FINNISH ROAD ADMINISTRATION

Finnish Road Administration research and development program 2003-2005

R&D 2003-2005

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Finnish Road Administration
Helsinki 2003

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SUMMARY

The Finnish Road Administration's (Finnra's) annual research and development program is based on the strategy adopted in 2002, and research priorities are set according to the focal areas of the strategy. The goal of research and development is to develop new knowledge and skills to improve the function, safety and competitiveness of the whole Finnish road transport system on a sustainable basis. The focal areas of research and development are:

1 Requirements of road users and other client groups
2 Impacts of road management and traffic
3 Asset management
4 Working markets for procurement of road works and services
5 Traffic management
6 Management of traffic and road network information.

Finnra is also responsible for products and services of the whole road transport and R&D is also directed at these activities.

The focal area coordinators' research programs indicate that resource needs for the year 2003 exceed the target set in the strategy, a 1% share of road management funding, by approximately half a million Euro. The target share also seems to be exceeded in 2004-2005.

Finnra's Management Group adopted the program on January 20, 2003. To initiate the 2003 program, the following basic allocation was decided:

Strategic projects (separate program decisions)	1,182,000
Requirements of road users and other client groups	100,000
Impacts of road management and traffic	500,000
Asset management	700,000
Working road management markets	400,000
Traffic management	500,000
Management of traffic and road network information	400,000
Sector tasks	1,500,000
Total	5,282,000 Euro

Two strategic projects end during the program period: the Road Structures Research Program and the Main Road Improvement Solutions Program. Two new projects were initiated in 2002: the Research Program for Impact Management and the Low-volume Road Economic Maintenance Program.

The road users' requirements theme will need further consideration. For the information management theme, development needs especially concern the relationship between R&D projects and computer systems development. The 2003-2006 program for developing the asset management theme was also adopted on January 20. The other themes' programs have been established and also coordinated extensively with the projects of Finnra's partners. Sector task programming is based on the fields of road management expertise.

FOREWORD

The Finnish Road Administration's (Finnra) research and development program is based on the strategy that was approved February 26, 2002. On May 20, 2002, Finnra's Management Group authorized focal area coordinators to prepare research plans which include the most important goals of the program, fundamental content, primary projects and a cost estimate and annual financing needs.

Finnra's R&D program 2003-2005 was compiled on the basis of the research plans. The research plans of ongoing strategic projects have been decided on separately; short descriptions are included here.

The program was reviewed by Finnra's R&D cooperation group on October 23 and December 12, 2002 and at a process owners' seminar held November 13, 2002. Finnra's Management Group approved the program on January 20, 2003.

Helsinki, January 20, 2003

Finnish Road Administration

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CONTENT

1 R&D PROGRAM FRAMEWORK

Finnra's annual research and development program is based on the strategy adopted February 26, 2002, and research priorities are set according to its focal areas. The focal areas are:

1 Requirements of road users and other client groups
2 Impacts of road management and traffic
3 Asset management
4 Working markets for procurement of road works and services
5 Traffic management
6 Management of traffic and road network information.
7

R&D also focuses on product and service tasks serving the whole road transport sector.

The scope of the program is about 1 % of road management funding. In the preparation of the program, core processes specify problems to be addressed by focal area research plans and determine what type of development is needed. The research plans are made for several years, the present one being for 2003-2005. They present the goals and content of the research areas in general and the activities of the first years in more detail.

The program also includes descriptions of the strategic projects. These projects are decided on separately. Two strategic projects end during the program period: the Road Structures Research Program and the Main Road Improvement Solutions Program. Two new projects were initiated in 2002: the Research Program for Impact Management and the Low-volume Road Economic Maintenance Program.

Regional road administrations implement projects related to research and development activity either as part of Finnra's R&D program, as part of the region's and its stakeholders' local development program, or as an obligatory part of road management or road projects, for example, as follow-up activity. Only projects directly connected to the program are included in central programming, funding and reporting. The needs of these projects are determined by the process owners within the framework of the core process.

Of the program's focal areas, determining the requirements of road users still requires operational development. The same is true for information management, where especially defining the boundary between information system projects and the projects of this program requires consideration.

A research program was compiled for asset management, in which conjunction the possibility of forming a strategic project was examined. It was decided, however, that the program serves further deepening of the theme. Finnra's Management Group approved the program on January 20, 2003.

Planning of other focal areas has become established and is coordinated extensively with the projects of partners. Sector task programming is based on the fields of road management expertise.

The research plans have determined the following resource needs:

	Weight, proposal	Proposals, 1000 Euro			
		2003	2004	2005	TOTAL
Strategic projects:	1300				
S4, Road structures		9			9
S12, Main road solutions		390	100	105	595
S13, Impact management		403	460	380	1243
S14, Low-volume roads		380	700	700	1780
1 Requirements of road users and other client groups	500	500	500	500	1500
2 Impacts of road management and traffic	700	700	700	700	2100
3 Asset management	500	700	700	700	2100
4 Working road management markets	500	501	455	400	1356
5 Traffic management	500	646	580	545	1771
6 Management of traffic and road network information	700	700	700	700	2100
Sector tasks	1500	1939	1950	1950	5839
TOTAL	6200	6868	6845	6680	20393

The weight shown in the table was proposed in the strategy decision-making process. It is included in the programming framework.

The proposed resource needs for the year 2003 exceed the target set in the strategy, which is 1% of road management funding, by approximately half a million Euro. The target also tends to be exceeded in 2004-2005. On the other hand, the plans include reservations that depend on the progress of other projects, which cannot yet be considered very definite. Finnra's R&D cooperation group will regularly review implementation of the program, whereupon resource allocation can be adjusted as needed.

Finnra's Management Group decided January 20, 2003 to approve the R&D program 2003-2005 as follows:

- Implementation of strategic projects will proceed in accordance with program decisions; if essential changes to the programs become necessary, they will be submitted to Finnra's Management Group.
- The multi-year research program of the traffic management theme is based on the Ministry of Transport and Communication's transport telematics structures and services R&D program (FITS) and the EU-supported VIKING program.
- The objectives, scope and cost framework of asset management's four-year research program are approved.
- The plans of the impact of road management and traffic and working road management markets themes are approved with funding within the framework of the themes. The research plan of these themes will be developed further.

- The requirements of road users and other client groups theme and ongoing projects of the information management theme will be funded within the framework of the themes; start-ups of new projects require reviewing of the research plans by the Management Group. The goal is to review the plans this spring.
- The research plan of sector tasks is approved. The plan will be further developed along with the clarification and role definition of Finnra's substantial expertise and know-how, which is a goal of engineering services in 2003.

Finnra's Management Group stated that R&D needs to be comprehensive, the results of regional road administration innovation must also be recorded and made available to the entire administration.

To start the 2003 program, the following funding framework was decided:

	Framework decision in January 2003, 1000 Euro
Strategic projects (according to separately decided programs)	1,182
Requirements of road users, other client groups	100
Impacts of road management and traffic	500
Asset management	700
Working road management markets	400
Traffic management	500
Management of traffic and road network info	400
Sector tasks	1,500
TOTAL	5,282

Approximately 0.9 million Euro of funding will be reviewed next summer.

2 STRATEGIC PROJECTS

A research task which is of significance importance from the standpoint of Finnra's operation and which involves considerable overall expense can be defined as a strategic project. Implementing a strategic project is decided separately on the basis of a preliminary study. Two projects end during the program period and two were started in 2002. Starting a program concerning cost control and price management is also under study.

The **Road structures research program (S4)** final seminar was held June 13, 2002, and the final assessment of the program was made in 2002. In this research program, only COST 347, "Pavement Research with Accelerated Pavement Testing" will continue in 2003. The program is headed by Jukka Isotalo. The program has a management team chaired by Aulis Nironen. The team members represent Finnra, the Finnish Road Enterprise, the Finnish Association of Municipalities, the Finnish Rail Administration, the Technical Research Center (VTT) and various universities.

The general goal of the **Main road improvement solutions (S12)** project is to determine the most reasonable way to improve existing two-lane main roads considering the current level of funding and goals, especially on the part of road safety. The goals set for main road improvement solutions are:

- Actions result in good road safety and even speed levels
- Reduce and prevent disadvantages of road traffic and road management
- Solutions are feasible at the current level of funding
- Planning procedures and methods are continuously developed.

The project was started in 1999 and it will end in 2003. Monitoring of experimental roads will, however, continue in 2004-2005. The emphasis in 2003 is on utilizing and informing about the results. This will be done by compiling guidelines on the use and design of new road types, revising junction policies and junction guidelines of main roads, renewing guidelines on the use and design of edge/center line solutions that provide feedback, and developing safety audit and capacity analysis procedures. Research projects started last year were brought to conclusion. New research projects will not be started, with the exception of experimental road monitoring.

Main road improvement solutions	2003	2004	2005
Utilization of results, project termination	270		
Experimental road monitoring	120	100	105
Total (1000 Euro)	390	100	105

The program is headed by Pauli Velhonoja. The management team is chaired by Aulis Nironen, and the team members represent the Ministry of Transport and Communication, the Ministry of the Environment, industry, the University of Helsinki and Finnra.

The **Managing the impact of road management research program (S13)** is targeted for 2002-2005. The objective of the program is to manage the impacts of road management on society. This implies that the impacts of road management are identified, the impacts can be determined and the impact knowledge is used correctly.

The results of the research program are visible in everyday operation in the form of instructions, guideline and operating procedures. Finnra's Management Group decided to start the program on June 17, 2002. The estimated total cost of the program is 1.32 million Euro.

Impact management	2003	2004	2005
1. Develop road management impact knowledge	135	152	
2. Develop impact management procedures	76	96	120
3. Enhance utilization of impact knowledge	31	24	55
4. Improve basic data for impact management	28	28	40
Reservations	100	120	100
Other expenses	43	40	65
Total (1000 Euro)	403	460	380

According to the research plan, the focus of the program in 2003 is on correcting lacks in impact knowledge. Studies will also be made on the development of impact management procedures. A preliminary study on impact assessment methods and their possibilities and limitations will be conducted. Under the topics of enhancing utilization of impact knowledge and producing initial data, a description will be compiled of how information related to impact management is currently produced, updated and used in Finnra's processes and other decision-making in the transport sector.

The program is headed by Anton Goebel. The management team is chaired by Aulis Nironen and the team members represent the Ministry of Transport and Communication, the Ministry of the Interior, Finnra, the Rail Administration, VTT and Tampere University of Technology.

The goal of the **Economical maintenance of lower-class roads (S14)** research program is to develop more economical measures, procedures and solutions for the maintenance of lower-class roads. This is based on a closer examination of client requirements and more focused maintenance measures. The study will examine, among other things, optimal standards for lower-class roads, elimination of frost damage, the possibility of doing away with weight limits during spring thawing, and alternative maintenance of roads with very little traffic and poor pavement. Questions related to the boundary between public and private roads will also be addressed.

The research program is a three-year program. It was initiated October 21, 2002. It should be ready by the end of 2005. The estimated cost of the program is 1.8 million Euro.

Lower-class roads	2003	2004	2005
Total (1000 Euro)	380	700	700

The program is headed by Lasse Weckström and the management team is chaired by Aulis Nironen. The team members are from the Finnish Association of Municipalities, the Central Association of Earth-Moving Contractors, the Trucking Association, the Road Association, the Forest Industry Association and the Ministry of Transport and Communication.

3 FOCAL AREAS

3.1 Requirements of road users and other client groups

Determining needs and expectations involves not only surveying the opinions of various client groups, but also examining changes in the operating environment and their effect on supply or demand. The client is not necessarily aware of all future possibilities or limitations. On this basis, studies can be divided into the following categories:

- Determining clients' own needs and expectations
- Studying changes in the operating environment that affect supply and demand
- Research needs related to the transport system and its functionality
- Impact of regional development on road management
- Development of client relations management.

The research plan should be ready in 2003. It does not include only determining the requirements of road management. The needs and expectations of some client groups are primarily directed at the interactive process, i.e., participation and exchange of information. These studies form a separate entity. Some of the studies concern Finnra's profile, or the way Finnra operates and the content of Finnra's communication.

Determining clients' requirements
In recent years the mobility of children and vulnerable groups have been studied under this topic. The work needs to be expanded to include a study of the requirements of public transport. The requirements of automobile traffic, especially in the city aeras, also need to be included. Taking the viewpoint of industry into consideration in transport planning is a separate topic. Client relations strategy and its implementation results in sizeable projects:

- requirements of public transport
- requirements of tourism and leisure time
- viewpoint of industry research plan
- pedestrian and bicycle routes as places for exercising.

Changes in the operating environment that affect supply and demand
This year one object of study is change in the operating environment of goods transport. The focal areas in future years will be the impact of changes in regional structure and changes in economic life on traffic and road management requirements. Future studies also belong under this topic:

- change in the production and economic structures, transport intensity, characteristics of transports, distribution of work among different modes of transport, role of road transports
- changes in the service structure (stores, schools, post office, etc.)
- changes in work conditions and income distribution, teleworking, changes in the consumption structure
- future studies
- scenarios of society
- changes in population structure, impact of migration on transport by region
- survey of changes in attitude of travelers
- impact of electronic trade and business on transport demand.

Research needs related to the transport system and its functionality
- development of information management related to transport chains
- pedestrian and bicycle traffic user study
- job and worker placement, impact of transport system planning
- what effect do people's aging, travel habits and travel costs have on mobility and road safety, and how can Finnra meet these challenges
- development of road user and stakeholder interaction in transport system planning
- effect of parking systems on traffic behavior.

Impact of regional development on road management
- regional development and regional policy, applied to road management (see also 4.1)
- specification and measurement of the basic level of service.

Development of client relations management
- development of indicators of success
- development methodology.

A preliminary estimate of the cost structure of the focal area is:

Client relations management	2003	2004	2005
Determining clients' requirements	100	100	100
Changes in the operating environment	100	150	150
Transport system and its functionality	100	100	100
Regional development	150	100	100
Development of client relation management	50	50	50
Total (1000 Euro)	500	500	500

Juhani Pulkkanen is responsible for this focal area.

3.2 Impacts of road management and traffic

Finnra as an expert agency must have solid information about the condition of the transport system and the road network and the impact of the administration's actions. To support planning and decision-making, Finnra needs to assess and describe the impacts of road management with respect to different transport policy objectives and also to show how benefits and drawbacks affect different stakeholders.

The emphasis of this focal area is to continuously improve available information and procedures and to experiment with new planning practices. Research related to road safety and environmental impact is in a significant position. Research on social sustainability, traffic conditions and land-use planning is included in this focal area. The strategic project S13 (Managing the impact of road management) focuses on developing deficiencies in impact knowledge and assessment methods, unifying assessments and enhancing the use of impact information.

A cooperative effort of various ministries is initiating a biological diversity research program (MOSSE) and an environmental cluster research program (Eco-efficient society). Finnra will participate in the projects of these programs if they are beneficial to road and traffic planning. The projects will be chosen dur-

ing the spring of 2003. Applications to EU research programs are ongoing, and Finnra will participate in those projects if they coincide with the policy of the focal area.

This focal area is divided into three sections: Monitoring and development of road and traffic conditions, Impact of actions and Development of assessment methods and procedures together with the S13 project. In 2002 18 projects were ongoing, of which 11 will continue under this focal area. Their total funding requirement is around 350,000 Euro. The duration of most of the projects in the focal area is 2-3 years.

Monitoring and development of road and traffic conditions deals with developing information gathering methods and improving utilization of existing information. The resulting follow-up information and databases are used to support planning and design. They can also be used in communicating the condition of the transport system and in justifying road management. New projects in the program are

- development of indicators and key figures concerning the impact of road management activity (balanced scorecard)
- a study of risk drivers.

Continuous projects are

- a study of the safety of the road network
- implementation of a noise database.

In addition there are several smaller projects, some of which continue from 2002, and cooperative projects with various stakeholders. A preliminary study of a traffic flow information management system was completed in 2002, and implementation of the system continues as an information system investment.

Impact of actions aims at improving the impact and efficiency of design solutions. The focal area also includes before-and-after studies of various solutions. They result in best practice solutions and information for impact assessment. The studies serve compiling guidelines and quality standards for road and traffic engineering and developing impact assessment.

New projects are

- transport and land-use system planning projects (also EU projects)
- a review method for urban area road design updating
- analysis and processing of safety information acquired in the main road development program for use in planning and design
- cultural environment and landscaping maintenance concerns in road management
- models for calculating road traffic emissions and energy consumption and use of the models in planning.

Continuing projects are

- esthetics of main routes in city areas (a road art handbook may be published in 2004)
- impact of road management and road traffic on nature and biological diversity
- effect of automatic surveillance and possibly also fixed controls on speeds.

In addition there are smaller projects, some of which continue from 2002, and cooperative projects with various stakeholders.

The emphasis in **development of assessment methods and procedures** is on developing methods used to assess road safety and noise. Research results and planning methods are obtained through the Impact management research program. New projects in the plan are

- renewal of safety models in different programs (IVAR, TARVA, EMME)
- renewal of maintenance models for the IVAR program
- renewal of the road traffic noise calculation model
- pricing of noise and use in benefit/cost analysis
- review and update of unit values of driving cost calculations
- methods and follow-up of program-level impact assessment.

Continuing projects are

- project assessment guide
- TARVA development
- social impact assessment.

The Savo-Karjala region is planning to conduct a Master's thesis study on the process of determining and repairing environmental damage caused by road management and the environmental permit procedure. The goal is to determine procedures and actions required by environmental legislation when the ground is contaminated at a depot or during road construction. Guidelines will be compiled for use in future problem situations.

The cost structure of these projects is as follows:

Impact of road management and traffic	2003	2004	2005
Monitoring and development of road and traffic conditions	280	105	140
Impact of actions	221	230	160
Development of assessment methods and procedures	175	180	135
Total (1000 Euro)	676	515	435

The goal is to keep the focal area within the annual 700,000 Euro framework as proposed. The focal area coordinator is Mervi Karhula. Focal area planning is reviewed in Finnra's road safety and environmental networks and in other related work groups. Cooperation is done with experts from the Ministry of Transport and Communication's road safety and environment unit.

3.3 Asset management

The **Asset management research program** was approved January 20, 2003. There is a separate publication dealing with the program. According to the program, Finnra is in charge of assets worth 15,000 million Euro, mainly in road structures. Asset management comprises specifying the value of the property, gathering information, condition assessment, registers, management systems and models, and management and control of maintenance. To manage these assets efficiently, road management must be examined as an entity that includes management, maintenance, investments and road network use management.

Procedures and systems for managing parts of this entity currently exist, but uniform, systematic management is lacking. To develop this, asset management is being expanded to include all of road management, and relevant research and development projects are being gathered under one program.

At this stage the program is defined to include paved roads, gravel roads, bridges, and accessories and equipment. The included road management products are repair and replacement investments and part of maintenance (maintenance of gravel roads and accessories and equipment). As far as gravel roads are concerned, the project relies on the results of the S14 project, Economical maintenance of lower-class roads. The areas of impact that are treated are condition and value. Traffic flow, safety and the environment are not examined at this stage. Daily operation and technical development of systems and registers are not included in the program.

The goal of the research program is to specify and implement research and development projects related to determining the assets, measuring their condition, developing asset maintenance, and controlling the use of assets. The program does not produce one general management system. Instead, it produces a systematic approach to asset management. The research program's focal points of development are:

I. Information management and development
II. Development of asset management methods
III. Enhancing utilization of information
IV. Development of the functional entity

Information management includes specifying and calculating the value of assets as well as specifications and methods related to information gathering and condition assessment in different areas of road management. This part of asset management also includes registers and the data used, among others, to specify the value of assets and the level of service of the road network.

Asset management methods are primarily different types of network and programming management systems. Models for deterioration, action thresholds, driving cost and others are also developed under this topic. The impact of road management and condition is examined to the extent that they are not included in the Impact management research program.

To make the management process as efficient as possible, the policies and objectives of road management should be developed and unified. An important part of **utilizing information** is to refine information and distribute it onward both inside Finnra and to external stakeholders. Investment in staff training and information marketing is also necessary.

The main aspect of asset management is overall planning of road management. The fourth focal point of development centers on integrating repair and replacement investment management and expanding asset management to other areas of road management.

The goal is to have as comprehensive a **functional entity** as possible, so that road management planning would be based on as diverse impact factors as possible and it would handle assets effectively and economically. System coordination, elimination of overlapping, and clarifying and developing joint use of areas of road management are also important tasks for enhancing asset management.

The research program is a four-year program and the goal is to implement it in 2003-2006. The estimated cost is 700,000 Euro/year, for a total of 2.8 million Euro.

Asset management	2003	2004	2005
0 Project management and coordination with other projects	50	50	50
I Information management and development (information gathering, registers, value, level of service)	290	210	180
II Development of asset management methods (management systems, models)	190	210	240
III Enhancing utilization of information (policies, goals of road management, information service/reporting, training, marketing)	120	130	90
IV Development of the functional entity (integration of repair and replacement investment management, expanding management to other road management product groups)	50	100	140
Total (1000 Euro)	700	700	700

The focal area coordinator is Tuomas Toivonen. The project manager of the research program is Mikko Inkala. A steering group chaired by Jani Saarinen was set up. The other members of the steering group represent regions, contractors, the Ministry of Transport and Communication, the Rail Administration and economic institutions.

The following continuing individual projects are included in this theme 2003:
- development of network and programming-level prediction and life cycle models for bridges. This includes the Life-cycle management of concrete structures EU project (LIFECON).
- development of experimental road monitoring
- development of pedestrian and bicycle route condition management
- commissioning of new rut and smoothness measurements (PTM).

These projects account for 200,000 Euro in 2003.

3.4 Working road management markets

Most important in the Working road management markets focal area is to develop procurement procedures to support the innovation of consultants and contractors. Development of procurement procedures includes new product and service entities, new tender evaluation principles and new service provider selection criteria. It includes development of quality requirements, quality assurance and procurement information management. A basis for all activity is in the principles of sustainable development.

Short-term goals include participation in the National Technology Agency's (TEKES) "INFRA construction and services 2001-05" program projects and thereby wide cooperation with different stakeholders in the earth construction sector. When the TEKES project ends, there is a need to apply the issues that came up in these projects as new areas of development in practical activity. This involves focusing the studies in critical questions for Finnra. Important objects of development in the information management sector include price and cost management, new tools used in tendering and contract supervision, and changing over to e-commerce.

Internationally, infrastructure projects increasingly employ forms of implementation in which the contractor offers more extensive services. The client no longer divides a project into parts and acquires different types of services under different contracts, as was long the practice in infrastructure construction. In addition to construction, at least technical design and often also financing as well as a specified period of maintenance may be included under the same contract. The reason for this change in practice is not only the global trend, clients concentrating on core activities as network managers. The change is also significant when striving to increase both the client’s and supplier’s benefits. In principle, expanding project entities makes it possible to optimize implementation and the product as a whole. It also functions as catalyst for improving the developmental activity of the field.

Procurement based on functional requirements and the extensive competition this fosters is intended to provide a way to develop the field to the benefit of everyone involved. The introduction of new methods of procurement is also an obvious prerequisite for full utilization of new technologies. Because the trend around the world is toward broader contracts, and reports indicate their benefits, it is reasonable to assume that by changing the way of operation in like manner, significant benefits could be achieved in Finland, also.

The goal of the **Assessment of the functionality and development potential of different implementation models of infrastructure products (INKA)** project is to employ in-depth cost-benefit analyses to assess different infrastructure network procurement methods and their functionality in Finnish projects. The **Functionality requirements in maintenance contracts (TOIVA)** project promotes the creation of a procurement culture where service and product providers are given the possibility to develop new products and thereby a competitive edge. The project supports the creation of competition based on open markets and product features. The object of this study is developing procurement of maintenance of roads and streets.

The objective of the **Life cycle assessment in road management procurement procedures** project is to include the costs, function and environmental impact of a product throughout its entire life cycle in procurement. Pilot contracts are used to create the prerequisites for introducing life-cycle thinking into road management procurement. Another important goal is to identify themes requiring more clarification from the standpoint of life cycle quality. Tender documents will be compiled with which a 'Life cycle competition' will be arranged for two pilot sites in the autumn of 2003.

The current way of interpreting procurement legislation and make purchases in this field does not encourage companies to develop their operation and product solutions. Cooperation is modest and the market outlook is short. The same applies to cooperation between clients and within the chain of values. The goal of the **Partnerships and innovations** development project is to develop models, operating methods, development programs and service products for use by partners registered in the project in order to strengthen the innovativeness of partners and thereby the market. Basic information about companies and their operation will be gathered in 2003. Finnra will not participate in this, but Finnra will gather reference material. Finnra will support completion of a doctoral thesis based on the material.

Information systems that support operation are in a significant position in the development of procurement methods and development of the operation of the procurement process. This development work will continue in 2003, but the regional contract reporting system (AURA) and the procurement tendering tool (RDA) are now in the implementation phase. The project involving a changeover to e-commerce (eUrakka), requires further preliminary study.

Because only a few actors in this field are able to assess the long-term impacts of their operations, Finnra still needs to be concerned with the impact of its operation on both road users and the environment. Development of documentation requires the support of basic studies. If sufficient information on the winter season of 2002-03 is obtained, the final report of the MIDAS project, which studied alternative de-icing agents, will be available in the beginning of 2004. It is hoped that the project will result in a new de-icing agent suitable for sensitive groundwater areas. A study of de-icing methods used on the Raippaluoto bridge will examine the differences in cost, work methods and quality of conventional methods and automatic equipment.

Working road management markets	2003	2004	2005
Development of procurement procedures			
INKA, TEKES project	50		
TOIVA, TEKES	20	22	
Including life cycle assessment in road management procurement procedures, TEKES	32	16	
Partnerships and innovations	20	20	
Intelligent road work site	12	12	
Infrastructure specifications	20	20	
Impact of ice-melting chemicals on pavements, TEKES	20	15	
Other Tekes projects	110	175	200
Development of information management			
eUrakka, preliminary study	35		
Background studies of document development			
Alternative de-icing materials (MIDAS)	45		
Gravel road studies	51		
De-icing methods on the Raippaluoto bridge	17		
FORMAT occupational safety program/EU	20		
Other	60	180	200
Total (1000 Euro)	501	455	400

The focal area coordinator is Anne Leppänen.

3.5 Traffic management

Traffic management R&D activity focuses on studying the prerequisites of operation, such as developing the basic structures of traffic management, real-time monitoring of traffic conditions and impact assessment. Development of services emphasizes development of media information, disturbance control and management services.

The R&D program is adapted to the EU VIKING program, which develops and promotes road traffic management in northern Europe, and the Ministry of Transport and Communication's transport telematics structures and services FITS program. Finnra will participate in FITS with 300,000 Euro of funding in 2003. About 130,000 Euro of 2003 funding needs relate to continuing projects from 2002.

Basic structures of traffic management
To produce traffic management services efficiently and economically requires sustainable basic structures. Definition of traffic management system architecture and functional improvement of the Traffic Management Center's information systems (LK-tieto and Liito) will continue in 2003. The STARA service established in 2002 will be taken into use in distributing road and traffic condition information to emergency centers and commercial operators in Finland and with the traffic center of the Swedish National Road Administration.

A project starting in 2003 will specify a traffic situation database. In the following years, development of a uniform system architecture will be continued, the compatibility of different information systems will be improved and the exchange of information in Finland and abroad will be expanded.

Real-time monitoring of traffic conditions
Functional, reliable real-time monitoring systems are necessary for high-quality information and control. To make gathering of information more efficient, Finnra is developing new, cost-effective methods for gathering and refining road weather and traffic information from specific points and road sections. Finnra is also investing in developing the predictability of traffic conditions.

Experience with traffic monitoring based on cell phone positioning obtained in 2002 shows promising results. Weaknesses and the quality of positioning will be improved in 2003. The system will be expanded on the main road network to be part of the nationwide traffic monitoring system.

Prediction models based on travel time will be further developed. A master's thesis will study which methods and models can be used to estimate the traffic situation on the basis of various measured information. Finnra will also cooperate with other stakeholders in the Digitraffic pilot study. To improve cost-efficiency, the use of new information transmission methods and the development of the "intelligence" of traffic measuring equipment will be studied as a continuation of a general plan for nationwide traffic monitoring.

Traffic information and disturbance control
Control of traffic disturbances consists of traffic monitoring, control, information, and cooperation between various authorities. Development of information distribution and cooperation between Finnra and other authorities will be continued in 2003. Informing about traffic conditions increases the safety of travelers and the functionality and efficiency of the transport system. Informing is based not only on information produced by monitoring systems, but above all on close cooperation with emergency centers and the police. Development focuses on ensuring and speeding up the functionality of information transmission chains, improving the operation of Road Management Centers and renewing Finnra's Internet pages to bring them up to date and make them easier to use.

Finnra and the emergency center system develop mutual real-time information exchange, in order to endure rapid transfer of information from emergency centers to Road Management Centers in case of accidents or other similar situations requiring swift action. Correspondingly, Finnra provides weather predictions, alternate route and maintenance information to rescue centers and the police. Finnra's aim is to create a uniform, clear, nationwide framework for efficient transfer of information between stakeholders by means of information systems and common rules of the game. In abnormal situations on the road network, dangerous places like tunnels and lift bridges without alternate routes require their own instructions in case of an accident. Operating models are being developed with the fire and rescue authorities.

Real-time traffic control
Real-time traffic control improves the effectiveness of the transport system and directly affects road safety. Finnra real-time traffic control especially concerns traffic lights and variable message signs. This sector also includes in-vehicle speed control. The various areas of real-time traffic control are in very different phases of development.

The principles for variable control management will be developed in 2003. The quality and uniformity of implementation of variable control systems will be improved by improving guidelines. Traffic light development at the end of the period will focus on fuzzy logic, with the purpose of developing easier traffic light programming and thereby improving equipment life span and further control improvement. The research supports the development and advancement of Finnish technology. In the area of vehicle speed control, driver feedback systems will be developed and their social acceptance studied.

Assessing the impact of traffic management
Traffic management methodology is new compared to other road management. To exploit its potential usefulness, it is necessary determine the impact and benefits of the methods and compare them to the cost of producing them. Evaluating the impact of traffic management consists of examining the effects of individual traffic information, control, disturbance control or demand management services and assessing the impact of the overall system. An overall picture of the effects of traffic management methodology in road management is important as a base for management policy and planning.

In 2003 the impact on traffic and especially on road safety of variable message signs and variable speed limits will be studied on a general level. The impact, cost and profitability of public transport and road traffic telematics applications will be studied on the international level. The potential effect and profitability of

the applications in Finland's conditions will also be examined. The effects of an individual variable control system will be studied on route 10 in Lieto, where before-after materials being gathered.

Traffic management	2003	2004	2005
Basic structures of traffic management	130	100	75
Real-time monitoring of traffic conditions	152	150	170
Traffic information and disturbance control	126	100	100
Real-time traffic control	153	150	150
Assessing the impact of traffic management	85	80	50
Total (1000 Euro)	646	580	545

Southeast Finland regional road administration nationwide development projects

The Southeast Finland Region (KaS) is conducting nationwide development projects in traffic management related to border traffic, shape recognition and development of road weather detection.

Modeling of border traffic monitoring and prediction is being developed and implemented for the Vaalimaa border station. Automatic transfer of information related to border station traffic control to the Road Management Center is being developed. A moose warning system based on shape recognition is being tested. A new type of light-duty weather station suitable for the lower-class road network is being tested. An impact study of the Selkäharju variable speed limit experiment is being conducted.

Region	Project	Cost, 1000 Euro	Schedule
KaS	Study of the impact of variable speed limits on route 6 in Selkäharju	25	2003
KaS	Development of monitoring and prediction of border traffic	60	2003-04
KaS	Moose warning experiment based on shape recognition	50	2003
Turku and KaS	Development of a light-duty weather station for the lower-class road network	20	2003-

The focal area coordinator is Kari Hiltunen. The projects are overseen by the management teams of various programs (FITS and VIKING).

3.6 Management of traffic and road network information

The most important aspects of information management R&D are

- information systems for the client relations process
- route and traffic information required for transport system development
- geographic information system
- development of road management systems
- development of electronic procurement systems together with the entire sector.

The central points of development required to implement the information management strategy can be expressed as common tasks of the processes and organization:

Focal points of development of core processes:
- eAsiakas (client relations and client information management)
- eTLOS (development of road management planning information management)
- eManagement (road network management)
- eUrakka (electronic procurement)
- eLiike (operative traffic management).

Finnra's common services:
- eInfo (road network and traffic information services, GIS, etc.)
- eInfra (basic information structures, architecture, etc.)
- development of office systems
- document management
- development of network services (Internet, Extranet and Intranet).

Strategic projects that are separately monitored and controlled:
- eTie (operation control and road management information management)
- Digiroad
- traffic management infrastructure (system architecture, roadside technology)
- process information management development planning.

The information process R&D projects are categorized as follows:
- Wide-ranging research and studies derived from Finnra's business operation plan and vision, which serve Finnra' core operation.
- Discretionary projects that develop information management of a process or operating sector (e.g., procurement management, which affects nationwide and outside the road sector).
- Extensive discretionary projects that serve the entire base of Finnra's information management (e.g., GIS information management, document management, e-business).

This does not cover operative systems, but may include preliminary studies, modeling, etc. and pilot applications in separately agreed projects. System specification and implementation are investments that are financed from investment appropriations. System upkeep, minor development work and revision are financed from operational expense appropriations.

A finance framework of 700,000 Euro/year is reserved for the information focal area. A research plan will be compiled in 2003.

Development of Finnra's geographical information system
The general objective in developing Finnra's geographical information system is a uniform, system-independent way to manage and produce GIS information and GIS services. GIS data procurement, management, services and presentation have common architectural structures and a common information content.

Development is distributed over several years. A basic system which will satisfy Finnra's basic needs of GIS use will be constructed in 2002-2004/5 (phase II). Phase III (2004/5 -) will bring added value to Finnra's operation. The estimated cost of the project is:

Development of Finnra GIS	2003	2004	2005
Cost (1000 Euro)	490	295	160

Development of information services
The goal is to create an information service concept for Finnra, combining information purchased externally and produced internally, and to offer this information to Finnra's processes and clients in an easily usable form. Information services refer to the digital information services of an information network. The project will formulate a goal for Finnra's internal information services and direct implementation of that goal. A development plan for information services and development team resources will be decided on the basis of the development proposals generated by the project.
Progress from here on:
- 2003, gradual implementation of the development plan
- 2004, ready services independent of time and place.

The focal area coordinator is Jan Juslén. The focal are is managed by the information process steering group.

3.7 Sector tasks

In many issues related to the development of road management, Finnra's responsibility for development covers more than just public roads or traffic conditions, especially with respect to transport engineering and road safety, certain environmental questions and traffic management, as well as standardization of bridges, structures and equipment, and private roads. This position is based on Finnra's central role in this sector or on acquired trust. Sector responsibility is also defined by law. This role is linked to Finnra's position as a national agency with responsibility for standardization, issuing norms and taking care of tasks specified in road and road traffic legislation.

Structures and equipment
The following manuals will be completed in 2003:
- road structure design manual and structural quality standards
- lighting design instructions and quality standards
- drainage equipment.

A project on product requirements for structural improvement will be started.

The sector's common studies will continue:
- effect of a reinforcement net on damage formation
- "Watmove" drainage study
- durability of groundwater protection structures
- heavy vehicle simulator (HVS) study reports.

No decision has been made yet concerning Finnra or external funding for the following new tasks:
- acceptability requirements of contractor-specific quality measurement methods

- replacement of paper equipment lists (e.g., culvert lists) with computer files in requests for tenders and implementation reports
- noise barrier maintenance.

The cost of these projects in 2003 is about 269,000 Euro, of which continuing projects account for 129,000. The cost level in 2004-2005 is about 240,000 Euro/year. After the strategic project S12 ends, railing studies belong under structures and equipment.

The following Finnra and sector **pavement** studies will continue in 2003:
- pavement wear resistance
- low-noise pavements (HILJA)
- road deformation
- the effect of stabilization on damage formation.

In the summer of 2002, experimental road sections related to the HILJA project were constructed in the Uusimaa region on route 51 to Kirkkonummi and route 25 to Virkkala. The project will also determine which test procedure or application complying with European standards is best suited for describing the acoustic properties of pavements when using project-specific Scandinavian noise calculation to calculate the level of noise.

A type approval procedure for stabilization and by-products will also be developed. Funding for some new tasks has not been decided yet: crossfall repair and cost and benefit of crack repair.

Continuing projects account for 90,000 Euro in 2003, new projects, 120,000. The cost level of 2004-2005 is 190,000 Euro/year.

Geotechnical engineering R&D in the next years will focus on developing deep stabilization and rock construction (tunnels). Finnra will participate in the development of calculation methods and development of a system for measuring change in the longitudinal slope of a road. Current guidelines are being renewed with the goal of adapting them to new contracting formats and missing guidelines are being compiled. Finnra participates in CEN standardization and implements new standards. Finnra will cooperate with other actors in this sector (such as TEKES) and other Nordic road administrations. Monitoring of internationally interesting experimental embankments will continue. A joint project by various ministries, the Rail Administration, Finnra, the Association of Local Authorities and certain municipalities will develop assessment and ways to mitigate traffic-induced vibration in 2003-2004.

The estimated annual cost level of the focal area's projects in 2003-2005 is 140,000 Euro.

Traffic engineering and **traffic control** R&D is grouped as follows:
- actions that promote safety
- maintaining and enhancing the capacity of current heavily trafficked routes
- development of traffic control
- public transport operation demands
- traffic engineering guidelines.

The development of solutions and methods that promote safety is based on the Council of State's decision in principle concerning road safety and actions that are Finnra's responsibility. These include:
- development of safety audits of plans and existing roads
- urban road traffic calming: policy and design
- pedestrian and bicycle route intersection arrangements
- functionality of staggered junctions
- safety effects of junction improvements
- effect of traffic light operation on safety
- driving behavior and ways to influence driving errors.

The cost of actions that promote safety is 180,000 Euro in 2003. Some of the studies will continue in 2004-2005.

Maintaining and enhancing the capacity of heavily trafficked routes primarily focuses on routes leading into and passing through large built-up areas. Methods for increasing route capacity, eliminating bottlenecks and reducing the inconvenience of congestion will be studied. At the same time, methods for evaluating the functionality of routes will be developed, such as capacity calculation and simulation models. The cost is 50,000 Euro in 2003.

The development requirements of traffic control will be studied by a task force set up in 2002 with representatives from the Ministry of Transport and Communication, Finnra, the Finnish Association of Local Authorities and cities. Renewal of directional sign guidelines will begin in 2003. The principles of directional signs of service facilities will be developed with the help of a pilot project (Keuruu area) and the guidelines will be reviewed. Studies will be started concerning the development of traffic sign layout and drivers' ability to simultaneously notice several or closely spaced signs. Quality standards and quality assessment of road markings will be developed. The cost of traffic control R&D in 2003 is 110,000 Euro.

The operating conditions of public transport will be developed by compiling a best practices manual. The quality standards of bus stop canopies will be specified. The cost is 30,000 Euro.

In December 2002 the EU commission issued a directive concerning regulations that affect the safety and functions of road tunnels. The directive is binding and it must be followed in all TERN network tunnels. The directive will be used as a basis for Finnish guidelines concerning road tunnel design, safety equipment, traffic control and monitoring. The cost in 2003 is 60,000 Euro.

A study will be made of the structure, production and updating of technical guidelines. Alignment design guidelines will be renewed. Renewal of cross-section guidelines and specification of the quality standards of roads parallel to motorways will be started. The cost is 60,000 Euro.

The total cost of Traffic engineering and traffic control R&D is 490,000 Euro for 2003 and about 550,000 Euro/year for 2004-2005.

Bridge R&D projects focus on keeping norms and quality standards up to date. Changes are caused by a phase of significant development of common European norms and standards as well as changes in Finnra's operating procedures. Bridge maintenance and repair also require research and development

work in order to prevent premature deterioration of bridges. The goal is bridges that are safe, uniform in quality, cost-efficiently designed and constructed, and adapted to their environment. Bridge maintenance and repair is done at the right time and in suitable volume to minimize overall cost and to reach the target age. International development is followed and utilized. Finnra will participate in Eurocode preparation, as responsible for the bridge sector.

Bridge projects in 2003-05 will focus on the following:
- Guidelines and studies that serve quality standards
- Cost management
- Life cycle studies.

Cooperative bridge projects are:
- life cycle studies of concrete structure (in cooperation with safety administration and the Rail Administration, the concrete industry, and several cities)
- self-compacting concrete ITB (in cooperation with companies and associations in the sector)
- environmentally friendly, durable concretes (in cooperation with TEKES, companies in the sector)
- "Intelligent bridge" project, aiming to create an open 3D model of a bridge and an information transfer standard (in cooperation with the Rail Administration and TEKES).

The total cost level of the focal area in 2002-05 is about 660,000 Euro/year, of which in 2003
- design guidelines, norms and quality control 155,000
- quality standards and quality control of construction, maintenance and repair 255,000
- study of bridges on the oversize transport network 40,000
- development of bridge railings 70,000
- cost management 20,000
- bridge life cycle studies 80,000
- bridge safety and reliability 40,000.

The goal of the long-term **Road safety research and development program** (LINTU) is to produce, through selected projects, the information needed in road safety work so that the national road safety target can be achieved:
- The road traffic system must be designed so that no one has to be killed or seriously injured in traffic.
- The number of annual traffic fatalities is under 250 in 2010 and less than 100 in 2025.

The program started in the spring of 2002 and it will last five years (2002-2006). The Ministry of Transport and Communication has the primary responsibility, with funding also from Finnra and the Vehicle Administration.

From applications in the autumn of 2002, projects will be selected for the 2003 program that best help to clarify the road safety vision, outline questions of safety in traffic and land-use planning, and clarify the impact of social changes on traffic behavior and safety.

Publication of the **Tiennäyttäjä** journal will continue as before, with six issues a year. The cost is 50,000 Euro/year.

(The Finnish Technology Transfer Center publishes a corresponding quarterly, Finncontact, in pdf form: see http://www.tiehallinto.fi/finncontact.htm. The Center (FinnT2) is a cooperation organization for international and domestic technology transfer in the road sector. FinnT2 also serves as a communication forum between organizations, people and cultures in the sector. The newsletter is published to inform about road technology, highlights in technical and management issues, written and visual material available, and training.)

Sector tasks	2003	2004	2005
Structures and equipment	269	240	240
Pavement	210	190	190
Geotechnical engineering	140	140	140
Traffic engineering	490	550	550
Bridges	660	660	660
Road safety: LINTU	120	120	120
Tiennäyttäjä journal	50	50	50
Total (1000 Euro)	1939	1950	1950

The focal area coordinator is Jukka Isotalo. The focal area is overseen by the engineering services management group and several cooperation task forces. The Tiennäyttäjä journal has a support group, with representatives from Finnra, the Finnish Road Enterprise and the Central Association of Earth-Moving Contractors. The LINTU program has its own management board.

4 REGIONAL PROJECTS

Development of road administration is a joint effort. Regional road administrations conduct projects related to research and development activity as a part of Finnra's R&D program, a part of the region's and stakeholders' regional development program or a part of road management or road project obligations, e.g. in monitoring. Projects directly connected to this program are within the scope of central programming, funding and reporting. Process owners determine the needs of these projects within the framework of the core process. These are described in the previous chapter. The nationwide traffic management development project of the Southeast Finland Region is covered in section 3.5.

For other projects, the region and the R&D coordinator together ensure that their programming, progress and results are reported sufficiently to Finnra. The projects presented in the following are part of regional action. In part they are also related to central projects covered under the focal areas.

4.1 Uusimaa region

Uusimaa region development work aims at:
- better utilization of research and development information,
- more active participation in Finnra's research programs,
- networking with the region's universities, colleges and other research organizations
- specification of the region's role in R&D work,
- specification of research and development projects concerning the special features of the Uusimaa region,
- specifying the "gray area" left between R&D programs and planning from the viewpoint of research and development,
- the role of R&D activity as a supporter of know-how development, and
- possibilities of inter-region cooperation in the development of operation.

Concrete projects include:
- Development of the public transport module of the EMME 2 forecasting program.
- Development of the procurement procedure: In the U6 pilot contract, sites were subjected to competitive bidding using a new type of procurement procedure (freely selectable paving method / service life guaranteed by the contractor). Bidding and implementation of the contract succeeded without problems. The results are being monitored and they will be measured after three years, in August 2005.
- Low-volume road network: the condition and need for repair of the low-volume road network is analyzed, required actions and the required funding are specified, and proposals concerning matters related to the classification of the network considered.
- Groundwater protection and de-icing: the POSKI project integrating groundwater protection and aggregate supply continues in the Uusimaa region in 2003 with the compilation of a final report. The Uusimaa Environment Center is responsible for the project. Monitoring the impact of reduced de-icing salt use on route 25 will continue in 2003. The final report will be ready in February 2004. Different types of sand will be tested under different conditions of frost and slipperiness on route 170 from Porvoo to Koskenkylä.

4.2 Häme region

Häme region develops a regional studies cluster related to the client relations focal area. The preliminary operating plan is:

2003
- regional studies as a science and application of research results in road management planning
- ongoing research programs
- links to Finnra's R&D program
- creation of a network and specification of targets of cooperation.

The University of Tampere has a Faculty of Regional Studies. Other universities are doing similar research. The willingness of the universities to cooperate and necessary areas of cooperation from Finnra's standpoint are studied. Forms of cooperation could include research programs, consultation, personnel cooperation, etc. Systematic practical cooperation will be started in 2004 as agreed, and the need for other similar clusters, e.g., in economic science, will be assessed.

The contact person is Matti Höyssä.

4.3 Central Finland region

Finnra's regional units in central and eastern Finland have determined the area's common problems and need for studies in conjunction with their own development work. One such sector comprises forestry and the wood processing industry.

- Forest cluster transports and road management

The goal is to determine the needs and expectations of forestry and the wood processing industry particularly regarding road management and the condition of the road network. Partial projects are Roadex and Stratos mentioned below and wood chip transports and harvesters transports. Partial projects may also be done as graduate research.

- Roadex II

The project studies frost damage prediction and frost heaving, the durability of various road structures and bases that carry forest cluster and food supply transports, and road users' viewpoints. The Interreg III C Northern Periphery project started in 2002, with partners from Scotland, Sweden and Norway and four Finnish forest sector organizations.

- Stratos, energy and logistics

Stratos is a project proposed for the Interreg III B program, which intends to develop the use of renewable forms of energy, improve the efficiency of energy consumption and the competitiveness and profitability of business in the sector, and develop activity in the renewable energy sector. The research emphasizes energy issues and the logistical viewpoint. There are 11 participants from the Central Nordic region, Germany, Poland and Russian Karelia. The energy office of central Finland is responsible for the project in Finland. The regional road administration is mainly involved in logistical and road management aspects of the project.

The region's responsible persons are Seppo Kosonen and Hannu Keralampi.

4.4 Savo-Karjala region

The region's areas of expertise are management of the lower-class road network, client-orientation and environmental aspects. The goal of research is to develop the region's skills in specific areas of expertise, determine the effects of road management, improve focusing of road management resources, improve client satisfaction, and promote development of environmentally sound products and procedures.

- Client-oriented summertime operation

The goal of the project is to improve road user service by enhancing summertime maintenance and by focusing and scheduling road and road environment maintenance procedures on the basis of clients' special needs. In particular, the intent is to improve the operational prerequisites of business and commercial traffic and support local and national tourism traffic. Another goal is to improve the level of service of the pedestrian and bicycle route network**.** An intermediate report was compiled in March 2002, and a final report will be ready in early 2003. The responsible person is Jukka Karjalainen.

- Hot water sanding

The goal of the study is to determine the applicability of hot water sanding as an anti-slipping measure. If the hot water sanding method results in better adhesion to the road than normal sanding, it has a significant impact on road safety. From the environmental standpoint it is interesting to determine whether the method results in a need for less sand and whether salting can be replaced with hot water sanding at least in certain conditions. This is a preliminary study, and a report will be ready in January 2003. The method has been studied intensively in Norway. Contact person Asko Pöyhönen.

- Zedivap stabilization

Significant amounts of debarking plant wastewater evaporation liquid (Zedivap sludge) is formed each year at the StoraEnso Finepaper Oy plant in Varkaus. The goal of the project is to determine the possibility of using the sludge as a stabilizer in road structures. The possibility of using the sludge as a dust binder on gravel roads was studied earlier, but the results were not satisfactory. The region will decide in early 2003 whether to start the project. The responsible persons are Asko Pöyhönen and Juhani Kohonen.

- Reducing timber transport damage during spring thawing

The goal of the project is to compile a method, based on the requirements of timber transports, which will support Finnra's prioritization of sites requiring frost damage repair of the road base and preparation of a repair schedule. The project was started in the spring of 2002 an d will end in 2003. The contact person is Pasi Patrikainen.

- Differences in road user satisfaction in different regions

The objective of the project started in the beginning of 2003 is to determine the reasons for differences in road user satisfaction with winter maintenance in different regions and to develop the region's operation to improve client satisfaction and even out the differences in satisfaction. The responsible person is Jukka Karjalainen.

4.5 Vaasa region

- Natural maintenance of gravel roads using a sawdust-salt mixture

The goal is to bind dust using a sawdust-salt mixture. The project was started in 2001 and it will end in 2003. An intermediate report was published by VTT: "Sawdust salting, gravel road dust-binding field tests in 2001". The region's contact person is Arvo Lähde.

- Development of a friction meter calibration unit

The goal is to develop a device / procedure for reliably verifying the correctness of a friction meter display. The project will be carried out in 2003-2004. The contact person is Raimo Sillanpää.

4.6 Oulu region

- Temmes instrumented road (TPPT experimental road)

The goal is to measure responses caused by loading, condition information and driving habit information in a road structure subjected to normal traffic. A final report was compiled in 2001. In continuation the results should be analyzed so structural measurement guidelines can be developed.

4.7 Lappi region

- Clarifying the essence of tourist traffic

Tourism is an important, developing business in Lapland. Traffic and travel are an essential part of tourism. Currently there is no information on tourist flow in Lapland as a whole. In the first stage of the project, information from individual sites should be gathered and compiled. This information can then be supplemented by studies. The person in charge is Erkki Vuontisjärvi.

- Ylläs scenic road

A new road is being planned west of Ylläs fell, which will connect the villages of Äkäslompolo and Ylläsjärvi. The road will be located high on the slopes of the fell, where weather conditions differ from what they are elsewhere on the road network. Telematic methods could be used to warn drivers of difficult driving conditions and if necessary, direct all or part of traffic to alternate routes. The new road will affect not only development of tourism, but also commitment of municipal services in the area. The expectations of residents and actors could be surveyed during the planning of the road and the realized impact could be measured once the road is completed.

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