

The introduction of the high speed rail and urban restructuring: the case of Spain.

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ABSTRACT

The introduction of the high speed rail in Spanish cities with stations located either in the centre of the city or on its outskirts has presented a new opportunity for railways and cities to reconcile their differences. The introduction and development of railway infrastructure, which began back in the 19th century, combined with rapid urban growth created a problem of integration that was never satisfactorily resolved. With time, railway workshops, warehouses and other centrally located railway installations and tracks became trapped in central locations where they constituted divisive barriers. The arrival of the new high speed train (HST) was therefore regarded by many Spanish cities as an excellent opportunity for these cities and their rail installations to resolve long-standing differences. This article presents some examples in which notable synergies have been achieved between the implantation of the HST lines and the urban model. Our analysis centres on large and medium-sized non-metropolitan cities, as they tend to be less complex systems with only one railway station.

KEY WORDS: high speed train, cities and railways, urban renewal, central train stations, integrating transport infrastructure

1. THE INTRODUCTION OF THE HIGH SPEED TRAIN IN SPAIN 1992-2012 ⁽¹⁾

After a period of gradual decline, it seems that the role of the railway within Spain's national transport system has been reconsidered. The railway system has not only managed to reconcile its differences with the city system

¹ - The results reflected here form part of more extensive research projects: "Urban policies and the high speed train in Spain", a project financed by Spain's *Ministerio de Educación y Ciencia* (Ministry of Education and Science) whose reference number is TRA2007-68033-C03C02; and the research project "High speed rail, intermodality and territory", awarded by Spain's *Ministerio de Fomento* (Ministry of Public Works) whose reference number is T98/2006.

but has also become actively involved in promoting modern cities and has even aided the development of new urbanisation processes (López, 1999). The decade of the 1930s saw the beginning of a crisis that affected railways throughout Europe, as consumer preferences for short and medium distance travel turned away from the train and towards the car. The ensuing crisis, which was experienced throughout Europe, reached Spain after the Spanish Civil War. First, the flexibility of road transport, and later the efficiency of air travel over large distances, resulted in a progressive abandonment of rail services as they became increasingly obsolescent. This in turn led to the progressive deterioration of many railway installations, particularly in urban locations. The areas around stations were also affected by this process of degradation, with large areas of centrally located land that had originally been destined for railway uses falling into disuse and becoming abandoned.

Although technical improvements were introduced in the 1970s, with the aim of making the railway more competitive by providing better services at a lower cost, it was not until the 1980s, with the help of the suburban train services, in Spain “*cercanías*” services, and the subsequent arrival of the high speed train, in the 1990s, that the city was finally reunited with the train (Capel, 2007).

The high speed train service arrived in Spain on April 21st, 1992, with the inauguration of a service covering the southern corridor route between Madrid and Seville (471 km). This first line, whose opening coincided with the Seville Expo '92 (World Fair) initially brought 4 stations into service: Madrid-Atocha, Ciudad Real, Puertollano, Córdoba and Seville-La Cartuja. This last station will disappear when the Seville-Santa Justa station comes into service.

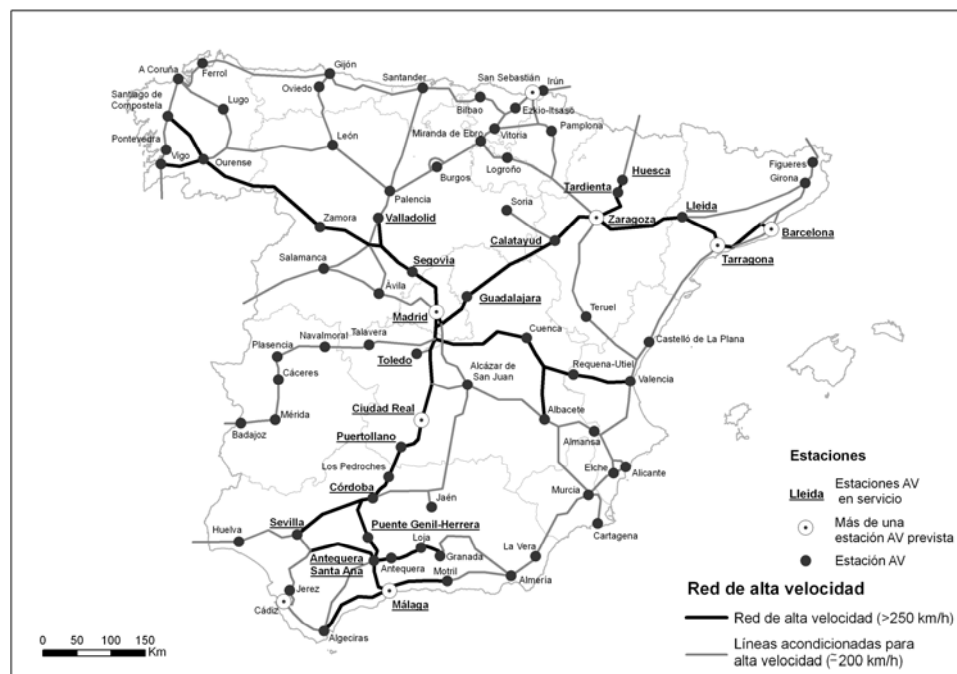
Spain's high speed rail network was considerably enlarged in 2003 when the Madrid-Lleida (519 km) section of the Madrid-Barcelona-French Border line was brought into service. This added 4 more stations to those that were already operative: Guadalajara-Yebes, Calatayud, Zaragoza-Delicias and Lleida-Pirineus. The same year also saw the opening of the Zaragoza-Huesca (79 km) section of the national network. In 2005, the La Sagra-Toledo (21 km) section of the network also came into service; this line took advantage of the previously constructed southern corridor, with a dead-end track between La Sagra and Toledo.

Two new sections of track were opened towards the end of 2006. Firstly, on the Madrid-Barcelona-French Border line, there was the Lleida-Camp de Tarragona (82 km) section. Then, on the Cordoba-Malaga line, there was the Cordoba-Antequera (100 km) section, which entailed the inauguration of two new intermediate stations: Puente Genil-Herrera and Antequera-Santa Ana. The northern part of the network was inaugurated in December 2007, with the incorporation of the Madrid-Valladolid (180 km) section, which ran north from

the station of Chamartín in Madrid, with stops at the stations of Segovia-Guiomar and Valladolid-Campo Grande. The following day saw the opening of a new service along the Antequera-Malaga (55 km) section, incorporating the station of Vialia-Maria Zambrano in the city of Malaga. However, due to problems that encountered during work on the Madrid-Barcelona-French Border line, it was not possible to inaugurate the section between Camp de Tarragona and Barcelona-Sants (88 km) until as late as February 20th 2008.

Fig. 1.

Present and future high speed rail lines in Spain. Taken from the *Plan Estratégico de Infraestructuras de Transporte* (PEIT - Strategic Plan for Transport Infrastructure) (2005-2020)



Source: Prepared by Laboratori de Cartografia (University of Lleida) on *Plan Estratégico de Infraestructuras de Transporte* (Strategic Plan for Transport Infrastructure) (2005-2020)

The process of implementing the high speed train (HST) in Spain has received a notable impulse in recent years. The total length of high speed line in service reached 1,595 km in 2009, which made it possible to connect 19 Spanish cities through 20 stations. According to ADIF (Spain's State Administrator of Infrastructure), and if all goes to plan, by 2010, Spain will have a total of 2,556 km of high speed line in service, taking this infrastructure to another 11 cities. The length of Spain's high speed rail network is comparable with that of other major European states with extensive networks: according to recent data from the UIC (International Union of Railways): France has 1,872 km of high speed line and Germany has 1,285 km.

2. THE HISTORICAL IMPLEMENTATION OF THE RAILWAY IN SPAIN'S URBAN ENVIRONMENT

The configuration of new urban spaces in the 19th century as a result of the arrival of the railway was basically based on two spatial models of introduction (Cayón, Muñoz, Olivares, 2002). The first model involved constructing new railway infrastructure within the walled part of the city, opening gateways in the city walls, and demolishing buildings located on land chosen for the construction of the station and the whole railway complex. This model was frequently chosen when “end of line” railway stations were constructed in central locations and were sited almost without exception in areas of cheap housing (Bruinsma, et al., 2008). The second model involved providing the same infrastructure, but this time outside the walled enclosure. This normally implied a location on the outskirts of the city, where it was easier to meet the territorial requirements of the railway, and avoid overly disrupting the urban layout. With time, this type of location encouraged the appearance of suburbs, neighbourhoods and population nuclei around the new station, which subsequently became incorporated within the main structure of the city through newly created streets and/or avenues (Pérez, 1994; Santos, 2007).

With time, urban expansion almost inevitably engulfs the station area in an unplanned way and without resolving the problem of how best to structure space. Indeed, it tends to generate a whole series of new urban problems through the creation of urban barriers and what – as far as railways are concerned – constitute operational disfunctionalities (Santos, 2007). The city wraps itself around railway infrastructure without taking into account the nature and characteristics of this mode of transport; in some cases it turns its back on the railway, while in others, it simply fails to recognise it or ignores it.

As explained by Santos (2007), if we look at things from the present, the way in which railways have been integrated into many Spanish cities cannot be regarded as satisfactory. The railway is an urban element which, on account of its specific characteristics and given the nature of the transport function that it serves, needs to be able to be integrated within the city. In cases in which serious disfunctionalities occur, it is therefore necessary to find technical and economic solutions that make this integration viable (Pérez, 1994, 79).

Following the popularity amongst users of the first high speed service established in Spain, which connected Madrid and Seville in 1992 (Ureña, 2005; González, Aguilera, Borderias et al. 2005), a good deal of enthusiasm was kindled amongst public authorities, who saw this infrastructure as a potential instrument for economic development and urban restructuring. In general, forecasts linked to the economic dynamism that would result from it, had to be

moderated with time. Even so, the expectations generated by the second consideration: the possibilities offered for urban redevelopment were reinforced to the point of them almost becoming a *leifmotiv* for local aspirations. As a result, the implementation of HST services in Spanish cities has, above all, been interpreted as an excellent opportunity to restructure urban space in a similar way to that achieved with the arrival of the first railways back in the 19th century.

4. The integration of the high speed train in Spain's urban environment

Attempts to integrate railway infrastructure into an urban environment can include “soft” solutions (including: the treatment of borders, increasing permeability, the construction of different types of railway crossing, adapting to specific topographic site conditions, etc.) and what we could call “hard” solutions (such as covering urban sections of rail track, or constructing rail by-passes). In Spain, and particularly with the arrival of the HST, it would appear that the “hard”, or “maximalist”, solutions have won the day, with possible external lines bypassing cities being studied and authorities opting to completely cover sections of track passing through the inner areas of cities. These ‘maximalist’ solutions, which look upon the railway as an irksome aspect of urban life whose presence needs to be dissimulated, are very expensive and financing them almost inevitably requires obtaining a large amount of funding through capital gains generated by freeing land from railway-associated uses. According to a number of authors, peripheral stations and external lines are hardly compatible with the function of a means of passenger transport whose efficiency is supposed to be based on the greater proximity of its stations to the centre of the city (Troin, 1995; Pérez, 1994) ⁽²⁾. External by-passes for passing traffic, built outside cities, would evidently constitute an exception to this general rule.

However, in less densely populated areas, the heavy investments called for in developing central locations and the minutes that can be lost in travelling between large cities often influence decisions on where to locate new stations. These factors may finally lead to stations being built in peripheral locations, out in the country or relatively far from any significant urban nucleus. Central and tangential locations aim to take the fullest advantage of the centrality and accessibility offered by the centres of modern cities, with many of these stations

² - In fact, the Chairman of ADIF, Mr. González Marín, made the point during a lecture entitled "Spain's High Speed Train service in the 21st century" given at the Geology Faculty of the University of Oviedo on 15/10/2008 that: "it has been shown that locating stations outside cities ends up producing an uncompetitive solution".

combining both conventional and HST services in order to permit a greater degree of intermodality. ⁽³⁾.

In a good number of cases, the introduction of the high speed rail has been interpreted as an opportunity to redefine the relationship between the existing rail infrastructure and the city. As a result, at the local scale, the project to introduce the new infrastructure may also effectively become part of a wider strategy for urban redevelopment, within a larger project capable of transforming the physical and functional structure of the wider whole (Bruinsma, et al., 2008; Van den Berg y Pol, 1998; Groupe Ten, 1993). Furthermore, the restructuring of the railway system also offers the opportunity to improve the integration of rail spaces within the urban fabric and to thereby palliate the barrier effect that railway installations have traditionally had (Bertolini y Spit, 1998; Santos, 2007).

In the case of developments affecting city centres, projects to introduce new train services tend to focus their attention on either making rail barriers more permeable or eliminating them. In this way, it is possible to organise the urban fabric around stations and railways so that they become better integrated within the city as a whole. Burying sections of track and/or constructing false tunnels are the preferred options in the case of city centre projects, but technical difficulties and, more significantly, economic questions often lead planners to search for alternative way of palliating the barrier effect. The relocation of large railway installations (repair yards, warehouses, service and freight areas, etc.) trapped inside the main built up area to outlying areas (or peripheral locations) also offers an excellent opportunity to carry out major urban renewal projects in city centres.

Project administrators tend to oppose such expensive schemes and it is at this point that the local and/or regional authorities have tended to look to public-owned companies and capital in order to help implement both railway projects and urban renewal schemes affecting the areas around railway stations. Public companies that have participated in such projects include, for exemple: Zaragoza Alta Velocidad 2002, S.A., Valladolid Alta Velocidad 2003, S.A., Gijón al Norte, S.A., Palencia Alta Velocidad, S.A., Valencia Parque Central Alta Velocidad 2003, S.A. and Logroño Integración del Ferrocarril 2002, S.A.

Yet, these companies, and the projects that they undertake, must be self-financing. In other words, the income generated from the sale of land destined for subsequent urbanisation must cover a large part of the costs entailed by the redevelopment project. As well as posing a risk to the financial viability of the

³ - Bustinduy makes the point that traditional “end of line” stations in large cities are giving way to “through” stations. This implies profound changes in the stations themselves and in the relations that elements of rail infrastructure have with the city (Bustinduy, 2006).

project, this also places a significant limitation on the extent of any urban restructuring which, in most cases, can be expected to be strategic. The general depression caused by the present financial and economic crisis, in combination with the deep recession in the real estate market in Spain that began halfway through 2008, has made it increasingly difficult for these publically owned companies to deliver development projects as initially planned. Indeed, in some cases, there have even been question marks concerning whether and how they will finally be completed.

In most cases, we are speaking of the most important urban transformations that will take place in a city's history. In such situations, the arrival of the HST is regarded as a tremendous opportunity not only to transform the area around the existing station (as in Lleida, Girona, Leon, Orense, etc.), but even to restructure the whole urban area (as in the cases of cities like Zaragoza, Burgos and Valladolid).

5 . The implementation of HST services which are central or tangential to the main urban nucleus.

5.1. Tangential high speed rail lines and the restructuring of the whole urban area

The construction of new external stretches of railway line, along which both conventional and high speed trains must operate, not only generates extensive processes of city-centre renewal, but also enables a general restructuring of the whole urban complex. The trajectories of these new routes, which skirt around the perimeter of the city but run relatively close to well-consolidated areas of the urban fabric, offer suitable locations for a railway station that can serve the requirements of both conventional and high speed train services. The elimination of conventional tracks and the removal of certain other railway installations (such as workshops, repair yards, storage and freight facilities, etc.) from more or less central locations create very intense processes of urban renewal. Furthermore, in this way, the complete remodelling of the railway system becomes a very important tool that can have a profound influence on the restructuring of the city as a whole: revitalising centrally located railway property; forming new relationships between different parts of the city; and creating a new "centrality" based on and around the new station itself, etc.

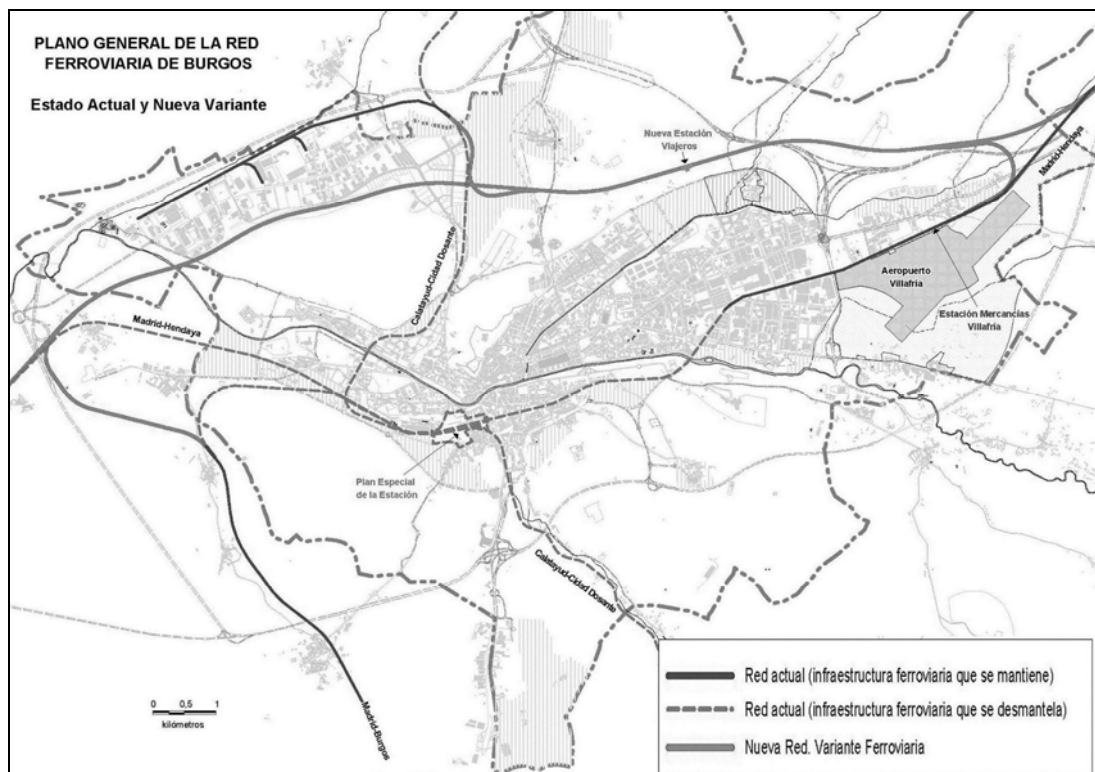
This is precisely what happened, for example, in the case of **Ciudad Real**, where a new rail route running past the eastern side of the city was associated with the closure and dismantling of the centrally located railway installations that had served the city since 1861. The construction of the new line freed 17.5 hectares of centrally located railway property, thereby permitting the removal of

a historical barrier and also creating an opportunity to restructure the city as a whole (Bellet, 2000; González, Aguilera et al., 2005). The redevelopment of this central location, through a project approved in 1992, yielded residential land for the construction of 900 new homes, a park, and a new road network providing improved connections between the centre and the southern part of the city (UREÑA, et al., 2001).

A similar scheme has been projected for the medium-sized Catalan city of **Figueres**, which will receive high speed services when the Barcelona-French Border part of the HSL network comes into operation. The construction of a new section of line that will run past the western side of the city in the area near Vilafant, some 2.5 km from the city centre of Figueres, will help to generate a far-reaching urban transformation. The urban development operation implies dismantling the centrally located railway installations and moving services to the new station which is tangentially located with respect to the urban nucleus. Through this operation, the city will eliminate a historic barrier and free land in the heart of the city that is currently occupied by what are now outdated railway installations.

Fig.2.

The new external rail line bypassing the city of Burgos on the north



Source: ANDRÉS, G. (2008), "Infrastructures as a city project? Some reflections on Burgos, a medium-sized city in Castilla y León", in *Ciudades. 11th Journal of the Instituto Universitario de Urbanística of Valladolid University*

It may, however, be Burgos the city that provide the most representative examples of this particular typology. The remodelling of the arterial rail network of the city of **Burgos** led to the most important urban transformation in the history of the city. In Burgos, far from being an invigorating and dynamic factor, the presence of railway lines has historically constituted an obstacle to urban development. Though the railway may have facilitated interchange and communication, it has always had a negative impact on the city's urban structure as a whole, acting as a barrier to growth and hindering connections between different parts of the city (Santos, 2005). The arrival of the HST, however, offers the city an unparalleled opportunity to reconsider the relationship between its railway infrastructure and the urban space. This new relationship will involve the complete restructuring of the arterial rail line network, with the construction of a new, 20.7 km long, external rail line bypassing the north of the city and the relocation of the historic central passenger station to a point on this line. These operations will allow almost 29 hectares of centrally located railway property to be freed for other uses, as well as the construction of a 12 kilometre long avenue, complete with new housing, parks and other facilities. The project that is based on this new avenue seeks to improve connections between the centre of the city and the neighbourhoods that lie in the south of the urban area (Andrés, 2008).

5.2 HST station in central location with the relocation of railway installations to peripheral areas

The construction of a by-pass for passing traffic and the transfer of freight facilities and other space-extensive railway installations to spaces outside the city centre free important areas of rail space in central locations. In some cases, these processes make it possible to undertake projects that imply large-scale urban transformations and development that almost inevitably result in major changes to the whole of the urban structure. This type of urban transformation is normally the result of both; changes in uses and of the freeing of rail space, without the need to excessively modify the existing urban model. The cases of Zaragoza and Valladolid are worth closer examination given the extent of the transformations involved and the impact they have at the local scale.

Zaragoza is perhaps one of the clearest and most exemplary cases. The implementation of high speed rail services involved a remarkable restructuring of it's the city's rail structure and facilities and significant changes to its urban structure. These changes directly affect some 114 hectares of centrally located land. The relocation of the freight facilities to a location in the south of the city, near the current location of the Zaragoza Logistics Platform (PLAZA), make it possible to free key areas in the centre of the city. The actions undertaken in and around the Delicias area (95.8 hectares) had several different objectives including: the construction of a new intermodal station; improving

communication between Zaragoza's western neighbourhoods (Delicias-Almozara); providing the immediate area with better facilities and services; and also improving the integration of the river within the western part of the city. Relocating rail services previously provided at the Portillo station to Delicias also presented an opportunity to restructure this very centrally located part of Zaragoza (⁴). The actions undertaken also made it possible to develop a series of extensive and ambitious urban projects with the following urbanistic objectives: removing the divisive urban scars that the railway installations had effectively created in both the Delicias area and along the Oliver-Valdefierro corridor; creating an area with greater centrality and multiple uses between Portillo and Delicias, aimed at exploiting the new "information society" and the latest technologies; bringing Zaragoza closer to its river, opening the city to its river, and providing it with extensive open areas, green spaces, and a significant number and quality of urban amenities.

The new high speed train system is not only a powerful driving force for urban restructuring, but it has also become one of the main tools for the new urban project that the local administration is trying to promote. The arrival of the HST coincided with the drafting and development of the Strategic Plan (Ebro-2006) and the Zaragoza Masterplan (2002), which have been used to propose a series of far-reaching strategies aimed to promote urban, economic and social change. Perhaps one of the most emblematic initiatives associated with the transformations generated in the city is the "Digital Mile" project. This project seeks to take advantage of urban development in the regenerated areas between Delicias and Portillo and to establish a City of Innovation and Knowledge in which housing, businesses and amenities will coexist under a common umbrella approach that places the emphasis on intense activity aimed at promoting knowledge, high quality architecture and state-of-the-art telecommunications infrastructure.

Logistics and transport were perhaps the most strongly developed vectors during the 1990s (with the airport, high speed train service, and area for Exhibitions and Fairs...). However, a decision has now been taken to pursue a knowledge-based economy based on new technologies, as clearly demonstrated by the Digital Mile project. Another of the clear commitments of the city in its quest to reposition itself and increase its international exposure was Expo 2008: the International Exhibition on Water. These projects, together with the arrival of the HST, are instruments that have had a clear impact on the city and its urban transformation. They are also the driving forces behind the economic and

⁴ - The project for the urban development of the 9.7 ha around the Portillo site implies the provision of 22,000 m² of residential space for the creation of around 220 housing units (with a total built density of 28.35 housing units per hectare), 30,000 m² dedicated to tertiary sector uses, 45,000 m² for green areas (58% of the total surface area) and 16,000 m² for amenities (20.6% of the total surface).

social changes that seek to make Zaragoza one of the most dynamic territories in the 21st century ([Alonso and Bellet, 2009](#)).

Fig. 3

The introduction of the HSR in Zaragoza. The opportunity for urban restructuring



Source: Zaragoza Alta Velocidad, S.A

As well as making the city a communications hub for northwest Spain, the importance of the railway installations of **Valladolid** lies in the fact that this can be truly termed a rail city. The functional and the presence of the train is profoundly felt in both the local landscape and in the day-to-day activity of the city. To fully appreciate this, it is suffice to consider that that the railway installations in the centre of the city used to occupy an area of almost 66 hectares. The importance of this presence was, however, a source of constant friction between the rail and the city. This is aptly summarized by Santos and de las Rivas in the following terms: “the interior character of the railway premises, the absence of so much as a common freight depot outside the city, the incrustation of the extensive Repair Yard within the city, the existence of areas in disuse, line closures, and the tension generated expectations for the modernization of the railway infrastructure” (Santos, de las Rivas, 2005, 88). This situation gave rise to the argument that the obvious solution to this problem involved burying the section of track that ran through the centre of the urban fabric and relocating the workshops and larger railway facilities to somewhere out on an by-pass. In fact, this is exactly what is now happening. The construction of Valladolid’s arterial rail line network has led to the development of a by-pass, running to the east of the city, on which a new freight depot and

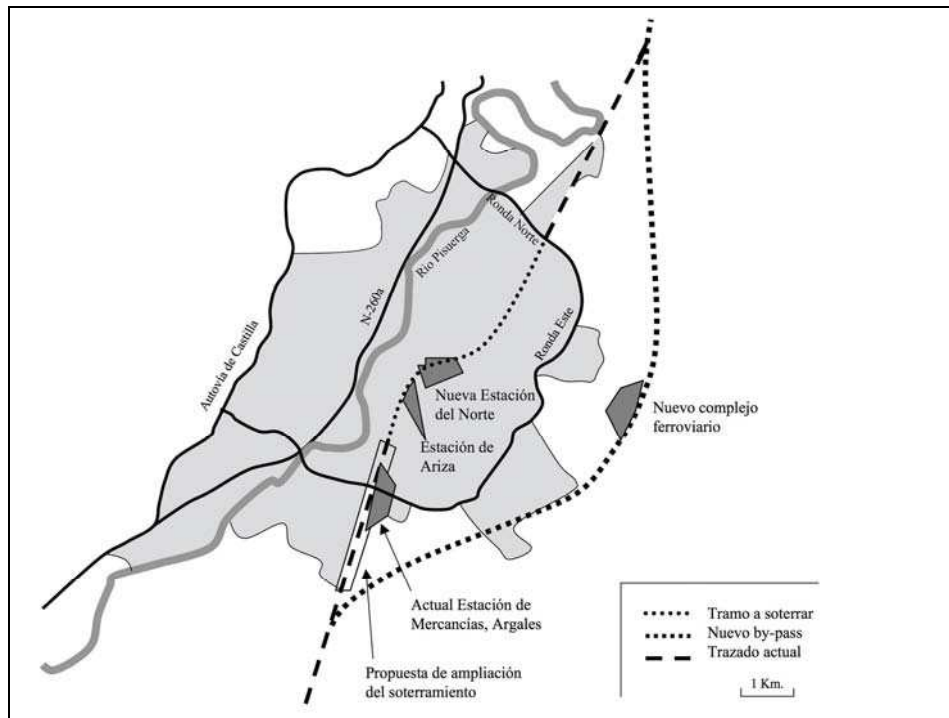
railway workshops are being built. The relocation of these facilities and the covering of sections of track in the centre of the city (4.7 km in the approved project, with a request to cover a further 1.5 km in the southern part of the city that is currently subject to approval) will free almost 100 hectares of centrally located urban land. This has provided an opportunity to undertake the most extensive urban renovation project in the city's history at a cost that could exceed 1,000 million Euros.

According to the firm Rogers Architects, who won the contract put out to international tender by the local City Council to build the "New Valladolid", this project would be organised around three major areas. The first, referred to as an "area of new centrality", is located on the site of the old railway workshops and organized around four squares. Here, the project envisages the construction of some 3,000 homes with a further 150,000 m² being destined for tertiary sector uses, including a 110 metre high office block and seven others high rise buildings with heights of between 40 and 50 metres. This is one of the most emblematic landmarks in the project, creating an intermodal space designed for both residential use and as a business centre. The old Campo Grande station will be transformed into a 50,000 m² Vialia shopping centre, which will be constructed above a new underground station. The relocation of the present bus station will see the site converted into a leading intermodal hub. The freeing of railway land by the relocation of its original activities will make 850,000 m² available for new construction, 605,000 m² of which will be destined for residential use.

The Argales neighbourhood, which is the furthest from the centre, will receive a further 2,600 homes, as well as two 60 metre high office blocks (another 32,000 m²) destined for tertiary uses. A total of 28 new buildings will be constructed in an area which will not be significantly affected by the relocation of two RENFE facilities and where there are no current plans to cover track. At the beginning of 2009, Valladolid's City Council asked ADIF for permission to bury a further 1.5 km of track located between Argales and the southern ring road. If approved, this measure would imply significant changes to the original project. Meanwhile, in the area around Ariza, where the freight depot is currently located, plans are in place to build 600 new housing units in a series of staggered tower blocks, ranging between 25 and 53 metres in height, and with a ground floor area reserved for small and medium-sized commercial premises.

Fig. 4.

New arterial rail network structure in Valladolid



Source: prepared by Aaron Gutiérrez (Department of Geography and Sociology – University of Lleida)

This Area of “New Regional Centrality”, and the way in which it is treated, has been conceived as an opportunity to strengthen Valladolid’s claims as a territorial capital. This would appear, however, to be somewhat questionable when we consider the overall statistic of almost 70 housing units per hectare (a density typical of any residential development). An area of “new regional centrality” should show a decided commitment to uses that are closely associated with activities that generate or foster new types of economic action and/or new types of quality-based urban and cultural activity. Moreover, it is important to underline that the projected capital gains associated with the freeing of railway land were based on figures relating to the height of the housing boom. These figures have now had to be dramatically revised downwards, putting a number of these projects at risk.

This major urban project based on large-scale renewal was led by the prestigious firm of architects, Rogers. They have given meticulous thought and attention to form when designing buildings and urban space but have nevertheless neglected the strategic planning of content. Thus, intensive urban change is taking place, but in a rather piecemeal manner, in stark contrast with the situation in Zaragoza, which has seen parallel changes in the economic and social functions of the city.

Urban transformation in other Spanish cities may also be important, but perhaps less so than in such cases as Zaragoza and Valladolid. Burying some stretches of track, relocating certain pieces of railway infrastructure that are now

in disuse, and/or improving the use of existing installations should all foster a better integration of the rail within the city. This is what happens in cases in which the new high speed rail technology takes advantage of a good deal of the existing rail infrastructure in an attempt to improve its integration within the urban structure. Thereby, that permits capitalising on the more or less central locations of stations that house both old and new services. In the majority of these cases, decisions are taken to bury some sections of track that run through urban areas and to move some rail installations to the periphery. Burying track implies eliminating historic barriers and improving connectivity within the city itself. This is the case in many medium-sized cities that have either already received the high speed train, as in the case of Córdoba, or that will receive it in the medium term, as with Girona, or in the longer term, as in the cases of Leon, Orense, Santander and Almeria.

5.3 The introduction of HSR in central locations and the redevelopment of areas around the station.

In other cases, a choice is made to take the fullest possible advantage of a good deal of the existing, centrally located, installations and infrastructure and to construct external by-passes for passing traffic. In such cases, advantage can be taken of the remodelling of the railway in order to reinforce the structure of the central part of the city and to recover degraded neighbourhoods around stations. This situation generates interesting renewal processes, which tend to centre on the area surrounding the old station, yet without excessively modifying the existing railway model. In the majority of these cases, it is a question of finding ways to take advantage of existing infrastructure, trying to improve the integration of the railway within the general urban fabric, almost always opting to bury at least a small section of track, and totally or partially remodelling the station and its immediate surroundings. In this category, we can cite the case of Lleida, where the remodelling of the area around the station is already partially complete, or the operations projected for Logroño, Gijón and Santiago de Compostela.

In **Lleida**, for example, the high speed train service is housed in the conventional station, whose transformation has extended beyond the railway station itself. The introduction of the HST was based on a dual model: on one hand, an external by-pass has been built for high speed passing traffic, while on the other hand, advantage has been taken of the existing infrastructure, including the historic station, to foster the penetration of the HST into the city centre. In this case, the introduction of the HST service has facilitated new development in the area around the station, which was previously an impoverished, depressed area.

The redeveloping project of the station area (affecting 14.3 hectares), whose first version was approved in 2003 (⁵), has the following objectives: to eliminate the railway barrier by completing burial of the track as far as the station platforms; to improve connectivity between neighbourhoods by constructing two new bridges; to reinforce the station's centrality by making it an intermodal hub (by relocating the bus station nearby); and to provide 91,000 m² of covered facilities for leisure, commercial and tertiary uses. All in all, the implementation of the high speed rail will generate a total volume of investment of around 360 million Euros, of which 75 million will be earmarked for the urban planning investments established in the redeveloping project (Bellet, 2002).

Fig. 5

Redevelopment of central station and track burial in Logroño



Source: created by Aaron Gutierrez (University of Lleida) using <http://earth.google.com>.

In the case of **Logroño**, the operation is centred on redeveloping the area around the station and burying the section of track that passes through the urban nucleus. The first and main stage is planned to start at the end of 2009, with a projected cost of around 180 million Euros. This phase will involve burying 2.8 km of track and creating a new, intermodal station. The project should be finished by 2015.

Covering the present network of track and building the projected underground car park will free an important area of centrally located land. This

⁵ - The original project for the station was approved in 2003, but it was later modified, in 2008, following a change in the agreement between ADIF and the *Ministerio de Fomento* and which allowed for the burial of the section of track closest to the station.

will be destined for residential and tertiary uses and will also include an urban park and the hall of the future intermodal station. This operation will also include the redevelopment of the accesses to this space, thereby resolving the problem of north-south connectivity between the neighbourhood of Cascajos and the rest of the city by eliminating the barrier effect of the rail tracks.

Controls over what could be built on the land recovered by covering the rail tracks and the uses to which it could be put have been established by the *Plan Especial de Reforma Interior del Ferrocarril* (Special Plan for redeveloping railway installations within the city) and through the corresponding modifications to the city's Master Plan. The Master Plan grants planning permission for an area of some 213,000 m², with no fewer than 65,000 m² to be destined for green zones and open spaces. Income from the sale of land will be used to partly finance the cost of the redevelopment operation.

6. CONCLUSIONS

With the recent implementation of 1,595 km of high speed line connecting 19 cities through 20 stations, Spain has become one of the European countries that is most clearly demonstrating its commitment to this new infrastructure. The cities and territories are aware of the transformations that this infrastructure can potentially bring with it. Of these, the most immediate is the urban transformation that the introduction of the high speed rail itself entails.

At local level, the arrival of the new infrastructure has been accompanied by major urban renewal and urban transformation projects, making the train an effective and efficient urban tool in redeveloping not only the station surrounds, but equally the physical and functional structure of the city as a whole. The redevelopment of the railway system has additionally provided an opportunity to better integrate the rail space into the urban fabric, palliating the traditional barrier role that some rail installations have played as they have been absorbed by urban growth.

However, given this fresh opportunity to redefine the relationship between rail and city, Spain has opted in practically all cases for 'maximalist' solutions to integration problems, as opposed to 'minimalist' ones. These more far-reaching solutions involve the covering/burial of tracks and/or the laying of external by-passes, with the associated costs that such actions entail.

The arrival of the new train has been used as an excuse to develop major urban transformation operations associated with the relocation of more or less centrally located rail facilities. In many of the Spanish cities analyzed, this will be the most significant urban transformation project undertaken in the city's

history. Amongst others, Burgos and Valladolid are good examples of this. On very few occasions is the urban transformation accompanied by economic and functional transformation objectives, though this is the case in Zaragoza. Here, the arrival of the HSR has also represented the opportunity to proceed with a change in the socio-economic model which has been tackled in strategic planning (Strategic Plan-Ebropolis), territorial planning (Master Plan and redeveloping projects), urban projects (the logistic area of PLAZA, Digital Mile, Puerto Venecia Shopping Centre, etc.) and major city events such as ExpoZaragoza 08. The urban transformation associated with the introduction of the HSR has led to a strengthening of an even more profound process of urban change.

These redevelopment projects, which depend to a large extent on capital gains from the sale of land, were programmed at a time when the real estate market in Spain, with particularly strong emphasis on the housing sector, was in a period of rapid expansion. This explains the amount of land and the extent of planning permissions that were granted for residential use. This is somewhat different to what usually happens in other European contexts, where the land is normally reserved for uses that help to promote the concept of centrality that the station generates. In a situation such as that faced at the present time, with a strong market recession, it is reasonable for a series of question marks to be placed over the future of at least some of the macro-urban projects. However, this new context might also give a greater margin of time that could be used to redirect these projects and to think once again about the relationship between the rail and the city.

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