

**MUNICIPAL GEOGRAPHIC  
INFORMATION  
REQUIREMENTS**

**MUNICIPALITY OF  
BLAGOEVGRAD, BULGARIA**

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# **MUNICIPAL GEOGRAPHIC INFORMATION REQUIREMENTS**

## **MUNICIPALITY OF BLAGOEVGRAD, BULGARIA**

### **INTRODUCTION**

Modern GIS provide opportunities for improving service delivery and making it more cost effective. This report discussed the tasks of the municipal technical service units that have to be solved through GIS software. It describes the requirements that the end product should meet.

Used materials include ones produced by the Central Laboratory of Space Geodesy and GIS, the System of Administrative and Technical Service Delivery (ATSD), the Report and Project Design for “Information System for Cadastre and Land Registration BG - 9206-01/113,” as well as regulatory documents issued by the Ministry of Agriculture, Ministry of Regional Development and Construction, MoF, Ministry of Justice.

### **MAIN STAGES**

The main stages in the process of development of a geographic information system for the municipality are the following:

- Determining the main tasks and requirements for GIS;
- Identifying basic data sources and linkages with other systems;
- Developing the general architecture of the system;
- Determining the data model;
- Determining the main operations;
- Selection of software and hardware; and
- Implementation of the system.

### **SPECIFICATION OF REQUIREMENTS FOR THE INFORMATION SYSTEM FOR MUNICIPAL TECHNICAL SERVICES (ISMTS)**

ISMTS should be developed to comply with:

- ! Existing legislation.
- ! Basic trends of approximating Bulgarian legislation with a view to integrating the country in the European structures.
- ! Necessity to secure optimum conditions for transition from the legal basis existing now towards a new legal basis—the financial

conditions that will prevail in the country in the middle and long-term perspective.

ISMTS is a typical software, whose textual data base is geo-referenced. The images or characteristics of all objects have a spatial location. They can be selected both from the textual data base and from the graphical data base. ISMTS is a geographic information system. It has the following features:

- ! The points in the system have been determined through well known methods in an accurately determined projection, standard for the country. The system can register the co-ordinates of the points, survey methods and their accuracy.
- ! All lines and closed polygons in the main layers of the system are images of real physical objects.
- ! The system has a set of functions for input and editing the measurement results of different survey methods.
- ! The system generates set out data (text and plots).
- ! The system has a specific set of symbols, font faces, standards for formatting plots.

In ISMTS each area object on the territory of the municipality has its definitely determined owner. ISMTS can operate autonomously and execute a number of operations, but its main usage is to produce reliable data on property borders, owners, legal grounds for ownership and burdens on property and it is realized through exchange of data with the Cadastre information system and the land registration information system.

## **DATA**

The following data is subject to ISMTS.

### ***Basic Data***

#### **Data on Control Network**

The cadastre information system contains and provides official data of: numbers, classes, co-ordinates in the 1970 system and altitudes within the Baltic elevation system for the points from the state survey control



network, the local survey control networks and the operational survey control, all of which are used or generated additionally when the cadastre of territory belonging to the settlement was developed.

**Data on Land Property**

- Identifiers
- Co-ordinates of boundary points
- Land use
- Mode of land use
- Administrative address of property
- Owners
- Ownership documents (title deeds)
- Zone/Category/Grade

**Data on Buildings**

- Identifier of building
- Location (survey co-ordinates of determining points of the horizontal projection of developed area)
- Building permit and occupation permit

**Data on Objects Within a Building, Which are Subject to Separate Title Holding**

Whenever there are parts within the building which are subject to separate title holding, the following data should be entered in ISMTS for each one of them:

- Identifiers of the properties in the building, which are independent objects of ownership (properties in a building)
- Kind of the property
- Administrative address of the property
- Owners
- Documents for ownership (title deeds)

**Data on Restrictions**

- Identifier of property
- Type of limitation
- Document with which limitation was established

**Data on Servitude**

- Identifier of dominant tenement
- Identifier of servient tenement
- Document (deed) by which easement was established

## **Additional Data**

### **Data on Buildings**

- (Type of) Construction
- Functional designation/functionality
- Year of constructing/erecting
- Number of stores/floors
- Number of underground levels

### **Data on the Digital Regulation Plan of the Settlement or Another Urbanized Location**

The regulation plans contain projections for future property boundaries. Upon implementation of the regulation plan, the boundaries of the parcels become property boundaries and being such, they become an object of the Cadastre plan. For this reason ISMTS should have a digital mapping of:

- Street regulation lines;
- Yard regulation lines;
- Numbers of quarters and parcels; and
- Co-ordinates of axis points.

### **Digital Data on the Objects of the Technical Infrastructure**

The technical infrastructure (TI) is of great importance for ISMTS due to the following reasons:

- ! The objects from the TI are immovables, mainly municipal and state property.
- ! The elements of the underground utilities—pipelines and equipment—are least represented in the Cadastre.
- ! From the point of view of the Cadastre and Land registration the presence of objects of underground utilities within the boundaries of a given property engenders restrictions in the right of use.
- ! The underground utilities are expensive facilities and their protection is of great economic effect and of great importance for environment and safety.

## TEXTUAL DATA IN ISMTS

The following data are needed for the proper operation of ISMTS.

### ***Data About the Owner***

! Natural persons (including sole-proprietorships)

- CIN/BULSTAT
- Name
- Address

! Legal persons

- BULSTAT
- Name
- Address
- Court registration

### ***Data About the Objects in ISMTS***

! Land properties

- Identifier
- Address
- Permanent use of the property (according to a nomenclature)
- Mode of permanent use of the property (by classifier)
- Zone/category of soil/grade
- Former (previous) number of the property
- Restrictions
- Servitude

! For properties within a building

- Identifier
- Address
- Type of property (by nomenclature)
- Type of ownership (by code table)
- Restrictions

! For buildings (as structures)

- Identifier of building

- Construction (by nomenclature)
- Function (by nomenclature)
- Year of constructing
- Building permit
- Occupation permit
- Number of floors
- Number of underground levels

**!** Data about the deed in ISIOS

- Issuing authority
- Number in entry register
- Register
- Number of volume
- Number of document
- Number of file
- Date of issuing
- Effective date
- Reasons for the deed
- Official

## **FUNCTIONS OF THE SYSTEM**

The functions of the system are grouped in the following way:

- Initial loading of code tables and classifiers
- Initial entry of geographical data
- Maintenance and updating of system data
- Customer servicing
- Servicing external users
- Archiving
- Recovery

## **TECHNICAL ACTIVITIES CONNECTED WITH SERVICE DELIVERY TO ORGANIZATIONS AND INDIVIDUALS AND WITH DATA MARKET**

Here is a list of services most frequently delivered with ISMTS.

### ***Lists and Balances***

- ! Lists No. 1 to 7 of Instructions for compiling registers of the territories and buildings according to the Unified Cadastre of RB upon specific request.
- ! Balances No. 1 to 28 of Instructions for compiling registers of the territories and buildings according to the Unified Cadastre of RB upon specific request.
- ! For properties or other real rights held by one person by selecting one of the fields: name of the person, PIN/BULSTAT, address of the person.
- ! For a property by selecting one of the fields: property identifier, address of the property.
- ! For restrictions imposed on the property by selecting the fields: property number, address, name of owner, PIN/BULSTAT.
- ! For servitude imposed on the property by selecting one of the fields: property number, address of the property, name of the owner, PIN/BULSTAT.
- ! For the market price of a group of properties by selecting SQL conditions in the fields: property number, address, name of owner, PIN/BULSTAT, construction, year of construction, type of property, rights, zone/category, restrictions, servitude.
- ! For the kind of transaction with a property by selecting one of the fields: kind of transaction, period of time.
- ! For a property and kind of transaction with it by selecting the fields: property number, address, name of a person.
- ! For prices by selecting SQL conditions in the fields: UCS, administrative address, location, construction, year of construction, type, zone/category, restrictions.
- ! For a property and its former owners by selecting one of the fields: property number, address, period of time.
- ! For former ownership of a person by selecting one of the fields: name of the owner, PIN/BULSTAT, period of time.



- ! For properties by type of ownership by selecting SQL conditions in the fields: cadastral area, street, location name.
- ! Lists of objects referred to in ISTMS under SQL conditions—for land properties, for building properties, for persons, for rights and restrictions, for defined districts and objects, etc.
- ! For concession contracts expiring after a period of time.
- ! Balances according to attributes described in ISTMS on the basis of SQL conditions for selecting the objects.

### **Map Extracts (Graphic Information)**

Possible services may be summarized as follows:

- ! Sketches of land properties containing or not the objects within and textual description of properties, owners, deeds and other data according to legislation.
- ! Cadastral plans with scale and contents as required by legislation.
- ! Thematic maps of properties, of a district or of objects which have been selected on the basis of SQL conditions with plan contents, determined on the basis of SQL conditions.
- ! Sketches of project decisions connected with changes of property boundaries.

## **LIST OF FUNCTIONS OF THE SYSTEM**

The functions described below are operational tools of ISTMS in a GIS environment. The list consists of functions that proceed from the mode of creation and application of the system as described above.

### **Graphic Functions**

- Selecting objects/defining areas
- Parallel processing (editing) of all logically related graphical layers
- Registering changes in a boundary
- Reproducing the results of a change in the graphical and attribute database

- Data recovery of a selected area by a given past moment in time
- Viewing the selected array of map symbols and lettering in a selected area
- Shading /cross hatching and coloring of a selected array of objects
- Editing the contents and map layout formatting, including the legend of the plan
- Input and editing of user's identifier of a graphical object
- Automatic calculation of the field "area"
- Automatic calculation of the field "line length"
- Viewing of errors in closed polygons
- Input and editing of lines ("Legalized boundaries")
- Generating plots by conditions, set on tables
- Input data in fields of attribute DB by assigning attributes to graphical objects
- Input Cadastral identifier
- Initial input of graphical and textual data from digital mapping in FERMA and CAD format
- Edge matching (documenting adjacency zones and identifying overlaps and gaps where data sources are different for adjacent territories)
- Checking of graphical data
- Viewing and documenting data on a property
- Creating cross-sections of two layers
- Modifying graphical DB using the keyboard
- Producing graphical and textual information about changes in a property
- Registration of commands in a log file
- Converting the lettering from FERMA and CAD files format into WINDOWS and vice versa

### ***Functions of the Graphical Environment***

#### **Of General Character**

- Selecting the cursor mode
- Selecting type of point
- Selecting type of line
- Selecting font
- Selecting style
- Selecting color
- Selecting accuracy and dimension



- Selecting of zero bearing and a direction of increase of the angles (positive rotation)
- Reading (input) graphical data from a file in CAD format
- Writing (output) of graphical data into a file in CAD format

### **About Points**

#### **! Input modes of points**

- By rectangular co-ordinates
- By local rectangular co-ordinates with selected origin and positive directions of the X and Y axis
- By polar co-ordinates with selecting origin, zero bearing and a direction of increase of the angles
- By selecting by a cursor
- By loading from a file (number, X, Y or X, Y)

#### **! Defining points by intersections**

- Straight intersection
- Straight intersection with adjacent angles
- Straight intersection with bearings
- Linear intersection

- Resection
- Continuation of line sections
  
- ! Selecting a point array by different criteria
  - Condition
  - Circle (outside, inside, on the circumference line)
  - Rectangular (outside, inside, on the rectangular line)
  - Polygon (outside, inside, on the polygon line)
  - Points of lines
  - Points from closed polygons
  
- ! Assigning of attributes to a selected point array
  
- ! Viewing the attributes of a selected point array (inscription of a number, of altitude, circle with a specified diameter, proportionate to the accuracy, color, depending on the accuracy, class, number and altitude, etc.)
  
- ! Automatic temporary renumbering of a point array with a set initial number and increment
  
- ! Generation of a text file from a selected point array with assigned attributes of the points
  
- ! Editing of attributes of points, including numbers
  
- ! Creation of CAD file for a selected point array
  
- About Lines**
  
- ! Division of a line at an optional point
  
- ! Viewing of all points, which define a polygon
  
- ! Drawing a line as an arc of a circular curve at different conditions set for the arc
  
- ! Draft-plotting by selecting the type of line, kind of object, layer by combining the following modes
  - Selecting on the display
  - Input of the number
  - From file (#, X, Y or X, Y)



- Generating linear elements
- ! Generating a line with an identifier, beginning from a pseudo-knot, passing through a number of vertices and knot-points and ending in a pseudo-knot
- ! Generating a line with identifier, beginning from a pseudo-knot and ending with a pseudo-knot by selecting linear elements
- ! Selecting an array of lines by different criteria
  - Condition
  - Circle (outside/inside/intersection)
  - Rectangular (outside/inside/intersection)
  - Polygon (outside/inside/intersection)
  - Lines of closed polygons
- ! Numbering of all points from a given array of lines
- ! Generating a file of a selected array of lines with selected attributes of the lines
- ! Entering a line at various conditions
  - Parallel to a given line, at certain distance from existing line
  - At a known point from existing line, at a certain angle from it and length of the new line
  - As a tangent, with a set point outside the circumference and existing arc from a circumference
  - Continuation of a line to intersection with a line
- ! Removing a pseudo-knot from a line (rectification)
- ! Defining
  - The length of a line
  - Length of a section
  - Distance from a point to a section
  - Shortest and longest distance of vertices from one line to the sections of another
  - Angle between two sections
- ! Transferring a line from one layer to another

- ! Viewing of attributes of the selected array of lines
- ! Lettering of lines with selected attributes
- ! Editing of attributes of lines
- ! Generating of a CAD file for the selected array of lines

### **For Closed Polygons**

- ! Selecting closed polygons
  - By condition
  - By identifier
  - By selecting a line from the attribute table
  - By selecting an internal point on the display
  - By selecting an area
    - All internal
    - All external
    - All intersecting
- ! Entering a local numbering of the points from the borders of selected closed polygons
- ! Generating of a file with numbers and co-ordinates of points from selected closed polygons
- ! Generating of a file with selected attributes for selected closed polygons
- ! Viewing attributes of selected closed polygons
- ! Defining
  - Area of a closed polygon
  - Perimeter of a closed polygon
- ! Division of closed polygons by a project line, with appropriation of attributes
  - In case of set area and direction
  - In case of set ratio between areas and direction
  - In case of set area or a ratio between areas and point, through which the division line should pass



- ! Merging, cross-section, attaching to closed polygons with appropriation of attributes

- ! Editing of attributes of closed polygons
- ! Generating a CAD file for a selected array of closed polygons

### **About Lettering**

- Selecting standard (scale)
- Positioning of lettering
- Fields of the attribute database for lettering
- Size of the lettering
- Form of the lettering
- Direction of the base of the first symbol of the lettering
- Link of the beginning of the lettering with the basic points of the labels of the objects
- Color of the lettering
- Moving and rotation of the lettering
- Scale of lettering
- Global change of standard and functions for lettering

### **About Map Symbols**

- Selecting standard (scale)
- Global change of standard and direction of the base of the symbols
- Plotting of map symbols in closed polygons and over lines, set by conditions, interpolated over fields from the attribute base
- Replacing linear map symbols with thick lines and vice versa

## **FUNCTIONS OF THE ATTRIBUTE DATABASE**

- Checking integrity of data
- Recovery of modified attribute data
- Checking data needed in tables of codes
- Viewing the accessible fields and layers depending on the rights of the user
- Generating lists
- Generating balances
- Formatting the output for lists, balances and plots
- Replenishing with lists, balances and plot layout libraries (sketches, cadastral plans, thematic plans)
- Extracting information about a given property
- Modifying attribute data by keyboard, including data input from forms and text files



- Semantic control over the input of attribute data
  - For completeness of the data input
  - For the range of values of elements

### ***Archiving and Recovery of Data***

- Archiving on traditional carrier
- Archiving on magnetic carrier
- Recovery after emergency interruption

## **CONCLUSION**

The application of GIS in the municipality will undoubtedly give positive results. The digital mapping of ISMTS will be established initially and put into operation on a day-to-day basis. Later on, a great number of new clients will start requesting the data, kept by the municipality. Development of a GIS for the technical services rendered by the municipality is the first and foremost task that has to be solved.