

Developing the Finnish Main Road Network: The Planning Process

JUHANI TERVALA

A new round of planning of Finland's main road network began in summer 1989 with the publication of the report *Developing the Main Highway Network in Finland—A Basis for Reassessment*. The aim of the planning work was to redefine the length of the main road network and to provide new quality standards for the main roads. An effort has been made to carry out the planning work for the main highway network in a completely new way. The planning work is based in its entirety on an open, interactive, participative planning process that recognizes local conditions and needs. The work has been carried out open to public inspection. The planning process has aimed to reduce the conflicts between professional planning and its clients. The planning of development actions aims at correct timing of projects, in a wide area over a sufficiently long time span. The plan includes comprehensive investigations of effects. The plan is dynamic. It is easy to revise if the starting assumptions change. Thus a durable basis for decision making has been obtained. The choices can be made on an informed basis. The planning of the main road network was extended in the beginning of 1990 to include all public roads. The planning of ROAD 2010 was begun because of the main road network and because the whole financing of road maintenance and its various priorities are interlinked to a considerable extent. The ROAD 2010 report will be published in summer 1991. The plan includes a new draft proposal for the main highway network. The plan will then be sent to be dealt with by the Ministry of Transport and Communications. The process is a continuous one.

The aim has been to carry out the planning of the development of the main highway network in a completely new way (see Figure 1). The planning work is based in its entirety on an open, interactive, participative planning process recognizing local conditions and needs. In the planning, an attempt has been made to take into consideration the trend towards openness in public administration that is characteristic of the present era. Publicity belongs to the nature of the work.

In addition, it was desired to see the clients' point of view in the planning and give weight to it. The main highway network will serve the whole of Finland and promote its affluence. By means of an open, interactive, and participative planning process, an attempt has been made to reduce the conflicts between professional planning and its clients, i.e., other planners and road users and inhabitants. These conflicts are as follows:

- Difficulty in understanding plans,
- Differences of opinion in the content of the plans, and
- Lack of confidence.

EXPECTATIONS OF SOCIETY

In general, all planning activities provide the society of the moment with the framework, frontiers, and expectations. As regards the planning of the main highway network in today's society, points of emphasis include the planning of the entire transport system, demands for the balanced development of the country, common visions, green values, and demands for clarity in respect of the plans.

The Transport System

The Finnish National Road Administration has until now, like the other sector administrations, operated within the confines of its own sector. However, today's society is increasingly seeking to find solutions that transcend sector boundaries. There is a need to develop a common basic understanding regarding the country's transport system. The National Road Administration for its part must participate actively in this work both by putting forward its own views and also by assessing the views put forward by others.

In the National Road Administration, an effort has been made to raise the planning of the road transport system from the project-planning level to the level of planning the entire transport system. From consideration of the effects of individual projects, the level of discussion and planning must be raised to consideration of the effects of the entire transport system.

The Balanced Development of the Country

Balanced development of the country requires that the Finland of the future shall be developed increasingly around regional centers. In order to prosper in an expanding Europe, there should be increased interaction between these regional centers, with the metropolitan region, and internationally. This process requires good communications. All Finns must be ready for a united Europe.

A Common Vision

In Finland, road transport is the principal mode of transport. The planning of road traffic is not just a highway engineering design process. Limitations of resources require a common vision of the future in which all forms of transport must be considered at the same time. New forms of finance must be

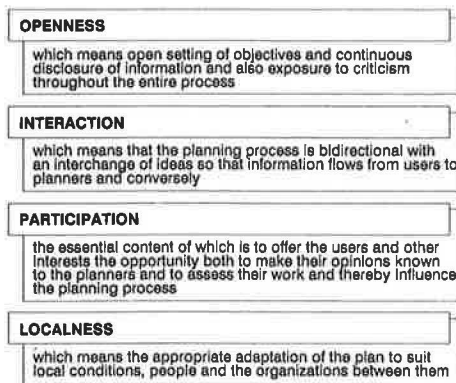


FIGURE 1 The aims of the planning process.

actively sought. Traffic planning is in part also a political process. The task of the National Road Administration is to participate in this ongoing process as an expert authority.

Green Values

Consideration of the environment in all activities is a starting point of planning. A wide view of the consequences of different actions should be taken. Proposed measures should have an overall beneficial effect on the natural environment. The principle of lasting development should be a starting point in our activities.

Clarity in Planning

In all fields, the limitations of resources require the establishment of priorities and setting of limits. By means of planning, it is possible to allocate resources correctly and time them right. The improvements proposed should be realistic. Ideal solutions that are based on traffic considerations do not solve the whole problem.

The appearance of a road must tell the driver how to behave, on the basis of the knowledge of safety risks. This knowledge of human behavior must be a basic starting point of planning. The appearance of a road must take into account the communications function of the road, the surrounding land use, and the classification of the road.

STARTING ASSUMPTIONS FOR PLANNING OF THE MAIN HIGHWAY NETWORK

In Summer 1989, the Finnish National Road Administration initiated a discussion on the development of Finland's highway network. The aim was to redefine both the length and the quality standard of the main road network.

The principal reasons for initiating planning of the main highway network were as follows:

- The rapid increase in the number of sections of main highway subject to congestion and traffic jams and the rapid deterioration in traffic conditions. Additional capacity is required.

- The growth in the number of traffic accidents. By developing the main highway network, it would be possible to improve traffic safety.

- The seriously deteriorating condition of the roads. A period of extensive major repairs to the main roads was becoming inevitable.

- Support for regional structure. Development of the main road network is an effective means of influencing regional land use development.

- Providing for future needs. The planning of motorways should be comprehensive. The provisions for motorways (for the years 2010 to 2030) must be examined very critically.

As a basis of planning, new forecasts of traffic volumes and numbers of vehicles for 1989 to 2010 are used. It is assumed that the proportion of the total traffic carried by the different forms of transport will remain approximately as at present and also that in the near future there will not be major changes in the weights and dimensions of vehicles. It is assumed that measures to limit demand for transport will not be implemented except in city centers. Increased emphasis on the environment is also a starting point.

STAGES OF THE PLANNING PROCESS

The planning of the development of the main highway network is based entirely on an open, interactive, participative planning process recognizing local conditions and needs. The planning process is continuous. The stages of the planning process are shown in Figure 2.

In the report *Developing The Main Highway Network In Finland—A Basis For Reassessment*, June 1989, two development alternatives are put forward for the main highway network: a regionally more extensive Network A, and a Network B designed almost entirely on the basis of traffic considerations. The length of Network A was approximately 4,700 km and that of Network B approximately 2,600 km.

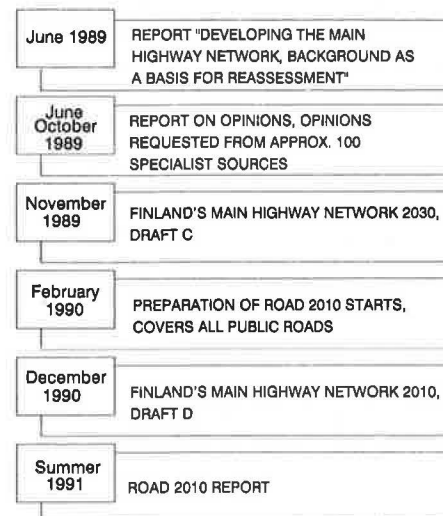


FIGURE 2 Stages of the planning process.

Opinions on the Report

Opinions on the report were requested from road districts, regional planning authorities, provincial federations, county administrative boards, central administrative boards, and certain associations. In total, 85 opinions were received.

The majority of the opinions stated that additions should be made even to the more extensive Network A. The most serious deficiency was considered to be the lack of a main highway running across the country in an east-west direction in central Finland.

It was generally considered to be a good thing that discussion of the development of main roads had begun. The development of the main highways and comprehensive planning were also considered important. The most criticized item was that the development of other forms of transport, above all rail transport, had not been dealt with in the report. The opinions also held that environmental effects should have been examined more closely.

Finland's Main Highway Network for 2030, Draft C

On the basis of the opinions, a new draft proposal for Finland's main highway network was produced in Autumn 1989 (draft 29 November 1989). The draft comprised a total of 7,000 km of main highways, of which 2,800 km were motorways. The main roads now covered all the higher road classes.

On the basis of this draft, full-scale planning work was begun on the effects of the main highway network, on its justification, and also on the procurement projects involved. The draft was subjected to strong criticism by the press.

Preparation of ROAD 2020 Starts, February 1990

The problems that emerged during the planning of the main highway network played a part in accelerating the long-term planning of the entire road network. The planning of the main highway network became an essential part of the planning of highway network maintenance as a whole. ROAD 2010 comprises seven separate subprojects, as shown in Figure 3.

Finland's Main Highway Network for 2010, Draft D, December 1990

On the basis of the investigations of effects, the negotiations, and other assessments, it has been decided to produce a new proposal for the main highway network (Draft D, see Figure 4). The main highway network comprises 7,100 km, of which approximately 1,200 km are motorways. The draft together with its justification will be sent out for extensive consideration by public interest groups at the end of 1990.

ROAD 2010 Plan, Summer 1991

The ROAD 2010 report will be published in summer 1991. The report will then be sent to be dealt with by the Ministry of Transport and Communications.

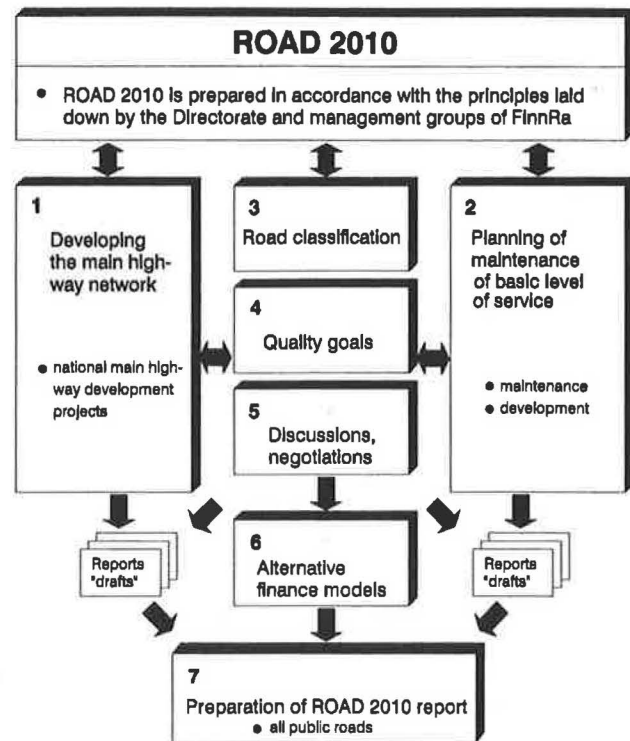


FIGURE 3 ROAD 2010 subprojects.

CONTENT OF THE PLAN FOR THE MAIN HIGHWAY NETWORK

The principal contents of the report on developing the main highway network in Finland are as follows:

- Defining the length and quality standard of the main highway network,
- Formulating projects and allocation of priorities,
- Preparing the development program,
- Investigating effects (other forms of transport, regional and social structure, economic effects, traffic, safety, driving costs, environmental effects).

Length of the Main Highway Network

The main highway network currently denotes the part of the public road network that consists of trunk highways and other main highways comprising altogether over 11 400 km of road. Of this amount, almost 7 500 km are trunk highway.

The development plan for the trunk highway network being prepared is for a highway network of revised length (excluding the Helsinki metropolitan region inside Ring Road III), the length of which in the draft is approximately 7 100 km (Figure 4). The definition of the network is based on the following factors.

Regional and Social Factors

The main highway network

- Covers the entire country,

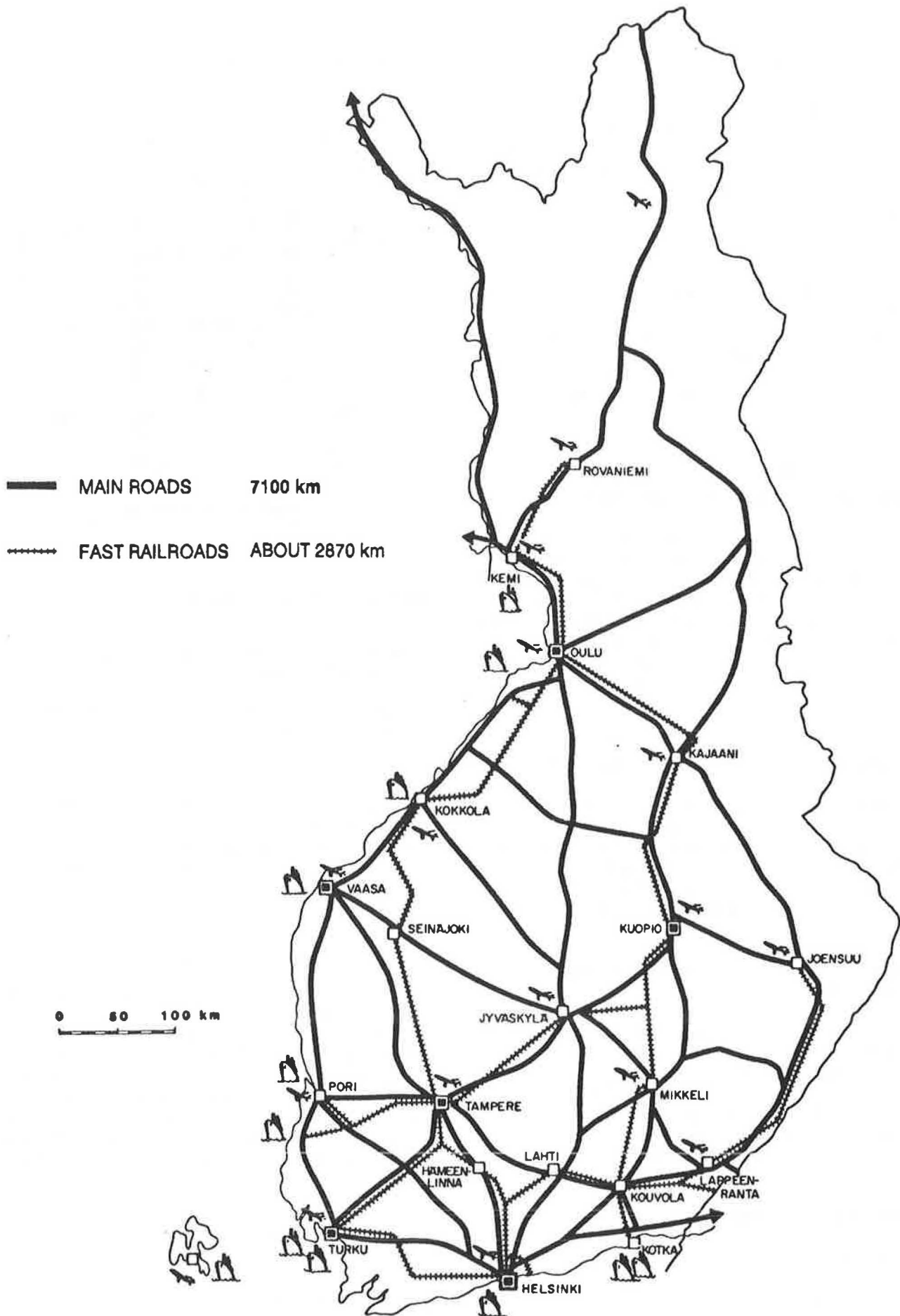


FIGURE 4 Finland's main road network, Draft D.

- Supports regional structure and its development, and
- Bypasses built-up areas (as a general rule).

Road Network Factors

The main highway network

- Is a fully connected network consisting of long, unbroken stretches of road;
- Connects Finland to its neighboring countries and to the rest of Europe;
- Includes the European (E) roads; and
- Provides road connections to the vicinity of passenger and goods terminals for other forms of transport.

Road Quality Factors

The main highway network

- Includes motorways, semimotorways and high-grade trunk highways with two or more lanes, and
- Comprises the highest class in the highway classification system.

Qualitative Targets For Main Highways

Targets have been set for travel speeds and road width.

Speed Level

For the main highway network, the aim is for the highest permissible speeds and a technical quality standard of the road such that it is possible to drive safely at these speeds. The speed limit guidelines used as a starting point in planning are as follows:

Road Class	Speed Limit (km/hr)
Motorway	120
Semimotorway	100
Main road in general	100

For safety and environmental reasons, speeds may be 20 km/hr lower in built-up areas and at intersections. In towns, speeds below 80 km/hr and traffic lights are possible, but only where absolutely essential or as a temporary solution. In each case, the speed limit is determined according to conditions either on the basis of safety or to achieve the desired environmental effects. On motorways and semimotorways, the use of variable speed limit signs is a possibility in the future.

Width of Road

The width of the road has a significant effect on driving behavior and thus also on traffic safety. As a starting point, the following cross section values have been used as a guide in combination with the average daily traffic (ADT) volumes given by the traffic prediction for the year 2010.

ADT Volume, 2010	Cross Section (m)
< 3,000	9
3,000 to 10,000	10.5
10,000 to 12,000	Considered individually
> 12,000	Motorway, semimotorway, or dual-carriageway trunk road

To a minor extent, roads with width of 12.5 m have been constructed on which traffic of all classes is permitted. This type of cross section is being discontinued. Its use is possible only in special cases as a stage in the ultimate construction of a motorway. It is intended that the use of overtaking lanes shall be increased considerably, with the road having three lanes periodically. Main roads having four or more lanes and dual carriageways come into question in built-up areas.

Other Qualitative Factors

Other qualitative guidelines for main highways are not laid down, but are determined in the detailed design of each individual project, taking into consideration the conditions and what is reasonable.

Classification of Developmental Measures

The measures required for the road network under examination and in different parts of the country vary greatly. The classification of developmental measures that is used is as follows:

1. Addition to network of a new main road connection,
2. Construction of motorway,
3. Construction of semimotorway,
4. Upgrading of semimotorway to motorway,
5. Construction of bypass for built-up area or special arrangements in built-up area,
6. Major improvement of existing road,
7. Minor improvement of existing road,
8. Major bridges and grade-separated intersections,
9. Right-of-way reserve, and
10. No need for developmental measures.

Selection Criteria for the Groups of Measures and the Formulation of Development Projects

The selection of the right measure is based above all on the present standard of the road, on the volume and nature of the traffic, and on their predicted development. The selection of the measure is likewise affected by factors connected with regional and social structures and by environmental factors in the vicinity of the road. The selection criteria for the various groups of measures are explained in the following paragraphs.

1. Addition to Network of New Trunk Road Connection. This group comprises only one project; the development and construction of an east-west link (between Jyväskylä and Vaasa) to the main highway standard. The lack of road links in this group is illustrative of the nature of the development of the trunk road network. The links of the network already exist,

but relative to the standard of the roads already have many shortcomings, and more are anticipated in the future.

2. Construction of Motorway. The need for a motorway is based on high traffic volume. In this work, the guideline threshold value has been increased so that 12,000 veh/day on an existing road requires additional traffic-carrying capacity. Regional and social factors and road network factors together with the volume of traffic to be carried ultimately decide whether a motorway, semimotorway, or four-lane trunk road should be built. The traffic volume for a motorway should be at least 10,000 veh/day for the solution to be justified.

3. Construction of Semimotorway. A semimotorway comes into the question

- As the first stage in the construction of a motorway,
- When the maximum volume of traffic to be carried is forecast to remain below 10,000 veh/day, or
- As a transitional link from a motorway to the ordinary trunk road environment.

Other factors are similar to those relating to motorways.

4. Upgrading of Semimotorway to Motorway. The upgrading of a semimotorway to a motorway, i.e., the construction of a second carriageway, is justified at the stage when the traffic volume on the road exceeds 12,000 veh/day.

5. Construction of Bypasses for Built-up Areas or Special Arrangements in Built-up Areas. In this group of measures, the starting point is naturally that the existing road passes through a built-up area. This condition generally causes numerous problems for traffic (flow and safety) and social structure (continuous effect). The environmental effects are negative (emissions, noise, and urban image). The construction of a bypass around the built-up area is not always justified. Depending on the circumstances, a more efficient solution may be to resolve the conflicts between the road, traffic, and environment while preserving the existing road routing.

6. Major Improvement to an Existing Road. This measure comes into question when the existing road has multiple shortcomings. If a road simultaneously has poor geometry, is narrow with numerous intersections, and additionally has structural weaknesses, then the road must be rebuilt. In this case, the road must be built either entirely or partly to a new site. The upgrading of a road to four lanes is also classified as belonging in this group.

7. Minor Improvement to an Existing Road. This group of measures covers the largest number of road-kilometers in the planned network. The main shortcoming is narrowness, i.e., the road lacks hard shoulders. This condition affects the structural durability of the road, safety (and particularly conditions for pedestrians and cyclists), and also driving comfort. The development measures can be carried out for the most part while retaining the existing road siting. In connection with widening of the road, it is appropriate at the same time to carry out the measures required to protect the ground water (as is also done in connection with major road improvements).

8. Major Bridges and Grade-Separated Intersections. The projects in this group of measures, which apply to points on the network, serve to improve traffic safety and traffic flow.

9. Advance Right-of-Way Reservation. The time span of the program for the implementation of the development plan for the trunk road network extends to the year 2010. By that time the basic growth of traffic will be substantially complete

(the number of vehicles will not grow significantly and there will be no further increase in the number of people holding a driving license). On the other hand, regional or social factors may still give rise to even considerable growth of traffic locally or on particular sections of road. Projects that may become topical after the year 2010, and for which it is desirable to make site reservations at the various stages of land-use planning, have been classified as reservations. Advance right-of-way reservations are generally associated with stretches of semimotorway for their future upgrade, and also with built-up environments in which socioeconomic development is to be expected. Projects, the approval of which is subject to dispute and unsettled, have also been classified as reservations.

10. No Need for Developmental Measures. Part of the trunk road network has already been constructed or improved to a standard corresponding to the targets. Minor measures are not considered as development, but are instead carried out as part of basic road maintenance.

Quantitative Data by Developmental Measure Group

On the basis of the survey of needs, the approximate quantities in the different groups of developmental measures are as follows:

Category	Quantity	Cost (FIM)
1	62 km	0.3
2	480 km	10.8
3	330 km	5.1
4	220 km	2.4
5	400 km	3.8
6	1 050 km	4.0
7	3 080 km	5.0
8	6 + 33	1.1
9	625 km	—
10	1 200 km	—

The same stretch of road or connecting link may be the subject of action in more than one group of measures during the time span under consideration, so that the above lengths cannot be added together directly.

Order of Implementation of Projects Within Each Group of Measures

For purposes of scheduling, the projects within each group of measures are arranged in order of relative importance. In the following, the criteria used are explained for each group of measures.

1. Addition to Network of New Main Road Connection. There is only one project in this group (link between Jyväskylä and Vaasa). It has been decided that the project will be implemented on the basis of the decision made in 1984 by the Ministry of Transport and Communications.

2 and 3. Construction of Motorway and Construction of Semimotorway. Motorways and semimotorways have been placed in a special position in road and traffic legislation. As part of the trunk road network, they provide carrying capacity for high traffic volumes economically and safely. In the long term, they have a significant effect on regional structure and the local social structure.

The order of implementation of motorways is affected by the following:

- **Volume of Traffic in Built-Up Environments.** From the point of view of the functioning of the entire trunk road network, it is important to avoid congestion of the major concentrations of traffic in urban areas. The environmental effects are generally favorable.

- **Volume and Nature of Traffic in Rural Areas.** The traffic volumes vary on the network links for which a motorway is a justifiable solution.

- **Factors Related to Service Level of the Existing Road.** These also affect the choice of development path for the stretch of road in question, should improvements be made first to the existing road before construction of a motorway.

- **Formation of Continuous Motorway Links.** This factor comes into the question mainly when considering the need for motorway reservations on the basis of road network and regional structure factors.

4. **Upgrading of Semimotorway to Motorway.** The existing semimotorways have been designed and constructed so that they can be upgraded to full motorways in the second phase of the implementation. The need to do this will arise in the near future. The criteria are in principle the same as those given in connection with motorways. The service life of an existing semi-motorway, however, can be prolonged to a limited extent in rural conditions by making more effective use both of the parallel road and of the semimotorway, and also by providing the semimotorway with a clearly marked system of overtaking lanes.

5. **Construction of Bypass for a Built-Up Area or Special Arrangements in Built-up Areas.** The order of implementation in this group of actions is affected above all by the seriousness of the conflicts between the road traffic and the environment. Top priority should be given to solving the problems that arise when the trunk road traffic is carried by the street network or passes through the urban area. Generally, the location of the road in the community is decisive. Other factors taken into account are traffic safety, the volume and nature of the traffic, and the seriousness of the nuisance caused by the traffic.

6. **Major Improvement of an Existing Road.** The order of implementation of the projects in this group of actions is affected by the level of service that the road offers to traffic. The international classification of the level of service *A* to *F* (*F* represents a completely congested state during peak traffic hours) simultaneously takes into account both quantitative and qualitative highway engineering and traffic factors. Poor traffic safety or poor structural condition of the road may increase the priority for implementation of the project.

7. **Minor Improvement of an Existing Road.** Inadequate width of the road in relation to the composition and volume of traffic establishes the order of priority for projects in this group. Stretches of roads running near houses and with a more than average number of accidents should be improved before more remote sections.

8. **Major Bridges and Grade-Separated Intersections.** Weight and headroom restrictions cannot be tolerated on bridges on the trunk road network. These points should be dealt with at the earliest opportunity. The order of priority for grade-separated intersections is based on traffic safety and traffic

flow considerations and on the location of the point in the road network and in the community structure.

9. **Advance Right-of-way Reservations.** Reservations are not arranged in any order of priority in this connection. By following the development of society and traffic growth, establish the importance of the land and the rate at which the existing reservations being abandoned and new ones planned to the extent required.

Program of Measures, 1991 to 2010

The development plan for the main highway network is being formed into a program of measures for four 5-year periods covering the time interval 1991 to 2010. The content of the program is affected by the weightings of transport policy, highway policy, economic policy, and environmental policy and by the corresponding opportunities to obtain funding. In turn, the program can affect the development of the regional and social structure of Finland.

The program of measures has been drawn up in connection with this work on the basis of need and keeping the goals in view.

Projects from the different group of measures have been included in the program in order of effectiveness. In the whole program, emphasis has been given to conditions in urban areas, traffic safety, and traffic economy. If funding does not correspond to the need, then it will be necessary to decide what shall be left undone, or what shall be postponed until a later date.

The length of the main road network in the draft is approximately 7 100 km. For reasons of regional structure, it includes road sections that differ widely in their importance to traffic. Largely as a factor in structuring the program of measures, the especially important roads in the main highway network have been defined. These highways connect the major regional centers to the metropolitan region and provide road links to Sweden and the Soviet Union (see Figure 5). The projects for the construction and improvement of these

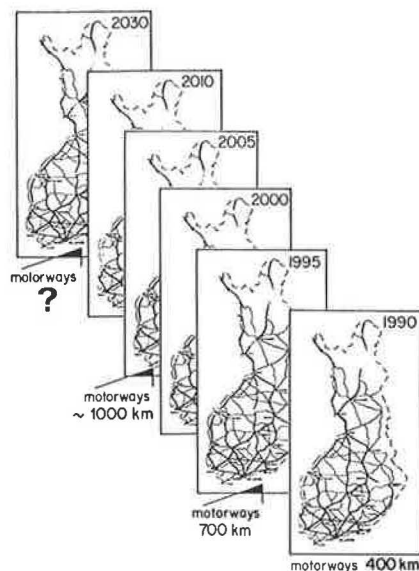


FIGURE 5 Developing the main road network.

roads are scheduled so that they will be completed by the year 2005, i.e., over the next 15 years.

Around 2010, Finland's network of main highways should appear near the state shown in Figure 6.

Investigations of Effects

The development of the main highway network to a state that corresponds to the targets and needs will cost approximately FIM 33 billion. In order to ensure an adequate return on the

investment and the achievement of the targets set, the plan includes comprehensive investigations of the effects. These investigations concern the effects of development on

- Traffic safety,
- Noise emissions and exhaust emissions from traffic,
- Fuel consumption by traffic,
- National economy and transport economy in particular,
- Regional and social structure, and
- The division of labor between different forms of transport.

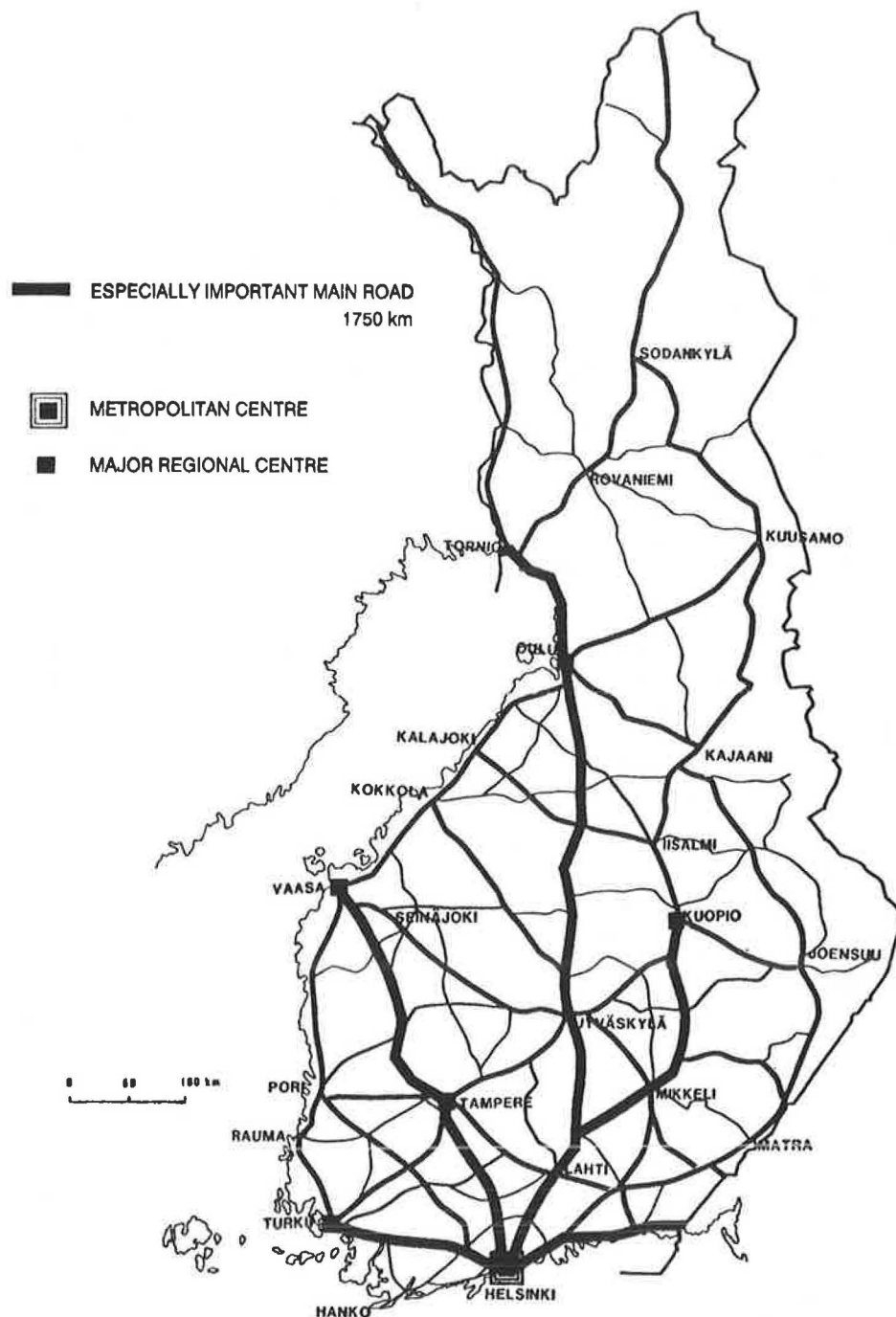


FIGURE 6 Finland's main road network around year 2010.

EFFECTS OF DEVELOPMENT ACCOUNT

The development of the main highway network should result in favorable development and prevent or reduce negative effects. In this connection the following targets have been set. The development of the trunk road network should

- Make a positive contribution to development of the national economy,
- Safeguard the reliability of transport and the operating conditions for commerce and industry in the different regions of the country,

- Maintain and improve the service level offered to road users,
- Promote traffic economy,
- Improve traffic safety,
- Reduce the growth of fuel consumption and emissions by road traffic, and
- Localize problems so as to cause less nuisance.

The targets set in planning the development measures mean that the requirements set for both the natural and man-made environments and also for the economic effects will be taken into account as a whole.

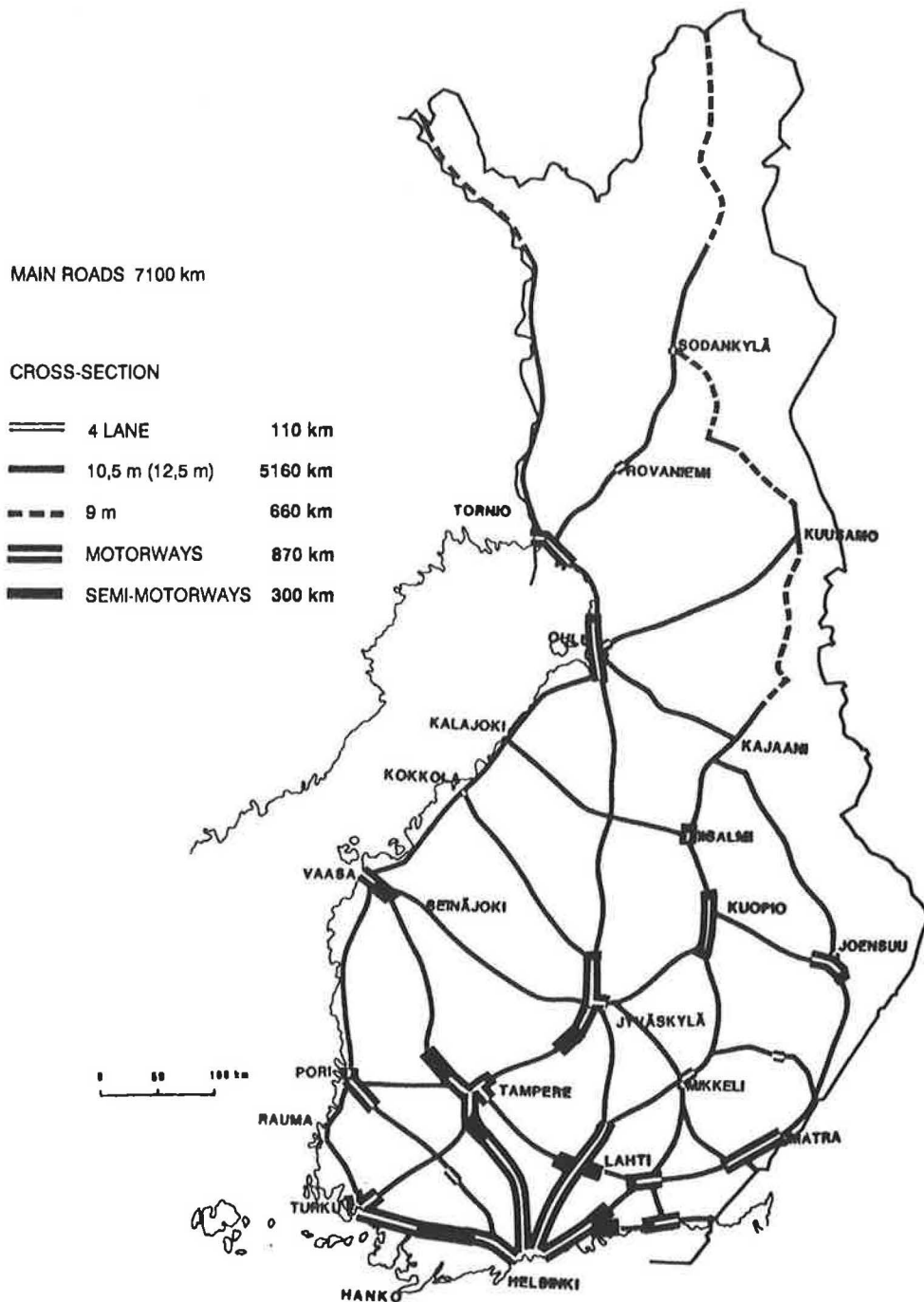


FIGURE 7 Finland's main road network—cross sections after year 2010.

ASSESSMENT OF THE PLANNING PROCESS

The development plan for the main highway network is a network level plan that creates a basis for more detailed project planning. Only by the investigation of the project need and the various stages of physical planning can a project proceed to implementation.

The development plan for the main highway network is being prepared by an open and interactive planning process. At the end of 1990, the draft plan will be presented for consideration by public interest groups. The reactions and opinions received will, as far as possible, be taken into account together with the results of the impact assessment in drawing up the proposal of the Finnish National Road Administration, which is to be submitted to the Ministry of Transport and Communications in May 1991.

In the planning work, an effort has been made to take into account publicity, the points of view of the different parties, discussions, opinions, etc. The plan has changed during the work. It has proved possible to partly reduce conflicts between professional planning and its clients.

Some of the principal observations of the planning process include the following:

- The draft proposals presented were misunderstood. They were seen as final proposals. There have been problems in providing information about the process.

- The proposed changes to the present situation have been feared "hysterically." It appears difficult to perceive the system as a whole; there was a tendency to see isolated details as being problematic.

- The planning of the entire road maintenance function (ROAD 2010) was begun more forcibly during the planning process.

- Far fewer motorways should be proposed than originally assumed.

- The weighting of traffic considerations should be more flexible than before (more technical alternatives, and local problems must be taken into account).

- It has been possible to develop the planning process during the course of the work. The views of different interests have been put forward at an opportune time.

Figure 7 shows a map of the main Finnish road network as it should appear after the year 2010.

Publication of this paper sponsored by Committee on Transportation Programming, Planning, and Systems Evaluation.