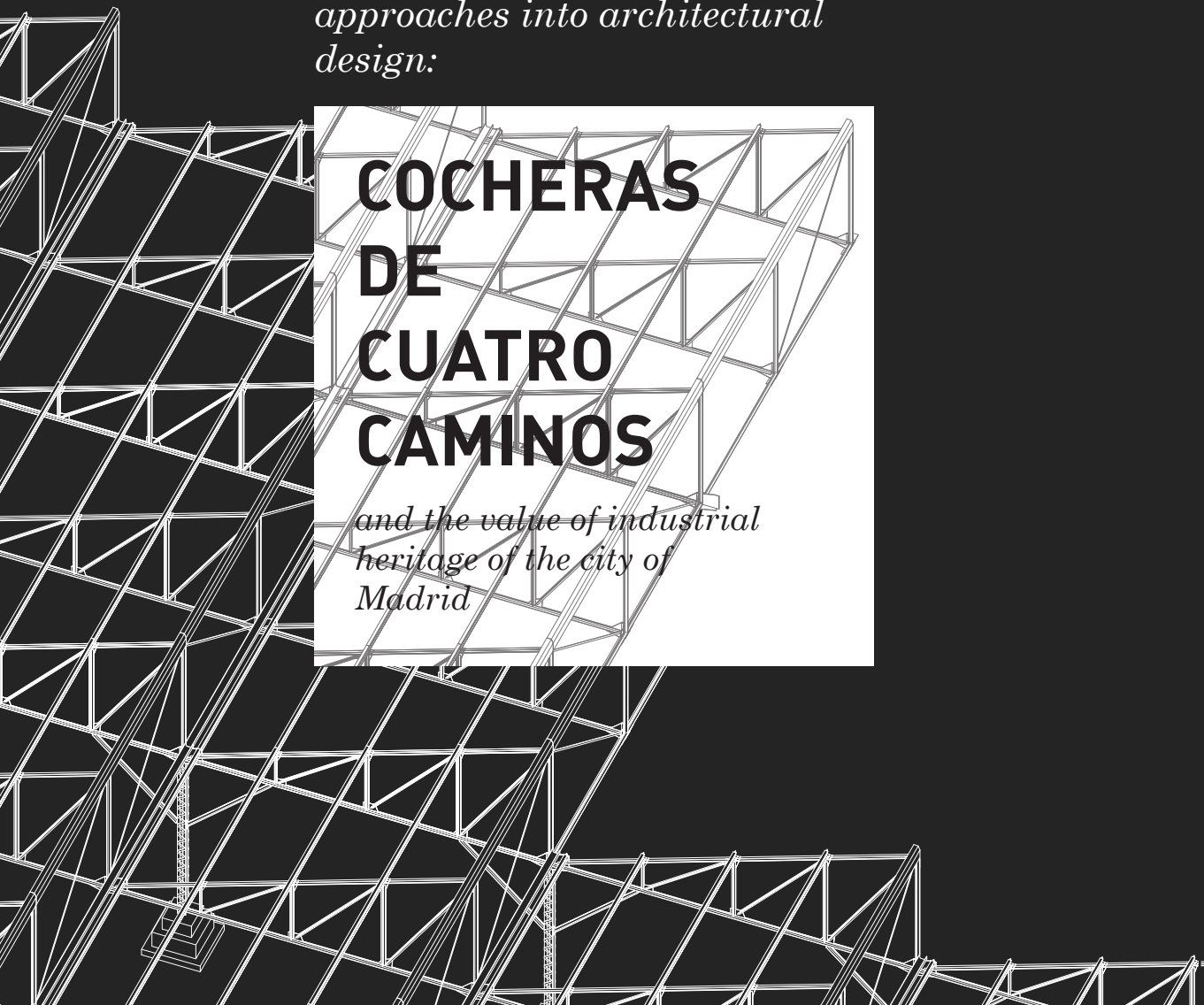
*Integration of **adaptive re-use** approaches into architectural design:*

COCHERAS DE CUATRO CAMINOS

and the value of industrial heritage of the city of Madrid



The city -the world- is perpetuated in its entire tissue,
but lives in objects that show the living traces of change.

-Aldo Rossi

Politecnico di Torino
&
Universidad Central de Venezuela

Maximo Izarra

Matteo Robiglio _Supervisor
Lucia Baima _Co-Supervisor
María Josefa Casinello _Supervisor abroad

2018

_____ _____

supervisor *candidate*

*Integration of **adaptive re-use** approaches into architectural design:*

COCHERAS DE CUATRO CAMINOS

and the value of industrial heritage of the city of Madrid

Agradecimientos

La etapa a la que este trabajo da un sello de cierre no hubiese sido tan importante y maravillosa sin muchas personas que, tal vez, sin saberlo han influido enormemente en mi y en como he vivido esta experiencia. Así, se convierte está en la ocasión de materializar lo agradecido que siempre les estaré.

Abuela Nena, eternamente en el lugar mas preciado de mi memoria, gracias a ti esto fue posible, solo podre esperar que si tuviera la oportunidad de verte de nuevo pueda hacerte orgullosa de la persona en que me he convertido desde tu partida.

A mis padres, mi mayor aspiración, por ser luz en todas las sombras de mi camino, por ser mis mas especiales maestros, por lo que soy, lo que no soy y lo que seré; perdón siempre por agradecerles tan poco.

A mi familia, gracias por el apoyo más puro e incondicional; a mis abuelos por el cariño más cálido; a mis tíos por ser siempre figura de admiración, especialmente gracias tío Luis por tu especial afecto.

Ana paula, la más grandiosa compañía en este viaje, por tu amor y tu apoyo incondicional, por siempre levantarme de mis tropiezos sin importar que tan grande sean; y a su familia por recibirme tan cariñosamente, nunca les podré agradecer suficiente.

A mis amigos, colegas y hermanos no consanguíneos: Alba, Daniel, Maurizio y Yorgelis, gracias totales, por permitirme soñar juntos a pesar dormir poco, por motivarme siempre a ser mejor y estar a la altura de lo grandes arquitectos que son.

A los inesperados amigos que conseguí en Italia: Dario, Erika, Giuliana, Irene, Jose Gregório, Layling, Lucrezia, Matteo, Marco, Maru, y todos los que hicieron de vivir y estudiar en Torino una de las mejores experiencias de mi vida.

Por último, debo resaltar todo el apoyo académico que recibí durante el desarrollo de este trabajo, que no hubiera sido el mismo sin la contribución de grandes profesores como Matteo Robliglio, Lucia Baima y Maria Josefa Cassinello, y algunos destacables profesionales como Luis Manuel Marco.

ABSTRACT

This work explores the practice of ***adaptive re-use*** applied to the phenomenon of obsolescence that buildings and sites pass through as consequence of the crisis that suppose the natural passage of time and the rupture with the economic, socio-cultural and normative ties that once sustained architectural elements with its past context. And pose it as a possible solution to the complicated situation that *Las Cocheras de Cuatro Caminos* is going through in the city of Madrid, where even being recognized as an important part of the Spanish industrial heritage are in danger of extinction due to the high value of its land.

With this objective, the work begins with a research composed of a verb: ***re-use***, and a subject: ***the industrial heritage***. Addressed in part, to highlight the historical/typological value intrinsic in the buildings that belong to *Las Cocheras de Cuatro Caminos*, and at the same time, understand how the ***adaptive re-use*** as methodology could be compatible and applicable to the complex, which today runs the risk of disappearing.

This work understands the disappearance as a loss and seeks in its reactivation the opportunity to provide Chamberí and the Spanish capital with new public, cultural and residential infrastructure, without sacrificing the added value of the *memory* that resides in the place.

This text explores the ***past***, through the history of the industry, its architecture and link with the design of *Cuatro Caminos*, passing through the relevant

intervention of Antonio Palacios and the importance of the metropolitan company of Madrid, in order to understand its value as Spanish industrial heritage. Analyse ***present***, reviewing the qualities and circumstances of similar international and local cases of *adaptive re-use* which are currently going through a renewed validity. And wants to look to the ***future***, being the product of this work an architectural project based on the *adaptive re-use* of most of the existing structures, proposing a new mix of activities that respond to the needs of both, the district where it belong and the city, diluting the physical and architectural separations with their surroundings to integrate the industrial complex into the city and involving private and public interests without sacrificing the intrinsic memory of the place.

TABLE OF CONTENTS

MA-DRID, SPAIN

ADAPTIVE RE-USE :

1. Principe Pío Mall
2. Principe Pío Theatre
3. Google Campus
4. Regional Archive
5. Tabacalera
6. Neumudejar Art Center
7. Train museum
8. M.U.N.C.Y.T
9. Matadero
10. Real Fabrica de Tapices
11. Students residence
12. Reina Sofia Museum
13. Canal Isabel II

INDUSTRIAL HERITAGE IN DANGER:

1.Cocheras de Cuatro caminos
2.Legazpi Market

INTRODUCTION

A building in obsolescence, as fossil, may preserve many of its main characteristics of a pass life and is able to communicate the history of the city. For this reason, could be said, the interest in building preservation developed on this century is nothing to be amazed, and neither the most recent one about the industrial heritage.

This research is addressed to the industrial heritage, more specifically, the complex case of "*Cocheras de Cuatro Caminos*", placed in one of the crowded city centers of Madrid, Spain. Using architectural design to give the obsolete building a new validity, exploring the concepts of adaptive re-use.

For obvious reasons all buildings cannot be preserved, cities don't stop growing, demand space, densification and constant evolution; making a fossil like "*Cocheras de Cuatro Caminos*", seem like a hindrance. Nowadays, in the search of massive development, grow and low budget construction, contemporary cities start to look very similar, in consequence are in need of its individuality, and those, before called, fossils have the potential to be part of a solution. They have created with time, a link with society, with history, a character of identification, in other words, have a cultural meaning of place, a *genius loci*. A very complicated value to preserve in the hostile context of nowadays cities.

Starting from this premise, it is necessary to proceed from the past, to understand the roots of the architectural typology under discussion, which

are found, in the *Industrial Revolution*, in order to understand the intrinsic aesthetic and functional value of this particular type of structures, buildings and sites, and then, the impact they have had on contemporary cities; understanding that both the aesthetic and functional values and the very morphology of the city have changed drastically in a short time, making *Industrial Archeology* acquire the value of the memory.

Despite it, these buildings do not find a total affinity with the ideals of classical restoration and preservation, which seems to feel more attracted and interested in older memories. But it is in this vacuum where *Adaptive reuse* has found its place, giving a more appropriate response to the particular characteristics of *Industrial heritage*, with a more austere approach and objectives, but which have demonstrated, not only internationally, but in the city of Madrid itself, to be an alternative to give a second life to these *fossils* and make them endure over time; thus, presenting itself as a possible solution to the impasse currently being experienced by "*Cocheras de Cuatro Caminos*", which are recognized by the TICCIH as an important part of the *Spanish Industrial Heritage*.

Looking into the past can be found that not only this building is strongly linked to the *industrial and railway history* of the Spain and its capital, but also to its architecture, and beyond that, to the city's past desire to become the Metropolis it is today. It was the original part of the famous underground transport of Madrid, designed by Antonio Palacios, and having as inspiration the largest projects of this type of his time: New York, London and Paris; and was a catalyst for

the urbanization of the district of Chamberrí and part of the northern area of the city of Madrid, which today is one of the densest and urbanized outside the historic centre.

The problem is that often this values are ignored, because these kind of buildings just occupy a very profitable land for the real estate market, and, without a good project and planification, neither are rentable for the government to keep, almost never and just with lucky, the citizens are the only ones interested in not losing this link, this identity and this cultural meaning of that specific place.

Cases like "*Cuatro Caminos*", are very complex, and simple act of preservation of the buildings seems not to be compatible, that is why, a complex solution is needed; A project within the framework of adaptive reuse, flexible and articulated enough that brings a response to all interest involved in the "Cocheras", which demonstrate that maintaining at least a part of the tangible part (the building) but the whole meaning of the place, represents an opportunity and it destruction, only can mean a lost.

OBJECTIVES

- Identify the historical link and aesthetic characteristics which make *"Cuatro Caminos"* and representative example of industrial architecture of Madrid and Spain, trough the compilation and structuration of antecedents and subsequent information.

- Motivate the conservation and preservation of the meaning of the *"Cocheras"*, this, including the tangible and the intangible, and looking for its continuity in time.

- Explore how can be applied the approach of adaptive re-use to "*las Cocheras de Cuatro Caminos"*

- Integrate the approach of adaptive re-use in the architectural design operations needed to elaborate a possible solution for the current issue which affect the future of *"las Cocheras de Cuatro Caminos"*

- Elaborate a project which propose a renewed validity for *"Cocheras de Cuatro Caminos"* and secure the continuity in time of the meaning of the place, extolling the value of identity of the neighborhood and the city of Madrid.

INDUSTRIAL HERITAGE & ADAPTIVE RE-USE

To be able to understand the building of "las Cocheras de Cuatro Caminos" as industrial heritage and how is this compatible with the "adaptive re-use" approach, first is needed to define both terms and contextualize them, into the developing line of this work. Thus, the study case could be, in a first step identified it into the spectrum of industrial heritage, and in a consecutive step, understood how "adaptive re-use" could be an answer to the problem which are facing "Las Cocheras de Cuatro Caminos" nowadays.

INDUSTRIAL REVOLUTION

Almost from its origins, human beings have sought the efficient exploitation of the resources around them, in the first place to survive, and after, to improve their quality of life. For a long time, agriculture was the main activity of exploitation developed by human beings, until technological development allowed to go beyond meeting alimentary needs and think about a much more developed production level. And therefore, in the trade of goods originating from such production processes.

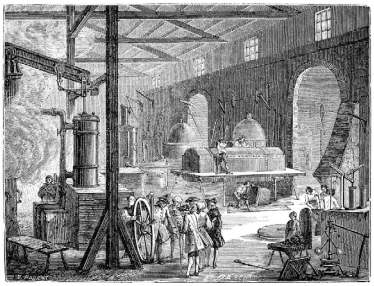


Fig.01: Illustration of Boulton and Watt's Soho Foundry, 1790s.

The evolution of all the processes of production and the new movements in the economy generated in the end of XVII century, and beginnings of XIX, the **Industrial Revolution** which meant a fast migration process from agriculture to *industrialization and manufacturing*. And, would end up unleashing enormous changes at the social, political and economic levels.

Even though, the precise start and end of the Industrial Revolution is still debated among historians, diverse founts agree its beginning in 1760 ca. in Britain, from where, started spreading for all Europe. **The industrial revolution** meant a bring new manufacturing methods to increase productivity; thanks to the development of new technologies, the discovery and production of new materials, optimization of the manufacturing process of basic materials, and the use of new energy founts. Accompanied by an increase in the application of science to production methods, and the replacement of hand tools by steam- or electricity-driven machines.

One of the most relevant technologies, was the mastering of the vapor pressure and its use as energy, applying it, not only into manufacturing process, but into new transportation methods, translated in important improvement in the mobility at urban and extra-urban scale, to facilitate trade of goods and passenger transport over short and long distances. In addition, the transport infrastructure created at the time was one of the major sources of transformation in cities.

Architecture and Urbanism

The so-called **"industrial city"** marked a change respect the previous urban spaces of the city. New uses, like train stations, ports, industrial naves, storage

buildings and even residential complexes for workers required not only new kind of spaces in the city but a large amount of land. This end it up by transforming the previous urban grid [1].

In the field of construction, were very relevant the developments in the use forged iron and milled steel, which, began to replace wood, brick and stone as primary materials for large buildings.

Not only changed the materials; but, more also the interests of the society started to change, and the economic point of view took a new level of relevance, transforming the ideals of architecture at the time. Which was no more focused so much on aesthetics and its capacity to impress, now *"efficiency"* was protagonist of this discussion so, architecture was directed by the need of spaces and the cost.

The added value of land in cities began to increase and under the idea of maximum utilization of space (and thanks to new construction technologies), buildings began to develop vertically; neighbourhoods were created in the proximity of cities for people who were migrating from the countryside to work on industries.

The cities and population

All industrial activities tended to be concentrated in cities, creating big demand of non-specialized labor force to work in the big manufacturing structures located in those cities, offering a better life quality. This way, even some small towns quickly became big cities, and, for the first time in history, more people lived in urban centres than in the countryside. For example, Manchester city, a sleepy town in 1771 with no more

[1] E. Protti, I luoghi della terza rivoluzione industriale : spazi per nuove economie, Torino: Tesi Politecnico di Torino, 2015.

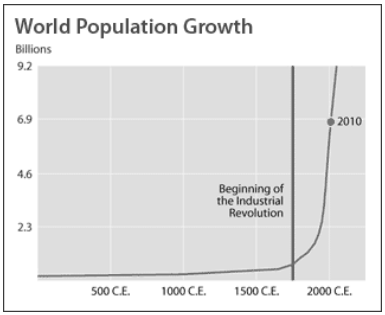


Fig.02: Hill, Anne. "Urbanization Population Graphs." Whsannehillhomework.12/6/14.

[2] S. Hylton, A history of Manchester, Manchester, 2003.

[3] D. S. Landes, The Unbound Prometheus, Cambridge: Press Syndicate of the University of Cambridge, 1969.

than 22,000 habitants, was transformed in a short time in the textile capital of the world, bringing an important migration to the workplaces created in the city, reaching 180,000 habitants during the industrial revolution. [2].

This phenomena was replicated over the industrialized world. Thus, the population of the world suffered an important increasement in a short time, leading to over-population and sanitary crisis.

These factors together catalyzed important social and economic changes, bringing a transformation in the way of living, working and moving in the cities, in such way that, by late 1830s to the early 1840s the rate of grown of the population on the big "industrial" cities exceeded by far the capacity of response of the technologies in transport and manufacture in use at the time, creating an economic recession. Until, a new wave of technological innovations by the 1870s, came to re-start the movement of the economy; a *"Second Industrial Revolution"*. [3]

SECOND INDUSTRIAL REVOLUTION

Are of special interest to this work, the improvements generated over this period, in terms of architecture and transportation, more specifically at service stations. An interest which is motivated by direct connection with "Las Cocheras de Cuatro Caminos".

This period is dated between 1870 and 1914 but is agreed that is very related with the previous crisis and changes produced near the 1850s. Characterized by new pathbreaking inventions that represent great

improvement, not only in terms of production, but also in energy, material, chemicals and medicine. [4]

[4] J. Mokyr, The Second Industrial Revolution, 1870, Northwestern: Northwestern University, 1998.

Transportation and Metropolitan systems

For transportation, the steam power was not something new (was developed in the previous industrial revolution), but in this period were made so many improvements in transportation infrastructure, which came after mastering past technologies; in fact; the main characteristic of the period was the development of many *"micro inventions"* which made more affordable, efficient and secure the application of new technologies at big scale. Thus, railroads became faster, safer, and more comfortable during the second Industrial Revolution. Later, by 1897 will appear the Diesel engine and electrical locomotive.

The mobility was not only an extra-urban problem, in fact, after the over population crisis from the first industrial revolution, cities needed to change the way people was moving inside them. As the cities grown, more difficult was for the workers to arrive to their jobs in the factories. So, after ten years of debate, in 1863 London inaugurates the first *underground transportation system*. After that, the model started spreading for al Europe and the world, being New York the second city to count with a system of this kind, and not arriving to Madrid until 1919.

Fig.03: Lithograph of the Crystal Palace constructed for the Great Exhibition of 1851 held in London, Britain.

Architecture

By the second industrial revolution, the materials explored in the past years where more developed and produced in mass. The explorations with steel structural systems and the glass production lead to completely

Fig.04: Pierce-Arrow Factory Complex built at 1906. A representative building to this kind of one-store factories.

Fig.05: Witney Mills: power-loom weaving shed, c. 1898.

new kind of spaces: larger, taller and more illuminated. Thus, became a competition to arrive to the perfection of this structural techniques and, **International Exhibitions** where the scenario to show the world the new developments and the economic power that came behind them.

Had been achieved its own aesthetic style in the pursuit of its efficiency, the mastering of construction technique with steel and glass lead to minimize the dimension of the structural elements, and maximum profit of space; these have become the *ornament* of the architecture of this period.

With time, elements and technologies were translated from exhibitions to more practical field. **The factories** were the most representative typology; one, very attached to the function and its efficiency, thus, these new technologies gave better conditions for workers and increasing the production.

For that reason, the factories in vertical (more than one store) started to be replaced by factories extended in horizontal; and this way, the *industrial nave* was born. A morphology which sought a horizontal disposition of workplaces and direct use of sunlight and natural ventilation. In addition, elements like the "waving shed roof" were developed to correctly perceive the sunlight coming from the north, the most diffuse and, therefore, the most suitable for developing manual production labors, so efficiently that will become a usual element in industrial typology in such way, that nowadays is the most used *archetype* to represent the idea of industry.

Railway industry

At the same time the big systems of locomotive which connect Europe and the metropolitan systems, had adopted the *industrial nave* typology, because it adapted perfectly to their needs. Although, within the infrastructure required by the families of the railway industries (urban and extra urban), they can be divided into two main needs: passenger stations and service stations.

The **passenger stations** were the connection between the transport service and the public (the customer) and had particular characteristics that, from the functional point of view, attended almost exclusively to the control of passengers and their access to trains.

By the other hand, and the most hidden side of these systems, are the **service stations**. Places with a stricter functional character, in which were carried out the duties of maintenance, storage, repair, painting and everything related to the proper functioning of the system. In most cases, these places did not need to have contact with the general public or customers and were located in strategic places for the operation of the same (in some cases very close or in the same space of passenger stations).

Again, the model of the *industrial nave* comes into focus, because it can respond very effectively to the needs of **services stations** of the railway systems, allowing large horizontal extensions where vehicles between 60 and 90 meters and even more could fit, in addition to the conditions of ventilation that allowed these naves were appropriate to carry on the temperatures produced by the engines of the trains.

[3] D. S. Landes, The Unbound Prometheus, Cambridge: Press Syndicate of the University of Cambridge, 1969.

Fig.06: 129 Street Inspection Shed, part of Manhattan Railways in 1908. Museum of the City of New York. (images extracted from "informe: Las cocheras de cuatro caminos (2015)"

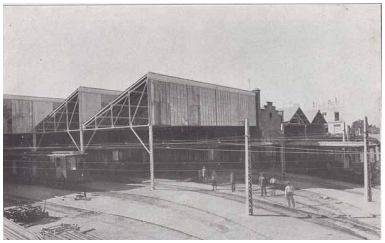


Fig.08: Naves A, B, C and D. Photo by Luis Lladó and Fábregas published in the book Metropolitano Alfonso XIII, Trozo Sol-Atocha (1921). Juanelo Turriano Foundation

[3] D. S. Landes, The Unbound Prometheus, Cambridge: Press Syndicate of the University of Cambridge, 1969.

Fig.07: 240th Street Yard or Van Cortlandt Yard under construction, in 1910. Museum of the City of New York. (images extracted from "informe: Las cocheras de cuatro caminos (2015)"

Fig.09: East 180th Street Yard under construction, 1916. Museum of the City of New York. (images extracted from "informe: Las cocheras de cuatro caminos (2015)"

A model very well adopted by America, having an important quantity of example where, not only the *nave* morphology is used in their service stations, but also used the *shed* for better inside conditions, becoming, clearly a direct source of inspiration to be applied in Madrid some years later.

INDUSTRIAL LEGACY

Jumping to a more contemporary period, with the aim of review the legacy left by the industrial revolution to nowadays cities; should be highlighted the fact that cities of the XXI century do not have large industrial infrastructures in their centres. Due to, in part, to all the sanitary and pollution problems, which derive from

the industrial cities; also, to the development of urban planning approaches based on rationality and science, with the aim of re-ordering cities by functions and activities.

France, Germany and Britain had early explorations of *"zonificated"* urban strategies to regulate their cities but, was Germany, at the end of XIX century the first to implement the Zoning that will shape the big cities of Europe. This means a separation of the industrial areas away from residential areas to avoid pollution produced by factories and big infrastructures, allowed by the transportation technology of that period.

Urban planning was not the only force that push industry outside the city; economic recession and the high price of land played an important role, but mainly social changes transformed the industrial process, manufacturing and production started to transform under the forces of *globalization*.

Now, the principal place that were founts of economic growth have change since industrial revolution, nowadays the focus is *" in places that have the richest clusterings of people who come together in dense ecosystems, generating ideas and products faster that they can elsewhere,... this are the fuel of the creative economy."* [5].

[5] P. Hardin Kapp e P. J. Armstrong, SynergiCity: Reinventing the Postindustrial City, Illinois: University of Illinois Press, 2012.

As previous past transitions and periods of deep transformation, when it comes to an end, tendentially,starts the valorization of its memory. By the 70s after the crisis that lead the world's economy to globalization, Kenneth Hudson bring to the table the term *"Industrial archeology"* [6]; a very controversial statement at the time and even nowadays.

Anyhow, these industrial periods left it mark in contemporary cities, some of those factories or production places are still operative, others have been transformed and others are simply abandoned. In any case, cities now must deal with the phenomenon, these, sort of *"ruins"* left by industrial revolution.

Is true that these areas could be seen as a problem to urban planners and the cities' council's, due its dimensions, its morphology and especially because of its incompatibility with its current environment; its habitability condition in many cases has become obsolete and may represent a risk for society.

Even so, society from its own roots has begun to see these sites as more than possible problems, as new opportunities; and with this is born the will to protect these industrial remains and give them a new life.

The reference to society is no coincidence in this argument, as it is a type of incentive that normally comes from the very people who make a living surrounding these industrial sites. Rarely, in successful cases, have been proposals come from large government entities. As said by Florida, R.: "*the key… lies in letting go all of the old described top-down strategies and embracing …* **bottom-up energy** *coming from community groups, architects and designers, entrepreneurs, and techies, and city-builders and place makers of all stripes and from all corners of the community*."

[6] K. Hudson, Industrial Archeology, London: Routledge, 1969.

The reuse of old buildings is nothing new, in fact it is a fairly common practice. When a building ceases to be functional, one of the most economical options is to replace its original use (if the container allows it).

ADAPTIVE RE-USE

The term of "adaptive reuse" could be superficially understood by anyone, the word give a clear idea of what it means: "*The process of reusing and old site or building for a purpose other than which it was built for*" [7].

But, in agreement with Robiglio, this definition could be "at the same time too extensive and too restrictive". Minimizing the meaning of the adjective "*Adaptive*" which is the most relevant part of the term. "*Adaptation*" is linked with natural science's approaches and evolution; in Darwing's words: "survival of the fittest", describes the constant interaction with the environment and how, in this case, this unavoidable relationship, ends by shaping architecture. Thus, when environment changes, architecture must be "adapted" to survive. By the other hand, the definition becomes very restrictive in terms on the adjective "old" which is definitively not a condition to reuse. Also, applications of adaptive reuse have shown, that there is a bigger spectrum this practice where infrastructures are definitely not excluded.

In the light of the breakdown of this very common definition, is founded more interesting and precise the Robiglio proposal: defining adaptive reuse as "the process of reusing and existing site, building or infrastructure that has lost the function it was designed for, by adapting it to new requirements and uses with minimal yet transformative means." [8]

Is not a new practice, but on the other hand, has become a facilitator for innovation. Strengthened by the characteristics of the industrial places, the

[7] Wikipedia, «Adaptive reuse,» 13 August 2018. [Online]. Available: https://en.wikipedia.org/w/index.php?title=Adaptive_reuse&oldid=854726958.

[8] M. Robiglio, RE-USA : 20 American stories of adaptive reuse : a toolkit for post-industrial cities, Berlin: Jovis, 2017.

adaptive reuse, allows to create spaces for new ideas and at low cost. Allowing communities' own organized groups to run these projects and giving them room for improvisation and exploration of ideas to meet their direct needs. These types of initiatives were born from the sector of art and culture being ideal spaces for them.

This practices when is well implemented allows to give public infrastructure saving funds, saving energy and reducing the amount of greenhouse gasses produced by an ordinary construction. In addition to being perfectly compatible with the conservation of the built heritage. In any case, Adaptive reuse separates from the *"conservation"* or *"restauration"* of artifacts, in fact, the cases where its applied normally do not have the founds to complete restoration of the building, or any economic support at all, and the particularity of this cases is the **"field of liberty"** that have. Here is where adaptive reuse could reach its full potential, of course, accompanied with an inherent sense for preservation of the collective memory.

Evolution of Adaptive Reuse

As said before, the transformations caused to society by factories and industries (and their decline), leaved a big opportunity for new patterns of use and living this "tenacious industrial objects that were left behind. Opportunities, which began to be exploited by artist in search of new, cheap, flexible and open spaces near the cities, that would allow them to mix living with work and exhibition; as result of this blend, in the 60s, the

"Loft" was born.

The exploration of the first concept of loft were placed at New York, in the lower Manhattan, when artists began to notice the aesthetic possibilities offered by the old abandoned industrial sites in the middle of the city, and the spatial flexibility offered by these buildings; in addition to the low cost of appropriating an unused place. This, opened the door to exhibitions as "9th Street Art Exhibition" by Leo Castelli in a scheduled for demolition building, in 1951, which will end it up by influencing Andy Warhol's "Factory".

These artistic movements lead to develop the concept of **loft** as "*...adaptable, flexible and at the same time powerful spaces with identity in which people can live and work."* From the inside, private spaces to big scale and an urban dimension. Where these incompatible, and obsolete objects in the city could be domesticated to become accessible, unique, and flexible spaces to city life.

It is important to talk about the **loft**, not only because of the particularity of this typology but also because it was the element that propelled the potentialities of the industrial spaces. In such a way that the loft was commercialized as a trendy element, attracting the attention of large real estate agencies, and massified the idea of reusing industrial spaces.

This is represented in the case of SoHo, in Lower Manhattan, New York City, a neighborhood originally characterized by the great presence of the industrial since 1840 but that from the decline of industry in the cities, between 1960 and 1970, was abandoned and forgotten. Obtaining the name of Hell's Hundred

Acres. But it had a great heritage of historic buildings that had been left unused, and on land that was not attractive to the real estate sector. Thus, artists began to appropriate the upper floors of these buildings, where they got large spaces at very low prices, flexible and illuminated, being ideal for their field, as well as a very good position within the city. Thanks to this phenomenon SoHo became the bohemian neighborhood by excellence, increasing importantly its value and became a reference for many loft-based neighborhoods around the world.

But, the answer to all the problems of industrial cities was not to remove from the city everything that was not housing. In fact, moving away the main sources of work and economic movement from the city can harm life in the cities, as it generates the need for large masses of people to displace out of the city for an important part of the day. *"Displacement also lead to cities that are firstly less stable, and secondly less interesting"* [9].That is why the same authors propose **SumCity** with the ideal of rethinking urban interventions, so that they do not always represent a succession of an old model for a new one. But a layered coexistence, where a new element does not represent the disappearance of the previous one, what it seeks, is the coexistence of different socio-economic groups in the same place.

The problem -they say- *"is that the conversion of industrial areas usually amounts to what game theorist call a zero-sum game, where one party's gain is another party loss"*. Even though, cities like New York manage to maintain a concentration and homogeneity of the different socio-economic groups, making it different, interesting and above all, constantly alive.

[9] T. Armborst, D. D'Oca e G. Theodore, «Fromo Soho to SumCity,» in City as a Loft, Zurich, gta Verlag, 2012, pp. 32-38.

[8] M. Robiglio, RE-USA : 20 American stories of adaptive reuse : a toolkit for post-industrial cities, Berlin: Jovis, 2017.

It is true that adaptive reuse is a practice that is carried out over pre-existences, this implies a building or a site with its own aesthetic character and its own architecture, which certainly must be maintained. This may lead one to think that architectural design does not have much to contribute to this type of practice. But on the contrary, architectural design is the responsible for manoeuvring within the pre-existing aesthetic limits in order to insert and organize new uses within these *"tenacious objects"*, preserving their memory as intact as possible but at the same time transmitting the freshness necessary to connect with their new users and not seem a strange and distant element. As said by [8] *"hybridize the new with the old"*.

And although it seems taken to less the usefulness of the architect in an operation, where, certainly the organized groups, entrepreneurs, innovators and the neighbors are the main catalysts and in some cases, the same constructors; the figure of architect becomes indispensable in the technical development, the organization of the spaces, to find efficient and economic ways to give functionality to the spaces available, of the formation for the future, construction or expansion of these spaces, and above all, to apply the language of the architecture to achieve the coexistence between the new and the old.

In short, architecture must know the possibilities and limits of social groups and organized communities, in order to seek a good balance between both parties and consequently aim at their full potential.The architect

must be prepared to face the compatibility of adaptive reuse *"with undisciplined means, mixing ordinary maintenance, deliberate neglect, DIY simplifications and clashing additions"* [8], and must prevent and manage it, not limit it. Because these are intrinsic characteristics that give life and make this type of actions work, and allow it to endure, evolve and adapt.

This is why adaptive reuse is so well suited to industrial typology, thanks to the ideals under which were built and designed the factories and infrastructures of the XIX and XX centuries, of maximum functionality and flexibility; that allowed to regulate the internal space later with enough freedom, and according to the necessity of the tools and machineries of the moment. This leaves a new opportunity for freedom that can be easily taken advantage of, now, in its new life.

BENEFITS AND LIMITATIONS OF ADAPTIVE REUSE

Adaptive Reuse is an approach that may be born in the 1970s but is put in the attention of society to root of the real estate crisis of 2008, thanks to all the benefits it has shown to have, in the same way shows to have its limitations.

From **economic** point of view, it is no surprise that a space can be rehabilitated in less time than creating one from nothing, in fact *"rehabilitation typically takes half to three-quarters of the time necessary to demolish and re-construct the same floor area"* [10] , reducing in consequences many of the most important cost implied in construction cash flows. This does not mean that a

[10] A. Jhonson, «Rehabilitation and Re-use of Existing Buildings,» in Building Maintenance and Preservation: A guide to desing and management, Oxford architectural press, 1996, pp. 209-230.

pre-existing building cannot present eventual problems such as: structural, the presence of materials harmful to health or even incompatibility with urban standards; that could represent a great increase in costs. But it is not a fact that it cannot be prevented with a good work of survey and feasibility prevention.

"The recycling of materials, reuse of structural elements and the reduction in the generated landfill waste" [11] are the main **environmental** benefits, but not the only ones; the constructive characteristics of the industrial period such as the search of the maximum efficiency of the sunlight to illuminate the indoor spaces and the natural ventilation to improve work conditions, become methods of passive energetic saving that can be exploited by new technologies without many complications, besides the good constructive quality and the mass abundance that help to reduce heating and cooling energy.

In **social** terms, this kind of interventions comer from bottom-up actions, which mean, that are the same communities and neighbors to impulse this action, getting deeply involved in the process and creating a sense of identity and a strong link with this place. Places that where strong elements of their past and could see its revival and might be part of the life and memory of future generations. The location of this historical buildings normally allow this due to their location in the middle of a neighborhood that has seen it grow, and for that reason, even if have been a close site and an abandoned building, is easy to reinsert it in the community; removing a problem and adding new public spaces that can be managed by the community itself in search of its own benefit, growth and culture.

[11] L. Craig , «The sustainability implications of bui,» Bond University, Queensland, 2008.

RELEVANT PRECEDENTS OF ADAPTIVE REUSE

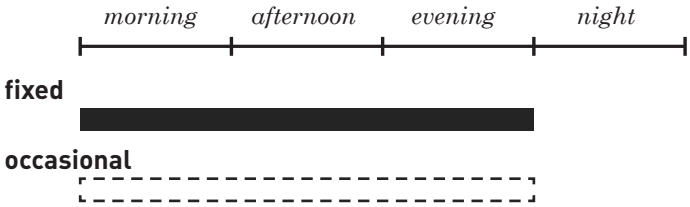
In order to objectively evaluate the application of adaptive reuse as an effective methodology applicable to industrial buildings going through both, urban and functional/programmatic obsolescence, is used the observation and analysis of previous cases that have successfully extended the life cycle of such buildings.

The six precedents to which it is resorted to next, on one hand, coincide in aspects that make them relevant for the case of LAS COCHERAS DE CUATRO CAMINOS, that is to say, they are industrial buildings that are remnants of a previous industrial period that has left them abandoned in the middle of the contemporary urbanity of the city. On the other hand, in many other aspects they differ, with the objective of being able to compare the strategies of reuse, but above all, their results, the strong points and therefore their weaknesses.

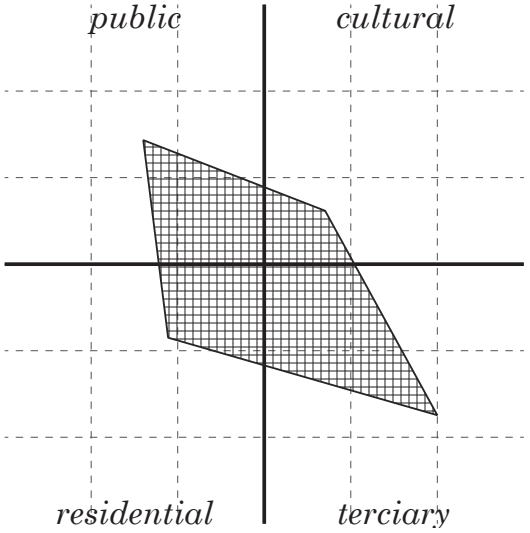
READ-ING KEY

Chronology

Hours of activity



Vocation



The very know cultural centre of the Spanish capital is one of the most important referents of adaptive re use worldwide, after a long process of transformation that still goes on.

Investment: promoted by the city council and some privates

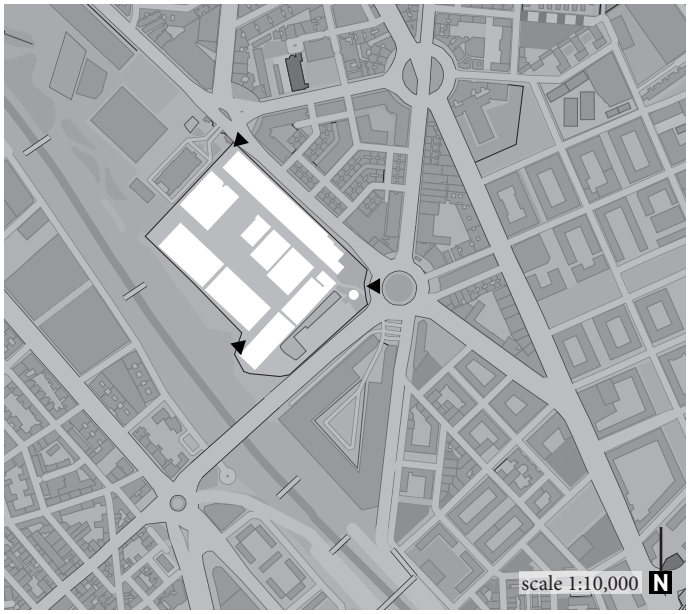
Location: 30 min on foot from city's centre and very well connected by public transportation.

Activities: The main activities for each of the different are cultural or artistic even on the private naves, except for a restaurant and a bar.

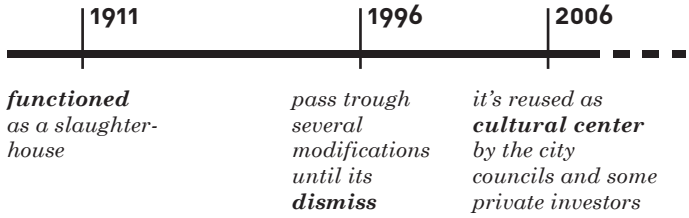
Weak points: the fixed affluence of the place is limited to the few people working there, so have a limited use in work hours and risk of being empty at night if there are not events.

Strength points: successful collaboration between public and private to create very useful space for art in culture with constant events. Have become a example of how efficient could be adaptive re use

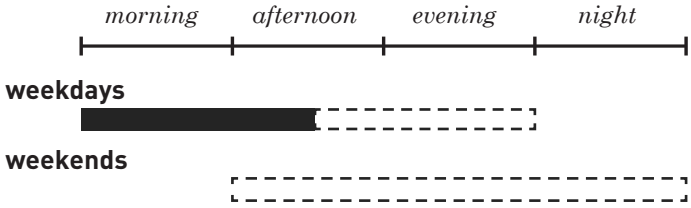
MATA-DERO, MADRID

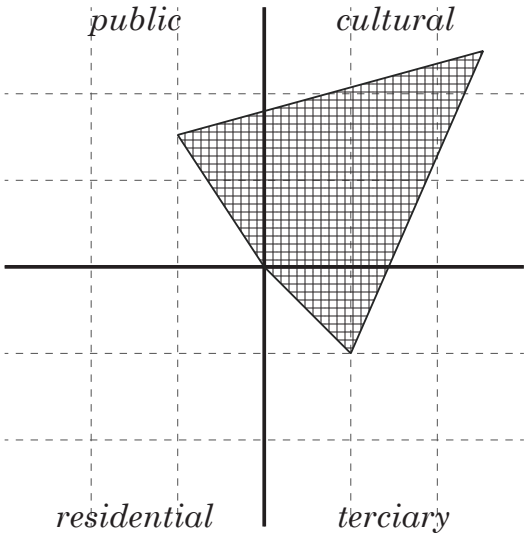


Chronology



Hours of activity





The very know cultural centre of the Spanish capital is one of the most important referents of adaptive re use worldwide, after a long process of transformation that still goes on.

Investment: promoted by the city council and some privates

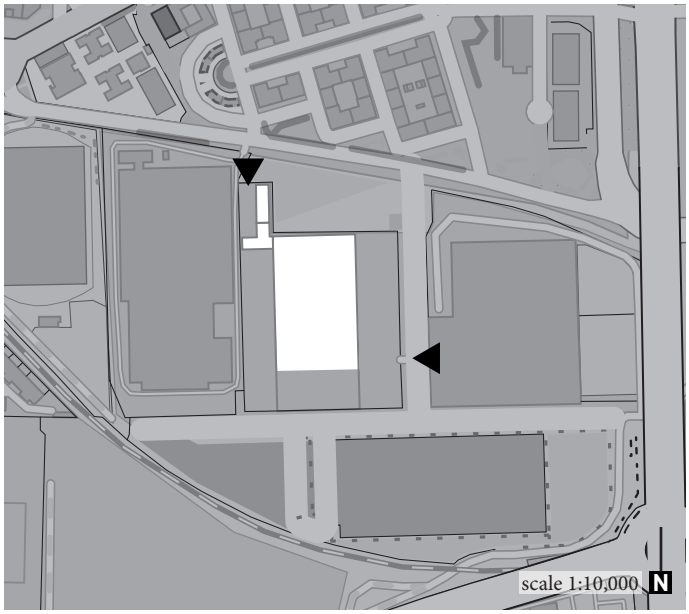
Location: 30 min on foot from city's centre and very well connected by public transportation.

Activities: The main activities for each of the different are cultural or artistic even on the private naves, except for a restaurant and a bar.

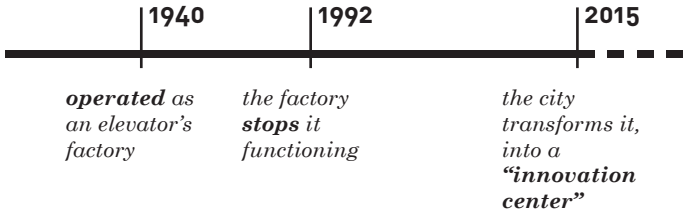
Weak points: the fixed affluence of the place is limited to the few people working there, so have a limited use in work hours and risk of being empty at night if there are not events.

Strength points: successful collaboration between public and private to create very useful space for art in culture with constant events. Have become a example of how efficient could be adaptive re use

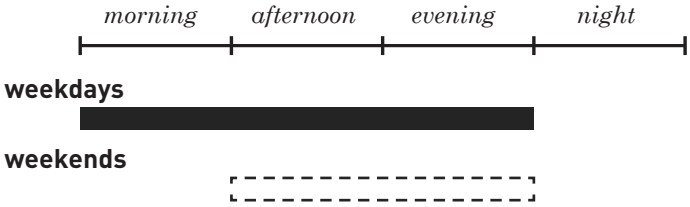
LA NAVE, MADRID

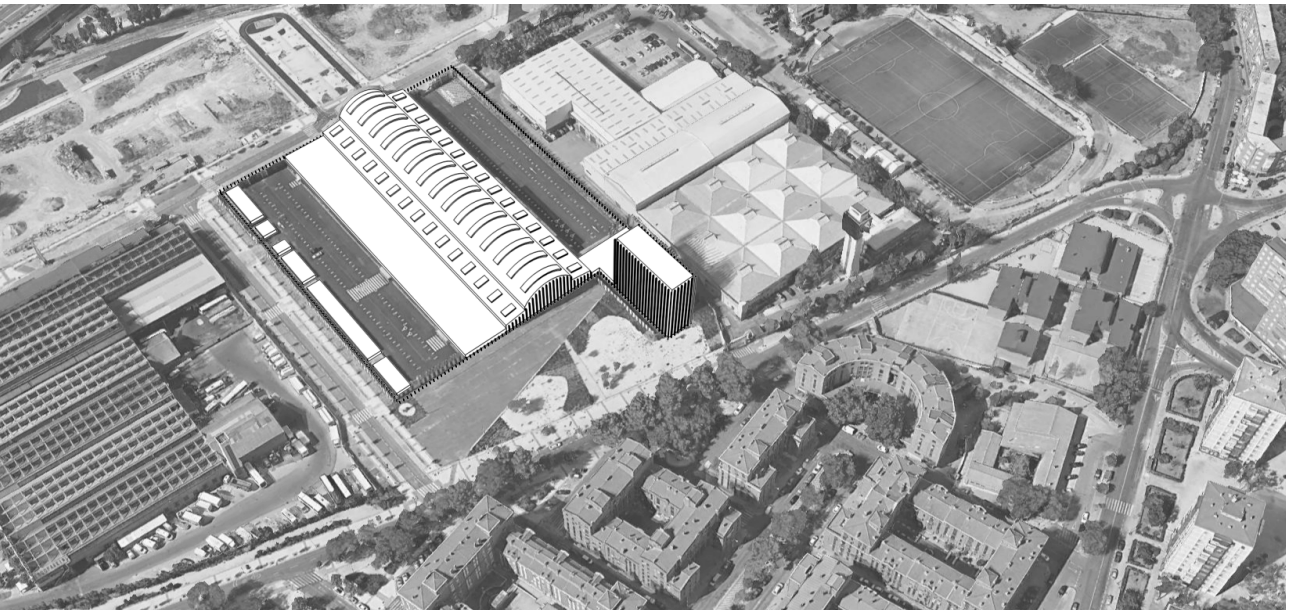


Chronology

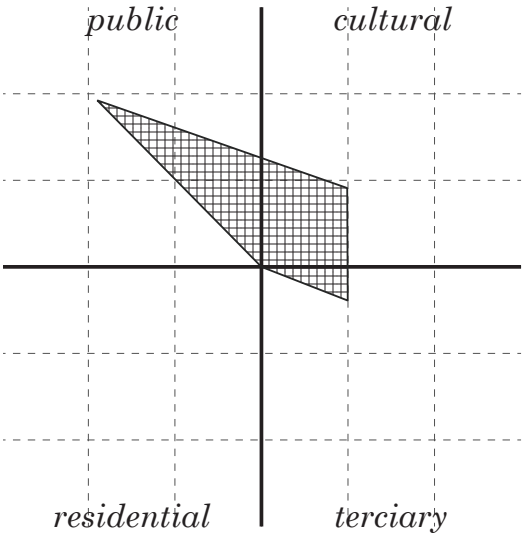


Hours of activity





Vocation



This case is particular because does not host any artistic/cultural activity, instead have been created as innovation centre and incubator for local starts up and entrepreneurs.

Investment: Madrid's city council.

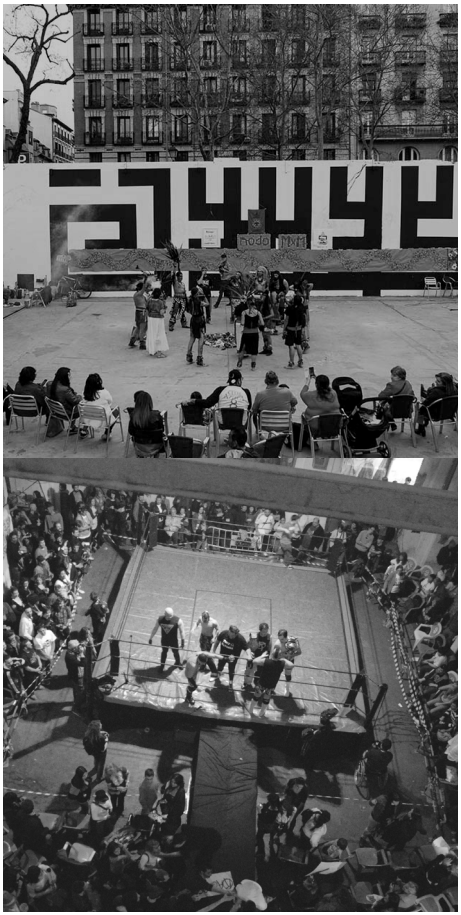
Location: south from the city centre, peripheries of Madrid

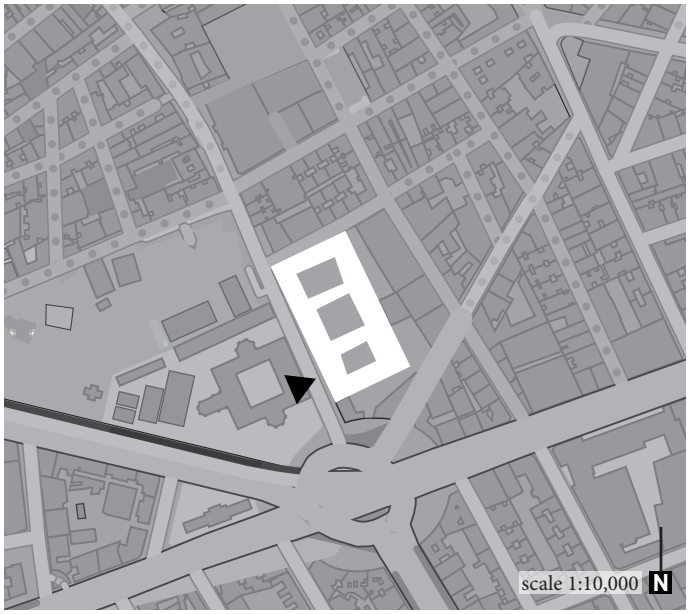
Activities: workspace for starts up and entrepreneurs, courses, conferences, meetings and assistance.

Weak points: Its location makes it difficult to reach and this limits it affluence.

Strength points: a project with a very strong identity and amplifies the spectrum of activities to which adaptive reuse may be directed.

TABA-CALERA, MADRID





Chronology

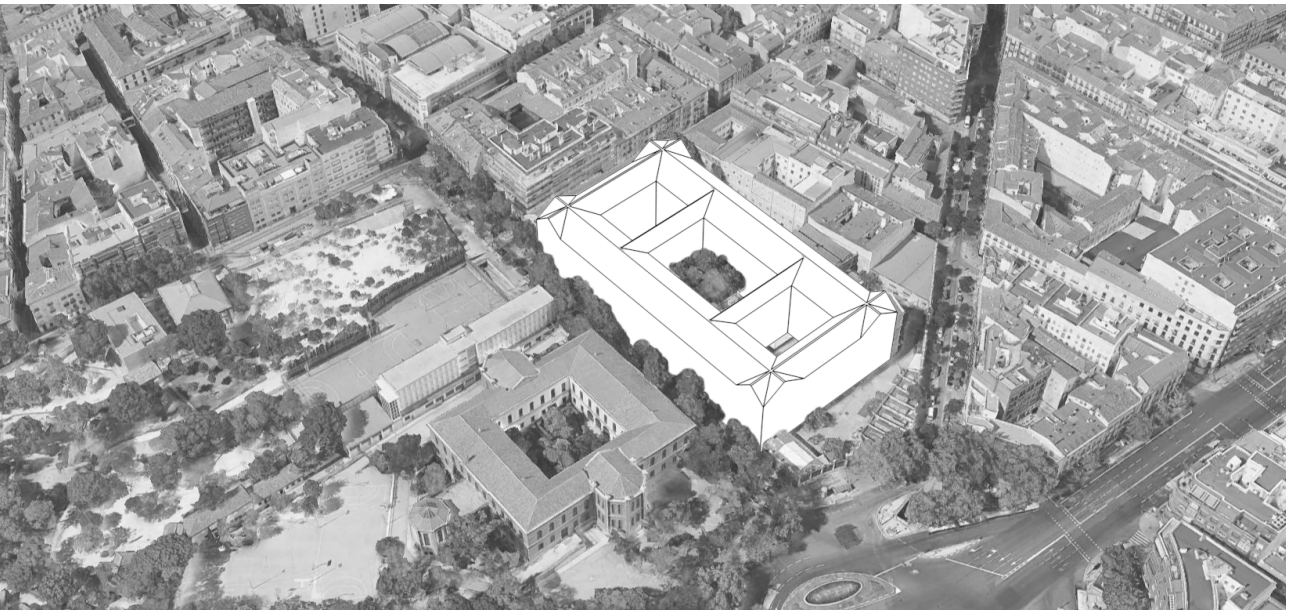
was build *to be the royal factory of aguardiente and cards*

becomes *a tabaco factory*

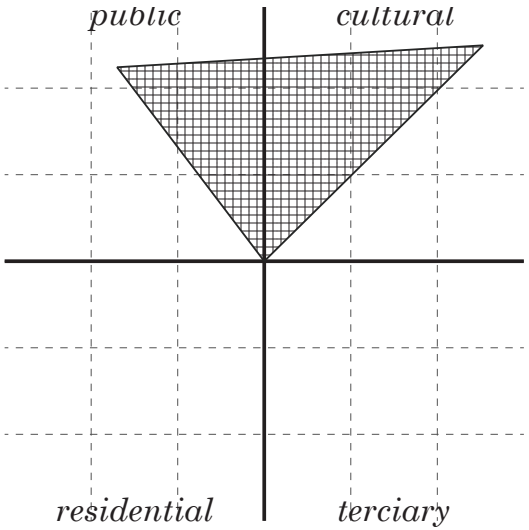
was definitively ***vacated***

in 2003 starts its reuse for social activities to finaly became a ***self-managed art center***

Hours of activity



Vocation



A case of reuse that is a product of the inefficiency of state management, where the community itself decided to appropriate the spaces of the abandoned building and convert it through self-management and self-construction into a communitarian cultural centre.

Investment: The community with governmental help

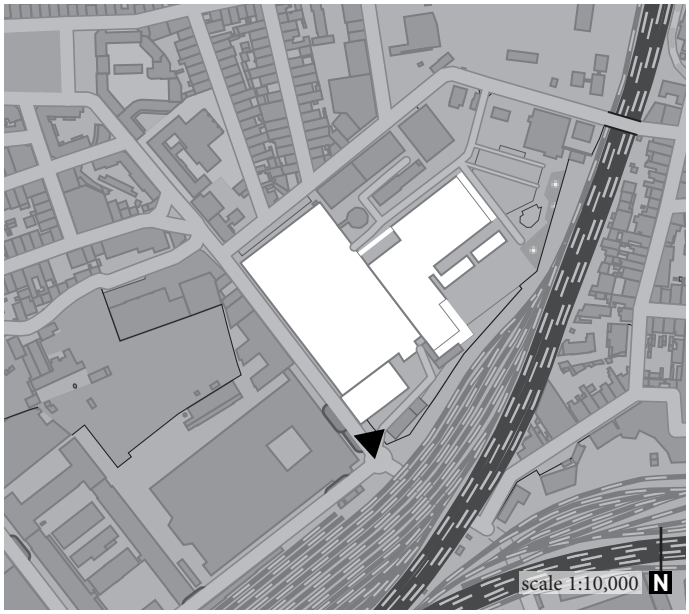
Location: in the city centre, very well connected by public transportation.

Activities: A mix between communitarian activities like meeting and formation, and cultural events.

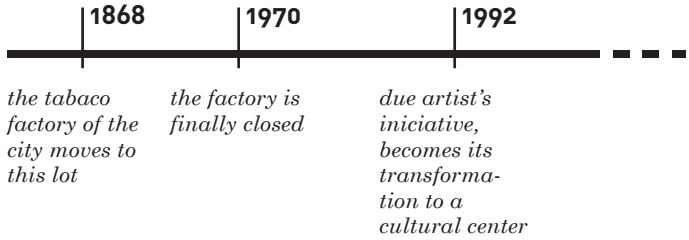
Weak points: due to self-management and self-construction has been a slow and problematic way to reuse, in fact only have been transformed a small part of the building.

Strength points: the community have achieve to create their own cultural space to fulfil their needs with almost none private intervention.

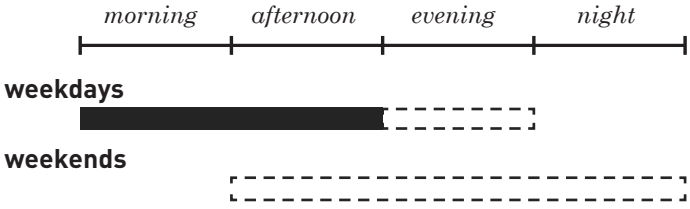
LA FRICHE, MAR-SEILLE

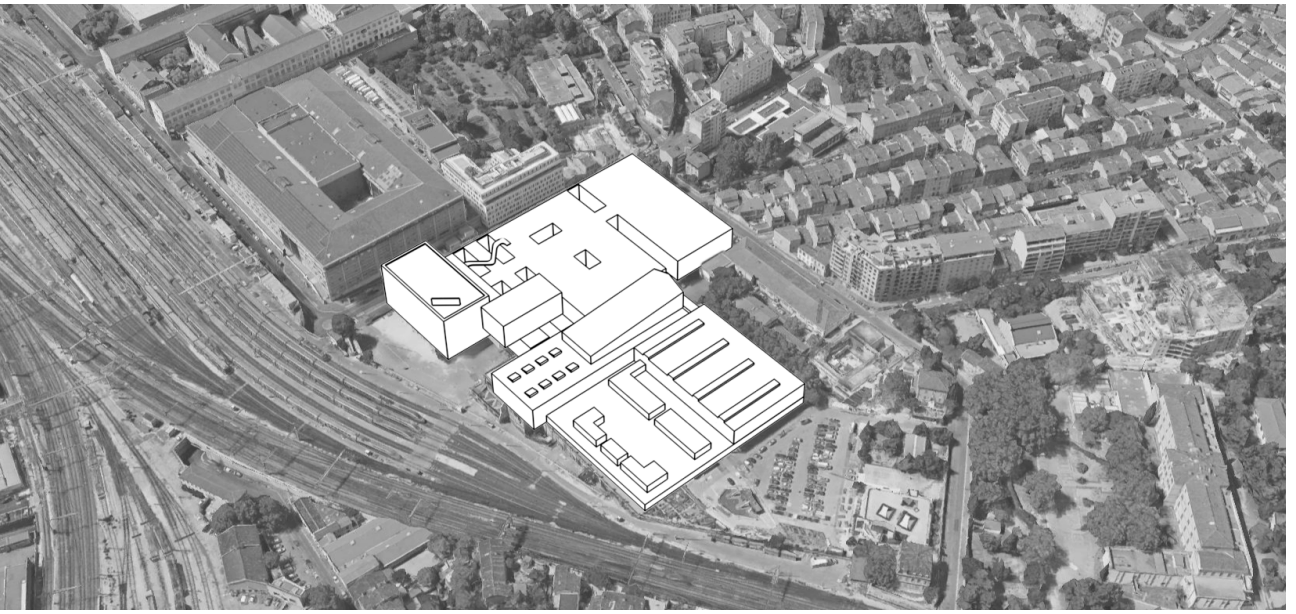


Chronology

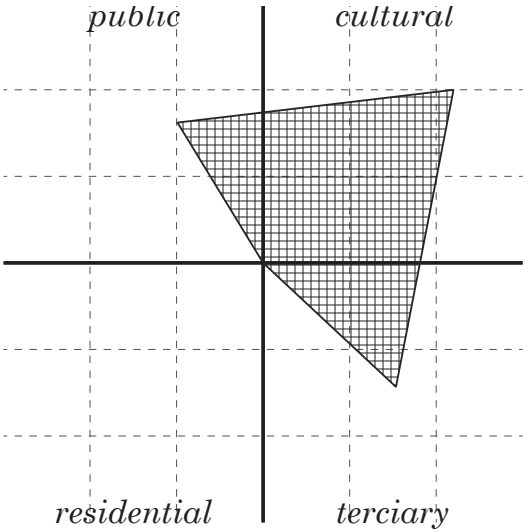


Hours of activity





Vocation



Begun as a small local project to give artist free space and time to create, and end it up being the complex for culture, expression and innovation that is today inserted on the working-class neighbourhood "Belle de Mai".

Investment: Marseille's city council art program.

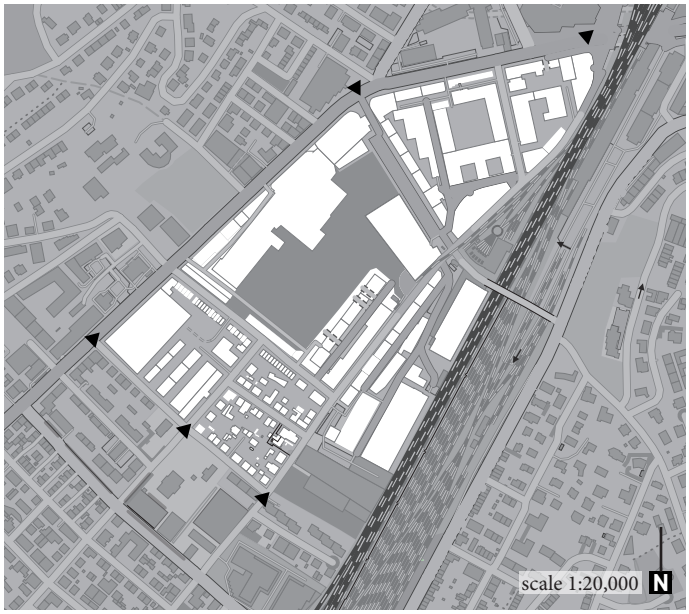
Location: not far from city's centre and close to the trains station

Activities: from smalls educative meeting for the youth to big festivals, mixed with bar, coffee shops, some retail and sportive spaces.

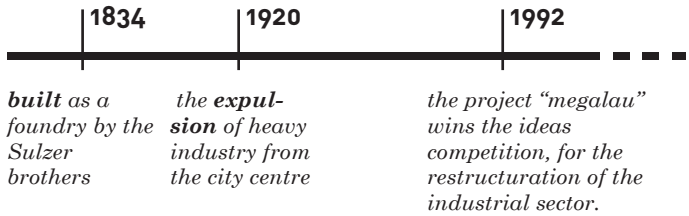
Weak points: haven't been able to create a connetion with it surrounding neighbourhood and integrate them.

Strength points: have a great mix of activities which can attract more people making it always alive.

SULZER AREAL, WINTERTHUR



Chronology

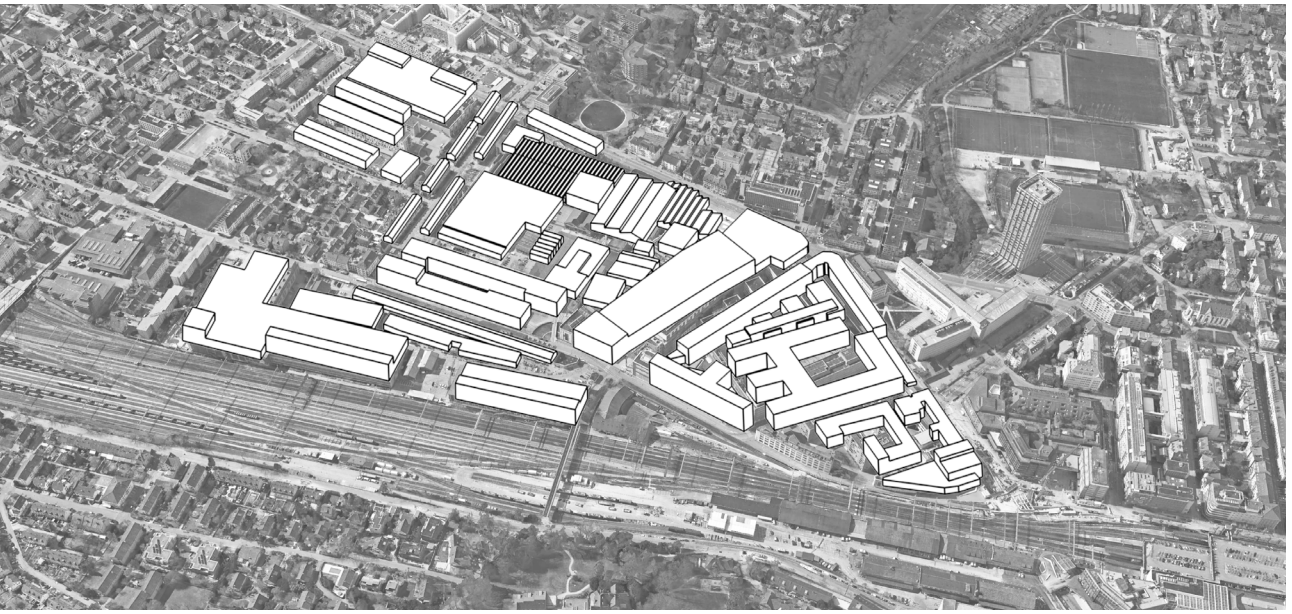


built *as a foundry by the Sulzer brothers*

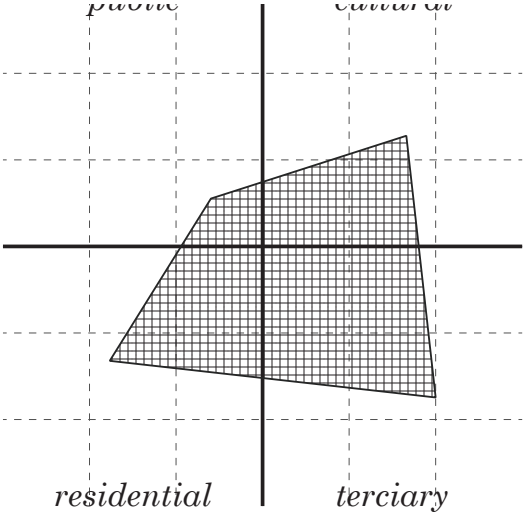
the ***expulsion*** *of heavy industry from the city centre*

the project "megalau" wins the ideas competition, for the restructuration of the industrial sector.

Hours of activity



Vocation



An industrial complex, which have expanded until became an exceptionally dense urban industrial zone, and needed to be reconverted into a functional part of the city,

Investment: public and private.

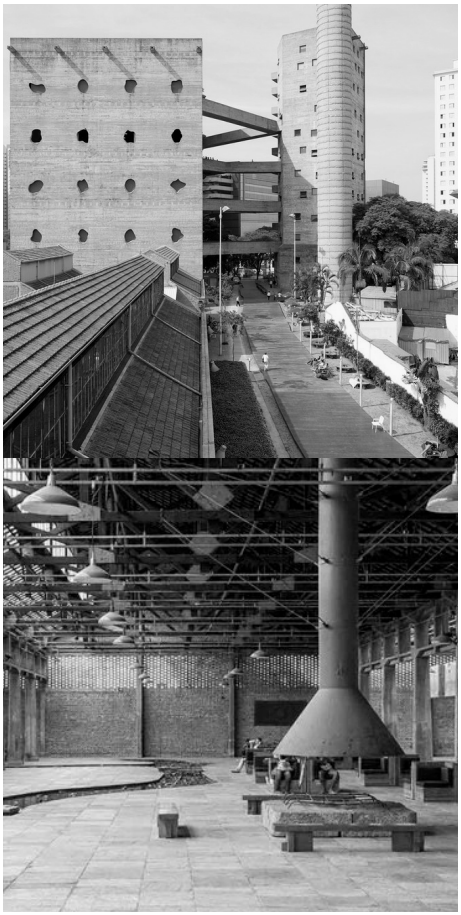
Location: industrial area close to city center.

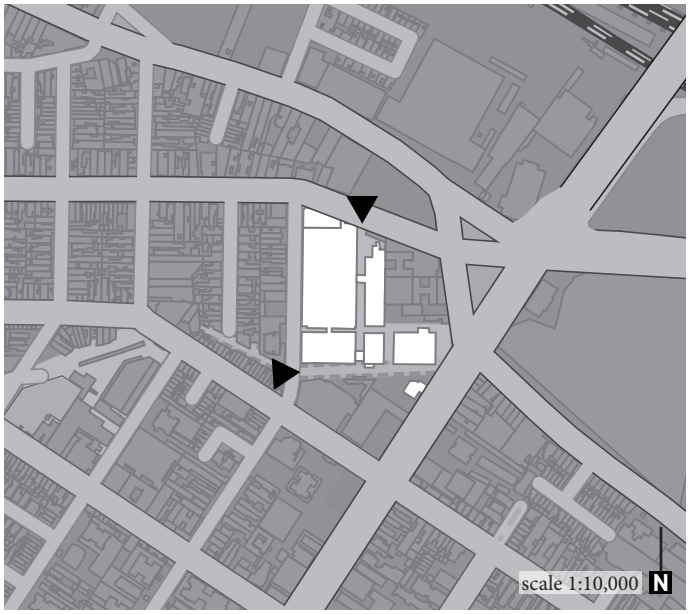
Activities: due to its expansion host all kind activities directed to al kind of users including housing.

Weak points: required an enormous investment of time and money to slowly transform such big area.

Strength points: demonstrate how and industrial site could be integrated to the city in such way that becomes a functional extension of the urbanity of its environment.

SESC POMPEIA, SAO PAULO





Chronology

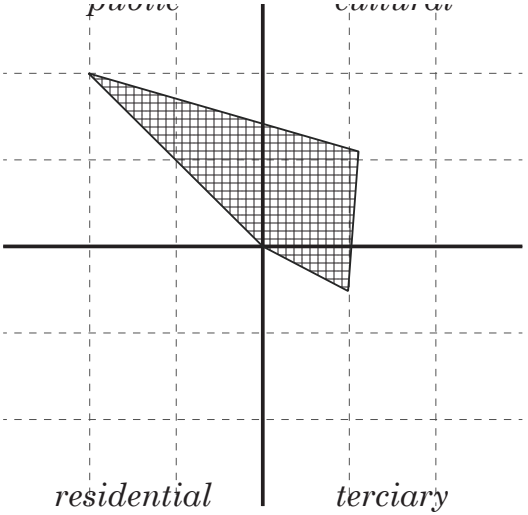
built *as a foundry by the Sulzer brothers*

the ***expulsion*** *of heavy industry from the city centre*

the project "megalau" wins the ideas competition, for the restructuration of the industrial sector.

Hours of activity

Vocation



Monumental project over an abandoned factory, converted in social free-time centre of activities for public association, and restructured by Lina Bo Bardi which transformed into an architectural landmark.

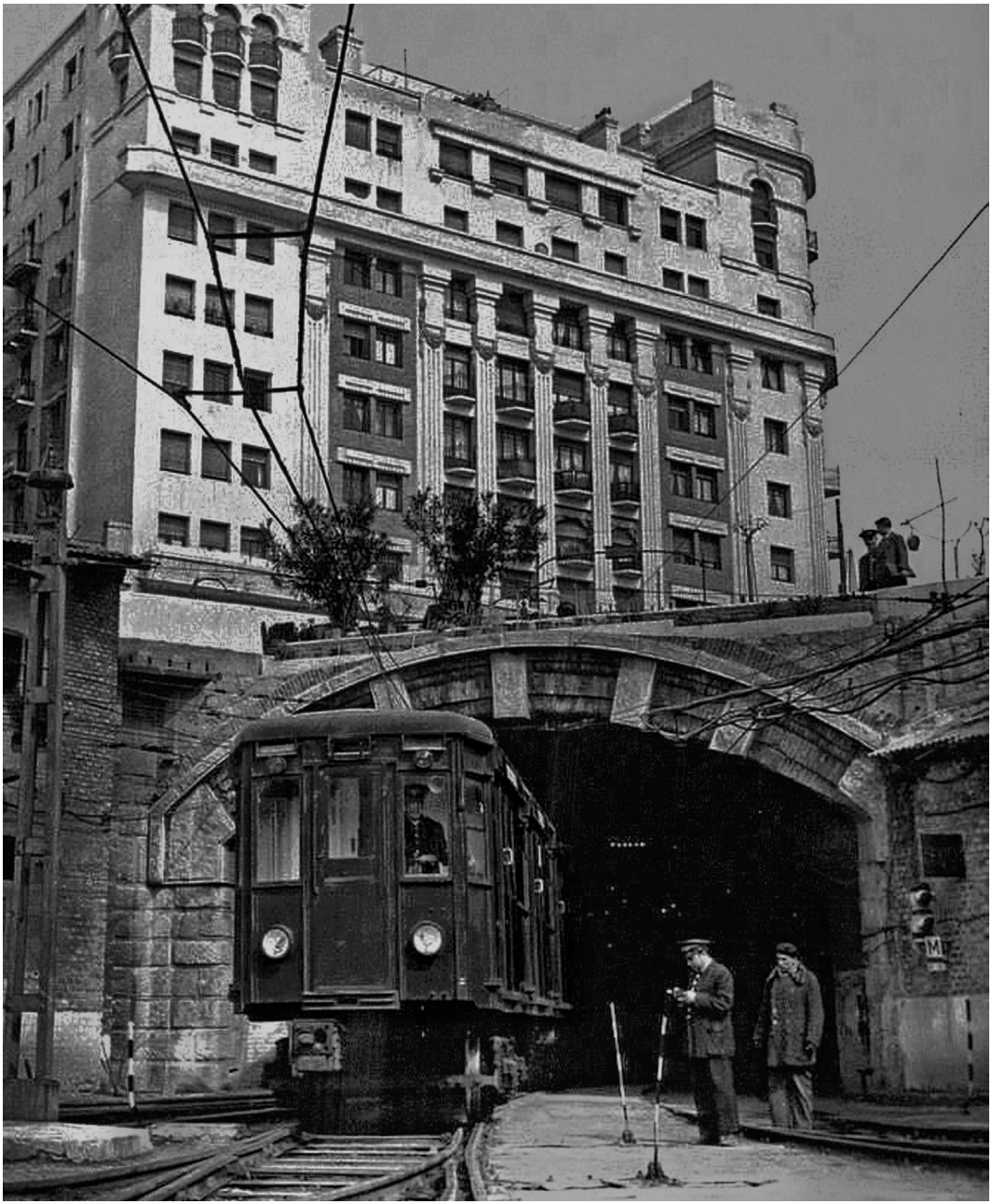
Investment: Social commerce association.

Location: in the middle of a middle class neighborhood far from city's center

Activities: cultural, recreational, educational, sportive mixed with communitarian activities.

Weak points: not very well connected with the rest of the city.

Strength points: further than the successful mix of activities, Lina Bo Bardi create a great interaction between industrial legacy and new architecture.



INDUSTRIAL DEVELOMENT OF MADRID

It is necessary to deal with the arrival and development in Spain of the aforementioned Industrial Revolution and its repercussions in the city of Madrid in order to establish a link between *"las cocheras de Cuatro Caminos"* with their environment and consequently, its past. And to understand its place among the Spanish industrial heritage and what makes it unique within the constructions of the same era.

As said previously, it is understood that by the middle of the XVIII century a period of profound change was beginning in England. The industrialization that was born with the sectors like fabrics, iron, steel and railways; and developed at great speed *"thanks to the competitive and non-interventionist climate"* that provided the ideal conditions for the rapid development of an industrialized economy. But, not in all the European countries that were barely integrating to this process, happened in the same organic way, in Spain, for example, *"the state was expected to play a more positive role in the creation of favourable conditions for the companies"* [1]

In fact, Spain is considered a mainly agrarian country until the 1930, when the state allocated a large amount of lost funds to promote industrial development. For a long time, the system of landlords was maintained as

[1] T. Kemp, La revolución industrial en la Europa del siglo XIX, Barcelona, 1979, 49-50., Barcelona : Ed. Fontanella, 1979.

a method of distributing the territory and the main production centres, infrastructure and civil work was very much linked to the monarchy. [2]

[2] R. Gómez Rivero e M. C. Palomeque López, «Los inicios de la revolución industrial en España:la fábrica de algodón de Sevilla (1833-1836),» Revista del Ministerio de Trabajo e Inmigración , n. 43, pp. 185-222, 2003.

Chronology of Spain's industrial development

Several stages of industrial growth in Spain can be identified ;starting from the moment in which a truly remarkable process of industrialization begins to gestate, where industry is propelled by constant technological advances, and passes from small manufacturing workshops with few workers to large industrial centres with numerous workers [2]:

The new industry (1830-1854)**:** is created by the introduction in Spain of steam and textile machinery, Catalunya being the main focus of a still young industrialization.

Industrial apparatus (1855-1881)**:** where a favourable international economic climate and a policy towards free trade provided the basis for the industrialization of the economy.

Large periphery industry (1882-1914)**:** a period in which foreign investment is boost banking and credit societies, large macro-services infrastructure and energy production companies. The development of heavy industry (in Vizcaya) and modern industry (in Catalunya) was therefore prepared.

Development and industrialization (1915-1935)**:** thanks to Spain's neutrality in the Second World War, industrial production was increased,

which logically favored the country's economic outlook enormously.

Great depression & Civil war (1936-1950)**:** the consequences of the great depression and mostly the Spanish civil war that ended until 1939 would hold back industrial development in the country, and there would be no significant recovery until 1950 under underdeveloped and anarchic patterns of capitalism.

Spain's industrial architecture

The first industrial elements that began to appear in Spain date from the XVIII century, are called "factorias or manufacturas", and are almost entirely established by the absolutist monarchy of the time, with the aim of optimizing the production of goods for the nation. These first specimens, morphologically were not different from the typical civil buildings like the rural constructions of the nobility, where the manufacturing activities were distributed in the different floors of the building. Most of them were designated to the architects and engineers of the crown. [3]

[3] J. Sobrino, Arquitectura industrial en España 1830-1990, Madrid: Cátedra S.A., 1996.

Although the Industrial Revolution had already begun in England, it was not until 1832 that the first steam-driven textile factory was inaugurated in Barcelona. Until, by 1840 the country took on a new nature, thanks to the establishment in Spain of a moderately bourgeois government, which managed to bring the industrial revolution. This new government was responsible for creating the conditions of the legislative and practical framework for the new economic transformations brought by the first industrial revolution, such as the mechanization of many production sectors and new mechanical engineering.

Fig.10: Royal tapestry factory of Madrid, 1972. From: http://fotoblog-madrid-josamez.blogspot.com

[4] E. Torroja e M. Salvadori, Las estructuras de Eduardo Torroja, Madrid: Madrid CEDEX, 1999.

Fig.11: Ca l'aranyo, poble nou, Barcelona

The path towards the typological identification of industrial architecture was long, at first, it was evident an intention not to abandon the classic styles of civic buildings, until it was understood that the new materials provided by industry could have an artistic character and their own architectural language. Were the great pieces of civil engineering, such as markets, bridges, and stations, where would begin to be seen the new aesthetics coming from the expressive synthesis of new materials, always under strict functional criteria.

Engineers were the first to understand the need to find a link between building technique and architectural morphology, and this, is reflected in the thought of the important Spanish structural engineer, Eduardo Torroja: « … *before and above all calculation reigns the idea, which models the material and gives it a resistant form so that it can fulfil its function*» [4]. Thanks to this extended vision of Spanish engineers at that time, is that was consolidating an idea of the expressiveness of industrial architecture in Spain.

From this point onwards, the typologies of industrial architecture in Spain in the XVIII and XIX centuries are inspired by models that have already been used and verified in other countries; Sobrino in 1996 divides them into three: The factory in height, the industrial nave and the naves in sawtooth -*shed*-.

The factory in height normally came used by the textile and alimentary sector, the first prototypes (by 1834) could be found in the historical centres of the main Spanish cities, until due to the mechanization force them to migrate towards the countryside in search of more open spaces and of greater extensions of land. A great part of the textile factories resorted to importing

the whole model from England, that is to say, blueprints, machines, looms and even the columns of iron; as is the case of "Ca l'Aranyo" in "Poble nou", Barcelona. Then, this style would be translated to a regional architectural language that will replace the old factories with civic aspect.

The first industrial naves were adopted mainly by the metallurgical industry, starting from the premise of locating the industry near the source of raw material or resources. The metallurgical industry is propelled by the great demand produced by the textile sector both, for the construction of its production spaces, and the machinery used in it.

The factories built from 1850 considerably increased in size thanks, this time, to the development of the first railways. In this way, the small workshops in the historic centres disappeared completely and were absorbed by the large production centres. At the same time it involves the construction of large engineering works, partly with the aim of making the supply of resources for industry more accessible and of transporting the goods produced.

Fig.12: Estado actual de la fundicion de Sargadelos, foto extraida de " La arquitectura de la real fundicion de Sragadelos" de Guillermo Bas Ordoñes

Railway

It was not until 1848 that the Barcelona-Mataró line was inaugurated, and three years later the one of Madrid-Aranjuez, and consequently the first of large Spanish train station, Atocha in 1851, inspired by the prototype of the London station, with technology and materials that were also imported. The same phenomenon was seen in all the great railway constructions of the country

Fig.13: Basconia Company, Vizcaya

[3] J. Sobrino, Arquitectura industrial en España 1830-1990, Madrid: Cátedra S.A., 1996.

Fig.14: Atocha, first have of the xx century

for a long time and due to the great cost involved in bringing to the country all the elements from abroad, the economic growth was not the desired one. [3]

It was then followed by several train stations in Madrid that had the same concept of importation, until, in 1888, Alberto de Palacios was in charge of the new renovation project for the Atocha station and, was given an architectural expression of his own, appropriating the brick as the protagonist of the aesthetics of the building, thus breaking with the mimetic monotony of his predecessors.

From there, although it was impossible to cut off with foreign influences, the main Spanish stations followed the path of their own national expression, leaving several examples such as the station of Valladolid (1890-1895), Almería and the northern station of Valencia; some of them were more expressive cases, and with a more regional identity as the station of Cordoba in Seville (1899-1901) or Tafalla on the Zaragoza line, which use the expression of Neomudéjar, characteristic of Spanish architecture of the time.

Fig.15: Cordoba's train station, from: www.galeon.com

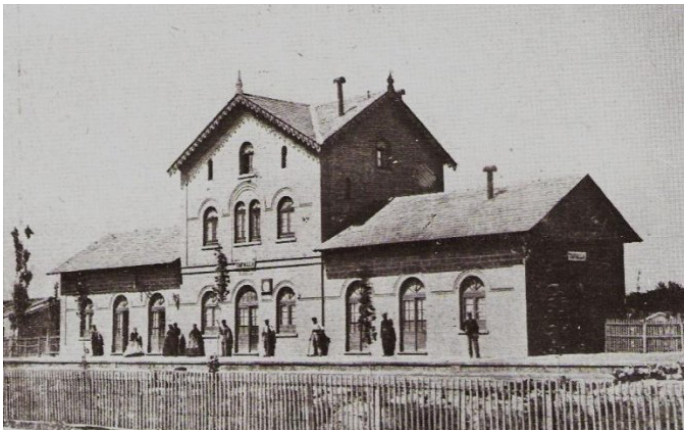


Fig.16: Tafalla's train station, 1918 . "Guia Couseau de Norte"

Industrialization of Madrid

Being the Spanish capital, most of the transformation processes mentioned above at the national level, had as epicentre the city of Madrid. Although it is worth approaching with more zoom the process of industrialization of this city to understand the context in which would be developed later *"las cocheras de Cuatro Caminos"*, the building which is object of this work.

As already mentioned, at the beginning of the XVIII century, we can speak of a pre-industrial period, where manufacturing activity was sustained by the small workshops and artisan offices of the city, and there were only a few "royal industries", approved and promoted by the crown for the production of certain goods and thus, propitiate the economic growth. At the beginning of the century, the royal currency house and the royal printing house were among the few references that existed.

Fig.17: Water deposit of "Canal Isabel II", Chamberí, 1907

[5] F. Revilla e R. Ramos, La arquitectura industrial de Madrid, Madrid: La Librería, 2008.

Fig.18: Beer and ice factory, "Hijos de Mahou". 1982

Fig.19: Beer factory "El Aguila",1907

In the course of the XVIII century with the promotion of the state for a new industrialization more in line with what was happening in England in the same period, were appearing, not only new royal factories as: the royal factory of tapestries, the royal factory of porcelains of "Buen Retiro", the factory of saltpetre and the factory of cards and alcohol (Current community cultural centre "la tabacalera");but also, some factories of private initiative of great scale were registered like some printers, the real factory of silverware, but always closely linked to the crown. [5]

For the XIX century there are no noticeable changes, so much so that we can speak of a regression in a certain way, very possibly due to the war that was developing with France. During the first half of the century there were still small and medium scale artisan workshops, dedicated to cover internal consumption, while the big real factories and private initiatives of greater scale focused on a larger market or failing to cover infrastructure services, as was the channel Isabel II.

One of the most important factories in the Spanish capital for the XIX century was the car factory, in Recoletos; it was considered the first large transport industry created in Madrid, the main supplier of the royal house until its demolition in 1860.

Another prolific sector that left several references of an industrial architecture with a clearly "Madrileño" language was the brewer, with examples such as the Santa Barbara brewery inaugurated in 1815, and especially the Mahou beer and ice factory, located in the northern part of the central area and adopting a more mature Neomudéjar style which at that point would be part of the image of the city of Madrid. [5]. In the same

Fig.20: Train station Principe Pío ,XIX century

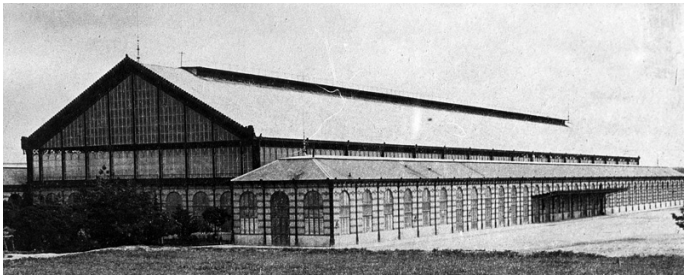


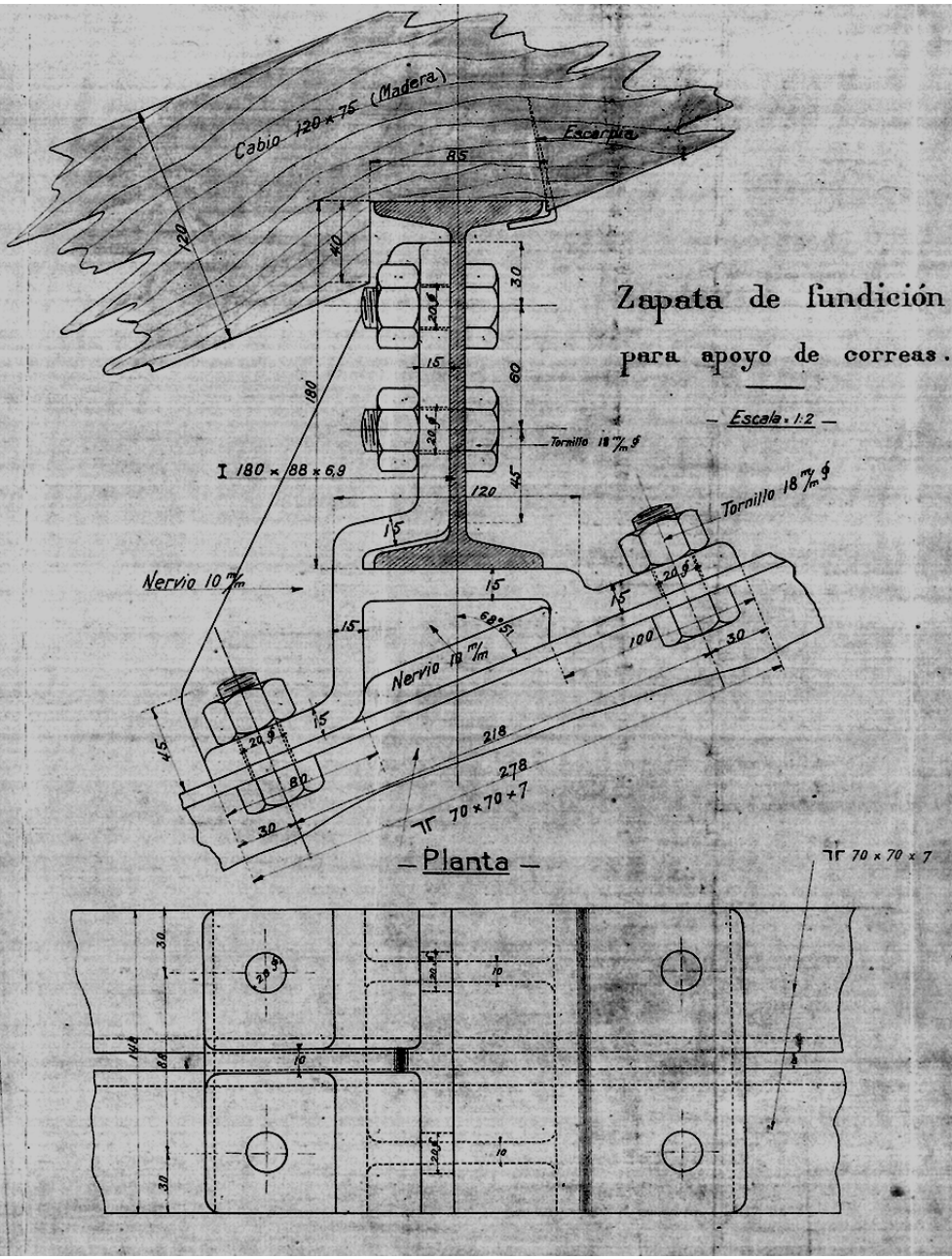
Fig.21: Train station Las Delicias ,Madrid, 1880

way, at the end of the century, El Avila brewery was founded, which is currently one of the most relevant examples of reuse in Madrid, becoming the municipal archive and library.

Due to its condition of centre of peninsula, Madrid suffered constant problems of communication, reason for which much of the heavy industry had a lot of development in coastal cities like Barcelona and Valencia. For that reason, it was indispensable for the development of the Spanish capital the connection with the rest of the territory that arrived with the railway, a

fact that coincided with the process of widening of the enclosure of the city in 1860, reason why the first great station of Madrid would be located in the door of Atocha.

Atocha would contribute enormously to the economic development of its immediate surroundings, which would give the stations the impression of being urban catalysts, and so Atocha was followed by the stations of Príncipe Pío, Norte, Las Delicias and some other auxiliary stations such as the Imperial and Melancolía; having the same effect, so trains stations would be used as an incentive for the development of the city towards a metropolis, and would be repeated later with the installation of the metropolitan transport system.



Zapata de fundición para apoyo de correas.

— Escala 1:2 —

METRO MADRID & LAS COCHERAS DE CUATRO CAMINOS

By 1860, the city of Madrid was going through a process of expansion of its limits, where in part, happened in an organized way by following the expansion plan proposed by the architect and urbanist Carlos María de Castro, which prevented the orderly reception of 150,000 new inhabitants, but which developed very slowly, or at least not fast enough to avoid the spontaneous creation of small rural centres on the edge of the formal city. [1]

That is why at the end of the *XIX* century the distances, that many citizens are forced to travel in order to make a live in the city of Madrid increased significantly, especially in the north-south direction, which was the longest axis of the city by that time. This caused the existing transportation systems in Madrid, such as trams, to find it difficult to meet the demands of the society, which deteriorated the conditions of service, creating the need for a new transport system that could meet more efficiently the needs of the citizen of the Spanish capital. [2]

[1] J. J. Bataller Enguix, R. López de Lucio, D. Rivera Blasco e J. Tejera Parra, Guía del urbanismo de Madrid S. XX, Madrid: Ayuntamiento de Madrid, 2004.

[2] Á. Valdés Menéndez, L. M. Marco Fernández, A. M. Sanz Muñoz e Á. Bonet López, «Informe: Las Cocheras de Cuatro Caminos,» Madrid Ciudadanía y Patrimonio, Madrid, 2015.

METRO MADRID

Since 1982 there has been a record of official intentions and concessions made with the aim of carrying out a project for an underground railway system to improve the transport service in the city. But it was not until 1914, when Madrid had more than 600,000 inhabitants, that the need for a new and a better method of transport for the Spanish capital, became a higher priority. As response, the definitive project would be presented to the city council that year, by the founding partners of the then-called *"Compañía Metropolitano Alfonso XII"* : Miguel Otamendi, Carlos Mendoza and Antonio González Echarte; a project originally constituted by four lines: North-South Line *Cuatro Caminos-Sol-Progreso* (3,960 km and nine stations), East-West Line *Goya-Sol-Ferraz* (4,565 km and twelve stations), *Barrio de Salamanca- Serrano -Diego de León* line (1.572 km and four stations) and *Ferraz-Goya Boulevards* Line (3,837 km and ten stations).

By then, the largest cities in Europe already had similar systems in operation and had proven to work very well for the needs of the XIX century, besides the fact that the type of travel that underground systems imply represented a completely innovative idea for the time; the decontextualization experienced when users transporting rapidly underground was not something common at that days. Thus, underground transportation system was synonymous with progress and gave the idea of the cities of the future, so this project was an essential part of the transformation of the Spanish capital into a great metropolis. [3]

[3] S. Olivares Abengozar, «Madrid 1919, un nuevo escenario urbano subterráneo: el Metro.,» Escuela de Arquitectura de Las Palmas de Gran Canaria, Las Palmas.

Otamendi, Mendoza, and Gonzáles were familiar with the projects of the principal world referents in metropolitan systems by 1917, like were the metro of New York and Paris, in fact, Otamendi and Mendoza were invited and assisted to the inauguration of the metropolitan of New York. And by the other hand, were inspired by the attentions to aesthetic of the metropolitan of Budapest and Paris, were participate architects of high relevance like Otto Wagner o Hector Guimard. In the case of the Spanish capital, its founders wanted to give the same importance to aesthetic for the transport system, and the one chosen for this task was the colleague of studies of Otamendi and acclaimed Spanish architect, who by the time was in the most proliferous moment of his professional career as an architect. [2]

The architect: Antonio Palacios

The architect was born in Porriño (Spain in 1874), coincidentally in the bosom of a family of railway workers. Ended up being one of the most influential architects of Spain, especially thanks to the monumental line that acquired the city of Madrid for the first half of the twentieth century, a city that will be considered as his second home, center of operations and main canvas. He understood the desire through which the Spanish capital was passing, *"Madrid wanted to be metropolis"* (Javier García-Gutierres), and was author of big part of the works that represent the modern Madrid such as "*Palacio de Comunicaciones"* (1904-1919), *"Hospital de Maudes"* (1808-1916), *"Banco Español del Río de la Plata"* (1910-1918), and *"Circulo de Bellas Artes"* (1919-1926).

He finished his degree in architecture in 1900 at the "Escuela Superior de Arquitectura de Madrid",

coinciding with a moment of important changes and discussions in the field of architecture gestating in several European countries, and of which arise examples like the *Tassel house* of Víctor Horta, and that would end up manifesting in the Universal Exhibition of Paris in 1900. Being a key moment for *L'Art Nouveau* and parallel movements like the Viennese *Sezession* of Otto Wagner and Josef Maria Olbrich; or the *Art & Craft* movement with William Morris and Charles Mackintosh in England; on the other hand, outside the European continent was Frank Lloyd Wright who by 1905 was working on the famous *Prairie Houses.* [4]

In 1917 became chief architect of the metropolitan transportation company thanks to his renown and his friendship and partnership with Miguel Otamendi (founder member the company) which he met as student on the "Escuela Superior de Arquitectura de Madrid". They associated in 1903 and participate in several public infrastructure competitions throughout Spain. Their career would gain a great momentum, leading to their great opportunity when together, they won the contest for the *"Palacio de Comunicaciones de Madrid"* which would catapult their career enormously and would make it so recognized in Madrid. [5]

His participation on the underground company was one of his biggest projects due to the measure of the intervention, he participated in all scales, designing the passenger stations, the service stations like *"Cuatro Caminos"* , deciding the line of design that will follow all interiors, the punishment, even the corporative look of the company including the logo, which is still used nowadays. [2]

[4] J. A. Franco Taboada, «Antonio Palacios: Una singularidad arquitectónica de la modernidad vista a travéz de sus dibujos,» Expresión Gráfica Arquitectónica 29, pp. 271-287.

[5] S. Olivares Abengozar, «Antonio Palacios y el ferrocarril metropolitano. Patrimonio industrial en el metro de Madrid,» Universidad Politecnica de Madrid, Madrid, 2006.

Authorship of "Las Cocheras de Cuatro Caminos"

Palacios served as chief architect of the Madrid transport company from 1917 until his death in 1945, as confirmed by the documents issued by the company itself. However, there has been doubt about his degree of intervention in the design and construction of the garages object of this work, because it had not been found his official sign in the technical drawings until 2017, where it was unanimously confirmed authorship on the building.

In any case, his participation was evident in the aesthetic and compositional details from which no architect or designer can be separated, it is an almost impossible task not to leave "characteristic" and individual traces of each creator in his own work. In the case of architectural design, the buildings respond to a very particular way of approaching architecture on the part of each author, and so the work is impregnated, to a greater or lesser extent, with *"fingerprints"* (as Palacios himself referred to); which in this case will allow to relate *"Cuatro Caminos"* not only to other works of their author, but also their relevance within the industrial architecture of the city as legacy of the important figure of Antonio Palacios.

For this purpose, will be mentioned briefly the stylistic analysis carried out in the *"Informe: Cocheras de Catro Caminos"* in 2015 [2], which had the objective of plead the authorship of the architect Palacios in the initial stage of the *"Cocheras de Cuatro Caminos"*.

Since Palacios developed his professional life in an era that could be considered a transition, his search was always that of creating a synthesis between modernity and tradition, something he channelled through the expressive quality that the materials had for him, always exploring the duality between the most traditional materials and the most recent technological advances. Amézqueda affirms: « *The most significant feature (...) is the decision to always use the materials exposed sincerely and to obtain the substantial richness and expressiveness of the buildings on the basis of an adequate combination of diverse materials. In works of higher quality there is a virtuous handling of noble and rich materials (...) while in works of lesser category and budget it shows an original ability to find a substantial plastic treatment with the simplest materials. Especially the virtuous and deep manipulation of the stone - granite, with preference over others - is one of the most successful and defining features of Palacios's work in his early period.* » [6]

[6] A. G. Amézqueta, «Experiencias Dispersas,» Arquitectura Nº106, pp. 36-38, 1967.

All above mentioned are characteristics that are evident in the work built by the Spanish architect, and that are reflected in the design of the buildings of *"Cocheras de Cuatro Caminos"*. One of the resources quite used by Palacios was the contrast, be it of textures, materials or colours. In the few industrial buildings that he designs, made use of bricks and granite (a characteristic combination of Madrid's architecture) in contrast to highlight modular elements of very refined and simplified ornament in facades, usually making up an arch. A resource evidenced on the opening of the railway tunnel of the yard in "Cuatro Caminos"

Another constant in Palacios' work is the use of lowered

Fig.22: View of the entrance of train's Tunnel of "Las Cocheras de Cuatro Caminos". Photography made by Antonio Manuel Sanz.

arches with a step-shaped joint in the upper corners, an element probably influenced by Viollet-le-Duc. As well as the gesture of strongly evidencing the modularity of the constructive elements, evidencing a link with the material and the constructive technique that is behind it, it is seen habitually in his work, in the finish of the facades that lines of shadows are used over the stone or granite to highlight the modularity and the composition of the wall. [2]

Clearly, at least the naves of *"Cuatro Caminos"* built during the period in which Antonio Palacios was in charge of the architecture department of the Madrid Metro form part of the architectural legacy left by the important figure that this architect was for the city of Madrid and for Spain, which adds value to the link that this structure has with the city's past, not only an industrial past and a memory of the work that was developed within it, but that together with all the

Fig.23: Shops from ICAI at Madrid (1908-1915). Photography made by Alvaro Valdés.

Another example of industrial building made by palacios where could be found the contrast between granite and brick.

Fig.24: Rectangular corners in the arches at nave C of "Cuatro Caminos". Photography made by Alvaro Valdés.

Fig.25: "Maudes" Hospital, "Villamejor" warehouse, "Circulo de Bellas Artes", "Salamanca" Substation and "Las Cocheras de Cuatro Caminos". Photografies of examples of flatted arch corners in the buildings designed for Antonio Palacios.

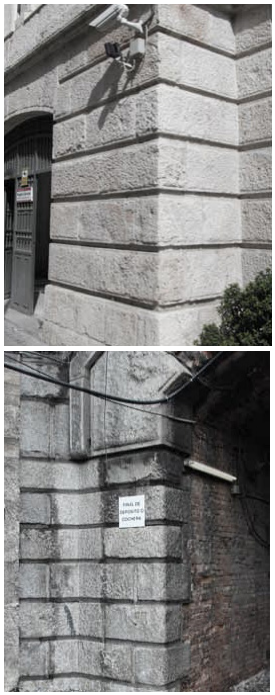


Fig.26: Shadow lines on wall finish on Maudes Hospital (above) and in"Cuatro Caminos". Photographies made by Alvaro Valdés.

infrastructure of the metropolitan form part of an ideal of Madrid, an idea of future and innovation, in part propelled by Palacios, and that evidently left its mark on the city that it is today.

COCHERAS DE CUATRO CAMINOS

It was not until 1917 that the concession to the *"Metropolitano Alfonso XII"* company was approved, having as its main investment partners the bank of Vizcaya and king Alfonso XIII himself, as well as many other small investors attracted by these large economic entities that supported the project. This way, in April of

the same year started the construction labours for the Line 1 (*Sol-Cuatro Caminos*) and a year later in 1918, the company's garages for the parking, overhaul, repair and assembly of the trains in *"Cuatro Caminos"*.

In Spain are called *"Cocheras"* the buildings which serve as deposit of trains, and where are held labors of maintenance, repairs and in some cases painting; in English this kind of establishment are called *shop, repair and maintenance shop, repair and inspection shed* or *rail yard* [2]. Are service building that are part of the transportation infrastructures like railways or subways. In this case, the work is specifically addressed to the first service structures belonging to the Metro Madrid subway transportation system.

Fig.27: View of the entrance of the tunnel, April 30th of 1918. Photography published by "Revista de Obras Publicas n 2225.

Fig.28: Assembly of the metal structure, beginning of 1919. Metro Archive

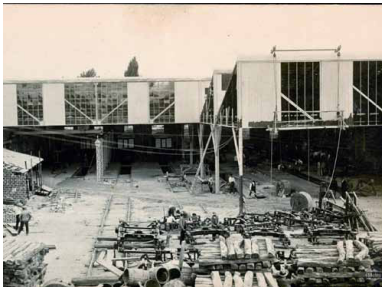
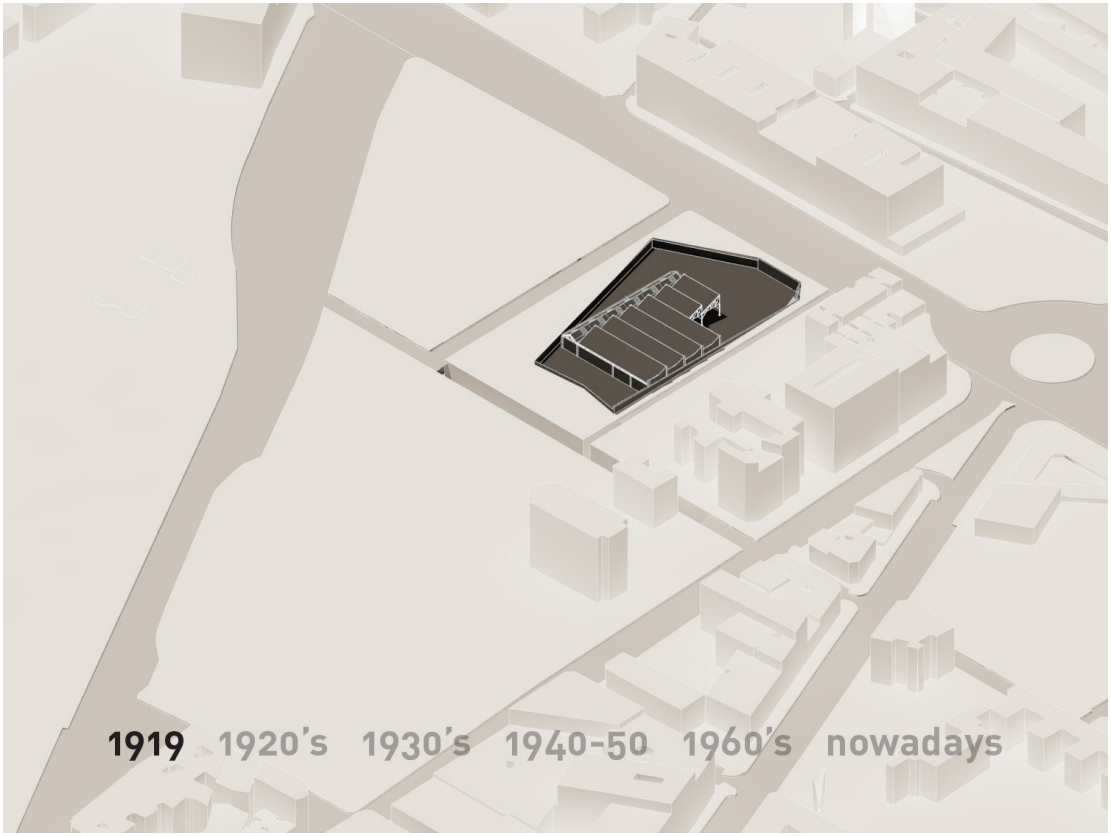


Fig.29: Final touches to the building, before its inauguration. Summer 1919. Metro Archive.

Construction & Evolution

Both the project in paper and the construction labors on the land acquired by the metropolitan company of Madrid, date back to the summer of 1918. When works began with the earthworks that would the construction to be carried out on a flat platform 5 metres below the level of the northern front of the lot. With the aim, not only of overcoming the unevenness of the terrain with respect to the southernmost side, but also facilitating the communication of the complex with the underground line of the subway; through a tunnel that would be located in the northeast end, and over it the main access to the complex from the street.

Finally, in **1919**, the shops were inaugurated in "Cuatro Caminos", consisting of three naves which, for practical reasons of this work, will be called **A, B and C**. Although with many variations from the original project, **naves A and B** are made up of 10x20 meters structural modules and a shed roof. **Nave A** consists of four modules while **nave B** consists of six modules. On the other hand, the **nave C** is attached to the whole length of **nave B** with a width of 8,5 meters and a gable roof.


1919
1920's
1930's
1940-50
1960's
nowadays

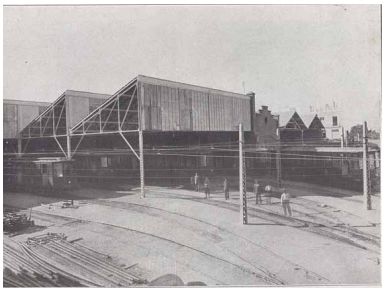


Fig.30: Naves A, B, C and D. Photo by Luis Lladó and Fábregas published in the book Metropolitano Alfonso XIII, Trozo Sol-Atocha (1921). Juanelo Turriano Foundation

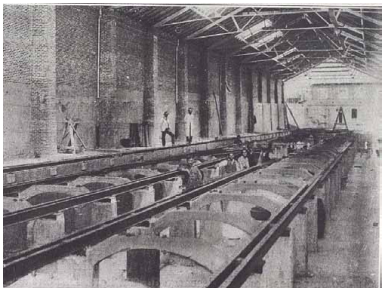


Fig.31: Naves D. Photo by Luis Lladó and Fábregas published in the book Metropolitano Alfonso XIII, Trozo Sol-Atocha (1921). Juanelo Turriano Foundation

The following year the company bought the lot adjacent to the south in order to have enough space for future expansions, the same year two new buildings were built, both 70 meters long and about 12 meters wide each, the **naves D**. These, as the **nave C** had a gable roof and were supported at its ends on masonry walls, in addition these would consist of pits for the overhaul and repair of trains. At the same time, **naves A and B** were enlarged with one more module each; and will be added a yard (south part) in order to give trains facility to move in the complex.

During the **1920s** the entire metropolitan system underwent major expansions, in the case of *"Cuatro Caminos"* was added in 1924, an administrative building on the east side of the site, which is called **"Tuduri"** and consists of four floors above the level of the railyard (three floors above street level), accompanied by two lower volumes of a single level for bathrooms and changing rooms. On the northern edge of the lot is also built a longitudinal structure divided into three parts of 9 meters wide made of masonry and gable roof, to accommodate some offices of the staff of the shops, of works as well as some offices of payment and sanitary services.

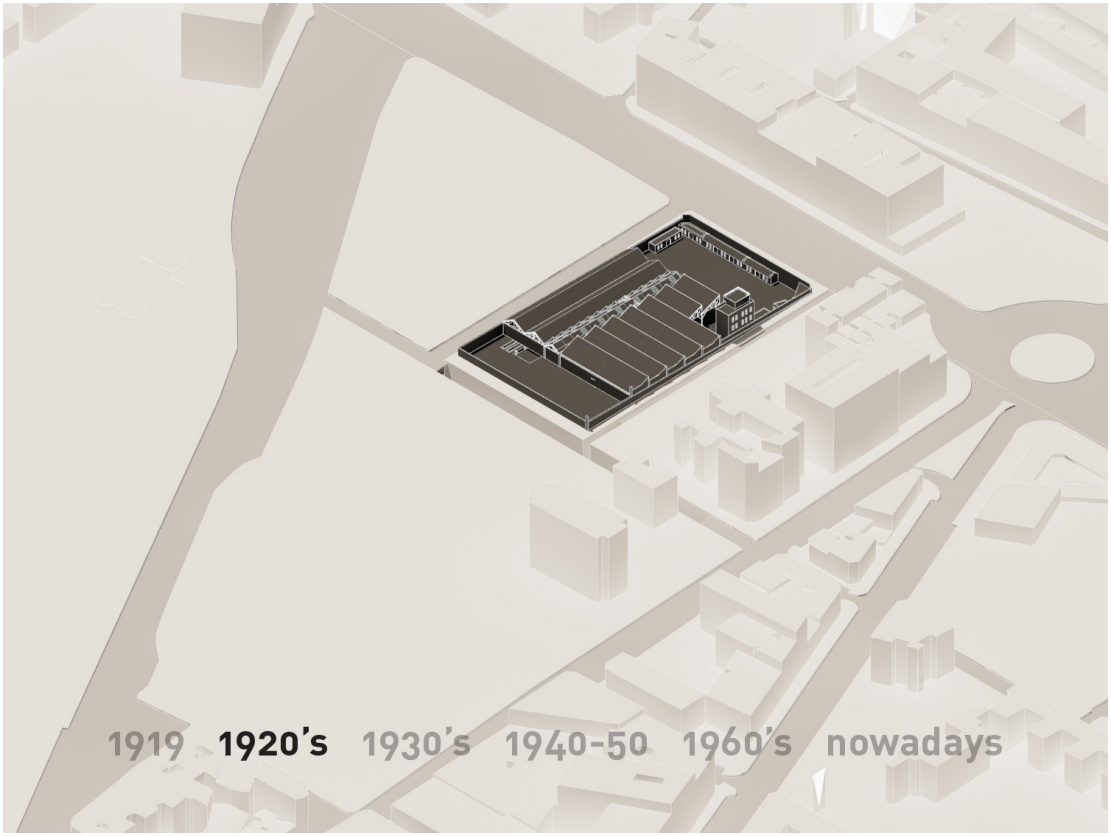

1919
1920's
1930's
1940-50
1960's
nowadays

Fig.32: Northeast view of "Cuatro Caminos", ca.1930. Metro Archive.

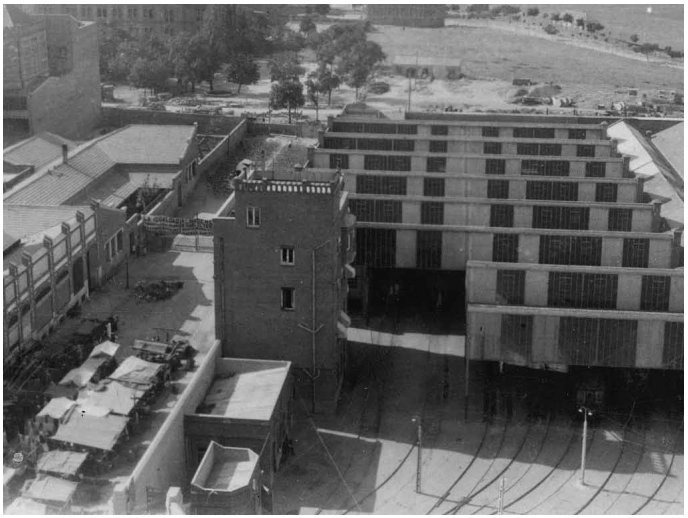
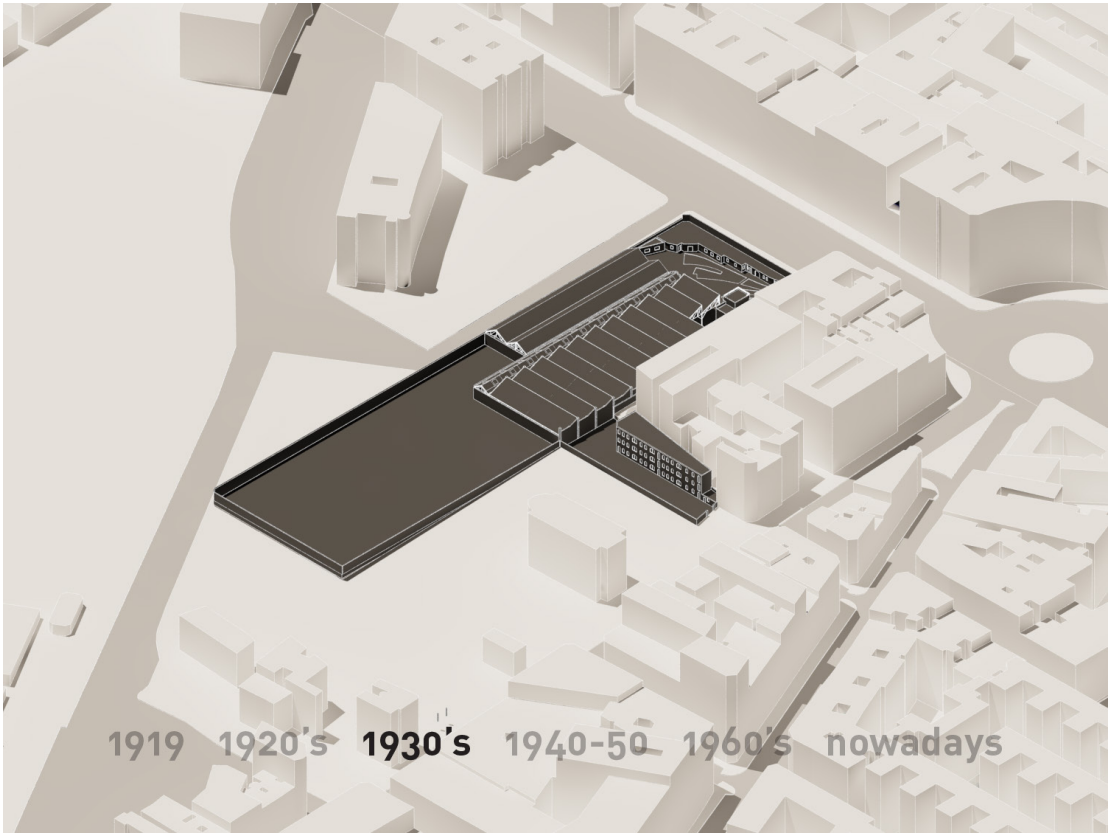


Fig.33: High view of "Tuduri" building (1930). C.O.A.M. Historic Service

In the summer of **1933** a new purchase of land was made, again towards the south occupying the street that originally divided both lots and using it as new access to the site and adding in this area a new 3-storey building with basement, made with metal structure and perimeter walls in masonry, committed to storage. In addition to this, four modules are added to **naves A, B and C** and one more to **naves D**.


1919
1920's
1930's
1940-50
1960's
nowadays

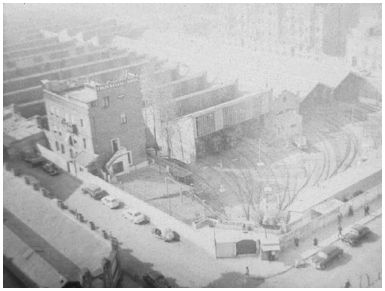


Fig.34: View from a building near "Las Cocheras", in the 50's. Santos Yubero Archive.

Fortunately, the *"Cocheras de Cuatro Caminos"* did not suffer significant damage during the Spanish civil war, so in the **40s and 50s** followed the expansion of complex to the south, reaching its current area of 34,480 m². A new connection was created with the street towards the south, the north access on the tunnel was definitively eliminated, and new construction annexed to the north wall was concluded. **Naves A and B** were enlarged, this time with 5 modules; while in **nave C** the gable roof was replaced by sheds and extended with 5 modules like those of **naves A and B**, and another 5 smaller modules. In the case of **naves D**, the shed modules of A and B were adopted to expand it with six of these.

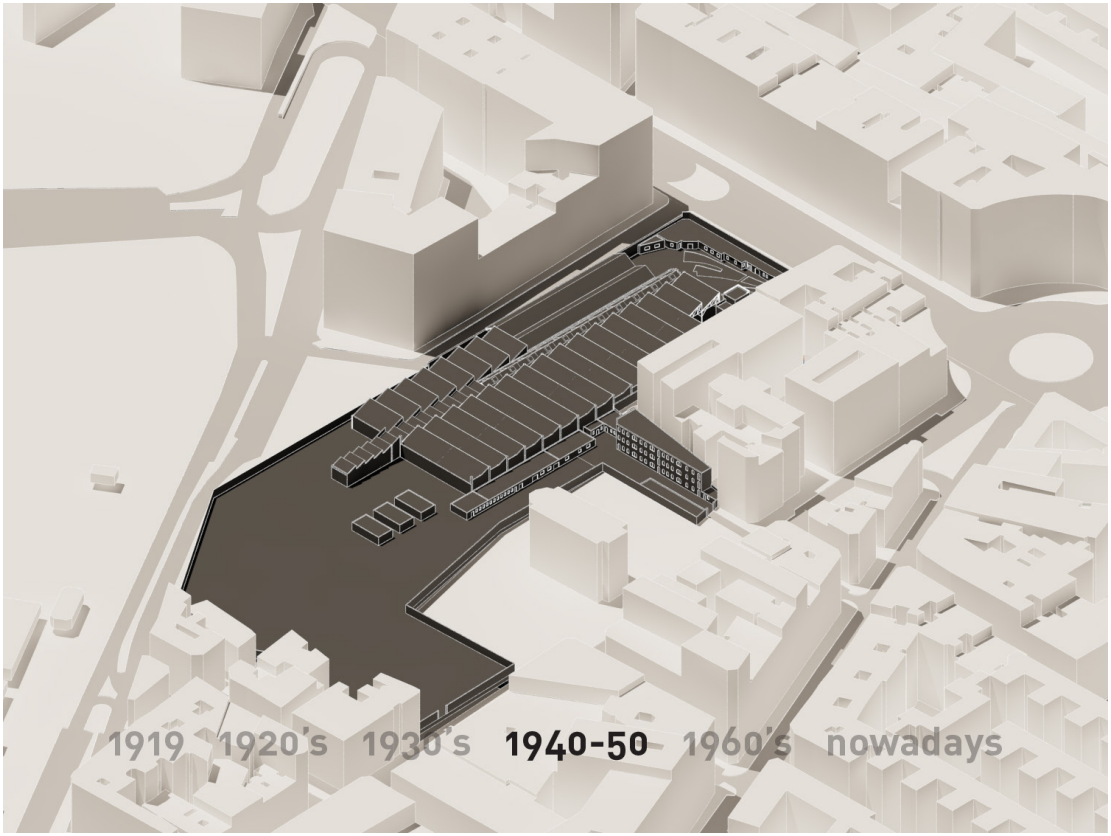
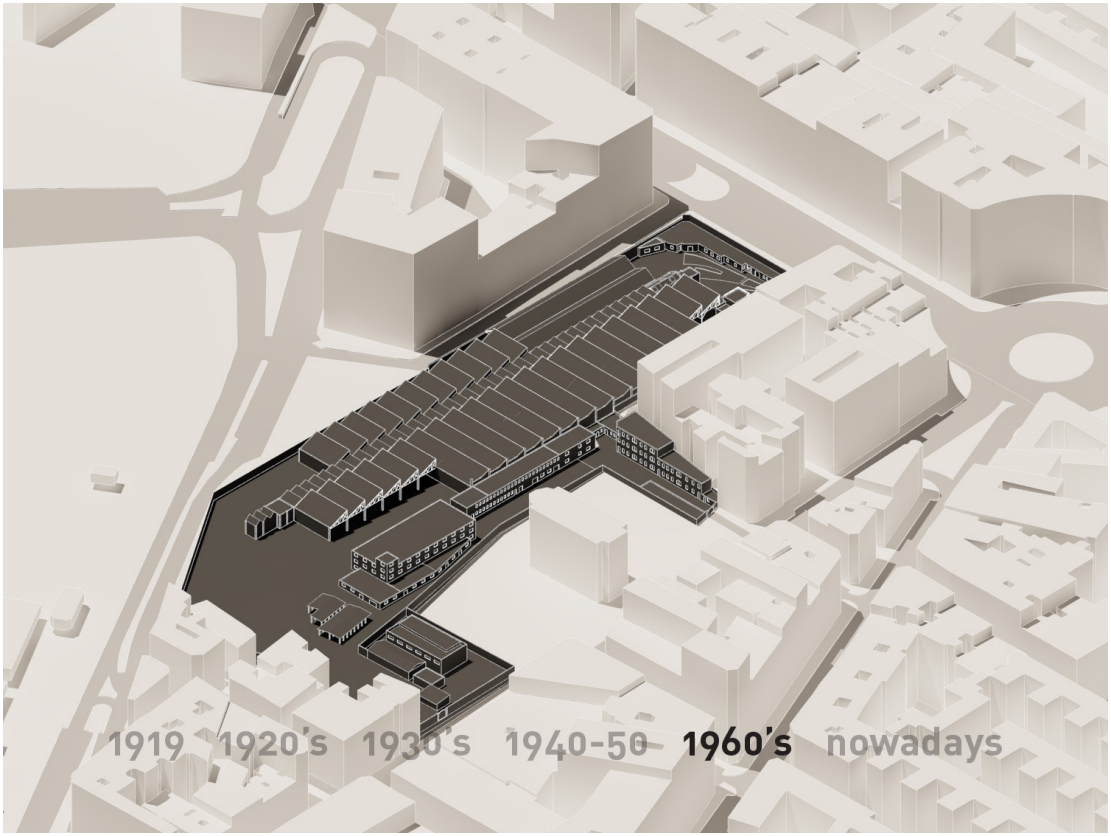

1919
1920's
1930's
1940-50
1960's
nowadays

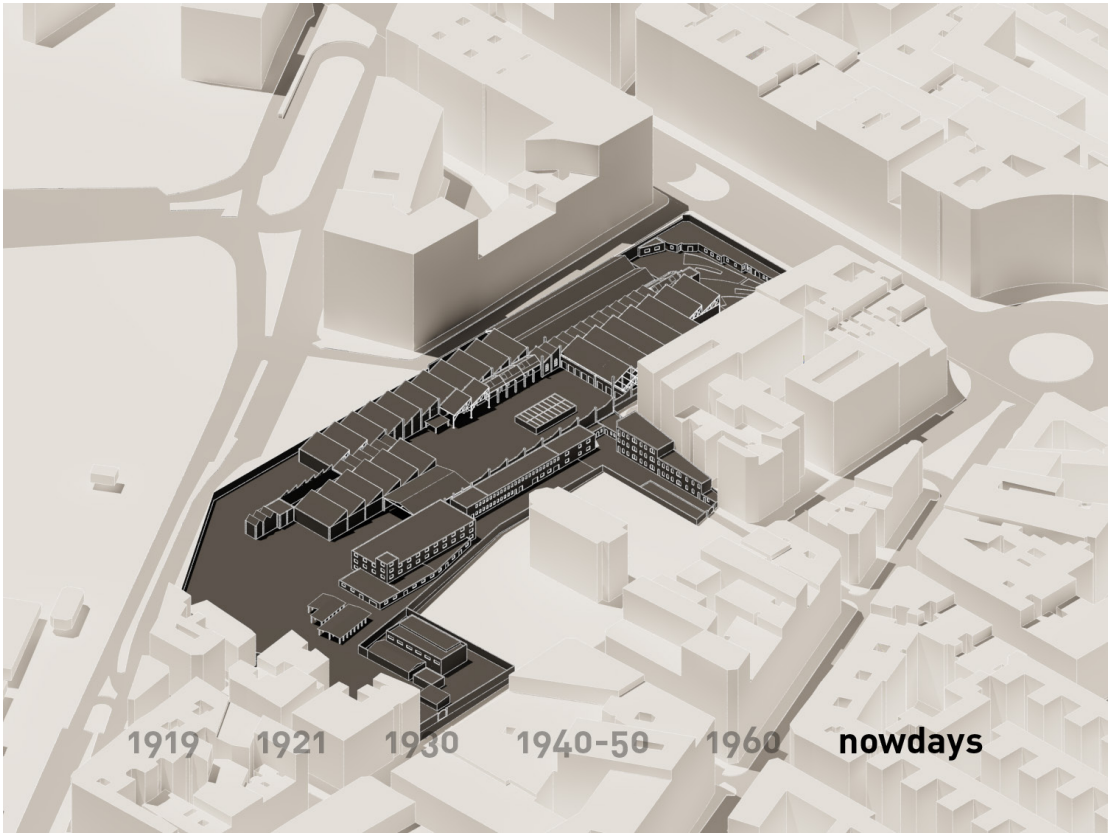
Fig.35: Offices and warehous constructed on the southern part of the lot in the 60's. Metro Archive..

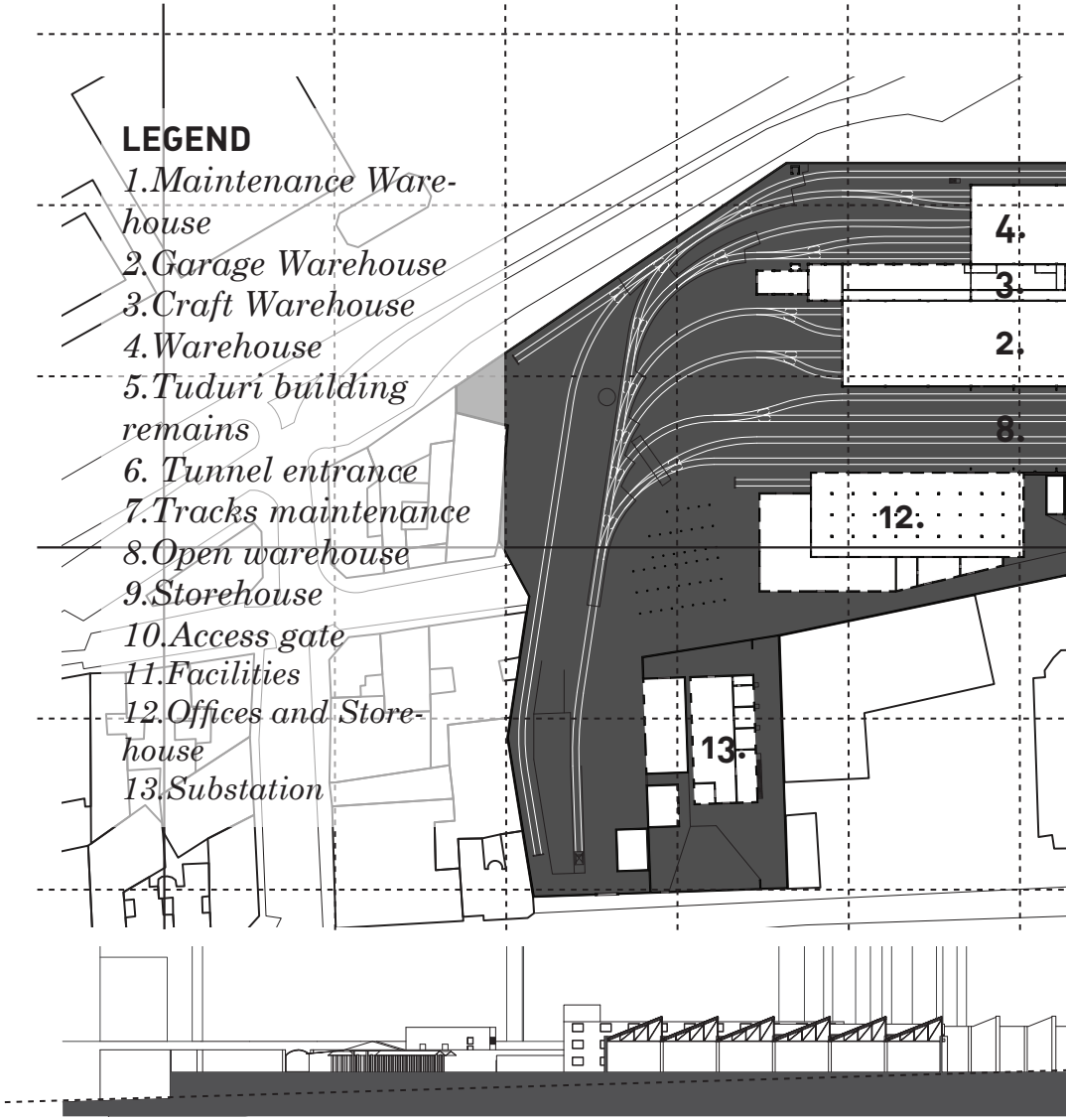
From the **60's to the 80's** the complex reached the total of its buildings. **Nave B** was expanded with six new modules, in **nave C** 60 meters of gable roof in were changed to shed and the small modules from the last expansion were replaced with 5 normal modules and shorter modules with transverse gable roof were added. Three shed modules were added to the **naves D** and the construction of a new two-storey longitudinal building parallel **to naves A and B** and attached to it east wall was completed. Continuing with this arrangement a rectangular building with new offices and warehouses would be constructed. And in the southern part of the lot the construction of a new electrical substation with a rectangular floor plan and two levels would begin, accompanied by two warehouses in a light metallic structure.

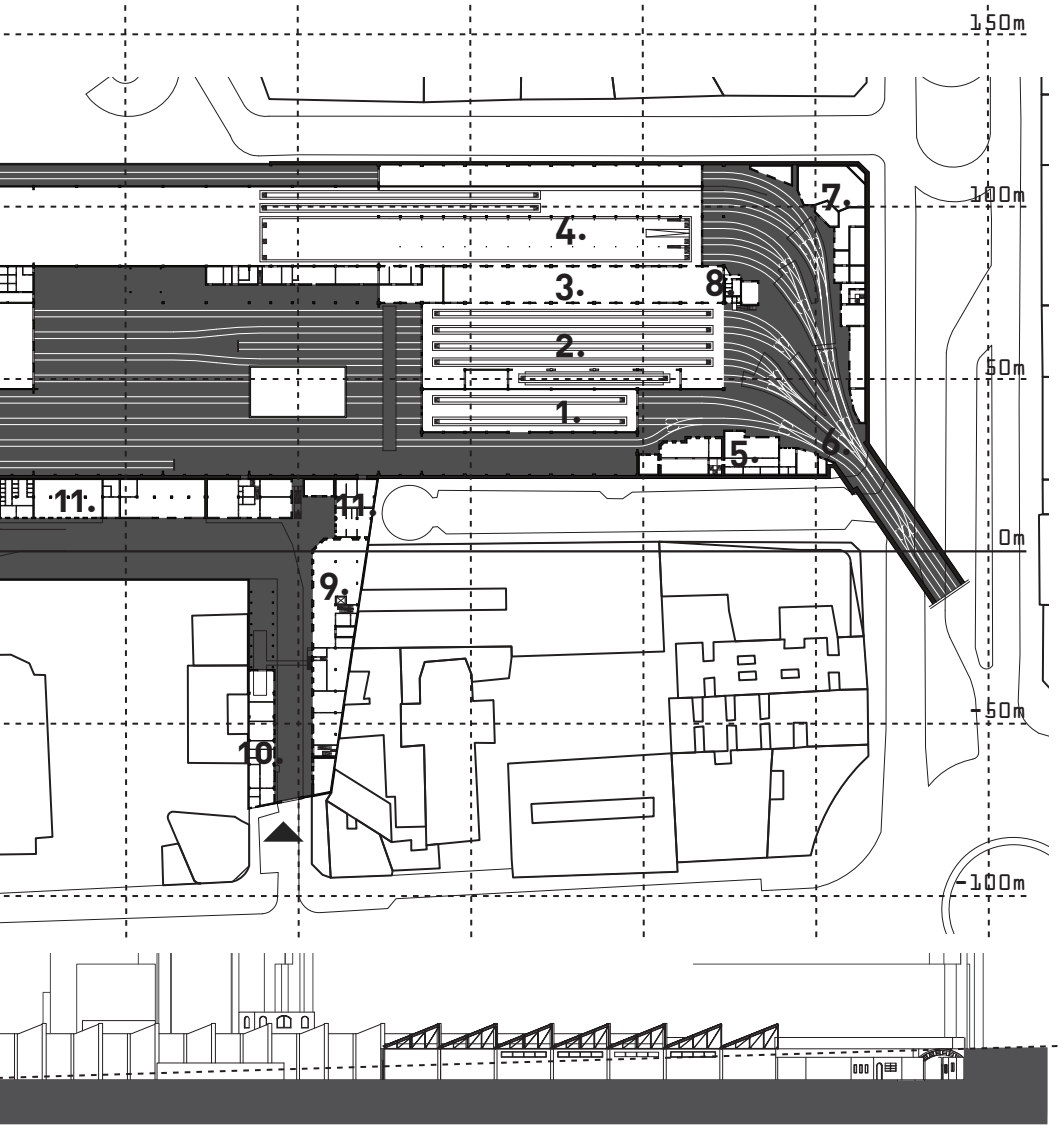

1919
1920's
1930's
1940-50
1960's
nowadays

From **90's** the facilities begin to diminish their importance inside the railway system of the company, since this, logically begins to decentralize its infrastructure of service, relocating the buildings of this type in the periphery and delegating the greater part of the functions that were fulfilled in *"Cuatro Caminos"*. Therefore, in this period are carried out mainly demolitions in existing structures, such as the eastern half of **nave A** to get a yard in the central part, in total, nine sections of the **naves A y B** were removed as well as three of **nave C**, and in **2011** the buildings **"Tuduri"** was almost completely demolished, only remnants of the ground floor and part of the facade is currently preserved.

Fig.36: Aerial of the complex. 2015. "Salvemos Cuatro Caminos".


1919
1921
1930
1940-50
1960
nowdays


LEGEND
1.Maintenance Warehouse
2.Garage Warehouse
3.Craft Warehouse
4.Warehouse
5.Tuduri building remains
6. Tunnel entrance
7.Tracks maintenance
8.Open warehouse
9.Storehouse
10.Access gate
11.Facilities
12.Offices and Storehouse
13.Substation
4.
3.
2.
8.
12.
13.


150m
100m
50m
0m
-50m
-100m
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
11.

PRECEDENTS

As it is known neither the underground system nor the *"Cocheras"* were the first of their kind; therefore both, the engineers who were part of the founding group of the company and the architect in charge (Antonio Palacios), already had an idea of what they wanted to achieve in the Spanish capital, taking inspiration from cities such as Paris and New York that already had consolidated systems of this type and where, an architectural style was beginning to take shape for buildings of this type.

Therefore, it requires a review of previous examples in order to understand its value within the architectural spectrum of *Industrial legacy*, and where the main decisions of the design process come from. A revision that focuses on the original naves (**A, B, C** and **D**) of the complex, which were the ones that had the direct intervention of Palacios and which would set the tone for subsequent expansion.

As it was developed in the chapter "INDUSTRIAL HERITAGE & ADAPTIVE RE-USE" of this work, it is understood that at the end of the XIX century the typology of *industrial naves* had been adopted in the railway systems, since this not only responded to the trend of horizontal development for industrial buildings, but also adapts perfectly to the needs of the service railway stations as is *"Cuatro Caminos"*. One of the first precedents with this type of layout was the headquarters of the Pierce Arrow Motor Car Company of 1906, which was also linked to the mobility sector and represented a milestone for this type for horizontal distribution in industrial architecture.

Fig.37: Aerial view of the headquarters of Pierce Arrow Motor Car Company (1906)

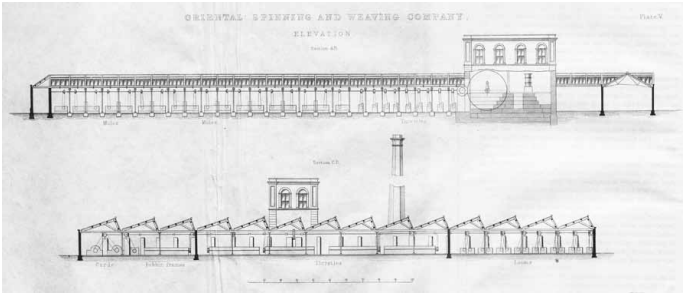


Fig.38: One of the first case of the use of shed roof on textile industry. Illustration published by engineer William Fairbarn en the book "Treatise on Mills and Millworks"(1861-1863)

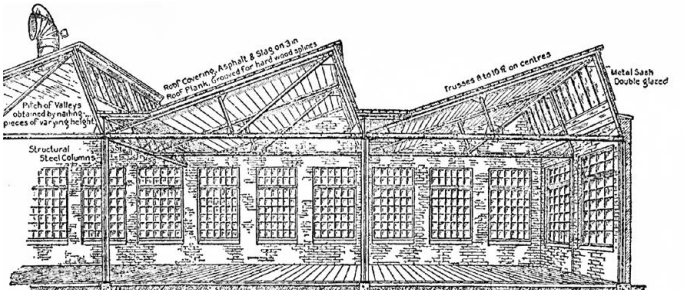


Fig.39: Light Machine Shop, shed roof construction. Illustration from "Radford's Cyclopedia of Construction, Carpentry, Building, and Architecture"(1909), William A. Radford.

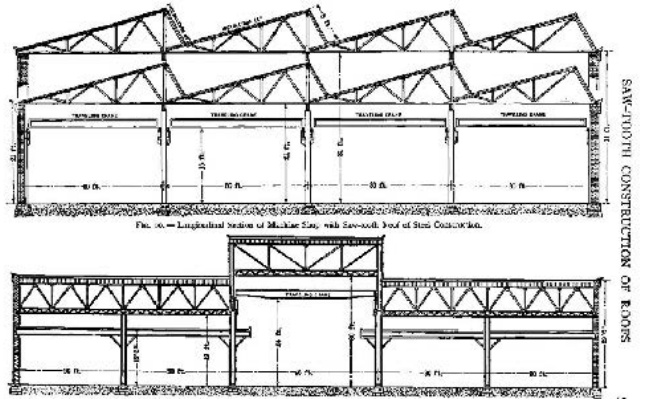


Fig.40: Saw-tooth Construction of Roofs. Illustration of Oscar E. Perrigo for "Modern Machine Shop Construction".(1906)

On the other hand, the most outstanding aesthetic characteristic of *"Las Cocheras"* is the **shed** roof, of which the first references are found in the textile sector of the mid-XIX century. It was adopted thanks to the good conditions of illumination and natural ventilation that it offered to the interior spaces, ideal for manual works of manufacture process. By the end of the XIX century, this type of covering would be taken to all sectors of industry, especially to the railway; and fueled by the advances in steel construction techniques at the beginning of the XX century, which allowed prefabrication and rapid assembly of its components, it would become one of the most versatile constructive solutions of the time.

In the railway industrial sector was widely used in the manufacturing of trains and mobile stock, as for example headquarters of Horwich railway company in Manchester. In Madrid were seen some precedents to the yards od *"Cuatro Caminos"* on the *"docks" of Atocha,* where the cases as the barracks and factories of Pacifico from 1900 ca. and the railway workshops of MZA of 1910 are evidenced.

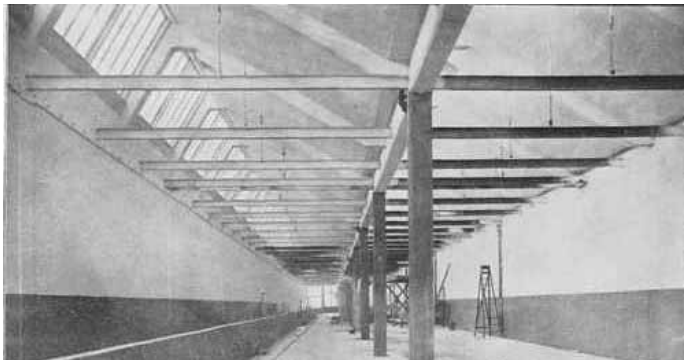


Fig.41: Pierce-Arrow Motor Car Works, 1906. Buffalo, New York. One of the first important referents of "Daylight Factories", made with shed in structural concrete. Albert Kahn.

Fig.42: Continental Motor Car Factory, 1911, at Ditroit, Michigan. Another precedent "Daylight Factory" designed by Altber Kahn,this time with metal structure.

Fig.43: Paint shop on Horwich railway headquarters 1886 in Manchester

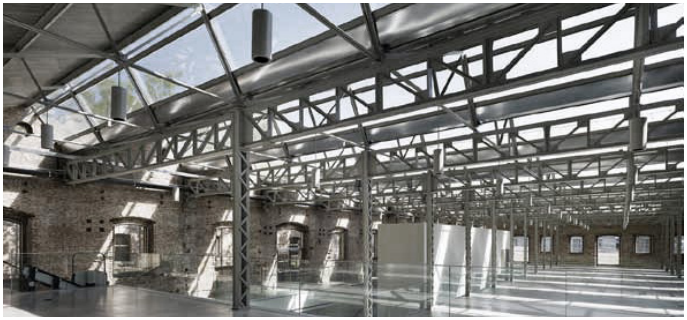


Fig.45: "Los Cuarteles y Factorías Militares de Pacífico" (ca. 1900)

Fig.44: Paint shop on Horwich railway headquarters 1886 in Manchester

Fig.46: Recent photography of "Los Talleres Ferroviarios de MZA" (ca. 1910).

The first record of the use of **shed** roof in service stations annexed to the metropolitan railway system was not until 1908, which are believed to have contained the embryo of the architectural design of the *"Cocheras"*: the 129th Street Inspection Shed and 159th Street Inspection Shed of the Manhattan Railway Company, that belong to the service infrastructure of the New York metropolitan system, which was a direct reference for Otamendi and Palacios. These already presented many of the characteristics that would be reinterpreted into Madrid, large rectangular naves built with the repetition of a shed covering module, to brought sunlight from the north into the interior of the building, the combination of load-bearing masonry walls with the light-weight steel structure system of the roof.

Despite the fact that naves with a **shed** roof seems to be a repetitive model and very restricted by their functionality, Palacios had the ability to use the intrinsic morphology in this system and, instead of hide the formal character of the shed, he rather evidence it as a characteristic element of the building, in such way that the east perimeter wall takes on its contour the

Fig.47: 129 Street Inspection Shed, part of Manhattan Railways in 1908. Museum of the City of New York. (images extracted from "informe: Las cocheras de cuatro caminos (2015)".

Fig.49: 129 Street Inspection Shed

Fig.48: 240th Street Yard or Van Cortlandt Yard under construction, in 1910. Museum of the City of New York. (images extracted from "informe: Las cocheras de cuatro caminos (2015)"

Fig.50: East 180th Street Yard

Fig.51: East 180th Street Yard under construction, 1916. Museum of the City of New York. (images extracted from "informe: Las cocheras de cuatro caminos (2015)"

sawtooth shape of the roof. Likewise, it is speculated that the original decision of **nave A** to begin two modules further back with respect to **nave B** has as architectural intention that of highlight sawtooth silhouette of the building from the pedestrian entrance to the complex (originally located towards the northeast corner of the lot).

Subsequents to "Las Cocheras de Cuatro Caminos"

It is possible to emphasize the relevance of the *"Cocheras"* and their constructive quality, when are compared with buildings subsequent to this one, they take great part of the ideas applied which served as prototype for the other facilities of railway service station of the metropolitan system of Madrid. It is evident that even services yard

Fig.52: Tunnel entrance of the "Ventas" mechanical yard of Metro Madrid. Antonio Manuel Sanz.

Fig.53: View of the entrance of train's Tunnel of "Las Cocheras de Cuatro Caminos". Photography made by Antonio Manuel Sanz.

Fig.54: Tunnel entrance at "Chamartín-Atocha" yard (1933-1936). Álvaro Valdés.

formed part of the image of Metro de Madrid, which Palacios had personally taken charge of, and for this reason, *"Cuatro Caminos"* being the first service station in the capital's underground system, would serve as a room for experiments and ideas that would later be applied to future buildings of the company. And so it was; characteristic elements of *"Cuatro Caminos"* can be seen in later constructions with a similar vocation.

At the entrance of the railway tunnel that connects the *"Ventas"* depot with the metropolitan system, the formal influence from arch present in "*Cuatro Caminos"* designed by Antonio Palacios, is evident; is highlighted the contrast between brick and granite in the jagged composition of the arch that frames the tunnel. This is repeated almost identically at the entrance arch of the *"Chamartín-Atocha"* tunnel (1933-1936).

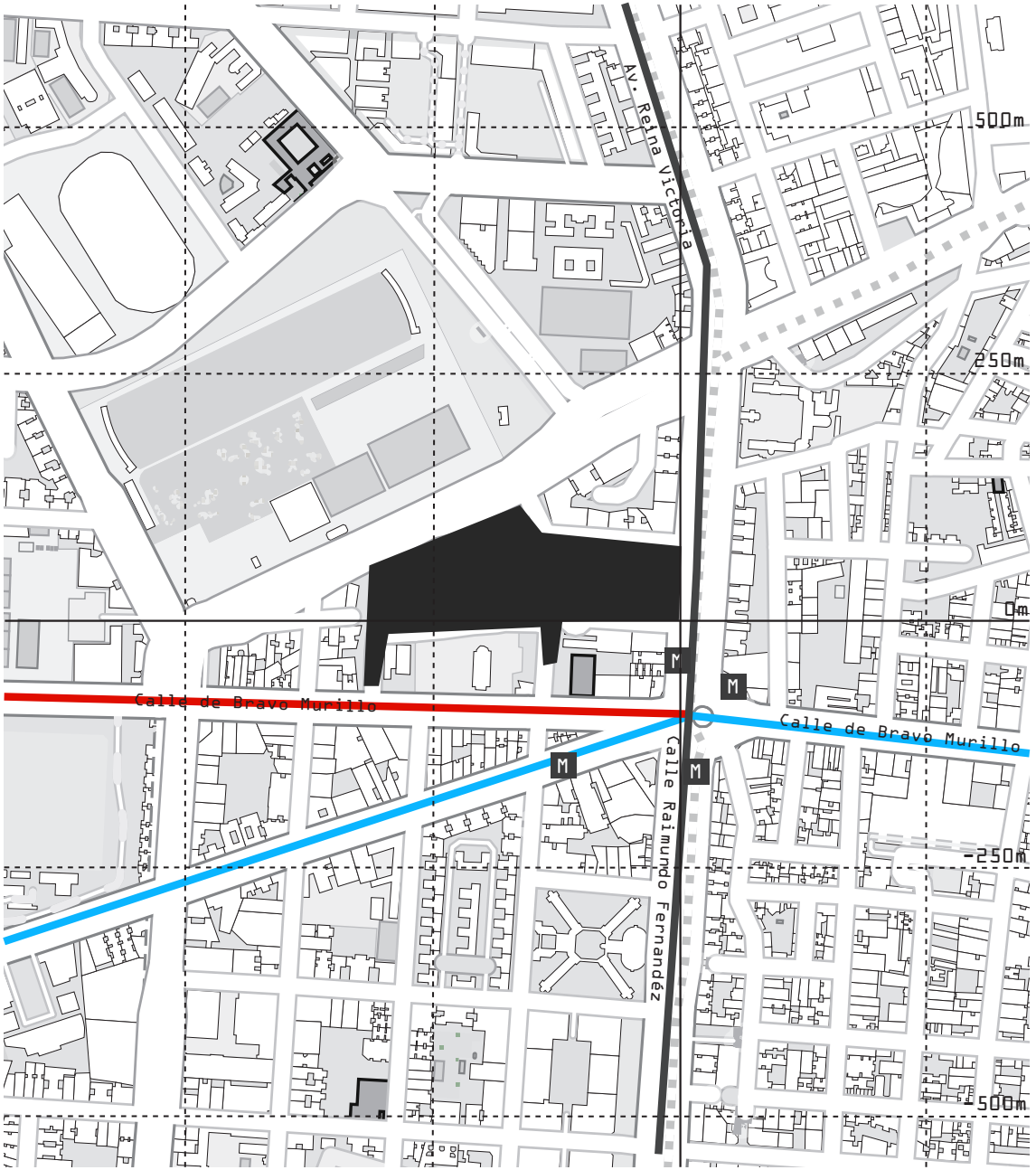
Fig.56: Trains yard in "Plaza de Castilla", Madrid. (1966). Álvaro Valdes.

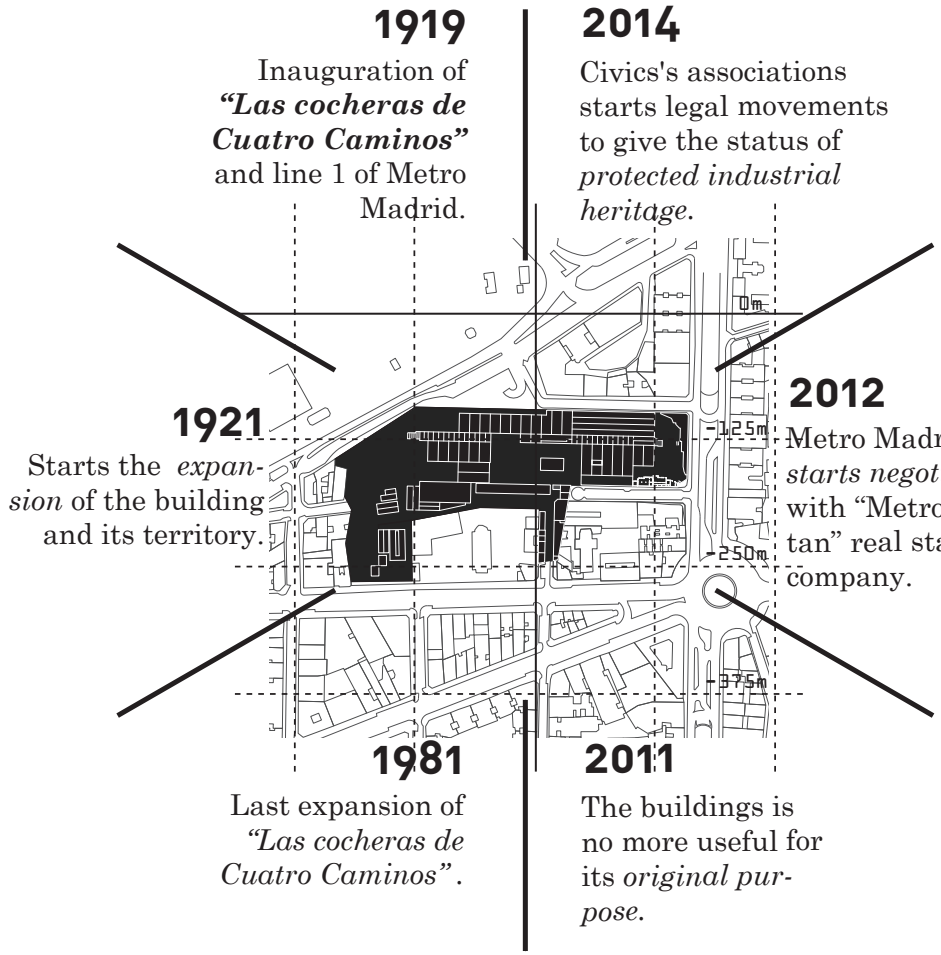
Fig.55: "Ventas" mechanical yard of Metro Madrid. Victor Hugo Hernándes.

Also in the same garages of *"Ventas"* was followed the precedent of "*Cuatro Caminos"* ,in terms of the lighting system applied in the large naves dedicated to the service of trains, in this case also, the design pointed to natural sunlight and modular structure, using the shed system for coverage, with the difference that due to the orientation of the lot was not possible to receive light frontally and the system had to respond to a lateral lighting. But in the same way as with "*Cuatro Caminos"*, the structural system of the roof is allowed to take over the morphology of the building.

Thanks to the connection that this building has with its industrial past, to the way in which it responds to a very marked formal typology but at the same time manages to highlight its own identity, largely to the intervention of an architect as important for Spain and for Madrid as was Antonio Palacios and his ideal of a city for the future; and how became direct reference for buildings of this kind, The Internationl Committee for Conservation of Industrial Heritage (TICCIH) in Spain pointed out, through an official statement in 2016, the *"Cocheras de Cuatro Caminos"* as one of the 100 elements of Spanish industrial heritage.

DESIGN EXPLORATIONS: LAS COCHERAS DE CUATRO CAMINOS


Av. Reina Victoria
500m
250m
0m
-250m
-500m
Calle de Bravo Murillo
Calle de Bravo Murillo
Calle Raimundo Fernandez
M
M
M
M



Since its inauguration in 1919, the building has suffered several modifications to adapt it to the technical needs. After the negotiation of the property, "Las Cocheras" are under legal issues, because of civic organizations which attempt to save this piece of industrial heritage against its future demolition.

URBAN USES:

Residential

Retail+Residential

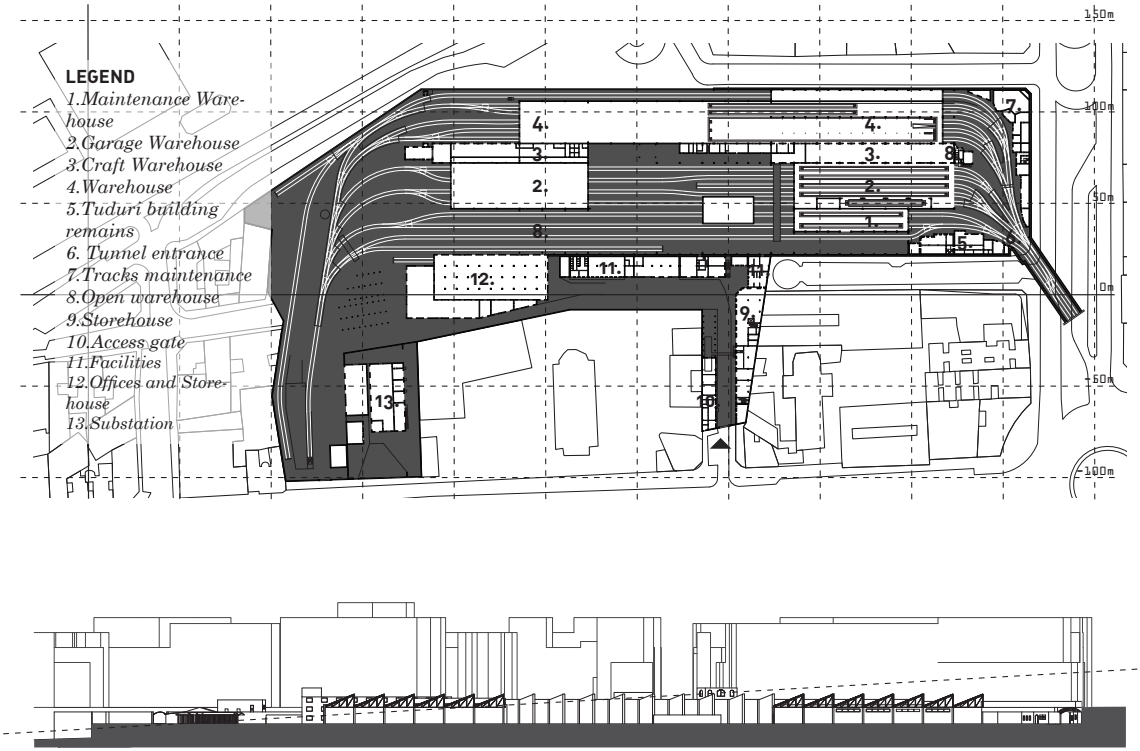
Urban Infrastructure

PEOPLE DYNAMICS:

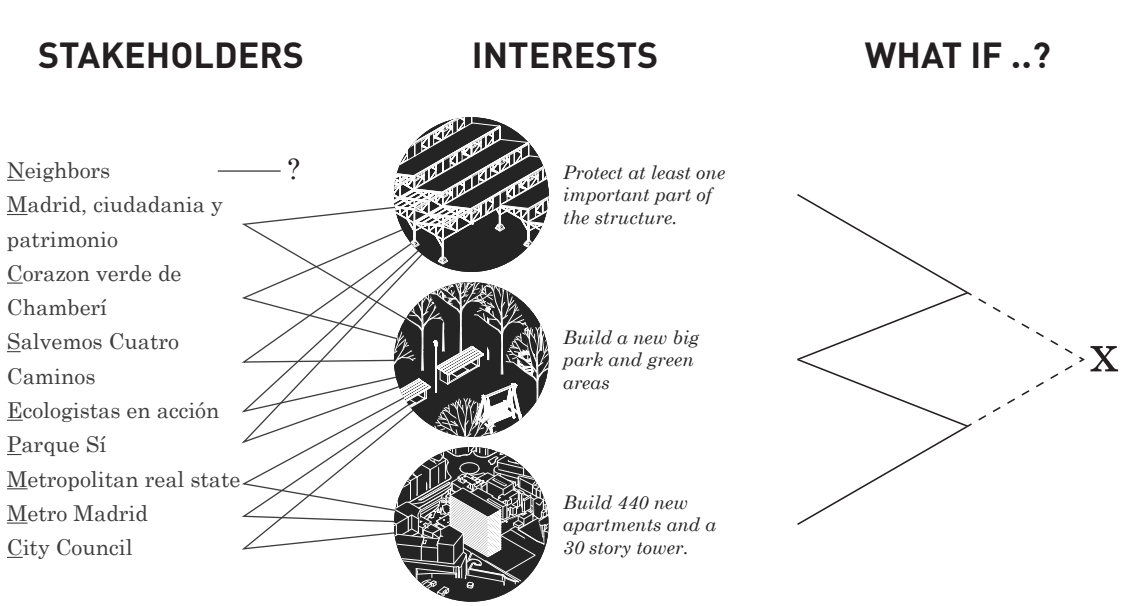
Fast *Slow*

**Interpretation of public's GPS traces from www.openstreetmap.org*

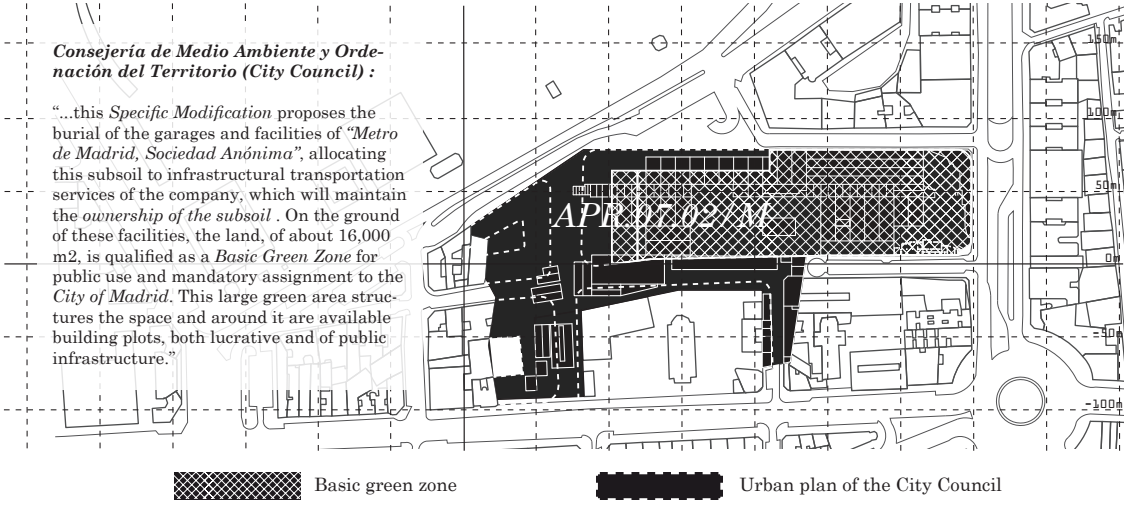
"Las Cocheras" are surrounded by the dynamics of a well conformed city area, with a hight concentration of residences and retail, along with a system of urban infrastructure. And it is clear, how the Roundabout of *"Cuatro Caminos"* is a very important city node, and meeting point of the principal affluence of people in the area.



Conditioned by its use related to railways, all buildings that make part of "Las cocheras" are allocated over an almost plain platform (ca. 0,20% slope), which due to the geographical environment generates an underground condition of 5 mts by the northern part, and an overhang condition on the southern part (ca. 4 mts).

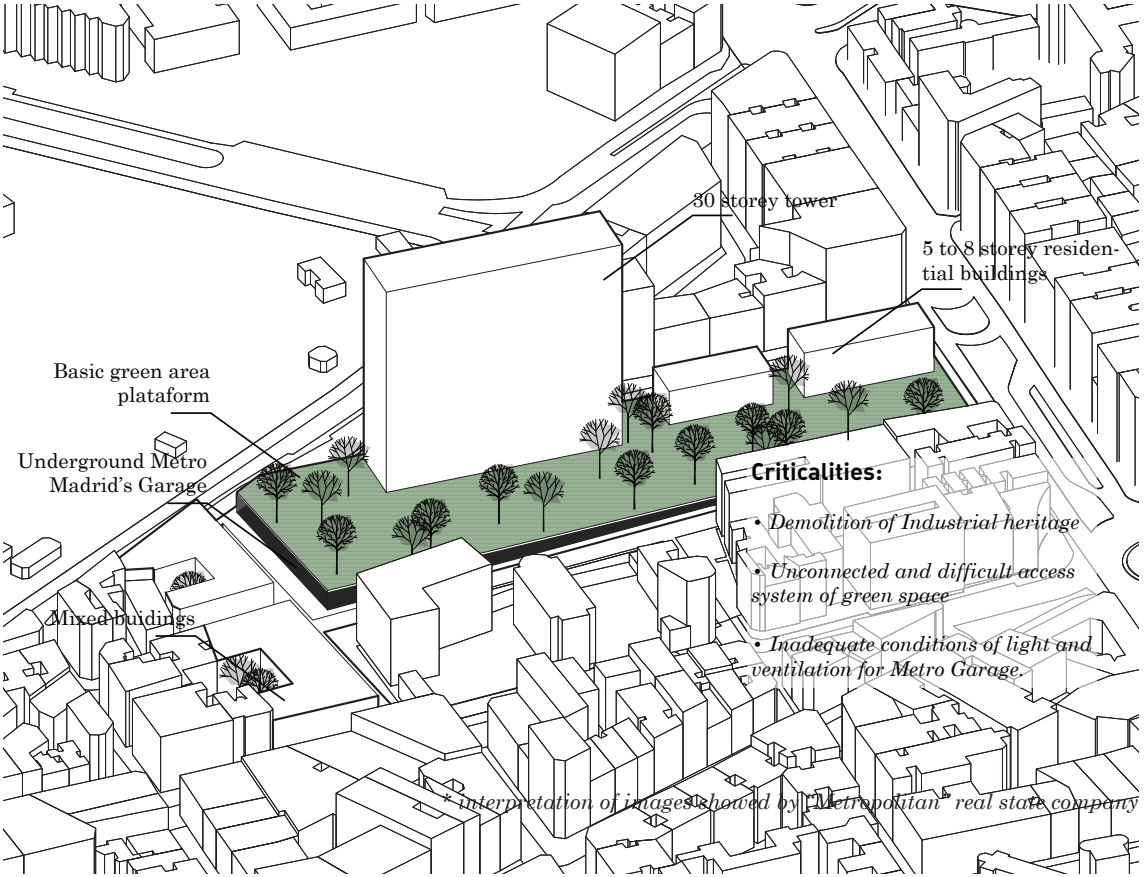


There are three main interests which unfortunately divide the stakeholders, and no one of them agrees with the three interests, and neighbors are completely divided or careless. At the moment does not exist any proposal which integrates all three interests.



In 2014, the real state company "Metropolitan" appealed the city council for a Specific Modification on the General Urbanistic Organization Plan of the city, and make feasible the construction of residential blocks in the lot. Was partially approved by the city council on july of 2014.

The "Metropolitan" proposal consist in the demolition of "Las cocheras de Cuatro Caminos" to create a giant platform which will be used to accomplish the green area agreed with the municipality, allocate the residential buildings and the tower, and at the same time, hide a new garage for "Metro Madrid" under this platform.



Were defined this objectives for the project, with the aim of being a feasible proposal which includes and integrate the interests of all groups involved.

INVESTORS INTEREST

440 Apartments.

"Metro Madrid" facilities to control flow of vehicles.

30 story tower.

HERITAGE PRESERVATION

Maintain ships A and B.

Perimeter west wall and tunnel entrance.

Preserve Tuduri building rest.

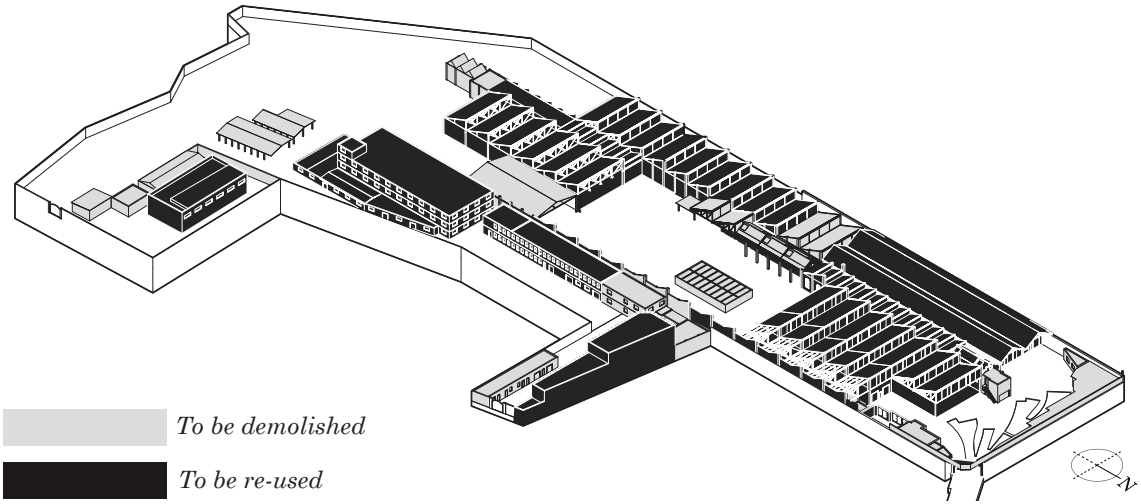
MUNICIPALITY REQUIREMENTS

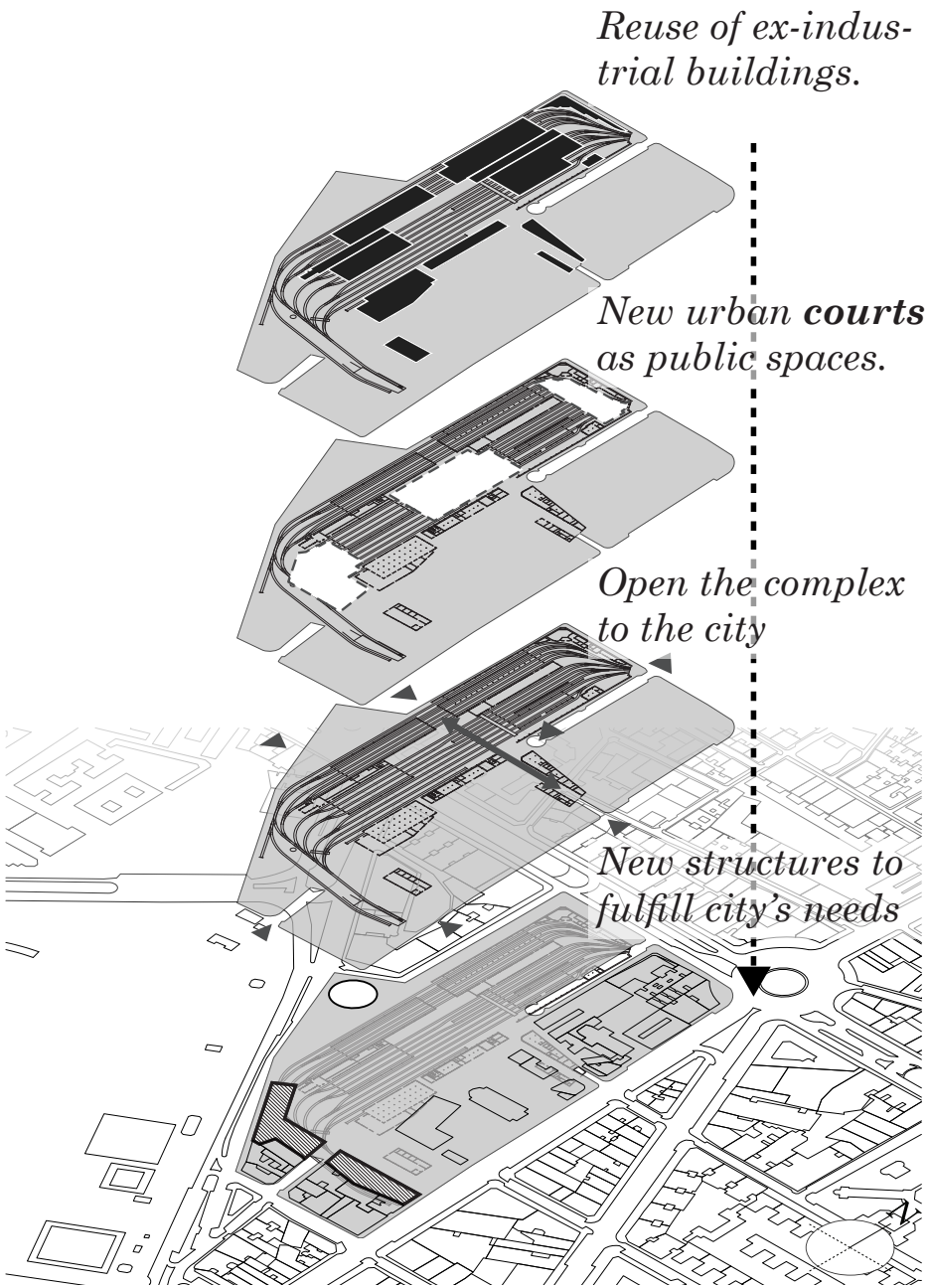
860 m2 of public infrastructure.

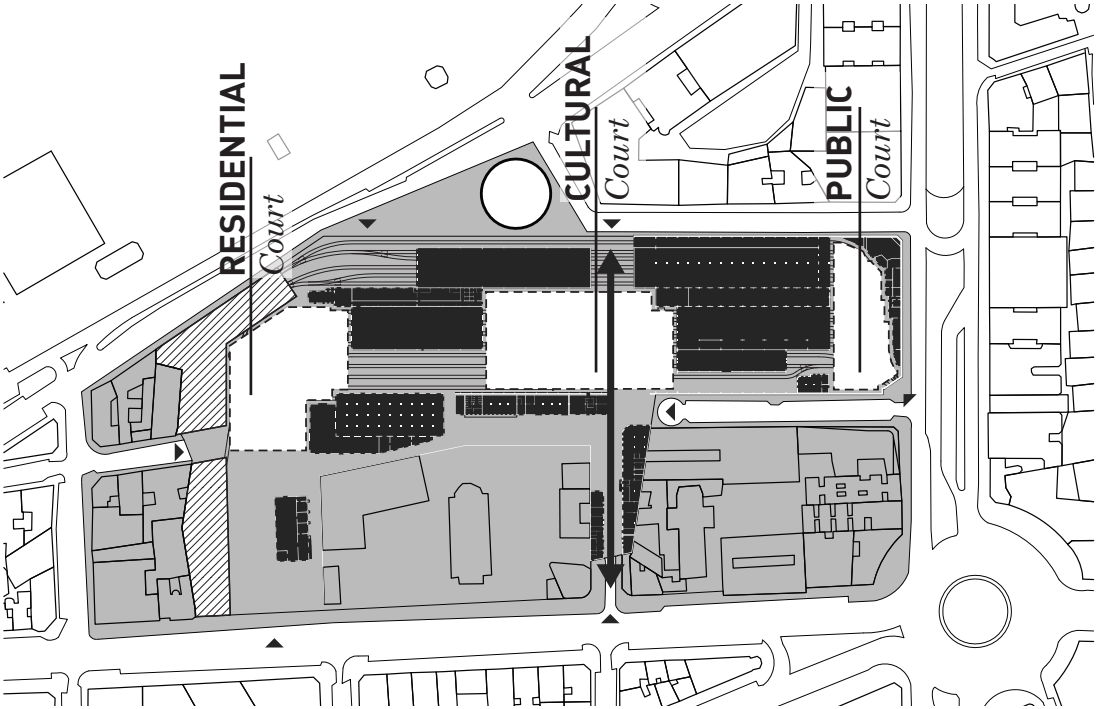
16,000 m2 of green space.

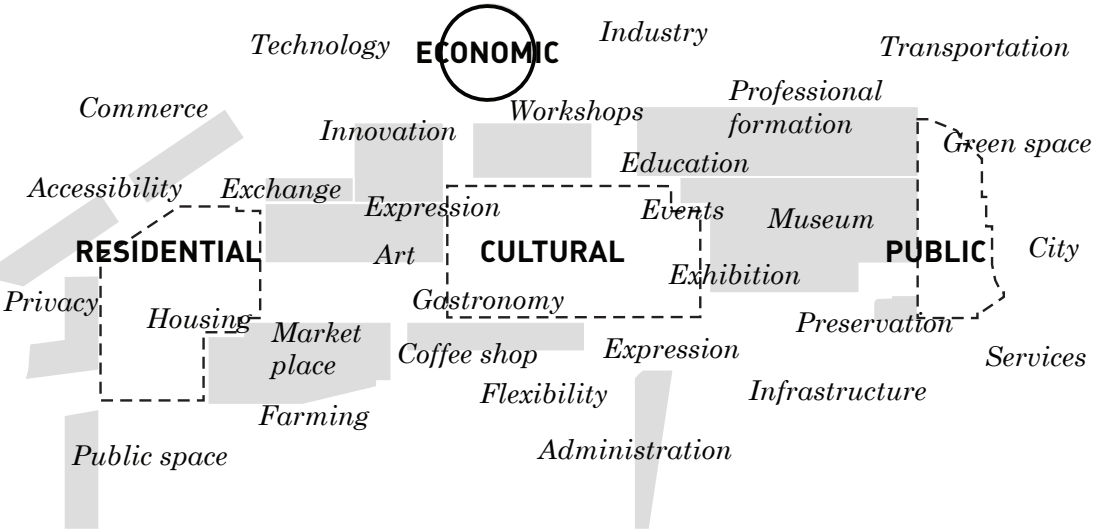
Divide the lot to create continuity in the existent roads.

Is needed to vacate, but the operation does not intend to demolish structures to replace them with new buildings, on the contrary, it supposes the creation of public spaces, accesses, and paths.



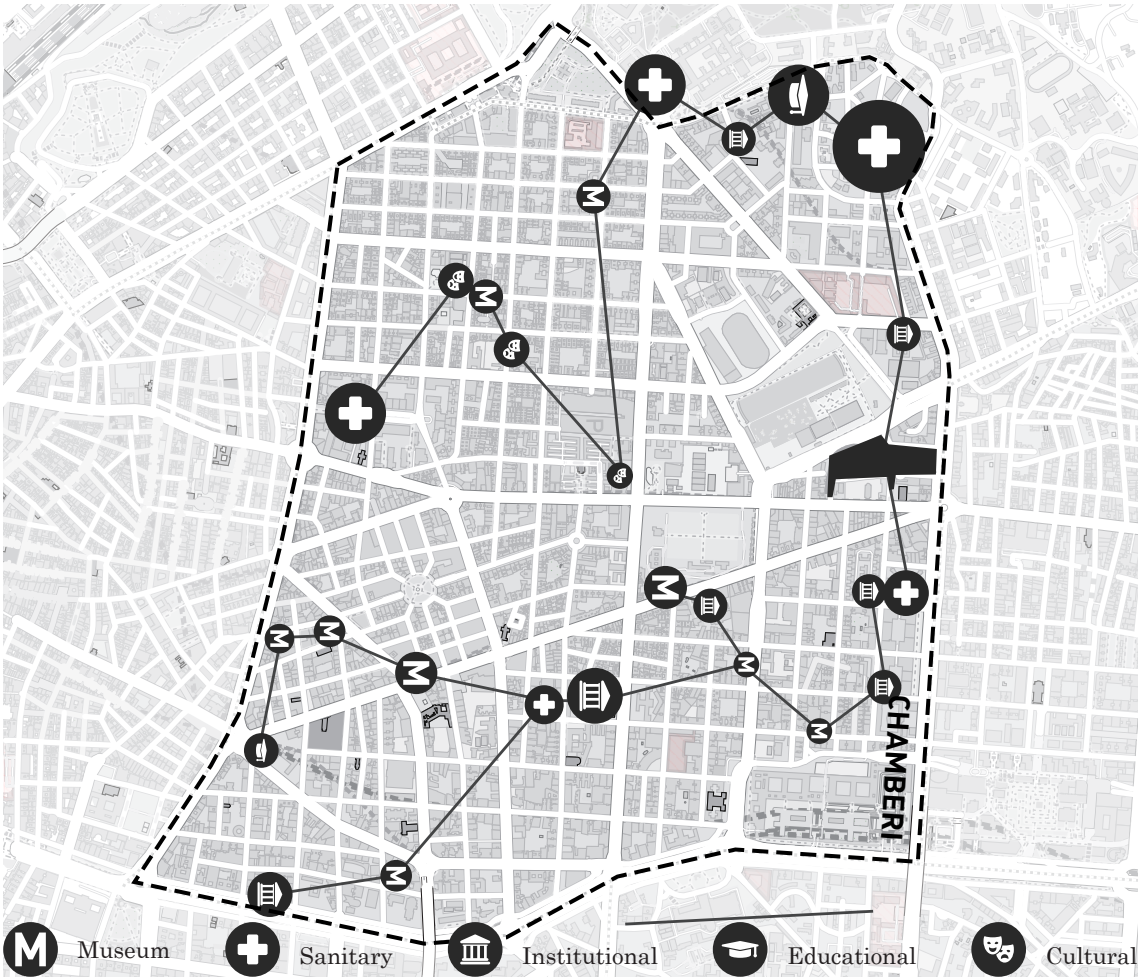

Reuse of ex-industrial buildings.
*New urban **courts** as public spaces.*
Open the complex to the city
New structures to fulfill city's needs


RESIDENTIAL
Court
CULTURAL
Court
PUBLIC
Court

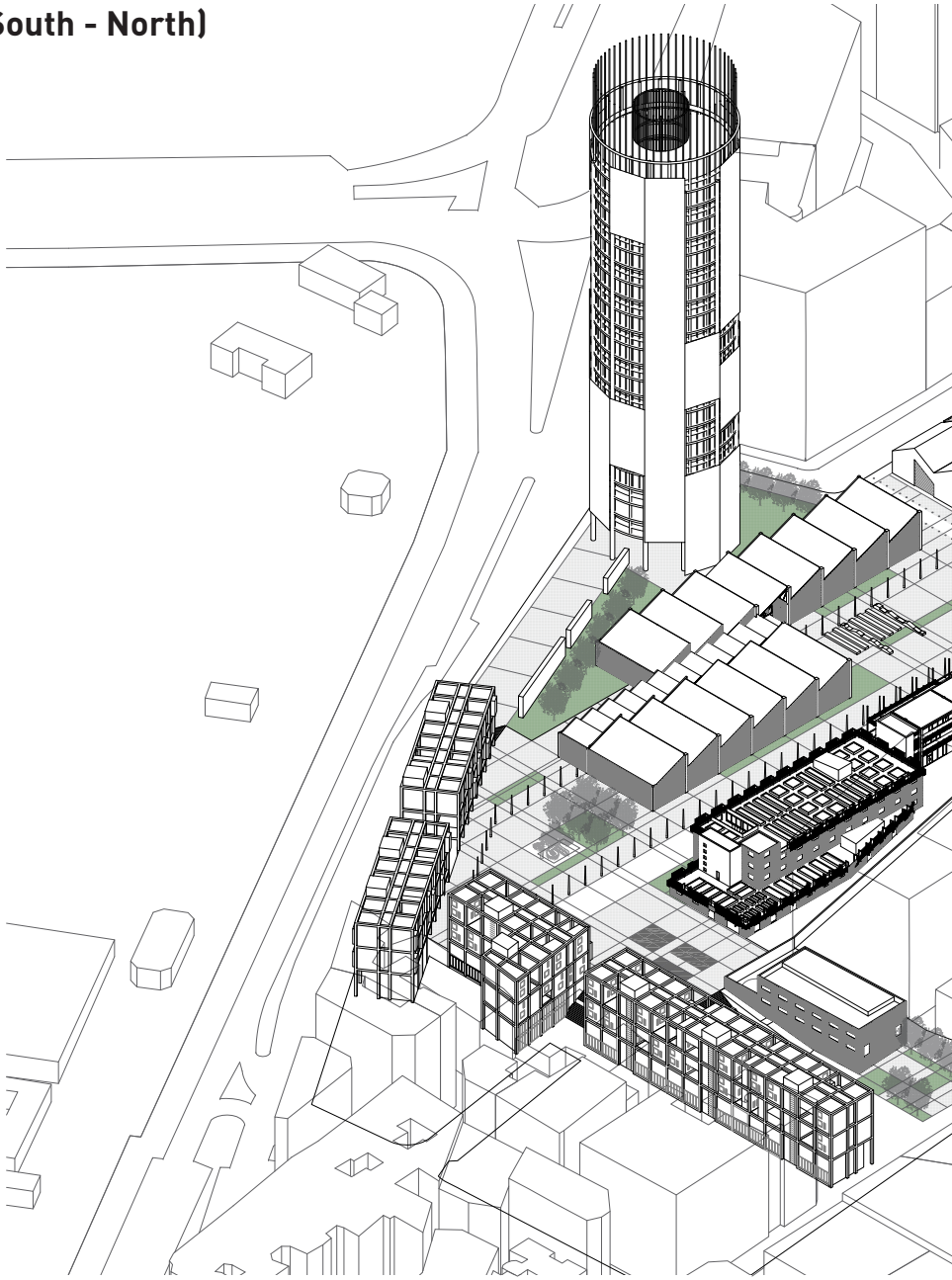

ECONOMIC
Technology
Industry
Transportation
Commerce
Innovation
Workshops
Professional formation
Green space
Education
Accessibility
Exchange
Expression
Events
Museum
RESIDENTIAL
Art
CULTURAL
PUBLIC
City
Exhibition
Privacy
Housing
Market place
Gastronomy
Preservation
Coffee shop
Expression
Services
Flexibility
Infrastructure
Farming
Public space
Administration

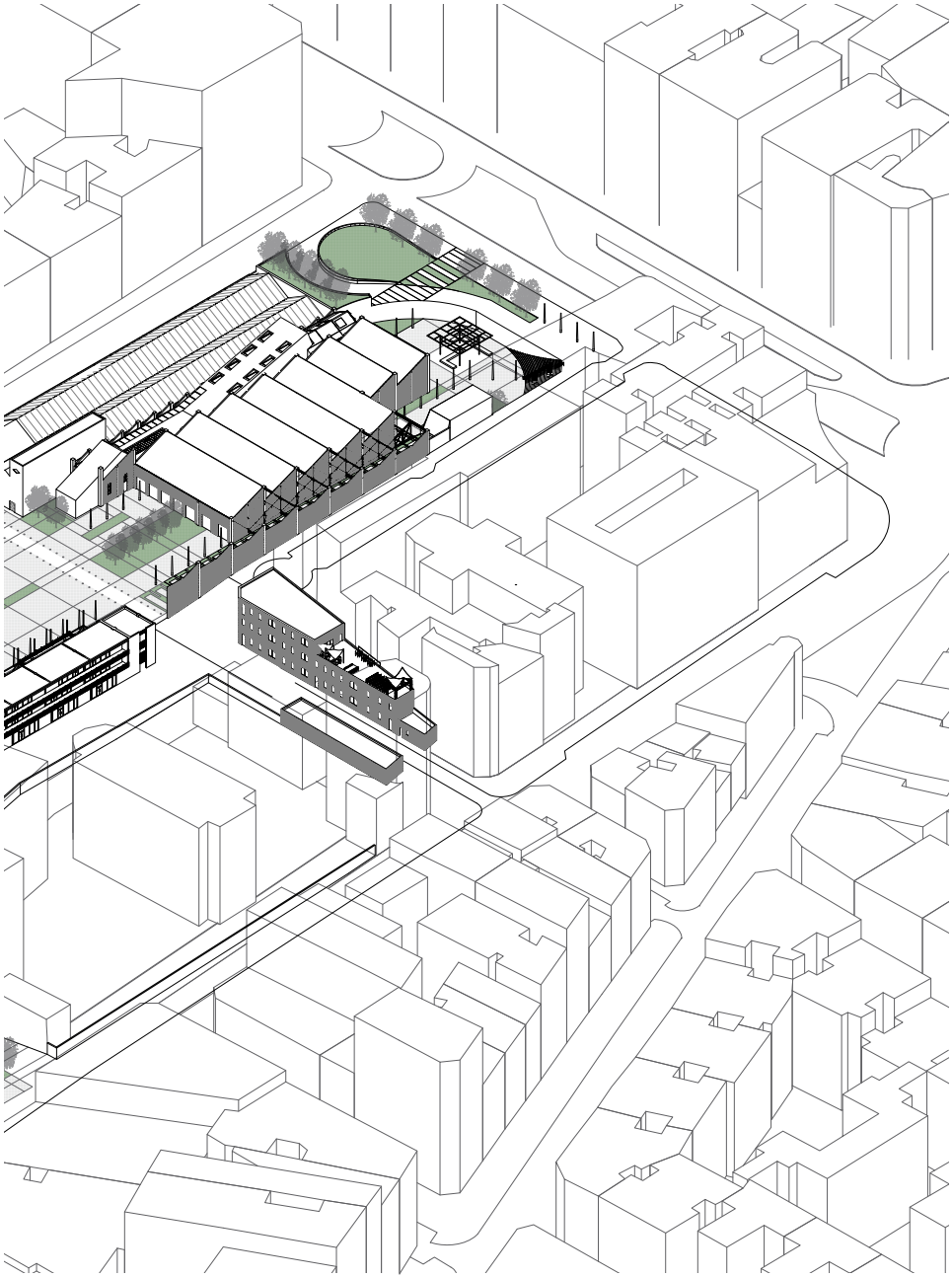
Every of these systems represent one element of the master plan, and was conceptualized, designed and dimensioned separately and with the aim of filling the project objectives. So, the final result will be the **overlapping** of all this systems.

Court yards will work as **catalyzer** of the activities that can contain the project, and a the same time as "gravity force" to organize them into space.

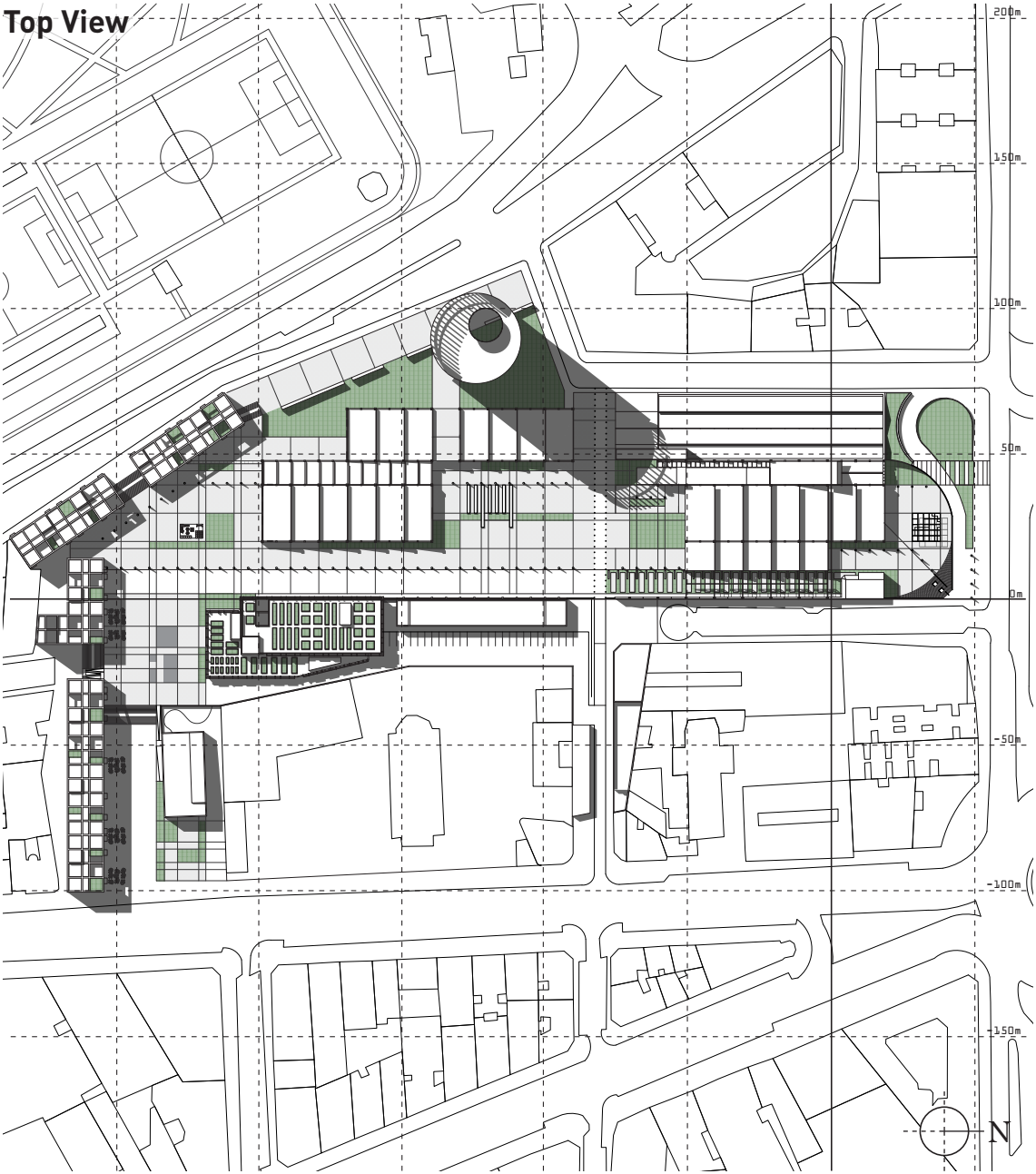


Axonometric View (South - North)

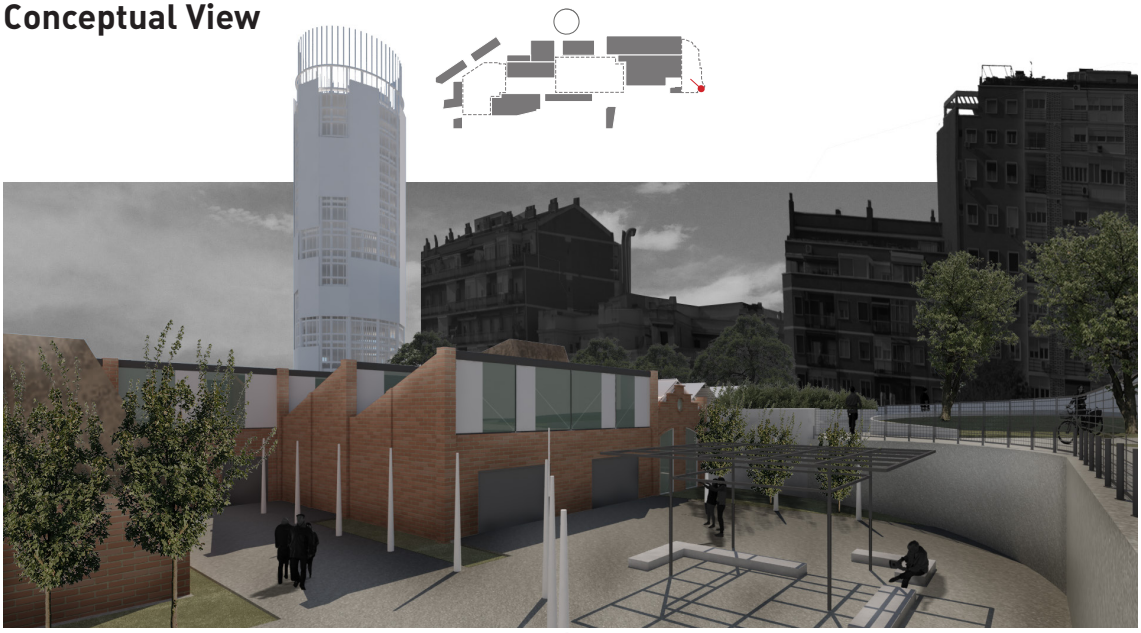




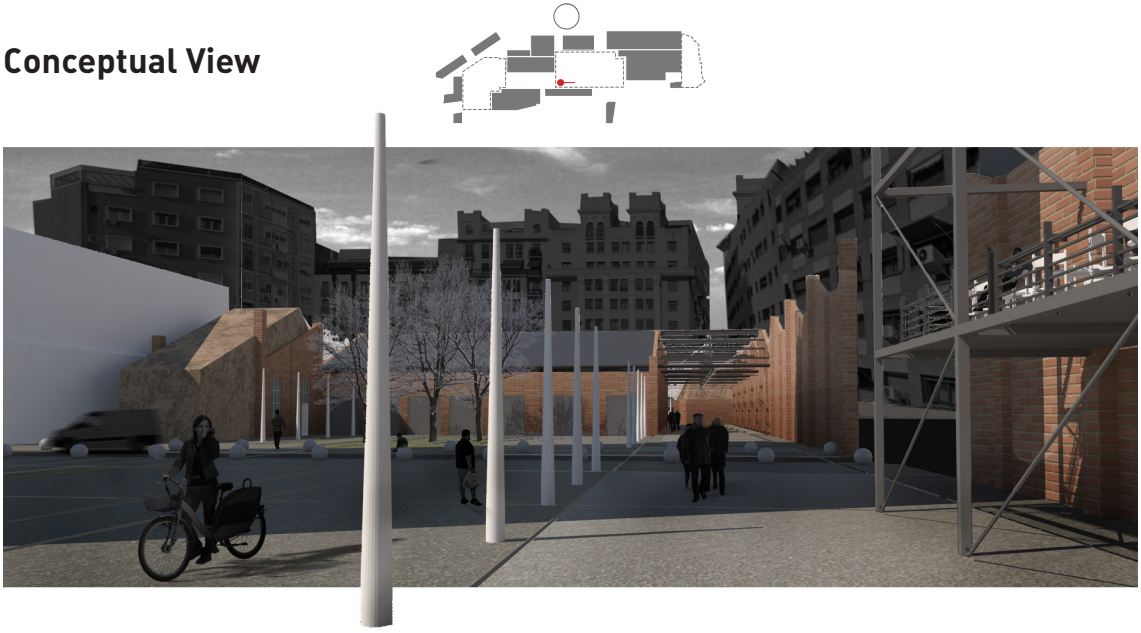
Top View



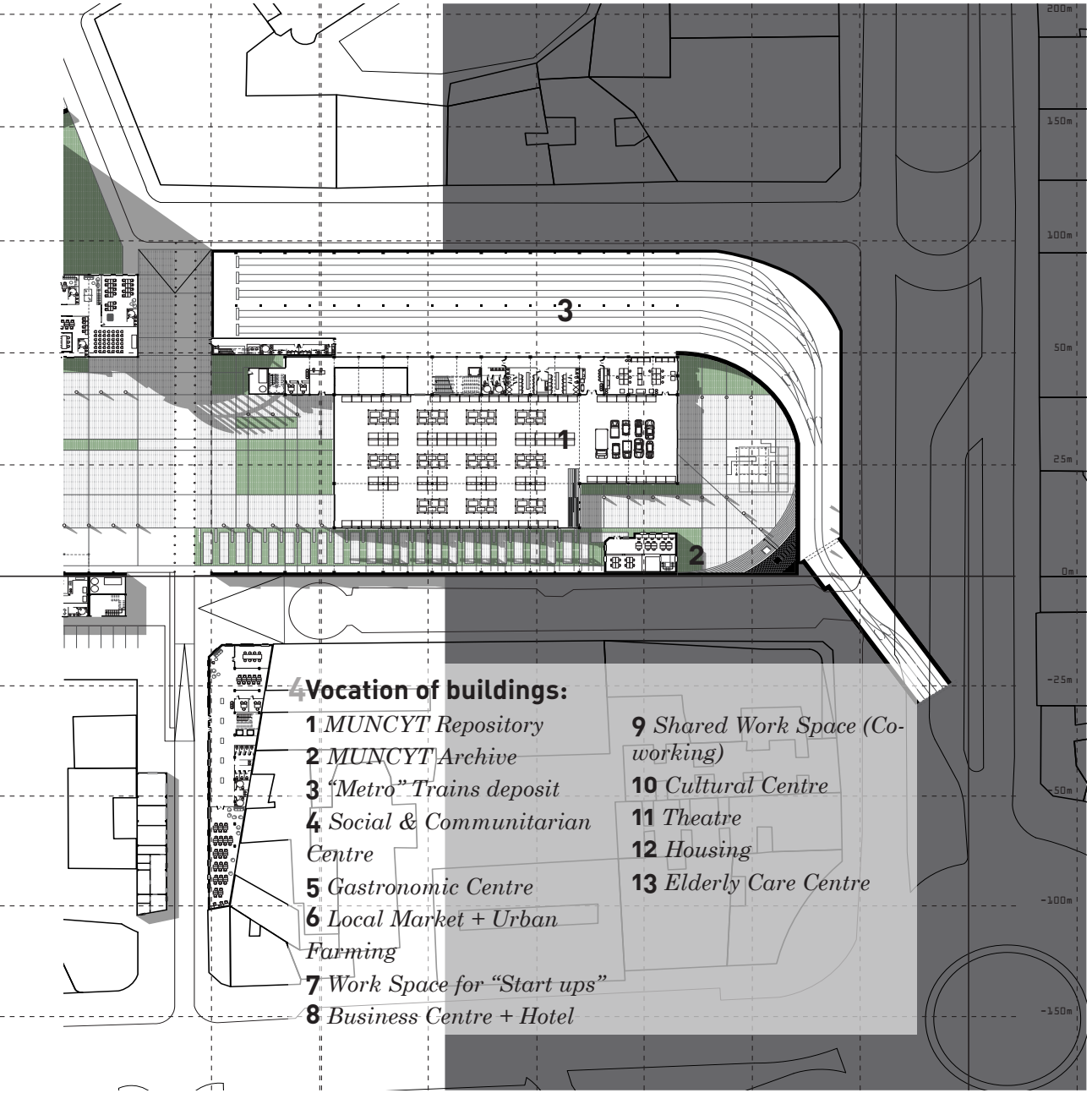
Conceptual View



Conceptual View

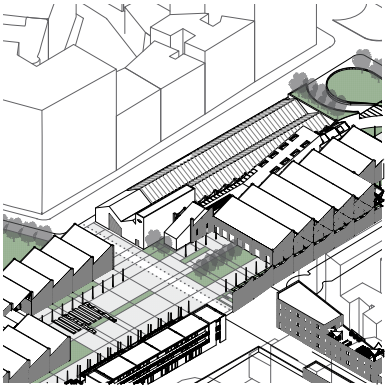


et Level Floor Plant



4 Vocation of buildings:

1 *MUNCYT Repository*
2 *MUNCYT Archive*
3 *"Metro" Trains deposit*
4 *Social & Communitarian Centre*
5 *Gastronomic Centre*
6 *Local Market + Urban Farming*
7 *Work Space for "Start ups"*
8 *Business Centre + Hotel*
9 *Shared Work Space (Co-working)*
10 *Cultural Centre*
11 *Theatre*
12 *Housing*
13 *Elderly Care Centre*

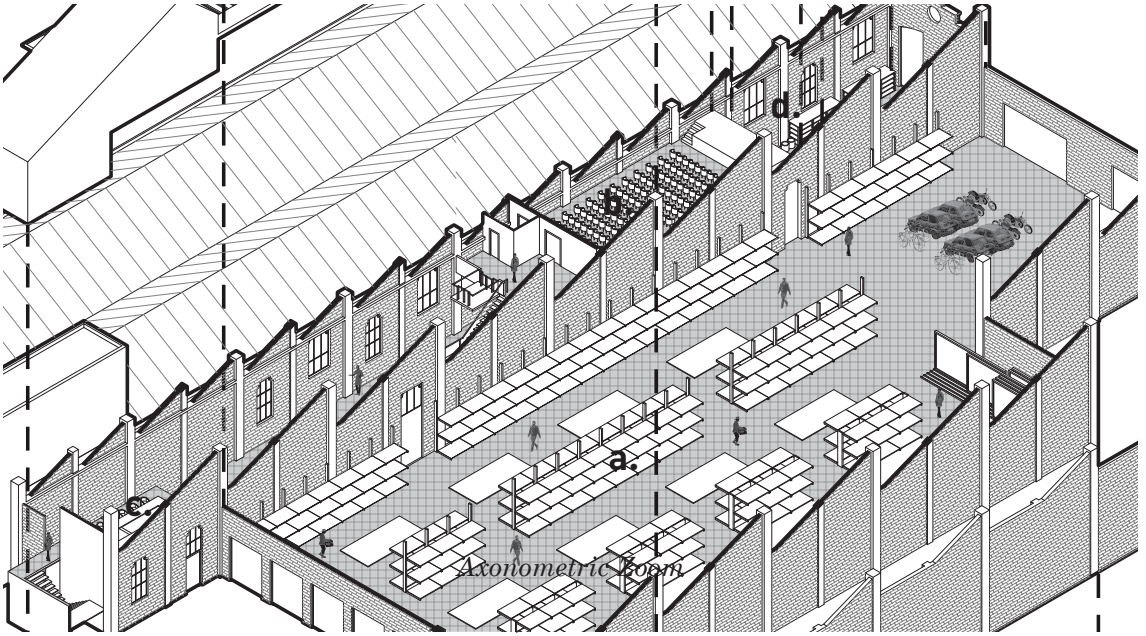


Public Court :

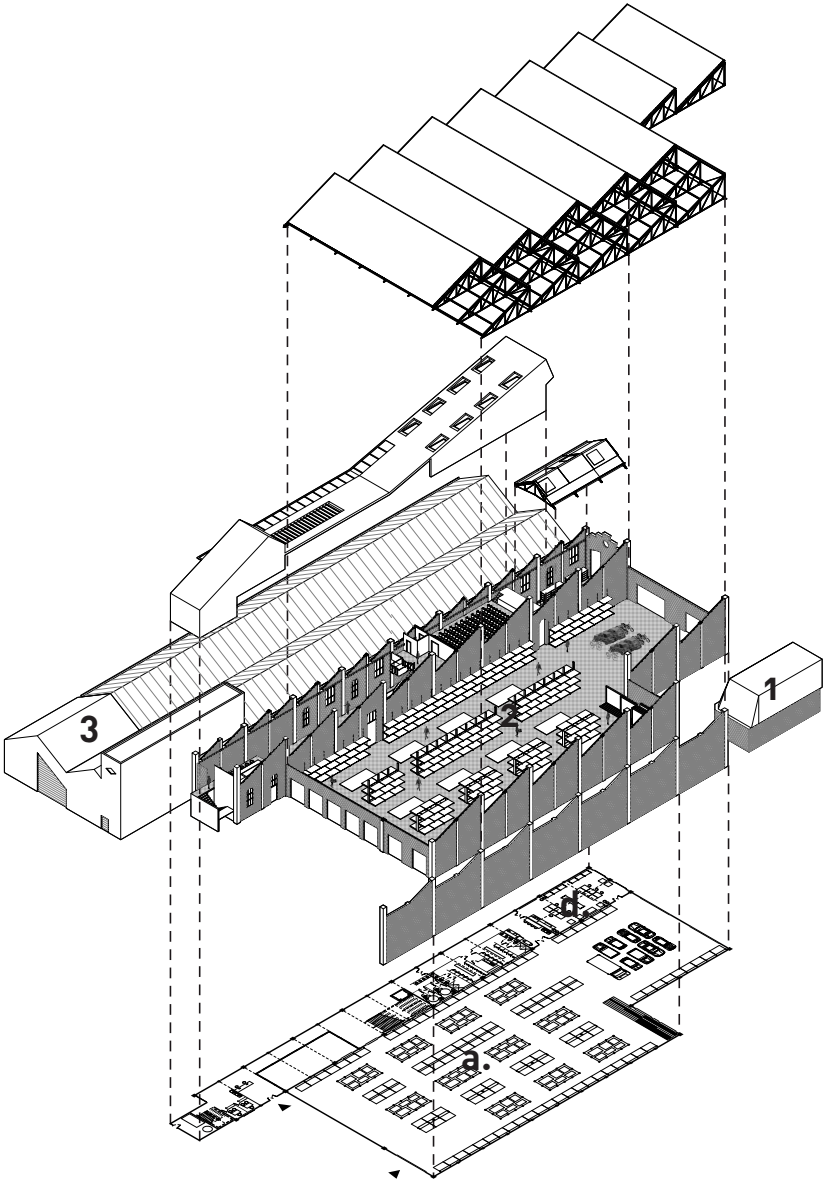
1 *MUNCYT Repository* + **2** *MUNCYT Archive* + **3** *"Metro" Trains deposit*

Relevant indoors spaces:
a. *Storage and exposition*
b. *Auditorium*
c. *Council Room*
d. *Restoration Laboratories*

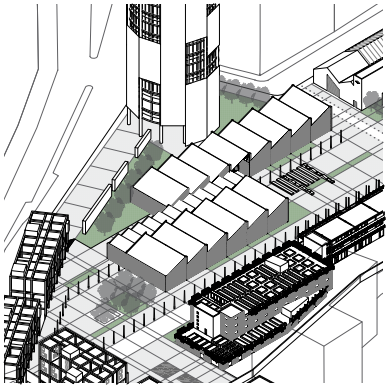
The MUNCYT (Museo Nacional de Ciencia y Tecnología) repository is a place to store, preserve and exhibit pieces of museums which are not in their regular expositions, and at the same time is where is decided if a pieces should be conserved before considering it a museum piece. The repository opens periodically to the public like a museum itself, of all pieces stored.



Axonometric Zoom



Exploded axonometric view



Cultural Court :

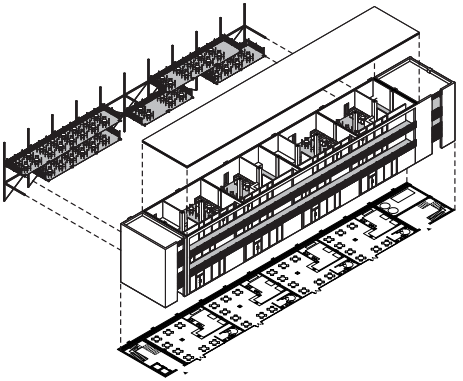
5 *Gastronomic Centre* + **6** *Local Market / Urban Farming*

Relevant spaces:
a. *Storage and exposition*
b. *Auditorium*
c. *Council Room*
d. *Restoration Laboratories*

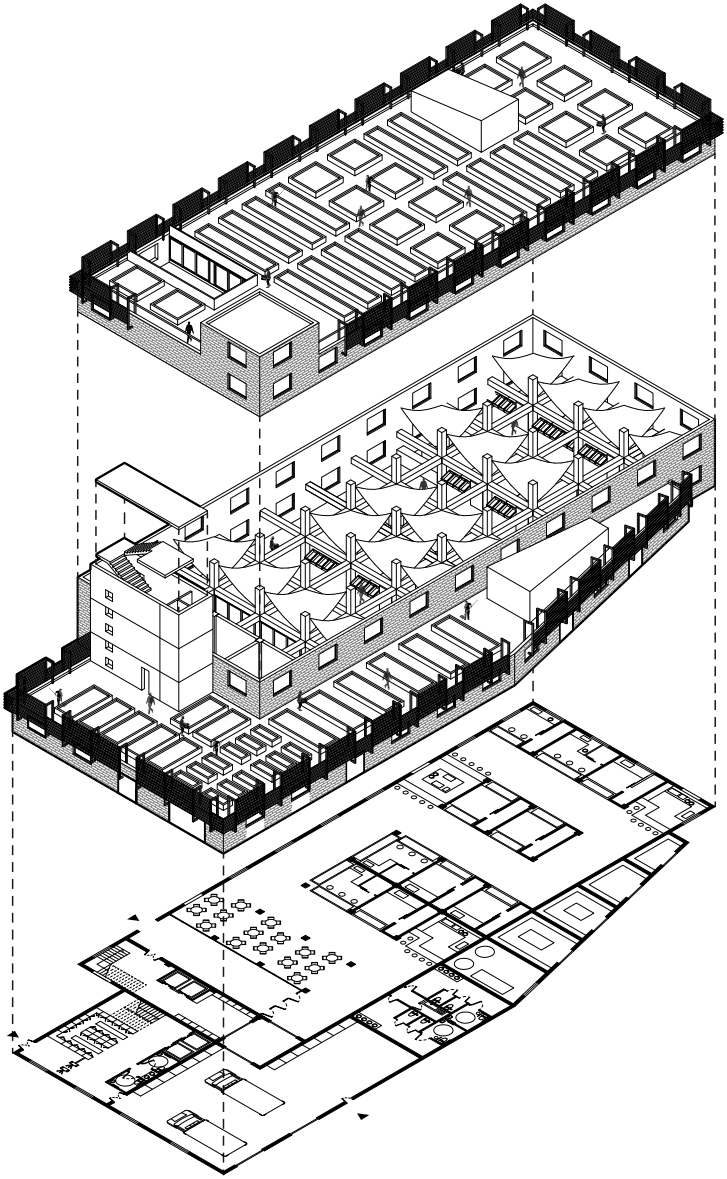
5: This three-storeys building is converted in a gastronomic centre that is supported, with all levels of food service from coffee shops to restaurants, which can have a big range of attraction and at the same time serve all activities developed in the new complex.

6: This building offers a big roof's surface that could be used for urban farming activities, where neighbors and producers can rent spaces for personal use or for selling it on the lower floors, where is proposed a local market to serve the entire adjacent residential area.

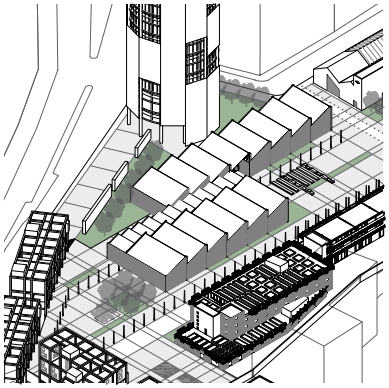
Interior view of the Local Market



Axonometric view of Gastronomic Centre



Exploded axonometric view of Local Market

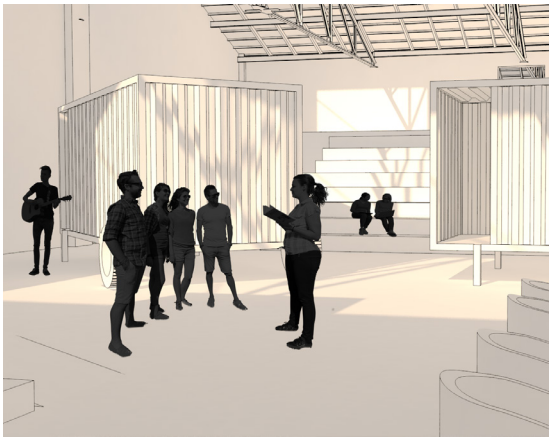


Cultural Court :

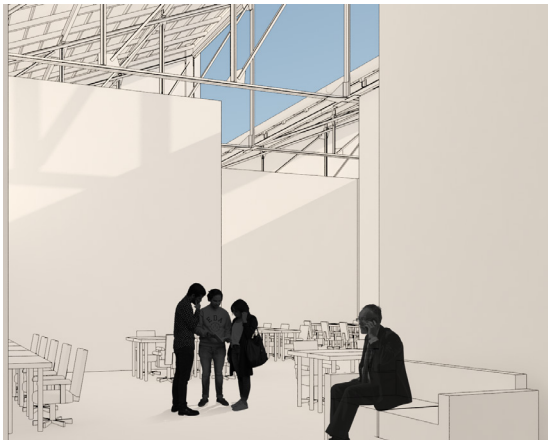
7 *Work Space for "Start ups"* + **9** *Shared Work Space (Co-working)* + **10** *Cultural Centre* + **11** *Theatre*

5+9: Are two kinds of shared spaces for work, which are treated as opposites in a Fill/Void scheme. Are focused on innovation and support young entrepreneurs and freelancers.

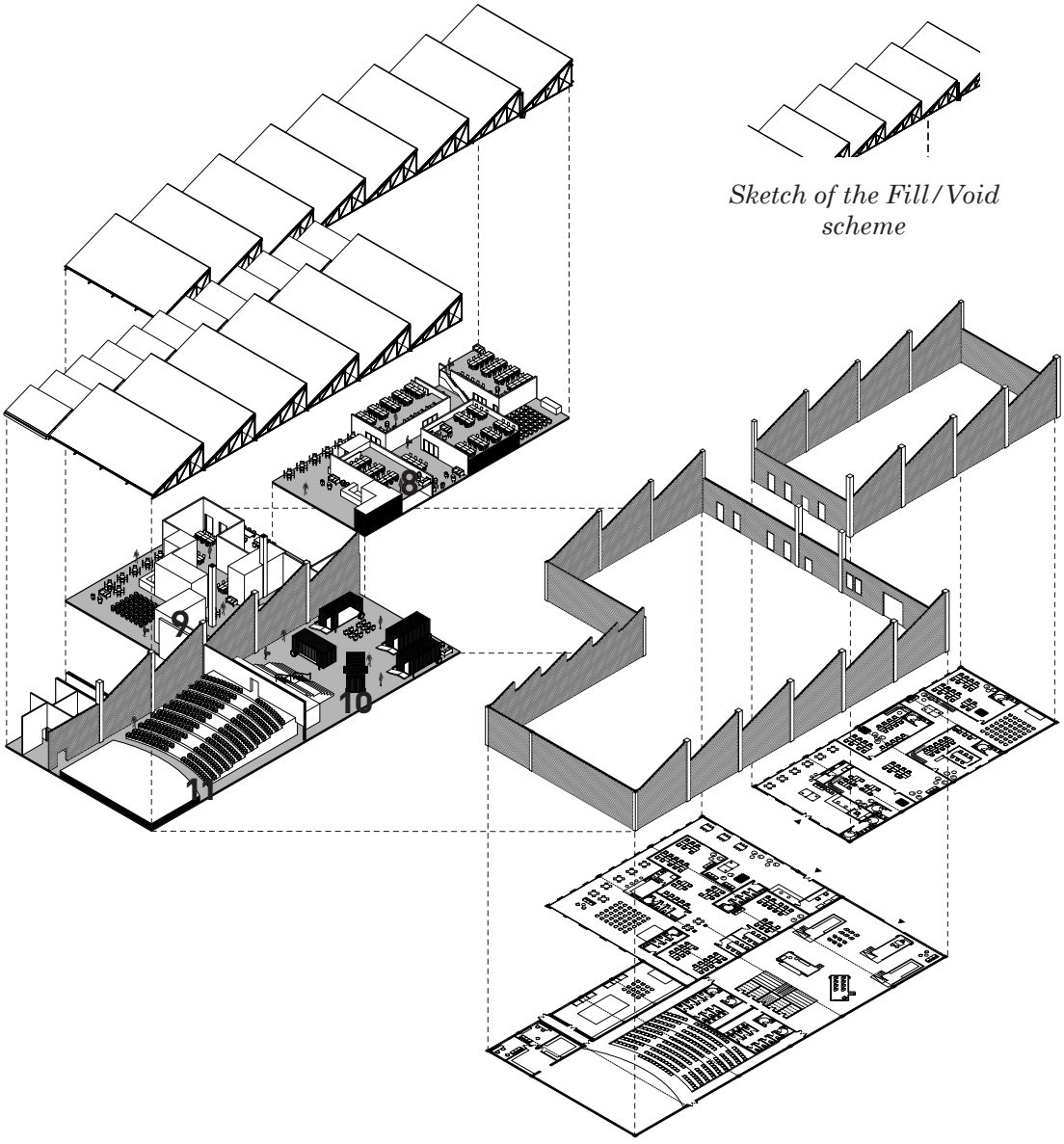
10+11: Are the cultural focus of the project, are supposed to supply the neighborhood with cultural infrastructure devoted to new generations of art and flexible spaces to host art exhibitions and cultural events.



Interior view of the Cultural Centre

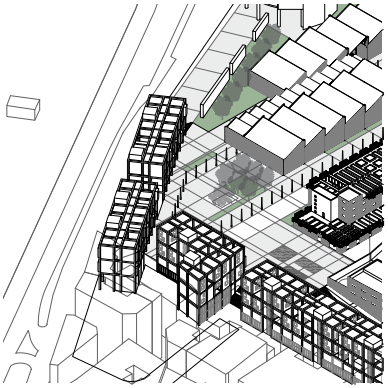


Interior view of the Coworking



Sketch of the Fill/Void scheme

Exploded axonometric view of Local Market

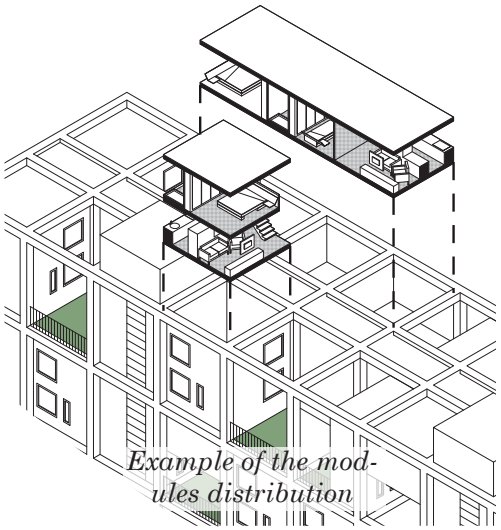


Residential Court :

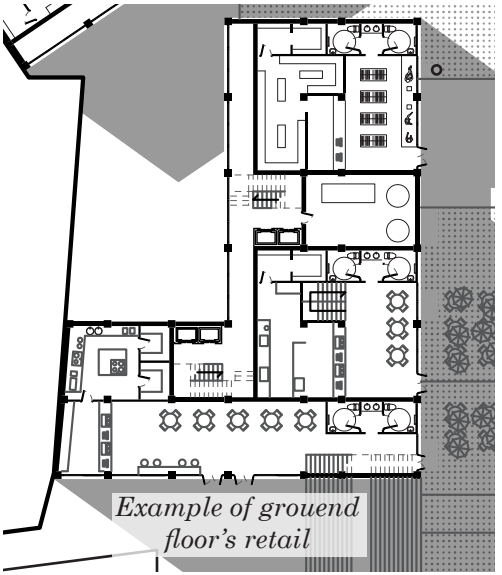
12 *Housing* + **13** *Elderly Care Centre*

12: Four housing blocks devoted to attend the housing crisis of the city of Madrid. Are created from housing modules addressed to offer several types of distributions and dimensions, and a social/economic diversification .

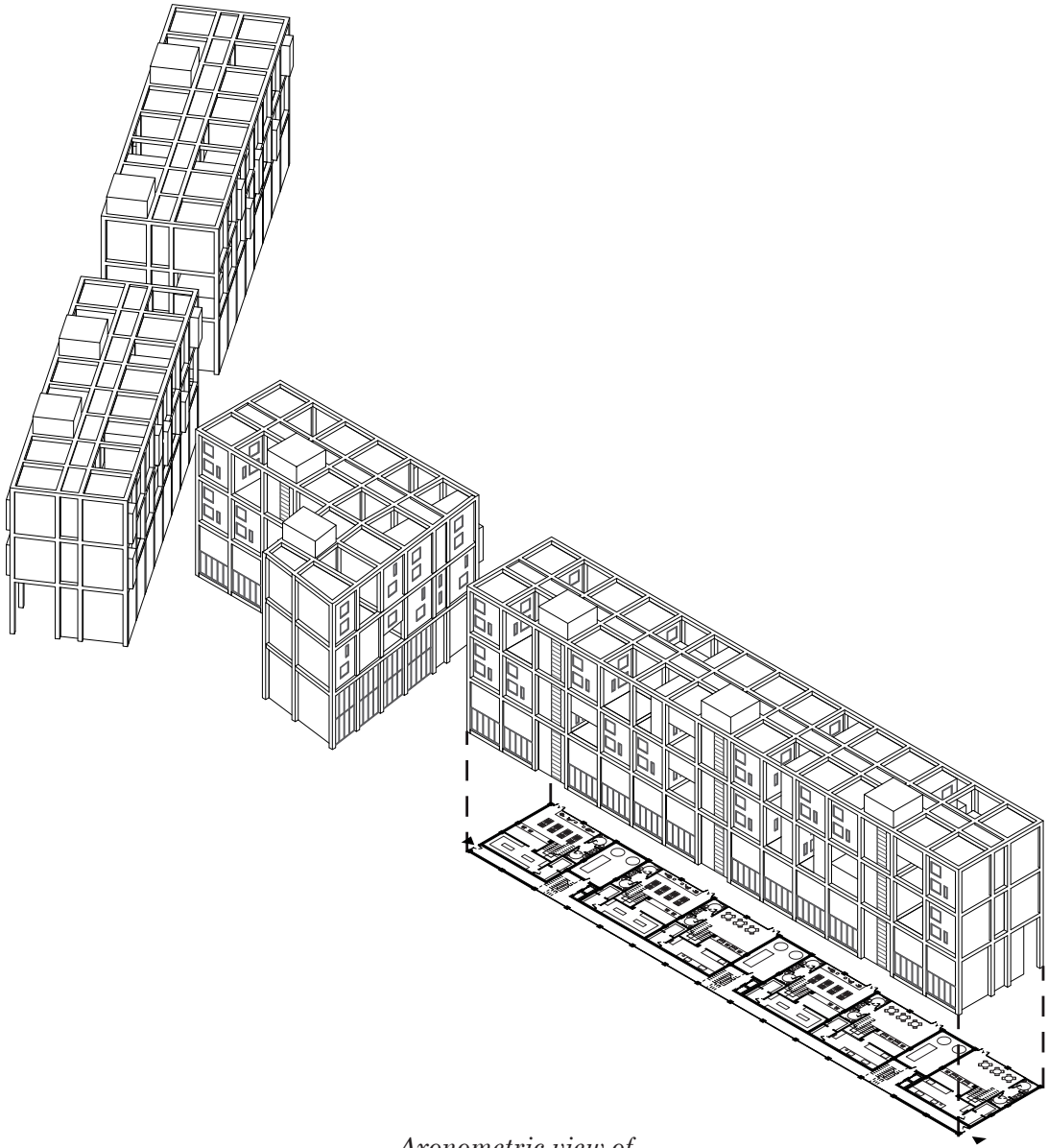
13: Space for the caring of older citizens, again providing a service for the city and in favor of the "mixté" of the proposal.



Example of the modules distribution



Example of grouend floor's retail



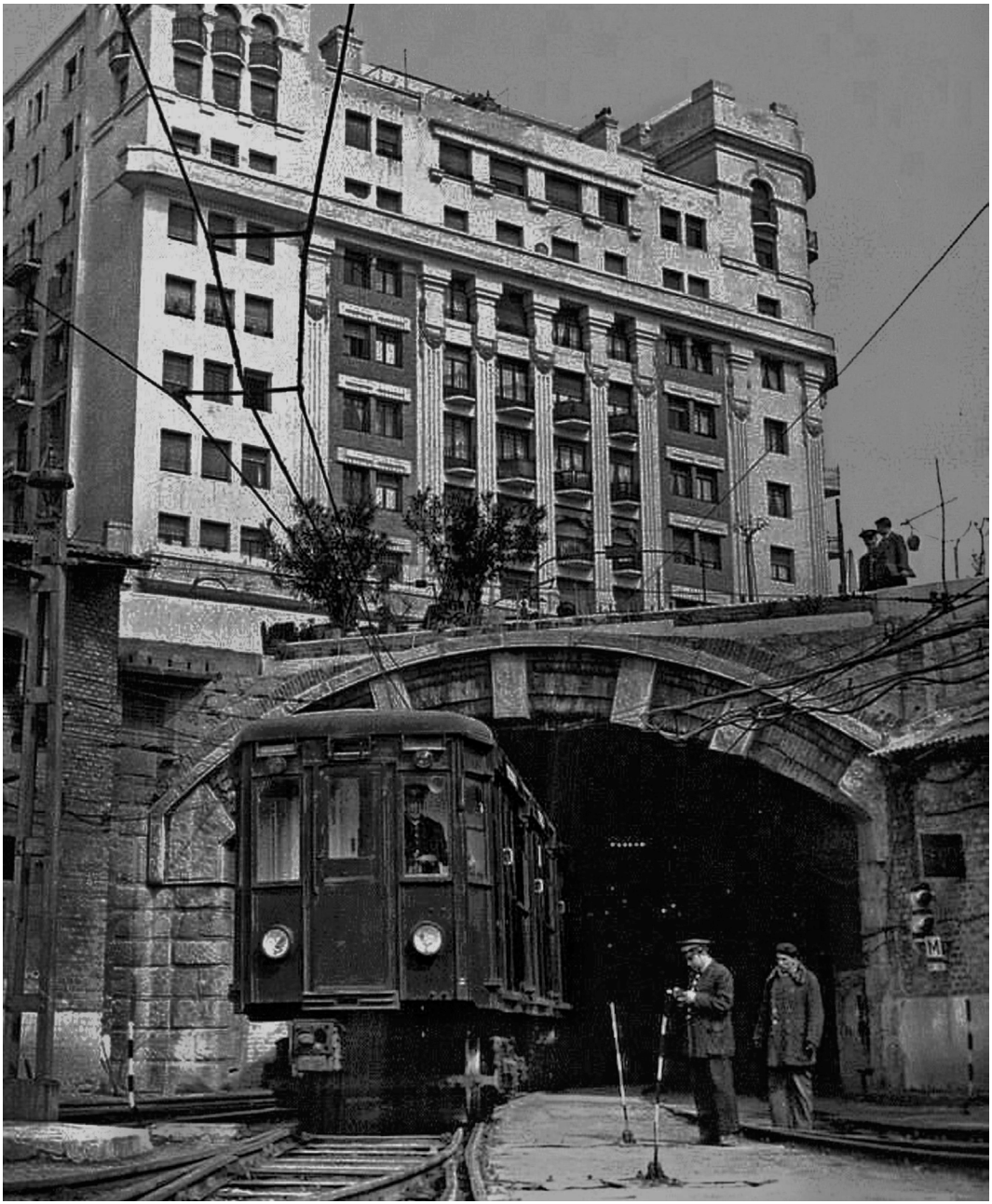
Axonometric view of housing blocks

Plates

Scan to go to the architectural plates of the project.

Presentation

Scan to go to the slides from the presentation.



CONCLUSIONS

History is a collection of past events which have certain matter for the collective which have been register in somehow, once history ends its registration becomes memory. Rossi transport this phenomenon to architecture; where he claimed *"History exists so long as an object is in use; that is, so long as a form relates to its original function. However, when form and function are severed, and only form remains vital, history shifts into the realm of memory. When history ends, memory begins."*

Thus, this work finds in the memory of *"Cocheras de Cuatro Caminos"* a strong point that turns it into a *"tenacious object"* that offers resistance to oblivion, to disappearance. It presents itself firmly and uniquely before its changing and unfamiliar context, and this is confirmed by the interest that has been awakened in the collective, multidirectional interests which miss clear focus but are present.

A clear connection has been found from the origin of the building, during its development and at the end of its life, not only with the city it inhabits but also with other important cities in the world that went through similar processes and that today, are great metropolises such as Madrid, partly thanks to transport systems such as that of which the *"Cocheras de Cuatro Caminos"* form part; not to mention the relevance of Antonio Palacios' seal, making it a materialised part of his monumental vision of Madrid.

It has a sufficiently clear and relevant past for the city

that allows it to establish a bond of attachment with the collective and a particular architectural identity within its own typology, so this work found its space in highlighting the opportunity that represents the buildings permanence in time for the neighbourhood of Chamberrí and the city of Madrid.

Demonstrating in this way that the methodology of adaptive reuse is a sufficiently flexible proposal that allows to integrate and mutually strengthen the conflicting and pluridirectional interests that revolve around *"Cuatro Caminos"* and at the same time rigorous in the preservation of the memory of the place -genius loci-.

One hundred years after their gestation, "Las Cocheras" make a demonstration, perhaps the last one, of their tenacity and puts the problem of their future on the table, charging us with the responsibility of their possible loss. This work attempts to respond, and points to the opportunities that its continuity in time can offer, rather than the irrevocability of the past, and is satisfied to expand the range of proposals to encourage discussion and energize the admirable tenacity of the industrial heritage.

BIBLIOGRAPHY

Baum, M., & Christiaanse, K. (2012). City as loft : adaptive reuse as a resource for sustainable urban development. Zurich: gta.

Olivares Abengozar, S. (2006). Antonio Palacios y el ferrocarril metropolitano. Patrimonio industrial en el metro de Madrid. Madrid: Universidad Politecnica de Madrid.

Amézqueta, A. (1967). Experiencias Dispersas. Arquitectura Nº106, 36-38.

Armborst, T., D'Oca, D., & Theodore, G. (2012). Fromo Soho to SumCity. In M. Baum, & K. Christianse, City as a Loft (p. 32-38). Zurich: gta Verlag.

Bataller Enguix, J., López de Lucio, R., Rivera Blasco, D., & Tejera Parra, J. (2004). Guía del urbanismo de Madrid S. XX. Madrid: Ayuntamiento de Madrid.

Bianchi, A., & Turturiello, F. (2017). Adaptive reuse of industrial heritage. Best practices definition by case studies analysis. Milano: Polimi.

Craig , L. (2008). The sustainability implications of bui. Queensland: Bond University.

Franco Taboada, J. A. (s.d.). Antonio Palacios: Una singularidad arquitectónica de la modernidad vista a travéz de sus dibujos. Expresión Gráfica Arquitectónica 29, 271-287.

Hardin Kapp, P., & Armstrong, P. (2012). SynergiCity: Reinventing the Postindustrial City. Illinois: University of Illinois Press.

Hudson, K. (1969). Industrial Archeology. London: Routledge.

Hylton, S. (2003). A history of Manchester. Manchester.

Jhonson, A. (1996). Rehabilitation and Re-use of Existing Buildings. In Building Maintenance and Preservation: A guide to desing and management (p. 209-230). Oxford architectural press.

Landes, D. S. (1969). The Unbound Prometheus. Cambridge: Press Syndicate of the University of Cambridge.

Martínez, J. (2006). El patrimonio industrial y sus activaciones. KOBIE, 5-33.

Mokyr, J. (1998). The Second Industrial Revolution, 1870. Northwestern: Northwestern University.

Norberg-Schulz, C. (1979). Genius Loci: Towards a Phenomenology of Architecture. New York: Rizzoli .

Olivares Abengozar, S. (s.d.). Madrid 1919, un nuevo escenario urbano subterráneo: el Metro. Las Palmas: Escuela de Arquitectura de Las Palmas de Gran Canaria.

Protti, E. (2015). I luoghi della terza rivoluzione industriale : spazi per nuove economie. Torino: Tesi Politecnico di Torino.

Quatremère de Quincy , A.-C. (1832). Dictionnaire historique d'Architecture. Paris: Librarie D'Adrien Le Clere ET.

Robiglio, M. (2017). RE-USA : 20 American stories of adaptive reuse : a toolkit for post-industrial cities. Berlin: Jovis.

Rossi, A., & Eisenman, P. (1982). The architecture of the city. Cambridge, Mass: MIT Press.

Valdés Menéndez, Á., Marco Fernández, L. M., Sanz Muñoz, A., & Bonet López, Á. (2015). Informe: Las Cocheras de Cuatro Caminos. Madrid: Madrid Ciudadanía y Patrimonio.

Wikipedia. (2018, August 13). Adaptive reuse. Tratto da Wikipedia: https://en.wikipedia.org/w/index.php?title=Adaptive_reuse&oldid=854726958