THE NEW UMANITARIA CORE

CONSERVATIVE TRANSFORMATION OF CLOISTERS - SOCIETA UMANITARIA

School of Architecture, Urban Planning, Construction Engineering
Architecture - Building Architecture

Architectural Design Studio for the Restoration and Transformation of Complex Constructions
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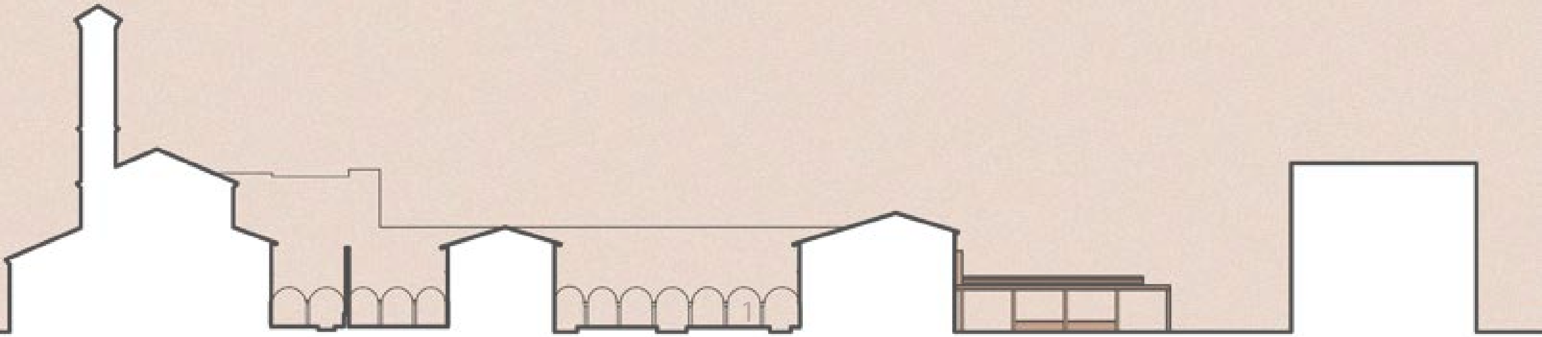

The project of Conservative Transformation created during the yearly course of "Architectural Design Studio for Restoration and Transformation of Complex Constructions" was the subject of the thesis.

Under the many modules, the Design Studio was an integrated studio aimed at teaching the management of the profoundly interdisciplinary aspect of a Complex Architectural project.

Subject Module:

- Architectural Design
- Restoration
- Materials for Preservation
- Structural Design
- Technology Design in BIM Environment
- Building Services

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The creation of the project was viewed as a chance to delve deeper into the current subject of conservative changes inside the consolidated urban modern city fabric. This topic was critically examined from a variety of perspectives, with the information and abilities gained during the educational route at the Politecnico di Milano being put to use.

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ABSTRACT

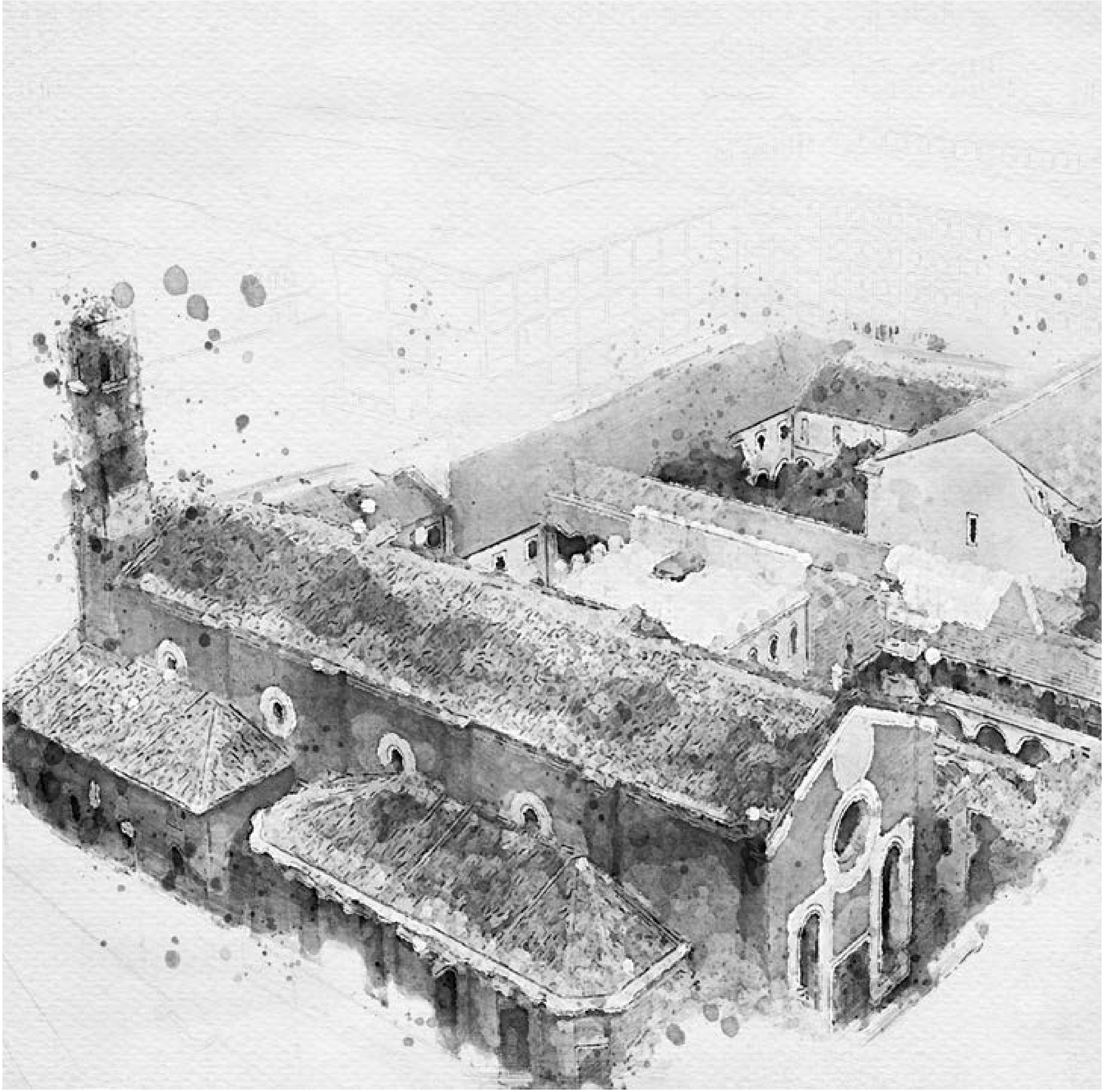
A proper systematic approach to the restoration of historic buildings is very important in the preservation of heritage buildings. This book presents the unity between the conservation and the transformation of a historic building. The project aims to establish an effective method for the conservation and transformation of the historic building and renovation by modern needs and conservation requirements while maintaining the authentic appearance. The main method in the project is the observation of Societa Umanitaria buildings and increase the efficiency of usage of the building by designing a new entrance and a pavilion to the Umanitaria Cloisters.

Since 1893, the inception date of the Societa Umanitaria, it has been a living testament to Milan′s history and the educational life, which has seen the city go through the major social role of the industrial period and has established the framework for education in the era through various innovative initiatives. It has also undergone a revival and a fall due to the regime′s change and the rapid transitions caused by the several wars. While carrying out this project to conserve and transform the Umanitaria Cloisters, our primary goal was to use the traces of the past and reinterpret them to the site and the project based on their historical significance.

We have conducted the conservation and transformation project of Societa Umanitaria for about a year, and have traced the historical documents: Giovanni Romano′s architectural drawings, Societa Umanitari archive, historical photos, books, and magazines. And through these acts, we found some structural and geometrical hints for our intervention, especially during the surveys and the archive documents. By designing a timber pavilion for Cloisters, we aimed to reflect the surrounding geometries which we inspired during the site visits and researches. On the other hand, the problems that we faced about the existing situation of the site, showed us a way how to transform the functions of the internal spaces and the form-finding process of the pavilion design.

"As an architect you design for the present, with an awareness of the past, for a future which is essentially unknown."

Norman Foster



01.
MILAN
SOCIETA UMANITARIA

01.1 TRACES OF HISTORY IN CONTEMPORARY MILAN

In Milan′s urban history, and more generally in the major outlines of its historical development, the continuous transformations provide a key to understanding the growth and phenomenology of the city. In a remarkably compact territory, despite enlargements between the nineteenth and twentieth centuries, the city continually adapted to changes in the demand for spaces for the production and exchange of goods, for housing and social relationships, firstly as the result of a series of wartime events, then over the last century through the intense dynamic of its economy and processes of urbanization and reconstruction of the stock of buildings. The most significant periods of urban development in the definition of Milan′s urban form as we perceive it today are bound up with the transformations between the eighteenth and twentieth centuries and also, perhaps, with the most recent transition from manufacturing to the post-industrial city, with the extensive remodelling of the sites originally occupied by forms of production now rendered obsolete through processes of modernization common to many European cities. Yet the signs of the earlier phases can still be clearly made out and decoded, interpreted through a reading of the city′s plan and direct experience of urban reality.

The main sign of history is the deep urban structure of the city, so strong that to date it has resisted the continuous growth of urbanization and alternative models of territorial development. In all the synthetic representations of it, Milan′s urban form appears as a pattern of interlocking circles and radials. This grew up over the centuries in response to the city′s complex links with its neighboring territory, areas as far afield as the Ticino, the Adda, the Mincio, the Po and the foothills of the Alps, their intersection underscored by the presence, real or virtual, of the city′s gates. The city′s growth as a series of concentric belts around the original core with its Roman matrix, fully developed in the Middle Ages and continually remodelled since the sixteenth century, is a constant that Cesare Beruto theorized in the presentation of his urban plan in the late nineteenth century by using organicist metaphors:

“The plan of our city, represented on a small scale, is very like the cross section of a tree; you can see clearly the outgrowths and concentric layers. It is a highly rational scheme that is exemplified in nature: all this plan has done is to give it the requisite greater extension.”

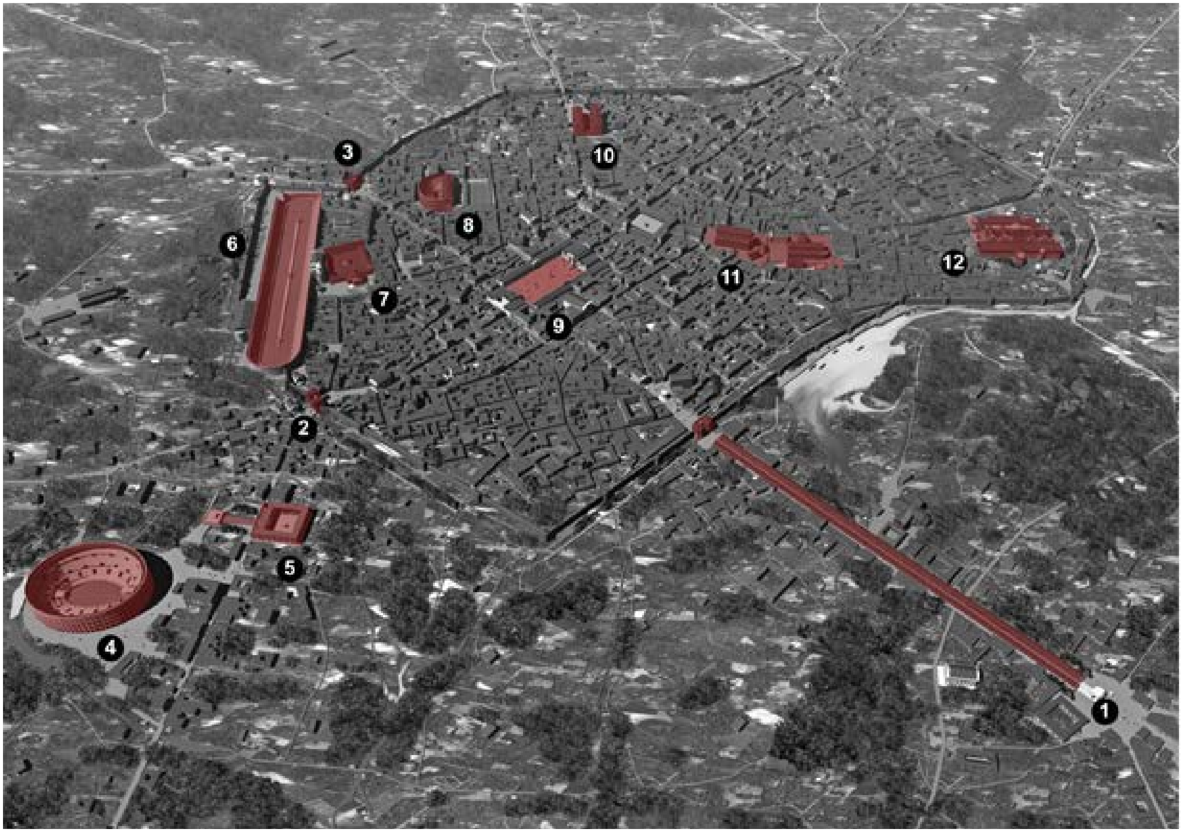


Fig .01.1:The City View of Milan when it is the Capital of Roman Empire

1. Porta Romano
2. Porta Ticinese
3. Porta Vercellina
4. Amphitheater
5. Basilica of San Lorenzo
6. Circus
7. Imperial Palace
8. Theater
9. Forum
10. Warehouse
11. Episcopal Complex
12. Thermae Erculee

Fig. 01.2: Milan in an illuminated codex by Pietro del Massajo, dated to between 1456-1472.

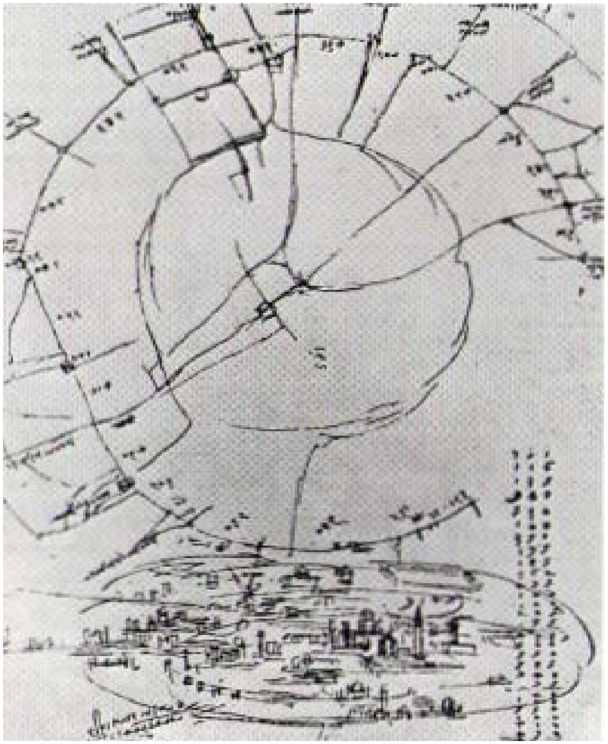


Fig. 01.3: Schematic image of Milan in a drawing made by Leonardo da Vinci, most probably in 1497

On the map by Pietro del Massaio from 1472, its visible that the churches and palaces, surrounded by medieval walls, since the Roman ones had been dismantled long ago. The main entrances to the city are depicted, as well as one of the biggest hospitals in Europe Ca' Granda, comissioned by Francesco Sforza.The new urban structure was closed in turn by a new city wall, much bigger than the previous one. This wall was developed on the route of the "circle of ships", which had as well developed in a later period. A ditch, fed by the waters of Seveso, Nirone and Olona was dug near the walls. At the beggining this water canal served a defensive purpose, and later on it became fundamental for trade.

Fig. 01.4: Plan of Milan after the construction of the wall and ramparts, 1579

Fig. 01.5: Plan of Milan, Carta Pinchetti, 1801

In 1500 one of the important urban transformations, under Spanish domination, was the new city walls. On the map from 1579 both the Spanish Ramparts and the Medieval Walls are visible. On the threshold of the nineteenth century, the projects inspired by Piermarini had left their mark on Milan. The previous decades had seen consrruction of new roads and squares in its old urban fabric. Till the last two decades of the eighteenth century, the city developed without a general plan, simply by the extension and densification of the built up areas along its principal street axes, which radiated out like so many spokes from the centre.

01.2
URBAN GROWTH
HISTORICAL STAGES

Fig .01.6: Milan,1629

Milan, 1629

In 1629 a map which also called as "Gran Citta di Milano" was delivered by Marco Antonio Baratteri for Cardinal Federico Borromeo. The map consists of 256 numerical references to important buildings. Worth mentioning is that the church of Santa Maria Delle Pace, which is part of the Societa Umanitaria complex, is included in this list.

Fig. 01.7: Milan,1760

Milan, 1760

In 1760 a map was issued by Giovanni Filippini. On this map the remarkable part is the Rotonda della Besana towards the periphery of the city. The Rotonda is connected to Ca' Granda through Via San Barnaba. In 1783 a general map of Milan, including the 6 jurisdictions of Milan, was issued by Domenico Cagnoni.

Fig. 01.8: Milan,1889

Milan, 1889- Beruto Plan

This city plan had a major impact on city life and development and has served Milan well for over a hundred years demonstrates its direct link with the external ring road that exists to this day. The Beruto in its plan draft first identifies the two key principles to which this should have been inspired: the faith,that of the prosperous economic future, and material of the city,that of the necessity of doing practical thing could have an immediate principle of execution as it is absolutely necessary, together with the necessary and the useful, to satisfy the needs of decoration and also of beauty.

Fig. 01.9: Milan,1912

Milan, 1912- Masera Plan

Milan therefore began to expand according to a model of uniform expansion that will weigh heavily on the developments of the Lombard chief town, becoming a kind of imprinting of Milanese planning at least until the entire mid-twentieth century. The new networks needed bigger roads, navigable canals, new railway lines, stations and a subway system for an adminisrative area. The 20 square kilometres of the Beruto plan was increased to 44 square kilometres of urban territory while it drafted in the 1930s increased the area to 130 square kilometres.

Fig. 01.10: Milan,1934

Milan, 1934- Albertini Plan

The plan provided for expansion by general urban development across almost the whole urban area, so fuelling the formation of urban rent. In the inner city it planned to open up new roads, some of which were actually built, demolish the old established urban fabric. This policy of urban clearance is graphically called sventramenti (“gutting”). In this phase there were changes to the form and function of the most ancient core of the city, with the massive insertion of new tertiary activities and businesses.

Fig .01.11: Milan,1953

Milan, 1953- General Plan

After the Second World War in 1945, under the pressure of the historical occasion offered by the reconstruction after the war destruction, several proposals, they tried to reset again the Milan development model and to address the expansion of the city according to different principles, but once again subsequent elaborations and compromises brought back the master plan, approved in 1953, to the previous lines.
Deta⊠l of the central zone: marked in black are monumental edif⊠ces. in yellow mixed housing and offices.

01.3
RECONSTRUCTION AND THE BOOM YEARS

In Milan, the 1940s were a time of enormous change. First, there was the war, particularly the air attacks of 1943, which devastated vast parts of the city, including some of its most important and emblematic structures, and influenced rebuild patterns. Then the drafring of new planning instruments, both partial and comprehensive, went on without a break, largely as a result of the approval in 1942 of the first coherent master plan for an Italian city. The new policy laid down that the whole municipal territory should be subject to regulation under a single plan, including consultation with major neighbouring municipalities; it defined the general objectives of the patterns of new development and specified land use on the new functionalist principles. Application of the Albertini plan in the late thirties had already caused controversy and encountered technical and administrative problems, so it was first re-examined in relation to the most problematic zones and then comprehensively overhauled. Between 1938 and the early 1940s variants and detailed plans were drafted for some of the most extensive alterations to central Milan.This was the setting for the development of a number of decisions and projects that were to define the functional layout and some important elements of the urban form of Milan in the postwar period.

In the transition period between the air raids of 1943 and approval of the master plan that was to regulate as far as any plan could in a period of raging, chaotic growth Milan′s development from 1953 to 1980, the debate among town planners was dominated by a project strongly alternative to the established models. Even though its underlying principles were never applied. ⊠t left extensive traces on subsequent development and, together with the 1948-1953 plan, provides an important clue co understanding the period between the war′s end and the late l 960s, the years of Milan′s most hectic urban growth.

The AR plan, presented only with a synthesis of its objectives in “Rinascita” in 1944 and illustrated in “Construzioni-Casabella” 194 for 1946, was the manifesto of the Milanese Rationalist architects: Franco Albini, Lodovico Belgiojoso, Piero Bottoni, Ezio Cerutti, Ignazio Gardella, Gabriele Mucchi, Giancarlo Palanti, Enrico Peressueti, Mario Pucci, Aldo Putelli and Ernesto Rogers. They were to build many of Milan′s most significant works in the years ahead.

Disruption of the ring shaped monocentric form of the city and its northward development were underpinned by the creacion of two "equipped axes", urban freeways running through the city, intersecting in its heart near the Arco della Pace, along which were arranged the most important urban services. Parcicularly along the axis running from the centre towards the north-west, confirming a major line of development, the plan located the city's business centre, the new Trade Fair site, a zone for spectator sports and mass entertainments. On this point the seructuring role of the north-west axis the alterations in the 1948-53 master plan are substantial. Despite the proposals to move the Trade Fair site further out, an idea championed in the thirties by the Rationalist architects.

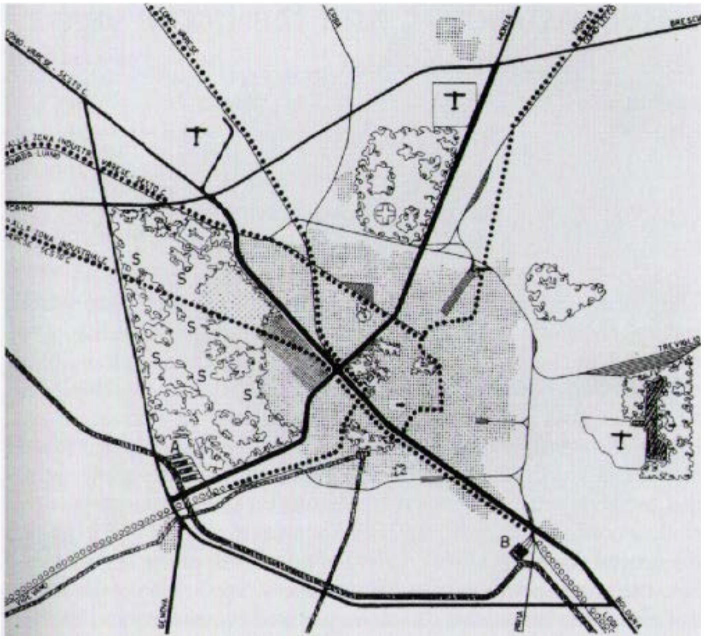


Fig.01.12: Piano AR, 1944-45. Scheme showing the developed and metropolitan axes and the location of the new business centre to the nord-north-west

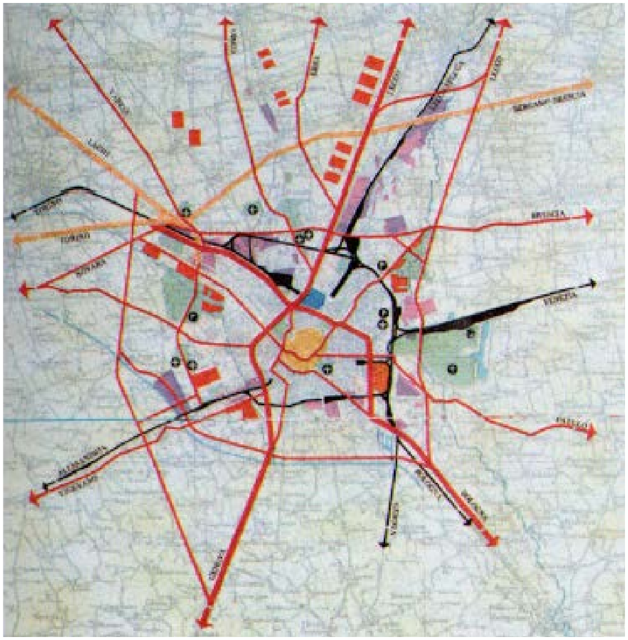


Fig. 01.13: Territorial scheme of the master plan approved in 1953

01.4 RATIONALIST ARCHITECTURE

The relationship between the thought and architecture of Italian Rationalists and the new Fascist state is commonly presented as a battle between revolutionary modernism and a reactionary regime. Italian rationalism inspired by the scale, structure and symmetry of ancient Roman architecture but without the ornamental flourishes associated with the styles of classicism and neoclassicism. Vitruvius had claimed in his work De architectura that architecture is a science that can be comprehended rationally and should be based on consistent discipline. The history of Italian rationalism is made of groups, movements, exhibitions and reviews, even more than of architects and buildings.
Historians acknowledge that the Modern Movement in other European nations encompassed social programs, but Italian architecture of the inter-war period has been strangely exempt from discussion on this level. Despite years of heated polemics and debates during the 20s, Rationalists, traditionalists, and moderates in Italy reached a consensus on political and social objectives. The Fascist state claimed to offer revolutionary social programs, and the various architectural factions merely argued about the appropriate forms within which to house these programs.

Italian Rationalist architects, who contributed substantially to the Modern Movement and its acceptance in Europe, undertook most of their best work either for or in the spirit of Italian Fascism. The Italian scholars who discuss these architects reveal a profound discomfort in their interpretations of an architecture that is as modern as it is Fascist. Over the years, they have attempted to explain away the Fascism of Rationalist architects in Italy. The earliest argument was that the architects "played Fascist in order to do architecture," as Veronesi held to be the case for Giuseppe Pagano. But clearly Pagano, Giuseppe Terragni, and others were ardent Fascists, even if by 1942 they had renounced Fascism.

As one of the example of the Facist building, Terragni's Casa del Fascio in Como included decorative symbols of Fascism, and Terragni built the patron's emblem into the structure by designing the windows as simplified versions of the fascio. Terragni also arranged for Marcello Nizzoli to paint a mural with Mussolini figuring prominently for the Sala del Diretto .

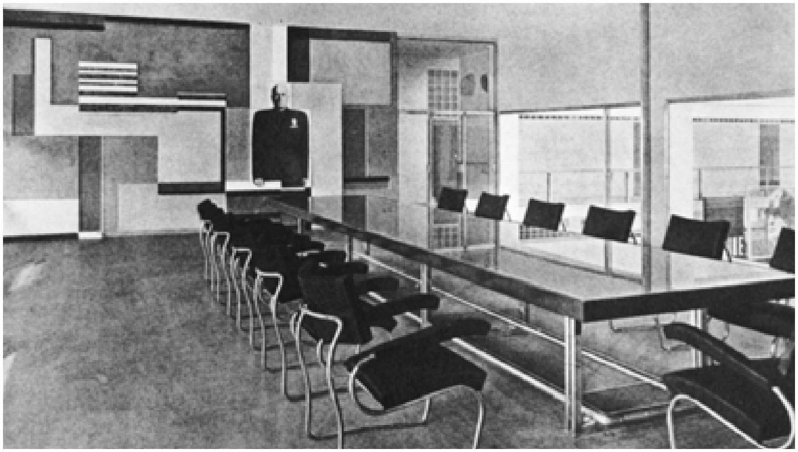


Fig.01.14: I. Giuseppe Terragni, Casa del Fascio, Como, I93 2-I936, Sala del Direttorio, mural by Mario Radice (Quadrante, 1936)

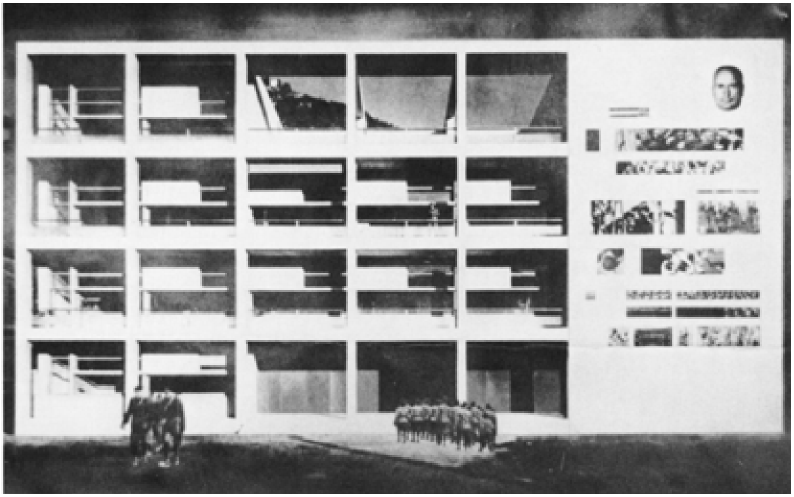


Fig.01.15: Terragni, Casa del Fascio,Como, facade facing Duomo

Gruppo 7 and MIAR

The Rationalists constituted the Italian avantgarde. In general, they advocated typological studies and the primacy of technical and functional considerations from which a new aesthetic would derive. In their manifestoes they favored enormous extensions, vast openings, the extensive use of glass for surfacing, and an absolute correspondence between structure and the purpose of a building. Italian architects of the 1930s, replaced a rigid adherence to the canons of one style with freer experimentation. Despite the actual reluctance to adhere dogmatically to the new canon, the Rationalists sought unity in their polemics. Beyond a general commitment to a functional architecture that responded to new materials and a new aesthetic open to many interpretations Rationalists were united in their stalwart opposition to the accademici and to the moderates. . During the 3os, the Rationalists laid claim to a surprisingly large number of successes. The Decennial celebration of the Fascist revolution in 1932 offered several examples of Fascism linked with entirely new, modern concept. Several Rationalist architects designed commemorative and celebrative rooms with the ideology of : "Make something of today, very modern and audacious, without gloomy reminders of the decorative styles of the past."

The ideology was embraced in 1926 by a group of architects referred to as Gruppo 7.

Fig.01.16: Gruppo 7

Fig.01.17: Fontana di Carmelata, by Rationalist Architect Cesare Cattaneo, built in 1935-1936

These young professionals who are Luigi Figini, Guido Frette, Sebastiano Larco, Adalberto Libera, Gino Pollini, Carlo Enrico Rava and Giuseppe Terragni, set out to produce logical buildings, elegant in an understated way that sought a balance between the excesses of neoclassicism and the sterility and destruction of futurism. Gruppo 7 distanced itself from an other form of Italian fascist architecture created by the Novecento Movement. Gruppo 7′s members felt the work of the Novecento Movement did not produce anything truly new in an ideological sense; it was nothing more than classical reproductions used by the state′s propaganda department. Gruppo 7′s manifesto included a call for architecture with sincerity, logic and order, echoing the ideas of Le Corbusier, but they also expressed rhythm and classical proportions in a tribute to history.

However,in 1928,the short life of Gruppo 7 was extended and incorporated into the MIAR. MIAR was founded by Adalberto Libera (1903-1963),Gaetano Minnucci(1896-1980) and about 50 architects in Rome 1928, after the first exhibition of Esposizioni Italiane di Architettura Razionale. However, the group, which was initiated as a promoter of the Italian Modern Architecture, did not last long and eventually dismissed in the aftermath of the fascist Pietro Maria Bardi (1900-1999)′s provocative work, "Tavolo degli orrorio," in the second exhi bition in 1931.

Fig.01.18: University of Rome, 1932-1935, model; Piacentini′s original design for the Rettorato with high tower is at upper left

Fig.01.19: Tavolo degli Orrorio, exhibited by Bardi as part of the Second Exhibition of Rational Architecture.

CIAM- The International Congress of Modern Architecture

The International Congresses of Modern Architecture (CIAM) was founded in response to the need to promote functional architecture and urban planning. It brought together the avant-garde architects, who were drawing up the minutes of the movement that characterized the twentieth century. Some of the architects were Carlo Enrico Rava, Luigi Figini, Guido Frette, Sebastiano Larco Silva, Gino Pollini, Giuseppe Terragni, Ubaldo Castagnoli and Adalberto Libera. In those meetings, a good part of the theoretical body of architecture and the rationalist city was built .

The 1920s were consolidating the foundations of modern architecture and the pioneers of functionalism began to materialize their ideas. In 1927, Stuttgart, Weissenhof Siedlung was one of the most recognized exhibits and conceived as an international exhibition of modern architecture. Promoted by the Deutscher Werkbund and organized by Ludwig Mies van der Rohe, the residential complex housed thirty-three buildings by sixteen architects representing the rationalist avant-garde, particularly German, Dutch and French.

In 1928, twenty-four architects of eight nationalities met in the Swiss castle of La Sarraz, initiating the CIAM. Without a prior plan, although with great ideological coherence among the participants, the interventions led to a Declaration of Principles with a manifest vocation. The continuity of the meetings was also confirmed.

Fig.01.20: Photo of the first Congress held at the castle of La Sarraz, June 1928

Fig.01.21: CIAM VII poster held in Bergamo

The Declaration of La Sarraz was the conclusion of the CIAM I and was structured on the basis of four themes: general economics, urbanism, architecture and public opinion, architecture and its relations with the State.
In 1937 the CIAM V met. The meeting was held in Paris to reflect on the theme of housing and free time. World War II would interrupt dating for a decade, but CIAM members would remain active. The CIAM VI in 1947 is the first congress held after the war. The meeting took place in Bridgwater, England. In 1949, CIAM VII concentrated in Bergamo, Italy and symptoms of crisis began to appear. The congress disappointed the expectations placed on it, among other things because the momentum and intensity of the prewar congresses were fading and conflicts between delegations were beginning to surface. However, The Charter of Athens in practice and the Synthesis of the major arts were the two main theme of the congress. The organization of the tenth congress would be the responsibility of the group of young architects who had rebelled in the previous meeting. For this reason, in their preparation meetings they adopted the name TEAM X. However, a new meeting would still be called, CIAM XI in 1959, which would be held in Otterlo, Holland with the absence of the great masters. CIAM XI would be the last congress and its task would be to certify the death of those meetings. During the 11th congress, held in Otterlo, the Netherlands in 1959, the members agreed to suspend their works.

Fig.01.22: Team 10 meeting, presentation at the Kr⊠ller- Müller Museum in Otterlo

Fig.01.23: The members of TEAM X certified with humor the death of the CIAM in Otterlo

Postwar Rationalism in Italy

In the 1960s, when World War II ended, a slightly different so that the new trend of rationalist architecture began to emerge in Europe and the United States. And while Europe and the US were steadily influenced by Le Corbusier, Mies van der Rohe, Walter Gropius, and Frank Llyod Wright′s modernist rationalism defined by symmetry and simplicity. Italy needed another effort to disassociate rationalism from Fascism. Postwar rationalism in Italy was different from that of fascist days. One of them is that the tendency of architecture to be concentrated on the building′s monumentality has been extended not only to architecture but to urban planning.

Postwar rationalists wanted to make the entire city a more rationally constructed space for citizens. La Tendenza, the rationalist movement that arose in postwar Italy, insisted that "Rejected utopia in favor of a political and critical architecture with a firm grip on reality". 15th Triennale di Milano in 1973 entitled "Architettura razionale" curated by Aldo Rossi, was a founding event of La Tendenza. In Italy, the architecture of Rossi, Grassi, Carlo and Aldo Aymonino, Massimo Scolari, Vittorio Gregotti, Stefano Boeri and others is associated with the movement; Venice was its intellectual center.

Fig.01.24: La Tendenza, Italian Architecture, 1965-1985

La Tendenza´s members hoped to return architecture to an absolute simplicity and clarity of the architecture and the relationship and importance of urban planning. This movement has lasted for about two decades with Aldo Rossi´s famous book, The Architecture of the City (1966) and the perpetuity of their rational arguments because we are rational, but there is no denying that its influence is still on.

Massimo Scolari, in his text for the catalogue of the XV Triennale di Milano Architettura razionale (1973), writes that for Tendenza (by this stage not just a theory but a movement),

"Architecture is a cognitive process that in and of itself is today necessitating a re-founding of the discipline in the acknowledgement of its own autonomy. This means architecture refuses interdisciplinary solutions to its own crisis; that it does not pursue and immerse itself in political, economic, social, and technological events only to mask its own creative and formal sterility, but rather desires to understand them so as to be able to intervene in them with lucidity."

Fig.01.25: Members of La Tendenza

Torre Velasca by Studio BBPR

The Torre Velasca in Milan, completed in 1958 by the Tendenza studio BBPR (founded in 1932 by Gian Luigi Banfi , Lodovico Barbiano di Belgiojoso, Enrico Peressutti, and Ernesto Nathan Rogers), is a case study for reflecting on Tendenza′ s aesthetic theory. Instead of following the current urban pattern of milan, in which new building match the old and follow the old street fronts, the tower is built in the center of its site, providing a vital contrast to its immediate neighbors.
Given that it provoked several negative reactions and has been often characterized as ugly, its examination illuminates Tendenza′ s stance towards ugliness. Its height of ninetynine metres and its embodiment of certain forms found in medieval architecture provoked a great deal of criticism. The year it was completed, the French journal L′ Architecture d′ aujourd′ hui regarded it as an effect of the Italian appreciation for ‘ugliness, baroque inflammation, exaggeration, false originality, the strange, and the bizarre′ . The velasca tower became an isolated case, in contrast with the current concept of skyscrapers as a repeatable type. The tower′ s contour rises a hundred meters, a unique land mark on Milan′ s skyline with the clear intent of reconstructing the skyline of a city that was losing all of its salient element such as bell towers, churches, and large public buildings that were subsumed by the increased average height of buildings.


Fig.01.26: Torre Velasca, BBPR, 1956-1958


Fig.01.27: Torre Velasca, BBPR, 1956-1958

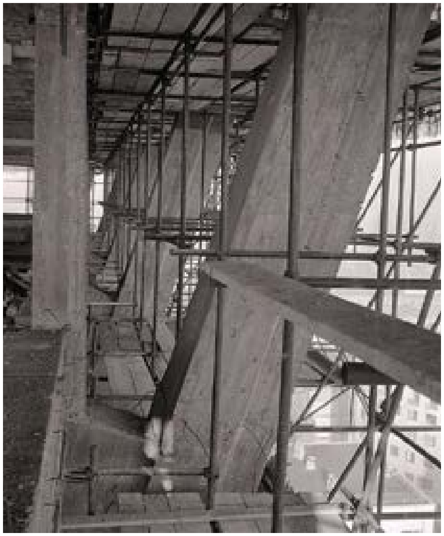


Fig.01.28: The Tower under construction in 1956

Palazzo Argentina by Piero Bottoni

Among the most relevant works of the immediate postwar period in Milan, discussed and full of controversies later, the initial project by Bottoni signed with the architect Piero Pucci which construction were carried out i 1946-1951, has all the character of a demonstrative and rebellious work, in opposition to the provisions of the current regulatory plan. A four storey building was planned along via Redi, a three storey building overlooking the street intended for shops and a 14 storey building perpendicular to the street , intended for shops, offices and homes. On the pavement a cross gallery would have favored the pedestrian viability inside.

As Bottoni himself declared: “The building is designed not only according to its specific intended use but also in relation to the urban aspects of the area”.

Today, almost seventy years after its construction, Palazzo Argentina represents a current building that stands out for its innovative image in a context devoid of architectural specificity, renewing the concepts expressed in Bottoni’ s research on the relationship between urban space and pre World War II architecture.

Fig.01.29: Palazzo Argentina, Piero Bottoni, 1946-1951

Fig.01.30: Palazzo Argentina, Piero Bottoni, 1946-1951

Casa al Parco by Ignazio Gardella

The building designed by an Itaian rationalist architect Ignazio Gardella(1905-1999), who played an essential role in the Italian modern movement, intended for housing for the Milanese upper class, is spread over five floors above ground and two underground. It is designed according to a rigorous plan, in which two blocks with a rectangular plan, staggered between them, host the living area on one side open to the park and on the other, the sleeping area that extends to the edge of the long lot. Piazza Castello. Between them, the two wings are connected by a nucleus of services, which houses stairs, elevators, and the atrium of each accommodation. The articulation described in this way is also reflected in the treatment of the fronts and the construction techniques adopted: the sleeping area, supported by load bearing walls covered in Botticino marble slabs, is punctuated by a rigid sequence of full height vertical windows reminiscent of Gardella's contemporary experiences and which stops at the service loggias at the kitchens and master bedrooms; the living area. On the other hand, rests on a reinforced concrete frame left exposed to form a single loggia, behind which the diagonally cut walls of the dining room, living room, and study take place, housed in a single large open space. The solution adopted to conclude the building in height is particularly interesting the four slightly inclined pitches with a copper mantle.

Fig.01.31: Casa al Parco, Ignazio Gardella

Fig.01.32: Casa al Parco, Ignazio Gardella

Casa Albergo by Luigi Moretti

Afterthesecondworldwar,asone-thirdoftheedificationofMilanwasdestroyedbythebombings,inNovember1946 themunicipalityofMilanlaunchedapreliminaryprogramforthereconstructionofthecitydevastatedbybombing. The program included the construction of 22 Apartment house-hotel to be built, on public municipality′s land, with the goals of facing the high demand of low-cost dwellings. Being part of this program, the building via Corridoni 22 is one of the only three Apartment house-hotel which were actually built, developed by Confimprese.The projeci strongly reflects Moretti′s experience and conception of architecture as far as regards several architectural features. When approaching the site area from via the project, appears, in all its strength, from the short side of the laller volume, as a plastic and distinctive urban symbol, in its simplicity and geometrical essentiality in the monolithic volume of the laller building broken by vertical cuts projecting the corridors on the side facades, we can read the architect′s interest and studies in the composition principles of the Baroque as well as Classical figurative art and architecture. Space is not conceived as a void but as a volume full of matter. As so, it is modified by the architect by means of cuts, incisions, and extrusions so as to create an interesting and clever interplay of shadows and cavities on the external surface of the building.

Fig.01.33: Casa Albergo, Luigi Moretti, 1947-1950

Fig.01.34: Casa Albergo, Luigi Moretti, 1947-1950

01.5
SOCIETA UMANITARIA

"Education and Work: knowing, doing and knowing how to do"

-Claudio A. Colombo

Perhaps the term that best summarizes the past of Socia Umanitaria is just one thing: Modernity. Modernity for the essence of the institution, the operating process, the representation of the management team.

In 1961, in a written report for the Touring Club, Bianciardi manages to identify himself perfectly with the spirit that governs this worthy institution of which he graspsa supportive and democratic soul, always aimed at the good of the workers. "There volutionary character of the Umanitaria, its modernity, its Italian primacy, and in certain European sectors, were clear since begin ", immediately writes the author of the bitter life. And then it continues: "Schools we have seen above all: classrooms, laboratories, teachers and children. A population of about three thousand young people who for at least six to seven hours a day gives life to this Milanese citadel. Here we insist above all on the didactic importance of teamwork. In short, the idea is that you learn better by collaborating and discussing all together, pupil sand masters. "This is a pilot school", one tells us. Another he would have said "model school", but it is more correct in the other way, gives the sense of forward movement, of progress ".

At the beginning of the 1900s, the socio economic context Milanese is that of a city in strong demographic expansion and production, which already shows signs of considerable industrial development.Milan,looks colossal social laboratory, subjected to very strong tensions such as new industrial activity, with industries and workshops sprouting like mushrooms, and a fourth state adrift, with roads that overflowing with unemployed people.

Fig.01.35: Unemployed people on the street

In this scenario, a singular character, Prospero Moisè Loria, an Israeli born entrepreneur valance which, having made a fortune in Egypt, he had moved to Milan, where he had come up with a project that would have revolutionized the history of ours Country: set up a Socia Umanitaria.

Societa Umanitaria was founded in 1893 and is subject to the Act of 17th July 1890 which regulates the functioning of those public institutions engaged with welfare and charity. Loria left his entire fortune to the municipality of Milan with the specific purpose of setting up a unique social organism, in order to promote social advancement, with the name Societa Umanitaria.

In this sense Umanitaria rather tends to create a dense network of relationships,support, contacts, relations with public bodies, trade federations,industries, mutual aid societies and cooperatives of Milan and province:
"More than anything else it must lead by example, provide experience,incite Government, Municipalities, Pious Works to do, or rather to join it in doing", in the name of progress, emancipation and of the moral and material elevation of people.

Fig.01.36: Prospero Moise Loria

Furthermore, Umanitaria's other goal is to help people improve their intellectual skills, personality, physical abilities, and the education program with the ideas of freedom, justice, and social equality, which were lacked in society before industrial evolution.

The Societa Umanitaria, driven by the conviction that research and action are indispensable prerequisites for any social venture, has evolved into an active center of research and an experimentation workshop.

01.6
SOCIETA UMANITARIA
Spast and legacy

The Ideas and Aims

The idea behind of the Societa Umanitaria is to “provide the underprivileged, without distinction, with support, work, and education so that they may elevate themselves”. The underprivileged will be provided with the instruments that would help them improve on their condition by receiving work and education instead of just a temporary support. Education was the Society’s earliest concern. Based on the concept that “developing the worker’s professional skills means protecting them from the threat of unemployment and increasing their economic wealth”, it established a whole range of primary and secondary schools and more importantly, professional training schools. Thus, it is considered an institute for social service in a broader sense, which was established, as kind of experiment, to create conditions of social life which make it impossible for men to fall into pathological situations. The Societa Umanitaria can be described as an active center of study and a work - shop for experiment, as the most important idea was that study and action are the basic conditions for every social enterprise.

Fig.01.37: Students of Scuola del Libro

Fig.01.38: Secondary School for Women of Vocational and Industrial Orientation

The Fascist Period from 1924 to 1945

With the beginning of the fascist period, in 1924 the Societa Umanitaria lost its democratic administrative structure. In order to adapt to the new political regime, it suspended all its main activities for the next twenty years, leaving only the technical 16 17 education activities. Its services for emigration, social activities, as well as the activities in the field of People′s Libraries were all discarded.
This was a period of involution and it ended with the almost total destruction of the buildinges and equipment by bombing in the August 1943, striking at the only activity of Umanitaria which had been saved and extended: the Technical Schools.

The Period from 1945 to 1951

With the new administration from 1945, after the liberation, surprisingly, all the activities in Societa Umanitaria were brought back. The activities, and especially the technical education ones were reinitiated by means of funds from private or local organizations, as well as the Ministriest of Labour and Home Affairs. Throughout the years 1954-1951,Umanitaria was improving and moving forward. Despite being bombed and having a lot of work and effort to be put in for its reconstruction, Umanitaria did not hold back its services and was eager to set an example of will to action in the face of adversity.

War Damage

The war during the fascist regime left Societa Umanitaria with big losses. Because of the war, money got devaluated which resulted in removing almost the whole value of the securities which represented the patrimony of the institute. During this period, the bombing in the August 1943 left Umanitaria almost totally destructed. All the technical, scientific, cultural and artistic equipment were destroyed. All in all, the result of the bombing is around eighty percent of the buildings got destroyed or heavily damaged.

Fig.01.39: After a very serious damage suffered with the allied bombing in August 1943

Fig.01.40: Demolished Umanitaria Building

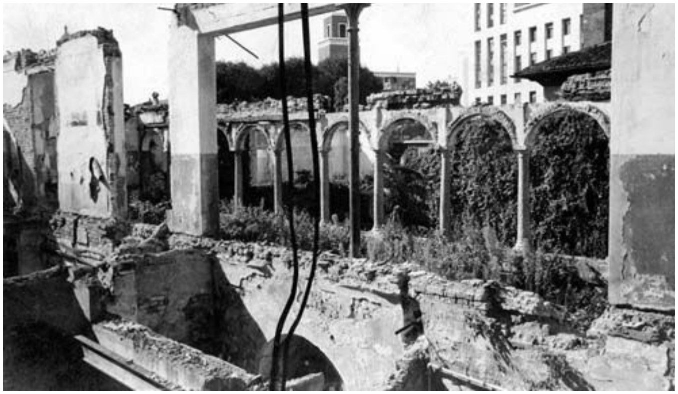


Fig.01.41: Cloisters after Bombing in 1944

The Reconstruction

The reconstruction of Umanitaria began in 1945. It also included reconstruction of Santa Maria della Pace, dating from 1400. The process of rebuilding was paid by Umanitaria as well as by the state. The outcome was around thirty usable rooms which, together with the thirty that were already in use, enabled Societa Umanitaira to open its doors once again and to restart its functions. Also, the old main hall, with its frescoes painted by Leonardo da Vinci´ s students, was ready to be used again. After the bombing of 1943 state was expected to pay for the reconstruction of the new central building to the extent of six hundred million. It was also expected that the state would pay for the destroyed furnishing machinery and equipment. The architectural competition for the reconstruction of Societa Umanitaia was held in 1947. It was won by the architect Giovanni Romano and right after his victory the reconstruction began.
The new buildings, classrooms, heavy laboratories, light laboratories, the scuola del libro, the administration and the boarding facilities were recognized as part of the complex, along with the reconstructed cloisters and the Church of Santa Maria della Pace. The reconstruction process was a very important for the reintroducing of Societa Umanitria and its earnest plan in social aspect. During the 1960- 1950 the idea of combining school teaching with professional training was revolutionary and thus Umanitaria was providing once again a unique service to the public.

Fig.01.42: Newly Built Umanitaria Building

Fig.01.43: Newly Built Umanitaria Building

The Library

In 1926 the fascist the administration sold its specialized library for perpetual use to the state university, which is now considered to be unnecessary to the institution′s new life. In 1945 the large book collection allocated in the university had been completely destroyed during the war. The study of social problems was vital for the recovery of the country. In order for this to happen, the library had to be reconstructed, with the help of the Ministry for Post War Aid, including four thousand books on political and social subjects, taken from the old parliamentary library of Milan. The library was also funded by private individuals, as well as from foreign and Italian organizations, and is now consisting of eleven thousand volumes, twelve daily papers, and around two hundred and thirty periodicals.

The School for Cooperation

The school for Cooperation was reintroduced, consisting of three courses: An introductory course; A bookkeeping and administration course; Course for managers of cooperatives. As a consequence of no funds, from 1945 to 1948, the school had to be suspended. Only two courses were held, financed by political parties and cooperative organizations. The people attending courses were war veterans, partisans and members of cooperatives. By this time, the Umanitaria′s formation of a Committee for Propaganda in Cooperation, was an important development. It was composed from different cooperation bodies and political parties. During 1945 - 1946 a radio feature called "Ten Minutes for the Cooperator" was released, and the first volume of "The Cooperators Library" was published. Even though the committee was later on separated, Umanitaria released a second volume.

Course for Union Organizers

During 1947 Societa Umanitaria coordinated a course for the technical and cultural education of trade union organizers. This course was in cooperation with the Milan Camera di Lavoro. This course was very successful in the School for Social Legislation, but as a consequence of the splits in the Italian Union, it had to be suspended.

The Italian Union for Adult Education

The Italian Union for Adult Education is a national federation including 38 organizations. This union was very much dependent of the Societa Umaniaria´ s help. The Union was founded in 1908. During the fascist period it was suppressed, and in 1947 in was reconstructed. The purpose of this union was to highlight the public opinion to the answer of the issue with adult education. It was aiming to seek the collaboration of the Universities, Trades Unions, recreational organizations and so on, trying to make contacts with foreign bodies. The Union has given its active cooperation to the National Union for Campaign against Illiteracy. In 1949 the Union became part of the International Federation of Workers Educational Associations and collaborates actively with UNESCO.

Fig.01.44: The Picture Shows the Youth Vocational Education

Fig.01.45: Developed a core of wide-ranging professional courses

01.7 TIMELINE FROM 1892 Till TODAY

- 18 October 1892

The Mantuan Patron Prospero Moisè Loria left his heritage to the newly formed Socia Umanitaria more than 13 million liras, equivalent to half the spending of the Municipality of Milan at that time. On 29th of 1893 Society was established with the Royal Decree, the purpose of which is "to help the dispossessed to take over from themselves, providing them with support, work and education".

- 14 May 1898

General Bava Beccaris dissolved the Board of Directors after the Milanese revolt. Thanks to the appeal opposed by lawyer Luigi Majno, on 13 April 1901, with the sentence of the IV Division of the Council of State, the organization would be constitutionally reinstated.

- 1903

Electrical Engineering for employees, Applied Art to Industry and the School of Books were established as the first laboratory schools.

- 2 January 1905

Establishment of the Ufficio Agrario which aimes "to improve the material and social conditions of farm labourers".

- 28 April - 11 November 1906

At the Universal Exhibition, the Società Umanitaria took part in Milan, with its own pavilion where its projects and the work of the School of Arts and Crafts were exhibited, and helped to set up a pavilion on social welfare, which was present at the Expo for the first time.

- 1907

The Cremona Branch was born, the first decentralized office, followed by that of Piacenza and in 1908, by the sections of Brescia, Verona and Padua, which were soon joined by those of Biella, Udine and Bergamo. The institution's headquarters moved from Via Manzoni to Via San Barnaba.

- 18 October 1908

The first Casa dei Bambini was started in Milan, in the working class neighborhood of Via Solari, under the guidance of Maria Montessori.

- 16 October 1910

The Casa del Popolo was born in the former Brown Boveri plant, where the National League of Cooperatives, the Union of Mutual Aid Societies and the Chamber of Labor are based, some of the most significant workers' organizations in the region.

- 1915-1918

The Socia Umanitaria agrees to stop all its operations with the start of the First World War in order to dedicate himself fully to the assistance of refugees from war.

- August 1920

The association enters the Work against literacy, focusing its effort in Puglia and Veneto, overseeing hundreds of courses and colleges: there were 321 schools in 1927-28 and more than 11,000 pupils entered the school population.

- 14 April 1921

The Consorzio Autonomo law was drawn up between Milan Capital, the City of Monza, the Societa Umanitaria For the opening of the Decorative Arts University. The College, Located at the Villa Reale in Monza, it was opened on 12 November 1922.

- 4 January 1924

Suspention of most of the Societa Umanitatia's activities because of the fascist regime.

- 1943-1944

The Allied bombings have badly damaged the site. More than 80 percent of the buildings have been demolished.

- 17 May 1945

Lodovico d´ Aragona has been named Extraordinary Umanitaria Relations Commissioner. Riccardo Bauer, who would become president in 1954, was by his side.

- September 1945

The first repairs began; the Societa Umanitaria was able to restore its operations, though in part. The Centre for Social Studies was rebuilt for the planning of social activities; the Scuola di Cooperazione e Legislazione Sociale was also restarted, with courses for war veterans and partisans, the musical seasons of the Teatro del Popolo also started again. A new consortium for the Scuola del Libro was instituted.

- 1947

On the basis of a proposal by the architect Giovanni Romano, the final project for the renovation of the institution is presented: the imposing work will last for nearly a decade.

- 1951

UNESCO accredits the Umanitaria as its affiliate, recognizes the status of "associated experience" to the organisation, welcomes Riccardo Bauer as a member of the UNESCO Advisory Committee on Adult Education, and funds various national and international seminars coordinated by the Humanitarian Agency.

- 8 June 1954

Riccardo Bauer was appointed President of the Società Umanitaria.

- 1956

The preparatory school pilot trial for start-up and job guidance begins: within three years, the Italian State will implement this experiment for the redesign of the Single Middle School.

- 1966

The Umanitaria is responsible for overseeing five Cultural Service Centers in Puglia in Manfredonia, Foggia, Bari, Altamura, Massafra as part of the Intervention Project in the South, ‘to promote economic growth with appropriate cultural development.’ The CSCs in Apulia have been under the jurisdiction of the Puglia Area since 1977.

- Autumn 1968-summer 1969

The conflict influences the organization. Riccardo Bauer resigns as President following these events and leaves the institution forever. He only returned for a visit in 1981, one year before his disappearance.

- 1981

All technical courses are moved ex lege to the area of Lombardy, which takes away Umanitaria houses, facilities and staff. The School of the Book is formally disappearing, but the R. retains its legacy. Bauer Vocational Training Center, which continues to operate today.

- 1985

The Seasons of the Umanitaria Concerts have been revived, flanking the Music Execution Rivalry for students at the Conservatory since 1989. Since 2009, the competition has alternated with the International Musical Performance Competition every two years, involving all the Member States of the European Union.

- 1991

The Municipality of Milan awards the Gold Medal of Civic Appreciation to the company for being a “point of reference in the cultural and social life of Milan.

- 1997-1999

The Fresco Hall was reopened from the Architectural and Environmental Heritage Superintendence of Milan. The repair of the frescoes, the vaults and the vaults The cleaning of the painted surfaces and the walls showed San Bernardino′s sparkling suns, the cornucopias and other decorative parts. The “Monitor Program” was established to reduce the drop out rate for students.

- June 2003

Having received the ISO 9001-2000 international standard credential, the Umanitaria will take back its place in the field of technical training, defining its presence in the design, bakery, human greenery maintenance, creative make up industries.

- 2004

The Umanitaria Archive is regarded as a ‘archive of significant historical significance′ by the Archival Superintendence for Lombardy and is thus subject to the discipline of Legislative Decree 29 October 1989, n. 490.

- 2008

The City of Milan has recognized the Societa Umanitaria as being a historical educational institution. The project of the modern undergorud parking begins in the same year before the beginning of the dig, trees were chopped down.

- 2009

The initiative for schools Ambassadors of Human Rights was born in cooperation with the International League of Human Rights (LIDU), which seeks to make clear to high school students the spirit that animates the Declaration of Human Rights.

- 2012-2014

Opening of the modern elevated car park and the new office The Court of Milan building.

Fig. 01.46: 2020: After the Construction

01.8 ARCHITECTURAL TIMELINE

PRELIMINERY PHASE

GIOVANNI ROMANO

In 1936, Elio Palazzo, the current President of Societa Umanitaria asked Giovanni Romano to design a preliminary study for the new headquarters. The architect was specialized in school buildings considering his participation to numerous competitions about it. He was involved in the construction of an elementary school in Lecco, a school in Bolzano, a technical institute and a middle school in Busto Arsizio, and, finally, a technical institute in Pavia and the Swiss school in Milan.

A NEW HEADQUARTER

The idea of the President was to change the order of the school to create a New Umanitaria. However, the area in which this transformation should have been constructed was not decided yet. At the beginning, the work of Romano was a theoretical study on how to solve the functional problem and how to reorganize laboratories and services. In that period, to better perform the task, Romano visited some of the most innovative school in Europe to use as an inspiration in order to reform the new headquarters of Umanitaria. Bauhaus was mentioned among the list of references.

In the spring of 1937, Benito Mussolini, during the approval of the initiative, specified that the new headquarters should have been built within the circle of the Spanish walls, in the central part of Milan. Subsequently, Elio Palazzo, asked to Municipal Technical Office, to identify, in general terms, which were the most suitable areas of the city to satisfy the purpose.

A municipal area of about 15,000 square meters was proposed to the Municipal Technical Office coming from the ex-gasometer of Porta Ludovica, an area which could still have been extended. In the summer of 1938, it was found that the proposed area did not meet all the requirements, due to its size, orientation and location, stating that the general value if the new site as not meeting the ambitions of the future project.

Therefore, the Technical Office was consulted to find out if the proposed area could have been modified or moved. However, considering the limitations imposed both by the general layout of the town plan and by the private properties, it would not be possible to reach a satisfactory solution. Then, Palazzo proposed to the Municipality another area adjacent to the first, included between Via Sarfatti and the Milk factory. After the agreement between the municipality and the Head of Government, the President requested the Municipality this new area. The preliminary project was studied concerning this new area, explaining the reasons that made this solution more desirable than the one proposed by the Municipality.

The Program

The area was perfect for the development of a school district since there was already a primary school, the new Bocconi University, the new Feltrinelli school.

The project was driven by these general criteria:

- The rational distribution of each building
- The favourable orientation of the classroom and laboratory
- The ease of surveillance
- The possibility of expanding the complex
-

The preliminary plan was around 22600 sqm including:

- Presidency, administrative office and general services building
- School of preparation to work and specialization
- Higher Institut for Arts and advanced courses of specialization
- School of Book
- Gym
- Auditorium
- General services for school assistance (refectory, changing room, shower...)

In the project, Romano decided to group up all the laboratories and classroom and to separate them not to disturb each others from the noise coming from the laboratories. The plan is flexible according to the demand: for example, a new gym can be added next to the existing one in accordance to the number of students. Other extensions could be made like adding floors on top of the existing building according the need.

In November 1938 the project, with a rough estimate of 13 740 000 Lire, was accepted by the President and it moved the execution phases.

The Bombing and the Reconstruction

Unfortunally, when war broke out everything stopped.

After the war, Ludovico d′Aragona was appointed as the Special Commissioner of Umanitaria, assisted by Riccardo Bauer. Comune of Milano, initially, was pursuing a “reconstruction” policy of evacuation of the destroyed areas in the city centre to create some new parks. The area of Umanitaria was one of them. Therefore, the Comune proposed to the Umanitatia to move slightly outside of the city centre in a suburban area. However, the Commissioner of Umanitaria immediately refused. He knew that Societa Umanitaria could have kept its effective role in people′s education only remaining in the city centre.

In the first period, Giovanni Romano helped to reconstruct the cloisters with architect Gardella. The law of June 1946 about the reconstruction of church building and care institution was the occasion to find some money to start the reconstruction. Therefore, Bauer asked Romano to design the preliminary project for the New Societa Umanitaria. After four months of work, he realised that the project was too complex and extended to be commissioned to only one person, so he decided to announce a public competition.

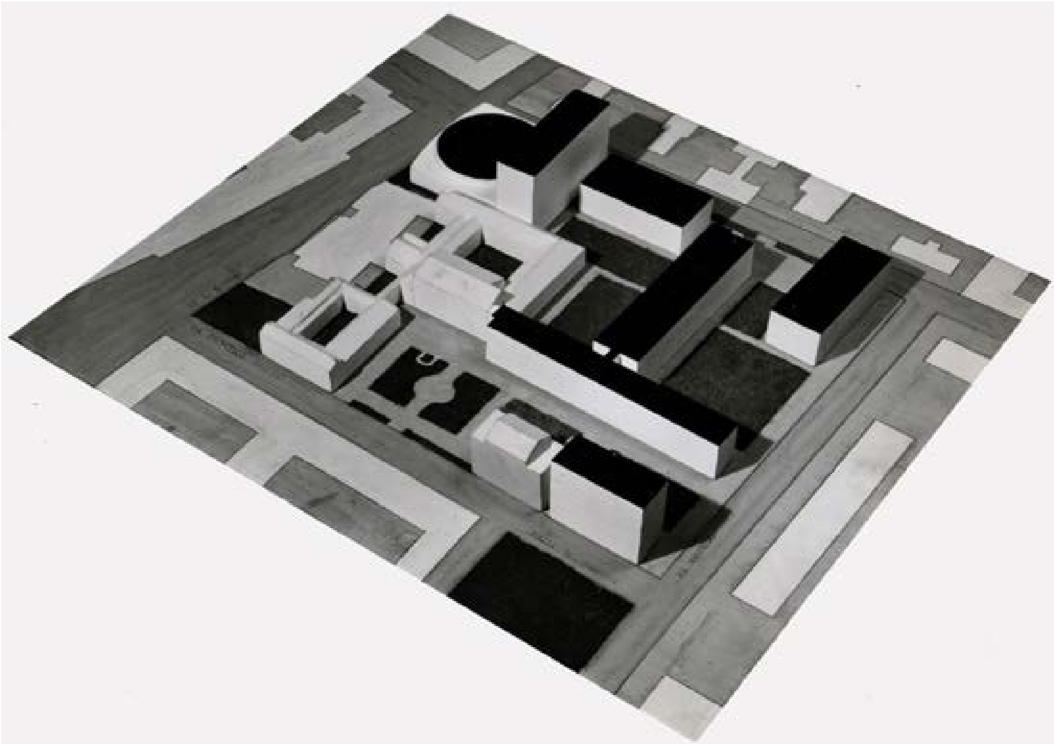


Fig.01.47: Model of the Project of the Societa Umanitaria, Giovanni Romano, 1953

COMPETITION

The national competition was announced the 10th of March 1947 with a deadline of 1st May 1947. The short period was justified by the willing of returning fully operational as soon as possible. The competition requested a preliminary project and a relation with the concept of reconstruction. The activities that should have been included were:

- Vocational School
- School of Book
- Female Vocational School
- Advanced courses of specialization
- Convitto with 200-250 guest

Surprisingly, the call was not sufficiently publicized and only three studios answered to it:

- Arch. L. Salvoni e A. Galesio
- Arch. V. Viganò, V. Gandolfi, Farina
- Arch. Romano

The project of Giovanni Romanos was implemented.

GIOVANNI ROMANO

A totally different approach is visible from the drawings provided by Romano at the end of the competition. In fact, we must not forget the previous experiences between Romano and the Umanitaria. Romano took into account the previous projects, especially the one which was already design to work on Via Sarfatti. This revealed to be crucial in setting up a relation in which he included his view point on how to rebuild the Umanitaria. The idea of the school as a set of specific functions in accordance with the modern movement. The orientation is the key factor of this project.Each building is rotated according to the function it includes.

The result is a visible structure in reinforced concrete with glass and steel window. This concept is reflected in a way more complete and technical relation that was submitted along with the drawings. In the first part of the relation, Romano includes some consideration regarding the social content that Umanitaria is granting to provide to its students. The architect is proposing a very detailed program and his architecture is definetly its reflection.

"The social content of the project is way more important than its architectural value"

These were the words of the architect in one of the document that were found in the archive. However we can notice how in both project the functions a dedicated access lead to the different fucntions in order to maximize efficiency.

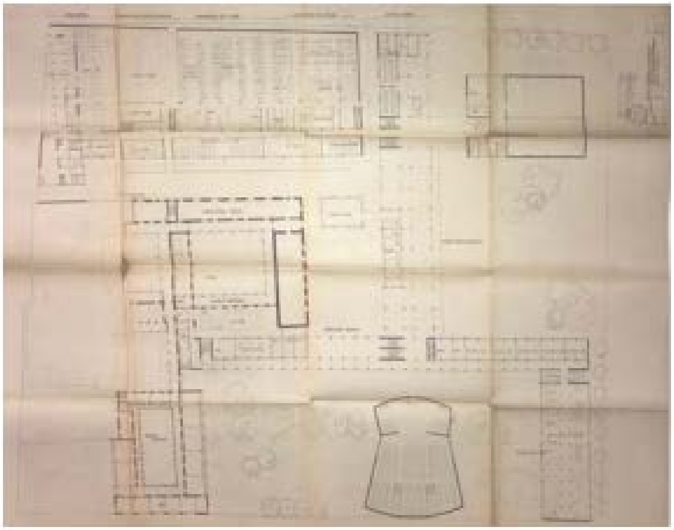


Fig.01.48: Umanitaria Competition, Ground Floor Plan; Giovanni Romano; 1947

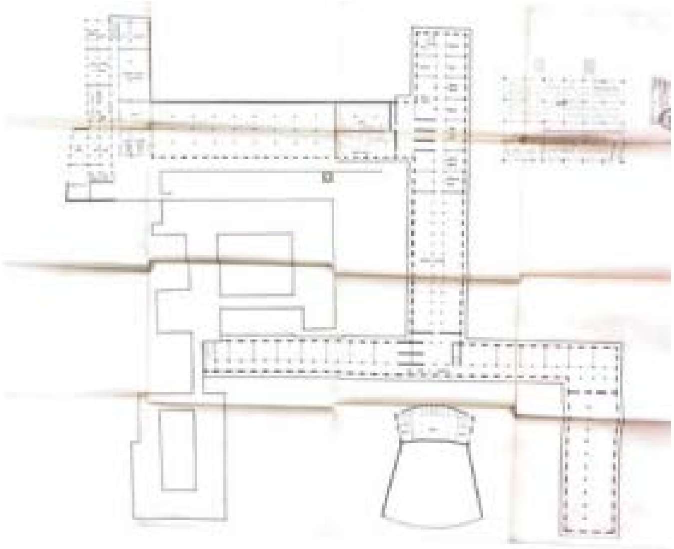


Fig.01.49: Umanitaria Competition, Third Floor Plan; Giovanni Romano; 1947

CONSTRUCTION PHASE

In the summer of 1937, Romano started the evaluation of the damage along with the final design. The problem now was the funding of the project. The Societa Umanitaria was in a dreadful situation since only seven of the sixteen were used by the school. The other nine were rented as offices to privates. The activities in these building were not related to the social purpose of Umanitaria, and, consequently, the reconstruction policy was not including them. This meant that the Umanitaria should have paid by itself the reconstruction works without any help by the Government. The battle to include these buildings in the funds for reconstruction lasted for two years bouncing from one office to another to get the approval. Now, as it has been said, the Law establishes that state intervention in reconstruction should be limited to what is strictly indispensable to the exercise of assistance and charity. Bauer assessed that the initial design of the competition should be updated and made more flexible stating that the theatre of 600 places should be enlarged.
The new project was ready in May 1948. Surprisingly, in that period the Comune of Milan offered to the Umanitaria The Collegio della Guastalla. It was a building severely damaged by the bombing during the war and Umanitaria could fix it and use it instead of Convitto in order to host the students. For these reasons the project of May 1948, including Convitto, was redesigned including:

- Classroom building
- Heavy machinery building
- Light machinery building
- School of Book
- Theatre
- Offices building

The 12th June 1949 Romano showed to Bauer all drawing, budget and structure analysis. The final cost of the project was 1,085,162,888 lire. In the meanwhile, the government had significantly reduced the amount of recognizable damage to the state.

So, Umanitaria was forced to cut out of the project some buildings:

- The theatre
- Office building
- Gym

The other buildings were reduced and simpified in the structure and the quality of the finishing. All the calculous were remade and the project cost reduced to 543 million. In the meantime, the idea of the Convitto inside the project came back since the Comune of Milano changed its mind about the Collegio della Guastalla. Then Romano remade the general disposition of the project to accommodate the Convitto and reduced the budget of other buildings to make this new one. The classroom and Light machinery building from the previous project were just repositioned maintaining the same layout and structure to not redo the clamorous. Finally, the work for constuction started. The Heavy Machinery building, the School of book and Convitto were redesigned from scratch. Their project was approved the 5th of October 1953 and shortly afterwards the started the construction work too.

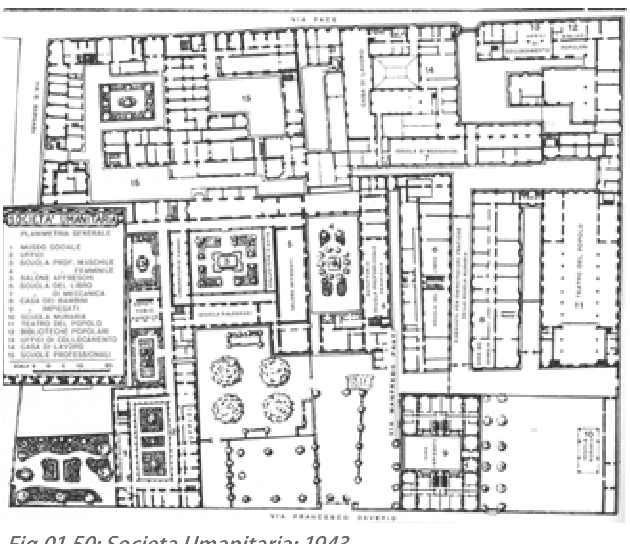


Fig.01.50: Societa Umanitaria; 1943

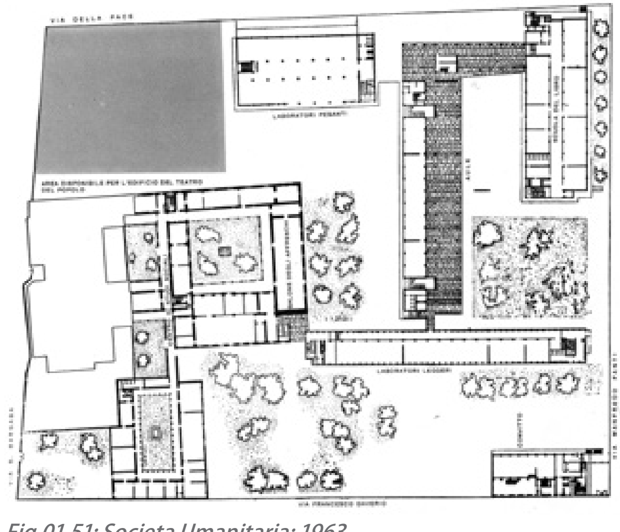
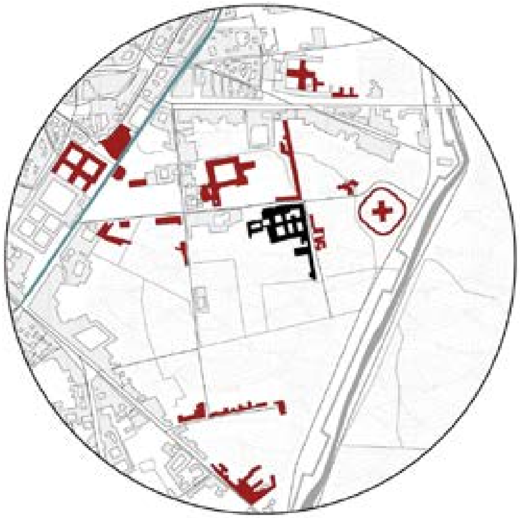
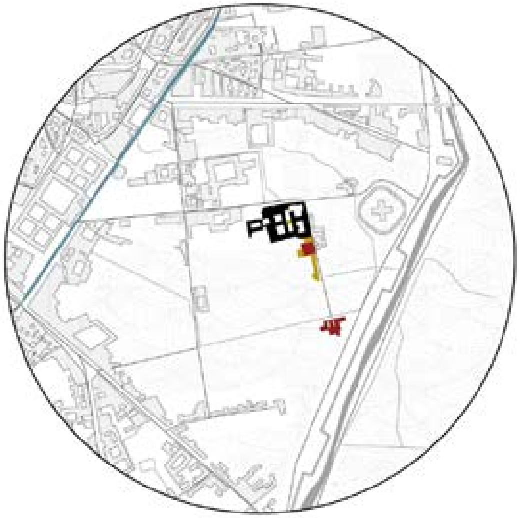


Fig.01.51: Societa Umanitaria; 1963

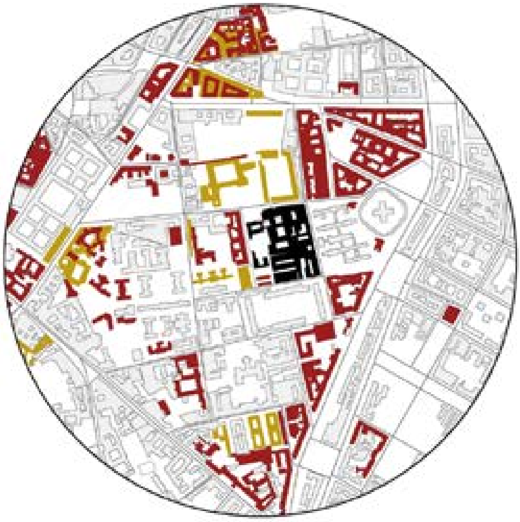
01.9
SITE DEVELOPMENT ADDITIONS/ DEMOLITIONS



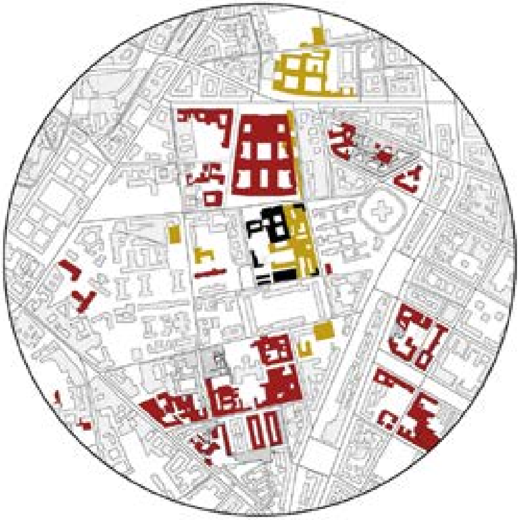
First half of ‘700, *Il Centro Antico di Milano_ Gianni*



1856, *Pianta Numerica della Reale Citta di Milano_ Giuseppe*



1930, *Carta Tecnica Comunale di*

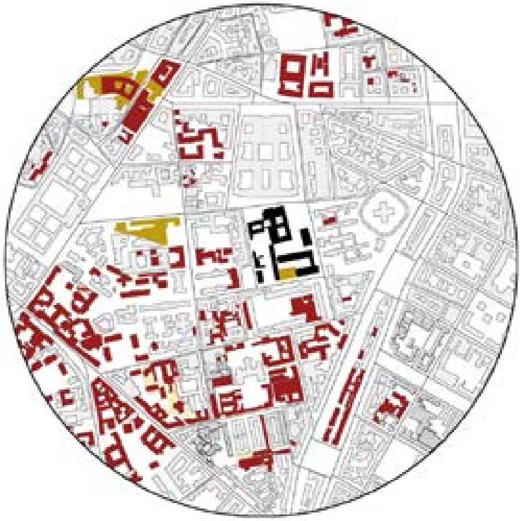


1946, *Carta Tecnica Comunale di*

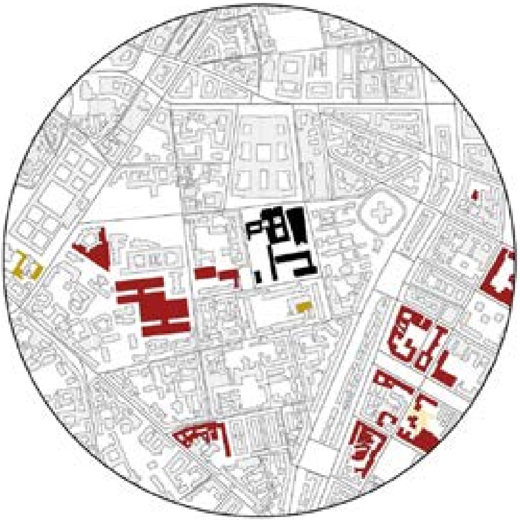
Umanitaria Urban | Existing Buildings | Water Canal | Additions | Demolitions

1884, Carta Tecnica Comunale di Milano_ Piano del

1910, Carta Tecnica Comunale di



1965, Carta Tecnica Comunale di



2012, Carta Tecnica Comunale di

Umanitaria Urban | Existing Buildings | Water Canal | Additions | Demolitions

01.10
THE CLOISTERS

The Societa Umanitaria is based in what was once the monastic complex of Santa Maria della Pace. The foundation of the church and convent took place in the second half of the 15th century by the noble Portuguese knight Amedeo Menez de Silva, who became a Franciscan in Milan. Following a conspicuous donations, the community of friars had as a gift an area located between the city walls and the ramparts, in the streets that would later be called via San Barnaba and via Pace.

1476
Construction of the church and convent began in 1476.

1497
The church completed and consecrated in 1497. The construction of the convent complex was certainly entrusted to the Solari family, already known for the work of Guiniforte, architect in S. Maria delle Grazie , before the intervention by Bramante . The convent, which at the end of the 16th century had 3 cloisters and 60 cells , already a century later had expanded with 30 cells and an extra cloister. The refectory of the convent, the precious Salone degli Affreschi , was richly decorated with the Crucifixion by Bernardino Ferrari in 1520, the Lomazzo dinner and works by Marco d′ Oggiono.

1805
In 1805 the complex was requisitioned by Napoleon , deconsecrated and confiscated in the state property; later it shared the fate of other religious buildings in Northern Italy, becoming first a stable, then a warehouse, a hospital and finally a reformatory.

1900
At the turn of the 19th and 20th centuries,the church was used as a concert hall , but later it rearranged and rededicated it to worship.

1967
The convent passed to the property of Prospero Mose Loria: in the shadow of the cloisters of this convent, the history of the Humanitarian Society begins in its historical site.

Fig.01. 52: The area of the Church of S. Maria della Pace at the end of the 19th century

Fig.01. 53: Overall view of the complex of buildings, School of Umanitaria, General view, The ancient monumental historical nucleus to the left, Milan

Pictures of the Cloisters after Bombing

Fig.01.54: Societa Umanitaria; 1943

Fig.01.55: A cloister of the Societa Umanitaria after allied raids in 1944

Fig.01.56: Societa Umanitaria; 1943

Before bombing and the demolitions of the main buildings of the Societa Umanitaria, one of the main points was the Courtyard of the Fountain. It is located in front of the Cloister of Fish. Fresco Hall is the main point of the area which acts as a transition zone between two gardens. After the demolition of the surrounding buildings, the courtyard lost its value and today there is no effective usage of the area while still, it has the potential to become the main area for the events at the outside.

Fig.01.57: Societa Umanitaria/ The Cloisters; 1945

Figure 02.27, in the year 1960 its shows the detailed drawing and the measurements of the Courtyard of the Fountain. It´s visible that how it has the potential to become the main garden with the ancient fountain and the important lime trees which become a symbol of this courtyard. To enhance the efficiency of the Umanitaria this courtyard was analyzed in detail and as the project, the potential of the area increased by designing a pavilion to this courtyard which will be talked about in the next chapters.

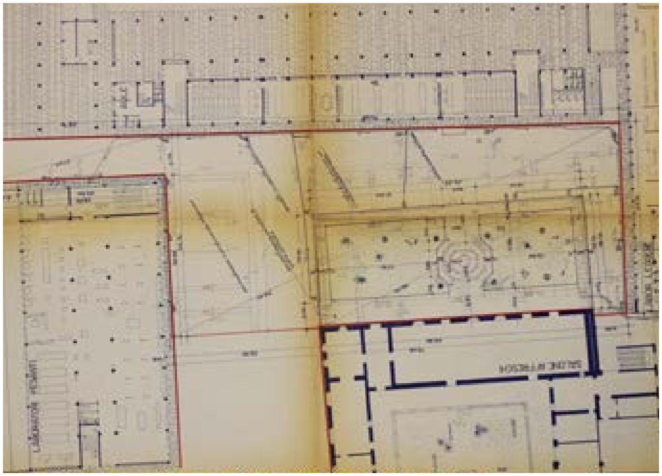


Fig.01.58: Societa Umanitaria/ The Cloisters; 1960

Pictures of the Cloisters after Bombing

Fig.01.59: Societa Umanitaria, Courtyard of the Fountain; 1943

Fig.01.60: Societa Umanitaria, Cloister of Fish; 1943

Fig.01.61: Societa Umanitaria, Cloister of Fish; 1943

The other important space is the Facchinetti hall with wide arches inside. The right part of it, named Courtyard of Ricreazione was a green area before the bombing. Now Facchinetti hall has a function of the meeting room and the courtyard became a garbage space. During the time it lost its value same as the Courtyard of the Fountain. To enhance the efficiency of the Umanitaria, this area was analyzed in detail and as the project, the functions changed and the potentials of the areas increased by emphasizing and extending the entrance through the Courtyard of the Fountain.

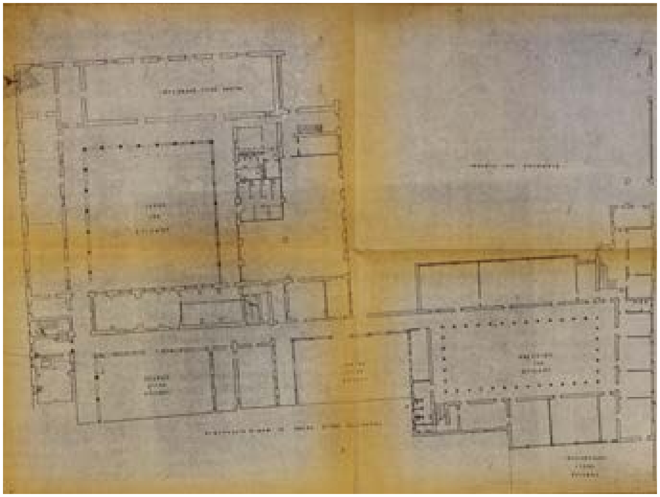


Fig.01.62: Societa Umanitaria/ The Cloisters; 1957

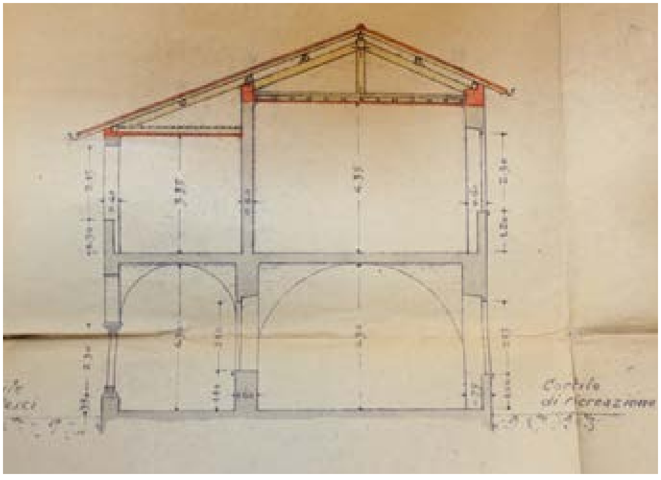


Fig.01.63: Societa Umanitaria/ The Cloisters; 1945

Pictures of the Cloisters after Reconstruction

Fig.01.64: The New Headquarters of Umanitaria, Giovanni Romano, Milano; 1948-1956

Fig.01.66: The New Headquarters of Umanitaria, Giovanni Romano, Milano; 1948-1956

Fig.01.65: Courtayrd of the Fountain

Fig.01.67: The New Headquarters of Umanitaria, Giovanni Romano, Milano; 1948-1956

Fig.01.68: Archive document that shows the historical layers

01.11 FRESCO HALL

Pictorial Restoration of the Vaults and Walls of the Refectory (today called "Fresco Hall") of the Convent of Santa Maria della Pace in Milan

In the second half of the 1400s, Milan was a rare moment of completion and building of architectural complexes of considerable artistic wealth, some of which had luckily come to us. The cultural policy promoted by the Sforza, which continued the attention paid to it by the Visconti predecessors, and the coexistence of conventional and creative artistic contributions in the Lombard region, enable the production of exceptional works. Parallel to the efforts of the Court, those championed by the monastic orders, in particular the Franciscans and Dominicans, were born, mostly thanks to the charitable patronage of the Court itself or of individual protectors.

Renewed commitment to our monumental past has enabled us, in recent years, to provide for their preservation, enabling us to illuminate the worlds that appeared forgotten because they were mystified or obscured by neglect and superstructure. In this respect, it is appropriate to recall the recent finds and renovations of the pictorial and decorative apparatus of the Church of Santa Maria della Pace, which is joined by that of the Fresco Hall or the Refectory of the monastic complex annexed to it, which is undoubtedly the most prestigious of all.

Although the bombings of 1943 produced a serious wound for the whole architectural ensemble, the reconstruction of the partially saved convent part was respectful of the ancient structure both in terms of volumes and in the sobriety of the new insertions still allowing us to fully grasp the main features of the original convent complex, built according to the precise and usual medieval functional distribution schemes, but with rich and always different architectural and decorative solutions of the various parts.

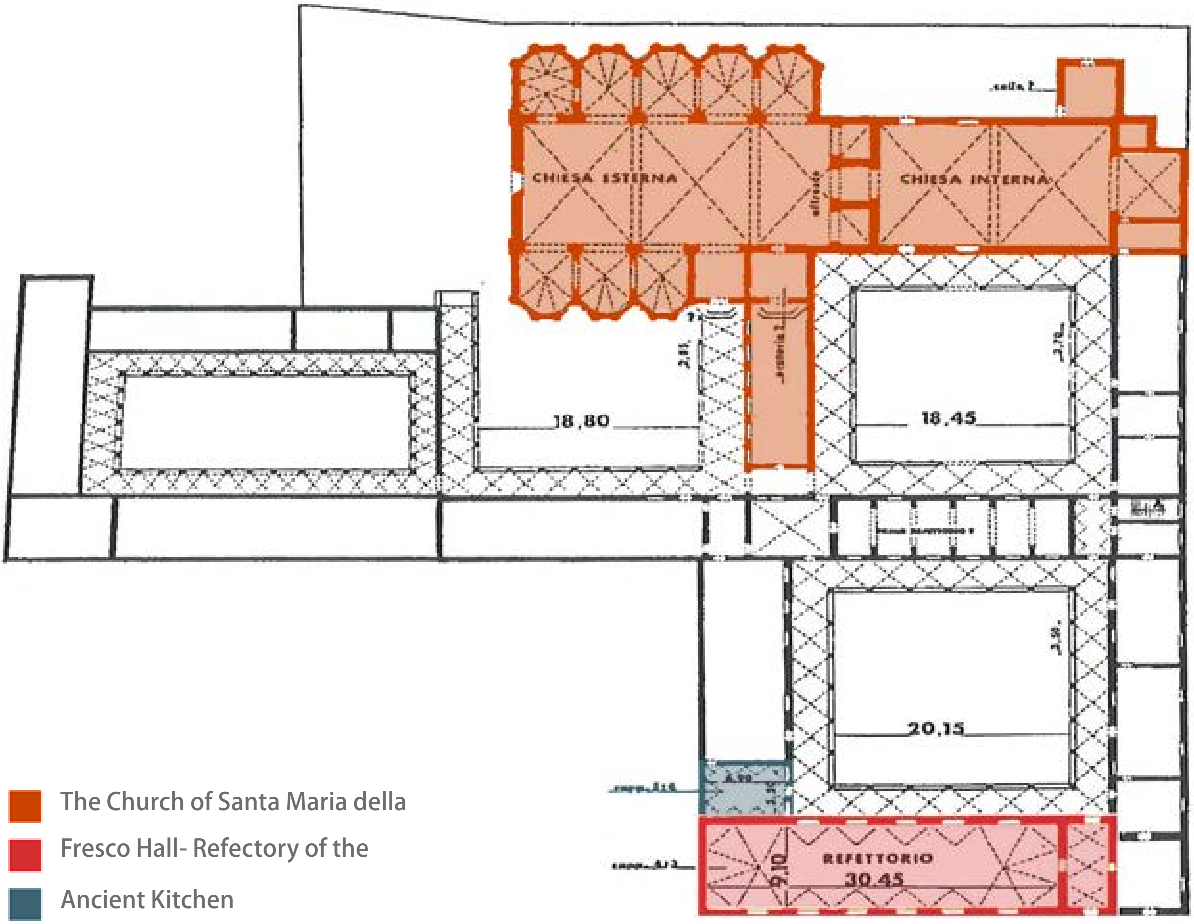


Fig.01.69: General plan of the convent of Cloisters including the Church of Santa Maria della Pace, according to the original layout of the late fifteenth century

The influence of the construction methods of the Solari, a well known architectural family, related to the Romanesque-Gothic tradition, is clearly present in the architectural layout of the church and the cloisters, whereas the new Fresco Hall, which does not correspond with the first Refectory of the complex, probably situated between the second and third cloisters. Similarly, in terms of space and architecture, to the Refectory of the Convent of Santa Maria delle Grazie-a wide rectangular hall with a parasol shaped vault on the short sides-this precious room preserves its original decoration from the 80s to the 90s of the 1400s.

The decoration of the walls can be dated back to the early 1500s, with grotesque and artificial architectural features. This room of the Refectory of Santa Maria delle Grazie also contained the themes of the Last Supper and the Crucifixion; the first, lost during the bombings, suggested a replica of the Cena Vinciana, the work of Giovanni Paolo Lomazzo, whom he definitely wished to bear in mind the masterpiece of his great master.

Fig. 01.70: The Refectory of Church Santa Maria Delle Grazie

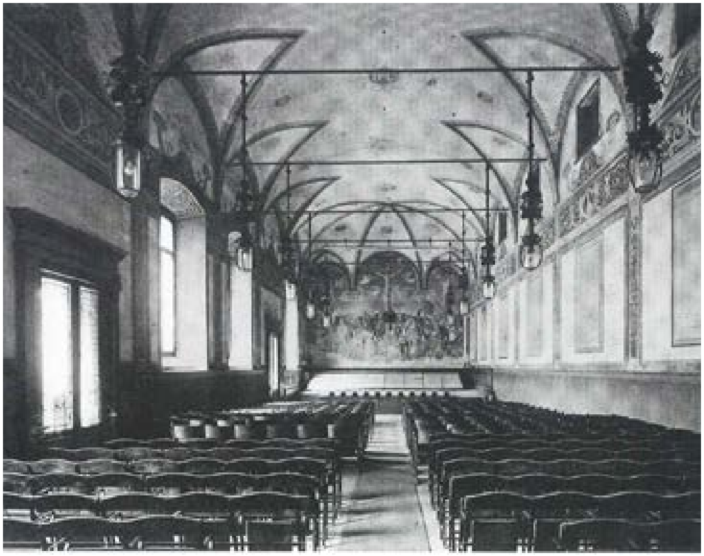


Fig. 01.71: The Fresco Hall in the 1920s, Refectory of Church Santa Maria Delle Pace

Description of the Work

The refectory of the Convent of Santa Maria della Pace is rectangular in shape, with a roof barrel vault with sails and umbrella shaped terminals of the short sides. On the east wall there is a door in a central position above which four had been practiced square holes for movie projection. The north wall, which faces the cloister, has four small square windows open in the vaults and three doors, two of which communicating with the outside and one passing through an adjacent room that is probably identifiable as the ancient kitchen. Also in the lower part of the wall there were, before the restoration, four niches rectangular, happy with the radiators for heating.

The south wall has a series of six large windows, two of which are reduced in height due to the opening of respective doors, now also used as security doors. In the niches obtained under the four remaining windows were placed the radiators for the heating. An external conduit electrical system ran along the entire perimeter of the room at the height of the vault shutter. The decoration technique is of good quality: probably applied fresh (or in any case with the lime-based binder) the colors were subsequently smoothed with a particular metal tool according to a technique used during the Middle Ages and the Renaissance. There “Compactness” thus obtained made the surface less subject to degradation having been suture, with the lime drawn from the substrate, all porosities.

The vault painted in white covered with small red brushstrokes is decorated with motifs Ornamental in the shape of a “sun” with yellow and red flame rays. There are three ornamental motifs sizes depending on the position they occupy in the architectural backgrounds, the largest and those of medium size have in the center. At the ribs of the vaulted bands are painted, about 20 cm wide, decorated with fake inlay in red colors it is green. A frieze depicting cherubs with garlands is painted in correspondence with the vault imitating a stone bas-relief on a black background. At the center of the vaults the frieze is interspersed with tondi depicting Franciscan saints, difficult to interpret before the given restorations the considerable state of decay. To “support” the the very thin pilasters decorated with black and red candelabra on a yellow background are painted. The pilasters define large gray-blue mirrors framed in red.

On the Wall south these mirrors are occupied by large windows and doors except for the two adjacent to the east and west walls. Of these two, the western one is painted with a jamb perhaps part of a door imitating the real one opposite on the north wall. The vaults are decorated with bas-relief painted copings with cornucopias containing flowers on the White background.The plaster on the east wall is hammered and there are sections of figures drawn in black on the original fake architecture decoration; this preparation painting represents the sinopia of copy of the Last Supper by Lomazzo. It was torn off at the end of the last century and brought to Santa Maria delle Grazie where it was destroyed by the bombings of the last war.

State of Conservation

The state of conservation of the painted plaster, before the current restoration, was to this extent a point compromised by the vicissitudes and travails suffered over the centuries that the possibility of fruition was almost completely lost. Two main causes, which are consequential between them, have compromised the integrity of the paintings.

Fig. 01.72: Fresco hall- Ceiling

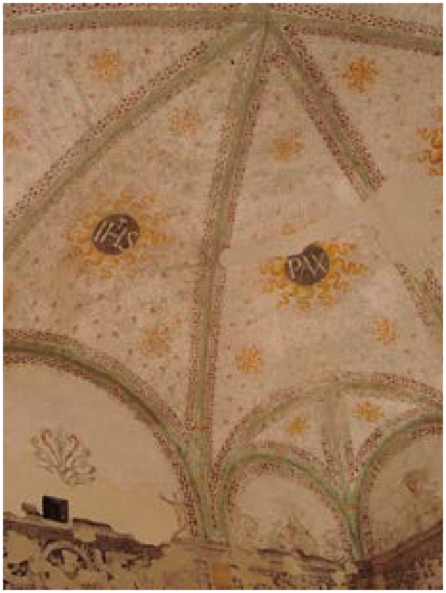


Fig. 01.73: Fresco Hall- Sun Motifs

Fig. 01.74: Fresco Hall- Sun Motifs

On the masonry covering the hall there were some lesions placed obliquely follow the progress of the laying of the bricks of the vault. These lesions, forming small “steps”, they imply the downward displacement of a wall and have caused, for what it concerns the conservation of the painted surface, plaster detachments, lack of cohesion of the starti and loss of portions of the painting, especially in the western part. Large patches of saline efflorescence of circular shape, mostly in correspondence with the lesions, highlighting ancient water infiltrations now healed. The efflorescence caused the loss of pictorial film and the incorporation of black smoke and dirt, disintegrating the plaster layer because it is impoverished by the migration of salts towards the surface internal and warmer than the vault.

The major cause of deterioration of the wall paintings is due to a previous operation of rehabilitation of rising damp, which at the beginning of the restoration work was very high, made with the demolition of decayed and crumbling mortars by “cutting out” the plaster around the main decorations in fake architecture. A reddish mortar of reintegration, which most likely consisted of lime loaded with sand and powder of brick, thus allowing a greater passage of humidity and giving hydraulic qualities plaster, without using cementitious binders. Blackish concretions were noticed on the entire painted surface, especially towards the top and speckles that soften the brilliance of the color contrasts giving opaque thorium as a whole. The formation of these concretions can be attributed to the condensation of acidic water vapor on the painted surface, condensation resulting from the fact that the structure was initially used as refectory and later as aula magna.

Carbon dioxide, emitted by breathing by the occupants of the room, and the water vapor produced they mix with each other, sometimes creating carbonic acid which fixes itself as condensate on the surface of the masonry, gradually melting small quantities of lime constituting the work, lime that has recarbonised by incorporating soot and dirt and thus creating a new uneven grayish layer. The monochromatic frieze on a black background appeared to be very damaged due to the plastering of gaps hardly identifiable due to heavy reintegrations. The gray-blue painted mirrors on the walls have various layers of color, the considerations on the presence of these layers can be many, but it is believed which are very likely to be repainted to maintain the color tone in the hatching.

The Restoration Work

In 1994, during the analysis, after having ascertained that the water infiltrations had been healed and therefore the saline efflorescenceceased, as the main operation, to the export of the salts from within the layers of plaster and surfaces. Packs of deionized water were then performed supported by cellulose pulp, simultaneously heating the internal environment in order to draw as much moisture as possible towards the pack-masonry interface. In this case the humidity recalled was a vehicle of saline ions, fixed in the cellulose pulp soaked in water demineralized and therefore greedy for these. A vast operation of anchoring from the layers of plaster to the masonry and consolidation of the pictorial film was particularly necessary on the areas bordering the large onessaline efflorescence spots, areas where physical-mechanical stresses have led to disintegration of the materials making up the painting. The anchors were made by injecting lightly loaded lime mortar and slightly expansive in order to completely fill the internal space and ensure adhesion without having to resort to shoring the area.The consolidation and re-adhesion of the small detachments of pictorial film have been carried out by imbibition with tissue paper with acrylic resin or acrylic emulsion depending on the hygrometric situation of the portions of masonry. These adhesives, diluted in solvent at 2 - 3%, acquire a very strong bonding power bland which is sufficient to ensure good adhesion, but at the same time will leave you free the passage of humidity, an exchange necessary for a good conservation of the work. Depending on of the areas the consolidation of the paint film was carried out before and after cleaning, judging based on the ability of the layer to withstand such an energetic operation or based the amount of dirt present.

Following the execution of the cleaning samples performed in the analysis phase, the solvent and the method of application best suited to the problems encountered. As for the surface dirt it was enough to clean with a damp sponge and alight surfactant. The elimination of the layers of recarbonation present was more complicated and time-consuming on almost the whole of the room, layers that are sometimes identified as whitish veils, sometimes as layers covered with gray color.
These layers were removed by applying a compress for 30 - 45 minutes composed of a saturated solution of ammonium carbonate in deionized water supported by carboxylmethylcellulose, then thoroughly rinsed with water. Where the recarbonations were lighter, replacing the laborious application of the pack, cleaning with a pad was always used with the saturated carbonate solution ammonium.

The old fillings in excellent condition and with a good draft, easily identifiable following the removal of the retouches after the cleaning operation, were kept as a basis for pictorial reintegration. Light grouting up to three centimeters of depths were performed in sub-level or at the level of the plaster with loaded lime putty with quartz marble powder and purified sand, after having made the appropriate essays for identify the optimal chromatic and granuolometric characteristics.

Fig. 01.75: A detail of the frescoes on the side walls

Due to the decorative character of this painting, the pictorial integration, under the supervision of the Superintendence for Architectural and Environmental Heritage of Milan, was carried out only incorrespondence of particularly disfiguring gaps with the watercolor hatching method, while for the very extensive gaps the integration took place through backgrounds of homogeneous colors imitating the neutral background of the plaster, using tempera colors.

Fig.01.76: Frescoes before intervention

Fig.01.77:Frescoes after the restoration

Fig.01.78:Frescoes after the restoration

Fig.01.79:Frescoes after the restoration

Pictures of the Fresco Hall according to Related Years

Fig. 01.80: Fresco Hall before Bombing- 1920

Fig. 01.81: Fresco Hall after Bombing- 1945

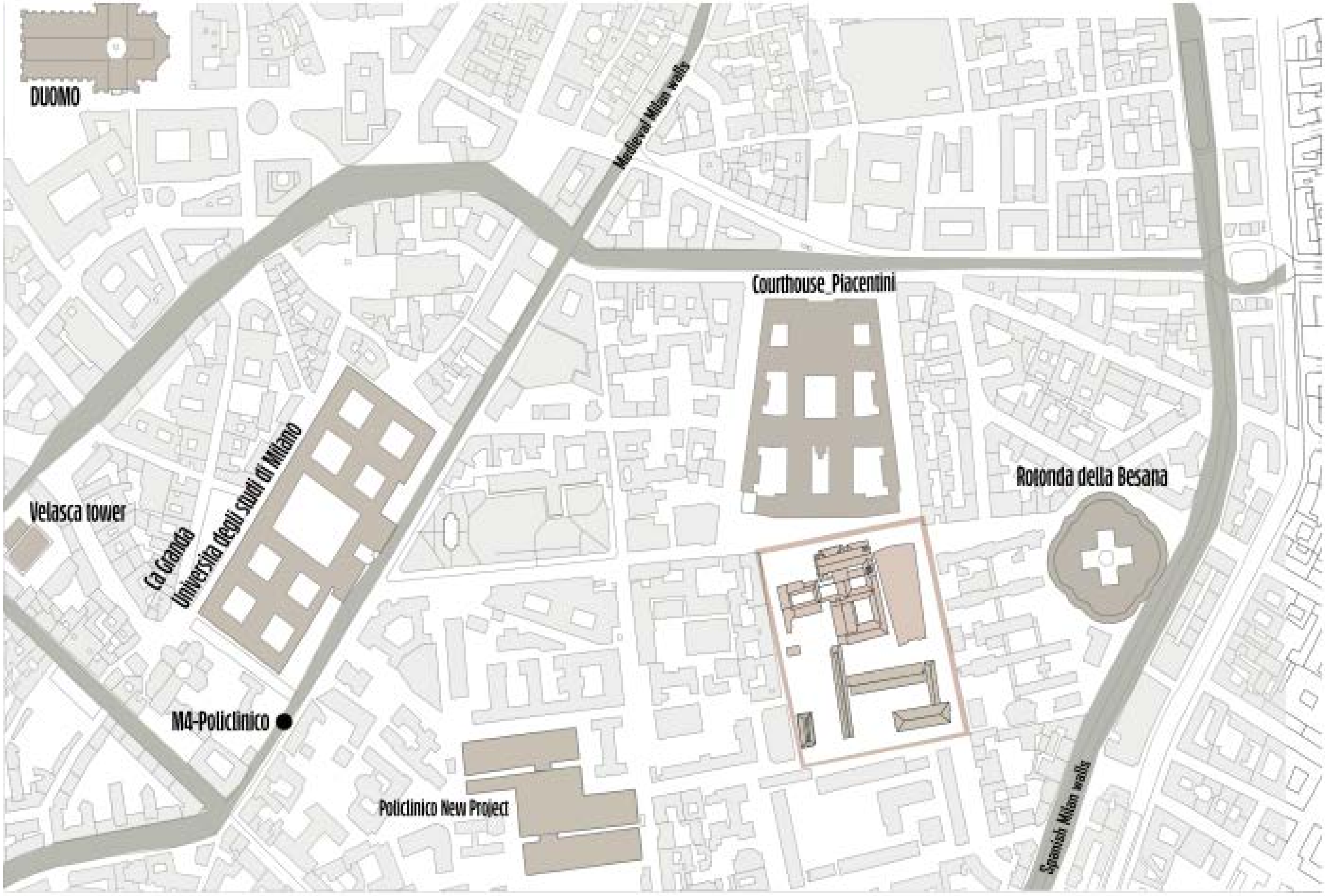
Fig. 01.82: Fresco Hall during the Intervention- 1999

Fig. 01.83: Fresco Hall after the Intervention- 2016

02.
PAVILION
THE NEW UMANITARIA CORE

02.1
SITE ANALYSIS

Master Plan

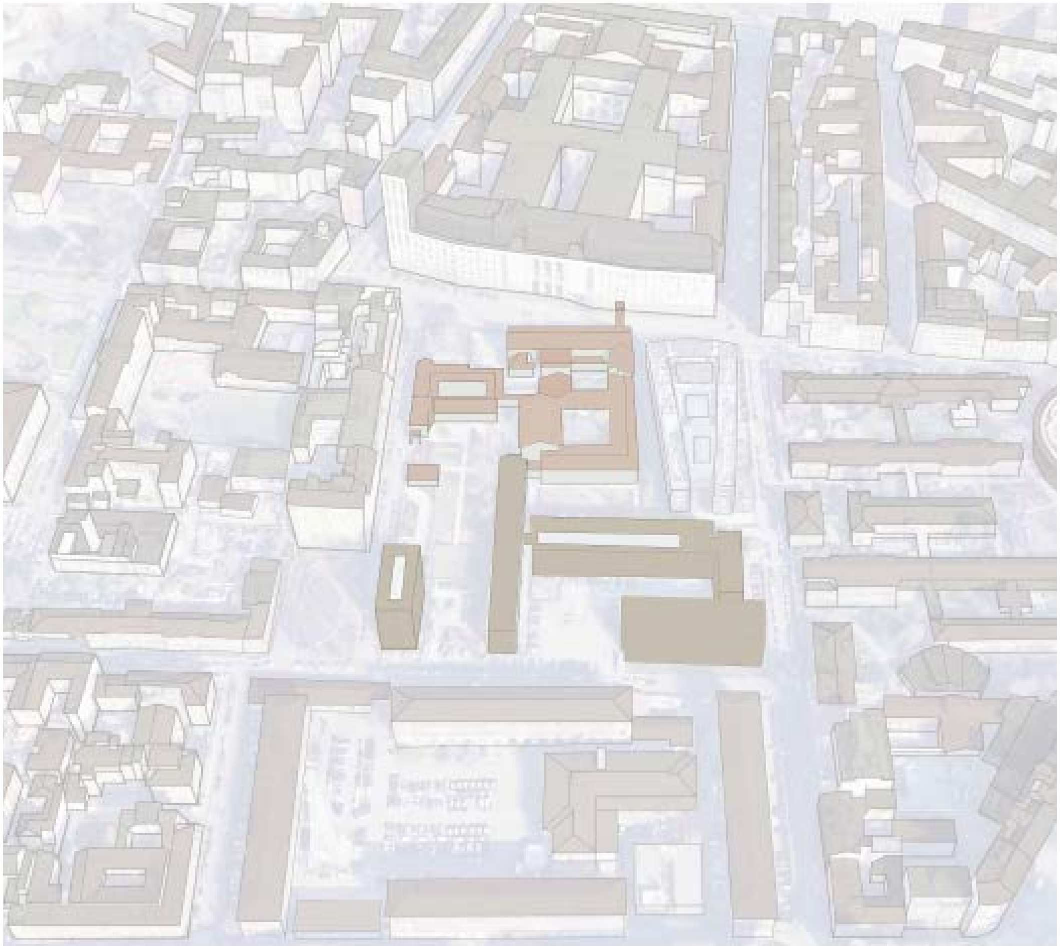


Societa Umanitaria

Partially blocked by garbages

Parking area, pedestrian access

Access from Via San Barnaba



Entrance from Via San Barnaba:

- Instead of being one of the main entrances, its not prominent
- Deteriorated ancient wall
- Church gap to use

The Passages to Umanitaria Blocks:

- No good defined tribunale border
- Deteriorated main facade and the passage way
- Blocked area because of the garbage space

The Passage to Umanitaria Blocks:
- Blocked area with garbage space
- No continuity for the pedestrian accesses
- Pollution for the area

Courtyard of the Fountain:

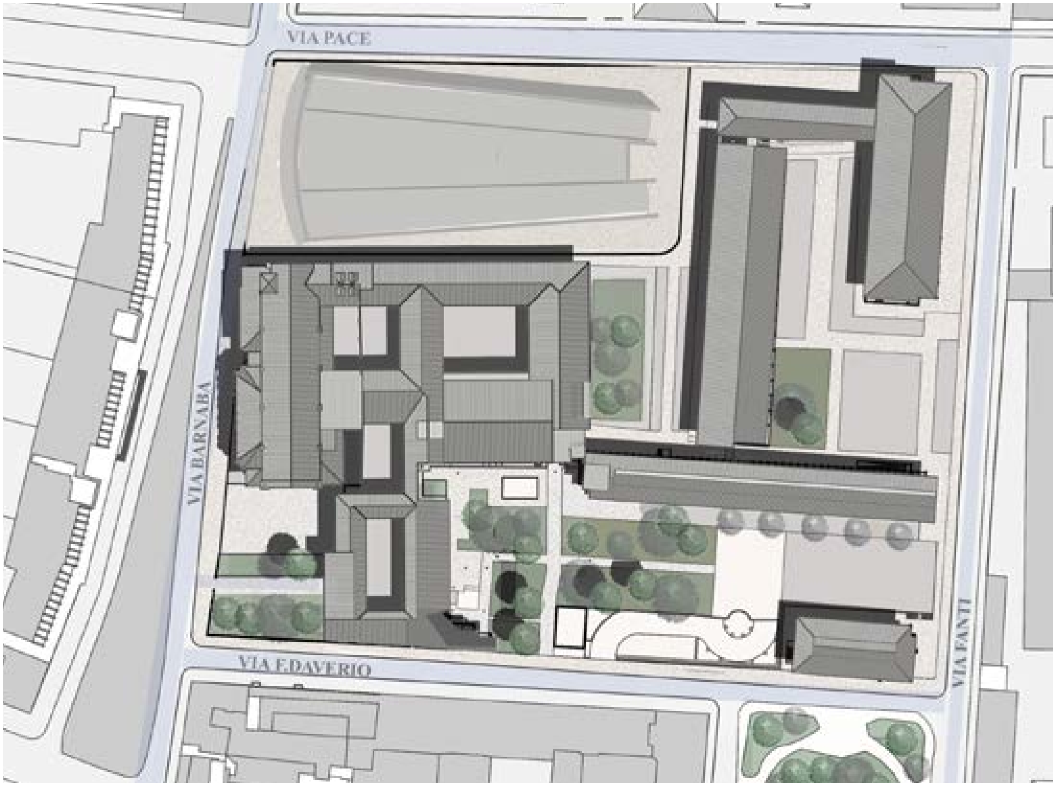
- Garbages and car parking area
- No efficient usage
- Desolate area

Existing Terrace:
- Not open to public
- Located in one of the good location looking through the Cloister of Fish
- Deteriorated area

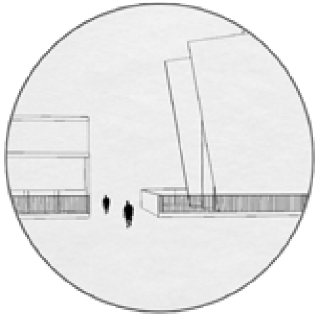
Fresco Hall Corridor:

- Good access point to existing terrace
- There is a view points through Fresco Hall from First Floor
- Blocked area because of a storage usage

02.1
SITE ANAYSIS
SUSTAINABILITY CONCEPT

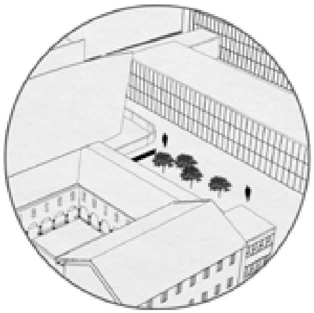


View from Via San

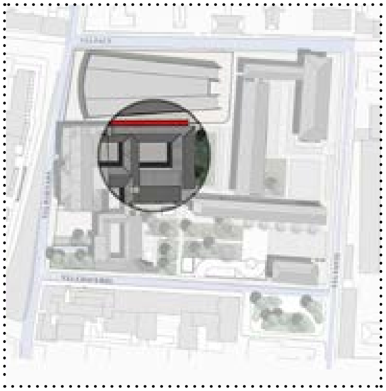


View from Via Pace

The first issue discovered on the site was a garbage dump in front of the main facade of the umanitaria buildings, which blocked the major route between the cloisters and the Tribunale building and constituted an impediment to continuous access. We cleared the rubbish and extended the corridor to offer an effective link between the San Barnaba entrance and the frescos garden.



View from Courtyard

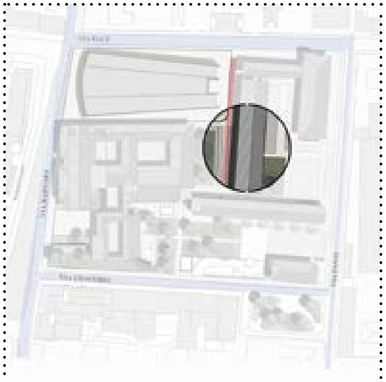


First problem that observed at the site was the garbage space located in front of the main facade of the umanitaria blocks which block the main passage between the cloisters and tribunale building and becamo an obstacle for the continuous access. To provide an efficient connection between the san barnaba entrance and the frescos garden we removed the garbages and extend the passage.

Inside of the cloister of fish

One main point of this cloister was the potential of green area and the connection between the inner and outer space and the terrace view to the gardens so using this factor as a reference point we made the continuity in terrace connection and having an open pavilion by saving trees.

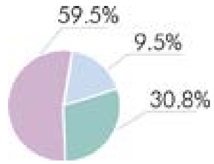
Courtyard of lime trees



As it's shown in the picture from the other entrance(via pace) we have a parking space also in the other side of the lab we have enough parking space by making the way only for pedestrians and bicycles. In that case we planned to increase the quality of the space also reduce the noise and pollution around the area.

02.2
SITE SURVEY
PUBLIC/ PRIVATE CIRCULATION

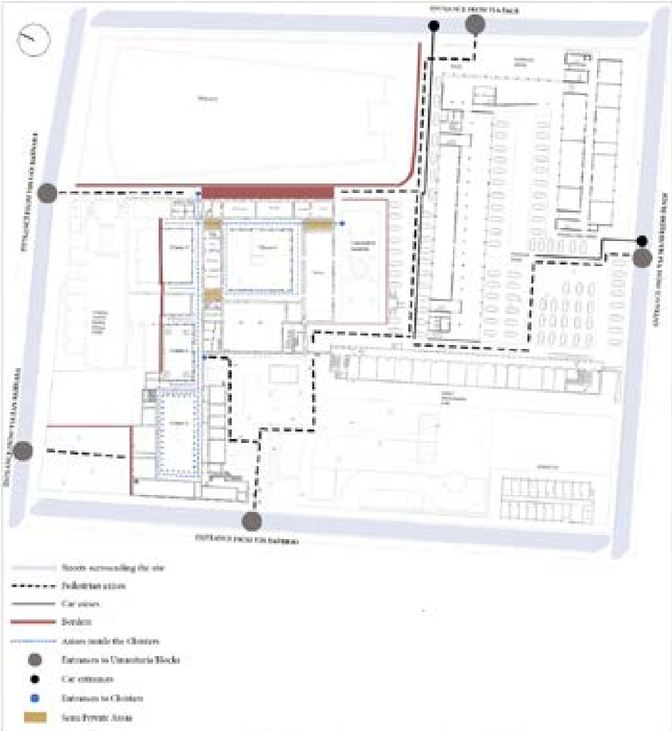
Public/ Private Zones and the Accesses



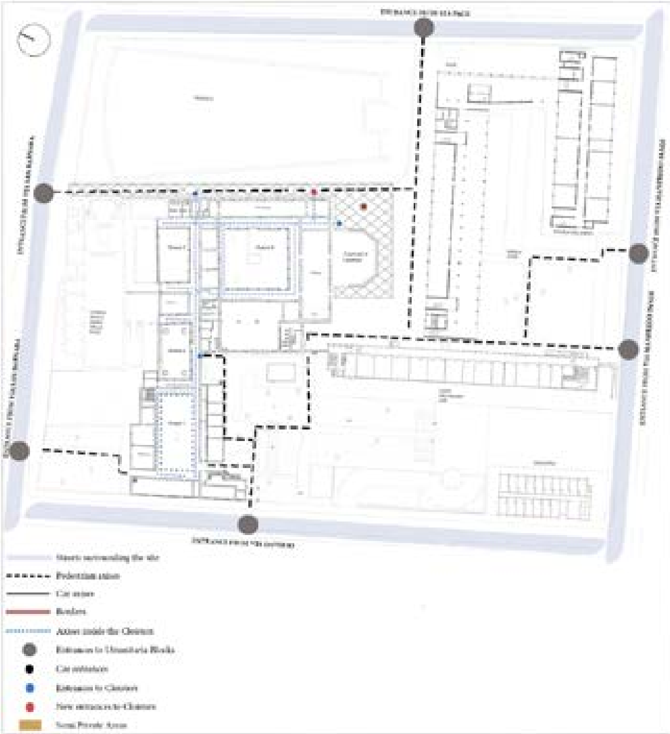
02.2
SITE SURVEY
AXISES

GROUND FLOOR

Current Situation



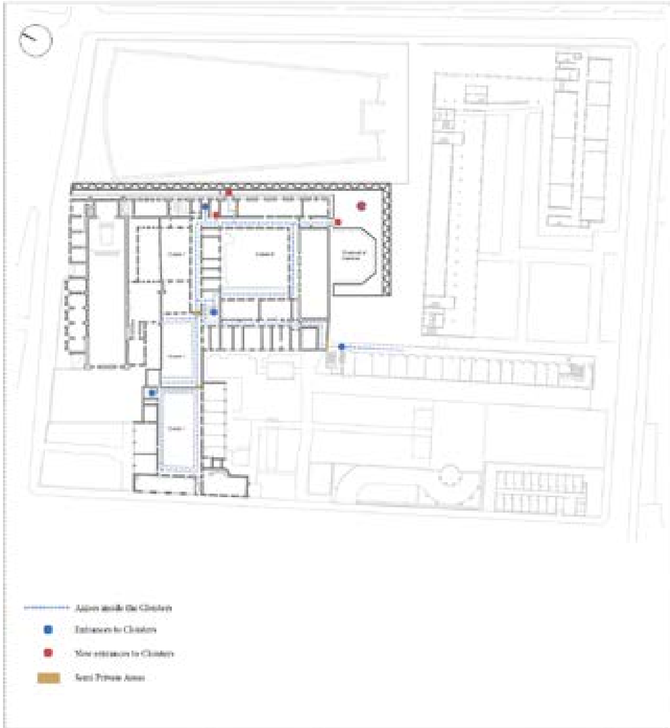
New Proposal



FIRST FLOOR

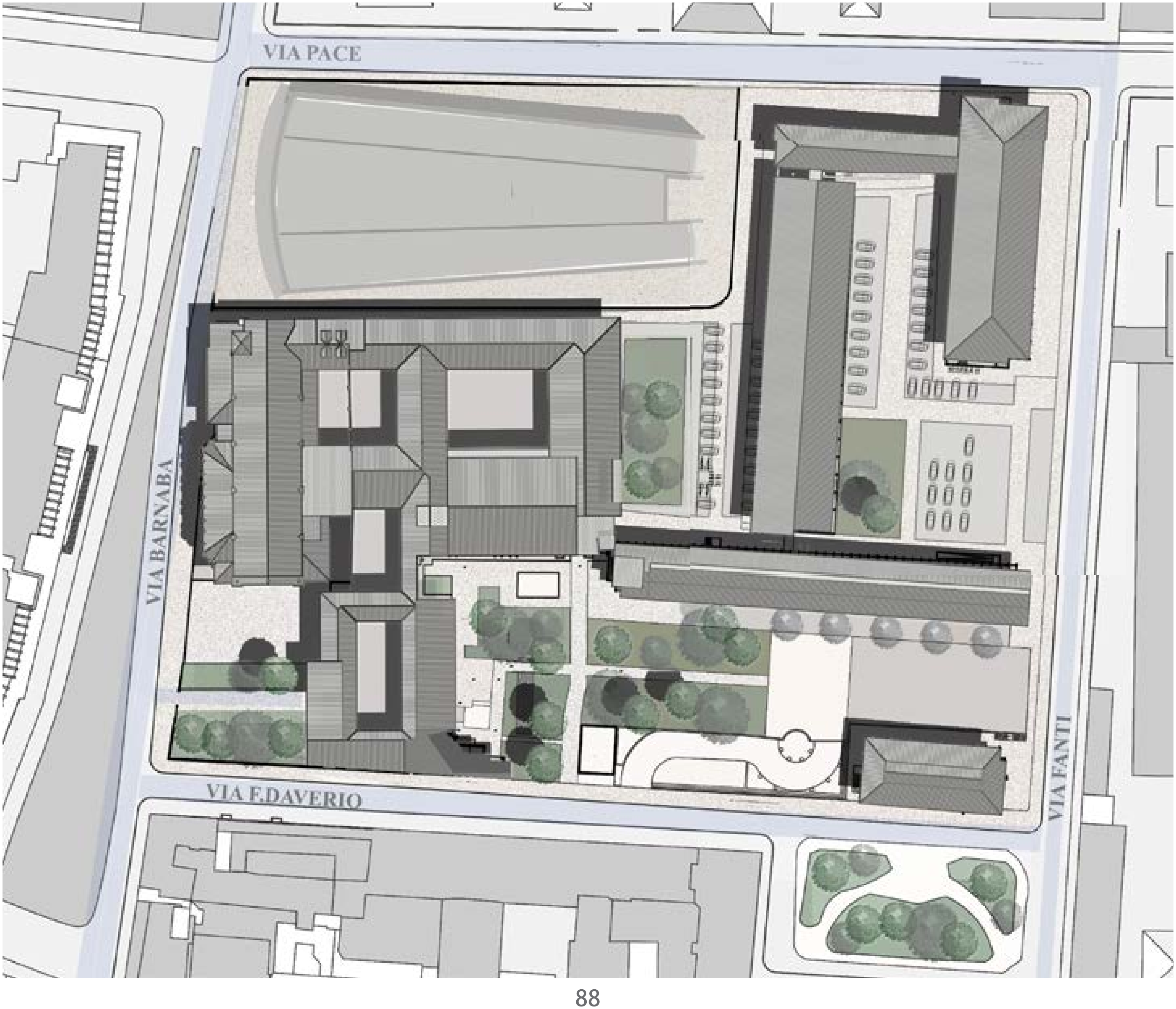
Current Situation

New Proposal

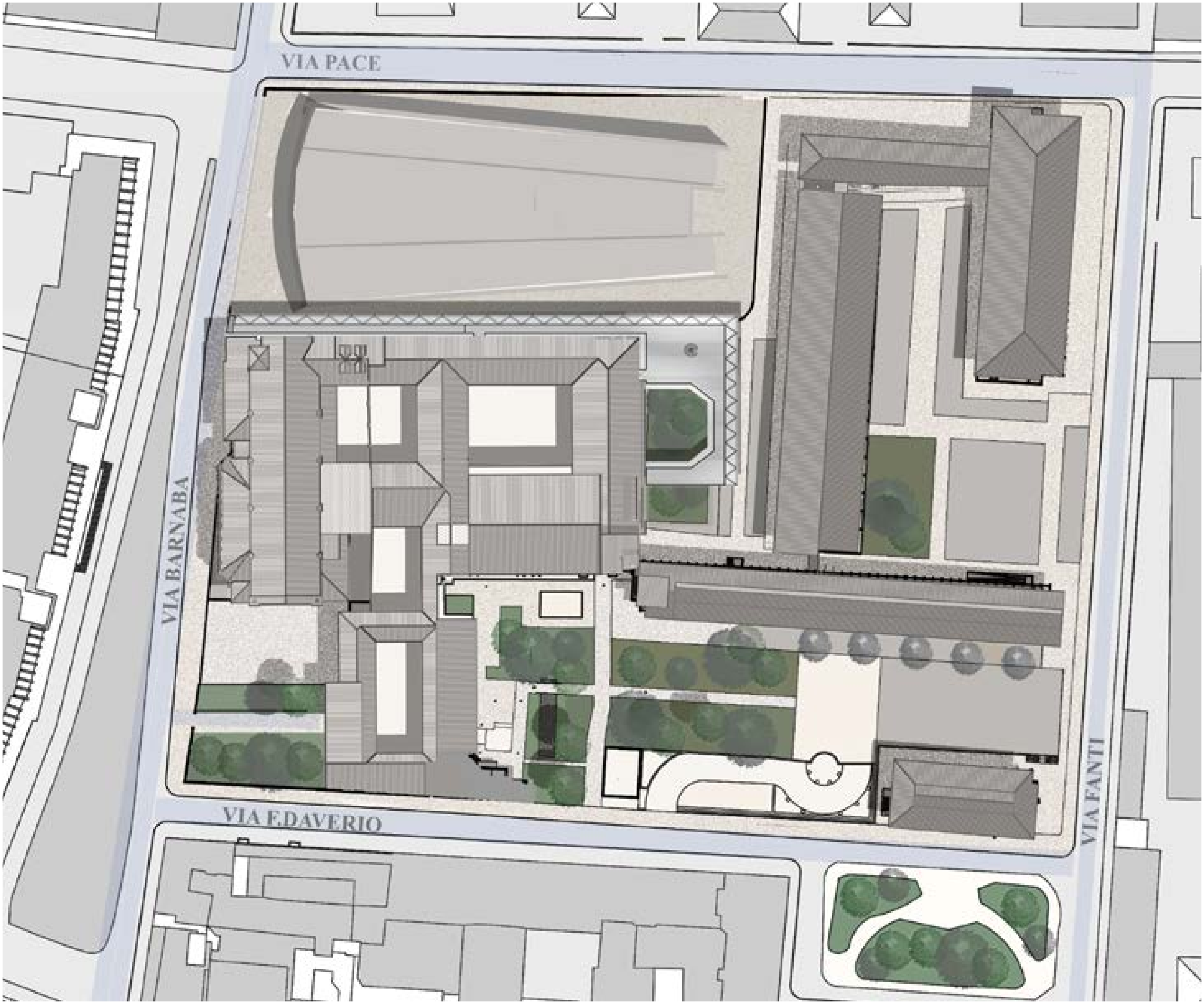


02.2
SITE PLAN

CURRENT SITUATION



NEW PROPOSAL



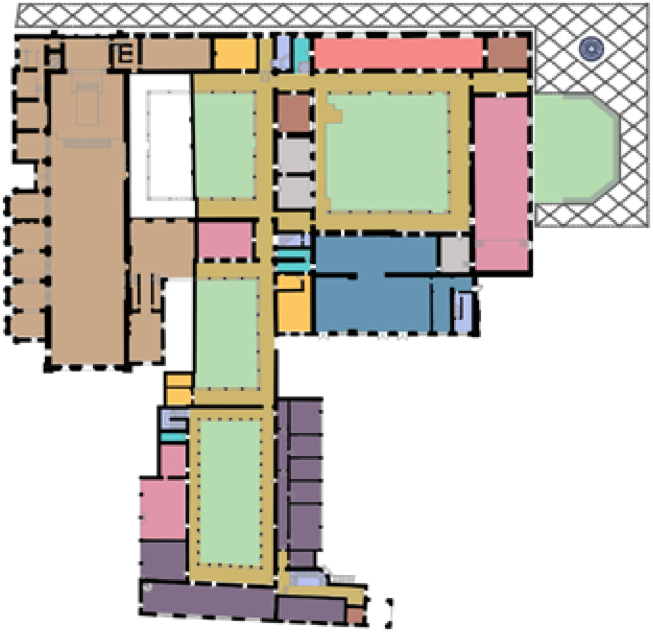
02.2
SITE SURVEY
FUNCTION DIAGRAMS

GROUND FLOOR

Current Situation

- Cloisters
- Church- Santa Maria della Pace
- Corridor
- Cores
- Offices/ Administration
- Event Halls
- Waiting Areas
- Retaurant
- Security- Information Points
- Storage- Technical Area
- Bathrooms

New Proposal



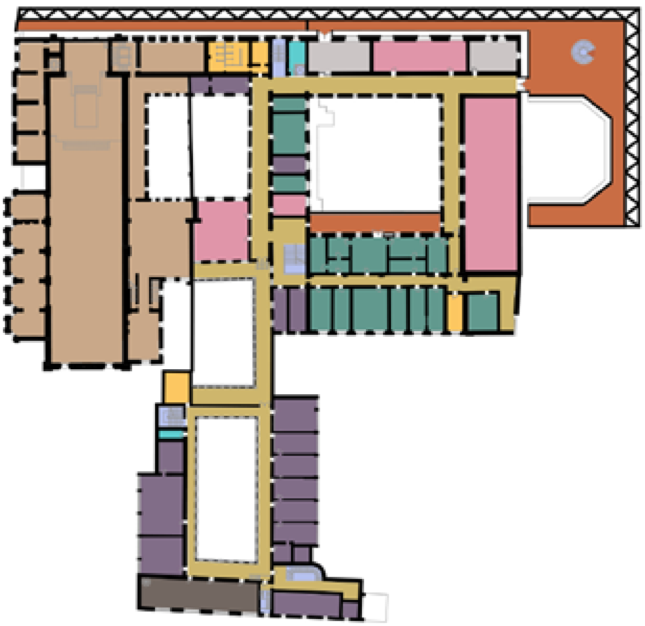
- **Cloisters**
- Church- Santa Maria della Pace
- **Corridor**
- **Cores**
- Offices/ Administration
- **Event Halls**
- **Waiting Areas**
- **Retaurant**
- **Security- Information Points**
- **Exhibition Space**
- Storage- Technical Area
- Bathrooms

FIRST FLOOR

Current Situation

- Terrace
- Church- Santa Maria della Pace
- Corridor
- Cores
- Offices/ Administration
- Event Halls
- Waiting Areas
- Classrooms
- Library
- Storage- Technical Area
- Bathrooms

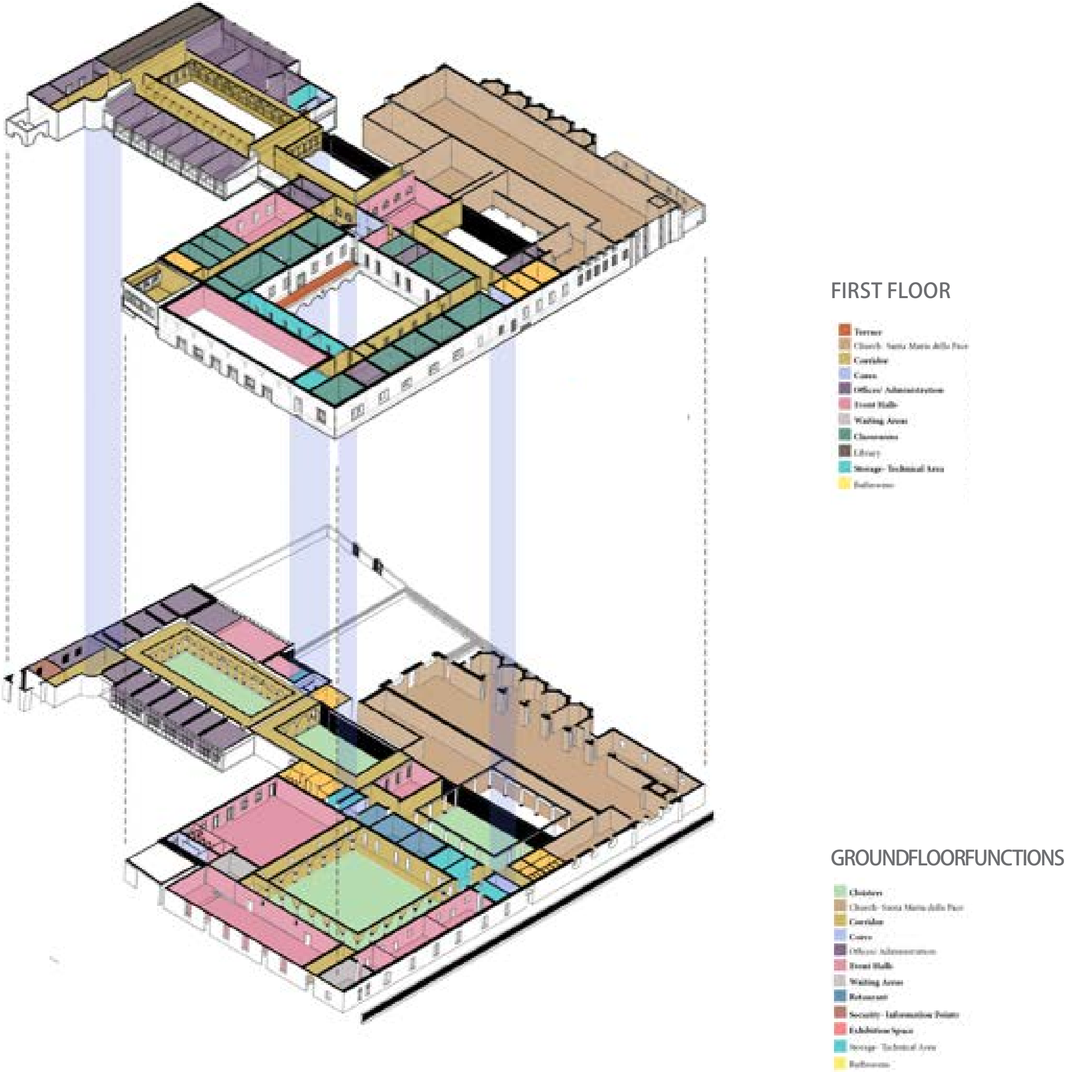
New Proposal



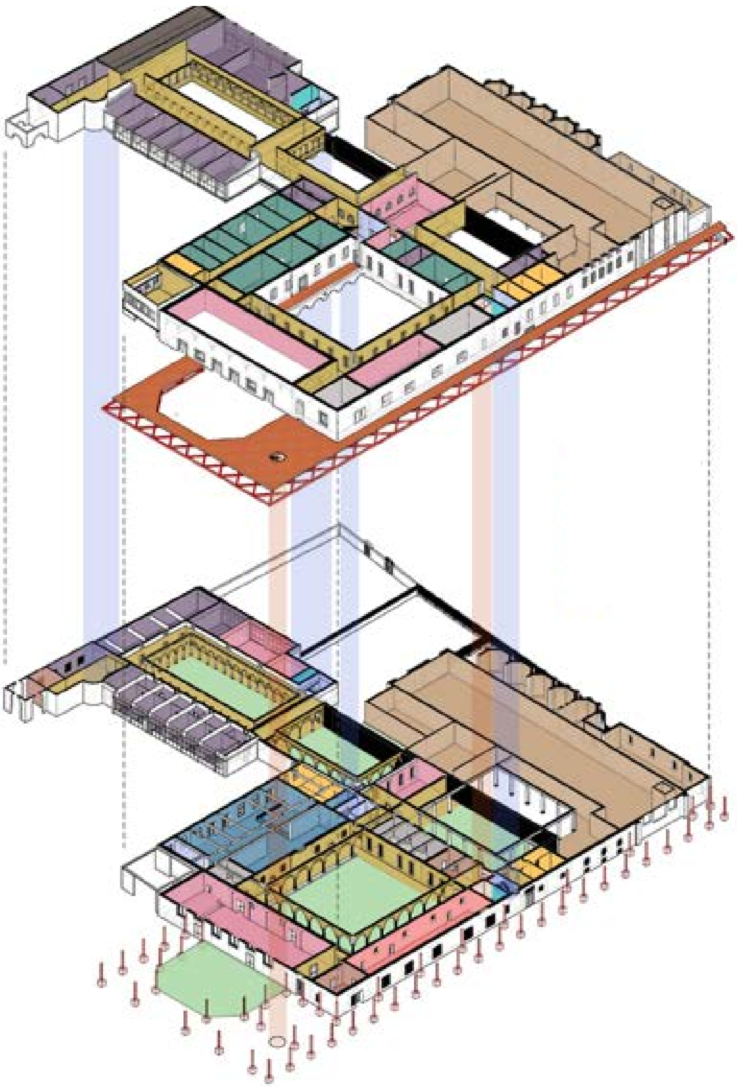
- **Terrace**
- Church- Santa Maria della Pace
- **Corridor**
- **Cores**
- **Offices/ Administration**
- **Event Halls**
- **Waiting Areas**
- **Classrooms**
- Library
- **Storage- Technical Area**
- Bathrooms

02.2
SITE SURVEY
FUNCTION AXONOMETRIC DIAGRAMS

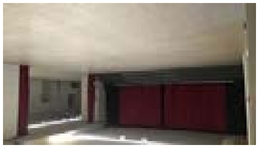
Current Situation



New Proposal



AUDITORIUM



300
Maximum

Capacity for Setting Up

Stalls	Desks				Dinner
150	120	80	60	300	120

Area(sqm): 386
Height(mt.): 4.30
Fixed Stage:9.10 x 6.44
Natural Light: Yes

FRESCOHALL

300
Maximum

Capacity for Setting Up

Stalls	Desks				Dinner
250	180	200	170	300	180

Area(sqm): 325
Height(mt.): 8.50
Fixed Stage:9.10 x 5.80
Natural Light: Yes

FACCHINETTI HALL

140
Maximum

Capacity for Setting Up

Stalls	Desks				Dinner
110	70	50	45	140	70

Area(sqm): 132
Height(mt.): 4.30
Fixed Stage:5.50 x 3.80
Natural Light: Yes

CINEMAHALL

50
Maximum

Capacity for Setting Up

Stalls	Desks				Dinner
50	40	30	25	50	40

Area(sqm): 57
Height(mt.): 3.40
Fixed Stage: No
Natural Light: Yes

In the heart of Milan, inside a 15th-century convent with timeless cloisters and gardens, event halls are waiting to be discovered, full of charm and mystery.

The Salone degli Affreschi, a refectory of the ancient convent, in which you can admire a splendid fresco from the first half of the 16th century, meticulously restored about thirty years ago, is the largest room in the location with its 300 square meters. Equipped with sound and lighting systems, it is an ideal setting for both meetings and conferences and elegant gala dinners.

The Salone degli Affreschi overlooks the charming Chiostro dei Pesci, which, thanks to the large porch, can be used in any season. All the rooms, even the smallest, are equipped, on request, with technical equipment and overlook one of the four splendid cloisters. A large garden with an orchard crossed by a marble avenue and characterized by small ornamental pools becomes an original alternative for exhibitions or fashion shows.

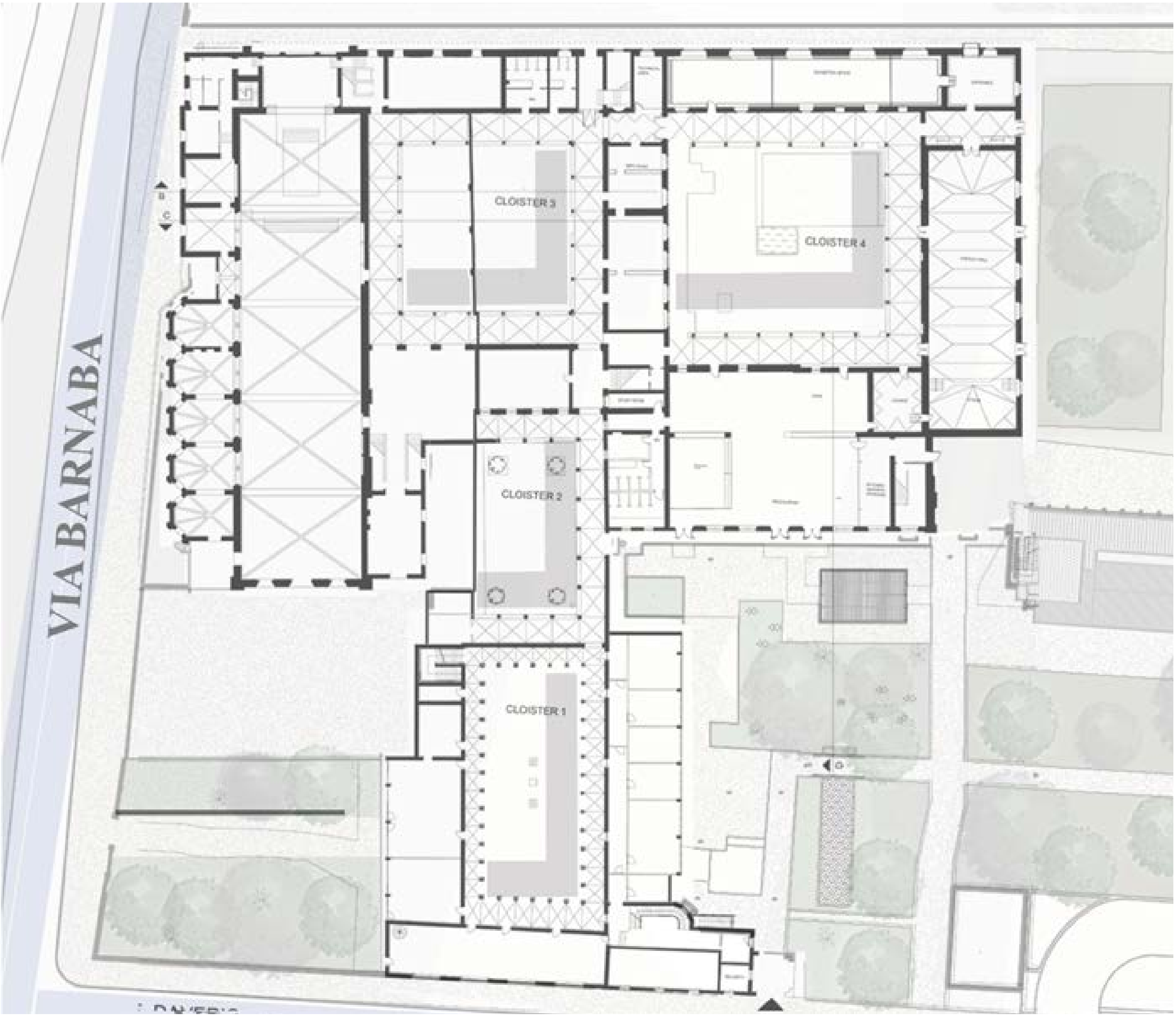
Current situation	**Area(m^2)**
Ground floor	
library	152
Offices	158
Restaurant	98
Meeting rooms	196
Event Halls	913
Storage	37

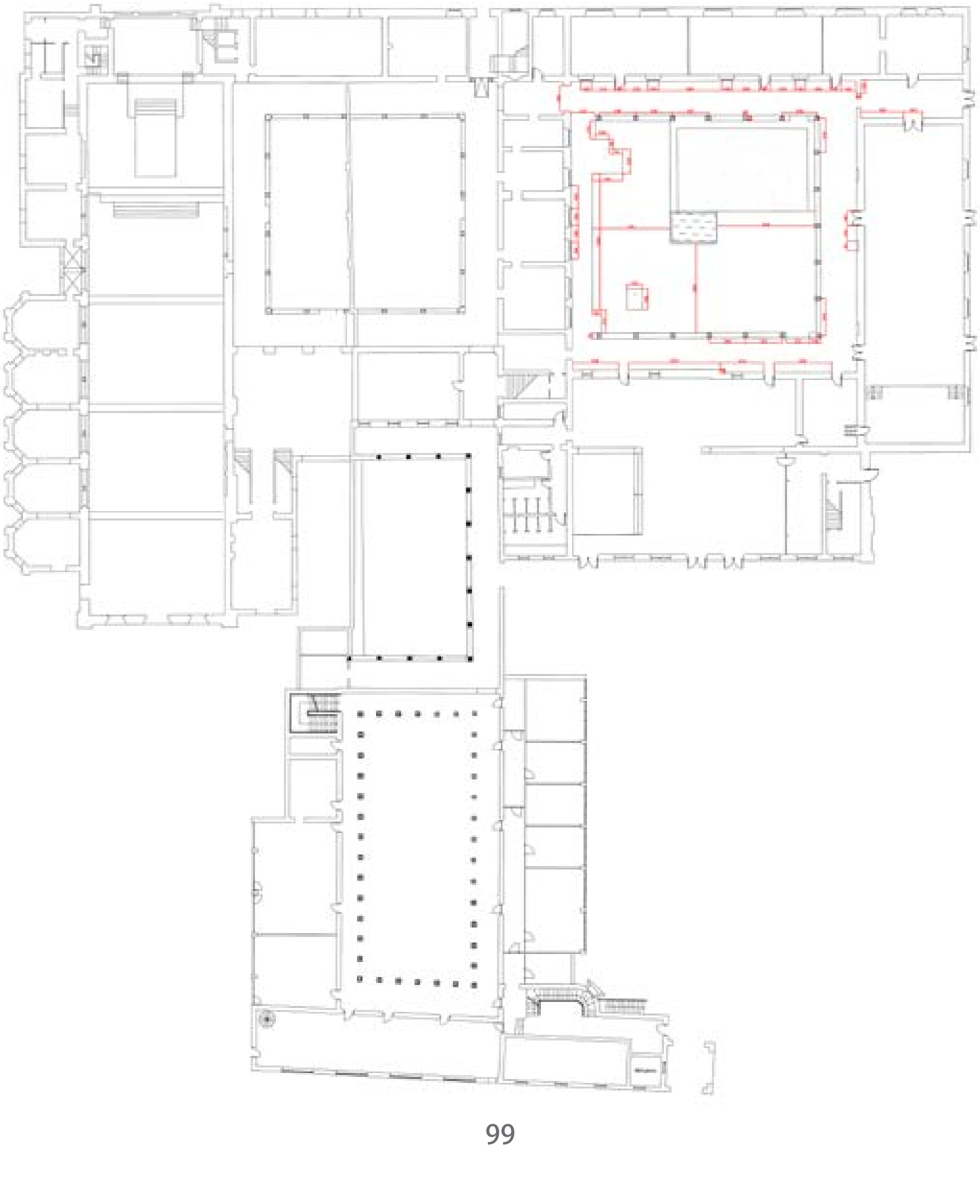
Design proposal	**Area(m^2)**
Ground floor	
Library	152
Offices	158
Café & Restaurant	455
Exhibition space	168
Event halls	343
Meeting rooms	196
Info point	77

Current situation	**Area(m^2)**
First floor	
Library	152
Classrooms	478
Event Halls	489
Offices	561

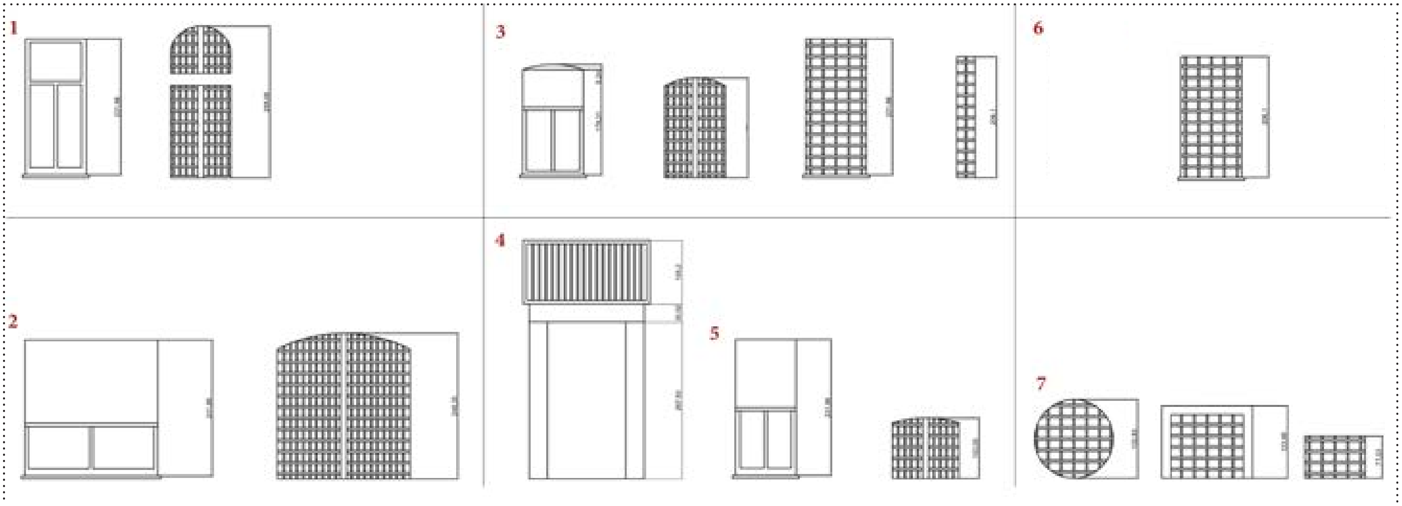
Design proposal	**Area(m^2)**
First floor	
Library	152
Classrooms	408
Event Halls	394
Offices	461
Public meeting Room	155
lounge	54

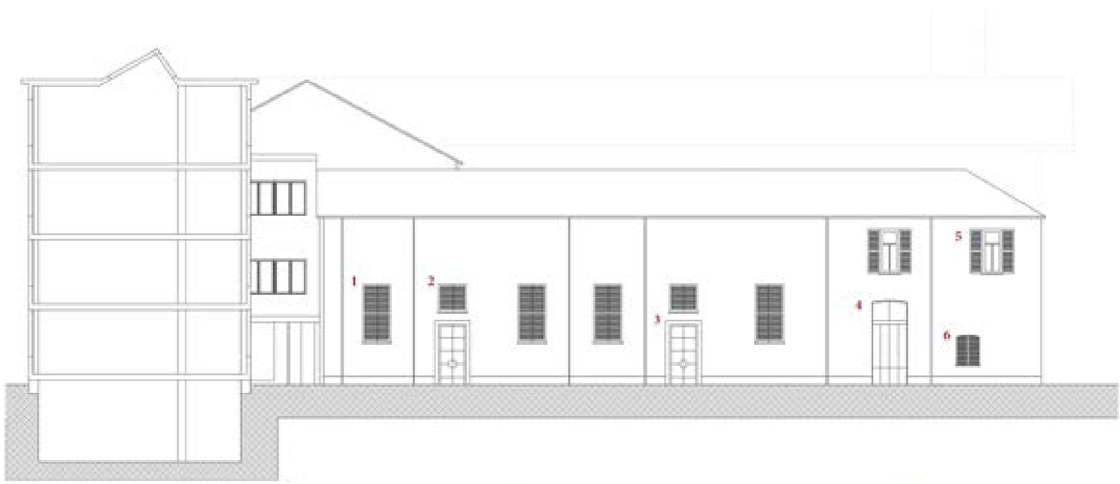
03.
CONSERVATION AND TRANSFORMATION


VIA BARNABA
CLOISTER 3
CLOISTER 4
CLOISTER 2
CLOISTER 1



03.1
MEASURE SURVEY

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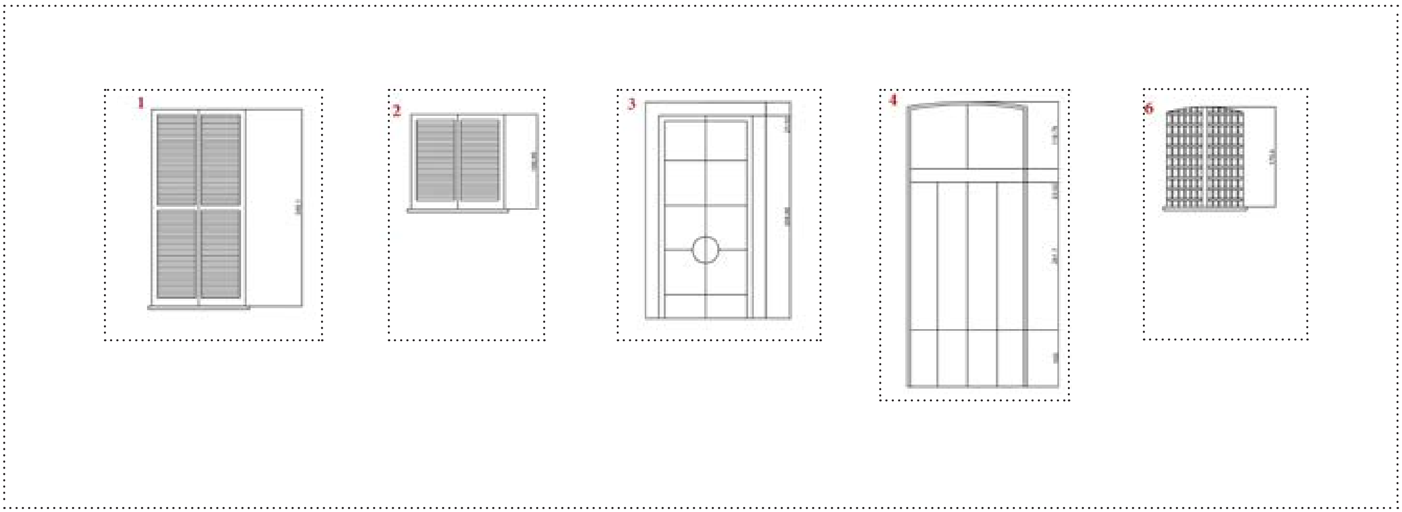
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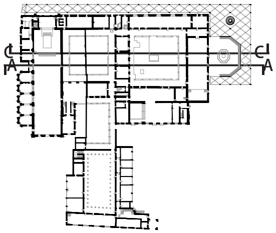
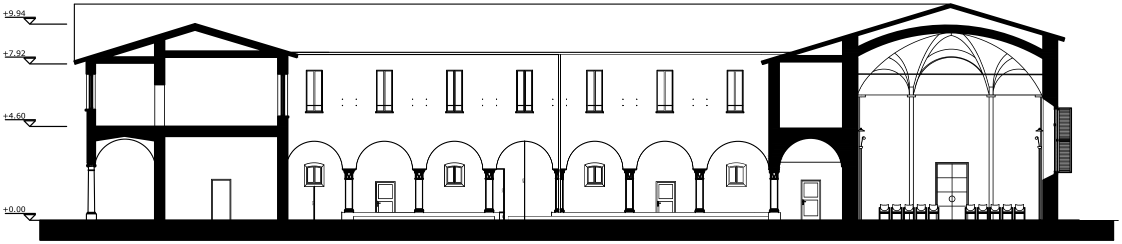
03.1
MEASURE SURVEY





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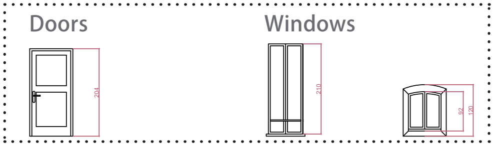
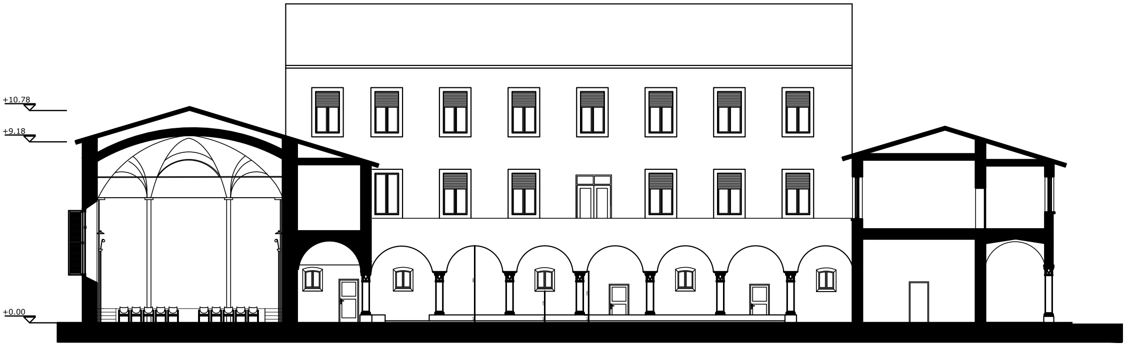
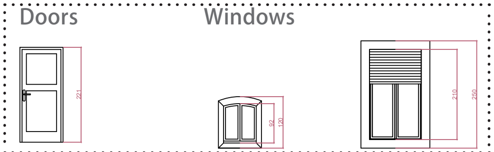
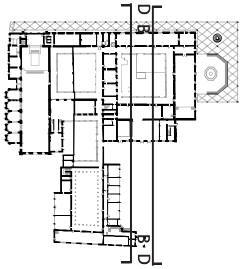
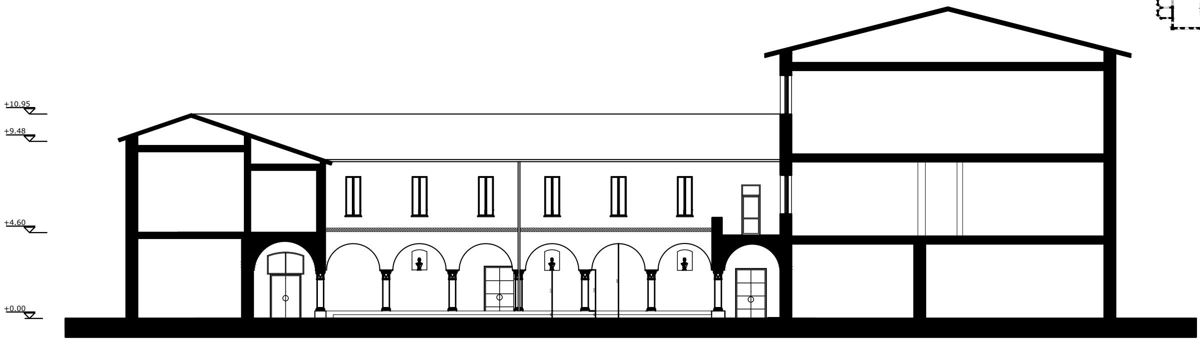




CC Section







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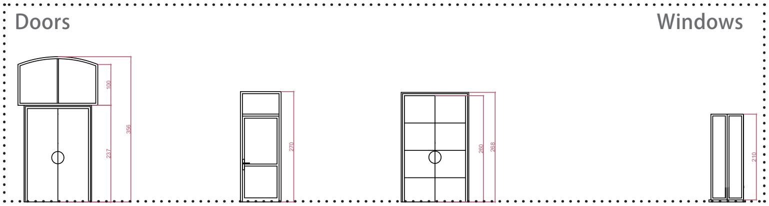
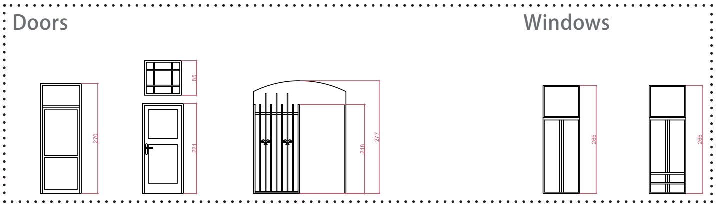


DD Section

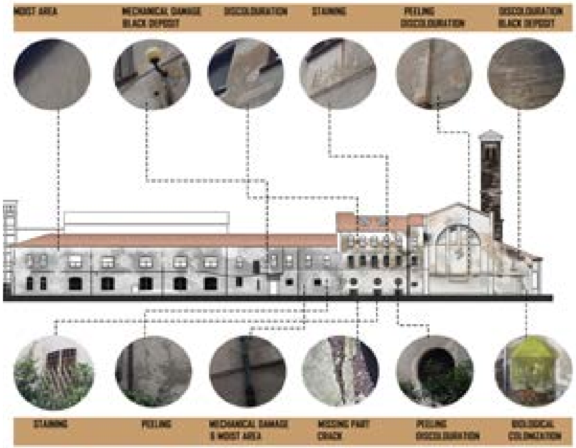


05.2 MATERIAL SURVEY AND MAPPING

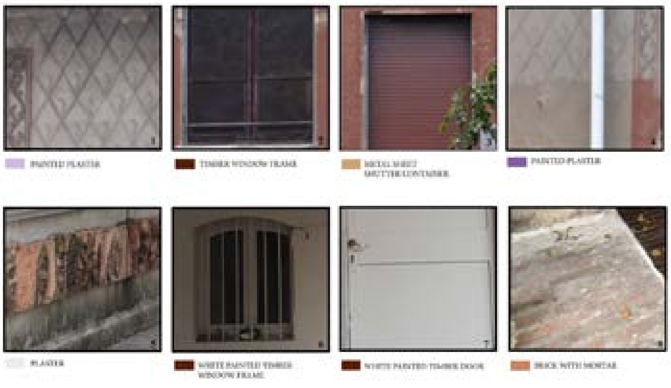
PHOTOGRAPHIC SURVEY

MATERIAL
NORTH-EAST ELEVATION

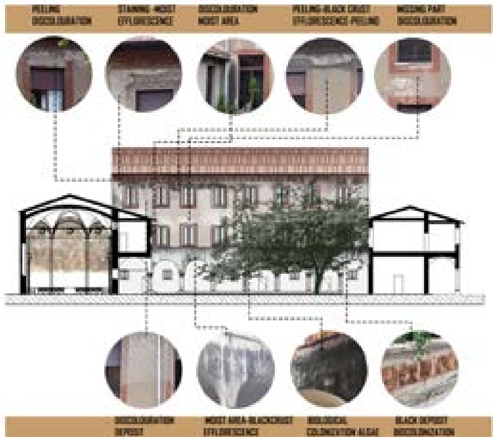
DETERIORATION
NORTH-EAST ELEVATION



F-F SECTION (WEST FACADE)



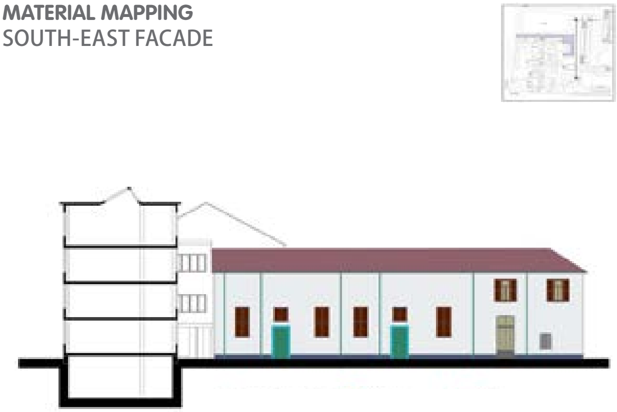
F-F SECTION (WEST FACADE)



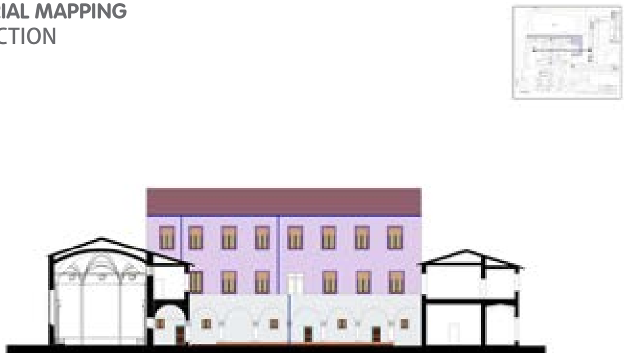
MATERIAL MAPPING

MATERIAL MAPPING
NORTH-EAST FACADE

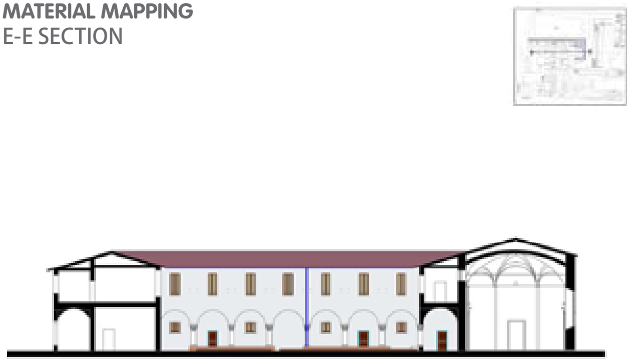
MATERIAL MAPPING
SOUTH-EAST FACADE



MATERIAL MAPPING
F-F SECTION

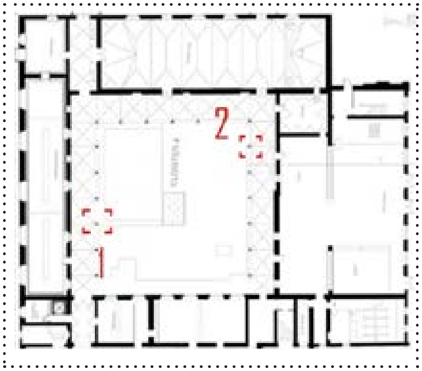


MATERIAL MAPPING
E-E SECTION



03.1 MATERIAL SURVEY AND MAPPING

Columns: Decay

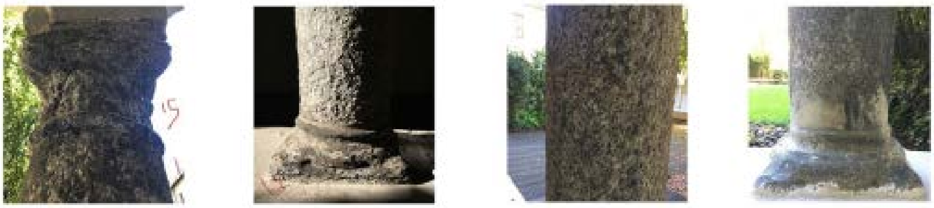


DEPOSIT

SUBFLORESCENCE & SCAILING

The most affected columns

EROSION & ROUNDING



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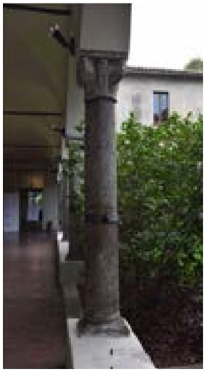
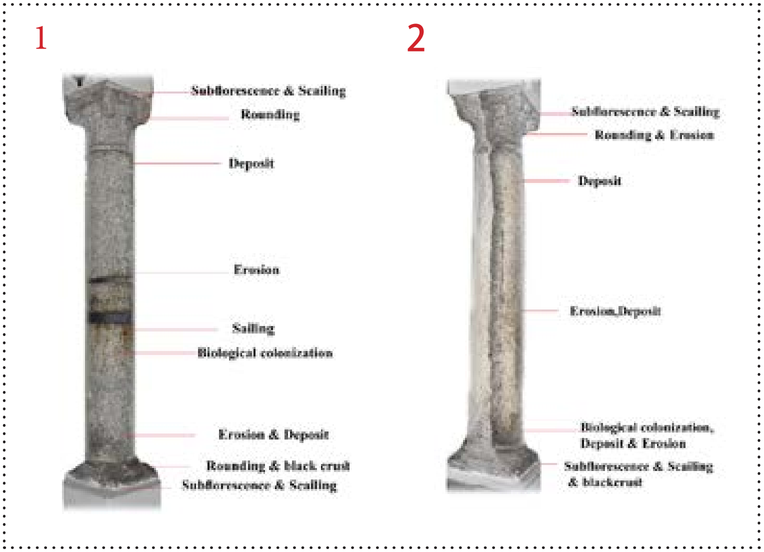


2

SAILING

Columns: Decay



Diagnosis:

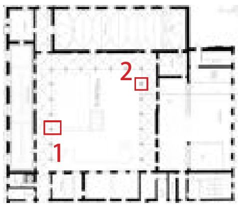
- Sub florescence- Scaling- Rounding- Deposit-Sailing- Biological Colonization - Lichen

Consolidation:

- Current stone consolidants, such as ethylsilicates, acrylic, and epoxy resins have distinct performances.
-The ethyl silicate modified with a methyl-phenyl resin (SM) is more stable under moist conditions.

Cleaning:

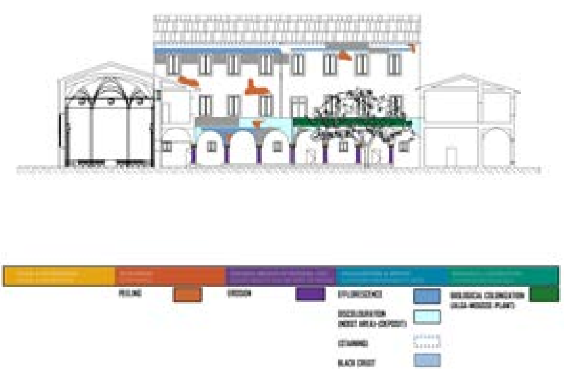
ultrasonic cleaning, laser cleaning, heat lances, sulfate-reducing bacteria, oil-consuming bacteria and etc.
- The columns should be protected through water-repellent treatments, anti-graffiti coating, antifouling treatments and transparent treatments that should slow down the deterioration processes, by reducing the surface contact with water.



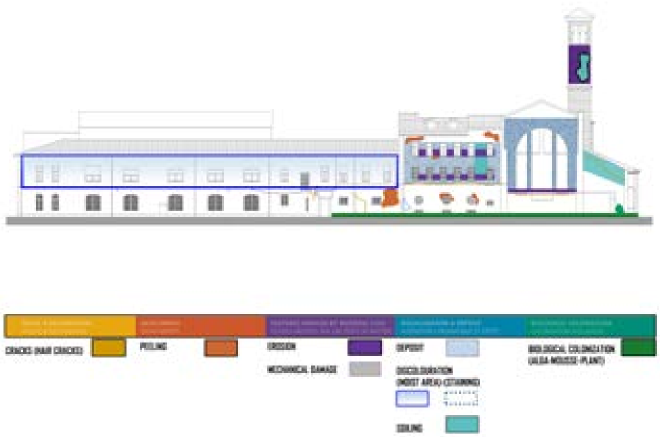
03.2 Deterioration mapping

ICOMOS GLOSSARY

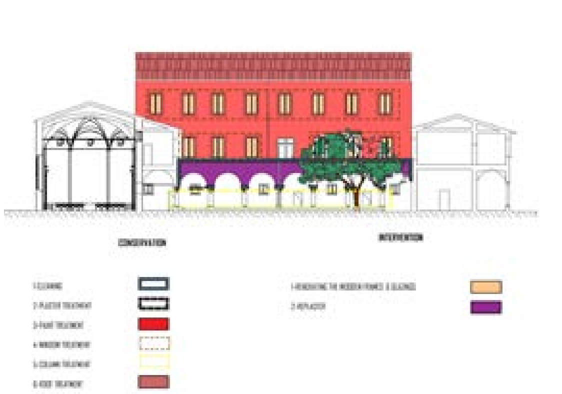
FF SECTION
WEST FACADE



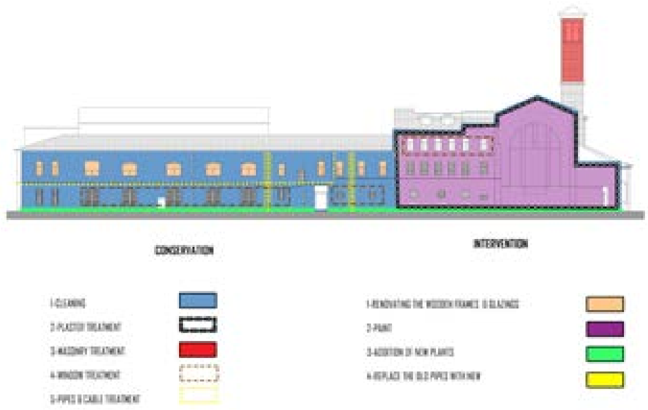
BB SECTION
NORTH-EAST FACADE



Conservation project_Interventions on the existing
CONSERVATION/INTERVENTION



Conservation project_Interventions on the existing
CONSERVATION/INTERVENTION



03.2
Conservation intervention

METHODS TO BE APPLIED

DISCOLOURATION TREATMENT
TREATMENT OF DEPOSIT & MOIST AREAS
PLASTER TREATMENT

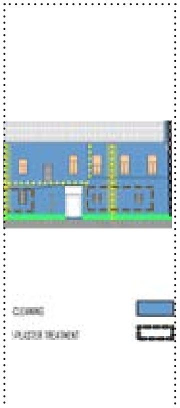
presence of moisture on the upper side of the facade, due to the fact that the roof overhang covers & not letting it dry properly.

INTERVENTIONS

The part with a vast number of cracks the layer may be removed, and that particular part of the surface may be replastered.
- The surface must be brushed, and the existing layout of the paint must be removed to avoid filming in the future.
- The surface must be cleaned with nebulized water to clean the surface from leftover paint and other weak attachments of the plaster.
- After all the cleaning has been done, the surface has to be painted with weatherproof paint.

PREVENTIVE MEASURES

Apply weather-resistant paints and surface finishes help in reducing the discoloration.



WINDOW TREATMENT

Frames are made of painted timber. The finishing layer of the wooden frames of the windows is affected by peeling, especially the lower parts.The windows have poor thermal performance.

BEFORE INTERVENTION

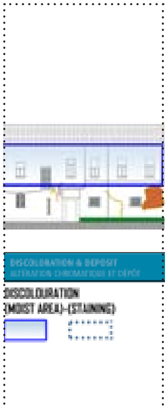
Checking if the material is in condition for reuse.Checking the possibility to improve the glass layer without having to change the window completely.

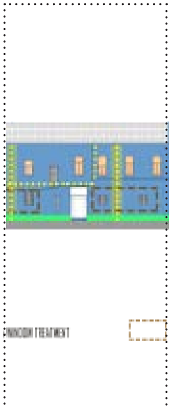
INTERVENTIONS

Brushing and removing damaged paint from the surface before treating the frame with necessary primer/paint.Weather sealant must be applied to the frame in case of energy losses.The frame should be checked for the thickness, to determine if it is wide enough to host double glass.

PREVENTIVE MEASURES

Weather-resistant primer or rot fluid may be applied to the wooden frames to avoid the problem with damp.





COLUMN TREATMENT

Columns have decay signs of:
Deposit- Subflorescence- Scaling -Rounding & Erosion

PRECONSOLIDATION

protection of those areas before the following conservative works comprising removal of deposited layers or desalting treatment.

CLEANING

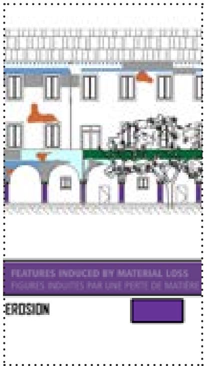
soap cleaning, bio-cleaning (for black crust), ultrasonic cleaning, laser cleaning, heat lances, sulfate-reducing bacteria, oil-consuming bacteria and etc.

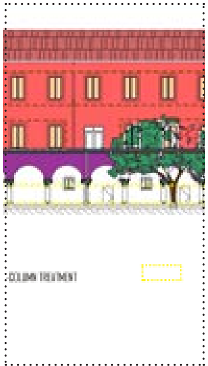
CONSOLIDATION

The ethyl silicate modified with a methyl phenyl resin (SM) is more stable undermoist conditions although it keeps a good penetration capacity.

PREVENTIVE MEASURES

Protecting columns with Water-repellent treatments, anti-graffiti coating antifouling treatments that should slow down the deterioration processes by reducing surface contact with water.





ROOF TREATMENT

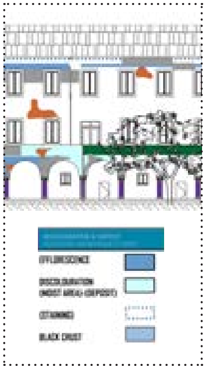
Leakages from roof overhang on the upper side of the facade,The roof overhang covers the part of the facade from the sun, not letting it dry properly.

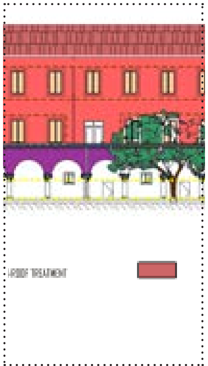
INTERVENTIONS

The condition of the gutter should be chack to continue the usage & must be checked for the cracks & leaks to be replaced or repaired.

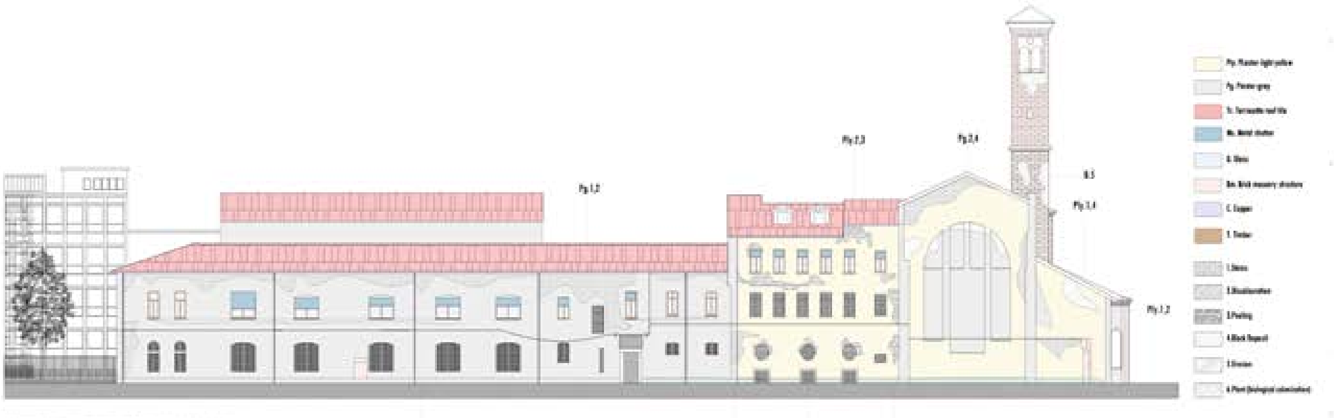
PREVENTIVE MEASURES

In case of replacing it functions better with leaks
As a result it will help to have less stains on the wall.

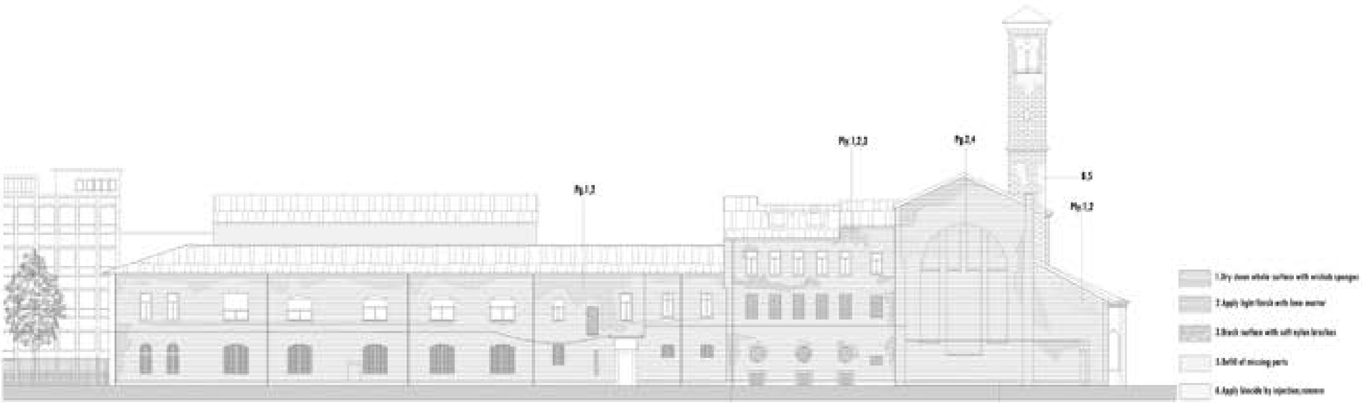




03.2 Deterioration mapping



MATERIAL AND DETERIORATION MAPPING



INTERVENTIONS

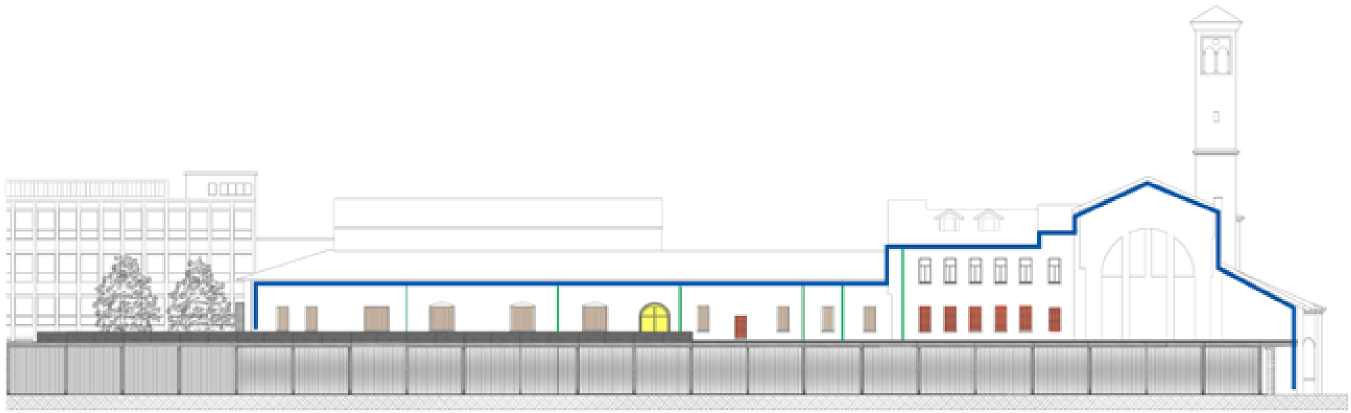
PLASTER
Stains-Discolouration-Detachment-cracks
cause: water absorbtion-Vapor condensation
Intervention:
1.General dry cleaning of wall surface using wishab sponges
2.Clean the surface from dust and dirt with brushes
3.Becareful not to damage underlying masonry structure
4.Apply light finish with lime mortar

METAL
Windows and shutters
Rust-Staining effect
Cause: Moisture
Intervention:
1-Carefully remove the shutters and substitute with new type
2-Clean the rust on metal using a dry brush
3-Use a brush to apply a layer of rust converter
4-repeat the step with two or more thin layers.

PLANTS
Algae-Lichen
Biological Colonization
Cause: Moisture-rising damp
Intervention:
1.Apply biocide by injection
2.Cut the roots by machine
3-Wash surface with clean water

BRICKS
Missing parts-Erosion
Cause: Eroded due to moisture
1-Restore mortar joints
2-Apply a natural lime mortar in successive layers
3-In more severe cases,totally replacing the elements.

WINDOWS
Damp-proofing-poor thermal performance
Cause: Moisture
1-Degreasing,brushing and removing paint from timber frames
2-Apply sealant to the frames
3-Substitute glasses with double glazed glass



RENOVATION
ELEMENT: ENTRANCE PANELS
EXISTING MATERIAL: OSB PANEL
NEW MATERIAL: POLYCARBONATE PANELS
LOCATION: NORTH-EAST ELEVATION

DUETOTHENEWADDITIONWHICHGOESTHROUGH THE ENTRANCE WE NEED TO CHANGE THE EXISTING PANELS WHICH IS THE SEPARATING ELEMNTBETWEENTHEBUILDINGANDTRIBUNALE BUILDING.

FACADE RENOVATION 1
ELEMENT: WINDOWS FRAME & SHUTTERS
EXISTING MATERIAL:TIMBER (WHITE PAINTING)
NEW MATERIAL: TIMBER (LATEX PAINT)
LOCATION: NORTH-EAST ELEVATION

BY VISUAL SURVEY WE SAW MOST OF THE WINDOWS ARE DAMAGED AND THE PAINT IS GONE AND ALSO THE GLAZINGS ARE NOT SUITABLE DUE TO THERMAL COMFORT AND THE NEW FUNCTION OF THE EXHIBITION

FACADE RENOVATION 2
ELEMENT: WALLS & RENDERINGS
EXISTING MATERIAL:PLASTER RENDER
NEW MATERIAL: PLASTER RENDER
LOCATION: NORTH-EAST ELEVATION

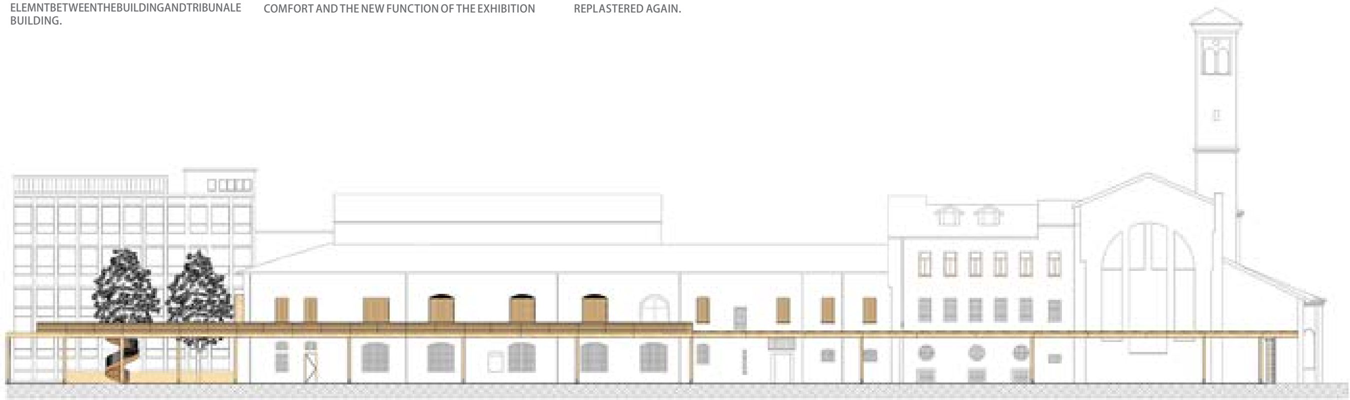
THIS FACADE IS MOSTLY BEEING EFFECTED BY MOISTURE & HAS A LOT OF DISCOLOURATION NEEDS TO BE CLEANED FIRST AND REPLASTERED AGAIN.

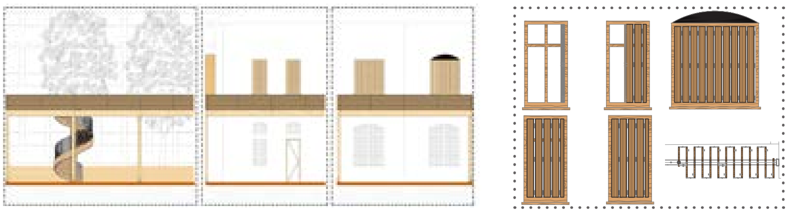
FACADE RENOVATION 3
ELEMENT: WINDOW GRILLINGS
EXISTING MATERIAL: METAL
NEW MATERIAL: PLASTER RENDER
LOCATION: NORTH-EAST ELEVATION

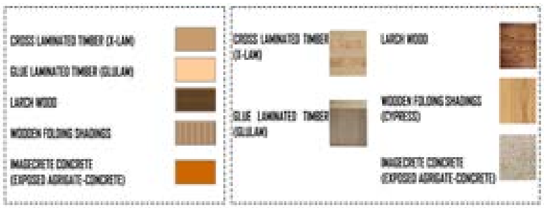
THE MAJOR PROBLEM FOR GRILLINGS IS STAINING SO WE WIL CLEAN THEM AND CHANGE THE DAMAGED ONES.

DEMOLITION
ELEMENT: WINDOW
NEW ELEMENT: DOOR
NEW MATERIAL :TIMBER
LOCATION: NORTH-EAST ELEVATION

ENTRANCE FOR THE EXHIBITION AND FOR THE TERRACE.





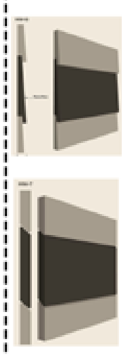


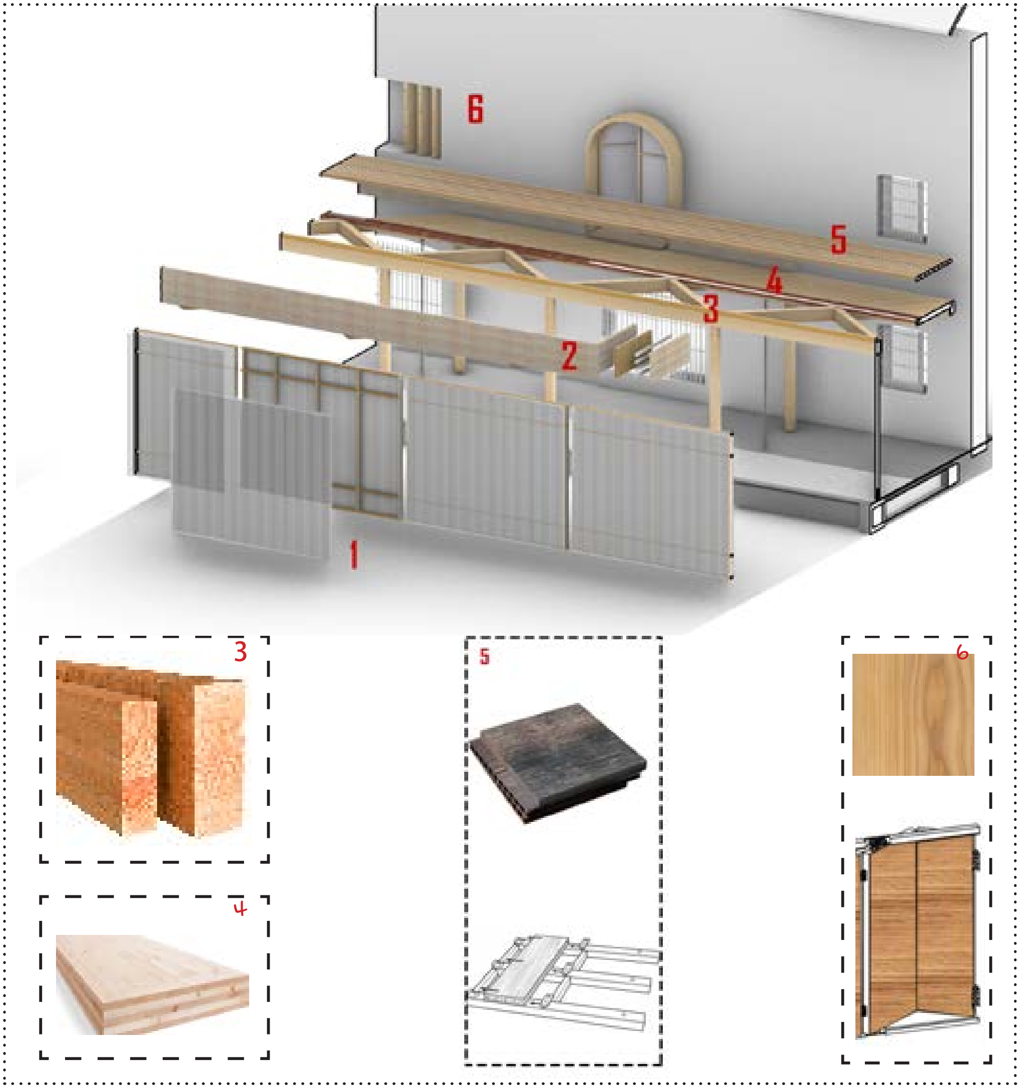
03.2
Material producers

ELEMENT	MATERIAL	PRODUCER
1-WALL PANELS	POLYCARBONATE	RODECA
2-PARAPET CLADING EXT	SIBERIAN LARCH -MW10	MILL WORKS
PARAPET CLADING INT	SIBERIAN LARCH -MW7	MILL WORKS
3-COLUMN-BEAM	GLUE LAMINATED TIMBER	BOISE GLULAM
4-FLOOR LAYER 1	CROSS LAMINATED TIMBER	X-LAM
5-FLOOR PLANKS	WPC-PLASTIC COMPOSITE	GREENWOOD
6-WINDOW FOLDING SHUTTER	CYPRESS	SCURETTO

1

2

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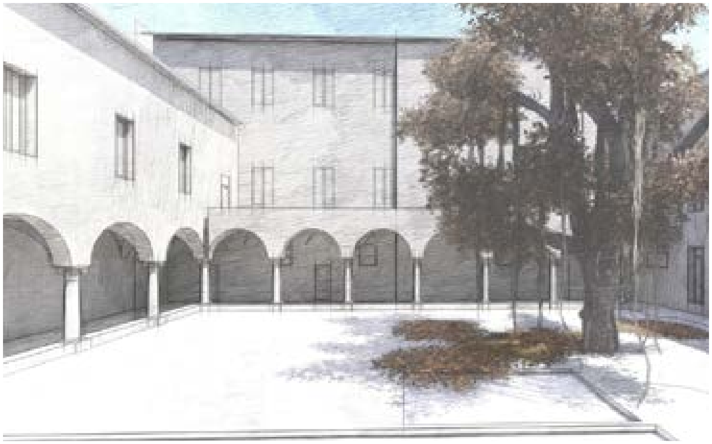
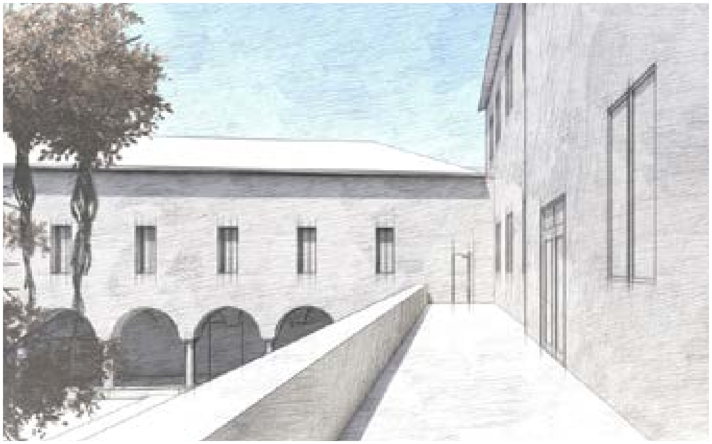
03.
STATE OF THE APROJECT

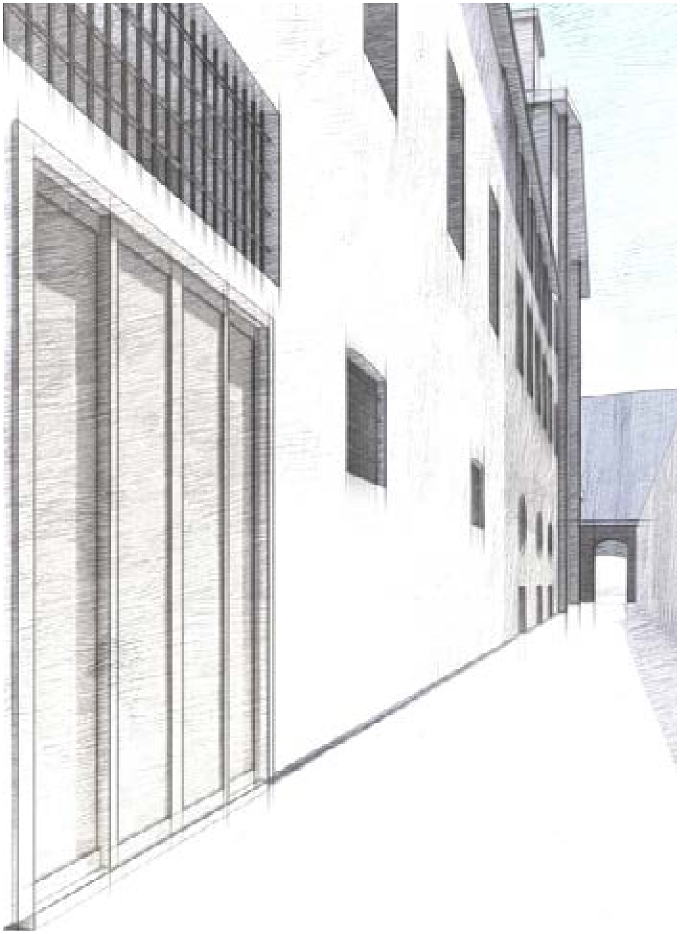
03.3
STATE OF THE PROJECT
THE CURRENT SITUATION



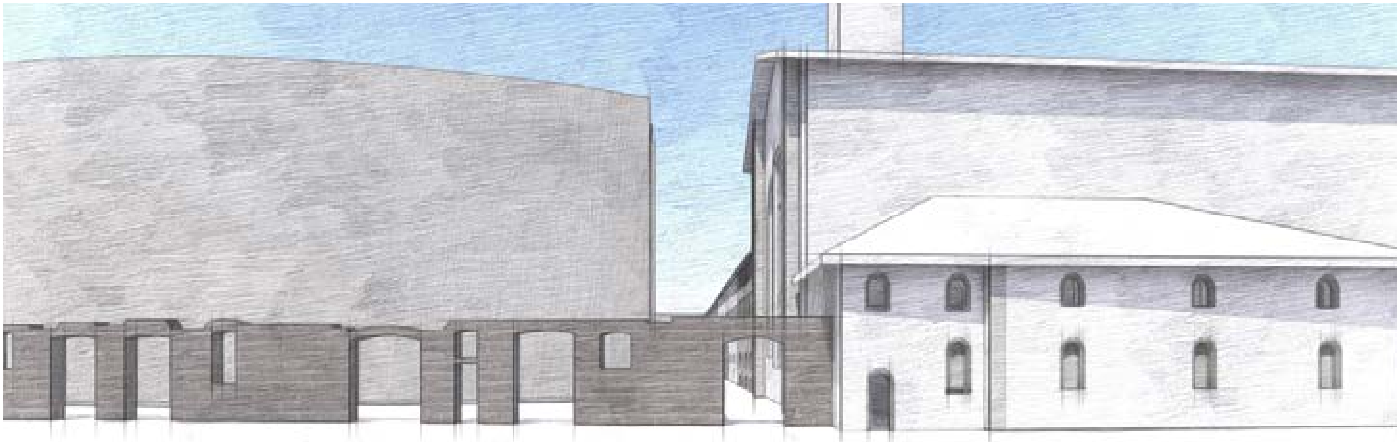
Cloister of Fish



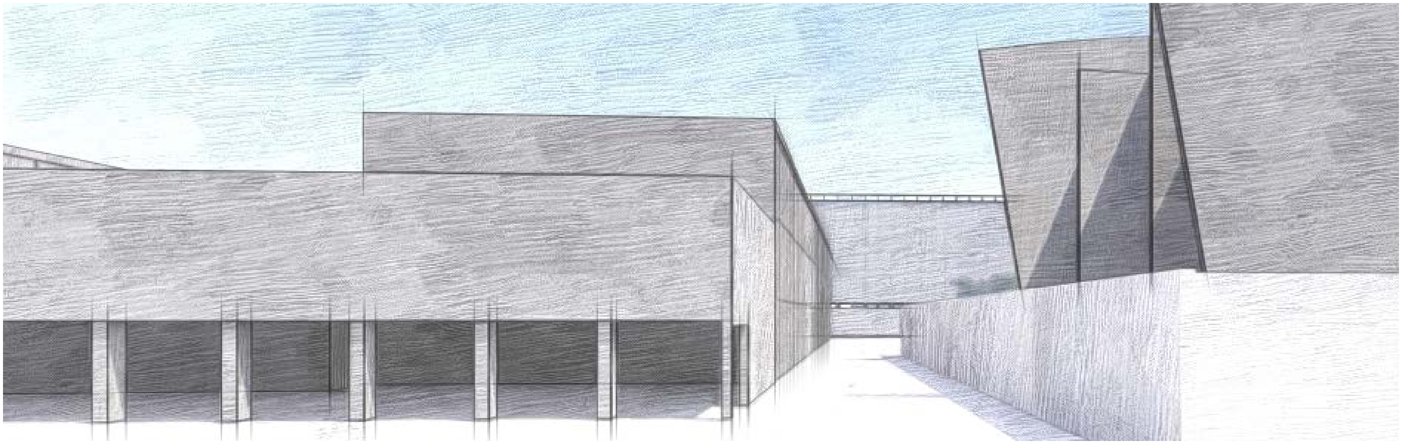
Existing Terrace



Passage to Umanitaria Blocks



Entrance from Via San Barnaba



Entrance from Via Pace

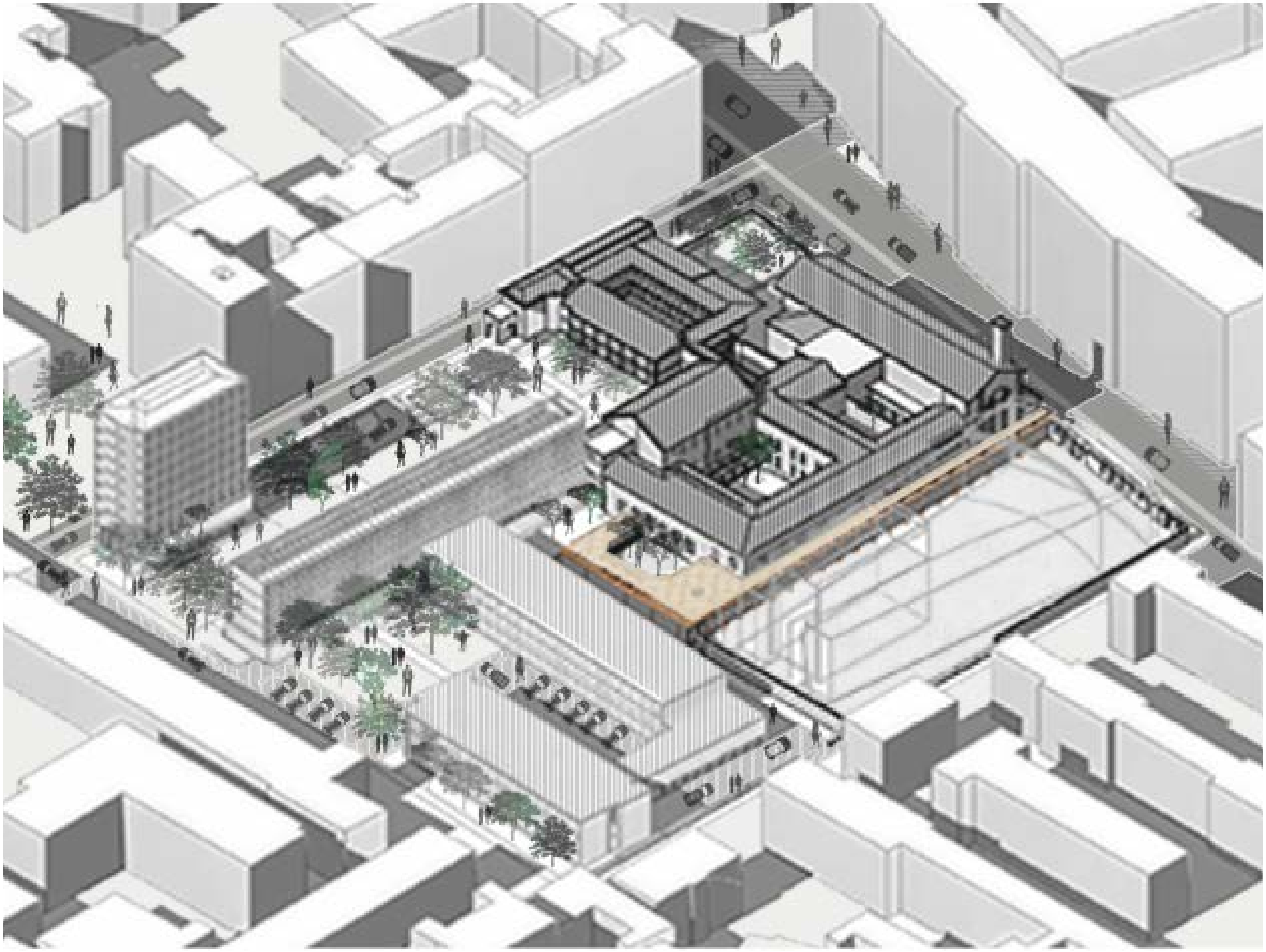
03.3
STATE OF THE PROJECT THE NEW PROPOSAL

Archive Document before the

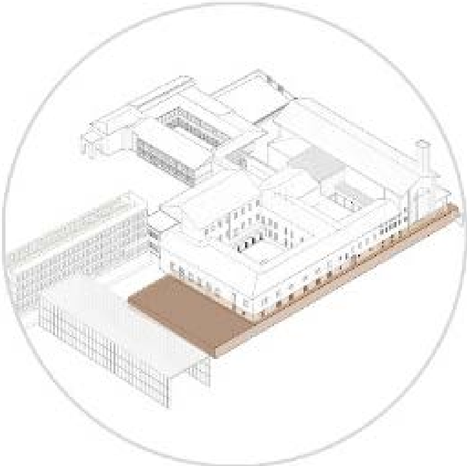
	Cloisters		Cloisters and the open green
	Demolished buildings after war		Church of Santa Maria della
	1947 Giovanni Romano' s project		

Archive Document after the

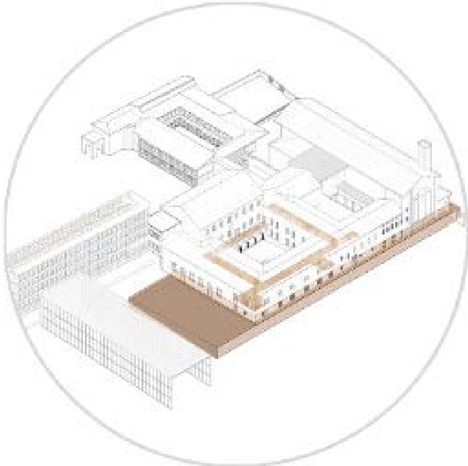
	Cloisters		Cloisters and the open green
	Demolished buildings after war		Church of Santa Maria della
	1947 Giovanni Romano' s project		New Intervention


Site view with new intervention

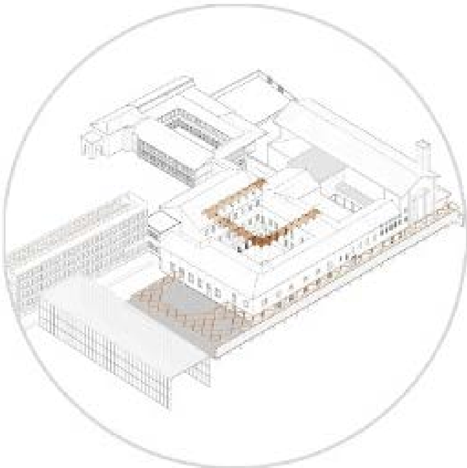
03.4
DESIGN APPROACH



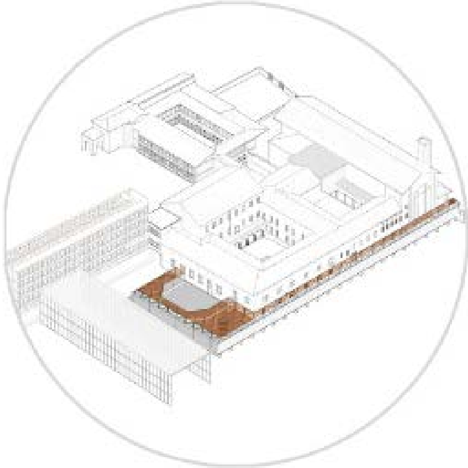
1- Connecting the Entrance with Cortile of Limetrees



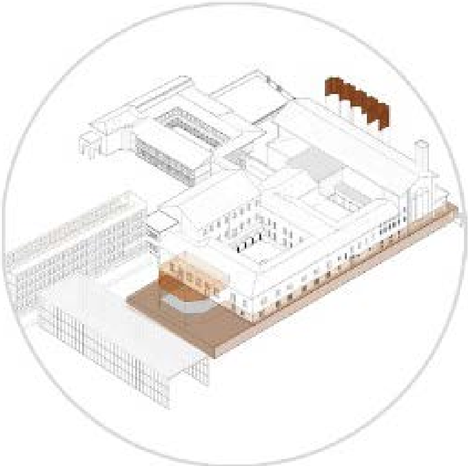
2- Extending the Interior Circulation to Exterior



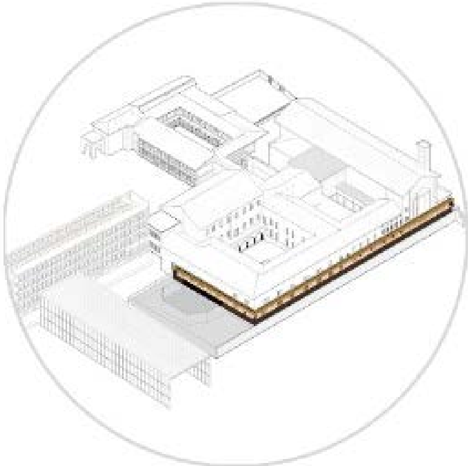
5- The Pattern Obtain from the Arc Diagonals



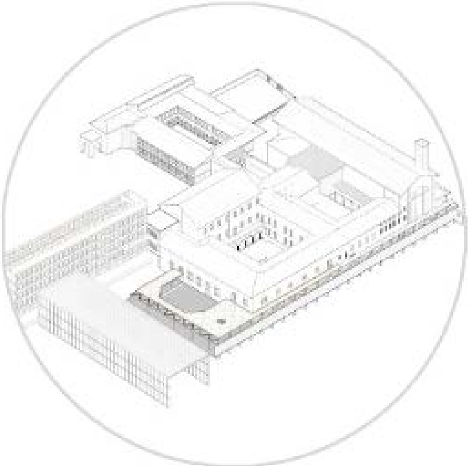
6- Putting the Flooring on the Top of the Structure



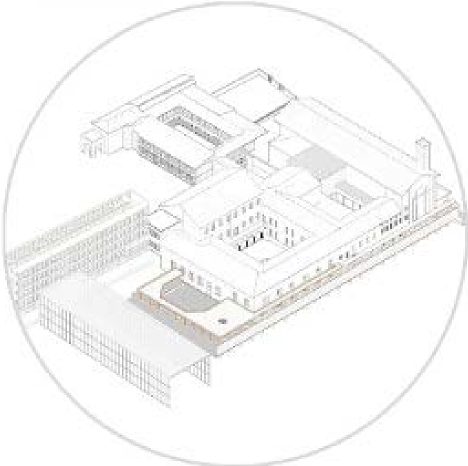
3- Using the Shape of the Transept for the Cut



4- Saving a Gap Between the Existing Building and Pavilion



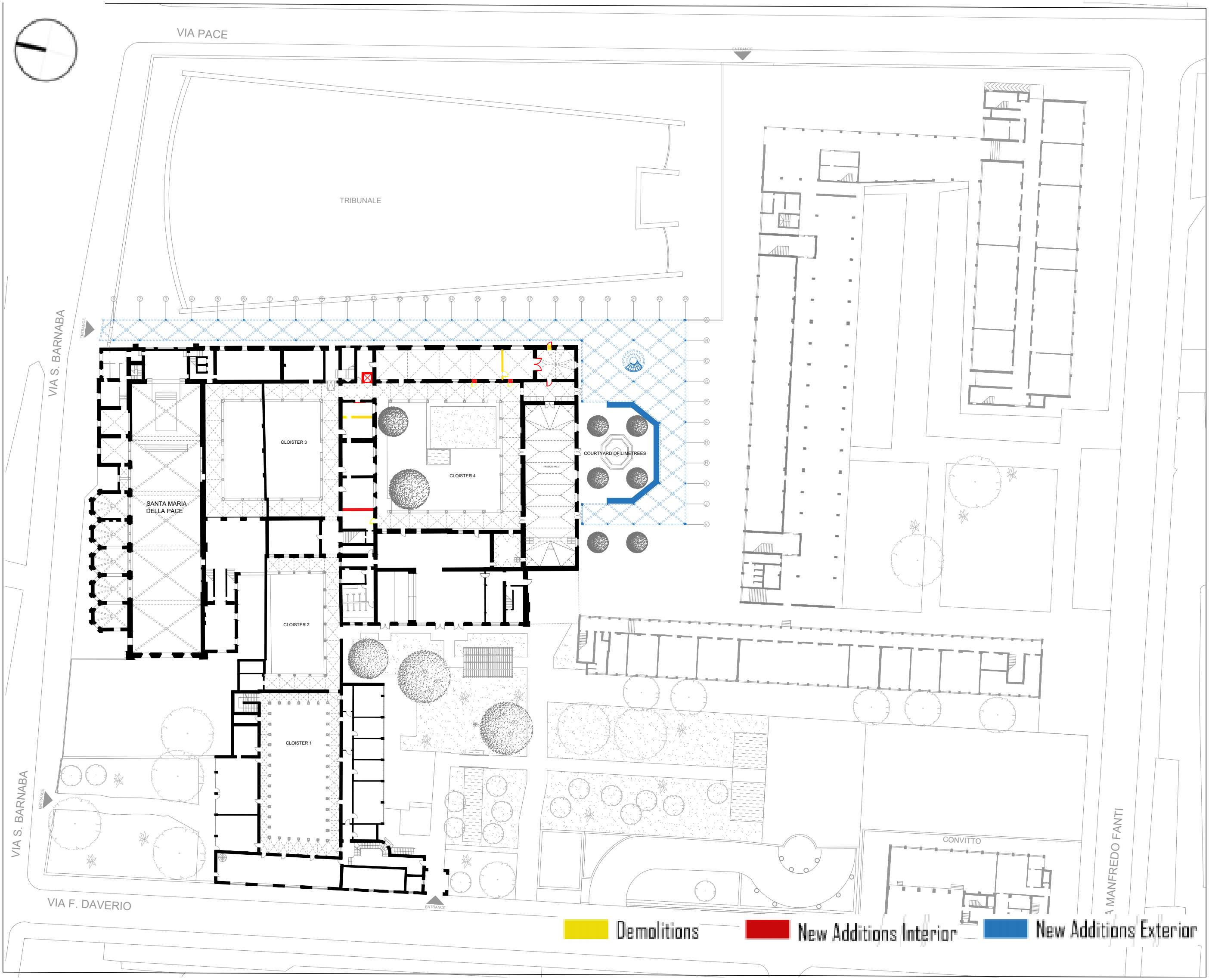
7- Seperating the Walking Area with Railings

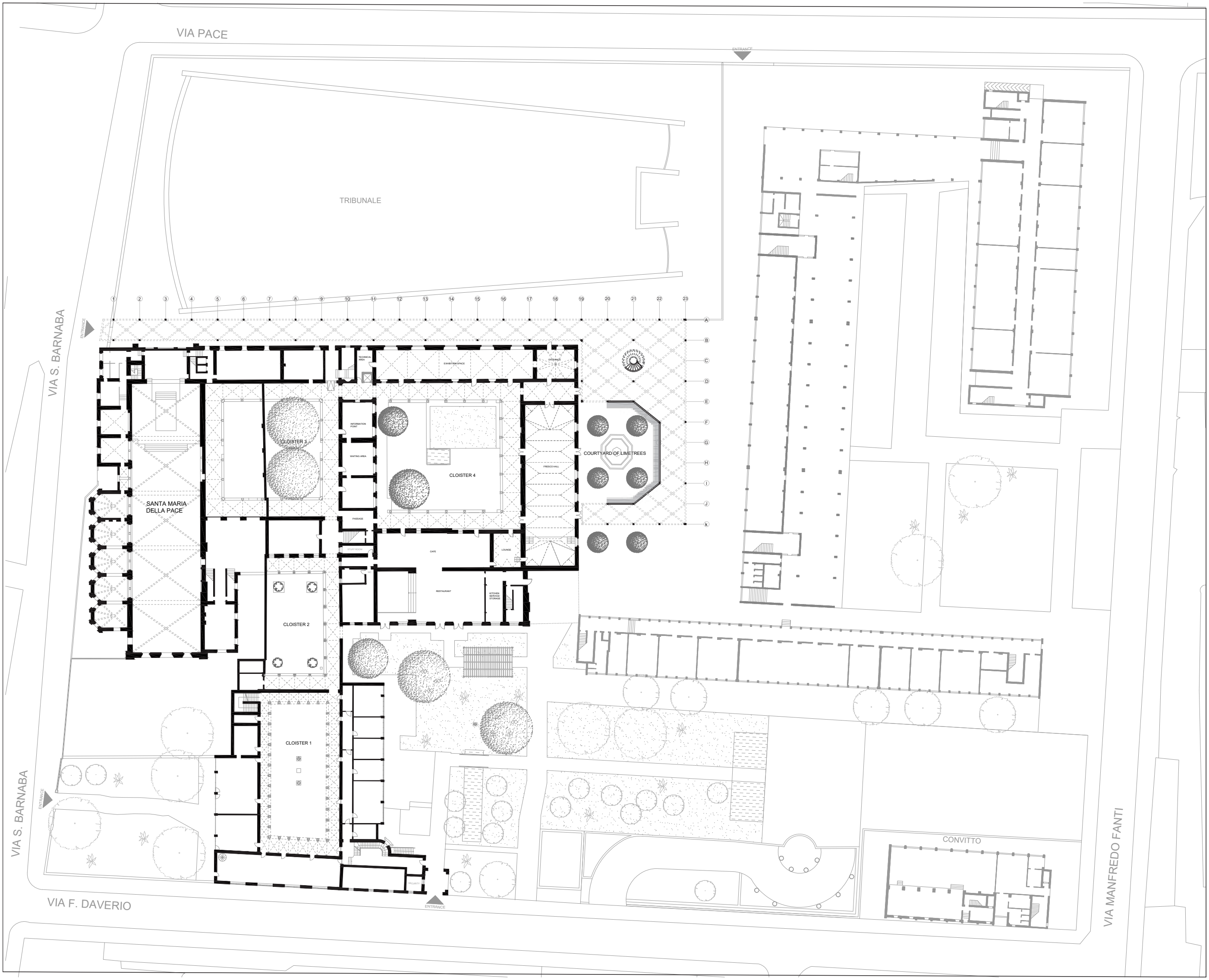


8- Pavilion and the New Wing to Umanitaria

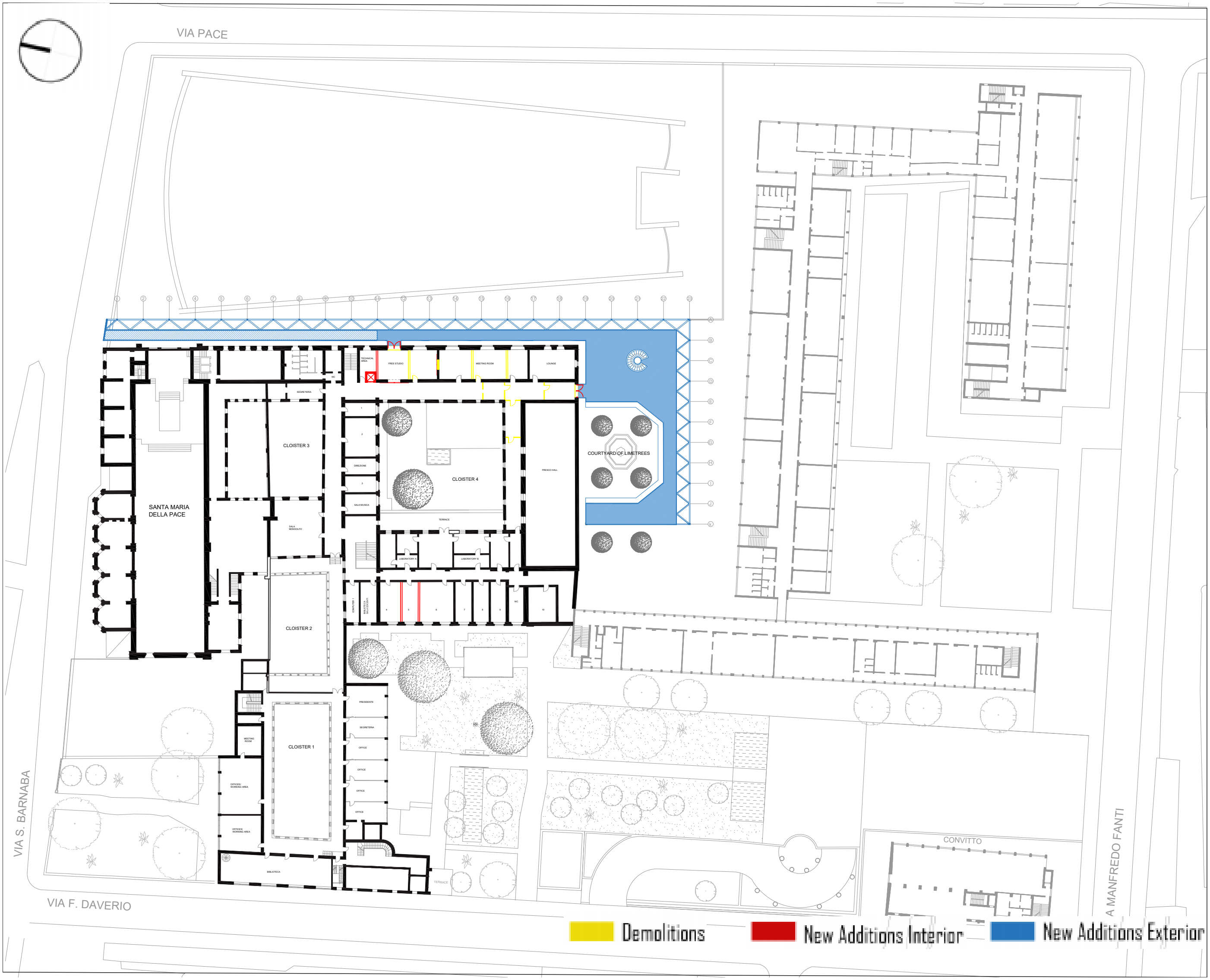
03.4
FLOOR PLANS ADDITIONS/ DEMOLITIONS

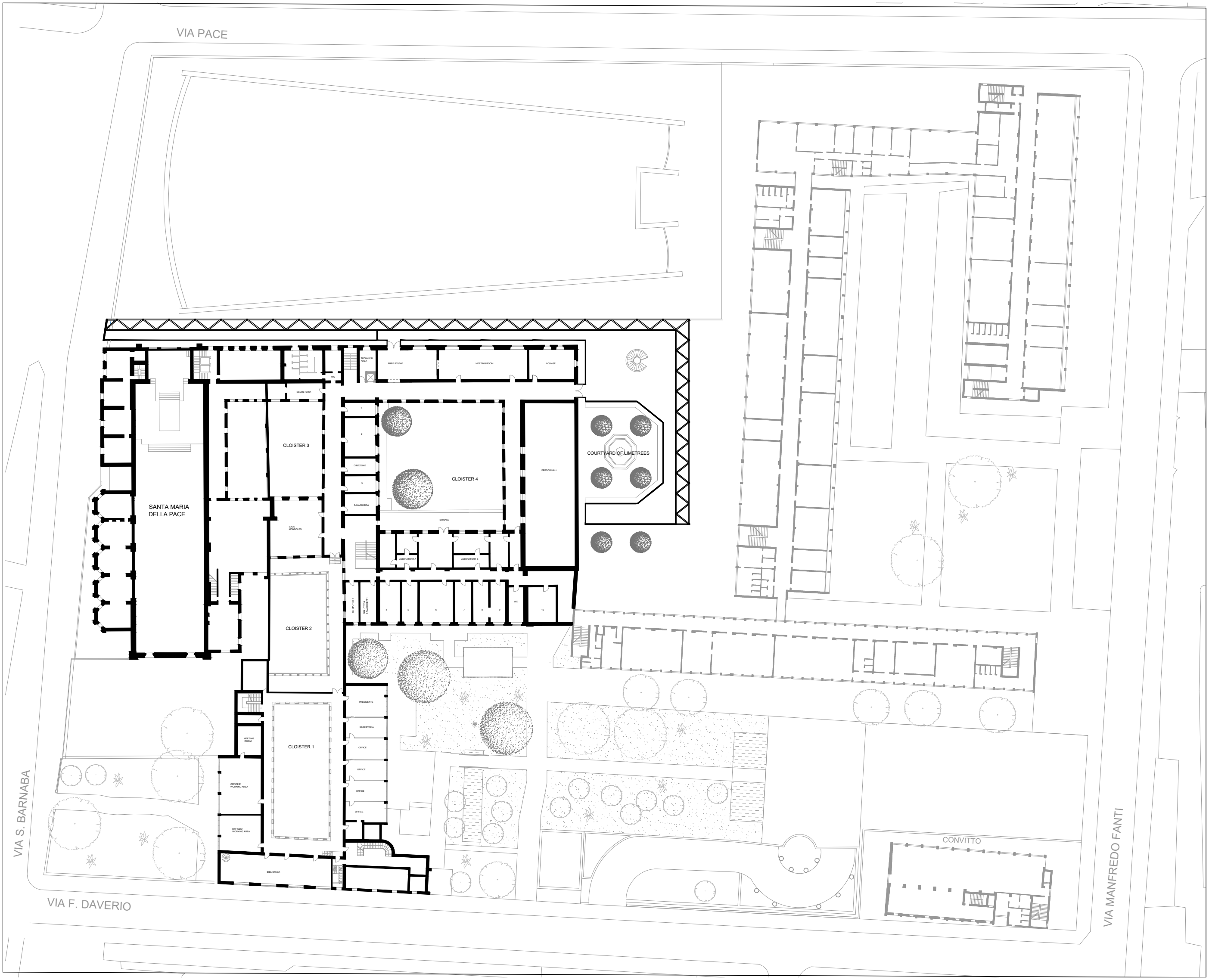
Ground Floor Plans



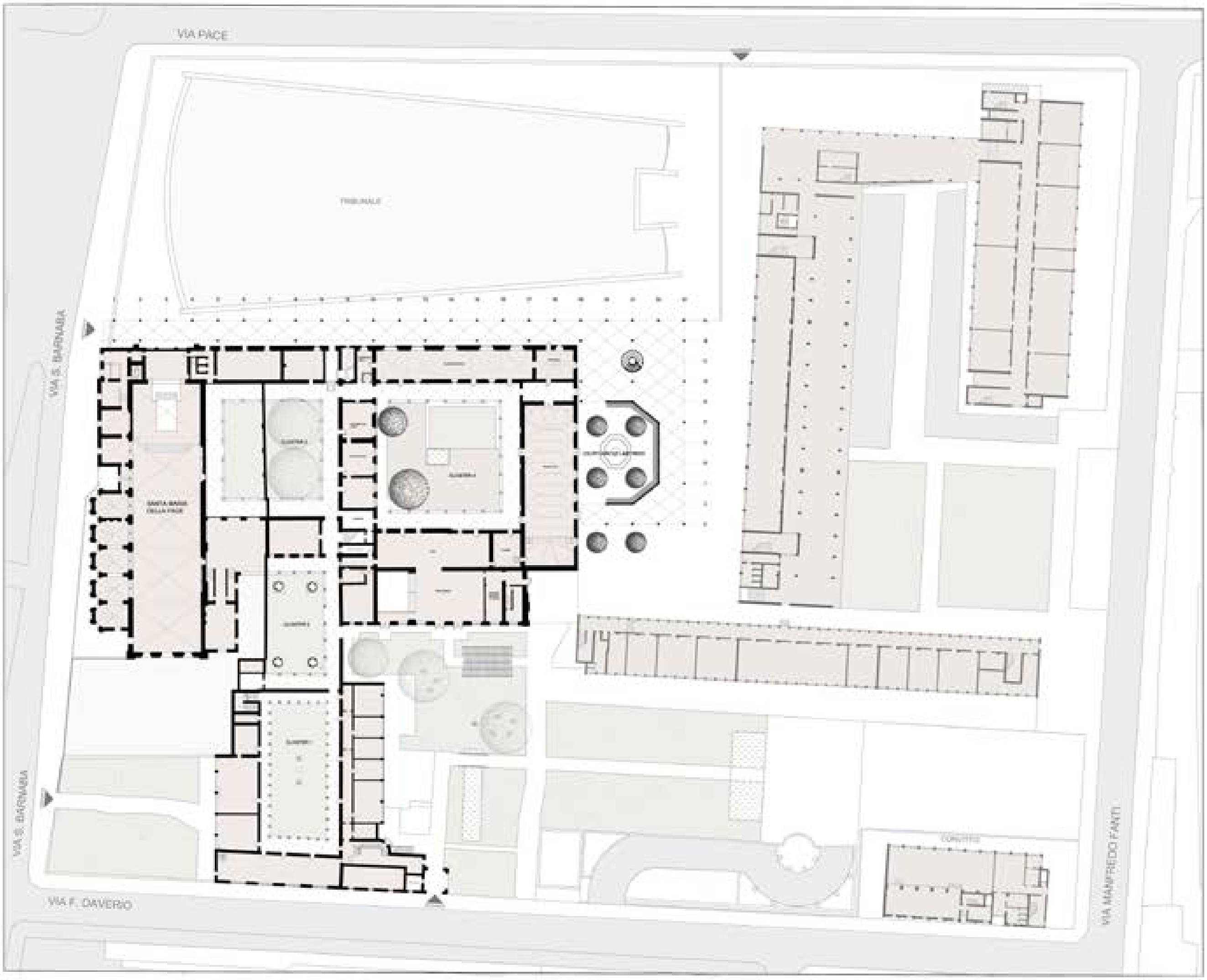

VIA PACE
ENTRANCE
TRIBUNALE
VIA S. BARNABA
ENTRANCE
SANTA MARIA DELLA PACE
CLOISTER 3
CLOISTER 4
COURTYARD OF LIMETREES
CLOISTER 2
CLOISTER 1
VIA S. BARNABA
ENTRANCE
VIA F. DAVERIO
ENTRANCE
CONVITTO
VIA MANFREDO FANTI

First Floor Plans

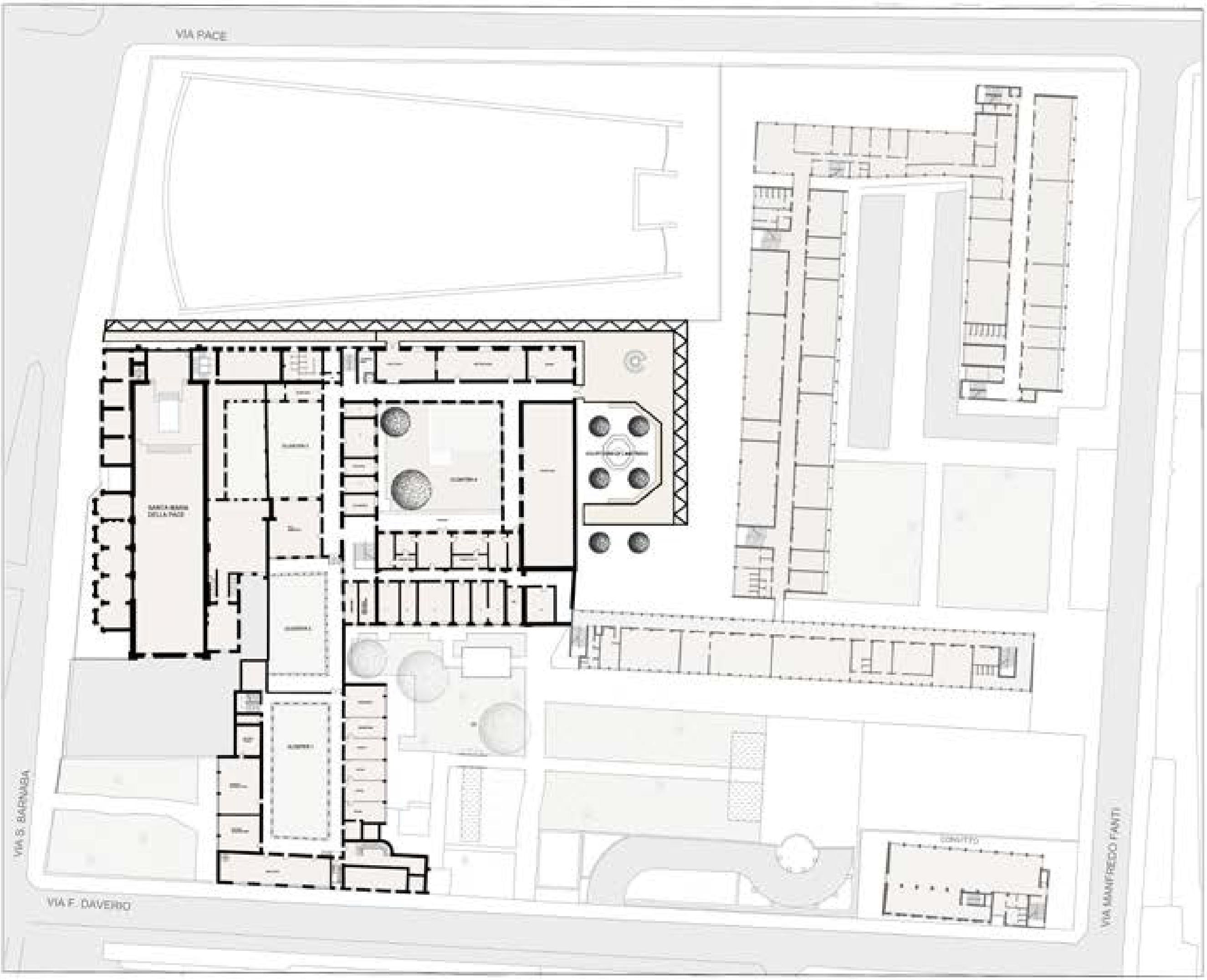



VIA PACE
SANTA MARIA DELLA PACE
CLOISTER 3
CLOISTER 4
COURTYARD OF LIMETREES
CLOISTER 2
CLOISTER 1
CONVITTO
VIA S. BARNABA
VIA F. DAVERIO
VIA MANFREDO FANTI

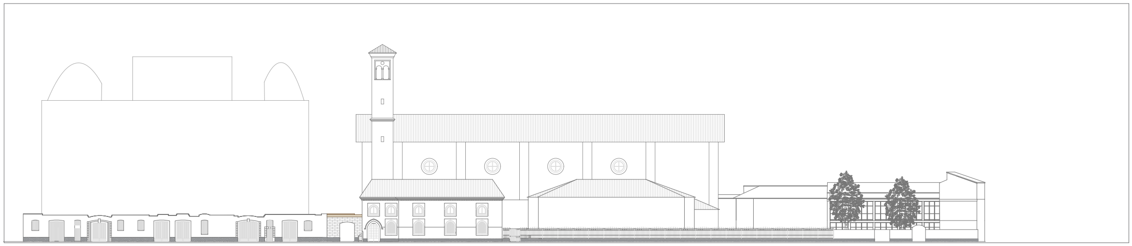
Ground Floor Plan



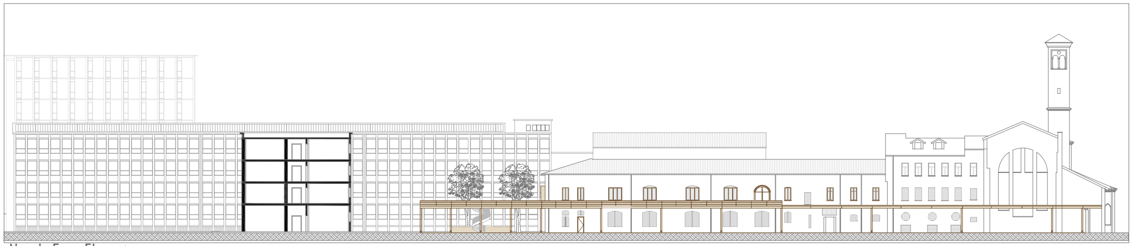
First Floor Plan



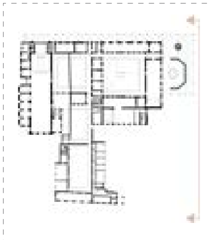
03.4
ELEVATIONS
SECTIONS



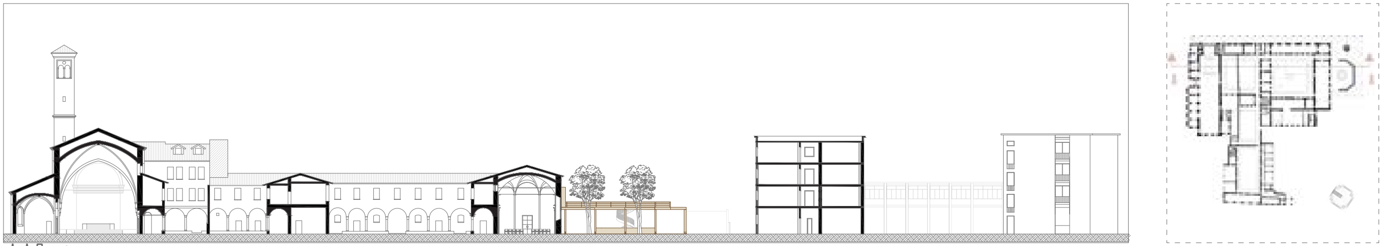
North Elevation
Scale: 1/200



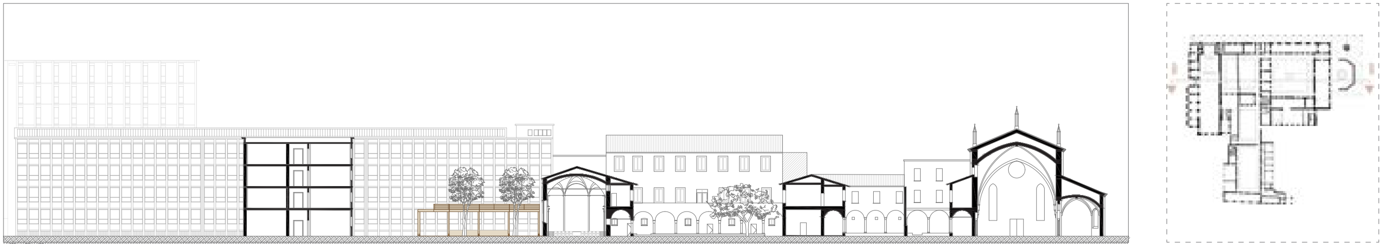
North-East Elevation
Scale: 1/200



South-East Elevation
Scale: 1/200



A-A Section
Scale: 1/200



B-B Section
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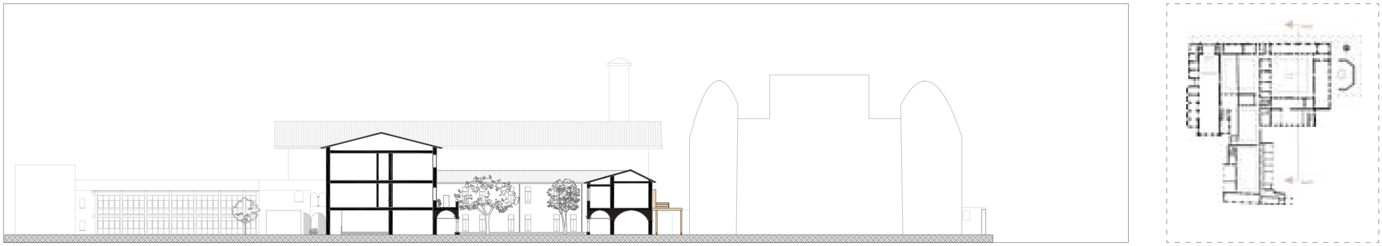
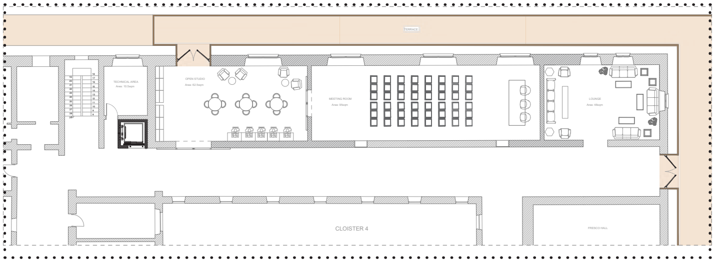
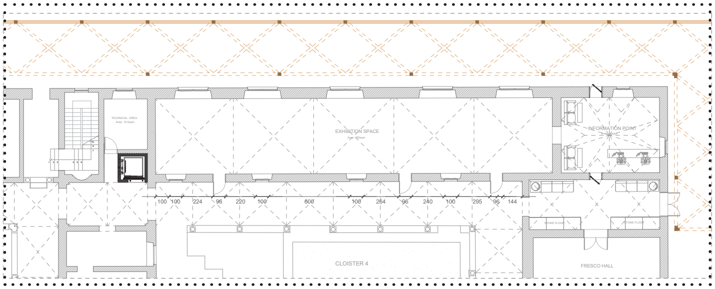


C-C Section
Scale: 1/200

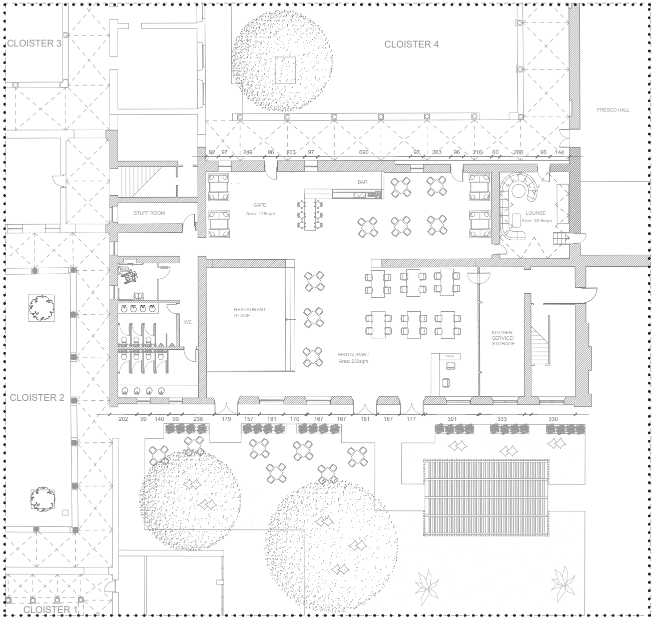
03.4 MAIN ROOMS DETAIL PLANS



MeetingRoom

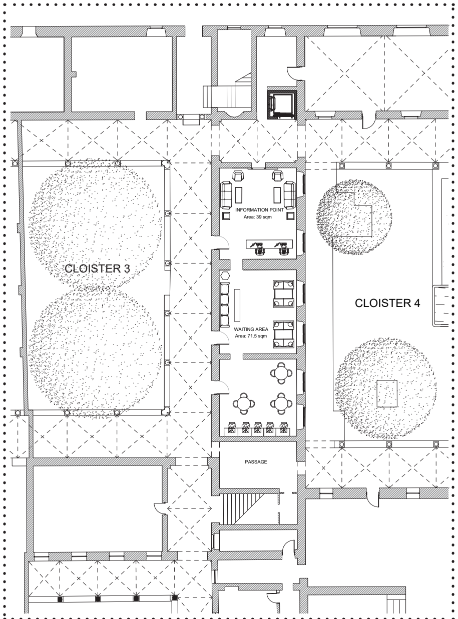


Exhibition Space

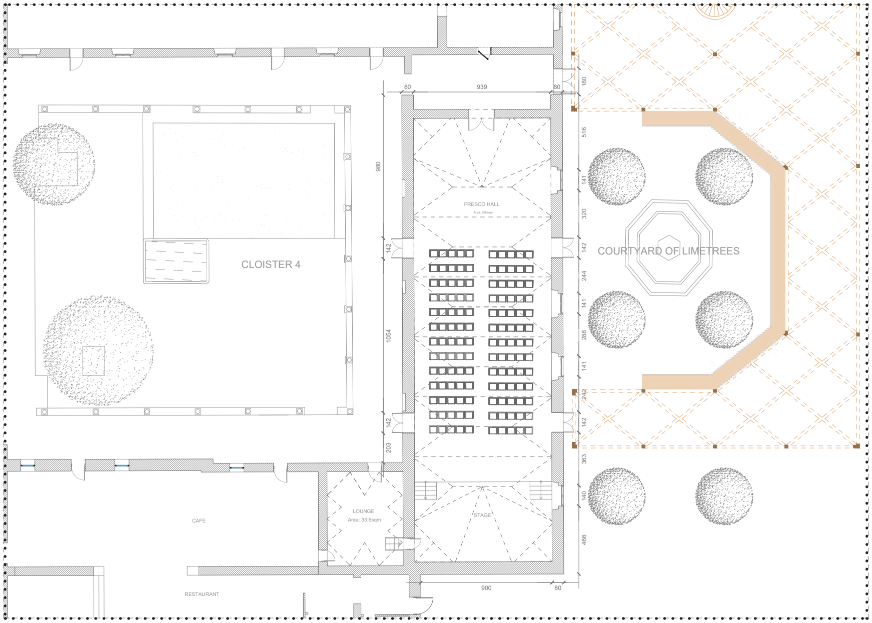


Restaurant and Cafe

In the current situation, the space on the ground level is operated as a conference room, and the cloister corridor is used for the exhibition area. They also utilized the upper level of the room as a classroom.
For the design proposal,The ground floor room is utilized as an exhibition area for the shown items following the fresco activities, according to the design plan.
As a result, the cloisters' passageway will be opened up for better circulation.Classrooms for the first level are moved to the other side, where there are existing classrooms. And for the greeting area, two rooms are used as a waiting area, with a conference room in the middle for guests and students.
The auditorium space was converted into a restaurant and a cafe. One of the primary entrances is visible from this chamber. The area's permeability will rise if it is converted to public space.
Because the area where the restaurant is now will change as an information point because it is close to the entrance and the tables are in the cloister 3, which blocked the movements and increased the density, but with this change and an open area, the restaurant can now serve for the outside garden, which is larger and more flexible.



Information Point

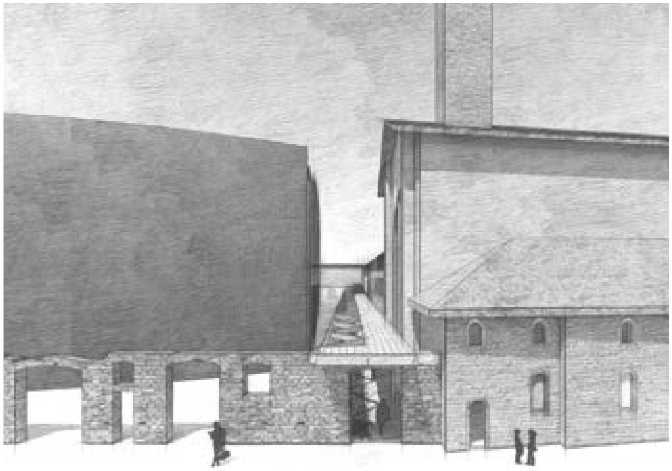


Fresco Hall

The space, which was previously a restaurant, was converted into an information center and waiting area for the events. Because the location is one of the major corners that faces one of the main entrances. After the information point, attendees can proceed to the waiting room to await the activities.
We constructed a continuous circulation path between the waiting area and the café to connect Third Cloister and Fourth Cloister .
One of the most prominent parts of the site is the fresco hall. It acts as a hinge and connects the fourth cloister and the new wing.
Visitors to the fresco hall can walk immediately to Fourth Cloister , where they can be distributed around the exhibition area, information point, or café.
In the right section, visitors can see the new intervention and the pavilion, as well as the courtyard including its fountain, which has a pleasant ambiance created by the ancient trees and the fountain.
As an additional intervention, people may utilize the space for resting and waiting, and they can access the first level by accessing the stairs from outside.

03.5
CONSERVATION
ADDITIONS/ INTERVENTIONS

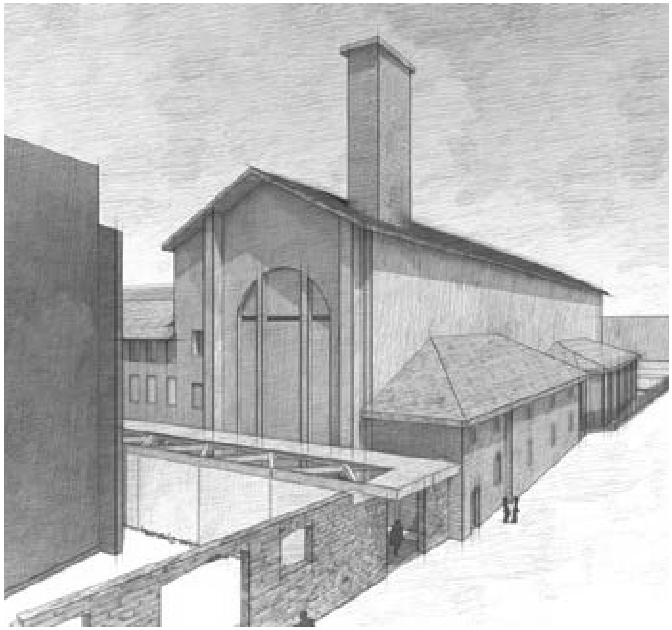
As the starting point of the design, we chose one of the entrances from Via San Barnaba which there was no continuity of the axes and blocked by the garbage space. By extending the passage through the Courtyard of the Fountain, we enhanced the efficiency of the entrance and made it one of the prominent points. The entrance used the existing gap between the ancient wall and the church facade. We extending the structure till the end of the gap to provide recognizability of the entrance and make it more welcoming for the visitors.

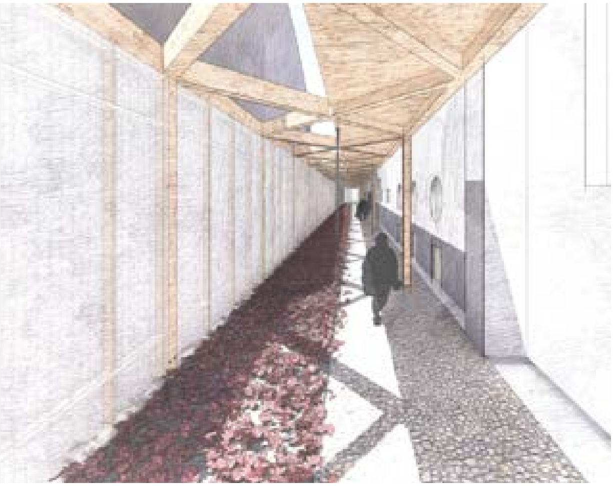


In that way, visitors can have a clue and the curiosity of the Umanitaria and the internal spaces.

The idea of using timber for the structure also matched with the brick wall by its natural texture inside, although it creating a contrast to be recognizable between the old and new.

By following the structure the passage is bringing people outside to internal space and involving them to Umanitaria and the Courtyard of the Fountain.

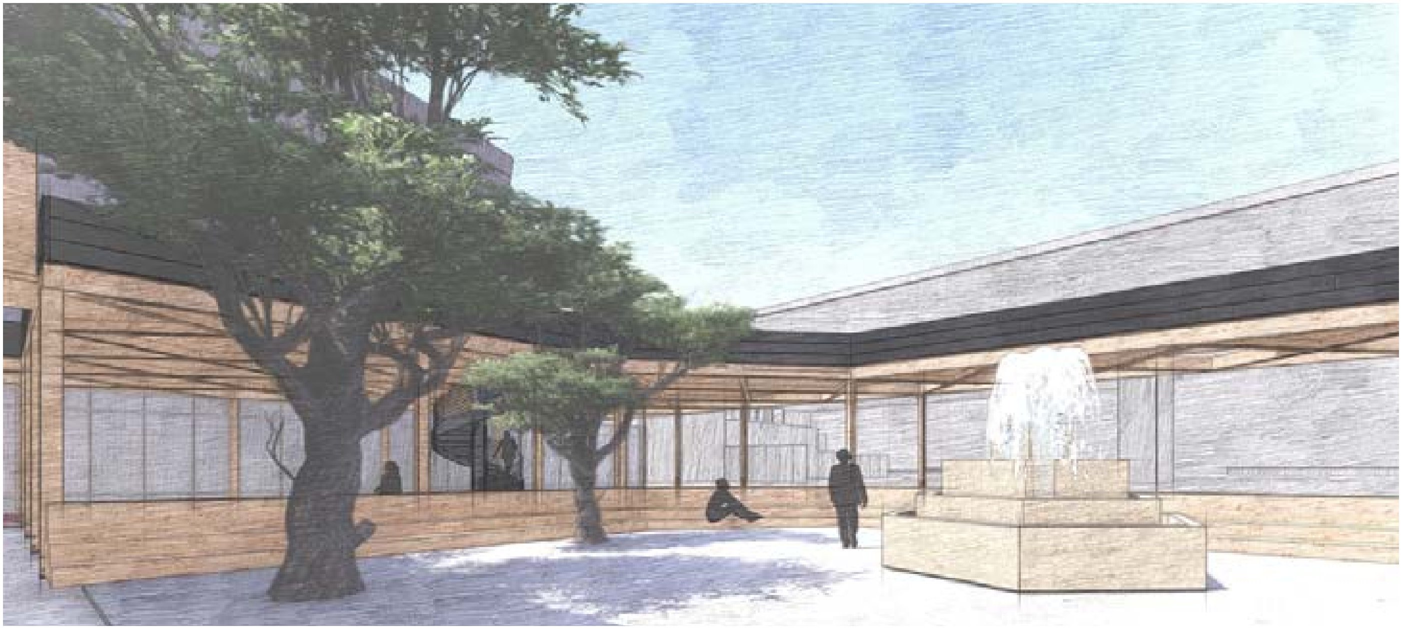


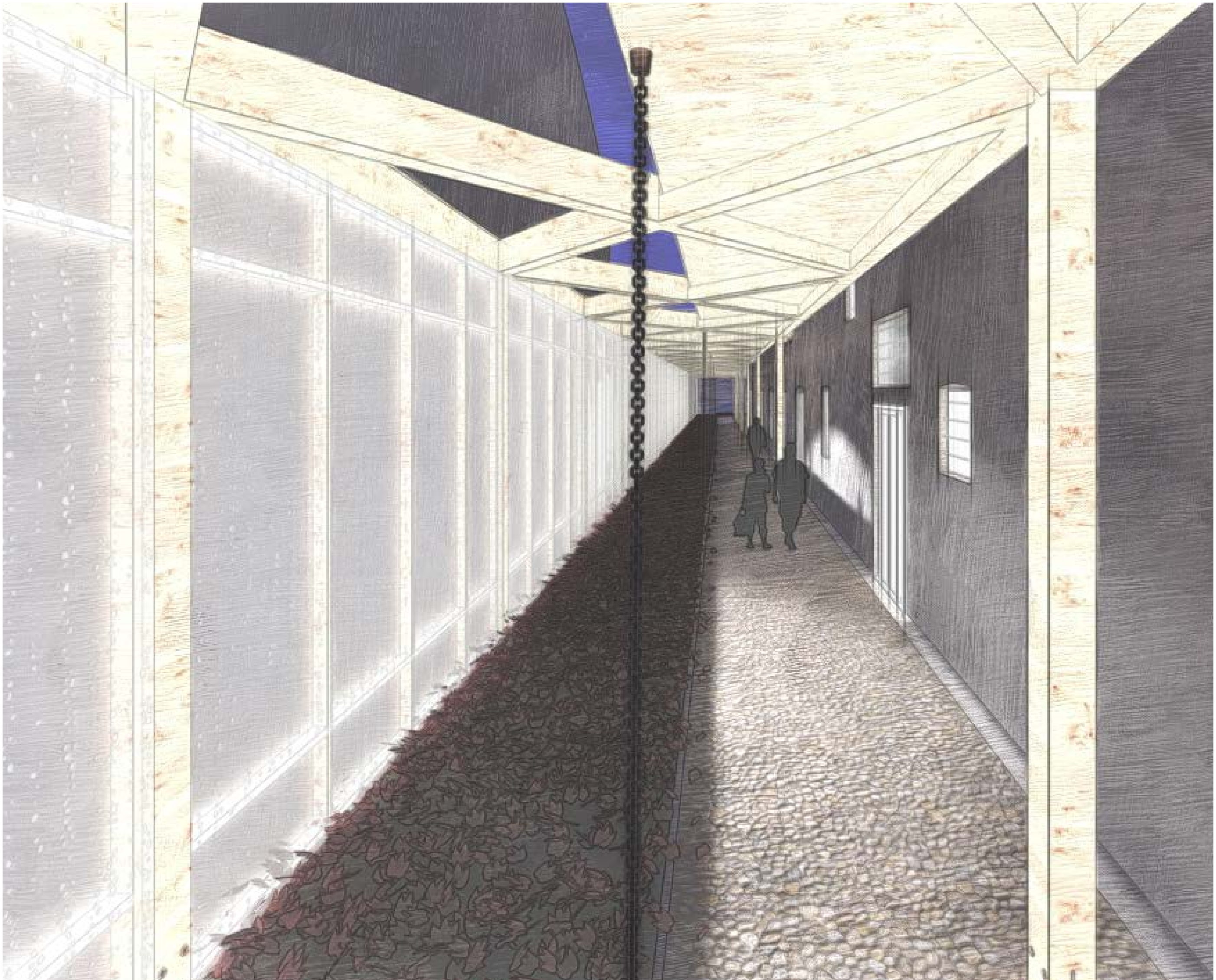


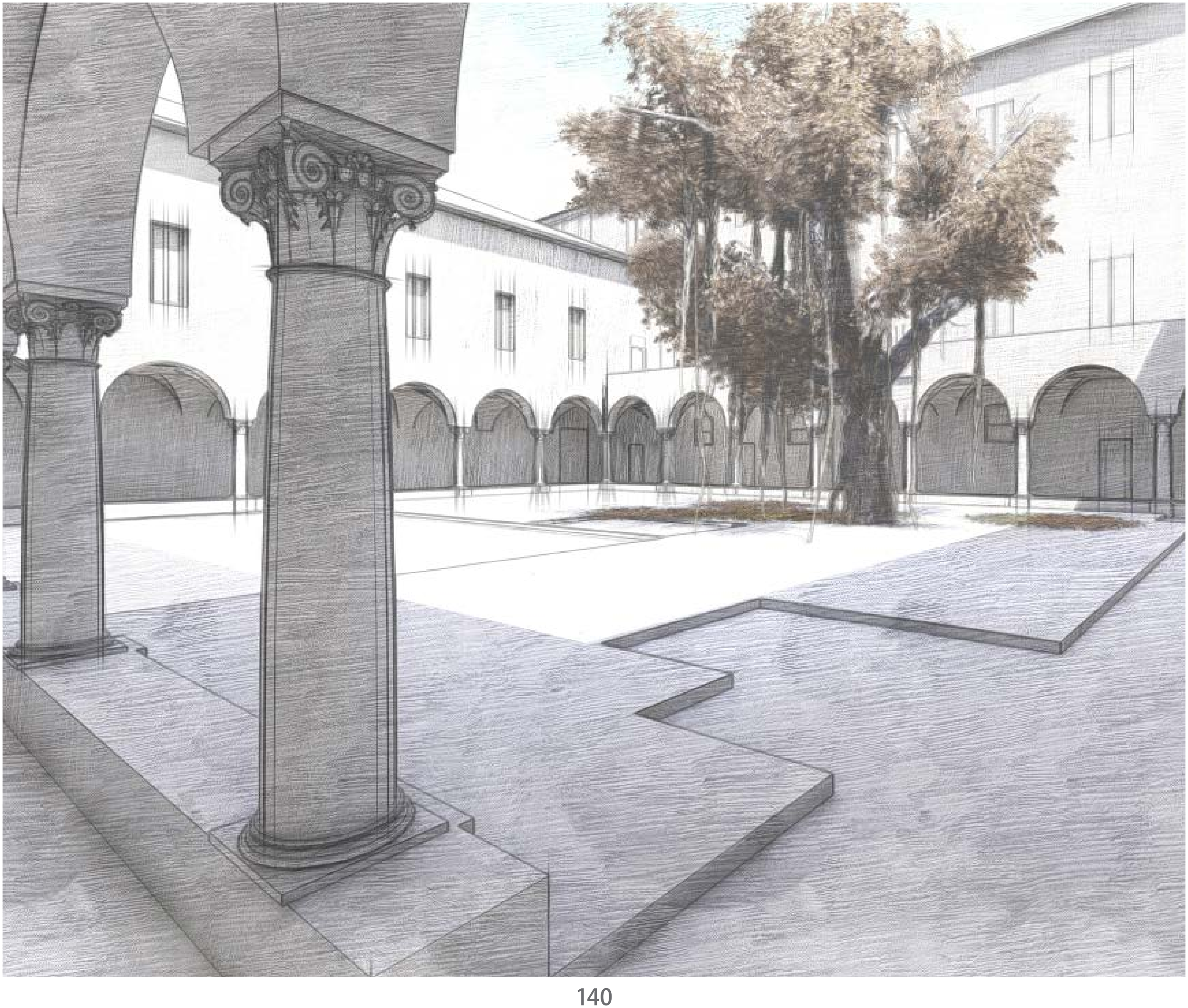
Connecting the entrance with the Courtyard of the Fountain is providing another connection with the Fresco Hall which is one of the main event room of the Umanitaria site and being an intersecting point between the Courtyard of the Fountain and Cloister of Fish.

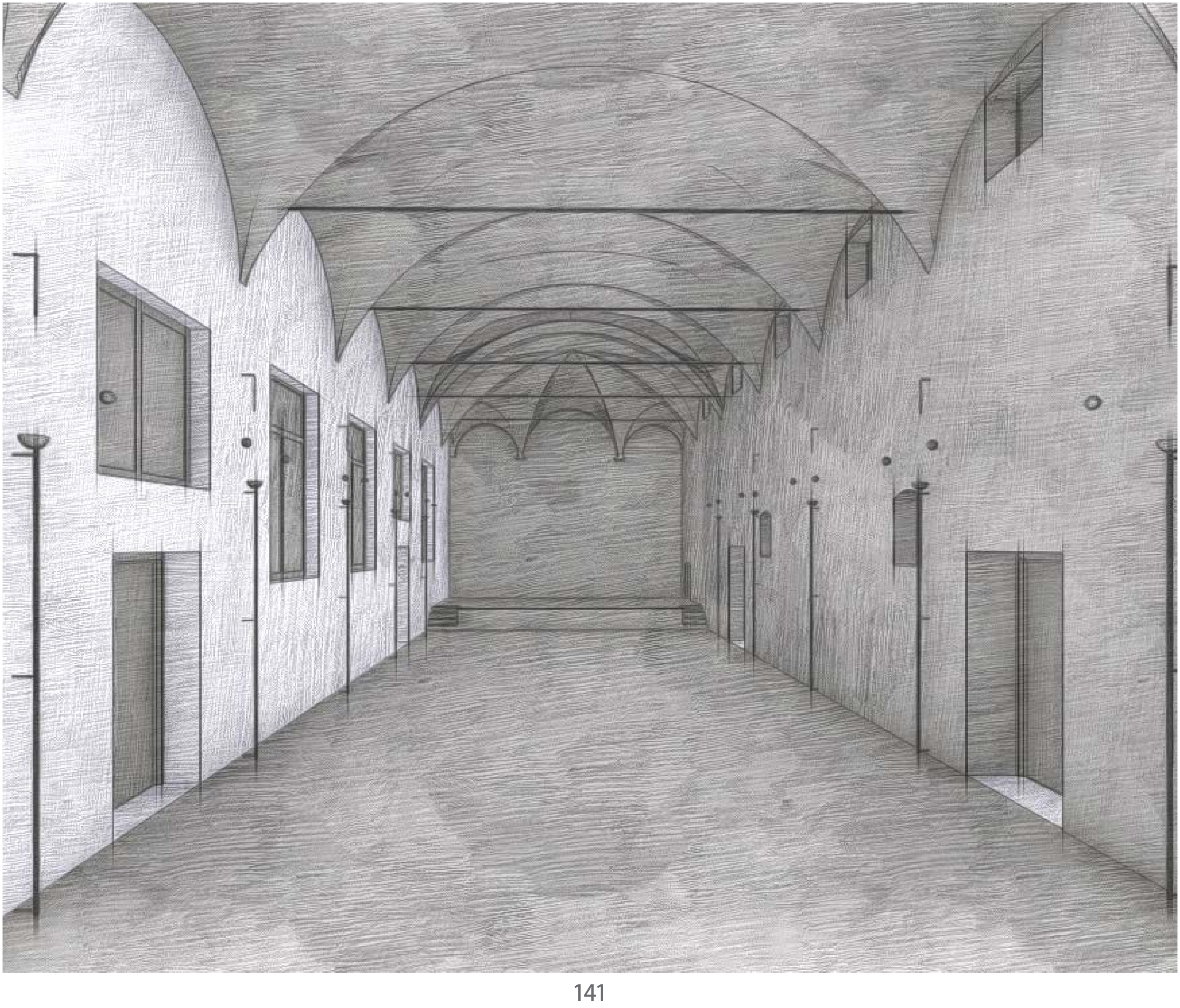
In that case, the structure itself is becoming a guideline for the visitors through the main spaces of the site. Also, the corner of the cloister of Fish has become more permeable and open to the public.

With respect to the existing building, there is a gap between the walls and the structure of the pavilion. For the new two-door openings from the first floor, we fill that gap with the wooden door extensions to provide recognizability of the new entrances to the building. People also can reach the first floor from outside using the staircase of the pavilion. Terrace floor they can enjoy the view of the Umanitaria and the Courtyard of the Fountain. When they enter the building from the new openings, they can reach the main corridor of the first floor or the meeting room. Following the corridor, they can reach the existing terrace which looks through the Cloister of Fish and they can go through the classrooms.









04.
TEMPORARY PAVILIONS REFLECTION IN RESTORATION PROJECT

04.1
TIMBER STRUCTURES

Timber grids are a solution to the growing interests of free form architecture in the context of an ever increasing awareness of the natural limitations of our environment. The characteristics of timber diagrids long span, lightweight, affordable and sustainable can be a perfect solution to some of the architectural projects. However, their use has so far been limited to experimental and temporary pavilion.

- **Design**

Due to the two directional arrangement of members, timber grids can support forces along the two directions (tension or compression) and out of plane bending. In order to provide in plane shear strength and stiffness, the structures need to have diagonal bracing in the form of cross ties, rigid bracing or an active covering system. Advantages of timber structures is the relatively low cost associated with them. it illustrates the financial viability of timber structures in relation to similar types of structures constructed from other materials. Furthermore, timber gridshells are very efficient ways to span large distances a comparison of their selfweight against the covered area.

- **Form Finding**

The term form finding is often used to describe the process of defining the shape of a structure which features a complex geometry. This process is often influenced by factors such as structure type, material properties, boundary conditions and construction requirements in this case we used the idea of inner arcs and subject them to a module for the structure of the pavilion.

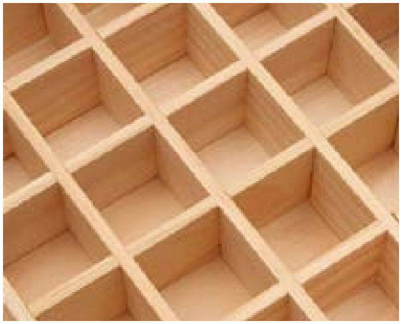


Fig. 04.1: Timber Structure

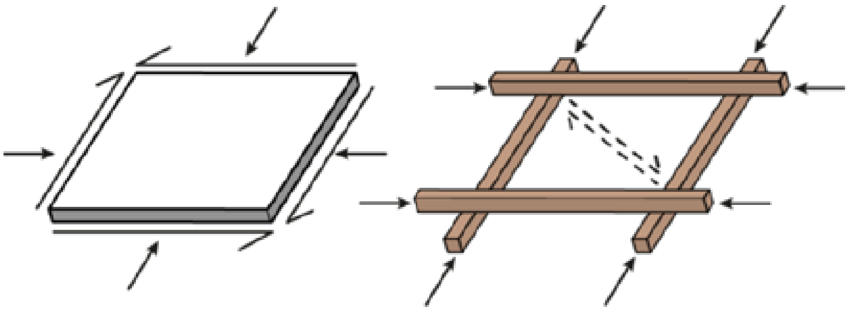


Fig. 04.2: Left – Shell element; Right – Gridshell element

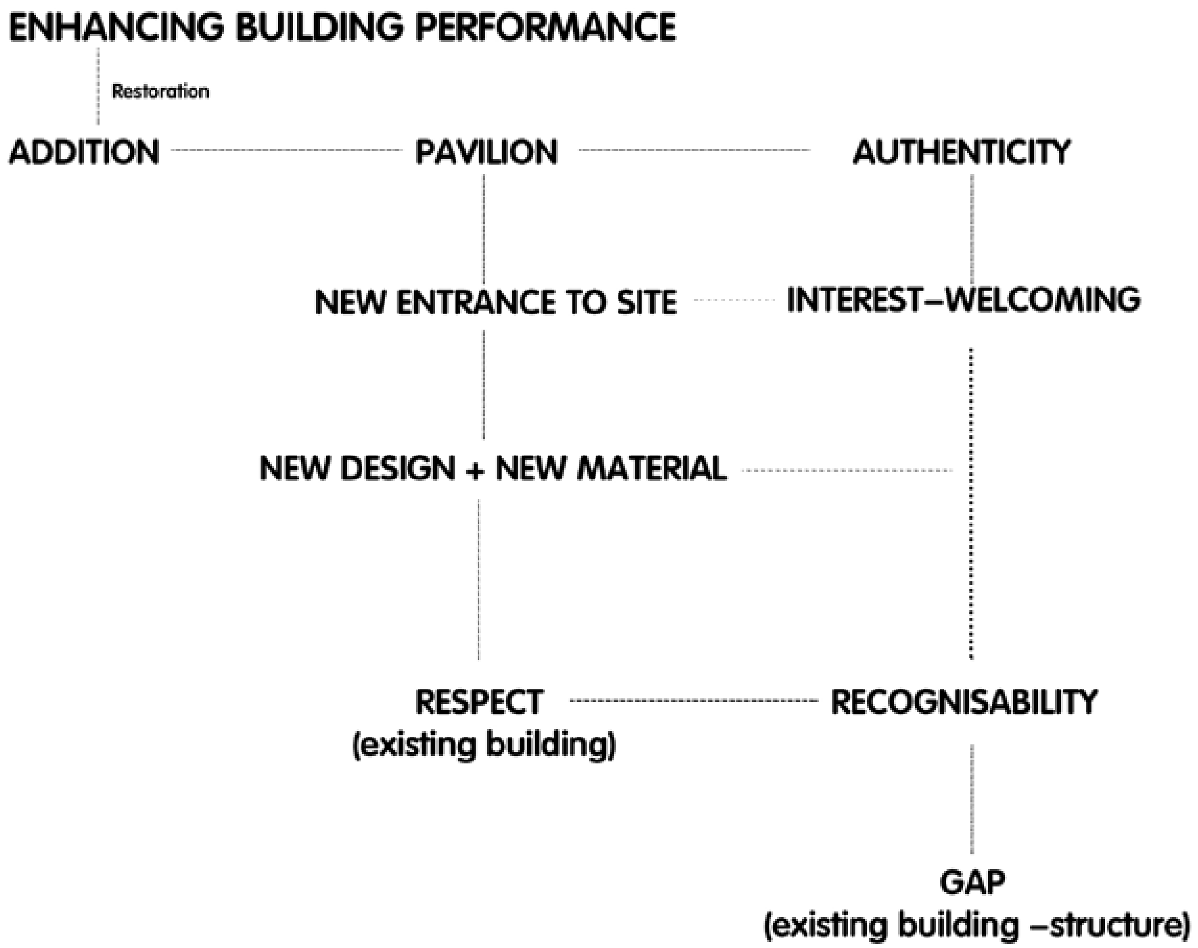


Fig. 04.3: Idea Map

04.2 APPROACHES

Wood has been used extensively as a key construction material because of its availability in nature. Moreover, growing environmental awareness increases the motivation to use wood as a renewable material that reduces CO_2 emissions. Wood construction systems typically encompass light frames, posts, and beams, cross-laminated timber or massive wood structures, mixed and hybrid systems, and space frames

Analytic Approach

This involved starting with a flat grid. The availability of modern software tools and computational power allows complex structures like timber structures to be designed more easily. Using Revit together with Rhino3D and Grasshopper) as computational and design tools to develop the Design.

The form-finding process has to be followed by a structural design phase that involves sizing members, detailed connection design, and structural calculations for the appropriate load scenarios. This sequence is often an iterative one, where optimization for various criteria takes place.

Firstly, the shape(module) of the grids is directly linked to the size of timber members to be used, as well as to the number of layers (cross-laminated). Either one of them can have the dominant influence. Secondly, as for any compression dependant structure, the analysis of timber grids requires a non-linear study to evaluate buckling behavior. In addition, material properties have to be carefully considered to allow for accurate representations.

Timber structures offer the attractive possibility of creating complex surfaces and spaces using a set of straight elements that are bent into shape. This makes them affordable and relatively easy to build. Their design and analysis methods are diversified and have evolved. Computational possibilities are no longer a limiting factor in the design of timber grids and structures. The convergence of sustainability concerns and computational abilities makes the timber grid technique relevant now.

Systematic Approach

A proper systematic approach to the restoration of historic buildings is crucial in the preservation. This presents the unity between the restoration of a historic building and sustainability. The aim is to establish an effective method for the restoration of historic buildings and their reuse and sustainable renovation in terms of energy efficiency, following modern needs and conservation requirements while maintaining the authentic appearance.

The main method is the observation of a historic building during its restoration, analysis, and evaluation of the results achieved in improving energy efficiency, accessibility, and functional performance.

The findings are recommendations for the restoration, by modern requirements for comfort and environmental protection. By applying the principles and measures of energy efficiency, maintaining the authentic appearance of the building, under the conservation requirements.

Heritage is more than just a petrified memory of the past that has a particular significance in the life of the nation, it is also an active resource for the future. Reusing and valorizing it changes the way we think about preservation.

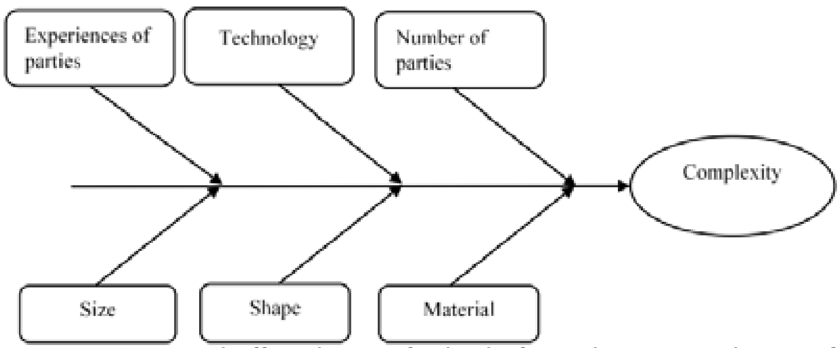


Fig. 04.10: Cause and effect diagram for level of complexity in production of a

04.2 APPROACHES

Although precious cultural heritage resources are reusable, they are neither renewable nor replaceable. This means that all interventions to modify buildings must involve minimal disturbance to both the buildings themselves and their wider context.

Heritage buildings are architectural and historical monuments, and their preservation is crucial in terms of passing on the cultural identity to future generations. What characterizes this building is its unchanged role and function in the development of life in the last years.

Architectural heritage and historic buildings are primarily influenced by bioclimatic design principles, specific resilient architectural structures, and strategic design choices of durable construction materials. Their sustainability is verified by their endurance and durability measured by hundreds and thousands of years. All the construction materials and any planned interventions should be in harmony with the authentic appearance and integrity of the building. The building should meet the space requirements of the new functions.

Historic buildings declared cultural assets. The approach to this type of renewal is based on the needs and specifics of the cultural heritage. Before the restoration, the existing characteristics of the historic building should be assessed. Measures to improve building functional efficiency & accessibility in historic buildings also protect the materials & historical values and their characteristics [4]. The key to the successful refurbishment of historic buildings is to identify and understand existing aspects of historic construction, to retain and preserve them and have further efficient implementation along with new measures aimed to improve functionality & authenticity.

Structural Approach

The energy efficiency measures should be carefully planned and implemented in historic buildings, without negatively impacting the historic integrity and character of the building. Continuous observation of buildings after the restoration can reveal possible changes and defects and prevent irreparable damage to historic structures.

This, along with regular maintenance, ensures long-term preservation of our historic built environment and sustainable use of our resources.

To achieve a quality and optimally energy efficient architectural object during its restoration and rehabilitation, it is necessary to:

- Perform on-site observation and analysis of the location, orientation, and shape of the building
- Apply local construction materials wherever possible as authentically applied materials in the restoration
- Improve the thermal insulation of the building envelope
- As for further exploitation, apply an energy efficient heating system in combination with renewable energy sources if possible
- Use the possibility of natural ventilation of the building
- When it comes to historic buildings, this cannot be consistently applied due to the preservation of the authentic visual appearance. Thermal insulation over the exterior walls should be avoided since the loss of visual historic environment is incomparable in its significance to slight energy saving. In this way, both the visual appearance of the building and a valuable construction system is protected.

The goals are:

- The use of site conditions for the protection and preservation of the historic building without
- negatively affecting the environment and existing building
- Improving the knowledge on the importance of preserving the historic buildings, their potentials, methods of restoration, and use of authentic building materials, following the conservation requirements
- The use of construction measures to improve function and accessibility efficiency in the restoration of historic buildings and contribute to the preservation of the environment of this site

04.3
TIMBER STRUCTURES project

For the project, we used STRIP foundations, GLULAM for beams and columns, X-LAM panels for the flooring and parapet, and WPC panels as our flooring cover.

STRIP FOUNDATION

Strip foundations are by far the most popular form of wood frame construction foundation. These are made out of a continuous, flat strip of concrete that serves as the foundation for a linear structure such as a wall or row of oak joists.

GLUE LAMINATED TIMBER (GLULAM)

Glulam is often advocated as a viable alternative to structural concrete and steel. When compared to concrete and steel, glulam can produce a lighter weight structure with a lesser carbon footprint that is much stronger, pound-for-pound. A variety of structural components can be formed using glulam including parallel beams, pre-cambered beams, sloped beams, curved beams, light beams, and trusses. The design possibilities are virtually limitless.
Product description. Glulam is the ideal material when great importance is placed upon high form maintenance and dimensional stability. Even when large-sized and long construction elements are produced, the timber does not twist and is, to a great extent, free of any cracking.

Fig. 04.4: Monolithic strip foundation

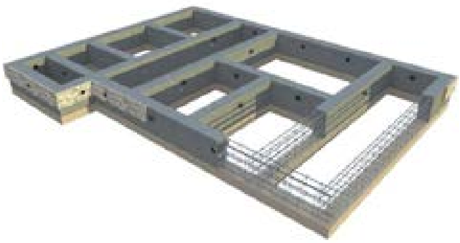


Fig. 04.5: The strip foundation

Fig. 04.6: The strip foundation

CROSS LAMINATED TIMBER (X-LAM PANELS)

CLT is used for floors in residential, commercial, and industrial buildings, including floor diaphragms in multi-storied timber construction. CLT is very economical; The span and cantilevering capabilities of CLT permit economies in foundation support.

XLam floor panels are craned into position at the rate of approximately 100sqm floor area per hour, meaning an entire house floor can be placed in less than four hours. This represents a large saving of on-site labor.

FLOOR PLANKS WPC

Wood-plastic composites, are composite materials made of wood fiber/wood flour and thermoplastic such as PE, PP, PVC, or PLA.

WPC Boards Are 100% Water Proof, 100% Termite Proof, 100% Borer Proof, 100% Moisture-Proof, And UV Resistant Product. WPC Boards Can Use At Both Interior & Exterior. WPC Boards Are 100% Environment-Friendly Product And Contains No Hazardous Chemicals.

Wood-plastic composites (WPCs) are produced by thoroughly mixing ground wood particles and heated thermoplastic resin. The most common method of production is to extrude the material into the desired shape. Extruded WPCs are formed into both solid and hollow profiles.

Fig. 04.7: Wood plastic composite

Fig. 04.8: Wood plastic composite decking

Fig. 04.9: Wood plastic composite

04.3
TIMBER STRUCTURES
project

Glulam (laminated beams) is the natural alternative to steel or concrete. It is a natural structural material that is economical, strong, and attractive looking.

GLULAM´S POPULAR, BECAUSE IT´S:
* Versatile – Glulam can be used for almost any type of structure. See here for more details.
* Light – Glulam is one-sixth the weight of a reinforced concrete beam (two-thirds the weight of steel).
* Economical – Our competitive pricing aside, glulam´s lower weight leads to savings in transport, foundations, and building.
* Easy fixing – Material that´s easy to handle, work, and erect.
* Flexible to your specifications – To your specific needs, with short delivery stock available in standard sizes.
* Fire resistant – An important safety factor.
* Durable – Glulam is very durable with standard coating or preservative, but extra durability can be provided with special pressure-impregnated preservative, too.
* Energy conserving – Glulam is a renewable resource that´s ecologically attractive and uses only a tenth of the energy it would take to produce an equivalent steel beam.
* Competitive pricing – We can supply glulam beams to your chosen specification at a competitive price. No order is too large, too small, or too complicated.



CLT (Cross Laminated Timber) is very similar to Glue Laminated Timber in that it is manufactured from finger-jointed, dried timber using glue lamination under pressure.

X-LAM´ S POPULAR, BECAUSE IT´ S:

* XLam panels are big (up to 15m x 3.5m) and fit together quickly on-site, making the building much faster.
* Each XLam panel is custom-made to suit the structural needs of the project and the required appearance.
* Panels are manufactured using the latest European CNC machining technology to ensure high precision and eliminate site waste.
* Safe to erect, weighing only 20% as much as concrete. Safe to inhabit, being strong and flexible under load.
* XLam CLT is sustainable. Wood stores carbon to help save our planet.
* Out-performs conventionally framed construction in air-tightness, thermal insulation, internal moisture management, acoustic insulation, and fire resistance.

Weald & Downland

Architect: Edward Cullinan

The Weald and Downland gridshell was built in 2002. The architect was Edward Cullinan Architects with engineering by Buro Happold and carpentry by Green Oak Carpentry.

It features an uninterrupted floor space which is 48 m long and between 11 and 16 m wide, enclosed by a corrugated barrel vault shape. The double layer gridshell was built from locally sourced oak with 50mm x 35mm sections arranged on a 1.0m grid that was halved in some areas to 0.5m.

Different architectural and structural solutions create varying requirements for the materials they employ. The reason of the material choice of Oak is durable, available from sustainable sources in the UK and with a better performance that the other species on the shortlist.

Fig.04.11:Gridshell,interior view

Fig. 04.12: Typical connection showing thinner laths

Pavilion ZA
Student Workshop

Double layered timber gridshell was designed during a student workshop in Cluj, Romania, functioned as a temporary cultural venue in Cluj-Napoca, Romania. It spanned 18 m x 13 m with a height of 4.0m by using a structure with laths made from Siberian larch, 70mm x 20mm in section.
The grid was assembled from 3.5m by 3.5m modules, connected on site. The pavilion featured four arched entrances where areas of highest curvature were present. In these areas, 2 laths, each one 10mm in thickness, were used for each layer so that bending the gridshell into shape would be possible without breakages.
The timber was "sawn, finger jointed and planed off site" producing 6.0m lengths. Using a workshop on site, the higher grade material was scarf joined into the specified lath lengths. Lower grade material was used for shear blocks and auxiliary pieces.

Fig. 04.13: Pavilion ZA

Fig. 04.14: Typical connection showing thinner laths

Aspen Art Museum
Firm: Shigeru Ban Architects

The New Aspen Art Museum is located in the center of the high mountain town of Aspen Colorado on a prominent downtown corner site. The three story building provides galleries on the first two floors. The third floor is a multifunction space and cafe. Design features include an innovative long span timber space-frame roof structure and structural glass floors for gallery day lighting.

Ban' s charge was to create a wood space frame with spans of more than 50 feet and cantilevers of 14 feet, in a structural depth of 3 feet. The space frame was to have two planes of intersecting diagonal webs of curved members that undulated up and down to touch the planes of the top and bottom chords with no visible connectors. This case study presentation will describe the design and construction of the wood structure, including paths explored but not chosen for the final design.

Fig.04.15: Aspen Art Museum, Exterior

Fig.04.16: Aspen Art Museum, Interior

The wood truss covers slightly more than half of the roof area, extending from edge to edge of the building plan, and along a diagonal from corner to corner. The truss is supported on a series of two, three, and four-part column clusters, with a maximum span of approximately 50 ft (15.2 m). The truss cantilevers approximately 10 ft (3 m) at the roof edges .

For the structural concept they used three attempts and they failed but the last one was the final result which they used BIRCH PLYWOOD LAMINATIONS as their main structure element.
1 st Concept: Reinforced lap splices with deposit composite material
2 nd Concept: Knife plates with tight driven pins
3 rd Concept: Micro laminations crossing at joints with no half laps
Final Concept: Kerto Chords Birch Plywood webs half-lapped joints full-thread screw connections

Fig.04.17: Aspen Art Museum Interior

Fig.04.18: Aspen Art Museum, Exterior

Museum of Castelvecchio

Restored by Carlo Scarpa

It was built by order of Cangrande II della Scala, during medieval Veronese period. It underwent a dramatic structural change. It was transformed from its military function to a museum. The initial renovation was designed by architect Ferdinando Forlati. While Forlati ´s ideologies are unclear, his renovation is consistent with Ttalian fascist architecture of the time. The museum underwent a total reorganization in effort to restore the value of both the historical and the artistic additions. The restoration favored authenticity, thus eliminating the false contexts created in the 1920s renovation. The architect was the renowned Carlo Scarpa.

There are three themes in Scarpa´ s approach:

- First is tl⊠e notion ofbalance and unity between the new function ofthe museum and tl⊠e quality of the existing building in which it is placed.
- Second is the idea of the particularity of each object requiring individual thought and precise placing in a sequence.
- Third is the concern to make the visit a vivid and stimulating experience for the visitor, dramatizing the communication between object and v⊠ewer.

Fig. 04.19: Castelvecchio, before intervention

Fig. 04.20: Castelvecchio, after intervention

Sketches of Caserma Facade

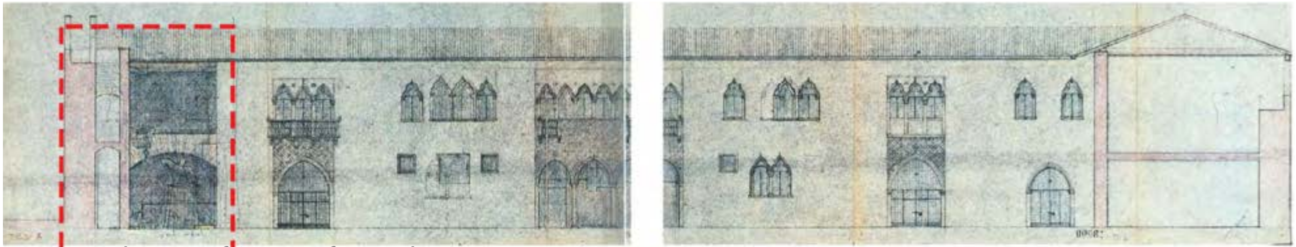


Fig. 04.21: Elevation of Caserma, first study

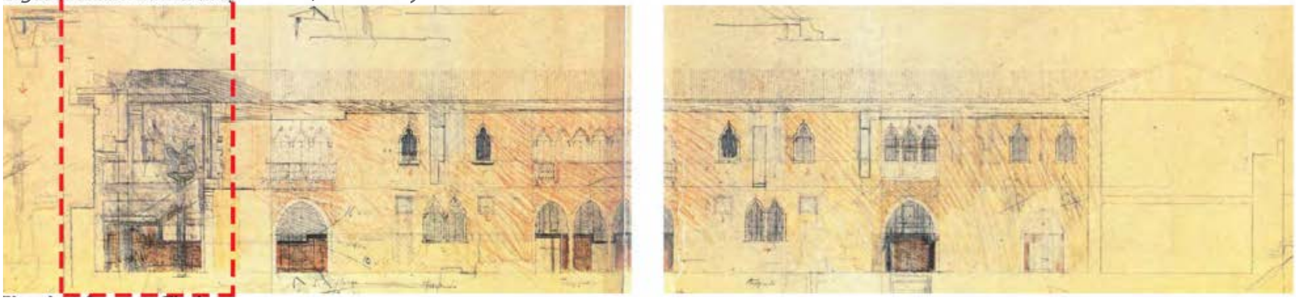


Fig. 04.22: Elevation of Caserma, final

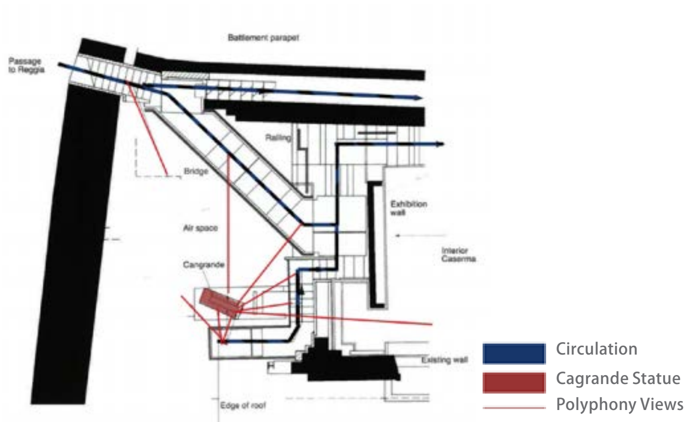


Fig. 04.23: Floor plan of Cagrande space

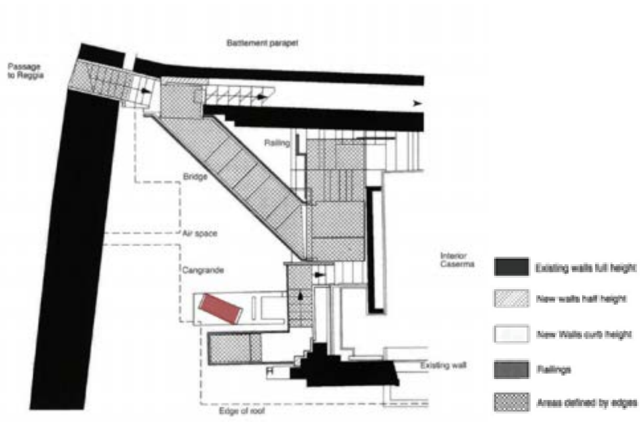


Fig. 04.24: Floor plan of Cagrande space

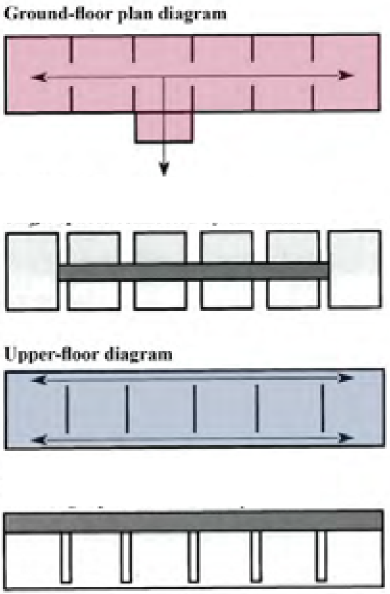


Fig. 04.25: Caserma plan diagram

Spatial Configuration:
Single spaces connected by

Spatial Configuration:
One large space structured by walls

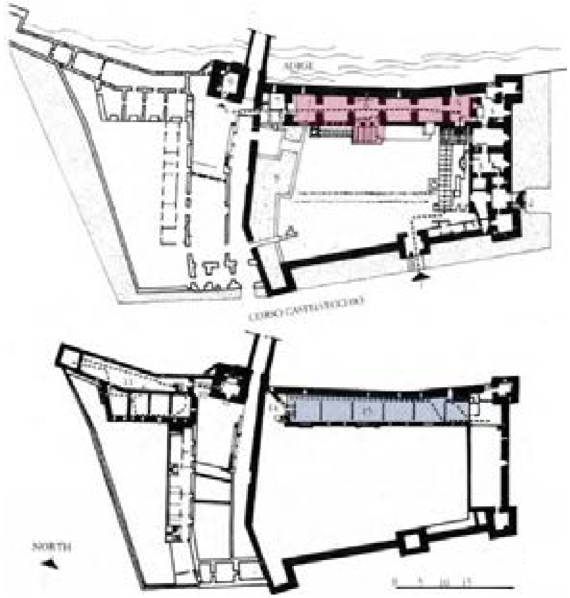


Fig. 04.26: Ground and firsst floor plans

Fig. 04.27: Statue view seen from gallery

Fig. 04.28: Statue space top view

Fig. 04.29: New situation of Cagrande

Intersection between the gazes of Statues in the Sculpture Galleries

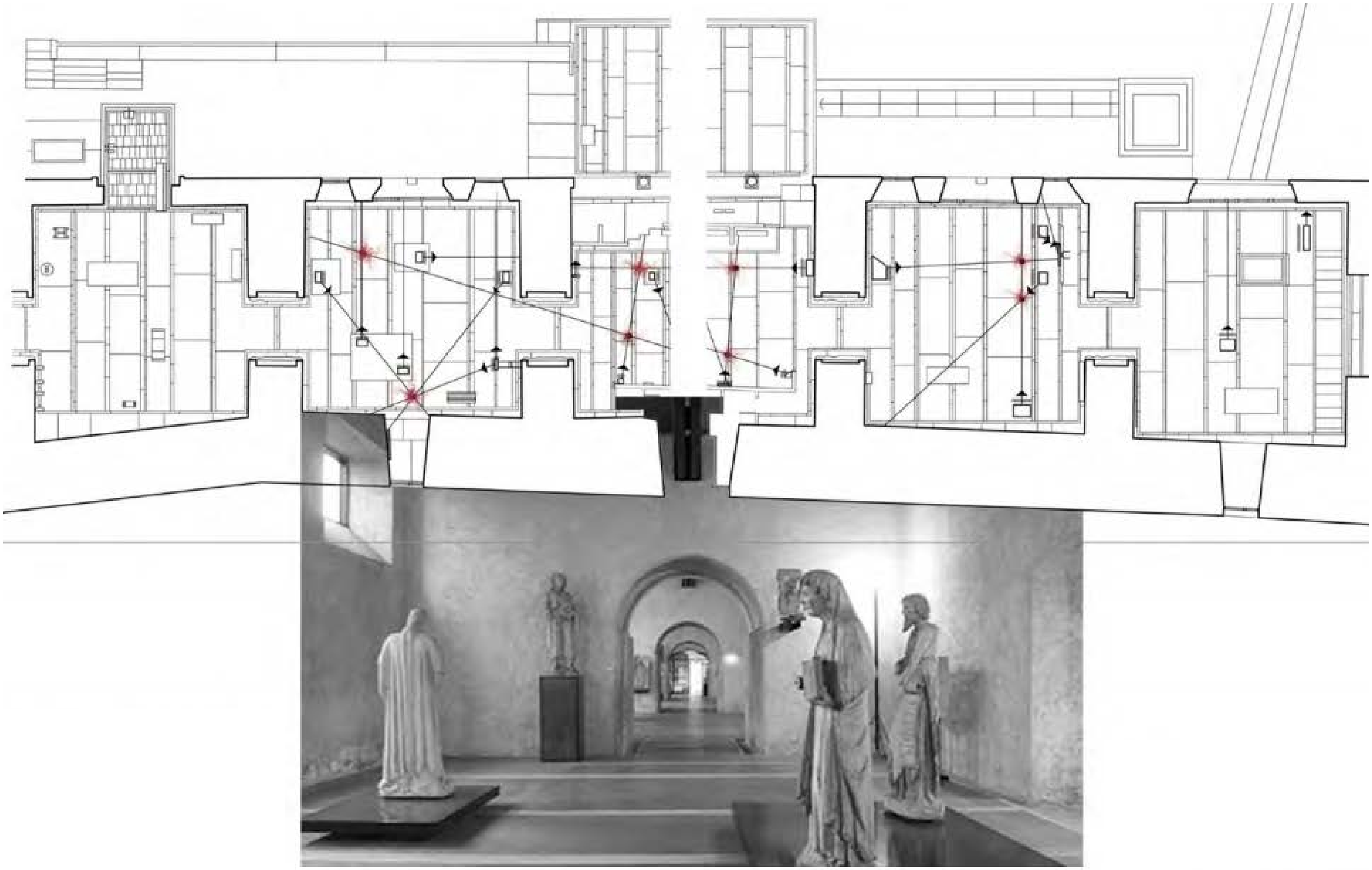


Fig. 04.80: Intersection between the gazes of statues in the sculpture

For Scarpa the concept of detachment is everywhere. Sculptures and paintings are also detached from wall and floor. Giving a third material that wasn´t prevalant in preceding constructions.

Galleries and Bridge Conncetion


Fig. 04.31: Intervention of art gallery


Fig. 04.32: Intervention of art gallery

The Art Gallery, located on the first floor of the gallery .Scarpa enhances them by placing on simple bases and tufa cubes. The roof´s material is timber. The floor is made of a particular kind of stone, with an opaque finish that absorbs shadows. The wall, with its particular raw f⌧nish reduces reflections so that sculptures, paintings and the spectator too seem to float in a space.


Fig.04.33:Intervention of sculpture gallery


Fig.04.34: Intervention of sculpture gallery

It located on the ground floor of the nineteenth century section.The elements delimiting the space are characterized by different materials: a long iron beam on the ceiling; plaster on the walls; cemented concrete edged with pink Prun stone slabs covering the arches


Fig. 04.35: Intervention of the bridge connection


Fig.04.36: Intervention of the bridge connection

Arriving from the bridge, completely reconstructed in the postwar period after it was bombed by the German army during a retreat. It is 30 meters long. A complex unity of material,structural and spatial layers replaces the demolished section.

Design and Material Strategies

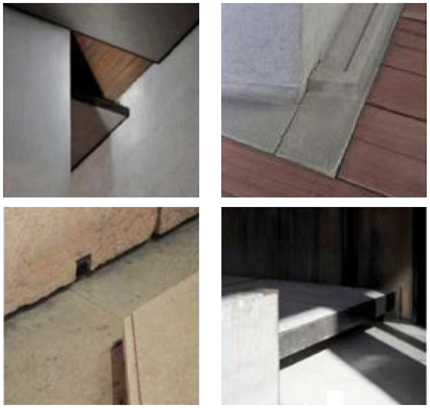


Fig. 04.37: The corner details of the new materials

Section of a corner detail,various materials visible along the edge. Detachment between materials is a motif that is evident at different levels of details. It visible that having a gap between the existing and the new structure and material is makes the intervention respectful and stratification. In that way the structure can be reversible without a damage on the existing building that can increase the authanticity and recognazibility. The galleries, bridge connection and exterior spaces all the respectful approaches are visible.

Fig. 04.38: Gap between the existing and new structure, bridge

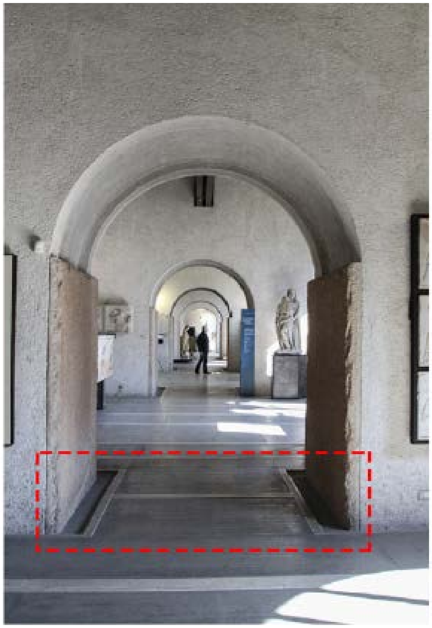


Fig. 04.39: Gap between the existing and new flooring, gallery

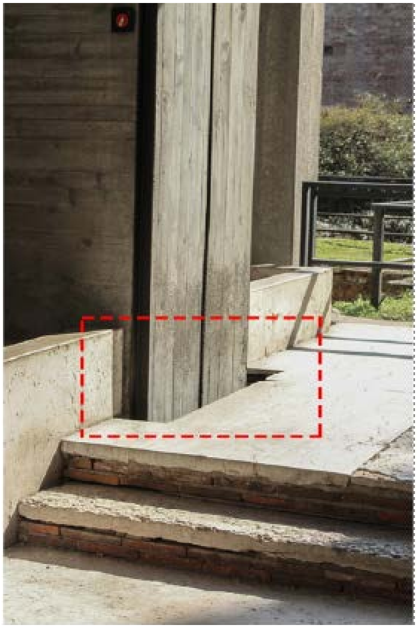
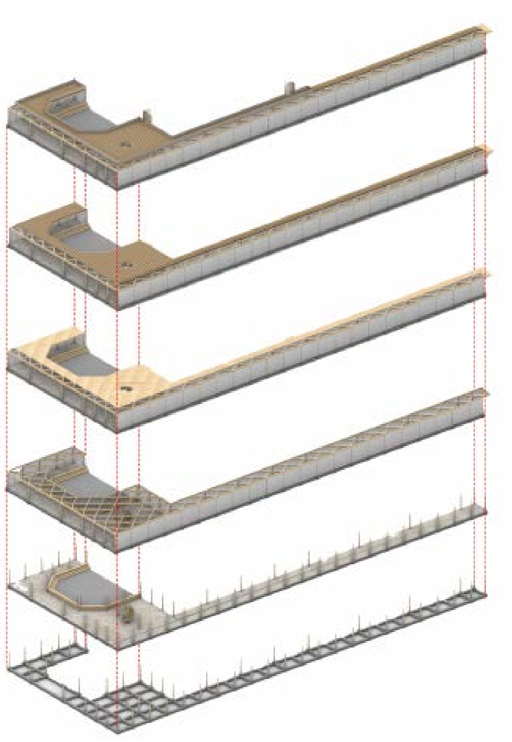


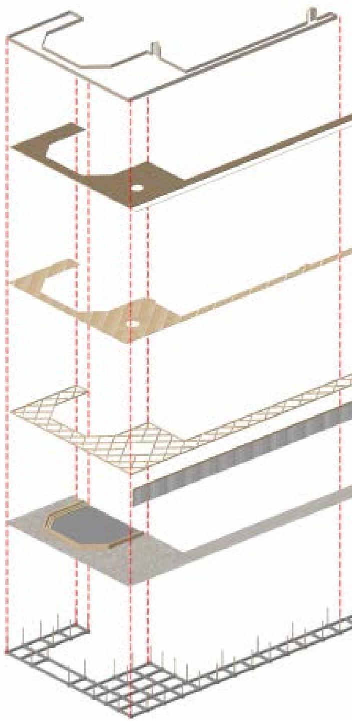
Fig. 04.40: Gap between existing and new structure, exterior

05.
STRUCTURAL DESIGN

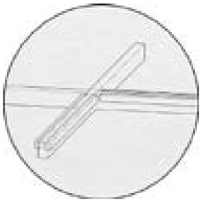
05.1
STRUCTURAL DESIGN OF THE PAVILION

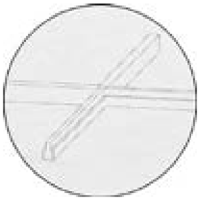
The pavilion structure was designed to be temporary and lightweight by utilizing current wood techniques, allowing us to remove or replace the parts as needed over time. Since we're not connecting the structure to the existing building, we are using a strip foundation, as shown in the design. We utilized GLULAM for the beams and columns. (Glulam is one-tenth the weight of steel and one-sixth the weight of concrete; the embodied energy required to create it is one-sixth that required to produce steel of equal strength.) We utilized X-LAM/CLT for the flooring (Cross Laminated Timber is the answer to constructing responsibly; Adding value to a natural, renewable resource through technology, constructing using XLam CLT panels is quick, safe, cost-effective, and environmentally friendly.)
As a result, we will meet the pavilion's structure efficiency and sustainability objectives.



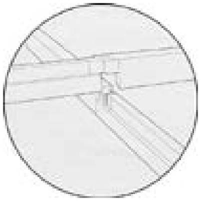


As part of our design process, we will go through a few phases for creating the framework as well as a few methods for attaching our elements.
Because our glulam elements are prefabricated and have a maximum length of 5 meters, we are employing them in a variety of on-site methods throughout the project.
We have a simple extending connection for joining glulam beams, as shown in the figures.
In addition, because there is higher stress on the terrace area, we employ two distinct node connection strategies for the beam diagrid frame.
The initial connection, which is mostly for the passage beams, was made by making a simple cut within the beam and gluing them together. We also cut almost one-third of each diagonal beam to insert our flooring (x-lam panels) inside our diagonal frame.
The second connection is the pavilion´s courtyard connection; because the terrace is bearing greater weights, we installed steel connections within the nodes and concealed them by connecting the beams. Also, the same one-third cut for all four sides of the beams to fit the flooring underneath.


Glulam beam cut


Beam diagrid cut


Fill with X-lam


Connection n.1


Connection n.2

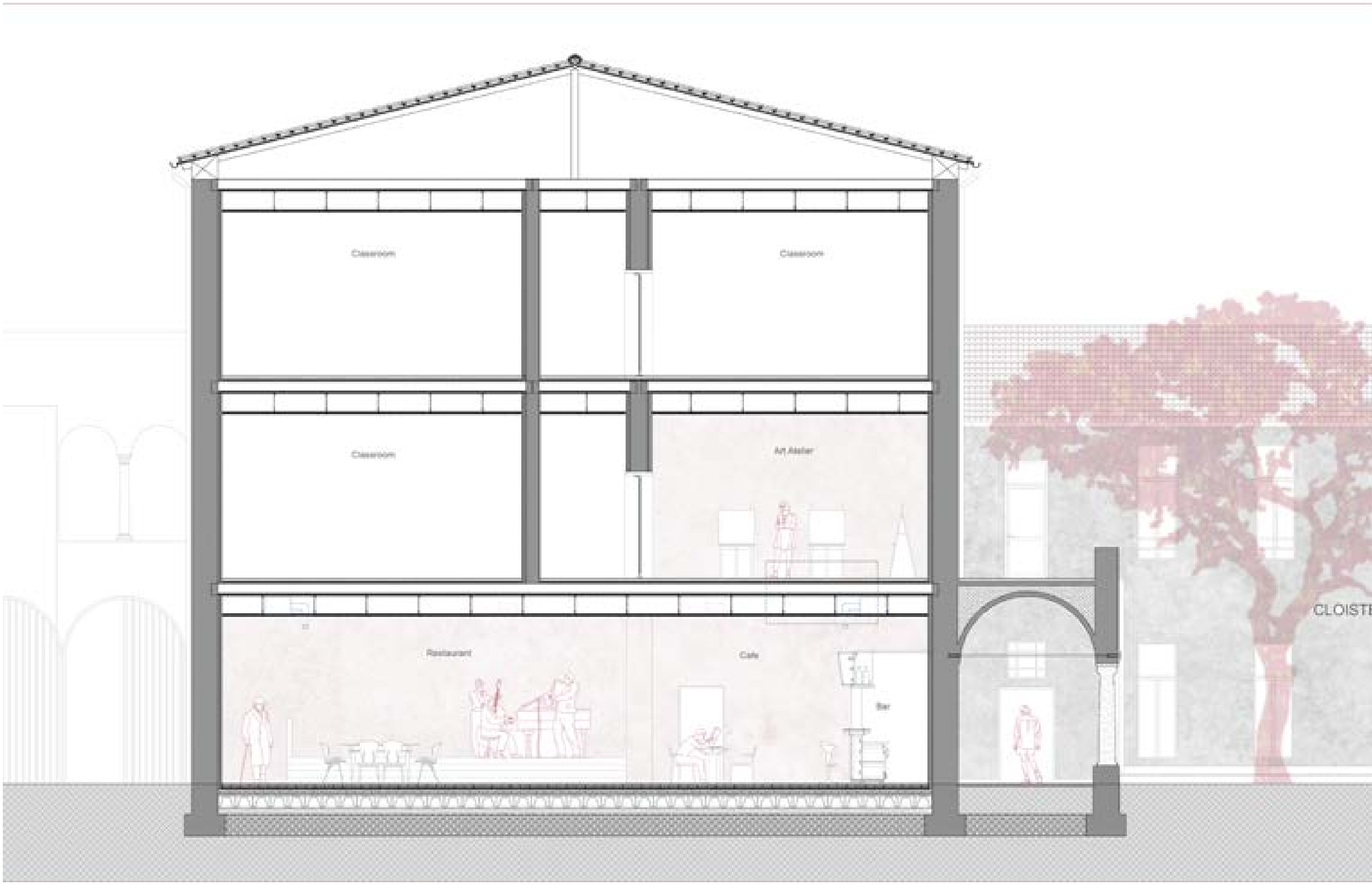

X-lam panels

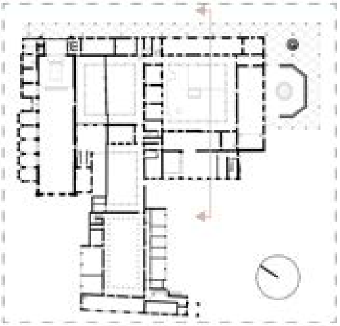

Lengthening Connection

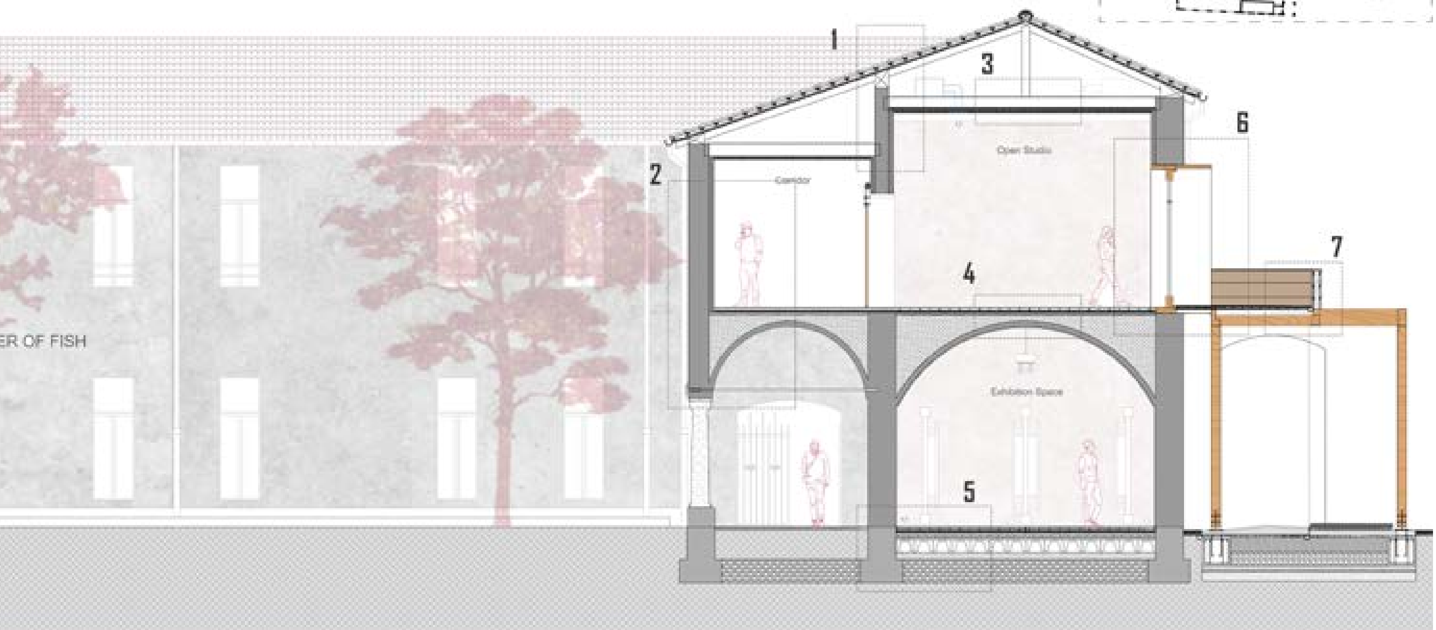

Passage Beam connection


Pavilion main connection secondary beams

05.2 CONSTRUCTION DETAILS-section







1
2
3
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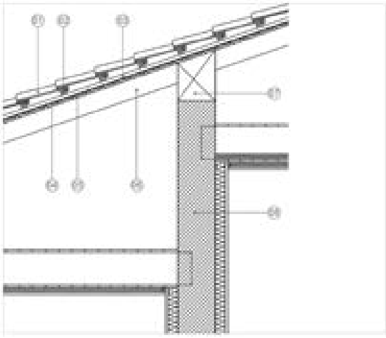
7
Corridor
Open Studio
Exhibition Space
ER OF FISH

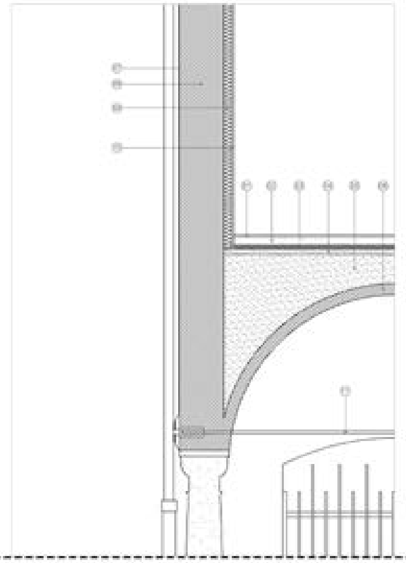
BUILDING DETAILS

1



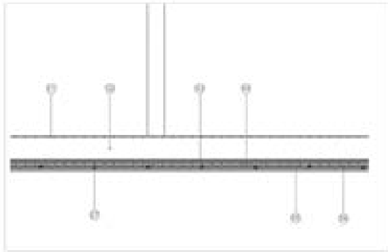
01- Terracotta Roof Tiles
02- Timber Batten 30x50 mm
03- Lath
04- Waterproof Membrane
05- Wooden Planks
06- Rafter
07- Wooden Beam
08- Masonry Wall

1



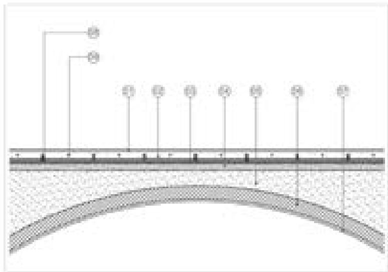
01- Tiles
02- Screed
03- Rockwool Comfortboard Rigid Insulation
04- Screed
05- Sand Filling
06- Masonry Cross Vault
07- Plaster
08- Masonry Wall
09- Rockwool Comfortbatt Soft Insulation
10- Gypsum Plastered Board
11- Tie Rod

3



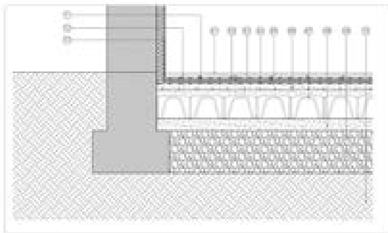
01- Wooden Plank
02- Wooden Beam
03- Rockwool Comfort
04- Wooden Plank

4



01- Epoxy Concrete Fl
02- Screed 60mm
03- Rockwool Comfor
04- Screed 60mm
05- Sand Filling
06- Masonry Cross V

5



01- Epoxy Concrete Fl
02- Screed 60mm
03- Polythene Layer
04- Rigid Foil Faced B
05- Damp Proof Mem
06- Reinforced Concr
07- Iglu System H30

tbatt Soft Insulation

05- Acoustic Insulation
06- Gypsum Plastered Board
07- C Profiles

oor Finishing

rtboard Rigid Insulation

07- Plaster
8- Short Pipe Stable
9- Speedfit 15mm B-Pex Pipe

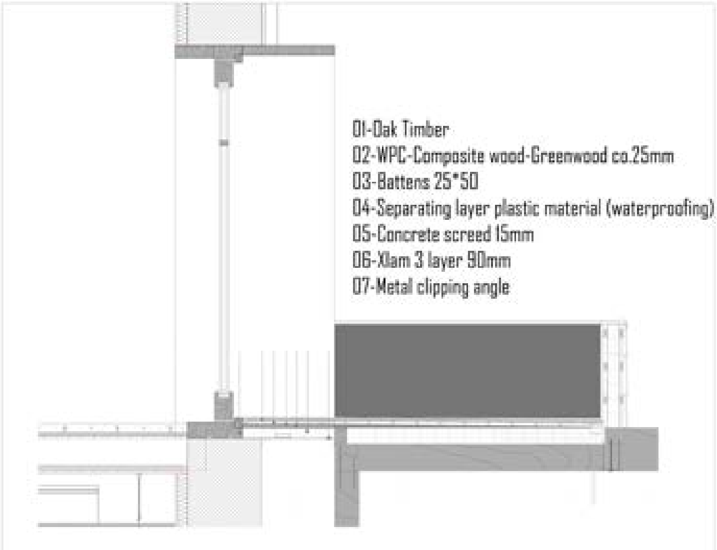
ault

oor Finishing

oard Floor Insulation 50mm
brane
rete 110mm

08- Lean Concrete 150mm
09- Gravel
10- Soil
11- Short Pipe Stable
12- Speedfit 15mm B-Pex Pipe
13- Edge Insulation Strip

6



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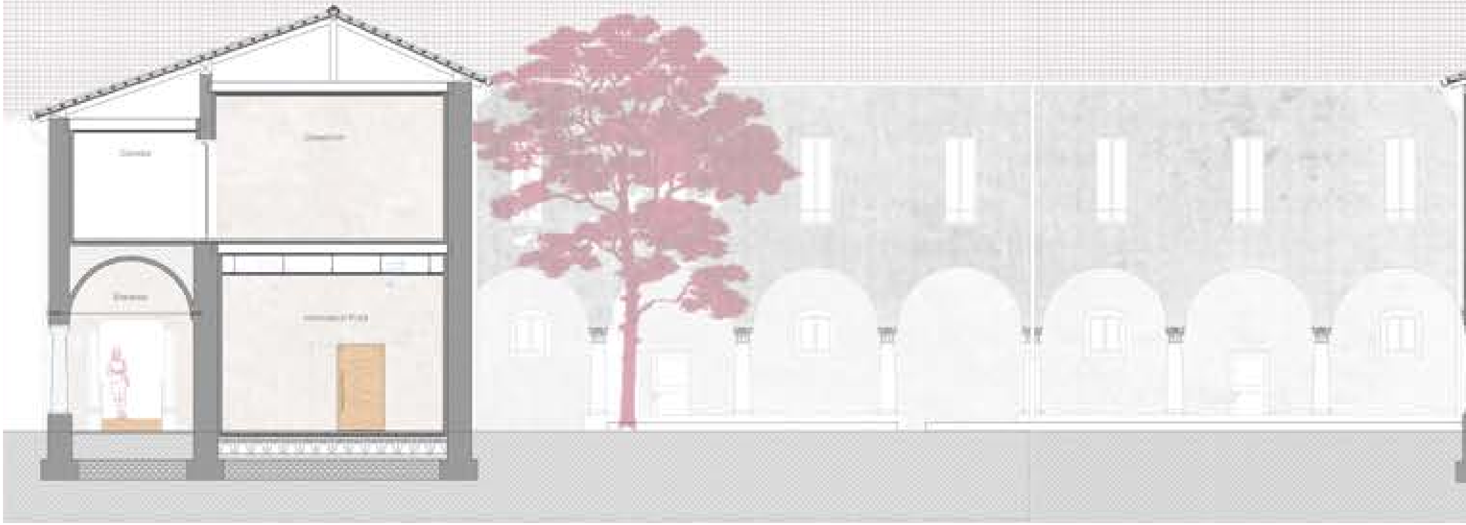
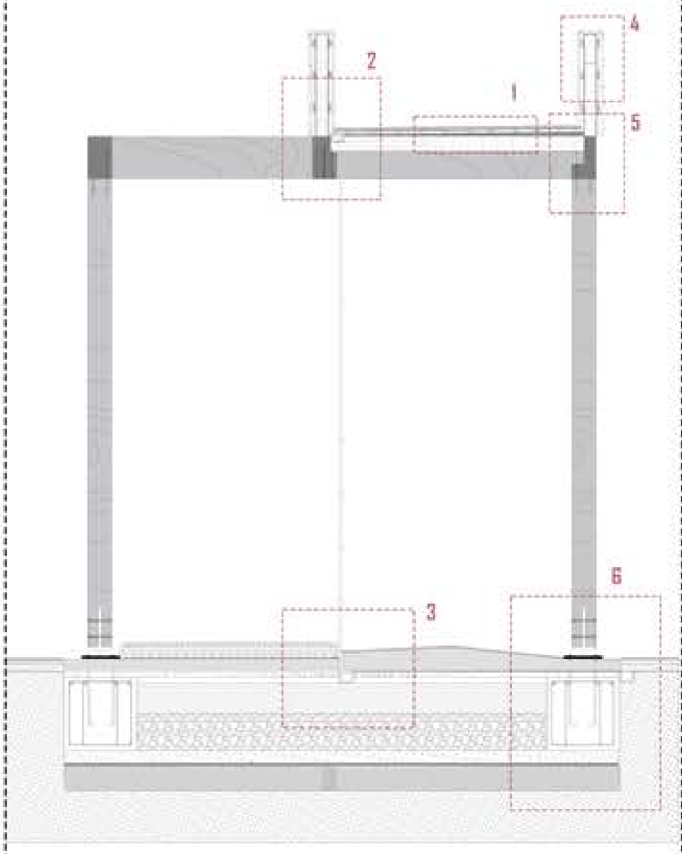
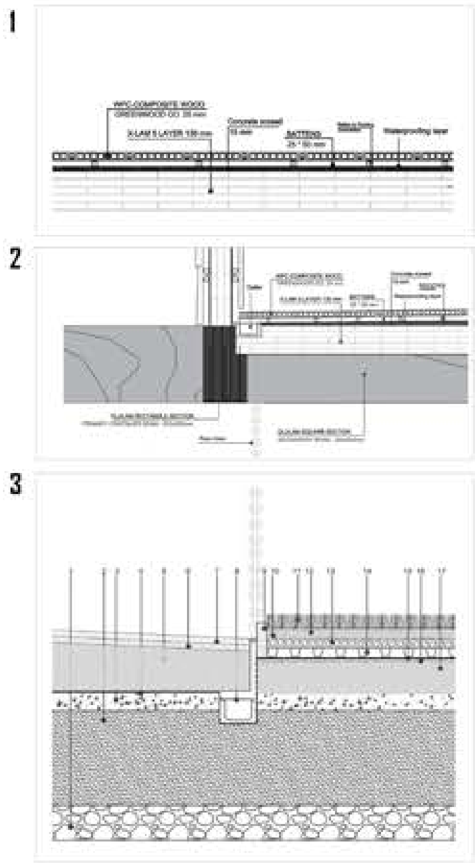
05.2 CONSTRUCTION DETAILS-section



PAVILION STRUCTURE DETAILS





01- Cruseh Aggregate
02- Cement
03- Lightweight Concrete
04- Separating Layer plastic mate
05- Cement Screed 100mm,2% slo
06- Concrete Screed 10mm
07- Imagecrete Exposed
Decorative concrete 30mm
08- Gutter
09- Curb 30*40mm
10- Perforated Aluminium curb

11- Low plants,herbs
12- Growth soil 35mm
13- Drainage layer
Lightweight granular mix 30mm
14- Anti root barrier 30mm
15- waterproof layer
16- Concrete screed 10mm
17- Cement screed 100mm

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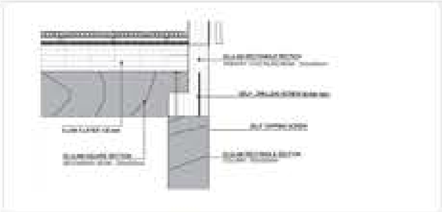
4

5



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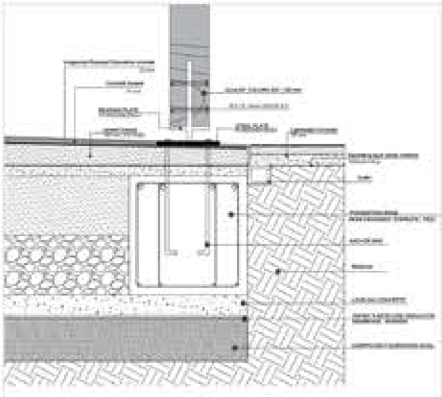
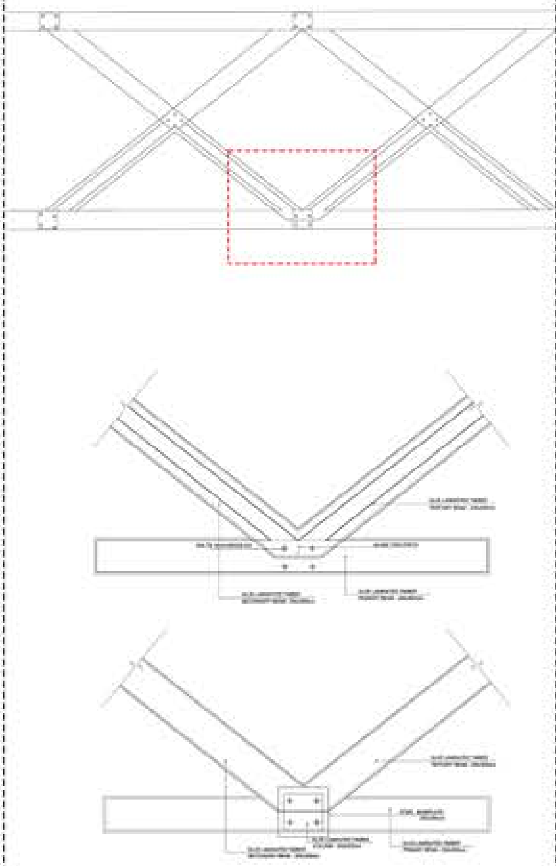
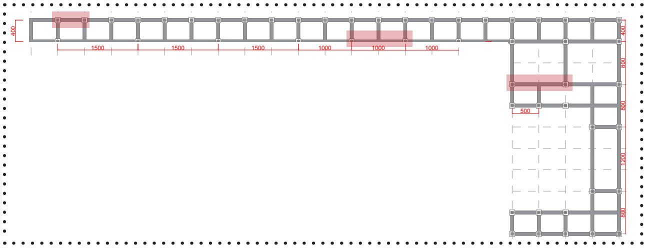




05.3 NUMERICAL COMPUTATION

Calculations- Beam

HYPOTHESIS TYPE 150*350 mm
GLULAM -GRADE 10



Roof/Floor-Exterior (terrace)	Name of layer	Material Selection	thickness (mm)	thickness(m)	Density (kn/m^3)	Self weight (kn/m^2)	Length of influence area(m)	g(KN/m)	γ	Pd(dead load)(KN/m)
	CROSS LAMINATED TIMBER	X-LAM	135	0.135	---	0.68	2	1.36	1.3	1.768
	CONCRETE SCREED	Tarmac Screed	15	0.015	8	0.12		0.96		0.96
	WPC PACK	Sundi wpc	50	0.05	12.06	0.603		7.27218		7.27218
Total			200			1.403		2.806		3.6478

1-Beam	b	h	weight(kn/m)	γ	Pd(dead load)(KN/m)
	0.15	0.35	0.272	1.3	0.3536
2-Beam	b	h	weight(kn/m)	γ	Pd(dead load)(KN/m)
	0.2	0.35	0.322	1.3	0.4186
3-Beam	b	h	weight(kn/m)	γ	Pd(dead load)(KN/m)
	0.2	0.35	0.418	1.3	0.5434

Variable	load(KN/m^2)	length of influence area(m)	q(KN/m)	γ	Pd(live loads)(KN/m)
	2.6	2	5.2	1.5	7.8

1-Pd(KN/m)	flooring	beam	variable	Total
	2.806	0.272	5.2	8.278
2-Pd(KN/m)	flooring	beam	variable	Total
	2.806	0.322	5.2	8.328
3-Pd(KN/m)	flooring	beam	variable	Total
	2.806	0.418	5.2	8.424

1-Pd(KN/m)SAFETY coef	flooring	beam	variable	Total
	3.6478	0.3536	7.8	11.8014
2-Pd(KN/m)SAFETY coef	flooring	beam	variable	Total
	3.6478	0.4186	7.8	11.8664
3-Pd(KN/m)SAFETY coef	flooring	beam	variable	Total
	3.6478	0.5434	7.8	11.9912

1-Med(KNm)	Pd(KN/m)	length of beam	Med(KNm)	max bending moment	length of beam	max bending moment
	11.8014	5	36.879375	47.63	2*5=10	95.26
2-Med(KNm)	Pd(KN/m)	length of beam	Med(KNm)	max bending moment	length of beam	max bending moment
	11.8664	5	37.0825	53.45	10	106.9
3-Med(KNm)	Pd(KN/m)	length of beam	Med(KNm)	max bending moment	length of beam	max bending moment
	11.9912	5	37.4725	67.51	10	135.02

As(m^2)	Med(KNm)	max bending moment	d(m)	d*(m)	As(m^2)	As(mm^2)
	36.879375	47.63	1	0.9	0.860320876	860320.8762

COMPARISON ON DEFLECTION

Floor Max Deflection ⩽ L (Span) / 250
Deflection simply supported beam with uniform load: Pd x L^4 x 5/384 EI

Modulus of Elasticity E = 1800000 psi / 12410560 (KN/m^2)

moment of inertiai   I= 1257.7 psi / 0.00052 (m^4)

L=span= 5 m -10 m / designed width of influence area = 2 m

pd (unifirm load carried) = 10.26 (KN/m)

L = Span (m)	Designed Width of Influenced area (m)	Pd = Uniform Load Carried (KN/m)	Hypothsis Type	Max Deflection = Pd x L^4 x 5/384 EI (m)	L/ 250	Possibility (true if usable)
5	2	max bending moment	GR10-GLULAM 5*14 in	0.1352	0.2	TRUE

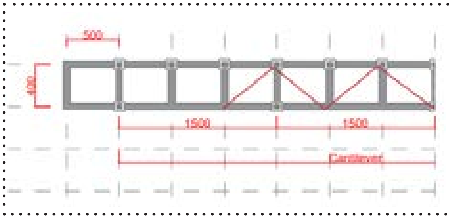
Max Deflection = Pd x L^4 x 5/384 EI (m)	L/ 250	Possibility (true if usable)
0.1352	0.2	TRUE

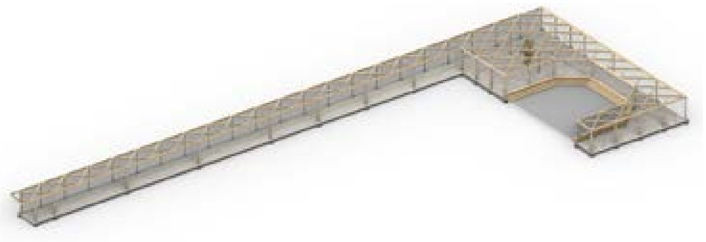
we can use (GRADE 10)
90*400 mm
140* 355 mm
150*350 mm
200*350 mm

Due to the design as we need a bigger beam for the span of 10m which can be covered with 2, 5m glulam beams the size should be bigger than the minimum size ,so we choosed: 200 * 350 mm

Calculations- Columns

DIAGONAL BEAM: 6.5m
INFLUENCE LENGTH :2.35





Roof/Floor-Exterior (terrace)	Name of layer	Material Selection	thickness (mm)	thickness(m)	Density (kn/m^3)	Self weight (kn/m^2)	Length of influence area(m)	g(KN/m)	Υ	Pd(dead loads)(KN/m)
	CROSS LAMINATED TIMBER	X-LAM	135	0.135	—	0.68	10	6.8	1.3	8.84
	CONCRETE SCREED	Tarmac Screed	15	0.015	8	0.12		0.96		0.96
	WPC PACK	Sundi wpc	50	0.05	12.06	0.603		7.27218		7.27218
Total			200			1.403		14.03		18.239

Beam	b	h	weight(kn/m)	Beam influence length(m)	g(KN)	Υ	Pd(dead load)(KN/m)
	0.15	0.35	0.272	5	1.36	1.3	1.768

Column	Width(m)	Length(m)	Selfweight(kn/m)	Column height(m)	g(KN)	Υ	Pd(dead load)(KN/m)
	0.15	0.2	0.272	4	1.088	1.3	1.4144

Variable	load(KN/m^2)	length of influence area(m^2)	q(KN/m)	Υ	Pd(live loads)(KN/m)
	2.6	10	26	1.5	39

Pd(KN/m)=Ned	flooring	beam	Column	variable	Total
	18.239	1.768	1.4144	39	59.007

fy	265 psi	A=Ned/fy	
	1827 kn/m^2	0.032297209	0.03 < 0.052
GLULAM HYPOTHESIS		0.052	TRUE

we can use (GRADE 10)
150*150mm
150* 350 mm
90 * 400 mm
210*380 mm

Calculation References

CROSSLAMINATED TIMBER(X-LAM) FLOORING PANELS

Max load floor 253 (PLF)=> 12.11 KN/m^2

GLUE LAMINATED TIMBER (GLULAM) BEAMS & COLUMNS

-FLOORING : X-LAM 5 LAYER THICKNESS 135 mm
-BEAMS : GLULAM 200 * 350 mm- GRADE 10
-COLUMNS : GLULAM 200 * 220 mm - GRADE 10
-PARAPET : X-LAM 3 LAYER THICKNESS 96 mm

3½" and 5½" Roof Load Tables – 125% Non-Snow

24F-V4 Grade – 125% Load Duration
In pounds per lineal foot (PLF)

Span (ft)	Span Type	3½" 4.5"	6"	7.5"	9"	10.5"	12"	13.5"	15"	5½" 9"	10.5"	12"	13.5"	15"
28	Simple	-	-	-	44	73	112	163	226	69	115	178	254	356
	Multiple	-	-	-	80	99	151	197	242	95	158	234	295	363
	Min. Bearing	-	-	-	1.5/3	1.5/3	1.5/3	1.5/3.2	1.5/3.9	1.5/3	1.5/3	1.5/3	1.5/3.1	1.5/3.7
30	Simple	-	-	-	-	58	89	130	182	54	91	140	205	286
	Multiple	-	-	-	-	79	121	165	208	75	124	195	263	311
	Min. Bearing	-	-	-	-	1.5/3	1.5/3	1.5/3	1.5/3.6	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3.3
32	Simple	-	-	-	-	46	72	105	147	42	72	113	165	232
	Multiple	-	-	-	-	63	98	142	180	59	100	154	219	269
	Min. Bearing	-	-	-	-	1.5/3	1.5/3	1.5/3	1.5/3.4	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3.2
34	Simple	-	-	-	-	-	58	86	121	-	58	91	136	190
	Multiple	-	-	-	-	-	80	117	157	-	81	125	183	234
	Min. Bearing	-	-	-	-	-	1.5/3	1.5/3	1.5/3.2	-	1.5/3	1.5/3	1.5/3	1.5/3
36	Simple	-	-	-	-	-	47	71	100	-	47	74	111	157
	Multiple	-	-	-	-	-	66	96	135	-	66	103	151	206
	Min. Bearing	-	-	-	-	-	1.5/3	1.5/3	1.5/3	-	1.5/3	1.5/3	1.5/3	1.5/3
38	Simple	-	-	-	-	-	-	58	83	-	-	61	92	130
	Multiple	-	-	-	-	-	-	80	113	-	-	85	126	179
	Min. Bearing	-	-	-	-	-	-	1.5/3	1.5/3	-	-	1.5/3	1.5/3	1.5/3
40	Simple	-	-	-	-	-	-	49	69	-	-	50	78	109
	Multiple	-	-	-	-	-	-	67	95	-	-	71	106	149
	Min. Bearing	-	-	-	-	-	-	1.5/3	1.5/3	-	-	1.5/3	1.5/3	1.5/3

8¾" Roof Load Tables – 125% Non-Snow

24F-V4 Grade – 125% Load Duration
In pounds per lineal foot (PLF)

Span (ft)	Span Type	9"	10.5"	12"	13.5"	15"	16.5"	18"	19.5"	21"	22.5"	24"
16	Simple	673	1077	1573	1970	2410	2892	3414	3978	4583	5229	5913
	Multiple	692	903	1209	1512	1950	2221	2623	3057	3522	4019	4546
	Min. Bearing	1.5/3	1.5/3.4	2.2/4.3	2.8/5.4	3.4/6.6	4.1/7.9	4.9/9.4	5.7/10.9	6.5/12.5	7.4/14.3	8.4/16.2
18	Simple	457	750	1127	1532	1875	2250	2658	3098	3569	4072	4606
	Multiple	538	724	938	1174	1439	1726	2040	2378	2741	3128	3539
	Min. Bearing	1.5/3	1.5/3	1.8/3.8	2.5/4.8	3/5.8	3.6/7	4.3/8.2	5/9.6	5.7/11	6.5/12.6	7.4/14.2
20	Simple	335	540	814	1157	1496	1797	2123	2474	2852	3254	3682
	Multiple	427	576	745	936	1146	1377	1627	1898	2188	2497	2826
	Min. Bearing	1.5/3	1.5/3	1.5/3.4	2.1/4.2	2.7/5.2	3.2/6.2	3.8/7.3	4.4/8.5	5.1/9.8	5.8/11.2	6.6/12.6
22	Simple	247	400	605	870	1201	1464	1731	2018	2326	2655	3005
	Multiple	331	467	606	761	932	1121	1325	1546	1783	2036	2304
	Min. Bearing	1.5/3	1.5/3	1.5/3.1	1.7/3.8	2.4/4.7	2.9/5.6	3.4/6.6	4/7.7	4.6/8.8	5.2/10.1	5.9/11.4
24	Simple	186	303	461	660	918	1214	1435	1674	1930	2204	2494
	Multiple	251	386	500	629	771	928	1096	1281	1476	1688	1911
	Min. Bearing	1.5/3	1.5/3	1.5/3	1.5/3.5	2/4.2	2.6/5.1	3.1/6	3.6/7	4.2/8	4.8/9.2	5.4/10.3
26	Simple	142	234	357	516	715	959	1207	1409	1625	1855	2101
	Multiple	193	315	418	527	647	779	922	1078	1242	1419	1607
	Min. Bearing	1.5/3	1.5/3	1.5/3	1.5/3.2	1.7/3.8	2.3/4.7	2.8/5.5	3.3/6.4	3.8/7.4	4.4/8.4	4.9/9.5
28	Simple	110	183	281	407	566	761	995	1200	1384	1581	1790
	Multiple	151	247	355	447	549	661	783	915	1057	1208	1368
	Min. Bearing	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3.6	2/4.3	2.5/5.1	3.1/5.9	3.5/6.8	4/7.7	4.5/8.7
30	Simple	86	144	223	326	454	612	802	1027	1191	1361	1542
	Multiple	119	197	302	385	471	567	673	788	906	1038	1177
	Min. Bearing	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3.3	1.7/4	2.2/4.7	2.8/5.5	3.3/6.3	3.7/7.2	4.2/8.1

Classification of Roofs and Canopies

Class		Specific Use
7	7A	Inaccessible roofs and flat roofs (where no access is provided to the roof except such access as may be necessary for maintenance work only)
	7B	Accessible roofs (where access is provided in addition to such access as may be necessary for maintenance work only) or for use of Class 1 to 6
	7C	Accessible flat roofs or for use of Class 1 to 6[1]
	7D	Canopies[1]

Minimum Imposed Loads on Roofs and Canopies

Class	Roof Slope	q_k (kPa)	Q_k (kN)
7A	Of or less than 5°	2.0	1.5
	Greater than 5° but of or less than 20°	0.75	
	Of 40° or greater	0	
7B	Of or less than 20°	As given in Table 3.2, 3.4 and 3.5 according to the specific use but q_k not less than 2.0 kPa and Q_k not less than 1.5 kN	
	Of 40° or greater	0	0
7C	Not applicable	As given in Table 3.2, 3.4 and 3.5 according to the specific use but q_k not less than 2.0 kPa and Q_k not less than 1.5 kN	
7D	Not Applicable	2.0	1.5

Notes : 1 For roof slopes greater than 20° but less than 40°, the value of q_k may be determined by linear interpolation.

Glued-Laminated Timber with Different Assembly Patterns

Me10	22.6	10336	40.9	10828

Floor joist calculater

C16	Dead load per square metre (in kN/m²) supported by joists								
	Not more than 0.25			More than 0.25 but not more than 0.5			More than 0.5 but not more than 1.25		
	Centre to centre spacing of joists (in mm)								
Joist size Width × depth (mm)	400	450	600	400	450	600	400	450	600
	Permissible clear span (metres)								
38 × 95	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
38 × 120	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
38 × 145	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
38 × 170	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
38 × 195	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
38 × 220	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Calculation References-BEAM

6 3/4 * 13 1/2 (In) => 200*350 (mm)=>weight 0.322 KN/m
Max bending moment : 53.453 KN.m

8 3/4 * 13 1/2 (In)=> 200 *350 (mm)=>weight 0.418 KN/m
(usable for 30 (ft)=> 10m
Max bending moment : 67.517 KN.m

5 1/2 * 14 (In)=> 150*350 (mm)=>weight 0.272 KN/m
(usable for 16 (ft)=> 5m
Max bending moment : 47.636 KN.m

Calculation References-COLUMN

6 3/4 * 7 1/4 (In) => 200 *220 (mm)

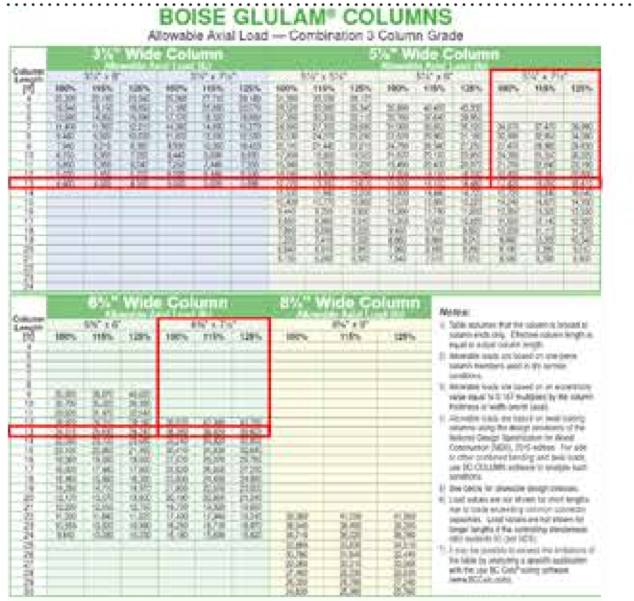
BOISE GLULAM® IJC Design Values

Width (in)	Depth (in)	Weight (plf)	Allowable Shear (lb)	Allowable Moment (ft-lb) (1)	Moment of Inertia (in⁴)
5½	11⅞	15.5	11539	25698	767.5
	14	18.7	13603	35135	1257.7
	16	21.4	15547	45281	1877.3

BOISE GLULAM® 24F-V4 Design Values

Width (in)	Depth (in)	Weight (plf)	Allowable Shear (lbs)	Allowable Moment (ft-lbs)	Moment of Inertia (in⁴)
3⅛	6	4.8	3313	3750	56.3
	7½	5.7	4141	5859	109.9
	9	6.8	4969	8438	189.8
	10½	8.0	5797	11484	301.5
	12	9.1	6625	15000	450.0
	13½	10.3	7453	18984	640.7
	15	11.4	8281	23438	878.9
	16½	12.5	9109	28359	1169.8
	18	13.7	9938	33750	1518.8
3½	4½	3.8	2783	2363	26.6
	6	5.1	3710	4200	63.0
	7½	6.4	4638	6563	123.0
	9	7.7	5565	9450	212.6
	10½	8.9	6493	12863	337.6
	12	10.2	7420	16800	504.0
	13½	11.5	8348	21263	717.6
	15	12.8	9275	26250	984.4
5⅛	6	7.5	5433	6150	92.3
	7½	9.3	6791	9609	180.2
	9	11.2	8149	13838	311.3
	10½	13.1	9507	18834	494.4
	12	14.9	10865	24600	738.0
	13½	16.8	12223	30770	1050.8
	15	18.7	13581	37589	1441.4
	16½	20.6	14939	45052	1918.5
	18	22.4	16298	53151	2490.8
	19½	24.3	17656	61881	3168.8
	21	26.2	19014	71237	3955.2
	22½	28.0	20372	81215	4864.7
	24	29.9	21730	91810	5904.0
5½	9	12.0	8745	14850	334.1
	10½	14.0	10203	20213	530.6
	12	16.0	11660	26214	792.0
	13½	18.0	13118	32769	1127.7
	15	20.1	14575	40056	1546.9
6¾	7½	12.3	8944	12656	237.3
	9	14.8	10733	18225	410.1
	10½	17.2	12521	24457	651.2
	12	19.7	14310	31520	972.0
	13½	22.1	16099	39425	1384.0
	15	24.6	17888	48163	1898.4
	16½	27.1	19676	57724	2526.8
	18	29.5	21465	68102	3280.5
	19½	32.0	23254	79288	4170.9
	21	34.5	25043	91276	5209.3
	22½	36.9	26831	104061	6407.2
	24	39.4	28620	117636	7776.0
8¾	9	19.1	13913	29048	531.6
	10½	22.3	16231	39891	844.1
	12	25.5	18550	39812	1260.0
	13½	28.7	20869	49798	1794.0
	15	31.9	23188	60834	2460.9
	16½	35.1	25506	72911	3275.5
	18	38.3	27825	86018	4252.5
	19½	41.5	30144	100147	5406.7
	21	44.7	32463	115290	6752.8
	22½	47.9	34781	131438	8305.7
	24	51.0	37100	148585	10080.0

Notes:
1) Allowable moment calculated using glulam volume factor (C_v) with a span length of 21 ft. Allowable moment shall be multiplied by (21/Span Length [ft])$^{1/10}$ for longer spans.



BOISE GLULAM® 24F-V4 Allowable Design Stresses

Bending F_b (psi): Tension Zone in Tension	Bending F_b (psi): Compression Zone in Tension	Horizontal Shear F_v (psi)	Modulus of Elasticity (Apparent) E (psi)	Tension Parallel to Grain F_t (psi)	Compression Parallel to Grain F_c (psi)	Compression Perpendicular to Grain $F_{c\perp}$ (psi)
2400	1850	265	1,800,000*	1100	1650	650

Calculation References

BOISE GLULAM® — Douglas Fir-Larch Solid Sawn Substitution Table

Floor Beam Applications (100%) Duration for BOISE GLULAM®

24F-V4 BOISE GLULAM® Equivalent Member

Span [ft]	4x6 Doug Fir-Larch Select Structural	4x6 No. 1	4x8 Doug Fir-Larch Select Structural	4x8 No. 1	4x10 Doug Fir-Larch Select Structural	4x10 No. 1	4x12 Doug Fir-Larch Select Structural	4x12 No. 1	6x8 Doug Fir-Larch Select Structural	6x8 No. 1	6x10 Doug Fir-Larch Select Structural	6x10 No. 1	6x12 Doug Fir-Larch Select Structural	6x12 No. 1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

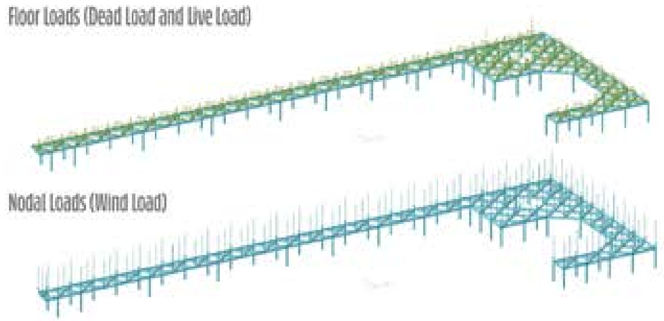
Load Duration %	Roof Load [psf] Live	Dead	Width of Bldg Segment [Feet]	Clear Span [feet] 6'-3"		9'-3"		12'-3"	
125	20	15	24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
115	25	15	24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
115	30	15	24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
115	40	15	24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

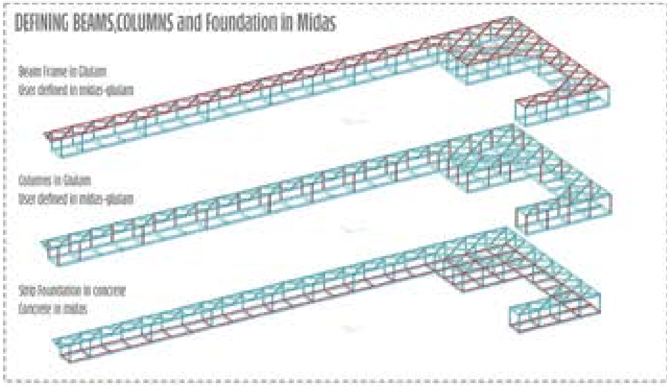
Load Duration %	Roof Load [psf] Live	Dead	Width of Bldg Segment [Feet]	12		16		20		24	
125	20	15	24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
115	25	15	24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
115	30	15	24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
115	40	15	24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

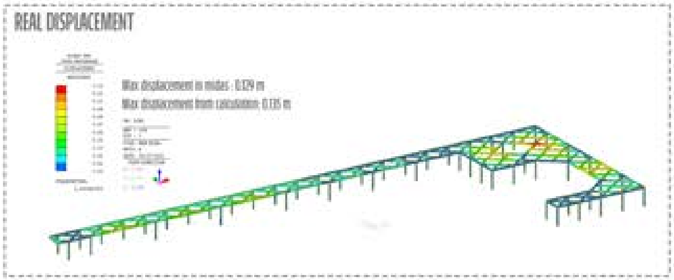
Load Duration %	Floor Load [psf] Live	Dead	Beam Support Spacing [Feet]	Width of Building Segment [feet] 24		28		32		36		40	
100%	40	12	6	3.125 x 10.5	2.1 / 5.2	3.125 x 12	2.5 / 6.2	3.125 x 12	2.9 / 7.1	3.125 x 13.5	3.2 / 7.9	3.125 x 15	3.5 / 8.7
				5.125 x 9	1.5 / 3.2	5.125 x 9	1.5 / 3.8	5.125 x 9	1.8 / 4.3	5.125 x 10.5	2.0 / 4.8	5.125 x 10.5	2.2 / 5.3
			8	3.125 x 13.5	2.8 / 6.9	3.125 x 15	3.2 / 8	3.125 x 15	3.7 / 9.1	3.125 x 16.5	4.1 / 10.1	3.125 x 18	4.5 / 11.1
				5.125 x 10.5	1.7 / 4.2	5.125 x 12	2.0 / 4.8	5.125 x 12	2.3 / 5.6	5.125 x 12	2.5 / 6.2	5.125 x 13.5	2.7 / 6.8
			10	3.125 x 16.5	3.4 / 8.4	3.125 x 16.5	3.9 / 9.7	5.125 x 15	2.7 / 6.7	5.125 x 15	3.0 / 7.4	5.125 x 15	3.3 / 8.1
				5.125 x 12	2.1 / 5.2	5.125 x 13.5	2.4 / 6	6.75 x 12	2.1 / 5.1	6.75 x 13.5	2.3 / 5.6	6.75 x 13.5	2.5 / 6.1
			12	5.125 x 15	2.4 / 6	5.125 x 16.5	2.8 / 6.9	5.125 x 16.5	3.1 / 7.8	5.125 x 18	3.4 / 8.5	5.125 x 18	3.7 / 9.2
				6.75 x 13.5	1.9 / 4.8	6.75 x 13.5	2.1 / 5.3	6.75 x 15	2.4 / 5.9	6.75 x 15	2.6 / 6.5	6.75 x 16.5	2.8 / 7
			14	5.125 x 16.5	2.8 / 6.9	5.125 x 18	3.2 / 7.8	5.125 x 19.5	3.5 / 8.7	5.125 x 19.5	3.8 / 9.5	5.125 x 21	4.1 / 10.2
				6.75 x 15	2.1 / 5.2	6.75 x 16.5	2.4 / 6	6.75 x 16.5	2.7 / 6.6	6.75 x 18	2.9 / 7.2	6.75 x 18	3.1 / 7.7
			16	5.125 x 19.5	3.1 / 7.6	5.125 x 21	3.5 / 8.7	5.125 x 21	3.9 / 9.6	5.125 x 22.5	4.2 / 10.4	5.125 x 22.5	4.4 / 11
				6.75 x 16.5	2.4 / 5.8	6.75 x 18	2.7 / 6.6	6.75 x 19.5	2.9 / 7.3	6.75 x 19.5	3.2 / 7.9	6.75 x 21	3.4 / 8.4
			18	5.125 x 21	3.4 / 8.4	5.125 x 22.5	3.8 / 9.4	5.125 x 24	4.2 / 10.5	5.125 x 24	4.5 / 11.1	6.75 x 22.5	3.6 / 8.9
				6.75 x 19.5	2.6 / 6.4	6.75 x 19.5	2.9 / 7.2	6.75 x 21	3.2 / 7.9	6.75 x 22.5	3.4 / 8.4		

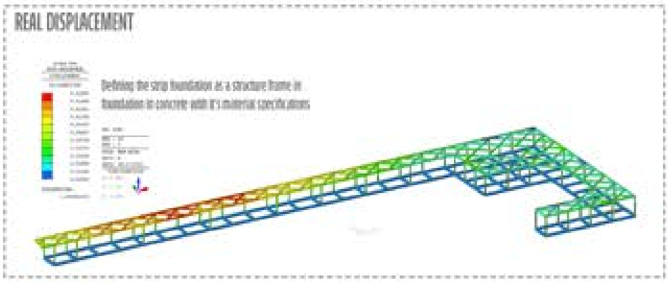
05.4
MIDAS ANALYSIS

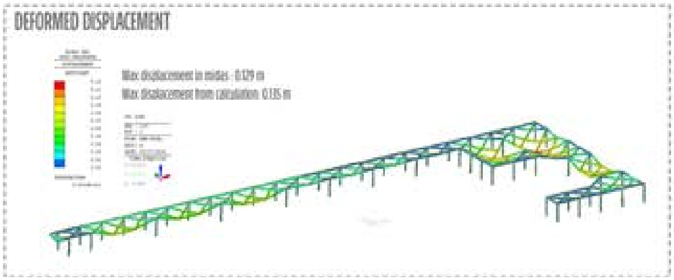
For the Midas analysis, we defined two types of loads: flooring load (dead load and live load), Nodal Load (wind load). We also used the load combination for the analysis, considering the safety coefficients (dead load:1.3 and live load:1.5)
As we used lumber for the framework, in Midas, we user-defined the material characteristics of our beams and columns based on the tables and computations.
Even though we had a strip foundation, we performed our study before and after releasing the column ends and installing a structural foundation frame in concrete material.

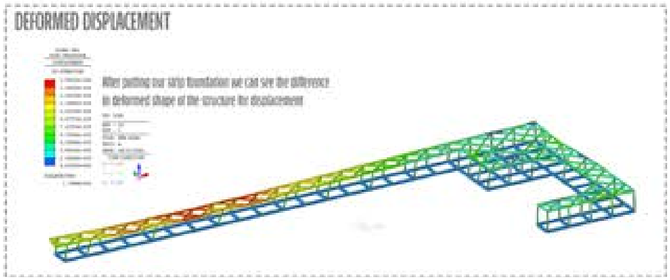




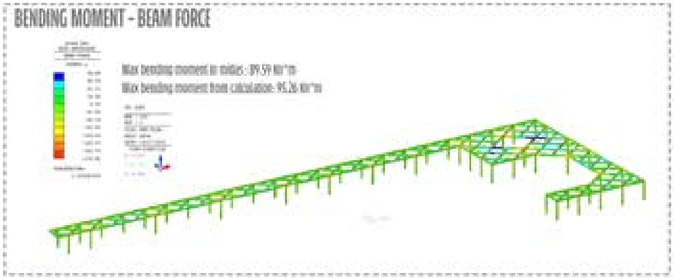


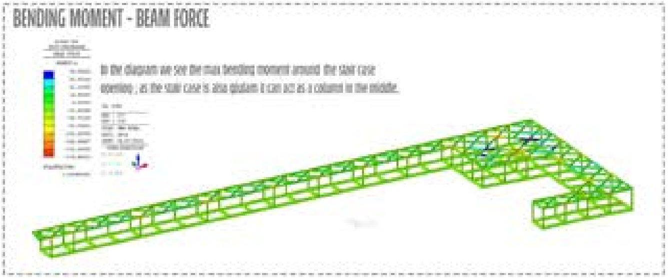


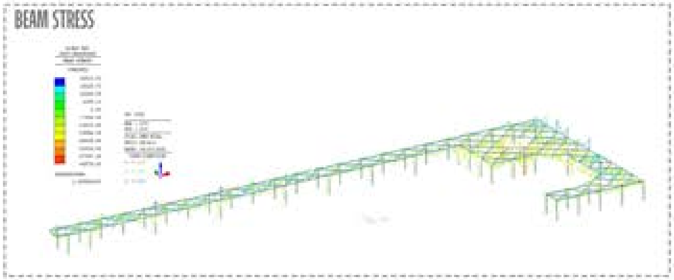


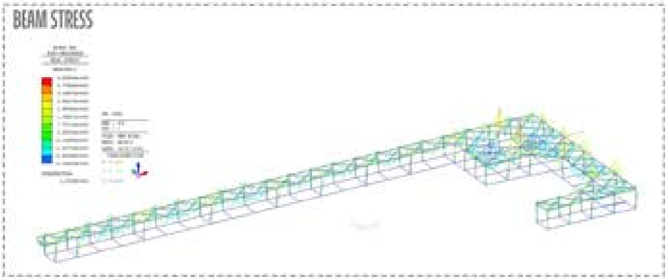


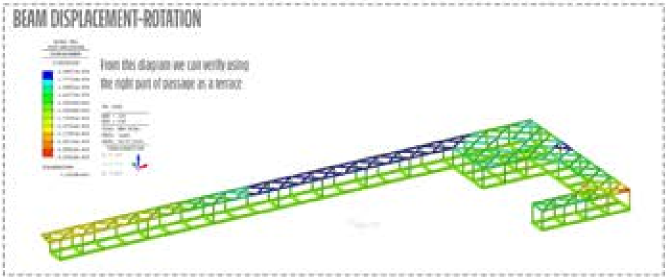
The maximum bending moment in Midas analysis is bringing the largest span of 10m, which is the opening we have for the staircase; following the maximum bending moment from the hand calculation also table, we noticed the size of glulam we were using is acceptable.
Also, by comparing the maximum value of displacement from Midas to the maximum value from the manual calculation, it looks that we are selecting the proper size of the glulam.
Also, The story drift shown in the result panel, shows that the vertical parts across the axis are fine.











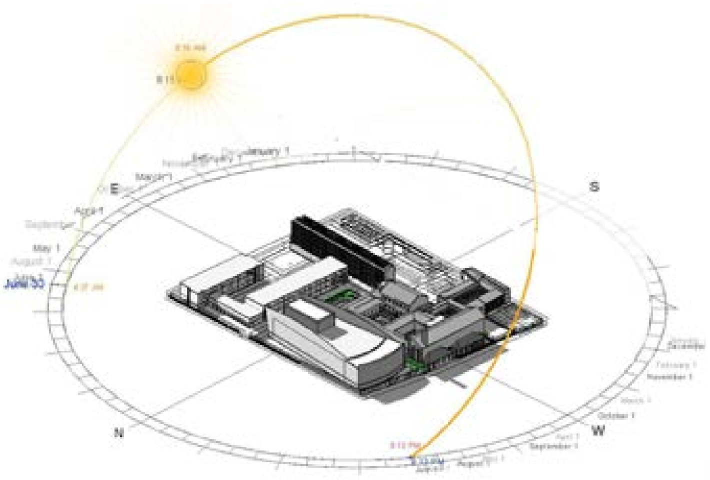
06.
TECHNOLOGYANDDESIGNINBIM ENVIRONMENT

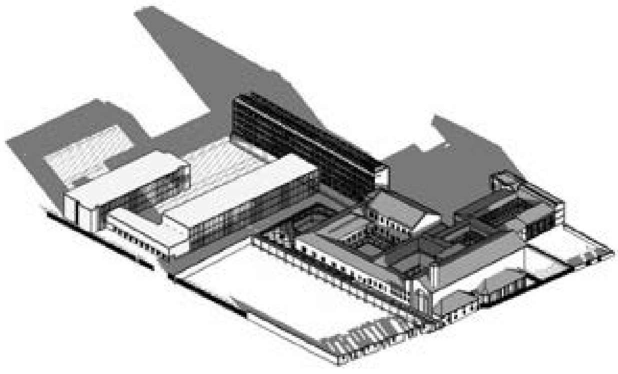
06.1 SOLAR ANALYSIS

SOLAR ANALYSIS
INSIGHT 360 ANALYSIS-REVIT

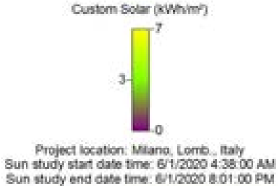
We collected our solar study using rhino (ladybug) for the overall site analysis following the position of the site in Milan and Revit (Insight 360) for the particular location of Umanitaria.

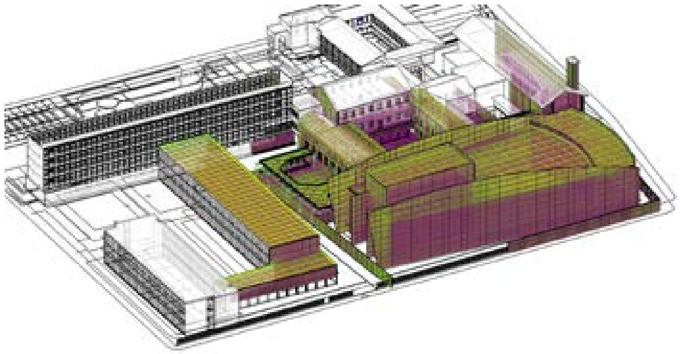
Performing these solar analyses was critical for the project because we′ re doing some restoration work on the main facade (church facade), such as substituting the window glasses and shutters.
Also, because our pavilion is located on the northeast facade and continues until the southeast, we should receive a lot of solar radiation. However, because the Tribunale building was blocking the radiation from coming directly through the pavilion, we have the least amount of radiation through our passage, as shown in the figures. We also tried to analyze without the building in front, as a result, we noticed that the facade and pavilion are taking a moderate range of solar radiations, thus we can consider the building to have a longer life since it is less exposed to solar radiation.

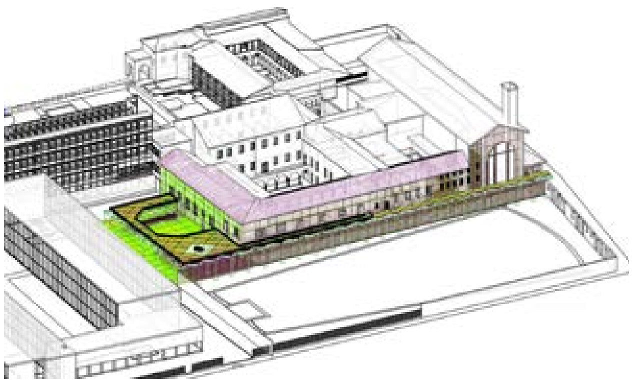


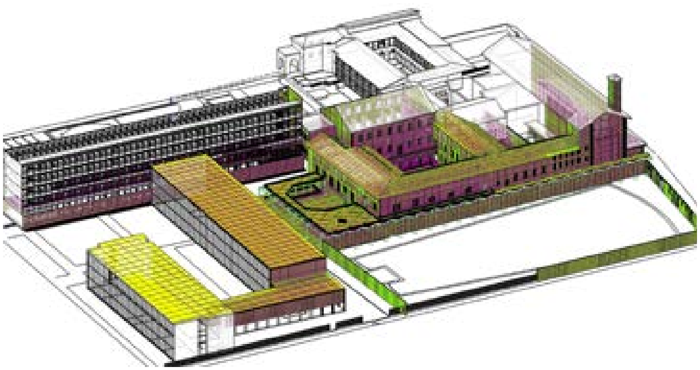


SOLAR ANALYSIS
INSIGHT 360 ANALYSIS-REVIT

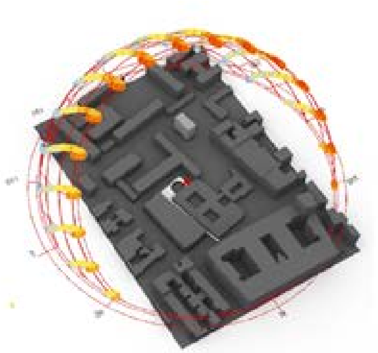


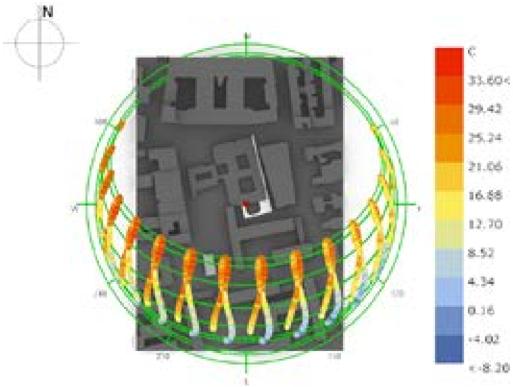


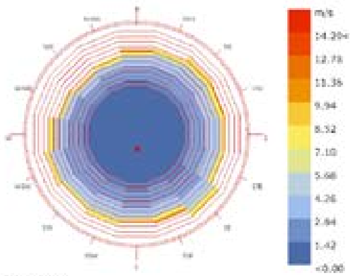




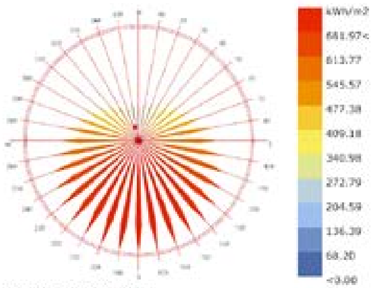
SOLAR ANALYSIS
LADYBUG ANALYSIS-RHINO



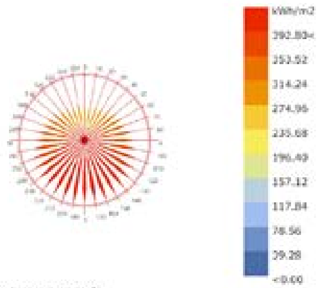




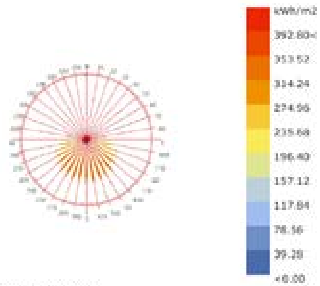
Wind-Rose
Milano-Linate_ITA
1 JAN 1:00 - 31 JUL 24:00
Hourly Data: Wind Speed (m/s)
Calm for 54.46% of the time = 2771 hours.
Each closed polyline shows frequency of 0.4%. = 18 hours.



Total Radiation(kWh/m2)
Milano_Linate_ITA_2005
1 JAN 1:00 - 31 DEC 24:00

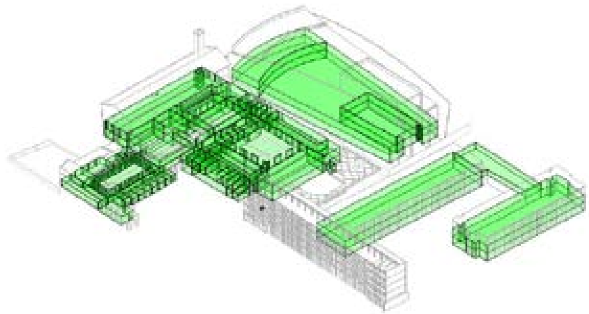


Diffuse Radiation(kWh/m2)
Milano_Linate_ITA_2005
1 JAN 1:00 - 31 DEC 24:00



Direct Radiation(kWh/m2)
Milano_Linate_ITA_2005
1 JAN 1:00 - 31 DEC 24:00

HEATING AND COOLING SYSTEM
INSIGHT 360 ANALYSIS-REVIT



BUILDING TYPE

type in revit : convention center

exhibition space:
space type revit: general exhibition space-museum

lobby:
space type revit : lobby-waiting area

fresco hall:
space type revit: Audiencce-theatr & performing area with seats

fresco lobby:
space type revit : lobby for audience of fresco hall

meeting area:
space type revit: conference & meeting room / multipurpose

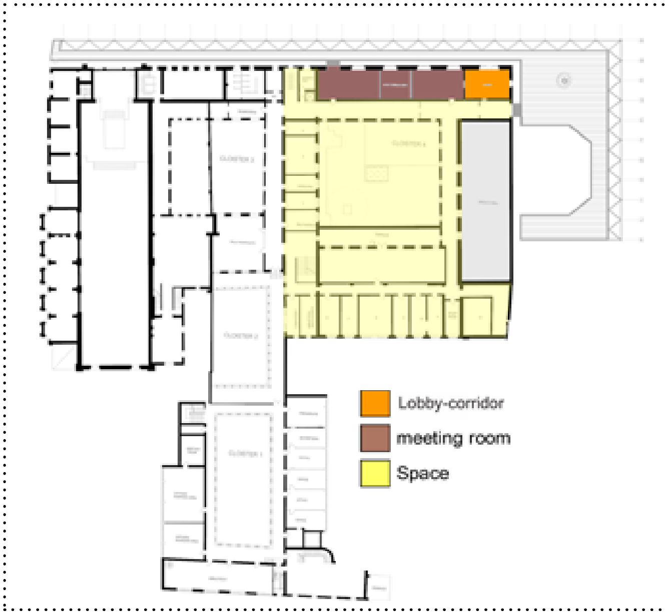
lobby-corridor:
space type revit: corridor / transition

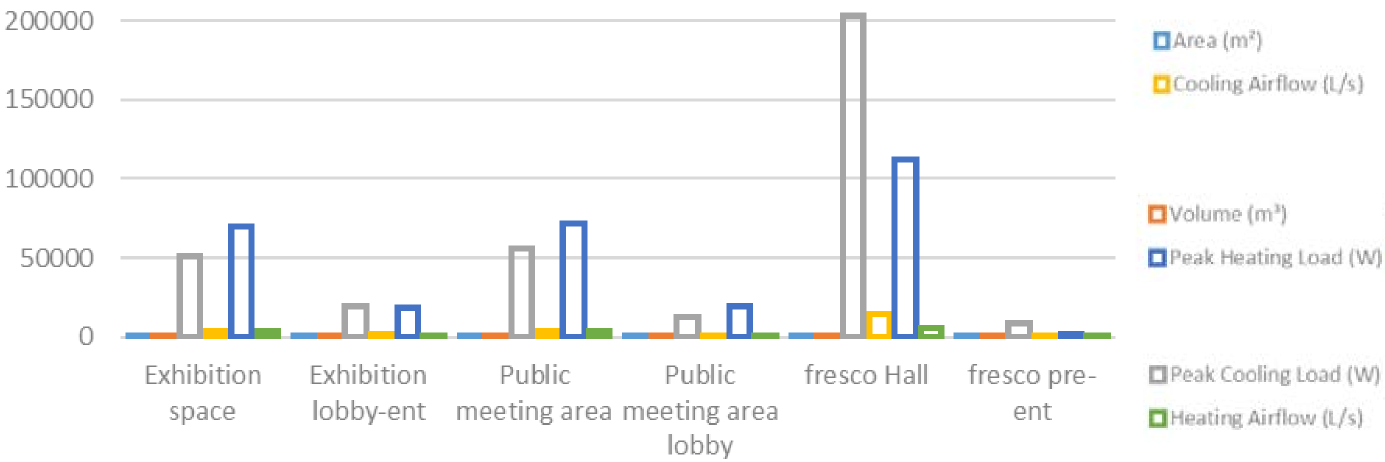
Project Summary	
Location and Weather	
Project	UMANITARIA
Address	ITALY,MILANO,VIA DAVERIO 7
Calculation Time	Thursday, July 2, 2020 5:01 PM
Latitude	45.47°
Longitude	9.18°
Summer Dry Bulb	33 °C
Summer Wet Bulb	26 °C
Winter Dry Bulb	-5 °C
Mean Daily Range	10 °C
Air Volume Calculation Type	VAV - Single Duct
Relative Humidity	46.00% (Calculated)

INSIGHT 360 ANALYSIS-Result

Space Name	Area (m^2)	Volume (m^3)	Peak Cooling Load (W)	Cooling Airflow (L/s)	Peak Heating Load (W)	Heating Airflow (L/s)
Exhibition space	166	630.87	51,031	3,537.30	69,777	3,684.00
Exhibition lobby-ent	41	165.35	19,226	1,337.40	18,084	954.80
Public meeting area	166	647.47	56,345	3,914.10	71,645	3,782.60
Public meeting area lobby	45	180.33	12,753	858.20	19,580	1,033.80
fresco Hall	287	1,146.15	203,111	14,632.70	112,346	5,931.50
fresco pre-ent	36	140.43	8,213	593.30	2,074	109.50

HEATING AND COOLING SYSTEM
INSIGHT 360 ANALYSIS-REVIT





HEATING AND COOLING SYSTEM

INSIGHT 360 ANALYSIS-REVIT

Space Summary - Exhibition space	
Inputs	
Area (m^2)	166
Volume (m^3)	630.87
Wall Area (m^2)	256
Door Area (m^2)	8
Window Area (m^2)	28
Lighting Load (W)	1,787
Power Load (W)	2,681
Number of People	33
Sensible Heat Gain / Person (W)	73
Latent Heat Gain / Person (W)	59
Revit-Space Type	General Exhibition - Museum
Calculated Results	
Peak Cooling Load (W)	**51,031**
Peak Cooling Month and Hour	July 5:00 PM
Peak Cooling Sensible Load (W)	49,084
Peak Cooling Latent Load (W)	1,946
Peak Cooling Airflow (L/s)	3,537.30
Peak Heating Load (W)	**69,777**
Peak Heating Airflow (L/s)	3,684.00

Components	Cooling		Heating	
	Loads (W)	Percentage of Total	Loads (W)	Percentage of Total
Wall	41,687	81.69%	67,541	96.80%
Window	1,051	2.06%	2,170	3.11%
Door	30	0.06%	66	0.09%
Lighting	1,526	2.99%		
Power	2,290	4.49%		
People	4,446	8.71%		
Total	**51,031**	**100%**	**69,777**	**100%**

Space Summary - Public meeting area	
Inputs	
Area (m^2)	166
Volume (m^3)	647.47
Wall Area (m^2)	260
Door Area (m^2)	2
Window Area (m^2)	16
Lighting Load (W)	2,323
Power Load (W)	1,787
Number of People	28
Sensible Heat Gain / Person (W)	73
Latent Heat Gain / Person (W)	59
Revit Space Type	Meeting/Multipurpose
Calculated Results	
Peak Cooling Load (W)	**56,345**
Peak Cooling Month and Hour	July 5:00 PM
Peak Cooling Sensible Load (W)	51,723
Peak Cooling Latent Load (W)	4,622
Peak Cooling Airflow (L/s)	3,914.10
Peak Heating Load (W)	**71,645**
Peak Heating Airflow (L/s)	3,782.60

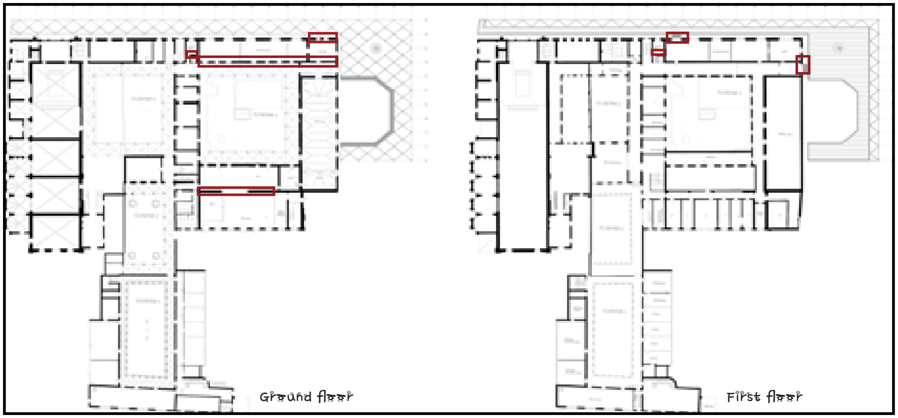
Components	Cooling		Heating	
	Loads (W)	Percentage of Total	Loads (W)	Percentage of Total
Wall	43,157	76.59%	70,225	98.02%
Window	587	1.04%	1,190	1.66%
Door	127	0.23%	204	0.28%
Roof	23	0.04%	26	0.04%
Lighting	1,321	2.34%		
Power	1,016	1.80%		
People	10,114	17.95%		
Total	**56,345**	**100%**	**71,645**	**100%**

Space Summary - Fresco Hall	
Inputs	
Area (m^2)	287.00
Volume (m^3)	1,146.15
Wall Area (m^2)	330
Window Area (m^2)	26
Lighting Load (W)	8,019
Power Load (W)	1,666
Number of People	150-200
Sensible Heat Gain / Person (W)	66
Latent Heat Gain / Person (W)	31
Revit Space Type	Audience/Seating Area - Performing Arts Theatre
Calculated Results	
Peak Cooling Load (W)	**203,111**
Peak Cooling Month and Hour	August 4:00 PM
Peak Cooling Sensible Load (W)	192,530
Peak Cooling Latent Load (W)	10,581
Peak Cooling Airflow (L/s)	14,632.70
Peak Heating Load (W)	**112,346**
Peak Heating Airflow (L/s)	5,931.50

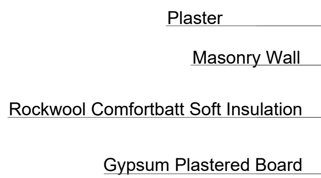
Components	Cooling		Heating	
	Loads (W)	Percentage of Total	Loads (W)	Percentage of Tota
Wall	161,560	79.54%	110,369	98.24%
Window	1,250	0.62%	1,976	1.76%
Lighting	6,850	3.37%		
Power	1,423	0.70%		
People	32,029	15.77%		
Total	**203,111**	**100%**	**112,346**	**100%**

06.2
BUILDING SCHEDULE
NEW CONSTRUCTION

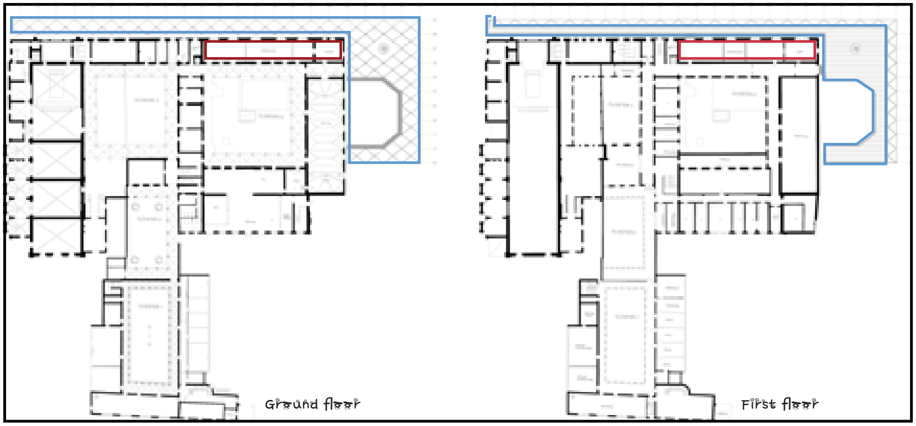
Wall Schedule							
	Assembly Code	Assembly Description	Family and Type	Function	Width	Structural Material	Phase Created
1	C3010110	Wall Finishes - Paint	Basic Wall: MECHANIC ROOM WALL_Int_BRICK WALL 600mm	Interior	0.6	CLOISTER BRICK WALL	New Construction
2	C3010110	Wall Finishes - Paint	Basic Wall: RESTAURANT_BRICK WALL 600mm	Interior	0.6	CLOISTER BRICK WALL	New Construction
3	C3010110	Wall Finishes - Paint	Basic Wall: RESTAURANT_BRICK WALL 600mm	Interior	0.6	CLOISTER BRICK WALL	New Construction
4	C3010110	Wall Finishes - Paint	Basic Wall: cloister of fish 400mm	Interior	0.4	CLOISTER BRICK WALL	NEW(door loc)
5	B2010	Exterior Walls	Basic Wall: Cloister Of Fish_EXT_BRICK WALL 600mm	Exterior	0.6	CLOISTER BRICK WALL	NEW(door loc)
6	B2010	Exterior Walls	Basic Wall: Cloister Of Fish_EXT_BRICK WALL 600mm	Exterior	0.6	CLOISTER BRICK WALL	NEW(door loc)
7	B2010150	Ext. Wall - Brick (Single Wythe)	Basic Wall: ENTRNCE EXT_BRICK WALL 800mm	Exterior	0.8	CLOISTER BRICK WALL	NEW(door loc)
8	B2010100	Exterior Wall Construction	Basic Wall: Cloister Of Fish_Arc_ Brick wall 525mm	Exterior	0.53	CLOISTER BRICK WALL	NEW(door loc)
9	C3010100	Wall Finishes	Basic Wall: Generic - 200mm	Exterior	0.2	CLOISTER BRICK WALL	NEW(door loc)
10	B2010150	Ext. Wall - Brick (Single Wythe)	Basic Wall: ENTRNCE EXT_BRICK WALL 800mm	Exterior	0.8	CLOISTER BRICK WALL	NEW(door loc)



1



Floor Schedule							
	Assembly Code	Assembly Description	Family and Type	Function	Level	Structural Material	Phase Created
1	C3020400	Flooring	Floor: PUBLIC MEETING ROOM	Interior	Level 1	Concrete	New Construction
2	C3020400	Flooring	Floor: EXHIBITION SPACE	Interior	Level 0	Concrete	New Construction
3	A1030110	SOG - Reinforced	Floor: ENTRANCE-PASSAGE	Exterior	Level 0	CONCRETE-FINISH IMAGECI	New Construction
4	B1010500	Balcony Floor Construction	FLOOR: NEW TERRACE PAVILION	Exterior	Level 1	GLULAM-FINISH WPC	New Construction



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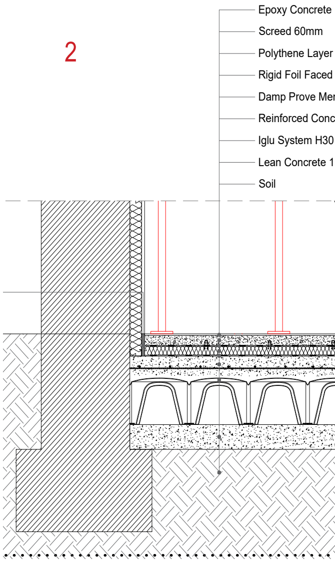
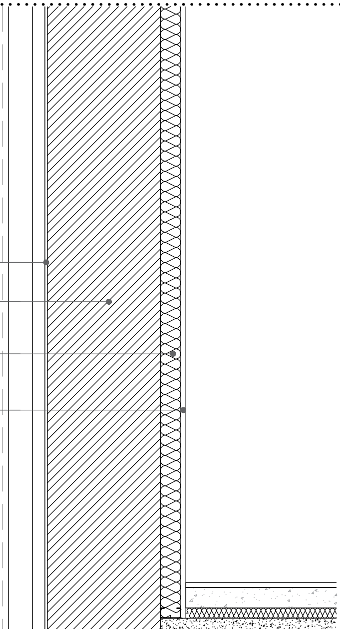
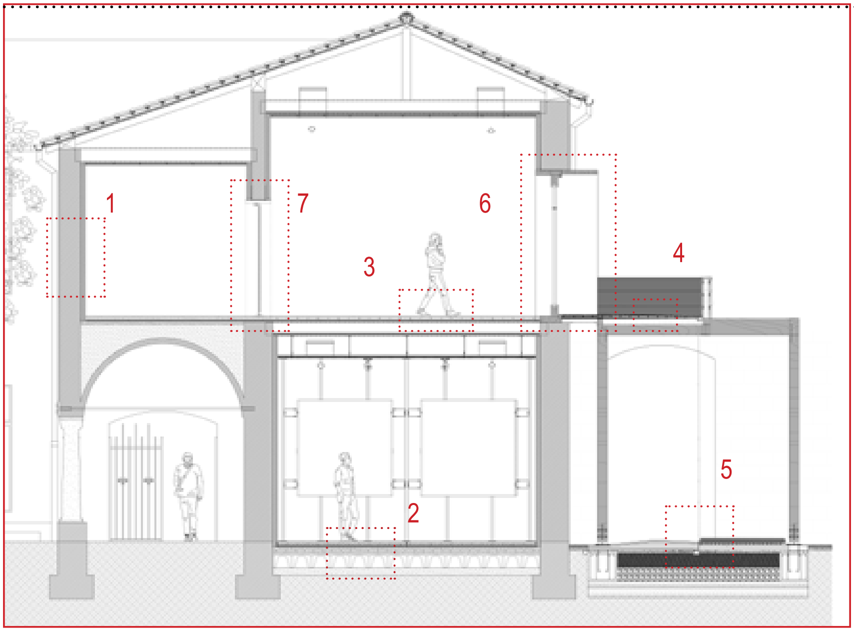






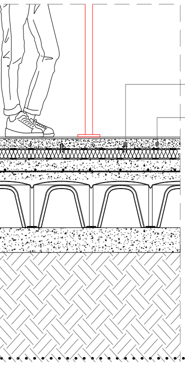
Floor Finishing

Board Floor Insulation 50mm

mbrane

rete 110mm

50mm



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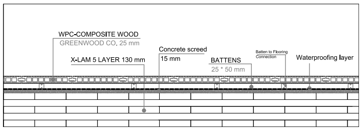

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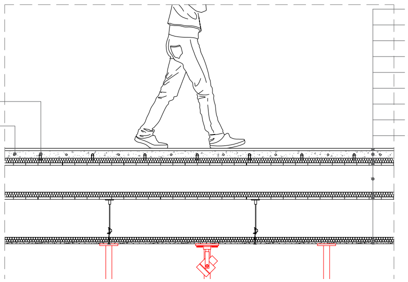
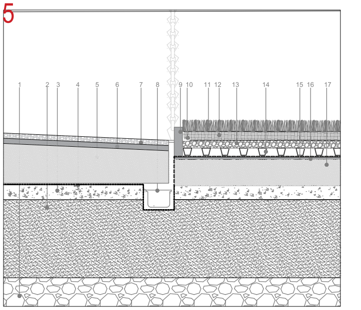


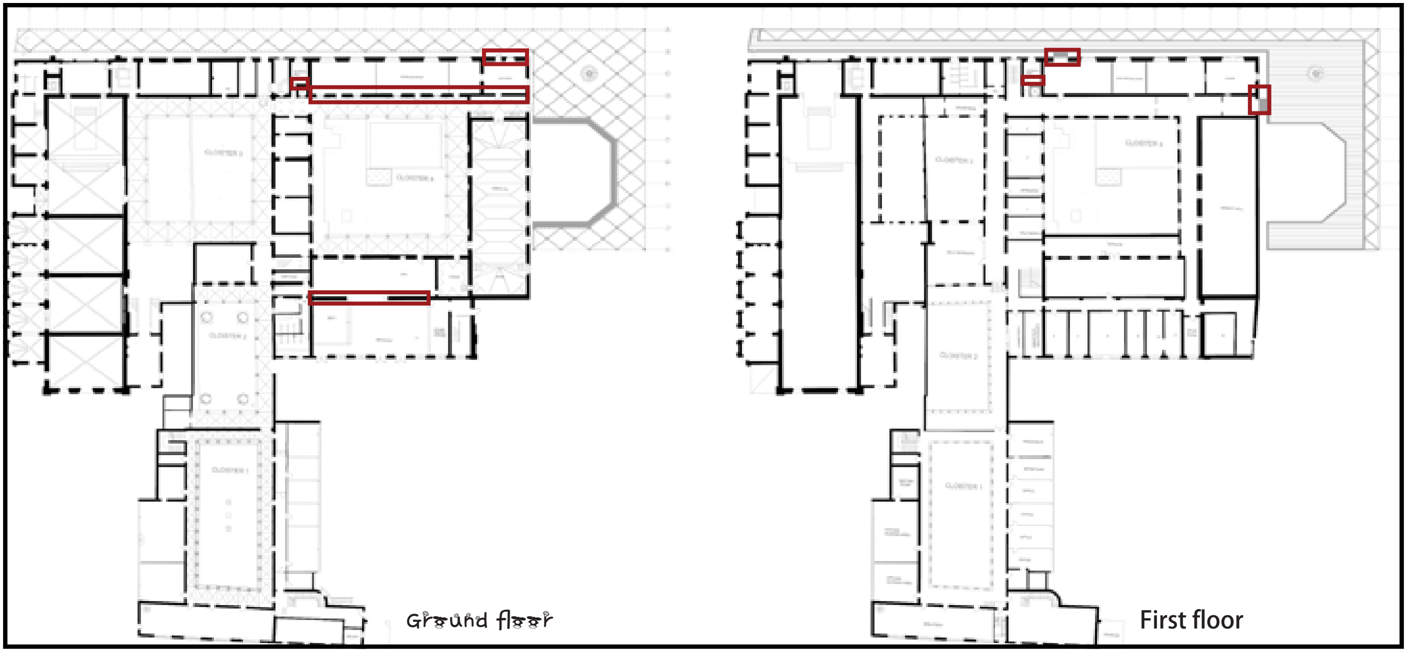
1-Crushed Aggregate
2-cement
3-Light weight Concrete
4-separating Layer plastic material (water proof)
5-cement Screed 100 mm,2% slope
6-Concrete Screed 10 mm
7-Imagecrete Exposed Decorative concrete 30 mm
8-Gutter
9-Curb 30*40 mm
10-Perforated Aluminium Curb
11-Low plants,herbs
12-Growth soil 35 mm
13-Drainage layer-Lightweight granular mix 30 mm
14-Anti root barrier 30 mm
15-waterproof layer
16-Concrete screed 10 mm
17-cement screed 100 mm

5



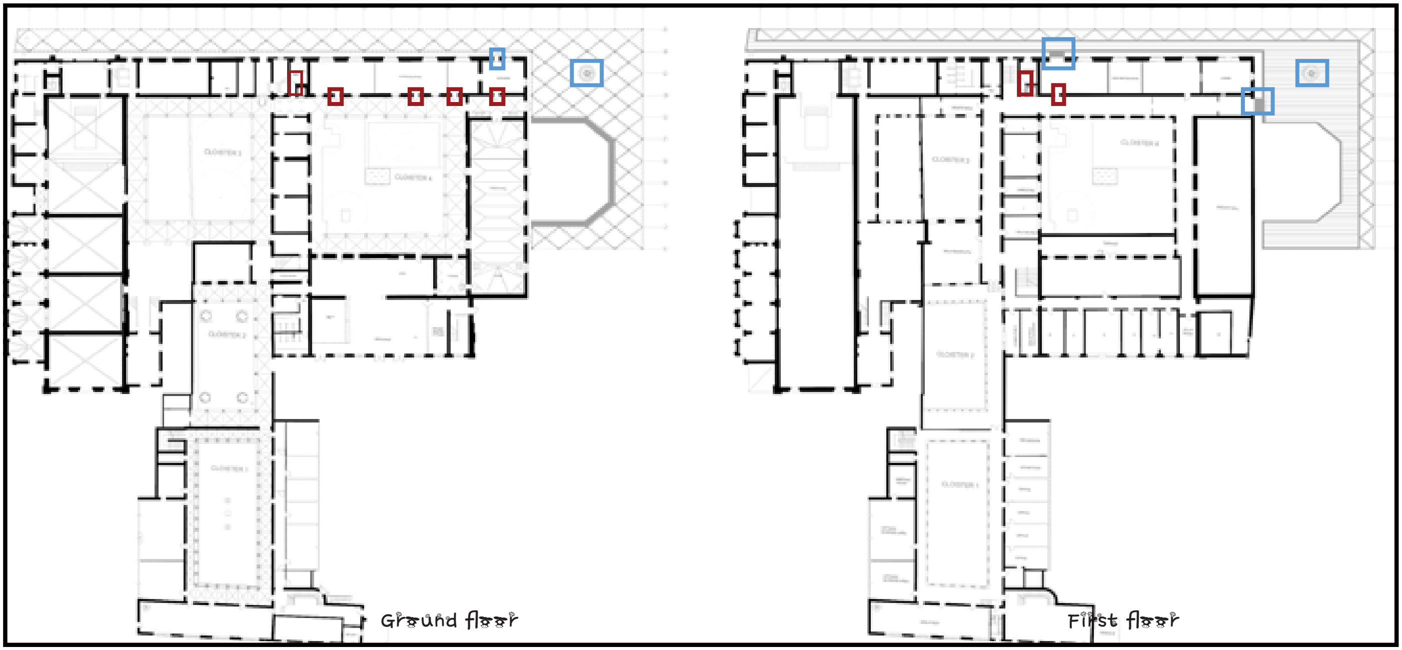
06.2
BUILDING SCHEDULE
NEW CONSTRUCTION

Wall Schedule							
	Assembly Code	Assembly Description	Family and Type	Function	Width	Structural Material	Phase Created
1	C3010110	Wall Finishes - Paint	Basic Wall: MECHANIC ROOM WALL_Int_BRICK WALL 600mm	Interior	0.6	CLOISTER BRICK WALL	New Construction
2	C3010110	Wall Finishes - Paint	Basic Wall: RESTAURANT_BRICK WALL 600mm	Interior	0.6	CLOISTER BRICK WALL	New Construction
3	C3010110	Wall Finishes - Paint	Basic Wall: RESTAURANT_BRICK WALL 600mm	Interior	0.6	CLOISTER BRICK WALL	New Construction
4	C3010110	Wall Finishes - Paint	Basic Wall: cloister of fish 400mm	Interior	0.4	CLOISTER BRICK WALL	NEW(door loc)
5	B2010	Exterior Walls	Basic Wall: Cloister Of Fish_EXT_BRICK WALL 600mm	Exterior	0.6	CLOISTER BRICK WALL	NEW(door loc)
6	B2010	Exterior Walls	Basic Wall: Cloister Of Fish_EXT_BRICK WALL 600mm	Exterior	0.6	CLOISTER BRICK WALL	NEW(door loc)
7	B2010150	Ext. Wall - Brick (Single Wythe)	Basic Wall: ENTRNCE EXT_BRICK WALL 800mm	Exterior	0.8	CLOISTER BRICK WALL	NEW(door loc)
8	B2010100	Exterior Wall Construction	Basic Wall: Cloister Of Fish_Arc_ Brick wall 525mm	Exterior	0.53	CLOISTER BRICK WALL	NEW(door loc)
9	C3010100	Wall Finishes	Basic Wall: Generic - 200mm	Exterior	0.2	CLOISTER BRICK WALL	NEW(door loc)
10	B2010150	Ext. Wall - Brick (Single Wythe)	Basic Wall: ENTRNCE EXT_BRICK WALL 800mm	Exterior	0.8	CLOISTER BRICK WALL	NEW(door loc)



Door Schedule							
	Assembly Code	Assembly Description	Family and Type	Function	Level	Structural Material	Phase Created
1	C1020220	Interior Door Frames - Wood	DOORS:FROM EXHIBITION ENTRANCE TO FRESCO PRE ENT	Interior	Level 0	WOOD-OAK FRAME	New Construction
2	C1020220	Interior Door Frames - Wood	DOORS:FROM EXHIBITION TO CORRIDORS	Interior	Level 0	WOOD-OAK FRAME	New Construction
3	C1020220	Interior Door Frames - Wood	DOORS:FROM EXHIBITION TO CORRIDORS	Interior	Level 0	WOOD-OAK FRAME	New Construction
4	C1020220	Interior Door Frames - Wood	DOORS:FROM EXHIBITION TO CORRIDORS	Interior	Level 0	WOOD-OAK FRAME	New Construction
5	C1020220	Interior Door Frames - Wood	DOORS:FROM PUBLIC MEETING ROOM TO CORRIDORS	Interior	Level 1	WOOD-OAK FRAME	New Construction
6	C1020100	Interior Doors (MECHANICAL ROOM	DOOR: 1010 x 2110mm	Interior	Level 1	WOOD-OAK FRAME	New Construction
7	C1020100	Interior Doors (MECHANICAL ROOM	DOOR: 1010 x 2110mm	Interior	Level 0	WOOD-OAK FRAME	New Construction
8	B2030100	Exterior Glazed Doors - Wood	DOOR: new door (from groundt to terrace exhibition)	Exterior	Level 0	WOOD-CYPRUSS	New Construction
9	B2030100	Exterior Glazed Doors - Wood	DOOR: new door (from first to terrace ext)	Exterior	Level 1	WOOD-CYPRUSS	New Construction
10	B2030130	Exterior Glazed Doors - Wood	DOOR: new door (from first to terrace ext)	Exterior	Level 1	WOOD-CYPRUSS	New Construction

Stair Schedule							
	Assembly Code	Assembly Description	Family and Type	Function	Level	Structural Material	Phase Created
1	C2010320	SPIRAL STAIRS-WOOD	180mm max riser 275mm tread-23 RISERS	Exterior	Ground To Terrace Floor	X-LAM 5 LAYERS	New Construction



07.
BUILDING SERVICES

07.1 WATER SUPPLY SYSTEM

Domestic Hot Water Production Systems

A DHW production system can be instantaneous or with a storage cylinder and the elements that make up the system also depend on whether or not there is a recirculation system.
An instantaneous system produces the necessary hot water on demand starting up when a hot water fixture is turned on. It is the simplest configuration. Before entering the network, the cold water can be suitably filtered and softened.

Cold Water Networks: Distribution from Below

This is the most widely used system, in which the supply manifold is located below and hence the supply riser pipes providing cold water also start out from below. The branch lines to the individual floors lead off from the supply riser pipes. In the upper part of each riser pipe, a device should be installed to reduce the effect of water hammer, whereas at the bottom it is advisable to fit a stop valve to allow isolation from the rest of the system in the event of malfunction or servicing.

Branch Lines and Connections to Terminal Units: Manifold Systems

These are composed of distribution elements installed in pairs, one for cold water and one for hot water with a variable number of outlets depending on the type and quantity of sanitary appliances installed. This is the most modern type of system, which offers the advantage that it saves time during installation and of requiring no joints in the chases. Each otlet of the manifold can incorporate a stop valve or a flow control valve, so that it is possibble to cut off or regulate the flow for each point of use.

The manifolds are generally installed a concealed cabinet and equipped with stop valves that allow complete isolation from the rest of the system.

TOILET A

Point of Use	Ground Floor (n)	First Floor (n)	Flow Rate (l/s)	Loading Units (LU)
WC	8	8	0,1	1
Washbasin	6	6	0,1	1

Table 07.1: Quantity, flow rates and the loading units for different points of use for toilet A

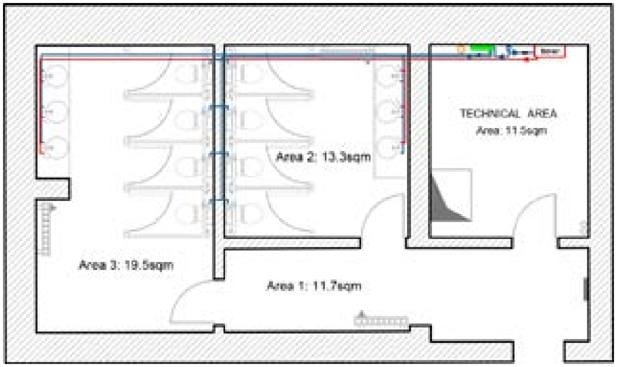


Fig. 07.1: Plan of the toilet A, shows the cold and hot water networks

TOILET B

Point of Use	Ground Floor (n)	Flow Rate (l/s)	Loading Units (LU)
WC	8	0,1	1
Washbasin	9	0,1	1
Urinal with Outlet Valve	2	0,3	3

Table 07.2: Quantity, flow rates and the loading units for different points of use for toilet B

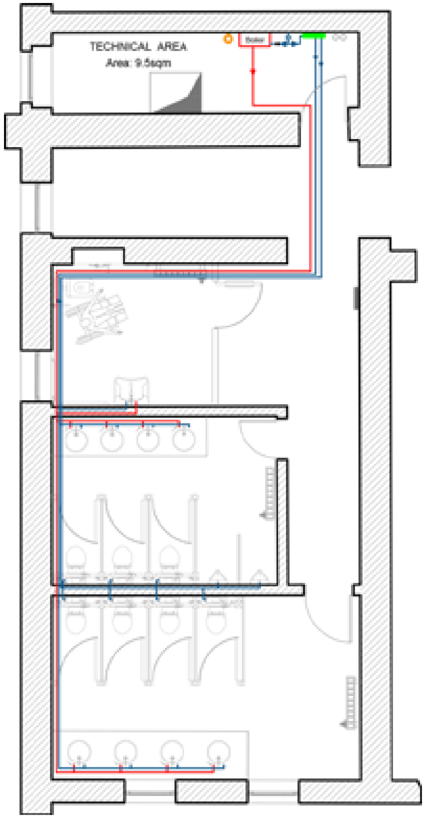


Fig. 07.2: Plan of the toilet B, shows the cold and hot water networks

TOILET A

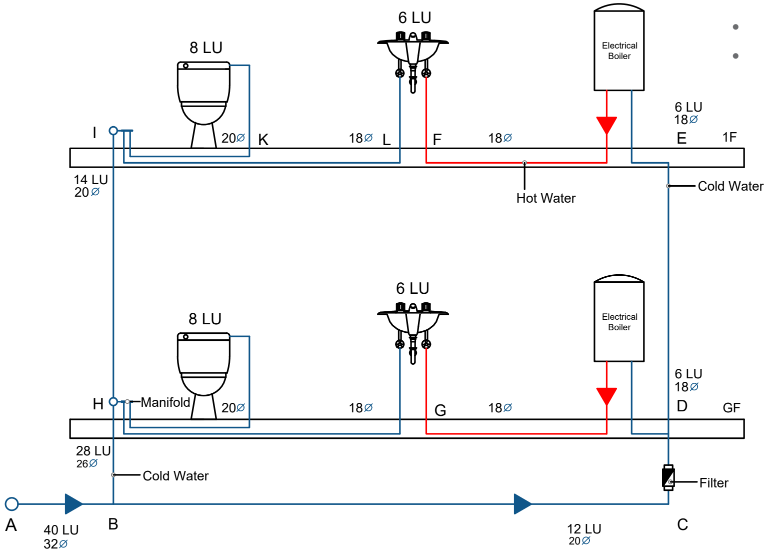


Fig. 07.3: Cold and hot water distribution schema, toilet A

- For cold water, manifold distribution system
- For hot water, distribution with electrical boiler

Sections	Total Loading Units (LU)	Diameter of the Pipes (mm)
IL	6	18 x 2
IK	8	20 x 2,5
HI	14	20 x 2,5
BH	28	26 x 3
DG	6	18 x 2
EF	6	18 x 2
DE	6	18 x 2
CD	12	20 x 2,5
BC	12	20 x 2,5
AB	40	32 x 3

Table 07.3: Loading units and diameter of the pipes,

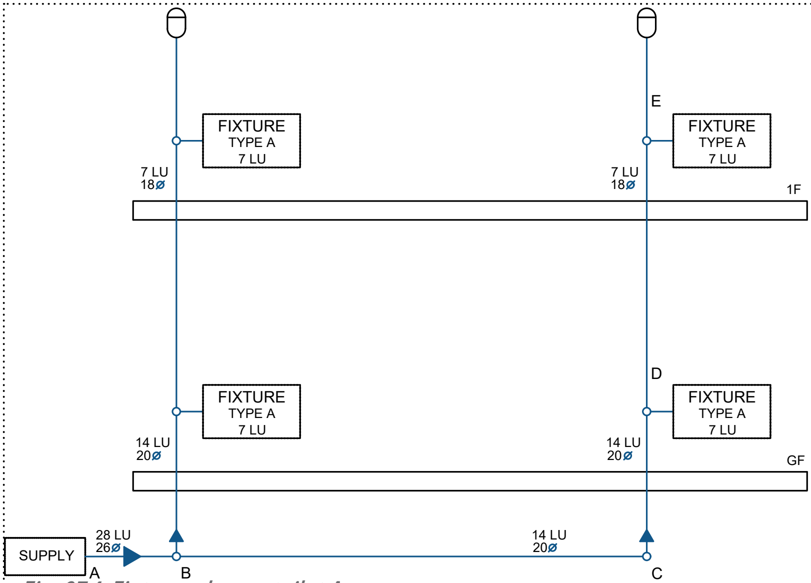


Fig. 07.4: Fixture schema, toilet A

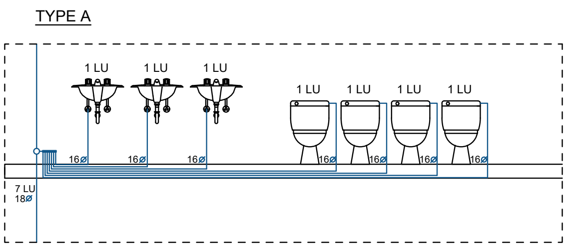


Fig. 07.5: Type A schema of the toilet A

Sections	Total Loading Units (LU)	Diameter of the Pipes (mm)
DE	7	18 x 2
CD	14	20 x 2,5
BC	14	20 x 2,5
AB	28	26 x 3

Table 07.4: Loading units and diameter of the pipes,

TOILET B

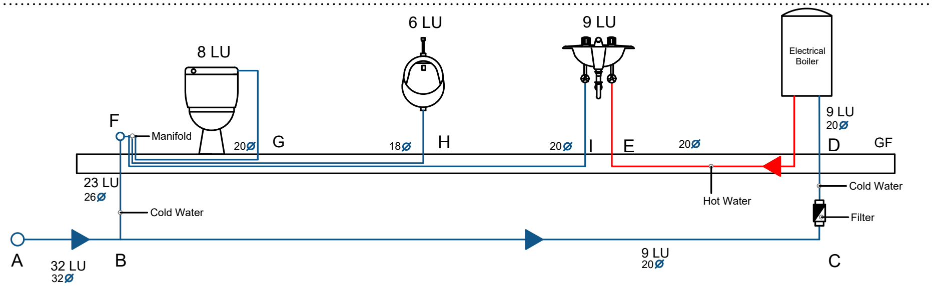


Fig. 07.6: Cold and hot water distribution schema, toilet B

Sections	Total Loading Units (LU)	Diameter of the Pipes (mm)
FI	9	20 x 2,5
FH	6	18 x 2
FG	8	20 x 2,5
BF	23	26 x 3
DE	9	20 x 2,5
CD	9	20 x 2,5
BC	9	20 x 2,5
AB	32	32 x 3

Table 07.5: Loading unites and diameter of the pipes, B

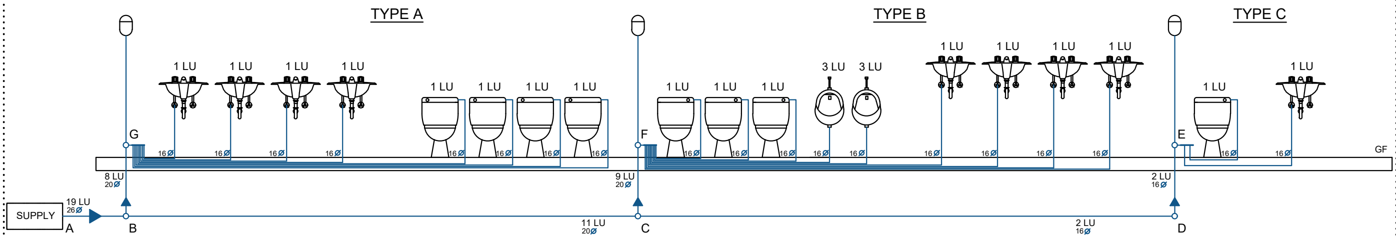


Fig. 07.7: Fixture schema, toilet B

Sections	Total Loading Units (LU)	Diameter of the Pipes (mm)
BG	8	20 x 2,5
CF	9	20 x 2,5
DE	2	16 x 2
CD	2	16 x 2
BC	11	20 x 2,5
AB	19	26 x 3

Table 07.6: Loading unites and diameter of the pipes,

07.2 WASTE SYSTEM

Primary Ventilation System for up to 2 Storey Buildings

Building Type: Public Bathrooms
Use: Very Frequent
Coefficient K: 1.0

$Q_{ww} = K \times \sqrt{\sum DU}$ The formula for calculating the flow rate of the waste waters in realtion to the type of

Q_{ww} is the flow rate of the waste waters caused by sanitary fixtures [l/s]
K is the factor of contemporary use or frequency factor
$\sqrt{\sum DU}$ is the sum of the drainage units of the sanitary fixtures that flow in that section of the

The waste system is made up of:

- Traps: Mounted directly onto the sanitary fixtures such as washbasins, bidets and sinks, positioned on the floor in the case of tubs and showers incorporated into the fixture in the case of pans and urinals.
- Waste Branches: Made up principally of horizontal pipes that connect traps with the waste stack.
- Waste Stacks: Made up principally of vertical pipes that conncet the branches with waste manifolds.
- Waste Collectors: Made up of pipes that are characterised by small gradients as compared with horizontal pipes that collect the water deriving from the waste stacks to transport it to the sewers. The waste manifolds can be placed underground or suspended from the ceiling of the cellar or garage.
- Ventilation Conduits: Made up essentially of vertical pipes that when connected to the waste network restrict pressure oscillations and guarantee silence in the operation of the sanitary fixtures.

TOILET A

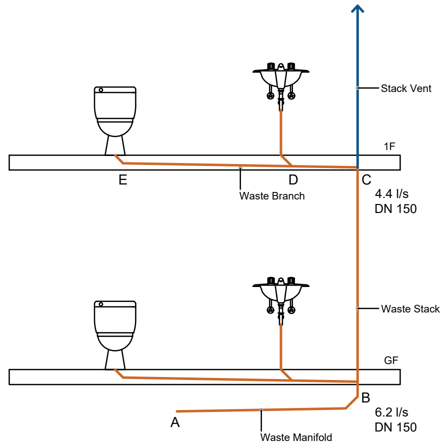


Fig. 07. 8: Waste system schema, A

Sanitary Fixture	Quantity (n)	Drainage Unit DU (l/s)	Total Drainage Unit DU (l/s)
Washbasin	6	0,5	3
WC	8	2	16
Total			19

Table 07. 7: Table of the sanitary fixtures and their datas, A

Sanitary Fixture	Quantity (n)	Drainage Unit DU (l/s)	Total Drainage Unit DU (l/s)
Washbasin	12	0,5	6
WC	16	2	32
Total			38

Table 07. 8: Table of the sanitary fixtures and their datas of the two

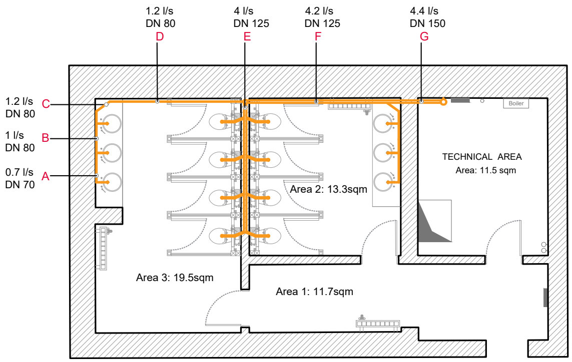


Fig. 07. 9: Plan of the waste system with pipes,

Pipe Name	Total Drainage Unit (DU)	Formula	Flow Rate (l/s)	Diameter (DN)
A	0,5	$Q_{ww} = 1\ x\ \sqrt{0,5}$ Q_{ww} = 1 x 0,7 = 0,7 l/s	0,7	70
B	0,5 + 0,5 = 1	$Q_{ww} = 1\ x\ \sqrt{1}$ Q_{ww} = 1 x 1 = 1 l/s	1	80
C	1 + 0,5 = 1,5	$Q_{ww} = 1\ x\ \sqrt{1,5}$ Q_{ww} = 1 x 1,2 = 1,2 l/s	1,2	80
D	1 + 0,5 = 1,5	$Q_{ww} = 1\ x\ \sqrt{1,5}$ Q_{ww} = 1 x 1,2 = 1,2 l/s	1,2	80
E	8 x 2 = 16	$Q_{ww} = 1\ x\ \sqrt{16}$ Q_{ww} = 1 x 4 = 4 l/s	4	125
F	16 + 1,5 = 17,5	$Q_{ww} = 1\ x\ \sqrt{17,5}$ Q_{ww} = 1 x 4,2 = 4,2 l/s	4,2	125
G	17,5 + 1,5 = 19	$Q_{ww} = 1\ x\ \sqrt{19}$ Q_{ww} = 1 x 4,4 = 4 ,4l/s	4,4	150

Table 07.9: Table that shows the calculation of the diameter of the pipes, A

Section	Total Drainage Unit (DU)	Formula	Flow Rate (l/s)	Diameter (DN)
BC	19	$Q_{ww} = 1\ x\ \sqrt{19}$ Q_{ww} = 1 x 4,4 = 4,4 l/s	4,4	150
AB	19 + 19 = 38	$Q_{ww} = 1\ x\ \sqrt{38}$ Q_{ww} = 1 x 6,2 = 6,2 l/s	6,2	150

Table 07. 10: Table that shows the calculation of the diameter of the pipes,

TOILET B

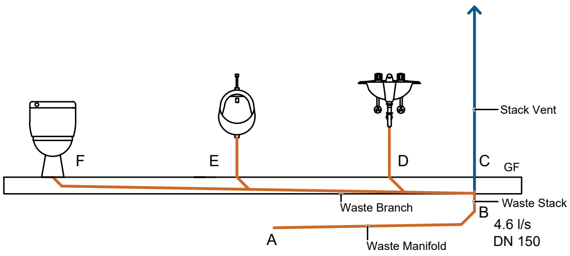


Fig. 07. 10: Waste system schema, B

Sanitary Fixture	Quantity (n)	Drainage Unit DU (l/s)	Total Drainage Unit DU (l/s)
Washbasin	9	0,5	4,5
WC	8	2	16
Wall Urinal	2	0,2	0,4
Total			20,9

Table 07. 11: Table of the sanitary fixtures and their datas, B

Sanitary Fixture	Quantity (n)	Drainage Unit DU (l/s)	Total Drainage Unit DU (l/s)
Washbasin	18	0,5	9
WC	16	2	32
Wall Urinal	4	0,2	0,8
Total			41,8

Table 07. 12: Table of the sanitary fixtures and their datas of the two

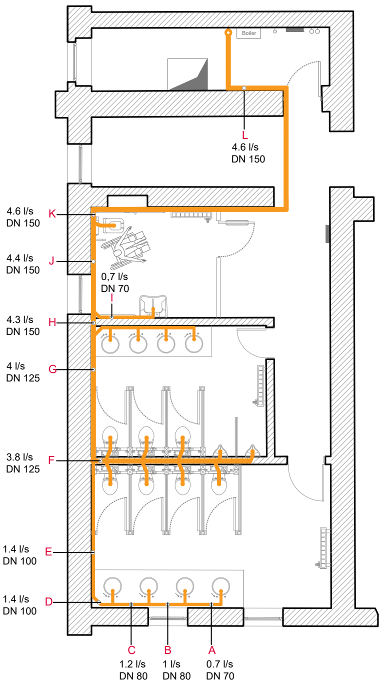


Fig. 07. 11: Plan of the waste system with pipes, B

Pipe Name	Total Drainage Unit (DU)	Formula	Flow Rate (l/s)	Diameter (DN)
A	0,5	$Q_{ww} = 1\ x\ \sqrt{0,5}$ Q_{ww} = 1 x 0,7 = 0,7 l/s	0,7	70
B	0,5 + 0,5 = 1	$Q_{ww} = 1\ x\ \sqrt{1}$ Q_{ww} = 1 x 1 = 1 l/s	1	80
C	1 + 0,5 = 1,5	$Q_{ww} = 1\ x\ \sqrt{1,5}$ Q_{ww} = 1 x 1,2 = 1,2 l/s	1,2	80
D	1,5 + 0,5 = 2	$Q_{ww} = 1\ x\ \sqrt{2}$ Q_{ww} = 1 x 1,4 = 1,4 l/s	1,4	100
E	1,5 + 0,5 = 2	$Q_{ww} = 1\ x\ \sqrt{2}$ Q_{ww} = 1 x 1,4 = 1,4 l/s	1,4	100
F	(7 x 2) + (2 x 0,2) = 14,4	$Q_{ww} = 1\ x\ \sqrt{14,4}$ Q_{ww} = 1 x 3,8 = 3,8 l/s	3,8	125
G	14,4 + 2 = 16,4	$Q_{ww} = 1\ x\ \sqrt{16,4}$ Q_{ww} = 1 x 4 = 4 l/s	4	125
H	16,4 + 2 = 18,4	$Q_{ww} = 1\ x\ \sqrt{18,4}$ Q_{ww} = 1 x 4,3 = 4,3 l/s	4,3	150
I	0,5	$Q_{ww} = 1\ x\ \sqrt{0,5}$ Q_{ww} = 1 x 0,7 = 0,7 l/s	0,7	70
J	18,4 + 0,5 = 18,9	$Q_{ww} = 1\ x\ \sqrt{18,9}$ Q_{ww} = 1 x 4,4 = 4,4 l/s	4,4	150
K	18,9 + 2 = 20,9	$Q_{ww} = 1\ x\ \sqrt{20,9}$ Q_{ww} = 1 x 4,6 = 4,6 l/s	4,6	150
L	18,9 + 2 = 20,9	$Q_{ww} = 1\ x\ \sqrt{20,9}$ Q_{ww} = 1 x 4,6 = 4,6 l/s	4,6	150

Table 07.13: Table that shows the calculation of the diameter of the pipes, B

Section	Total Drainage Unit (DU)	Formula	Flow Rate (l/s)	Diameter (DN)
AB	20,9	$Q_{ww} = 1\ x\ \sqrt{20,9}$ Q_{ww} = 1 x 4,6 = 4,6 l/s	4,6	150

Table 07. 14: Table that shows the calculation of the diameter of the pipes,

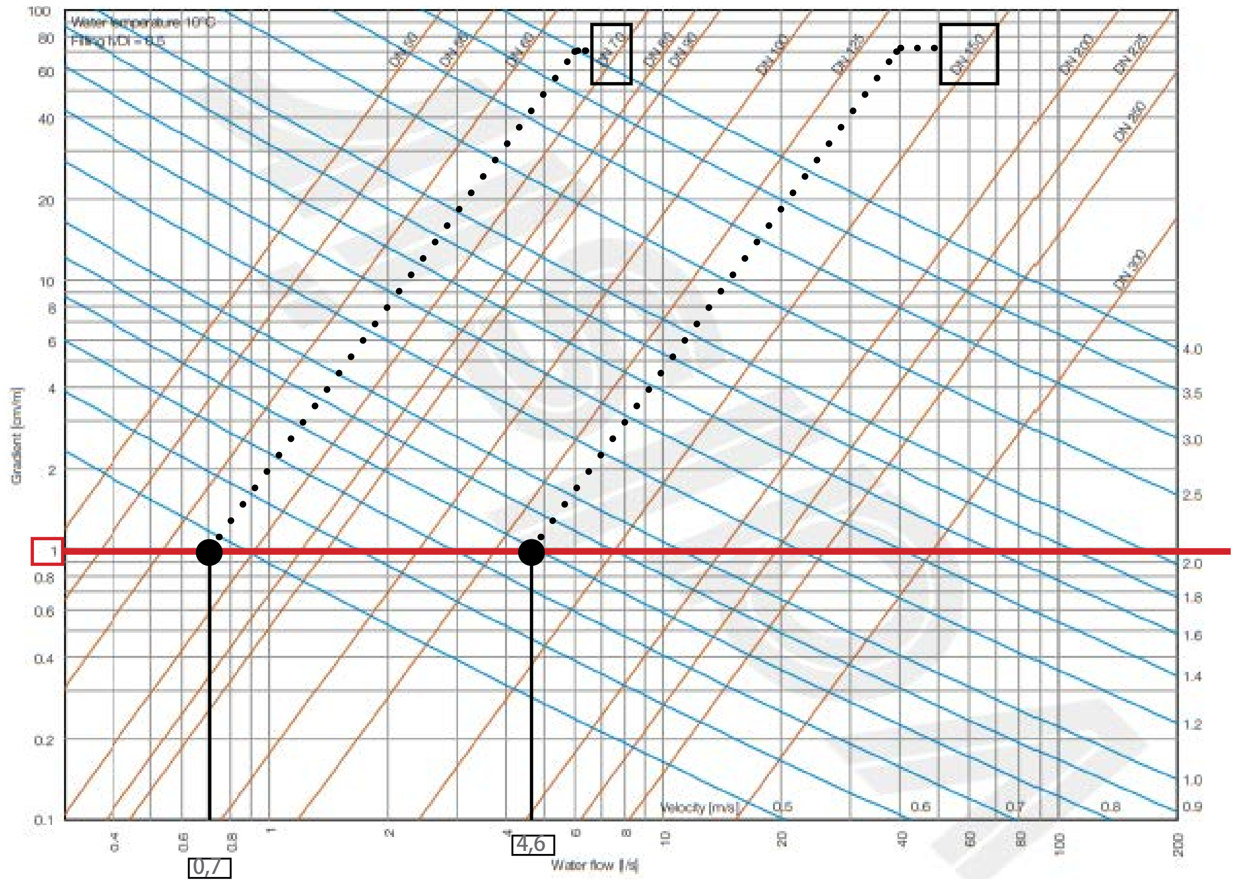


Table 07. 15: Table of the pipe diameters according to coefficiency and the flow rates

07.3 HEATING SYSTEM

Supply Temperature: 55 C
Return Temperature: 45 C
Output Transported with Temperature Difference: 10 C

- For the heating system of the toilets, manifold distribution system were used.

TOILET A

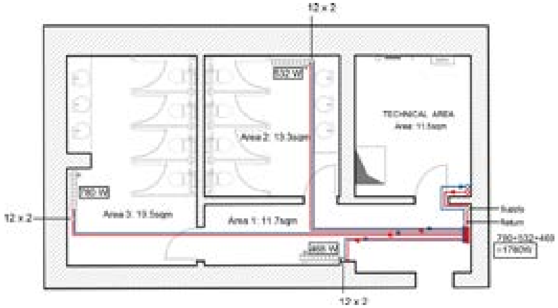


Fig. 07. 12: Plan of the heating system with pipes, A

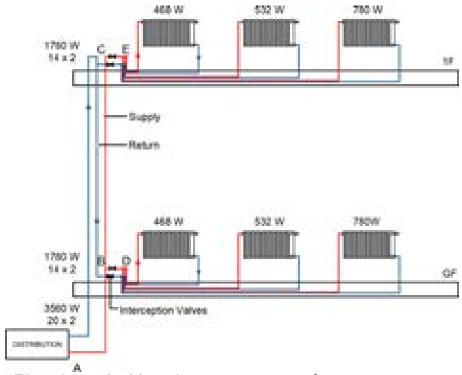


Fig. 07. 13: Heating system schema,

	Area (m²)	Heat Load (W/m²)	Heat Output (W)	Flow Rate (l/s)
Area 1	11,7	40	468	0,01
Area 2	13,3	40	532	0,01
Area 3	19,5	40	780	0,01

Table 07.16: Heating datas of toilet A

Sections	Heat Output (W)	Flow rate (l/s)	Diameter of the Pipes (mm)
CE	1780	0,04	14 x 2
BD	1780	0,04	14 x 2
BC	1780	0,04	14 x 2
AB	3560	0,09	20 x 2

Table 07.17: Flow rates and the diameter of the pipes, A

TOILET B

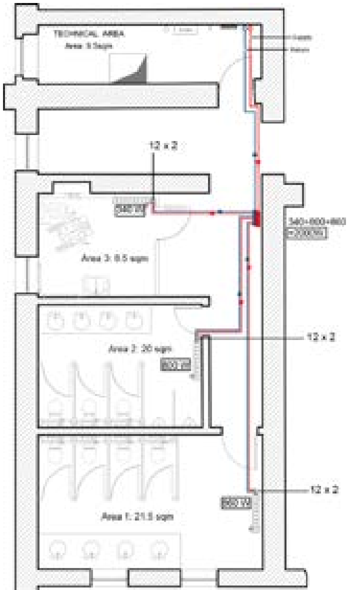


Fig. 07. 14: Heating system plan, B

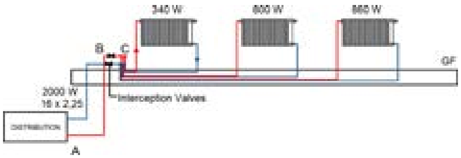


Fig. 07. 15: Heating system schema,

	Area (m²)	Heat Load (W/m²)	Heat Output (W)	Flow Rate (l/s)
Area 1	21,5	40	860	0,02
Area 2	20	40	800	0,01
Area 3	8,5	40	340	0,01

Table 07.18: Heating datas of toilet B

Sections	Heat Output (W)	Flow rate (l/s)	Diameter of the Pipes (mm)
BC	2000	0,05	16 x 2,25
AB	2000	0,05	16 x 2,25

Table 07.19: Flow rates and the diameter of the pipes, B

Double Meander

Installation Notes
- Pipe normally laid in floor at 200 mm centres.
- Uses only 90° and 180° bends which requires min 175 mm bending radius must be observed to minimise mechanical stress on tube.
- Suitable for large open areas.
- Suitable for battened / screed floors
- Provides relatively even temperature distribution across flow as flow & returns altenate.
- Perimeter zones difficult to achieve if specified.

Restaurant and Cafe

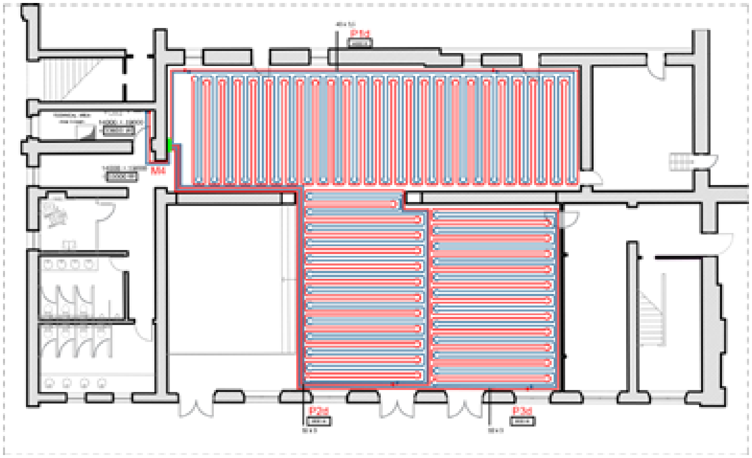


Fig. 07.16: Heating system plan of the restaurant

	Area (m^2)	Heat Load (W/m^2)	Heat Output (W)
Restaurant	196	100	19600
Cafe	140	100	14000

Table 07.20: Heating datas of the restaurant

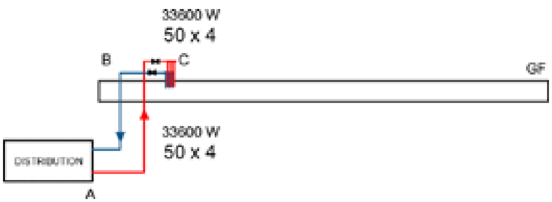


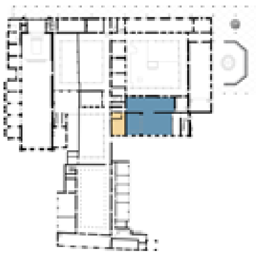
Fig. 07.17: Heating schema of the restaurant

	Heat Output (W)	Flow Rate (l/s)	Diameter of the Pipes (mm)
Manifold M4	33600	0,85	50 x 4
Pipe P1d	14000	0,34	40 x 3,5
Pipe P2d	9800	0,24	32 x 3
Pipe P3d	9800	0,24	32 x 3

Table 07.21: Flow rates and the ppe diameters of the restaurant

	Heat Output (W)	Flow Rate (l/s)	Diameter of the Pipes (mm)
BC	33600	0,85	50 x 4
AB	33600	0,85	50 x 4

Table 07.22: Flow rate and the pipe diameters of the restaurant



Counter Flow Pattern with Perimeter Zone

Installation Notes
- As detail 1 other than pipe normally laid in floor at 200 mm centres with closer pipe spacing of 100 mm at high heatloss areas as determined by design criteria (refer to manifold installation data sheets supplied with final quote).

Information Point

	Area (m^2)	Heat Load (W/m^2)	Heat Output (W)
Information Point	39	60	2340
Waiting Area	71,5	60	4290

Table 07.23: Heating datas of the information point

	Heat Output (W)	Flow Rate (l/s)	Diameter of the Pipes (mm)
Manifold M3	6420	0,15	26 x 3
Pipe P1c	2340	0,06	16 x 2,5
Pipe P2c	2130	0,05	16 x 2,5
Pipe P3c	1950	0,05	16 x 2,5

Table 07.24: Flow rates and the pipe diameters of the information point

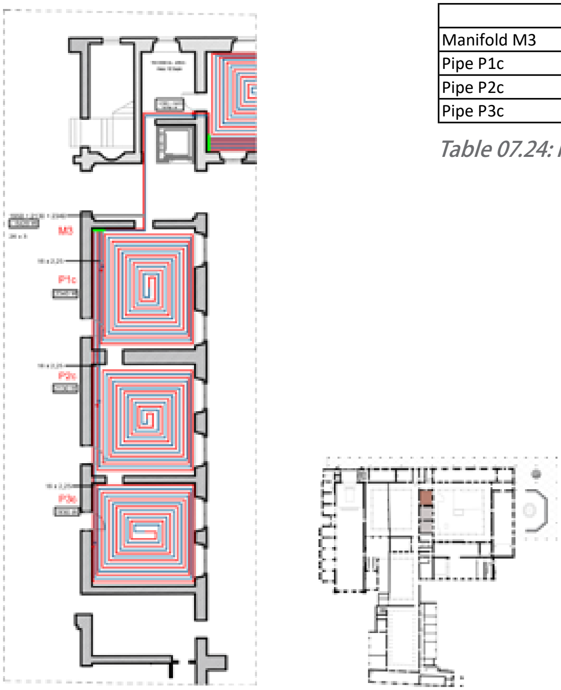


Fig. 07.18: Heating system plan of the information point

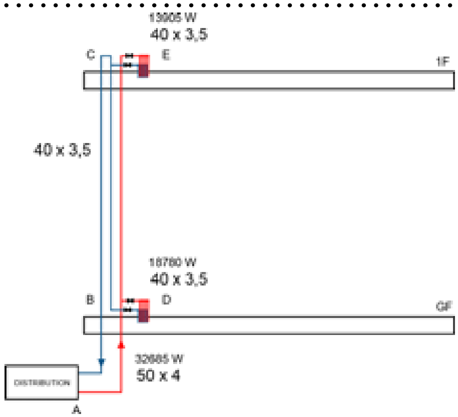


Fig. 07.19: Heating system schema

	Heat Output (W)	Flow Rate (l/s)	Diameter of the Pipes (mm)
CE	13905	0,33	40 x 3,5
BD	18780	0,46	40 x 3,5
BC	13905	0,33	40 x 3,5
AB	32685	0,78	50 x 4

Table 07.25: Flow rates and the pipe diameters of the information

Meeting Room

	Area (m²)	Heat Load (W/m²)	Heat Output (W)
Meeting Room	95	70	6650
Open Studio	62,5	70	4375
Waiting Area	48	60	2880

Table 07.26: Heating datas of the meeting room

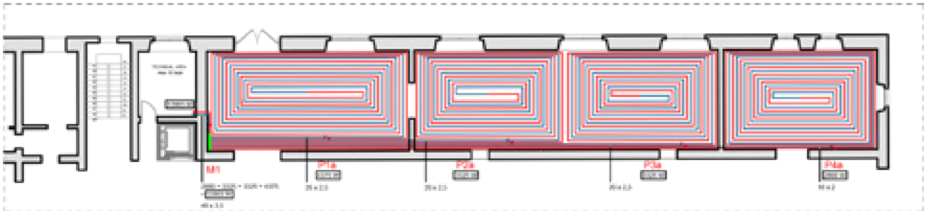
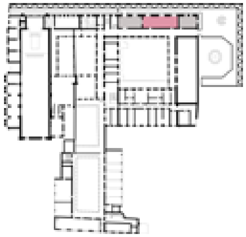


Fig. 07.20: Heating system plan of the meeting room



	Heat Output (W)	Flow Rate (l/s)	Diameter of the Pipes (mm)
Manifold M1	13905	0,33	40 x 3,5
Pipe P1a	4375	0,1	20 x 2,5
Pipe P2a	3325	0,08	20 x 2,5
Pipe P3a	3325	0,08	20 x 2,5
Pipe P4a	2880	0,07	18 x 2

Table 07.27: Flow rates and the pipe diameters of the meeting room

Exhibition Space

	Area (m²)	Heat Load (W/m²)	Heat Output (W)
Exhibition Space	165	60	9900
Entrance	41	60	2460

Table 07.28: Heating datas of the exhibition space

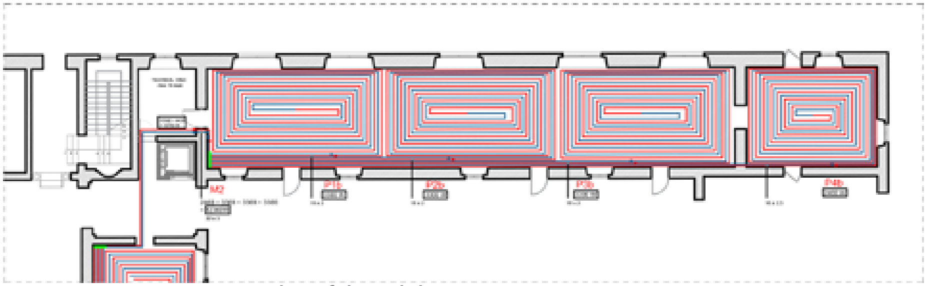
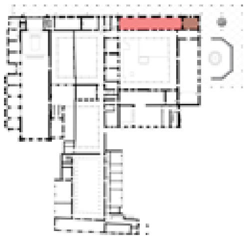


Fig. 07.21: Heating system plan of the exhibition space



	Heat Output (W)	Flow Rate (l/s)	Diameter of the Pipes (mm)
Manifold M2	12360	0,03	32 x 3
Pipe P1b	3300	0,08	18 x 2
Pipe P2b	3300	0,08	18 x 2
Pipe P3b	3300	0,08	18 x 2
Pipe P4b	2460	0,06	16 x 2,5

Table 07.29: Flow rates and the pipe diameters of the exhibition space

07.4 VENTILATION SYSTEM

Calculating the Duct Sizes

01 Exhibition Space

Area: 165 m^2 **Height:** 4 m **Volume:** 660 m^3

Building Occupancy: 5 m^2 per person
Number of People: 165/5 = 33
Ventilation Fresh Air (l/s per person): 10 l/s
Fresh Air Rate: 10x33 = 330 l/s
330x3,6 = 1188 m^3/h → 1188/3600 = 0,33 m^3/s

q = n x V
Air Change Rate (n)= 12 h^{-1}
Volume (V)= 660 m^3
Fresh Air Supply (q)= 12x660 = 7920 m^3/h → 7920/3600 = 2,2 m^3/s

Q = A x V
Velocity (V): 5 m/s
Q = 0,33 + 2,2 = 2,53 m^3/s

02 Information Point/ Waiting Rooms

Area: 107 m^2 **Height:** 4 **Volume:** 428 m^3

Building Occupancy: 1 m^2 per person
Number of People: 107/1 = 107
Ventilation Fresh Air (l/s per person): 10 l/s
Fresh Air Rate: 10x107 = 1070 l/s
1070x3,6 = 3852 m^3/h → 3852/3600 = 1,07 m^3/s

q = n x V
Air Change Rate (n)= 4 h^{-1}
Volume (V)= 428 m^3
Fresh Air Supply (q)= 4 x 428 = 1712 m^3/h → 1712/3600 = 0,48 m^3/s

Q = A x V
Velocity (V): 5 m/s
Q = 1,07 + 0,48 = 1,55 m^3/s

03 Meeting Room

Area: 95 m^2 **Height:** 4 m **Volume:** 380 m^3

Building Occupancy: 0,83 m^2 per person
Number of People: 95/0,83 = 114
Ventilation Fresh Air (l/s per person): 10 l/s
Fresh Air Rate: 10x114 = 1140 l/s
1140x3,6 = 4104 m^3/h → 4104/3600 = 1,14 m^3/s

q = n x V
Air Change Rate (n)= 4 h^{-1}
Volume (V)= 380 m^3
Fresh Air Supply (q)= 4x380 = 1520 m^3/h → 1520/3600 = 0,42 m^3/s

Q = A x V
Velocity (V): 5 m/s
Q = 1,14 + 0,42 = 1,56 m^3/s
Area of the Duct (A): 1,56 / 5 = 0,31 m^2

04 Restaurant/ Cafe

Area: 336 m^2 **Height:** 4 m **Volume:** 1344 m^3

Building Occupancy: 3 m^2 per person
Number of People: 336/3 = 112
Ventilation Fresh Air (l/s per person): 10 l/s
Fresh Air Rate: 10x112 = 1120 l/s
1120x3,6 = 4032 m^3/h → 4032/3600 = 1,12 m^3/s

q = n x V
Air Change Rate (n)= 12 h^{-1}
Volume (V)= 1344 m^3
Fresh Air Supply (q)= 12x1344 = 16128 m^3/h → 16128/3600 = 4,48 m^3/s

Q = A x V
Velocity (V): 5 m/s
Q = 1,12 + 4,48 = 5,6 m^3/s

05 Toilet A

Area: 45 m^2 **Height:** 4 **Volume:** 180 m^3

Building Occupancy: 3 m^2 per person
Number of People: 45/3 = 15
Ventilation Fresh Air (l/s per person): 10 l/s
Fresh Air Rate: 10x15 = 150 l/s
150x3,6 = 540 m^3/h → 540/3600 = 0,15 m^3/s

q = n x V
Air Change Rate (n)= 15 h^{-1}
Volume (V)= 180 m^3
Fresh Air Supply (q)= 15 x 180 = 2700 m^3/h → 2700/3600 = 0,75 m^3/s

Q = A x V
Velocity (V): 5 m/s
Q = 0,15 + 0,75 = 0,9 m^3/s

06 Toilet B

Area: 62,5 m^2 **Height:** 4 m **Volume:** 250 m^3

Building Occupancy: 3 m^2 per person
Number of People: 62,5/3 = 21
Ventilation Fresh Air (l/s per person): 10 l/s
Fresh Air Rate: 10x21 = 210 l/s
210x3,6 = 756 m^3/h → 756/3600 = 0,21 m^3/s

q = n x V
Air Change Rate (n)= 15 h^{-1}
Volume (V)= 250 m^3
Fresh Air Supply (q)= 15x250 = 3750 m^3/h → 3750/3600 = 1,04 m^3/s

Q = A x V
Velocity (V): 5 m/s
Q = 0,21 + 1,04 = 1,25 m^3/s

a [mm]	b [mm]											
	100	150	200	250	300	400	500	600	800	1000	1200	
250	0,025	0,038	0,050	0,063								A_c
	143	188	122	250								d_m
	165	206	241	273								d_e
	0,70	0,80	0,90	1,00								A_l
300	0,030	0,045	0,60	0,075	0,090							A_c
	150	200	240	273	300							d_m
	180	224	262	296	327							d_e
	0,80	0,090	1,00	1,10	1,20							A_l
400	0,040	0,060	0,080	0,10	0,12	0,16						A_c
	160	218	267	308	343	400						d_m
	205	255	299	337	373	436						d_e
	1,00	1,10	1,20	1,30	1,40	1,60						A_l
06 500		0,075	0,10	0,13	0,55	0,20	0,25					A_c
		231	286	333	375	444	500					d_m
		283	331	374	413	483	545					d_e
		1,30	1,40	1,50	1,60	1,80	2,00					A_l
02 - 03 600		0,090	0,12	0,15	0,18	0,24	0,30	0,36				A_c
		240	300	353	400	480	545	600				d_m
		307	359	406	448	524	592	654				d_e
		1,50	1,60	1,70	1,80	2,00	2,20	2,40				A_l
800			0,16	0,20	0,24	0,32	0,40	0,48	0,64			A_c
			320	381	436	533	615	686	800			d_m
			410	463	511	598	675	745	872			d_e
			2,00	2,10	2,20	2,40	2,60	2,80	3,20			A_l
1000				0,25	0,30	0,40	0,50	0,60	0,80	1,00		A_c
				400	462	571	667	750	889	1000		d_m
				512	566	662	747	825	965	1090		d_e
				2,50	2,60	2,80	3,00	3,20	3,60	4,00		A_l
1200					0,36	0,48	0,60	0,72	0,96	1,20	1,44	A_c
					480	600	706	800	960	1091	1200	d_m
					614	719	812	896	1049	1184	1308	d_e
					3,00	3,20	3,40	3,60	4,00	4,40	4,80	A_l
1400						0,56	0,70	0,84	1,12	1,40	1,68	A_c
						622	737	840	1018	1167	1292	d_m
						771	871	962	1125	1270	1403	d_e
						3,60	3,80	4,00	4,40	4,80	5,20	A_l

Table 07.30: Table of the Rectangular Duct

Diametro nominale d [mm]	Spessore [mm]	Area della sezione trasversale A_t [m^2]	Area della superficie laterale A_l [m^2/m]	Tolleranze maschio/femmina [mm]
63	0,4	0,00312	0,198	0,50
80	0,4	0,00503	0,251	0,50
100	0,6	0,00785	0,314	0,50
125	0,6	0,01227	0,393	0,50
160	0,6	0,02011	0,503	0,60
200	0,6	0,03142	0,628	0,70
250	0,6	0,04909	0,785	0,80
315	0,8	0,07793	0,990	0,90
400	0,8	0,12566	1,257	1,00
500	0,8	0,19635	1,571	1,10
630	1	0,31172	1,979	1,20
800	1	0,50265	2,513	1,30
1000	1,2	0,78540	3,142	1,40
1250	1,2	1,22718	3,927	1,50

Table 07.31: Table of the Circular Duct Sizes

Information Point - Ground Floor

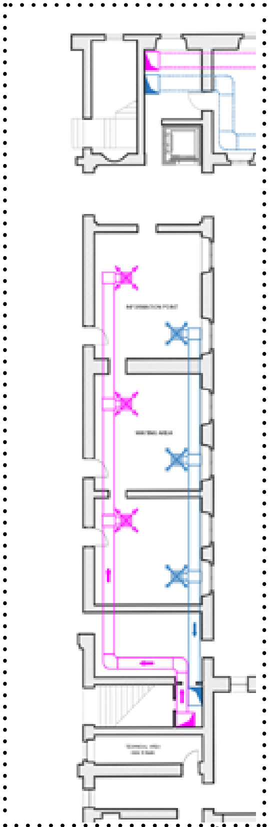


Fig. 07.22: Ventilation system plan of the information point

Toilet A - Ground and First Floor

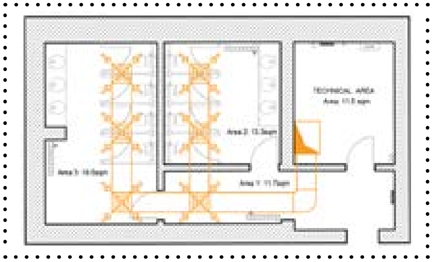


Fig. 07.23: Ventilation system plan of the toilet A

Restaurant and Toilet B - Ground Floor

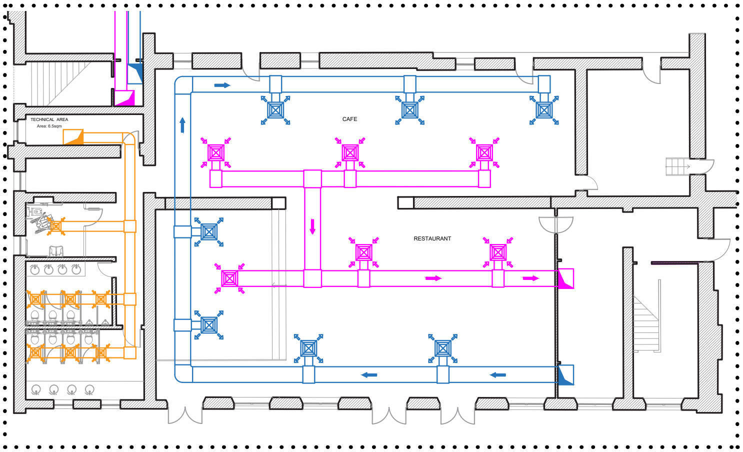


Fig. 07.24: Ventilation system plan of the restaurant

Meeting Room - First Floor

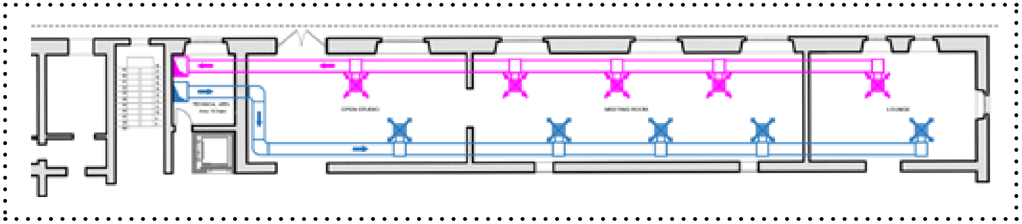


Fig. 07.25: Ventilation system plan of the meeting room

Exhibition Space - Ground Floor

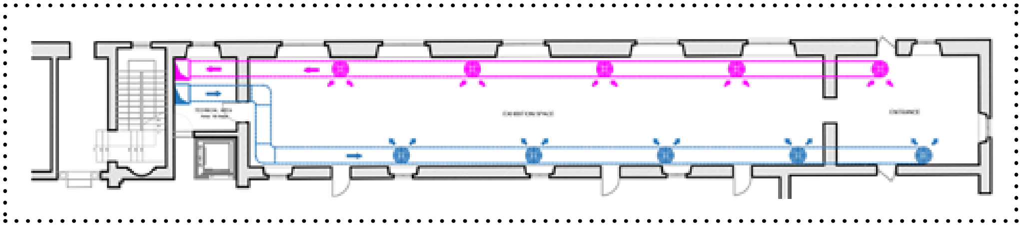


Fig. 07.26: Ventilation system plan of the exhibition space

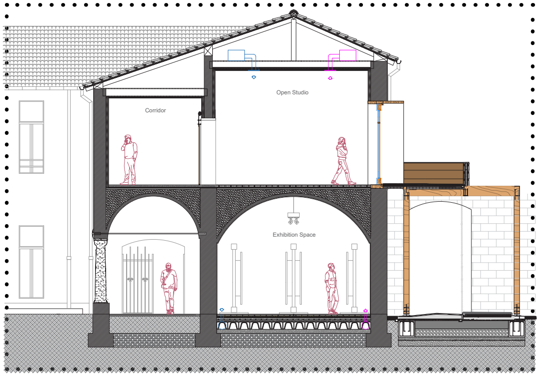


Fig. 07.27: Section shows the heating and the ventilation system of the exhibition space and the meeting

08
CONCLUSION

To conclude, the need to preserve the existing building and prevent its further decay is the major point of architecture while transforming and interpreting it according to the needs of the time in respect to its origins.

Designing the structure and applying it on the site in accordance with conservation requirements, in order to increase the efficiency of the building and improving the human flow around the site, enables an uninterrupted connection between cultural heritage and modern needs while maintaining the original purpose and authentic visual appearance of the building.

To design a compatible structure with nature while respect to the existing building, it´s necessary to observe and use the site conditions to ensure the conservation of the historic building without damaging the environment. Also, maintaining the original function of the space following the conservation requirements is one of the major points.

In this context, the survey of the Societa Umanitaria Cloisters and the design process of the timber pavilion went under the idea of respecting the existing structure and maintaining it without giving harm to the surrounding. The surrounding geometries and nature itself gave hints of the form-finding process of the pavilion structure which was designed to be temporary and lightweight by utilizing the current wood techniques. As a result, the structure caught the harmony and the unity between the existing buildings and the site.

09
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04 Timber Structures and Case Studies

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07 Building Services

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