

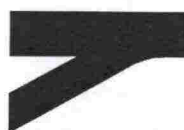
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Moscow Region Road  
Maintenance Strategy  
Development

# Final Report

January 9, 1998



**Finnish National  
Road Administration**



**Federal Highway  
Administration of Russia**

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Moscow Region Road Maintenance Strategy  
Development

**Final Report**

Published January 1998

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# Moscow Region Road Maintenance Strategy Development

## Final Report

### Table of contents

What is Tacis?

Tacis PCP II Project Sheet	1
Tacis PCP II Project Synopsis	2
A: Overall Report on the Total Project	3
1. General	3
2. Seminars	4
3. Summary of Expert Days Used	4
4. Reports	5
B: Lessons Learnt and Recommendations	5
1. General	5
2. Targets	5
3. Changes in the Administration	6
4. Motivation	6
5. Quantity of Equipment	6
List of Annexes	7



# What is Tacis?

## The Tacis Programme is a European...

The Tacis Programme is a European Union initiative for the New Independent States and Mongolia which fosters the development of harmonious and prosperous economic and political links between the European Union and these partner countries. Its aim is to support the partner countries' initiatives to develop societies based on political freedoms and economic prosperity.

Tacis does this by providing grant finance for know-how to support the process of transformation to market economies and democratic societies.

In its first four years of operation, 1991-1994, Tacis has committed ECU 1,757 million to launch more than 2,000 projects.

Tacis works closely with the partner countries to determine how funds should be spent. This ensures that Tacis funding is relevant to each country's own reform policies and priorities. As part of a broader international effort, Tacis also works closely with other donors and international organisations.

Tacis provides know-how from a wide range of public and private organisations which allows experience of market economies and democracies to be combined with local knowledge and skills. This know-how is delivered by providing policy advice, consultancy teams, studies and training, by developing and reforming legal and regulatory frameworks, institutions and organisations, and by setting up partnerships, networks, twinings and pilot projects. Tacis is also a catalyst, unlocking funds from major lenders by providing pre-investment and feasibility studies.

Tacis promotes understanding and appreciation of democracy and a market-oriented social and economic system by cultivating links and lasting relationships between organisations in the partner countries and their counterparts in the European Union.

The main priorities for Tacis funding are public administration reform, restructuring of state enterprises and private sector development, transport and telecommunications infrastructures, energy, nuclear safety and environment, building an effective food production, processing and distribution system, developing social services and education. Each country then chooses the priority sectors depending on its needs.

# Introduction

The final report introduces the most important findings of the Moscow region Road Maintenance Strategy Development project. The results have been described in detail in 11 project reports.

The road authorities in Finland and Russia have prepared the report. The Finnish National Road Administration, Finnra, has been contracted by TACIS with co-financing from the Finnish Ministry for Foreign Affairs and both road authorities.

**Tacis PCP II Project Sheet**

Date  
31.12.1997

- 1 Project Number:** PCP2/FIN-7-R
- 2 Contract Number:** 96-5027
- 3 Project Title:** **Moscow Region Road Maintenance Strategy Development**
- 4 Area of Activity:** Transportation
- 5 Lead Applicant:** Finnish National Road Administration
- 6 Contact Person:** Raimo Sallanmaa
- 7 Address:** Finnish National Road Administration, Export Services  
P.O.Box 33  
FIN - 00521 Helsinki  
Finland
- 8 Other EU Partners:** None
- 9 NIS Partners:** Federal Highway Administration of Russia  
4 Bochkov str.  
129085 Moscow  
Russia  
(Partner name in the beginning: Russian Federal Highway Department)
- 10 Project Duration:** 19 Months (earlier 18 Months)
- 11 Starting Date:** June 10, 1996 (earlier June 6, 1996)
- 12 Interim Report Due:** planned February 6, 1997, realized March 12, 1997
- 13 Final Report Due:** December 10, 1997, prolonged up to January 10, 1998
- 14 Tacis Contribution:** Up to 291.774 ECU
- 15 Matching Contribution:** 292.805 ECU

## Tacis PCP II Project Synopsis

Date  
31.12.97

- 1 Project Number:** PCP2/FIN-7-R
- 2 Project Title:** Moscow Region Road Maintenance Strategy Development
- 3 Project Objectives:** The objective of the project is to define a new federal and local road maintenance development strategy. The impact of project achievement will be the overall capability of the organizations involved in the Moscow area road maintenance to perform the required maintenance tasks in a more efficient way. This results in better road conditions for the road users with the same level of financing. Better road conditions reduce accident risks and decrease travelling and transportation costs of the road users. The results of this project will be spread out to other parts of Russia.
- 4 Planned Outputs:** The following reports will be published:
- a plan for organizational structure with different alternatives
  - proposals for a contractual procedure and definition of requirements concerning the contents of contract documents
  - a structural chart of the necessary supporting systems
  - an evaluative report of the development in Kolomna and Istra
  - report on the maintenance courses and presentation of methods
  - equipment planning for road maintenance areas and bidding documents
  - description of the road data bank development activity
  - a preliminary plan for carrying out a traffic counting system
  - pavement management system
  - an implementation plan for a road weather service system
  - a proposal for the communication network of the road maintenance areas
- Other outputs:
- documents of project seminars
- Project progress reports:
- inception report (in English)
  - interim report (in English and Russian)
  - final report (in English and Russian)
- 5 Project Activities:** The project includes:
- improvement of organisational structure and contracting methods
  - improvement of road maintenance methods
  - equipping of road maintenance units
  - building up of road data bank and traffic counting system
  - development of road condition analysis and pavement management system (PMS)
  - creation of road weather service and communication systems
- 6 Target Group:** The target group consist of the staff responsible of road maintenance activities in the Moscow area.



# A: Overall Report on the Total Project

## 1. General

The project was technically divided into eight development fields:

1. Organizational Structure and Contracting Methods
  - Organisation Development (report 1.1)
  - Contract Development (report 1.2)
  - Subsystem Development (report 1.3)
2. Road Maintenance Methods
  - Study of Kolomna and Istra (report 2.1)
  - Maintenance Courses and Method Demonstrations (report 2.2)
3. Equipping Road Maintenance Units (report 3.1)
4. Road Data Bank and Road Condition Analysis (report 4.1)
5. Traffic Counting System (report 5.1)
6. Pavement Management System (report 6.1)
7. Road Weather System (report 7.1)
8. Communication System (report 8.1)

Results concerning each of these fields have been summarised and presented in Annex 1. A general review of the project concentrating on the future overall development strategy is presented in Annex 2 (possibilities to implement the planned maintenance strategy in the Moscow Region).

The Interim Report dated March 12, 1997 described project progress during the period from May 6, 1996 to February 6, 1997. In April 1997, Tacis confirmed that the starting date for the project was June 10, 1996, the date when Finnish National Road Administration (Finnra) signed the contract. Finnra accepted the change and thus the first report covered the period from June 10, 1996 to December 10, 1996. Finnra applied for project extension of one month in order to finalise the project reports and facilitate wishes of the Russian partner for meetings in December. Tacis approved the extension on the December 2, 1997. The remaining project activities have been adjusted so that they comply to the new schedule (Annexes 3 and 4).

The Russian participating organisations have undergone a major organisational changes and project participants have changed their positions. These changes have, however, not affected the status of the project within the Federal Highway Administration. The ongoing Russian organisational development does not have any significant impact on priorities for the project targets that were adopted in the project progress outline. The project target area remains also the same, covering the most important and busiest road network in the region.

The Federal Highway Administration of Russia plans to implement the project results and has estimated that an allocation of Russian Rubbles 30 to 50 milliard (ECU 25 to 45 million) for investments in new equipment and facilities is needed starting from 1998. The detailed action plan comprising training requirements and cost estimates is under preparation.

An application has also been submitted to the Tacis Bistro facility. It includes training support for implementing the project results. In this way, the recommended strategies should be fully operational by 2003.

The collaboration between Finns and Russians has been successful mostly due to the fact that both participating organisations have similar roles, work in the same scope and understand each other's problems. Because the climatic conditions in Russia are similar to those in Finland, technologies developed in Nordic countries are suitable to Russian roads.

## 2. Seminars

The first seminar was organised near Moscow during May 13-15, 1996. This seminar introduced the project goals and outlined the work program. In so doing, it gave the basis for the project which officially started on the June 10, 1996. The project programme was adjusted to allow for the collection of background information. Visits by Russian experts to Finland during June 12-13, 1996 and August 7-9, 1996 helped in the information preparation stage..

The second seminar held in Finland during September 16-18, 1996 summarised the background data, analysed of the current situation in the various fields of road maintenance and re-targeted some details. The seminar confirmed the final composition of the work teams for the chosen areas and concluded that the first drafts of the Action Plans (publications) for the areas should be presented in the third seminar. The project programme was also adjusted to allow for the collection of more detailed information. Visits of the Russian experts to Finland were scheduled. The visits were arranged for November 4-8, 1996 and January 13-15, 1997.

The third seminar was held in Moscow during January 22-24, 1997. Draft project reports were presented. Final work plans were accepted and programmed. Based on these results, Russian experts visited Finland in order to continue preparation of the project reports during February 10-14, 1997, April 14-24, 1997, May 6-8, 1997 and June 23-26, 1997.

At the fourth seminar which was held in Finland between August 6-8, 1997, the final project reports were prepared.

The fifth seminar was held as working level seminar in Finland during December 11-12, 1997. The project reports were discussed and finalised.

It was agreed that the project results will be introduced to the various management levels of the Federal Highway Administration of Russia (RFHA) at presentations in Moscow and during a regional co-operation meeting between Russian and Finnish road authorities in Oulu on March 15, 1998. The costs of these presentations are outside the financing of this project.

Articles on the project have appeared in Finnish and Russian Highway Journals. The results of the project will be presented at the PIARC Winter Road Conference in March 1998 in Luleå, Sweden.

Finnish short term expert visits to Russia have been organised on May 16-23, 1996, June 5-6, 1996 (before official start date), September 4-6, 1996, October 15-31, 1996, December 9-11 and 19-20, 1996, February 17-21, 1997 and June 17-18, 1997. Special expert visits have been organised also on June 30 - July 3, 1997 and October 15-16, 1997. In addition, two Finnish experts have been worked as long term experts in Moscow for long periods.

## 3. Summary of Expert Days Used

Finnra has used a total of 734 expert days during the reporting period June 10, 1996 - January 10, 1998. This represents 142 % of the total planned (516). The collection of base information and the preparation of conclusions was more difficult as experts expected. This increased the need to use more work time as scheduled. The project target, divided into the 11 development plans was very challenging and led to more and more detailed plans. To keep the quality of the result high, Finnra allocated additional manmonths fully understanding that this extra allocation was to be financed from Finnish funds. The Russian experts have contributed 2054 days corresponding to 101 % of the total planned (2042).

During the period June 10, 1996 - January 10, 1998 Finnra experts have worked in Russia 302 days corresponding to 105 % out of the total planned (287) while Russian experts have been in Finland 282 days corresponding to 81 % of the total planned (350).

The manpower inputs are presented in Annexes 5 and 6.



## 4. Reports

The Inception Report was completed on August 28 and approved in January 1997. The Interim Report was completed on March 12 and approved in April 1997.

The final drafts of all of the 11 reports concerning Moscow region road maintenance development are available in both Russian and Finnish languages. Summaries of these reports are presented in Annex 1 in English. Russian participants have summarised the project results in Annex 2. All reports will be finalised, copied and distributed to each participant (RFHA, Finnra and Tacis) before January 10, 1998 in accordance with the contract.

The partners intend to use these detailed reports as work copies only and summarise the main results into one main report, which will then also form a part of the final project report. This main report will also be distributed to all participants.

The seminar results have been summarised in Seminar Reports A1, A2, A3 and A4 for the first four seminars. A report covering the proceedings of the fifth seminar will be completed by December 1997.

Project progress is summarised in Annex 7.

# B: Lessons Learnt and Recommendations

## 1. General

The crucial element in ensuring project success is that the top management of the Russian Road Administration trusts that the project proposals can be successfully implemented in the target areas. The project will strengthen the role of the road administration by introducing reliable road maintenance technologies, management systems and information systems. This, in turn, will bring stability also to the regional level as the information systems enable better planning and allocation of funds.

The Russian road authorities plan to implement the recommendations of the project during the years 1998 - 2003. Investments worth ECU 25 to 45 million will be required along with annual funds needed for running costs of the new systems (personnel, maintenance, etc.).

Photographs of current conditions appear in Annex 8.

Annex 9 lists the activities carried out during the entire project period. Timing and resources are detailed.

## 2. Targets

The most significant adjustment has been that the implementation of the project recommendations started from the federal road administrations in the Moscow Region and their production units instead of the regional (Mosavtodor) level. The justification was that the results would be more effective because the federal administration is responsible for the more important road network and, secondly, it is more likely that funds for implementation will be available.

The original concept of starting with the regional level was based on the assessment that the regional management would be more ready and motivated for change and that the risks associated with learning new techniques were smaller due to lower traffic volumes. The latest analysis, though, indicated that the new federal level management was the more motivated of the two.

The final target was to merge the two organisational levels into one, starting with suggestions for common activities (management systems, databases, and information systems). At present the relations between these two organisations are not very communicative and implementation of common activities has proven to be very difficult.

The changes concerning regional and federal financing are very political in nature. It appears that it will take more time to implement new mutual financial and organisational systems in the near future.

### 3. Changes in the Administration

The changes in the administration structure of the Russian Federation have been reflected in the continuous reorganisation of federal and regional bodies. It is clear that this will continue up to the point when the financing possibilities start to match the requirements and the society is more stable. The important lesson for project targeting is to concentrate on the overall strategies and methods, which are not excessively dependent on the organisation structure.

In this case, it is clear that organisational changes alone can not have substantially impact road maintenance efficiency. The strategic changes outlined in the project are evidently needed. For project administration coping with the changes requires plenty of flexibility.

### 4. Motivation

During project implementation there is one conclusion, which covers all organisations. The personnel generally have a very good educational background and are well motivated to increase overall efficiency. New work methods have been widely discussed. Still, a general problem is finding a common language. Working through interpreters is not an efficient method. For instance, 1-2 month intensive language training is recommended for project experts, English for Russians and Russian for foreign experts.

### 5. Quantity of Equipment

During the fact finding phase it still was a surprise to the expatriate experts to find, by actually how much the Russian standards exceeded the western practice in the resources allocated for road maintenance. Understandably, the standards were based on the circumstances prevailing earlier and were justified under those circumstances. Radical changes in cost structures now call for a major reorientation.



## LIST OF ANNEXES

ANNEX 1	The Project Reports Summaries
ANNEX 2	Possibilities to Implement the Planned Maintenance Strategy in the Moscow Region
ANNEX 3	Overall Plan of Operations
ANNEX 4	Overall Output Performance Plan
ANNEX 5	Project Progress Report
ANNEX 6	Resource Utilisation Report
ANNEX 7	Output Performance Report
ANNEX 8	Photographs of Current Condition
ANNEX 9	Project Completion Report
ANNEX 10	Project Participants
ANNEX 11	Roads in the Moscow Region

# PROJECT REPORT SUMMARIES

## 0. General

The Moscow region has 15 million inhabitants, of which nine million are living in Moscow city - nearly all inside the 109 km long ring road. The area of the Moscow Region is about 50,000 square km.

The total public road network is about 15,000 km. Nearly all roads have been paved leaving only 1,000 km of gravel roads. All streets inside city areas and private roads are out of the scope of the project. Traffic on four-lane highways and roads is rapidly increasing. Highway traffic density varies between 3,000 and 55,000 vehicles per day.

Traffic safety is a problem. The death toll on federal roads was 832 in 1995. That equals one casualty for each 2.2 km of road. The corresponding rate on corresponding roads (semi-motorway) in Finland is about 16 km. The statistics on local road accidents are still under preparation because of difficulties in collecting data. There is no data on accidents causing only property damage. One of the objectives of the project is to reduce traffic accidents by means of more effective road maintenance operations. Although the poor quality of road maintenance is not the only cause for accidents. Other factors are driving behavior, non-observation of safety rules and the technical condition of vehicles. Seat belt use became obligatory in the beginning of May, 1997.

The most difficult problem is the excess number of employees. The total number of employees in the Moscow Region (administration and contractors) is about 15,000, from which 4500 directly in Maintenance sector, corresponding to one employee per 6.5 km of road. In Finland, for instance, the corresponding rate is 17 km. Not only human resources, but also the quantity of trucks, graders, loaders, and asphalt plants is too high.

## 1 Organizational Structure and Contracting Methods

### 1.1 Organizational Structure With Different Alternatives

It is urgent to start an overall development programme of Russian road maintenance by first improving maintenance of the country's busiest roads in the Moscow region. Results obtained from the Moscow region will be more easily utilized in development elsewhere in Russia.

The basic problem with road maintenance in Russia is the low level of organizational and technical efficiency compared with corresponding western organizations and technology. It would be possible to keep roads in their present condition with 1/4 - 1/5 of the currently used funds by making operations more effective.

For historical reasons, priority of the road sector and awareness of road technology development in other countries have been at a low level. This also easily causes motivation problems at different organizational levels.

Road maintenance in the Moscow region is taken care of by almost completely self-sufficient production units (road maintenance areas), which have evolved over the years. For example, nearly all the road maintenance areas have their own asphalt plant and equipment repair organization and tools. By rationalizing these activities, the asphalt plants and repair shops would begin to operate over a wider area and produce more efficiently and competitively. Nearly 200 asphalt plants operate in the Moscow Oblast region. Depending on their capacity, 15 - 20 plants would suffice for this area. Bridge repair activity, road marking, etc. have already been concentrated in the Moscow region.

A disproportionately large amount of funds are currently used merely to keep up supporting functions. Savings realized by concentrating functions could be used by activities that actually improve the condition of the road network.

The federal road administration has 22 road maintenance bases and Mosavtodor has 40. The federal road administration could operate with 10 bases and the Mosavtodor with 25. Savings realized by reducing the number of bases and income from the sale of unnecessary bases would facilitate renewal and upkeep of the remaining bases. Construction of new bases should be avoided.

The amount of equipment can be decreased by investing in more powerful, versatile trucks and machinery. This, coupled with concentrated functions and drivers with better all-round training, would allow a considerable cut in the present work force of 4,500 employees directly in Maintenance Operations. A critical stand should be taken toward hiring new workers, and current employees should be trained to give them more versatile skills.

Over the long term, it would be wise to combine the management organizations of the purchasing branches of the federal and local road networks. In any case, cooperation between road administrations should be increased within a few years, for example, by using the same road data bank, the same traffic information center, etc. The operating possibilities of road maintenance areas should also be expanded so that local road maintenance area equipment could operate on federal roads and vice versa.

Economic benefits can be most quickly achieved by rationalizing production activity. This can be started in priority regions chosen as targets of development, such as road maintenance areas of the Moscow - St. Petersburg highway and selected Mostavtodor road maintenance areas. By spreading the experiences of these areas it is possible to improve road management elsewhere in Russia and gradually organize road management according to a vision, if necessary, toward a model with one orderer (client) organization.

For the changes to be successful, the entire organization must be committed to the decisions that are made. This is possible through active information and training that supports the process of change.

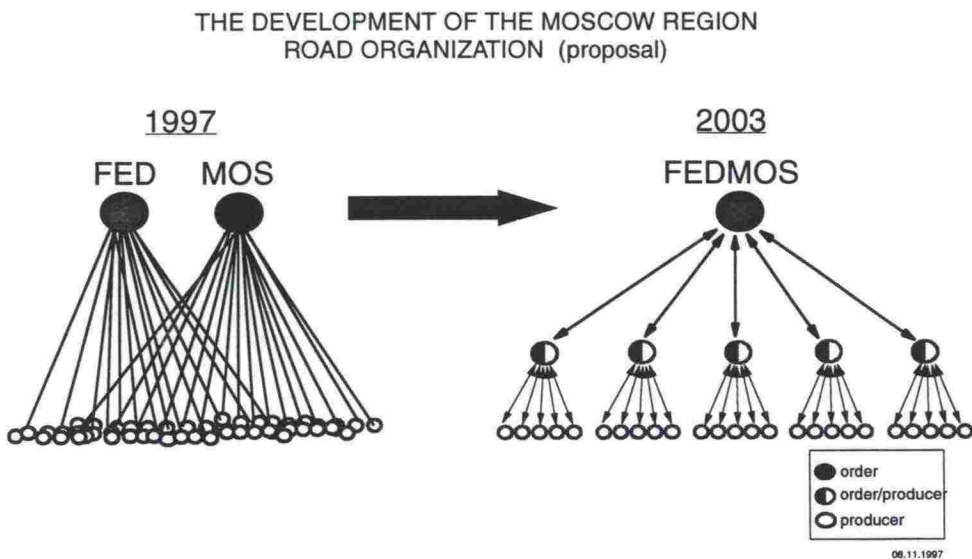


Figure 1. The 15,000 km road network of the Moscow Oblast region is maintained by two road administrations. The most significant problems with efficiency are caused by duplicate administrations and contractors' excess capacity to carry out all the roadwork.



## **1.2 Contractual Procedure and Requirements for the Contract Documents**

A contractual procedure is greatly affected by the structure of the organization. Changes in the organization immediately affect the contracting procedure. The organization of the present Russian federal road administration is divided according to the Oblast division into 9 administration regions and 18 contracting regions with borders at the cities. Both the contracting and production regions are under the direct authority of a director general.

The administration (client, order) and contractor (producer) have local sub-divisions. Local administration units employ road maintenance areas, which are contractors and execute contracts at the local level.

An agreement between a contracting region and The Federal Highway Administration involves distribution of appropriations and agreements on the most important investment projects. This report does not deal with this contractual procedure, although it also needs to undergo continuous development by the agreeing parties. For example, a contractual procedure evaluation seminar is held every year. At this level, the contractual procedure is also affected by the manner in which funding from the federal road fund is handled.

Regional road administration writes bids for maintenance work, for example, from the road maintenance areas in its area. There is no actual competition yet, but a section of road maintained by a road maintenance area may be transferred from a road maintenance area offering the highest bid to a less expensive one. A suitable contract model has been developed under the project.

The contractual procedure between a road maintenance area and a contractor requires a team of experts that is able to provide help in contractual problem situations and develop the contractual procedure on the basis of earlier experience. At this stage it is apparent that there is a need to categorize maintenance work included in a contract. Quality requirements of the maintenance work also need to be recorded with sufficient detail to make it possible to exact fines for negligence without causing disagreements.

Quality assesment of contractors' bids will be needed more and more in future. Developing quality based contract system requires contractual work. This work needs to be started by introducing the system developed under the project and using the experiment in further work.

## **1.3 A Structural Chart of the Necessary Supporting Systems in the Moscow Region**

The data systems of the Russian federal road administration and Mosavtodor, which represents local roads, has not been described completely. Several partly functioning systems are in use, but they are poorly linked to each other. This is also indicated by the fact that organizations using the systems had no experts who could describe the overall system.

The first task is to set up teams in both the federal road administration and Mosavtodor who are responsible for the structure of the system.

It is recommended to categorize the systems and assign responsibility as follows:

- road network and traffic data systems
- financial and personnel administration
- office systems
- production systems.

Within each category of the system, the functionality of existing systems and problems should be evaluated. Separate plans should also be compiled for developing the systems. This report contains a model for starting this work.

The Moscow project already indicated the necessity of developing the road data bank systems, the road weather system, the contracting system and the communication system, but on the basis of a rough analysis, there is also a need to develop the financial management system.

Chart 3 in Annex 2 shows a structural diagram of the support systems that should be improved in order to make Moscow Oblast's road administration more efficient.

## 2 Road Maintenance Methods

### 2.1 Evaluation of Development in Kolomna

Development plans were made in 1994 for the Kolomna and Istra road maintenance areas in Moscow Oblast, which are responsible for local roads in their region. The evaluation report has mainly focused on the Kolomna road maintenance area. Development has been similar in the Istra road maintenance area.

The following parts of the Kolomna development plan have been completed:

- machinery and equipment storage and repair facilities have been renovated and their ventilation systems have been completely renewed
- a separate washing hall makes daily cleaning of motor vehicles and machines possible, thus extending their service life
- new, more suitable machines and equipment have been purchased, thus improving maintenance efficiency
- drivers have been trained for their work
- wage bonuses have been introduced
- road profiles have been improved and drainage systems have been repaired more than earlier
- communication between work supervision, bases and workers has been improved by means of a radio telephone base station and communication devices
- operations have been clarified by implementing road class-specific requirements for winter work (cycle times, allowable amount of snow, amount of sanding, friction values) that were presented in the plan
- Kolomna has been a pioneer in developing the contracting system
- key personnel from other Russian road maintenance areas have been introduced to the implemented development plan and they have informed their regions of the operating methods.

The following parts of the Kolomna development plan were not realized or were poorly realized:

- equipment purchases have not been made entirely according to the planned schedule
- workers would have time to work in the summer, but not enough suitable summer work is available
- salting methods have not been implemented in anti-skidding measures, although due to that the plowing and anti-skidding measures are able to do with one truck at the same time
- salt is stored outdoors, where it cakes in the rain and dissolves excessively into the ground
- quality standards have not been compiled as was originally intended

Mosavtodor is responsible of local roads in Moscow Oblast. Mosavtodor and the federal road administration are still carrying out some overlapping development, such as developing communication and road weather systems separately.



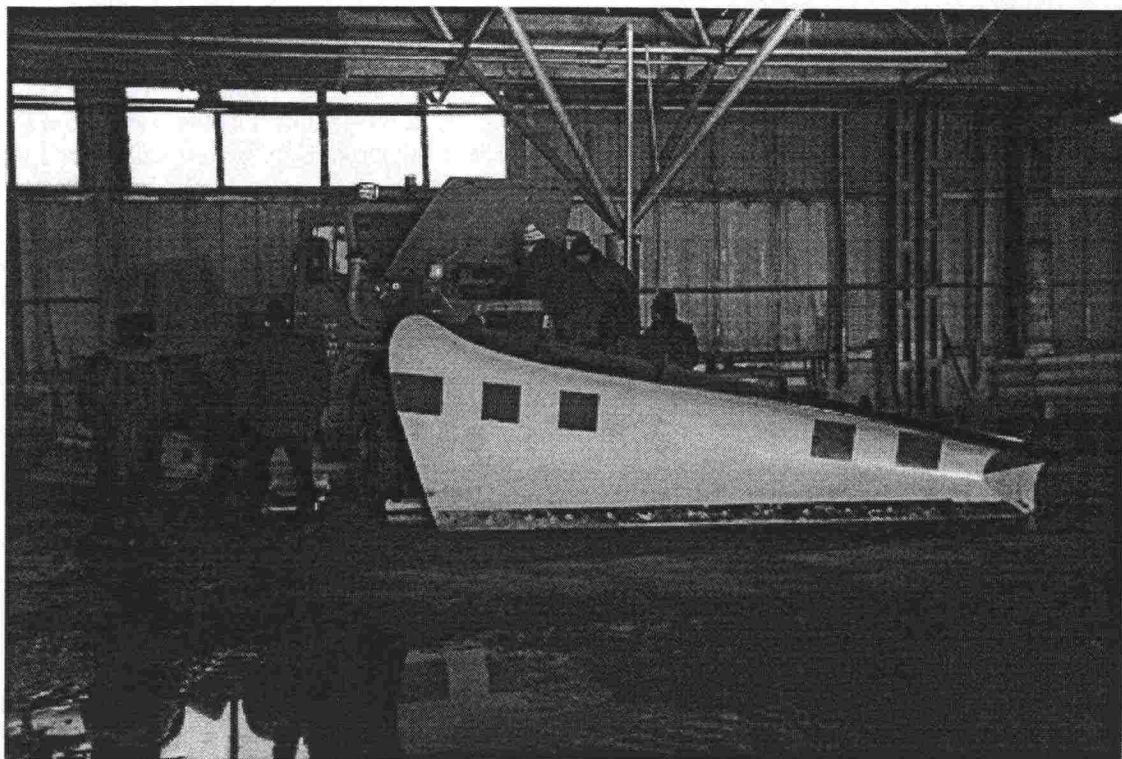


Figure 2. Ural trucks belonging to Kolomna road maintenance area winter maintenance being serviced in a garage converted from a storehouse.



Figure 3. Road maintenance areas still store salt-sand and salt outside. This causes the material to cake, making it difficult to use. The ramp in the photo facilitates loading, although it could have been made even more functional.

## **2.2 Maintenance Courses and Methods**

The production organizations of federal and local roads in the Moscow region have disproportionately large number of employees. There are many reasons for this, but foremost are excessive organizational self-sufficiency and inefficient equipment compared with available technology.

In future less personnel is required due to improved operational efficiency and more productive equipment. More training is needed to make the changes possible.

Continuous development of training to meet the needs of each phase of development requires a team responsible for training services. Necessary resources and the support of the road maintenance area management are also needed. Every year the training team should evaluate its own activity, document the results of the evaluation in order to further develop its activity.

Training should be planned, sufficient training material should be available and, if necessary, separate teams should be set up to prepare training courses and training material (printed material and videos).

Machinery, equipment and work demonstrations are an important part of employee training. Machinery and equipment suppliers as well as material suppliers should be required to supply instructions and separate training with their products. This requirement should be a precondition for ordering the products.

Regular training should be arranged for supervisors and heads of production units to ensure that training given to employees is adapted to routine activity in the Maintenance Area and superiors have adequate skills to manage. In the future more emphasis should be placed on training of trainers.

Trainers and trainees should evaluate each training course that is arranged. This enables those responsible for training to improve the content of the training and, if necessary, to plan further training for the trainees.





Figure 4. Training given as part of the project to drivers and mechanics in February 1997 included both practical training and theory.



### 3. Road Maintenance Equipment Requirements and Technical Specifications.

The following are the most important factors when determining equipment procurement policies and investments or rehabilitation of maintenance areas:

- Responsibility of road maintenance is clearly divided between the client and producer with regard to roles and entities.
- The organizational development work has clear goals.
- The maintenance areas have been optimized with regard to number and location, and there is a general rehabilitation or development plan.
- Maintenance organizations have clear main task descriptions, standards and objectives so that calculations on the need for facilities, equipment and personnel have a solid basis on.
- Strategies for developing maintenance method exist.

When the above mentioned items are agreed upon and documented, dimensioning the equipment units becomes a straightforward task.

Dimensioning has to start with an inventory of the existing facilities and equipment. The number and quality are there compared to that actually needed for future activities. The review will concentrate on the key activities, which will be carried out with local recourses also in the future.

Existing equipment and facilities have been surveyed in general, the maintenance organization dimensioning is based on rigid standards defining maintenance needs for different types of roadway sections. This has, in practice, lead to excessive quantities of specialized equipment for a variety of works. The average annual utilization rate is quite low because no effort has been placed on introducing multipurpose equipment.

The optimal amount of future equipment is a complex issue. Several methods have been applied. The need has been compared with regions of similar winter maintenance needs and to the results of pilot projects in Russia.

Dimensioning winter equipment is based on the capacity needed for sand-salt spreading and snow ploughing with different type and sized equipment. The calculations again take into account cost factors, fixed and variable including investment costs. The target numbers are substantially lower than the exiting and offer better road surface conditions at much lower cost.

The maintenance facilities network does not need expansion, on the contrary there are several areas which can be merged with others. Facilities need upgrading especially with regard to material storage (salt) and fuel distribution.

Technical specifications of new equipment have been outlined. The trend shall be towards higher capacity and more multipurpose equipment. Although there are already in use new types of equipment such as Troika and Sokol, there are also several method improvements still to be introduced. Changing from salt-sand to spreading salt or brine would offer substantial efficiency improvement and result in better road safety.





Figure 5. A typical federal road maintenance base in the Moscow region.

#### 4. Road Data Bank

Development and updating of the road data bank will take several years, and the work requires a long-term plan. Therefore, arrangement of financing for the coming years is an important part of planning this activity.

Information related to the road network and traffic is used as part of the road administration's basic data bank. This information is needed when planning new project. To obtain maximum benefit from limited resources, it is necessary to determine whether too much information is currently being gathered.

The compatibility of systems created in the Moscow region should be taken into consideration, as well as their suitability for later use in a management system covering the entire Russian road network.

In developing a road data bank, the following phases should be implemented:

- specify how many different levels of data banks are to be maintained and who is responsible for maintaining each level
- decide on a road network address system and a functional classification of the road network
- determine the extent and quality of currently available information
- specify what information is required by each organizational level, i.e., basic reports
- measure necessary basic information about the entire road network during the following 3 - 5 years
- create a data handling and processing system in conjunction with the measurement; describe data flow processes, specify responsible organizations and persons, compile a quality system and train the personnel



The recommendations during the development phase are based on the following:

- the extent and condition of the road network must be known before measures can be planned
- ADP technology will not be the critical problem, because it is so well developed
- Acquiring measurement data is of primary importance and it should begin immediately

It is recommended to measure the condition of the roads by placing the main emphasis on pavement damage and roughness. For example measurement of load-bearing capacity is of secondary importance. This recommendation is based on the following factors:

- all-inclusive measurement of load-bearing capacity will take several years
- damage can be approximately measured rather quickly
- road roughness can be measured quickly and reliably by machine
- the roughness situation can be used to describe the level of service of the road network to international financing institutions, if necessary
- Reducing roughness and repairing damages most rapidly bring road users visible benefits, indicating the profitability of road network investments

## 5. Traffic Counting System

Creation of a functional traffic counting system in the Moscow region is a definite prerequisite for road management that takes economics into consideration. It is also absolutely necessary before a road network condition monitoring system can be arranged. Objective, on-time information about traffic flow characteristics and volume makes it possible to plan measures that effectively improve road safety and traffic-carrying capacity. It also ensures correctly-timed implementation of measures needed to improve traffic-carrying capacity.

Traffic volume and composition must be known so that structural development measures, basic improvement, maintenance and, in the future, telematic projects can be focused where the need is greatest. Sections of road in need of repair can be pinpointed on time on the basis of estimated traffic volume. Estimates of traffic conditions are also needed.

Traffic growth rates on an annual basis suffice for strategic long-term planning. Coefficients of seasonal change should be periodically updated. Heavy truck traffic volumes are needed to establish settlement-load curves. Information on the composition of traffic is necessary. Weight distribution may be defined on a sampling basis. Comprehensive hourly traffic data is not necessary at this level of strategic planning.

Implementation of an efficient traffic counting system covering the entire road network in the Moscow region requires many years of programmed work. World Bank-funded improvement measures on certain segments of roadway should include provision of automatic counting stations. However, only centrally arranged funding will guarantee profitable realization of plans and implementation of a counting system on the roads in the Moscow region.

Applications of a traffic counting system can be expanded considerably in the future. Results of automatic measurement can be used to arrange traffic monitoring, determine suitable speed limits, collect fines from overweight vehicles, arrange toll roads for certain types of vehicles, etc. Measurement data can be supplied to the media (radio, text TV) and the police (GAI).

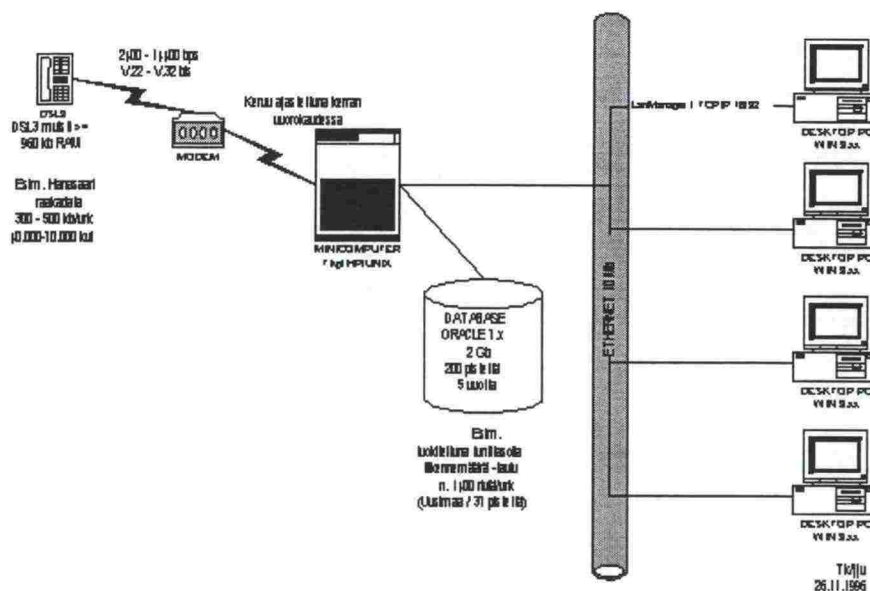


Figure 6. An example of a traffic counting system equipment environment.

## 6. Pavement Management System

The goal of road network upkeep programming is to find a socioeconomically optimal level for the condition of the roads at both the road network level and the project planning level. For this reason, the condition level with the best overall benefit and the corresponding funding level should be determined. The intent is not to maximize funding. Control systems provide a numerical basis which road management can use in negotiating a final budget with political decision-makers.

Condition data needed for strategic planning are usually included in tailored study reports. The central road administration and financial planning utilize the data as forecast, distribution and statistical models.

Precise condition data primarily serve the needs of project-level planners by facilitating programming of improvements. Programming includes compilation of a pavement program and a rut patching program, as well as planning of sites that need structural improvement. Measures are programmed in order to meet annual objectives set for the condition of the road network.

With the help of reliable basic data, it is possible to begin developing the actual administration system. Initially this may involve compilation of rather simple lists of the order of urgency of measures to be implemented. Due to developments in data retrieval and data processing, it is possible to create more reliable pavement programming management systems.

Most of the motor vehicle, time and accident savings will accrue to road users, rather than to the road management. By making pavement programming more efficient, it will be possible to select repavement sites to give optimal results for road users. It is also important for the road administration's image to select road repair sites based on the road users' viewpoint.



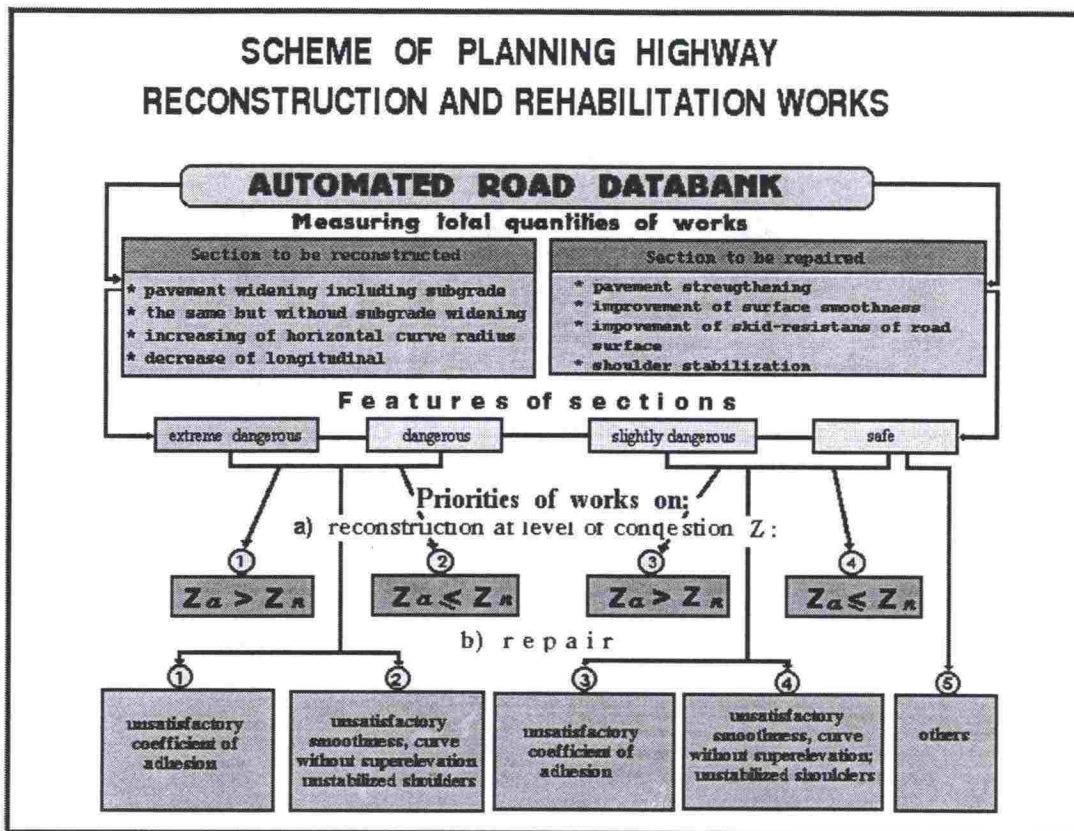


Figure 7. Operating principle of the pavement management system

## 7. Road Weather Service System

An important element of road maintenance development in the Moscow region is a Road Weather Service System. This system will be used to make winter maintenance more effective, thus reducing costs and improving safety.

The benefits of Road Weather Service Systems realized in various countries are linked to prediction of driving conditions and more effective implementation of maintenance measures. Efficient use of a Road Weather Service System aids in improving traffic conditions from the standpoint of level of service.

Centralized weather and driving condition centers have resulted in noticeable savings in the cost of enforcement and being on call. Noticeable savings have also been realized through better optimization of maintenance measures. For example, accurately focused anti-skidding measures have become possible, resulting in a considerable reduction in salt use.

By improving the quality of winter weather monitoring it is possible to predict poor driving conditions more effectively, so that slipperiness can even be prevented beforehand. This significantly reduces accident risk factors caused by bad weather. This has the most significance in evaluating the cost efficiency of Road Weather Service Systems.

The system's most noticeable benefits for traffic are obtained through improved level of service and road safety.

A Road Weather Service System comprises a weather station road network, a weather camera network, National Weather Service satellite and radar data, advanced weather predictions and a driving condition center that performs monitoring and emergency work. These, coupled with maintenance procedures, form a dynamic system of knowledge and skills that makes successful activity possible.

A plan based on the weather services of Finland and Russia has been drawn up for a Road Weather Service System that will serve road maintenance needs. The plan also includes the development of weather and forecasting models.

Calculations show that at least 35 - 38 road weather stations are needed in the Moscow region. Decisive factors in the calculation include climatic differences, terrain and road network density. The proposed locations of road weather stations can be specified more closely with the help of thermal mapping of the road network. The 13 - 15 teams that will maintain and develop the Road Weather Service System are also described.

In order to develop weather services, the report deals with the significance of thermal mapping and road weather stations in making precise weather models and forecasting models.

The cost of setting up a Road Weather Service System is estimated at 1,400,000 USD, and the annual cost of upkeep will be at least 210,000 - 650,000 USD (1997 price level). The average annual costs for 1998 - 2003 will be about 900,000 USD. The cost of need-based, decentralized weather monitoring will be 1,800,000 USD per year.

The system's most noticeable benefits for traffic are obtained through improved level of service and road safety.

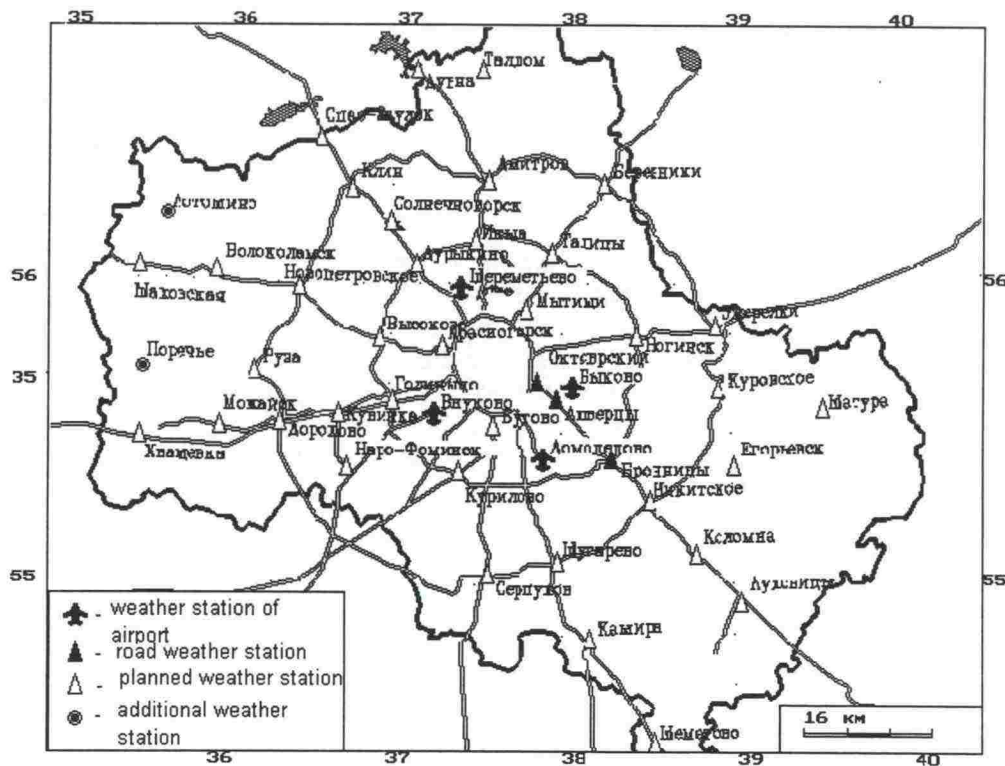


Figure 8. Plan for locating road weather stations in the Moscow Oblast region.



## 8. Communication Network for Road Maintenance

Poor quality of the road network and a high number of traffic accidents are commonplace in Russia and in the Moscow region. The main reason for this situation is the low efficiency of the road administration system compared with that of other countries. The problem is compounded by the underdeveloped communication infrastructure. This is due to the traditional indifferent attitude toward communication systems as well as funding problems, which have recently become even worse.

Under the current conditions, to improve the economic efficiency of Oblast road management, which covers the large Moscow region and has a developed infrastructure, sufficient data from all the scattered sites to be controlled should be supplied to both operational needs at the maintenance area level and for long term planning. This can be arranged by implementing new data communication technology.

The Moscow region road administration has plans to develop a data communication system of its own. It will be used to provide reliable and operative connections to road administration, maintenance production processes, planned traffic volume monitoring systems, vehicle weight and load measurement enforcement, road weather condition monitoring systems and traffic sign control. There will be also potential users who may be offered services of the future system on a business basis.

The special conditions under which a data communication system will be developed in the Moscow region make it necessary to explore different alternatives for realizing the system; from small, simple services intended for road users to a uniform, integrated system. An integrated system would offer comprehensive, modern data communication services to all users. This alternative is relatively costly and it has a potential for advanced technical characteristics. The communication system developed by the City of Moscow is also available and it is one expedient to minimize costs as well as to take other interested organizations to develop and utilize the system.

Many years of extensive planning are needed to realize a data communication system for road management in the Moscow region. The primary condition for obtaining results is centralized, full funding.

In recent years, lack of planning has been the prevailing tendency in the development of data communication systems in individual road organizations. This has resulted in the unexplainable high cost of arranging data communication. In addition, further development of data communication and completely incompatible plans lead to a situation where it is not possible to offer all-inclusive data communication services to the administration systems in different areas and at different levels. This report is a first attempt to move toward planned, coordinated work with the goal of creating a controlled data communication infrastructure for road management in the Moscow region.

The calculations in this report are estimates, and they need to be checked during the planning phase and linked to specific conditions in the field.

The system will improve road maintenance and particularly road safety in the Moscow region.

The data communication network of the road maintenance areas in the Moscow region requires technical renewal and expansion of the existing communication network in order to comply with modern reliable data transfer needs.

The data communication system's requirement for better connections is justifiable because

- financial administration's receipts and computer-stored budgets are increasingly being turned over to road maintenance areas and planning and construction sites
- use of electronic mail will increase rapidly, because it is the most efficient currently known channel for distributing directives and other information. At the same time, traditional mail distribution is rapidly decreasing.
- the number of telefax messages will remain at least at the present level, and unnecessary disturbances in transmissions will decrease as connections are improved in the next few years
- more effective daily maintenance increases the need to improve communication between supervisors and workers. This is also affected by road users' demands and their possibilities of influencing road administrators
- the Road Weather Service System used by road maintenance areas in day-to-day situation management requires reliable transfer of data from road weather stations to a central location, and from there to traffic information centers and road maintenance area management
- when traffic is congested, reliable transfer of data from automatic traffic counting stations improves traffic control, for example, by means of information distributed by the media

A communication system called a "mobile productional technological communication system" MPTCS is recommended for the Moscow region. Its implementation, which consists of four phases, would take two years. The total cost of implementation the system is estimated at 10.3 million USD.

An IRPS (International Radio Phone System) is already functioning within a 40 km radius of Moscow. If the systems are compatible, an MPTCS system does not need to be constructed there.

The proposed maximum number of subscribers is 2500, with no more than 250 being able to connect to Moscow's telephone network. The system requires construction of 27 base stations in the Moscow Oblast region.

The system includes two trunking sub-systems, automatic centers for administrative phones, a monitoring and control system and a network of connecting lines. A suitable operating frequency for the phones in this system is 450 MHz, and for the radio links, 8 - 15 GHz. The maximum data transfer rate is 1200 bits per second.

The purpose of the communication system is to serve the organizational units' control of operation, work and transportation, and also to aid in road safety work and police work, such as tracking down stolen motor vehicles.



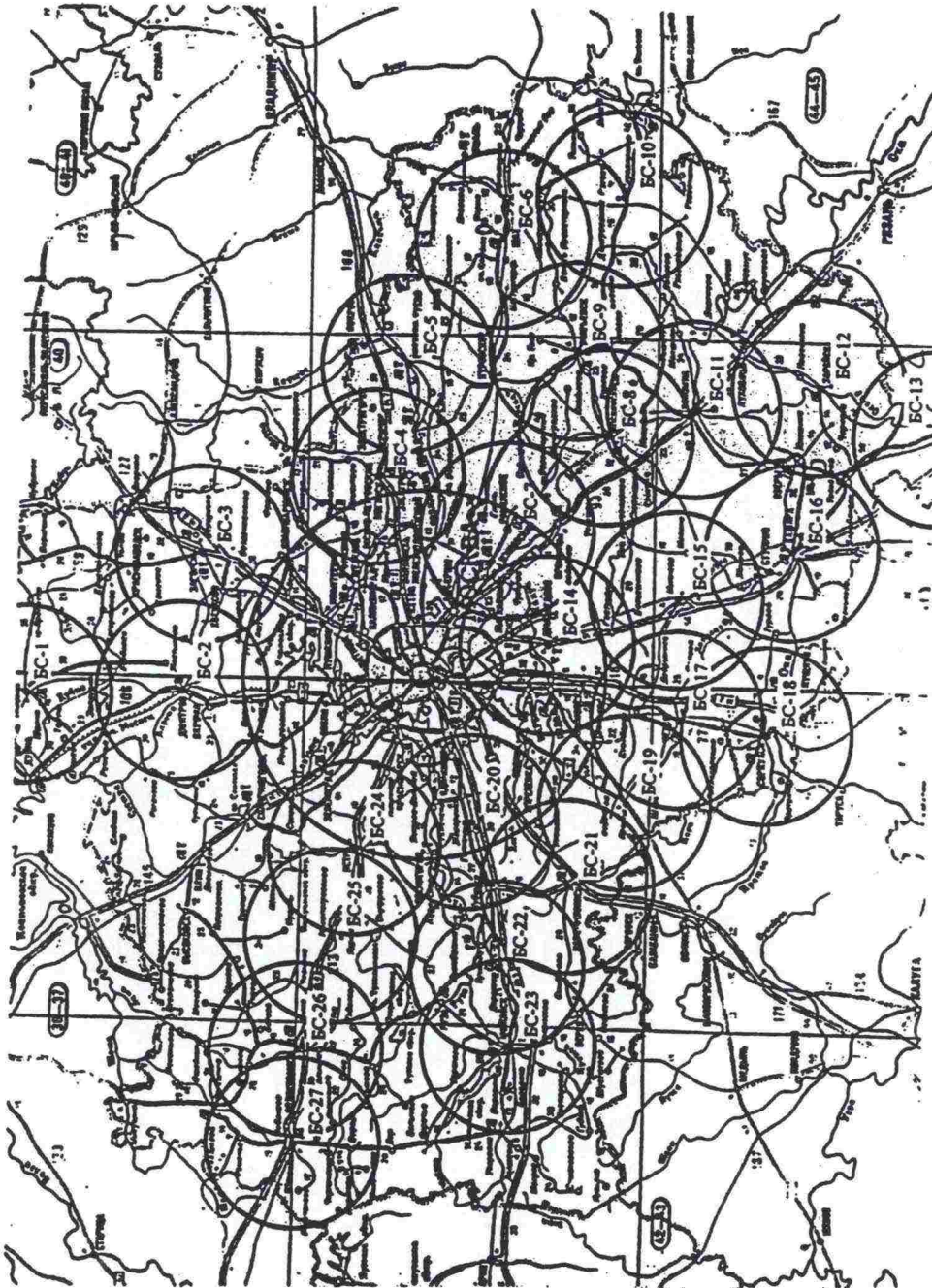


Figure 9. Plan for locating radio phone network base stations in the Moscow Oblast region

# POSSIBILITIES TO IMPLEMENT THE PLANNED MAINTENANCE STRATEGY IN THE MOSCOW REGION

## 1. INTRODUCTION

In accordance with the joint agreement between the Moscow Oblast Board of Local Roads (Mosavtodor) and the Finnish National Road Administration (FinnRA) on the example of the Moscow region, it has been decided to formulate the project "Elaboration of the development **strategies** for the highway maintenance **unit** in the Moscow Oblast".

**The idea for the project** originated from the analysis of various concrete situations and problems in the sphere of road maintenance in Russia.

**First.** The establishment of the government's highway maintenance organizations combined with basic changes in highway management (see diagram 1) made the development of a highway management system at each level indispensable.

**Second.** At the present time the maintenance of highways within the territory of the Moscow region is being carried out by the following highway administrations:

1. Moscow Federal Directorate (federal highways within the territory of the Moscow district).
2. Mosavtodor (territorial/local roads).
3. Moscow district department of urban roads (the streets of the towns in the Moscow district).
4. Special organizations (the highways belonging to other government departments within the territory of the Moscow district).

In light of the above, it is typical that each maintenance organization generates its own development strategy and establishes its own infrastructure for providing road maintenance services.

**Third.** At the present time the technology of highway management, organization and maintenance is undergoing a significant technological reform process. The economic system is also going through process of a modification. The **main characteristics** of changes influencing the choice of a development strategy which are being reviewed under this project, are:

1. Changes in **technical means** of management - traffic data registration system, pavement quality management systems, development of road data banks, communication systems, meteorological support
2. Changes in road maintenance **technology** - new materials, development of road maintenance equipment
3. Changes in economic **conditions** - development of a market economy.



**The objective of the project is to develop the main structural components for an optimum highway maintenance mechanism in the regions on the basis of modern (domestic and foreign) technology operating in a market economy.**

**The users of the project**

- Moscow Oblast Regional Administration
- MOSAVTODOR - Moscow Oblast Board of Local Roads
- Federal Highway Administration of Russia (RFHA)
- Federal Highway Department of Central Russia no. 7
- Moscow Federal Directorate of Highways
- "Highways of Russia" Directorate

**Parties interested in development and implementation of the project**

- RADOR - Association of the territorial highway management organizations of Russia
- Territorial highway management organizations of the regions bordering on Moscow
- Moscow Oblast Urban Streets Board
- Moscow Roads Board

**The participants and executors of the project**

- Federal Highway Administration of Russia (RFHA)
- "Highways of Russia" Directorate
- MOSAVTODOR - Moscow Oblast Board of Local Roads
- Moscow Federal Directorate of Highways
- Research institutes
- Consulting firms
- Working groups

## 2. PROJECT FORMULATION TASKS

The existence of two branches of highway management (federal and territorial/local) is one of the realities of the federal system in Russia. This reality probably will exist forever. It will predetermine the degree of parallelism in highway management and will be the main reason for establishing a **regional management system**.

Federal Highways Administration of Russia (RFHA) and Mosavtodor are both management instruments of the government and their roles are equally significant. For this reason talking about competition between them would be senseless.

The Finnish maintenance management system is formed as a single structure and has proved itself to be sufficiently **effective**. At the same time it is based on international experience, which it is necessary and advisable to adapt for highway management purposes in Russia. In 1994 the projects for developing the maintenance unit of Mosavtodor in the Kolomna and Istra districts were formulated with the participation of Finnish specialists.

That is why in order to form a strategy for developing highway maintenance unit it was decided to determine the main directions of the strategic development of highway maintenance management using the experience of Finnish specialists, taking into consideration the specific features of the Moscow region.

The main result of the project will be to **substantiate** the development **strategy** of **infrastructure** for highway maintenance and repair management in the Moscow region. This will determine the organizational development of highway maintenance and repair management. The project being formulated must promote the **merging** of highway management organs irrespective of their controlling bodies in order to implement common strategies for highway maintenance and repair work in the Moscow Oblast.

The objective of the project is not to substantiate the organizational structures nor to finally determine the function of the existing highway management organs.

The project shall consist of separate reports formulated by groups of Russian and Finnish specialists.

The composition of the project has been determined on the basis of work experience in improving the highway maintenance management systems in Russian regions.

#### Composition of the project according to types of reports

Report No.	Name of report
1.1.	Plan of organizational structure according to alternative options.
1.2.	Proposals on methods for concluding agreements.
2.1.	Report on evaluation of the development of the Kolomna and Istra regions.
2.2.	Report on the Moscow region's highway maintenance training courses and on methods for production of works.
3.1.	Plan for technical rigging of highway maintenance enterprises.
4.1.	Description of task for development of road data bank.
5.1.	Reference plan for implementation of traffic registration system.
6.1.	Road surfacing condition management system.
7.1.	Plan for establishing meteorological service on highways.
8.1.	Proposal on the Moscow region's communication system.

#### The project consists of three parts:

1. **Technical part** (reports 2.1 and from 4 to 8) - development of technologies and the technological basis of a highway management system, implementation of technological solutions along the lines of accomplished projects in the Kolomna and Istra districts of the Moscow Oblast.
2. **Training and methodical part** (reports 2.1 and 2.2) - training of specialists within the framework of the project.
3. **Organizational arrangements** (report 1.2) - to propose a system of organizational arrangements providing for the establishment of an effective system of highway maintenance management on the basis of the analysis of the details of the first two parts.

The main result of the project will be to **substantiate** the choice of the development **strategy** for **infrastructure** for highway maintenance and repair management in the Moscow region, which will determine the organizational development of highway maintenance and repair management. The project being formulated must promote the **merging** of highway management organs irrespective of their controlling bodies in order to implement common strategies for highway maintenance and repair work in the Moscow Oblast.

The objective of the project is not to substantiate the organizational structures nor to finally determine the function of the existing highway management organs.



### 3. WORKS IMPLEMENTED UNDER PROJECT

The project has been formulated in two stages:

1. collection of initial data
2. development of section of the project

#### 1. Collection of initial data

No	Data	Type of report
1.	Highways (technical parameters, assessment of condition )	List of federal and territorial highways with maps included. Main technical parameters
2.	Clients (highway administrations)	Description of the main functions and tasks of the highway administrations
3.	Work contractors	List of contractors, work types and locations
4.	Technical equipment of highway maintenance structures	Analysis of technical equipment
5.	Technologies being used	Analysis of technologies being used in highway maintenance work
6.	Contract systems	Analysis of maintenance contract systems used by road administrations

Work undertaken in the project generated a need for further research.

The following reports have been included in the final version of the project:

Report No.	Name of report
1.1.	Plan of organizational structure according to alternative options.
1.2.	Proposals on methods for concluding agreements.
1.3.	Organizational plan for additional systems needed for the Moscow Oblast.
1.4.	Economic and technical analysis of development options.
2.1.	Report on evaluation of the development of the Kolomna and Istra districts.
2.2.	Report on the Moscow region's highways maintenance training courses and on methods for production of works.
2.3.	Establishing a training system for maintenance service personnel.
3.1.	Plan for technical rigging of highway maintenance enterprises.
4.1.	Description of task for development of road data bank.
5.1.	Reference plan for implementation of traffic registration system.
6.1.	Road surfacing condition management system.
7.1.	Plan for establishing meteorological service on highways.
8.1.	Proposal on the Moscow region's communication system.

During the project, the specialists that participated in the project also implemented scientific and methodical development works which were not included in the final version of the report, but can be used in formulating an optimum highway maintenance management system in the region.

No.	Sections of the management system	THEMES FORMULATED UNDER THE PROJECT
1.	Organising	Analysis of optimization of highway service zones, scheme for optimal siting of production bases and materials storage bases. Proposals for forming maintenance enterprises on the basis of optimal service zones. Project for establishing a regional meteorological centre: <ul style="list-style-type: none"> <li>• functions</li> <li>• personnel</li> <li>• work protocol</li> </ul> Recommendations on transforming the existing highway repair and engineering boards into maintenance enterprises.
2.	Normative basis	Comparative analysis of highway maintenance expenses at the highway section level in Russia and Finland.
3.	Providing the management	Analysis of the development of a system for providing meteorological services for highways. Methods for calculating the number of meteorological stations in the region.
4.	Organising the management	Common base of highway work and service executors used by the highway management bodies for distributing contracts.
5.	Technologies	Economic substantiation of the choice of technical equipment for maintenance enterprises. Comparative characteristics of the basic road machines involved in highway maintenance. Recommendations on purchasing the highway maintenance equipment.
6.	Personnel	Proposals for establishing the personnel training system when new technologies are transferred. Project for establishing the centre of technology transfer for the Moscow Oblast.

#### 4. MAIN CONCLUSIONS ON THE RESULTS OF THE PROJECT

The project proceeds on the premise that **the main institutional changes** in highway management system are **already made** - the state bodies are established for managing those highways which use a certain management mechanism.

At the beginning of the reforms, the highway management systems were established as an interaction between the customer and contractor (see diagram 2), but worldwide experience indicates that an effective system of highway management cannot be implemented only by applying contract system for road works (see diagram 3).

If the main mechanism in the previous structure was **enterprise management**, at the present time this mechanism is becoming **auxiliary**. The establishment of effective mechanisms for managing the condition of highways needs thorough scientific and methodical substantiation.



Changes in the structure of highway management, and the division of the management bodies of contractors and material suppliers, stipulate the necessity of **establishing economically independent** enterprises which should be objectively interested in **new technologies** as a source of increasing their own effectiveness in order to survive in market conditions.

Analysis results were presented in the project and the following conclusions were made about compulsory highway management **co-operation** in the following directions:

- 1) Information support
- 2) Norms and standards
- 3) Co-ordinated planning
- 4) Technologies and equipment

**1. Information support** is aimed at the timely delivery of necessary and sufficient information to allow management organizations to make correct decisions about highway management and repair. Information support includes establishment of special data banks and information flows as well as collection, storage, renovation, processing and transmission of information for analysis and decision-making.  
The **result** is better information on which highway management organizations and road works contractors can base their decisions.

**2. Norms and standards** involve investigating practical, methodological, managerial, technical, technological and economic issues in order to establish norms, rules, requirements, characteristics and methods to be used while solving questions related to highway management and repair.  
The **result** is an expected reduction in management costs.

**3. Co-ordinated planning** is aimed at taking into account the interests of the Moscow region as a whole when elaborating financial plans and repair addresses by the highway management bodies.  
Co-ordinating the financial interests in the development of the production infrastructure of the Moscow region's road network.  
The **result** is an optimum adjustment of investment in the main highway maintenance programs of the regions and the Moscow region highways. Another result can be optimum financial apportionment for highway maintenance infrastructure in accordance with the common plan.

**4. Technology and equipment** involves providing the optimum equipment for highway maintenance organizations and improving the quality of maintenance and repair work by means of new technologies.  
The **result** is an optimum distribution of equipment among the highway maintenance organizations and a reduction in highway maintenance costs.

These four project sections may be implemented under any of the following strategies. Among the existing strategies the following alternatives could be assessed:

1. **Separate development** of federal and regional road maintenance services.
2. **Separate development** of the territorial and federal highway maintenance units with **unification** of infrastructure or establishment of new **common infrastructures**.
3. Establishment of a **common unit** for federal and regional road maintenance.

**In general, the alternative strategies have the following major characteristics:**

**1. Separate development**

In this case the development of all the sections of the project is considered to happen without reforming the organization and management functions of the existing highway management organizations. While developing the strategies, emphasis should be placed on:

- combining existing management strategies with new technologies,
- adapting new technologies and new development strategies to the existing management system.

The project implementation recommendations are directed at the existing management organizations. The project results are intended to be used by each management organization separately.

The project implementation phase is expected to include agreements on the following items to be unified:

- 1) Standards of unification
- 2) Highway maintenance level classification
- 3) Information exchange procedure (for highways and highway conditions, meteorological information, etc.).

**2. Separate development with the establishment of a common infrastructure**

The highway management organizations remain in the present condition.

The expected **result** could be an agreement similar to the first alternative (see above) and the establishment of joint highway management activity support centres:

- 1) Information centre
- 2) Meteorological data centre
- 3) Highway traffic and condition data centre (traffic data and road condition data)
- 4) Material support service centre (delivery and preparation of materials)

The result of the project could be an **agreement** on the financing of common projects providing functioning of the highway maintenance unit.

**3. Establishment of a common maintenance unit**

Condition: A special highway maintenance organization is established in the Moscow district to maintain all highways and roads in the district. This organization will function as Moscow federal directorate's and Mosavtodor's contractor (on federal and territorial highways, respectively). All the strategies are intended to be adopted by the newly established organization.

Structural subdivisions and technical equipment for highway maintenance work are arranged according to the principle of optimum service coverage of the zones.

A highway maintenance management centre will be established in the Moscow region. It will be responsible for all highway maintenance tasks. The existing highway maintenance management structures in the Moscow Oblast will delegate their authority to this new organization.

**This project gives bases for the scientific and methodical implementation of all three possible development strategies.**



## 5. PLANNING OF DEVELOPMENT STRATEGIES

### Development strategies are implemented in programmes and projects.

Following the elaboration of the project the main structural components of the development program for an optimum highway management system in the region were determined.

The **development program** shall include all possible aspects of highway management and shall be elaborated on the basis of coordinated development projects.

A **development project** is a **long-term plan** for organizational reforms and technical development, fixed and accepted by management bodies. A development project includes a **set** of various strategies (approaches), investment alternatives and organizational arrangements focused on achieving set goals.

This project addresses possibility of establishing a **development program** for the Moscow Oblast highway management and is a basis for planning and elaborating investment programs for development. The project formulates a **problem** and describes possible **ways solve it**, and the **results** expected from implementing the chosen strategy.

### Minimum composition necessary for the highway management development program in the region.

No.	Program sections	Targets
1.	Organizing	Choosing the organizational structure for management bodies and maintenance unit. Elaboration of management and administrative system for management bodies and maintenance unit
2.	Normative basis	Determination of legislative, normative and methodological basis for management bodies and maintenance unit.
3.	Requirements and standards	Determination of requirements and standards for highway and highway maintenance works
4.	Providing	Establishment of necessary information support system for management bodies and work executors.
5.	Work contractors	Establishment of necessary market infrastructure and relationship system between customers and contractors.
6.	Interaction and com-munications	Organizing the interaction system between highway management bodies.
7.	Organizing the works	Elaboration of the requirements for organizing the works.
8.	Technology	Strategy in the field of technology development.
9.	Personnel	Development strategy for the maintenace unit's management bodies' personnel
10.	Equipment	Elaboration of technical policy in rigging the highway maintenance organizations.

### Characteristics of major works stipulated in the development program

No.	Program sections	Necessary composition of works under program (separate projects)
1.	Organizing	<p>Determining the system of interaction between federal and territorial highway management bodies.</p> <p>Determining the system of interaction with territorial bodies of state motor vehicle inspection (GAI), traffic inspection.</p> <p><b>Substantiating the development of maintenance enterprises and organizations. Determining the optimum correlation of highway network length.<sup>1</sup></b></p> <p>Determining the organizational and legal form of the maintenance unit at all levels.</p> <p>Determining the rights and obligations of the maintenance unit according to the following sections: highways registration, financing of works, highway works client, highways commissioning.</p> <p>Elaborating the systems of financing, registration and paperwork.</p> <p>Elaborating the norms of monetary expenditure on maintenance for the highway maintenance unit. General financing principles.</p> <p>Elaborating the system of responsibility procedures for highway network condition.</p> <p>Elaborating the system of responsibility procedures during production of works.</p> <p>Elaborating the highway safety measures.</p> <p>Elaborating the measures for observing ecological requirements during highways maintenance.</p>
2.	Normative basis	<p><b>Provisions and charters for organizations of management bodies and maintenance unit enterprises.</b></p> <p>Instructions and provisions for organizing the maintenance unit.</p> <p>Determining the necessity to elaborate legislative acts and changes in existing legislation.</p> <p>Legislative acts, instructions and provisions according to responsibility procedures (highway condition, safety, etc.).</p>
3.	Requirements and standards	<p>Elaborating the indices to assess technical condition of elements in the highway network for classification according to maintenance levels.</p> <p>Elaborating the indices to assess highway condition for decision-making about execution of works.</p> <p>Determining the requirements for highway classification according to maintenance levels depending on:</p> <ul style="list-style-type: none"> <li>• traffic density</li> <li>• technical condition</li> <li>• administrative importance</li> <li>• traffic composition</li> <li>• other indices</li> </ul> <p><b>Determining the standards and requirements for executors of maintenance works.</b></p>

<sup>1</sup> Items in bold face indicate the themes elaborated in this project.



No.	Program sections	Necessary composition of works under program (separate projects)
4.	Providing the management	<p><b>Elaborating the traffic registration system.</b></p> <p><b>Elaborating the information systems.</b></p> <p><b>Substantiating the main requirements for efficient meteorological and highway information.</b></p> <p><b>Elaborating the information collection and data processing system for information from the state meteorological service.</b></p> <p><b>Determining the necessity of equipping highway organizations with meteorological stations.</b></p> <p><b>Establishing the data processing system in order to receive necessary forecasts, including software.</b></p> <p><b>Elaborating the requirements for equipping the maintenance unit with the necessary means of official and technological communication in order to meet the needs of efficient work control.</b></p>
5.	Work contractors	<p><b>Elaborating the contract system</b></p> <p>Establishing the mechanism of market pricing.</p>
6.	Interaction and com-munications	<p>Coordination order for financing the joint projects.</p> <p>Determining the system of interaction between highways management bodies.</p> <p>Determining the interaction system with territorial bodies of vehicle inspection (GAI), traffic inspection, mobilization service and local administrations.</p>
7.	Organizing the works	<p><b>Determining the list and composition of works included in controlling the maintenance unit.</b></p> <p><b>Classification of the work composition for:</b></p> <ul style="list-style-type: none"> <li>• state maintenance units</li> <li>• works for contracting</li> </ul> <p><b>Determining the common principles for elaborating the projects as a necessary means when financing highway maintenance.</b></p> <ul style="list-style-type: none"> <li>• highway maintenance projects</li> <li>• highway maintenance organizing projects</li> <li>• maintenance development projects.</li> </ul> <p><b>Working out the requirements for project elaboration.</b></p> <p><b>Working out the contract classification according to the forms of:</b></p> <ul style="list-style-type: none"> <li>• payments</li> <li>• quality (standard) assessment</li> <li>• control systems</li> </ul>
8.	Technologies	<p><b>Considering the effective methods and technologies in the summer time. Determining the technology list for applying to works.</b></p> <p>Considering the effective methods and technologies in the winter time.</p> <p>Elaborating the:</p> <ul style="list-style-type: none"> <li>• weather condition classification</li> <li>• technology depending on weather conditions</li> <li>• action depending on weather conditions</li> <li>• methods of work depending on weather conditions</li> </ul>
9.	Personnel	<p><b>Elaborating the plan for training the maintenance unit's management personnel.</b></p> <p><b>Elaborating the measures for training highway maintenance workers.</b></p> <p>Elaborating the means of payment and incentive for the maintenance unit's personnel.</p>

No.	Program sections	Necessary composition of works under program (separate projects)
10.	Technical equipment	<p><b>Requirements for equipment operation during maintenance works.</b></p> <p><b>Requirements for elaboration of equipment and suspended machinery.</b></p> <p>Determining the requirements for highway maintenance materials.</p> <p>Determining the most promising directions for using non-traditional materials in highway maintenance.</p> <p>Elaborating the requirements for the equipment of highway organizations' production bases for effective usage of machinery and materials during highway maintenance.</p> <p>Materials saving requirements.</p> <p>Requirements for materials preparation for winter maintenance.</p>

## 6. IMPLEMENTATION OF THE PROJECT

The project has examined the problems (in their development) irrespective of the existing management systems. However, when establishing the system for optimum management, and mechanisms for its implementation, it is necessary to take **fully** into account the **concrete** conditions of the Moscow region.

The main facet of establishing the highway management system in the region is that its description cannot be drawn up as a unified document or project adopted and easily adaptable for future implementation. This is a **system** of separate programs and coordination of current projects.

All the problems in establishing the highway management system are, by necessity, continuous **correction of the current processes** and detailing **new projects**. Consequently, it is more realistic to talk about the elaboration of a **united strategic development plan** to implement its main tasks in a coordinated manner rather than the creation of a highway management system in the region. This project is a **basis** for furthering the **strategic plan** of creating an effective highway management system.

**Strategic planning** presumes preliminary outlining of the problems, their analysis in the development (what has been done in this project), coordination of the interests of stakeholders and consideration of methods for solving the contradictions.

**Compulsary, intensive training** of personnel is vital and this is a guarantee of successful implementation of the project.

**Each report in this project is good training material for employees of management bodies. A special report on training has also been elaborated.**

The strategic plan consists of different parts that are detailed and implemented separately. Currently, some parts of the plan which are being implemented by the management and maintenance organizations are being detailed independently of the current project. That is why coordination of the planned and implemented parts of the project is needed.

Some initial organization is needed which will be able to implement in practice the main conclusions of the project because many research results elaborated under the contract were elaborated autonomously and did not reach executors. There is no coordination between executors for different parts of the work on establishing the management system.



**Decision on establishing the project implementation management shall be made primarily when it is not necessary to create an organization which can also be a conciliatory commission.**

For this reason the organization that is carrying out the project needs to have the following three main functions:

- 1) Coordinating function,
- 2) Consulting function,
- 3) Regulating function.

**Coordinating function** is the cooperative joint actions needed for local projects (creation of the meteorological service, contract system, development of standards, etc.).

**Consulting function** determines that all of the research results obtained by the management organizations should conform to the current project. They are to be provided as recommendations or methods to be used by all of the organisations.

**Regulating function** covers the decisions concerning the establishment of the highway maintenance management which do not correspond to the common strategy and are intended to be approved for use by all the users of the project for later introduction and necessary correction.

A lowest-cost project can be implemented if a project **management unit** is established to deal with the project from its inception. It must have certain authorities and rights.

**Major guidelines for the initial work on implementation of the project**

1. The most urgent task of Russia's Federal Highway Administration (RFHA) and MOSAVTODOR is the development and establishment of unified standards and requirements to determine:
  - 1) the level of service of the highways and its minimum level,
  - 2) the actions needed to provide the minimum level of service,
  - 3) the technical capability of the maintenance organizations.
2. Questions relating to the development of the organization responsible for maintenance service must be solved.
  - 1) The status of the highway maintenance organizations must be determined.
  - 2) The communication procedures covering the relationship between the management and maintenance organizations must be formulated.

The development strategies for the maintenance organization must be elaborated and adopted; for the federal administration this question is elaborated and determined in the project.

In so far as the conditions of existence and development of each highway organization are unique, development projects for each separate maintenance organization must be elaborated.

A development project must include:

- list of works
- measures for implementation of new technologies
- plan for re-equipping with new machinery
- measures and arrangements for using capacities which are not needed for maintenance work
- measures for re-equipping organizations' bases and material preparation bases
- other necessary measures

A special methodology for these measures was elaborated in the project.

A development program must be elaborated for the project implementation.

This project addresses the possibility of creating a highway **development program** for the Moscow Oblast and is a basis for planning and elaborating the investment programs for development. The project formulates a **problem**, describes **methods to solve it** and details the **results** expected during implementation of the chosen strategy.

Most important is that it is impossible to build a management system if its **major targets, their prioritization** and methods for their achievement are not determined. Such an approach is represented on diagram 4 in a general way.



Diagram 1. Changes in the highway management system during transition to a market economy.

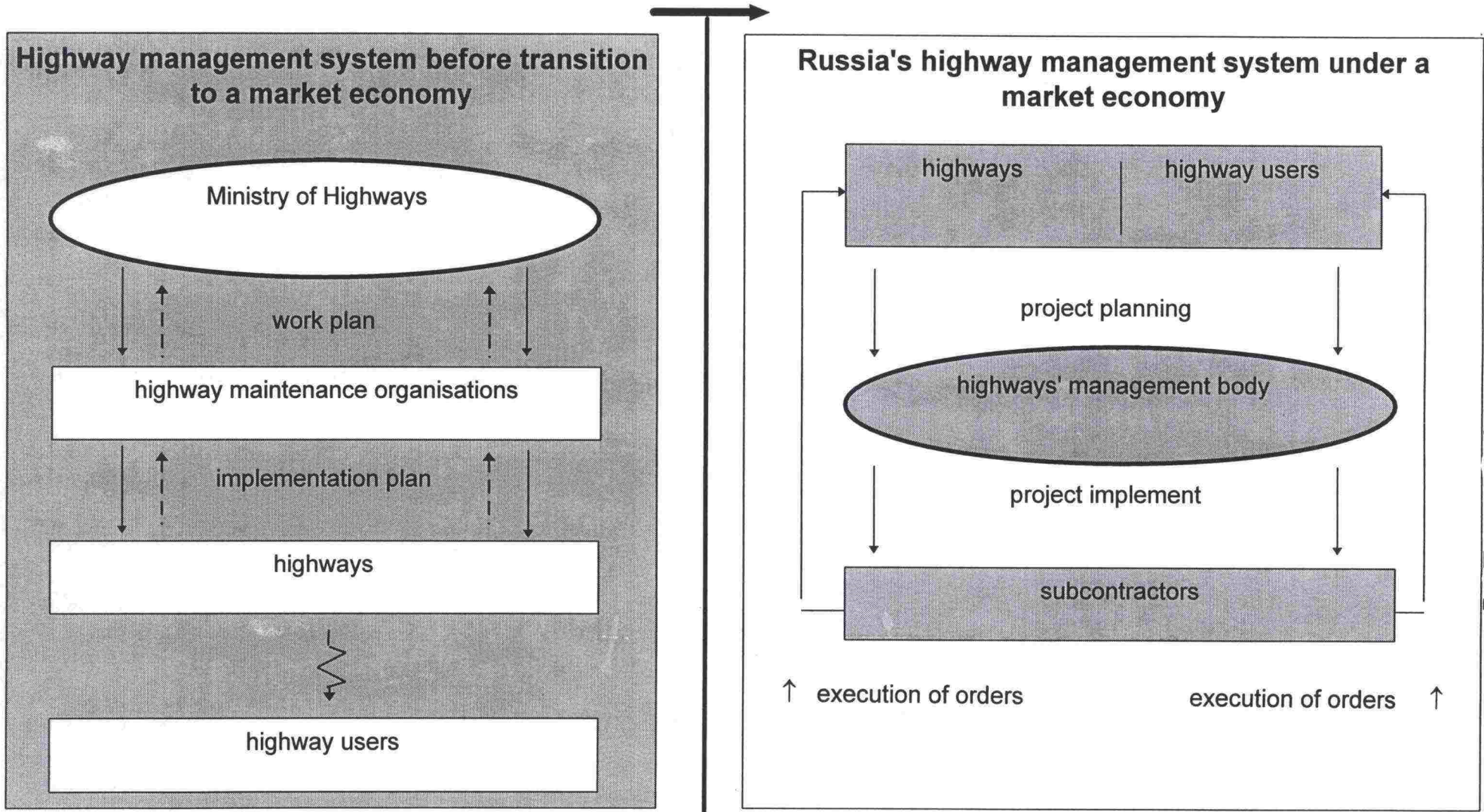
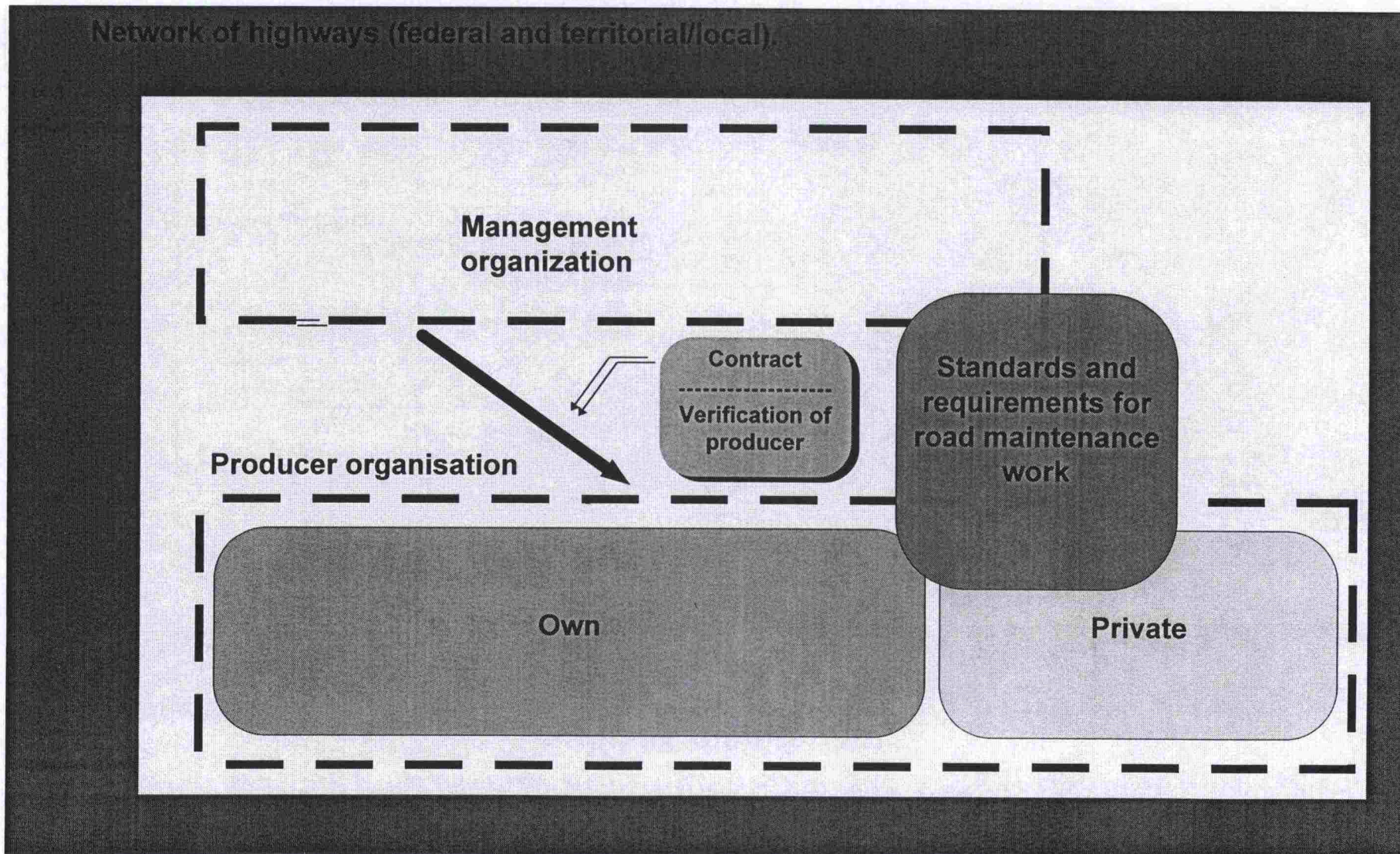




Diagram 2. Development of technological and management methods for hihhway maintenance





**Diaram 3 Development of technological base and management methods for highway maintenance.**

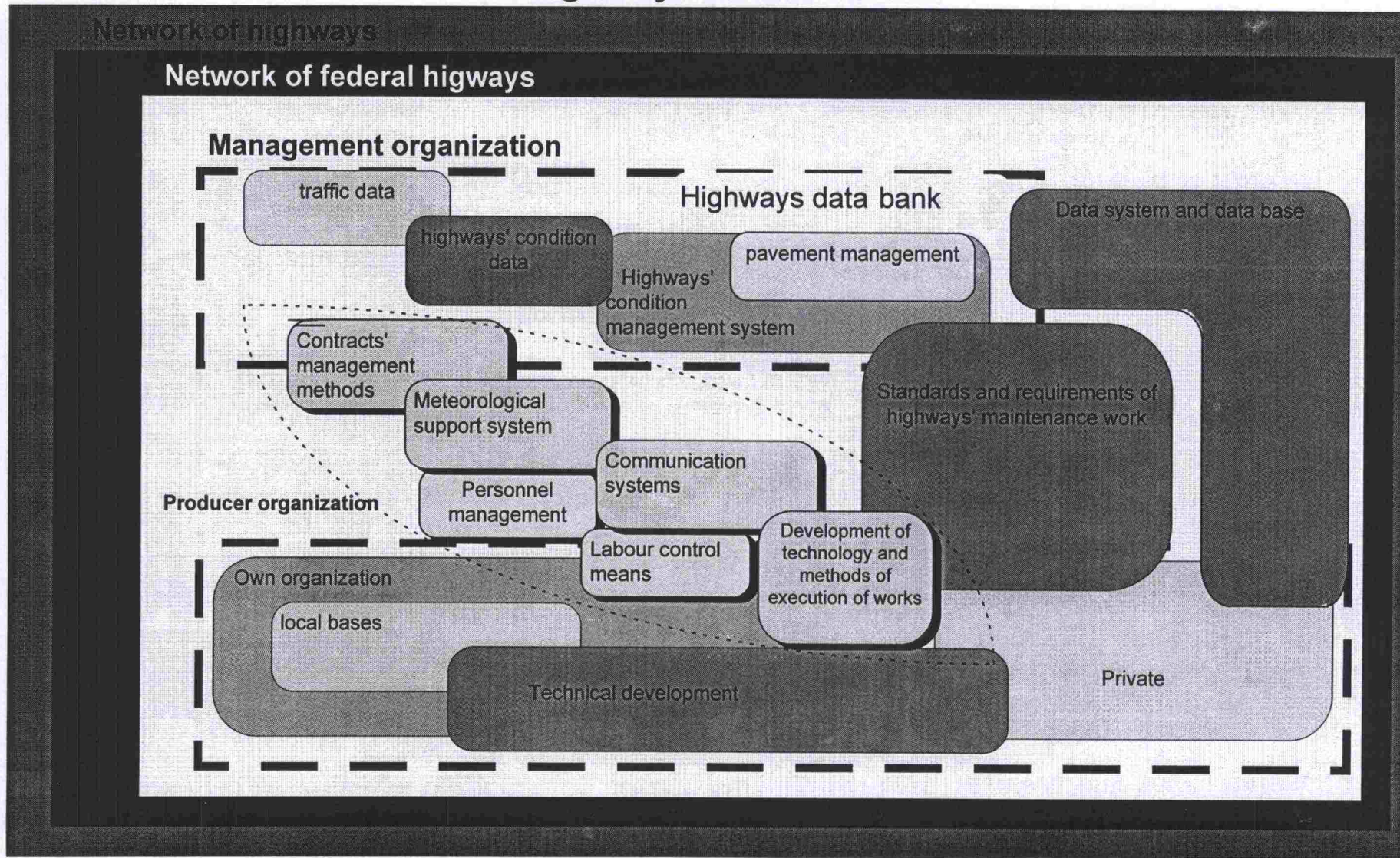
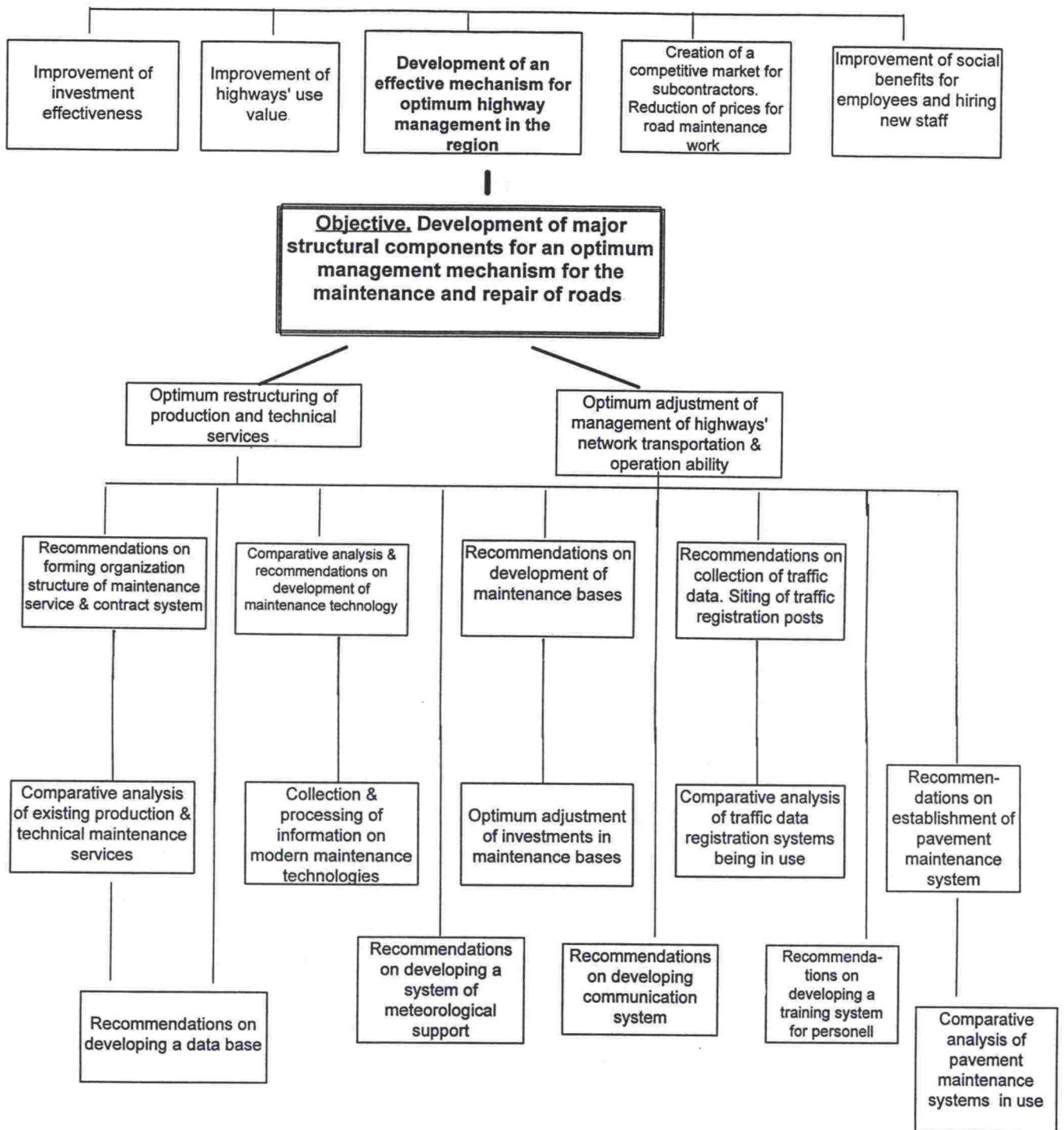




Diagram 4 Project tasks subordination and sequence of realisation of the project



Recommendations, comparisons and analysis concerning the implementation of results presented in project reports.



### Annex 3: Overall Plan of Operations

Project title: <b>Moscow region road maintenance strategy development</b>	Project number: <b>PCP2/FIN-7-R</b>	Country: <b>Russia</b>	Page: <b>1</b>
Planning period: <b>10.6.1996 - 10.1.1998</b>	Prepared on: <b>06.02 .1997</b>	EC Consultant: <b>Finnish National Road Administration, PO Box 33, FIN-00521 Helsinki</b>	

**Project objectives:**  
**Due to defining a new federal and local road maintenance development strategy, the project enhances traffic safety and makes road maintenance financing more effective.**

No	MAIN ACTIVITIES	TIME FRAME												INPUTS							
		1996				1997				1998				PERSONNEL (weeks)		EQUIPMENT AND MATERIAL	OTHER				
		1	2	3	4	1	2	3	4	1	2	3	4	EC Consultant	Counterpart						
1.	The settlement of existing road maintenance activities and collecting of the base data			xxxxxxxx	xxxx	xxxxx	xxx											10,0	80,0	PCs, software, printers	34 extra days/f 39 extra days/r
2.	Analysis of the base data			xxxxxxxx	xxxx	xxxx	xxx											20,0	40,0	Teaching materials, lecture notes, copier	48 tickets/f 68 tickets/r
3.	The compilation of development plans for road maintenance activities			xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx														41,4	120,0		
4.	Training of project target groups			xx	xxxxxxxxxxxxxxxxxxxxxxxxxxxx					xx								10,0	140,0		
5.	The compilation of Tacis-reports			xxxx	xxxxxx				xxxx	xxx								15,0	19,8		
<b>TOTAL</b>																<b>96,4</b>	<b>399,8</b>				

### Annex 4: Overall Output Performance Plan

Project title: <b>Moscow region road maintenance strategy development</b>	Project number: <b>PCP2/FIN-7-R</b>	Country: <b>Russia</b>	Page: <b>1</b>
Planning period: <b>10.6.1996 - 10.01.1998</b>	Prepared on: <b>06.02.98</b>	EC Consultant: <b>Finnish National Road Administration, PO Box 33, FIN-00521 Helsinki</b>	
Outputs (to be described and target dates indicated)	Agreed Objective Verifiable Indicators	Constrains and Assumptions C/A	
A1. The Seminar Report of May 1996, ready 8/96 B1. Inception Report, valmis 9/96 A2. The Seminar Report of September 1996, ready 10/96 A3. The Seminar Report of December 1996, ready 1/97 B2. Interim Report, ready 2/96 A4. The Seminar Report of May 1997, ready 6/97 A5. The Seminar Report of September 1997, ready 10/97 1.1. A Plan for Organizational Structure with different Alternatives, 11/97 1.2. Proposals for a Contractual Procedure and Definition of Requirements concerning the Content of Contract Documents, ready 11/97 1.3. A Structural Chart of the Necessary Supporting Systems, 10/97 2.1. An Evaluation Report on the Development in Kolomna and Istra, 12/96 2.2. Report on the maintenance courses and presentations of methods for the Moscow region, 11/97 3.1. Equipment Planning for Road Maintenance Areas and Bidding Documents, ready 9/97 4.1. Description of the Road Data Bank Development Activity, 7/97 5.1. A Preliminary Plan for Carrying out a Traffic Counting System in the Moscow Region, 9/97 6.1. Pavement Management System, ready 10/97 7.1. An Implementation Plan for a Road Weather Service System, 5/97 8.1.A Proposal for a Communication Network of the Road Maintenance Areas in the Moscow Region, 6/97 A6. The Seminar Report of November 1997, ready 12/97 B3. Final Report, 1/98  <small>(The detailed contents of reports 1.1 - 8.1 have been described in Inception Report. The contents of reports B1-B3 and A1-A6 are in accordance with Tacis Guidelines for reporting and the seminar programs)</small>	Seminar Copy in Russian and Finnish Complete Report in English Seminar Copy in Russian and Finnish Seminar Copy in Russian and Finnish Complete Report in English and Russian Seminar Copy in Russian and Finnish Seminar Copy in Russian and Finnish Complete Report in Finnish and Russian Complete Report in Finnish and Russian Complete Report in Finnish and Russian Complete Report in Finnish and Russian Complete Report in Finnish and Russian Complete Report in Finnish and Russian Complete Report in Finnish and Russian Complete Report in Finnish and Russian Complete Report in Finnish and Russian Complete Report in Finnish and Russian Complete Report in Finnish and Russian Complete Report in Finnish and Russian Seminar Copy in Russian and Finnish Complete Report in English and Russian	Completed (seminar was held before the project started) Completed Completed Seminar in January, 1997 report accordingly Completed Completed The seminar was replaced with short term visits Seminar in August, 1997; Report completed The proposal requires Russia to make changes in laws and political decisions Completed The proposal requires Russia to make changes concerning contract activities Completed The most important structures for the development of systems are studied Completed The reports concerning development of Kolomna and Istra are the starting points Completed To be implemented in accordance with the existing training program Completed The organizational structure (output 1.1) has a major influence on this plan Completed The same data collecting system of federal and regional roads has to be solved Completed The decisions concerning Road Data Bank (output 4.1) have an effect Completed The decisions concerning Road Data Bank (output 4.1) have an effect Completed The service system requires cooperation with Russian Meteorological Institute Completed The network design requires cooperation with Russian Telecommunications Bureau Completed Results presented during seminar which will be held in December; Report 12/97 Completed	



Annex 5: Project Progress Report

Project title: <b>Moscow region road maintenance strategy development</b>		PCP2/FIN-7-R												Country: <b>Russia</b>				Page: <b>1</b>															
Planning period: <b>10.06.1996 -10.01.1998</b>		<b>08.02 .1998</b>												EC Consultant: <b>Finnish National Road Administration, PO Box 33, FIN-00521 Helsinki</b>																			
Project objectives:		Due to defining a new federal and local road maintenance development strategy, the project enhances traffic safety and makes road maintenance financing more effective.																															
No	ACTIVITIES	TIME FRAME												INPUTS																			
		1996 (months)						1997 (months)						1998	PERSONNEL (Weeks)				EQUIPMENT AND MATERIALS		OTHER												
		5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	EC Consultant		Counterpart		Planned	Utilised	Planned	Utilised	Planned	Utilised	Planned
1.1	Development of Organizational Structure																																
1.11	Description of present condition of organization	xx	xx	xx	xx	xx	x	xx	xx	xx		xx	xx				xx						5,0	12,0	16,4	12,2	PCs, software,						
1.12	New organization alternatives and analysis		x		xxxx	xxx	xxx	xxx	xxx	xxxx	x	xxxx	xx	xx			xxx	xxx	xx				3,0	7,2	9,4	7,0	printers						
1.13	The location plan of bases and analysis	xxx	x		xxx	xxxx	xxx	xxxxxxx				xx	xxx	xxx			xxx	xxx	xxx				5,0	12,0	17,8	13,2	Teaching materials,	8	8	tickets/finns			
1.14	Plan of organization management and analysis				xxxxxxx	xxx	xxxx		x	x		xxxx	xxx	xxx			xxx	xxx	xxx				3,5	8,4	21,4	15,9	lecture notes,	128	200	days DSA/finns			
1.15	Plan for the application of a new organization				xxxxxxx	xxx	xxxx				xxx	xxxx	xxx	xxx			xx	xx	xx		x		1,3	3,1	12,6	9,3	copier	328	285	days DSA/russians			
1.2	Proposals for a contractual procedure																						17,8	42,8	77,6	57,6							
1.21	Current contractual procedure	xx	xxx	xx	xx	x	xx	xxxx			xxx	x	xxx	xxx			xxx	xxx	xxx	xxx			1,0	2,8	7,0	3,4		3	3	tickets/finns			
1.22	Proposal for a contractual procedure					xxx	x	xxxx			xxx	x	xxx	xxx			xx	xx	x	x	x		2,5	6,4	60,0	28,8		33	56	days DSA/finns			
1.23	Classification principles of contractors									xxx	x	xxx	xxx	xxx			xxx	xxx	xxx	xxx	x		1,2	3,1	16,7	8,0		354	200	days DSA/russians			
1.3	A structural chart of necessary supporting systems																						4,7	12,1	83,7	40,2							
1.31	Current situation	xxxx			x	xxxx		xxxx		xx	xx	xx	xx				xx	xx	xx	x			1,0	1,7	7,3	4,5		1	1	tickets/finns			
1.32	Working out the structural chart	xxxx			xxxx		xxxx		xxxx	x	xx	xx	xx	xx			xx	xx	xx	x			1,4	4,1	23,2	14,2		17	27	days DSA/finns			
2.1	Evaluation on the development in Kolomna and istra																						2,4	5,8	30,5	18,6		129	92	days DSA/russians			
2.11	Assesment of the general development	xx		xx	xxxx																		1,0	1,0	1,0	1,1							
2.12	The use of new working methods				xxxxxxx	xxxxxxx																	1,0	1,0	1,0	1,1							
2.13	The influence of resource sizing				x	x		xxxxxx		xx	x	xx	xxx	xxx	xx	xx	xx	xx	xx	xxx	x		1,0	2,0	2,0	5,0		2	2	tickets/finns			
2.14	The implementation of working and acquisition plans				xxxxxxx		xxxxx		xxxx				xxx	xxx	xx	xx	xx	xx	xx	xxx	x		1,6	1,1	3,0	4,5		33	25	days DSA/finns			
2.2	Maintenance courses and method demonstrations																						4,6	5,3	7,0	11,7		30	58	days DSA/russians			
2.21	Current situation	xxxx	xx								xx	xxx	xxx	x	xxxx	xxx	xxx	xxx	xxx	xxx			1,0	2,1	4,0	2,7							
2.22	Planning and implementation of occasions	xx	xxx	xxx	x		x	x	x	x	xx	xxx	xx	x	xxxx	xxx	xxx	xxx	xxx	xxx	x		3,5	7,3	122,6	83,3		7	7	tickets/finns			
2.23	Training and demonstration documentation	xx				xxx	xxx	xxx	xxx			xxx	xxx	x	x		xxx	xxx	x	x	x		2,0	4,2	18,0	12,2		71	95	days DSA/finns			
2.24	Training development planning										xxx		xxx	xxx			xxx	xxx	xxx	x	x		3,3	6,9	8,0	5,4		644	516	days DSA/russians			
3.1	Equipment planning for road maintenance areas and clearing documents																						9,8	20,5	152,6	103,7							
3.11	Current situation	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xx		x	xx	x			xx	x					1,0	2,2	11,2	11,4							
3.12	Estimate of the need for equipment and maintenance bases				xxxxxxx	xxxxxxx	xxxxxxx	xxxx	xxxx			xxx	xxx	xx	x	xx	xx	x	x	xxx	x		2,3	5,0	9,6	9,7							
3.13	Technical specifications and necessary documents				xxxx	x	xxx	xxx	xxx	xxx	x		x	x	x	x	x	xxx	x	xxx	x		2,2	4,7	10,6	10,8							
		TOTAL																		See next page	See next page												

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### Annex 5: Project Progress Report

Project title: <b>Moscow region road maintenance strategy development PCP2/FIN-7-R</b>															Country: <b>Russia</b>					Page: <b>2</b>																																				
Planning period: <b>10.06.1996 -10.01.1998</b> <b>08.02 .1998</b>															EC Consultant: <b>Finnish National Road Administration, PO Box 33, FIN-00521 Helsinki</b>																																									
Project objectives: <b>Due to defining a new federal and local road maintenance development strategy, the project enhances traffic safety and makes road maintenance financing more effective.</b>																																																								
No	ACTIVITIES	TIME FRAME																								INPUTS				EQUIPMENT AND MATERIALS		OTHER																								
		1996 (months)												1997 (months)												1998				Planned		Utilised		Factor																						
		5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	Planned	Utilised	Planned	Utilised	Planned	Utilised	Planned	Utilised																										
3.1	<b>Equipment planning for road maintenance areas and clearing documents...</b>																																																							
3.14	Device procurement																															XX	X	XX	XXX	XX	XXX	XX	XXX	XX	XXX	XX	XXX	XX	XXX	XX	XXX	XX	XXX	XX	XXX	XX	XXX			
3.15	Planning of the construction and repair of maintenance bases																																																							
4.1	<b>Development of road data bank</b>																																																							
4.11	Current situation																																																							
4.12	Planning of data collection and registration																																																							
4.13	Proposal for further measures																																																							
5.1	<b>Development of traffic counting system</b>																																																							
5.11	Current situation																																																							
5.12	Plan for traffic counting																																																							
6.1	<b>Pavement management system (PMS)</b>																																																							
6.11	Current situation																																																							
6.12	Development measures of PMS																																																							
7.1	<b>Implementation plan for road weather service system</b>																																																							
7.11	Current situation																																																							
7.12	Description of the system																																																							
7.13	Plan for the location of the road weather stations																																																							
7.14	Plan for the application of the road weather service system																																																							
8.1	<b>Proposal for the communication system</b>																																																							
8.11	Present communication system																																																							
8.12	Assessment of the alternatives to the system																																																							
8.13	Development plan for the communication system																																																							
																						<b>TOTAL</b>																				<b>71,7</b>	<b>146,7</b>	<b>483,9</b>	<b>410,9</b>							<b>2042</b>	<b>2054</b>	48 tickets/finns 734 days DSA/finns 2054 days DSA/russians		

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## Annex 6: Resource Utilisation Report

Project title: <b>Moscow region road maintenance strategy development</b>		Project number: <b>PCP2/FIN-7-R</b>		Country: <b>Russia</b>		Page: <b>1</b>	
Planning period: <b>01.11.1996 -10.01.1998</b>		Prepared on: <b>08.02.98</b>		EC Consultant: <b>Finnish National Road Administration, PO Box 33, FIN-00521 Helsinki</b>			
Project objectives: <b>Due to defining a new federal and local road maintenance development strategy, the project enhances traffic safety and makes road maintenance financing more effective.</b>							
RESOURCES/INPUTS	TOTAL PLANNED	PLANNED earlier period	REALISED earlier period	Available for remainder	TOTAL REALISED	AVAILABLE FOR REMAINDER	
	work months	work months (100%-53,3 % + may96)	work months	work months	work months (earlier+period)	work months	
<b>PERSONNEL</b>							
- Long term experts	58,5	31,2	1395,8	-1337,2	63,9	-5,4	
- Short term experts	38,0	20,2	1098,3	-1060,3	50,5	-12,5	
- Other experts							
- Interpreters	16,5	8,8	399,8	-383,3	18,3	-1,8	
Sub-total	<b>113,0</b>	<b>60,2</b>	<b>2893,9</b>	<b>-2780,8</b>	<b>132,8</b>	<b>-19,7</b>	
<b>EQUIPMENT AND MATERIAL</b>							
- Personnel computers	1	1	1	0	1	0	
- Laser printer	1	1	1	0	1	0	
- Copying machine	1	1	1	0	1	0	
- Teaching materials (pages)	9000	4500	3600	5400	9000	0	
- Copies (pages) (reference only)	10000	5000	6000	4000	10000	0	
Sub-total	<b>19003</b>	<b>9503</b>	<b>9603</b>	<b>9400</b>	<b>19003</b>	<b>0</b>	
<b>OTHER INPUTS</b>							
Sub-total	<b>0,0</b>	<b>0,0</b>	<b>0,0</b>	<b>0,0</b>	<b>0,0</b>	<b>0,0</b>	
<b>TOTAL</b>	<b>19116,0</b>	<b>9563,2</b>	<b>12496,9</b>	<b>6619,2</b>	<b>19135,8</b>	<b>-19,7</b>	

### Annex 7: Output Performance Report

Project title: <b>Moscow region road maintenance strategy development</b>	Project number: <b>PCP2/FIN-7-R</b>	Country: <b>Russia</b>	Page: <b>1</b>
Prepared on: <b>04.02.98</b>		EC Consultant: <b>Finnish National Road Administration, PO Box 33, FIN-00521 Helsinki</b>	
Output results	Deviation original plan + or - %/months	Reason for deviation	Comment on constrains and assumptions
A1. The Seminar Report of May 1996, ready 8/96	±0		Completed
B1. Inception Report, ready 9/96	±0		Completed
A2. The Seminar Report of September 1996, ready 10/96	- 2 months	Material from Russians was delayed	Completed
A3. The Seminar Report of December 1996, ready 1/97	- 2 months	The seminar was held in January 1997	The report was ready 3/97 Completed
B2. Interim Report, ready 2/97	- 1 month	Russian time sheets for needed calculations were delayed	
A4. The Seminar Report of May 1997, ready 6/97	- 3 months	The seminar was held in August 1997 and the report completed in 9/97	Timing was better in August Completed
A5. The Seminar Report of September 1997, ready 10/97	- cancelled	The seminar was cancelled because it is more useful to concentrate on writing project reports	Seminar activities were replaced by short term expert visits
1.1. A Plan for Organizational Structure with different Alternatives, 11/97	±0		The proposal requires Russia to make changes in laws and political decisions Completed
1.2. Proposals for a Contractual Procedure and Definition of Requirements concerning the Content of Contract Documents, ready 11/97	±0		The proposal requires Russia to make changes concerning contract activities Completed
1.3. A Structural Chart of the Necessary Supporting Systems, 10/97	±0		The most important structures for the development of systems are studied Completed
2.1. An Evaluation Report on the Development in Kolomna and Istra, 12/96	- 11 months	The published report concentrates more on Kolomna. The delay was due to organizational changes on the Russian side.	Completed
2.2. Report on the maintenance courses and presentations of methods for the Moscow region, 11/97	- 3 months	The delay was due to organizational changes on the Russian side.	Four courses have been held, report completed
3.1. Equipment Planning for Road Maintenance Areas and Bidding Documents, ready 9/97	±0		The organizational structure has a major influence on this plan Completed
4.1. Description of the Road Data Bank Development Activity, 7/97	±0		The same data collecting system of federal and regional roads has to be agreed Completed
5.1. A Preliminary Plan for Carrying out a Traffic Counting System in the Moscow Region, 9/97	±0		The decisions concerning Road Data Bank have an effect Completed
6.1. Pavement Management System, ready 10/97	±0		The decisions concerning Road Data Bank have an effect Completed
7.1. An Implementation Plan for a Road Weather Service System, 5/97	±0		The service system requires cooperation with Russian Meteorological Institute Completed
8.1. A Proposal for a Communication Network of the Road Maintenance Areas in the Moscow Region, 6/97	±0		The network design requires cooperation with Russian Telecommunications Bureau Completed
A6. The Seminar Report of November 1997, ready 12/97	±0		Small group meetings took the place of last seminar
B3. Final Report, 12/97	+1		Completed but finalising continued until January 1998



## Photographs of Current Conditions



Figure 1. Some main road sections are in good condition.



Figure 2. Some roads have deteriorated rapidly due to pavement failure.





Figure 3. Regional roads can be more icy than federal roads.



Figure 4. New techniques and technology help improve maintenance capability during in winter as well.





Figure 5. Axel loads are a very important factor in road design and up keep. Vehicles, therefore, are being weighed more frequently.

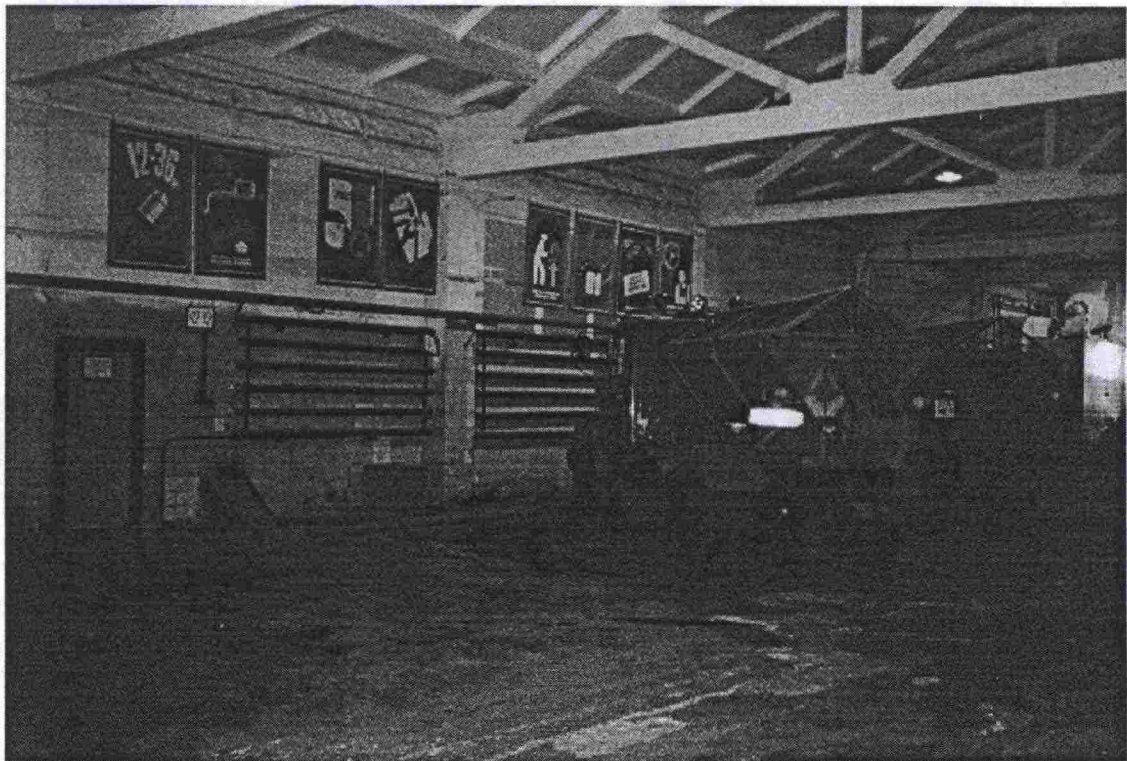


Figure 6. As depicted by the posters, work safety is an important part of a road maintenance area's responsibilities.



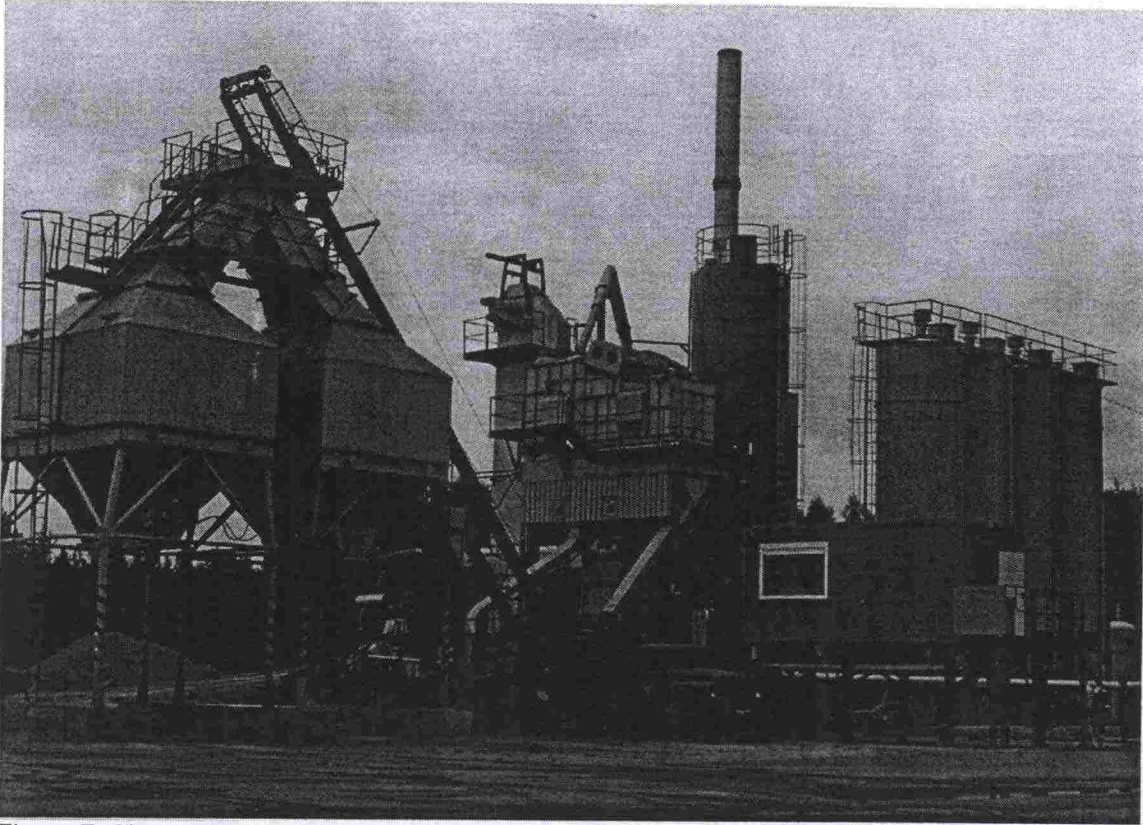


Figure 7. Almost every road maintenance area has its own asphalt plant. In Moscow Region they are usually in good condition.

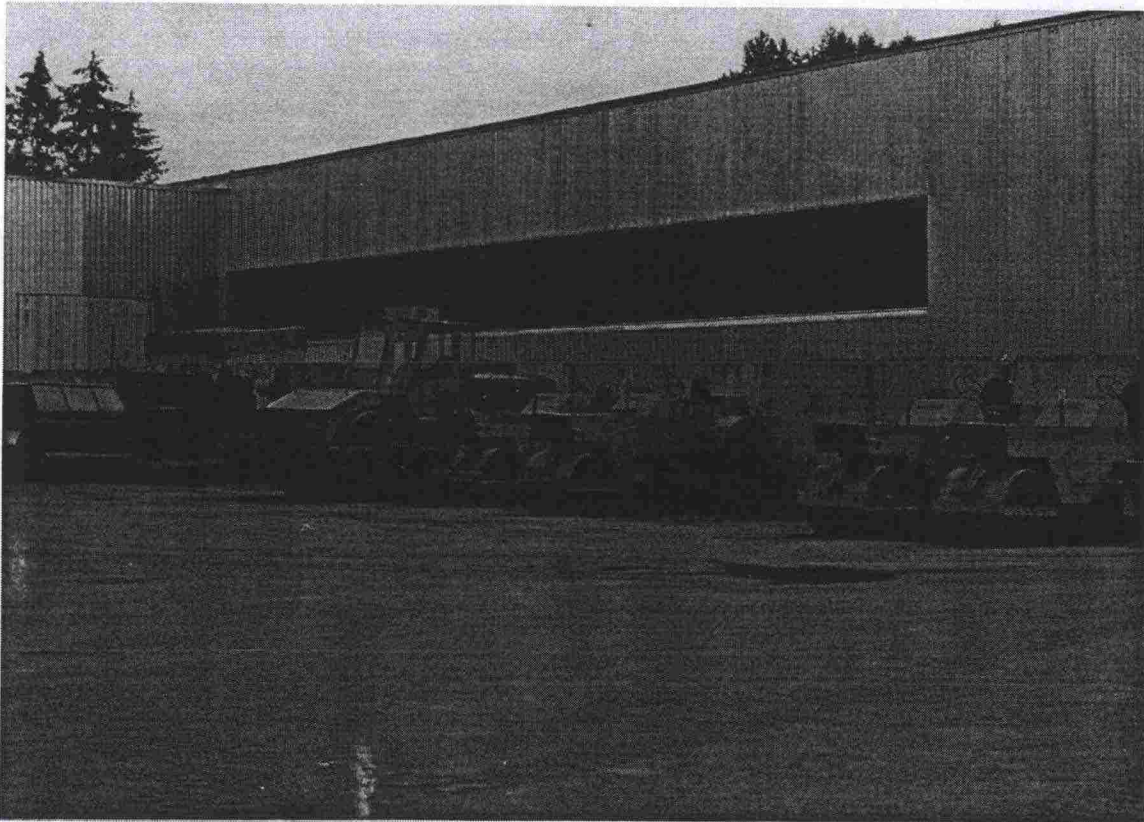


Figure 8. The large number of asphalt plants requires a large number of supporting equipment, like compactors.





Figure 9. The maintenance base is full of clearly marked by signs on the main gate.



Figure 10. All maintenance areas are clearly depicted on maps. The map on the left belongs to a federal road maintenance area and the one on the right to a regional road maintenance area.



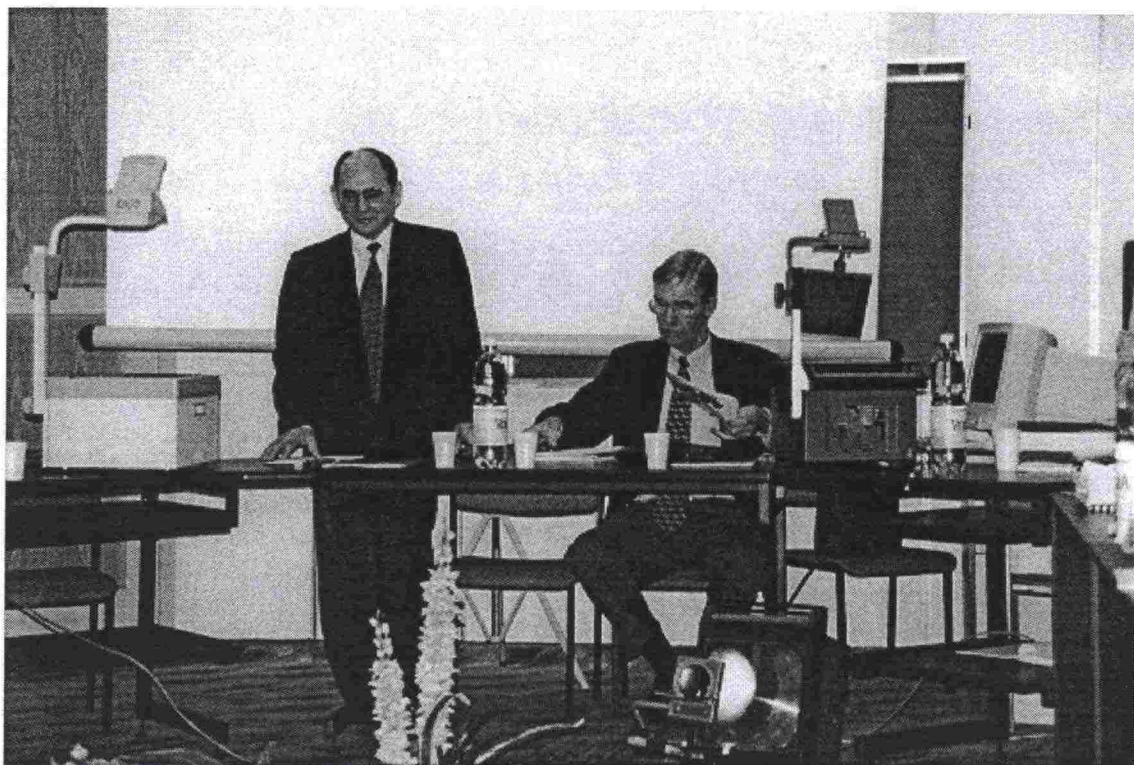
### Annex 9: Project Completion Report

Annex 9

Project title: <b>Moscow region road maintenance strategy development</b>	Project number: <b>PCP2/FIN-7-R</b>	Country: <b>Russia</b>	Page: <b>1</b>								
Planning period: <b>10.6.1996 - 10.01.1998</b>	Prepared on: <b>08.02.98</b>	EC Consultant: <b>Inistration, PO Box 33, FIN-00521 Helsinki</b>									
MAIN ACTIVITIES UNDERTAKEN			EC CONSULTANT (work months)				INPUTS UTILISED				
Period:			6/96-10/96	11.96-12/97	6/96-12/97	6/96-10/96	11.96-1/98	6/96-1/98	OTHER		
<b>1.1 Development of Organizational Structure</b>	3,2	7,6	<b>10,7</b>	1	7	<b>8</b>	tickets/finns	71	129	<b>200</b>	days per diem/finns
<b>1.2 Proposals for a contractual procedure</b>	1,0	2,0	<b>3,0</b>	1	2	<b>3</b>	tickets/finns	52	233	<b>285</b>	days per diem/russians
<b>1.3 A structural chart of necessary supporting systems</b>	0,4	1,1	<b>1,5</b>	0	1	<b>1</b>	tickets/finns	8	19	<b>27</b>	days per diem/finns
<b>2.1 Evaluation on the development in Kolomna and Istra</b>	0,4	1,0	<b>1,3</b>	1	1	<b>2</b>	tickets/finns	9	83	<b>92</b>	days per diem/russians
<b>2.2 Maintenance courses and method demonstrations</b>	1,6	3,5	<b>5,1</b>	1	6	<b>7</b>	tickets/finns	10	15	<b>25</b>	days per diem/finns
<b>3.1 Equipment planning for road maintenance areas and clearing documents</b>	1,7	3,1	<b>4,9</b>	1	8	<b>9</b>	tickets/finns	11	47	<b>58</b>	days per diem/russians
<b>4.1 Development of road data bank</b>	0,6	2,1	<b>2,6</b>	1	4	<b>5</b>	tickets/finns	12	503	<b>516</b>	days per diem/russians
<b>5.1 Development of traffic counting system</b>	0,4	1,5	<b>1,9</b>	1	8	<b>9</b>	tickets/finns	14	187	<b>227</b>	days per diem/finns
<b>6.1 Pavement management system (PMS)</b>	0,2	0,8	<b>1,0</b>	1	4	<b>4</b>	tickets/finns	15	78	<b>99</b>	days per diem/russians
<b>7.1 Implementation plan for road weather service system</b>	0,5	2,1	<b>2,6</b>	1	2	<b>3</b>	tickets/finns	20	128	<b>147</b>	days per diem/russians
<b>8.1 Proposal for the communication system</b>	0,5	1,6	<b>2,1</b>	1	1	<b>2</b>	tickets/finns	12	26	<b>38</b>	days per diem/finns
<b>Weekends</b>				14	99	<b>113</b>	days per diem/russians				
<b>TOTAL</b>	<b>10,6</b>	<b>26,1</b>	<b>36,7</b>	8	40	<b>48</b>	tickets/finns	232	502	<b>734</b>	days per diem/finns
				241	1813	<b>2054</b>	days per diem/russians				



## PROJECT PARTICIPANTS



Nikolai S. Van from Federal Highway Administration of Russia (RFHA) and Jorma Hintikka from Finnish National Road Administration (Finnra) have been in main responsibility in Moscow Region Road Maintenance Strategy Development Project.

### Russian participants:

#### Name

#### Tasks in project

Nikolai Sergejevits Van, RFHA

Main responsibility,  
especially report 1.1 and final report



Vladimir Nikolajevits Shumilin, RFHA

Project Director, all reports

Gennadi Konstantinovits Popkov, RFHA

Project Manager, all reports

Victor Pavlovits Yashin, RFHA

Project Manager, expert, especially reports  
1.1, 1.2, 1.3, 2.2, 3.1 and final report

Gennadi Timofejevits Puzikov, RFHA

Expert, especially report 1.1

Georgi Vladimirovits Fedorov, RFHA

Expert, especially reports 1.1 and 3.1



Raisa Sergejevna Ivanova, RFHA	Short term expert, especially reports 4.1, 5.1 and 6.1
Natalia Aleksandrovna Bezrukova	Short term expert, especially report 7.1
Nikolai Afanasevits Vazenin, RFHA	Short term expert, especially report 8.1
Juri Borisovits Asheulov, RFHA	Short term expert, report 3.1
Igor Gennadevits Kroin, Mosavtodor	Short term expert, especially reports 4.1, 5.1 and 8.1



Nikolai Nikolajevits Timashov, RFHA	Expert, common tasks
Mihail Ivanovits Klinitski, Mosavtodor	Expert, especially report 2.1
Vasili Mihailovits Ananiev, Mosavtodor	Expert, especially report 2.1
Anatoli Jakovlevits Erastov, Rosdornii	Assistant, reports 4.1, 5.1 and 6.1

Other experts:

Nikolai Petrovits Mihailov, Mosavtodor	Expert, especially reports 1.1 and 1.2
Aleksander Vladimirovits Erohin, Mosavtodor	Expert, especially reports 1.1, 1.2 and 2.1
Mihail Aleksandovits Slavutski, Mosavtodor	Short term expert, especially report 6.1
Anatoli Iljits Samoshin, Moscow Oblast	Short term expert, common tasks
Anatoli Veniaminovits Borodin	Short term expert, common tasks
Vladimir Sherbakov	Short term expert, common tasks
Viktor Borishovits Shifrin	Short term expert, common tasks

Assistants:

Larisa Arkadjevna Slavutskaja, RFHA	Report 2.2
Vladimir Aleksandrovits Ashrjan, RFHA	Reports 2.2 and 3.1
Vladimir Viktorovits Tsvanov, Rosdornii	Reports 4.1, 5.1 and 6.1
Georgi Petrovits Kudrjavtev, Rosdornii	Reports 4.1, 5.1 and 6.1
Aleksander Moisejevits Strishevski, Rosdornii	Reports 4.1, 5.1 and 6.1
Aleksander Ivanovits Dudakov, Rosdornii	Reports 4.1, 5.1 and 6.1
Mihail Lvovits Ermakov, Rosdornii	Reports 4.1, 5.1 and 6.1
Jelena Olegovna Vanina, Rosdornii	Reports 4.1, 5.1 and 6.1
Aleksander Leonidovits Kosarev	Report 7.1
Jevgeni Andrejevits Stulov	Report 7.1
Aleksander Jakovlevits Naumov	Report 7.1
Aleksei Sergejevits Velkovski	Report 8.1
Viktor Mihailovits Bogatsev	Report 8.1
Nikolai Mihailovits Karpov	Report 8.1
Nikita Valerevits Dikanski	Report 8.1



Oleg Viktorovits Koshin, RFHA  
Denis Elisejev, RFHA

Project secretary  
Project secretary

### Finnish participants:

Name	Tasks in project
Jorma Hintikka	Main responsibility, especially report 1.1 and final report



Tapani Angervuori	Project Director, all reports
Arvo Pehkonen	Project Manager, especially reports 1.1, 4.1, 5.1 and 6.1
Raimo Sallanmaa	Project Manager, expert, especially report 3.1 and final report
Einari Poikonen	Expert, especially reports 1.1, 1.2, 2.1, 2.2 and 3.1
Tapani Kokko	Expert, especially reports 1.1 and 3.1
Jukka Torniainen	Specialist, especially final report

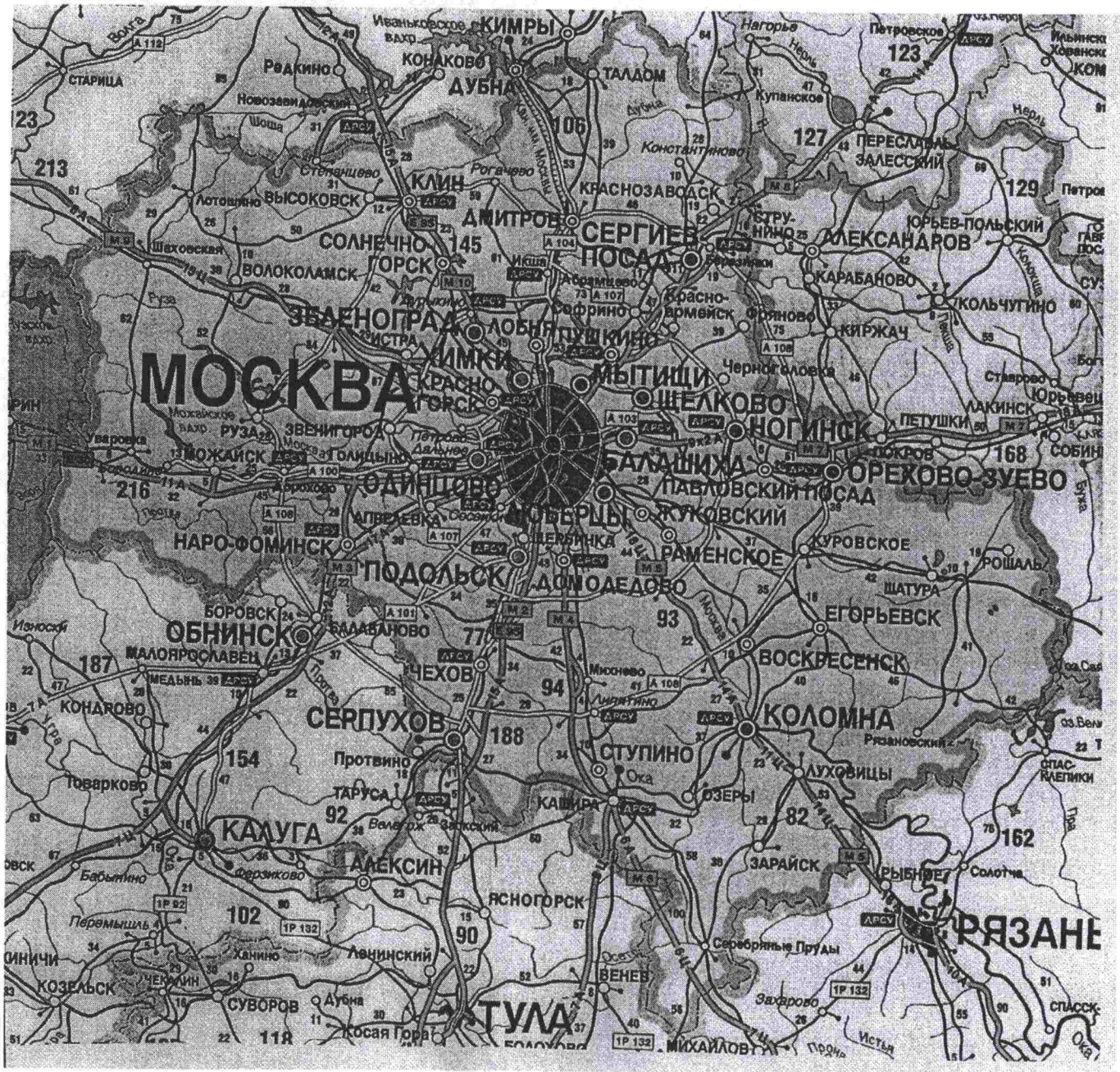


Jan Juslen	Specialist, especially report 2.2
Reino Nieminen	Short term expert, especially report 2.2
Jyri Mustonen	Short term expert, especially reports 4.1, 5.1 and 6.1
Georg Dunkel	Short term expert, especially report 7.1
Markku Mäenpää	Short term expert, especially report 8.1
Sari Töllinen	Project secretary

### Other experts:

Pekka Korhonen	Short term expert, especially report 3.1
Riitta Viren	Short term expert, especially report 4.1
Pentti Temonen	Short term expert, especially report 8.1
Ali Hiltunen	Short term expert, especially report 8.1





Roads in the Moscow Region