



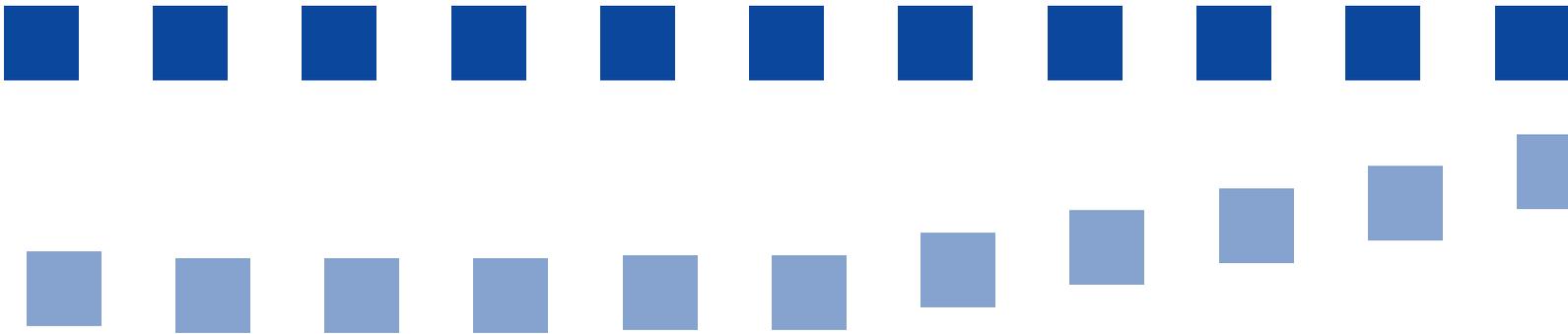
Vägverket

*Swedish National
Road Administration*

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Handbook

Initial study



Initial study Handbook

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1. FOREWORD

Background

In 1993 the SNRA published the document *Förstudie i vägprojektering [Initial Study in Road Design]* (Publication 1993:8), and in 1997 published the document *Redovisning av förstudie, handbok [Initial Study Report, Handbook]* (Publication 1997:149). Since these documents were published, requirements connected with road planning and road design have increased. For example, the Environmental Code has appeared, and has brought with it changes in the Roads Act and the SNRA's regulations. Views of road safety and questions concerning the disabled, and the situation of children and old people in society have changed. The implementation of the UN Convention on the Rights of the Child requires the perspective of children to be included in decisions that affect social and road planning. Yet another transport-political subsidiary goal, gender equality, has arrived.

The SNRA has also produced a new operational idea, worded as follows:

"We make the good journey possible – the SNRA creates opportunities for efficient, safe and environmentally suited transport and arrival, for the benefit of the people"

The changes have meant that the initial study handbook of 1997 is out of date and needs to be revised. Experience from the previous initial study handbook has also shown that a clearer division of methodology and reporting are desirable.

Goal of the Handbook

The goal of this Handbook is to create conditions for good quality in initial studies and initial study documents, and also in producing them. The documents shall satisfy certain requirements concerning content in order to constitute a safe basis for continued planning of measures in the road transport system, which lead to transport-political goals being achieved. Work with production of initial studies shall also satisfy certain requirements as regards such things as consultation, in order to give well-based standpoints.

The Handbook shall also contribute to initial studies being carried out in a unified way, both within the SNRA and by other road managers.

Target group

The Handbook is primarily intended for those who place orders, project managers and road planners within the SNRA, and also consultants who work on assignment for them. Another target group is other road managers and the civil servants at county administrative boards/regional boards and municipalities, with whom road managers co-operate when drawing up initial study.

Areas of use

The Handbook shall be primarily seen as an aid for planning measures within the road transport system. The Handbook supports fulfilment of those requirements which are presented in the Environmental Code, the Roads Act and the SNRA's regulations concerning consultation and environmental impact assessments, etc., in initial studies, feasibility studies and design plans (VVFS 2001:18). The Planning and Building Act and the UN Convention on the Rights of the Child affect work with

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initial studies. Applicable sections of the Handbook are also usable in, for example, studying deficiencies and problems concerning such things as road pricing, improving public transport, social planning for reduced demand for transport, effects on demand, and control of transport, transfer from road to rail transport, etc.

Also recommended for the support of studies are *Från vägbyggare till samhällsbyggare [From Road Builder to Community Planning]* – a new course for the SNRA's participation in social planning, SNRA Publication 2002:91.

Control Group/Working team

Work with producing this document has been led by a control group consisting of;

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1.1 Presentation/Reader's Guide

The Handbook is arranged in a methodology section and a reporting section, in order to be of practical support for work with initial studies. As initial studies contain choices of action, the following publication is recommended; *Analysis of Measures in Accordance with the Four-Stage Principle – a general approach to analyses of measures for the road transport system*, SNRA Publication 2002:72. In order to obtain a good basis for continued work with Environmental Impact Assessments, another publication that is recommended is *Handbook – Environmental Impact Assessment within the Road Sector*, SNRA Publication Series 2002:40–42. For work with child impact analyses, one can obtain guidance from *Värderingsunderlag för barnkonsekvensanalys [Evaluation Basis for Child Impact Analysis]*, SNRA Publication 2003:37. The Handbook is divided into four main chapters, as below.

What is an initial study?

Explains what an initial study is and when the working methods of the Handbook should be applied.

Methodology

The methodology chapter deals with the work stages in an initial study. Topics discussed include planning of the initial study, collecting facts, functional analysis of the transport system, project goals, conceivable measures and consultation procedures.

Reporting

There then follows a chapter describing how reporting should be carried out. This chapter has been made relatively short intentionally, and instead, examples of initial studies are presented as appendices. It is important to point out that reporting of small projects should not be over-elaborated.

The SNRA's Planning

The Chapter, "SNRA's Planning" gives a brief description of the transport-political goals, and describes how the SNRA's planning is carried out at various stages.

2. WHAT IS AN INITIAL STUDY?

2.1 Concept

By object is meant something (the thing) which is identified for possible measures, while project is a designation for work (the activities) with planning and with carrying out the measures.

For several years now, the SNRA has recommended that all project design of road building measures shall be preceded by a so-called initial study. After the introduction of the Environmental Code, formal requirements for an initial study have been established, including such things as early consultation and a decision by the county administrative board regarding significant environmental impact. The Roads Act also states that whoever plans to build a road must carry out an initial study.

With this, the general public is involved at an early stage, with a risk both of unnecessary anxiety and hope for quick improvements. This means that any initial study work is often preceded by problem studies, - internal or in consultation with certain interested party/parties – or other forms of study, in order to check how realistic proposed measures are.

In connection with strategic planning, initiated by such things as long-term planning or municipal planning, it is also necessary to carry out early studies, before problems and deficiencies which have arisen have reached sufficient urgency for justification of an initial study being carried out. Measures proposed from such problem studies can thus be included in strategic planning, and/or constitute a basis for initial studies. This requires early studies being carried out in a constructive and quality-ensured way, in accordance with the four-stage principle, and being well documented.

Two main types of early study can be separated out, system studies and object studies. By system studies is meant studies at a general level of identified problems, and the opportunities of solving them, in the transport system (as far as SNRA is concerned, primarily the road network). By object studies is meant equivalent studies at "competence level" (as far as the SNRA is concerned, primarily separate road segments). System studies are normally preceded by object studies, and give proposals for solutions in principle (road or other measures) for the object studies.

The primary purpose of the Handbook is to give support for object studies, with the requirements that the Roads Act and Environmental Code impose. It can, however, also give guidance for system studies.

Initial studies shall also be carried out for smaller objects if new land is required. Studies and reporting shall, however, be suited to "the small scale". Several smaller initial studies can, however, be arranged in the same report.

In order to quality-ensure its work, the road manager should normally carry out a simplified initial study, including measures which do not require new land, for example, in order to identify the requirement for EIA. The extent of the work, requirement for consultation, etc., is then decided upon by the road manager.

The Handbook can be used as a "checklist" in simplified initial studies.

2.2 Purpose

The initial study is primarily a survey stage prior to any continued planning and design process. Production of the initial study shall be characterised by a wide view and unbiased method of working, together with open dialogue with authorities, organisations, the general public and the business community.

The emphasis shall be on collecting existing information and describing problems on the basis of it, and which goals are to be attained, i.e., *what* is to be attained. The proposed measures (*how*), with their effects and impacts, are only superficially affected, and are processed further on in the continued work.

The main purpose of the initial study is thus to provide a good platform for any continued planning and project design work. The completed initial study document is therefore an important basis for consultancy procurement for continued work.

Often the document needs to be appended to the feasibility study or design plan respectively, as an important supplement, in such things as presentation and review.

The sub-purposes of an initial study are to:

- Create opportunities for consultation, information and anchoring.
- Give a picture of the requirements/problems that there are
- Describe important values/qualities in the area
- Work out goals for the project and continued work
- Assess conceivable measures and give proposals for solutions
- Be a basis for the county administrative board's decision on significant environmental impact

2.3 Level of Ambition

Methodology and planning of the work in drawing up an initial study can vary considerably, depending on whether the project is a small one or a large one, simple or complex. It can range over everything from improving accessibility to public transport with a bus parking slot in the countryside to a capacity problem which leads to a large motorway project or to a project in an urban environment with many interested parties involved.

It is of the greatest importance that the extent of the initial study is relevant in relation to the problems and questions which the project throws up.

It is also important that those responsible for ordering the initial study, and for carrying it out, have appropriate competence in relation to the character and extent of the assignment. In order to be able to elucidate and analyse the questions included in the initial study in a satisfactory manner, and to affect the content, several professional specialities must normally be involved.

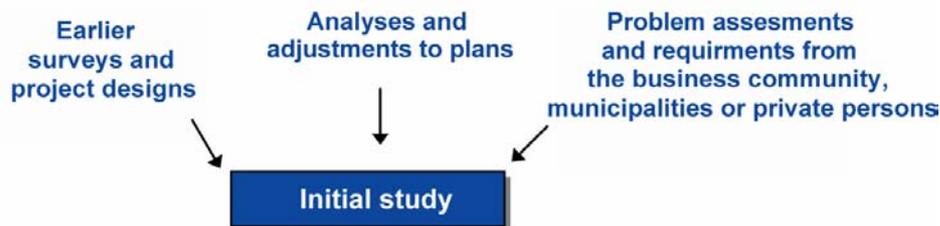
Initial studies should not expand and become unnecessarily comprehensive. Nor should the initial study analyse questions which are dealt with in possible subsequent planning and project design. The degree of detail should be suited to the decision which is to be taken.

It is of the greatest importance that the extent of the initial study is relevant in relation to the problems and questions which the project throws up

2.4 Basis/Problem Scene

The reasons for an initial study being carried out vary. It can be a case of deficiencies and problems which have been identified in the SNRA's strategies in national plans, regional plans or municipal plans. Apart from occurring in plans, other deficiencies, problems or requirements can originate from such things as the business community, municipalities and citizens (including children), leading to an initial study being carried out. The results of earlier surveys and design work can also lead to a new initial study.

This means that the material and input data available before the actual initial study is started vary, both as regards quantity, content and level of detail.



Basis and problem layout for starting an initial study (what gives rise to an initial study).

2.5 The Result

The initial study work results in a document in which important interests and qualities in the area are described, and in which the goal of the project is defined, together with possible existing solutions for attaining these. With this as a basis, the county administrative board decides whether the project can be presumed to involve significant environmental impact. In this context, the county administrative board can also give advice and points of view concerning possible continued work (relevant investigation alternatives, important EIA aspects, etc.). The road management authority takes a position on what measures shall be carried out/investigated, and how continued work shall be pursued.

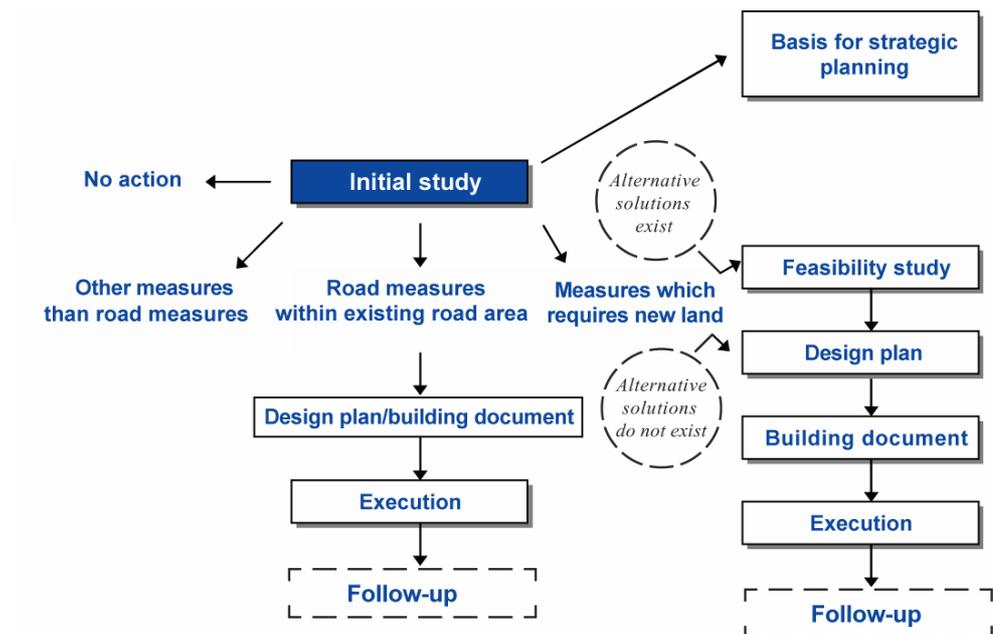
If the initial study work results in proposals for solutions other than road measures, or measures within the municipal road network, the road management authority should transfer the responsibility for possible continued planning and project design of these, to the responsible principal. Co-operation can also be included.

Depending on what is proposed in the initial study, the next step in the process can be;

- that planning work is terminated
- that other types of measure than road measures are investigated, for example, speed limits or alterations to public transport

- that a feasibility study is carried out, together with associated EIA, – if in the initial study work it has been clarified that alternative measures (most often road corridors), with associated EIA, need to be studied and traffic engineering standards need to be investigated
- that a design plan is drawn up – if new land is required, and feasibility study does not need to be carried out
- that a design plan/building document is drawn up – if only measures within existing road areas are proposed, possibly with EIA (voluntarily) – referring to "not building of road" in accordance with the Roads Act.
- that the initial study is used as a basis for long-term planning

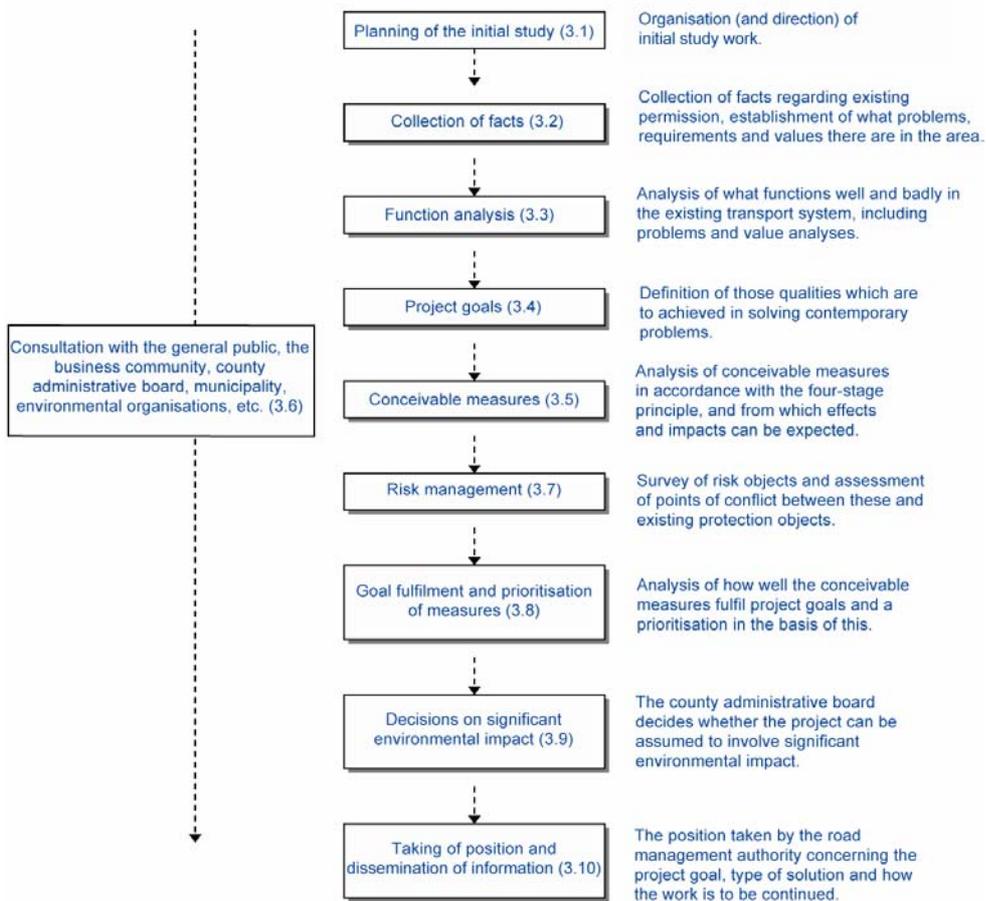
It is also possible for the initial study to lead on to a new initial study needing to be carried out, with other concentration and scoping. Certain conditions can involve initial study work being broken off prematurely, if such things as analysis work show that system studies or land use planning must be carried out before road-related measures can be planned and project designed.



Results of initial study

3 METHODOLOGY

This Chapter gives a description of the stages which are normally included in initial study work. The general stages described below shall be included in all initial studies. On the other hand, the weight of the various stages, and their content, should be suited to each project. This means that not all parts described in the various stages are relevant in all projects. The method of working shall therefore be adapted to each project.



Stages of initial study work.

3.1 Planning the Initial Study

This stage involves clarifying the conditions for the initial study and initial study work.

To start off with the SNRA's strategic plans are studied, together with the national plan for the road transport system, the regional plan, any local plans and other strategic documents, for example, environment and traffic safety programmes, public transport programmes, programmes for intelligent transport systems, cycle programmes, policies and programmes for children and questions concerning the disabled respectively, together with earlier investigations or studies. Contact with authorities, organisations and the business community can already be made at this stage, if it is thought that this will be valuable for planning the work.

After that, an assessment is made of the size of the geographical area to be covered by the initial study.

Current goals at national, regional and local levels are documented and finally a direction is formulated (preliminary objectives) for the project.

3.1.1 Being up to date

Current events involved in the project shall be elucidated in the initial study, i.e., whether it is included in any plans, and possible times for design and building.

3.1.2 Previous Investigations, Decisions, and Adjacent Planning

If there are previous surveys and studies of problems which deal with the transport system in question, or the road segment in question, with proposals for solutions in principle, alternative measures, other types of transport, etc., this shall be stated, and may be taken into consideration in the initial study.

If there are earlier decisions regarding the choice of alternative solutions, it should be stated why the selected solution was not carried out, and what the reasons are for a new investigation. Regional and municipal plans which cover the road question should also be presented.

Adjacent planning regarding such things as road projects in the vicinity or municipal road and building projects should also be mentioned. Investigate whether there can be advantages in co-ordination with adjacent projects, or possibly problems from them, or whether there are interests in adjacent areas in which conflicts might occur.

3.1.3 Geographical Scoping

The initial study shall clarify the geographical scoping, assessed to include all conceivable measures, the so-called initial study area. The surrounding road network can also have deficiencies, and need to be included in the initial study area. It is within this area that existing conditions shall be surveyed and analysed. Subsequent surveys shall cover the area in question regarding alternative road corridors, and also existing roads and connecting roads that will be significantly affected through

changed traffic movements. In the initial study, one should also try to determine the immediate area of influence. The area of influence is the area within which a road

measure affects such things as the travel pattern of road users, or makes possible other uses of land. This area is, of course, very much larger than the area that is affected purely physically by alternative road measures. In studies within city areas that have heavy traffic traffic, it may be necessary to analyse the entire transport system. The extent to which the surroundings will be utilised for new locations of activities should also be assessed.

With regard to smaller projects, where new road segments are not current, the natural scoping will often be local, round the area which is physically affected. Limited measures can, however, also have a larger area of influence, for example, traffic controls.

3.1.4 General Goals and Strategies

Document current goals and questions of strategy that could be relevant for the project, at national, regional and local level.

At national level, there is a comprehensive goal for transport policy, which is to secure a socio-economic, efficient and long-term sustainable provision of transport for citizens and for the business community in the entire country. The general goal is divided into the following six subsidiary goals; accessible transport system, high quality of transport, safe traffic, good environment, positive regional development and a road transport system with gender equality.

At regional level, there can be such things as strategies for regional development, etc., for improved communications through co-ordination with other types of transport. At local level, municipal planning can stipulate goals or norms for such things as air quality.

3.1.5 Formulation and Organisation of Problems

In order that work with the initial study shall focus on significant questions, it is important to formulate what the problems to be solved are. I.e., the purpose of any future measures. The basic criterion in looking for possible locations/measures is thus, fulfilment of the purpose.

In the introductory phase of initial study work, the primary problems are therefore defined, together with the direction in which they can be remedied (preliminary project goal). There can be various types of problem, and they can refer to such things as accessibility, road traffic safety or environmental disturbance in connection with an existing road, or requirements from the business community for improved connections, a municipality's requirements for a through-road problem to be solved, etc. (See Chapter 2.4 on causes of an initial study).

The direction taken should subsequently be developed and clarified during the entire initial study work, and should continue into the next step of the planning process, towards a clearer goal formulation. Prerequisites, environmental conditions and general information on problems, assessed by experts or investigators during the course of the project, can give signals as to what specific goals may need to be established for the project (see Chapter 3.4 Project Goals, on the

prioritisation of deficiencies, and Chapter 3.8 Goal Fulfilment and Prioritisation of Measures).

Formulating clear goals also makes it possible to produce measurements or indicators, in the final stage of the initial study, as to how the goals should be followed up. This work can give an idea as to further clarification of the goals. It is important that the project-specific goals can be connected to the transport-political subsidiary goals, (see Chapter 3.3 Functional Analysis of the Present Transport System). This facilitates subsequent analysis of the transport-political goal fulfilment of any conceivable measure.

3.2 Collection of Facts Including Problem Assessments

The next stage of the initial study work is to collect facts on existing conditions in the initial study area. The main purpose of surveys is to document the conditions in the form of qualities and functions, together with deficiencies and problems that there are in the area. This information subsequently forms the basis of such things as an assessment of what shall be subjected to action, what consideration needs to be taken, and what the effects of various measures can be. In dialogue with interested parties affected, it is therefore important to enter into wide-ranging discussions on the qualities and functions that are present now, and why there are deficiencies and problems, in order to make the situational and problem information as clear as possible. In collecting facts there can be reason to take special consideration of the differences between the travel patterns of men and women, and their transport requirements. For this, it can be necessary to have gender-divided and problem oriented statistics within all statistical areas. Such statistics are also required for following developments and evaluating measures. The role of statistics in affecting attitudes is important. Statistics on gender equality have been included in the official statistics since 1994. According to the Ordinance on Official Statistics, Section 14, individually based official statistics should be broken down according to gender unless there are special reasons for not doing so. This applies to statistical products from all authorities that have responsibility for statistics. (See the Statistics Sweden homepage, under "Gender equality")

The collection of facts should be adapted to the extent of the initial study, and should be concentrated on the problems, requirements and values that there are in the area. Headings and aspects below can therefore be considered to be a checklist. Only that which is relevant for the initial study in question should be collected. Normally, only collection of existing data is included in the initial study. Larger surveys in the field can most often be excluded. The collection of facts should apply to both existing roads and to the initial study area in question. Data is subsequently the basis of an account of the existing conditions, and certain parts of the functional analysis (see Chapter 4 Reporting).

3.2.1 Population, Buildings

In the initial study, information is produced concerning the population structure and habitation structure within the initial study area. What information is important depends on what type of problem the initial study applies to.

With such things as a problem with through traffic in a smaller community, it is of great interest to clarify how many people cross a pedestrian crossing, or who go along the road, and whether there are many children or old people involved, etc. (See also Section 3.2.5 on unprotected and functionally disabled road users).

If it is a case of a long stretch of road with problems of access, it is perhaps relevant to elucidate how many people commute between two places, or whether there are smaller places along the road. It is thus most often valuable to assess numbers of people, age distribution (for example, the number of children of various ages), the type of buildings (permanent housing, schools, old people's housing, hospitals, holiday cottages, recreational installations' sport areas and green areas) etc. For basic data and consultation, contact can be made with such institutions as county administrative boards, municipalities and Statistics Sweden.

3.2.2 The business community, and Employment

In order to be able to assess the effects on the business community and employment that conceivable action can be expected to cause, information on them must be collected. Road action gives impacts on established activities, and also on new development possibilities. It can also give secondary effects for such things as the environment, which are important to assess. New establishments can involve traffic safety problems and encroachment. Increased bearing capacity can mean unwanted transfer of heavy traffic.

To assess how many people are employed in a certain operation also gives an indication concerning movement patterns in traffic, within a community or between two places. Give an account in the initial study of the activities within the area in question, for example, industries, agriculture, public service and business operations. Employment is assessed for the activities involved.

For basic data and consultation, contact can be made with such institutions as county administrative boards, municipalities, Statistics Sweden and local companies.

3.2.3 Important Starting Points and Destinations

In connection with making an survey of the buildings and the business community, it is important to clarify what the starting points and destinations are within the initial study area, in order to clarify the travel patterns of road users, both as regards cars and other traffic, for example, unprotected road users, in appropriate cases, divided into categories of children, adults, old people, and the functionally disabled. Conceivable destinations can be schools, day-care nurseries, housing, housing for old people, shops, work places, travel centres, bus stops, recreational installations' sport areas and green areas, etc.

3.2.4 Municipal Plans and Other Plans

Collect municipal plans regarding future land use, with respect to such things as road sanctuaries, expansion areas for housing, open-air recreation areas, etc. The information is available in general plans, detailed plans, area regulations and other municipal documents, such as cycle programmes, traffic network analyses, etc.

State whether there are restrictions in the form of development plans or area regulations within the initial study area. It can also be necessary to look at the Armed Forces' planning.

3.2.5 Traffic and Road Users – Travel and Transport

Surveys should be made of existing traffic together with categories of road user and demand for travel and transport.

Car Traffic

Data on present traffic volumes and the proportion of heavy traffic should be collected. For certain projects it is necessary to have other information as well on the distribution of directions. Years and sources should be given for reported traffic volumes. State what type of traffic volume is presented, for example, average annual 24-hour traffic, or annual weekday 24-hour traffic. State whether the traffic is presented in vehicles per day or axle pairs per day. There should also be a survey of the transport of dangerous goods.

In certain initial studies the purpose of travel and distribution between short journeys and long journeys are important and should be elucidated. In the planning of a possible by-pass it will be necessary to know such things as what proportion of traffic will continue to have its destination in the central urban area. If commuting is considerable, bus traffic might be favoured, and a possible by-pass which would disfavour it could be questioned. Also present forecasts of future traffic increase.

Traffic figures are mostly acquired from the SNRA, and in certain cases from municipalities. The National Rescue Service Agency and county administrative boards have certain information on dangerous goods transport, including recommended road networks and prohibited areas.

Public Transport

A survey should be carried out against the background of commuters' real needs, and in a "whole trip perspective".

In making a survey of the interests of public transport, the following questions can be used as support:

- What railway lines and bus routes supply the area?
- Is there a school bus?
- Are there travel centres or other functional places for changing between public transport?
- How easy is it to get to and from bus stops, stations, travel centres?
- Are there barriers as regards accessibility for buses and travellers?
- What traffic safety do those travelling by bus have regarding such things as the standard of bus stops and pedestrian/cycle paths to the bus stops?
- How many people travel?
- What is the frequency of trips?
- Are there future plans for such things as frequency of trips, road markings and bus stops?
- Are there co-ordinated set-ups for car-pooling and public transport, for example, car parks next to bus stops, stations and travel centres?
- Is it possible to change road marking to make a safer traffic environment?

In order to obtain basic data and consultation, it can be a good idea to contact the authorities responsible for traffic, who are responsible for local and regional bus and train connections, schools (school buses), municipalities, etc. The regional offices of

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the SNRA can also give guidance concerning people to contact within public transport.

Unprotected and functionally disabled road users

By unprotected and functionally disabled road users is meant that group of road user who are most vulnerable and unprotected in traffic, such as pedestrians and cyclists, children, old people and functionally disabled people. Unprotected road users use public transport more often than other groups in society. It is therefore important to analyse possible problems with public transport and unprotected road users in an integrated way.

At the survey stage, the following things could be investigated:

- Existing pedestrian/cyclist routes, the standard of their crossings and connections to public transport.
- Starting points and goals for pedestrian/cycle traffic within the area of influence, for example, schools and central buildings, and in the countryside, also inhabited premises and their connections to roads, village cottages, shops, bathing places, etc.
- Deficiencies in the pedestrian/cyclist system for unprotected and functionally disabled road users. Are safety and security in the system sufficiently high?

In order to obtain relevant information on the above, it is important to consult with those who will be directly affected by the project, for example, teachers and children in that school which is affected by a project. The following organisations can also be contacted in order to obtain basic data and for consultation:

- Organisations for the disabled – working with information and opinion forming.
- County Disablement Advisory Bureaux – deal with such things a public transport questions.
- Municipalities – work with such things as accessibility programmes and traffic analyses, in which they present their view of the importance of accessibility. Such a programme can already constitute a basis of an initial study.
- Organisations responsible for traffic – responsible for local and regional public transport routes in each respective county.
- County Administrative Boards – In the county transport plan are included such things as investment in installations for public transport establishment and disablement adaptation of public transport.

Other important participants are such things as other road departments, the National Board of Housing, Building and Planning, private road managers and interest groups.

Road Safety

The collection of facts is primarily intended to assess the safety of the road. The results of in-depth studies are important for identifying and understanding what

Injury
Refers to reduction of physical or mental function due to injury, disturbance or illness, which can be temporary or permanent.

Functional impairment
Involves limitations to a person's functional ability as a result of injury

Disablement
Refers to limitations and consequences that occur in a person's daily life as a result of injury and functional impairment.

factors in the environment of the road is of decisive importance for safety standards. It is also important to collect accident statistics, traffic case notes from the police and other basic data that may be accessible with regard to the road in question. In this collection of facts it is important to focus on what gives rise to serious injury and not only on the causes of accidents. Data which is required in order to assess the safety standard of the road, and data on accidents which have occurred can be collected from the regional offices of the SNRA. Studies in depth of accidents, connected to the particular road segment are, in almost all situations, so few that they do not give object-specific information. Accident statistics can be too limited to give statistically safe results. The traffic safety standard of a road must thus be primarily assessed from the actual design of the road and the knowledge which is available concerning the importance of the design for road safety. Accident statistics can, however, show whether there is/are any special place or places which are especially affected by accidents. Which factors shall be assessed are given in the Section 3.4 *Function analysis of the present transport system*.

3.2.6 The Road Network

A survey is made of the function of the present roads with the types of traffic (heavy through-traffic, commuter traffic, etc.) and technical standards. This should be done from a total perspective, i.e., to include roads that can be of interest within the entire initial study area. In the national and regional perspectives, the function of the road is expressed as a national road, important regional road, etc. From the perspective of urban areas, it is expressed as a by-pass, through-road, etc. (Notice of public roads and other important roads are published by the county administrative boards). It should especially be stated whether the road constitutes a national interest or is included in a road network, in which a so-called national interest might be asserted. (Identified by the SNRA as especially important for transport). The national importance applies both to existing road segments and planned new road segments.

Transport quality (important for such things as the business community) can be subject to survey with regard to the standard of the road surface, the bearing capacity of the road, winter road standard.

3.2.7 Environment

General

Important environmental qualities and environmental prerequisites, together with conceivable conflicts with various environmental interests, need to be given prominence in the initial study work. The environmental component of the initial study should be based on existing information and knowledge.

The Character of the Landscape and Formation Questions

Aesthetically attractive design and giving consideration to city and landscape information and natural and cultural values are requirements for all road projects. In the initial study it is already important to describe and analyse the character of the landscape, point out aesthetically valuable environments and give prominence to questions concerning architecture and design. In the work, the emphasis should be put on comprehensive assessments of the character of the landscape in the form of such things as terrain formation, visual attributes, vegetation, buildings and use.

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Things that need to be taken into account differ greatly depending on whether the project in question is in a town or countryside environment. Note that low formation qualities in existing roads can be a problem which has to be solved! The conclusions of the initial study then become the basis for future design work and documents, and eventually lead to a formation programme. In a project, often a small one, in which a design plan is drawn up as the next step in the planning and design process, simple formation ideas can also be described in the initial study.

Natural Environments

An assessment of the character of the landscape in the form of types of vegetation, hydrology, geology and forms of terrain are the bases for assessing the ecological functions of the area.

The basis for planning of a road project shall be that various plant and animal species shall, after any road building, have the opportunity to survive in their natural distribution areas, i.e., to have access to necessary environments and be able to propagate between them. The main purpose of collecting information in the initial study work is to emphasise qualities and functions of the natural environment which shall be present in the future as well, and have the opportunity to develop. The information shall refer to the natural values that are documented, and can be reported from existing information. It is also important to take note as to whether a field survey is required in the future project design work.

The collection of information at the initial study stage can, as a suggestion, cover the following subject areas;

- Ecological values, for example.
 - valuable natural environments
 - valuable fish water
 - protected biotopes
 - threatened plant and animal species
- Geological values
- Hydrological values

For basic data and consultation, contact can be made with such institutions as the county administrative board, county forestry board, municipalities and nature conservation societies.

Cultural Environments

The ambition is that a cultural environment can be experienced and understood, and perhaps even have been strengthened after any road measures.

A cultural environment conveys our history – the activities, ambitions, values and worlds of ideas of earlier generations – and shows how people have made use of the landscape, and perhaps still make use of the landscape.

Collecting information on cultural environments at the initial study stage should be based on existing documentation, and it is suggested that it could cover;

- cultural monuments
- historical structures
- topographical structures and types of landscape.

Cultural monuments are not only traces and remains of human activity in our physical environment, but are also places connected with historical events, beliefs and traditions. In the Cultural Heritage Law, the cultural monuments which are protected by law are defined, for example, *churches, building monuments* and *fixed ancient remains*.

Historical structures are cultural environments and/or cultural monuments with common denominators. The connections can be historical, social, functional, economic, ecological and visual. Examples of structures are trading locations and inns along our roads, which tell of various conveyance regulations. A structure can also be determined legally, for example, property and municipal borders.

For basic data and consultation, contact can be made with such institutions as county administrative boards, county museums, municipal museums, municipalities and local folklore societies. Information concerning valuable environments and objects can be found in the municipal general plan, municipal or regional cultural-environment programmes, the county conservation programme for the cultivation landscape, the register of ancient monuments, surveys of buildings, surveys of roads, etc. Compiling surveys of historical roads is a co-operative project which is ongoing between the SNRA and the country's county administrative boards.

If a road measure might affect fixed ancient remains, the person(s) responsible for the project shall consult the county administrative board (The Cultural Heritage Law, Chapter 2, Section 10).

If it is justified, the county administrative board will take the initiative for an archaeological survey in order to establish whether a planned road measure can affect previously unknown ancient remains. The survey is ordered by the road management authority, and is decided upon by the county administrative board. The survey shall be carried out by archaeological experts, and can cover studies of archive material, analyses of maps and field surveys at various levels of ambition. Normally, the survey is carried out after the initial study stage.

Recreation and Outdoor Activities

Outdoor activity interests refer to natural and cultural qualities for recreation and outdoor activities. Sports installations, ball game pitches, routes and tracks, i.e., purely exercise components, are usually included in this context. By outdoor activities is intended being in nature for experiencing nature, physical activities and relaxation. Such things as variations in the landscape belong to essential natural qualities for recreation.

A survey of recreation and outdoor activity interests can, as a suggestion, cover:

- Outdoor recreational exercise
- Areas with installations for exercise and outdoor activities
- Important walking tracks
- Green areas in towns
- Areas with special qualities of interest for recreation, for example, bird lakes, areas which are noise-free and undisturbed, lakes and shore areas
- Minor roads and road crossings which are of importance for walking and for reaching recreation areas
- The opportunities for children to reach green areas and play areas

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As regards information material and consultation, contact can be made with, for example, the county administrative board, municipalities, schools in the vicinity, the Swedish National Environmental Protection Agency, sporting and outdoor activity societies.

Natural Resources

The natural resources which are fundamental for the society's requirements and production, and which are often relevant to take note of and collect facts about in connection with environmental analyses for a road project, can be allocated to the following interests;

- land and water for area interests (agriculture and forestry, commercial fishing, water usage, reindeer husbandry)
- water supply
- requirements for materials and deposits, management of gravel and deposit requirements
- mineral resources and mining
- energy/fuel with regard to energy management.

For information and consultation, contact may be made with, for example, the county administrative board, municipalities, County Forestry Board, Mine Inspection Office.

The importance of water as a resource increases in step with increased demand. Against this background, a Directive has been formulated in a European perspective (The EU General Directive for Water, 2000). This is intended to give such things as a collective view of water questions, and studied requirements concerning all drinking water sources which supply more than 50 people or give > 10 m³ per 24-hour period. The aim is towards water with good ecological status. Sweden is following the time schedule and requirements for implementation. The Directive will require increased attention being given to the country's water resources.

A new authority for water questions is to be established, with the country divided into five administrative areas, organised in accordance with the "run-off principle" (according to proposal). At present, the Geological Survey of Sweden, county administrative boards (surface water, status of lakes, etc.) and the environmental administrations of municipalities are the most important co-operating parties.

Protected areas and areas worthy of protection

In the Environmental Code there are several types of protected area described within different subject areas, such as natural and cultural environment, outdoor activities, communications and other industries, for example;

- Natura 2000 areas (a network of valuable natural areas which is being established within the EU)
- national parks
- nature reserves
- cultural reserves
- biotope protected areas
- shoreline buffer zones
- environmental protection areas

- wetlands
- water protection areas
- areas of national interest
- areas which are ecologically especially sensitive
- large unaffected areas
- nature close to urban areas

The majority of these protected areas require special permits for carrying out a road project.

The county administrative boards, the Swedish National Environmental Protection Agency and the National Heritage Board have information and descriptions of national interests and other areas worthy of protection as regards nature, outdoor activities and cultural environments respectively. In the comprehensive plans of the municipalities, areas which are worthy of protection are described, both of local, regional and national interest.

Other subject areas exist, for which national interests can be asserted, for example

- communications
- reindeer husbandry
- commercial fishing
- energy distribution
- total defence.

The SNRA has singled out a road network which is judged to have such special function for the provision of transport, that the land (and water) areas affected by the roads are of national interest for transport structures, in accordance with the definition given in the Environmental Code. The protection applies to both existing and planned road networks. The road network that has been defined is shown on the SNRA homepage, www.vv.se.

Environmental Load

(This Section can be seen as a supplement to 3.2.1 Population, Buildings).

Collect information on the environmental load on air, land, water and housing environment in the initial study area. What is the extent of emissions of climate gases and other air pollutants, deposition, air quality, etc? What environmental quality norms can be critical?

Examples of aspect which should be documented are;

- air pollution (health, climate and acidification-related)
- polluted land
- noise disturbance
- vibrations
- visual experience
- barrier effects
- dangerous goods – risks for residents

For information and consultation, contact can be made with such institutions as the Swedish Meteorological and Hydrological Institute (SMHI), county administrative boards and municipalities.

3.2.8 Structural Engineering Conditions

Make a survey of the geological and geotechnical conditions (types of soil and rock), extraction (gravel and rock extraction), gradient relationships, etc. Give a general

description of the geological and topographical conditions which often dictate costs. Suitable information consists of maps of soil types, vegetation maps, etc. For information material and consultation, the following bodies can be contacted, the Geological Survey of Sweden (SGU), the Swedish Geotechnical Institute (SGI), the Swedish Meteorological and Hydrological Institute (SMHI) and municipalities.

3.2.9 Cables, Lines and Pipes

Make a survey of the more important cables, lines, pipes and similar installations in the area, both above ground and underground, for example, electricity and telecommunications connections, opto-cables, broadband, cable-TV networks, water and drainage installations and power lines.

For information material and consultation, contact can be made with such bodies as municipalities, power companies, Telia, the National Rail Administration (Banverket), other owners of cables and landowners. Valuable information on the setting out of cables can be obtained from the homepage www.kabelanvisning.com.

3.3 Functional Analysis of the Present Transport System and its Area of Influence

3.3.1 General

The functional analysis phase covers analysis of deficiencies, problem analyses and analysis of what works well within the existing transport system. Many of the deficiencies and problems will be discovered during the collection of facts. In the functional analysis, a structural analysis is made of the existing transport system, based on data/material that has been collected together, and through consultation. The information on problems and values identified while facts are being collected – not least from dialogue with interested parties involved – should be taken into account. A problem analysis is made against the background of this, together with an analysis of what actually can (and should) be achieved, and what values affect the present transport system, and what values should be retained.

It can be appropriate to make the functional analysis in accordance with the same divisions as for the subsidiary goals, see headings below. The time aspect is important in the functional analysis, as both deficiencies and measures available for solving them change over time.

At the end of the functional analysis a check should be carried out against the "direction" which was formulated earlier (see Chapter 3.1.5).

Subsidiary goal – Accessible transport system
The goal is an accessible transport system in which the road transport system is designed so that the basic transport requirements of citizens and the business community can be satisfied.

The situations of children, old people and the functionally disabled shall be especially taken into account in questions concerning accessibility.

3.3.2 Accessible Transport System

Accessibility can be defined as the ease with which certain offerings and activities in society can be attained, by which is meant the needs of the citizens, the business community and public organisations. Accessibility can be divided into; accessibility to the system, for the functionally disabled, for example, and accessibility to destinations.

Accessibility should be analysed with reference to all relevant starting points and destinations within the initial study area, and be made from a “total journey perspective”, i.e., from door to door. The requirements generally for all transport are for short, plannable transport times, low transport costs and high reliability.

The accessibility analysis is made for different modes of traffic, for example, cars, pedestrian/cycle traffic, public transport and heavy vehicle traffic, and also for other groups of road user. It is especially important to take into account unprotected road users, children, functionally disabled and old people.

Important analysis parameters are;

- distance
- travel time
- impediments
- barrier effects
- ferrying children
- reliability
- comfort and security
- vehicle costs
- goods transport costs
- flexibility between mode of travel and type of transport
- effect on land use.

Child Impact Analysis

Implementing the UN Convention on the Rights of the Child requires decision-making authorities having ascertained that the best interests of the child have been included in weighing up and have been reported in the decision-making process. When a project is especially intended to solve the problems of children, or can be assumed to be of great importance for children, a child impact assessment should be included in the initial study. The child impact assessment is a method of following up whether the best interest of the child has been taken into account in measures that affect children.

The assessment should describe how the children affected, and the representatives of children’s interests, have participated. (*See also Värderingsunderlag för barnkonsekvensanalys [Valuation Data for Child Impact Assessment], SNRA Publication 2003:37.*)

At the time of publication of the *Handbook Initial Study*, many experiments are ongoing regarding child impact assessments. The SNRA will publish information material as a support for working with child impact assessments in pace with the development of knowledge and experience.

3.3.3 High Transport Quality

Analyses are carried out of the design of the transport system and its function, in order to establish what quality of transport citizens and the business community are offered. Various groups of road traffic users (in accordance with the above) should

Subsidiary goal – high quality of transport

The goal is that the design of the road transport system and its function shall permit high transport quality for citizens and for the business community.

be taken into account. Quality can be measured in terms of predictability, safety, flexibility, comfort, passability and access to information.

Important analysis parameters for transport quality are;

- the standard of the road surfaces
- the bearing capacity of the roads
- reliability – winter road management and standard of the condition of the roads.

Other parameters with emphasis on public transport can be such things as;

- availability of protection from the elements at bus stops
- possibility of safely parking a bicycle by a bus stop.

3.3.4 Positive Regional Development

The requirements of the business community are of crucial importance for regional development. They depend upon access to such things as labour and markets. Access to labour depends on such things as the possibility of commuting. The extent to which commuting to work takes place depends on the properties of the transport system, and the tendency and ability of the labour force to commute by car, cycle or public transport. The ability of the public transport system to promote development of so-called local labour market regions is important to take into account. Good architectural design of the road network is of importance for the impressions that both tourists and inhabitants get of urban areas/countryside, and thus contribute, to a certain extent, to regional development.

Regional development can be analysed from two perspectives:

- *Regional growth* – Refers to such things as how changes in the transport system can affect conditions of the business community.
- *Regional allocation* – The regional allocation aspect is about satisfying transport demand, i.e., accessibility. For example, access to commercial and public service can be decisive for people in thinly populated area. Other allocation aspects are systematic changes in operating and maintenance standards of roads in areas which have difficulty in developing compared with other areas. Development within EU assisted areas¹ are of especial interest. Effects on such areas should be elucidated.

3.3.5 Safe Traffic

Accidents and injury in the road traffic system are a considerable public health problem. There are clear connections showing that the design of the system is of great importance for its level of safety.

The safety of the present transport system is analysed in order to clarify such things as its safety level. The system should contribute to road users, who follow the

¹ Areas which are delimited in accordance with criteria established by the EU, and which are entitled to apply for aid from the EU Structural Funds.

Subsidiary goal – Positive regional development

The goal is positive regional development, in which the road transport system promotes positive regional development through evening out differences in the development possibilities of different parts of the country and counteracting the disadvantages of long transport distances.

Region

A region can mean a local labour market region or other large area.

Subsidiary goal – Safe traffic

The goal is safe traffic, in which the long-term goal of road traffic safety shall be that no-one is killed or seriously injured as a result of road traffic accidents within the road transport system. The design of the road transport system and its function shall be adapted to the requirements resulting from this.

rules of the traffic system, being able to do something wrong or make mistakes without being killed or seriously injured. The analysis can be carried out with reference to the collision force calculated that people can withstand in collisions, when travelling in modern vehicles. This means that speed should be;

- max 70 km/hr in collision with an oncoming vehicle
- max 50 km/hr in collision from the side
- max 30 km/hr in collision between an unprotected road user and a motor vehicle.

The following design elements should be analysed;

- Central separation for speeds of > 70 km/hr, (at vehicles per year of < 4000 the risk of head-on collisions is assessed to be so low that median separation is not normally required)
- Side area standard – objects that do not give way in the safety zone, design of gradients, side safety barriers (type, length, where they end)
- Type of road crossing and design of road crossings
- Separation and design for pedestrians and cyclists
- Visibility conditions along the road and at turn-offs
- Presence of exits
- Visual guidance and clarity
- (points of) conflict, protected road users, unprotected road users
- (points of) conflict traffic, wild animals
- speed conformity

Subsidiary goal – Good environment

The goal is good environment in which the design and function of the road transport system shall be adjusted to requirements for a good, healthy living environment for everyone, in which natural and cultural environments are protected, together with the promotion of good management of land, water, energy and other natural resources. The design of the road transport system shall contribute to achieving the national environmental goals.

3.3.6 Good Environment

Analyses are made of how the existing transport system affects the environment. The analyses can focus on the following areas;

- Access to natural areas and leisure areas
- Emissions of climate gases and air pollution
- Effects on health of air pollution, exceeding of environmental quality norms
- Noise and vibration
- Adaptation of cycles/natural resources
- Natural values, cultural environment values and formation
- Protected areas and areas worthy of protection

A directed value analysis should also be made for natural values and cultural environment values, from the material that is collected. The information should be co-ordinated and interpreted, and conclusions drawn concerning sensitive environments and what qualities and functions in the landscape are important to conserve or develop. Is it a question of an urban area environment, a heavily developed area, protected environment, or an "everyday landscape" that requires normal care?

The analysis shall also show what values/qualities and connections/functions should also remain in the natural and cultural environment landscape, even after

measures have been taken in respect of the problems and deficiencies which it is intended that the transport system should solve.

In order to ensure that the analysis work is sufficiently complete, checks may need to be made against the descriptions given in Chapter 3.2.7 Environment.

3.3.7 Gender Equality in the Road Transport System

In working for gender equality in the transport system, three aspects are of especial importance to take into account, against the background of known differences between women and men. These are the different transport requirements of women and men, values and access to power, and influence in the transport sector.

In analysing demand for transport, one should take into consideration the fact that the travel patterns of women and men are different. In total, men drive cars twice as much as women, but women make more trips as car passengers and with public transport. There are also differences between the sexes as regards what missions men and women undertake with their trips. Business travel is more common with men than with women, while women make more trips for service purposes, especially as regards looking after children, and for shopping purposes.

Differences in evaluations of different transport questions should also be looked at in the analysis. Surveys show that more women than men consider it unacceptable that people are killed on the roads, and that it is reasonable that speed limits are lowered in order to increase traffic safety. Men consider, to a greater extent than women, that it is more important to follow traffic rhythm than to remain within speed limits, and value the possibility of driving fast very much more than do women. Women include security within the concept of safety.

At present, the different points of view have different possibilities of being realised. Historically, the transport sector is clearly dominated by men. Even if this can be explained as being a generation question, domination by men is still considerable. With the introduction of the goal of a gender-equal transport system, there is now an expressed requirement for greater gender equality.

As yet, the SNRA has no fully developed assessment of, and clear goal for, gender equality in the transport system. The aspects above can, however, be a basis for the analysis. The question as to whether access (and transport quality) by women to relevant destinations is equal to that of men, can perhaps be "thought provoking"!

3.3.8 Summarising Problem and Value Assessment

The analysis should be summarised in a clear, concise, problem and value description. It is very important that this description should show *what* the deficiencies are, or *what* should be protected, expressed as basic qualities.

3.4 Project Goals

At the beginning of the initial study work, the primary problem is formulated, together with a direction (preliminary objective) of the project. The information which will have been collected on existing values and conditions in the area, and the functional analysis, will have answered the questions as to what works well at present, and what deficiencies there are. With this as a basis, specific goals can be formulated. The goals that are established in the initial study are very important.

They describe the most important qualities that the project is intended to achieve, and it is towards these qualities (project goals) that the entire project shall, in due

Subsidiary goal - gender equality in the transport system

The goal is that there is to be gender equality in the transport system, where the transport system is designed so that it meets both women's and men's transport requirements. Women and men should have the same opportunities to influence the construction, design and management of the transport system and their values should be given equal weight.

course be followed up and evaluated. They shall be formulated on the basis of a totality perspective, but at the same time be tied to the local situation. Different road user groups can have different needs and problems. It is especially important that the needs of children, old people and the functionally disabled are made visible in the project goals. It is appropriate that they should be related to the transport-political goals by being formulated under the headings of: accessibility, transport quality, regional development, traffic safety, environment and equality. It can also be necessary to formulate goals for formation qualities (architectural qualities).

The project goals shall, in accordance with the above, be composed of both;

- the new qualities/functions which are to be attained with the project, i.e., measures taken to rectify deficiencies
- the qualities/values/functions present in the area at present and which shall remain, or even be increased.

Feasibility studies can consist of different "scales" and refer to problem solutions, both for European highways and bus stops on small thoroughfares, and apply to completely new problems or "tie-backs" after surveys lasting many years. It is therefore difficult to give a general proposal for project goals which can be used as a model for all feasibility studies. The proposals below should be mainly seen as sources of ideas.

Examples of project goals:

Accessibility

- Passability of traffic shall be improved so that the travel time between A-ville and B-ham is not more than 25 minutes during the rush hour.
- After improvements have been carried out, it should be possible for 90 % of the functionally disabled within city area C to use public transport (conforms to the requirements in the Government official document to the SNRA regarding adaptation of the transport system for the disabled by the year 2010).
- School children should be able to go from home to E-school on their own in a safe way

Transport Quality

Transport conditions for heavy traffic between the harbour in A-town and the industrial area north of B-town shall be improved so that delays during the summer do not occur, and during the winter occur not more than once a week.

Regional Development

Conditions for the business community in A-town shall be improved so that commuting to work in B-bury can be carried out with a total daily travel time of not more than 60 minutes.

Road Safety

Road safety shall be improved so that the number of killed and seriously injured within the entire area of A is reduced by 20 over a five-year period, as from the date of opening.

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- The carrying elements; the fault scarp, the water course and the pasture land east of the water course, which set the tone in the landscape shall continue to do so.
- The elk population within area A shall have an unchanged living situation and habitat.
- It shall be possible to continue to classify the B-ford open-air recreation area as a “wilderness”.
- Within the area in question, existing environmental quality norms for particulates and nitrogen dioxide may not be exceeded on any segment of the road.

Gender Equality

Pedestrian and cycle connections between A area and the centre, including connections to bus stops, shall be improved so that everyone – irrespective of gender and age – can feel safe when travelling/walking, at all times of the day and night.

Formation, Architecture and Quality

Overall:

- By means of its location and design, the road shall be adapted to the surrounding landscape and buildings.
- A formation programme shall be drawn up which secures the intentions of the SNRA policy regarding road architecture.

In more detail:

- A new bridge over the X-river shall be subordinated to the landscape.
- The existing road space must not be widened if a new pedestrian and cycle path is to be built in the sensitive cultural landscape at Y-green.
- In rebuilding the existing road, measures shall be taken in respect of deficiencies in the design of the side area, in order to achieve better suitability to the landscape.

In the initial study, the goals do not normally need to be (shall not be) detailed.

Instead, they can be made tangible in subsequent planning stages. The question of how the goals shall be measured and dimensioned can/should occur at a later stage. It is, however, important that any precision of goals and objectivity that is done can be traced back to the project goal of the initial study.

Example (accessibility);

| | |
|----------------------|--|
| Initial study | School children shall be able to go between home and E-school on their own, in safety. |
| Road project | There shall be a connection which is safe for children alongside the routes of the thoroughfare, and between X-square and Y-crossroads. |
| Design plan | A pedestrian and cycle path shall be established west of the thoroughfare, and between X-square and Y-crossroads, with a bridge over the thoroughfare at Z-hill. |

It is most often also necessary to prioritise between the different goals (quality, values, functions).

3.5 Conceivable Measures

The four-stage principle

Measures shall be tested and analysed in the following order:

1. Measures which influence transport requirements and choice of method of transport.
2. Measures which give efficient utilisation of the existing road network.
3. Road improvement measures.
4. New investment and greater rebuilding measures.

3.5.1 General

The emphasis in an initial study should be on carrying out surveys and functional analysis of existing conditions. Conceivable measures should only be touched on in outline. Apart from an analysis of conceivable measures, in accordance with the four-stage principle, the affects and impacts of the measures shall be assessed in outline.

3.5.2 Analysis of Conceivable Measures

The strategies for measures (solutions in principle) which have been produced, or choice of action which may have been made in earlier planning work, are documented and are the basis and prerequisites for the initial study. For example, it might be that a railway has been ruled out as an alternative to a new road. This involves analyses that have already been made not being carried out again, provided the decision data is still relevant. However, it may happen that new information emerges in the initial study, which means that earlier standpoints must be re-examined. The work in looking for conceivable solutions shall be carried out in an unbiased way. The four-stage principle shall be applied. In the work, views shall be obtained from representatives of various interest organisations, so that all conceivable measures are taken into consideration, and the questions at issue are elucidated correctly. Because the goal of a gender-equal transport system is new, it should also be given attention in a constructive way, in discussions on choices of measure. Sufficient representation of women must be guaranteed in choices of action, against the background of the fact that women and men make different evaluations, and that women have a lower degree of power and influence.

Examples of measures in the four stages:

| | |
|----------------|---|
| Stage 1 | road pricing, improvement of public transport, social planning for reduced demand for transport, effect on the demand for transport |
| Stage 2 | speed controls, intelligent transport systems, control of transport of dangerous goods, information, influence and prioritisation of public transport |
| Stage 3 | gradient lanes, bus lanes, rebuilding of signals, commuter parking, improved operational and maintenance measures on sections of road |
| Stage 4 | new building of road segments, expansion to motorway standard |

See also "Analysis of Measures in Accordance with the Four-Stage Principle" (SNRA's Publication 2002:72).

3.5.3 Effects and Impacts

Every conceivable measure brings with it effects of various types, which in turn give impacts on road users, the surroundings, residents and companies, etc.

The impacts which can be important should be given as hard facts, and if possible, shall be measurable. For example, if road traffic safety will be improved, it shall be stated for what groups this applies. Often, such things as separate measures are required to achieve increased safety effects for children compared with other groups of road users. Also try to quantify the increased safety, the improved ease of passability and accessibility, or other changes which it is judged will result from the proposed measures. Impacts from nothing having been done should normally also be presented.

With minor projects, it can be relevant to assess the impacts of only a few aspects, while with larger projects, a report should be made, by all means grouped in accordance with the six traffic-political goals. As regards impact assessments in the initial study, there are many uncertain factors. These should be presented in order that uncertainties can be dealt with in continued work.

For quantification and assessment of effects, *Effektsamband 2000 [Connections between Effects 2000]* (Publication Series 2000: 113-120) is a good aid, as is *Handbok Miljökonsekvensbeskrivning inom vägsektorn [Handbook Environmental Impact Assessment within the Road Sector]* (Publication Series 2002:40-43).

With regard to larger projects, compiling a comprehensive socio-economic calculation can be justified, in which some of the effects are assessed in terms of money.

3.5.4 Costs

If it is possible and relevant to assess costs (depending on how detailed the measures are which have been studied), this can be appropriately carried out in the form of an interval. It is important to point out and clarify uncertainties in assessing the cost. One should also give the points of time involved, and relate the costs to proposed measures, proposed standards and proposed extent.

For certain measures, for example, for clearing up side areas, it can be necessary to study the cost efficiency of this. If the finance for it is coming from several sources, this can be commented upon.

3.6 Consultation in the Initial Study

The purpose of consultation in an initial study is to create a dialogue between the general public who are affected, authorities, organisations, the business community, etc., who in turn contribute participation and involvement in the work. Through this, existing problems, needs and expectations can become known. Similarly, conditions, restrictions and values in the area in question can be elucidated. Conceivable solutions can also be discussed during consultation.

The new goal of an equal transport system, which includes requiring differences between men and women as regards transport requirements, values and influence being taken into account, is dependent on women participating actively and extensively in consultation.

Opportunities for getting good end results and constructive dialogue increase, if first one achieves an understanding of what the problem(s) consist of, and what

Effects

The extent of change compared with the do-nothing alternative is expressed *neutrally* as an effect. In a chain of changes, in which one change causes another change, one refers to primary and secondary effects.

Impacts

In assessing effects, they are evaluated as positive or negative.

Impacts thus constitute value assessments of effects.

The consultation process is primarily regulated by:
The Environmental Code,
Chapter 6, Section 4
The Roads Act, Section 14 a,
VVFS 2001:18

measures should be taken, followed by a discussion concerning how this should be done.

The so-called early consultation in the initial study stage is regulated by legislation, and must fulfil certain formal requirements which are specified in the Environmental Code, Chapter 6, Section 4, the Roads Act, Section 14 and in VVFS 2001:18, Section 21.

Children should be given the opportunity of getting involved in the questions and problems referred to in the initial study. This requires forms of consultation and working methods being adapted in order to enable children to express themselves. Read more about this in *Värderingsunderlag för barnkonsekvensanalys [Evaluation Basis for Child Impact Analysis]* (SNRA Publication 2003:37) and *Trafik, miljö och samhällsplanering [Traffic, Environment and Social Planning]* (SNRA and the Swedish National Agency for Education, 2000)

Early consultation shall include consideration of the following things:

- The size of the initial study area
- Interests in the area
- Problems/deficiencies
- Conceivable directions/goals
- Possible measures for solving the problems
- Conceivable environmental effects

According to VVFS 2001:18, Section 21, so-called early consultation should be started early on in the initial study process. It is important that the consultation is seen as a process that continues during the entire compilation of the initial study. Usually it is necessary to contact many of the consultation partners a great many times during the initial study stage.

Initially, the consultations are more about establishing contact with the consultation partners, and collecting facts. This can be carried out in simple ways, by separate contact via letter or telephone. When sufficient information has been produced to enable the early consultation to take place, as above, an invitation shall be made by notification in local newspapers, by letter and similar. The basic data for consultation should be included in the invitation or should be available. Consultation should be carried out on several occasions, and in several different ways, for example, through consultative meetings, open house or in written consultation. It is, however, important that the consultees all receive the same basic data. When the form of consultation is being decided upon, it is important to think about whom the consultation involves. If the project depends on children, for example, consultation shall be carried out on their terms. In that case, written consultation is probably not appropriate, but a visit to their school would be preferable.

The outcome of the consultation should be presented in a consultation statement, which is subsequently attached to the initial study. This describes how the consultation was carried out, the points of view that were expressed and the road management authority's assessment and possible consideration of the standpoints.

3.7 Risk Management

During the initial study, one should attempt to identify risks. One can make a survey of what objects require protection within the area in question, what types of risks the objects that require protection are sensitive to, and what type of protective measure can be considered to protect the objects. Important objects that require protection regarding personal injury, are housing areas and other areas in which there are many people, for example, schools, day nurseries and hospitals. Protected areas and areas that are worthy of protection are described in Chapter 3.2.7 Environment.

A survey of risk objects should be made in an equivalent manner. What destinations and transport routes are there within the area for dangerous goods? What special risk objects are there in the way of bridges, tunnels, watercourses, slopes, areas prone to landslides, water catchment areas, etc. Are there bus routes and bus stops? Furthermore, should one assess what conflicts there are between objects that require protection and risk objects, and assess what possibilities there are of limiting risks through choice of location and design of a possible new road, or through measures in respect of an existing road? Finally, should one record the work that has been done, and formulate recommendations concerning which questions of risk should be given attention and taken note of in continued planning?

3.8 Goal Fulfilment and Prioritisation of Measures

This stage involves analysis of how well the conceivable measures fulfil the project goals, and a prioritisation on the basis of analysis and identification of risks.

The analysis should be carried out in accordance with the four-stage principle, which means first examining whether one can fully or partly achieve one or more of the goals in step one. After that, examine measures in step two, etc. When all the steps have been gone through, a weighing up and prioritisation of measures is made, with various time perspectives, and taking into account cost effectiveness, long-term sustainability and goal fulfilment.

Even if a measure is found that partly achieves the goal, there may be measures in a later step which solve all the problems or which are more cost-effective and therefore, seen as a whole, are better. All steps should therefore be gone through if it is not apparent that the goals can be achieved in a cost-effective, long-term sustainable way in a certain phase. The measures in the different steps do not need to be seen as alternatives, but can complement one another. The result can therefore be a combination of measures from the different steps.

Sometimes, unwanted impacts can also be identified, which do not contribute to goal fulfilment. They can be a heavy burden on taking a position regarding continued work. In some cases it can be justified to analyse and possibly suggest how the selected goals can/should be followed up (measurement/indicators) after measures have been carried out, even in the initial study phase. Such analyses can contribute to making the goals tangible.

3.9 Decisions Concerning Significant Environmental Impact

After prioritisation of measures has been carried out, and all information and all consultation has been documented in a so-called proposal document, the initial study is ready to be delivered to the county administrative board for a decision as to whether the project can be considered to entail significant environmental impacts.

According to VVFS 2001:18, Section 18, the proposal document should contain the following:

1. A problem assessment that contains reasons for measures being studied
2. Affected geographical area, including information concerning roads and other communication networks that are affected, their function and traffic conditions
3. A description of the general character and environmental situation of the area
4. Current measures and their assessed effects and impacts
5. Plans and planning data
6. A consultation statement

If at this stage, the road manager has put forward a proposal for a standpoint, it can be advantageous to present this as well, prior to the decision by the county administrative board. In this way, it will be more clearly shown what measures the road management authority envisages going on with, and the assessment by the county administrative board will not be as general.

In general, certain activities have been judged to entail significant environmental impacts, see Chapter 17 of the Environmental Code, and Appendix 1 to the ordinance on environmental impact assessments. In respect of the measures counted when building a road, the building of a motorway and a four lane road longer than 10km is always assessed to involve significant environmental impacts.

In the ordinance on environmental impact assessments, it is stated in Appendix 2 what criteria shall be the basis of the county administrative board's assessment with regard to other projects. These are;

- the characteristics of the activity or measure
- the sensitivity of the environment in the areas which can be assumed to be affected
- possible effect of the project in relation to the criteria above.

Before the county administrative board makes a decision, an opinion should be requested from the supervisory authority in those cases in which it is not the county administrative board. Normally, the county administrative board receives input from all affected municipalities before the decision is made.

As regards activities that can be presumed to entail significant environmental impacts, a procedure of environmental impact assessment shall be carried out. The environmental impact assessment constitutes increased consultation, which does not only cover those directly affected. The consultation shall apply to the location of the measure, its extent, design, environmental effects and content, and the formulation of the environmental impact assessment. The increased consultation is carried out in the next stage of the planning process.

3.10 Adopting a Standpoint and the Distribution of Information

After the county administrative board has come to a decision as to whether the project can be assumed to entail significant environmental impacts, the road management authority shall take a position on whether the project shall be continued, broken off or re-worked. If the project is to be continued, the road management authority should state, in which way.

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In adopting a standpoint, the following points need to be dealt with;

- Project goal
- Whether the project shall be continued or not
- If deficiencies shall be rectified with some road measures and/or whether any other measure is suggested
- Explanatory statement for the decision
- Scoping of area affected, starting point and destination of the object
- Whether a road project shall be set up, or whether it is possible to go directly to the design plan
- The extent and direction of future EIA and other impact assessments
- Other environmental considerations in the project
- Whether a formation programme should be drawn up
- Whether special investigations are required
- Special requirements and ambitions (*for example, visual quality, requirements regarding competence*)
- Co-ordination with other planning (*for example, with municipal planning or railway planning*)
- Form of base (*should any continued road project be based on the Roads Act, on the Planning and Building Act process, or on both*)
- Whether consideration in accordance with other legislation than the Roads Act is required
- Appropriate methods of working (*should such things as special reference groups be constituted*)
- Further questions which should be given attention (*can, for example, have been raised during consultation*)

The initial study can now be completed. The initial study will be finished when the decision of the county administrative board regarding significant environmental impacts and the position taken by the road management authority are appended to the proposal document. Those who have delivered written views during the initial study stage shall be informed as to the position taken by the road management authority. This is done by means either, of the actual position taken being distributed, or by the completed initial study being distributed. What is distributed depends on what has been sent out at an earlier stage.

4 REPORTING

4.1 General

Reporting is very important because the initial study document has several purposes. The document is information material for the scrutiny carried out by supervisory authorities within all subject areas, and for the decision of the county administrative board regarding significant environmental impacts, and the document is also used for contact with the general public. In addition, the initial study is the SNRA's internal basic material, and constitutes a platform prior to future stages of the planning and design process. This means that the structure of the initial study shall satisfy several requirements. It shall facilitate scrutiny for those who are interested in a certain subject area, and it shall give a good overview and also be easily accessible for people who have never read an initial study before. A basic rule in drawing up an initial study should therefore be to write and report it in simple terms, i.e., make it comprehensible for the layman!

Examples of appropriate basic structures for the reporting of an initial study are given below. Then, various subject areas, road networks and vehicle traffic, uses of environment and land, are described under the headings. See also templates presented under the heading "Contents". There is a clear connection to the transport-political subsidiary goals, and to the four-stage principle, which is shown by such things as the division into different subject areas under the headings, "Functional Analysis of the Transport System" and "Conceivable Measures".

- Summary
- Background
- Existing conditions
- Functional analysis of the transport system
- Summarising descriptions of problems and values
- Project goals
- Conceivable measures
- Risk management
- Goal fulfilment and prioritisation of measures
- Position taken by the road management authority
- Continued work
- Appendices: Account of consultation and the decision of the county administrative board regarding significant environmental impacts (these can perhaps be worked in under their own headings in the initial study)

This list, together with the template presented under Chapter 4.5 Content, is a "gross list", which should generally cover all types of measure which are carried out on the road network. It means that the template cannot be used in the same way for all types of project. Headings can be crossed out or added as required, and the level of detail suited to the size of the project and types of measure.

As regards more significant measures, which are counted as building of roads in accordance with Section 10 of the Roads Act, for example, new motorways or rebuilding of motorways, two-lane roads, traffic junctions and roundabouts, all headings in the template shall normally be presented in the initial study and the

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subject areas dealt with in depth under these headings. For this type of measure, it can sometimes be necessary to expand the initial study with several additional headings/subject areas.

For more minor measures which constitute building of roads in accordance with Section 10 of the Roads Act, for example, pedestrian and cycle paths, reconstructions, mending frost-damaged surfaces, bus stops and minor junctions, certain subject areas can be dealt with very superficially.

As regards operational and maintenance measures for which land is required in accordance with Section 28 of the Roads Act, for example, improvement measures in the form of maintenance of gravelled roads, surfacing of gravelled roads, cleaning ditches, repairing bridges, extensions of safety barriers, replacement of culverts, etc., headings and subject areas that are not relevant can be removed. For some operational measures it can be less relevant to present the four-stage principle or connection to all transport-political subsidiary goals.

When you compile an initial study, take note of the following!

- Try to produce a precise and clear report (for limited operational and maintenance measures, 2-3 pages are often sufficient).
- Use extensive illustration and map material to clarify values, deficiencies, conceivable measures and points of conflict
- Produce clear compilations (by all means in the form of tables and figures) and conclusions.
- Try to handle several similar or adjoining minor road-building operations or requirements for land in the same initial study
- Try to describe effects and impacts as objectively/ neutrally as possible
- Connect in subject area expertise for the areas you do not have a command of (can be required for operational measures as well)
- Report conceivable alternatives in order to clarify those which you have given attention to

4.2 Digital Reporting

Information created during planning and design shall be re-used during the production and operating phases. As regards the SNRA, this means that all documents produced internally or externally shall be progressively stored and made available via joint electronic document management support. Rules regarding digital management, and information about it, are available in the SNRA Publications; 2000:5 *Principer för informationshantering [Principles of Information Management]*, 2000:5A *Principer för informationshantering, Bilagor [Principles of Information Management, Appendices]*, and 2000:4 *Manual för upprättande av IT-handledning [Manual for setting up IT instructions]*. (The publications are being revised and will be replaced by Publication 2003: 54). The initial study work and the reporting shall be carried out in accordance with these requirements.

4.3 Cover and Title Page

The cover of the initial study is important, and should be both informative and arouse interest. In order that the reader shall be able to familiarise him/herself with

the content, it should contain a map of the area. Alternatively, a photograph representative of the project can be used.

The following basic information should always be included on the cover:

- The SNRA logotype
- Heading, with information on road number, the road segment covered by the project and the object number, in accordance with the SNRA's designations
- The words "Initial study", in order to differentiate it from other documents which are produced in the project
- Information concerning which version of the initial study it is (proposal document or the complete initial study)
- Date

The following information should always be present on the title page:

- Responsible SNRA administrative official, this is normally the project manager, with information on the work place and telephone number(s)
- The people who have contributed to the initial study with information on the technical area (competence), and the places of work (both the SNRA's, consultants', and any other)
- Those who have participated in working groups and reference groups

Apart from that, all feasibility studies should follow the SNRA's graphic profile programme, Publication 2000:128.

4.4 Illustrations and Maps

Photographs, illustrations and maps are good aids for describing the existing environment and the measures that the road management authority plans to implement. They contribute greatly to making the initial study easier to understand. Most often, a picture or a map can replace text, and in this way reduce the size of the document.

At the beginning of the initial study there should be a picture showing the initial study area. Sometimes it can be appropriate to have this picture on the cover of the initial study. There should be a map showing where various interests are located in the initial study area, under the heading "Existing Conditions". If it is already possible to show where conceivable measures should be carried out at the initial study stage, or if there are proposals for possible road corridors, these should also be shown on a map or maps.

One way of clarifying possible goal conflicts is to include existing interests, such as nature reserves, buildings, ancient monuments, etc., in the same map as the proposed solutions/measures.

4.5 Content

A template is shown below, which can be used as a support when compiling an initial study. The template shall (as before) be adapted to the extent and type of measure that the initial study refers to. Headings which are not relevant can be left out as required. In certain cases, however, it can be a good idea to comment as to

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why a heading is not included, in order to show that that subject area has not been forgotten. With some types of project, the template needs to be supplemented or adapted in other ways.

Prior to the presentation of the report, one should take note of the fact that it is *not* advantageous to report all factual information that has been collected “straight off”. It should instead be compiled and interpreted, so that it contributes to the position taken being well presented. Things to work for are *high quality and limited quantity*.

In the proposal document (which is to constitute a basis for the county administrative board’s decision on significant environmental impact), the heading ”Positions taken” should either be removed or presented as “Proposals for Positions taken”.

| Headings | Contents |
|--|--|
| Summary | |
| Deficiencies and problems | <i>Summary description of the deficiencies and problems which need to be attended to.</i> |
| Project goals | <i>Assessment of the qualities which shall be attained with the project.</i> |
| Conceivable measures, in accordance with the four-stage principle | <i>List of the measures which are conceivable.</i> |
| Proposals for measures | <i>A somewhat more detailed description of measure(s) which might be proposed..</i> |
| Effects and impacts | <i>Rough assessment of the most important effects and impacts of possible measure(s).</i> |
| Positions taken/continued work | <i>Description of the road manager’s position taken, reasons for this and how any continued work will be carried out.</i> |
| Background | |
| Deficiencies, problems and purpose | <i>Descriptions of what deficiencies and problems gave rise to the initial study, and the goals of the project, if these have been defined at an earlier stage of the planning.</i> |
| Current | <i>Presentation of the project at present</i> |
| Earlier investigations and decisions | <i>Comprehensive description of the content of earlier surveys (the SNRA’s, municipal, other) and what decisions have been taken. A separate report should be made of the application of the four-stage principle in earlier planning stages, and the decisions which were taken on the basis of this.</i> |
| Geographical scoping | <i>Presentation of geographical scoping and reasons for it.</i> |
| General goals and strategies | <i>Presentation of visions and goals at national, regional and local levels.</i> |
| The road planning and road design process | <i>Summary description of the planning and design process, with connection to the current project.</i> |
| Existing conditions and development trends | |
| Use of land | |
| - Population | <i>Presentation of the population and, if possible, age distribution (e.g., the number of children of different ages, etc..).</i> |
| - Buildings | <i>Description of what buildings exist in the area (housing, play and green areas, holiday cottages, recreation installations).</i> |
| - The business community and employment | <i>Description of what industries, etc., there are in the area (agriculture, industrial establishments), etc.</i> |
| - Important destinations | <i>Description of important destinations in the area.</i> |

| Headings | Contents |
|--|---|
| - Cables and pipes | <i>Description of larger cables, pipes or similar connections that exist in the area (electricity, telecommunications, water and drainage, power lines).</i> |
| - Municipal plans, future use of land | <i>Description of what municipal plans there are as regards use of land (future buildings, industrial areas, etc.). Requirement for initiating planning for secondary development can require assessment.</i> |
| Traffic journeys and road user journeys and transport | |
| - Motor traffic | <i>Description of existing road network and standard of it, freight traffic and the proportion of this in the form of heavy traffic, pedestrian/cycle traffic, distribution as to purposes of travel, etc., with information on years and sources of information presented. Types of travel, commuting, long distance transport, dangerous goods, etc., also capacity problems and risks of generation of new traffic can also need to be assessed.</i> |
| - Public transport | <i>Description of existing bus routes, bus stops and access to other public transport, etc.</i> |
| - The pedestrian/cyclist network and unprotected road users | <i>Description of the pedestrian/cyclist network, and how the unprotected road users move within the area (for example, whether many cycle to one large place of work).</i> |
| - Road safety | <i>Description of present road safety situation for all affected groups of road user, the safety standard of the traffic system and the accident situation.</i> |
| Other infrastructure | <i>Description of other infrastructure, for example, railway, shipping, etc.</i> |
| Environment, important prerequisites, aspects and interests | |
| - The general character of the area and its physical environment and formation questions | <i>Description of the general character of the landscape (small scale/large scale, fertile, forest land/farm land, etc.).</i> |
| - Natural environment | <i>Description of what natural environments there are in the area, together with threatened species of plants and animals.</i> |
| - Cultural environment | <i>Description of the cultural historical values that exist in the area, in the form of such things as buildings and environments, and a presentation of known ancient remains.</i> |
| - Natural resources | <i>Description of land and water that constitute important resources for residential groups and for land use, agriculture, forestry, commercial fishing, use of water and reindeer husbandry, and a description of the supply of natural materials (gravel, etc.) available in the area.</i> |
| - Recreation and outdoor activities | <i>Description of the outdoor recreational exercise in the initial study area, the fixed installations that there are, and any green areas in towns, etc.</i> |
| - Protected areas and areas worthy of protection | <i>Description of the areas and environments that are protected in the form of such things as Natura 2000 areas, national interest, nature reserves, biotope protection, etc.</i> |
| - Environmental load | <i>Presentation of environmental load on air, land, water and residential environments in the initial study area.</i> |

| Headings | Contents |
|--|---|
| Structural engineering prerequisites | <i>Description of geological and geotechnical prerequisites (types of soil and rock), deposits (gravel and rock, etc.) and topographical conditions, etc.</i> |
| Functional analysis of the transport system and its area of influence | |
| Accessibility | <i>Presentation of analysis of accessibility to the area's destinations, by car and public transport, and for unprotected road users such as cyclists, functionally disabled, etc., and presentation of a possible child impact analysis.</i> |
| Quality of transport | <i>Presentation of analysis of how the transport system functions at present, and what functions (and perhaps links) are lacking, and what engineering problems there are (frost damage to road surface, risk of avalanche, etc.).</i> |
| Regional development | <i>Presentation of analysis of regional development within the initial study area, with connection to the infrastructure.</i> |
| Road traffic safety | <i>Presentation of analysis of road traffic safety levels in the present transport system.</i> |
| Environment | <i>Presentation of analysis concerning the effect of the transport system on the environment, noise, vibration, barrier effects, discharges, etc., in relation to the current environmental quality norms.</i> |
| Gender Equality | <i>Reporting of analysis of if and how the transport system affects equality between the sexes.</i> |
| Comprehensive problem and value assessments | <i>Presentation of collected analysis of previous problem and value assessments, with the purpose of clarifying the target information.</i> |
| Project goal | |
| Project goal | <i>Presentation of project goals, by all means formulated under headings in accordance with "Functional Analysis", see above.</i> |
| Conceivable measures | |
| Analysis of conceivable measures | <i>Presentation of both analysis and choice of conceivable measures (in accordance with the four-stage principle), with reference to analyses and choices of measures made in earlier planning stages.</i> |
| Effects and impacts | <i>Presentation of what effects and impacts can be important regarding the quality of transport, the safety of transport, accessibility, the environment, regional development, and as regards a gender-equal transport system.</i> |
| Costs | <i>Description of costs for proposed measures (if this is possible and relevant), and source/sources of finance.</i> |
| Risk management | |
| Objects requiring protection and objects at risk | <i>Description of objects requiring protection (schools, hospitals, etc.) and objects at risk (bridges, tunnels, areas that are prone to landslide, destinations and transport routes for dangerous goods, etc.)</i> |
| Points of conflict | <i>Description of where objects at risk coincide with objects requiring protection (water courses, water catchment areas, nature worthy of protection, residential areas, etc.) and other risk analyses.</i> |
| Goal fulfilment and prioritisation of measures | |
| Goal fulfilment and prioritisation of measures | <i>Assessment of conceivable measures' goal fulfilment, and prioritisation of measures on the basis of goal fulfilment and risk analysis</i> |
| Consultation | |

| Headings | Contents |
|---|---|
| Consultation | <i>Brief presentation of what consultation has been carried out while the initial study has been in the process of being drawn up, general points of view which have been put forward and consideration given to these, including reasons.</i> |
| Position taken by the road management authority | |
| Position taken by the road management authority | <i>Presentation of the position taken by the road management authority regarding how the project might be progressed, including envisaged extent and arrangement of the EIA at the next stage, and reasons for this.</i> |
| Continued work | |
| Next step in the planning process | <i>Description of how the project will perhaps be continued (road project, design plan or building document), and if possible, how the work will be conducted (working party, controlling group, co-operation with other interested parties, etc.).</i> |
| Geographical delimitation | <i>Presentation of general geographic scoping of the area for possible continued planning and design work.</i> |
| Questions that require special attention | <i>Description of what questions shall be given special attention in the planning and project design process (special investigations/surveys, for example, survey of travel patterns, initial delimitation of content and extent of the EIA., child impact assessment, etc.</i> |
| Consideration in accordance with other legislation | <i>Statement for expected consideration in accordance with other legislation, of those measures which are proposed, for example, permissibility consideration in accordance with the Environmental Code, or consideration of water operations, which are considered by the environmental court.</i> |
| Type of base | <i>State whether the road project should have its base via the SNRA's process (in accordance with the Roads Act), or via the Planning and Building Act (PBL) process, or via both.</i> |
| Appendices | |
| Consultation statement | <i>Attach a summary presentation of all statements and comments that have come in, both verbal and in writing, and the commentaries to these by the road manager.</i> |
| The decision of the county administrative board on significant environmental impacts | <i>Attach the decision of the county administrative board regarding significant environmental impacts.</i> |

5 THE SNRA'S PLANNING

5.1 Transport Political Goals

5.1.1 General Goals

The Swedish Parliament has given the SNRA the task of looking after Swedish roads, including general responsibility for the safety and environmental problems of road traffic. The general direction as regards roads has been fixed in transport-political goals, which break down into six subsidiary goals. The general transport-political goal in Sweden is “to secure a socio-economic efficient, long-term sustainable provision of transport for citizens and the business community throughout the entire country”. By “long-term sustainable” is meant ecologically, economically, socially and culturally sustainable.

The paramount traffic-political goal:
“to secure a socio-economic, efficient and long-term sustainable provision of transport for citizens and the business community throughout the entire country”

5.1.2 Subsidiary Goals

The general goals are defined as six subsidiary goals:

An Accessible Transport System

”The transport system shall be designed so that the basic transport requirements of the citizens and the business community can be satisfied.”

The basic purpose of the transport system is to satisfy the demand for transport of a well-developed society. It involves different groups of citizens and the business community. As a result of this, the perspective should embrace the “total journey” from door to door, in which transport solutions can cover several types of transport.

High Quality of Transport

”The design and function of the transport system shall permit high quality of transport for the business community.”

The subsidiary goal of transport quality is clearly structured towards the business community’s transport of goods

Positive Regional Development

”The transport system shall promote regional development and both level out the differences in the opportunities for different parts of the country to develop, and counteract disadvantages of long transport distances.”

The concept ”positive regional development” is about social and economic wellbeing, which in turn is reflected by the income levels, level of employment, access to private and public service and conditions for good accommodation of the citizen.

Safe Traffic

”The long-term goal of road traffic safety is that no-one shall be killed or seriously injured as a result of a traffic accident. The design and function of the transport system shall be adapted to the requirements which result from this.” According to

the Government, the structure of measures in this respect should mainly work towards:

- an efficient and outcome-oriented weighing up being made between accident-prevention measures and damage-prevention measures leading to stages of safety goals being achieved
- the requirements for road traffic safety of road user groups most exposed (including children, old people and functionally disabled) shall guide the choice of measures
- in the long term, speed, together with the engineering standards of the roads and vehicles, shall be adapted to requirements that are justified from a traffic and environmental point of view.

Good Environment

”The general goal of environmental policy is to hand on to the next generation (about 20-25 years) a society in which the big environmental problems have been solved, the so-called generation goal. The purpose of environmental policy is to protect the health of people, conserve biological diversity, promote long-term and satisfactory management of land, water and energy, and other natural resources, and to protect the natural and cultural environment. Within the area of transport, this involves the design and function of the transport system being adapted to the requirements of a satisfactory healthy living environment for everyone, in which natural and cultural environments are protected against damage.”

The requirements for long-term sustainability within the transport sector mean that transport should not cause the health of people to be impaired, and that emissions, noise and encroachment or other effects of transport shall be minimised, so that the natural and cultural environment is protected from damage.

A Transport System with Gender-equality

”The goal shall be a transport system of gender-equality, in which the transport system is designed so that it meets the transport requirements of both women and men. Women and men shall have the same opportunities of influencing the creation design and administration of the transport system, and their evaluations shall be accorded equal importance.”

This subsidiary goal is relatively new. Work in interpreting and defining the impact on the activities of the SNRA is ongoing.

”The basis of prioritisation of measures should be that they contribute to the proposed structure, and that the most profitable measures, socio-economically, should be put first.”

5.1.3 Weighing up and Prioritisation

The importance of socio-economic efficiency and socio-economic profitability is emphasised within transport policy. “The basis of prioritisations of measures should be that they contribute to the proposed structure, and that the most profitable measures, socio-economically, should be put first.”

Impact assessments for measures should be based on measurements and indicators which cover all transport-political subsidiary goals. Because all aspects of subsidiary goals cannot be covered by measurements and indicators, they should be supplemented with other information of importance in the follow up. Goals and guidance towards results shall be applied by the SNRA. Guidance of towards results involves “guiding towards goals and measuring results, which subsequently become the basis of changes of activities”. The goals should be realistic, with an established

time base, measurable and capable of being followed up. The Swedish transport policy has been characterised by a socio-economic way of looking at things for many years. During recent years, the input of quantified goals has increased, primarily through a goal-oriented way of looking at environment and the area of road traffic safety. A big change which has occurred during the last few years is the entry of the zero vision into transport policy.

5.2 The Planning Process

5.2.1 General

The long-term planning process results in the strategic plan. In this is shown how the transport-political goals can be achieved in the long term. But, because the planning framework is also limited in extent, full goal fulfilment cannot be attained.

Therefore, a deeper analysis is carried out in order to prioritise those measures which contribute to the best goal fulfilment. The long-term plan therefore shows measures which are prioritised and which will be carried out during a planning period, which is usually ten years in duration in those cases in which the economic space conforms to the planning framework within which long-term planning is constructed. The second phase is operational planning – also called short-term planning – which is based on the annual economic capacity available, and which is decided upon by the Swedish Parliament for each year.

5.2.2 The Four-stage Principle

Background

In connection with the new transport policy being formulated (see the Government Bill "Transport Policy for Sustainable Development", 1997/98:56), the requirement was expressed for solutions to be chosen to a greater extent that use existing roads in a more efficient way

In the Government Bill it is also stated that the planning system should be

In this connection, it is recommended that before new building and rebuilding of the road infrastructure are proposed, it should be possible to show that alternative solutions have been analysed and considered

formulated so that it permits co-ordination of, and weighing up between, different types of measure within the transport sector. Against the background of things which include this emphasis on a comprehensive view of the transport system, more efficient utilisation of the existing road network, possibilities of using other measures as alternatives or complements to infrastructure measures, and the new possibilities of intelligent transport systems, the

SNRA has worked out the so-called four-stage principle. According to this, proposals for appropriate solutions to identified problems should be discussed and examined in a more unbiased way than was the case previously.

The four-stage principle

Stage 1

Measures which can affect the requirements for transport and choice of method of transport shall first be considered and examined.

Stage 2

In a second stage, measures which give more efficient utilisation of the existing network shall be examined. They can be measures such as control, regulation, information, intelligent transport systems and charging systems.

Stage 3

In the third stage, limited development measures are examined. They can consist of widening, central safety barriers, roadside area measures, reconstruction of intersections and other improvement measures, in combination with intelligent transport systems.

Stage 4

In the fourth stage, new investment is examined in the form of extensive rebuilding or entirely new building in new terrain corridors.

Method of Working

After the analysis of conditions and analysis of deficiencies, an analysis of measures is carried out, which is characterised by an unbiased approach and examination of possible measures, step by step. All planning work, both early requirements and problem studies made in such things as planning of measures and in feasibility studies and road projects – shall thus be characterised by a wide, open approach, in accordance with the four-stage principle. See also *Analysis of Measures in Accordance with the Four-Stage Principle* (SNRA's Publication 2002:72).

5.2.3 Long-Term Planning

Organisational Planning

Long-term planning begins with organisational planning, which is the phase of the planning process in which the extent and the basic purpose of the investment in road transport within the forthcoming planning period is established. The purpose is that comprehensive, political deliberations at this stage shall be made by the Government and the Swedish Parliament, and not at authority level.

This planning can be made for different types of object, for example, new investment, traffic safety objects or environmental investment. In such cases, it can be a question of funds being specifically allotted in order to speed up certain urgent measures.

After the Swedish Parliament has taken a position regarding the future structure of the measures in the transport system, the Government decides on required assignments and on goals and directives for planning of measures, formulated in an organisational decision.

Planning of Measures

Long-term planning terminates with planning of measures to be taken. The decision of the Swedish Parliament shall be the basis for various types of measure planned to be carried out within the transport system. Measures within the infrastructure are weighed against other measures within the transport system.

The planning of measures to be taken occurs at national level by means of the establishment of a national plan for the road transport system. This covers all measures which fall within the areas of responsibility of the SNRA.

Planning of measures to be taken occurs at regional level through the establishment of county plans for regional traffic infrastructure. (The National Rail Administration compiles a so-called Outline Network Plan in parallel.). The regional plans/county plans are managed and decided upon by county administrative boards or regional boards. They also decide on the content of the plans.

The basis is that the transport system shall be treated as an entity, and that co-ordination between different types of traffic shall be facilitated. The county plans for transport infrastructure have, in this context, a key function. The county administrative boards/regional boards have a widened role through participation in the strategic analysis of the organisational planning, and in the task of co-ordinating and basing the county plans for regional transport infrastructure. In order that the planning work may be carried out efficiently and with high quality, it is important that the planning resources of the SNRA and the National Rail Administration give the county administrative boards/regional boards professional support.

5.2.4 Operational Planning (Short-Term Planning)

The second phase in the planning process – short-term planning – is the annual operational planning (establishment of budget), which is drawn up by the SNRA. In an annual letter of appropriation, the Government gives the financial conditions for operational planning. The basis of economic, short-term (annual) planning consists of the long-term plans which have been described earlier. As there are many uncertain factors influencing planning, differences can emerge between annual budgets and long-term plans. The definitive budget work is preceded by operational planning, on the basis of preliminary frameworks and the Government's budget Bill.

5.3 Planning at Project Level

5.3.1 General

Strategic planning can, as described previously, lead to widely differing proposals regarding measures to be taken.

For those measures which the SNRA has the responsibility to carry out, the analysis of measures is given increasing depth towards the final choice of measures to be taken, and choice of design in the planning that follows at project level.

5.3.2 Physical Road Planning

As regards measures for road building, which cover all measures that involve some change in the physical design of the road or its surroundings, an established process is applied, which is partly legislated upon. This is usually called *physical road planning* and covers the *planning* phase – normally initial study and road project and *project design work* – working out design plan and building document.

This process can be drawn out and continue for several years before any building work can actually begin.

Physical planning shall be co-ordinated with the planning by the municipalities.

5.3.3 Planning of Roads

As mentioned earlier, the planning of roads normally covers an initial study and a road project phase. During the planning stage, the general public interest weighs most heavily. Planning of roads has often been preceded by various requirement and problem studies in connection with long-term planning.

Initial study

The purpose of an initial study is that it shall constitute a basis for the planning of measures to be taken, and be a safe basis for continued work and clarify the prerequisites for it. It is the first step of physical planning, and is primarily a survey stage, and is also expected to answer questions which include the following;

- what are the problems and the possibilities
- what happens if nothing is done
- is there an alternative way of solving the problems
- shall the project be taken further or not
- what area shall be scoped?

Furthermore, the initial study shall, in a general way, describe important values/qualities in the area, and work out goals for the project. The initial study starts with a problem assessment, which can cover the deficiencies existing roads have, for

example, low passability, bad safety levels, unsatisfactory accessibility, or environmental disturbance. When other information has been produced, all interested parties are invited to an early consultation. The early consultations can also be of an informal character or in writing. The problems and opportunities of solving these are discussed. In the attempts to find conceivable proposals for measures, openness and a wide view shall characterise the work. All consultation shall be documented.

The proposal documents/initial study is drawn up, and on the basis of it, the county administrative board/regional board decides whether the project can be considered to involve significant environmental impact or not. After completion of the proposal document and consideration of views received, the road manager decides how any continued work shall be carried out.

A full initial study is drawn up. It shall consist of a "pre-audited" proposal document, the decision of the county administrative board/regional board as to whether there is significant environmental impact or not, the position taken by the road management authority regarding continued work or not, and an account of consultations made.

A simplified initial study should be drawn up, even with minor improvement and operational work that does not require more land. It should, however, be suited to the size and importance of the project.

The initial study should not be carried out an excessive number of years before the feasibility study, as consultation can then become obsolete. It can be difficult to carry it out again with retained credibility.

Feasibility study

The feasibility study shall constitute the basis for selection of road corridor and traffic engineering standards. During the survey, alternative road corridors are studied, these can be several hundred metres wide; they are compared with one other, and with a "do-nothing alternative". By do-nothing alternative is meant that the existing road is retained, and only the operational and maintenance measures required to maintain the standard of the road continue. A so-called 0+alternative, which involves improvement of the existing road, for example, widening, putting up safety barriers or environmental protection measures, should be presented as a survey alternative. The do-nothing alternative and the 0+alternative shall always be presented, if this is not impossible for special reasons. The investigation normally begins with going through the initial study and supplementing and deepening the analysis of such things as traffic, nature and cultural environments, safety and the situations of children, old people and the functionally disabled.

If, at the initial study stage, the county administrative board considers that the project can be presumed to entail "significant environmental impact", the survey work shall begin with increased consultation which shall include assessment of environmental impacts.

Important consultation partners are the general public, authorities, municipalities, county administrative boards and organisations.

Impact assessments are carried out for the different survey alternatives. An important component of the work is to analyse which impacts the road can have on the environment, and to draw up an environmental impact assessment (EIA), which shall be approved by the county administrative board/regional board. In those cases

Initial study Handbook

in which the interests of children are affected, a child impact assessment is carried out.

The Proposal Document/Road Project is drawn up. In the case of “significant environmental impact”, this is displayed, including the EIA, and any views are documented. The survey can also be displayed if significant environmental impact is not present. Consultation can also be carried out earlier at various stages, depending on how the project looks. All views are collected together in a consultation statement.

After consideration of views from the display and from the opinions from the county administrative board/regional board, among others, (requirements for this are given in Section 32 of VVFS 2001: 18) the road manager takes a position regarding alternatives (usually road corridors), and the Decision Document/Road Project is drawn up.

Certain road projects are examined for permissibility by the Government, in accordance with the Environmental Code.

The municipality’s comprehensive plan is of great value for “connecting up” road planning with other urban and regional planning.

5.3.4 Road Design

Road design is commenced with a design plan, and then a building document is drawn up.

Design Plan

An important purpose of a design plan is that the road manager shall obtain so-called right of way, normally through the establishment of a design plan. In exceptional cases, most often involving operational or maintenance measures, or minor rebuilding, there can be a so-called voluntary right of way concession, with a written agreement with the landowners. The right of way means that the road manager has sole access to the land area required for the existence, operation and use of the road, and which is shown as road area in the design plan.

The work of drawing up a design plan is begun with in-depth work on the road project’s information data. Further work is undertaken in order to determine the position and design of the road in more detail. In the design plan, a specific road line is shown within a marked road area. The impact assessments, including the EIA which is to be approved by the county administrative board/regional board, are drawn up, and the child impact assessment is carried out. While the work is in progress, a meeting of landowners should be held. Consultation is also now made with authorities, municipalities, county administrative board, organisations and others.

The design plan, including EIA, is exhibited, and the general public is given the opportunity of putting forward comments and points of view regarding the proposal. When the comments from exhibiting have been considered, a final proposal is drawn up for the design plan. The design plan, together with the county administrative board’s comments, is sent to the SNRA for determining consideration. In the event of any appeal, the design plan is given to the Government for consideration.

It can also be necessary to draw up a design plan for operational and maintenance measures, or other minor measures. Where land is required, in addition to an existing road area, there is a mandatory requirement that an initial study and design plan must be drawn up in order to obtain right of way. If it is judged that a project will entail

significant environmental impact, a design plan *shall* always be drawn up and adopted.

If, during the initial study stage, the county administrative board has decided that the project entails significant environmental impact, and no road project is carried out, increased consultation with environmental impact assessment *shall* be undertaken at the design plan stage. The increased consultation with those members of the general public who are particularly affected can be carried out in connection with the meeting of landowners.

The Building Document

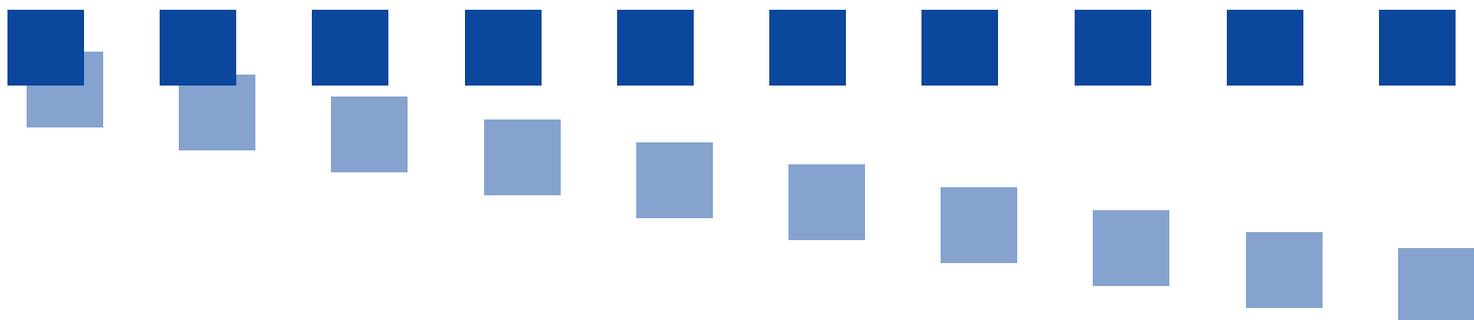
The main purpose of the building document is that it should constitute a basis for procurement and for execution of the construction work.

Only when the design plan is established and the decision has gained legal force, can a building document be completed. The building document primarily contains engineering data, assessments and quantity and cost information. It should also contain a programme regarding how environmental questions shall be handled during the building period, a control programme for the building phase, and a management programme, and a possible follow up, for the operational phase.

5.3.5 Follow Up

After building has been carried out, the goal fulfilment of the project should be checked. A relevant follow-up, which may need to take several years, must therefore be carried out. This shall give the answers as to whether the measures actually lead to project goals being fulfilled, so contributing to fulfilment of the transport-political goals.

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Analysis of Measures in accordance with the Four-stage Principle

- a general approach to
analyses of measures for
the road transport system

1 Demand for transport
and modes of transport

2 More efficient utilisation
of the road network

3 Improvements and
minor rebuilding

4 New investment and
major rebuilding

Analysis of measures in accordance with the four-stage principle

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1 Introduction

Society's measures with respect to the road transport system shall be based on a total view, and be intended to secure the provision of socio-economic, efficient and long-term sustainable transport support for citizens and the business community throughout the country.

The intention of the report is to give a direction to planning work which guarantees a broad approach, in which the best measures shall be found for solving a deficiency. The report gives a general description of the four-stage principle and its application within the SNRA, and gives an example of how analyses of measures can be carried out.

We have chosen to call the report "Analysis of measures in Accordance with the Four-Stage Principle", as it is about analysis of measures in general, and is not limited to planning of measures in work with road transport plans.

The report, Analysis of Measures in Accordance with the Four-Stage Principle, has been produced by the Department for Road Design and Traffic, having been ordered by the Unit for Government Road Management, and the Unit for Planning of the Road Transport System, whose network has functioned as a reference group. Work has been ongoing during the period December 2000 until September 2001.

At a late stage of the work, the designation used previously of four-stage model was replaced with four-stage principle, in order to further emphasise that it is about an "approach" and not a strict model.

Work Group

The following have participated in the work with this report:

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2 Description of the Four-stage Principle

2.1 What is the Four-stage Principle?

The four-stage principle should be seen as *a general approach to analyses of measures for the road transport system* and not as a strict model that should be applied at some specific planning stage. It was originally launched in order to manage investment funds, but has been developed to a general planning principle for management of resources and reduction of the road transport system's negative effects. The four steps involve measures being analysed in the following order:

Step 1. Measures which affect the demand for transport and the choice of modes of transport

Covers planning, control, regulation, effect and information bearing on both the transport system and society at large, in order to reduce the demand for transport or transfer transport to less space-requiring, safer or more environmentally friendly means of conveyance.

Step 2. Measures that give more efficient utilisation of the existing road network

Covers input within control, regulation, effect and information directed towards the various components of the road transport system, in order to use the existing road network more efficiently, more safely and in a more environmentally friendly way.

Step 3. Road improvement measures

Covers improvement measures and rebuilding of existing segments, for example, traffic safety measures or load-bearing capacity measures.

Step 4. New investment and major rebuilding measures

Covers rebuilding and new building measures, which often demand new land, for example, new segments of road.

The principle is constructed on a general transport-type approach, but primarily deals with deficiencies and problems within the road transport system. A basic consideration is that measures outside the road transport system can reduce the demand for road transport, and thus the requirement for measures within the road transport system. As a first step therefore, measures outside the road transport system should be tried. After that, the principle is, to a very large extent, concerned with analyses of measures within the road transport system.

2.2 Background

In connection with the formulation of the present traffic policy, see Government Bill "Transport Policy for Sustainable Development" 1997/98:56), the requirement was expressed that, to an increased extent, solutions should be chosen that utilise existing roads in a more efficient way. In this context, it was recommended that before new building and rebuilding of the road infrastructure be proposed, one should be able to show that alternative solutions had been analysed and considered.

The Government Bill also stated that the planning system should be designed to permit co-ordination of and weighing up between different types of measure within the transport sector. Against the background of this emphasis on the holistic view of the transport system, proposals for suitable solutions to identified problems should be discussed and tried in a more unbiased way than previously. This can, for example, be done through more efficient utilisation of the existing road network, or as alternative measures to infrastructure measures, such as controls or intelligent transport system measures.

In the SNRA's guidance to the regions and to the units at the head office, prior to planning of measures 1998 – 2007¹, it was stated that the four-stage model (as it was earlier called) could be used in the following way in order to carry out examination of various proposed solutions:

- First, those measures that can affect the demand for transport and the choice of mode of transport should be considered and tested.
- In a second stage, measures should be tried which give more efficient utilisation of the road network. These can be measures such as controls, regulation, information, intelligent transport systems and charging systems.
- In the third stage, improvement measures can be tried. These can be widening, rebuilding of intersections and other limited building measures in combination with intelligent transport systems.
- Only in the fourth and last stage should new investment be considered.

¹ Guidance for the Regions and Units at Head Office. Basis of the National Plan for the Road Transport System and for the Regional Transport Plans, (13-03-1997), Appendix 8, Page 3.

2.3 Application

Basis

The four-stage principle describes an approach in the analyses of measures for solving identified problems and deficiencies. It therefore presupposes that an analysis of deficiencies has been carried out, in which the existing situation is compared with the transport-policy goals.

Goal

The paramount goal of transport policy is "to ensure socio-economic, efficient and long-term sustainable transport support for citizens and the business community throughout the country". By "long-term sustainable" is meant both ecologically, economically, socially and culturally sustainable.

The general goal is given precision in five subsidiary goals for the transport system:

- An accessible transport system
- High transport quality
- Positive regional development
- Safe traffic
- Good environment

Yet another subsidiary goal – equality of opportunity – has been formulated in the Government Bill 2001/02:20 Infrastructure for a Long-term Sustainable Transport System². The stage goals and other measures need to be developed for this subsidiary goal. It is therefore not dealt with in this document.

Other relevant goals to deal with in connection with the analysis of measures, are the general environmental quality goals for society, and the architectural-political goals.

The subsidiary goals for the transport system should be given precision as far as possible for each particular planning case.

Analysis of conditions and deficiencies

A survey of conditions in the road network and its surroundings is given in the analysis of conditions. After that, the analysis of deficiencies is made, with reference to relevant types of traffic and groups of road users, by means of a systematic run-through of the transport-policy goals and goals for individual planning cases. Analyses of conditions and deficiencies are not developed further in this report.

² Adopted by the Riksdag without change, 14-12-2001.

Requirements of Measures

It is often not possible to attain all goals, on account of goal conflicts and/or limited resources. When deficiencies and problems in relation to goals and other formulated requirements are identified, some form of adjustment and prioritisation is therefore required between the goals. Even if the starting point for the analysis of measures should be to solve the problems, measures which only partially solve the problems must also be tried.

Work Methods

In application of the four-stage principle in analyses of measures, the method of working should be characterised primarily by an *unbiased approach* and a *step-by-step consideration* of measures. All work, including earlier analyses, shall be *documented* in a relevant manner.

Unbiased approach

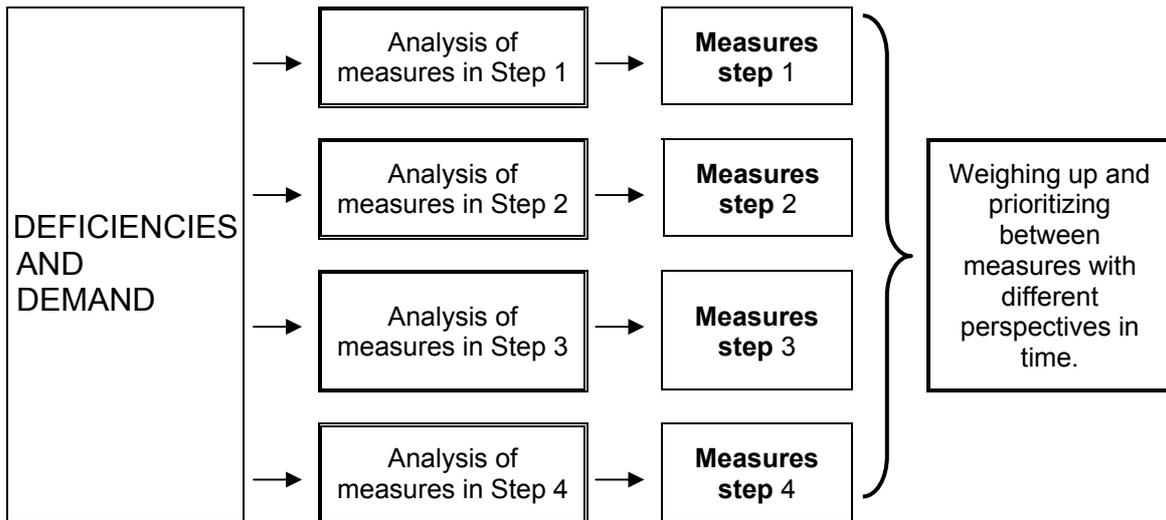
Irrespective of when and where the analysis of measures is carried out, both measures within the road transport system, and measures outside the road transport system and all their components (users, vehicles, infrastructure and regulatory system) must be considered. In discussions concerning which conceivable measures shall be analysed, it is therefore important to have an *unbiased approach*. Consequently, representatives for various interests should participate, so that all conceivable measures emerge, and the questions at issue are correctly elucidated.

Step-by-step consideration of measures

The four-stage principle involves first considering whether one can fully or partly attain one or more of the goals with the measures in *step one*. After that, measures in *step two* are considered, etc. When all the steps have been gone through, a weighing up and prioritisation of measures with various time perspectives is made, taking into account cost-effectiveness and long-term sustainability.

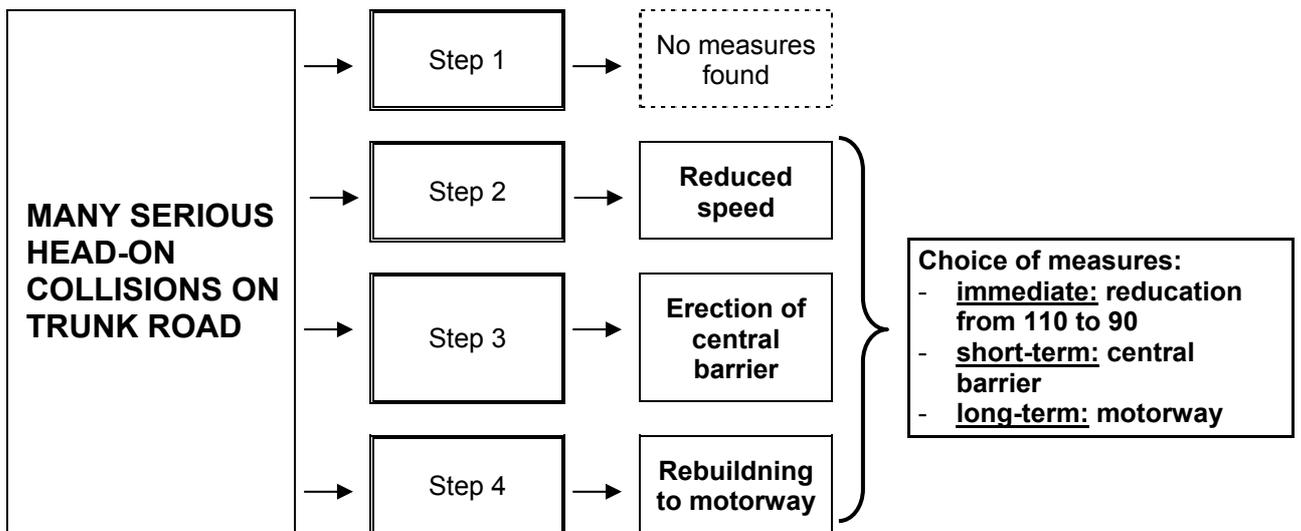
Even if a measure is found which partly fulfils the goals, there may be measures at a later stage that solve all problems or which are more cost-effective, and therefore are better in total. All steps should consequently be gone through if it is not obvious that the goals are attained in a cost-efficient and long-term sustainable way. Measures in the various steps should not be seen as alternatives, but can complement one another. The result can therefore be seen as a combination of measures from the different steps. The method of working can be illustrated by the figure on the next side.

Analysis of measures in accordance with the four-stage principle



Consideration of measures according to the four-stage principle, step by step

An example of how consideration can be carried out in steps can be shown by the following analysis of measures for Road E4 past Ljungby.



Analysis of measures for Road E4 past Ljungby

3 The Four-stage Principle within the SNRA

3.1 The SNRA's Tasks

The tasks of the SNRA have been widened during the 1990s. The SNRA has been given the collective responsibility (sector responsibility) for the entire road transport system, with the following tasks:

- **Sector tasks**
co-operating with and co-ordinating input to push on development of the road transport system
- **Exercise of authority**
producing and applying rules for vehicles, drivers' licences, traffic environment, etc.
- **Government road management**
developing and administering the Government road network

In addition, there are profit centres in the SNRA, with the task of carrying out production within project planning, building, operations and maintenance, and also training.

The sector responsibility of the SNRA involves responsibility for results for the entire road transport system. This responsibility is in addition to the operational responsibility the SNRA has for measures within the sector tasks, Government road management and exercise of authority. Within responsibility for results is included responsibility for influencing other participants to undertake measures which contribute to fulfilling the transport-policy goals.

The role of the SNRA is not only to satisfy demand for transport, but also to influence both the demand for transport and the way in which transport is carried out. One approach can therefore be to attempt to prevent the transport situation becoming a problem at all. Transport can often be forecast, even during urban and regional planning, and certain operational locations give transport that is longer and creates more disturbance than others. The SNRA affects locations and society's planning by participating in urban and regional planning. Demand for transport and modes of transport are thus also affected in processes outside traditional planning of measures.

Often a combination of regulation, physical measures and influencing measures give greater effect than any one of these methods alone. Some measures have a national effect, for example, legislation and taxation, while others have regional effects, for example, pricing and regional public transport, or local effects, for example road charging, parking fees and commuter parking. It is therefore important in analyses of measures to identify what effect different types of measure give from a system perspective, and not

only relate the measures to a specific planning problem or particular feasibility study.

3.2 Analysis of Measures in the Planning Work of the SNRA

Analysis of Measures at different levels

In order to demarcate analyses of measures for the road transport sector, some form of general transport type analyses of conditions and deficiencies in combination with other participants are required. The purpose of these is to indicate general deficiencies in the transport system, and deficiencies in the actual road transport system.

The purpose of analyses of measures for the road transport system then is to find the "best" measures, irrespective of:

- whether the measures are undertaken within or outside the road transport system
- the SNRA, or some other body, has the responsibility for carrying them out

Measures handled within the SNRA are structured differently in different contexts, for example, in accordance with purposes/goals of such things as general measures for passability, safety and environment. Or in accordance with how responsibility for planning and execution are allocated (for example, operational measures, investment measures or public transport measures). The search tool in *Effektsamband 2000 (Effect Connections 2000)* is an aid for being able to look both for appropriate measures to fulfil a certain goal, and describing various effects of a particular measure.

In the four-stage principle, measures are mainly structured on the basis of what part of the transport system they are directed towards. Step 1 deals with measures outside the road transport system, and measures directed at road users, vehicles and regulatory systems. Step 2 deals with controls, etc., within the road transport system. Steps 3 and 4 consist of measures directed towards the infrastructure. The structure is therefore independent of what purpose the measure has, or how the responsibility for the measures is divided up. The measures within each step do, however, differ depending on the planning situation. This is exemplified under each respective step below.

3.3 Long-term Planning

In the SNRA, analyses of measures are made at general level, in order to create a basis for long-term planning at national and regional level. The plans are dominated by road management measures, but also deal with the basis of the SNRA's other tasks

(see Chapter 3.1). The planning thus covers all the measures for which the SNRA has operational responsibility, i.e., apart from Government road management, also being sector tasks and exercise of authority. In the road transport plans for 1998-2007, this applies to the national plan, while the regional plans only cover parts of the national road management.

Between planning batches there is also a need for general analysis of measures resulting from decisions on special investment (for example, central safety barriers), or, as required, measures after unforeseen events such as new developments, serious accidents or natural catastrophes. There is no established method of approach for such analysis of measures. Actually, it is no different from the analyses of measures which are made as a basis for the long-term plans. They are like general analyses of measures, in that they are based on an analysis of conditions and deficiencies.

Directional Planning

Directional planning can be seen as a “programme stage”, which results in decisions on such things as total average allocation, division between types of transport and goal directions. In directional planning, the general transport-type analysis of conditions and deficiencies are made that indicate deficiencies in the road transport system, and general deficiencies in the transport system for which measures within the road transport system are conceivable.

Those surveys of conditions and deficiencies, and descriptions of effects which are made in directional planning, constitute the basis for the so-called directional decision, and should not be seen as proposals for choices of measures and prioritisations of objects, except in certain indicated exceptional cases. Work with proposing measures and prioritisations should normally therefore “start again” in an unprejudiced way in planning of measures.

In directional planning, measures are considered, which are of a general nature, and which often apply for the whole country. At this stage, solutions for solving deficiencies on longer links can also be considered, for example, the “right line” and the Road E6 from Uddevalla to the Norwegian border. Measures in accordance with step 1 for such a system must often be drawn up at this strategic level.

Examples of measures with directional planning

Examples of measures in accordance with step 1

- Reduction of vehicle traffic through higher charges
- General concentration on public transport
- General concentration on alternative types of transport, such as railway, aircraft or ship

Examples of measures in accordance with step 2

- General speed reductions
- Improved driver training
- Increased use of cycle helmets
- General emphasis on intelligent transport systems

Examples of measures in accordance with step 3

- General concentration on road improvements for increased accessibility, safety, environment, regional development and good transport quality
- General concentration on operational and maintenance measures

Examples of measures in accordance with step 4

- General concentration on new building for increased accessibility, safety, environment, regional development and good transport quality

Planning of Measures

Planning of measures is the stage that results finally in the long-term plans of the SNRA and the county. Planning of measures can be divided into three constituent parts: deficiency analysis, analysis of measures and prioritisation. The proposals for measures that emerge are often preliminary. Formulation of measures can change during later planning stages.

Conditions and deficiency analysis

An action-neutral and goal-oriented condition and deficiency analysis shall be carried out as a basis for selection and prioritisation of measures. It should be based on the present and expected condition of the transport system being compared with the goals, with respect to types of traffic and groups of road users. The analysis results in an assessment of deficiencies in relation to the goals. The deficiencies can be assessed for the entire transport system or the road transport system, demarcated road networks or geographical areas, single roads or segments, etc.

Analysis of measures

When the deficiencies are identified, all conceivable measures and combinations of measures are studied. Solutions in the form of information and influence measures, and directed traffic safety and environment measures, as well as object-based measures are studied and considered in accordance with the four-stage principle.

Often a measure cannot conclusively solve all problems. Therefore, a combination of measures is often necessary. In addition, limitations of resources and goal conflicts cause adjustments between different goals and allocation of measures over time.

Analysis of measures in accordance with the four-stage principle

The analysis of measures results in “gross lists”, with proposals for various types of measures

Prioritisation

When establishing plans, a prioritisation is made between different measures, and a grading of measures over time.

Examples of measures and planning of measures

Examples of measures in accordance with step 1

- Arrangement of school transport
- Improvement of public transport in a certain area, in consultation with the principal for public transport
- Location of new activities, in consultation with municipalities, so that the need for transport is reduced
- Road pricing in urban areas

Examples of measures in accordance with step 2

- Speed limits in certain sections
- Intelligent transport systems
- Control of traffic with dangerous goods
- Information and influence

Examples of measures in accordance with step 3

- Road improvements on certain segments, for example, the erection of median separation, improvement of side areas, load-bearing capacity improvements, improvements of worn road environments
- Improved operational and maintenance measures in the section of road

Examples of measures in accordance with step 4

- New building or rebuilding of the section of road, most often fully or partly as a new segment, for example, a new by-pass, new motor traffic route with separated carriageways, new motorway, new bridge with greater load bearing capacity.

3.4 Operational Planning

Operational planning results in operational plans which look ahead 1 – 3 years. These contain financial planning for measures which the SNRA has the responsibility of carrying out. For measures outside the road transport system, and for those measures within the road transport system for which others are responsible, the role of the SNRA is to influence the participants who are involved, for example, representatives of other types of transport, other road management bodies or vehicle manufacturers. As regards further investigation and design of such measures, the main responsibility lies with the participants involved. The SNRA also has an interest in

following both continued planning and the effects of such measures, for such reasons as to be able to co-ordinate them with its own measures, and in order to obtain experience for the development of the connections between measures and effects.

Planning of measures uses knowledge obtained earlier, and initiates continued work on the basis of existing proposals for measures. As to what process in the SNRA (by whom and where in the organisation), and how the analysis is undertaken, is determined by the type of measure proposed, for example, investment measure, sector measure or execution of authority. Thus, it is not decided by the type of deficiency involved. However, in the work, feedback to the deficiency has to be made to be able to make an unbiased assessment of the preliminary proposal for measures on the basis of in-depth knowledge.

3.5 Planning at Object Level

For those measures which the SNRA has the responsibility of carrying out, the analysis of measures is intensified in continued work towards a final choice of measures and design. In principle, this is carried out in parallel with planning, in accordance with 3.3 and 3.4, and is both initiated by and creates planning information. Analyses of measures at object level all have in common the fact that they are based on some form of preliminary proposal for measures. This imposes the requirement that assessments of conditions, deficiencies and proposals for measures carried out earlier must be gone through in order to clarify that this work is carried out in an acceptable way in the spirit of the four-stage principle, and that the decision-making information has been sufficient and is still valid.

How the work is then continued in order to produce the various final decision-making information for choice of measures and design differs depending on the proposed measure, as earlier. The best-assessed work procedures are those for traditional road-building measures. For this reason, the assessment below exemplifies the in-depth analysis. Equivalent investigation work is also made to produce final decision-making information for other types of measures.

Brief description of how continued investigation work is carried out for physical measures

Physical Road Planning

For road-building measures, which cover all measures involving some change in the physical design of the road or its surroundings that affect the traffic or the environment (this means that small measures such as erection of safety barriers, surfacing of gravel roads and cleaning side areas should also be considered to be road-building measures), an established, partly legislated, process with initial study, feasibility study, design plan and construction documents are applied. In this, analyses of measures are included, both in the initial study and the feasibility study.

Initial studies

Initial studies shall assess the problems, and propose conceivable measures, and shall be a basis for how it is assessed that significant environmental effects can arise, and shall give proposals as to how work is pursued. Continued work is dependent on what measures are assessed to become appropriate.

In the initial study, it is assessed whether the alternatives for measures have been considered in accordance with the four-stage principle at earlier planning stages. If earlier consideration showed that road-building measures can be appropriate, and the decision-making basis is still relevant, no further consideration in accordance with the four-stage principle is required. However, one should be aware that in-depth analyses in the initial study work can give reason for reconsideration.

It is also necessary to clarify whether measures, in accordance with steps 1 and 2 can contribute to removing defects within selected main solutions (road measures) and reduce the requirement for, or postpone, road-building measures.

For examples of measures, see "Examples of Measures, Planning of Measures"

Feasibility studies

A feasibility study shall constitute the basis for selection of measures for continued planning in the design plan and construction documents. In the feasibility study it is checked whether the alternative for measures has been considered in accordance with the four-stage principle at earlier planning stages. If earlier consideration showed that road-building measures can be appropriate, and the basis for decision making is still relevant, no further consideration is required in accordance with the four-stage principle. One should, however, be aware that in-depth analysis in work with the feasibility study can give cause for reconsideration.

One must also clarify whether measures in accordance with steps 1 and 2 can contribute to remedy deficiencies within the selected main solution (road measures) and reduce the requirement for, or postpone road building measures.

Step 3 measures (often called the 0+-alternative) shall, of course, also be assessed in the feasibility study. There shall, moreover, be assessment of the future situation if no measures are taken, (the so-called 0-alternative).

For examples of measures, see "Examples of Measures, Planning of Measures"

4 Example

4.1 Purpose

In order to show how measures can be considered in accordance with the four-stage principle in various planning situations, an example is shown as an appendix. The example does not refer to any specific stage, but the degree of detail is selected with a view to it being suitable for an initial study or a feasibility study.

The example shows how an analysis of measures in stages, according to the four-stage principle, can be undertaken for problems in the transport system, but it is not an example of how the actual report should be compiled. The purpose is both to show how deficiencies and problems can be identified/assessed through a progressive survey of the transport-policy goals, and also as to how the actual analysis of measures can be carried out.

The example is primarily intended to show the actual structure, but the formulation, conclusions, etc., are somewhat simplified; reasons for this include the fact that the conditions are partly invented.

4.2 Example in Principle

General Assessment

It can be appropriate to divide the general assessment into three subheadings, namely:

- Collecting information on the problem
- The condition of the transport system in the section in question
- The design of the existing road and previous measures

A brief description of the case in question is given under each of these headings.

Deficiency Analysis

In this section, a description is given regarding the five transport-policy goals, and with respect to the actual type of traffic (for example, cars, public transport, pedestrians and cyclists), and groups of road users (for example, motorists, children and the functionally disabled).

- An accessible transport system
- High transport quality
- Positive regional development
- Safe traffic
- A good environment

Under each of these headings, there is then a division, as appropriate, into the following subheadings:

- Present situations

Analysis of measures in accordance with the four-stage principle

- Goals (here, both the general goals and those goals which are appropriate in the case in question shall be given)
- Deficiencies in conditions compared with the goals.

After an analysis under these headings, it is appropriate to compile a

- Summary

Analysis of measures

The analysis of measures is carried out in accordance with the four-stage principle, i.e., in the following four stages:

- Reduced demand for transport and choice of alternative modes of transport (Step 1)
- More efficient utilisation of the existing road network (Step 2).
Can be appropriately divided into control and regulation, and intelligent transport systems
- Improvement measures (Step 3)
- Rebuilding or new building (Step 4)

For each step, a division should be made as follows:

- Conceivable measures
- Effects

The analysis of measures shall be carried out step by step, irrespective of what stage the process is at. If at previous stages one has rejected measures in previous stages, in accordance with the four-stage principle, it is only necessary to give an account of these if the basis for the decision is relevant and still appropriate. However, it should always be investigated as to whether the problem in question can be solved through a combination of presented proposals for measures.

Evaluation

State which measure or measures should be undertaken to solve the problem in question.

Here it is also appropriate to elucidate the question as to whether short-term measures are possible before carrying out the end solution.

4.3 Example Shown

The following example is shown in Appendix 1

- European highway through larger urban area

5 Identified Requirements for Continued Development

In the course of the work, it has been established that the requirement for joint bases in analyses of conditions and deficiencies is a prerequisite for being able to apply the four-stage principle in a relevant way, and one which is more or less equal in merit over the whole country.

Example

European Highway through Larger Urban area

| | |
|--|----------|
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1 General Description

1.1 Introduction to the problem

At present, transport on the Road E4 through the central part of X-town is largely of the character of through traffic. This situation involves deficiencies in road safety, disturbance for those living in the area and for those unprotected road users who cross the European highway or travel along it. In addition to this, there is impaired passability for through traffic.

1.2 The function of the transport system

The transport system is of crucial importance for the business community, and of decisive importance for access to places of work, service and culture and leisure facilities. The transport system is thus of decisive importance for the development of the region and for the quality of life of its inhabitants.

1.3 The present design of the road and earlier measures

The design of the road as a two-lane road, centrally located through the city, has required measures to be undertaken in order to attempt to improve the situation in different ways. Thus:

- crossings have been rebuilt
- speed limits have been reduced on certain segments
- traffic control has been carried out in order to improve the environment
- traffic control has been carried out to improve passability for unprotected road users
- buses have been given priority at traffic lights
- attempts have been made to develop public transport.

Despite measures that have been undertaken, a considerable problem remains in the form of a high accident rate with resulting serious injuries, high traffic load and interruptions in passability.

2 Analysis of Defects

2.1 An accessible transport system

The existing situation

The existing traffic load on the Road E4 through the city is approximately 20,000 vehicles per 24-hours period on weekdays. The transport of timber through the city is from logging north of the river and north of the city. Most of the destinations are located south of the city. Of regional travel, at present 51% is by car and 5% by bus. There is at present, considerable pedestrian and cyclist traffic, unprotected, along the European highway and without level-separated crossings.

Goals

In general/As regards transport policy

”The transport system shall be designed so that the basic demand for transport by citizens and the business community can be satisfied”

Case in question

Both for those who live in the city and for the through traffic, it is of great importance that the traffic should either be removed from the city or, at least, that measures should be undertaken to improve the situation for the unprotected road users. As regards the environment, measures must also be taken to improve the situation for residents.

Problems

Because the timber terminals are located south of the city, conflicts of various types arise when such transport goes through the central parts of the city. The problems can be summarised as follows:

- passability is impaired because different types of traffic are mixed together
- traffic safety for unprotected road users is inferior
- the situation for those living in the vicinity is not satisfactory as regards noise and exhaust gases
- difficulties in developing public transport satisfactorily.

2.2 High transport quality

The present situation

The load bearing capacity of the road is unsatisfactory throughout the year. The evenness of the road and the road surface are also unsatisfactory. Passability through the central parts of the city is not satisfactory. The unprotected road user experiences great uncertainty. Public transport has difficulty in functioning in the required way.

Goals

In general/As regards transport policy

”The design and function of the transport system shall permit a high degree of transport quality for the business community”

The case in question

The road should have satisfactory bearing capacity, evenness, and be fully passable throughout the year. For people using public transport, the situation should be secure as regards keeping to timetables, and also adapted for functionally disabled people. As regards pedestrians and cyclists, there should be separate paths along the European highway, safe as regards traffic, and crossings of the European highway should either be on different levels or controlled by traffic signals.

Problems

In order that heavy transport may function throughout the year, the load-bearing capacity of the road must be improved. This also applies to the evenness of the road and the road surface throughout the year. With respect to the requirement that transport should arrive on time, passability through the central parts of the city must be improved. This latter is also of great importance for improved public transport. The situation for unprotected road users must also be improved.

2.3 Positive regional development

The present situation

The forest industry is the branch of industry which is of greatest importance for the development of the region.

Goals

General/From the transport-policy point of view

”The transport system shall promote positive regional development by both evening out the differences in the ability of different parts of the country to develop, and in counteracting disadvantages of long transport distances”

The case in question

Transport shall be undertaken in such a way that industry knows that it will arrive on time, and safely. The possibilities of getting to work quickly and safely must be improved.

Problems

The problem is to be able to transport timber from the felling regions to the processing locations, quickly and safely. It is additionally important that the unsatisfactory public transport connections for conveying people from their homes to their places of work should be improved.

Analysis of measures in accordance with the four-stage principle

2.4 Safe traffic

The present situation

The segment of the European highway through the city involves clear road safety risks, both for vehicles and for unprotected road users. Despite crossings having been rebuilt, speed restrictions imposed and traffic regulation having been carried out, the road safety aspect is still unsatisfactory.

Goals

General/From the transport-policy point of view

”The long-term goal for road safety is that no-one shall be killed or seriously injured as the result of road accidents. The design and function of the transport system shall be adapted to the requirements resulting from this”

Actual cases

As long as the European highway goes through the city, the measures presented above must be intensified. In addition, further investment must be made in both summer and winter road management, as regards pedestrian and cycle paths.

Problems

An investigation must be carried out concerning measures which must be taken. Which measures can be taken in the short-term, which shall be seen in a longer perspective, and which can wait until final rebuilding.

2.5 Good environment

The present situation

The through traffic causes significant environmental problems in the city, especially for those living nearby. The big problems are primarily air pollution and noise. Transport of dangerous goods through the city is also a problem of great importance.

Goals

General/From the transport-policy point of view

”The paramount goal of environment policy is to hand on society to the next generation (in about 20-25 years) in which the big environmental problems have been solved, the so-called generation goal”

Actual case

The goal is to undertake measures in the transport system and in the city, so that the environmental problems described above can be reduced and finally surmounted.

Problems

An investigation must be carried out in order to clarify whether the noise problem can be solved fully or partly by erection of noise barriers or by replacing window glass. It would appear to be difficult to solve the exhaust gas problem. The routes to which transport of dangerous goods should be directed must also be investigated.

2.6 Summary

The analysis of deficiencies should be neutral as regards measures, not action-directed, meaning that the analysis should cover the requirements of all groups.

Expected future circumstances should also be assessed, in order to take into consideration changes in society regarding vehicles and road users, for example, new locations or general measures.

This means that it is important to study whether deficiencies can be rectified in a short-term and long-term perspective.

The analysis of deficiencies shall be carried out for the five subsidiary goals in the transport-policy prerequisites. Furthermore, it also means that after the analysis has been carried out, prioritising what measures are the most important ones to carry through. This work should constitute the basis of the following analysis of measures.

3 Analysis of Measures

3.1 Reduced demand for transport and choice of alternative modes of transport (Step 1)

Conceivable measures

It does not appear to be possible to reduce demand for the transport of forest products, as long as the forest industry is a main employer for the area, and as long there is a market for such products. To reduce demand for other transport is not possible either, with consideration to the requirements of the community.

Measures which should be discussed are the expansion of the railway, which requires the building of a new bridge over the river, improvement in public transport for conveying people, and improved conditions for pedestrians and cyclists.

Effects

As the transfer of transport to rail discussed in the area does not involve changing the locations of goods terminals and commuter stations, the local transport will retain traffic volume at the existing level. This leads, in total, to the planned and conceivable public transport and transport solutions only fulfilling established goals to a marginal extent.

3.2 More efficient utilisation of the existing road network (Step 2)

Control and regulation

Conceivable measures

Locally, it is possible to re-route traffic through the city streets, for example, when there is interruption (an accident) in the traffic. In a larger perspective, it is possible to re-route traffic over an adjacent river bridge, which is located 20km upstream. This would give a 48km longer travel distance. This bridge also has limited load-bearing capacity.

Effects

Re-routing traffic along city streets creates considerable new problems, but is one conceivable possibility. Re-routing the traffic via a 48km longer road increases the total environmental effect, but solves the problem of passability in the central parts of the city by the near absence of through traffic. This redistribution does, however, involve certain requirements for rebuilding work along the road to be utilised.

Intelligent transport systems

Conceivable measures

The SNRA and the municipality have been working actively for several years to benefit from the possibilities from intelligent transport systems. Use of intelligent transport systems for control of the choice of roads is effective in raising the capacity of a road network. It does, however, need flexible and durable possibilities of road choice available, which is, however, not the case in the urban areas.

Effects

Intelligent transport systems are an alternative which can solve problems in the cases of such things as an accident. Investigation of it should be continued.

The environment and passability problem will, however, not be improved through these measures

3.3 Limited building measures (Step 3)

Conceivable measures

Adjacent to the city and through it, the European highway has been worked on on several occasions during the past few years. Examples of such measures are roundabouts, pedestrian and cycle paths and crossings on separate levels for pedestrians and cyclists.

The measures mentioned above have brought positive effects in several ways, but have not, however, been sufficient by any means. Apart from the limiting measures, which have been carried out earlier, there are possibilities of further improving the situation along the arterial road through the city. However, such measures can probably not produce a satisfactory standard for the European highway through the city. The possibilities of attending to the air environment problem are probably also limited.

Effects

These measures fulfil the pedestrian and cyclist goals regarding passability and traffic safety, but the environmental problem remains, as does the passability problem for through traffic.

Despite the above measures, the environmental, safety and passability problems through the urban area will remain, and may intensify.

3.4 Rebuilding and new building measures (Step 4)

Conceivable measures

The possibility of building a completely new diversion past the urban area. Several different alternatives are possible to carry out, and should be investigated more closely. An alternative to limited rebuilding is to

Analysis of measures in accordance with the four-stage principle

build a new bridge over the river at a position which would fit a future diversion. Another alternative would be to leave the European highway where it is, through the urban area, but at a sunken level.

Effects

A diversion or a new bridge would constitute land encroachment, but would solve the passability goal, and would solve the road safety goal to a great extent. An alternative sunken road solves the passability goal to a great extent, and the road safety goals, but not the environmental goals.

4 Evaluation

Solving the problem with the Road E4 through the city, solely with effects on the demand for transport and choice of transport, together with more efficient utilisation of the existing road network, would not appear to be economically defensible. These measures should be combined with "limited development measures" as described above. An investigation should also be carried out to see whether it is possible to solve parts of the through traffic problem with other measures.

With reference to the important function that the European highway has, and with reference to the considerable problems along the road through the city, investment in a new diversion must be considered in continued planning work.

With reference both to the high investment cost of development of a diversion, and to the limited funds available, a debate should be started as to whether the problem can be solved in a short-term perspective and a long-term perspective. In such case, an investigation must be carried out to establish whether the cost of development in a short-term perspective can be written off before the final development takes place.

Analysis of measures in accordance with the four-stage principle



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The Environment and Safety on Roads – An Investment in the Future



New Strategy for Environmental and Safety Considerations on Roads – A Summary

It is important that we are able to travel and transport goods wherever we want. However, the freedom to do so is not to be at the expense of harming people and the environment. Hence, we have to revise our way of thinking when it comes to road traffic.

It is essential that our way of travelling and transporting goods be changed. Vehicles, fuels and roads must be improved. Transport in built-up areas has to be carried out on the terms of those living and working there.

These are the basic premises in the new strategy for the environment and road safety on Swedish roads.

How quickly the necessary changes can be implemented depends on good intentions, market forces and voluntary agreements. Better knowledge and interaction are contributing factors in this process, as are financial incentives and laws and regulations that promote road safety and environmental awareness.

In 1999, the Swedish Government commissioned a strategy that was drawn up in co-operation between the National Environmental Protection Agency, the National Police Board, the Swedish National Road Administration and the Swedish Association of Local Authorities. In addition, more than 400 people have been able to influence the design of this strategy through their taking part in the discussion groups and seminars that were

organised throughout the country during the course of the work. The strategy shows the long-range aim and direction of the work on improving safety and the environment in the road transport system. This work had already begun and now concentrates on the following seven principal areas:

- 1 Demand and conduct safe, environmentally-sound transport.
- 2 Actively promote developments on the international scene regarding vehicles and fuels.
- 3 Develop roads so that they can cope with more stringent safety and environmental requirements.
- 4 Improve road safety and the environment in urban areas and make walking, cycling and public transport more competitive modes of transportation.
- 5 Co-operation between the government and industry for the development of new technology.
- 6 Greater knowledge on a wider front and working in dialogue with others.
- 7 Economic incentives support development.

Demand and conduct safe, environmentally - sound transport

If companies, organisations and public authorities were to procure safe and environmentally-sound transport and travel in their operations, the demand for vehicles that fulfil these requirements would increase. Further, this would put greater pressure on transport actually being conducted in a safe and environmentally-sound manner.

The need for transport decreases if co-ordination is improved, not least of all within the public sector. This is greatly beneficial to safety and the environment – and to the economy.

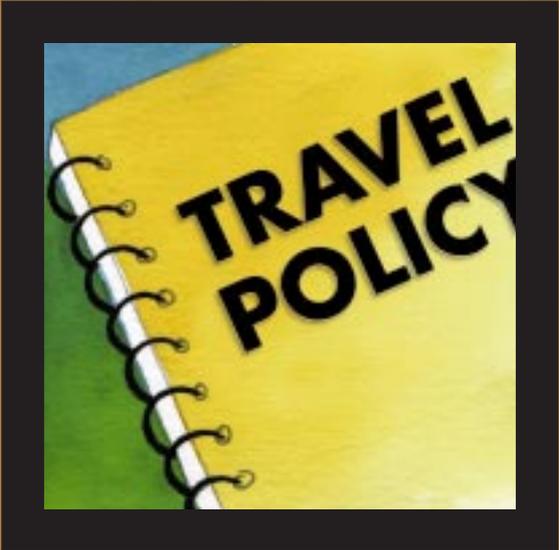
Alcohol ignition interlocks guarantee sober driving. Photo: Erik Stigmark.



People who drive cars and other vehicles are responsible for their traffic behaviour, like keeping within the speed limit and obeying other traffic rules, using seat belts and refraining from drink-driving. Ecodriving, moreover, pays off. Using public transport services, cycling or walking instead of taking the car helps reduce the environmental impact of traffic.

Some good examples:

- Companies and organisations set their travel policy based on important safety and environmental considerations.
- Companies and organisations ensure that their in-house travel arrangements and the transport services they procure are quality assured as concerns safety and environmental impact. Well-functioning follow-up systems are used to check compliance with the terms of contract.
- The municipal authorities in Piteå, Luleå and Skellefteå have run a pilot project in co-operation with the Norrbotten County Council to co-ordinate deliveries to schools, day-care centres and homes for seniors, etc. A collective consignment centre has been the base for all the goods purchased, and is the point from which co-ordinated distribution has been arranged. This has reduced the distance driven by about 34 percent, and the number of deliveries to each destination by up to 75 percent. These municipal authorities intend to continue this way of organising their deliveries.
- Drive economically. This reduces fuel consumption and entails such manoeuvres as accelerating distinctively and letting up the accelerator well ahead of time, instead of braking sharply when coming to a stop.
- Hauliers who install alcohol ignition interlocks in their vehicles demonstrate that they guarantee sober driving and thereby enhance safety and quality in their transport operations.
- Take the bus instead of the car to work.



1 2 3 4 5 6 7

Actively promote developments on the international scene regarding vehicles and fuels

From an international perspective, Sweden is a little country with a tiny automobile market. In order to be able to influence developments in the field of vehicles and fuels, Sweden must take an active initiative in the international arena.

EU is an important forum for progressive developments when it comes to vehicle specifications, rules and regulations and more environmentally-sound fuels. There are many other bodies and organisations working in co-operation, where initiatives on the part of Sweden can contribute to safer and more environmentally-sound vehicles and fuels. It is important to take advantage of the opportunity to actively promote the issues in any possible context.

Photo: Euro Ncap.

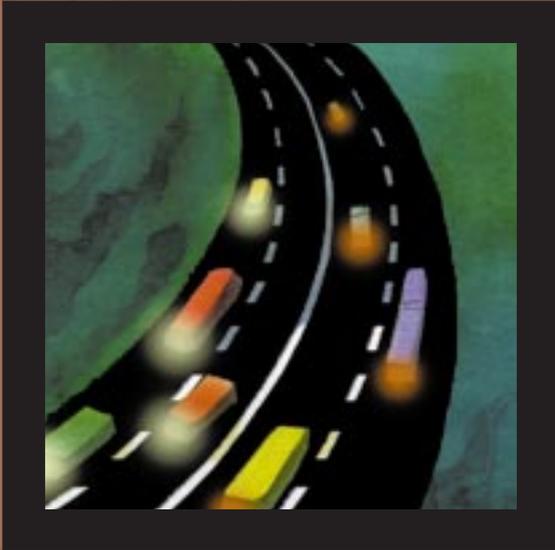


Crash tests help improve safety.

Swedish information booth at an ITS Congress in Berlin. Photo: Nils Mordenstedt.



- International fairs and exhibitions provide an opportunity to exchange ideas and experience and promote important issues.
- EuroNCAP, the European New Car Assessment Programme, an independent organisation for co-operation in the field, has been running crash tests for several years now. The test results have helped raise the safety standard of European cars.
- Rearward-facing child safety seats are by far the safest way for small children to travel in cars. These seats are considered self-evident in Sweden, but not so in other countries. It is therefore important for Sweden to work internationally so that all automobile manufacturers ensure that it is easy to install these seats in all car models.
- Researchers in different countries are collaborating within many areas. An example of this concerns reducing the noise from tyres and carriageways. This has resulted in such things as international standards for measuring the noise properties of road pavements. The co-operation has also meant a greater exchange of knowledge and expertise between countries.



2 3 4 5 6 7

Develop roads so that they can cope with more stringent safety and environmental requirements

Roads are a necessity for society to function, but there are shortcomings in present-day roads as far as safety and environmental aspects are concerned. There are, however, many possible means of improvement.

Safety levels can be increased through separating oncoming lanes of traffic, making roadside areas safer, adapting the speed limit to the road standard and providing pedestrians and cyclists with safer road space.

From an environmental point of view it is often better to maintain existing roads rather than build new ones. New roads consume natural resources. They can also have a negative impact on residential areas and depreciate the value of natural and cultural landmarks.

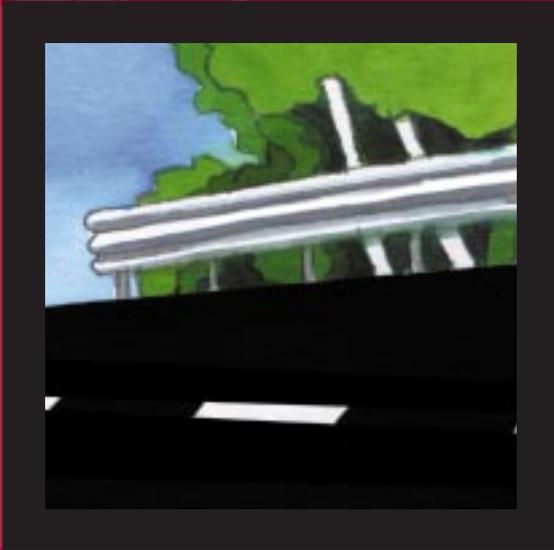
Through investing in the existing road network, it is economically possible to improve many more stretches of road than if entirely new roads were built.

- Centre guard rails prevent head-on collisions and thereby make a normal rural road significantly safer.
- Noise embankments, walls and/or sound-absorbing windows reduce the noise from traffic, which is an environmental problem for many people, primarily in the vicinity of major roads.
- Dangerous obstacles such as trees, boulders and rigid poles within roadside areas are removed, exchanged or enclosed by protective fences in order to prevent human injury. It is important that natural and cultural landmarks are taken into consideration when executing this work.
- A roundabout is the safest type of road intersection. It is also good for the environment since the smoother traffic rhythm found there results in lower emissions than the start-and-stop traffic that is typical at a normal intersection.

- Roadside areas often function as a haven for threatened or repressed plant and floral species. Looking after botanically valuable roadside areas represents an important contribution to biological diversity in Sweden.



Roadside areas are important for biological diversity. Photo: Cammy Karlsson.



3 4 5 6 7

Improve road safety and the environment in urban areas and make walking, cycling and public transport more competitive modes of transportation

Urban areas are first and foremost places to live and be in. Car traffic plays an important part, but demands on a sound living environment should be more governing.

Both the environment and safety will be the winners if people choose to use public transport instead of their cars. Community planners have a great opportunity to

develop built-up areas in that direction. Other ways of reducing congestion and vehicle emissions are to build cycle routes, and via parking facilities and transfer points facilitate seamless journeys.

Photo: Tommy Olofsson/Grupp Fem.



Transferring between different modes of travel shall be easy, like in Lund.

- The LundaMaTs project, which is a comprehensive concept for an environmentally-sound traffic system, is underway in the city of Lund. This entails such things as greater investments in public transport and cycling as well as making it easier to transfer between different modes of transport. At Lund central station it is easy to transfer between trains, buses and bikes. The bicycle parking facilities are supervised by parking attendants.
- Walking or cycling provides good exercise, while reducing the volume of motor vehicle traffic and thus vehicle emissions. Moreover, it is often faster to cycle than to take the car in city centres. A cycle helmet is a necessary part of the equipment.
- Separate pedestrian and cycle paths. Both the urban environment and safety will be better if pedestrians and cyclists do not have to share road space with cars.
- The publication issued by the Swedish Association of Local Authorities entitled "Lugna gatan" (Calm Streets) – is a compilation of examples and advice intended as guidance for municipalities when improving road safety and the environment in urban areas.
- A speed of 30 km/h is the only one that can guarantee safety in places where cars, pedestrians and cyclists share the roadway or in areas where children are often found.
- Knowing when the next bus, commuter train or tram will actually arrive makes it more attractive to use public transport. Information boards are used to display such details.



4 5 6 7

Co-operation between the government and industry for the development of new technology

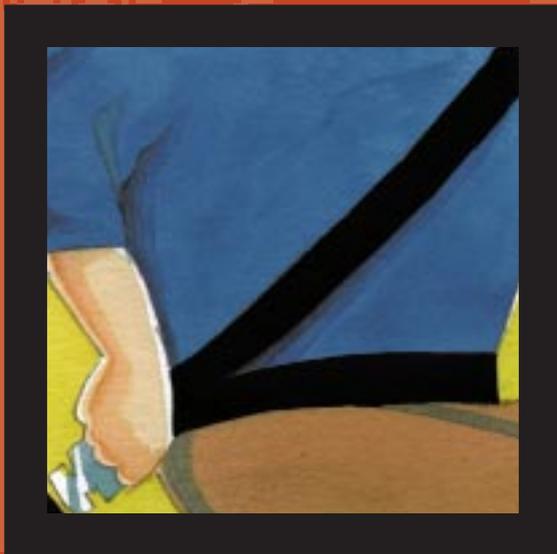
New technology is important in finding solutions that enhance road safety and reduce the environmental impact of road traffic. Much is already available and it is important that it be used. Advantage can be taken of new technology much more quickly through co-operation between the government and the industrial sector.

It ought to be possible to make greater use of the sophisticated technical expertise that exists in trade and industry to improve safety and the environment in road traffic than what is currently the case. The government can support research as well as help create a market for new technology both in Sweden and abroad via its ministries and public authorities.

- Seatbelt reminders in cars increase safety but are not installed in all cars. In Sweden, a collaboration between the Swedish National Road Administration, insurance companies, and the automobile industry has led to a common approach. Stipulating that seatbelt reminders are a requirement in all transport procurements will expedite this process.
- The development of cars that are light, contain recyclable parts and boast low fuel consumption and thus cause less harm to the environment than today's cars.
- The development of alternative fuels and vehicles, e.g., electric cars, hybrid cars and fuel cell cars.
- Speed surveillance using video cameras.
- Using Information Technology (IT) for travel planning. One example that already exists is the "Tågplusguiden" (TrainPlusGuide) available on the Internet, where it is possible to look for train and bus connections between different places in Sweden.
- The development of methods for the production and distribution of biofuels.

The Necar 4 prototype is run on fuel cells and produces no emissions.





Greater knowledge on a wider front and working in dialogue with others

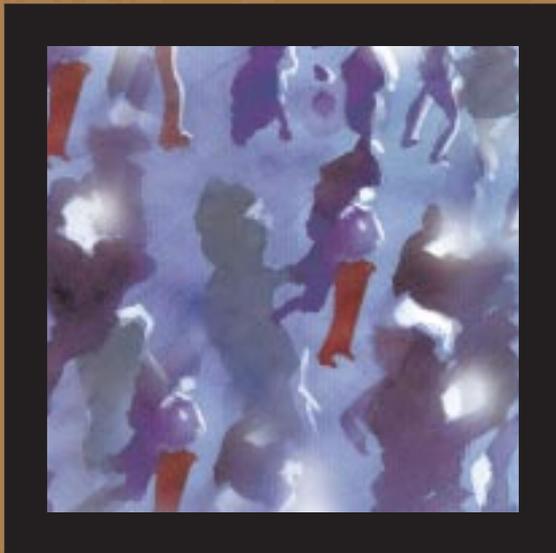
Members of the general public and decision-makers require knowledge in order to turn safe traffic and a good environment into a reality. Greater knowledge is gained through research and development, in-depth studies as well as through national and international experience. This is disseminated through consumer reports, knowledge banks and the exchange of knowledge.

The development of roads is carried out in dialogue between individuals in society, the business community and public authorities. Accordingly, more knowledge is gained in conjunction with increased social participation and a better understanding of the needs of different groups in society.

Residents of Lidköping discuss traffic issues with their politicians. Photo: Genljans.



- The "Exploring and Learning in the Local Community" project aims at school children actively learning more about their neighbourhood in order to be able to exert a social influence. In the town of Ryd, in Småland County, pupils functioned as a referral body when a local thoroughfare (Nissastigen) was to be re-constructed.
- The project designated "Lidköping – Spearheading the Way to Vision Zero" is being run on several fronts, primarily through dialogue, information and education. Meanwhile, improvements are being carried out in the traffic environment on the basis of the opinion of Lidköping residents.
- Gävle was one of twelve European cities to take part in an EU project to reduce car traffic. The reduction was to be accomplished solely on the basis of changing people's attitudes to cars. Nantes in France and Rome are two of the other cities participating in this project.
- The publication entitled "Bilars säkerhet och miljöpåverkan" (Safety characteristics and environmental impact of car models) contains information that can provide guidance prior to buying a car. This as well as other consumer information reports can be ordered from the Swedish National Road Administration.
- Transport Forum, the Tylösand Conference and the autumn conference arranged by the Swedish Transport & Communication Research Board – are annual occasions for discussion and exchanging experience.
- "No-one can do everything, but everyone can do something" is the theme of a project in Vetlanda where traffic issues have been integrated into Agenda 21. The work has been carried out through networks in companies and associations, for instance. Driving schools have run courses in "EcoDriving". Vetlanda has seen a change in the travel habits of its population since the initiation of the project in 1997. Many more people now car-pool, cycle or use public transport services.



Economic incentives support development

Safe and environmentally-sound travel to work should be encouraged. Photo: Genfjansi.



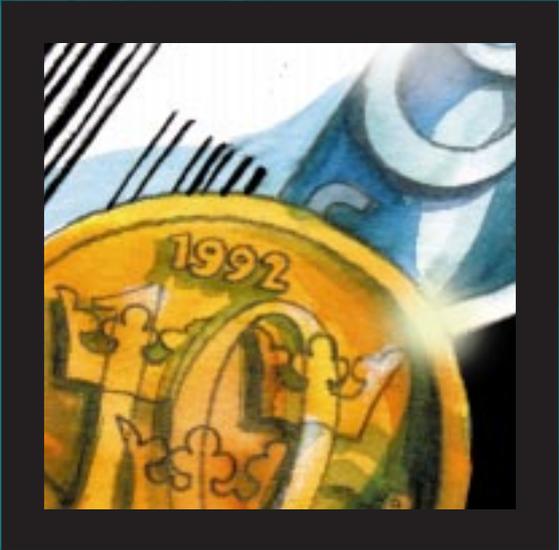
A higher scrapping bonus reduces vehicle emissions. Photo: Mats Fjellstrom.



It should be worthwhile to behave in traffic in a safe and environmentally-sound way. Present-day taxes and fees are often experienced as erratic and short-sighted. Instead of this, economic rules are needed that are sustainable in the long term and that benefit safety and the environment. One underlying principle is that road traffic should pay for the damage it causes. Economic incentive is most effective when it is related to the safety and environmental characteristics of vehicles and fuels.

- Higher scrapping bonus. This would help eliminate many older car models that produce extensive vehicle emissions.
- Favourable tax reductions for safe, environmentally-sound cars.
- There are employers who give economic compensation to employees who choose to cycle or use public transport to get to work instead of taking their cars. There is currently nothing in Swedish tax legislation that encourages this opportunity to make travel to work both safer and more environmentally sound.

Photo: Mats Fjellstrom.



How we can carry on from here

- Contact the local authorities or the regional headquarters of the Swedish National Road Administration and ask what they are doing to improve the environment and safety on roads.
- Take a good look at how we travel ourselves. Could we leave the car at home more often? Would it be possible to form a carpool with neighbours or colleagues at work?
- Those of us who belong to different associations – how do our members get to meetings and other events? Try carpooling! What demands do we make when arranging trips and excursions together?
- How do we travel to work? And how do we travel on business? Try to think up smarter ways to travel! Sometimes the smartest way is not to travel at all.
- What decisions do we make in our work? Do these have an effect on road traffic in any way? Could we in this context make road traffic safer and more environmentally sound?
- Can we influence the decisions of others? How?

Would you like to learn more about the ideas behind this new strategy? The full text version available in Swedish is contained in the document entitled "Miljö och säkerhet på väg – en investering för framtiden" (The Environment and Safety on Roads – An Investment in the Future).

This can be ordered from Vägverket, Butiken, SE 781 87 Borlänge, Sweden

Telefax: +46 243 755 50

E-mail: vagverket.butiken@vv.se

You can also read it on the Internet:

www.vv.se/publ_blank/bokhylla/intro/bok.htm.

Further information is available on the Swedish National Road Administration website www.vv.se.

This summary of the strategy designated "The Environment and Safety on Roads – An Investment in the Future" has been produced by the National Environmental Protection Agency and the Swedish National Road Administration.

