side of the monument, while containers filled with ancient and more recent clamps, which were temporary stored in the south worksite of the shelter, were transferred to the old Acropolis Museum where their documentation was completed.

At the same time the areas of the worksite that extend along the south side of the Parthenon are to be rearranged in accordance with the study of L. Lambrinou. Besides replacing the external panels that were seriously damaged, equipment that will not be needed in the future programmes was removed from the worksite, such as the old pantographs, the fixed drill and the drum flute cutter. These were either stored in the area of the lifting platform or they will be given on loan to the Ephorate of Antiquities of the Dodecanese in order to be used in the restoration works of the Temple of Apollo, on the ancient Acropolis of Rhodes. The above works are in progress and expected to be completed in the spring of 2017.

Despite the decrease in the number of specialised personnel that happened at the end of 2015, the transfer of experienced marble craftsmen from the team working on the Propylaia to the worksite of the Parthenon allowed the continuation of the works in both areas. The works concerning the restoration of the north wall of the monument's cella carried on by reseting blocks of the orthostat and the first course of the wall; they all followed the study of N. Toganidis and K. Matala as it was modified in 2015 by K. Skaris. In addition to the 29 blocks of the orthostat and the 10 blocks of the first course of the wall, which were expected to be completed by the end of 2015, 6 more blocks of the orthostat and 11 of the first course of the wall were shaped and placed back to their positions, at the same time relevant works concerning the shaping of the final surface of the fillings and the new architectural members were carried out. Other works that were completed within the framework of the NSRF, concerned the restoration of the ceiling beams of the west colonnade and the repositioning of the two most southern beams together with the relevant inter-beam slabs. In addition, another completed work was the drilling of the two restored beams of the cella's west door lintel in order to reinforce it by titanium bars according to the structural study of V. Papavasiliou. Because of the large length of the drillings the work was carried out on a special bench placed east of the Propylaia and where the parts of the beams were transferred. Finally, additional works started concerning the carving of the flutes on the new surfaces of the third from the north column of the Pronaos. G. Aggelopoulos, S. Kardamis and G. Despiris were in charge of the worksites.

At the Propylaia, the restoration works on the northwest corner of the monument were timely completed in line with the study of the architect K. Karanasos, and until the end of February 2016 the removal of the scaffoldings from both the south wing and the northwest corner of the monument was



View of the two repositioned beams from the ceiling of the Parthenon west collonade.
Photo P. Christodoulopoulou, 2016

also concluded. In charge of the worksite was G. Despiris.

In the area of the Brauroneion cleaning works were completed, unusable materials were removed, and the visitors' route was redesigned in accordance with the study of the architect K. Mamalougas and the civil engineer D. Michalopoulou. The votive offering of Chairedemos was restructured and an information sign about the monument of the Temple of Athena Nike was placed on this position because its main –east– façade can be seen from there.

All these works in the west area of the Acropolis allowed access to the visitors who can now enjoy a view of the Propylaia and the Temple of Athena Nike without scaffoldings which for many years hid the monuments devaluing as such their aesthetic value.

The interruption of the works on the Propylaia gives us the opportunity to examine the monument in areas where interventions hadn't been implemented. In particular, in the foundation of the west wall of the north wing, where an installation of optical fibres has been placed –a donation of OSMOS Company– the monitoring of deformations continues, while the possibility of installing similar systems to other parts of the monument is being investigated.

On completing the works on the Propylaia the specialised personnel of the project moved to the worksites of the Parthenon and the Acropolis Walls.

The numbers of the Technical Office personnel and the worksite crew for the consolidation and restoration of the Acropolis Walls increased in order to realise the agreed works for the restoration of the Walls. The members of staff who were transferred to the office were besides the architect A. Chatzipapa, the civil engineer D. Michalopoulou, who was appointed Head of this project, the architect K. Mamalougas and the draughtsman G. Trichakis. The civil engineer N. Ninis, who was loaned to YSMA from DIPKA, was responsible for the work "Consolidating the rock masses and the Walls". The person in charge of the consolidation worksite was G. Vasdekis.

The removal of the scaffoldings from the south wing of the Propylaia was carried out in conjunction with their transfer and re-positioning on the north Wall, in the cave of Zeus area; the civil engineers V. Papavasiliou and F. Petsi conducted the study for these works.

Setting up the scaffolding enabled us to reach the exterior side of an area of the Wall where serious damage has been observed and to document troublesome places in order to prepare the consolidation study. During the first half of the year the studies concerning the consolidation of parts of the Acropolis north Wall in the areas B17 and B12-13 were completed.

The first study, by D. Michalopoulou and K. Mamalougas, concerns the area B17 (27,500-35,000) of the north Wall, in the position of the northwest building. A substantial part of the Themistoclean Wall boundaries are defined in the east from an Ottoman buttress, while in the west from the restored in the 18th century part. The ancient Wall used carved blocks of Piraeus aktitis stone arranged in an isodomic construction. This part of the remaining Wall has in its interior a height of 10 courses, while its exterior part has only 6 courses, since later on its highest part has been restored with the use of ancient stones. In the middle of the height of the exterior sidewall the construction is totally destroyed and many stones have fallen from the 7th and 8th courses. What is suggested for its consolidation is the conservation of its lowest part –up to the 6th course– and also of the highest, restored, section. For the 7th and 8th courses it is suggested to use new stone for the fillings corresponding so to the ancient structure. For the west side of the area to be restored, which is part of the most recent ottoman restoration, it is suggested to replace the mortars and grout it with appropriate and compatible materials.

The second study, by D. Michalopoulou and A. Chatzipapa, concerns the area B12 (34,000 - 42,000) and B13 (0,000-4,000), which is north of the Erechtheion on top of the row of the Pre-Parthenon unfluted drums, incorporated there during the Themistoclean fortification. The section under study has

Restoration works of the north wall first course of the Parthenon cella. Photo R. Christodoulopoulou, 2016

The two columns of the Parthenon pronaos after the completion of carving the drum flutes. Photo R. Christodoulopoulou, 2016

The south wing of the Propylaia, viewed from the SW. Photo V. Eleftheriou, 2016

The NW corner of the Propylaia central building as viewed from the north. Photo K. Karanasos, 2016

survived in its full height of 15 courses. This area was restored and filled in during the Balanos' restorations where the used materials of cement mortar and iron have by now been oxidized. The Wall presents erosion problems, widening of the horizontal stone joints and cracking. The restoration proposals aim at the structural restoration of this section, the reassurance of its static tolerability and its aesthetic enhancement by removing the most recent additions and also all the oxidized iron elements and cement mortars. What is proposed is the structural replacement of the ancient blocks and their systematic exterior preservation, the filling of 6 ancient blocks with new stone and the addition of new blocks in order to replace the ones used by Balanos' inapt choices.

The materials, which are to be used in the interventions on the Wall, contain mortars already employed during the works of 2015 on the south Wall and whose components resulted from conducted analyses of historic mortars of the area; an example of these is the stone coming from Pitsa near Corinthos, used for a limited number of fillings. Although these components are suitable for the proposed and future interventions, the need for further investigation into this matter became apparent, and to that end YSMA has instigated collaboration with the National Technical University of Athens and the Department of Stone of the Directorate of the Restoration of Ancient Monuments (DAAM).

Together with the above studies N. Ninis and D. Michalopoulou drew out the needed specifications for assigning geostatic analysis research in seven sections of the Wall and the rocky slopes of the Acropolis where most of the serious problems have either been detected or expected to emerge.

Concerning other works, the stabilisation of the rocky slope on the SW incline was completed, which according to the study of Dr D. Englezos included the uprooting and removal of flora and any loose parts of the rock, placing anchors, strengthening the rock with a wall in the areas of negative gradient, and among others laying a metallic mesh for additional support. Similar works are to be carried out to stabilise the limestone rocky slope southeast from the Temple of Athena Nike, scheduled to happen within 2017.

Maintenance work was carried out on the ten accelerometers placed on the Acropolis, at the same time the Institute of Geodynamics (G.I.) of the National Observatory of Athens (EAA) examined the seismic recordings under the supervision of Dr I. Kalogeras. In spring, within the framework of a research programme coordinated by the Institute of Geodynamics (G.I.) of the National Observatory of Athens (EAA) and the NTUA, funded by the Latsis Foundation, a number of fibber optic sensors was placed and connected with the set of the nearest accelerometers on the south Wall between the 7th and 8th buttress, supervised by the Institute of Geodynamics (G.I.).

During the 2016 the collaboration between YSMA, MIE University and the National Technical University of Athens (NTUA) continued to record seismic activity from the set of accelerometers

View of the Brauroneion area after its opening to the visitors. Photo E. Petropoulou, 2017

that was placed on the northeast corner of the Parthenon. In August one more recording instrument was positioned on the south colonnade of the monument.

The conservation works on the surface of the monuments, implemented within the framework of NRSF, were completed on time and continued during 2016 on the Parthenon and the Propylaia. Head of the department is the chemical engineer Dr E. Aggelakopoulou. During the year it was decided to give priority to recording and importing in a database documentation material collected from all the monuments throughout the last decade. This project coincided with the conservation works on the surface of the monuments.

Conservation works also took place on the Parthenon, after the restoration crew finished its works, especially on the blocks of the west side doric frieze backers and on the north wall (the 1st course and orthostat), under the supervision of the conservator A. Panou. At the same time the conservation works of the central metopes, the triglyphs and their overlying and underlying members on the west part of the monument started; the works began from the 6th metope and the 6th triglyph. In the summer the workers crew focused on evacuating the worksite cabins, transferring the materials and arranging them in their new location.

At the Propylaia, under the supervision of the conservator A. Frantzikinaki, research was carried into the condition of the stoa colonnade in the north wing, the overlying architraves and their backers. The drums of the columns were photographed and drawn for documentation reasons, while systematic interventions in conserving the lowest drums of the three columns started. Moreover, interventions were carried out to save and conserve areas of the north wing floor and the portal wall of the central building where pins were inserted in the niches of the architectural members on the superstructure of the monument.

The deterioration state of the Wall was recorded under the supervision of the conservator A. Tsimereki, in addition, a technical report was prepared to assess the preservation condition of the north Wall stones in the areas B12-B13, the chosen methodology and the conservation materials. In addition, after careful planning specific areas of the Wall were chosen so as to collect samples of historic mortars for analysis.

During 2016 the work of recording the scattered architectural members was also organized; the supervisor here was the archaeologist Dr E. Sioumpara. The main focus of the work was not only the study for the storage and exhibition of chosen scattered architectural members at the old Acropolis Museum, but also the preparation of the work for the next programming period (enhancement of the Chalkotheke area, of the Ancient Temple members arranging the remaining scattered members, after transferring them to the old Acropolis Museum), and promoting stored sets (such as the study of ottoman tombstones in collaboration with the University of Crete). The only remaining marble craftsman from the scattered members worksite continued work on restoring the Archaic triglyph of the inventory number 21432, (carving of the fillings, placing of clamps and filling mortar in the existing mortises –in collaboration with the Conservation Section– and the final carving of the fillings).

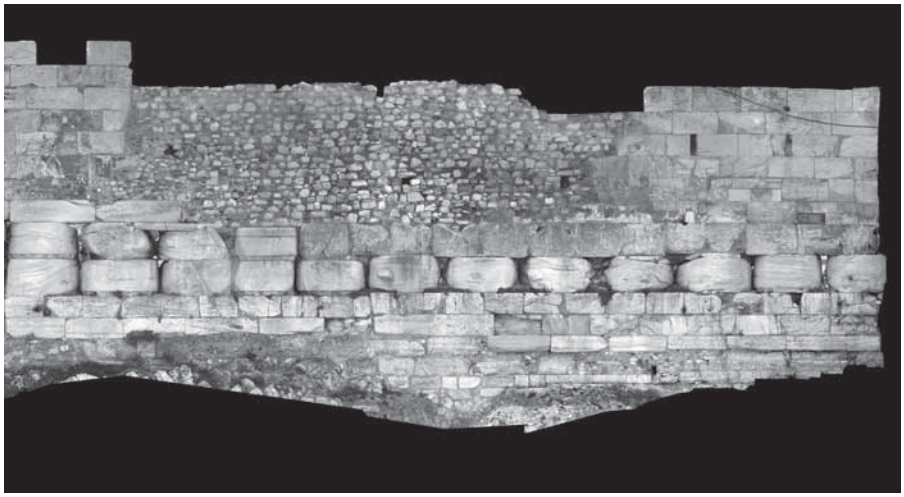
After the old Acropolis Museum was agreed to be used as an archaeological storeroom, and because YSMA's worksites had to be moved as their functions had changed, the architect Dr K. Karanasos put forward a proposal to place the worksite offices in the east halls of the Museum (the Karantinos expansion). The new design, especially in the north hall of the east part of the museum, took into consideration the existence of remains from the Sanctuary of Pandion, which had been removed during the expansion works in the middle of the 50s. This proposal revealed the position and level of the highest sections of the blocks that belong to the retaining walls of the sanctuary, and found that the remaining blocks could be repositioned in the hall, on the exact positions that result from the surveying of J. Bundgaard. The proposal refers to a part of the works concerning the re-use of the old Acropolis Museum, programmed by the Ephorate of Antiquities of Athens and funded by NSRF 2014-2020; the studies are carried out in collaboration with YSMA.

In December 2015 the work "Topographic and photogrammetric surveying" was completed under the supervision of the rural-surveying engineer D. Mavromatis. The last stage of the work that started in 2011 concerned the plans of the highest layers of the entablature in the NW and SW corner of the Parthenon after the repositioning of the architectural members, to a scale of 1:20 and 1:10, and the plan of the south wing of the Propylaia, to a scale of 1:25. The work "Three-dimensional scanning and production of a digital model of the temple of Athena Nike" was also finalised, producing a complete, entire, without gaps, three-dimensional triangle model of realistic texture, which has been created after the appropriate processing of the digital scanning and the appropriate photographs. Digital scanning and the production of three-dimensional models of specific architectural members of the Parthenon were also carried out from the rural-surveying engineer Dr E. Kalisperakis with the use of a scanner provided by YSMA.

The Documentation Office, in charge of which is the archaeologist Dr E. Lembidaki, responsible for documenting and promoting the works, assigned the archaeologist E. Karakitsou to continue the import of documents related to the restoration interventions in the Parthenon in the Database of the Service. Another similar project focusing on the restoration interventions in the Propylaia is to be completed by the archaeologist E. Petropoulou. The central office of YSMA Archive, after E. Tyropolis retired and the temporary staff left at the end of 2015, was run only by G. Alexopoulos, responsible for the network. For this reason in the autumn of 2016 two more members of the personnel, D. Chamopoulou and P. Konstantopoulos, were transferred there. The work of the Documentation Office continued by monitoring the operation of the Database, the import and organisation in the central archive of conventional and digital documentation material (drawings and photographs) coming from the restoration and conservation works of the Parthenon, the Propylaia, the Walls, the Erechtheion, the temple of the Athena Nike and the Brauroneion; works that were completed and presented by the worksites and the photographic lab. Moreover, the above work was also enriched by the entry of new papers and studies in the library catalogue, the entry of work logs, the digitalisation of conventional documentation material from previous years and its organisation, and finally by allowing public access to the use of documentation material and the distribution of the Service's publications.

At the end of 2015 the work resulting from the collaboration between YSMA and the National Documentation Centre (EKT) was completed. YSMA's depository, which was created in order to digitally organize the archive material from the Acropolis restoration works, is now easily accessible on the Internet address: **http://repository-ysma.ekt.gr.** Initially the public has been given access to documentation material (3.5000 documents) from the restoration intervention in the Erechtheion during the period 1979-1987: including texts from studies, drawings, and photographic and audio-visual material. In order to make the material widely accessible it was imperative to edit the terminology thesauruses of YSMA's Database, espe-

The Acropolis north Wall. We can see the scaffoldings (area B17) of the future intervention. Photo V. Eleftheriou, 2016



The Acropolis north Wall, area B12 of the future intervention. Part of an orthophotomosaic. Study for developing GIS in the Acropolis of Athens, 2009

A view of the rocky slopes at the SW area of the Acropolis, after the consolidation works. Photo V. Eleftheriou, 2016

cially the terms related to ancient Greek Architecture, the restoration and conservation interventions, as well as to the documentation works. The repository is to be enriched systematically together with the completion and presentation of the restoration works. M. Katsianis, G. Alexopoulos, E. Lembidaki and P. Kamatsos, librarian of EKT, supervised the work. On 22nd January 2016, the digital repository of YSMA, whose creation has been strongly supported by Ch. Bouras, was presented during an event at the Acropolis Museum. In the event the enriched digital catalogue of YSMA's library that can be now accessed on the address: **http://ysma.openabekt.gr** was also presented.

E. Karakitsou continued the recording of casts and copies from the cast laboratory. The photographer T. Souvlakis continued the photographic documentation of the restoration works.

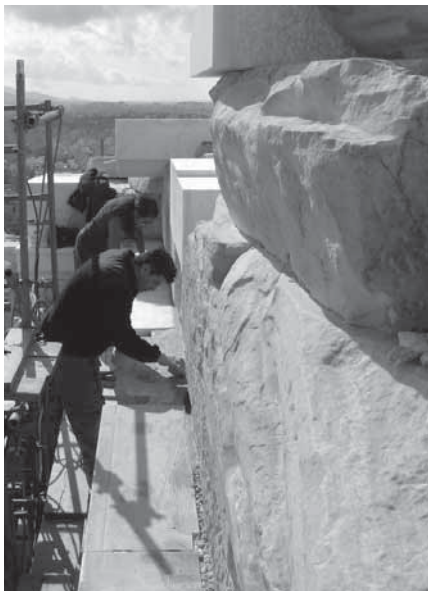
The archaeologist E. Petropoulou edited the Greek and English publication of the issue "The Acropolis Restoration News".

The archaeologists working at the documentation office of YSMA, E. Petropouplou and E. Karakitsou are also responsible for writing the minutes of all ESMA meetings.

The lack of supervisor for YSMA's sector of Electrical Engineering Support since 1.1.2016, has posed a serious problem to the operation of the worksites. For the time being, the foremen of the work sites are supervising the works, yet the electromechanical installations of the Acropolis works ask for supervision by specialised personnel.

The Department of Information and Education of YSMA continued its activities by organizing educational seminars to both students and teachers. The educational programme " Acropolis and Anastelosis", which 300 students from 14 Lyceums of Attica attended, was run for the third time on the worksites of the monuments on the 14th and 15th April 2016. The scientific team of this Department consists of the archaeologists E. Kaimara and A. Leonti, while we should mention the helpful contribution of the ex-Head of the department, Ms C. Hadziaslani.

Restoration works on the colonnade of the Propylaia north wing. Photo P. Vlachouli, 2016



Conservation works inside the west pediment of the Parthenon. Photo S. Gavrielidou, 2016

The contribution of the Accounting Department of YSMA, in charge of which is P. Katsimihas, has also been significant, especially during the demanding process of the financial management and regulation of the community resources that subsidise the works. In particular, through the demanding process for the completion of the works under the NSRF funding of 2007-2013, and also over the preparation of the proposal for the NSRF 2014-2020 funding, which was submitted by the Service on 30th September 2016.

Among other members of stuff that also contributed to the works was Ch. Papanikolaou, responsible for the Administration Office, and P. Karabetsou, in charge of the Office of Material Management. YSMA has been since 1.7.2015 part of the YPPOA electronic Protocol.

On the 30th of September 2016 the Emeritus Professor M. Korres was elected President of ESMA and the Emeritus Professor F. Mallouhou - Tufano Deputy President. Both of them are quite acquainted with the problems the monuments present as they have worked for many years in their restoration. The fist action taken by ESMA under its new President was the approval of the updated proposal by YSMA concerning the programming period 2014-2020 that was submitted after the invitation for the "Protection, restoration and enhancement of archaeological sites and major monuments, embodied in the List of World Heritage of UNESCO" by the Ministry of Economy and Development of a budget of €5.000.000. The proposal also includes the continuation of the works concerning the west side of the Parthenon, the north wall of its cella and the west colonnade, and the smoothing of the flutes of a column from the Pronaos. The areas that will be restored from the north part of the Acropolis Wall are B17, B12 and B13, moreover, part of the south Wall of the Acropolis in the area of the platform lift. The conservation works on the surface, besides the areas of the monuments that are being restored, will include the colonnade and the entablature of the north wing of the Propylaia. The Department of Scattered Architectural Members will catalogue selected architectural members that would be stored in the Old Acropolis Museum, document and organise scattered architectural members from the Ancient Temple and the area of the Chalkotheke, while, in collaboration with the Conservation Department, large limestone architectural members will be connected.

In parallel with the above, the following works will be completed: laboratory analyses so as to determine the nature of materials produced by corrosion, the evaluation of materials applied during the intervention for conserving marble and limestone, the experimental examination of the static adequacy of the restoration mortars, and the mechanical properties of the restoration materials and joining components, and also the use of observation instruments in chosen areas of the monuments (the network of accelerometers etc.). Finally actions have been programmed for the documentation, promotion and publicity of the works, such as the systematic import of documents in the Database, filming of the works, organising a two-day conference, educational activities, digital and printed publications concerning the works of the restoration and conservation of the Acropolis monuments.

The approval by the Ministry of Economy and Development of the proposal is expected to give a new incentive in the development of the restoration works on the Acropolis monuments, which as large scale technical works demand a numerous and specialised personnel, and also the supply of highly expensive materials. We remain optimistic that despite the difficult economic conditions of the last years, the works will continue unimpeded so as to be able to complete within the following years the work that our teacher, Ch. Bouras, started and served with dedication.

Vassiliki Eleftheriou
Architect
Director of the YSMA

Three-dimensional textured photographic model of the Athena Nike temple, 2015

Backfilling the foundations and designing a new floor for the interior of the Erechtheion

I. Backfilling the foundations

A general introduction

Parts of the foundations inside the Erechtheion were backfilled during the period 2014-2015. Restructuring the area inside the Erechtheion has been an issue pending since 1986, the year when the restoration works on the monument were completed. In the past, the late A. Papanikolaou, architect, scholar and responsible for the restoration works at the Erechtheion, and the civil engineer D. Monokrousos, although they had put forward proposals concerning this issue they were never implemented.

The aim of the intervention was to highlight the archaeological remains of the Christian basilica of the 7th century A.D., that is, the most important –after the classical period– historical phase of the monument and to relieve the confusion the visitors felt when seeing the monument's interior. In addition, the new design of the place would allow groups of visitors to enter.

It is worth mentioning from the beginning that the final decision concerning the extent of the intervention in the Erechtheion's interior was determined by balancing the following three main factors:

- To establish which historical period the intervention wants to highlight – in this particular case the one of the Christian basilica.
- To protect the rock and the foundations.
- To determine the areas of the monument considered acceptable to be concealed.

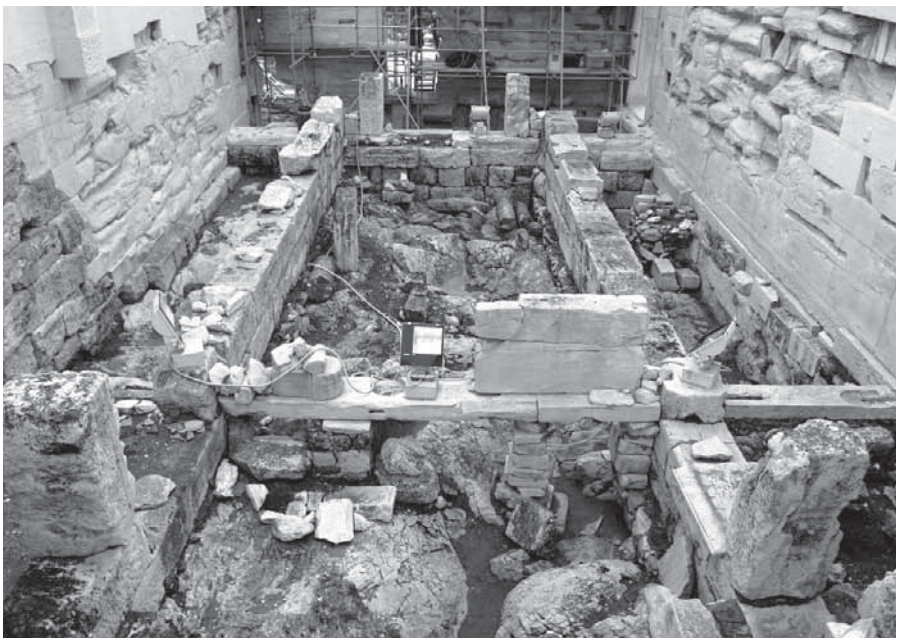
What remains from the Christian basilica are mainly the foundations and the stylobate of the colonnade and the iconostasis. The foundation is constructed with porous stone originating from the classical foundation of the eastern porch, while the underpinning is made of amorphous stones and fragmented marbles using mortar to bind them together. The design of the basilica and its division in nave, side aisles, sanctuary and narthex, becomes apparent from the surviving parts. Nowadays, what remains intact from the level of the floor –made of earth in the side aisles and paved in the central nave and the sanctuary– is only the area of the diakonikon. However, the exact level of the nave is also known because part of the floor had remained undamaged until it was excavated and removed.

Location and level of backfilling

The main purpose of the intervention was to underline and bring forward the Christian phase of the monument. Consequently the level of the Christian basilica's floor –in the nave, the south aisle and the area of the sanctuary– was chosen as the final level of the backfilling. The solution offers the visitor a very clear picture of the appearance of the monument during the specific historical period and restores the correct relation between the foundation and the super-structure, that is to say, between the visible and non-visible parts of the building. This level facilitates as well the visitor to easily access the interior of the monument. In particular in the south aisle the final level of the backfilling was differentiated chromatically –with the use of marble chips– at the position of the Erechtheion's cross-wall, in order to mark an exceptionally important for the monument architectural element that is missing today.

In contrast to the rest of the monument, the final level of the north aisle was constructed 50 cm lower than that of the basilica's floor so as to leave important details of the Erechtheion's construction unconcealed. Moreover, the backfilling stopped at its western part so as to leave unobstructed the classical doorway towards the area, where according to the tradition there can be seen on the rocks traces of the contest between Athena and Poseidon. To stop the backfilling a short wall was constructed out of new porous stone, built in such a way that the final layer of the backfilling covered its upper level, remaining as such as invisible as possible.

Finally, the area of the narthex –which was later converted into a cistern– was not backfilled. Such an intervention would ignore and hide important evidence of the monument's history. For this area there have been made provisions for constructing a new floor (see bellow).



The interior of the Erechtheion from E before the intervention. Photo K. Mamalougas, 2013

Choosing the backfilling method

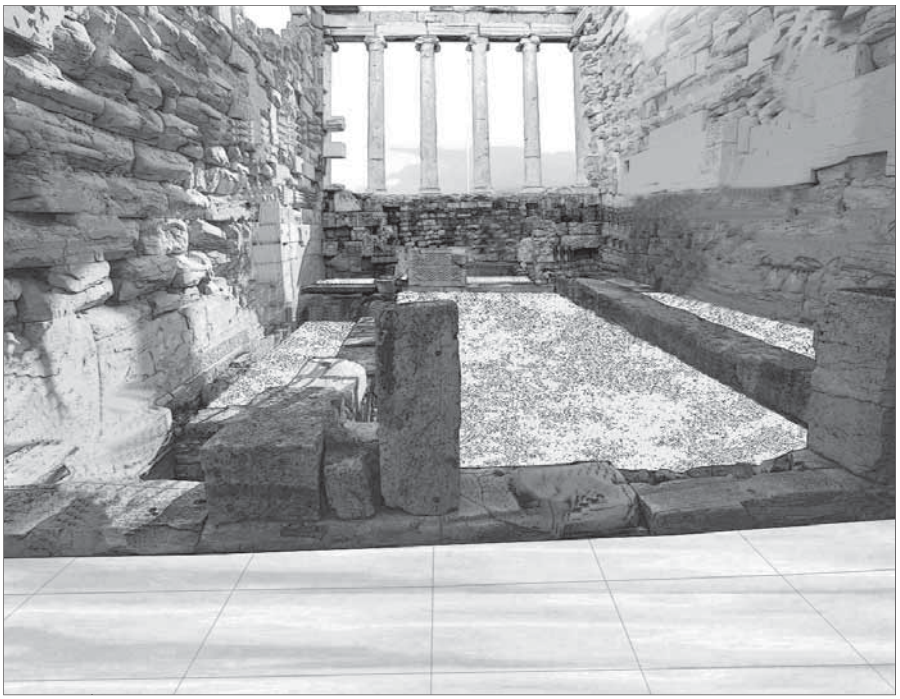
Rainwater in the interior of the Erechtheion penetrates into the surface layers and then flows deeper, following thus the process of infiltration. This process is facilitated not only by the existing limestone layers, which can be characterised as a permeable karst formation in respect to their hydrolithological permeability, but also by the presence of fine-grained material that fills the gaps of the limestone and is known to have middle permeability qualities which –in contrast to the limestone layers– traps the water and reduces the permeability coefficient.

Bearing in mind the lithological composition and permeability of the background (factors that affect the quantity of infiltration), the low height of the backfilling (0.75 – 1.30 m) and the sufficient width used in structuring the foundation walls (b=0.55 m), it was found that the simple backfilling with coarse grained material, of a high permeability soil, which facilitates the infiltration of surface water, was the most suitable method for backfilling part of the foundations (a surface of 100 m^2).

Backfilling was used in the nave, the side aisles and the sanctuary and it was supported with the use of geosynthetics. The construction of the work was carried out in accordance with the approved study and proved to be really effective during the heavy rainfall of 2015.

The soil filters were laid on four layers of different particle size. Because of the behaviour of the layers (filters) of the drainage system, and concerning the water flow –which to a large extent depends on the distribution and the size of the particles of each material, and therefore on the size of the pores and the gaps– the filters have been designed in such a way that the water flow progressively slows down from the underlying layers and the infiltrated quantity of the water cannot stagnate in the existing geomaterial.

For the backfilling natural materials were used, offering full grain size distribution that plays an important role in the compaction of every coating and as a result in the stability and density of the volume of the geomaterial giving it large load bearing capacity and shearing resistance. Moreover, with the use of those granular materials and the construction of the appropriate drainage coatings (filters), problems of lateral pressures that might be caused when the water of the soil pores freezes can be successfully addressed.

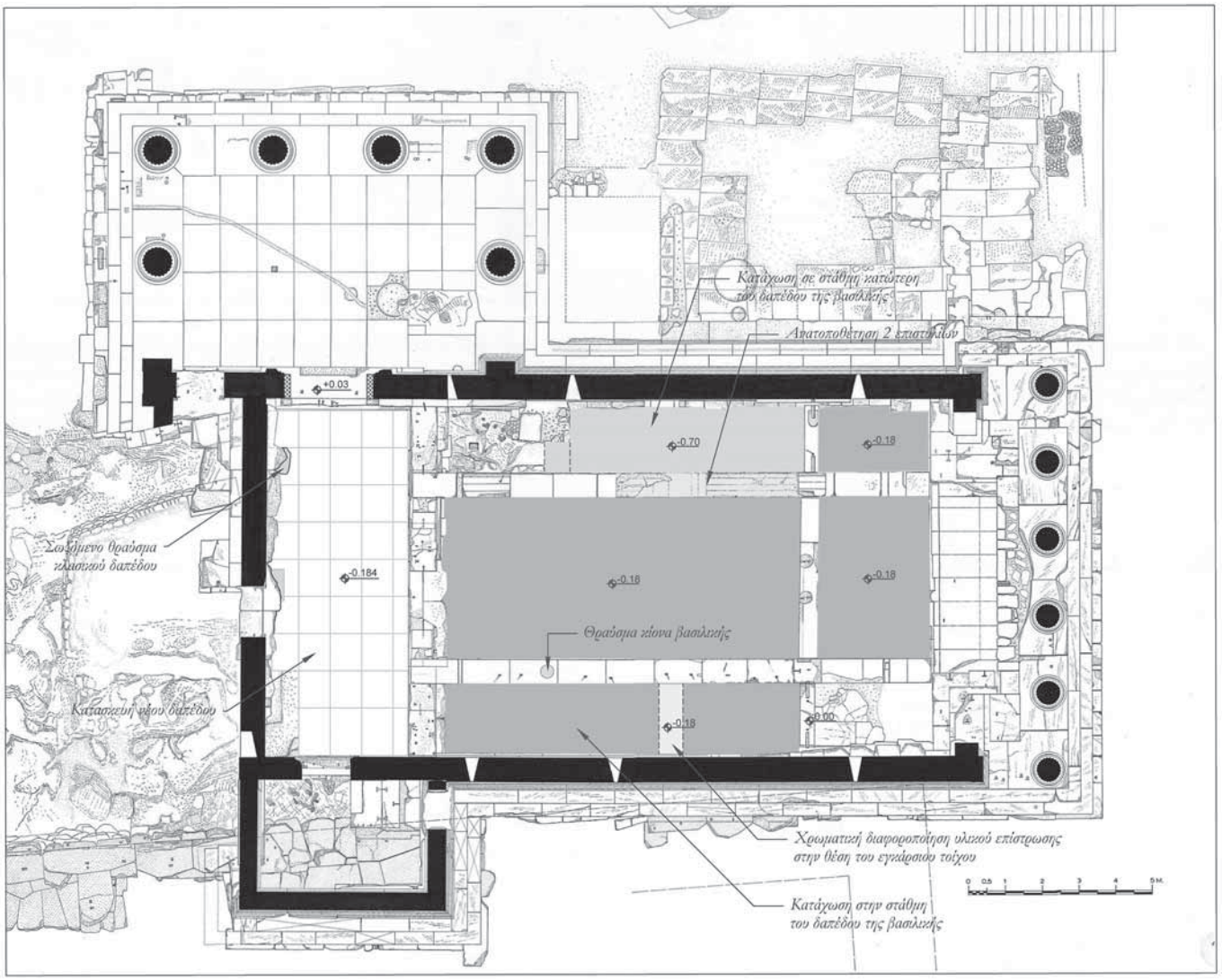


Proposal for the backfilling of the Erechtheion's foundation. Photorealistic imaging: K. Mamalougas, 2014

The cistern inside the Erechtheion. Photo K. Mamalougas, 2015

The first three layers –from the bottom upwards– are made out of quartz granular materials, which cannot be agglomerated as they don't have any filling capacity, while the final (levelling) layer is made up of small river pebbles. River pebbles were preferred to quartz material because the dust produced from the friction of the latter causes damage to the stones and can be of a significant threat to people's health.

Between the third and the final coating a separating, needle punched, non-woven geotextile was placed. For the protection of the porous stone made foundation walls the geotextile was placed at a distance of 15-20 cm from them, while the gap in the middle was filled with the graded geomaterial of the corresponding coating.



Top view of the Erechtheion with the new interventions. Drawing: K. Mamalougas. Background drawing: A. Papanikolaou

The stages of the works were in detail as follows:

- The lowest layer (20-25 cm), placed in contact with the ground, was made out of quartz sand (particle size 63-1000 μm).
- The core of the filter was constructed in full particle size distribution, in two layers (1000-2000 μm the lowest and 2000-4000 μm the highest).
- The final levelling layer, made out of small river pebbles (4000-8000 μm), was thoroughly washed and sieved. The choice of the final material depended on the effort to subtly adapt it to the surrounding space, both in terms of texture and colour.

Following this specific methodology in the construction of the backfilling ensures:

- The protection of the porous stone material of the foundation walls since a neutral physicochemical environment is created.
- The complete reversibility of the intervention.
- Zero strain, from soil forces, on the sides of the foundation walls.

It should be mentioned that infiltrating rainwater into the interior of the Erechtheion was not the best option; yet, the better solution to gather and direct it elsewhere could not be implemented because there is not any passage towards a lower level area. Any other solution would request to intergrade and use electromechanical equipment (pumps) and simply transfer the problem to another position in the perimeter of the Erechtheion.

Additional works

Backfilling in the interior of the Erechtheion was accompanied by a series of other works that did not only aim at

promoting the image of the monument, but also at reassuring the future possibility to access and study parts of the backfilled foundations.

Before starting the backfilling works the scattered fragments from the inside of the monument were recorded and removed. In addition, three-dimensional scanning, additional surveying and photographing of the area to be backfilled were carried out.

Then the older –constructed with scattered material– provisional support of the stylobate of the basilica temple was replaced. For this reason pillar-shaped support made out of new porous stone and integrated in the backfilling so as not to be visible, was constructed.

On the north foundation wall two architraves from the Erechtheion, which –in a later second use– had become part of the column stylobate of the Christian basilica, were placed back in order to facilitate the recognition of the Byzantine period of the monument. Moreover, on the south porous stone stylobate a fragment of specific green marble (verde antico), which probably comes from the basilica colonnades, was indicatively placed.

II. Designing a new floor

A general introduction

The resulting condition of the interior of the Erechtheion after the successive excavations and interventions made its visiting rather difficult. Although the completed backfilling allows groups of visitors to move around the largest part of the monument, it still does not solve the problem of allowing access to it. From the four doorways of the classical monument, the three ones open to its western side, where today there is no floor, whereas its eastern doorway is today much higher from the created level.

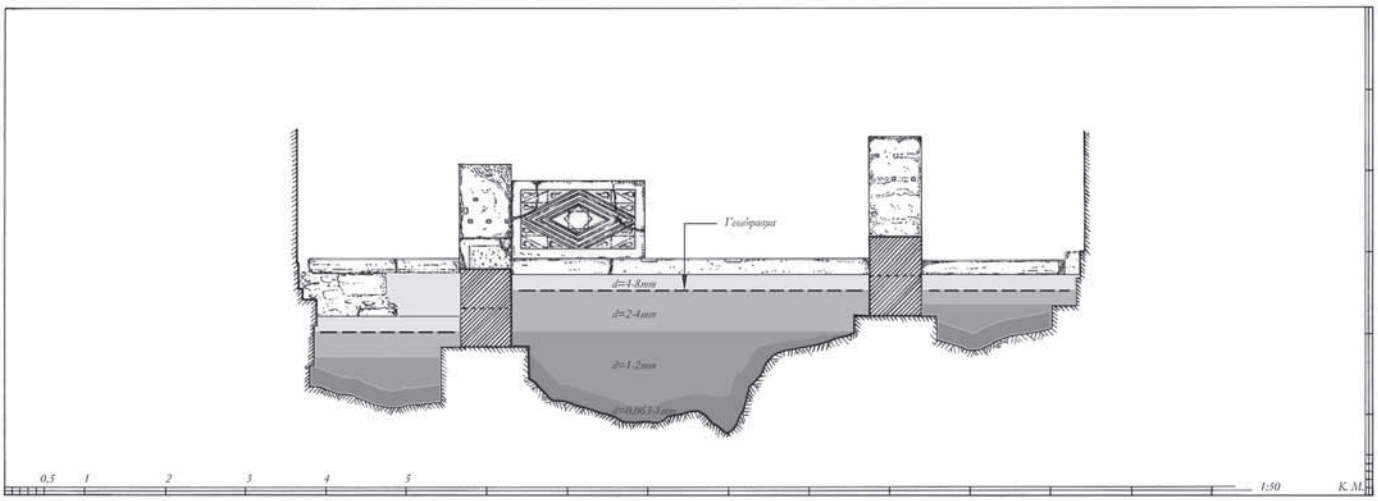
Making it possible to enter the Erechtheion again from the north porch would have given not only a solution to the issue of how to access the interior of the monument, but it would have also contributed to bringing the original function and layout of the monument to light. These were the reasons that led Professor M. Korres to suggest the construction of a floor above the medieval cistern, and the authors of this paper to undertake the structural study of such construction.

This area in the interior of the Erechtheion functioned during the classical period as the vestibule for its western chamber and can be identified with the area mentioned in an inscription as “Prostomieon”. Under its floor, in an unknown area nowadays, there was the “Erechthian Sea”, a well of salt water, which according to tradition was created when Poseidon struck the rock with his trident. The access from the “Prostomieon” to the well was through the “Prostomion”, an opening probably located at the Southwest corner of the area.

The floor of the “Prostomieon” was laid with marble slabs, 14 cm thick. A fragment of one of them was recognized by G. P. Stevens and is today placed on its position with metal supports. The area also comprised a marble bench, of 45 cm height, stretching along the western wall, and steps towards the Caryatides porch on its south end.

During the Roman conversion of the building the width of the area was reduced by 32.5 cm because of the western transverse internal wall’s displacement. Later on, during the Byzantine era, the area served as the narthex of the Christian basilica.

Finally, at a later date –unknown whether it was during the Middle Ages or the Ottoman rule– the character of the area changes, as the cistern takes the form it has today, covered with a semi-



Cross section of the Erechtheion interior with the successive layers of the backfilling. Drawing: K. Mamalougas

Photorealistic imaging of the proposed floor from north porch. K. Mamalougas, 2014

cylindrical dome, and having its marble floor destroyed.

Theoretical context

Every intervention in a classical monument, especially of the significance of the Erechtheion, constitutes many times a subtle balance between contradictory factors and principles. In this present case, in order to satisfy functional needs, and also to draw attention to the way the monument's interior was designed during both the classical and the Byzantine periods, contradicts the principle of safeguarding its authenticity, as it refers to a large-scale contemporary intervention.

The next pair of contradictory principles, reflected on the design of the suggested solution and the choice of materials, is the one concerning the differentiation of the new construction from the rest of the monument. The principle of offering the observer the possibility of distinguishing between the new intervention and the surviving original part should be applied up to the extent that it does not alter the character of the monument as a whole.

Finally, the decision to choose to highlight elements of a specific time period –in this case the one referring to the level of the classical and Byzantine floor– should not prevent the future researcher from studying either the cistern built on a more recent date or the older foundations.

Bearing in mind all the above, a study on the construction of a new marble floor laid on a metal grating which seats, with the help of columns, on the rocky bottom of the cistern, was submitted. It should be noted though, that the main intention of the aforesaid solution was to serve pure functional needs and in no case does it constitute a suggestion to restore the classical floor of the monument, especially when there are many doubts concerning its exact original form.

Design principles

Although, as it was mentioned above, the submitted solution does not suggest that the classical floor of the monument should be restored, an effort was made to consider the saved architectural elements and come up with a new construction that could be compatible with the original design and structure of the Erechtheion.

A very important matter concerning the harmonious integration of the new construction in the scale and structure of the monument is the need to define how the floor slab joints would be arrayed. For this reason the following data had to be deployed:

- The distance between the –recovered and placed back on its position– floor slab fragment from the threshold of the north porch. The above fragment preserves on its north side traces of anathyrosis, whose distance –and therefore the length of the missing slab– from the threshold of the north porch is 1.014 m.
- The common axis of the symmetry of the north porch and the doorway towards the porch of the Caryatids crosses the area in two parts –in the width it had during the classical period– at a ratio of 2:3. Drawing from this observation it is logical as well as consistent to the architecture of the monument, to divide the width of the area into five equal parts.

On the evidence given by the above, the basic slab size suggested is 1.014 x 0.855 m. This size differentiates in the perimeter of the floor, so as to cover all the area and creates a circumferential seal joint between the new and the old construction. In the eastern edge, in particular, the width of the slabs is reduced to only 44 cm so as to show the decrease of the area's width during the Roman modification.

Moreover, the proposed solution requires an opening in the southwest corner of the floor in order to indicate the position –possible on this spot– of the "Prostomion" during the classical period of the monument. This opening has been widened to provide the necessary space for the construction of a metal ladder leading towards the area of the cistern.

For the construction of the new floor it has been suggested to employ marble slabs of equal thickness with the ones of the ancient construction (14 cm). Despite using for the new floor identical material with that of the ancient one, the whole of the modern construction (use of metal elements – the existence of a circumferential seal joint) will be enough differentiated to help the demanding visitor understand the modifications. As for the completion of the missing part of the recovered ancient fragment of the floor, and for the construction of the two slabs that are adjacent to the base of the cistern dome, the use of artificial stone has been recommended.

In the case of the Erechtheion, the use of modern and highly distinguishable materials for the construction of the new floor, despite being a suitable prac-

tice in other kind of monuments, is not advised, because we believe that it is not acceptable to strongly juxtapose contrasting materials and ways of construction in order to clearly confirm the date of the intervention.

Metal construction

The new marble floor above the medieval cistern of the Erechtheion, dimensions: 9.45 x 3.84, will lay on a metal construction made out of a grating and supporting columns seated on the rocky base of the cistern bottom. The material selected was stainless steel 316L.

The parameters within which the designing of this supporting construction was completed depended on architectural demands, the formation of the structural load carrier, and also on limitations such as the constrains set by the previously existing conditions of the area.

These parameters are related to:

- The function of the basement area, that is, whether it is possible to access it in order to study and research the architectural members of the monument's foundations,
- the morphology of the available space and
- the dimensions of the marble floor slabs, which also define the grid of the metal grating.

After taking into account the parameters above and the characteristics of the area, a support metal construction was designed with the use of a space frame that has protruding parts (cantilevers) on its three sides (north, west and south), and is seated on the east side on the porous stone structure of the western cross wall. The structure system employs cantilevers because it is not possible to place supporting vertical elements in the perimeter of the new construction due to the rocky outcrops on the bottom of the cistern and the protrusions of the foundation stones.

The structural model of the construction forms a grid of columns joined with double symmetric beams, creating frames in both directions (x, y). The grid of the grating was designed in such a way so that the joints of the floor slabs above would be in the middle of the width of the primary and secondary beams' upper flange which in turn form a single level on which the marble slabs are seated. The exact form and the dimensioning of the metal elements together with the foundation of the construction on the rock will be the object of a relevant future structural study.

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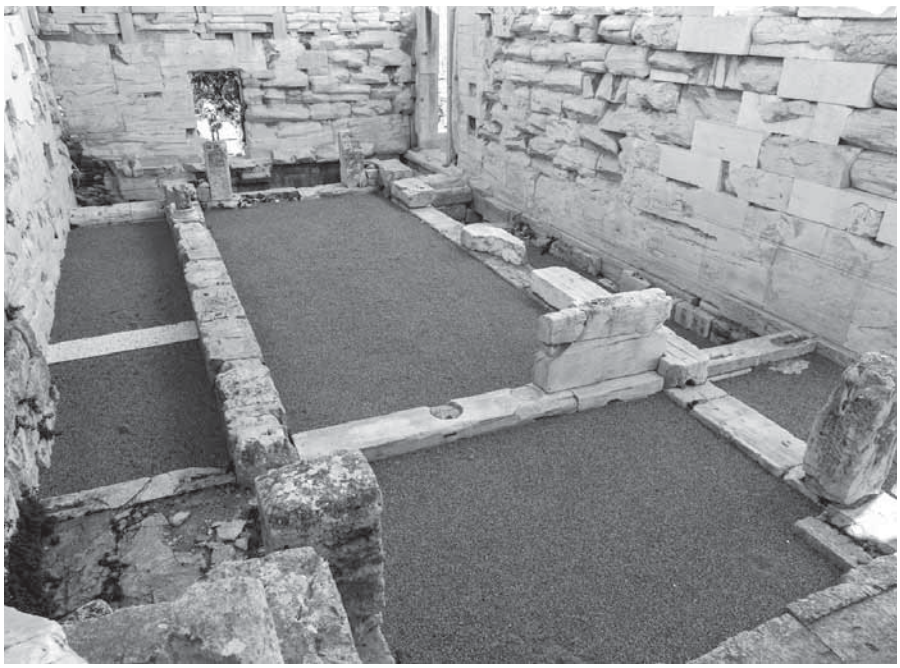
Civil Engineer, Head

Technical Office for the Restoration of the Acropolis Wall

Acknowledgments
On completing the above paper we would like to mention that the work would have never been completed without the valuable and constructive comments of the late Professor Ch. Bouras. We would also like to express our sincere thanks and appreciation to the Professor M. Korres for his profound contribution to developing suitable final solutions for this study.



The interior of the Erechtheion from E after the intervention. Photo T. Souvlakis, 2016

The interior of the Erechtheion from W after the intervention. Photo K. Mamalougas

The "Cast Laboratory" of the sculptural and relief decoration of the Acropolis monuments

The "Cast Laboratory", where cast technicians experienced in producing copies of ancient sculptures work, was established among the Sections of the Acropolis Restoration Service in accordance with the Presidential Decree 97/99 con-cerning the operation of the Service. The laboratory inextricably linked with the Centre for the Acropolis Studies, is housed in the basement of the Weiler building, on Makrigianni Street (Evi Touloupa *The Makrigianni land - the Weiler building - the New Acropolis Museum,* Anthemion, issue 25, 2014, in Greek). Except for the main laboratory, where the sculpture moulds (plaster or elastic moulds), and cast copies are made, there are also the two main halls of the basement and the corridors that are both specifically designed for their storage. The collection is further enriched with moulds and copies made in different time periods, the oldest ones dating back to 1846. Nowadays there can be found more than 1500 copies and moulds mainly of plaster on the shelves of the laboratory.

In the middle of the 70s when the degradation on the surfaces of the Athenian monuments was worsening because of air pollution, the main focus of the ensuing discussion was on the measures needed to be taken in order to protect the reliefs and sculptures that had remained in their original position, among which the Caryatids of the Erechtheion's south porch required the most urgent intervention. The decision of the Central Archaeological Council in 1976 to move the sculptures inside the museum so as to protect and replace them, on their exact positions, with copies, made it necessary to study and implement a specialized programme, which despite constructing casts (production of moulds and plaster copies) included works such as the construction of elastic casts, casting mortar of special composition, treating the surfaces etc. It has to be noted that during that period and in the cast laboratory the Caryatids copies were made under the supervision of the renowned sculptor and museum artist S. Triandis (A. Papanikolaou, *The Restoration of the Erechtheion,* Athens 2013).

The use of plaster casts in order to construct fine art copies has had a long tradition whose roots can be traced back in ancient Egypt. Literary sources and archaeological findings confirm the use of casts in Ancient Greece and Rome; moreover, since the Renaissance collections of plaster casts from the Greek and Roman Antiquity have been used to train artists. Plaster copies were and are still used as visual aids to teach Archaeology because sculpture cannot be suitably studied only from photographs, let alone in older periods where the use of photographs in publications was really limited. Known cast collections of works from the Greek and Roman Antiquity can be found at museums in Berlin, London, Copenhagen, Basel, Vienna, Rome and in many others.

The collection of the British Museum (I. Jenkins, *Acquisition and Supply of Casts of the Parthenon Sculptures by the British Museum, 1835-1939,* BSA 85, 1990), and the one found in Basel have a lot of importance for the Acropolis. At the same time the Acropolis Museum in addition to including a complete series of copies, many of which are exhibited next to the original works, has systematically started digital scanning and the creation of three-dimensional models of the Parthenon sculptures and reliefs.

Making casts from the Parthenon reliefs started at the beginning of the 19th century when ancient Greek art prevailed in the European intellectual circles and the acquisition of ancient antiquities was seen as an essential step in order to create appropriate and relevant collections. However, all this was used as an excuse to allow for looting the sculptures and reliefs decorating the monuments. The permit given for making casts was used as a permit for dismantling original reliefs and paved the way for more systematic dismantling and removal plans; these culminated in Lord Elgin's action to remove the marbles.

The establishment of the Greek state signalled the beginning of making every possible effort to gather the widely dispersed marbles of the Acropolis. While Greece still negotiates the satisfaction of its demand for the return of the Parthenon marbles, the British Museum in 1846, reacting to the request of the Archaeological Society of Athens and to the letter signed by Pittakis and Ragavis, sent to Athens a series of casts from the "Elgin Marbles" (A. Mantis, *Disjecta mebra. The looting and dispersing of the Acropolis antiquities,* Anthemion, issue 4, 1997, in Greek). The collection of these casts whose storage has changed many times became the core of the collection of the Centre for the Acropolis Studies, which was founded in 1987 and housed in the Weiler building after the proposal of the Ephor Emerita of the Acropolis E. Touloupa and the late Minister of Culture M. Mercouri. In the following years, under the supervision of A. Mantis, Ephor Emeritus of Antiquities, and in parallel with the massive work of creating inventories, indexes and catalogues of the movable findings that had come from the area of the Acropolis and were scattered in and outside of the country, the enrichment of the cast collection continued.

A substantial part of the collection is directly linked to the restoration works carried out in the monuments since 1975. In addition to the making of casts, copies had to be produced replacing progressively the original works of the monuments. This, contrary to cast making, was a task that necessitated its re-examination from the beginning. The main focus of that examination lies on the composition of the cast material that was going to be used for the making of the copies and the required reinforcing. From the copies of the sculptures coming from the west pediment of the Parthenon, which were made of polyester

in 1976 (sent by the British Museum) to the most recent made copies of the same sculptures, together with the metopes of the west side corners of the Parthenon, the composition has been altered many times. The main differences in the compositions concerned the quantity of the aggregates in the mixture and the reinforcement (stainless steel), which were gradually increased (E.E. Toumbakari, *Design of cast stone for the production of the copies of the W. and S. frieze and the N. colonnade of the Parthenon and the frieze of Athena Nike Temple* in Ch. Bouras- V. Eleftheriou, *Interventions on the Acropolis Monuments 2000-2012, Completed Projects,* digital edition, Athens 2013). The following copies were made in this chronological order: in 1984, that of the Caryatids and of the architectural members of the NE corner (supervisor civil engineer K. Zambas), in 1990, the sculptures of the pediment and the metopes of the Parthenon's eastern side (K. Zambas), in 2003, the western frieze of the Parthenon (E. Toumbakari), in 2008, the metopes of the north side of the Parthenon and the frieze of the Temple of Athena Nike (E. Toumbakari), and finally in 2013, the sculptures of the pediment and the metopes of the corners on the west side of the Parthenon (D. Michalopoulou, A. Vrouva).

This process is quite time-consuming both in the stage of making the casts and during the period the copies need to "mature", as they should stay inside the water tank for quite some time. Moreover, it was found that even when the mortar has a fixed composition, multiple trials before every final application are needed in order to achieve the best colouring and the aesthetic adaptation of the copies to the adjacent original architectural members.

We can indicatively mention that the most recent construction of the copies of the seven metopes and the two pedimental sculptures of the western side of the Parthenon took 18 months. Drawing from elements that were revealed after the original blocks had been dismantled, the construction started from the stage of completing already existing moulds. During 2012, the small team of the four cast technicians of the Service tested, repaired and enhanced the existing casts and then made moulds out

Up left: Preparing in the laboratory the plaster cast of the Cecrops and his daughter Pandrosos' sculpture complex. Up right: Coating the cast with silicon in order to produce the elastic mould. Down left: The cast copy during the removal of the elastic cast and the plaster mould. Down right: The copy while being transferred to the water tank. Photo T. Souvlakis, 2013

of silicone. In February 2013, the final composition of the materials was decided after having conducted repeated trials. The casting took place in the middle of April and a month later the copies were placed in the water tanks from which they were removed at the beginning of July of the same year. In the monument they were placed in 2014-15.

The Centre for the Acropolis Studies comprised a cast repository that supplied the New Acropolis Museum exhibition with a large number of exhibits supplementing the original displays and contributing as such to a comprehensive presentation of the sculptural decoration of the monuments, offering thus the visitor the possibility to get to know sections that are shown in museums of other countries. Every new fragment that can be identified expands the existing knowledge of the monument and helps not only the researchers but also the visitors of the museum to build a comprehensive view of the exhibits as the copy is adapted to the original and completes it.

The importance of this area lies on the fact that the gathered and stored copies and moulds, either fragments in their majority or intact parts of the sculptural decoration of the Acropolis monuments, have come from various museums and collections such as the Acropolis Museum, the British Museum, the Museum of the Ancient Agora of Athens, the National Archaeological Museum, and the Museums of Padua, Palermo, Verona and Copenhagen. In addition, there are copies that haven't been used in the exhibitions of the new Acropolis Museum and originate from an old exhibition of the Parthenon sculptures in the Centre for the Acropolis Studies. The collection continues to grow even today with new copies that result from contemporary restoration interventions mainly in the Acropolis monuments.

These copies and the ones sent from the British Museum in the middle of the 19th century are unique, thus it is imperative that attention and respect should be paid in order to be preserved and receive the suitable protection. These are single copies of the sculptural decoration of the Parthenon that retain details of the initial surface before their being degraded over time, and their exposure to human intervention. Someone can recognise in the older copies details that are not saved anymore in the original and in any of the museum exhibits. What demands special attention, besides the 1846 copies of the British Museum, are the plaster moulds set on a wooden skeleton of the Parthenon metopes coming from the collection of the National Archaeological Museum and which are the first copies made on the monument in 1900.

The distinctiveness and importance of the copies and the moulds does not only depend on their age. Latest productions are also important, among them the plaster copies of the Caryatids, coming from the first elastic moulds that S. Triantis made from the original statues during the 70s, the elastic moulds of the Gigantomachy metopes from the eastern side of the Parthenon made in 1988-1989, and finally the cast of the sixth stone of the eastern frieze which was sent by the Louvre Museum in 2000. We should add that the copies of the architectural members of the NE corner of the Erechtheion, which the British Museum made available to ESMA for the amount of 6.900.000 drachmas in 1984, belong to a different category. (M. Ioannidou, *The architectural members of the Acropolis Monuments in the British Museum and their replacement in the modern restoration,* Anthemion, issue 26, 2015, in Greek).

Cast technicians have contributed a lot with their skilled work seen in the thorough preservation of the oldest plaster moulds that had wooden skeletons and came from the sculptural decoration of the Parthenon. They were moved from the National Archaeological Museum to an area in the Weiler building, but as they had been kept outdoors for a long time their wooden skeletons had started warping. Before their final storage their skeletons had firstly to be repaired and then, in order to safeguard the initial surface of those very old moulds, a copy was made, from which a new plaster or elastic mould was produced, this time though it was made on a metal skeleton.

Thus what is reassured, even if the original mould is destroyed, is the produc-

General view of the casts' storage area in the Weiler building

The copy of the Cecrops and his daughter Pandrosos' sculpture complex in the yard of the Weiler building before transferring it to the Acropolis. Photo V. Eleftheriou, 2013

The copy of the Cecrops and his daughter Pandrosos' sculpture complex while being placed on the monument. Photo E. Tavouktsi, 2015

tion of a copy very similar to the original. The specific area is important not only because these stored copies and moulds are unique, but also because it operates as a source of finding casts that grant anyone the opportunity to study the sculptural decoration of the Parthenon and the other monuments of the Acropolis. It is worth mentioning the aesthetic and archaeological importance of both the casts that stood the test of time and newer ones that are made to cover the needs of works related to the restoration of the monuments. Another factor that should not be ignored is the educational value of the copies as they represent and combine the modern art and craftsmanship of casting copies together with the artistic value of classical sculpture.

The completion of the works at the corners of the west side of the Parthenon coincides with the end of making copies with the use of casting material since the last original reliefs that remain on the monument are not expected to be removed (eight metopes in the west side); in addition, no copies are planned to be replaced.

During the period of approximately forty years the "Cast Laboratory" has been in operation many changes have been imposed by the application of technological innovations, such as the use of metal instead of wood for the construction of the skeleton and the enhancement of polymers for the making of elastic moulds. Yet, efforts should be made to continue its operation as it is there to preserve an arduous and time-consuming process, as every handcraft work is, that tends to be replaced with the use of applications based on new technologies (V. Manidaki, *The replacement of the sculptured architectural members on the Acropolis monuments. Casts, copies and authentic members,* ETEPAM 20.11.2010).

At the same time, this important collection of copies-casts from the reliefs and sculptural decoration of the Acropolis monuments should be managed and promoted in such a way as to allow access to all visitors. Nowadays though, as it is common practice, only individual researchers are granted admission. Within this context an effort has recently started to re-evaluate the material stored in the basement of the Weiler building. The largest part of the copies and moulds has been recorded and photographed. The collected information has been imported into an Access Database and has been correlated with information collected from handwritten index cards since 1991, etc. A copy and its mould on the display cases can thus be easily accessed on the shelves; in addition, any relevant information regarding the displays and referring to the origins, description and relevant bibliography is also made accessible.

We hope that the completion of the inventory will contribute to the shaping of the appropriate proposals that in the future will bring forth this valuable material.

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The digital repository of YSMA: Contribution to the preservation of the collective memory of the restoration interventions

Introduction

The development of a publicly available digital repository for the restoration works of the Acropolis of Athens supplements and extends the existing documentation processes, which originate from the systematic recording of the restoration and conservation works and successively include the archiving of the produced documents, their progressive digitization and their integration within the Database of the Documentation Office of the Acropolis Restoration Service (YSMA).

At the same time, it constitutes a novel example for the dissemination of the raw documentation material from an established and multifaceted restoration intervention programme to an iconic world heritage site. The project was a collaboration between YSMA and the National Documentation Centre (EKT) in the framework of the "Digital Convergence" Operational Programme. It provided the opportunity to further develop an ongoing collaboration that has delivered several digital platforms, including the web application "The Parthenon Frieze" (http://www.parthenonfrieze.gr/) and the Acropolis educational resources repository (http://repository.acropolis-education.gr).

Selected documents from the collection of the Erechtheion restoration project

Repositories and open access

In the last few years it has progressively become apparent within the areas of Science and Culture that in order for the generated Knowledge to have an impact on society, it must be freely accessible by everyone. The Open Access movement established new practices that were gradually adopted by universities, research institutes and publishing houses and were incorporated into state policies regarding the open dissemination of publicly funded data, as well as into the development strategies of the European Union.

The development of digital repositories, where the scientific production of an organization is accumulated and openly disseminated, is one of the steps towards the implementation of Open Access practices. The benefits of such policies are many: they incubate innovation, support the production of new knowledge, strengthen scholarly communication and ultimately encourage transparency in knowledge production practices through fostering wider public participation.

EKT, as the national body responsible for the collection, documentation and distribution of scientific information in Greece develops and provides digitization and open access repository services that aim to aggregate and distribute scientific and cultural content from third parties. The significance of the archive of YSMA falls within both categories. The documentation material of the restoration interventions in the Acropolis monuments follows in practice the guidelines of article 16 of the Venice Charter (1964) for the systematic documentation of the restoration works and complies with the principle of reversibility of the interventions; that is, the possibility, in the light of new knowledge, to bring the ancient monuments back to their original state before any restoration intervention. At the same time it documents a historically specific process and preserves the thought-processes of the actual participants in the restoration works, as well as the collective memory for an important cultural project that covers the entire post-1974 political era in Greece.

In this context, the development of the repository constitutes a strategic technological milestone for the Committee for the Conservation of the Acropolis Monuments (ESMA), for it ensures the sustainability and distribution of the archival material. A key component of the repository service is the storage of back-up copies of the digital collections of YSMA in the infrastructure of the EKT National Information System which can be made available to the scientific community and the public under the appropriate terms of use.

Project outline

EKT repository services are standardized and provide automated development tools (wizards) that allow collaborating institutions (content providers) to specify the characteristics of their digital repository and customize it according to their needs. In real life, however, digital content from diverse

YSMA DB fields	EKT fields		
Content type: Photographs	Ονομασία πεδίου-ελληνικά	Field name - English	Dublin Core Element
Record code	Προσδιοριστής	Identifier	dc.identifier
Creation date	Χρονολογία	Date	dc.date
Entry number	Προσδιοριστής	Identifier	dc.identifier
Description	Τίτλος	Title	dc.title
Source	Πηγή	Source	dc.source
Association	Σχετίζεται με	Relation	dc.relation
External Archive	Προέλευση	Provenance	dc.provenance
Author	Δημιουργός	Creator	dc.creator
Contributor	Συντελεστής	Contributor	dc.contributor
Distribution form	Άδεια χρήσης	License	dc.rights.license
Position in Archive	Ταξιθετικός αριθμός	Call Number	ekt.subject.classNumber
Comment	Σημειώσεις	Notes	ekt.note

Field standardization in the database and the repository

organizations present to a lesser or greater extent the need to develop a custom approach to application design and data mapping. The majority of the archival records held by YSMA have been digitized and are systematically entered by specialized archaeologists in the Database of the Documentation Office, the principal tool for the digital management of the Acropolis restoration documentation content. The primarily concern for the development of the repository was to ensure that the appropriate methodology and relevant tools were used, so as to select specific data sets from the Database, (e.g. all documentation that refers to the year 1987), perform quality checks for content accuracy, export the content from the Database along with the associated digital files and finally ingest into the EKT infrastructures.

It was decided that the initial case-study would be the restoration works of the Erechtheion, completed in 1987. The collection includes cohesive documentation that was digitized and nearly in its entirety entered in the Database of YSMA. Part of the material, mainly photographs and drawings, was published in the CD that accompanied the printed volume of the project report (A. Papanikolaou, 2012) and contained brief information about each resource. This published material comprised the essential corpus for the project, which was enriched with additional photographs and drawings, as well as different document types, such as unpublished studies and audiovisual material from recent digitization activities carried out by YSMA.

The dissemination of cultural content on the Web requires the explicit, consistent and inclusive description of a set of documents, so as to be intelligible by non-expert audience and ensure proper resource discovery following an online search query. In order to approach the international community as well, further effort must be directed towards the integration of additional languages in the description of the resource. To address these issues emphasis was placed on the standardization of the metadata that describe each resource through mapping the YSMA Database metadata fields to the Dublin Core international metadata standard. Dublin Core is a widely used and universally accepted framework for digital resource description and it is used in EKT repositories as it allows for interoperability with various platforms, national and international aggregators.

Despite the thorough documentation of every record in the database of YSMA, it was necessary to further normalize and enrich the set of records that would be deposited in the repository. The material was processed directly in the Database of YSMA, so that the final version of every record would be maintained in the source information system. We concentrated on the examination of every record to detect potential documentation omissions, the refinement of the title to make each document more comprehensible by non-expert audience and the addition of information in secondary fields to enrich the metadata of each document (e.g. image orientation, background drawing source etc.). This work was based to a great extent on primary information sources, such as the relevant studies and the final report on the restoration of the Erechtheion.

The homogenization of the Database records brought forth the significance of controlled vocabularies and contributed towards the further normalization of the architectural and restoration terms used in the description of the works. Using established thesauri developed by international organizations, such as the Art & Architecture Thesaurus of the Getty Research Institute and the Subject Headings of the Library of Congress, together with dictionaries of archaeological and architectural terms, such as the *Dictionary of Ancient Architectural terms* by Anastasios Orlandos and Ioannis Travlos or the *Dictionnaire méthodique de l'architecture grecque et romaine* by René Ginouvès and Roland Martin, we managed to clarify and distinguish the fine meaning of related terms, and thus their correct usage, as well as to identify and establish their translation into English, so as to allow automatic translation of every metadata field containing fixed values.

Όρος ΒΔ ΥΣΜΑ	SKOS-GR	SKOS-ENG	Εναλλακτικές ονομασίες	Ορισμός	Definition	Πηγή
ΑΝΩΦΛΙΟΝ	ανώφλιο	lintel		*Το οριζόντιο μέλος που τοποθετείται πάνω από το κενό μίας θύρας και φέρει το βάρος του τμήματος του τοίχου επάνω από αυτό.*	*The horizontal structural element that spans an opening in a wall carrying the superimposed weight of the wall.*	AAT: 300003161
ΓΕΙΣΟ	γείσο	cornice		*Το προεξέχον αρχιτεκτονικό στοιχείο που στέφει τις άκρες ενός οικοδομήματος και ιδιαίτερα το ανώτατο τμήμα του θριγκού των ναών.*	*The projecting, uppermost feature of classical entablatures.*	AAT: 300001788 & Ορλάνδος-Τραυλός 1986
ΕΠΙΣΤΥΛΙΟ	επιστύλιο	architrave	epistyle	*Το χαμηλότερο από τα τρία κύρια μέρη του θριγκού, έχει την μορφή οριζόντιας δοκού, στηρίζεται στους άβακες των κιόνων ή των πεσσών και σχηματίζει ένα είδος ανωφλίου που καλύπτει το μεταξύ τους διάστημα.*	*The lowest of the three main parts of an entablature that rests on the abacus of a column, comprising a horizontal beam that spans the columns or piers in the manner of a lintel.*	AAT: 300001780
ΖΩΦΟΡΟΣ	ζωφόρος	frieze		*Το μεσαίο τμήμα του θριγκού που βρίσκεται πάνω από το επιστύλιο και κάτω από το γείσο.*	*The middle section of a classical entablature, above the architrave and below the cornice.*	AAT: 300001816
ΠΑΡΑΣΤΑΣ	παραστάδα	anta	rectangular pillar	*Αρχιτεκτονικό στοιχείο που προκύπτει από την πάχυνση των τοίχων στο σημείο που τέμνονται οι απολήξεις τους.*	*A pier that is produced by the thickening of walls at their termination.*	AAT: 300001635
ΠΕΣΣΟΣ	πεσσός	pier		*Τετράγωνος ή ορθογώνιος στύλος.*	*A square or rectangular pillar, monolithic or built in courses.*	AAT: 300000953 & AAT: 300264605

Processing and normalization of the controlled vocabulary terms (AAT: Art and Architecture Thesaurus)

The data editing process was demanding, as for every record we had to:

- evaluate its coherence regarding its description,
- cross-check with the actual document to identify the subject,
- correct unforeseen inconsistencies in relation with the available sources,
- add information where necessary,
- choose appropriate terms from the controlled vocabularies,
- edit the title using shared expressions and sentence structure, so as to reflect the relation of the recorded object with the type of the undertaken work and the stage of the intervention.

Through this process we prepared a set of 4014 records that describe 3416 photographs, 532 drawings, 53 textual documents and 13 film extracts related to the restoration interventions. Several documents were digitized and registered in the Database for the first time in order to enrich the available content. We then exported the specified dataset in a spreadsheet format (Excel file) and examined it thoroughly with respect to their consistency with the Dublin Core metadata schema implemented in the repository. In this phase, record titles were translated in English, for the English content interface of the repository. Record titles were isolated in a separate list and translated into English using the finalized controlled vocabularies of the Database. Finally, the processed tables containing the total record sets and their corresponding files were delivered to EKT to complete the ingestion into the repository. Approximately 4000 documents from the Erechtheion restoration interventions are included in the repository and they represent about 70% of the entire raw documentation files available in the archive of YSMA.

In collaboration with the legal department of EKT, we looked into issues of copyright and licensing for all resources. Taking into account the relevant copyright legislation, the archaeological act (Law 3028/2002) and the operational context of ESMA and YSMA, a workflow was gradually formulated for the clearing of rights of the documents held in the archive of YSMA. The content that decisively belongs to YSMA and ESMA was attributed with the Fair Use License, which is a flexible license included in the Creative Commons legal code, that ensures the free and unhindered distribution of the material to the users, while safeguarding the intellectual property rights of the creators.

Repository functionality

Content curation work-flows, were supplemented by activities towards the design of the application interface and the implementation of supported functionalities. Using the automated interface configuration wizard we gave our spec-

ifications for navigation, search and result sorting services, inserted several introductory supplementary texts and completed the communication and visual design of the platform. The repository application went live and is now accessible at **http://repository-ysma.ekt.gr/.**

The content is organized in collections (e.g. Restoration programmes) and subcollections for every restoration project (e.g. the Restoration of Erechtheion 1979-1987). Users can access the repository and navigate using selected browsing gateways from the main page, visualized with tag clouds (where the size of each word corresponds to the frequency of its appearance in the entire record set) or simple lists for document types (e.g. photographs), creators (e.g. A. Papanikolaou), creation date (e.g. 1985), monument parts (e.g. the north porch) or architectural elements (e.g. architrave).

Advanced search functions allow searching for specific terms in a combination of fields. Search results are returned in a list containing the thumbnails of the respective digital files. Results can be further narrowed by adding more filters and sorted in alphabetical or chronological order. Selecting a result from the list, the user is directed to the resource page with its metadata and its digital file. When a field takes a value from one of the controlled vocabularies used (e.g. column capital), it is a highlighted link that directs users to other records with the same value in this field. Every resource is given a persistent digital identifier (e.g. http://hdl.handle.net/11638/10904) and can be cited as a bibliographic reference, which can be directly exported from the resource page using a variety of citation styles (e.g. Harvard citation style).

Last but not least, the repository offers advanced access rights to the staff of YSMA to add, edit or delete individual records and manage the platform online.

Benefits for YSMA and the public

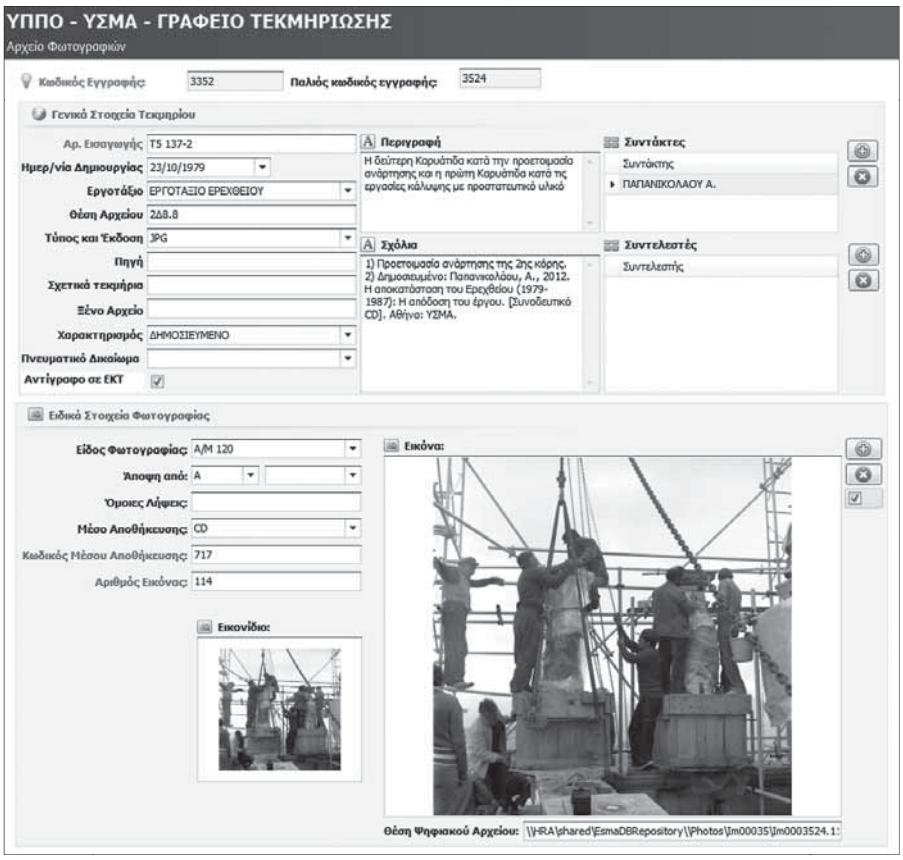
The launch of the repository offers opportunities for furthering the engagement of the public with the Athenian Acropolis as a living monument, an active cultural and historical site. For the first time web users can search for the traces and the damages time has left on the Acropolis buildings, study the constructional details of ancient architecture, observe the technical parameters of contemporary restoration interventions, appreciate the current cultural and symbolic status of the monuments, and contemplate on their new adventures following the accounts and the reports of the principal restoration team members.

In this respect, the content of the repository could be utilized:

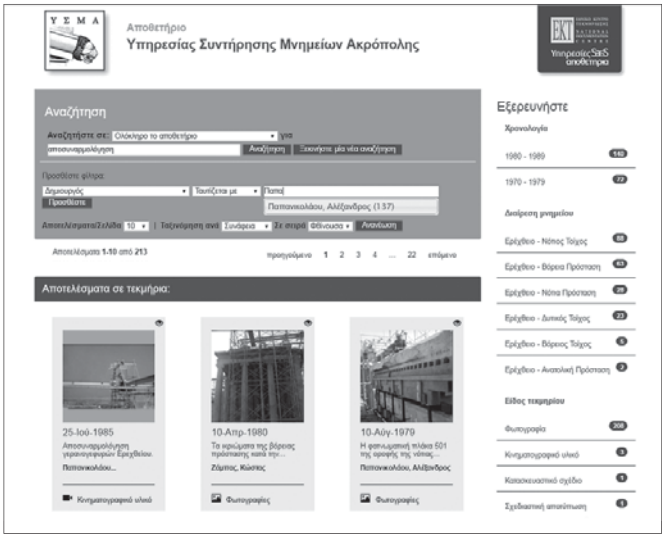
- as a scientific body of evidence in research programmes and technical works for the restoration and conservation of ancient monuments,
- as a contemporary cultural resource in all educational levels or in lifelong learning courses, and
- as source and inspiration material for the creative industries.

The translation of all collection metadata in English opens up access to the Acropolis monuments and the works of YSMA to an international audience, while the compliance with documentation standards ensures interoperability with national and international digital content aggregators, such as SearchCulture and Europeana.

In operational terms, the process of developing the repository resulted in the targeted upgrade of the Database of the Documentation Office, so as to support the process of editing and exporting selected sets of records to the repository. Moreover, the staff of YSMA acquired the necessary expertise for organising, processing and migrating the material held in the archives, while vocabular-



Edited record in the database system of YSMA



Left: Search in the repository for documents using the term «dismantling» and filtering of the results by creator name. On the right column, results appear grouped by date, by monument division and by document type, to facilitate record navigation.
Right: The resource page in the repository.

ies of archaeological and architectural terms were compiled and validated. The experience gained contributed significantly to a better understanding of the current requirements for the documentation of restoration activities and led to the further enhancement of primary documentation processes, both on the worksites and in the offices. In this context, a documentation workflow has been formulated that takes into account, apart from the stage of recording and archiving, other important issues, such as intellectual property rights management or long-term preservation and dissemination of digital content.

Future activities

The joint effort by YSMA and EKT revealed a great collaboration dynamic between the two organizations and set the basis for its further development and orientation into new fields of activities. The addition of documentation material into the repository from further monuments of the Acropolis is now a feasible goal, as the necessary infrastructure is there and the content migration process has been tested. In the near future, extended extracts from the hand written diaries of the Erechtheion restoration will be imported into the repository. These have been digitized as part of a pilot digitization program, to supplement the documentation material of the restoration program between the years 1979-1987. The scheduled final reports of the completed restoration programs will make provisions for the concurrent raw documentation processing and integration with the repository. In all respects, YSMA, encourages the reuse of the content made publicly available by all interested parties, on the use terms stated in the repository and with a view to its preservation and further utilization.

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Paraskevas Kamatsos
Librarian
EKT

** The people who contributed to the development of the repository, apart from the writers of this article, have been:*
On the side of YSMA: Dr E. Lembidaki, archaeologist, Head of the Documentation Office (project supervision), G. Alexopoulos, Information Engineer (content selection, technical management) and Dr C. Koutsadelis (architectural thesauri editing).
On the side of EKT: D. Hardouveli and E. Angelidi (project supervision), K. Bartzi, A. Papanoti, N. Vasilogamvrakis and E. Lagoudi (processual design for content documentation, organization and migration, support and curation), K. Stamatis, M. Megalooikonomou, M.-A. Simos, Th. Melachroinidis, G. Voulgarakis (software development, platform installation, long-term data preservation, digitization), D. Pelekanou (graphic design), P. Tsiavos and A. Trachaliou (legal advice on use licenses), M. Androutsopoulou and A. Belouli (Strategic Development & Coordination Office).

Last year was marked by the loss of Professor Charalambos Bouras, the man whose idea and inspiration has been the extensive restoration programme of the Athens Acropolis, and who, from his position as the President of ESMA, coordinated, led and considerably influenced the character of the works. His demise filled the Acropolis community with grief and made all of us participating in the restoration works aware of his absence. The following text –written before the sad event– shows his continuous, hard working and at the same time discreet presence during all the activities relevant with the Acropolis works.

Educational activities

The Information and Education Department of YSMA realized during the 2nd half of 2015 and the 1st half of 2016 various educational activities aimed at teachers, students, families and the general public.

In particular, 2160 primary and secondary school pupils attended at the Acropolis Museum educational programmes concerning the Parthenon sculptures, the ancient temples and the Olympian gods. In addition, on the 14th and 15th April, 2016 the two-day educational programme "Acropolis and Anastelosis" was implemented for the third time on the Acropolis. Within this programme 280 pupils of the 1st Greek Lyceum, coming from 14 schools of Attica, had the chance, with the help of the Service's specialized personnel, to get acquainted with the important and up to date technical work that is being carried out on the Acropolis. Moreover, in September 2015, the Department participated in the celebration of the "European Heritage Days" that during the years 2015-2016 focused on the duality of "Violence and Tolerance", a topical and timeless subject. The specialized educational programme "Cultural Conflicts and Convergences at the Acropolis Monuments" offered the 3rd grade Secondary pupils the opportunity to know the monuments' adventures through the ages by tracing and interpreting them according to the conditions of every era, elements of both violence and tolerance. In the context of the same European celebration and the Ministry's gradual implementation of activities focusing on the duality of "Persecution and Asylum", another educational programme for secondary pupils was realized in September 2016. The emphasis of the programme was the historical event of the Cylonian Affair, a story that greatly affected the life of ancient Athens for many years. Finally, 120 children aged between 7 and 12 were invited to the Acropolis Museum to participate in Christmas educational workshops on the subject of "Temples and other buildings made out of Lego bricks inspired from the Acropolis". Our young friends had the chance to demonstrate their imagination skills and create their own buildings with the use of white Lego bricks. Their inspiration was the temples, columns and capitals of the Acropolis.

Students of the 1st Lyceum attending the educational programme "Acropolis and Anastelosis" at the Parthenon worksite. Photo T. Souvlakis, 2016

Students of the 1st Lyceum carving marble during the educational programme "Acropolis and Anastelosis" at the Propylaia worksite. Photo T. Souvlakis, 2016

Furthermore, 7400 pupils in 155 schools of Greece used the museum kits of the Department. Concerning the educational material for families created by the Department in collaboration with the Acropolis Museum it has been estimated that family backpacks were used by 3270 families, while 1400 more families toured around the Museum with the help of trail leaflets available free of charge. Resulting from the temporary exhibition on Samothrace anew trail leaflet entitled "A journey in the Mysteries of Samothrace" was published in Greek for 8 years old children.

Training seminars were also given either inside school premises or in the Museum area to 600 teachers regarding the best use of the various educational material of YSMA (printed material, museum-kits, lesson plans and digital applications).

Finally, a digital game was designed for the Samsung interactive board entitled: "Playing with the Olympian gods at the Acropolis Museum", catering for Primary school children and accompanying the educational programmes that are realized in collaboration with the museum.

Presentation of the digital repository and YSMA publications

The Documentation Office in collaboration with the National Documentation Centre (EKT) completed during the previous period the project of creating the YSMA digital repository. The completion of this work allowed YSMA to upload on the Internet and make available to the scientific community and the general public information and documents concerning ESMA's restoration intervention in the Erechtheion (see relevant article in this issue). This activity marks the inauguration of disseminating on the Internet material concerning works on the Acropolis. The project was presented in the Acropolis Museum amphitheatre on 22nd January 2016 where the General Secretary of the Ministry of Culture and Sports, M. Andreadaki-Vlazaki delivering the commencement address mentioned the importance of using innovative digital tools for spreading cultural creations.

From the presentation of YSMA's digital repository and publications at the Acropolis Museum. Photo T. Souvlakis, 2016

Event at the amphitheatre of the Ministry of Culture celebrating the inclusion of marble craftsmanship in the list of the intangible cultural heritage, chaired by the Minister of Culture and Sports, A. Baltas. From the left S. Photopoulou (Director of DNPAAPK), M. Andreadaki-Vlazaki, A. Baltas, S. Orfanos (Mayor of Tinos) and V. Eleftheriou. Photo D. Kollaros, 2016

Then the president of ESMA, Professor Ch. Bouras, talked about the pioneering contribution of ESMA not only in documenting the restorations, but also in its dedication to preserving the transparency of the interventions. Afterwards, the director of YSMA, V. Eleftheriou concentrated on the subject of ESMA and YSMA's restoration archives and their future prospects of development, in particular as they emerge after their collaboration with the National Documentation Centre (EKT). The director of EKT, E. Sahini, talked about the services EKT provides and made a thorough presentation of the work done dur-

ing the last years and resulted from the collaboration between the two bodies (YSMA and EKT). Finally she presented the new digital implementations available on the Internet, that is the digital repository of YSMA and the enriched YSMA library catalogue. The presentation finished with the talk of Professor F. Mallouhou-Tufano, who had been the Head of the Documentation Office for many years and who introduced the recent publications of YSMA: The Study of the Parthenon restoration (volumes 8 and 9), The Study of the Propylaia restoration (volume 3), the Proceedings of the 6th International Meeting for the restoration of the Acropolis monuments and the Acropolis Restoration News, edited by the Documentation Office. She also presented the printed educational material: "Educational activities about the Acropolis", "Exploration map of the Acropolis for children", and"10 questions about the restoration of the Acropolis monuments", which were edited by the Information and Education Department. Closing the day the participants received copies of YSMA publications.

Showing a film in honour of C. Bouras

On 19th of February 2016 the citizens' movement "Diazoma" organized an event in honour of Charalambos Bouras. During the event that took place at the cinema Opera Odeon the film "Charalambos Bouras, the Man, the Scientist, the Teacher" by Ch. Tsokas was shown, a dramatized, scientific documentary produced by "Diazoma" and based on the life of the prominent scientist. His friends and students, members of the scientific community and his partners attended the event, expressing their gratitude towards their tireless teacher and scholar known for his unparalleled scientific work.

Tinos marble craftsmanship

During the 10th meeting of the Convention for the Safeguarding of the Intangible Cultural Heritage of UNESCO, in Namibia on 5th December 2015, it was decided to include Tinian marble craftsmanship in the representative list of intangible cultural heritage of Humanity. The submission of the dossier was the outcome of the collaboration between the Directorate of Modern Cultural Heritage and Intangible Cultural Heritage (DNPAAPK) of YPPOA and the Piraeus Bank Group Cultural Foundation (PIOP). YSMA appreciated the event largely because the Acropolis restoration works are closely related to the traditional art of marble craftsmanship and thus when the director of YSMA, V. Eleftheriou addressed an audience at an event organized by YPPOA on 22nd April 2016 at the Ministry's amphitheatre she explicitly mentioned the "Contribution of men and women marble workers to the restoration of the Acropolis monuments" by praising their long lasting contribution to the preservation and enhancement of the cultural wealth of our country. In a similar event that took place on the island of Tinos, on 28th of July 2016, at the 1st Sculpture Symposium at the Tinos Museum of Marble Crafts, organized by PIOP, a film produced by YSMA showing aspects of the restoration works was shown.

Participation in the AGON festival

ESMA and YSMA, in an effort to sensitise and inform the public about the Acropolis works, decided to make films about the restorations. The film "The Erechtheion, its history and restoration", directed by D. Patrikios, and C. Arvanitakis' film "The restoration of the Acropolis monuments" are examples of the most recent YSMA productions (2010 and 2013 respectively). The films, shown in the past at the Acropolis Museum, were accepted by the jury of the AGON International Meeting of Archaeological films to enter the competition and screening. This constitutes an important distinction as out of the 200 films submitted from 41 countries, only 75 were accepted. The festival will take place from October 17th to October 23rd at the Greek Film Archive. The event gives the opportunity to show the films to an international audience expanding as such the discussion concerning the necessity and quality of restorations.

Visits

On November 4th, 2015 the European Commissioner for Economic and Financial Affairs, Taxation and Customs, P. Moscovici, accompanied by the Minister of Economy, Development and Tourism, G. Stathakis, the Minister of Culture and Sports, A. Baltas, and the Head of the EU Representation in Greece, Panos Karvounis visited the Acropolis works. ESMA's President, Ch. Bouras, the Director of YSMA, V. Eleftheriou, the Head of EFAA Dr E. Banou and the Emeritus Professor of NTUA M. Korres, informed P. Moscovici about the progress of the works. During the visit, they all had the chance to observe works of resetting architectural members at the Parthenon and the Propylaia.

Marble craftsmen of YPPOA during the event for the inclusion of Tinian marble craftsmanship in the list of the intangible cultural heritage. Photo D. Kollaros, 2016

V. Eleftheriou, director of YSMA, showing the Acropolis works to the European Commissioner, P. Moscovici. Photo T. Souvlakis, 2015

Many educational Institutions from Greece and abroad expressed a strong interest in visiting the Acropolis work sites. Last year students from the Universities of Notre Dame, Accademia Adrianea, Georgia Institute of Technology, as well as graduates of the Ecole de Chaillot, visited the works. The scientific and technical personnel of YSMA guided students and their accompanying professors around the works where they had the chance to have a closer look at the restoration sites and so fully understand the principles and processes applied to the works on the Acropolis rock. YSMA would also like to express its gratitude to the institutions who in return for the tour made donations to "The Friends of the Acropolis".

Lectures – publications

The members of the scientific personnel of YSMA, complying with the objectives of disseminating and publishing information, prepared various papers and publications on the restorations.

V. Eleftheriou, the director of YSMA, except of her participation in the above mentioned events she took part in the Pan-Hellenic Conference on digitalising Cultural Heritage, organized by the University of Thessaly (Volos, from 24th to 26th of September 2015). Together with the Head of the Department of Documentation, Dr E. Lembidaki, she presented a paper on "Digital applications of managing cultural content in the restoration works of the Acropolis". V. Eleftheriou, on 19th April 2016, also addressed an audience at the School of Architecture of the Technical University of Crete on the subject of "Restoring restored monuments: the cases of the monuments on the Athens and Lindos Acropolis". A day later, on 20th of April 2016, she participated with a talk in one-day Conference organized by EYTOP (Special Service of Culture and Tourism of the Ministry of Culture and Sports) at the Acropolis Museum, entitled "The transition from ESPA 2007-2013 to ESPA 2014-2020: review of activities, accomplishments, problems and planning of the new programme". Her speech focused on the "Preservation and restoration of the Acropolis monuments within the context of ESPA 2007-2015". V. Eleftheriou also took part in the Greek-German symposium "Identitäres Bauen: Die Athener Akropolis und die Stadt (Erecting buildings with identity: The Athens Acropolis and the city), at the University of Konstanz, between 13th and 14th May 2016. Her paper was on "The restoration of the Acropolis monuments, recent works and future programmes"; she addressed her audience in English. Dr E. Sioumbara took part at the same symposium.

Between 13th and 14th June 2016, V. Eleftheriou and Dr K. Karanasos participated as presenters in a workshop organized for the third consecutive year by the School of Architecture of the Polytechnic University of Bari, where they talked about matters concerning the restoration of the monuments of the Athens and Lindos Acropolis. Moreover, last year V. Eleftheriou and D. Mavromati, published in English and Chinese on the bilingual publication Chinese Journal of Heritage Architecture the paper: "The Acropolis of Athens: restoration and application of advanced technologies of geometric documentation".

The Head of the Parthenon restoration works, R. Christodoulopoulou, participated in the 4th Pan-Hellenic restoration conference of ETEPAM (Society for the Promotion of Research and Scientific Restoration of Monuments), organized in Thessaloniki from 26th to 28th of November 2015, on the subject of "Restoration options at the beginning of the 20th and 21st centuries: the columns' restoration at the Parthenon Opisthonaos". More members from the scientific personnel of the Parthenon restoration participated in the same Conference: V. Manidaki presented a paper on the subject of "Restoration dilemmas: recomposing a lion's head from the Parthenon", while K. Skaris participated with the paper "Questioning theoretical matters concerning the restoration of the north wall of the Parthenon cella". All presentations were in Greek.

The architects K. Karanasos and V. Manidaki delivered two more interesting lectures. K. Karanasos discussed the intervention in the NW corner and the western façade of the Propylaia at the Italian Archaeological School of Athens and within the context of the 9th Masters of Museography, Architecture and Archaeology of Accademia Adrianea (1st February 2016). V. Manidaki presented a paper in the framework of the series of seminars examining in depth the History of Architecture organized by NTUA entitled "The structural com-

position of the west pediment of the Parthenon", (24th March 2016).

The Acropolis works were presented to the NTUA students of the graduate programme DPMS "Monument Protection (line B)" on 13th June 2016. R. Christodoulopoulou, participated in this event with the paper "The Parthenon restoration programmes", Dr E. Aggelakopoulou, the Head of the Department of Surface Conservation with the papers "Examining and optimizing restoration materials for the anti-seismic protection of monuments combined with the criteria and methods of designing and redesigning the monuments" and "Preservation interventions in the Parthenon and the Acropolis monuments". Dr E. Lembidaki talked about "Managing the documentation material of the restoration interventions in the Acropolis monuments". Two days later, on 15th June 2016, the graduate students visited the Acropolis and were guided around the works by members of the scientific and technical personnel of YSMA.

Finally, Dr E. Sioumbara, Head of the Scattered Members Project, presented in German the paper "The monumentalization of Acropolis in the 6th century BC" at the Greek-German symposium "Identitäres Bauen: Die Athener Akropolis und die Stadt" (see above). She also had the article "Tooth chisel: the traces and importance for the topography of the archaic Acropolis" published in German in the volume of collected essays edited by U. Wulf-Rheidt entitled "Werkspuren. Materialverarbeitung und handwerkliches Wissen im antiken Bauwesen" ("Tool traces. The treatment of materials and the knowledge of manual work in ancient construction"), DiskAB 12.

Volume in honour of M. Korres

Special reference should be made to the recently published volume "Architect", (editions Melissa), in honour of the NTUA Emeritus Professor M. Korres. It is well known that M. Korres had his name inextricably linked to the Acropolis works, which he had been closely attending for over 30 years either as the Head of the Parthenon restoration (1983-1999), or as a member of the Committee for the Conservation of the Acropolis Monuments (from 2002 until today, and as a Deputy President since the beginning of 2016). It was natural then that in this volume the people who contributed papers were mainly many of his colleagues and students working on the Acropolis. Except of his teacher, Professor Ch. Bouras, who wrote the article "Manolis Korres on the Parthenon", the following people participated in the volume (in order of appearance in the book): E. Touloupa ("About Manolis"), M. Ioannidou ("The restoration works on the Acropolis monuments by the CCAM: Theoretical reflections, approaches and applications in the spirit of the Venice Charter"), L. Lambrinou ("The interior formation of the orthostates of the cella of the Parthenon"), V. Manidaki ("Puzzling out the western pediment of the Parthenon: twisted clamps and the structural system of the tympanon wall"), E. Papakonstandinou ("The cleaning of the Acropolis monuments and sculptures and the revealing of Egyptian blue"), T. Tanoulas ("The architraves at the west end of the south wing of the Propylaia"). From the rest of the Acropolis' people the following participated with articles about other monuments: F. Mallouhou-Tufano, R. Christodoulopoulou, V. Lambrinoudakis, V. Eleftheriou and P. Themelis. The volume was presented in an emotionally charged atmosphere at the Acropolis Museum on 22nd June 2016.

Epilogue

Concluding we would like to say a few words about the colleagues who left the Service during the last few months. S. Tyropolis, administrative clerk, having contributed for years to the Acropolis works and particularly to Documentation Office, took his retirement last June. We should also mention the employees whose temporary contracts ended at the end of 2015. Fifty-six employees of various professional specialties and proficiencies worked in the restoration of the monuments with consistency and enthusiasm for more than four years, giving as such a new impetus to the restoration work. Their group departure from the works created a difficult to fill gap in the daily life of the restoration worksites.

Evi Petropoulou
Archaeologist
Documentation Office

Students of Accademia Adrianea at the temple of Athena Nike during their visit in the Acropolis works

Charalambos Bouras during the works of the 3rd International Meeting for the restoration of the Acropolis monuments, 31st March – 2nd April 1989. From the left: Ch. Bouras, E. Touloupa, M. Mercouri, M. Andronikos and G. Dontas.

Charalambos Bouras during ESMA's visit on the Acropolis works, 19th November 2015. From the left: Ch. Bouras, V. Labrinoudakis, R. Christodoulopoulou, V. Regopoulou-Kaselouri, L. Aggelakopoulou and F. Mallouchou-Tufano.

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