Transactions on the Built Environment vol 52, © 2001 WIT Press, www.witpress.com, ISSN 1743-3509

Transport infrastructure in the urban planning scheme of the town of Vladicin Han

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Abstract

Vladicin Han is situated on the Belgrade - Nis - Macedonian frontier railway line which significantly curtails the physical and urban development of the central part of the town. Important international lines of communication run through Vladicin Han as it has a favourable transport and geographical position but they represent a restrictive factor in the planning, organization and use of the urban area because besides the space that they extend along, they also need a space reserve which in the case of Vladicin Han coincides with the town centre. The major problem in the town development planning is the railway station and its facilities located in the very centre. Taking into account the existing regulation, current plans and technical solutions in the corridor within the town area and considering all the natural and man-made factors and their interactions, the paper attempts to point out that timely considering of the space in the transport corridor within the town area has advantages not only from the technical aspect but primarily from the aspect of planning, and that these advantages have been availed of in the multidisciplinary approach to the General Railway Infrastructure Design study for Vladicin Han.

1 Introduction

This paper is an attempt to describe complex problems in the railway infrastructure planning in the town of Vladicin Han and the surrounding settlements which justify the work on the General Railway Infrastructure Design Study for Vladicin Han done by CIP-Institute of Transportation, Belgrade, 2000 upon an order for the research placed by "BEOGRAD" RTO with an aim to solve the problems of the existing railway infrastructure, a limiting factor in Vladicin Han as it occupies the central town zone. The objective of the General Design Study was to find a temporary solution for railway and its facilities and structures; the aim was to free the town centre of Vladicin Han until long-term solutions foreseen in the Physical plan of the infrastructure corridor Nis - frontier of Former Yugoslav Republic of Macedonia could be realized in Vladicin Han and the surrounding settlements.

The aim of this study is to emphasize the advantage of timely considering the space in the transport corridor in the town not only from the technical aspect but primarily from the aspect of planning with a view to existent planning and technical solutions that relate to the corridor space. We implemented a number of general and specific scientific methods: induction-deduction, generalization, comparison, analysis and synthesis and evaluation of planned solutions.

2 Spatial-urban analysis

Vladicin Han is situated in the valley of the South Morava River at the mouth to Grdelicka Gorge. The following important lines of communication run through the gorge and through Vladicin Han:

- Belgrade-Nis-Skopje railway line, the backbone of the railway traffic in our country and a very important international railway link;
- E-75 highway Budapest-Belgrade-Skopje-Athens, a very important link in international road traffic;
- M-1 main road Nis-Skopje connecting several communities of the South Morava region at the motorway interchange in Vladicin Han, and via Strezimirovci and Bosilegrad with Bulgaria;
- the old road through the Morava River valley connecting Vladicin Han with nearby towns (Leskovac and Vranje) also ensuring communication among the settlements along the bank of the South Morava river [1].

From the aspect of external connections, all of the above links place Vladicin Han in the group of most open towns and it becomes a very important crossroads in the international traffic.

The position of Vladicin Han on the transcontinental road-railway route (E-75 road: Belgrade-Nis-Leskovac-Vranje-Skopje) is an advantage as it connects the area with the most important centres of development in the country and the region and gives good development prospects. However, it should be noted that important international lines of communication represent a restrictive factor in the planning, organization and use of the urban area because besides the space that they extend along, they also need space reserve which in the case of Vladicin Han coincides with the town centre.

The gravity area of Vladicin Han is rather small in radius. All such gravity areas end up in the municipality of about 25.000 inhabitants.

The town is situated on the Belgrade-Nis-Macedonian frontier railway line which significantly curtails the physical and urban development of the town. As in the past, railway lines were designed regardless of urban needs, Vladicin Han

having been no exception, the railway line then divided into two parts and the town continued to expand on either side of it, that is, on the left and right banks of the South Morava River.

Though each railway line should as a rule enter the town area (unlike other infrastructure) still, in a way, it disintegrates this town and affects its expansion. Therefore, solutions are being sought in order to mitigate any adverse effects on the integrity of the local environment (alternative traffic solutions, underpasses, overpasses, and the like).

The major problem in the town and the overall urban development planning is the railway station and its facilities in the very centre of the town that have merged with it in the area bordered by the main street, the Kalimanka River and the South Morava River which is occupied by the goods shed, a loading-unloading ramp for bulk and dirty loads, a loading-unloading ramp for fragile goods and military needs.

Hilly ground is the main topographic characteristic of the area. The town lies at the mouth of Grdelicka Gorge, on rather steep slopes dipping east-west and differences in ground levels range as high as 140 m. Potential landslide areas have to be rehabilitated, forested, etc [2].

One of additional advantages in Vladicin Han is that its industrial estate is displaced upstream from the town in the Suva Morava zone. Urban science calls for unified passenger and freight operations on one and the same location for small towns such as Vladicin Han. Therefore, attempts should be made to unite passenger and freight stations, remove them from the town and bring them closer to the industrial estate which heavily relies on railway transport, and thus find an optimum solution that should satisfy both the town and the railway needs.

The Physical plan of the Republic of Serbia stipulates elaboration and adoption of several strategic land-use plans for physical entities such as an infrastructure corridor [3]. The Physical Plan for the infrastructure corridor Nis- frontier of the Former Yugoslav Republic of Macedonia is in the top priority group and it refers to the following transport and other infrastructure systems: E-75 highway, E-85 high-speed railway line, main optic cable route, gas pipeline and the Danube-Aegean Sea navigable channel. There is a problem of how to "take through" and harmonize the routes of these complex infrastructure systems, how to coordinate them with the current and planned uses of land in the most difficult section from the aspect of topography and geotechnics.

3 The impact of the existing infrastructure systems and their development levels upon demographic processes and population structure in Vladicin Han

The impact of natural and economic characteristics upon the demographic structure can be seen in the analyses of age structure and physical mobility of the population and there is also the feedback influence of the major infrastructure on demographic characteristics of the population and its mobility, intensive development of settlements, and structural changes in employment and the decrease in the count of agricultural population, which all point to the importance of this problem-burdened topic for the transport infrastructure planning process.

3.1 The impact of natural and economic characteristics on population structure (period 1961-1991)

The overall agricultural population counts in 1961 and 1991 was the basis for the tabular review from which we can conclude that there is a significant decrease in

agricultural population in the 18 analyzed settlements in the area of Grdelicka Gorge, particularly in Vladicin Han; the population decreased to one fifth over a period of 30 years. The following settlements were analyzed: Balinovce, Dupljane, Dzep, Garinje, Kalimance, Kopitarce, Krznice, Letoviste, Manajle, Mrtvica, Polom, Prekodolce, Repince, Repiste, Ruzic, Suva Morava, Tegoviste and Urvic.

Table 1. Agricultural population in 1961 and in 1991

Territory	Agricultural population		Index 91/61	Average annual rate
	1961.	1991.		
Grdelicka Gorge area (Vladicin Han municipality)	3215	665	20.6	-4.1

The total population in the analyzed settlements (Vladicin Han municipality) shows a slight decrease over the period of thirty years (10%), but the decrease in agricultural population is significant (79,4%), this reflecting changes in employment structure (See Table 2.)

Table 2. Total population in 1961 and in 1991

Territorial changes of population	Total population		Index 91/61	Average annual rate
	1961.	1991.		
Vladicin Han - total	20074	25255	96.8	-0.1
Grdelicka Gorge area (Vladicin Han municipality)	3185	2714	86	-0.5

3.2 Housing standard depending on the current state of communal utilities in the settlements in Vladicin Han municipality (electrical and water connections, 1971 to 1991)

Important quality changes were evident in the development of public utilities in the period 1971-1991:

- in 1991 the number of households without electricity connections was negligible; in 1971 one fifth of households were not electrified (considerable differences among settlements),
- in 1991 the number of households connected to water supply network was about 70% (worse in smaller settlements); in 1971 this was under 10%, and a large number of settlements had no plumbing at all.
- in 1991 a negligible number of apartments were not connected to electricity and water supply network; in 1971 the situation changed.

4 The built –up area

4.1 The existing railway infrastructure

The single track railway line Belgrade-Mladenovac-Nis-Presevo-national frontier runs through the stations of Vladicin Han and Suva Morava. In the

Railway Classification Code 325, this line bears number 3 as a trunk line on the E-75 and E-85 main routes. Axle loading is 22.5 t and 8 t/m[1]; according to UIC 700 leaflet the line is in category D4. The line is electrified by 25 kV, 50 Hz single phase system and the services run in automatic block system. The section from Leskovac to Vranje was put in commercial operation on September 13, 1886 and is one of the oldest railway lines in the territory of the Federal Republic of Yugoslavia. The maximum train speed on the Nis-Presevo section is 100 km/h and there is a permanent speed limit of 50 km/h in Vladicin Han station because of the bad geometry of the running track after the reconstruction of track facilities and extension of the station area [4].

The railway station of Vladicin Han is located at km 329+591 of the Belgrade-Nis-Presevo line. There have been several reconstruction and extension projects on it and the track grade changes in several places from 5.45‰ to 0‰ and the track centre line in the station runs through successive curves of different radii. With the 5.45‰ gradient at the entry end, operations on the goods handling track are difficult. The holding siding of the Track Maintenance Dept. is in operation only over a length of 95 m. The goods shed is in very bad condition. The loading ramp left from the entry to the station is neglected and is not in use.

The station has five tracks: for goods handling, one through running tracks, two main tracks and a dead-end holding track for work trains. The permanent way consists of rails type 49 and type 45 in the holding track. A 150 m long platform of prefabricated elements exists between tracks One and Two. A summer kitchen, goods shed and Track Maintenance Dept. buildings (supervisor's lodgings, guardhouse, sheds for road vehicles) are next to the station building in the station area.

There are two level crossings: an unclassified 3m wide road crossing with St.Andrew's Cross, and a 5.2 m wide pedestrian crossing with a light signal.

The Suva Morava railway station is at km 334+006.50 m of the Belgrade-Nis-Presevo main line. After the above mentioned station reconstruction and extension schemes the through running track is in a 1000 m curve with a 100 m long transition. Grade changes are numerous, gradients being 0.33‰, 1.29‰ and 4.79‰. Besides the through running Track One, there are two main tracks in 1000 m transition-free curves, and an industrial track with a push-pull section. Branching from it are three sidings that enter the Wrapping Paper and Packaging Factory Yard (left and right) and a siding to Delises Co.

The rail is type 49 in sidings and points and type 45 in the industrial track. The elements of the through track and the positions of the points allow for a continuous maximum running speed of 100 km/h on the Suva Morava-Priboj Vranjski section of the line.

A humble station building lies on the right side of the line. It has two offices (train dispatcher and station manager), a waiting room and two auxiliary rooms. The total building area is 82 m^2.

There are two level crossings with local roads equipped with signals and semi-barriers in the station area.

4.2 Railway infrastructure proposal based on urban infrastructure and documents in Vladicin Han municipality

Even though the railway line runs through the centre of the town thus occupying the area best suited for the city, it is to be retained in whole in the town centre as stated in the current General and Detailed urban plans for Vladicin Han (both dated 1980) prepared by the Institute for Urbanism and Housing and Communal Services, SRM, Skopje.

For this reason, the General Railway Infrastructure Design Study, however, considered the railway corridor between the main street and the regulated South Morava River bed and its conclusions and solutions were treated and discussed in this paper from the aspects of space, technology and urbanism. The aim was to propose such a railway station solution that will fit in the organization of the town, allow expansion of its centre and reconcile the interests of the railway and the municipality.

According to the General and Detailed urban plans a housing zone within Residential Unit 1 (on the left bank of the South Morava River) is planned between the main street and the railway line, within the boundaries set by the above design study. A service zone with car repair shops, bus, truck depots etc. is planned south of the housing zone in the area intended for industry. The town centre with the railway facilities is to remain on the present location but to occupy a somewhat larger area. In the General urban plan a protection green belt is planned between the South Morava River and the railway station.

The railway station, planned to remain on the location presently includes a goods shed and a loading-unloading ramp for bulk and dirty loads, which means that these operations are taking place in the heart of the town. Loads are further transported on trucks along the main street to the municipalities of Surdulica and Bosilegrad. To free the centre from dirty materials and enable its spreading, the General Design Study suggests removal of the ramp for bulk and dirty loads and of the goods shed to a new location on the other side of the railway line away from the town centre on the South Morava river. The land will be used to erect a building for the Track Maintenance Dept. instead which means that the land use will change into commercial use and a new shopping centre and a car park will be integrated in the existing town centre. So, according to this solution, a green belt between the railway line and the river as a type of land use will not be

possible. This can be explained by the logical solution in the General Design Study that meets the town spreading requirements not incorporated in the recent plans and that satisfies the interests of both the railways and the municipality.

In the area where the green belt is planned, the General Design study suggests a street the primary function of which will be to relieve the main street of dirty loads that are transported through the town core. The new street will provide better access and connection to existing and future users along the South Morava River and a connection to the part of the town on the opposite bank.

A high-speed railway line is planned on the E-85 route in the Physical Plan of the Republic of Serbia to replace the single track line and the E-75 highway to replace the M-1 main road.

The planned highway route will run through Vladicin Han at a distance from the existing M-1 road in a completely new corridor bypassing the town in the east. The future high-speed line will run through two new tunnels, cross at two levels, the M-1 main road, the South Morava River and the existing station of Vladicin Han by a viaduct and enter a tunnel in the area of the Repince village. The future stopping place of Vladicin Han will be on the viaduct above the existing station. Behind the last tunnel mentioned, the high-speed line will return to the corridor of the existing railway line, precisely in the industrial estate in Suva Morava [5].

The problem of the displacement of the passenger and freight stations from the town will be solved only when the planned station is built in Lepenci, further south of the Suva Morava industrial estate and it will free the central town zone of railway infrastructure and satisfy the need of the industry for railway services. A unified passenger-freight station is an optimum solution for small towns such as Vladicin Han from the aspect of changes in structure and use [6].

The General Railway Infrastructure Design Study gives transitional solutions until the realization of the Physical Plan.

5 Conclusions

The objective of our research was to identify the railway infrastructure as a generated source in the overall organization of the area and in the current land use plan in Vladicin Han from the aspect of physical planning.

For that reason, our considerations were focused on an analysis of the past impact of the infrastructure as an element of generated environment, on the functions, activities and life in this local community and on the interaction of elements in the generated environment, all for the purpose of achieving harmonized and quality relations in the area considered.

Therefore, when setting the objectives and the subject of a physical plan for the infrastructure corridor which is a tool for the elaboration, implementation and enforcement of the Physical plan of the Republic of Serbia, it is essential to consider all interactive natural and generated factors for the welfare of the local community, and by building new infrastructure, specifically so in an area such as Grdelica where the process of village withering away exists to stop being witness to the processes of emigration and leaving of the population because of dissatisfied public interest.

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