

## INTERDISCIPLINARY CONTRIBUTION TO THE PROTECTION PLAN OF THE FORTIFIED OLD TOWN OF CAGLIARI (ITALY)

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### ABSTRACT

The present article illustrates an interdisciplinary methodology for the protection of fortified old towns and the management of their possible future transformation. Specifically, the study has developed a process of investigation to support the identification, assessment and conservation of material evidences related to the urban walls inside old towns. The disciplinary fields involved in the research are mainly history, drawing and restoration, supported by diagnostics on materials and structures, urban planning and sustainable design. The testing area is the walled city of Cagliari, a typical Mediterranean fortified settlement, highly stratified with a wide chronology of structures and interesting military constructive techniques. The research develops a working structure for the reasoned collection of contributions belonging from different disciplinary fields. The complex set of information implements a detailed knowledge plan conceived as a vulnerable risk map. Landscape and visual perceptions of the surrounding environment are also considered. The complex mosaic of interdisciplinary knowledge has been the basis for the proposal of effective policies for protection in order to forecast, guide and control possible transformative scenarios. Contemporarily, the management plan includes some strategic actions for the fruition and enhancement of the walled perimeter, such as new touristic paths or entertainment and sporting areas. Criteria and methodology resulting from this article seem to be easily applicable to other contexts, especially in the Mediterranean settlements.

*Keywords:* chronology of structures, constructive techniques, fortified system, landscape drawing, preservation, reuse, urban survey.

### 1 INTRODUCTION

Many of the Mediterranean coastal cities were found as military strongholds with the express purpose of controlling the administrative boundaries. They are characterized by relevant military heritage associated with an outstanding landscape and are fairly frequent stratified sites, where every layer is related to different historical dominations. With the military decommissioning, their defence mission has turned into a touristic vocation. This reconversion could be difficult, slow, dangerous and even harmful in terms of heritage protection. Therefore, an effective control on these changes could represent for coastal municipalities a unique opportunity for sustainable development [1]. Starting from this awareness, the present article illustrates an interdisciplinary methodology for the analysis and protection of fortified old towns and for the management of their possible future transformation. Specifically, the article has developed a process of investigation to support the identification, assessment and conservation of material evidences related to the urban walls still evident in public spaces, but also hidden inside the urban fabric, or even traces of assets destroyed because of urban growth.

The case study of Cagliari is particularly relevant in this context for its strategic position in the core of the Mediterranean, its long history, its natural and environmental peculiarities,



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its remarkable military heritage and its touristic vocation (Fig. 1). Consequently, criteria and methodology deriving from this article seem to be easily applicable to other international similar contexts.

## 2 THE WORKING METHODOLOGY FOR URBAN HERITAGE PROTECTION (DRF)

The walled system of Cagliari, with its impressive bastions, the stratified urban texture and the formal architectural identity of the intramural structures, still represents a ‘transversal’ document of the history of architecture – not only military – and the history of restoration, with an undoubted international relevance [2]. For this reason, the protection of the urban walls is a strategic theme for the general governance of the city growth. Consequently, the restoration of the urban walls plays a ‘transversal’ role inside the policies for urban transformation and cultural valorization of the touristic city. Therefore, the intervention on the walled system requires the definition of a master plan for the integrated government of material and immaterial values.

The research project is twofold. On the one hand, it is based on indirect analysis with the systematic recognition of bibliographic, archival, manualistic, iconographic and graphic sources. On the other hand, it is centred on direct analyses of the structures, through photographic, metric, architectural, stratigraphic and material evaluations, and predominantly non-destructive diagnostic investigations.

The first step of the research was the graphic analysis of the archival sources such as historic maps and plans, compared to the current urban situation. This work has been specifically useful for the comprehension of the transformation occurred to the historical line of defence over time (13th–18th century). The result is a basic but essential cartography (Fig. 2) where the different assets are geographically identified, chronologically described and catalogued for the following thematic surveys. A careful analysis has also been carried out on the history of the transformations occurred during the 19th and 20th centuries and critically reframed in the light of the historical restoration ideologies. The entire survey was based on an ‘archaeological’ approach with in-depth investigations into the structures, but the entire defence system has always been considered as a whole. This is a significant approach in order to recognize the general cultural and testimonial values coming from the different historical phases. Subsequently, the article is focused on interdisciplinary researches on building techniques and materials, state of conservation, state of fruition, ownership, level of protection, visual perception and urban interferences. With the reasoned collection of these contributions, the knowledge plan has been conceived as a complex mosaic [3] where the



Figure 1: The fortified landscape of Cagliari (credit: D.R. Fiorino).

missing pieces are the policies for protection that represent the most interesting outcomes of the research.

By now, it is a known fact that conservation passes through the definition of rules for governing and directing urban renewal and also managing possible interferences, both in the public and in the private spheres. General criteria for protection of the landscape views also need to be considered. Based on this awareness, the entire defence system has been divided into sections, considering geographic, cultural and historic aspects. For each of these, the article provides a historic report, a technical description and a screening on the state of conservation. It furthermore traces a methodology for the identification of material and immaterial values and for the mapping of critical situations and local vulnerability. Turning to the tools, an integrated informative system was designed in order to change the mosaic of data into a network of knowledge. The cross-check of the disciplinary contributions makes it possible to forecast, guide and control possible transformative scenarios. In fact, the research suggests a set of criteria for a cultural integrated assessment of the different artefacts, and, depending on these, it proposes a scale of levels for their possible conversion to civilian use based on historic reasons, considering the urban and social needs as well.

The application of this methodology on Cagliari urban walls highlights the most crucial moment of this delicate and complicate process.

### 3 THE DRAWING OF THE WALLED OLD TOWN, FROM THE HISTORIC MAPS TO THE CONTEMPORARY LANDSCAPE

#### 3.1 The long history of the fortified old town (AP)

The existence of a fortified nucleus in the city of Cagliari was first mentioned in 1215 [4]. It was founded by the Pisans following the morphology of the hill where today there is the district of Castello. The former defence system can be still observed in the eastern side of this historical quarter. Here there is an impressive landscape, characterized by a huge difference of height that separates the fortified town from the lower city. The former perimeter (13th century) was modified in the beginning of the 14th century with the construction of new towers for a stronger defence of the city gates. In the 16th century, the Spanish engineers designed a new line of defence called '*alla moderna*'. This new protection system was characterized by pentagonal bastions. The medieval curtains were decommissioned, but some 'visible segments' still remained since these structures, particularly in the period between the end of the 15th and early 16th century, were not demolished but reused in the new military configuration. For these reasons, it is still possible to find medieval 'traces' within the 16th-century architectures and in the existent urban fabric. This was a very important period for the renewal of the fortifications because this new drawing of the urban walled perimeter guided the development of the city until the 17th century, when Savoy engineering arrived in Cagliari. Piedmontese technicians improved the military sites further with new updated military architectures.

In the beginning of the 19th century and especially after the cancellation of Cagliari (1866) from the list of strongholds of the kingdom, defence structures were affected by changes and demolitions. First restoration works were carried out only in the beginning of the 20th century on the '*liberation*' works of Dionigi Scano [5] and, later, on the reconversion of the Royal Arsenal in the Citadel of Museum by the architects Libero Cecchini and Piero Gazzola (1957–1979). For these stratified contributions the urban landscape of Cagliari represents an international military site with exceptional historical value.

### 3.2 Analysis of historic maps and graphic representation of the development of a defence system (AP)

The analysis of the origin and evolution of the walled perimeter of the fortified city of Cagliari started with the selection of the available iconographic archival sources and was based on the typology and the chronology of the drawings. Fortunately, since the 14th century, significant military maps have been providing useful elements to understand the development of the fortifications and, consequently, of the entire settlement. In this direction, the most useful documents for the understanding of the constructive phases of the walls are those about the urban views, the plans designed by military engineers, the cadastral maps and also recent projects and investigations. The survey makes a review of the signs in the drawings that are integrated with the current cartography.

This article allows not only the 'geo-referenced' individuation of the existing features but also the hypothetical tracking of the demolished segments and of the so-called hidden traces widespread in the urban fabric (Fig. 2). The first iconographic documentation that

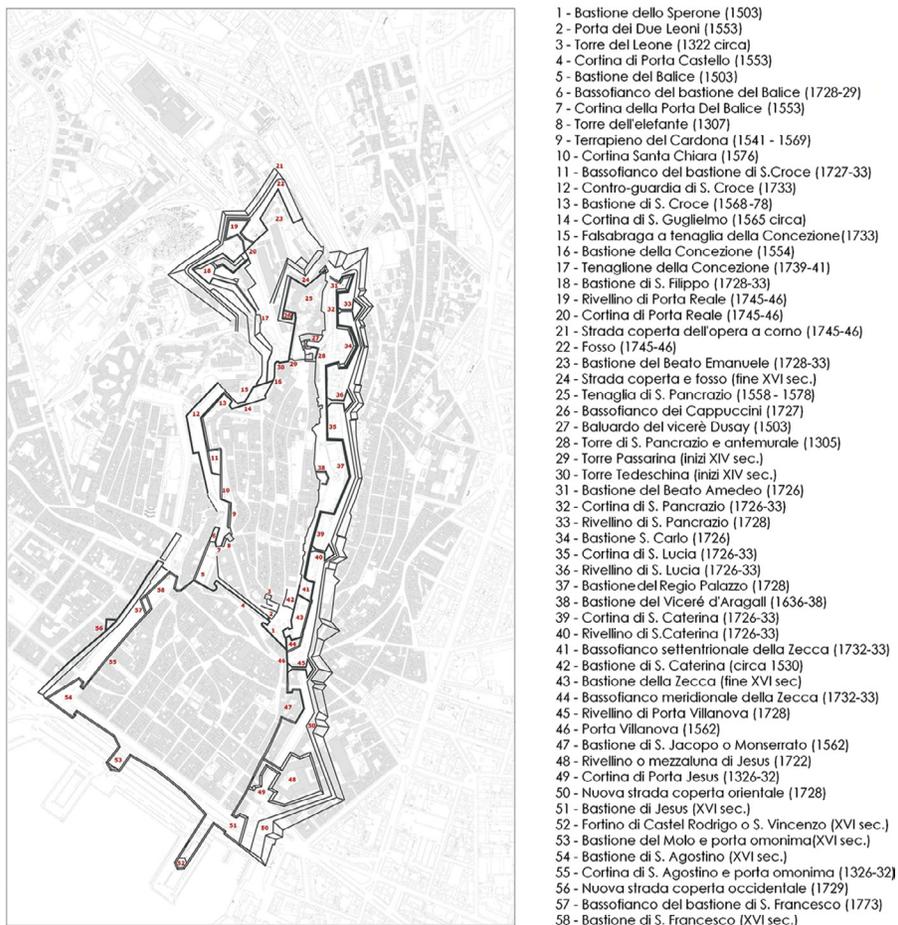


Figure 2: Identification of every single element of the fortified citadel of Cagliari in the 18th century (edited by A. Pirinu).

shows the medieval line is a 14th-century document from the Archive of the Crown of Aragon, while the first description of the entire settlement is a view published by Sebastian Munster in the *Cosmographia Universalis* (1550). This view describes the city, its medieval districts and the urban gates before the extension of the urban walls required by the Spanish Kingdom (Carlo V and Filippo II). The analysis of the document allows us understanding the changes occurred to the medieval line due to the work carried out by the Spanish viceroy in the Castello district and by the architect Pietro Pons in the Marina district. Later, the detailed study of the drawings of Rocco Capellino (1552) and Giorgio Paleari (1573 and 1578) leads to the reconstruction of a new configuration of the fortified system. The analysis was carried out using special graphic representation methods and metric scales.

Coming to the 18th century, the upgrading works of the Savoy engineers can be studied with the help of another interesting map kept in the Archive of Turin (ASTO, Carte topografiche segrete, Cagliari 42 A I Rosso).

A further source of documentation is available in the 19th-century cadastral map and in a subsequent plan of the 1930s. Both of them provide useful support for the definition of reconstructive hypothesis of the defensive line and of the structure of the bastioned front, for example, the identification of the structure present in Cortina di Porta Castello and of the vaulted rooms in the area of the Porta dei Leoni [6].

### 3.3 Graphical analysis of the historic and modern signs in the urban landscape (AP)

The research strongly supports the idea of the walled system as a only monument. As it has already been introduced in the description of the methodology, this belief drives all the choices of protection. However, the complexity of the stratified military heritage and the different historical moment of design and construction have suggested the division of the perimeter into some separate areas of investigation. However, all of these areas are strongly characterized by the close visual connection between the district of Castello and the lower town. This aspect is a key factor for the analysis of the wide, current urban environment.

Specifically, the fortified landscape is characterized by a strong relationship between architecture and place, and this link appears evident while investigating the drawing. The analysis and graphic representation of the landscape become especially significant in the light of the recent definition of landscape included in the well-known European Landscape Convention. The international document describes the landscape as a sequence of graphical, physical and human signs, whose value is strengthened by the relationships between these components and the individual or a plural perception of each particular place.

Following this definition, several readings and graphic codes have been tested in the study of the urban landscape of Cagliari, and the element that more than any other represents is undoubtedly the district of Castello and its walls. The analytical method used is called 'life drawing' and requires a physical immersion in the landscape.

This *experience* creates images that are different but complementary to those produced when we design a map of a city or of an urban space; the pictures convey the feelings of someone who is immersed in the 'environment' and they can be defined as an image of a complete 'way of feeling', rather than a simple 'manner of drawing'. In addition, the described methodology allows the understanding of the element's *weight* in their urban landscape, where the stylistic-dimensional challenge brought by recent buildings to the

landscape system (Fig. 3) is particularly evident. Furthermore, it helps to achieve a deeper consciousness of the values related to the urban diversity, which is the necessary starting point for enhancing it. For this purpose the graphic analysis of the landscape components can be used as a lens for the identification of monumental evidences and for the definition of efficient levels of protection.

Another interesting point is that the walls of Castello, observed from some of the many available scenic overlooks, show an image dense with meanings; this image is still similar to the portraits made by travellers and painters in the 19th century, despite the growth of the lower town. This development of the modern city did not deny the view of the skyline of Castello from panoramic overlooks and from the districts of Villanova, Marina and Stampace. Otherwise, many smaller interventions, producing local but heavy interferences, have reduced the perception of the city wall and the perception of the overall design.

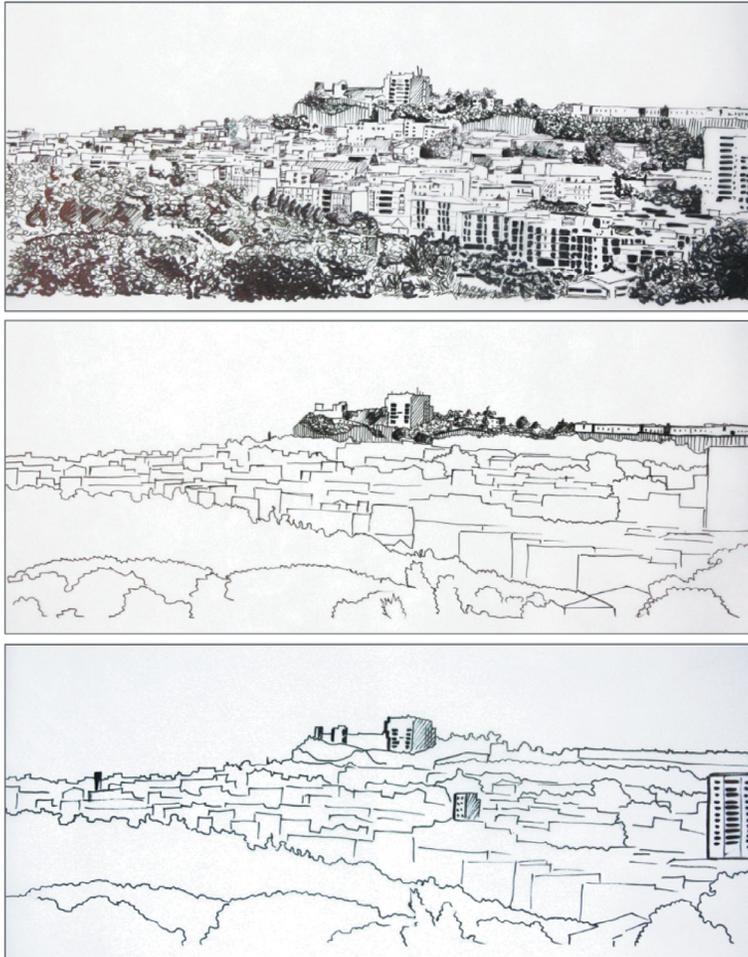


Figure 3: Graphic analysis of the stylistic-dimensional challenge brought by recent buildings to the landscape system (credit: scientific coordinator A. Pirinu).

#### 4 THE CONSERVATION AND MANAGEMENT PLAN: GUIDELINES FOR PROTECTION AND STRATEGIES FOR VALORIZATION

##### 4.1 Definitions, structure and specific objective of the plan (DRF)

Starting from the deep analysis carried out on the wide and impressive architectures and archaeological remains of the fortified old town, a master plan for the protection and valorization of the walled perimeter has been developed. The plan, here outlined, defines general principles and criteria for future restoration works and strategic projects; it includes guidelines, prescriptions and indications necessary to guarantee the conservation of the integrity of the ancient structures as well as the maintenance of the unitary perception of the site. In addition, it also aims at making greater use of potential tourism in the area, reconciling civilian reuse with the conservation and respect for the memory of the military history and the related architectural peculiarities.

The plan identified as '*Spaces of the urban walls*' is inclusive of all the public and private surfaces and architectures that are pertinent to the defensive system in one of the several historical configurations from the medieval time to the decommission phase. In this context, it considers in the same way the material evidences in public spaces and the elements of the defence curtains. Examples are walls or walkways that, hidden inside the urban fabric or disappeared because of urban transformation, are recognizable through the archival sources or by the critical analysis of the urban shape. Restoration works and urban transformation, occurred in 19th and 20th centuries, are also considered as part of the monument, together with the air-raid shelters used during the World War II. Even demolitions can be considered as cultural signs whose memory has to be preserved.

In fact, the absence of the walled heritage – consequence of the dismantling of the curtain walls and supported by a new idea of the modern city – has to be considered as a negative stratigraphy which is itself a testimony for a historicized cultural approach. For this reason, it needs to be protected in the same way as we use to do with material heritage [5].

For the definition of effective protection standards, the complexity of the urban monument makes it necessary to scale down and properly consider the identity value of each architecture, component of such a vulnerable heritage. For a more incisive management of the matter, the entire site has been divided into compartments. The identification of those areas of analysis takes into account historical and military criteria, geographic aspects and landscape values. All of them are functional in terms of the relationship with the extended city.

Every single compartment includes several architectural units (bastions, curtains, walkways, etc.) and for each of them the plan intends to reach the following goals:

1. The incentive of an integrated knowledge and the definition of a dynamic urban risk map of the fortifications with the support of ICT tools, a geographic information system, constantly updatable with the results of interdisciplinary studies.
2. The adoption of specific implementing rules for the conservation and monitoring of the material integrity of the artefacts, the protection of architectural and environmental values, and the accurate assessment and control of both the inner and the environmental vulnerability. Three levels of protection have been considered. The first level refers to areas where material monumental evidences are still visible; in this context, the only actions admitted are restoration works. More specifically, demolitions, emptying of bastions and embankments, as well as new buildings with bad landscape interference with

the urban walls, are strictly forbidden. Furthermore, the plan recommends maintenance and structural consolidation of the military architectures, the modelling of historic scarps with techniques used by historical military engineers (avoiding concrete structures), the reopening of the ancient walkways, etc. Integrations are also allowed with strict adherence to the modern criteria of restoration: minimal intervention, material compatibility, distinctness, reversibility and modern architectural language [7]. The second level refers to areas where material monumental evidences are no more evident, even if there is a serious risk of underground archaeological remains. These areas are considered as areas of specific respect and attention, where every single work requires high quality of preventive diagnostics. Finally, the third level refers to areas that are scenically or functionally connected to the old fortifications, without being directly affected by the archaeological remains. These areas need to be monitored in terms of mutual urban relationships and visual interferences.

3. The design of an urban itinerary along the walled perimeter together with a coordinated urban redevelopment and the protection of the historic urban landscape.

The proposal considers that those three actions need to be supported by an appropriate office for the walls. This office should be included in the wider laboratory for the historical centre, already considered in the city urban plan. This one, in its turn, will be entrusted with the monitoring of the actions and, in particular, with the management of the synthesis of the knowledge programme and the documentation of restoration sites and the related transformations.

Every individual project is always preceded by necessary knowledge campaigns, is proposed after the adoption of the master plan and should refer to the plan rules, developing further details and technical aspects. In this way, the plan will ensure the synergy and coordination of the different actions in a general strategy of protection and cultural enhancement of the 'walls system' as a whole. This unity should be recovered as a value in itself and not under subjective or technical/practical considerations.

The main idea is to design an Integrated Linear Park of the Walls, favouring, as far as possible, not only the use of green areas, but also the design of public spaces for different uses such as sports, entertainment, etc. In this sense, a complete review of the existing projects will be necessary to re-calibrate and integrate them on the basis of a more specialist knowledge of the walled heritage and the related historic and landscape values.

#### 4.2 The 'caution map' and the definition of the areas of protection

The graphic overlay of the previously described archival documents facilitates the historical description of the walled system in the different chronological phases and, at the same time, the identification of some wall segments, demolished or buried as a result of the late 19th-century transformations (Fig. 4(a)).

Moreover, several functional architectures and ancillary works (ditches, covered way, etc.) have been literally adsorbed by the urban growth so today many military sites correspond to areas occupied by the urban fabric (e.g. the School of Arts in San Giuseppe street) or are located under the road level (e.g. Piazza Yenne). Some of these structures have been found during recent public worksites (Fig. 5). Their comparison with the structures described in the military treatises and the archived documentation could provide a new military geography for the city [8].

For this reason, these artefacts have been located in an interdisciplinary 'caution map', a sort of an archaeological 'risk map' where information derived from archival sources, historical cadastres and recent surveys are fed into an integrated map, which is intended to

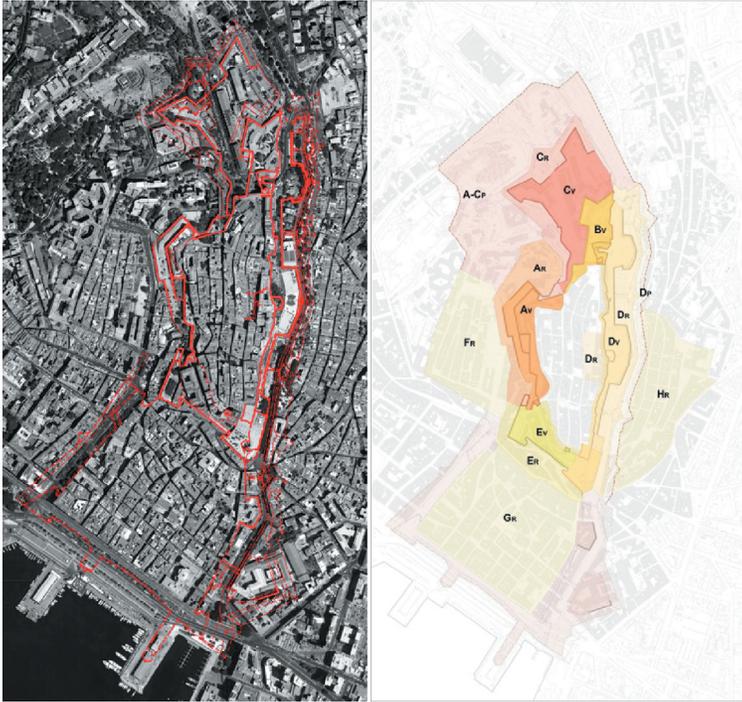


Figure 4: (a) The archaeological risk map (edited by A. Pirinu) and (b) the correspondent areas of protection. In the figure 'v' is for areas of total protection; 'r' is for buffer or respect zone; 'p' is for prevalent landscape protection (designed by D.R. Fiorino, A. Pirinu).

be updated with further hidden traits. Future archaeological surveys and diagnostics will certainly provide important data to implement the map. The map (Fig. 4), through the use of the graphic sign, highlights the still existing military architecture and, simultaneously, draws our attention to the boundaries of urban shapes and public spaces once occupied by the line of defence. It also should be specified that the surfaces of the bulwarks are only the skin of a constructive and functional system that extends itself inside and outside the visible structures.

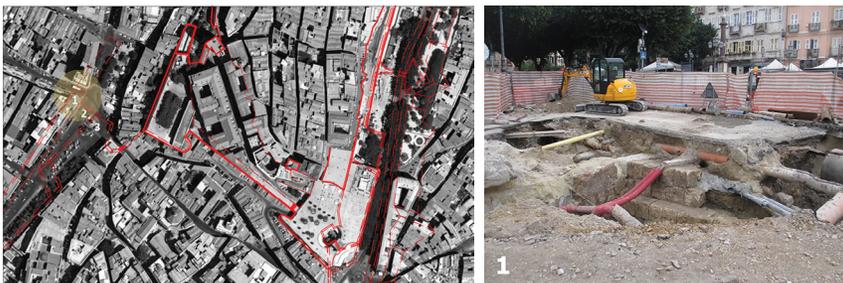


Figure 5: Some elements for the implementation of the attention map. Recent excavations in Piazza Yenne with some archaeological remains refer to military structures, probably the sixteenth-covered way (1), the ditch (2) and the St Francesco bulwark (3) (credit: A. Pirinu).

Based on the results of the historical analysis and on the landscape survey, the defence system has been divided into eight sectors for protection purposes (Fig. 4(b)). Five of them are strictly related to the architecture that is still existent in the district of Castello and in the Buoncammino hill. In the protected areas, only restoration works are admitted.

The other three sectors refer to the historic districts of Stampace, Marina and Villanova, where only few material evidences of the ancient urban walls have been maintained; however, the morphology of the urban blocks and the consistent documentary sources still allow to recognize (or hypothesize) the historical lines – buildings or structures – that once belonged to the walled perimeters. In these areas every worksite is required to be compulsorily monitored in terms of archaeological risk and transformation impact.

In addition, the protection of the fortified system is in turn guaranteed by establishment of specific buffer zones and management of the archaeological risk and landscape vulnerability.

The definition of the boundaries of these sectors also considers the protection of landscape views.

#### 4.3 Urban itineraries for the valorization of the urban walls

The present article includes some strategic projects for the integrated fruition of the military monumental evidences and archaeological remains, by means of thematic touristic itineraries (Fig. 6). In detail, the research recommends reconnecting the main historical urban gates with the different sites of the defence system through cultural walking routes or by using public transport wherever possible. The entire perimeter of the walls – also considering the districts of Villanova, Stampace and Marina – extends for around 5 km, a distance that can be travelled in a guided or independent walking tour. Moreover, some areas could also be reused for sport purposes such as jogging, Nordic walking and climbing.

Unfortunately, because of the urban growth, the paths cannot exactly follow the wall's perimeter but some local interventions would be sufficient to ensure the continuity of the itineraries, especially the pedestrian ones. Furthermore, the designed routes are strictly related to other cultural sites, as suggested by the analysis of the historical maps, especially by the 16th-century cartography where urban ways are clearly drawn [9]. As a consequence, the proposed routes make also possible an integrated fruition of several touristic places (Roman amphitheatre, botanical gardens, public gardens, church, civic museums, private residences, etc.).

Certainly the routes should be integrated with adequate signposting of tourist sites, which can be kept outside and inside the buildings, providing historic images and digital rendering. This could also be necessary for all the sites that have profoundly changed aspect; in fact, a graphical comparison between the historical and the current situation could provide useful information for the interpretation of the historical architectures and their military functions. This strategic project has several cultural and functional connections with other relevant urban actions (urban renewal, public infrastructure, public lighting, etc.).

### 5 CONCLUSION

The article highlights the importance of interdisciplinary researches for the knowledge and the protection of the walled old towns. This cultural heritage appears more threatened by the human activities than by the natural environment, and the impact of tourism as well as urban transformations are the most important set of problems to be dealt with. The only solution comes from the deep knowledge of the historical and cultural relationship between the walled system and the urban development. On the one hand, the comprehension of the way in which

this relationship has changed during these centuries increases the awareness on the aspects of strength and weakness, which characterize the current urban government. On the other hand, it suggests new significances of the military permanence for the present city.

While architectural conservation seems to be a consolidated matter, landscape values are quite difficult to be recognized, described and consequently controlled.

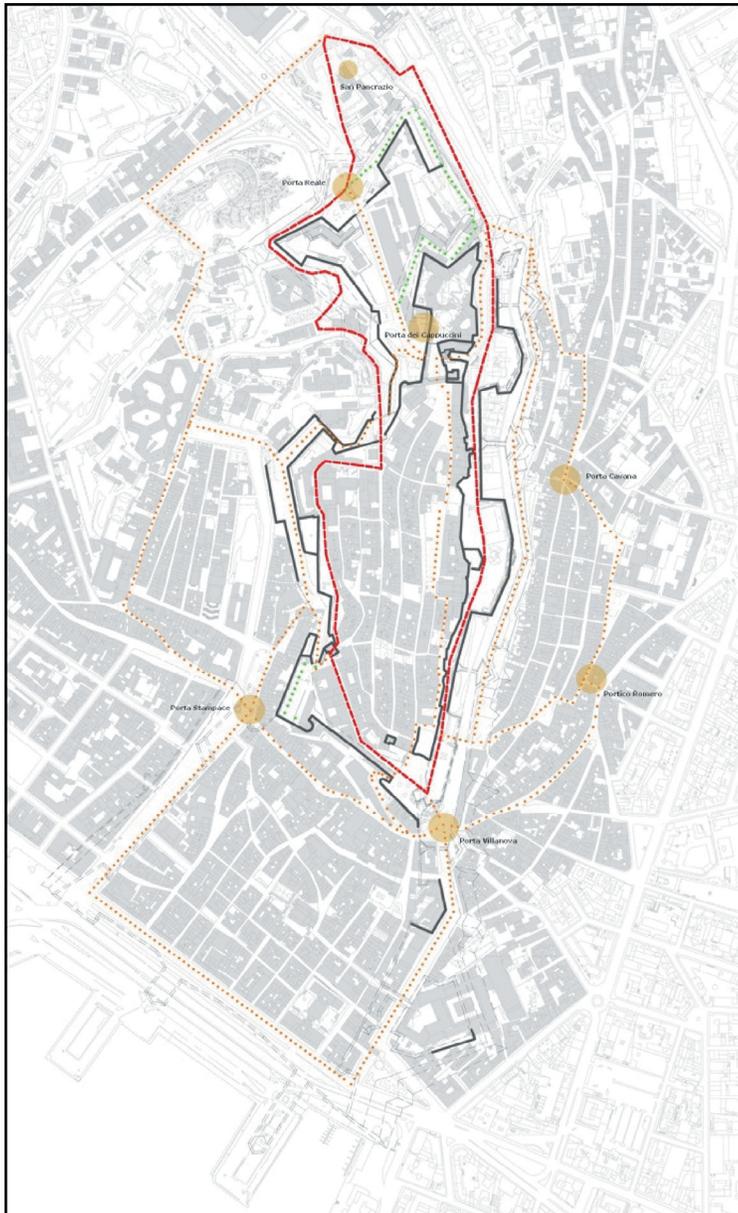


Figure 6: Proposal of urban itineraries, following the traces of the historical fortifications (designed by D.R. Fiorino & A. Pirinu).

The illustrated interdisciplinary methodology provides a successful cultural tool for a conscious redraw of the boundaries of protection areas and for the construction of balanced rules for the conservation of cultural values and, at the same time, the sustainable development of the contemporary city.

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