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GIS DESIGN AND APPLICATION FOR LOT CREATION

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ABSTRACT

The aim of this paper is to implement a system design and its application for the solutions of the problems in the lot production activities with geographic information systems. To do so, activities of the Land Office was analyzed, system design was performed and a pilot study was applied in a selected region. The logical process and data design, PCs to be used in the study and the GIS software ARC/INFO were the criteria while doing physical design. Designed application programs have been performed with ARC/INFO's macro language SML design and application programs have been tested in a pilot project.

1 INTRODUCTION

Geographic Information System (GIS)-The organized activity by which people

- *measure* aspects of geographic phenomena and processes;
- *represent* these measurements, usually in the form of a computer database, to emphasize spatial themes, entities, and relationships;
- *operate* upon these representations to produce more measurements and to discover new relationships by integrating disparate source; and
- *transform* these representations to conform to other frameworks of entities and relationships.

These activities reflect the larger context (institutions and cultures) in which these people carry out their work. In turn, GIS may influence these structures (Chrisman, 1997).

It is stated that the lot production is required when considering the problems come with population increase in the cities, like the places for housing, health care, industry, education, tourism and public buildings are needed, to find the suitable land for all of them, we need to produce lots in a plan. Expropriation generally is final method, if there are no other solutions, but during this study exactly the opposite has been observed in Turkey. The documents show that almost all government offices use expropriation methods at present to public use. Here, the benefits of GIS during the expropriation process has been explained and the aim of the study has been determined.

In this study, to provide faster, easier and more economic satisfaction of lot requirements, it is aimed to use the capabilities of geographic information systems (GIS) in lot production activities. This study has been limited with expropriation processes.

2 GIS DEVELOPMENT AND IMPLEMENTATION

Definition of the system

Analysis and feasibility study;

- determination of existence status in the activities,
- definition of requirements
- feasibility study

Design;

- planning of establishment and organization for the system,
- system design,
- data design ,
- process design
- physical design.

Implementation;

- selection and installation of hardware and software,
- installation of data base,
- creating of application programs,
- testing of system with pilot project,
- preparation of application

Application and Maintenance

- following of events, adaptation of changes, enhancement, corrective maintenance.

The components of a geographical information system

Geographical information systems have three important components-computer hardware, sets of application software modules, and a proper organization context (Burrough, 1996).

Computer hardware

Central processing unit

- digitizer;
- plotter;
- disk drive;
- tape drive.

GIS software modules

The software package for a geographical information system consists of five basic technical modules.

1. Data input and verification;
2. Data storage and database management;
3. Data output and presentation ;
4. Data transformation
5. Interaction with the user.

The organizational aspects of GIS

The five technical sub-systems of GIS govern the way in

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which geographical information can be processed but they do not of themselves guarantee that any particular GIS will be used effectively, the GIS needs to be placed in an appropriate organizational context (Fig. 1).

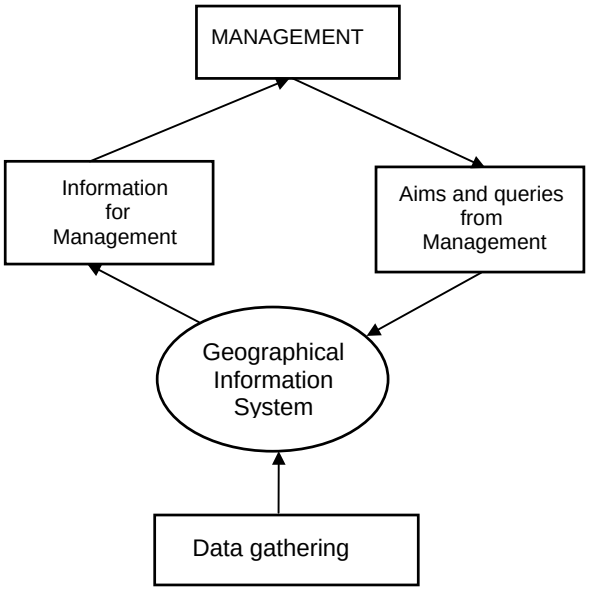

Figure 2.1. Organizational aspects of geographical information system

2.1 Definition of Lot Create Information System

For better life standards in public life in Turkey, there is a strong need for a better utility management. The base of this infrastructure utility is to produce parcels according to public plans. Turkish Parcel Office General Organization has been founded in 1969 according to the law numbered 1164 to produce lot. This organization is one of the constitutions which has significant positive effect on producing legal parcel.

Information system for lot creation is special form of geographic information system. In this study, cadastral and building maps are used as graphic data and also owner registration, deed information, parcel valuing as non graphic data.

By this geographic information system addition to proper lot searching gaining the reports of parcel value, the observation of the project fulfillment will be possible.

In this study, to provide faster, easier and more economic satisfaction of lot requirements, it is aimed to use the capacities of geographic information system (GIS) in lot production activities. This study has been limited with expropriation processes.

2.2 The System Analysis and Feasibility Study

System analysis defines the components, its aims, requirements and to determine the degree of their realizations according to the relations of the components to each other. What to do is determined during the analysis. (Gümüşay 1997).

Determination of existence status in lot creation.

The following studies were made for determination of status in lot creation.

-Some questions were asked to the Turkish Parcel Office Organization and other organization.

- Interviews were made by the organizations which are effective in the activities.

- Reports, correspondence files, map sheets

- Valuing reports and reports of analysis and evaluating were searched.

Consequently following are observed from these studies.

- Lot creation works that are executed by Parcel Office.

- Organization charts were generated for Parcel Office

-Data and process flow diagrams were created for each activity.

Definition of requirements
Required data and processes were defined. The required data presented in Table 2.1 and Table 2.2.
Required processes are; generation of geographic data base, data entry, updating, query.

The contrasts on the design were determined.
- Hardware (PC) and software limited
- PC GIS software more complex than other platform
- Time limited.

Feasibility study
The system configuration was chosen by taking the constraints and the data source, the requirements into account.

2.3 The design of Information System for Lot Creation

The analysis and the feasibility study was evaluated and the system was designed (Gümüşay, 1997)

System design
Hardware and software of the system were designed.
- Hardware; PC with mathematics coprocessor, expandability, color monitor, mouse, digitizer, printer.
- Software; independent from hardware, user friendly, speed, various data types and data entry, exchanged data with other GIS software, large volumes of data, ability of geographic analysis, meet requirements, layer type of graphics data, relational data base.

Data design
The requirement data (entities, attributes, relations), which are presented Table 2.1. and the Table 2.2. and the required processes for system were evaluated for design of layer and data base. Designed graphical layers were illustrated in Figure 2.2.

Process design
Data input, data update, draw, query, geographical analysis and forms, delete and output process.

Physical design

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Hardware and software, which have been used for this work, certainly determined.

- Hardware
  PC 486 DX -66 Mhz
  HP Laserjet III and HP Deskjet 660C
- Software
  PC ARC/INFO 3.4.D Plus, DOS 6.0 operation system, ARC/INFO SML Macro Language for application programs.

The data and process design (logical design were transformed to the physical design.

- DGN format does not convert in the software. Therefore, DGN-DXF-ARC/INFO conversion should be made for data input
- The application programs flowcharts were created for the processes.

2.4 The Implementation of Information System for Lot Creation

The aim of this study is to implement a system design and application for the solutions of the problems in the lot production activities with geographic information systems. To do so, the activities of the Land Office have been analyzed, system design was performed and a pilot study was applied in a selected region.

Data Base
The tables of the relational data base and the code, symbol files were defined in the hard disk. Data have been entered in the pilot project.

Application Programs
As it was mentioned before, in this study, an application program was developed which makes the analysis for expropriation.

The programs were written with SML. Some forms were created by ARCPLOT module of the software.

Checking of the system with pilot project
The region of pilot project was selected (Gümüşay, 1997). Some characteristics of this region are;

- A region where expropriation is done to create lots,
- Available of digital data
- A region the valuing forms of which are present.

In area of approximately 500 hectare, separated for industry in urban planning at • stanbul-Bak• rköy • kitelli, a region recently expropriated lot creation is selected as a pilot application area.

Although the selected region was large, its important for the problems it contained.

F21-C-16B-2-D, F21-C-16B-2-C, F21-C-16B-1-B, F21-C-16B-3-A, F21-C-16B-3-B, F21-C-16B-3-C, F21-C-16B-1-A these building sheets were supplied from • stanbul Municipality.
Owner information and valuing form were supplied from the Parcel Office in • stanbul.

2.5 Application and Maintenance

The first menu of the application program illustrated in Figure 2.3. In Figure 2.4. and Figure 2.5 forms which is produced in the application was presented. This forms is produced from the system.

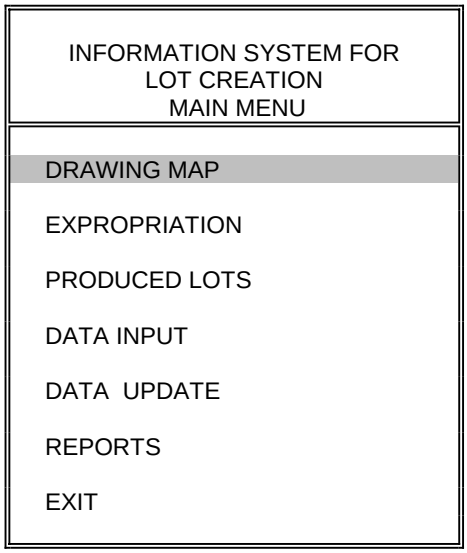

Figure 2.3 System main menu

Table 2.1. Some of the Required Data

Geographical Entity	Data Source[1]	Scale	Type	Level Nr	Feature Type	Attributes
Parcel	SKH	1/1000 1/2000	DIGITAL DGN	1	Line String Text	Parcel code, Ownership, Lawsuit, Property
Building	SFH	1/1000	DIGITAL DGN	24,25,26,28,30, 32,36,37,46,35	Line String Text	
Stream	SFH	1/1000	DIGITAL DGN	57	Line String	
Road	SFH	1/1000	DIGITAL DGN	15	Line String	

1 SKH; cadastral map digitized by survey company, SFH; base map generated by • stanbul Municipality with method of

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analytical photogrammetry, DGN; Intergraph graphical design file.

Table 2.2. Designed Some of the Data Base Tables and Attributes

Table Name	Attributes
Parcel	**Parcel code**, Province name, District name, Ward name, Location, Type, Cadastral sheet name, City block number, Parcel square number.
Owner	**Owner code**, First name, Second name, Year of bird, Father name, Address
Parcel-Owner	**Parcel code**, **Owner code**, Portion of share, Denominator of share
Detail valuing	**Parcel code**, **Detail code**, Detail no, Detail type, Age/Length, Depth, Price, Ruins share, Explanation
Detail-Owner	**Parcel code**, **Detail code**, Portion or share, Denominator of share

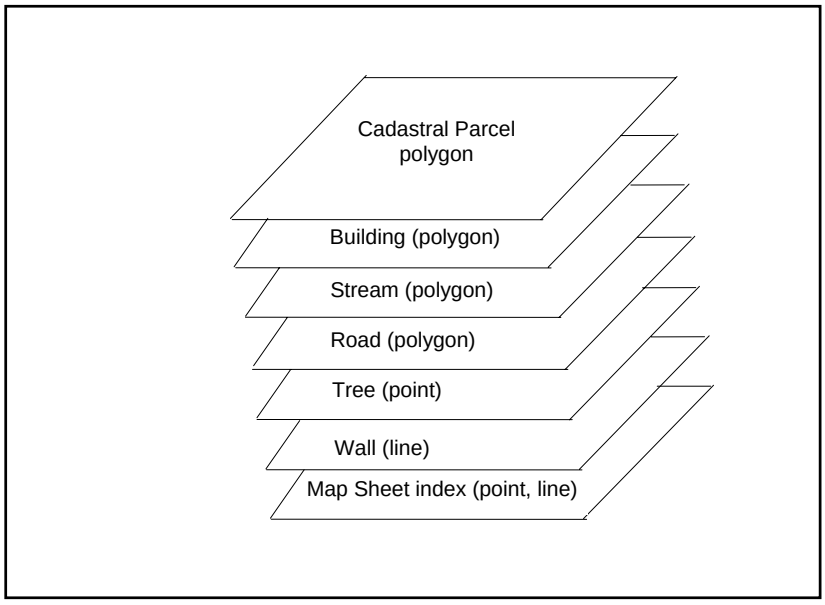

Figure 2.2. Designed Some Layers

3 CONCLUSIONS AND SUGGESTION

Recent researches have shown that GIS provides possible solution to solve complicated problems.

In this pilot project the lot production system implementation phases were described. While determining the existing status, the activities of Land Office, an authorized organisation in our country, are discussed. The studies in Istanbul Regional Land Office were analysed and examined in detail. And the existing status, the data, process, products, problems, expectations in the activities are evaluated. At the end of these studies, lot production geographic information system has been designed. The logical process and data design, PCs to be used in the study and the GIS software ARC/INFO were the criteria while doing the physical design. Designed application programs have been performed by ARC/INFO's macro language SML. Design and application programs have been tested in a pilot project.

Some proposals were obtained in the result of this study

Parcel value forms derived from expirations made by government foundation are variable. Standardization must be done.

The prepared design and application programs can be expanded for new requirements and can be converted to other platforms like work station.

It has been observed whether the study can satisfy the expectations or not, the problems encountered during the implementation of the system were given and the problems based on hardware and software were discussed. When compared the classical systems and the geographic information systems, we implemented with this study; it is obviously seen that the geographic information system serves us benefits with time, cost, personnel, productivity and standards. It is more open and easy-to-use that brings a more convenient working environment to the persons working in this field.

Conclusions and remarks. It's necessary to support and develop geographic information systems.

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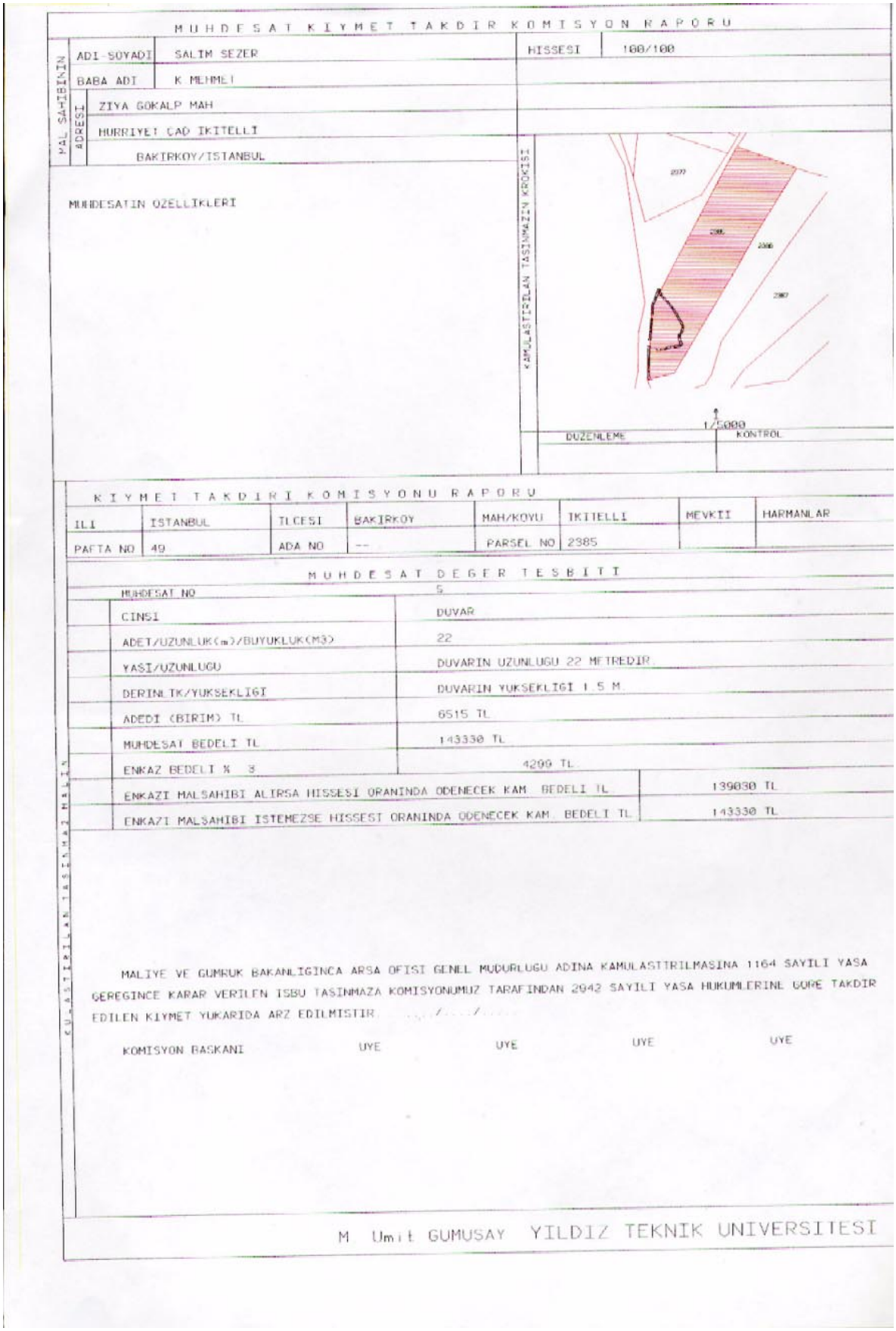

MUHDESAT KIYMET TAKDIR KOMISYON RAPORU

MAL SAHIBININ
ADI-SOYADI: SALIM SEZER
BABA ADI: K MEHMET
ADRESI: ZIYA GOKALP MAH
HURRIYET CAD IKITELLI
BAKIRKOY/ISTANBUL

HISSESI: 100/100

MUHDESATIN OZELLIKLERI

KAMULASTIRILAN TASINMAZIN KROKISI

DUZENLEME
1/5000
KONTROL

KIYMET TAKDIRI KOMISYONU RAPORU

ILI	ISTANBUL	TLCESI	BAKIRKOY	MAH/KOYU	IKITELLI	MEVKII	HARMANLAR
PAFTA NO	49	ADA NO	--	PARSEL NO	2385		

MUHDESAT DEGER TESBITI

MUHDESAT NO	5
CINSI	DUVAR
ADET/UZUNLUK(m)/BUYUKLUK(M3)	22
YASI/UZUNLUGU	DUVARIN UZUNLUGU 22 METREDIR
DERINLIK/YUKSEKLIGI	DUVARIN YUKSEKLIGI 1.5 M
ADEDI (BIRIM) TL	6515 TL
MUHDESAT BEDELI TL	143330 TL
ENKAZ BEDELI % 3	4299 TL
ENKAZI MALSAHIBI ALIRSA HISSESI ORANINDA ODENECEK KAM. BEDELI TL	139030 TL
ENKAZI MALSAHIBI ISTEMEZSE HISSESI ORANINDA ODENECEK KAM. BEDELI TL	143330 TL

KAMULASTIRILAN TASINMAZ MALIN

MALIYE VE GUMRUK BAKANLIGINCA ARSA OFISI GENEL MUDURLUGU ADINA KAMULASTIRILMASINA 1164 SAYILI YASA GEREGINCE KARAR VERILEN ISBU TASINMAZA KOMISYONUMUZ TARAFINDAN 2942 SAYILI YASA HUKUMLERINE GORE TAKDIR EDILEN KIYMET YUKARIDA ARZ EDILMISTIR ../../..

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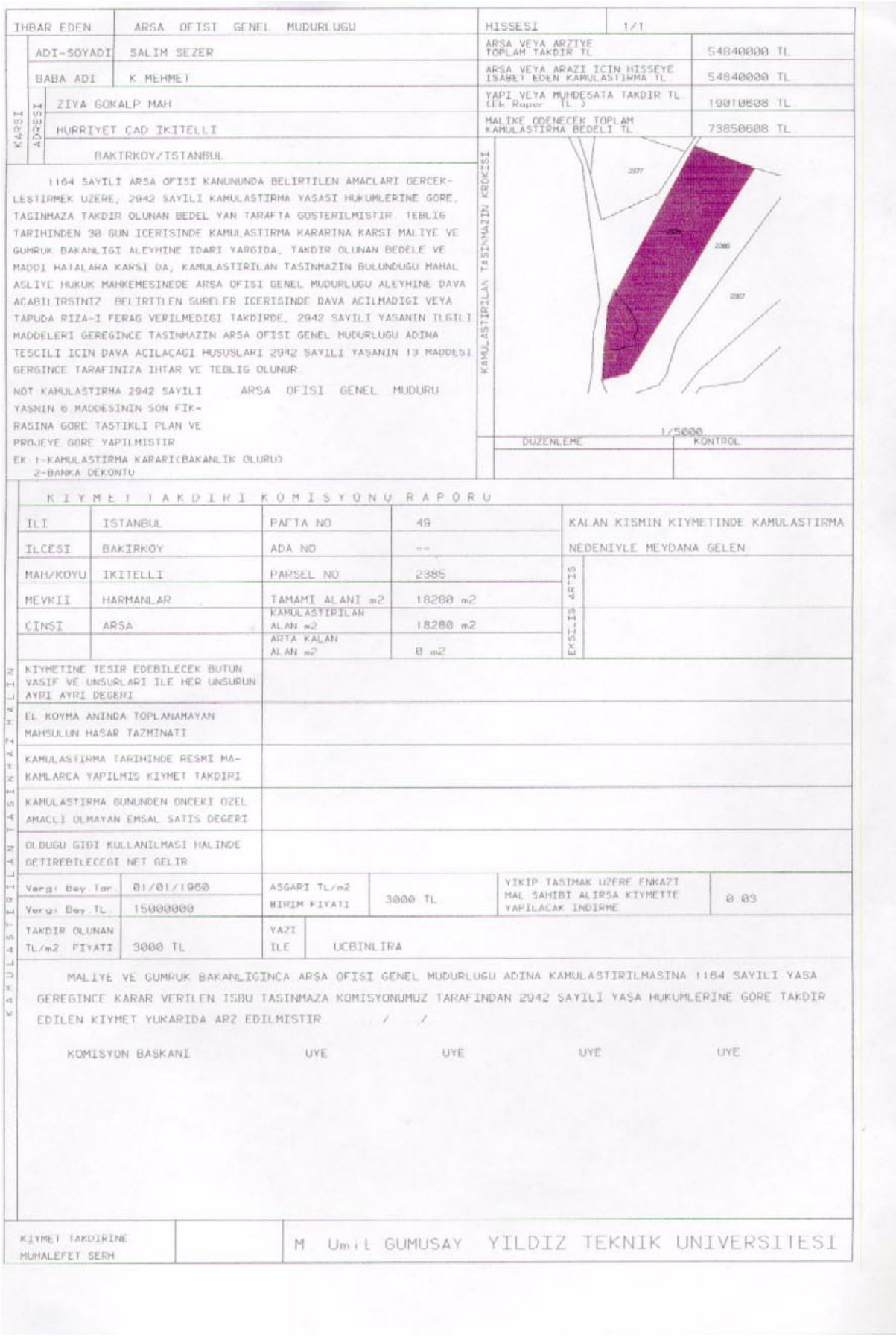
Figure 2.4 The form was produced from system



IHBAR EDEN: ARSA OFISI GENEL MUDURLUGU — HISSESI: 1/1

KARSI ADRESI — ADI-SOYADI: SALIM SEZER — BABA ADI: K.MEHMET — ZIYA GOKALP MAH — HURRIYET CAD IKITELLI — BAKIRKOY/ISTANBUL

ARSA VEYA ARZIYE TOPLAM TAKDIR TL: 54840000 TL
ARSA VEYA ARAZI ICIN HISSEYE ISABET EDEN KAMULASTIRMA TL: 54840000 TL
YAPI VEYA MUNDESATA TAKDIR TL. (Ek Rapor TL.): 19010508 TL
MALIKE ODENECEK TOPLAM KAMULASTIRMA BEDELI TL: 73850608 TL

1164 SAYILI ARSA OFISI KANUNUNDA BELIRTILEN AMACLARI GERCEKLESTIRMEK UZERE, 2942 SAYILI KAMULASTIRMA YASASI HUKUMLERINE GORE, TASINMAZA TAKDIR OLUNAN BEDEL YAN TARAFTA GOSTERILMISTIR. TEBLIG TARIHINDEN 30 GUN ICERISINDE KAMULASTIRMA KARARINA KARSI MALIYE VE GUMRUK BAKANLIGI ALEYHINE IDARI YARGIDA, TAKDIR OLUNAN BEDELE VE MADDI HATALARA KARSI DA, KAMULASTIRILAN TASINMAZIN BULUNDUGU MAHAL ASLIYE HUKUK MAHKEMESINEDE ARSA OFISI GENEL MUDURLUGU ALEYHINE DAVA ACABILIRSINIZ. BELIRTILEN SURELER ICERISINDE DAVA ACILMADIGI VEYA TAPUDA RIZA-I FERAG VERILMEDIGI TAKDIRDE, 2942 SAYILI YASANIN ILGILI MADDELERI GEREGINCE TASINMAZIN ARSA OFISI GENEL MUDURLUGU ADINA TESCILI ICIN DAVA ACILACAGI HUSUSLARI 2942 SAYILI YASANIN 13.MADDESI GERGINCE TARAFINIZA IHTAR VE TEBLIG OLUNUR.

NOT KAMULASTIRMA 2942 SAYILI YASNIN 6.MADDESININ SON FIKRASINA GORE TASTIKLI PLAN VE PROJEYE GORE YAPILMISTIR

EK 1-KAMULASTIRMA KARARI(BAKANLIK OLURU)
2-BANKA DEKONTU

ARSA OFISI GENEL MUDURU

KAMULASTIRILAN TASINMAZIN KROKISI

1/5000

DUZENLEME | KONTROL

KAMULASTIRILAN TASINMAZ MALIN

KIYMET TAKDIRI KOMISYONU RAPORU

ILI	ISTANBUL	PAFTA NO	49	KALAN KISMIN KIYMETINDE KAMULASTIRMA NEDENIYLE MEYDANA GELEN EKSILIS ARTIS	
ILCESI	BAKIRKOY	ADA NO	--		
MAH/KOYU	IKITELLI	PARSEL NO	2385		
MEVKII	HARMANLAR	TAMAMI ALANI m2	18280 m2		
CINSI	ARSA	KAMULASTIRILAN ALAN m2	18280 m2		
		ARTA KALAN ALAN m2	0 m2		

KIYMETINE TESIR EDEBILECEK BUTUN VASIF VE UNSURLARI ILE HER UNSURUN AYRI AYRI DEGERI					
EL KOYMA ANINDA TOPLANAMAYAN MAHSULUN HASAR TAZMINATI					
KAMULASTIRMA TARIHINDE RESMI MAKAMLARCA YAPILMIS KIYMET TAKDIRI					
KAMULASTIRMA GUNUNDEN ONCEKI OZEL AMACLI OLMAYAN EMSAL SATIS DEGERI					
OLDUGU GIBI KULLANILMASI HALINDE GETIREBILECEGI NET GELIR					
Vergi Bey.Tar.	01/01/1950	ASGARI TL/m2 BIRIM FIYATI	3000 TL	YIKIP TASIMAK UZERE ENKAZI MAL SAHIBI ALIRSA KIYMETTE YAPILACAK INDIRME	0.03
Vergi Bey.TL.	15000000				
TAKDIR OLUNAN TL/m2 FIYATI	3000 TL	YAZI ILE	UCBINLIRA		

MALIYE VE GUMRUK BAKANLIGINCA ARSA OFISI GENEL MUDURLUGU ADINA KAMULASTIRILMASINA 1164 SAYILI YASA GEREGINCE KARAR VERILEN ISBU TASINMAZA KOMISYONUMUZ TARAFINDAN 2942 SAYILI YASA HUKUMLERINE GORE TAKDIR EDILEN KIYMET YUKARIDA ARZ EDILMISTIR / /

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Figure 2.5 The form was produced from system