FINNISH ROAD ADMINISTRATION

Finnish Road Administration R&D Program 2002

R & D 2002

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Finnra

Helsinki 2002

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SUMMARY

On January 1, 2001, the Finnish Road Administration (Finnra) and the Finnish Road Enterprise started operation as separate entities. A new research and development strategy 2002-2007 was prepared for Finnra. The strategy focuses on Finnra's mission and vision. The goal of Finnra's research and development is to develop new knowledge and skills to improve the functionality, safety and competitiveness of the entire Finnish road transport system on a sustainable basis. Finnra's Board adopted the strategy on February 26, 2002 and the Management Committee adopted the annual R&D program on May 20.

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 the products and services of the entire public road sector, and R&D also focuses on these activities.

The annual research and development program is based on the strategy, and research priorities are set according to focal areas. Focal area coordinators chair area task forces and report on activities and results to management.

Programming for 2002 has to some extent been delayed by strategy development and organization of actions and funding based on the strategy. Due to the large number of projects continuing from 2001, this year's R&D programming does not fully correspond to strategy priorities, but for 2003 and onwards, programming will be based on 3-year theme action plans.

Finnra's research program comprises approximately 1 % of road management funding. The R&D budget for 2002 is 5.55 million Euro, of which 4 million Euro are for projects continuing from 2001. This program designates 1.19 million Euro for new projects, out of the 1.55 million yet available.

One or two program updates are expected during the year. This supports project continuity beyond the year's end.

The cost of projects continuing in 2003 and later is expected to be about 7 million Euro. A large share of this is allotted to the traffic management program, which continues until 2006. A preliminary evaluation shows that the projects included in this program may need some 3.9 million Euro in funding for 2003.

FOREWORD

Following the separation of the Finnish Road Administration (Finnra) and the Finnish Road Enterprise, a new Finnra Research and Development Strategy was prepared for 2002 – 2007. The goal of Finnra's research and development is to develop new knowledge and skills to improve the functionality, safety and competitiveness of the entire Finnish road transport system on a sustainable basis. Finnra's Board adopted the strategy on February 26, 2002.

The annual research and development program is based on the strategy, and research priorities are set according to focal areas. Focal area coordinators chair area task forces and report on activities and results to management. Programming for 2002 has to some extent been delayed by strategy development and organization of actions and funding based on the strategy. For this reason, the share of continuing projects and projects started before the processing of the program is now quite large.

Finnra's Management Committee adopted the R&D program on May 20, 2002.

Helsinki, May 2002
Finnish Road Administration

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1 RESEARCH AND DEVELOPMENT PROGRAM 2002

Following the separation of the Finnish Road Administration (Finnra) and the Finnish Road Enterprise, a new research and development strategy for 2002 – 2007 was prepared for Finnra. The strategy is based on Finnra's mission and vision. The goal of Finnra's research and development is to develop new knowledge and skills to improve the functionality, safety and competitiveness of the entire Finnish road transport system on a sustainable basis. Finnra's Board adopted the strategy on February 26, 2002.

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Because Finnra is also responsible for the products and services of the entire public road sector, R&D also focuses on these activities.

The annual research and development program is based on the strategy, and research priorities are set according to focal areas. Focal area coordinators chair area task forces and report on activities and results to management.

As a base for the preparation of the R&D program, the core processes (steering, public relations, planning, procurement and traffic services) 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. They present the goals and content of the research areas in general and the activities of the first years in more detail.

A research task that is of major significance from the standpoint of Finnra's operation and involves considerable overall costs can be developed as a strategic project. Before a strategic project is started, a preliminary study is conducted in which the problem in question is identified to a sufficient extent, goals are set for the program and the required resources are determined.

Project files are allocated for projects that are included in the research program. The files contain information about the object and problems of the study, an outline of the implementation, a cost estimate and schedule, and expected results and how they will be utilized. The program may also include themes, agreed on with other stakeholders, in which several problems in one area are examined. Similar project files are also allocated for projects funded with R&D money and carried out in cooperation with external operators.

Finnra's research program comprises approximately 1 % of road management funding. The R&D budget for 2002 is 5.55 million Euro, The following table shows the proposed distribution among the focal areas during the strategy period if the share of strategic projects is about 20 %.

Focal area or project	TARGET DISTRIBUTION 2003–
Strategic projects	20%
Client group requirements	8%
Impact management	8%
Asset management	8%
Road markets	8%
Traffic management	8%
Information management	12%
Sector tasks	24%

The people responsible for different focal areas or themes are:

- client group requirements — Juhani Pulkkanen
- impact management — Mervi Karhula
- asset management — Tuomas Toivonen
- road markets — Anne Leppänen
- traffic management — Lea Virtanen
- information management — Jan Juslen
- sector tasks — Jukka Isotalo.

The people responsible for ongoing strategic projects are

- Jukka Isotalo, Road structures research S4
- Pauli Velhonoja, Main road improvement solutions S12.

The following people are responsible for coordinating R&D activity:

- Research director Jukka Isotalo
- R&D coordinator Anders HH Jansson.

The cost distribution of continuing and new focal area projects in 2002 is:

Focal area	Cost, 1000 euro			
	Continued from 2001	New for 2002	Total for program	Continuing in 2003 (est.)
Strategic projects:				
S4, Road structures research	140		140	9
S12, Main road improvement	325	257	582	175
1 Requirements of road users and other client groups	65	55	120	0
2 Impact of road management and traffic	324	194	518	380
3 Asset management	678	96	774	488
4 Working markets for procurement of road works and services	321	156	477	381
5 Traffic management	737	0	737	4560*
6 Management of traffic and road network information	250	50	300	290
Sector tasks	1160	380	1540	680
TOTAL	4000	1188	5188	6963

* 2003-2006

The cost distribution takes into consideration as new projects such starting projects which are included in the research plans of this program. At this stage, certain themes have not yet incorporated the whole framework of new projects, while in other themes it has become apparent that as programming progresses, more resources have been committed than was originally estimated, which correspondingly reduces the amount of freedom in programming. In this program, 72 % of the available R&D budget is reserved for ongoing projects and 22 % for new projects.

On the part of the client group requirement theme, which has not been completely programmed yet, it is basically still possible to include new projects totaling 165,000 euro. On these conditions it is possible to still allot a total of 197,000 euro for other new projects.

The goal is to update the program 1-2 times during the year to support project continuity past the year's end. The total estimated cost of projects continuing to 2003 and beyond is presented in the last column. These are mainly directed to the year 2003. The traffic management program extends to 2006. A preliminary evaluation shows that the projects included in this program may need some 3.9 million Euro in funding for 2003.

A separate documentation has been compiled of the research theme project files. It is available in Finnish on the Finnra web pages:
http://www.tiehallinto.fi/tkohj/tutkimusteemat.htm

2 STRATEGIC PROJECTS

2.1 S4 Road structures research program

The main emphasis in 2002 is on publishing the results of the road structures research program and promoting their use through training, and completing the separate projects continuing to 2002. Such projects include a study on basic data of paved roads, the REFLEX project (EU steel grid project), monitoring of the load-bearing condition of a road structure and participation in the COST 347 project (Pavement Research with Accelerated Pavement Testing).

The objective of the work is to

- ensure the utilization of the results of the Finnish Road Structures Research Program (TPPT) and other programs
- compile a "comprehensible" description of the behavior and condition of paved roads
- lengthen the life span of road structures by developing the use of steel grid in the structures
- audit and evaluate the research program
- arrange a final seminar of the research program and training events.

All the projects end in 2002 except COST 347, which continues to 2003.

S4 Road structure research program	**Cost** 1000 euro 2002	2003
S4 project information activity	19	
Study on basic data of paved roads	25	
REFLEX (use of steel grid)	5	
Comparison of Mn-Road and S4 results	20	
Monitoring of the load-bearing condition of a road structure (Percostat)	8	
Result evaluation: continuous settlement calculation	5	
COST 347: Pavement Research with Accelerated Pavement Testing		9
Summary of S4 results	33	
Training (planning)	2	
S4 final report and post-evaluation	9	
Project coordination	14	
TOTAL	140	9

2.2 S12 Main road improvement solutions

S12 started with preliminary studies in 1998, on which basis the actual projects were started in 1999. The project is still continuing full-scale in 2002. After this, implemented experiments will be monitored according to a separate program. In the last year of the program, utilization of the results will be most important, for example, by compiling new and revising old design instructions, methods and guidelines. In 2002 the focus will be on the following areas:

- Level of service and capacity of main roads
- Safety analysis of main roads
- Development and testing of new road types
- Improving roadside safety
- Traffic behavior and road user opinions
- Implementation of results, information
- Compilation of a monitoring program for experimental roads, preliminary planning of further studies.

The project's budget for 2002 regarding external costs is 582,000 euro.

S12 Main road improvement	2002 1000 euro	2003-
0 Project planning and steering	10	
1 Level of service and capacity of main roads	60	
2 Safety analysis of main roads	55	20
3 Main roads and land use	15	
4 Development and testing of new road types	75	40
5 Alignment of main roads	80	25
6 Junctions	65	30
7 Pedestrian and bicycle traffic		
8 Public transport	25	
9 The environment and esthetics		
10 Improving roadside safety	75	20
11 Traffic telematics		
12 Road work traffic arrangements		
13 Maintenance		
14 Traffic behavior and road user opinions	45	
15 Design methodology, impact assessment, quality requirements of main roads	60	30
Implementation of results and information	17	10
TOTAL	582	175

2.3 Preliminary studies of possible strategic projects

Preliminary studies of three strategic projects are ongoing. The projects will be decided on in 2002.

Economical maintenance of lower-class roads:
Lower-class roads refer to lower-class public roads, local roads and private roads. These roads are functionally classified as connecting roads or access roads. The study will also include quiet regional roads with a traffic volume of < 200 vehicles/day. In the beginning of 2001 there were about 15,100 km of lower-class public roads, 36,200 km of local roads and 350,000 km of private roads. There were 1,800 km of quiet regional roads.

The goal of the Economical maintenance of lower-class roads project is to make a comprehensive proposal to improve the cost-efficiency of maintenance and renovation of these roads. The goal is to boost the customer satisfaction of road users (passenger and freight transport), within the limited resources available.

Lasse Weckström is responsible for the preliminary study.

Development of impact management:
The aim of the Impacts of road management research program is to provide concrete tools for standardizing Finnra's impact assessment. At the same time existing impact knowledge will be utilized to better serve the various aspects of operation and decision-making. The project will produce instructions, impact studies, databases, guidelines, etc. Systematic development of impact management will continue within this developed framework.

Anton Goebel is responsible for the project.

(On June 17, 2002, the Finnra Management Committee decided to start this project, as Strategic Project S13.)

Cost management:
In order to develop cost management in the planning of Finnra's services (products) and in procurement, a study was conducted in 2001 to determine how the cost management and economic-cycle evaluation model (bid price index) used in the housing sector could be applied to road management. Investment-based building component modeling has been done since 1999. Nomenclature for project part assessment was proposed in February 2002. A separate preliminary study on cost information requirements and the possibilities of information production for road management is being completed. A traditional building component unit price list was also compiled in 2001.

In 2002 the following studies will be conducted as a basis for continuing projects:
1. Principal problems in cost control and price management and proposed solutions.
2. Proposals for information management models in support of the above-mentioned.
3. Proposals for projects with other stakeholders in order to create a common database and common systems.

Jussi Ala-Fossi is responsible for the preliminary study.

3 THEMATIC RESEARCH PLANS

3.1 Requirements of road users and other client groups

In order to develop the road transport system, information is needed about trips made, transports and the development of different regions within the country. From the standpoint of producing and correctly focusing road services, more knowledge is needed about changes, clients' expectations and needs, underlying activities and processes, and the interaction between the transport system and the rest of society.

The research plan does not include only studies of road management requirements. The expectations and needs of some client groups are directed at the interaction process, i.e., participation and exchange of information. These studies form their own entity. Furthermore, some of the studies concern our profile, or the way we operate and the content of our communication:

- A study of needs and expectations related to road management
  - by road user group
  - by interest group
  - by those who need transportation
- A study of needs and expectations related to interaction
  - connected to planning and design
  - connected to road use
  - connected to transports
- A study of needs and expectations related to Finnra's profile
  - as an authority
  - as an expert
  - as a partner
  - as a purchaser.

As a part of client strategy, client groups are more finely segmented and prioritized. Based on completed and ongoing studies and this prioritization, a plan is drawn up for implementing supplementary or new studies of needs or environmental studies.

Requirements of client groups A. CONTINUING PROJECTS	Cost, 1000 euro	
	2002	2003-
Mobility of weak groups	12	
Development of urban area road design	28	
Esthetics of urban area main roads	25	
TOTAL	65	
B. NEW PROJECTS		
Children's viewpoint in road management	30	
Survey of changes in the operating environment of freight transport	25	
TOTAL	55	

The research plan aims at a framework of about 220,000 euro for new projects. It should be ready by early autumn 2002. At this stage it contains only a few significant commissions. The following projects are also being proposed:

- Cultural environment and road management
- Road safety description 2020 (see also 4.1)
- Milk transport routes.

3.2 Impacts of road management and traffic

Finnra as an expert agency must be able to provide more accurate, diversified and illustrative evaluations and descriptions of the impacts of transport system development and road management with respect to different transport policy objectives and also show how benefits and drawbacks affect different stakeholders (road safety, environmental impact, etc.). Alongside calculated indices it is necessary to develop new indicators and means of expressing the impact of operation and measures. Impact assessment should be developed as an integral part of the planning process, as a tool for planners' decision-making.

The theme includes several different projects, which are grouped under three topics. The 2002 projects emphasize road safety, utilization of traffic flow data and environmental issues.

Monitoring and development of road and traffic conditions deals with developing data collection methods and improving the quality of existing information. Three continuing projects and two new projects are ongoing in this area in 2002. One continuing project is developing a traffic flow data management system with the goal of obtaining a reliable, clear picture of traffic and freight flow on the road network.

Safety analyses of public roads and related studies of speed limits are being started as a new project. Based on the research and regional studies, Finnra will provide the Ministry of Transport and Communication with a proposal on the possibilities of developing the speed limit system and an impact study.

Impact of measures assesses i.a. the impact of automatic traffic control and built-up area speed limits and speed limit facilities (bumps, traffic islands etc.) on vehicle speeds by means of before and after studies. The impact of road management and road traffic on biological diversity is also being studied, and guidelines are being developed to lessen detrimental impact. Six continuing projects and one new project are ongoing in this area.

Development of assessment methods and procedures includes two ongoing continuing projects and two new projects. A project is ongoing related to the preparation of the research plan for the strategic project on impact management (see also 2.3).

The Tarva application used to evaluate road safety impact is being developed and its impact coefficients are being revised. A new project will compile project assessment guidelines, continuing work done by the Ministry of Transport and Communication.

Impacts of road management and traffic A. CONTINUING PROJECTS		
Project	Cost, 1000 euro	
	2002	2003-
Monitoring and development of road and traffic conditions	138	165
Impact of measures	146	60
Development of assessment methods and procedures including the strategic project preliminary study	40	5
TOTAL	324	230
B. NEW PROJECTS		
Monitoring and development of road and traffic conditions	82	
Impact of measures	24	85
Development of assessment methods and procedures	88	65
TOTAL	194	150

3.3 Asset management

Expanding asset management to cover all of road management requires:
- evaluation of road management as a whole, including maintenance, investments and use of the road network
- development of road infrastructure asset management and
- development of evaluation of the impact of measures on assets, taking account of paved roads and gravel roads as well as bridges.

The goal of the area of research is to improve asset management by developing methods and innovations with which it is possible to safeguard more efficient, economical maintenance of the road network while taking transport policy objectives into consideration.

In the beginning of the strategy period emphasis will be on economic maintenance of the lower-class road network and advancement of projects continuing from last year. Most of the continuing projects will be completed next year.

Asset management A. CONTINUING PROJECTS		
Project	Cost, 1000 euro	
	2002	2003-
Maintenance of lower-class roads, preliminary study	30	possible strategic project
LIFECON, EU proj., Bridge models	15	9
Siha proj., Progn. models, implem.	63	50
HIBRIS, implementation	202	33
HIBRIS, bridge models	34	73
Bridge register, bridge picturing application, implem.	99	23
Monitoring of experimental roads	65	75
Heavy vehicle simulator	170	
TOTAL	678	263

B. NEW PROJECTS		
Pedestrian and bicycle route maintenance management	41	65
Renewal of PTM meters	40	40
Asset management optimization, preliminary study	15	120
TOTAL	96	225

Only absolutely necessary new projects will be started. They include ensuring the continuation of measurement of ruts and evenness (subjecting new PTM measurements to competitive bidding) and developing management of the condition of pedestrian and bicycle paths. Optimizing asset management for the road network will be studied as resources allow.

3.4 Working markets for procurement of road works and services

Most important in the Working markets for procurement of road works and services theme is to develop procurement procedures to support the innovation of consultants and contractors. Development of procurement procedures includes new products and services, new tender evaluation principles, new service provider selection criteria, development of quality requirements and quality assurance.

Working markets for procurement of road works and services A. CONTINUING PROJECTS		
Project	Cost, 1000 euro	
	2002	2003-
Mainten. contract tendering tool	50	50
Road project cost management, prelim. study and project plan	18	possible strategic project
Maintenance research program	92	100
Life cycle systematics	12	
Intelligent road work site	28	23
Format work safety program	20	20
MIDAS de-icing alternatives	101	65
TOTAL	321	258
B. NEW PROJECTS		
Infra production process as a value chain	33	33
Product and service requirement systematics	40	40
Development of maintenance information management	25	
procurement information support - E-contract, preliminary study - Maintenance contract information collection and quality control	 35 10	 50
Price management	13	
Contractor qual. report & supervis.		
New product & service entities		
Supplier selection criteria		
TOTAL	156	123

Short-term goals include participation in the "INFRA construction and services 2001-05" program of the National Technology Agency (TEKES), in broad cooperation with different parties in the civil engineering sector. Important information management developments include price and cost management, tools used in tendering and contract supervision, and changing over to e-commerce. Preliminary studies and "umbrella projects" related to the INFRA program will be conducted in 2002-2003, on which basis more detailed studies will be started in 2003.

3.5 Traffic management

Traffic management R&D activity focuses on studying the prerequisites of operation, developing real-time monitoring of basic structures and traffic conditions associated with traffic management and determining the impacts of traffic management. Development of services emphasizes management of basic services, public information and disturbances as well as development of management services.

Basic structures of traffic management
To produce traffic management services efficiently and economically requires sustainable basic structures. In 2002 a traffic management system architecture description of roadside technology will be started, a preliminary study on a traffic condition database will be compiled and development of the Traffic Management Center's information system will be continued. Cooperation with the authorities in managing disturbances will be enhanced and distribution of information about traffic conditions to various cooperative parties and commercial operators in Finland and with Sweden's Road Administration will be started. 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, real-time monitoring systems are necessary for high-quality information and control. To make the collection of information more efficient, we are developing new, cost-effective methods for collecting and refining road weather and traffic information from specific points and road sections. We are also investing in developing the predictability of traffic conditions.

In 2002 we will experiment with producing travel time data at pilot sites on Ring I and Route 4 between Lahti and Heinola with the help of cell phone positioning. We will evaluate the functionality, quality and expandability of the procedure. A pilot application of an information system based on a travel-time prediction model developed in 2001 will be implemented on Route 4. Also, an operating model will be developed with which information about disturbances on the road network can be obtained from registered road users.

Traffic information
Informing about traffic conditions – driving conditions, congestion, limitations and sudden disturbances – increases the safety of road users and the functionality and efficiency of the transport system.

Finnra's Road Management Centers concentrate on producing information for mass media, like radio and the Internet. Informing is based not only on information produced by monitoring systems, but above all on close cooperation with emergency centers and the police. For this reason, 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.

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 includes traffic lights and variable message signs, in particular. This sector also includes in-vehicle speed control. The various areas of real-time traffic control are in very different phases of development.

In 2002 we will participate in the development and product creation of fuzzy logic control of traffic lights and a pilot project involving vehicle speed control. The goal is to develop easier traffic light programming and thereby lengthen their life span and provide better control. The research supports the development and advancement of Finnish technology. The objective of vehicle speed control is to evaluate the functionality and acceptance of the system in Finland.

Evaluating 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. In evaluating the impact, the effects of different traffic control technologies on traffic and the effects of information on driving behavior are being studied. The effects of informing about driving conditions and congestion are being studied. The results of these impact studies will be used to form an overall picture of the effects of traffic management methodology in road management.

Traffic management CONTINUING PROJECTS		
Project	Cost, 1000 euro	
	2002	2003-06
Basic structures of traffic management	243	1 740
Real-time monitoring of traffic conditions	204	700
Traffic information	85	1 420
Real-time traffic control	50	500
Evaluation of the impact of traffic management	155	200
TOTAL	737	4 560

3.6 Management of traffic and road network information

The focal area of information management broadly covers the transport system, road management steering, planning and procurement, as well as development of information and information services concerning maintenance and use of the entire road transport system for Finnra's other proc-

esses and profit sectors. Finnra is also developing its own network-based information services offered to different user groups.

The core of Finnra's **Geographic information system** consists of a numeric vector road network linked to the road address system as well as the agency's own numeric position information and information purchased externally. Also essential to the system are factors and equipment related to information management and a competent staff. This location information is used as a basis for various services. GIS development spreads out over several years. The development work is divided into ongoing work and two main development phases and a transitional phase. Since the beginning of 2002, the development phases are divided into infra, information and service projects.

The development goals for 2002 are:
- specify a technical platform for the maintenance and distribution of Finnra's GIS material
- specify the integration of the GIS and the Digiroad system
- rationalize the procurement of GIS material by describing the position information process from the definition of the need for information to the use of the information
- begin using ArcGIS products.

The goal of the **Information service development project** is to create an information service concept for Finnra that comprises information created internally and purchased externally, and providing this information in an easily utilized form to Finnra's processes and clients. The information services are based on databases maintained by Finnra and information purchased externally; they are a form of information maintenance available from the information network in digital form.

Information management A. CONTINUING PROJECTS		
Project	Cost, 1000 euro	
	2002	2003-
Geographic information system	250	250
TOTAL	250	250
B. NEW PROJECTS		
Development of information services	50	40
TOTAL	50	40

There is also an expected additional resource use of 50,000 euro during 2002.

3.7 Sector tasks

In many issues related to the development of road management, Finnra's responsibility, or role, covers more than just public roads or traffic conditions. This position is based on a principal operator's role or acquired trust. Sector obligations are also specified in legislation. Finnra has broader monitoring and development responsibility particularly in regard of

- traffic control and traffic management,
- road safety,
- certain environmental issues,
- bridge, structure and equipment standardization work, and
- private roads.

Part of the sector obligations are based on Finnra's position as a national agency with responsibility for EU and CEN standardization, issuing of norms and taking care of sector tasks in accordance with road and traffic legislation, and on Finnra's responsibilities to various ministries in numerous questions related to road management.

Road safety. Each year projects that are considered most beneficial in achieving set goals are selected to be included in a long-term research and development program (LINTU). The goal of the program is to produce information for road safety work in order to reach national safety objectives. The program begins in the spring of 2002 and will last five years.

Geotechnology. The aim is to renew current guidelines to make them suitable for new contract formats. Missing guidelines will be compiled. We participate in CEN standardization and apply new standards. The Scandinavian countries cooperate in unifying guidelines. We will participate in projects funded by TEKES, among others, which benefit Finnra and further development in the sector.

Pavement. Development in 2002 will involve continuing the creation of wear models and participating in TEKES Infra program projects that deal with reducing deformation and developing silent pavements. We assess the correlation of EN tests and PTM vehicles. We will also prepare product approval of pavements, etc.

Structures and equipment. We will bring to completion a road structure design manual and quality standards of structural layers, drainage accessories and groundwater protection, and a design manual and quality standards of lighting. All are based on multi-year studies.

Bridges. 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.

Traffic engineering. Concentrates on determining the operating prerequisites for bus transport, developing safety audit procedures and conducting background studies that serve the renewal of design guidelines.

In 2002 we will renew bus stop guidelines, develop design auditing procedures and examine road tunnel design standards. Guidelines on lane marking and traffic sign use will also be reviewed.

Finnra publishes the **Tiennäyttäjä** journal that provides summaries about new research projects. The journal can be ordered free of charge from Finnra.

(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 A. CONTINUING PROJECTS		
Project	Cost, 1000 euro	
	2002	2003-
Tiennäyttäjä journal	40	40/year
Road safety: LINTU	50	Under study
Geotechnology	98	80
Pavement	200	60
Structures and equipment	200	59
Bridges	340	51
Traffic engineering	232	140
TOTAL	1160	390
B. NEW PROJECTS		
Pavement	55	55
Structures and equipment	45	30
Geotechnology	20	40
Bridges	130	15
Traffic engineering	130	150
TOTAL	380	290

4 OTHER R&D ACTIVITY

The 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., as 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 processes. For other projects, the region and the R&D coordinator together ensure that their programming, progress and results are reported sufficiently to Finnra.

4.1 Southeast Finland region

The Southeast Finland region's research and development projects are very closely or directly connected to traffic management. The projects study or develop monitoring of road and road environment conditions and traffic management. Most of the projects included in the research theme belong to the northern European VIKING program, which deals with traffic management. Telematics, or data transfer and data processing technology in traffic management will be the most rapidly developing aspect of road management in the near future.

The goal in the monitoring sector is to develop monitoring of driving conditions by continuing experimentation with new types of sensors in conjunction with road weather stations and testing the usability of GPRS technology in road weather station data transfer. The possibility of combining different observation stations to reduce data communication costs is being examined and the use of simpler road weather stations to monitor road weather on the lower-class road network is being tested. Product creation of road weather measurement equipment developed for mobile monitoring of driving conditions and traffic will be continued. The equipment will also be tested on a bus driving on a regular schedule. The functionality of a moose warning system will be improved by developing sensor technology.

In the traffic management sector, an impact study of real-time control systems will be continued to determine the benefits of such systems. An impact study of variable message signs installed at the Selkäharju junction of Route 6 will be started in 2002.

Contact: Petteri Portaankorva, tel. int. +358 204 22 6222.

Project	Cost, 1000 euro 2002	2003-
Sensor tests, road weather stations	25	
Integrated observation station	34	
Light-duty road weather stations	15	
Dev. of road weather station data transfer	15	
Dev. of sensors for moose warning system	34	
Driving condition measurement equipment, product development	30	
Impact studies	17	
TOTAL	170	n.400

4.2 Savo-Karjala region

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

Project	**Client-oriented, focused summertime operation**
Goal	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.
Contact	Jukka Karjalainen, tel. +358 204 22 5310
Project	**Use of phospho-gypsum in civil engineering**
Goal	The goal is to find new, environmentally sound use for gypsum and fly ash in civil engineering.
Contact	Asko Pöyhönen
Project	**Use of paper mill evaporation sludge to bind gravel roads**
Goal	The goal of the project is to study the usability of sludge in binding dust on gravel roads. Pilot structures were constructed in the spring of 2001, and the project will continue with the compilation of a final report.
Contacts	Asko Pöyhönen, Juhani Kohonen, tel. +358 204 22 5175
Project	**Hot water sanding**
Goal	The goal of the study is to determine the applicability of hot water sanding as an anti-slipping measure.
More info	The study is being conducted together with the Finnish Road Enterprise.
Contact	Asko Pöyhönen

Contact: Procurement manager Jukka Karjalainen, tel. +358 204 22 5310

4.3 Vaasa region

Project	**Measurement of road frost penetration depth**
Goal	Measurement of road frost penetration using a newly developed meter and predicting frost heave damage on the basis of the measured results.
Contact	Raimo Sillanpää, tel. +358 204 22 7583

Project	**Monitoring of the Murto experimental embankment**
Goal	Determining the settlement of a road embankment constructed on a large area of soft soil and a study of the stability of the soil. The results of the experimental embankment facilitate selection of a soil reinforcement procedure. A main road from Vaasa to Jyväskylä is being planned in the area.
Contact	Mauri Kimpimäki, tel. +358 204 22 7653

Project	**Natural maintenance of gravel roads**
Goal	Dust binding using a sawdust-salt mixture.
Contact	Arvo Lähde, tel. +358 204 22 7590

Project	**Automatic anti-slipping system**
Goal	A study of the possibility of arranging an automatic anti-slipping system on a large bridge. The pilot site is the Raippaluoto bridge.
Contact	Mauri Kimpimäki

Project	**Roadside safety improvement**
Goal	Experimentation with minor measures that improve road safety. Moving/sloping junction culverts and improving the safety of traffic control equipment. Part of national projects.
Contact	Markku Järvelä, tel. +358 20 422 7502

Summary of costs in 2002

	1000 euro
Measurement of road frost penetration depth	5
Monitoring the Murto experimental embankment	4
Natural maintenance of gravel roads	8
Automatic anti-slipping system	100
Roadside safety improvement	35
TOTAL	152

4.4 Oulu region

The TELI project concerns designing and developing mobile, GPS-based traffic control and information services of the future. Implementation is based on the Digiroad information system. The contact person is Jani Huttula, tel. +358 204 22 6834.

The final report of the experimental instrumented road in Temmes was compiled in the Finnish Road Structures Research Program project in 2001. Further analysis of the results is estimated to be a three-year project.

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