

## **AN ANALYSIS OF THE URBAN PUBLIC TRANSPORT SYSTEM IN RZESZÓW – A STUDY OF CONDITIONS**

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### **Abstract**

*The article presents an analysis of the urban transport system solutions in Rzeszow in terms of its optimization and implementation of new solutions. In the analysis the current traffic and communication solutions were taken into account, i.e. the network of the existing roads, road marking, traffic control and public transport traffic. In addition, the possibility of applying innovative solutions to the urban transport - ground monorail train was taken into account.*

*The reason for the analysis is constantly increasing volume of traffic in the city, which causes the necessity to implement new innovative solutions for transport and public transport. At present in Rzeszow the transport system is based on the bus service, most urban and suburban lines are supported by Urban Transport Company. In addition, some suburban lines are served by private carriers and Shuttle Service Company, which is also transport provided by buses. Therefore, if possible, the new transport solutions should not burden the existing system of public roads and ensure smooth movement of passengers regardless of vehicle transport. All kinds of overground or underground urban railway types, including monorail train transportation, are examples of such solutions. Rzeszow City is considering the introduction of such a railway within the framework of the development of transport infrastructure.*

*The article also presents an analysis of the possibility of building a monorail train in terms of technological, architectural and urban solutions. Described are also planned solutions of the monorail train routes from the point of view of connection of the most important areas in the city at the first stage of the investment.*

**Keywords:** urban public transport, rebuilding of road, monorail, crossroads

## 1. Introduction

The transport system fulfils a stimulating function in the economic development of regional centres in Poland. In order to determine the possibility of developing the transport system of a given centre, it is essential to make an analysis of communications solutions in terms of global and local connections.

The city of Rzeszów, situated at the intersection of historical communications routes, plays an important role as a major interchange in the south-east of the country. On the one hand, the location of Rzeszów is beneficial to the development of the city, but on the other hand it is the source of many communications problems. In the European ranking, Rzeszów has been classified as a city of international significance. The Concept of the Domestic Land Development Policy defines Rzeszów as a domestic centre for balancing development, which concentrates development enterprises on a transregional scale. The Land Development Plan of the Sub-Carpathian Province indicates to the transregional functions of the City, including the transformation of the urban and industrial agglomeration into a metropolis.

The city has an international airport and a technological park geared to aviation. Rzeszów Flying Club and the Centre of Aeronautical Education of Rzeszów University of Technology function within the airport. In the immediate proximity of the airport, the A-4 motorway (Berlin-Kiev) is being constructed with two interchanges meant to serve the airport together with the adjacent zone and Rzeszów itself. There is a good public transport connection between the city centre and the airport.

An important rail hub for the Sub-Carpathian region, Rzeszów provides a logistic base and a place where the main south-east railway line – E30 branches off and the regional system of the Rzeszów-Jasło line [1-6].

## 2. An analysis of the existing communications and transport system of Rzeszów

Rzeszów is a city located in the strip of the European east-west space, in the Third Pan-European Transport Corridor and the border area of the Sub-Carpathian Euroregion. The city is an intersection of international east-west road and railway routes, and north-south road routes (Fig. 1). The network of external roads running through Rzeszów consists of:

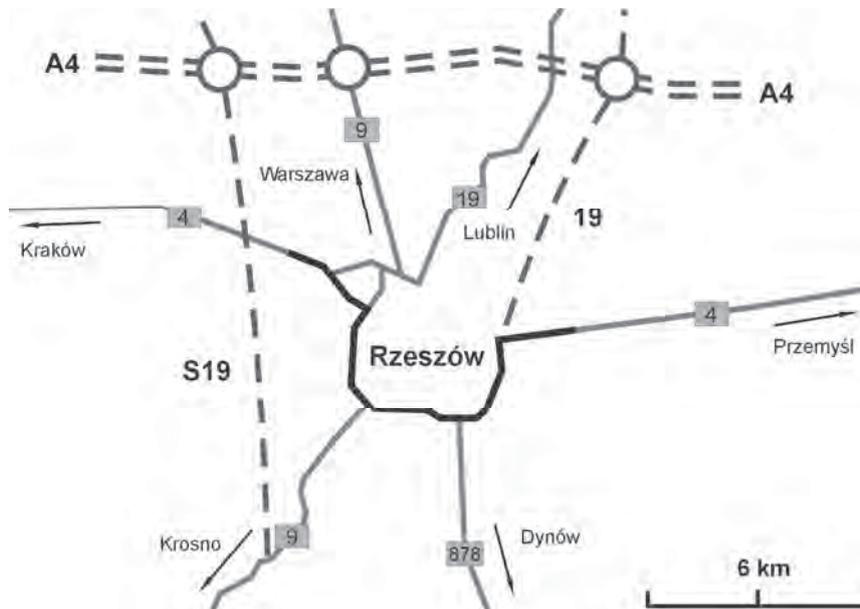
- Trunk road no. 4 (the international E-40) connecting Dresden, Zgorzelec, Wrocław, Katowice, Kraków, Medyka and Lvov,
- Trunk road no. 9 (the international E-371) linking Radom, Rzeszów, Barwinek and Košice,
- Trunk road no. 19 connecting Białystok, Lublin and Rzeszów, which runs further southwards as trunk road no. 9,
- E-30 main railway line linking Dresden, Zgorzelec, Wrocław, Katowice, Kraków, Medyka and Lvov.

This system is supplemented by the following elements:

- Provincial road no. 878 connecting Rzeszów and Dynów,
- Rzeszów-Ocice railway line,
- Rzeszów – Jasło railway line.

Traffic capacity has been exceeded considerably in the streets of the city centre, which results from both the increasing level of motorization and parking facilities in the city centre. There are also difficulties on the former city centre ring road and exit routes. This is caused by the overlap between the city centre (source and destination) and transit traffic. An insufficient number of flyovers and

two-level overpasses at the intersections of roads with railway lines as well as the incomplete north-east road system combined with the rapid development of motorization have all brought about the overloading of the basic city road system [8-11].



*Fig. 1. System of main road routes in Rzeszów area*

### **3. Plans of communications system development**

#### **3.1. Development of communications connections**

The main strategy of the city land development in terms of the transport system consists in developing the road network from the outside and public transport in the city centre and new areas. Additionally, the following initiatives will be undertaken:

- increasing the use of public transport for travelling purposes, thus reducing the volume of private car traffic,
- increasing non-motorized traffic through the construction of a bike lanes system and development of pedestrian traffic zones,
- eliminating transit traffic from the city centre area.

The modernization of the communications infrastructure will take the form of building separate lanes for bus traffic, modernizing bus stops and interchange stations as well as improving the bus service. As a result of the realization of the urban transport development project, a few bus lines or line fragments will be created with a modern bus service and an infrastructure of roads and bus stops, which will serve the needs of public transport [10-14].

#### **3.2. Public transport development**

The main focus of the public transport modernization will be bus lines providing transport service to a large group of passengers, operating in the city centre, in order to exert an influence on the greatest possible number of passengers. Additionally, there is also a plan to increase the number of ecological buses powered by CNG (Fig. 2).

The project includes the introduction of an electronic public transport ticketing system, optionally (at the next stages) developed with other facilities, such as the collection of parking charges and admission fees to museums, exhibitions, etc. What is more, the system would enable the location of buses within the area provided with the local traffic control, introduction of timetables



Fig. 2. MPK Rzeszów buses powered by CNG

displaying up-to-date information on the time remaining until the arrival of a vehicle on a given line at the nearest change hubs, major stops as well as the introduction of an internet and mobile phone information service (WAP, SMS).

Optionally, it would be possible to install timetables inside buses, providing information on the time remaining until the arrival of a vehicle on a given line at the nearest change hubs and information on the names of the next stops and departure times.

The plan of the urban transport development also includes the introduction of an overground monorail system (Fig. 3a) [7]. The first stage of the railway construction would be to link a few of the most important areas in the city, such as universities and the railway station (Fig. 3b).



Fig. 3. Test monorail train manufactured by Bartholette (a), proposed train route (b)

At present the railway system in Rzeszów is not suitable for the internal needs of the city. However, the central location of the railway lines on the east-west and north-south axes presents a possibility of performing such functions in the future. This requires the construction of special railway stations in Rzeszów and the purchase of modern railbuses. As part of the transport system modernization, there are plans to initiate railway communications in Rzeszów and the adjacent areas, served by low-capacity trains running with high frequency.

#### 4. Conclusion

The system of public transport in Rzeszów requires a modernization based on the development of the technical infrastructure and a modernization of organizational solutions. The planned expansion of the infrastructure will include streets and crossroads redevelopment as well as the introduction of the monorail train system in the future. The organizational solutions aim at the creation of the Local Traffic Control System, which will ultimately be a part of an electronic traffic management system in the city. The system will consist of the following solutions:

- Local Traffic Control (traffic lights) responsible for directing traffic in a way that makes it possible to realise the assumed control strategies, such as ensuring priority for public transport and restricting access to areas of limited traffic capacity;
- Public Transport Management intended for the steering and control of the public transport traffic, provision of information to the passengers on buses and at bus stops, the cooperation with the subsystem of the Local Traffic Control in the realisation of priority for public transport vehicles;
- Information Subsystem for drivers, designed to control traffic signs of changeable content and making information available in the Internet, radio news programmes, etc.;
- Parking Information Subsystem, aimed at directing vehicles to car parks, geared to the operators of parking devices;
- Other subsystems for priority vehicles, roadwork management, etc.

Currently the constant-time traffic lights prevail in Rzeszów. Approximately 30% of crossroads are equipped with accommodative traffic lights. There is no linear coordination. This brings about considerable losses during driving and generates unnecessary noise and pollution emission. The realisation of the project should ensure an open character of the system so that it can be expanded into further areas and cooperate with emerging subsystems connected with the management of the public transport traffic.

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