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The mausoleum of Cecilia Metella on the Appia Antica: a structural contribution to its restoration and adaptation for use

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Abstract

The Mausoleum of Cecilia Metella on the Appia Antica is one of Rome's most famous monuments. The great tomb was incorporated into the Caetani Castle in the 14th century. Since that period the massive cylindrical construction has been part of a single monumental site including the castle, whose impressive walls have come down to us virtually intact. As part of the "Project of Large-scale Works for the Great Jubilee Year 2000", the Soprintendenza Archeologica of Rome drew up a plan to safeguard and adapt the monument of the Caetani Castle and Tomb of Cecilia Metella for use as a museum. This report illustrates the general criteria followed in the structural intervention and the complex problems that will have to be faced in the future. In particular these concern the type of roofing to put over the main hall of the castle, access to and use of the mausoleum, and how the latter, one of the most interesting viewing points for the "panorama of the Appia Antica", should be covered over.

1. Introduction

The monumental site comprises the tomb of Cecilia Metella and the adjacent Caetani Castle. The tomb is a cylindrical mausoleum measuring twenty metres in diameter, resting on a square plinth and faced with large blocks of travertine stone. It dates from the final decades prior to the birth of Christ, while the castle conserves the aspect it was given at the beginning of the 14th century when the Caetani family rebuilt a castle belonging to the Counts of Tuscolo that dated back to the 11th century. The two monuments are conjoined: the tomb was adapted as the castle stronghold, and given a swallowtail outwork. At its centre stands the burial chamber, comprising a tall, narrow room slightly ogival in

shape, clad in brickwork of excellent quality. This chamber is reached by means of a corridor at the same level as the castle courtyard, while another corridor below this one leads to the lower part of the tower. The tomb has never been properly investigated: we sincerely hope that in the not too distant future it will be subject to a comprehensive archaeological survey. This will tell us more about the concept that lay behind its construction and the techniques and know-how that went into what was undoubtedly a complex and highly accomplished building project.

The construction of the castle was simpler and more linear, as was characteristic of medieval architecture. Its scale appears less grandiose than the tomb, which dominates the ensemble. It has an L-shaped groundplan enclosing the courtyard giving onto the mausoleum, granting access to the aforesaid corridor (Figure 1).

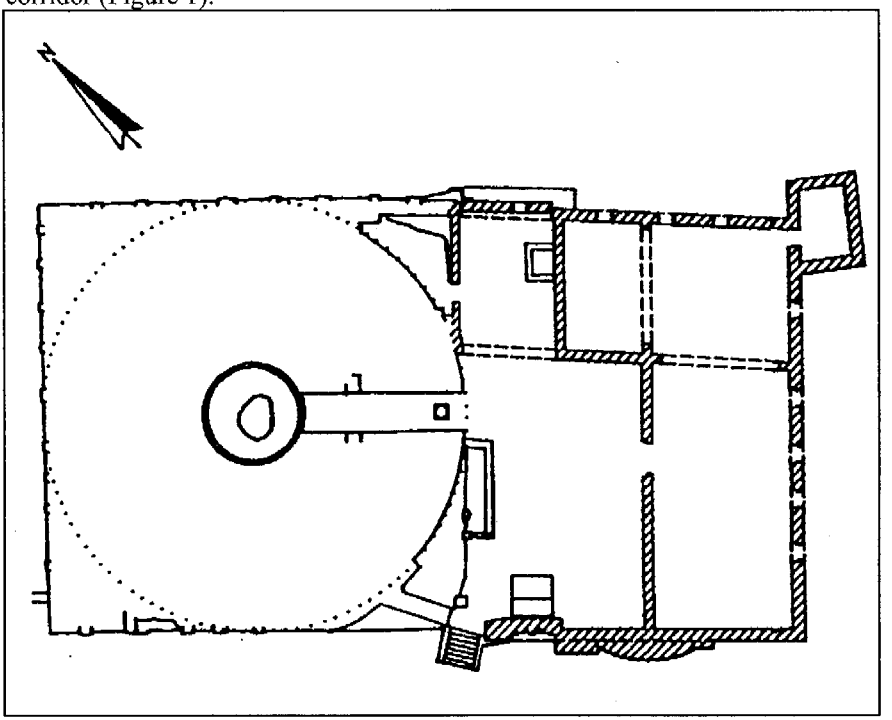

Figure 1

The castle conserves its 14th century aspect despite being damaged during the papacy of Sixtus V. However, the walls have no roofing and there are no intermediate floors. With our current knowledge it is not possible to establish when the castle was finally reduced to its present condition, but this must have been at least a century ago. The only restoration work we know to have been carried out was done by Muñoz in the first decades of the 20th century. Since

then merely occasional routine maintenance has been carried out by the Soprintendenza Archeologica.

2. Guidelines

Most people with a certain cultural awareness, and archaeologists in particular, now know to what an extent the interventions of static restoration, above all since the Second World War, have used methods, materials and techniques running quite contrary to a correct conservation of our architectonic heritage. These interventions failed to consider the monument as a document of material history: on the contrary, they treated it as a construction to be transformed and adapted according to the projectual and structural criteria of modern architecture, with results to match.
Since the mid-1980s, first in theoretical terms, then by developing a methodology and finally by means of some actual restoration projects, much effort has gone into promoting interventions of structural engineering which respect the material history of monuments. The guidelines that underlie this conception of restoring our heritage of historical buildings can be summed up as follows:
- analysis of the construction concept which lay behind the building of the monument and the interventions that have modified it since. Analysis of the static behaviour that has enabled it to survive over the centuries;
- a project of minimal interventions in the interests of "improvement", relying as far as possible on building materials and techniques which conform to the original construction concept. By "improvement" is meant primarily the repristination of the static efficiency of the various construction elements, ensuring a suitable static behaviour for the building and eliminating any signs of deterioration which as time goes on might set in motion collapse mechanisms;
- identification of schedules of inspection and maintenance such that the institution responsible for the monument may intervene in good time if some exceptional event, or indeed the normal passage of time, should lead to structural weakening;
- when new structures are required to meet specific needs they should interfere as little as possible with the ancient artefacts: the behaviour of ancient and modern components should ideally be kept independent, and the latter should be designed to be removable, so that even in the distant future they could be eliminated if they were deemed superfluous or out of keeping with the interpretation and conservation of the monument/document.

3. Considerations at the planning stage

Both the structural assessment and the contributions to the architectonic project for safeguarding and adapting the monument for public use were constantly informed by the above guidelines. We took care to avoid making the slightest alteration to the original conception of the monument/document as it had come down to us, while ensuring its stability and functionality. A prime example of

this strategy, as we shall illustrate below, was our determination to avoid any sort of invasive intervention. We were able to keep strictly to this strategy and at the same time collaborate in designing all the structures required to adapt the site for use as a museum, thanks to an excellent understanding with the staff of the Soprintendenza Archeologica.

Now that the project has been realised, the site, and in particular Caetani Castle, is far better suited for public use than in the past. At the same time, archaeological research has benefited from a large quantity of finds and new research perspectives have been opened up, which we hope can be actively pursued in the near future. This concerns above all the Roman Mausoleum, about which still not enough is known and which is not yet ready for public access; we would also like to know more about the interrelations between the castle and the cavities lying beneath it.

4. The intervention as realised

The intervention can be subdivided into four categories, namely the excavations carried out, the underground cavities discovered, the ancient walls, and the structures put up to ensure greater access and a new functionality for the site.

4.1 Excavations

The excavations concerned above all Caetani Castle and produced a large haul of archaeological finds, as well as giving us fuller knowledge of the castle. New premises were created, part of which provide the necessary facilities for opening the site to the public.

Digging down also made it possible to study the deep strata of the monument. In particular excavation of what was referred to as "the well" first revealed interesting sections of wall indicating the presence of passages and links between the various rooms; then it showed that the wall extends down many metres and includes a "doorway" which probably gave access to the cavities below the castle. Regrettably it was not possible to complete the excavation in order to carry out a comprehensive inspection of the structures.

4.2 Cavities

The monumental site was subjected to a wide-ranging and scrupulous survey by the Laboratory of Geological, Cartographic and Aerial Photographic Investigation of the Soprintendenza Archeologica of Rome. In addition to these geological and geotechnical investigations, a microgravimetric survey was carried out.

The first investigative campaign was undertaken in July 1998, followed by the microgravimetric survey, with further investigations in 1999. These established the lithotypes present, the Young and pressiometric modules and the net limit pressure. Direct drillings were made which enabled us to establish the angle of external friction and cohesion. A total of 30 borings were made, 7 in 1998 and 23

in 1999. Such an intensive analysis was justified by the need to gain an accurate knowledge of the lithotypes and their geotechnical stratification, by the fact that the monument had been built on a non-homogeneous substratum including the fringes of a lava flow, and thirdly by the unexpected presence of cavities. These were inspected by the specialised personnel of the Laboratory and their findings were documented with the help of film cameras. The following considerations are based on the stratigraphs of the borings correlated to their location and on the numerous cross-sections supplied by the above-mentioned Laboratory which situate the cavities with respect to the monument above ground. Examination of the findings from the borings, most of which went down to a depth of 15 metres, enabled us first of all to ascertain that there was no water table running through the site. Below a stratum of infill generally no more than a metre deep came deposits of tufa, whose consistency could be assessed as gravel with coarse sand or as slightly silty sand, often thickened. In some cases this material was interspersed with compact leucite (lava) which was blackish grey in colour. It goes without saying that the Mausoleum rests on perfectly sound foundations, but the Caetani Castle had to be carefully investigated in this respect. For immediately below the castle wall overlooking the valley we found the entry to the cavities referred to above. They date back a long way, were used in ancient times, and display both elements of collapse and some evidence of walls whose purpose remains unclear. These cavities are situated principally below this particular castle wall and the one at right angles to it in the stretch running from the so-called well to the hall in front of the tower and the tower itself.
These findings prompt the following considerations:
- in the hall in front of the tower an excavation to a depth of about three metres was made. While rainwater undoubtedly percolated down through the soil unhindered over the last hundred years, the hall has now been roofed over and is thus proof against infiltrations.
- the borings showed that in between the current floor level of the area of facilities and the roof of the cavities there is at least five metres of earth;
- the situation has remained remarkably stable since the restoration work carried out in the first decades of the 20th century, as can be seen from the limited deterioration visible in the walls, exposed to the elements for at least a century and lacking any covering;
- the excavation of the so-called well showed the presence of a very ancient means of access to the cavities inside the castle and walls that went down below this level.

These considerations and the improvements carried out in the current restoration phase enable me to affirm that the situation is entirely stable. Nonetheless we also decided to insert an underpinning slab beneath the perimeter wall of the so-called well, at right angles to the confining wall. This curb in practice constitutes a hypothetical platband for the cavity underneath, which in this area presents subterranean walls whose purpose is not clear.
We have also suggested a suitable way of consolidating the terrain in front of the the cavities should be ensured to permit periodical inspections. The availability

in the Soprintendenza of specialised personnel means it will be possible to keep the cavities under regular observation.

4.3 Ancient walls

As we have seen, the monumental site comprises a Roman part, going back to the years around Christ's birth, and the medieval construction, created in the early 1300s. The walls of the former needed no attention, for the static condition of the Roman structure is excellent, but the situation of the medieval construction was more complicated.

The groundplan of the castle is basically square, built around the Mausoleum, the walls forming an L-shape round the central courtyard. They are actually joined to the Roman structure, having been built leaning onto it. In its current form the castle comprises six rectangular rooms with load-bearing walls varying in width from 70 cm (external walls) to 50 cm (internal walls). The walls generally reach a height of about 12 metres, except in certain points corresponding to the roof gables (figures 2, 3).

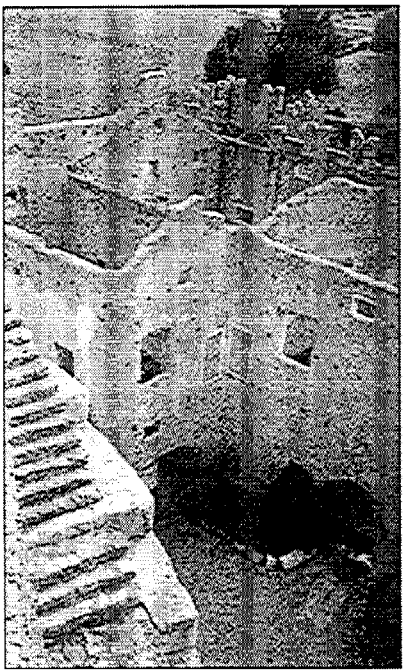

Figure 2

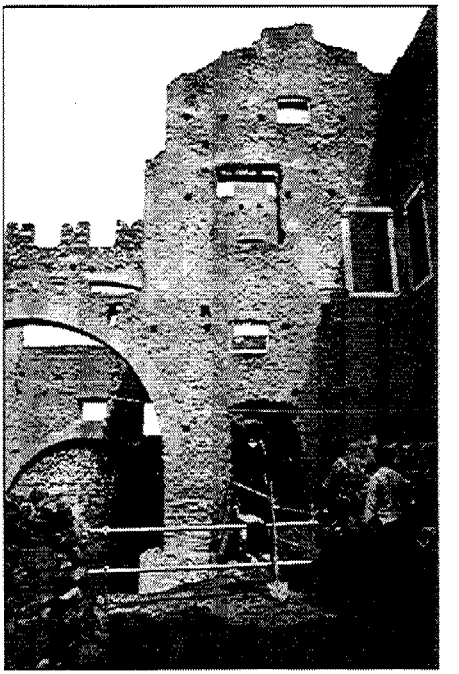

Figure 3

The wall overlooking the valley mentioned above has some stone buttressing along its outer face. In its present state the castle has no roofing: we do not know when the original roofing collapsed, but this must have been more than a century

ago. Apart from occasional local maintenance, no restoration work had been carried out since the first years of the 20th century. In spite of this long period, the unmitigated exposure to the elements and periodical seismic swarms, endemic throughout the region of Rome, on close inspection the walls showed no signs of either significant deterioration or patterns of fissures that might point to collapse mechanisms in the future. Only in a few points were there concentrations of cracks, in particular one along the demarcation between the section of wall resting on lava and its continuation on tufa (Figures 4, 5).

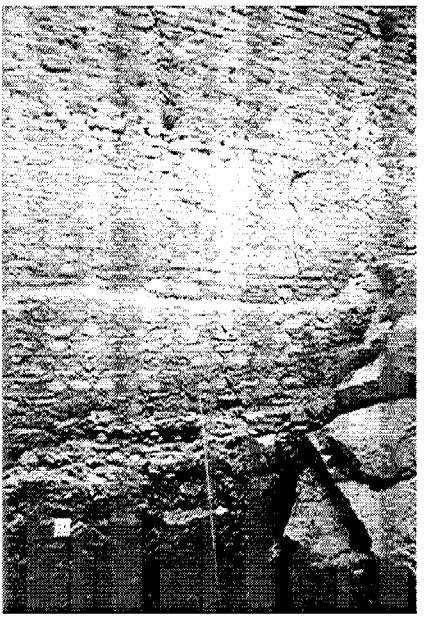

Figure 4

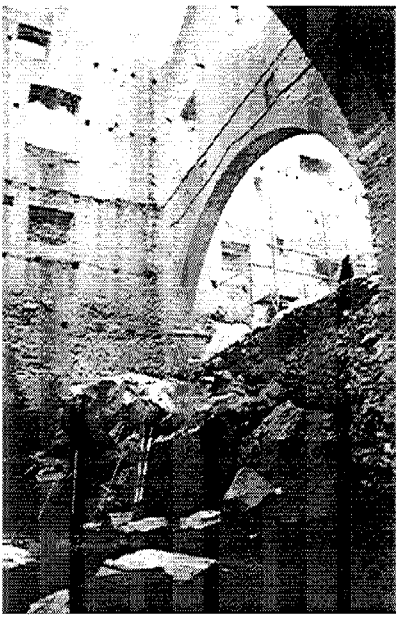

Figure 5

Evidence of previous interventions shows that this has always been a weak point in need of periodic treatment: our making good came 80 years on from the restoration work of Muñoz. Apart from such limited shoring up of local fissures we decided not to do anything to the walls, whose structure appears overall to be compact and satisfactory.

Moreover, our interventions have contributed to a general improvement in the walls' static behaviour. This is particularly true of the large hall in front of the tower. The removal of soil to a depth of three metres made it possible to incorporate facilities underground, beneath flooring which serves to strengthen the structure of the walls beneath it, and the same holds for the walls of the tower, which are braced by the new roofing and flooring.

We must nonetheless put on record that, following the new possibilities for use created by this restoration project, some significant interventions of improvement should be carried out in the near future which can ensure a higher degree of

stability and conservation of the ancient walls. Care has already been taken to rationalise the dispersion of rainwater, but the whole monumental site could be made much sounder by creating a suitable covering and by installing, wherever this is compatible with the criteria of correct conservation, sections of internal roofing inside the castle at intermediate heights which would not only enhance the monument's functionality but also increase the transverse stability of the walls.
The flooring of the castle rooms has been renewed. It was decided to lay basalt slabs throughout, aligned with the castle's longest façade, stopping approximately 90 cm short of the ancient walls. The border is paved with clay in order to highlight this innovation both visually and materially.

4.4 The new structures

As we said above, it was necessary to build some new structures in order to make the monument fit for visitor access. Underground premises were created for toilets, service facilities and changing rooms for attendants. The creation of roofing and flooring in the tower improved it for visiting and made it possible to display exhibits inside.

4.5 Roofing and flooring in the tower

Within the body of the tower can be seen traces of various ancient ceilings. It seemed appropriate to use the old fixtures for the beams to support both the new roofing and flooring. The structure of the roofing was determined by the disposition of the ancient traces: the cover is in wood with the counterlath resting on a large central beam running the length of the room. The underside of the roof thus has a saddleback structure; in one corner there is a trapdoor to permit cleaning and inspection of the roofing.
The flooring was designed to be removable and uses metal bars inserted into the ancient fixtures. An unusually thick extrados slab reinforced with a double arc-welded grid attached was inserted, with a trapdoor for inspection of the space below. This slab is also free-standing with respect to the ancient walls, to which it is joined by a layer of compressible material. Naturally we have based the design of the innovations on the traces already existing in the monument, even though this produced structural elements which are considerably larger than those strictly required by statics.

5. Conclusions

The restoration made it possible to carry out a series of archaeological excavations which will make a significant contribution to our knowledge of the material history of the castle and its connections with the Mausoleum. The cavities lying beneath the site have been identified and studied, and in future will have to be checked periodically. The most interesting aspect has been both the overall "improvement" of the ancient walls and the adaptation of the monument

for public use, making the large rooms in the castle and the tower itself fit for visitor access.

It is our hope that in the not too distant future it will be possible to tackle other fundamental problems posed by the conservation of this complex monument. We are thinking in particular of covering the main hall of the castle, inserting a gallery halfway up the walls in order to emphasise the existence of windows, and making a definitive investigation of the Mausoleum which will complete our knowledge of it and realise its potential for access and use.

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