

Historical Review of the Former Headquarters of the Civil Engineering School of Cerrillo De San Blas

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Summary

Actions in patrimony should be the result of the respect to our heritage and an exhaustive knowledge of the buildings from their initial conception, and should be obtained prior to any intervention, to assess the physical reality and the evolution of the historical building over the time. A research of the evolving needs and the consequent adaptation of the building to them is made. Educational buildings destined to technical instruction have undergone an evolution on their architectural determinant factors intrinsically linked to the own evolution of higher education. Particularities of the Civil Engineering Degree have been studied from its early stages through the different locations until the construction of the former headquarters of Cerrillo de San Blas. The knowledge of the fact and the physical whereabouts is found by first considering the approach on a city scale, and then moving on to the nearer environment, until the building is understood.

Keywords: Heritage, Historical - constructive study, Building evolution, Civil Engineering Instruction. Evolution of technical higher education

1. Introduction

Actions in patrimony should be the result of respecting our heritage and exhaustive knowledge of the building and the initial conception from its original use.

Given the importance of interventions to be made in buildings so categorised and because of their characteristics, it is necessary to carry out an analysis and to obtain detailed knowledge of the same prior to any intervention, to assess their physical reality and its evolution over the time. We study collected data and observations, as well as documents and old publications in order to analyse the historical building. The findings of this study will render the answers about the reality of the work through the life of the good.

The other approach to the reality of the analysed building will be a research of the arising needs and the adaptation of the building to them over the time. Educational buildings destined to high degree technical instruction have undergone an evolution on their architectural determinant factors intrinsically linked to the own evolution of higher education.

Particularities of the Civil Engineering Degree have been studied from its early stages through the different locations until the construction of the former headquarters of Cerrillo de San Blas.

We find a clear path towards the knowledge of the fact and the physical whereabouts by first considering the approach on a city scale, and then moving on to the nearer environment, until we are finally able to understand the building.

2. The City and Its Immediate Environment

An historical study of the city where our building stands will allow us to: comprehend the different stages its surroundings and building have been through; answer questions such as the origins of its foundation; understand its total or partial occupations by other people and cultures; review total or partial destructions of the city; and perceive the historical relevance of the different eras or the main characters related to the city at different periods.

The first complete plan of the city of Madrid was traditionally believed to have been drawn and engraved in the Netherlands by Frederic de Witt, member of a family of Dutch printers, around 1635. Later investigations call this authorship into question, ensuring that it was drawn by Juan Gómez de Mora, coloured by Antonio Marcelli and finally engraved by Witt. The date is also revised to 1622. The first illustrations of the Retiro Monastery are found in those maps, in which one can see the Prado de Recoletos constructed by the Augustinian Secluded monks, and a straight street coming from Puerta del Sol towards the monastery (Carrera de San Jerónimo), passing by the small Tower of Music. This map gives us an idea of the location of the flat areas that will become the future park of El Retiro. The frontier between the fields is limited at Atocha by the San Blas Hermitage (it has been there since April 1588) and the nearby fountains of the Duke of Lerma.

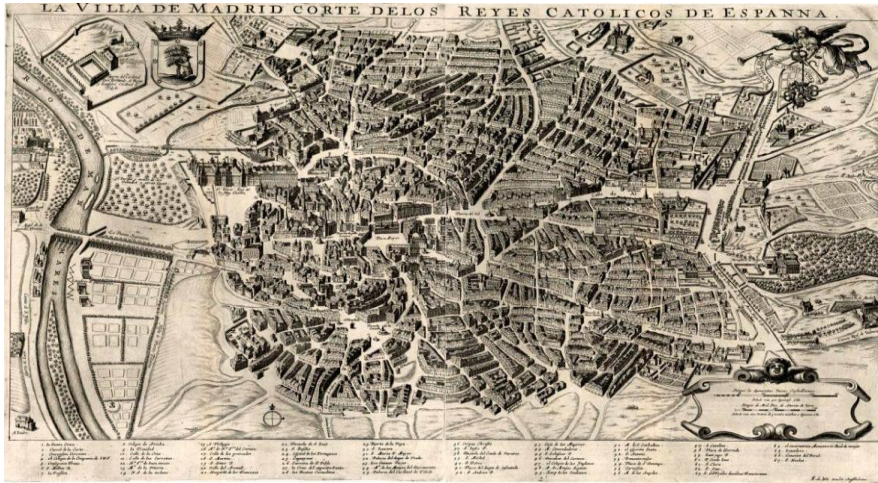


Figure 1: WITT, F: Plan of the Town of Madrid – Court of the Catholic Kings. 1622

The plan of Madrid engraved by the Portuguese Pedro Texeira (1595-1662) in Antwerp in 1656 is, undoubtedly, the most important and representative of the old plans of the villa. It shows the Buen Retiro Palace, as well as its vicinity, which would be the site of the building studied two hundred years later.

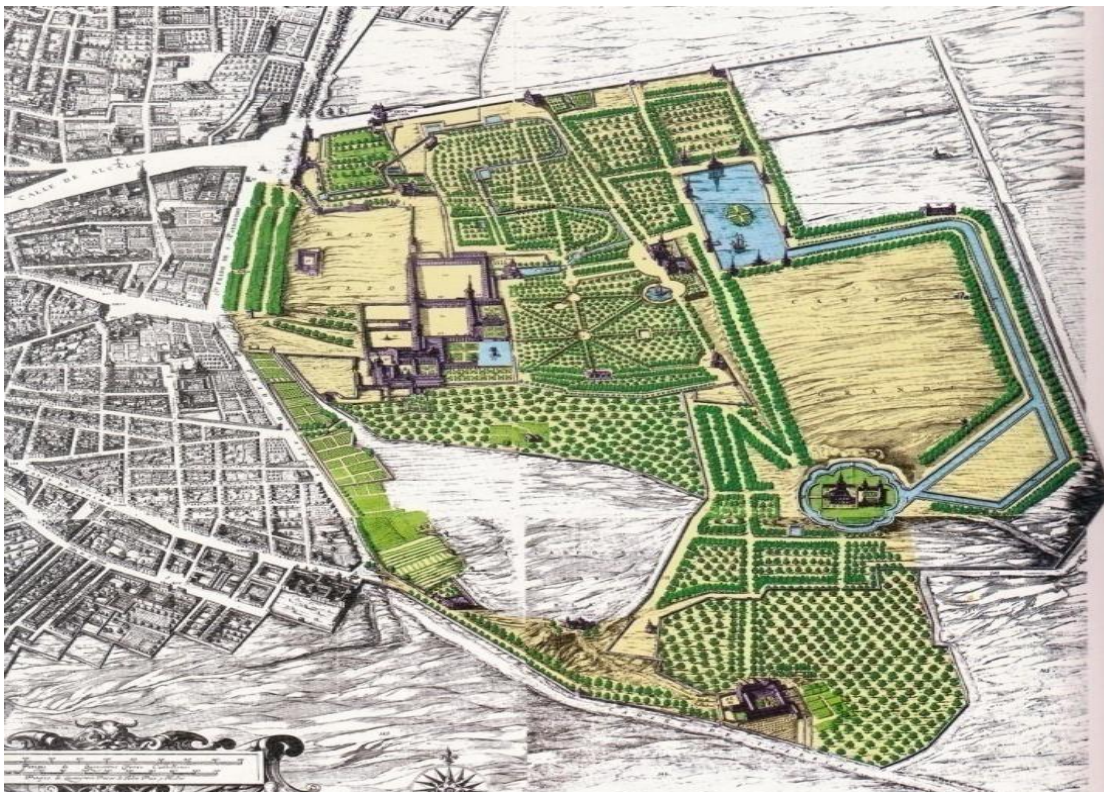


Figure 2: TEXEIRA, P: Fragment of the Villa of Madrid plan, emphasising the Retiro Park, in 1656



Figure 3: HOMANS, J.B. Engraving made in Germany in 1700 of the Villa of Madrid, showing the area under study

Before the 1860 Expansion Plan of Madrid, the southern edge of the studied area underwent a transformation with the demolition of the Puerta de Atocha (one of the gates of entry to Madrid) in 1851, and a scant urban expansion, which gained strength during the next decade due to the demolition of Phillip IV’s Wall as a part of Castro’s Expansion Plan. Before the approval of this Plan, the first Atocha Train Station had already been built. In 1851, the second railway of the country linking Aranjuez and Madrid was inaugurated; the train departed from Madrid from a wooden landing situated next to Atocha Street.

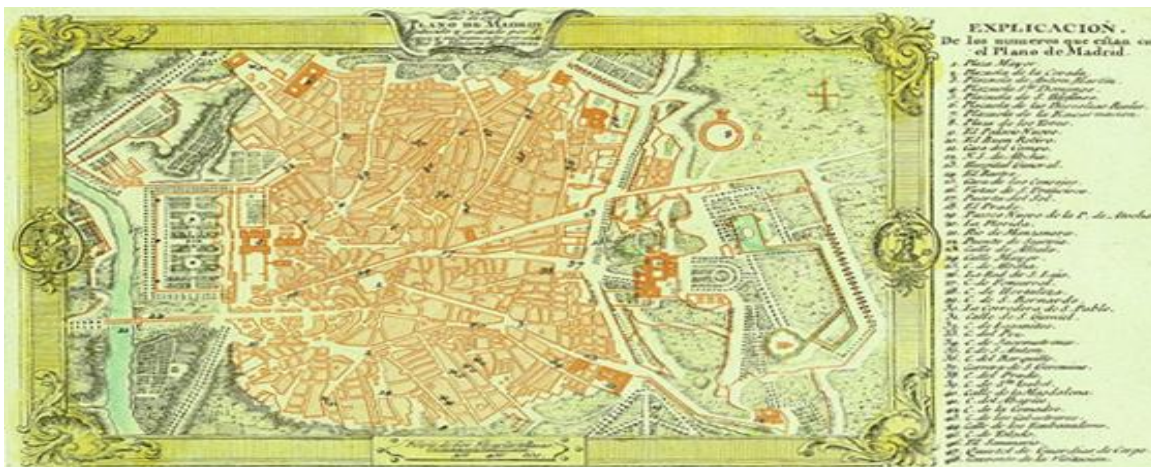


Figure 4: ANONYMOUS. Plan of Madrid. 1762. National Library. Nuestra Señora of Atocha (Our Lady of Atocha) is marked number 12

The construction of the station, also called Midday Station, rapidly forced the restructuring of this city sector. The streets Ronda de Atocha, Ronda de Valencia, Paseo de Santa María de la Cabeza, Paseo de Atocha, Paseo de las Delicias and Paseo de la Infanta Isabel, along with the Paseo del Prado now converged in the Atocha area. This location was selected for the site of prestigious buildings, such as the Ministry of Public Works (presently, the Ministry of Agriculture).

In 1865, with the alienation of parts of the assets of the Crown, a radical change of the left margin (east) of the Paseo del Prado began. With this plot alienation, the so-called Buen Retiro Orchards (the old San Juan Orchard), and an extensive strip between the Paseo del Prado and the park of the Retiro, and from the Botanical Gardens to Alcalá Street went to the Town Hall. Here, the municipal council decided to parcel the land in order to build for the gentry, creating the Los Jerónimos area, where we can find some of the most striking architectural landmarks of modern and present Madrid.

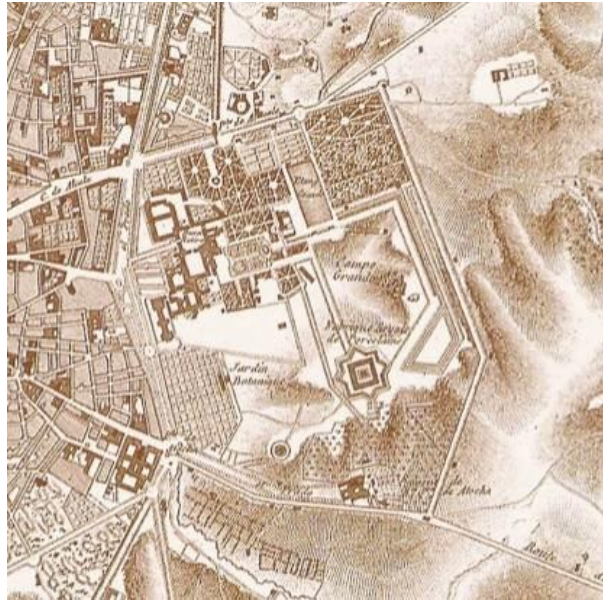


Figure 5. LABORDE, A. Detail of the plan of Madrid, engraved in 1806

In 1889, Hilario Peñasco and Carlos Cambronero included a copy of an original engraving that represents the Villa made by Emilio de la Cerdain the same year in their book “The Streets of Madrid”. Although lacking a date, it is believed that the original plan must have been drawn in the later years of the reign of Phillip III or the first years of Phillip IV, due to the existence of the Uceda Palace, built on a housing plot bought by the Duke from Pedro de Porras in 1613, and the absence of the Retiro Park, which was initiated in 1630. We believe, with a minimal margin of error, that it is a copy of the engraving of F. de Witt, as it is an almost absolute likeness.

We take this opportunity to consider a first abstraction going back to the original plot in the higher parts of the Retiro: an abrupt hill without any buildings. It was colonised as a nursery for the Retiro, lacking any communication, due to its high elevation.



Figure 6: Aerial views of the area in 1929 and 1994

3. The Retiro and Cerrillo De San Blas

In its origins, The Monastery of the Jerónimos was called “Santa María del Paso”, and was inaugurated on May 6th 1465. Some time later and after the death of King Henry IV, the monks suffered from rheumatic fevers and other diseases caused by the unhealthy terrain. This situation made them request the Catholic Kings to transfer to another area.

The monks chose the eastern part of the city (very close to the site of the present Prado Museum) as it presented healthier conditions, being located outside of town, and enjoying streams, springs, orchards and healthy wind from the mountains. They were settled on a hill in the place then known as Prado Viejo, south of the road to Alcalá.

In addition, the San Blas Hermitage (XIVth century), which doesn't appear in an anonymous plan dated in 1762, was located in the southern limit of the left margin in Witt's plan of 1622. The exact location of the hermitage is unknown, but it is clear that it was situated at the Cerrillo de San Blas. Afterwards the Convent of Atocha, presently the Basilica of Nuestra Señora de Atocha, was located there.



Figure 7: WITT, F: Fragment of the Villa of Madrid. Catholic Kings Court. 1622

To complete the view of the area of this left margin in the XVIIth century, it was an ample unconstructed terrain where one could see the hills and ravines that descended to the Castellana stream, south of the Convent of los Jerónimos, its orchards and olive groves. This area was known as San Blas Field on whose hill on the southern edge the aforementioned hermitage was located.

Later on, the Astronomy Observatory was developed based on a design by Juan de Villanueva, and built in the plots next to the old San Blas Hermitage. The building was finished in 1795, although it suffered heavy damage during the War of Independence, and wasn't restored and reconstructed until 1845.



Figure 8. VELAZQUEZ, I. View of Madrid's Royal Observatory. 1791. Drawing

To complicate the building situation, French troops constructed a fortified area with bastions and trenches around the Porcelain Factory (which would be turned into a powder keg), the Convent of Atocha and the Observatory. Once the French troops were defeated in 1813, the English dynamited and destroyed the entire fortified area, including the Porcelain Factory, leaving the Retiro Gardens, The Convent of Atocha and the Observatory severely affected.

The origin of the park goes back to the reign of Phillip II. With Phillip IV, its surface was expanded as an extension of the orchard from the Monasterio of the Jeronimos, and the Palace of Buen Retiro was constructed. From this period of time, the Casón and the Salón de Reinos (the present War Museum) have been preserved outside of the park's enclosure. With Elisabeth II, the designs for the gardens were finished, and promenades such as the one of the Statues (presently in Argentina), were designed. The park contains several sculptures that make it an authentic open-air museum. Special notice must be taken of a singular monument dedicated to the Devil, the Fallen Angel of Ricardo Bellver. Another monument, to General Martínez Campos, by Mariano Benlliure, is of great beauty. The Count-Duke of Olivares created the Royal Site called the Buen Retiro for the solace of Phillip IV.



Figure 9. Present aerial view of the Area and its Relationship with the City

4. The Civil Engineering School and Its Different Official Headquarters

During the XVIIIth century, Western Europe was undergoing the transition process towards modern civil engineering. In this period, there were still three specialties of engineering related to public works in Spain: the military were in charge of the fortresses, the mining engineers, and the architects dealt with the construction of bridges, ports and channels.

Thanks to the enlightened spirit of Charles III, but above all, due to the completion of the Palace of Oriente as the new residence for the kings, it was decided to concentrate the three engineering specialties in this area of the Paseo del Prado and the Palace of the Buen Retiro. This tradition would be maintained throughout the XIXth century and the beginning of the XXth. One of the landmarks of this decision is the Machine Office (Rumeu de Armas, 1990), created in 1792, inside the Palace of the Buen Retiro, where all kinds of mechanical gadgets were stocked prior to their study.

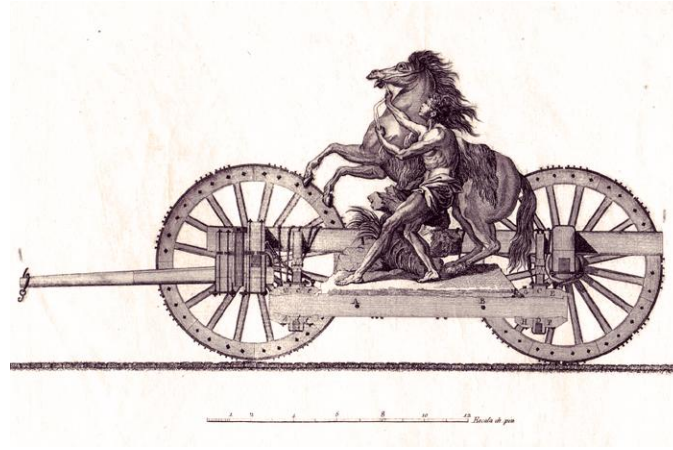


Figure 10: LOPEZ DE PENALVER; J: Description of the more useful machines that are at the Royal Office, established in El Buen Retiro. Madrid: Royal Printers, 1798, 10 prints

The Count of Floridablanca was the first politician who considered the problem of promotion of public works globally. From his position inside the Post Superintendent's Office (Menéndez, 1986), he created the State Office for Roads in 1785, followed by the Government and Accountancy Boards in 1788. In 1799, the Civil Engineering Technical Board was initiated, belonging to The State Inspection of Roads and Channels.

In May 1802, Betancourt founded the School of Engineers of roads and channels in the Palace of the Buen Retiro. The School was occupied by French troops during the invasion of 1808 and it did not reopen either when they left it or with the return of Ferdinand VII in 1813. In 1814, The State Inspection of Roads disappeared, along with the school.

The Cadiz Courts paid attention to civil works and created a commission in charge of drafting an extensive report that would serve as the basis of the reorganisation of the trade (State Office for Roads and Channels, 1820). Following the guidelines of the commission, the School of Civil Engineers was reopened on November 8, 1820, in a building situated on Alcalá Street at the corner of Marqués de Cubas Street (Echevarría, 1848), property of the Marquis de Riera thirty years later.

The Royal Decree of June 29 1821 on General Regulations of Public Education must be noted. It established the creation of an institution in Madrid called the Polytechnic School, in which the syllabus included the learning of civil engineering and architecture in its first stages. This centre would be the precedent of the future preparatory school, founded in 1848.

In May 1823, during the French army's invasion, the constitutional government withdrew to Cadiz, and with it, the State Office of Roads and the alumni of the school. With the return of the absolutist regime, reprisals fell upon all of the engineers, the school was closed, and the alumni dispersed.

From 1834 on, coinciding with the regency of María Cristina, decisive steps were taken to reorganise the public works and the Civil Engineers' Corp. The organisation of the State Office, independent of the Post Office, and the reopening of the School of Civil Engineering (Sáenz et al, 2000) it is worth noting.

The School was brought to the building sited at Aduana Vieja, 14, which had been the Quarters for the Royalists, at the small plaza of La Leña (presently Stock Exchange Street). In spite of the renovation the building underwent, it was inappropriate for its objective. Its new headmaster was Agustín Larramendi (Garcini, 1899), who substituted Betancourt.

With Narváez as president of the State and Juan Bravo Murillo in charge of the Ministry for Commerce, Education and Public Works, the School moved to Turco Street, now Marqués de Cubas Street, in 1847. The building, originally built to accommodate the glass from the Royal Glass Factory of La Granja, dates from the end of the XVIIIth century and was possibly designed by Manuel Martín Rodríguez, disciple of Ventura Rodríguez. This building had various and diverse, namely: Art Conservatory, School for the deaf-mute and blind, a professorship of Diplomatic Palaeography and the Civil Engineering School (Martín, 1994).

It remained at this site till the beginning of the school year of 1885-1886, when it moved to the building at the Cerrillo de San Blas, close to the Astronomy Observatory.

5. The Building at Cerro De San Blas

The building for the Civil Engineering School was drafted by the architect Mariano Carderera (Carderera, 1877) between 1882 and 1885, after the commission from the State Office of Public Works.

By mid-century, the Ministry of Public Works decided to construct a building for the Schools of Mining, Civil Engineering and Public Works Assistants. Ángel Mayo and Manuel Riaño y López de Salcedo were in charge of the design of the building in 1862 (Maffei, 1877). It was intended to be located in areas near Atocha Street, between the Paseo de las Delicias and Sur Street.

However, sources note that the urgent necessities of space for teaching made the engineer-architect Mariano Carderera Ponzán design a common outline for the Schools of Civil Engineering and Mining, about to be erected in 1875 (Revista de Obras Públicas, 1889) in the Atocha area. The idea was abandoned, pointing out the necessity for an exclusive School for Civil Engineering at the site where it is currently located.

According to Manuel Aguilar López (Aguilar, 1945), Principal of the Civil Engineering School in 1945, when Carderera's building was erected, someone claimed the old school plot at the Retiro. Only a part of a nearby hill, known as that of San Blas, was conceded.

This small hill must have had a similar aspect to the one of the clearings made around that time in the southern area of the Astronomy Observatory, with muddied accesses.

Manuel Aguilar sustains the opinion that the election of the terrain is only justified by the idea of getting closer to Betancourt's old school, as there were better choices when Madrid was being expanded and not this scarcely accessible plot.

The aforementioned project was ordered to Mr. Carderera, only for the School of Civil Engineering, and the building initiated construction. It only progressed to the first floor, when the contract was annulled and the works delayed.

In 1886, the architect Repulles Segarra (Repullés, 1881) was named construction manager, and except for small interruptions of the works due to changes in the project, the building was finished on February 29 1888. The relocation was carried out for the school year 1889-1890.



Figure 11. Photograph of House-Palace of the Marquis of Casa-Amao; the home and dwellings of Mr. Mariano Carderera Rotó; elevation and photograph of the Palace for the Countess of Adanero; the mansion of the Viscount of Roda; the Casón del Buen Retiro; the House-Palace for the Count of Campo Giro. Architect Mariano Carderera

The building at Cerrillo de San Blas was, strictly speaking, the first headquarters built as the School of Civil Engineering, until in 1968, it moved to its present headquarters at the Ciudad Universitaria.

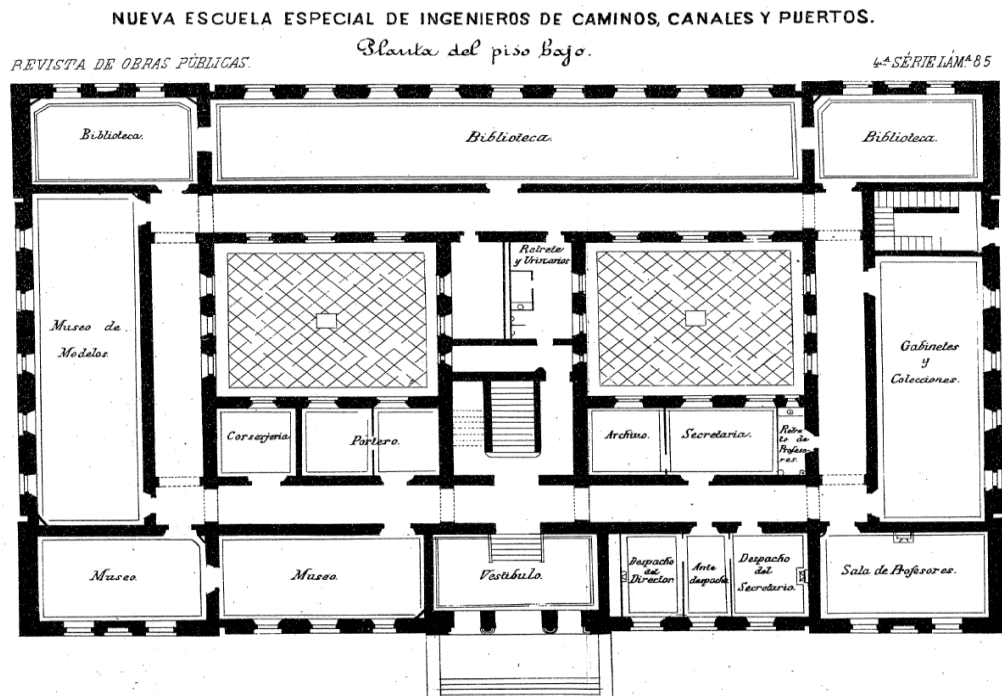
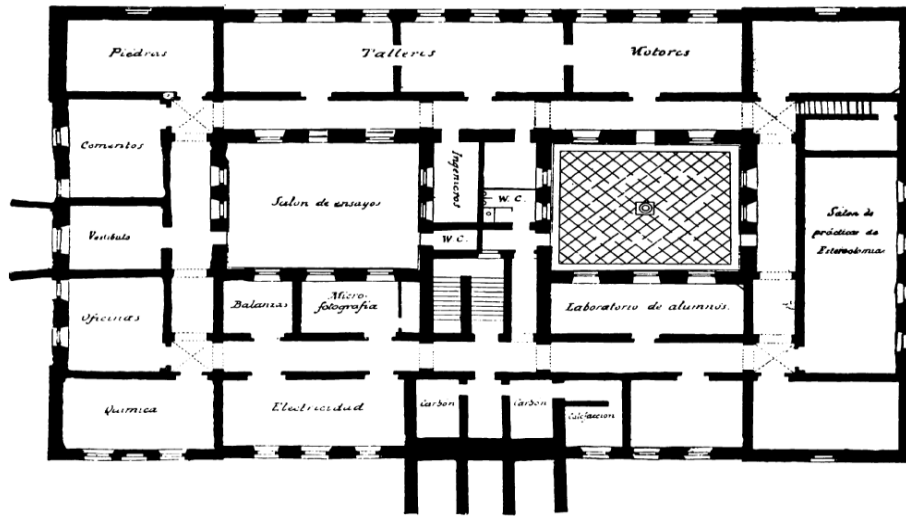


Figure 12: The School’s Ground Floor. Revista de Obras Públicas. 1889. Volume VII. Page 83. Note the two Unroofed Patios

The construction effort was considerable, not only due to the extensive soil movement, but also because of all the facilities required by the laboratories, specially the drainage, and the quite expensive foundations.

For its construction, a fill was made at the slope of the gardens, with its nursery, harbour, pond and magnificent enclosure. The school occupied a plot in the shape of a rectangular parallelogram 50 m in length (main and back façades) and 35 m in width (lateral façades). People entered the building mainly from Alfonso XII Street by means of stairs and ramps.

It had a basement, ground floor, main floor and second floor, and two pavillions in the shape of an attic (Revista de Obras Públicas, 1889). Almost all authors agree in considering Carderera's project as a replica of the École de Ponts et Chaussées in Paris: classrooms, office, museum, library, etc.



**Escuela de Caminos.—Planta de sótanos.
Laboratorio central para ensayos de materiales de construcción.**

Figure 13: School's Basement Floor. Revista De Obras Públicas. 1899. June 1267-03. Page 48. Note The Laboratory in One Of The Patios. See Royal Decree from August 12, 1898 for the Creation of the Testing Lab for Materials

The library was designed proportionally to the number of pupils; it was located on the ground floor and occupied the entire eastern body of the building, opposite the entrance (with a north-south orientation). It had an elongated room and high ceilings, with wide rounded windows opened toward the eastern wall. At either end, there were, as an appendix, offices or ancillary rooms. The one sited at the south-east angle was used for the library, library services in general, the professor's office, as well as for other employees.

The room at the northeast corner was at the service of the professors, and the one in the centre was the reading room for the public and the school's alumni. These three rooms were also the storage room for books. The library itself had seventy-four cabinets or shelves made of wood, numbered, attached to the walls and spread throughout the reading room and ancillary zones. The cabinets in the common room were articulated in three overlapping bodies of considerable height, each of which had a letter assigned according to its location – (a) for the higher body, (b) for the lower one, and (c) for the middle, which facilitated the search for books. These letters, combined with numbers, composed the topographic catalogue that is still used in the present storage rooms. The number and place of the cabinets were adapted to the availability of the existing space, either arranged in solid individual bodies along the eastern wall or placed against the wall on the opposite side, where their upper body was reached by a spiral stairway that led to an elegant corridor with a metallic balustrade at each end. The peculiar conception of the common room imposed a considerable restriction in the number of reading places available arranged around long tables, aligned along the axis of the orientation of the room.



Figure 14: Photographs of the Library's Main Room, a Graphic Works Room and One of the Museum's Rooms in 1899

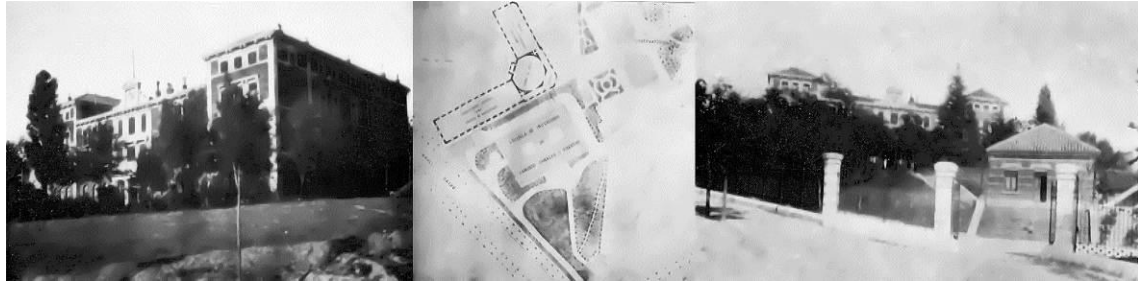


Figure 15: Photographs of the Main Façade (Without the Present B Building), Floor Plan of the Civil Engineering School, And One of the Enlargements Designed in the Plots Ceded in 1929

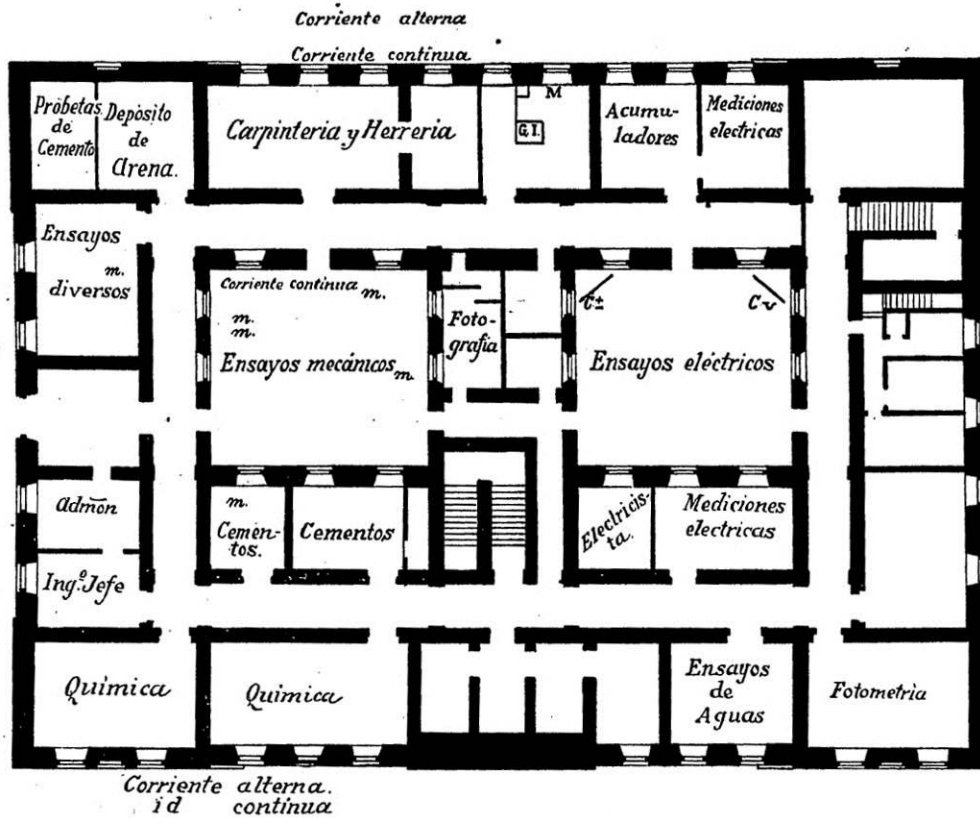


Figure 16: Revista de Obras Públicas. 1910. Volume I. 1839. Page 613. Basement floor plan of the School of Civil Engineering by 1910, occupying the entire space, including the patios

This building had a basement, a ground floor slightly elevated over the plot, a main floor, second floor and some lateral attics. Two patios lightened the interior and the skylights did so in the basement. There were also two stairways that connected the different floors: the main one, called “imperial” (one first stretch with a double turn), of common usage, seen from the entrance; and another one on the right side, used exclusively by the people living there due to their position (and therefore the only access to the attics) (Martín, 1994).

In order to enter by the main door, there was a small central stairway with four steps over the sidewalk surrounding the whole building. You could also enter from the left façade, through a door that had a direct access to the basement.

The original interior layout of the building was as follows:

The basement was vaulted and contained the labs, test rooms and machines. On the ground floor there were the model museums, offices, library, manager’s office, secretariat, teachers’ room, etc.

The main floor was basically occupied by the classes for lectures and graphic works, assembly hall, and the offices for Mineralogy, Physics and Chemistry. Beside the latter, on the left side, there was a service stairway that led only to the second floor. The second floor was exclusively for the living quarters of the manager, secretary and caretaker, while the two lateral bodies (attics) were used as housing for the workers of the school. These lateral towers were connected via a passage made into the back bay.

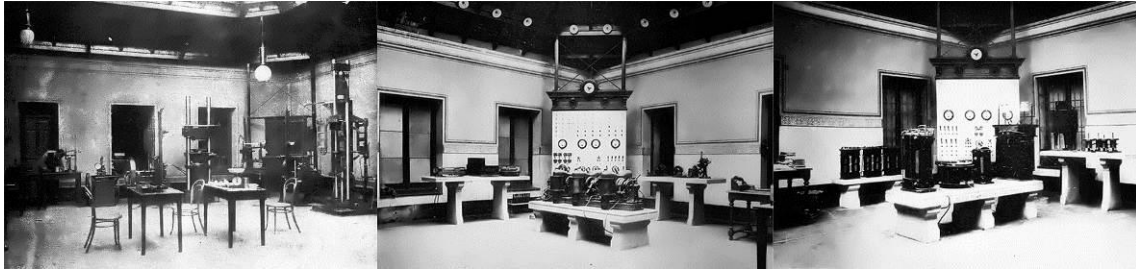


Figure 17: Revista De Obras Públicas. Photographs from 1899 and 1910 of the Alumni's Labs for Mechanical and Electrical Testing, by the Patios of the A Building Note the Bars and Window Openings, Which Could Signify That the Patios Were Originally in the Open

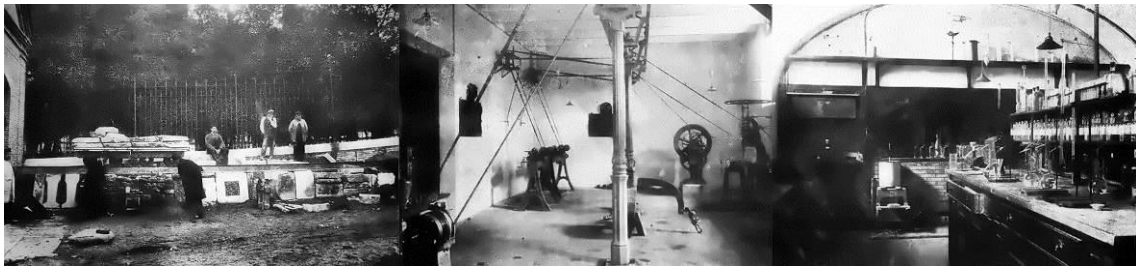


Figure 18: Photograph of a Load Test from the End of the XIX Century, Next To the Wall of the Retiro. Two Photographs of the Revista De Obras Públicas of the Locksmith Workshop and the Chemistry Lab of the Civil Engineering School, from June 1899. 1267

Later on, the building added new walls for the labs at different sides or façades. Shortly after the construction of the main building, the needs for learning required the appropriation of the manager's house, and later on, that of the secretary, which were on the second floor. A large number of laboratories, including those for materials or hydraulics were built in annexed buildings.



Figure 19: Photographs of the Different Annexes to the School Labs from the Middle of the XX Century. One of the Most Important Was Dedicated to Ports, Placed at One of the Main Quarters of the Materials' Central Laboratory of CEDEX

In the 1940's, the possibility of enlarging the school by the Retiro nursery is considered in order to create a university campus and provide more lab space, a residence hall, sports fields and other facilities.

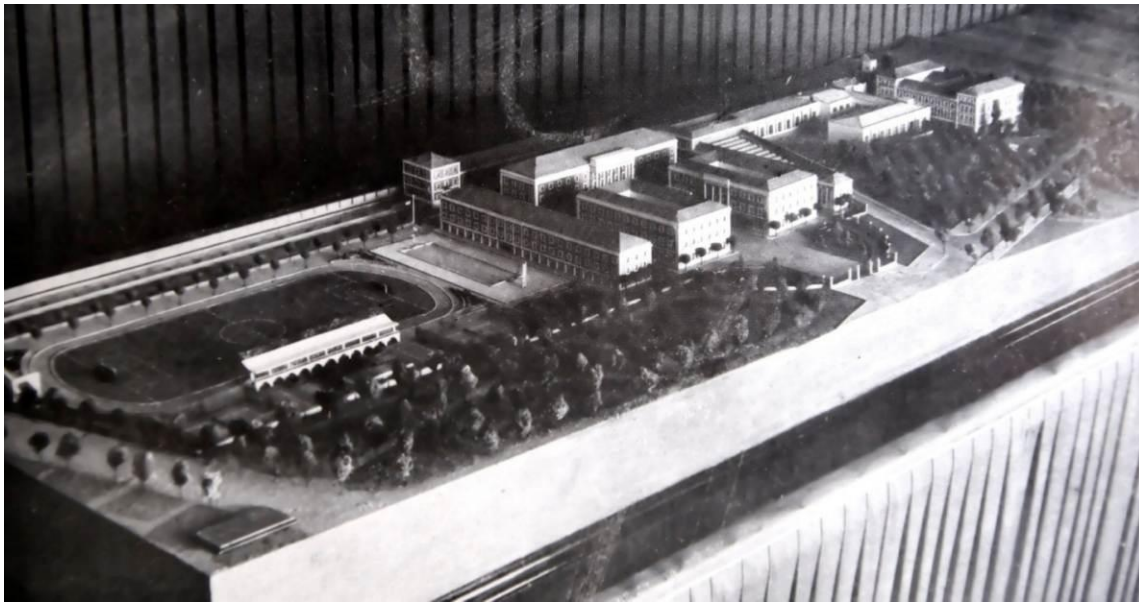


Figure 20: Model and Floor Plans of the Proposal for the Enlargement of the Civil Engineering School by the Retiro Nursery. Mid- XX Century, Under the Management of Mr. Manuel Aguilar López

In 1957, the building was designated as the Technical School for Civil Engineering (Roads, Channels and Ports), and was assigned to the Ministry of Education, annulling the title associated with the Ministry of Public Works,. In the 60's, the increasing number of alumni obliged yet another enlargement. The impossibility of acquiring new plots by the Retiro forced consideration of placing the school in the Ciudad Universitaria. The architects Luis Loarga and José López Zanón were in charge of the final project, starting construction in 1965 and ending in 1968.

When the school moved to the Ciudad Universitaria, the Ministry of Education assigned the former building as part of the system for the newly created Universidad Autónoma of Madrid, until it finally moved to the campus at Cantoblanco.

Later on, the Main Office for Construction of the Ministry of Education moved in, becoming the Management Office for Infrastructures and Equipments of Education and Culture when the Ministries of Education and Culture were unified. Today, it is an autonomous department of the Ministry of Culture.

6. Conclusions

The paper is an approach to the problematic of diagnosis in historical buildings, due to the emptiness found on the methodological and documentary aspects on the previous phases of study, diagnosis and understanding of the behaviour of the building.

A reasoned study of the historical background of the construction itself and the applications associated with it is addressed from the respect towards that which is built. The exhaustive knowledge of the building and its surroundings are a font of proposal and action in patrimony (Martínez et al, 2011).

Emphasis on the need for a prior an intensive study of the monument as a historic good has been done. Currently, the scientific method is being used for the study and interpretation of the monuments, as well as the use of multidisciplinary teams specialised in heritage. But while the cited study is not prescriptive by legal means, it will not be incorporated into the cognitive process and design.

A survey of the most important phenomena influencing the state of this type of construction has been performed. Heritage buildings are very sensitive to changes to their boundary conditions, using a mathematical comparison, so if they vary the premises of departure for which they were built, it will affect their specific conditions. Problems related to use such as those of aesthetic kind, stability or even collapse are emphasized.

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