

MECHANICAL ENGINEERING / PHYSICS /
PRESERVATION OF THE ARCHITECTURAL
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MODELS AND METHODS IN ENGINEERING



DOCTORAL PROGRAM IN PRESERVATION OF THE ARCHITECTURAL HERITAGE

Chair:
**Prof.
Mariacristina Giambruno**

The Doctorate Course in Preservation of the Architectural Heritage was first held at Milan based Politecnico back in 1983.

The PhD program focuses its attention to some currently crucial themes for the preservation, conservation, management and valorization of Architectural Heritage. Starting from the fundamental topics of knowledge, preservation, design and intervention, the PhD program takes care of the most important and urgent problems affecting the built Heritage and Cultural Landscapes: the fragility and the abandonment of historic marginal areas; the climate change and its effects on the built environment; the improper pressure of mass tourism on our historic settlements and sites of cultural interest, the needs for a wider social involvement in the field also through appropriate ICT mediums, the management and the use of architectural Heritage.

The conservation of Architectural Heritage is, in fact, a strategic field as well as one of the main important resources for worldwide economy and for a sustainable future in different areas of the world.

In addition to the professors of architectural restoration, history of architecture and structural strengthening of the Politecnico di Milano, the Faculty Board includes representatives from other well-known universities and research institutes (Università IUAV, Venezia; Università di Genova; Politecnico di Torino, Università degli Studi di Bergamo; Istituto Superiore per il Restauro e la Conservazione ISCR; ISPC-CNR, Milano); they collaborate actively in the teaching and research activities. The ultimate purpose of the Faculty Board not only resides in broadening the experiences that the PhD candidates acquire over the first three years of the course, where they have the opportunity to interact with scholars from different backgrounds; it chiefly aims at providing the PhD candidates with a unique training experience in the Italian panorama, so far unparalleled also in domains other than the preservation and restoration of the cultural heritage. Such context investigates the synergies and responses to the modern themes of cultural heritage protection. The PhD programme is meant as the place where theorization, methodology, investigation into the most significant chapters of the protection of historic architectural and cultural heritage are connected to complex, challenging operating research themes, on-site and lab experimentation of analytical and diagnostic stages.

The relationship with Italian Ministero per i beni e le attività culturali e il turismo - Mibact has been definitely fruitful, especially when we consider that many among the best PhDs in Preservation of Architectural Heritage have been hired as officers

and executives to the above ministry; recently (February 2018) twelve PhD from the PAH Programme won the competitive exam to become officers in the Ministry of Cultural Heritage

Teaching aims

The Faculty Board organization allows to investigate and share extremely relevant, up-to-date topics that, architectural heritage being the high spot of research, describe the complex domain of preservation, a strategic field and, at the same time, one of the chief resources of the Italian economy and future.

Being a mix of differentiated research, experimentation and operating methods, the PhD programme provides the candidate with a rich and very interesting experience. The on-going contact with the breakthroughs from studies and research carried out in Italian and international contexts and the will to promote joint projects are fostered through expanding the network of relations the university entertain with other universities and research centres in different geographic areas of the world.

In this regard, over the past 5 years the PhD programme in Preservation of the Architectural Heritage has been committed to promoting and coordinating inter-doctoral courses contributed by foreign professors from different European countries.

Coursework

The PhD programme, lasting three years, calls for the acquisition of 180 credits overall. 25 credits are offered by PhD courses (ten of them by PhD School).

The academic plan of the PhD programme revolves around 3 main research areas, corresponding to the core courses:

- 1) Heritage and landscape preservation: culture and practice
- 2) Methods and themes of historical research. Construction History
- 3) Science and innovation in diagnostics of materials and structures. Rehabilitation of historical buildings

Within this plan, different experiences are organized in order to get PhD candidates in touch with study and research developed in Italian and International context.

Visits to important restoration site are organized, such as the ones to the area in the central part of Italy damaged by the earthquakes (Amatrice Accumoli, etc.); to the Procuratie, Rialto Bridge and the Palazzo Vendramin Calergi in Venice; to the Colosseo in Rome under intervention of maintenance (with ISCR, formerly Istituto Centrale del Restauro), to the Sanctuary of Vicoforte (in collaboration with Politecnico di

Torino); to the underwater archaeological site in Baia (Napoli) in relation to the ISCR project "Restoring Unerwater".

The remaining credits are aimed at personal study and research for the PhD thesis.

The activities undertaken during the second and third year also include attendance of workshops, seminars, international meetings related to individual research, with great attention to conferences wherein PhD candidates present the results, even partial, of their research theses.

Research organization and topics

Educational activities are related to research either under way or at an early stage of development, some of which addresses major monumental structures and some of the most renowned sites of the world. This aspect increases the technical characteristics and will make PhD immediately competitive at the European level.

To the aim of their thesis research, PhD candidates have the opportunity to rely on facilities and laboratories, both inside and outside the University, the breadth and width of which provides them with a crucial support to the aim of acquiring "competence for highly qualified research activities" in the domain of cultural heritage protection.

In this connection, the PhD programme deems to carry on the long - standing collaboration with the ISPC-CNR (the Institute for the Preservation and Enhancement of Cultural Heritage).

As for the thesis research, candidates thus have the opportunity to address and investigate in-depth the wide-ranging themes connected to heritage knowledge and preservation broadly meant, such as advanced methods of investigation.

The multi-disciplinary nature of the doctoral courses, encouraged in the framework of the PhD programme since its establishment, equally values the fundamental contribution of historical research and its methods; at the same time it features innovative, pioneering themes: impacts of climate change on architectural heritage and cultural landscapes; *Inner Areas*: census, conservation and re-use of Architectural Heritage; strategic approaches for the preservation; social involvement and Communities engagement in the protection and management of their Heritage; Impact of mass tourism on architectural heritage and cultural landscapes; cultural and sustainable tourism policies and practices; Architectural Heritage at risk in seismic or in conflict areas; Architectural Heritage and Cultural Landscapes in Countries in transition.

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MODELS AND TECHNIQUES OF THE CONSTRUCTION OF THE REAL COLEGIO-SEMINARIO DE CORPUS CHRISTI OF VALENCIA: ORIGINS, TRANSFORMATIONS AND RESTORATIONS OF THE BUILDING BETWEEN 17TH AND 21ST CENTURIES

Margherita Cannoletta - Tutors: Alberto Grimoldi, Daniel Benito Goerlich

The Real Colegio-Seminario of Corpus Christi is the object of the research. The building, founded in Valencia by St. Juan de Ribera in 1584, now houses collegiate and seminarians and is aimed at the education of new priests.

The College represents today a remarkable testimony of the history of Valencian culture and has often been the subject of numerous and complex researches, which have involved historical disciplines, from the history of art to the history of society. The archival documentation preserved inside the Seminar, his architecture and the objects of art make it a symbolic building of Valencia and an example of the late Spanish Renaissance, as consequence of the prerogatives of the Council of Trent and of the profound and refined culture of its founder.

Despite recent multidisciplinary researches, construction, decoration, maintenance and the numerous transformations require further investigations.

The enclosure of the College has in fact hindered the analysis of the construction aspects of the building, more than artistic ones, by researchers.

His archive, which preserves the documents of the College and of its properties, has undergone new "rearrangements" over time, corresponding to different administrations and changes

of the institutional context; that caused the loss of useful references to localization of materials. The examination of the "Gasto General" section and the systematization of the data that emerged, led to the conclusion that the building has undergone small but continuous interventions during his history. In addition, the degradation phenomena (varied, although rarely worrying) have introduced further (unintended) changes. The thesis has highlighted events and traces, ignored until today, of the late 16th century building site and rebuilt in detail the transformations made up to the 21st century. The work was mainly structured around archival documents, which were collected first following a topographical order, through the drafting of the "Raumbuch", and subsequently discussed in the thesis text, in relation to the historical events of the national and local context. The large amount of in situ surveys and graphic and photographic material produced during the research also made possible to link the information obtained from the archive with the material evidence of the building.



Fig. 1 - View of the church



Fig. 2 - View of the cloister

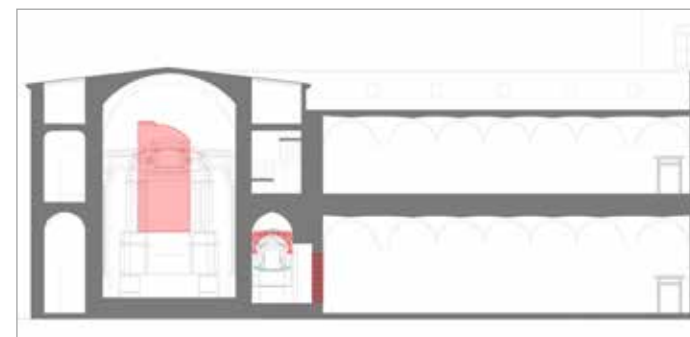


Fig. 3 - Schematic cross section

FROM MASSAWA TO ASMARA ALONG THE INFRASTRUCTURES FROM THE COLONIAL PERIOD (1885-1941): HISTORY AND SAFEGUARD OF A CULTURAL LANDSCAPE

Nelly Cattaneo - Supervisor: Prof. Maurizio Boriani

The object of the research concerns the history of infrastructures, landscapes and settlements derived from the Italian colonial activity in Eritrea, focusing on the area connecting Massawa to Asmara, and touching upon the issue of their perception as a Heritage in the contemporary Eritrean frame. In printed sources all along the Italian colonial period, the issue of communications and transports stands out for its paramount importance, both for military reasons and for the so-called “messa in valore” of the newly conquered territories. Although crucial for understanding relations between the development of settlements, the economic strategies and political relations, the communication and transport system is not recurrent in present literature about Eritrean colonial heritage, which is mainly focused on urban architectural heritage. Nevertheless for the colonial administration and the Italian government, this branch of activities required relevant efforts in engineering. The study of their general planning and their tangible outcomes offers the opportunity to consider the results of the work of technicians enrolled in the *Genio Militare* and *Civile*, and the contribution provided by Italian academics and companies of the time. Moreover the landscape that slowly took shape is the evidence of a quite articulated relation between

Italian administration, *coloni*, and local inhabitants’ culture and traditions, offering the opportunity to investigate also the intangible outcomes. In the first part the study aims at outlining the development of communication infrastructures in Eritrea during the Italian Colonial period as the result of several - and sometimes contradictory - projects for its military control and for its economic improvement, which can be mainly divided into policies for agricultural, commercial and touristic enhancement. From this general frame, dealing at the national scale, the axis going from Massawa to Asmara stands out for its absolute relevance in the transport and communication network. At the same time the infrastructures planned and built in area between these two towns were the most challenging, due to the complex orography and hydrography of the territory, and to the extremely



Fig. 1 - The railway line along the slopes of the higlands, close to Arbaroba (Nelly Cattaneo 2018)

different climatic conditions along the way. In the second part the history of the infrastructures connecting Massawa to Asmara has been retraced, as their past bears witness of the sequence of the Italian policies concerning the Colony all along its historical process, and displays the technical and technological knowledge acquired in Italy and adapted to the various conditions posed by the Eritrean territory. The infrastructures are constituted of a road, which in 1941 was defined by the British “in every way a triumph of engineering”, of a narrow gauge railway and of a ropeway, which was one of the longest in the world in the Thirties: in different ways and in different steps, the road, the railway and the ropeway had impacts on the territory which triggered transformations acted both by local people and by Italian *coloni*, and created peculiar landscapes along

the way. The history of these three infrastructure is determinant for the important and peculiar changes occurred in the cultural landscape. Another determinant element, strictly connected to infrastructures, is the hydrographic and hydrological system. The cultural landscape is very differentiated all along the area, but

it has briefly referred to three sub-regions: the coastal lowlands, the middle mountain area and the slopes to the highlands. A specific study deals with the meaning of Colonial Heritage in Eritrean contemporary context, which has peculiarities due to the role of colonial past in the process of



Fig. 2 - The reinforced concrete bridge built in 1935 in the lowland near Sabarguma (Nelly Cattaneo 2018)



Fig. 3 - The ropeway visible from the road between Nefasit and Embatkalla (from the photographic album “Teleferica Asmara-Godaif - Massaua-C.Marte” 1939, available on www.ferrovieeritrea.it)

emancipation from Ethiopia, and of the formation of Eritrean identity as a nation. The aim of these outlines is to point out if and how the attention paid to the colonial architectural heritage of Asmara (which entered the World Heritage List in July 2017) and in a different way to the railway (a rehabilitation project was carried out from 1994 to 2002 on Eritrean initiative), can find a general common ground and be transferred also on infrastructures and their remains, as well as on the cultural landscape they defined.

MICROSTRUCTURAL CONSOLIDATION OF MORTARS' SURFACES BY THE USE OF DI-AMMONIUM PHOSPHATE (DAP) AS AN INNOVATIVE TREATMENT IN CULTURAL HERITAGE BUILDINGS.

Agnieszka Katarzyna Defus

Supervisors: Dr. Marco Realini, Prof. Carolina Di Biase

The thesis' aim is to provide the first insight view upon the possible treatment with DAP (di-ammonium [hydrogen] phosphate) of the lime-based mortar surfaces. As each of the operation aiming for a preservation of historic material is considered as a highly delicate issue, it is necessary to fully understand the overall complexity of the surface treatment through the application of substances aiming for its consolidation. For that reason, a detailed state of the art is presented and its milestones are analyzed, thus clarifying and resolving an essential issues attributed to the motives and effects of implemented novelties, advancements and continuations in the field. The main conclusion that may be drawn from this particular section is clearly visible change of approach in the consolidation interventions, that lays in the direct dependency with the major markers observed during its timeline – as the first triggering point for involving chemical product in the application of historic material is always the formulation seemingly better than previous solutions. The availability of different methods and products – previously seen rather as threatening of disparity – within the passing of time start to be perceived as a growing opportunity for individual treatment of each unique surface. For that reason, nowadays each additional availability in the consolidation methods – given the growing complexity of observable deterioration

(caused as well by the previous misled applications) – is considered as a substantial contribution towards constantly important practice of remedial surface preservation. Providing the full understanding of this phenomenon, it was possible to introduce to the research area a novel treatment based on previously known DAP consolidation. Through the projected examinations – firstly performed in laboratory and then on site – certain outcomes were obtained giving a wider view upon the possible consolidation of mortar surfaces with this particular chemical and opening this branch into the further studies. First step of the experimental research was to assess the primal properties of the laboratory-prepared mortars treated with DAP in different configurations, concerning its molarities (2.0 M, 3.0 M, 3.7 M) and eventual subsequent limewater application. Through the evaluation of mechanical properties, color change, water capillarity and microstructural observations it was possible to assess the most optimal solution for the chosen substrate. As the general outcome regarding this section was no visible improvement in case of treatment modality in case of post-application of limewater, a direct statement was drafted of its unnecessary for this particular substrate. For what regards the other qualities and their relation towards applied DAP molarity, the treatment

contributed to general improvement of samples' condition in each case but no substantial differences between them were noted. The obtained outcomes allowed thus to form a statement that 24 hours' poultice application of 2.0 M DAP would be an optimal solution applied for prepared mortar samples. More profound view was provided by the second research step, taking into consideration the application of DAP solution in previously assessed molarity on the surfaces displaying a certain level of deterioration. For that reason, laboratory prepared mortars were subjected to artificial weathering following two different mechanisms – freeze/thaw cycles and salt attack by sodium sulphate. After obtaining a desirable superficial weakening, the DAP treatment was performed, while the measured features were confronted with both original samples' condition and the one altered by the weathering. The properties taken into consideration were the change of mechanical structure's strength, possible improvement of superficial, visual affection, and depth of treatment's penetration. Overall, in each case the treatment applied on deteriorated surfaces contributed to the significant improvement of samples' properties, in some cases creating as well the overstrengthening effect, that is to say, exceeding the primal original values after the treatment (which feature shall be bear in mind in the future studies'

evaluation). After the treatment, the durability of the treated and non-treated samples' was assessed by additional weathering cycles, carried on until the rupture or loss of at least 50% of material. In case of freeze/thaw deterioration, obtained results revealed a particularly promising consolidation action, as the treated samples gained more than three times' longer lifespan comparing to those untreated. For what regards the secondary salination cycles, treated surfaces were able to survive three additional cycles in comparison to non-treated specimens. The ultimate step of this research was

the trial testing of DAP application on the surfaces of St. Paul and Peter's church in L'viv (UA). For that purpose, the plastered part of ceiling was chosen, displaying a particularly complex and dispersed state of preservation, essentially in case of lack of mechanical consistency due to the proceeded salination. The first stage of this research step concerned the application of DAP in three different modalities, following the molarity: 1.0 M, 2.0 M and 3.0 M. The subsequent limewater application was decided to be added due to the presumed low level of lime-bearing compounds inside the substrate. The

overall condition after the treatment displayed a substantial improvement of cohesive qualities, no water transport properties' change, Ca-P phases detection and slightly poorer results obtained for 1.0 M DAP. Nonetheless, significant color change was observed (whitening). In order to overcome this problem without the loss of mechanical improvement, second step of the experimentation was undertaken, omitting the limewater application and using 2.0 M DAP. Observed results clearly indicated the color alteration diminishing which was however not fully discarded and no significant changes in case of cohesive qualities. It shall be however bear in mind, that in case of further coverage of the zones picked for treatment, being the possible subsequent step of on site restoration activities, the color alteration plays insignificant role, as the most important issue in such case is to provide a proper mechanical strength allowing for a support of newly set plaster. The overall conclusion resulting from this research may state of the highly promising perspective regarding superficial treatment with DAP of historic lime-based mortars. Multiple questions risen during its execution, particularly in case of color change and post-salination behavior, shall be considered as an input features for future studies.



Fig. 1 - Indicator of treatment zones during in-situ DAP application.

THE SPANISH CRUCIFORM HOSPITALS OF 15TH/16TH-CENTURY. PROTECTION, TRANSFORMATION, REUSE FROM 1836 TO PRESENT DAY

Lucía López Cenamor - Supervisor: Carolina Di Biase

Co-supervisor: Ignacio González-Varas Ibáñez

The research focuses on the Architecture of the Spanish Cruciform Hospitals, their evolution from the period of foundation to the present day and, particularly, the processes of protection, transformation and reuse that were carried out during the last two centuries -from the rise of the liberal principles of “*beneficencia pública*” and “*desamortización*” and the consequent leap to a public administration. The case studies presented have been called and grouped under the denomination “Spanish Cruciform Hospitals”: constructions with a healthcare use that were built up over the Spanish territory between 15th and 16th century, following a cross floor design. These buildings correspond to the “Hospital de los Reyes Católicos” in Santiago de Compostela, the “Hospital de Santa Cruz” in Toledo, the “Hospital Real” in Granada, the “Hospital General” in Valencia and the “Hospital de las Cinco Llagas” in Seville. Currently, these same buildings house very different functions from the original and in turn with variations between them, namely: the “Parador Nacional de los Reyes Católicos”, the Museum of Santa Cruz, the headquarters of the Rectorate and General Library of the University of Granada, the Public Library of Valencia and the Parliament of Andalusia. The proposed goals of the research are: in the first place, to reconstruct the architectural evolution of each one of

the cases, as well as their comparative and transversal analysis, relating them to different contexts such as the beginning of the Renaissance in Spain, the origin of the cruciform floor scheme and its diffusion from Italy to Spain, the assimilation of foreign architectural models, the welfare and healthcare history since the time of the Catholic Monarchs, the leap to the “*Beneficencia Pública*” during the 19th century and the hygienist principles, the urban framework, the protection policies on the Spanish architectural heritage, the criteria intervention on *monuments*, the reuse and revalorization of historic buildings, etc.; secondly, to analyze the importance and the role that each Cruciform Hospital has held throughout its life as well as the perception that the different characters and

institutions have acquired about them, such as the monarchs, benefactors or patrons, the “*maestros*”, public and cultural administrations, the “*Arquitectos Conservadores*”...; finally, to understand the *architecture-function* duality and to determine the relevance that the cross scheme has achieved over the centuries, both with healthcare use and with the diverse functions that have been subsequently installed.

The thesis is based on a structure formed by six themed chapters -with a chronological basis- a conclusive section and a documentary appendix integrated by selected graphic material of great relevance, as well as a compendium of projects, with transcribed memories and the corresponding planimetry extracted from the various archives. Each chapter

consists of an introductory part with the presentation of different questions to be answered, the development of the text and a final section with a comparative analysis between the cases and the specific conclusions regarding the particular issues of the chapter. The concluding section is presented as an epilogue that covers the comparative analysis between the primitive design, the state in the 19th or 20th century before the functional mutation and the current situation that helps to understand the interior and exterior spaces as well as the distribution communication paths that have been preserved or transformed over the centuries; the relationships and deductions generated by the study of the conservation and reuse processes of the Cruciform Hospitals analyzed; and, in the same way, a

series of reflections and suggestions on the recovery of the memory of the former uses and the revalorization of the past life of the five cases. In addition to this, the general conclusions generated thanks to the research are exposed in the final pages which, together with the specific conclusions shown at the end of each chapter, represent the original results obtained from this thesis. Therefore, thanks to the research carried out, several contributions have been achieved: a thorough study where, for the first time, the five Cruciform Hospitals are jointly analyzed, parallel and transversely; a homogenization of the existing information, with an important discovery of unpublished archival material related to the numerous works executed in the last two centuries; a

critical and analytical study of these interventions -*restoration, preservation, consolidation, rehabilitation, reconstruction...* - in relation to the figure in charge of carrying them out, their methodology and the intervention criteria used, the existing regulations, laws and decrees and the management and protection works developed by the different administrations related to the architectural heritage; and finally, based on the considerations and reflections developed on the processes of *preservation* and *reuse*, it has been possible to demonstrate the relevance that the five buildings and their cruciform floor plan have achieved within the artistic, social and heritage history of each city in particular, as well as of the whole national territory.



Fig. 1 - Facade of the Parliament of Andalusia, former “Hospital de las Cinco Llagas”, Sevilla, 2017



Fig. 2 - Courtyard of the Museum of Santa Cruz (“Arqueológico y de Bellas Artes”), former “Hospital de Santa Cruz”, Toledo, 2018



Fig. 3 - Exhibition hall within the Rectorate of the University of Granada, former “Hospital Real”, Granada, 2017

SUCCESS AND DECLINE OF MOVIE THEATERS IN EMILIA-ROMAGNA AFTER THE SECOND WORLD WAR. CONSERVATION OF THE ARCHITECTURES FOR THE MOVIES

Elena Macchioni - Supervisor: Prof. Giovanna Franco

Co-supervisor: Prof. Stefano F. Musso

The research investigates the architectures for the movies in Emilia-Romagna, with specific attention to the ones built or transformed after the Second World War.

Movie theaters in the region represent a large group of buildings, encompassing over 300 constructions for movie screening. In general, it is a set of strongly diversified architectures, which configuration is often the result of ongoing interventions, to comply with changing commercial or regulatory requirements.

Emilia-Romagna is one of the Italian regions that display the highest indicators related to cinema-going for the post-war period. Even in the 1970s, a decade marked by a contraction of the cinema industry, it had one of the highest rates of tickets sold and active premises per inhabitant. Moreover, many of the most influential filmmakers of Italian post-war cinema are from Emilia-Romagna and its territory is portrayed in several critically acclaimed feature films, starting from Luchino Visconti's *il Grido*, considered the inception of Italian Neorealism. Finally, the city of Bologna has always been at the forefront of cinema studies, hosting the first film archive and university program on Drama, Art and Music Studies in the country.

Since the mid-fifties, however, over a thousand spaces for movie screening have disappeared. Many buildings

underwent transformation, demolition, or neglect. The phenomenon is still underway, involving several movie theaters during this research. This is a global trend, seeing these architectures, linked to a specific way of enjoying leisure time and watching the movies, suffering from functional obsolescence.

The starting point of the thesis is the enlargement of the meaning of heritage, moving towards more and more inclusive definitions, and the consequent dilemma posed to the conservation field, confronted with the impossibility of extending an active protection to the entire existing building stock.

Among the scientific community, the interest in movie theaters architecture has been growing exponentially since the end of the 1960s. Over the years, scholars explored their architectural features, role in defining the urban

modernity, authorship by famous designers, as well as their persistence in the collective memory; most of those studies looked at constructions of the first half of the 20th century. Currently, Italian movie theaters convey the interest of the society at different levels. Recognizing their beneficial effect for urban life, the national government provides owners with financial support for renovation projects and addition of other activities, and with a tax credit system for venues functioning since the year 1980 at least. Some local administrations promoted municipal resolutions and agreements with other public or private organizations aimed at protecting premises in the city centers and offered funds for the renovation of historic venues. Finally, movie theaters draw the attention of local communities as places holding collective memories, and abandoned



Fig. 1 - Principe Theater in Modena. Designed by Vinicio Vecchi and inaugurated in 1961, the building replaced a previous venue dating to the beginning of the 20th century.

buildings are often claimed for communal use.

The research explores the material outcomes of the two subsequent seasons of success and decline of cinema-going in Emilia-Romagna, providing information on construction, transformation and current state of cinema architectures on the territory. The focus is specifically on the buildings dating to the second half of the century, being less studied and more easily prone to demolitions or transformations, but corresponding to the climax of cinema-going in Italy and even more in the context of Emilia-Romagna.

The author carried out a survey of cinema architectures in the region,

verifying the current condition of the buildings through direct inspections, combined with bibliographic and archival research. Commercial venues (that is, for entertainment and profit-making) were more thoroughly analyzed in consideration of their spatial, structural and material features, as well as their connection to the architectural culture of the time. Educational movie theaters are strongly rooted in the region, with many premises owned and managed by religious bodies, recreational organizations and political parties (in the post-war decades, mostly the Italian Communist Party). In terms of authorship, the work of Vinicio Vecchi is crucial when considering cinema

architecture in Emilia-Romagna: he designed over sixties movie theaters in the region and created one of the first examples of bleacher type auditorium with cross-section following a hyperbola branch in Italy. Other well-known Italian authors designed some movie theaters in the region, but few of those buildings survive today. Finally, the question regarding movie theater architecture as a possible heritage of the recent past underlies the whole research. The work explores the specific features of the existing buildings for the movies in the region, capable to be translated into potential reasons for their conservation and therefore to guide the choices regarding their permanence and use.



Fig. 2 - Ambra Theater in Reggio Emilia. Designed by Carlo Lucci and inaugurated in 1952, it is currently abandoned

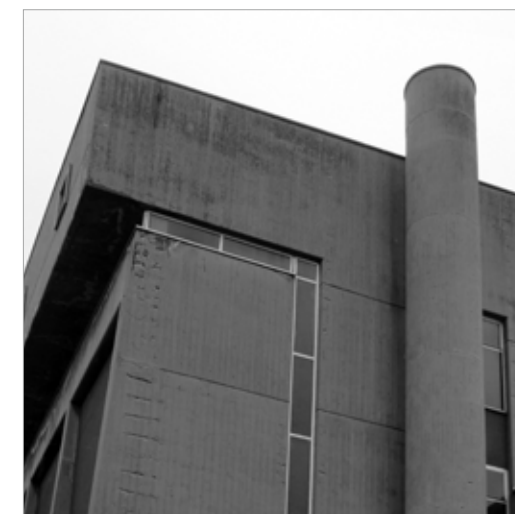


Fig. 3 - Astoria Theater in Rimini, detail of the back façade. Designed by Vinicio Vecchi, the venue opened in 1980 in a new district outside the city.

CONSERVATION OF THE FRENCH COLONIAL ARCHITECTURAL HERITAGE IN HANOI CITY: FRENCH COLONIAL HOUSES, NOW “SHOPHOUSES” AS A CASE STUDY

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French colonial architecture in Hanoi was formed and developed over 80 years, under the French colonial period from 1873 to 1954. The French constructed many colonial buildings which could be regarded as valuable architectural heritage, contributing to the creation of typical identity for Hanoi, and forming an important part of the history in the city's urban development.

In recent decades, like other cities in Vietnam, Hanoi has given priority to developing the economy without paying due attention to heritage preservation. Under the strong pressure of urbanization and modernization processes, the asset of French colonial architecture in Hanoi has been largely affected, in which the group of French colonial houses, now “shophouses” is facing serious degradation and will also probably soon be disappearing from the historic center of Hanoi. Unfortunately, these colonial houses have been virtually ignored, and never been mentioned in legal documents or protected as the built heritage of the city.

This Ph.D dissertation is aimed at highlighting the importance of French colonial houses, now “shophouses”, in the panorama of French colonial architecture in Hanoi; affirming the historic value as well as the precious characteristics of these houses. In addition, the dissertation points out the existing limitations

regarding the conservation of colonial architectural heritage in Vietnam. As a consequence, unrecognized heritage buildings like colonial houses have to face the risk of fading and disappearing. After studying and clarifying specific issues that are happening with French colonial houses, now “shophouse” in Hanoi, the dissertation has also developed and proposed an appropriate conservation orientation for these houses in the modern context of Hanoi city.

The dissertation starts with *the first part including four chapters*, which

aimed to clarify the “state of art about French colonial architectural heritage in Hanoi”: the legal system regarding the heritage conservation was presented in chapter 1, which provided certain regulations related to French colonial architecture. Understanding this protection system would be very necessary for developing an urgent (and more efficient) conservation plan to keep colonial houses better protected in the near future. Chapter 2 was dedicated to provide a historical overview of the formation and development of the French colonial



Fig. 1 - The “Shophouses” in Hanoi. Photo taken by the author, 2018.

city in Hanoi. The transformation from feudal urban form into colonial urban style through analyzing a series of city maps of Hanoi in different periods of time was clearly described in order to show how urban development in Hanoi during French colonial era progressed. Especially, the last section of this chapter focused on the analysis of the French colonial architecture at the end of the 19th century and its influence on the construction technique as well as the trend of architectural styles applied to the architecture in Hanoi in the early 20th century. The chapter was elaborated as the background for the next parts. It helps connect as well as clarify relevant historical information in order to focus significantly and efficiently on the main object of the research. The literature review of all documents on French colonial architecture in Hanoi was carried out in chapter 3, which was dedicated to mention the previous studies as well as conservation projects related to the architectural heritage in Hanoi, especially previous studies on the urban development of the city and the French colonial architecture. The valuable studies of Vietnamese specialists and Western scholars undertaken in the previous years were important sources of reference for the researcher to gain a deeper view of French colonial heritage and to understand the current state of the architectural heritage conservation in Hanoi as well as to study on the urban development of the city in history more clearly and systematically. These are the necessary knowledge to help the researcher, not only to avoid repeating the previous completed studies, but also to develop an individual and original research more carefully in order to fill the gaps that

other scholars in the same field have not yet chosen to deal with. Chapter 4 was to focus on discussing the current situation in preservation of French colonial architecture in Hanoi. A variety of effects on French colonial architecture in Hanoi since Reform Policy (after 1986) are clearly stated in order to link the general problems caused by the urbanization process in Hanoi to the existing problems in colonial houses in the next section. The objective difficulties in the management of the French colonial architecture are also determined in this chapter; these difficulties play a major role in the deterioration or even the disappearance of the French colonial architecture, especially those unrecognized or unlisted colonial buildings in Hanoi.

The second part of the dissertation encompasses three chapters fully focused on the main object of the research - “French colonial houses”: The formation and development of French colonial houses were summarized in chapter 1 through historic documents and important archives. Furthermore, the typologies and characteristics of French colonial houses were also clearly described. Especially, the biggest transformation from colonial house into the “shophouse” after 1986 in Vietnam was explained and analyzed in this chapter. Chapter 2 of the second part tried to discuss and define some specific criteria for evaluation of French colonial houses, now “shophouses” in Hanoi based on Vietnamese viewpoints as well as from international viewpoints, which could be suitable and necessary to be applied in the context of Hanoi. The last chapter of this part was to highlight the present status of these “shophouses”: functional changes,

previous interventions, the materials and the decay phenomena, which are important points and very necessary to link them with the proposals in the third part of the thesis.

Part 3, the last part of the dissertation, comprises three chapters which focused on developing a proposal for the conservation of French colonial houses, now “shophouses” in Hanoi: Chapter 1 was to discuss and analyze the disadvantages of the protection system in Hanoi by identifying the limitations of protection system and clarifying renovation practices in Hanoi regarding the colonial houses. Chapter 2 aimed to propose the orientation for conservation of these houses in the current context of Hanoi, pointed out the necessity of the comprehensive diagnosis of those houses and defined a series of essential principles for the preservation. The last chapter was dedicated to develop the conservation and rehabilitation action plan. Especially, the conservation measures, with the detailed proposal for dealing with 03 main categories, were proposed for protecting the colonial houses, now “shophouses” in the historic center of Hanoi in near future.

GENOA AND THE ANCIENT CITY DURING THE SECOND POSTWAR PERIOD, BETWEEN INNOVATION AND CONSERVATION. THE PICCAPIETRA CASE (1945-1975)

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The object of the research is the Piccapietra district, built in the second half of the 20th Century after the almost complete demolition of the old medieval area. Despite the episode of Piccapietra had involved well-known architects and defines today again the city centre, its history has not been studied yet. Moreover, the fact that today Piccapietra presents some conservation problems (e.g. unjustified modifications, transformations of intended use, etc) makes even more necessary the comprehension of mechanisms and cultural debate that led to its construction.

Therefore, the aim of the research is to piece together the events, the protagonists, the debate about Piccapietra demolition and new construction, to investigate the urban and architectural features of new district, and to focus on conservation problems and possible advantages implied within a protection program. This research adds a piece of knowledge not only to city transformations history in late twentieth century, but also to conservation history in Italy, with which Piccapietra episode is actually connected.

First chapter focuses on the way in which the relationship between Italian cities and historical centers has changed during the Second post-war period. Identified as a key-moment for conservation discipline,

this period was characterized by a gap between the architectural debate and transformation models promoted on centers, expression of a specific cultural and political season. A complex and contradictory relationship with the ancient city emerged: historic centers were considered as matter to dismantle (to support the growth of the metropolis), to manipulate (as a simulacrum), but also to preserve as an expression of a "minor" history that contributes to the "greater" one definition. In this part of the research it was possible to recognize, studying Piccapietra as a synecdoche, an ambivalent attitude in relationship with the old city also from Genoese administration and bodies responsible to protection. The same historical center has in fact been considered in some cases as an object to destroy for modern city development, and in other cases to preserve with a protection strategy plan.

The second chapter of the research is devoted to investigation of events, protagonists and projects for Genoa centre redefinition, in order to reconstruct how the idea of the city was expressed from the late Nineteenth century up to the World War II, through the relationship with its historical center. In this way, has been identified the architectural and urban premises that led to Piccapietra Executive Plan definition (1950-1953). In order to understand the forecasts of

plans for Piccapietra transformation, it was firstly necessary to retrace the iconographic, cartographic and toponymic coordinates of this district at the end of Nineteenth century, on which the literature and the historical cartography did not provide accurate indications. Thanks to the cartography georeferencing executed on GIS (Geographic Information System), that allowed to re-draw every single geometries and to associate each with datas reported in a database, previously defined, it was possible to give back a rigorous image of Piccapietra planimetric configuration after the II World War.

The second part of this chapter focuses on the reconstruction of damages caused by war bombing on Piccapietra, in order to better understand the demolition choice that has been taken in the conflict aftermath, and the postwar debate around the configuration of the "modern" district. Thanks to collected archival materials, then inserted in GIS, it was possible to recreate an accurate image of Piccapietra after the war: a damaged district, but not completely destroyed. This result allowed to better comprehend that the 1950 demolition choice was only led by economic, political and urban interests, in order to take better advantage of center areas, replacing old and unhygienic fabric with sparkling and modern district. Third chapter focuses on post-war

genoese debate around the city and its historical center renewal and specifically around the definition of Piccapietra Executive Plan. There is in fact a lack of knowledge in published literature not only about events that led the demolition and construction of new Piccapietra, but even on Genoa transformations in the second half of the Twentieth century. It turned out that in this period Genoa had to face - as many Italian centers - a complex situation. Material and moral city reconstruction was expressed not only with creation of new job positions, construction of new houses, actions for industries reconversion and for reorganization of destroyed merchant port, but also with the redefinition of the city image. The central power indeed committed Italian Municipalities to draw up new general plan, reconstruction plan and detailed plans for individual urban areas execution. This situation led technicians, administrators, designers and citizens to confront themselves with the future city image and possible interventions on historical centre. The examination of genoese discussions on new urban configuration allowed to recognize a dual situation: two different attitudes in relation with the same historical center. On one hand historical city was considered as a white canvas on which new metropolis could be built, and on the other hand as a precious inheritance that had to be preserved.

This attitude actually found the basis on a split that the genoese historical centre experienced at the end of Nineteenth century. The construction of new wide vehicular roads divided in two parts the medieval center and the east working-class districts had thus been earmarked for whole replacement, through a dense sequence of transformation plans, many of which were realized. In this perspective, Piccapietra demolition in 1953 could be seen as the backlash of that great transformations season, but transferred in a key moment for the historic centre protection national debate.

The fourth chapter focuses on Piccapietra Plan execution phases, events and protagonists in order to reconstruct the role of public and private subjects in the new district definition, through the history of its construction. The chapter starts analyzing the public subject role, in order to understand if and how the Municipality position, as new city image "promoter", has changed over time. Through the focus on two areas, which the Executive Plan addressed to public management for creation of new cultural centers that wasn't actually built, it was possible to reveal an Administration attitude which was already evident during the discussions on new Piccapietra definition. After a first moment of true interest on architectural and urban configuration of this part of the city,

the public subject began to consider this area only as an opportunity to enrich the common funds, to create job positions and to attract private investment in high-yielding central areas. This chapter also focuses on private subjects role in new Piccapietra buildings design and construction. At first, the participation of well-known designers seemed to be part of Municipality will for the definition of city's new image. Thanks to archival materials it was possible not only to identify unknown subjects involved and to retrace construction buildings history, but also to unveil that the responsibility of designers participation was only attributable to private subjects instead of Administration. The analysis of Piccapietra's history has allowed to build a body of knowledge that could be useful for possible future neighborhood redevelopment, which is nowadays a black hole in the city center, evidence of a complex cultural and political season. A local history therefore, which actually represents a national one, whose products remain today as dots in our cities and for which it is necessary to imagine a new role in urban balances.