

Primljen / Received: 28.10.2013.

Ispravljen / Corrected: 6.7.2014.

Prihvaćen / Accepted: 27.7.2014.

Dostupno online / Available online: 10.9.2014.

New directions in the design of railway stations

Authors:



Ksenija N. Stevanović, PhD. Arh
University of Belgrad
Faculty of Architecture
thestecats@yahoo.com



Milena V. Stevanović, BSc. Arh
Ecole Polytechnique de Bruxelles
Service BATir Université Libre de Bruxelles
Milena.Stevanovic@ulb.ac.be

Professional paper

Ksenija N. Stevanović, Milena V. Stevanović

New directions in the design of railway stations

Sustainable development of traffic and cities, integration of transport modes, and the renaissance of railway traffic, have led to construction of a great number of railway stations/terminals over the past decades. These multi-modal traffic interchanges, based on advanced concepts and properly integrated in urban matrices, are becoming new focal points of urban development. Recent positive experience in the construction of significant railway stations is presented from the standpoint of urban development. Results obtained during analysis of the Belgrade railway station, which is based on the proposed morphological concept, can be used as guidelines for development of other significant railway stations in urban areas.

Key words:

railway stations, morphological concept, throughway type railway stations, integration in urban matrix

Stručni rad

Ksenija N. Stevanović, Milena V. Stevanović

Nove smjernice koncipiranja željezničkih kolodvora

Održivi razvoj prometa i gradova, objedinjavanje vidova transporta, preporod željezničkog prometa, utjecali su na izgradnju velikog broja željezničkih kolodvora posljednjih desetljeća. Multimodalni kolodvori, unaprijeđenih koncepata i integrirani u urbanu matricu grada, postaju novi centri razvoja. U radu se iz aspekta urbanističko-arhitektonske struke analiziraju pozitivna iskustva u izgradnji značajnih željezničkih kolodvora. Rezultati provedenih analiza na primjeru željezničkog kolodvora u Beogradu, prema predloženom morfološkom konceptu, mogu poslužiti kao smjernice u definiranju važnih kolodvora u urbanim sredinama.

Ključne riječi:

željeznički kolodvori, morfološki koncept, prolazni tip kolodvora, integracija s gradom

Fachbericht

Ksenija N. Stevanović, Milena V. Stevanović

Neue Richtlinien zum Entwurf von Eisenbahnterminalen

Die nachhaltige Verkehrs- und Stadtentwicklung, Verbindungen verschiedener Verkehrsnetze, sowie eine Belebung des Bahnverkehrs, wirken sich in den letzten Jahrzehnten auf den Bau vieler Eisenbahnterminals aus. Multimodale Bahnhöfe modernen Konzepts, die in urbane Stadtmatrizen integriert sind, werden zu neuen Entwicklungszentren. In dieser Arbeit werden gute Erfahrungen im Bau bedeutender Eisenbahnterminals aus urbanistisch-architektonischen Blickwinkeln analysiert. Die Resultate am Beispiel des Eisenbahnterminals in Belgrad können, dem vorgeschlagenen morphologischen Konzept folgend, als Richtlinien im Entwurf wichtiger Bahnhöfe in Stadtzentren dienen.

Schlüsselwörter:

Eisenbahnterminals, morphologisches Konzept, Durchfahrtsbahnhof, Stadtintegration

1. Introduction

A sustainable development of cities is one of topical issues that is considered in many research projects and investment schemes at the global scale. It can briefly be defined as the process of city preservation in which all its users can fulfil their needs without affecting natural systems and living conditions of other people, both in the present and in the future [1].

In the context of sustainability of transport and cities, the current plans, directives and projects are aimed at both preserving cities and ensuring efficient traffic. With the beginning of the third millennium, the EU has defined the transport policy based on combining different types of transport, lessening of traffic jams, and placing the users and their needs in the focus of interest [2]. A special attention is paid to the revitalisation and greater use of rail systems, and thus to the revival of the railway passenger transport and integration of all types of traffic into a unique and efficient system. The creation of the unified transport has been accelerated by the renaissance of rail transport, thanks to development of the high-speed train technology [3].

In accordance with the aforementioned tendencies, a sustainable city implies affirmation of railway systems as they lower pollution levels, reduce traffic jams, and are at the same time able to transport a large number of users [4]. Traffic (rail and bus) terminals are important distribution zones and interchange places where various types of transport are linked, and are therefore regarded as key points of the city traffic network. This distinct mode of transport connects interurban and urban traffic and is very complex to solve, since it is placed in a built environment. Hierarchical implementation and branching of public transport is carried out through terminals which, if offering an appropriate comfort of services, can significantly influence sustainability of cities and their traffic in a positive way [5].

In terms of the above-mentioned trends and changes, railroad nodes present in the region also come to the focus of attention. The Belgrade railroad node as a part of a larger rail network, with the current state of re-definition and transition, should make good use of the new and positive experience of contemporary train station facilities in order to achieve a complex synergy with the city.

Last few decades have been marked by intensive construction of railway stations in Europe and beyond. These terminals are outstanding examples of multimodal interchanges, places of easy and quick change of transport modes, and traffic interchange points providing a good-quality public transport service. They are also distinguished by proper use of construction land, reduction of car use, distinctive architectural appearance, etc. [6]. In contrast to the stations from the past that have fallen into disrepair in the period of stagnation of rail traffic, modern stations are increasingly becoming exclusive centres of urban development [7].

The example of the new stations clearly reveals the use of the pass-through terminal concept, which allows a highly convenient interaction with the urban matrix. The identification and enumeration of new requirements in the design of city terminals enables definition of guidelines for the design of important stations in the central zone of Belgrade.

Given that the historical Main Railway Station is still in function, and the station facilities are lacking at the stops at Prokop and New Belgrade, the use should be made of recent experience so that steps can be taken to enable full definition of this metropolitan area.

2. Relationship between station and city

Traffic terminals are special places in the urban fabric, mega structures of the cities, and traffic nodes enabling large fluxes of people. They abound in a range of services and facilities that determine the character and development of the entire city district. The main advantage of city terminals is their central position, easy access for passengers, fast change of transport modes and, from the aspect of their appearance, they create a distinct visual identity of the city.

European cities, often characterized by similar urban development, have old railway stations in function, and these remarkable structures are a part of the historical infrastructure and architectural heritage of the city. These terminals from the 19th century stand as witnesses of a glamorous period of the first occurrence and development of railways, and subsequent growth of cities and stagnation of railways. These old structures have become incompatible with new trends, they are expensive to maintain, and are disruptive to the city and its matrix. Due to their head-type development and tracks placed in horizontal plane, they occupy vast areas of valuable urban land, while also constituting a barrier that cuts off natural flow patterns of the street network, [8].

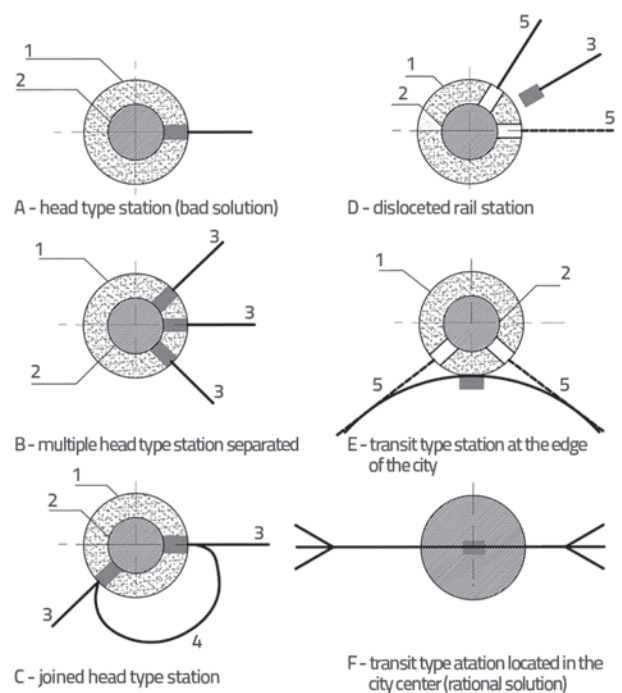


Figure 1. Development of relations between the station and the city: From appearance, duplication, connection and relocation of head-type stations, to the adoption and application of the throughway station type, [9]

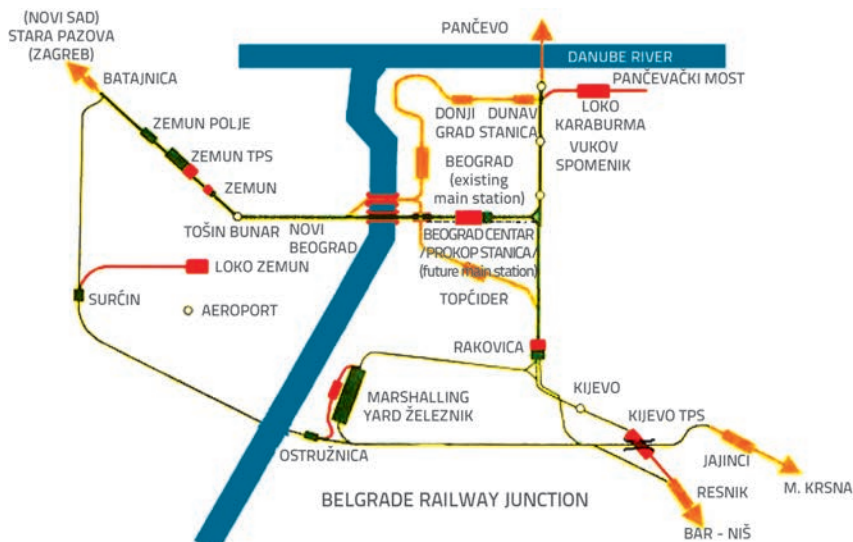


Figure 2. Present network of the Belgrade railway junction

Head-type terminals, which are in fact the final stations of lines from different directions, are outdated in terms of traffic and construction concepts, and from the standpoint of the planning, architectural and urban planning profession. Already in the late 19th century, multiplied head-type terminals connect to one another and move away from the city centre. This trend is followed by introduction of the transit type stations touching the city like tangents. This genesis of the railway node has led to optimum solutions: the transit-type terminal placed in the central city area (Figure 1).

The current picture of terminals in European cities is significantly changing. The revival of railway passenger traffic led to construction of new terminals in Europe at the end of the last century. In many cities, expensive reconstruction of older stations is under way. These stations are being adjusted to accommodate new high-speed train lines, as well as the city traffic, thus creating a more efficient traffic interchange enriched with a number of other facilities [10].

On the other hand, new stations are being built in accordance with modern principles for the construction of multi-modal transport nodes. These new structures touch the central area of the city, thus becoming centres of development in these parts of the city. The city of Belgrade has been trying to solve the issue of the old main head type station for almost half a century now, and has been building a new pass-through type station. Full reconstruction of the junction would enable replacement of the outdated old station located in the wide valley at the right bank of the Sava River (which used to be a suburban part of the city in the late 19th century) with the new pass-through type station in Prokop. The historic station is in many ways unsuitable for both the city and passengers. Occupying a large space due to its track layout, the old station does not allow urban facilities to access the Sava, nor to spread along this river and, on the other hand, it increases significantly the time of travel for transit trains, due to the time the train composition is kept the station. The new station, called Belgrade Centre, is

situated at Prokop, in the extended centre area of the city. This is a pass-through type station that is to connect railway lines from all directions (Figure 2.). The remaining passenger stations (in the north, east and south directions) would be of a pass-through type. In this manner, the city would gain a system composed of pass-through stations and stops, compliant with all standards applied to modern railways, and highly suitable for urban needs. This comprehensive plan and investment has already been implemented to a great extent, but not sufficiently for the system to function fully, so that the long-distance passenger traffic is still operated via the old station.

Significant socio-political events have also contributed to this situation so that today, after almost forty years, we are faced with the situation in which this growing city requires some other significant railway terminals as well [11].

3. Improved concept of pass-through type stations

Three main constitutive elements of the station complex, i.e. the platform area, the station building with a hall, and the station square, define by their mutual disposition the functional concept of the station, and therefore its final morphology [12]. The typology of station facilities, derived from this correlation, is important for the architectural and urban planning profession as it gives the functional and emergent character to the whole, while two basic types are the head-type station and the pass-through type station [13].

Apart from being in "conflict" with the urban matrix, the head-type station separates, in terms of its appearance, the town from the railway infrastructure. This station is of the input-output type, i.e. its operation requires a greater number of tracks in the function of inevitably long manoeuvres, and thus also a larger area of urban land. Despite its greater spaciousness, the head-type station has a very limited throughput capability compared to the pass-through type station. If there are several stations of this type, which is the case in great metropolises, the city is divided into several sectors and the street network is broken by bigger stations. Contrary to head-type stations, pass-through stations enable, albeit with some skilful planning, introduction of various interregional lines or other railway lines into the urban area, by merging them into one bundle with an appropriate number of tracks. These solutions allow customization and adjustment of rail network to the city transport network, and to the city master plan as a whole, as well as the most appropriate splitting of passenger lines from freight lines. The main passenger station is in that case a pass-through type station. It has a great throughput capacity, allowing all main railway tracks to enter and leave the city in a bundle, and their

most appropriate passage through urban space. All tracks of the pass-through type station are main tracks, i.e. there are no side tracks and the station is more accessible. Squares can be placed on both sides of rail tracks, or either below or above them, depending on disposition of routes and terrain morphology [14].

A pass-through type terminal is applied for multiple connectivity railway lines in railway network. Conditions of the location, and natural and man-built morphology, determine which station sub-type will be applied (Figure 3.).

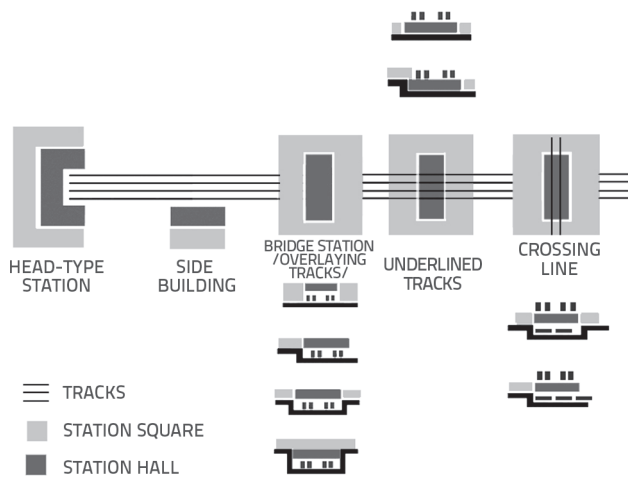


Figure 3. Typology of station by disposition and correlation with constitutive elements in plan and profile; head-type and pass-through station modalities [15]

In the beginning, a pass-through type terminal entailed platform accessibility through gangways or underpasses, depending on whether the facility was on embankment or in cutting, while the station itself was placed laterally. Such solutions have many disadvantages: a long way from the station square to platforms, and narrow dark-corridors or gangways exposed to external influences [16]. Over time, the concept has evolved and so the station building is no longer isolated from platforms, but integrated in the vertical plan of the entire complex, with unified architectural appearance of the station (Figure 4.) [13, 16].

This station concept, with its appropriate vertical-plan arrangement of contents, is not only highly beneficial for users, but is also very functional for the city itself. Obvious advantages of this concept are:

- terminal can be reached from many sides and levels, i.e. the existence of multiple station squares is possible, which relieves traffic approaches,
- a fast and easy transition from one mode of transport to the other is provided,
- it occupies a relatively small urban area, since a good use is made of vertical plan,
- such stations are characterized by unity of architectural appearance and functionality [17].

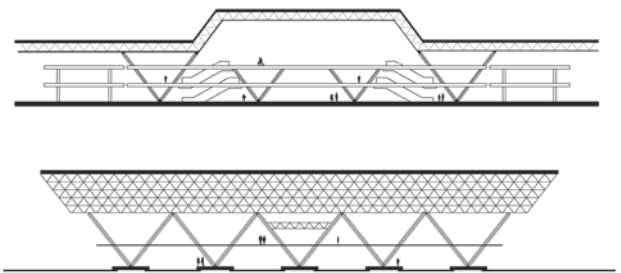


Figure 4. Schematic view of pass-through type station, the unity of the vertical content superposition, first implemented in 1953 in a competition entry for the New Haven Station / USA / [16]

Terminals have been constructed and reconstructed in Europe, Asia and beyond for almost a quarter of the century now; they are landmarks of railway renaissance and the society's economic power. Examples of these terminals are developed modalities of pass-through type stations, which are appropriately placed either underground, above the ground level, or at the intersection of regional and city railway lines (Figure 5.).

Apart from the already accepted vertical concept, these stations should meet several other functional needs, some of the most important being:

- to form a contemporary and efficient multimodal traffic interchange,
- to provide for good orientation and information, to ensure proper user safety when moving within the station,
- to have an abundance of natural light that reaches deep into the lowest levels of the stops,
- to change the station's appearance so that it becomes a kind of covered city square, a voluminous space enriched with many attractive contents and amenities,
- to shape the station in accordance with its surroundings, so that it comes to be a recognizable benchmark of the city [18, 19].



Figure 5. Modern multimodal terminals: Main Station in Berlin, 2006; Waterloo Station in London, 1994; new station in Liège, 2011



Figure 6. Urban context of terminals in central zones of Belgrade

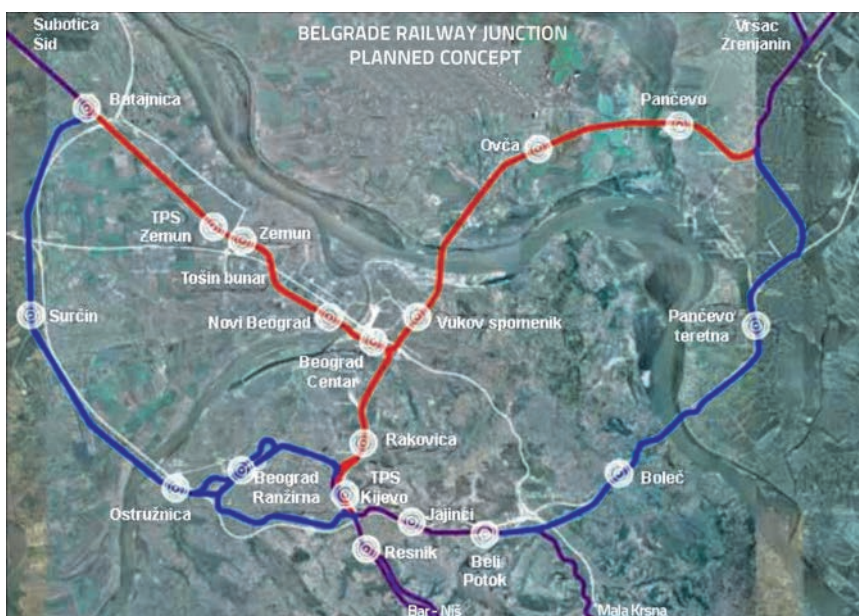


Figure 7. Planned node concept with passenger pass-through stations (red) in central zones of the city [11]

4. Status and potential of railways stations in central zone of Belgrade

Belgrade holds a significant position for the Pan-European transport network, as it is situated within important railway, road and water corridors. It also has a great potential of becoming the centre of the Southeastern Balkans. Main international railway lines in both north-south and east-west directions pass through Belgrade. Despite these advantages, the reconstruction of the railway junction, began in the 1970s, has not as yet been completed. The city of Belgrade, despite being the centre of the railway network in

Serbia, has been entangled for a long period in the process of redefining the railway junction. In the context of the Belgrade sustainability measures, its traffic, Corridor 10 infrastructure, and transition of railways, the junction and its terminals are yet to find themselves in the focus of interest. The current planning documents (Urban Master Plan of Belgrade 2021), do not place a sufficient emphasis on this important part of urban infrastructure [20].

Indealingwiththisissue,multidisciplinary teams, design organizations, and authorities in this field, are forced to cyclically adjust to the changes and needs of the city and its investments. In this sense, the professionals and general public have to treat the complete station structures as a specific "gateway" of the city. The transport development strategy emphasizes the importance of the Belgrade railway junction, with the main pass-through station, as the node of European north-south and east-west directions [21].

The old and the new railway bridge and motorway, the old Main Station, the Belgrade Centre Station in Prokop, and the New Belgrade Station, are all positioned in the city of Belgrade, along the Sava River. The aforementioned stations are in mutual correlation, and each one represents a "neuralgic" place for that part of the city (Figure 6).

According to the Belgrade railway node concept, the passenger system is based on railway lines that pass through the central zone of the city, from north to south and east. The contact with the city is established via the pass-through stations Zemun and New Belgrade on the left river bank, and the Belgrade Centre and Rakovica stations on the right bank (Figure 7.). As the concept of the passenger system node is not yet completed, the traffic is now operated through the old system node, so that the trains reaching the Belgrade railway system from all directions, arrive to the old passenger head type station [11].

By relocating the old railway station from the Sava amphitheatre, and by removing its track layout, a large area of the most exclusive urban land along the river Sava would be freed. Currently, the most discussed municipal issue is the project called "Belgrade Waterfront", which implies relocation of rail tracks from the Sava amphitheatre [22]. This area also



Figure 8. Station at Prokop: a) Nonexistent complex; b) existing railway infrastructure

accommodates the main bus terminal with 80 departure and 20 arrival platforms, and with the daily circulation of 1,500 buses, as well as some other forms of public transport. All these facilities are spread in a horizontal plane, additionally occupying the city area, and changes between transport modes are inefficient, unforeseeable, time consuming and risky [23].

If Prokop Station is completed and New Belgrade Station upgraded, the whole area would obtain adequate facilities in an exclusive area along the river, while the old Main Station building, as a part of architectural heritage, would be adequately provided with a number of flexible-use contents [24].

The above idea is supported by the expected frequency of passes through the Belgrade railway node. Many years of unstable socio-political situation, as well as the lack of development, have severed major relations on which such forecasts are based. Nevertheless, by combining the methods, factors and existing projects and studies, according to the data provided by professor Veskovic from Faculty of Transport and Traffic Engineering, and if the railway is revitalized and modernized as befits, it can reasonably be predicted that in 2020 thirty-five international trains (with transit), about 18 interregional trains, and 37 regional ones, will be passing through the Belgrade railway node. Sixty-seven city trains (Beovoz) would also be operating, as well as a dozen suburban trains in different directions. The station at Prokop, whose construction began forty years ago, is foreseen as the future Main Central Station of the Belgrade Railway Node. From the urban planning standpoint, it is planned as a large traffic node that integrates the rail, road and metro traffic, with a tendency of becoming the new city centre. The contents and amenities in the area under study will focus on a great number of users: a fair, a health centre, stadiums, and residential areas. It is expected that

a daily circulation of people would be about forty thousand, i.e. about 250 pairs of trains (around 200 local and city trains, and some 130 direct and transit trains). The station is well connected with city traffic routes and is located in the central zone. It has been designed for ten rail tracks and six platforms, and includes a contemporary station building within a business and commercial complex [11]. The station is largely completed in terms of railway infrastructure and operational support, but only for the operation of municipal railways (Beovoz) (Figure 8.). The railway passenger system would be put into operation once the station is completed. The problem with this station lies in the fact that it has remained unfinished for a long period of time, it lacks superstructure facilities, and the necessary transport access and connections to other modes of public transport. The reasons for this situation can be found in the economic and political situation, both at the city level and the national level. The station is still the subject of remodelling incentives in the scope of which various opinions and design solutions are being harmonized [20, 21].

Despite these facts, the station at Prokop has a good development potential, especially today, in the context of a growing city. The station is a pass-through type facility in cutting, with the altitude de-levelling of 30 meters, and with a dual side road access, from top via Dedinje Boulevard, and from bottom via the Belgrade - Zagreb Motorway. This position has allowed design of a sophisticated traffic

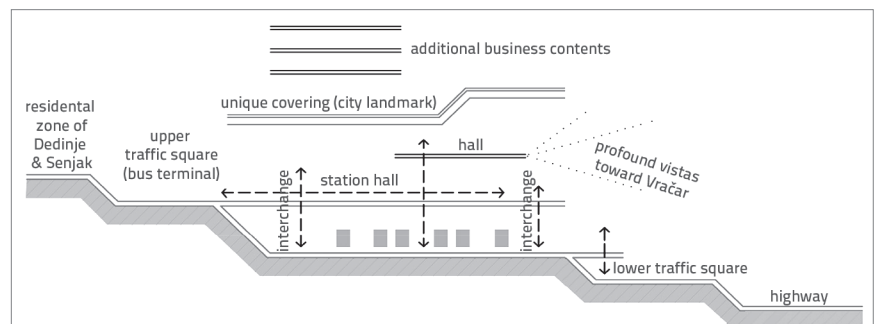


Figure 9. Cross section of Prokop Terminal Complex, basic facilities and multimodal interchange potential

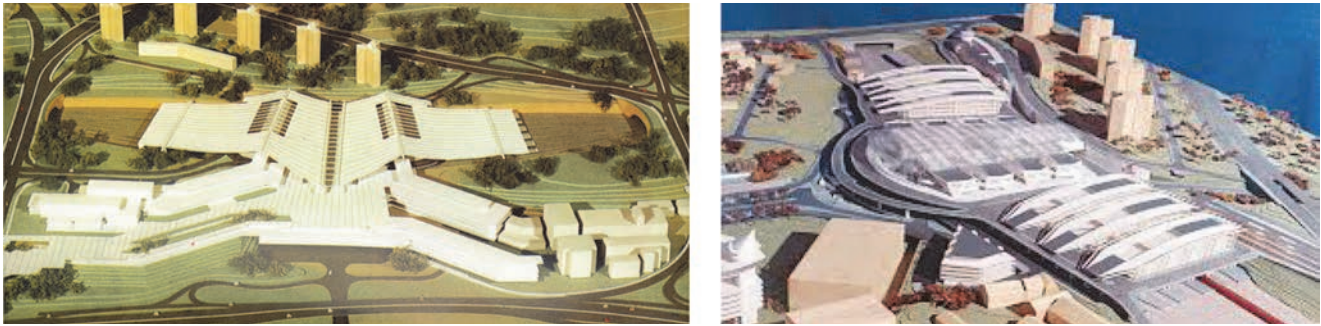


Figure 10. The oldest (1975.) and the most recent draft solution for Prokop Terminal, in accordance with past and present standards for modern achievements



Figure 11. New Belgrade Station: a) Location capacity; b) Lack of a station equipment and amenities

checkpoint, accessible from many directions and from various parts of the city. An extensive horizontal spreading of the locality enables establishment of station squares on both sides of the central hall, which makes the area "fluid" and enables an undisturbed flow of traffic from all directions. Multifunctional halls of the central part of the station are planned above the platform area and are a correlating element of all station parts. The morphology of the terrain and the complex itself will make the terminal a unique "belvedere" or vista point providing a fascinating view of the central part of the city (Figure 9.).

As to the history of conceptual designs prepared for this station, since the very first concept made in 1975, it is a station with the vertical plan uniting all areas of the complex. Situated at the edge of the narrow city centre, with a residential area in the background, the station is conceived as a future urban centre of this part of the city, and it offers, in addition to the traffic interchange, a wide range of business and commercial contents, which are currently lacking in that part of the city. The potential of the location, and design principles used for this terminal, justify hopes that Belgrade will have an exemplary multimodal terminal corresponding to similar structures built in modern developed world. In terms of architectural value, main city terminals mirror the latest architectural and structural engineering achievements, as

they are created in the spirit of time and destined to be a long-term architectural legacy of the local community and society as a whole (Figure 10.) [25].

When examining the current state of the New Belgrade railway station, we can easily see that its outstanding position and potential of the location are insufficiently used (Figure 11.). The station is located in the middle of New Belgrade, in the zone where the centre of this part of the town is situated, according to Urban Master Plan. The train traffic from east or west toward the existing Main Station and the Belgrade Centre Station passes through this station, as it is a part of the passenger system node. Rail tracks are conducted aboveground and wide profile roads pass below both ends of the platform (Figure 11.). An outdoor shopping mall ("flea market"), and a large parking surface has been standing in this area for many years. The noise is not a disturbing factor as there are no built structures in the vicinity of the station. The station does not have an adequate platform shelter, station building, and other related amenities.

According to current city and traffic development plans, the existing bus terminal is to be moved to this locality, and this station is to become one of the main city stations, so as to enable proper deployment of rail traffic [26].

As no fundamental plan for the entire station complex and the main bus terminal and their coupling has so far been

prepared, it is quite appropriate to point out the potential for building a terminal at this particular location. A spacious locality without any built structures, with secured traffic entrances and the presence of various public transport forms, tram and bus lines, as well as taxi stands, opens up the possibility for building a large-scale urban interchange without significant hindrances. The station's accessibility from the direction of Belgrade Fair and Zemun was further improved by construction of the Sava bridge over Ada Ciganlija (Figure 6.). In such a large place with multiple contents and high flow of people, New Belgrade would obtain a new centre of development, if not the main centre, as city centres are now "moving" whenever a new shopping centre is built [27]. The following advantages have been derived from the aforementioned research on potential capabilities of the New Belgrade Station:

- the station does not interfere with the street matrix and can be accessed by different transport modes and for users,
- it is visible from several directions, which is good for orientation and safety,
- the arrival to the platform is a pleasant psychological experience, offering a nice view towards New Belgrade,
- with visible dynamics of movement within the terminal complex, the station becomes a kind of an urban city stage,
- In addition to the above-mentioned advantages, the transition of the New Belgrade Station into a complex urban terminal also imposes compliance with some additional requirements:
 - the access to the station should be provided from both ends of the platform,
 - below the station, at the underground level, a large garage can be formed so as to provide a high-speed connection from rail, as well as a "park & ride" point,
 - a good orientation and a high-speed connection from one level to another should be provided,
 - the station should be equipped with additional business and economic amenities, so as to become a functional and eye-pleasing entity, a recognizable landmark of the town,

- the platform area should be fully covered, to provide comfort and protection (Figure 12).

This situation, actually the entire state of the railways in Serbia, makes this mode of transport, although much needed, uncomfortable and unattractive to users, and the most important terminals in Belgrade may be regarded as inappropriate urban areas. However, the current potential of these sites does enable establishment of representative station complexes, which would be a good and proper contribution to formation of a suitable urban matrix.

5. Conclusions

The renaissance of railway passenger traffic in the world, and construction of a number of contemporary terminals in accordance with the state-of-the-art standards and solutions on the one hand, and the current state and stagnation of railways in the region on the other, gave rise to this study of morphological potential for the design of railway terminals in the central area of Belgrade.

This analysis recognizes the advantages of pass-through type stations, and the requirements and experience gained in the creation of most recent generation of terminals; it enumerates and interprets them through examples of Belgrade terminals.

The current situation and the transition of major terminals in Belgrade, show that the moment to apply contemporary experience and achievements in the design and completion of the station superstructure at the Belgrade Centre Terminal, New Belgrade Station, and Prokop Station, has arrived, and that this is the proper time to free up the area along the Sava banks, which is encumbered with technical plant of the station dating back to the 19th century. This research supports the definition of spatial aspects of design solutions as a part of multidisciplinary work aimed at designing terminal structures in general and, at the local level, it is one of preconditions for solving present dilemmas and making final decisions about the form of the aforementioned stations.

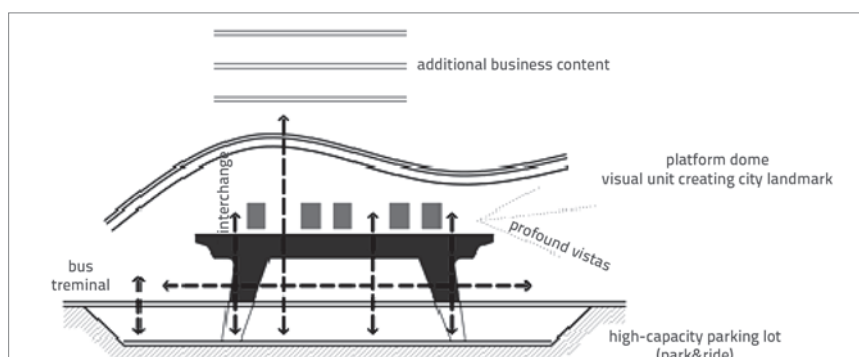


Figure 12. Schematic view of possible concept of aboveground New Belgrade terminal, using advantages of its vertical disposition of contents and traffic flows [26]

Acknowledgments

This work results from research conducted in the scope of the scientific project entitled: "Spatial, Environmental, Energy and Social Aspects of Developing Settlements and Climate Change – Mutual Impacts" (TR 36035), which was financed within the Technological Development Program by the Ministry of Education, Science and Technological Development of the Republic of Serbia from 2011 to 2014.

REFERENCES

- [1] Girardet, H.: "Sustainable Cities: A Contradiction In Terms?" in *The Earthscan Reader In Sustainable Cities* (ed. Satterthwaite, D.), Earthscan Publications, London, 1999.
- [2] European Commission, White Paper - Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system, Brussels, Belgium, 2011.
- [3] European Commission, White Paper - European Transportation Policy for 2010: time to decide, Office for Official Publications of the European Communities Luxembourg, 2011.
- [4] Calthorpe, P.: *Urbanism in the age of climate change*, Island Press, Washington DC, 2011.
- [5] Maletin, M.: *Gradske saobraćajnice*, Gradjevinski fakultet u Beogradu, 2005.
- [6] Blow, C.: *Transport Terminals and Modal Interchanges*, Architectural Press Oxford, 2005.
- [7] Richards, B.: *Future transport in cities*, Spon Press, London, 2001.
- [8] Stevanović, K.: *Sustainable Development of Cities – Transport, Modern Railway Terminals, Architecture and Urban Planning*, no. 22/23, IAUS, Beograd, 2008. (in Serbian)
- [9] Ventura, P.: *Citta e Stazione Ferroviaria*, Firenze University Press-EDIFIR, 2004.
- [10] Binney, M.: *Architecture of rail*, Academy Edition, London, 1995.
- [11] Beogradski željeznički čvor, <http://www.sicip.co.rs/>
- [12] Janjić, S.: *Railway Stations 1*, Faculty of Civil Engineering – Belgrade, 1983. (in Serbian)
- [13] Stevanović, K.: *Passenger rail terminals in the function of the urban matrix*, PhD, Faculty of Architecture – Belgrade, 2010. (in Serbian)
- [14] Dobrović, N.: *Urban Planning Engineering – Transport*, Naučna knjiga, Beograd 1957. (in Serbian)
- [15] Stevanović, K.: *Renaissance of Railway Terminals*, Andrejević Foundation, Belgrade, 2008. (in Serbian)
- [16] Meeks, C.: *The railroad station*, Dover Publication NY, 1956.
- [17] Ferrarini, A.: *Railway Stations*, Electa architecture, 2005.
- [18] Ross, J.: *Railway Stations-Planning, Design & Management*, Architectural Press, Oxford, 2000.
- [19] Popović, Z., Puzavac, L., Lazarević, L.: *Improving the accessibility of passenger railways in the Republic of Serbia*, RTR - Rail Technology Review, Vol. 52, 2012, No. 2, pp. 25-29
- [20] *Urban Master Plan – Belgrade 2021*, Transport and Infrastructure, Town Planning Institute – Belgrade, 2003. <http://mapa.urbel.com/silverlight/gp/?src=saobracaj> (in Serbian)
- [21] *Strategija regionalnog razvoja Republike Srbije za period od 2007. do 2012. god*, Vlada RS, "Službeni glasnik RS", br. 55/05 i 71/05 <https://www.google.rs/#q=projekat+beograd+na+vodi+politik>
- [22] *Renaissance of Railway Stations*, Bund Deutcher Architekten, Deutsche Bahn, Deutsches Architekturzentrum 11, 1996.
- [23] Galan Gonzalez, A., Stevanović, M., Acha Roman, C., Bouillard, P.: *Keeping the historical heritage alive*, PLEA2013 - 29th Conference - Sustainable Architecture for a Renewable Future, Munich, Germany, 2013, http://mediatum.ub.tum.de/?change_language=en
- [24] Kincl, B., Neidhardt, V., Radić, J., Vlašić, A., Mujkanović, N.: *Passenger terminal construction at Zagreb airport*, GRAĐEVINAR 64 (2012) 6, pp. 475-484.
- [25] <http://www.politika.rs/rubrike/Beograd/t50736.lt.html>
- [26] Stevanović, K., Popović, Z.: *Sustainable urban development-Terminal Novi Beograd-Morphological potential*, Sustainable urban & transport planing International Conference 2013, Beograd, pp. 256-270, 2013.