

15. Transport infrastructure as development factor of Belgrade

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Development of Belgrade has been directly caused by the development of transport systems. Demographic, economic and spatial expansion of the city is connected with the development of forms and systems of transport infrastructure. The periods of the development of the city are connected with historical events, but the formation of Belgrade, from the border settlement to the Balkan metropolis, reached its development culmination by the end of the Second World War in the Socialist Federal Republic of Yugoslavia. The progress of transport and all other structures was recorded up to 1980. In that historical year, the stagnation in the development of Belgrade and whole Serbia had begun. The culmination was reached in the 1990s with all retrograde processes, followed by economic recession, disappearing of elementary social values and the wars.

Nevertheless, during “golden seventies” of the 20th century, Belgrade succeeded to improve and develop transport function and transport infrastructure. Perhaps it was the consequence of the tradition of the development of the city in the period of the Kingdom of Yugoslavia, with the two following illustrative examples:

- “Flying Belgrade citizen”, express train, functioning from 1936 as express steam train on route from Belgrade to Zagreb, when the travel took less than 5 hours and
- the first night commercial flight from Belgrade to Bucharest, more precisely, from Pančevo to Bucharest, on September 9th 1923, as a part of the commercial air line Paris-Belgrade (Pančevo)-Bucharest-Istanbul.

Progressive development of transport systems of the 1960s in Europe, the Balkans, the SFRY, Serbia and very Belgrade, enabled the city to valorise the following:

- intercontinental patterns, i.e. telecommunication systems and “Nikola Tesla” airport;
- continental-intercontinental pattern, “Belgrade” port as the largest port in Serbia, on European traffic corridor 7, connecting Belgrade with the network of internal navigable ways of Europe and world sea and
- continental pattern, on the European Corridor 10, connecting the city with road and railroad network of Europe.

Belgrade has still not used the mentioned patterns, because the development of transport and transport systems was slowed down by retrograde processes. Nevertheless, the city with almost two million people, cultural, scientific, educational, economic and natural contents on one side and road, railroad, air, water and telecommunication transport infrastructure on the other side, represents the significant development potential, more exactly “motor” of the development of Serbia and its communication with broader regions.

15.1. Situation and development problems

The situation of transportation systems of Belgrade can be illustrated through several forms of dominant transportation services⁶⁷:

- in 1990, 819.324.000 passengers were transported by public city and commuter transportation, while the figure decreased on 532.186.000 passengers in 2005;
- in 1990, there were 503 lines of public city transportation, while 475 lines were in 2005;
- the length of all lines was 15.423 km (in 1990) and 9081 km (in 2005), with 1864 (in 1990) and 1587 vehicles of public city transportation;
- suburban railway, which has functioned since 2002, transported 6.963.000 passengers in 2005 with 6 lines in a total length of 602 km;
- in public road transport, 6.862.000 passengers (in 1990), i.e. 6.138.000 passengers and 6.187.000 tons (in 1990) and 823.000 tons of goods (in 2005) were transported;
- in air transport, 4.497.000 passengers (in 1990) and 1.122.000 (in 2005) passengers were transported, while the transported cargo was 37.142 tons and 4995 tons;
- etc.

The positive and negative development trends can be explained by a detailed analysis, but the following can also be concluded on the basis of previous data:

- considerable varying within transport services;
- declining trend of transportation of passengers and goods in all segments and
- reduction of transport means by which the service is maintained.

The reasons for the situation are many, but they can be classified into two most significant ones. The first reason is the fifteen-years of intensive crisis Serbia went through and unfortunately, it is still going through. The second one is the rationalisation of transport systems with a series of unresolved issues such as: completion and competitiveness of the transport forms, unfinished major facilities and networks, unfinished transformation of road, and especially railroad system, incomplete facilities and lines, etc.

Development plans from the period of the SFR Yugoslavia represented a special problem, where Belgrade was dimensioned as the capital of the large Balkan state and the focal point of communication of the former non-aligned nations, i.e. "the third world countries". Belgrade has never reached the overambitious development plans, but it has begun with the construction of the major infrastructure on those bases. The construction of Belgrade railroad hub has begun, as well as a part of the by-pass (highway) Batajnica-Bubanj potok, freight terminals, etc.

The role of Belgrade in broader area can be connected with mentioned continental and intercontinental patterns, but after a very unfavourable period of development, the role of the city was reduced on the territory of Serbia mainly, while its daily functional zone, on its administrative area, Pančevo, Smederevo and partly the Srem settlements towards

⁶⁷ Statistical yearbook of Belgrade 2005, Institute for informatics and statistics, Belgrade, 2006.

Novi Sad to India. That issue was the point of discussion during the making of the Regional Spatial Plan of Administrative Area of the City of Belgrade and a series of expert discussions. The functional shadow in cultural, educational, administrative sense has covered Serbia, having partly the broader influence. Nevertheless, daily movements and connections, except mentioned ones, can mainly be connected with suburban railroad lines ("Beovoz").

Transport and transport infrastructure represent simultaneously the key problem and the basic potential of the future development, i.e. one of the most influential factors for achieving the general goal of the conception of protection, organisation and development of Belgrade and its functional area.

The basic characteristics of the existing transport infrastructure of the international and national significance are the following⁶⁸:

- roads of international significance have only partly constructed elements of highway and mainly unsatisfactory roadways;
- the international road network is on the lowest organisation and technical-technological level (traffic and tourist signalisation, motels, services, petrol stations, support service, information, etc.);
- the railroad lines are of one track mainly, having old technical elements and signal-safety equipment;
- geographical position that "Belgrade" airport has, is used insufficiently, the contents and capacities of the airport satisfy the needs of the present international air transport of passengers, but adequate contents and capacities for cargo planes are missing;
- port capacities have not been completely or at all equipped for modern international multimodal transport;
- corresponding coordination of activity between "Belgrade" port and ports in the metropolitan area (Pančevo, Smederevo) is not established; and
- network of logistic centres is undeveloped, terminals of integrated transport are on unsuitable locations and technological equipment is insufficient.

On the regional level, the transport system of Belgrade is characterised by heterogeneous development and technological equipment of all forms of transport and insufficient mutual connection.

The regional and local transport system is characterised by the following⁶⁹:

- the condition of road network does not satisfy in regard of the quality of roads and technical elements of roads;
- all suburban municipal centres are on the main or regional roads on distance from 30 to 60 km, i.e. in isochrones of public transport from 40 to 90 minutes from the centre of Belgrade, however, with inadequate offer concerning the quality of public transportation;

⁶⁸ Regional spatial plan of AA of the City of Belgrade, Belgrade, 2004.

⁶⁹ Regional spatial plan of AA of the City of Belgrade, Belgrade, 2004.

- railroad transport is in bad condition with already mentioned problems;
- technological expiration and insufficient number of trains for suburban and regional transport of passengers; and
- river transport is used exclusively for cargo transport, mainly bulk freight (building material – gravel).

Mentioned problems will limit urban and every other development, they will not enable necessary mobility and needs of sustainable development on the basis of the following facts⁷⁰:

- mono-centric development and high concentration of job positions in the central zone of Belgrade with a tendency to redirect a part of the concentration to New Belgrade and dispersions of the main residential zones in the suburban parts of the city: overemphasized intensity of transport to radial directions and aggravated supply of the central zone;
- inadequately and insufficiently developed network of primary roads which reflects on a very low level of services, especially during rush hours, and especially on bridges and accessible roads and streets;
- partial mixing of local transport with transit and target cargo transport trends in the most critical parts of the primary street system which increases the exploitation costs and the pollution of environment (noise, harmful gas emissions) in some residential parts of the city;
- lack of high-capacity forms of public transportation in the most frequented corridors, so that the level of transport services in the city and commuter transport systems is determined by the dominant form of transport – bus transport, while the commuter rail participates in the overall passenger transport very little;
- chronically insufficient capacity of public and other parking places;
- unresolved issue of the Belgrade railway hub and the tendency to neglect the once main reason for construction of the new hub – removal of railway infrastructure and plants from the Sava river basin: an investment which will ask for considerable funds in the future;
- neglected and marginalized river transport, both passenger and cargo, and unclear position of the passenger river quayside on the Sava, and especially the largest Balkan port on the Danube;
- “Nikola Tesla” airport has lost the priority position it once occupied in the airport network in passenger transport in this part of Europe and its participation in cargo transport is insignificant;
- connection of the administrative area of Belgrade with suburban municipalities relies mainly on road transport, characterized by long travels at relatively short distances, low level of safety and services, poor condition of roads and inappropriate traffic signalisation;
- low accessibility of Belgrade by rail – journeys from other capitals of the Balkans to Belgrade last much longer by rail than by road;

⁷⁰ Strategy of development of city of Belgrade, goals of concepts and strategic priorities of sustainable development, 2008.

- absence of the unique long-term transport policy both on the level of the Republic and the city of Belgrade, resulting in undefined transport management, non-harmonised interests, without division of accountability among several entities, undeveloped financing system.

Aforementioned facts show clearly that when international, state, regional and urban transport aspect of the development of Belgrade is coincided, there are always systems that should be the generators of the development: traffic corridors 7 and 10, "Nikola Tesla" airport and "Beograd" port. The largest potential has been the actual problem of the urban sub-wholes, city, administrative area, functional area and broader.

15.2. Possible development concepts – planning visions and dilemmas

The improvement of transport and transport infrastructure and its putting into completely operative logistics of multifunctional development of the city is burdened by the following:

- strategic solutions are corrected and adapted to the necessary activities of planning, projecting and construction of facilities and networks without which the traffic role cannot be raised to the sustainable transport function and continuity;
- concept of strategic planning of development of the city is deserted, while apartments are being built without any insight in other needs of the city and
- construction of transport systems is late due to lack of resources, which makes the actual situation more difficult.

Therefore, the consequences will be visible only after some processes are being ended, whereof the reconstruction is the primary one. More exactly, Belgrade directed a great deal of its activities towards the reconstruction of unsanitary and uncomfortable structures in constructed parts of old urban wholes. The reconstruction is pragmatic and location one. Buildings appear without other urban contents and the new street regulation. Reconstruction and construction, justified developmentally, give a chance to widen the profiles of narrow streets in old parts of the city and thus improve urban and transport productivity, communal comfort and hygiene and exceed the actual conflicts, whereof two of them are dominant: parking problem and the functioning of public city transportation.

In 1985, the Study of Transport System of Belgrade up to 2000 ("BETRAS") was made. Analytical-information preparation, methodological framework and very qualitative solutions represented the basis of the long-term development of transport systems. On the basis of physical, urban and economic conditions, the planning solution was founded which cannot be and does not have to be too much corrected. The network of main roads was given, as well as road corridors, railways and corridors of underground, transport terminals and ports. However, all forthcoming events slowed down the realization, while the concept of the construction of the first line of underground was being transformed into the first line of high-capacity trolley car, the realization of which has remained an open issue.

In order to exceed the existing situation, the city of Belgrade gives the priority to the construction of bridges, bypass highway and main road rings in its new strategic documents, as well as the modernization of the existing systems and improvement of services, so that the conflicts would be diminished: public city transportation-individual automobile transportation, pedestrian traffic-parking, city transport-transit transport, etc.

The basic aim of the development of transport and transport infrastructure is: (a) on international level, valorisation of its suitable geographical position and position in the network of the European corridors, through the maintaining of the effective transport infrastructure and its functional and technological connection with European transport network; (b) on regional level, preventing further ruining of transport foundation and bad conditions of transport of passengers and goods, as well as making the bases for the development of the system in the future.

Development tasks are the following⁷¹:

- define development of transport and transport infrastructure as the priority of economic and social policy of the city of Belgrade;
- realize the balance between external connection of the Belgrade region and internal organising within the territory, as the unique whole in the coordination with the metropolitan surrounding;
- coordination of all forms of transport (road, railroad, river, air), in order to organise the multimodal hub of the European rank with the network of logistic centres;
- firm coordination with projects based on the corridors (7 and 10);
- development of partnership of public and private sector at planning, construction and exploitation of transport networks;
- making effective and comfortable public transport in the urban area of Belgrade, relied on the system of rail transport, as well as improving the commuter public transport services and integrating it with the public transport in other urban centres in the administrative area of Belgrade;
- rehabilitation, revitalization and reconstruction of transport networks and facilities;
- standardisation and modernisation of technical elements, signalization and transport regime;
- defining policy and support to the development of transport as economic branch; and
- continuation of the construction of Belgrade railroad hub etc.

Concrete engineering activities are the following⁷²:

a) Road network:

- construction of the second road line of E-75 highway Belgrade - Novi Sad – Subotica - Hungarian border (corridor X-b);

⁷¹ Strategy of development of city of Belgrade, goals of concepts and strategic priorities of sustainable development, 2008.

⁷² Strategy of development of city of Belgrade, goals of concepts and strategic priorities of sustainable development, 2008.

- reconstruction of existing road line of E-75 highway (section Belgrade - Novi Sad);
- partial reconstruction of E-75 highway in direction Šid – Ruma - Belgrade (corridor X);
- partial reconstruction of E-75 highway in direction Belgrade – Niš - Thessalonica (corridor X);
- rehabilitation and continuation of reconstruction of bypass Batajnica – Dobanovci – Ostružnica – Železnik - Beli Potok - Bubanj Potok, with preparation of corridor Bubanj Potok – Leštane – Vinča - bridge on the Danube - connection with E-70 (Belgrade - Pančevo);
- development of general project for Highway E-763 (Belgrade-South Adriatic), with possibility of partial realization of some sections significant for the Republic of Serbia. As with the projection on the left bank of the Sava River, the line will be coordinated with the demands of the protection of the "Zidine" source;
- development of corresponding technical and planning documentation for northern main road ring T-6 with bridges over the Danube in zone of upper Zemun and Ada Huja.

b) Railroad lines:

- construction of two-track railroad line E-85 in direction Belgrade - Novi sad – border with Hungary, along with modernisation and construction with elements of line for speeds of 250 km/h and equipment of 160 km/h;
- modernisation of the second track on railroad line E-70, in direction border of Croatia-Belgrade for speeds of 160 km/h;
- modernisation of existing two-track railroad line Belgrade - Niš (E-70) for speeds from 120 - 140 km/h and construction of existing one-track railroad line as two-track with elements of line for speeds of 250 km/h and equipment of 160 km/h;
- rehabilitation and reconstruction of existing one-track railroad lines Batajnica – Ostružnica - Belgrade marshalling – Jajinci - Beli Potok, and construction of the second track in the II stage;
- railroad line Bela Reka - Ripanj (Klenje - Mala Ivanča) as connection between lines of Belgrade - Bar, Belgrade - Mladenovac and Belgrade – Jajinci - Mala Krsna;
- making planning investment and technical documentation for construction of railroad lines: technical - passenger station Zemun – "Beograd" airport; one-track railroad line Vreoci - Obrenovac (with existing industrial railroad line) with possibility of crossing the Sava River (in corridor of highway South Adriatic) and joining planned corridors towards "Beograd" airport and Zemun; Mladenovac – Aranđelovac - Vreoci, with a branch Aranđelovac – Topola - Gornji Milanovac - Čačak.

c) Freight-transport centres:

- development of "Belgrade" port as the place of direct section of corridors VII and X (with limited spatial possibilities), in coordination with the "Danube" port at Pančevo and "Smederevo" port, as the unique system of integrated transport;
- development of logistic freight-transport centres (FTC), in coordination with municipalities in direct and broader surrounding, on the following locations: Pančevo, Smederevo, Novi Sad and Šabac. In the AA of Belgrade, development of logistic FTC of international significance on locations: Dobanovci, "Belgrade" port and Vrčin.

d) Air transport:

- construction of the second airport runway of "Belgrade" airport, development of operative and attached contents, as well as possible construction of cargo terminals of international character;

e) Bicycle transport:

- according to project of European Union on establishing the European network of bicycle paths, two bicycle paths were planned to pass through Serbia that would be mutually connected in the area of Belgrade. The planned corridors as the part of European bicycle network are the following: on the territory of Banat, along the Zrenjanin road, on the territory of Srem, along the bank of the Danube to the confluence of the Sava and the Danube, while on the territory of Šumadija, area along the Smederevo road and along the old Avala road. The location of lines and other technical elements will be explained and defined by corresponding planning and technical documentation.

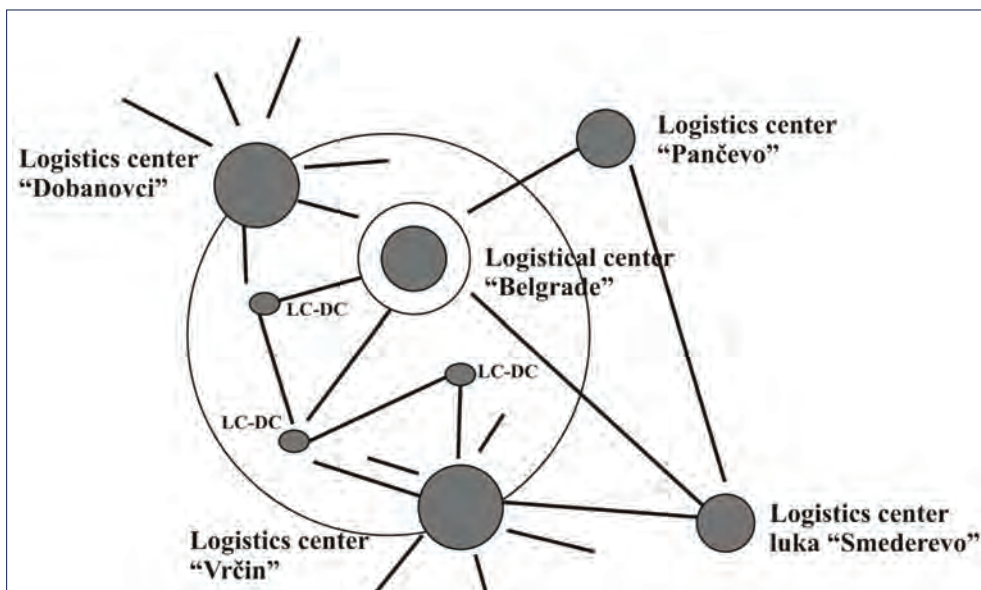
Development of transport system within the functional area of the city will be accomplished through the following:

- reconstruction, revitalization and partly new construction of network of roads on the territory of the AA of Belgrade, along with the introduction of adequate system of maintenance;
- widening the local road network in the function of increasing the accessibility within municipalities, i.e. better mutual connection of settlements and with centres of communities of settlements and/or centres of municipalities (200 - 250 km of new roads);
- reconstruction, modernisation and construction of local and regional road network for better connection of settlements with railroad stations and introduction the so-called electrical bus system of public transport; and
- construction of regional FTC on suitable locations such as Rajla, Umčari, Mali Požarevac, etc.
- transport in conditions of very small visibility and winter exploitation; and
- acquiring the status of the III category airport (SAT III b).

15.3. Development concept of transport and communications

The concept of development of transport and communications is a synthesis of ideas from the previously launched projects, which are an inherited obligation as well as ideas accompanying the goals and vision of the Strategy. Transport and communications represent a part of the system of the city of Belgrade as the metropolitan on the junction of two European corridors (X and XII), as well as the E-70 roads and the future highway towards the south Adriatic, with a developed transport infrastructure and four types of transport: road, rail, air and river, as well as developed telecommunication system, which represents the ideal conditions for achieving an integrated transport system and functioning of the city of Belgrade as a multimodal hub with centralised decentralised concept of logistic centres of Belgrade.

Figure 56: Concept of logistic centres of Belgrade; logistic centre-distribution centre (LC-DC) - Ada Huja, highway and Batajnica.



The concept is the result of planned solutions from the Regional Spatial Plan of Administrative Area of Belgrade, based on the following:

- development of transport and transport infrastructure as a priority in economic and social development;
- balance between external connections of the City and internal organisation;
- harmonising and balancing all forms of transport;
- implementation of projects which emphasise the role of the two corridors;

- development of public and private partnerships in planning, construction and exploitation of transport networks and facilities;
- development of an effective and comfortable public transport system;
- rehabilitation and reconstruction of the local transport network;
- standardisation and modernisation of technical systems;
- support to development of transport economy.

The concept of development of transport and communications will call for systematic horizontal coordination of the public sector as well as with neighbouring municipalities, as well as vertical coordination with the Republic, adjacent countries and European Union, and will be adapted to the possibilities and needs of the city of Belgrade and supported by a new system of long-term planning and programming.

The strategic concept is to enable development of transport economy as one of the most promising branches of economy of the city of Belgrade, followed by development of tourism, recreation and other branches of economy, as well as urban comfort and hygiene increase.

Communications problems became complicated in the very city, so that it was tried to make the concepts of the future road, railroad, air and river transport through planning solutions in the General Plan of Belgrade 2021. The emphasis has been put to the public city transport, parking, pedestrian and bicycle communications, while the development concepts were taken and modified from the previous strategic plans.

15.4. Conclusion and recommendations

Increasing the level of accessibility of the city of Belgrade as the major urban centre will call for considerable activities in the area of transport, investments in all transport sub-systems to increase their efficiency, comfort and safety. This will call for much organised horizontal and vertical coordination of all stakeholders to direct the Belgrade transport to the basic strategic goal: the increase of transport productivity, comfort, safety and hygiene that will enable rational (necessary) population mobility, improve urban comfort, support further development of the city and its participation in the region as well as in the territory of Southeast Europe.

It is realistic to expect that Belgrade will be significant freight multimodal centre in the part of Southeast Europe which can be achieved through the following:

- outer main road tangent (OMRT) – connections of Corridor X via the Lasta hub on the Highway with Pančevo road, including the new bridge on the Danube (Ada Huja);
- completion of OMRT in the Lasta – Avala road part of the hub;
- completion of the by-pass in the part Batajnica – Bubanj potok (stage 1) and Bubanj potok – Pančevo road with a new bridge near Vinča (stage 2);

- construction of a cargo terminal at Nikola Tesla airport and construction of a railway connection (passenger and cargo) with Belgrade;
- coordinated development of multimodal centres in the area from the port of Šabac on the Sava to the port of Smederevo on the Danube. In this sense, it is planned to construct a new harbour on the left bank of the Danube. It was not planned, but it was imposed by political financial-arrogant powerful persons to build a new port on the left bank of the Danube and to develop commercial activities on Ada Huja, as well as to construct new railway connection with the left bank on the Danube (the new port on the Danube); Unfortunately, Belgrade (and Serbia) does not have morally valuable managing infrastructure for almost 30 years so that the sale of capital public values (building land, technical infrastructure and facilities, public services) has been actual. Whether the citizens of Belgrade and whole Serbia need to build new port on the Danube only because one marginal and powerful group will be richer, and the city of Belgrade poorer, has remained an open question without answer.

The concentration of population, activities, attractive contents and events give chance to the city of Belgrade to be improved as the multimodal hub through the following:

- improved quality of the roads linking Belgrade with suburban and inner functional zone;
- development of an integrated transport management system;
- reconstruction of a part of Ibarska road from Banovo brdo to the hub with the bypass;
- connecting Batajnica road and the new Novi Sad road via Zmaj loop with the New Belgrade blocks (T6);
- construction of the inner main road semi-ring (IMRS);
- reconstruction and construction of new bridges on the Sava river and the Danube;
- regulated entrance to the central zone of the city;
- construction of tunnels to connect certain parts of the primary network;
- construction of a network of new bus stations;
- completion of the passenger railway hub;
- construction of the second airport runway and modernisation of "Nikola Tesla" airport;
- modernisation and technological improvement of transport.

Negative ecological impacts of all forms of transport have often been emphasized; however, generally, transport is primarily very positive activity, with a series of improvements of ecological values of the city which can be recognized in Belgrade as the following:

- construction of the first line of the high-capacity public transport system in Belgrade;
- stimulating the use of "Beovoz" in commuter transport;
- reorganisation of public city transport in the Beovoz corridors as well as within the whole network;
- introduction of river passenger transport;
- increased level of transport safety;
- development of new multimedia technologies, i.e. services;
- development of bicycle transport;
- stimulating pedestrian commuting;
- modernisation of the city streets in all urban centres in accordance with transport demands and standards;
- modernisation of local roads.

Belgrade represents the primary focal point of the development of tourism in Serbia which can be achieved through the following:

- construction of a marina for recreational transport on the Danube and the Sava;
- activating Batajnica airport for low-cost airline companies;
- creating conditions for obtaining category 3 for "Nikola Tesla" airport;
- completion of primary contents at the Sava passenger port;
- standardisation of tourist services in transport;
- development and reconstruction of the regional network at the broader territory of the city of Belgrade;
- construction of heliports in suitable locations.

The basic privileges for development of transport and transport system of the city of Belgrade are the following:

- position on intersection of two European corridors (7 and 10, with a branch 10b);
- position and construction of network of roads, railroad tracks, ports and airports; provided corridors and areas for development of integrated transport system; and
- interactive impact of economic potential of AA of Belgrade on development of transport as economic branch of the priority significance.

By reconstruction and construction of Belgrade passenger railroad hub, the effect of the key factor of metropolization is the introduction of city-commuter railway. This will be accomplished by its direct introduction into the most attractive parts of the metropolitan core.

The development patterns of the Danube and the Sava have double significance by connecting with the settlements of Pančevo, Smederevo, Novi Sad, Obrenovac, Šabac and other settlements.

In the conditions of expected economic growth, increased employment rate, exchange with neighbouring countries, attractiveness for commuters, tourists, activation of foreign companies' operations, etc., the existing transport system of the city of Belgrade will not be able to provide an appropriate level of services, especially in very Belgrade, as the primary economic and business centre.

Transport infrastructure of the city of Belgrade has marked characteristics which determine the level of its accessibility, which will have impact both on its future competitiveness within Serbia and Europe. Nevertheless, due to complexity of the territory, it will play significant role within the borders of the administrative area, in all 18 municipalities.

Transport, transport infrastructure and transport economy are capital development factors of the city of Belgrade, the potential which will always be emphasized. This relates to inter-regional processes (making connections with the environment) in which the city of Belgrade was not very significant, as well as to permanent intra-regional role (within the regions) of the connection of activities and structures.