

# PROCESS BASED ARCHITECTURAL DESIGN: MATTER / MATERIAL / DESIGN / CONSTRUCTION

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*The lecture topic is the interpretation of architecture as a process of transforming nature into architecture: the way in which matter becomes material and then construction through the design. The problem of the use of materials is not considered as the conclusive phase of the design process, the one that precedes the construction. On the contrary, the choice of matter / materials, the identification of their possible use, is regarded as one of the founding moments of the project intervening from its invention.*

*The distinction between matter and material is therefore considered a critical and at the same time collective action that in the past belonged to a whole culture. The act of recognizing and ordering the material corresponds to the creative designing phase par excellence.*

*In the first part of the lecture, a method of interpretation of the historical architectural process will be briefly presented. In the second part, the author's experience on the topic will be presented through a project.*

I will try to address, in this short talk, the problem of the use of material in the conception of the architectural design: how the building is the result of a process of physical transformation of matter into an architectural organism. I will then give an example of one of my projects believing that an architect should take responsibility for what he is claiming by demonstrating it with his own work, even knowing that the relationship between theory and practice, in architecture, is never linear.

First of all, I believe that, as architects, we should, recognize the principle that orders the use of matter in construction is the life of man in his environment. Every human being tends to be, in a certain way, the architect of the space he inhabits. The builder who designs or simply imagines a building, starts from a collective experience, from the form of the spaces that man organizes over time around him: the man who prays (the church, the mosque, the synagogue), the man who works (the factory, the farm, the office), the man who studies (the school,

the library, the studio). In this sense, architecture constitutes the representation of aspects, typical and typified by collective experience, of human life.

The form can therefore be defined as the visible aspect of a structure of dynamic relationships, of the hierarchy of functions and constructive elements, of the link between spaces connected by the nexus of paths and pauses, conventional or ritual gestures.

The builder organizes spaces following, consciously or spontaneously, the great flow of forms that make up his environment, he updates them endlessly on the basis of characters that end up becoming typical of a civil environment and of a historical phase.

The life of building organisms, their formation and modification over the course of history, is part of a great stream of transformations that change the shape of urban aggregates, cities, and territory. In fact, architecture is a state of temporary equilibrium within these continuous changes. Starting from its construction, which can be understood as a transformation of the *matter* that first becomes *material*, then an element of the construction until it aggregates into structures and systems to finally compose the architectural organism. The life of building organisms is a process.

Giuseppe Pagano, one of the most influential architects of modern Italian architecture, highlights this central problem in architecture that most of the modern movement had neglected.

*“To say that the material – he wrote - represents the necessary and sufficient means for the architectural realization – he wrote - is not enough. It is something more ... There is something in the material that is not only an external aspect but a formal tendency inherent in the chosen material.”* (Pagano 1931).

He explains that the characters of any construction are linked to the interpretation of a process of transforming nature into a built reality. That is, of how matter changes, so to speak, of the state in the constructor’s consciousness, becoming material before being transformed into an element of architecture. This fundamental step determines the formation of the character of the entire building.

Pagano’s words can be a good introduction to the central theme of my considerations. They explain how the two terms “matter” and “material” have a profoundly different value for the architect.

Matter is the substance of which the bodies of the universe are composed, the physical part of the world that we can know through experience. The term expresses, at the same time, an indeterminacy, and an aptitude to receive form. Not being, therefore, material of construction, matter is the given of the problem, pre-existing to any transformation. It is the primary origin of built reality.

The material, on the other hand, is *materia signata*, a sign, a recognition given to the matter.

The distinction between matter and material is a critic and at the same time collective operation that in the past belonged to an entire society. This operation of the conscience is one of the fundamental data in the formation of the characters of the buildings and it distinguishes, from common clichés, their creative substance. Indeed, the operation of recognizing and ordering the material corresponds to the creative act *par excellence*, constituting the origin of every construction.

The material is also an “adaptation” marked by the passage from the pure use of “encountered” materials to the processing of stone in blocks and squared ashlar, to the control of the melting of metals, to the formation of alloys. In architecture the term “material” indicates the aptitude recognized in the material to be used (transformed or not) in construction.

We can therefore define an organism as the result of a process of identification and transformation of matter into elements, which aggregate and establish a relationship of necessity between them to form an autonomous unit. Also, it could be added, as the origin of an inverse process, from construction, again, to nature through the intermediate stage of ruin.

In this sense, the building is not an object, but a succession of transformation phases, a process:

- construction, as a change in the state of matter transformed into material and then, by successive degrees, an organism;
- a second phase of the building’s life, as verification (or testing) and consequent adaptation, completion and finishing;
- a third phase of life, as a continuous process of transformations and updates in relation to the conditions of the civil environment;
- the ruin, as an extreme change of state and return of the organism, in a inverse process to that of construction, to disaggregated structures (which have lost their internal ties), elements, material, matter.

This last phase of progressive return to the state of nature, which man tries to remove through restoration, reuse, maintenance, never considered and foreseen in the project, is the one that makes evident the character of the building, which testifies to its greatness (the ability to ruin following a process) or its fragility (static, typological, aesthetic, civil)

It is therefore evident that the problem of the use of materials is not the conclusive phase of the design process, the one that precedes the construction, as is often believed. On the contrary, the choice of materials, the identification of their possible use, is one of the founding moments of the project and intervenes from its onset, even if, in contemporary architecture, the form derives from the architect’s intuition and the material is the means, the way to make it happen.

The problem of the use of the material is related to the cultural area to which it belongs, meaning by “cultural area” a portion of territory in which a high number of common characters is recognizable in elements, structures, systems of built organisms (Cataldi 1979, Strappa 1995).

Although the traditional idea of cultural area seems disappeared in the contemporary world, it has in fact surprisingly improved. It is evident in the permanence in the light and transparent structures and systems used in the *high-tech* forms, for example, of the light, transparent, elastic characters.

They are remarkably common in North European areas, once associated with Gothic civilization. In this context, it must be considered the modern reference to the specific characters of the local language, which in Mediterranean culture are often masonry plastic. Examples are the works of modern architects such as Sedad Eldem in Turkey, Fernand Pouillon in France, Mario Pagano in Italy, Dimitris Pikionis in Greece, but even geographically distant architects, such as Luis Barragan in Mexico, according to a construction tradition that originates in Spain.

To understand, from this point of view, the complexity of the built world, formed through the complementary relationship between heterogeneous materials, it is useful to draw a distinction between dyads of opposite and complementary characters (considering among the wooden-elastic characters also those of modern metallic materials) according to the different types of elements and structures to which the different materials can give rise:

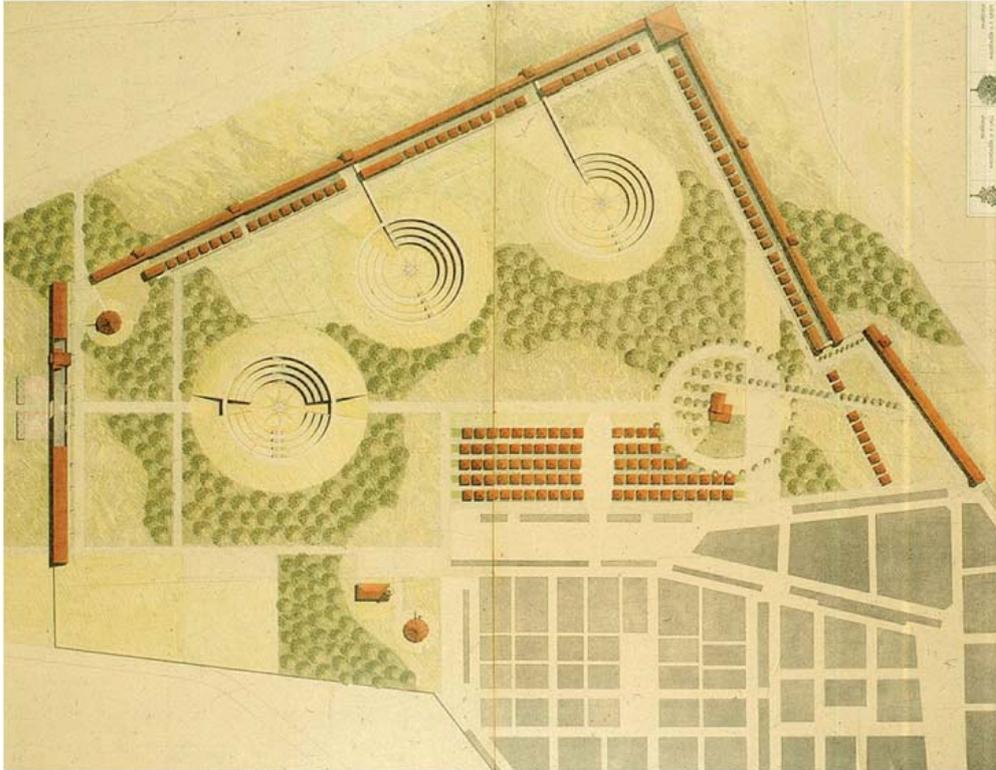
1. wooden - elastic materials / load bearing not closing spaces
2. masonry - plastic materials / load bearing - closing spaces

and also dyads crosses:

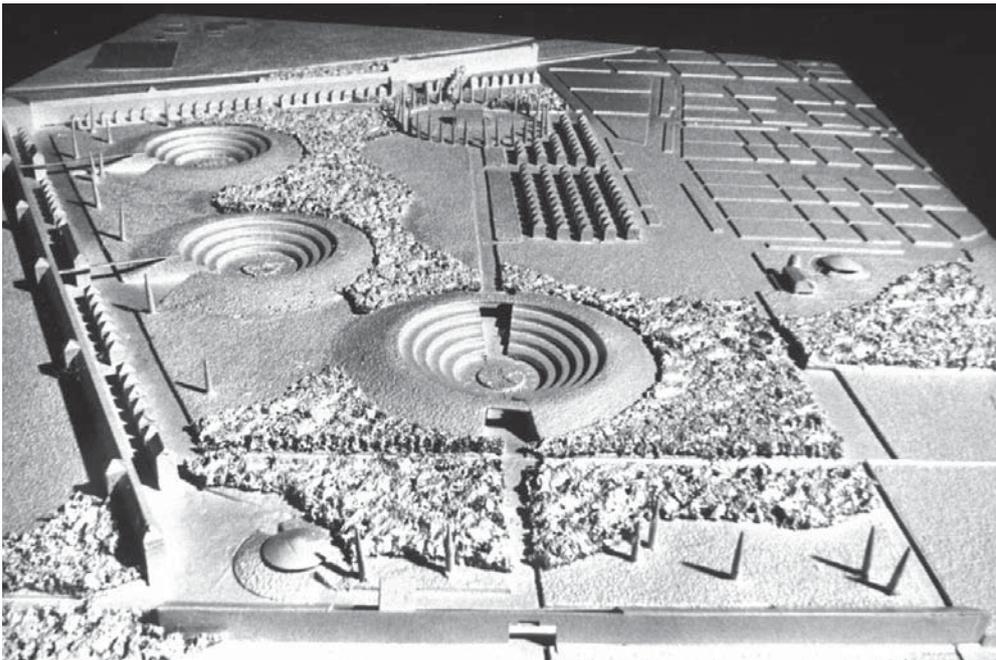
1. wooden - elastic materials / load bearing – closing spaces
2. masonry - plastic materials / load bearing – not closing spaces

The design of Terni Cemetery<sup>1</sup>, in Central Italy, could be a useful case to present some of my ideas about the relationship between matter/material and construction/expression in designing architecture. This example seems to me especially suitable to the subject in question, the cemetery constituting a kind of laboratory that contains the problems of morphological analysis and that of architectural language.

The project was born out of a teaching experience, from an uncommon interest of the students for a hard-poetic theme like that of death. At the end of this experience, a group of very motivated collaborators proposed me to participate in a competition for the construction of the large cemetery.



**Figure 1.** General plan presented at the national competition for the extension of the Terni cemetery. The final project was designed by the team: Giuseppe Strappa (group leader), Tiziana Casatelli, Paola Di Giuliomaria, Elmo Timpani. The second construction phase was completed in 2017. A new construction phase began in September 2021.

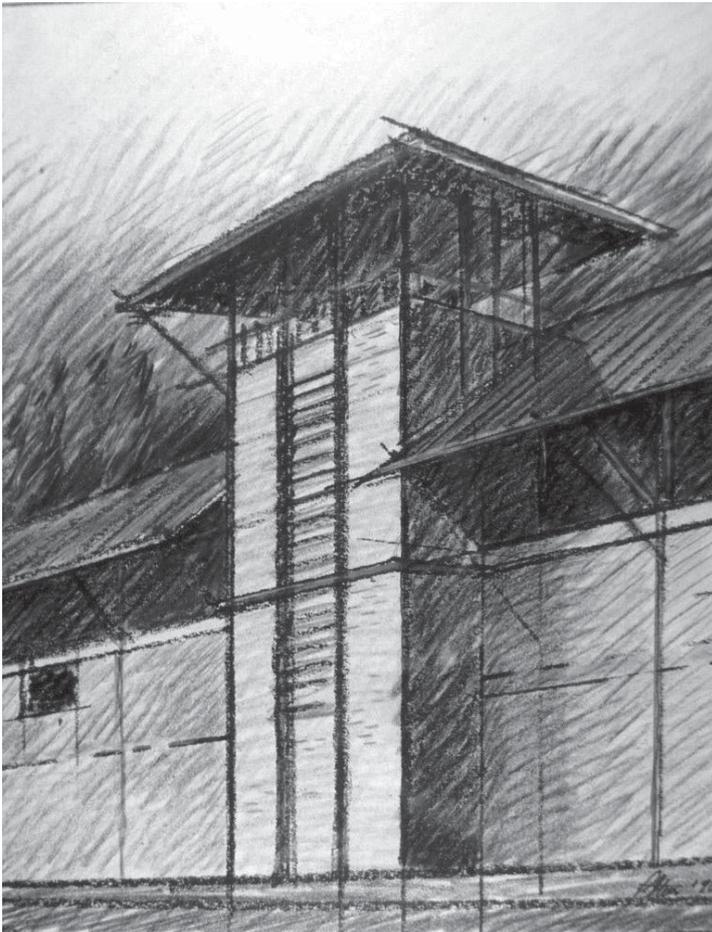


**Figure 2.** Model of the intervention presented in the national competition.

I never suspected we could win, as we did. Since then, the project has experienced professional ups and downs, between fast requests for changes and long interruptions. We had building companies sometimes very skilled, and others that have left public administrators in trouble. Some general considerations to frame the problem. In Italy, in premodern times, defuncts that had belonged to a religious or a civil community, in some ways were still part of the city. They were buried inside the urban space, in churches or close to sacred places.

The cult of the dead remained in our culture, until the XIX century, a strong symbolic force not only religious but also linked to bourgeois values. Instead, mostly in the years after the Second World War, the image of our cemeteries, built for functional purposes only, suggest the misery of the urban suburbs of which they replicate the contradictions.

But in the Seventies, for different reasons, the theme was again regarded as important for the work of architects. Two relevant examples were designed as small towns of remembrance, contributing in a significant way to the regeneration of Italian architecture: the Modena Cemetery by Aldo Rossi (1971-78) and the Parabita one designed by Alessandro Anselmi (1967-82).



**Figure 3.** Study sketch of the exterior wall.

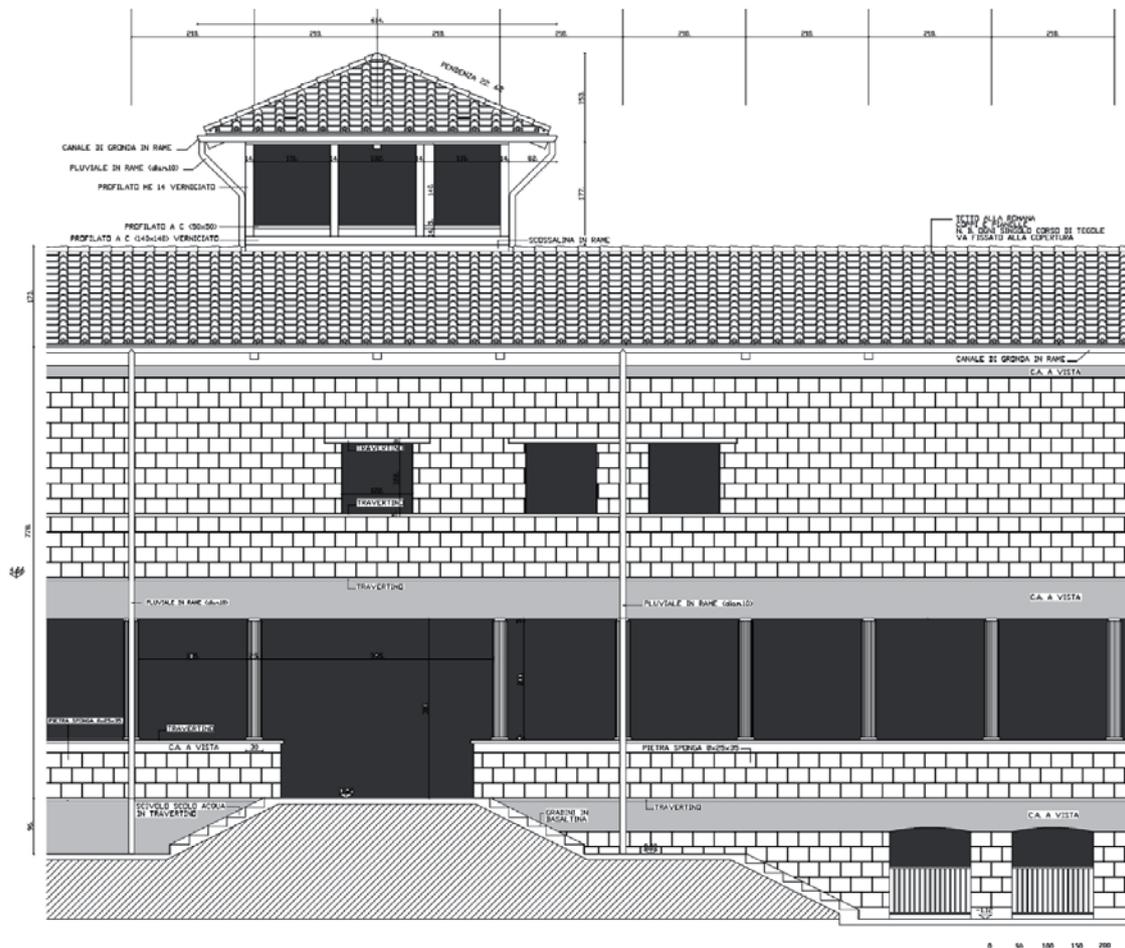


Figure 4. Inner elevation, detail.

Some general considerations to frame the problem.

The Terni Cemetery designed in the 90's, is centred on the concept of an enclosed city where elements and structures are expressed through building and routes, continuing the urban walls that separate it from the rural landscape.

The phase illustrated here is the most recent, and also the most fortunate, with municipal technicians unexpectedly attentive to architectural problems and a good company that concluded the work even earlier than projected.

The choice of using plastic-masonry structures is a basic component of the project idea and is due to two main reasons.

First of all, this choice is linked to the notion of 'cultural area' of which I spoke. Building and fabric in this area have solid stone tradition and the wise use of limestone and tuff is a character, updated and innovated, still working in our days.

A second reflection that concerns the choice of material is the "organic" character intrinsic in the use of plastic-masonry structures, the necessary continuity that is established inside the masonry walls and regulates the position of the elements in

a stable way: independently of the innovate purposes, a good masonry building is linked to physical laws that impose an organic hierarchy between the parties.

The civilizations that produced the great codifications in architecture, in my opinion, have always associated the culture of the builder to the aspirations of the civil context. That's why, I must say, I prefer the culture of the craftsman to one of the artist, which seems to be inspiring much of contemporary architecture.

But the modern use of stone has raised the problem of cladding. Assigning this material a constructive and aesthetic function, a shuttering role was initially intended for the external stone curtain. Economic reasons did not allow the full application of this principle, but I still consider the collaboration between stone, used in the dual role of cladding and building element, and concrete (a material that can also be used in a plastic method) as an interesting way.

The walls of the building are now in fact plastic in nature (reinforced concrete walls), but the expression of this character is delegated to the stone cladding. I believe that this too is a legitimate solution, as the history of plastic constructions demonstrates.

The use of masonry structures has involved (Palladio's buildings are a clear example) the acceptance of an "indirect expression". The result was, in the past, the formation of a code to be used even when nodes and static solutions were no longer constructively evident.

The walls of many large ancient Roman or Byzantine public buildings, for example, were covered in plaster (today only traces of it are barely visible) and did not allow the reading of the relationships between the elements of the structure. The direct readability of the building was replaced by an indirect readability that privileged the spatial and volumetric synthesis, contrary, in my opinion, to the belief that Roman architecture describes an essentially technical-constructive logic.

The notion of "architectural organism", (from Leon Battista Alberti to Gottfried Semper) assigned to the facade the function of an aesthetic synthesis of the building. Their idea of facade intended to report or represent indirectly spatial contents. The legacy that, as moderns, we get, amply legitimizes the use of stone as a material that expresses its original load-bearing function without having a true structural role.

I believe that, in the Terni cemetery, the continuity with this habit, translated into modern terms, is evident in the external facade of the perimeter walls. They are, with many variations, organized in four zones of architectural stratification (Maretto 1980): the base, the elevation, the unification, the conclusion. A special problem is that of the specific tectonic nodes in the wall systems.

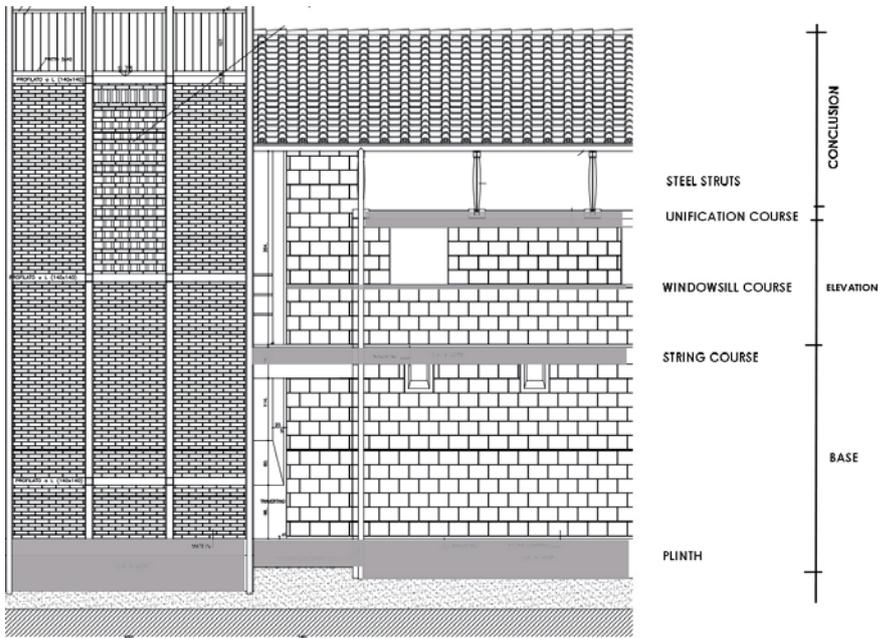


Figure 5. Detail of the external façade indicating the main tectonic nodes and the architectural “stratification bands”.

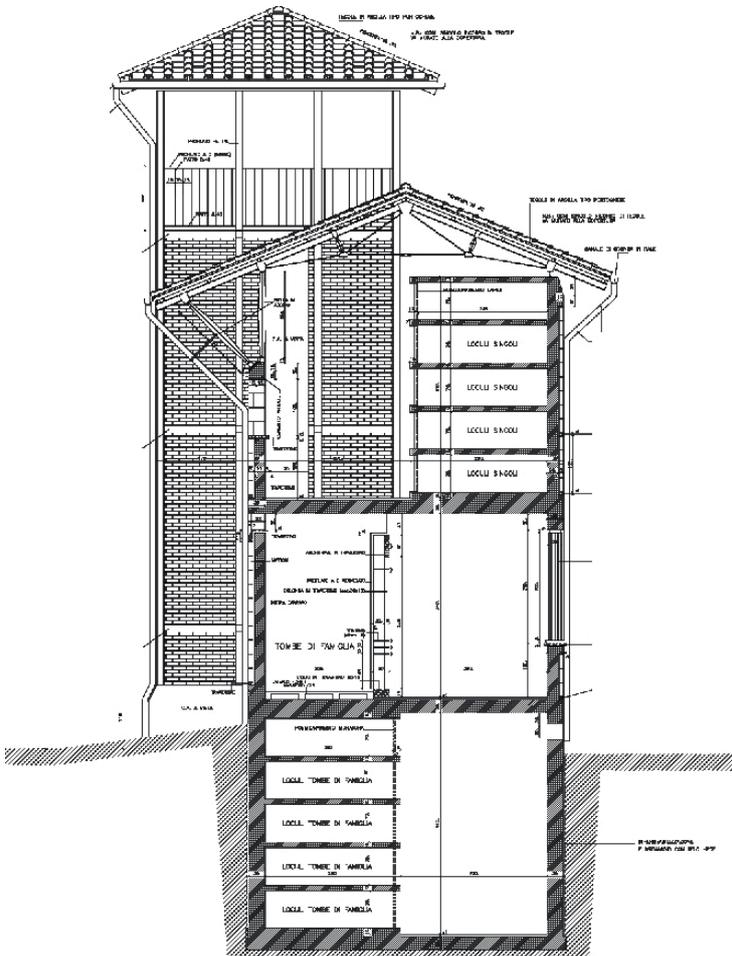
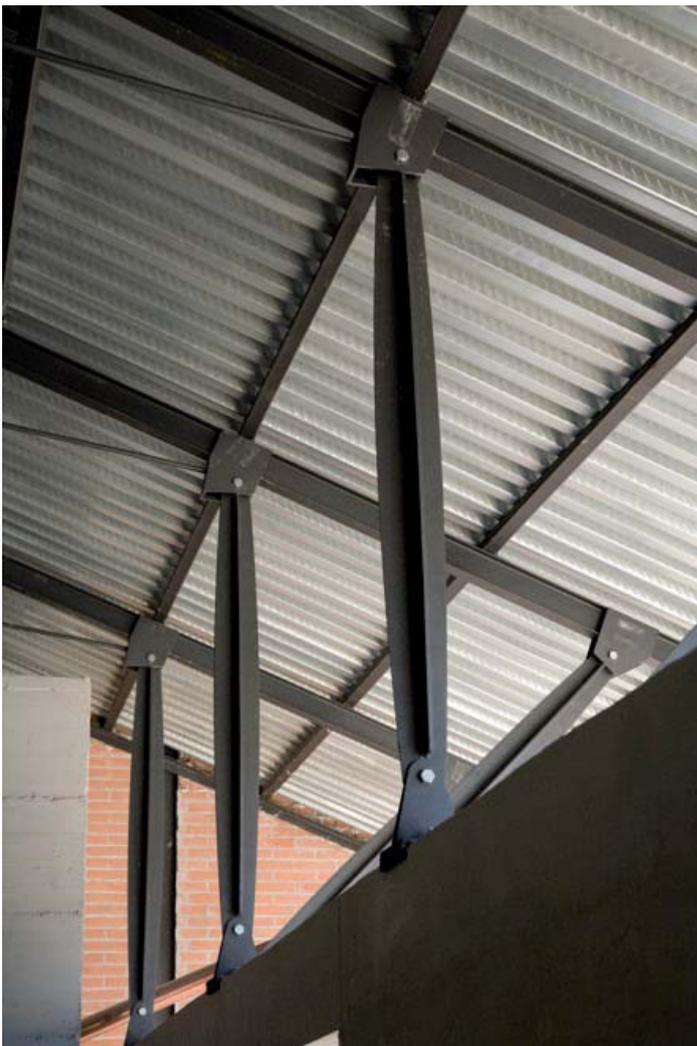


Figure 6. Cross section of the continuous perimeter building.



Some coded parts have been developed by subtraction of material, openings corresponding to windows for ventilation, lighting and facings and doors for passage. At the continuous base of the façade, in particular, openings with a totally revolving or slotted frame are obtained, integrated into the constructive logic of the wall as a subtraction of material. In the upper part, on the other hand, the openings are obtained by adding material, in the masonry walls, the rectangular gaps remaining as huge windows. In conclusion the windows of the base are slotted, the upper ones are formed by the void between two walls. The other tectonic nodes (intersection between continuums) are the string courses at the intersection between the floor and the vertical wall, and the windowsill courses, typical of the masonry areas.

As can be seen from the figures, in the case of the Terni Cemetery, the use of the *sponga* stone has highlighted the problem of indirect legibility, as this material can be employed according only to a collaborative role in the stability of the building, due to its mechanical characteristics and its relative inhomogeneity.



**Figure 9.** Detail of the struts supporting the roof steel structures.

These constructive considerations, I believe, are part of the architectural expression itself: the problem of the use of materials, for an architect, is in fact closely linked to language. An architectural organism is “legible”, even in its cultural and spiritual contents, through the characters formed in the process of transformation of matter-material-elements-organism (Strappa 1995).

For this reason, in the cemetery of Terni I tried to recognize which characters were still operating in the specific building culture of the area, bearing in mind, in fact, that the productive reality, the customs, the typicality of the forms are linked to the constructive data.

This consideration introduces the problem of language. Throughout history, these recognizable characters are expressed and consolidated, in an architectural code. They persist, in different forms, in contemporary languages: in the written or spoken language they are updated through the contribution of neologisms, syncretisms, or even through the experimentation.

In architecture, today, the continuous, personal transformations in the expression of form, only partially allow the formation of a code, the foundation of way of communicating. It is no coincidence that contemporary criticism only enhances originality, diversity, innovation.

The faculties of architecture encourage this exclusively personal research, condemning the new generations of architects to come to terms with the understanding, by users, of the works they produce, as Claudio D’Amato pointed out, in an incisive book of his, to the Italian school of architecture (D’Amato 2017).

Perhaps we should link the term “architectural expression” to the personal use of a more general, common and shared language, which should be understood, studied, respected (Purini 2011). We speak of the language of writers and poets as of different uses and interpretations (for historical phase, cultural area, individual contribution) of a common language. In this context, just as in a literary work (which identifies, that is, it makes individual, unique and unrepeatable characters of the common language) a work of architecture should identify common characters of a building and architectural culture of which shared characteristics are recognized.

The question is rather complex as it is not possible today to solve the problem by returning to the origins of the language, to common architectural forms. In fact, a real language has been lost in architecture. In this condition, the only solution, I believe, is given by the physical and concrete aspect of architecture. Unlike the spoken or written language, architecture not only indicates or evokes reality: architecture *is reality*. This explains why in periods of great crisis architecture returned, even in full modernity, to the material, constructive foundation of our



**Figure 10.** Second floor internal space.



**Figure 11.** Corner tower facing the countryside: Opening the cemetery to the outside is a completely innovative feature in the Italian tradition of burial places.

**Figure 12.** Steel cover of the corner tower: Metal sheet is employed to reflect the light inside the masonry, massive building.



**Figure 13.** The continuous external wall facing the countryside.

profession: think of the many ideas in this field, from Eugène Viollet-Le-Duc to Mies van der Rohe.

It seems to me that a contribution to the solution of the crisis in which the contemporary architect is struggling can be provided by the concrete and material aspect of architecture and its relationship with the local culture.

Terni however, to go back to the example under consideration, is also an area of steel mills and old industrial traditions. This custom with modern metal skills has produced remarkable innovations in society (no longer only farmers, but also workers) and in construction techniques based on elastic, industrially produced elements that are now part of the building practices of the place, especially in roofing structures.

It seems to me that these blended structures derived from a masonry custom and others derived from a metal imported culture at the beginning of the XX century, were especially interesting and generated outcomes of great significance. For this reason, I believed that the fourth band of architectural stratification, the conclusion that overlaps the plastic-wall structures, should have transparent, elastic character.



**Figure 14.** Exterior of the cemetery nearing completion, in winter.



**Figure 15.** External wall of the cemetery: To the left of the stair tower, the protruding volume of the small votive chapel.



**Figure 16.** Brick “transenna” structures, closing and not load-bearing, in the stair towers.

The roofing structures are therefore made up of Polonceau steel trusses, with cast iron struts, a material at that time extensively produced in Terni and now almost in disuse. The inside of the roof, instead, is made of corrugated sheet metal.



**Figure 17.** Detail of the votive chapel wall behind the altar: Coloured glass set on the concrete, washed with a jet of water to make the aggregates emerge.

The stair towers have also a metal supporting structure, the brick curtain only having a closing purpose. This option is due to the intention to avoid the risk of a picturesque solution: the tower is not, here, the resistant stronghold of a defensive structure, but a light interval, which uses a load-bearing and non-closing, virtually transparent construction system, inside the *sponga* stone curtain wall, which expresses, on the contrary, its massive, opaque, continuous, load bearing and closing spaces character.

Let me make, in conclusion, some personal consideration. Although I have always tried, in fact, to give my projects an objective character, to propose solutions that are always demonstrable, it is also true that some personal choices, the individual perception of places and events, are an integral part of any architecture.

The first project was delivered to the municipal administration of Terni in 1990, following a national competition. Since then, I have continued to build this work until today and the works are continuing. For this reason, I am not aware of what impressions these constructions can cause. In fact, the project was carried out trying to avoid the romantic impulses that the theme could induce. The motto of the competition design was “La Buona Terra” (The Good Earth) to recall the Latin tradition of death as a return to the Mother Earth and the beginning of a regeneration.

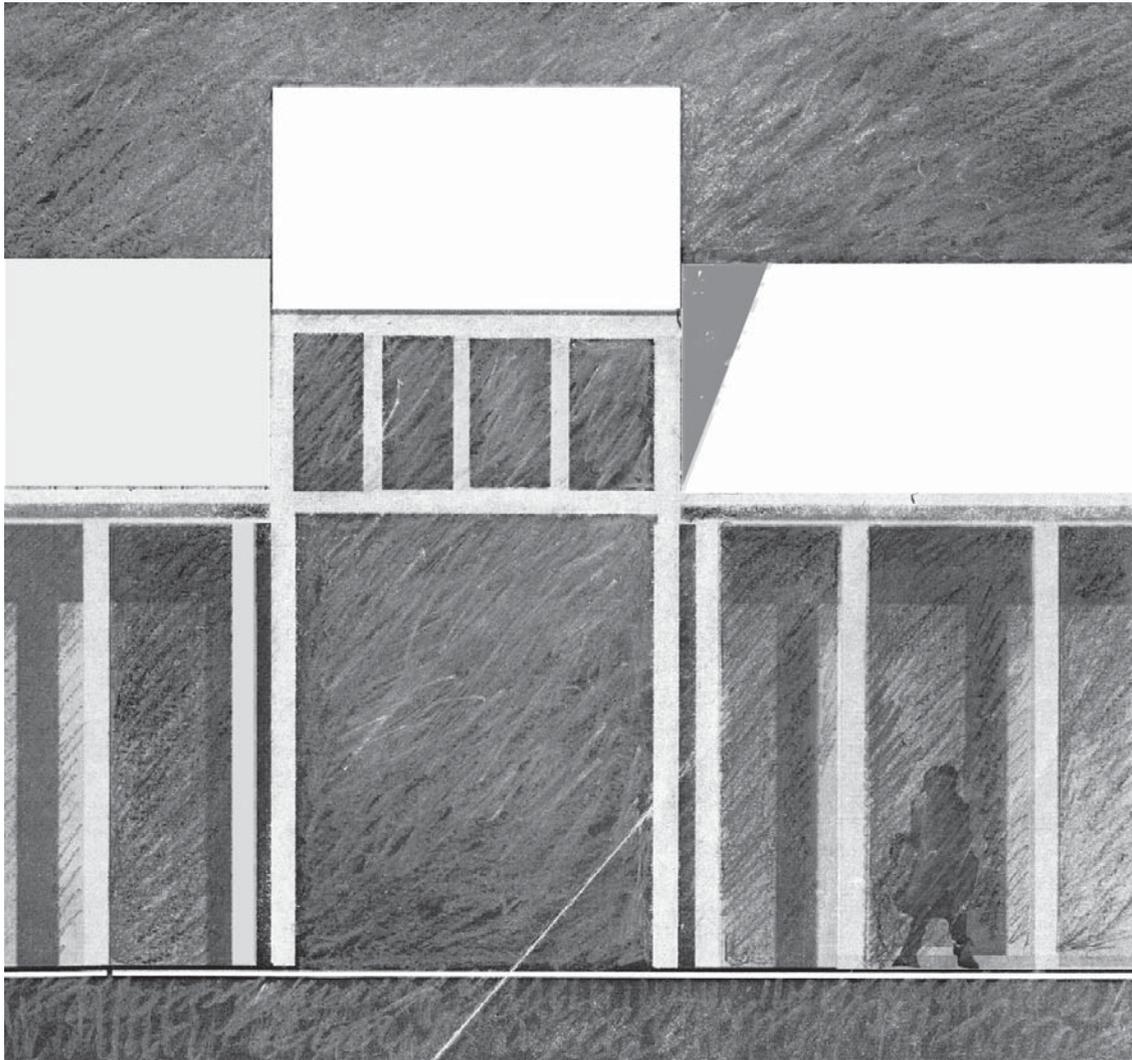


**Figure 18.** Study for the new expansion phase, under construction: The volume of the new pavilion, on the right, has been schematically inserted in the Google aerial photo of the second phase currently existing buildings.

Against a macabre and gothic interpretation still widely diffused, the idea of death that gives shape to the project is the ancient one linked to the image of the natural process that links the alterations of human life to the continuous changing of the fields.

Mario Torelli writes, presenting the volume *Necropoli dell'Italia Antica*: “There is no doubt that among the most ancient metaphors that accompany the image of death there is that of the agrarian cycle. Thus, human life is felt precisely as a parallel to plant life in general, and edible plants in particular, capable of evoking a long series of further symbolic images: the earth as a mother, plowing as a sexual act, the lunar month and the seasons as scans of the biological cycle, burial as plantation ... “ (Torelli 1982).

These figures came to mind, before the project, by visiting the place where the future cemetery of Terni would rise. In this border area that is no longer a city, but where its signs are still visible (the fast-flowing roads, the noise of traffic), before the austere and sweet face of the countryside, I tried to draw few signs by observing with respect the traces left on the territory by the men that lived here.



**Figure 19.** Detail sketch of the new single-storey pavilion under construction.

So, the design stems from an idea of death as a biological cycle, as a return to the earth and aims to collect the suggestions of the rural surroundings.

I have tried to avoid any reference to the sadness of many cemeteries. It does not seem to me that there is, here, the melancholy of lost affections; rather, I hope, an architectural calm, a classical stillness. Some visitors reported to me the impression of “severe harmony”. The term “severe” seems very appropriate to me.

The small votive chapel contains, on the other hand, the only exception, the expression of an emotion. I drew with great care its back wall, behind the altar and I personally set the coloured glass on the concrete, washed it with a jet of water, making the aggregates emerge from the mass inside the horizontal formwork, so that the magmatic nature of it would be evident.

In these days, work is starting on a new construction cycle, a completely “serial” pavilion. In a few years I will have to design the final shape of the terminal excerpt, of the orthogonal arm which, from the ossuary tower, will close the large enclosure.

Despite the passing of time (the succession of debates and fashions, the variation of technologies) I have never believed that it was necessary to rethink general choices, even those concerning language.

The result will be evident over a long period of time: a single sign on the territory where only small differences, which will escape the visitors, will mark the slow transition from one construction season to another. An “inhabited wall” a thousand meters long containing gardens and some “craters” (a feminine, generating form), for burials. There is no idea of progress in the Terni Cemetery. Only a way of seeing the same things with different eyes, in the light of subsequent requests, of further reflections.

In continuing the construction, I imposed on myself (as long as the municipal administration will allow me) the need to resist the temptation to “keep up with the times”. There is no need. I talked about it many years ago with Sandro Anselmi, a great Roman architect who recently passed away. He himself, an indefatigable experimenter, encouraged me in the idea of continuing the same construction (Anselmi 2012).

I know that this idea of mine is hardly shared by contemporary architects, but I believe that architecture, particularly in themes like this, is a non-progressive form of science. Many of the forms we need today have largely been built already, and recur, if one knows how to see them, in the great flow of the built world. Many of the things we write today and that seem brand new to us, have already been written. Knowing how to recognize them in the contemporary condition (in the age of crisis and uncertainty) is, I think, is a true form of contemporary writing.

## **Note**

**1.** The design for the second phase for the expansion of the Terni cemetery was drawn up by the design team: Giuseppe Strappa (group leader), Tiziana Casatelli, Paola Di Giuliomaria, Elmo Timpani. The second phase works, described here, was completed in 2017. A new construction phase began in September 2021. All the project phases were carried out with the collaboration of the Municipality of Terni, Public Work Department, whose current general manager is Arch. P. Giorgini, and technical manager Ing. L. Donati with the collaboration of Surv. G.Poddi.

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