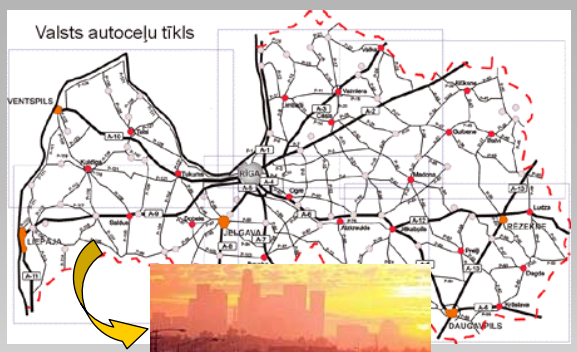
Assessment of road traffic safety level on Latvia's main highways

Ziedonis Lazda
Civil EngineeringFaculty,
Riga Technical University

Rīga 2008



No Actions

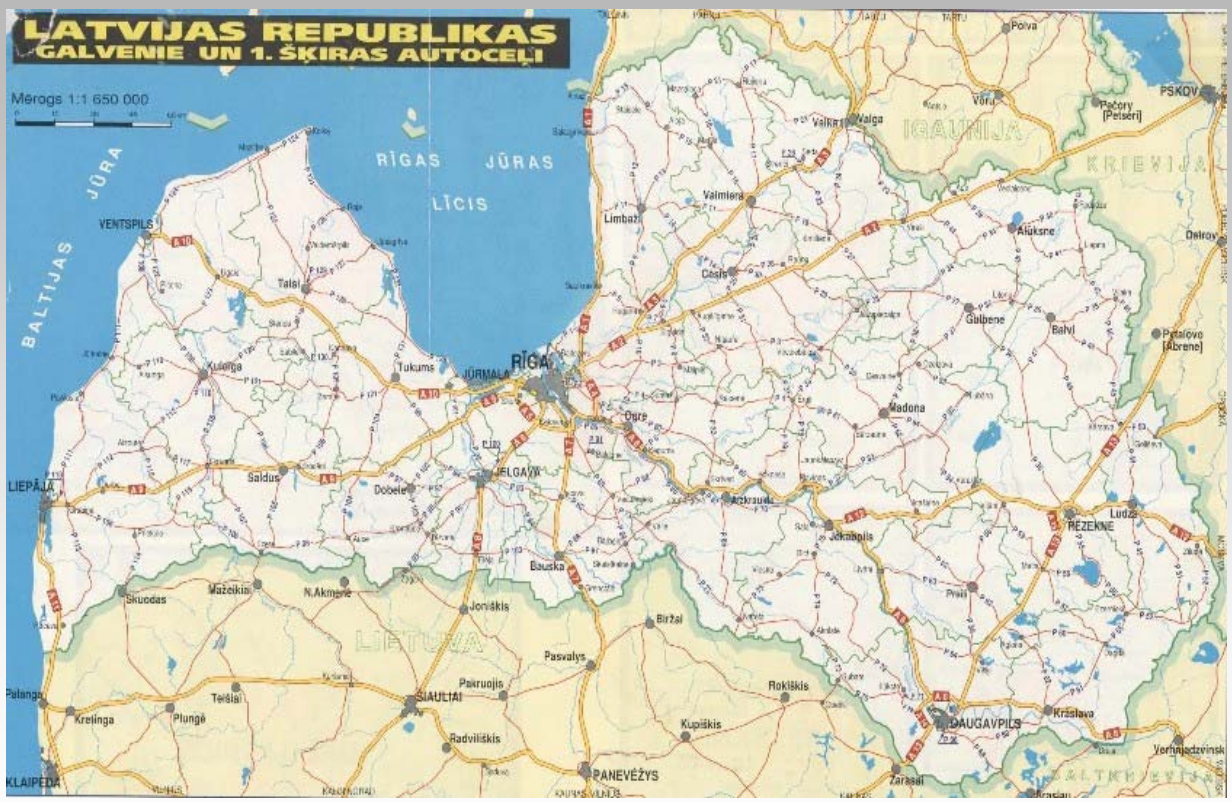
Actions

Traffic safety methods

Evaluation of road traffic safety level may be done using several methods

- ACCIDENT FREQUENCY
- ACCIDENT RATE

State road network



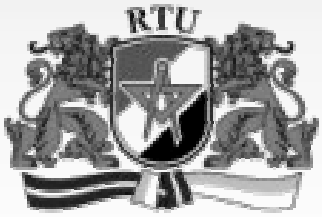
accident frequency $$AF = \frac{Acc}{L \times T}$$

AF – accident frequency (accident/km);

Acc - number of road traffic accidents per 3 years;

L – length of analysed road section - 1 km;

T – reviewed time period - 3 years

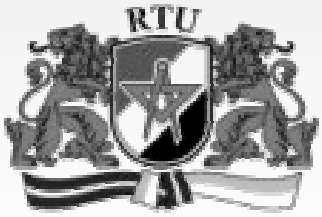


average frequency of accidents $$AF_{ave} = \frac{\sum_{i=1}^{n} AF_i}{n}$$

AFi – total number of accident frequency in specific section (accidents per km);

n – number of sections in general group;

AFave – average frequency of accidents (accidents per km)

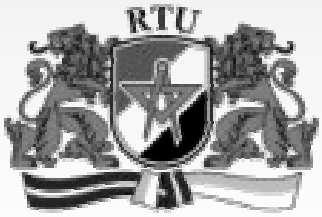


the dangerous accident frequency

$$AF_{\lim} = 2 \times AF_{ave}$$

After determining the accident frequency AF for all sections it is compared with the accident frequency limit value AF_{lim}

With this approach the most dangerous road sections according to accident frequency are determined



accident rate

$$AR = \frac{Acc \times 10^6}{365 \times L \times T \times N}$$

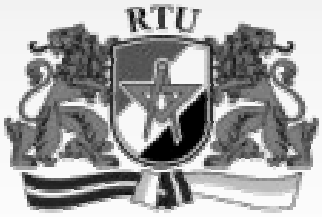
AR – accident rate (accidents per million vehicle kilometres);

Acc - number of road accidents per 3 years;

L – length of reviewed section - 1 km;

T – reviewed time period - 3 years;

N – annual average daily traffic, vehicles per 24h.



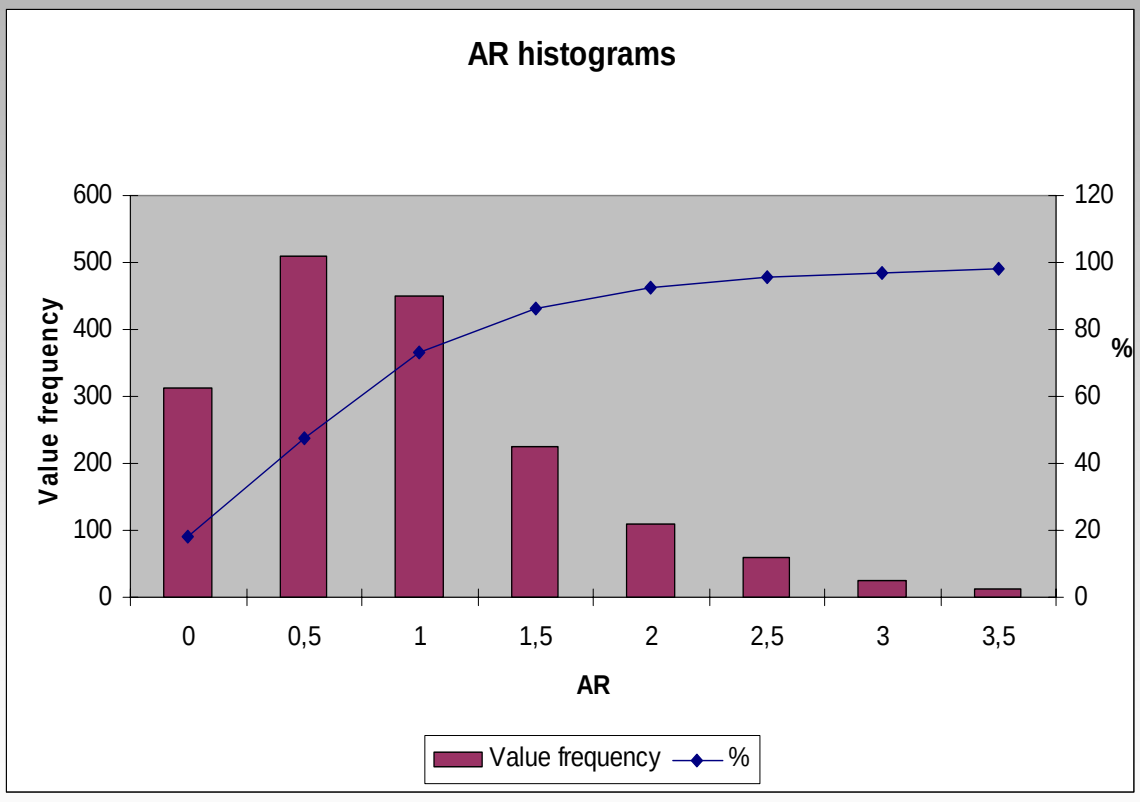
$$AR_{crit} = AR_{ave} + \frac{1 \times 10^6}{730.5 \times T \times L \times N} + K\sqrt{\frac{AR_{ave} \times 10^6}{365.25 \times T \times L \times N}}$$

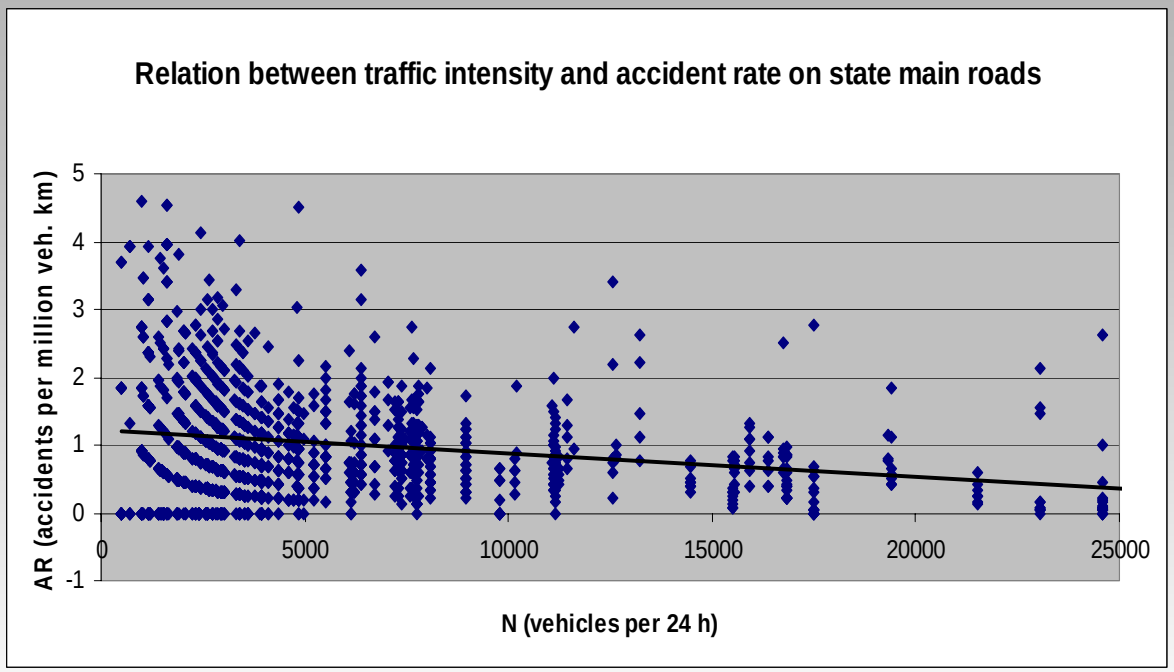
AR_{crit} – critical value of accident rate (accidents per 106 vehicle km);
AR_{ave} – average value of accident rate in specific road network (accidents per 106 vehicle km);
L – length of reviewed section - 1 km;
T – reviewed time period - 3 years;
N - annual average daily traffic– 5305 vehicles per 24h for the state main roads;
K – statistical constant (with 95% reliability level)

If this value is exceeded it may be stated that the analysed road section is ***dangerous to traffic***

Accident frequency and accident rate on main state roads

Time period 2005 - 2007						
Road No.	**Acc.**	**Heavy acc.**	**Fatalities**	**Injured**	**AF_{ave}**	**AR_{ave}**
A1	630	123	28	175	2.04	1.05
A2	937	192	46	276	1.58	0.98
A3	475	100	20	142	1.28	0.94
A4	380	82	15	140	5.74	1.56
A5	460	75	23	106	3.62	1.05
A6	1563	328	69	461	1.69	0.86
A7	590	141	30	199	2.26	0.62
A8	505	132	40	138	2.16	0.73
A9	926	203	49	294	1.54	0.99
A10	997	211	33	313	1.75	0.71
A11	111	17	2	24	0.67	1.00
A12	747	103	27	127	1.48	1.96
A13	485	95	19	124	0.97	1.28
A14	33	6	2	5	0.65	1.10
A15	7	1	2	2	0.26	0.48
Total	**8846**	**1809**	**405**	**2526**	**Ave = 1.67**	**Ave = 1.03**
AF_{lim}					**3.34**	
AR_{crit}						**1.81**





AR = 1,23364655 - 0,00003516N

Practical use of accident rate and accident frequency –

State road A4

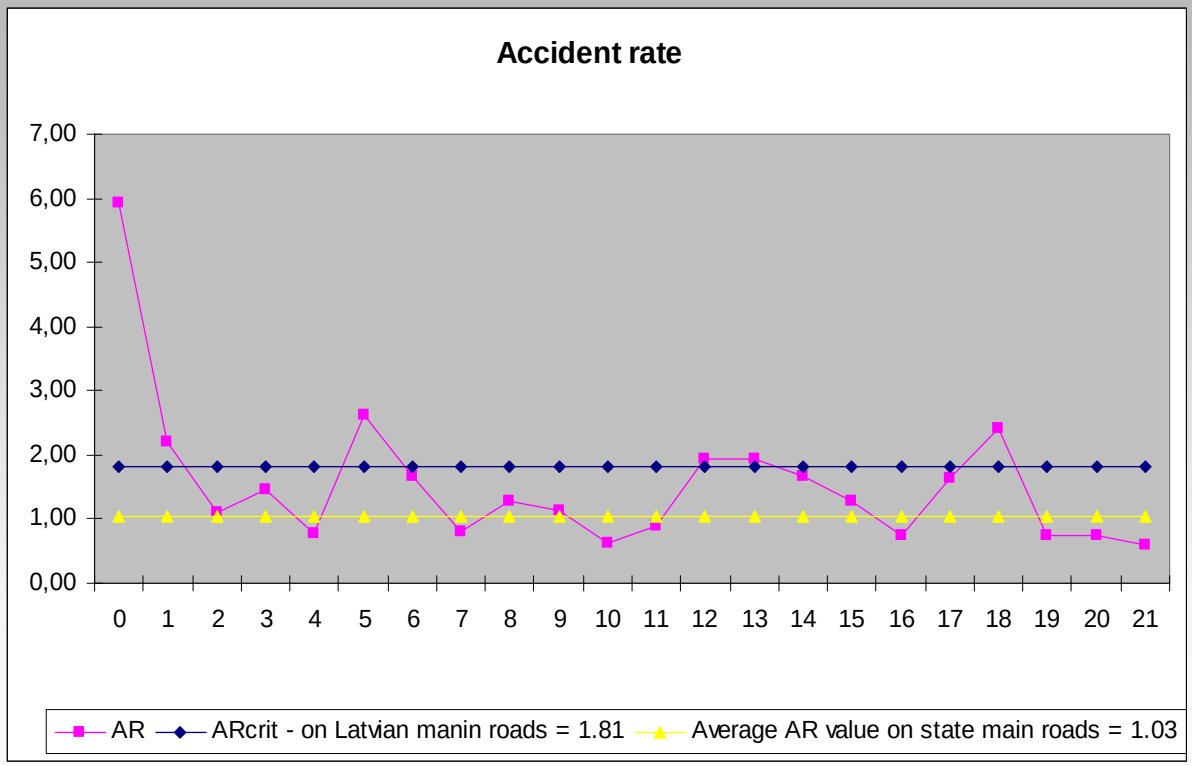
Analysis of road traffic accidents on A4

	Road km	Acc.	Heavy acc.	Fatalities	Injured	AF	AR
	0	86	23	3	46	28.67	5.94
	1	32	6	0	10	10.67	2.21
	2	16	2	0	4	5.33	1.11
	3	21	4	1	4	7.00	1.45
	4	11	2	0	2	3.67	0.76
	5	38	8	1	11	12.67	2.63
	6	21	2	0	9	7.00	1.68
	7	10	2	1	4	3.33	0.80
	8	16	6	3	13	5.33	1.28
	9	14	4	0	9	4.67	1.12
	10	8	2	0	2	2.67	0.64
	11	7	1	0	1	2.33	0.90
	…	…	…	…	…	…	…
2005 - 2007	21	4	1	0	4	1.33	0.60
Total		**380**	**82**	**15**	**140**	**5.74**	**1.56**
AR_{lim}						*3.34*	
AF_{crit}							*1.81*

Analysis of road traffic accidents on A4

	Road km	Acc.	Heavy acc.	Fatalities	Injured	AF	AR
	0	86	23	3	46	**28.67**	**5.94**
	1	32	6	0	10	**10.67**	**2.21**
	2	16	2	0	4	**5.33**	1.11
	...	...	...	...	...	...	...
	12	15	3	0	6	**5.00**	**1.94**
	13	15	1	0	1	**5.00**	**1.94**
	14	13	0	0	0	**4.33**	1.68
	15	10	3	1	3	3.33	1.29
	16	5	3	1	2	1.67	0.75
	17	11	2	2	1	**3.67**	1.65
	18	16	4	2	4	5.33	**2.40**
	19	5	1	0	2	1.67	0.75
	20	5	2	0	2	1.67	0.75
2005 - 2007	21	4	1	0	4	1.33	0.60
Total		**380**	**82**	**15**	**140**	**5.74**	**1.56**
AR_{lim}						*3.34*	
AF_{crit}							*1.81*

Accident rate on A4



Conclusions

C...

The values of ARcrit and AFlim provide an opportunity to identify dangerous road sections.

Calculated values of accident rate and accident factor provide an opportunity to define priorities for the needs to reconstruct dangerous road sections in the state main road network of Latvia.

Thank you for attention
and drive with care