

## THE USAGE OF TRAFFIC CONFLICT TECHNIQUE ON THE SWEDISH NATIONAL ROAD NETWORK

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### 1. BACKGROUND

For the purpose of unvaryingly pointing out and analysing black-spots on roads, the Swedish National Road Administration (SNRA) developed a model for the work to be carried out on regional traffic safety at the end of the 70's. This model titled "The Regional Road Administration Work on Traffic Safety" was published in a report dated 1978 (1). The contents, in general, is as follows:

- methods for pointing out blackspots on a specific road network through systematically analysing accidents reported by the police
- methods for recognizing and obtaining information on locations considered dangerous from a traffic point of view, but where no accidents have been reported by the police
- methods for analysing these locations pointed out in order to find the measures suitable for attending to the problem
- methods for establishing priorities on the locations analysed with respect to the gain in traffic safety, the cost, etc.

Using the model, there are generally no difficulties in locating places with traffic safety problems.

The difficulties arise when making an analysis of the blackspots in order to find a suitable solution.

The number of accidents registered by the police in the Swedish national road network at the locations pointed out is often low. This makes it difficult to choose relevant measures for the improvement of traffic safety.

Another problem with small accident figures arises when setting priorities between several different objects. Priorities are given according to the estimated gain in traffic safety, directly dependant on the number of accidents which have accured and the assumed effect of the measures choosen.

In order to be able to deal with this problems it is often necessary to supplement the accident data with other data.

## 2. THE INTRODUCTION OF CONFLICT TECHNIQUE

For the SNRA the conflict technique developed at the Lund Institute of Technology was considered as an interesting and possible method in the future within the regional traffic safety work.

Before introducing the conflict technique at the SNRA there were two main problems to deal with.

Firstly, the conflict technique was developed primarily for studies in built-up-areas where the velocity is generally low (50 km/h). For the SNRA the main interest is to use the conflict technique in rural areas which is the predominant environment within the Swedish national road network.

Secondly, a training program was to be produced for the personnel within the 24 Regional Road Administrations (RRA) spread all over the country.

In 1978 the SNRA started a project at the Lund Institute of Technology for the purpose of adapting the already existent conflict technique to the usage in rural conditions.

The first stage of the project showed that the existing urban conflict technique was suitable for rural conditions as well, but with one, very important reservation. The fixed limit value used to judge the degree of seriousness of a conflict in urban areas, 1.5 seconds, had to be changed to a value depending on the velocity.

The figure at next page indicates how this limit value varies with the velocity and the distance to an estimated point of collision.

A more detailed description of the urban technique is given in reference (2).

Moreover, it can be mentioned that the relation between conflicts and accidents indicated in the urban technique was not generally considered to be representative of the national road network as a whole.

The second stage in the project was to produce a training program for personnel at the Regional Road Administrations.

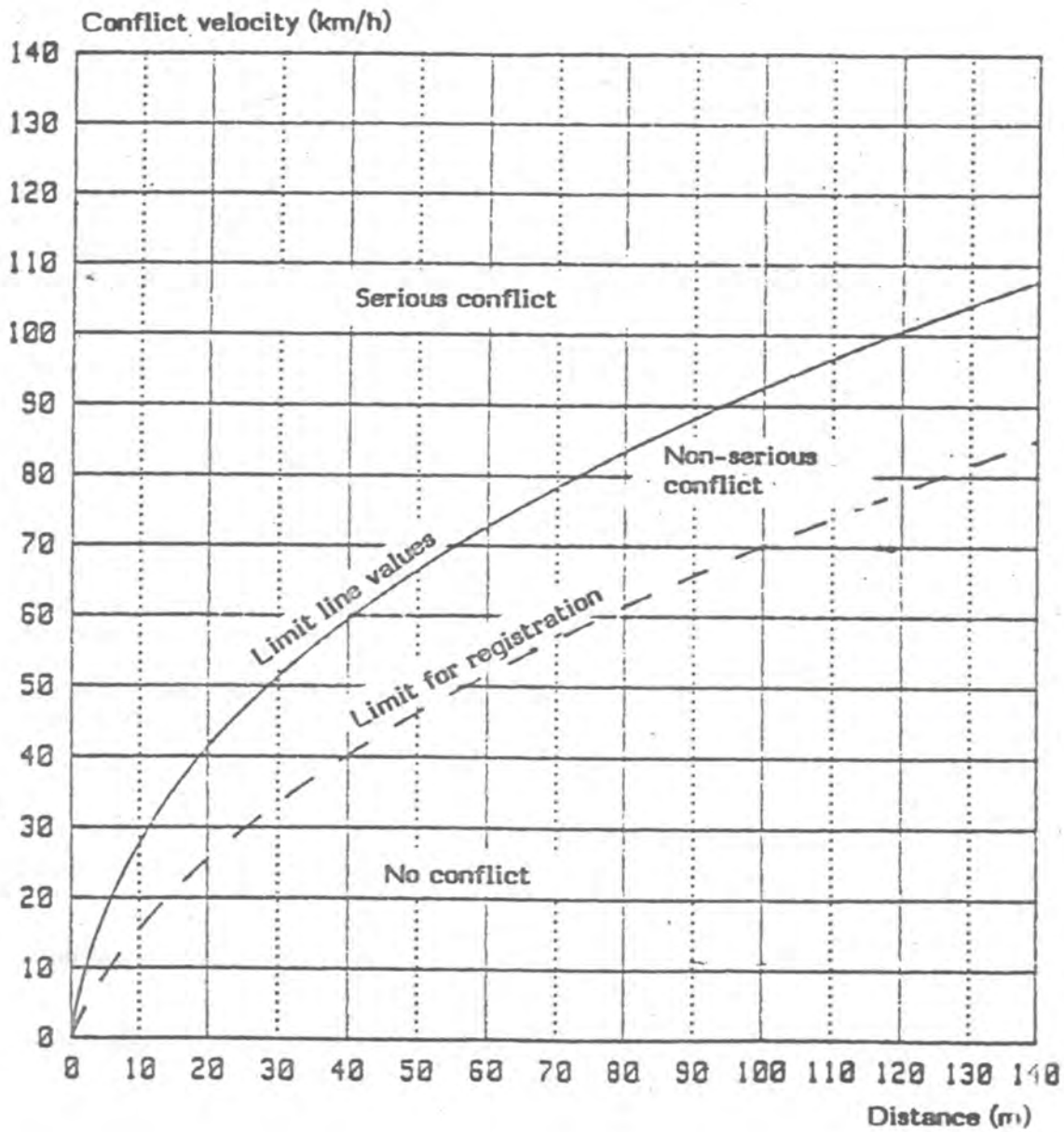
An instruction manual in conflict studies was drawn up based on the experiences gained from completed courses, performed conflict studies, etc, at the Lund Institute of Technology.

In 1982 a summing-up of the project was presented in a report (3).

During 1982 some thirty representatives of the Regional Road Administrations were trained in the conflict technique for one week. The education included both theory and field studies.

The education was followed up by an inquiry to each participant. One question asked was if the participants thought that they should carry out conflict studies in 1983. They all answered yes.

THE LIMIT VALUE BETWEEN SERIOUS AND NON-SERIOUS CONFLICTS AND ITS VARIATION WITH THE VELOCITY AND THE DISTANCE TO AN ESTIMATED POINT OF COLLISION



All situations above the broken line are to be registered.



### 3. THE PRESENT SITUATION

So far only about ten conflict studies have been carried out within the 24 regional organizations.

The question we have to ask is, "Why have only a few studies been carried out during the last three years?"

The Head Office of the SNRA has not made any stipulations as to the usage of the traffic conflict technique. Each Regional Road Administration can independently make its own decision from case to case.

Any lack of education or other help can hardly be the reason.

In addition to the education, advisory consultation both from the Head Office of the SNRA and from the Lund Institute of Technology has been possible. The instruction manual and a film containing information and exercises on the conflict technique are other aids to make studies easier.

Different inquiries to the personnel working with the traffic safety model have shown that the technique of today has too great of a demand on resources.

At an average intersection on the Swedish rural network the daily incoming traffic is about 5000 vehicles, of which 5-10% are from the secondary roads.

When planning conflict studies for the basis of selecting a precaution, the manual gives a value of 10-20 serious conflicts. This is equivalent to an observation time of at least 80 hours with at least 2 men, i.e. at least 160 man hours at an average intersection. Personnel that are qualified for such assignments at the respective Regional Road Administrations have numerous different tasks which is why it is very difficult to allot time for such extensive studies. Furthermore, the financial resources for traffic safety work are inadequate in order to use consultants to any greater extent.

### 4. THE FUTURE

After a reorganization of the SNRA this year the significance of the traffic safety work has increased.

Consequently, it can be taken for granted that the traffic conflict technique will be a factor in the work on traffic safety within the SNRA in the future.

There are, however, three main problems to solve before the technique more continuously can be used within the traffic safety work at the SNRA

1. The technique must be developed in order to suit the demands of the SNRA i.e. adaption to studies in parts of the country with low traffic volume
2. Studies concerning the relationship between conflicts and accidents
3. The organization of the work for conflict studies

As mentioned earlier, the present technique is very demanding on the resources pertaining to the studies on the Swedish Rural Network. One study could often extend over several weeks. One way to solve this problem could be some type of automatic registration of conflicts by means of a computer. By working with video recordings with the help of a computer or data from detectors in the road, a certain portion of the assessment which is today done manually by an observer, could be replaced. The best way would be to let the computer work with certain calculations referring to conflicting traffic and make its own decisions when video recording so that only potential conflict situations are recorded. Later the observer could assess and analyse the incidents directly from the video film.

The amount of time used for studies at places where there is little traffic could thereby be considerably reduced making the use of the conflict technique less expensive and reducing the number of personnel needed which in turn would make the technique more attractive to use.

As a conclusive goal one can speculate about a fully automatic registration and analysis instrument that achieves the analysing an observer does today.

To show what benefits different traffic safety precautions offer, the SNRA uses financial estimate tables. The advantages or benefits are expressed as a value of expected accident reduction in comparison to the invested capital for a certain precaution.

Depending on, among other things, the few studies that have been carried out in a rural environment today, the connection between conflicts and accidents is missing. The validness of the technique referring to conflicts - accidents will, however, probably be very expensive. Earlier estimates reach the million mark.

Still this knowledge can gradually be increased by more general use of the conflict technique and experience gained from it.

The situation today is that the Regional Road Administrations will hardly carry out any studies on their own. The knowledge that has already been gained often has not been maintained by regular studies. Furthermore, newly-employed personnel have not been educated with this knowledge.

There are two alternatives for the continued work on conflict studies.

- a) Carry out a new period of education for newly-employed personnel and refresher courses for those who completed the education offered in 1982.
- b) Relieve the RRA's work burden and instead form a central group at the head office to carry out conflict studies commissioned by the RRA.

Experience shows that despite a first-rate education in conflict technique, it has not been used regularly within the RRA. Therefore knowledge has worsened and refresher courses are now needed at many RRAs before studies can be carried out.

Since additional resources - personnel and/or financial - will probably not be granted to the RRA despite revised education, the conflict studies are not likely to be carried out to any great extent.

Instead, the possibility of organizing a group centrally is being discussed within the head office. The group would consist of a number of qualified conflict observers which would carry out studies commissioned by the RRA and work in co-operation with them. The group would primarily carry out field studies but would also help with a portion of the analysis if so desired.

By means of a central group, uniform assessment could be achieved regardless of where in Sweden. This gives a more homogenous and reliable material for, among other things, to find the validity of the technique as well as the evaluation of the precaution/effect connection. Still another advantage with a central group is that the financial resources for technical equipment can be concentrated to the group instead of spreading it over 24 Regional Road Administrations. The chances for a faster development of the technical equipment is thereby increased.

## 5. CONCLUSIONS

In summary, the following conclusions can be drawn on the usage of the traffic conflict technique in the SNRA traffic safety work

- We consider it essential that the conflict technique will be used within the traffic safety work in the rural network as a complement to the accident data.
- The carrying out of studies should be performed by a central group at the head office in co-operation with the respective RRAs.
- The technique must continue to be developed so fewer resources are used for studies at places with little traffic volume.
- The connection between conflicts and accidents in rural conditions must be more carefully researched.

## REFERENCES

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## ABSTRACT

In the late 1970's the Swedish National Road Administration (SNRA) developed a traffic safety work model for their regional organization. The model shows, based on reported accidents from the police, places with high accident risks i.e. black spots.

This paper describes the work on introducing the traffic conflict technique, developed at the Lund Institute of Technology, to the Regional Road Administrations (RRA).

One part of the traffic safety work recommends that conflict studies should be carried out with the intention to get a better decisionground for taking measures.

In the early 1980's the staff in all 24 regional road administrations was educated in the traffic conflict technique. The education lasted one week and 6-8 persons took part each time.

The SNRA has not made any stipulations as to the usage of the traffic conflict technique. Each regional road administration can independently make its own decision from case to case as to the performance of a prospective conflict study.

Until today there have been only about 10 conflict studies carried out at the regional road administrations. The reasons why so few studies have been carried out are that the technique of today demands a lot of resources and that you lose the knowledge of the technique since it's not used regularly.

After a reorganization of the SNRA this year the significance of the traffic safety work has increased. The question about where to place the conflict technique within the traffic safety work is being discussed over again.

Three main problems must be solved before the technique continuously can be used.

- 1) The technique must be developed in order to suit the demands of the SNRA so it can be used in parts of the country with low traffic volume.
- 2) The relationship between conflicts and accidents.
- 3) The organisation of the work for conflict studies.