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GEOLOGICAL AND GEOTECHNICAL INFORMATION SYSTEM FOR ISTANBUL

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In this paper, Istanbul Geological and Geotechnical Information System (ZeBiS) is introduced. In this system, data sets consist of bore hole data, and base maps are three-dimensional topographical maps produced by digital photogrammetry at a scale of 1:5 000. Software components of the system are AutoCAD Map, Access, RockWorks and an interface program written with AutoLISP and running under AutoCAD Map. Functions performed by the system are finding a destination (for example a building land) on a map via site and street name queries, displaying bore hole(s) the nearest to or in a certain distance from destination, displaying data of a selected bore hole and preparing an ASCII file in the file format of RockWorks99 by the data of selected bore holes.

1. INTRODUCTION

When considering the bore hole studies which have been done all over Istanbul up to date, lack of any standart can immediately be noticed. According to the preferences of the agencies and the companies, graphical and text data of the bore holes have been portrayed on the papers in several ways, bore hole locations have been represented on a variety of maps at different scales and contents, and they have been stored in conventional methods. Among the used maps it can also be encountered the ones reproduced with a photocopier at smaller but not exact scales and quite poor about the objects represented on. Furthermore, many bore hole data have been lost. The projections of this current situation on the real life are that available bore holes are not sufficiently used, bore holes which have been lost or not available because the archives are scattered and inadequate are repeatedly done, and, in consequence, time, money and energy are wasted.

The current situation mentioned above revealed the requirements of such a system in this field and led the development of ZeBiS.

In this context, ZeBiS can be described as a system in which

- bore hole data in a certain format can be stored and represented on three dimensional topographical maps produced with digital photogrammetry at a scale of 1:5 000,
- any place required on a map (for example a building land) can be zoomed in with SQL queries in accordance with site and street names,
- a bore hole which is the nearest or bore hole(s) which is/are in a distance from the selected place can be showed ,
- information about the the selected bore hole can be showed and
- an ASCII file in the file format of RockWorks99 can be prepared with the information of the selected bore holes.

Software components of ZeBis are AutoCAD Map, Access, RockWorks99 and an interface program written with AutoLISP and running under AutoCAD Map. Specific functions of the system are performed by the interface program whose pull-down menu includes the commands of name corrections, bore hole data inputs, source drawing attachments, data source (i.e. database) attachments, location (i.e. site and street) queries, bore hole (i.e. nearest and in given distance) queries, bore hole information outputs, and RockWorks99 file preparations.

Next section examines ZeBiS with its two aspects: implementation and utilization of the system.

2. IMPLEMENTATION OF THE SYSTEM

Implementation of the system is carried out in the following steps as shown in the flow diagram in Figure 1:

- correcting the site and the street names which have wrong characters in the used maps,
- inputing bore hole data into the system,
- storing some bore hole data written in ASCII files in the bore hole database table,
- linking bore hole data in the database to the graphical objects representing bore holes in the maps,
- storing the site and street names in the address database table and
- linking the data in the address database to site and street names in the maps.

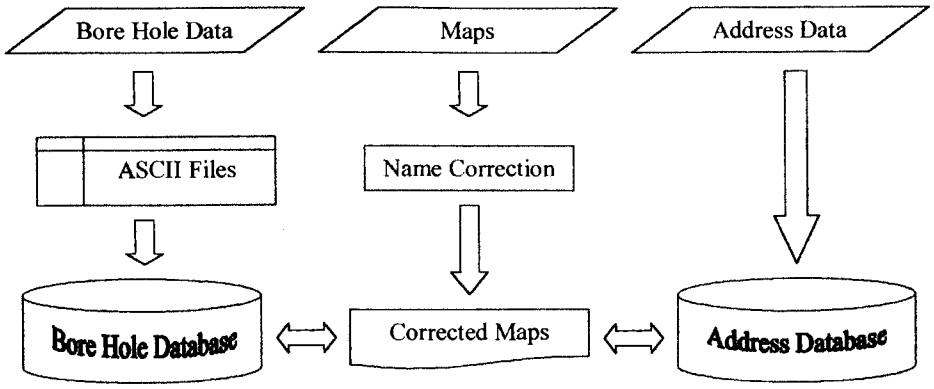


Figure 1: Implementation of the system.

2.1 *Correcting Site and Street Names*

The first command (i.e. *Correct Name*) of the interface program was created for correcting graphical (text) objects of site and street names in the maps which have wrong characters. Such characters occur because original maps are produced in Microstation format and insertted into the system in AutoCAD drawing interchange format.

Wrong characters and their substitutes are defined beforehand. Each character of each name in a map is examined individually, and wrong characters are replaced with their substitutes. For example the second and the fourth characters of the street name *Y[ld[z Caddesi* are wrong and their substitute is the character *i*. In this case, corrected name will be *Yildiz Caddesi*. This process is performed automatically.

2.2 *Inputting Bore Hole Data into the System*

The second command (i.e. *Get Bore Hole Data*) of the interface program is created for inputing bore hole data into the system. Here bore hole data means identification, location and geological formations of a bore hole.

The first characters of the bore hole identifications must be the same (for example *Z* as it is in this project). Bore hole locations and elevations are specified by entering coordinates (x,y and z) if known, otherwise by clicking on a point on three-dimensional maps on the screen. In the second case, elevation (z) is computed as a weighted mean with at least two, at most four points of objects on the surface. However these points must exactly be on the surface (i.e. neither below nor under the surface). These points are searched in four neighbour regions around the bore hole. These regions are defined as squares with fifty meters sides which are parallel to x and y axes. The bore hole is on the common corner of these four squares. Each point used in weighted mean calculation is the nearest one in each region (i.e. sequare) to the bore hole. Weights of these points are inverses of distances to the bore hole. If there are not at least two surface points around the bore hole, elevation of the bore hole is not calculated.

Information of geological formations consist of names and depths of geological formations. Here depth of a geological formation means a distance between the surface and the top of the geological formation. Normally value of the first depth input must be zero. Value of the last depth input must be total depth of the bore hole (i.e. a distance between the surface and the bottom of the bore hole). Although depths are manually entered, formations are selected from a list containing all formations in Istanbul. Formation list is constant, in other words it is created at the implementation stage and must not be modified.

Bore hole data are written in two or three ASCII files depending on the situation. In the first one, bore hole IDs and locations are written. The second one contains bore hole IDs, locations, elevations and formation depths. The third one consists of bore hole IDs, symbol number, locations, elevations and formation elevations. Symbol number is an integer number corresponding to the "index number" for the symbol by which bore holes are represented and it is the same for all bore holes. Bore hole data are written in the third file types only in the case of entering or computing the elevation of the bore hole because formation elevations are computed in accordance with the bore hole elevations. The first file types are created in order to import minimum number of data into the bore hole database tables, and names of these files are typed by the user during the data input. Name of the second and the third file types are *sondaj.txt* and *sondajrw.txt* respectively. For every bore hole inputing the system, the data mentioned above are added to these files individually and automatically. Although the second file types are created for only storing

the bore hole data, the third file types are created for obtaining or querying the bore hole information when the system is running.

2.3 *Completing the System Implementation Stage*

Data in the first type of ASCII file mentioned above are added to the bore hole database tables created in Access for every district and linked to the graphical objects (i.e. symbols and texts) representing bore holes. Finally, site and street names are also stored in the address database tables created in Access for every district and linked to the graphical objects (i.e. texts) representing them. Linking process is realized in the Data View window of the AutoCAD Map. This window can also be used for storing the data to the database tables mentioned above.

3. UTILIZATION FROM THE SYSTEM

The system can be utilized in two ways: on a map opened directly as a project and on map(s) and database(s) attached to a project.

In the first way, the system can be utilized via the sixth and the seventh commands (*Output The Bore Hole Information* and *Prepare a RockWorks99 File*) in the menu of the interface program. The command *Output The Bore Hole Information* requires from the user to select a bore hole. After the selection, in accordance with its location information, it is searched in the file called *sondajrw.txt*, and if found, all about it are shown to the user in a window. Otherwise, a message such as "*It is not found any information about the selected bore hole.*" is displayed. Because, nothing about a bore hole is written to the file *sondajrw.txt*, if its elevation is not entered or computed as mentioned above. The command *Prepare a RockWorks99 File* requires from the user to select at least two bore holes and to enter a file name. The selected bore holes are also searched in the file *sondajrw.txt* and if found, their information is written in the selection order in the ASCII file created with the entered name. In this process, the formation elevations are listed in order, with the top the bore hole listed to the left in the file, proceeding to the bottom of the hole to the right. This is the most important requirement. Moreover a row of column headings is written at the top of this file. Suppose the selected bore holes are ZD-S101 and ZD-S102, and their information is as shown in Table 1:

Table 1: Sample bore holes

First Bore Hole		**Second Bore Hole**	
Bore Hole ID	: Zd-s1	Bore Hole ID	: Zd-s2
Easting (y)	: 97191.40	Easting (y)	: 97139.10
Northing (x)	: 43185.70	Northing (x)	: 43101.00
Surface (z)	: 13.42	Surface (z)	: 9.85
Clay	: 13.42	Clay	: 9.85
Sand	: 7.92	Silt	: 5.85
Silt	: 6.17	Sand	: 1.35
Bottom of The Bore Hole: 1.10		Shale	: 0.60
		Bottom of The Bore Hole	: -5.15

In this case, the file prepared for RockWorks99 is as shown in Table 2:

Table 2: Appearance of the sample RockWorks99 file

ID	*Sym.*	*Easting*	*Northing*	*Surf.*	*Clay*	*Silt*	*Sand*	*Silt*	*Sand*	*Shale*	*Bottom*	*Bottom*	*Lowest*
Zd-s1	1	97191.40	43185.70	13.42	13.42		7.92	6.17			1.10		-5.15
Zd-s2	1	97139.10	43101.00	9.85	9.85	5.85			1.35	0.60		-5.15	-5.15

As shown above, more than one columns with the same headings can occur due to the requirement of listing from left to right in order of decreasing elevation.

Such a file, which is saved with *.atd* extension, is proper to the stratigraphy data format of RockWorks99, and thus it can be opened and used to illustrate the data in logs and sections.

In the second way, the system can be utilized on map(s) and database(s) attached to a project via the fifth and its sub-commands (*Query... / Location... / With Site Name, Query... / Location... / With Street Name; Query... / Bore Hole... / Nearest, Query... / Bore Hole... / In a Given Distance*) in addition to the sixth and the seventh commands of the interface program.

Map(s) and database(s) are attached to a project via the fourth (*Attach Map(s)...*) and the fifth (*Attach Database*) commands respectively. There are two sub-menus depending on *Attach Map(s)...* command. The first one including district names appears when selecting *Attach Map(s)...* command, and the second one including quarter names appears when selecting a district in the first sub-menu. When the user selects a quarter, the map(s) covering it are attached to the project and comes to the graphic window zooming to the drawing extents. When selecting *Attach Database* command, a window displays all bore hole and address databases in a list form. With this command, only one database can be attached in every selection.

Location (With Site Name and With Street Name) and bore hole (Nearest and In a Given Distance) queries are executed as SQL queries on the address and the bore hole databases. With the location queries, it is tried to reach an address (for example a building land) on a map. With the bore hole queries, the nearest bore hole or the bore hole(s) in a given distance to a certain point (for example a point in the building land) is/are found. Moreover, when finding the nearest bore hole, the distance between the bore hole and the certain point is displayed. The graphical object(s) found with location or bore hole queries is(are) displayed covering ninenty per cent of the drawing area.

4. CONCLUSIONS

In this system, bore hole data are systematically stored in a certain format in digital environment and thus advantages of digital storage methods to conventional ones are projected into this field.

When the information related to underground in any place of Istanbul is needed, it can be applied to this system firstly and can be learned if there is any bore hole in or around the place. If available, then it is prevented from making new bore holes in the same place and thus wasting time, money and energy. The same benefits are gained from finding bore holes which are not exactly in that place but sufficiently around that place in accordance with the usage aim.

This is a living and growing system as long as new bore holes are added. Therefore, every new bore hole added contributes to obtain more detailed information about the underground. Thus, at a certain stage, the underground will be clearly known in its geological aspect.

This system has been designed for Soil and Earthquake Investigation Department of Istanbul Metropolitan Municipality, and a practical application has been performed with the data of Avcılar district.

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Transition in East Germany - Restitution and Experiences from the private point of view

Horst Borgmann, Berlin

Key words: Restutution, landbook, cadastre, public licensed surveyor

Abstract

After 1945 a land reform was started in East Germany. Many farms had been depropriated by Soviet government. Later the two German states had been founded. They had a different philosophy of properties and landregistration. In the Federal Republic of Germany a free market was initiated while in the German Democratic Republic „people's property" was supported by the government. There was a process of transition after the German reunification. There was a need of transformation of people's property to private property under the conditions of the free market. The „Landregister-Acceleration-Act" was the fundamental law for a short term transition. Many experiences have been made in the last 11 years. The work had been completed successfully with support from public licensed surveyors.

1. INTRODUCTION

The Berlin wall has been opened 11 years ago. This was the start of a peaceful revolution in Eastern Europe. Perhaps there is no place in the world, where the partition and the reunification of Europe can be regarded so oviously. This report is based on these 11 years of experiences in the process of transformation from socialism to free market.

1.1. Some History

Nazi-Germany had disappeared by capitulation1945. From that time until 1949 Germany was devided into 4 zones, where the government was carried out by semi-military staffs (USA, UK, France and Soviet Union). In East Germany a landreform (Bodenreform) was started by the Soviet government. All farms were depropriated, if they exceeded 100 hectars. There was no compensation at all. In the legal point of view there was no depropriation but confiscations. The landreform was made on 3,3 millions of ha of farmland. 1949 both Germanies -Federal Republic and German Democratic Republic- were constituated. 1990 the German Democratic Republic applicated the Federal Republic for membership. This was the time, when the constitution of the Federal Republic replaced the constitution of the German Democratic Republic.

2. MODELS OF PROPERTY IN THE FORMER GERMAN DEMOCRATIC REPUBLIC

There was a goal in the constitution to make „Peoples Property", whenever it was possible. The roots for this model can be regarded in the documents before 1949 (Soviet military orders). Bit by bit the land from the landreform was transformed to peoples property.