

*INSTITUTE FOR TRANSPORT SCIENCES Ltd*

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## **Annual Report 2002**

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## Introductory notes

To date, KTI Rt. (the Institute for Transport Sciences Ltd.) has published its annual report, in both Hungarian and English, on six occasions. The first edition contained results from three years of research, while the following three editions each covered a period of two years and included a brief summary of selected research projects. The fifth and sixth editions each dealt with the most significant research topics prepared by the various departments of the institute over a period of one year.

The current edition details the most significant research work carried out by the institute in 2002. The chapters are arranged by KTI research division in alphabetical order. A list of books, scientific articles and lectures by KTI's researchers can be found at the end of the publication; this gives a clear insight into the professional fields of interest of the researchers and the tendencies in the institute's research work, as well as the demands of those who commission work from the institute.

The *Name index* contains details of the responsible leaders, and the names of the authors of books, articles and lectures.

In compiling the *Subject index*, the Documentation and Information Centre of KTI followed the librarianship practices established earlier: key words (not bound to any fixed technical vocabulary) are assigned to the annotated research reports, and, in addition to drawing on our own technical experience, great attention is paid to the principles of the key word system of the *TRANSPORT CD*.

We would be delighted to receive the opinions, comments and suggestions of our readers, so that we may take these into consideration during the preparation of the next edition.

Budapest, March 14<sup>th</sup>, 2003.

The editor



## SELECTED RESEARCH TOPICS

### COMPLETED IN 2002

#### *Division of Automotive Engine and Exhaust Emission Technology*

**Ref. number:** 252-050-1-1

**Title:** Numerical evaluation of the effects of traffic engineering measures on emissions of harmful pollutants and noise caused by motor vehicle traffic.

**Responsible leader:** Dr. Tamás Merétei

**Contributors:** Sándor Hajdú; József Kis; István Czéh; István Antal; János Jaksa.

**Commissioner:** KVM

**Consultant of the Commissioner:** Ms. Zsuzsanna Bibók

**Starting and finishing dates:** 05.12.2002 – 18.12.2002.

**Abstract:** The traffic engineering measure adopted was the reconstruction into a roundabout of a junction situated on a very busy section of the national road network outside built-up areas. This junction is located at the crossing point of main road № 5 and road № 4604 in the agglomeration area of Budapest, between Dunaharaszti and Alsónémedi. Air pollution and noise level caused by road traffic were examined in the neighbourhood of the junction during the period from spring to autumn 2002 under average meteorological conditions. The air pollution caused by vehicle traffic was evaluated on the basis of CO, NO<sub>2</sub>, benzol, toluol and xilol concentrations measured close to the traffic junction. In addition the NO<sub>2</sub> and benzol emissions of the traffic were calculated, according to speeds recorded before and after the reconstruction, with the registered emission factors and by motor vehicle categories.

According to the tests and the results of simulation calculations, both air pollution and noise level have been reduced moderately in the surroundings of the investigated junction as a result of the reconstruction into a roundabout. In addition to the road safety benefits, the construction of the roundabout definitely resulted in positive environmental effect as well.

**Key words:** environmental protection, traffic engineering, noise level, air pollution, emission control, roundabout.

**Ref. number:** 252-063-1-2; 252-049-2-1

**Title:** Strategic environmental impact assessment of the national Danube transport corridor as a part of the European transportation network. Part III.

**Responsible leader:** Dr. Tamás Merétei

**Contributors:** Mrs. Dr. Pálné Bite; Ms. Ágnes Mészáros-Kis; Tibor Bodnár; Dr. Péter Holló; Mihály Békefi; Ms. Emőke Magyar; Dr. Ernő Pál; Dr. Attila Vörös; Gyula Simon; Dr. József Zoller; Dr. Tibor Várkonyi; István Vas.

**Commissioners:** GKM; KVM.

**Consultants of the Commissioners:** Dr. Miklós Szoboszlay; Ms. Zsuzsanna Bibók.

**Starting and finishing dates:** 02.01.2002 – 23.12.2002.

**Abstract:** As a follow-up to the situation analysis presented in Part I, a detailed pre-assessment has been offered on the expected developments of the characteristic indices describing some environmental effects based on the predicted improvement in the different transport sectors. As far as air pollution caused by traffic is concerned, the pre-assessed emission level of pollutants

presenting the local, regional and global effects, the expected value of noise level (inside and outside built-up areas), the probable trend of accident frequency - characteristic for the road safety situation - and an analysis of the possible human health, landscape and nature protection issues have been elaborated.

On the grounds of prognoses on transport-economics and environmental impacts, the external costs related to environmental harm resulting from transport were calculated. Otherwise, these form the basis of the analysis of the health and environmental risks that is to be carried out in the final part of the study. Based on the prognoses, recommendations have been elaborated on sustainable mobility issues.

**Key words:** transport policy, environmental protection, air pollution, emission control, external costs, transport corridor.

**Ref. number:** 252-059-1-2

**Title:** National, regional and local emission inventory of road, rail, air and inland waterway transports in the year 2000.

**Responsible leader:** Dr. Tamás Merétei

**Contributors:** István Antal; Zsolt Antoni; István Czéh; János Jaksa; József Kis; Zoltán Oláh.

**Commissioner:** KVM

**Consultant of the Commissioner:** Ms. Zsuzsanna Bibók

**Starting and finishing dates:** 11.07.2002 – 10.12.2002.

**Abstract:** The emission inventory is to be set up for the moving emission sources of the Hungarian transport sectors, namely of the quantities of the most important pollutants (CO, CH, NO<sub>2</sub>, SO<sub>2</sub>, Pb, particulates, and CO<sub>2</sub>) in the exhaust emissions caused by the engines of the road, railway, air and waterway vehicles. Emissions of air polluting substances have been calculated for the total territory of Hungary, for each county and county-seat, as well as for each 20x20 km land area.

In the case of road transport, the emission inventory calculations used the data on the volume of traffic, the specific emission coefficients, as well as the total length of the road system for each vehicle type. In the case of railway transport, the calculation was based on the traffic of diesel-traction trains, the length of the railway network and the average specific emission of the diesel-engines. In the case of air-transport only Ferihegy Airport was taken into consideration and the emission values to be calculated according to its traffic, the so-called LTO-cycle (landing, rolling in/out, taking off) were used. In this case the basis was the number of take-offs and the average specific emission values of the aeroplanes using the airport. In the sector of waterway transport, the ship traffic on the Danube, the Tisza and Lake Balaton, as well as the length of the waterways that were used for the calculation. Based on fuel consumption and specific emission values of the shipping traffic, the emission was determined for goods and passenger waterway transport, respectively. The table below shows the 2000 emission values in a modal split:

**Emissions caused by transport in Hungary in the year 2000 in modal split and summarised [tons/year]**

Harmful substance emissions by transport sectors	CO	CH	NO <sub>2</sub>	SO <sub>2</sub>	Pb	Particulate	CO <sub>2</sub>
Road transport	433131	59372	100064	1126	0.00	19644	9874973
Railway transport	1125	369.4	5174	323.05	0.00	43.4	23876
Air traffic	167.2	139.1	270.7	24.29	0.00	11.91	76516
Waterway transport	1495.1	1046.6	4348.8	119.6	0.00	324.4	250265
<b>Total</b>	<b>435918</b>	<b>60927</b>	<b>109858</b>	<b>1593</b>	<b>0.00</b>	<b>20024</b>	<b>10440514</b>

In the road transport sector, the CO, CH, SO<sub>2</sub> and Pb emissions in 2000 decreased in comparison with the values calculated for the previous year, while a slight increase could be experienced in the case of NO<sub>2</sub>, CO<sub>2</sub> and particulates. Cessation of Pb emissions is due to the ban on the sale of leaded petrol.

**Key words:** environmental protection, air pollution, emission-registry, emission coefficients, green house effect.

**Ref. number:** 252-062-1-2

**Title:** Investigation of fine and ultra fine particle emissions of diesel engines (development of EU compliant background for the measurement techniques).

**Responsible leader:** Mihály Kardos

**Contributor:** Egyed Serf

**Commissioner:** GKM

**Consultant of the Commissioner:** Dr. Miklós Szoboszlai

**Starting and finishing dates:** 01.01.2002 – 31.12.2002.

**Abstract:** The trend in the 2002 research of the emission of diesel particles, during the ECE cold starting tests, was aimed at the emission of fine particles. Research was also extended to low-temperature ECE tests. The KTI's emission testing system, prepared in 2002 and capable of measuring over a range of temperatures, made it possible to carry out measurements under the above special circumstances. During the tests, the emitted particles produced 2-3 times higher values in comparison with the *Hot Test*. On the basis of the development of the EU-conform instrumentation background, and of the overview of the European circumstances, it may be stated that the measuring principle of fine and ultra-fine particles cannot be unanimously explained yet; the comparison of instruments produces contradictory results. Accordingly, at the moment the standardisation of the measuring principles and the possible application of the instruments can only be expected by 2003 (EU directive PM Diesel Aerosol Testing).

In addition to the petrol or spark-ignition engines operating in European motor vehicle traffic, there are also a considerable number of diesel engines, as is also the case with the Hungarian motor vehicle fleet. This is true of both commercial vehicles and passenger cars, although the proportion is higher in the case of commercial vehicles. In Austria the selling ratio of new passenger cars equipped with diesel engines is 85% (1999-2002). The development of diesel engines has not implied a reduction in harmful emissions. The current regulation of particle emission does not encourage the manufacturers to reduce environmental pollution (the fine and ultra-fine particles are regulated according to the mass of particles [g/m<sup>3</sup>]). It is now known, as a result of recent research on particles, that the impact on health of fine particles is a multiple of the impact of coarse ones (>PM<sub>10</sub>). Complex and harmonised multi-disciplinary scientific research is needed in order to study the interactions between the effect of diesel particles and their quality characteristics. If confined only to the quality test of the diesel particles, their effects on health should also be known. Emission of particles does not only and exclusively depend on the characteristics of the diesel engine; the effect of the fuel used must also be taken into consideration; it is necessary, for example, to distinguish between a test fuel, and a fuel available at the filling station. The relationship between the mass limit [g/km] and the number and volume of particles also affects the rating of the particle emission of diesels. It may happen that modern motor vehicles equipped with diesel engines emitting a high number of fine particles comply with recent regulations, but because of the multiple emission of fine and ultra fine non-deposit particles they have a more harmful impact on the environment than the outdated vehicle types. On the basis of the measurements, it can be stated that under the tested operational circumstances [ECE 83, UDC+EUDC and the  $v=50$  km/h 3<sup>rd</sup> gear] the size of particles > 1µm also fell into the range of fine particles. The relative "density" was smaller in the tested 0.5-1.0 size-interval than in the 0.3-0.5 µm range.

**Key words:** emission control, particles, air pollution, Diesel engines, nano-size particles.

**Ref. number:** 252-056-1-1; 252-152-3-2

**Title:** Tests of international approval carried out in compliance with the UN-ECE regulations.

**Responsible leader:** Iván Pollák

**Contributors:** György Horváth; János Jaksa.

**Commissioners:** INTERUSZ Külker Kft.; RÁBA Motor Kft.

**Starting and finishing dates:** 01.02.2002 – 31.12.2002.

**Abstract:** In accordance with the UN-ECE regulations, a number of air-pollution related exhaust emission tests were carried out in the laboratory of the Division of Automotive Engine and Exhaust Emission Technology of the KTI. In these tests the type approval provisions of the national requirements were applied to the test bench mounted engines. In 2002 two successful international engine approval tests were carried out:

- (a) on the *D-130 T 10* type engine according to the prescriptions of the *UN-ECE Regulations* № 85 (measurement of net power), 24.03 (approval of pollutants) and 96 (pollutants of engines installed in agricultural tractors), and
- (b) on the *RÁBA D-10 TLL-225 E3* type engine. In accordance with the test results, it was stated that the engine meets the requirements of *UN-ECE Regulation* № 49-03, i.e. it satisfies the most severe European parameters (*EURO-3*) currently in force.

**Key words:** environmental protection, engine approval, international co-operation.

**Ref. number:** 252-058-1-2

**Title:** The role and representation of Hungary in the regulatory work carried out in the ECE working groups on the environment of the World Forum for Harmonisation of Vehicle Regulations (WP 29); participation in the elaboration of the UN-ECE regulations.

**Responsible leaders:** Iván Pollák, Sándor Hajdú

**Commissioner:** GKM

**Consultant of the Commissioner:** Péter Barna

**Starting and finishing dates:** 01.01.2002 – 31.12.2005.

**Abstract:**

1. Co-operation in the following meetings held for the co-ordination of the national activities of the WP.29:

92<sup>nd</sup> meeting, February 14<sup>th</sup> 2002

93<sup>rd</sup> meeting, May 21<sup>st</sup> 2002

94<sup>th</sup> meeting, October 29<sup>th</sup> 2002.

These meetings provided information on, and discussed findings related to, the statutory provisions of national and scientific importance, and raised within the framework of the activity of the working group dealing with air pollution and energy problems of motor vehicles.

2. Participation in the following GRPE meetings:

No. 43 held from January 15<sup>th</sup> – 18<sup>th</sup> 2002, and

No. 44 held from June 10<sup>th</sup> – 14<sup>th</sup> 2002,

as well as in the preliminary discussions of the *ad hoc* group on a) the new world cycle (WHDC), b) the regulation concerning particles (PM), c) the new cycle of motor cycles (WMTC), d) on-board diesel diagnostics (OBD), e) Off Cycle emission, on special OBD and Off Cycle working groups meetings in November 2002.

3. For the first time, it was possible for the Hungarian representative to participate as an observer in the MVEG meeting of the EU Committee of Experts involved in the establishment of directives and dealing with air pollution problems.

A report summarises the accounts of the meetings and the working papers important from the aspect of the making of arrangements for the drafting of the national regulations.

4. On the basis of the international meetings held in 2002 it is justified to draft some ideas:

- a) Within the framework of the plenary meetings of the GRPE the text of the new or already existing regulations are mainly elaborated and collated; professional debates laying the foundation of the regulations were transferred to *ad hoc* groups, an increasing number of which are being developed.

- b) The reputation of the regulation-drafting activity of the UN-ECE is increasing, and more and more European countries are adopting and applying the elaborated provisions on emission and other subjects.
- c) Greater emphasis has been placed on the development of global regulations (GTR).
- d) Within the framework of the EU a definite share is unfolding in the work done in relation to the preparation of the directives by MVEG and the UN-ECE GRPE, as well as the above mentioned *ad hoc* working groups.

**Key words:** international regulation, international co-operation, environmental protection, air pollution, emission control.

**Ref. number:** 252-021; 252-048-1-1; 252-060-1-2; 252-061-1-2

**Title:** Participation in the development of the uniform European models of calculation for the determination of the air pollution caused by road transport (*Assessment and Reliability of Transport Emission Models and Inventory Systems – ARTEMIS*).

**Responsible leader:** Iván Pollák

**Contributors:** Dr. Tamás Merétei; Mihály Kardos; Attila Tamási; József Kis; Zoltán Oláh; Tibor Mocsári; Ms. Erzsébet Hóz; György Horváth; János Jaksa.

**Commissioner:** GKM

**Consultant of the Commissioner:** Dr. Miklós Szoboszlai

**Starting and finishing dates:** 01.03.2002 – 15.12.2003.

**Abstract:** The ARTEMIS research theme forms part of the EU 5<sup>th</sup> Framework Programme on Research and Technological Development; its aim is to elaborate in international co-operation the database of the future emission coefficients of vehicles and the right models for emission calculations. Research was planned to last from 2000 to 2003.

In 2002 within the framework of the project supported by the ministry, research was carried out in the following four fields:

- WP-300 “Methodology to determine the system of emission coefficients for passenger cars and light trucks”;
- WP-400 “Development of the model of the emission coefficients of heavy commercial vehicles”;
- WP-500 “Emissions of two-wheeled motor vehicles”;
- WP-1000 “Determination of the relationship between traffic conditions and vehicle emissions”.

The different tasks of the work packages were collated, and the results of the test which had been performed were presented at the international meetings of experts.

1) WP-300

*Task 3122 Evaluation of the emission stability*

The measurements have been implemented and results were sent to the foreign leader of the theme. A Hungarian report has been prepared.

*Task 3124 Testing of fuel properties*

The chemical analysis has been carried out; RENAULT presented the results on the occasion of the March session of ARTEMIS in Finland.

*Task 3126 Effect of the preconditioning of motor vehicles*

An Interim Report has been prepared.

*Task 3141 The test of running cycles*

*Task 3142 Effect of gear-changing strategies on exhaust emissions*

The Hungarian report has been prepared.

*Tasks 3126; 3141; 3142:* The measurements have been completed and the results have been sent to the foreign leader of the theme.

*Task 325 Emission test of light trucks*

- 1) A preliminary report has been prepared on the tests carried out and on some selected results of the tests performed earlier as an external commission.

- 2) Within the framework of theme WP-500, 10 motorcycles have been tested. The subject leader has sent the results in the form requested by TNO.
- 3) Hungarian urban traffic tests have been completed. Processing is being collated with the Swedish subject leader.
- 4) On the basis of the revised contract for the execution of the Regional Conference on Transport and Environment (POJA), a complementary report has been prepared concerning the current Hungarian research works and their results.

Working papers have been prepared for the Hungarian participants of the session and there was a co-operation offered in the preliminary meeting held in Vienna.

- 5) Testing the Will-Start fuel additive in the RÁBA engine.

The additive was tested in a *MAN-D2356 HM6U* type engine mounted on an engine test bench. The test was completed in three steps; firstly operating with normal diesel oil purchased at a filling station, then with the same fuel but mixed with the additive, and finally again, without additive.

In order to stabilise the operation of the engine, each testing phase has been started with a four-hour pre-operation.

The test bench measurements were carried out in accordance with *ECE Regulations № 49 and 24*.

The following conclusions have been drawn:

- There is no definite positive effect (> 5%) concerning the CO, HC and NO<sub>x</sub> emissions. The additive has a decreasing effect on CO and HC and an increasing effect on NO<sub>x</sub>, however its size remains practically on the accuracy limit of the measurement.
- From the point of view of particle emissions, the results of the three measurements showed some improvement, but, as it was justified by the 3<sup>rd</sup> measurement, this was due to the operational purification of the exhaust system of the engine, i.e. the final measurement performed without the additive had better results.

During the measurements, the performance of the engine and its hauling capacity did not change practically, and the impact of the additive was not measurable.

*WP-400 Emission test of commercial vehicle and bus engines*

1. The emission impact analysis of the fuel with low sulphur content has been completed on RÁBA D10 ÚT SLL 190 E2 type engines according to the work-plan, and it has been elaborated and transmitted to the co-ordinator of the theme in an ARTEMIS theme-developed form. Running cycles applied in the test are the 13 point stationary cycles (13), in accordance with UN-ECE Regulations 49-02 and 49-03, and the ESC cycle, as well as the 21 and 12 point cycles developed within the framework of the ARTEMIS theme. Laboratory tests carried out under the same circumstances were completed on the engines with a test diesel oil – received from MOL -, and with a filling station fuel. The above tests were also performed with the RÁBA D10TLL225 type engine. The other measuring results (TUV, TNO, TUGraz), together with the reports processed, were first discussed in December. A common COST 346 and ARTEMIS WP400 session was held in Brussels. Here co-operation was unfolded on the formation of the emission model (systematisation of engine and traffic parameters).
2. Participation in the elaboration of the study: “Low emission vehicles” initiated by the OECD. The task was to compile the chapters mentioned under items 1 and 4.2.

The impact analysis of fuels (ARTEMIS WP500 /two-wheeled vehicles/) is carried out by KTI instead of TNO. After several discussions, the fuel, which is to be commercially available by 2005, was successfully obtained from MOL Rt., and the 5 motorcycles needed for the tests were purchased. The experiments were finished and a report has been prepared.

**Key words:** ARTEMIS, emission control, air pollution, passenger car, goods vehicle, two-wheeled vehicle, emission register, quality of fuel, international co-operation.

## ***Aut-O-Mat, Division of Vehicle Operation and Maintenance***

**Ref. number:** 273-603-1-2/7.2

**Title:** Integration of EU Directives with road safety implications necessary for harmonisation of technical provisions relating to road vehicles.

**Responsible leaders:** József Dabi

**Commissioner:** KöViM

**Consultant of the Commissioner:** András Vid

**Starting and finishing dates:** 29.03.2002 – 28.06.2002.

**Abstract:** As a part of legislative harmonisation carried out within the framework of the preparations made for EU accession, the national technical provisions on road vehicles compliant to EU directives adopted in road transport entered into force. Further development of the EU directives makes necessary the adoption of changes and new directives, as well as their integration into national technical provisions on vehicles.

Within the framework of the study, the directives *2001/3/EC* (on type approval of rubber-tired agricultural and forestry tractors), *2001/43/EC* (on tyres and their installation for motor vehicles and their trailers), *2001/56/EC* (on heating system of motor vehicles and their trailers) and *2001/92/EC* (on safety glazing and glazing materials for motor vehicles and their trailers) were surveyed and revised.

Incorporation into the relevant technical regulations has been prepared.

The directives mentioned above are amendments of the EU directives which were adopted within the framework of the harmonisation of the technical provisions on vehicles, and accordingly they concern the Appendices and Annexes of the *KöHÉM Orders Nos 5/1990.(IV.12.)* and *6/1990.(IV.12.)*

**Key words:** motor vehicle operation, motor vehicle type approval, harmonisation, road safety, EU accession.

**Ref. number:** 273-605-1-2/7.5

**Title:** Ensuring the expertise background for the technical and information tasks related to the development of the official testing technology of tachographs and the central processing of the collected data.

**Responsible leader:** László Faragó

**Commissioner:** KöViM

**Consultant of the Commissioner:** András Vid

**Starting and finishing dates:** 29.03.2002 – 13.12.2002.

**Abstract:** In compliance with the provisions of the European Agreement concerning the work of crews of vehicles engaged in international road transport (AETR), the specified categories of freight and passenger transport vehicles must be equipped with tachograph and its proper operation must be checked within periodic technical inspection of the vehicles. The ways of inspection, the range of necessary operations, the facilities to be used and the circumstances of the inspection were determined in co-operation with the Chief Transport Inspectorate.

The testing technology embraces control of the fitting of tachographs to the vehicles by the measurement of the number of road impulses, visual surveillance, legibility of the graphs on the disc, and the accuracy of timing. The measuring method of the road impulse numbers has been elaborated in order to be executed on low speed testing bench (e.g. roller brake testing bench), too. In order to eliminate the measurement accuracy deteriorating factors, the testing requirement is based on the determination of the impulses counted on a longer than 20 m road

section resulting from complete wheel turn-arounds; the travelled distance is equalled to the product of the tyre's rolling circumference recorded at the time of the tachograph's fitting and of the number of the turn-arounds.

Possibilities of central storing and reading of the data recorded at the Chief Transport Inspectorate were presented as information tasks. WAP-based database has been prepared and an experimental WAP server was set into operation. Client and server test programmes have been prepared and installed. The testing of the mobile network designed for WAP started and the results of the test were satisfactory.

**Key words:** tachograph, periodic technical inspection of vehicles, road safety.

**Ref. number:** 273-606-1-2/7.7

**Title:** Establishment of the database for different technical defect types detected in official vehicle tests and its utilisation in the training of commissioned examiners.

**Responsible leader:** Imre Dobos

**Commissioner:** KöViM

**Consultant of the Commissioner:** András Vid

**Starting and finishing dates:** 01.04.2002 – 13.12.2002.

**Abstract:** A collection of defects has been based on the code system of defects introduced by the Chief Transport Inspectorate. Besides the codes of defects, the key system of the database has also been established according to the type denomination of the motor vehicles. The type characteristic defects were collected at five county Transport Inspectorates' inspection stations. In order to ensure uniformity, a data-collection software has been elaborated. A photo was taken on each defect, and a detailed description was required to be attached to the photos. The county Transport Inspectorates' experts collaborated in data collection and supervision.

A programme has been prepared for the management of the collected database. The programme makes also possible to detect the characteristic vehicle defects by vehicle types and according to the code of defects. The programme stored on CD-ROM has been transmitted to the Chief Transport Inspectorate and the county Transport Inspectorates in order to be utilised for the training of commissioned examiners. As long as a great interest has been shown for the topic, the project will be continued in the years to come.

**Key words:** periodic technical inspection of vehicles, computer program, professional training.

**Ref. number:** 273-607-1-2/7.10

**Title:** Laying the foundation of the development of a national periodic technical inspection system for buses and heavy freight vehicles in collaboration with the Chief Transport Inspectorate; elaboration of technical terms and revision technology.

**Responsible leader:** László Faragó

**Commissioner:** KöViM

**Consultant of the Commissioner:** Péter Barna

**Starting and finishing dates:** 29.03.2002 – 13.12.2002.

**Abstract:** Presently, the periodic technical inspection of heavy freight vehicles and buses does not cover all road safety related systems or units. From these, the pneumatic brake system is the most important, its regulation compliant operation being checked only in the case of passenger transport vehicles engaged in international transport. Other special items, e.g. higher permissible speed (TEMPO 100), higher permissible axle weight, etc., also raise the need for further inspections (shock absorber, wheel alignment).

The task was to explore the ways of these checking operations, to prepare the measuring technologies and to determine the necessary requirements relating to the measuring instruments. The operational time needed for the elaborated technologies is too long and it upsets completely the scheduling of the periodic inspection. In its avoidance, the implementation and certification to be carried out in authorised vehicle maintenance plants seemed to be one of the applicable possibilities.

Inspection of the pneumatic brake system cannot be shortened in the necessary extent even by the improvement of the measuring technology and instruments, therefore implementation at the testing stations cannot be executed in the future either, nevertheless, there is theoretical solution for the short operational time of the wheel alignment and the shock absorber.

**Key words:** heavy freight vehicles, bus, periodic technical inspection, pneumatic brake system, road safety.

**Ref. number:** 273-609-1-2/7.12

**Title:** Legislative replacement of the national standard MSZ 07-4402 dealing with the approval of, and the requirements on spare parts and accessories of outstanding road safety importance.

**Responsible leader:** Dr. Tibor Gál

**Commissioner:** KöViM

**Consultant of the Commissioner:** Károly Pongrácz

**Starting and finishing dates:** 29.03.2002 – 13.12.2002.

**Abstract:** The relationship between the decrees and standards should be approximated more emphatically, this being required according to the KöHÉM decrees № 5/1990(IV.12.), 6/1990(IV.12.) and the statutory EU harmonisation referred to the standards. To this end, with the analysis of the above mentioned KöHÉM decrees and the provisions of the *Law XXVIII/1995* relating to national standardisation, a preliminary study has been prepared. In this, the adaptation place and form of the standard *MSZ 07-4402* is discussed. After laying down the principles, modification of the decree has been proposed and the relevant annexes elaborated. This annexe – enlisting the inspection-bound spare parts, accessories and the relevant requirements – has been updated. The *TÜV Hannover-KTI Kft.*'s experts were drawn into the work.

**Key words:** inspection of spare parts, provision on EU harmonisation, road safety.

**Ref. number:** 273-611-1-2/7.16

**Title:** Tasks of research and development relating to the 2002 programme of road safety activities.

**Responsible leader:** Imre Dobos

**Contributors:** József Dabi; Dr. Tibor Gál; Lajos Szlobodnyik.

**Commissioner:** KöViM

**Consultant of the Commissioner:** Károly Pongrácz

**Starting and finishing dates:** 01.04.2002. – 13.12.2002.

**Abstract:** Within the framework of the topic the following actions have been taken:

Draft environmental and health impact analysis of the Ministry of Health has been studied and commented.

Draft amendment to the Ministry of Economy's decree *9/2001.(IV.5.)GM* on the safety requirements of the pressure limiting devices and systems and on the certification of conformity has been studied and a note prepared with comments.

On the basis of applicable information the labour safety situation at the Department for Road Transport has been revised and comments were drafted.

Preliminary study and preparation of a draft standard on the requirements, manufacturing, repair, operation and inspection of armoured cars have been compiled.

The draft on the revised examination requirements for getting certificate as skilled polisher-painter has been studied and commented in written form.

A report has been compiled on the identification symbols of road vehicles.

On the basis of geometric characteristics a computer program has been prepared on the manoeuvrability of buses.

**Key words:** regulation, labour safety, vehicle identification, chassis number, manoeuvrability, computer program.

**Ref. number:** 273-612-1-2/7.18

**Title:** Special safety control applied in the periodic technical inspection of the buses engaged in international passenger transport with higher permissible speed.

**Responsible leader:** József Dabi

**Commissioner:** KöViM

**Consultant of the Commissioner:** Péter Barna

**Starting and finishing dates:** 29.03.2002 – 13.12.2002.

**Abstract:** Buses travelling with higher permissible speed on motorways (100 km/h) and engaged in international passenger transport, beyond meeting general road safety requirements are obliged to satisfy additional norms in conformity with decrees, and furthermore, due to their operation, some structural parts are utilised in an increased extent. Therefore, the level of periodic inspection should also be elevated. This implies an outstanding and detailed control of certain vehicle parts (steering gear, running gear, braking system, anti-block braking system, retarding brake, safety belt, interior fittings, etc.)

On the basis of the above, inspection technology with special safety control has been elaborated, specifying the following: aspects of inspection, provisions relating to higher permissible speed, testing methods, possible defects. In addition, information has been provided in the Annex on different markings applied to some equipment, their interpretation, approval marks and control data.

**Key words:** periodic technical inspection of motor vehicles, bus transport, international road passenger transport, motor vehicle test, road safety.

**Ref. number:** 273-633-1-2

**Title:** Development of an information base to be established by the Department for Road Transport, necessary for solving the tasks of emergency (disaster) situations.

**Responsible leader:** Dr. Tibor Gál

**Commissioner:** GKM

**Consultant of the Commissioner:** Károly Pongrácz

**Starting and finishing dates:** 01.06.2002 – 05.12.2002.

**Abstract:** Statutory provisions relevant to road transport tasks were collected; concrete places subject to regulation indicated; the existing databases of the country relevant to passenger and freight transport and motor vehicle maintenance were explored and examined from the aspect of expedient serviceability. Proposals were made for harmonisation.

Following the necessary checking, the databases needed for the establishment of the information base were selected and where necessary a modification was suggested.

Proposal has been prepared on requirements relating to searching programmes ensuring expedient management of the databases. Collations to be made with the involvement of supreme authorities relevant to concrete execution have been prepared.

**Key words:** emergency situation, demand of road transport, database.

## *Documentation and Information Centre*

**Ref. number:** 306-027-2-1

**Title:** Editing and publishing of the quarterly Hungarian language professional journal entitled „*Útügyi Szakirodalmi Tájékoztató*” [= Reference Journal of Road Related Topics].

**Responsible leaders:** Dr. Pál Boros; Dr. Mihály Füredi; Tibor Jakab.

**Contributors:** Dr. Jenő Bodolay; Dr. habil. László Gáspár; Dr. Péter Holló; Tibor Jakab; Mrs. Jenőné Katona; Tamás Radóczy; Dr. László Reznák; Dr. Dezső Rósa; Dr. Ervin Szentés; Tibor Tóth; Dr. Boldizsár Vásárhelyi.

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Ms. Margit Schulz

**Starting and finishing dates:** 01.01.2002 – 31.12.2002.

**Abstract:** During the past year the quarterly Hungarian language professional journal *Útügyi Szakirodalmi Tájékoztató* was published 4 times, with a total of 801 annotated items on 400 published pages in A/4 format. The inner structure of the journal has remained unchanged for many years, and consists of three main parts: (1) annotations, (2) abstracts, and (3) some samples from the *ITRD* and *TRIS* databases of *TRANSPORT CD* on a selected central topic. As a result, professional readers can receive new information in their mother tongue quarterly on the latest results published in selected foreign language newspapers and journals, professional literature and databases. Key words, which cover all three chapters, assist the readers in using this journal.

**Key words:** publishing, information dissemination, information technology, *ITRD*, *TRIS*, *TRANSPORT CD*.

**Ref. number:** 306-034-2-9

**Title:** A selected bibliography of the Hungarian professional literature on bridges, viaducts and tunnels from the beginnings until 30<sup>th</sup> June 2002.

**Responsible leaders:** Dr. Pál Boros; Dr. Mihály Füredi

**Contributors:** Ms. Lilian Bogdán; Mrs. Lászlóné Igari; Ms. Erika Simon; Ms. Jelena Teleki.

**Commissioners:** UKIG – ÁKMI Kht.

**Consultant of the Commissioner:** Dr. Ernő Tóth, UKIG

**Starting and finishing dates:** 01.01.2001 – 30.11.2002.

**Abstract:** This thematic bibliography contains Hungarian articles, books, standards, dissertations and small publications on bridges, viaducts and tunnels published from the beginnings until 30<sup>th</sup> June 2002.

Preparatory works had been carried out as a *MicroISIS* database.

The final product was published on paper. At the end of the thematic bibliography there is a name index, a very detailed and professionally elaborated key-word index, a list of the periodicals and journals processed, and a list of abbreviations used. This bibliography occupies 280 pages in A/4 format, and was published in 100 copies. The electronic, database version of the whole thematic bibliography can be used at the KTI Library, and, with its well-known user friendly *MicroISIS* tools, can satisfy all professional needs.

**Key words:** publishing, information dissemination, bibliography, bridge, tunnel, viaduct, culverts, database, database handling, *MicroISIS* software.

## ***Environmental Protection and Acoustics Division***

**Ref. number:** 250-054-1-1

**Title:** Air pollution and noise protection analysis of road sections within settlements where traffic is slowed.

**Responsible leaders:** Sándor Hajdú; Dr. Tamás Merétei

**Commissioner:** ÁKMI Kht

**Consultant of the Commissioner:** József Zsidákovits

**Starting and finishing dates:** 31.08.2001 – 15.11.2002.

**Annotation:** The basic principle of slowing traffic is that a changed environment, which forces a reduced travel speed, maintains the driver's carefulness and increased awareness in such a way that the driver acknowledges this restriction and considers it to be a reasonable measure to protect the community.

During the elaboration, we disclosed the more important relations between traffic on prospective and existing traffic-slowng roads, and their effects on air and noise pollution (Part Report 1).

A further task was to evaluate the environment-polluting effects of vehicles (air pollution and noise), i.e. to compare environmental pollution before and after completion of a bending-lane to slow traffic that was to be completed during the elaboration. Part Report 2 describes the recording of the “before” state and the creation of the method of estimation.

At the end of the elaboration, we completed the “after” measurements and assessed the method of estimation. With this method of estimation, environmental evaluation of individual traffic-slowng plans can be prepared, and plans may be classified upon that basis.

**Keywords:** traffic calming, noise impact, air pollution, air quality, environmental pollution estimation, environmental protection.

**Ref. number:** 250-007-2-2

**Title:** Noise and vibration measurements following the reduction of noise and vibration of the *Déli Összekötő Railway Bridge* (Budapest).

**Responsible leader:** Mrs. Dr. Pálné Bite

**Contributors:** Dr. Fülöp Augusztinovicz; István Dombi; Ferenc Márki; Attila Nagy.

**Commissioner:** MÁV Rt. Investment Processing Management Board on behalf of MÁV Rt. Special Management for Track, Bridge and Superstructure Building.

**Consultant of the Commissioner:** Ms. Ildikó Moldoványi.

**Starting and finishing dates:** 27.03.2002 – 15.05.2002.

**Abstract:** Demand for noise reduction of railway bridges that cross cities has significantly increased in the last few years. The development of settlements, and structural changes and modernisation of cities require focusing on questions that had been omitted so far, for example noise and vibration reduction of railways and bridges that cross cities. This is especially important, since the noise load at bridge --crossings significantly (by 10-15 dB) exceeds that at running on an embankment.

The following measurements were taken following restoration works on the *Déli Összekötő Railway Bridge* to determine the level of noise reduction achieved:

- Vibration measurement at the previous measurement points of riverside bridge: geo-plate, base-plate, main girder belt-plate, web-plate, walking plate
- Noise level measurement on the bridge – 1,5 metres above walking plates, directly under the bridge, projecting the track centreline at an angle of 45 degrees to the ground, and at a

- distance of 19 and 84 metres from the bridge
- Simultaneously with the above measurements: velocity measurement in the sectional point of the measurement points
  - Noise level measurement on the balcony of the National Theatre, and on the “HÉV” footbridge

Considering close and remote measurements, it can be seen that achieved noise reduction is 8.2 dB, expressed in single-value noise pressure level A, (i.e. a noise energy reduction of 85%), which is excellent, even when compared with international standards. It should be noted that the noise reduction achieved is as high as 12 dB at certain frequencies.

At the *Wasserpark Bridge* in Vienna, the result of a similar noise reduction (i.e. which included vibration reduction and restoration) was 6 dB. According to *German Railway Company* measurements, installation of a pliable ballast at a new railway bridge at Koblenz reduced air sound by 4 dB.

**Keywords:** railway bridge, noise and vibration reduction.

**Ref. number:** 250-012-1-2

**Title:** Elaboration of domestic tasks arising from *EC Guidelines № 2001/6660-C5-0245/2001-2000/0194 COD*. Part II.

**Responsible leader:** Mrs. Dr. Pálné Bite

**Commissioner:** GKM Environmental Department

**Consultant of the Commissioner:** Dr. Miklós Szoboszlay

**Starting and finishing dates:** 01.05.2002 – 30.11.2002.

**Abstract:** We introduced and analysed in detail European Parliament and Council's Guideline 49/2002/EC of 25 June 2002 on assessment and handling of environmental noise.

The guideline on assessment and handling of environmental noise prescribes features  $L_{den}$  and  $L_{night}$  uniformly for all outdoor noise sources (road, railway, aircraft, industrial, etc.). We concluded that the difference between the foregoing day- and night-time equivalent noise loads must be in connection with the  $L_{den}$  value. With our formula,  $L_{den}$  can be accurately estimated from the foregoing noise features. This result of the elaboration also caused great interest at a German conference dealing with EU noise protection requirements, and we were asked to publish information in a German technical journal. We created a noise emission database in accordance with the EC-Directive; i.e. we determined the areas where noise maps are required. Methodological problems of EU-compliant noise map making were dealt with, and technical and economic requirements of preparing a noise protection action plan were analysed. Both KTI and the Ministry must prepare well for this task, in both IT and professional, as well as in human respects.

ÁKMI Kht traffic-count publications must be completed, indicating EU-required traffic. There are no insufficient traffic data on municipal roads for the creation of conurbation maps. New limits that match new periodic breakdown must be elaborated.

Access to population data necessary for the determination of involvement should be provided, e.g. from census results. The technical and professional basis for noise map making should be created at the Environmental Protection and Acoustics Division of KTI. This involves both acquiring suitable IT equipment and training specialised personnel.

**Keywords:** noise map, noise reduction, EU noise policy.

**Ref. number:** 250-013-1-2

**Title:** Elaboration of a technical guideline to pre-estimate noise load arising from stationary traffic establishments.

**Responsible leader:** Sándor Hajdú

**Commissioner:** GKM Environmental Department

**Consultant of the Commissioner:** Dr. Miklós Szoboszlay

**Starting and finishing dates:** 01.05.2002 – 30.11.2002..

**Abstract:** Regarding inflated-tyre traffic, it is a good estimation to consider noise sources (i.e. inflated-tyre road vehicles) as punctiform objects. In this case, passing vehicles as noise sources can be modelled as series of incoherent monopolar sources (in respect of traffic-technology, vehicles cannot, of course, be considered as punctiform). ÚT-2-1.302 Road Guideline calculation method also uses this approach. In most cases, however, stationary traffic establishments are not linear establishments. Therefore, we elaborated the theoretical background of this calculation method for such a more general case, which describes noise source motion by the likelihood of the object's presence at a given place, and motion takes place in a two-dimensional area. The disadvantage of this extended method is that it is much more complex than the Guideline's noise model, so practically-speaking it is insufficient for the amendment of the Guideline. It does, however, form an excellent basis for individual, detailed studies, and it can also be used to evolve the noise model that is in accordance with the Guideline by means of sufficient simplification conditions.

Another important difference between linear and stationary traffic establishments is the difference of vehicle speeds, which substantially determine noise emission. Road speeds exceed speed in parking spaces or similar establishments by 7-10 times, while city speeds by 2-4 times. This, concerning noise load levels arising from stationary establishments, means that rolling noise is negligible, and engine noise is low for cars with high power excess, and medium for utility trucks (equipped with many-speed gearboxes) with low power excess.

Based on the results of measurements performed during elaboration, a noise model compliant with the Guideline was created, normative data of motion frequency indicated, and a recommendation to complete the Guideline to pre-estimate noise effects of inner-city parking spaces which emit significant noise load assembled.

**Keywords:** noise load, stationary traffic, noise barrier.

**Ref. number:** 250-014-2-2

**Title:** Comparative study of noise and vibration emission from modern tramways.

**Responsible leader:** Sándor Hajdú

**Contributor:** István Dombi

**Commissioner:** Environmental and Water Ministry

**Consultant of the Commissioner:** Mihály Berndt

**Starting and finishing dates:** 31.05.2002 – 10.12.2002.

**Abstract:** Considering the benefits of public transport by tramlines, extensive line restoration works are in progress in Budapest. During the past year, a new type of car – the so-called “*Hannover (TW6000) car*” – has also appeared. Noise and vibration which place a burden on the environment are determined by tramways and cars together. Tramways can be ranked on the basis of noise and vibration effects. We performed studies to assess the situation in Budapest to form a basis for the ranking.:

Based on the results of noise measurement studies, the following conclusions were drawn: Noise power arising from tramway traffic and placing a burden on the environment is determined by the technical condition and construction of cars, together with the construction and condition of the superstructure. Those superstructures where body sound (i.e. structural vibration) is transmitted to the substructure from the excited rail with a poor efficiency are quieter. Those superstructure systems where these impedance steps spoil even emission efficiency of the base-plate are even better. The best structures are those without base-plate, or which provide full vibration insulation. In addition to the construction of the superstructure, the structure of the current Budapest cars also makes them contribute seriously to environmental noise load as individual noise sources.

Based on vibration studies, it can be stated that no outstandingly advantageous or disadvantageous combination of tramways and cars have been found. Among the tasks for the planning of tram-traffic, careful noise and vibration protection is important, as when the

transmission chain is disadvantageous, extreme vibration load, and thus structural noise load may occur.

**Keywords:** noise load, vibration load, environmental protection, fixed-line traffic.

**Ref. number:** 250-016-2-2

**Title:** Noise study following the replacement of dilatation construction of structures at Road M0, kilometre-section 13+406.

**Responsible leader:** Mrs. Dr. Pálné Bite

**Contributors:** Fülöp Augusztinovicz Dr; István Dombi.

**Commissioner:** Állami Autópálya Kezelő Rt.

**Consultant of the Commissioner:** Zoltán Bakonyi

**Starting and finishing dates:** 12.08.2002 – 20.10.2002.

**Abstract:** Based on the results of the measurement– and our personal experiences during the measurement – the following conclusion can be drawn: noise level increasing effects of rebuilt dilatation are slight. The greatest difference, 1.5 dBA, occurs with passenger cars. Tyre noise is not yet prevalent with typical large trucks in Hungary, therefore the increase in noise level in this category arises mainly from impacts on load, and largely depends on truck and load type: it is between 0.5-1.0 dBA. With utility trucks, the effects of the increase in noise level following dilatation are virtually negligible.

It can generally be said that the the long-term effect of dilatation on the A-level of noise is negligible.

The studies performed form a basis for the monitoring of the “deterioration” of dilatation. Measurements were performed in such a system, as also forms a basis for subsequent measurements.

It should be noted that the following noise protection measures are recommended in case further claims arise near Street I.

- sound absorbing cover around dilatation under the bridge;
- “*sound absorbing plasterwork*” on piers to reduce reflection of noise from railway.

**Keywords:** dilatation, noise reduction, structure.

**Ref. number:** 250-021-2-2

**Title:** Adopting EU Environmental Noise Guidelines – Determining Harmonisation Limits. Part III.

**Responsible leader:** Mrs. Dr. Pálné Bite

**Commissioner:** GKM Environmental Department

**Consultant of the Commissioner:** Dr. Miklós Szoboszlay

**Starting and finishing dates:** 01.09.2002 – 11.11.2002.

**Abstract:** Comparing the two noise mapping software packages that are available in Hungary, we found that IMMI is, from the handling point of view, much simpler and more straightforward. It is more recommended to those with less computer knowledge. SP aims at more experienced users with more computer knowledge. When creating involvement maps, the problem is obtaining population data and integrating these data into the calculation method. We recommend use of the feature elaborated by KTI, until the EU prescribes a different method. In the future, its integration into calculation software and its EU-approval should be achieved. Database on railway noise emission has been extended. From the analysis performed, it can be seen that formula to calculate  $L_{den}$  may also be used for railway noise.

The studies which have been performed allow the determination of the tasks to be carried out next year. To fulfil the obligation to supply information to the EU, however, KTI's Environmental Protection and Acoustics Division should undergo significant development in both the economic and human respect. Neither the Hungarian professional circles nor KTI are prepared for noise mapping in accordance with EU requirements. KTI is prepared only in professional respect to make a noise map according to EU requirements. However, noise-

mapping hardware is not yet available.

**Keywords:** noise map, noise reduction, EU noise policy.

**Ref. number:** 250-005-2-2

**Title:** Determination of a noise protection area around *Zalaegerszeg Airport*, and preparation of an environmental impact assessment.

**Responsible leaders:** Sándor Hajdú; Ms. Ágnes Mészáros-Kis.

**Commissioner:** Airport Consulting Mérnök Tanácsadó Kft.

**Consultant of the Commissioner:** László Fördős

**Starting and finishing dates:** 04.03.2002 – 15.07.2002.

**Abstract:** Determination of a noise protection area and preparation of an environmental impact assessment was completed for the *Zalaegerszeg Airport*.

Based on investigations, it has been found that the noise load originating from air traffic does not exceed the limit values in the surrounding protected area.

The researchers proved, based on the environmental impact assessment of the airport, that the direct and indirect adverse effects of the development on the environment were not significant.

**Key words:** airport noise, noise level, noise protection area, nuisance, aeroplane, airport, environmental impact assessment.

**Ref. number:** 250-011-1-1

**Title:** Investigation of the necessity of environmental protection measures alongside the motorway and main road networks. (Part 2)

**Responsible leader:** Ms. Ágnes Mészáros-Kis

**Commissioner:** GKM

**Consultant of the Commissioner:** Dr. Miklós Szoboszlai

**Starting and finishing dates:** 01.05.2002 – 30.11.2002.

**Abstract:** Comprehensive investigations of the adverse effects on the environment of heavy traffic on motorways and main roads were carried out.

The main points of the project were the analysis of water-pollution originating from run-off water from the highways, and the collection of the data on the disturbance of flora and fauna.

Concerning the run-off water pollution, international experience and the opinion of the Environmental Protection Inspectorates are different, but it has been found that the two main pollutants are organic extract (TPH) from leaking fuel and oil and chloride due to different de-icing materials during winter maintenance.

The task of the planned nature protection database is to collect the data from different institutes and companies and to try to uniform and co-ordinate them, which can serve the more effective usage of the relevant information. The requirements of the process and function of the database were determined, and recommendations were taken for further research to collect further relevant data about the flora and fauna affected.

**Key words:** environmental protection, water pollution, main road network, database, nature protection.

**Ref. number:** 250-055-1-1

**Title:** Investigation of the environmental impacts of road constructions needed by environmental impact assessments.

**Responsible leader:** Ms. Ágnes Mészáros-Kis

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Ms. Ildikó Varga

**Starting and finishing dates:** 01.09.2001 – 10.12.2002.

**Abstract:** In the project the legal background, the prescriptions of environmental impact assessments concerning the construction and the potential adverse effects of certain – most polluting phase – of road construction work were investigated.

Investigation and measurements were carried out on the pollution of air, soil and vegetation in connection with the construction. Noise emissions of different machines used during construction and the noise loading of the building area were determined. On the spot vibration measures and determination of the adverse effects of vibration were carried out.

The effects of air pollutants (nitrogen-oxides, solid particles, suspended matters) of the construction and material-transport were determined on the direct and indirect area.

The project was finished with environmental proposals and methodological guide for some chapter.

**Key words:** environmental protection, air pollution, noise load, vibration, road construction.

## ***Bureau for R+D Organisation***

**Ref. number:** 110-077-1-9

**Title:** Hungarian obligations in financing the international research project *ALSO DANUBE* (Advanced Logistic Solutions for the Danube Waterway) within the *EU 5<sup>th</sup> Framework Programme*.

**Responsible leader:** Dr. Ernő Pál

**Commissioner:** GKM

**Consultant of the Commissioner:** Tamás Marton

**Consultant of the Ministry:** István Valkár

**Starting and finishing dates:** 08.12.1999 – 30.06.2003.

**Abstract:** The international research project is part of the EU 5<sup>th</sup> Framework Programme. The project deals with a study of the possible share of the Danubian waterway and port services from the traffic and development of the transport corridor VII.

The main objectives of the project are as follows:

- The formation of a planned European concept and system for the organisation, operation and control of the intermodal transport chains, with special regard to inland navigation.
- The development of the management and control system of integrated logistics, related to inland navigation and the integration of the advanced telematics means and applications.
- The elaboration of a waterway transport operation programme and demonstration of the ideas within the framework of different scenarios.
- The elaboration of recommendations in the form of guidelines on further applications and implementations for the logistical service providers, the users of these services and the national authorities.
- The improvement of transportation quality by creating improved logistic services.
- Proposals to exploit the strategic potentials of the waterways, with special regard to medium and long distance transportation.

The research has to be carried out in international co-operation up to 2002 and to date, tasks dealing with the elaboration of the methodology, the growth of the Hungarian economy, the survey of the transport market and that of the environmental problems have been completed.

**Key words:** EU 5<sup>th</sup> Framework Programme, ALSO-DANUBE, inland navigation, international co-operation, Danube, transport corridor.

**Ref. number:** 110-041-1-2

**Title:** The possibilities of the utilisation of environmentally friendly electric vehicles and their conditions in a special environment.

**Responsible leader:** Dr. Ernő Pál

**Commissioner:** GKM

**Consultant of the Commissioner:** Dr. Miklós Szoboszlay

**Starting and finishing dates:** 01.05.2002 – 05.12.2002.

**Abstract:** It can be stated that the development of electric vehicle propulsion has been very intensive during the last ten years, but that no unanimously leading technology has been developed. The dominant direction of the development has not been clarified either. The alternative possibilities were investigated during the research works at the level of 0-series experimental vehicles or vehicle fleets. The direction of the development of the electric vehicles can be evaluated at present as a moving target.

Between 1993 and 2000 the studies elaborated under the names UTOPIA and ZEUS in the international co-operation of the EU contain the following statements concerning the technologies of electric vehicle propulsion made on the basis of the operational experiences of several thousand vehicles.

- The plans of manufacturing electric automobiles can be found in the developing program of almost every leading automobile factory
- Battery-driven vehicles can be considered as the traditional starting basis in this respect, which will be followed by the generation of electric vehicles supplied with fuel-cells and by another generation of vehicles with partially or completely hybrid propulsion.
- In the near future - by 2008 or 2010 - the maturing of fuel-cell technologies and hydrogen storage can be expected, as can the appearance of the so-called hybrid automobiles and the generation of energy storing "pulse-power" batteries.

Parallel to the developments of electric automobiles, the elaboration and introduction of the standards related to the safety and infrastructure are also under way in the leading automobile manufacturing countries.

Unfortunately, the production of the target-vehicles to be used in special environments (serial production of the electric automobiles *HÓDGÉP, PULI 2E*) has been reduced, in spite of the former pioneering role, and the development of the infrastructure required for their charging was not commenced.

**Key words:** electric vehicles, environmental protection.

**Ref. number:** 110-022-1-1

**Title:** A review of the development plan for the national public ports (OKK) fitted to the new OKK concept.

**Responsible leader:** Dr. Ernő Pál

**Commissioner:** GKM

**Consultant of the Commissioner:** György Kovács

**Starting and finishing dates:** 25.05.2001 – 10.12.2002.

**Abstract:** Based on the development plan for the national public ports elaborated 10 years ago, it can be stated that in addition to the ranking of the *MAHART Csepel Free Port* into the national public ports there is no need at present for an essential change of the previous concept. On the basis of the new freight traffic forecast of the port, and also taking into consideration the new transport policy, the development of the external and internal infrastructure of *Győr-Gönyű, Csepel Free Port* and *Baja* shall be supported first of all through financial means by the state. The study contains, among others, details of the concepts for the development of the infrastructure.

**Key words** inland navigation, inland water ports, development of ports.

**Ref. number:** 110-043-1-2

**Title:** The efficient use of the infrastructure using transport systems and the enforcement of the standpoints of environmental protection.

**Responsible leader:** Dr. Imre Büki

**Commissioner:** MÁV INFORMATIKA Kft.

**Consultant of the Commissioner:** László Ruzics

**Starting and finishing dates:** 01.05.2002 – 05.12.2002.

**Abstract:** The unequal development of the individual transport sectors, the pollution of the environment and the losses caused by accidents are among the problems to be found in the EU. The Hungarian transport policy was approved in 1996 and a study and draft proposals were prepared for its modernisation.

The alleviation of the European transport problems can be served by the utilisation of the intelligent transport systems (ITS), which assures the better exploitation of the infrastructure. The areas enjoying priority in the field of the use of the ITS are as follows:

- Traffic management and regulation
- Traveller information services
- Freight and fleet management
- Handling of accidents and emergency situations
- Electronic fare collection
- Checking the infrastructure
- Traffic centres

The solution of the tasks is to be found in the TEMPO (Trans-European Intelligent Transport Systems Projects) valid between 2001 and 2006.

Taking the activity made so far and the European ideas into consideration, a proposal was elaborated for the introduction of ITS services to be used in the fields of domestic railway, road transport, inland navigation and air transport.

**Key words:** transport infrastructure, ITS, intelligent transport systems, transport policy.

**Ref. number:** 110-044-1-2

**Title:** Forecast of the expected extent of the energy demand of transport.

**Responsible leader:** Dr. Imre Büki

**Commissioner:** GKM

**Consultant of the Commissioner:** Dr. Miklós Szoboszlay

**Starting and finishing dates:** 01.06.2002 – 05.12.2002.

**Abstract:** The project is divided into three parts:

1. European documents
2. Materials related to the development of transport
3. Transporting performances, transport work; specific energy consumption and energy consumption

In the first part, the documents influencing domestic transport can be found, such as e. g. the "White Paper" presenting the common transport policy, the "Green Paper" dealing with the safe energy supply of Europe, as well as the presentation of the methods of "Mobility management" supporting sustainable development.

The second part presents the development of the concepts related to the development of Hungarian transportation, the Hungarian transport policy already valid and the initiatives for its modernisation, development or the Hungarian contribution to the European program and the ideas of the CEMT concerning the development of European transportation.

The third part presents the expected energy demand of transportation until 2015 on the basis of the ideas related to the expected specific energy consumption and sectoral transport performances using the latest statistical data available.

**Key words:** transport performance, specific energy consumption.

**Ref. number:** 110-045-2-2

**Title:** Performance indicators on public roads (OECD brochure).

**Responsible leader:** Mrs. Gyuláné Flórián

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Ms. Margit Schultz

**Starting and finishing dates:** 15.07.2002 – 30.11.2002.

**Abstract:** The present publication was elaborated using the translation of the study prepared by the working committee of the OECD and with its reworking for domestic conditions.

The OECD study deals with the issues to be considered on admission into the EU, which are as follows:

- the future image of the road transport system,
- the future image of the road administration,
- performance indicators, choice, utilisation, case studies,

- practical use (risk of road users, source annotation, quality assurance, road property value, state of the roads and bridges).

**Key words:** transport performance, quality assurance.

**Ref. number:** 110-046-2-2

**Title:** Property management of roads (road transport booklets).

**Responsible leader:** Mrs. Gyuláné Flórián

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** József Tímár

**Starting and finishing dates:** 15.07.2002 – 30.11.2002.

**Abstract:** The working group of the OECD dealing with the Road Transport Intermodal Connections (RTR) has given a commission for the establishment of a property Management Working group. The group has dealt with the following tasks during its three-year research operation:

- the development of the general definition of the property management system and the determination of the components concerned,
- the situation of the practice and of the realisation of the programs for the property management in the OECD countries, including the determination and measurement of the advantages arising from the property management systems,
- the review of the data and analysing requirements with the booking principles and capitalisation methods utilised successfully in the property management system,
- investigation of the indicators, with the aid of which the performance of the road transport system can be measured,
- strategies promoting the realisation of the property management system, professional knowledge from the side of the personnel, the new way of thinking at a very high level of the leadership, the invitation to participation of the publicity, realisation of new goals,

The representatives of the following countries participated in the Working group for the Property Management: Belgium, Canada, Czech Republic, Finland, France, Great Britain, Hungary, Italy, Japan, Mexico, Netherlands, Poland, Sweden, Switzerland, USA.

The translation of the OECD material into Hungarian and its revision for the domestic experts will be published as a road management publication.

**Key words:** asset management, economic management system.

**Ref. number:** 110-101-3-2

**Title:** Development thematic of the TERN.

**Responsible leader:** Mrs. Gyuláné Flórián

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Tamás Nagy

**Starting and finishing dates:** 09.04.2002 – 30.09.2002.

**Abstract:** According to the WERD (*Association of Road Directors in Western Europe*) the international road management system plays an important role in the development of European traffic forecasting methods.

The material has developed its standpoint on the basis of three condition-systems, which are as follows:

- every factor exerting an impact has a role in the world, but this does not form part of the traffic and transport systems
- the existing system of transport and the future transport system based on the future political development
- theoretically it is an independent element of the TERN scenario, since in the description of the future tasks this means a separate element.

The study gives proposals for macro management, for international traffic, for the planning model, the whole European traffic, as well as for the traffic safety measures, environmental protection and the regulation of road traffic noise.

**Key words:** value/profit analysis, transport noise, macro economic management.

**Ref. number:** 110-037-2-1

**Title:** Preparation of the investment for the realisation of the satellite freight following system at the *Hungarian State Railway (MÁV)*.

**Responsible leader:** László Valter

**Commissioner:** AGROCOMBI Haulage Ltd.

**Consultants of the Commissioner:** Attila Csaba, GKM; Lajos Németh, AGROKOMBI.

**Starting and finishing dates:** 13.12.2001 – 28.02.2002.

**Abstract:** The swap body developed by *AGROCOMBI Ltd.* is suitable for the transport of mass goods in large quantities, expediently for longer distances using first of all block trains. It was expected that the supervision of those block trains using satellite following should be ensured. In the research project we showed the possible engineering solutions for the use of the GIS system, the related possibilities for financing this and we consulted with the subcontractors chosen together with the Customer for the sake of realising the investment as efficiently as possible.

**Key words:** intermodal transportation, ITS, intelligent transport system, block train, GPS, GPStrain.

**Ref. number:** 110-040-2-2

**Title:** Investigation of the establishment of a logistics centre in *Esztergom*.

**Responsible leader:** László Valter

**Commissioner:** STRIGONIUM Real Estate managing share company

**Consultants of the Commissioner:** Csaba Attila, GKM; György Parragi, Mayor's Office of *Esztergom*.

**Starting and finishing dates:** 02.07.2001 – 13.12.2002.

**Abstract:** The study presents and illustrates with several figures the prevailing traffic flows affecting *Esztergom* and the surrounding area. The most suitable area for the establishment of the logistics centre will be determined in co-operation with the Customer. The directives for the impact studies of the environmental protection will be elaborated and indicate the legal provisions affected. The study gives proposals summarising the traffic to be expected, the conditions for the establishment of the logistics centre, the infrastructure condition, the environmental protection issues and the realisation of the informatics system. After analysing all these viewpoints, a proposal will be made on whether or not the construction of a so-called satellite centre in *Esztergom*, which can be fitted well into the system of Hungarian logistics service centres, is worthwhile.

**Key words:** logistics, logistics centre, freight traffic, environmental protection, Esztergom.

**Ref. number:** 110-049-2-2

**Title:** The supervision of the realisation of the storing logistics system at the Logistics Centre of *Sopron*.

**Responsible leader:** László Valter

**Commissioner:** Railway Company of Győr-Sopron-Ebenfurt share company

**Consultants of the Commissioner:** István Fullér, GySEV; Attila Csaba, GKM.

**Starting and finishing dates:** 02.09.2002 – 15.12.2002.

**Abstract:** The purpose of this project is the establishment of a logistics informatics system which can support efficiently the service of commission storage of the customer.

The task of the informatics system is to store several thousand articles on approximately 3000 pallets.

The logistics processes of the established systems will be described: outgoing and incoming goods, movement within the warehouse and performance evaluation.

The functions realised are: management of the basic data, movements, inventory, data message reports and information services.

**Key words:** logistics, radio frequency systems, bar code, Sopron.

## ***Research Director***

**Ref. number:** 101-005-2-1

**Title:** Trial section monitoring for road management purposes.

**Responsible leader:** Dr. habil. László Gáspár

**Contributor:** Tibor Bors

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** László Holnapy

**Starting and finishing dates:** 01.10.2001 – 30.06.2002.

**Abstract:** Some 60 trial sections, each of 500 m in length, selected from the Hungarian state highway network, have been monitored each year since 1991. Unevenness (roughness), rut depth, pavement structure bearing capacity, macro and micro texture have been measured, while the condition of the surface (defects) has been characterised visually.

The results of the twelve years of trial section monitoring carried out so far have made it possible to create more and more accurate highway performance models for the condition parameters mentioned above.

Linear and exponential models have been developed as a function of pavement age or traffic volume. 14 road section types have been differentiated.

The actual effect of rehabilitation techniques on improved conditions were evaluated and the deterioration features of rehabilitated sections compared to those before rehabilitation.

**Key words:** condition survey, trial section, pavement deterioration, pavement performance model, PMS, pavement management system.

**Ref. number:** 101-002-1-2

**Title:** Evaluation of road pavement defects in *OKA 2000 (National Road Data Bank)*.

**Responsible leader:** Dr. habil. László Gáspár

**Contributor:** Tibor Bors

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Dr. András Gulyás

**Starting and finishing dates:** 23.04.2002 – 20.09.2002.

**Abstract:** The pavement defects of the national highway network have been evaluated by visual means, aided by keyboard-type *Road-master* since the late-1970s. The data on the condition of a total length of 30000 km of the national highway network are stored in compact form in the *National Road Data Bank*. The modernisation of this data bank, achieved by the creation of *OKA 2000*, makes it possible not only to store detailed information on pavement defects, but also to revise the algorithms applied here. Taking into consideration both the road user and agency expectations, new algorithms were suggested which allow the appropriate weighing of point-like and section-type defects. Before the finalisation of the recommendation, the views of field experts were requested.

**Key words:** road surface defects, condition survey, *National Road Data Bank*, pavement deterioration, road maintenance.

**Ref. number:** 101-178-2-0

**Title:** Independent quality assurance tasks and control test on the road and bridge construction works on the M3 motorway and M9 expressway, as well as on the rehabilitation works on the M7 motorway.

**Responsible leader:** Dr. habil. László Gáspár

**Contributors:** Ms. Ágnes Görgényi; Ms. Katalin Lukács; Elek Csókás; Gábor Mózes; Zoltán Tóth.

**Commissioner:** National Motorway Ltd. (NA Rt.)

**Starting and finishing dates:** 25.09.2000 – 31.07.2003.

**Abstract:** As part of the development of the Hungarian motorway network, the M3 motorway between *Füzesabony* and *Polgár*, the M7 motorway between the M0 expressway and *Zamárdi*, as well as the M9 expressway between road № 6 and road № 51 are being constructed or rehabilitated. KTI performs independent quality controls of these projects. It checks the appropriateness of the laboratories of the Contractor and judges the production technological reports submitted by the Contractor. Its main task, however, is the quality control of the projects by a prescribed number of samplings, their testing and subsequent evaluation. The Institute immediately informs the Commissioner, *National Motorway Ltd.* and the *Independent Engineer* of any eventual inadequate results on the project. In addition, the Institute summarises its remarks and recommendations in monthly reports. Before the technical delivery, KTI takes part in the control of qualification documents.

**Key words:** motorway, motorway construction, motorway rehabilitation, quality control.

**Ref. number:** 101-001-1-2

**Title:** Preparatory activities and technological design for the trial sections between km 19+350 and 21+150 of the M30 motorway.

**Responsible leader:** Dr. habil. László Gáspár

**Contributors:** Ms. Ágnes Görgényi; Ms. Katalin Lukács; Gábor Mózes.

**Commissioner:** National Motorway Ltd. (NA Rt.)

**Consultant of the Commissioner:** József Hargitai

**Starting and finishing dates:** 01.01.2000 – 30.10.2003.

**Abstract:** The acceleration of the development of the Hungarian motorway network accounts for the construction of a trial section on a motorway under construction which allows the testing of internationally up-to-date, economic and user friendly pavement structure variants with a long lifespan. A reference section of traditional pavement structure joins the actual experimental section, comprising 5 subsections each of 300 m in length. The uniform wearing course is built of French BBTM, a thin asphalt course with exceptionally favourable surface characteristics. Some of the elements of the trial section are: continuously reinforced concrete pavement, high modulus asphalt base course, cement stabilised fly ash, fly ash embankment. Built-in strain gauges and thermometers aid the regular evaluation and analysis of its condition, planned for a 3-year period. Separate parts of the topic cover reviews of the relevant literature, suitability tests and production technological specifications, technological consulting and managing activities, as well as the performance of continuous quality control. The pavement structure variant of most favourable technical and economic features could be the structure of the motorways in the next decade.

**Key words:** motorway construction, trial section, road pavement structure, asphalt pavement, reinforced concrete pavement, strain gauge.

## ***Division of Roads and Bridges***

**Ref. number:** 245-001-2-2

**Title:** Monitoring of concrete pavement trial sections for the follow-up of deterioration.

**Responsible leader:** Ms. Katalin Lukács

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** András Rétháti

**Starting and finishing dates:** 23.07.2002 – 30.11.2002.

**Abstract:** In 1999, three cement-concrete pavement trial sections, with a total length of 2000 m and using various techniques, together with an asphalt control section, were constructed on road № 7538. The monitoring of the trial section began immediately after the completion of construction. The main aim of the present research theme is the continuation of monitoring and the registration of the results obtained. The short- and mid-term monitoring of the condition of the pavement of the three concrete sections plays an important role in the study of the deterioration process and the determination of maintenance-rehabilitation costs. An additional advantage of the methodology applied is that the simultaneous monitoring of the asphalt control section allows the comparison of both pavement structure types, evaluating the long-term consequences for the national economy.

**Key words:** trial section, road condition monitoring, cement concrete pavement structure, road maintenance, road rehabilitation, pavement deterioration, costs.

**Ref. number:** 245-002-2

**Title:** Evaluation of the results of regular bridge inspections

**Responsible leader:** Zoltán Tóth

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** István Rigler

**Starting and finishing dates:** 02.08.2002 – 15.12.2002.

**Abstract:** The topic of the investigation was the evaluation and qualification of the conditions and the competency of the principal and target bridge inspections in 2000 and 2001, for the purpose of evaluating and improving the level of principal bridge inspections. 37 principal and 51 target inspections were evaluated using the aspect and point system already applied before. The methodology of competency judgement and of the evaluation of adequacy is specified mainly in *KHVM-order 1/1999 (I.14)* on the registration and technical supervision of highway bridges, as well as in its appendix. Furthermore, technical specification *ÚT 2-2.208:1997 „Registration and technical supervision of highway bridges”* was also used. The evaluation as a function of bridge managers and of testing organisations was also interpreted in tabular form in order to draw uniform conclusions. The proposals made support the conclusion that increased caution is needed in the measuring-testing activities, and the inclusion of experts is also required.

**Key words:** highway bridges, bridge inspection, condition survey.

**Ref. number:** 242-190-1-1

**Title:** Investigation and testing of the relationship between resistance to deformation and life expectancy of existing asphalt pavements with a high volume of traffic.

**Responsible leader:** Ms. Ágnes Görgényi

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Dr. Sándor Tóth

**Starting and finishing dates:** 01.09.2001 – 01.09.2002.

**Abstract:** The construction and strengthening of road pavement structures which carry high levels of commercial traffic have been carried out using asphalt mixtures of increased resistance. The design requirements of this latter are specified by the *Road Technical Specifications ÚT 2-3.301:1995; ÚT 2-3.301:1997* and *ÚT 2-3-301:2002*. The design specification includes threshold values for asphalt mixture composition and mechanical properties in order to allow the evaluation of the adequacy of pavements.

Some of the Hungarian road pavements carrying high amounts of traffic have already reached half of their life expectancy or the end of the warranty period accepted by the contractor. General experience shows that the existing road pavements with actual resistance to deformation age quickly, becoming rigid and fragile, and have to be repaired significantly by the contractors even during the warranty period.

The main aim of the research work is the determination of early deterioration based on the relationship between the results of complex tests performed on highly trafficked road pavements selected from the national highway network. A further goal is to establish a recommendation based on the test results to determine what measures should be taken to ensure sufficient resistance to deformation of highly loaded pavements and, at the same time, that they reach their expected lifespan.

In the research work, 17 pavements of wearing courses AB-12/F and AB-16/F built between 1995 and 1997 were selected from the national highway network. For each section, the investigation comprised a review of the design and construction documentation, its site condition evaluation, sampling in a predetermined cross section, and the laboratory tests of wearing course and asphalt mixture signed F.

Three intermediate reports were made. Volume 1 of intermediate report 1 includes the results of the review of construction documentation, while volume 2 contains the results of the site condition evaluation and site tests. Intermediate report 2 contains the laboratory test results of the core samples of 7 road sections, and intermediate report 3 of 10 additional road sections. The final report presents the summary of the results and the conclusions drawn.

**Key words:** asphalt, durability, resistance to deformation.

**Ref. number:** 242-199-2-2

**Title:** Investigation of the moisture susceptibility of asphalt layers built in 2002.

**Responsible leader:** Zoltán Kubányi

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Dr. Sándor Tóth

**Starting and finishing dates:** 01.08.2002 – 30.11.2002.

**Abstract:** The susceptibility to cracking and moisture susceptibility of asphalt mixtures are interrelated features. In the case of asphalt mixtures with insufficient cohesion properties, cracks are initiated as a consequence of climatic and traffic loads. It is extremely important, during the phase of mixture design, to be aware of both the cracking susceptibility and the resistance to deformation of pavements in due time. Achieving this goal can be facilitated by moisture susceptibility tests, in which first the standard Marshall-specimens are saturated in a vacuum container, at a given pressure and for a predetermined time. The specimens taken from here have to be stored under water of a prescribed temperature for a given duration. This is the „*wet treatment*”; in addition, so-called „*dry specimens*” are also produced and are investigated by static split tests, similarly to the wet specimens. The ratio of the split-tensile strength of the

wet and dry specimens is taken as a test result. If the ratio is above 0.8, the asphalt mixture is appropriate from the viewpoint of moisture susceptibility.

In the research work, the composition, the moisture susceptibility and dynamic creep of various asphalt mixtures was taken into consideration. It was determined that there is a reasonable connection between bitumen saturation and moisture susceptibility. As a consequence, those mixtures which met the bitumen saturation requirements of earlier Hungarian Standard MSZ 07-3210/1-1989 were suitable from the viewpoint of moisture susceptibility. It would be investigated that the bitumen saturation requirements would be reincluded in the valid design specification of asphalt mixtures.

Based on the results of dynamic creep tests of various asphalt mixtures in order to determine their resistance to deformation, it can be concluded that it is also justified to limit the bitumen saturation of mixtures from above. Furthermore, it is suggested that the asphalt mixtures can be made appropriate among the controversial requirements by a permanent seeking of compromise as a function of their position in the pavement structure and of their loads. It should satisfy the requirements of the resistance to deformation, should not be susceptible to cracking or premature ageing, while they have different maintenance needs.

**Key words:** moisture susceptibility, statical split test, resistance to cracking, resistance to deformation, bitumen saturation.

**Ref. number:** 242-160-2-9

**Title:** Research on dynamic falling weight bearing capacity measurement using light falling weight apparatus.

**Responsible leader:** Zoltán Kubányi

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Dr. Tibor Boromisza

**Starting and finishing dates:** 01.09.1999 – 30.11.2002.

**Abstract:** The research activities began in September 1999. In the first period, mainly comparative tests were carried out between traditional plate bearing capacity tests and light falling weight bearing capacity measurements, then correlations were determined between both measuring methods. Afterwards, the calibration of the light falling weight apparatuses of which a large number are already available in Hungary and whose number is still expected to grow, were performed. For this, it was necessary to develop a calibration station of sufficiently high technical standard. The foundation of calibration bench was constructed in 2000, then, using the experiences gained on a German study tour in March 2000, the design and manufacture of mechanical elements began. The evaluation and selection of alternatives to high-cost electronic units (potentiometer call, strain gauges, amplifiers) were carried out simultaneously from the domestic market.

The design and production of the computer card substituting the amplifier caused one of the biggest problems. By the end of 2000, the mechanical part of the calibration station had been completed, and the first version of electronics was ready by early 2001. Compilation of a computer program could then start. After the first unsuccessful attempts, the actual programming activities began in early 2002. The computerised reading of measuring data on the display of apparatus also caused a great problem. It was followed by the refinement of measuring electronics. The system was completed by November 2002, and so it was possible to perform a trial calibration.

**Key words:** light falling weight deflectometer, calibration.

## ***TEM Bureau***

**Ref. number:** 130-001-2-2

**Title:** Implementation of, and co-operation in the activities related to the Trans-European North-South Motorway (TEM) Project.

**Responsible leader:** Dr. Boldizsár Vásárhelyi

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Tamás Nagy

**Starting and finishing dates:** 01.01.2002 – 30.11.2002.

**Abstract:** The aim of the study was the harmonisation of the activities of the TEM planning and construction, carried out independently by each member country, and an investigation into the financing possibilities. Participation is beneficial to the transport and economy of all countries, because it also helps the main traffic lines of the TEM region to join collectively the EU road network (major contribution to *TINA* project).

Within the framework of the theme, co-ordination of research required from the Hungarian party is continuing, in accordance with the principles of the current VI<sup>th</sup> phase of the activities.

**Key words:** TEM, international co-operation, motorway planning, road construction, traffic corridor.

**Ref. number:** 130-002-2-2

**Title:** Co-ordination of several Hungarian activities to be carried out in the Inland Transport Committee, its subordinated bodies of the United Nations Economic Commission for Europe and implementation of some tasks pertaining to WP1 (road traffic safety).

**Responsible leader:** Dr. Boldizsár Vásárhelyi

**Contributor:** Mrs. Jenőné Katona

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Tamás Nagy

**Starting and finishing dates:** 01.01.2002 – 30.11.2002.

**Abstract:** The Institute for Transport Sciences Ltd and its predecessors have continuously participated for more than twenty years in Hungary's contributions to the activities of the *Inland Transport Committee of the United Nations Economic Commission for Europe*. Co-ordinating and preparatory works are provided, together with expert knowledge, and, as a result, the Institute for Transport Sciences Ltd serves as an interface between the Hungarian road sector and the most competent European organisation for the evaluation and adaptation of the results of the overall progress. The Hungarian party actively participated in updating the international conventions on road traffic regulation.

**Key words:** traffic safety, transport policy, international co-operation, UNECE.

**Ref. number:** 130-013-2-2

**Title:** Implementation of, and co-operation in the activities related to the Road and Combined Transport Research Programme of the OECD-RTR.

**Responsible leader:** Dr. Boldizsár Vásárhelyi

**Contributor:** Gábor Albert

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** András Rétháti

**Starting and finishing dates:** 01.01.2002 – 30.11.2002.

**Abstract:** Hungary has been participating with full membership in OECD programmes since the spring of 1996, and, as a consequence, in its „RTR” *Programme (Road and Combined Transport Research)*. The work which has been carried out here for 30 years is highly co-operative, disciplined and of a high level, also providing, in harmony with the other international professional organisations of the world, a valuable outlook to their activities. Hungarian contributions were made in several topics (databases, environment, technology transfer, etc.).

**Key words:** OECD, RTR programme, international co-operation.

## *Division of Traffic Safety and Traffic Engineering*

**Ref. number:** 211-072-1-1

**Title:** Revision and updating of the network of conformity and monitoring stations (adjusted to the system of the national road traffic census).

**Responsible leaders:** Ms. Mária Cseffalvay

**Contributors:** Dr. Csaba Koren; Árpád Tóth.

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Gábor Thurzó

**Starting and finishing dates:** 01.09.2001 – 30.10.2002.

**Abstract:** The study deals with the following two fields of the national road traffic census:

- Exploration of the updating possibilities of two main representative networks, and the
- Accuracy problems of the samplings distributed unevenly in time.

*Exploration of the updating possibilities of the two main representative networks:*

The two representative networks of the national road traffic census are the network of *conformity stations* and that of *continuous traffic monitoring*.

In the first stage, the existing situation has been presented with the help of analyses, descriptive statistics, time series and diagrams.

In the second stage, mathematical-statistical calculations and accuracy tests have been carried out in relation to minimal elements of the county networks and to the reducibility extent of the census programmes. On this basis proposals have been prepared for the updating of the networks and traffic census programmes. These are documented by maps and tables.

**Key words:** traffic counting, representative network, traffic census programme.

**Ref. number:** 211-091-2-2

**Title:** Current tasks of the 2002 traffic counting.

**Responsible leaders:** Ms. Mária Cseffalvay

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Gábor Thurzó

**Starting and finishing dates:** 02.01.2002 – 30.11.2002.

**Abstract:** Within the framework of the study, central management tasks (ÁKMI Kht.) specified by technical provision *ÚT 2-1-109:2000* on the national road traffic census were supported. The task was to control the traffic surveys carried out by hand and with the help of automatic devices, as well as the elaboration of the data on the monitoring network of the national public road system, and furthermore on the roadside stations designated as such in the 2002 national traffic census programme also extended to roadside stations. If needed, a proposal had been made in order to take measures for the improvement of the quality of the traffic census. Continuous recording of the traffic counting stations were made up-to-date. Materials necessary for the planning of the 2003 traffic census were compiled (proposed planning of stations, counting programmes, guidance for counting).

In the course of the year, reports were prepared on two occasions on data processing presenting diagrams and demonstrations with the implemented programmes of the different counties.

**Key words:** traffic counting.

**Ref. number:** 211-075-2-2

**Title:** Road safety problems related to transit traffic in Austria's neighbouring countries: Hungary, Slovakia, Slovenia, and the Czech Republic.

**Responsible leader:** István Fehérvári

**Contributors:** Ms. Mária Cseffalvay; Dr. habil. Péter Holló.

**Commissioner:** Kuratorium für Schutz und Sicherheit

**Consultants of the Commissioner:** Klaus Robatsch, Harald Nadler.

**Starting and finishing dates:** 02.2002 - 03.2003.

**Abstract:** The continuously increasing level of border traffic between Austria and its neighbouring countries made the research theme opportune, having been initiated at the invitation of the Austrian institute *Kuratorium für Schutz und Sicherheit*. In the countries participating in the project, transport infrastructure and road users' behaviour had followed different trends for decades, which might be considered as one of the sources of the transport conflicts. It is questionable whether these dangerous situations arise exclusively from the ever-increasing flow of traffic or from insufficient knowledge of the statutory rules existing in the neighbouring countries. At the suggestion of the Austrian party a questionnaire survey was carried out at four border crossing stations, extending to 1000 Hungarian vehicle drivers returning home from Austria. In addition to the evaluation of the questionnaires, data were provided pertaining to Hungarian traffic specifications; social-demographic, economic and special framing conditions; and subjects of national legislative and traffic regulation. On the basis of the correlation revealed within the framework of the theme, recommendations were drafted to help provide solutions for the road safety problems. The research theme will be closed in 2003.

**Key words:** border crossing, traffic regulations, road safety, human factors.

**Ref. number:** 211-073-1-1

**Title:** Participation in the SARTRE-3 project – Implementation of tests in Hungary (attitude of vehicle drivers towards road traffic risks in Europe)

**Responsible leaders:** Miklós Gábor

**Contributors:** József Tarjányi; Ms. Erika Révész; Tamás Siska.

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Dr. Péter Lányi

**Starting and finishing dates:** 15.10.2001 – 31.03.2003.

**Abstract:** The aim of the interviews that were made simultaneously and using the same methods in 23 European countries within the framework of the *SARTRE-3* project (*Social Attitudes to Road Traffic Risk in Europe*) was to reveal the social attitude related to characteristic road safety risks. 1000 persons from each country were questioned on such problems as the events endangering life in general, the perception of traffic risks, the role of speed, drinking and driving and safety belts in accidents. Some singled out drivers were also questioned about other driving habits and road safety countermeasures. Within the framework of the theme, the inquiry test of the Hungarian drivers, together with the relevant preparatory tasks will be executed in a phased scheduling.

**Key words:** human factors, road safety, social attitude, SARTRE-project.

**Ref. number:** 211-069-11

**Title:** The test in accordance with the application proposal of the road marking cues enabling better visibility of road alignment.

**Responsible leader:** Miklós Gábor

**Contributors:** Tibor Kucsara; János Endrédi; Gábor Fogarasi.

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Zoltán Nagy

**Starting and finishing dates:** 01.06.2001 - 31.10.2001.

**Abstract:** Positioning, distance and lifespan are different for the various types of retro-reflective road marking cues helping the better visibility of the alignment of public roads. In order to introduce uniform application, the foreign provisions were collected and on the basis of foreign and national experiences a comprehensive study has been prepared with the aim of drafting a technical regulation.

Upon application experiences the marking cues appropriate from the viewpoints of quality and traffic control can be selected from the actually circulated retro-reflective cues. As a final result of the work, a proposal has been prepared for the road management companies on the application of the cues (colour, positioning, distance of installation).

**Key words:** traffic engineering, edge-marking, road marking cue, technical regulation on roads.

**Ref. number:** 211-081-1-2

**Title:** Elaboration of proposals for the planned continuation of the road safety activity in Hungary on the basis of the evaluation of the *National Traffic Safety Programme (NTSP)*.

**Responsible leader:** Dr. habil. Péter Holló

**Contributors:** Dr. Domokos Jankó; Ms. Jánosné Papp; Tamás Siska.

**Commissioner:** KöViM

**Consultant of the Commissioner:** Géza Kározy

**Starting and finishing dates:** 28.03.2002 – 13.12.2002.

**Abstract:** On the basis of the evaluation of the implementation of the NTSP in 2001, a picture has been obtained about the areas where the previously formulated goals were or were not achieved. In 2002 – mainly on the basis of the evaluation of the results of the previous year and the experiences of foreign programmes – proposed measures (drivers' training, demerit point system, police enforcement, road safety campaign, inspection of professional skill) were elaborated primarily with respect to chapters on human factors of the NTSP. The study report is devoted to major road safety problems, the role in the profession of the new information/communication technologies; it goes on to make a proposal for a computer program that can be successfully used in the future planning activity and the effect analysis of the previously made provisions.

**Key words:** accident prevention, road safety, National Traffic Safety Programme.

**Ref. number:** 211-078-1-2

**Title:** Euro-conform methods used in the determination of road accident loss caused to the national economy

**Responsible leader:** Dr. habil. Péter Holló

**Contributors:** Dr. Imre Hermann; Dr. Domokos Jankó; Dr. József Reimann; Miklós Gábor.

**Commissioner:** KöViM

**Consultant of the Commissioner:** Géza Kározy

**Starting and finishing dates:** 28.03.2002 - 30.04.2003

**Abstract:** Until now the method of costing the production loss caused by accident injuries and deaths has been used in Hungarian practice to quantify the road accident loss. In the highly motorised countries, the method based on the so-called *willingness to pay* is becoming more and more widespread, and produces an essentially higher accident loss than the method presently used in Hungary. On the one hand, the demand for making comparisons with the countries with developed motorization, and on the other hand, the increased role and importance of road safety requires the determination with the same method of the actual value of the road accident loss in Hungary also. Until now, within the framework of the study, research has been methodologically established, the questionnaire needed for the survey has been drafted, a large scale professional harmonisation has been performed and one thousand Hungarian vehicle drivers were interviewed with the involvement of the TÁRKI. First results may be expected in 2003.

**Key words:** loss and damage, fatalities, injuries, costs, statistical survey.

**Ref. number:** 211-096-1-2

**Title:** Cost/benefit and cost effectiveness analyses of the road safety and environmental measures made for the decision-makers (ROSEBUD: **R**oad **S**afety and **E**nvironmental **B**enefit-**C**ost and **C**ost-**E**ffectiveness **A**nalysis for **U**se in **D**ecision-**M**aking)

**Responsible leader:** Dr. habil. Péter Holló

**Contributors:** Members of the Reference Group: Dr. Jankó Domonkos; Dr. Imre Hermann; Ms. Katalin Kajtár; Dr. Csaba Koren; Dr. Péter Lányi; Dr. József Pálfalvi; Ms. Dr. Lászlóné Tánczos; Dr. András Timár.

**Commissioner:** BASt (Bundesanstalt für Strassenwesen)

**Consultant of the Commissioner:** Dr. Karl-Josef Höhnscheid

**Starting and finishing dates:** 14.10.2002 – 30.06.2004.

**Abstract:** KTI, as a member of an international consortium, is taking part in a research study belonging to the EU 5<sup>th</sup> Framework Programme. The aim of the research is to elaborate and make available for the decision makers the means and methods by which the use of the existing resources of road safety improvement can be ensured most efficiently: saving as many human lives as possible and preventing as many injuries as possible using of the existing financial means. The aim of the EU transport policy, to halve the number of road fatalities by the year 2010, can only be realised if the resources are spent with the optimal effectiveness. The first task of the project, which was started at the end of 2002, was “screening”; that is, a survey of the extent to which the methods referred to are used by each country’s decision makers in drafting and consolidating the professional decisions concerned. In this work stage, too, great help is provided by the highly experienced members of the *User Reference Group*, who work in different areas of the profession.

**Key words:** road safety, environmental protection, cost/benefit analysis, cost-effectiveness.

**Ref. number:** 213-072-2-1

**Title:** Study of safety problems of multilane roundabouts on the basis of on-site observations

**Responsible leader:** Ms. Erzsébet Hóz

**Contributors:** Tibor Mocsári; Zoltán Jákli.

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Dr. Péter Lányi

**Starting and finishing dates:** 01.06.2001 - 30.03.2002.

**Abstract:** 2-3 day traffic monitoring and conflict-analysis were carried out on four Hungarian two-lane roundabouts (on main road № 5 in *Kecskemét*, on main road № 82 in *Veszprém*, and on main roads № 86-87 in *Szombathely*, as well as on main road № 11 in the neighbourhood of *Budakalász*). Tasks related to the further use of two-lane roundabouts in Hungary were determined following an investigation of the operational features and regularities, and the monitoring and analysis of driver attitudes. A recommendation on the application of two-lane roundabouts has been prepared, taking into consideration both national and international experiences.

**Key words:** roundabout, human factors, conflict analysis, Highway Code.

**Ref. number:** 213-072-2-1

**Title:** Elaboration of the registration system of roundabouts, taking into consideration the aspects of route-permission.

**Responsible leader:** Ms. Erzsébet Hóz

**Contributors:** Tibor Mocsári; István Fehérvári.

**Commissioner:** ÁKMI Kht.

**Consultants of the Commissioner:** Ms. Zsuzsa Szirbek; Balázs Farkas

**Starting and finishing dates:** 01.06.2001 – 30.04.2002.

**Abstract:** The traffic of oversize vehicle combinations is bound to route-permission. For the issuance of a route-permission, the road manager has to be in possession of the basic data in

order to decide whether the junctions along the relevant route are appropriate or not for allowing the safe passage of the vehicle combinations. Collection of basic data has been made within the framework of the study in order to determine the location of the roundabouts and their principal data, and by closely following the vehicle combinations, which could be considered as typical, information was gathered on their passage over roundabout and on the eventual problems. With the after-analysis of the passages recorded on video, information was obtained on the true line of the vehicles, and recommendations were made on the character of the geometric dimensions to be unconditionally controlled before the issuance of permissions.

**Key words:** oversize vehicle combination, roundabout, route permission.

**Ref. number:** 213-086-2-2

**Title:** After-survey of the traffic and accidents at the two-lane roundabout of the CORA shopping centre on main road № 11.

**Responsible leader:** Ms. Erzsébet Hóz

**Contributors:** Tibor Mocsári; István Fehérvári.

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Zoltán Nagy

**Starting and finishing dates:** 01.02.2002 - 31.05.2002.

**Abstract:** A specific example of two-lane roundabouts is the junction on main road No.11. A traffic survey, an accident analysis, and a two-day conflict monitoring were carried out at the junction. Accordingly, the appropriateness of the two-lane roundabout, which is being rated as something new, has been evaluated and proposals have been developed for further increasing the safety of the junction. A short video film has been prepared on the typical conflicts.

**Key words:** roundabout, conflict analysis, traffic safety, accident prevention.

**Ref. number:** 213-088-2-2

**Title:** Impact analysis of the reconstruction of the *Dugonics Square* in *Szeged* from the point of view of traffic engineering.

**Responsible leader:** Ms. Erzsébet Hóz

**Contributor:** Tibor Mocsári

**Commissioner:** Szeged Megyei Jogú Város Önkormányzata

**Consultant of the Commissioner:** Péter Lantos

**Starting and finishing dates:** 01.02.2002 – 29.11.2002.

**Abstract:** *Dugonics Square* in *Szeged* has been reconstructed in order to improve tramway traffic. In order to facilitate decision-making, preliminary surveys had to be carried out to determine the necessary traffic engineering arrangements. Two roundabouts were constructed on the square as very special solutions. The combined form of traffic, of vehicles with very different dynamical features (tramway, passenger car, motorcycle, cycle), and of pedestrians, is of special interest. In this situation the need for road users to pay special attention to one another is a basic requirement for road safety. In this work the attitude of road users was studied and evaluated, and proposals were elaborated on how the undisturbed flow of traffic can be further helped. The task was to decide whether it is necessary to use a coverage signal for the tramways. Experiences are favourable, with the road users willing to act considerately to each other, therefore “safeguarding” of the tramway traffic with a covering signal, at the expense of the impairment of the service level, is not necessary.

**Key words:** fixed-line traffic, light rail transit, traffic safety, traffic and transport planning, traffic engineering, Szeged.

**Ref. number:** 213-083-1-2

**Title:** Means of passenger transport dedicated to the service of individuals or small groups helping the safe transport of persons with restricted mobility.

**Responsible leader:** Dr. Sándor Szilháti

**Contributors:** Miklós Gábor; Szabó és Tsa Mérnöki-Gazdasági Bt.

**Commissioner:** KöViM

**Consultant of the Commissioner:** Ms. Ibolya Nagy-Bana

**Starting and finishing dates:** 01.04.2002 - 13.12.2002.

**Abstract:** *Law № XXII of 1998* relating to the equal opportunities provided to handicapped persons sets different deadlines for the implementation of the elements of the EU Directive “*The European notion of non-restriction.*” This also concerns the development of passenger transport facilities operated as taxis or other services ensuring the safe transportation of small groups. In the study, preparations have been made for the implementation of the relevant passenger transport systems and for the compilation and publication of a document comprising the international recommendations on the suitable taxi transport of persons with restricted mobility.

**Key words:** paratransit, travel demand, door-to-door transport, automobiles for the physically handicapped.

**Ref. number:** 213-070-2-1

**Title:** Effect analysis of the amendment applied in 2001 to the Hungarian *Highway Code (KRESZ)*.

**Responsible leader:** Tibor Mocsári

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Zoltán Nagy

**Starting and finishing dates:** 03.2001 – 10.2002.

**Abstract:** For the analysis of the effect of the amendment applied to the Hungarian Highway Code (*KRESZ*) in 2001, the measurement data of 77 traffic counting stations were studied (61 pcs *ADR2000*, 7 pcs *RAKTEL 8000*, 9 pcs *QLD-6CX*). Measurements were carried out in different areas of the country on various road categories both inside and outside built-up areas. The study of cross-sectional measurements was carried out by each traffic lane. Outside built-up areas during the analysis of the speed data of 83 traffic lanes, in 26 cases no significant difference could be presented, the data in 11 lanes indicated significant speed decrease, while in 46 lanes significant speed increase appeared. Inside built-up areas, in the course of the analysis of 77 lanes, in 11 cases no significant difference could be experienced, while the data in 22 lanes presented significant speed decrease, and the data in 44 lanes manifested significant speed increase. On the basis of the measurements carried out with the *ADR2000* instruments, analysing the speed data of 9.6 million vehicles, it has been stated that outside built-up areas, on average, the free speed of vehicles increased by 0.82 km/h, while in built-up areas by 0.24 km/h in the period subsequent to the introduction of the modification of the Highway Code in comparison with the period before the introduction (overall: 0.46 km/h increase).

**Key words:** Highway Code, speed, vehicle speed, speed measurement, traffic surveillance.

**Ref. number:** 213-075-1-1

**Title:** The effect on driver speed of traffic engineering devices used on the boundary of built-up areas.

**Responsible leaders:** Tibor Mocsári

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Károly Rankli

**Starting and finishing dates:** 10.2001 – 11.2002.

**Abstract:** The behaviour of pedestrians and pedestrian-vehicle interactions were observed at two sites. Both sites were within built-up areas, but not far from the end of the inhabited areas marked as such. One of the measuring-monitoring sites was in *Piliscsaba* on the pedestrian crossing of the 23+900 km section of main road № 10. According to the measurements, on average drivers travelled well in excess of the permissible limit. In itself, the marked pedestrian crossing has no essential speed decreasing effect. On the site in Budapest (the marked

pedestrian crossing on the entry section of Main road № 5 in the XXIII<sup>rd</sup> district at the intersection of *Grassalkovich Street* and *Ócsai Street*) a traffic island in the centre of the road significantly helps the crossing of pedestrians. The effect of traffic calming devices in application was studied, at the boundary of the inhabited area of *Tokodaltáró* from the direction of Budapest, at the entry points of the built-up areas. 200 m before the signboard with the locality's name, road signs and yellow transversal road markings warned drivers to reduce their speed to the 60 km/h indicated limit. Measurements proved that the majority of drivers accepted the speed limit. Consequently, the intervention – with the exception of some excessively speeding drivers – may be considered as efficient.

**Key words:** pedestrian crossing, speed, speed measurement, human factors, accident prevention.

**Ref. number:** 213-084-2-2

**Title:** The 2001 risk ranking of railway crossings.

**Responsible leaders:** Tibor Mocsári

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Károly Rankli

**Starting and finishing dates:** 03.2002 – 09.2002.

**Abstract:** The study presents the point system used in the preparation of the risk ranking of railway crossings. After describing the road safety conditions of the railway crossings, proposals are given for accident prevention and the results of the interventions implemented so far are evaluated.

**Key words:** railroad-grade crossing, grade crossing safety, risk assessment.

**Ref. number:** 213-087-1-2

**Title:** Effect analysis of the traffic conditions and road characteristics within the framework of the *ARTEMIS Project* (EU 5<sup>th</sup> Framework Programme) using floating car measurements

**Responsible leader:** Tibor Mocsári

**Commissioner:** GKM

**Consultant of the Commissioner:** Dr. Péter Lányi

**Starting and finishing dates:** 05.2002 – 12.2002.

**Abstract:** Within the scope of the *ARTEMIS Project* of the *EU 5<sup>th</sup> Framework Programme*, the emission measuring model of the EU countries has been elaborated with the involvement of experts from several European countries (France, Germany, Italy, England, Switzerland, Sweden, Hungary). For the elaboration of the model, in addition to the data already available – in order to survey the different running cycles – the driving characteristics of vehicles operated in each relevant European country also had to be compared. These measurements can be implemented with a “floating car”. Measurements were made in *Budapest*, *Malmö* and *Naples* on routes drawn up according to uniform principles using a passenger car characteristically representative of the given country's vehicle fleet. The KTI's *Suzuki Swift* type passenger car used as the measuring vehicle was equipped with the *MUVITAS laser-radar device* manufactured by *VIDEO HT Ltd.*, and in addition to data recording, the surveyed route was also recorded on video tape.

**Key words:** floating car measurements, speed measuring, emission control, traffic-surveillance, ARTEMIS.

## ***TRANSORG, Division of Transport Organisation Development and Logistics***

**Ref. number:** 220-069-2-2

**Title:** Investigation into the co-operation between the *Intermodal Logistics Centre of Budapest (BILK)* and the *Free Port of Csepel* from the points of view of traffic, operation and informatics.

**Responsible leaders:** Dr. János Berényi; Gyula Simon.

**Contributor:** László Valter

**Commissioner:** MÁV Rt.

**Consultants of the Commissioner:** Dr. Attila Csaba; Lajos Nagy.

**Starting and finishing dates:** 06.05.2002 – 30.11.2002.

**Abstract:** The purpose of the study was to survey the possibilities to be assured through the wide co-operation related to traffic, operation and informatics by the co-operation of the planned *Intermodal Logistics Centre of Budapest (BILK)* (currently under construction) and of the *Free Port of Csepel*, aimed at satisfying important demands which already exist in the operational logistics services of today in the fields of traffic, operation and informatics, and the tasks which could increase the success of this co-operation.

For the sake of achieving these goals, the freight traffic surveyed in the previous investigations concerning the area of attraction almost identical for the two establishments was considered, and on the basis of this we have updated the tendencies to be expected in the development of freight traffic.

We have determined the sphere of logistics activities for both the *BILK* and for the *Free Port*, and we have investigated the possibilities for the exploitation of the synergetic effects inherent in the co-operation between the *Terminal Railway Station of Soroksár* and the *Free Port of Csepel*.

A separate investigation was made for the situation prevailing in the infrastructure of the *Free Port of Csepel* and for the development possibilities of the connection with the *BILK*. On the basis of this investigation we have determined the demands of the development assuring better road and railway access to the port.

The investigations carried out have shown that both logistics complexes strive after the completeness of services in their own territories. In the territory of the *Free Port of Csepel*, about 50 smaller undertakings provide various services. In the case of the *BILK* it can be seen that the majority owner, *Volán Tefu Ltd.*, assembles several logistics providing, forwarding, servicing, and vehicle repairing undertakings. Under those conditions it is obvious that the division of labour cannot be influenced from outside.

The co-operation between the logistics complexes shall be promoted through the aid provided for the creation of the conditions of the co-operation, which can be assured by the appropriate development of the infrastructure and through the harmonisation of the information systems.

As the basis for the development of the information system we have recommended a block-scheme, which shall be naturally adapted in both complexes, taking the particular circumstances into consideration.

**Key words:** *BILK*, *Free Port of Csepel*, logistics, logistics service centre, multimodal freight transport.

**Ref. number:** 220-050-2-2

**Title:** Feasibility study for the virtual system of the Logistics Service Centre in three places (*Nagykanizsa, Zalaegerszeg, Zalakomár*) in the *Transdanubian region*.

**Responsible leader:** Béla Nógrádi

**Commissioner:** MÁV Rt.

**Consultants of the Commissioner:** Lajos Nagy; Dr. Attila Csaba.

**Starting and finishing dates:** 15.08.2002 – 30.11.2002.

**Abstract:** Several studies dealing with the feasibility of the logistics service centre in the South-western Transdanubian region have already been elaborated, and these have approved the necessity of the establishment, and a proposal has been prepared for the location at settlement level, and within the settlement and for the development. After the elaboration of the last study, the municipality of *Nagykanizsa* assured important forces and financial resources for the sake of the realisation, but in spite of all efforts, the acquisition of the territory chosen has only been partly realised. Within the territory proposed, some logistics services have already been started, and naturally numerous logistics activities are operated within the area of attraction. The developments based on the limited financial resources of the state have resulted in slow realisation, while the private firms have built up their own logistics service systems. The individual firms already operating such services consider the realisation of the regional logistics centre as necessary, and they would like to participate in it. Once the regional logistics centres have been fully established, they will carry out a significant amount of freight traffic, but it is not the intention that all the goods of the area of attraction will appear physically in the logistics centre, The national network system will play an important co-ordinating role, and one of its regional centres will be *Nagykanizsa*, which can perform its logistics co-ordinating role in the area of attraction with the sub-centres to be found within the district, in the framework of a relation-system. The economic structure of the area of attraction, the main goods flows and the value of the freight traffic of each area were explored in the framework of the study, and on the basis of the available data the territorial sizes for the sub-centres and the logistics premises at the level of settlements were formulated. On the basis of those considerations the study recommended four sub-centres taking the neighbouring logistics areas into account, with the central role of *Nagykanizsa*:

- *Szentgotthárd*
- *Zalaegerszeg*
- *Kaposvár*

The premises of the Customhouse agency M7 at *Zalakomár* can be considered as an integral part of the logistics service centre of *Nagykanizsa*, playing a central role, which can be concentrated on traditional railway transport and truck parking services, as well as the *Airport of Sármellék*, which can undertake the air transport services.

The regional virtual system elaborated in the study as a part of the nation-wide network offers the possibility for the satisfaction of the logistics demands.

**Key words:** freight traffic, logistics, logistics service centre, multimodal freight transport.

**Ref. number:** 220-065-1-2

**Title:** The integration of the Hungarian national logistics centre network into the network of the European Union.

**Responsible leader:** Zsolt Béla Garda

**Commissioner:** KöViM Közlekedési Iroda

**Consultant of the Commissioner:** Dr. Attila Csaba

**Starting and finishing dates:** 02.04.2002 – 10.12.2002.

**Abstract:** Hungary will soon be a member of the EU. The Hungarian logistics network shall be integrated into the logistics network of the united Europe. The possibilities and ways of achieving this goal are investigated in this study. Through this study we can get a picture of the freight traffic connections of the actual areas of attraction of the national logistics service centre network – with the accentuation of the EU's relation – from, among others, the points of view of

quantities and directions, taking the transport corridors passing through Hungary and the future TINA network on the railway, road and on the waterways into account. The study includes an investigation of the freight transport demand of 11 Hungarian logistics areas of attraction.

Through the presentation of the solutions for the European logistics centres, the purpose and the possibilities of the combination of the European and Hungarian networks with logistics aspects, the requirements and the bottlenecks – in conformity with the European transport policy – were investigated.

**Key words:** EU White Paper, national logistics centre network, TINA network, TEN, Trans-European Network, traffic and transport planning, highway and transport planning, transport corridor.

**Ref. number:** 220-063-1-2

**Title:** The impact of the express road network development program accepted in *Governmental Resolution № 2003/20001 (X.9.)* on the accessibility of logistics centres.

**Responsible leader:** Dr. János Berényi

**Contributor:** Béla Nógrádi

**Commissioner:** KöViM

**Consultant of the Commissioner:** Dr. Attila Csaba

**Starting and finishing dates:** 02.04.2002 – 30.11.2002.

**Abstract:** The study analyses in detail the role of the Hungarian road and railway networks in the international corridors and the level of development of the sections alongside the corridors. It was determined during the investigation that the program for the development of the road and railway networks preferred the sections of the international corridors. From the point of view of the accessibility of the objects of the national logistics centre network it is important which kind of transport networks are connected with it. In the course of the development of the logistics service centre network this was an important aspect, and so all the logistics centres were to be found alongside an international corridor or in their vicinity. In the study we have investigated the impact of the road and railway developments exerted on the traffic of the logistics centres. The existence of the railway connection is an important aspect at every logistics centre, primarily for the sake of the development of the intermodal transport system. The investigation has stated that the track development plans actually known favour the expressway road network against the railway system. Concerning the fifteen-year development program, *Baja, Sopron, Szolnok* will have no direct expressway connection and there is no decision yet as to whether *Záhony* will have an expressway connection. The logistics centres at *Sopron* and *Záhony* have been developed primarily for the railway services and *Baja* for the waterway connection. The indirect connection of the centres not affected by the expressway network will also develop relatively favourably. The accessibility and modality of the logistics centres to be constructed within the framework of the governmental concept are very favourable and those centres can form the terminals and regional co-ordinating centres for the intermodal system.

**Key words:** logistics service centre, expressway network, railway track network, TINA network, transport corridor.

**Ref. number:** 220-072-2-2

**Title:** Investigation of the impacts of the juridical regulation in an EU conform uniform framework for combined freight transport.

**Responsible leader:** Mrs. Miklósné Szilágyi

**Commissioner:** MÁV Kombiterminál Kft.

**Consultants of the Commissioner:** Dr. János Verbóczy; Gyula Kiss.

**Starting and finishing dates:** 06.05.2002 – 10.12.2002.

**Abstract:** The exploitation of the freight transporting trains running in combined transport relations actually operated, as well as the directions of the newer relations to be started in the near future are influenced to a great extent by the road transit traffic running through our

country. We have demonstrated the development of the road transit relations according to the volume and the directions in the research work report – for the sake of the enlargement and further development of the combined transport methods protecting the environment – first on the basis of the data basis of the TRANSORG division of the KTI and on the basis of targeted surveys, and have evaluated this development.

Taking the measurements of the EU and of the neighbouring countries promoting the combined transport into consideration, we have prepared the EU-conform regulation, as well as the impact analysis of the regulation.

**Key words:** combined transport, freight transport, legislation, harmonisation.

**Ref. number:** 220-052-2-2

**Title:** The elaboration of the feasibility concept of the logistics service centre of *Záhony* in the territory of *EURO-GATE Ltd.*

**Responsible leader:** Zsolt Béla Garda

**Commissioner:** EURO-KAPU Kft.

**Consultant of the Commissioner:** István Vass

**Starting and finishing dates:** 02.05.2002 – 30.07.2002.

**Abstract:** One of the dominant areas of the Hungarian Logistics Centre Network is the region of the Northern territory of the country, east of the river *Tisza*, which is particularly important, and unusual from several aspects and. On the one hand, due to the huge extension of the logistics district of *Záhony*, the question of where the premises of the logistics service centre are to be established is still to be decided, and on the other hand it is well known as a land port and so fulfils a particular function, being the transshipment area between the normal and broad gauge railways. In the field of transshipment, more and more private firms providing logistics services have been formed over the years, in addition to MÁV. Several firms have played an important role in the life of the area, including the premises of *EURO GATE Ltd.*, without which freight traffic, crossing the borders by road, could not be accomplished trouble-free. The research work has investigated the possibility of the integration of those premises into the national logistics service centre network and presents a development concept together with the investigation of the rate of return.

**Key words:** EURO-GATE Ltd., national logistics centre network, logistics service centre, *Záhony*

**Ref. number:** 220-065-2-2

**Title:** Survey of the methods for the formation of performance indicators used at the transport associations of five Hungarian cities, and recommendations for their modernisation.

**Responsible leader:** Mrs. Endréné Trepper

**Commissioners:** Department of Service Statistics of the Hungarian Central Statistics Office; KTI – Division of Transport System Research and Network Planning.

**Consultants of the Commissioners:** Dr. István Gether; Gábor Albert.

**Starting and finishing dates:** 19.04.2002 – 10.06.2002.

**Abstract:** It is well known that the utilisation of the cheap system using more simple paper tickets and basically employing mechanical ticket validation methods is characteristic of the domestic local public transport. The main imperfection of this system, though not the only one, is that it does not allow the determination of the exact value of the performances to be assigned to the journeys. At the same time, the analysis of the performance used for the transport of passengers and the analysis of the activity carried out by the transport associations require the use of measuring indicators characteristic for the processes investigated, as do the companies' obligations regarding the provision of data. Those measuring values are formed indicators.

The Hungarian *Central Statistics Office (KSH)* would like to know the methods of calculation used by the companies, in order to determine the accuracy of the data provided and whether or not the data provided can be used for making comparisons.

The actual investigation includes the detailed exploration of the ticket- and season ticket systems of the transport associations used by the municipalities and the itemised analysis of the method for forming the performance indicators used. A proposal for modernisation was elaborated on the basis of the differences and discrepancies examined.

**Key words:** public transport, fare, fare prepayment, ticketing system.

**Ref. number:** 220-047-2-2

**Title:** Investigation into passenger satisfaction on the scheduled local bus services operated by *Borsod Volán Ltd.* at city of Ózd.

**Responsible leader:** Mrs. Endréné Trepper

**Contributor:** Lajos Vass

**Commissioner:** Borsod Volán Rt.

**Consultant of the Commissioner:** Bertalan Fukker

**Starting and finishing dates:** 22.02.2002 – 31.05.2002.

**Abstract:** In 2001 the TRANSORG division of the KTI carried out an investigation into user satisfaction related to local public transport services in 54 settlements of the country, including Ózd. The *Borsod Volán company* providing the local bus service for the town of Ózd made a rationalisation on the local public transport network of the town following the investigation, and the company wanted to receive information on the reaction of the passengers. In order to do this, the company required a repeated survey in 2002 – using the same system as in the previous year – and an absolute and relative evaluation (in relation to the year 2001) with the purpose of evaluating the criteria and possibilities which promote better passenger service. The representative personal sampling interviews included the following items:

- journey characteristics,
- passenger satisfaction in the fields of basic and supplementary services,
- estimation of the environmental protection activity of the Volán company,
- estimation of the participation of the municipality and state in public transport activities.

**Key words:** public transport, local bus transport, passenger's satisfaction, level of service, Ózd.

**Ref. number:** 220-057-1-2

**Title:** Evaluation of the transport safety situation of the concessionaire companies involved in local bus transport.

**Responsible leader:** Dr. István Zsirai

**Contributor:** Ms. Anna Kocsis

**Commissioner:** KöViM

**Consultant of the Commissioner:** András Székely

**Starting and finishing dates:** 03.01.2002 – 30.11.2002.

**Abstract:** The Minister of Transport concluded six concession contracts for scheduled inter-town bus transport services in 1996, namely for 5 new services:

- *Szigetújfalu – Szigetszentmárton* inter-town bus line, operator: STROMI BUSZ concessionaire limited partnership company,
- *Dunaharaszti – Alsónémedi – Dabas* inter-town bus line, operator: NEXUS BSZ concessionaire Ltd.
- *Csömör – Budapest Örs vezér square* inter-town bus line, operator: CSÖMÖR BUSZ concessionaire Ltd.
- *Nyíregyháza – Kótaj – Buj – Tiszabercel - Gávavencsellő* inter-town bus line, operator: Trans-Tour '96 transport concessionaire Ltd.
- *Hódmezővásárhely – Szeged* inter-town bus line, operator: HÓD-MEZŐ concessionaire Ltd.
- *Zalaegerszeg – Budapest* long-distance services, operator: GRATIS '96 bus transport concessionaire Ltd.

The licence contracts were concluded for a period of 10 years, with one exception in the case of the service between *Szigetújfalu* and *Szigetszentmárton*, which was concluded for a period of 5 years up to 2001. Following a tender, the licence of the operator has been extended for a further 5 years, and so the activity of this company will expire in 2006.

In the framework of the project the activity of six operating companies has been evaluated from the following points of view: do their services correspond to the conditions of the contract; can their further operation activity be considered as assured; and how can they fit into the national system of scheduled bus transport operation.

**Key words:** public transport, bus transport, local bus transport, concession.

**Ref. number:** 220-048-1-2

**Title:** Proposal for the further development and alteration of the tariff and allowance system related to local and inter-town bus transport.

**Responsible leaders:** Dr. János Berényi; Dr. István Zsirai.

**Contributor:** Ms. Anna Kocsis

**Commissioner:** VOLÁN Egyesülés

**Consultant of the Commissioners:** Ms. Dr. Ildikó Marcsa

**Starting and finishing dates:** 03.01.2002 – 31.10.2002.

**Abstract:** The research project deals with the following issues corresponding to the tasks to be resolved:

- the development and alteration of the tariff and allowance systems of scheduled local and inter-town bus transport,
- the solutions of the regulation for the tariff and allowance systems in Western Europe and the methods used in practice and
- an economic analysis of the operating system of bus transportation.

In order to carry out the tasks involved in this project, an analysis dating back to 1950 was made of the following: juridical regulation, the effectiveness of the price law, price levels, the development of revenues and costs of bus transport activities, and the appropriateness of the ticket and season ticket systems. The project surveyed the prevailing situation, and on the basis of various targeted analyses, set down the problems which arose.

In the course of the elaboration of the section dealing with development, the following issues were investigated:

- forecasting the amount of bus transport to be performed, the revenues to be expected and their composition,
- showing the practice and the regulating system of the EU,
- elaborating recommendations for the renewal of the tariff level, of the financing system (subsidies for fares), structure of the travelling documents, and of the fare-collecting system.

**Key words:** public transport, bus transport, tariff, fare, fare prepayment, financing.

**Ref. number:** 220-071-2-2

**Title:** Elaboration of the competition system for the budgetary support assured for the development of the logistics service centres.

**Responsible leader:** Dr. István Zsirai

**Commissioner:** MÁV Rt.

**Consultants of the Commissioner:** Dr. Attila Csaba; Lajos Nagy.

**Starting and finishing dates:** 06.05.2002 – 30.11.2002.

**Abstract:** In accordance with the aim of the research project, a recommendation has been elaborated for the competition system to be used in the state support of the logistics service centres. In the course of the elaboration the following items were formulated:

- the target of the support,

- the competitors involved,

The following issues were also elaborated:

- the conditions of competition,
- the areas and proportions of support to be won through competition,
- the expedient choice of the method for the submission of competitions and of their deadlines,
- the aspect-system of the evaluation,
- the recommended shaping of the decision mechanism for the competition.

In the course of the elaboration of the competition system, *Governmental order № 163/2001(IX.14.)* on the exemption from the interdiction of the state supports given to the undertakings, which shall determine basically the uniform order of the supports to be given to the association formed for the establishment of the logistics service centres, was considered.

**Key words:** logistics service centre, financing, government funding.

## *Division of Transport Economics*

**Ref. number:** 271-005-1-2

**Title:** The corridor approach surveying of disturbances caused by road traffic.

**Responsible leader:** Árpád Tóth

**Commissioner:** IV. Országos Környezettudományi és Természetvédelmi Kutatási Pályázat  
National project for the surveyance of the protection of nature and the environment.

**Starting and finishing dates:** 01.04.2002 – 31.12.2002.

**Abstract:** Real traffic (transport) demand raised by society or the economy is always developing between geographic points or areas. However, a demand may be met on several alternative routes, and also by different means of transport. This justifies the corridor or transport corridor approach, which operates these routes and the transport modes together.

The inconveniences (accidents, health damage, air pollution, climatic changes, noise impacts, congestion, urban impacts, land/territory use, and irreversible processes) are all known individually. However, the management of the different elements, the objective comparison of these elements and of their effects on the examined field cannot be imagined otherwise but by generating the total social (external) costs.

On the basis of detailed Hungarian transport data (traffic volume and composition, noise and emission, accident data, etc.) a methodology has been elaborated, and on this basis, in a definite relation (*Budapest-Győr-Hegyeshalom*/road-railway-inland waterway connection), the elements of the external costs are determined by sections, and hence the environmental loading by route sections can be quantified. The applied approach is in accordance with the proposals and recommendations of the best EU practice. Using this process (outside the frameworks of this project) traffic nuisances caused to the environment can be objectively determined for the whole country.

On the one hand, the planning of new transport infrastructure investments are helped by the results (in the pre-decision phase), and on the other hand, those geographic areas are explored where local authorities, and ministries concerned (environment, transport, health, etc.) have to introduce ulterior provisions for the mitigation of the expected damages in the appropriate order of importance.

**Key words:** costs, external costs, social costs, environmental load.

**Ref. number:** 271-007-1-2

**Title:** Evaluation of the *VOLÁN* companies' market position; proposal for a concept designed to preserve the market position and to develop future ownership structure alternatives.

**Responsible leader:** Dr. József Pálfalvi

**Contributors:** Dr. József Pálfalvi; István Vas; Mihály Békefi; Ms. Lászlóné Lukács.

**Commissioner:** *VOLÁN* Egyesülés

**Consultant of the Commissioner:** Ms. Dr. Ildikó Marcsa

**Starting and finishing dates:** 01.03.2002 – 30.09.2002.

**Abstract:** Research carried out in 2002 was aimed primarily at the surveying and evaluating of the market position of the *VOLÁN bus-companies*, and, on the basis of the expected future tendencies of the EU bus-transport market, at the elaboration of proposals designed to preserve and improve this position. In this context, it also seemed necessary to elaborate the strategy elements of optimal expansion and privatisation, allowing the *VOLÁN* companies to make arrangements for any unforeseeable, unfavourable phenomena, and to exploit the implied

transition benefits of the EU accession, to lessen, and eventually eliminate the expected negative effects.

In the EU passenger transport market, and in the field of public bus transport a new type of public service appears among future priorities; it is market-based, nevertheless, operated subject to highly regulated allocations and larger, but decentralised supports. It includes such efforts as to eliminate cross-financing and public service obligations and to apply a tariff rating which reflects real costs, but is based on marginal cost. With permanent development and sustainable mobility in sight, the improvement of public services is directed at increasing efficiency, harmonising the transport modes (through combined and common investments), as well as improving infrastructure availability (e.g. through the linking of the networks).

It is a clear strategic company goal that VOLÁN companies have to present a competitive alternative in comparison with individual transport. Of course, this has to be maintained in future, too, and in addition, it may no longer be possible to concentrate strictly inside the country borders, but the dangers involved by the opening of the Hungarian market, and the possibilities of penetration into the foreign market must be considered equally. The companies should be pooled, not only to maintain their existing travelling public versus their foreign competitors, but also to increase the market share through participation in the new markets. This is supported by the international experiences gathered so far by VOLÁN bus companies, the existing system of networks, the strong infrastructure background and the repute of these companies merged together.

In general, there are three well defined players acting the main executive role in privatisation and in the case of the VOLÁN companies, too:

- the state, as owner (*ÁPV Rt.*);
- business companies to be privatised (VOLÁN bus companies) and their characteristics;
- possible investors (workers, management, local authorities, investors of the profession).

In the process of privatisation only the business company which is to be privatised is not in a position to take decisions; however in the pre-decision phase – anticipating the events – it can play a serious role. Nevertheless, this requires suitably thorough grounding to handle the expected effects of possible and probable versions of privatisation.

**Key words:** public transport, bus transport, passenger transport market, privatisation.

**Ref. number:** 271-011-1-2

**Title:** Basic institutional tasks to be implemented in order to achieve the activities subsequent to the closing of the chapter on transport policy.

**Responsible leader:** Mrs. Dr. Istvánné Csejtei

**Commissioner:** GKM

**Consultant of the Commissioner:** Rezső Hupfer

**Starting and finishing dates:** 02.05.2002 – 29.11.2002.

**Abstract:** The connection between Hungary and the EU, that makes accession a reality, dates back several years. The long process starting with the conclusion of the 1991 Treaty on Association and lasting right up to the probable obtaining of full membership on 1 May 2004 is hall-marked by important stations. Preparations were made according to precise Union expansion programme formulating requirements for the applicant countries. The applicants' reflections to these requirements were included in documents, programmes and government resolutions which implied at the same time the schedule of the operations, such as: *The Programme on law Harmonisation*, the *National Programme of the Adoption of the Community Achievements*, etc. Starting in 1999, the arrangements were also supported by different Union funds (*Phare, ISPA, SAPARD*); their role after accession will be taken over by the *Cohesion and Structural Funds*. Utilisation of the support provided by these funds has to be consolidated through programmes which are in compliance with comprehensive and sectoral national development concepts, however reflecting EU priorities, as well. In order to meet this requirement, the *National Development Plan* and five *Operative Programmes* attached to it have been elaborated.

From the point of view of transport, it was important that in December 2001, the closing date of the chapter on negotiations, with its results and the statements of the last country report of November 2002 – implying the starting point of further arrangement activities – determined the tasks to be implemented up to the accession in relation to all problems, from developments to legislative harmonisation, and from institutional development to the improvement tasks of the field concerned by derogation.

**Key words:** EU accession, financing, Hungarian National Development Programme, harmonisation.

**Ref. number:** 271-012-1-2

**Title:** Post-accession prospects of competitiveness for the Hungarian enterprises engaged in road haulage and passenger transport, with special regard to expenses.

**Responsible leader:** Mrs. Dr. Istvánné Csejtej

**Commissioner:** GKM

**Consultant of the Commissioner:** László Ágai

**Starting and finishing dates:** 25.04.2002 – 29.11.2002.

**Abstract:** The Europe today – both the EU member states and the Central Eastern European countries – faces a new challenge, namely the *challenge of integration*, which involves both *risks* and *possibilities* for both parties, for the old and the new member states alike. The most decisive question of the enlargement is whether in the implementation process of the integration the “*comparative benefits*” implied by various potentialities of the different countries will be able to be used, since in this case the Union’s enlargement will create the possibility of economic and social development, evolution, and political stability never seen before. The Union’s enlargement will affect the sphere of operation and the terms of competition between the participants of the market. Arising from the structure of the market, the problem of maintaining competitiveness prevails most acutely in the freight market.

*Evaluation of the present situation from the aspect of competitiveness, determinants:*

1. Segmentation of the market, differences in costs: CEE hauliers, due to lower wages, offer services at depressed prices mainly on the conventional freight market. Lower wages are counterbalanced in the other segment of the market by better quality services provided in the EU, since they are more profitable.
2. Sharp separation of the international and domestic segments of the Hungarian freight market.
3. Formation of market sharing: the share of the CEE countries is greater in the conventional freight market, whereas in the segment of complex services the EU hauliers are in a more advantageous position.
4. Efficiency differences: from the point of view of almost every indicator, the EU hauliers are in a more advantageous position (ratio of useful time, running performance, etc.)
5. Profitability differences: due to profitability differences in the two segments, the profitability of EU hauliers is higher.

*Expected tendencies:*

1. Elimination of licence limitations
2. Probable development of the freight market share: both country groups keep their current position
3. Further expected shift in the structure of demands into the direction of more complex services

*Improvement possibilities of competitiveness:*

1. Modernisation of the vehicle fleet.
2. Implementation of network-like organisations.
3. Improvement of marketing activity.
4. Increased use of services provided by logistic centres.
5. Increased utilisation of information technology.

**Key words:** competition, pricing, logistics, international freight market, freight licence, market segmentation, market share.

**Ref. number:** 271-014-1-2

**Title:** User-friendly transport system, implementation possibilities of the objectives of the EU White Paper.

**Responsible leader:** Mrs. Dr. Istvánné Csejtei

**Commissioner:** GKM

**Consultant of the Commissioner:** Rezső Hupfer

**Starting and finishing dates:** 15.05.2002 – 29.11.2002.

**Abstract:** With the formation of the uniform European transport market, the intensifying competition and the fight for clients among the competing agencies made the enhancement of the role of the demanders, the road users unavoidable. This is also reflected by the Union's recent transport policy, since the White Paper's whole chapter: "*The road users in the focus of the transport policy*" is dedicated to this subject, giving strategic importance to road users' services. Within the framework of this topic, the White Paper discusses the problems of road safety, the amount to be paid by road users for the service provided, the rights and duties of road users, as well as emphasising the problems of urban transport. These problems are timely in Hungary, too, and because of the differences resulting from their different levels of development, and, though quite a few problems must be dealt with differently, the Union's standpoint and recommendations are a good "*cliché*" from the point of view of the elaboration of the Hungarian transport policy.

**Key words:** EU White Paper, sustainable mobility, road safety, urban transport.

**Ref. number:** 271-015-1-2

**Title:** Hungarian interpretation of the "*White Paper*", the transport policy of the EU Commission valid up to 2010.

**Responsible leader:** Mrs. Dr. Istvánné Csejtei

**Commissioner:** GKM

**Consultant of the Commissioner:** Rezső Hupfer

**Starting and finishing dates:** 15.05.2002 – 29.11.2002.

**Abstract:** In the preparatory period the tasks are twofold:

- Closing-up, adaptation, "harmonisation";
- Separate management, eventual maintenance of characteristics, or taking special steps, application of suitable tools.

In the field of transport, the *White Paper* on recent Union transport policy, which *clearly and unambiguously lays down the principles of future transport development up to 2010, provides good orientation*. Studying the Union transport policy, a conclusion may be drawn that in our age there are such general challenges which more or less are present in every country, therefore their management and the responses given are also similar. This is the explanation of why the Hungarian transport policy issued almost simultaneously with the community's transport policy contains many similar ideas, and comes to the same conclusions as the *White Paper*. There are currently two challenges which must be faced and which need to be answered appropriately:

- Managing by the implementation of the tools of "sustainable mobility" the implying negative effects of transport developments;
- Enlargement of the EU.

In order to respond to the challenge attached to enlargement, the such an *enlargement strategy* has been elaborated by the Union as would mean the solution of the tasks suggested by such milestones as the *uniform market – uniform regulation – uniform network*. The applicants have to be added into this system. In order for this integration to be accomplished successfully, appropriate trends and a degree of *law harmonisation* and *infrastructure development* need to be formed and achieved.

The approach of the applicants is slightly different. Notwithstanding that the interests laid down by the Union coincide with the national interests of the future member states, there are some viewpoints which are more important for the applicants than for the EU. Primarily, improvement of the competitiveness of the national transport enterprises should be thought of, but a specific interest in the priority order of the infrastructure development, the degree and timing of the liberalisation of the access to the market, etc might also be discovered. These are specific national interests which had to be emphasised with as equal force in the negotiations on accession as during the preparation process. Accordingly, the *similarities and divergences*, the *identities and differences of the interests* between the Union and the applicants, namely, Hungary, can be defined. These points should be highlighted and with simultaneous consideration of the two aspects, the proper solution sought.

**Key words:** EU White Paper, sustainable mobility, harmonisation, infrastructure development, EU enlargement.

**Ref. number:** 271-016-1-2

**Title:** Application conditions and the effects of the motor vehicle taxation system in conformity with the EU proposal; the possible mode of regulation.

**Responsible leader:** Ms. Dr. Mária Magdolna Szabó

**Commissioner:** GKM

**Consultant of the Commissioner:** András Székely

**Starting and finishing dates:** 24.04.2002 – 28.06.2002.

**Abstract:** The research tasks were to revise the domestic taxation system of goods transport vehicles, to evaluate the requirements for EU compliance, and to make a relevant proposal for the elaboration of the desirable taxation system, also taking into consideration Hungary's transitional tax exemption provided by the accession negotiations.

Within the framework of the research, detailed calculations have been carried out in order to clarify the points where, and the degree in which the current vehicle taxation system does not meet the relevant requirements of *EU Directive 1999/62/EC*, and the conditions under which the Community expectation could be ensured. According to the findings, if the current taxation system is maintained, the achievement of minimum Union vehicle tax could necessitate a very significant tax increase and/or radical reduction of the tax allowance currently ensured for environmental friendly vehicles; this would mean unfavourable impacts for the freight market, and vehicle modernisation.

In order to establish a workable taxation system, the Austrian, German and Dutch taxation practice has been surveyed. Taking into consideration the experiences, a proposal has been submitted on the following subjects: desirable transformation of the national taxation system; changing of both the structure and the base of the tax; classification of freight vehicles according to number of axles; reasonable tax rates and the system of tax allowances.

Due to the existing tax rates and constraints of the community expectations, the introduction of the proposed system, though in a moderate extent, already involves necessarily a tax increase which would hit the EURO-norm compliant vehicles hard. Therefore, it would be desirable to make use of the transitional exemption offered by the Union applicable for the *EURO-2* and *EURO-3* vehicles exceeding 25 t gross mass and operated in domestic traffic only. In practice, however, in the absence of taxation on vehicle trains, this cannot be solved.

**Key words:** motor vehicle tax-system, harmonisation, freight vehicles.

**Ref. number:** 271-017-1-2

**Title:** Elaboration of the distribution system of the road haulage licences used in 2003 through the revision of the former systems and the re-evaluation of the impact mechanism of preferences.

**Responsible leader:** Ms. Dr. Mária Magdolna Szabó

**Commissioner:** GKM

**Consultant of the Commissioner:** András Székely

**Starting and finishing dates:** 21.05.2002 – 31.10.2002.

**Abstract:** The task of the research theme was to survey the former distribution system of the international road freight licences, evaluate the quantified results and effects of the distribution and lay the basis for the 2003 activity. Surveys have been extended to 817 international road freight enterprises and examined the availability of the current licences (Austrian CEMT, universal lines and EU transit, as well as Italian CEMT, loco-transit, and third country). Results of the analysis carried out with the help of the multi-criteria mathematical-statistical method and the SPSS programme are summarised in 30 tables. According to the evidence represented, the success of the system applied until now is that, beyond being based on the principle of market protection and the encouragement of vehicle fleet modernisation, it is due to this that the composition of the international vehicle fleet is outstandingly good, and also the process of changing the modern vehicles to even more sophisticated ones has been started. However, the negative impact is the dispersion of the licence quotas of some enterprises, their unjustified differentiation and the practice of the exclusive issuing of licences making “incidental” haulage possible.

Quotas do not allow a basic change in the 2003 distribution of licences. Therefore, proposals of the research theme are restricted to smaller corrections only. These include determination of lower and upper limits for licences, issuance of additional licences for EURO-3 vehicles only and increased control of the utilisation of licences.

**Key words:** goods road transport, freight transport, international haulage, freight licence.

**Ref. number:** 271-018-1-2

**Title:** Replacement possibilities and terms of licensing regulation in scheduled passenger transport with special regard to community ruling of public service obligations.

**Responsible leader:** Ms. Dr. Mária Magdolna Szabó

**Commissioner:** GKM

**Consultant of the Commissioner:** András Székely

**Starting and finishing dates:** 25.04.2002 – 29.11.2002.

**Abstract:** The task of the research was the itemised surveying of the valid national regulation of scheduled road passenger transport, its collation with the legislative system of the community, and accordingly, the elaboration of a proposal relating to the ensuring of an EU compliant, high service level new regulation and order.

Revision of national regulations has been extended to the licensing obligation, the conditions of access to the profession, the problems of price control and financing, and the related rules on market regulation, exploring the tensions and problems to be solved in actual regulation. From the rules of the Union, in addition to those relating to access to the market and state subsidies, special attention has been paid to existing regulation of public service obligations and planned new community regulation of public service requirements.

In conformity with the research results, in the long term the introduction of a regulation ensuring controlled competition, and based on tendering is desirable, while in the short term, also taking into consideration the demand to privatise the state owned companies, the only objective to be set is to take the activity out of the concession-bound sphere, and to develop a contractual system. Accordingly, the proposal elaborated for regulation specifies the statutory and executive levels of legislative duties including the regulatory problems of responsibility, access to the market, public service obligations and loss-financing.

**Key words:** public transport, public service, passenger transport, concession, regulation.

**Ref. number:** 271-019-2-1

**Title:** Views and requirements relating to the cross-locality road sections of the national road network (on the basis of the character of the built-up areas, determination of territorial differences – county, region).

**Responsible leader:** Mihály Békefi

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** András Rétháti

**Starting and finishing dates:** 21.09.2001 – 28.02.2002.

**Abstract:** Surveys concerning the sections of the national road network passing through built-up areas were carried out with the help of questionnaires, opinions and demands of the population were inquired. The findings of earlier surveys were also used. 110 built-up settlements were involved. 10 interviewees over the age of 18 were chosen from each settlement. The sample amounted to 1104 elements. Each Hungarian county and region, and the areas surrounding the actual and planned expressways, as well as the areas not affected by them, were represented in the survey.

In compliance with the number of composing elements, the sample represents the population of the villages, as well as the villages themselves. Our results were precise.

Inquiries were addressed to the relationship between the place of residences and the public roads (distance), the impact of public roads, the use of exit roads of the settlements, opinions on road characteristics and impacts of expressways.

Processing was carried out on the basis of various viewpoints among which the study by regions stood first on the list. Within the bounds of possibility, a comprehensive picture was provided by the results. Hereby, the most interesting findings are summarised.

Population has superficial information on the status of the roads. The size of the built-up areas by population, and the average distance of residences from the public road sections crossing the built-up areas are inversely proportional.

Effects of public roads affect most adversely the population living in the built-up areas of Hungary's central area, and the western Transdanubian region. Women are more sensitive than men to disturbing effects. It is more common with men than with women that for travelling purposes the habitation is left. Territorial differences are not significant in transportation frequencies.

Passenger cars are the most frequently used means of transportation, followed by buses, while railways and bicycles have an almost equally low ratio of usage in villages. As far as exit cycle tracks of the built-up areas are concerned, there are great differences between the different regions.

<b>Factors</b>	<b>Best</b>	<b>Most unfavourable</b>	<b>Rating divergence</b>
Road connection	South Transdanubia	North Hungary	0.75
Traffic	South Transdanubia	Central Hungary	0.67
Road condition	Central Transdanubia	North Hungary	0.62
Change of road	West Transdanubia	Central Hungary	0.41
Road width	Central Transdanubia	North Hungary	0.37
Safety	Central Transdanubia	North Hungary	0.25
Total	Central Transdanubia	North Hungary	0.26

The impact of expressways is evaluated differently by the population living along the existing roads, the future roads and by the population of the areas which will not be affected in the foreseeable future.

**Key words:** road transport impacts, statistical survey, statistics, national road network.

**Ref. number:** 271-023-1-2

**Title:** Actualisation of the chapter on the development of the Hungarian transport policy.

**Responsible leader:** Mrs. Dr. Istvánné Csejtei

**Commissioner:** GKM

**Consultant of the Commissioner:** Rezső Hupfer

**Starting and finishing dates:** 15.05.2002 – 29.11.2002.

**Abstract:** In 2001 the first version of the mid-term strategy plan of the transport development was prepared as chapter 2 of the renewed Hungarian transport policy. More than one year

passed and the accelerated events of nowadays, and the almost constant changes meant that a revision of the development plan was already due. This is important, because the *National Development Programme (NDP)*, accepting and harmonised with the main strategy development trend, will become, following accession, the collection of projects possibly enjoying union support. Therefore, we are financially interested in seeing that the expectations on transport development planned up to 2006 draw up positive and real demands, and if the *NDP* is based on them, then the national resources will be supported with significant union assistance. This development plan must agree with union priorities, but it must also help the Hungarian entrepreneurs to close the gap. Contrary to the original development strategy of 2001, the present document indicates 2006 as a *time horizon*. Primarily, practical reasons (EU fiscal year, date of parliamentary elections) justify the one-year extension of the validity. Of course, plans and strategies are worth as much as they are implemented. And, implementation always depends on the *magnitude* and the *efficient utilisation* of the *available resources*. Therefore, it is clear, why the problems of financing are emphasised in the study. Different sub-sectoral development plans were compiled with the involvement of experts and allowing for the relevant demand on funds. Primarily, in order to increase the purchasing possibility of support, the expert group already focused on union priorities at the time of selection of the projects.

**Key words:** EU White Paper, transport policy, financing, PPP, public-private partnership, government funding.

**Ref. number:** 271-024-1-2

**Title:** Study of heavy cross-border traffic based on aspects of road management.

**Responsible leader:** Mrs. Dr. Ervinné Szentés

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Balázs Farkas

**Starting and finishing dates:** 06.05.2002 – 30.11.2002.

**Abstract:** Because of overweight and oversize vehicle traffic, special attention should be paid to the protection of the highway network and its facilities (especially bridges), since overweight cargoes overburden the pavement structure in an essentially greater than average extent, and as a follow-up to EU accession, higher GVW and axle weight limits are to be expected, which will require the construction of roads with appropriate bearing capacity. The time-series data concerning the inbound heavy cross-border traffic was processed for the period from 1999 to the first half of 2002. Analysis was carried out on the basis of route permission types, the character of the traffic, vehicle nationality and the crossing points. 2% of the vehicles were permission-bound, which, due to the continuous increase in freight traffic would result in the probable entry of 34,000 heavy vehicles. In heavy cross-border traffic, following a continuous increase in the number of oversize vehicles, a light decrease was experienced in 2002, while the number of overweight ones grew. The number of vehicles with excessive axle weight is three times that of overweight ones. Directional traffic is higher than transit traffic. Comparing the heavy vehicle traffic of the Union and other countries,, the rate of transit is 1:2.7 and of directional traffic: 1:2.0 Using the vehicle traffic data, traffic volume maps of the national public road network were prepared, illustrating well the transit and directional traffic volumes of the public roads. By surveying the transit/directional distribution of the heavy traffic at different border crossing points, it may be stated that transit is higher at the southern border sections, while directional traffic is higher at the western and northern parts of the borders. These data may be used directly in the pavement development and strengthening plans of road management.

**Key words:** traffic data, traffic flow rate, traffic volume, data-collection, border crossing, overweight vehicle, overmass weight, excessive axle-weight.

**Ref. number:** 271-026-1-2

**Title:** Effect analysis concerning the adoption and introduction of the International Vehicle Weight Certificate elaborated by *SECI (South-east European Co-operative Initiative)* and the UN-ECE for goods road vehicles.

**Responsible leader:** Mrs. Dr. Ervinné Szentés

**Commissioner:** GKM

**Consultants of the Commissioner:** Tamás Zsolnay; Ms. Zita Egyházy.

**Starting and finishing dates:** 15.08.2002 – 31.10.2002.

**Abstract:** The Hungarian version of the *International Vehicle Weight Certificate (IVWC)* elaborated by SECI and UN-ECE has been prepared. The national adoption of the IVWC is important because in addition to accelerating the speed of transit shipments, as originally targeted, it also certifies the technical co-operation of member countries and the mutual approval of each other's competence. The format of the Certificate remained unchanged for the sake of the bilingual (English-member state) applicability serving the aim of its introduction in practice. As for the text of the Certificate, a great number of notes have been made, which on the one hand forecast the application of relevant Union rules (e.g. international vehicle category, code number of the certificate), and on the other hand relate to the harmonisation of the measuring tools, the agreement to be concluded on the limits of measuring errors and the application of the code system. As long as no final member state agreement is concluded in these questions, they should be raised on the occasion of a subsequent meeting of experts. The chapter on Sanctioning also conveys many problems. It is not unequivocal from the two parties signing the certificate, who is the offender, and how the offence can be settled. A well-developed measuring system is missing. Different versions of the mode of implementation have been presented.

**Key words:** weight certificate, SECI co-operation, weight control, measuring accuracy.

**Ref. number:** 271-027-2-2

**Title:** The updating of the system of registration of the mechanical equipment at the public utility companies (Kht).

**Responsible leader:** Dr. László Anda

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Tamás Künnle

**Responsible leader of the Commissioner:** Örs Füleký

**Starting and finishing dates:** 04.01.2002 – 30.11.2002.

**Abstract:** The study tasks can be divided into four groups:

a.) *Studying the necessity of supplying the equipment with registration plate for operation purposes in road traffic*

Presently, one part of the machine stock at Kht-s are not equipped with registration plates. This may result from the fact that its need and the sanctioning for participation in traffic without registration plate varies in different counties. Deliberate updating of the whole system of regulation could eliminate contradictions.

b.) *Evaluation of the composition of the vehicle fleet engaged in winter maintenance and specification of the snow-clearing demands*

According to calculations, from the Kht-s' available vehicle fleet only vehicles purchased after 1995 are capable of carrying out winter maintenance activities. Due to engine performance and the technical conditions, if the depth of snow 20 cm or more, then it is difficult to ensure the serviceability of the main roads. Mechanical management at 14 Kht-s declared 39,3% of the vehicles and 40.7% of the UNIMOG-s as inadequate from the point of view of winter maintenance.. This unanimously supports the fact that the outdated, worn out equipment has to be changed.

c.) *Evaluation of the composition of the available snow-cutting/blowing accessories and determination of the necessary performance for snow-cutters.*

Most of the fleet of special high performance snow-cutters consist of the 61 worn out special purpose ZIL machines. Basically, 95% of the fleet is in want of reconstruction, because the equipment is outdated, old, in bad technical condition, and needs repairing. The insufficient supply of spare parts and the significantly deteriorated technical conditions frequently mean that the machines are unworkable. With the exception of some relatively new machines (one ZIL D-262 and two ZIL-s D-470/131) the facilities to be renewed consist of 58 snow cutters (ZIL D-470) purchased in the 1970-s. Their average service life is between 30 and 37 years. Essentially, of the existing equipment of the Kht-s', the single purpose snow cutters, the UNIMOG equipment carrier and the small capacity adapters for snow cutting and blowing must be updated or replaced. Having studied the operational characteristic of the high capacity self-propelled snow cutters/blowers with different layout, it is considered that purchase of the special single-purpose snow cutters, notwithstanding that they are the most appropriate for snow cutting purposes, is not recommended because of the short period of the Hungarian weather extremities and economic reasons.

*d.) Updating the registration systems of the mechanical accessories*

Statutory specifications are only partly implemented by the Kht-s' existing registration system. The updated registration system has to contain full-scale data concerning the purchase, operation and replacement of mechanical equipment. The three databases grouped on the basis of necessary information are developed on one another and are only capable of rendering combined information. Furthermore, the updated system is also connected to a calculation method specified within the framework of theme № 6513.G.5/2001, making the unanimous determination of the machine operational costs possible.

**Key words:** fleet of winter maintenance equipment, serviceability of machine stock, registration system, costs.

**Ref. number:** 271-029-1-2

**Title:** Implementation of Hungary's partial TER-related tasks on the basis of *Government Resolution 2003/2001(I.17.)*.

**Responsible leader:** Árpád Tóth

**Commissioner:** GKM

**Consultant of the Commissioner:** Ms. Ágota Bérczi Halmosné

**Starting and finishing dates:** 01.07.2002 – 15.12.2002.

**Abstract:** Hungary's adhesion to the UN-ECE/TER Project (Trans-European Railway /Co-operation Trust Found Agreement/) has been prolonged for the period 2001-2005 in compliance with *Government Resolution 2003/2001.(I.17.)*.

In October 2001 KTI made and won a tender valid for 2 years for the elaboration of the relevant tasks. The scheduled tasks were elaborated and fully approved by the Commissioner. The present contract is the continuation of the work of the year 2002.

The maintenance, completion, necessary actualisation, and modification of the TER database of the Hungarian railway lines and documents such as the *Hallstatt Agreement*, *TER Decision № 2.06.98* and the *Data Entry Manual (V 9.04.2001)* have been used.

The database includes 14 chapters addressed to basic data, comprehensive country data, codes, line sections, junctions, bridges, tunnels, overpasses, passages, operating data, locomotives and motor-coaches, passenger cars, trucks and combined transport.

Data obtained from competent organisations and railway companies are included into the database after control, interpretation and necessary recording. A responsible TER data expert for Hungary was selected and appointed from the KTI experts. In accordance with the database, coloured maps have been prepared showing the TER, AGC/AGTC and the Pan-European railway lines.

**Key words:** TER Project, railway database, infrastructure data, operational data, rolling stock data.

**Ref. number:** 271-033-1-1

**Title:** Comparative analysis of road transport

**Responsible leader:** Dr. József Pálfalvi

**Contributor:** Mihály Békefi

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Gábor Ercsey

**Responsible leader of the Commissioner:** Károly Mayer

**Starting and finishing dates:** 10.09.2001 – 22.04.2002.

**Abstract:** In 2000, in the EU member states a survey, “*European travel – who does the best?*” was carried out by the *Automobile Association of the United Kingdom*, with the aim of an overall investigation into traffic practices. Such a detailed inquiry covering almost all the “delicate” questions was not carried out in Hungary (or in other Central and Eastern European countries), although some fields of the subject have already been included in former appraisals. On the basis of the EU survey and bearing in mind comparability, the objective of the research was a complete investigation into Hungarian traffic practices, including questions on travelling reasons, fleet data, advantages and disadvantages of vehicle ownership, evaluation of car usage characteristics (drinking and driving, loyalty, attitudes, annual running performance), comparison of the opinion of the road users concerning the volume of taxes payable and the utilisation of the taxes.

The study has three main parts: *exploration of the literature sources* tries to discover user attitudes, the respected or neglected statutory or social norms. If the density of the road system is used, which is provided by the OECD as one of the indicators of the road sector, the total length of the Hungarian national public roads just exceeds 40% of the value justified by – on the basis of similar values in other countries– the density of the population and the railway network. The expected future improvement of the living standard in Hungary results in an abrupt increase in mobility, partly due to the greater use of the existing passenger car fleet, and partly to vehicles recently entering into operation, which further increase the expected congestion.

The *survey* described in the second main chapter was carried out in the second period from 7<sup>th</sup> to 24<sup>th</sup> November 2001. The target group of the survey were drivers who had been users of the road. The opinion of the service users (passenger car drivers) was explored in questions posed in personal interviews. The sampling procedure was a so-called one-step stratified sampling (without repetition). The territorial location of the interviewees was the criterion of the stratifying. On the whole, according to the findings, Hungary follows the EU trend, and with the exception of traffic morals and culture, differences may be explained chiefly with the output of the economy, which, in general, is lower than that of the EU member states. If comparison is made, it is a disadvantage for Hungary that the network density of motorways and public roads, due mainly to economic reasons, is below the EU average by 80% and 50-60%, respectively, since in 1999, in Hungary the per capita GDP was only 51% of the EU average. In reality, the national indices are not that bad, as the state of development of the economy is lower. The low level of traffic morals and the driving attitude which also endangers safety can really be declared disadvantageous and negative. In the future, it will be indispensable to clarify the principles of the model of efficiency calculation for the road investments and to modify the method of calculation. A real result can be expected subject to updated output data. Within the framework of the study, the basic elements of specific travelling and transport costs, the value of *leisure time* were determined with the help of sampling according to questions posed in interviews. Based on the findings, the corrected average price/hour of renouncing free time is ~900 HUF/hour and corrected average price/hour of the acquisition of leisure time is ~610 HUF/hour.

**Key words:** traffic operations, traffic moral, network density, public road, leisure time, accident prevention.

**Ref. number:** 271-037-1-2

**Title:** Experiences of the operation and the possibilities for expansion of the motorway surveillance and control systems.

**Responsible leader:** Lajos Tóth

**Commissioner:** GKM

**Consultant of the Commissioner:** Zoltán Andricsák

**Starting and finishing dates:** 12.06.2002 – 20.09.2002.

**Abstract:** The study presents preliminaries of the installation of the system on motorways M1 and M3 and the operation of cameras and mobile surveillance groups. It analyses the installation circumstances of the processing unit (four camera /16/ positions + 1 server), the management of the databases, the safety of data transfer, and the related administrative and legislative background. A separate chapter addresses investment costs, equipment and personnel demands, as well as operational costs. International experience of electronic fee collection, and the systems already implemented and planned developments in European countries are described. Furthermore, operational experiences of the Hungarian experimental system are dealt with and proposals are made on possible trends and further developments. Up to the finishing date of the study, due to the ownership, legal, technical, economic, data safety reasons and the absence of an external audit, the experimental system was not fully operational. The study has drawn the final conclusion according to which the electronically controlled Hungarian vignette fee collection system enables passage without stopping, while the fee is not related to the distance travelled. This is not unique in European practice, but the future implies the introduction of distance related fee collection. This experimental system in itself is not appropriate for the implementation of this type of fee collection (nor was it designed to be), however it may have an important complementary role in distance related fee collection to be realised in the future. Therefore, the present system – improved and updated – must be maintained until there are enough financial resources available for the introduction of an automatic, distance-related system focused on heavy goods vehicles (see Austria).

There are three steps suggested for the introduction of the system:

1. Improvement of the existing experimental system that would embrace future operation, elimination of emerging technical and administrative problems, auditing, clarification of ownership relations, legal security of personal records, simplification of vignette purchasing, insurance in case of elementary damage or any external impairing, ensuring the possibility of initiating legal proceedings against unauthorised foreign users, surveillance of the police or action taking supervisors (accounts), and elimination of lengthy domestic civil procedures.
2. Improvement of electronically controlled vignette system that would include: enhancement of the existing system, extension of installations to additional motorway sections, taking into consideration the entry and exit motorway ramps as potential locations, enlargement of the system's communication capacity, increasing the number of mobile groups and their equipment.
3. Establishing the basis of a future automatic fee collection system that could include the planning of a mixed (automatic, camera-equipped, and mobile group) control system, staged implementation of the microwave technique, consideration of using the OBU, operation of further mobile groups, consideration of the foundations of the automatic payment system and elaboration of the parameters of an up-to-date system (permissible mass limits, emissions, vehicle category).

**Key words:** motorway pricing, registration plate identifier, camera-surveillance, database.

**Ref. number:** 271-038-1-2

**Title:** A comprehensive financing concept of the *Uniform Transport Authority (EKH)*.

**Responsible leader:** Dr. József Pálfalvi

**Contributor:** Mrs. Dr. Ervinné Szentes

**Commissioner:** Közlekedési Főfelügyelet

**Consultant of the Commissioner:** Ms. Ildikó Szerző Dalmayné

**Starting and finishing dates:** 22.06.2002 – 08.07.2002.

**Abstract:** The existing self-financing system of the *EKH* is task-related, regulated, and with some automation, which from the aspects of the transport inspectorates means that the more activities (e.g. technical examination of vehicles) are carried out within the framework of a given organisation (for example at a county transport inspectorate), the higher the income generated, and the higher the income is, the greater is the apparatus to be maintained. Of course, at the expense of higher operation costs. However, the system is inflexible in a way, because already inversely, it works less.

The relationship between tasks and their financing is harmonised if administration services are self-financing, imposed penalties and duties are financed in a combined form (difference between incomes and expenditures would be covered from the state budget), while the coverage for the expenses raised by official control and surveillance activities would be ensured completely by the budget.

Mixed financing implies some transformation of the organisation (more precisely internal transformation of the organisation), because the income by different activity types shall also be differentiated within each organisational unit. Only under this condition may the incomes and the expenses be adjusted (zero balance).

Further requirements:

- Elimination of cross-financing
- Itemised determination of fees
- Efficient (cost sensitive) management (including staff management, the employment of highly qualified experts, and adjustment of relevant statutory provisions).

**Key words:** financing, mixed financing, cross financing.

**Ref. number:** 271-042-1-2

**Title:** Development tasks in the activity of the body engaged in the allocation of the railways track capacity.

**Responsible leader:** Árpád Tóth

**Commissioner:** GKM

**Consultant of the Commissioner:** Dr. György Wagner

**Starting and finishing dates:** 10.09.2002 – 10.12.2002.

**Abstract:** The *Law on railways № XCV.* of 1993 amended in compliance with the EC directives relating to railways stipulates that the railway companies are obliged to pay track usage charges. Determination of the track usage charges is the responsibility of the infrastructure charging body.

The charge shall reflect the justified costs of the infrastructure organisation, which must be derived from the actual accounting order of the MÁV Rt.

Using the activity-orientated accounting system of the MÁV Rt:

1. the methodological principles of the establishment of service-orientated track usage charges connected to railway infrastructure use have been shaped,
2. the measuring system of the allowances, performance characteristic for infrastructure use have been determined,
3. the terms of application have been specified,
4. the accounting system of service-orientated pre- and after calculation of costs has been determined,
5. the relevant computer system has been elaborated.

**Key words:** railway track, costs, infrastructure charging, user charges.

**Ref. number:** 271-044-2-2

**Title:** The surveying demanded for the improvement of the system of Hungarian road institutions.

**Responsible leader:** Dr. József Pálfalvi

**Contributors:** Dr. László Anda; Mihály Békefi; Tamás Veress.

**Commissioners:** ORKA, UKIG

**Consultant of the Commissioners:** Dr. Imre Keleti

**Responsible leader of the Commissioner:** Csaba Csordás

**Starting and finishing dates:** 02.09.2002 – 30.09.2002.

**Abstract:** The Hungarian public road network can be rated, from several aspects, as being of medium level: the density of the paved public road system is low, the quality of the pavement of roads under state or local authority management was rated at 2,9 and 1,9 respectively. Consequently, the ownership structure is representative of the state of and the records on public roads; according to all aspects of the tests, the national (state) roads represent a slightly higher level than the average, while the local (local authority) roads are essentially below that level.

In the classification of the network of national public roads, national public roads are in state ownership, while local public roads are the property of local government. Due to ownership differences the financing resources are also different.

In the existing financing system (interference with transparency), it is difficult to determine the magnitude of the revenue raised from road transport (besides fuel sales, vehicle sales, maintenance, parking charges). For decades, both national and local roads obtained resources for development and maintenance on the basis of the rest-principle, notwithstanding that in the case of local roads neither the funds generated nor the expenditures afforded to maintenance and development of the public roads can always be followed.

The present ownership, institutional and financing system, although harmonised, is one of the obstacles that hinders the progressive maintenance and faster development of the whole network of public roads. Implementation of a uniform system needs thorough consideration of the existing situation. Many statutory rules must be modified (laws on public transport, local authorities, company law). A transformation should resolve the existing problem: increasing the number of public roads and upgrading.

**Key words:** public roads, road network, asset value of road network, road network management, financing, ownership.

**Ref. number:** 271-045-1-2

**Title:** The reorganisation concept of the *Győr-Sopron-Ebenfurt Railway Co. (GySEV Rt.)*

**Responsible leader:** Dr. József Pálfalvi

**Contributor:** Tamás Veress

**Commissioner:** GySEV Rt.

**Consultant of the Commissioner:** Károly Józsa

**Starting and finishing dates:** 18.09.2002 – 30.11.2002.

**Abstract:** It is one of the special features of the company that due to its size, the different company processes are easily manageable. This manageability enables the process-principled decomposition of the tasks helping the harmonisation of the different functions (e.g. marketing and turnover), and of the business fields (e.g. shipping and project planning). Through continuous follow-up of the company processes, enhancement of a customer-focused attitude can be observed.

In the case of *GySEV Rt.* the aim of reorganisation is essentially the transformation of the existing functional and territorial structures in compliance with the EU directives. In the extreme case, the railways under infrastructure management or operated in the form of undertaking may also become independent legally (vertically separated railway). From the aspect of practical implementation, several possibilities can be imagined, from traditional to vertically separated versions.

The shaping of the two-level management is a substantial element of reorganisation. EU accession makes the elimination of separate regional management in *Sopron* and *Vulkapordány* possible. However, the two-level system is only reasonable if general management performs such central functions as cover the company's strategy, including rather conceptual than operative tasks. Nevertheless those works which are relevant to all company activities (e.g. accounting) may also belong here (it depends on the decision).

Functions that concern the whole *GySEV* – as a railway company - belong to corporate foundations. Organisational units providing for these functions have their scope of activities and duties delegated by the general director.

Transferring the traction and the hold stocks to railway undertaking, following international examples, is justified by a close connection with the railway's basic activities, by the outstanding importance of the development (especially in the case of *GySEV*). The transfer of the rolling stock into the framework of a separate organisational unit has also been considered, but – because of the small size of the company – it would be more expedient to reject this solution.

The whole traffic personnel – mainly on the basis of efficiency considerations – will fall under the management form of the undertaking railway, and the infrastructure railway would finance its own tasks. This solution is justifiable as long as the costs of the infrastructure railway are essentially lower than the maintenance costs would be for an own property traffic organisation.

**Key words:** EU railway policy, railway infrastructure management, railway undertaking.

**Ref. number:** 271-048-1-2

**Title:** National Cohesion Fund - Transport

**Responsible leader:** Dr. József Pálfalvi

**Commissioner:** GKM

**Consultants of the Commissioner:** Dr. Győző Kenéz; Ms. Magdolna Czímer

**Starting and finishing dates:** 29.10.2002 – 15.11.2002.

**Abstract:** The transport strategy of the period 2004-2006 contains projects, financing resources, such as *Cohesion Fund*-like grants, which, if necessary, should be actualised in co-operation with the European Commission; therefore, the list of projects and the relevant tables on financing should be considered as of an advisory nature.

The strategy is based on the goals to be forwarded in the *Hungarian Transport Policy Concept* and set forth in the *National Development Programme*, and furthermore, it also takes into consideration the EU provisions relevant to the acceptance of grants of the nature of the *Cohesion-Fund*. This strategy, starting from the existing situation of the Hungarian Transport infrastructure and based on the expected development of the economy – allowing for the selection criteria of the projects that can be applied for – collects and presents projects in possible co-financing. It is an integral part of the *Cohesion Fund*'s strategy to finance transport projects supported from this Fund.

**Key words:** infrastructure projects, Cohesion Fund, financing.

## ***Division of Transport System Research and Network Planning***

**Ref. number:** 212-052-1-2

**Title:** The multi-modal network development model for the North-Hungarian region.

**Responsible leaders:** Gábor Albert; Dr. Attila Vörös.

**Commissioners:** Földművelésügyi és Vidékfejlesztési Minisztérium, OTK Ministry of Agriculture and Rural Development.

**Contributors:** Mrs. Istvánné Beszedics, Mrs. Jenőné Dr. Rimaszombati.

**Consultants of the Commissioner:** Endre Szala; Mihály Szűcs.

**Starting and finishing dates:** 01.08.2001 – 30.06.2002.

**Abstract:** The conceptional aim of the transport network development concerning the Northern-Hungarian region was the achievement of transport policy aims in accordance with *Parliamentary decision № 68/1996.(VII.9.) OGY*. Accordingly, while preparing the plan of the regional transport network development, the aim was to develop such a transport network that would satisfy to the highest standard possible the transportation demands resulting from the co-operation of the neighbouring countries and the Hungarian regions surrounding the planning area on economic, social, touristic, etc. fields. The conception offers a proposed version of transport network development until 2030 with attention to the complex courses and numericalities, and regarding the viewpoints of environmental protection and area- and economic development of utmost importance.

**Key words:** Northern-Hungary, road network development, regional development

**Ref. number:** 212-053-2-1

**Title:** Definition of the actual annual mileage of Hungarian vehicles differentiated in area, time and category.

**Responsible leader:** Ms Éva Hingyi.

**Contributors:** Dr. Attila Vörös; Péter Miksztai; László Czeglédi; Mrs. Istvánné Beszedics; Ms. Dr. Jenőné Rimaszombati.

**Commissioner:** ÁKMI Kht.

**Consultants of the Commissioner:** Dr. András Gulyás, Gábor Thurzó.

**Starting and finishing dates:** 22.08.2001 – 30.06.2002.

**Abstract:** There are currently huge differences in Hungary in the annual mileage figures, especially in the case of cars, calculated by transport experts, statisticians, sociologists and those calculated either from measured traffic volumes or from interviews. Consequently, the accurate and precise definition of the actual and differentiated mileage of Hungarian vehicles is inevitable for the calculation of the actual utilisation of the road network and of the running costs of the vehicles. In the course of working on the project the analysis of four types of data collection was carried out. This was necessitated by the demand for both the extension of the differentiation and the increase of reliability. The results achieved are given in the final study differentiated on more levels, which also correspond to the different levels of reliability. The main criteria of differentiation in the case of cars were the following:

- category of product (ex-socialist or not),
- type of settlement (Budapest, other towns, villages),
- age of the vehicles,
- the cylinder volume of the engine,
- location (counties, regions).

The sample size available made it possible to differentiate the mileage of trucks on the basis of the total weight. On the other hand, in the case of buses and motorcycles only global data were defined.

In addition to the results in figures the study shows several verbal declarations, which further contributes to a complex picture of the annual mileage of the Hungarian vehicle fleet.

**Key words:** mileage, running of vehicles.

**Ref. number:** 212-055-2-1

**Title:** Investigation into the reorganisation of traffic in accordance with the opening of the Danube bridge at Szekszárd, and with the staged opening of the connecting road network, paying special attention to the complex efficiency of these stages and the specific solutions of network development.

**Responsible leaders:** Dr. Attila Vörös; Ms. Éva Hingyi; Péter Miksztai.

**Commissioner:** UKIG

**Consultant of the Commissioner:** Ms Mária Hamarné-Szabó.

**Starting and finishing dates:** 15.09.2001 – 30.06.2002.

**Abstract:** The project investigated the Danube bridges under construction at *Szekszárd*, along with the M9 motorway and the connected road network, which is in different stages of development and assuming different levels of development of the wider road network until 2008. The probable reassignment of traffic in some of the versions and the volumes of traffic were defined with the help of the road network modelling software *EMME/2*. Social and economic plans for regional development and their influence on the traffic volume were taken into consideration. Complex investigations of efficiency have been carried out on the individual versions on the basis of the algorithm developed by our department.

**Key words:** Danube bridge, Szekszárd, traffic reassignment, *EMME/2* software, efficiency analysis.

**Ref. number:** 212-056-1-2

**Title:** Multi-modal transport network development model of the Northern-Hungarian region

**Responsible leader:** Gábor Albert; Dr. Attila Vörös; Péter Miksztai.

**Commissioner:** Észak-Magyarországi Regionális Fejlesztési Ügynökség Kht. (= Northern Hungarian Regional Development Agency Kht.)

**Consultants of the Commissioner:** Zoltán Török; László Varga.

**Starting and finishing dates:** 01.02.2002 – 20.06.2003.

**Abstract:** The aim of the project is the foundation of the multi-modal transport network development conception of the Northern-Hungarian region until 2015. In addition to road transport, the conception also considers railroad transport, as well as dealing tangentially with the subject of other modes of transport (water and air transport). The conception was founded with a computer model created with the help of the software *EMME/2*. During the course of the modelling several network variations were considered, assuming different levels of investment. The conceptions of development concerning the region were divided into smaller units called investment projects. Both on the projects and on the drafts including the complete network complex investigations of efficiency have been carried out on the basis of the methods developed by our department. A close contact was kept with the representatives and decision makers of the region during both the selection of the variations to be investigated and the usage of the conclusions drawn from the results in the proposed conception.

**Key words:** regional transport, *EMME/2* software, efficiency analysis.

**Ref. number:** 212-059-2-2

**Title:** Modification of the land use structural plan of Hódmezővásárhely, transport chapter

**Responsible leader:** Gábor Albert.

**Commissioner:** CSOMITERV PLUSSZ Kft.

**Consultant of the Commissioner:** Ms. Márta Szemerey.

**Starting and finishing dates:** 01.02.2002 – 21.07.2002.

**Abstract:** In the spring of 2002 the former track of the bypass section of main road № 47 in *Hódmezővásárhely* was modified. According to the new plans, the relief section runs across the inner-city area with rural parameters parallel with the railroad. As the newly-planned road provides different links between the local and the national road network from the former one, the revision of the transport chapter of the land use structural plan of the settlement became inevitable. The research included the examination of the impact of the changes on the traffic emerging on the road network of the town through extensive modelling of the traffic. The analysis included the entire scale of the possible long-term developments on the national road network, indicating their effect on the course of the traffic on the local roads and the resulting burden on the environment. As a consequence, apart from the modification of the transport chapter of the structural plan of the settlement, the optimal sequence of long-term network development has also been suggested.

**Key words:** Hódmezővásárhely, modelling road traffic, network development, land use.

**Ref. number:** 212-060-1-2

**Title:** Differentiated definition of the road accident indices for the five-year period of 1996-2000 according to the construction parameters of the roads, traffic control, traffic, and other characteristics.

**Responsible leader:** Gábor Albert.

**Contributor:** PC-BÜRO Bt.

**Commissioner:** KöViM Gépjárműközlekedési Főosztály

**Consultants of the Commissioner:** Géza Kározy; Dr. Péter Lányi.

**Starting and finishing dates:** 01.04.2002 – 13.12.2002.

**Abstract:** In order to discover the cause and effect relationship between the construction parameters of the roads, the characteristics of the traffic and the accidents that occurred, there is a need for a highly extensive analysis. This is inevitable as well for gaining basic data for the estimation of the situation of traffic safety resulting from long-term network developments. In two of our previous works, the four-year periods between 1989-92 and 1992-95 were examined and attached to the corresponding construction parameters of the roads and conditions of traffic. In the present project the same has been realised for the five-year period of 1996-2000. The results were calculated with the following differentiation:

- Road: type of road, number of lanes, character of region, alignment;
- Traffic: category of traffic volume and composition;
- Accident: number of accidents and injuries according to severity, accident losses.

The results show the number of accidents and injuries, the value of accident losses and the relative and the specific indices of accidents. The investigations provide reliable basic data not only for the tasks of estimation mentioned above but also for the defining of long-term trends and the analysis of the effects of the increased speed limit of May 2001 on traffic safety as well, serving as "before" data.

**Key words:** traffic safety, forecasting, road category, traffic volume.

**Ref. number:** 212-061-1-2

**Title:** Preparation of background documents connected to the projects of TEN-T achievement indices started by the EC.

**Responsible leader:** Gábor Albert.

**Contributor:** Péter Miksztai.

**Commissioner:** KöViM Közlekedéspolitikai Integrációs Iroda = Office of Traffic Policy Integration.

**Consultant of the Commissioner:** Ms. Éva Kramer

**Starting and finishing dates:** 28.05.2002 – 30.11.2002.

**Abstract:** As the first step the earlier activities that founded the basis of the successfully completed integration – connected to the development of the EU-conform infrastructure network – were surveyed. Secondly, the present situation of the index-system connected to the extension of the TEN-T networks and defining the priorities were explored.

A comprehensive examination has been prepared on the new priorities that prevail in the transport development of the EU, to facilitate the examination of the relationship between the development of the planned Hungarian transport infrastructure and the claims of the European Union.

The project also analyses the way the plans of development articulated by the Hungarian National Development Plan (Nemzeti Fejlesztési Terv) and the Policy of Transport (Közlekedési Politika) conform to the directives of the EU.

In addition to the above, we also occasionally supported the Commissioner in his professional activity with *ad hoc* work.

**Keywords:** EU accession, TEN-T.

**Ref. number:** 212-062-1-2

**Title:** Preparation of background documents connected to the technical adaptation of the future Hungarian TEN-T.

**Responsible leader:** Gábor Albert.

**Commissioner:** KöViM Közlekedéspolitikai Integrációs Iroda (= Office of Traffic Policy Integration)

**Consultant of the Commissioner:** Ms. Éva Kramer.

**Starting and finishing dates:** 28.05.2002 – 30.11.2002.

**Abstract:** In the first phase, with the knowledge previously-acquired information, the current official Hungarian viewpoint was harmonised in connection with EC Decision 1692/96. The preparation and the documentation of the material supporting the official viewpoint were completed in the format agreed on with the Commissioner.

In order to ensure the efficient adoption of the public resources, the claim has been raised for the introduction of the EC's claims regarding transport infrastructure development and the satisfactory Hungarian methods, or at least the methods that are used in Hungary, on network development, for these are fundamental criteria for the success of the activities intended to gain public resources. Apart from the traditional elements of expenses, the study also considers the questions of the monetarization of the externals and the accessibility of the data required for the adaptations.

In addition to the above, we also occasionally supported the Commissioner in his professional activity with *ad hoc* work.

**Key words:** EU accession, TEN-T.

**Ref. number:** 212-063-2-2

**Title:** Continuation of the extensive speed measurements started in 2001; examination of the different circumstances of development; habits in choice of speed and the frequency of speed appearing with temporal and permanent speed limitations.

**Responsible leaders:** Gábor Albert; László Czeglédi.

**Contributors:** Mrs. Dr. Jenőné Rimaszombati; Mrs. Istvánné Beszedics.

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Zoltán Vályi.

**Starting and finishing dates:** 13.05.2002 – 28.02.2003.

**Abstract:** The Division for Transport System Research and Network Planning of KTI completed several measurements on the rural sections of the national road network in the year 2001, in order to facilitate the examination of the choice of speed of cars and freight traffic.

Even at the planning stage of the research it became obvious that although speed measurements carried out as part of the national traffic count provide the opportunity to gather a large amount of data, they are not enough. The measurement performed with the device *Nu-metrics Hi-Star NC-97* – although it cannot in magnitude provide as a large amount of data as continuous measurements – can be processed in an integrated system, independent from the place of data and its time of origin; in addition, all the circumstances needed for a sound analysis are provided to be recorded. As a result, it was decided that in the places chosen for these aims, the series of measurements will be continued, following a time schedule, in an extended form on the national road network in the year 2002. The final aim is the production of a "general view" of the choice of speed characteristic of the national road network, which first of all correctly describes the present situation, and secondly can serve as a basis for similar measurements in the future. In each case the course of the speed of the traffic was examined for 3-5 hours with the Nu-metrics measuring devices. The experiences showed that if the measuring period was chosen appropriately, then this period was sufficient to define the speed-characteristics of the traffic flow and how these characteristics are influenced by the volume of traffic.

According to the examinations, the results depict the effects of the outer factors quite accurately. This is also due to the fact that in the period of the measurements the scene was constantly observed by the experts of the division, and as a result only data collected under supervised circumstances were processed.

With the help of the data the variations of measures taken in order to increase safety of transport, influence choice of speed, their possible effects and the place where they will probably be necessary can be defined more precisely.

The results show that the measurements completed live up to expectations, and on the basis of the results received, significant effects can be displayed. This would provide effective help in the elaboration of measures intended to influence speed and would help in the evaluation of their effectiveness. On the basis of the positive experiences it can be stated that there is need for the continuation of the series of measurements and for the investigation of the choice of speed occurring under specific circumstances.

**Key words:** speed, speed measurement, Nu-metrics Hi-Star NC-97 counter, road shoulder, optical guidance.

**Ref. number:** 212-064-2-2

**Title:** Classified traffic counting and speed measurement on the M7 motorway and expressway, according to the Work plan agreed by the contractors.

**Responsible leader:** Gábor Albert.

**Contributors:** László Czeglédi; Istvánné Beszedics Ms; Ms Jenőné Dr. Rimaszombati.

**Commissioner:** Állami Autópálya Kezelő Rt. Hungarian State Motorway Operating Co.

**Consultants of the Commissioner:** Antal Pálfay; Ernő Kiss.

**Starting and finishing dates:** 06.05.2002 – 20.10.2002.

**Abstract:** The renovation of the M7 motorway and expressway started in 2001 and as a result the counting of traffic was interrupted on these sections, since the loop detectors built into the pavement were removed. Consequently, it was not possible for a long time to keep continuous record of the composition, volume and course of the traffic.

Aware of the above, the Hungarian State Motorway Operating Co. (Állami Autópálya Kezelő Rt.), the operator of the motorway, has been searching for a method to rapidly install temporary counters in order to be able to complete the data set as much as possible. The American device for traffic counting and speed measurement *Nu-metrics NC-97* owned by the Institute for Transport Sciences proved to be totally suitable for the fulfilment of this purpose.

In addition to defining the volume of traffic already mentioned, it was also beneficial to pay attention to the choice of speed. It is an everyday experience that on the diverted sections only a few drivers keep to the speed limit of 60 km/h. It was also beneficial to pay attention to the actual frequency of speed.

Another interesting topic is how the drivers behave in a long diverted section; whether they change their speed or patiently drive in the diverted section without changing speed. Furthermore, another question is whether heavy vehicles use the outside lane, which is usually quite narrow, being only 2m in width (this is forbidden, but occasionally occurs in the case of low traffic volume).

The measurements were conducted in three perfectly separable types of sections. First, as one of the main aims of the project, was the definition of the characteristics of the traffic on the diverted section. The second was the definition of the normal traffic flow on motorways: characteristics in free, unlimited circumstances. A separate group was concerned with the observation of the course of the traffic on the expressway section of M7, where there were temporary speed limitations in the course of the measurements.

The evaluation of the results of the measurements was also carried out on these three groups. The documentation is in the form of tables on the one hand, and a lot of comprehensive result-sheets on the other hand, containing numerous detailed diagrams showing the frequency of speed, they are suitable to show the circumstances of the measurements from different viewpoints.

**Key words:** speed, speed measurement, *Nu-metrics Hi-Star NC-97* counter, motorway, expressway, traffic diversion.

**Ref. number:** 212-065-2-2

**Title:** Survey of the methods used for the calculation of the performance of local passenger transport applied by the transport companies of the cities Budapest, Szeged, Debrecen, Miskolc and Győr.

**Responsible leader:** Gábor Albert; Mrs. Endréné Trepper.

**Contributor:** TRANSORG Közlekedésszervezés Fejlesztési tagozat. Department of Transport Organisation Development

**Commissioner:** KSH

**Consultant of the Commissioner:** Dr. István Gether

**Starting and finishing dates:** 01.05.2002 – 15.06.2002.

**Abstract:** At the request of the Central Statistical Office (KSH) a comprehensive investigation was carried out into the tariff system and the calculation method of indices for passenger transport.

The aim of the investigation was the examination of the possible solution of the harmonisation of these factors to ensure their comparability.

It was found that in most cases the calculation of indices based on old, presumably out of date data, and that there are also differences in the algorithms of the calculation of the indices.

Several raw data (eg. the capacity of buses) are not available or, where available, are not sufficiently reliable.

In order to achieve the aim set out, several variations have been elaborated. The first step towards reaching the aim was supplying the missing or out-of-date data, the costs of which have been estimated.

**Key words:** public transport, costs, tariff system.

**Ref. number:** 212-066-2-2

**Title:** Definition of the sequence of development of the high-speed road M9 following the opening of the bridge at Szekszárd.

**Responsible leaders:** Péter Miksztai; Gábor Albert.

**Commissioner:** Nemzeti Autópálya Részvénytársaság. Hungarian Motorway Co.

**Consultants of the Commissioner:** Lajos Hórvölgyi; Ms. Andrea Mikecz.

**Starting and finishing dates:** 15.05.2002 – 31.01.2003.

**Abstract:** The aim of the project was to provide a proposal for the optimal staging of construction of the high-speed road M9 until the date of 2015, which is professionally backed

up and supported with calculations. For this purpose we constructed a computerised model network with the help of the software *EMME/2*, and completed traffic assignments and a complex examination of efficiency on this model. We investigated about 15 sub-versions with this method in co-operation with the commissioner *Hungarian Motorway Co. (Nemzeti Autópálya Rt.)*.

**Key words:** M9 high-speed road, modelling, *EMME/2* software, efficiency analysis, network development.

**Ref. number:** 212-067-2-2

**Title:** Traffic assignment on the Hungarian national road network for 2008 and 2015

**Responsible leaders:** Gábor Albert; Péter Miksztai.

**Commissioner:** Környezetfejlesztés Kft.

**Consultant of the Commissioner:** Dr. István Fi

**Starting and finishing dates:** 07.06.2002 – 31.10.2002.

**Abstract:** In this project traffic assignments were realised with the software *EMME/2* on the network containing the ideas on national public road network development provided by the client.

**Key words:** national model, *EMME/2* software, traffic assignment, network development.

**Ref. number:** 212-068-2-2

**Title:** Providing the data of the *Út2-1.118. Ütügyi Műszaki Előírás* (Technical Road Regulations) in function form in order to define the long-term traffic of public roads in a clearer, easier and more precise way.

**Responsible leaders:** Gábor Albert; Péter Miksztai.

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Gábor Thurzó.

**Starting and finishing dates:** 01.09.2002 – 10.12.2002.

**Abstract:** The *Út2-1.118. Technical Road Regulations* contain the data required to define the long-term traffic of public roads in table form. The project had a dual aim. Firstly, to produce continuous functions instead of the descriptive discrete data, and secondly, to match the vehicle classes to the detailing resembling cross-sectional traffic counting that appeared in the OKA2000. As the elaboration of the Technical Road Regulations took place several years ago, the base data of the calculation was refreshed and the time series lengthened. Unfortunately, the extensive detailing of the vehicle classes was limited by the small rate of accessible data eg. the division of the bus fleet according to categories of traffic counting (single, articulated) is not possible. The time series of divided registers of lorries only goes back to the past few years. The results of the project actualised functions, which described the long-term changes per region, road category and vehicle class in those cases where there is no objection in principle against the applying of the growth factor method.

**Key words:** traffic forecast, Technical Road Regulations.

**Ref. number:** 212-069-2-2

**Title:** Definition and detection of traffic jam and the theoretical basis for the calculation of the critical value of intervention.

**Responsible leaders:** Gábor Albert.

**Commissioner:** ÁKMI Kht.

**Consultant of the Commissioner:** Mrs. Csilla Szabóné Kamarás.

**Starting and finishing dates:** 01.09.2002 – 30.05.2003.

**Abstract:** Although the system of methods to dissolve traffic jams is given, there is still no agreement on from which time and depending on which circumstances the state of traffic can be considered as a traffic jam from the point of view of sections and networks. It is also still

necessary to define the critical value above which intervention is justified from economic, traffic safety or other points of view. These factors define the type of information to be collected, the place and time of the collection and the way the data has to be processed in order to achieve a well-founded decision of intervention.

Accordingly, the project has more than one aim. Firstly, the definition of traffic jam has to be given with regards to the different road categories, time spans and periods of time. In addition there are the elaborations of different possibilities of transmitting the observations and information, and the complex definition of the critical value required for intervention depending on several points of view (economic efficiency, safety, etc.).

In the first phase of the elaboration the professional literature has to be understood. This is not easy, as the literature concerning traffic jams and capacity strongly linked to it is highly extensive. At the same time, the results have to be evaluated as placed in the Hungarian circumstances in order to decide on its application in Hungary.

The continuation and completion of the project in 2003 are also based on these evaluations and results.

**Key words:** traffic jam, traffic volume, traffic capacity, travel time.

**Ref. number:** 212-070-2-2

**Title:** Preparation of a plan of action for the development of the national road network included in act CXII. of 2000.

**Responsible leaders:** Gábor Albert; Péter Miksztai.

**Contributors:** Mrs. Dr. Jenőné Rimaszombati

**Commissioner:** UKIG.

**Consultants of the Commissioner:** Ms. Mária Hamarné-Szabó; Tibor Goszleth.

**Starting and finishing dates:** 01.08.2002 – 15.11.2002.

**Abstract:** According to *Act CXII.* of 2000 the area planning designs in the Balaton region will have to be revised by the end of 2003, and in these the transport sections will also be included. As the first step the task was narrowed down on the basis of the definition of the designing area. The second step was the definition of the design supply of the road sections to be developed. Though in the case of high-speed roads the design supply might be called complete, in the case of major- and secondary roads this fate is much lower, and in the case of the latter only a few sections are supplied with recent development plans.

The third section was the analysis of the specific links. The phases and the main parameters of the plans required the realisation, and, according to this the design expenses have been defined. The action plan defines the tasks in a way that they conform to the plans of neighbouring regions and, in the case of the high-speed road network, the plans of the national road-network development. The time sequence of the tasks set out is first of all the deadline of 31 December 2003 defined by the act for revising area planning designs, and secondly the end of the present government cycle in 2006, but it also takes into account the need for long-term developments of the network.

**Key words:** Balaton, region of Balaton, high-speed road network, network development.

**Ref. number:** 210-001-1-2

**Title:** Elaboration of a proposal for the Hungarian application system of recommended speed and of the development of suitable signs, taking into consideration the requirements of EU conformity

**Responsible leaders:** Dr. Attila Vörös.

**Commissioner:** KöViM Gépjárműközlekedési Főosztály.

**Consultants of the Commissioner:** Géza Kározy; Péter Lányi Dr.

**Starting and finishing dates:** 01.05.2002 – 13.12.2002.

**Abstract:** The notion of recommended speed existed in the Hungarian speed –regulation, but was diminished by earlier rules of the *Highway Code (KRESZ)*. The regulation of the European

countries is not unified in this regard. The same kind of regulation exists in The Netherlands, Germany, Italy, Spain and Bohemia, but does not exist in several other countries eg. Austria and Slovakia.

Applying the highest recommended speed is proposed in areas where a speed limit that has to be kept unanimously is unwarranted, but it is useful to inform road users of the possible occurrence of unexpected situations. As a supplement to this information it is practical to suggest a lower speed than the highest speed allowed.

It has to be pointed out that this would not be exchanged with the regulations of speed limitation and the unambiguous rules attached to them, but it would complete them with an element which is not compulsory but which is practical to conform to.

It would be applied in case of increased bends, slighter limitation of perceptibility, sudden change of road-environment and situations that occur periodically or require more attention occasionally.

The research completed in 2002 was the continuation and the perfection of the project of 2001. In addition there were revisions based on wide-ranging professional remarks and the answers given to objections that provided the most important chapters of the study.

**Key words:** speed, traffic control, recommended speed.

**Ref. number:** 210-002-2-2

**Title:** Traffic safety aspects and limitations in application of four-lane rural road sections taken as a function of cross sectional and other parameters of design.

**Responsible leaders:** Dr. Attila Vörös.

**Commissioner:** ÁKMI Kht.

**Consultants of the Commissioner:** Károly Rankli; Csaba Vigh.

**Starting and finishing dates:** 01.06.2002 – 30.11.2002.

**Abstract:** In the rural sections of the road network - although not to the desired extent - there is a constant increase in the length of the four-lane sections. These sections have a unique position from the viewpoint of traffic safety, and the traffic flow also differs from that experienced on two-lane roads.

The wide-ranging accident analyses and the complete audit stated that the main sources of danger leading to accidents on these sections were the state of optical signs, minor deficiencies of vertical and horizontal alignment and the incorrectly designed junctions.

Furthermore, it was proved that the relative accident indices of the short sections with a maximum length of 1.5 km are significantly worse than those of longer sections.

Special attention was paid during the investigation to the nature of accidents. The types found to be the most frequent were the one-car accidents and the accidents at junctions.

With the growth in traffic the rate and number of accidents resulting from the collision of oncoming vehicles also increases.

The study drew the conclusion that there is a connection between the rate of the several slower vehicles and the risk of collision between vehicles passing in the opposite direction. On this basis it was stated that in the case of eg. 30% slower vehicles and 11-13 thousand vpd traffic volume the physical separation of the two directions of the traffic (with steel safety barriers, central reserve, New Jersey elements etc.) is inevitable in order to reduce the risk of accidents.

**Key words:** four-lane roads, traffic safety, traffic control.

**Ref. number:** 210-003-2-2

**Title:** Feasibility study on the XXX Olympic Games and the XIV Paralympic Games

**Responsible leaders:** Dr. Attila Vörös.

**Commissioner:** Közlekedés Kft.

**Consultant of the Commissioner:** Tamás Dobrocsi.

**Starting and finishing dates:** 20.05.2002 – 15.06.2002.

**Abstract:** It is well known that, under certain conditions Hungary would like to submit the tender for the organisation of the summer Olympic Games of 2012 or 2016. The transport conditions are quite wide-ranging. The completed study answered the questions of the changing of local and international transport aims as a consequence of the distribution of competition locations in Budapest and the countryside, and the capacity and location of the accommodation currently available and planned for the future.

Both the road- and the railroad transportation were examined. In addition, the transport aims of the periods before and after the Olympic Games and the period of the realisation have been analysed separately.

**Key words:** traffic demand, network capacity, Olympic Games.

**Ref. number:** 210-004-2-2

**Title:** The effects of the application of speed retarder bumps and humps on the condition of vehicles, the induced vibration- and noise effect and the air pollution of vehicles.

**Responsible leaders:** Dr. Attila Vörös.

**Contributors:** Logar 93 Mérnöki és Szolgáltató Bt.

**Commissioner:** Budapest Főváros Főpolgármesteri Hivatal, Közlekedési Ügyosztály.  
Department of Transport of the Budapest Mayor's Office

**Consultant of the Commissioner:** Tibor Janča

**Starting and finishing dates:** 15.07.2002 – 30.11.2002.

**Abstract:** Speed retarder bumps and humps are currently one of the most frequently used instruments of traffic control. They are mostly installed in residential, recreation, tempo 30 and other such areas, where the reducing of drivers' speed has to be enforced for traffic safety reasons.

The location of the investigation was a region in north-Buda, where the choices of speed had to be examined resulting from the position and physical design of the speed retarder humps, the effect of the choice of speed on the environment and the traffic diverting effect from the areas to be protected.

It was stated that in this case the installation of the speed retarder humps was a considerable disadvantage for the area to be protected. The reason is that the transit traffic using the collector and access roads of the area is unable to use other elements of the network during peak hours, due to the maximum saturation of the main roads and their junctions. The traffic forced to use the roads of the area is not diverted by the speed retarder bumps and humps, but hindered, increasing the environmental damage. The study showed that air pollution as a result of the necessary, forced braking and acceleration in contrast to steady traffic is increased by 80-150%, and so noise pollution is higher as well.

The study proved that the development of the traffic condition of the area could only be improved by the extension of capacity, building new roads, bridges and tunnels; an optimal schedule for the construction of these is included in the study .

**Key words:** traffic control, bump hump, environmental losses, network development.

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## Some Hungarian Acronyms

<b>ÁKMI Kht. / ÁKMI</b>	Állami Közúti Műszaki Információs Közhasznú Társaság Technical and Information Services on National Roads
<b>BM</b>	Belügyminisztérium Ministry of Interior
<b>GKM</b>	Gazdasági és Közlekedési Minisztérium Ministry of Economy and Transport
<b>KHVM</b>	Közlekedési, Hírközlési és Vízgazdálkodási Minisztérium Ministry of Transport, Communications and Water Management
<b>KöM</b>	Környezetvédelmi Minisztérium Ministry of Environmental Protection
<b>KöViM</b>	Közlekedési és Vízügyi Minisztérium Ministry of Transport and Water Management
<b>KTE</b>	Közlekedéstudományi Egyesület Hungarian Society for Transport Sciences
<b>KTI Rt. / KTI</b>	Közlekedéstudományi Intézet Részvénytársaság Institute for Transport Sciences Ltd.
<b>KVM</b>	Környezetvédelmi és Vízügyi Minisztérium Ministry of Environment and Water
<b>MOL Rt. / MOL</b>	MOL Magyar Olaj- és Gázipari Részvénytársaság MOL Hungarian Oil and Gas Public Limited Company
<b>ÖMISZ</b>	Önkormányzati Útügyi Műszaki Információs Szolgáltatás Technical and Information Services on Local Roads
<b>UKIG</b>	Útgazdálkodási és Koordinációs Igazgatóság Road Management and Co-ordination Directorate