ANNUAL REPORT FOR 1975

annual report for 1975

INSTITUTE FOR ROAD SAFETY RESEARCH SWOV

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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 Council consists of representatives of various Ministries, of industry and of leading social institutions.

The Bureau is managed by E.Asmussen, SWOV's Director. Its departments include: Research Policy, Research Co-ordination, Research Services, Theoretical Research Pre-crash Projects, Applied Research Pre-crash Projects, Crash and Post-crash Research and Information.

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Foreword

In 1974, a start was made with an interdepartmental road safety policy, co-ordinated by the Minister of Transport and Waterways. Two interdepartmental consultative committees and the Road Safety Directorate DVV of the Ministry of Transport and Waterways set up in that year assist the Minister with his co-ordinating task.
Against this structure of road safety policy, important duties are allotted to SWOV, as specified in the Road Safety Policy Plan presented to Parliament in November 1975. This Plan indicates the need for scientific research as a means of surveying the safety aspects of road traffic and puts the co-ordination of all government research on this subject in the hands of the Road Safety Directorate DVV which, in performing these duties, enlists the services of co-ordinating bodies: the Central Road Safety Committee and the Permanent Contact Group on Road Safety. One of the purposes of this co-ordination is to ensure within the list of priorities governed by the availability of funds, that policy-related projects are promoted.

A substantial part of the research work is allocated to SWOV. While this perpetuates the relationship that has grown between the national policy-making bodies and SWOV, a new feature is that SWOV, besides its own research projects, now also has the duty of acting as an adviser for planning and performing research where this is carried out by others than SWOV. Duplication, overlapping and unnecessary differences in method are therefore likely to be avoided. Furthermore, it is intended that SWOV should present the results of scientific research in a form usable for policy formulation. Frequent contact between the Road Safety Directorate DVV and SWOV is described in the Policy Plan as being of importance for effective interaction between research and policy-making. These new duties have extended SWOV's field of operations. SWOV is no longer just a research institute, but also architect of research by others as well.
In 1975, SWOV already endeavoured to give shape to these new duties. Detailed consultations took place with the Road Safety Directorate DVV in order to assess the implications of these wider responsibilities, since a balance has to be struck between research and the new advisory tasks.

Research, in the way it has grown in SWOV, is subdivided into theoretical, basic research – focused on developing and testing new theories and methods – and policy-supporting research focused on direct accident prevention, on decreasing the consequences of accidents and on after-care. From both research sectors recommendations can be drawn, but research itself must go on.

Similarly, a balance must be struck between the duties envisaged by the authorities and the financial and organisational facilities that SWOV will be provided with. The benefits are now emerging from SWOV's adaptation in earlier years to making quick recommendations based on past research. These recommendations are proving their value, particularly in the current problems with which the authorities are faced. If these

are to go on being valuable, scientific research must not be disregarded; the sources of knowledge must not run dry.

Th.J. Westerhout, Chairman of the Council

Introduction

In 1975, and even earlier, governments started taking more interest in structural measures for reducing road hazards, especially in residential areas. Structural measures are often drastic and expensive. The requisite funds are often difficult to obtain, consultations frequently have to take place at many levels before the measures can be put into effect. If the measures prove not to have had the anticipated effect, modifications are only possible after further heavy capital expenditure and effort. People involved in decisionmaking processes relating to structural measures of any extent will be aware of these problems and will often safeguard themselves against failure by predicting the effectiveness of the contemplated measures with the help of scientific research.

No wonder, therefore, that government, provincial and local authorities are making more and more use of SWOV's services. Research is inexpensive compared with the cost of modifying traffic infrastructures and, within certain safety margins, can give some guarantee of the effectiveness of the proposed changes.
The number of research projects which SWOV has in hand increased considerably in 1975. In 1973 there were eighteen. In 1974 twenty-one. In 1975 there were no fewer than twenty-seven. The number of requests for recommendations also increased.

There is not only a big increase in the need for SWOV research, but there is also a striking increase in the demand for scientific information. The demand for SWOV publications doubled compared with the previous year. The dissemination of information obtained by research led to the despatch of about 9,000 publications to those professionally interested. Institutes outside the Netherlands sent us 633 requests for scientific publications.

These more strenuous duties, besides the new responsibilities referred to earlier in this annual review, put the Institute under great pressure.

The scope of the research programme has made it necessary to change the presentation of the 1975 Annual Report somewhat as compared with previous years. The principal difference is that a brief explanation is given of the objective of each project prior to reviewing the work in 1975.

E. Asmussen, Director

The Institute

The Council of the Institute for Road Safety Research SWOV was organised as follows at 31st December 1975:

Th.J. Westerhout, Chairman

Th. van der Meer, Deputy Chairman
on the recommendation of the Nederlandsche Vereeniging De Rijwiel- en Automobielindustrie RAI (Netherlands Association of Bicycle and Automobile Industry RAI)

J. Volmuller, Secretary
on the recommendation of the Minister van Onderwijs en Wetenschappen (Minister of Education and Sciences)

J. D. J. Idenburg, Treasurer
on the recommendation of the Nederlandse Vereniging van Automobielassuradeuren (NVVA) (Netherlands Association for Automobile Insurance NVVA)

P. Allewijn
on the recommendation of the Minister van Verkeer en Waterstaat (Minister of Transport and Waterways)

W.F. Haak
on the recommendation of the Minister van Volksgezondheid en Milieuhygiëne (Minister of Public Health and Environmental Hygiene)

C. A. Kuysten
on the recommendation of the Koninklijke Nederlandse Toeristenbond ANWB (Royal Dutch Touring Club ANWB)

A. J. Fonteijn
on the recommendation of the Minister van Justitie (Minister of Justice)

J. M. de Graaf
on the recommendation of the Minister van Binnenlandse Zaken (Minister of the Interior)

B. Schultsz
on the recommendation of the Koninklijke Nederlandsche Maatschappij tot Bevordering der Geneeskunst (Royal Netherlands Medical Association)

H. Zandvoort
on the recommendation of the Vergadering van Hoofden van Provinciale Waterstaatsdiensten (Joint Directors of the Provincial Bureaus of Public Works)

In personal quality:

J.P. Neeteson
director-in-chief of the Hoofddirectie van de Waterstaat (General Board of Roads and Waterways)

H.A.W. Nijveld
head of the Economisch Technische Afdeling van de Centrale Organisatie TNO (Economic Technical Department of the Central Organisation for Applied Scientific Research TNO)

The seven members first mentioned are forming the Executive Committee

On 22nd October 1975, Mr.Th.M.J.de Graaf resigned from the Council. No successor had been appointed at 31st December 1975.
In December 1974, Mr.H.A.M. Elsen left the Council. As from 1st January 1975 he was succeeded by Mr. W.F. Haak. The Council elected him to the Executive Committee.
On 23rd May 1975 Mr.P.Allewijn joined the Council, as proposed by the Minister of Transport and Waterways. The Council elected him to the Executive Committee to succeed Mr. J.P. Neeteson.
Mr.Neeteson became a member of the Council in personal quality as from 23rd May 1975.

The Bureau of the Institute is directed by Mr. E.Asmussen. Its departments include: Research Policy, Research Co-ordination, Research Services, Theoretical Research Pre-crash Projects, Applied Research Pre-crash projects, Crash and Post-crash Research and Information.

Obituary D.J.Griep

While this Annual Report was being compiled we were deeply grieved to hear that Mr. D.J. Griep, a SWOV research worker, was killed in a road accident on 13th February 1976.

Mr. Griep was in charge of the Department Theoretical Research Pre-crash Projects. As a worker with the Institute since its formation, Mr. Griep can be looked upon as the founder of general road safety psychology in The Netherlands.
He was the first to develop and stimulate scientific research into man's possibilities and limitations as a vehicle driver.
Mr. Griep put man at the focal point. His research concentrated on increasing our knowledge of human beings. His thesis was that roads, traffic conditions, vehicles and traffic regulations should be adapted to mankind and not the other way round.
The Contributions for the Ministerial Memorandum on Road Safety published in 1967 and the Elements for the Road Safety Policy Plan drawn up by the Institute for Road Safety Research SWOV in 1975 at the request of the Minister of Transport and Waterways largely bore the stamp of his scientific work.

Mr. Griep was a member of many national and international committees. He has written numerous scientific publications in The Netherlands and other countries.

E. Asmussen, Director

Research projects

1. Basic research

Research activities which are necessary for analysing road safety problems, making forecasts, establishing priorities, improving methods of research and developing theories for future research. These activities do not necessarily have any corresponding policy measures in view.

Analysis of the driving task

An analysis of driver behaviour, in such a way that a link is established between the general behavioural model relevant to driver behaviour and possibilities for practical applications.
The object is to find behavioural criteria for the assessment of driver characteristics and road, vehicle and traffic conditions.
Theoretical Research Pre-crash Projects
Project Leader: the late D.J. Griep

Route selection and guidance
The main work in 1975 consisted of literature research; a report will appear in due course with a concrete proposal for research.

Selection and maintenance of course, lateral position and speed
The Institute for Perception TNO undertook laboratory research into drivers' possibilities and limitations in detecting deviations in their vehicles' heading angle and lateral position. These tests, which will be continued in 1976, are of importance to driver/vehicle cybernetic models and for practical application in road marking.

At the request of the Ad hoc Working party on Road lighting, the Institute for Perception TNO at SWOV's request designed a number of experiments as part of the subsidiary project on Selection and maintenance of course, lateral position and speed. Their purpose was to provide some information on the influence which visibility conditions and/or road lighting levels have upon course maintenance etc.

Perception of other vehicles
Work was done on constructing a simulator (Institute for Perception TNO) which will make it possible, inter alia, to investigate drivers' abilities and limitations in detecting collision courses with other vehicles at intersections.

The Institute for Perception TNO was instructed to undertake literature research.

Preparations were made for new subsidiary projects on: Speed perception and influencing; and Providing of information at intersections.

Driver/vehicle cybernetic model

Cybernetic research is based on the notion that driver and vehicle are a total system (a man-machine system) and that such systems can produce the optimum output only if human properties as the controlling element within the system and the vehicle as the controllable element can interact in unison. The ultimate purpose of such research is to obtain descriptive models of the driver vehicle combination. A knowledge of such models, for instance, makes it possible to estimate the limits within which the combination forms a stable system, it provides information on the effect of external disturbances and the influence of elimination of, or transference to other, sources of information used in driving, etc.
Theoretical Research Pre-crash Projects
Project Leader: P.I.J. Wouters

In the literature research, theoretical analysis and reviewing of research methods and apparatus and of problem areas, developments and results in the literature are being followed.

With regard to the ridability of the two-wheelers (bicycles and mopeds) to which priority was given in the subsidiary research into Response characteristics of special vehicles, a draft state of the art report was completed. Information obtained from this draft has meanwhile been embodied in a background paper compiled within SWOV, describing the work which will be undertaken by OECD Research Group S13: Prevention of Accidents to Users of Two-wheeled Vehicles.
The report on the field tests regarding ridability, by the Institute for Perception TNO in co-operation with the Research Institute for Road Vehicles TNO, is now available. The diversity of bicycles and mopeds investigated in the field tests, which adequately reflects the design features of two-wheelers in The Netherlands, the realistic disturbing circumstances, riding tasks and the specific choice of test subjects, made it possible to request the Institute for Perception TNO to analyse the results also with a view to the necessary lane-widths. The resulting data were presented to a Working party of the Committee RONA (Design Guidelines for Non-Motorways).

As regards the reviewing of problem areas, the Research Institute for Road Vehicles TNO was requested to search the literature regarding the effect of side-winds on the driver/vehicle system's dynamic behaviour, response and system performance. The report has been completed in draft form.
The College for Automobile Technology, Apeldoorn, was contacted in order to examine the possibilities of examining the action of an air-shield and vortex stabiliser, placed on a tractor and trailer, on air displacement alongside such large motor vehicles. The background was that potential solutions for wind-hindrance to road traffic might involve modifying the aerodynamic design of air-displacing vehicles. Exploratory measurements will be made.
Preparations are well advanced for internal subsidiary research aimed at establishing the extent of the wind-hindrance problem in terms of its occurrence, and the places and other conditions in which road users are involved in accidents.

Standards for participation in traffic

Training and experience are major aspects in various situations and also as regards a number of criteria (including productivity and safety). Value is consequently attached to instilling the requisite skills by means of efficient training methods.
The research aims (a) at defining and analysing performance, basic skills and elementary processes; recording methods, (b) at reviewing and developing methods and aids for teaching skills, (c) at the selection of evaluation methods and criteria and (d) at reviewing critical situations with respect to safety and possible consequent specific training.
Theoretical Research Pre-crash Projects
Project Leader: R. Roszbach

A start was made with processing and analysing data obtained with the co-operation of the Central Bureau for the Issuance of Driving Licences CBR (results of the practical part of the driving test). This analysis concentrates on identifying driving-test characteristics as well as on locating possible shortcomings in new drivers' skills.

Road-safety education

The object is to obtain information on the way road-safety education should be structured and presented to young people.
Theoretical Research Pre-crash Projects
Project Leader: R. Roszbach

In the preparatory stages of this project (in co-operation with the Groningen State University; Traffic Studies Project Group, Professor J.A. Michon) an extensive compilation of the literature was made. This formed the basis for problem analysis and research planning.
The next stage will comprise detailed analysis of the literature from various angles: task analysis, developmental psychology, learning psychology, and educational aspects. After integration of the findings from these various aspects an empirical research plan will be formulated.

SWOV assisted in drawing up the definitive version of the report on Driver Instruction for OECD Research Group S10: Driver Education and Training.

Traffic-flow models

Measures relating to roads and traffic are usually based on fairly rough criteria regarding hazards (accident statistics) and on traffic flows (levels of service), while the relationship between the various criteria is not clear enough. The point of this research is to improve this by recording and analysing traffic-flow data and by putting these data in a mathematical model. Traffic flow data comprise among others densities, speeds, vehicle-following times and overtaking manoeuvres, and of external factors affecting traffic flows, such as road characteristics and atmospheric conditions.
The results of this research can be assumed to furnish information of importance in

indicating, designing and evaluating measures influencing traffic flows, including road safety.
Theoretical Research Pre-crash Projects
Project Leader: H. Botma

The general literature research into traffic-flow models for arterial roads was continued. An initial draft was completed for general average traffic-flow characteristics such as intensity, density and average speeds, and for the characteristics themselves and their static and dynamic interrelationships, and for traffic-flow characteristics, such as speed and following-time distributions.

The examination of the properties of a new measuring system for traffic flows carried out in collaboration with the Transportation Research Laboratory of Delft University of Technology did not yet produce any results owing to unforeseen delays in working out the results of the first experiment.

Breath-analysis methods

Here, the object is to test breath-analysis equipment for scientific research, utilising the experience gained from research into Drinking and driving.
Applied Research Pre-crash Projects
Project Leader: J.A.G. Mulder

During the year under review new developments in breath analysis equipment were followed.
The study of the research results, and close contact with industry, led to two types of apparatus qualifying for further testing. These experiments were fitted in the field research on Drinking and driving this Autumn (see p. 31).
In the case of a type of analyser intended as a screening aid for the police, the tests were made at the request of and in collaboration with the Forensic Laboratory of the Ministry of Justice.

Categorising of roads

This research concentrates on the systematic classification of the Dutch roads system into categories aimed at improving road safety without losing sight of other quality aspects of traffic flow. The categories are based on the roads' traffic (or precinct) function which should conform with the designing of the traffic facilities (road characteristics), and road-user behaviour within the traffic situation (traffic and vehicle characteristics). The roads in each individual category must satisfy the expectations they create in the road user's mind. This calls for a limited number of categories clearly distinguishable by road users.
Applied Research Pre-crash Projects
Project Leader: S.T.M.C. Janssen

At the end of 1974, SWOV formulated a theoretical classification for the Dutch roads

system. For one of the next research stages, i.e. reviewing the Dutch roads system, preliminary work was done in the form of random sampling of streets taken from the complete range administered by the Road Accidents Recording Department (VOR). Preparations were furthermore made for selecting the research method, together with the appropriate analysis methods.
Lastly, SWOV is an advisor of a number of governmental working parties dealing with road guidelines.

Information systems in road traffic

A driver has limited scope for perception, judgement and decision. In present-day traffic, the demands drivers have to meet can be assumed to lead to dangerous situations. With the present state of the technique it should be feasible to furnish information on incidents beyond the driver's immediate perception or for making judgement and decision problems easier to solve. The research is aimed at gathering knowledge and establishing research priorities for information systems.
Applied Research Pre-crash Projects
Project Leader: H. L. Oei

Work on road traffic information systems was temporarily suspended because SWOV took part in the research on Road hazards in the province of Noord-Brabant. Preparations were made for issuing publications based on a review of information systems in various countries.
SWOV joined the Working party on Traffic information by radio, set up by the Traffic and Transportation Engineering Division of Rijkswaterstaat DVK.

Methods for black-spot studies

The object of the research is to draw up guidelines (directions) for studies aimed at improving black spots. This necessitates the specification of existing and possible new methods of research and analysis.
Applied Research Pre-crash Projects
Project Leader: S. Oppe

As a member of OECD Research Group S12, SWOV collaborated in the report on Hazardous Road Locations: Identification and Countermeasures. This deals at length with road and traffic characteristics which must be taken into account in improving black spots. An endeavour was made to draw up a check-list for road administration authorities. The report has little to say on the improvement of methods for identifying and analysing black spots. With a view to this, SWOV began a literature research into conflict observation techniques. The next important step is to analyse the relationship between traffic characteristics and accident statistics, while there are as many as possible equal road characteristics.

Mathematical model of vehicle exterior and surroundings

This research comprises the design, verification and further development of mathematical models of vehicle collisions with safety structures, obstacles and other vehicles.
Crash and Post-crash Research
Project Leader: A.Edelman

As regards this model, development continued in collaboration with Professor V. Giavotto of the Istituto di Ingegneria Aerospaziale del Politecnico di Milano of a part-model for an all-round deformable vehicle exterior and part-models for obstacles. Various improvements were also made in the basic model, and the design of a modular structure for this model was started.
The model was also used very effectively for developing a special bridge safety barrier for (heavy) trucks at the request of the Belgian authorities.

Mathematical model of vehicle interior and occupants

This project covers the design, verification and further development of mathematical models for simulating collisions, as regards the vehicle interior and the occupant or occupants, i.e. including seat belts, padding, etc.
Crash and Post-crash Research
Project Leader: A. Edelman

As regards this model, there has already been practical collaboration with the Research Institute for Road Vehicles TNO.
The enlistment of a new project leader by SWOV at the end of 1975 has made it possible to push ahead with this work.
Efforts were made to verify the two-dimensional model of a vehicle occupant, while good progress was made with the three-dimensional model, especially including computer-generated motional equations.

2. Policy-preparatory research

This research provides recommendations for measures which the Authorities intend to take.

Road Safety Policy Plan

Late in 1974 and early in 1975 five sections of the Elements for the Road Safety Policy Plan were presented to the Road Safety Directorate DVV set up in the meantime, for the purpose of the first stage (an overall analysis of road safety and road hazards and a review of present knowledge).
The object was to supply constructive elements for the Policy Plan: to serve as discussion papers for the appropriate policy-making bodies.

Because of the short time available for carrying out the first stage, the presentation of basic material had to suffice. The Elements thus consist primarily of (parts of) lectures, papers, reports and recommendations already presented or being processed, and continuous research reporting. They cannot therefore claim to be complete or well-balanced, either in subject matter or their references to literature. In this stage there was no possibility of indicating policy implications in terms of proposals for specific measures.
Since, as already stated, these texts had to serve as elements in the consultations prior to compilation of the Road Safety Policy Plan, the texts were not re-edited for publication.

Advice on low-speed mopeds

Research Services
Project Leader: A. Blokpoel

On 9th October 1975, the Minister of Transport and Waterways requested SWOV to inform him before the end of the year of SWOV's views on the anticipated consequences of low-speed mopeds whereby the rider would be exempted from wearing a crash helmet, upon road safety. Assistance was received from the Netherlands Association of Bicycle and Automobile Industry RAI, the Central Bureau of Statistics in The Netherlands CBS and other institutions possessing the information needed for this research. It was possible to report to the Minister before the end of the year, as requested.

Integrated road-accident recording

The purpose of this research is to obtain greater insight in making recommendations for the most effective, objective and efficient method of recording data on traffic hazards such as occur on public highways. The fullest possible allowance should be made for the needs of a large number of users of these data, such as policy-making bodies (including the Ministry of Transport and Waterways and the Ministry of Public Health and Environmental Hygiene, government and municipal statistical offices, the police, organisations providing information (Dutch Road Safety Association VVN, Royal Dutch Touring Club ANWB, and so on) and research establishments.
Owing to the complexity of the problem, the entire research project is divided into a number of subsidiary projects:
- *cataloguing the position relating to accident records in The Netherlands;*
- *insurance companies' accident records;*
- *sub-recording system for road casualties' medical data;*
- *sub-recording system for vehicle characteristics;*
- *sub-recording system for road and traffic characteristics.*

Research Services
Project Leader: A. Blokpoel

Pilot study Utrecht
In the course of 1975, the definitive version of the report on the evaluating research into Road accident recording (VOR), a description and results of the Preliminary research on Carnets and the Pilot study in the province of Utrecht was completed. Owing to various causes, the figures obtained were not representative of the material expected by the future Road Accidents Recording Department VOR, and as regards the purpose of the project, therefore: to establish the value of the VOR on the basis of statistical forms and claim forms, it was not possible to draw any conclusions.
The research, however, does indicate that of all the road accidents that became known via claim forms about one-third were known to the VOR via police records.
It was also found during the investigation that a new type of claim form was not being sufficiently used by road users.

Medical records
Owing to a change in priorities, the reports on the tests in Rotterdam could still not be finalized.

Recording road, traffic and vehicle characteristics
In 1975, a start was made with theoretical research for these sub-recording systems. This theoretical research is intended to give indications of the important points in the next stage of the research (primary functional requirements).

Working party on Statistics
Good road safety policy makes it necessary to have qualitatively and quantitatively sound road accident records.
Although insurance companies are prepared in principle to assist with these new records, there are a number of considerations preventing actual introduction at present of the continuous provision of copies of all claim forms they receive.

The Road Safety Directorate of the Ministry of Transport and Waterways DVV and the Netherlands Association for Automobile Insurance NVVA have meanwhile set up a Steering group in which the Road Accident Recording Department VOR and Volder & Co., an organization and efficiency bureau, are also represented. The group is seeking constructive solutions by mutual consultation which will be acceptable to all parties, so as to obtain the best possible system of accident records.
The group has set up a Working party on Statistics which will first advise the Steering group on how research can be undertaken to obtain information on the additional qualitative and quantitative value of accident records expanded with insurance data. SWOV will advise the DVV at its request on the essential aspects of the investigations still to be carried out.

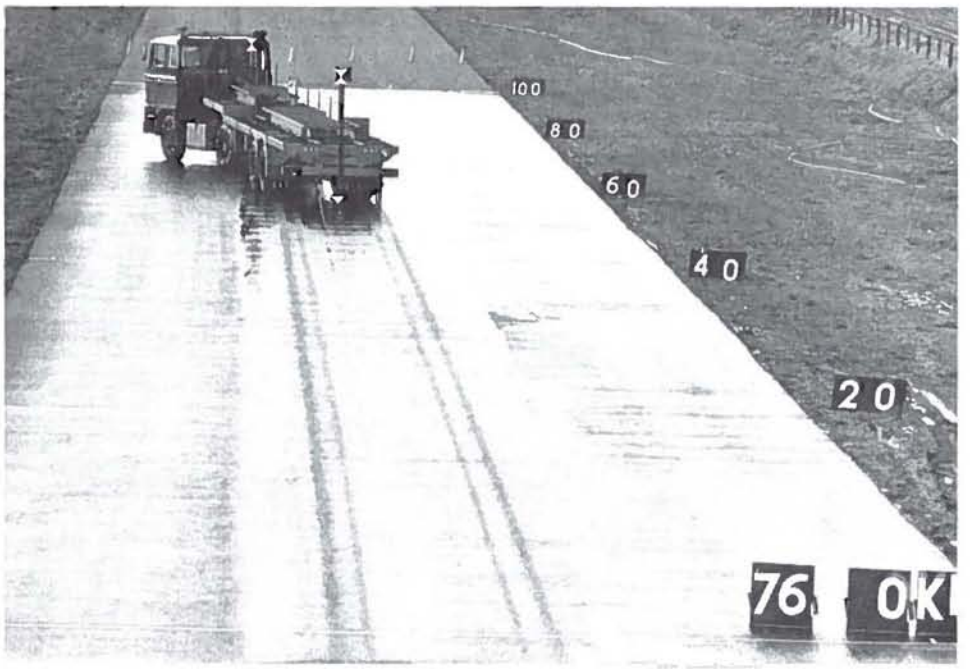
Road hazards in the province of Noord-Brabant

This research will take place in three stages.
Stage 1: (a) overall assessment of relative road hazards in Noord-Brabant as compared with the other provinces; (b) further quantitative analysis of road hazards in Noord-Brabant as compared with the rest of The Netherlands. This stage will be completed by establishing a number of target areas in Noord-Brabant.
Stage 2 will be the formulation of possible explanations for the target areas, the indication of research priorities for these and their effectuation. Measures will be proposed based on known theories and research results and on the results of the present research.
Stage 3: evaluation of the effect of these measures on road safety in Noord-Brabant.
Research Services
Project Leader: H. L. Oei

A Steering group was set up, with SWOV acting as rapporteur. A technical Working party was also set up.
The report on Road hazards in Noord-Brabant I: The first version of an overall comparison of hazards in Noord-Brabant with those in other provinces and in The Netherlands as a whole, was completed and handed to the Steering group.
The report on Road hazards in Noord-Brabant II: Analysis of relative hazards in Noord-Brabant as compared with the Rest of The Netherlands, is practically complete.

Tyres, road surfaces and skidding accidents

Research into the extent of skidding and the influence of the factors involved. Recommendations for practical measures will have to be made, based on the knowledge so gained. A Working party on Tyres, road surfaces and skidding accidents had been set up to work out the research. This Working party gave subsidiary projects to sub-committees. A number of such projects have meanwhile been completed.
Project I: Experimental multifactor research into braking and side-way forces on the one hand and road surface and tyre characteristics, speed, tread depth, water-layer depth and other relevant factors on the other.
Project II: Research into the braking force distribution between a vehicle's axles on the one hand and its deceleration and stability on the other.



For the research into Emergency braking of trucks, all auxiliary braking systems were tested in practice with a specially prepared tractor-semi-trailer combination under various conditions (speed, loading, road-surface skidding resistance).

Project III: Behaviour observations with accelerometers and cine cameras.
Project IV: Development of simple measuring equipment.
Project V: Statistical single factor research into the relationship between relative road risk and road-surface skidding resistance.
Project VI: Statistical multi-factor research into first-order factors involved in skidding.
Project VII: Minimum tread depth of tyres.
Applied Research Pre-crash Projects
Project Leader: L.H.M. Schlösser

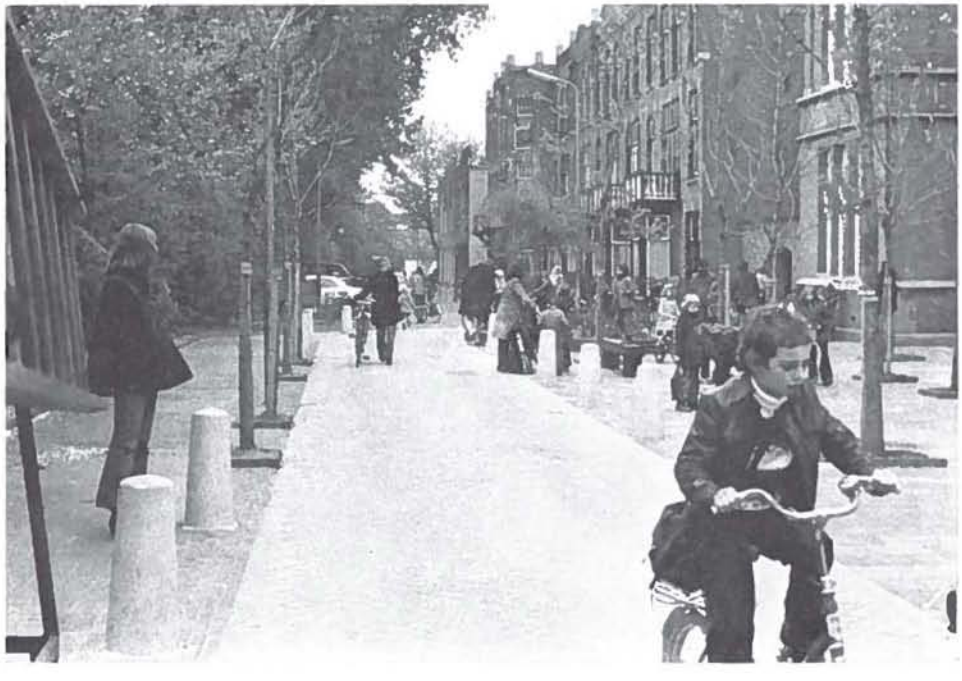
Projects I, II, V and VII were finalized. In the case of I, a film was completed on Tyres and road surfaces. Based on the resulting information, summaries were made together with recommendations for further research. These are intended as a preliminary to the functioning of an Interdepartmental project group. This group will also have to decide the form and contents of Projects II, IV and VI. In anticipation of the work within this new consultative structure, investigations were already made at the request of the Department of Road Transport RDW into emergency braking of trucks, in continuation of Project II.

Ad hoc Working party on Emergency brakes
Experimental and analytical research is being used in seeking recommendations for statutory requirements for trucks' braking systems. In the first instance, a specially prepared tractor-semi-trailer combination was used for practical testing of all auxiliary braking systems, under various external conditions such as vehicle speed, loading and road-surface skidding resistance. The results were verified against criteria for the vehicle's deceleration and lateral stability. This project is being carried out in collaboration with the Vehicle Research Laboratory of the Delft University of Technology and Daf Trucks B.V., Eindhoven. The tests were filmed by the Foundation Film and Science SFW, Utrecht.

Pedestrians and cyclists in built-up areas

Research into the factors affecting pedestrian safety in built-up areas, followed by evaluation of present measures and the indication of criteria for providing various types of safety devices. An aspect that must not be disregarded is the social and economic interests (movement flows) of both pedestrians and vehicles.
Applied Research Pre-crash Projects
Project Leader: J.H. Kraay

This included consultation on policy measures based, inter alia, on a number of SWOV reports, within the Interdepartmental project group on Pedestrians and cyclists in built-up areas. There are a number of ad hoc Working parties; SWOV is a member of two: Pedestrian facilities and Categorising of roads in built-up areas.
The Interdepartmental project group is also in constant touch with the Interdepartmental working group on Environmental conditions of traffic in towns and villages, in which SWOV acts as an observer.



Various measures have already been adopted in order to increase the safety of pedestrians and cyclists in built-up areas. These pictures show a school in Delft, where the street has been reconstructed, providing an area where pedestrians and cyclists can move about more easily.

Road safety in residential areas

There are too few accidents in a residential area to warrant scientific conclusions, and a conflict observation method is being evolved in order to determine effects on road safety. The ultimate object is to verify new approaches in planning direct residential areas against their use and the consequent road safety aspects.
It is felt that infrastructural physical-planning measures will have more effect on the safety of pedestrians than purely behavioural regulations.
Applied Research Pre-crash Projects
Project Leader: J.H. Kraay

During the year under review, development was commenced of a conflict observation method as a potential substitute for measuring traffic accidents. This method was developed under both laboratory and field conditions. The field conditions concerned two residential areas in Delft differing in their physical planning. The project is being carried out by the Netherlands Institute for Preventive Medicine TNO, Leiden.

Road safety in country districts/Investigation into road safety in De Beemster polder

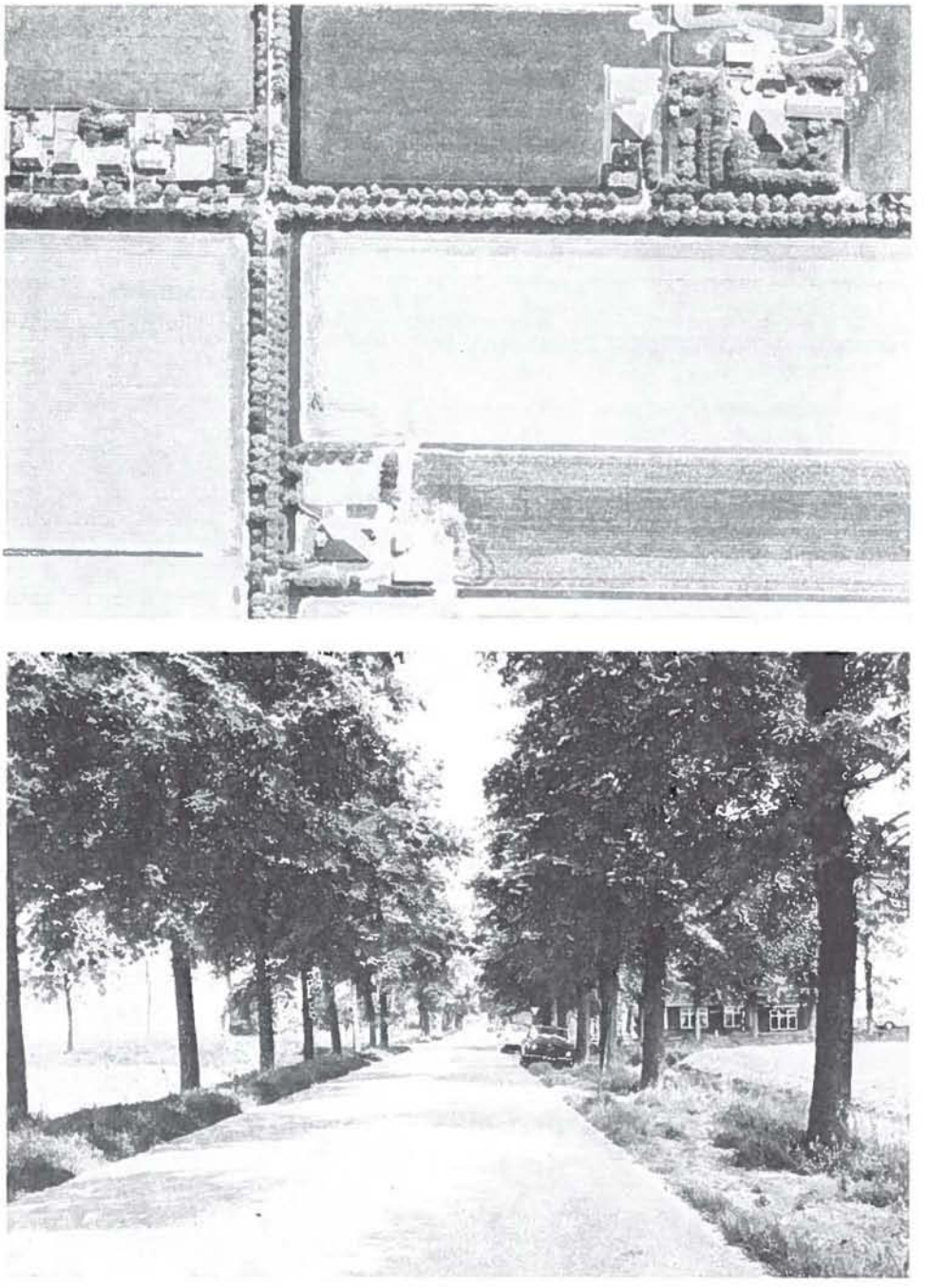
This research focuses on road-safety criteria for constructing and making infrastructural modifications to roads in rural areas. Recommendations for road-safety measures in such areas can be inferred from these criteria.
Research into road safety in De Beemster I relates to recommendations for road-safety measures in De Beemster at an early date.
Research into road safety in De Beemster II (*See Evaluation Research*).
Applied Research Pre-crash Projects
Project Leader: S.T.M.C. Janssen

During the year the reports on Project I were completed and presented to the Steering group.

Safety of children in private cars

Research into safety precautions for children in private cars, based on information gained in the meantime and on norms, standards, regulations or legislation effected or being effected in other countries. The purpose is to arrive at a set of requirements for regulations relating to safety of children in private cars by way of a pragmatic approach.
Crash and Post-crash Research
Project Leader: A. Edelman

Together with the Research Institute for Road Vehicles TNO many of the programmed projects were carried out during the year. They will be compiled in a report as soon as possible. Verification will also be required by means of test inspections.



The research in De Beemster polder revealed dangerous intersections. The intersection seen from the air in the top illustration as approached from right to left is hardly distinguishable for an approaching road user, nor are the various exits, as the bottom illustration shows.

Safety structure for bridges

This research is aimed at developing effective safety structures for bridges, in order to prevent vehicles crashing through the central reserve or the shoulder.
Crash and Post-crash Research
Project Leader: W.H.M. van de Pol

This research had already been reported on to the Rijkswaterstaat's Working party on Roadside safety structures. Following this, the authorities in 1975 drew up draft guidelines for designing roadside safety structures on bridges. Other work on this research has been slowed down because of the work on a bridge safety structure for (heavy) trucks for the Belgian government.

Roadside obstacles

Research into the extent to which roadside obstacles constitute a danger to road traffic and how to reduce this risk.
Crash and Post-crash Research
Project Leader: C.C.Schoon

A report was presented to the Interdepartmental project group on Roadside obstacles regarding the research on lighting columns with a low aggressiveness for private cars and heavier vehicles. A report was also drawn up to furnish more general information. A film is in course of preparation. A report was prepared relating to the *incidental* risk of an impact with a lighting column of low agressiveness. This risk implies in the first place that the column may hit road users after a collision. In the second place, if the column drops on to the carriageway it may constitute a danger to other road users, especially two-wheeler riders.

Obstacle-free zone

Research into the relationship between collisions with roadside obstacles on various types of roads and the lateral distance between these and the carriageway edge.
Crash and Post-crash Research
Project Leader: C.C.Schoon

While the research was being carried out, it proved necessary to have more data. After having obtained and processed additional material on provincial roads and national highways, the preparation of a report was commenced.

Bridge safety structure for trucks

The Belgian Director-General of Highways asked SWOV via the Intercommunale B1 (Motorways Association for the Brussels Periphery) to evaluate a safety structure designed in Belgium for a bridge in the Brussels ringroad.

In order to examine the danger of sideways-on collisions during the research into Lighting columns, a special test installation was used with which reproducible lateral impact tests can be made.

Overall assessment indicated that the Belgian structure was unsatisfactory, and SWOV submitted a proposal for designing and verifying an alternative.
The following subsidiary projects were necessary for this purpose:
1. Collection of the necessary data and formulation of the principles on which a design could be based.
2. Research with the mathematical model of the vehicle-exterior/surroundings suitably adapted for this project.
3. Verification of the provisional design with a number of full-scale tests.
This work had to be done quickly, in view of the forthcoming opening of the bridge.
Crash and Post-crash Research
Project Leaders: W.H.M. van de Pol and A.Edelman

In 1975 most of the data mentioned in 1 had been collected, and on this basis mathematical research for the provisional design was more or less finalized.
Most of the mathematical research was carried out by Professor V. Giavotto, of the Istituto di Ingegneria Aerospaziale del Politecnico di Milano, with whom there is very close collaboration.
It is intended to have the full-scale tests made by the Motor Industry Research Association (MIRA), in Britain. MIRA has promised to develop testing facilities suitable for running heavy masses (road trucks) at high speed. After receipt of the first part of the study (the provisional design resulting from mathematical model research) the principals wish, however, to consider whether full-scale tests are necessary.

3. Evaluation research

Research into the effects of governmental measures and/or safety campaigns.

Crash helmets for moped riders/Evaluation of publicity campaign on moped riders' crash helmets

This subsidiary research project aims at evaluating the effect of a campaign as part of a general objective, i.e. to promote the wearing of crash helmets by moped riders and their passengers during a period prior to, at the time of and after introduction of compulsory use.
Applied Research Pre-crash Projects
Project Leader: P.C. Noordzij

Following the compulsory wearing of crash helmets by moped riders as from 1st February 1974, a final enquiry was made among moped owners in May by the Institute of Social-Scientific and Economic Research ISEO, Bussum. The information obtained from all four enquiries since Autumn 1973 is now being processed, and in due course a report can be made on the extent to which the measures – especially the Dutch Road Safety Association VVN publicity campaign – have had any effect.

Investigation into road safety in De Beemster polder II

Project II is intended to ascertain the effect of the selected measures on road safety in De Beemster, by means of before and after studies.
Applied Research Pre-crash Projects
Project Leader: S.T.M.C. Janssen

As part of evaluating research of the prospective measures, speed and density measurements were made.

Drinking and driving

The objective can be divided into three sub-sections:
1. *To determine the lasting effect of the proposed change in Article 26 of the Road Traffic Act (WVW) by comparing statistics from roadside surveys on drinking and driving before and after the change took effect.*
2. *To make suggestions for supplementary measures that might be taken with regard to drinking and driving, with a view to improving road safety.*

3. *To collect information on the value of breath analysis for scientific research purposes.*
Applied Research Pre-crash Projects
Project Leader: P.C. Noordzij

In 1975 there was again a complete roadside survey in September, October and November on Friday, Saturday and Sunday nights from 22.00 to 04.00 hours, covering over 3000 persons. As compared with earlier roadside surveys, some modifications were made, such as the use of breath analysis instead of blood tests by two of the three teams and by changing the location of the teams half way through the night. The latter meant that the number of test locations had to be greatly increased, and some new municipalities had to be included.

Evaluating research on roadside safety structures

The object of this research is to ascertain the extent to which various safety structures located in the course of the years in soft soil and on bridges meet the requirements.
Crash and Post-crash Research
Project Leader: W.H.M. van de Pol

With regard to the evaluating research on Roadside safety structures it proved impossible, as preliminary tests had already indicated, to use the customary evaluating methods. It was not possible to trace most of the required data. This project was therefore redesigned, so as to include reviewing guide-rail structures along Dutch motorways. A start was made with this work.
The other work on this project was slowed down by that relating to a bridge safety structure for (heavy) trucks, for the Belgian authorities.

Vehicle characteristics of importance in reducing the severity of injuries

The consequences of car accidents are substantially influenced by specific vehicle characteristics. They include the car's overall construction, and specific safety devices such as seat belts. Such provisions are generally developed in the car manufacturers' laboratories, but their actual efficacy can only be established by analysis of actual accidents.
The object of this research is therefore to evaluate the effectiveness of safety devices by reference to accident statistics, under the various conditions actually occurring in accidents (in The Netherlands).
Crash and Post-crash Research
Project Leader: L.T.B. van Kampen

Statistical accident research into safety devices
The project started in 1968 has almost been completed by way of publications and reports. It meant listing over 22,000 car accidents for a two-year period. From 1971, the material was processed, extended and improved, and analysed with computer programmes.
The most important part of this project was to analyse the effect of seat belts; the data

were used not only for recommendations in national policy-making, but also in international consultations relating to private cars (ECE, EEC). Based on the information obtained from this research, the report on Lap belts and three-point belts was published in 1975.
In view of their experience, the project workers took part in an international accident project started during the course of this research (under the auspices of NATO-CCMS), and close contact was maintained with research institutes in other countries.
Subsequently to this, and in collaboration with the Department of Road Transport RDW, a start was made at the end of 1975 on planning the OECD International Accident research project.

Enquiries regarding the fitting and use of seat belts
Enquiries were made into the fitting and use of seat belts by motorists on the road, firstly as an aid to statistical accident research, but later as an independent subsidiary project.
The enquiries were made twice a year, in July and October, from 1971.
Reports on the results were published and the enquiries continued, partly in order to check developments since the wearing of seat belts was made compulsory for a large proportion of motorists on 1st June 1975.
Two press releases were issued reporting on limited enquiries in May and June 1975 and two normal enquiries in July and October.

Supplementary research: Accident analysis
This research has the object of keeping track of developments in newer safety devices, by means of accident research. Devices such as head rests, safety-type steering columns, laminated-glass windscreens, cage constructions, etc. have been developed so as to lessen the severity of car crashes.
Their effectiveness has to be established in practice, and the results of the research can indicate to what extent the structures are satisfactory or are susceptible of improvement.
Only large-scale investigations can provide material qualitatively and quantitatively adequate to arrive at reliable conclusions.
This project, planning for which began in 1975 and in which wide use has been made of experience gained in earlier accident research, provides for the inspection of 15,000 damaged cars.
Besides data on damage, the remaining accident statistics and information concerning the occupants and any injuries sustained will be compiled. Commencing in February 1976, the period covered will be about eighteen months. After this, the information will be processed, analysed and reported upon.

Documentation and Library/ Basic data section

Documentation and Library

Work on documentation and the library relates to the selection, collation and efficient retrieval of professional publications to assist SWOV's road-safety research and for maintaining the level of SWOV's specialists in the various scientific disciplines.
Research Services
Project Leader: J.F. Demmenie

The growth in the library has aggravated the shortage of accommodation, putting an extra burden on the library staff, who had to seek means of creating additional storage space.
The number of outside lendings increased, while during the year, similarly to 1974, extensive bibliographical information on road safety and related subjects was supplied on over 80 occasions to research workers and students in The Netherlands and other countries.

Within the International Road Research Documentation Pool (IRRD) work was done in adapting the system to changes in users' interests. The IRRD data base has now been available complete as from 1972 and is accessible via indexes; by using the COM process (Computer Output on Microfiche) time and space are being saved. Within the IRRD a survey of current projects on road traffic research in The Netherlands was revised for the International Road Federation (IRF).

Basic data section

The objective is to obtain fuller information on the absolute and relative extent of road safety in all its aspects. It is also important to keep pace with developments, in order to make forecasts.
Research Services
Project Leader: S. Harris

Operations in 1975 were determined primarily by the following three main projects:
1. Supplementary statistics on fatal accidents;
2. Location coding of fatal accidents;
3. Risk research among road users.

1. *Supplementary statistics on fatal accidents*
The purpose of this project is to use more of the data provided by the police than the Central Bureau of Statistics in the Netherlands CBS processes in order to obtain more information about road accidents.

The project is now limited to fatal road accidents from 1968 onwards, especially as regards their occurrence. The main activities in this project were:
(a) Building up the data bank of supplementary statistics of fatal road accidents from 1968 to 1973;
(b) The addition of supplementary statistics of fatal road accidents in 1974;
(c) The provision of tables from this data bank for the Departments Crash and Post-crash Research and Applied Research Pre-crash Projects, by manual processing;
(d) Contact was established with the Road Accidents Recording Department VOR, Heerlen, during which possibilities were discussed, without any commitment, of their taking over future processing (coding – taping) of supplementary statistics on fatal traffic accidents.
The solution of technical computer problems regarding the serviceability of the data bank was dealt with by a computer processing agency.

2. *Location coding of fatal accidents*
In February 1975, a start was made with building up an initial auxiliary bank for the project on Supplementary statistics on fatal accidents.
The purpose of the Location coding project was to encode accident locations to an accuracy of at least 100 metres. The project made use of the coding system developed for the Road Accident Recording Department VOR, Heerlen, and of that department's manpower and equipment.
The work on this project was completed at the end of November 1975, after which the tapes with the relevant data for 1968 to 1974 were handed over to SWOV.

3. *Risk research among road users*
The object of this project is to compile statistics on road-traffic performance by various categories of road users, such as motorists, cyclists, moped riders and pedestrians.
It has been found that, with the exception of motorists, hardly any statistics are available for other categories which can be regarded as sufficiently reliable.
Road-traffic performance data are an important link in quantifying and qualifying road safety problem areas. This is evident, for instance, from the fact that the lack of such reliable data is a serious impediment in an increasing number of research projects, whereby SWOV cannot carry them out on an adequate scientific basis.
Bearing in mind the great importance of research, a number of preliminary studies have been commenced in the planning stage, the results of which will be known within the near future. These results can be used, among other things, as the basis for this project.
In addition to these three main projects, the collection of basic data includes the following activities:
1. In 1975, a start was made with collating and carrying out ad hoc surveys. This is a new form of activity, anticipating new developments in road safety. It should be looked upon as an extension of the continuous work on the collection of basic data.
2. Data of a widely divergent nature have been supplied to third parties (via the Information Department) and to our own research workers.
3. In the last quarter of 1975, considerable work was done on the recommendations relating to low-speed mopeds, presented to the Minister of Transport & Waterways at the end of 1975.

Information

The duties of the Information Department are as follows:
a. to advise on general policy;
b. to give advice on information activities on the basis of general policy;
c. to carry out and evaluate these activities.
The recommendations made are of two kinds. One consists of recommendations regarding the Institute's place in society, i.e. they indicate and assess social trends that may be of importance to (the functioning of) the Institute. The other consists of recommendations on the standpoint the Institute should take, for instance in specific problems with a general social aspect.
Publicity work is a means of making the Institute's position clear, and making scientific data accessible, on the understanding that such data must remain intact.
This work in fact amounts to the editorial monitoring of scientific data, whatever their form, when presented to others.
This presentation includes guidance for SWOV workers in their dealings with the public.
Head of Information Department: R. Maas

The editorial work by the Information Department in 1975 led to a steady flow of publications, articles in periodicals, reports, recommendations and papers. These are specified on pp. 39 et seq.
A total of 8958 publications were despatched in 1975. The number of organisations and individuals in other countries requesting our publications was 633.
During the year, our Director Mr.E.Asmussen and his workers complied with very many requests for information in the press and on radio and television on specific aspects of road safety.
Subjects on which interest was focused in 1975 were: lap belts and three-point belts, safety of children in cars, and whether children should sit on the front seat.
In 1975 the Information Department devoted considerable attention to welcoming and giving guidance to visitors from abroad. Prior preparation of programmes proved to guarantee that our guests were provided with the fullest information.

The film *Submerging Vehicles* continues to attract attention. At the end of 1975 a member of Westdeutsche Rundfunk contacted SWOV, with a view to using part of the film for a TV programme advocating the use of seat belts.
The film *Tyres and Road Surfaces*, made for SWOV by the Foundation Film and Science SFW, Utrecht, was awarded the Silver Bucranio at the XVIIIth Festival of Didactic Scientific Films in Padua. In total, fifteen films were entered in the engineering skills category, by Italy, France, Hungary, Denmark, Great Britain, Switzerland, Western Germany and The Netherlands. Neither the Gold nor the Bronze Bucranio was awarded, and The Netherlands, with its Silver Bucranio, was the only award-winner in this category.

Other SWOV activities

International co-operation

SWOV participated in the work of the following international committees:

European Communities
Scientific and Technical Research Committee (CREST), Committee for Medical Research and Public Health (Ad hoc Working Group on Toxic and Psychological Factors in Road Traffic Accidents)

Commission Internationale de l'Eclairage (CIE)
T.C. 1.6. Fundamentals of Visual Signalling (Subcommittee on Signals)
T.C. 4.6. Public Lighting (Working Group Glare; Working Group Fundamentals; Working Group Tunnel lighting)

International Committee on Alcohol, Drugs and Traffic Safety

Organisation for Economic Co-operation and Development (OECD)
Steering Committee for Road Research
International Road Research Documentation (IRRD)
Research Group S2: Lighting, Visibility and Accidents (Ad hoc Committee on the Application of Polarized Headlights)
Research Group S5: Road Safety at Junctions in Urban Areas
Research Group S9: The Effects of Roadside Obstacles on the Frequency and Severity of Accidents
Research Group S10: Driver Education and Training
Research Group S11: Driving in Reduced Visibility Conditions due to Adverse Weather Conditions
Research Group S12: Hazardous Road Locations: Identification and Countermeasures
Research Group S13: Prevention of Accidents to Users of Two-wheeled Vehicles
Research Group S14: New Research on Alcohol and Drugs

Semi independent:
Ad hoc Group on Multidisciplinary Accident Investigations Surveys
Special Group on Pedestrian Safety Research

International contact

In addition to written and telephone contact with scientific institutes in other countries, the following research workers and other interested people visited SWOV in 1975:

Mr.M.Couillaud, Director of Organisation et Aménagement, France; he spoke with Mr.J.H.Kraay on pedestrian safety and the research in Delft.

Ir.Suganda and Ir.Nurhadi, senior scientific staff of the Institut Technologi Bandung (ITB), Indonesia, who discussed type-testing of motor vehicles with Ir.H.L.Oei and Ir.L.T.B.van Kampen.

Dr.R.L.Dupont, Director White House Special Action Office for Drugs Abuse Prevention, Washington, D.C., discussed drug usage with Ir.H.G.Paar at an informal meeting organized by the Ministry of Health and Environmental Hygiene with the object of exchanging information under the motto 'immediate priorities in research'.

Professor H.Votey visited SWOV and had a discussion with Mr.P.C.Noordzij and Ir.F.C.Flury. Together with Professor L.Phillips (University of California, Santa Barbara, USA). Professor Votey is carrying out research into the 'Control of Drunken Driving' in its economic aspects, sponsored by the Ford Foundation.

Four Danish students from the University of Lyngby talked with Mr.J.H.Kraay on the research in Delft (conflict observation techniques).

Mrs.Boyer (Minister of Justice, Ontario) had a discussion with Mr.P.C.Noordzij) on moped riders' crash helmets in view of the recent increase in moped sales in Ontario.

Mr.D.J.M.Vorster, Director of the National Institute for Personnel Research, South African Council for Scientific and Industrial Research (CSIR), talked with Mr. R.Roszbach on 'Human factors research in road safety'.

Dr.A.S.Hakker, Road Safety Center, Technion City, Haifa, Israel, talked with Ir.E.Asmussen, Ir.F.C.Flury and Ir.H.L.Oei on 'Traffic measurements and equipment', 'Definitions of research programmes', 'Investment priorities in safety' and the scope of IRRD.

Thirty Germans attending the ADAC-Städtewettbewerb 1975 visited SWOV; Mr.J.H. Kraay read a paper on 'Der Fussgänger im Verkehr', and the 'Submerging vehicles' film was shown.

Dr.B.Luetchford (Police Scientific Development Branch, Home Office, London) had a discussion with Ir.E.Asmussen on the enforcement of speed limits with a patrol car system. The SWOV workers, Mr.D.J.Griep, Mr.J.H.Kraay and Mr.S.Oppe, explained the various aspects of their work which were important to traffic policing. Lastly, our guest saw the available research films.

Mr.W.J.Frith (Traffic Engineering Section, Road Transport Division of the Ministry Transport, New Zealand), had a discussion with Ir.E.Asmussen, who gave a brief explanation of SWOV's objects and procedures. After this, Mr.D.J.Griep, Mr.P.C. Noordzij, Ir.A.Edelman and S.Harris M.A. explained their work to our visitor.

Since mid-1975, visits have been organized and guided by the Information Department.

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