

Urban and Architectural Revival for Public Transport Infrastructure in The Netherlands

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Two major rail infrastructure projects in the Netherlands are now moving ahead rapidly, changing cityscapes by the end of the decade. The first is an extension of the North European high-speed link (HSL) rail network for major cities within the country, with the southern part of the network planned to begin operations in April 2007 (Fig. 1 and Table 1). The second, expected to be in service in 2008, is the RandstadRail tram-train rail network (Fig. 2) in the southern part of the Randstad conurbation (metropolitan region of Amsterdam,

Rotterdam, The Hague and Utrecht). Both projects mesh with the Dutch government's energetic strategy to improve national mobility and promote transportation modes other than the automobile. The high urban concentration in the centre of the country is one reason why congestion has gradually grown to a critical level on trunk roads in this small area—the Randstad conurbation alone has a population of 7.3 million, representing 46% of the nation's population in just 25% of the total area (Tables 2 and 3).

However, the high population density and close proximity of cities in the Randstad actually represent an asset for development of transit networks, explaining why the Ministry of Transport, Public Works and Water Management has decided to invest in an exciting light rail project that can compete well with the automobile over short distances of around 10 to 20 km. The Ministry signed an agreement with the urban region of Rotterdam and the Haaglanden conurbation to establish RandstadRail linking Rotterdam, The Hague and Zoetermeer on existing tracks. Train frequencies will be increased considerably, and the system will connect directly to The Hague's tramway network and Rotterdam's subway. This tram-train solution will permit travel on different transport modes (train, tram and subway tracks). Several Dutch cities plan to integrate their urban renewal projects with one or other of these two future rail networks. In larger cities, such as Amsterdam and Rotterdam, the two rail transport projects are the focus of ambitious renewal projects promoting transportation modes.

Table 1 Journey Times before and after HSL-Zuid

Connection	Now	HSL-Zuid (2007)
International		
Amsterdam CS–Paris	4 h 09 min	3 h 04 min
Amsterdam CS–Brussels Zuid	2 h 51 min	1 h 44 min
The Hague–Brussels Zuid	2 h 17 min	1 h 44 min
Breda–Brussels Zuid	1 h 56 min	59 min
Domestic		
Amsterdam CS–Rotterdam Centraal	58 min	37 min
Amsterdam CS–Breda	1 h 44 min	59 min
Amsterdam Zuid/WTC–Rotterdam Centraal	53 min	30 min
Amsterdam Zuid/WTC–Breda	1 h 42 min	54 min

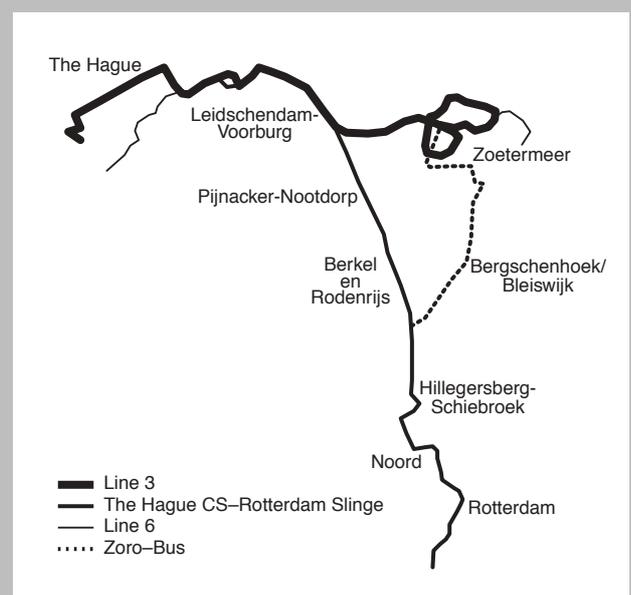
Source: www.hslzuid.nl (WTC = World Trade Center; CS = Central Station)

Figure 1 HSL-Zuid Route



Source: www.hslzuid.nl

Figure 2 RandstadRail Route



Source: www.randstadrail.nl

- In Amsterdam, the rail development is located outside the old city because of a strategy to connect Schiphol Airport and develop the Amsterdam–Zuidas (Southern Axis) services district, (see *JRTR* 39, pp. 18–25).
- On the other hand, Rotterdam is keen to revitalize its central district around the main train station.
- In the case of other smaller but growing cities, such as Arnhem, which is located outside the Randstad conurbation and is just 20 km from the border with Germany, the plan to develop a high-speed connection to Amsterdam and Frankfurt led to a thorough re-examination of Arnhem’s future role as a transport hub.
- The Dutch capital, The Hague, adopted a short-term strategy focused on improving the quality of its central public spaces by freeing them from the tram network, part of which will be moved underground. The city’s longer-term strategies call for major high-density changes in the downtown core and upgrades to the central train station to permit RandstadRail services.

In all cases, architectural and urban planning has been commissioned to teams of experts skilled in planning innovative infrastructure projects, who are bringing new vision to the design of transportation space and facilities in the urban landscape.

Expanding Rotterdam Centraal Station

Located in the northern part of Rotterdam—the port city for the Randstad conurbation—Rotterdam Centraal is the main station and serves as a multi-modal (train, subway, tram and bus) transport hub. To ensure access to the high-speed rail line and RandstadRail, local decision makers launched a global restructuring project for this urban hub with the main

Table 2 Modal Split by Journey Purpose and Urbanization, 1998

Transport mode	Randstad		Rest of Netherlands	
	Three large cities (Amsterdam, Rotterdam, The Hague)	Randstad (total)	More urbanized	Less urbanized
Percentage of commuters				
Cars	37.4	50.6	52.7	64.9
Bicycles	31.2	24.5	32.1	22.6
On foot	8.8	6.6	5.2	4.0
Trains	11.0	9.1	4.5	1.9
Buses/Trams/Metros	14.9	7.9	2.3	1.6
Percentage of shoppers				
Cars	25.6	35.6	40.3	52.4
Bicycles	26.4	30.5	33.8	30.0
On foot	41.0	31.0	23.6	14.7
Trains	1.5	1.6	0.9	0.3
Buses/Trams/Metros	12.2	5.5	1.8	0.9

Source: Netherlands National Travel Survey, 1998

Table 3 Daily Travel Distance and Time per Person as Car Driver by Trip Purpose and Urbanization in Netherlands, 1998

Purpose	Randstad		Rest of Netherlands	
	Three large cities (Amsterdam, Rotterdam, The Hague)	Randstad (total)	More urbanized	Less urbanized
Commuting				
Distance (km)	39.6	42.0	38.7	41.4
Time (min)	53.2	53.8	48.6	49.5
Shopping				
Distance (km)	14.9	15.7	13.8	16.3
Time (min)	31.5	29.3	27.2	27.4

Source: Netherlands National Travel Survey, 1998

goal of improving modal connections that will continue to grow in number and complexity. Rotterdam Centraal first opened in the 1950s and now serves some 140,000 passengers each day—a number predicted to rise to 210,000 by 2025. Nevertheless, both the physical boundaries of the project and its programme for the area to be revitalized largely exceed those of the transport facilities and embrace areas around the rail right-of-way. Private investors joined the project, adding mixed-used activities to the transport services. Rotterdam is

the first stop for high-speed trains from Paris and Brussels, and the city and its 600,000 inhabitants intend to profit from their location as the southern gateway to the Netherlands. Thanks to RandstadRail, the city will soon be just 20 minutes from Amsterdam Schiphol Airport, and it intends to play up this advantage by making its station district more attractive by adding a mixture of services. However, several obstacles, make it difficult to achieve these two aims. Since Rotterdam Centraal is located outside the downtown core and



Bus terminal and main façade of Rotterdam Central Station in 2001

(Author)

- To provide comprehensive links for both sides of the track without changing track layout. This strategy is not to reshape the infrastructure but to boldly urbanize it, assimilating tracks by creating urban links joining the city centre and suburbs through multi-purpose projects that are directly integrated with or connected to transport facilities.
- To increase the occupancy density of the site, despite the lack of vacant land. In addition to urbanization of the few patches of vacant land along the tracks—really the only available empty space—on one hand, the project attempts to increase the layers of transport facilities, and blend them into the urban fabric on the other.



Artist's impression of Rotterdam Centraal Station main hall by William Alsop

(Alsop Architects)

Alsop says, 'The mixed-use development will provide community links by serving the needs of businesses, residents and commuters, with an emphasis on the importance of the quality of the urban space. Plans are to integrate the new development into the city—shops, cafes and public facilities will complement those that already exist and add a new value to city life in Rotterdam. This will provide a powerful catalyst for further regeneration in neighbouring areas and throughout the city.'

Called Mobility Hub, the new project includes three access levels (street, platform and overhang) all linked through four distinct urban elements (deck, roof, towers and peripheral areas). Continuing the main north-south axis that serves as a topographic reference point, a linear outdoor deck extends across the tracks and ends at a belvedere on the other side. Complete with shops and services, the top level of this pedestrian deck is protected by a roof overhanging the railway. It is twinned with an intermediate level that provides a link to the platforms. The suspended upper deck is designed to serve as a mezzanine for various activities, opening onto the city and the passenger area, while the lower level

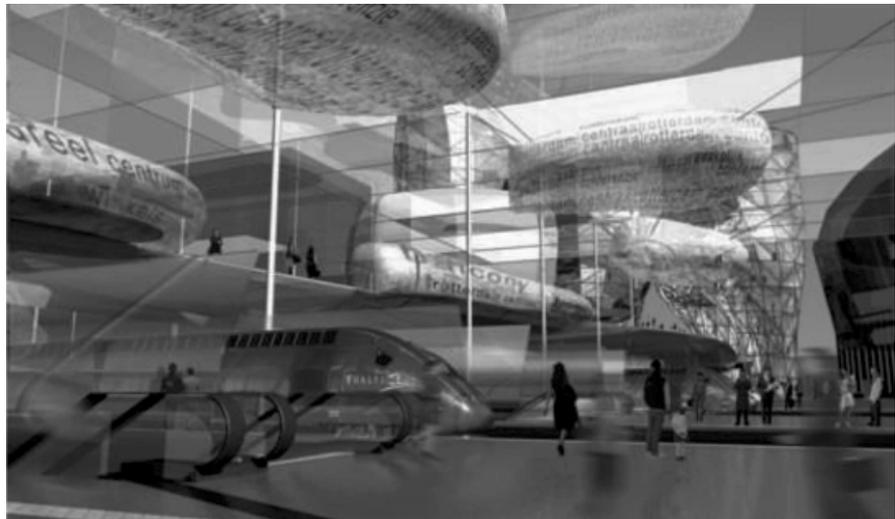
is a transit station, it suffers from typical urban problems; the rail right-of-way isolates one side of the tracks from districts to the north (Proveniersplein), and a branch line has reduced the value of the urban fabric in the east (Hofplein). The lack of large areas of vacant land also restricts planning of major urban

revitalization projects. At present, only a few neglected trackside strips of land offer some construction opportunities. An international competition launched by the city in 2001 resulted in the selection of a master plan by the British architect William Alsop. The plan offers two solutions:

provides seamless pedestrian access under the platforms. A number of office towers mark the gateway to the southern transportation node, standing as a landmark indicating the new central location of the station. The buildings are bulbous shaped so that they occupy as little land as possible, with the lower floors being used mainly to give vertical access to higher floors. The upper floors overhang the whole transportation infrastructure that is public property (the station plaza, including a road haulage depot and tramway terminal). A partial overhang over a curve in the track to the east permits construction of a new access road leading directly to the transport node and peripheral areas where mixed development projects provide housing, business and office facilities (Table 4).

Preparing Arnhem Centraal for Heavy Use

Arnhem Centraal Station is now entering its final restructuring phase, getting ready for the soon-to-be-operational HSL-Zuid. In 2008, even before direct links to Amsterdam and Frankfurt (HSL-Oost) are in service, central Arnhem will be no more than 40 minutes from Schiphol, the national airport. This will give Arnhem—a city of slightly over 140,000—the opportunity to take advantage of its



Artist's impression of Rotterdam Centraal Station main platforms by William Alsop

(Alsop Architects)



Rotterdam Centraal Station master plan by William Alsop

(Alsop Architects)

Table 4 Station and Station Area Average Building Programmes

Units: m² unless indicated

	Arnhem Centraal (1996–2007)	The Hague Nieuw Centraal (2003–2009)	Rotterdam Centraal (2001–2009–2018)
Site area	40,000	-	200,000
Programme (total)	150,000	221,000	641,000
Transfer hall	14,000	-	-
Trolley-bus zone	6,000	-	-
Bus deck	8,000	-	-
Parking	44,000 (1,000 cars, 5,000 bicycles)	-	6,500 cars
Shops and facilities	8,000	12,000	121,000
Office space	55,000	128,500	318,000
Housing	15,000	59,000	195,000
Hotel	-	21,500	7,000

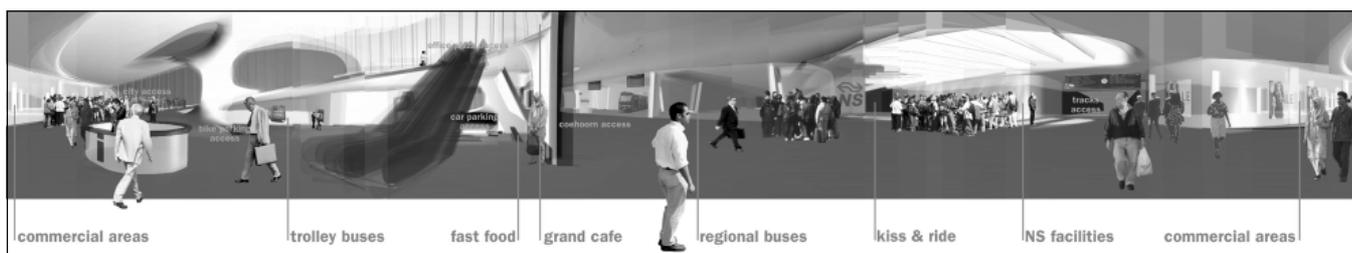
Source: Arnhem—www.unstudio.com; Rotterdam—www.alsoparchitects.com; The Hague—www.denhaag.nl



Construction site of Arnhem Centraal Station: the office tower by Ben van Berkel

(Author)

location between two of Europe's busiest airports. When the station restructuring project started about 10 years ago, some traffic surveys indicated that 75% of the 65,000 daily journeys through the station involved changes between transportation mode, either public (train, bus or tram) or private (car, taxi or bicycle). First seen as a source of problems because of its inadequate structure, once given an optimum layout, its mission as a transport hub offers great potential for mobility. Built in 1954, the station was no longer suitable for its purposes. Plans call for doubling its capacity (to 110,000 journeys per day) to meet future needs. The Arnhem municipal government hopes to take advantage of the project by revitalizing the station neighbourhood. As in Rotterdam, architects were asked to develop a master plan for an area expanding far beyond the station and its role as a simple transport node. Lead by Ben van Berkel, architects at the Dutch architecture office UN Studio spent 2 years developing an architectural and urban system to overcome the complexity of the site and possible future restrictions. Ben van Berkel defines their 'one terminal concept' as follows: 'By combining the number of users with the transfer movements, the connections between the different systems are placed in a hierarchical order. To optimize the network in the places with the greatest number of transfer movements, the distances are kept as short as possible.' The result is a building designed with



Artist's impression of Arnhem Centraal Station transfer hall by Ben van Berkel

(UN Studio)



V-shaped slits accentuating concrete laminated structure at Arnhem Centraal Station (Author)



Den Haag Station platform and its exhibition wall by OMA (Author)

distinct thematic floors that minimize movement from one to another. There are three parking levels underground beneath an intermodal deck (buses and the tramway are located together at ground level), and the superstructure will eventually be topped by a three-storey pedestal for an attractive trio of office towers (Table 4). The two, long V-shaped slits accentuating this concrete laminated structure along the east-west tracks bring natural light into the furthest reaches of the parking levels, providing direct vertical integration with the bus and tram platforms. Construction of the Willemstunnel allows road traffic to pass under the station, giving motorists direct access to the underground parking levels. The risk of monotony inherent in such a concrete laminated structure is avoided thanks to an admirable architecture design based on movement from one level to another. The architect explains his concept as, 'Movement studies are the cornerstone of the proposal: the analysis

of the types of movement on location includes the directions of the various trajectories, their prominence in relation to other forms of transportation on the site, duration, links to different programmes and interconnections. A kind of landscape has resulted from the organization of the area. The cuts into the landscape determine the routes of the traffic flows. Pedestrian movements, transport systems, light, construction and the distribution of the programme are fused into one continuous landscape.'

The Hague's Underground — A Linear Station

The Underground project opened in October 2004 after about a decade of planning and construction. Located in the heart of the business district, it provides an underground link for two tramway stations (Grote Markt and Spui) where three lines cross, as well as parking for 500 automobiles. The decision to put

the tram underground for 1.3 km in the downtown area was part of a global strategy to rationalize personal and public transportation systems in the capital. It was an essential strategy for such a project intended to modernize the cityscape. The location of this city of nearly 500,000 people, hedged between the sea to the west and an expressway to the east, greatly reduces its ability to expand laterally. Therefore, the municipal government focused on a plan to increase density in the downtown area. This plan proposes additional projects covering 500,000 m² of land, all to be completed by 2020, including upgrades to the central station. Comprehensive traffic flow management is required to prevent congestion that could otherwise arise from the increased density and the future RandstadRail service. To this end, a loop road punctuated by parking areas will encircle the downtown area, turning it into an island-like district with an area of about 100 ha, open only to local



Den Haag Station open corridor by OMA

(Author)



Den Haag Station platform and elevated car parking ramp by OMA

(Author)

traffic. Also, a project to completely revitalize the central station for The Hague is on track. In 2003, architects at Benthem Crouwel proposed an entirely

transparent volume through which the future RandstadRail will pass (Table 4). At present, this first attempt to increase traffic fluidity on the city's most important

commercial street, with its many large stores, while at the same time offering transport services and busy parking areas, seems to be a success thanks to its use of the Underground architectural device. The design of this space was assigned to the Dutch architecture office OMA under the direction of Rem Koolhaas who describes the Underground principles as, 'A totally underground—invisible—system of federated parking garages, subway stations, sunken roads, etc., that would mine the entire centre, invade, connect, and consolidate existing garages. The tunnel acts like a spine connecting the separate organs, creating a body of underground connections serving the city from underneath.'

In addition, the problem generated by the uneasy coexistence of tram platforms and parking areas inside the long traffic corridor is solved by an innovative interplay of transparencies—a road runs suspended inside a transparent structure over the tracks from one end of the Underground to the other, offering lateral access to the different parking spaces. Motion is apparent because of the transparency, so the usual uneasiness felt in underground spaces can be avoided.

Intermodality and Urban Living

Will these two future transportation networks and their revitalized stations reduce automobile traffic in the heart of the Netherlands? At the least, we can say that the dynamics working toward this major goal, which was set out in the fourth report on land development defining directions for 2015, are in place so far. In the Netherlands, these development projects represent advanced technical exploits, and improvements to public transportation create a revival in architectural and urban expression. At any rate, all projects share the common goal of intermodality, a goal that is

essential to getting people out of their cars and onto public transport. Attractive, easy-to-access and user-friendly transport infrastructure will soon become reality for more passengers. When completed, its effect will also be measured on the basis of its ability to link different elements of the urban fabric, such as apartments, centrally located businesses and facilities, offices, etc.

But the complexity and scope of these projects could make successful completion difficult. An example is the Rotterdam project, which the new municipal government cancelled in 2002 because it was considered too grandiose. The project was recently launched on a reduced scale and now encompasses only a single intermodal terminal.

Projects that closely relate architecture and urban reconfiguration seem to require an average of 10 years to complete. As shown by the above three examples, a major transportation facility can no longer be regarded as a single monumental building but should now be seen as an integral part of the city in its entirety. As such, it can be completed only over the long term. ■



Den Haag Station platform seen from cross-pedestrian bridge by OMA

(Author)



Den Haag Station platform seen from mezzanine entrance by OMA

(Author)



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Ms Tiry is a French architect-researcher. After attending Kyoto University on a scholarship from the Japanese Ministry of Education, Science and Culture, she worked as a freelance researcher in Tokyo and Hong Kong thanks to French AFAA grants. She specializes in architecture and urban issues related to transportation changes in metropolitan areas. She has written several articles for specialist magazines (including *JRTR* 13, 20, 28, and 35), and is the author of *Learning from Three Tokyo Stations, 1997–2000* (CD-ROM format). She now teaches at the Paris-Belleville National School of Architecture and is a member of the research laboratory LACTH at Lille National School of Architecture and Landscape.