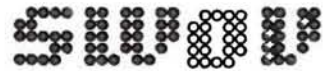


SWOV in 1978



INSTITUTE FOR ROAD SAFETY RESEARCH SWOV
P.O. BOX 71 2270 AB VOORBURG THE NETHERLANDS

Contents

The Institute	2
Foreword	3
Introduction	4
Recording traffic data	5
Road hazards as a side effect of the transportation system	6
Pedestrians, two-wheelers and road safety	7
National road safety congress 1978	11
Drinking and driving	15
Road safety in Noord-Brabant	18
Safety facilities in cars	19
Viaduct protection	20
Visibility of markings on wet roads	21
SWOV and the OECD	23
Published in 1978	25

The Institute

The Institute for Road Safety Research SWOV was founded in 1962. Its object is, on the basis of scientific research, to supply the authorities with data for measures aiming at promoting road safety. The information obtained from this scientific research is disseminated by SWOV, either as individual publications, or as articles in periodicals or via other communication media.

SWOV's Board of Governors consists of representatives of various Ministries, of industry and of leading social institutions. The Bureau is managed by E. Asmussen, Director.

Its departments include a.o.: Research Policy, Research Co-ordination, Research Services, Pre-crash Research, Crash and Post-crash Research, Methods and techniques and Information.

Foreword



*Th. J. Westerhout
Chairman Institute for Road Safety
Research SWOV*

In 1978, in addition to its official Annual Report for 1977, SWOV published for the first time a ready-reference review of its work, entitled 'SWOV in 1976 and 1977'. The many favourable responses have been an extra inducement to issue the review of 1978 presented herewith. SWOV's Board of Governors considers it one of their major tasks to spread the results of road safety research as widely as possible. SWOV is a subsidised institute using public funds and is therefore also accountable to the public. Scientific reports are often very complicated and difficult to refer to for people engaged in practical work on reducing traffic hazards. Consequently the practical value of the research results is not always recognised. This applies even more so to interested outsiders. 'SWOV in 1978' endeavours to meet these drawbacks by presenting a number of important results of SWOV's work briefly and with as little technical jargon as possible; this inevitably detracts somewhat from the completeness essential in scientific publications. Some scientific details have been omitted to make the information clearer and more readable. This is not a great drawback, however, because anyone requiring more detail about a particular project can always order the scientific publications from SWOV. A complete list of the reports and articles published in 1978 is given at the end of this brochure.

In order to spread SWOV's research results better still in future, a quarterly information bulletin will be published as from September 1979. This 'SWOV-schrift' will (for the time being) only be available in Dutch. It will give brief, concise information on SWOV's work.

Th. J. Westerhout
Chairman Institute for Road Safety
Research SWOV

Introduction



*E Asmussen
Director Institute for Road Safety
Research SWOV*

In 1978 there was a favourable trend in road safety in The Netherlands; compared with 1977, the number of fatalities fell by 11% to approximately 2,300, the lowest figure since 1964.

Although this is a hopeful development, there is no reason for rejoicing yet.

Firstly, traffic hazards are still one of the most serious threats to Dutch national health. For people aged between 15 and 25, injuries in road accidents are by far the biggest cause of death. Nearly half all deaths in this age group are caused by traffic accidents.

Secondly, it is questionable whether the decline in road-traffic hazards will continue in the next few years, since no conclusive explanation has yet been found for the 1978 drop. And as long as the causes of this are unknown, it is difficult to guide policy so as to ensure that the hazards can be controlled in the future. No explanation can be found because too few data about traffic is available.

A crucial aspect is the 'exposure' of the various categories of road users, i.e. the time they spend in traffic and the distance they cover. This situation is likely to improve, however, once data are available from the National Travel Survey begun by the Central Bureau of Statistics (CBS) in 1978. The first results are expected by the end of 1979. The project was prompted partly by the SWOV project

'Risk research regarding road users in The Netherlands' (ROVIN). The first phase of the ROVIN project examined whether it was possible to collect exposure data systematically in The Netherlands. Meanwhile the second phase is going ahead, with the collection of supplementary information to establish the various categories' risks on the basis of the CBS data.

The limited data now available nevertheless allow some striking developments to be noted in 1978. As compared with 1977, there was a decrease especially in the number of casualties in 'fast' traffic (cars, lorries, and motorbikes) outside built up areas. Inside these areas, the decrease related mainly to 'slow' traffic (mopeds, cycles, and pedestrians). The trend in the various age groups shows that the number of child deaths up to the age of 14 remained at the same level as in 1977 (about 300). This, in any case, makes it clear that children involved in road traffic need additional attention from research and policy-making bodies, since one of the authorities' major responsibilities is to safeguard the weaker members of society. Children occupy an important place in SWOV's research programme. Besides a number of projects dealing solely with child safety, children are also given special attention in the many 'slow' traffic projects.

Recording traffic data

For this brochure, a choice has been made of subjects on which reports, articles or other publications appeared in 1978. This of course presents only a very small fragment of SWOV's efforts to promote road safety, because no reports have yet been made on a large part of the current research projects. A full review of SWOV's activities is given in the official Jaarverslag 1978 (Annual Report for 1978, only available in Dutch).

E. Asmussen
Director Institute for Road Safety
Research SWOV

The Road Accident Recording Department (VOR) of the Ministry of Transport and Waterways was formed in 1975. It met one of SWOV's long cherished wishes. Up to then, SWOV's research had to be based on accident statistics recorded by the Central Bureau of Statistics (CBS). But these CBS records contained insufficient data to form a basis for reliable scientific research (and policy). The VOR falls under the Road Safety Directorate (DVV). The setting up of this department represented a considerable extension of national road accident records. But in order to explain and predict trends in road safety, and if necessary to adjust these by means of policy measures, much more information will be required. In addition to accident statistics, information is needed about the characteristics of road users, roads and vehicles, the kind of road usage, and so on. Much of the required data is already being collected at present, but by different bodies and for different purposes. The result is that the various data banks are not accessible on the whole to other users. It would be interesting to examine to what extent this involves a waste of social resources; in other words, would it not be possible to link the various banks together and put them in a single system? This might be described as an Integrated Traffic Elements Records System (INVERS). Via such a system all major components

of the transportation system could be monitored and disturbances notified. This would make it possible to take effective action more quickly.

In order to create the system an inventory would first have to be made of data already being collected and their quality. Next, the various users' needs would have to be more closely analysed so as to draw up conditions which the system's data would have to satisfy. The system itself would also have to meet a number of conditions. For instance, it would have to be suitable for a variety of users, while the various bodies could continue to administer their own data banks. It must be capable of expansion, safeguard confidential information, be accessible rapidly and efficiently.

An Integrated Traffic Element Records System (INVERS). A Blokpoel, 1978. (Only in Dutch)

Road hazards as a side-effect of the transportation system

A symposium on 'Academic Training and Research into Safety' was organised at the auditorium of Delft University of Technology in October 1978. The principal questions discussed were: should academic training and research devote more attention to safety engineering, and what standards ought the planning of such training and research to satisfy? In this context, SWOV's director Asmussen read a paper in which he approached hazards as an element in a system, road hazards thus being a side-effect of the transportation system. The counteracting of road hazards must not disregard the purpose of the system: i.e. mobility. As long as human actions play a part in this, absolute safety will be unattainable. Instead, therefore, the objective will have to be an acceptable hazard level. What is an acceptable level, and to what extent the purpose of the system can be encroached upon for the benefit of greater safety is a political decision.

The control and study of road safety problems requires the entire problem field to be traversed. In recent years, this has been done many times for research and for controlling the road safety problem, with varying degrees of success. On the basis of Energy-Transfer Analysis', W Haddon jr. introduced a number of control strategies which SWOV is now elaborating

specifically for road safety purposes. This traversal appears to present very good perspectives for arranging research and for comparing road safety measures. The assumption is that the built-up energy is the 'agent' (the necessary but not sufficient condition) of risk in traffic. Energy transfer analysis can thus be described as follows. In order to make locomotion possible there must be an energy build up. But the release of this energy is not always controllable, for example when a vehicle skids. In this case we speak of an incident. If the released energy then comes into contact with dead or living structure, we speak of an accident, which may cause damage or injury. If adequate help is not provided quickly enough the injury may spread. On the basis of this analysis, road safety control strategies may intervene at six different phases of this process. Countermeasures may be focused upon:

Phase 1: Limitation of mobility: this, however, seriously affects the objective of the transportation system.

Phase 2: Limitation of energy build-up: for instance by promoting public transport and cycling, by means of speed limits for motor vehicles and lessening the need for mobility by reducing the distances travelled.

Phase 3: Prevention of (undesired) energy release (incident prevention); to

achieve this, traffic facilities will have to be designed and constructed in such a way that the road user does not have to function beyond his capabilities and is moreover not 'tempted' to act in an 'undesirable' way; rules will have to be made for using these facilities.

Phase 4: Prevention of contact of released energy with living or dead structure (accident prevention), this can be achieved by segregating the various categories of road users physically or in time (for instance by providing traffic signals and separate paths or lanes for motorised traffic, cycles and pedestrians), or by creating space for emergency manoeuvring.

Phase 5: Prevention or limitation of injury or damage to living or dead structure caused by contact with released energy (injury and/or damage prevention or limitation), injury is generally regarded as so much more serious than material damage that in practice material is often sacrificed to save human lives (crash zones in cars, roadside safety structures, moped riders' crash helmets, seatbelts).

Phase 6: Prevention or limitation of spreading of injury or damage: this necessitates speedy, adequate aid.

In a system approach to road safety, priority is given to measures having the greatest effect on safety while affecting the objective of the transportation

Pedestrians, two-wheelers and road safety

system as little as possible. The effect upon this objective is greatest in Phase 1, it becomes gradually smaller in the subsequent phases.

In the present state of the art, the principal premise for countermeasures will be adaptation of traffic facilities to man's possibilities and limitations. This relates both to human tolerance (injury limitation) and man's capacity of observation, decision and action in road traffic.

Basically, this strategy for controlling the hazards of the transportation system is also applicable to the residential system and the work system.

Redivision and redesigning of urban areas

In recent years the authorities have become increasingly interested in urban road safety problems. In particular, greater attention is being paid to pedestrians, cyclists and moped riders. On the one hand, this is because of these road-user categories' vulnerability: if they come into conflict with motor traffic they are almost invariably the weaker party. But reassessment of these categories as full-bodied road users is also related to official efforts to improve the quality of life in city centres and residential areas. Many cities and towns – not only in The Netherlands – are in danger of being stifled because they cannot meet the growing demand for more space for motor traffic.

As part of the 'Meerjarenplan personenvervoer' (Five-Year Plan for Passenger Transport) 1976-1980, experiments are being made in Eindhoven and Rijswijk which should lead to an improvement of these cities' quality of life. This is being based on a redivision between through-traffic and residential areas. In some residential areas, there will only be simple measures such as road signs to keep out through traffic. In others, there will also be physical measures to reduce the speed of the motor vehicles that still use them, for instance road humps.

Lastly, a number of these areas will be designed as 'woonerf' (mews court). Before and after studies will be made to examine the effects of these measures on the environment, traffic circulation, use and experience of public spaces, road safety and socio-economic aspects. With reference to the results of the study, recommendations will ultimately be made for improving the quality of life in other urban areas too. SWOV is in charge of the research into the effects on road safety, especially in residential areas. It has drawn up a nine-point research programme which will be carried out in collaboration with the Netherlands Institute of Preventive Medicine TNO, Leiden, the Institute of Perception TNO, Soesterberg, and the Traffic Research Centre of Groningen University. One part of the research has meanwhile been completed, viz. a literature review of (investigations on) the effects of measures in built-up areas on traffic behaviour and road safety. The preliminary studies for a number of other parts have also been completed.

Residential areas designed as 'woonerf'

An urban area where the residents can live out of doors in the widest sense, and where cars are not banned but integrated, is known in The Netherlands as a

The quality of life in cities and towns can usually be improved with simple means emphasising the residential function.

'woonerf' (pronounced 'vone e-ri'). Not only the quality of life but also – and perhaps particularly – road safety are important aspects of the 'woonerf'.

As regards *street lighting*, there are a number of functional requirements with three important aspects:

- the road users must not only be able to see, but also recognise one another;
- obstacles must be clearly visible;
- lighting must be varied without some places being too dark – for obvious reasons it is easy to step into a pothole in the dark, and dark spots are not conducive to public safety; they also make police supervision difficult.



As to *vehicle lighting*, the use of improved town beams is recommended in a 'woonerf'.

Attention is also required for the *road surface*:

- lights, diffusely reflecting small elements (for instance paving bricks) which are available in different colours, while they retain these colours even when wet;
- standardised traffic obstacles, especially humps and raised edges.



Children's road hazards

In order to establish exactly what hazards children face in traffic, one would have to know how many accidents they are involved in, how much time they spend in traffic and what distances they cover. But in reality, there are no reliable statistics on accidents involving injury or purely material damage; only fatal accidents are practically all recorded. Nor is any detailed information available on the time children spend on public highways or the distances they cover (known as 'exposure'). If one nevertheless wishes to say something about children's traffic hazards, this will have to be limited to presenting simple data relating mainly to fatal accidents.

Since 1975, the total number of children (up to 14 years) killed every year on the roads has fluctuated around 300, following a big drop (of about 30%) between 1971 and 1974. Most of these children were killed in built-up areas, and were involved as cyclists or pedestrians in accidents with cars, lorries, or motorcycles. In the case of pedestrians this happens mainly while crossing the road: over two-thirds of the fatalities occur under these conditions. As regards cyclist deaths, most of these occur through cyclists being run down at intersections. In this respect there is little difference compared with older cyclists.

But it is striking that out of the young cyclists killed in this way nearly 20% had a right of way but were not given it, while for older cyclists the proportion was 'only' 12%.

SWOV's conclusion is that measures aimed at greater road safety for children should concentrate on accidents in which child cyclists or pedestrians are run into by cars, lorries, or motorcycles.

Cyclists and moped riders

About one-third of all those killed on the roads in The Netherlands are cyclists or moped riders. Many of them are hit by cars. One way to prevent such accidents is to segregate the various road user categories either in time or space, another to integrate them as e.g. in a 'woonerf'. One might also try to ease the riding tasks of cyclists and moped riders. Further vehicles and facilities should be attuned better to each other and to their users. An important aspect of cyclists' and moped riders' tasks is steering, i.e. controlling the course and stabilising their vehicles in a variety of circumstances.

At SWOV's request, the Institute of Perception TNO, Soesterberg, carried out research into bicycle and moped handling characteristics. It included riding tests in which the subjects had to follow different courses. Various models

of bicycles and mopeds were used. The programme included cycling at different speeds, holding the handlebars with one hand or both hands, with and without side-wind and road-surface disturbances. The test results were analysed and supplemented with data from the literature.

The principal finding was that cyclists and moped riders need a width of at least 1 metre on straight roads and a width of about 1.25 metres near intersections. Side-wind effects (caused for instance by passing lorries) and road-surface unevennesses make it difficult for cyclists and mopedists to hold their course, especially at low speeds. The same applies to riding with one hand on the handlebars and to carrying pillion passengers. All these set standards for construction and maintenance of roads and cycle tracks, for the traffic environment, the design of two-wheeled vehicles and traffic rules and codes. The research also showed that some models of bicycles and mopeds are less manoeuvrable (bicycles with racing handlebars and the so-called motorcycle model mopeds). Manoeuvrability is very important especially in heavy traffic. Lastly, it was evident that rear orientation and indicating direction often causes difficulties.

In addition to research aimed at accident prevention, SWOV also does

research with a view to reducing the severity of injuries. This research was one of the reasons why crash helmet wearing by moped riders was made compulsory on 1 February 1975. In 1978, SWOV presented the Permanent Contact Group on Road Safety (PCGV) with an advisory report on the effect on road safety of wearing crash helmets by moped riders, (and seatbelts by car drivers and front passengers). The report showed that shortly after these became compulsory practically all moped riders were wearing helmets. Measurements in 1974, shortly before the regulations came into force, had shown in fact that more than half of all moped riders were already wearing helmets. From 1975 to 1977, SWOV calculations indicated that helmet wearing saved the lives of some five to six hundred moped riders. The calculations assumed that proper wearing of crash helmets reduced the risk of fatal injury by about 40%.

Internationally, SWOV played a part in preparation of an OECD report on the safety of two wheelers (bicycles, mopeds and motor cycles). One of the compilers' main objectives was the systematic presentation of available knowledge on this subject and to use it as the basis to recommend countermeasures. This latter proved possible only to a limited extent because knowledge about the use of two wheelers

*Space is also needed to ease the riding tasks of cyclists.
Moped riders using crash helmets has already saved many lives.*



National road safety congress 1978

and hence the risks their riders run is still inadequate. Besides this, too little is known about the factors playing a part in the cause and outcome of accidents. In fact, extensive research results are known only about the (very favourable) effect of wearing helmets. It is therefore stated that detailed information should be collected on the use of two-wheelers and that in addition research is needed into their riding characteristics and their riders' age and experience. In view of the greatly in-

creasing interest in the safety of two-wheelers in the member countries it was possible to give an extensive list of current research projects on this subject in the report. Their results are expected to be available within a year or two. The group which drew up the report therefore concluded by saying that the research results must be used in order to make a follow-up report in which more detailed suggestions for counter-measures can be made.

Under the theme 'The safety of pedestrians, cyclists and moped riders in built-up areas', the first National Road Safety Congress was held at the RAI Congress Centre, Amsterdam, on 19 and 20 April 1978. The Congress was organised jointly by thirteen institutes and organisations working in the field of traffic and road safety.

Traffic hazards, especially those affecting vulnerable groups such as pedestrians, cyclists and moped riders, was the element linking policy makers, scientists, organisations and action groups active in the field of road safety. Everyone agreed that the number of casualties in and caused by traffic must be reduced. What could be done to it, and how should available funds be allocated so that the best conceivable results could be achieved, were the questions which, asked and set forth from many sides, exercised the minds of the Congress participants for two days.

After a word of welcome by Mr Th. Westerhout, Chairman of SWOV, the Congress was opened by Mr D.S. Tuijnman, Minister of Transport and Waterways. The Managing Director of the Royal Dutch Touring Club ANWB, Mr A. Blankert, explained the purpose of the Congress. He defined two main objectives:

1. 'The bringing together of policy-making, research, executive and

Research into effects of counter-measures and facilities relating to traffic and traffic hazards in urban areas; A literature review. J.H. Kraay, E. Lind-Bart & M. van den Hondel, 1978. (Only in Dutch)

The lighting in residential areas designed as 'woonerf'. D.A. Schreuder, 1978. (Only in Dutch)

Traffic hazards affecting children. F.C.M. Wegman, 1978. (Only in Dutch)

Course holding by cyclists and moped riders. J. Godthelp (IZF-TNO) & P.J.J. Wouters (SWOV). SWOV, Voorburg, 1978/79.

Safety of two-wheelers. A report prepared by an OECD Road Research Group (Chairman: P.C. Noordzij, SWOV). OECD, Paris, 1978.

advisory institutes and organisations in order, by means of an exchange of knowledge and viewpoints, to discuss possible activities and counter-measures for optimising road safety'.

2. 'To arrive at common viewpoints which may lead to recommendations'.

This 'bringing together' resulted in over 750 Congress participants. The 'exchange of knowledge and viewpoints' took place by means of papers read by many experts who posed the problems as seen from their respective aspects.

The 'discussion on possible activities and countermeasures' took place in workshops; there was very great interest in the workshops, and about 200 people took part in them.

Various institutes and organisations working in the field of policy making, research, execution and advice were represented at the National Road Safety Congress 1978.



Mr F.C.M. Wegman (SWOV) explained the programme for the Congress. In view of the specific interest in safety inside built-up areas, it is useful to know that 40% of all traffic fatalities and 70% of all those injured fall in accidents inside built-up areas.

Accident statistics showed that of all the fatalities due to accidents inside built-up areas about 70% were pedestrians, cyclists or moped riders. The percentages of injuries were the same. In over 70% of the accidents pedestrians were run over by fast moving vehicles – mostly cars. In the years 1974 to 1976, 53% of all pedestrian deaths were caused by passenger cars, this applied to 48% of cyclist deaths and to 32% of the moped riders killed. Motor lorries accounted for 14% of all pedestrian deaths, 28% of cyclists and 26% of moped riders. It should be borne in mind that the annual mileage of passenger cars is twelve times that of motor lorries. Mr Wegman, of course, gave more figures, and more detailed ones too. It was clear that the combatting of traffic hazards in towns and villages, that is to say in built up areas, must be given top priority with emphasis on the most vulnerable road users: pedestrians, cyclists and moped riders.

Next, Mr P. Allevijn, Director of the Road Safety Directorate of the Ministry of Transport and Waterways, spoke about

co-ordination by the government with respect to road safety, under the title 'A national road safety policy? Existing road hazards unacceptable'. He advocated a national road safety policy also effective at the municipal level, and made a number of suggestions for collaboration between the government, municipalities and private organisations.

At the end of the first day of the Congress, the first showing of a film 'The quality of life in residential areas' was given. It was made by the Foundation Film and Science SFW in co-operation with SWOV, and with the support of the ANWB.

The purpose of the film was to record available knowledge about the residential environment, social activities and road hazards. These concepts form part of the quality of life of residential areas. An endeavour is being made to trace the possible influence of various urban planning principles and viewpoints on this. For instance, the film clearly brings out both positive and negative aspects of the residential area.

During the Congress five workshops were held on various subjects or problem areas. The subjects were concerned with the theme of the Congress; some linked up with an earlier address to the full Congress. The object was a direct exchange of expertise, viewpoints

and experience from different aspects.

At the end of the second day, Mr. E. Asmussen, Director of SWOV, gave a summary and conclusions of the essential aspects of the papers read at the Congress and the workshop discussions. He went into what one of the workshops' discussions had stressed:

'that we still know far too little about what road safety and road hazards are'. He also stated that a concept is needed as a basis for decisions and action which gives information per road, per traffic situation, per road user category, and so on, as regards the possibilities of accidents. The *risk* is such a concept.

As is already being done in many fields, risk analysis and risk assessment would have to make the concepts of safety and hazards comprehensible and manageable with respect to road traffic. On the assumption that absolute safety is unattainable, it would have to be carefully considered what the acceptable risk is. Every road user would have to be aware of the risk he runs when he uses traffic facilities in some way or other. Only then the individual user can consciously choose an attractive alternative *and* also be held responsible for his decisions and consequent behaviour.

But much consultation, thought and research is needed to establish national norms differentiating adequately between road user categories, situa-

tions and so on. Very high priority would have to be given to developing methods of ascertaining differentiated risks and their acceptability. And, lastly, the publication of risks differentiated between types of road, intersections, traffic situations, vehicles, times and so on

P. Allewijn
Director Road Safety Directorate of
the Ministry of Transport and Waterways.



would have to be made compulsory. Selective information on this will of course prove to be essential. Speaking of road safety policy, Mr Asmussen said an effort would have to be made to attune policy planning and decisions, effectuation and evaluation more closely to one another. The entire decision-making process would have to be focused primarily on instruction and adaptation, with the consequence of speedy solutions and continuous evaluation. Full and consequential examination of the various stages of the

decision making process is necessary. therapy is impossible without a diagnosis.

The comments and conclusions of the various workshops indicated the difficulties of road safety research:

At the National Road Safety Congress 1978 much interest was shown for participation in the five workshops.



– we do not know enough in order to use safety as a hard argument in decision making and in putting countermeasures into effect ;

– we are too busy dealing with ad hoc problems to make any improvement in this;

– we cannot give the decision-makers the information they need to evaluate road safety research.

Pursuing this theme, Mr Asmussen put forward a kind of allocation of duties for the policy planner, centralised road safety research, the decision-maker, those giving effect to the policy and the policy evaluator. Ending this summary, Mr Asmussen hoped that the follow-up of the Congress would be the beginning of the systematic 'instruction and adaptation process'.

The safety of pedestrians, cyclists and moped-riders in built-up areas.

Congress Book and Report on the first National Road Safety Congress, held at the RAI Congress Centre, Amsterdam, 19 and 20 April 1978. SWOV (ed.) Royal Dutch Touring Club ANWB, The Hague, 1978.

With SWOV contributions by E Asmussen, F C M Wegman, S Oppe, P I J Wouters, A Kranenburg and A Blokpoel. (Only in Dutch).

Drinking and driving

The new legislation on drinking and driving of 1 November 1974 was still having an effect in 1977: drinking by Dutch motorists in 1977 was still below the pre-legislation level. This was found from roadside surveys by SWOV of drinking and driving by Dutch motorists. In the literature study Alcohol and Road Safety, SWOV had already shown in 1967 that the introduction of a legal BAC limit was an important measure against driving while intoxicated. On 1 November 1974 an Act became law making it an offence for road users to have a BAC of 50 mg alcohol or more per 100 ml blood. The drinking and driving research was aimed at measuring the effect of this Act. SWOV carried out roadside measurements for this purpose in 1970, 1971, 1973, 1974, 1975 and 1977. Around the time of the introduction of the new Act there was a very great decrease in drinking by motorists. In 1975, there was an increase again. After that, the increase slowed down. The result was that in 1977 driving while intoxicated was still less than in 1973. Nevertheless, in 1977 one out of nine drivers was found during the hours investigated to have a BAC in excess of 50 mg/100 ml. The striking feature was that SWOV found an excessive BAC for many more motorists than the police did in their special checks. SWOV found over 100 mg/100 ml in four per cent of the drivers. Fewer than half of all drivers

had not been drinking at all in the course of the evening

Accident risk increasing fast

Alcohol is one of the few factors known to contribute in nearly all circumstances to the occurrence of road accidents. Studies have been made of the relationship between BAC and the accident risk. In Grand Rapids, in the U.S.A., for instance, drivers involved in accidents were compared as regards drinking with drivers not involved in accidents. It was found that the higher the BAC the greater the accident risk. Later data suggests that the risk of drinking drivers being involved in an accident is much greater than was demonstrated in Grand Rapids. It would be very useful to re-establish this relationship more precisely.

Research design

Since the introduction of the new Act, the police have taken wide-scale action against drinking drivers. At any rate, this is indicated by the number of summonses for this offence. Part of these are the result of special nationwide campaigns, in which at a number of places all drivers are stopped. They are carried out throughout the year on

weekend evenings. The results are issued to the press. In 1977, 236,740 vehicles were checked during these campaigns. In 4,417 cases the drivers were not allowed to continue driving, and 1,698 drivers were summoned for driving while intoxicated. Police checks, however, give insufficient information to indicate what percentage of motorists drive while intoxicated. In many cases the police do not check road users arbitrarily, but on suspicion. In SWOV's investigations, nationwide random checks were made. Every ten minutes, the police stopped a driver at random. He or she was asked if he or she was willing to co-operate. The investigations were made during weekend evenings and nights because much drinking is likely at those times. Autumn was chosen on the assumption that the results would then approximate the average for the year.

The BAC of those taking part in the test was ascertained. Next, particulars such as age, sex, place of trip, origin and time of being stopped by the police were recorded.

Who drinks, and where and when?

It was found that between 22.00 and 24.00 hours a lower percentage of motorists over 50 had been drinking than of those in other age groups.

Between 00.00 and 02.00 hours the percentage that had been drinking was a little higher among younger drivers than in other age groups. But between 02.00 and 04.00 hours the increase in drinking by younger drivers was not as great as in other age groups. A lower percentage of women than men drive while intoxicated. Besides this,

The biggest effect of anti-drinking legislation is to be expected among car drivers at nighttime.



there was a pronounced increase in the number of women drivers after the new Act.

A difference in drinking as between the three evenings in the week investigated was most evident soon after midnight. On Sunday night the percentage of drinking drivers was lower than on the other two days. But the average BAC was higher.

Most drivers who had drunk too much were returning from visiting friends or from a public house or bar. It was found that motorists coming from a bar or public house at any time of night had drunk more than those who had been visiting the family or friends. But while drinking per person continued to increase as the night went on for the visiting category, this was less so in the 'public house' category.

On the whole, the percentage of drinking drivers increased the later the hour. The average BAC also increased in the course of the evening or night.

The change in the law did not lead to any sudden differences in the distribution of drivers over the days and times of the investigations. The biggest effect of the change was therefore an all round reduction in drinking by drivers, rather than a decrease of the number of drivers during certain days and times. It was also found that there was a bigger decrease in drinking late at night than early in the night.

Effect on safety

Has the decrease in drinking also led to fewer accidents? To see this, the results of the research into drinking and driving must be compared with accident statistics. SWOV made this comparison for the years 1970 to 1976. Only fatal accidents were checked, since these are the only ones fully recorded. A distinction was made between situations in which little and much drinking is likely. This breakdown relates firstly to accidents involving at least one moving car, and other accidents, second, accidents at nighttime (from 22.00 to 04.00 hours) and at other times. The biggest effect of anti drinking regulations is likely in the case of car drives and at nighttime.

With this distinction, the fatal accident pattern does indeed indicate differences coinciding in time with major changes in drinking by drivers. The number of fatal daytime accidents involving at least one moving car decreased greatly from the end of 1973 to the end of 1974. In 1975 there was a slight increase. From 1973 there was a slight decrease at night and, in contrast to daytime, this continued rather more from the end of 1974 to the end of 1975. At the end of 1975, the number of fatal nighttime accidents started going up again.

The different trends in nighttime and daytime accidents from the end of 1974 to the end of 1975 probably mean that the nighttime decrease was due to the anti-drinking regulations. This is substantiated when making a breakdown for workdays and weekends (Friday, Saturday and Sunday). It was already noted that the number of fatal nighttime accidents continued to decline from the end of 1974 to the end of 1975, in contrast to daytime accidents. In 1976 there was a rise during weekend nights, a trend that did not occur on workdays.

This increase will in any case largely have a cause of its own: a lessening effect of the new Act.

In the SWOV survey on drinking and driving habits of car drivers breath tests were made with the Intoxilyzer, one of the best breath analysers available at this moment.



Breath analysers

During the drinking and driving research, SWOV carried out field tests with various types of breath analysers to ascertain to what extent road users had been drinking. Simple, accurate measuring devices are needed for the police as an alternative to the present detection procedure of using the chemical test tube, followed where appropriate by a compulsory blood test. There would seem to be a possibility of using breath analysers for screening purposes. But first of all the requirements must be formulated with which these analysers should comply, and their advantages and disadvantages in practice should be gone into. Replacement of the blood test by a breath test indicating the BAC will probably save work, making it possible in principle to increase the number of prosecutions of drinking drivers. Should the breath analyser readings prove less accurate, the disadvantage of using them is that a wider margin of error must be used for prosecution than is the case with blood tests.

International activities

The Organisation for Economic Co-operation and Development (OECD) published a literature review on the

Road safety in Noord-Brabant

role of alcohol and drugs in road accidents. On SWOV's behalf P.C Noordzij was a member of the research group that compiled this report. The report gives the research results since 1968, the year in which the first OECD publication was issued on this subject.

Insufficient scientific data is available as yet on the influence of drugs on road safety for any new measures to be based on them. More sensitive and more practical apparatus will have to be developed for reliable investigations to be made into the use of drugs by road users. As regards drinking, much more is known. The OECD group makes a number of recommendations for further scientific research and for adaptation of legislation to simplify police screening procedures.

Drinking by motorists. Second revised and extended edition. P.C Noordzij et al., 1978. (Only in Dutch)

Breath analysis and Blood alcohol concentration. J.A.G. Mulder & P.C. Noordzij. SWOV, Voorburg, 1978.

New research on the role of alcohol and drugs in road accidents. A report prepared by an OECD Road Research Group (Member P.C Noordzij). OECD, Paris, 1978.

Since 1975, SWOV has been making large-scale investigations into road traffic hazards in the province of Noord-Brabant. This is being done at the request of the Noord-Brabant Provincial Council and the Ministry of Transport and Waterways. In the first stage, completed in 1976, hazards in Noord-Brabant were specified in detail and compared with those in other provinces. This disclosed that in some respects Noord-Brabant compares unfavourably with the rest of The Netherlands. In the second stage, which is still going ahead, the reasons for this are being sought in order to give the roads authorities some indications for countermeasures. In addition, in this stage solutions are being sought for more general, and not specifically Brabant type problems of road safety. For this purpose, use is being made of available knowledge obtained from earlier SWOV research, from literature studies or practical experience.

One of the more general problems is that of wet-weather accidents. Such accidents cause the death of about 200 motorists and motorcyclists every year in The Netherlands, while several times this number are injured. Such accidents, moreover, are an extra source of danger to pedestrians, cyclists and moped riders, while the material damage is also considerable.

A large proportion of accidents on wet roads are due to surfaces not having enough skidding resistance or to large puddles of water remaining on them during and after showers. Especially at high speeds, this may cause a big decrease in road-surface skidding resistance. It is not known to what extent such puddles form in roads in Brabant; but skidding resistance is systematically measured by the Dutch State Road Laboratory.

In 1971 and 1975 the skidding resistance of provincial roads in Noord-Brabant was measured. In both years, almost a quarter of the roads were described as 'slippery', 'very slippery' or 'dangerous'. Most of these roads with insufficient skidding resistance had cobbled or brick surfaces. The measurements also showed that the quality of asphalt and concrete pavings had deteriorated somewhat between 1971 and 1975.

Besides a high proportion of road lengths in the low classes of skidding resistance, great variations were also found in successive road sections of the provincial roads system. Jumps of three or four classes of skidding resistance from one section to another were no exception. Such variations can also be explained substantially by the presence of cobbled or brick surfaces. As these

Safety facilities in cars

variations are largely unobservable for drivers, they cannot adjust their driving to the changed situation. This may, therefore, constitute an additional safety hazard.

In 1974, the State Road Laboratory measured the skidding resistance of national highways in Noord-Brabant. Of these, only 1.3% came in the 'slippery', 'very slippery' or 'dangerous' categories. There are, however, no grounds for assuming that the position regarding skidding resistance of the national and provincial roads in Noord-Brabant differs much from that in the rest of The Netherlands. This is indicated by the fact that the percentage of deaths due to wet-weather accidents in Noord-Brabant is about the same as for the whole of The Netherlands.

In order to reduce the number of wet-weather accidents in the future, SWOV made a number of policy recommendations for the roads authorities.

In taking short-term countermeasures (one to two years) the best way is to find places with a comparatively large number of wet-weather accidents.

Based on absolute numbers, priorities can then be established. For these places skidding resistance data should be collected, and they should also be the subject of visual inspection, among other things to determine whether large puddles are caused by rainfall. Possible

improvements at such places are to increase the skidding resistance available, evenness and water disposal or to reduce the skidding resistance required (by means of signalling, speed limits or re-routing some road sections).

In the medium term (three to five years), a more systematic approach could be adopted to the prevention of wet-weather accidents.

Road sections should then be mapped in the 'slippery', 'very slippery' and 'dangerous' categories, together with places where big puddles occur (a water layer exceeding 2 to 3 mm). Measures could give priority to road sections with a high traffic density and a lot of goods traffic. The skidding resistance of successive sections could also be examined, together with places where the skidding resistance decreases greatly in successive years.

Road safety in the province of Noord-Brabant IV. The aspect of skidding resistance in the road safety research project in Noord-Brabant. SWOV Project team Noord-Brabant (L.H.M. Scholser), 1978 (Only in Dutch)

Seatbelts

On 1 June 1975, the use of seatbelts was made compulsory for front-seat occupants of cars bought new in The Netherlands after 1 January 1971.

An advisory report made by SWOV in 1978 to the Permanent Contact Group on Road Safety (PCGV) shows that this regulation has indisputably promoted road safety. Various investigations indicated that the wearing of seatbelts reduced the average risk of being killed in a traffic accident by at least 60%.

In 1974 – the year before the regulations were introduced – about 8% of all car occupants wore seatbelts in built-up areas and about 15% outside built-up areas.

In 1977, seatbelt wearing had increased to about 37% in built-up areas and about 52% outside.

On the basis of these figures, SWOV calculated that between 1975 and 1977 seatbelt wearing saved the lives of at least 1,200 car occupants.

In addition, SWOV calculated how many lives more would have been saved in 1977 if all car occupants (including back seat passengers) had been wearing belts. There would not have been 1,210 deaths of car occupants but 680, or over 500 fewer.

Viaduct protection

Children in cars

Since 1 January 1976 a regulation has been in force regarding the place where children sit in private cars. Children under six are no longer allowed to sit in front. Children from six to eleven can sit in front only if they wear lap belts (or the hip part of a three point belt). At the request of the Road Safety Directorate of the Ministry of Transport and Waterways, SWOV investigated the short term effect of this measure. SWOV conducted four oral surveys for this purpose: one in December 1975, and three in January, February and March 1976. They were held in the car parks at

six big modern shopping centres in five provinces. A report was made in February 1977, and was published in 1978.

Shortly after the introduction of the regulations, there were half as many children on front seats: prior to 1 January 1976 one out of every fifteen children under twelve sat in front, and after one out of every thirty. The wearing of lap belts by children from six to eleven did not change. Nor were the regulations found to have had any effect on the use of other safety devices. It can be concluded that the regulations had a favourable effect in the short term.

In the course of time SWOV has gained considerable experience in developing safety facilities for Dutch roads: roadside safety structures in central reserves and hard shoulders and on flyovers, lighting columns low-aggressive for private cars, etc. In view of this experience, SWOV was asked by the Belgian government to develop a safety structure for a 1700-metre viaduct on the Brussels ring road. This viaduct bridges a number of important objects: several main traffic arteries, the Amsterdam-Brussels-Paris railway line, a large car assembly plant and the Brussels-Rupel ship canal. Bearing in mind that the canal head room is 35 metres, it will be clear that the chances of survival for occupants of a vehicle crashing down below are practically nil. If a lorry or tanker were to run off the viaduct and land on the car assembly plant, the consequences would be simply disastrous. The Belgian government wanted the risk of this happening virtually eliminated.

The first step in SWOV's investigations was to collect data on accidents, traffic composition, characteristics of vehicles and of the viaduct and so on. These data were fed into a computer programme simulating impacts under various conditions. This form of research is comparatively inexpensive. Full scale impact tests under practical conditions

Influence on road safety of the wearing of helmets by moped riders and seat belts by car occupants. SWOV, 1978. (Only in Dutch)

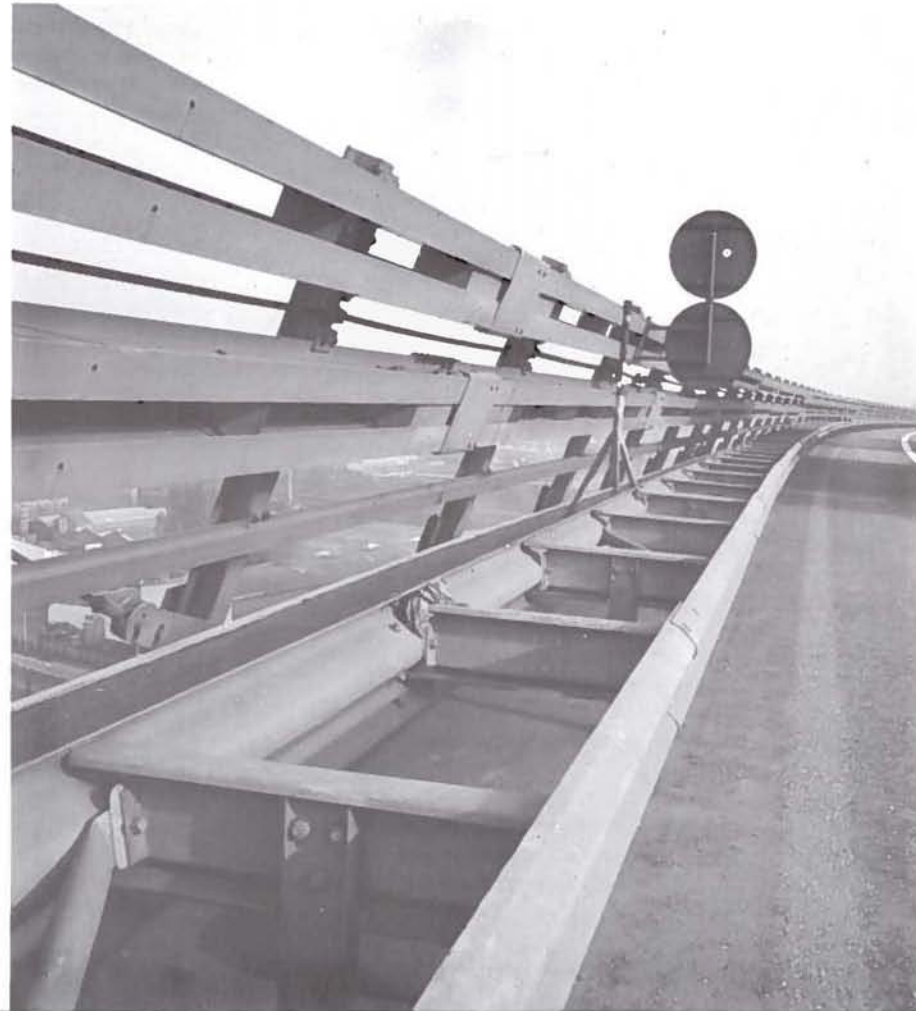
Children in cars. Report on short term effect of the regulations of 1 January 1976 concerning the place of children in cars. SWOV, 1977/78. (Only in Dutch)

would have increased the research costs more than ten-fold. On the basis of the results, a two-part safety barrier was developed. A vehicle running off the road would first hit a normal guide rail structure capable of stopping cars, buses and even medium-duty lorries without any danger of their tipping over. Behind this structure there is a second safety barrier designed to stop heavy lorries (up to 30-tonners at least). In view of the requirement of absolute impenetrability, SWOV deemed it essential to verify the results of the computer simulations with a limited number of full-scale impact tests. However, no tests were commissioned.

Viaduct safety structure for lorries.

Summary of the report and results of a general and mathematical investigation into the development of a safety structure on a viaduct, intended to be impenetrable to heavy lorries, made on the instructions of Intercommunale B1, Brussels. SWOV, 1977/78. (Only in Dutch)

At the request of the Belgian government SWOV developed a safety structure for lorries on a 1,700 metres long and up to 35 metres high viaduct on the Brussels ring road.



Visibility of markings on wet roads

The working group on 'Visibility of markings on wet road surfaces' was set up on 2 June 1977, under the auspices of the Road Construction Research Centre (SCW) and the Traffic Engineering Research Centre (SVT). The group's first activities consisted of detailed literature research, which SWOV was requested to make.

The conclusions from this literature study are that it cannot be established from the published literature what visibility standards road markings should meet. It became evident, however, that as regards nighttime visibility on wet road surfaces there is a preference for raised markers with corner-cube reflectors.

Research in America in 1976 speaks, after the application of raised pavement reflector markers, of 70% fewer single-vehicle accidents and 57% fewer nighttime accidents. British research (1978) gives figures of 50% and 37%.

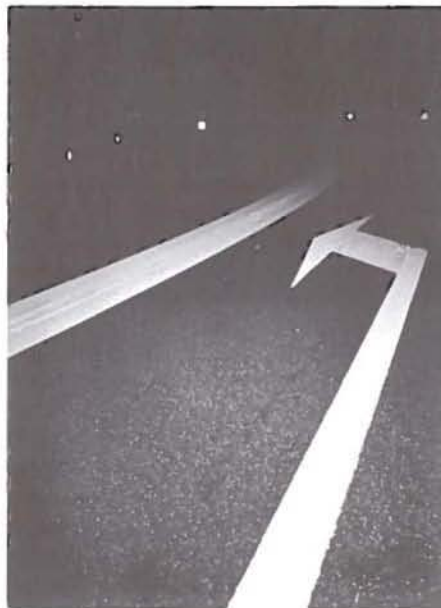
It was investigated to what extent reflectors are liable to be damaged by snowploughs. In The Netherlands, this danger so far seems slight, nor is the risk of motorcyclists skidding, alleged to be caused by raised pavement markers, considered to be great.

Further research is advisable into the comparative values of various types of marking materials, taking into account their visibility in other conditions (dry surface, daylight). This research should

include various types of prism reflectors. It is also advisable to examine the use of large glass beads (marbles). The research can be carried out by way of test markings on roads in normal use.

In these tests visibility can be based on subjective assessments. It would seem

The visibility of road markings must also be guaranteed under bad conditions such as wet road surfaces and nighttime.



advisable to devise an objective method of measuring visibility of the markings (including very small ones, for instance cats' eyes) on wet surfaces. It should be examined whether normal commercially available photometers can be used for this purpose.

Further theoretical study of the function of road markings (lane markings, bends) seems advisable. The literature study does not give, however, direct indications that this subject should receive higher priority.

Visibility of markings on wet roads.

D A Schreuder, SCW/SVT, Arnhem, 1978. (Only in Dutch)

SWOV and the OECD

International co-operation on road traffic takes place mainly within the OECD, the Organisation for Economic Co-operation and Development. The OECD has set up a Road Research Programme, under which research groups are formed. SWOV has played an active part in the Road Research Programme since its inception. SWOV is represented on the Steering Committee for Road Research by its Director. SWOV's contribution is also reflected in its membership and, in a number of cases, chairmanship of research groups.

SWOV provides, among other things, a major contribution to the Research group on 'Traffic Safety in Residential Areas'. Promotion of road safety is an important aspect of the endeavour to strengthen the residential function of urban areas. Although every country has its own legislation and urban planning traditions for taking measures on this connection, the exchange of experience is of great significance. In The Netherlands' case, a policy outline was given in the Five-Year Plan for Passenger Transport 1976-1980, under the motto 'Forward to controlled traffic'. In this plan, the Minister of Transport and Waterways declares himself in favour of a policy for urban areas '...which will keep existing building intact and promote urban intimacy, will abate the nuisance of noise and air pollution and

will above all radically improve safety, particularly for slow traffic'. A good way of giving shape to such a policy consists in dividing the urban area into specific traffic areas and into residential areas where functions other than traffic have priority.

Numerous redivision and redesigning measures for urban areas are raised in the OECD research group. Such as the 'woonerf', a typically Dutch product, the Dutch name of which is used as a colloquial term by people from other countries.

One of the questions dealt with by the groups relates to the way of measuring road safety in residential areas. The number of accidents in these areas is comparatively low. Moreover, they occur widespread over the entire area. This makes it difficult to ascertain the effects of accident prevention measures. The research group is examining whether not only accidents but also behaviour studies (for instance traffic conflicts) and attitude research among residents can be used for road safety assessment. Two members of SWOV are in this research group, F.C.M. Wegman, who is also the chairman, and J.H. Kraay.

In 1978 SWOV participated in another seven OECD research groups. The groups' principal objective until recently was to review the state of the art. With

this as their starting point, two research groups presented reports.

The Research group on 'Prevention of Accidents to Users of Two-wheeled Vehicles' published a report on 'Safety of Two-wheelers'. This report is dealt with under the heading 'Pedestrians, two wheelers and road safety'. P.C. Noordzij, from SWOV, was the chairman of this group.

The Research group on 'New Research on Alcohol and Drugs' published a report on 'New Research on the role of Alcohol and Drugs in Road Accidents'.

P.C. Noordzij was a member of this group too. The publication is dealt with briefly under the heading 'Drinking and driving'.

Since 1978, the emphasis in Road Research Programme work has been on making recommendations. This change was made at the request of the member States' governments. The new method has already been applied in the 'Special Group on Pedestrian Safety', which issued three reports. J.H. Kraay took part in this group's work on SWOV's behalf. Its principal object was to recommend measures which had already proved their scientific value in some countries and could be introduced quickly in other member states. The group was set up after consultation with the EEC Council of Ministers of Transport.

The three reports related to the pedestrian's road environment, training for

safe behaviour and the use of the mass media in order to propagate pedestrian safety. Measures limiting access by vehicles to protected pedestrian areas have been applied successfully in many cities. With good traffic planning and good urban design there is no need to introduce new legislation in order to give priorities to pedestrians. The effect of such measures on safety is great and the procedure allows plenty of scope to urban planners.

Lessons in traffic theory should be given by means of practical training in existing traffic. This training should be given by both teachers and parents.

Continuous use must be made of the mass media in order to promote pedestrian safety. Campaigns should be preceded by tests. It must be possible to check the effects after the campaign.

In the Research group on 'Traffic Measurement and Analysis Methods for Urban and Suburban Areas' the focal point is traffic planning. Factors which have to be taken into account include the accessibility of destinations, the mobility of road users, road safety and environmental and energy problems. These factors are quantified in order to compare them. The growing interest in conservation and in the scarcity of economic resources are important factors in this comparison. This means, for instance, that solutions for better

traffic planning are being sought less and less by building new roads and junctions etc. F.C.Flury is a member of this research group for SWOV.

The Research group on 'Improving Road Safety at Night' is chaired by SWOV's D.A.Schreuder. This group's importance is evident from the comparatively large number of nighttime accidents. Moreover, some kinds of accidents occur especially in the evening or at night. Factors particularly influencing road safety at night, for instance, are the visibility and lighting of roads, vehicles and road users, drinking and fatigue, and the different traffic densities.

The Research group on 'Methods for Evaluating Road Safety Measures' bases its work on the principle that the financial resources provided for road safety should be employed as effectively as possible. The effectiveness of measures such as speed limits, seat belts and road improvements is determined. The measures can also be arranged in order of effectiveness expressed in terms of money. F.C.Flury is SWOV's member of this group.

The ad hoc group on 'Multi-disciplinary Accident Investigation Surveys' concentrates on in-depth accident investigation. 'In depth' means that every accident covered by the investigation is

studied individually and in fairly great detail. In principle, events in all phases of the accident are analysed. This requires a multi-disciplinary approach. The members contrast the research methods used in the various countries in order to achieve harmonisation and further international co-operation. The chairman of this international work group is H.Kuiperbak, Director of the Dutch Department of Road Transport RDW. The technical work secretariat is dealt with by SWOV's A.Edelman en L.T.B.van Kampen.

Rapid access to international literature and other documentation on road safety is of prime importance. SWOV is a member of the International Road Research Documentation IRRD, part of the OECD Road Research Secretariat. Together with the State Road Laboratory, SWOV supplies Dutch publications and information on current Dutch research to this documentation system. Thanks to a computer system, it is possible to retrieve information from the IRRD at very short notice. The IRRD bank from which this is obtainable has been built up from 1972.

The IRRD is a stimulus to international collaboration in road safety research. Twenty four countries participate in it. J.F.Demmenie and F.P.G.van Ussendijk take part in IRRD discussions on SWOV's behalf.

Published in 1978

Reports 1976

+ Policy making on road design standards. Summary of the contribution to the OECD Symposium on Methods for determining road design standards 1976, Helsingør, Denmark, 10-12 May 1976. FC Flury. R-76-22. SWOV, Voorburg, 1976. 9 pp.

Also presented to the Select Committee on Highway Safety on Ontario, Canada, Voorburg, 4 October 1976.

+ Interrelation and optimisation of road design elements as related to classes of roads. Report by E. Asmussen, Chairman of Session V of the OECD Symposium on Methods for determining geometric road design standards 1976, Helsingør, Denmark, 10-12 May 1976. R-76-23. SWOV, Voorburg, 1976. 5 pp.

+ Design and classification of roads from the viewpoint of driving task analysis. Paper and shortened version presented to the OECD Symposium on Methods for determining geometric road design standards 1976, Helsingør, Denmark, 10-12 May 1976. S.T.M.C. Janssen. R-76-24. SWOV, Voorburg, 1976. 26 pp.

+ Beleid onderbouwd. Bijdrage SWOV-congres Toekomst in veiligheid, gehouden op 18 mei 1976 in het Internationaal Congrescentrum RAI te Amsterdam. Ir E. Asmussen. R-76-25. SWOV, Voorburg, 1976. 76 blz.*

+ Onderzoek naar de verkeersveiligheid van de voetganger. Bijdrage SWOV-congres Toekomst in veiligheid, gehouden op 18 mei 1976 in het Internationaal Congrescentrum RAI te Amsterdam. J.H. Kraay, soc. drs. R-76-26. SWOV, Voorburg, 1976. 22 blz.*

+ Het gedrag van lichtmasten bij aanrijdingen door personenauto's en de consequenties daarvan. Bijdrage SWOV-congres Toekomst in veiligheid, gehouden op 18 mei 1976 in het Internationaal Congrescentrum RAI te Amsterdam. Ing C.C. Schoon. R-76-27. SWOV, Voorburg, 1976. 9 blz.*

+ Verkeersveiligheid in plattelandsgebieden. Bijdrage SWOV-congres Toekomst in veiligheid, gehouden op 18 mei 1976 in het Internationaal Congrescentrum RAI te Amsterdam. Ir S.T.M.C. Janssen. R-76-28. SWOV, Voorburg, 1976. 42 blz.*

+ Enige aspecten betreffende ongevallen op nat wegdek. Bijdrage SWOV-congres Toekomst in veiligheid, gehouden op 18 mei 1976 in het Internationaal Congrescentrum RAI te Amsterdam. Ir L.H.M. Schlösser. R-76-29. SWOV, Voorburg, 1976. 15 blz.*

+ Emergency braking. Research summary. L.H.M. Schlösser. R-76-30. SWOV, Voorburg 1976. 25 pp.

+ The analysis of contingency tables; Log-linear Poisson models for weighted numbers. J. de Leeuw & S. Oppe. R-76-31. SWOV, Voorburg, 1976. 29 pp.

+ Integration of motor traffic in residential areas; General principles and strategies. Contribution to OECD Special Research Group on Pedestrian Safety. J.H. Kraay. R-76-32. SWOV, Voorburg, 1976. 12 pp.

+ Kinderen in personenauto's. Consult over het korte-termijneffect van de wettelijke maatregel van 1 januari 1976 betreffende de plaats van kinderen in auto's. SWOV. R-76-33. SWOV, Voorburg, 1976. 16 blz.*

+ Banden en wegdekken; Experimenteel multifactoronderzoek naar de factoren die de rem- en spoorcrachten tussen autobanden en natte wegdekken beïnvloeden. Samenvatting, Conclusies en Aanbevelingen van de research van Subcommissie I van de werkgroep 'Banden, Wegdekken en Slipongevallen'. (Ir L.H.M. Schlösser). R-76-34. SWOV, Voorburg, 1976. 47 blz.

+ Tyres and road surfaces; Experimental multifactor investigation of the factors effecting the brake and side way forces between car tyres and wet road surfaces. Summary, Conclusions and Recommendations from the study by Sub-Committee I of the Working Group on Tyres, Road Surfaces and Skidding Accidents. (L.H.M. Schlösser). R-76-35. SWOV, Voorburg, 1976. 47 pp.

* Only in Dutch

- + Future lines of research in the field of toxic and psychological factors in road traffic accidents. A study made on request of the Ad hoc Working Group on Toxic and Psychological factors in Road Traffic Accidents of the Committee of Medical Research and Public Health of the Commission of European Communities, Directorate General for Research, Science and Education. SWOV. R-76-36. SWOV, Voorburg, 1976.
- + Afscherming van de zijkant van vrachtauto's; Een beschouwing over de consequenties van een eventuele invoering van een afscherming van zijkanalen van vrachtauto's. Consult in opdracht van de Directie Verkeersveiligheid van het Ministerie van Verkeer en Waterstaat. SWOV. R-76-37. SWOV, Voorburg, 1976. 26 blz.*
- + Evaluatie-opzet voor een plaatselijk signaleringsysteem. Ir.H.Botma & ir.H.L.Oei. R-76-38. SWOV, Voorburg, 1976. 23 blz.
- + Evaluatie-onderzoek Snorfiebs, mogelijk of niet; Een discussienota. Consult ten behoeve van de Directie Verkeersveiligheid (DVV). SWOV. R-76-39. SWOV, Voorburg, 1976. 23 blz.*

Reports 1977

- + Ademanalyse en het alcoholgehalte van bloed. Ing J.A.G.Mulder en Drs P.C.Noordzij. R-77-17. SWOV, Voorburg, 1977. 33 blz.
- + Stichting Wetenschappelijk Onderzoek Verkeersveiligheid SWOV; Een portret. Ir.E.Asmussen en Dr ir D.A.Schreuder. R-77-18. SWOV, Voorburg, 1977. 23 blz.
- + De (brom)fiets en de verkeersveiligheid. Inleiding voor het congres 'De (brom)fiets en zijn voorzieningen' op 16 december 1977 in de Stadsschouwburg te Tilburg. Drs P.C.Noordzij. R-77-19. SWOV, Voorburg, 1977. 21 blz.*
- + Unieke beproevingsinstallatie voor zijdelingse botsingen met auto's ontwikkeld. Ing C.C.Schoon. R-77-20. SWOV, Voorburg, 1977. 6 blz.
- + Unique testing equipment for sideways impacts. C.C.Schoon. R-77-21. SWOV, Voorburg, 1977. 6 pp.
- + Einzigartige Testvorrichtung für seitliche Anprallteste für Fahrzeuge. Ing.C.C.Schoon. R-77-22. SWOV, Voorburg, 1977. 6 pp.
- + Economische schade door verkeersongevallen 1970 t/m 1976; Aanvulling op tabel 31 in Tien jaar verkeersonveiligheid in Nederland. Ir.F.C.Flury. R-77-23. SWOV, Voorburg, 1977. 5 blz.*
- + Needs of a member country. Paper presented at the 3rd Plenary meeting of the International Road Research Documentation, Paris, 8-10 November 1977. J.F.Demmenie. R-77-24. SWOV, Voorburg, 1977. 5 pp.
- + Lichtmasten en openbare verlichting: Kosten in relatie tot verkeersveiligheid. Een beslissingsmodel. Ir.F.C.Flury. R-77-25. SWOV, Voorburg, 1977. 43 blz.*
- + Wegmeubilair: Verkeersveiligheid in relatie tot economische aspecten. (Verkorte versie R-77-25). Ir.F.C.Flury. R-77-26. SWOV, Voorburg, 1977. 22 blz.*
- + Onderzoek betreffende jeugdigen en de verkeersveiligheid en het verkeersveiligheidsbeleid in Nederland. Bijdrage aan Studiedag Kinderen en Verkeersveiligheid, Touring Club België, Antwerpen, 28 september 1977. Dr ir.D.A.Schreuder. R-77-27. SWOV, Voorburg, 1977. 11 blz.*
- + The introduction of a statutory BAC limit of 50 mg/100 ml in The Netherlands and its effect on drinking and driving habits and traffic accidents. Paper presented to the Seventh International Conference on Alcohol, drugs and traffic safety, Melbourne, Australia, 23-28 January, 1977. P.C.Noordzij. R-77-28. SWOV, Voorburg, 1977. 34 pp.
- + Een categorie-indeling van wegen benaderd vanuit het aspect verkeersveiligheid. Bijdragen t.b.v. OWG Langzaam Verkeer, Ad hoc Werkgroep Categorie-indeling van wegen binnen de bebouwde kom. Ir.S.T.M.C.Janssen. R-77-29. SWOV, Voorburg, 1977. 21 blz.*

- + Forschungsgesellschaft für Verkehrssicherheit SWOV; Ein Porträt. E.Asmussen & D.A.Schreuder. R-77-30. SWOV, Voorburg, 1977. 23 blz.
- + Translation into English of terms and definitions used in the road-accident statistics of The Netherlands, as reported by the police to the Central Bureau of Statistics (CBS) and the Road Accident Registration Department (VOR). R-77-31. SWOV, Voorburg, 1977. 18 pp.
- + Retroflecterende materialen aan fietsen en bromfietsen. Consult in opdracht van de Directie Verkeersveiligheid van het Ministerie van Verkeer en Waterstaat. SWOV. R-77-32. SWOV, Voorburg, 1977. 11 blz.*
- + Ademanalyse apparaten; Beproeving van apparatuur voor de bepaling van het alcoholgehalte in uitademingslucht onder laboratorium- en praktijkomstandigheden. SWOV (ing J.A.G. Mulder & drs P.C. Noordzij). R-77-33. SWOV, Voorburg, 1977. 176 blz.*
- + Demonstration project: Urban re-devision. Paper presented to members of Association pour le développement des techniques de transport d'environnement et de circulation ATEC, Paris. Voorburg, 26 september 1977. F.C.M. Wegman. R-77-34. SWOV, Voorburg, 1977. 5 pp. Also presented to the 13th AIT/FIA/PIARC International Study Week on Traffic Engineering and Safety, Montreux, 11-16 September 1978.
- + Some notes about the use of the traffic conflicts method. Contribution to the Proceedings of the First Workshop on Traffic Conflicts, Oslo, 26-27 September 1977; Report on the discussion of Group B. J.H. Kraay. R-77-35. SWOV, Voorburg, 1977. 7 pp.
- + Viaductbeveiligingsconstructie voor vrachtauto's; Een samenvatting van het verslag en de resultaten van een algemeen en een mathematisch onderzoek betreffende de ontwikkeling van een beveiligingsconstructie op een viaduct, bedoeld om ondoordringbaar te zijn voor zware vrachtauto's, verricht in opdracht van de Intercommunale B1 te Brussel, België. SWOV (ing W.H.M. van de Pol en ir A. Edelman). R-77-36. SWOV, Voorburg, 1977. 52 blz.*

- + Some aspects of traffic safety in residential areas. Contributed to OECD Research Group Traffic Safety in Residential Areas. J.H. Kraay & F.C.M. Wegman. R-77-37. SWOV, Voorburg, 1977. 23 pp.
- + Deceleratielengten bij uitvoegstroken in enkelbaansautowegen; Een discussiebijdrage. Consult t.b.v. Dienst Verkeerskunde van de Rijkswaterstaat. SWOV. R-77-38. SWOV, Voorburg, 1977. 25 blz.*
- + State of the art rapport 'Verkeersstroommodellen'; Deel I. Inleiding. Ir.H. Botma. R-77-39. SWOV, Voorburg, 1977. 19 blz.
- + State of the art rapport 'Verkeersstroommodellen'; Deel II. Macroscopische verkeersstroommodellen. Ir.H. Botma. R-77-40. SWOV, Voorburg, 1977. 58 blz.*
- + State of the art rapport 'Verkeersstroommodellen'; Deel III. Het basisdiagram. Ir.H. Botma. R-77-41. SWOV, Voorburg, 1977. 56 blz.*
- + State of the art rapport 'Verkeersstroommodellen'; Deel IV. Macroscopische dynamische verkeersstroommodellen. Ir.H. Botma. R-77-42. SWOV, Voorburg, 1977. 48 blz.

Reports 1978

- + Jaarverslag 1977. Stichting Wetenschappelijk Onderzoek Verkeersveiligheid SWOV. R-78-1. SWOV, Voorburg, 1978. 95 blz.*
- + Rapporten, publikaties en artikelen in 1976. R-78-2. SWOV, Voorburg, 1978. 11 blz.
- + Rapporten, brochures, publikaties en artikelen in 1977. R-78-3. SWOV, Voorburg, 1978. 11 blz.
- + Woonerven en hun verlichting. Lezing voor de Nederlandse Stichting voor Verlichtingskunde, gehouden op 19 januari 1978. Dr ir D.A. Schreuder. R-78-4. SWOV, Voorburg, 1978. 21 blz.*

- + Water nuisance and road safety. Paper presented to Session II of 1978 OECD Symposium on Road Drainage, Berne, Switzerland, 22-24 May 1978. A.G.Welleman. R-78-5. SWOV, Voorburg, 1978. 15 pp.
- + The relation between lighting parameters and transportation performance. Paper presented to Transportation Research Board. D.A.Schreuder. R-78-6. SWOV, Voorburg, 1978. 18 pp.
- + De veiligheid in het wegverkeer en haar bewaking. Bijdrage Symposium Veiligheid van de vervoerssystemen, georganiseerd door het Centrum van Vervoers- en Verkeerswezen van de TH-Delft, 17 maart 1978, Aula TH-Delft. Ir.E.Asmussen & Ir.F.C.Flury. R-78-7. SWOV, Voorburg, 1978. 31 blz.*
- + Een integraal verkeerelementen-registratiesysteem (INVERS). Lezing gehouden tijdens de cursus Wegonderhoud en Wegbeheer van de Stichting Postdoctoraal Onderwijs in de Civiele Techniek, op 21 maart 1978 te Lunteren. A Blokpoel. R-78-8. SWOV, Voorburg, 1978. 29 blz.*
- + De verkeersonveiligheid van voetgangers, fietsers en bromfietzers binnen de bebouwde kom in cijfers; Een statistische beschrijving van de landelijke gegevens betreffende verkeersongevallen en verkeersslachtoffers. Bijdrage Congresboek Nationaal Verkeersveiligheidscongres 1978, Internationaal Congrescentrum RAI, Amsterdam, 19-20 april 1978. A Blokpoel. R-78-9. SWOV, Voorburg, 1978. 51 blz.*
- + Die Beleuchtung in der Strassen als Wohnviertel. Vortrag für die Lichttechnische Gemeinschaftstagung der LvTG, LTAG, NSVV, SLG, RAI Kongresszentrum, Amsterdam, 13-16 Juni 1978. Dr D.A.Schreuder. R-78-10. SWOV, Voorburg, 1978. 23 pp.
- + SWOV onderzoekt veiligheid taluds; Proeven op ware schaal ondersteunen theorie. SWOV. R-78-11. SWOV, Voorburg, 1978. 4 blz.*
- + Efficiënter verkeersbeleid mogelijk met INVERS; Een Integraal Verkeerselementen Registratiesysteem. (Verkorte versie R-78-8). A Blokpoel. R-78-12. SWOV, Voorburg, 1978. 22 blz.*
- + The quality of life in residential areas; An introduction to a film made by the Foundation for Film and Science, in co-operation with the Institute for Road Safety Research SWOV, supported by the Royal Dutch Touring Club ANWB. Presented at the 13th AIT/FIA/PIARC International Study Week on Traffic Engineering and Safety, Montreux, 11-16 September 1978. SWOV. R-78-13. SWOV, Voorburg, 1978. 4 pp.
- + Systeemonveiligheid: inventarisatie van de toestand. Puntsgewijze samenvatting van een voordracht te houden op het Symposium 'Universitair Onderwijs en Onderzoek in Veiligheid', Aula TH-Delft, 11 oktober 1978. Ir E.Asmussen. R-78-14. SWOV, Voorburg, 1978. 9 blz.*
- + Onderzoek naar effecten van maatregelen en voorzieningen met betrekking tot het verkeer en de verkeersveiligheid in stedelijke gebieden. Een literatuuroverzicht t.b.v. de Onderzoek- en realisatiegroepen Demonstratieproject Herindeling en herinrichting van stedelijke gebieden (in Eindhoven en Rijswijk). SWOV (drs J.H. Kraay, mevr.E.Lind-Bart & M.van den Hondel). R-78-15. SWOV, Voorburg, 1978. 99 blz.*
- + Koers houden door fietsers en bromfietzers. Ir J.Godthelp (IZF-TNO) & drs P.I.J.Wouters (SWOV). R-78-16. SWOV, Voorburg, 1978. 39 blz.
- + De verkeersonveiligheid in de provincie Noord-Brabant IV; Het aspect stroefheid in het verkeersveiligheidsonderzoek Noord-Brabant. Interim rapport ten behoeve van de Stuurgroep van het Onderzoek Noord-Brabant. SWOV (Projectteam Noord-Brabant). R-78-17. SWOV, Voorburg, 1978. IV + 48 blz.*
- + The use of multiplicative models for analysis of road safety data. S.Oppe. R-78-18. SWOV, Voorburg, 1978. 35 pp.
- + Alcoholgebruik onder automobilisten, Verslag en resultaten van het onderzoek Rij- en drinkgewoonten van Nederlandse automobilisten in weekeindnachten in het najaar van de jaren 1970, 1971, 1973, 1974, 1975 en 1977. 2de Herziene en uitgebreide druk. SWOV (drs P.C.Noordzij, A.A.Vis en ing J.A.G.Mulder). R-78-19. SWOV, Voorburg, 1978. 140 blz.*

- + Eisen te stellen aan de verkeersverlichting. Voorlichting gehouden op de Congresdag Verlichting en Energiegebruik, Hilton Hotel, Rotterdam, 18 april 1978. Dr. ir. D.A. Schreuder. R-78-20. SWOV, Voorburg, 1978. 32 blz.*
- + Verkeersveiligheid bij kinderen. Bijdrage voor het Symposium Preventie van ongevallen bij kinderen. Oosterbeek, 17 en 18 oktober 1978. Ir. F.C.M. Wegman. R-78-21. SWOV, Voorburg, 1978. 30 blz.*
- + Invloed van het gebruik van helmen door bromfietzers en autogordels door inzittenden van personenauto's op de verkeersveiligheid. Consult ten behoeve van de Permanente Contactgroep Verkeersveiligheid (PCGV). SWOV (A. Blok-poe | J van Minnen, ir. L.T.B. van Kampen, drs P.C. Noordzij). R-78-22. SWOV, Voorburg, 1978. 64 blz.*
- + Nationaal Verkeersveiligheidscongres 1978. De veiligheid van voetgangers, fietsers en bromfietzers binnen de bebouwde kom; Samenvatting en conclusies van de inhoudelijke aspecten van de zaalinleidingen en workshops. Bijdrage Congresverslag Nationaal Verkeersveiligheidscongres 1978, Internationaal Congrescentrum RAI, Amsterdam, 19-20 april 1978. Ir. E. Asmussen. R-78-23. SWOV, Voorburg, 1978. 17 blz.*
- + Wetenschappelijk onderzoek ondersteunt beleidsmaatregelen. Bijdrage aan Berichten over Verkeersveiligheid (1978) 4 (december) (Themanummer Onderzoek en Statistiek). R-78-24. SWOV, Voorburg, 1978. 9 blz.*
- + Trendanalyse Verkeersveiligheid I; Beschrijving van de onveiligheid van 1964 t/m 1976 en de verwachting voor 1977, 1978 en 1979 + Bijlagen 1 t/m 5. J van Minnen. R-78-25A + B. SWOV, Voorburg, 1978. 70 + 59 blz.*
- + Breath analysis and blood alcohol concentration. J.A.G. Mulder & P.C. Noordzij. R-78-26. SWOV, Voorburg, 1978. 29 pp.
- + Systeemveiligheid: Inventarisatie van de toestand; Lezing tijdens het Symposium Universitair Onderwijs en Onderzoek in Veiligheid, Aula TH Delft, 11 oktober 1978. Ir. E. Asmussen. R-78-27. SWOV, Voorburg, 1978. 42 blz.*
- + Globale analyse van de geraamde verkeersongevalcijfers over het eerste kwartaal van 1978. Consult ten behoeve van de Permanente Contactgroep Verkeersveiligheid (PCGV) (Subgroep Statistiek). SWOV. R-78-28. SWOV, Voorburg, oktober 1978. 8 blz.*
- + Globale analyse van de geraamde verkeersongevalcijfers over het eerste halfjaar van 1978. Consult ten behoeve van de Permanente Contactgroep Verkeersveiligheid (PCGV) (Subgroep Statistiek). SWOV. R-78-29. SWOV, Voorburg, november 1978. 8 blz.*
- + Globale analyse van de geraamde verkeersongevalcijfers over de eerste negen maanden van 1978. Consult ten behoeve van de Permanente Contactgroep Verkeersveiligheid (PCGV) (Subgroep Statistiek). SWOV. R-78-30. SWOV, Voorburg, december 1978. 10 blz.*

Brochures and publications 1978

- + De SWOV in 1976 en 1977. SWOV (Afdeling Voorlichting). Brochure. SWOV, Voorburg, 1978. 44 blz., geïll.
- + SWOV in 1976 and 1977. SWOV (Information Department). Brochure. SWOV, Voorburg, 1978. 40 pp., ill.
- + Ten years road safety in The Netherlands; A description of the extent and trends of road traffic and road safety in The Netherlands since 1964. SWOV. Publication 1978-1E. SWOV, Voorburg, 1978. 88 pp., ill.
- + Lighting columns; Research on the behaviour of lighting columns in sideway-on and head-on impact tests with private cars. SWOV (C.C. Schoon & A. Edelman). Publication 1978-2E. SWOV, Voorburg, 1978. 57 pp., ill.
- + Hazards with falling lighting columns; Considerations regarding the positioning of lighting columns low-aggressive for private cars. SWOV (C.C. Schoon & A. Edelman). Publication 1978-3E. SWOV, Voorburg, 1978. 28 pp.

Articles 1978

- De veiligheid in het wegverkeer en haar bewaking. Ir E. Asmussen & ir F.C.F. Lury (1978).*
- Ook in: 'Veiligheid van de Vervoerssystemen. Boek 1: Preadviezen uitgebracht ten behoeve van het Symposium 'Veiligheid van de vervoerssystemen', georganiseerd door het Centrum voor Vervoers- en Verkeerswezen van de TH-Delft, 17 maart 1978, Aula TH. Delft, Deel D, blz. 115 t/m 125. Centrum voor Vervoers- en Verkeerswezen, Delft, 1978.
- Ademanalyse en het alcoholgehalte van bloed. J.A.G. Mulder & P.C. Noordzij (1977).*
- Ook in: Tijdschrift voor alcohol, drugs en andere psychotrope stoffen 4 (1978) 1 (maart): 23 t/m 32.
- Forschungsgesellschaft für Verkehrssicherheit SWOV. E. Asmussen & D.A. Schreuder (1977).
- Ook in: Zeitschrift für Verkehrssicherheit 24 (1978) 1 (Quartal): 3-10.
- De veiligheid van voetgangers, fietsers en bromfietzers binnen de bebouwde kom; Congresboek Nationaal Verkeersveiligheidscongres 1978 (Internationaal Congrescentrum RAI) Amsterdam, 19-20 april 1978. SWOV (ed.). (Bijdragen van Ir E. Asmussen, Ir F.C.M. Wegman, Drs S. Oppe, Drs P.J.J. Wouters, Mevr A. Kranenburg, A. Blokpoel e.a.) Koninklijke Nederlandse Toeristenbond ANWB, (s-Gravenhage), 1978.*
- De verlichting van verkeerstunnels. Dr ir D.A. Schreuder. In: Wagenaar, W.A. e.a. (eds.). Proeven op de som; Psychonomie in het dagelijks leven, blz. 108 t/m 113. Van Loghum Slaterus, Deventer, 1978.*
- Pechvogels en brokkenmakers. Drs M.J. Koornstra. In: Wagenaar, W.A. e.a. (eds.). Proeven op de som; Psychonomie in het dagelijks leven, blz. 148 t/m 162. Van Loghum Slaterus, Deventer, 1978.*

- Test equipment for sideways impacts. Ing C C Schoon (1977).
Also in: Automotive Engineer 3 (1978) 2 (April/May): 36.
- Verslag Derde Verkehrs-kraftfahrmedizinischer Kongress te Wenen. Dr.J.H.Aarts (medisch adviseur). In: Arts & Auto 44 (1978) 9 (29 april): 726-727.*
- Wegmeubilair, verkeersveiligheid in relatie tot economische aspecten. Ir.F.C Flury (1977).*
Ook in: Verkeerskunde 29 (1978) 6: 286 t/m 290.
- De (brom)fietser en de verkeersveiligheid. Drs P C Noordzij (1977).*
Ook in: Congres Fiets- en bromfietsvoorzieningen, Tilburg, 1977, blz. 58 t/m 60. Koninklijke Nederlandse Toeristenbond ANWB, 's-Gravenhage, 1978.
- A scheme for evaluating a local queue warning system. H Botma & H.L Oei (1977).
Ook in: Traffic Engng & Control 19 (1978) 7 (July) 350-354.
- SWOV onderzoekt veiligheid taluds; Proeven op ware schaal ondersteunen theorie. (1978).*
Ook in: Autokampioen 70 (1978) 36 (8-14 sept.): 2108 t/m 2111.
- Woonerven en hun verlichting. Dr ir D A Schreuder (1978).*
Ook in: Elektrotechniek 56 (1978) 9 (september): 633 t/m 639.
- The relation between lighting parameters and transportation performance. D A Schreuder (1977/1978).
Also in: Transactions 'Measures of Road Lighting Effectiveness', 3rd International Symposium, Karlsruhe, 5th and 6th July 1977, p. 7-20. Lichttechnische Gesellschaft e.V., Berlin (1978).
- Inventarisatie van Nederlandse opleidingen op het gebied van de verkeersveiligheid. Mevr. A. Kranenburg. In: Symposium Universitair Onderwijs en Onderzoek in Veiligheid, Aula TH-Delft, 11 en 12 oktober 1978, Deel 1, blz. 291 t/m 294. Symposiumbureau Academische Opleiding Veiligheid, Delft (1978).*
- Systeemonveiligheid: Inventarisatie van de toestand. Punts-gewijze samenvatting. Ir E Asmussen (1978).*
Ook in: Symposium 'Universitair Onderwijs en Onderzoek in Veiligheid', Aula TH-Delft, 11 en 12 oktober 1978, Deel 2, blz. 21 t/m 26. Symposiumbureau Academische Opleiding Veiligheid, Delft (1978).
- INVERS, een integraal verkeers-elementen registratiesysteem. A.Blokpoel (1978).*
Ook in: Verkeerskunde 29 (1978) 10: 475 t/m 478.
- Zichtbaarheid van wegmarkeringen op natte wegen; Een literatuurstudie. Dr.ir.D.A Schreuder. Stichting Studie Centrum Wegenbouw, Arnhem/Stichting Studiecentrum Verkeers-techniek (SVT), 's-Gravenhage, 1978. 65 blz., geïll.*
- Koers houden door fietsers en bromfietzers. Ir.J.Godthelp (IZF-TNO) & drs.P.I.J Wouters (SWOV) (1978).
Ook in: Verkeerskunde 29 (1978) 11: 537 t/m 543.
- Eisen te stellen aan de verkeersverlichting. Dr.ir.D.A.Schreuder (1978).*
Ook in: Elektrotechniek 56 (1978) 12: 897 t/m 903.
- Wetenschappelijk onderzoek ondersteunt beleidsmaatregelen (1978).*
Ook in: Berichten over verkeersveiligheid 1 (1978) 4: 3-4.
- Book review on Ian S. Jones: 'The effect of vehicle characteristics on road accidents'. L.H.M Schlösser. Vehicle System Dynamics 7 (1978): 255-256.
- De verkeersveiligheid van voetgangers, fietsers en bromfietzers binnen de bebouwde kom; Een toelichting op het congresprogramma. Ir F C M Wegman. In: Congresverslag Nationaal Verkeersveiligheidscongres 1978, gehouden op 19 en 20 april 1978 in het RAI-Congrescentrum te Amsterdam, blz. 8 t/m 10. Koninklijke Nederlandse Toeristenbond ANWB, 's-Gravenhage, 1978.*

- Samenvatting en conclusies van de inhoudelijke aspecten van de zaalinleidingen en workshops. Ir E. Asmussen (1978). Ook in: Congresverslag Nationaal Verkeersveiligheidscongres 1978, gehouden op 19 en 20 april in het RAI-Congrescentrum te Amsterdam, blz. 42 t/m 45. Koninklijke Nederlandse Toeristenbond ANWB, 's-Gravenhage, 1978.*
- Discussiestuk Workshop A: Consequenties van verkeerstechnische maatregelen op de verkeersveiligheid; hoe komt een onderzoeker (in een gemeente) achter de effecten. Drs S. Oppe. - Discussiestuk Workshop C: Berijdbaarheid van fietsen en bromfietsen. Drs P. I. J. Wouters.*
Discussiestuk Workshop E: Kennis over de verkeersveiligheidsproblematiek en de aanpak ervan; hoe en waar moet deze kennis aangewend worden in de gemeentelijke organisatie. Mevr. A. Kranenburg. In: Congresdag Nationaal Verkeersveiligheidscongres 1978, gehouden op 19 en 20 april 1978 in het RAI-Congrescentrum te Amsterdam, resp. blz. 52-53, 57-58 en 63-64. Koninklijke Nederlandse Toeristenbond ANWB, 's-Gravenhage, 1978.*
- Die Beleuchtung in der Strasse als Wohnviertel. Dr. D. A. Schreuder (1978).
Ook in: Tagungsbericht Lichttechnische Gemeinschaftstagung, RAI Kongreszentrum, Amsterdam, 13-16 Juni 1978, Teil II, pp. 348-358.

- Out of print or replaced by revised version, only to be borrowed from SWOV Library.

+ Available at request from the Information Department SWOV.

If not on our mailing list please let us know.
Institute for Road Safety Research SWOV
P.O. Box 71, 2270 AB Voorburg, The Netherlands

This brochure has been compiled by the Information Department SWOV.

Photographs by: Bureau of Public Works, Delft (cover, p. 8);
Adri van Wyngen, Vlissingen (p. 3); Studio Verkoren, The Hague (pp. 4, 10, 16, 17); Z. Stornebrink, Hilversum (p. 10);
Helmuth Vonk/Autovisie (p. 21); K. Wester/SCW (p. 22); a.o.