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A PROJECT FOR CONSERVATION AND VALORIZATION OF THE ARCHAEOLOGICAL PARK OF POPULONIA

UN PROGETTO PER LA CONSERVAZIONE E LA VALORIZZAZIONE DEL PARCO ARCHEOLOGICO DI POPULONIA

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ABSTRACT

The Archaeological Park of Populonia extends from the beach in the Gulf of Baratti - where you overlook the necropolis of the Etruscan town - up to the acropolis of Populonia - which contains the large monumental structures, dating from the second century BC. The ancient town extended, on a promontory overlooking the Gulf of Baratti, into an area rich in mines and near a natural harbour, obligatory point of stopping for ships that navigated the central Tyrrhenian. The town consisted of two areas: the acropolis, located on top of the promontory with housing complexes, public buildings and temples, defended by mighty walls of which are still visible traits very conspicuous, and the lower town which included the districts productive and port area behind which stretched the necropolis. The project was carried out by experimental technical and didactic solutions, also to improve its accessibility taking into account the most urgent needs of conservation and valorization of the structures on the site and of its landscape value.

Keywords

Populonia, Archaeological park, Conservation, Valorization, Heritage landscape, Accessibility.

"Populonia is one of the most beautiful places in Italy. The ruins are situated on an enchanting promontory jutting out into the sea in the direction of Elba and Corsica where the first inhabitants of the town may have come from. It has always been the destination of Tyrrhenian sailors who found a safe port here - on those routes through the seas and the skies which migratory birds have always used, stopping off precisely on this promontory – and exchanged valuable iron ingots with all sorts of goods as Diodorus Siculus recounted (V. 13)" (Manacorda, D. 2010, p. 271) (my translation).

1. HISTORICAL-ARCHAEOLOGICAL CONTEXT

The Baratti and Populonia Archaeology Park starts at the beaches of the Baratti gulf stretches out to the Populonia acropolis with its great monument complex dating to the 2nd century BC. The ancient town was set on the promontory, which dominates the gulf of Baratti at the centre of a territory packed with mines and adjacent to a natural port which was a necessary stop off point for ships sailing across the central Tyrrhenian sea. The town was made up of the acropolis on the summit of a promontory with residential compounds, public buildings and temples defended by an imposing set of walls many sections of which are still visible and the lower town which took in the manufacturing areas and the port with the necropolis behind them¹.

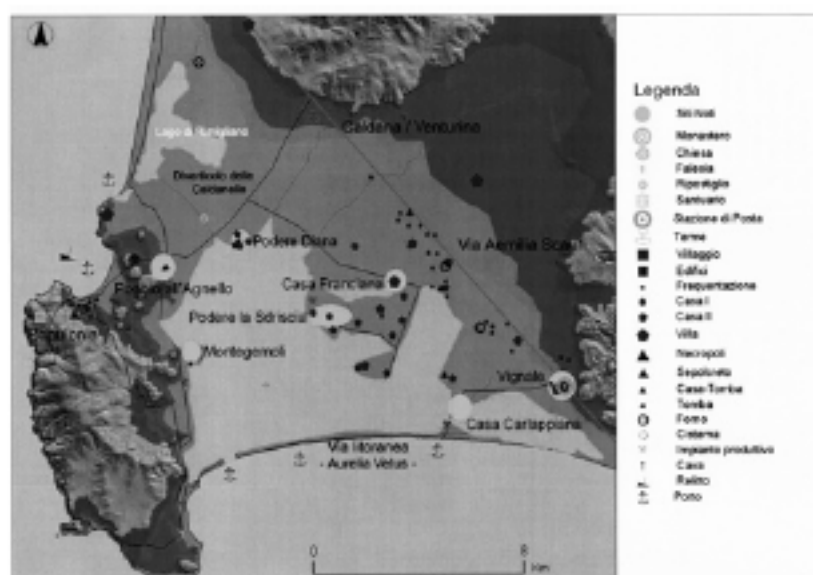


Fig. 1. The lagoon of Populonia in classical age. Hypothetical reconstruction (Cambi, F. et al. 2009, Tav. 16)

In 2006, on behalf of the Soprintendenza per I beni archeologici della Toscana – SBAT – experimental conservation work was done on several of the artefacts found in the Acropolis². The purpose of these tests was to identify suitable methods and materials for work on the ancient buildings in order to plan subsequent conservation and maintenance work³ in view of sustainable valorization action⁴. The "*Interventi di conservazione, adeguamento e valorizzazione del Parco archeologico di Baratti e Populonia*" project was drawn up in consideration of the most urgent building conservation and enhancement requirements at the site⁵. The project "*mainly focused on certain types of building - the most frequent - with its specific types of decay and on identifying the most suitable methods - including by means of experimenting with alternative solutions - to be extended subsequently to the other buildings in*

the park after evaluating the effective costs in view of desirable future funding of restoration work on the entire complex" (Marino, A. 2011, p. 14) (my translation).

2. PLANNED WORK

In 2009, following on from 2006 experimental work, a second '*Interventi di conservazione, adeguamento e valorizzazione del Parco Archeologico di Baratti e Populonia*' planning proposal for conservation work was drawn up with Piombino town council in accordance with the guidelines set down by the funding body, ARCUS SPA⁶.

"In that wonderful corner of Italy where a human miracle has enabled a unique archaeological heritage in a layered, intact historical landscape to be conserved, our aim is to bring to the site a touch of sober, cautious modernity which avoids discontinuities but encourages a natural rebalancing of past and present, a critical approach and, at the same time, the emotional, intimate balance between the two which is often the basis of conservation and preservation consciousness hopes" (Manacorda, D. 2010, p. 284) (my translation).

However, as the funding allocated was lower than that requested, conservation priorities had to be agreed. These priorities were jointly identified as the great *Le Logge* wall (involving work on the domus building and of those above *Le Logge*), in *Temple C* and in the *Ring of City Walls* in the sections called *Massi 1, Massi 2, Massi 3 and Massi 4*. The plan was drawn up after the necessary studies on the main monuments and specifically the following:

- on *Le Logge*, geophysical analysis brought to light the presence of considerable quantities of mixed fill in materials above the building at thicknesses of up to 8 metres which required a number of vertical core surveys which produced core samples corresponding to the geophysical analysis joint sections; the purpose of this was to assess the validity of data gathered previously and obtain a more definitive overview of the load bearing capacity of the ancient buildings with public access to the area in mind.

- on the ring of city walls, point and general topographical reliefs with a series of environmental sections along the slopes relating to the most important sections of ancient walls were carried out with the aim of creating a three dimensional reconstruction of the land layers and suggest an isometric trajectory line for visits to these wall sections.

- on *Temple C*, after updating the old reliefs done by the universities of Rome and Pisa, experimental partial rebuilding work was done on the podium using artificial stone in the context of the ACCESSIT European project and on agreement with SBAT. This experiment terminated with definitive assembly on site and the writing up of the respective *Work Instructions (SOIs) – Work Methodology File and Maintenance Plan*. These file constitute the specifications for a total rebuilding of the temple podium⁷.

Therefore the project was split into two separate tenders:

- a. Supply of prefabricated elements and building work on the *Temple C* podium (involving staff with suitable category OS-2A skills);
- b. Conservation, adjustment and enhancement work on the Baratti and Populonia Archaeology Park: loggias, walls, support structures and earth movement for the rebuilding of the *Temple C* podium (OG2 category work).

The special tender specifications contain the *Work Instructions* (SOIs) for all the main operations involved in the tender. Maintenance plans will be linked to the SOIs setting out the maintenance work required to ensure the efficacy of the work done over time⁸.

2.1 Consolidation of the *Le Logge* buildings

Le Logge show a number of through hole lesions and missing sections which indicate the instability of the landfill which supports it. Analysis carried out on the building and its fill in materials (see Censini, G., Garzonio, C. A. 2013) show that, to increase safety and usability, *Le Logge* requires protective work to improve its ability to sustain accidental over loading which could result, in particular, from atmospheric agents.

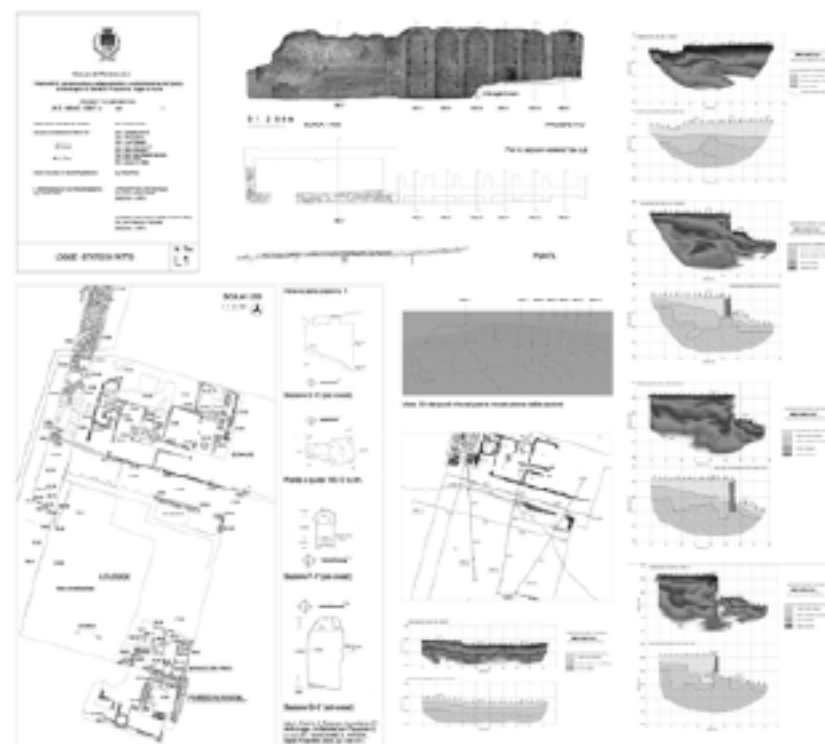


Fig. 2. The Lodges: preventive diagnostic (Diacon srl., 2013)

After establishing the building's foundation levels – in order to consolidate the building – the aim is to use solid fill in the deficiencies caused by the collapse of the northernmost corner and the lacing of the lesions with stainless steel bars and fallen material. A number of permanent active sub horizontal displacement pull rods will be inserted subsequently (ribbed stainless steel bars) with facade concealed anchoring plates (see Tempesta, G. 2013).

To limit rain water infiltrations the upper soil layer will be equipped with a surface drainage system after the necessary archaeological enquiries have taken place.

2.2 Work on the *Le Logge* terraces

Work on the structures unearthed above *Le Logge* involves a visit trajectory with a panoramic viewpoint overlooking the *Le Logge* walls and an access route to the structures which once contained the 'sea bed' and 'black men' mosaics of which copies will be arranged in their original position.

2.3 Work on the lower *Le Logge* terraces

After archaeological excavations of the landfill have been completed and a wooden parapet built, a visitor access route is planned to enable visitors to walk across the countryside layer at the base of *Le Logge*.

2.4 Consolidation and restoration work on the domus wall structures

Work on the domus structures is planned, involving the consolidation of the wall structures and the building of an additional row on traces of the wall foundations in order to raise the walls above the land surface level. The domus's mosaic floors, especially the '*labyrinth mosaic*', also require stabilising work.

2.5 Recovery and consolidation/restoration work on the city walls

This project involves building a visitor access route to the sections of city wall identified with the name Massi, from 1 to 4. The route will be outside the ancient walls in a section of forest on the south side of the promontory following an isometric trajectory line which gives visitors the best view of the lower wall sections. The pedestrian walkway will be made by moving earth and will involve minimal movement of the large blocks. In order to ensure adequate views of the wall sections from the visitor access route, preliminary clearing of the overgrown vegetation along the walls will be necessary and some thinning of the vegetation in the area of the visibility cones identified in the project. In order to make the sections with the most dangerous deficiencies safe, the walls will require integrations using collapsed wall material.

2.6 On site re-building of the podium with artificial stone covering

The artificial stone rebuilding project involves Temple C⁹, one of three sacred buildings unearthed at the Populonia acropolis by archaeological research undertaken from 2001 onwards¹⁰.

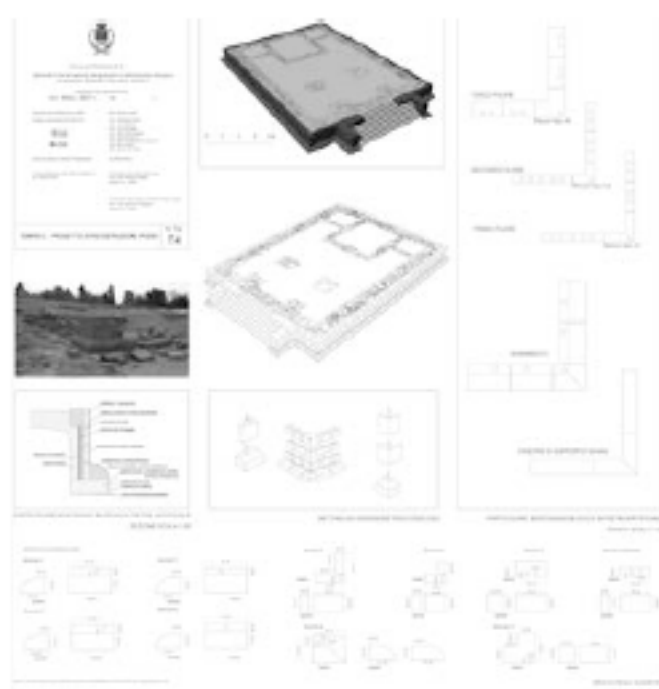


Fig. 3. Technical drawings for the reconstruction of the podium of the Temple C (DiaCon srl, 2014)

Regarding indications and specifications on artificial stone rebuilding methods and on the techniques and materials used, the results obtained with the experimental ACCESSIT project, which enabled a sample – a rebuilding prototype – to be built on the south west corner of the temple, are shown here. This experimental project was used as reference point for the drawing up of the SOI podium rebuilding sheets too and an analysis of the working costs involved in artificial stone rebuilding work was completed, blocks of artificial 'panchina' stone were chosen. Given the size of the blocks, the material was required to have a low specific weight. A range of artificial materials were thus tested and high resistance polystyrene was finally chosen for its weight, durability and workability (30 kg/mc) to be covered with imitation panchina stone. The covering is made of two layers: the first layer in bi-component mortar with fibreglass in order to avoid the 'craquelè' effect is anchored to the polystyrene blocks with a medium mesh galvanised metal net; the second - once again bi-component mortar - is strengthened with aggregates of a size and colour resembling those of panchina stone. The size of the blocks was chosen on the basis of the few natural elements which have survived on site: only two have a bull nose outline on the base of the podium. The elements on the central body of the podium have been shaped on the basis of traces of the onset of the smooth vertical strip on the bullnose elements and the average size of the other surviving elements.



Fig. 4. Reconstructive sample of the Podium for the Accessit project (DiaCon srl, 2013)

The depth of the artificial blocks – certainly less than that of the original blocks – is dictated by the need to obtain manageable blocks (approx. 40-50 kg, more or less 1/5th of the weight of natural stone) and avoid taking the place of the arenite flake fill, which can thus remain unaltered.

While it is made with 'lightweight' blocks, then, the facing thus possesses its own inertia due to the moderate weight of the individual blocks which are, in any case, kept together with lightweight, reinforced mortar columns and fibreglass bars which cut through all the blocks and join them together into a single structure suitable for its soil fill in. The blocks making up the bullnose plinth rest on a stabilised quarry material slab fixed on its external edge by an L-shaped metal section in order to level the supporting plane of the original podium - *crepidoma* - which has survived only in some sections of the temple perimeter. The L-shaped metal element is painted with an enamel reinforced with aggregates taken from panchina stone grinding. In summary, the experimental phase of artificial stone building for the purposes of rebuilding Temple C in the Populonia acropolis took the following phases:

- geological and mineralogical-petrographic enquiries aimed at identifying the nature of the original stone and locating locally available lithotypes with characteristics suitable for artificial stone making in colours and grain sizes which are similar to those of the original stone¹¹;
- recovery and analysis of all the fragments from the original covering of the temple podium;
- graphic reconstruction of the temple podium;
- test building of artificial stone blocks;
- partial rebuilding of the podium on a real life scale with blocks of artificial stone;
- drawing up of the Operational Work Instructions to enable the subsequent rebuilding of the whole podium to take place;
- cost analysis for each single element for a later accurate estimate of the costs involved in totally rebuilding the podium.

NOTES

1. The first archaeological excavations on the acropolis were carried out in 1980 under the supervision of Antonella Romualdi (SBAT). The universities of Pisa and Siena have been involved in excavation work since 1998 supplying fundamentally important information on the forms urbanisation on the site had taken, the Roman era transformations, the time frame in which the site was abandoned from late antiquity to the Middle Ages and the way this took place (see *Materiali per Populonia*, 1-10, 2002-2011).
2. The tests took place within the framework of work on extending and enhancing the Baratti-Populonia Archaeological Park (Piombino Town Council) - First operational phase: curated by A. Marino, A. Camilli, M. Toccafondi (MiBACT) with R. Sabelli (DIDA-Florence University) and the Universities of Pisa, Roma Tre, Siena and Venice (jointly funded by the Tuscan Region: PISL – Integrated Local Development Plans).
3. "In accordance with the code on tenders and related actuation plans, the maintenance plan is the document in which the law responds to pressing demands by sector operators - presented for some time and never fully satisfied - for legal tools to use in prevention plans intended to maximise the effects of work and reduce artefact maintenance efficiency costs in the context of a more general architectural legacy conservation policy" (Sabelli, R., 2011, p.69-70). See also Lucchetti, P. 2005, pp. 9-10.
4. "Safeguarding the value of the site as historical evidence encompasses the primarily important function of preserving the soil's historical role despite the fact that its overall historical importance is much greater than this. This, lastly, is the irreplaceable special feature of each project and work on buildings which respects the motives behind conservation work is the key feature and central criteria in its specific sustainability" (Grimoldi, A. 2014, p.36).
5. The Baratti-Populonia Archaeological Park is managed by Parchi Val di Cornia SPA, a joint venture set up in 1993.
6. The task of drawing up the new project was entrusted to DiaCon srl - Diagnostic & Conservation (Università degli Studi di Firenze spin-off: www.diacon.it).
7. INTERREG strategic international research project (Programme opérationnel Italie-France "maritime" 2007-2013. Objectif coopération territoriale européenne) - ACCESSIT funding project plan - "Itinerario del patrimonio accessibile: l'acropoli di Populonia", aimed at facilitating understanding of the site also by means of partial reconstruction experiments using innovative artificial methods and materials.
8. See Sabelli, R. 2011.
9. "Rebuilding, therefore, for safeguarding but also communication purposes. Physical conservation cannot do without cultural conservation which is born of widespread understanding of the formal and historic importance of architectural remains" (Manacorda, D. 2010, p. 282).
10. The material which made up Podium's curtain wall and stairway was stolen. The wall foundations and much of the high base in rock blocks on which the building stood (21x16 m with a maximum podium height of approx. 1.5 m, from the base of the lower shaped blocks to that of the highest column base) have survived. Datable to the early 2nd century BC, Temple C shows significant survivals of elements typical of Etruscan

temple architecture. It must have been of a peripteros type, in antis, with a pronaos made up of two rows of double columns of which virtually square foundations remain. The podium was made in arenite flakes and blocks with facing curtain wall and shaped elements in calcarenite (*panchina*). In the Middle Ages it was almost completely stripped and the *panchina* reused as building material in nearby Populonia castle.

11. Petrographic analysis has shown that the *panchina* used in the temple was taken from the now exhausted *Buca delle Fate* quarry (see Pallecchi, P. 2009, p. 69).

BIBLIOGRAFÍA

Cambi, F., Cavari, F., Mascione C. (eds.) (2009), *Materiali da costruzione e produzione del ferro. Studi sull'economia popoloniese fra periodo etrusco romanizzazione*. Bari: Edipuglia.

Censini, G., Garzonio, C. A. (2013) *Relazione Studio Geologico, "manoscritto inedito" allegato al progetto*. Firenze: DiaCon srl.

Grimoldi, A. (2014), *Sostenibilità, tutela, nuovi orizzonti della ricerca storica*. In: eds. G. Biscontin, G. Druissi, *Quale sostenibilità per il restauro?*, *Scienza e Beni culturali XXX*. 2014, Bressanone 1-4 luglio. Bressanone (BZ): Edizioni Arcadia Ricerche, pp. 29-39.

Gualandi, M.L., Manacorda, Patera, A. (2002) *Introduzione*. In: eds. F. Cambi, D. Manacorda, *Materiali per Populonia*, 1. Firenze: Edizioni All'Insegna del Giglio, pp. 5-6.

Lucchetti, P., Semeraro, G. (2005), *Il piano di manutenzione*. Roma: EPC Editore, pp. 9-10.

Manacorda, D. (2010), *Archeologia dei paesaggio / Paesaggi dell'archeologia: il caso dell'Acropoli di Populonia*. In: eds. G. Baratti, F. Fabiani, *Materiali per Populonia*, 9. Pisa: Edizioni ETS, pp. 271-284.

Marino, A. (2011), *Prefazione*. In: R. Sabelli, *Progettare il restauro*. Santarcangelo di Romagna (RN): Maggioli Editore, pp. 14-19.

Pallecchi, P. (2009), *La "panchina" dell'antico bacino estrattivo di Buca delle Fate: considerazioni sui caratteri compositivi e tessiturali e sul suo utilizzo nelle costruzioni dell'acropoli e delle necropoli di Populonia*. In: eds. F. Cambi, F. Cavari, C. Mascione, *Materiali da costruzione e produzione del ferro*. Bari: Edipuglia, pp. 65-70.

Sabelli, R. (2011), *Il Piano di manutenzione dell'opera e delle sue parti*. In: R. Sabelli, *Progettare il restauro*. Santarcangelo di Romagna (RN): Maggioli Editore, pp. 69-81.

Tempesta, G., (2013) *Relazione Tecnica Strutturale, "manoscritto inedito" allegato al progetto*. Firenze: DiaCon srl.