

## SIIV - 5th International Congress - Sustainability of Road Infrastructures

### Traffic Conflict Techniques in Czech Republic

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#### Abstract

This paper presents the project KONFLIKT (“Methodology for monitoring and evaluation of traffic conflicts in the Czech Republic”) which aims develop a methodology of observation and evaluation of traffic conflicts and its application of traffic conflict techniques in Czech Republic.

In the beginning of project literature survey has been conducted and simultaneously first pilot observations were performed. Pilot observation was performed on two intersections in Brno and Ostrava. For monitoring there were described conflict severity and then were used two subjective methods: manual observation and video analysis. This paper shows basic results of the first phase of this project.

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*Keywords:* road safety, traffic conflict, conflict severity, pilot observation

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#### 1. Introduction

The traditional approach in road safety is monitoring quantitative and qualitative characteristics of traffic accidents on the road network, evaluating them, and appropriate measures, mostly building character. The whole process of solving accident sites is summarized in the Methodology to identify and manage places of frequent accidents, published by the Transport Research Centre in 2001. This traditional method has a high time and financial demand: a typical time traffic monitoring and evaluation of the security situation are 3 years.

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Monitoring of traffic conflicts in the Czech Republic is less traditional method of monitoring traffic. This is a monitoring and evaluation of conflict situations in real traffic. A well accepted definition of traffic conflict is “an observe situation which two or more road users approach each other in space and time to such an extent that there is a risk of collision if their movements remain unchanged”, in Kocourek [2]. The research is focused on traffic conflicts as an alternative to accident data. Conflicts occur far more frequently in traffic and can include the whole range of incidences where the actual accident is just at one end of the scale. Techniques range from subjective to the more objective where conflicts are rated by measurements such as time to collision or post encroachment time. The advantage of traffic conflict techniques is that it can detect problems before accidents occur alone. While monitoring and evaluation of accidents is in the order of years, the conflicts that are more numerous, are working in a matter of days or weeks. Monitoring of conflict is not only more efficient (time and money), but humane - safety of the site can be addressed before there are accidents, injuries, death and societal damage.

## **2. Traffic conflict techniques**

The method of traffic conflicts is in comparison with the traditional identification of safety from traffic accidents time and financial more efficient. But in Czech Republic there is not consistent methodology for monitoring of traffic conflicts yet. View of project KONFLIKT (“Methodology for monitoring and evaluation of traffic conflicts in the Czech Republic”) is to create a practical tool for assessing and addressing road safety in the Czech Republic.

On the project are working together Czech Technical University in Prague, Faculty of Transportation Sciences and Transport Research Centre. The task on project will take three years and will consist of several parts of research (key parts are literature search, pilot observation, and creation methodology for observation of traffic conflicts).

### *2.1 Literature search*

In the beginning of the project there was performed literature search. Traffic conflict techniques (TCT) are used more then 40 years in the world. In the literature search we came out of two quid from USA from Mr. Parker and Mr. Zegeer: [3 and 4]. The material originated from the research of traffic conflict in USA in year 1986 – 1988 and is focused on monitoring of traffic conflicts on the basic types of level crossings. There are established the basic criteria for selection of crossing for following the traffic conflict, for engineers it provide the basic back ground information and standard procedures which are needed to incorporate traffic conflict studies into daily routine practice. The guide contains step-by-step instructions for using traffic conflicts to analyze safety and operational problems at intersections. Included are guidelines for training observers, conducting the survey, analyzing conflict data and interpreting the results to make decisions and recommendations. Each procedure is supplemented with illustrative examples. Traffic conflict studies can be used to identify abnormal conflict situations, diagnose specific unsafe conditions, select corrective treatments, and evaluate the effectiveness of countermeasures without having to wait a long time for additional accidents to occur.

For monitoring it is important to appropriately train observes. Manual describes in detail how to train observes. Manual contains definitions of traffic conflicts which typically occur at intersections as well as step-by-step instructions for conducting the survey.

### *2.2 Conflict severity*

Most traffic conflict techniques (TCTs) categorize conflicts based on their severity (e.g. serious or non-serious). Some TCTs use subjective criteria to determine conflict severity.

For the TCTs purposes three levels of conflicts have been defined. For the complex analysis of the studied locality even so called level 0 and level 4 can be monitored. Thus there are 5 levels altogether, see Fig 1. We will describe the constituent levels of conflict severity now.

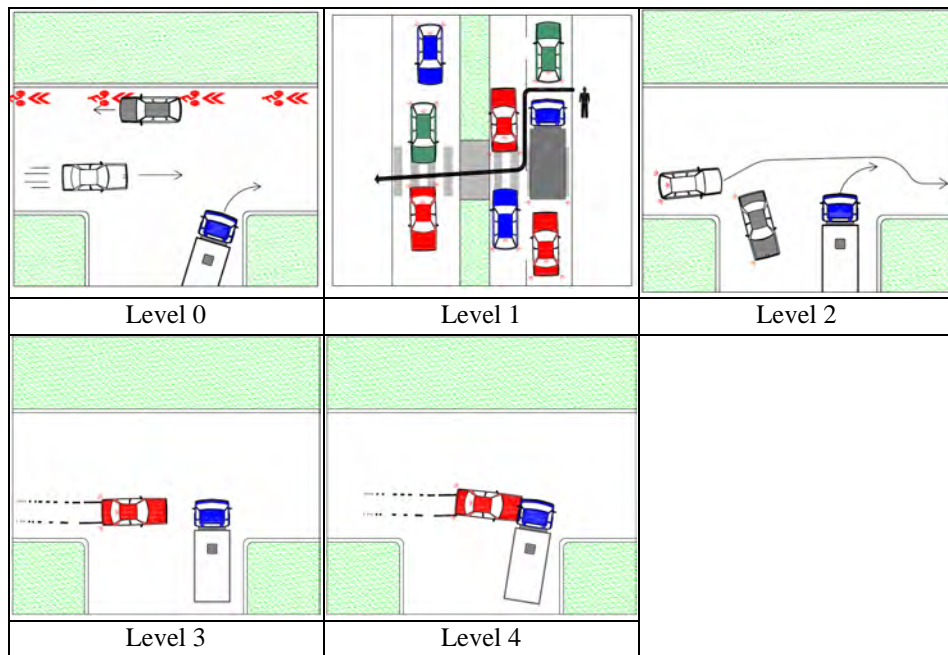


Fig 1. Example of traffic conflict severity, Kocourek [2]

The first level (level 0) is used for the record of mere breaking road traffic rules of the isolated vehicle. The level 1 is assigned to the controlled maneuver without any limitation or just with minor limitation. The difference between level 1 and level 2 is minor. In spite of that, it is necessary to realize, that in some specific situations (the example with pedestrians - see above) it is necessary to sort out this kind of conflict into less severe and more severe (level 2). The conflict level 3 is assigned to such situations, when the road users are threatened and sharp maneuver (loud breaking supplemented for example with beeping) is necessary to avert traffic accident. Level 4 is accident. Example of traffic conflict record is illustrated in Table 1.

Table 1 Example of traffic conflict record, Kocourek [2]

Traffic conflict record		O / B – 1	
		Problem creator / respond – conflict severity	
Comment:			
O	personal vehicle	B	bus
N	small largo vehicle	T	tramway
NT	long largo vehicle	Ch / C	pedestrian / cyclist

2.3 Traffic conflict summary – presentation

Once observations are completed, data must be reduced and summaries prepared. Results are presented either in summary tables or in traffic conflict diagrams (Figure 2). Summary tables allow comparisons of conflict rates between the site being analyzed and sites with similar characteristics, which is useful in detecting deviant patterns. The logic behind these analyses is similar to that of the accident pattern analysis. Traffic conflict diagrams are quite similar to the collision diagrams. They facilitate the identification of repetitive conflict patterns that are concentrated in some travel directions and intersection areas. As a result of traffic conflicts survey has been chosen simple relative index  $k_R$  .(1)

$$k_R = (P_{ks}/I) \times 100 \text{ [conflict situations /100 reduction vehicles]} \tag{1}$$

where:

$k_R$ : relative index

$P_{ks}$ : ... conflict situations per hour (only conflicts of levels 1 – 3)

I: ... traffic volume rv/h (reduction vehicle per hour)

Results in Figure 2 are from survey which was realized in Děčín (roundabout “Dělnická – Hankova – Ruská”) by students of the CTU FTS.

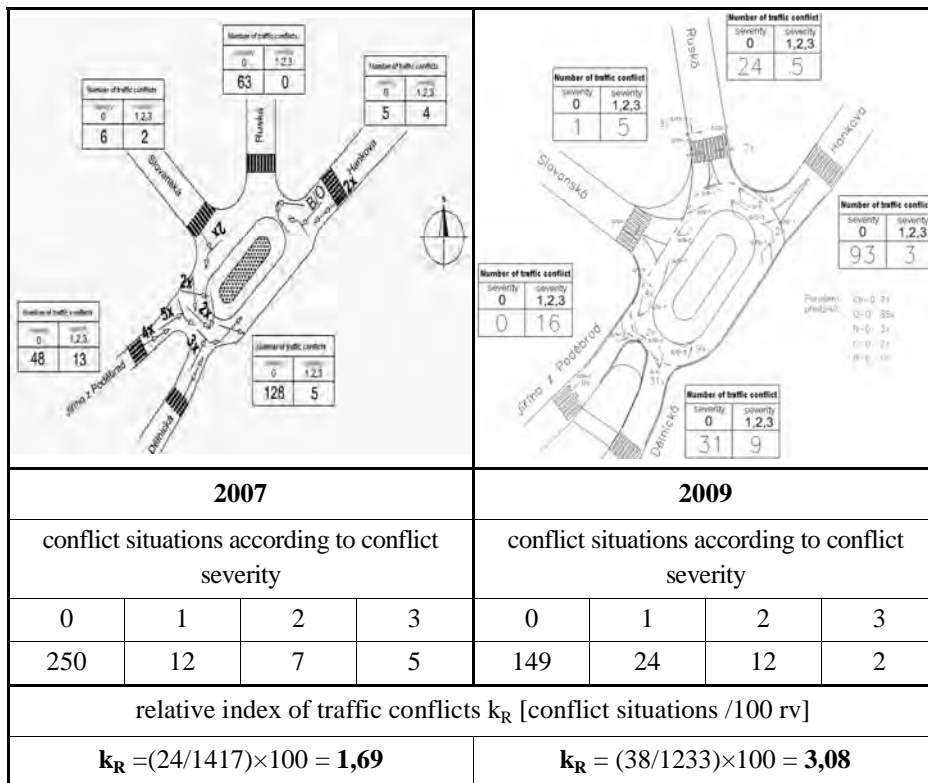


Fig 2. Traffic conflicts survey at the roundabout in Děčín, Kocourek [2]

### 3. Pilot observation of conflicts

For pilot observation was chosen two intersections. There were used for monitoring two subjective methods: manual observation and video analysis. Situation was monitored in place by both methods at the same time. The purpose was to compare both approaches and their advantages and disadvantages (calibration).

#### 3.1 Intersection in Brno

Pilot observation will be shown on one of the monitored intersections – at traffic light controlled intersection in Brno, see Fig 3 and 4. In this intersection there are all types of transport (individual and mass transport include tram, pedestrians, and cyclists). The observation conducted in peak hour by two independent teams of observers who used two methods (manual observation and video analysis). There was completed all the information on the traffic form heading to ensure that the location and observation conditions will be readily recognized in the future: municipality, intersection, approach, date, time, weather conditions and other comments.



Fig 3. Situation of monitored intersection [<http://mapy.cz/>]



Fig 4. Traffic at monitored intersection [photo author]

In both methods were observed most frequently traffic conflict by

- leaving intersection – opposing left-turn
- pedestrians crossing on red light
- lane – change conflict
- cyclists on pedestrian crossing.

Observation conclusions of both methods were slightly different in number of conflict and their conflict severity, but basic types of conflict were diagnosed equally.

#### 3.2 Conclusions of pilot observation

For pilot observation were chosen two intersections, in Brno and in Ostrava. Both intersections were followed with two subjective methods – manual observation and video analysis. Method comparison showed

- serious situation were ever registered
- slightly different were in number of conflict and their conflict severity

The using of both methods is applicable, main importance should be placed on training observes.

Results of pilot observation are presented in traffic conflict diagrams, see Fig 5 and 6. The color of the arrows indicates increasing conflict severity. Yellow indicates conflict level 1, green conflict level 2 and red conflict level 3.



#### 4. Conclusion

Project “KONFLIKT” is now in the first phase. Literature search was prepared and the results are appreciated. The pilot observation was held on two intersections.



Fig 5. Results of observation in Brno

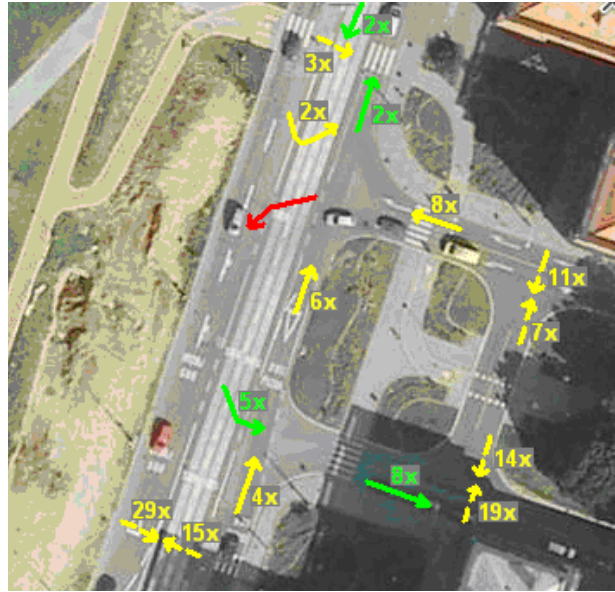


Fig 6. Results of observation in Ostrava

The main conclusions of pilot observation are consistent with recommendations of literature search

- serious situation while watching are ever registered
- for reliability observation is necessary thorough training of observes including validation observation.

In next phase of project there will continue further observation on various selected locations, more information about project are on <http://konflikt.cdvinfo.cz/>. Main aim of project “KONFLIKT” is to obtain sufficient documentation to create consistent methodology for monitoring of traffic conflicts in Czech Republic.

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