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REPUBLIC OF POLAND

Report of the Republic of Poland on the progress of implementation of activities and projects regarding the priority areas in accordance with the Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport for 2011-2014

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1 Introduction

In accordance with the reporting obligation resulting from Article 17 Section 3 of the Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport (hereinafter the ITS Directive), the Republic of Poland submits a report on the progress of the implementation of activities and projects regarding the priority areas of the Directive.

According to the Commission Implementing Decision 2011/453/EC of 13 July 2011 adopting the guidelines for reporting by Member States in accordance with the ITS Directive and under Article 17 Section 3 of the ITS Directive, cyclic reports on the progress of the implementation of national measures in the field of intelligent transport systems (hereinafter referred to as ITS) should include information on the current status of implementation of national ITS measures in relation to the priority areas set out in Article 2 and Annex I of the ITS Directive.

According to the legislation cited, reporting information should include in particular:

- General national approach to ITS measures;
- Information about current projects (target, time perspective, material scope, information about responsible parties, including contact details).

In order to implement the above recommendations, the information has been prepared in cooperation with the central government offices (Ministry of Administration and Digitization, General Directorate for National Roads and Motorways, General Inspectorate of Road Transport and National Centre for Research and Development), local governments in voivodeships and cities.

In order to ensure the transparency of the information provided, the report has been divided into:

- Part containing the general national approach to ITS measures based on existing strategic documents¹;
- Description of the completed projects and activities in the field of ITS divided into initiatives including:
 - The whole country,
 - Areas of individual voivodeships,
 - Urban areas,
- Information about R&D projects in the field of ITS;
- List of monitoring projects.

The report includes ITS projects implemented in 9 voivodeships and 24 urban areas (including cities, agglomerations and intermunicipal transport unions).

In the report, the projects have been assigned to the following priority areas ²:

- PA 01. Optimal use of data on road, traffic and travel data;
- PA 02. Continuity of traffic and freight management ITS services;
- PA 03. ITS road safety and security applications;
- PA 04. Linking the vehicle with the transport infrastructure.

For some projects, a reference point was the European Commission Information on the national ITS measures envisaged for another period of five years, in accordance with Article 17 Section 2 of the ITS Directive, 2012.

¹ The report refers the provisions of the strategic documents most important from the point of view of the ITS. The authors' intention is not to refer to all of the provisions relating to the ITS, which were included in the currently applicable documents, and thus duplicating the content contained in the report from 2012.

² Some of the projects, due to the complexity and specificity, were assigned to more than one priority area. In addition, projects were assigned to the priority measures of the ITS Directive.

2 National strategic approach

In the Polish legal system, the term "intelligent transport systems" was introduced by the 21 March 1985 Act on Roads (Journal of Laws 2013, Item 260, as amended), which defines ITS³ **as systems using information and communication technologies in the field of road transport, including the infrastructure, vehicles and users, as well as in the areas of traffic management and mobility management as well as for interfaces with other types of transport.**

The Act introduced section 4a - Intelligent Transport Systems, in which the entities implementing ITS applications and services were obligated to apply the principles set out in Annex II to the ITS Directive, i.e. effectiveness, cost-effectiveness, proportionality, supporting continuity of ITS services, delivering interoperability, supporting backward compatibility, respecting the existing national infrastructure and network characteristics, promoting equal access, support for maturity, delivering quality of timing and positioning, facilitating intermodality, respecting coherence.

ITS have been included in a number of strategic documents related to transport, information and communication technologies, informatization and space technologies. These include⁴:

- Long-term National Development Strategy for Poland 2030. The third wave of modernity;
- National Development Strategy 2020 - Active society, competitive economy, efficient state;
- National Spatial Development Concept 2030;
- National Reform Programme for the implementation of the Europe 2020 Strategy;
- Transport Development Strategy by 2020 (with perspective by 2030);
- Efficient State Strategy;
- Action programme for the development of space technologies and the use of satellite systems in Poland;
- Polish National Road Safety Programme 2013-2020;
- National Programme of Integrated Informatization.

A principal document defining the key tasks in the area of ITS in Poland is the *Transport Development Strategy by 2020 (with perspective by 2030)* (hereinafter referred to as TDS⁵).

According to the TDS, ITS is one of the tools supporting the implementation of the first strategic objective, which is to *create an integrated transport system*, as well as the specific objectives of the safety of transport users (specific objective 3) and reducing the negative impact of transport on the environment (specific objective 4). Informatization of transport management processes will enable the creation of a modern, coherent transport infrastructure (specific objective 1).

In division into specific TDS objectives, the following directions of intervention are differentiated:

- Objective 1: development of innovative technological solutions optimizing traffic flows;
- Objective 2: implementation of modern technological solutions;
- Objective 3: effective rescue and medical assistance system in road transport;
- Objective 4: implementation of innovative traffic management systems in individual modes that contribute to decreasing environmental pressures.

Specific intervention directions for the implementation of modern technological solutions in road transport include:

- Transposition of the ITS Directive to the Polish legal framework;
- Provision of information services for safe and secure parking places for trucks and commercial vehicles – at selected sections of national roads;
- Provision of reservation services for safe and secure parking places for trucks and commercial vehicles – at selected sections of national roads;

³ Under the Act of 27 July 2012 amending the Public Roads Act (Journal of Laws of 2012, item 965), the Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes has been transposed in Poland (Official Journal of the EU L 207 of 06.08.2010). Thus, the definition in the Public Roads Act is consistent with the definition of ITS proposed in the ITS Directive.

⁴ In addition, provisions related to the ITS can be found in the draft National Urban Policy and the draft National Development Plan for the Space Sector.

⁵ Adopted by the Council of Ministers on 22 January 2013.

- Provision of information on travels using various modes of transport;
- Provision of real time information in road traffic conditions;
- Defining the scope of data and development of procedures regarding the provision of free of charge information on road traffic safety;
- Development of Intelligent Transport systems under Operational Program Infrastructure and Environment;
- Gradual implementation of electronic toll collection system via TOLL for using road infrastructure on selected network of public roads for vehicles above 3,5 t.;
- Construction of the National Traffic Management System.

In addition, interventions in the field of transport by rail, air, sea and inland waterway have also been programmed in the TDS.

The National Programme of Integrated Informatization (hereinafter referred to as the PZIP) ⁶ is a strategic document defining the actions of the Government aimed to provide the public with high-quality public services. The aim of the Programme is to create a coherent, logical and efficient national information system, providing e-services at national and European level, in an efficient manner in terms of quality and cost. The Programme will ensure the cooperation of existing and new IT systems of the public administration, while eliminating currently duplicated functionalities. The PZIP contains recommendations to the catalogue of basic public e-services to be implemented at the central level, which in the field of ITS in road transport include:

- Information service for road users about traffic conditions on the subsequent sections of the planned route (e.g. surface conditions, traffic congestion, blockage of a section of the motorway, free space in Rest and Service Areas (RSA), route alternatives);
- Toll collection service for toll roads using an electronic toll collection system via TOLL for the distance travelled. Users will be able to make non-cash pre-payments or post-payments at the end of the accounting period;
- Improving the surveillance of road traffic (full automation of control measures) - launching an automated administrative penalty system for exceeding the norms relating to axle load or the total weight of the vehicle, expansion of the network of fixed speed recording equipment, launching section speed measurements (so-called *section control*), launching a system imposing penalties for passing a red light;
- Journey planning service with regard to transfers and delays of vehicles, including multi-modal travel, using websites and passenger terminals, located in the main urban transport nodes;
- Provision of information and data relating to the conditions of travel using public transport, departure time of public transport and its delay (via the Internet, mobile phones and bus-stop information boards);
- Sharing information and data in urban areas on traffic conditions on the road network, weather conditions, traffic incidents, road works, free parking spaces (via the Internet, mobile phones, variable message boards and signs placed on the road network);
- Providing information on the current transit times, the current location of the cargo, the price of the transport service, the number of train cars carrying the given goods and the carrier performing the transport service, etc.;
- Moreover, for services relating to safety and emergency notification, *eCall* service is recommended - faster assistance in road accidents; system installed in the vehicle starts automatically (optionally also manually) in case of a serious accident and communicate information to emergency services about the event, including its time, the exact location of the crashed vehicle and the direction of travel (which is particularly important on motorways and in tunnels).

The National Road Safety Programme 2013-2020 ⁷ (hereinafter referred to as *NRSP 2013-2020*) - sets out the priorities and directions of Poland's activities in the field of road safety. The pillar "*Rescue and Accident Care*", included in the NRSP 2013-2020, points to the need to develop modern communication and location systems improving the emergency system, including the development of *eCall* (pan-European rapid road accident assistance system). NRSP 2013-2020 indicates a very low level of implementation of intelligent transport systems within the management of road traffic (variable message signs, traffic control systems,

⁶ Adopted by the Council of Ministers on 8 January 2014

⁷ Adopted by the National Road Safety Council on 26 June 2013

roads condition and congestion information system). It also indicates the growing potential of modern solutions used in cars, which allows the cooperation of the vehicle with the infrastructure and within systems such as eCall in order to improve road safety. It also provides for the use of ITS equipment supporting speed management.

An important element of Polish strategic approach to Intelligent Transport Systems to take account of this subject in the process of programming the EU financial perspective for 2014-2020. The most important document in this regard is the Partnership Agreement adopted by the European Commission on 23 May 2014. According to its provisions, the key measure allowing for the optimal use of existing infrastructure, the management of traffic flows and reducing CO2 emissions is the implementation of ITS.

Implementation of transport investments will be accompanied by a series of actions aimed at, inter alia, increasing traffic safety. They will include the support for services responsible for ensuring and maintaining traffic safety in the various modes of transport, implementing modern navigation systems, traffic management and monitoring (including ITS). These activities will focus primarily on the TEN-T network, as well as on selected transport routes beyond it. Also, investments in urban transport will be focused, among others, on intelligent transport systems (to improve conditions for public or non-motorised transport). In accordance with the requirements of the EC, in the new perspective, ITS projects must be integrated into infrastructure projects and rolling stock projects. Given the above, within the framework of the Operational Programme Infrastructure and Environment 2014-2020 (OPIE), ITS-related investments will be the elements of investment priorities.

Within the framework of the Operational Programme Infrastructure and Environment, ITSs have been included in the following investment priorities (IP):

- *4.e Promoting low-carbon strategies for all types of territories, particularly in urban areas, including the support of sustainable multi-modal urban mobility and adaptation measures mitigating the impact of climate change;*

As part of the IP 4.e, at the national level, basic projects will be supported in 18 voivodeship cities and areas associated functionally - construction, reconstruction of public transport infrastructure (rail, trolleybus and bus networks), purchase and modernisation of low-emission fleet, construction of a system for the distribution of energy carriers for low-carbon rolling stock, construction and reconstruction of interchanges, **innovative transport information and traffic management systems** (as part of the aforementioned projects)

In turn, on the regional level support is planned for projects implemented in 18 voivodeship cities and areas associated functionally - construction, reconstruction of public transport infrastructure complementary for the national level, including, for example: P&R, integrated interchange centres, single ticket, **Intelligent Transportation Systems**, bike paths, rebuilding urban infrastructure in order to reduce traffic in city centres, etc.

- *7.a Supporting a single multimodal European transport area by investing in TEN-T;*

As part of the IP 7.a, on the national level, the construction and reconstruction of roads in the TEN-T network will be implemented, including investments to improve safety on these roads, including, among others, **ITS**.

- *7.b Increasing regional mobility by connecting secondary and tertiary nodes with the TEN-T infrastructure, including with multimodal nodes;*

As part of the IP 7.b, on the national level, the construction, reconstruction of national roads (including expressways) will be implemented to improve regional mobility, including investments to improve safety and traffic capacity on these roads, including, among others, **ITS**.

On the regional level, the construction and reconstruction of voivodeship roads will be implemented on sections which are connections to the TEN-T network, including investments to improve safety and traffic capacity on these roads, including, among others, **ITS**.

3 Nationwide projects

3.1 National Traffic Management System

The National Traffic Management System (NTMS) project involves the use of intelligent transport systems in the area of traffic management on national roads. Objectives of the project include:

- Improving the safety of road users,
- Shortening travel time,
- More efficient use of existing road infrastructure,
- Increasing the comfort of the journey,
- Improving the quality of road maintenance,
- Reducing the impact of road traffic on the environment,
- Improving cooperation with other road administration authorities,
- Improvement of traffic flows in trans-European transport and elimination of so-called bottlenecks.

Construction of the NTMS is treated as a long-term project, covering roads located throughout the country. Due to the high functional complexity, technical advancement, a vast area of implementation and financial and organisational issues, it was decided to implement the NTMS in stages. The project has been divided into several separate implementation projects, taking into account the possibility of obtaining funding, including from various EU funds, and the progress of the construction of the national road network:

- NTMS on the core TEN-T corridors, which forms part of the objectives of the "Connecting Europe Facility" (CEF) ,
- NTMS on the national road network not lying on the core TEN-T network,
- NTMS as part of the construction of roads,
- NTMS in other projects.

Using the European experience, and on the basis of observations and the GDDKiA's own conclusions from pilot deployments of ITS, a comprehensive programme of project development management has been adopted. NTMS management has been based on the European Framework Architecture FRAME.

The basis for each NTMS project will be an identical system architecture, and each of them will be divided into identical implementation modules standardised by the GDDKiA. Systems arising in individual projects will create one coherent whole in terms of functionality, organisation and communication. NTMS is divided into the following main components for the system master layer:

- National Road Traffic Management Subsystem;
- Data Collection and Archiving Subsystem;
- Simulation and Traffic Forecasts Management Subsystem;
- Road Maintenance Subsystem;
- Road Network Traffic Information Transmission Subsystem;
- Video Data Acquisition Subsystem;
- Car Data Acquisition Subsystem;
- RSA and Parking Information Subsystem;
- Environmental Information Management Subsystem.

The project includes the creation of a Traffic Data Warehouse, which will archive data collected by NTMS and process them for further transmission to entities that are competent to use them. NTMS will be equipped with telematics devices which are components of individual systems, and with application software. This investment includes the adaptation of buildings and equipping them for the needs of the Traffic Management Centres (TMC). It is assumed that access to the system functions will not be limited only to the TMS but depending on the competences and needs of individual organisational units of the GDDKiA, interfaces for individual system functions (with a defined authorisation level) will also be available from the level of, for example, GDDKiA branches, regions and districts. This will allow to dynamically change the authorisations of the various TMCs in relation to the area of the road network which the given TMC will directly supervise.

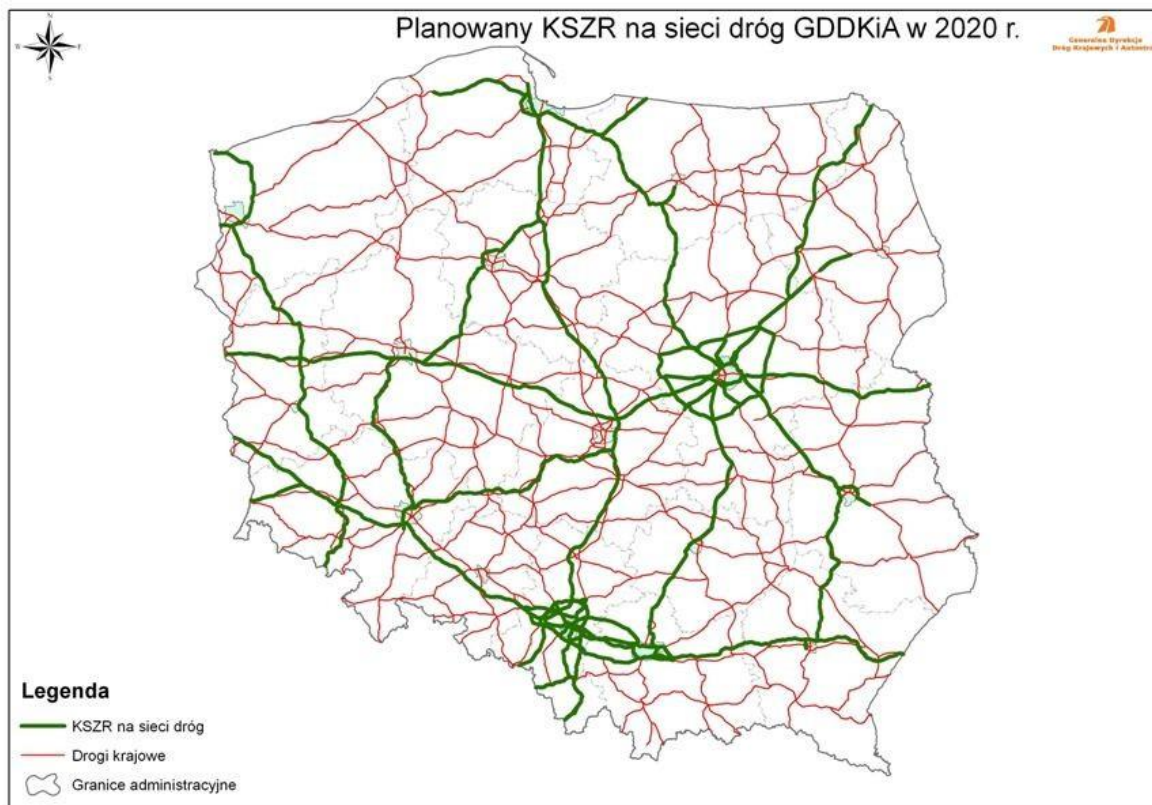
NTMS components will include a vehicle weighing system - "The important case of weight bridges (Wagi ważna sprawa)", the Electronic Toll Collection System, Roads Meteorological System and Roads Video Surveillance and Surface Condition Monitoring System operating within the already developed and planned traffic management systems, Information System for journeys on roads connecting Kraków and Zakopane, Motorway Information System on the section of the A8 motorway, so-called Wrocław Motorway Bypass.

In the context of previous work on NTMS, general functional assumptions of the system have been determined. A feasibility study has been developed, which showed high economic efficiency

of the project. General specifications were created for selected NTMS areas. A dedicated project website, for information and consultation purposes, has been created. A tender was resolved for the pilot system module for obtaining meteorological information for the purpose of road maintenance and dissemination of warnings to road users.

Expenditure incurred since the beginning of the project until the end of 2013 amounts to PLN 342,782. The amount planned for 2014 amounts to PLN 12,000,713.

➤ **Planned territorial scope of the NTMS by 2020 implemented in a variety of projects**



3.2 Functioning ITS solutions on national roads

- ✓ In 2014, the contract "Delivery with installation and maintenance of the pilot module of meteorological information with the function of impact on traffic" was implemented as a pilot solution for the implementation of meteorological stations within the NTMS. The contract value amounts to PLN 1,329,053.13. The contract included the following elements: meteorological stations - 7 sets, video monitoring devices - 11 sets, variable message signs - 4 sets, communication of devices in the GSM network, a managing system. Devices have been installed in the existing infrastructure - sign gantries, which feature the elements of an electronic toll collection system (ETCS). Meteorological stations acquire the following data: surface temperature, dew point temperature - by calculation, freezing point temperature - by calculation, air temperature, base course temperature, pavement condition (dry, moist, wet, flooded, slippery, salted), rainfall, type of precipitation (snow, rain), precipitation intensity (none, intense, continuous, showers, dew), thickness of the liquid layer, wind, wind speed, wind direction, presence of de-icing agent, relative humidity, visibility, snow layer thickness - measurement off the road. The protocol (Modbus) used for the communication of the meteorological station with the server is an open protocol. To "read" the data transmitted by the device, knowledge of the allocation of its records is sufficient. As part of the contract, an interface has been created for monitoring the work of road meteorological stations, import, archiving, processing and visualisation of meteorological parameters. The application allows ongoing monitoring of weather conditions prevailing on the road network and warning about dangerous weather phenomena which may affect traffic safety. The application also makes it possible to work with external traffic management systems.
- ✓ Traffic Management System (TMS) implemented as part of adaptation of the A2 motorway on the Konin - Stryków section to motorway standards. The TMS includes a system of information signs,

warning signs and bans using information about the current traffic on the interchanges, information from the weather station and alerts about traffic incidents and road works, providing information in real time, equipped in the Traffic Management Centre in Stryków. The program provides the ability to display information about traffic jams in manual or automatic mode. The system was put into use in 2012. Expenditure on the implementation amounted to approx. PLN 48.5 million.

- ✓ Motorway Information System on the section of the A8 motorway (Wrocław Motorway Bypass). The implemented ITS system provides traffic participants with the access to weather information (including warnings and alarm messages as well as information about the weather conditions) using variable message boards. The system uses variable message signs to direct traffic, i.e. control the traffic lane users, introduce speed limits, inform drivers about dangers and traffic jams, directing to detours, informing drivers about the type and location of risks and transfer of other information in order to maintain traffic safety. The system was put into use in 2011. Total expenditure for the implementation amounted to approx. PLN 14.5 million.
- ✓ Traffic management system in a road tunnel in Laliki on the S-69 express road, with notification and warning functions. The system allows for making changes in the organisation of traffic before and in the tunnel and for directing to alternative routes by displaying information on variable message signs. The functioning of the system is supervised in the tunnel management control room. The estimated total cost of the telematics equipment in the tunnel is PLN 18.3 million.
- ✓ Journey time information system for the roads connecting Kraków and Zakopane. The system provides information on arrival time for people travelling on national roads No. 7 and No. 47 Kraków - Myślenice - Rabka-Zdrój - Zakopane. Vehicle registration plates are identified at the measurement points and on this basis average travel time on the road segments is calculated. Data are transmitted using variable message boards placed along the road, and are available at www.nadrodze.info. The system was launched in 2011.
- ✓ System on section of S8 expressway Konotopa - Prymasa Tysiąclecia. The primary objective of the system is to improve safety and traffic flow. The system consists of sign gantries, VMS signs visualising any signs from the group of vertical road signs (prohibitory, mandatory and warning), message displays, cameras transmitting images in real-time, water level sensors in four lowest-lying places on the route, weather warning system (weather stations). The total cost of the system amounts to approximately PLN 3.2 million.
- ✓ Comprehensive Weighing System of vehicles on national roads - "The important case of weights". The aim of the system is the introduction of a comprehensive system for the removal from traffic of vehicles in excess of permissible axle loads, total weight and height, and a system of measurement and monitoring of truck traffic intended for use in the routes of class A, S and GP roads. Within the framework of the "Weight bridges are an important matter" project, places designed for inspecting vehicles in terms of the permissible total weight, axle loads and height will be set up throughout the country. Such a place is made up of: A station intended for static weighing of vehicles (portable weight bridges), a pre-selection measuring point equipped with the necessary measurement tools for checking the total weight, axle loads and total weight, length and height. Fifty four pre-selection point have been created by April 2014 - cost incurred amounted to approx. PLN 70 million.
- ✓ Weather Warning System operating within the already developed and planned systems. More than 300 meteorological stations located on the national road network primarily dedicated to maintenance services, but also forwarding data in order to present information and warnings of adverse weather conditions to road users using variable message signs. For example, Integrated Weather Warning and Traffic Management System on the section of the A-4 motorway Wrocław (Bielany) - Sośnica. The system was installed on the sect. of 150 km of the A4 motorway, running through the area of three voivodships (Opolskie, Dolnośląskie, Śląskie). The system was financed with funds from the European Union for a total amount of approx. PLN 18 million.

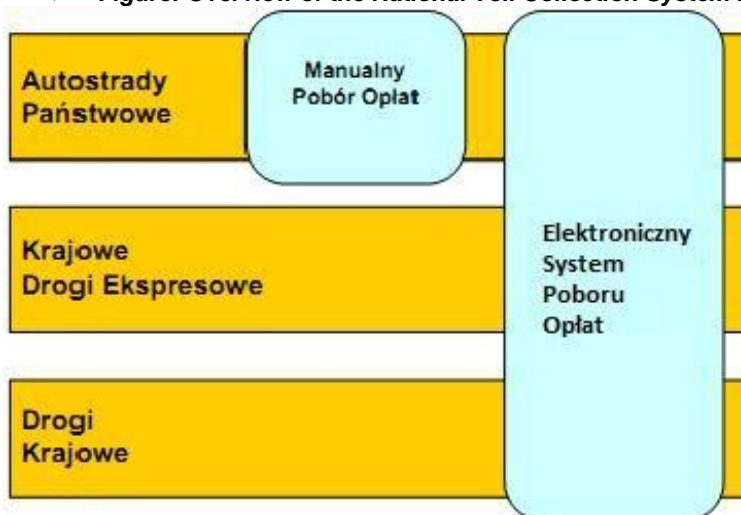
3.3 National Toll Collection System

National Toll Collection System operates in Poland since July 2011, used for collecting tolls on national roads from vehicles the gross vehicle weight (GVW) above 3.5 tons and buses regardless of their GVW as well as vehicles with GVW below 3.5 tons, using

motorways managed by the General Directorate for National Roads and Motorways. The fee depends on the category of vehicle and the EURO emissions class as well as the category of the road covered by the system. It does not depend on the number of axles in the vehicle.

The NTCS in Poland has been divided in logical terms into a Manual (Traditional) Toll Collection System (MTC), which is limited to state-owned toll motorways managed by GDDKiA, dedicated exclusively for vehicles with a GVW of less than 3.5 tons, and Electronic Toll Collection System (ETC), which came into force on sections of toll roads, as indicated in the Regulation of the Council of Ministers *on national roads or their sections on which the fee is collected electronically, and the amounts of electronic fee rates* for vehicles and combination vehicles with a GVW above 3.5 tons and buses regardless of their GVW.

➤ **Figure: Overview of the National Toll Collection System in Poland.**



Toll collection from vehicles and combination of vehicles with a GVW above 3.5 tons and buses regardless of their GVW, on motorways, not fitted with Toll Gates, expressways and parts of national roads, takes place using the "free flow" method and therefore there is no need to stop to pay the fee. At the entrance to the toll motorways managed by GDDKiA provided with toll gates, vehicles registered in the NTCS move according to the principle of "slow & go". After the vehicle equipped with on-board device allowing for charging fees (viaBOX) approaches the toll gate, it opens automatically.

From 1 June 2012, drivers of motor vehicles and combination of vehicles with a GVW less than or equal to 3.5 tons can use the Electronic Toll Collection System, which allows for the payment of fees by electronic means in accordance with the principle of "slow & go" on toll motorways managed by GDDKiA. The main network at the launch of the NTCS accounted for 1565 km of roads. The first expansion of the system took place in July 2012, and another successively, according to the completion of the newly built road sections.

Launch of the system - July 2011 - 1565 km of roads

1st extension - 1 July 2012 - 325 km of roads

2nd extension - 12 January 2013 - 139.2 kilometres of roads,

3rd extension - 30 March 2013 - 160 km of roads

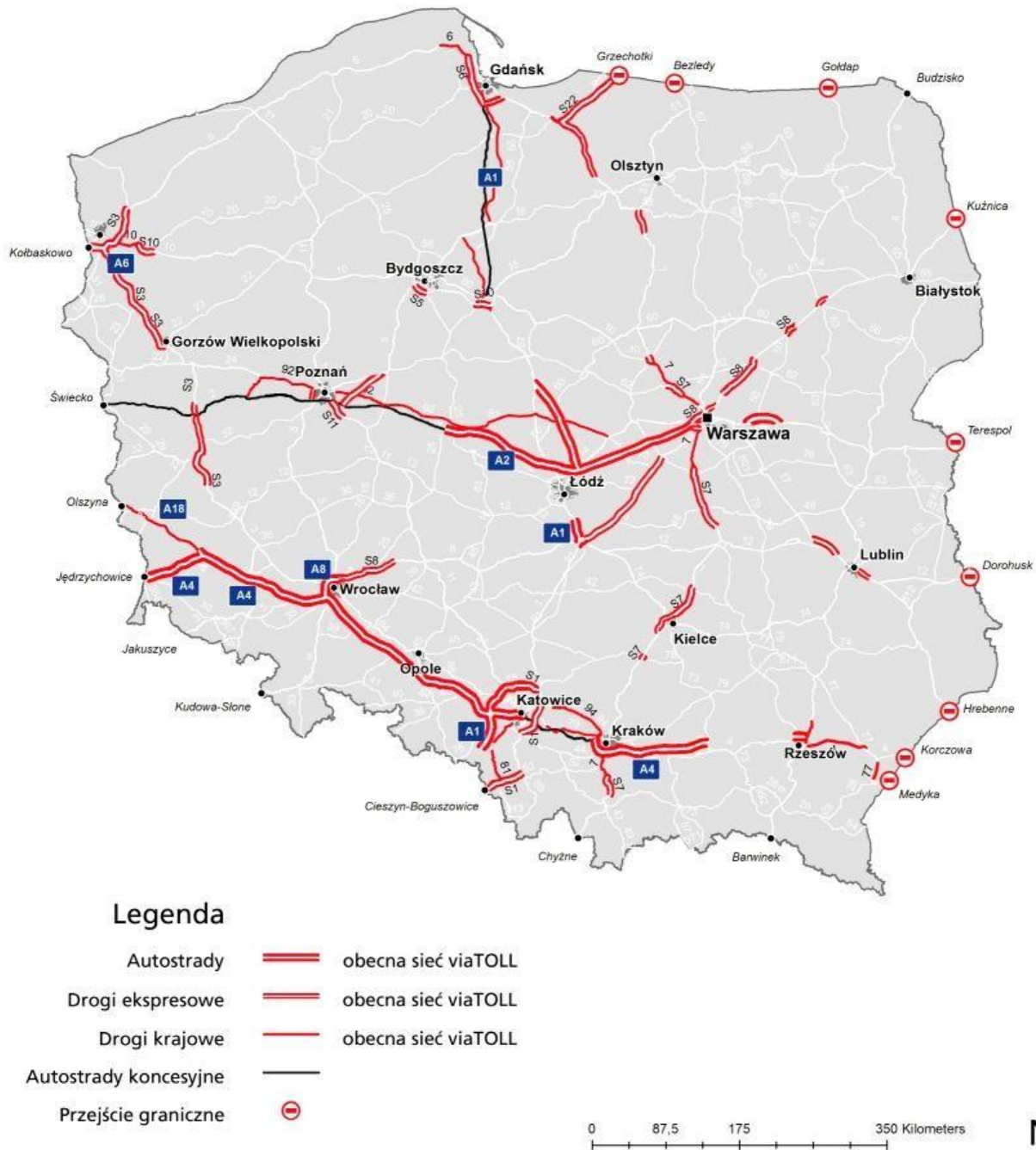
4th extension - 31 October 2013 - 343 km of roads,

5th extension - 1 December 2013 - 121 km of roads,

Planned extension - 2014 - about 250 km of roads

The current network of roads under the NTCS covers more than 2650 km. Ultimately, the network of roads covered by the NTCS until 2018 may reach the level of 8000 km.

➤ **The current road network covered by the NTCS**



Costs incurred in 2011 - 2014 (01-05) in connection with the construction and operation of the system amounted to PLN 2,141 billion.

➤ **Revenue from system in 2011-2014 (01-07)**

ESP	MTC	TOTAL
2.817 billion	449 million	3.266 billion

The costs of building the system were returned in the fourth quarter of 2012.

Based on data collected during the operation of the NTCS and after carrying out an appropriate analysis, the system can provide traffic information. In addition, the data generated by the system are now a source of information useful when performing official duties by authorised external parties, including law enforcement and tax authorities.

Interoperability with other toll systems in Europe

According to the Directive 2004/52/EC of the European Parliament and of the Council of 29 April 2004 on the interoperability of electronic road toll systems in the Community (O Journal EU L166 of 30.04. 2004, as amended), interoperability means standardised and compatible platforms at the following levels: technical, contractual and operational. Electronic toll collection system is based on the one of the technologies preferred by Directive 2004/52/EC and will be prepared to support the interoperability of services offered by the European electronic toll service (so-called EETS). The use of an electronic toll collection system assumes that interoperability will enable the introduction of a European electronic toll service in the future. With this service, road users will be able to move freely within the European road network under a single contract with an EETS provider.

European Regional Electronic Fee Service - a project funded under the TEN-T programme (now INEA - Innovation and Networks Executive Agency) of the European Commission. Its objective is to implement actions to enable the implementation of the first phase of EETS in 8 European countries, i.e. the EETS service, taking into account the requirements of the commission decision in this regard. The project includes conducting analyses of contractual, procedural and technical issues in order to prepare recommendations and solutions that can facilitate the implementation of EETS. Parties to the project are Austria, Germany, Italy, Spain, Poland, Denmark, France and Switzerland. The expected duration of the project - until the end of 2015.

3.4 Integrated Toll Collection System

General Directorate for National Roads and Motorways, together with the Ministry of Infrastructure and Development began developing strategies for the Integrated Toll Collection System (ITCS). The ITCS system will include electronic toll collection from passenger vehicles on motorways and electronic toll collection from trucks and buses on motorways and national roads.

In the preparation of this strategy, work is underway aimed at defining the final shape of the architecture and functionality of the toll collection system for the road network covered by the fee in Poland. The subject of detailed analyses includes issues related to the definition of the target network of toll roads, payment methods, strategies for the implementation of control activities, solutions for occasional users, manner of provide services, interoperability of the ITCS with systems introduced by the licensees, the necessary legal changes to launch the ITCS, the funding model for the project. Completion of the works on the strategy is planned for the fourth quarter of 2014. One of the basic assumptions of the implementation of the ITCS is to change the method of toll collection from light vehicles

– from the current one (fee charged in a manual or electronic way) to an electronic toll collection system, which is as collision-free and functional as possible from the point of view of the user.

Implementation of the ITCS will help to reduce delays and the number of collisions caused by queues at Toll Gates (due to the increasing traffic on the motorways, they form so-called "bottlenecks", significantly slowing down the passage), to reduce the costs associated with the construction and operation of the toll system (if the proposed solution will not use tolling points and ramp toll plazas), to reduce emissions, to reduce fuel consumption, and to increase comfort for users. In addition, there is the possibility of introducing compatible toll systems throughout the country, if the licensees express willingness to join the ITCS.

3.5 Traffic supervision

As part of the activities carried out by the Road Transport Inspectorate (ITD), in 2011 work started on the project "Construction of a central system of automatic traffic supervision", co-financed by the European Union from the European Regional Development Fund under the Operational Programme Infrastructure and Environment. This project is scheduled for 2011-2015, with a total eligible cost of PLN 188,971,909.11, of which funding from the European Regional Development Fund amounts to PLN 160, 541,122.74 PLN⁸. The beneficiary of the project is the General Inspectorate of Road Transport (hereinafter referred to as GITD).

The scope of the project includes the purchase of speed camera infrastructure used for stationary and mobile traffic supervision, and the creation of the Automatic Traffic Supervision Centre (hereinafter referred to as CANARD) and the purchase of the system software enabling automatic processing of data from recording equipment. In the course of project implementation, GITD launched CANARD on 1 January 2011. CANARD began measures aimed at revealing the speed limit exceedances on 1 July 2011 - initially using the existing infrastructure of speed cameras, taken over from the Police and the General Directorate for National Roads and Motorways. In the period from August 2012 to September 2013, installation was carried out of 300 newly

⁸ By the end of February 2014, the overall approved expenses related with the CPD CANARD project amounted to PLN 124,543,421.35, of which EU funding amounted to PLN 105,861,908.10.

purchased recording devices throughout the country. In addition, since November 2012, 29 mobile recording devices installed in vehicles began operation. In parallel, in March 2013, the first version of the IT Data Processing Centre CANARD (CPD CANARD) was implemented.

As part of the above project, the following activities are planned for 2014 - 2015:

- Installation of 100 fixed recording devices;
- Installation of 29 recording devices for average speed section control;
- Installation of 20 devices recording vehicles running a red light.

At the same time it should be added that the recording equipment installed as part of the construction of an automatic traffic surveillance system are installed on national roads. In accordance with the directions of improvement of road safety contained in the NRSP 2013-2020, improvement of speed management is aimed to maintain the speed of vehicles in accordance with the speed limit and traffic signs on different categories of roads. Rational speed management involves, among other things, forcing the vehicle drivers to obey speed limits through the use of surveillance and restrictions (automation of traffic surveillance). The development of CANARD will contribute to strengthening the supervision of traffic safety and ultimately reducing the impact of incidents on the road, especially the number of people killed and seriously injured.

3.6 Emergency notification system

From 8 September 2012, supervision of the emergency notification system in Poland is exercised by the Minister of Administration and Digitisation. During this time, a number of measures was taken, aimed at ensuring the prompt and efficient functioning of the system. These measures included both the legislative sphere, as well as organisational and technical sphere. The most significant of these include: preparation of a new "Concept of the construction of the Emergency Notification System in Poland" and the development and implementation of the Act of 22 November 2013 on the emergency notification system (Journal of Laws item 1635), in force since 1 January 2014, which comprehensively regulates the functioning of the system. By the end of last year, 17 emergency notification centres were opened, which handle emergency calls to the emergency number 112 from the territory of the whole country, and at the same time, a number of organisational and technical measures was taken, aimed at providing all the planned functions of the data transmission system for the needs of emergency notification centres.

It should be noted that in the course of the work carried out by the Ministry of Administration and Digitisation on the organisation of the operation of the emergency notification system in Poland, since the beginning, the possibility of also extending the scope of the service to non-voice emergency notifications was taken into account, hence Article 2.1 of the aforementioned act on the emergency notification system indicates that the emergency notification should be understood as relevant information "from external monitoring systems" - which undoubtedly include the eCall system. In view of the above, it must be assumed that there already is a legal framework for efficient, prompt and professional handling of emergency notifications - both "classic" ones by telephone and directed from the eCall system. All emergency notifications will be handled in appropriately equipped emergency notification centres, according to uniform procedures (as defined in the Regulation of the Minister of Administration and Digitisation of 28 April 2014 on the organisation and functioning of emergency notification centres, Journal of Laws item 574), by professionally trained emergency number operators. However, the degree of complexity of the implemented data transmission solutions does not allow for the rapid introduction of all planned functions. Work is underway on, among other things, connecting the data transmission system used in the emergency notification centres with systems, which were built by the appropriate emergency services. Continuation of the technical development of emergency notification centres will also include the implementation of handling eCall emergency calls in existing public safety answering points - whose functions are fulfilled by Emergency Notification Centres. The issue of the cost of expanding the emergency notification system is described in detail in the Regulatory Impact Assessment of the act on the emergency notification system. These costs relate to the expansion of the system, under which all emergency calls to the 112 emergency number will be handled- regardless of their form (i.e. both 'classic' voice phone calls, or "notifications from external monitoring systems"). Therefore, it is not possible to specify the amount or percentage of costs allocated only to the implementation of handling eCall notifications. In the emergency notification system, all emergency notifications will be handled in the emergency notification centres in accordance with uniform procedures by qualified emergency number operators equipped with the necessary technical tools.

4 Projects on a voivodeship scale

4.1 Mazowieckie Voivodeship

ITS-related activities carried out by Warszawska Kolej Dojazdowa WKD sp. z o.o.

1. Implementation of the Passenger Information and Monitoring System at WKD stations and stops

- a) Project enabling the creation of a comprehensive system of dynamic passenger information about the actual state of traffic on the WKD line, to be implemented at all WKD stations and stops in the form of electronic display boards, sound devices (emission of voice messages) and computerised Surveillance Centre,
- b) Project enabling the creation of a comprehensive video monitoring system of all WKD stations and stops with crossings located in the immediate vicinity of stops;
- c) ITS deployment in the following categories:
 - *Traveller information* - types of services: information before travelling, services related to personal information, guiding along the route and navigation;
 - *Traffic management* - types of services: assisting transport planning, management of incidents, demand management;
 - *Public transportation* - types of services: management of public transportation;
 - *Need of assistance* - types of services: notice of accident and personal safety;
 - *Safety* - types of services: safety in public transport;
- d) Completion date of the project: 2014 – 2015,
- e) Financing: funds from the loan granted by the European Investment Bank and the support of the Swiss-Polish Cooperation Programme
- f) Value of the project: PLN 5,300,000.00.

2. The construction of telecommunication infrastructure for a fibre-optic conduit with laying of a fibre-optic cable

- a) Project which is a determinant for the implementation of the dynamic passenger information system for train movement on WKD lines, available at every station and stop - based on the electronic display boards and the Surveillance Centre,
- b) Project which is a determinant for the implementation of a comprehensive monitoring system for all stations and stops on the WKD lines to improve the safety of users of rail and road transport (monitoring stations and stops as places of passenger check-in and monitoring of the crossings located in the immediate vicinity of stops),
- c) Project supporting the modernisation of level crossing protection systems on WKD lines as part of improving the safety of users of road and rail infrastructure as well as in the longer term, supporting the remote train traffic control system, electrical power control systems and telephone communications,
- d) ITS deployment in the categories: Safety - types of services: safety in public transport,
- e) Completion date of the project: 2012 – 2014,
- f) Financing: own funds and funds from the loan granted by the European Investment Bank,
- g) Value of the project: PLN 3,500,000.00.

3. Purchase of new electric rolling stock (14 units)

- a) Project enabling the improvement of passenger service through the use of on-board dynamic passenger information systems as well as vehicle interior and surroundings monitoring systems,
- b) Project enabling the improvement of safety in rail traffic by transmitting data from the vehicle about its current position to the computerised Surveillance Centre of the Passenger Information and Monitoring System,
- c) ITS deployment in the following categories:
 - *Traveller information* - types of services: information when travelling by public transport, guiding along the route and navigation;

- *Traffic management* - types of services: assisting transport planning, management of incidents;
 - *Vehicle* - types of services: use of equipment limiting the movement of the user of the vehicle during a collision;
 - *Need of assistance* - types of services: notice of accident and personal safety;
 - *Safety* - types of services: safety in public transport;
- d) Completion date of the project: 2010 – 2012,
- e) Financing: funds from the European Regional Development Fund under the Regional Operational Programme for Mazowieckie Voivodeship 2007-2013, restricted grants from the Railway Fund and a loan granted by the European Investment Bank,
- f) Value of the project: PLN 231,000,000.00.

4. Purchase of new electric rolling stock (6 units)

- a) Project enabling the improvement of passenger service through the use of on-board dynamic passenger information systems, vehicle interior and surroundings monitoring systems as well as passenger counting systems,
- b) Project enabling the improvement of safety in rail traffic by transmitting data from the vehicle about its current position to the computerised Surveillance Centre of the Passenger Information and Monitoring System,
- c) ITS deployment in the following categories:
- *Traveller information* - types of services: information when travelling by public transport, guiding along the route and navigation;
 - *Traffic management* - types of services: assisting transport planning, management of incidents, demand management;
 - *Vehicle* - types of services: use of equipment limiting the movement of the user of the vehicle during a collision;
 - *Need of assistance* - types of services: notice of accident and personal safety;
 - *Safety* - types of services: safety in public transport;
- d) Completion date of the project: 2013 – 2016,
- e) Financing: funds from the Swiss-Polish Cooperation Programme, own funds and, if appropriate, from a commercial loan
- f) Value of the project: PLN 96,000,000.00.

5. Periodic repair of the electric rolling stock series EN95 (type 13WE) with modernisation

- a) Project enabling the improvement of passenger service through the use of on-board dynamic passenger information systems, vehicle interior monitoring systems as well as passenger counting systems,
- b) Project enabling the improvement of safety in rail traffic by transmitting data from the vehicle about its current position to the computerised Surveillance Centre of the Passenger Information and Monitoring System,
- c) ITS deployment in the following categories:
- *Traveller information* - types of services: information when travelling by public transport, guiding along the route and navigation;
 - *Traffic management* - types of services: assisting transport planning, management of incidents, demand management;
 - *Vehicle* - types of services: use of equipment limiting the movement of the user of the vehicle during a collision;
 - *Need of assistance* - types of services: notice of accident and personal safety;
 - *Safety* - types of services: safety in public transport;
- d) Completion date of the project: 2014,
- e) Financing: own funds,
- f) Value of the project: PLN 4,000,000.00.

6. Projects related to the implementation of multimodal applications helping to plan a trip

- a) Start of cooperation with external institutions in relation to sharing of own timetable to the use of electronic applications allowing to plan a trip together with determination of approximate travel time and the necessary transfers by other means of transport,
- b) Data exchange format: data compiled and prepared by the WKD via XML format, which are then sent to interested parties; recipients using the received file are able to quickly adapt the necessary data to the requirements of the applications used,

- c) Export of data used by the connections search engine *www.jakdojade.pl* (in the Warsaw agglomeration),
- d) Export of data used by the connections search engine *www.rozklad-pkp.pl*,
- e) Timetables on the website of the Warsaw Transport Authority and the Grodzisk Mazowiecki municipality,
- f) ITS deployment within the category of traveller information - types of services: information before travelling, services related to personal information;
- g) Completion date of the project: 2010. It was a one-off project, related to releasing the timetable to one of the websites. Currently, the website automatically downloads updates of train timetable from WKD. This project did not result in any cost to the WKD.

7. Installation of ticket machines on platforms of all stations and stops on the WKD lines

- a) Project enabling the improvement of passenger service through the use of solutions aimed to integrate tariff and ticketing systems, and the improvement of access to information about the offers of public transport organisers and operators (access to the WKD's full ticket offer and within a certain range, to the offer of the Warsaw Transport Authority),
- b) ITS deployment in the following categories:
 - *Traveller information* - types of services: information before travelling;
 - *Traffic management* - types of services: support for transport planning, demand management (by collecting information about the degree of interest in elements of the offer - in regard to quantity and location);
- c) Completion date of the project: 2012 – 2014.

ITS-related activities carried out by Koleje Mazowieckie – KM sp. z o.o.

Implemented solutions supporting the management of Koleje Mazowieckie services, including a failure detection system for DSAT rolling stock.

It is a project implemented by PKP PLK S.A. and made available to railway undertakings. Costs incurred in connection with the launch of the system and further plans for its further potential development are not known. Nevertheless, the carrier Koleje Mazowieckie – KM completed a project in 2013 associated with the assembly of a station for early detection of wheelset damage - the value of the station is about PLN 0.7 million. In addition, since 2013, a system has been in operation at the KM, installed in 34 modernised EN57 series vehicles, which allows the ongoing monitoring and tracking the status of vehicles online. The estimated cost of the implementation of such a system in vehicles is about PLN 0.25 million. Train positioning system using GPS terminals installed in vehicles is mainly used by the Company's Dispatch Office. It is one of the IT tools that facilitates the work of dispatchers and is used primarily for the organisation of railway traffic. Apart from this, KM for more than a year has been conducting activities related to the implementation of IT system for travellers, which will enable real-time notification about the actual train running. This system will contain information about four to eight next trains departing from the given station with the following information:

- Train number,
- Carrier,
- Date,
- Train route,
- Planned departure from the station where data are displayed,
- Departure delay given in minutes,
- with a text message, displayed, for example, on the "moving bar" about any obstructions in train running, e.g. train cancelled, train runs skipping certain stops, etc.

Information will be available on the KM website in the "departures" and "arrivals" arrangement from the station or stop selected by user. In addition, the train timetable chosen by the interested person can be expanded, showing full station timetable.

ITS activities carried out by the Mazowieckie Voivodeship Road Authority

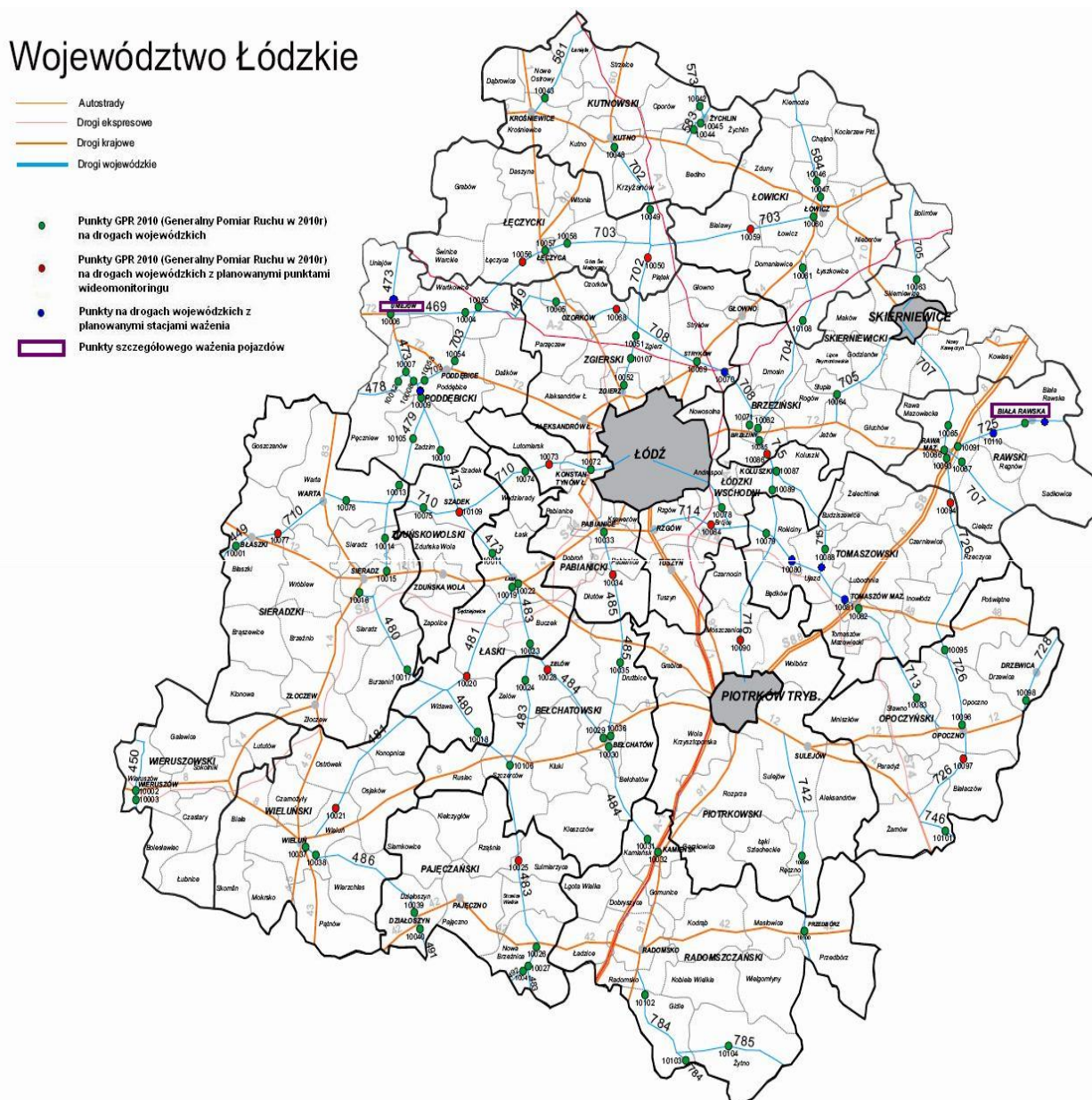
On the roads in the Mazowieckie Voivodeship managed by the Mazowieckie Voivodeship Road Authority, as part of limited activities related to the implementation of Intelligent Transport Systems, demand-actuated traffic control adapting the control parameters to the existing traffic in 76% isolated traffic lights has been introduced so far. Adaptation to this standard of other signals will depend on budgetary appropriations for subsequent years up to 2020.

Traffic lights are implemented in the framework of the organisation of traffic, as approved by the traffic management body, and ultimately the range of adaptation of signals to demand-actuated control will depend on the standard of operation of traffic lights adopted during approval by the traffic management body.

4.2 Łódzkie Voivodeship

In the period from 26 April 2010 to 30 November 2011, the Voivodeship Road Authority in Łódź carried out a project entitled "Intelligent transport systems - traffic load monitoring" under the Regional Operational Programme for Łódzkie Voivodeship for 2007 - 2013, containing elements listed in the ITS Directive. This project is funded by the Łódzkie Voivodeship executive board under Resolution No. 997/10 of 28 June 2010 i.e. before the publication of the aforementioned Directive. The objective of the project is to monitor and protect against destruction of voivodeship roads managed by the Voivodeship Road Authority in Łódź. The system consists of 8 pre-selection weighing stations for moving vehicles (weights and cameras), 17 traffic monitoring stations (cameras), 2 devices for confirming the need for the elimination of suspect vehicle for traffic (portable weights), IT infrastructure for transferring and storing data and specialised software. The cameras also have a radar to measure speed.

➤ Location of the weighing station and monitoring points in the Łódzkie Voivodeship



Information from measuring points is processed in real time on a server located at the headquarters of the Voivodeship Road Authority in Łódź. Registered and processed data are accessible, through the available individual passwords, to law enforcement, i.e. the Voivodeship Police Headquarters in Łódź (6 stations), Road Transport Inspectorate (33 stations) and the Central Bureau of Investigation (1 station). The data processing application is continuously modified and adapted to the needs of road maintenance and preventive services. It is possible to share a portion of information to users through the Internet, through the website of the Voivodeship Road Authority in Łódź. In the case of obtaining additional financial resources, the system can be extended with traffic control components, transmission of visual information to users and securing the data exchange compatibility with other ITS applications.

The total amount allocated for investment in the field of intelligent transport systems from 2010 to the present, including as a percentage of the entire pool of annual funding for the infrastructure investments:

- 2010 - PLN 2,073,012.41, which represents 1.17% of the entire annual pool of funds for infrastructure investments,
- 2011 - PLN 7,423,580.03, which represents 3.77% of the entire annual pool of funds for infrastructure investments.

Project entitled: "Intelligent transport systems - traffic load monitoring" has been carried out on public roads in the Łódzkie Voivodeship classified as provincial roads.

Indicators relating to the ITS project being implemented:

- Product indicator - number of installed systems,
- Result indicators:
 - Time savings in passenger transport;
 - Time savings in freight.

4.3 Małopolskie Voivodeship

Małopolskie Voivodeship carries out projects related to the implementation of intelligent transport systems in the region. Such projects include a traffic control system on roads, a program to improve the availability and standard of passenger rail transport within Fast Agglomeration Rail System (SKA) in the Krakow Agglomeration, as well as electronic tickets for public transport in the Małopolskie Voivodeship.

Voivodeship Road Authority (ZDW) in Kraków, which is financed by the budget unit of the Małopolskie Voivodeship Government, carries out activities related to the implementation of ITS solutions in the network of voivodeship roads in the Małopolskie Voivodeship through the implementation of the following projects:

1. Intelligent Traffic Control System for the Podhale Region (ISSRRP)

The project was completed in 2011 using funding from the European Union under the Regional Operational Programme for Małopolskie Voivodeship 2007-2013. It assumed the construction of the ITS system, consisting of a network of specialised devices, such as traffic monitoring stations, warning stations monitoring weather conditions and the condition of the road surface, video monitoring stations, as well as traffic information boards, connected together in a control centre, also performing the functions of a data distributor for the website functioning in many dimensions (internet, GPS navigation, radio, GSM), which will serve to provide information to road users. An integral part of the system is a mobile traffic control centre operating directly in the field, providing information about the situation on the roads to the regional centre. Scope of the project included a complete monitoring coverage of the network of national and voivodeship roads in the Podhale region, as well as selected county roads. The main objectives of the project are to increase the safety of people using the roads in the Podhale region and reducing congestion on the roads in this region, through the implementation of Intelligent Traffic Control System for the Podhale Region, allowing for continuous monitoring of traffic and weather conditions, road surface condition, traffic management as well as real time notification of user/drivers about traffic conditions on the Podhale roads. This project won the contest Leader of ITS 2012. It won first prize in the category of best implementation.

2. Integrated Traffic Control System in Małopolskie Voivodeship (ZSSRM)

The project is currently in progress and its completion has been set for 2015. It is included on the list of key projects of the Regional Operational Programme for Małopolskie Voivodeship 2007-2013. Within the

project, a system will be created composed of devices for traffic monitoring and surveillance, issuing messages and video surveillance on the inlet roads to urban areas (Kraków, Tarnów, Nowy Sącz, Oświęcim). Also, data transmission infrastructure will be created in order to clear the access to the parking lot in Palenica Białczańska. The system involves the construction of autonomous measuring stations located before the entrance to the agglomeration, through which the following will be carried out in real time:

- Measurement of traffic volume,
- Classification of vehicles,
- Measurement of the speed of vehicles,
- Detection of road accidents,
- Monitoring of the movement of certain vehicles.

The project involves the construction of subsystems consisting of ANPR devices, VMS devices as well as video monitoring and meteorological monitoring. As part of the ZSSRM project, a modern parking management system will be built in Palenica Białczańska with an electronic reservation of parking spaces. These systems are connected with the 1st priority area: Optimal use of data on roads, traffic and travel in the ITS Directive.

3. Małopolskie Voivodeship Agglomeration Card - public transport management system in the Małopolskie Voivodeship

The project is planned for implementation in 2014 - 2015 and covers public transport in Kraków and Tarnów, the Rapid Agglomeration Rail System and the Park & Ride car parks located in Bochnia and Tarnów. The project will include the installation of access devices to the aforementioned Park & Ride car parks, which will be used to automatically detect vehicles of MKA users, MKA machines used to purchase the transportation service offered within the MKA system, devices for the location and identification of rail transport vehicles that provide information on travel times of rail vehicles to the destination and waiting time on railway vehicles, passenger information signs located along the SKA route, mobile devices for MKA control. The project will include the construction of the MKA system, whose structure will be distinguished by the following elements:

- Integrated transportation ticket system covering the public transport in Kraków, Tarnów, Fast Agglomeration Rail and the Park & Ride car parks,
- Passenger information system for the waiting time for a railway vehicle,
- Availability management system for the Park & Ride car park, allowing for making reservation of parking spaces in car parks participating in the MKA project and controlling the parking availability.

Applications for travellers, which will use data from the passenger information system, mobile websites and an information portal for passengers will also be developed. The project also includes the creation of two interconnected Data Processing Centres (CPD1 and CPD2), responsible for handling all the operations taking place in the MKA system and installing local MKA system servers in the area of the Park & Ride car parks. The project will be developed taking into account the need to maintain technological neutrality, security of IT systems and ensuring adequate redundancy between the Centres. The project involves the operation of the MKA within the existing KKM network (Kraków City Card), TKM (Tarnów City Card), SKA (Fast Agglomeration Rail) and the Park & Ride system, which in turn will allow passengers to better plan their trip and to move around the Małopolskie Voivodeship with more convenience. In the years after the MKA project completion, efforts will be undertaken to extend the MKA project with another elements related to, among others, the construction of new car parks and the need to integrate them into the MKA system, as well as the development of passenger information system, including the purchase of new devices and the integration into the system of private transport vehicles BUS.

➤ **Information in respect of amounts intended for investments in the area of ITS from 2010 to the present:**

ITS project name	Total amount allocated in a given year[PLN]				
	2010	2011	2012	2013	2014
Intelligent Traffic Control System for the Podhale Region	0.00	4,221,372.00	0.00	0.00	0.00
Integrated Traffic Control System in Małopolskie Voivodeship	0.00	0.00	29,520.00	14,697.18	1,409,938.00

Małopolskie Voivodeship Agglomeration Card - public transport management system in the Małopolskie	0.00	0.00	0.00	191,137.00	4,982,863.00
Total	0.00	4,221,372.00	29,520.00	205,834.18	6,392,801.00
% of the annual pool of funds allocated for ITS projects	0.00%	1.43%	0.02%	0.11%	3.51%

➤ **Information about the categories of roads where ITS projects are implemented**

ITS project name	Road categories
Intelligent Traffic Control System for the Podhale Region	voivodeship, national and county
Integrated Traffic Control System in Małopolskie Voivodeship	voivodeship, national and county
Małopolskie Voivodeship Agglomeration Card - public transport management system in the Małopolskie Voivodeship	(the project does not include roads)

➤ **Information on implementation indicators of ITS projects**

ITS project name	ITS project implementation indicators	
	Product indicators	Result indicators
Intelligent Traffic Control System for the Podhale Region	<ul style="list-style-type: none"> • Number of websites enabling the contact between citizens and authorities/institution - 1 • Number of online services launched at level 1 - Information - 1 • Number of online services launched at level 2 - Interaction - 2 	<ul style="list-style-type: none"> • Number of institutions covered by the management system based on data transmission technologies - 68 • Number of users of online services - from 2,985,278 (one year after completion of the project) to 3,222,465 (5 years after project)
Integrated Traffic Control System in Małopolskie Voivodeship	<ul style="list-style-type: none"> • Number of new/upgraded/expanded management systems for public administration or other public entities - 3 • Number of websites enabling the contact between citizens and authorities/institution - 1 • Number of online services launched at level 1 - Information - 1 • Number of online services launched at level 2 - Interaction - 1 	<ul style="list-style-type: none"> • Number of institutions covered by the management system based on data transmission technologies - 51 • Number of potential users of e-services launched - from 363,697 (one year after the completion of the project) to 4,194,263 (five years after project completion)
Małopolskie Voivodeship Agglomeration Card - public transport management system in the	<ul style="list-style-type: none"> • Number of online services launched at level 1 - Information - 1 • Number of online services launched at level 2 - Interaction - 1 • Number of online services launched at level 4 - Transaction - 1 	<ul style="list-style-type: none"> • Number of people using online services - from 23,406 (one year after the completion of the project) to 80,863 (five years after project completion)

Information about the location of ITS

deployments: ISSRRP:

- National roads numbered: 7, 47 and 49,
- Voivodeship roads numbered: 957, 958, 960, 961, 962 and 969,
- County roads numbered: DP1642, DP1644, DP1648.

ZSSRWM:

- National roads numbered: 4, 28, 44, 49, 75, 79, 87, 94,
- Voivodeship roads numbered: 768, 774, 776, 791, 794, 780, 781, 791, 933, 958, 960, 961, 964, 965, 966, 967, 968, 969, 971, 973, 975, 977 and 981,
- County road no: 1648K.

- **Roads covered by the ZSSRWM project (green) roads under the ISSRRP project (blue)**



MKA:

The Małopolskie Voivodeship Agglomeration Card project - public transport management system in the Małopolskie Voivodeship covers the public transport in Kraków and Tarnów (in terms of integration with electronic tickets systems existing in this area), Fast Agglomeration Rail System:

- SKA1 line: Trzebinia – Kraków Główny – Tarnów,
- SKA2 line: Sędziszów – Miechów – Kraków Główny – Skawina – Podbory Skawińskie,

- SKA3 line: MPL Balice – Wieliczka Kopalnia, as well as Park & Ride car parks located in Bochnia and Tarnów.

- **Area covered by the Małopolskie Voivodeship Agglomeration Card project - public transport management system in the Małopolskie Voivodeship, along the SKA1 line: Trzebinia – Kraków Główny – Tarnów (green), SKA2 line: Sędziszów – Miechów – Kraków Główny – Skawina – Podbory Skawińskie (blue), SKA3 line: MPL Balice – Wieliczka Kopalnia (violet)**



4.4 Lubelskie Voivodeship

The Voivodeship Road Authority in Lublin has taken measures to improve road safety for traffic participants. At all intersections of voivodeship roads with traffic lights (13 intersections), intelligent (accommodative) traffic control systems are used, signalling by means of devices which adjust the light duration to the traffic flow at intersections, including 2 sections of roads with linearly coordinated intelligent signals. Detection of vehicles at intersections is done using inductive loops installed in the roadway, cameras or both of these methods in a "mixed". In order to improve road safety, it is also planned to install information signs at the inlets of the bridge constructed over the Vistula River, located in the towns of Kamień - Solec nad Wisłą. Variable message boards will allow for displaying graphical and alphanumeric content. Planned completion date is November 2014.

4.5 Lubuskie Voivodeship

On the roads in the Lubuskie Voivodeship, as part of limited activities related to the implementation of Intelligent Transport Systems, demand-actuated traffic control adapting the control parameters to the existing traffic has been introduced so far. Adaptation to this standard of other signals will depend on budgetary appropriations for subsequent years up to 2020. Traffic lights are implemented in the framework of the organisation of traffic, as approved by the traffic management body, and ultimately the range of adaptation of signals to demand-actuated control will depend on the standard of operation of traffic lights adopted during approval by the traffic management body.

➤ **List of traffic lights/sound signalling implemented in 2010 - 2014 on regional roads in Lubuskie Voivodeship**

No	Road No	Name of task	Years of implementation	Value [PLN]
1	136	Construction of traffic lights as well as pedestrian and bicycle paths within the intersection of ul. Jana Pawła II, ul. Sulęcińska and ul. Świerczewskiego in Lubniewice at km 9+764	2010	222,059.67
2	132	Construction of demand-actuated traffic signals with the power connection and pedestrian crossing lighting on the voivodeship road No. 132 in the town of Dąbroszyn at km 4+366	2010	84,073.66
3	151	Construction of demand-actuated traffic signals with a power connection and pedestrian crossing lighting on the voivodeship road	2010	85,122.45
4	315	Construction of traffic lights on voivodeship road No. 315 in the town of Lubiecin	2010	83,871.22
5	-	Installation of 4 sets of active pedestrian crossings	2010	62,220.00
6	282	Construction of beacon lights at a pedestrian crossing in the town of Droszków on the voivodeship road No. 282 at approx. km 18+589	2011	62,410.20
7	297	Construction of beacon lights at a pedestrian crossing in the town of Borowina on the voivodeship road No. 297 at approx. km 21+746.50	2011	41,820.00
8	158/160	Implementation of sound signalling (for the disabled) on the intersection of voivodeship roads No. 158/160 in Drezdenko	2012	3,788.40
9	278	Construction of beacon lights at a pedestrian crossing in the town of Sława on the voivodeship road No. 278 at approx. km 70+938 (Implementation of the pedestrian crossing with traffic signs and road surface markings, solar warning lights and fences U-12a on the intersection of voivodeship road - ul. Henryka Pobożnego No. 278 with	2012	64,988.97
10	137	Construction of traffic lights on voivodeship road No. 137 in the town of Kowalów	2013	111,746.08
TOTAL				822,100.65

4.6 Opolskie Voivodeship

Since 2010, 21 devices to measure and record vehicle speed, travel time and the number of vehicles have been installed on the network of voivodeship roads in the Opolskie Voivodeship, thereby enabling an overall traffic load assessment. These devices indicate the speed of passing vehicles and display relevant messages depending on the speed. In addition, one meteorological station was also installed, providing information about ambient and road surface temperature. These devices are equipped with an independent power supply using solar panels.

So far, in the framework of implemented projects in the Opolskie Voivodeship, costs were incurred on ITS equipment with a total value of approx. PLN 806,000.

Currently, in the planned investments as part of the upgrade of transport routes, a requirement for installation of Intelligent Transport System equipment is being introduced more and more often.

➤ **Table of installed ITS devices on voivodeship roads in the Opolskie Voivodeship**

No.	Project name	Road category	Value of investment	Quantity of ITS	Cost of the ITS device				connection to priority areas Art. 2 and Art. 3 of the ITS Directive	Technical information / scope of work
					2011	2012	2013	2014		
1	Reconstruction of the voivodeship road No. 426 by the motorway interchange Olszowa	G	40 043 847,80	2	289 024,37				area III measure c)	Meteorological station transmitting data about ambient and road surface temperature
2	"Expansion of the voivodeship road No. 414 on the section Smolarnia - Krobusz at km 24+565 - 35+760"	G	33 299 515,57	2	33 333,00				area III and IV measure b) and c)	A device for measuring and recording vehicle speed. The data recorded will also provide an overall assessment of the traffic load
3	Reconstruction of the voivodeship road No. 396 in km 8+970 to 11+380 on the sect. Przeczów - Mikowice	Z	6 179 500,00	1	32 000,00				area III and IV measure b) and c)	
4	5. Expansion of the voivodeship road No. 414 on the section Przysiecz - Dzików.	G	16 893 682,71	2		47 000,00			area III and IV measure b) and c)	
5	Expansion of the voivodeship road No. 401 on the section Grodków - Pakosławice Stage 1"	G	30 364 525,58	2		59 040,00			area III and IV measure b) and c)	
6	Expansion of the voivodeship road No. 463 on the section from km 21+680 to km 26+031 Krasiejow - Mnichus"	Z	6 743 044,50	1			30 000,00		area III and IV measure b) and c)	
7	Construction of a ring road for the town of Głubczyce on voivodeship road No. 416	G	25 861 836,77	2				61 500,00	area III and IV measure b) and c)	

8	"Reconstruction of the voivodeship road No. 494 on the section Olesno - Bodzanowice at km 20+220-20+560, 20+860-21+480, 24+000-24+400, 26+100-26+350, 33+600-33+900"	Z	4 472 518,07	1		28 290,00		area III and IV measure b) and c)
9	Expansion of the voivodeship road No. 901 at km 7+670-10+625 (in the section Nowy Wachów - Kocury), 15+860-16+810 (in the town of Dobrodzień), 24+850-26+750 (on the section Pludry - Pietraszów)"	G	9 934 992,58	2			57 810,00	area III and IV measure b) and c)
10	Expansion of the voivodeship road No. 901 in the town of Bzinica Stara from km 21+560 to km 22+960	G	4 142 145,70	2			49 200,00	area III and IV measure b) and c)
11	"Expansion of the voivodeship road No. 407 in the town of Konradowa from km 0+380.00 to km 2+140.23"	Z	6 040 075,08	2			61 500,00	area III and IV measure b) and c)
12	Expansion of the voivodeship road No. 409 at km 25+199 to km 12 39+257.73 from the town of Roźniątów to the town of Gogolin	G	37 609 622,72	1			30 700,00	area III and IV measure b) and c)
13	13 Expansion of the voivodeship road No. 494 on sections: Szumirad-Chudoba at km 7+200 - 8+250 and 8+350-9+200, and in the town of Łowoszków at km 13+295 - 14+300	Z	4 314 835,60	1			26 000,00	area III and IV measure b) and c)

14	Expansion of the voivodeship road No. 487 on the section Olesno - Boroszów at km 29+550 - 32+000 and 32+500-34+500	Z	6 107 542,74	1			26 000,00	area III and IV measure b) and c)		
15	Construction of a ring road in the town of Biała as part of the road No. 414 Opole - Lubrza	G	28 378 455,27	2			48 216,00	area III and IV measure b) and c)		
15	"Supply and installation of radar speed displays in the town of Rzepcze" - Voivodeship Road 416	G	39 788,20	2			39 788,20	area III and IV measure b) and c)		
TOTAL			260 425 928,89	26	354 357,37	134 330,00	286 514,20	144 200,00	Total ITS devices :	919,401.57

➤ **Table of planned ITS devices on voivodeship roads in the Opolskie Voivodeship**

No.	Task	road category	Investment value	Number of ITS devices	connection to the priority areas in Art. 2 and Art. 3 of the ITS Directive	Technical information / scope of work	Progress	ITS location
1	Construction of a ring road for the town of Głubczyce within the voivodeship road No. 416	G	25,861,836.77	2	area III and IV measure b) and c)	A device for measuring and recording vehicle speed. The data recorded will also provide an overall assessment of the traffic load.	planned	within the ring road
2	Expansion of the voivodeship road No. 494 on the sections: Szumirad-Chudoba at km 7+200-8+250 and 8+350-9+200, and in the town of Łowoszków at km 13+295 - 14+300	Z	4,314,835.60	1	area III and IV measure b) and c)		expected	km 14+126 (P)
3	Expansion of the voivodeship road No. 487 on the section Olesno - Boroszów at km 29+550 - 32+000 and 32+500-34+500	Z	6,107,542.74	1	area III and IV measure b) and c)		expected	km 34+300 (Olesno)
Total number of planned ITS				4				

4.7 **Kujawsko-Pomorskie Voivodeship**

Voivodeship Road Authority in Bydgoszcz, acting on behalf of the voivodeship government, has allocated for capital expenditures from 2010 until now the amount of PLN 338,440,220.00, and the total amount allocated for investments in the field of intelligent transport systems since 2010 until now amounts to PLN 2,155,311.32. In percentage terms this represents 0.64% of the entire pool of funds for infrastructure investments.

The ITS project introduced concerns regional roads class G and Z, and 3 pre-selection gates have been created within its framework. The project of pre-selection vehicle inspection was carried out on the basis of indicators of road safety, reducing the number of overloaded vehicles and the number of vehicles passing the aforementioned voivodeship roads.

4.8 **Świętokrzyskie Voivodeship**

Świętokrzyskie Voivodeship Road Authority (ŚZDW) in Kielce, within the framework of the project "Elimination of development barriers - bridge over the Vistula River with the expansion of the provincial road No. 764 and connection to the voivodeship road No. 875" will install 2 weather stations for the amount of PLN 295,200. Variable message signs will be implemented at the inlets of the bridge built over the Vistula River, in the town of Połaniec. Variable message boards will allow for displaying graphical and alphanumeric content.

ŚZDW in Kielce will implement the project "Comprehensive implementation of 8 weather stations in the Świętokrzyskie Voivodeship in design and build system" for an amount of approx. PLN 270,000. Weather stations will provide information such as air temperature, surface temperature, wind speed and direction, air humidity, camera image 1.3 MPixel in outdoor housing with a heater, data transfer, possibility of real time viewing at www.szdw.kielce.com.pl.

4.9 Wielkopolskie Voivodeship

Poznań Agglomeration Electronic Card (PEKA) is a project co-funded by the Regional Operational Programme for Wielkopolskie Voivodeship 2007-2013. The beneficiary of the project is the city of Poznań. The main objective of the project is to create a tool that facilitates the daily life of the inhabitants of the Poznań agglomeration and to accelerate and streamline public institutions' services for the citizens. One of the primary objectives included in the development of the PEKA concept was to stimulate the development of the information society and the fight against the so-called digital divide mainly of the older generation and low-income populations. The project involves the development and launch of PEKA cards, which will provide the users with several functions (including single payment scheme for communication, single parking ticket in the whole agglomeration). The aim of the measure is to implement innovative solutions for the development of the data transmission infrastructure of the public sector. The value of the project amounts to PLN 44,859,584.57, of which the EU contribution is PLN 29,606,481.02. Timeframe: 2009 - 2014 The project is still ongoing and is part of an area of priority measure a) of the ITS Directive.

5 Projects in urban areas

5.1 Warsaw

ITS projects in the capital city of Warsaw are implemented by the municipal public transport companies.

The company Miejskie Zakłady Autobusowe Sp. z o.o., since 2010, has been implementing a project related to the modernisation and maintenance of a video monitoring system for buses. Expenditure incurred for this purpose amounted to PLN 1,328,400. At the same time, PLN 3,820,057 was allocated for the implementation and expansion of the radio and emergency communication system.

In turn, the company Tramwaje Warszawskie Sp. z o.o. expended the amount of PLN 3,415,252 during this period for the construction of a passenger information system. It included the installation and connection in a common system of 40 electronic PIS boards within the reconstruction and modernisation of the "WZ Route" as well as routes of the ul. Zieleniecka – ul. Targowa – ul. Kijowska. Currently, this system will be expanded by another 100 boards for the amount of approx. PLN 5.7 million on routes between Dworzec Wileński and Żerań, on the newly built road in Tarchomin, on ul. Powstańców Śląskich, on ul. Obozowa, on Al. Jana Pawła II, on ul. Prosta, and in the junctions of the Dworzec Wileński and Dworzec Wschodni. These boards are to be launched by October 2015.

In addition, in 2012-2013, the Public Transport Authority implemented the so-called passenger information service. Expenditure incurred for this purpose amounted to PLN 243,000. The existing WTA passenger information service has been lent to the WTA by a foreign partner. In the coming time, a new service designed for the needs of the WTA will be launched, for which WTA purchased a license.

At the same time, the capital city of Warsaw is planning to launch the 2nd phase of the Integrated Traffic Management System (ITMS), which ultimately is to cover the whole area of Warsaw, whose key element will be to cover the area of the city with demand-actuated traffic control. Additional functions of the Traffic Management Centre will also be taken into account, such as event management and functional development of the system website. Besides the territorial extension of the ITMS, the function of automatic detection of traffic incidents and distinguishing them from ordinary events will be implemented. A subsystem for informing drivers and other road users (variable message boards) will be built. In addition, it is planned to expand the system of CCTV surveillance. Implementation of the ITMS should take place in 2016 - 2020, and the cost of implementation is estimated initially at approx. PLN 200 million.

➤ **Renovation and construction of traffic lights in 2011 - 2013 in Warsaw carried out by the Municipal Roads Authority**

No.	Subject	Year of renovation/construction	Gross amount [PLN]
RENOVATIONS			
1	Wysockiego - Bartnicza	2011	854,983.46
2	Powstańców Śląskich - Człuchowska, Powstańców Śląskich - Borowej Góry	2012	1,741,648.42
3	Kondratowicza - Malborska	2012	1,051,234.75
4	Sobieskiego - Nałączowska	2013	1,350,000.00
5	Słowackiego Popiełuszki	2013	1,346,893.84
TOTAL			6,344,760.47
CONSTRUCTION			
1	Construction of traffic lights at a pedestrian crossing at ul. Odyńca between ul. Tagore'a and ul. Juliot-Curie	2011	387,190.17
2	Construction of traffic lights at the ul. Płochocińska - ul. Przyrodnicza intersection	2012	340,191.92
3	Construction of traffic lights at the ul. Bazylińska - ul. Ogińskiego intersection	2012	747,511.71
4	Construction of traffic lights on Al. Krakowska - crossing at the level of the bus terminus	2012	382,549.43
TOTAL			1,857,443.23

5.2 Tricity (Gdynia, Gdańsk, Sopot)

Implementation of the Integrated Traffic Management System TRISTAR in Gdańsk, Gdynia and Sopot

In the Tricity area, the largest affiliate project of metropolitan character is being carried out, coordinated by Gdynia and implemented by the Municipality of the City of Gdynia, Municipality of the City of Gdańsk and Municipality of the City of Sopot, entitled „Implementation of the Integrated Traffic Management System TRISTAR in Gdańsk, Gdynia and Sopot”. The project is co-financed by the European Union through the European Regional Development Fund under the Operational Programme Infrastructure and Environment (Priority VIII: Transport safety and national transport networks, Measure 8.3 Development of Intelligent Transport Systems). The EU grant will cover 85% of eligible costs of this investment. The system will be implemented at major streets in the transport system of cities included in their management. For the purposes of the traffic management system, new cable conducts with fibre optic cable will be built in the lanes of streets covered by the system, traffic lights will be rebuilt and built, with the devices for priority control for public transport. New features will include a system of recording traffic violations, vehicle identification system with automatic recognition of registration plates, roadside weather stations, variable message boards informing about traffic conditions and duration of travel to selected points in the Tricity, parking information boards specifying the number of available parking spaces, information boards on public transport stops. On the website and in the so-called passenger terminals, located in Tricity's main transport nodes, it will be possible to plan a trip with regard to transfers and delays. In the TRISTAR system, public transport receives priority in traffic lights at intersections, which will certainly improve its punctuality. The master unit of the system will be the Traffic Management and Control Centre located in Gdańsk and Gdynia. In the next five years, after the completion of the above project, the Municipality of the City of Gdynia, where possible, plans to integrate more routes into the system, as well as intersections and pedestrian crossings controlled by traffic signals. The value of the project amounts to PLN 160,815,099.81.

Connection to the priority areas and priority measures set out in the ITS Directive:

- 1) As a result of the above project, for the purposes of the proper and effective functioning of the system, activities will be carried out consisting of collecting, processing and sharing with road users (in real-time) of information on travel and road conditions, which by the implementation of priority measures (a), (b) and (c), falls under the Priority Area I *Optimal use of data on roads, traffic and travel*.
 - 2) The Traffic Management and Control Centre created under the project will operate as two autonomous branches located in Gdańsk and Gdynia, managing separate areas, while ensuring the exchange of data and traffic information (at an inter-city level), both between them and providers of public transport services, which will ensure high efficiency of the system throughout the Tricity area, falling under the Priority Area II *Continuity of ITS services related to the management of traffic and freight*.
 - 3) By building an open architecture of the system, which in the future will allow its connection to other urban areas, and by the ability to expand the system with additional elements, the project falls under the Priority Area IV *Linking the vehicle with the transport infrastructure*.
- **The total amount allocated for investments in the area of the TRISTAR project from 2010 to the present, including as a percentage of the entire pool of annual funding for infrastructure investments.**

Year	ITS investments	Infrastructure investments excluding ITS	Total infrastructure investments	Percentage of ITS projects in relation to the entire pool of annual funds for infrastructure investments
	[PLN]	[PLN]	[PLN]	[%]
2010	1 335 584.25	77 749 206.67	79 084 790.92	1.69
2011	2 037 005.19	57 425 892.98	59 462 898.17	3.43
2012	1 807 582.00	62 586 556.00	64 394 138.00	2.81
2013	29 654 546.22	42 062 923.64	71 717 469.86	41.35
2014*	36 913 300.00	no data	no data	no data

* Funds estimated on the basis of the annual plan

Categories of roads where ITS projects are implemented.

ITS projects in Gdynia are being implemented on the following categories of roads:

1. National roads
2. Voivodeship roads
3. County roads.

Wdrożenie Zintegrowanego Systemu Zarządzania Ruchem TRISTAR w Gdańsku, Gdyni i Sopocie



Information about the implementation indicators used for ITS projects:

Road safety

In terms of road safety, no detailed analysis has been conducted yet due to the ongoing work related to the installation of the TRISTAR system. The Traffic Safety Management System will be installed as part of the system, which, based on the equipment used for recording offences (running a red light, point and section speed measurement), is designed to discipline drivers and reduce the number of dangerous behaviours. Currently, work is underway related with launching the devices and transferring them to the services responsible for conducting proceedings in misdemeanour cases. After completing and launching the system, it will be possible to carry out the analysis of road traffic safety after the application of the aforementioned measures.

At the stage of conducting a feasibility study, it has been assumed that with the introduction of the Integrated Traffic Control System TRISTAR, road safety on the roads covered by the system will be improved by the following indicators in 2013, with two variants of the level of economic development of the country:

- Decrease in the number of road accidents by **32.13%** (for the optimistic scenario) and by **30.50%** (for the pessimistic scenario),
- Decrease in the number of fatalities by **37.03 %** (for the optimistic scenario) and by **36.84 %** (for the pessimistic scenario).

Efficiency

TRISTAR system contractor is required to demonstrate, before the final acceptance, the following changes of traffic parameters in terms of efficiency:

- Traffic improvement - shortening the overall travel time of all vehicles in the area covered by the system by not less than **5.5%**
- Traffic improvement - shortening the overall travel time of passengers using public transport in the area covered by the system by not less than **6.5%**

At the same time, an increase in queue lengths by **3%** on the side junction legs is allowed. At the moment, it has been shown in an analysis that after the implementation of phase I and II:

- Average travel time of individual transport vehicles including junction leg sections was shortened **13% - 34%**,
- Average speed of travel of individual transport vehicles including junction leg sections increased **13% - 45%**,
- Average travel time of public transport vehicles on the main passageways was shortened **3.1% - 8,4 %**,
- Average speed of travel using public transport on the main passageways has increased **3,2% - 9,2%**.

Completion of the system and its calibration is currently expected. **Before final acceptance of the system (at the end of 2014)** contractual requirements will be verified.

Reducing congestion

In accordance with the requirements of the contract, increase of the length of queues (i.e. congestion) is allowed by no more than **3%** on the side junction inlets when reaching the overall results in terms of shortening the travel time for individual and public transport. This indicator will be verified after the calibration of the system and before final acceptance (end of 2014).

In addition, under the contract, before the introduction of the first phase and after completion of the works, measurements of the following traffic parameters were/will be carried out:

- Traffic capacity,
- Utilisation of traffic capacity,
- Length of queues,
- Loss of time.

Therefore, the Roads and Greenery Authority in Gdynia will have data on reducing congestion after the construction of the TRISTAR system.

Reducing emissions

Reconstruction of traffic control devices and the use of energy-efficient LED technology in the signalling chambers contributes to a significant, **25%** decrease in electricity consumption. This has an indirect impact on reducing emissions of CO₂ into the atmosphere as a result of lower demand for electricity. Moreover, reduction of the value of transport work (resulting on one hand from an increase in traffic capacity and on the other hand from the reduction of the share of travel using individual means of transport in favour of public transport) and improvement of traffic in the form of shortening travel time and congestion will reduce the emission of pollutants into the atmosphere. According to a feasibility study and the economic analysis included therein, it is estimated that the environmental benefits of reducing emissions will constitute **2.38%** of the total economic costs and benefits associated with the introduction of the Integrated Traffic Management System TRISTAR.

➤ **Benefits associated with the introduction of the Integrated Traffic Management System TRISTAR**

Benefits	Value Unit (if applicable)	Total value in (PLN, discounted)	% total benefits
Saving on costs operation of vehicles	-	1,754,594	17.01
Saving on time costs of passenger transport	-	4,771,006	46.26
Saving on time costs of freight	-	706,404	6.85
Benefits of reducing the amount of spending	-	2,744,649	26.61
Environmental benefits from reducing emissions	-	245,828	2.38
Benefits due to the increase of employment	-	2,584	0.03

5.3 Kraków

Expansion of the traffic control system (UTCS), including the construction of fibre optic ducting;

Implementation of technology solutions to improve the tram travel time and expansion of the Traffic Control System:

- as part of Phase I (until mid-2014) - along the tram line in the area of Al. Pokoju, ul. Nowohucka and along the Teatr Bagatela – Bronowice Małe line;
- as part of Phase II (by the end of 2014) in the area of ul. Czarnowiejska and along the tram line in the area of ul. Kocmyrzowska and ul. Jana Pawła II and Al. Solidarności.

Designing signalling programs at intersections covered by the contract, taking into account the full priority for trams passing through the intersection. Laying optical fibre in ducts on a part of the city road sections: Allowing data transmissions to and from the Traffic Control Centre, including:

- Transmission of digital data (bi-directional) between the UTCS system and the controllers of traffic lights at intersections,
- Transmission of digital data (bi-directional) between the TTSS system and the dynamic passenger information boards,
- Transmission of digital video signals (unidirectional) from intersection monitoring cameras,
- Transmission of digital data and video images (bi-directional) related to Systems of Access to the Calmed Traffic Zone and Supervision Over Public Transport Lanes.

The project is carried out in 2 phases. Phase I is being implemented in the years 2011-2014, while the work within Phase II will be carried out in 2014.

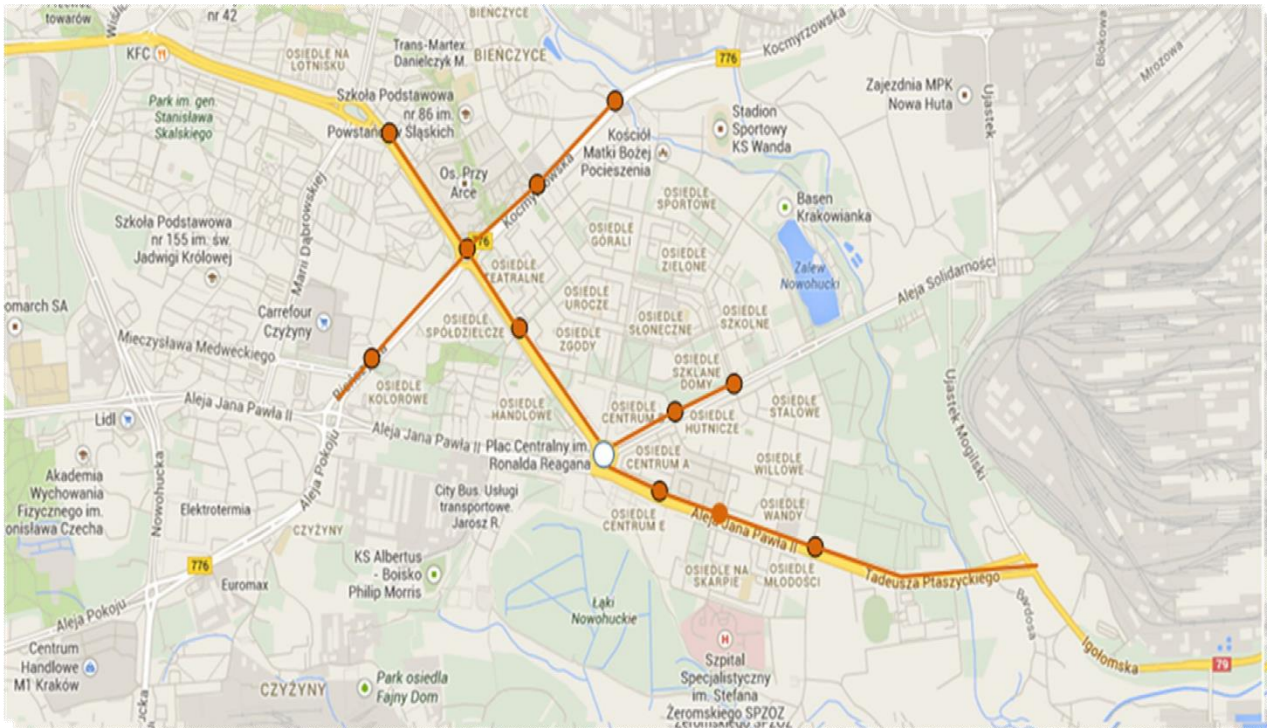
- **Expansion of the traffic control system (UTCS) Phase I - project completed (acceptance May 2014). Modernisation and integration into the traffic control system of traffic lights at 24 intersections and the construction of a fibre optic network**



- **Expansion of the traffic control system (UTCS) Phase II - project completed (planned acceptance December 2014). Czarnowiejska area (modernisation of signalling on 8 intersections and construction of a fibre optic network)**



- **Nowa Huta area (modernisation of signalling on 11 intersections and construction of a fibre optic network)**



Expansion of the public transport management system (TTSS);

The project will include:

- Equipping the entire tram network fleet with on-board computers, enabling the inclusion of all trams participating in traffic in the TTSS system, providing ongoing monitoring of the location of the tram fleet and the implementation of timetable plans;
- Implementation of technological solutions for the tram stops enabling better access of passengers to the actual passenger information at the stops by installing passenger information signs and information boards about the current public transport network. Including the range includes delivery and installation of 203 stop information boards at tram stops;
- Supply of software for statistical analysis of data from the TTSS system;
- Supply and installation of 14 boards displaying information about the transport network in Kraków;
- Supply of software modules for creating timetables;
- Supply of an integration module for external public transport information systems.

Expansion of the Traffic Control Centre (TCC)

The project will include upgrading and retrofitting the Traffic Control Centre (TCC). The main task carried out by the TCC is continuous supervision and monitoring of the road and transport infrastructure, traffic and public transport. The TCC contains servers and dispatcher stations for the UTCS and TTSS systems. The scope of the expansion includes:

- Modernisation of the existing IT system in the TCC;
- Purchase the equipment needed for the proper functioning of the TCC;
- Purchase and installation of a large-format screen;
- Launch of a system providing radio communication for the TCC with field services or entities cooperating with the roads authority;
- Modernisation of the power supply and cooling system for the TCC server room.

Another element of the deployment of ITS systems in Kraków is the development of traffic control on major Kraków traffic routes:

Projects completed:

- Area-Wide Traffic Control System - corridor of the Krakow Fast Tram and all signals on Al. 29 Listopada (from Prandoty), Al. Trzech Wieszców, Al. Konopnickiej, Al. Kamieńskiego, Al. Wielicka (to ul. Bieżanowska) and the First Ring Road - a total of 70 traffic lights;
- Implementation of traditional coordination in the routes: ul. Turowicza – ul. Herberta, ul. Zakopiańska, ul. Opolska, ul. Okulickiego, Al. Pokoju (from ul. Ofiar Dąbia to the entrance to the Plaza Shopping Centre), Nowohucka (from ul. Stoczniovców to ul. Centralna), ul. Księdza Jancarza;
- Construction of a tram line on Mały Płaszów and on the route of ul. Rybitwy, ul. Christo-Botewa - inclusion into the area-wide traffic management system and development of dynamic passenger information signs;
- Construction of a tram line on the Campus of the Jagiellonian University - phase I - creation of area-wide traffic management system implemented along the tram line to the Campus of the Jagiellonian University which is being built. Development of the system of dynamic passenger information signs;
- reconstruction of the route of the ul. Dominikańska - ul. Franciszkańska along with the tracks - development of the system of dynamic passenger information signs.

Projects currently being implemented:

- Construction of a tram line on the Campus of the Jagiellonian University - phase II - inclusion in the area-wide traffic management system of the traffic lights located along the route of ul. Tischnera, ul. Brożka, ul. Wadowicka, ul. Kapelanka, ul. Monte Cassino, ul. Dietla, ul. Zielińskiego and traffic signals by the Zwierzyniecki bridge and the tram terminus in Salwator. Dynamic passenger information system;
- The project "Development of the public transport management system in Kraków";
- Adaptation of the tram line in the route of ul. Mogilska and Al. Jana Pawła II to fast tram parameters (the section from the rondo Mogilskie to the Pl. Centralny) - extension of the area-wide traffic management system in the area of implementation of the investment and development of dynamic passenger information signs;
- Extension of the KST tram line, phase II B along with the road system (Ul. Lipska – ul. Wielicka) - expansion of the area-wide traffic management system and development of dynamic passenger information signs.

Projects prepared for implementation:

- Reconstruction of ul. Kocmyrzowska (from the intersection with ul. Bulwarowa to the city borders); - expansion of the area-wide traffic management system and development of dynamic passenger information signs;
- Reconstruction of ul. Igołomska (from the intersection with ul. Giedroycia to the city borders); - expansion of the area-wide traffic management system and development of dynamic passenger information signs;
- Implementation of traditional coordination in the routes: ul. Wielicka (from ul. Wlotowa to ul. Rydygiera), Al. 29 Listopada, including additional traffic signals in the coordination on ul. Opolska (ultimately from the entrance to IKEA to ul. Okulickiego - ul. Andersa). Ultimately, the plan includes connecting the traffic signals to the area-wide management system.

Total expenditure on investments in the ITS area in 2010-2014 incurred by the city of Kraków amounted to PLN 32,508,371.28/gross, while total expenditure on infrastructure (investment and investment purchases) in the area of transport and communications amounted to PLN 958,780,620.00/gross. ITS solutions were implemented on municipal, county and voivodeship roads.

Indicators used in the implementation of ITS projects:

In order to monitor results of the expansion of the traffic control system (UTCS) implemented under the project "Development of public transport management system in Kraków", the indicators used are:

- Time savings of public transport (tram) users after expanding the UTCS system - 10%;
- Time savings of individual transport participants after expanding the UTCS system - 5%.

Other ITS solutions implemented in Kraków are parts of larger investments in transport, e.g. construction/reconstruction of roads, construction/reconstruction of the tram route. Thus, specific indicators to monitor the implementation of ITS elements are not developed, but only for entire projects. The main indicators used in transport projects containing ITS elements are:

- Time savings in passenger transport;
- Time savings in freight;
- Reduction of travel time by tram at a given section;
- Additional number of persons served by improved city transport;
- The number of people using public transport.

Location of projects in the field of ITS implemented in 2010-2014:

- Area-wide traffic management system - the following areas are included:
 - Sequence of the following streets: ul. Herlinga-Grudzińskiego, ul. Klimeckiego, ul. Kuklińskiego, ul. Lipska, ul. Surzyckiego, ul. Botewa;
 - Sequence of the following streets: ul. Balicka (from the intersection with ul. Zielony Most toward the city centre), ul. Bronowicka, ul. Podchorążych, ul. Królewska;
 - stretch of: Al. Pokoju;
 - Sequence of the following streets: ul. Tischnera, ul. Brożka, ul. Wadowicka, ul. Kapelanka, ul. Monte Cassino, ul. Dietla (travel cards), ul. Zielińskiego and traffic signals by the Zwierzyniecki bridge and the tram terminus in Salwator;
 - corridor of the Krakow Fast Tram and all signals on Al. 29 Listopada (from Prandoty), Al. Trzech Wieszczów, Al. Konopnickiej, Al. Kamieńskiego, Al. Wielicka (to ul. Bieżanowska) and the First Ring Road - a total of 70 traffic lights;
 - Stretch of the following streets: ul. Grota-Roweckiego, ul. Bobrzyńskiego (to the tram terminus on ul. Czerwone Maki).

5.4 Poznań

ITS Poznań

The project "ITS Poznań" is located in the Wielkopolskie Voivodeship within the area of the city of Poznań. In Poznań, the project is implemented in so called "western area" of the city (districts Grunwald and partly Jeżyce). The project aims at the provision of an integrated intelligent traffic management system in Poznań in the western part of the city, i.e. the design, delivery, implementation and start-up in the road traffic of the city of Poznań of ITS based on the solutions that already exist in the city, in particular in the area of traffic control. The project will be mainly implemented in the part of the city located between the following streets: ul. Dąbrowskiego – ul. św. Wawrzyńca – ul. Żeromskiego – ul. Dąbrowskiego – ul. Roosevelta – ul. Głogowska – border of the city of Poznań. It will cover 115 traffic lights facilities and public transport fleet composed in total of 540 trams and buses.

Project innovativeness is reflected in the level of integration between the various components which make up the whole system. Each of the components will exchange data and information with the other components through a common IT platform. As a result, a database will be created and used as a source of information for new functionalities that may be developed over the couple of years. The main assumption of the system is its openness, i.e. the capability of working out program solutions that allow for the building of new modules, which is to facilitate scalable solutions and expansion of the system operation without the need to create new databases and tools to obtain information.

The ITS Poznań is to provide a foundation for an innovative ICT system that will be used to support not only transport management in the city but also management of the other processes relating to key areas of city management. When implemented, the project itself will bring a number of new solutions. First of all, all the users will be provided with real-time traffic data for the city obtained from measuring stations. The system will help to plan a journey through the city on public transport making use of actual location of a given public transport vehicle and estimated arrival/departure times. In addition, a special software will make it possible to book a place at buffer car parks included in the new system as well as automatic detection of incidents that will have an adverse impact on traffic conditions. The primary advantage of the project are to be social and economic benefits experienced by users of the system, i.e. residents of the city and users of transport infrastructure. The most important advantage are to be savings made as a result of lower costs and shorter travel time for the users. Openness of the applied solutions and system architecture are to contribute to system scalability. As planned, the system will be further implemented in the remaining part of the city and then in the whole agglomeration. An agreement on implementation of the project "ITS for the City of Poznań" was signed on 27 May 2013. At present, the first implementation stage of the project is underway (27 May 2013 - 31 March 2015). The project ITS Poznań is worth in total PLN 96,151,121.83 (current costs on the basis of the contract for co-financing).

The following will be done as part of the contract:

- development of traffic management system on the basis of the existing infrastructure in accordance with the philosophy of dynamic, area traffic control, developed over the years;
- development of the existing urban tele-transmission network: development of the existing MPLS backbone network and design and execution of optical fibre access network ETHERNET so that it enables electronic communication between distant elements of the system installed within the area of the city as well as with the Central ITS ensuring the transfer of all digital data between these elements, including: camera images, data collected by traffic light control systems, passenger information, location of means of public transport, etc., development of urban broadband wireless communications network by adding subsequent wireless nodes necessary for the operation of the ITS in full range of its functionality;
- design and implementation of an open IT platform integrating ITS elements to ensure data exchange between these elements through open communication protocols, which need to be worked out and implemented;
- construction of a server room and operations room together with equipment for operator workstations, adaptation of premises in the building that houses the Traffic Control Centre to the needs of System use and operation;
- working out and implementation of a traffic model in the transport network and a technologically advanced traffic management system making possible short-term predictions of traffic flow in the network and intelligent traffic management. Thanks to the above, urban network congestion will be counteracted and reduced;
- execution of a system of displays (also mobile ones) and variable message signs which provide vehicle drivers with important information (about incidents, threats, recommended detours, car parks). The purpose of the above is to enable dynamic and tactical traffic management and facilitate the traffic flow for the drivers, taking into account actual situation in the city, including crisis situations (accidents, crashes, mass events, roadworks, etc.);
- development of priority systems for trams and buses in order to speed up public transport. The system will be also used by intervention services, ambulances, etc. to optimise travel time of privileged vehicles;
- delivery and implementation of public transport fleet management system that will make possible the monitoring of transport service punctuality, on-line presentation of location on a digital map, travel time prediction, provision of passenger information. Equipping vehicles with devices which enable communication with road infrastructure (traffic light control systems, distribution points of transmission network signals) and provision of in-vehicle passenger information;
- design and implementation of a system of passenger information, including information displays at passenger stops and Internet portal, through which passenger information will be made available (prediction of traffic loads on road networks, information about car parks, roadworks, detours, congestion, alternative routes, etc.);
- delivery and installation of elements of the road safety system: video detection, including vehicle registration recognition, development of the video surveillance system, delivery and installation of sensor stations;
- replacement of elements of traffic light control systems as well as support structures and street lamps.

It has been assumed that implementation of the project to develop the traffic management system in Poznań should improve both car transport (passenger vehicles) as well as public transport (trams, buses) through:

- monitoring of vehicle traffic on the road network and reducing road network congestion;
- more effective use of the existing road and transport infrastructure;
- improved travel conditions;
- speeding up the public transport, in particular trams;

- increased demand for public transport;
- making available current information (to drivers and passengers) useful during the planning phase and in the course of the journey;
- improved road user safety;
- monitoring and protection of natural environment.

The above mentioned general objectives will be achieved through the fulfilment of a number of more detailed and inter-related tasks. One of more important of these tasks is development of the existing infrastructure, in particular the data communication system so that it makes possible the transfer of all the necessary data (camera images, information from motion detectors, tracking of public transport vehicles, etc.) to and from the Traffic Control Centre and the Supervision Centre at MPK (City Transport Company). A key task is to design and implement the open IT platform that integrates all the ITS modules and makes available all the data through a family of open communication protocols. Another major purpose is the development and implementation of the traffic model which makes possible short-term predictions of traffic flow in the network. This will enable intelligent urban traffic management, including the counteracting and reduction of network congestion within the existing road infrastructure. An important purpose is to enable dynamic and tactical traffic management, taking into account the current situation in the city, including crisis management (handling road accidents, crashes, handling mass events, conducting roadworks, etc.). This will be implemented, among others, through a system of displays (also mobile ones) and variable message signs which provide vehicle drivers with information about various incidents, e.g. threats or recommended detours. In order to speed up public transport the system of priorities for trams and buses will need to be further developed. In addition, all public and useful information about transport in the city will be made available to the residents of the city of Poznań both on the Internet (e.g. prediction of traffic loads on road networks, location of trams and buses, etc.) as well as special information displays at passenger stops (e.g. wait time until the arrival of next public transport vehicles). This will facilitate journey planning for the residents and should result in a smoother traffic flow in the city. What is more, state-of-the-art IT solutions will be introduced to support car park management. A security system based on a set of cameras located throughout the city should give municipal services a quick view in emergency situations and will become a source of additional information about traffic flow conditions in the city.

Additional information:

➤ ***Total amounts earmarked for investments in the area of ITS:***

year	expenditure on ITS in PLN	total city expenditure on infrastructure investments in PLN
2010	233 731,00	872 598 332,02
2011	1 072 470,18	945 383 033,68
2012	1 918 534,31	594 595 968,42
2013	6 285 183,37	499 719 038,02
2014 (until 20 May 2014)	6 796 673,05	

Categories of roads on which the ITS project is implemented: national road, voivodeship, county and municipal roads.

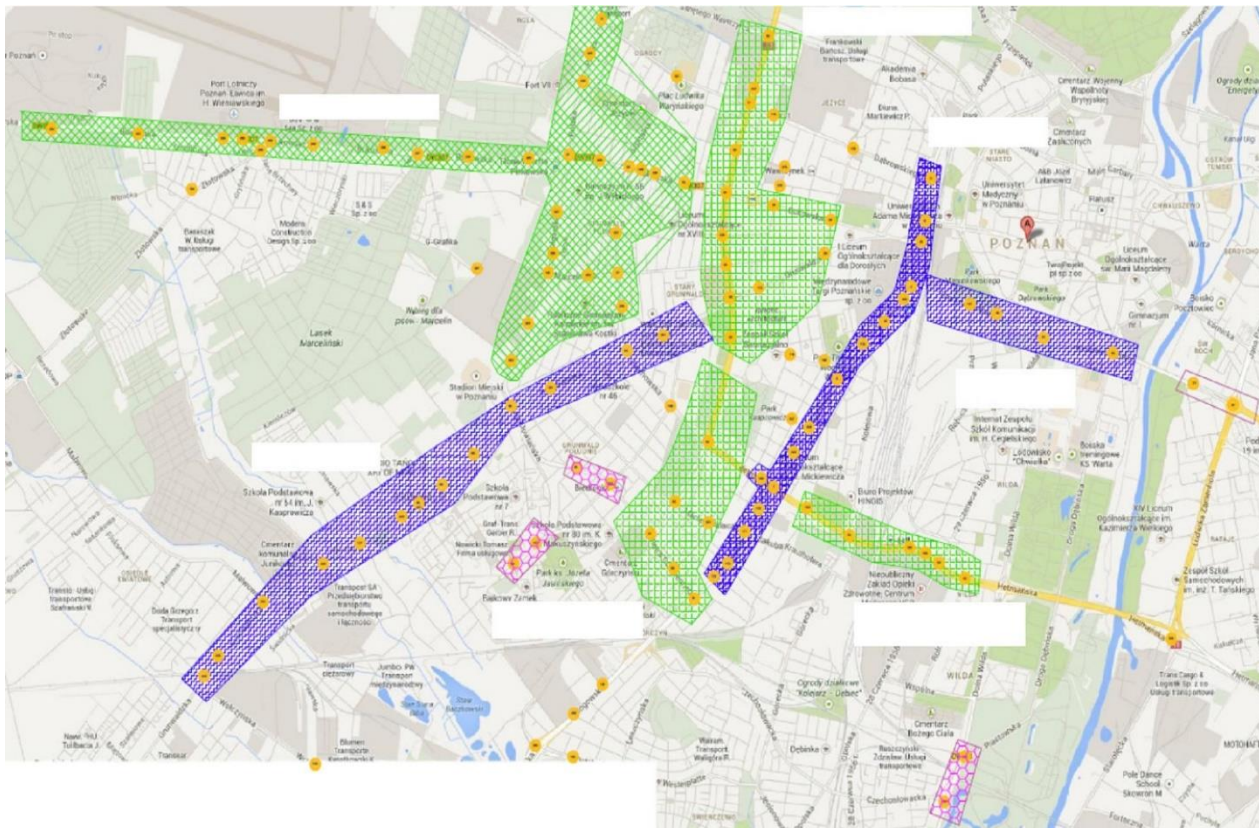
Result indicators for the project:

- relative reduction of travel time by car within the area of the project - 5.21%
- relative reduction of travel time by public transport as regards tram travel time within the area of the project - 8.12%.

➤ **Location of the ITS Poznań project implementation:**



Control areas:



5.5 Rzeszów

Development of a public transport integration system for the city of Rzeszów and surroundings

The project entitled: "**Development of a public transport integration system for the city of Rzeszów and surroundings**", project no. POPW.03.01.00-18-002/11 – Priority 3: Voivodeship growth centres, Measure 3.1: Collective urban transport systems, Operational Programme Development of Eastern Poland for the years 2007-2013 worth PLN 331,444,753.90, will comprise the design, delivery and implementation of an Integrated Traffic and Public Transport Management System (ZSZRiTTP), as one coherent system that integrates in the city the operation of the following subsystems:

○ Area Traffic Control System (SOSRD)

SOSRD is an element which to a significant extent facilitates city traffic. The system consists of the following elements:

- the traffic lights control system which allows to maintain smooth traffic flow and shorten to the minimum the wait time at crossroads,
- the system of giving priority to collective transport vehicles, under which the right of quick passage is first of all given to public transport vehicles;
- the system of information for drivers that uses variable message signs, which will make possible the provision of instant information about difficulties, changes in traffic system or recommended detours.

○ Public Transport Management System (SZTP)

Thanks to SZTP, vehicles will be located and the number of passengers will be calculated, while operators will be able to control the quality standards of passenger service, which will make possible responding to the current needs of public transport in Rzeszów, among others as regards the timetable, remodelling of the road system, verification of control algorithms, etc. The following systems will cooperate with SZTP:

- *Passenger Information System (E-INFO)* which will aim at smooth provision of information to public transport passengers. Information displays installed at bus stops will display, among others, the time remaining until the arrival of a given bus. Buses will be also equipped with elements of this system. In addition, the plans envisage the provision of interactive information on the Internet (including operation of nomadic devices and journey planning);
- Electronic Fare Collection System (E-TICKET), which will aim at facilitating the use of means of public transport, optimisation and fare integration.

The above elements will contribute to the shortening of vehicle travel time, increase in the number of collective transport passengers, ease of getting around the city and increased safety of all road users. An ICT Platform for ITS (PTITS) will be designed and implemented to integrate such elements of the Integrated Traffic and Public Transport Management System as SOSRD, SZTP, E-info and E-ticket. PTIITS will serve as an ICT radio channel used for transmission and information purposes. City buses will be equipped with devices cooperating with these systems (150 pcs.). In addition, there are plans to make available, to those commercial carriers that are interested in the integration, specifications of devices that cooperate with *E-ticket* and *E-info* systems. The measures will be implemented over the period 2011-2014.

Status of implementation as of June/July 2014: The design phase of the Area Traffic Control System is nearly completed, modernisation works on the traffic lights, installation of VMS and weather stations will be commenced soon. In the part dedicated to collective public transport, works are in progress on the implementation of E-info and E-ticket systems and the Public Transport Management System - completion of works has been planned for October 2014.

Improved public transport service quality in the centre of Rzeszów through transit traffic restrictions and the introduction of paid parking zone

Project no. POPW.03.01.00-18-001/14 11 – Priority 3: Voivodeship growth centres, Measure 3.1: Collective urban transport system, Operational Programme Development of Eastern Poland for the years 2007-2013. Project value – PLN 183,153,827.67. Except from the closing off of the north-east city ring road, as part of the project the Parking Zone Management System (SOSP) will be designed, delivered and implemented. The system will be used to manage the paid parking zone planned in the city centre (management, fee collection, information about available parking spaces

and their location). Over the years 2013-2025, also management of Park&Go and Park&Ride parking facilities. The planned measures will be implemented over the period 2013-2015.

Status of implementation as of June/July 2014: Tender process is being prepared for the design, delivery and implementation of the Parking Zone Management System - announcement of tender procedure has been planned for November 2014 and completion of works for September/October 2015.

Expansion of the intelligent road transport system within the area of the city of Rzeszów

The planned measures will be implemented over the period 2011-2015, while the ITS Rzeszów project is worth in total PLN 16,004,669.36 (current costs on the basis of the contract for co-financing).

As part of the project "Expansion of the intelligent road transport system within the area of the city of Rzeszów", project number POIS.08.03.00-00-011/10 – Priority VIII: Transport safety and national transport networks, Measure 8.3: Development of Intelligent Transport Systems, Operational Programme Infrastructure and Environment for 2007-2013 - delivery and installation of the following elements and systems of devices has been planned within the area of Rzeszów:

- 89 sets of passenger information displays (expansion of the system),
- 9 e-kiosks of Public Passenger Information (expansion of the system),
- Dynamic Vehicle Weighing System type Weight in Motion on 5 major access roads to the city - streets: ul. Lwowska, ul. Podkarpacka, ul. Krakowska, ul. Warszawska and ul. Lubelska.

Executed elements of the intelligent transport system will bring a number of benefits to the road users in Rzeszów. Backlit displays delivered as part of expansion of the electronic passenger information system will present passenger information about the next buses approaching a given bus stop. On the other hand, passenger information kiosks will perform the function of a 24-hour inquiry desks about the possible transport connections. In addition, they can serve as electronic information about the city, its attractions, history and the most important current events. Apart from these functionalities, the kiosks will also offer a possibility to buy single fare paper tickets and travel cards, top up smart cards on proximity carriers (expansion of the electronic fee collection system). In consequence of the design, delivery and implementation of the vehicle automatic weighing system, vehicles that exceed the permissible axle mass load or total weight will not be allowed to drive through the city and the risk of road damage will decrease.

Status of implementation as of June/July 2014: a call for tenders for the design, delivery and implementation of the Vehicle Dynamic Weighing System will be issued within the nearest 2 months, tendering procedure for the delivery and implementation of a part of the project intended for collective public transport is currently in progress. Completion of works has been planned for May 2015.

All projects enumerated above implement the provision of the strategic document of the Municipality of the City of Rzeszów - the Integrated Public Transport Development Plan of Rzeszów for 2010-2015.

Collective information about the ITS investment		
Period	Outlays on ITS	Percentage presentation to total capital expenditures
2010-2014	approx. PLN 110 million	9%
Road categories: national, county, municipal roads		
Impact indicators:	<u>Road safety:</u> <ul style="list-style-type: none"> • Number of collisions and their costs are taken account of in the economic and financial analysis model <u>Efficiency and reducing congestion:</u> <ul style="list-style-type: none"> • Number of persons using public transport (i.e. number of public transport passengers) • Increase in the number of persons using collective transport (i.e. increase in the number of collective transport passengers) • Time savings in passenger transport <u>Reducing pollutant emissions:</u> <ul style="list-style-type: none"> • Favourable impact of the investment was assumed (reducing emissions, vibration, noise) without measurements in the form of specific indicators. 	

Investment project location:	Rzeszów and, to some extent, also its functional area (to the extent dedicated to public transport - relates only to ITS investment projects that are to be implemented after 2015)

In accordance with status as of June/July 2014.

5.6 Łódź

The Area Traffic Control System built as part of the investment project "Łódź Regional Tramway", has been operating in Łódź since 1 July 2008. Over the last two years, the system has been expanded through an inclusion of 9 crossroads provided with traffic lights (in total 79 locations), 14 passenger information displays (in total 22 displays in 11 points) and 6 PTZ cameras (in total 11 points). In addition, the Vehicle Weighing System was implemented within the area of the city in May 2012, including the construction of two certified vehicle weighing stations, a place designated for weighing with the use of portable weigh scales, two scales for weight pre-selection with variable message signs and 5 PTZ cameras that monitor all places intended for inspection. A number of road investment projects are currently in progress and during their implementation traffic lights will be modernised and built. In the course of construction of the Upper Route and during the renovation of ul. Inflancka, 10 traffic lights with 6 PTZ cameras will be connected to the traffic control system.

A key investment project "Expansion and modernisation of (Retkinia – Olechów) east-west tram route together with the power supply system and the area traffic control system" was started in November 2013 and as planned should be completed in October 2015. In the course of works on the investment project, over 230 traffic lights, 150 passenger information displays, 60 PTZ cameras, ANPR cameras which monitor 26 locations and 10 variable message boards will be modernised or built and connected to the system. The Traffic Control System delivered will have a module structure, in which all the sub-systems (both newly installed and existing ones) can operate irrespective of the other sub-systems, with all the sub-systems supervised from the central system. The system and all the sub-systems will be based on standard solutions as regards IT equipment, standard protocols and commonly used software solutions. The system will be designed so as to provide a flexible tool to achieve the objectives of transport policy in the city.

The Traffic Management System will consist of the following sub-systems:

- Area-wide traffic management,
- Information for drivers and mobile information,
- Public transport management,
- Dynamic stop information,
- CCTV,
- ANPR,
- tunnel supervision and control.

Expenditure incurred by the city on intelligent transport systems in the years 2010-2014 amounted to approx. PLN 22 million, which constitutes approx. 2% of total capital expenditure. After completion of the investment projects that are currently in progress, i.e. in late 2015, expenditure on ITS will increase to approximately PLN 100 million, which will constitute approximately 5% of total expenditure on infrastructure investments.

ITS-related projects are implemented on all road categories in the city, i.e. internal, municipal, county, voivodeship and national roads and cover the area within administrative boundaries of the city of Łódź.

The following performance indicators are applied for the purpose of implementation of ITS projects:

1) road safety:

- elimination of overweight vehicles from the roads,
- modernisation of traffic lights,
- information for drivers on variable message boards and signs, on the website and information on mobile devices about traffic obstructions,

2) efficiency and congestion reduction:

- traffic flow coordination along traffic routes,
- information for drivers about current traffic conditions, travel time, recommended speed, alternative route determination,
- collective transport priorities,
- passenger information on displays located at passenger stops,

3) pollutant emission reduction:

- reduction of the number of brake applications and hence lower exhaust emissions.
-

Collective information about the ITS investment		
Period	Outlays on ITS	Percentage presentation to total capital expenditures
2010-2014	Approx.. PLN 22 million	Approx.. 2%
When the started investment projects are completed, i.e. in late 2015.	Approx.. PLN 100 million	approx. 5%
Road categories	internal, municipal, county, voivodeship and national roads	
Impact indicators	<u>Road safety:</u> <ul style="list-style-type: none"> elimination of overweight vehicles from the roads, modernisation and construction of traffic lights, information for drivers on variable message boards and signs, on the website and information on mobile devices about traffic obstructions, <u>Efficiency and reducing congestion:</u> <ul style="list-style-type: none"> traffic flow coordination along traffic routes, information for drivers about current traffic conditions, travel time, recommended speed, alternative route determination, collective transport priorities, passenger information on displays located at passenger stops, <u>Pollutant emission reduction</u> <ul style="list-style-type: none"> reduction of the number of brake applications and hence lower exhaust emissions. 	
Investment project location	Area of the city of Łódź	

projects are completed, i.e. in late 2015.

approx. PLN 100 million approx. 5%

Road safety:

- elimination of overweight vehicles from the roads,
- modernisation and construction of traffic lights,
- information for drivers on variable message boards and signs, on the website and information on mobile devices about traffic obstructions,

Efficiency and reducing congestion:

- traffic flow coordination along traffic routes,
- information for drivers about current traffic conditions, travel time, Kalisz

The task currently implemented in Kalisz is entitled "Construction of the Integrated Road Traffic Management System in Kalisz - stage 1" in the design and build system under the Operational Programme Infrastructure and Environment. The project ITS Kalisz is worth in total PLN 20,342,375.65 (current costs on the basis of the contract for co-financing).

The Kalisz Integrated Traffic Management System (ZSZR) stage I will be composed of the following modules:

- the subsystem for the monitoring and control of traffic lights. It will cover all the crossroads and pedestrian crossings where traffic management lies within the scope of responsibilities of the President of City of Kalisz.
- the traffic optimisations subsystem for urban thoroughfares. It will be used at crossroads of inbound/outbound city thoroughfares;
- the crossroads video surveillance subsystem. It will cover all the crossroads and pedestrian crossings connected to the Kalisz ZSZR:
- the sub-system of variable message boards. Graphic variable message boards will be installed on city inbound national and voivodeship roads;
- the sub-system for the detection and recording of vehicles exceeding the authorised axle load. Pre-

selection weigh scales will be installed on city inbound national and voivodeship roads.pre-selection. The subsystem will also cover other places where vehicles exceeding authorised axle load can enter the city. Certified portable scales will be purchased that do not require building specialised vehicle weighing stands;

- the traffic data distribution sub-system. Data processed by ZSZR will be made available in the graphic form on the Internet portal of the Municipal Road Authority in Kalisz,
- the sub-system for recording vehicles exceeding the average travel speed at road sections. The sub-systems for recording vehicles exceeding the average travel speed at road sections will be installed in the most dangerous places in the city.
- the sub-system for recording vehicles passing through a red signal. It will be installed at crossroads controlled by traffic lights, where the most common traffic incidents occurring are mostly caused by offences, such as failing to stop at the red light;
- the sub-system for automatic vehicle count with breakdown by category. The vehicle count sub-system will cover all the crossroads and pedestrian crossings controlled by traffic lights connected to the ZSZR as well as other selected places. In the second case, it should be possible to count vehicles broken into categories, assuming definitions of up to 100 different categories of vehicles.
- the sub-system for wanted vehicle detection. The sub-system will cover all city inbound national and voivodeship roads and some of the main crossroads in the city.

The first stage of development of the Kalisz ZSZR will cover 23 traffic lights that will be included in the monitoring and management sub-system. As part of construction stage I:

- the road projects necessary because of crossroads realignment will be completed;
- new traffic system plans and traffic signal control programmes will be developed;
- traffic signal coordination plans will be developed;
- electrical design projects for: traffic signals and transmission cables connecting individual traffic signal controllers and the traffic control centre (CSR) will be prepared. The communication between the controllers will be through the active devices of the traffic control centre (star topology).
- a room to accommodate the Kalisz ZSZR will be prepared;
- crossroads pavement will be reconstructed or rehabilitated;
- all existing traffic lights will be modernised;
- individual traffic lights will be connected to the Kalisz CSR;
- the operators of the subsystem for monitoring and management of traffic lights will be trained.

The Integrated Road Traffic Management System operating within the major arterial roads in the city of Kalisz will help alleviate congestion during peak hours. Operation of the system will consist in gathering information on an ongoing basis on road conditions, and then adjusting the operation of traffic signals in sensitive areas of the city. Where bottlenecks are created, the green light cycle will be automatically extended. At the same time, a computer programme will ensure interoperability of traffic signals at adjacent crossroads, ensuring smooth traffic flow through major thoroughfares. The overall purpose of the project is to improve transport accessibility and traffic safety in private and public transport in the city of Kalisz through the implementation of the Integrated Road Traffic Management System. The implementation of the project will improve traffic management through the installation of a modern traffic management system. The project will improve traffic safety by ensuring smooth and organised vehicle traffic flow and reduction of traffic volume in the city centre. This will also reduce public transport travel times. Reducing the cost of public transport will discourage the loss of public transport passengers observed in a number of Polish cities. The implementation of the project will also bring about improvements in the condition of the environment by reducing emissions of pollutants and noise in the city centre. This task constitutes stage I of the construction of the Integrated Traffic Management System, providing a possibility of System extension by further crossroads, however the development is largely dependent on the ability to obtain extra-budgetary sources of financing.

5.7 The Intermunicipal Transport Union (*Międzygminny Związek Komunikacyjny*) in Jastrzębie Zdrój

At present the Intermunicipal Transport Union in Jastrzębie Zdrój⁹ is implementing a project entitled: "Innovative IT systems to support the service and safety of MZK Jastrzębie passengers". The project is co-financed by the European Union through the European Regional Development Fund under the Operational Programme Infrastructure and Environment (Priority VIII: Transport safety and national transport networks, Measure 8.3 Development of Intelligent Transport Systems). It is implemented in the period 2013-2015 and total project value is PLN 14,640,113.00. The project is to be implemented in the administrative area of 10 cities and municipalities associated in the Intermunicipal Transport Union having its seat in Jastrzębie Zdrój.

⁹ Municipality of the City of Jastrzębie Zdrój, Żory, Czerwionka-Leszczyny, Markłowice, Mszana, Pawłowice, Pszów, Radlin, Rydułtowy, Suszec.

The purpose of the project is a complex system to support the service and safety of MZK Jastrzębie passengers through an introduction of innovative IT systems that will cooperate with each other to exchange data.

The solution comprises the following systems:

- The e-ticket system, i.e. electronic:
 - distribution of tickets through the MZK Jastrzębie Network of Distribution and Top-up Points and by bus drivers;
 - ticket inspection and submission of inspection results to the Service Centre;
 - ticket settlement in a single Service Centre for the whole agglomeration indicated by MZK Jastrzębie
- Geolocation and supervision system for 130 buses:
 - providing Traffic Dispatchers with information about the technical condition of the bus;
 - visual information for Dispatchers about geographic location of the bus;
 - Emergency Call – immediate emergency notification.
- A system of 100 Information Boards, i.e. the provision of visual information:
 - for passengers about arrival time of buses and in particular about delays in relation to the timetable;
 - for passengers about the current bus timetable – passengers about other incidents in the bus service;
 - provision of information on the passenger safety.
- Digital mobile supervision system, i.e. the system of bus monitoring which enables:
 - continuous observation of the interior of the bus;
 - continuous observation of the road and incidents on the road in front of the bus.
- Website system created for the operation and marketing of the e-ticket system.
- *Firewall system*, i.e. the system which protects the server room and access to the website system.

5.8 Municipal Transport Union of the Górnośląskie Voivodeship Industrial District (Komunikacyjny Związek Komunalny Górnośląskiego Okręgu Przemysłowego, KZK GOP)

In accordance with the draft "Sustainable Development Plan of Collective Public Transport for the area of KZK GOP 2013-2020", one of the major courses of action of KZK GOP¹⁰ in the area of data communication systems is:

- implementation of the project Śląskie Voivodeship Card of Public Services, co-financed from the resources of the European Union, and then system expansion,
- introduction of state-of-the-art technologies used for collective public transport management (e.g. dynamic passenger information on the vehicles and at passenger stops, traffic priorities, vehicle tracking, task implementation monitoring),
- cooperation with higher education institutions to make use of intellectual potential and experience of scientific employees, within the framework of various research projects that influence the development of transport systems.

In 2014, activity of KZK GOP resulted in the launch of "Dynamic Passenger Information System" – SDIP (implementation in the period 2012-2014). The system aims at facilitating the process of managing road public transport through the use of ITS-related solutions. Project scope covered:

- the design, delivery and implementation of the Dynamic Passenger Information System and the delivery of a professional IT tool to support traffic modelling and analysing;
- delivery of computers and software for traffic modelling;
- ensuring GSM technology-supported data transfer between the infrastructure created as part of the project. The Dynamic Passenger Information System is implemented within the area of 6 municipalities out of 27 municipalities that form the KZK GOP;
- construction of the SDIP Management Centre and purchase of application software and licences for the system – purchase of servers and software with licences; purchase of the service comprising system implementation and start-up; costs of exercising supervision over the installation and employee training – the task concerns the creation of the centre for the collection and processing of data, among others, on traffic on the major routes of the Górnośląskie Voivodeship agglomeration. Data collected by the Centre will provide basis for messages about the current traffic situation within

¹⁰ Katowice, Będzin, Bobrowniki, Bytom, Chełm Śląski, Chorzów, Czeladź, Dąbrowa Górnicza, Gierałtowice, Gliwice, Imielin, Knurów, Mysłowice, Psary, Radzionków, Ruda Śląska, Siemianowice Śląskie, Siewierz, Sławków, Sosnowiec, Świętochłowice, Wojkowice, Zabrze.

the area of the KZK GOP;

- creation of the communication infrastructure to carry out bi-directional data and signal transmission - equipping 177 vehicles with universal on-board computers with GPRS/EDGE communication module and alarm buttons - as a result of fulfilment of the task (at selected routes), public transport vehicles will be equipped with GPS/GSM devices monitoring vehicle traffic, which will make it possible to generate and make available information about congestion on major traffic routes in the Agglomeration;
- installation of information displays - equipping 72 passenger stops with LED displays- when the task is fulfilled, current information about hindrances to traffic flow will be presented to public transport passengers.

The area of project implementation is provided with the necessary utilities (i.e. there is access to electric power and an expanded telecommunications network is available). It has a well-developed network of wireless telephony. The project will be implemented within the area of the following municipalities: Będzin, Dąbrowa Górnicza, Gliwice, Katowice, Sosnowiec, Zabrze and covers the following routes:

- Katowice Osiedle Tysiąclecia - Katowice Osiedle Paderewskiego;
- Sosnowiec Dworzec PKP/Urząd Miasta - Zagórze Osiedle – Dąbrowa Górnicza Centrum/Gołonóg Manhattan;
- Będzin Dworzec PKP - Dąbrowa Górnicza Centrum;
- Gliwice Plac Piastów/Dworcowa - Zabrze Goethego.

In total, in the above mentioned area there will be installed 72 information displays (70 displays had been installed by 15 May this year) which will present timetables of thirty-three transport lines serviced by 177 vehicles. The total cost of project implementation is PLN 6,137,161.65 (co-financing from the European Regional Development Fund within Measure amounted to PLN 4,031,196.57 8.3.OPI&E 2007-2013). It is anticipated that in the new 2014-2020 EU programming period, the system will be expanded by approx. 680 displays located in all municipalities that form the KZK GOP as well as neighbouring municipalities (Tychy, Wry, Orzesze, Łaziska Górne, Ornontowice). The result indicator will be shortening of the travel time on lines covered by the system from 17 minutes 25 seconds to 16 minutes 12 seconds.

One more project with ITS elements is "Śląskie Voivodeship Public Services Card" –**ŚKUP** (implemented since 2010 until now), which will constitute a part of an electronic payment system for services provided by public institutions. The idea behind the project is creating a possibility to pay for travelling by public transport vehicles, stays at the car park, museum or swimming pool entrance fees as well as local taxes in 21 municipalities of the Śląskie Voivodeship agglomeration. Apart from being used as electronic money, the card will serve as the holder's identifier and a carrier of the holder's electronic signature certificate. The introduction of the card on the market aims at improving the quality of life of residents of the entire metropolitan area and simplifying the study of passenger preferences (e.g. it will make possible the collection of precise data on the popularity of particular lines), and thus will facilitate the adjustment of the public transport system to actual needs.

	2010	2011	2012	2013	By the end of April 2014
(Gross) capital expenditure on SDIP [PLN]	0.00	0.00	0.00	0	5,458,010.61
(Gross) capital expenditure on ŚKUP [PLN]	138,071.19	67,502.40	0.00	16,633,150.00	34,689,326.12
Capital expenditure KZK GOP (gross) [PLN]	677,059.05	411,262.19	425,032.92	17,184,807.60	40,175,472.98
% of capital expenditure on ITS	20.4%,	16.40%,	0%	96.8%,	99.9%,

The above projects are implemented with a view of supporting public transport, and therefore ITS is implemented on municipal, county, voivodeship as well as national roads. The following indicators have been adopted for ITS projects:

- Output indicators - number of ITS systems introduced - 1 system was introduced (SDIP);
- Result indicator - shortening of the travel time.

"Dynamic Passenger Information System within the area of KZK GOP activity" was implemented in selected municipalities associated in KZK GOP and will cover passenger stops located along the following routes:

- Route 1: Katowice Osiedle Tysiąclecia - Katowice Osiedle Paderewskiego;
- Route 2a: Sosnowiec Dworzec PKP/Urząd Miasta - Zagórze Osiedle – Dąbrowa Górnicza Centrum/Gołonóg Manhattan;
- Route 2b: Będzin Dworzec PKP - Dąbrowa Górnicza Centrum;
- Route 3 - Gliwice Plac Piastów/Dworcowa – Zabrze Goethego.

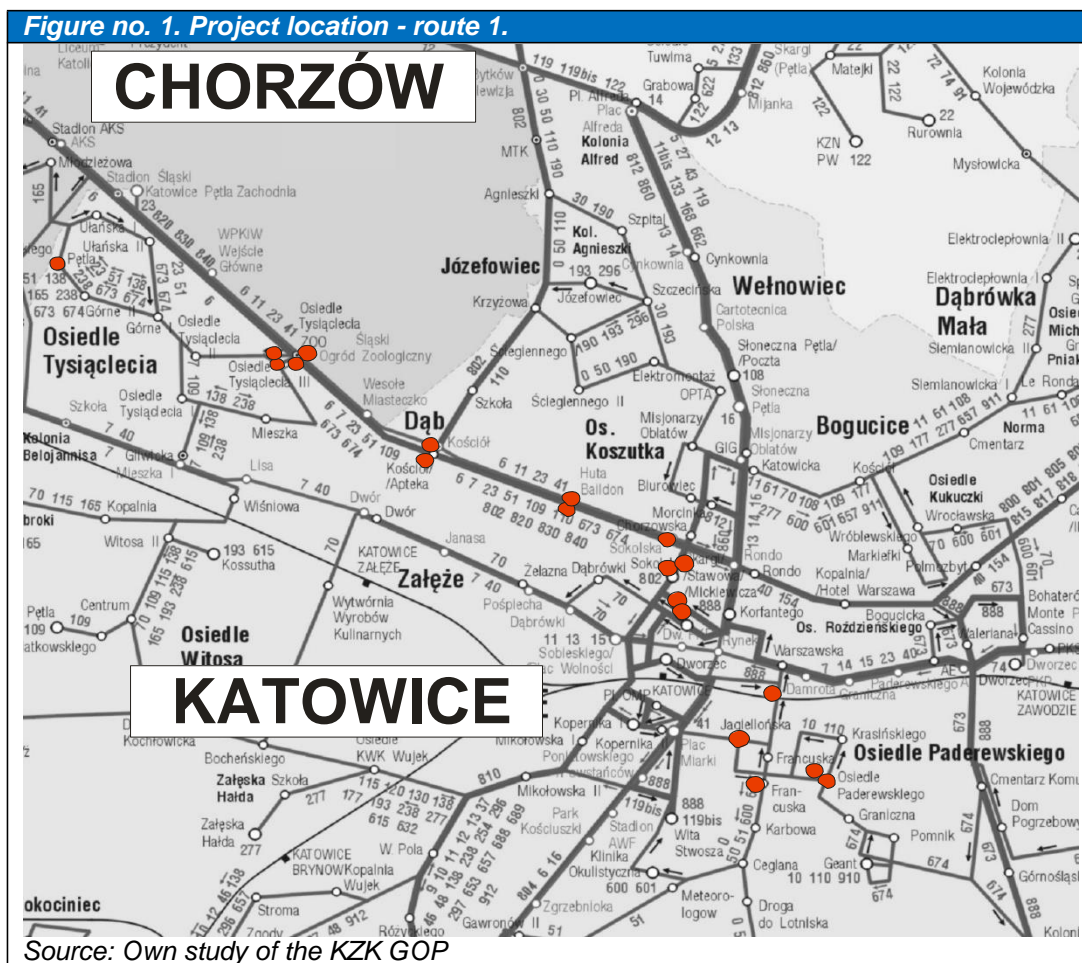
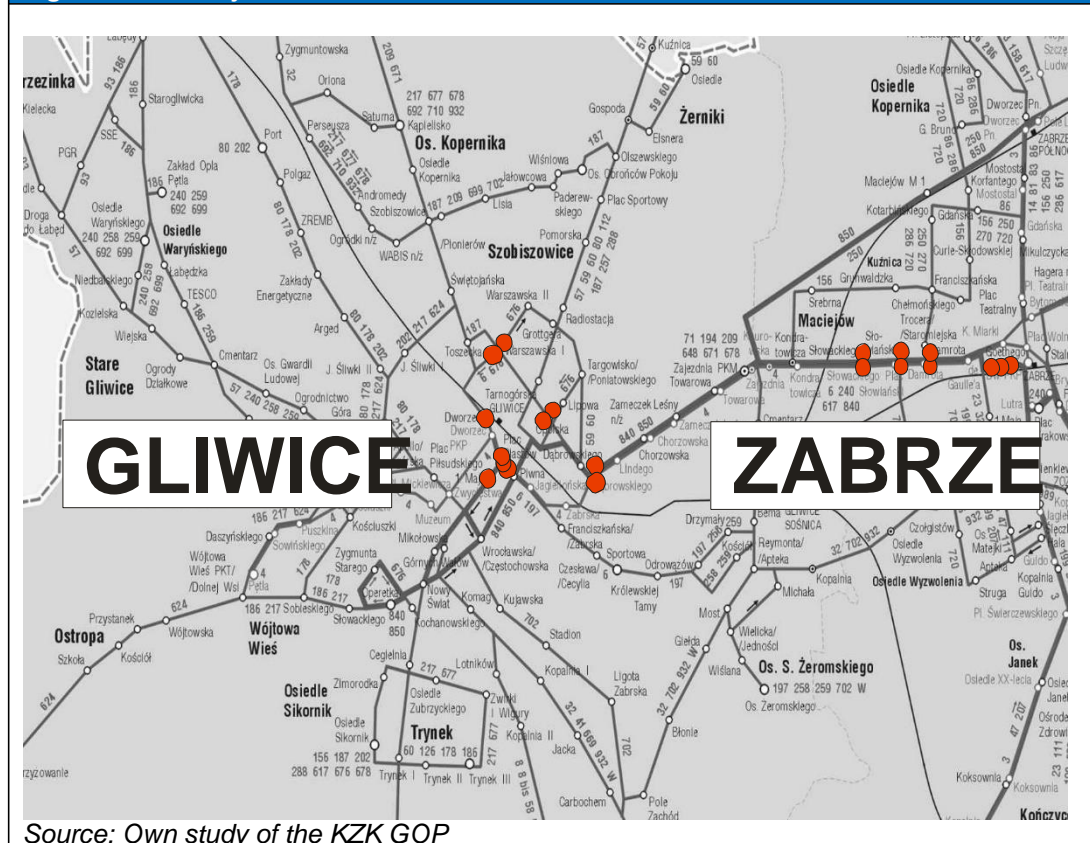


Figure no. 2. Project location - routes 2a and 2b



Figure no. 3. Project location - route 3



The project entitled "Śląskie Voivodeship Public Services Card" is implemented in all the municipalities associated in the Municipal Transport Union of the Górnos Śląskie Voivodeship Industrial District and within the area of Tychy and Jaworzno.

5.9 Kielce

Making use of the European Union resources in the financial perspective 2007-2013 the Kielce municipality implemented the following tasks from the area of Intelligent Transport System which formed a part of the project "Development of the public transport system in the Kielce Metropolitan Area".

Passenger Information System (SIP), which conducts real-time monitoring of public transport buses in service. SIP makes possible, among others:

- providing passengers with information given on displays located at passenger stops about actual waiting time for a given bus line;
- real-time tracking of the location of buses in service on the website and using a mobile phone;
- recording of all the data on buses in service.

SIP is a perfect tool which enables real-time transport management, on-going carrier monitoring, and provides a very extensive material for timetable and line analyses.

Purchase and installation of electronic displays to be used at passenger stops

The task comprised the purchase and installation of 24 electronic information displays for passenger stops, which in 2011 were located at bus stops and at junctions in areas with the highest passenger traffic volumes. In connection with extension of the project, there are plans to purchase and install in 2014 another 36 electronic information displays for passenger stops as a completion of the Passenger Information System implemented in Kielce. Taking into account suggestions of the residents, locations of individual displays were determined in the areas with the highest passenger traffic volumes. Devices are located in the city in a scattered manner. The displays are made using bright LED light sources in an airtight casing to protect the electronic devices against direct exposure to atmospheric conditions. The displays will present information about actual time of arrival of particular buses at the bus stop and about potential delays as well as information on changes to the tariffs, running of individual lines, etc.

Fulfilment of the above mentioned tasks in terms of ITS will entail the following cost:

- Passenger Information System - PLN 3,153,658.17;
- delivery and installation of 24 information displays for passenger stops (including ticket vending machines) - PLN 5,878,039.82;
- expansion of the system by adding another 36 information displays for passenger stops - PLN 2,688,042.

5.10 Legnica

The City of Legnica is implementing the project entitled: "**Construction of integrated traffic and public transport management system in the city of Legnica**", co-financed from the European Regional Development Fund under the Operational Programme Infrastructure and Environment, Priority VIII Transport safety and national transport networks, Measure 8.3 Development of Intelligent transport systems. It is implemented in the period 2012-2015 and total project value is PLN 19.648.737,10.

The Concept of Central Traffic Management in Legnica was created in 2007 and served as grounds for the working out of a functional programme for the above mentioned project. Building of the whole system is a long-term undertaking, mainly because of its logistics and implementation complexity. Thus, a decision was made to divide the investment project into two stages: Stage I comprises 29 crossroads located in the direct vicinity of the old town and on roads leading to the centre running in the east-west direction and 2 traffic lights to the north from the centre. On the other hand, the works to be performed as part of stage II include: 12 traffic lights outside the centre located in the southern part of the city, from the side of A4 motorway.

The project in question is implemented on national roads no. 94 and no. 3, voivodeship road no. 364 and county roads, which is shown on the map below.

The undertaking that consists in the building of an integrated traffic and public transport management system in the city of Legnica comprises:

- an integrated traffic and public transport management centre which services all the functions performed by sub-systems of the integrated traffic management system;
- area optimisation and traffic control systems including detection of traffic incidents and a possibility to analyse traffic measurements within the area of system operation;
- driver information systems - variable message boards (VMB) and mobile information (SIM);
- redundant communication system between the crossroads and the Centre based on the TCP/IP communication protocol implemented in the fibre optic Ethernet network and radio networks;
- sub-system of priorities for public transport, public transport management and servicing the privileges of special vehicles;
- system of dynamic information at passenger stops (DIP);
- CCTV video surveillance system and sensor systems, including: a sub-system of information about weather conditions.

Implementation of the integrated traffic and public transport management system in Legnica (ZSZRiTP) will be an efficient tool supporting the traffic system and enabling the practical application of the assumed transport priorities. This will contribute to the improvement of the transport system, so that it could become more efficient, effective, human-friendly and safer.

The overall objective of the project is to improve the effectiveness of the traffic management system through the use of Intelligent Transport Systems in road and urban transport. Implementation of advanced transport solutions will optimize the logistics process and reduce unnecessary journeys. This will facilitate traffic in the transport network of Legnica.

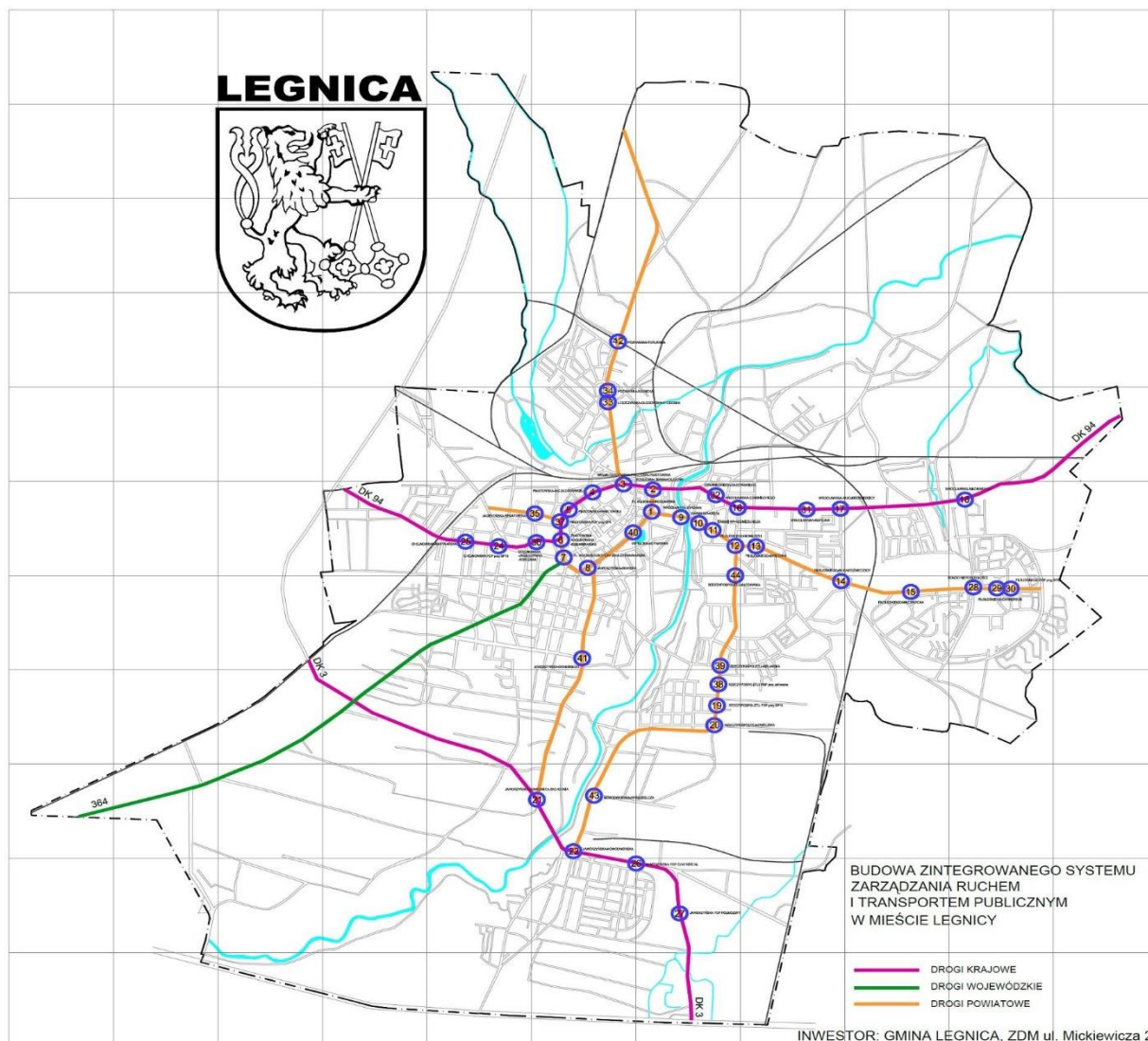
Main results expected after the launch of ZSZRiTP:

- shorter car travel time (%) - base value (2010) – 0; target value (2015) – 2.05;
- shorter travel time for passengers of collective transport - base value (2010) – 0; target value (2015) – 2.04;

➤ **Total amounts earmarked for investment in the ITS area and expenditure on infrastructural investments in the years 2010-2014, including expressed as a percentage**

No.	YEAR	EXPENDITURE ON ITS	EXPENDITURE ON INFRASTRUCTURE INVESTMENTS	%
1.	2010	769,757.39	59,569,441.75	1.29
2.	2011	197,564.02	57,567,085.03	0.34
3.	2012	396,896.93	42,658,253.18	0.93
4.	2013	160,922.16	26,992,386.67	0.60
5.	2014 (plan)	8,786,172.84	45,690,980.00	19.23
TOTAL		10,311,313.34	232,478,146.63	4.44

➤ **Project location**



5.11 Olsztyn

In the next five years, the City of Olsztyn will continue the following measures in the field of ITS implementation within the project entitled “Modernisation and development of the integrated collective transport system in Olsztyn”:

- a street traffic control system, with priority for public transport vehicles,
- a street traffic control centre,
- controlling the traffic of public transport vehicles on bus and tram services,
- a dispatch centre for traffic control and management of public transport vehicles,
- information for passengers on the Internet, at public transport stops and on vehicles,
- electronic tickets (city cards) along with a top-up system and on-board equipment on trams and buses.

The ongoing measures are based on the Olsztyn Development Strategy for 2006 - 2020 and are related to the priority areas listed in the ITS Directive (priority areas: I, III and IV). At the moment works are in progress on the description of the subject matter of contract where the standards will be described.

Since 2010, the City of Olsztyn has earmarked for the ITS-related investments PLN 15.67 million, expenditure was only incurred in 2013 and constituted 11.20% of transport infrastructure expenditure. Implementation of the ITS system comprises all categories of roads, i.e. municipal, county, voivodeship and national roads. Indicators adopted for the ITS project implementation are performance indicators - achieving a pre-determined tram passage speed. The ITS project is implemented within the whole area of city of Olsztyn.

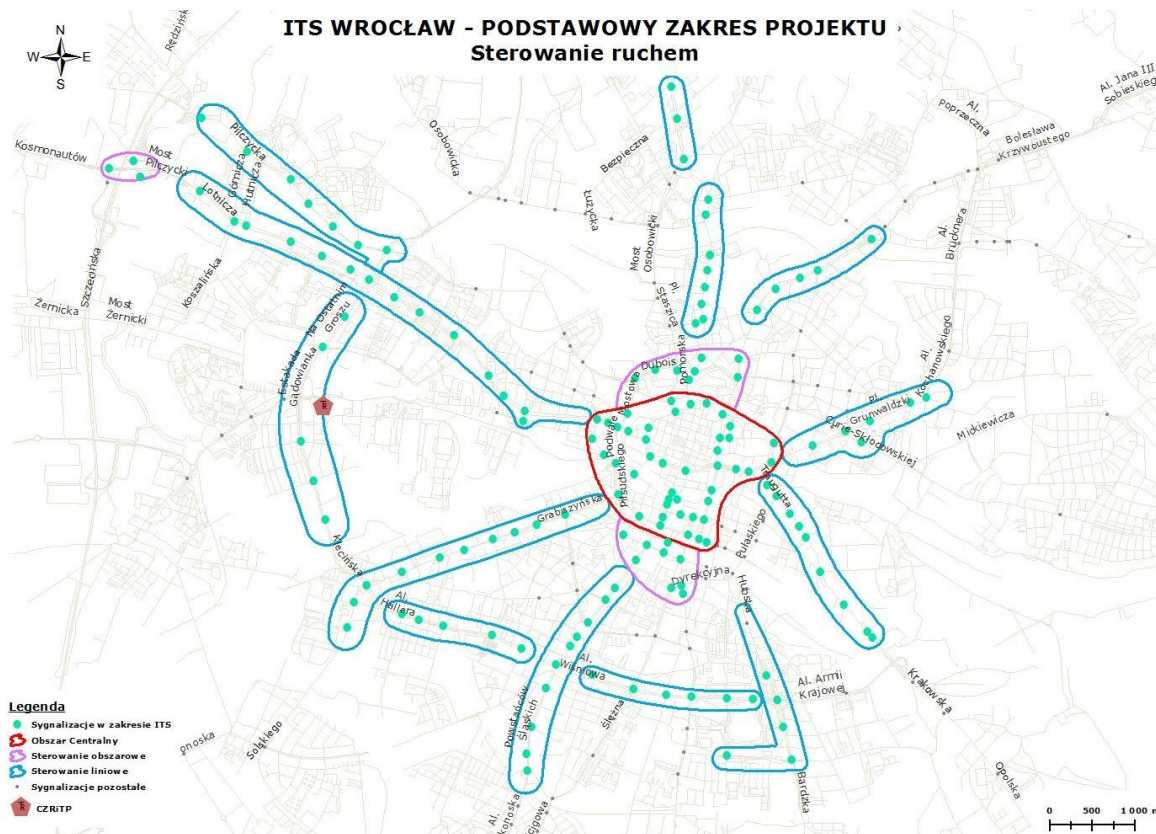
5.12 Wrocław

At present Wrocław is implementing an intelligent transport system "ITS Wrocław", which in total is worth PLN 102,278,010.26 (in accordance with the contract for co-financing). The project will be implemented over the period 2010-2014. At that time, expenditures incurred by Wrocław on transport and communication amounted to PLN 2,177 million. Therefore, the cost of ITS implementation constituted 6% of the total expenditure on transport infrastructure incurred by the city in this period.

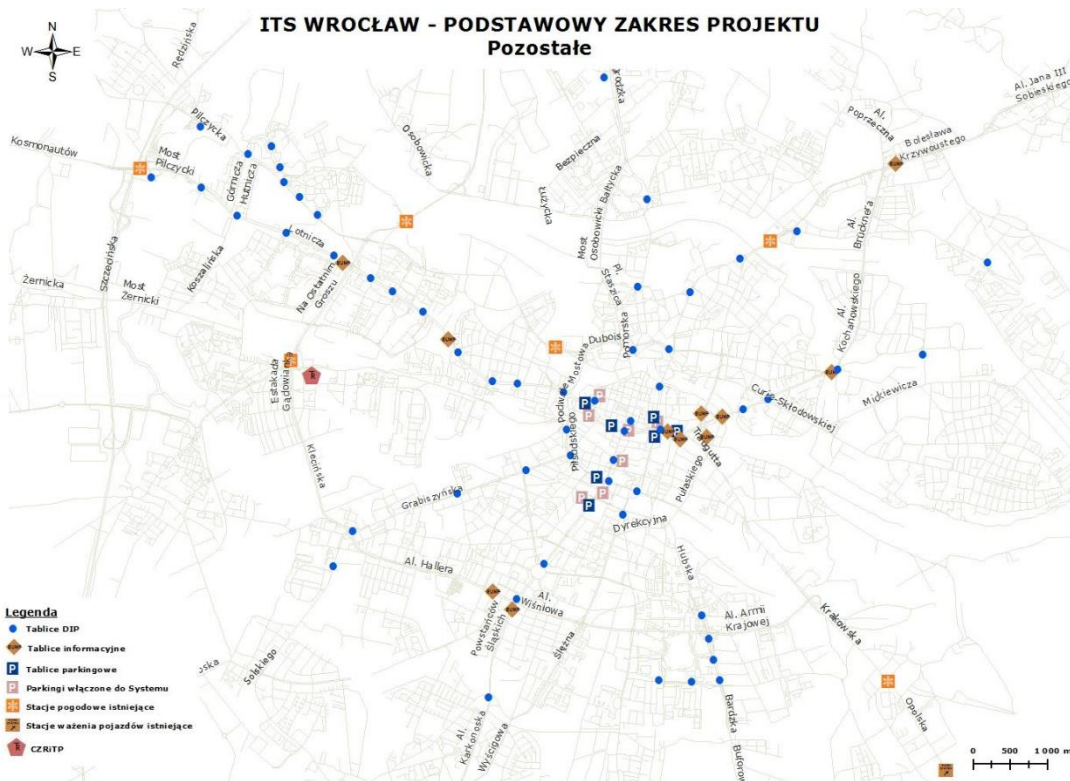
Wrocław fulfilled two large tasks in the priority area enumerated in Article 3 of the ITS directive. The first one was connected with the construction of the Tramway Plus system and priority to tram traffic at crossroads. Task 2 expanded the territorial scope of ITS and introduced additional elements, such as variable message boards and other systems of information for road users.

Implementation of the Project "Intelligent ITS-Wrocław Transport System" involved construction of the Traffic and Public Transport Management Centre (CZRiTP) and equipping the main CPD - Data Processing Centre. The system covered 153 crossroads located on the roads of Wrocław municipality and on national roads going through the city. A vehicle detection system and a data transfer system between control cabinets and CZRiTP were built at all 153 crossroads controlled by traffic lights. All vehicles in possession of the urban public transport operator were provided with devices to communicate with ITS (over 800 devices). Thanks to the location tracking, the Centre calculates time needed to arrive at particular passenger stops. The information is distributed on LED displays located at passenger stops. As many as 168 displays have already been installed and 120 more will be added. Because ITS-Wrocław was also equipped with ANPR (Automatic Number Plate Recognition) cameras the Centre collects information about the speed with which vehicles move through particular sections of the network. This allowed for the construction of variable message boards which are mounted above the roadway and display information about the operability of selected sections (13 locations). This also provides an opportunity to directly inform drivers about hindrances, detours, etc. and becomes an excellent tool to support decisions taken by the drivers. What is more, in order to limit unnecessary circling around in the vicinity of the centre by parking space seekers, the city installed in 12 locations displays informing about available parking spaces in the city centre at multi-storey car parks. This task entails adjustment of data exchange interfaces between the system used by the city and, many a time, private car park operator. An ITS Internet portal with traffic information is being created for the residents and drivers. Besides, a telephone system providing information on road conditions will be launched.

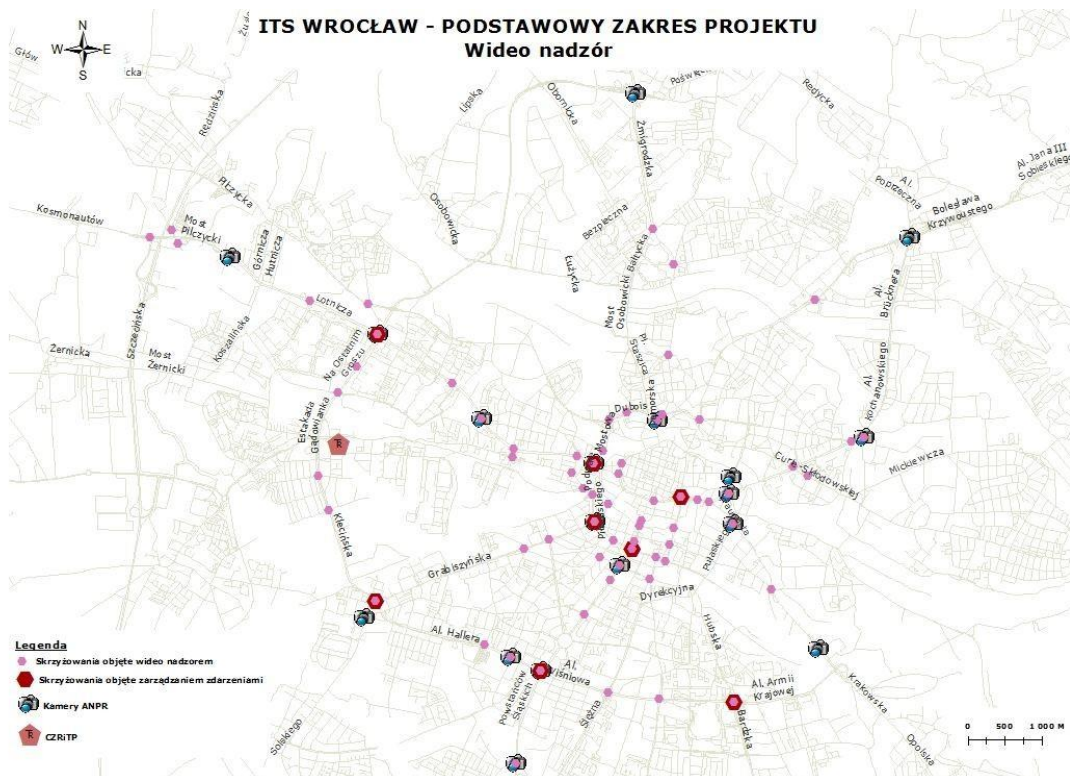
➤ **Maps showing the scope and location of individual elements of ITS-Wrocław**



➤ **Traffic lights connected to ITS. 153 crossroads are controlled by the Traffic and Public Transport Management Centre.**



- **The map shows the location of the other elements of ITS-Wrocław: VMBs, InfoPARK displays, weigh-in-motion systems, weather stations that measure weather conditions and also displays of Dynamic Information at Passenger Stops.**



The map shows the location of surveillance cameras, including cameras intended in particular to analyse such incidents as driving a vehicle against the direction of traffic, lane blocking, etc. ANPR cameras recognise number plates.

5.13 Koszalin

The Municipality of the City of Koszalin is implementing the project entitled “Construction of the intelligent transport system in Koszalin” co-financed by the European Union from the European Regional Development Fund - Operational Programme Infrastructure and Environment, priority VIII Transport safety and national transport networks, measure 8.3 Development of Intelligent Transport Systems. Total project value is PLN 13,506,000. The project involves the design and construction of a multi-component, comprehensive Intelligent Transportation System in the city of Koszalin to improve the efficiency and safety of passenger traffic and the transport of goods in the city. The contract is for the design, delivery of equipment and software, construction, start-up and calibration of the ITS system for the city of Koszalin. The system consists of the Traffic Management System, which is a platform integrating the whole ITS, and a number of systems described below. The purpose of building the system is to enable operative management of the city’s transport system, providing for the possible extension of the system both in terms of its area and functionalities. Irrespective of the structure of individual systems, it is necessary to ensure full functional integration from the point of view of the user. This means, for example, the same selection interface for all the cameras of the system - both mobile cameras used in the video monitoring system and fixed ones, which constitute elements of the other systems. Communication protocol must be open, fully documented and must enable communication with the devices installed for the purpose of the ITS System.

The construction of the ITS system consists of the following tasks:

- Construction of the Traffic Management, Control and Safety Monitoring Centre;
- Area traffic lights control system;
- CCTV video surveillance system;
- Automatic Number Plate Recognition (ANPR) System;
- Video detection system;
- Overheight vehicles pre-selection system;
- Overweight vehicles pre-selection system;

- Detection system for vehicles passing through red lights;
- Detection system for speeding vehicles;
- Available parking spaces information system;
- System of variable message boards and signs;
- The use of a portal for drivers and passengers for ITS purposes.

The ITS will be based on existing, currently under-construction and planned fibre optic infrastructure in the Municipality of the City of Koszalin, covered mainly in the project "Intelligent Koszalin – expansion of information society infrastructure of e-Koszalin – construction of a data communication network and a video monitoring system". Basic functions of the Traffic Management System include:

- monitoring road traffic, both using a traffic control system and the CCTV network,
- monitoring incidents associated with exceeding certain traffic parameters,
- monitoring and visualisation of the technical status of system components (detectors, signalling devices, signalling installation, traffic light controllers, area traffic control servers, data transmission equipment, connections, etc.) and archiving of monitoring-related data,
- a possibility to take over control over system components in specific situations,
- management of variable message boards and signs,
- exercising supervision over vehicles committing traffic offences, their tracking and reporting their location to security services (using the integrated surveillance software ANPR with the following modules: detection of vehicles passing through red lights, identification of overweight vehicles, identification of speeding vehicles and identification of overheight vehicles);
- quick information for emergency services about accidents or other road dangers (receiving driver reports and reporting dangers, support for the emergency services management, reporting incidents);
- collecting, archiving and transmitting data to selected services from the following systems: travel times, pre-selection of overweight vehicles, pre-selection of overheight vehicles, pre-selection of speeding vehicles, detection of vehicles passing through red lights,
- collecting and archiving the following: visual data, measurements from parameter control systems, information about equipment status, hindrances to traffic flow, incidents, statistical data about offences, traffic intensity;
- providing information to drivers and passengers via the Internet portal and the installed variable message boards and signs;
- information and guidance to car parks with available parking spaces;
- creating reports, analyses, specifications and statistics illustrating the operation of individual subsystems and of the whole system;
- planning support;
- information about detours caused by accidents, congestion, road works;
- evaluation of each of the subsystems.

The project "Construction of the intelligent transport system in Koszalin" is related to priority areas I, II and III.

5.14 Gliwice

Since 2011, the City of Gliwice has been implementing within its area the investment project entitled "**Development of the detection system within the area of the city of Gliwice and modernisation of selected traffic lights Stage I**". In 2011, a call for tenders was issued for the modernisation of 15 traffic lights and the delivery of a traffic management system. The investment project was completed and accepted in June 2011. In connection with the signing of a contract for co-financing for the above mentioned task of measure 8.3: Development of intelligent transport systems of priority VIII: Transport safety and national transport networks under the Operational Programme Infrastructure and Environment 2007-2012, in December 2011, the Municipal Road Authority in Gliwice issued a call for tenders for the implementation of the second part of the above mentioned investment project comprising the modernisation of the other 45 crossroads within the area of the city of Gliwice. The winning tender was announced and as a result of the works performed, the investment project was completed and accepted in April 2013. The project is worth PLN 35,664,690.65.

As part of the above mentioned task, the first part of the project that included the components enumerated below was completed in 2011:

- installation and start-up of measurement points of traffic volume on street entries in the vicinity of 4 crossroads controlled by traffic lights located within the area of the city of Gliwice;
- implementation of the system for automated data capture from measurement points to a data storage system and launch of an application providing data on vehicle traffic volumes;
- technical reconstruction of 15 crossroads, including expansion of the operated systems of controllers, the installation of vehicle detectors (video detection) and pedestrian detectors (buttons for pedestrians);
- replacement of traffic lights accessories (poles, lantern bodies), upgrade of signal control software.
- reconstruction of crossroads including the installation of city surveillance cameras at 15 crossroads to ensure the observation of the area within the crossroads and their entries;
- installation at 15 crossroads of IT access points to the WiMAX network and a backup network based on transmission medium which does not conduct electrical impulses with transmission speeds of at least 4x 1Gbit/s;
- implementation of a station for traffic control in the Municipal Road Authority in Gliwice and the Rescue Centre Gliwice (Centrum Ratownictwa Gliwice).

The subsequent part of the project including the components enumerated below was implemented in the years 2012-2013:

- installation and start-up of measurement points of traffic volume on street entries in the area of 16 crossroads controlled by traffic lights located within the area of the city of Gliwice;
- technical reconstruction of 45 crossroads, including expansion of the operated systems of controllers, the installation of vehicle detectors (video detection) and pedestrian detectors (buttons for pedestrians), replacement of traffic lights accessories (poles, lantern bodies), upgrade of signal control software;
- reconstruction of crossroads including the installation of city surveillance cameras at 45 crossroads to ensure the observation of the area within the crossroads and their entries;
- installation at 45 crossroads of IT access points to the WiMAX network and a backup network based on transmission medium which does not conduct electrical impulses with transmission speeds of at least 4x 1Gbit/s;
- equipping a new traffic control centre;
- streamlining the passage through the city of the A4 bus service;
- the implementation of the central traffic control system and the system of line coordination management.

Operation of the ITS Gliwice consists, among others, in coordinating the work of devices which simultaneously control traffic at a number of crossroads. This directly contributes to smoother traffic flow and shorter car travel time along the major urban thoroughfares. In addition, the system facilitates the passage of bus line A4 by giving the green light at all the crossroads along the route. This is possible because buses as well as crossroads are equipped with devices that enable the tracking of public transport vehicles. During the period of project implementation, infrastructure within the crossroads was modernised and the Traffic Control Centre was opened. In addition, there was created a network of radio and fibre optic connections which enable remote traffic signal management. Gliwice is the only city in Poland that has LED type lamps in all the traffic signals. Such lamps not only consume less power (12.5 times less than incandescent lamps), but are also more durable and resistant to weather conditions, and the light they emit is more visible to drivers and pedestrians in difficult weather conditions.

5.15 Zielona Góra

The following projects in the area of intelligent transport systems are implemented in the city of Zielona Góra:

- So far Zielona Góra has implemented the Passenger Information Management System and the integrated public transport management system along with the electronic ticket. Its implementation schedule comprised:
 - December 2006 - start-up of the system - 11 4-line displays;
 - 2007 - start-up of a virtual monitor - real-time preview of 10 departures from all the passenger stops;
 - October 2009 - another 2 (LCD) displays;

- September 2011 - expansion of the system by adding 5 more (6-line) displays, in total 18 pieces. According to the assumptions made in the plan, in subsequent years it will be expanded, modernised and adapted to the new technologies that will be implemented.
- Connection search engines:
 - July 2009 - start-up of the Google Transit search engine, thanks to which, when a given destination is entered, the search engine will show on the map how it can be reached;
 - March 2014 - start-up of another search engine, jakdojade.pl.
- Timetable available on the telephone. Starting from 26 June 2009 you can download applications with a timetable on Java-equipped phones and from 2011 also on smart phones (Transportoid application).

Public transport in Zielona Góra was covered by an implemented project from the area of multi-modal travel planners, IT services and integrated ticket systems. An integrated common database was implemented to ensure interoperability and availability of data. The data in question are available on the Internet, passenger information displays and mobile phones. Data format and update are done through IT systems. BusMan, MINICOM and Seasam systems are used for electronic data exchange.

Execution of the City Development Strategy adopted for the years 2012-2022 involves gradual implementation of the monitoring system for the traffic lights controlled crossroads (at present 9 crossroads), which makes possible the verification and adjustment of operation parameters and traffic flows at these crossroads. Another step towards coordination of vehicle traffic flow through these crossroads is the implementation of video monitoring. Implementation of these projects depends on the financial resources earmarked for this purpose in the budget of the City of Zielona Góra.

ITS projects are mainly implemented on voivodeship and county roads.

5.16 Bydgoszcz

Bydgoszcz is currently implementing the project of Intelligent **Transport System for the Urban Transport**, which involves a dynamic passenger information system at a cost of: PLN 4,200,000.00 as part of the "Construction of tram line from the city centre to the Railway Station Bydgoszcz Główna". Additionally, a procedure has been initiated to select a contractor for the other ITS project entitled "Intelligent transport systems in Bydgoszcz". The project ITS Bydgoszcz is worth in total PLN 55,376,056.00 (current costs on the basis of the contract for co-financing). Project implementation will be implemented over the years 2007-2015.

"The Intelligent Transport System for the Urban Transport in Bydgoszcz - dynamic passenger information" The implementation of the Intelligent Transport System for the Urban Transport in Bydgoszcz encompasses dynamic passenger information and is executed as part of the construction of the tram line to the Bydgoszcz Główna railway station. The main objectives of the system implementation:

- to improve public transport punctuality by the modernisation of the electronic punctuality analysis system and implementation of an automatic travel time analysis module;
- to improve safety through the implementation of panic buttons in vehicles with vehicle identification on an electronic map;
- to facilitate the work of bus and tram drivers by supplying equipment that shows the current status against the timetable and enable communication with the Traffic Headquarters using predefined messages;
- to make possible for traffic supervision staff real-time vehicle fleet management with a preview of all vehicles on an electronic map;
- to provide passengers with real-time dynamic passenger information at stops, on the website and on mobile phones;
- to provide the public transport operator (Urban Roads and Public Transport Management (ZDMiKP) in Bydgoszcz) with tools for automatic analysis and accounting for punctuality, travel time analysis, etc.;
- to enable the sending of free-text messages to passenger stops.

At present the system is being developed for the entire area of the city of Bydgoszcz, and the visualisation of stop displays is being implemented for a tram service under construction and will be completed by May 2015. Further works to extend system visualisation and functionalities in the entire city centre will be carried out in the next programme to be implemented entitled "Intelligent transport systems in Bydgoszcz" in 2012-2014.

Intelligent transport systems in Bydgoszcz. The main objective of the project is to ensure priority passage of rail vehicles in the existing transport corridors through the centre of Bydgoszcz, namely:

- T0 - (tram main line EW encompassing ul. Fordońska from the terminus on ul. Wyścigowa to rondo Fordońskie with an intermediary terminus on ul. Bałtycka, ul. Jagiellońska, ul. Marszałka Focha, ul. Nakielska from rondo Grunwaldzkie to the Wilczak terminus on ul. Trentowskiego);
- T1 - (tram main line NS along ul. Gdańska from the terminus on LPKiW Myślęcinek on ul. Rekreacyjna street to the crossroads with ul. Jagiellońska and ul. Marszałka Focha), while minimising the impact of the implementation of this priority on the other participants of vehicular traffic in the corridors of:
 - ul. Fordońska – ul. Kamienna – ul. Artyleryjska – ul. Rotmistrza Pileckiego – ul. Grunwaldzka – ul. Skośna),
 - S2 - (south route along the following streets: ul. Planu 6-letniego – ul. Wojska Polskiego with a tram track separated in the street – ul. Solskiego – ul. Piękna – ul. Szubińska),
 - E2 - (along the following streets: ul. Armii Krajowej from ul. Modrzewiowa to ul. Kamienna – ul. Wyszyńskiego – Pomorski bridge with a tramway section between rondo Fordońskie and rondo Toruńskie – ul. Jana Pawła II, ul. Brzozowa from ul. Jana Pawła II to ul. Goszczyńskiego), and preserving the current separation and accumulation function in the following corridors:
 - W1 - (along: ul. Szubińska from ul. Piękna to Pl. Poznański – ul. Kruszwicka – ul. Grunwaldzka from rondo Grunwaldzkie to ul. Pileckiego);
 - E3 - (along: ul. Łęczycka from ul. Kamienna to ul. Fordońska – ul. Kazimierza Wielkiego – ul. Planu 6-letniego from ul. Nowotoruńska to ul. Kapuściska.

The ITS area is delimited by the following streets:

from the north: ul. Kamienna – ul. Artyleryjska – ul. Zygmunta Augusta,
from the west: ul. Dworcowa – ul. Królowej Jadwigi – ul. Marszałka Focha – ul. Kruszwicka – ul. Szubińska, from the south: ul. Piękna – ul. Solskiego – ul. Wojska Polskiego,
from the east: ul. Ujejskiego – ul. Jana Pawła II – Pomorski bridge – ul. Wyszyńskiego including the section of ul. Fordońska
from rondo Fordońskie to ul. Wyścigowa. Sub-systems included in ITS:

- 1) traffic control with video monitoring and recording of vehicle characteristics;
- 2) public transport management with dynamic information at passenger stops;
- 3) parking information;
- 4) alternative route vehicles guidance.

Main elements of the central traffic and public transport management system in Bydgoszcz entitled “Intelligent transport systems in Bydgoszcz”:

- 1) traffic control with video monitoring, which will include, among others:
 - modernisation of 45 existing traffic lights and installation of 7 new ones,
 - a video monitoring system ensuring the operation of approx. 90 cameras, including 40 CCTV monitoring cameras and 50 cameras for automatic recording of vehicle characteristics,
 - fibre-optic cable connections - up to 30 km,
 - a traffic control centre (purchase, delivery, installation and start-up),
- 2) public transport management with dynamic information at stops, which will include, among others:
 - equipping 80 trains with radio priority transmitters (purchase, delivery, installation and start-up),
 - dynamic information displays at passenger stops (180 pcs., purchase, delivery, installation and start-up),
 - automatic tram switch controls (3 pcs., purchase, delivery, installation and start-up),
 - adjustment to the needs of the System of a control room, implemented under a separate task for dynamic information at passenger stops,
 - purchase of 20 information kiosks with ticket vending functions,
- 3) parking information, which will comprise, among others:
 - installation of 101 parking metres,
 - equipping 10 inspectors with inspection devices,

- installing 26 parking information displays,
 - equipping the Paid Parking Zone office,
- 4) alternative route vehicles guidance, which will consist of, among others:
- installation of 32 variable message boards,
 - system loops.

Main results expected after the launch of ITS:

- relative reduction of car travel time in the area of system operation determined at the level of: 6.03%,
- relative reduction of travel time by public transport as regards tram transport within the area of the system operation determined at the level of - 8.33%.

Since 2010, total expenditure on the Intelligent Transport System for Public Transport in Bydgoszcz – dynamic passenger information has reached PLN 4,167,699.34 gross, while expenditure on the ITS "Intelligent Transport Systems in Bydgoszcz" has reached PLN 53,984,700,00 gross. The projects are implemented on municipal, county, voivodeship and national roads.

The following performance indicators are used for the projects:

- shortening by 8% of average travel time by tram on the selected transport routes;
- shortening by 6% of average car travel time on the selected transport routes;

5.17 Toruń

Municipality of the City of Toruń is implementing a project entitled "Development of tramway transport network in Toruń in 2007 – 2013", co-financed from the resources of the European Regional Development Fund under the Regional Operational Programme of the Kujawsko-Pomorskie Voivodeship for 2007-2013 (Priority Axis 1: Development of technical infrastructure; Measure 1.2 Public transport infrastructure). A contract for co-financing for the above mentioned project was concluded between Municipality of the City of Toruń and the Kujawsko-Pomorskie Voivodeship on 3 November 2010. Total project value is PLN 86,391,816.40, and it is implemented in the period 2007-2015.

The project is consists of four sub-projects:

Sub-project I - Road traffic management system in Toruń. The task comprised re-programming, reconstruction and construction of new traffic lights as well as the modernisation and construction of new tram stops tailored to the needs of the disabled;

Sub-project II - Real-time passenger information system. The task comprises the design and implementation of real-time information at passenger stops;

Sub-project III – Tram line to Nicolaus Copernicus University (Bielany residential development). Sub-project III comprises three tasks:

- 1. construction of a tram line to Nicolaus Copernicus University (to Bielany residential development);
- 2. connecting the tram line to NCU (to Bielany residential development) with Rubinkowo residential development. The task comprised reconstruction of the road system in Solidarności avenue through the construction of an integrated tram and bus interchange,
- 3. modernisation of the Olimpijska terminus to serve the line to NCU (to Bielany residential development);

Sub-project IV - Modernisation of tramway line rolling stock. The task comprised the modernisation of 18 tramcars.

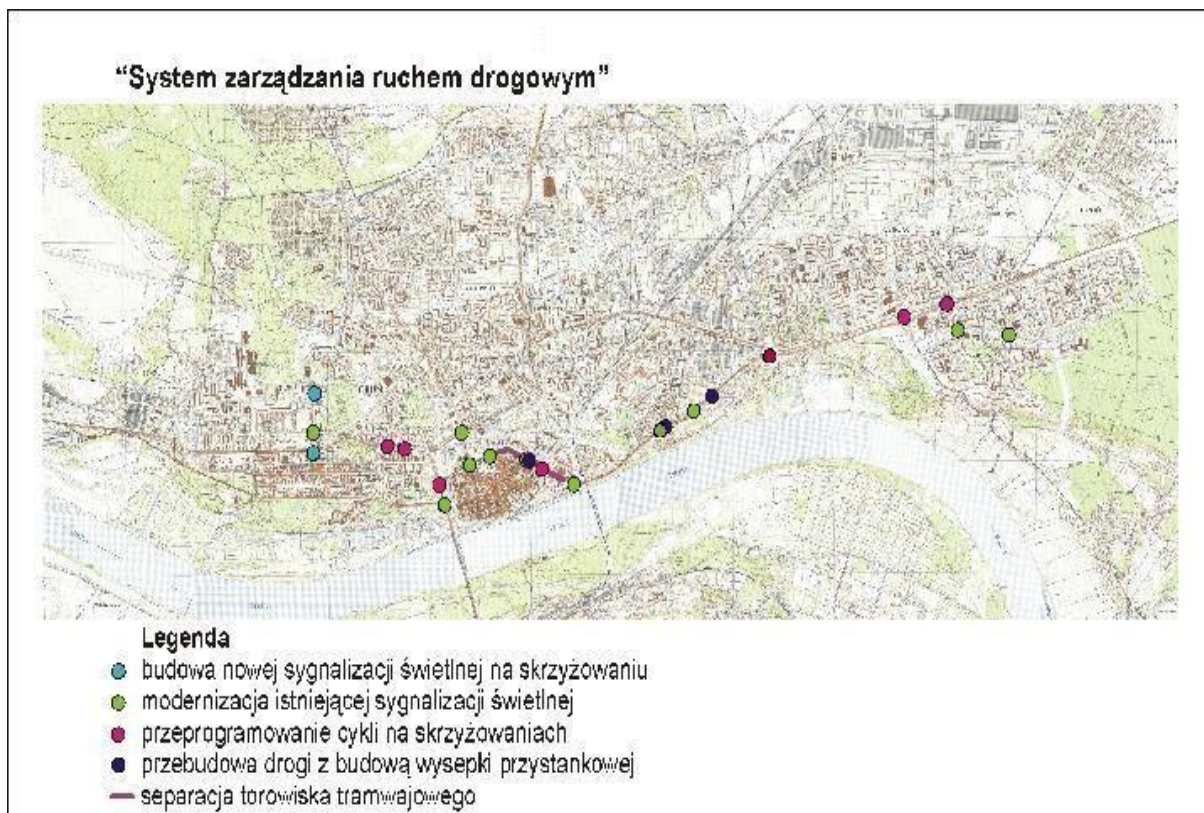
Intelligent transport systems in the area of road transport and interfaces with other modes of transport fall under sub-project I and sub-project II:

Sub-project I - "Road traffic management system":

It comprises measures relating to road traffic management, which aim at ensuring priority to trams, improved accessibility of rail transport, road safety, shorter travel time in the east-west vector along the section between the city centre and residential developments. It entails investment projects that comprise: reconstruction of a part of the road system,

infrastructure at passenger stops and also construction, reconstruction, modernisation and re-programming of traffic lights at crossroads. It is implemented over the period 2008-2015. The system covers locations marked on the info graphics below.

➤ **Territorial scope of the system**



“Traffic management system”
Key
Construction of new traffic lights at the crossroads
Modernization of existing traffic lights
Re-programming of signal cycles at crossroads
Road reconstruction with the construction of a passenger stop island
Tramway separation

Sub-project I costs PLN 10,276,555,73 gross and so far 41% of the project has been completed. The project is implemented on municipal, voivodeship and national roads.

➤ **Output indicators:**

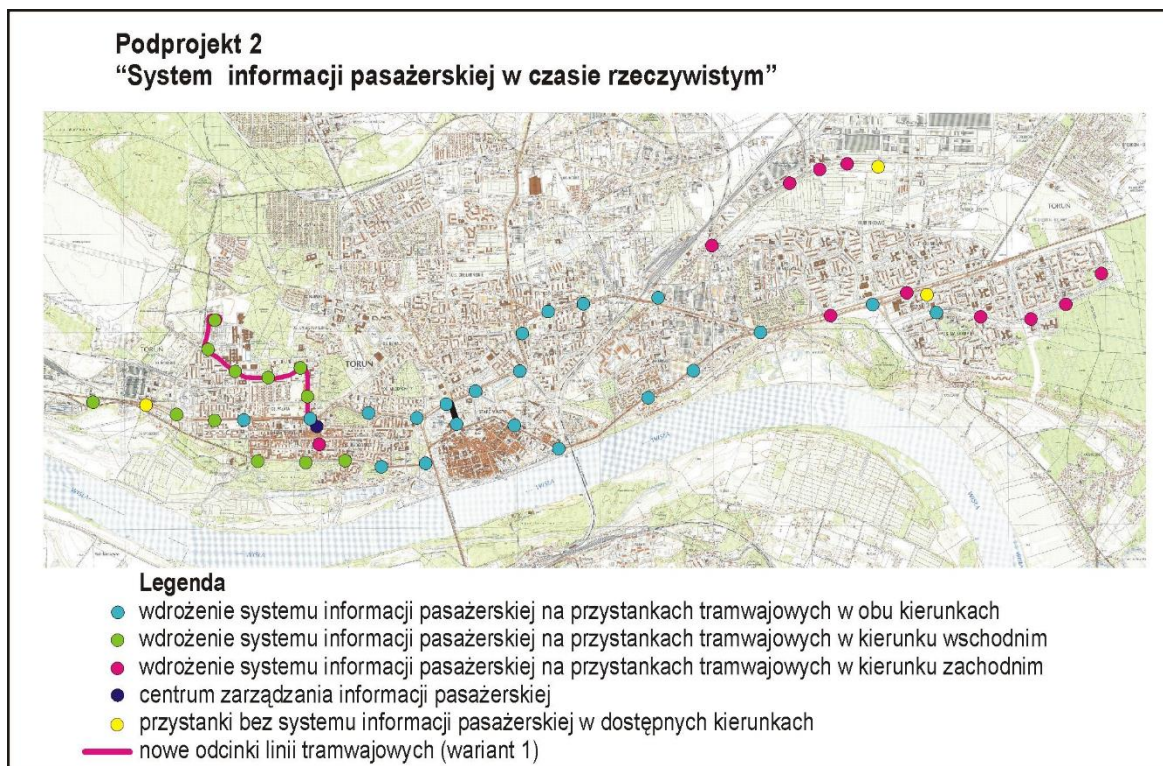
No.	Output indicators	Unit	Target value of the indicator
1.	Number of constructed/reconstructed traffic signal systems	pcs.	24

➤ **Result indicator:**

No.	Result indicator	Unit	Target value of the indicator
1.	Travel time shortening (total decrease travel time saving)	min.	5

Sub-project II "**Real-time passenger information system**" is to cover 65 platforms at 44 tram stops. Works under the project will include preparation of design documentation for the information management software at stops and erection works comprising the installation of the devices that inform public transport passengers travelling by trams. All types of work relating to the provision power supply to IT devices (technical infrastructure devices) are also covered by the scope of the sub-project. Both the software and the devices will ensure current and real-time information about tram departures at nearly all the passenger stops within the tramway network in Toruń that are used at present and will be constructed in the future. It will be implemented over the period 2012-2014.

The system covers stops marked on the info graphics below.



Sub-project 2
"Real-time passenger information system"
Key
implementation of the passenger information system at tram stops in both directions
implementation of the passenger information system at tram stops in the east direction
implementation of the passenger information system at tram stops in the west direction
passenger information management centre
passenger stops without the passenger information system in available directions
new tram line sections (variant 1)

Sub-project II costs PLN 6,760,699.97 gross and so far 56 % of the project has been completed. Indicator that is used for the purposes of the project - number of systems installed.

The project entitled: "Development of tramway transport network in Toruń in the years 2007-2013" is one of major priority undertakings that are to be implemented, enumerated among others in the Sustainable Development Plan of Collective Public Transport for the city of Toruń in the years 2013-2035 (Resolution no. 630/13 of the Toruń City Council of 24 October 2013). Implementation of sub-project II "Real-time passenger information system" is part of the Priority Area 1: Optimum use of road, traffic and travel data referred to in the ITS directive.

In addition, in 2013 the Municipality of the City of Toruń initiated works on the project "**Intelligent Transport System for the City of Toruń**", which main objectives are as follows:

Dynamic road traffic management:

- improved traffic flow on the sequences of major exit roads (directions: Gdańsk, Bydgoszcz, A1 Motorway, Warsaw);
- on-going road traffic surveillance through a network of cameras and measurement sensors;
- road traffic control by traffic lights and information provided by means of variable message boards, the website and mobile devices;
- possibility to react in emergency situations thanks to current information about incidents in sensitive areas of the road network.

Development of collective transport:

- maximum shortening of travel time by collective transport - traffic signal priorities;
- expansion of the passenger information system with the addition of bus transport;
- improved infrastructure quality at bus stops.

Protection of the Old Town Complex:

- dynamic information about available parking spaces decreasing the number of vehicles within the Old Town Complex and eliminating unnecessary circling around by parking space seekers;
- monitoring access to the Old Town and compliance with the entry permits issued;
- monitoring compliance with tonnage limit in the buffer zone of the Old Town Complex through the automatic detection system;
- possibility to use parking situation prediction as an innovative element.

Additional elements:

- monitoring compliance with speed limits;
- checking heavy goods vehicles entry permits;
- dynamic measurement of traffic volume;
- detection of offences, such as: excess tonnage, passing through a red signal.

"Initial materials for the concept of Intelligent Transport System (ITS) for the City of Toruń" were prepared in December 2013. The Initial Materials (database) include:

- data on the road network;
- data on projects to be implemented by the Municipal Road Management Administration (MZD) in the years 2014-2018 in accordance with the Investment Programme by 2025;
- data on projects which are implemented or are to be implemented by other units of the Municipal Office of Toruń;
- data on more important strategic programmes;
- data on collective transport.

The amount of PLN 66,038.70 gross has been earmarked for the execution of the undertaking in question.

In May 2014, a contract was signed for "Advisory services in the form of complex support for the Employer in organising and conducting the award of a public contract in competitive bid procedure to select a contractor for the task Concept of Intelligent Transport System for the city of Toruń based on the European Intelligent Transport System Framework Architecture ITS FRAME".

Objectives

Stage I – preparation of the procedure until final acceptance of the relevant documentation by the Employer,
Stage II – support offered when the procedure is pending until its completion.

The amount of PLN 66,038.70 gross has been earmarked for the execution of the undertaking in question.

5.18 Lublin

As part of the project: "**Integrated Urban Public Transport System in Lublin**" two ITS-related components are being implemented, i.e.:

- Construction of the Public Transport Management System – this component is implemented by the Urban Transport Authority in Lublin;
- Construction of the Traffic Management System - this component is implemented by the Roads and Bridges Authority (Zarząd Dróg i Mostów) in Lublin;

So far the Construction of the Public Transport Management System has resulted in the implementation of a dynamic passenger information system which comprises, among others, the following elements 2 dispatcher centres installed at the ZTM seat in Lublin in Al. Kraśnicka 25 and at the registered office of MPK Lublin Sp. z o.o. in ul. Grygowa 56 as well as 20 dynamic passenger information displays located at public transport passenger stops in Lublin (the table below shows a list of locations).

➤ **Scope of the system**

No.	Stop name	Street
1	Skrzetuskiego 02	B M Cassino
2	ZUS 06	ZANA
3	Mickiewicza 04	Kunickiego
4	Rondo Krwiodawców 03	Kraśnicka
5	Politechnika 02	Nadbystrzycka
6	Politechnika 01	Nadbystrzycka
7	Park Bronowice 04	Fabryczna
8	Rzemieślnicza 02	Kraśnicka
9	Piastowska 02	Filaretów
10	Wojciechowska 01	ZANA
11	Leclerc 04	Zana
12	Kraśnickiego 01	Zana
13	MPK 02	Kraśnicka
14	MPK 01	Kunickiego
15	PL. Bychawski 01	Kunickiego
16	Leclerc 01	B M Cassino
17	Os. Słowackiego 02	Wileńska
18	Związkowa 02	Sp. Pracy
19	Jana Sawy 02	ZANA
20	Paderewskiego 02	Choiny

In order to ensure proper functioning of the system, it was necessary to purchase and equip public transport vehicles, among others, with control panels, bi-functional validators, validator system software and server infrastructure which allows for data processing. In addition, to improve data transfer, depots were provided with WiFi hotspots.

➤ **List of system elements and the incurred expenses:**

No.	Items	Incurred expenses [PLN]
1	Validators	2,465,000.00
2	Control panels	782,600.00
3	Validator system software	473,000.00
4	WiFi hotspots	28,000.00
5	Operator stations	37,600.00
6	Server infrastructure	432,800.00
7	Air-conditioner	2,500.00
8	Support structures with displays	764,978.35

9	Dispatcher stations	21,000.00
10	Computer sets	10,500.00
11	Video walls 2x	484,821.65
13	GSM communication module with antenna	291,600.00
TOTAL		5,794,400.00

The component Construction of the Public Transport Management System has been completed.

Two ITS-related elements are implemented as part of the component Construction of the Traffic Management System (SZR), i.e. traffic management system, priorities for collective transport, which will involve, among others, implementation of the following sub-systems:

- sub-system to handle traffic lights and variable message signs control systems;
- sub-system of priorities for collective transport and privileged vehicles;
- traffic incidents management sub-system;
- sub-system of archiving, analysis, planning and information about the traffic situation;

Implementation of the contract that covers the above mentioned scope commenced in December 2011 and is going to continue until December 2014. The contract is worth PLN 24,001,980.09 gross. Design works are in progress at present and will be completed soon, construction works have also commenced (e.g. rooms have been adjusted to the needs of the Traffic Control Centre).

ITS projects are mainly implemented on national roads (Al. Kraśnicka, Al. Solidarności), voivodeship roads (Al. Unii Lubelskiej) and county roads (Al. Raławickie, ul. Lipowa, ul. Droga Męczenników Majdanka). No ITS project performance indicators were used during implementation of SZR in Lublin, while an indicator for the implementation of the whole ZSMTP project is development of the system.

5.19 Szczecin

The Municipality of the City of Szczecin is implementing the project "Improvement in the performance of urban transport in Szczecin agglomeration through the use of telematics systems". Project implementation involves the creation of the Central Public Transport Management System for Szczecin agglomeration to cover the city of Szczecin and Szczecin agglomeration. The main purpose is traffic management facilitation through implementation at the regional level of Intelligent Transport Systems. The consequence will be increased transport and spatial cohesion within the area covered by the Project.

The project is co-financed from the resources of the European Regional Development Fund under the Regional Operational Programme Infrastructure and Environment 2007-2013, Priority VIII Transport safety and national transport networks, Measure 8.3. Development of intelligent transport systems.

Execution of the Project will involve the implementation of 11 complementary sub-systems which are to enable efficient management of the existing fleet and improve the quality of transport services from the point of view of passengers.

Transport management elements to be implemented:

1. Fleet Management System for the whole fleet - the process is to enable the dispatcher to track the location of all vehicles in service and establish text and voice communication with them, which will in turn make it possible to respond to all traffic disruptions;
2. Technical Vehicle Location System - this is a system that supports the Fleet Management System whose role is to connect the dispatcher with the nearest technical vehicle in a crisis situation and send the vehicle there so that the problem can be quickly resolved;
3. Dynamic Passenger Information System - this system is to allow for providing passengers with real-time information about vehicle arrival at passenger stops, frequency of service, information about current incidents occurring en route;
4. In-Vehicle Video Surveillance System;
5. Passenger Flow Counting System - the system makes it possible to collect data about the number of passengers, and thus to adjust the frequency and capacity of vehicles serving particular transport lines;
6. Electronic ticket system - single fare and season tickets;
7. Tracking and Monitoring system for Dedicated Vehicles servicing the "Winter Action" integrated with the Fleet Management System which tasks include planning an optimum route for the vehicles

- adapted to the current situation on the roads and the position of public transport vehicles;
8. "On Demand" Transport System - the system which makes it possible to carry passengers from peripheral areas located at a distance from the agglomerations, to public transport end stops;
 9. Transport Network Optimisation System - the system which integrates and optimises transport networks;
 10. Wi-Fi wireless transmission system at carrier depots - the system will enable the transfer of data to the vehicles before they leave the depot and from vehicles when they come back to the depot in order to limit data transfer through mobile networks as well as the preview and making copies of certain video monitoring records;
 11. equipping the dispatcher/operator centre in order to enable the administrators and dispatchers full control over and real-time management of the whole fleet.

The project was implemented in two stages.

- Stage I was implemented in the years 2010-2011.

As part of this stage the following systems were launched and used to the utmost efficiency: Fleet Management System, Technical Vehicle Tracking System, Dynamic Passenger Information System (part of the system to be implemented during stage I); In-Vehicle Video Surveillance System (a part of the system to be implemented during stage I - 10 vehicles); Passenger Flow Counting System (a part of the system to be implemented in stage I - 10 vehicles); dispatcher/operator centre equipment; Season Electronic Ticket System (a part of the Electronic Ticket System). Implementation of the systems was accompanied with trainings to ensure their efficient use and full support. Stage I was completed in full, as intended.

- Implementation of stage II started in 2013, scheduled completion December 2014.

The following systems will be implemented during this stage: Electronic Ticket System (expansion by adding single fare ticket); Passenger Flow Counting System (system expansion by adding another 40 vehicles); Dynamic Passenger Information System (expansion); In-Vehicle Video Surveillance System (expansion to add all vehicles); Tracking and Monitoring System for Dedicated Vehicles servicing the "Winter Action", "On-Demand" Transport System, Transport Network Optimisation System, Wi-Fi Wireless Transmission at operator depots. System implementation will be accompanied with training.

Total project value is PLN 54,261,332.88.

5.20 Gorzów Wielkopolski

The following projects in the area of intelligent transport systems are implemented in the city of Gorzów Wielkopolski:

1. Implementation of an intelligent traffic management system ITS with public transport preference in traffic. The measure was planned within the European Union funds for the years 2014-2020. Implementation of the measure includes installation of variable message boards, development of a traffic control system and priority control for public transport.
2. Implementation of a passenger information system. The measure was planned within the European Union funds for the years 2014-2020. Implementation of the measure includes introduction of dynamic information at stops as well as introduction of dynamic information on public transport vehicles, the Internet and mobile devices.
3. Execution of a system of information about available parking spaces at the city car park next to the Gorzów Philharmonic building. The system was developed in 2011. The system comprises displays informing about available parking spaces at the city car park next to the Gorzów Philharmonic building.
4. Modernisation of traffic lights within the area of the city. Works on the project commenced in 2010 and are still in progress. The project involves replacement of traffic signal controller cabinets, installation of acoustic traffic lights and gradual replacement of traditional traffic signal light bulbs with LED.

Amounts earmarked or spent on particular ITS elements and territorial scope of projects (the projects were located on county, voivodeship and national roads)

- Implementation of an intelligent traffic management system ITS with public transport preference in traffic that covers the whole area of the city, planned cost PLN 12 million.
- Implementation of a passenger information system that covers the whole area of the city, planned cost PLN 5 million.
- Replacement of traffic signal controller cabinets, 17 units, cost – PLN 285,143.94, the task fulfilled in 2010.

- Installation of 204 acoustic traffic lights worth PLN 60,975.60 – task fulfilled in 2010.
- Installation of 96 acoustic traffic lights worth PLN 28,929.60 – task fulfilled in 2013.

The above mentioned projects were located on county, voivodeship and national roads.

- Gradual replacement of traditional traffic signal light bulbs with LED under contracts for traffic lights maintenance in Gorzów Wielkopolski.
- The system of information about available parking spaces at the city car park next to the Gorzów Philharmonic building developed as part of the investment project consisting in the construction of Gorzów Philharmonic in 2011 – total project value PLN 252,890.00.

5.21 Białystok

The City of Białystok is developing the Traffic Management System as part of implementation of the project: "Improved public transport service quality in the city of Białystok – Stage III". The contract for this investment project was executed on 11 June 2013. The investment project is worth PLN 26,551,136.79 gross.

In addition, the City of Białystok implemented a system of dynamic passenger information along with infrastructure for the introduction of Białystok City Card as part of Stage II of the above mentioned project. For implementation of the above mentioned component, the city was awarded with the ITS Leader 2012. Project implementation was completed on 31 July 2011, total cost amounted to PLN 156,649,253.64.

As part of the above mentioned Stage III, the System implemented within the whole area of the city of Białystok is to ensure better traffic conditions for the residents. It is being implemented, among others, in order to:

- improve the functioning of public transport in terms of effectiveness of passage and maintenance economics,
- improve the street network throughput,
- optimise the control with a view of minimising time losses and increasing the speed of passage,
- minimise the number of pull-ups,
- improve traffic safety,
- distribute traffic data to the residents and emergency services.

The main element of the Traffic Management System will be the Traffic Management Centre enabling complete control over the parameters of all elements of the system. Over 100 traffic lights operating in the city, monitoring equipment at crossroads, variable message signs, traffic flow measurement devices in points not equipped with traffic lights will be connected to the Centre. The connection between elements of the system will be ensured through a communications network based on high-quality and high-performance fibre optic lines. Development of the system will entail both reconstruction of the existing devices and construction of new ones. In addition, this will be a scalable system with potential for expansion.

This task involves the design, development, expansion and integration of the following elements:

- Traffic Management Centre (CZR),
- sub-system of area traffic control with the use of traffic lights (OSR),
- sub-system of priorities for public transport vehicles (PTP),
- sub-system of traffic control with the use of variable message boards and signs (PRTZ),
- traffic incidents detection and management sub-system (WZZD),
- sub-system of crossroads monitoring in terms of recording the course of traffic incidents (MSk),
- sub-system of recording the entering on red light (RWCS);
- passenger information sub-system (InDP),
- communication sub-system (NET),
- telecommunication duct networks,
- measurement instruments in crucial spots not provided with traffic lights.

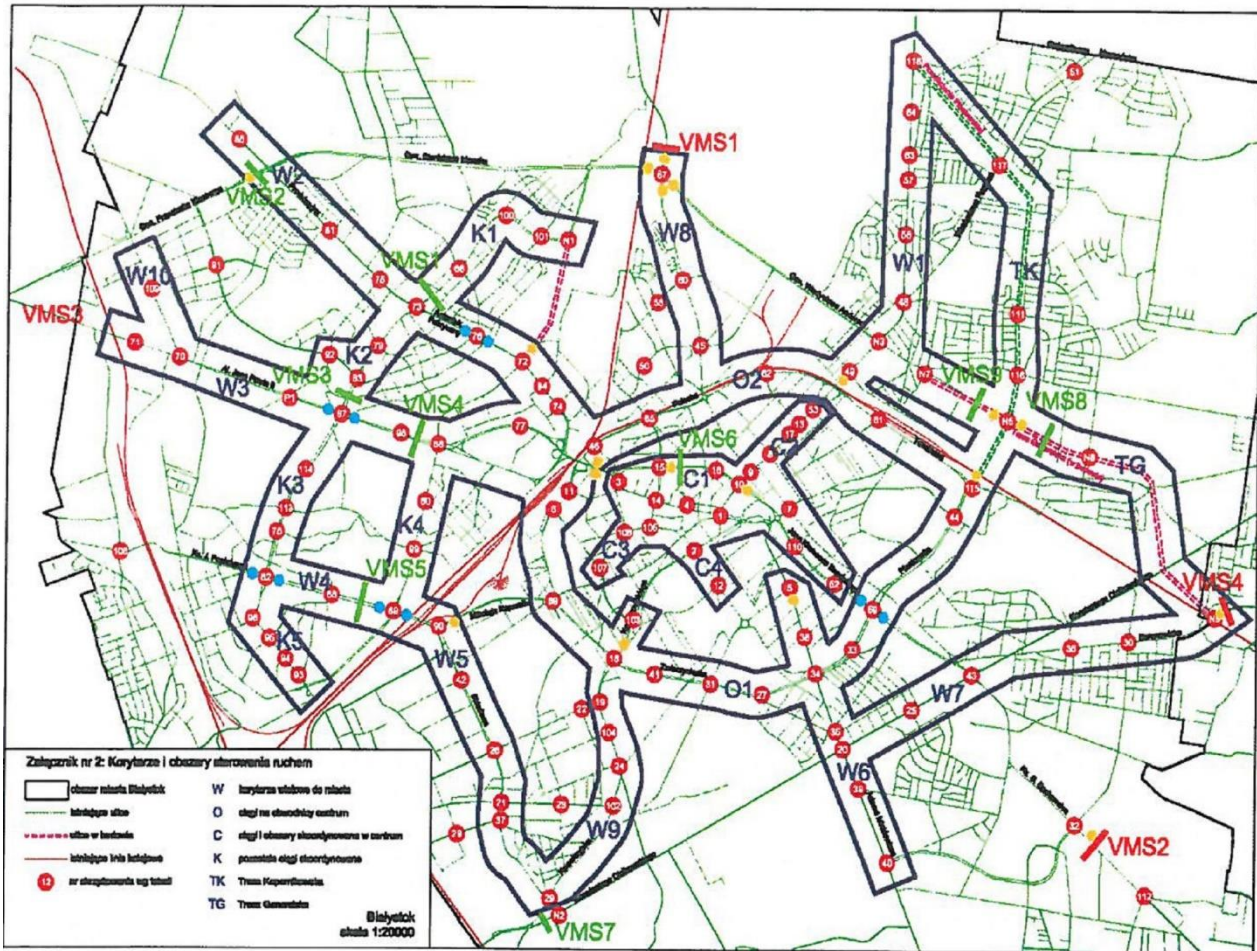
The project will be implemented until 31 May 2015.

Status of investment project implementation

In accordance with the execution schedule, the contractor prepared a concept of individual sub-systems. At present, works are in progress on documentation for individual elements of the system. Some traffic organisation and control designs were drawn up, favourably reviewed by the police and approved by Road

Administrator. The Contractor also commenced replacement of old traffic signal controllers. They will constitute a key element of the traffic control system in the field making it possible to improve the efficiency of traffic lights operation. At the moment expenditure incurred by the city on this purpose amounted in 2013 to PLN 132,717 gross, which constitutes 0.07% of the expenditure earmarked for infrastructure investments in 2013. The project is implemented within the area of the city of Białystok and on national, voivodeship, county and municipal roads.

➤ **Map showing ITS elements within the implemented project**



Załącznik nr 2 Korytarze i obszary sterowania ruchem	Appendix no. 2 Traffic control corridors and areas
Obszar miasta Białystok	The area of the city of Białystok
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5.22 Częstochowa

The following ITS projects were implemented in the city of Częstochowa:

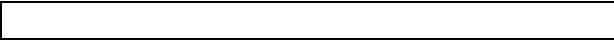
- 1) Construction of accommodative traffic lights at the crossroads of ul. Kopernika with ul. Pułaskiego in Częstochowa, launching a coordinated control system on subsequent intersections of ul. Pułaskiego with ul. 7 Kamienic, ul. Kopernika and ul. Sobieskiego, installation of a meteorological station, installation of 2 variable message signs and stations for continuous measurement of traffic. The task is worth – PLN 988.000,00.
- 2) Construction of accommodative traffic lights at the crossroads of Armii Krajowej with ul. Worcella in Częstochowa using unconditional priority for the tram. The value of the project - PLN 491.885,90.
- 3) Installation of a meteorological station, installation of 2 variable message signs and stations for continuous measurement of traffic on the overpass of Al. Niepodległości in Częstochowa. The task is worth – PLN 244.000,00.
- 4) Construction of accommodative traffic lights at the following crossroads: Al. Niepodległości and ul. Jagiellońska, ul. Jagiellońska and ul. Orkana, ul. Jesienna with ul. 11 Listopada, ul. Jesienna with ul. Bohaterów Katynia and at the exit from the tram terminus on ul. Limanowskiego. The task is worth PLN 2,700,000.00.

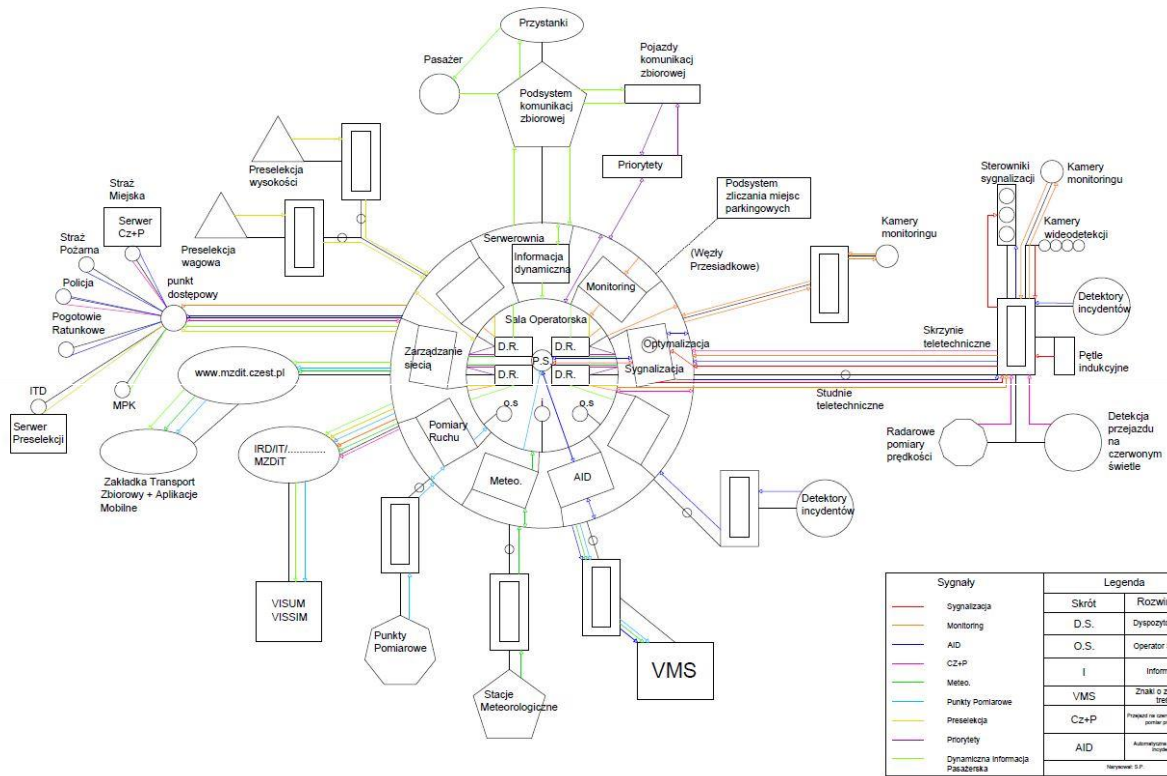
- 5) Construction of accommodative traffic lights at the crossroads of ul. Jagiellońska and ul. Sabinowska in Częstochowa. The value of the project - PLN 450,000.00.

In the new financial perspective 2014-2020, the Municipality of the City of Częstochowa is planning the implementation of an investment project relating to the construction of traffic management system in the area of operation of Intelligent Transport Systems within the area of the city of Częstochowa.

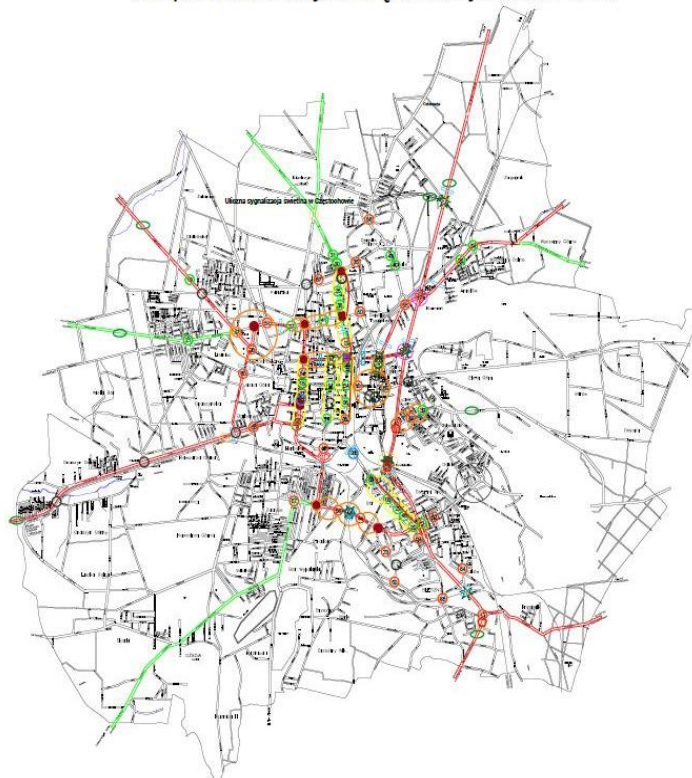
System diagram and location are shown at the tables below.

Height preselection
Weight preselection
Access point
City Guard
Preselection server
Fire Service
The Police
Emergency service
Tab Collective Transport + Mobile Applications
Collective transport sub-system
Passenger
Server room
Dynamic information
Operator Hall
Optimisation
Signalling
Network management
Traffic measurements
Measurement points
Weather stations
Collective transport priorities
Priorities
Parking spaces counting sub-system
Interchanges
Incident detectors
Telecommunications manholes
Telecommunications boxes
Radar speed measurements
Traffic signal controllers
Monitoring cameras
Video selection cameras
Induction loops
Detection of passing through a red signal
Localization map of ITS system devices
Signals
Dynamic Passenger Information
Key
Abbreviation
Meaning
Dispatcher
System Operator
IT specialist
Variable message signs
Passing through a red signal and speed measurement
Automatic incident identification





Mapa lokalizacji urządzeń systemu "ITS"



Legenda

(Red circle)	Sygnalizacja	(Green circle)	Monitoring	(Blue circle)	AID	(Orange circle)	Cz+P	(Black circle)	Meteo.	(Cyan circle)	Punkty Pomiarowe	(Yellow circle)	Preselekcja	(Purple circle)	Priorytety	(Light green circle)	Dynamiczna informacja Pasażerska
(Red line)	Sygnalizacja	(Orange line)	Monitoring	(Black line)	AID	(Green line)	Cz+P	(Blue line)	Meteo.	(Cyan line)	Punkty Pomiarowe	(Yellow line)	Preselekcja	(Purple line)	Priorytety	(Light green line)	Dynamiczna informacja Pasażerska

5.23 Opole

To date no uniform ITS project has been implemented within the area of the city of Opole. However, such a system may be built in the future through the fulfilment of investment tasks consisting in the reconstruction of road infrastructure and while the bus fleet is purchased (traffic lights provided with state-of-the-art controllers, new buses equipped with GPS transmitters).

In accordance with the provisions of the Development Strategy of Opole for the years 2012-2020, the City of Opole is planning to implement an electronic traffic control system as well a system of integrated passenger information. These investment projects will be contingent on the financial capabilities of the budget of the City of Opole but, above all, on the possibility to obtain external aid resources for this purpose.

The Municipality of the City of Opole – the Municipal Road Authority in Opole implemented investment projects consisting in the construction of intelligent traffic lights. The investments are related to areas I and IV 3. b), c) of Directive 2010/40/EU. The following fall within the scope of the investment projects implemented:

- construction of accommodative "green wave" traffic lights in the following streets: ul. Ozimska (voivodeship road 423) on the section from ul. Horoszkiewicza to ul. Głogowska and on ul. Niemodlińska (voivodeship road 414) on the section from ul. Wrocławska to ul. Hellera;
- the acyclic traffic signal control model which adjusts control parameters to the existing traffic in isolated traffic lights at the crossroads of: ul. Plebiscytowa (voivodeship road 435) with ul. Ozimska, (voivodeship road 423), northern bypass of the city of Opole (national road 45, 46, 94) with ul. Luboszycka (county road 1703), northern bypass of the city of Opole (national road 45, 46, 94) with ul. Oleska (national road 45).

6 Research and development activities

Over the last two years, the National Centre for Research and Development has expanded its activity and stimulated growth of the Polish research and development sector through the launch of new programmes. The budget of the National Centre for Research and Development has been increasing steadily over this period together with the taking up of new activities and developing new programmes of economic importance which support R&D activity in Poland. The implementation process of intelligent transport systems will be offered support in programmes continued by the Centre as well as in new initiatives.

In 2012, the National Centre for Research and Development commenced implementation of the Applied Research Programme (PBS), within which subsequent editions of competitions, i.e. PBS I, PBS II and PBS III, have been announced. The Applied Research Programme is a horizontal programme aimed at supporting the science sector and the industry sector within the scope of applied research in various fields of science (programme path A) and industrial sectors (programme path B), introduced on the basis of Article 30 section 1 point 1 of the Act of 30

April 2010 on the National Centre for Research and Development¹¹. The program covers the following areas:

1. Chemical Sciences;
2. Geology, Mining and Construction;
3. IT Technologies, Electronics, Automation and Robotics;
4. Power and Electrical Engineering;
5. Materials and material technologies;
6. Mechanics and Transport;
7. Medical and Pharmaceutical Sciences;
8. Biological, Agricultural and Veterinary Sciences, Forestry;
9. Interdisciplinary areas.

The subject matter and application of intelligent transport systems (ITS) may be directly related to the following: information technology, electronics, automation and robotics, mechanics and transport and the interdisciplinary area.

As many as 1604 applications for the total amount of PLN 4,819,966,903.00 have been submitted as part of the Applied Research Programme in the areas directly connected with ITS (power and electrical engineering, mechanics and transport, interdisciplinary areas), and 113 projects among them obtained financing, which in total amounted to PLN 358,543,985.00.

Pursuant to Article 30 point 1 of the Act of 30 April 2010 on The National Centre for Research and Development (Dz. U. No. 96, item 616, as amended), the Centre initiates new programmes which significantly contribute to improved innovativeness of Polish economy and encourage entrepreneurs to invest in research and development activity. Given the above, in resolution no. 1/2013 dated 30 January 2013, the Council of

¹¹ The issue of programmes initiated by the Centre was defined in Article 30 section 1 point 2 or 3 of the Act.

the National Centre for Research and Development approved the launch of a new

pilot undertaking on support for scientific research and development on demonstration scale entitled DEMONSTRATOR+. The main objective of this undertaking is to strengthen the transfer of research results into the economy by supporting projects to develop new technology or product comprising tests of a developed solution on demonstration scale. This support is mainly targeted at entrepreneurs, scientific consortia and research organisations. Two projects of key importance for the development of information and communication technologies have been implemented as part of the programme. These are:

1. "Integrated System Supporting Management of Information about Rail Passenger Traffic", DEMONSTRATOR BIO-INFO, project worth PLN 6,231,560.00.
2. "Intelligent system of supervision and safety or real-time air operations" DEMONSTRATOR TECH, project worth PLN 17,497,955.00.

The pilot undertaking "Support for scientific research and development on demonstration scale" is implemented as part of two systemic projects within priority axis 1 Research and development of new technologies, within Measure 1.5 Systemic projects of the National Centre for Research and Development under the Operational Programme Innovative Economy. Two systemic projects are implemented under the names Support for scientific research and development on demonstration scale DEMONSTRATOR + in the TECH area and Support for scientific research and development on demonstration scale DEMONSTRATOR + in the INFO-BIO area. In accordance with the National Research Programme, the following interdisciplinary areas of scientific research are supported within the TECH area:

- ✓ new technologies in the field of energy,
- ✓ modern materials technologies.

As part of the INFO-BIO systemic project and in accordance with the National Research Programme, support is also allocated to interdisciplinary research areas, such as among others advanced information and telecommunication technologies.

Projects implemented under the above programmes and directly related to ITS include:

1. Intelligent System of Monitoring and Penalising Overweight Vehicles;
2. Multi-Modal Traffic Monitoring System;
3. System of radio monitoring and activating data from photoradar devices.
4. Working out the methodology for the system of automatic notification of road accidents "eCall";
5. System of automatic data collection about motor vehicles using analysis of stereoscopic images;
6. System that facilitates independent travel of the blind and partially-sighted and ensures access to urban infrastructure, which integrates wireless data transmission technologies as well as global and local navigation systems
7. System to analyse the impact of road traffic parameters on environmental pollution using the traffic model and emission tests under real conditions;
8. Integrated System Supporting Management of Information about Rail Passenger Traffic;
9. Working out an IT system to support the process of loading consignments in railway transport;
10. Railway Euro-Asian Land Bridge Data Base System (Information Support of CIM/SMGS)
11. Intelligent system of supervision and safety or real-time air operations
12. System supporting the ship entry into the harbour and mooring as an element of intelligent transport system in the Port of Gdynia;
13. System supporting the ship entry into the harbour and mooring as an element of intelligent transport system in the Port of Gdańsk;
14. Mobile inland navigation;
15. Form of construction of River Information System (RIS).

7 Appendices:

- Table 1 - List of projects at the national level;
- Table 2 - List of projects at the voivodeship level;
- Table 3 - List of projects in urban areas;
- Table 4 - List of R&D projects.