ARCHEO-MAPEI IN TURKEY

Consolidation and conservation works at the archeological site of Tilmen Höyük in Turkey

by Nicolò Marchetti (University of Bologna, Department of Archaeology) and Stefano Musso (University of Genoa, Department of Sciences for Architecture)

2

3

Tilmen Höyük is located in south-eastern Turkey in the Islahiye valley, which is bound to the north and to the west by the Anti-Taurus and the Amanus mountain ranges respectively, while to the south it looks over the plains of northern Syria. It represents one of the most important archaeological sites to study the links between Anatolia and Syria, and to investigate an ancient capital city of the 2nd millennium BC, a contemporary of the splendours of Ebla and Ugarit.
In the 1960's, a Turkish team led by B. Alkim initiated a number of archaeological digs in the area including Tilmen. The more recent discoveries were made thanks to a joint research excavation project promoted by the Department of Archaeology of the University of Bologna (Italy) together with Istanbul University and Gaziantep Museum.

Under the direction of Prof. Nicolò Marchetti, what had originally started as an ambitious excavation project in the region of Gaziantep, evolved into a large scale Euro-Mediterranean cooperation project, with the aim of safeguarding and enhancing the landscape, not only from an archaeological point of view, but also from an environmental one.

In fact, the project availed itself of the collaboration with the University of Bologna Faculty of Agrarian Studies, Genoa University Faculty of Architecture, Adana University Faculty of Science, Marmara University Faculty of Fine Arts and Istanbul University Faculty of Arts. The collaboration between Italian and Turkish faculties marked the go-ahead of a multi-disciplinary, far-reaching project: the creation of an archaeological and environmental park to preserve and manage the site, officially inaugurated in October, 2007.

Between 1997 and 2000, Nicolò Marchetti was involved with another similarly important and prestigious dig along the walls of Jericho in Palestine (Mapei was also involved in this dig with its products – see the article published in issue no. 9 of *Realtà Mapei International*), but the precarious political situation caused a halt to the research project.

Since 2003, Marchetti has been directing the dig at Tilmen Höyük, and in just five excavation campaigns a number of important monuments and remains from 1700 BC have been unearthed, including temples, fortresses and the Royal Palace, in addition to splendid works of art such as a votive stele with a relief of the Storm God or a seal impression mentioning the king of Babylon.

An Analysis of the Archaeological Site

The monuments which have been unearthed at the site of Tilmen date back to various periods of the Bronze Age, that is, from the 3rd and 2nd millennia BC. The site covers an area of more than five hectares, and includes an acropolis and a lower city fortified with a continuous system of casemates pierced by two posterns, and a monumental gate decorated with two carved lions on each side of the entrance. From here, along a monumental stairway, you can climb the fortified acropolis, and at the top there is an ancient road which leads to the south towards the public sector.

This area is made up of four large buildings: a temple, a royal palace with nearby living quarters and a fortress which protected the south-east corner of the acropolis, and which was originally at least 11 metres high (nowadays it is still 4.5 metres high).

All the monuments unearthed have foundations built using large basalt blocks, a stone which is very easily found in this area. The main period of development of the city took place between 1800 and 1600 BC, a particularly turbulent period in history which witnessed the city becoming first an independent capital, and then a vassal state of the king of Aleppo. Tilmen finally fell into the hands of the Hittite army which, after ransacking the city, set fire to the acropolis.

After the excellent collaboration implemented at the time of the Jericho excavations, Mapei decided once again to get involved in a technical research partnership involving the restoration of Tilmen Höyük. All the works on the

Photo 1. The monuments from 1700 BC on the acropolis at Tilmen Höyuk site as in 2006.

Photo 2. One of the excavation areas where restoration work was carried out using Mapei products.

Photo 3. An aerial view of the southern side of the acropolis and the eastern lower town (the throne room in the royal palace is highlighted).

Photo 4. Cleaning and consolidation operations of the 1700 BC mudbricks by means of ethyl silicate.

Photo 5. Grouting the cracks in the orthostats (i.e. uprights) and fixing the loose parts in place with resin.


6


7


8

site were carried out with the highest respect for the ancient structures, with small-scale interventions being preferred so as not to alter the aspect of the site, while guaranteeing its conservation over the years.
After a preliminary phase for identifying the main problems of the archaeological remains, the most efficient, and at the same time least invasive, intervention techniques to solve the problems were singled out: weed control, cleaning and consolidation using materials which were extremely compatible with the original substrates, and a limited number of integrative interventions just to guarantee the stability of the structures, carefully avoiding any significant rebuilding operation.

Field Problems and Their Solutions
The remains at the site had a series of problems due to the spread of infesting vegetation, and the lack both of protection against the rain and of an efficient system to channel off rainwater (water was free to flow over the surface, eroding the ground and ancient masonry as well).
The structures most at risk were in the area designated K-5 where the archaeological dig had unearthed mudbrick masonry work, which was crumbly and powdery. The operation recommended for this problem was to clean the surfaces of the walls manually with simple brushes and sponges, a disinfestation treatment followed using a special biocide product made up of quaternary ammonium to eliminate fungi and algae, and consolidation using ethyl silicate. This treatment is recommended on absorbent silica-based materials (sandstone, tuff, peperino, etc.).
Some portions of the walls, including the posterns (K-3 and K-2) were partially rebuilt after they had collapsed, probably after the first excavations carried out in the 1960's. Rebuilding was carried out using a "re-composition" technique of the more dangerous elements, by inserting a sheet of lead between the original part and the newly rebuilt one, in order to mark the latter.
To fix on the spot the portions in danger of detachment (the edges of the corner stones in the K-3 postern, and grouting of some of the stones in the same area) the Mapei Technical Service Department recommended the use of ADESILEX PG2 thixotropic adhesive, a two-component, epoxy resin based product with selected, fine aggregates and special additives. ADESILEX PG2 has


10

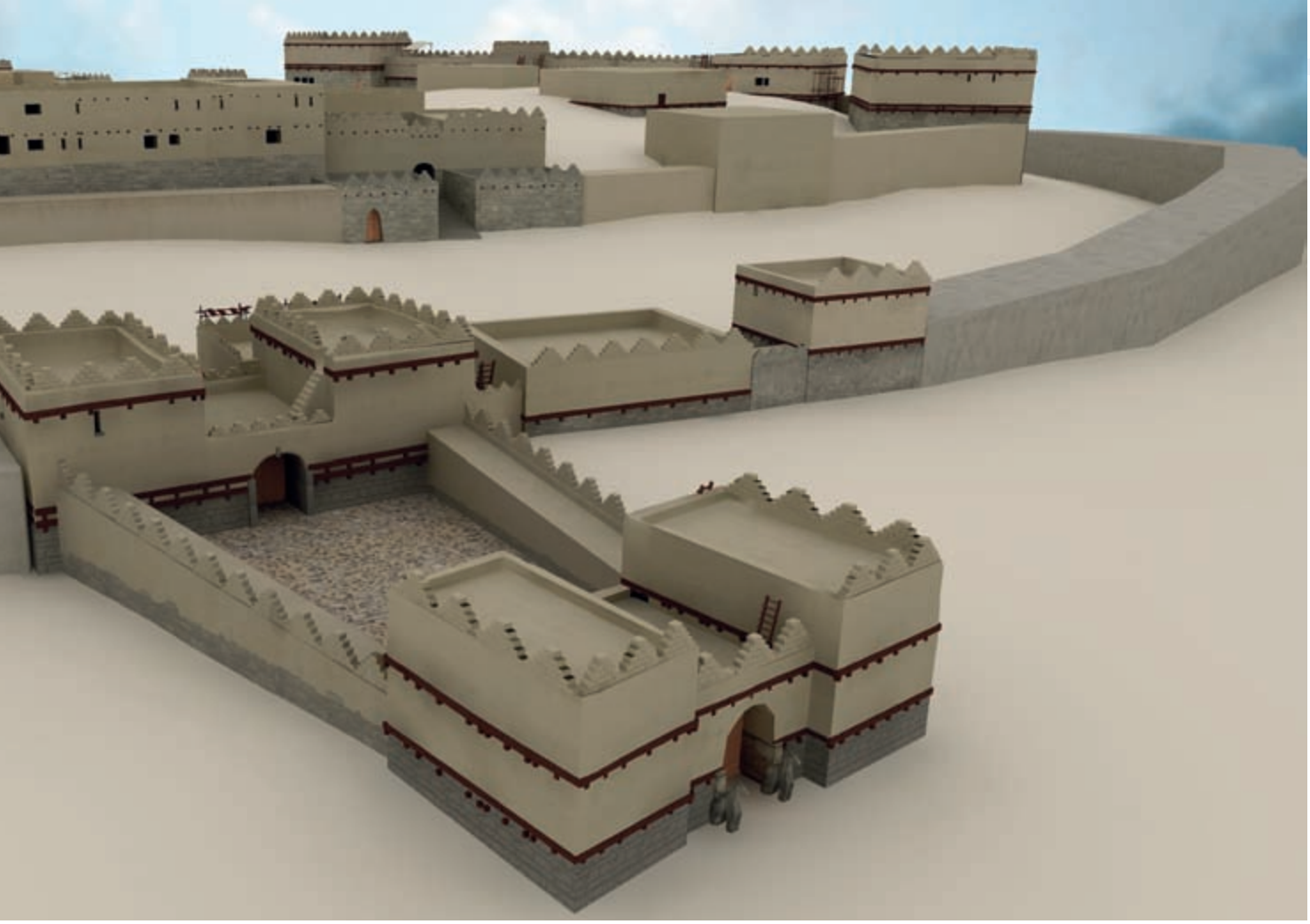
Photos 6 and 7. Consolidation of the mud plaster binder in the masonry work and protection of the tops of the walls in the K-3 postern (photo 7 shows a lead sheet inserted in order to indicate the renovation work).

Photo 8. Consolidation of the floors from 1700 BC with PRIMER 3296, applied with a manual spray gun.

Photo 9. The archaeological and restoration team in 2006.

Photo 10. A virtual reconstruction of the ancient city as in 1700 BC.


9



an extended workability, which makes it particularly suitable at temperatures above 20°C, a characteristic which was important for operations carried out on this archeological site.
Further, also the orthostats – large squared stone uprights placed at the base of walls for construction and decoration purposes – of the walls of the residency in K-5 and of the royal palace were in a poor state of preservation, being full of cracks and missing pieces in various places. Their restoration and conservation project included grouting irregularities and fixing detached fragments or those in danger of becoming so. Composite products with an epoxy resin base were used, and where required, stainless steel dolly-rods were also inserted to provide even more reinforcement in the connections.
It was noted that the surfaces of the ancient floors made with crushed limestone in the K-5 residency had a poor degree of residual cohesion. They were consolidated using PRIMER 3296 consolidating primer mixed with water at a ratio of 1:2. PRIMER 3296 is an acrylic polymer-based water-dispersion primer, made up of very fine particles of acrylic polymers which have a good capacity of penetrating into the building materials on which it is applied, including those with low porosity. This property makes it the ideal primer for consolidating weak, crumbly substrates, such as plasters, masonry work made from solid bricks or tuff. To consolidate the edges of the floors in the same area, a layer of MAPE-ANTIQUE RINZAFFO salt-resistant mortar was initially applied, a product specially tested for renovating old stone, tuff and brickwork buildings. After this operation, a layer of MAPE-ANTIQUE MC light-coloured dehumidifying mortar was applied on the area concerned.

Mapei Products: *the products mentioned in this article belong to the "Products for Ceramic Tiles and Stone Materials" range. The technical data sheets are available on the "Mapei Global Infonet" DVD or at the web site: www.mapei.com. Mapei products and systems for the renovation of old buildings have been awarded the CE mark in compliance with European standards.*
Adesilex PG2: *thixotropic epoxy adhesive with extended workability.*
Mape-Antique MC (CE EN 998-1): *pre-packed, cement-free, light coloured dehumidifying mortar for the restoration of damp stone, brick and tuff masonry.*
Mape-Antique Rinzaffo: *cement-free, pre-packed, light-coloured "salt-resistant" mortar to be used before applying Mape-Antique MC, Mape-Antique CC and Mape-Antique MC dehumidifying mortars on stone, tuff and brick substrates.*
Primer 3296: *acrylic primer in water dispersion with strong penetrating action, consolidating surfaces of unsound screeds.*

TECHNICAL DATA

Archaeological Site of Tilmen Höyük, Islahiye Valley, region of Gaziantep (Turkey) – 2nd millennium BC.
Excavation Campaigns: 2003-2007
Conservation Campaigns: 2006-2007
Conservation Works: restoration and consolidation of the ancient structures at the site
Direction of the Excavations: Prof. Nicolò Marchetti (University of Bologna Alma Mater Studiorum – Department of Archaeology)
Project of the Conservation Works: Prof. Stefano Francesco Musso (University of Genoa – Faculty of Architecture), Chiara Davite (Archiéo srl)
Executive Field Coordinators: Elena Rosa, Luciano Cuccui and Pietro Baldassarri
Project and Design for the Archaeological Park: Prof. M. Benedetta Spadolini, Prof. Giovanna Franco, Prof. Niccolò Casiddu (University of Genoa – Faculty of Architecture), Elena Rosa
Mapei Coordinators: Davide Bandera and Pasquale Zaffaroni, Mapei SpA (Italy)