ROAD ACCIDENT INVESTIGATION GUIDELINE for ROAD ENGINEERS

Prof. Dr. Péter HOLLÓ

Institute for Transport Sciences (KTI)
Széchenyi István University
hollo@kti.hu

PART B
(chapters 5-8)

AUTHORS STATEMENT

RAI guideline has been prepared by PIARC TC- 3.1 "Road Safety", within the frame of activity WG1 "Making cost – effective road safety investment".

The team consisted of:
Team Leader: Josef Mikulík, CDV
Deputy Team Leader: Péter Holló, KTI
Members: Sabine Degener, Tawandar W.M. Mdawarima, Krzystof Kowalski, Peter M.W.Elsenaar and others

Significant contribution was done by CDV team

The RAI guideline is based on findings compiled in the Road Safety Manual (PIARC, 2003)

CONTENT

CHAPTERS

1. DEFINITION
2. ROAD – SIGNIFICANT FACTOR IN SAFETY SYSTEM
3. ACCIDENT DATA
4. ACCIDENT LOCATION
5. **ACCIDENT DATA ASSESSMENT**
6. **TYPES OF ACCIDENTS**
7. **COLLISIONS DIAGRAMS**
8. **EVALUATION OF COLLISION DIAGRAMS**

Chapter 5: Accident Data Assessment

Accident data basically can be used in two ways:

1) To determine the common characteristics of accidents in order to elaborate the effective countermeasures.

2) To identify the locations, together with the traffic volume data, where the probability of accidents is significantly higher than the average (so-called black spots).

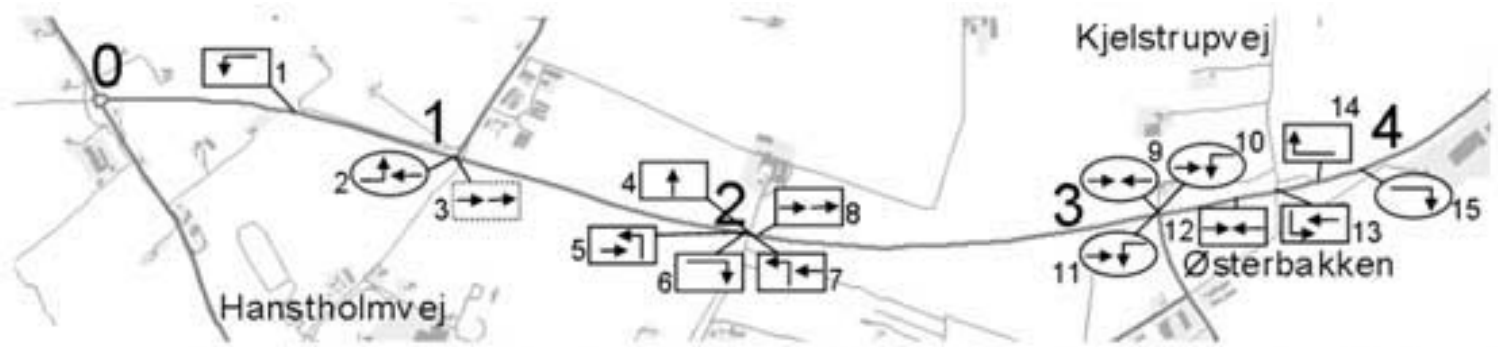
Chapter 5: Accident Data Assessment /2

In the first case, we have to produce very simple frequency tables, from which we can have an overview about the most frequent characteristics of road accidents.

Some very simple examples:

- If the number of night-time accidents is out-standingly high, it is very probable that the nighttime visibility is insufficient for the investigated location;
- If the number of accidents on wet road surface is outstandingly high, it is very probable that the skid resistance of the road surface is inappropriate at the investigated section, etc.

Chapter 5: Accident Data Assessment /3



No.	1		2	3		4	5	6	7	8		9	10	11	12	13	14	15
Year	03		03	03		02	03	04	04	04		02	02	04	02	03	03	03
Month	5		9	10		10	9	9	10	10		1	8	5	6	12	10	5
Day	7		1	5		6	2	1	3	1		4	5	5	7	6	6.	6
Hour	6		12	22		02	05	23	11	22		18	10	9	4	11	01	05
Type	012		410	198		031	660	032	650	140		241	410	410	241	660	011	023
Whether	Dry		Dry	Dry		Dry	Dry	Dry	Dry	Dry		Rain	Rain	Rain	Dry	Dry	Rain	Dry
Road	Dry		Dry	Dry		Dry	Dry	Dry	Dry	Dry		Wet	Wet	Wet	Dry	Wet	Wet	Wet
Light	L		L	D		D	D	D	L	D		D	L	L	L	L	L	D
Alcohol	Yes		Yes	Yes		Yes	-	Yes	-	-		-	-	-	-	-	-	-

…to identify local accident patterns that “drown” in the average for the whole road section (Source: Sørensen M., TØI, RIPCORD-ISEREST, WP6)

EXTENDED COLLISION DIAGRAM

Chapter 5: Accident Data Assessment /4

In the second case we need traffic volume data as well for the evaluation. For this purpose the most used accident rates are as follows:

- accident density (A_d):

$$A_d = \frac{A}{L.T}\left(\frac{accident}{kmyear}\right)$$

where:

L: the length of the investigated road section or road network (km)

A: the number of accidents occurred on the section or network with length “L”.

T: the number of years.

This rate is typically calculated yearly. In some countries so-called accident frequency maps are produced on the basis of the accident density in order to show the most dangerous parts of the network. The problem is that this rate does not take into account the traffic volume; therefore it has a high value in case of high traffic volume also.

Chapter 5: Accident Data Assessment /5

The other well-known relative number is the

- accident rate (A_r):

$$A_r = \frac{A.10^6}{365.AADT.L.T}\left(\frac{accident}{10^6\, vehiclekm}\right)$$

where:

AADT: annual average daily traffic (vehicle/day)

In most cases this rate is also calculated yearly.

From theoretical point of view this rate is the most accepted as a measure (the approach) of the accident risk. This rate is based on the concept, that there is a linear relationship between the number of accidents and the traffic volume.

Chapter 5: Accident Data Assessment /6

The PIARC Road Safety Manual gives a very good overview about the existing methods to identify the black spots. What is more, the Manual describes the advantages and disadvantages of the existing methods, it gives a very detailed comparison of them, and it helps the practical work of the road safety engineers with so-called calculators.

It is of a basic importance to differentiate between sections and intersections, like in case of the critical accident rate method.

Chapter 5: Accident Data Assessment /7

The PIARC Road Safety Manual deals with the accident prediction models too, it gives details, among others, about the empirical Bayesian method as well, which can be assessed as the best one from a methodological point of view. It takes into account the random nature of road accidents, and improves the accuracy of the estimated potential for improvement. Its only disadvantage is the relative complexity.

For developing countries, the application of more simple methods can be suggested. For developed countries, the usage of the best practice guidelines can be proposed, which will be elaborated in the framework of RIPCORD-ISEREST project in the near future.

Chapter 6: Type of Accidents

The type of accident is the collective noun used for the denomination of situations which occur repeatedly and lead to accident. The accident types are determined on the basis of the manoeuvre(s) being performed just before the accident. In the course of the definition of accident types we have to take into account the situation directly preceding the accident.

Chapter 6: Type of Accidents /2

It is important that we have to leave the cause of accident out of consideration. It should be only an additional piece of information. We have to concentrate clearly on the manoeuvre(s) of traffic participants (vehicles, pedestrians, etc.)

There are different accident type systems. The chapter describes detailed the Czech, the German systems and the system used in New Zealand as well.

Chapter 7: Collision diagrams

Collision diagrams are very simple and efficient tools for road accident analysis.

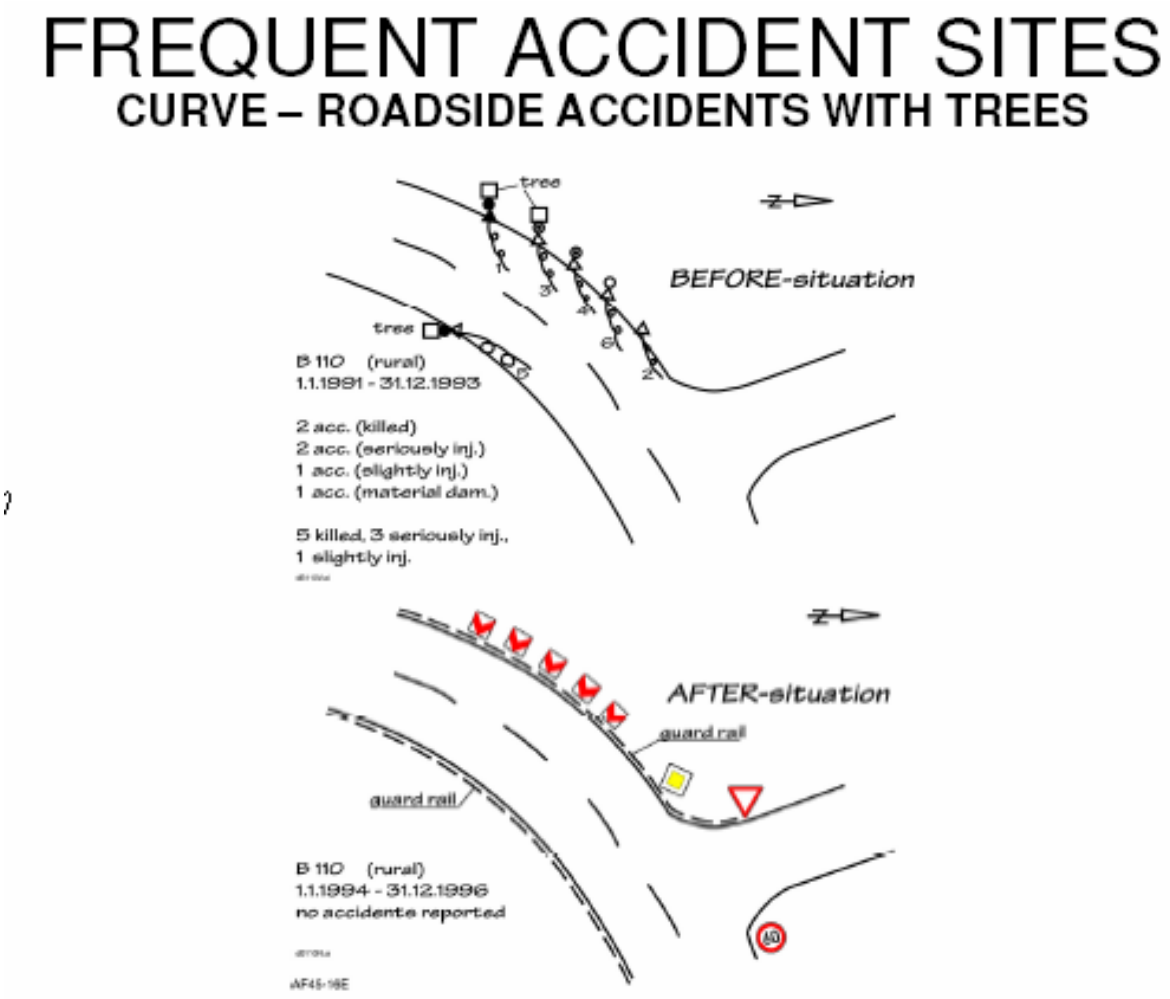
They allow to get an overview about the safety situation of the investigated part of the road network.

They make possible to find the most suitable countermeasures in a relatively easy way.

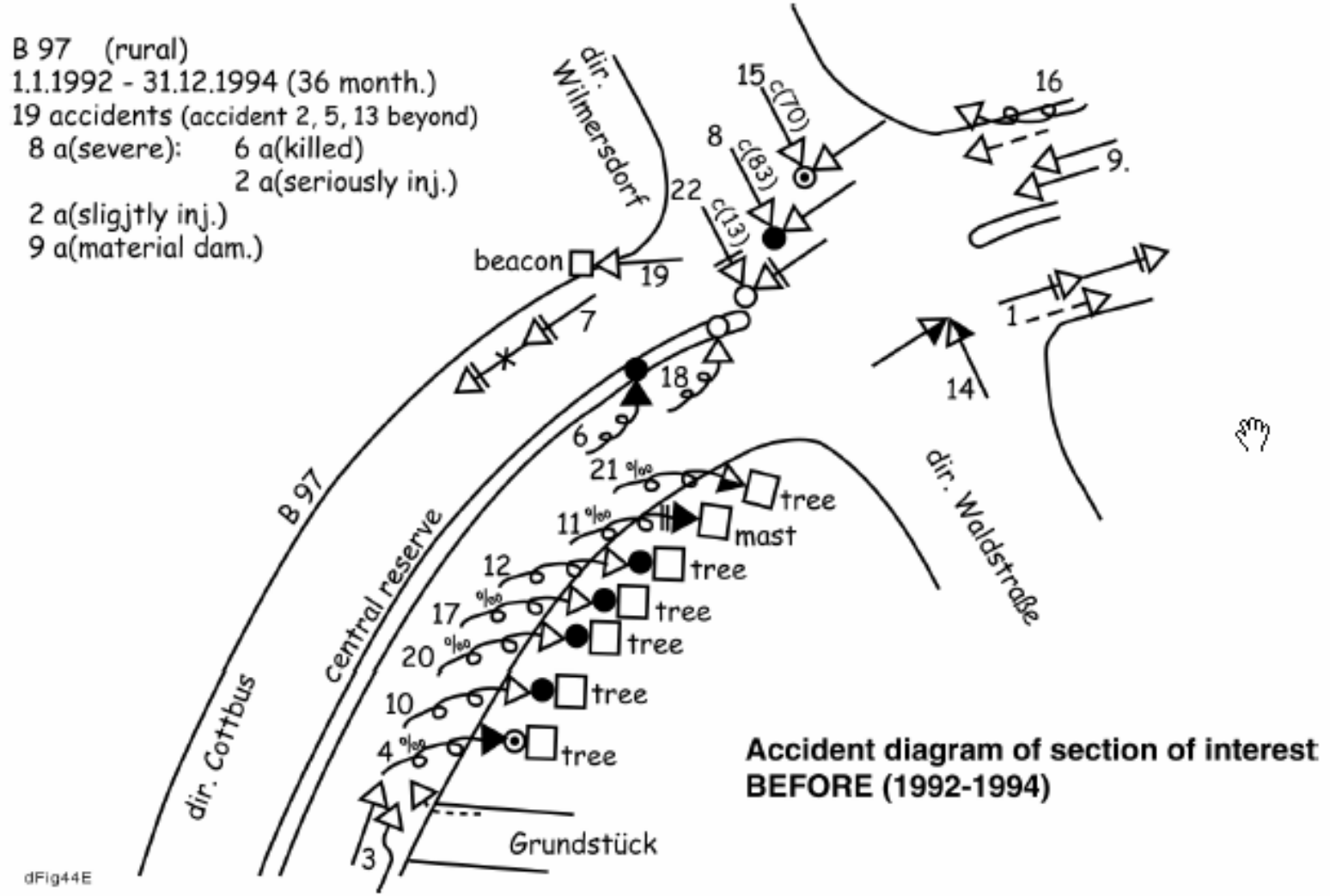
Chapter 7: Collision diagrams /2

FREQUENT ACCIDENT SITES

CURVE – ROADSIDE ACCIDENTS WITH TREES



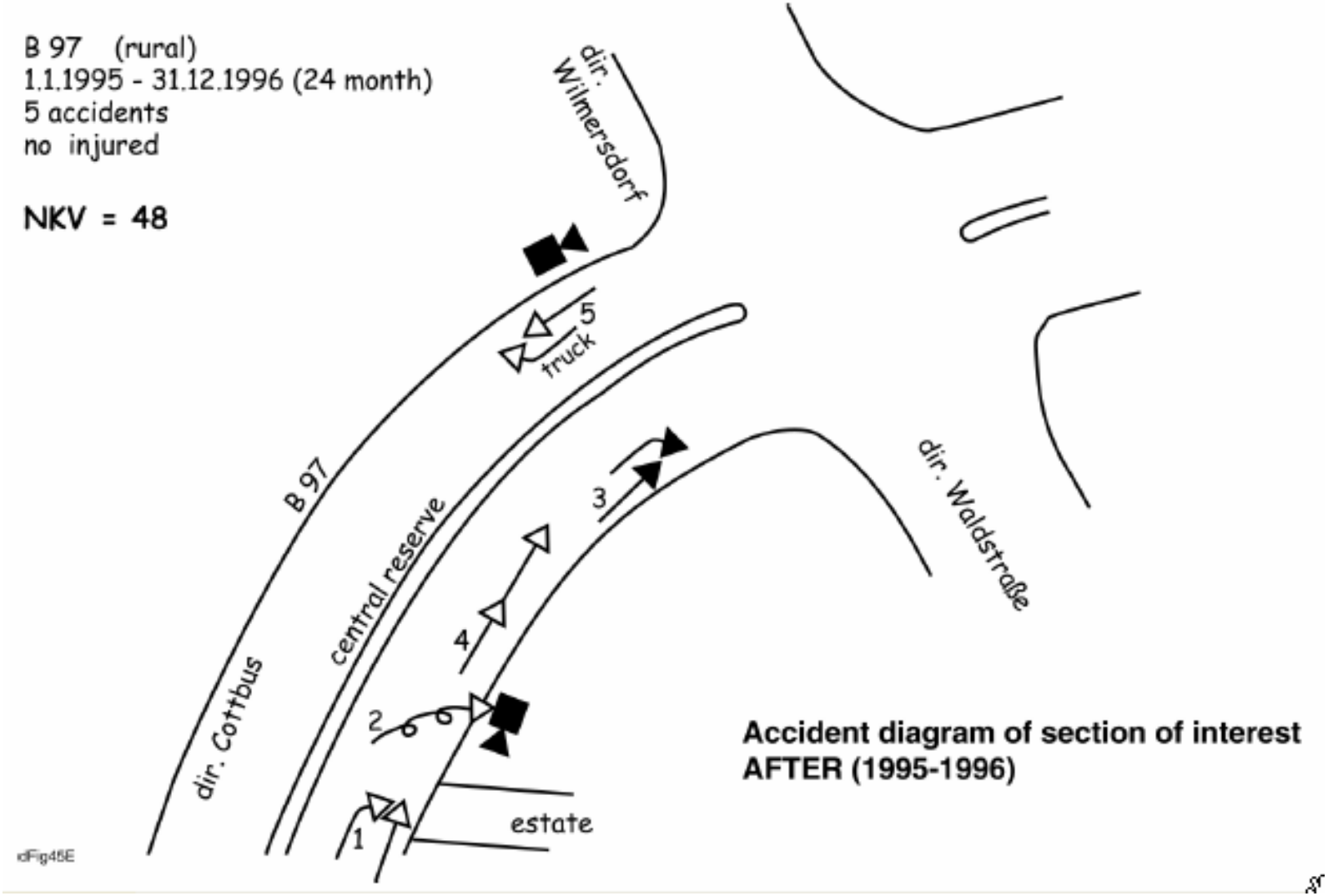
Chapter 8: Evaluation, Improvements



Accident diagram of section of interest BEFORE (1992-1994)

Source: Dipl-Ing. Sabine Degener, GDV, Berlin, Germany

Chapter 8: Evaluation, Improvements /2



Source: Dipl-Ing. Sabine Degener, GDV, Berlin, Germany

Chapter 8: Evaluation, Improvements /3

Section of interest with stationary speed monitoring (AFTER)

Source: Dipl-Ing. Sabine Degener, GDV, Berlin, Germany

Conclusions

The collection of the data of PDOs could be important if we are responsible for the safety of a part of the network. But we have to be careful with the usage of these data. At the same time we have to stress the importance of the right interpretation of the results of the analysis.

The types of accidents are of basic importance from the point of view of traffic engineering. Especially the knowledge of the traffic situation preceding directly the accident is outstandingly important for the elaboration of successful countermeasures. In order to be able to identify the most dangerous parts of the network, at least the data given in the guideline are necessary.

THANK YOU FOR YOUR ATTENTION

Péter HOLLÓ
email: hollo@kti.hu