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INDUSTRIAL HERITAGE AND LANDSCAPE: THE ROLE OF WATER IN THE ARCHITECTURAL REACTIVATION DESIGN FOR THE BURGO PAPER MILL IN MANTUA

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HIGHLIGHTS

- On the base of Mantua's Burgo Paper Mill research experience, the paper highlights the role that water can play in an architectural reactivation design.
- An historical and geographical overview and Mantua's Burgo Paper Mill case-study is provided.
- The unstable nature of water as part of the territorial and urban system, as well as a cultural and natural element, is articulated, suggesting the possibility of turning it into a design resource.
- The research reveals the potentialities of water in a complex and multi-faceted context addressing new scenarios of transformation.

ABSTRACT

The paper is part of a research project, carried out within the Polytechnic University of Milan about the Burgo Paper Mill, an industrial settlement involved in the production of paper near the UNESCO World Heritage site of Mantua, on the banks of the Lago di Mezzo lake. The area represents an exceptional case study related to the topics of industrial reconversion, landscape, environmental design, and the valorization of cultural and natural heritage. The recent change in the site ownership fostered a new life cycle, which represents the occasion for the enhancement of its architectural and landscape heritage. The research project focused on a new system of relations between architectural artefacts and open spaces, with a particular consideration about socioeconomic and cultural themes, as well as the role that water can play in the future development of the site. Water plays a key role in the definition of cultural and natural elements in this research project, revealing new possibilities for revitalization of the industrial settlement as well as the whole territorial framework. Between theoretical thought and design experimentation, pursuing to tackle the problem in its whole complexity, the authors understood the necessity of a multi-scalar approach structured within a time-based strategy.

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1. INTRODUCTION

The Burgo Paper Mill (Fig. 1) is located in close proximity to the Mincio river, in front of the Mantua city center, which in 2008, together with Sabbioneta, has been declared by UNESCO as a World Heritage site (World Heritage Committee, 2008). The historical industrial complex, redesigned by P. L. Nervi in the early 1960s, represents an exceptional case study related to the topics of industrial reconversion, landscape, environmental design, and valorization of cultural and natural heritage. Facing a reactivation process over the last two years, today the factory complex needs a new strategy for its further development, as well as for the enhancement of its architectural and landscape heritage.



Figure 1: Burgo Paper Mill, aerial view. *Source: authors' elaboration of a Google Maps image (2017).*

The paper summarizes the results of the Heritage and Design International PhD Summer School of Polytechnic University of Milan, held in Mantua in September 2016. The Burgo Paper Mill case study has been chosen in order to carry out a multi-pronged research program that spans across history, theory and design.

The paper is structured in to three parts, in correspondence with the authors' methodology. The design-oriented historical reading is followed by a theoretical reflection about the meaning of the water system related to the site and eventually the role of the design practice in the reactivation of the overall area.

The first phase of the research project consists of a historical analysis of the factory site and surrounding off-site areas. The complex research methodology comprises the following key elements: the analytical survey of the areas historical stratification; chronological mapping revealing essential modifications of architectural entities, landscape and production cycle; mapping and cataloguing of architectural artefacts present in the area of production. A special attention is paid to the modifications regarding location and layout of the mill's loading bay, connected to the whole water system of the Mincio River

through the waterfront of the Lago di Mezzo lake, as well as to the alterations of the canal system within the project area. As major tools of the historical research, images retrieved from the State Archive of Mantua, the Ex Renato Giusti Museum of the Risorgimento and Resistance Archive, the Eros Vecchi Archive, and the IGM (it. *Istituto Geografico Militare*) maps from the Historical Archives of the Polytechnic University of Milan have been used. Analytical and factological data from the research thesis *Praise to the reflected sensitivity: Cartiera Burgo on the mirrors of Mantua* by M. Caliarì and G. Simonazzi (2004) and the monography *A century of paper. The first hundred years of the Burgo* by P. L. Bassignana (2005) has also been used in the process of chronological mapping.

Considering the ongoing industrial reconversion phenomena (Setti, 2014; Maglio, 2016; Palazzotto, 2016) and site-specific analytical readings, the research project pursues the definition of a specific framework for the sustainable development of the Burgo Paper Mill and its related territorial system. Close to the historical center, but at the same time part of a very rich natural context, which includes the Mincio Regional Park, a natural infrastructure connecting the Garda's Lake with Mantova's water system by crossing the Padana's Valley typical agricultural landscape, defined by specific artifacts and soils, the strategic position of the Burgo Paper Mill, and its dramatic value (Ferriolo, 2002; Turri, 1998), suggests the adoption of a multiscalar approach in the definition of the design strategy, from the territory to the settlement, as well as to the architectural artefacts.

2. HISTORICAL SURVEY OF THE PROJECT AREA

The first industrial site in the research area dates back to end of the 19th century: 1885, when A. Burton Buckley founded an oil refinery in the Poggio Reale area, north-east of the Cittadella di Mantova district ("Nuovi impianti industriali", 1891), also known as Cittadella di Porto due to its proximity to the Mantuan Lakes. As mentioned by M. Caliarì and G. Simonazzi (2004, p. 29), "the territory near Poggio Reale [...] is a virgin, marshy place [...]. The slow-flowing muddy waters of the River Mincio form stagnating marshlands that, due to the proximity of the city, need to be reclaimed".

The 1886 IGM map reveals the presence of the Parcarello canal on the north-west of the refinery, as well as the presence of two canals connecting the site with the waterfront of the Lago di Mezzo lake: "[...] the factory filtered the waters of the River Mincio through a series of canals, natural and artificial, the most important of which is the Parcarello canal, already present in the eighteenth century [...]" (Caliarì & Simonazzi, 2004, p. 32). In 1902, the property was acquired by Bindi-Lamberti&Co. The production cycle changed completely: the factory started to produce poplar cellulose ("Tessili, cellulosa e derivati", 1939).

The 1912 IGM map (Fig. 2) reveals a substantial development of the factory complex, as well as the residential development in its immediate proximity. The flow pattern of the Parcarello canal has undergone an alteration and historical images of the same period reveal considerable floodings of the whole Cittadella di Mantova area. The factory complex is now indicated on the map under the name of its subsequent proprietor – Kron&Co. From 1914, the official name of the factory complex was '*Poggio Reale Paper Mill, Mantua*' ("Movimento di ditte e ditte nuove: Mantova", 1914).

During the following decades, the factory complex changed its name and ownership several times ("Tessili, cellulosa e derivati", 1939, p. 228; Ferrari, 1999, pp. 101-116; Carera, 2004, pp. 124-125). In 1931, the Nodari Paper Mill of Poggio Mantovano which was part of the Vonwiller company at the time, was then acquired by L. Burgo becoming part of the Burgo Mills company (Ferrari, 1999; Bassignana, 2005). Production volumes of the Burgo Mills company were constantly increasing in the following years, triggering extension of all of its factories ("Some of the Mills", 1938). According to the images of 1938-1939, the Mantua factory complex continued its growth featuring new production and warehouse facilities, a hydroelectric power station, a tower-like building for the storage of bisulphite solution and

administrative offices. The 1936 map from the Burgo Archives (Caliari & Simonazzi, 2003, p. 32) shows the presence of the boat wharf for the transportation of raw materials (Fig. 3), as well as further alterations of the surrounding canals' flow patterns. According to Bassignana (2005, p. 81), "[...] the mill at Mantua, acquired from Vonwiller, and appropriately converted, for which provision had been made to use spruce wood from the Altopiano dei Sette Comuni, transported by water".

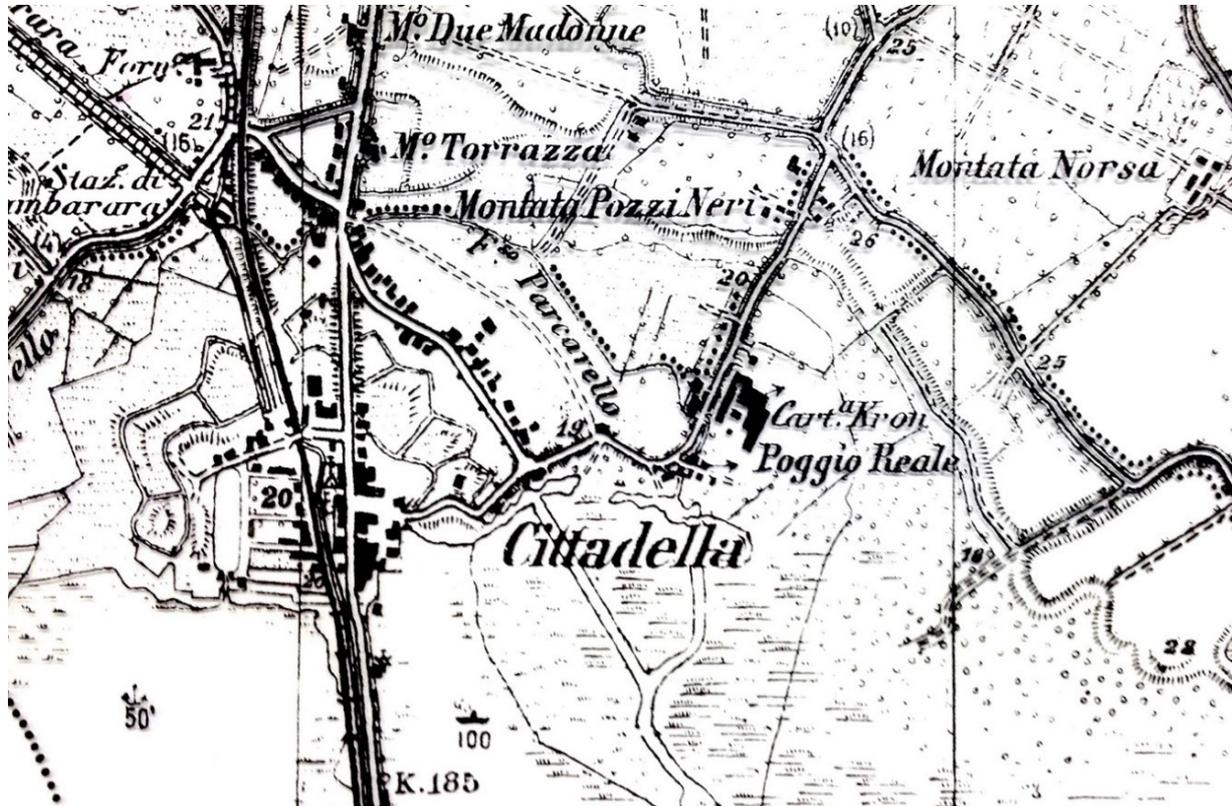


Figure 2: Map of the Mantua area, 1912. Source: Military Geographic Institute.

Throughout the 1940s, despite heavy aerial bombardments of the area during World War II, the factory complex remained intact. According to L. Cavazzoli (2008, p. 288), "[...] the main industrial factories, such as the Burgo Paper Mill [...], have not suffered any damage from those historical events". In 1954, presumably, for military reasons, the factory site was completely removed from the IGM map, whereas the 1950 image from the State Archive of Mantova (Fig. 4) and the 1954 planimetry from the Burgo Archives (Caliari & Simonazzi, 2003, p. 32) affirm the architectural development of the production site during the previous two decades.

The development process has reached its peak in the early 1960s with the large-scale architectural and landscape interventions of L. Nervi that were strictly connected with the fundamental change of production cycle: in 1961 the Burgo Paper Mill inaugurated a 112 m long continuous paper machine (Stella, 2011, p. 31; Casalegno, 2013, p. 293), which has transformed the site into an integral cycle factory, "starting with wood and arriving at paper [...]" (Bassignana, 2005, p. 116). Concurrently, the water system of the area was completely rearranged due to the new production cycle and transport logistics: the flow pattern of the Parcarello canal was alerted again; the loading bay and adjoining canals were no longer in use due to the post-war growth of motorized transportation.

In 2013, due to the financial problems, the Burgo Paper Mill was closed. In 2015, the factory was acquired by the Pro-Gest Group, which launched the reactivation process of the overall area.



Figure 3: Boat wharf for raw materials transport, 1938. Source: P. L. Bassignana (2005).

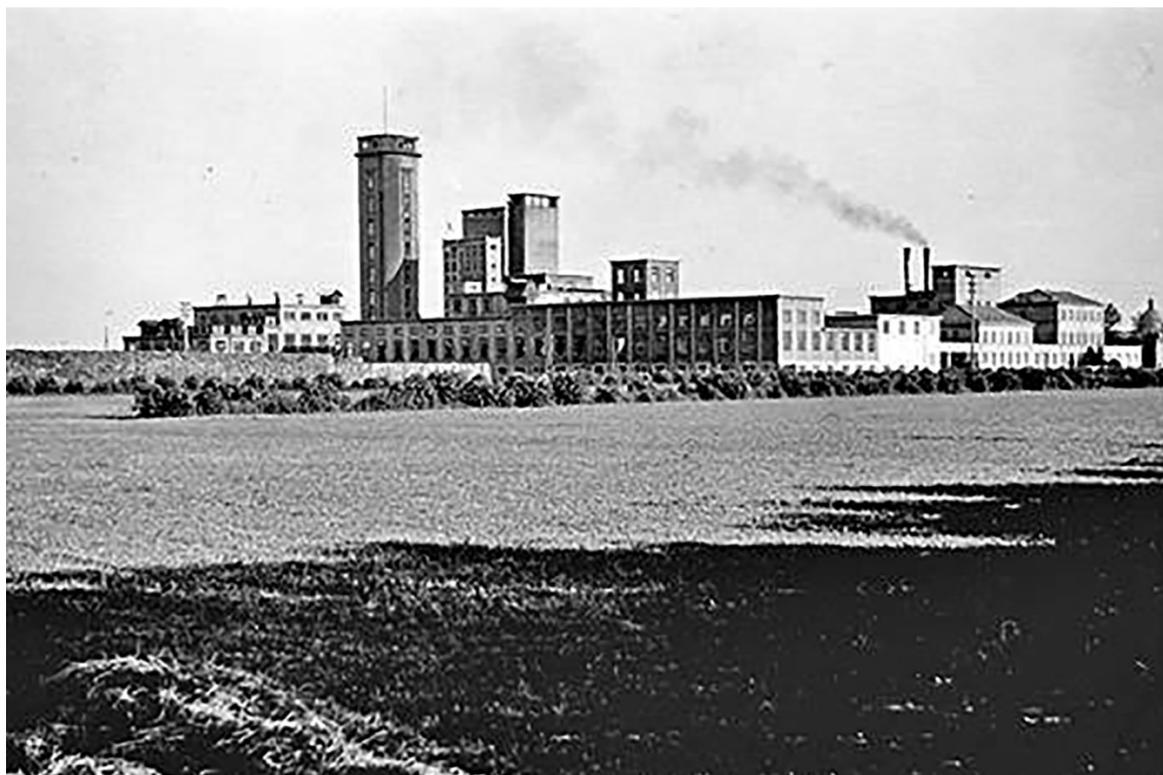


Figure 4: Burgo Paper Mill, Mantua, 1950. *Source: State Archive of Mantua.*

3. INTERPRETING PLACES THROUGH THE FORMS OF WATER

The site analysis based on cartographic comparisons confirms the importance of studying the geography in order to define a fruitful interpretative framework for the project. Although distant in time, nowadays it still seems appropriate to quote the Greek geographer Strabo when he states: “as well as the geographer must know how to draw to represent celestial figures, astronomical figures, magnitudes, distances and forms of places, so the architect must know all these things in order to place cities and buildings” (Strabo, 1833, p. 7). This is even more relevant if assumed from the perspective of the re-qualification of neglected areas, whose readings reveal the presence of strong environmental values. In the construction of productive and inhabited landscapes in the Po Valley, these values are witnesses of the constant constitution of the territory through the work of the man (Sereni, 1961).

Water is a fundamental element in these landscapes: the way in which the “minor” water is regimented represents the structure for the configuration of openfields, as well as, in more recent times, the condition for the position of manufacturers and industries. Not only this relatively minor network has undergone a strong transformation by human activity. Even the most visible one, formed by the rivers and, in the case of Mantua, by the lakes, has faced constant and significant hydraulic works even preserving shapes closer to the natural ones.

On the other hand, the reading of the maps highlights how the urban system of Mantua is related to the lakes shape: for instance, the noblest part of the city with Palazzo Ducale and the main churches take advantage of the presence of water and their presence marks the lakes shores. From the space of civil and religious power, city neighbourhoods are hierarchically articulated from North to South, revealing a progression that finds a counterpoint in Palazzo Te, the historic Gonzaga country residence.

These considerations introduce the ways in which the element of water has been considered within project-oriented readings of the sites. Its volubility, as defined by Leonardo da Vinci (2002, p. 59), who spent a period of his life in Mantua, although mitigated by the hydraulic works as in the case of the Mincio Lakes, makes necessary the re-design of their banks *thick edge*. The rising and the lowering of water level makes its perimeter variable and its shape an "unstable landscape" (Oldani, 2016, p. 19) open to its design reconfiguration. This landscape can be described as a hybrid area between the lake and the open spaces of the Burgo Paper Mill able to reveal new possibilities of transformation through the opportunity of its reintegration into a wider environmental system, rich in biodiversity and ecological resources.

At the same time the water, located between the Burgo Paper Mill and the city center can reveal another intrinsic aspect in its nature: the fact of representing an interval in the landscape construction. This interval introduces perceptive values, such as: from one side the revelation of the Monumental City *noble front*, while on the opposite bank, the articulation of the Burgo Paper Mill volumes, dominated by the figure of the main building designed by Pier Luigi Nervi. The image of the built-up space finds therefore, in the distance set by the water, the occasion of its prefiguration. As Droctulft, the warrior imagined by Jorge Luis Borges, we see a multiplicity without disorder: we see a city (Borges, 1998, p. 43). And its double (Fig. 5).



Figure 5: Visual relations. (a) Burgo Paper Mill seen from the Monumental City. (b) Monumental City seen from the Burgo Paper Mill. *Source: D. Galli (2016), G. Sempredon (2016).*

4. DESIGN FOCUS: STRATEGIES FOR A SUSTAINABLE REACTIVATION

Regeneration of the Burgo Paper Mill bank side represents the possibility to establish a renovated relationship between Mantova historic center, Nervi's heritage buildings, a new cultural attractor and the landscape water system, by offering high quality spaces within the industrial area. Moving from this hypothesis, authors argue the necessity of a collective effort involving different institutions, in order to accomplish an effective regeneration of the site starting from minimum actions to be developed over time. The given program coming from site-specific former studies concerning current necessities for private and public institutions (expecting a green public area close to the lakeside, spaces for cultural activities including a museum area, laboratories, didactic rooms and one auditorium, with related facilities, in accordance with the production cycle) and the survey clearly showed authors the necessity of defining a design strategy in order to set the main principles of the transformation.

Moving from this hypothesis, the project faces different actions and timing, tackling the regeneration process as a metabolic progress articulated over time, including experimental testing and implementation phases.

The design strategy focuses on the architectural interference between different elements, now conceived as isolated fragments belonging to the former productive cycle, as an opportunity of territorial reconnection, through a value reattribution able to turn them in to powerful resources. In addition, the project tries to give an answer to the issue of how the preserving of fundamental values, such as heritage and memory or the productions necessities, allows the coexistence with ordinary and everyday equivalents, closer to contemporary needs, apparently detached each other. The ongoing production revitalization joint with the intention of designing a series of cultural areas and common facilities represents an extraordinary opportunity for the reconfiguration of the whole area through the design of a new public space where different activities can meet and give the area new life (Fig. 6).

The first action consists in the rethinking of the water side, through the definition of a new access from the lake banks, close to the old water gate and dedicated to a slow mobility network. While the production cycle activities continue using the old entrance, defined by the gate and the small acceptance building, the new one can be reached from both the cycle-pedestrian paths, crossing Porta Giulia Gate, an important historical building, and the Lago di Mezzo waterfront, both from Mantova city center, using a new boats ring, connecting other relevant points. The new access is provided with a small parking system and become a nodal point within the multiscalar landscape network composed by the historical heritage



Figure 6: Design strategy. Source: elaboration by the authors.



Figure 7: Masterplan. *Source: elaboration by the authors.*

of the monumental city and the Burgo Paper Mill, by the water system of Mincio River, the artificial Laghi di Mantova and the Po River, by the cycle paths connecting surrounding cities like Verona, Cremona, Parma, Modena, and Ferrara, and by the natural elements, such as banks, forests, fields and so on. The new entrance gives new meaning to the relationship between industry and water and permits to consider the landscape and environmental requalification of the whole Lago di Mezzo's bank system (Fig. 7).

The second part of the strategy is the definition of the cultural platform in correspondence with the new access. This is at the heart of the project, where the revitalized industrial heritage, the

environmental reconnection and the historical city meet together turning what before was an abandoned bank into a new public space. The architectural definition of the platform is based on a sequence of actions to be developed over time. The first raises from the necessity to make order between existing buildings, entailing the selection of what should be maintained and what should be removed, on the base of: a critique and sincere analysis of the state of preservation, the importance in the former production cycle, the new property's needs, and the coherency with the adopted strategy. In fact, authors argue that heritage can not be considered only for its past value, but has to face the challenges of present and become a resource for the future. In the same way, while criticizing the World Heritage Convention in 1972, F. Choay (2008, p. 123) stated that "there is no inheritance in itself, placed in an abstract space [...] – which can be – manipulated according to an approach that is the prerogative of science. [...] A heritage does not make sense beyond its economic one, except in relation to identity and institutions that contributes in the founding and consolidating".

As a consequence, the project chooses to demolish superfluous structure such as coverages and other inconsistent additions in order to give relevance in terms of memory and re-use to the former industrial architecture. The platform, defined by a specific pavement with a simple shape, is not conceived as an expansion of the city, as a square with its usual dynamics, but as a new public space in which the urban character is one of the attributes melting with industrial one and trying to give an architectural definition to the interference between the different scales. According to the program, partially given and partially assumed in a critical way, the project defines a series of new functions, including a space for events, coworking for startups and fablab, a space for sport activities, a temporary house and related facilities, a restaurant with a panoramic terrace from which users can benefit of a direct view of *Città Monumentale*. The new platform takes advantage of this activity selection making it livable the whole day and creating a kind of unordinary routine thanks to the continuous presence of people working or entertaining (Fig. 8). The addition of two new buildings, one hosting the incinerator and one the warehouse, lead us to the third main action: the definition of the axes connecting the new access with the new museum inside the Pastalegno building. The axes represent the crucial element to solve problems of incompatibility between productive and cultural flux. Indeed, the productions are definitely relevant in the equilibrium of the system, not only for the memory of the place but also for the possibility of a new future and they should not be hidden or kept aside. That is why the project assumes the production as a system to look at and to

learn from. The axis acts as an infrastructure between three separated areas which correspond to different productions. The first is the cultural production consisting in the described platform, the second is the industrial production, which

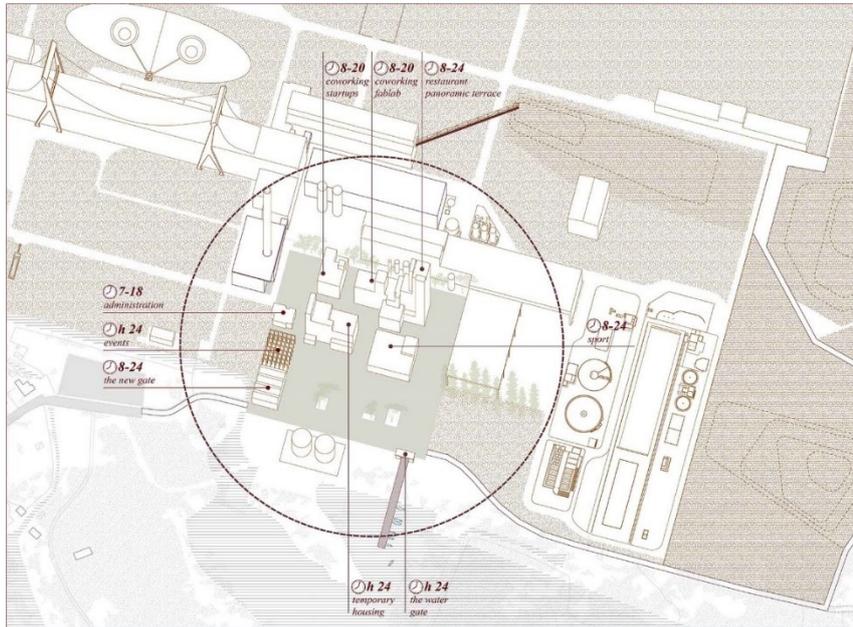


Figure 8: Masterplan. Source: elaboration by the authors.

needs to be detached from the others and the last production is the second cultural production given by the museum hosted in the Pastalegno building. From the new waterfront, exploiting the presence of the existing building and new building, an expository itinerary allows to reach the museum by intercepting the relevant elements within the production system, such as the new incinerator or the old command room. The architectural articulation of the axis is represented by the urban section, conceived as the main tool in order to describe the complexity of the proposal and

the multiscale approach. Historical city, industrial heritage, rural landscape and the waterfront recompose themselves through the urban section, establishing new relations and revealing old ones. Authors refer to the urban section as a sequence of 'interesting distances', as conceived by M. de Sola Morales (1999, p. 17) when he states: "In the urban project the section is at once plan and elevation, topography (territory) and use" (It seems also relevant to consider studies of E. T. Hall (e.g. 1966) on the role of specific distances on human habits - Fig. 9).

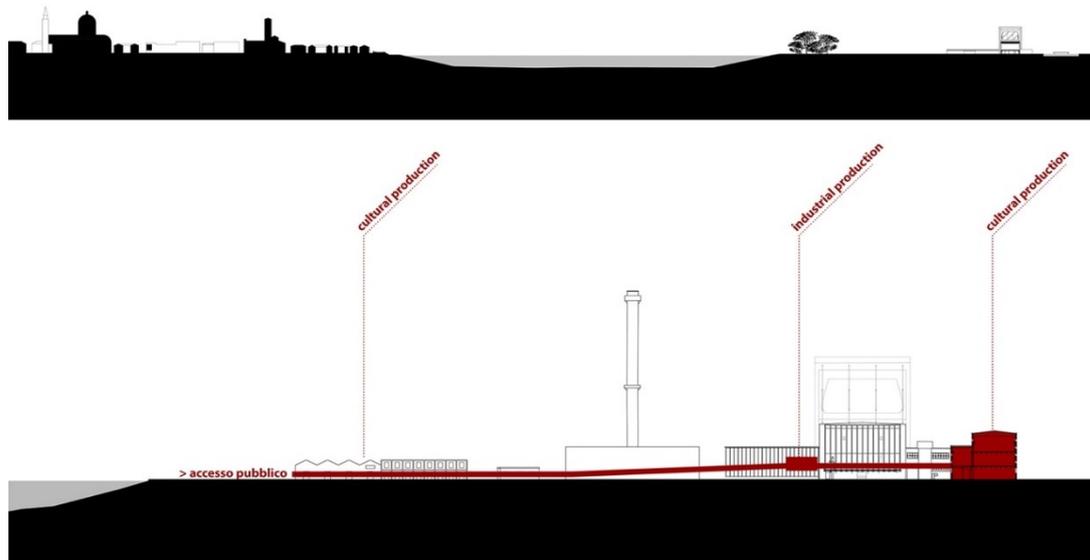


Figure 9: Urban sections. Top: relation between Burgo Paper Mill and the Monumental City. Bottom: zoom on the project. Source: elaboration by the authors.

The proposed strategy tries to regenerate soils, transform landscapes, inhabit abandoned spaces, build new architectures with the purpose to define tools that are able to reveal opportunity and to open new scenarios of transformation.

5. CONCLUSION

In this research project, water plays a key role in the definition of cultural and natural elements. Indeed, water is the main reason for the geographical position of the Burgo Paper Mill both for its use in the production cycle and its infrastructural system. At the same time, water assumes a key role also in the definition of architectural elements of the industrial settlement, such for instance the large fountains designed by P. L. Nervi between the main entrance and the iconic paper machinery building or the wharf gate where boats imported raw materials. Moreover, the artificial system of Mantuan Lakes is the element shaping the urban and rural landscape, currently dividing the historic center from the factory and potentially connecting them.

The research project has been guided by the design process, forcing the authors to assume a critical attitude towards both the existing artefacts and theoretical arguments, strictly related to the project. The design becomes an occasion for the description of a scientific issue, aiming to define some crucial topics that could be considered beyond the architectural scale and project itself. In the circumstances of the current economic crisis, the Burgo Paper Mill represents an exceptional case study of re-industrialization, carried out through the beginning of a new production cycle and considering a sustainable development compatible with cultural and environmental realms. From another point of view, the case of Burgo Paper Mill shares many features with other industries, such as the proximity to the World Heritage site, the strong presence of water, or the necessity of urban and environmental regeneration.

During the research project, the authors have understood that a responsible development requires a series of chronologically based actions, ranging from the short-term to the mid-term ones, on the base of urgency and priority.

The double trajectory of this research project, along with theoretical thought and design experimentation, allows to tackle the problem in its whole complexity, focusing on cultural implications, meanings frameworks, production needs, design issues and the role of architecture in the regeneration of industrial heritage and water landscape. The proposed strategy aims to regenerate soils, transform landscapes, inhabit abandoned spaces, build new architectures, with the purpose of revealing opportunity and opening new scenarios of transformation.

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