Town of Sudbury GIS Strategic Plan
(FY2007 - FY2011)

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EXECUTIVE SUMMARY

Introduction

A Geographic Information System (GIS) is comprised of hardware, software, networks, data, and trained personnel to support the capture, management, manipulation, analysis, and display of geographically referenced data for solving complex municipal management and planning problems, and will result in improved and more efficient public services. The Town of Sudbury has recognized the value of GIS and funded this project to develop an implementation road map which will enable all departments in Town to be able to take advantage of this new technology and establish an enterprise-wide GIS system.

Goals

The goals of this strategic plan are to analyze the existing GIS data, hardware, software, personnel, procedures, and processes; to assess departmental and town-wide GIS needs and priorities; and to establish a roadmap with timelines and estimated costs for successful implementation of a state-of-art town-wide GIS infrastructure over the next five years (FY07-FY11).

A town-wide GIS system, built upon accurate base data, will provide a wide range of benefits, most significant of which are the following:

- It will provide town departments with an updated and accurate information infrastructure and it will enable all town departments to have improved parcel mapping, utility mapping, and institutional, demographic and environmental mapping.
- An updated, comprehensive and accurate land based GIS data base will allow the Town officials to capture recent land use changes and to conduct analyses related to land use, housing and population.
- It will become the catalyst and foundation for the integration of all municipal information systems.
- It will allow sharing of GIS resources across town departments.
- It will allow for more efficient execution of departmental responsibilities, and will enable more informed decision-making.
- It will assist in providing faster and more accurate information to public safety officials to fight crime, and for fire prevention.
- It will provide greatly needed information on the relationships between tax parcels and natural resources such as wetlands and water resource protection areas, which will assist in more efficient management of the town's natural resources and open space.
- It will assist in more efficient management and maintenance of the Town's infrastructure and facilities.
- It will assist in providing improved services to Sudbury residents, and the general public.

Methodologies

Survey forms were developed and used to gather existing data, hardware, software, network and personnel information, user department needs and priorities. They are followed by individual user department interviews. All existing digital data layers have been evaluated and user needs are categorized and prioritized by department and summarized town-wide. Surveys of other communities in Massachusetts have been conducted for this project to serve as benchmarks.

Key Findings

Trough the user needs assessment process to prepare this plan, key findings are the following:

- The Town of Sudbury has a departmental GIS in the DPW and GIS is almost solely used by one engineer.
- There is strong support among Town Departments to implement a town-wide GIS system.
- A number of GIS data layers have been developed in the past by consultants or in-house personnel. However they are from various sources and are not all updated. A number of essential GIS data layers are not available.
- The GIS parcels layer and the Assessor's Computer Aided Mass Appraisal (CAMA) database do not match completely.
- Some of the existing GIS data layers are not accurate enough.
- An accurate, comprehensive and updated GIS data repository is missing for data sharing among all town departments.
- The departmental GIS is maintained by one engineer who has many tasks to complete other than GIS, and who has done a tremendous job serving the GIS needs of that department and others. However this is not sufficient enough to serve town-wide GIS needs. Lack of a full-time GIS coordinator is preventing the Town from taking full advantage of this technology and the investments already made.
- User departments require greater "ease of use" of GIS in order to directly utilize GIS and are lack of GIS software training. Task specific GIS applications are missing.
- No web based GIS applications present.
- Digital plan submission standards and GIS data maintenance procedures are missing.
- GIS is not integrated with other municipal information systems.

Recommendations

Recommendations are made in the following four major areas: GIS Data Development, Application Development, Hardware/Software and Staffing/Training.

GIS Data Development

This report examined the Town's departmental and town-wide GIS data needs and priorities, researched available GIS data from other agencies such as MassGIS, and commercial sites such as Google, Yahoo, MapQuest, and Microsoft. Data development recommendations are made in the areas of base data accuracy, immediate data development strategy, major data development strategy and data maintenance procedures. A base data accuracy of 1"=100' is recommended for the Town. In the short-term, it is recommended to maximize the use of existing GIS data layers, update and reconcile the data bases, obtain and integrate as much applicable data layers from MassGIS as possible, and create a main GIS data repository for data sharing among Town departments. Commercial companies such as Google and Microsoft have recently played a big role in bringing GIS mapping into the main stream through web based tools they have introduced and databases they have acquired and developed. Google Map, Google Earth, Microsoft's Live Local and Virtual Earth provide 2D and 3D visualization, mapping and routing capabilities. Companies like these are to be closely watched to see what the future holds. However at present time, the data they are providing are not detailed, specific and comprehensive enough for a local government such as the Town of Sudbury for its GIS needs. Both Google and Microsoft's web interfaces currently do not have the necessary spatial data editing functions and spatial analytical functions for municipal applications. Accurate base data and other data layers need to be developed for mapping and analyses. The following represents data development recommendations over the next five years:

- Current Year (FY2007): maximize the use of existing GIS data
  a. Convert all existing AutoCAD drawing files and ArcGIS shapefiles maintained by the DPW into a Personal Geodatabase, and share the main data repository among all Town Departments.
  b. Reconcile the GIS parcels data layer maintained by the DPW with the assessor's CAMA database.
  c. Download all applicable MassGIS data layers and incorporate them into the Town's main GIS repository.
- FY2007 – FY2008: Major data development
  a. New fly-over of the entire Town, development of accurate ground controls, and development of 6" pixel size color orthophotography and 2' contours.
  b. Development of planimetrics, including building footprints, water bodies, wet areas, fences, tanks, driveways, docks, street centerlines, pavement edges, sidewalks, parking areas, trails, hydrants, manholes, catchbasins, utility poles, transmission lines, train lines, recreation fields, and many other identifiable physical features from aerial photographs.
  c. Spatial adjustment of existing data layers to match the new base data including parcels, zoning, precincts, histories districts and others.
  d. Scan of all water service tie cards maintained by the Water District.
  e. Development of a fire alarm circuit database, police sectors, school districts, existing school bus routes, speed limits, assessing neighborhoods, and poll locations.
- FY 2009 – FY 2011: Further data development
  a. Recreation facility Inventory
  b. Update of pavement and sidewalk inventory.
  c. Development of historic walks, trails and monuments, historic homes, and cemetery lots.
  d. Scan of historic land plans maintained by the DPW and historic maps maintained by the Town Clerk's Office.

These recommendations and data maintenance procedures are discussed in detail, in Chapter Three, and the estimated costs are itemized, and summarized in Chapter Six.

GIS Application Development

Once the GIS main data repository is built and major data development efforts are on the way, the strategic focus should be shifted to GIS applications development in FY08. An easy to use web GIS application will not only allow users to access GIS data and analysis functions easily, but is also more cost effective than purchasing additional desktop GIS software packages. Public safety task specific applications will enable the police and fire departments to integrate GIS with public safety applications and to gain easy access to GIS.

In FY09, more GIS applications will be developed to integrate GIS with other municipal applications such as the CAMA system, permitting system, document management system, public safety systems and pavement management system. Task specific field data collection applications will enable users to enter real time data and reduce data entry duplications and will enable timely updates of information.

Detailed descriptions of GIS application development are in Chapter Six.

GIS Hardware and Software

Hardware recommendations for the next five fiscal years include a new GIS web server, an E-size color plotter/wide format scanner, an 11x17 postscript color inkjet printer, a new laptop, and four tablet PCs.

Software recommendations for the next five fiscal years include purchasing a copy of web GIS software, a GIS module for assessors and a copy of the enterprise-wide GIS database management program.

The existing 1GB or above network connections between town offices are suitable for GIS applications and the 100MB or lower connections will be slow.

Existing hardware, software and networks are evaluated, needs are identified and new system resources are recommended in Chapter Four. The costs of these recommendations are itemized and summarized in Chapter Six.

GIS Staffing and Training

The hiring of a GIS administrator is crucial. When compare to hiring consultants, the major benefit is the continuity of in-house knowledge with a full-time GIS person. The GIS administrator can take care of most of the in-house ad-hoc mapping needs, tech support needs and the coordination of GIS efforts among departments. The GIS administrator can also coordinate the integration between GIS and other information systems such as the permitting system, document management system, public safety systems and others.

The annual salary range for such a position is recommended to be within $54,000 and $64,000 range and a non-union Grade 12 position is recommended.

Training and Education is extremely important in the implementation of GIS and the deployment of GIS applications. It is recommended to budget $2500 each year for GIS user training. GIS technologies change very quickly and in order to keep abreast of new and emerging technologies, an annual budget of $1500 is recommended for the GIS administrator to attend at least one GIS conference a year.

GIS staffing and training needs are discussed in detail in Chapter Five

Estimated Costs

The total estimated cost for implementation, over the next five fiscal years (FY07-FY11) is $638,900, excluding the salary for a full-time GIS Administrator. The estimated cost for each fiscal year is broken down as the following:
- Year 1 (FY 2007) – $113,900
- Year 2 (FY 2008) – $346,500
- Year 3 (FY 2009) – $113,000
- Year 4 (FY 2010) – $34,000
- Year 5 (FY 2011) – $31,500

The estimated cost for each category is broken down as the following:
- GIS Data Development – $373,000
- GIS Application Development - $128,000
- GIS Hardware/Software - $115,000
- GIS Training/Education - $21,400
- Others - $1,500

These estimated costs are itemized, explained and summarized in Chapter Six.

FY2007-FY11 Town of Sudbury GIS Implementation Plan Estimated Cost Summary

	FY2007	FY2008	FY2009	FY2010	FY2011	Total
GIS Data Development	$ 89,500.00	$ 248,500.00	$ 18,000.00	$ 10,000.00	$ 7,000.00	$ 373,000.00
GIS Application Development	$ -	$ 45,000.00	$ 63,000.00	$ 10,000.00	$ 10,000.00	$ 128,000.00
GIS Hardware/Software	$ 17,500.00	$ 49,000.00	$ 28,000.00	$ 10,000.00	$ 10,500.00	$ 115,000.00
GIS Training/Education	$ 5,400.00	$ 4,000.00	$ 4,000.00	$ 4,000.00	$ 4,000.00	$ 21,400.00
Other General Consulting	$ 1,500.00					$ 1,500.00
Total	$ 113,900.00	$ 346,500.00	$ 113,000.00	$ 34,000.00	$ 31,500.00	$ 638,900.00

Table 6.1 - FY2007 (Year 1) GIS Implementation Plan and Esitmated Costs

FY2007(Year 1) Town of Sudbury GIS Implementation Plan

	Task	Sub Total	General Consulting	Software/Hardware	Training/ Education	Personnel	Q1	Q2	Q3	Q4
			Cost Breakdown				Implementation Time Frame			
	Data Development	**$ 89,500.00**								
1	Build a GIS Main Repository	$ 3,000.00	$ 3,000.00				x			
2	Reconcile the discrepancy between the CAMA file and the GIS Parcels numbering scheme	$ 2,000.00	$ 2,000.00				x	x		
3	Develop 6" pixel size color digital photos	$ 64,500.00	$ 64,500.00						x	x
4	Develop other GIS data layers, maps and applications	$ 20,000.00	$ 20,000.00				x	x	x	x
	Training	**$ 5,400.00**								
5	Pictometry Training (2 sessions and up to 20 people)	$ 1,000.00			$ 1,000.00		x	x	x	x
6	ArcView 9.1 Training (up to 12 people)	$ 4,000.00			$ 4,000.00		x	x	x	x
7	GPS Training (Conservation)	$ 400.00			$ 400.00		x	x	x	x
	Hardware	**$ 7,000.00**								
8	11"x17" Color Laser Printer to be shared by building, DPW, conservation, and planning	$ 4,000.00		$ 4,000.00			x			
9	3 GIS-Ready PCs for the computer training lab	$ 3,000.00		$ 3,000.00			x			
	Software	**$ 10,500.00**								
10	GIS software maintenance	$ 4,000.00		$ 4,000.00			x			
11	GIS Module by Patriot Properties	$ 6,500.00		$ 6,500.00			x	x	x	x
	RFP	**$ 1,500.00**								
12	write an RFP for base data development including new orthos, 2-foot contours and planimetrics	$ 1,500.00	$ 1,500.00				x	x		
	SubTotal:		**$ 91,000.00**	**$ 17,500.00**	**$ 5,400.00**					
	FY2007 (Year 1) Total Funding Request	**$113,900.00**								

Table 6.2 - FY2008 (Year 2) GIS Implementation Plan and Estimated Costs

FY2008(Year 2) Town of Sudbury GIS Implementation Plan

Task	Sub Total	Cost Breakdown				Implementation Time Frame			
		General Consulting	Software/Hardware	Training/ Education	Personnel	Q1	Q2	Q3	Q4
Data Development	$ 248,500.00								
1 DEM and 2' Contours	$ 71,000.00	$ 71,000.00							
2 update planimetrics	$ 140,000.00	$ 140,000.00				x	x	x	
3 align and adjust existing GIS layers to the new base data	$ 20,000.00	$ 20,000.00				x	x	x	x
4 scan 5700 water service cards and link to water system	$ 10,000.00	$ 10,000.00				x	x	x	x
5 Update utility data layers	$ 7,500.00	$ 7,500.00							
Training	$ 4,000.00								
6 GIS Training	$ 2,500.00			$ 2,500.00		x	x	x	x
7 GIS Conference	$ 1,500.00			$ 1,500.00					
Application Development	$ 45,000.00								
8 webGIS Application	$ 15,000.00	$ 15,000.00						x	x
9 Public Safety GIS application	$ 30,000.00	$ 30,000.00							
Hardware	$ 34,500.00								
10 wide-format scanner	$ 10,000.00		$ 10,000.00			x	x		
11 Large Format Plotter	$ 10,500.00		$ 10,500.00				x		
12 webGIS Server	$ 6,000.00		$ 6,000.00					x	x
13 Color laser printer (11x17)	$ 4,000.00		$ 4,000.00						
14 Laptop for the GIS Administrator	$ 4,000.00		$ 4,000.00			x			
Software	$ 14,500.00								
15 GIS Software Maintnenance	$ 4,500.00		$ 4,500.00			x			
16 Upgrade one ArcView to Arc/Info	$ 5,000.00		$ 5,000.00						
17 webGIS Software	$ 5,000.00		$ 5,000.00				x		
Personnel									
18 Full-time GIS Administrator (Non-Union Grade 12)					$54K-$64K	x	x	x	x
Subtotal:		$ 222,500.00	$ 49,000.00	$ 4,000.00					

FY2008 (Year 2) Total Funding Request	**$346,500.00**

One Full-Time GIS Position: Non-Union Grade 12: $54K-$64K

Table 6.3 - FY2009 (Year 3) GIS Implementation Plan and Estimated Costs

FY2009(Year 3) Town of Sudbury GIS Implementation Plan

	Task	Sub Total	Cost Breakdown				Implementation Time Frame			
			General Consulting	Software/Hardware	Training/Education	Personnel	Q1	Q2	Q3	Q4
	Data Development	$ 18,000.00								
1	Recreation Facilities Inventory	$ 10,000.00	$ 10,000.00				x	x	x	x
2	update pavement and sidewalk shapefiles	$ 8,000.00	$ 8,000.00				x	x	x	x
		$ -								
	Training	$ 4,000.00								
3	GIS Training	$ 2,500.00			$ 2,500.00		x	x	x	x
4	Conference	$ 1,500.00			$ 1,500.00		x	x	x	x
	Applications	$ 63,000.00								
5	Integate GIS with the permitting and complaint tracking system	$ 10,000.00	$ 10,000.00				x	x	x	x
6	Integrate GIS with the document management system	$ 10,000.00	$ 10,000.00				x	x	x	x
7	optimize inspection routes	$ 15,000.00	$ 15,000.00				x	x	x	x
8	field applications and syncronization	$ 20,000.00	$ 20,000.00				x	x	x	x
9	Integate GIS with the pavement management system	$ 8,000.00	$ 8,000.00						x	x
	Hardware	$ 12,000.00								
10	Tablet PCs	$ 12,000.00		$ 12,000.00			x	x	x	x
		$ -								
	Software	$ 16,000.00								
11	GIS Software Maintnenance	$ 8,000.00		$ 8,000.00			x	x	x	x
12	ArcSDE	$ 8,000.00		$ 8,000.00						
	Personnel									
13	A part-time GIS Intern position					$10,000	x	x	x	

	Subtotal:		$ 81,000.00	$ 28,000.00	$ 4,000.00	

FY2009 (Year 3) Total Funding Request	$113,000.00		part-time GIS intern	$ 10,000.00

Table 6.4 - FY2010 (Year 4) GIS Implementation Plan and Estimated Costs

FY2010(Year 4) Town of Sudbury GIS Implementation Plan

	Task	Sub Total	Cost Breakdown			Implementation Time Frame			
			General Consulting	Software/Hardware	Training/ Education	Q1	Q2	Q3	Q4
	Data & Mapping	$ 10,000.00							
1	scan historic land plans and historic maps	$ 10,000.00	$ 10,000.00			x	x	x	x
		$ -							
	Training	$ 4,000.00							
2	GIS Training	$ 2,500.00			$ 2,500.00	x	x	x	x
3	Conference	$ 1,500.00			$ 1,500.00	x	x	x	x
	Software	$ 10,000.00							
4	GIS Software Maintnenance	$ 10,000.00		$ 10,000.00		x	x	x	x
		$ -							
	Consulting	$ 10,000.00							
5	Programming & Maintenance	$ 10,000.00	$ 10,000.00			x	x	x	x
	Subtotal:		$ 10,000.00	$ 10,000.00	$ 4,000.00				
	FY2010 (Year 4) Total Funding Request	$ 34,000.00							

Table 6.5 - FY 2011 (Year 5) GIS Implementation Plan and Estimated Costs

FY2011(Year 5) Town of Sudbury GIS Implementation Plan

	Task	Sub Total	Cost Breakdown			Implementation Time Frame			
			General Consulting	Software/Hardware	Training/Education	Q1	Q2	Q3	Q4
	Data & Mapping	**$ 7,000.00**							
1	digitze cemetery lots and link to the cemetery database	$ 7,000.00	$ 7,000.00			x	x	x	x
	Training	**$ 4,000.00**							
2	GIS Training	$ 2,500.00			$ 2,500.00	x	x	x	x
3	Conference	$ 1,500.00			$ 1,500.00	x	x	x	x
	Software	**$ 10,500.00**							
4	GIS Software Maintnenance	$ 10,500.00		$ 10,500.00		x	x	x	x
		$ -							
	Consulting	**$ 10,000.00**							
5	Programming and Data Maintenance	$ 10,000.00	$ 10,000.00			x	x	x	x
	SubTotal By Task Category		**$ 7,000.00**	**$ 10,500.00**	**$ 4,000.00**				
	FY2011 (Year 5) Total Funding Request	**$ 31,500.00**							

CHAPTER 1 - INTRODUCTION

1.1 – Project Background and Objectives

1.1.1 Sudbury's GIS History

More than a decade ago, Massachusetts cities and towns started to employ GIS technologies. These help to provide a wide range of services to residents more efficiently and effectively. The Town of Sudbury is among communities who recognized early on the power of GIS and began to implement a GIS system. Beginning in the Fall of 1993, the Town Planning and Engineering departments worked in collaboration to determine which type of GIS would optimally fulfill the Town's needs. By January of 1994, the DPW, in cooperation with the Planning Board, had developed a Comprehensive Plan and 3-year budget proposal for the development of GIS in Sudbury. The plan called for the installation of an AutoCAD/ArcCad-based GIS server in the Town Engineer's Office, and ArcView workstations in most Town departments. This featured linked network access to the central GIS server and all its data. It would be a user- based maintenance system with no staffing demands. It also recommended the development of the Town's parcel data layer, training for Town staff on the use of ArcView software, and the installation of appropriate hardware and networks. The plan recommended a total of about $82,000, and existing staff time. The Town, Sudbury Foundation, Water District, and the Sudbury Valley Trustees contributed funds. Boston Edison donated their 1991 aerial photography and planimetric information, such as pavement edges and buildings. ESRI donated ArcCad software. No GIS staff position was proposed.

Currently Sudbury's existing GIS data layers are primarily maintained in AutoCad DWG format by the DPW (Engineering) and can be exported to ArcView shapefiles. The data layers include parcels, zoning districts, precincts, historic districts, hydrants, pavement edges, water bodies, buildings, utility poles, water pipes, rail roads, open space and schools. Some data updates and maintenance are done by the Assistant Town Engineer in AutoCAD. Some standard maps and the Assessor's map atlas are created by the same engineer using AutoCAD, and are distributed to other departments and the general public for use. Data is not shared by other departments. In addition to the maps provided by the DPW, the Conservation Coordinator and the Director of Planning and Community Development occasionally use the MassGIS data viewer to look up wetlands, zone IIs, biomap and other natural resource related information. The Police Department uses Pamet Systems as its computer aided dispatching system, and a GIS module called 4th Watch is tied with the Pamet system. The Assessor's Office has upgraded its CAMA system to Patriot Properties, and is considering the GIS module provided by the same vendor. Overall many of the Town's staff understand what GIS can do for them. They are very interested in implementing a town-wide GIS system.

1.1.2 GIS Strategic Plan 2005 Project and Objectives

GIS implementation has been a goal of the Town's for many years. The Town has established mapping capabilities in the DPW, and a certain amount of data layers have been developed. Some layers have been maintained and updated. Currently, many new data layers are needed and existing layers need to be updated continuously. In addition, GIS capability needs to be expanded beyond the DPW and Engineering to other departments. A number of departments have expressed the need for GIS data and training. Others are looking into GIS modules that are offered by their particular information systems, such as the Computer Aided Mass Appraisal (CAMA) system and the Computer Aided Dispatching (CAD) system. In recent years, the Town has also invested in building its IT infrastructure, and has designated a fund for GIS implementation from rental fees

collected from telecomm companies. In order for the Town to proceed with GIS, an updated, comprehensive plan that reflects current technologies and provides a road map is necessary. In the Information Systems Department, funding was allocated in FY06 to hire a GIS consultant to develop a strategic plan. The objectives of such a strategic plan are to analyze the existing GIS data, hardware, software, personnel, procedures and processes; to assess departmental and town-wide GIS needs and priorities; and to establish a roadmap with timelines and estimated costs for successful implementation of a state-of-the-art town-wide GIS infrastructure over the next five years.

1.2 – Basic Concepts of GIS

A Geographic Information System (GIS) is comprised of hardware, software, networks, data and trained personnel. It is designed to support the capture, management, manipulation, analysis, and display of spatially referenced data for solving complex planning and management problems. There are three key elements of a GIS: digital mapping, database management and spatial analysis. When implementing a GIS system in a municipality, GIS should not be just considered a piece of software or a data layer. It should be considered as a whole system that integrates information resources together.

Figure 1.1 - A GIS System (www.esri.com)

1.3 Why does a municipal government need a GIS?

A GIS is a very effective planning and management tool that assists municipal departments in their day-to-day operations and management. It integrates information resources and systems together by geography. A user-friendly GIS can provide department heads and division managers with quick and accurate information for better decision-making. It can allow technical staff to access necessary information easily and quickly, and also allows them to maintain data frequently and efficiently.

There are many applications of GIS in a municipal government. For example, GIS can help a municipal assessor's office improve the ability to perform analyses, based upon a variety of geographic and attribute criteria. It can provide the ability to verify completeness of property assessment records, both as to parcels and structures. It can also improve the efficiency in calculation of re-assessments, and significantly shorten the time frame for planning and executing re-assessments. In addition, it can also provide easy and secure access to parcel and assessment information to users within the town government.

A GIS-based pavement and utility management system can improve the efficiency of the maintenance of a municipality's infrastructure. The improvements will result in a better level of

service to the residents, and the ability to plan and respond to increasing maintenance demands in future years.

GIS can also help a municipal planning department improve the ability to analyze options for land planning and development. It can provide readily available and integrated geographic information, and spatial and analytical functions. It can assist public safety personnel in analyzing crime statistics, and in planning emergency response scenarios. It can help to improve inter-departmental communications mainly involving the sharing of data, and in eliminating duplication. GIS can also help to improve the Town's ability to meet the concerns of individual citizens, while improving community planning and community relations.

Many communities in Massachusetts have embraced GIS technology. As of September 2005, many communities have an operational GIS, some are in the process of building a GIS, while others are planning a GIS.

Figure 1.2 - Massachusetts municipal GIS status. (Source: MassGIS, www.state.ma.us/mgis)
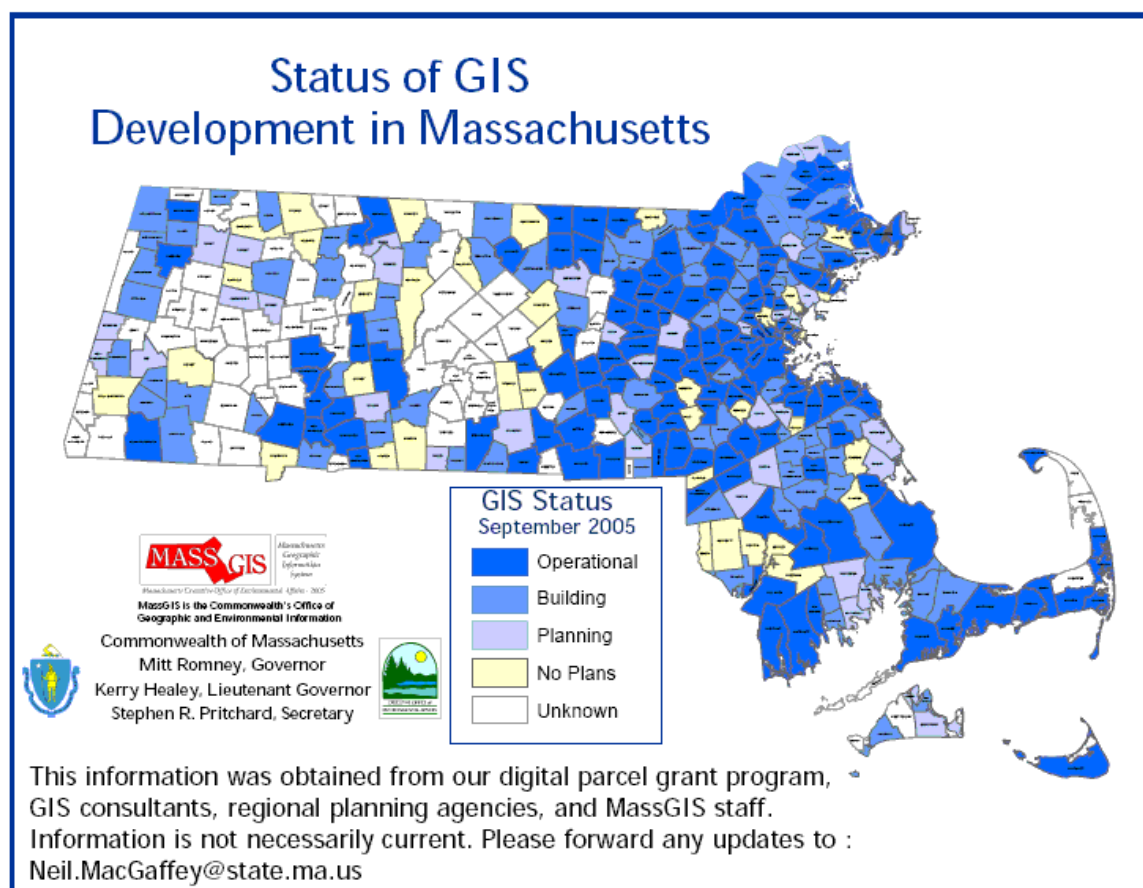
The Town of Sudbury's 2001 Master Plan characterized the Town as "a residential low-density rural/suburban town with a great deal of historical treasures and traditions, natural resources and beauty, open spaces, wetlands, forests, wild life, high quality public schools and public services. It encourages residential housing built in harmony with and in proportion to its surroundings and acreage; promotes a socioeconomic environment that permits and encourages a diversity of ethnicity, religion, age and income; and values the traditions and institutions that create a sense of community". The Town has been experiencing very rapid growth in the past thirty years, and the population has tripled. Land use decisions have become extremely important in maintaining the

characteristics of the community. Many residents are approaching retirement and the Town needs to address the needs of its senior citizens. Providing a diverse stock of housing has become increasingly important. The Town also needs to address ways to free itself from the dependence on single-family homes as the majority of the tax base. Rapid growth makes preservation of open space and natural resources more pressing. All of these factors have made for a very challenging job for Town officials. To meet the challenge, they have looked into new technologies that will help them do their jobs more efficiently and effectively. GIS is an emerging technology, and has been recognized by Town officials as one which can assist them in accomplishing goals set by the Board of Selectmen, to protect and enhance the unique sense of place offered by the Town, and to protect the environmental quality of the Town.

1.4 Examples of Municipal Applications of GIS

GIS can be applied by almost all municipal departments including assessing, planning, engineering, water and sewer, public works, public safety, inspectional services, conservation, council on aging, schools, recreation, and many others. This section provides some examples of these applications.

In assessing, GIS applications include mapping parcels, mapping comparable sales, analyzing assessed value to sale price ratio (ASR), analyzing ASR stratified by assessing neighborhoods, and mapping tax-exempt properties.

Figure 1.3 - An example of an assessor's atlas page
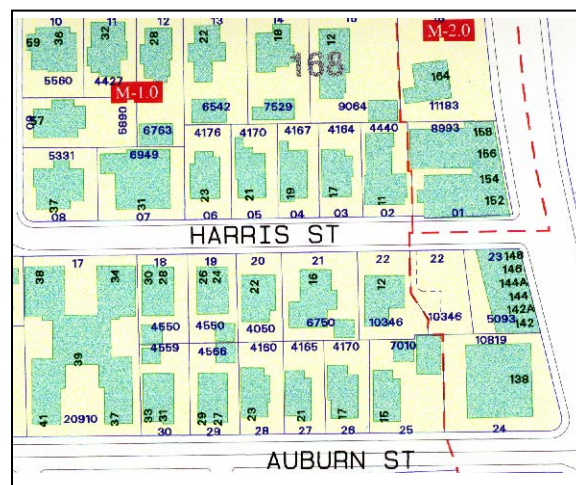
In planning, GIS applications include land use studies, buildout analyses, mapping zoning districts, site studies and visualizations, transportation planning, and mapping capital improvement projects.

Figure 1.4 - 3D view of a proposed building site
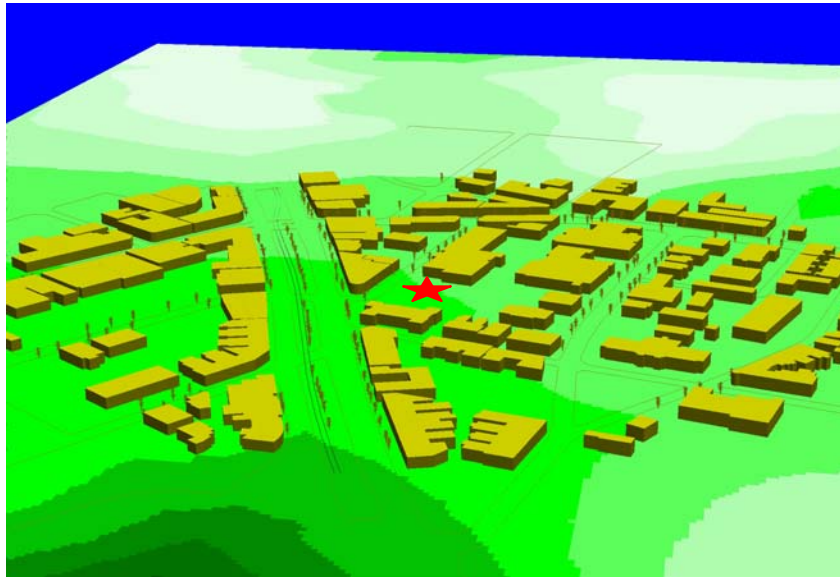
Figure 1.5 – 3D view of a proposed transportation plan showing lane changes and parking spaces

In engineering, GIS applications include traffic signal management, roadway pavement management, street light management, and site designs.

Figure 1.6 - An example of mapping traffic intersections

In Parks and Conservation, GIS applications include open space mapping and management, tree inventory maintenance, wetlands and flood plain mapping, and conservation land management and acquisition studies.

Figure 1.7 - Mapping street trees by their species and conditions

For the Council on Aging, GIS applications could include mapping elderly bus routes, and assistance in the siting of a new senior center.

Figure 1.8 - Distribution of elderly population in relation to the proposed new senior center with a overlay of COA bus stops and routes (each red dot represents a senior citizen)
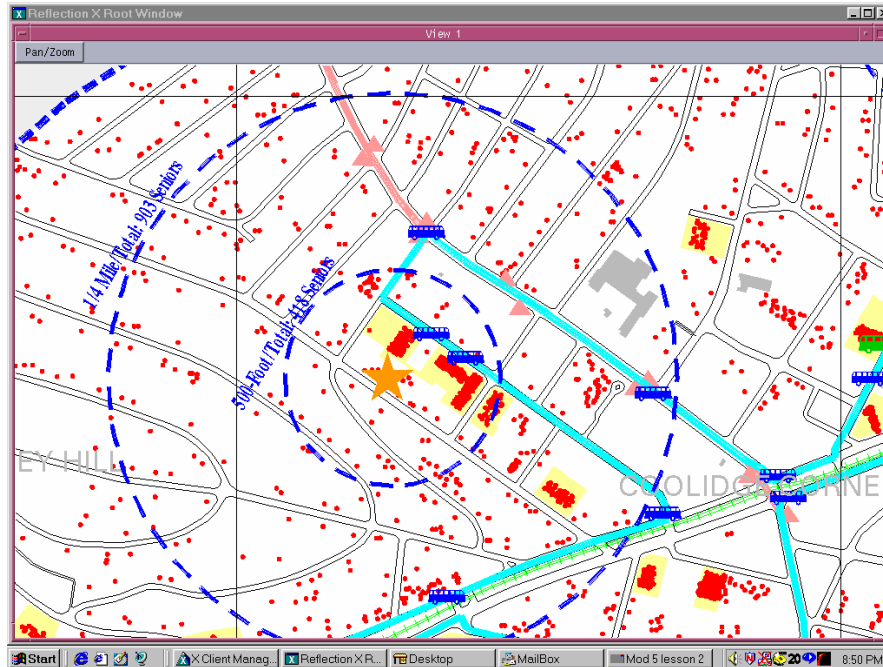
In Public Safety, GIS applications include crime analysis, mapping EMS call locations, fire equipment response distance analysis, and assistance in E-911 operations, by providing interactive maps, and identifying drug free school zones.

Figure 1.9 - EMS call locations and frequencies
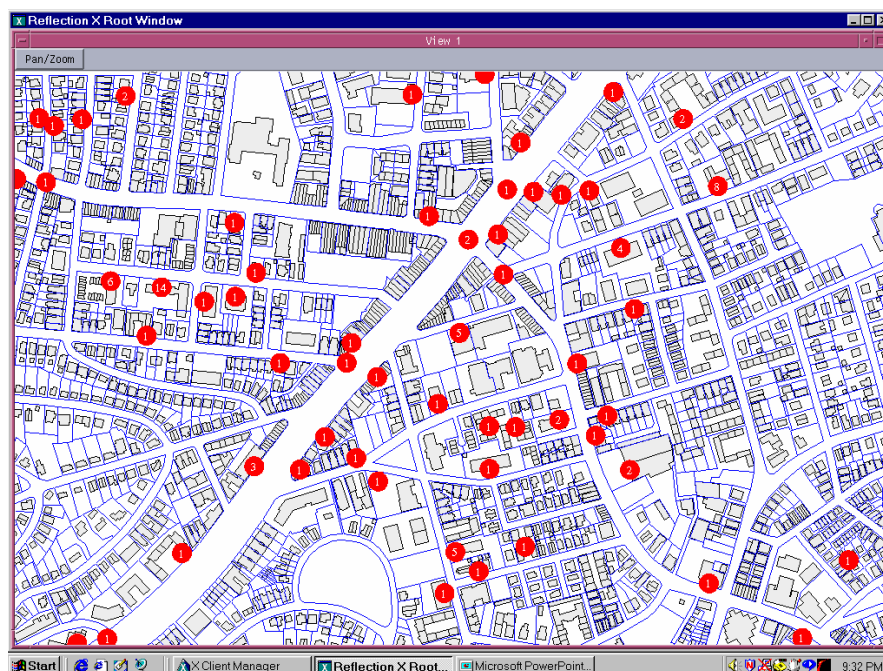
1.5 – Benefits of a Municipal GIS

There are many benefits of a municipal GIS. In an ESRI publication, "Measuring Up – The Business case for GIS", case studies from twenty-two segments of society are presented to demonstrate thirteen benefits of implementing a GIS:

- Saving time
- Increasing efficiency
- Saving money/avoiding cost
- Generating revenue
- Providing decision support
- Automating work flow
- Increasing communication and collaboration
- Aiding in budgeting
- Building an information base/managing knowledge
- Increasing accuracy
- Increasing productivity
- Managing resources
- Improving access to government

According to the Commonwealth of Massachusetts GIS Office (MassGIS), many communities have reported quantifiable benefits of their geographic information systems. The following are four reports quoted from MassGIS website (http://www.mass.gov/mgis):

The City of Cambridge reports:

- Since the Assessors parcel map information became available via the city's web site, walk-in visits to the Assessor's office have dropped 20%.
- The time required for determining if an arrest for dealing drugs occurred within 1000 feet of a school has gone from about two hours to about five minutes. This determination is important, because people convicted of dealing drugs within 1000 feet of a school are subject to longer prison terms.
- The time required for producing mailing labels for abutter notifications, a capability required by many departments (e.g., Assessing, Public Works, Planning, City Clerk, Licensing, Historical Commission, Traffic), has gone from between two hours and two days to about ten or fifteen minutes.

The City of Fitchburg reports:

- By comparing the area of a parcel calculated by the GIS, with the area listed in the Assessors database, finding errors and making the necessary corrections in lot area, the city gained $225,000 in assessed value for the first ten properties corrected.
- Fitchburg completed the state-mandated CSO plan with assistance from the GIS. There are significant mapping requirements associated with those plans. DPW-Engineering estimated that this saved the city thousands of dollars in the first phase of the plan preparation alone.

The Town of Hingham reports:

The Town of Hingham was looking to put out an RFP for lawn mowing of all town fields. It was difficult to ask for a bid without giving the amount of area to be cut. Using GIS, Hingham was

able to identify all the parcels. Then, using the orthophoto base maps available through MassGIS the area of grass on each parcel was identified and calculated. The only other way to get an area of grass calculated would have been to physically measure the areas. It was estimated that it would have cost $5,000 to $10,000 to have a surveyor do this work. The Town does not have anyone on staff qualified to do it.

The City of Newton reports:

- Using the GIS to produce mailing labels for abutter notification saves at least 500 hours staff time annually.
- The GIS provides map features for use in engineering drawings, instead of creating the same information from scratch every time; this saves approximately 80 staff hours annually.
- The GIS was used to map the locations of properties that, according to the water/sewer billing system, were not connected to the city sewer system. A review of the map by city staff familiar with the sewer system identified many properties that were in fact connected; this resulted in the city collecting approximately $8,000 in additional sewer fees annually.
- The GIS is used to produce hundreds of maps annually for the public; the fee covering staff time and materials produces approximately $4,000 in general revenue.
- The city's aerial-photo GIS base map ("orthophotos") provided conclusive evidence in the city's favor in a personal property assessment dispute. This resulted in a one-time additional $61,800 in tax revenue.
- A consultant developed custom bus stop assignment and bus routing tools for the city's GIS software for a cost of about $15,000. These assignments not only took into account what school the child was going to, but the distance to the nearest bus stop over the street network without crossing pre-identified busy streets. The student-to-stop and stop-to-bus assignments calculated with GIS were more efficient, resulting in Newton having one additional bus available annually (a value of about $49,000).

With the advances in geospatial technologies and the development of geospatial data, more and more communities are seeing the benefits of a municipal GIS.

CHAPTER 2 - DEPARTMENTAL GIS NEEDS AND PRIORITIES

This chapter details the results of the user needs assessment conducted for this strategic plan, and summarizes departmental GIS needs and priorities. An introduction on the two methods used to collect information from each department was followed by an elaboration on the needs and priorities by each department and other entities (Sudbury Water District and the Lincoln-Sudbury High School). For each department, all GIS needs are listed by priority and explained in detail. Priorities are set by the interviewed department and certain needs have the same priority number because they are considered equally important to the user department. These needs are grouped into the following categories: Data Needs, Mapping Needs, Application Needs, Integration Needs, System Needs and Policy Needs (when applicable). "Data needs" refers to the needs for GIS data layers. "Mapping needs" refer to the needs for maps. The underlining data may already exist, however the maps are not created from the underlining data. These two categories are sometimes combined together when the underlining map data does not exist. "Application needs" refer to the need for custom GIS programming application, such as field data collection, application, or web GIS application. "Integration needs" refer to the needs for GIS integration with other information systems, such as the permitting system, document management system, pavement management system and computer aided mass appraisal system. "System needs" refer to the needs for new or upgrading hardware, software and networks. "Policy needs" refer to the needs for a policy procedural change.

2.1 Introduction to Methodologies

Two methods have been employed to collect information as accurately as possible. The first uses a set of survey forms and the second uses interviews. Three survey forms (Appendix A) were developed for this project. The first one was designed to gather general Information, and the current GIS status of each department. The second is for collecting geographic, and attribute information resources, which are created and maintained by each department. The third form is used to compile a list of geographic and attribute information resources, used by each department; however these resources are created and maintained by others. These forms are designed not only to gather departmental GIS information resources, but also cross check information ownership and data maintenance responsibilities. Survey forms were distributed at the department head meeting/GIS Strategic Plan 2005 kick-off meeting on July 6th, 2005. A GIS presentation was also given at the meeting. Follow-up interviews were scheduled for gaining further knowledge of Sudbury's existing departmental GIS information resources, future needs and the urgency of these needs. All town departments have participated in this project and they are listed alphabetically in Table 2.1. The interviews were conducted between August 4th and October 7th.

In order to gain input from boards and commissions, and the residents of the Town, a televised presentation was given to the Board of Selectmen on August 16th, 2005. Coupled with this, the Historical Commission requested to be interviewed as well.

Table 2.1 - Departments Interviewed, and Participants

Department	Department Head	Staff
Assessor's Office	Maureen Hafner	
Board of Health	Bob Leupold	
Building Department	Jim Kelly	Kathy Plante
Conservation Office	Debbie Dineen	
DPW	Bill Place	
DPW – Engineering	Bruce Kankanpaa	
Fire Department	Kenneth MacLean	
Library	Bill Talentino	
Police Department	Peter Fadgen	
Planning Department	Jody Kablack	
Recreation Department	Dennis Mannone	
School Department	John Brackett	Mary Will
Senior Center	Kristin Kiesel	
Town Clerk's Office	Barbara Siira	
Town Manager's Office	Maureen Valente	
Treasurer/Collector	Andrea Terkelson	
Boards and Commissions	**Co-Chairman**	**Member**
Historical Commission	Marilyn A. MacLean	James A. Hill
Other Entities	**Representative**	**Staff**
Sudbury Water District	Al Renzi	
Lincoln-Sudbury Regional High School	John Ritchie	Pauline Paste, Scott Carpenter, Rosemary Colson

Once the user needs assessment was conducted, the results of the surveys and interviews were entered into a MS Access database. The following sections summarize user needs department by department based upon the Access database.

2.2 Assessor's Office

Department Head: Maureen Hafner, T: (978) 443-8891 x392, hafnerm@town.sudbury.ma.us

This section is organized into the following smaller sections: summary of needs, data needs, mapping needs, applications needs and integration needs.

Summary of Needs

A Summary of the GIS needs of the assessor's office is listed and prioritized in Table 2.2, and followed with a detailed description of each need.

Table 2.2 - Assessor's Office GIS Needs

Priority	GIS Needs
1	GIS Module By Patriot Properties
2	Maps of Wetlands, Contours, Water Supplies etc.
3	Optimize Inspection Routes
4	Sales Map for DOR
4	Neighborhood Map
4	Land Classes Map
5	Integrate Building Plans into Sketch Pro in Patriot System
6	Link to Other Databases for Analysis
7	Standardizing Parcel ID format
8	Map of Parcels with no Property Images

Priority 1 – GIS Module by Patriot Properties
The assessor's office uses Patriot Properties for its Computer Aided Mass Appraisal (CAMA) system, which is used to manage property records, and calculate valuations of all properties in Town. Patriot Properties Inc. developed an integrated GIS module using ESRI embedded software components. This integrated GIS module allows the assessors to create abutters lists, mailing labels and maps. It also enables them to utilize GIS in a familiar environment, and allows them to integrate GIS into the property valuation process.

Priority 2 – Maps of Wetlands, Topography, and Water Supplies
Information on whether or not a property is within a wetland buffer zone, on a steep slope, or within water supply protection areas is very important to the assessors in determining the value of a property. This information is not readily available on hard copy maps or in digital format. The DPW does have information regarding water supplies and water supply protection areas. However, the information only becomes useful to the assessors when overlaid onto real estate parcels with parcel IDs. Such information is needed first as GIS data layers, and then embedded into the Patriot Properties CAMA system.

Priority 3 – Optimize Inspection Routes
The assessor's office keeps updated property records via information from the registry of deeds and field inspections. Inspections can be cyclical, or ad hoc. The Massachusetts Department of Revenue (DOR) requires property assessments be revaluated or updated every year. All properties are inspected in a nine-year cycle. Coupled with this, when a new sale occurs, the property is usually inspected. The locations of these inspections can be all over the Town and the time frame that the home owner is available will differ. A great deal of time can be saved if the optimal routes can be calculated for the inspectors.

Priority 4 – Sales Maps, Assessing Neighborhood Maps and Land Class Maps
In certifying the valuations submitted by the Town, DOR requires certain maps to be produced. These include a recent sales map, assessing neighborhood map, and land class map. These maps are also very useful for the assessors in calculating property valuation.

Priority 5 – Integrate Building Floor Plans into Sketch Pro in the Patriot Properties CAMA system
In the CAMA system, sketches of building floor layouts and dimensions are stored for record keeping, and for calculating the number of bedrooms, bathrooms, etc. The module in the Patriot Properties CAMA system is called Sketch Pro. Creating these sketches is very time consuming.

In addition, building plans can be submitted in digital format. There is a need to convert both the digital and hard copy floor plans into Sketch Pro format, to reduce duplicate data entry and to save time and resources.

Priority 6 – Link to Other Databases for Analysis
The Chief Assessor pointed out the need to link Town census data, collected by the Town Clerk's Office to the CAMA system, so that it is possible to calculate total assessments by age groups. Once the Town implements a permit, licensing and complaint tracking system, linking it to the CAMA system will reduce duplicate data entry of permitting information, and save the assessors time.

Priority 7 – Standardize Parcel ID format
Currently, there are discrepancies between the parcel identifiers in the GIS parcel layer maintained by DPW/Engineering and the assessor's CAMA system database. Such discrepancies cause the owner information, property information, property use information, and assessment information to not match geographic parcels completely. This is an urgent issue that needs to be addressed so that property information can be analyzed geographically, and utilized by many town departments. The parcel layer is one of the most important and most utilized GIS layers in a municipality.

Priority 8 – Map of Parcels with no Property Images
The Assessor's Office has been taking digital photos of properties throughout the town. To have a complete collection of property images will help assessing efforts a great deal. A Map showing missing property photos will help the assessors organize volunteering senior citizens to complete the task.

The aforementioned GIS needs are categorized as following:

Data Needs

Wetlands
Floodplains
Water Suppliers and Protection Areas
Contours/Elevation/Slope
Floor Plans
Home Owner Age Groups
Building Permits

Mapping Needs

Assessing Neighborhood Map
Sales Map
Wetland Map with Parcel Overlay
Water Supply Protection Map with Parcel Overlay
Elevation/Slope Map with Parcel Overlay
Map of Parcels with no Property Images

Application Needs

Imbedded GIS Module by Patriot Properties
Conversion from AutoCAD DWG floor plans to Sketch Pro in the Patriot Properties System

Integration Needs

CAMA – Town Census (State System)
CAMA – Permitting System (to be implemented, currently excel spreadsheets)

2.3 - Board of Heath (BOH)

Department Head: Bob Leupold, T: 978 443-2209 x1379, health@town.sudbury.ma.us

This section is organized into the following smaller sections: summary of needs, data needs, mapping needs, applications needs, integration needs and policy needs.

Summary of Needs

A Summary of the GIS needs of Board of Health is listed and prioritized in the following Table 2.3 and followed by detailed descriptions of each need.

Table 2.3 – Board of Health GIS Needs

Priority	GIS Needs
1	Live Link to the Assessor's Database
2	Private Wells
2	Surficial Geology
2	Soils
2	21E Sites
3	Fire Hydrant Map with Parcel Outlines
4	Digital Submission of Septic Plans
5	Scanning old Septic Plans
6	Critical Infrastructure

Priority 1 – Live Link to the Assessor's Database
The current septic tracking program in FileMaker Pro does not have a live link to the Assessor's CAMA system. The owner and property information are not updated when changes happen. It is also extremely important for BOH to know the number of bedrooms on site when reviewing a septic system plan.

Priority 2 – Private Wells, Surficial Geology, Soils, 21E sites
This is information necessary for a septic system plan review process. The information is particularly useful when overlaid by parcel boundaries.

Priority 3 – Fire Hydrant Map with Parcel Outlines

Priority 4 – Digital Submission of Septic Plans
Currently all septic system plans are submitted to the BOH as hardcopies. Multiple copies are submitted to various departments. Hardcopy plans cause storage, filing and sharing problems. A policy needs to be developed to require digital submission of plans so that future plans can be stored digitally, shared among departments, and indexed for archiving and research.

Priority 5 – Scanning Old Septic Plans

Having a digital submission of plans in place will take care of future plans. Any prior submitted plans will have to be scanned and indexed.

Priority 6 – Critical Infrastructure
Sudbury is in MAPC Region 4A and the critical infrastructure is being prepared by MetroWest Planning for critical sites related to emergency preparedness. The critical infrastructure data can be incorporated into the Town's GIS database.

The aforementioned BOH GIS needs are categorized into the following:

Data Needs

Private Wells
Surficial Geology
Soils
21E Sites

Mapping Needs

Fire Hydrant Map with Parcel Outlines

Integration Needs

Septic Tracking Program - CAMA

Policy Needs

Digital Submission of Septic System Plans

Section 2.4 Building

Department Head: James Kelly, T: 978-443-2209 ext. 1361, kellyj@town.sudbury.ma.us

This section is organized into the following smaller sections: summary of needs, data and mapping needs, data needs, integration needs, applications needs and hardware needs.

Summary of GIS Needs

Table 2.4 lists and prioritizes Building Department's GIS needs, and followed by detailed descriptions of each need.

Table 2.4 Building Department GIS Needs

Priority	GIS Needs
1	Permitting System
1	Maps of Wetlands, Flood Plains, Historic Districts, Zone IIs
2	Live Link to the Assessor's Database
3	Digital Requirement of Plans
4	Scanning of previous plans
5	Optimize Inspection Routes
1	Hardware Needs: Digital Camera
2	Hardware Needs: Color Printer
3	Hardware Needs: Large Format Scanner
4	Hardware Needs: Tablet PCs

Priority 1 – Permitting System
Currently the building department uses MS Excel spreadsheets to track permits and fees making it very difficult to search and summarize permitting information. It also creates problem for linking permits with other information systems. The Town's IT department is currently looking into new town-wide integrated permitting, licensing and complaint tracking systems.

Priority 1 – Maps of Wetlands, Flood Plains, Historic Districts, Zone IIs
Accurate locations of wetlands, flood plans, historic districts and sites, and Zone IIs overlaid with parcel data are vital for the building inspectors when they review plans, or issue building permits. Hardcopy maps of such information are needed immediately. Digital data, built into the permitting system for such information to be flagged when entering an address will be ideal.

Priority 1 – Hardware: Digital Camera – Purchased – Sony Cybershot DSC-P200 7.2 MP
Having a digital camera in hand when inspecting a site is very useful for documenting potential violations observed by inspectors. The Building Department director was using his personal camera for work and during the preparation of this plan, the camera has been purchased.

Priority 2 – Live Link to the Assessor's Database
For property information looking up such as owner information, and building characteristics such as the number of bedrooms, bathrooms, etc.

Priority 2 – Hardware: Color Printer – Purchased – HP LaserJet 2550N Printer (Color)

Priority 3 – Digital Submission of Plans
Currently all building plans are submitted on hardcopies. They are difficult to store, index and share among departments. Having a digital submission requirement in place will ensure that future plans will be stored, indexed and archived digitally, for easy storage, access and sharing among departments.

Priority 4 – Scanning of Previous Building Plans
Scanning previous hardcopy plans will provide more efficient access to archived plans.

Priority 5 – Optimize Inspection Routes
GIS can help develop optimized routes for inspectors' site visits.

The aforementioned GIS needs are categorized into the following:

Data and Mapping Needs

Wetlands
Floodplains
Zone IIs
Historic Districts

Data Needs

Historic plans

Integration Needs

Permitting system to CAMA

Application Needs

Optimize Inspection Routes

Hardware Needs

Large format scanner (shared with other departments in the DPW building)
Tablet PCs

Section 2.5 – Conservation Office

Department Head: Debbie Dineen, T: 978-443-2209 x1370, concom@town.sudbury.ma.us

This section is organized into the following smaller sections: summary of needs, data needs, mapping needs, integration needs, and hardware needs.

Summary of GIS Needs

Table 2.5 lists the Conservation Office's GIS needs by priority and provides detailed descriptions of each need.

Table 2.5 – Conservation Office GIS Needs

Priority	GIS Needs
1	Software Needs: Upgrade ArcView to 9.1
1	Updated Wetlands map
1	GPS Training
2	Overlaying parcels onto MassGIS Bio Map and others
3	Integrate Current Wetlands Permit Database with GIS
4	Hardware Needs: Color Printer (11"x17")

Priority 1 – Software Needs: Upgrade to ArcView 9.1

The conservation officer has an old copy of ArcView 3.x and needs to upgrade it to the latest version 9.2. While this plan was being prepared, this copy of ArcView has been upgraded to ArcView 9.2.

Priority 1 – Updated Wetlands Map
The existing wetlands map was developed in 1978, and is only used for historic information. The ability to view the relationship between parcels and wetlands is essential, and will save the conservation office a great deal of time.

Priority 1 – GPS Training
The conservation officer has a Magellan GPS and needs immediate training so that she can use it for collecting wetlands and other natural resource information in the field.

Priority 2 – Overlaying Parcels onto the MassGIS Bio Map and others
MassGIS Bio Diversity Map Project has delineated core habitat and supporting natural landscape. The conservation officer uses this map a great deal. However, without parcel outlines overlay, it is difficult for the conservation officer to use for enforcement. MassGIS also provides other maps that are very useful to the conservation office.

Priority 3 – Integrate Current Wetlands Permit Database with GIS
For the following information lookup: owners, flood plains, Zone IIs, Bio map, zoning districts, wetlands.

Priority 4 – Hardware Needs: Color Printer – Purchased – HP LaserJet 2550N Printer (Color)
This request has also been made by the building department, and this printer can be shared by all departments in the DPW building. While this plan was being prepared, the color laser printer has been purchased by the IT department.

The aforementioned GIS needs are categorized into the following:

Data Needs

Wetlands
Bio diversity core habitat
Bio diversity supporting natural landscape

Mapping Needs

Wetlands Map with parcel outlines
Bio Map with parcel outlines

Integration Needs

Wetlands Permit Database to GIS Data layers
Wetlands Permit database to CAMA

Hardware Needs

Laptop

Section 2.6 Department of Public Works

Department Head: Bill Place, T: 978-443-2209, x1390, DPW@town.sudbury.ma.us

This section is organized into the following smaller sections: summary of needs, data needs, application needs, integration needs, and policy needs.

Summary of GIS Needs

Table 2.6 lists the DPW's GIS needs first by priority and followed by detailed descriptions of each need.

Table 2.6 - DPW GIS Needs by Priority

Priority	GIS Needs
1	Full-time GIS person
2	Update existing GIS data and align MassGIS data layers
3	Upgrade existing software ArcView
4	2-foot Contours
4	New Orthophotography
5	Pavement Management System
6	Scanning historic land plans
7	Digital Submission of Asbuilt Plans

Priority 1 - The Town needs a full-time GIS person. The DPW Director has expressed that IT is probably the most logical department for this position.

Priority 2 – There is a great need for updating the existing data layers so that they can be utilized by the Town staff. There are some obvious issues with the existing data. The existing parcel layer and the assessor's CAMA database do not match completely. There are some Town line accuracy problems. Fire hydrants are not up to date. Water mains are at least 3 years out of date. The Building footprints layer does not have address attributes. Public land parcels have no parcel IDs. However engineering staff, Bruce, has put in a great deal of efforts to update the parcel layer using AutoCAD. About 95% of the parcel updates (line work) are completed.

Priority 3 – The Town has purchased 7 copies of ArcView 3.x in the past. The copy that Bruce is using has been upgraded to ArcGIS 9.x. The rest also need to be upgraded (at the time of the interviews, only 2 copies have been upgraded. As of 05/14/2006, all 7 copies have been upgraded to ArcView 9.1).

Priority 4 – A Digital Elevation Model (DEM), and 2-foot contours are needed. New flyovers and aerials are also needed.

Priority 5 – The current Pavement Management System was developed by VHB and is not being used.

Priority 6 - Historic land plans are currently stored in drawers and indexed by cards. In the near future, utilizing the Town's GIS system, they need to be scanned and stored digitally for easy file sharing, archiving and maintenance.

Priority 7 - Subdivision plans are submitted in digital form currently. However, Asbuilt plans are not. Asbuilt plans are required to be signed off by the DPW commissioner. Digital submission requirements need to be developed.

The aforementioned GIS needs are categorized into the following:

Data Needs

New Digital Orthophotography
Two-Foot Contours
Digital Elevation Model
Scanned Historic Land Plans
Pavement Segments

Application Needs

Pavement Management System

Integration Needs

Integrating GIS with the Pavement Management System

Policy Needs

Digital Submission Requirements for Asbuilt Plans

2.7 Police Department

Department Head: Police Chief Peter Fadgen, T: 978-443-1042, E-mail: fadgenp@town.sudbury.ma.us

This section is organized into the following smaller sections: summary of needs, data needs, mapping needs, integration needs, and hardware needs.

Summary of GIS Needs

Table 2.7 lists the Police Department's GIS needs by their priority and followed by detailed descriptions of each need.

Table 2.7 – Police Department GIS Needs by Priority

Priority	GIS Needs
1	Integrating the existing GIS Data with the 4th Watch Program
1	Updated Street Map
1	Data and Map of Police Sectors
1	Data and Map of Speed Limit Map
2	Mobile Mapping: Pictometry
2	Mobile Mapping: CAD

Priority 1 – The Police Department purchased a GIS program called 4th Watch that links to their record management system, however it does not have suitable GIS data available. There is a need to integrate the existing GIS data layers with the 4th Watch program.

Priority 1 – The Street map needs to be updated.

Priority 1 – The current police sector map is hand-drawn. It is time consuming to reproduce and cannot be used in the 4th watch program or other computer programs. A data layer of the 3 police sectors and a map are needed.

Priority 1 – Similarly, the current speed limit map is also hand-drawn. A data layer of the speed limits also needs to be developed.

Priority 2 - Laptops in cruisers need to be upgraded to use Pictometry.

Priority 2 - The mobile mapping capabilities of the existing CAD system (PAMET) need to be examined.

The aforementioned GIS needs are categorized into the following:

Data Needs

Pictometry
Police Sectors
Speed Limits

Mapping Needs

Police Sector Map
Speed Limits Map

Application Needs

Mobile Mapping Applications need to be examined.

Hardware Needs

Cruiser Laptop Upgrades

2.8 Fire Departments

Department Head: Fire Chief Kenneth MacLean, T: 978-443-2239, E-mail:
macleank@town.sudbury.ma.us

This section is organized into the following smaller sections: summary of needs, data needs,
mapping needs, integration needs, application needs and hardware needs.

Summary of GIS Needs

Table 2.8 lists Fire Department's GIS needs by their priority and followed by detailed
descriptions of each need.

Table 2.8 – Fire Department GIS Needs by Priority

Priority	GIS Needs
1	Permit Tracking
1	Tear Sheet
1	Integrate E-911, Firehouse, Fire Alarm Systems
2	Mapping fire alarm circuits
2	Fire Atlas
3	GPS and navigation system for the two ambulances
3	Hardware needs: tablet PCs
3	Hardware needs: plotter
4	Hose Locations/Fire Department Connections
4	Utility Entrance to Properties
4	Utility Poles

Priority 1 – Permits currently issued by the Fire Department (such as black powder permits, oil
burning permits, sprinkler permits and burning permits), are recorded by hand on paper. They are
then marked as dots on various maps in different stations. Accurate and timely information
sharing is difficult. A permit tracking system is greatly needed.

Priority 1 – There is a need to generate a "Tear Sheet" and have it printed remotely to any fire
stations for emergency responses.

Priority 1 – Currently the Dispatcher does a great deal of redundant data entry, working with
multiple programs that do not talk to each other. There is a great need to integrate E-911,
Firehouse, and Fire Alarm Systems together.

Priority 2 – The fire alarm circuits need to be mapped out.

Priority 2 - Currently the hydrants, fire boxes, fire districts and other information are hand drawn
onto a hard copy map book that the dispatcher uses. This atlas book needs to be converted into
digital format so that it can be updated in a timely fashion and distributed to various stations.

Priority 3 – A GPS and navigation system is needed for the Town's two ambulances for the areas
outside of Sudbury, due to the majority of the services going to Boston area hospitals.

Priority 3 – Tablet PCs are needed for code compliance inspections and pre-plan inspections. The Tables PCs will provide fire personnel onsite access to plans, maps and code books.

Priority 3 – An E-size large format plotter is needed for printing large size maps.

Priority 4 – Information about the hose location or fire department connection to a property is needed for fire fighting.

Priority 4 – Locations of utility poles and utility entrance to a property are also important for fire fighting.

The aforementioned GIS needs are categorized into the following:

Data Needs

Fire Alarm Circuits
Hydrants
Fire Boxes
Fire Districts
Hose Locations/Fire Department Connections
Utility Poles
Utility Entrance to Properties

Mapping Needs

Fire Alarm Circuit Map
Fire Atlas Book

Application Needs

Fire Inspection Field Application
Tear Sheet
Permit Tracking

Integration Needs

Integration of the E-911, Firehouse, and Fire Alarm Systems

Hardware Needs

Large Format Plotter
Table PCs

2.9 Historical Commission

Co-Chairman: Marilyn A. MacLean and Member: James A. Hill
T: 978-443-6722, E-mail: historical@town.sudbury.ma.us

This section is organized into the following smaller sections: summary of needs, data and mapping needs.

Summary of Needs

Table 2.9 lists Historical Commission's GIS needs by their priority and followed by detailed descriptions of each need.

Table 2.9 – Historical Commission GIS Needs by Priority

Priority	GIS Needs
1	Map of 12 Town Owned Historic Sites
1	Map of Scenic Roads
2	Map of Historically Significant Homes
3	Map of homes built prior to 1940s
4	Map of Historic Trails and stone walls

Priority 1 – There is a need to develop a GIS data layer and a map for the 12 Town-owned historic sites.

Priority 1 – The following were designated as Scenic Roads at the 2003 Annual Town Meeting: Brimstone Lane, Bowditch Roads, Candy Hill Road, Clark Road, Concord Road, Dakin Road, Dudley Road, Dutton Road, French Road, Goodman's Hill Road, Goodnow Road, Haynes Road, King Philip Road, Lincoln Road, Marlboro Road, Morse Road, Mossman Road, Newbridge Road, Old Country Road, Old Framingham Road, Old Garrison Road, Old Lancaster Road, Pantry Road, Peakham Road, Plympton Road, Power Road, Rice Road, Water Row, Wayside Inn Road, Weir Hill Road, Willis Road, Woodside Road. A GIS layer and map needs to be developed which displays the above Scenic Roads.

Priority 2 – A need to inventory, catalog and map historically significant homes.

Priority 3 - A need to inventory, catalog and map homes built prior to 1940s.

Priority 4 – A need to map historic trails and stone walls

The aforementioned GIS needs are categorized as the following:

Data and Mapping Needs

Town Owned Historic Sites
Scenic Roads
Historically Significant Homes
Homes Built Prior to 1940s

Historic Trails
Historic Stone Walls

2.10 Library

Department Head: Bill Talentino, T: 978-443-1035, E-mail: goodnow@town.sudbury.ma.us

This section is organized into the following smaller sections: summary of needs, data and mapping needs, application needs and integration needs.

Summary of GIS Needs

Table 2.10 lists Library's GIS needs by their priority and followed by detailed descriptions of each need.

Table 2.10 – Goodnow Library GIS Needs by Priority

Priority	GIS Needs
1	Historic Homes
2	Demographic Information
3	Library Customers Overlay Demographic Information
4	Town Owned Buildings Map
5	Portal
6	Historic Walks, Trails and Monuments

Priority 1 – There is a need to Map all the historic homes in the Historic Homes Publication, publish it online, and link it to library archives.

Priority 2 – Demographic information on age, income and race is needed to help the Library serve its current and future customers better.

Priority 3 –A customer database by address from Minuteman (library) needs to be used to create an overlay onto existing demographic and town GIS data, for visualization and analysis.

Priority 4 – A map is needed showing all town-owned buildings.

Priority 5 – The Library is potentially the logical portal for disseminating GIS information to the general public once the Town has a GIS system implemented.

Priority 6 – There is a need to digitize and map historic walks, trails and monuments.

The aforementioned GIS needs are categorized as the following:

Data and Mapping Needs

Location of Historic Homes
Demographic Information from US Census on Age, Income and Race
Minuteman Customer Database for Goodnow Library

Town Owned Buildings
Historic Walks, Trails and Monuments

Applications Needs

GIS web portal

Integration Needs

Linking Historic Homes to Library Archives

2.11 Planning Department

Department Head: Jody Kablack,
T: 978-443-2209 x1387, E-mail: planningboard@town.sudbury.ma.us

This section is organized into the following smaller sections: summary of needs, data needs, mapping needs, hardware and software needs.

Summary of GIS Needs

Table 2.11 lists Planning Department's GIS needs by their priority and followed by detailed descriptions of each need.

Table 2.11 – Planning Department GIS Needs by Priority

Priority	GIS Needs
1	Pictometry
1	Hardware Needs: digital camera
1	Software Needs: training
1	Software Needs: upgrade existing copy of ArcView
1	MassGIS Data Viewer with Aerial Photos
1	Ad Hoc Mapping Capabilities
2	Abutter List and Access to Assessor's database
3	Permit Tracking System
4	Mapping Overlay Districts
5	Town Census
6	Conservation Restrictions and Wetlands
7	Parcel Based Buildout Analysis
8	Chapter 61A Parcel Deed Inaccuracy
9	Tablet PC

Priority 1 – The oblique imagery and Electronic Field Study tools, developed by Pictometry International Inc. and distributed by Mass Highway and Metropolitan Area Planning Council (MAPC), are great visualization and measuring tools for application review. Installation and training are needed.

Priority 1 – A digital camera is needed for the Planning director to take onsite photos.

Priority 1 – The copy of ArcView 3.x software needs to be upgraded to ArcGIS 9.1 Training is needed on this new system (This copy of ArcView has been upgraded to ArcView 9.2 by the IT department).

Priority 1 – The MassGIS DataViewer is very useful for preliminary application review. The need exists to integrate the MassGIS color aerial photos with the data viewer.

Priority 1 – Information such as parcels, aerial photos, base map and other available data layers are very useful for application review. Capabilities to make ad hoc maps using these GIS data layers are essential, and they can be achieved by upgrading the existing ArcView software. This will help obtain current data and aerials from MassGIS, aligning MassGIS data with existing town GIS data layers and training.

Priority 2 – For notification and property information access, there is a need for an abutters program and the access to the current assessor's database.

Priority 3 – The Town needs a comprehensive and cross-department permit tracking system for better code enforcement.

Priority 4 - Current zoning maps are created by DPW/Engineering. The Planning Department is very satisfied by the maps provided by DPW. A couple of overlay zoning districts are currently in narrative and they need to be mapped out. These include wireless districts, Senior Development, Waste Water Facility Districts, and Floodplains (FEMA Q3).

Priority 5 – Demographic information in the Town Census can be useful.

Priority 6 – Conservation restrictions and wetlands information is very valuable.

Priority 7 – Parcel based buildout analysis can be very useful for shaping the town's future land use decisions.

Priority 8 – More research is needed for the deed inaccuracy of Chapter 61A parcels.

The aforementioned GIS needs are categorized as the following:

Data Needs

Aerial Photos
Town Census
Wetlands
Conservation Restrictions
Chapter 61A Parcels
Wireless Overlay Districts
Senior Development Overlay Districts
Waste Water Facility District
Floodplain
Permits

Mapping Needs

Overlay District Maps

Hardware ad Software Needs

Digital Camera
Tablet PC
ArcView Upgrade and Training
Pictometry and Training

Application Needs

Permit Tracking System

2.12 Park and Recreation Department

Department Head: Dennis Mannone
T: 978-443-1092 x259, E-mail: mannoned@town.sudbury.ma.us

This section is organized into the following smaller sections: summary of needs, data and mapping needs, application needs and hardware needs.

Summary of GIS Needs

Table 2.12 lists Parks and Recreation Department's GIS needs by their priority and followed by detailed descriptions of each need.

Table 2.12 – Park and Recreation Department GIS Needs by Priority

Priority	GIS Needs
1	Mowing Routes
1	A Facilities Inventory
1	Aerial Photos & Pictometry
2	Map of Camps
2	Map of Members Overlaying Population By Age Group
3	Soil Testing Map
3	Tracking Teem Programs and Identifying High Risk of Drug Use
4	Maps of Wetlands and Zone IIs
4	Facility Permit Tracking and Inspection Program
5	Color Plotter
5	Maps of Shelters/Recreation Facilities and Helicopter Landing Field

Priority 1 – The Parks and Recreation Department manages and maintains the Town's parks and recreation facilities. Lawn mowing is one of many maintenance tasks. Optimizing the grass mowing routes can save the Town money.

Priority 1 – It is very important to accurately locate the irrigation pipes, gates, gate keys, trash receptacles, lights and other facilities for mowing, measuring, marking and rotating fields. A complete inventory of Park and Recreation facilities is essential.

Priority 1 – Aerial photos and Pictometry are very useful tools to measure fields.

Priority 2 – Having a map of existing camp sites will assist in planning and facilitating allocation of campsites.

Priority 2 – Having a map of members overlaying population by age group can help track membership.

Priority 3 – Soil Testing Results Map can be helpful.

Priority 3 – Tracking Teen Programs, and Identify High Risk of Drug Use

Priority 4 – There is a need for maps of wetlands and Zone IIs for the integrated pest control program.

Priority 5 – A large format color plotter is needed for large size map printing, once the GIS system is in place.

Priority 5 – Maps of shelters, recreation facilities, and helicopter landing fields are necessary for emergency preparedness.

The aforementioned GIS needs are categorized as the following:

Data and Mapping Needs

Mowing Routes
Park Facility Inventory
Aerial Photos
Existing Camps
Membership
Soil Testing Results
Wetlands
ZoneIIs
Shelters
Helicopter Landing Fields

Application Needs

Pictometry

Hardware Needs

Large Format Plotter

2.13 School Department

Superintendent: John Brackett
T: 978-443-1058 x211, E-mail: john_brackett@sudbury.k12.ma.us
Other Attendee: Mary Will, Director of Business and Finance, Sudbury Public Schools

This section is organized into the following smaller sections: summary of needs, data needs, mapping needs, and hardware needs.

Summary of GIS Needs

Table 2.13 lists School Department's GIS needs by their priority and followed by detailed descriptions of each need.

Table 2.13 – School Department GIS Needs by Priority

Priority	GIS Needs
1	Integration between GIS and recently purchased student transportation management software Transfinder.
1	Distribution of Upcoming School Age Children
1	School District Map and Location of Students by Grade
2	Mapping existing school bus routes
3	Mapping distance to schools and distribution of students
3	Mapping and listing immediate abutters to schools
4	GPS for school buses on out of town field trips

Priority 1 –The school department recently purchased a student transportation management software called Transfinder. MassGIS street centerlines with address ranges developed have been obtained and provided to the school department.

Priority 1 – To help the School Department's planning process, having solid information about the distribution of upcoming school age children is critical. Such information is extremely valuable to the school administrators.

Priority 1 – An understanding of the spatial distribution of currently enrolled students, and students by grade in different school districts is necessary for school administrators.

Priority 2 – A map showing the existing bus routes is needed for the school administration.

Priority 3 - A map showing the distance to schools and the distribution of students will tremendously aid school administrators in determining bus fees.

Priority 3 – A map and list showing the immediate abutters to schools will be very useful for emergency management and for notification purposes.

Priority 4 – GPS equipments for school buses on out of town field trips are needed.

The aforementioned GIS needs are categorized as the following:

Data Needs

Children under School Age
Currently Enrolled Students by Grade
School Districts
Existing School Bus Routes
Parcels

Mapping Needs

School District Map
Existing School Bus Routes
Map of Currently Enrolled Students by Grade
Map of Children under School Age
Map of Immediate Abutters to Schools
Map of Distance to Schools and Distribution of Currently Enrolled Students

Hardware Needs

GPS

2.14 Senior Center

Department Head: Kristin Kiesel
T: 978-443-3055 x266, E-mail: kieselk@town.sudbury.ma.us

This section is organized into the following smaller sections: summary of needs, data needs, mapping needs, application needs and hardware needs.

Summary of GIS Needs

Table 2.14 lists Senior Center's GIS needs by their priority and followed by detailed descriptions of each need.

Table 2.14 – Senior Center GIS Needs by Priority

Priority	GIS Needs
1	Updated Large and Colored Street Map
1	Information about Senior Citizens in Town
2	Information on Changes of Senior Income
3	Van Pickup/Drop-off Address and Routes
4	A mapping and scheduling ride program

Priority 1 – The current street map is old and out of date. A large size color street map is needed immediately.

Priority 1 – Demographic information regarding senior citizens in the Town is necessary, especially information on naturally occurring retirement communities (NORCs) and age groups.

Priority 2 – Information on changes in senior income is essential.

Priority 3 - A map of the van pickup/drop-off addresses and routes is necessary to improve efficiency, and to ensure that no one is overlooked.

Priority 4 – A computer program that can map and schedule rides for seniors is in great need.

The aforementioned GIS needs are categorized as the following:

Data Needs

Demographics on Senior Citizens

Mapping Needs

Street map
Map of van pickup/drop-off addresses and routes
Map of Naturally Occurring Retirement Communities (NORCs)
Map of Population by Age Group

Application Needs

Mapping and scheduling program for matching and arranging rides for seniors

Hardware Needs

A Color laser printer

2.15 Town Clerk's Office

Department Head: Barbara Siira
T: 978-443-8891 x450, E-mail: siirab@town.sudbury.ma.us

This section is organized into the following smaller sections: summary of needs, data needs, and mapping needs.

Summary of GIS Needs

Table 2.15 lists Town Clerk's GIS needs by their priority and followed by detailed descriptions of each need.

Table 2.15 – Town Clerk's Office GIS Needs by Priority

Priority	GIS Needs
1	Poll Locations and 150-foot buffers
2	cemetery database
3	Scanning Historic Maps

Priority 1 – As required by Massachusetts General Law, no picketing is allowed within a 150-foot buffer of the polling locations. A map showing the polling locations and buffers can be helpful to poll workers and the Town Clerk.

Priority 2 – The Town Clerk's office gets a fair number of calls from people requesting genealogical information. Having access to the cemetery database will help with fulfilling these requests.

Priority 3 – The Town Clerk's Office is the record keeper of many historic maps. See the Appendix K for the list. These maps needed to be scanned.

The aforementioned GIS needs are categorized as the following:

Data Needs

Poll locations
Cemetery database
Scanned historic maps

Mapping Needs

Map of polling locations and 150-foot buffers

2.16 Town Manager's Office

Town Manager: Maureen Valente
T: 978-443-8891 x385, E-mail: townmanager@town.sudbury.ma.us

This section is organized into the following smaller sections: summary of needs, data and mapping needs, application needs and integration needs.

Summary of GIS Needs

Table 2.16 lists the GIS needs in the Town Manager's Office by their priority and followed by detailed descriptions of each need.

Table 2.16 – Town Manager's Office GIS Needs by Priority

Priority	GIS Needs
1	Help deliver town services better
2	Assist big development issues
3	Assist in dealing with environmental issues
4	Service/Complaint Tracking
5	Abutter List for Liquor Licensing

The Town Manager has a vision for Town and has many ideas on how to manage the Town more efficiently and effectively. She outlined in the following 4 items:

1 - Need real time problem solving instead of budget time and need real time data to
- Improve services
- Identify problems
- Analyze patterns
- Solve problems

    For instance, map improvements (such as traffic improvements) and map mailboxes knocked down by trucks.

2 – Assist big development issues
- Plans and visions for the Rail and Trail project; impact on the environment and public safety
- Downtown needs to have sewering; leeching field, distance from hookups, and land use decisions
- The impact of 1000 potential building lots on water usage, fire, police, and schools
- Walkways (children can walk and bike)
- Patterns of building demolitions

3 – Assist in dealing with environmental issues
- Wetland buffers
- Endangered species

4 – Tracking Service/Complaints
- Service tracking: sanding, snowing plowing, trash pickup;
- Complaint tracking

5 – Abutters List for Liquor Licensing is usually done by the Assessor's Office. However, once a town-wide GIS system is in place, an abutters program can assist in the liquor license application process.

Data and Mapping Needs

Any Land based data
Conservation and Environmental Data
Demographics
Work Orders and Current Status

Permits/Demolitions
Complaints

Application Needs

Complaint Tracking System
Permitting System
Work Order System
Abutters Tool

Integration Needs

Integration of real time GIS data to complaint tracking, permitting and work order system

2.17 Treasurer/Collector

Department Head: Andrea Terkelson
T: 978-443-8891 x377, E-mail: terkelsona@town.sudbury.ma.us

This section is organized into the following smaller sections: summary of needs, data and mapping needs, and application needs.

Summary of GIS Needs

Table 2.17 lists the GIS needs in the Treasurer/Collector's Office by their priority and followed by detailed descriptions of each need.

Table 2.17 – Treasurer/Collector's Office GIS Needs by Priority

Priority	GIS Needs
1	Map of Developable and Undevelopable Land
1	Map of Tax Ranges
1	Map of Active Building Permits
2	Abutter List

Traditionally, the Treasurer/Collector's Office does not have a large need for GIS. However, they have many good ideas for potential use of GIS in this department:

Priority 1 – There is a need for a map showing developable and undevelopable land.

Priority 1 – A map of tax ranges.

Priority 2 – An abutters program can be used to notify abutters of an auction of properties.

The aforementioned GIS needs are categorized as the following:

Data and Mapping Needs

Developable and Undevelopable Land
Tax Ranges

Active Building Permits

Application Needs

Abutters Program

2.18 Water District

Superintendent: Al Renzi
T: 978-443-6602, E-mail:customerservice@sudburywater.com

This section is organized into the following smaller sections: summary of needs, data and mapping needs, hardware and software needs.

Summary of GIS Needs

Table 2.18 lists the GIS needs in the Water District by their priority and followed by detailed descriptions of each need.

Table 2.18 – Sudbury Water District GIS Needs by Priority

Priority	GIS Needs
1	LIST OF ADDRESSES AND PARCEL IDS
2	Location of Main Valves and Hydrants
3	Scanning 5700 Service Cards
4	Field Work Using Wireless Mapping
5	Hardware: Plotter, PC, Network Connection and ArcGIS

1 – There is an immediate need for a list of current addresses and parcel IDs, as the Water District is updating their customer service program.

2 –Accurate locations of main valves and hydrants are greatly needed.

3 – There are approximately 5700 service cards that need to be digitized for archiving, sharing and information access/lookup purposes.

4 – In the future, if the town has a town-wide wireless network, looking up or updating mapping information during field work will be extremely useful.

5 – GIS Hardware and Software Needs: Large Format Plotter, PC, Network Connection, and ArcGIS 9.x.

The aforementioned GIS needs are categorized as the following:

Data and Mapping Needs

Hydrants
Main Valves
Current Addresses and Parcel IDs
Service Cards

Hardware Needs

Large Format Plotter
PC
Connection to the Town's Network

Software Needs

ArcGIS 9.x

2.19 Lincoln-Sudbury Regional High School

Superintendent: John Ritchie
T: 978-443-9961, x2373, E-mail: john_ritchie@lsrhs.net
Staff Attendees: Pauline Paste, Scott Carpenter, Rosemary Colson

Lincoln-Sudbury Regional High School has recently been rebuilt and detailed emergency management plans and digital drawing files have been developed. At this stage, they do not have any immediate needs for GIS, however, are very interested in potential cooperation with the Town on possible GIS projects.

CHAPTER 3 - SUMMARY OF EXISTING GIS DATA, TOWN-WIDE DATA NEEDS AND DATA DEVELOPMENT RECOMMENDATIONS

This chapter examines Sudbury's town-wide existing GIS data layers, discusses data accuracy and discrepancy issues, summarizes departmental data needs to identify town-wide GIS data needs, proposes data development strategies, present detailed data development tasks and time lines over the next five fiscal years, and recommends data maintenance procedures.

3.1 Existing GIS Data Layers

The Town's Department of Public Works/Engineering maintains the existing GIS data layers listed below. Some of them are in AutoCAD DWG or DXF format and some of them have been converted to a GIS ArcView shapefile format. These data layers came from a variety of sources such as MassGIS, Nstar, and other consulting firms hired by the Town in the past. A number of them were developed in house by DPW/Engineering. Most of the maps were developed in AutoCAD by DPW/Engineering and data maintenance is also completed using AutoCAD.

Table 3.1 Existing GIS Data Layers, Format, Status, and Data Sources

LAYER NAME	FORMAT	STATUS	SOURCES
Parcels	ArcView shapefile	Updates In Progress	
Town_Line	ArcView shapefile		Nstar
Buildings	ArcView shapefile	Updates Needed	Nstar
Easements	ArcView shapefile		Nstar
Wetland_Areas	ArcView shapefile	Incomplete	
LCI_MAPC	ArcView shapefile		
Open_Space_MAPC	ArcView shapefile		
Hydro_Minor	ArcView shapefile	New Download from MassGIS	MassGIS
Hydro_Major	ArcView shapefile	New Download from MassGIS	MassGIS
Well ZoneII's	ArcView shapefile	Complete	MassGIS
Contours_27	ArcView shapefile	Complete	MassGIS
Bridges	ArcView shapefile		Nstar
Pavement_CL	ArcView shapefile	QC Needed	Nstar
Pavement_Edge	ArcView shapefile	QC Needed	Nstar
Rail_Roads	ArcView shapefile	QC Needed	Nstar
Rail_Trail	ArcView shapefile	No data	
Hydrants	ArcView shapefile		Sudbury Engineering
Utility Poles	ArcView shapefile		Nstar
Street Names	AutoCAD DXF		Sudbury Engineering
Municipal Buildings	AutoCAD DXF		Sudbury Engineering
Brook_Pond Names	AutoCAD DXF		Sudbury Engineering
Zoning2005	AutoCAD DWG	Complete	Sudbury Engineering
Water Mains	AutoCAD DWG	Incomplete	Sudbury Engineering
Precincts	AutoCAD DWG	Complete	Sudbury Engineering
Historc Districts	AutoCAD DWG	Complete	Sudbury Engineering
Zone IIIs	AutoCAD DWG	Complete	Sudbury Engineering
Wells	AutoCAD DWG	Complete	Sudbury Engineering
Drainage	ArcView shapefile	2 Years Old	Sudbury DPW
Concord River	ArcView shapefile	Current Download	MassGIS

The following are snapshots of some of the existing data layers overlaid with one another, such as parcels, buildings, easements and town boundary.

Figure 3.1 Existing Parcels, Buildings, Easements and Town Line Layers
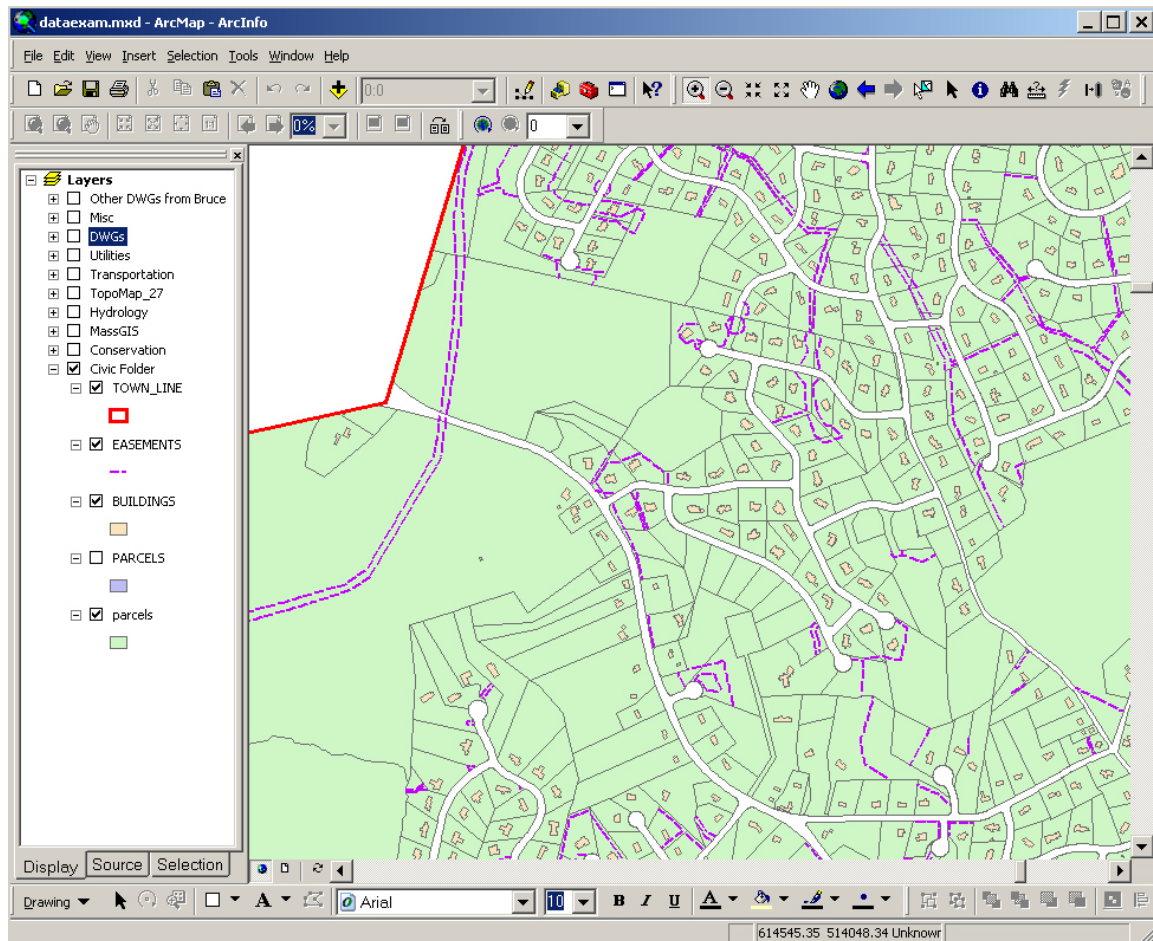
Figure 3.2 Existing Open Space, Land of Critical Interest and Wetlands Layers
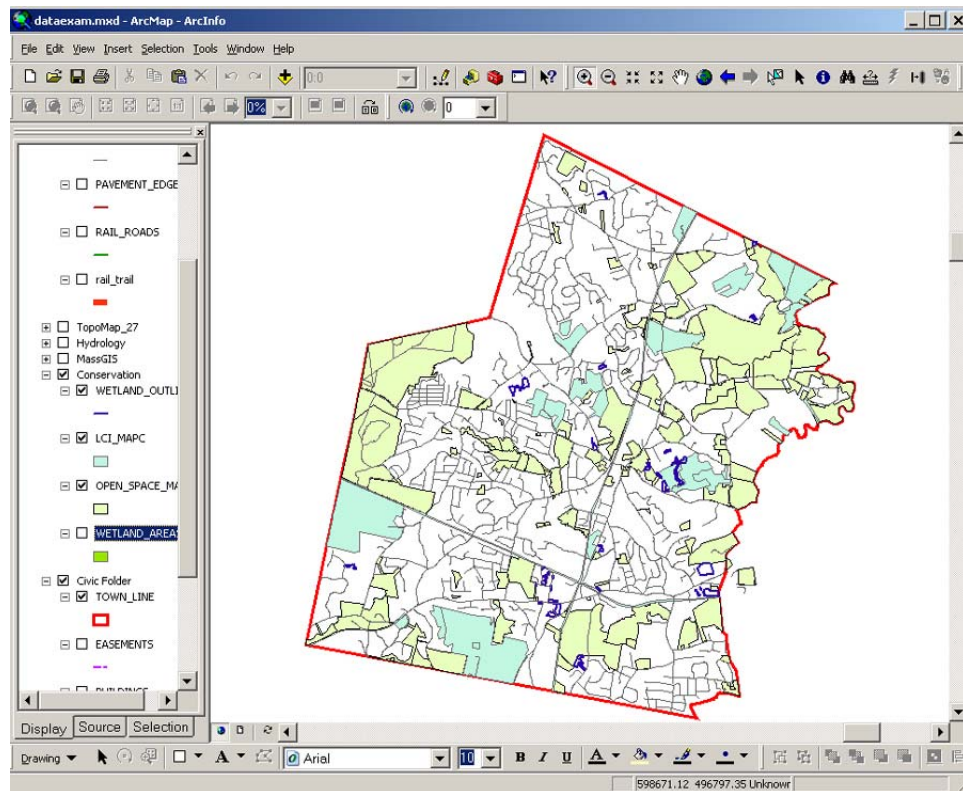
Figure 3.3 Existing Zone IIs and Hydrography Layers
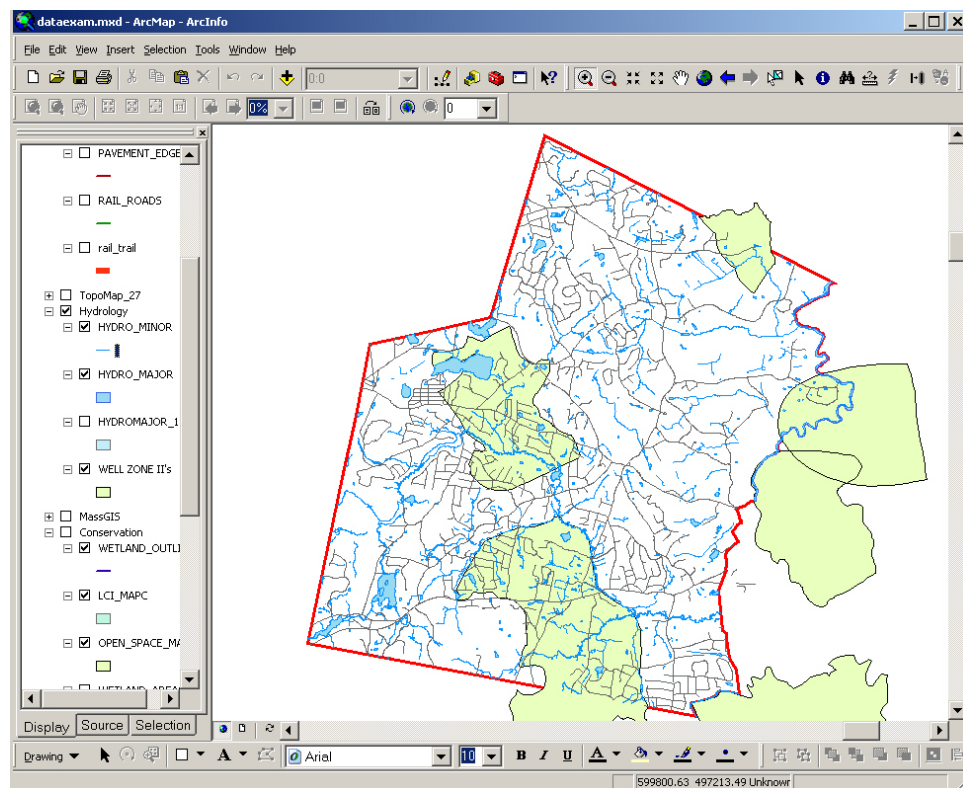
Figure 3.4 Existing Pavement Centerlines and Contours Layers
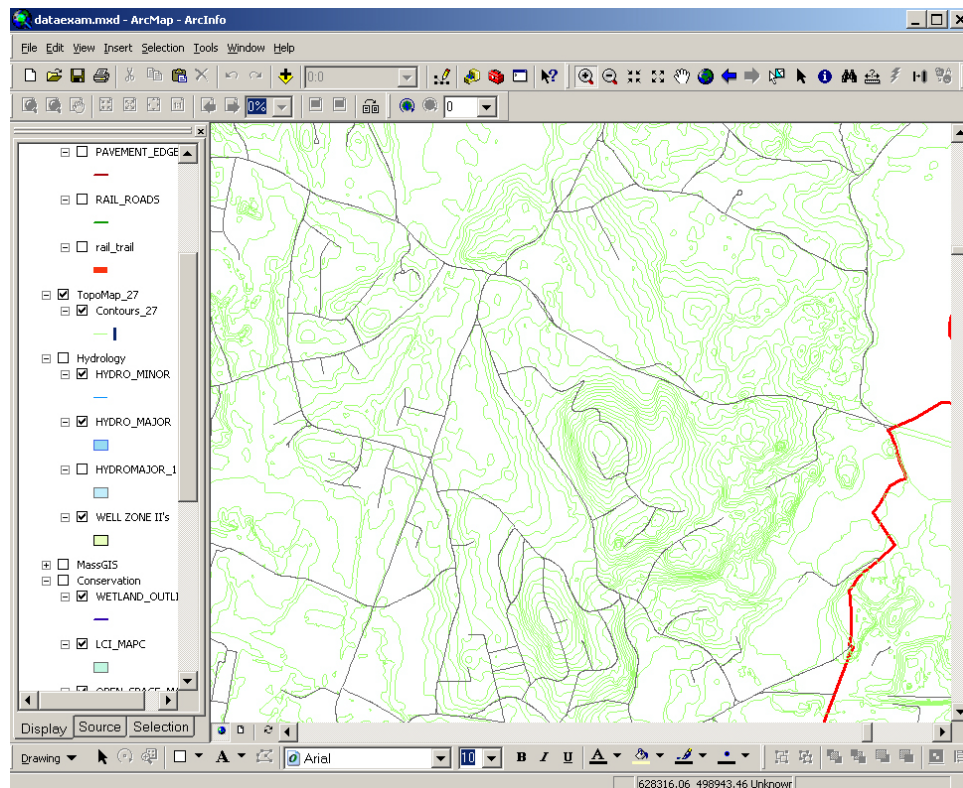
Figure 3.5 Existing Hydrants and Utility Poles Layers
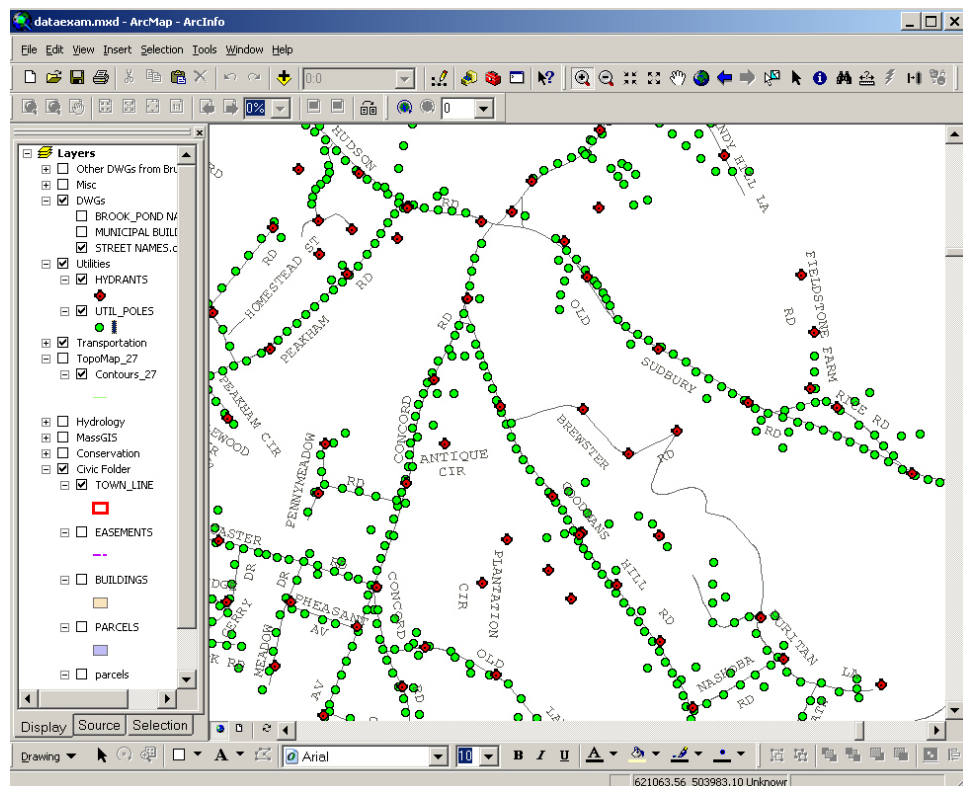
Figure 3.6 Existing Municipal Buildings and Street Names AutoCAD Drawing Files
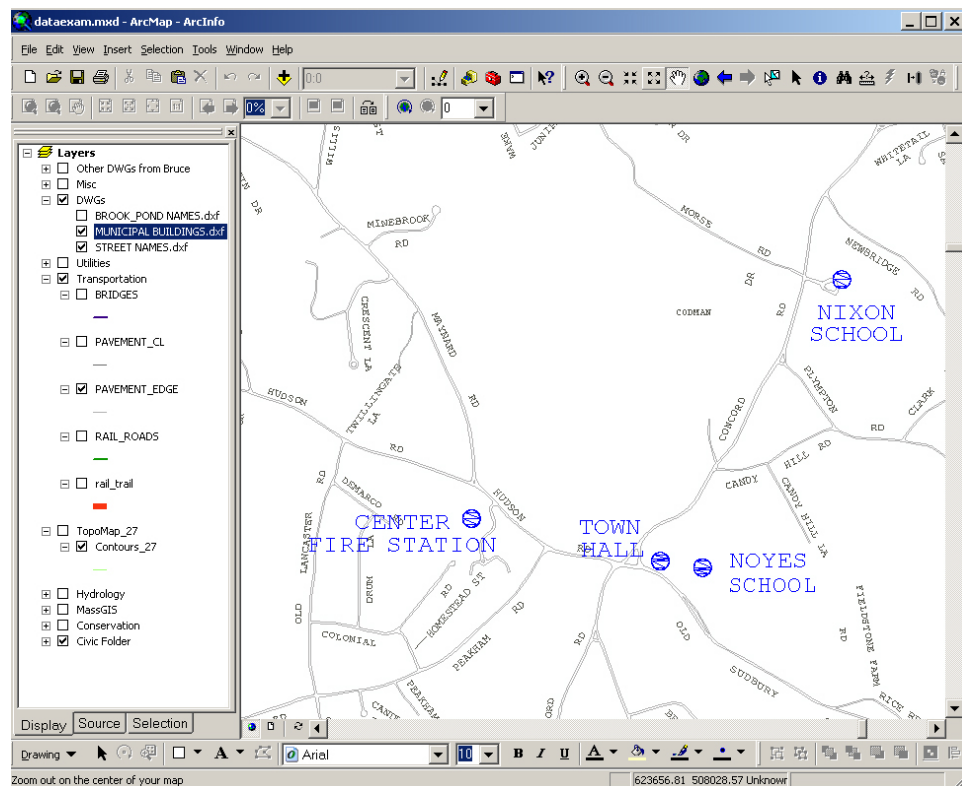
Figure 3.7 Existing Aquifer Protection Contribution Zones and Discharge Zones
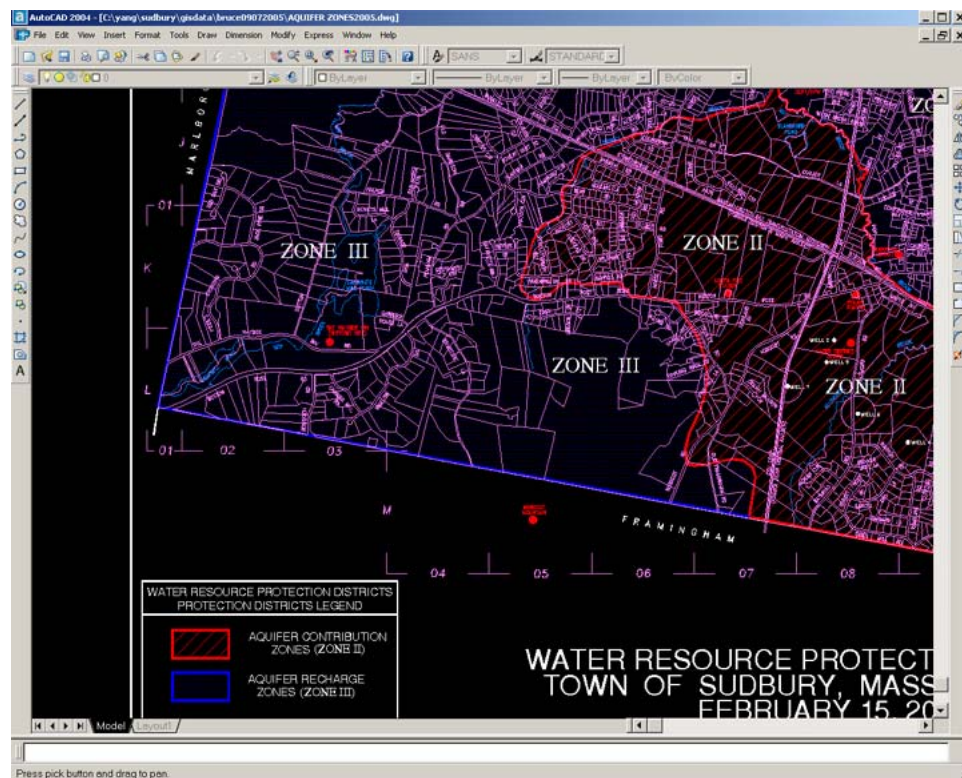
Figure 3.8 Existing Historic Districts CAD Drawing
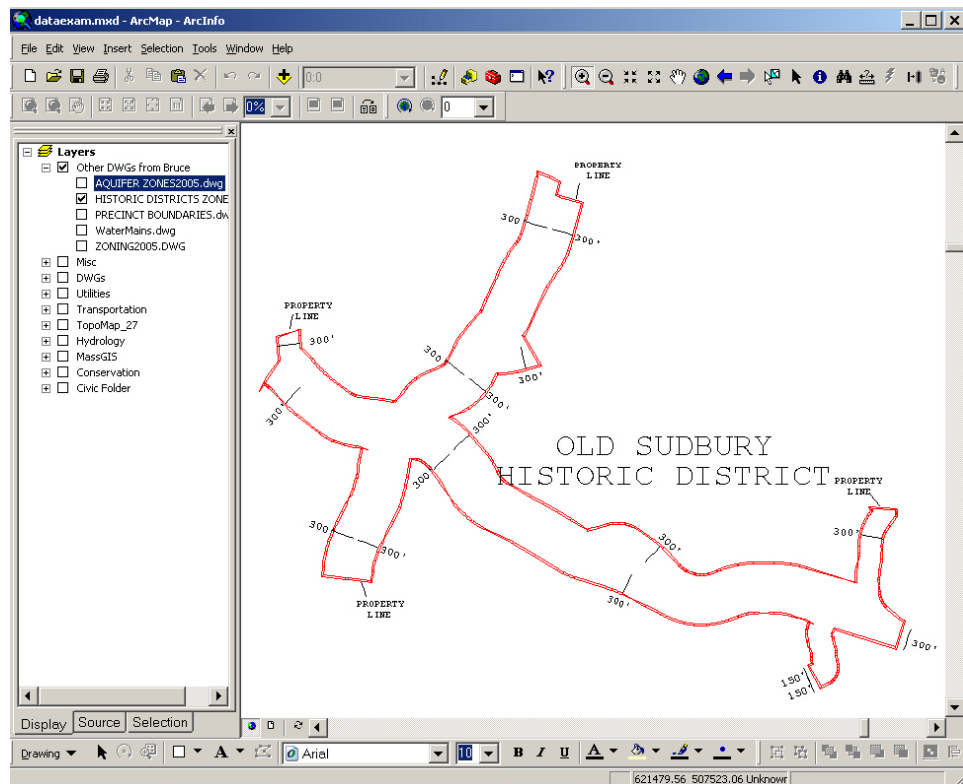
Figure 3.9 Existing Precincts CAD Drawing
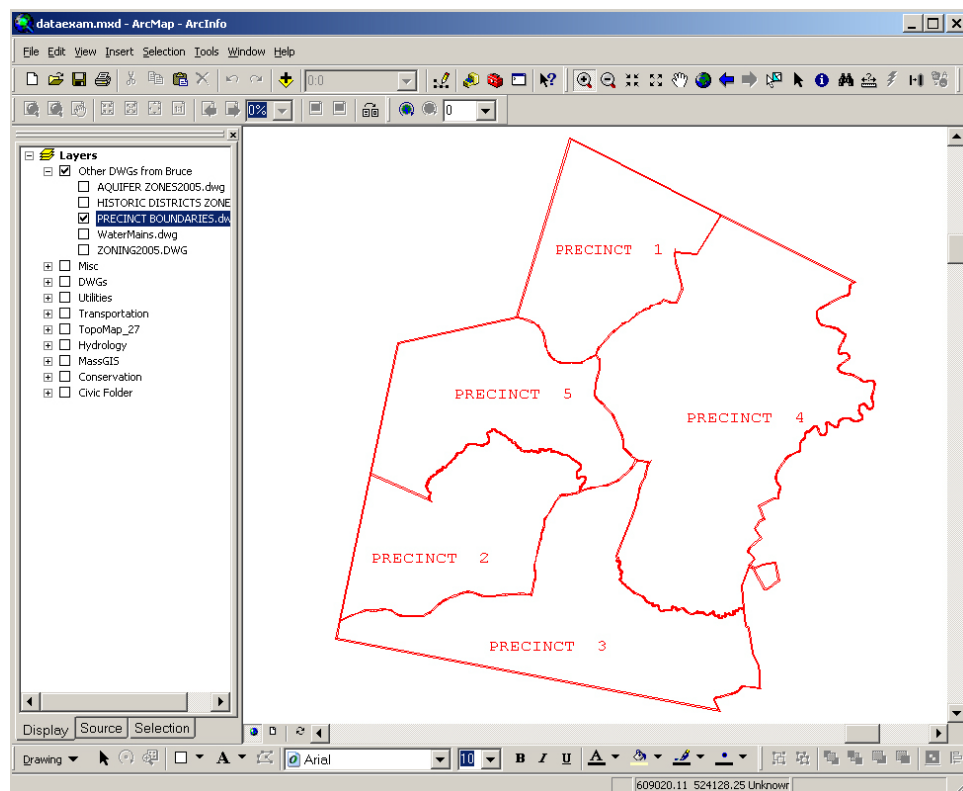
Figure 3.10 Existing Zoning Districts
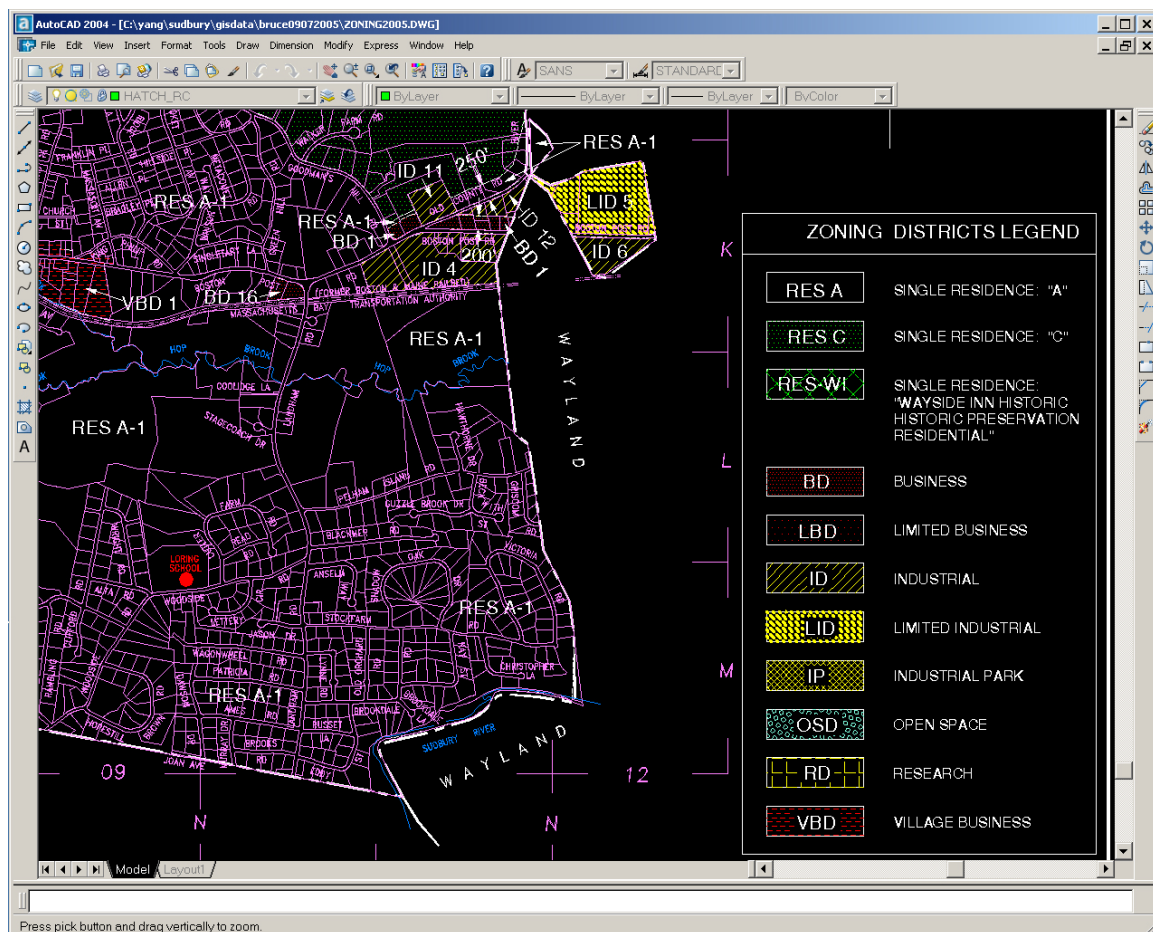
3.2 Data Accuracy Issues

There are two important aspects to the issue of data accuracy. One is the absolute accuracy, and the other is the relative accuracy. Absolute accuracy is a measure of the coordinate position of a feature in a GIS database to its true position in space. Relative accuracy is a measure of a position of a feature relative to another feature (Chernin and LeRoux, 2000).

Sudbury's existing GIS and CAD data layers are from various sources and the absolute accuracy varies greatly. Land base data layers such as pavement edges, centerlines, rail roads and bridges are from Boston Edison Co. (now Nstar), and were developed in 1991. The data accuracy is believed to meet National Mapping Standard of 1:1200 mapping and the features in GIS are within 2-3 feet of their true position in space. However the DPW/Engineering Department raised accuracy questions regarding the street and building layers. Since the buildings are interpreted from aerial photos, it is important to recognize that the buildings are not true building footprints, rather rooflines. The parcel data layer was digitized by Harvard Design and Mapping (HDM) in 1997 based upon the Town's existing Mylar maps and Nstar land based data layers. Other layers such as the aquifer protection zones IIs, hydrography and topography are from MassGIS. MassGIS data accuracy varies. The color digital orthos are for 1:5000 scale mapping and the accuracy for hydrography is for 1:25000 scale mapping. The open space and land of critical interest layers were from MAPC based upon MassGIS data. Hydrants were developed in-house by DPW using GPS. The accuracy of the GPS equipment is not available from the Town. Other

data layers such as the precincts and zoning districts were developed in-house based upon existing data such as the Nstar land based layers and parcels.

Table 3.2 shows a survey of most Massachusetts communities who have an established GIS and the accuracy of their GIS base data. In most cases, a 1"=100' base map is sufficient enough for a municipal GIS and the survey suggests that.

Table 3.2 Municipal GIS Base Data Accuracy in Massachusetts (Survey Conducted in February 2006)

Town Name	Base Data Accuracy	
Amherst	1"=40' (1:480)	
Andover	1"=100' (1:1200)	
Brockton	1"=100' (1:1200)	
Brookline	1"=100' (1:1200)	
Cambridge	1"=100' (1:1200)	
Falmouth	1"=100' (1:1200)	
Natick	1"=40' Planimetrics (1:480)	1"=100 Parcels
Needham	1"=40' (1:480)	
Newton	1"=100' (1:480)	
North Reading	1"=100' (1:480)	
Northbridge	1"=100' (1:480)	
Pelham	1"=100' (1:480)	
Reading	1"=40' Planimetrics (1:480)	
Russell	1"=100' (1:1200)	
Stockbridge	1"=100' (1:1200)	
Swansea	1"=100' (1:1200)	
Waltham	1"=40' Planimetrics (1:480)	1"=100' Parcels
Wellesley	1"=40' (1:480)	
West Springfield	1"=40' (1:480)	
Westborough	1"=40' (1:480)	
Weston	1"=100' (1:1200)	
Wilmington	1"=100' (1:1200)	
Winchendon	1"=100' (1:1200)	
Winchester	1"=100' (1:1200)	
Worcester	1"=100' (1:1200)	

Some communities went the route of a 1:480 base map, which is considerably more costly than 1:1200. In most cases the push for the higher accuracy base data comes from their Engineering Department for meeting site design accuracy requirements. However, the Survey also suggest that some communities who went for 1:480 mapping have had difficulty keeping up with the maintenance, and the data has degraded overtime. Other communities, who are using 1:1200 scale mapping, chose a less expensive approach for their GIS base data and opt to conduct individual survey at 1:480 for engineering site design, on a case by case base.

Because Sudbury's existing data layers are from at least 3 different sources, there are some issues with the relative accuracy. Data layers from the 3 different sources do not completely line up. However since the parcels layer was developed based upon the Nstar land based data layers such as the pavement edges, town boundaries, water bodies and geodetic controls, this kind of discrepancy is not widespread. Even though the MassGIS 1:5000 scale orthos, and the Nstar 1:1200 scale land based data are from two very different sources, in most areas they align

surprisingly well. Figure 3.11 is a snapshot of one area in Sudbury showing the color orthos, and pavement edges from Nstar.

Figure 3.11 Relative Accuracy between Nstar layers and MassGIS layers
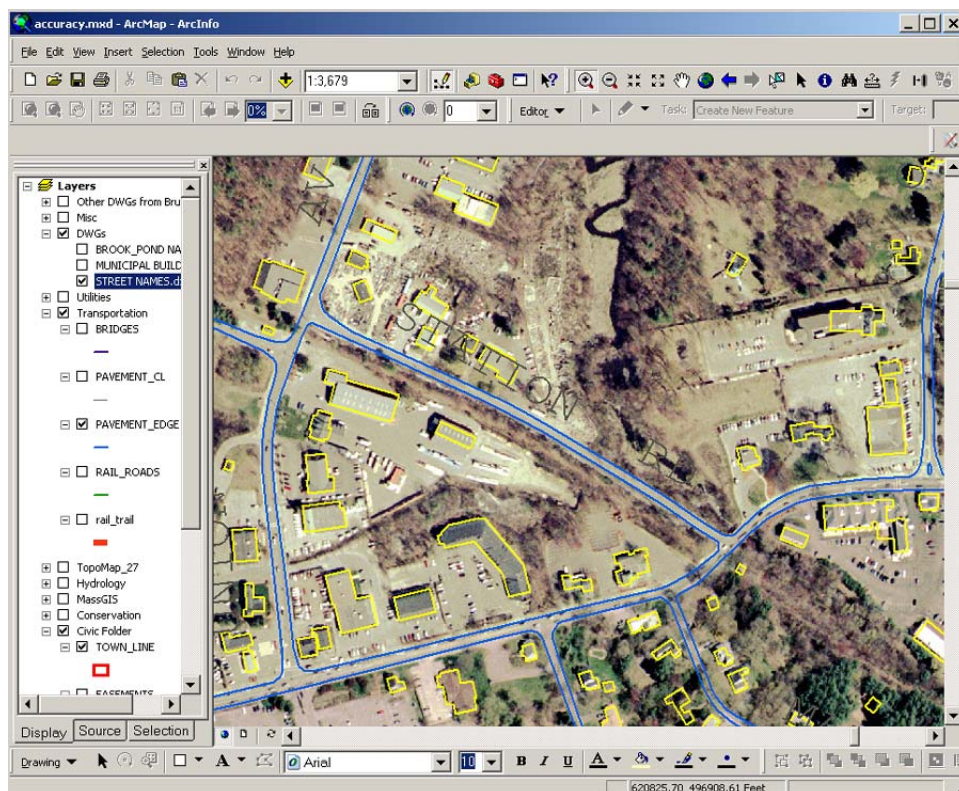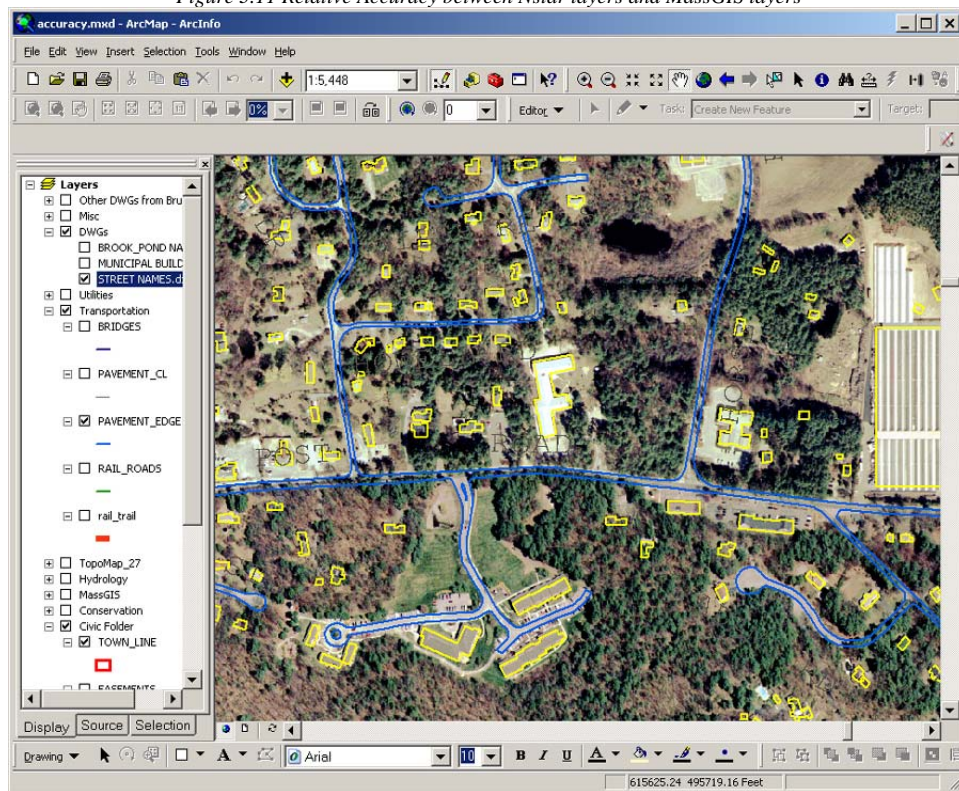
3.3 Parcels and CAMA database Issues

The section discusses parcels and CAMA database issues from three different angles: within the GIS parcel layer; within the CAMA database; and the link between the two.

Issues within the GIS Parcels Layer

- Parcel ID formats in the parcels layer itself are inconsistent. Most of them are in a format such as F05-719A with four exceptions. C08-115-4, J10-011-A, L03-343-A, and J10-601-A. Modified in Parcels layers.
- 31 Parcels (in the parcels layer) with no IDs.
- One parcel with the Parcel ID in Map field and Lot ID in Map_parcel field.
- Two parcels with Map ID no Lot ID.
- One parcel with 0000 as Map and Lot ID.
- 73 parcel IDs occurred more than twice in the GIS parcels layer.

Figure 3.12 an example of Duplicate Parcel IDs in the GIS Parcels Layer
(reference red arrows)
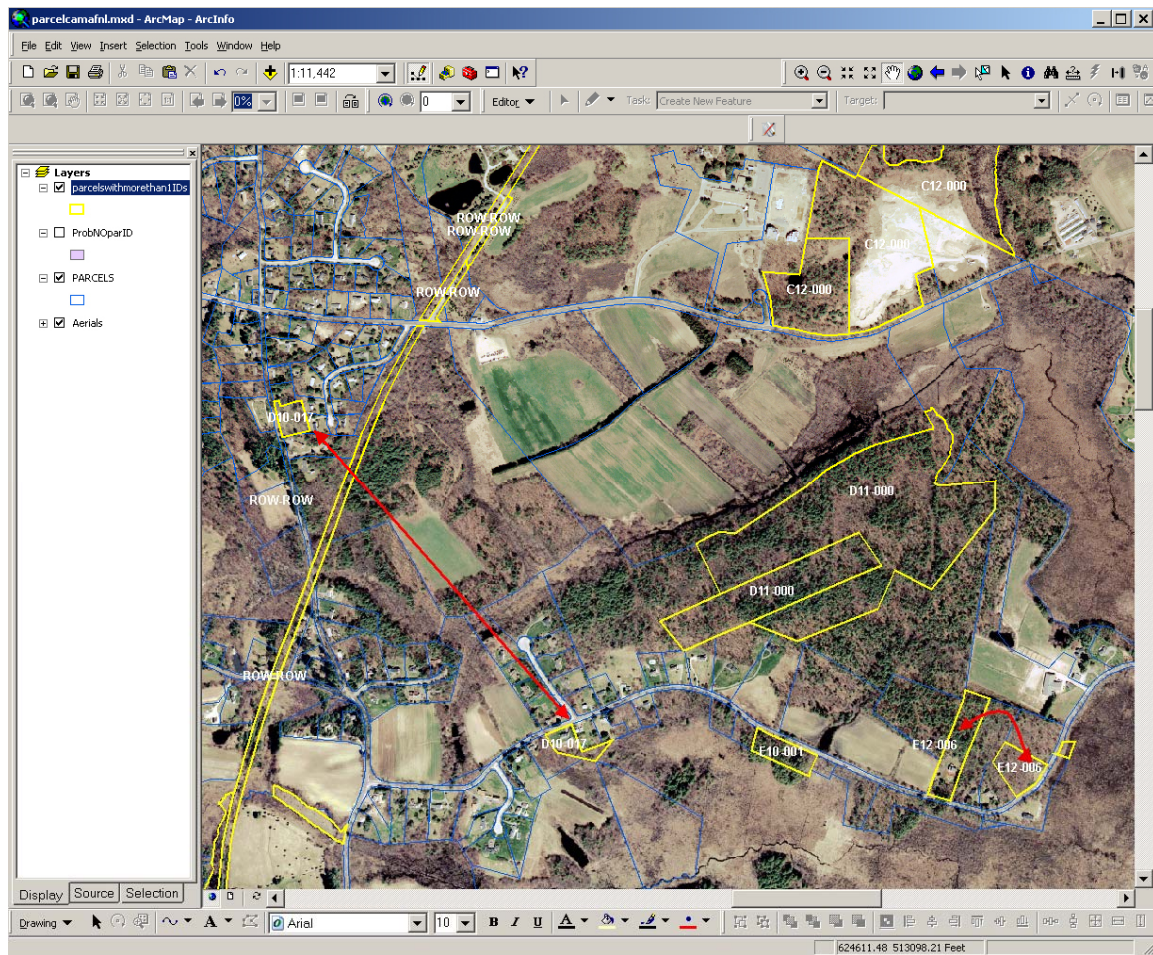
Issues within the CAMA database

- There are 92 out of 6691 Parcel IDs in the CAMA database, which have inconsistent formats. Most of them are in a format such as F05-0719-A. However some are in the format such as E06-0010.A. See Table 3.3.1 for similar records.

Table 3.3.1 An Example of Inconsistent Parcel ID Formats in the CAMA file

Parcel_ID	Parcel_ID	Parcel_ID	Parcel_ID
C08-0115-A	F05-0719-A	K09-0053-J	K09-3234-C
C11-3101-A	J10-0011-A	K09-3212-A	K09-5701-A
C11-3102-D	J10-0601-A	K09-3212-B	K09-5701-B
C11-3103-B	K06-0012-A	K09-3213-A	K09-5701-C
C11-3201-A	K06-0012-B	K09-3213-B	K09-5701-D
C11-3202-C	K06-0012-C	K09-3213-C	K09-5701-E
C11-3203-B	K06-0012-D	K09-3213-D	K09-5701-F
C11-3301-A	K06-0012-E	K09-3214-A	K09-5711-A
C11-3302-C	K06-0012-F	K09-3214-B	K09-5711-B
C11-3303-B	K06-0012-G	K09-3214-C	K09-5711-C
C11-3401-A	K06-0012-H	K09-3231-A	K09-5711-D
C11-3402-C	K06-0012-I	K09-3231-B	K11-0019.A
C11-3403-B	K08-0079-A	K09-3231-C	K12-0004-A
E06-0009.A	K08-0079-B	K09-3232-A	K12-0004-B
E06-0010.A	K09-0053-A	K09-3232-B	K12-0008-U
E06-0010.B	K09-0053-B	K09-3232-C	K10-0071-A
E06-0010.C	K09-0053-C	K09-3232-D	K10-0071-B
J06-0011-A	K09-0053-D	K09-3233-A	K10-0071-C
J07-0111.z	K09-0053-E	K09-3233-B	K10-0072-B
J08-0023-A	K09-0053-F	K09-3233-C	K10-0072-C
J08-0023-B	K09-0053-G	K09-3233-D	L03-0343-A
J08-0023-C	K09-0053-H	K09-3234-A	L07-0020.A
F05-0707-A	K09-0053-I	K09-3234-B	L07-0021.z

Issues between the GIS parcels layer and the CAMA data

- In most cases parcel IDs in CAMA have a format of F05-0719-A and a format of F05-719A in the GIS parcels layer. Changes have to be made either in parcels or in CAMA files when downloaded to match the two. Change parcels IDs in the parcel layer to match CAMA so that every time there is a new CAMA file there is no need to change the IDs? Change the IDs in the CAMA system to match GIS parcels?
- 6262 out of 6691 records in the CAMA database have a match in the parcels layer. 429 parcels in CAMA do not have a match. See Appendix A for a list of parcels that did not match.
- 6328 out of 6466 parcels in the parcels layer have a match in the CAMA database. See Appendix A for a list of unmatched parcels.

Figure 3.13 Parcels that Do not have a matching CAMA record (green) and
Parcels that have duplicate IDs in the Parcels Layer (red)
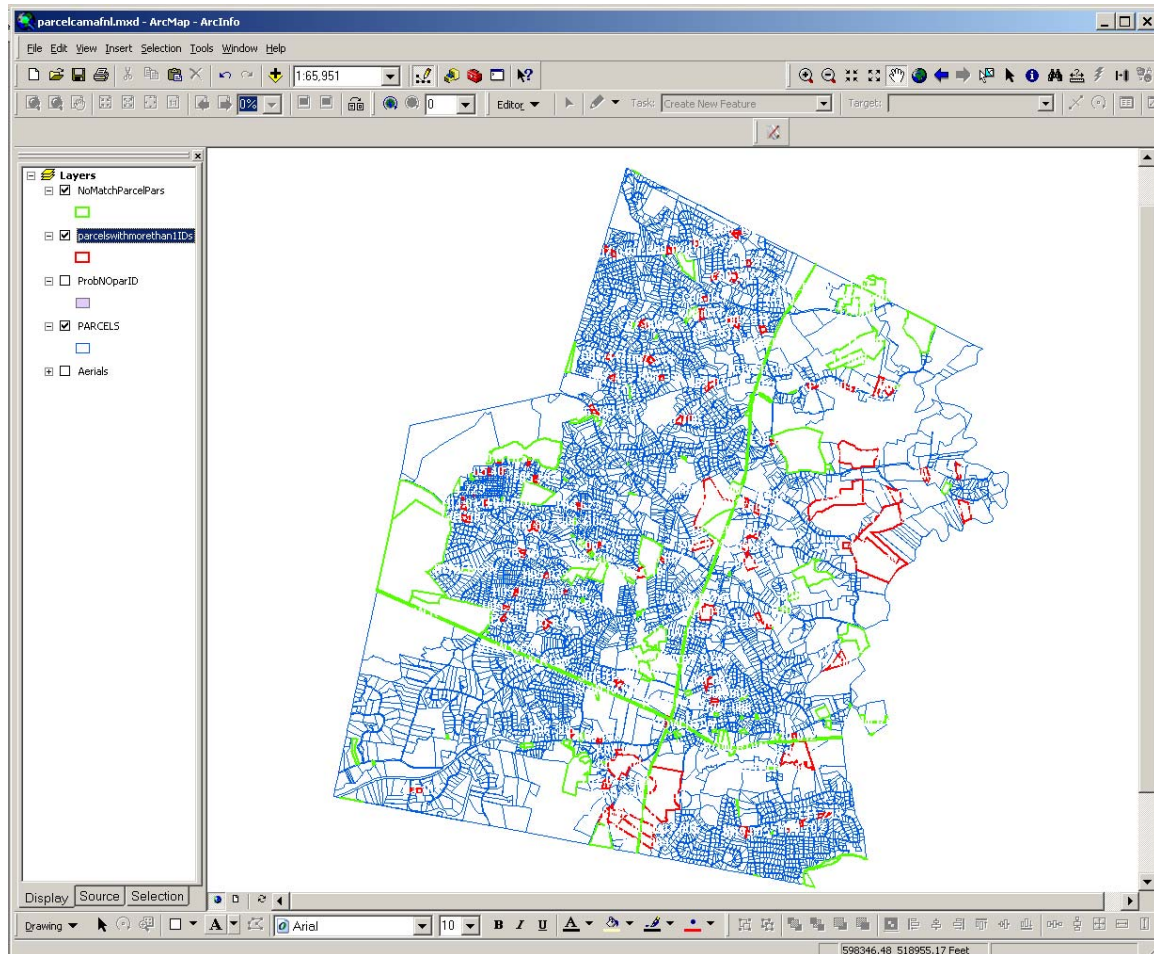
3.4 CAD Layers and Conversion Issues

The Town's DPW/Engineering Department has created some AutoCAD maps with new data layers, such as the historic districts, aquifer protection areas, precincts and zoning districts. These drawing files were prepared in AutoCAD. They need to be converted into ArcGIS personal GeoDatabase.

3.5 Other Data Layers in Need

Table 3.5.1 Summarizes town-wide data needs as a result of the interviews and surveys conducted.

Table 3.5.1 Other Data Needs by Category

GIS DATA Needs	GIS Data Category
Assessing Neighborhood map	Assessing
Land Classes Map	Assessing
Map of Parcels with no Property Images	Assessing
Sales Map for DOR	Assessing
Tax Ranges	Assessing
Chapter 61A Parcel Deed Inaccuracy	Conservation
Conservation Restrictions	Conservation
Overlaying parcels onto MassGIS Bio Map	Conservation
Demographic Information: school age children, senior citizens, Income change	Demographics/Town Census
Town Census	Demographics/Town Census
Scanning old Septic Plans, Historic land Plans, Historic Maps	Document Management
12 Town Owned Historic Sites	Historic Preservation
Historic Walks, Trails and Monuments	Historic Preservation
Historically Significant Homes and Homes built prior to 1940s	Historic Preservation
2-foot Contours	Land based
Developable and Undevelopable Land	Land based
New Orthophotos	Land based
Pictometry	Land based
Updated Streets	Land based
Library Customers Overlay Demographic Information	Library
21E Sites	Natural Resources/Environmental Protection
Private Wells	Natural Resources/Environmental Protection
Soils	Natural Resources/Environmental Protection
Surficial Geology	Natural Resources/Environmental Protection
Wetlands, Zone IIs, Flood Plains	Natural Resources/Environmental Protection
Cemetery database	Parks/Recreation
Mowing Routes	Parks/Recreation
Recreation Facilities Inventory	Parks/Recreation
Recreation Facility Members	Parks/Recreation
Shelters and Helicopter Landing Field	Parks/Recreation
Soil Testing Results	Parks/Recreation
Tracking Teem Programs and Identifying High Risk of Drug Use	Parks/Recreation
Youth Camps	Parks/Recreation
Active Building Permits	Permitting/Licensing
Map of Scenic Roads	Planning
Zoning Overlay Districts	Planning
Poll Locations and 150-foot buffers	Political Boundaries
Critical Infrastructure	Public Safety
Data and Map of Police Sectors	Public Safety
Data and Map of Speed Limits	Public Safety
Fire Alarm Circuits	Public Safety
Fire Hydrants and Fire Atlas	Public Safety
Hose Locations/Fire Department Connections	Public Safety

Tear Sheet	Public Safety
Distribution of Upcoming School Age Children	Schools
Existing school bus routes	Schools
Mapping and listing immediate abutters to schools	Schools
Mapping distance to schools and distribution of students	Schools
School District Map and Location of Students by Grade	Schools
A mapping and scheduling ride program	Seniors
Elderly Van Pickup/Drop-off Address and Routes	Seniors
Town Owned Buildings	Town Owned Assets
Road Pavement Segments	Utilities/Facilities
Utility Entrance to Properties	Utilities/Facilities
Utility Poles	Utilities/Facilities
Main Valves and Hydrants	Water District
Optimize Inspection Routes	Water District
Scanning 5700 Service Cards and Previous Plans	Water District

3.6 Summary of Issues

The Town of Sudbury has developed a certain amount of GIS data over the past decade through various vendors and the DPW/Engineering department. Some of the data layers are in ESRI format and others in AutoCAD format. Some of them use the Massachusetts State Plan coordinate system NAD 27 while others do not have any coordinate information specified. The GIS data has been used by the Town's DPW/Engineering department through the use of AutoCAD software by one engineer. However, the data is not shared and used by other departments. The majority of the data layers can be updated, documented and converted into a format that can be shared and used by other departments.

The Town's DPW/Engineering department does some data maintenance in AutoCAD, but the majority of the layers are not updated and maintained. No inter-departmental data maintenance procedures or requirements are currently in place.

The State GIS Office, MassGIS has developed a vast amount of statewide database and custom programs that the Town has not yet taken advantage of. There are relevant layers which need to be downloaded and populated into the town-wide GIS database for end users. Training is a necessary and important next step.

A great deal of data development and updates are needed. Just as the Town invests in its physical infrastructure, investments in its information infrastructure are necessary. More accurate land based data such as a new orthophotography, a town-wide digital elevation model and 2-foot contours should be developed first. Others such as utilities, facilities, natural resources, schools and public safety related information, and demographics are in need to be developed in the next 5 years.

3.7 Future Town-wide Data Development Recommendations

This section covers data development recommendations in the following areas: base data accuracy, short term strategy, major data development strategy, and data maintenance procedural recommendations. These recommendations are made under the assumption that there will be a GIS Administrator's position created in FY 2008. The short-term data development strategy is proposed for the period of time when this GIS position is not yet in place.

3.7.1 Base Data Accuracy (absolute accuracy)

From the base data accuracy survey conducted for this plan in Table 3.2, seventeen out of 25 communities in Massachusetts have a base data accuracy of 1:1200. Only eight communities have a base data accuracy of 1:480. From the survey, a few of the towns with 40' scale base data has had problems keeping the data up to date to the same accuracy level. Not only is the initial data development expensive, the maintenance of such data is expensive as well. Base data accuracy of 1:1200 is suitable for planning purposes, not suitable for engineering site design. Most communities that went with 1:1200 base data accuracy require additional surveys for any engineering design and other site design projects.

It is not only costly to obtain 1:480 scale land based data, but also it is also expensive to maintain such data. This plan suggests the Town of Sudbury use 1:1200 scale base data accuracy for its GIS data development and obtain individual survey for site design at a higher accuracy on a case by case base.

3.7.2 Short Term (immediate) Strategy

As discussed in section 3.6, the town has over time acquired and developed a certain number of GIS data layers. A very small amount of work is needed to document and convert such layers into a format that can be used by many other departments. MassGIS data can be downloaded and populated into the new main GIS database quickly. It is recommended to the Town to hire a consultant to download, document and convert aforementioned data layers, compile a main existing GIS database, and provide basic training on ArcGIS (ArcView) to utilize these data layers by various departments. The following is a detailed list of recommended tasks and time lines.

Table 3.7.2 List of Short Term Data Development and User Training Tasks, and Time Lines

Tasks	Time Lines
• Build a main GIS data depository in Personal Geodatabase format for town wide data sharing (with all MassGIS layers and existing GIS layers maintained by the Engineering Dept.)	FY07: 1st - 2nd Quarter
• Reconcile the discrepancy between the CAMA file and the GIS Parcels numbering scheme	FY07: 1st - 2nd Quarter
• Pictometry Training (2 sessions and up to 20 people)	FY07: 1st Quarter
• Introduction to ArcGIS (ArcView) (6P): On-site 3-day training using ArcGIS (ArcView) 9.1 and the main data repository (up to 6 attendees).	FY07: 2nd – 3rd Quarter

3.7.3 Major Data Development Strategy

While a main GIS data repository of existing layers is compiled and shared by user departments, it is recommended to focus on the development of new, updated and accurate land based data such as new orthophotography in 6" pixel size for the entire Town and 3" pixel size for the downtown area, Digital Elevation Model, 2-foot contours and planimetrics in the first couple of years of GIS implementation. The planimetrics include any features that can be interpreted from the aerial photography, such as buildings, hydrants, manholes, catch basins, roads, driveways,

fences, docks, water bodies and wetlands. This will capture most recent land use changes in the Town of Sudbury. This data development will not only benefit the Town but also the water district. Funding should be pursued from both entities. Existing data layers will then be rectified onto the new base data. The detailed list of data development tasks and time lines is recommended below.

Table 3.7.3 List of Data Development Tasks, and Time Lines

Tasks	Time Lines
• Write an RFP for base data development including new orthos, and 2-foot contours	FY07: 1st Quarter
• New flyover, 6" orthophotography (3" downtown area)	FY07
• DEM and 2' Contours	FY08
• Update planimetrics: buildings, hydrants, manholes, roads, driveways, fences, docks, water bodies and wetlands	FY08
• Align and adjust existing GIS layers to the new base data**	FY08
• Scan 5700 water service cards and link to water system (for water district)	FY08
• Update utilities data layers	FY08
• Recreation Facilities Inventory	FY09
• Update pavement and sidewalk shapefiles	FY09
• Scan historic land plans and historic maps	FY10
• Digitize cemetery lots and link to the cemetery database	FY11

Other data layers identified as in need, and listed in Table 3.5.1 will be accomplished in house by the GIS administrator with some consulting help. (The GIS Administrator's position is discussed in Chapter 5).

3.8 Data Maintenance Procedural Recommendations

Maintenance on some of the major data layers such as parcels and buildings are discussed in this section and procedural changes are recommended, primarily to add digital plan submittal requirements. Maintenance is discussed under the assumption that the GIS administrator's position will be filled in FY 2008.

3.8.1 Parcels

Parcel data maintenance involves the following departments: planning, assessing, engineering and IT (GIS Administrator). The parcel subdivision process usually starts with the planning department when owners or developers submit their subdivision plans. If the subdivided parcels have enough frontage or are in compliance with local zoning by-law, the Planning Board signs off the plan as Approval Not Required (ANR). If the subdivided parcels do not have enough frontage or are not in compliance with local zoning by-law, these applications will need approval by the Planning Board. In either case, the Planning Board and the Planning Department should require submittal of a digital plan as part of the application process, before the sign-off or approval. See Appendix C for an example by the Brookline Planning Board. The sign-off or approval is the Town's leverage in obtaining digital files from owners or developers.

At this stage, these subdivision plans are not necessarily official until the owners or developers file the subdivisions with the Middlesex County Registry of Deeds. They may never file, in which case the subdivision plans are not official. Once the owners or developers file with the Registry of Deeds, which is when the Assessor's Office usually gets a copy of the subdivision plan from the Registry. They then assign new parcel IDs to the newly subdivided properties. The Engineering

Department also gets a copy of the plan either from the Registry, or the Planning and Assessing Departments.

In order to keep the GIS parcel layer up to date in a timely fashion, the requirement of a subdivision plan digital submittal is the first step (see Figure 3.8.1, Step ①). Once the Planning Department gets the digital plan, and before they sign off on it, the digital copy should be forwarded to the Assessor's office and the Engineering Department (see Figure 3.8.1, Step ②). The Engineering Department is currently maintaining the parcel layer in AutoCAD. This practice should continue since there is such an expertise in that area already by existing staff, though some communities have their GIS group maintain the parcels layer (see Figure 3.8.1, Step ③). Once the Assessor's Office receives the digital plan, new parcel IDs should be issued and new numbers should be forwarded to the Engineering Department and ITD (see Figure 3.8.1, Step ④). Since some of these new parcels are not going to be assessed right away, the Assessor's Office may need to give an inactive status to these records. These records are also not official until the owners have filed with the Registry. Thus keeping these records as inactive is the right approach. Once there is a record with the Registry (see Figure 3.8.1, Step ⑤) , the Engineering Department already rectified the plan into the existing parcels layer. New parcel IDs have been issued by the Assessor's Office and recorded in the GIS layer. The final version will be quality checked and made public by the GIS Administrator for everyone to use (see Figure 3.8.1, Step ⑥). Figure 3.8.1 depicts the work flow between the four departments, and how the parcel layer is kept up to date in a timely fashion, without adding much to the existing work load.

Figure 3.8.1 Parcel Data Maintenance Model
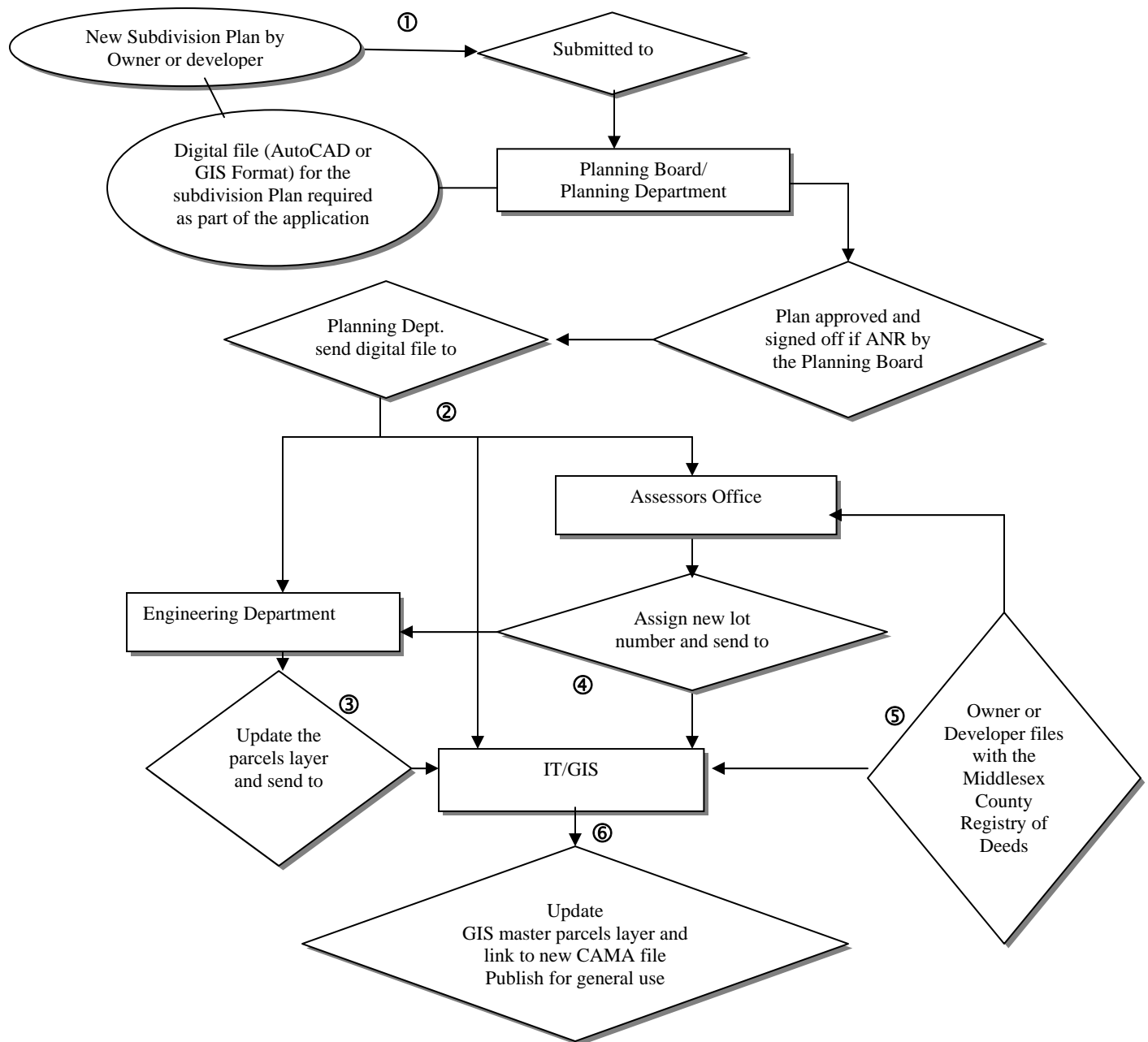
3.8.2 Building Footprints

Building footprint layer update and maintenance is triggered by new constructions, building additions and demolitions. They all start with the Building Department.

New Buildings

When an owner or a developer proposes a new buildings construction, the process usually starts at the Building Department with a plan review. The Building Department then determines

whether or not the plan meets local zoning bylaws. If not, the Building Department will deny issuing a building permit, and the applicant can file an appeal to the Board of Appeals. If the plan meets local zoning bylaws, the building permitting process starts. Some communities at this point require the applicants to submit a digital version of the proposed plan. Some require an AutoCAD drawing file and others require a scanned TIFF, JPEG or PDF file of the plans. Most communities in Massachusetts only require the applicants to submit hard copies.

After the new building is constructed, and also inspected, the applicant applies for a Certificate of Occupancy. Various sign-offs are needed before the Building Department issues the C.O. to the applicant. One of the sign-offs is by DPW for water, storm water and waste water connections in more urban areas. In more suburban or rural areas, sign-off by the Health Department on the septic system is required. In the case of the Town of Brookline MA, before DPW/Engineering signs off on the C.O., they require the applicant to submit in AutoCAD format the as-built plans. See appendix D for a sample as-built Plan requirement by the Town of Brookline DPW.

Having the digital plan submission built into the permitting process will enable Sudbury to maintain its GIS building footprints layer, without adding much extra work for the Town. The requirement for digital plan submission can be built into the Building Department's CO application process, or the Health Department's septic system sign-off or the DPW's water, storm water and waste water connection sign-off process. The building layer updates can be part of the responsibilities of the Engineering Department or the GIS Administrator in IT, or consultants hired by the Town. Figure 3.8.2 depicts the work flow for maintaining the GIS building footprint layer using the GIS Administrator scenario.

The State GIS Office, MassGIS, has developed a very comprehensive digital plan submission standard which can be adopted by the Town of Sudbury. See appendix B for details.

Figure 3.8.2 Building Footprint GIS Layer Maintenance – New Buildings

*If the GIS Administrator's position is not created, this role can be fulfilled by GIS Consultants hired by the Town or the Town's Engineering Department if time permits.

Digital As-built plans Required by Building, Health or DPW

GIS/ITD*

Extract buildings footprints from the file

If MassGIS standard is applied to the requirement

Delete old building footprints and insert new into the building layer

If MassGIS standard is not applied and no coordinate system specified

Create control points, geo-reference new building footprints and add address information

Publish new building footprint layer for general use

Building Additions

Building additions usually are much smaller construction projects than new buildings, and most communities in Massachusetts at this point do not require digital submission of plans. However, most building addition plans are drawn in some sort of CAD program these days by an Architect or an Engineer. Therefore there is no reason not to require digital submission of the proposed

plans if not in CAD format, at least in scanned PDF or image format. This requirement needs to be incorporated into the building addition permit application process.

Demolitions

Demolition permits are issued by the Building Department. A periodic download from the permit's database will be able to provide a list of demolition permits issued. This list can be linked to the GIS building footprint layer and the demolition sites can then be mapped out. Building inspectors or other staff can field check the status. The demolished buildings can then be deleted from the database by the GIS Administrator.

3.9 Conclusion

Data is the most important part of a GIS system and usually is the most costly one. Data development and update are usually the first steps in implementing a municipal GIS. This chapter carefully examined town-wide GIS data needs, proposed data development strategies, recommended data maintenance procedural changes, and laid out a data development road map over the next five years. The estimated cost for the data development will be discussed in Chapter Six.

CHAPTER 4 - CURRENT SYSTEM RESOURCES AND SYSTEM RECOMMENDATIONS

This chapter reviews the Town's current IT resources such as networks, hardware, and software related to GIS, to determine whether or not GIS can be brought to all municipal departments, and to identify future GIS needs for system resources. This study will not cover the evaluation of the overall information technologies resources, nor is it the goal of a GIS needs assessment to design or re-design the Town's IT networks.

The IT director, Mr. Mark Thompson, has been the primarily contact person for this GIS Needs Strategic Plan project and has been involved in every stage of the process. His knowledge has greatly assisted the development of this plan.

4.1 Existing System Resources (networks, hardware and software)
Networks

There are two primarily types of networks in the Town of Sudbury, a wide area network (WAN) and a local area network (LAN). For example, the network inside the Flynn building is a local area network, which connects all personal computers, servers, and printers together within a single group or building. The LAN allows for the sharing of files and printers in the building.

WANs are networks, which tie LANs together so that different buildings or groups are connected. A Sudbury WAN will allow for the communication among the Flynn building, the old Town Hall, Library, Council on Aging, Police and Fire, Recreation, and others. Figure 4.1.1 and Appendix F Town of Sudbury I-Net Map visually display the Town of Sudbury's networks.

Figure 4.1.1 – Town of Sudbury I-Net (Provided by Mr. Mark Thompson, IT Director)
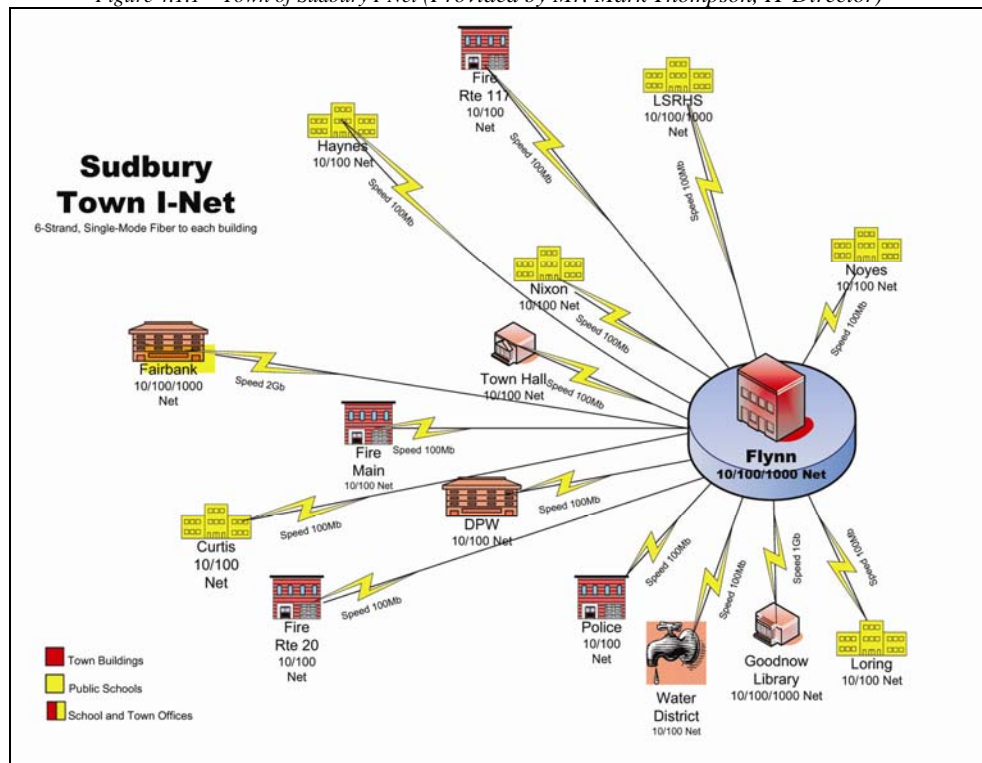
Hardware

GIS hardware includes: GIS servers, desktop PCs, plotters, printers, and data input devices such as scanners and global positioning systems (GPS). Appendix G lists the Town's entire server inventory and Appendix H lists the Town's entire desktop inventory, provided by the IT director in May 2006. The SQL server in the Flynn Building is used as the general file server. GIS main data depositary can be stored and shared on this server in the short term. Table 4.1.1 lists the number of PCs by department that meet the minimum system requirements for desktop GIS. The PCs are evaluated against the system requirements established by Environmental Systems Research Institute (ESRI) Inc. for ArcView 9.1. See Appendix E for the details of the system requirements for ArcView 9.1. Most departments have PCs that meet the minimum requirements, and only a few that meet the recommended requirements. None of the computers in the computer training lab meet the minimum requirement. As a result, it will be difficult to conduct GIS desktop training there.

Table 4.1.1 – Number of PCs meet minimum and recommended requirements for Desktop ArcView 9.1

DEPARTMENT	TOTAL NUMBER OF PCS	PCS MEET MINIMUM SYSTEM REQUIREMENTS	PCS MEET RECOMMENDED MEMORY SIZE
Accounting	4	4	
Assessors	7	5	1
Akinson Pool	5	4	
Board of Appeals	1		
Budget and Personnel	3	1	
Building	5	5	
Conservation	3	2	
Credit Union	2	1	
Engineering	4	3	1
Fire	12	8	1
Health	5	4	
Highway	9	5	
Historical Commission	1		
Information Systems (including computer training lab)	28	8	4
Law	2	1	
Library	43	15	
Planning	2	2	1
Police	21	13	1
Recreation	8	5	1
Selectmen	3	3	
Senior Center	6	4	1
Sudbury Foundation	2 (Macs)		
Sudbury Public Schools	5	2	
Town Clerk	6	5	1
Town Manager	1	1	1
Treasurer/Collector	6	6	1
Veteran's Agent	1	1	
Sudbury Water District	1		

Appendix I lists all printers capable of printing to an 11x17 size or above and Table 4.1.2 summarizes them by department. Most of these are black and white laser printers, which can be used for printing up to 11"x17" size black and white GIS maps. One color copier in the police station can print 11x17 size color maps. The two plotters in Engineering can print up to E-size color maps.

Table 4.1.2 - Sudbury "GIS-Ready" Printer Inventory

DEPARTMENT	11x17 size/color (yes/no)	Up to E-size (34"x46")/color
Accounting	2/no	
Credit Union	1/no	
Engineering/DPW	1/no	2/yes
Highway	1/no	
Information Systems (including computer training lab)	1/no	
Library	2/no	
Police	1/yes	
Recreation	1/no	
Selectmen	1/no	
Senior Center	1/no	
Treasurer/Collector	1/no	

Scanner/GPS

The Engineering Department has a GPS unit and has been using it to collect GIS data such as the hydrants, catch basins, and storm water drainage features. No scanner is currently available for scanning large format plans and drawings.

Software

There are many GIS software companies. Table 4.1.3 list five major companies and some of their products:

Table 4.1.3 – GIS Software Companies and Example Products

COMPANY	DESKTOP GIS PRODUCTS	WEB GIS PRODUCTS	OTHERS
ESRI	ArcGIS	ArcIMS	ArcSDE, ArcPad, Arc GIS engine, ArcGIS Server
AutoDesk	AutoCAD	MapGuide	AutoDesk Map 3D
Intergraph	GeoMedia, Microstation	GeoMedia webMap	ImageStation
Caliper Corporation	Maptitude	Maptitude for the web	TransCAD, TransModeler
MapInfo	MapInfo	MapExtreme	MapInfoMapX

Of the five, ESRI and AutoDesk hold significant market shares of the municipal GIS market in New England, and other parts of the country. Sudbury currently uses products from ESRI's ArcView and AutoDesk's AutoCAD. There are 7 ArcView 9.1 licenses and one AutoCAD license. There is no web- mapping software.

4.2 System Resource Needs and Recommendations

Network Needs

An effective LAN and WAN are very important for successful GIS implementation and operation. GIS is just like other information systems in the Town, It relies heavily on the network infrastructure to deliver the applications. The 1GB and 2GB connections are adequate for deploying GIS desktop applications that pull data from a central server at the Flynn building. The 100MB connections can be slow. The Highway Garage houses a few departments such as the DPW/Engineering, Highway, Board of Health, and Building and Conservation. These departments are going to be heavy GIS users. The connection between this and the Flynn building needs to be examined by a network expert. The connections to the 3 fire stations and the police station are also 100 MB and can be slow for deploying applications from the Flynn building. These connections also need to be examined by a network expert. Currently all networks are wired. With more and more communities looking into setting up WiFi, Sudbury is also carefully watching recent developments in wireless technologies. With high speed WiFi in the future, it enables live data collection and maintenance in the field, and up-to-date mapping information to be readily available in the hands of field inspectors.

The evaluation of the Town's networks is out of the scope of this project.

Hardware Needs and Recommendations

At present time, GIS is only used and maintained by the Engineering Department. The GIS data layers are mostly in AutoCAD format and some in ESRI shapefile format. They are stored on a PC. In the near future, a personal Geodatabase with all existing GIS data layers from the Town and MassGIS should be created. This should be stored on the Town's main file server, managed by the IT department for sharing among other departments. With the advances of web technologies, web GIS applications are becoming largely more and more popular. A separate webGIS server is recommended in FY07 to provide access to GIS data through an Internet Browser. This is not only beneficial for the general public, but also for all casual GIS users in various town offices. Rather than buying more and more expensive GIS software packages when more staff begin using GIS, webGIS allows casual users to look up GIS information via a web browser, which comes with all PCs.

From the PC inventory listed in Table 4.1.1, most departments have PCs which are "Desktop GIS ready". An additional 512MB of memory added to some PCs will be sufficient. In general, not all town employees will use GIS, nor is there a need for this. Some departments may need to use GIS more than others, such as Engineering, Assessing, Conservation, Planning, Health and buildings. GIS users who will be editing and maintaining GIS data such the Engineering Department will need more powerful machines. From the inventory, engineering does have one machine that meets the recommended requirements. In summary, it is recommended to add additional memory, and take GIS requirements into consideration in the next PC replacement cycle. That portion of the budget is covered by IT's annual PC operating budget. A new laptop is recommended for the GIS Administrator.

All PCs in the computer training lab do not meet the minimum requirements for GIS. It is recommended to upgrade at least 2-3 desktop PCs in FY07 to enable GIS training. This should be high on the priority list for PC replacements and upgrades that the IT Director manages annually.

<u>Printer/Plotter Needs</u>

The primary outputs from a GIS system are maps. An 11"x17" color laser printer is recommended in FY07. This would be shared by DPW, Engineering, Conservation, Health and Buildings in the DPW building. This has been purchased while this plan is being finalized. A large format plotter and an 11"x17" color laser printer are recommended in FY08, to be primarily used by the GIS administrator, and to be shared by other departments.

A large format scanner (E-size) is recommended in FY2008 to be shared by DPW, Engineering, Conservation, Building and Health to convert these departments' large floor plans into digital format. This wide-format scanner has also be purchased while this plan is being finalized.

<u>Software and Recommendations</u>

The continuing use of ESRI's products as the primary GIS software for Sudbury is proposed for the following reasons:

- The Town already owns 7 ESRI's ArcView 9.1 licenses.
- ESRI has a suite of software tools for local governments including web-enabled and mobile GIS technologies.
- The data conversion between ArcView and others such as AutoCAD has become easy.
- Most Massachusetts communities use ESRI software. ESRI products are popular among local, regional and state agencies. For example, communities listed in Table 3.5.1 all use ESRI products. MassGIS, the State Geographic Information Office, primarily uses ESRI products.
- ESRI provides grant software opportunities for local governments.

A copy of ArcGIS Arc/Info 9.X, and webGIS software are recommended in FY08. ArcSDE is ESRI's server software product used to access large multi-user geographic databases. These are stored in relational database management systems (RDBMS) such as the SQL server, which the Town already owns. It is recommended to purchase a server software product like ArcSDE for more robust multi-user data sharing and editing in FY09. The Assessor's Office has recently converted their CAMA system to Patriot Properties. The GIS module that is provided by Patriot Properties is built on ESRI's MapObjects technology and soon to be ArcObjects. It is recommended to purchase this model in FY07. It should be noted that annual software maintenance fees should be budgeted into the IT Department's operating costs every year just like other software maintenance fees. Table 4.2 lists all the system recommendations by fiscal year.

Table 4.2 System Recommendations

Hardware/Software Recommendations	Time Lines
• 11x17 Color Laser/DPW shared (purchased)	FY07
• Upgrade 3 PC in the Computer Training Lab	FY07
• GIS Software maintenance	FY07
• GIS Module by Patriot Properties	FY07
• Large Format Scanner (purchased)	FY08
• Large format plotter	FY08
• webGIS Server	FY08
• 11x17 Color laser	FY08
• Laptop (GIS Administrator)	FY08
• GIS Software Maintenance	FY08
• Upgrade one ArcView to Arc/Info	FY08
• webGIS software	FY08
• Tablet PCs	FY09
• GIS Software Maintenance	FY09
• ArcSDE	FY09
• GIS Software Maintenance	FY10
• GIS Software Maintenance	FY11

CHAPTER 5 - GIS STAFFING, EDUCATION AND TRAINING NEEDS AND RECOMMENDATIONS

This chapter summarizes the GIS staffing and salary survey results conducted for this plan, discusses the benefits of having a full-time GIS person employed by the Town of Sudbury, and recommends more GIS training and education for users.

5.1 Current Status

Presently, there isn't a full-time GIS position in Sudbury. GIS is almost solely used by one engineer in the DPW/Engineering Department. The MassGIS data viewer has been used somewhat by the Planning and Conservation departments. Departments such as Conservation, Planning, Town Clerk, Recreation and Health use the map products created by DPW/Engineering. Judging from interviews of user departments, there is a need for an in-house GIS person. This individual would strengthen the effort for necessary data development, oversee major data development efforts that will cost the Town a great deal of money, and ensure the quality of data development by consulting firms. The GIS person is also needed to conduct training for other department staff, keep GIS data updated, help the integration between GIS and other information systems, and to coordinate all GIS efforts and deploy GIS applications town-wide.

5.2 GIS Personnel Needs and Recommendations

Many municipalities in Massachusetts have started planning, implementing or operating a GIS system. (See Figure 1-2 Massachusetts Municipal GIS Status Compiled by MassGIS in Chapter 1). For this study an inventory of municipal GIS staffing in Massachusetts has been compiled (see Table 5.1). Twenty-four communities are included in this inventory, and they have all hired at least one full-time GIS person to implement and operate their GIS systems.

A full time GIS person in Sudbury can:
- Serve as an in-house expert who utilizes existing data while managing other major future data developments;
- Serve as the hub for geographic information sharing and data maintenance.
- Carry out the implementation of an enterprise GIS.
- Revise and develop action plans for Sudbury GIS in the future.
- Serve as the GIS technical support center.
- Serve as the GIS system administrator.
- Coordinate town-wide GIS activities so that redundant efforts are eliminated, and multi-departmental GIS projects can be coordinated.
- Serve as the developer for task specific applications to make GIS more user-friendly and effective.
- Serve as the central communication point for GIS integration with other municipal information systems.
- Train GIS end users.
- Develop simple GIS data layers upon the new accurate base data.
- Fulfill ad hoc map requests by all departments.

The alternative to employing a GIS coordinator is to outsource all GIS tasks, such as system setup and administration, large or small data developments, data updates, map creation, training, and technical support. Outsourcing can be very costly, and the knowledge and skills of a GIS

coordinator will not be in-house. With the GIS position, money can be saved and GIS knowledge stays as an in-house resource.

Table 5.1 - GIS Staffing in Other Towns and Cities in Massachusetts

Town/City	GIS Staff	Department	Hiring status	Employment Status
Amherst	GIS Coordinator/Planner	Planning	Hired	Permanent Full-time
	GIS Intern	Planning	N/A	Temporary part-time
Andover	GIS Coordinator	Planning	Hired	Permanent Full-time
Brookline	GIS Analyst	ITD	Hired	Permanent Full-time
	GIS Manager	ITD	Hired	Permanent Full-time
	GIS Technician	ITD/Planning	Open	Temporary Full-time
Cambridge	GIS Analyst	ITD	Hired	Permanent Full-time
	GIS Manager	ITD	Hired	Permanent Full-time
	GIS Technician	ITD	Hired	Permanent Full-time
Concord	GIS Coordinator	DPW	Hired	Permanent Full-time
Falmouth	GIS Coordinator	N/A	Hired	Permanent Full-time
Fitchburg	GIS coordinator/planner	Planning	Hired	Permanent Full-time
Greenfield	Planner/GIS Coordinator	Planning	Hired	Permanent Full-time
Lowell	GIS Administrator	DPW	Hired	Permanent Full-time
Nantucket	GIS Coordinator	N/A	Hired	Permanent Full-time
Needham	GIS Administrator	N/A	Hired	Permanent Full-time
Newton	GIS administrator	ITD	Hired	Permanent Full-time
	GIS Intern	ITD	N/A	Temporary part-time
North Reading	GIS Coordinator	N/A	Hired	Permanent Full-time
Northborough	GIS/MIS Director	MIS/GIS	Hired	Permanent Full-time
Plymouth	GIS Coordinator	N/A	Budgeting	Permanent Full-time
Stoneham	GIS/MIS Director	MIS/GIS	Hired	Permanent Full-time
Wayland	GIS Administrator	DPW	Hired	Permanent Full-time
Wellesley	GIS Database administrator	ITD	Hired	Permanent Full-time
	GIS Intern	ITD	N/A	Temporary part-time
	GIS Manager	ITD	Hired	Permanent Full-time
West Springfield	GIS Manager	N/A	Hired	Permanent Full-time
Westborough	GIS Intern	MIS/GIS	Open	Temporary part-time
	GIS/MIS Director	MIS/GIS	Hired	Permanent Full-time
Westfield	GIS Coordinator	N/A	Hired	Permanent Full-time
Westford	GIS Coordinator	N/A	Hired	Permanent Full-time
Weymouth	GIS manager	ITD	Hired	Permanent Full-time
Worcester	GIS Administrator	DPW	Hired	Permanent Full-time
	GIS Analyst	Planning	Hired	Permanent Full-time
	GIS Manager	MIS	In progress	Permanent Full-time

Source: Compiled by Feng Yang, 08/2001.

It is recommended that the position be created in the IT department, and this person reports to the IT director for the following reasons:

- Most communities have their GIS staff in the IT department.
- The fact that GIS is a shared system fits very well into the existing IT function.
- GIS and IT are merging.

After reviewing the GIS salary survey conducted by AGI in 2002 (see Table 5.2) and examining the internal pay structure provided by the Town, this position is recommended in FY08 at non-union Grade 12 level.

Table 52 - GIS Salary Range Survey Conducted by AGI for the Town of Falmouth in 2002

Town/City	Title	Salary Low	Salary High	Full/Part Time
Andover, MA	GIS Coordinator	45,290	45,290	Pt. Time
Bedford, MA	GIS Analyst	38,684	51,255	Full
Beverly, MA	GIS Coordinator	59,000	59,000	Full
Brookline, MA	GIS Manager	64,000	75,000	Full
	GIS Analyst	?	56,000	Full
	GIS Technician			PtTime/Temp
Cambridge, MA	GIS Manager	65,000	75,000	Full
(2001)	GIS Analyst			Full
Falmouth, MA	GIS Manager	43,900	57,346	Full
Franklin, MA	GIS Administrator	40,000	53,000	Full (35hrs)
Nantucket, MA	GIS Coordinator	67,600	67,600	Full (35hrs)
Needham, MA	GIS Administrator	55,000	60,000	Full
Newton, MA	GIS Administrator	64,000	64,000	Full
Northborough, MA	GIS/MIS Director	53,000	71,000	Full
Salem, MA	GIS Administrator	44,000	52,000	Full
Stoneham, MA	MIS/GIS Director	50,000	65,000	Full
Wellesley, MA	GIS Manager	46,000	70,000	Full
	GIS Administrator	39,000	60,000	Full
Westborough, MA	MIS/GIS Director	58,000	70,000	Full
Weymouth, MA	GIS Administrator	56,000	66,000	Full
Worcester, MA	GIS Manager	60,000	65,000	Full
(2001)	GIS Programmer	47,000	52,000	

In FY 09 and beyond, a temporary part-time GIS intern is proposed to assist the GIS administrator in data development, user support and mapping.

The GIS staff should work closely with the engineer in DPW as a team on data maintenance and development issues, and on other GIS efforts.

5.3 GIS Education and Training Needs and Recommendations

Training is extremely important in ensuring a successful GIS implementation. From the interviews conducted for this plan, many departments such as DPW/Engineering, Fire, Police, Conservation and Planning have expressed the needs for Pictometry, GPS and ArcView 9.1 training. Technologies change dramatically and training is essential for staff to keep their skills up to date. It is recommended for the Town to fund GIS training for GIS users every year and also fund the GIS administrator to attend at least one GIS conference a year to keep abreast of the new developments in geospatial technologies. This will enable the GIS staff to steer the Town to the right direction in future GIS application deployments.

CHAPTER 6 - FIVE-YEAR GIS IMPLEMENTATION PLAN
AND ESTIMATED COSTS

This chapter discusses tasks undertaken over the next five years to implement Sudbury's enterprise GIS system. The implementation is broken down by fiscal year, and contains an estimated cost breakdown for each fiscal year and each task. Estimated costs, which are presented, are for budgetary purposes only. The estimated costs and the implementation plan are based upon the hiring of a full-time GIS administrator in FY2008. The administrator, with the support of the IT Director, should carry out the implementation. Technologies change quickly, and a GIS plan should be revised before the end of the 5th year.

The town of Sudbury's GIS goal is to establish an integrated and easy-to-access multi-departmental enterprise GIS system. In the future, key decision makers in the Town should be able to query inter-departmental spatial and attribute data right at their desks. Town staff should be able to make maps for reports, presentations, and planning easily and quickly. Various departmental technical staff should be able to query, display and maintain their spatial and attribute data efficiently. The general public should be able to access information easily from the Town Hall and from the Internet. In short, the integrated enterprise GIS system should provide better and quicker information support to decision makers, to meet the ever-growing needs of various departmental operations, and to provide the Town's residents and businesses information based upon locations.

To meet this goal, the hiring of a GIS administrator in FY08 is essential. The implementation strategy should focus on maximizing the use of existing data, some new data development, and user training in FY07 before this individual is hired. Once the GIS Administrator is hired, major data development efforts should start in FY08. In FY 09, focus should be shifted onto application development and the integration between GIS and other information systems. Easy-to-use and integrated GIS applications can then be deployed to the users and the general public. Application development should aim towards web GIS.

6.1 Year 1 Implementation Plan and Estimated Costs
- Fiscal Year 2007 (Calendar Year 07/01/2006 to 06/30/2007)

Year 1 implementation goals include data development, training and equipment improvements and the grand total funding request for FY 2007 is $113,900.

Data Development (Total Proposed Funding: $89,500)

A major goal for Year 1 GIS implementation is data development. This has two aspects. One is to maximize the use of existing GIS data layers, by putting together a main GIS data depositary. This would be for general use. Training sessions would be provided to users on the use of this shared database. The other is to start major data development efforts, including new base data layers, orthophotography, DEM and 2-Foot contours.

GIS is a system that is comprised of data, hardware/software/networks, applications, and people. Data is one of the most important pieces of the puzzle and should be dealt with first. Chapter 3 examined the Town's existing data layers and future needs. As it identified, the Town's existing data layers are in various formats and coordinate systems and need to be converted into one GIS data database to be shared by all departments.

Table 6.1 FY2007 (Year 1) Town of Sudbury GIS Implementation Plan details the task and estimated costs.   A   total   of $89,500   is   proposed   for   data   development.

Descriptions of the Data Development Tasks:

1. Build a main GIS data repository with a consistent format (ESRI Personal Geodatabase) from various sources, and create detailed metadata for each data layer. This main GIS database will be shared among all departments through the Town's LAN. An amount of $3000 is proposed. This task should be completed by hiring an outside consultant in the 1st and 2nd quarter of FY 2007.
2. Reconcile the discrepancy between the CAMA file and the GIS Parcels numbering scheme. The parcel layer is one of the most important GIS layers for a municipal GIS, and the assessor's database linking to the parcels layer can provide a great deal of information for land use decision making. An amount of $2000 is proposed to hire a consultant to reconcile the difference, to match the current parcel layers and the CAMA database, and to recommend changes to be made in the CAMA system and the parcels layer. This should happen in the 1st and 2nd quarter of FY 2007.
3. Develop 6" pixel size color digital photos. As identified in Chapter 3, 6" pixel size color digital photos are some of the major data layers in need. An amount of $64,500 is proposed for the data development in the 3rd Quarter of FY 2007 when the leaves are not yet out and the snow is gone, which will be sometime around the first two weeks of April.
4. Develop other GIS data layers, maps and applications as identified in Table 3.5.1 in Chapter 3. An amount of $20,000 is proposed to hire a consultant for this task.

User Training (Total Proposed Funding: $5,400)

Training is another goal of FY2007, going hand-in-hand with the main database development. Providing training will help maximize the use of existing GIS data without spending a great deal of money. A total amount of $5,400 is proposed for training in FY2007, and the items are listed in Table 6.1.

5. Pictometry Training (2 sessions and up to 20 people). An amount of $1000 is proposed to provide Pictometry training to users in FY2007. Pictometry is a set of oblique images and software tools allowing users to view a certain area in town from four directions. The imagery was developed through funding provided by MassHighway and it is provided to the towns free of charge.
6. ArcView 9.1 Training (up to 12 people). The Town currently owns 7 copies of ArcView, and only one copy is partially in use. An amount of $4000 is proposed to provide training on the use of ArcView 9.1 to take full advantage of the Town's existing GIS resources in FY2007.
7. GPS Training (Conservation). The conservation officer has a Magellan GPS and needs training on the use of it. An amount of $400 is proposed for the training in FY2007.

Equipment Improvements (Total Proposed Funding: $7,000)

Other tasks in FY2007 implementation include hardware, software and the development of an RFP for the color digital orthophotography. Again, refer to Table 6.1, items 8, 9, 10, 11, and 12. Details are below.

8. An 11"x17" Color Laser Printer to be shared by building, DPW, conservation, and planning. One of the major outputs of a GIS system is map. An 11"x17" color laser is essential and this printer will be shared by many departments in the DPW building. An amount of $4000 is proposed in the 1st quarter of FY2007 and while this plan is being developed, this has been purchased by the IT department.
9. Three GIS-Ready PCs for the computer training lab. As identified in Chapter 4, the PCs in the computer training lab are not sufficient to run ArcGIS. At least three PCs should be

upgraded for training and an amount of $3000 is proposed in the 1st quarter of FY2007 to upgrade 3 PCs to be GIS-ready. This can be part of the annual IT desktop replacement.

Software (Total Proposed Funding: $10,500)

10. GIS software maintenance. The 7 copies of ArcView 9.1 will need to be put on software maintenance to receive updates and upgrades automatically.   An amount of $4000 is proposed in FY 2007.
11. GIS Module by Patriot Properties. The Assessor's office uses Patriot Properties as its CAMA system and there is a GIS module built in. An amount of $6500 is proposed in FY 2007 to purchase the GIS module.

Others (Total Proposed Funding: $1,500)

12. Write an RFP for base data development including new orthos, 2-foot contours and planimetrics. Development of a color digital orthos and 2-foot contours is not a small task and it is extremely technical. Currently the Town does not have a GIS person who has the technical background to write such an RFP. A well-written RFP will help ensuring that the Town gets qualified vendors to complete this important data development task. An amount of $1500 is proposed to hire a consultant to write the RFP.

6.2 Year 2 Implementation Plan and Estimated Costs
-Fiscal Year 2008 (Calendar Year 07/01/2007 – 06/30/2008)

Year 2 implementation goals are hiring a GIS Administrator, more major data development, applications development, training and new hardware/software. A full-time GIS administrator at non-union grade 12 ($54K-$64K) is proposed and a total amount of $346, 500 is proposed for continuing major data development from FY07.

GIS Administrator Position

Chapter Five discussed the importance of having a GIS Administrator employed by the Town. This position is proposed for Fiscal Year 2008 and the job requirements should include the following:

- Five or more years of experience using Arc/Info.
- Five or more years of experience using ArcView or other ESRI products.
- Familiarity and skills in using Geodatabase, ArcIMS, ArcSDE and GPS.
- Project management skills and ability to develop action plans.
- Experience in Microsoft Windows 2000, XP and 2003 system administration.
- Familiarity with database programs such as Access, SQL server or Oracle.
- Skills in providing GIS training to other town employees.
- Strong communication skills and public presentation skills.
- Ability to work with multiple departments.

The following is a suggested job description of the GIS Administrator:

GIS Administrator's Job Description

Responsible for the planning, implementing, and managing the town-wide GIS

Develop short, medium, and long term strategic planning related to GIS resources

Prepare annual budgets and grant-writing

Support GIS Users in user departments

Develop user expertise in GIS through training, support, demonstrations and other user group activities

Coordinate and oversee vendor/consultant activities related to GIS

GIS Data development and maintenance

GIS Application Development

Internet and Intranet Homepage and related Web development.

Assist with integration of GIS into existing systems.

Act as Systems Manager for all GIS software.

Serve as Project Manager for implementation of GIS applications.

Act as a central communications point.

Act as public information source.

Attends seminars and conventions to keep abreast with developments in the field

Bachelor's Degree in related fields is required. Masters degree in related field is desired. Five years or more experience.

Reports directly to Information Technology Director, with Project Responsibility in other areas as required.

Hiring the right person will help ensure a successful implementation of GIS. Because of the qualifications required for such a person and the job responsibilities described in Chapter Five, the compensation must be compatible with other municipalities. In Massachusetts the annual salary for a municipal GIS coordinator ranges from $45,000 to $85,000. After comparing the salary among other communities and to the Town's existing pay structure, a Non-Union Grade 12 ($54K-$64K) is proposed for the GIS Administrator's position.

Continuing Major Data Development (Total Proposed Funding: $346,500)

As discussed in Chapter 3 Section 3.7.3, data development strategy is to update the planimetric data layers based upon the new flyover and aerial photos and build a new and more accurate land based data layers, and to adjust existing data layers to match the new base data.

Table 6.2 lists data development estimated costs and tasks in items 1, 2, 3 and 4.

1. DEM and 2-Foot Contours
    An amount of $71000 is proposed for the development of a digital elevation model (DEM) and 2-foot contours which was identified by users in the user needs assessment process. This project should be funded both by the Town and the Water District.
2. Update planimetrics.
    It includes the data development and update of any features that can be interpreted from the aerial photography, such as buildings, hydrants, manholes, catch basins, roads, driveways, fences, docks, water bodies and wetlands, which meet National Mapping Accuracy Standard of 1"=100' scale. This project should be funded both by the Town and the Water District.

3. Align and adjust existing GIS layers to the new base data.
    Once the new planimetrics is developed, some of the existing data layers will be updated and others need to be adjusted to the new and more accurate land based data to achieve better relative accuracy.
4. Scan 5700 water service cards and link to water system.
    Currently all water service cards that show the connection from the water mains to houses are in hard copy format and hard to look up information at a timely fashion. By scanning them into PDF files or other digital file formats, they can be directly linked to the water system for easy information lookup.
5. Update utility data layers.
    Base upon the new and more accurate planimetric data, some utility data layers will be updated and any information that can not be interpreted from an aerial photo will need to be field checked and collected either though GPS or through on screen digitizing.

Training (Total Proposed Funding: $4,000)

6. GIS Training.
    Continuing user training is very important for a successful implementation of an enterprise GIS. A total amount of $2500 is proposed for more ArcView and other software training sessions. They can be more advanced ArcView training for users who have gotten familiar with the basics of ArcView through the training provided from prior year and through working with the software. The training can also be the basic ArcView training sessions for new users.
7. GIS Conference
    GIS technologies, just like other information technologies, change dramatically from year to year. Keeping the skills of the Town's GIS professional up to date will ultimately save the Town money in the long term. An amount of $1500 is proposed for the GIS Administrator and/or other appropriate personnel to attend at least one conference a year to keep abreast the most current technologies and to network with their peers in other communities and state.

Application Development (Total Proposed Funding: $45,000)

In the second year of GIS implementation, major data development is getting close to be completed. To maximize the use of the newly developed and more accurate data, creating certain task specific application will help the utilization of the data and the GIS system. Two major application development projects are proposed in FY 2008.

8. WebGIS application.
    Deploying a GIS application through the internet or intranet will reach more users without adding additional cost to purchase desktop software packages. Most communities prefer the webGIS approach. A general data viewer will not only help users internally, but also reach the residents and businesses in Town. An amount of $15,000 is proposed to hire a consulting firm to develop such an application.
9. Public safety GIS applications.
    Both police and fire can benefit tremendously from an easy access to geospatial information. They can benefit even more from easy access to GIS information that is integrated with public safety databases such as crime statistics, hazardous material sites and demographics. Currently the police and fire are using many different systems and information is not necessarily integrated. An amount of $30,000 is proposed for the development of an integrated public safety GIS application.

Hardware/Software (Total Proposed Funding: $53,000)

10. Large format scanner
    Many departments in the Town keep a great deal of hard copy large format plans, such as the building, conservation, DPW, and health departments. In many cases, they have multiple copies of the same plans because each department needs to review the plans. A large format scanner will help converting these plans into digital form and have them stored centrally on the Town's server to allow easily access to all departments in Town without duplicate hardcopies. Since most of the departments aforementioned are physically located in the DPW building, this scanner is recommended to be-installed in the DPW building. An amount of $10,000 is proposed for the purchase of this scanner. While this plan is being finalized, this equipment has been procured by the IT department.

11. Large format plotter
    A large format plotter is an essential piece of hardware for any GIS administrator. An amount of $10,500 is proposed for the purchase of such as plotter and it will be mostly used by the GIS Administrator, and are shared among many departments to take fully advantage of such a resource.

12. WebGIS server
    With the development of webGIS applications, a separate server is proposed to host the GIS applications to ease traffic hitting the Town's main web server. An amount of $6000 is proposed for the webGIS server.

13. 11"x17" color laser printer

14. Laptop for the GIS administrator
    The GIS administrator will be doing a fair amount of demonstration and training, and a sufficient laptop will help him/her accomplish the tasks.   This laptop can be his/her desktop machine. An amount of $4000 is proposed for the purchase of such a laptop with a minimum of 2GB RAM, 100 GB hard disk space at 7200 RPM, and 2.8 GHz processor.

15. GIS Software Maintenance
    An amount of $4500 is proposed for the maintenance of the GIS software already purchased by the Town to ensure the Town gets all the upgrades.

16. Upgrade one ArcView to Arc/info
    Arc/Info is more robust than ArcView in editing and geo-processing, and it is necessary for the GIS Administrator to have one copy for any in-house data development and analysis. An amount of $5000 is proposed for such an upgrade.

17. webGIS software
    This item goes hand-in-hand with the webGIS application and webGIS server. It can be ESRI's ArcIMS or ArcGIS server software for publishing GIS data online or other software that is the state of the art at the time. This should be determined by the GIS administrator according to his/her expertise. An amount of $5000 is proposed for the purchase of such a software package.

6.3 Year 3 Implementation Plan and Estimated Costs
   – Fiscal Year 2009 (Calendar Year 07/01/2008 - 06/30/2009)

Year 3 GIS implementation goals are shifting data development from outsourcing to in-house, continuing user training; and focusing on the integration of GIS with other information systems and the development of field applications. Table 6.3 details the estimated cost for a part-time GIS intern, data development, application development, hardware, training and integration of GIS with other systems.

A Part-time GIS Intern Position

In year 3 of GIS implementation, most of the major data development projects are completed. As time goes on, these new data layers need to be maintained and updated. The GIS administrator will be coordinating all the data updates with other departments. A temporary part-time GIS intern position is needed to assist the GIS coordinator in in-house data development, data maintenance and custom mapping. The hourly rate is recommended to be in the range of $10-$20/hour and a total amount of $10,000 is proposed for this temporary position without any benefits.

Data Development (Total Proposed Funding: $18,000)

In FY 2009, the 3rd year of GIS implementation, data layers that will be used cross-departments have been developed. Other data layers that are mostly used by a single department will be the focus of this fiscal year's data development, such as recreation facilities inventory, and pavement and sidewalk inventories.

1. Recreation facilities inventory
   An amount of $10,000 is proposed for the compilation of a comprehensive recreation facilities inventory which was identified through the user needs assessment as important to the Parks and Recreation department.
2. Update pavement and sidewalk shapefiles
   An amount of $8000 is proposed to update the existing pavement and sidewalk shapefiles developed by VHB a few years ago for the Town's pavement management system.

Training (Total Proposed Funding: $4,000)

The same amount, $4000, is proposed in FY 2009 for GIS training which includes user training (Items 3: $2500) and conferences (Item 4: $1500).

Application Development (Total Proposed Funding: $63,000)

Application development is this year's focus since major data development is completed, and through integration with other information systems, GIS benefits can be maximized.

5. Integrate GIS with the permitting and complaint tracking system
   There are two parts to the integration: one is to embed the GIS address information into the permitting system or have the permitting system look up address information from GIS which is serving the role of a master address database; the other is to build GIS application to display and analyze permitting and complaint information. An Amount of $10,000 is proposed for the integration.
6. Integrate GIS with the document management system
   An amount of $10000 is proposed to integrate GIS with the document management system so that archived plans and other documents can be searched by locations rather than by date or title. This does not have to be a separate project. It should be part of the Town's document imaging and management system implementation.
7. Optimize inspection routes
   The assessors inspect properties regularly. Some of the inspections are periodic. Others are triggered by sales, or abatements. GIS is the perfect technologies to optimize the inspection routes to save staff time. In order to do so, the integration of GIS with the Patriot Properties CAMA system is the key. An amount of $15000 is proposed for the full integration of GIS with the CAMA system and the creation of the routing applications.

8. Field applications and synchronization
   At this stage, major data development is completed and GIS is used by many departments. Data maintenance and being able to bring GIS information to the field become very important. Through the development of appropriate field applications and synchronization methods, staff can take Tablet PCs out to the field and access GIS information at any time. In return data can be updated right in the field. An amount of $20,000 is proposed for the development of such field applications.
9. Integrate GIS with pavement management system
   An amount of $8000 is proposed to integrate GIS with the Town's pavement management system and this should be part of the upgrade of the Town's pavement management system project.

Hardware/Software (Total Proposed Funding: $20,000)

10. Tablet PCs
    An amount of $12,000 is proposed for the purchase of multiple Tablet PCs to support the field applications.
11. GIS software maintenance
    An amount of $8000 is proposed for the annual GIS software maintenance and this portion of the funding should be part of the IT department's operating budget.
12. ArcSDE
    ArcSDE is ESRI's server software product used to manage large multi-user geographic databases. These are stored in relational database management systems (RDBMS) such as the SQL server, which the Town already owns. It is recommended to purchase a server software product like ArcSDE for more robust multi-user data sharing and editing.

6.4 Year 4 Implementation Plan and Estimated Costs
  – Fiscal Year 2010 (Calendar Year 07/01/2009 – 06/30/2010)

In the 4th year of GIS implementation, the cost should drop sharply since most of the major data and application developments are completed. Small data development and programming tasks are needed. The in-house staff will support, maintain and operate GIS and its applications. The GIS administrator and GIS intern positions are not listed in the budget sheet on Table 6.4.

Data Development (Total Propose Funding: $10,000)

1. Scan historic land plans and historic maps.
   DPW maintains many historic land plans and the Town Clerk's Office keeps many historic maps that are very valuable for looking up historic land record information and for tracing land based changes happened overtime. An amount of $10,000 is proposed to scan all the hard copy plans and store them digitally and linked to GIS so that information can be searched easily.

Training (Total Proposed Funding: $4,000)

The same amount, $4000, is proposed in FY 2010 for GIS training which includes user training (Items 2: $2500) and conferences (Item 3: $1500).

Software (Total Proposed Funding: $8,500)

4. GIS software maintenance
    An amount of $8500 is proposed for the annual GIS software maintenance and this portion of the funding should be part of the IT department's operating budget.

General Consulting (Total Proposed Funding: $10,000)

5. Programming and Data Maintenance Services
    In the 4th year of GIS implementation, data maintenance is going to become a major task and an amount of $10,000 is proposed to assist the GIS administrator in data maintenance and custom programming.

**6.5 Year 5 Implementation Plan and Estimated Costs
    – Fiscal Year 2011 (Calendar Year 07/01/2010 – 06/30/2011)**

In the 5th year of GIS implementation, the estimated cost reflects the cost to maintain an operational GIS system, primarily on continuing training, software maintenance and data maintenance. Through the user needs assessment process, a need for a cemetery database was identified. Table 6.5 details the estimated costs for FY2011.

Data Development (Total Propose Funding: $7,000)

1. Digitizing cemetery lots and link to the cemetery database.
    Just like the recreation facilities inventory that helps the Parks and Recreation Department to better manage their assets and services, having a cemetery inventory that displays the physical lots and their associated information will help the DPW manage them more efficiently. In addition, it will help the residents and the general public who are interested in genealogy to look up information online. An amount of $7000 is proposed to hire a consultant to complete the task.

Training (Total Proposed Funding: $4,000)

The same amount, $4000, is proposed in FY 2011 for GIS training which includes user training (Items 2: $2500) and conferences (Item 3: $1500).

Software (Total Proposed Funding: $9,000)

4. GIS software maintenance
    An amount of $8000 is proposed for the annual GIS software maintenance and this portion of the funding should be part of the IT department's operating budget.

General Consulting (Total Proposed Funding: $10,000)

5. Programming and Data Maintenance Services
    Data maintenance is ongoing and an amount of $10,000 is proposed to assist the GIS administrator to accomplish this task.

Department Name:

<u>Survey</u> Form 1 (of 3):   GENERAL INFORMATION AND CURRENT GIS STATUS

Department Head Name:		**Telephone Number:**	
E-mail Address:		**Fax Number:**	
Major Responsibilities:			

Employee Information			
Name:	Title:	Major Responsibilities:	
Name:	Title:	Major Responsibilities:	
Name:	Title:	Major Responsibilities:	
Name:	Title:	Major Responsibilities:	
Name:	Title:	Major Responsibilities:	

Current issues or concerns in your department that you think GIS might be able to help solve:

Existing GIS resources in your Department:

Hardware	
Software	
Personnel	
Maps and Data	
Applications	

If you already have GIS in your department, describe any issues or problems with the existing GIS hardware, software, data, data maintenance, personnel and applications:

If you do not have GIS yet, what do you envision that it can do for you?

Survey Form 2 (of 3): Maps, Databases and Spreadsheets
CREATED AND/OR MAINTAINED BY YOUR DEPARTMENT

Data/Map Name:	*zoning map*								
Description:	*zoning district boundaries and designations*								
Current Format (hard-copy/digital):	*hard-copy*								
If digital, specify file format(s):	AutoCAD	ArcView	Arc/Info	MapInfo	DBF	Access	Excel	Word	Other
(Check all that apply)									
If hard-copy maps, specify map scale:	1" = 40'	1" = 50"	1" = 100'	1"= 200'	1" = 400'	Other			
(Check all that apply)						*1"=600'*			
Data/Map Source(s):	*planning department*								
Update Frequency	weekly	monthly	quarterly	semi-annually	annually	other			
(Check one)						*when changes occur*			
Total number of sheets or records:	*1*								
Do you distribute this data/map?	*yes*								
If Yes, to whom?	*internal departments: assessing, DPW, selectmen and the general public*								
Internal Applications of the data/map	*1 to assist the interpretation of the zoning by-law*								
	2 part of the zoning by-law book								
	3 for purchase by the general public								
	4								
	5								
Comments:									

Survey Form 2 (of 3): Maps, Databases and Spreadsheets
CREATED AND/OR MAINTAINED BY YOUR DEPARTMENT

Data/Map Name:									
Description:									
Current Format (hard-copy/digital):									
If digital, specify file format(s):	AutoCAD	ArcView	Arc/Info	MapInfo	DBF	Access	Excel	Word	Other
(Check all that apply)									
If hard-copy maps, specify map scale:	1" = 40'	1" = 50"	1" = 100'	1"= 200'	1" = 400'	Other			
(Check all that apply)									
Data/Map Source(s):									
Update Frequency	weekly	monthly	quarterly	semi-annually	annually	other			
(Check one)									
Total number of sheets or records:									
Do you distribute this data/map?									
If Yes, to whom?									
Internal Applications of the data/map	1								
	2								
	3								
	4								
	5								
Comments:									

Parks & Recreation

Survey Form 3 (of 3): Maps, Databases and Spreadsheets
USED BY YOUR DEPARTMENT, CREATED AND/OR MAINTAINED BY OTHERS

Data/Map Name:	parcel maps								
Description:	real estate property boundaries								
Which dept. or outside organization did this data/map come from?	assessor's office								
Format Received (hard-copy/digital)	digital								
If digital, specify file format:	AutoCAD	ArcView	Arc/Info	MapInfo	DBF	Access	Excel	Word	Other
(check all that apply)		X							
If hard-copy map, specify Map Scale:	1" = 40'	1" = 50"	1" = 100'	1"= 200'	1" = 400'	Other			
(check all that apply)									
Do you modify this data/map?	no		**If yes, how often?**						
Describe the modifications made:									
Internal Applications of such data:	1 notification of abutting property owners for specific projects								
	2								
	3								
	4								
	5								
	6								
Comments:									

Note: If you have more than one set of data or map to report, please make copies of this form.   *Form 3 Sample*

Survey Form 3 (of 3): Maps, Databases and Spreadsheets
USED BY YOUR DEPARTMENT, CREATED AND/OR MAINTAINED BY OTHERS

Data/Map Name:									
Description:									
Which dept. or outside organization did this data/map come from?									
Format Received (hard-copy/digital)									
If digital, specify file format:	AutoCAD	ArcView	Arc/Info	MapInfo	DBF	Access	Excel	Word	Other
(check all that apply)									
If har-copy map, specify Map Scale:	1" = 40'	1" = 50"	1" = 100'	1"= 200'	1" = 400'	Other			
(check all that apply)									
Do you modify this data/map?			**If yes, how often?**						
Describe the modifications made:									
Internal Applications of such data:	1								
	2								
	3								
	4								
	5								
	6								
Comments:									

Mitt Romney
Governor

Stephen R. Pritchard
Secretary

EXECUTIVE OFFICE of
ENVIRONMENTAL AFFAIRS

STANDARD FOR
DIGITAL PLAN SUBMITTALS
TO MUNICIPALITIES
Version 1.0

Issued by
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MASS GIS

Office of
Geographic and
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INTRODUCTION

Computer aided design and drafting (CADD) software is widely used by surveyors and civil engineers in preparing individual site plans submitted to cities and towns as part of the land development review and approval process. Digital files are created and maintained, and from these traditional paper or Mylar documents can be reproduced easily and efficiently.

In a parallel technology development, many cities and towns have adopted geographic information system (GIS) technology to store, manage and use the town-wide geographic/spatial information on which they rely. However, just like the traditional paper or Mylar maps and associated files or notebooks, a GIS database must be maintained to remain useful. Better maintenance of municipal GIS databases benefits all users of those databases, including those in the private sector.

Many cities and towns have realized that plans submitted for development review are usually produced using CADD software. Therefore, some communities now require that copies of the CADD files from which plans are printed be provided to them and many more are considering such a requirement. Municipalities recognize that implementing this kind of requirement will considerably facilitate maintenance of their GIS databases (e.g., parcel boundaries, pipe infrastructure, building outlines, etc.).

However, there are difficulties with using points and lines derived from CADD files in GIS software. Engineering design is typically completed in a CADD file that includes several, and sometimes many, plan and profile drawing sheets. When the CADD file used to produce the development plan is submitted, it will often not be easy to use in the GIS environment. For example, the number and organization of the plan drawings can be problematic; dashed lines from a CADD file may import into the GIS software as a series of small, unconnected, line segments; and conventions for organizing and naming CADD layers vary from one engineering and surveying firm to another. These kinds of issues complicate the use of CADD files in the GIS environment. Thus many municipalities are now implementing or considering implementing, standards for the format and content of required digital plan submittals.

PURPOSE OF STANDARD

Rather than having each community develop its own unique requirements for digital plan submittals, it makes sense to have a state-level standard. Therefore, this standard has two purposes:

1. Enabling municipalities to avoid the time consuming process of developing their own digital submission standard and to avoid the risk of creating a

standard that is flawed because they lack sufficient expertise in the issues involved.

2. *Enabling those in the surveying and civil engineering communities to standardize their work processes, if this standard is being used[1]. To the extent that communities implement this standard, standardized requirements for digital plan submittals will save time and money.*

SUMMARY OF STANDARD

The standard supports the above purposes by defining a Standard Digital File (SDF) for plan submittals. <u>The SDF is a subset of the graphic layers from the CADD file used to create development plans[2]. It is not simply a copy of the CADD file used to print development plans.</u> The SDF does not include bearing information (distances are required), the title block, border, or notes from the CADD file. Only features present in the source CADD file for the project for which approval is sought need be included in the SDF – there is no requirement that features not present in the source CADD file be created.

As specified below, the SDF does have requirements for how map features are organized into layers, how those layers are named, and how features in those layers are symbolized. Compliance with the standard is not relevant if the development plans being submitted to a municipality are created using pen and ink. <u>Neither MassGIS nor any other state agency requires this standard to be implemented; that decision lies entirely with individual cities and towns.</u> If municipalities do implement this standard, they must understand the following:

1) The SDF is an extract from a larger CADD file and is, therefore, <u>not</u> the equivalent of a copy of the original CADD file. The SDF is intended solely to support the needs of updating GIS databases.

2) Maps and other products from a GIS database are typically intended for planning, operational support, and graphic display purposes. <u>However</u>, to help prevent inappropriate uses of information derived from the SDF, <u>maps and electronic displays of information derived entirely or in part from one or more SDFs must include the following statement or its close equivalent</u>: **"Information displayed must not be used for authoritative boundary determinations or for authoritatively locating physical objects; the authoritative determination of boundary or other physical locations remains the purview of the professional land surveyor"**.

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[1] Realistically, some municipalities may choose to use an existing standard or may develop their own, even if a state standard is issued. Nonetheless, a state standard will reduce the number of standards being implemented.
[2] Some existing municipal requirements call for a copy of the <u>entire</u> CADD file.

The standard has three levels. Each level builds on the prior one. Which level or levels of the standard a municipality implements is entirely up to each municipality. All levels require that the SDF be submitted and that it conform to format and content requirements. Providing a template SDF is a required part of implementing the standard. This document and a template SDF[3] in DWG and DXF format are available through the MassGIS web site at http://www.mass.gov/mgis/standards.htm.

Each level of the standard implements some or all of the following four requirements for the SDF:

1. A plan view of the affected construction area shall be submitted in one comprehensive drawing file.
2. File format shall be the AutoCAD DWG or, alternatively, ASCII Drawing Exchange File (DXF) format, delivered using a mechanism specified by the municipality, and with required companion information.
3. Required drawing specifications include layer names as well as standard line and point types (see the layer list in Table 1.)
4. The drawing submitted shall reference ("tie to" or "georeference") at least two (a) point features (e.g., center of manhole, hydrant spindle, center of catch basin, or utility pole, present in the community's GIS database (a community might also choose to provide points created from photo-identifiable locations on their orthophoto base map) or (b) Second Order, Class II (or better) monumented survey control (if available).

The following graphic summarizes the required elements comprising each level of the standard ("R" = required, "O" = optional).

Element	Level I	Level II	LEVEL III
1. Plan View File in Standard Digital File (SDF)	R	R	R
2) SDF in DWG or ASCII DXF Format and accompanied by documentation	R	R	R
3) Graphic File Specifications	R	R	R
4a) Reference a minimum of two point features present in GIS database (if provided by the municipality)		R	R
4b) Coordinates in Massachusetts Coordinate System, NAD83, units of U.S. Survey Feet		O	R

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3 If a template is not provided, the individual or organization submitting the SDF would create it in compliance with Appendix A, Table 1.

IMPLEMENTATION RECOMMENDATIONS

When implementing this standard, MassGIS strongly recommends that cities and towns consider:

1. Incorporating requirements for complying with this standard directly in municipal ordinances/review processes.
2. Specifying a mechanism for ensuring that the SDF submitted meets the requirements of this standard, including the basic capability of being able to read media on which the SDF is delivered. Depending on the review process involved, communities might consider specifying, a time period during which the department/commission/board requiring use of the standard, or its designee, will review and verify the content of the data submitted in the SDF to make sure it meets the requirements of this standard.
3. Ensuring the SDF conforms to this standard by using the checklist in Appendix A.
4. Implementing the standard for a variety of processes requiring municipal review or oversight (subdivisions, ANRs, approval of building occupancy or of building permits, release of a bond required as part of installing pipe infrastructure, etc)
5. Consulting with the department and/or the individual with direct responsibility for GIS data update. This is particularly relevant in deciding what level of this standard to implement for different kinds of projects requiring municipal oversight (see "Municipal Requirements" section, below).

COPYRIGHT FOR SURVEYING AND ENGINEERING DRAWINGS

The engineering and surveying community provided many comments on drafts of this standard; some of these comments concerned copyright. These comments stated that information on surveying/engineering drawings, whether provided on mylar or as a single digital file (SDF) as required by this standard, were protected by copyright. Because of these comments and concerns about copyright being violated if the digital plan standard is implemented, MassGIS asked Linda Hamel and Stephanie Ziertan, the General Counsel and Deputy General Counsel, respectively, of the Commonwealth of Massachusetts' Information Technology Division (ITD), for advice on this issue. The full text of their advice, which includes discussion of the relevant case law, is Appendix C of this document; it can be found as a separate file on the MassGIS website in the page devoted to standards (http://www.mass.gov/mgis/standards.htm).

ITD's memos conclude that survey data may include a mixture of expressive data in which the surveyor holds copyright and factual data in which he does not. For instance, a surveyor has no copyright interest in the pre-existing facts contained in his survey, such as the location of lot boundaries that existed before he drafted his survey. He does, however, have copyright interest in the data he creates about proposed boundaries for and improvements in a subdivision that does not yet exist.

The copyrighted survey data uploaded into a GIS may lose its copyright protection when and if it becomes "fact". For instance, the data showing the surveyor's depiction of the location of a sewer line as yet un-built will lose its protection when the line is actually installed in the ground. Boundaries for lots to be subdivided clearly lose copyright protection once those lots are sold and the boundaries are described in deeds filed with the Registry of Deeds, and may even lose copyright protection when those boundaries are approved by the local planning board and the plan is registered at the Registry of Deeds.

Case law clearly indicates that copyright protection is not lost when a municipality requires that a surveyor provide some survey data for a municipal GIS. Survey data in municipal or state GIS is also public record to which the public has unrestricted access under our state's public records law. Information can be both public record and subject to U.S. Copyright Law. Some of the survey data uploaded to municipal GISs is therefore subject both to a surveyor's copyright interest under U.S. law and subject to public access under the public records law.

Copyright law protects the copyright owner's right to control the copying of their expressive work. One exception to the copyright holder's rights is called "fair use". Fair use permits people who have not been given a license by the copyright holder to copy the owner's work for purposes like criticism, comment, news reporting, teaching, scholarship, or research. The Federal courts have said that public access to and copying of documents that are both public record and subject to copyright falls under this exception to the copyright law. Thus, survey data that is part of a municipal GIS and is also subject to copyright can be accessed and copied by people under the state's public records law without diminishing the surveyor's copyright interest. That data cannot, however, under U.S. copyright law be copied for sale to a third party, because copying for that purpose exceeds the "fair use" exception under U.S. copyright law.

Because survey data uploaded into municipal GIS systems may include a mix of data subject to and data not subject to surveyor copyright interests, GIS managers/administrators should post a notice of this fact and a statement regarding the limitations imposed by US copyright law on the copying of such data. Municipalities implementing this standard can avoid having to post such notices by declining to post survey data that reflects something other than existing facts.

AUTHORITY

As the Commonwealth's Office of Geographic and Environmental Information, MassGIS has the legislatively assigned authority and mandate to "set standards for the acquisition and management of geographical and environmental data by any agency, authority or other political subdivision of the Commonwealth" (Ch. 21A, §4B, MGL 1999). MassGIS is issuing this standard and is responsible for its content.   As noted above, whether or not this standard is implemented is entirely up to individual municipalities; there is no state requirement that this standard be used.

DEVELOPMENT PROCESS

A member of the MassGIS staff wrote and edited the drafts of this document and facilitated the review process. However, much of the actual standard is based on a draft standard developed by the Town of Weymouth's Department of Public Works, Engineering Division.

Standards produced by GIS staff at the Central Massachusetts Regional Planning Commission, the Northern Middlesex Council of Governments, and at the Merrimac Valley Planning Commission were also consulted in developing this standard. The report, "Submission of Plans in Digital Format Compatible with the Towns Geographic Information System", submitted by Applied Geographics to the Town of Mashpee in 1999 also provided useful background information in preparing this document.

Drafts of this document were reviewed by a large group of GIS and Surveying professionals (see Appendix B)[4]. This group included GIS staff from many cities and towns, GIS staff from regional planning agencies, and individuals representing most of the Massachusetts based GIS consulting firms. In addition, representatives of most chapters of the Massachusetts Association of Land Surveyors and Civil Engineers (MALSCE), as well as members of its GIS Committee, and members at large, reviewed and commented on drafts of the standard.   Comments, concerns, and questions concerning the drafts of this document were discussed at length with staff from the Towns of Weymouth and Wayland (see Appendix B). They drew on their expertise with CADD and GIS software and their knowledge of surveying, civil engineering, and local government practices, in explaining comments and questions from reviewers; they also assisted with crafting or recommending changes to accommodate those comments and questions.   Without the contributions of all these participants, this standard would not have been possible.

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[4] The presence of someone's name in Appendix B does not mean that they endorse the standard. Instead it simply acknowledges that they provided feedback on the standard during its development.

Many questions were asked and many issues were raised during the development and review process. A summary of these questions and issues and how they were resolved is included in Appendix D, which is distributed as a separate document. If after reviewing Appendix D you have questions about or suggestions for this standard, please contact:

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REQUIREMENTS OF THE STANDARD

The requirements are broken into two parts: 1) those that apply to municipalities, and 2) those for each level of the standard that apply to surveyors and engineers. As discussed above, which level of the standard applies would be a decided by the municipality.

REQUIREMENTS FOR MUNICIPALITIES

In implementing this standard, municipalities must:

1. Identify the standard correctly in their ordinances or regulations.
2. Identify which level of the standard applies to a specific development project.
3. Provide a template SDF.
4. Make provisions for an appeal process.
5. Provide GIS data points that are candidate geo-referencing points for the SDF "locked layers" when implementing Levels II and III of the standard.
6. When requiring Level III, specify the vertical datum.
7. Specify how the SDF will be delivered

Each of these are discussed in more detail below

1. <u>Correctly Identifying the Standard</u> - To avoid any confusion ,the standard must be referred to as the "current version of the MassGIS Standard for Digital Plan Submission to Municipalities"
2. <u>Level of the Standard</u> - Specifying which level of the standard is required is important as their requirements differ. Different kinds of documents (for example, approved plan, as-built plan, occupancy or building permits, pipe infrastructure plans, as condition for releasing construction bond, etc) may warrant a different level of the standard. Another reason that different levels of the standard might be used is to reflect project complexity. So, for example, one possible application of the standard is to require that "small" or "simple" projects require adherence to requirements for Level I. Following that logic, "large" or "complex" projects would be required to follow requirements for Level III. Projects falling into a middle ground would be assigned to Level II. With this approach, a community would have to clearly define what constitutes a small/large or simple/complex project and which level of the standard applies.   This definition might be included directly in municipal ordinances. Alternatively, the standard could be implemented with a default requirement of complying with Level II unless the requirements of a different level of the standard are negotiated for a specific project.

3. <u>Template SDF</u> - The template SDF (DWG or ASCII DXF format) must comply with the requirements for the SDF in that the coordinate system, layer naming, and symbols must meet the requirements of this standard. The template file must contain empty layers for each of the layers identified in the Graphic File Specifications in Table 1. It is expected that these layers will be populated (by those submitting the SDF) with the appropriate survey/engineering data. The purpose of providing this template file is making it as easy as possible to comply with this standard. A template SDF can be found at www.mass.gov/mgis/standards.htm. Note that a knowledgeable user of CADD software can also readily create a blank or template SDF based on the specifications in this standard and in Table 1.

4. <u>Provisions for Appeal</u> – Municipalities must consider making provisions for an appeal of and possible deviation from SDF requirements or waiver of the required SDF submittal. While many people have reviewed this standard it is not possible to predict all scenarios that might be affected by its requirements.

5. <u>Provide GIS Data</u> - When requiring Levels II or III of the standard, provide <u>project-specific</u> GIS data for the "locked layers" in the template file (See Table 1) at no charge to firms/individuals that will be submitting SDFs; the practical effect of this for some communities may be that it makes sense to regularly provide complete portions (e.g., parcel boundaries, sewer manholes, fire hydrants) of their GIS database at no charge to firms that do a lot of work in their community.

6. <u>Vertical Datum</u> - When requiring an SDF that meets Level III of this standard, specify the vertical datum that must be used in the SDF. If the vertical datum is <u>not</u> NGVD29 or NAVD88, but a local vertical datum, then a conversion factor between the local datum and NAVD88 must be provided. <u>An assumed datum must NOT be used in the SDF.</u> See document on the MassGIS web site at www.mass.gov/mgis/standards.htm for a copy of conversion factors for local datums provided by the MassHighway Department's Survey Section.

7. <u>Delivery Media</u> - Specify the delivery media (e.g. CD-ROM) or mechanism (e.g., FTP, email) for the SDF.

REQUIREMENTS FOR SURVEYORS/ENGINEERS

In implementing this standard, municipalities will require compliance with one of the levels below. Levels II and III incorporate all the elements of Level I, unless otherwise noted.

Level I Requirements

Under this standard, plans produced using computer aided drafting and design (CADD) software, must be accompanied by a digital file containing a subset of

the features in the CADD file. This subset of features is referred to as the Standard Digital File or SDF. The SDF is not simply a copy of the CADD file used to print development plans. It does not include information about bearings (distances are required), the title block, border, or notes from the CADD file. As specified below, the SDF does have requirements for how map features are organized into layers, how those layers are named, and how features in these layers are symbolized. The SDF cannot be required if the development plans being submitted to a municipality were prepared by hand. <u>Only features present in the source CADD file for the project for which approval is sought must be included in the SDF.</u>

The SDF will be used as a source for maintaining map features and associated information in the GIS database of any municipality using this standard. <u>The printed plan will remain the official document.</u>

Communities implementing this standard understand the following:

1) The SDF is an extract from a larger CADD file and is, therefore, <u>not</u> the equivalent of a copy of the original CADD file. The SDF is intended solely to support the needs of updating GIS databases.
2) Maps and other products from a GIS database are typically intended for planning, operational support, and graphic display purposes. <u>However</u>, to help prevent inappropriate uses of information derived from the SDF, <u>maps and electronic displays of information derived entirely or in part from one or more SDFs must include the following statement or its close equivalent</u>: **"Information displayed must not be used for authoritative boundary determinations or for authoritatively locating physical objects; these determination remain the purview of the professional land surveyor"**.

Level I Summary

At Level I the SDF must meet three requirements:

1. It must contain a <u>plan view</u> of the affected construction area in one comprehensive drawing file.
2. The <u>file format</u> must be AutoCAD DWG (alternatively ASCII DXF) transferred on a CD-ROM or other computer storage medium (as specified by the municipality) and with appropriate <u>documentation</u>.
3. <u>It conforms to the graphic and layer naming specifications</u> of this standard.

Details on these three required elements are below.

Plan View

The required subset of CADD file layers of the affected construction area shall be submitted, in plan view, as one comprehensive drawing file. Plan view is defined as all "entities" on the same plane of zero elevation in the drawing coordinate space.

At Level I of this standard, the SDF is not required to use a geographic coordinate system (e.g., Massachusetts Coordinate System, NAD83); coordinates based on drawing units are expected. However, in the event that the submitter of the SDF wishes to create it with coordinates from the Massachusetts Coordinate System, they may do so. See details concerning this topic in Level III of the standard.

File Format and Documentation

File format shall be the AutoCAD DWG (alternatively ASCII DXF) file format; most GIS software can read DWG or DXF file format. DXF files can be created by all the major CADD and GIS packages. The SDF shall be delivered on a CD-ROM disk or other media as specified by the municipality implementing this standard. The delivery medium must be labeled with:

- Submission date
- Municipal project number or ID
- Project or subdivision name, and
- Name and version of the computer operating system on which the media was written.

Documentation accompanying the SDF as a text file or files in electronic form must include:

- The name of the land owner and of the preparer of the plan/SDF
- The same project identifying information as on the delivery media.
- The name and version of the CADD software used to create the SDF
- Project address or, if no address, a descriptive location
- A list of the file names on the delivery with a description of what each file contains.
- The vertical datum of the SDF, if relevant.
- The date or dates when the survey work was performed.
- Disclaimer (see discussion immediately below)

In addition, either in the same text file as the above documentation OR embedded in a separate layer in the SDF (G-ANNO-NOTE, the "SDF Disclaimer" layer in the template (Table 1), the following **disclaimer** must appear:

"This SDF is submitted solely for meeting the requirements of the _____ (city/town name) as described in the current version of the MassGIS Standard for Digital Plan Submission to Municipalities. The information contained on this SDF is derived from a CADD file containing the results of original field survey work and related research.   The information in this SDF must not be used for authoritative boundary or elevation determination, or for the authoritative location of physical objects without an actual field survey."

Graphic Specifications

The SDF must conform to the graphic file specifications shown in Table 1. These specifications include layer names as well as standard line and point types; a template is available through the MassGIS website at http://www.mass.gov/mgis/standards.htm.

In addition, the submitted SDF must conform to the following requirements:

a) The features shall be submitted in the layers specified in Table 1. Systems using numbered levels, such as MicroStation include a conversion table in the DXF file creation process that can be used to specify named layers.

b) Reference to external CADD layers ("XREF") must be removed and the referenced information included directly in the SDF[5].

c) The SDF must be created in the "World Coordinate System" in model space (or the Massachusetts Coordinate System, see below), it must have a one-to-one (1:1) DWG scale, where one (1) drawing unit = one (1) Us Survey Foot. The coordinate system base must be the same as the AutoCAD system coordinate base or equivalent with the north rotation up. In other words the project (N,E,Z) should equal the CADD (Y,X,Z). The North Rotation must be 0°.

d) When the SDF is in the Massachusetts Coordinate System, all of requirement 'c' above applies.

e) Features added that do not have a layer specified in Table 1 shall be placed on a separate, unique layer and identified in accompanying documentation.

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[5] An alternative that was discarded was to "bind" XREF files to the SDF; however for this to work, there would have to be no duplicate entities and map features would have to appear on the appropriate layers as presented in Table 1; this would defeat the purpose for which the XREF was created.

f) When creating line features that represent polygons (see FEATURE TYPE in Table 1) in a GIS, CADD users must snap end points of lines together and must make sure polygons close (e.g. property boundaries).

g) All line features (see FEATURE TYPE in Table 1) shall be of a continuous line-type, such that each individual line/pipe feature (i.e. each segment) is only broken at the ends where a node/structure is located.

h) Straight lines must be represented by only the beginning and ending x- and y-coordinate points. The <u>exception</u> to this is a line developed from multiple traverses on the <u>same</u> bearing where the coordinates differ only in the "z" values. <u>Line strings must not cross back on themselves or have a zero length (i.e., points).</u>

i) All point features (see FEATURE TYPE in Table 1) shall be entered using standard point/node symbols.

Level II Requirements

At Level II, all the requirements of Level I persist. There are two additional requirements, one each for the municipality implementing this level of the standard and for the company or individual submitting the SDF.

Municipality Provides Features for Spatial Reference

The municipality must provide GIS data for use in the SDF "locked" layers. The data provide must be specific to the particular project. These locked layers shall include point features from the Town's GIS database suitable for spatial referencing in the plan view contained in the SDF (see further discussion of reference features below). The point features in these locked layers must each be uniquely identified with a "GIS ID"; this will facilitate references to these points. In addition to the points for spatial reference, there will be a locked layer containing simple large scale mapping features (e.g., town boundary, street network, street names, surface waters, building outlines, etc.)) to be used as a quick reference for those preparing the SDF.

Spatial Reference in the SDF

The plan in the SDF shall be submitted with a minimum two points[6] of spatial reference. While the SDF for Level II can remain in drawing units[7], it <u>must</u>

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[6] Only two points are required to correctly orient the features from the SDF because in the GIS environment other information is available that will help resolve any ambiguity concerning the SDF's orientation.

reference ("georeference" or "tie to") a minimum of two features identifiable in the Town GIS as provided in the locked layers of the template SDF (see above); the two points of spatial reference for the SDF are only required if useable reference points are within 750 feet (via survey traverse) of the project's boundaries.

These reference points will be one or both of the following types, depending on what is available in a community:

1. FGDC Second Order, Class II (FGDC-STD-007.4-2002 Table A-1) or better survey control monument locations[8].

2. The centers of manholes, fire hydrant spindles, or catch basins; utility poles may also serve as reference points. Alternatively or in addition, a municipality may choose to provide photo-identifiable points from their orthophoto base map. To be referenced in the SDF, these features must be provided by the municipality for import into the template SDF in the "Secondary Control Points" (V-CTRL-HCPT) locked layer.

Features being referenced must appear in the SDF; their locations must be determined as part of completing the field survey work for the project depicted in the SDF. It is not expected that locations for these features would come from the GIS data. However, the same unique "GIS ID" provided in the template SDF must identify the surveyed reference features in the SDF. Including the "GIS ID" for reference features in the SDF is needed to facilitate finding the two reference points in the GIS environment.

The points selected for reference in the SDF must be separated by as much distance as is possible given the features available to choose from. The accuracy of any ties in the SDF to features in the locked layers must be consistent with the location accuracy of other features in the SDF. If there are not two points for spatial reference within 750 feet of the project, then requirements for the SDF submittal revert to Level I of this standard.

Level III Requirements

At Level III, all the requirements of Level I and of Level II persist. At Level III there is one additional required component and one suggested (optional) component.

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[7] Note that, at the discretion of the individual or business submitting the SDF, the Massachusetts Coordinate System may be used in the SDF at Level II; in that situation, the requirements of Level III of this standard apply.

[8] Some communities have systematically developed a network of such control points.

SDF Coordinate System

The coordinate system of the SDF at Level III must be the Massachusetts Coordinate System, North American Datum 1983, with units of U.S. Survey Feet. The vertical datum must be North American Vertical Datum 1988, <u>unless</u> the municipality using this standard requires that the local vertical datum be used. <u>If the local vertical datum is required</u>, the city or town <u>must</u> provide a conversion factor between the local vertical datum and NAVD88. This conversion factor should be developed using the North American Vertical Datum Conversion (VERTCON) algorithm. If a temporary benchmark (TBM) is created, it must be shown and labeled in the SDF. <u>The horizontal and, as applicable, vertical accuracy of the features in the SDF must match those of the surveyed locations depicted on the printed plan to which the SDF is a companion submission.</u>

Suggested Additional SDF Documentation

At this level of the standard, <u>suggested</u>[9] additional documentation accompanying the SDF includes:

- A list of the control points used and held.
- Information about the method used to bring the control points to the project site (GPS, traverse resection, etc.).
- The source benchmark held to derive temporary benchmarks created for the project, if any.
- Data derived from GPS, terrestrial traverse, or by geo-referencing to existing GIS features.

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[9] Feedback from some MALSCE members included the suggestion that this additional documentation might willingly be provided by some surveyors because of its value to surveyors following after them.

TABLE 1: GRAPHIC FILE SPECIFICATIONS

NOTE: layers in bold are "locked" layers that would be provided in a template SDF (Levels II and III) for reference purposes. Except for those names followed by an asterisk (*), the layer names below are all taken from the A/E/C CADD Standard. Not all the features listed below appear in the A/E/C standard. Missing features have been assigned a name that is constructed in a way that matches the A/E/C Standard. Note that Autodesk Land Desktop 2006 includes a standard drawing template that incorporates the A/E/C Standard's naming conventions.

SDF LAYER NAME	DATA OR FEATURE	FEATURE TYPE[10]
G-ANNO-NOTE*	SDF DISCLAIMER	Text
V-CTRL	**Geodetic Control Points**	**Point, Locked Layer**
V-CTRL-HCPT*	**Secondary Control Points[11]**	**Point, Locked Layer**
V-SITE-OTLN	**Map Reference Features[12]**	**Polyline, Locked Layer**
V-PROP-LINE	Property Boundary	Line
V-ANNO-DIMS*	Property Dimension, Survey Calls	Text
V-PROP-ESMT	Easement	Line or Polyline
V-PROP-RWAY	Right-of-Way Boundary	Line or Polyline
V-SURV-DATA	Survey Monuments[13]	Point
V-PVMT-ROAD	Edge of Pavement	Line or Polyline
V-*PVMT*-WALK*	Edge of Sidewalk	Line or Polyline
V-BLDG-OTLN*F**	Building Footprint Outlines	Line or Polyline
V-BLDG-OTLN*R**	Building Roofprint Outlines	Line or Polyline
V-SITE-EWAT	Stream, River & Pond Edges	Polyline
V-SITE-*BVW**	Wetland Boundaries	Polyline
V-TOPO-MINR	Topographic Contours - Interval	Line or Polyline
V-TOPO-MAJR	Topographic Contours - Index	Line or Polyline
V-TOPO-MAJR-IDEN	Elevation Value - Index	Text
V-TOPO-SPOT	Spot Elevations	Point

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[10] While it is expected that feature type line will usually be chosen for linear features, polyline is also acceptable and is even preferred; see discussion of required graphic specifications

[11] Secondary reference points are features from a municipal GIS database such as manhole and catch basin centers and fire hydrant spindles for which locations and the unique GIS ID would be provided for this layer by the municipality (Levels II and III only).

[12] Map reference features are features from a municipal GIS database such as street centerlines, surface waters, town outline, and building outlines that may be useful as background orientation.

[13] This layer is for features such as corner bounds, points of curvature, and other locations recovered by the surveyor.

V-TOPO-SPOT-*IDEN**	Spot Elevations Value	Text
L-SITE-RTWL	Retaining Walls	Line or Polyline
C-RAIL-CNTR	Rail Road Line	Line or Polyline
V-SITE-FENC*	Fence Line	Line or Polyline
L-PLNT-BUSH	Shrub or Shrubbery	Point
C-ROAD-CNTR	Road Centerline	Line or Polyline
L-PLNT-TREE-LINE	Forested or Large Vegetation Area	Line or Polyline
L-PLNT-TREE	Tree (>= 6" diam)	Point
C-PKNG-OTLN	Parking Area Outlines	Line or Polyline
V-DOMW-MAIN	Water Mains	Line or Polyline
V_DOMW-SERV	Water Services	Line or Polyline
V-DOMW-HYDR	Fire Hydrant	Point
V-DOMW-DEVC*	Water Valves	Point
V-DOMW-FTTG*	Water Reducer or Fitting	Point
V-DOMW-WELL	Water Well	Point
V-DOMW-METR*	Water Meter Pit	Point
V-DOMW-TANK	Water Storage Unit	Point
V-DOMW-PUMP	Water Pump Station	Point
V-DOMW-*MISCPT**	Water Miscellaneous Points	Point
V-SSWR-MAIN	Sewer Mains	Line or Polyline
V-SSWR-SERV	Sewer Service Lines	Line or Polyline
V-SSWR-JBOX	Sewer Manholes	Point
V-SSWR-PUMP	Sewer Pump Station	Point
V-SSWR-LEAC	Sewer Wet Well	Point
V-SSWR-DEVC	Sewer Valve	Point
V-SSWR-*MISCPT**	Sewer Miscellaneous Points	Point
V-STRM-MAIN	Storm Drain Mains	Line or Polyline
V-STRM-JBOX	Storm Drain Manholes	Point
V-STRM-*CB**	Catch Basin	Point
V-STRM-CULV	Culvert	Point
V-STRM-HDWL	Storm Drain Headwall	Line
V-STRM-*INLT**	Storm Drain Inlet	Line
V-STRM-*OTFL**	Storm Drain Outfall	Line
V-STRM-LAGN	Retention/Detention Basin	Line or Polyline
V-STRM-*MISCPT**	Drain Miscellaneous Points	Point
F-ALRM-MANL	Fire Department Call Box	Point
V-POLE-UTIL	Electric Poles	Point
V-LITE-FIXT	Street Lights	Point

V-ELEC-JBOX*	Electric Manhole	Point
V-COMM-JBOX*	Telephone Manhole	Point
V-COMM-CBOX*	Telephone Switching Station	Point
V-ELEC-HBOX*	Hand Hole	Point
V-ELEC-PAD*	Padmount	Point
V-ELEC-CBOX*	Electric Switching Station	Point
V-MISC-JBOX*	Manholes, other	Point
V-SPCL-TRAF*	Traffic Light	Point
V-SPCL-TCBOX*	Traffic Light Control Box	Point
C-PVMT-SIGN*	Traffic Sign	Point

APPENDIX A: ITEMIZED CHECKLIST FOR SDF SUBMITTALS

File Format and Documentation

_____ Delivery media labeled with project information

__ Submission date

__ Municipal project number or ID

__ Project or Subdivision name

__ Name and version of computer operating system on which the media was written

_____ Documentation submitted with media in electronic format

__Name of landowner and the preparer of the plan/SDF

__Same information identifying the project as on the delivery media

__Name and version of the CADD software used to create the SDF

__Project address or, if no address, project description

__A list of the file names with a description of what is in each file

__The vertical datum of the SDF, if relevant

__The date or dates when the survey work was performed

__Disclaimer statement (may be included directly in the SDF)

Plan View Requirements

_____ Entire project area submitted in plan view as one comprehensive drawing file.

__ SDF used town template (if required)

_____ Drawing submitted in Massachusetts Coordinate System

__NAD83 MA Coordinate System _____ (US Survey Feet)

__Two control points for georeferencing

_Geodetic Control points
_Other approved GIS utility or photo-identifiable features

__Vertical Datum specified (either local datum or NAVD88)

Required Graphic Specifications

_____ SDF features submitted in the layers specified in Table 1. Systems using numbered levels, such as MicroStation include a conversion table in the DXF file creation process that can be used to specify named layers.

_____References to external CADD layers ("XREF") removed and the information included directly in the SDF

_____ Created in the "World Coordinate System" in model space or the Massachusetts State Plane Coordinate System

_____ Features added that do not have a layer specified in Table 1 are placed on a separate, unique layer and identified in accompanying documentation

_____ Polygons boundaries "close".

_____ Straight lines have been drawn with a continuous line-type represented by only the beginning and ending x- and y-coordinate points. The exception to this is a line developed from multiple traverses on the same bearing where the coordinates differ only in the "z" values.

_____ Line strings must not cross back on themselves or have a zero length (i.e., points).

_____ Point features are drawn with standard point/node symbols.

APPENDIX B: PARTICIPANTS IN STANDARD DEVELOPMENT

The individuals listed below participated in the development process either by contributing their expertise on a specific topic (e.g., CADD, Surveying, GIS, law) or by commenting on drafts of the standard. The presence of a particular individual's name and that of their employer in this Appendix does not necessarily signify an endorsement of this standard. Rather it simply acknowledges their participation in the development process. Without the contributions of these individuals, this standard would not have been possible. The professional positions and affiliations may no longer be current.

From Cities and Towns

Lien Alpert, GIS Manager, Town of Wellesley
Shaun Anderson, GIS Coordinator, City of Westfield
Alf Berry, Town Engineer, Town of Wayland
Chip Fontaine, Town Engineer, Town of Weymouth
Kim Honetschlager, GIS Coordinator, Towns of Reading and North Reading
Jim McGrath, Surveyor, Town of Weymouth
Mike Olkin, GIS Manager, Town of Amherst
Jamie Portolese; GIS Coordinator, Town of Weymouth
Garret Walsh, GIS/CADD Specialist, Town of Weymouth

From Regional Planning Commissions

John Matley, GIS Manager, Northern Middlesex Council of Governments
Mike Morin, GIS Analyst, Central Massachusetts Regional Planning Commission
Jerrard Whitten, GIS Manager, Merrimack Valley Planning Commission

From GIS Consulting Firms

Steven Anderson, Applied Geographics, Inc.   Mike Doyle, Chas. H. Sells
Jason Brennen, Camp Dresser McKee   Kevin Flanders, PeopleGIS
I-Jen Chen, DesLauriers Municipal Solutions   Rajan Nanda, Full Circle Technologies

From The Massachusetts Association Of Land Surveyors And Civil Engineers

Richard F. Gosselin, Northeast Engineers & Consultants; President, Eastern Mass Chapter
Wayne Harrison, Cullinan Engineering; President, Central Mass Chapter
Mark A. Joy, Coastal Engineering; President, Cape Cod Chapter
Brian E. Koczela, BEK Associates; President, Berkshire Chapter
Edward O'Brien, Chas. H. Sells; MALSCE GIS committee
Russ Sackett, Sackett Survey Services, MALSCE GIS Committee
Mark Violette, Schofield Brothers of New England, MALSCE GIS Committee
Mary Ann Corcoran, Hill Engineers, Inc.
John A. Hammer III, Professional Land Surveyor
Patrick Healey, Professional Land Surveyor
David Humphrey, Schofield Brothers of New England
Bob Staples, DGT Survey Engineering Group
Paul Gay, private surveyor
Professor Knud Hermansen, Department of Civil Engineering Technology and Survey Engineering, University of Maine at Orono.

ANR SUBDIVISION APPLICATION TO BROOKLINE PLANNING BOARD

PLAN THOUGHT NOT TO REQUIRE APPROVAL
UNDER THE SUBDIVISION CONTROL LAW*
(MGL. CHAP. 41, SEC. 81-T)

Plan Received (Date Stamp)

Address of ANR Plan Property   _____

Name & Address of Person and Firm Submitting Plan   _____

_____

Zip Code: _____

Telephone Number of Person to Pick Up Plan   _____

Name & Address of Owner (if not the same as above)   _____

_____

Zip Code: _____

Name of Survey Company   _____

Date of Plan (last revision)   _____

Description of Changes Being Effected by Plan: _____

Signature of Record Owner or Official Representative   _____

ATLAS PAGE:_____   BLOCK:_____   LOT(S): _____

FEE PAID: $ _____   DATE:_____

ACTION	DATE
1. PLAN IS SUBMITTED AT PLANNING BOARD MEETING*	
2. PLANNING BOARD FINDS THAT PLAN DOES NOT REQUIRE APPROVAL	
3. APPLICANT IS NOTIFIED THAT HIS/HER PLAN HAS BEEN SIGNED	
4. PRINT OF PLAN IS MADE AND IS FILED	
5. ORIGINAL DRAWING IS PICKED UP BY APPLICANT	

* *Applicant submitting plan for determination that approval is not required must give written notice to the Town Clerk that such a plan has been submitted (see Chap. 41, Sec.81-T, MGL)*

ALL SUBDIVISION PLANS SHALL BE SUBMITTED IN PAPER AND DIGITAL FORM, EITHER IN AUTOCAD DWG OR DXF FORMAT, GIS ARC/INFO E00 FORMAT OR GIS ARCVIEW SHAPEFILE FORMAT. THE MEDIA SHOULD BE 3.5" FLOPPY DISK, OR CD.

TOWN OF BROOKLINE, MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

Requirements For The Approval Of
Sanitary Sewer, Storm Drain And Water Supply Connections

GENERAL:

Information on record street lines and grades; size, locations, and elevations of sanitary sewers and surface water drains; locations of sewer Y's or T's; size and locations of water mains; and bench marks is available at the office of the Engineering Division (the Division), Brookline DPW. The Town of Brookline cannot vouch for the accuracy of this information; therefore field investigation is necessary.

PLAN REQUIREMENTS:

General:

An original, signed site plan specifically drawn for this purpose, prepared by both a Registered Professional Engineer and a Registered Professional Land Surveyor and endorsed by them as to their area of responsibility shall be submitted to the Division for approval. After approval, this original site plan will be returned to the submitter. It shall be drawn on one 36" x 24" sheet to an engineering scale of 1" = 20'. If the size of the lot or complexity of the proposed construction precludes using either one sheet or this scale, then a waiver of one or both conditions shall be applied for from the Division **before** the plan is drafted. It shall show the scale, true north point and the description and elevation of the Town bench mark used to determine grades shown on the plan. A 3" by 3" area on the plan in the vicinity of the title block shall be reserved for the DPW approval stamp.

Site:

The plan shall show: 1) A boundary line survey made by the surveyor who shall certify that the lot corners, lengths and bearings of the lot lines and elevations, as shown on the plan, are from an actual survey on the ground performed by him. This certification may be on a separately submitted plan, but all the lot information must be shown on the site plan with reference being made to the separate certified surveyor's plan. 2) The size of lot in square feet. 3) The Assessors' Block and Lot number. 4) The proposed street sideline, curb and gutter grades (which shall conform to the record grades of the street) and finish grades immediately adjacent to the proposed building(s) or structure(s) (existing and proposed contour lines may suffice for this information and are preferred). 5) The locations and dimensions of driveway and driveway openings. 6) The location and dimensions of any parking spaces. 7) The name(s) and width(s) of abutting streets and ways. 8) All easements within the lot or abutting thereon whether public or private, their nature and any of their restrictions which could have an effect on the proposed construction. 9) All public sidewalks abutting the lot of industrial, commercial, or apartment buildings (3 or more units) which shall be rebuilt with concrete (including the resetting and/or installation of granite curb, if necessary) regardless of existing sidewalk material, and shall have wheelchair ramps installed where specified. 9a) All public sidewalks abutting the lot of a residential (one or two unit) building which shall have as a minimum two 2' radius granite curb returns with six foot long backup stones at driveways and a six foot long landing stone at the extension of the house walk. The driveway apron and walk landing shall be constructed of the same material as the existing walk but shall not be gravel. 10) The location, size and type of all trees within 20 feet of the proposed locations of the sewer, drain and water services. If there are no trees within this locus, then a statement to that fact shall be included on the plan.

Building(s):

The plan shall include the location, zoning setbacks and dimensions of the foundation(s) of any proposed building(s) on the lot and the house number(s) as assigned by the Engineering Division. The elevation of the basement and all below grade parking levels (the lowest level of which shall not be less than 17.47' without approval of the Board of Selectmen) shall be shown.

Water, Sanitary Sewer and Surface Water Drain:

The proposed locations, size and material of the domestic water, fire sprinkler supply, sanitary sewer, and surface water drain connections shall be shown. Neither domestic nor fire supply water services shall be closer than ten feet to the sewer and drain services at any point unless otherwise specifically authorized by the Director of the Water and Sewer Division. Sewer and drain locations shall include the distance from a manhole in the Town sewer or drain to the point of the connection. The storm drain connection must pass through a drain manhole or catch basin having a minimum three (3) foot sump and a trap before entering the Town's storm drainage system. If the storm water to be collected on site consists only of roof water and/or water collected by footing drains, then the sump structure requirements may be waived

All buildings to be connected to the Town's sanitary sewer system shall have a separate connection to the Town's storm drain system. If there is no Town storm drain available, or if the Town's sanitary sewer is a "combined" sewer, then the site plan shall show how storm and ground water is to be disposed of on site. If disposal is to be by leaching basin, then calculations by a Registered Professional Engineer shall be provided to show that the basin is of sufficient design and capacity.

If the sewer and or drain connections are made by other than by the use of existing T's, they shall be made by core drilling the Town mains and affixing saddle hubs, by building manholes or by other means specifically approved by the Commissioner of Public Works. Details of these connections shall be shown on the plan.

Profiles of the sewer and drain connections indicating the length, slope, elevation at both ends, existing and proposed ground elevations, location of all utilities being crossed and the clearance between the connections and these utilities must be shown. The horizontal scale of the profile shall be the same as the plan scale. The vertical scale shall 10 times the horizontal scale (e.g. 1"=20' Horizontal to 1"= 2' vertical)

DOCUMENTS:

1.   A completed Sewer / Drain Permit Application along with the required inspection fee.
2.   Any site plan for an industrial or commercial building, apartment house, parking lot or any structure other than a one or two family residential building shall be accompanied by calculations made by a registered Professional Engineer showing proposed Sewer and Storm flows and justifying the size, slope, and strength class of the sewer and drain connections and the sizing of the domestic water line and fire supply.

AS BUILT PLAN AND CERTIFICATIONS:

The Engineer and Land Surveyor (as necessary) shall submit to the Division an as built copy of the site plan in both hard copy and digital format (preferably in AutoCAD DWG format, but DXF format will be acceptable). It shall show the locations and dimensions of the building foundation(s), sanitary sewer and storm drain connections and water service(s). The location(s) of the foundation(s) shall be shown with respect to the lot lines. The locations of the sewer and drain connections shall include the elevation, the size and material of the connections, the distance from the points where the services leave the foundation to the nearest foundation corner, swing ties from at least two foundation corners to any sewer or drain structure or change in horizontal or vertical line of the services and the distances from the nearest Town manhole to the points of connection to the Town mains. The location of the water service(s) shall include the size and material of the service(s), the distance from the point(s) where the service(s) enter the foundation to the nearest foundation corner and swing ties from at least two foundation corners to any bends, valves, fittings, curb stop and the corporation stop.

The Engineer shall certify that the construction conformed to the approved site plan or approved modifications thereto. He shall further certify that a dyed water test of the sewer and drain lines has been performed and that they are each connected to the correct Town main. This certification shall be on letterhead and include the date tested and the name of the tester.

Both the above as built plan and the certification must be received and approved by the Division prior to DPW sign off of the Certificate of Occupancy.

Approved:

_____

A. Thomas DeMaio
Commissioner of Public Works

INSPECTION FEE SCHEDULE

$ 250 - Residential (up to two units)
$ 600 - Apartments or Condominiums (3 or more units)
$1000 - Commercial or Industrial

ArcView 9.1 on PC-Intel Windows XP Professional Edition

Product: ArcView 9.1

Platform: PC-Intel

Operating System: Windows XP Professional Edition

Service Packs/Patches: SP 1
                          SP2 (refer to Limitations)

Shipping/Release Date: May 18, 2005

Hardware Requirements

CPU Speed:

  1.0 GHz recommended or higher

Processor:

  Intel Pentium or Intel Xeon Processors

Memory/RAM:

  512 MB minimum, 1 GB recommended or higher

Display Color:

  Greater than 256 color depth

Swap Space:

  300 MB minimum

Disk Space:

  Typical 765 MB NTFS, Complete 1040 MB NTFS

Disk Space Requirements:

  In addition, up to 50 MB of disk space maybe needed in the Windows System
  directory (typically C:\Windows\System32). You can view the disk space
  requirement for each of the 9.1 components in the Setup program.

Notes:

Internet Explorer 6.0 Requirement:
Some features of ArcView 9.1 require a minimum installation of Microsoft Internet Explorer Version 6.0. If you do not have an installation of Microsoft Internet Explorer Version 6.0 or higher, you must obtain and install it prior to installing ArcEditor.

Python Requirement for Geoprocessing:
ArcGIS Desktop geoprocessing tools require that Python and the Python Win32 extension are installed. If the ArcGIS Desktop setup does not find Python on the target computer, it will install Python 2.1 and Win32all-151 extension during a typical or complete installation. You may choose a Custom installation to unselect the Python feature to avoid installing these features. See the install guide for additional information concerning Python.

License Manager Requirements:
- Simple TCP/IP, Network Card or Microsoft Loopback Adapter.
- The License Manager is supported on Windows Server 2003. Refer to ESRI Knowledge Base Article FAQ: Is the License Manager supported on Windows Server 2003? for more information.

Installation of Sentinel System Driver v7.0 from http://www.safenet-inc.com/support/tech/sentinel.asp is required.

Additional Requirements for ArcGlobe (as part of 3D Analyst):
- Memory/RAM: 512 MB minimum, 1 GB recommended
- CPU Speed: 1.5 GHz recommended or higher
- Disk Space: ArcGlobe will create cache files when used, additional disk space may be required for this and any other data used in ArcGlobe.
- Video Card: An OpenGL 1.1 or above compliant video card is required, with at least 32 MB of video memory, however 64 MB of video memory is recommended or higher.

ESRI supports and recommends the following integrated development environments for use with ArcGIS Desktop
and the ArcGIS Desktop Developer Kit:
- COM
Visual Basic for Applications
Visual Basic 6 SP3 or later

Visual C++ 6 SP3 or later
Visual C++ (Visual Studio .Net 2003)

-.Net
C# (Visual Studio .Net 2003 with .NET Framework 1.1 or 1.1 Service Pack 1)
VB.Net (Visual Studio .Net 2003 with .NET Framework 1.1 or 1.1 Service Pack
1)

Printer Support:
ArcGIS supports printing to any Microsoft certified Windows printer using the
native driver in ArcGIS. Please note that some printer drivers do not support
complex maps and the ArcPress printer driver or additional hardware may be
needed for these complex maps.

**ESRI recommends the following configuration when printing large
maps with the ArcPress printer drivers:**
- Pagefile system size of 4096 MB is recommended. ArcPress depends on
being able to acquire potentially large contiguous blocks of memory to
process a map. The windows limit is 2048 MB and by having a pagefile.sys file
of at least twice that size helps ensure that other applications running and
using the pagefile system will not introduce an unexpected limit for the
ArcPress printer driver.
- Pagefile system should be stored on a dedicated partition or, if possible, a
dedicated drive. This will prevent the file from becoming fragmented and
diminishing ArcPress's ability to acquire contiguous blocks of memory.
- If large complex maps do not print, then reboot the computer to ensure the
pagefile system is cleared. If the pagefile system is not a dedicated drive or
partition, make sure that drive does not need to be defragmented.
- Disk Space: at lease 10 GB of space is free on the drive where %TEMP% is
located, as potentially large temporary files will be written there while
ArcPress is processing a map for printing.

System Design Strategies
Recommended platform sizing and system configuration strategies are
provided in the System Design Strategies technical reference document
available at: System Design Strategies.

Limitations

Platform: ArcView 9.1 on Windows XP Service Pack 2 is certified with limitations.

Refer to ESRI Knowledge Base Article FAQ: Windows XP SP2 and ArcGIS 9.1 Products for details.

Send your comments to: Site Administrator | Terms of Use | PRIVACY | Copyright © ESRI | Careers

ArcView 9.1 on PC-Intel Windows 2000 Professional

Product: ArcView 9.1

Platform: PC-Intel

Operating System: Windows 2000 Professional

Service Packs/Patches: SP4

Shipping/Release Date: May 18, 2005

Hardware Requirements

CPU Speed:

1.0 GHz recommended or higher

Processor:

Intel Pentium or Intel Xeon Processors

Memory/RAM:

512 MB minimum, 1 GB recommended or higher

Display Color:

Greater than 256 color depth

Swap Space:

300 MB minimum

Disk Space:

Typical 765 MB NTFS, Complete 1040 MB NTFS

Disk Space Requirements:

In addition, up to 50 MB of disk space maybe needed in the Windows System directory (typically C:\Windows\System32). You can view the disk space requirement for each of the 9.1 components in the Setup program.

Notes:

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Some features of ArcView 9.1 require a minimum installation of Microsoft
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ArcGIS Desktop geoprocessing tools require that Python and the Python
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Python on the target computer, it will install Python 2.1 and Win32all-151
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See the install guide for additional information concerning Python.

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- Simple TCP/IP, Network Card or Microsoft Loopback Adapter.
- The License Manager is supported on Windows Server 2003. Refer to ESRI
Knowledge Base Article FAQ: Is the License Manager supported on Windows
Server 2003? for more information.

**Installation of Sentinel System Driver v7.0 from http://www.safenet-
inc.com/support/tech/sentinel.asp is required.**

Additional Requirements for ArcGlobe (as part of 3D Analyst):
- Memory/RAM: 512 MB minimum, 1 GB recommended
- CPU Speed: 1.5 GHz recommended or higher
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environments for use with ArcGIS Desktop
and the ArcGIS Desktop Developer Kit:**
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Visual Basic for Applications
Visual Basic 6 SP3 or later
Visual C++ 6 SP3 or later

Visual C++ (Visual Studio .Net 2003)

-.Net
C# (Visual Studio .Net 2003 with .NET Framework 1.1 or 1.1 Service Pack 1)
VB.Net (Visual Studio .Net 2003 with .NET Framework 1.1 or 1.1 Service Pack 1)

Printer Support:
ArcGIS supports printing to any Microsoft certified Windows printer using the native driver in ArcGIS. Please note that some printer drivers do not support complex maps and the ArcPress printer driver or additional hardware may be needed for these complex maps.

ESRI recommends the following configuration when printing large maps with the ArcPress printer drivers:
- Pagefile system size of 4096 MB is recommended. ArcPress depends on being able to acquire potentially large contiguous blocks of memory to process a map. The windows limit is 2048 MB and by having a pagefile.sys file of at least twice that size helps ensure that other applications running and using the pagefile system will not introduce an unexpected limit for the ArcPress printer driver.
- Pagefile system should be stored on a dedicated partition or, if possible, a dedicated drive. This will prevent the file from becoming fragmented and diminishing ArcPress's ability to acquire contiguous blocks of memory.
- If large complex maps do not print, then reboot the computer to ensure the pagefile system is cleared. If the pagefile system is not a dedicated drive or partition, make sure that drive does not need to be defragmented.
- Disk Space: at lease 10 GB of space is free on the drive where %TEMP% is located, as potentially large temporary files will be written there while ArcPress is processing a map for printing.

System Design Strategies
Recommended platform sizing and system configuration strategies are provided in the System Design Strategies technical reference document available at: System Design Strategies.

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▣ ArcView 9.1 on PC-Intel Windows 2003 Server Terminal Services

Product: ArcView 9.1

Platform: PC-Intel

Operating System: Windows 2003 Server Terminal Services

Service Packs/Patches: Limitations (refer to Limitations)

Shipping/Release Date: May 18, 2005

Hardware Requirements

CPU Speed:

   1.0 GHz recommended or higher

Processor:

   Intel Pentium or Intel Xeon Processors

Memory/RAM:

   512 MB minimum; additional 256 MB per client instance recommended or higher.

Display Color:

   Thin Client Greater than 256 color depth

Swap Space:

   Determined by operating system.

Disk Space:

   Typical 765 MB NTFS, Complete 1040 MB NTFS

Disk Space Requirements:

   In addition, up to 50 MB of disk space maybe needed in the Windows System directory(typically C:\Windows\System32). You can view the disk space requirement for each of the 9.1 components in the Setup program.

Notes:

Internet Explorer 6.0 Requirement:
Some features of ArcView 9.1 require a minimum installation of Microsoft Internet Explorer Version 6.0. If you do not have an installation of Microsoft Internet Explorer Version 6.0 or higher, you must obtain and install it prior to installing ArcEditor.

Python Requirement for Geoprocessing:
ArcGIS Desktop geoprocessing tools require that Python and the Python Win32 extension are installed. If the ArcGIS Desktop setup does not find Python on the target computer, it will install Python 2.1 and Win32all-151 extension during a typical or complete installation. You may choose a Custom installation to unselect the Python feature to avoid installing these features. See the install guide for additional information concerning Python.

License Manager Requirements:
- Simple TCP/IP, Network Card or Microsoft Loopback Adapter.
- The License Manager is supported on Windows Server 2003. Refer to ESRI Knowledge Base Article FAQ: Is the License Manager supported on Windows Server 2003? for more information.

Installation of Sentinel System Driver v7.0 from http://www.safenet-inc.com/support/tech/sentinel.asp is required.

Additional Requirements for ArcGlobe (as part of 3D Analyst):
- Memory/RAM: 512 MB minimum, 1 GB recommended
- CPU Speed: 1.5 GHz recommended or higher
- Disk Space: ArcGlobe will create cache files when used, additional disk space may be required for this and any other data used in ArcGlobe.
- Video Card: An OpenGL 1.1 or above compliant video card is required, with at least 32 MB of video memory, however 64 MB of video memory is recommended or higher.

ESRI supports and recommends the following integrated development environments for use with ArcGIS Desktop and the ArcGIS Desktop Developer Kit:
- COM
Visual Basic for Applications
Visual Basic 6 SP3 or later

Visual C++ 6 SP3 or later
Visual C++ (Visual Studio .Net 2003)

-.Net
C# (Visual Studio .Net 2003 with .NET Framework 1.1 or 1.1 Service Pack 1)
VB.Net (Visual Studio .Net 2003 with .NET Framework 1.1 or 1.1 Service Pack 1)

Printer Support:
ArcGIS supports printing to any Microsoft certified Windows printer using the native driver in ArcGIS. Please note that some printer drivers do not support complex maps and the ArcPress printer driver or additional hardware may be needed for these complex maps.

ESRI recommends the following configuration when printing large maps with the ArcPress printer drivers:
- Pagefile system size of 4096 MB is recommended. ArcPress depends on being able to acquire potentially large contiguous blocks of memory to process a map. The windows limit is 2048 MB and by having a pagefile.sys file of at least twice that size helps ensure that other applications running and using the pagefile system will not introduce an unexpected limit for the ArcPress printer driver.
- Pagefile system should be stored on a dedicated partition or, if possible, a dedicated drive. This will prevent the file from becoming fragmented and diminishing ArcPress's ability to acquire contiguous blocks of memory.
- If large complex maps do not print, then reboot the computer to ensure the pagefile system is cleared. If the pagefile system is not a dedicated drive or partition, make sure that drive does not need to be defragmented.
- Disk Space: at lease 10 GB of space is free on the drive where %TEMP% is located, as potentially large temporary files will be written there while ArcPress is processing a map for printing.

System Design Strategies
Recommended platform sizing and system configuration strategies are provided in the System Design Strategies technical reference document available at: System Design Strategies.

Limitations

Platform: Terminal Services Configuration: ArcView Single Use 9.1 on Windows Server 2003 Terminal Services is certified with limitations. - Refer to ESRI Knowledge Base Article FAQ: Support for Windows Terminal Server (WTS) and Citrix MetaFrame for details.

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ArcView 9.1 on PC-Intel Windows XP Home Edition

Product: ArcView 9.1

Platform: PC-Intel

Operating System: Windows XP Home Edition

Service Packs/Patches: SP 1, SP 2 (See Limitations)

Shipping/Release Date: May 18, 2005

Hardware Requirements

CPU Speed:

   1.0 GHz recommended or higher

Processor:

   Intel Pentium or Intel Xeon Processors

Memory/RAM:

   512 MB minimum, 1 GB recommended or higher

Display Color:

   Greater than 256 color depth

Swap Space:

   300 MB minimum

Disk Space:

   Typical 765 MB NTFS, Complete 1040 MB NTFS

Disk Space Requirements:

   In addition, up to 50 MB of disk space maybe needed in the Windows System
   directory (typically C:\Windows\System32). You can view the disk space
   requirement for each of the 9.1 components in the Setup program.

Notes:

Internet Explorer 6.0 Requirement:
Some features of ArcView 9.1 require a minimum installation of Microsoft Internet Explorer Version 6.0. If you do not have an installation of Microsoft Internet Explorer Version 6.0 or higher, you must obtain and install it prior to installing ArcEditor.

Python Requirement for Geoprocessing:
ArcGIS Desktop geoprocessing tools require that Python and the Python Win32 extension are installed. If the ArcGIS Desktop setup does not find Python on the target computer, it will install Python 2.1 and Win32all-151 extension during a typical or complete installation. You may choose a Custom installation to unselect the Python feature to avoid installing these features. See the install guide for additional information concerning Python.

License Manager Requirements:
- Simple TCP/IP, Network Card or Microsoft Loopback Adapter.
- The License Manager is supported on Windows Server 2003. Refer to ESRI Knowledge Base Article FAQ: Is the License Manager supported on Windows Server 2003? for more information.

Installation of Sentinel System Driver v7.0 from http://www.safenet-inc.com/support/tech/sentinel.asp is required.

Additional Requirements for ArcGlobe (as part of 3D Analyst):
- Memory/RAM: 512 MB minimum, 1 GB recommended
- CPU Speed: 1.5 GHz recommended or higher
- Disk Space: ArcGlobe will create cache files when used, additional disk space may be required for this and any other data used in ArcGlobe.
- Video Card: An OpenGL 1.1 or above compliant video card is required, with at least 32 MB of video memory, however 64 MB of video memory is recommended or higher.

ESRI supports and recommends the following integrated development environments for use with ArcGIS Desktop
and the ArcGIS Desktop Developer Kit:
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Visual Basic for Applications
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Visual C++ 6 SP3 or later

Visual C++ (Visual Studio .Net 2003)

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Printer Support:
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- If large complex maps do not print, then reboot the computer to ensure the pagefile system is cleared. If the pagefile system is not a dedicated drive or partition, make sure that drive does not need to be defragmented.
- Disk Space: at lease 10 GB of space is free on the drive where %TEMP% is located, as potentially large temporary files will be written there while ArcPress is processing a map for printing.

System Design Strategies
Recommended platform sizing and system configuration strategies are provided in the System Design Strategies technical reference document available at: System Design Strategies.

Limitations

Platform: ArcView 9.1 on Windows XP Service Pack 2 is certified with

limitations.
Refer to ESRI Knowledge Base Article FAQ: Windows XP SP2 and ArcGIS 9.1 Products for details.

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Town of Sudbury I-Net

Legend

- **ᴊ** Flynn Building
- **ⁿ** Public Schools
- **ᶜ** Water District
- **#** Other Town Buildings

Connection Speeds

- --- 100 MB
- — 1GB
- — 2GB
- Town Boundary
- Water Bodies
- Rivers and Streams
- Pavement Edges

μ

Locus Map

BOXBOROUGH, HARVARD, ACTON, BEDFORD, CONCORD, LEXINGTON, BOLTON, STOW, MAYNARD, LINCOLN, SUDBURY, WAYLAND, WALTHAM, MARLBOROUGH, FRAMINGHAM, WESTON, WELLESLEY, NEWTON, SOUTHBOROUGH, NATICK, NEEDHAM, WESTBOROUGH, ASHLAND
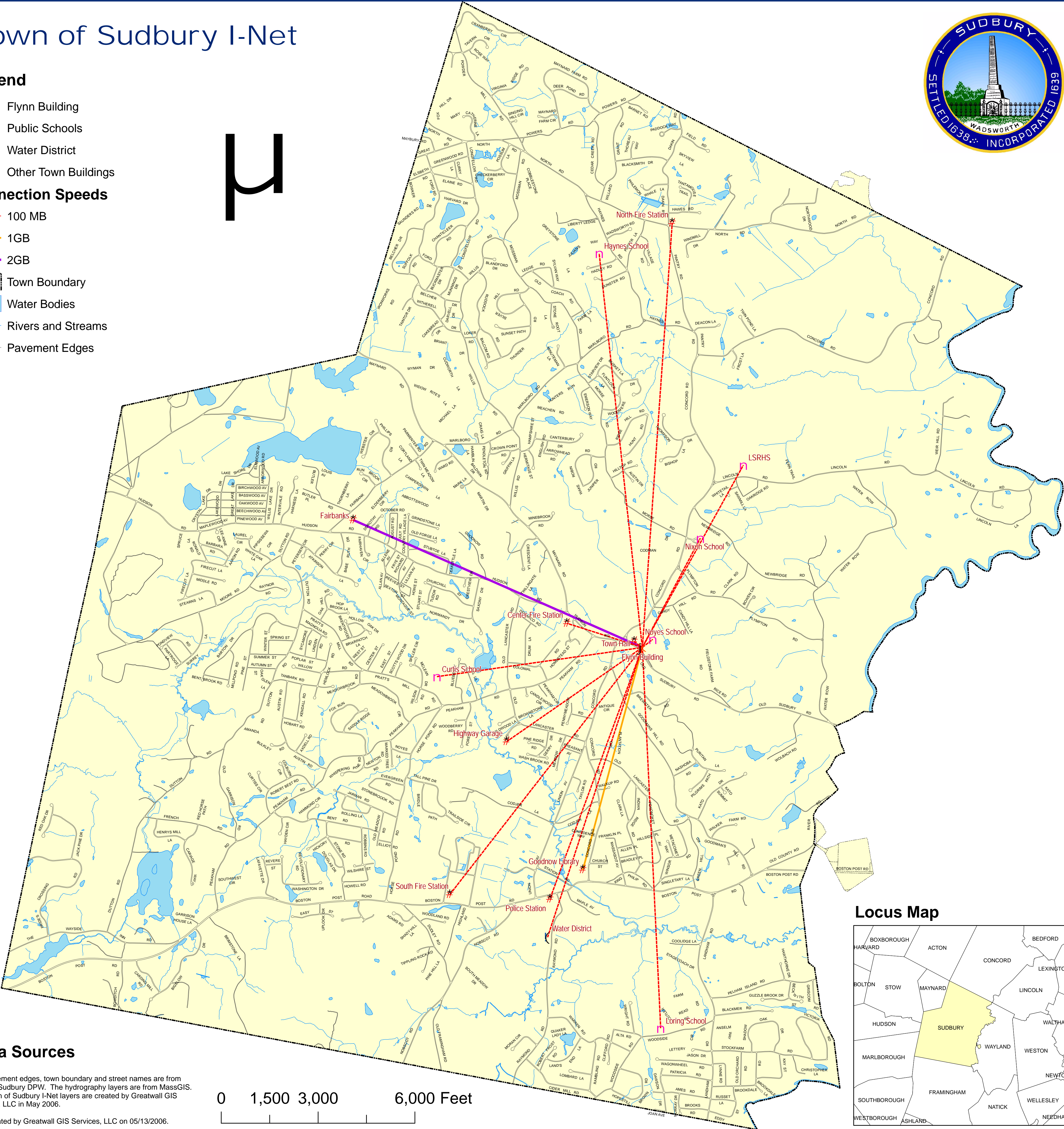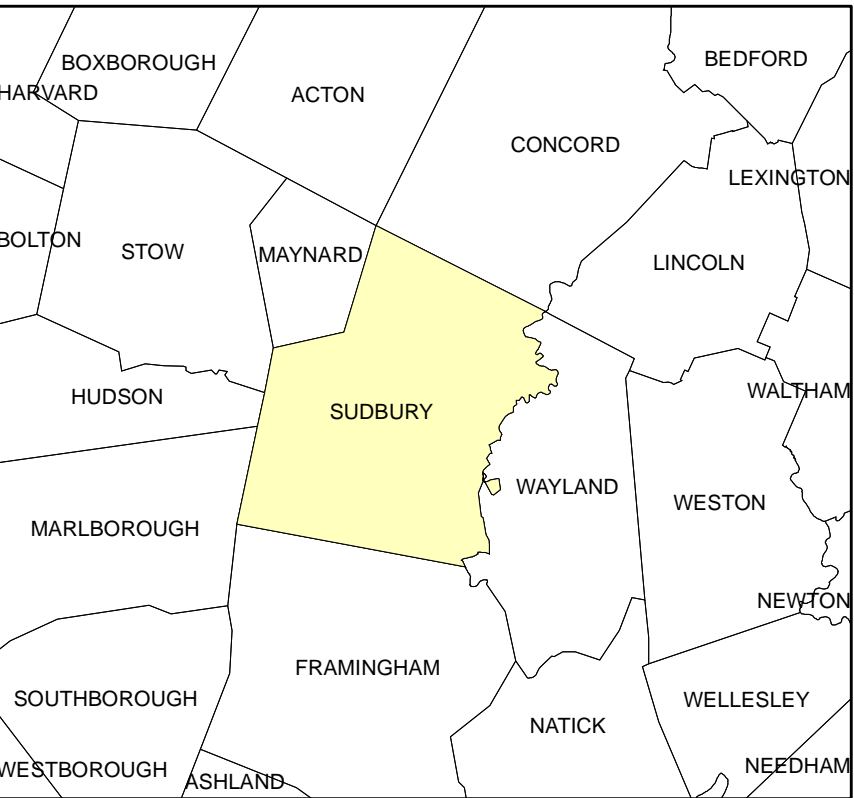
Data Sources

The pavement edges, town boundary and street names are from Town of Sudbury DPW. The hydrography layers are from MassGIS. The Town of Sudbury I-Net layers are created by Greatwall GIS Services, LLC in May 2006.

Map created by Greatwall GIS Services, LLC on 05/13/2006.

0   1,500 3,000   6,000 Feet

Labeled locations: North Fire Station, Haynes School, LSRHS, Fairbanks, Nixon School, Center Fire Station, Noyes School, Town Hall, Flynn Building, Curtis School, Highway Garage, Goodnow Library, South Fire Station, Police Station, Water District, Loring School

Inventory of Town Computers by Department

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name

Sudbury Public Schools

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	Central Office	Sudbury	CPU Pentium PC/ Pentium IV/2400Mhz, 256MB/60GB, w/40X 10/100MB	Dell	Dimensio	55X3321	Holmes, Marilyn
A	Central Office	Sudbury	CPU Pentium PC/ Pentium IV/2400Mhz, 256MB/40GB, w/ 10/100MB	Dell	DHM	CV29R11	Natale, Jean
A	Central Office	Sudbury	CPU Pentium PC/ Pentium IV/3000Mhz, 512MB/30GB, w/40X 10/100/1000MB	Dell	Dimensio	6K5ZM51	Stageman, Ginny
A	Central Office	Sudbury	CPU Pentium PC/ Pentium IV/3200Mhz, 64MB/6GB, w/40X 10/100MB Zip	PC	Clone	New4131	Storlazzi, Ken
A	Central Office	Sudbury	CPU Laptop PC/ Pentium IV Processor, 512MB/60GB, w/CDRW / DVD Combo	Sony	Viao	New1025	Will, Mary

Building

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	DPW Building	Building	CPU Pentium PC/ Pentium IV/2200Mhz, 512MB/60GB, w/32x/12x/8x + 8x DVD	Multiwave	Clone	037470	Hepting, Jack
A	DPW Building	Building	CPU Laptop PC/ Centrino - Duo/2000Mhz, 1GB/100GB, w/DVD±RW 10/100MB	Sony	VGN-S58	R5129268	Kelly, James Laptop 01
A	DPW Building	Building	CPU Pentium PC/ Pentium IV/3200Mhz, 1000MB/120GB, w/DVD±RW Dual	Multiwave	Clone	765455	Plante, Kathy
A	DPW Building	Building	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	54749	Richard, Art

Conservation

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	DPW Building	Conservatio	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	041666	Dineen, Deborah
C	DPW Building	Conservatio	CPU Laptop PC/ Pentium III/1000Mhz, 384MB/60GB, w/DVD/CDRW 10/100MB	Sony	VAIO	283320303104046	Dineen, Deborah Laptop 01
A	DPW Building	Conservatio	CPU Pentium PC/ Pentium IV/1900Mhz, 512MB/60GB, w/32x/8x/4x + 8x DVD	Multiwave	Clone	33235	Shapiro, Faith

Engineering

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
D	DPW Building	Engineering	CPU Pentium PC/ Pentium II/300Mhz, 128MB/9.1GB, w/24X 10/100MB	PC	Clone	MCI019801111	Bourque, Dennis
A	DPW Building	Engineering	CPU Pentium PC/ Pentium IV/1800Mhz, 1GB/60GB, w/CDRW / DVD Combo	Multiwave	Clone	31932	Josephson, Paul
A	DPW Building	Engineering	CPU Pentium PC/ Pentium IV/3600Mhz, 2000MB/74GB, w/DVD±RW Dual	Multiwave	Clone	7389120	Kankanpaa, Bruce 01
A	DPW Building	Engineering	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	041668	Place, Bill
A	DPW Building	Engineering	CPU Pentium PC/ Pentium IV/2200Mhz, 512MB/60GB, w/32x/12x/8x + 8x DVD	Multiwave	Clone	037473	Schubert, Gretna

Health

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	DPW Building	Health	CPU Pentium PC/ Pentium IV/1400Mhz, 256MB/40GB, w/16X / 48X 10/100MB	Multiwave	Clone	33752	Kelly, Joe
A	DPW Building	Health	CPU Pentium PC/ Pentium IV/1900Mhz, 512MB/80GB, w/32x/8x/4x + 8x DVD	Multiwave	Clone	33222	Korman, Michele
A	DPW Building	Health	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	54753	Leupold, Bob
A	DPW Building	Health	CPU Laptop PC/ Pentium IV/2800Mhz, 512MB/80GB, w/DVD±RW	Toshiba	P25-S509	Z3012514C	Leupold, Bob Laptop 01

Highway

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	DPW Building	Highway	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	55372	Boland, Alison
A	DPW Building	Highway	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	041669	Butler, Krista
A	DPW Building	Highway	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	54750	Dacier, Nancy

Inventory of Town Computers by Department

CAT Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A DPW Building	Highway	CPU Laptop PC/ Pentium IV/2800Mhz, 512MB/40GB, w/CDRW / DVD Combo	Sony	VAIO	A2225XXV	Dacier, Nancy Laptop 01

Planning

CAT Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A DPW Building	Planning	CPU Laptop PC/ Pentium IV/3000Mhz, 1000MB/80GB, w/DVD±RW 10/100MB	Sony	VAIO	R4273988	Kablack, Jody Laptop 01
A DPW Building	Planning	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	55369	Lindstedt, Julie

Atkinson Pool

CAT Build	Dept	Description	Manuf	Model	Serial #	Staff Name
D Fairbank	Atkinson	CPU Laptop PC/ Celeron/233Mhz, 64MB/, w/20X 10/100MB 00-00-86-19-8A-0D	Compaq	Presario	1V98CLR7209L	Atkinson Pool Laptop 02
A Fairbank	Atkinson	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	041671	Atkinson Pool Office 01
A Fairbank	Atkinson	CPU Laptop PC/ Pentium IV/1700Mhz, 512MB/30GB, w/DVD/CDRW 10/100MB	Sony	VAIO	45859903000001	Atkinson Pool Office 02
A Fairbank	Atkinson	CPU Pentium PC/ Pentium IV/2200Mhz, 512MB/60GB, w/32x/12x/8x + 8x DVD	Multiwave	Clone	037477	Atkinson Pool Sign-In Desk 01
A Fairbank	Atkinson	CPU Laptop PC/ Pentium IV/2200Mhz, 512MB/30GB, w/DVD/CDRW 10/100MB	Sony	VAIO	R3353906	Goulding, Tim Laptop 01

Recreation

CAT Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A Fairbank	Recreation	CPU Laptop PC/ Pentium IV/2800Mhz, 512MB/40GB, w/24x/10x/24x CD-RW /	Dell	Inspiron	CN0W09401296146F4	Barnes, Lisa Laptop 01
A Fairbank	Recreation	CPU Laptop PC/ Pentium IV/2800Mhz, 512MB/40GB, w/24x/10x/24x CD-RW /	Dell	Inspiron	CN09U807129613CQ2	Bendel, Jessica 01
A Fairbank	Recreation	CPU Pentium PC/ Pentium IV/3200Mhz, 1000MB/120GB, w/DVD±RW Dual	Multiwave	Clone	765453	Coleman, Peter
A Fairbank	Recreation	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	041667	Donovan, Barbara
A Fairbank	Recreation	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	55376	Haberstroh, Patricia
A Fairbank	Recreation	CPU Laptop PC/ Pentium M/2000Mhz, 1GB/100GB, w/DVD±RW Dual	Sony	VGN-FS5	A22274ST	Mannone, Dennis Laptop 01
A Fairbank	Recreation	CPU Pentium PC/ Pentium IV/2300Mhz, 256MB/250GB, w/ 10/100MB		Clone	N60250144	Park & Recreation
A Fairbank	Recreation	CPU Pentium PC/ Pentium IV/3200Mhz, 1000MB/120GB, w/DVD±RW Dual	Multiwave	Clone	753499	Recreation Department
C Fairbank	Recreation	CPU Laptop PC/ Pentium III/650Mhz, 256MB/12GB, w/8XDVD 10MB	Sony	VAIO	283107313300583	Recreation Department 01
D Fairbank	Recreation	CPU Pentium PC/ Pentium II/350Mhz, 192MB/40GB, w/ 10/100MB	Dell	Optiplex	23187	Recreation Department 03

Fire

CAT Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A Fire Station	Fire	CPU Laptop PC/ Pentium IV/1600Mhz, 512MB/30GB, w/DVD/CDRW 10/100MB	Sony	VAIO	A2223ZU8	Carroll, Michael Laptop 01
A Fire Station	Fire	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	54745	Fire Captains 01
A Fire Station	Fire	CPU Laptop PC/ Pentium IV/2200Mhz, 512MB/30GB, w/DVD/CDRW 10/100MB	Sony	VAIO	A2224RK7	Fire Department Laptop 01
A Fire Station	Fire	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	55375	Fire Station Alarm Rm 01
A Fire Station	Fire	CPU Pentium PC/ Pentium IV/3000Mhz, 1000MB/80GB, w/48x/24x/48x + 16x	Multiwave	Shuttle	54262	Fire Station Dispatcher
A Fire Station	Fire	CPU Pentium PC/ Pentium IV/1500Mhz, 512MB/40GB, w/CDRW / DVD Combo	Multiwave	Clone	31527	Fire Station Mail Room 01
A Fire Station	Fire	CPU Pentium PC/ Pentium IV/2000Mhz, 512MB/60GB, w/48/24/48X	Gateway	E-4000	0029065959	Fire Station Training
A Fire Station	Fire	CPU Pentium PC/ Pentium IV/3200Mhz, 1000MB/120GB, w/DVD±RW Dual	Multiwave	Clone	765452	Ford, Kerri
A Fire Station	Fire	CPU Laptop PC/ Pentium M/1900Mhz, 1GB/100GB, w/DVD±RW Dual	Sony	VGN-FJ1	282402353600297	MacLean, Kenneth Laptop 01

Inventory of Town Computers by Department

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
E	Fire Station	Fire	CPU Laptop PC/ Pentium/133Mhz, 16MB/4.0GB, w/ 10/100MB	Panasonic	CF-25DG	7EKSA02510	Salmi, John Laptop 01

Fire

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	Fire Station Rte	Fire	CPU Pentium PC/ Pentium IV/1500Mhz, 512MB/40GB, w/CDRW / DVD Combo	Multiwave	Clone	31531	Fire Station Rte 117 01

Fire

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	Fire Station Rte 20	Fire	CPU Pentium PC/ Pentium IV/2200Mhz, 512MB/60GB, w/32x/12x/8x + 8x DVD	Multiwave	Clone	037479	Fire Station Rte 20

Accounting

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	Flynn Building	Accounting	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	54751	Chisholm, Barbara
A	Flynn Building	Accounting	CPU Laptop PC/ Pentium M/2000Mhz, 1GB/80GB, w/DVD±RW 10/100MB	Sony	VGN-S58	A2227MJ4	Petersen, Sue Laptop 01
A	Flynn Building	Accounting	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	041674	Porcella, Robin
A	Flynn Building	Accounting	CPU Pentium PC/ Pentium IV/2200Mhz, 512MB/80GB, w/32x/12x/8x + 8x DVD	Multiwave	Clone	037471	Reiman, Marilyn

Assessors

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
C	Flynn Building	Assessors	CPU Laptop PC/ Pentium III/650Mhz, 256MB/12GB, w/8XDVD 10MB	Sony	VAIO	283107313300437	Assessor Backroom Laptop 01
D	Flynn Building	Assessors	CPU Pentium PC/ Pentium II/400Mhz, 256MB/9.1GB, w/ 10/100MB Jaz 1GB	Dell	Precision	FPNJ9	Counter Assessors
A	Flynn Building	Assessors	CPU Pentium PC/ Pentium IV/3200Mhz, 1000MB/120GB, w/DVD±RW Dual	Multiwave	Clone	765454	Gerry, Cynthia
A	Flynn Building	Assessors	CPU Laptop PC/ Centrino - Duo/2000Mhz, 1GB/120GB, w/DVD±RW Dual	Sony	VGN-SZ1	R5123544	Hafner, Maureen Laptop 01
A	Flynn Building	Assessors	CPU Laptop PC/ Pentium IV/2800Mhz, 1000MB/60GB, w/CDRW / DVD Combo	Sony	VAIO	10797148	Hafner, Maureen Laptop 01
A	Flynn Building	Assessors	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	041673	Irish, John
A	Flynn Building	Assessors	CPU Pentium PC/ Pentium IV/2200Mhz, 512MB/60GB, w/32x/12x/8x + 8x DVD	Multiwave	Clone	037476	Taranto, Elaine
A	Flynn Building	Assessors	CPU Pentium PC/ Pentium IV/2000Mhz, 512MB/60GB, w/32x/8x/4x + 8x DVD	Multiwave	Clone	036521	Tucker, Dave

Budget and Personnel

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	Flynn Building	Budget and	CPU Pentium PC/ Pentium IV/3200Mhz, 1000MB/120GB, w/DVD±RW Dual	Multiwave	Clone	765451	Greeno, Debbie
A	Flynn Building	Budget and	CPU Pentium PC/ Pentium IV/1400Mhz, 128MB/30GB, w/16X / 48X 10/100MB	Multiwave	Clone	34648	Personnel Department 01
A	Flynn Building	Budget and	CPU Pentium PC/ Pentium IV/1900Mhz, 512MB/60GB, w/32x/8x/4x + 8x DVD	Multiwave	Clone	33227	Walker, Wayne

Building

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
D	Flynn Building	Building	CPU Pentium PC/ Pentium II/450Mhz, 512MB/8GB, w/ 10/100MB Zip 100MB	Dell	Precision	02KC5	Jodrey, Larry

Health

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	Flynn Building	Health	CPU Laptop PC/ Pentium IV/2800Mhz, 512MB/80GB, w/DVD±RW	Toshiba	P25-S509	Z3015729C	Lynn, Martha

Inventory of Town Computers by Department

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name

Information Systems

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
C	Flynn Building	Information	CPU Pentium PC/ Pentium III/550Mhz, 128MB/12GB, w/DVD 10/100MB	Multiwave	Clone	023800	Computer Training Lab 01
C	Flynn Building	Information	CPU Pentium PC/ Pentium III/550Mhz, 128MB/10.8GB, w/5XDVD 10/100MB	Multiwave	Clone	020404	Computer Training Lab 02
D	Flynn Building	Information	CPU Pentium PC/ Pentium II/266Mhz, 128MB/20.5GB, w/24X 10/100MB	PC	Clone	MCI019801230	Computer Training Lab 04
C	Flynn Building	Information	CPU Pentium PC/ Pentium III/500Mhz, 128MB/10.8GB, w/5XDVD 10/100MB	Multiwave	Clone	019839	Computer Training Lab 05
D	Flynn Building	Information	CPU Pentium PC/ Pentium II/300Mhz, 128MB/6GB, w/24X 10/100MB	PC	Clone	MCI019801229	Computer Training Lab 06
C	Flynn Building	Information	CPU Pentium PC/ Pentium III/500Mhz, 128MB/10.8GB, w/XDVD 10/100MB	Multiwave	Clone	020400	Computer Training Lab 07
D	Flynn Building	Information	CPU Pentium PC/ Pentium II/266Mhz, 64MB/10GB, w/24X 10/100MB	PC	Clone	MCI019802001	Computer Training Lab 08
D	Flynn Building	Information	CPU Pentium PC/ Pentium II/300Mhz, 128MB/6GB, w/24X 10/100MB	PC	Clone	MCI019802004	Computer Training Lab 09
C	Flynn Building	Information	CPU Pentium PC/ Pentium III/500Mhz, 128MB/10.8GB, w/5XDVD 10/100MB	Multiwave	Clone	020403	Computer Training Lab 10
D	Flynn Building	Information	CPU Pentium PC/ Pentium II/300Mhz, 128MB/6GB, w/24X 10/100MB	PC	Clone	MCI019803026	Computer Training Lab 11
C	Flynn Building	Information	CPU Pentium PC/ Pentium III/650Mhz, 128MB/12.6, w/DVD 10X 10/100MB	Multiwave	Clone	26454	Computer Training Lab 12
D	Flynn Building	Information	CPU Pentium PC/ Pentium II/450Mhz, 128MB/8GB, w/ 10/100MB	Dell	Precision	03KCM	Computer Training Lab 13
C	Flynn Building	Information	CPU Laptop PC/ Pentium III/750Mhz, 128MB/18.1GB, w/8XDVD 10MB	Sony	VAIO	283106313100888	Computer Training Lab Teacher
A	Flynn Building	Information	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/60GB, w/48x/24x/48x + 16x	PC	Clone	MCI019802010	Floater 01
A	Flynn Building	Information	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/60GB, w/48x/24x/48x + 16x	PC	Clone	MCI019807199	Information System Meeting Rm
C	Flynn Building	Information	CPU Pentium PC/ Pentium III/500Mhz, 128MB/10.8GB, w/XDVD 10/100MB	Multiwave	Clone	020401	Information System Storage Rm 01
A	Flynn Building	Information	CPU Pentium PC/ Pentium IV/2800Mhz, 1024MB/200GB, w/48x/24x/48x + 16x	Multiwave	Clone	New3553	Information Systems 01
E	Flynn Building	Information	CPU Power Macintosh 5260/100/ 603/100Mhz, 32MB/, w/	Apple	M3046	S05426TV6LC	Lunch Rm - Flynn 01
A	Flynn Building	Information	CPU Pentium PC/ Pentium IV/2200Mhz, 512MB/60GB, w/32x/12x/8x + 8x DVD	Multiwave	Clone	037478	Powell, Brian
A	Flynn Building	Information	CPU Pentium PC/ Pentium IV/3200Mhz, 1000MB/200GB, w/DVD±RW 12X+R,	Multiwave	Clone	New4066	Powell, Brian
C	Flynn Building	Information	CPU Laptop PC/ Pentium III/650Mhz, 256MB/12GB, w/8XDVD 10MB	Sony	VAIO	283107313300067	Powell, Brian Laptop 01
A	Flynn Building	Information	CPU Pentium PC/ Pentium IV/3200Mhz, 1000MB/200GB, w/DVD±RW 12X+R,	Multiwave	Clone	New4065	Thompson, Mark W. 01
A	Flynn Building	Information	CPU Pentium PC/ Pentium IV/1700Mhz, 512MB/40GB, w/CDRW / DVD Combo	Multiwave	Clone	31526	Thompson, Mark W. 02
A	Flynn Building	Information	CPU Laptop PC/ Pentium IV/3000Mhz, 1000MB/80GB, w/DVD±RW 10/100MB	Sony	VAIO	R4298148	Thompson, Mark W. Laptop 01

Law

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	Flynn Building	Law	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	55370	Jones, Elaine
A	Flynn Building	Law	CPU Pentium PC/ Pentium IV/1900Mhz, 512MB/60GB, w/32x/8x/4x + 8x DVD	Multiwave	Clone	33223	Kenny, Paul

Selectmen

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	Flynn Building	Selectmen	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	041672	Daniels, Mary
A	Flynn Building	Selectmen	CPU Pentium PC/ Pentium IV/3200Mhz, 1000MB/120GB, w/DVD±RW Dual	Multiwave	Clone	753500	Harvell, Rosemary
A	Flynn Building	Selectmen	CPU Pentium PC/ Pentium IV/2200Mhz, 512MB/60GB, w/32x/12x/8x + 8x DVD	Multiwave	Clone	037472	Selectmen 01

Inventory of Town Computers by Department

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
	Town Manager						
A	Flynn Building	Town	CPU Laptop PC/ Pentium M/2000Mhz, 1GB/80GB, w/DVD±RW 10/100MB	Sony	VGN-S27	R4731794	Valente, Maureen Laptop 01
	Treasurer / Collector						
A	Flynn Building	Treasurer /	CPU Pentium PC/ Pentium IV/1900Mhz, 512MB/60GB, w/32x/8x/4x + 8x DVD	Multiwave	Clone	33226	Albertini, Sharon
A	Flynn Building	Treasurer /	CPU Pentium PC/ Pentium IV/2200Mhz, 512MB/60GB, w/32x/12x/8x + 8x DVD	Multiwave	Clone	037475	Anderson, Peter
A	Flynn Building	Treasurer /	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	55374	Connor, Melinda
A	Flynn Building	Treasurer /	CPU Pentium PC/ Pentium IV/1500Mhz, 512MB/40GB, w/CDRW / DVD Combo	Multiwave	Clone	31530	Kriger, Jeanne
A	Flynn Building	Treasurer /	CPU Laptop PC/ Pentium IV/2200Mhz, 512MB/30GB, w/DVD/CDRW 10/100MB	Sony	VAIO	R3330134	Terkelsen, Andrea Laptop 01
A	Flynn Building	Treasurer /	CPU Pentium PC/ Pentium IV/3200Mhz, 1000MB/80GB, w/24x/10x/24x CD-RW	Dell	GX270	F46KW41	Treasurer / Tax Collector 01
	Library						
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	041663	Mosher, Betsy
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	54748	Pellegrini, Debbie
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/450Mhz, 128MB/6GB, w/DVD 10/100MB	PC	Clone	MCI019804005	Public - AV 01
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/450Mhz, 128MB/6GB, w/DVD 10/100MB	PC	Clone	MCI019804007	Public - AV 02
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/450Mhz, 128MB/6GB, w/DVD 10/100MB	PC	Clone	MCI019804001	Public - AV 03
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/450Mhz, 128MB/6GB, w/40X 10/100MB	PC	Clone	MCI019804008	Public - AV 04
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/450Mhz, 128MB/6GB, w/40X 10/100MB	PC	Clone	MCI019804010	Public - Children 01
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/450Mhz, 128MB/6GB, w/40X 10/100MB	PC	Clone	MCI019804014	Public - Children 02
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/450Mhz, 128MB/6GB, w/40X 10/100MB	PC	Clone	MCI019804012	Public - Children 03
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/500Mhz, 128MB/10.8GB, w/5XDVD 10/100MB	Multiwave	Clone	020406	Public - Children 04
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/450Mhz, 128MB/6GB, w/DVD 10/100MB	PC	Clone	MCI019804004	Public - Children 05
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/450Mhz, 128MB/6GB, w/40X 10/100MB	PC	Clone	MCI019804013	Public - Children 06
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/500Mhz, 128MB/10.8GB, w/5XDVD 10/100MB	Multiwave	Clone	020631	Public - Children 07
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/450Mhz, 128MB/6GB, w/40X 10/100MB	PC	Clone	MCI019804009	Public - Circulation 01
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/650Mhz, 128MB/13.6, w/DVD 10X 10/100MB	Multiwave	Clone	26455	Public - Circulation 02
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/32x/10x/40x + 16x	Multiwave	Clone	044836	Public - Lab 01
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/32x/10x/40x + 16x	Multiwave	Clone	044841	Public - Lab 02
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/32x/10x/40x + 16x	Multiwave	Clone	044839	Public - Lab 03
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/32x/10x/40x + 16x	Multiwave	Clone	044837	Public - Lab 04
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/500Mhz, 128MB/10.8GB, w/5XDVD 10/100MB	Multiwave	Clone	020394	Public - Reference 01
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/450Mhz, 128MB/6GB, w/40X 10/100MB	PC	Clone	MCI019804011	Public - Reference 02
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/800Mhz, 128MB/10GB, w/DVD 12x 10/100MB	PC	Clone	MCI019804006	Public - Reference 03
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/700Mhz, 128MB/80GB, w/DVD 10X 10/100MB	Multiwave	Clone	26809	Public - Reference 04

Inventory of Town Computers by Department

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/450Mhz, 128MB/6GB, w/DVD 10/100MB	PC	Clone	MCI019804002	Public - Reference 05
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/450Mhz, 128MB/6GB, w/DVD 10/100MB	PC	Clone	MCI019804003	Public - Reference 06
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/700Mhz, 128MB/12.6, w/DVD 10X 10/100MB	Multiwave	Clone	26781	Public - Reference 07
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/500Mhz, 128MB/10.8GB, w/5XDVD 10/100MB	Multiwave	Clone	020398	Public - Reference 08
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/500Mhz, 128MB/10.8GB, w/5XDVD 10/100MB	Multiwave	Clone	020405	Public - Reference 09
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/3200Mhz, 1000MB/120GB, w/DVD±RW Dual	Multiwave	Clone	753498	Roughsedge, Anna
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/2400Mhz, 512MB/80GB, w/32x/12x/8x + 8x DVD	Multiwave	Clone	038352	Staff - Childrens Desk 01
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/32x/10x/40x + 16x	Multiwave	Clone	044842	Staff - Childrens Desk 02
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/1400Mhz, 128MB/40GB, w/16X / 48X 10/100MB	Multiwave	Clone	35336	Staff - Childrens Office 02
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/32x/10x/40x + 16x	Multiwave	Clone	044840	Staff - Circulation Desk 01
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/2400Mhz, 512MB/80GB, w/32x/12x/8x + 8x DVD	Multiwave	Clone	038353	Staff - Circulation Desk 02
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/1400Mhz, 128MB/40GB, w/16X / 48X 10/100MB	Multiwave	Clone	35335	Staff - Circulation Office 01
C	Goodnow Library	Library	CPU Laptop PC/ Pentium III/600Mhz, 256MB/12GB, w/4XDVD 10/100MB	Sony	VAIO	283066303200827	Staff Laptop 01
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/2400Mhz, 512MB/80GB, w/32x/12x/8x + 8x DVD	Multiwave	Clone	038351	Staff - Reference Desk 01
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	041664	Staff - Reference Office Desk 01
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	041662	Staff - Reference Office Desk 02
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	55368	Staff - Tech Services 01
C	Goodnow Library	Library	CPU Pentium PC/ Pentium III/1000Mhz, 128MB/30GB, w/DVD 12X 10/100MB	Multiwave	Clone	30282	Staff - Tech Services 02
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/1400Mhz, 128MB/40GB, w/16X / 48X 10/100MB	Multiwave	Clone	35334	Staff - Tech Services 03
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/32x/10x/40x + 16x	Multiwave	Clone	044838	Staff - Tech Services 04
A	Goodnow Library	Library	CPU Laptop PC/ Pentium IV/2800Mhz, 512MB/60GB, w/DVD±RW 10/100MB	Sony	VAIO	R3877737	Talentino, Bill Laptop 01
A	Goodnow Library	Library	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	55371	Tobin, Karen

Highway

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
D	Highway / DPW	Highway	CPU Pentium PC/ Pentium II/450Mhz, 128MB/4.0GB, w/32X 10/100MB	PC	Clone	MCI019812058	Anderson, Kenneth
A	Highway / DPW	Highway	CPU Pentium PC/ Pentium IV/1500Mhz, 512MB/40GB, w/CDRW / DVD Combo	Multiwave	Clone	31533	Highway Office 01
C	Highway / DPW	Highway	CPU Pentium PC/ Pentium III/500Mhz, 128MB/10.8GB, w/5XDVD 10/100MB	Multiwave	Clone	019840	Lee, James
A	Highway / DPW	Highway	CPU Pentium PC/ Pentium IV/2200Mhz, 512MB/60GB, w/32x/12x/8x + 8x DVD	Multiwave	Clone	037474	Taylor, Scott

Board of Appeals

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	Home	Board of	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	55373	Corley, Mary

Police

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
C	Home	Police	CPU Laptop PC/ Pentium III/850Mhz, 256MB/15GB, w/DVD/CDRW 10/100MB	Sony	VAIO	18563043000007	Fadgen, Peter Laptop 01

Inventory of Town Computers by Department

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name

Historical Commission

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
C	Hosmer House	Historical	CPU Pentium PC/ Pentium III/550Mhz, 128MB/10.8GB, w/5XDVD 10/100MB	Multiwave	Clone	020390	Historical Commission

Sudbury Foundation

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
B	Loring Parsonage	Sudbury	CPU Power Macintosh/ G4/1000Mhz, 64MB/6GB, w/24X 10/100MB	Apple	IMAC	QP3071WCNHXFF12	Martino, Marilyn

Police

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	Police Station	Police	CPU Pentium PC/ Pentium IV/1500Mhz, 512MB/60GB, w/CDRW / DVD Combo	Multiwave	Clone	31528	Caspe, Mitchel
A	Police Station	Police	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	042075	Fadgen, Peter 01
A	Police Station	Police	CPU Pentium PC/ Pentium IV/3200Mhz, 1000MB/120GB, w/DVD±RW Dual	Multiwave	Clone	765457	Glavin, Richard 01
C	Police Station	Police	CPU Pentium PC/ Pentium III/500Mhz, 128MB/20.5GB, w/5XDVD 10/100MB	Multiwave	Clone	020399	Glavin, Richard 911
A	Police Station	Police	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	54747	Grady, Richard
A	Police Station	Police	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	54746	Greenwood, Carol Ann 01
A	Police Station	Police	CPU Pentium PC/ Pentium IV/1400Mhz, 128MB/60GB, w/16X / 48X 10/100MB	Multiwave	Clone	35348	Greenwood, Carol Ann 02
A	Police Station	Police	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	54744	Harris, John
A	Police Station	Police	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	54752	Maclean, Richard
A	Police Station	Police	CPU Laptop PC/ Pentium M/2000Mhz, 1GB/100GB, w/DVD±RW Dual	Sony	VGN-BX5	A2227SFC	Nix, Scott Laptop 01
A	Police Station	Police	CPU Pentium PC/ Pentium IV/1500Mhz, 512MB/40GB, w/CDRW / DVD Combo	Multiwave	Clone	31529	Police Booking Rm
C	Police Station	Police	CPU Laptop PC/ Pentium III/500Mhz, 192MB/10.1GB, w/	Panasonic	CF-27	1FKYA03757	Police Cruiser #3
C	Police Station	Police	CPU Laptop PC/ Pentium III/500Mhz, 192MB/10.1GB, w/	Panasonic	CF-27	1FKYA03424	Police Cruiser #4
C	Police Station	Police	CPU Laptop PC/ Pentium III/500Mhz, 192MB/10.1GB, w/	Panasonic	CF-27	1FKYA03778	Police Cruiser #5
C	Police Station	Police	CPU Laptop PC/ Pentium III/500Mhz, 192MB/10.1GB, w/	Panasonic	CF-27	1FKYA03527	Police Cruiser #6
A	Police Station	Police	CPU Pentium PC/ Pentium IV/3000Mhz, 1000MB/80GB, w/48x/24x/48x + 16x	Multiwave	Shuttle	54263	Police Dispatcher 01
A	Police Station	Police	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	042076	Police Report Room 01
A	Police Station	Police	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	042150	Police Sergeant
C	Police Station	Police	CPU Pentium PC/ Pentium III/500Mhz, 128MB/10.8GB, w/5XDVD 10/100MB	Multiwave	Clone	020392	Police, Server Rm
A	Police Station	Police	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	042077	Police, Server Rm 01
A	Police Station	Police	CPU Pentium PC/ Pentium IV/1700Mhz, 512MB/40GB, w/CDRW / DVD Combo	Multiwave	Clone	31534	Terkelsen, Pat

Senior Center

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
C	Senior Center	Senior	CPU Pentium PC/ Pentium III/866Mhz, 128MB/60GB, w/DVD 10X 10/100MB	Multiwave	Clone	29768	COA Training Lab 01
C	Senior Center	Senior	CPU Pentium PC/ Pentium III/500Mhz, 128MB/10.8GB, w/5XDVD 10/100MB	Multiwave	Clone	020499	COA Training Lab 02
A	Senior Center	Senior	CPU Pentium PC/ Pentium IV/3200Mhz, 1000MB/80GB, w/24x/10x/24x CD-RW	Dell	SX280	DWYS761	Counter Senior Center 01
A	Senior Center	Senior	CPU Pentium PC/ Pentium IV/1900Mhz, 512MB/60GB, w/32x/8x/4x + 8x DVD	Multiwave	Clone	33225	Galloway, Deborah
A	Senior Center	Senior	CPU Laptop PC/ Pentium IV/2000Mhz, 512MB/30GB, w/DVD/CDRW 10/100MB	Sony	VAIO	STA2224AZE	Kiesel, Kristin Laptop 01

Inventory of Town Computers by Department

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	Senior Center	Senior	CPU Pentium PC/ Pentium IV/3200Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	55067	Wigandt, Claire

Town Clerk

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	Town Hall	Town Clerk	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	041665	Arleo, Anne
A	Town Hall	Town Clerk	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/120GB, w/48x/24x/48x + 16x	Multiwave	Clone	041670	Fortney, Elaine
A	Town Hall	Town Clerk	CPU Pentium PC/ Pentium IV/3200Mhz, 1000MB/120GB, w/DVD±RW Dual	Multiwave	Clone	765456	Newton, Judith
A	Town Hall	Town Clerk	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	042074	Oldroyd, Dorothy
A	Town Hall	Town Clerk	CPU Laptop PC/ Pentium IV/3000Mhz, 1000MB/80GB, w/DVD±RW 10/100MB	Sony	VAIO	R4273680	Siira, Barbara Laptop 01
D	Town Hall	Town Clerk	CPU Pentium PC/ Pentium II/333Mhz, 128MB/4.0GB, w/32X 10/100MB	PC	Clone	MCI019807204	Town Clerk Backroom 01

Veterans Agent

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
A	Town Hall	Veterans	CPU Pentium PC/ Pentium IV/1500Mhz, 512MB/40GB, w/CDRW / DVD Combo	Multiwave	Clone	31532	Harvell, Peter

Inventory of Town Servers by Building

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
	DPW Building						
S	DPW Building	Department	CPU Server Windows 2003/ Pentium IV Xeon/3000Mhz, 1GB/36.4GB (4),	COMPAQ	PROLIAN	D321LP94H006	DPW Telecom Rm Server 10
S	DPW Building	Department	CPU Pentium PC/ Pentium IV/2800Mhz, 1000MB/40GB, w/DVD±RW	Reverse911	Clone	DX314X00094	DPW Telecom Rm2 Reverse911
	Fairbank Community Center						
S	Fairbank	Recreation	CPU Server Windows 2003/ Pentium III Xeon/866Mhz, 512MB/18.2GB (3),	COMPAQ	PROLIAN	D024FFL1K212	Server 04
	Fire Station						
S	Fire Station	Fire	CPU Pentium PC/ Pentium III/500Mhz, 128MB/10.8GB, w/5XDVD 10/100MB	Multiwave	Clone	020395	Fire Station Main Network AutomatedTelephone
S	Fire Station	Fire	CPU Server Windows NT 4.0/ Pentium II/333Mhz, 64MB/4.3GB, w/16X	COMPAQ	PROLIAN	D848BX610233	Fire Station Server Rm Server 05
	Flynn Building						
S	Flynn Building	Information	CPU Server Windows NT 4.0/ Pentium II/333Mhz, /4GB, w/ 10/100MB	PC	Clone	MC9806058	Firewall Server
S	Flynn Building	Information	CPU Server Linux/ Pentium III/866Mhz, 256MB/20GB, w/ 10/100MB	Network	WebShiel	19413000068	Flynn Server Room Server WebShield
S	Flynn Building	Information	CPU Server SCO Unix/ Pentium II/333Mhz, 128MB/4.3GB, w/16X 10/100MB	COMPAQ	PROLIAN	D823BX610089	Information System Meeting Rm State CAMA
S	Flynn Building	Information	CPU Server Windows 2003/ Pentium IV Xeon/3000Mhz, 2GB/72.8GB (5),	COMPAQ	PROLIAN	USE524A397	Information Systems SQL Server
S	Flynn Building	Information	CPU Server Windows 2003/ Pentium IV/2200Mhz, 512MB/60GB, w/32x/12x/8x	Multiwave	Clone	037894	Information Systems TestWeb
S	Flynn Building	Information	CPU Server Windows 2003/ Pentium II/450Mhz, 256MB/9.1GB (3), w/24X	COMPAQ	PROLIAN	D926BVX2A143077	Server 02
S	Flynn Building	Information	CPU Server Windows 2000/ Pentium III Xeon/1000Mhz, 512MB/18.2GB (7),	COMPAQ	PROLIAN	D126FPY1K063	Server 03
S	Flynn Building	Information	CPU Server Windows 2000/ Pentium III Xeon/866Mhz, 512MB/18.2GB, w/24X	COMPAQ	PROLIAN	D028FFK1K039	Server 06
S	Flynn Building	Information	CPU Server Windows 2003/ Pentium IV Xeon/2400Mhz, 2GB/18.2GB (4),	COMPAQ	PROLIAN	D228JQ51D079	Server 07
S	Flynn Building	Information	CPU Server Alpha XP1000/ Alpha/466Mhz, 512MB/18.2GB, w/24X 10/100MB	COMPAQ	E2G60-E	AY02704062	Server Alpha
S	Flynn Building	Information	CPU Server Linux Unix/ Pentium III/650Mhz, 128MB/13GB, w/DVD 10/100MB	Multiwave	Clone	024423	Server DNS External
S	Flynn Building	Information	CPU Server Windows 2003/ Pentium IV Xeon/2400Mhz, 2GB/18.2GB (4),	COMPAQ	PROLIAN	D228JQ51D080	Server Exchange
S	Flynn Building	Information	CPU Server SCO Unix/ Pentium IV Xeon/2400Mhz, 2GB/18.2GB (4), w/40X	COMPAQ	PROLIAN	D233JQ31D191	Server MUNIS
S	Flynn Building	Information	CPU Pentium PC/ Pentium IV/2800Mhz, 512MB/80GB, w/48x/24x/48x + 16x	Multiwave	Clone	042073	WUG Server
	Goodnow Library						
S	Goodnow Library	Library	CPU Server Windows 2000/ Pentium II/450Mhz, 256MB/4.3GB, w/24X	COMPAQ	PROLIAN	D909BVX20143	Library Server 09
	Police Station						
S	Police Station	Police	CPU Server Mobile/ Pentium IV/3200Mhz, 1000MB/80GB, w/24x/10x/24x	Dell	GX280	F5JKG61	Police Dispatcher Mobile Server
S	Police Station	Police	CPU Server Windows 2000/ Pentium III Xeon/866Mhz, 128MB/9.1GB, w/24X	COMPAQ	PROLIAN	D025FFL1K051	Police Server 08
S	Police Station	Police	CPU Server Windows 2003/ Pentium IV Xeon/3000Mhz, 2GB/72.8GB (4),	COMPAQ	PROLIAN	D326LP94H075	Police Server Pamet
S	Police Station	Police	CPU Pentium PC/ Pentium II/266Mhz, 64MB/2.1GB, w/24X 10/100MB	PC	Clone	MCI019803025	Police, Server Rm Firewall

Inventory of Town Servers by Building

CAT	Build	Dept	Description	Manuf	Model	Serial #	Staff Name
S	Police Station	Police	CPU Pentium PC/ Pentium III/500Mhz, 128MB/10.8GB, w/5XDVD 10/100MB	Multiwave	Clone	020392	Police, Server Rm Server01
S	Police Station	Police	CPU Server VAX (MicroVAX-3100-40)/ , /1GB, w/	Digital	450ZM-89	KA420VMB59	Police Server Vax

Town Networked Copiers / Printers / Plotters that are capable of Printing 11 x 17 Documents

CAT Build	Dept	Description	Manuf	Model	Serial #	Staff Name
DPW Building		Copier - Networked, Fax, Scan (B & W)/ , 128MB/5.6GB, w/	Canon	IR3300	MP444164	DPW Mail Room 10.214

Engineering

DPW Building	Engineering	Printer Plotter/ , /, w/	Hewlett	DesignJet	SG040D1104V	Engineering Department
DPW Building	Engineering	Printer Plotter/ , /, w/ 10/100MB	Hewlett	DesignJet	SG21924023	Engineering Department

Recreation

Fairbank	Recreation	Copier - Networked, Fax, Scan (B & W)/ , /, w/	Canon	IR3300	MPH10105	Recreation Department

Accounting

Flynn Building	Accounting	Printer Network LaserJet 8000/ , /, w/ 10MB 00-60-B0-AB-E9-ED	Hewlett	C4085A	USBB008290	Accounting Department 3.96
Flynn Building	Accounting	Printer Network LaserJet 8150DN/ , 32MB/, w/ 10/100MB	Hewlett	C4267A	JPBLM61712	Accounting Department

Credit Union

Flynn Building	Credit	Printer Network LaserJet 8150DN/ , 160MB/, w/ 10/100MB	Hewlett	C4267A	JPBLLG5820	Credit Union 11.200

Information Systems

Flynn Building	Information	Copier - Networked, Scan (B & W)/ , /, w/	Canon	IR5000	MPL07752	Flynn Copy Room 3.214

Selectmen

Flynn Building	Selectmen	Copier - Networked, Scan (B & W)/ , /, w/ 00-00-85-47-D9-82	Canon	IR5570	KHT00423	Selectmen 3.215

Treasurer / Collector

Flynn Building	Treasurer /	Printer Network LaserJet 8150DN/ , 160MB/, w/ 10/100MB	Hewlett	C4267A	USBLM10008	Treasurer / Tax Collector

Library

Goodnow	Library	Printer Network LaserJet 8100N/ , 16MB/, w/ 10/100MB	Hewlett	C4215A	USCC046296	Public - Reference 17.239
Goodnow	Library	Copier - Networked, Fax, Scan (B & W)/ , /, w/	Panasonic	DP2310	GCG39H00417-206595	Library Wire Closet II 9.214

Highway

Highway / DPW	Highway	Printer Network LaserJet 8100DN/ , 24MB/, w/ 10/100MB	Hewlett	C4216A	USBC007493	Highway Office 10.31

# Town Networked Copiers / Printers / Plotters that are capable of Printing 11 x 17 Documents

| CAT Build	Dept	Description	Manuf	Model	Serial #	Staff Name
Police						
Police Station	Police	Printer Network LaserJet 8100DN/ , 24MB/, w/ 10/100MB	Hewlett	C4216A	USBC017859	Police Report Room 8.24
Police Station	Police	Copier - Networked, Scan (Color)/ , /, w/	Xerox	5352	3HL103519	Police Station 0.214
Senior Center						
Senior Center	Senior	Copier - Networked, Fax, Scan (B & W)/ , /, w/	Konica	Bizhub	30BE06420	Senior Center Office 4.215

Town of Sudbury, Massachusetts

MassDEP Wetlands

Legend

|	
~~	Rivers and Streams
�	OPEN WATER
	BOG
	DEEP MARSH
	SHALLOW MARSH MEADOW OR FEN
	SHRUB SWAMP
	WOODED SWAMP CONIFEROUS
	WOODED SWAMP DECIDUOUS
	WOODED SWAMP MIXED TREES
	Parcels
- - -	Town Boundary
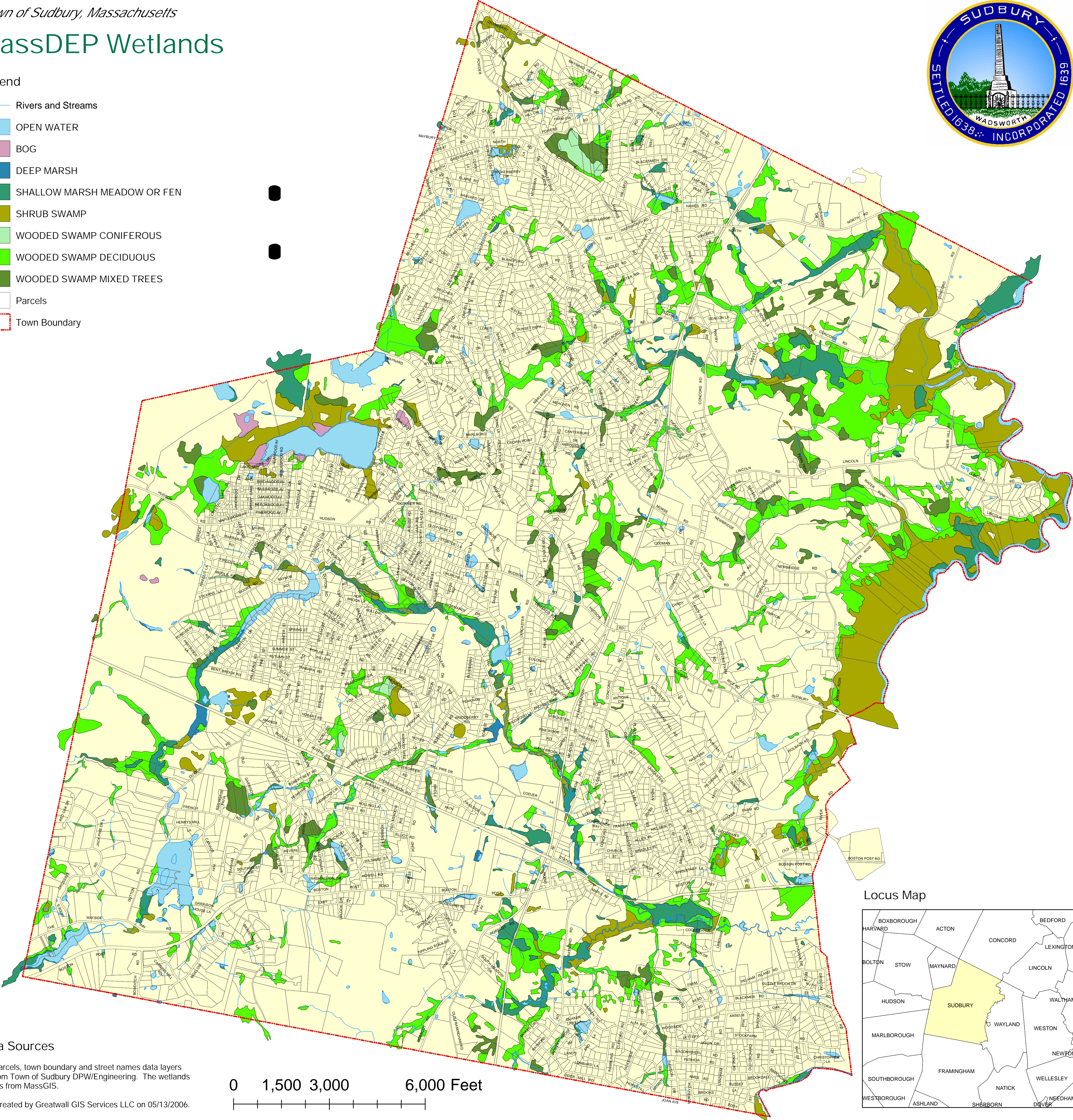
Locus Map

Data Sources

The parcels, town boundary and street names data layers
are from Town of Sudbury DPW/Engineering. The wetlands
layer is from MassGIS.

Map created by Greatwall GIS Services LLC on 05/13/2006.

0   1,500   3,000   6,000 Feet
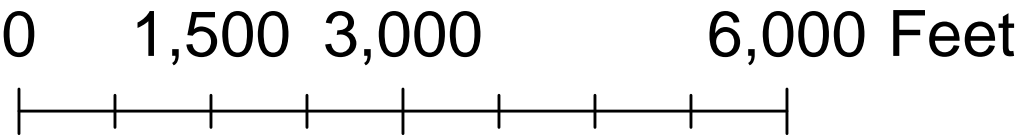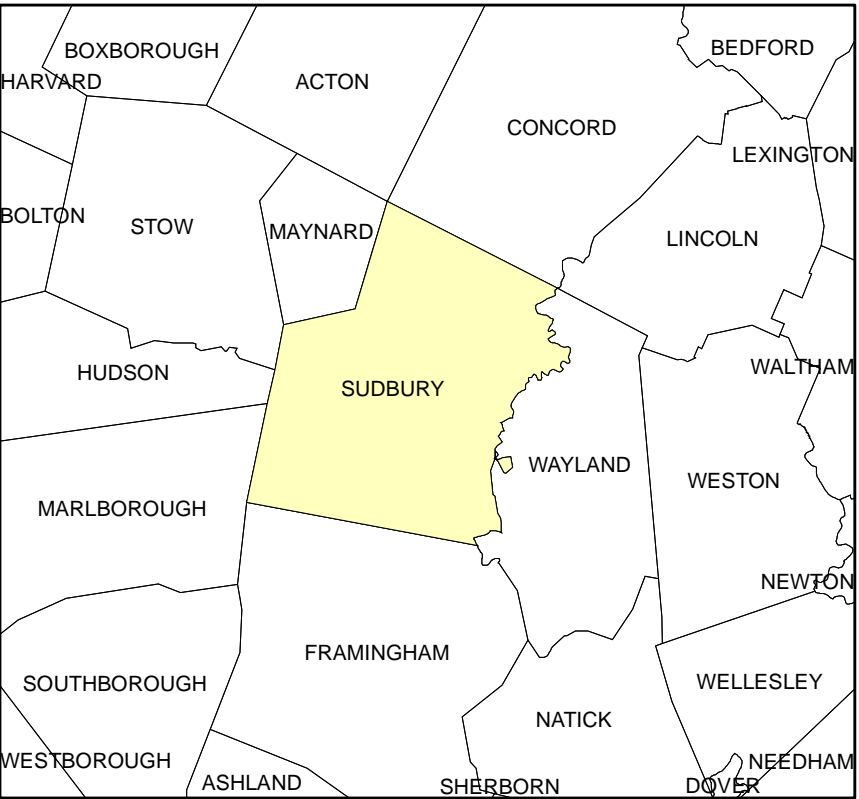
TOP DRAWER

- Zoning Map of Sudbury 1938 (Master) and copy showing revisions until 1962 Zoning Map: 1938, 1955, 1957, 1962, 1964, 1965, 1968, 1971, 1972, 1974, 1980, 1985, 193, 1996, 1999, 2000, 2001, 2002*, 2003, 2004,2005,2006

- Maps of Sudbury: 1650, 1687, 1795, 1830, 1856 (part of Middlesex County), 1859, 1908, 1910, 1972, 1973, 1984, 1985, 1998, 2000

- Precinct Maps: 1972, 1975

- Highway Wards: 1855

- Map of Sudbury showing Pole Locations: 1911

- Old Topographical Map of Sudbury (mostly north of Route 20) Map of the First Roads & House Lots in Sudbury

- 3 Zoning Maps of Sudbury 1938

- Historic District Map: 2005, 2006

*Changed: See Document Card

Second Drawer

- Cemeteries: Old North Cemetery, Wayland; New Town, Revolutionary, Wadsworth, Old Town, Old North, New North, Mount Pleasant

- Old Maps of Surrounding Towns: Marlborough - 1667, East Sudbury - 1831, Concord - 1830, Lincoln - 1795, Framingham - 1699,. Stow-- 1830, Watertown -: Original Allotments of Land, Wayland/East Sudbury - 1795, Middlesex County around 1830's, 1875 Map of Sudbury and Maynard 1844 Plan to alter boundary between Sudbury & Stow

- 1744 Map of New England: Northwest Section, Northeast Section, Midwest Section, Mideast Section, Southwest Section, Southeast Section

- 30 miles around Boston August 1775 100 Miles around Boston 1775

- 100 miles around Boston

- Boston and Its Environs and Harbor with the Rebels Works raised against that town in 1775

- Plan of Boston and its Environs 1775

- Plan of Boston and Its Environs, showing the true situation of His Majesty's Army, and also those of the Rebels October 1775

- Bowie's Map of the Seat of War in New England in 1776

- Plan of Boston and Its Environs 1776

- Plan of Boston and Its Environs with the Military Works 1776 Plot Plan of a Portion of Sudbury 1707

- Grant of Indian Land to Marlboro 1700

- 200 Acres granted Rev. John Norton in 1659

- 324 Acres adjoining Sudbury, granted to Stephen Day, printer, 1657 Plan of 200 Acres at Sudbury, granted to Daniel Weld, 1663

- 50 Acres of Land of Thomas How of Marlborough, 1719

- Land in Sudbury in 1676

THIRD DRAWER

- Location of Gas Pipes, Mains and Lines

- Orthophoto Maps of Sudbury

- Topographical Plan of Hop Brook Area (3 sheets)

- Map of Flood Plains - 2 copies - January 1962

- Special Flood Hazard Area - August 23, 1974

- FIA Flood Hazard Boundary Map 1974

- FIA Flood Hazard Boundary Map 1974 - also showing existing flood plain

- Map of Flood Plains in the Willis Pond - Run Brook Watershed Area

- Map of Flood Plains in the Hop Brook Area (1973)

- Wastewater Treatment Facility - Restricted zones (1989)

- Water Resource Protection Districts Map

- Street Map - 1994 Drainage Systems (Article 38)

FOURTH DRAWER

- Sudbury/Wayland Town Line 1980

- Sketch of a Portion of the Sudbury-Wayland Town Line,. May 1980

- Sudbury Wayland Town Line - Griscom Road – 1980

- Plan of Land in Sudbury - Robert Frost Road, and Cider Mill Road 1972

- Plan of Land in Sudbury - Robert Frost Road 1972

- Plan of Land in Sudbury - Robert Frost Road, Cider Mill Road 1972

- Plan of the Proposed Relocation of New Bridge Road – 1979

- Boy Scout Reservation, Nobscot, Norumbega Council, Revised 11/53

- Plan of Land in Sudbury & Concord - Dakin Road Area, Packard Road Area

- Proposed Additions & Alterations to the Sudbury Center School

- Proposed Additions & Alterations to the Sudbury Center School

- Proposed Sudbury Junior. High School at Pratt's Mill Site

- Topographical Map of Site of Proposed New School (Noyes) April 12, 1948

- 2 Mile Grant -- Sudbury -- Donated by George D. Max, 1987

- Plans for the Sudbury Housing Authority Comprehensive Permit for Low Income Housing