DEVELOPING A GIS WEB BASED MAP OF HEBRON CITY

BY

ANDALEEB SAADEH ASEEL AL-KHALAYLEH
AZEEZ ALHATHALIN

CIVIL & ARCHITECTURAL ENGINEERING DEPARTMENT
COLLEGE OF ENGINEERING AND TECHNOLOGY
PALESTINE POLYTECHNIC UNIVERSITY

HEBRON- WEST BANK
PALESTINE

June - 2008

Abstract

DEVELOPING A GIS WEB BASED MAP OF HEBRON CITY

BY

ANDALEEB SAADEH ASEEL AL-KHALAYLEH
AZEEZ ALHATHALIN

Palestine Polytechnic University

2007-2008

Supervisor By:

ENG.MAHER OWAIWI

The recent development in the IT sector at Hebron municipality is expanded to include an enter prize the GIS Database application, which in turn add an extreme improvement to GIS spatial applications. Currently, Hebron municipality GIS Database composed of more than 50 spatial layers distributed into five nodes. These nodes are base maps layers, infrastructure layers, tax properties layers, public safety layers and so network layers. In addition, a tourist map has been developed and published, which contain more than 500 important and tourist sites. However, these GIS data are knows available to be made accessible on the Internet by web-based GIS technology, using the Mapview SVG Software. This application will offer an effective media for public participation and collaborative planning. In addition, the sharing of information would be able to facilitate and support the planning agendas and urban management in Hebron city.

ملخص

بناء خارطة الكترونية "بنظام GIS"على الشبكة العنكبوتية لمدينة الخليل

إعداد

عندليب سعادة أسيل الخلايلة عزيز الهذالين

إشراف :

الأستاذ: ماهر العويوي

من استنادنا على أهمية مدينة الخليل كون لدينا رغبة في تحضير خارطة تحوي على المعلومات التي يحتاجها أي سائح أو أي شخص يهمه معرفة الكثير عن هذه المدينة والمواقع المهمة الموجودة فيها باستخدام الشبكة العنكبوتية العالمية وعليه تم اختيار هذا المشروع.

يتضمن المشروع إعداد وتحضير الخارطة السياحية لمدينة الخليل بكافة المعلومات التي استطعنا جمعها عن المرافق المهمة بما فيها من مـــدارس وجامعـــات ومستشفيات ومن ثم وضع هذه الخارطة على الصفحة الالكترونية لبلدية مدينة الخليل.

يمكن هذا النظام المستخدمين الحصول على أي معلومة عن مدينة الخليل وتكون كدليل سياحي للمدينة وقد يفيد أيضا في وضع السياسة التطويرية لمدينة الخليل.

يعتمد هذا المشروع في إعداد وإدخال المعلومات وتحضير ومنتجة الخارطة بشكل أساسي على برنامج – GIS - و بث هذه الخارطة على الانترنـــت بواسطة برنامج MapView SVG

TABLE OF CONTENTS

List of Figures

List of Tables

CHAPTER ONE

Introduction

This chapter covers the general idea of the project, its problem definitions, objectives, methodology, and project time table. This Chapter includes the following items;

1.1 Background

1.2 Problem Definition

1.3 Objectives

1.4 Methodology

1.5 Project Time Table

CHAPTER ONE

Introduction

1.1 Background

Hebron city considers one of the largest cities in West Bank with a municipal area of about 45 Km² and more than 200,000 inhabitants. Its municipality services vary from constructing new roads, maintain old ones, supplying fresh water, managing wastewater, collecting solid waste, supplying electrical power, and many other services.

Hebron city is located in the southern part of West Bank and a bout 35 Km to the south of Jerusalem figure (1-1). The elevation of the city ranges from 800m above sea level to 1006m above sea level. The general topography is mountainous hilly to sloppy at the western and eastern parts of the city. Hebron city is highly influenced by the Mediterranean climate, which is characterized by long, hot, dry summer and short, cool, rainy winter. Rainfall is limited to the winter and spring months, mostly between November and March; summer is completely dry. Snow and hail may occur in the study area.

The internet is currently considered an important media. Its ability in enabling users to interact across the network has provided opportunities for retrieval of hypermedia information in an easy and effective way. Through the World Wide Web (WWW) multimedia capabilities, users all over the world has turned this technology into an important media to access and acquire information as well as interact using diverse types of visual representations such as images, maps, diagrams and graphs which are as easy to implement as text supported by graphical interface, sound, video, animation and so forth.

Web-based GIS technology plays an effective role in the presentation and analyzing of planning information. Users need not have specific training or software to be able to interact. Its ability in enabling easy and simplified access and without limitation in terms of time and location should be able to increase the number of GIS users and involvement in the planning and development activities. Web-based GIS is expected to cultivate a new working environment in the field of planning through involvement from various agencies and personnel in obtaining common benefits.

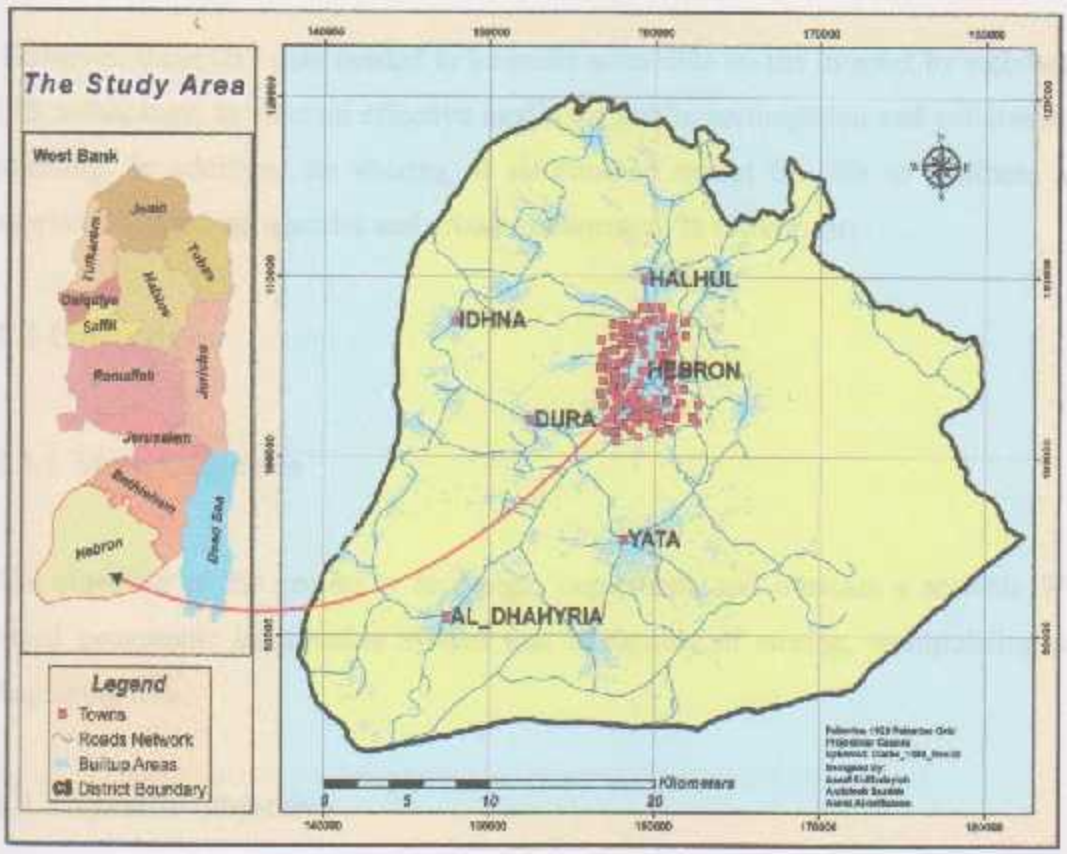


Figure (1-1): Location Map of Hebron city

1.2 Problem Definition

Currently, Hebron municipality GIS Database composed of more than 50 spatial layers distributed into five nodes. These nodes are base maps layers, infrastructure layers, tax properties layers, public safety layers and so network layers. In addition, a tourist map has been developed and published, which contain more than 500 different important and tourist sites.

However, these GIS data needed to be made accessible on the Internet by web-based GIS technology, to offer an effective media for public participation and collaborative planning. In addition, the sharing of information would be able to facilitate and support the planning agendas and urban management in Hebron city.

1.3 Objectives

1.3.1 Main Objective

The objective of the project is to design, implement, and evaluate a scalable Web based geographic information system that is capable of storing, manipulating and displaying data.

1.3.2 Specific Objective

1. Obtaining the GIS Based layers from Hebron Municipality.
2. Collection of attribute data for, schools, hospitals, universities and mosques.
3. Building a Web Base GIS application using MapVeiw SVG software.

1.4 Methodology

1.4.1 Field Work

We are collecting the necessary spatial and attribute data from Hebron Municipality, Hebron Directorate of Education, Hospitals, Universities and Al Awqaf Department.

1.4.2 Laboratory Work

Preparation of Spatial Data: This will include the preparation of the following layers;

- Municipal boundary
- Road Networks
- Important sites Locations
- Schools
- Hospitals
- Mosques
- Universities

Attribute Data

- Collection of available descriptive data on the mentioned spatial data.

Software Development

Developing the Web base GIS application based on MapVeiw SVG software. The Web GIS Tools will include:

- Map Navigation Tools
  - Center
  - Zoom Box
  - Zoom In
  - Zoom Out and Zoom to Fit
- Information box.
- Query Builder
- Thematic Map
- Report generation
- Print Wizard
- Layer Panel

1.5 Project Time Table

Table (1-1) shows the project time table in weeks.

Table (1-1): Project Schedule

Stages	Week Number	Time Frame In Week (First Semester 2007-2008)														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Choosing the Project	2															
Problem Definition	3															
Literature Review	2															
Collecting the Necessary Spatial and Attribute Data	3															
	Number Of Week	Time Frame In Week (Second Semester 2007-2008)														
Preparation of Spatial Data and Put it in Proper Syntax	3															
Preparation of Attribute Data Put it in Proper Syntax	3															
Software Development	5															
Writing Final Project Report	4															

CHAPTER TWO

WEB Mapping and GIS Background

This chapter covers the principles of Geographic Information System "GIS", its definition, components and some of its applications. Also it covers WEB Based Mapping and overview of MapVeiw SVG Software. This Chapter includes the following items;

2.1 Introduction to GIS

2.2 Spatial Element

2.3 Data Input

2.4 Data Representation

2.5 Web Mapping

2.6 Overview of Scalable Vector Graphics (SVG)

2.7 Features of SVG

2.8 SVG History & Advantages

2.9 Dynamic Web Mapping Using Scalable Vector Graphics (SVG)

CHAPTER TWO

WEB Mapping and GIS Background

2.1 Introduction to GIS

GIS is a collection of computer hardware, software, and geographic data for capturing, managing, analyzing, and displaying all forms of geographically referenced information, figure (2-1).

Figure (2-1): Representation of Reality as Spatial Layer, Maher Owaiwi, (2007)

Why Use GIS?

Used to organization new and legacy data stored in a variety of formats in many locations. And to integrate data then we can analyze it as a whole and leverage it to make critical business and planning decisions.

GIS can integrate and relate any data with a spatial component, regardless of the source of the data. GIS maps this data, giving dispatchers a visual tool to plan the best routes for mobile staff or send the closest worker to a customer. This saves tremendous time and money, figure (2-2).

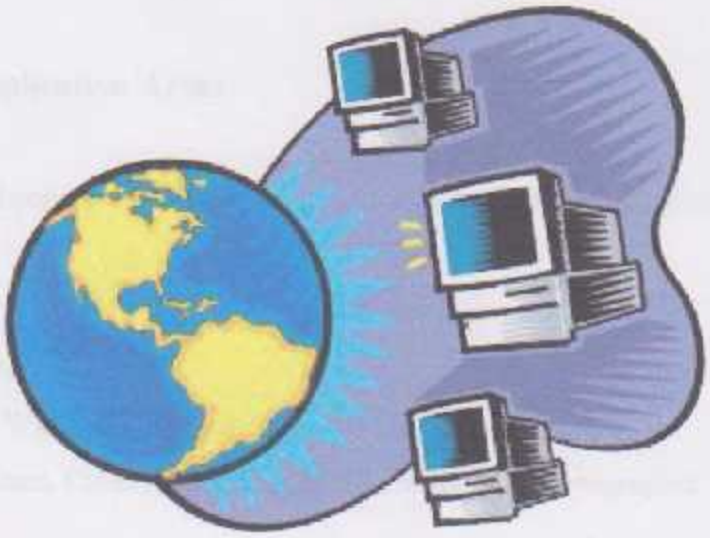


Figure (2-2): Visual Approach to GIS Definition, Maher Owaiwi, (2007)

Geographic Information System (GIS) is built on knowledge of various academic disciplines, which makes a new interdisciplinary science:

- Geography :
  - Cartography
  - Location Science
- Computer Science :
  - Data Modeling
  - Database Design
  - Computer Graphics
  - Interface Design
- Mathematics :
  - Topology

Graph Theory

Geometry

- Statistics :

  Traditional Statistics

  Spatial Statistics

2.1.1 GIS Application Areas

GIS data base become a vital data base, which is used in many application areas, such as figure (2-3).

- Agriculture.
- Forestry & Wildlife Management.
- National, State, County, Regional, Local mapping and geographic inventory.
- Streets.
- Facilities.
- Areas/Districts.
- Utility Applications.
- Electric.
- Gas.
- Telephone.
- Cable Television.

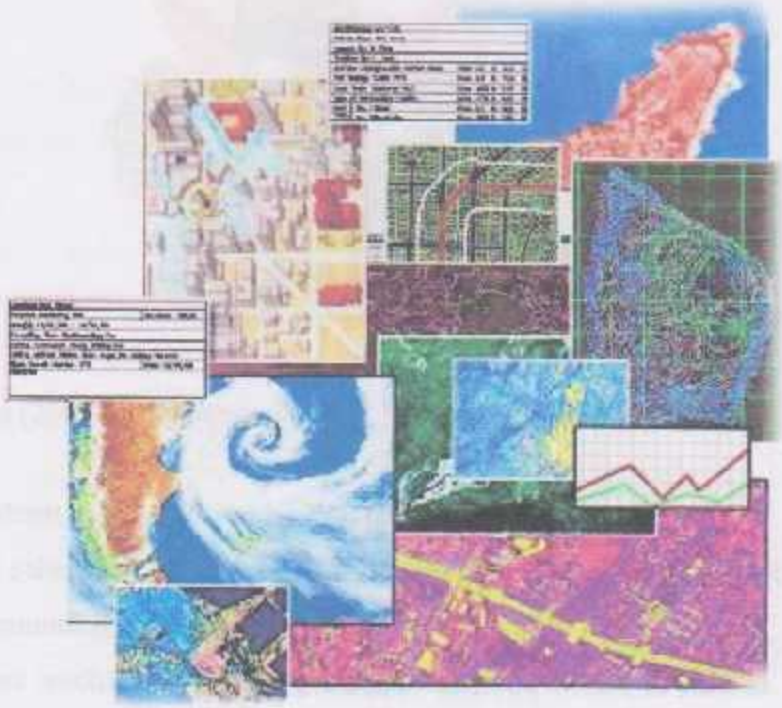


Figure (2-3): GIS Application Areas, Maher Owaiwi, (2007)

2.1.2 System Components

GIS have five primary components, namely:

1. **People**: computer staff, experts from various science disciplines, GIS operators, GIS experts, applications developers.

Figure (2-4): System Components, Maher Owaiwi, (2007)

2. **Data** : which may be of type spatial, temporal, or attribute.
3. **Engines :** that perform various data storage, retrieval, analysis, reporting, and communication functions.
4. **Interfaces** :such as GUIs having widgets based on toolboxes such as Windows.
5. **Hardware** : including workstations and networks, disk and tape storage, digitizers, plotters, and communications devices.

2.2 Spatial Elements

There are essentially only five different types of spatial object, also known as entity, feature or facility, which can be represented within a GIS: point, line, area, surface and network.

Three of these objects types will represent Inside the GIS, real world objects explicitly. Points, lines, and areas can be represented by their respective symbols, while surfaces are most often represented either by point elevations or by other computer structures.

Point: is the simplest graphical representation of an object. Points have no dimensions but may indicate on maps or displayed on screens by using symbols, figure(2-5).

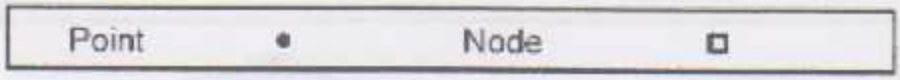


Figure (2-5): Basic 0-Dimensional Object Types, Maher Owaiwi, (2007)

Lines: connect at least two points and are used to represent objects which may be defined in one dimension. 1-dimensional object types, figure(2-6).

Areas: are used to represent objects defined in two dimensions. An area is delineated by at least three connecting lines; figure (2-7).

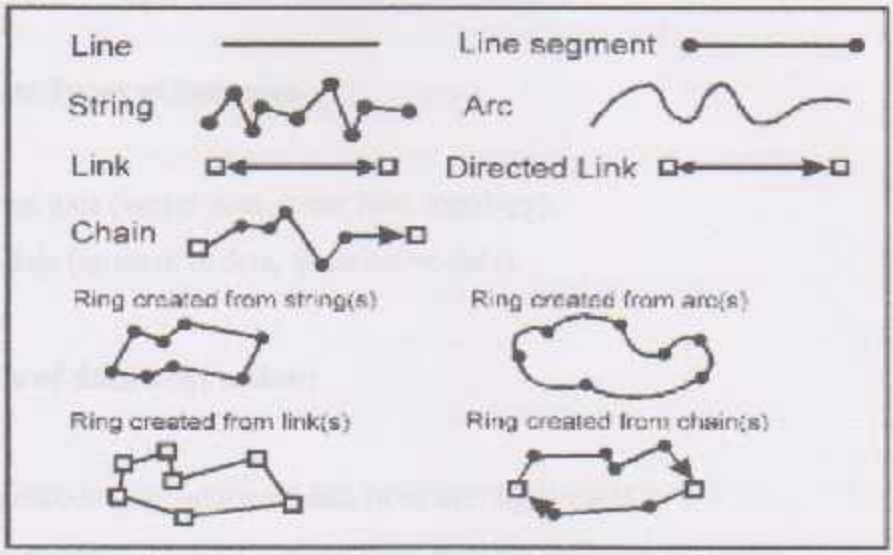


Figure (2-6): Basic 1- Dimensional Object Types, Maher Owaiwi, (2007)

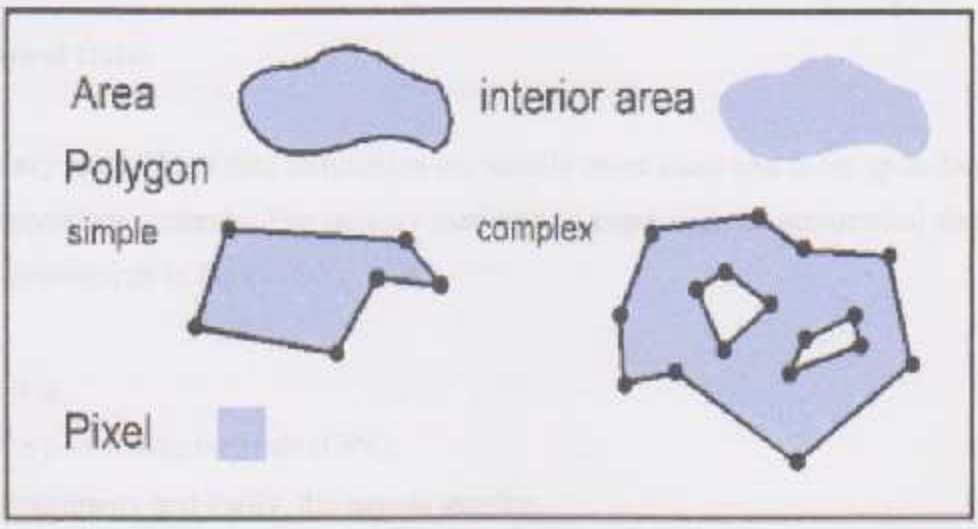


Figure (2-7): Basic 2-Dimensional Object Types, Maher Owaiwi, (2007)

2.3 Data Input

The Two Basic Types of Data are:

- Geometrical data (vector data, raster data, topology).
- Attribute data (qualitative data, quantitative data).

The methods of data acquisition:

- Primary methods (acquisition of data from the object itself).
- Secondary methods (data acquisition from existing analogue or digital sources).

- Geometrical Data:

The primary methods of data acquisition are usually more exact and more up to date than the secondary methods. The primary methods of acquisition of geometrical data are the followings: as in figure (2-8).

- Surveying.
- Satellite positioning methods (GPS).
- Photogrammetry and Partly, the remote sensing.

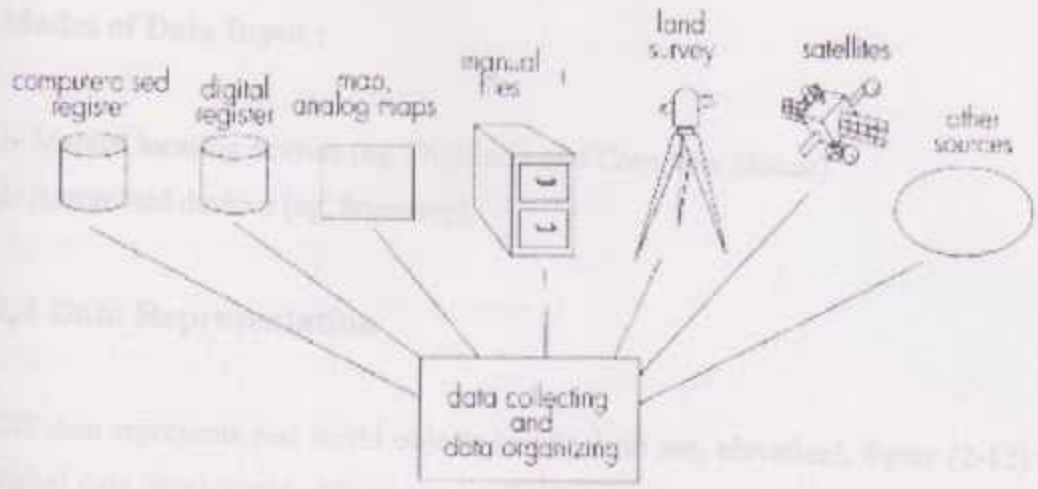


Figure (2-8): Numerous and Various Sources of Data , Maher Owaiwi, (2007)

The secondary methods of acquisition of geometrical data are the followings:

- Manual digitizing of analogue maps.
- Scanning of analogue maps and using existing digital databases.

- Attribute Data

The primary methods of acquisition of attribute data are:

- Measurements of various kinds (e.g. geophysical).
- The remote sensing.
- Interviews etc.

The secondary methods of acquisition of attribute data are:

- Using of conventional documents in registers and files.
- Compilations in scientific reports.
- Data acquisition from existing digital databases.

Modes of Data Input :

1- Manual locating devices (eg. Digitizers and Computer Mouse).
2- Automated devices (eg. Scanning).

2.4 Data Representation

GIS data represents real world objects (roads, land use, elevation), figure (2-12) with digital data. Real world objects can be divided into two abstractions: discrete objects (a house) and continuous fields (rain fall amount or elevation). There are two broad methods used to store data in a GIS for both abstractions: Raster and Vector.

Raster

Figure (2-9): Digital Elevation Model, Map (Image), and Vector Data , wikipedia 2007

Raster data type consists of rows and columns of cells where in each cell is stored a single value. Raster data can be images (raster images) with each pixel (or cell) containing a color value. Additional values recorded for each cell may be a discrete value, such as land use, a continuous value, such as temperature. Raster data is stored in various formats; from a standard file-based structure of TIF, JPEG, etc.

Vector

In a GIS, geographical features are often expressed as Vectors, by considering those features as geometrical shapes. Different geographical features are best expressed by different types of geometry:
A simple vector map, using each of the vector elements: points for wells, lines for rivers, and a polygon for the lake, figure (2-13).

Figure (2-10): Vector Map, wikipedia, 2007

2.5 Web Mapping

In recent years there has been a revolution of mapping applications on the web such as Google Maps, and Live Maps. These websites give the public access to huge amounts of geographic data with an emphasis on aerial photography.

Some of them, like Google Maps, and Live Maps allow users to annotate maps and share the maps with other.

Independent applications also exist for publishing geographic information on the web include Intergraph's GeoMedia WebMap, and the open source MapServer. In recent years web mapping services have begun to adopt features more common in GIS, Services such as Google Maps .

2.6 Overview of Scalable Vector Graphics (SVG)

A new technology defined by the W3C called SVG (Scalable Vector Graphics) is bringing rich, compelling, interactive, high-resolution graphics to the Web. particularly attractive to GIS developers and users.

Today, most mapping systems employ two approaches when delivering interactive maps on the web. The first approach is the familiar Java applet. The second approach involves generating map images on the server and delivering them to the user in either GIF or JPEG image format. Java applets perform well concerning interactivity, but have suffered from browser compatibility and firewall issues. Image maps are compatible with web tools and environments, but interaction with the map such as zooming, panning, layer control and thematic shading necessitate a round trip to the server in order to re-render the image.

Today, SVG solves all of these problems. SVG is an open, HTTP compatible standard that allows fully interactive mapping applications - without the need for applets or a round trip to the server every time the map presentation is weaked.

What is SVG?

The Scalable Vector Graphics (SVG) format is a new XML grammar for defining vector-based 2D graphics for the Web and other applications. The World Wide Web Consortium (W3C), the non-profit, industry-wide, open-standards consortium that created HTML and XML, created SVG.

It enables Web developers, designers, and users to move beyond the limitations of HTML and create robust visual content and interactivity through a simple declarative programming model.

SVG is suitable for Web applications based on data-driven, interactive, personalized graphics from real-time data sources such as e-commerce systems and corporate databases. Developers can customize SVG for many audiences, cultures, and demographics, no matter how the user interacts with the data.

2.7 Features of SVG

1- Small File Size

On average, SVG files are smaller than other Web graphic formats, such as JPEG and GIF, and are quick to download.

2- Display Independence

SVG images are always crisp onscreen and print at the resolution of your printer, whether it's 300 dots per inch (dpi), 600 dpi, or higher. You never get jagged edges due to pixel enlargement or anti-aliasing.

3- Superior Color Control

SVG offers a palette of 16 million colors and supports ICC color profiles, RGB, gradients, and masking.

4- Interactivity and Intelligence

Since SVG is XML-based, it offers unparalleled dynamic interactivity. SVG images can respond to user actions with highlighting, tool tips, special effects, audio, and animation.

5- Zooming

Users can magnify an image up to 1,600% without sacrificing sharpness, detail, or clarity. Text stays text in SVG, images remains editable (within the source code) and, more importantly, SVG is searchable (unlike in raster and binary counterparts). There are no font or layout limitations, and users always see the image the same way you do.

6- Text-based Files

An SVG file is text-based, not binary. It is a "human readable" format much like HTML. Even a beginner can look at SVG source code and immediately make sense of the descriptive content relative to the graphic representation.

2.8 SVG History & Advantages

Advantages of using SVG over other image formats (like JPEG and GIF) are:

- SVG files can be read and modified by a large range of tools (e.g. notepad).
- SVG files are smaller and more compressible than JPEG and GIF images.
- SVG images are scalable.
- SVG images can be printed with high quality at any resolution.
- SVG images are zoomable. Any part of the image can be zoomed without degradation
- Text in SVG is selectable and searchable (excellent for making maps)
- SVG works with Java technology
- SVG is an open standard
- SVG files are pure XML

MapView SVG supports vector based object data and image data. While image data are displayed as usual as GIF, JPEG files, the vector data and all text objects are converted into the SVG format. SVG graphics have the advantage to be infinitely zoomable without loosing cartographic quality. Beside this, the file size is quite smaller and loads much faster in a Web browser. Since 2003 MapView SVG uses technologies for displaying data which are actually known as AJAX.

MapVeiw SVG also supports attribute data. The data can be displayed in different ways: with mouse- over effects, identifying features on the map and even as the whole attribute table. Like in ArcView /ArcGIS, theirs exists a link between the attribute and the geometry, so flashing of individual shapes is possible. The data are stored as XML files or in a database (Tool"DBTable"), figure (2-14).

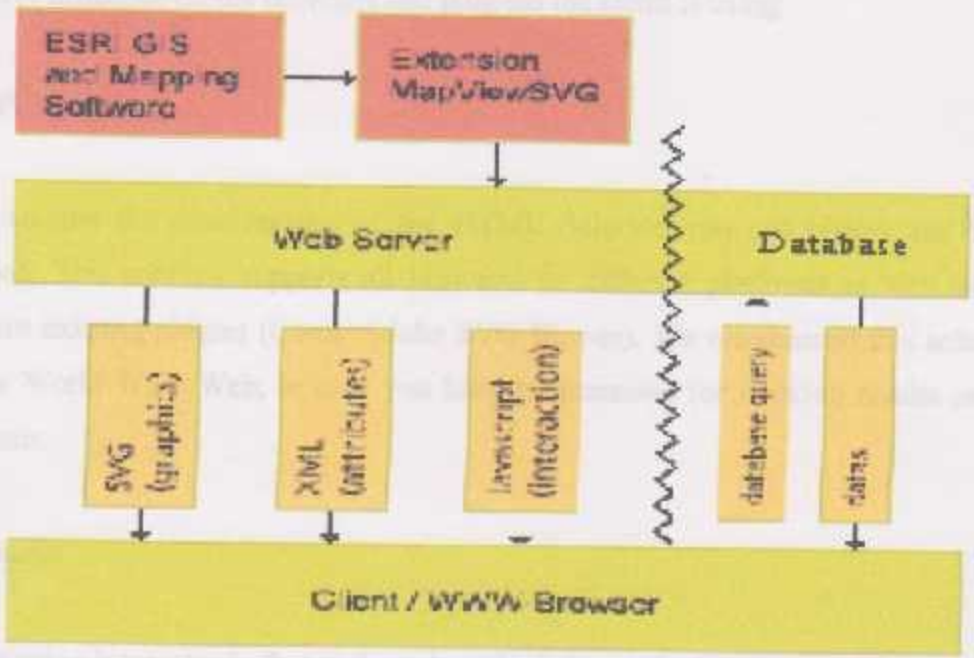


Figure (2-11): Process Scheme, MapVeiw SVG, ESRI, 2008

MapView SVG is available for different Web Mapping solutions:

- **HTML Solution**

This solution has more options (like Attribute Table, Query Builder) than the SVG solution. Also the display of the object information's (XML files) runs faster. The layout of the site is defined with style sheets, so it is very easy for you to change the layout on your own purposes. The disadvantage is, that only the Microsoft Internet Explorer (Window platform) with the Adobe SVG Viewer and Mozilla/Firefox Version 1.5 allow full functionality. We recommend this solution for intranet applications, in case you need all the functionalities that MapView SVG offers, and you have influence on the browsers and plug-ins the client is using.

- **SVG Solution**

To overcome the disadvantage of the HTML Solution you can choose the SVG Solution. This solution supports all browsers on different platforms as well as the different existing plugins (Corel, Adobe SVG Viewer). We recommend this solution for the World Wide Web, in case you have to guarantee for working results on all platforms.

- **Bundle**

This solution integrates both solutions described above. Both solutions can be export simultaneously.

2.9 Dynamic Web Mapping Using Scalable Vector Graphics (SVG)

Web-mapping is a growing and popular use of GIS, but creating even a simple map is often a non-trivial and costly task. One potential solution to this problem is Scalable Vector Graphics (SVG), an XML based 2D graphics standard. SVG offers rich client-side interactivity and unrivalled graphical quality, without the need for an expensive mapping/applications server. We will introduce SVG technology and provide an overview of its benefits for both producers and users of interactive maps. We will then outline the drawbacks of SVG Web Mapping and discuss how it compares to existing approaches.

CHAPTER THREE

Literature Review

This chapter describes several studies deal with the WEB Based Application, and it gives a brief description about the following studies;

3.1 Web Based SVG Map System: Design and Implementation, Macau

3.2 Citizen, Science, Highways, and Wildlife: Using a Web Based GIS to Engage Citizens in Collecting Wildlife Information, South western, Alberta, Canada.

3.3 Google Maps

CHAPTER THREE

Literature Review

3.1 Web Based SVG Map System: Design and Implementation, Macau

Systems providing geospatial information are numerous, but often are complex and difficult to use, preventing the more wide-scale utilization of geospatial information. We have designed and implemented a system that is easy to deploy and use, yet provides sophisticated map views. Our Web Based SVG Map System, besides having traditional map viewing and navigation functions, provides map printing, map exporting into GML and PNG formats, and a simple map editing function. It was built using open standards and open source components, and is centered on Scalable Vector Graphics (SVG) technology. It consists of a relational database backend storing geospatial information, a map server implemented by us using Java servlet technology, and a web based frontend implemented by us using SVG and JavaScript technology. Through the innovative use of asynchronous JavaScript, data transfer requirements are minimized and system responsiveness is improved. This system has the potential to make geospatial information significantly more accessible to and usable by general users.

Many organizations world-wide are deploying and using geographic information systems (GIS), providing geospatial information to assist management, planning, and decision making. Utility companies, government departments, and others often possess large amounts of geospatial information in these systems which frequently is vital for their operation. However, geographic information systems are usually complex and require significant amounts of training and expertise to be used effectively. This prevents the wider use of geospatial information within the

organization, limiting it to a relatively small group of experts. Managers, planners, and other non-technical end users would have much to gain from greater access to this information.

Web Based interfaces to geospatial information have emerged over the past years as an alternative to using the complex interfaces of geographic information systems. However, web-based interfaces usually suffer from several limitations. Firstly, the map displays are typically of inferior quality when compared to those of a desktop GIS. Secondly, the map displays are static, meaning that they cannot provide other information than what they initially display. Any map interaction such as zooming or getting information on map features (i.e. objects on the map) requires a separate request to the GIS web server, resulting in poor responsiveness as the new map view has to be downloaded from the server. Thirdly, web-based interfaces are almost exclusively for viewing only, disallowing editing of geospatial information. Finally, existing web-based interfaces use proprietary technology and data formats that work only with certain proprietary geographic information systems.

We have developed the Web Based SVG Map System to overcome all of these limitations. It uses Scalable Vector Graphics (SVG) as the core technology for producing and interacting with all map views. The resulting maps are of high visual quality. Moreover, given the nature of SVG, some map manipulation operations can be performed within the web browser without having to contact the web server to request a new map view. Given the programmatic capabilities of SVG, map editing can be performed through this interface. Finally, the system is based entirely on open standards and open source components and is independent of any existing proprietary GIS. As a figure (3-1).

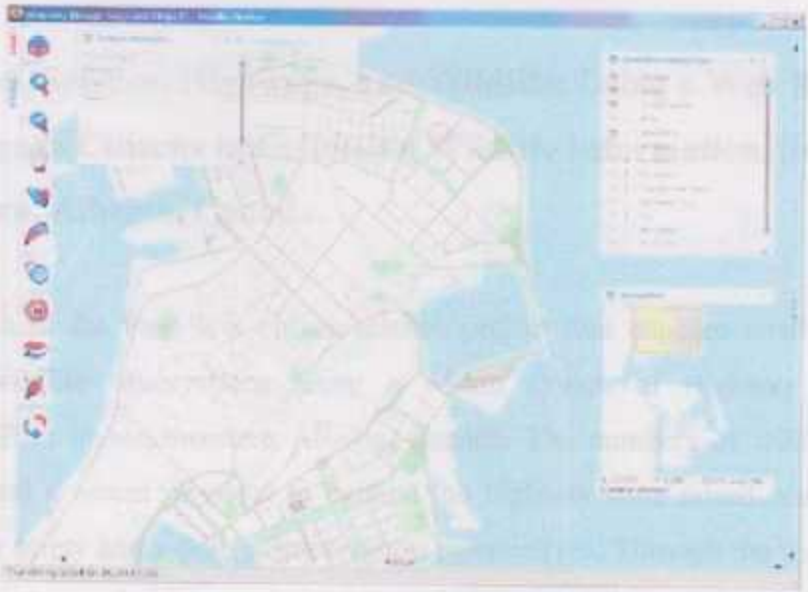


Figure (3- 1): Web Based SVG Map System User Interface with Map of Macau, GIS Development, 2008

3.2 Citizen, Science, Highways, and Wildlife: Using a Web Based GIS to Engage Citizens in Collecting Wildlife Information, South western, Alberta, Canada.

Road Watch in the Pass is a citizen-science project that engages local citizens in reporting wildlife observations along a 44-km stretch of Highway 3 through Crowsnest Pass in southwestern Alberta, Canada. The numbers of wildlife vehicle collisions and a recent proposal to expand the highway have raised concerns from both human safety and wildlife conservation perspectives. Through the use of a web-based GIS, interested citizens can contribute information that will be instrumental in making final decisions concerning measures to mitigate the effects of highway expansion. Currently, 58 people have contributed over 713 observations to Road Watch. We performed a preliminary comparison of 11 months of Road Watch observations and wildlife mortality data for the same time period to demonstrate that the use of citizen science not only augments more conventional approaches, but also results in the emergence of new knowledge and insights. A Kappa index of agreement of 14% indicates poor agreement between the data sets, highlighting that wildlife successfully cross the highway in areas not identified by the wildlife mortality data. This has important implications for design and mitigation efforts for Highway 3 and other roadways. As a figure(3-2).

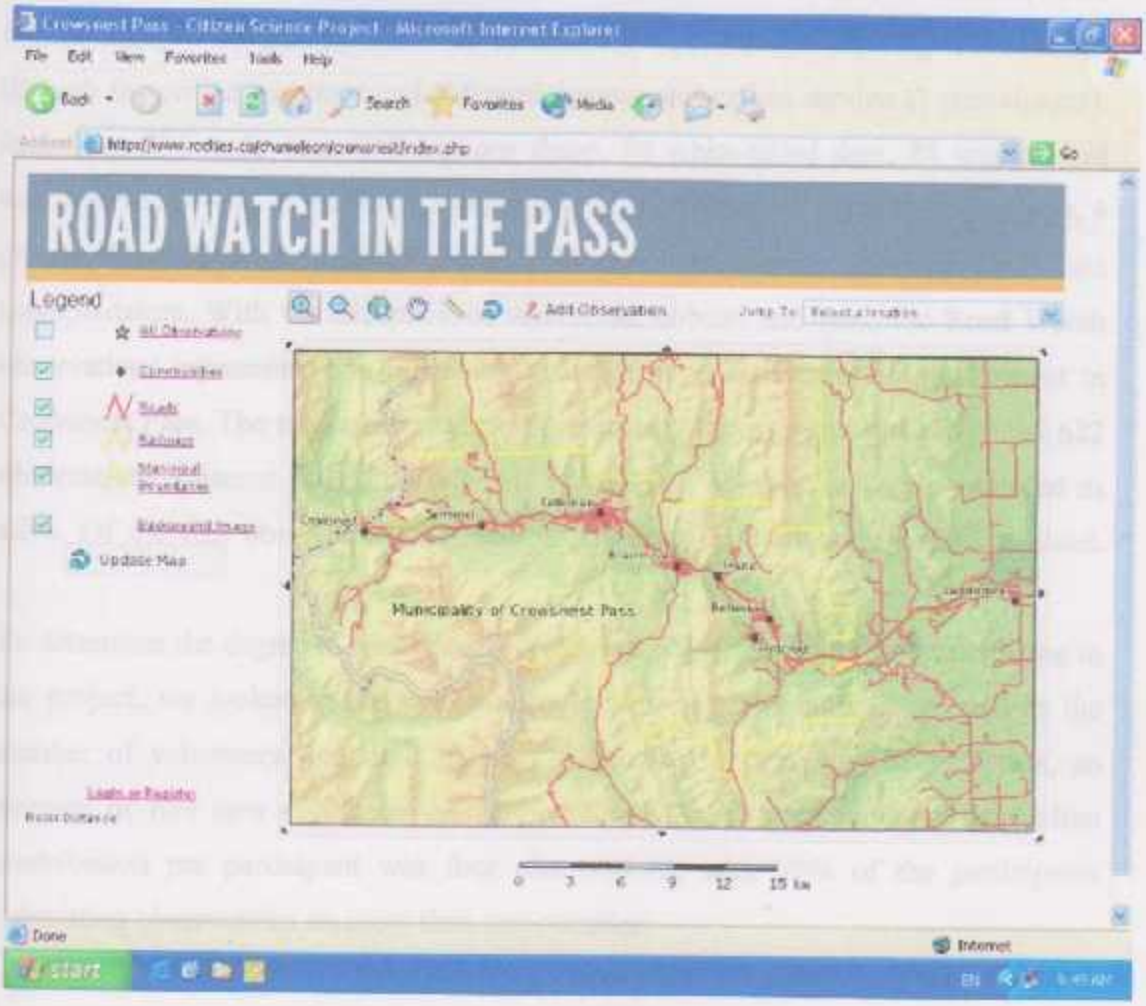


Figure (3-2): Road Watch Online GIS Interface

Road Watch was officially launched in November 2004. In the first 11 months, *Road Watch* engaged 58 participants who contributed 713 wildlife crossing observations through the online mapping tool (56 participants) and call-in service (2 participants), including: 286 mule deer, 118 bighorn sheep, 88 white-tailed deer, 88 unidentified deer species, 36 elk, 32 moose, 3 mountain goat, 12 coyote, 12 black bear, 6 cougar, 4 grizzly bear, 3 wolf, and 25 other wildlife observations, including birds and mesopredators. With the exception of wolverine, bobcat, and lynx, the Road Watch observations represented the full compliment of large mammals that are present in Crowsnest Pass. The total observations represented 94 crossing observations and 622 observations adjacent to Highway 3. All 94 crossing observations were recorded as alive. Of the 622 observations adjacent to Highway 3, 34 were recorded as dead.

To determine the degree to which Road Watch has engaged citizens in participating in the project, we looked at the total number of observations entered, as well as the number of volunteers that used the tool more than once. Since its inception, an average of five new volunteers has joined Road Watch each month. The median contribution per participant was four observations, with 70% of the participants submitting observations on more than one occasion.

3.3 Google Maps

Google Maps (for a time named **Google Local**) is a free web mapping service application and technology provided by Google that powers many map based services including the Google Maps website, Google Ride Finder and embedded maps on third-party websites via the Google Maps APL It offers street maps, a route planner, and an urban business locator for numerous countries around the world.

A related product is Google Earth, a standalone program for Microsoft Windows and Linux which offers enhanced globe-viewing features.

Features

Google Maps features a map that users can pan (by dragging the mouse) and zoom (by using the mouse wheel). Users may enter an address, intersection or general area to quickly find it on the map.

Users can also search for businesses and attractions (for example, theatres, restaurants and hotels) in or near a given place. For example, a user can enter a query such as "Waffles in Ottawa" to find restaurants serving waffles near the city.

Like many other map services, Google Maps can generate driving directions between any pair of locations in the United States and Canada and within certain other countries. It shows turn-by-turn instructions, an estimate of the trip time, and the distance between the two locations. Since July 2007, a user can drag any point on the route to another location to add a waypoint, and instantly see the revised route and length while dragging.

Starting November 21, 2007, users with a Google account can adjust the location of markers for businesses and other destinations. According to a video posted on "YouTube" "Sometimes a location can be a little off on a map and your friends can't find you. Now you can fix that." If a user moves the marker by more than 200 meters, the change must go through moderation before it appears online.

Google Maps offers five viewing modes by default: Map (topographic and street map), Satellite (satellite and high-resolution aerial photographs), "Terrain" (geographic features in high relief with street overlay), Street View, this feature was introduced on May 30, 2007. (ground level 360 degree view of certain streets), and Traffic' (traffic maps).

The "link to this page" link on each Google Maps map targets a URL which can be used to find the location on the map at a later time. The latitude and longitude can be used as input to NASA World Wind or TerraServer-USA, which in some cases have higher-resolution imagery.

Implementation

Like many other Google web applications, Google Maps uses JavaScript extensively. As the user drags the map, the grid squares are downloaded from the server and inserted into the page. When a user searches for a business, the results are downloaded in the background for insertion into the side panel and map - the page is not reloaded. Locations are drawn dynamically by positioning a red pin (composed of several partially-transparent PNGs) on top of the map images.

The technique of providing greater user-interactivity by performing asynchronous network requests with Javascript and XMLHttpRequest has recently become known as Ajax. Maps actually uses XmlHttpRequest sparingly, preferring a hidden IFrame with form submission because it preserves browser history. It also uses JSON for data transfer rather than XML, for performance reasons. These techniques both fall under the broad Ajax umbrella.

The GIS (Geographic Information System) data used in Google Maps are provided by Tele Atlas and NAVTEQ, while the small patches of high-resolution satellite imagery are largely provided by DigitalGlobe and its QuickBird satellite, with some imagery also from government sources. The main global imagery base called NaturalVue was derived from Landsat 7 imagery by MDA Federal (formerly Earth Satellite Corporation). This global image base provides the essential foundation for the entire application.

Extensibility and Customization

As the Google Maps code is almost entirely JavaScript and XML, some end-users reverse-engineered the tool and produced client-side scripts and server-side hooks which allowed a user or website to introduce expanded or customised features into the Google Maps interface.

Using the core engine and the map/satellite images hosted by Google, such tools can introduce custom location icons, location coordinates and metadata, and even custom map image sources into the Google Maps interface. The script-insertion tool Greasemonkey provides a large number of client-side scripts to customize Google Maps data, and the mygmaps.com website provides an interface for easily adding your own set of locations and viewing them on Google Maps.

Combined with photo sharing websites such as Flickr, a phenomenon called "memory maps" emerged. Using copies of the Keyhole satellite photos of their home towns or other favorite places, the users take advantage of image annotation features to provide personal histories and information regarding particular points of the area.

CHAPTER FOUR

Data Preparing

This chapter explains data and information collected for important places and sites in Hebron city. It also includes data transfer, digitizing and creating of attributes tables in GIS environment. This chapter includes the following items;

4.1 Overview

4.2 Hebron Municipality Data

4.3 Create Geospatial Data

CHAPTER FOUR

Data Preparing

4.1 Overview

This project includes several informations about important places in Hebron city. It includes information about schools, hospitals, universities, Streets (centerlines of streets) and buildings.

4.2 Hebron Municipality Data

An image of Hebron Tourist map was obtained from Hebron Municipality, figure (4-1). This image was registered and georeferenced to Palestine 1923 Grid system using the georeferencing tools of ArcMap Software at Palestine Polytechnic University GIS lab.

Schools, hospitals and universities shapefiles were created and their features were digitized from the georeferenced Hebron Tourist map.

Two additional shapefiles were obtained from Hebron Municipality; these are streets and Buildings shapefiles.

4.2.1 Information about Schools

Information about schools such as name, location, level of school, number of students, number of classes, number of teachers, and name of streets and schools, are obtained from Ministry of Education Directorate at Hebron city, table (4-1).

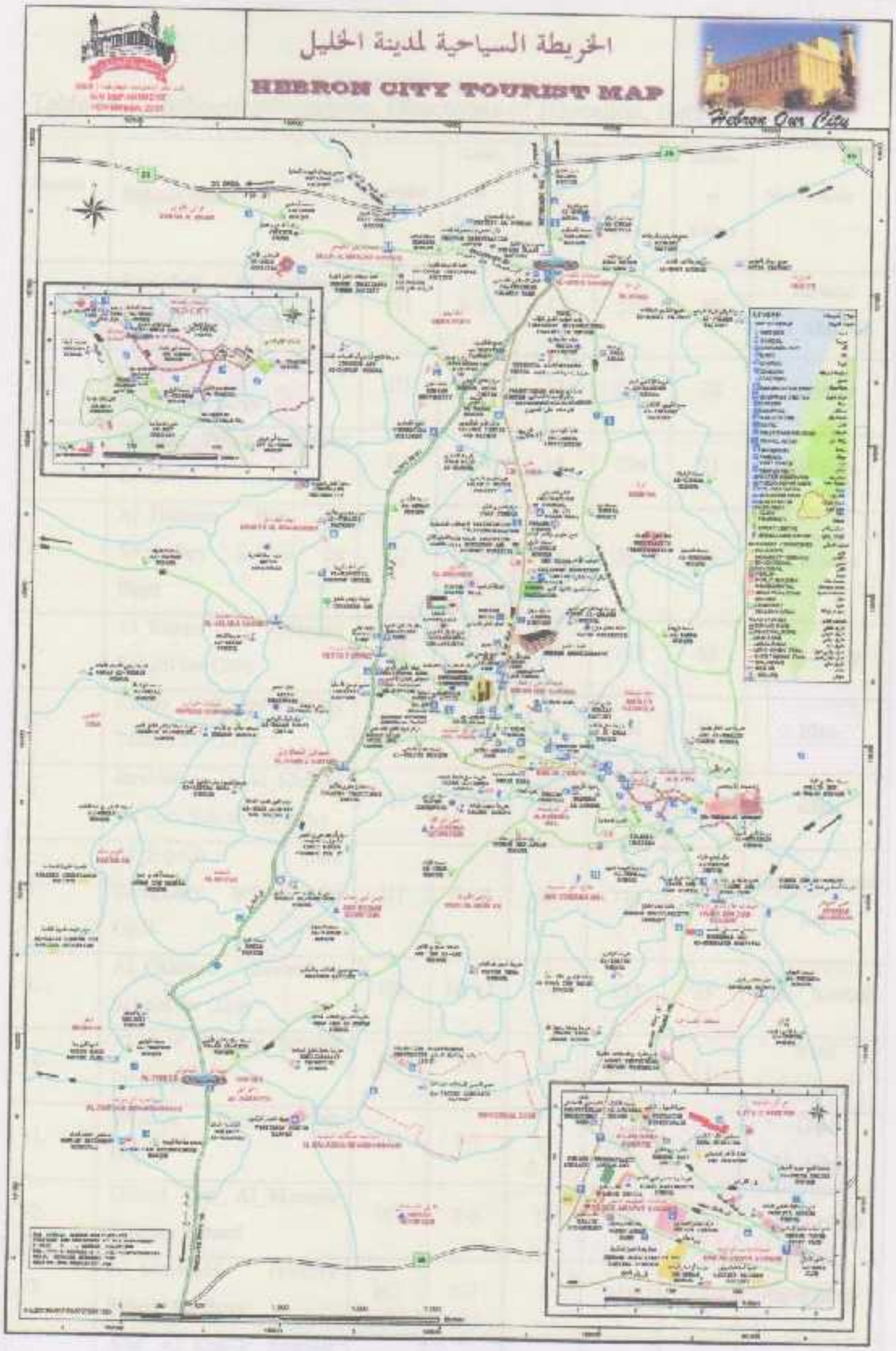


Figure (4-1): Hebron Tourist Map, Hebron Municipality, 2007

Table (4-1): Schools Information, Directorate of Education, Hebron, 2008

Number	School name	Location	Level of School	Number of Classes	Number of Student	Number of Teacher	Name of Street
1.	Rushdiya Al_Muhtaseb Primary school for Girls	H1	8-11	13	507	20	Adwaa' Al_Madenh
2.	Al_Aashden Secondary School for Boys	H1	8-12	17	635	28	Namera
3.	Barakat Primary School for Girl	H1	5-8	14	596	21	Ein Sara
4.	Al_Hussein Bin Ali Secondary School for Boys	H1	11-12	18	750	32	Ain Sara
5.	Al_Rayan Primary School for Girls	H1	1-10	21	788	30	Al_Jalada
6.	Rabae Al_Shreef Primary School for Girls	H1	1-9	11	341	16	Eisa
7.	Ibrahim Al_Khaleel Primary School for Boys	H1	6-10	20	754	30	Eisa
8.	Al_Sayeda Sara Secondary School for Girls	H1	6-12	21	774	32	Eisa/Al_mansher
9.	Al_Okhowa Secondary School for Girls	H2	10-12	14	572	25	Jabal_Korbaj
10.	Al-Nasr Primary School for Girls	H2	1-6	8	209	11	Wadi Al_Qadi
11.	Wasaya Rsol Allah School	H2	1-7	17	591	23	Om Al_Adaly
12.	Osama Ibn Al_Monqez Primary School	H2	1-6	16	585	22	Jabal Jawhar
13.	Al_Mutanabi Primary School for Boys	H2	1-7	7	217	11	Haret Jaber
14.	Abd Al_Khalik Yagmor secondary School for Girls	H2	5-12	13	408	21	Haret Al_Shaik

15.	Fahed Al_Qwasma Primary School for Boys	H1	1-6	18	669	25	Haret Al_Shaik
16.	Widad Naasr Al_deen Secondary School for Girls	H1	11-12	20	824	35	Al_Manara
17.	Jabal Al_Rahma Secondary School for Girls	H2	6-12	19	685	28	Jabal Al_Rahma
18.	Salhab Primary School for Girls	H2	1-7	14	437	21	Jabal Al_Rahma
19.	Hikmaty Al_Muhtaseb Secondary School for Boys	H1	11-12	13	549	24	Shortet Al_Hawoz
20.	Omar Ibn Al_Khtab Primary School for Girls	H1	1-10	13	507	19	Wadi Al_Hareya
21.	Yassen Taha Primary School for Girls	H1	1-7	14	487	20	Wadi Al_Hareya
22.	Municipality Technical School	H1	11-12	0	0	0	Wadi Al_Hareya
23.	Al_Zaatre Primary School for Boys	H1	1-9	16	566	24	Haret Abu Sunaina
24.	Tarek Ibn Ziad Secondary School for Boys	H2	10-12	18	677	31	Al_Sahleh
25.	Al_Nahda Primary School for Boys	H1	1-9	17	565	24	Haret Abu Sunaina
26.	Ibrahim Abu Al_Dabaat Secondary School for girls	H1	5-11	14	517	23	Abu Ktalah
27.	Om Ammar Primary School for Girls	H1	1-6	6	131	9	Bab Al_Zawya
28.	Khadeja Abdeen Secondary School for Girls	H1	10-12	14	531	25	Bab Al_Zawya
29.	Al_Yakaza Primary School for Girls	H2	1-9	14	426	20	Al_Zahed
30.	Kurtuba Primary School for Girls	H2	1-10	10	99	16	Al_Dabawea

4.2.2 Information about Hospitals

There are four hospitals within Hebron city, these are:

1) Al-Ahli Hospital:

Al Ahli Hospital information includes:

- The year of build: 1993
- Owner: Patient's Friends Society.
- Number of Workers: 395
- Number of Beds: 200
- Area: 27000 m^2.

2) Alia Hospital:

Information about Alia Hospital includes:

- The year of build: 1955
- Owner: Palestine Government
- Number of workers: 375
- Number of beds: 182
- Area: 12000 m^2.

4.2.3 Information about Universities

There are three universities within Hebron City, these are:

1) Palestine Polytechnic University (PPU):

This information includes:

- Year of building: 1978
- Number of students: 5000
- Number of collages: 4

2) Hebron University:

This Information includes:

- Year of building: 1971
- Number of students: 5200
- Number of collages: 7

4.3 Create Geospatial Data

4.3.1 Creating Shapefiles

You can create new shapefiles in ArcCatalog. When you create a new shapefile, you must define the types of features it will contain, whether those features will represent routes, areas point or lines. These properties cannot be modified after the shapefile has been created.

The process of defining the new shapefile is separate from creating the shapefile itself. After creating the item, define its attributes by right clicking it in ArcCatalog and clicking Properties. Because it must contain at least one attribute column, Arc Catalog adds a default column to the shapefile when it is created. For shapefiles, an integer column named "Id" is added as an attribute. After the new attributes have been saved as part of the shapefile.

Creating Schools, Hospitals and Universities Shapefiles

1. Select a folder or folder connection in the Catalog tree C:\newjob\students\buildings.
2. Click the File menu, point to New, and click Shapefile, figure (4-2).
3. Click in the Name text box and type schools for the new shapefile, figure (4-3).
4. Click the Feature Type dropdown arrow and click point schools shapefile that shapefile will contain.
5. Repeat the steps 1,2,3,4 to create Hospitals and Universities Shapefiles.

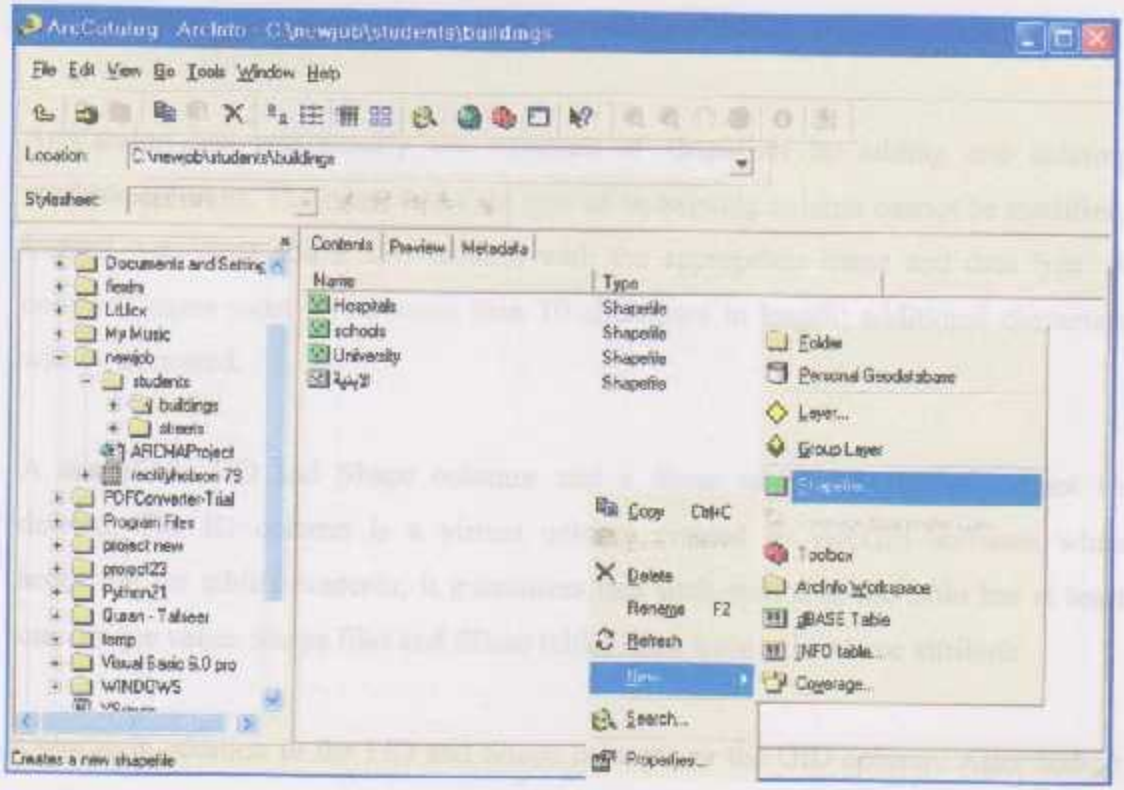


Figure (4-2): Creation Schools Shapefile

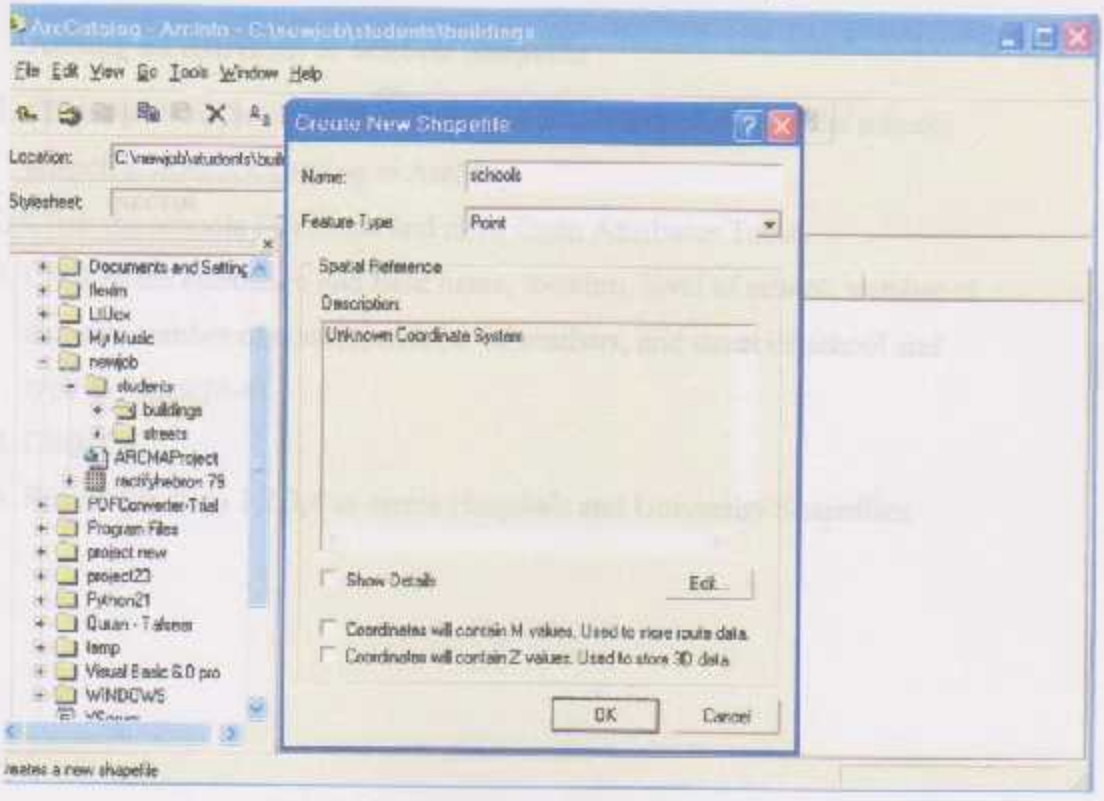


Figure (4-3): Name and Type of Schools Shapefile

4.3.2 Adding Attributes

ArcCatalog lets you modify the structure of shapefiles by adding and deleting attribute columns. The name and data type of an existing column cannot be modified; instead, you must add a new column with the appropriate name and data type. A column's name must be no more than 10 characters in length; additional characters will be truncated.

A shapefile's FID and Shape columns and a dbase table's ID column cannot be deleted. The ID column is a virtual column created by ArcGIS software when accessing the table's contents; it guarantees that each record in the table has at least one unique value. Shape files and dBase tables must have at least one attribute

Column in addition to the FID and Shape columns or the OID column. After adding attributes, you must start an edit session in Arc Map to define their values.

Adding an Attribute to Schools Shapefile

1. Click the Add Data button on the Standard toolbar to add the schools shapefile from ArcCatalog to ArcMap.
2. Click the schools File menu and click Open Attributes Table.
3. Click in the options to add field name, location, level of school, number of student, number of classes, number of teachers, and street of school and type as figure (4-4).
4. Click OK.
5. Repeat the steps 1,2,3,4 to create Hospitals and University Shapefiles.

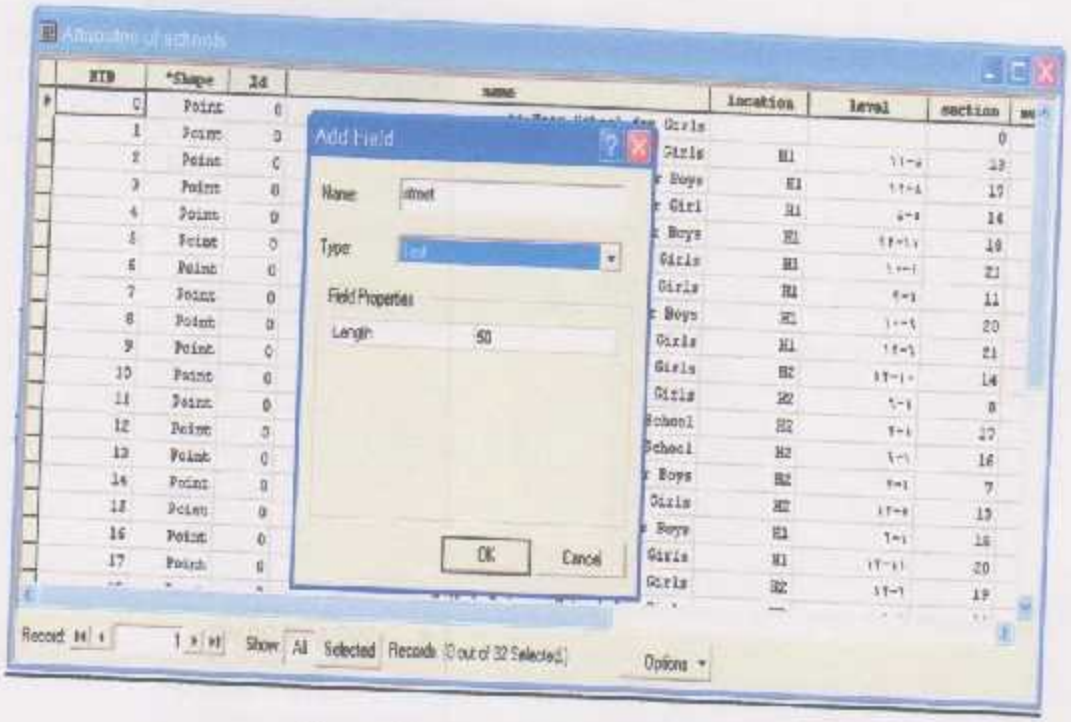
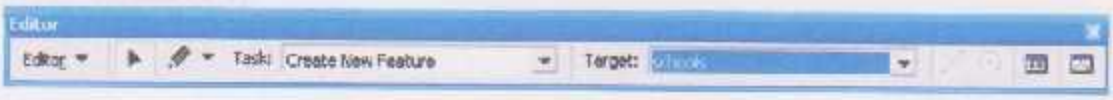


Figure (4-4): Add Fields for Schools Shapefiles

4.3.3 Digitizing Features and Editing Text in Records

1. Click Editor on the Editor Toolbar and click Start Editing.
2. Click the Edit tool .
3. Select in task tab Create New Feature.

4. Click the layer school that contains the features.
5. Use the sketch tool to digitize the schools points locations.



6. Click the Attributes button .

7. Click on the map and of the feature on the schools layer to put data in the attribute data, figure (4-5).

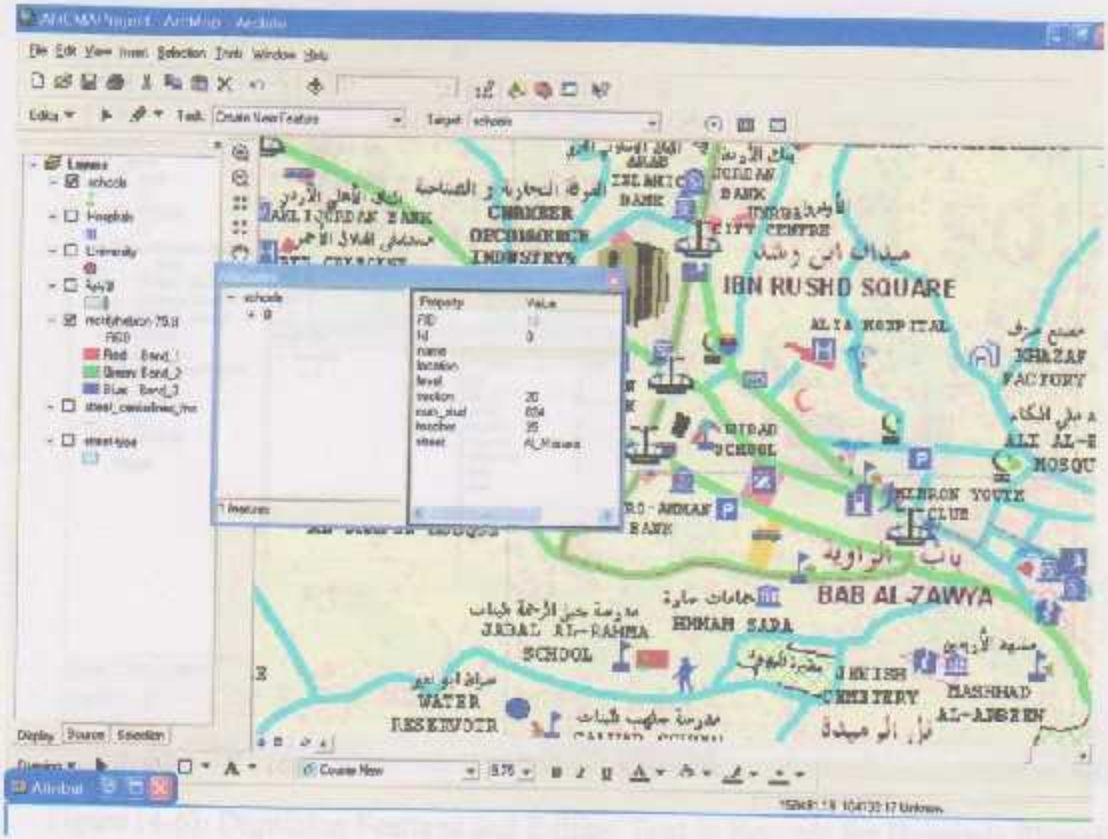


Figure (4-5): Digitizing Features and Editing Text in Records for Schools Shapefile

8. Repeat the steps 1,2,3,4,5,6 to create Hospitals and Universities attribute data, figures (4-6), and (4-7).

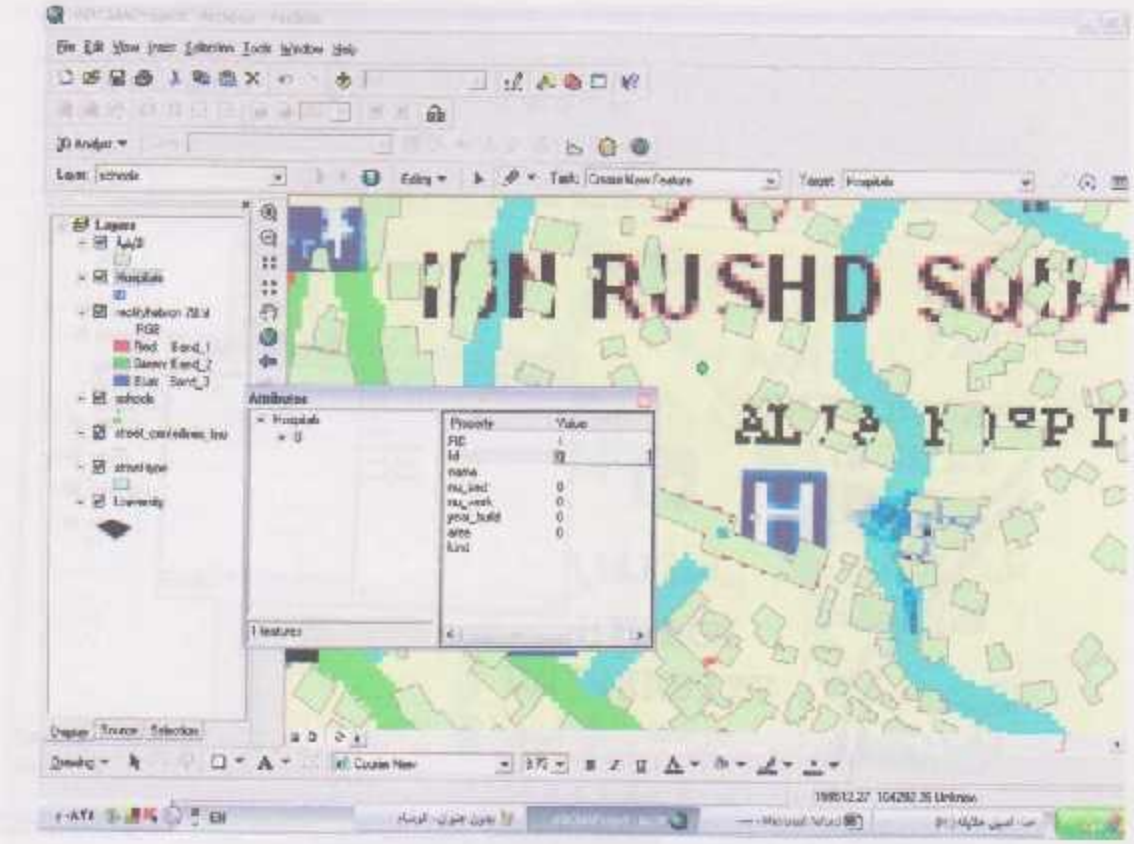


Figure (4-6): Digitizing Features and Editing Text in Records for Hospitals Shapefile

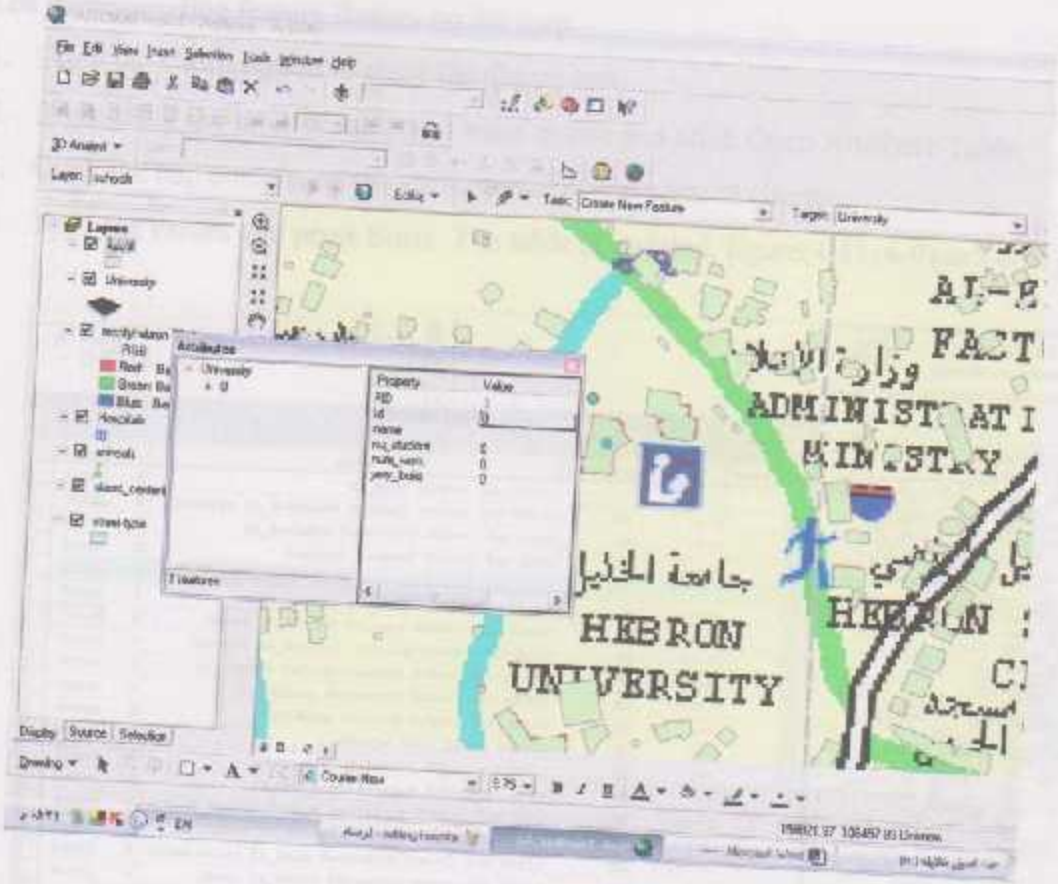


Figure (4-7): Digitizing Features and Editing Text in Records for Universities Shapefile

The corresponding feature flashes on the map.

1. Click the Close button to close the dialog box.
2. Right-click the layer or table you want to edit and click Open Attribute Table.
3. Click the cell containing the attribute value you want to change.
4. Type the values and press Enter. The table is updated, figure(4-8),(4-9)and(4-10).

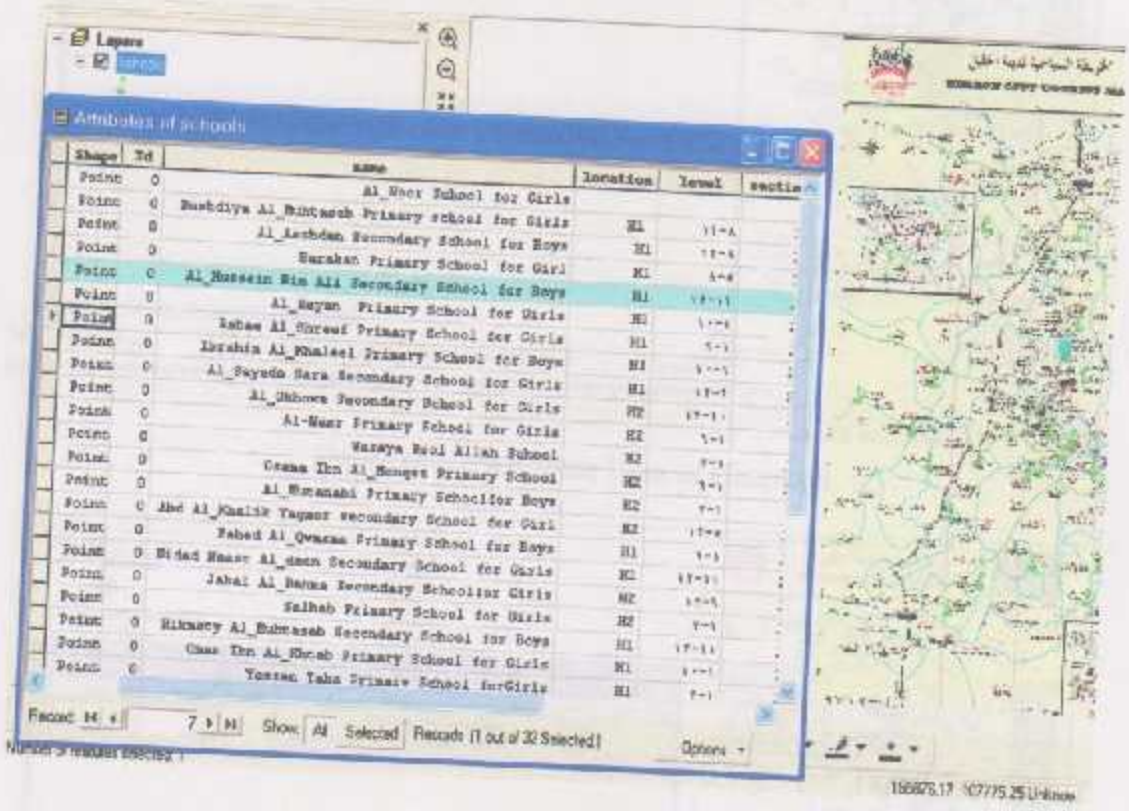


Figure (4-8): Attribute Data of Schools

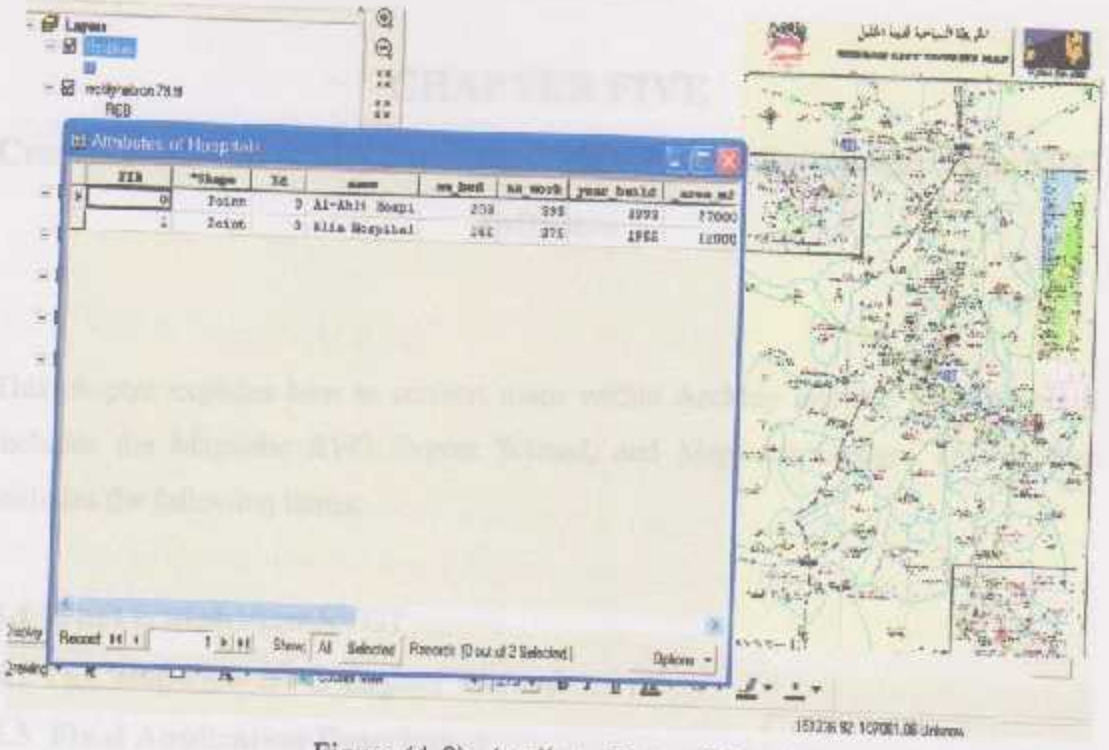


Figure (4-9): Attribute Data of Hospitals

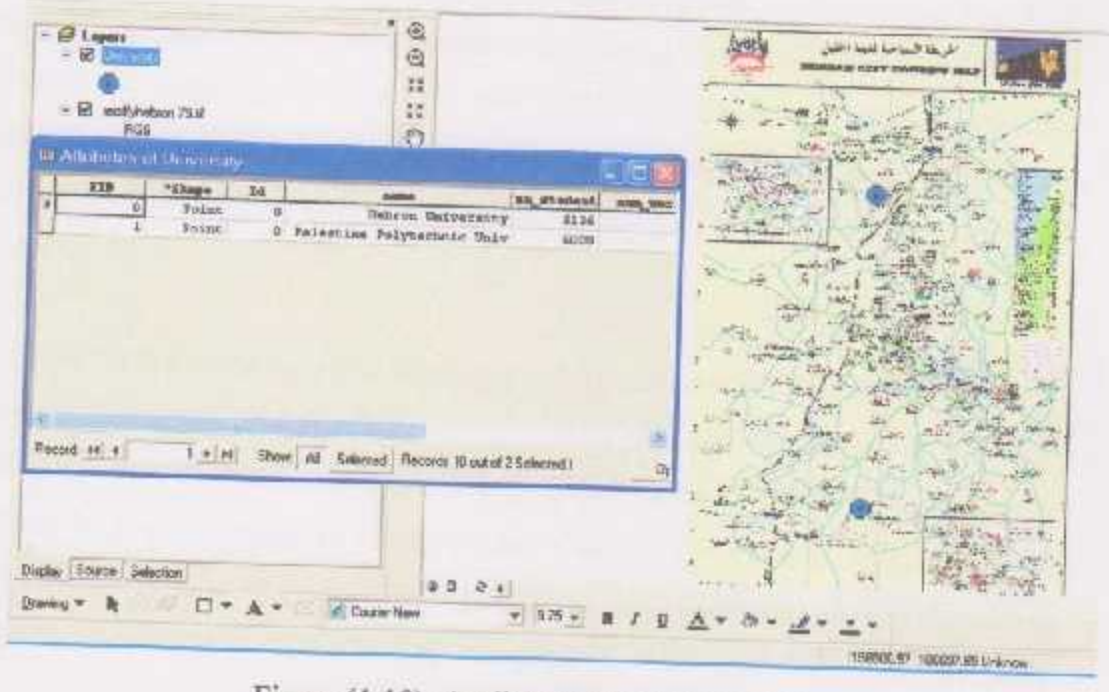


Figure (4-10): Attribute Data of Universities

CHAPTER FIVE

Creating Web Based GIS Map for Hebron City Using MapVeiw SVG Software

This chapter explains how to convert maps within ArcMap into the SVG format it includes the Mapveiw SVG Export Wizard, and Mapveiw Design. This chapter includes the following items;

5.1 What is MapView SVG?

5.2 The MapView SVG Export Wizard

5.3 Final Application Description

CHAPTER FIVE

Creating Web Based GIS Map for Hebron City Using MapVeiw SVG Software

5.1 What is MapView SVG?

Scalable Vector Graphics (SVG) is a recent technology for producing two-dimensional graphics and graphical applications. The SVG technology consists of two parts: the SVG language for specifying graphics and graphical applications; and an SVG viewer for displaying SVG content.

The SVG language is based on (i.e. it is an application of) the extensible Markup Language (XML), and is thus both human-readable and machine-processable. It has the status of a W3C (World Wide Web Consortium) Recommendation. The SVG language provides facilities for document structuring, definition of shapes, painting, clipping and masking, compositing, text manipulation, styling, linking, scripting, animation, interactivity, integration of multimedia content, and others. It is thus a very expressive language for creating rich graphics and highly interactive user interfaces for use on the Web.

The SVG viewer is software that interprets and renders an SVG document. It typically integrates into a web browser, either as a plug-in or as a built-in component. There are several SVG viewers on the market, including the Adobe SVG viewer which can be installed in a web browser as a plug-in, and a native SVG viewer integrated in the Mozilla Firefox web browser. Development on both of these viewers is still in progress in order to achieve full compliance with the SVG specifications.

In scope and capability SVG is similar to Shockwave Flash technology. However, it is different from Flash in being a W3C recommendation, rather than a proprietary technology; in being XML-based, rather than being based on a closed binary format; and in being explicitly designed to work with other W3C standards.

CHAPTER 5 Creating Web Based GIS Map for Hebron City Using MapVeiw SVG Software

Because of the capability of SVG of producing high-quality graphical displays, the ability to develop interactive user interfaces with it, and the ability to manipulate the contents and structure of an SVG document, it is very well suited for developing interactive web-based map applications. Details of our Web-Based SVG Map system are introduced next.

5.2 Creating our Application Using the MapView SVG Export Wizard

Make the data frame of ArcMap Software active when we want to export the map, as in figure (5-1).

Click the "MapView SVG-Export" button or choose SVG Export from the file menu. The MapView SVG export wizard, figure (5-2) will open.

CHAPTER 5 Creating Web Based GIS Map for Hebron City Using MapVeiw SVG Software

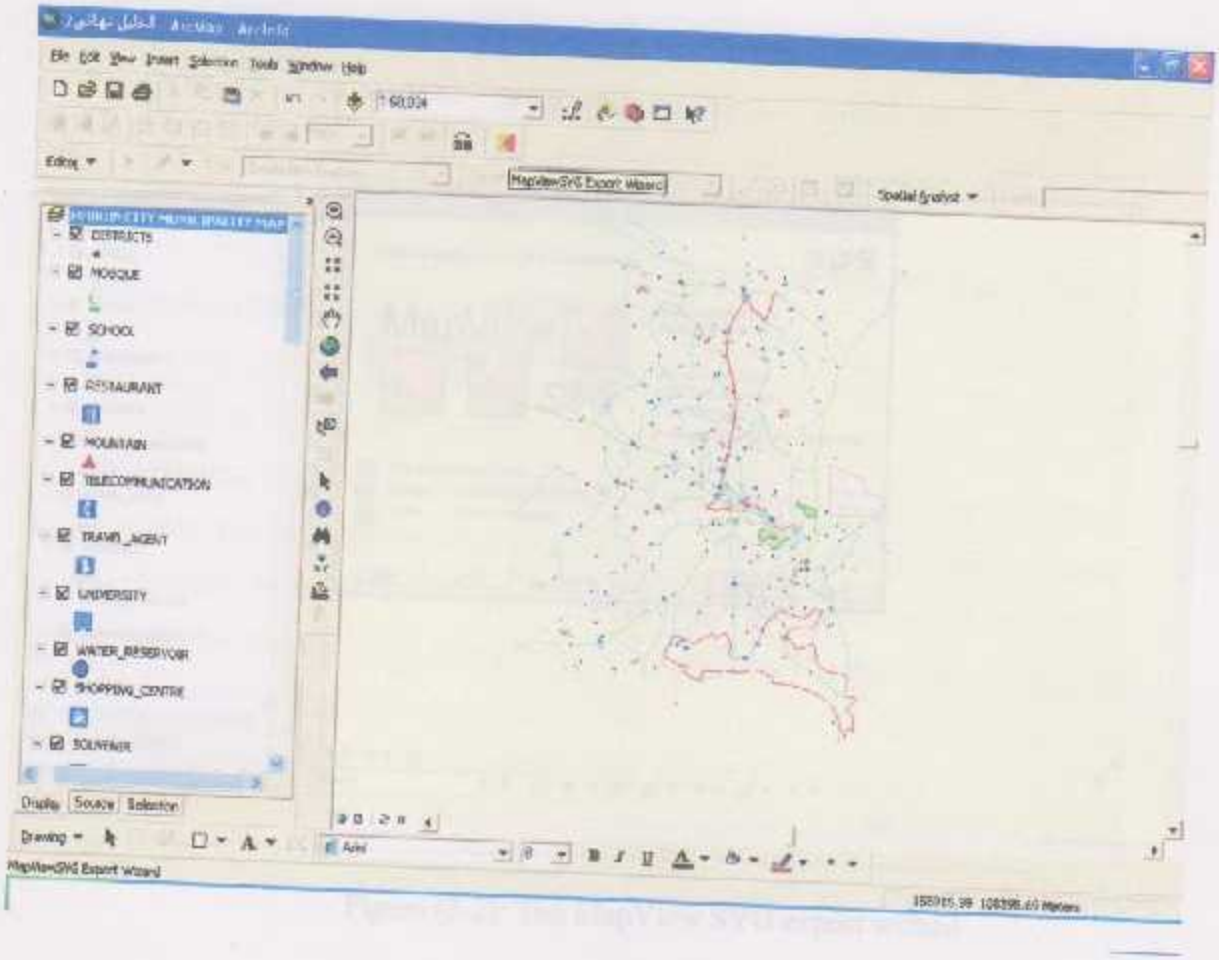


Figure (5-1): Export to Hebron Map

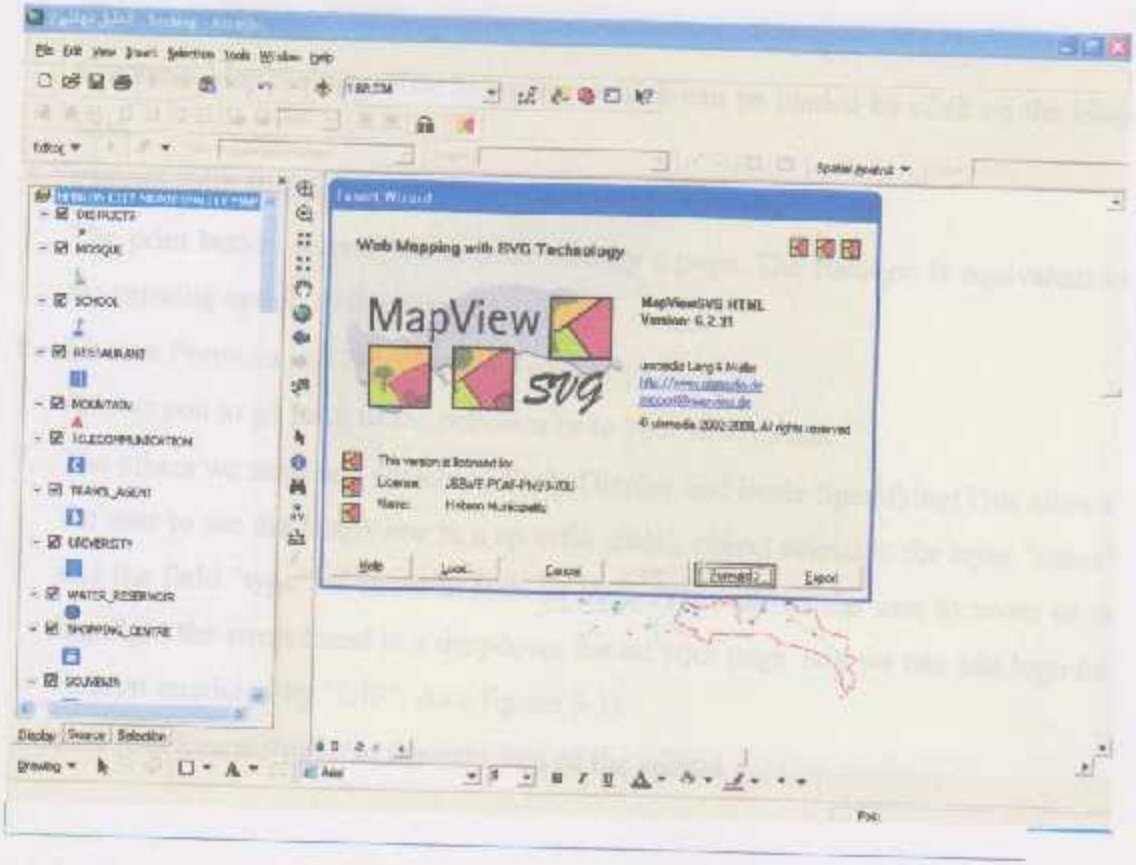


Figure (5-2): The MapView SVG export wizard

- Press forward to go to the next step of the wizard.

5.2.1 The Exports Options and Components Panel

1. Choose HTML – Solution.
2. Choose Measure Tool:

   This allows the user to measure distance on the map. The length is displayed in meters unit.
3. Choose Coordinate Read-out:

   This allows the user to read the coordinates, when he moves the mouse over the map. The coordinates are displayed in the browser status bar or in a textbox. This option needs information about the Map Units.

4. Choose Help Page:

   Creates a MapView specific help page, which can be loaded by click on the Help icon.

5. Choose Print Button:

   The print button allows you to print directly a page. The function is equivalent to the printing option of the browser.

6. Choose Previous and Next Extent Buttons:

   Allows you to go back to the previous or to your next extent.

7. The others we must add scalebar , Scale Display and Scale Specifying(This allows the user to see the MapView in a specific scale), object selection for layer "street" and the field "type" of street in Hebron map, (This allows the user to zoom to or highlight the street listed in a dropdown list on your page. and we can add logo for Hebron municipality "GIF". As a figure(5-3).

   - Press forward to go to the next step of the wizard

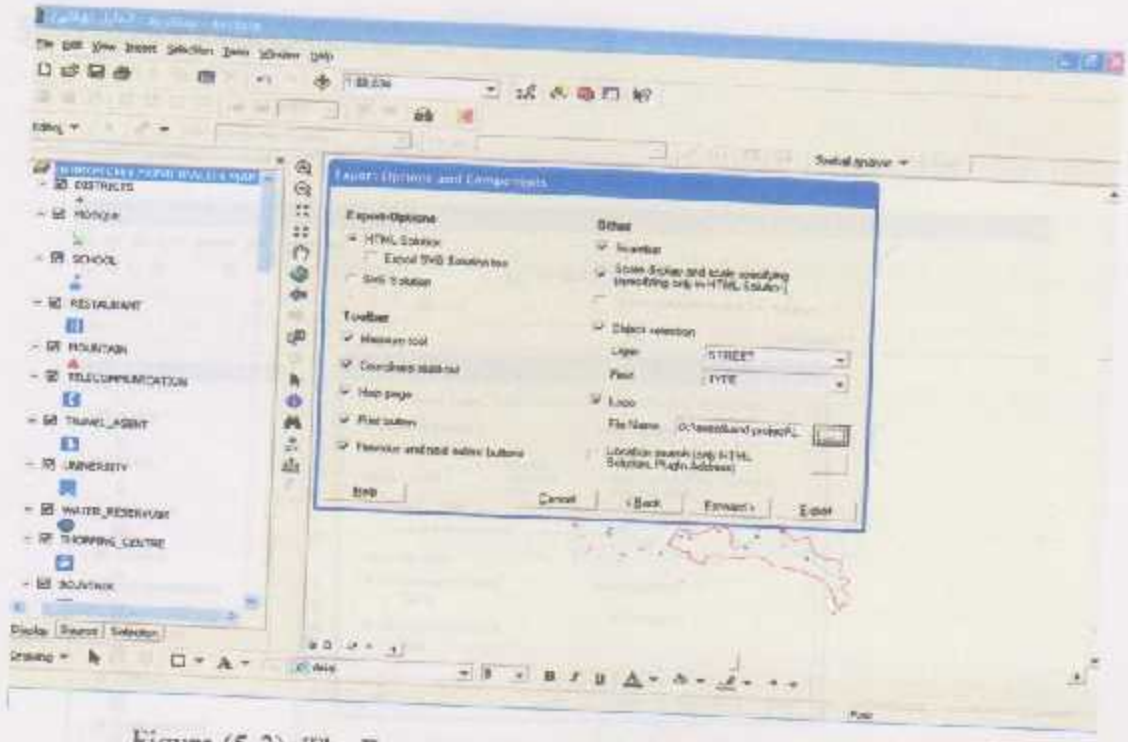


Figure (5-3): The Exports of MapView SVG and Components

5.2.2 MapView Design

This step defines the appearances of MapView.

5.2.3 Map Panel, as figure(5-4).

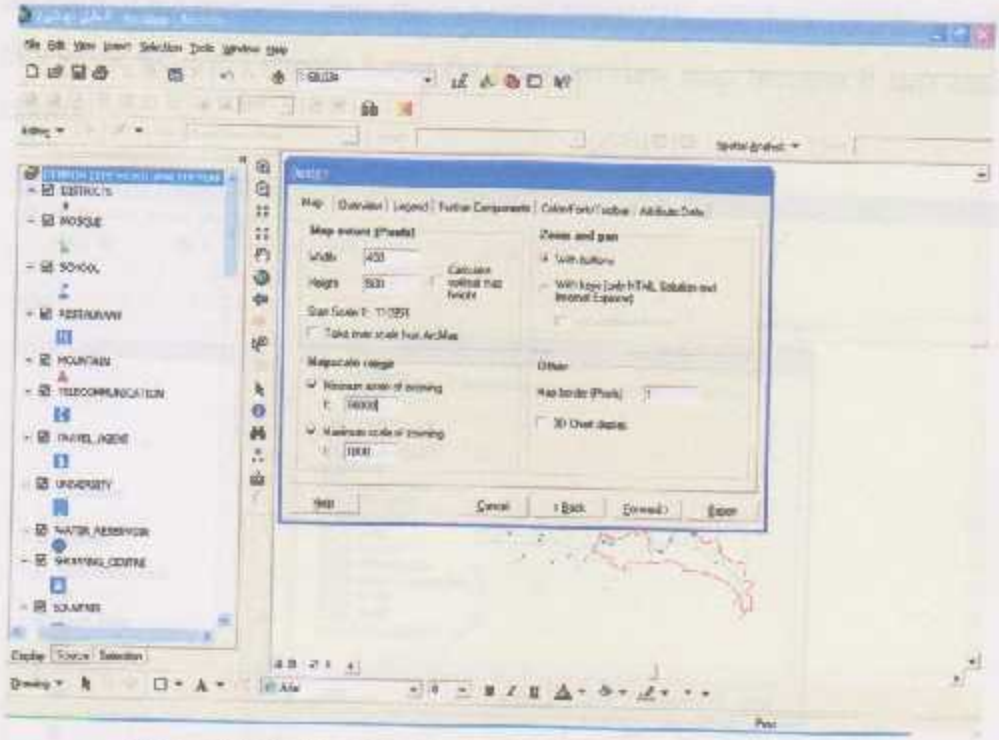


Figure (5-4): The MapVeiw SVG Design for Map Panel

1.In Map Extent (Pixels):

Choose the width of MapView "400" and then Choose the height proper "500" .

2.In Mapscale Range:

Click on the checkboxes to activate the Minimum scale of zooming, then in the box we write 100000. And activate the Maximum scale of zooming, then in the box write 1000.

3.In Zoom and Pan:

Click on the checkboxes to activate the "With buttons" The option "With buttons" works with JavaScript

5.2.4 Overview, figure(5-5)

To creates an overview map which shows the actual extent of the main map. With the help of the overview map, the user can directly change the extent in map but in this work we don't choose Layer for the Overview map because it isn't clear for clients.

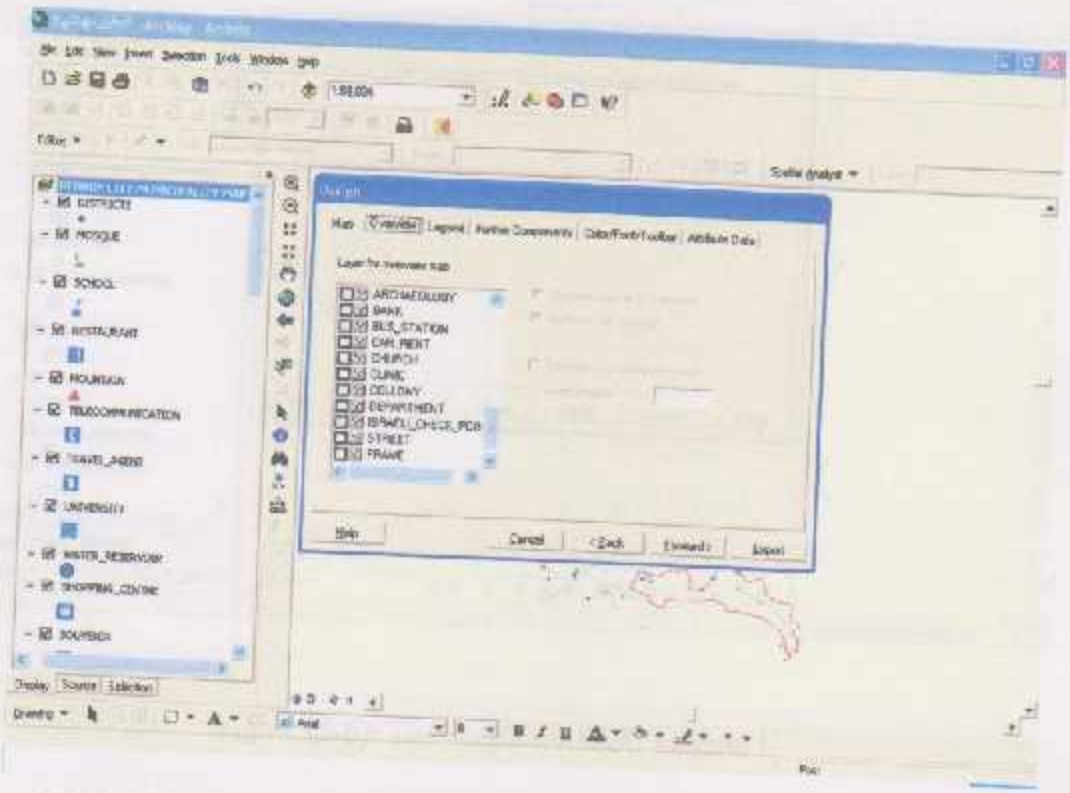


Figure (5-5): The MapVeiw SVG Overview

5.2.5 Legend, as figure (5-6)

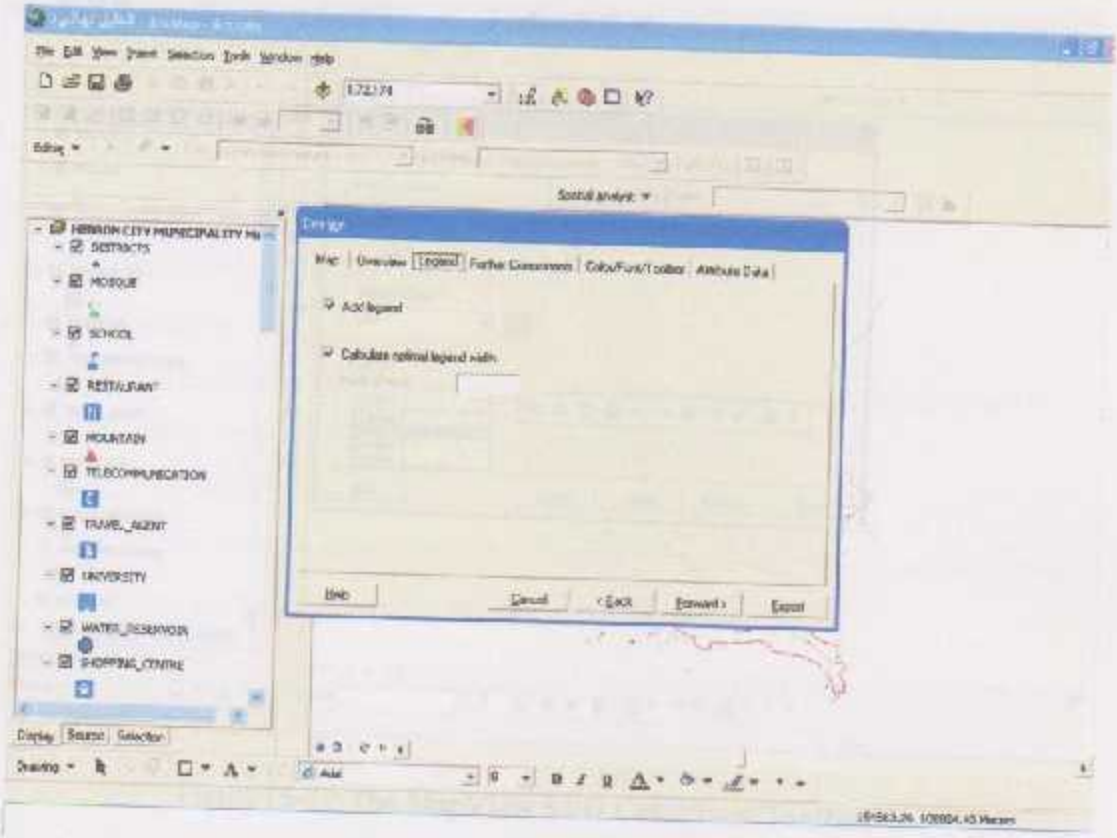


Figure (5-6): The MapVeiw SVG Legend

- Add Legend

To generate a legend, which allow the user to turn on or off the layers in the MapView. We want to choose "Attribute Table" or "Query Builder" later on we should not deactivate this checkbox.

5.2.6 Color/Font/Toolbar, figure (5-7):

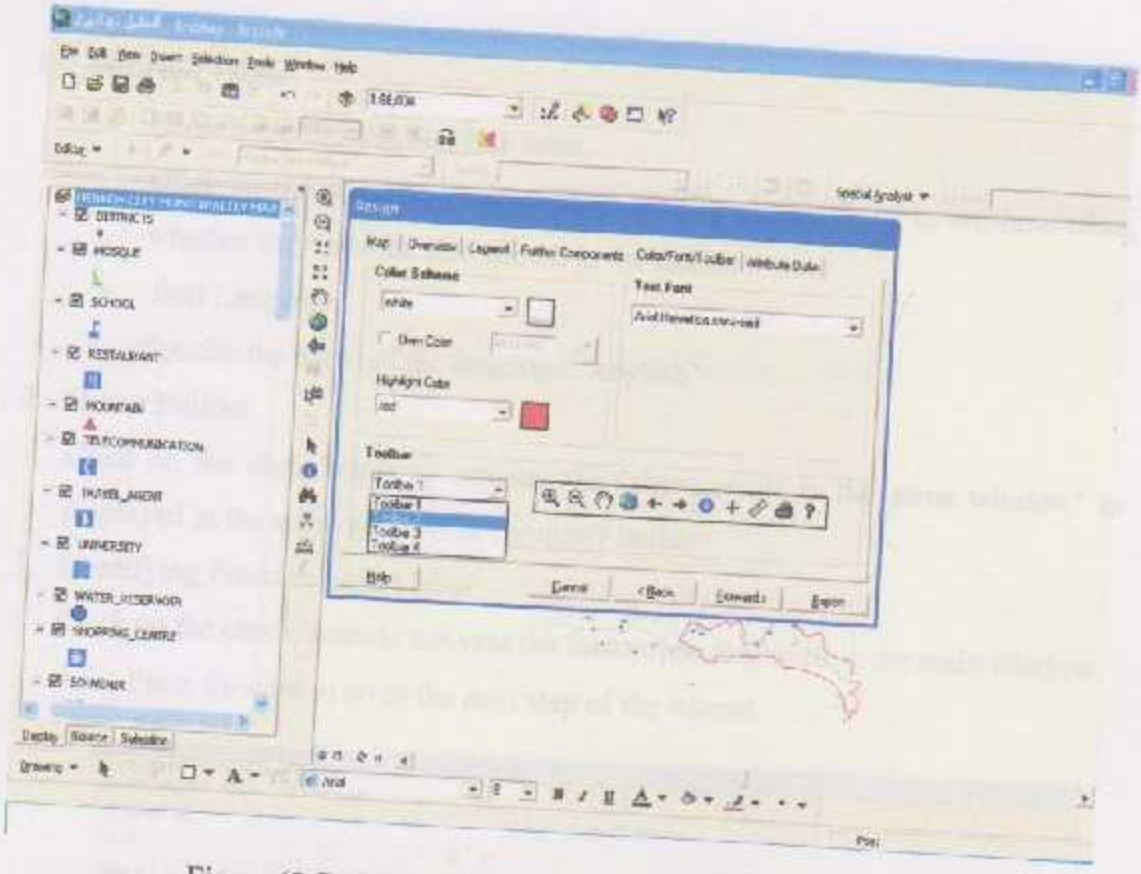


Figure (5-7): The MapView SVG Color/Font/Toolbar.

1. Color Scheme

   Choose white colors for background in the dropdown list . The color will be automatically converted to the WWW specific hex mode.

2. Highlight Color

   This color will be seen, when a ToopTipText is activated or to highlight the particular feature when the attributes will be seen. we choose red color

3. Text Font

   The display in the browser depends upon the fonts that have been installed on the system. We choose (Arial) font.

4. Toolbar; Choose the design of the toolbar. Choose" Toolbar 2"

5.2.8 Layers

This step allows add individual features to the layers of the MapView, figure (5-9).

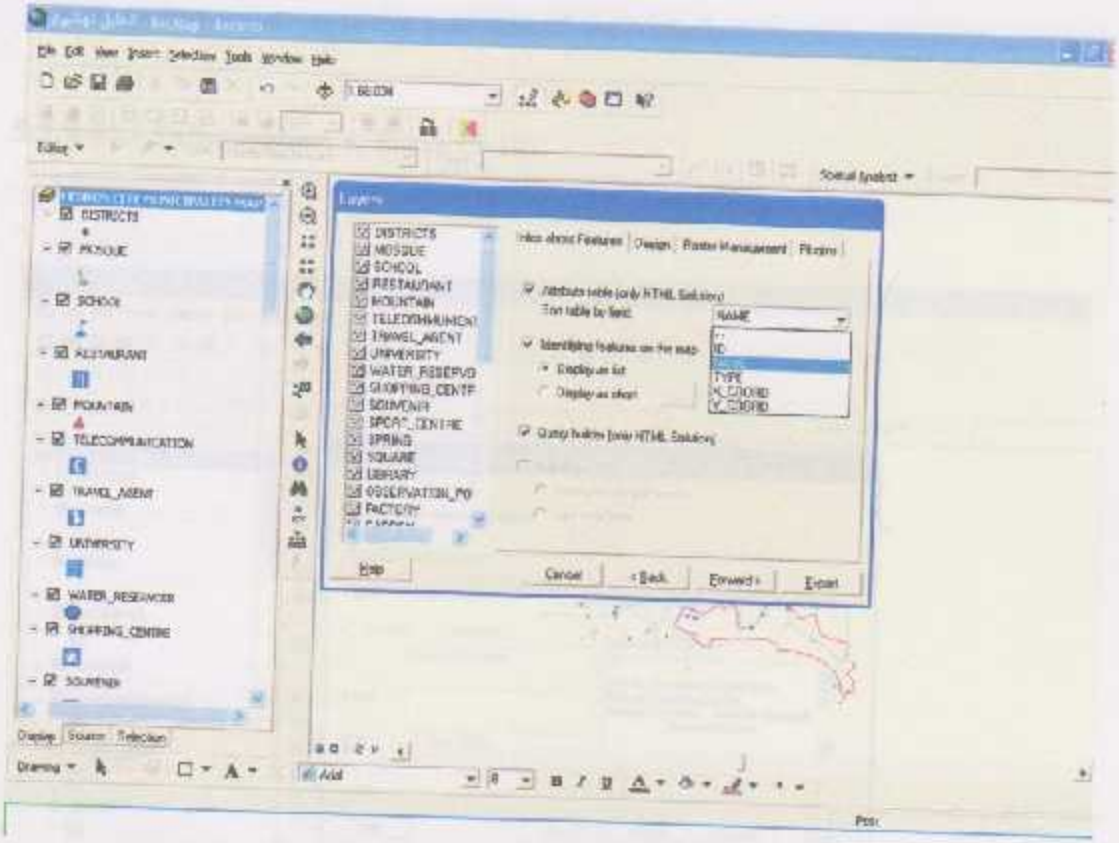


Figure (5-9): The MapView SVG Information about Features

1. Click on one of the layers in the list box and choose the features "MOSQUE".
2. Click on the checkboxes to activate the Attribute Table, Allows you to add an attribute table for each layer. Then click on this icon a new browser window will open with the attributes of all fields you specified in ArcMap then choose field "name".
3. Click on the checkboxes to activate the Identifying Features on the Map (This is equivalent to the Identify tool in ArcMap). When you click on a feature in the map, the attributes of the feature will be displays on the main page, choose as list.

4. Click on the checkboxes to activate the Query Builder.

(This is equivalent to the Query Builder in ArcMap). The query builder icon will be drawn right of the check box in the legend.

5. Repeat the steps 1,2,3,4 to add Information about other layers.

- Press forward to go to the next step of the wizard.

5.2.9 Site Information's, figure (5-10).

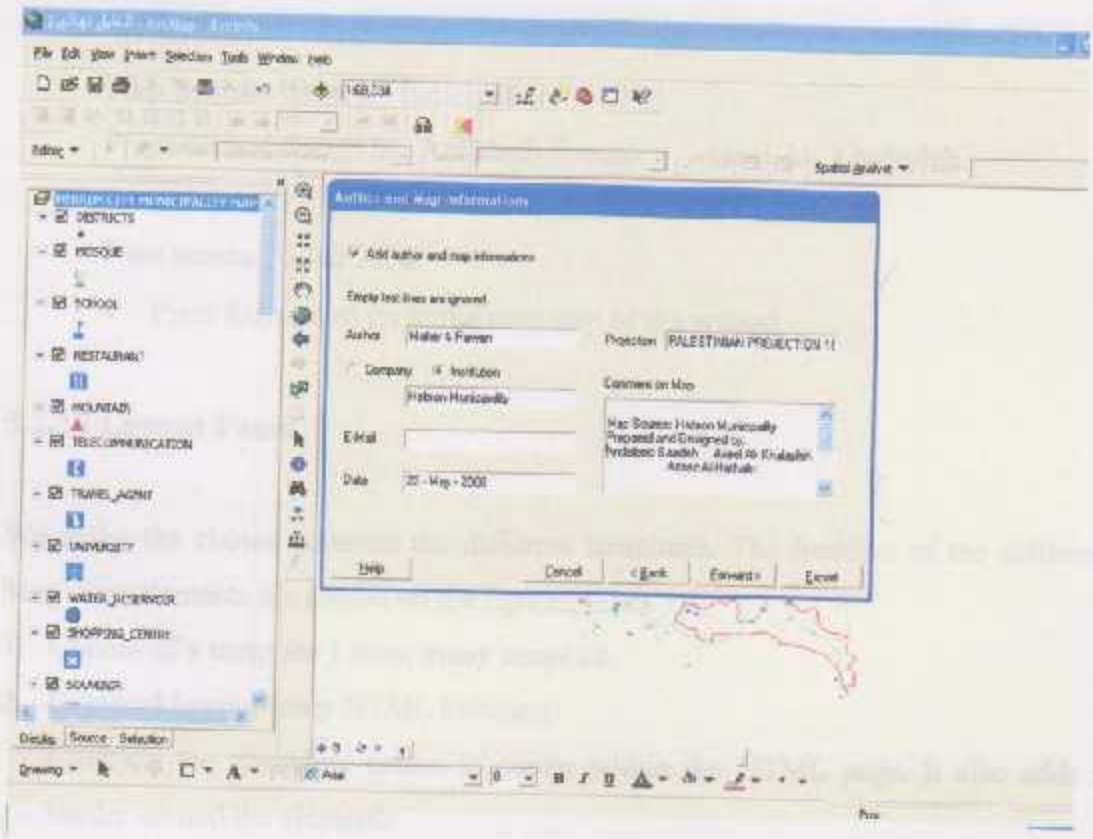


Figure (5-10): The MapView SVG Author and Map Information Panel for this Project

This step allows you to add more information's to your MapView. This author and map information's will be situated on the main page (HTML solution).

1. Click on the checkboxes to activate the " Add author and map information's"

2. In the tag Author:

This information comes from ArcMap "Maher & Rowan" this wrote on this box

3. Click on the checkboxes to activate the "Institution" , write the name of Institution(Hebron Municipality)

4. Date:

The Date of today will be the choice of the program.

5. Projection:

This information comes from ArcMap, (Palestine projection 1923)

6. Comment on Map:

Write:

Map Source: Hebron Municipality

Prepared and design by: Andaleeb Saadeh Aseel Al- Khalayleh

Azeez Al- Alhathalin

Date source 10 Jan 2008.

- Press forward to go to the next step of the wizard.

5.2.10 Layout Panel

We make the choice between the different templates. The location of the different MapView elements are shown on the figure (5-11).

1. Choose of a template 1 from many tamplate.
2. Centered Layout (only HTML Solution)

   Click on the checkbox center to centre within the HTML page. It also adds a border around the elements.

   - Press forward to go to the next step of the wizard

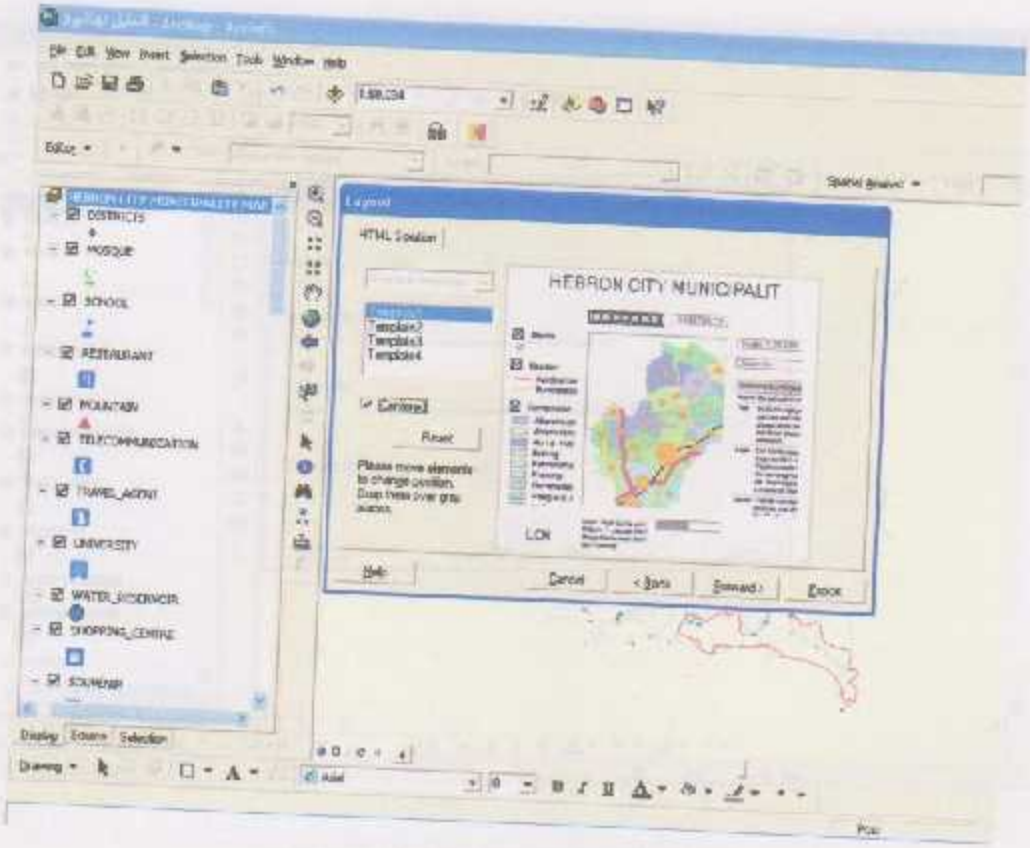


Figure (5-11): Choose of a Tamplet 1

5.2.11 Export Finish

This last step will finish the export figure (5-12).

1. Publication:

Choose English language in which we want to publish the MapView

2. Save SVG Files in the Folder

Choose the path where you want to store your export files. You can do it either by typing the path name in the text field by opening the dialog window with the "..." button. MapView creates a new folder "mapview" by default.

3. Save Settings

Choose a file (.xml), where we want to store the settings for this export. We are typing the path name in the text field by opening the dialog window with the "..." button.

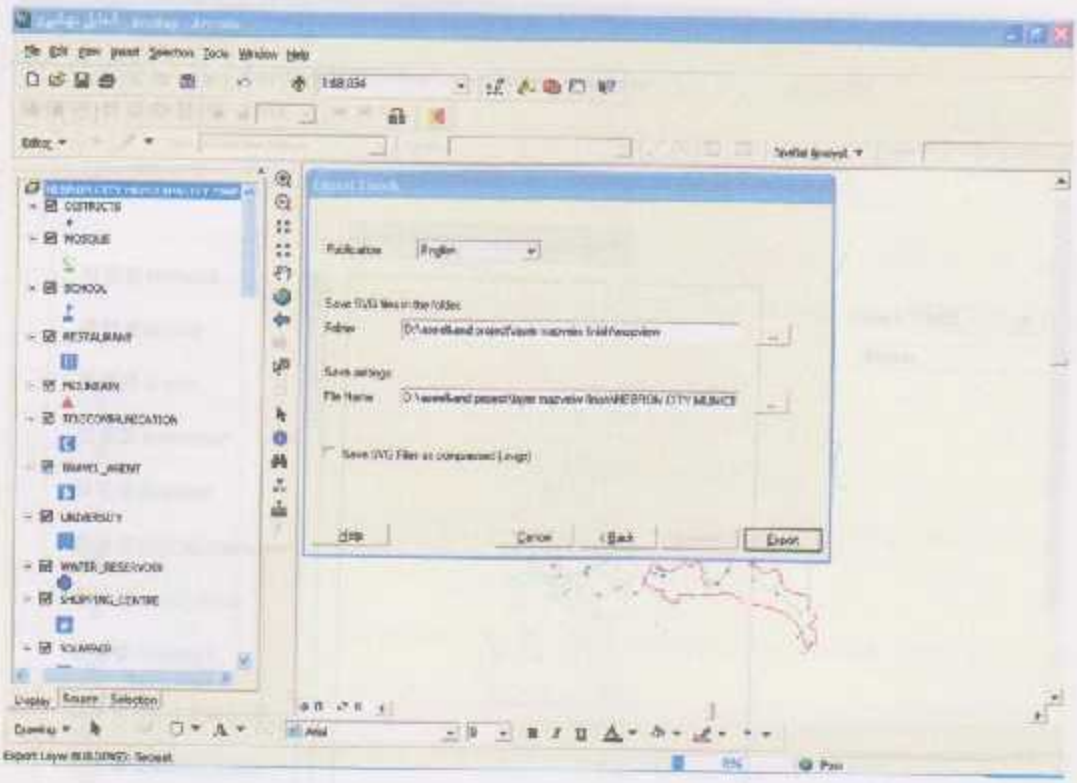


Figure (5-12): Export Finish Panel

4. Press Export to finish the export. The program starts to export the view. The status bar of ArcMap will inform you about the state of export.
When MapView SVG has finished exporting, a message box will inform as Massage Box Conversion Successful.

5.3 Final Application Description

Our Web-Based SVG Map System is a generic map application for use by untrained end users. It presents a map view and several map manipulation and navigation functions. It relies on data in a standard GIS format such as ESRI shapefiles as its input, which it converts into a relational database storage format. A view of the user interface as it appears in the web browser, including a map Hebron City, is shown in figure (5-13).

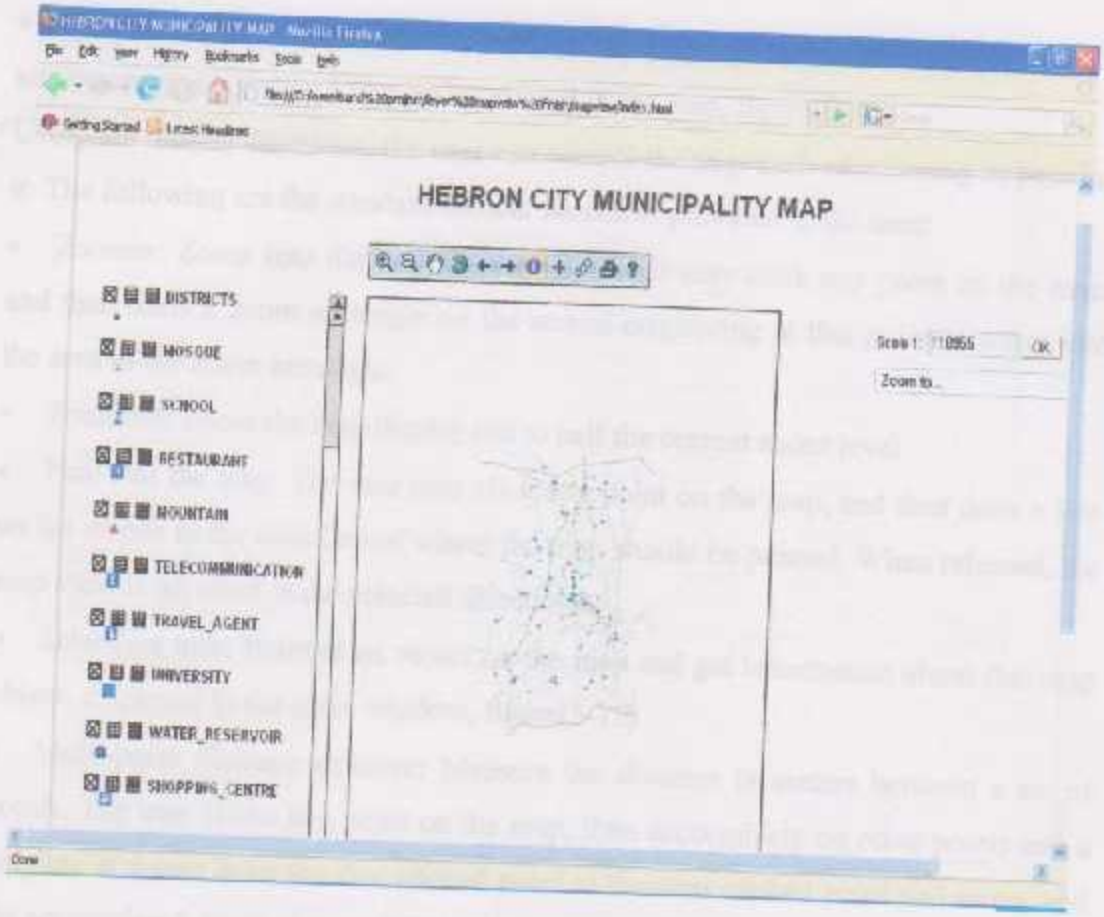


Figure (5-13): Web Based SVG Map System user Interface with Map of Hebron City

The display consists of the following parts:

- Map display area: The map is displayed centered in the main section of the screen.
- Map toolbar: On the top side, a toolbar is displayed for controlling the map. It provides buttons for zooming in and out, panning the map, etc.
- Feature type window: At the left side, there is a list of all feature types (layers) available in the map database. It controls the display of feature types, and the display of information pointed at in the map.

- Feature attributes window: A window displaying values of a map feature's attributes pops up when a feature is selected in the map, figure(5-14)

Using the toolbar functions, the user can control the map such as zooming or panning it. The following are the standard toolbar functions provided to the user:

- Zoomin: Zoom into the map display. The user may click any point on the map, and then draw a zoom rectangle on the screen originating at that point to zoom into the area of the zoom rectangle.
- Zoomout: Zoom the map display out to half the current zoom level.
- Pan: Pan the map. The user may click any point on the map, and then draw a line on the screen in the direction of where the map should be panned. When released, the map view is adjusted in the selected direction.
- Select/get info: Point at an object on the map and get information about that map object, displayed in the same window, figure(5-15)
- Multi-point distance measure: Measure the distance in meters between a set of points. The user clicks at a point on the map, then successively on other points and a polyline is drawn from the first clicked point to the next clicked point and so on, and the accumulated distance to each point is displayed on the map.
- Coordinates: The user clicks at a point on the map, then successively on map data in a selected feature then take a correct coordinate as Palestine Coordinate.
- Toggle feature types window: Show or hide the feature types window.
- Toggle navigation window: Show or hide the navigation window.
- Query Builder : Show or hide the Query Builder, figure(5-16)
- Print map: Print the current map view.

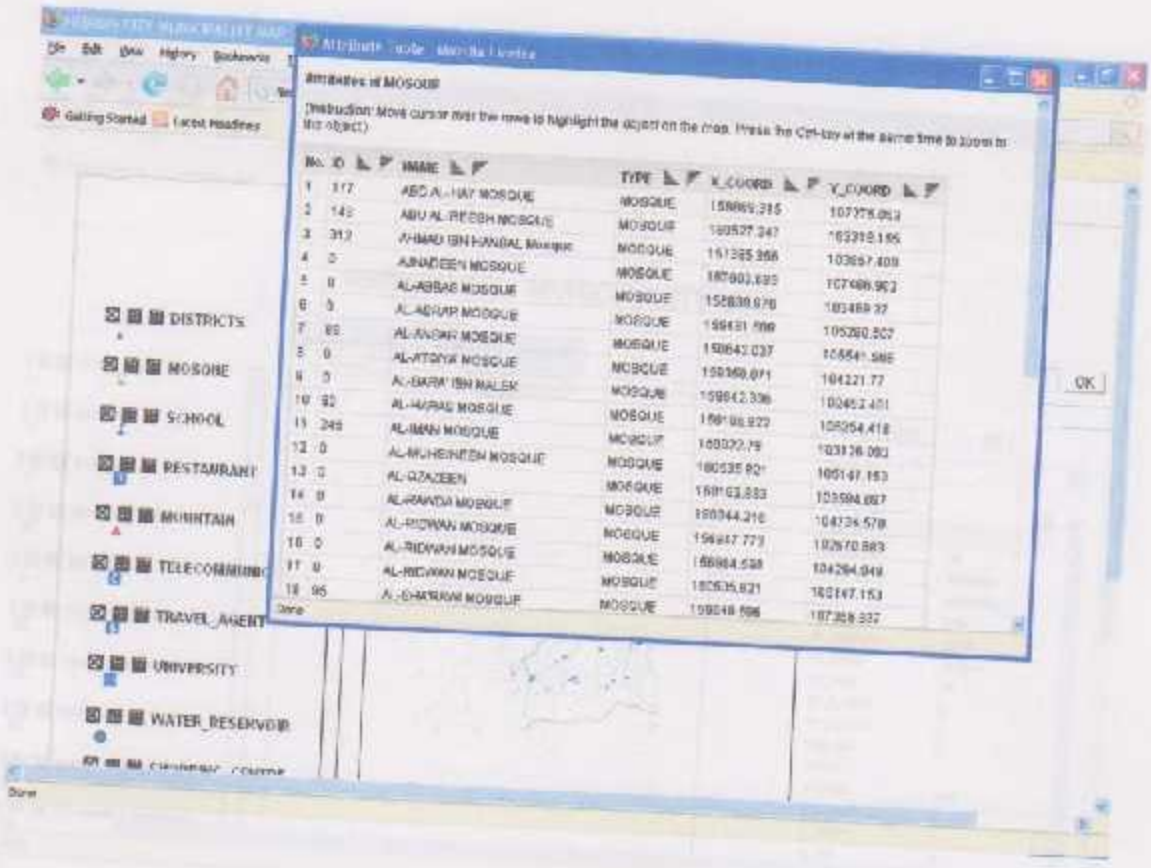


Figure (5-14): Atribute Table for Mosque

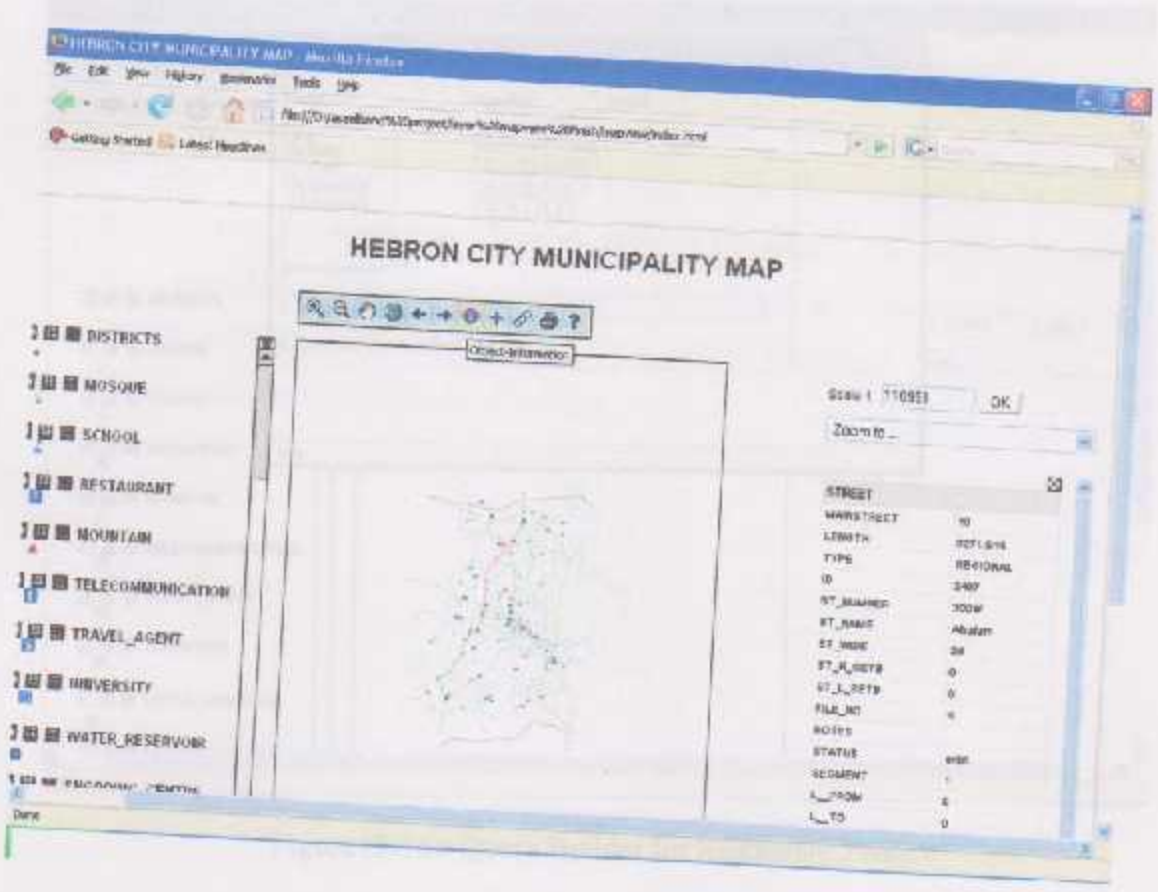


Figure (5-15):Object Identifying for Street Feature

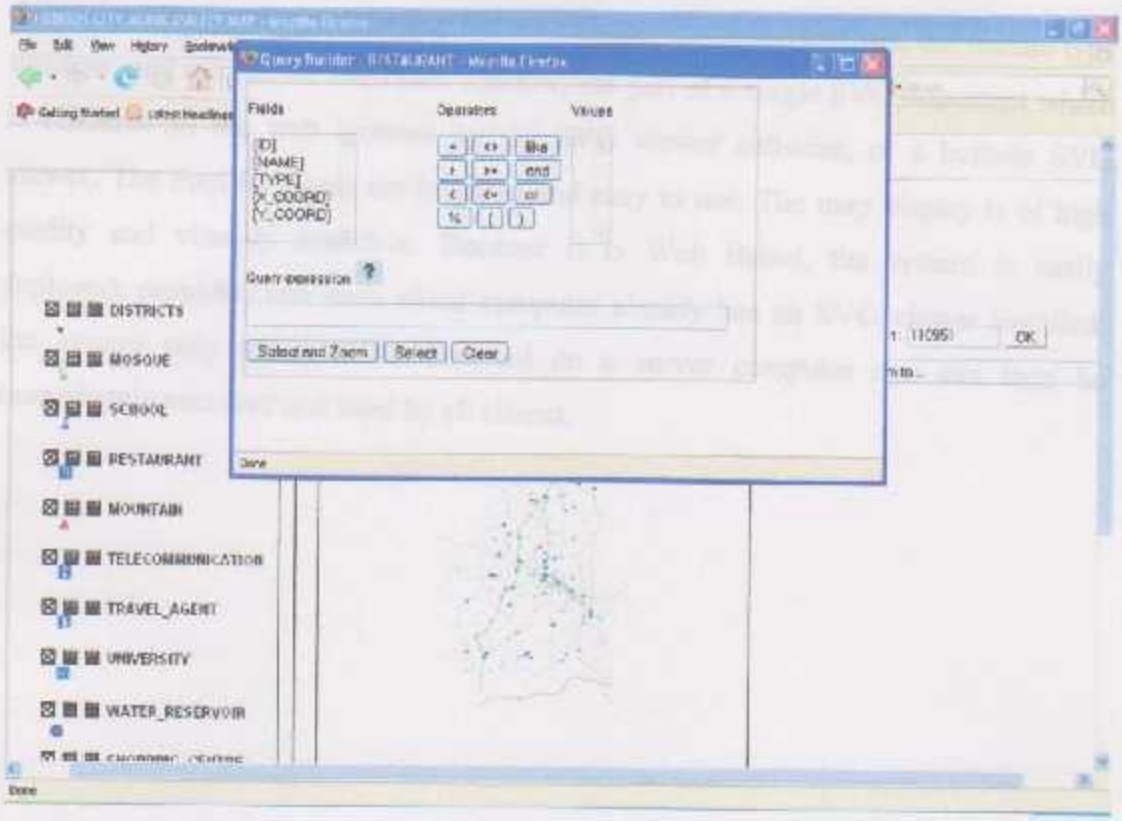


Figure (5-16): Query Builder for Restaurant Feature

CHAPTER 5 Creating Web Based GIS Map for Hebron City Using MapVeiw SVG Software

All of the user interface, including the map display itself, the toolbars, the feature type window, and the feature attributes window, are part of a single SVG document which is rendered in the web browser by the SVG viewer software, or a built-in SVG viewer. The map functions are intuitive and easy to use. The map display is of high quality and visually attractive. Because it is Web Based, the system is easily deployed: provided that each client computer already has an SVG viewer installed, the system only needs to be installed on a server computer and can then be immediately accessed and used by all clients.

CHAPTER Six

Conclusions and Recommendations

6.1 Conclusion

6.2 Recommendations

CHAPTER Six

Conclusion

6.1 Conclusion

SVG is a powerful technology when applied to GIS applications. We have only touched on its capabilities and applicability to GIS in this search.

This project has briefly introduced the functions, design and implementation of our Web Based SVG Map System for Hebron city. We conclude this project a detailed clarification of the results we have reached.

Moreover, it makes it possible to perform certain operations entirely in the client side, resulting in greatly enhanced system responsiveness. We foresee the use of this type of technology to increase in the future as it matures, and for increasingly more GIS systems to be based on it.

Initially our idea was to show the tourist map of the Hebron city - which provided us by the municipality - with all the information needed for this city as a page and download GIS as a connective on the Hebron Municipality.

The final Web Based Application contains

1. Display Area, for displaying the map
2. Toolbar, zoomin, zoomout, etc.
3. Legend for all layers.
4. Hebron Municipality logo.
5. Measure tool for measuring distance.
6. Query tool for query attribute table.
7. Searching tool.
8. Printing tool.
9. Scale adjustment.

6.2 Recommendations

Web based GIS Application area is a new technology which open a new area in it technology using the internet. It is highly recommended to use this technology in our Ministries, Organization and Universities.

References

References

1. Directorate of Education at Hebron city,2008
2. ESRI 2008, Getting Started with SVG, ESRI, Printed in the United States of America.
3. Hebron Municipality, 2008
4. Maher Owaiwi, 2007, Geographic Information System Literature Notes, Palestine Polytechnic University, Hebron- Palestine
5. Peter A. Burrough and Rachael A. MuDonnell, 1998, Principles of Geographical Information Systems, Oxford University Press Inc, New York.

The websites references:

1. ESRI, 2007, what is GIS? , www.gis.com.
2. ESRI, 2007, Desktop GIS (ArcGIS Desktop), www.esri.com.
3. En.wikipedia, 2007, Geographic Information System (GIS), http://en.wikipedia.org/wiki/Geographic_information_system/.
4. En.wikipedia. 2008, Google Map, http://en.wikipedia.org/wiki/Google_Maps#Features#Features
5. Gislounge, 2007, what-is-gis, http://gislounge.com/library/what-is-gis/.
6. Gislounge, 2007,http://gislounge.com/programming/basic-guide-to-arcxml/.
7. GIS Development, 2008, WEB Based GIS, www.gisdevelopment.net/technology/gis/techgis_001a.htm -
8. Mapveiw SVG Web Mapping with SVG(Scalable Vector Graphics)Technology, 2008, Mapveiw SVG, http://www.uismedia.de/mapview/eng/index.html
9. Mapveiw SVG Web Mapping with SVG(Scalable Vector Graphics)Technology, 2008, Mapveiw SVG ,http://www.mapview.de/eng/description/index.html
10. Mapveiw SVG Web Mapping with SVG(Scalable Vector Graphics)Technology, 2008, Mapveiw SVG, www.mapviewsvg.com