water and landscape
AGUA y TERRITORIO

Urban requalification projects along the water. Promoting the preservation of the railway heritage on the banks of the Douro River (Oporto/Portugal)

Proyectos de recalificación urbana a lo largo del agua. Promover la conservación del patrimonio ferroviario a orillas del Duero (Oporto/Portugal)

Fernanda de Lima Lourencetti
CIDEHUS-University of Évora
Évora, Portugal
flima@uevora.pt
ORCID: 0000-0001-5649-8774

Información del artículo
Recibido: 14/04/2023
Revisado: 30/11/2023
Aceptado: 8/12/2023
Online: 02/06/2024
Publicado: 10/01/2025

ISSN 2340-8472
ISSNe 2340-7743
DOI 10.17561/at.25.7918

ABSTRACT

The aim of this article is to promote Oporto's railway heritage located on the banks of the Douro River. The railway connection between Lisbon and Oporto was part of the first Portuguese railway plans. However, due to the natural features of the Douro River, the implementation of the railway in Oporto was only possible at the end of the 19th century, and a connection to the river was built in 1888. Meanwhile, the port of Leixões was already replacing Oporto's port services. At the end of the 20th century, the initial configuration of the Oporto railway was altered and part of its infrastructure was deactivated. Currently, some of the areas occupied by the old railway are undergoing interventions, but the urban requalification proposals do not clearly present initiatives to preserve the railway heritage. For this reason, it is important to promote knowledge about the history of railways in Oporto.

KEYWORDS: Porto, Douro River, Customs, Heritage, Railway.

RESUMEN

El objetivo de este artículo es dar a conocer el patrimonio ferroviario de Oporto, a orillas del río Duero. La conexión ferroviaria entre Lisboa y Oporto formaba parte de los primeros planes ferroviarios portugueses. Sin embargo, debido a las características naturales del río Duero, no fue hasta finales del siglo XIX cuando el ferrocarril se estableció en Oporto, construyéndose un enlace con el río en 1888. En este momento, el puerto de Leixões ya había sustituido a los servicios portuarios de Oporto. A finales del siglo XX, la línea férrea de Oporto perdió su trazado original y parte de la infraestructura ferroviaria fue desmantelada. Actualmente, parte de las zonas ocupadas por el antiguo ferrocarril están siendo objeto de intervenciones, pero las propuestas de recalificación urbana no presentan claramente iniciativas para preservar el patrimonio ferroviario. Por este motivo, es importante promover el conocimiento de la historia del ferrocarril en Oporto.

PALABRAS CLAVE: Oporto, Río Duero, Aduana, Patrimonio, Ferrocarril.

Projetos de requalificação urbana ao longo da água. Promover a preservação do património ferroviário nas margens do rio Douro (Porto/Portugal)

RESUMO

O objetivo deste artigo é promover o patrimônio ferroviário do Porto situado às margens do rio Douro. A ligação ferroviária entre Lisboa e o Porto fez parte dos primeiros planos ferroviários portugueses. No entanto, devido às características naturais do rio Douro, a implantação da ferrovia no Porto foi possível apenas no fim do século XIX, sendo construída uma ligação com o rio em 1888. Nesta altura, o porto de Leixões já vinha substituindo os serviços portuários do Porto. No final do século XX, o traçado ferroviário portuense perdeu a sua primeira configuração e parte da infraestrutura ferroviária foi desativada. Atualmente, parte das áreas ocupadas pela antiga ferrovia está a sofrer intervenções, mas as propostas de requalificação urbana não apresentam de forma clara iniciativas de preservação do patrimônio ferroviário. Por esta razão, importa promover o conhecimento sobre a história da ferrovia no Porto.

PALAVRAS-CHAVE: Porto, Rio Douro, Alfândega, Patrimônio, Ferrovia.

Projets de requalification urbaine au bord de l'eau. Promouvoir la préservation du patrimoine ferroviaire sur les rives du Douro (Porto/Portugal)

RÉSUMÉ

L'objectif de cet article est de promouvoir le patrimoine ferroviaire de Porto sur les rives du Douro. La liaison ferroviaire entre Lisbonne et Porto faisait partie des premiers plans ferroviaires portugais. Cependant, en raison des caractéristiques naturelles du fleuve Douro, ce n'est qu'à la fin du XIXe siècle que le chemin de fer a été établi à Porto, et une liaison avec le fleuve a été construite en 1888. À cette époque, le port de Leixões avait déjà remplacé les services portuaires de Porto. À la fin du XXe siècle, la ligne de chemin de fer de Porto a perdu son tracé original et une partie de l'infrastructure ferroviaire a été déclassée. Actuellement, une partie des zones occupées par l'ancienne voie ferrée fait l'objet d'interventions, mais les propositions de réaménagement urbain ne présentent pas clairement d'initiatives visant à préserver le patrimoine ferroviaire. C'est pourquoi il est important de promouvoir la connaissance de l'histoire du chemin de fer à Porto.

MOTS CLÉ: Porto, Fleuve Douro, Douane, Patrimoine, Chemin de Fer.

Progetti di riqualificazione urbana lungo l'acqua. Promuovere la conservazione del patrimonio ferroviario sulle rive del fiume Douro (Porto/Portogallo)

SOMMARIO

L'obiettivo di questo articolo è quello di promuovere il patrimonio ferroviario di Porto sulle rive del fiume Douro. Il collegamento ferroviario tra Lisbona e Porto faceva parte dei primi progetti ferroviari portoghesi. Tuttavia, a causa delle caratteristiche naturali del fiume Douro, la ferrovia fu stabilita a Porto solo alla fine del XIX secolo e il collegamento con il fiume fu costruito nel 1888. A quel punto, il porto di Leixões aveva già sostituito i servizi portuali di Porto. Alla fine del XX secolo, la linea ferroviaria di Porto perse il suo tracciato originale e parte dell'infrastruttura ferroviaria fu dismessa. Attualmente, parte delle aree occupate dalla vecchia ferrovia sono oggetto di interventi, ma le proposte di riqualificazione urbana non presentano chiaramente iniziative per preservare il patrimonio ferroviario. Per questo motivo, è importante promuovere la conoscenza della storia della ferrovia a Porto.

PAROLE CHIAVE: Porto, Fiume Douro, Dogana, Patrimonio, Ferrovia.

Introduction

The Euston Station (1960) demolition, in England, a historical milestone for the safeguarding of industrial heritage, took place later than the beginning of the appreciation of the railway heritage. At the end of the 19th century, the technical ability of engineers and the speed of locomotives already reserved a place for the railway in museums with a focus on art and technique. The exhibition of the Stephenson's Rocket locomotive in the Science Museum of London in 1860[1] is an example of that. After the First World War, several railway lines were decommissioned around the world due to the advent of automobiles and technology changes, such as the replacement of steam by diesel and electricity.

In Portugal, the first discussions on industrial heritage occurred between 1977 and 1978. In 1980, the Association of Industrial Archaeology of the Lisbon Region (AAIRL) was created with the purpose of studying, preserving, disseminating and valuing industrial heritage. Five years later, in 1985, the exhibition *Um Mundo a Descobrir, um Mundo a Defender* took place at *Central do Tejo* in Lisbon. This exhibition promoted the creation of an Industry and Transport Museum. In 1986, the 1st National Meeting on Industrial Heritage took place and, in the following year, the Portuguese Association of Industrial Archaeology (APAI) was created[2]. Despite all these initiatives, according to Custódio (2012), Portugal was "still living off the legacy it received from the 1st Republic, the Estado Novo and the post 25th April Revolution"[3]. This means that at that time, in the field of industrial heritage, the country lacked greater theoretical development at a national level. However, in recent years, several analyses on different typologies of industrial heritage in Portugal have been carried out[4].

Meanwhile, the appreciation of cultural landscape is becoming increasingly important in intervention strategies applied to industrial buildings and infrastructures inserted into the urban grid. At the beginning of the 21st century, the concept of "good practices" in the field of cultural and natural heritage protection has become extremely broad, starting from "a simply formulated need or main objective that serves to establish an innovative strategy of viable and realistic application"[5]. Heritage conservation started to be discussed as an opportunity for the development of a city or even a region. In this way, the positive aspects that the former industrial areas can promote for the city through their requalification became the basis of projects for the repurposing of industrial buildings.

Between 1978 and 1980, the archaeologist Christer Westerdahl started to apply the "cultural landscape" concept to coastal areas, coining the term "maritime cultural landscape"[6]. Initially, this concept referred to the remnants of underwater maritime culture, but currently its meaning is broader, including the ancient monuments used by humans in the maritime space, the port infrastructure being a part of it. Considering the real estate related to port areas, in addition to warehouses, hydraulic works (jetties, dikes, breakwaters, etc.), shipyards, port beaconing, lighthouses, bar markings, maritime stations and forts, railways become apparent as the main communication routes between them[7]. Therefore, the railways inserted into port zones are starting to be considered as a part of port heritage.

As stated by the architect Farinella (2016), water margins, as a source of energy, mobility infrastructure and waste receptacle, attracted the formation of settlements[8]. During the 19th century, these functions were accentuated, especially those related to port infrastructures, due to the advancement of technology. In Oporto, in Portugal, the old Customs House, built in 1325 on the orders of King Afonso IV, gave way to the construction of the new Customs House between 1859 and 1869, in the Miragaia area. This work was carried out by order of the engineer António Maria de Fontes Pereira de Melo (1819-1887)[9], who at the time oversaw the Ministry of Public Works, Commerce and Industry. During this period, the navigation system on the Douro River was improved: a quay was built and the river bar was dredged. Simultaneously, several urban works were carried out, such as the construction of *Rua Nova da Alfândega*, a street where buildings were constructed for companies linked to navigation, insurance and forwarding agents.

However, located 6 kilometres from the mouth of the Douro River, Oporto has a shallow area close to its

[1] Pinheiro, 2016, 84.
[2] Custódio, 1991, 3-5.
[3] Custódio, 2012, 40.
[4] Among others, it is worth mentioning those discussed at the University of Évora, namely the thesis of Maria da Luz Sampaio (2015), Sheila Palomares Alcarón (2020) and Armando José Graça Quintas (2021).
[5] Sobrino, 2014, 13.
[6] Westerdahl, 1992, 6.
[7] Nabais, 2021, 12.
[8] Farinella, 2016, 34.
[9] This engineer became a deputy in 1848, becoming Minister of the Navy and Overseas Territories, of the Treasury, of Public Works, Commerce and Industry and of War in 1851. In 1866 he became a State Counsellor, then a Peer of the Realm in 1870 and the head of the Executive Branch between 1878-1879 and between 1881-1886 (*Assembleia da República*. Fontes Pereira de Melo).

banks. At the beginning of the 19th century, this natural feature did not enable the existing port services to accommodate vessels with new technologies, such as the use of steam engines. Thus, due to the sinking of a steamboat on 29th March 1852, a committee to prepare all the necessary works for the construction of an artificial port on the north of the Douro River was created. This commission was constituted by the military engineers Belchior José Garcês (1809-1874)[10], Sebastião Lopes de Calheiros Meneses (1816-1899)[11] and Plácido de Abreu (1809-1895)[12].

In that same year, the port of Leixões began to be built in the municipality of Matosinhos to replace the port in Oporto[13]. As a result, some of the port services were closed in 1884. To avoid losing its position in the urban network hierarchy, Oporto "had to prolong the viability of its port structures in order to survive as a city with the functions of a regional metropolis"[14]. Thus, if in the first half of the 19th century, the port area was the most important area of the city of Oporto, due to the constraints of port activities, in the middle of that same century, the importance of this area began to be transferred to the central area of the city[15].

In the following century, the concept of the "waterfront" gained interest and value worldwide and has been used in the requalification works of the old port area of Oporto. Regardless of the type of obsolescence, the deactivation and/or relocation of port areas resulted in the emergence of extensive urban voids in a number of cities around the world. Consequently, as the industrial heritage was being converted to industrial museums, location for artistic manifestations, multifunctional commercial and educational space, cultural centres, residential complexes and other new public spaces[16], the port zones became the target of intervention works.

Meanwhile, the port areas and the railway heritage started to be considered as landmarks in the "urban landscape"[17]. In addition to the implementation of the "waterfront" concept, after 1992, "heritage parks" were created as an urban solution for the preservation and reuse of large-scale infrastructures. Some specialists define this kind of solution as an attempt to unite cultural elements with the history of the territory[18].

Linear infrastructures such as railways and ports have significant potential in urban requalification projects and are often converted to "linear parks"; a solution found in examples such as the High Line in New York or the *Promenade Plantée* in Paris. Currently, these requalification practices fit into the concept of "circular economy", which, through repurposing of decommissioned structures and industrial spaces, seeks to avoid the disposal of materials resulting from the demolition of buildings, and the need for new materials for the construction of new buildings[19].

In recent studies of the cultural valorisation of coastal areas, urban historians have begun to explore the relationship between the development of "waterfronts" and port areas. In 2016[20], Carola Hein proposed the concept "port cityscape", to refer to all the territory near the water and occupied by ships, pipelines, the port services, warehouses, industries and their logistical spaces, administrative buildings and working-class districts[21]. In her studies, the railway infrastructure is classified as part of the infrastructure allied to the port area, along with the airport, the roads and the port itself.

At European level, in 2002, the European Territorial Cooperation Programme ESPON was created and integrated into the INTERREG transnational cooperation community initiatives. Among ESPON activities, the reuse of industrial spaces and buildings have been allied with initiatives in favour of sustainability. In a report published in 2020, it was mentioned that out of 144 port cities, 96 had received some kind of intervention for the regeneration of their urban fabric. Of the cities analysed, 54 had their "waterfront" as part of a global strategy, 16 included these spaces in more punctual projects,

[10] This engineer served the national railway company of Oporto until 1852. In 1854, he worked as an inspector of the works on the road from Carregado to Coimbra and acted as a member of the Council of Public Works. On June 19, 1855, he became the supervisor of the construction of the southern railways. (*Arquivo Distrital de Setúbal*. Belchior José Garcez, PT/ADSTB/PSS/APAC/L/0022).

[11] He was a volunteer in the cavalry regiment n.10 in 1833 in Oporto. He graduated at the University of Coimbra 1838, when he went to study in Paris. In 1844, he joined the Public Works service and was promoted to lieutenant of the General Staff. (*Arquivo da Câmara Municipal de Ponte de Lima*. Sebastião Lopes de Calheiros e Meneses; 1816-1899, PT/MPTL/BMPL/01/008/0020).

[12] In 1839, he graduated in mathematics at the University. In 1842, he became director of Public Works in Castelo Branco, becoming a member of the *Conselho Superior de Obras Públicas* in 1858. In 1869 he was appointed chief engineer of the Sixth Division. Throughout his career he was also director of Public Works in Braga and Oporto and was a Member of Parliament between 1851 and 1861 (*Hemeroteca Infogenial*. Plácido António da Cunha de Abreu).

[13] Sousa; Alves, 2002.

[14] Alves; Dias, 2001, 96.

[15] Pacheco; Alves, 2019.

[16] Aguilar, 2001, 183.

[17] The "urban landscape" is field of studies established through the aforementioned European Landscape Convention, in 2000 (Monclús, 2013, 24).

[18] Álvarez Areces, 2010, 26.

[19] Cardoso de Matos; Lourencetti, 2021.

[20] Hein *et al.*, 2020, 3.

[21] Hein, 2019, 4.

applied periodically, and 26 had drawn up plans or policies for these areas, but they had not yet been applied[22].

In Portugal, despite its strong historical connection with the sea, most of the studies on railway heritage in the urban fabric are not related to the analysis of port areas. In fact, according to António Nabais (2021), studies on Portuguese port maritime heritage still need to be developed to systematise information and historical facts to provide the basis for enhancing the port heritage knowledge[23].

Since the beginning of the 21st century, the railway heritage constructed near the shoreline has been considered as part of the port heritage and, combined with the concepts and concerns for cultural, natural and urban landscape, the field of "good practices" for its preservation and safeguarding should be enhanced. Sustainability issues have put the requalification of railway and port areas under the spotlight of public and private agents, at local, regional, national and international level. The city of Oporto is no exception.

Currently, Oporto municipality is considering requalifying part of the area previously occupied by railway lines near the Douro River. The goal is to create a route to foster sustainable mobility, with the aim of regenerating these areas. Therefore, in order to promote the preservation of the railway heritage during the intervention works in Oporto, this paper will outline the construction process of the railway infrastructure in the city; the spatial connection established between the railway and the water will be explored; and the management of the railway heritage along the water will be evaluated.

To achieve this, the article presents the history of the Oporto railway from the second half of the 19th century to the present day. The agents responsible for the construction of the railway and those related to the intervention initiatives of its former areas will be identified. To complement the literature used, contemporary texts as well as press articles from the time of the construction of the Oporto railway, such as publications from the *Diário do Governo*, the Ministry of Finance, the Chamber of Deputies, the Ministry of Culture and Scientific Coordination and documents found in the Oporto Municipal Historical Archive were consulted. The promotion of knowledge regarding the contribution of the railway to the urban history of Oporto aims to instigate discussions about the urban requalification projects applied along the water line of this city.

When the railway reaches Oporto

The railway line between Oporto and Lisbon was part of the first Portuguese railway plans. Known as the North Line, its construction was approved in the same year that the works to build the port of Leixões began, through a decree of August 30, 1852. However, its concession was awarded later, on April 8, 1857, to the British entrepreneur Mr. Morton Petto. The project was drawn up by the engineers Wattier (1816-?)[24] and Boura, and approved on April 14, 1857[25].

The natural adversities of the Douro River influenced the construction of the railway. In addition to its shallowness, the stretch of the Douro River that separates Oporto from Vila Nova de Gaia is extensive, which motivated the carrying out of studies that concluded this second city to be the end point of the North Line. On June 7, 1864, the North Line from Lisbon reached Vila Nova de Gaia, having been financed by the Spaniard José de Salamanca y Mayol (1811-1883)[26] since 1859. The work was entrusted to the railway engineer D. Adolfo Ibarreta (1830-1893), but he abandoned the job in the same year that the service was entrusted to him, and the work was transferred to João Evangelista de Abreu[27].

Finally, to reach Oporto became a goal, but to cross the Douro River was still a significant challenge, which required the execution of several studies. Considering the positioning of the old port area of the city of Oporto, engineer Wattier proposed a railway connection that would run "by the sea through Ovar, flank the high mountains on the left bank of the Douro estuary and end at the lower part of Vila Nova de Gaia"[28]. This link would allow for the extension of the railway in the future, both to the *Alto Douro* and to *Galicia*[29]. However,

[22] ESPON. Policy brief 2020: Reuse of spaces and buildings. https://www.espon.eu/reuse-spaces-and-buildings.

[23] Nabais, 2021, 12.

[24] He graduated in Paris Polytechnic School in 1834. In 1855, he got a concession to present preliminary studies to be applied on the Portuguese railway construction, at this time this engineer belonged to the French Imperial Corps of Bridges and Roads (Matos, 2022, 64).

[25] Hemeroteca Municipal de Lisboa (en adelante HML), *Gazeta dos caminhos de ferro*, n. 1644, June 16, 1956, 250/253.

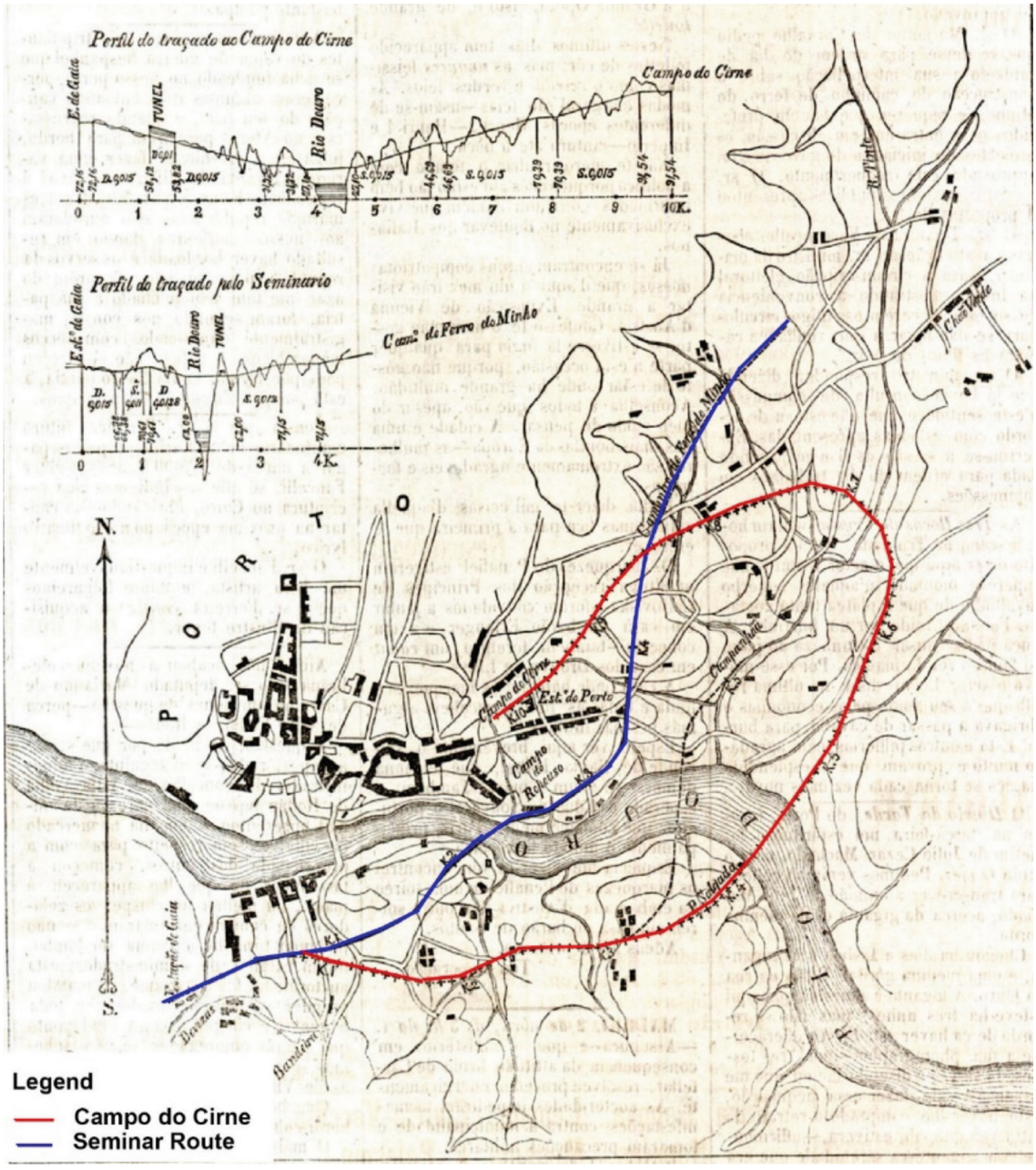
[26] He graduated in law at the University of Granada. In his long political career, Salamanca developed his interest in the construction of railway lines from 1840 onwards, having a great participation in the railway history of the Iberian Peninsula (*Real Academia de la Historia.* José de Salamanca y Mayol).

[27] HML, *Gazeta dos caminhos de ferro*, n. 1645, July 1, 1956, 267.

[28] HML, *Gazeta dos caminhos de ferro*, n. 1650, September 16, 1956, 411.

[29] The connection between Spain and Portugal through Galicia was discussed since 1857 (HML, *Gazeta dos caminhos de ferro,* n. 1644, June 16, 1956, 250-255).

Map 1. Campo do Cirne and Seminar Route



Source: HML, *Diario Illustrado*. - No. programme (June, 1872) - a. 39, no. 13301 (January 7, 1911). - Lisbon: Impr. de Souza Neves, 1872-1911. Adapted by the author.

an alternative plan was approved. Known as *Campo do Cirne* (Map 1), this was the first plan created by the *Companhia Real dos Caminhos de Ferro Portugueses* (CRCFP)[30] on July 14, 1869, for the extension of the North Line to Oporto. However, due to the political and financial crisis the country was experiencing[31], the government was unable to execute the necessary land expropriations, thus this design was not applied.

In 1872, engineer Manuel Afonso de Espregueira (1835-1917)[32], Director of the CRCFP, presented another route as a more efficient solution to cross the Douro River, the design was called the Seminar Route (Map 1).

[30] Created in 1859, as a complex alliance between mainly French and Spanish investments, the management of the company was formed by Salamanca and representatives of *Crédit Industriel et Commercial*, the investment bank Edouard Blount, *Compañía de los Ferrocarriles de Madrid a Zaragoza y Alicante* and *Compagnie Lyon-Mediterranée* (Silva, 2009, 332).

[31] Justino, 1988.

[32] Graduated in Mathematics at the University of Coimbra, he attended the Army School and the Paris School of Bridges and Sidewalks. He held the position of Director General of the Royal Company of Portuguese Railways between 1872 and 1885, and later between 1890 and 1894 (HML, *Gazeta dos caminhos de ferro*, n. 1652, October 16, 1956, 486).

Map 2. Plan of the railway tunnel near the Seminary in Oporto

Source: Câmara Municipal do Porto. Arquivo Histórico (cm-porto). Cobertura da trincheira do Seminário pelo prolongamento do túnel dos Caminhos de Ferro. 23169. TG-a/751. Adapted by the author.

The engineer Pedro Inácio Lopes (1840-1900)[33] made some changes to the design of the Seminar Route by raising the level of the rails by 2 metres on the bridge to improve it. His proposal was accepted on June 25, 1873, the final plan was approved on March 6, 1875, and the railway reached Oporto in 1877[34]. The construction of the Maria Pia Bridge by the Eiffel & Co., founded in 1869, made this achievement possible. Engineered by Gustave Eiffel (1832-1923)[35] and Théophile Seyrig (1843-1923)[36], designed by Gustavo Arneliau, Joseph Collin and by the foremen Campagorau and Destandau[37], this bridge is still considered one of the "masterpieces" of Portuguese engineering[38]. The connection between the bridge and the Oporto railway station was created between 1875 and 1876 by passing through a tunnel and a trench, under the old Seminary (currently Salesianos) grounds (Map 2)[39].

The railway station of Oporto was located outside the urban centre and with a topographic level far above the port area, on "the green fields of Pinheiro and Godim, also counting on part of the farm of Baron Vallado and Commendador Lima"[40]. Thus, Campanhã Station, which was also known as Pinheiro Station, stands at an altitude of approximately 70 metres above sea level, and required the expropriation of land owned by Barão Vallado and Serafim Pinto Morgado for the construction of the Estação do Oporto Avenue[41]. Those responsible

[33] Graduated in Mathematics and Philosophy, Pedro Inácio Lopes attended the School of Bridges and Sidewalks until 1864, when he joined the Royal Portuguese Railway Company (HML, *Gazeta dos caminhos de ferro*, n. 1652, October 16, 1956, 490).

[34] An article published in the magazine *O Occidente*, mentions that the first railway station in Oporto was connected to the North Line by the inauguration of the Maria Pia Bridge on November 4, 1875 (HML, *O Occidente*, 18º Anno, vol. XVIII, n. 601, September 5, 1895, 195).

[35] He graduated in chemical engineering at the *Ecole Centrale des Arts et Fabricatures* in Paris in 1855. Eiffel was appointed Head of Service and studies of the Paris workshops when the factory was merged with the Belgian company, *Compagnie Générale de Matérial de Chemin de Fer* (HML, *Gazeta dos caminhos de ferro*, n. 1652, October 16, 1956, 488).

[36] He was a German engineer graduated at the *Ecole Central des Arts et Manufactures* in Paris in 1861.

[37] HML, *Gazeta dos caminhos de ferro*, n. 1652, October 16, 1956, 472.

[38] Lopes Cordeiro; Vasconcelos, 2005.

[39] *Arquivo Histórico Municipal do Porto* (AHMP), (D-TGa-CMP/2 (439)).

[40] HML, *O Occidente*, 18º Anno, vol. XVIII, n. 601, September 5, 1895, 195.

[41] Diário do Governo Digital (DIGIGOV), *Ministério da Fazenda,* Livro 1874 (October 22, 1874), Diário do Governo, n. 175.

Figure 1. Campanhã Railway Station

Source: by the author (2021).

for the construction of Campanhã Station were part of the administration of the Minho Line[42] (the Portuguese section of the railway connection between Oporto and Vigo), namely the engineer João Joaquim de Mattos and the section chief Álvaro Allão Pacheco, with the collaboration of the conductor João Antonio Maximo.

The project was designed by engineer Pedro Ignacio Lopes, the same engineer who changed the scope of the project for the rail link between Vila Nova de Gaia and Oporto, but the workshop buildings were designed by the engineer Mendes Guerreiro[43], and the passenger building by José Ângelo Cottinelli Telmo (1897-1948)[44]. This architect worked for the Portuguese Railway Company between the 1920s and 1940s. The walls of this station are made of granite masonry, which have been plastered and painted white; The structure of the building is delineated by exposed granite, as in the window and door frames, the plinth, the pilasters, and the friezes[45] (Figure 1).

The station became a junction point for the North Line, the Minho Line (built in 1872) and the Douro Line (built between 1873 and 1882)[46]. Connected to this station, another branch was constructed to reach the Customs House, on the riverbank, for the transportation of goods. The design was drawn up by engineer Justino Teixeira in February 1881. After some changes to the project, the railway that gave rise to the *Ramal da Alfândega* was built with a length of 3,800 metres[47].

The railway and its connections to the water

The land around Campanhã Station was completely transformed by the construction of wide avenues and new residential buildings. Some of the houses were built so rapidly that they were completed before the embankments were constructed, requiring the use of ladders to gain access to the entrances. The construction of the connection between this railway station and the waterfront also generated urban impacts such as the construction of tunnels on the escarpment between the city and the river —one of 1320 metres, another of 23 metres and a third of 80 metres—; a bridge over *Rua da China;* another bridge over *Rua do Freixo;* retaining walls; and trenches[48]. The engineer Augusto Luciano Simões de Carvalho[49] was responsible for the majority of these works[50].

On January 10, 1884, Joaquim Bernardo Borges, owner of a farm in Rego Lameiro, requested a license to channel water from the public road, because after the construction of the *Ramal da Alfândega*, the pipe that

[42] The construction of this railway line went through a voting process recorded by the decree of July 14, 1872.
[43] HML, *Occidente,* 18º Anno, vol. XVIII, n. 601, September 5, 1895, 195.
[44] This architect graduated from the Special Course in Civil Architecture at the Lisbon School of Fine Arts in 1920.
[45] Sistema de Informação para o Património Arquitetónico (SIPA). Ferroviária de Campanhã, IPA.00023030.
[46] Sousa: Alves, 2002, 61.
[47] AHMP, *O Tripeiro*, 7.ª série, ano XXVIII, n. 01, 295.
[48] Portal de Notícias do Porto, April 19, 2021. https://www.porto.pt/pt/noticia/lancamento-do-debate-publico-sobre-a-reativacao-do-ramal-da-alfandega-marcado-para-quarta-feira.
[49] He studied in Paris in 1864. His first fieldwork was in Grenoble, the second one was in Bordeaux and the third one was in France and Spain during the Universal Exhibition (Cardoso de Matos, 2009, 194).
[50] HML, *O Occidente*, 18º Anno, vol. XVIII, n. 601, September 5, 1895, 195.

Map 3. Alfândega Station implementation in the *Preliminary Draft of the Ramal da Alfândega*

Source: Cm-porto, anteprojeto de uma variante (...) do projeto de ramal de caminho-de-ferro (...), 653117, D-CDT/B4-141(b). Adapted by the author.

crossed his land to fertilize his production had been intercepted[51].

In 1886, a preliminary project was presented by the Commercial Association of Oporto to the government, proposing a place for the construction of the Alfândega Station (Map 3). However, "the merchants of Oporto opposed the location of the new station next to the Customs House because they considered it mediocre"[52]. The location of this station was planned in front of Ferreira Borges Street and Infante D. Henrique Square, with entrances in Fonte Taurina Street, Alfândega Velha Street, and Alfândega Nova Street. From this station, branches would be extended to the Customs House accompanied by cranes that would facilitate the direct loading and unloading of wagons onto ships. The station would be "the complement of the pier, in order to correspond to its purposes"[53]. After a visit by Councilman Emídio Navarro, the proposal was accepted. However, to build a railway station in Miragaia would imply a large number of expropriations and the distancing of most of its users, as it would double the cost of transporting goods to D. Pedro Square (currently Liberdade Square), located in the city centre.

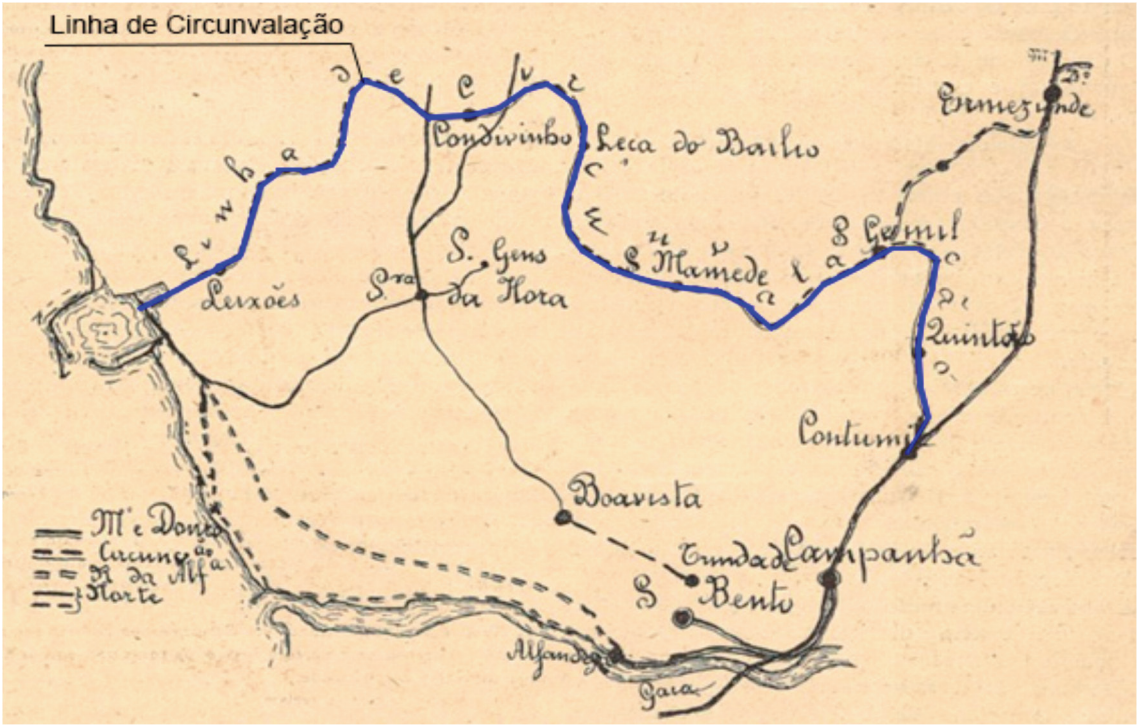
As the construction of all the necessary infrastructure was delayed, the *Ramal da Alfândega* was only inaugurated in 1888, without a station building. As a result, the railway occupied the riverbanks with a network of rails laid outside and inside the Customs House building, with a total length of 1,360 metres. In the vicinity of the rails, cranes were installed, to ensure the circulation and handling of goods between warehouses. Eventually, another railway station, the São Bento Station, was built nearby D. Pedro Square to connect the merchants to Campanhã Station.

Meanwhile, the port of Leixões was connected to Oporto by the Minho Coast Line, also known as the Oporto to Póvoa and Famalicão Line. "Indeed, on June 19, of that year [1873], the concession of a 0.90 m track railway between Porto and Póvoa do Varzim was given to Baron of Kessler and Temple Ellicot, at no charge to the Government"[54]. On December 30, 1873, the *Companhia do Caminho de Ferro do Porto à Póvoa* was created and the line was inaugurated on October 1, 1875. This line was connected to the branch line of Leixões in 1884. This branch line, built by the company Dauderni & Duparchy[55], had the purpose of connecting the port of Leixões (still under construction) to S. Gens Quarry (Map 4).

In 1889, the amount of 942 *contos* (the currency of that period) was calculated for the construction of a railway link between the Oporto railway and Leixões. The *Companhia das Docas e Caminhos de Ferro Peninsulares* was created to operate this link, along with the lines built towards the north, passing through Salamanca until the border between Portugal and Spain. However, although in 1903, Campanhã Station was expanded by the construction of new quays and reconstruction of the carriage trough, this infrastructure was no longer sufficient for the existing transport service[56]. For this

[51] AHMP, Licença de obra n.º 189/1884. 457672, D-CMP/7(90) - f. 35-38.
[52] Pinheiro, 2008, 56.
[53] AHMP, anteprojeto de uma variante (...) do projeto de ramal de caminho-de-ferro (...), 653117, D-CDT/B4-141(b).
[54] HML, *Gazeta dos Caminhos de Ferro*, ano LXXI, n. 1686, March 16, 1958, 137.
[55] This company belonged to Jean-Baptiste Dauderni (1827-1886) and his partner Jean Alexis Duparchy (1835-1907) (Matos, 2022, 65).
[56] Arquivo Histórico Parlamentar (en adelante AHP), *Câmara dos Deputados*. (May 9, 1903), Apendice à Sessão n. 71, Debate sobre a Lei n. 19-C.

Map 4. Sketch of the railway lines planned for the city of Oporto



Source: HML, *Gazeta dos Caminhos de Ferro*, n. 1219, October 1, 1938, 439. Adapted by the author.

reason, "in accordance with the opinion of the Higher Council of Public Works and Mines"[57], a project designed on October 31, 1902, for the construction of a new railway station near the urban area of Oporto, was approved by the government on April 30, 1903[58]. The new railway station was called Contumil; its construction was requested by the Secretary of State for Public Works, Commerce and Industry on September 10, 1903, being approved by the government on the same day[59].

On June 9th, 1904, "the Councillor Pedro de Araújo talks with the Mayor about the importance of building a branch line between Oporto Customs House and Leixões, a railway line that the Oporto Trade Association wishes to take the initiative, as it is an improvement of vital interest"[60]. However, this railway branch was not supposed to be designed in parallel to the existent marginal route. Finally, on the same day, the government authorized the construction of a railway branch between Customs House branch line and the port of Leixões; this was approved on July 4, 1905[61].

In 1906, a railway project was approved by the government, but it presented the rails following the marginal route from the port of Leixões to the Douro River, where they were supposed to meet the *Ramal da Alfândega*. The construction of this section would require the total demolition of Miragaia, a neighbourhood considered by hygienists to be unhealthy. However, the high price of the works did not make this project feasible[62]. Finally, this section was replaced by the *Linha de Circunvalação* (Map 4).

This railway line was composed of the rail branch connecting the port of Leixões and Oporto, the rail branch between Campanhã Station and Contumil Station and a direct railway line connecting the port of Leixões and the Oporto Customs House, by a path away from Douro riverbanks[63]. Eventually, the route between the port of Leixões and Contumil Station through Senhora da Hora was inaugurated in 1938, but the railway belt was never completed.

However, like other pre-industrial port cities occupied by extensive yards and docks, accompanied by factories, warehouses and railways, the city of Oporto suffered the impacts of technological changes. Besides

[57] DIGIGOV, *Diário do Governo*. (September 10, 1903), n. 203, Livro 1903, 567.
[58] DIGIGOV, *Diário do Governo*. (May 20, 1903), n. 113, Livro 1903, 211.
[59] DIGIGOV, *Diário do Governo*. (September 10, 1903), n. 203, Livro 1903, 567.
[60] AHMP, *O Tripeiro*, 5.ª série, ano 10, n. 2, 1954, 59.
[61] AHMP, *O Tripeiro*, 5.ª série, ano 9, n. 3, 1953, 92.
[62] Vilas, 2009, 295.
[63] HML, *Gazeta dos Caminhos de Ferro*, n. 1219, 1 de outubro de 1938, 439-441.

the deactivation of part of the port infrastructure, these changes contributed to the obsolescence of the Customs House and, consequently, to the deactivation of the railway line that supported it. Thus, the need to reintegrate the areas occupied by these infrastructures into the urban grid, inserted them into the "waterfront" concept.

Urban requalification and railway heritage on the banks of Douro River

The preservation of the urban cultural heritage concerns emerged in Oporto in the 1970s. Consequently, the Commissariat for the Urban Renovation of the Ribeira/Barredo Area (CRUARB) was created by the central government in 1974[64], being shifted to the municipal authority in 1983. The interventions on the riverbanks, classified as "waterfront", began in 1976, starting with the reconstruction of housing, followed by the renovation of some buildings and urban infrastructures. In this period, both the Oporto Customs House and the *Ramal da Alfândega* were in operation, however, in the 1980s, the services provided by the Customs House were transferred to the central area of Oporto, which was supported by the existence of some means of communication, such as São Bento Station and the airport. Then, in 1989, the *Ramal da Alfândega* was deactivated.

In an essay about the "waterfront" concept written by André Fernandes and João Souza (2016), the importance of areas previously occupied by former port infrastructure being included in urban requalification plans is highlighted. The "waterfront" is presented as a new "urban category", due to its physical-geographic specificities, and it is portrayed as a term adopted by several experts and in documents of technical nature, produced by institutions such as the Municipalities and the Administrative Entities of the Port Areas.

In the case of railways, the passenger buildings have been the element that have gained more attention at the beginning of the preservation practices of this heritage. In many cities, such as Paris and London, their construction holds internationally recognized aesthetic, constructive, cultural and historical values. However, the complexity of railway infrastructures is based on a set of buildings that have, throughout their history, influenced the consolidation of the urban landscape of many cities.

In 1965, the ICOMOS (International Council on Monuments and Sites) was founded. This Council is a non-governmental institution responsible for proposing the classification of historic monuments to UNESCO (United Nations Educational, Scientific and Cultural Organization). From 1978[65] to 2003[66], ICOMOS proposed the classification of thirty industrial monuments[67]. Semmering Railway (1848-1854), located in Austria, was among them. This was the first railway complex to be classified as a monument of cultural value by UNESCO in 1998; it was the first railway infrastructure to overcome a significant topographical unevenness.

In Portugal, the identification and collection of vehicles and other relevant elements of railway heritage were used for museological purposes, i.e., for the conception of exhibitions. Thus, in 1976, the Railway Museum Study Commission was created, which gave rise to a large collection, requiring the use of large spaces due to the size of the elements exhibited. For this reason, railway buildings "scattered around the country were reused, which, since the 1970s, have constituted the Museological Sections"[68]. In 2015, the Ginestal Machado National Railway Museum was inaugurated in Entroncamento, which has a collection of approximately 36,000 pieces[69]. In 2017, this museum and the Railway Museum of Lousado (Municipality of Vila Nova de Famalicão) were included in the European Route of Industrial Heritage (ERIH).

Since July 2016, the Portuguese Directorate General for Cultural Heritage has established a collaboration protocol with the railway company *Infraestruturas de Portugal S.A.* (IP). The aim of the protocol is to carry out a railway heritage inventory and to integrate it into the Information System for Architectural Heritage (SIPA). In this catalogue, only six railway stations are under some kind of protection policy (Table 1). The classifications vary between Monument of Municipal Interest (MIM)[70] and Property of Public Interest (IIP)[71]. The first Portuguese railway station to be classified was Rossio Station, in Lisbon, in 1971, registered as a Property of Public Interest.

[64] AHMP, Produtor – CRUARB. 1974-2003.

[65] In the same year that the first meeting of the International Committee for the Conservation of Industrial Heritage (TCCIH) happened.

[66] In the same year that the Nizhny Tagil Charter on Industrial Heritage was implemented.

[67] Pinheiro, 2016, 88.

[68] Silva, 2008, 130-133.

[69] National Railway Museum em https://www.fmnf.pt/pt

[70] This classification is awarded at municipal level by the General Directorate of Cultural Heritage.

[71] This classification is awarded at national level by the Directorate General for Cultural Heritage, together with the Regional Directorates for Culture.

Railway heritage requalification policies in Portugal were also influenced by the European Association of Green Routes, created in 1998 in Belgium. In 2015, the country reached almost 250 kilometres of green paths[72].

A publication about Setúbal (Portugal) port-railway infrastructure[73], illustrates the impact of the spatial relationship established between these infrastructures on the urban fabric. However, in Setúbal, only part of the port infrastructure was relocated, and this relocation meant the extension of the port services along the Sado River, and not the total deactivation of the port. In the case of Oporto, the port services were totally extinguished, leaving behind part of its legacy through some built remnants. Among these remnants are elements of the old *Ramal da Alfândega* and of the first railway connection between Vila Nova de Gaia and Oporto, deactivated in 1991 due to its inability to support new technologies, such as the increased speed of trains.

The urban requalification initiatives included the restoration of the Customs House by the architect Eduardo Souto de Moura[74], and its use as the Museum for the Transport and Communication Association. At the same time, the preservation of the *Ramal da Alfândega* was planned as a part of the works designed for the "Miragaia Operation". This initiative proposed the creation of a terminal for a historic train that would run through the tunnels of *Ramal da Alfândega* to D. Maria Pia Bridge, but this plan was never carried out[75]. Nevertheless, due to the efforts made in the urban requalification of Oporto, in 1996 its Historic Centre was included in the UNESCO World Heritage list.

At the advent of the 21st century, the urban requalification works continued after the beginning of the extinction of CRUARB; this process ended in 2003, and the *Porto 2001 S.A.* was created. This company was responsible for hosting and organizing the initiatives related to the classification of Oporto as European Capital of Culture, which occurred in 2001. The waterfront of Oporto, known as *Baixa*, was the focus of numerous proposals and projects presented for development within the scope of the event. However, many of these projects were not implemented. Finally, the *Sociedade Porto Vivo S.A.* drew up a project, called the 2008 Management Plan. This plan fostered the national and international valorisation of the city of Oporto[76]. As a result, between 2010 and 2021, 786 buildings were restored in the area between the Historical Centre, the Luiz I Bridge and the Serra do Pilar Monastery[77].

Although the *Ramal da Alfândega* crossed part of the area covered by the intervention plans, the preservation of railway heritage is in a delicate situation. Since its deactivation, the area occupied by the old railway infrastructure has undergone interventions for an urban improvement that would promote the urban integration of the disused railway spaces and the connection of citizens with the Douro River. In part of the area occupied by the old railway complex of the Customs House,

Table 1. List of classified Portuguese railway stations

City	Railway Station	Construction Period	Level or protection	Year of classification
Lisbon	Cais do Sodré Railway Station	1925-1928	MIP	2012
	Rossio Railway Station	1886	IIP	1971
Coimbra	Estação Nova	1925-1931	MIP	2013
Oporto	São Bento Railway Station	1900-1916	IIP	1997
Santarém	Santarém Railway Station	1870-1875 (Stables of the first building station) 1925-1927(second building station)	MIP	2013
Portalegre	Fronteira Railway Station	1933	In the process of becoming a MIP	-
	Portalegre Railway Station	Séc. XIX / XX	MIP	2022
Barreiro	Barreiro Railway Complex – Barreiro Railway Station	1884	In the process of classification (with Opening Order)	-

Source: Information System for Architectural Heritage (SIPA). Design by the author.

[72] Batista, 2015, 11.
[73] Lourencetti, 2022.
[74] A Portuguese architect who graduated at the Porto School of Fine Arts and won the Pritzker prize in 2011.
[75] Pinto; Santos, 2011, 228.
[76] Pinto; Santos, 2011, 239
[77] Portal de Notícias do Porto, December 5, 2021. https://www.porto.pt/pt/noticia/centro-historico-e-patrimonio-mundial-ha-25-anos-e-apresenta-projeto-de-novo-plano-de-gestao.

Figure 2. Area of the old Alfândega Station (2021), rails (a), mobile crane (b), fixed crane (c) and wooden barrier (d)

Source: by the author (2021).

a car park was built, leaving a fixed crane used for loading and unloading goods, a mobile crane with lifting boom used for customs clearance of goods, and two wooden barriers. In the parking area, it is also possible to identify part of the 1,360 m of rails that ran towards the Customs House building (Figure 2). In this context, only the cranes and the wooden barriers are accompanied by information panels, while the preserved rails have no explanation that refers to the history of their connection with Campanhã Station.

The tunnels and the D. Maria Pia Bridge (Figure 3) still remain as features of the landscape on the Douro riverbank. However, these elements have no new use, which means that they have not yet been reintegrated into the urban fabric of the city of Oporto. The tunnels are part of an urban void and the D. Maria Pia Bridge, despite having been classified as a national monument by Decree no. 28 of 1982[78], is closed, and it does not have any access or explanation of its heritage value.

Meanwhile, due to the interest in improving the mobility and sustainability of the old railway areas, two hypotheses for the requalification of the area between Miragaia and Campanhã Station have been discussed[79]:

- An urban park and a route for a soft mobility mode, i.e., for pedestrians and cyclists. As the land has a 3% slope rate, this solution can be easily implemented, and it foresees the connection of the consolidated urban grid of Oporto to the riverbank. Three mechanical links are planned. One of them will give

[78] AHP, *Ministério da Cultura e Coordenação Científica.* Instituto Português do Património Cultural, Decreto n.º 28/82, DR, I Série, n.º 47, de 26-02-1982.

[79] Portal de Notícias do Porto, April 19th, 2021. https://www.porto.pt/pt/noticia/lancamento-do-debate-publico-sobre-a-reativacao-do-ramal-da-alfandega-marcado-para-quarta-feira.

Figure 3. A partial perspective of the tunnels and D. Maria Pia Bridge

Source: by the author (2021).

support to the reuse of the D. Maria Pia Bridge, which is planned to be used as a route designed to link the cycle network of Vila Nova de Gaia with the one on the Gustavo Eiffel Avenue.

- Commuter transport route. To reduce the volume of motor vehicles in the historical centre, this mean of transportation is planned as a high-speed electrical transport. It is supposed to connect the old Customs House area to Campanhã Station. This solution is seen as an effective way to significantly reduce the number of cars in the city, allowing the requalification of part of the spaces used as a parking lot into green spaces.

Under the scope of sustainability, both proposals take advantage of the already existing man-made topography, foresee the reduction of air pollution and fulfil the requalification of urban spaces. Although the publicity made about these urban plans briefly presents the railway history of *Ramal da Alfândega*, no information has yet been released showing the application of strategies for the preservation and valorisation of its heritage in the urban requalification projects. In fact, not even Campanhã Station, as the first railway station built in Oporto, or any part of its infrastructure has a cultural heritage classification. Only the passenger building of São Bento Station, inaugurated in 1915, was classified as Property of Public Interest in 1997, due to its architectural features.

Inaugurated in 1875, Campanhã Station has undergone major interventions throughout its history, such as the deactivation of part of Oporto's railway system, which was replaced by the metro system. Throughout the railway system deactivation, some stations, such as Boavista Station, were permanently closed or replaced by new infrastructure. This second process occurred at Contumil Station, which had its old building demolished and replaced by a larger infrastructure, becoming the Operational Command Centre of the railway (Figure 4).

In view of what has occurred throughout the transformation process of the Oporto Railway System, it is important to draw attention to the requalification projects that have been developed for the old railway spaces along the water. The urban plans presented until now seem not to be sufficient to transmit the importance of the former operation of the railway. The works to prepare the areas occupied by the *Ramal da Alfândega*

Figure 4. Contumil Station (2021): the Operational Command Centre (a), the garages and workshops (b) and the embarkation/disembarkation platforms (c)

Source: by the author (2021).

began in 2022 to stabilise the escarpment, to clean the area, to remove the vegetation, to demolish some ruins, to rehabilitate the walls and to relocate the steps, thus the urban interventions can still be discussed.

Conclusion

The first discussions about the Portuguese railway lines already included the railway built between Lisbon and Oporto. The North Line plan was approved in 1857, but only reached Oporto twenty years later, in 1877. The cause of this delay was natural features of the Douro River, in particular the width of the river which could have resulted in Vila Nova de Gaia being the last stop of the North Line in 1864. The train was only able to cross to the northern bank of the river after the construction of the D. Maria Pia railway bridge, and to connect this infrastructure to Campanhã Station, a tunnel was built. Eventually, the railway tracks reached the station, located more than 70 metres above the topographic level of the river.

However, this was not the only influence that the river had on the railway construction in Oporto. Although port services in the city had already begun to be deactivated in the second half of the 19th century, even before the arrival of the railway, the Customs House continued to operate, and due to that, a railway branch to cross the steep banks of the Douro River was built. To enable the arrival of the train at the Customs House, tunnels and trenches were opened, and bridges and retaining walls were built. These works resulted in the *Ramal da Alfândega,* inaugurated in 1888.

There was also an attempt to link the port of Leixões to the banks of the Douro River. After a number of proposals, the *Ramal de Circunvalação* plan was approved. However, the project was not fully executed and the railway ring of Oporto was not closed on the Portuguese

coast as planned. The customs services operation gradually diminished, and trade in the city centre was enhanced and facilitated by the transport system that was being built throughout the first half of the 20th century.

From the 1970s onwards, concerns about Oporto's urban heritage increased. In this context, the Customs House and the waterfront railway were deactivated; Oporto's relationship with the river had deteriorated, and several urban requalification plans along the water were in order to rectify this situation.

In parallel, Portugal has seen the appreciation of its railway heritage grow. The Railway Museum Study Commission was created in 1976, the National Railway Museum of Entroncamento was inaugurated in 2015 and, in 2017, together with the Railway Museum of Lousado (Municipality of Vila Nova de Famalicão), the National Museum was included in the *European Route of Industrial Heritage* (ERIH). In 1997, Oporto had one of its stations, the São Bento Station, classified as Property of Public Interest. In the same decade, a plan for the preservation of the railway heritage of the *Ramal da Alfândega* was designed, but it was not executed.

Some remnants of this railway history remain and, in part, have not been entirely neglected. Some informative signs and the classification of the D. Maria Pia Bridge as a National Monument in 1982, i.e. before its deactivation in 1991, have attracted the attention of citizens and visitors in a discreet way. Currently, these infrastructures and the entire area once occupied by *Ramal da Alfândega* are in the spotlight of the professionals and managers responsible for the urban requalification of the city of Oporto. There are two proposals for reusing the area, both based on the precepts of sustainability, but neither of them presents clear policies for preserving the one-hundred-year history of the *Ramal da Alfândega*.

Thus, the continual reorganization of the railway infrastructure, and the areas surrounding it, reinforces the need to maintain uninterrupted discussions about this heritage and the deepening of reflections on its management. For this reason, what is presented here is significant, as it highlights the relationship between the railway and the Douro River before the reconversion of the old railway area along the water. The placement of a tramway or the creation of an urban park are still under discussion, and this article aims to raise awareness among citizens and agents involved in the requalification of the old railway areas in Oporto, in favour of the valorisation of the remaining railway heritage.

Acknowledgements

The author would like to thank the *Câmara Municipal do Porto. Arquivo Histórico*, for providing the necessary documents for the development of this article.

Funding

This work is funded by national funds through the Foundation for Science and Technology, under the project UIDB/00057/2021, and it is related to the PhD thesis of the author, which was developed in the HERITAS PhD Program – Heritage Studies [Ref.ª: PD/BD/150431/2019].

Bibliography

Aguilar, Inmaculada. 2001: "Restauración del patrimonio arquitectónico industrial", en Instituto Andaluz de Patrimonio Histórico, *Preservación de la Arquitectura Industrial en Ibérica y España*. Sevilla (España), Junta de Andalucía, Instituto Andaluz del Patrimonio Histórico y Editorial Comares, 160-203.

Álvarez Areces, Miguel Ángel. 2010: "Patrimonio Industrial, Paisagem y Desarrollo Territorial". *AREAS. Revista Internacional de Ciencias Soviales*, 29, 21-29.

Alves, Jorge; Dias, Brogueira Emílio. 2001: "O Fio de Água – O Porto e as Obras Portuárias (Douro-Leixões)". *Revista da Faculdade de Letras, HISTÓRIA*, 2(III), 93-106.

Batista, Raúl Manuel Gomes. 2015: *O aproveitamento de antigas infraestruturas ferroviários em meio urbano. As ecopistas como exemplo,* master thesis, University of Oporto, Oporto (Portugal).

Cardoso de Matos, Ana. 2009: "Asserting the Portuguese Civil Engineering Identity: the Role Played by the École des Ponts et Chaussées, 1825-1866", in Cardoso de Matos, Ana; Diogo, Maria Paula; Gouzévitch, Irina; Grelon, André (Eds.), *Jogos de Identidade Profissional: os engenheiros entre a formação e a Acção.* Edição colobri, CIDEHUS-EU e CIHUCT, 177-208.

Cardoso de Matos, Ana. 2022: "Mobilidade de engenheiros, circulação de conhecimento e transferência de tecnologia (1825-1886)", in Medina-Ruiz, Israel-David; Pinto Tortosa, Antonio Jesús; Ravina Ripoli, Rafael; Rodríguez Martin, Nuria (Eds.), *Los ingenieiros en la Europa del sur (siglos XVIII-XX).* Valência (España), Tirant lo Blanch, 47-70.

Cardoso de Matos, Ana; Lourencetti, Fernanda de Lima. 2021: "Reusing railway infrastructures in the spirit of circular theory. A contribution to an operational concept". *VITRUVIO - International Journal of Architectural Technology and Sustainability*, 6(1), 12-23. https://doi.org/10.4995/vitruvio-ijats.2021.15487

Custódio, Jorge. 1991: *Museologia e Arqueologia Industrial. Estudos e Projectos*. Lisboa (Portugal), Associação Portuguesa de Arqueologia Industrial.

Custódio, Jorge. 2012: "Património ferroviário em risco. O caso do complexo do Barreiro". *P&C*, 53, 38-40.

Farinella, Romeo. 2016: "Cidade, água, património. As razões de um projeto", in Peixoto, P., Cardielos, J. P., *A água como Património. Experiências de requalificação das cidades com água e das paisagens fluviais,* Coimbra (Portugal), Imprensa da Universidade de Coimbra, 29-46. https://doi.org/10.14195/978-989-26-1025-2_1

Hein, Carola. 2019: "The Port Cityscape: Spatial and institutional approaches to port city relationships". *PORTUSplus*, 8, 1-8.

Hein, Carola; van Schaik, Henk; Six, Diederik; Mager, Tino; Kolen, Jan (J. C. A.); Ertsen, Maurits; Nijhuis, Steffen; Verschuure-Stuip, Gerdy. 2020: "Introduction: Connecting Water and Heritage for the Future", in Hein, C. (Ed.), *Adaptive Strategies for Water Heritage. Past, Present and Future*, Delft (The Netherlands), Springer Open, 1-20. https://doi.org/10.1007/978-3-030-00268-8

Justino, David. 1988: *A formação do espaço económico nacional: Portugal, 1810-1913*. Lisboa (Portugal), Veja.

Lopes Cordeiro, José Manuel; Vasconcelos, António. 2005: *Ponte Maria Pia. A obra-prima de Seyrig*. Porto (Portugal), Ordem dos Engenheiros Região Norte.

Lourencetti, Fernanda de Lima. 2022: "Port-railway connection in Setúbal (Portugal) – an understanding of the past for a sustainable future". *Planning Perspectives*, https://doi.org/10.1080/02665433.2022.2128395

Monclús, Javier. 2013: "Repensar Canfranc desde el urbanismo Paisajístico y los paisajes culturales", in Monclús, Javier; López-Mesa, Belinda; Cal, Pablo de la (Eds.), *Repensar Canfranc. Taller de rehabilitación urbana y paisaje 2012*. Zaragoza (España), Institución Fernando El Católico- Prensas de la Universidad de Zaragoza, 14-27.

Nabais, António J. C. Maia. 2021: "Património marítimo portuário em Portugal". *Portus*, 6, 12-17.

Pacheco, Elsa; Alves, Jorge Fernandez. 2019: "Porto: a cidade industrial e o sistema portuário", in *As Cidades na História: Sociedade, vol. III, II Congresso Histórico Internacional.* Guimarães (Portugal), Ed. Câmara Municipal de Guimarães, 135-155.

Palomares Alcarón, Sheila. 2020: *Los nuevos usos de la arquitectura industrial agroalimentaria en el sur de Portugal en el contexto del Mediterráneo*. Évora, Tese de Doutoramento em História, na Universidade de Évora.

Pinheiro, Magda. 2008: *Cidades e caminho-de-ferro*. Lisboa (Portugal); Centro de Estudos de História Contemporânea Portuguesa – CEHC.

Pinheiro, Magda. 2016: "Le patrimoine ferroviaire entre le passé et le future", in Cardoso de Matos, Ana; Fontana, Giovanni Luigi; Graçon, Anne-Françoise, *L'ingénieur et le petrimoine. Savoirs techiniques, aménagement du territoire et mutation du paysage.* França, Université de Technologies de Belfort-Montbéliard (UTBM), 81-93.

Pinto, Liliana Patrícia Vasconselos; Santos, Teresa Campos dos. 2011: "Porto, Património Mundial – a classificação e a intervenção. Encontra-se o título "Porto Património da Humanidade" em risco?", in *Actas do Seminário Centros Históricos: Passado e Presente*. Porto (Portugal), Faculdade de Letras da Universidade do Porto – Departamento de Ciências e Técnicas do Património, 221-244.

Quintas, Armando José da Graça. 2021: *Os mármores do Alentejo. história, património e valorização cultural (1850 - 2020)*, doctoral thesis, University of Évora, Évora (Portugal).

Sampaio, Maria da Luz. 2015: *From the Factory to the Museum: identification, patrimonialization, and diffusion of industrial technical culture*, doctoral thesis, University of Évora, Évora (Portugal).

Silva, Álvaro Ferreira da. 2009: "Engineers and Organizational Behaviour: the Companhia Real dos Caminhos de Ferro Portugueses (1870-1885)", in Cardoso de Matos, Ana; Diogo, Maria Paula; Gouzévitch, Irina; Grelon, André (Eds.), *Jogos de Identidade Profissional: os engenheiros entre a formação e a Acção.* Edição colobri, CIDEHUS-EU e CIHUCT, 177-208.

Silva, Sílvia Ferreira. 2008: "Como comunicar o património cultural da CP". *Revista Turismo & Desenvolvimento*, 9, 130-133.

Sobrino Simal, Julián. 2014: "Revisión crítica de las estrategias para el Património Industrial en este nuevo siglo", in *Buenas prácticas en patrimonio industrial. El caso de Andalucía, II Encuentro de Asociaciones dedicadas a la protección del patrimonio cultural.* Sevilha, Grupo de Investigación S.O.S. Patrimonio (HUM-673) de la Universidad de Sevilla e Asociación "La Base Natural y Cultural de Rota", 9-16.

Sousa, Fernando de; Alves, Jorge Fernandes. 2002: *Leixões: Uma História portuária*. Porto (Portugal), Editor APDL.

Westerdahl, Christer. 1992: "The maritime cultural landscape". *The International Journal of Nautical Archaeology*, 21-1, 5-14. https://doi.org/10.1111/j.1095-9270.1992.tb00336.x