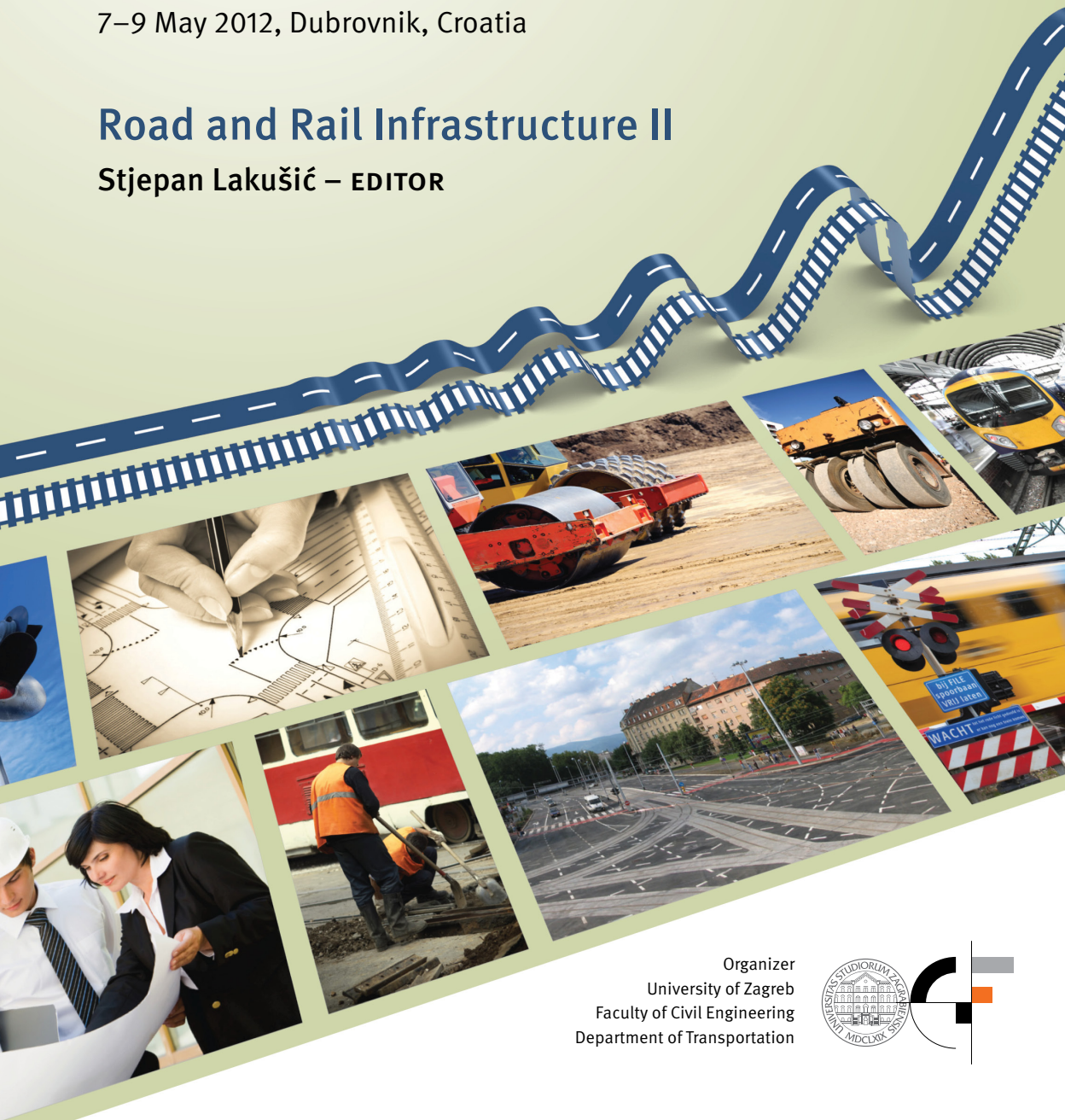
CETRA 2012

2nd International Conference on Road and Rail Infrastructure
7–9 May 2012, Dubrovnik, Croatia

Road and Rail Infrastructure II

Stjepan Lakušić – EDITOR



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MODEL FOR A SHORT – TERM FORECAST OF VEHICLES IN BITOLA TOWN

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Abstract

The contemporary lifestyle leads to rapid increase of number of motorized traffic participants, thus there is a need for traffic planning, which requires forecasting.
Considering the fact that contemporary software packages exist, based on modern technology and long - term experience it is decided to rely on the PTV Vision – VISUM software package, for traffic forecast in the Bitola town. A synthetic model was designed by this software package, modelling was done in accordance with the existing situation and model's calibration. This article presents the output results for the vehicle forecast in the town of Bitola, for next 5 years.

Keywords: model, forecast, Bitola

1 Introduction

Traffic planning is a specific process that determines the capacity needed to satisfy the transportation needs in the future of a pre-defined space. The traffic forecast will be described in this paper for the town of Bitola. Considering the fact that contemporary software packages exist, based on modern technology and long - term experience it is decided to rely on the PTV Vision – VISUM software package, for the traffic forecast in the town of Bitola. With this software package, modelling is done on the existing situation, model's calibration and forecast of vehicles in the Bitola town, for the next 5 years.
The first data collection is done for the purposes of traffic planning. A synthetic model has been designed by this software package where values gathered by counting the traffic at selected intersections in Bitola town were used as input data.
Model's calibration is done in VISUM, with Projection of routes, tool. Thus simultaneously, testing of results and comparison of numbered model sizes (dimensions) is done and a cooperative view will be presented.
Based on the created synthetic model, the resulting O-D matrix, corrections are made and predictions obtained for the flow sizes of thoroughfares in Bitola, for the next 5 years, individually for the flows of PC.

2 Data collection for traffic planning in Bitola

2.1 Zoning of the city of Bitola

Zones are areas with a particular land use and their location within the network (e.g. residential areas, commercial areas, shopping centres, schools). They are the origin and the destination of trips within the transport network.
Zoning is the process of determining and drawing the zones of a city.
Metropolitan municipality of Bitola was divided into 13 major areas that are functionally separate - compact enclosures that are mutually distinguished by certain city streets. On the other hand, they behave and act as a core - called the city of Bitola.

2.2 Cordon counting

On February 18th 2011 (Friday) from2:00pm to 3:00 pm, cordon counting of vehicles was made. The goal of the research is to provide an assessment of the accumulation of vehicles, and purpose of the survey is to give estimates on the number and structure of transit vehicles through the territory of Bitola.
A cordon implies notional boundary line around the city of Bitola, where counting of vehicles was carried out on all roads that intersect the cordon line.
The accumulation of vehicles on the cordon line is determined by summing the total number of vehicles entering and leaving the space in a given period. The results are given in Table 1.

Table 1 Results of cordon counting

	Greece-Prilep	Greece-Ohrid	Ohrid-Prilep	Ohrid-Greece	Prilep-Ohrid	Prilep-Greece
Car	8	4	2	8	5	9
Bus	1	1	0	0	0	3
Track	1	0	1	0	1	2

2.3 Counting on intersections

Counting on selected intersection in Bitola was done on 29th October 2010 during the period from 7:00 am until 9:00 pm., 290 counters were included in two shifts.
Data from 38 intersections was analyzed, rush hour was determined and these values were used as input values in the model.
Values were written by the 'Turns' tool and then received with the help of software flow of links.

3 Transport demand modelling

Modelling is done on an existing situation, model's calibration and forecast on vehicles in Bitola and a synthetic model is designed with the PTV Vision-VISUM software package.
Fig. 1 represents nodes and links of the network in the area where research is done. Accordingly, each link was added to the section capacity and vehicles speed. Roads with the speed limit of 50 km/h are shown in red, roads with the speed limit of 40 km/h are in green and blue are roads with the speed limit of 30 km/h.

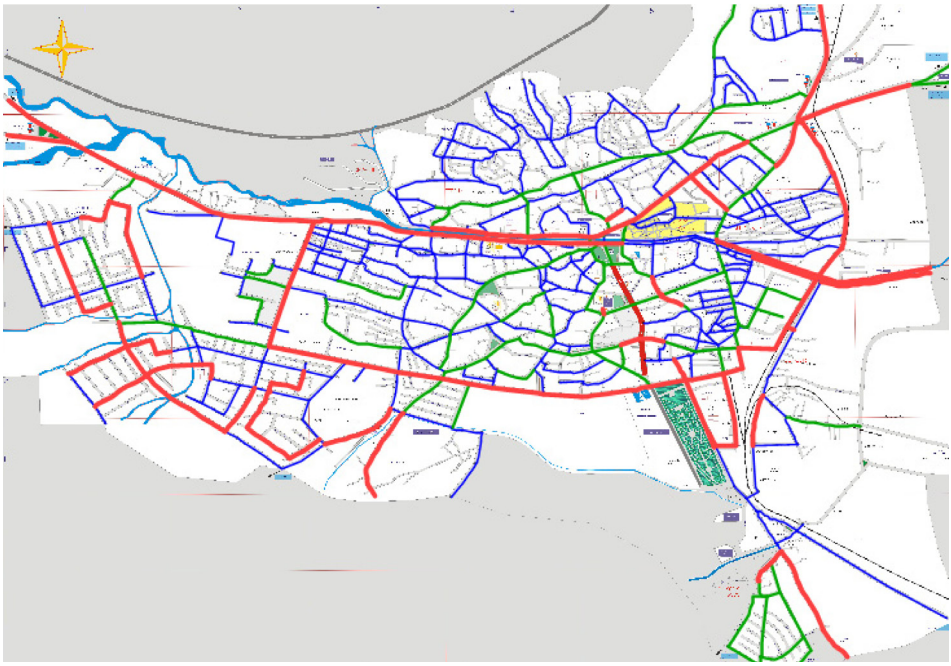

Figure 1 Graphic display of the road network with different speed limits

3.1 Modelling on existing situation

3.1.1 Zoning of the main zones

Metropolitan municipality of Bitola was divided into 13 major areas that are functionally separate - compact enclosures that are mutually distinguished by certain city streets. On the other hand, they behave and act as a core - called the city of Bitola.
For the purposes of the model further zoning was done. The main area includes different number of zones, so there are 46 zones. Fig. 2 presents the main zones (total 13) in blue, other zones (total 40) are in green and zones outside the city (total 6) are coloured red.

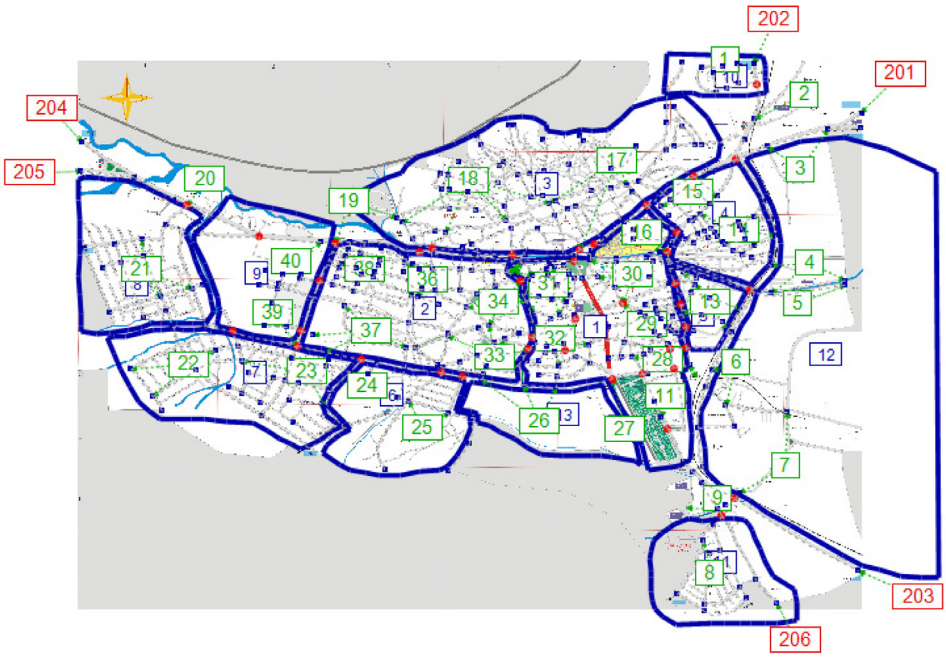

Figure 2 Separation of major areas into zones

3.2 Choosing a model forecast of transport demand

The formulation of the model depends on the initial sizes and input variables that will encompass. The basic definition is that the model should have the ability to 'reflect' the appearance that it simulates.
Modelling is done on an existing situation, models calibration and forecast of transport demand are done with the software package PTV Vision, VISUM.

3.2.1 Model input values

As input sizes in the synthetic model, the values of the counting of traffic at selected intersections were used, marked in red and shown on Fig. 3. Also, the data from the cordon counting were used (cordon counting results are given in Section 2.2).

3.3 Model's calibration

Model's calibration is done in VISUM, with Projection of routes, tool. The goal of the calibration is bringing counting and modals sizes together. Thus simultaneously, testing of results and comparison of numbered model sizes (dimensions) is done.
Following, the comparative display of the counted values (green colour) and model's sizes (in red) for PC are below.

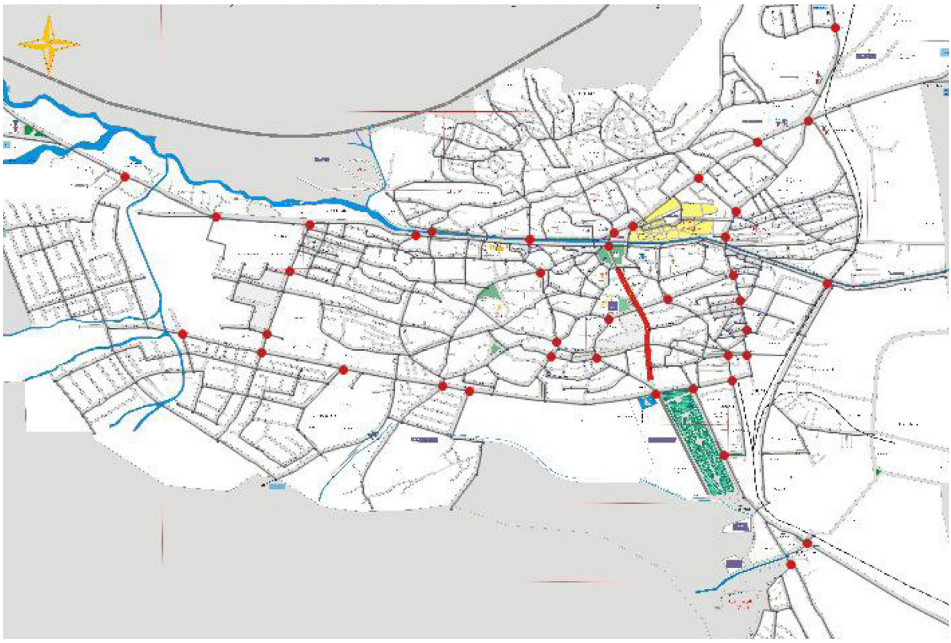

Figure 3 Intersections counting in the area where the research was conducted

4 Transport demand forecast

4.1 Forecast for the existing situation

Forecast is a scientific prediction of some phenomena that are of great importance to human society. Based on the created synthetic model, the resulting O-D matrix, corrections are made as well as the forecast on vehicles in Bitola, for the next 5 years.
When conducting a forecast, an increase of 2% annually is taken into account, for the main zone 13 (Barracks in Bitola), i.e. the zones 26 and 27, taking into account the DUP (detailed urban plan) in this part of town. A balanced growth of 5% annually - for the first 2 years and 3% annually - for the next 3 years was presumed.
Illustrative, in particular sections would look like this: the section between the two junctions Partizanska - Ivo Lola Ribar and Partizanska – Kliment Ohridski, have 635 vehicles counted, while the model gives us the value of 666 vehicles. The projected forecast for 5 years, obtained 739 vehicles.
On Fig. 8 counted values are represented with green, and red are the obtained model sizes values.

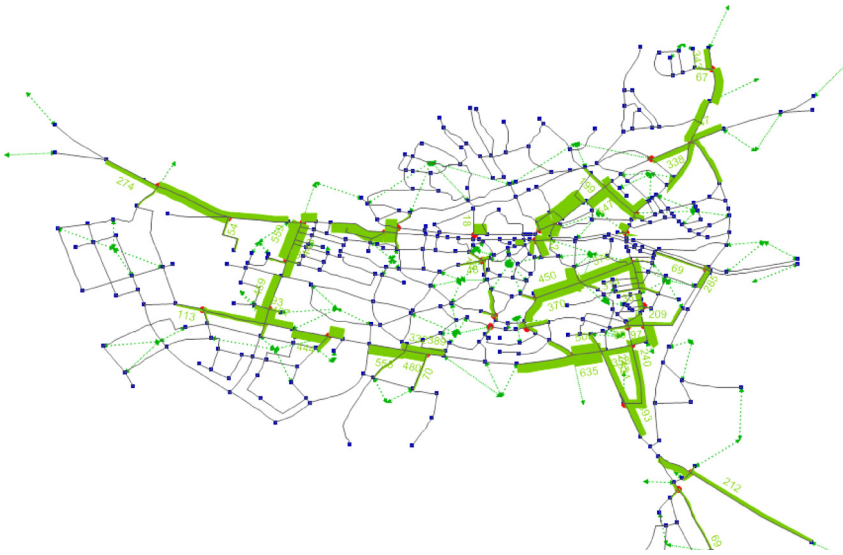

Figure 4 Counted values for cars on intersections, calculated in Visum, and presented in sections

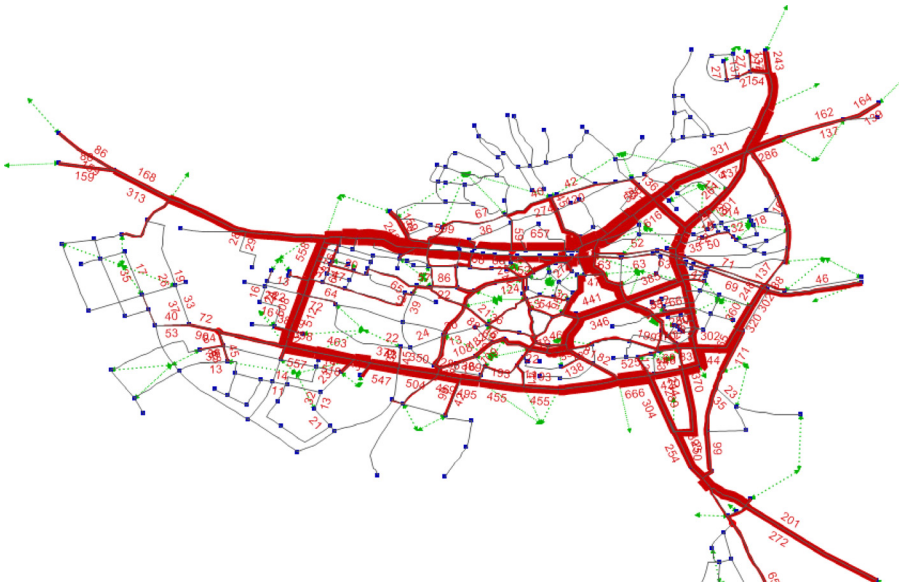

Figure 5 Modal values for cars on the whole network - existing situation

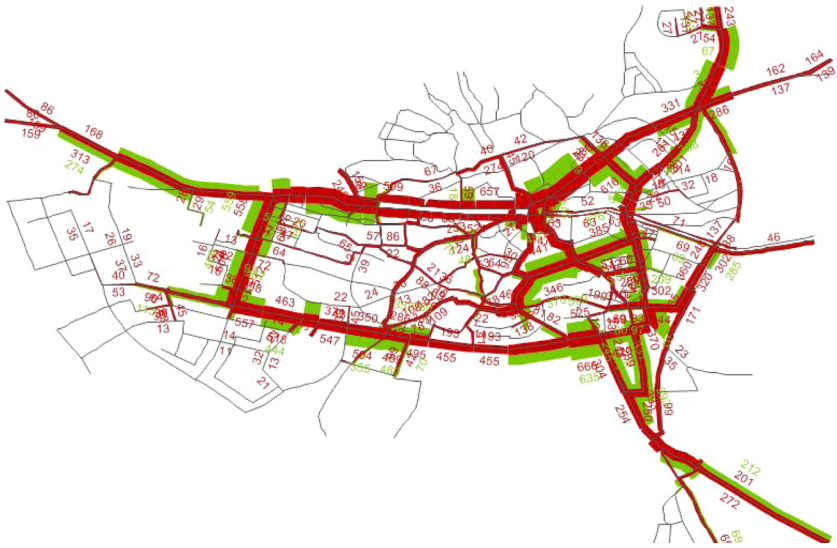

Figure 6 Counted and modal values for cars - existing situation

Figure 7 Forecast on vehicles in Bitola, for the next 5 years.

Figure 8 An illustrated example for the section Partizanska–Ivo Lola Ribar and Partizanska–Vasko Karangelevski.

5 Conclusion

The forecast has always been a big challenge for scientist who conduct research in the field of future predictions as well as for others. Forecast is a prediction of some scientific phenomena that are of great importance to human society. Using the software package PTV Vision–VISUM we made a forecast on vehicles in Bitola, for the next 5 years, based on a lot of input data, we got an investigation outreach and data collection. We made comparative analyses of counted, modal and forecasted values. From the output results we can conclude that there is an acceptable deviation of modal values from counted values that mean suitability for modal's usage.

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