ANNUAL REPORT FOR 1973

# annual report for 1973

SWOV

INSTITUTE FOR ROAD SAFETY RESEARCH SWOV

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# Contents

# Foreword

It was stated in the Annual Report for 1972 that the volume of SWOV's activities had increased rapidly and that this would almost certainly continue to be the case for 1973. This prediction has become reality. In 1973 SWOV carried out 18 research projects. The Institute took part in 21 Interdepartmental project groups, Steering committees and Working groups, set up by the Dutch authorities, and also participated in the work of 19 Consultative committees and of 26 international Working groups and Committees.
In addition to the documentation studies and other contributions introduced in Steering committees and Project groups, the Dutch authorities were provided in 1973 with 21 'recommendations'. What is meant in this context by 'recommendations' is: more or less detailed research memoranda concerning direct questions from the authorities which, by making use of existing data, can be answered within a short time. Requests from individuals and non-government institutions are, as a rule, answered in the form of letters. These 'data letters' were mainly concerned with statistical and other material regarding accidents, fatalities, injured parties and their injuries; moped riders; crash helmets for moped riders; safety belts; vehicle colouring, etc.
Literature documentation was provided on 60 occasions and 350 items were lent out from the library. The Information department alone corresponded with 448 people and bodies. Altogether 32 publications were produced.

At its foundation, SWOV was given the task by the government of co-ordinating and carrying out scientific research in the field of road safety in the Netherlands and disseminating the information thereby obtained. The needs still arising from traffic hazards show that these tasks are still far from completion. The above summary indicates how great has become the authorities' need to take measures based on scientific data.
Neither do society's everyday needs for more information by-pass SWOV; witness the extent to which the institute receives requests for information, by non-government bodies and societies as well. The operating principle in such cases is that all information is freely available except that resulting from research still in progress. In order to disclose such data, permission is necessary from the Dutch government who sponsor the research. In all cases this research is made freely available when the project is completed, this being when the sponsor has accepted the report. In this way a great deal of scientific knowledge is made available to society and SWOV complies with its statutary function as an independent institute.

Th.J.Westerhout, Chairman of the Council

# Introduction

As part of SWOV's internal reorganization in 1972, the research activities were grouped. A division was made into applied research and theoretical research. Applied research comprises pre-crash projects, crash projects and post-crash projects. The theoretical research is mainly concerned with pre-crash projects.
The terms 'pre-crash' and 'post-crash' are in current use in international scientific circles and the three phases 'before', 'during', and 'after the accident' are quite clear. For further clarity they are defined as follows:
- pre-crash research is aimed at *preventing* accidents;
- crash research at reducing the *severity* of accidents;
- post-crash research at reducing the serious *consequences* of accidents.

SWOV research contracts are broadly classified as follows:
1. Policy-preparatory research, i.e. research that results in recommendations for use in policy measures to be proposed by the government
2. Evaluation research, i.e. research in which the effectiveness of policy measures and/or road safety campaigns is investigated.
3. Basic research, i.e. research performed outside the framework of any particular policy measures and which is necessary for establishing priorities, making forecasts, improving research techniques and formulating theories for use in future research.
This classification is the same one as used in the review of research activities during 1973.

The situation in the world, especially the energy crisis, did not leave the SWOV unaffected in 1973. The restrictive measures taken by the government in connection with the expected shortages in the energy sector had on the one hand a disruptive effect, e.g. in the case of the drinking and driving surveys, and on the other hand SWOV was confronted with new problems and questions for which the government required rapid answers.
SWOV's ability, up to now, to cope with the demand for information, is due not only to the very great efforts made by the staff, but also to the more efficient procedures stemming directly from the internal reorganization.

E.Asmussen, Director

# The Institute

The Council of the Institute for Road Safety Research SWOV was organised as follows at 31th December 1973:

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 Automobiel Assuradeuren (NVVA) (Netherlands Association for Automobile Insurance NVVA)

H.A.M.Elsen
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 Nederlandsche Toeristenbond ANWB (Royal Dutch Touring Club ANWB)

J.W.Tops
on the recommendation of the Minister van Verkeer en Waterstaat (Minister of Transport and Waterways)

G.Dekker, surgeon
on the recommendation of the Koninklijke Nederlandsche Maatschappij tot Bevordering der Geneeskunst (Royal Netherlands Medical Association)

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)

Th.M.J.de Graaf
on the recommendation of the Vereniging van Nederlandse Gemeenten (Netherlands Association of Local Authorities)

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:

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 24th January 1973 J.M.de Graaf, Director-General, Directorate-General for Public Order and Security of the Ministry of the Interior became a member of the Council. On 1st April 1973 W.J.van Eijkern retired as member of the Council. He was succeeded by A.J.Fonteijn, Director-General, Head of Police Administration of the Ministry of Justice.
On 1st September 1973 O.P.F.M.Cremers retired as member of the Council.

The bureau is directed by E.Asmussen.

# Research projects

In consultation with the sponsors SWOV has set a few research projects aside. Although important, these projects have been more or less pushed aside by those of which the subjects required urgent solutions. As soon as possible, however, work on these projects will be resumed in order to complete them. The projects in question are: Colour of headlight beams, Fog, Railway level crossings, Safety features for cars, Road safety at dusk and after dark, Priority rules.

# 1. Policy-preparatory research

**Pedestrian safety**

The Interdepartmental project group on Slow moving traffic inside built-up areas started its work in December 1973. During the course of the year a more detailed elaboration and a systematic up-dating of the descriptive report compiled earlier was prepared in the form of interim reports.
The Interdepartmental project group plans to have a set of recommendations and guide-lines ready within two years, with the help of which the government can introduce measures to increase pedestrian safety.

Meanwhile, as part of the activities for the semi-independent OECD Working group on Pedestrian safety, SWOV has completed an international comparative statistical investigation into the effect of pedestrian crossing facilities on pedestrian safety. Eight countries participated in this research project carried out by the Netherlands.
Likewise, for the report of the NATO-CCMS Project group on Pedestrian safety, SWOV compiled a report giving a documentation-based review of possible measures relating to pedestrian behaviour, regulations and law enforcement.

**Vehicle perceptibility**

The definitive version of a report for the Interdepartmental project group on Vehicle perceptibility is largely completed. The report is concerned with all externally visible vehicle lighting (including retroflectors) which must enable the road user to see the vehicle, to recognize it and to distinguish aspects of actual or intended movement. It contains recommendations and suggestions relating to:
- the division of vehicles into various categories;
- the design of the lighting to indicate these categories;
- the conditions under which lighting is desirable;
- the requirements to be met by lighting under various circumstances;
- the design and use of brake-, direction-, and hazard signals;
- provisions relating to switching, in order to achieve the best possible operating;
- priorities to be established within the recommendations provided.

A report concerning the perceptibility of cyclists from the rear after dark has been made for the Interdepartmental project group (see also Reports, publications and papers).

A recommendation has been prepared for Rijkswaterstaat concerning accidents involving parked lorries (see Reports, publications and papers). Using data already collected, recommendations were made to, among others, the Royal Army on the subject of daytime use of lighting by military vehicles.

**Tyres, road surfaces and skidding accidents**

*Sub-committee I* (Research into the relationship between frictional forces, road-surface and tyre characteristics and speed; experimental multifactor research).
A series of experiments was carried out on a test track constructed at Woensdrecht Airbase. The aim was to obtain quantitative data in order to determine which road surface geometry has the best characteristics with regard to braking force and sideway force coefficients. The tests were carried out by the Vehicle Research Laboratory of Delft University of Technology.
The State Road Laboratory advises on the construction of test sections and the Institute of Mathematics, Information Processing and Statistics (IWIS-TNO) is in charge of the test programme, data processing and analysis.
A start has been made in constructing a mathematical relation between the braking force and sideway force coefficients on the one hand and the speed, road surface and (car) tyre characteristics on the other. In addition, measurements were also performed on intensively used road sections.
Meanwhile, the interim report on the first stage of the experimental multi-factor research project into factors influencing the frictional forces between car tyres and wet road surfaces has been made available to the Project group. Preparatory measures have been taken for continuing the research, using this time lorry tyres in the tests.

*Sub-committee II* (Experimental and analytical research into the relationship between braking force distribution and its implications for deceleration and stability of vehicle).
The documentation research regarding the braking force distributions and their implications for multi-axle vehicles is now completed. Using a computer programme, it is possible to examine the braking force distribution of a particular commercial vehicle and the effect of applying a braking force regulator. A summarizing report of all the Sub-committee II activities is under preparation for the Project group.

*Sub-committee V* (Statistical single-factor research into the relationship between relative road risks and road surface skidding resistance on straight roads without discontinuities).
This Sub-committee's activities have, for the time being, come to an end with the compilation of the report on Road accidents and road surface skidding resistance.

**Road safety in country districts (Beemster)**

In March 1973 the Minister of Transport and Waterways asked SWOV to initiate an investigation into the degree of traffic hazards in the Beemster polder. At the same time the Minister considered it necessary to conduct an investigation into structural traffic hazards on roads in country districts. The Beemster research project was planned and executed in collaboration with a project group consisting of local and central government authorities.
During the extensive stocktaking of road, traffic and accident characteristics between 1968 and 1973 (May), account was taken of the possibility of using these data as a basis for general research aimed at obtaining safety criteria to be used in the construction of, and infra-structural modifications to roads in country districts. The stocktaking comprised field measurements, frequency counts, speed measurements, measurements of driver visibility distances (from aerial photos), visual counts on intersections, a survey based on number plates, a school inquiry and the encoding of accident data. Sophisticated analytical techniques have been developed for processing the data. Furthermore, a cost/benefit analysis was drawn up for the policy-making bodies in which other aspects than solely road safety were also brought under discussion in connection with the measures recommended to the Project group as a result of the research.

**Roadside obstacles**

A documentation study made by SWOV for the recently formed Interdepartmental project group on Roadside obstacles has been discussed by this group who decided that the part-project Obstacle free zone and the part-project Lamp posts should receive top priority.
The aim of the part-project Obstacle free zone is to determine by means of accident research, the safe width of an obstacle free zone alongside the various categories of roads. This research will incorporate data from the project Road safety in country districts (Beemster).
The part-project Lamp posts is intended to determine which type of lamp posts do not constitute a source of danger to motor traffic. A start was made with experimental research, the particular feature of some tests being that the test vehicle, while in a skid, collides sideways against the lamp post. Special equipment was designed and assembled for this purpose.

# 2. Evaluation research

**Drinking and driving**

The interim report on the 1970 and 1971 roadside surveys which was prepared this year for the Interdepartmental project group mentions some differences in results between the two years. At least three points are necessary to calculate a trend. Due to the differences in results between 1970 and 1971 and because of the long period expected between the last investigation (1971) prior to the introduction of the amendment to the Dutch Road traffic act and the first survey subsequent to the amendment, a third pre-amendment survey was carried out in 1973. This latest survey was carried out according to a time-table as similar as possible to that of the 1970 and 1971 ones. However, only on seven out of the usual ten consecutive weekends in September, October and November, could the investigation be carried out according to the programme. The reasons for this were the restrictive measures for motorised traffic during the weekend in connection with the energy crisis. In spite of this limitation, data were obtained from approximately 2200 car drivers. In carrying out the breath tests during the investigation, use was made of the latest developments in breath analysers, further details of which are given in the section for the (basic) research project Breath analysis methods.
Once again the following bodies lent their assistance; the (local) police force, the Royal Dutch Touring Club ANWB, the Central Laboratory TNO, the Netherlands Institute of Statistics, the Royal Army Medical Inspectorate and the Delta Hospital Laboratory at Rhoon.
The medical section of SWOV took charge of medical aspects of the preparations and lent their assistance during the period of the investigations.
A start will be made in 1974 with processing and compiling the investigation results.

**Vehicle characteristics of importance in reducing severity of injuries**

*Use of car seat belts – Statistical accident research*
In 1973 the analysis of the data from 22,000 drivers involved in accidents was continued, a result of which was a first impression of the effectiveness of car seat belts with respect to severity of injury, nature of injury, and number of injuries. A follow-up programme has been planned in great detail. This programme features a greatly improved injury code, an improved seating code and an improved interior contact code. The intention is to enable definitive conclusions to be arrived at by means of the results obtained from multi-variate analysis.

A great number of ad-hoc questions could be dealt with using the provisional data from this research. From this resulted newspaper articles, lectures and recommendations. The main questions came from the Director-General of Waterstaat and concerned, among other things, the coming introduction of compulsory wearing of car seat belts. A memorandum comprising the provisional results was accepted as a starting point by the Interdepartmental project group set up in Autumn 1973 and in which SWOV is represented in an advisory capacity. A congress paper was also compiled in which the SWOV accident research was compared with other (foreign) accident researches (see Reports, publications and papers).

**Crash helmets for moped riders**

*Publicity campaign for moped riders' crash helmets*
A report with relevant scientific material to be used in the design of the publicity campaign Moped riders' crash helmets, has been prepared for the Steering group. The effectiveness of the campaign is determined by a series of measurements of crash helmet use at intervals of six months and four inquiries among moped riders also at intervals of six months beginning in autumn 1973.
Some of the data used in this campaign are a result of SWOV research. This research shows that:
- the probability of a moped rider dying as a result of an accident is reduced by 40% if he is wearing a crash helmet;
- it is at least as important for people above 49 years to wear a crash helmet as for younger people; 15% of these older people in the Netherlands have a moped yet no less than 35% of all moped riders killed are 50 years or older. 39% of young people (between 16 and 21 years) have a moped, and their share of the moped rider fatalities is about equal; older people are thus much more vulnerable;
- the group of accident victims aged 16 to 20 years is two to three times as large as the remaining moped riders;
- the probability of head injury decreases by 30% if all moped riders wear a crash helmet;
- inquiries have shown that the group of crash helmet owners has increased by 50% in a two year period.

*Prototype crash helmets*
Acting on the instructions of SWOV, the Research Institute for Road Vehicles TNO (IW-TNO) jointly with the Plastics and Rubber Research Institute TNO (KRI-TNO) have carried out a development project to see whether it is possible to manufacture a crash helmet which is more attractive than the current ones.
The most important part of the project was concerned with the choice of shock absorbing material. The project will be completed with the manufacturing and testing of a series of simplified crash helmet models in accordance with the newly established official standards for moped riders' crash helmets.

**Integrated road accident recording**

*Scheduling the position of road accident recording in the Netherlands*
This part of the research was completed in April 1973 with a report on road accident recording. This report, prepared by Volder & Co., an organization and efficiency bureau at Rijswijk, (who on SWOV's instruction carried out the work outlined by an Interdepartmental project group), only treats the organization of a 'Basic records system' (VOR).
After accepting the proposals concerning VOR, an indication should be made as to the manner in which the Integrated road accident recording system (INVORS) can be put into practice. The main aim of this is the combination of a number of sub-systems, the organization (and eventual realization) of the sub-systems, and the use of INVORS.
After the report was submitted to the Minister, who accepted it with thanks and appreciation, the Interdepartmental project group was disbanded. The Ministry of Transport and Waterways has now set up a Steering group to supervise the supplementary research as recommended in the report.
Meanwhile, the part-project into the usefulness of new claim forms has been carried out. Some points from the supplementary research have been combined in the 'Utrecht pilot study', which was started towards the end of 1973. Both projects are the responsibility of the Steering group set up by the Ministry of Transport and Waterways, although SWOV in an advisory capacity has indicated which criteria should be taken into consideration and possibly used as a basis for the evaluation.

*Medical records*
Collecting data for the 'Rotterdam pilot study' was stopped, but processing and analysis of the information obtained was continued. A start has been made with compiling a report.

*Records of accident-, road- and vehicle characteristics*
These activities will only start to play a part towards the end of 1975.

# 3. Basic research

**Speed limits outside built-up areas**

After the research into the effect of speed limits was completed in 1971 with the publication of the report Speed limits outside built-up areas, the Interdepartmental project group made an interim report in October 1971. This report adopted the SWOV recommendation for a systematic road classification which road users can clearly recognize. The roads within each category should meet the expectations created by that category. However, it became apparent that the identification of the top category after motorways, although considered necessary in the Interdepartmental project group's interim report, was still hardly possible at the time. The Interdepartmental project group drew up a supplementary recommendation proposing a provisional restricted classification of road categories with corresponding general speed limits (100 k.p.h. for trunk roads – 80 k.p.h. for other roads).

*Classification of roads into categories*
The principles on which road classification into categories must be based can be formulated as follows:
– a greater measure of predictability of both road and traffic characteristics is one of the most important factors in increasing road safety;
– increasing the degree of predictability can be achieved by a decrease in the variability of road and traffic characteristics;
– assuming a limited budget, the characteristics of a road will depend on the function performed by the road (otherwise all roads would be motorways);
– categorising roads leads on the one hand to less variation in road and traffic characteristics per road category, and on the other hand to road characteristics adapted to the function of the road.
Scheduling existing roads will probably be started in 1974. In late 1973 SWOV sat on the Rijkswaterstaat committee on Directives for designing non-motorway roads (RONA). This committee will further elaborate the functional requirements appropriate to the various categories of roads and based on road safety criteria.

**Breath analysis methods**

Review and appraisal of the latest developments in breath analysers were continued. After intensive consultation with the manufacturers on the basis of their own specifications and also on results obtained from a small scale laboratory investigation, a

selection was made out of the available analysers (some of which are still in the development stage) in order that these instruments could undergo more detailed investigation in a test programme. These tests were able to be combined with the roadside survey into Drinking and driving which was also held during the year under review.
A review of the results obtained as well as the experience gained with the various analysers will be included in the report on the above mentioned surveys. The results of the 1970 and 1971 breath analyser research have been incorporated in the 1973 interim report prepared for the Interdepartmental project group.
For internal use a review has been compiled of qualitative methods (both those available and those still in development) and the results that can be achieved with them, in as far as these data have been published.

**Information systems in road traffic**

A survey has been conducted of current developments in the various Western European countries, the United States and Japan, in the field of road traffic information systems.
After these data have been evaluated a research programme will be compiled with the aim of supplying the driver with information concerning events outside his direct field of observation, but which could lead to hazardous situations. This could also ease the vehicle driver's judgement and decision making role.
The possibility of evaluating signalling systems on main roads will be examined in consultation with the Traffic and Transportation Engineering Division of Rijkswaterstaat.

**Analysis of the driving task**

1. *Selection and maintenance of course, lateral position and speed*
The preparation of the theoretical part of the research and the documentation study were continued. Analysis of the problem 'selection and maintenance of course, lateral position and speed on a curved route' fell behind schedule. A review was made of data required for an integrated approach to the problem e.g. geometry, marking and signposting bends, accident data, traffic flow characteristics, vehicle control, perception and driver information processing. A previously completed and circulated paper on functional requirements of road marking (OECD Symposium Road User Perception and Decision Making, Rome, September 1972) was incorporated in the not yet published OECD report on Road marking.

*Laboratory research*
The Institute for Perception TNO has already completed its instrumentation developed under contract for SWOV for investigating the manner in which the driver

visually guides his vehicle along the road and which are the dominating visual dimensions in this process, e.g. width and depth of the field of vision, as well as their spatial and temporal structure. This instrumentation was used in 1973 for research into factors which are a help or a hindrance to the driver in discovering deviations from his route in various situations.

*Field research*

In December 1972 test drives were conducted on a completed, but not yet opened road section (Vaanplein) with the instrumented test car ICARUS belonging to the Institute for Perception TNO. The research was conducted in collaboration with the Traffic and Transportation Engineering Division and the Roads Department of Rijkswaterstaat. The aim of the research was to obtain an insight into the relationship between a motorist's perceptual habits and the control and movement of his vehicle, as well as obtaining information on the usefulness of data from similar test drives for theories and characteristics of 'natural traffic flow'. As part of the experiment measurements were made by the Survey Department of Rijkswaterstaat with the help of a helicopter made available by the Royal Army. A start has been made with processing and analysing the data obtained.

2. *Perception of other vehicles*

The laboratory and field research into the perception of vehicles in a longitudinal direction which was carried out by the Institute for Perception TNO under contract for SWOV will be terminated in 1974. The most important findings will be incorporated in a report for the Interdepartmental project group on Vehicle perceptibility. In this report recommendations are made for improvements in the design of vehicle indicator lights by which the presence, category and manoeuvres of other vehicles would be indicated in a more easily perceptible manner.

In 1973 preparations were made for a similar series of experiments concerning the perceptibility of vehicles from the side. The results of this project will eventually be used for proposing improvements in marking, illuminating and signposting intersections.

3. *Route guidance*

A review of route information required by the road user before and during a trip, as well as means of supplying this information in practice was prepared for the Project group on Research on signposting in which the Royal Dutch Touring Club ANWB and Rijkswaterstaat are represented. This report forms a starting point on which to base the research contract which is to be given to SWOV.

In the meantime a number of recommendations on signposting motorways could be supplied based on the limited information already obtained.

4. *Functional field of vision*

The introductory laboratory tests by the Institute for Perception TNO for the project on Functional field of vision, which is directed towards detecting the presence and

more detailed characteristics of stimuli in complex visual structures, were continued.

*Traffic signs – Subsidiary boards*
After the problem area was analysed, an investigation into the intelligibility of various symbols and texts on subsidiary boards of traffic signs was carried out. The investigation could lead to a standard technique for testing traffic signs for intelligibility.

**Traffic flow models**

The state of the art of measurement methods and traffic flow models for traffic arteries is being continued. An internal report on overall traffic flow characteristics and their mutual relationships is now complete.
These activities have been interrupted to allow preparations for an anticipated research into the effect of traffic-dependant signalling systems. A factor considered here is the contribution that knowledge of traffic flow models can make to this project. An internal report has been completed on research into the effect of signalling on traffic through-put, especially on journey times.

**Driver/vehicle cybernetic model**

The documentation study, theoretical analysis and the specification of elements (dynamic characteristics of the human controller and the vehicle) are being continued, as is also the scheduling of research methods and apparatus (vehicle simulators, instrumented vehicles) and of problem areas (vehicle/driver and road/driver interaction).
The project on the controllability of the two single-track vehicles: bicycles and mopeds, was given priority above the part-project on Response characteristics of special vehicles. Instructions have been given to the Institute for Perception TNO, collaborating in this project with the Research Institute for Road Vehicles TNO, for carrying out field experiments in order to demonstrate the influence of differences in stability and manoeverability between and within the vehicle types on the riding performance and also to determine the vehicle design characteristics which are of paramount importance in the above factors.

**Standards for participation in traffic**

1. Collection of documentation on driver training was continued. Using this material, an analysis of the problem area will be drawn up and will comprise:
a. a summary of the most important conclusions and points of view encountered in the documentation;
b. the directions taken by recent research and projects still in progress;

c. an evaluation of the possibilities for further research in this field.
2. Preparations have been made for the project to be started in 1974 in collaboration with Groningen University (Traffic Studies Project Group: Prof. J.A.Michon). This will be aimed at the broader area of traffic education.
The project mentioned under section 1. is concerned mainly with training the motorist. However, the need is also being felt for more information on education in other forms of traffic participation, especially the way that some factors are linked together in the various age groups.
Recommendations have been given to, among others, Rijkswaterstaat, concerning the issuing of (first) driving licences to people aged 65 years and above.

**NATO-CCMS Accident investigation**

Much preparatory work was done in Spring 1973 for the NATO-CCMS 'workshop' held in June 1973 in Brussels, where participating countries were represented by government and research bodies. SWOV read a paper on the function of crash accident research in general and SWOV research in particular.
In the period between the workshop and the end of August, work was done on an improved version of the final report concerning the approx. 50 accidents in the Netherlands which were analysed for this international project. After this report was completed it was sent to the processing body in America.
This completed SWOV's official role. Further processing is to be done at government level. It is intended that a report will eventually be combined with the SWOV project on Vehicle characteristics – Car seat belts.

**Safety structures on bridges**

The report on Safety structures on bridges has been completed in draft form. The report on hydraulic shock absorbers and expansion joints is also ready in draft form. The post with an L-weld gave problems in practice. Arising from this full scale tests were conducted in Amersfoort. This resulted in tests with posts which were carried out by the Institute TNO for Mechanical Constructions (IWECO-TNO).
The mathematical model is practically fully adapted to the computer belonging to the Central Computing Institute at Leiden. At the same time the model has been extended and up-dated.

# Other SWOV activities

**International co-operation**

SWOV participated in the work of the following international committees:

**Organisation for Economic Co-operation and Development (OECD)**
Steering Committee for Road Research
Research Group S2. Lighting, Visibility and Accidents/Ad hoc committee on Application of Polarized Headlights.
Research Group S3. Driver Behaviour
Research Group S4. Scientific Evaluation of the Effectiveness of Road Safety Campaigns
Research Group S5. Road Safety at Junctions in Urban Areas
Research Group S6. The Effects of the Enforcement of Legislation on Road User Behaviour and Traffic Accidents
Research Group S8. Research on Accidents involving Young Drivers
Research Group S9. The Effects of Roadside Obstacles on the Frequency and Severity of Accidents

Research Group T4. Road Design Parameters and Traffic Flow on Single Carriageways outside Built-up Areas
Research Group T7. Simplified Urban Traffic Models
Research Group T8. Capacity of At-Grade Junctions
Research Group T9. International Corridor Experiment (ICE)

Research Group C7. Resistance of Bituminous Pavements to Plastic Deformation under Heavy Traffic Conditions
Research Group C8. Visual Effectiveness and Durability of Road Markings, Reflectors and Delineators

Semi independent:
Working Group on Pedestrian Safety
Working Group on Crash Barriers
Working Group on the Effects of Alcohol and other Drugs on Driver Behaviour

International Road Research Documentation (IRRD)

**Commission International de l'Eclairage (CIE)**
T.C. 1.6. Fundamentals of Visual Signalling
T.C. 4.6. Public Lighting
Working Group Glare
Working Group Fundamentals
Working Group Tunnel lighting

**International Committee on Alcohol and Drugs and Traffic Safety**

**NATO-Committee on the Challenges of Modern Society (CCMS)**
Pilot Study on Road Safety
Accident Investigation Team
Project Group on Pedestrian Safety

As well as with those already mentioned, SWOV also kept in contact with the following institutions and bodies:
Asociación Mexicana de Directores de Tránsito, Mexico
Bundesanstalt für das Strassenwesen, Germany
California Highway Patrol, USA
Cornell University, USA
Federal Highway Administration, USA
Forschungsgesellschaft für das Strassenwesen, Germany
George Washington University, USA
Institute of Legal Medicine, USA
International Driver Behaviour Research Association, France
Istituto e Ingegneria Aerospeciale del Politecnico di Milano, Italy
Kuratorium für Verkehrssicherheit, Austria
National Academy of Sciences/Highway Research Board, USA
National Highway Traffic Safety Administration, USA
South West Research Institute, USA
Texas A&M University, USA
Transport and Road Research Laboratory, UK
Wayne State University, USA
World Health Organization

During the year under review SWOV received several groups of visitors from abroad. They were representatives of:
the Road Research Section of the Department of Transport, UK
the Danish Council of Road Safety Research, Denmark
the Department of Transport and Urban Planning, Poland
the International Institute for the Management of Technology, Italy
the South West Research Institute, USA

the Franklin Institute – Research Laboratories, USA
AB SALA en Allmänna Svenska Elektriska Aktiebolaget (AESA), Sweden
and a Survey Team of the Japan Automative Traffic Control System, Japan

**Documentation and the library**

The quantity of books and journals in the SWOV library has nearly tripled in the last five years and now stands at 16,000 publications (including magazine articles, reprints, etc) and 300 annual subscriptions for Dutch and international journals. By participating in the International Road Research Documentation (IRRD), SWOV also receives information on relevant but not easily accessible publications from many countries as well as information on current research in the field of road safety. To an increasing extent people from outside SWOV are calling on the services of the library and documentation service. In 1973, for example, publications were lent out on approx. 350 occasions and 60 people requested a documentation list pertinent to their research project, thesis, political campaign, etc. Developments in the classification and catchword system of the International Road Research Documentation were followed closely. Additions made by SWOV were in most cases incorporated in the system. Many Dutch publications became known outside the Netherlands due to SWOV having incorporated them, together with English abstract and catchwords, in the IRRD. Possibilities are under investigation for processing magnetic tapes by means of a computer in order to make the IRRD material readily accessible.

**Collection of basic data**

Collection, processing and analysing basic data concerning road accidents, vehicle fleets, traffic performance and composition, driving speeds, personal characteristics and quantifiable behaviour and characteristics of road users were continued throughout the year under review.
Collection of basic data was of particular significance in providing statistics for preparing documentation studies, recommendations and data statements, and in other ways of providing information on the above mentioned aspects.

**Information/editing and production**

In 1973 the Information department corresponded on 343 occasions as a result of requests to receive SWOV information. A total of 4502 publications were sent out on request, in addition to those sent according to a mailing list to 'regular customers'. On 105 occasions correspondance involved subjects concerned with research or of particular importance.
The following films were lent out:

Crash barriers in soft soil, Crash barriers for bridges, Collisions with some obstacles, Submerging vehicles and Experiments on tyres and road surfaces.
Information on various road safety problems of the day are regularly presented on radio and television by SWOV staff, co-ordinated by the Information department. One of the functions of the Information department is as a liaison between SWOV's scientific research and the publicity media and, when asked, it endeavours to supply the required information in as far as the state of the project will allow.

# Reports, publications and papers

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* Only available in Dutch.