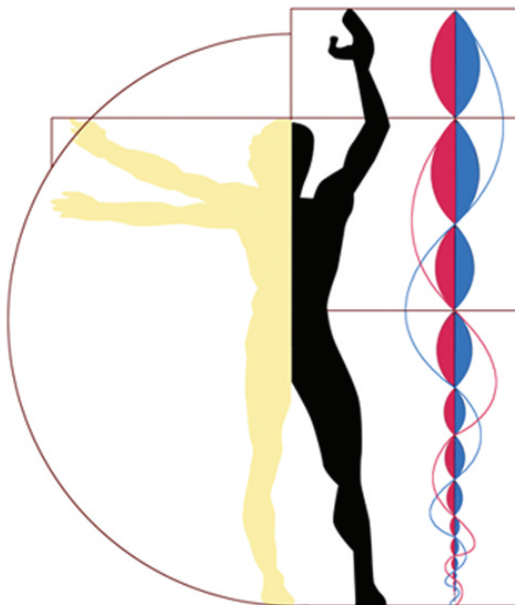


Fabbrica della Conoscenza

XIII Forum Internazionale di Studi

Le Vie dei  
Mercanti

Carmine Gambardella



# HERITAGE and TECHNOLOGY

Mind Knowledge Experience

**Fabbrica della Conoscenza numero 56**  
Collana fondata e diretta da Carmine Gambardella

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## **HERITAGE and TECHNOLOGY**

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XIII Forum Internazionale di Studi

Editing: Manuela Piscitelli

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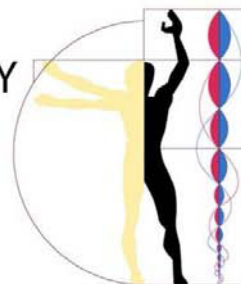
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More than 500 authors involved.

291 papers published.



## Cultural built heritage in cemeteries, between architecture and urban design. The Serramanna Cemetery Chapel

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### Abstract

The birth of modern cemeteries marks a crucial moment in the history of urban planning in Sardinia, providing designers with the opportunity to express the tendency towards monumental architecture. In the regional scene of Sardinia, the cemetery of Serramanna is an interesting example of nineteenth-century cemetery. The discovery of some documents from the historical archives of Serramanna allowed to attribute the cemetery project to Enrico Pani, an engineer trained at the school of Gaetano Cima in Cagliari. Enrico Pani discussed his graduation thesis on October 13, 1864.

Gaetano Cima with his school sets the rules that characterize a good number of the architectural works in Sardinia in the nineteenth century. His students worked in different parts of the island, in an historical moment characterized by major transformations both architectural and urban. The combination of these positive conditions led to the proliferation of numerous interventions including the construction of new cemeteries outside the urban perimeters. The cemetery of Serramanna was initially set to a plan of quadrilateral shape divided into four parts by two orthogonal paths. At the intersection of the two axes is placed a monumental chapel. The chapel, inspired by the model of the Pantheon, has a central plan layout, with an octagonal shape set. The construction of the cemetery began in 1893 and ended in June 1897. Enrico Pani worked in the context of Sardinia in the second half of the nineteenth century, designing some valuable architectures like the covered washhouse in Villacidro (VS).

**Keywords:** 19<sup>th</sup> century cemeteries, Sardinia, Enrico Pani

### 1. The planning of the nineteenth-century cemetery in Sardinia

The birth of the modern cemeteries marks in the cities of Sardinia a crucial moment that triggered a wave of urban transformations involving the main centers of the island. In 1806 the edict of St. Cloud, issued in 1804 by Napoleon, is extended to Italy. Despite the *Décret Impérial sur les sépultures* did not concern legally Sardinia, also in the island began the construction of cemeteries outside the city walls.

The need for new ways to consider the public health is engaged in a substantial reconfiguration about the traditional approach to urban issues. Cemeteries planning plays a strategic role in the nineteenth-century processes of urban transformation. The layout of these infrastructures in urban outskirts derives from the need to provide simultaneously to the sanitary rules and to the need of a new management of the urban planning in its general reorganization. In addition to the urban aspect, the issues related to the design and construction of new cemeteries involves two different scales of design, such as the design of individual artifacts and the project of the new cemetery system. The type of the large square enclosure surrounded by porticos is indicated by Francesco Milizia as a reference model for the design of cemeteries.

The principles set out by Francesco Milizia in his *"I Principj di architettura civile"* [7] had already found application in the projects of Ferdinando Fuga for the cemeteries of Rome and Naples, the prototype of which is constituted by the Cemetery of Pisa [2]. The structure of the atrium Graveyard of Pisa, with an open space enclosed on all its four sides by arcades, is taken as a model by Ferdinando Fuga for the projects of the cemetery of the Holy Spirit in Rome (1745) and the cemetery of the "366 Fosse" in Naples (1762). Both set on a quadrilateral shape, these two cemeteries are bordered by a fence portico on three sides, at the entrance side, are placed the functional buildings (chapel, caretaker housing and morgue).



**Fig. 1:** The Serramanna cemetery: the entrance portal and the chapel

In his treatise of 1781 [7], Francesco Milizia inserts the paragraph on cemeteries in the chapter entitled: “Buildings for health and public needs”. This choice already reveals how his cultural posture was aligned with the sanitary standards of the time [9]. However, this attitude does not stop him to pay close attention to the ideal of decorum and dignity expressed by the architectural ornament and by the monumentality of the architecture itself, considered unnecessary by Enlightenment meaning. Francesco Milizia assumes that each building must manifest the function they have through their features, highlighting the use of components, materials and finishes in keeping with the exaltation of the “funeral” appearance suited to cemeteries. He wrote: «*Sia un ampio recinto quadrato (...) circondato internamente da portici con archi scemi, e co’ piedritti a bugne vermicolate; genere d’ornamento analogo alla corruzione de’ corpi umani. (...) Il suolo dell’aia sia due o tre piedi al di sotto di quello de’ portici, e questo sia meno elevato di quello delle strade che v’introducono. Questa inuguaglianza, unitamente coll’esteriore corrispondente all’interno, accresce l’immaginazione di un soggiorno terribile*» [7].

In Europe one of the first cemeteries with monumental structure is the *Santo Spirito* cemetery in Palermo [2], designed by Carlo Chenchi in 1782 in keeping with the principles set out by Francesco Milizia.

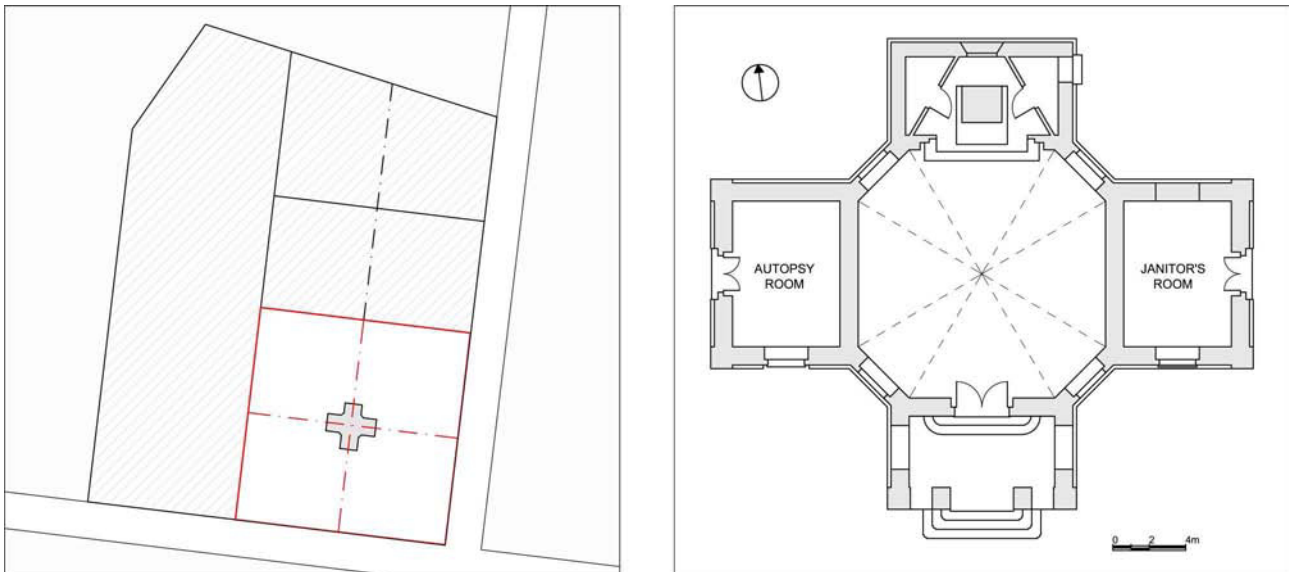
The cemeteries of the nineteenth century reveal and emphasize the spirit of the time of their foundation. The Enlightenment vision of cemeteries is opposed to the next romance, well expressed in 1821 by Shelley in the *Adonais* preface: «The cemetery is an open space among the ruins covered in winter with violets and daisies. It might make one in love with death, to think That One Should be buried in so sweet a place» [11].

Based on the principles of radical egalitarianism that leaves no room for the individual and the meditation, the rigid functional standards related to cemeteries light a strong debate in the Italian intellectual circles, in a period of transition between the extreme rationalization of the Enlightenment conception and the new sensitivity to religious values of Romanticism. In his work “*I sepolcri*”, Ugo Foscolo reaffirms the usefulness of graves and funeral rites, the value of the bond between the living and the dead, and the value of maintaining the memory of the deeds of dead men. Foscolo’s vision of the cemetery testifies the attitude in Italy at that time against the inadequacy of the Enlightenment conception of the cemeteries, he wrote: «*Pur nuova legge impone oggi i sepolcri fuor de’ guardi pietosi, e il nome a’ morti contende*».

The cemetery infrastructure go gradually detaching from the Enlightenment ideal of purely functional “devices”, to regain possession of the formal traditional content of architecture. For designers of the 19th century, the construction of new cemeteries is an opportunity to demonstrate a tendency to monumentality of architecture typical of the time, providing a particular aesthetic care in the design of these architectures. Born as urban infrastructure, the 19th century cemetery becomes a complex monument, and the representative power of art and architecture becomes the focus of its design and construction. Furthermore, the richness and variety of styles present in the cemeteries, reflects the economic and cultural vitality of the city in the second half of the nineteenth century.

The cemetery area is generally defined by a wall within which the space is organized in a hierarchical structure that reflects the idea of the city at that time. These monuments, halfway between urban and architectural design, established a real urban infrastructure, whose construction is necessary in accordance with the radical reforms intended by the liberal climate of the Enlightenment era.

Representing a city, these cemeteries require a study that focuses on two different levels: the scale of the overall structure and the scale of individual monuments [9].



**Fig. 2:** The Serramanna cemetery plan with the three successive extensions by the original one. The first expansions of the cemetery have maintained the axis of symmetry defined by the chapel and from the portal of the main (longitudinal axis). On the right the survey of the cemetery chapel plan.

An example of this attitude is found in the work of the engineer Luigi Oberty: in his report entitled “*Cenno sui campisanti, e sulla loro influenza sulla morale e sulla civilizzazione*”, in 1818 he offers a first typological scheme that rejoins the civil function of the cemetery with human and religious sentiment disowned by Napoleonic decree [2]. Adhering to the literary model of Pindemonte, Oberty assumes that the tombs generate a positive action in human life. The graveyard designed by Oberty for the city of Avellino in 1818, is defined by a square with a church centrally located in a grid of tree-lined avenues that allows access to the areas of the burials. Below the chapel is set an ossuary and a series of chapels are placed along the perimeter walls. The monumental entrance of the cemetery is located on the line stretched out of the church. Compared to the cemeteries of the Enlightenment, the innovation introduced in the model proposed by Oberty, lies mainly in restoring the dignity of men as individuals: the graves are no longer collective but individual burials, there are spaces for walking and meditation and architectural ornament finds a monumental key in the neoclassical style [2].

In the Kingdom of Sardinia, in 1731 Carlo Emanuele III di Savoia issues the first standards for the realization of some cemeteries outside the city limits. Vittorio Amadeo III di Savoia with the “*Manifesto senatorio con prescrizioni riguardo alle sepolture*” decreed a ban on the burial in areas within the city walls in 1776. In 1824, a circular from the Viceroy prohibits in Sardinia the burials in parish churches. Starting from 1824, many municipalities of Sardinia undertake projects and the construction of new cemeteries. In the following decade Cagliari, Sassari, Iglesias and other centers of the island build new cemeteries outside the city.

One of the early nineteenth-century cemeteries built in Sardinia was the Bonaria graveyard in the city of Cagliari. In 1816, a severe outbreak of cholera occurred in Cagliari: it imposed the identification of some areas near the city to use as a burial place. Until then in Cagliari, as everywhere, the burials took place inside churches and in areas adjacent to the churches. This often led to hygienic problems no longer tolerable. This precarious situation of the burials reinforced the need for a large city cemetery in Cagliari. Designed by the military engineer Luigi Damiano, the new cemetery was inaugurated January 1, 1829. It consisted of a rectangular plan divided into four parts. After just thirty years, the new graveyard needed an extension. The first expansion was designed by architect Gaetano Cima. The planimetric layout of the cemetery of Bonaria is one of the reference types used in the post-Enlightenment period in Sardinia and it became the model for some other cemeteries in Sardinia. The cemetery of Bonaria was used until the sixties of the twentieth century. Today the graveyard of Bonaria contains a wide variety of architectural styles used between the nineteenth and the twentieth centuries.

## 2. The Serramanna cemetery

During the thirties of the nineteenth century, Vittorio Angius in “*Dizionario geografico storico statistico commerciale degli stati di s. m. il re di Sardegna*” wrote that the Serramanna cemetery was adjacent to the church square. In 1859, in compliance with the provincial circular of 1850 which forbade burials inside the



town, the municipality of Serramanna identified an area located north-east of the town with the purpose of the construction of the new cemetery [1].

The new cemetery was designed in 1893 by Enrico Pani, an engineer trained at the school of Gaetano Cima in Cagliari [3]. A boundary wall, a building at the entrance and a funeral chapel represent a constant that characterizes a typology of nineteenth-century cemeteries. In the Serramanna cemetery we have the presence of two of these elements, missing the building at the gateway to the cemetery. The cemetery designed by Enrico Pani rises in place of a previous cemetery, evidently arisen in emergency conditions and not considered appropriate, which was demolished to make way for a new one [8].

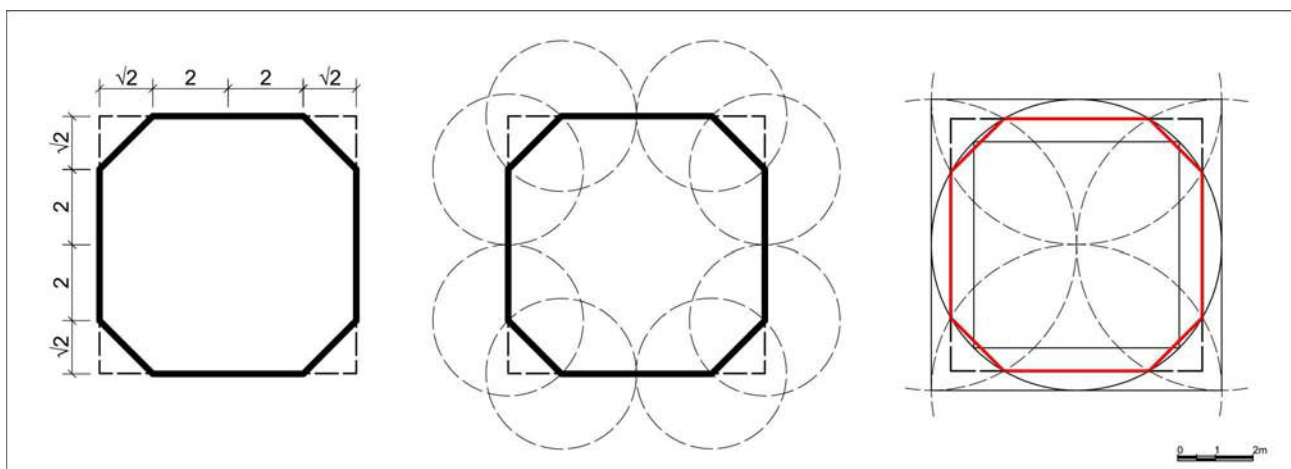
The cemetery designed by Enrico Pani uses as typological matrix the framework of the fence, in accordance with the statement made by Francesco Milizia. In his treatise *“I Principj di architettura civile”*, he proposed a large square enclosure, or any other curved or mixed-line shape, equipped with spaces for ossuaries and a chapel at the center in the shape of a pyramid or Pantheon. Francesco Milizia resumes ancient patterns drawn on a geometric basis and with symmetrical composition. In the project for the cemetery of Serramanna, Enrico Pani follows some of these principles.

Originally surrounded by a wall that defines a square spatial distribution, access to the new Serramanna cemetery is via a modest portal positioned centrally on a side of the nearly square plan. On each side of the entrance portal, two coupled cast stone pillars surmounted by stone pyramids. Aligned with the entrance portal a small domed chapel. The octagonal shape expresses the radial space and the multiple relationships established with the surroundings. The chapel is representative of the entire cemetery complex: it is built according to the model of centrally planned church, topped by an octagonal dome and preceded by a portico with a rectangular plan bounded by four pillars supporting a triangular pediment in the main front facing to the cemetery entrance portal. The architectural style of the cemetery chapel goes back to a neo-Palladian architectural language and the graveyard complete the project according to conventional typological references that realize a design in an urban language.

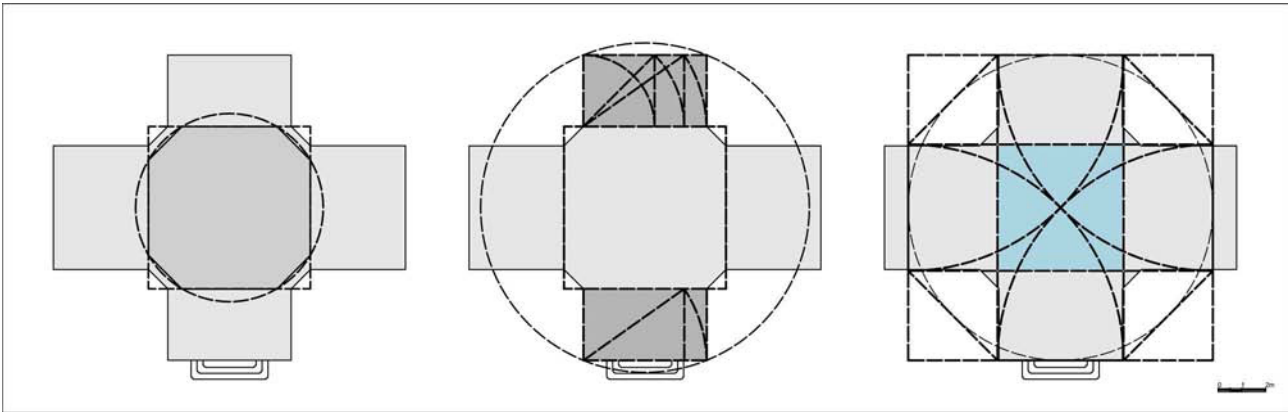
The cemetery chapel assumes an iconic value for its architectural forms and its location: it is the pivot of the geometric order of the cemetery. The cemetery plan is marked by two main axes hinged on the position of the chapel: ideally two lines depart from the axes of the chapel extending to the entire historic cemetery system. The quadripartite structure of the cemetery plan generates an orthogonal grid confined within a square perimeter whose center coincide with the chapel location: all the cemetery complex structure highlight the central position of the chapel. This same pattern also underlies the geometry of the cross that sanctifies the space. Obviously these assumptions are referred to the typological matrix of the fence of the historic core of the cemetery. Two subsequent “fences” have been added to the diagram of the historic cemetery and the space designed according these additions moves away from the original architectural and symbolic laws.

In the historical archives of Serramanna, are kept the *“Capitoli d’appalto”*, containing the procurement criteria of the “Project for a new cemetery” [7]. Dated 1893, the contract, signed by Ing.Enrico Pani, designer and project manager of the work, is divided into six chapters.

The Chapter I art.I reads: *«L’appalto ha per oggetto l’eseguimento di tutte le opere e provviste occorrenti per la demolizione del vecchio cimitero e la costruzione in più ampie dimensioni di un nuovo, a seconda del progetto compilato dall’Ing.e E.Pani nel Comune di Serramanna e nella stessa località del vecchio»*.



**Fig. 3:** Diagrams of the geometric construction of irregular octagon corresponding to the inner perimeter of the central block of the Serramanna cemetery chapel



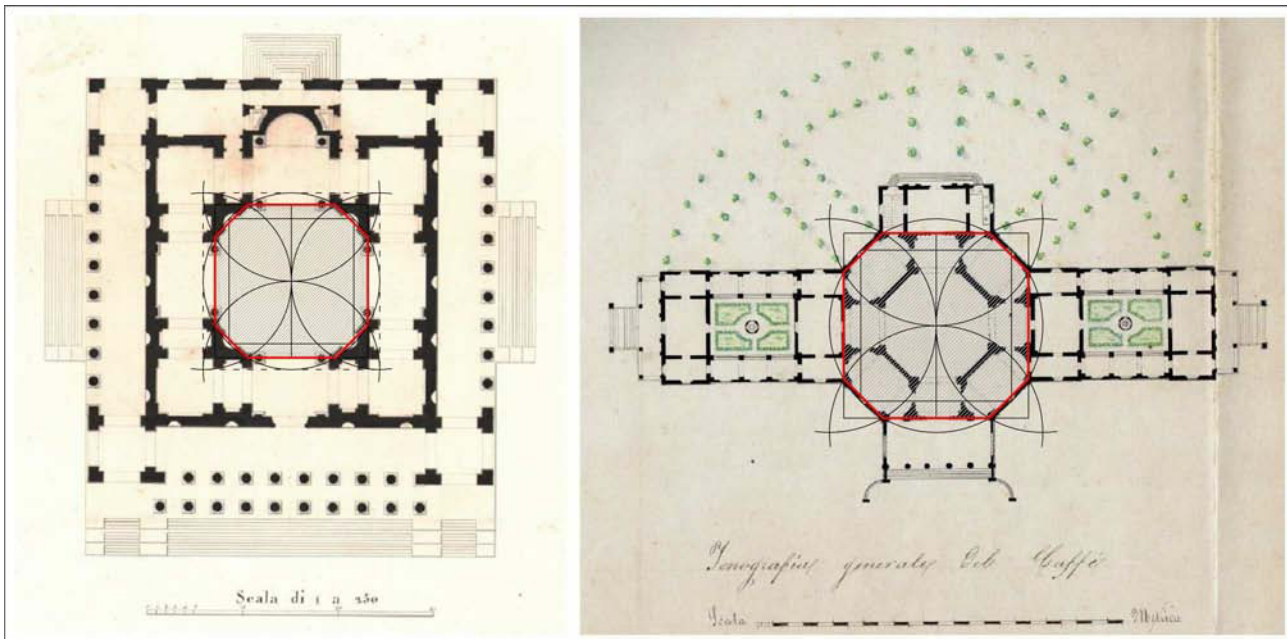
**Fig. 4:** Diagrams of the geometric construction of the outer perimeter of the plan of the Serramanna cemetery chapel

As can be seen from the 1<sup>st</sup> chapters of contract, the project designed by Enrico Pani includes the demolition of the old cemetery and the construction of a new one. In these chapters we can find the only indications of the characteristics of the cemetery, since there are no traces of the drawings: in particular Chapter II, *Designazione, forma e principali dimensioni*, describes the main geometric and functional characteristics of the new cemetery. Art.21, *Designazione sommaria delle opere di appalto*, lists the works included in the contract. Among these, step 2 shows the item: «Murature diverse per la formazione dei muri di cinta, di due stanzette, dell'oratorio e sottostante ossario». This entry clearly refers to the funeral chapel, with underground ossuary, and two small rooms attached to it: the autopsy room and the janitor's room. Article 22, concerning the form and main dimensions of the works, specifies that: «La forma del cimitero è quella di un rettangolo di m.170.15 di lunghezza per m.172.20 di larghezza esternamente ai muri di cinta. Più un fossetto esterno lungo la zona perimetrale prescritta dai Regolamenti di un metro di larghezza, della sezione di cui nella figura a margine, che nel senso longitudinale seguirà nel modo più possibile regolare la pendenza del terreno. I muri di perimetro avranno un'altezza totale sopra zoccolo di m.2,00 – comprese le copertine, e lo zoccolo poi le altezze che risultano dal p.o quotato annesso al progetto. Gli spessori saranno da 0,60 in fondazione a 0,46x0,40 per tutta la rimanente altezza fino al p.o di posa delle copertine. Alle distanze fissate dai disegni ci saranno i pilastri di rinforzo sporgenti sempre in elevazione m.10,05 per parte sui latistanti muri, ed in fondazione 0,10. Le stanzette e le altre due parti sporgenti dell'oratorio avranno 0,60 in fondazione e 0,50 in elevazione. Il perimetro dell'oratorio poi avrà 0,70 in fondazione - m.1 0,60 per l'altezza dell'ossario e m.1 0,50 in elevazione. In tutte le parti secondarie poi si seguiranno rigorosamente le dimensioni che dettagliatamente si vedono nei disegni riportati». From this article we learn that the cemetery was designed with nearly square shape (a rectangle measuring 70.15 meters long by 72.20 meters wide), enclosed by a wall with a surrounding externally small moat; are also specified the size of the different parts of the main works. Section III describes the execution mode of the works, the Chapter IV is about the quality and origin of materials, Chapter V is about the amount of works and their unit price and different rules for its accounting, Chapter VI explains rules and procedures governing the procurement and Chapter VII the "Special Conditions", containing particulars of the material from the demolition of the old cemetery. In addition to the chapters of contract, the Serramanna historical archive preserves a document with the final computation on the accomplished works and a written record of the conclusion of the works signed by the contractor Francesco Saddi and the construction manager Ing.Enrico Pani, testifying the date of completion on June 1, 1897.

Today the cemetery has a plan configuration that results from the different expansions become necessary over time (Fig.2). The dimensions described by Enrico Pani in its report match those of cadastral maps updated to 1957, where they keep the nearly square size, with the sides, respectively, 70.15 meters and 72.20 meters long.

### 3. The cemetery chapel

The cemetery chapel is a central-plan building with a central block of octagonal shape covered by a dome and four wings, each of which with a triangular pediment crowning, and a portico in the main front. The chapel is polygonal and cruciform in design and it results from the overlapping of two forms: the circle (by which the construction of the octagon) and the Greek cross.



**Fig. 5:** Design drawings of the Thesis of two of the students at the school of Gaetano Cima in Cagliari. Designed in the mid-nineteenth century, even in these two examples we find the use of irregular octagon. On the left the project for a church by Luigi Corona (1845), on the right a project for a Cafe by Filippo Vivanet (1855). The geometric structure of Vivanet project, is similar to that of the cemetery chapel designed by Enrico Pani, who also graduated with Gaetano Cima in 1864.

The combination of a portico with a dome refers to the model of the Pantheon in Rome. A typological reference for the Serramanna cemetery chapel can be represented by the *Tempietto Barbaro* in Maser (Treviso), designed by Palladio, but you can find similar models in numerous other examples of cemetery architectures such as the *Oratorio di San Gregorio Magno* in the Villetta cemetery in Parma (1818) [9].

The centralized plan structure of the Serramanna cemetery chapel has two main axis of symmetry: an irregular octagon defines the main body of the church and its center organizes both the plan and the exterior of the building. In the construction structure, circle, square and octagon, are all hinged at one center: from them is generated a more complex geometric figure that define the building installation. Usually buildings with centralized plans direct the emotional perception of the viewer to the function of a memorial or houses of worship. The main building is embellished in the front wing with a prostyle portico and its basement was used as an ossuary. Auxiliary buildings are linked to the main octagonal block by means of extended symmetrical wings on either side, containing the presbytery and two subsidiary rooms associated with the requirements of the cemetery (the autopsy room and the janitor's room).

Starting from the architectural survey, we can find some geometric constructions of the chapel plan: they may be considered the basis of the project by Enrico Pani. Clearly, the obtained geometries were affected by the errors introduced by the building up of the chapel and, as typically happens in the architectural survey, by the intrinsic errors inherent in the performed measurements. With the availability of the lost drawings of the project, certainly the research results could have further confirmation.

A first geometric construction is one that considers a circle and two squares inscribed and circumscribed to it [9]. Following this rules we can get a first geometric construction that allows us to trace the geometry of the irregular octagon used by Enrico Pani to define the layout of the main building and its four wings.

The setting of the entire building plan can be carried out considering the two perimeters respectively inside and outside of its walls. At the inner perimeter of the central block, we detect an irregular octagon (Fig.3). According to the measures derived from the architectural survey, this irregular octagon has the shorter sides with a length of 2 meters, while the larger ones are 4 meters. Considering the square on which it is set this octagon, we can find a second geometric construction. The resulting square has the side of 6.82 meters. The distance detached from the irregular octagon on each side of the square is equal to  $\sqrt{2}$  meters. Tracing circles with a radius of 2 meters on the vertices of the octagon, we find again the geometry of the plan system. In all the cases, the geometry of the chapel plan can be always brought back to that of a circle and a square.

The geometry of this particular irregular octagon it can be found in some different examples of architectures of the same period. Some examples will be found among the projects implemented in the Degree Thesis by

students of Gaetano Cima in Cagliari, designed in the mid-nineteenth century [3]: in the design of some of these buildings we can find the use of the same irregular octagon (Fig.5).

The four wings extending from the main body of the Serramanna cemetery chapel, are matched into two pairs: two are spaces for ancillary rooms, two are extensions of the central block and represent prostyle portico and the chancel of the church. The four auxiliary structures not only are combined in pairs from a functional point of view but also for their size and geometry. Starting by considering the two wings that house the porch and presbytery, the geometry of each of these two spaces is constituted by a root 3 rectangle. The root 3 rectangle construction begins with a root 2 rectangle. Consider the diagonal within the root 2 rectangle, we can use the diagonal as the radius of an arc whose trace touches the square base line. Enclose a rectangle around the new figure, this is a root 3 rectangle.

So, if we look at the outer perimeter of the whole building, the geometry of these two offshoots corresponds to a dynamic rectangle obtained from a square with side length of 3 meters. Both of the two rectangles have the aspect ratio of  $1:\sqrt{3}$  (Fig.4). The remaining two wings of the building are used as ancillary rooms, one for the caretaker and one for the autopsy room. The size of these two rooms result from an offset of a wall, beyond the line of the outer octagon that circumscribes the entire geometric composition of the building; in this way it was possible to make a space more appropriate size to accommodate the functions provided by the project.

A further geometric construction that can be considered is that of the so-called "Sacred Cut". This geometric construction involving the square for constructing an octagon was given by Sebastiano Serlio in his *I sette libri dell'architettura* ("Seven Books of Architecture") [5]. This geometric construction is sometimes called the *sacred cut*, a name coined by the Danish engineer Tons Brunés in his book *The Secretes of Ancient Geometry and Its Use* [5]. Starting from a reference square with side equal to the distance between the elevation front of the portico and the one of the presbytery, swing an arc from each corner with radius equal to half the square's diagonal. The four lines starting from the point where each arc cuts the square, is defined a center square called the *sacred cut square*. The *sacred cut square* can be found in the layout of many ancient buildings, such as the Parthenon [5].

We can use the Sacred Cut to construct an octagon whose sides have a length equal to that of the fronts of the four wings of the building (Fig.4).

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