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4. Railway and City

Ferrocarriles, cinturones y ciudad. Las líneas ferroviarias en torno a las ciudades europeas: París, Madrid y Milán

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Resumen: Este artículo compara tres configuraciones de ferrocarriles de cintura en torno a ciudades europeas: las Ceintures de París, la línea de circunvalación de Madrid articulada en torno a Delicias y las soluciones semicirculares y posteriormente circunferenciales desarrolladas en Milán. Analiza su construcción, la primera fase de explotación y las transformaciones posteriores, prestando atención a la articulación entre tráficos de mercancías y de viajeros y a la reconfiguración de las periferias urbanas. A partir de informes técnicos, archivos empresariales, prensa de época y bibliografía secundaria, sostiene que estos cinturones fueron estructuras urbanas centrales y espacios negociados donde redes, políticas urbanas redefinieron infraestructuras y crecimiento metropolitano.

Palabras clave: Historia ferroviaria; finales del siglo XIX; historia urbana; cinturón ferroviario; ciudades europeas.

Resumo: Este artigo compara três configurações de ferrovias de cintura em torno de cidades europeias: as Ceintures parisienses, a linha de circunvalação de Madrid articulada em torno de Delicias e as soluções semicirculares e posteriormente circunferenciais desenvolvidas em Milão. Analisa a construção, a primeira fase de funcionamento e as transformações posteriores, com atenção à articulação entre tráfego de mercadorias e de passageiros e à reorganização das periferias urbanas. A partir de relatórios técnicos, arquivos empresariais, imprensa da época e bibliografia secundária, argumenta que as linhas de cintura foram estruturas urbanas centrais e negociadas, nas quais redes, políticas urbanas redefiniram infraestruturas e crescimento metropolitano.

Palavras-chave: História ferroviária; final do século XIX; história urbana; cinturão ferroviário; cidades europeias.

Abstract: This article compares three configurations of urban belt railways around European cities: the Parisian Ceintures, Madrid's circumferential line anchored at Delicias, and the semi-circular and later circumferential solutions developed around Milan. It analyses their construction, early operation and subsequent transformations, focusing on how they articulated freight and passenger circulation and reshaped urban peripheries. Using technical reports, company records, contemporary press and secondary literature, the article argues that belt railways were not marginal by-products of radial networks but central, long-lived urban structures. They functioned as negotiated spaces where network logics, urban politics continuously redefined infrastructure, land use and metropolitan growth.

Keywords: Railway history; late 19th century; urban history; railway belt; European cities.

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INTRODUCTION

Urban belt railways have long occupied an ambiguous position in the history of European cities. Frequently relegated to the physical and historiographical margins, they have been described in various, often contradictory ways: as vectors of expansion or restrictive chains, as necessary evils or as major opportunities for reorganisation. At the same time these infrastructures became central components of the railway geography of many large European cities, structuring both urban circulation and the spatial distribution of industrial and logistics activities. This article proposes bringing them back into focus by comparing three configurations of the “belt” around European capitals: the Parisian Ceintures, the Madrid circumferential line anchored at Delicias, and the semicircular and later circumferential solutions developed around Milan.

Those peculiar lines, which, quite exceptionally for a railway, begin and end in the same city, can be used as observatories of the relationship between railways and the modern metropolis. The three case studies have been selected not because they conform to a single model, but precisely because they embody different ways of “wrapping” the city in rail infrastructure. Paris provides an early example of a belt line within a

capital undergoing rapid transformation. Madrid shows how an orbital corridor of stations and connections could emerge around a national capital dominated by a strongly radial network. Milan, finally, illustrates a more fluid and discontinuous process in which semi rings, freight yards and successive circumvallations were assembled in response to chronic infrastructural insufficiency and industrial growth.

The comparison tries to hold together three lines of enquiry. First, it examines the processes of construction and early operation of each belt line, highlighting the compromises between state, companies and municipal authorities that shaped their alignments, technical characteristics and initial functions. Then, it analyses how these infrastructures evolved over roughly half a century, focusing on the shifts in the balance between freight and passenger services and on the changing ways in which cities sought either to integrate them into everyday mobility or to keep them at a distance.

Methodologically, the article combines a reading of technical reports, company documents, and contemporary press with a synthesis of the existing secondary literature. The aim is to reconstruct, through three dense case studies, some common dynamics and local specificities in how European cities have welcomed, managed, or resisted their belt railways. By placing Paris, Madrid, and Milan side by side, the article argues that railway belts should be understood less as finished objects than as continuously restructured spaces: infrastructures whose form, functions, and meanings have been constantly redefined at the intersection of network logics, urban politics, and practices.

1. PARIS

The Parisian case provides one of the earliest and most clearly defined example of the urban railway belt, precisely because it condenses a long-term tension between mixed and distinct spaces for freight and passenger mobility in the French capital (Carrière, 2017, 15-17). The Petite Ceinture was constructed through a long and difficult gestation that began in the 1830s, when the idea of a circular railway around Paris first appeared in administrative and technical discussions, and continued through the 1840s as engineers and policymakers debated whether such a line should function as an urban railway, a military-support infrastructure, or a commercial

connector between the capital's terminal stations (Meneghini Sassoli, 2023, 30-31).

After the Revolution of February 1848, the question became more urgent because the expansion of Parisian rail traffic and the multiplication of terminal stations made interconnection increasingly necessary (Sauget, 2009, 31-34), while the provisional government also saw in the project a way of employing large numbers of unemployed workers in a vast public works programme (Carrière, 2017, 28-32). In practice, however, the solution that emerged from negotiations between the state and the major railway companies was only a partial compromise between rival visions. At one pole stood companies such as Havre and Rouen, which advocated a low-speed, highly permeable line integrated into urban circulation and equipped with numerous branches and level crossings; at the other stood Strasbourg and Nord, which defended a line equivalent to ordinary commercial railways, with as few level crossings as possible and almost exclusively dedicated to linking the terminal stations to one another (Carrière, 2017, pp.31-33). The line that began to take shape in the early 1850s, after the imperial decree of 11 December 1851 declared the Ceinture to be of public utility and the decree of 22 January 1853 created a singular institution to manage it: the Syndicat de Ceinture.¹

This structural ambiguity is central to the Petite Ceinture's historical significance. It insert itself within the broader Parisian trajectory in which freight and passenger flows had long shared infrastructures and urban spaces, from river services on the Seine to early urban transport experiments like the *carrosses à cinq sols* and, later, the omnibus (Passalacqua 2009). As the attached study emphasises, the line was effectively born as a freight infrastructure: in its first years of operation, the overwhelming majority of traffic consisted of goods trains connecting the terminal stations, while only occasional trains were run for military movements or specific official journeys, including imperial travels to Saint-Cloud. Yet quite rapidly, the Ceinture became controversial because it ran through or around densely inhabited urban areas while remaining inaccessible to ordinary residents (Meneghini Sassoli, 2023, 38–39), even as it maintained close connections with a limited number of strategically located industrial plants.²

¹ ANMT, Syndicat de Ceinture, 75AQ117, Traités.

² The society signed its first contract with the Société Ernest Gouin et Cie already in 1854. Source: ANMT, Syndicat de Ceinture, 75AQ1, Report 1854, 5-6.

In other words, Parisians endured the railway's nuisance before they fully enjoyed its utility. This phenomenon generated criticism in the press and in technical debates and pressured the Syndicat to adapt parts of the infrastructure to passenger transport gradually. (Meneghini Sassoli, 2023: 41-42).

The early history of the Petite Ceinture also reveals the technical fragility of many mid-nineteenth-century urban railway projects. Built under tight financial constraints and with clear pressure to minimise costs, the first sections soon suffered from structural failures, recurring maintenance needs, and the burden of underdesigned works that had to carry more than their builders had originally allowed (Menant, 2017: 55-59). The Syndicat's reports of the early 1850s are punctuated by references to subsidence, reinforcement works, and the need to strengthen embankments and structures along the line³. The Ceinture, therefore, illustrates an important pattern in the history of railway belts: infrastructures conceived as rational solutions to network complexity often entered service already compromised by cost-cutting, conflicting priorities between the state and private companies, and planners' inability to predict the scale and form of future metropolitan demand.

At the same time, the Parisian belt line was also a spatial and political device. Its location relative to the Thiers fortifications and the octroi boundary, its role in linking the trunk lines.

2. MADRID

The Madrid case illustrates a second form of the urban railway belt: not a single circular line, but a set of terminal stations and orbital connections that gradually produced a mixed corridor of freight and passenger infrastructures along the southern and western edges of the capital (Torres Ballesteros, 2012: 1-3). From the 1860s, the construction of the línea de circunvalación linking Atocha and Príncipe Pío provided the structural hinge for this belt-like system, tying together national trunk lines while opening up new possibilities and conflicts for urban expansion in districts such as Arganzuela. Later, the siting of the first Madrid's monumental station: the Delicias terminal on the southern side of the city in 1880, explicitly chosen to stand on the circumferential line and to occupy part of the Ensanche projected by Castro, was an important step in

³ ANMT, Syndicat de Ceinture, 75AQ, Reports 1854-1861.

construction the rail belt. As it became a fringe where long-distance rail, urban services, and speculative urbanism intersected (Torres Ballesteros, 2012: 3-5).

The planning of Delicias in the late 1870s followed the tripartite logic identified by industrial-architecture historians, with clearly distinguished sectors for voyagers, freight and traction services. (Torres Ballesteros, 2012: 2, 7-8). The station's layout, with the passenger hall set in front of extensive freight yards and tractive facilities, and with all three services plugged into the circumferential line, made Delicias simultaneously a national gateway, a local goods interface and a node in the orbital belt around Madrid (Torres Ballesteros, 2012: 7-9).

The evolution of Delicias also highlights how architectural modernity and industrial organisation were tightly bound up with the making of Madrid's belt. Designed by the French engineer Emile Cachelièvre and Spanish architects such as Calleja, Espinal and Uliarte, the station was conceived from the beginning as a monumental terminal articulated through iron and brick structures, in line with contemporary European exemplars (Torres Ballesteros, 2012: 3-4, 10-12). The great wrought-iron train shed, supplied by Fives-Lille and assembled on site, gave the passenger building both a representative façade toward the city and a highly rational interior for managing five tracks and two platforms under a single roof (Torres Ballesteros, 2012: 5-6, 14-15; Aguilar Civera, 1988: 190-197). Around this core, covered goods sheds with trusses, a large locomotive depot with semi-circular roundhouse, and a complex of workshops, stores and social facilities made Delicias into a fully-fledged industrial ensemble at the southern edge of Madrid (Torres Ballesteros, 2012: 15-18).

In strictly geographical terms, the Madrid belt was never a perfect ring; rather, it was a corridor shaped by the circumferential line, the cluster of terminal stations and the successive reconfigurations of rail access in and around the Ensanche (González Yanci, 1977: 332-338). The *línea de circunvalación*, which had linked Atocha and Príncipe Pío since 1863, ensured that Delicias, once built at Paseo de las Delicias, could be connected to a network serving both radial trunk lines and local freight distribution (Torres Ballesteros, 2012: 3-4).

The history of Delicias also shows how the distinction between freight and passenger spaces remained unstable and was repeatedly renegotiated over time. The original project soon required adjustments under operational pressure: the vestibule of the passenger building was reworked

and enlarged in 1906-1907 to concentrate arrivals and departures nearer to the new tram line on Paseo de las Delicias, while parts of the former arrival wing were converted into central offices (Torres Ballesteros, 2012: 16-17). Over subsequent decades, further refurbishments of statistics offices, workshops, and later museum uses continued to shift the internal balance between passenger circulation, administrative functions, and ancillary services (Torres Ballesteros, 2012: 20-22). At the same time, the adjacent goods yards and traction facilities experienced their own cycles of expansion, saturation and decline, with new sheds, coal depots, inspection posts, and workshops built up to the interwar years before later urban transformations erased much of this industrial fabric (Torres Ballesteros, 2012: 17-19, 21-23; García Santos, 1999: 919-927).

Regarding urban development, the Madrid belt reveals how railway infrastructures could both catalyse and constrain growth. Quantitative studies of Spanish urbanisation between 1860 and 1910 show that cities with access to the national rail network grew significantly faster than those without, with average annual growth differentials on the order of 0.2 percentage points and long-run effects that raise cumulative growth by around 60 per cent (Barquín, Pérez and Sanz, 2012: 401-411; Cuéllar Villar, 2007: 16-22). In Madrid's case, the cluster of stations and circumferential links not only reinforced the city's role as the centre of a national radial network but also reshaped its internal geography, intensifying industrial and logistics uses in districts like Arganzuela and around Delicias while leaving behind other, relatively less connected, areas (González Yanci, 1977: 330-338; Barquín, Pérez and Sanz, 2012: 402-409). Later operations such as the Pasillo Verde Ferroviario, initiated after the 1985 Plan General and pursued in the 1990s, transformed large segments of circumferential and freight infrastructures between Atocha and Príncipe Pío into residential areas, parks and new boulevards, dramatising the shift from industrial belt to urban redevelopment corridor (García Santos, 1999: 917-932).

3. MILAN

If Paris shows the belt line as an early metropolitan compromise and Madrid as a hinge within a radial capital system, Milan presents the

railway belt as part of a far more fluid but inorganic and continuously reconfigured industrial urbanism (Meneghini Sassoli 2026)

. From the 1840s onward, the city became one of the most dynamic railway nodes in the Italian peninsula, distinguished by precocity, strong freight demand, and repeated infrastructural transformation. Unlike many other Italian cities, where limited traffic slowed railway development, Milan experienced sustained commercial and industrial growth and became the beating heart of the Italian railway network (Bigatti 2009; Maggi, 2017: 70; Goitom and Pino, 2012: 28-29).

The city's railway history was marked by the rapid obsolescence of successive stations and by the repeated need to create new freight spaces, connections, and circumferential solutions. The first Milanese station, the Porta Nuova station, opened in 1840 for the Milan-Monza line, soon became insufficient and was replaced in 1850 by a larger station nearby (Cassina, 1857; D'Amia, 2004: 92). Porta Tosa, intended for the Milan-Treviglio line, formed part of the same early phase of provisional and quickly outdated infrastructure (Zaninelli, 1995: 87-89). By the late 1850s and early 1860s, increasing traffic and the multiplication of regional and interregional links led to the construction of the first Milano Centrale, itself already uncertain in capacity at the moment of inauguration in 1864 (Mongeri, 1865: 20-28; Angeleri and Columba, 1984: 23, 38-41).

The decisive feature of the Milanese case, however, is that the problem was not solved by building a single central station. Instead, the city developed a wider constellation of freight facilities and semicircular or circumferential links that progressively wrapped around the urban core (Montedoro, 2013: 22). The opening of Porta Ticinese, later Porta Genova, and the goods yard of Porta Garibaldi in 1873, followed by Porta Sempione in 1883, created what the attached text explicitly calls a new kind of belt around the city (Ogliari, 2000: 89). This belt was not a defined, nor planes, as a ring form many years. It was once just a system of stations, sidings, yards, depots, and connecting lines that increasingly structured the geography of Milanese expansion (Meneghini Sassoli, 2026).

The growth of freight traffic explains much of this transformation. Between 1872 and 1882, the volume of goods handled by Milan's stations rose by 71.7 per cent, consolidating the city as the foremost railway node in northern Italy and widening its lead over other major cities such as Genoa, Turin, and Venice (Direzione generale della Statistica e del Lavoro, 1912; Allocchio, 1884: 201-204; Maggi, 2017, 70). This pressure forced the city and railway companies to keep adding infrastructure, not

always following an organic process. Porta Garibaldi, intended to absorb growing goods traffic, but quickly became saturated; then, the new station of Porta Sempione was opened as a major relief yard, but it too proved only a partial answer to the accelerating flows generated by industrialisation, while international tunnel connections such as the Frejus and Saint-Gotthard routes, and Milan's integration into national and European markets and further put under stress its railway network (Zaninelli, 1995: X-XII).

The annexation of the Corpi Santi in 1873 enlarged the municipal territory and brought railway infrastructures more fully under urban political scrutiny, as its main stations were outside of the commune jurisdiction until this date (Colombo and Pagano, 2016). Debates on congestion, grade crossings, the imbalance between northern and southern facilities, and the need for new circumferential links all became part of the city's broader planning discourse, from the Fasana plan to the Beruto era and beyond (Rossari, 2017: 139-141; Frank, Mahi and Zipeto, 2021: 23). The southern railway circumvallation activated in 1891 was especially significant because it allowed freight movements to bypass the saturated Centrale and connected southern and western lines more effectively (Ogliari, 2000: 89). Later schemes continued to seek direct east-west and south-north freight circulation without overburdening passenger facilities, culminating in the major reorganization debates around 1905-1906⁴ (Candiani and Castiglioni, 1905: 21-26).

The Milanese case shows a model of a progressively expanding railway network that became, in three decades a belt line that borders the city. Still, it also generated new industrial districts, constrained western and northern expansion, and repeatedly forced both engineers and municipal authorities to reconsider the relation between those infrastructures and urban growth (Della Peruta, 1987: 8-10). The 1905-1906 reorganisation proposals, which increasingly moved away from the earlier transit-station logic and toward a new configuration of head stations and extra-urban transit yards, confirm that the previous system lacked flexibility and could not adapt gradually to larger needs (Candiani and Castiglioni, 1905: 21-26; De Finetti, 2002: 143).⁵ The later demolition of the first Stazione Centrale and the decades-long construction process of the

⁴ ACSM, Fondo Strade, Cartella N. 62, Dibattito rete ferroviaria.

⁵ See also: ACSM, Fondo Strade, Cartella N. 49, n. 65530, *Il riordinamento delle stazioni ferroviarie di Milano* (1884)

new one showed once again how Milan's railway geography had been built in a constant race against traffic growth, and every solution risked becoming obsolete almost as soon as it was implemented (De Finetti, 2002: 143).

CONCLUSIONS

This article has argued that urban railway belts are best understood not as marginal by-products of radial networks, but as central components of the organisation of European cities. The three case studies examined here highlight that there is no single model of railway belt: Paris reveals an early, conceptually dense configuration, born out of the necessity to link terminal stations; Madrid shows how an orbital corridor could emerge within a strongly radial national system; Milan illustrates a more fragmented and reactive process.

Taken together, these cases suggest that railway belts have served as negotiated spaces in which network logics, urban politics, and everyday practices intersect. Their histories show how the separation between spaces for goods and spaces for passengers has been repeatedly redefined rather than imposed once and for all, and how industrial and infrastructural frontiers have gradually become zones of redevelopment, controversy and recently, also heritage. This research invites further comparative work on other cities where similar infrastructures have played a decisive, if often underestimated or understudied, role.

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