MODELLING OF THE TRAFFIC IMPACT OF THE ROAD R3 ON CITY OF MARTIN

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Summary: This paper examines the modelling of the traffic impact on the planned express road R3 on the transport network of the city of Martin. It proved that the modelling issue can be very useful tool for evaluation of planning the building the new road infrastructure, especially in area where are presented the problems with traffic volume.

Key words: modelling, traffic, forecasting, road

1. INTROCUTION

The development of transport infrastructure and especially the road infrastructure of highways and express roads is necessary for regional and transregional development of Slovak republic. The building of such kind of roads is also necessary for reducing of traffic problems of particular cities. In Slovak republic we have a many of examples where the transit traffic uses the city transport network, because the city ring is missing. One of the important road which is planned to build in 2017 is the express road R3. This road will be important for city of Martin and the other existing communications, especially the road I/65 of the city of Martin. The road I/65 pass through the city and it represents the main transport communication from South to North direction. Another important communication is road I/18, which represents main communication from West to East. The main goal of building R3 is to light the inner city transport network. The road I/65 also represents the link between two counties, Martin and Turčianske Teplice. Moreover it is the part of international TEN network.

In the case that the road R3 will be not build, the traffic will be carried by actual transport network of the city which is represented by road I/65. But it is very important to note that the present road I/65 in section Martin – Príbovce and Turčiansky Michal – Turčianske Teplice will not meet the forecasting traffic requirements already in year 2017. On the other sections the traffic will be overloaded or will be close to the limit in year 2037. For this purpose, this paper presents the modelling analysis of two basic variants. First is related to the case when the R3 will be not build – so-called "Zero variant", second to the variant where the R3 will be build. The main goal of this paper is therefore to prove the transport modelling approach as a useful tool [1] in order to evaluate the planning of road investment in advance.

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2. MODELLING APPROACH

2.1 Input data

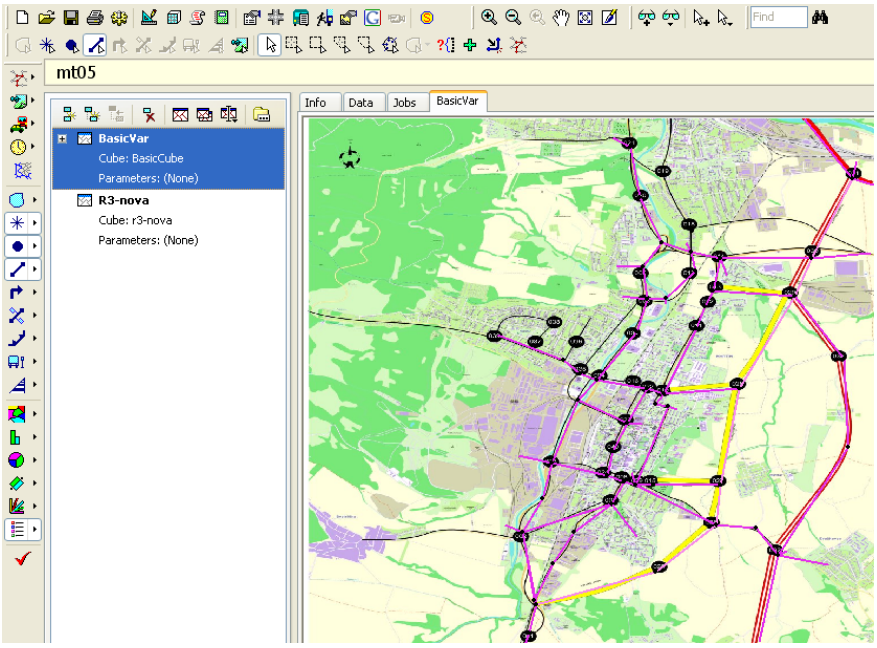
For the purpose of modelling the following data sources have been used:

- Junction survey which was focused on the traffic volume at the particular streets of city of Martin [2]
- Direction survey which was focused on determination of transit and inner traffic of city of Martin [3]
- Profile section traffic volume from national traffic volume survey
- Traffic accidents data, which provide the information, how safe or unsafe is transport network

These input data sources have been combined in order to develop the basic transport model of city of Martin and evaluate the road R3.

2.2 Model framework

The model was built in the transport planning software OmniTrans [4] which is state-of art one of the most complex transport modelling software. The Martin transport model network consists of 21 centroids, 72 nodes and 162 links, see fig.1. There are presented 3 O-D matrices. First is related to the basic status, second to the variant for 2010 – zero variant, third to the status of realisation the R3.



Source: Autor

Fig. 1 – The OmniTrans modelling environment – Transport model of city of Martin

In order to model the variant solution the script based on OJL (Omnitrans job Language) has been created. The OJL contains a various modelling classes [4] which can be

used in order to model traffic volume. For this reason the transport modelling class OtTraffic has been used.

2.3 Traffic safety

Very important factor for analysing is the road safety. The solved area and its transport network is characterised by 5,6 traffic accidents per kilometre per year, the average for express roads in Slovak republic is 4,18 traffic accidents per kilometre per year. This means that the level of traffic accidents is here higher that in other parts of Slovak republic and therefore it represents the unsafe road.

3. FORECASTING METHOD

As I have mentioned before, the forecasting and modelling have been developed for two variants: ***Zero Variant*** and ***Variant with realisation of R3***.

3.1 Zero variant

For the purpose of modelling and analysis the forecasting coefficient has been used from [5] for Region Žilina. As the zero variant the road is leaded in the direction of road I/18 to city of Martin, where in the northern part of city is joined with road I/65. The road I/65 is leaded through the centre of city of Martin and it contains a many of junctions which affect on traffic speed by slowing of traffic. Especially the section between the city of Martin and Košťanmi nad Turcom is characterised by high volume of traffic, because this part is developed fast by commercial activities and in the close future are expectation of joining of neighboured villages. In another section is traffic volume still high, because there is the direction to city of Prievidza on road II/519 in village Príbovce. In the case, that the R3 will be not realised, the forecasting traffic is not very optimistic, because already at the present time the traffic is overcrowded in many section of this road.

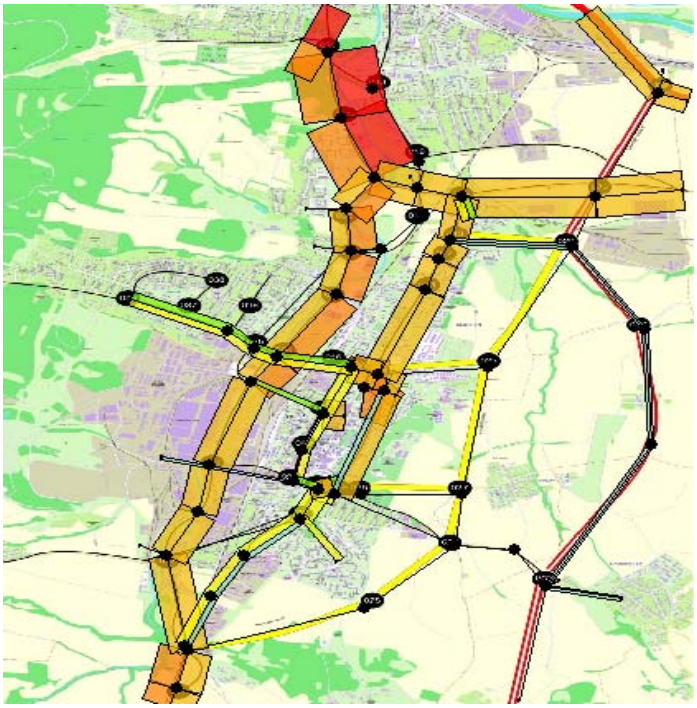
The forecasted traffic volume has been calculated based on the forecasting coefficient for year 2017 – zero variant, see tab.1.

Tab. 1 – Forecasting traffic volume 2017 – zero variant

Forecasting traffic volume for 2017 - Zero variant					
Road Nr.	section	Nr.of section	cars	other vehicles	total
D1	Dub.Skala - križ.Martin 1		20671	6149	26820
D1	Križ.martin 1 - križ. Turany		15367	4827	20194
feeder	križ.Martin 1 - križ. Martin 2		11468	3668	15136
I/18	Vrútky - Martin	90120	7524	2524	10048
I/18	Martin - intravilán	90130	12406	3718	16124
I/18	Martin - Sučany	90130	4992	1404	6396
I/65	Martin - intravilán	91251	22416	2676	25092
I/65	Martin - intravilán	91253	25366	2531	27897
I/65	Martin - intravilán	91252	16306	3688	19994
I/65	Martin - intravilán	91254	11485	1748	13233
I/65	Martin - obchvat	91255	24027	4434	28461

Source: Author

The results have proved that the traffic volume in the city of Martin will be higher. This will have the impact on the function of city transport network which will result in congested streets, reducing the Level of Service, etc.



Source: Autor

Fig. 1 – Traffic volume of city of martin – zero variant

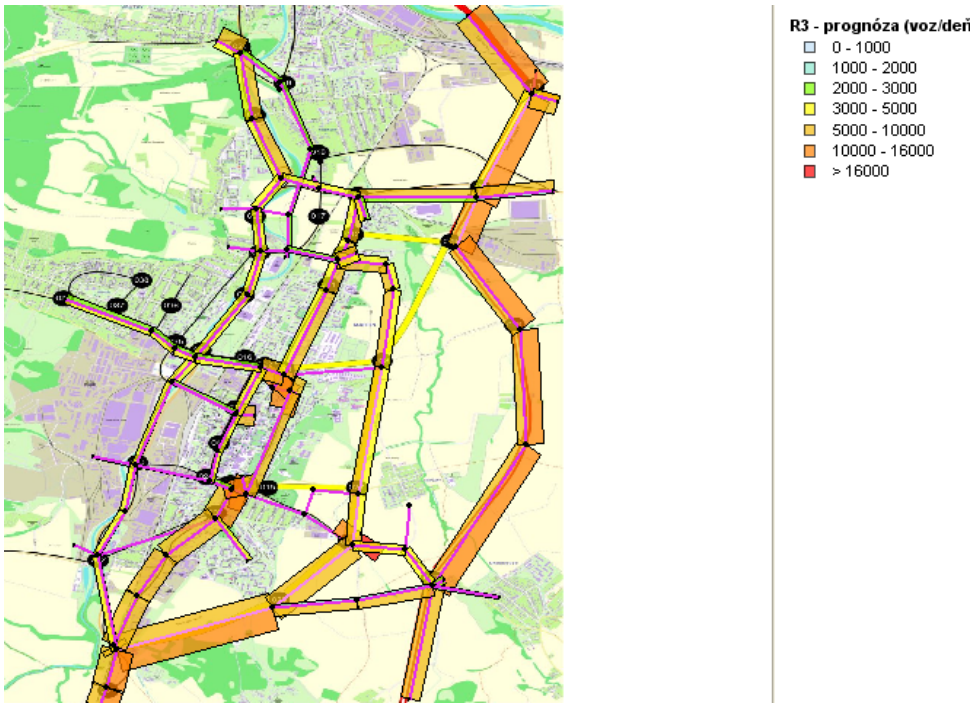
3.2 Variant – Realisation of R3

In second case, the realisation of R3 will be the traffic of the road I/65 leaded through the city of Martin reduced by 6000 vehicles per 24 hours. The forecasted volume of particular sections, is drawn in tab.2 and also in fig.2. These vehicles will be moved to the express road R3. In addition the section Nr. 90130 Martin 2 to feeder will be reduced about 10000 vehicles. This reduction will have the cardinal impact on traffic volume in the centre of city of Martin.

Tab. 2 – Forecasting traffic volume 2017 – Realisation of R3

Forecasting traffic volume for 2017 - Realisation of R3					
Road Nr.	section	Nr. of section	cars	other vehicle	total
D1	Dub.Skala - križ.Martin 1		20671	6149	26820
D1	Križ.martin 1 - križ. Turany		15367	4827	20194
feeder	križ.Martin 1 - križ. Martin 2		11468	3668	15136
I/18	Vrútky - Martin	90120	7524	2524	10048
I/18	Martin - intravilán	90130	4780	1252	6032
I/18	Martin - Sučany	90130	4992	1404	6396
I/65	Martin - intravilán	91251			0
I/65	Martin - intravilán	91253			0
I/65	Martin - intravilán	91252			0
I/65	Martin - intravilán	91254			0
I/65	Martin - obchvat	91255	19894	2896	22790

Source: Author



Source: Author

Fig. 2 – Traffic volume of city of Martin – realisation of R3

The modelling of Variant "Realisation of R3" has proved that the building of city ring and R3 will improve the traffic situation of city of Martin. The advantages of R3 consist in following areas. First, the R3 will carry out the transit traffic which is at the present time carried by city centre and the city centre traffic network will have better level of service. That means better mobility within the city. Second, from the environmental point of view the pollution of traffic of solved area will have a cardinal improvement. Very important is also economic point of view, because the primal big investment of such kind of road can be replaced by economical advantages by improving the mobility of persons, goods and services.

4. CONCLUSION

The main aim of this paper is to prove the result of modelling concept of the city of Martin and its relation to the planned building of express road R3. The modelling approach has been applied on two basic variants. First related to the unchanged status but with increasing traffic volume in centre of city. Second the realisation of R3 which will improve the inner traffic problem as well as problem of transit. Moreover, this result pointed on the fact, that with the help of traffic modelling can be forecasted and estimated the future transport problems in particular solved area.

LITERATURE

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