Computer simulation of traffic as a tool to facilitate decisions on the organization of traffic

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ABSTRACT

Paper presents an experiment using a specialized tool - traffic simulator.
The results of computer analysis of traffic have been presented as a very quick, easy and cheap method as base of making complex decisions in the process of organizing traffic.
For example, motion simulation for the planned reduction in traffic, resolved the dilemma at the local level, the theoretical analysis at this level is difficult for obvious reasons.

KEYWORDS: Traffic simulator, simulation systems and processes, transportation, transport policy

1. Introduction

In the process of decision making related to the organization of traffic is required math (scientific) justification of the solution. Most theoretical calculation in terms of bandwidth. While known for simple and repeatedly proven formulas for calculating the bandwidth traffic light at the intersection operation is the calculation of bandwidth for non-standard situations, or when there is free movement of vehicles, it is often impossible task. Local decision makers need to have simple and effective tools that give reliable results. Such a tool may be road traffic simulator.

Traffic simulator that is used to illustrate the results of the experiment described in the article was made by the author of the article and has been repeatedly used successfully as a tool for illustrating the operation of complex signaling street and as a tool to simulate traffic at intersections.

2. The boundary conditions adopted

2.1 Boundary values for the experiment:

- [E] contractual vehicles (passenger vehicle idealized)
- in the amount of 1,400 vehicles per hour [E / h] to ensure
- supersaturation of road traffic on one lane.
- buses in an amount of 5 (measurement 1) or 15 (measurement 2) buses per hour.
- road section with a length of 1200 m bus stop starting and ending at the intersection of entering graniczonej example, by signaling street (roundabout - traffic roundabout) bandwidth to 886 [E / h].
- bus stop in two variants, with the need to enter the bus bay, and without entering the bus bay.
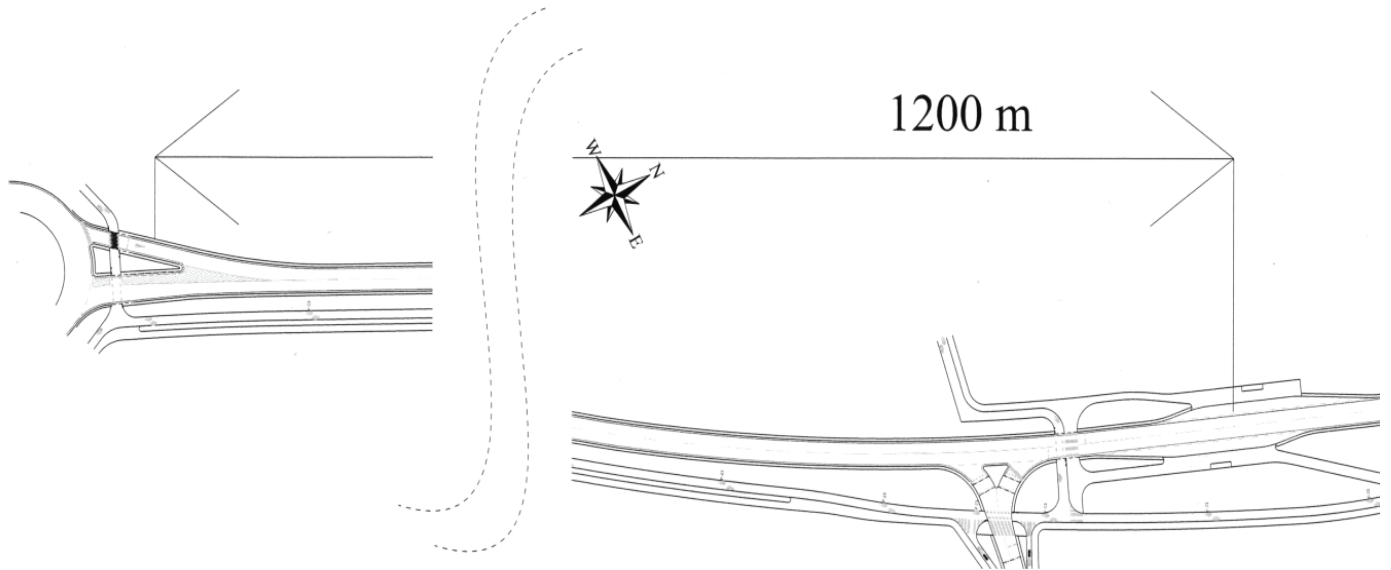- Number of measurement series - after 30 for each test case.
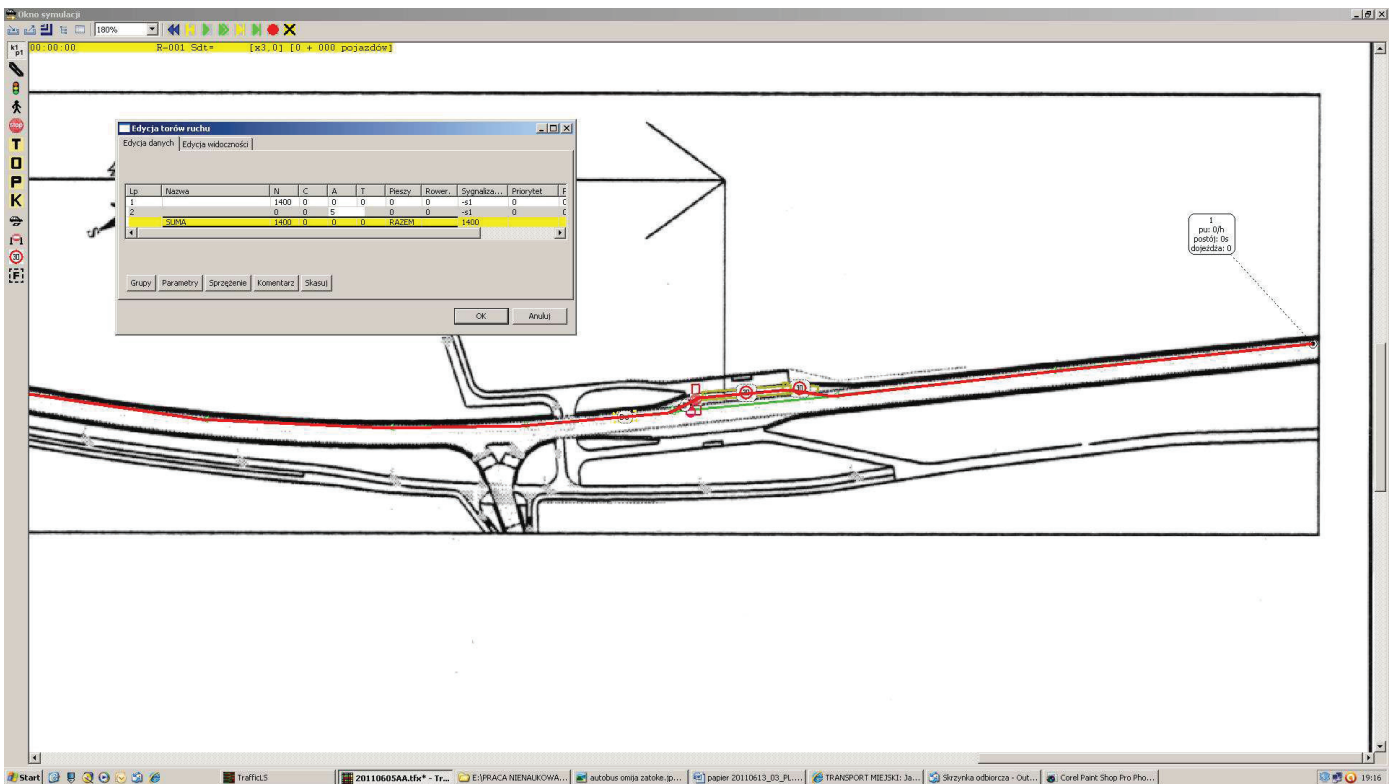
Fig.1. Simulation / base model

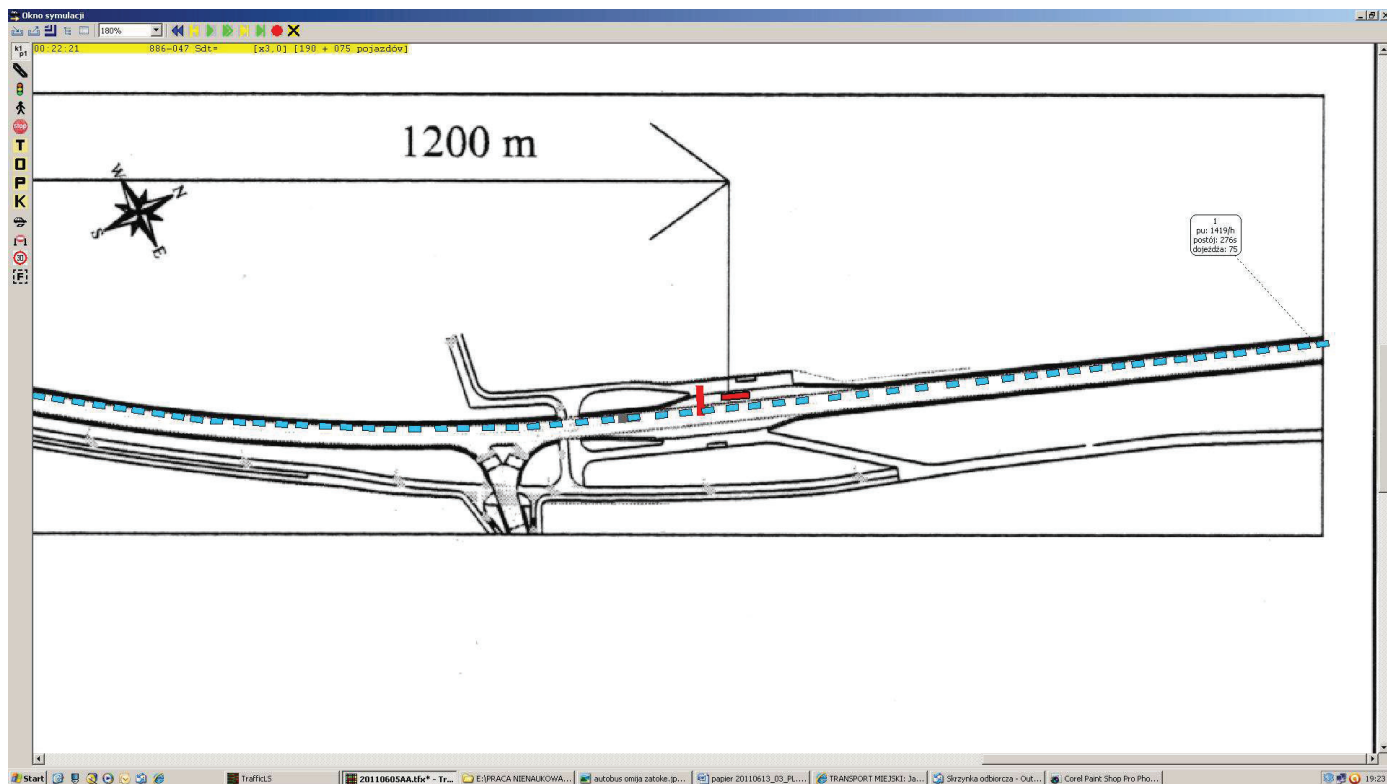**Fig. 2. Simulation - adopted the path of the bus**
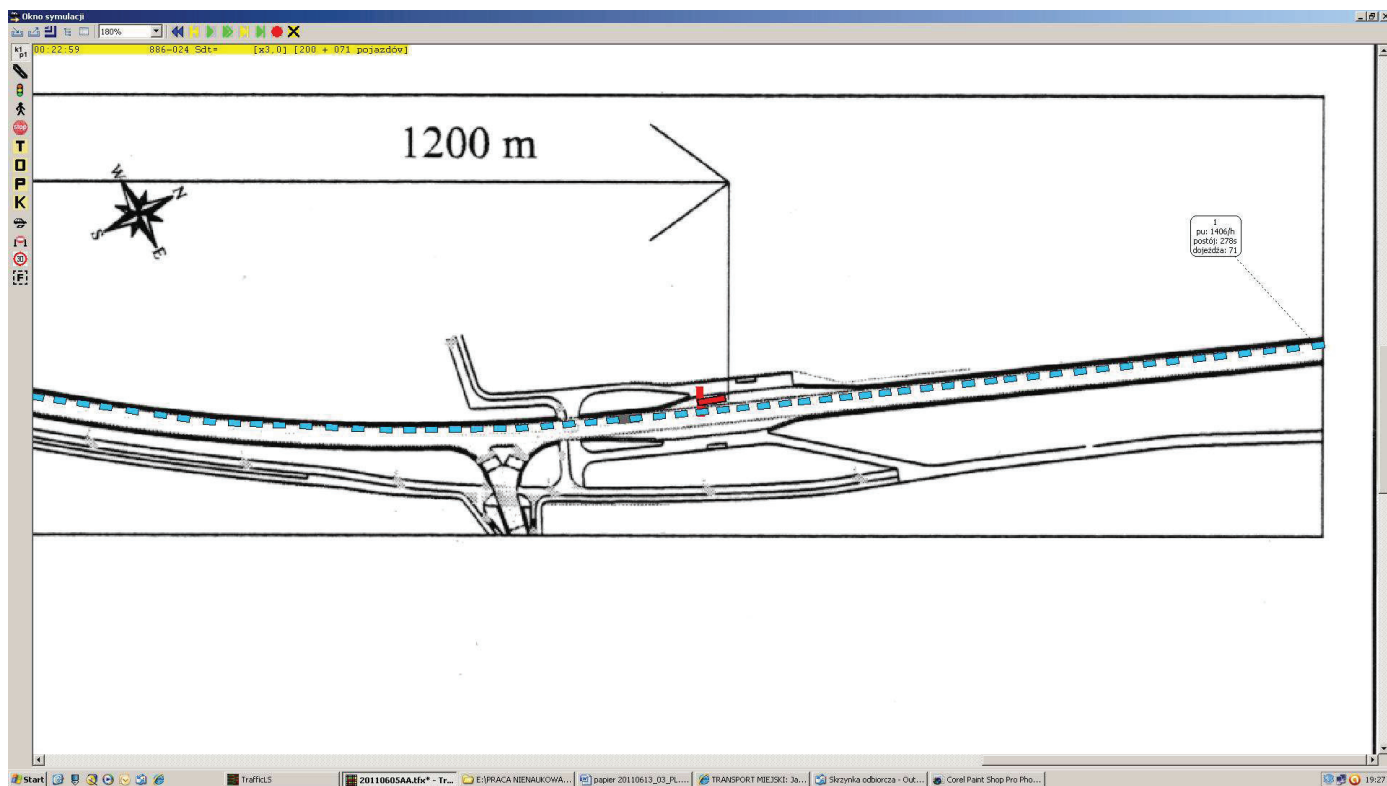
Fig.3. Phase 1 / bus on the bus bay.

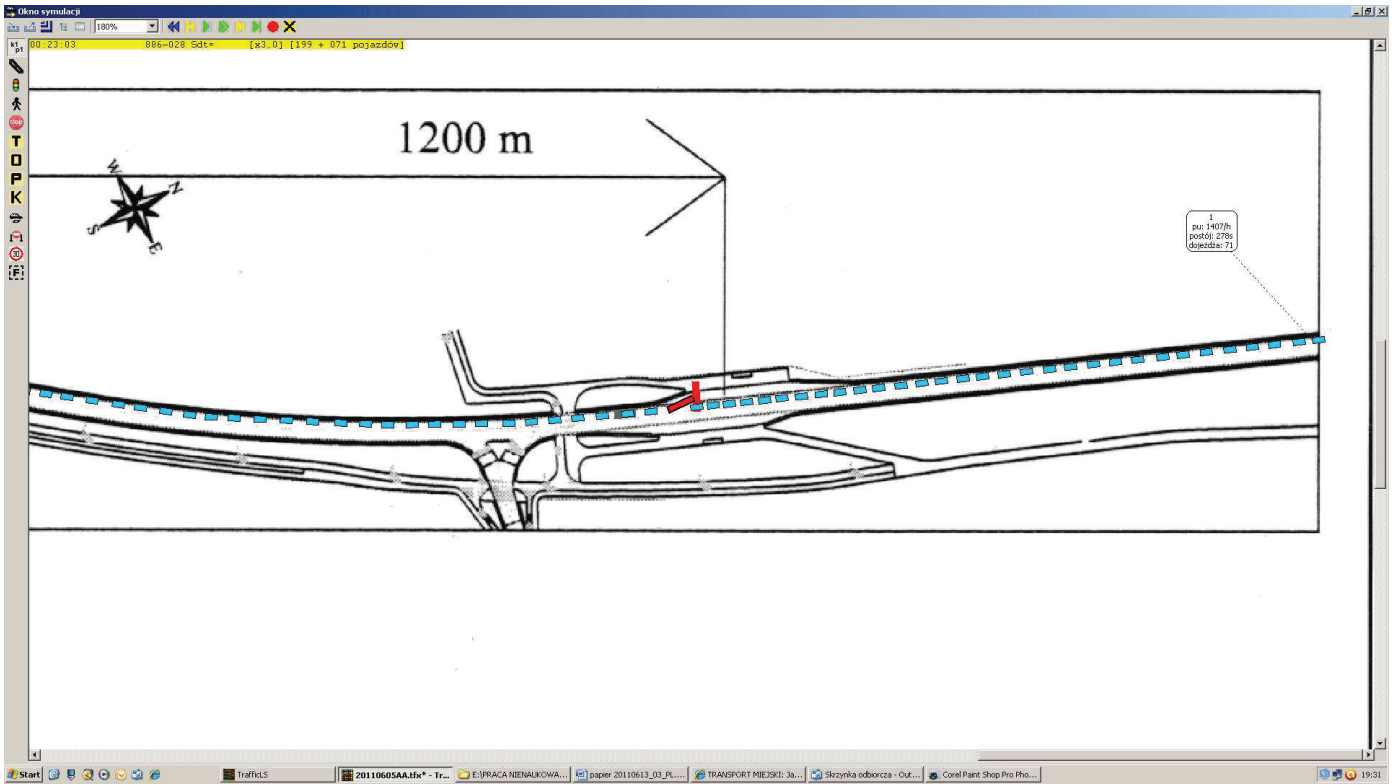**Fig.4. Phase 2/ bus start up from the bus bay.**

Fig.5. Phase 3 / bus wait for stop of the traffic chain.
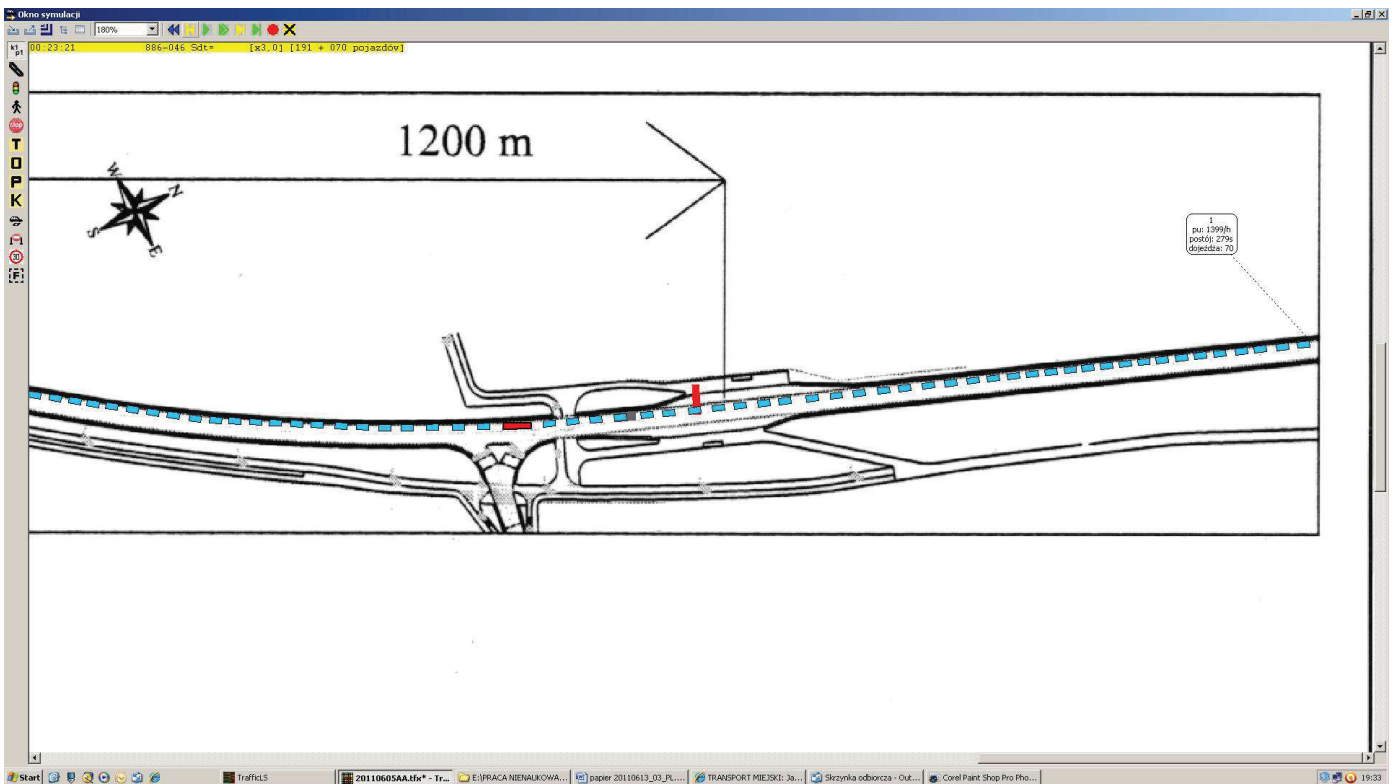

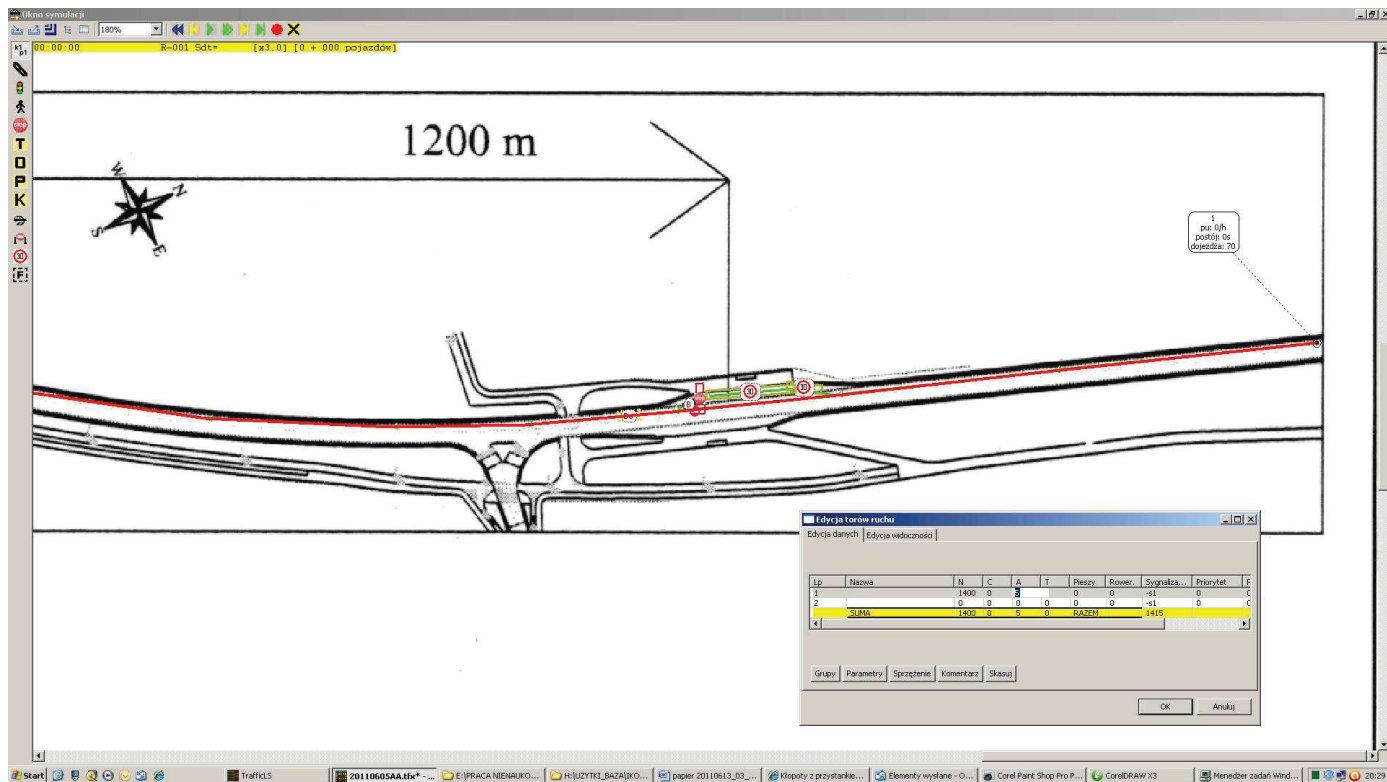**Fig.6. Phase 4 / bus in the traffic chain**

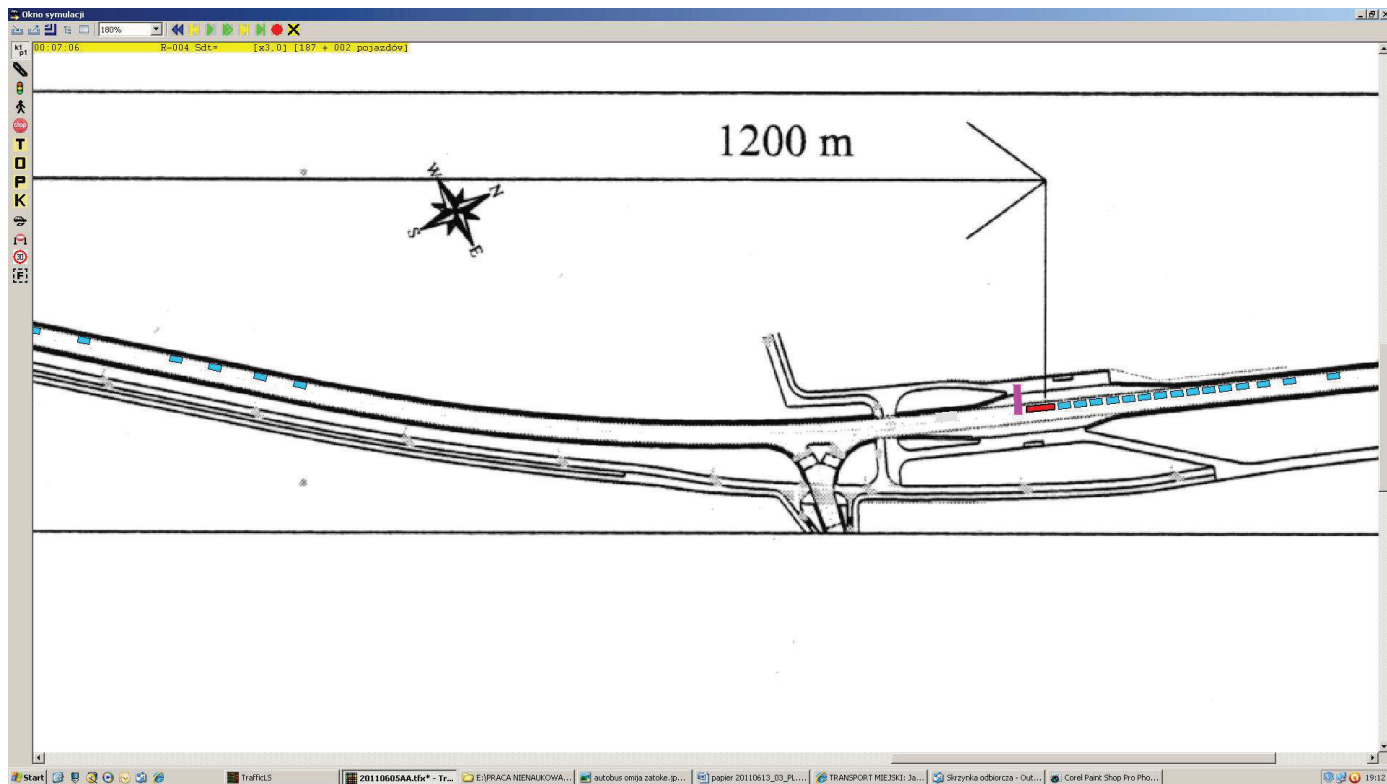**Fig.4. Simulation - adopted the path of the bus**

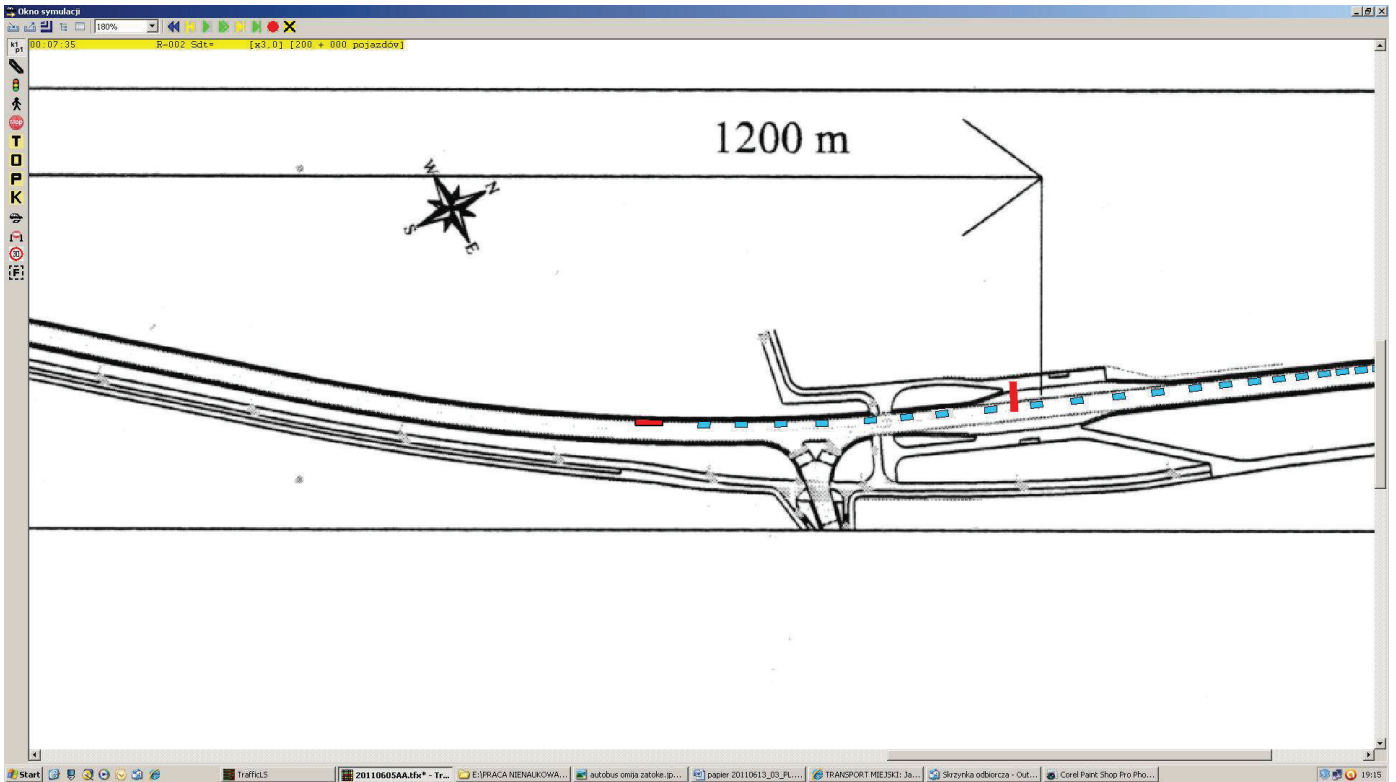**Fig.4. Phase 1 / bus on the bus stop with out bus bay.**

Fig.4. Phase 2/ bus start up from the bus stop.

One is a motion simulation to estimate the buses off the benefits of moving from the bay tour bus, loaded with traffic on the road beyond the limits of theoretical and practical capacity.

The results of computer analysis of traffic can be very fast, easy and cheap method when making complex decisions in the process of organizing traffic. For example, motion simulation for the planned reduction in traffic, resolved the dilemma at the local level, the theoretical analysis at this level is difficult for obvious reasons.

In several cases the results obtained from the traffic simulator was applied to the adoption of specific design solutions for complex atypical cases.

2.2 Description of the experiment and simulation

2.2.1 Tool

For the analysis the author used motor traffic simulator TrafficLS. This program has a built-traffic model based on stochastic theory. In this case it is important that traffic model used and whether other models of motion are "better" or "worse" because for all conducted experiments in the article uses one and the same traffic model and the

experiment was comparative in nature. So important was the quality of the experiment that every attempt was performed with identical initial data.

3. Description of result

3.1 Experiment results – interpretation

The experimental results clearly show a faster bus ride through the analyzed section of the road where buses do not leave the lane. Tests on the simulator in an unambiguous way to indicate this fact. Theoretical description of the results of the experiment beyond the scope of the article.

3.2 The legal aspect of the problem analyzed. Law, the Law on Road Traffic

Article 18
- 1. Driver, when approaching the bus stop marked (trolley) on the built-up area, is required to reduce speed, and if necessary stop to allow the driver bus (trolley bus), join the traffic, if the head of such a ve-

Table 1. Results of the experiment

n	Experiment name		travel time 1200 m [s]	difference $t_i - t_1$ [s] i=1..5	bus stop time tz [s]	facilitating the transit bus $tp = -(t_i - t_1 - tz)$ [s]
1	Control sample without stopping the buses	t1=	483,1	0	0	0
2	the buses not use the bay (5 buses per hour)	t2=	488,5	5,4	25	19,6
3	the buses not use the bay (15 buses per hour)	t3=	489,8	6,7	25	18,3
4	the buses use the bay (15 buses per hour)	t4=	522,3	39,2	25	-14,2
5	the buses use the bay (5 buses per hour)	t5=	528,1	45	25	-20

hicle direction indicator signals the intention to change lanes or to enter this in the bay on the road.

- 2. Control bus (trolley bus), referred to in paragraph. 1, may enter the adjacent lane or on the road only after having ascertained that it will not cause danger to road safety. ITS.

4. Conclusion

The article showed that decision-making process concerning the selection of solutions for traffic engineering tools can be used to simulate motion. Simulator as a result of comparative experiment clearly suggests that the proposed solutions should be used. Theoretical justification for this choice is no longer needed. Of course you can based on experiments carried out for synthetic theoretical models, but these proposals go beyond the subject of the article. To demonstrate the attractiveness of the method should be noted that the preparation and interpretation of the results of the experiment does not require a profound theoretical knowledge as the article confirms that the visualization experiment, the simulator can be made for decision or review of that decision by people who do not have expertise in calculating the bandwidth traffic.