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MARINA EL-ALAMEIN: CONSERVATION OF ARCHITECTURAL DECORATION AND GEOLOGICAL STUDY IN AID OF CONSERVATION

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Abstract: The 2011 conservation program of the Polish–Egyptian Conservation Mission to Marina el-Alamein covered: elements of the architecture of the Roman tomb T17, additional conservation of columns and stone benches in the main square as part of the anastylosis of its remains, and diverse conservation activities in selected rooms of the complex of Roman baths, including floor mosaics in the southern courtyard portico. A geological field survey investigated building stone material from the site. Other problems investigated included the nature, intensity and scale of the limestone weathering process, occurring in both newly discovered and already protected relics.

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Conservation of elements of architectural decoration at the ancient site of Marina el-Alamein was carried out within the frame of the Polish–Egyptian Conservation Mission, working annually on the preservation and conservation of historic monuments from the Graeco-Roman harbor (for a report on the activities of the mission, see Czerner, Bąkowska-Czerner *et alii* 2014, in this volume). Concurrently and for the purposes of the conservation program, a geological survey was completed of the stone building material in use at the ancient town. The study also involved examining the weathering process, including nature, scale and intensity, in both newly uncovered ancient remains and relics that have already undergone protection in the recent past.

CONSERVATION OF ELEMENTS OF ARCHITECTURAL DECORATION

The purpose of the scheduled work was to stop the destruction of elements of the decoration. One of the main tasks is extensive work aimed at improving the condition of historical objects in the ruins of the ancient town and necropolis. Annual

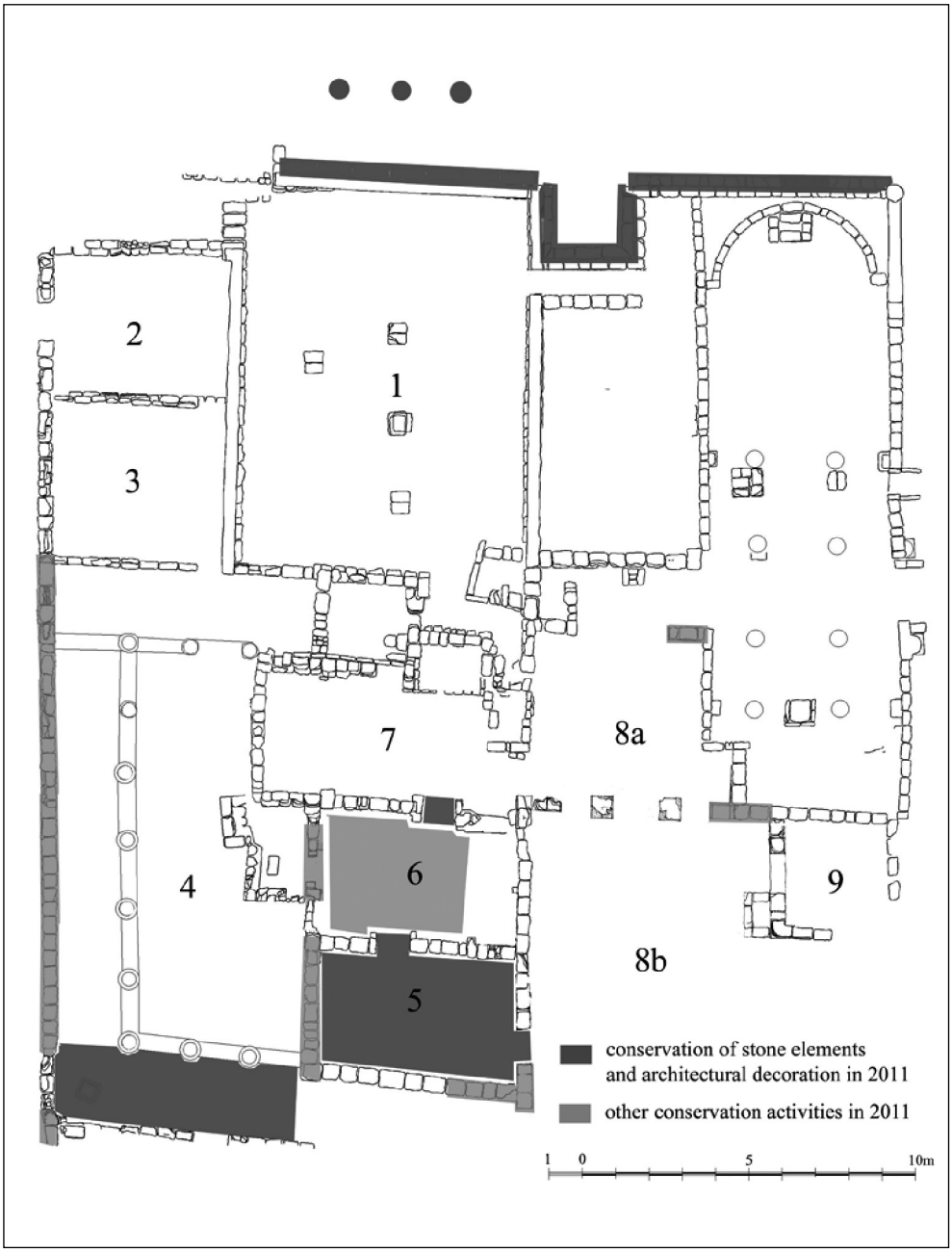

Fig. 1. Southern Baths and southern part of the main square (at top): scope of conservation work in 2011 (Drawing R. Czerner)

monitoring of the state of preservation demonstrated progressing deterioration of the material structure due to unfavourable exposition conditions and natural stone weathering. Additional intervention was necessary on the preserved and partly rebuilt wall structures. Hence the two-directional work schedule: firstly, scheduled conservation and building work and secondly, unplanned running repairs of elements already conserved in earlier seasons [***Fig. 1***].

ARCHITECTURAL ELEMENTS OF TOMB T17

The planned work was part of the anastylosis project for this tomb [***Fig. 2***]. Elements of the tomb facade (discovered in 1997, see Daszewski 1998: 69–70) were in an extremely poor condition, the stone having eroded to the point that holes appeared in the masonry burial box structure. Elements like pilasters and cornices had become difficult to distinguish. The original elements had to be reconstructed in their original form (without losing their historical expression) in order to be reattached.

Description of work: Documentation was completed of the condition before conservation of particular elements. Sockets were prepared to be fitted with stone patches. Big losses were filled in with stone patches of a material with properties matching the original. An epoxy resin-based binder (KEMAPOXY 150 produced by CMB) with lime filler was used to fit the patches. Small losses were filled in with lime–cement mortar with sand filler (6 parts sand to 3 parts lime to 1 part white cement). Post-conservation documentation was prepared.

COLUMNS AND STONE BENCHES IN THE MAIN SQUARE

Upon assessment of the state of preservation, the column shafts and joints as well as the material filling in the joints in the benches (anastylosis in 2007 and 2008, see Medeksza *et alii* 2010: 88–91; Medeksza, Czerner *et alii* 2011: 115–119) was found to be partly damaged by surface weathering. The deterioration is due to the properties of the stone used for these elements, which make it vulnerable to adverse weather conditions. There is evidence to show that similar processes occurred also in ancient times. The damage is local and easily repaired, but necessitates continuous maintenance. Experience from previous work has shown that small repairs are required annually. It is important in the process to comply with the principle of preserving the architectural expression of historical ruins (recommended, among others, by the Supreme Council of Antiquities of Egypt). Hence the requirement to limit reconstruction to a minimum, making full use of material salvaged from the excavation, the drawback being that it may have a weakened structure.

Description of work: The condition of the preservation was documented (P. Zambrzycki) and areas for intervention conservation work were selected. The damaged joints in the columns and benches were filled in with a lime–cement mortar with sand filler (6 parts sand to 1 part lime to 1 part white cement) (K. Tałuć, P. Zambrzycki). The edges of the preserved plaster on the south wall of the main square were protected with putties from mineral mortar as above (K. Tałuć).

Fig. 2. Elements of the facade of tomb T17, before (top) and after conservation in 2011 (Photo G. Bąkowska-Czerner)

SOUTHERN BATHS, ROOM 6

The preserved parts of marble floor had to be protected as were also the relics of a hypocaust structure in the western part of the room (see Medeksza, Czerner, Bąkowska-Czerner *et alii* 2012: 95). Progressing deterioration of the brick material and bonding mortar was observed, but also damage resulting from acts of vandalism (throwing in a column drum had collapsed the brick structures and broken elements of the *tubuli*). Ineffective draining of the sunken part of the room added another destructive factor. In these circumstances, it was deemed best to temporarily cover with sand the relics of the hypocaust cellar in the western part of the chamber.

Conservation was essential in this case of the preserved relics of marble floors in the passage between rooms 6 and 7, to avoid the expected damage resulting from the use of the passage, as exemplified by already detached edge slabs [***Fig. 3***]. The weakened bedding had to be reinforced and the stone slabs returned to their original position.

Description of work: The current state of preservation of the marble tile flooring was documented (G. Bąkowska-Czerner, P. Zambrzycki) and programs were prepared for protecting the hypocaust cellar remains and preserving the marble floor (R. Czerner, G. Bąkowska-Czerner, P. Zambrzycki). Geotextiles were used to cover the relics before backfilling the area with sand up to the level of the reconstructed part of the floor. The membranous fabric also served as a marker between the ancient substance and backfill. Cracked and detached fragments of the floor in the passages were removed in order to prepare a new substructure. The bedding consisted of limestone bonded with lime–cement mortar with sand filler (6 parts sand to 3 parts lime to 1 part white cement). Dismantled floor slabs were cleaned and replaced using mortar as above (P. Zambrzycki). Final documentation was prepared.

SOUTHERN BATHS,
FLOOR MOSAIC IN COURTYARD 4

The planned two-year program of emergency preservation work includes on-site exposition of the decoration. Taken together, building structure, technique and preservation condition determined the extensive nature of future conservation works, which will include a transfer of the mosaic decoration to a new setting. A reconstruction of the whole floor will not only enable effective rainwater draining of the surface, but also ensure renewed use of the passage in its original function. At present, activities were limited to reinforcing the weakened parts with bands stabilizing the edges of the decoration and to fixing detached tesserae in place [***Fig. 4***].

Modern reconstructions should match the original parts that have survived, but in Marina the case is additionally complicated by the use for repairs of materials other than the original ones. The main composition was made of stone tesserae arranged in rows, but historical repairs had been made chaotically, using loose pieces of grey marble (with numerous cases of recycled use of stone thresholds made of grey veined marble). Modern reconstructions should be made from packed limestone with smooth surface and the arrangement should refer to the original composition.

Fig. 3. Floor in the passage between rooms 6 and 7, before (top) and after conservation (Photo P. Zambrzycki)

Description of work: The state of preservation was assessed (P. Zambrzycki). The mosaic was cleared of loose dirt lying on it and fragments that should undergo conservation work were selected. Cement mortar with lime filler (1:3) with added plasticiser (5% solution of Primal AC33 in water) and natural pigment (vine black) was used. Wherever the original mortar was lost, a lime–cement mortar (3:1) with filler (coarse gravel) was used as a stabilizing base put under a band. Post-conservation documentation was completed.

[KT, PZ]

SOUTHERN BATHS, MARBLE FLOOR IN ROOM 5

Bands protecting the edges of slabs from rainwater penetration had to be introduced in order to counter the threat to floor stability, which was caused by the fact that the surface was sloping downward in the direction of the east wall. It will be possible to drain effectively the entire surface of the room once the door in the southeastern corner of the chamber is cleared.

Description of work: The state of preservation of the remains was recorded (R. Czerner, G. Bąkowska-Czerner, P. Zambrzycki). Detached and endangered sections of the marble slab floor were cleaned. Protective bands at the edges of some floor slabs and on the relics of the wall facing were made using lime–cement mortar (6 parts sand to 3 parts lime to 1 part white cement).

[PZ]

Fig. 4. Southern Baths, southern portico of courtyard 4 after conservation of the floor mosaic (Photo P. Zambrzycki)

GEOLOGICAL SURVEY AND OBSERVATIONS FOR CONSERVATION PURPOSES

Building stone from the site of Marina el-Alamein, already identified during earlier missions, was examined geologically. Secondly, a geological field reconnaissance was carried out on the modern quarries in the area. Thirdly, observations were made regarding the mechanism, intensity and scale of limestone weathering processes in newly discovered as well as already protected relics, and in the disused quarries.

The building-stone survey of newly revealed material brought no results to change the known picture. The material is a white limestone, weathering yellow, with low physical and technical parameters, sensitive to mechanical and chemical weathering.

The field reconnaissance in the quarries demonstrated that exposed limestone surfaces did not undergo rapid weathering and disintegration, but blocks of limestone (averaging 28 cm by 14 cm by 14 cm) did, resulting even in powdering. The quarries, disused today, are being developed relatively fast, for example into housing estates, where the scarps constitute a support for residential block basements. The remaining part of the disused quarries is being developed into recreation and sports areas, for example, golf courses, ponds with fountains and walking areas.

Key research this season was completed on the nature of the weathering of reconstructed stone. Macroscopic observations and comparisons suggest the following conclusions:

1. Once exposed, the surface of limestone building material is sensitive to weathering.
2. Local rock materials discovered and used to conserve and reconstruct the walls, columns and other architectural elements begin to undergo a process of disintegration after about 12 years.
3. Tura limestone and so-called Helwan limestone used for renovation have clearly higher weathering resistance, but proper storage prior to use is essential, because they absorb and retain water relatively easily.
4. The entire height of architectural elements reconstructed closer to the shoreline and at sea level is exposed to destruction processes. The higher a structure is situated, the more intense is the influence of the weathering process on its lower parts. Consequently, the longevity prospects of structures restored in the southern part of the ancient town, that is, further from the sea, are bigger.
5. Destruction processes are the most intense closer to the sea. Hence it is recommended to reconstruct in first place elements situated at right angle to the shoreline, that is, along a north–south axis.
6. The construction of a new eleven-storey apartment hotel to the northwest of the ancient town has contributed significantly to protecting the site from prevailing western winds and their destructive effect.
7. Local building material, which is what the builders of the Graeco-Roman town had used, should be used for modern conservation and restoration work.

The above-listed observations made for the purposes of conservation

indicate the need not only to use local stone, but also to reconstruct elements situated higher and thus further from the shoreline. Regarding wall reconstruction, it is always worth remembering when setting conservation priorities that walls at Marina el-Alamein are more resistant on a North–South axis.

[JS]

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