



THE INFRASTRUCTURE AND SYSTEMS OF URBAN MASS TRANSPORT

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Abstract: *The common tasks of traffic support in the cities and the regions. Units and elements of the mass transport infrastructure. Technology and subsystems of the mass transport. Characterization and priorities of the mass transport in the Slovak Republic. The mass transport in Žilina.*

Key words: *mass transport, infrastructure, transport support, integrated transport systems, transport policy, public passenger traffic*

INTRODUCTION

The trend of society development is still growing number of inhabitants in big cities. This tendency has got many reasons. These are economics reasons – the cities as the economics centres. The result is to increase the openings and concentrate the population. The documents of the European Union [1] says about 60% of inhabitants in the cities centres in member states of EU.

This integration brings many tasks and problems with transportation. Increasing range of urban concentrations, heavy building and many others factors transformate the demands to the transport support of the cities and the regions. Common problems are:

- The growth of negative effects in to the environment
- Capacity exceeding of transport infrastructure
- Increasing number of the traffic accidents
- Inadequate satiation of the transport needs of specific groups of population (disabled persons, children, seniors, etc).

In this way it is needed to dwell into the solving of these main fields of urban mass transportation (UMT):

- To prevent from the rise of congestions and to obtain the fluency of the traffic
- Radical decreasing of pollutant emissions and noise reduction
- Building infrastructure with minimal requirements of the area
- To utilize of intelligent transport systems
- To make available transport services to handicapped people, children and families, with relevant legislation too
- To increase the security of transport means and the elements of the transport infrastructure.

THE INFRASTRUCTURE AND THE TECHNOLOGY OF URBAN MASS TRANSPORT

Almost all problems associated with urban mass transport are related to its infrastructure. Common definition of transport infrastructure includes transport nets, buildings and equipments of transport kinds and transport means in. In the infrastructure of mass transport it is possible to cover up the elements of track and free-wheeled transport systems, or other specific transport systems (moveable zones, moving stairs, lifts, etc.). Beside these, it is required to accept special social and economic character of this infrastructure.

The possible partition of some components of mass transport infrastructure is represented at the pict. 1.

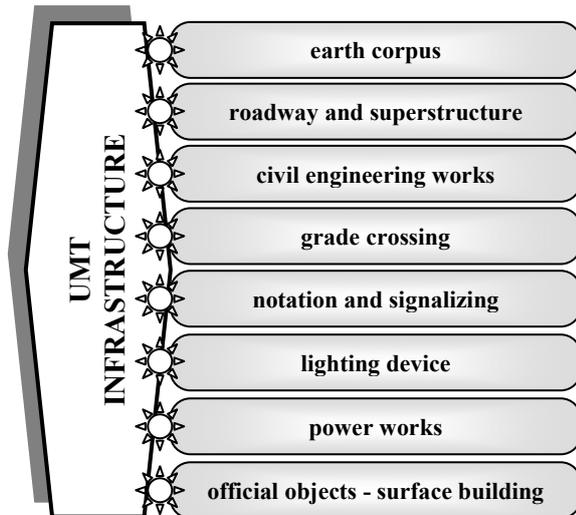


Fig. 1 Basic elements of UMT infrastructure

The traveller in the mass transport immediately apprehends only the part of elements of the infrastructure. There are the main components from above mentioned elements:

- Platforms for travellers, landscaping, hoarding and security equipment as a part of earth corpus, roadway, superstructure
- Bridges, tunnels, subways and their equipment (lifts, stairs as the parts of engineering buildings)
- Optimal solution and security of crossing as a part of separation
- Understandable and sufficient transport marking and signalization to enable safety and simply orientation
- Functional and suitable soluted lighting
- Simply manageable and sufficient distributed technical equipment of control
- Social equipment (waiting rooms, restaurants, shopping services, WC) of stations, transfer nodes as a part of ground transport buildings.

The quality, the solution and the function of elements above may subserve basic demands of travellers to mass transportation:

- Optimal lines at the area of city
- Periodicity of lines and their mutual sequence to other kinds of transport
- Velocity of transport
- Minimizing of time losses
- Operative solution of crises situations in transportation
- Quality in information processes

- Simply system of the tariff policy and dispatch
- Modernizing of rolling-stock, transport buildings and equipment.

The substantiality of technology of urban mass transport is illustrated at the picture 2.

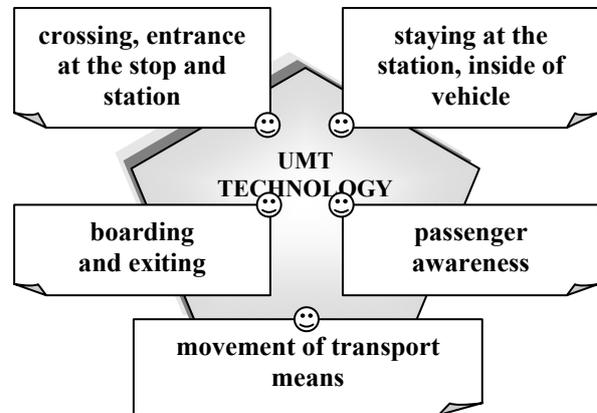


Fig. 2 UMT technology content

System of urban mass transport, mainly in big towns, is created by many subsystems. Used criterion of followed selection is kind of transport means. Basic subsystems of mass transport in city are: [2]:

- Bus traffic
- Trolley-bus traffic
- Tramway traffic
- Railway high speed traffic (underground)
- Cableway traffic
- Ship traffic
- Other kinds of traffic.

Integrated transport system is the specific of transport system. Urban mass transport is one of its elements. The aim of building of integrated transport systems is to provide good-class transport in urban agglomeration by mass transport and to compete with individual automobile transit. Integrated transport systems give possibilities for:

- Optimal using of existing infrastructure
- Simpler access to other kinds of transport and their combined using
- Support for ecological kinds of transport
- Better organization of transport for short distance
- Implementation of green zones and fees road utilization
- Behaviour change of population in the tasks of their own cars using.

TRANSPORT POLICY IN THE SLOVAK REPUBLIC AND URBAN MASS TRANSPORT

The main trends and tasks of transport development in SR are based in legal instrument: „Transport policy of Slovak Republic till 2015“. In an initial SWOT analysis is mass transport characterized [3]:

- **Strengths** – area developed system of public transport
- **Weaknesses** – unsuitable technical and quality conditions of regional and local transport infrastructure, low level and limited possibilities in support of transport means
- **Opportunities** – utilization of intelligent transport systems, achievement of attractive services for travellers
- **Threats** – emptiness of financial tools for development, repairs and operation of transport infrastructure.

Among the main priorities in the field of urban transport belong:

- Making competition possible between transport services providers
- Optimalization of transport effort capacity in public interest
- Implementing different models of area transport attendant
- Creating good conditions of mobility for transport participant
- Guaranteeing the right for travellers to be informed about transport services, safety and security of travellers, quality level of services
- Affording a reasonable reduction in travelling expenses
- Creating conditions for preference mass transport by modernizing and by development of transport infrastructure of towns and villages
- Modernizing and developing of infrastructure for motor-less transport
- Planning, organizing and financing of mass transport at the level of town and village
- Ensure financial tools for renovation of vehicles park of mass transport and short distance bus traffic
- Increasing of quality and range of transport services with accent to implementation of intelligent transport system

- Creating of separated traffic lane for mass transport and priority driving at the crossings
- Paying for using cars in expanated parts of big cities.

Urban mass transport in SR is providing by six transport enterprises of UMT and another 54 firms of public transport. Categorization is illustrated in table 1.

Tab.1

Selection of towns in SR

City type	Number	Number of the population [per.]	Participation at the total in SR
metropolitan cities	2	>10 ⁵	12 %
big cities	9	5.10 ⁴ ÷ 10 ⁵	12 %
middle cities	16	25.10 ³ ÷ 5.10 ⁴	10 %
small towns	45	10 ⁴ ÷ 2.10 ⁴	14 %
UMT has been in the 55 towns			

Source: www.geograf.sk

It is possible to describe the urban mass transport form 2000 till 2006 with some specifications from Statistic Office of SR and Department of Transport, Post and Telecommunications of SR [4]:

- UMT draws from total investment expenses into the transport infrastructure 1,25%
- Dotations of UMT from state budget from 2000 doubled on the average they represent yearly 17 % from all dotations into regular public transport
- Numbers of registrated busses subsidized from 2000 about 20%, number of tramways and trolley-busses alternated about 10%
- Number of travelled passengers in UMT did not change, growing of individual automobile traffic was about 7%
- UMT was about 20% at average transport distance 3,46 km in total transport capacity of public transport
- Concerns of UMT travelled about 400 mil. people in 206, 58% by bus-traffic, 27% by tramway traffic and 15% by trolley-bus traffic.

URBAN MASS TRANSPORT IN ZILINA

Zilina belongs into the category of big cities of the Slovak Republic. This town is the fifth biggest by the way of population number. Zilina as the centre of municipal authorities reaches at

the area of 80 km², its altitude is about 340 m. Zilina is economical, cultural and community centre of north-western Slovakia. Zilina represents very important international transport node.

The comparison of all big cities of SR with subsystems of urban mass transport is illustrated in table 2.

Tab.2

Comparison of selected cities of SR

City	Number of population [10 ³ per.]	UMT vehicle/transport line number [pc]		
		BUS	TROL	TRAM
Bratislava	426	454/66	125/14	233/12
Košice	237	354/37	27/3	129/15
Prešov	91	60/35	48/8	-
Žilina	85	53/12	43/8	-
B. Bystrica	80	99/17	28/7	-

Source: www.imhd.sk

Urban mass transport in the town of Zilina is operated more than 60 years by Transport Enterprise of Zilina, Ltd. Basic net of lines was made of bus-lines till 1994, when started to run the first trolley-bus route that served to almost 100,000 inhabitants of the city Zilina. At present time, it is running 43 vehicles on 8 trolley-bus routes and 58 vehicles on 12 bus routes.

Route location of UMT developed step by step with the development of the town. New shopping centres, automobile factory KIA induces the creation of new routes in last years. Schematic representation of Zilina city is on the picture 3.

One of the most important criteria describing the using of UMT is number of travelled persons. This indicator is decreasing in years from 2001 till 2006. The decreasing is about 40%. At the picture 4, there is illustrated development in transport of passengers by UMT in Zilina. Basic 100% represent average number of travellers during the time of 6 years (19 mil people).

It results from the graph, that the decreasing of travelled persons is mainly in bus-traffic. The reason is in good trolley-bus route creation in area of the higher number of travellers. But the decreation comes from high level of individual automobile traffic in the city and the region of Zilina too.

Travelling expenses should be one of the possible reasons of disadvantageous rate between urban mass transport and individual automobile traffic. Development of sales of urban mass transport in Zilina is represented at the picture 5. As 100% base is used average value of sales during six years (109 mil. Sk).

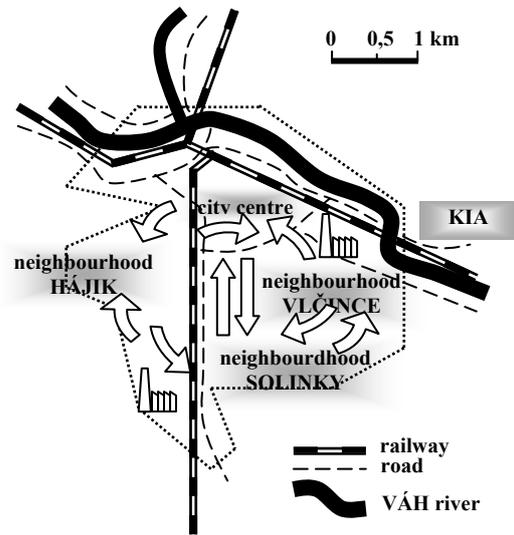
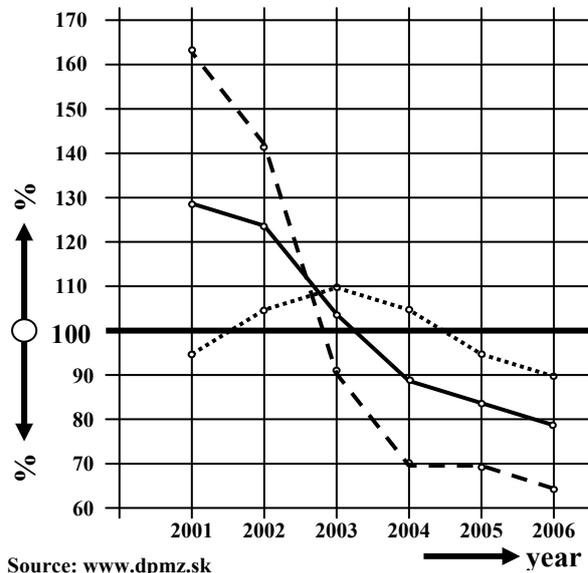


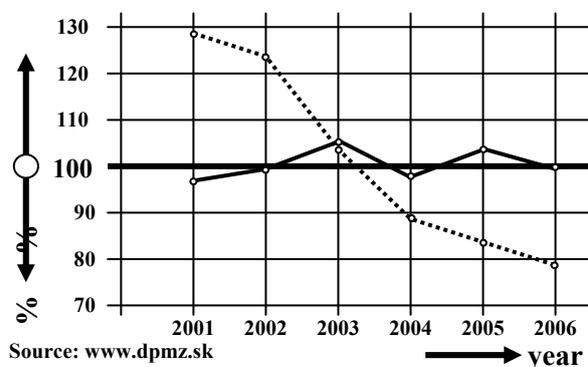
Fig. 3 City of Zilina



Source: www.dpmz.sk

--- total transport of passengers - bus
 total transport of passengers - trolleybus
 — total transport of passengers

Fig. 4 Transport of passengers UMT in Žilina



Source: www.dpmz.sk

— Total sales of traffic
 Number of travelled passengers

Fig. 5 Development of sales in UMT Zilina

Relatively stable level of sales by the decreasing of number of travelled persons goes hand in hand with more increasing travelling expenses in last years.

Behaviour of travellers is some picture of structure of sales. There is illustrated the development of some components of total sales at the picture 6. Basic value 100% represents average head of sales during 6 years (one way tickets 81 mil Sk, prepaid tickets 25 mil Sk, traffic control 3 mil Sk).

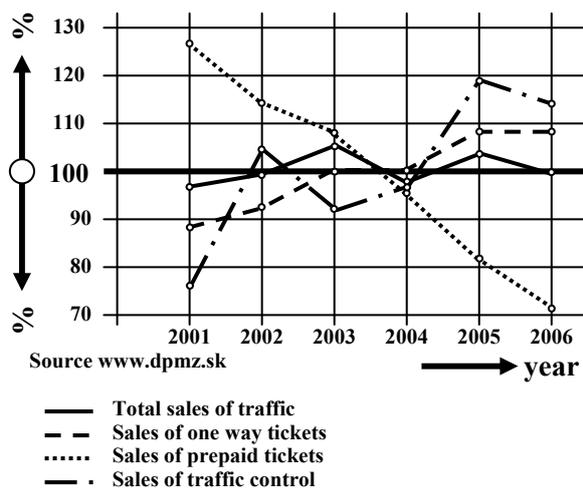


Fig. 6 Structure of sales in UMT Zilina

Often increasing travelling expenses go to increasing of sales for one way tickets. On the other side, attractive price of prepaid tickets is one of the ways to obtain the travellers to urban mass transport.

CONCLUSION

Transport serving of big towns agglomerations is still more important. It is important for international level of solving problems in town mobility too. Beside of economic and environmental problems, organisation of urban mass transport gives deep social aspects not only for inhabitants of big cities.

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This article has been worked out with the support of Slovak Research and Development Agency, Agreement No. SK-BUL-015-06.

ИНФРАСТРУКТУРАТА И СИСТЕМИТЕ ЗА МАСОВ ГРАДСКИ ТРАНСПОРТ

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Резюме: Докладът разглежда общите задачи за поддържане на трафика в градовете и районите, компонентите и елементите на инфраструктурата на масовия градски транспорт, технологията и подсистемите на масовия транспорт. Характеризира се инфраструктурата на масовия градски транспорт и се посочват приоритетите ѝ в Република Словакия. Представя се масовият транспорт в Жилина.

Ключови думи: масов транспорт, инфраструктура, поддържане на транспорта, интегрирани транспортни системи, транспортна политика, обществен пътнически трафик.