

## PRIVATE TRANSPORT PLANNING FOR A SMALL CITY USING PTV VISION VISUM SOFTWARE

**Atanasova V.,**

*Graduate traffic engineer, PhD*

**Stojanoska M.**

*Graduate traffic engineer, M.Sc*

*Faculty of Technical Sciences – University of St. Kliment Ohridski, Bitola, 7000, Macedonia*

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### Abstract

The modal distribution, as a part of the quadrilateral model, is the subject of analysis in this paper. We use the software tool PTV VISION VISUM, which is the world's leading software for traffic analysis, forecasting, and data management, accurately modeling all traffic participants and their interactions. This paper will outline the steps involved in the analysis of private traffic. It includes the placement of nodes on a predefined surface, the creation of a traffic network with links, zoning, and the development of a demand model. Furthermore, we will explain the calculation of modal sizes and forecasting.

**Keywords:** model, planning, forecasting, software

PTV Vision VISUM is the world's leading software for city, regional, and national traffic analysis, planning, forecasting, and data management. It is a comprehensive, flexible macroscopic software system designed for multimodal analysis, encompassing all types of transport, including cars, trucks, buses, pedestrians, and bicycles. [1] Macroscopic traffic models for the creation of transport demand are widely used in traffic engineering for the analysis and assessment of the projected transport system, traffic operations, the selection of alternative solutions, forecasts of transport demand, etc. They are simpler to apply, cheaper, more efficient, faster, compared to the analyzes and tests that are performed directly in the field. They serve to analyze multimodal and intermodal strategies, which can model all existing types of transport.[2] When planning traffic in urban areas, traffic engineers face a challenging task. Traffic and planning are intrinsically linked, as roads must be planned before traffic can exist. Even after a road is well-planned, ongoing reconstruction is often necessary for future years. PTV VISUM contains three essential components: the demand model, the network model, and the travel impact model. [1] VISUM contains the demand model, the network model and the travel impact model. In this paper, the emphasis will be placed on private transport in the city of Prilep, with the application of the PTV VISION VISUM software tool, a background of the city will be created with pre-editing and saving in a suitable format, the placement of nodes that indicate the location of the intersections, beginning and end of the thoroughfares where we set the type of intersection, the links indicate the traffic network, zoning of the city from 18 internal and 3 external zones towards entry-exit routes, with special land uses, the connectors show us where we have the greatest demand for travel, creation of the transport demand model where we define the four-level model, we define the purposes, calculation of modal sizes where we define

the generation and distribution factors, the skim matrix and the rewriting of the trip for private transport, the forecast of transport sizes using the matrix intended for home-work where we have the most trips. [6]

### 2. General data for Prilep city

The municipality of Prilep is located in the central part of the southern region of the Republic of Macedonia. It covers the Prilep field, which makes up the northern part of the largest valley in Macedonia - Pelagonia, Trojačka Valley and the area of the city of Prilep. [5]Through a modern regional road, Prilep is connected to all tourist centers and larger cities in the Republic of Macedonia, especially to the border crossing Medzitlia through Bitola to the Republic of Greece, to Kruševo, as well as to the Prespa-Ohrid tourist region. The municipality occupies a total area of 1,195 km<sup>2</sup> and is the largest municipality in Macedonia in terms of area. According to the 2021 census, it has a population of 69,025.[4]

#### 2.1 Laying of the substrate, drawing of the traffic network, zoning and connectors

By placing the base of the city of Prilep in the software and a scale of a previously determined length, the next step is drawing the traffic network. We could define it as a set of nodes (nodes), which represent the intersections, stations, stops and links (connections), that is, the road and railway network on which the traffic - transport activity is carried out. Figure 2.1.1 shows the nodes and links placed. Zoning is the very procedure of determining and delineating the zones of the city. They are the source and destination of travel in the transportation network. The city of Prilep is divided into 18 traffic zones and 4 external ones towards the entrance and exit routes of the city.[7] Figure 2.1.2 shows the delineated zones of Prilep city. Connectors have the function of connecting the traffic network to the zones. Figure 2.1.3 represents the connectors in place.

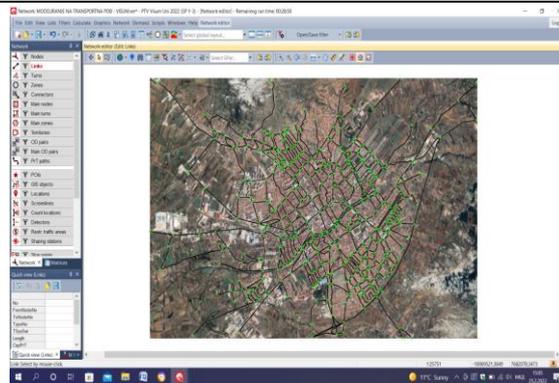


Fig. 2.1.1 Placed links and nodes

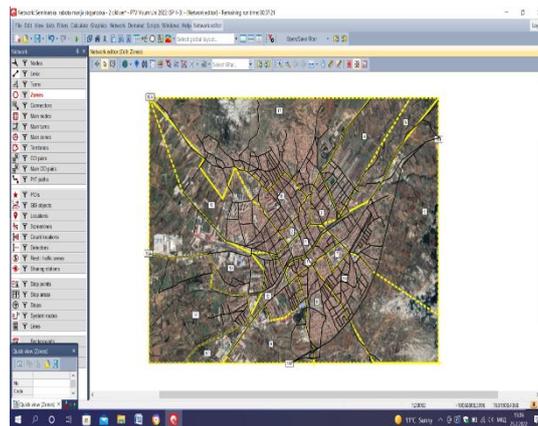


Fig. 2.1.2 Zoning of Prilep city

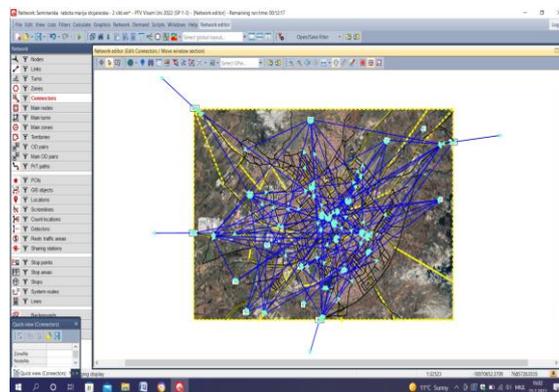


Fig.2.1.3 Placed connectors for the city of Prilep

**2.2 Creation of the demand model**

In this step, the transport systems are first set up, the purpose of the zones is entered (home - work, home - school, home - shopping, home - rest, home - business road, home - not home, freight transit and individual

traffic), the period of analysis (top class), creating matrices for all purposes and entering data into them, calling and choosing a four-stage model.[8] Figure 2.2.1 shows the choice of four-stage model.

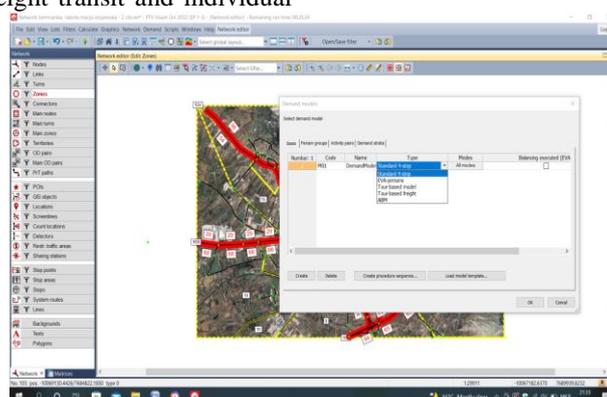


Fig.2.2.1 Choice of the four-level standard model

### 2.3. Procedures for the calculation of modal sizes for private traffic in the city of Prilep

Calculation procedures are the most important part of a model. Here we do the generation of the trip, the distribution and rewriting of the trip, where we enter the

factors of attraction and production of the trips, the attributes are called, a Skim matrix is created that is resistant to all obstacles that would appear on the links. Creation of the private traffic and calculation of the modal sizes.

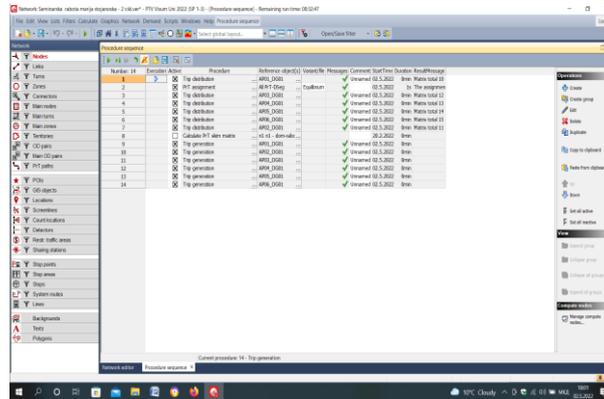


Fig.2.3.1 Calculation of modal sizes for Prilep city



Fig. 2.3.2 Presentation of the modal sizes for the city of Prilep

### 2.4 Forecast of transport demand for private traffic in Prilep city in the coming years

The transportation demand forecast is made in order to see how the transportation demand will increase or decrease in a certain period of time. Projected values

for the traffic load of a particular city are a challenging task for any individual, and especially for a traffic engineer. The fastest and simplest traffic flow forecasting procedure is provided by the PTV VISUM software.[9] Figure 2.4.1 shows the 10-year forecast values.



Fig. 2.4.1 Forecasted sizes of transport demand in Prilep city

### 3. Conclusion

Prilep is a city that has a well-built and connected traffic network, where the needs for travel are met with different transportation systems. The development of private journeys along the primary traffic network, train journeys along the built railway network and public city transport according to a pre-determined timetable, price and route of movement. With the help of the software tool PTV Vision VISUM, which is a professional software for traffic planning and detailed display of all modes of transportation, trips with private vehicles and public transportation, [3] a calculation and forecast of

the transportation demand for the city of Prilep was performed. In the first part, for the private transport, a base of the city of Prilep was set up, a scale, we created the transport systems (cars and freight transport), we drew the traffic network of the city from thoroughfares and intersections, we performed zoning and installation of the connectors that are the guides of the transport demand. In the part where we created the model, we set the purpose of the zones, the matrices of the trips between the zones, the selection of the standard four-level model, the period of analysis and the selection of pri-

vate traffic. The procedure for the calculation and forecast of the transport demand is the most important part where the output results are obtained, ie the current and future demand for transport. We can conclude that private trips on the traffic-transportation network of the city of Prilep predominate. The largest number of private trips are on the entrance-exit routes of the city and in the central city area, where the most numerous activities for meeting human needs are concentrated.

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