

Zoning of the city of Bitola and specificities of the PTV VISION VISUM software

Vaska Atanasova¹, Marija Stojanoska²

¹(Faculty of Technical Sciences, University "St. Kliment Ohridski", Bitola, Macedonia)

²(Faculty of Technical Sciences, University "St. Kliment Ohridski", Bitola, Macedonia)

Abstract: Urban zoning is an integral part of spatial and urban planning, and represents the division of the territory covered by the plan into different functional zones, each of which has a special purpose.^[1] The city of Bitola is divided into 12 main zones, and each main zone is divided into additional traffic zones, in order to clean the land, we have 41 traffic zones. The collection of data for the sixteen defined attributes was done by traffic zones, but due to the specificities of the software tool, those data were summarized and entered into the corresponding main zones.

Keywords: zoning, zones, software, specifics.

1. Introduction

Bitola is the largest city center in the fertile and largest Macedonian valley of Pelagonia and the second largest city in the Republic of Macedonia. The city of Bitola is located in the extreme southwestern part of the Republic of Macedonia and is the seat of the Municipality of Bitola. It represents an administrative, cultural, economic, industrial, educational and scientific center with a developed road and railway network. It has an area with different land uses, precisely and the goal is to carry out zoning with clean land uses by applying the PTV VISION VISUM software tool, understanding the specificities in the field of zoning.^[2] Zoning with the application of this software tool has been done in a large number of cities and papers, such as for the city of Radovish, Eastern region, Pelagonija region.^{[3][4]}

2. Setup of the Main Zones

Zoning is the very procedure of determining and delineating the city's zones. Zones are objects that describe an area with a special purpose of land and their location in the network. The purpose can be in the form of settlements, commercial zones, shopping centers, schools, industrial centers, recreational zones, etc. They are the source and destination of the journey in the transport network. The zones and the transport network are connected through connectors. The traffic zone represents the smallest spatial unit of observation for comparing the movements of the area, which includes one or more statistical zones, 500-1500 families, according to the literature. Zoning is the very procedure of determining and delineating the zones of a city, specifically in this example the city of Bitola. The city area of the municipality of Bitola is divided into 12 main zones, which separately represent functionally compact units that are mutually delimited by separate city thoroughfares.^[5] They behave and act as a single nucleus - called the city of Bitola.^[6] For the whole purpose, a background of the city from Google maps was used, and it was edited with the Paint tool.^[7]

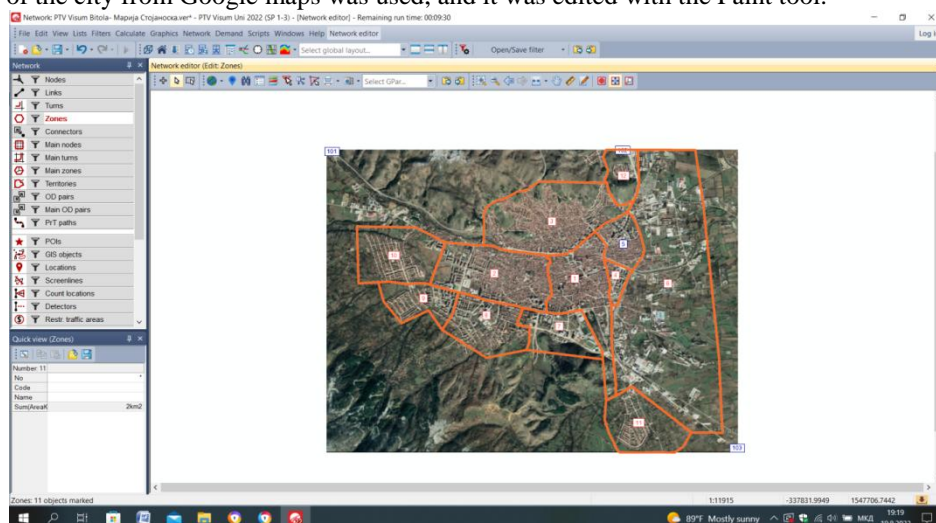


Fig.2 The main zones of the city of Bitola have been drawn

3. Division of Bitola City into Traffic Zones

The city of Bitola, in addition to being divided into 12 main zones, each zone was also divided into several traffic zones, in order to have cleaner uses of the land. There were 41 traffic zones created.

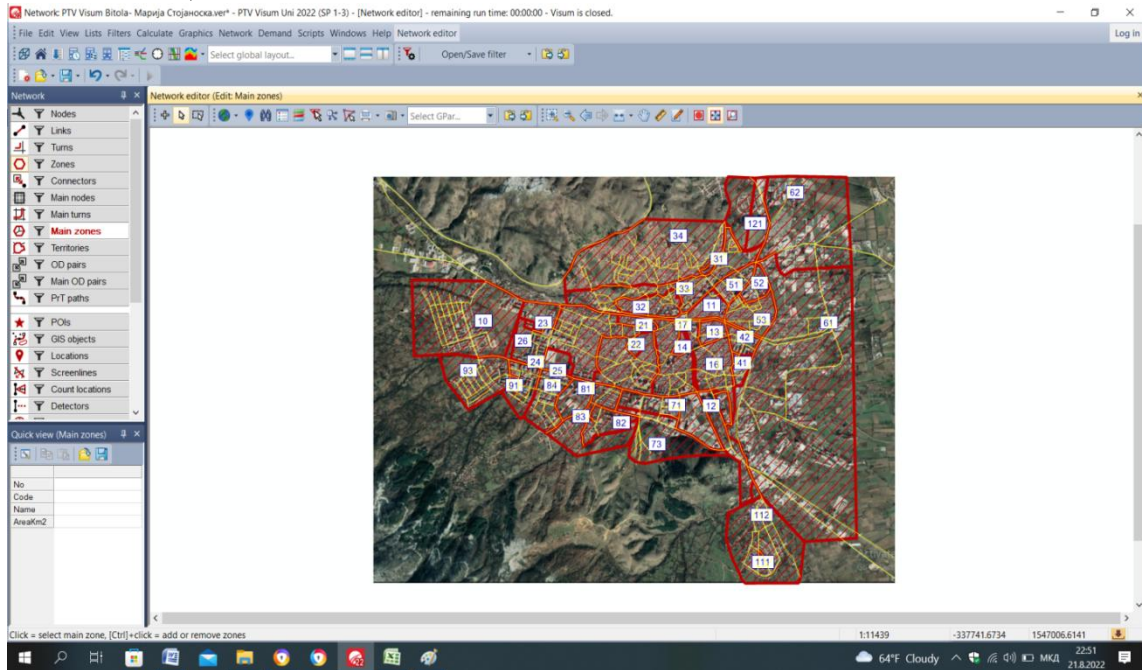


Fig.3 Display of already set traffic zones on the base for Bitola city

3.1 The entry of attributes for the traffic zones

One of the most important procedures in zones is entering data for attributes. For the specific example of the city of Bitola, for the defined zones we will enter sixteen attributes, namely: In Zone, From Zone, All Jobs, Agriculture (Agriculture Jobs), Forestry (Forestry Jobs), Animal Husbandry (Animal husbandry jobs), Industry (Industry jobs), Health (Health jobs), Administration (Administration jobs), Shopping, Hospitality, Tourism, Education (education jobs), Recreation, Residents and Employees.^[8]

Number	41	No	Code	Name	Type	h1	Top	NumZ	ZITELI	VRABOTENI	RMDOBRAZOVANI	RMZDRAVST	RMINDUSTRIJA	RMADMINIS	UGOSTITELI	TURIZAM	REKREACIJA	SITERABOJ	SHOPING	RMZEMLOJI	RMSTOCAI	RMŠUMARA	VOZONA	OOZONA
1	10	0	1	2739				39	9	27	0	0	0	0	18	3	5	263	14	24	150	0	0	0
2	11	0	0	0				30	0	27	0	0	0	0	235	123	0	765	369	0	0	0	0	0
3	12	0	0	0				0	0	0	0	0	0	0	0	0	57	100	0	0	0	0	0	0
4	13	0	0	0				118	0	0	0	0	0	0	0	0	0	0	143	0	0	0	0	0
5	14	0	0	0				28	80	0	0	0	0	0	10	0	0	0	118	0	0	0	0	0
6	15	0	0	0				63	145	0	0	0	0	0	6	0	0	0	214	0	0	0	0	0
7	16	0	1	4439				30	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
8	17	0	0	0				10	0	0	0	0	0	0	25	280	52	0	463	153	0	0	0	0
9	18	0	0	2129				52	0	0	0	0	0	0	0	0	0	52	0	0	0	0	0	0
10	19	0	0	170				2	54	2	0	0	0	0	0	0	0	58	0	0	0	0	0	0
11	22	0	0	194				1	70	6	0	0	0	0	0	0	5	79	1	0	0	0	0	0
12	23	0	0	1464				0	134	9	0	0	0	0	0	0	5	164	12	0	0	0	0	0
13	24	0	0	58				66	0	10	0	0	0	0	13	80	0	0	341	167	0	0	0	0
14	26	0	0	7822				88	71	14	29	0	0	0	162	10	2	0	491	108	0	0	0	0
15	27	0	0	6330				35	3	15	4	0	0	0	13	30	0	0	158	58	0	0	0	0
17	31	0	0	130				0	70	0	0	0	0	0	0	0	0	70	0	0	0	0	0	0
18	32	0	0	865				0	182	5	0	0	0	0	1622	0	0	0	1815	9	0	0	0	0
19	33	0	0	2349				0	0	220	15	0	0	0	92	10	5	10	319	22	0	0	0	0
20	34	0	1	5327				0	0	0	0	0	0	0	0	0	0	0	36	36	0	0	0	0
21	41	0	0	50				3	96	4	0	0	0	0	0	0	0	0	105	0	0	0	0	0
22	42	0	1	3712				51	0	14	0	0	0	0	6	8	0	10	95	16	0	0	0	0
23	51	0	0	4948				45	0	0	0	0	0	0	0	0	0	0	72	11	0	0	0	0
24	52	0	0	2314				18	70	0	0	0	0	0	40	0	0	0	134	6	0	0	0	0
25	53	0	1	3240				42	0	10	0	0	0	0	0	0	7	8	16	6	4	5	0	0
26	61	0	1	3809				0	6	452	204	172	6	0	0	0	0	833	248	80	0	0	0	0
27	62	0	0	0				150	0	0	0	0	0	0	232	52	51	0	939	144	0	0	0	0
28	71	0	0	0				0	0	0	0	0	0	0	0	0	0	0	176	31	0	0	0	0
29	72	0	0	0				0	0	121	0	0	0	0	0	29	0	190	146	6	0	0	0	0
30	73	0	0	0				0	0	0	0	0	0	0	0	5	10	24	0	10	5	3	0	0
31	81	0	0	25				34	16	1209	0	0	0	0	0	0	0	1263	0	0	0	0	0	0
32	82	0	0	1073				20	0	0	0	0	0	0	0	0	0	15	29	0	0	0	0	0
33	83	0	0	2292				25	0	0	0	0	0	0	0	17	20	0	42	0	0	0	0	0
34	84	0	0	3908				36	0	0	0	0	0	0	0	0	0	0	73	0	0	0	0	0
35	91	0	0	0				14	78	4	0	0	0	0	0	0	0	15	96	0	0	0	0	0
36	92	0	0	3225				47	0	0	0	0	0	0	0	0	0	21	89	17	0	0	0	0
37	93	0	1	1248				4	0	11	0	0	0	0	0	0	0	15	0	10	0	0	0	0
38	112	0	0	22				0	10	0	0	0	0	0	0	0	0	15	2	0	0	0	0	0
40	121	0	0	584				800	0	0	0	0	0	0	30	6	0	0	33	16	0	0	0	0
41	122	0	1	866				0	0	4	0	0	0	0	0	0	0	0	851	17	0	0	0	0

Fig.3.1 Entered traffic zone attribute data

4. Specificities in the Software Related to Zoning in the Transportation Demand Modeling Procedure

Today in the world there are a large number of software tools and packages that make the work of engineers easier. The PTV VISION VISUM software tool offers its users the demo version with the opportunity to use it for free, but not in full, so it has the following specificities: size A2, maximum number of links 1500, maximum number of time profiles 100, time limit of 45 minutes, the demo version can be used for 30 days, a 1x1 km size pad as well and the ability to set only 30 zones.^[9] After we have created the traffic zones and entered the data, the next step is to define the zones' purposes, where six purposes and two for transit freight and individual traffic were created, then we also create six matrices for the corresponding purposes of the zones and two for transit trips, with the Matrices – Create matrix tool, we choose to create a matrix for the Main zone. Shown in Figure 4.

The next step is to connect the purposes with the defined matrices, we do this with the Demand data-Demand Segments tool and in the Matrix field we call them, BUT we can notice that the software tool PTV VISION VISUM does not give us the right to connect them, maybe that we are using a demo version, so we have a set limit. This is shown in figure 4.1, where we have the matrices for main zones, but not for traffic zones.

Due to these specificities we were forced to perform the creation of attributes for the main zones and the input of summarized data for all the traffic zones that the main zone contains by structure. This is shown in figure 4.2.

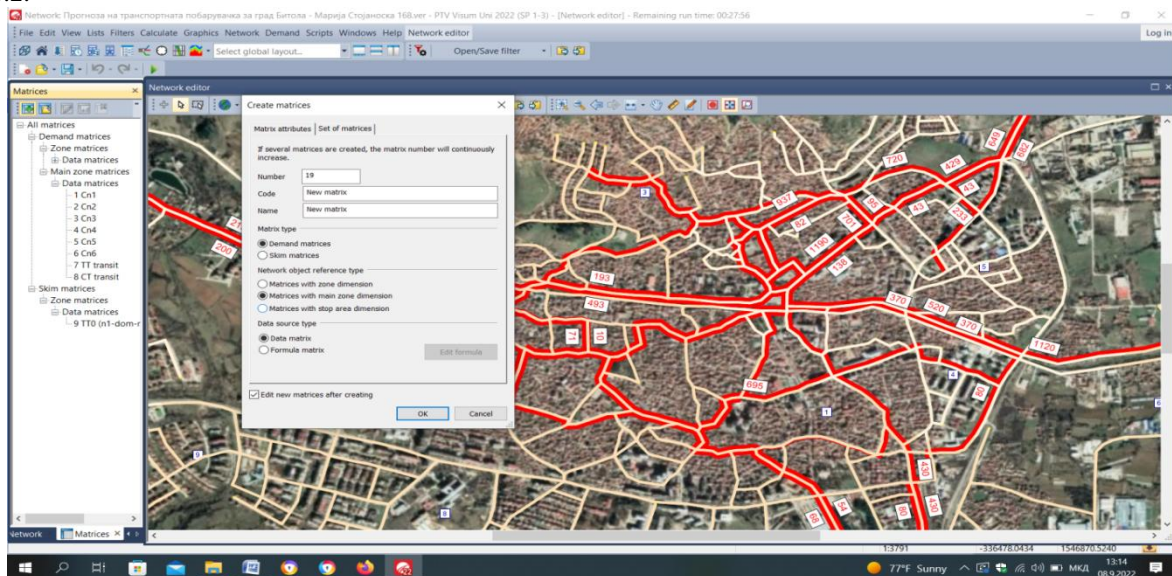


Fig.4 Display of the steps to create matrices for traffic zones and already created

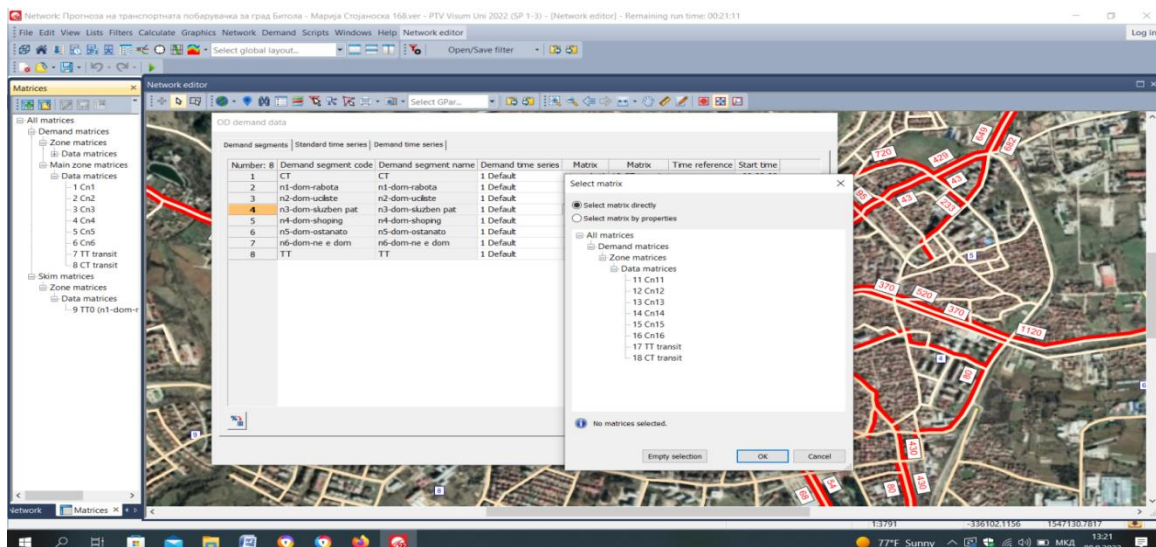


Fig.4.1 Linking the uses to the traffic zone matrices (specificities)

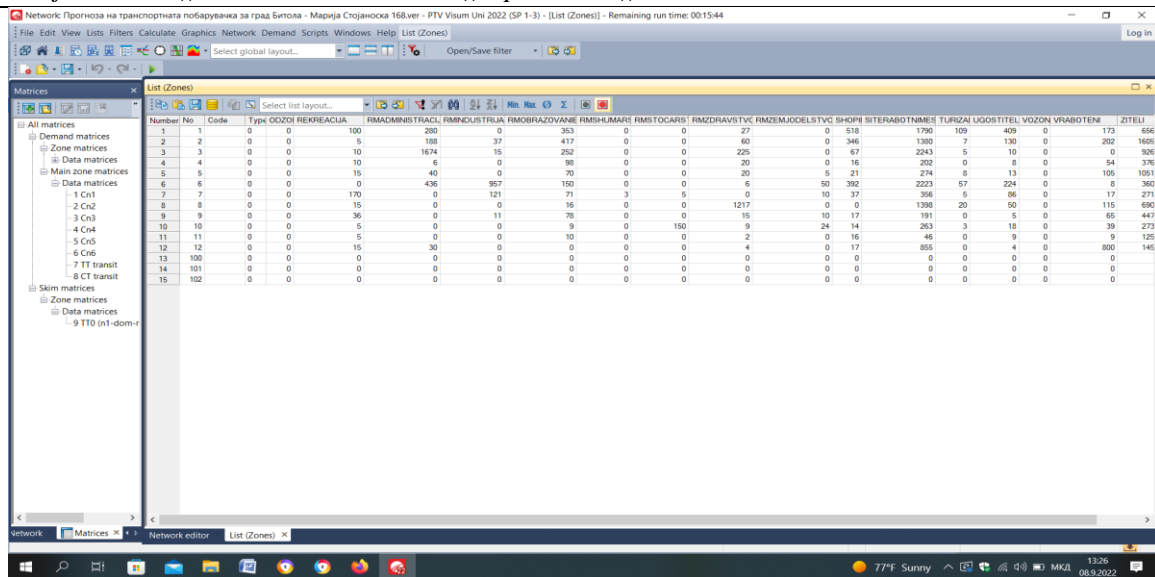


Fig.4.2 Data entry of the attributes in the main zones (the solution)

5. Conclusion

Planning and zoning are decisive in efforts to improve the physical and social environments in which modern man exists. These environments are currently not designed to encourage healthy habits and often promote a sedentary lifestyle. In addition, because zoning and land use policies are often discriminatory and exclusionary, the consequence is an uneven distribution of resources in urban tissues.^[10]The importance of zoning is great, the determination of clean land uses enables a better distribution of trips and transport demand. Zones are the source and destination of travel. Zones are objects that describe the area with a special purpose of the territory and its location in the network. Purposes should be: populated areas, recreational and shopping centers, places where hospitals, factories, etc. A traffic zone is the smallest spatial unit for observing and comparing movements. By placing the base and drawing the traffic network of the city, we divided the area into 12 main zones, and each main zone into several traffic zones, data was collected on the attributes of the zone and that data was entered into a table, while processing the matrices for journeys, we realized that we did not have the possibility to connect with the corresponding uses, so instead of by traffic zones, we summarized the data and entered it into the main zone, thus this specificity of the software tool in terms of zoning was solved. The cleaner land uses we have, the better. Traffic engineers cannot imagine their work without the use of modern software tools such as PTV VISION VISUM, with the help of which we carried out zoning and analysis of the area of the city of Bitola, understanding the specificities possessed by this tool in the zoning procedure and solving the problem.

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