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ASPECTS OF THE STUDY OF MICROSCOPIC CHARACTERISTICS OF ROAD TRAFFIC VARIABLES

V. BOBOC[1] A. BOBOC[2]

Abstract: *Shows some aspects of a very important variable microscopic namely TIV (time intervehicular), influencing the way the flow of movement, with examples from a case study on route 24. water retention data points. The present paper shows differences in seepage calculations using different parameters obtained for three different input data.*

Key words: *TIV (time intervehicular); e-coefficient of equivalence between vehicles; levels of service.*

1. Introduction

The transport means a category economic lifeblood complex and balanced development of any national economy, a role accentuated by deepening social division of labour. At the same time sustainable transport is a primary objective of the European Union strategy for sustainable development (EU SDS-Sustainable Development Strategy) aiming to minimise the impact of transport systems on the economy, society and environment.

In order to ensure the objectives of sustainable transport to motorways and national roads (primary and secondary European), allowable flow must correspond to the technical level of service C, and at the level of service D can be adopted, more economic than technical reasons, in the case of local roads.

2. Microscopic Study of Variable T.I.V

T.I.V. (intervehicular time) is the time interval between two successive vehicles passing on a same band movement [4].

$$TIV = t_i - t_{i-1} \left[\frac{s}{veh}\right] \quad (1)$$

Where ti and ti-1 represents the times "i" and "ti-1" Value T.I.V influences/is influenced by how the flow of movement:

- as a rule, it is considered that a value T.I.V. ≤ 3" corresponds to the movement of the platoon;
- for “free” vehicles, T.I.V. ≥ 4".

2.1. The Correlation of T.I.V. – Traffic Flow (Q):

$$TIV = \frac{1}{Q} \left[\frac{s}{veh}\right] \quad (2)$$

Where: Q [veh/s].

The correlation with high level of

[1] Technical University Gheorghe Asachi Iasi, Faculty of Civil Engineering and Building Services.
[2] Technical University Gheorghe Asachi Iasi, Faculty of Civil Engineering and Building Services.

confidence, allow hosted flows (current census operation to partial / general) to obtain the value TIV (medium) [3]. The ratio of the number vehicles with TIV <= 3" and the total number of vehicles (recorded) allows to obtain a parameter value equivalent TIV (the percentage of time of the movement within the racers group) the report older woman (heavy vehicles) /G CURRENT (light vehicles) representing a coefficient of equivalence between vehicles, added categories of coefficients of equivalent traffic in the study, namely:

$$\varepsilon = \frac{TIV(\text{Heavy Vehicules})}{TIV(\text{Light Vehicules})} \quad (3)$$

• The coefficient of equivalence in cars ("private vehicles");

• The coefficient of equivalence in OS 115 (load structures standard for sizing road);

• study hourly rates for older woman falls in the methods for the analysis of traffic congestion (Transport 05, SETRA 2009) [19];

• The study of TIV, within the framework of the doctoral thesis is based on recordings with ADR-3000 (Automatic Data Recorder) [20].

3. Case Study. Sector DN 24.

In the table 1 are presented average values of TIVm (measured) / TIVc (calculated with the relationship 1.) and the values of the coefficients for the equivalence (heavy vehicles/light vehicles) for the time intervals mentioned above. In the table 2, older woman average values are supplemented by the ratio n/N, broken down by categories of vehicles/total vehicles; n - number of vehicles with TIV≤3" (vehicles "embarrassed faces") [8].

Tables 2 and 4 refer to the day of 23.04.2012. The table 3 summarizes the results for the three days of records. In figure 1 illustrates the correlation Weibull for TIV (measured) - TIV (calculated) [9,12]. In figure 2 shows the correlation coefficient Weeibull equivalence (measured/calculated).

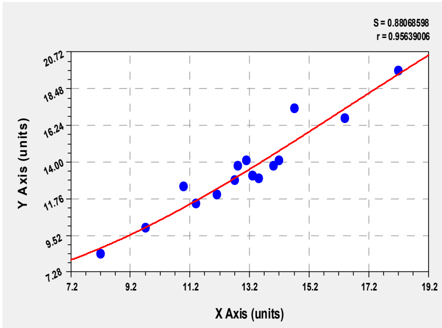

Fig. 1. *Weibull Model*

Weibull Model: y=a-b*exp(-c*x^d)
Axle x – TIV(measured)
Coefficient Data:
Axle y – TIV(calculated)
a = 3.26358451326E+001
b = 2.68620890167E+001
c = 1.03536026879E-003
d = 2.24921303913E+000
Standard Error: 0.88
Correlation Coefficient: 0.95

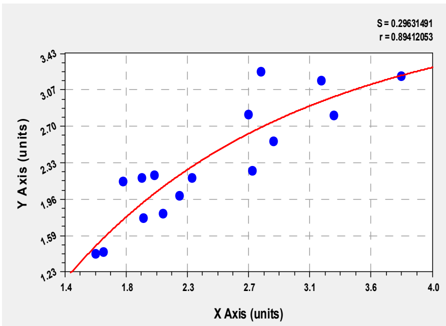

Fig. 2. *DN 24 (23.04.2012; a.m.)*

Correlation Weibull e(calculated) - e(measured).
Weibull Model: y=a-b*exp(-c*x^d)
axle x – e(measured)
axle y – e(calculated)
Coefficient Data:

a = 3.96264792490E+000
b = 7.42488730596E+000
c = 7.35733756550E-001
d = 8.54836723314E -001
Standard Error: 0.29
Correlation Coefficient: 0.89

It has used the program for calculating Curve Expert. Maximum residues are presented statistical tabular, with an indication of relevant values appears along.

DN 24 Study TIV Table 1

Line	Rush hour	Monday- 23.04.2012				Thursday – 19.04.2012				Friday – 20.04.2012			
		TIV_m	TIV_c	e_m	e_c	TIV_m	TIV_c	e_m	e_c	TIV_m	TIV_c	e_m	e_c
S_1	a.m.	12,7	12,9	2,29	2,18	17,2	18,0	5,13	4,0	7,9	18,8	2,93	1,67
		12,8	13,8	16,0	1,41	17,2	18,0	3,65	3,16	10,9	12,3	3,13	2,65
		14,0	13,8	3,30	2,81	14,7	14,8	1,91	1,65	13,8	14,5	3,07	3,13
		11,4	11,5	2,20	2,0	17,9	19,1	2,17	2,14	14,8	13,8	2,60	2,82
	p.m.	14,7	17,3	2,72	2,25	14,1	14,8	1,40	1,26	10,1	12,2	1,43	1,18
		9,7	10,0	2,08	1,82	11,8	12,3	1,90	1,81	11,5	11,4	3,94	3,65
		14,2	14,1	2,02	2,20	12,9	13,8	2,25	2,25	10,5	10,7	1,79	1,47
		18,2	19,6	3,78	3,20	15,9	18,1	2,32	2,57	12,5	12,9	2,70	2,69
S_2	a.m.	16,4	16,7	1,93	2,18	13,8	14,5	1,90	1,95	13,5	14,3	1,63	1,62
		11,0	12,5	1,94	1,77	14,8	15,0	1,82	2,0	12,2	11,7	2,31	2,66
		13,5	13,0	1,80	2,14	11,5	11,7	1,43	1,41	18,9	19,6	1,74	1,56
		13,3	13,2	1,66	1,43	8,1	8,7	1,41	1,34	12,1	11,7	1,96	1,85
	p.m.	8,2	8,4	2,69	2,82	11,3	11,7	2,07	2,08	11,5	11,8	1,95	2,17
		13,1	14,1	2,87	2,55	10,5	10,6	2,0	1,83	11,3	11,8	1,79	1,92
		12,1	12,0	3,21	3,16	12,1	12,0	2,58	2,74	10,5	10,6	1,58	1,58
		13,3	13,2	2,78	3,25	13,7	15,0	2,51	2,53	11,6	11,7	1,07	1,14

Study TIV DN 24 (Monday, 23.04.012) Table 2

Line	Rush Hour	Periods 15′	All Vehicules			Light Vehicules			Heavy Vehicules		
			TIV*)	S	n/N	TIV*)	S	n/N	TIV*)	S	n/N
S_1	a.m.	I	12,7	18,1	38/70	18,4	27,4	18/48	42,2	57,9	4/22
		II	12,8	16,9	26/65	22,4	24,5	11/38	35,9	52,3	4/27
		III	14,0	23,0	35/65	17,7	26,2	22/49	58,4	50,5	1/16
		IV	11,4	16,0	35/78	14,6	20,2	20/52	32,1	26,1	1/26
	p.m.	I	14,7	17,4	24/24	19,1	25,6	16/36	51,9	45,4	3/16
		II	9,7	15,6	48/90	15,6	22,4	28/60	32,5	30,0	3/30
		III	14,2	19,5	32/64	20,2	24,4	17/45	40,8	42,6	1/19
		IV	18,2	27,1	17/46	23,6	30,3	10/35	89,3	65,0	-/11
S_2	a.m.	I	16,4	16,2	11/54	23,5	22,9	6/37	45,3	53,6	-/17
		II	11,0	11,0	23/72	18,6	20,0	9/46	36,1	36,5	3/26
		III	13,5	16,5	25/69	19,3	22,1	14/48	34,8	27,9	1/21
		IV	13,3	15,1	23/68	22,8	25,9	9/40	37,8	39,6	2/28
	p.m.	I	8,2	10,7	47/107	11,0	13,6	33/79	29,6	32,8	2/28
		II	13,1	15,9	24/64	17,7	23,9	14/46	50,8	47,1	2/18
		III	12,1	11,8	26/75	15,5	16,6	22/57	49,8	71,4	1/18
		IV	13,3	14,2	21/68	17,8	18,8	11/51	49,5	43,7	1/17

TIV measured; n - vehicles with TIV≤3 ″; N - total vehicles

DN 24 Summary correlations TIV m – TIV c levels of service Table 3

Day	TIV		Coef. Echiv.		levels of service	
	Measured.	Calculated	Measured.	Calculated.	S_1	S_2
	$\bar{x}/s$	$\bar{x}/s$	$\bar{x}/s$	$\bar{x}/s$		
19.04.2012	13.59	14.25	2.28	2.17		
	2.68	2.89	0.91	0.71	C	B
	Δ=4.9%		Δ=5.1%		C	
20.04.2012	12.73	13.11	2.23	2.11		
	2.56	2.64	0.77	0.73	C	B
	Δ=3.0%		Δ=5.7%		C	
23.04.2012	13.04	13.51	2.43	2.32		
	2.32	2.61	0.62	0.57	C	B
	Δ=3.6%		Δ=4.8%		C	

DN 24 The TIV study. Correlations TIV m –TIV c / levels of service Table 4

Day	Q_{15} (veh.fiz.)		TIV		Coef. Veh.heavy/Veh.light		Corelation			PTP (PTSF)	
	Lines		m	c	m	c	m /c			Line	
	S_1	S_2					T_{ip}	S R	+r -r	S_1	S_2
	Veh.fiz.	Veh.fiz.	$\bar{x}/s$	$\bar{x}/s$	$\bar{x}/s$	$\bar{x}/s$	TIV			$\bar{x}/s$	$\bar{x}/s$
Monday 23.04. 2012	70	54					L	0.83	2		
								0.96	0.66		
	65	72					P(2)	0.84	2.06		
								0.96	0.91		
	65	69					W	0.88	2.01		
								0.96	0.91		
	78	68					EXP	0.83	2.18		
								0.95	0.78		
			13.04	13.51	2.43	2.32	Coef. de echiv.			47.4	33.6
	52	107	2.32	2.61	0.62	0.57	L	0.29	0.64	6.58	6.72
								0.88	0.31	Service Levels	
	90	64					P(2)	0.28	0.55	B	B
								0.89	0.40	$\bar{x}+s$	$\bar{x}+s$
	64	75					W	0.30	0.56	serv.	service
								0.89	0.40	C	B
	46	68					EXP	0.31	0.70	C	
								0.86	0.36		

Rush hour Table 5

Timetable	n_1	n_2	T_1 - sec -	T_2 - sec -	τ - sec -	α	1 - α
11^{00}-11^{15}	32	38	25.47	1.95	1.0	0.542	0.457
11^{15}-11^{30}	39	26	20.05	1.96		0.400	0.600
11^{30}-11^{45}	30	35	28.27	1.86		0.538	0.462
11^{45}-12^{00}	43	35	19.07	1.91		0.449	0.551
11^{00}-12^{00}	144	134	22.67	1.92		0.482	0.518

Traffic Flow Table 6

t -sec-	λ -sec-	$p(\bar{x} \geq t)$ Timetable					Ranges Media
		11^{00}-11^{15}	11^{15}-11^{30}	11^{30}-11^{45}	11^{45}-12^{00}	11^{00}-12^{00}	
4	4	0.48	0.62	0.48	0.57	0.54	0.54
5	5	0.44	0.57	0.45	0.52	0.50	0.50
6	6	0.42	0.53	0.43	0.48	0.47	0.47

4. Probability of Mistaking Certain for Older Woman

4.1. Traffic Flow

Traffic Flow is composed of vehicles "free" and "embarrassed faces", according to the values TIV. Probability of mistaking a certain values for older woman can be calculated with a distribution exponential composed [7, 2, 15], distribution proposed by SCHUHL:

$$p(x \geq t) = (1-\alpha) \cdot e^{-\frac{t-\lambda}{T_1-\lambda}} + \alpha \cdot e^{-\frac{t-\tau}{T_2-\tau}} \quad (3)$$

Where:

p(x ≥ t) - the probability that a value *x(x=TIV)* must be at least equal to a duration t;

α - the proportion of vehicles "embarrassed faces"; - the proportion of vehicles 'free';

T1 - (TIV) environment for vehicles " embarrassed faces";

T2 - (TIV) environment for vehicles "-free";

λ - (TIV) at least for vehicles "free" pooling - TIV at least for vehicles "embarrassed faces" (value);

e - Basic natural logarithms.

4. Conclusions

• Likelihood of TIV = 4 ",5" and 6 ", representing likelihood for vehicles free (with distinct levels of trust) are shown in the table (5.10). Probability for TIV =4" ... 6"

• Likelihood for the registration of TIV in the field of values 4" ... 6" varies in hourly intervals of 15 ', and the average value of intervals for probability is equal to the whole time.

• Variation occurring within time justified the study for intervals of 15 '.

• Knowledge for peak times of network traffic is useful for prioritizing monitoring traffic safety.

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