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ANALYSIS OF THE THROUGH TRAFFIC ON ROAD NETWORK OF KOSICE

Summary. In the discussions and considerations on the design of road network the data of volume and through traffic has an important role. In solving this problem the knowledge about its volume, direction and the percentage from the whole traffic volume is highly desirable. Therefore the effective determination of these characteristics is of a major importance. In the paper the data as results of special surveys of these characteristics, together with analysis of their development are described.

ANALIZA RUCHU TRANZYTOWEGO W SIECI DROGOWEJ KOSZYC

Streszczenie. W rozważaniach dotyczących konstrukcji sieci drogowej duże znaczenie ma poznanie wartości natężenia ruchu, struktury kierunkowej i procentowego udziału ruchu tranzytowego. W artykule przedstawiono wyniki badań i analiz rozwoju tych charakterystyk.

1. INTRODUCTION

Quality of urban road network depends on the designed capacity (efficiency) of its roads because this influences the quality of the movement of traffic flow (continuity of traffic flow, velocity, etc.). Urban road system should be built with sufficient efficiency, acceptable transportation-technical quality, while keeping acceptable ecological conditions in its immediate environment. In relation with enormous increase of traffic rate, mainly on urban through roads, this task is more and more demanding and the prominent problem is re-evaluation of existing road network and design of a new one with the aim of its sustainable development.

2. DESIGN OF ROAD NETWORK

The most important role at the decision making concerning a new design of a road network has the analysis of traffic on a road network mainly on through roads. It is necessary

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to analyse the information on vehicles, i.e., to find out from where they come (their origin), where they go (their destination), whether their occurrence on a particular road is inevitable. It is also necessary to know the values of traffic flow volume and traffic direction for the whole urban road network.

The primary source of information on the traffic flow volume on existing road network are regular traffic surveys. This data makes possible to obtain only some basic characteristics concerning road traffic which provide information on traffic flow volume on existing roads with their present traffic function. However, the data is not sufficient for the planning and design of urban road network connected to a superior road network. In order to obtain missing characteristics it is therefore necessary to complete these surveys with additional traffic surveys which would make possible to obtain these characteristics. The correct process of decision making on the design of a new road network, on the necessity of building by-passes or the reconstruction of through roads in order to increase transportation-technical level of a road network while keeping its environmental capacity requires to know: direction of vehicles in network, on routes, in intersections, the size and ratio of external traffic (origin, destination, through traffic), the size and ratio of internal traffic (traffic relationships between districts), attractiveness of a city for external vehicles, mobility and other special characteristics (accident rate, exhalations, vibrations, noise, etc.).

3. TRAFFIC VOLUME ON URBAN ROAD NETWORK OF CITY KOŠICE

The city Košice faces the problem of re-evaluation of road network or a design of a new road network in connection with preparation of urban plan (UP) of Košice and subsequent traffic plan. Thanks to the efforts and wise policy of the authorities of the city Košice, not only the data of regular traffic surveys (which are not sufficient as mentioned above) but also the results of special origin-destination traffic surveys carried out in cooperation with the TU Kosice and their own traffic surveys carried out for the purpose of UP in 2001 will be possible to use [1].

3.1. Description of road network

The basic road network of the city is ring-and-radial, it consists of external and internal rings with entering radial roads - Fig.1.

The city territory is crossed by through roads:

- I/68 - in direction north - south, in direction Prešov - Seňa (through Južné Nábřežie),
- I/50 - in direction east - west, in direction Michalovce - Rožňava (through Štúrova st., and through Južné Nábřežie for lorry traffic),
- II/547 Čermeľ - Jahodná,
- II/548 Pereš - Lorinčík,
- II/552 VSS - Krásna nad Hornádom and
- through roads of III. class.

Main entering roads (radial roads) in the territory are:

- road I/68 - highway feeder - entrance from Prešov (traffic survey point ST1),
- road I/50 - entrance from Michalovce (ST2),
- road II/552 - entrance from Krásna n/Hornádom (ST3),
- road I/68 - entrance from Seňa, H (ST4),
- I/50 - entrance from Rožňava - Bratislava (ST5),

- II/548 - entrance from Jasov (ST6),
- II/547 - entrance from Sp. N. Ves (ST7),
- III/5472 - entrance from Kysak (ST8),
- III/50192 - entrance from Myslava (ST9).

At present the through roads are used not only for through traffic, and a part of external origin and destination traffic, but also for a major part of internal traffic including public transport.

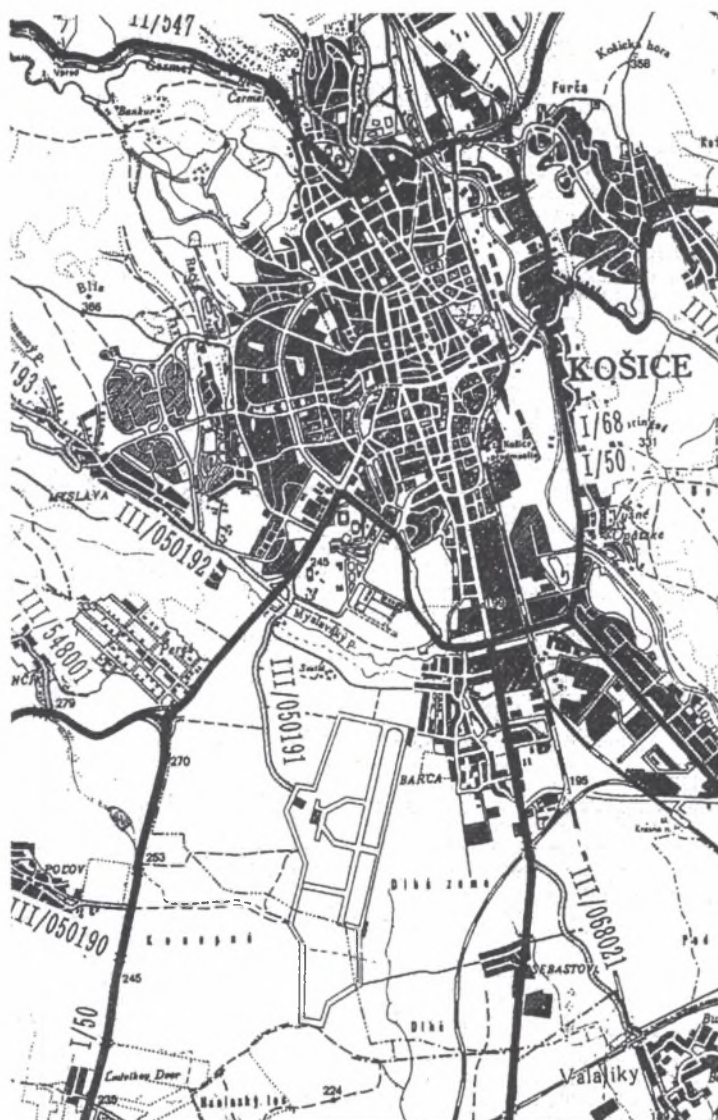


Fig. 1. Road network of Kosice

Rys. 1. Sieć drogowa w Koszycach

3.2. Concept of road network in connection with large territorial unit (LTU)

The concept of city road network is based on [2] approved by *Traffic plan of city Kosice* which was re-evaluated in connection with the proposal of *Lay-out of economic-urban agglomeration of Kosice - 1994*, with conclusion that the concept of traffic followed so far is correct and corresponds prospective needs of the city. The conceptional principles were included into the UP which was approved in 1994.

The intentions of traffic connection to superior road network were determined in *The UP of LTU of Kosice region, 1996*. The newly prepared prospective lay-out plan has to respect this principal concept given by law as far as traffic is concerned. Arguments for its support (or possible revision) should result from the precise analysis of present traffic volume on road network together with punctual traffic prediction. In the first stage of this process the analysis of present traffic situation is necessary.

3.3. Analysis of traffic volume on road network (selected part)

- A. Traffic volume on entering radial roads and through roads according to the results of regular traffic surveys

Table 1

The results of regular traffic surveys in SR in 1980 – 2000

Number of survey point	Road number	Segment number	Annual Average Daily Traffic - AADT (veh/24h)				
			1980	1985	1990	1995	2000
ST1	I/68	00229	-	5 866	7 120	9 658	14 858
ST2	I/50	00238	4 089	4 482	5 693	7 044	12 913
ST3	II/552	02548	-	2 314	2 902	4 069	6 378
ST4	I/68	02054	8 233	9 023	10 189	9 801	19 154
ST5	I/50	00619	4 247	4 385	5460	6 689	11 654
ST6	II/548	02158	1 395	1 770	2 091	2 043	3 354
ST7	II/547	02043	3 264	3 013	3 095	3 296	4 736
ST8	III/5472	03258	1 274	1 699	1 974	1 867	2 574
ST9	II/50192	03998	-	1 319	2 280	2 929	4 106
STA	MK	00232	-	7 045	7 710	11 765	15 359
STB	MK	00631	7 191	7 371	7 976	13246	12 272
STC	MK	00633	-	6 995	11 147	11 210	20 441

Source: [3]

Since it is possible to compare the trends of traffic volume development on the radial roads and through roads, the results of regular traffic surveys obtained in previous years are also listed in Table 1.

- B. Traffic volume on entering radial roads with through traffic according to the origin-destination traffic surveys

In order to make possible to compare the through traffic in previous years the ratios of through traffic in 1987 - 2001 at particular entrances to the city are listed in Table 2.

Development of the total through traffic is depicted in Fig.2.

Table 2

The results of origin-destination traffic surveys in 1987 – 2001

Number of survey point	Road number	Segment number	Ratio of through traffic - TR (%)*				
			r. 1987	r. 1991	r. 1994	r. 1997	r. 2001
ST1	I/68	00229	12,4	9,4	8,5	11,0	9,2
ST2	I/50	00238	13,0	10,5	10,3	9,5	14,2
ST3	II/552	02548	11,1	7,9	9,4	11,5	12,7
ST4	I/68	02054	9,9	7,3	8,1	17,9	14,1
ST5	I/50	00619	13,5	9,9	8,8	8,8	13,0
ST6	II/548	02158	11,8	7,7	10,5	12,0	11,4
ST7	II/547	02043	10,2	8,7	13,5	9,4	12,6
ST8	III/5472	03258	13,4	7,1	14,2	12,3	15,4
ST9	III/50192	03998	-	7,4	8,6	7,3	14,4
Sum			11,9	8,7	9,4	11,6	12,6
*due to technical condition through traffic has not been estimated on STA – STC							

Source:[3]

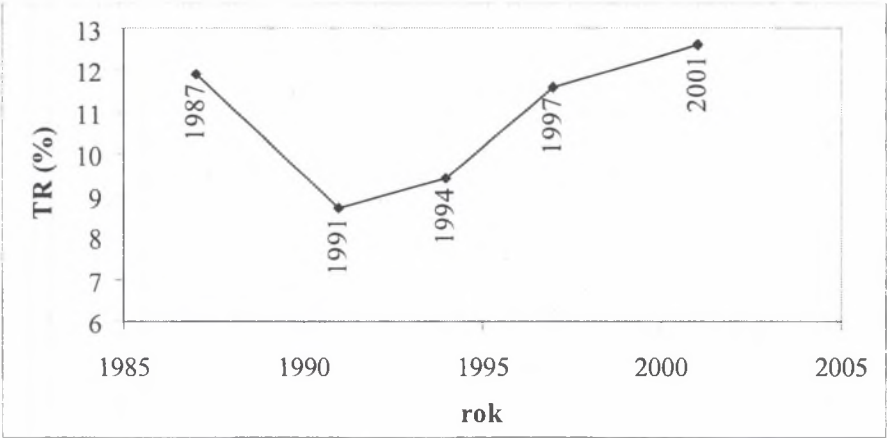


Fig. 2. Development of through traffic in Košice

Rys. 2. Rozwój ruchu tranzytowego w Koszycach

3.4. Discussion

The results obtained indicate that:

- at all entering radial roads (in 1987 – 2000) there is evident increase of traffic volume, in 2000 on survey points ST4 on radial road and STC on through road recorded almost 100 % increase in comparison with the value recorded 5 years ago,
- the entering radial road with the highest traffic volume, taking into account also development in time, is road I/68 – entrance from Seňa – Hungary (ST4).

The comparison of through traffic indicates that :

- the ratio of through traffic is stable in time, only at ST4 (road I/68 entrance from Seňa) it is observed that similarly to the total traffic volume, there is almost doubled increase of through traffic,
- the ratio of through traffic is relatively low in the whole followed period which proves that the city has significant attractivity,
- the highest ratio was found out in 2001, the lowest in 1991 – it can be assumed that with increasing attractivity of the city, the ratio of through traffic drops down, or it keeps its value.

4. CONCLUSION

Through traffic causes problems in urban areas since it influences immediate environment of roads in a significant way [4]. Elimination of through traffic is possible by construction of by-passes in urban areas.

The value of the ratio of through traffic in relation to the total traffic at the entrance of an urban unit is only one but very important value which can have decisive role in the design of a road network.

The results of traffic surveys in Košice have shown that :

- the extent of through traffic is influenced by the size and attractivity of the city,
- in large cities (as well as in Košice) there are large ratios of internal traffic (it results from the comparison of data on the counting segments at the entrances and at through roads) and external origin-destination traffic – digression of through traffic improves the traffic situation in the city but it is not a solution of traffic situation, it is also necessary to take into account origin-destination traffic while creating UP of the city.

From the facts mentioned above results that the effective design of urban road network requires data not only on external traffic (traffic volume on radial and through roads) but also the data on internal traffic in the city provided by origin-destination traffic surveys. To obtain this data is demanding in technical and financial way, but it is of great importance.

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References

1. Salaiová B., Mandula J.: Smerový dopravný prieskum v Košiciach. EDOS Prešov, 2002.
2. Analýza súčasného stavu dopravy a hlavné strategické zámery jej rozvoja v Košiciach. ÚHA mesta Košice 1997.

3. Výsledky celoštátneho sčítania dopravy v SR. SSC Bratislava, 1980 – 2000.
4. Salaiová B.: Možnosti riešenia tranzitnej dopravy v Košiciach. Silniční obzor, ročník 53, 9/1992. Silniční společnost Praha 1992.

Abstract

Through traffic causes problems in urban areas since it influences immediate environment of roads in a significant way. Elimination of through traffic is possible by construction of by-passes in urban areas. The value of the ratio of through traffic in relation to the total traffic at the entrance of an urban unit is one but very important value which can have decisive role in the design of a road network. The analysis of through traffic on roads network of Kosice (case study) is presented in this paper.