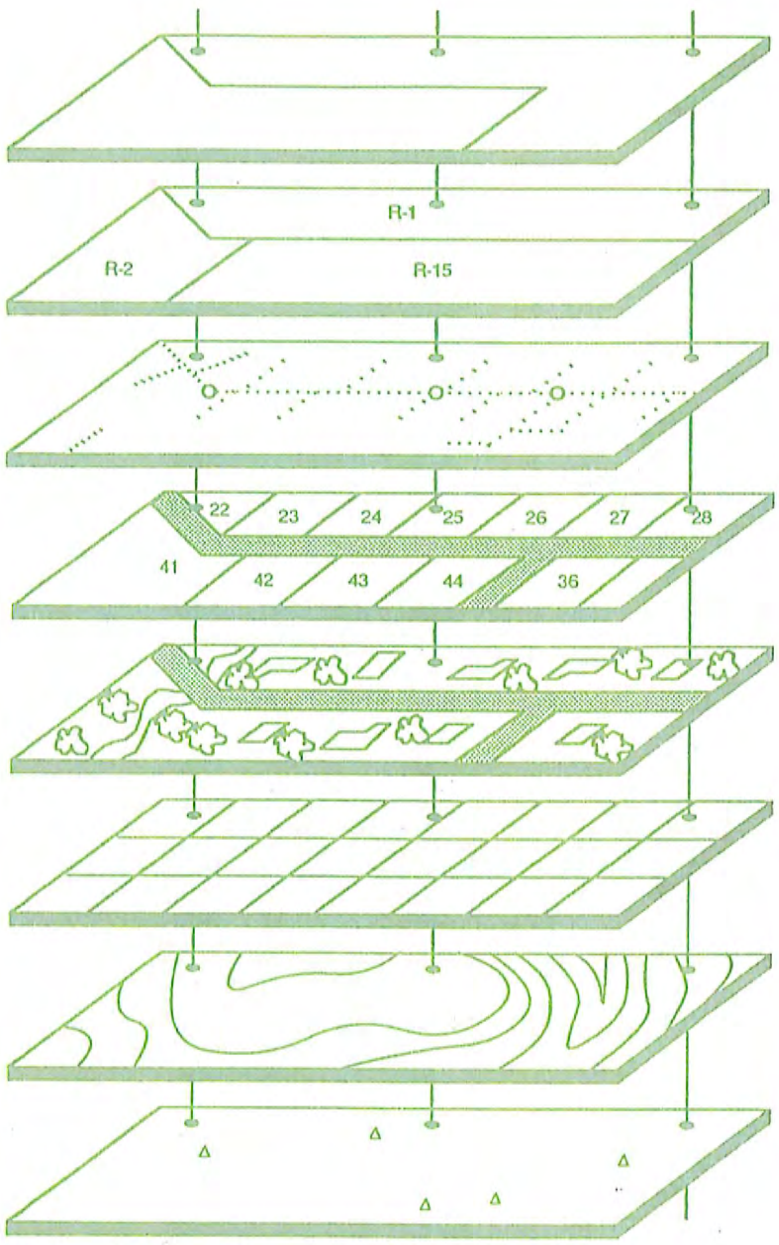

Vermont Geographic Information System

Annual Report To The Legislature

March 1989

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Madeleine M. Kunin
Governor

MADELEINE M. KUNIN
GOVERNOR

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March 16, 1989

Honorable Ralph Wright
Speaker of the House

Senator Douglas Racine
President Pro Tempore

Gentlemen:

Act 200 of 1988 requires that I submit annually to the General Assembly a report describing activity under the state Geographic Information System (GIS), including data collected, documents generated, and the use of GIS information. Act 200 also requires me to develop a comprehensive strategy for the development and use of a geographic information system.

Establishing a unified GIS that meets the needs of state, regional and local planners is an ambitious task. So far as we know, no state has attempted to establish a GIS system quite as comprehensive as this. Yet I believe that the development of a statewide GIS will be one of the most significant actions that will assist Vermont in coping the challenges of development. I am proud to know that we are being viewed as a national model in this field.

I am pleased to report that development of the comprehensive strategy is largely complete. Two significant decisions have been made. I will shortly be creating an Office of Geographic Information that will be located in the Secretary of Administration's Office. This Office will implement all aspects of the strategy, and will be guided by a GIS Policy Committee to ensure that all plans are reviewed and a five year work program is approved.

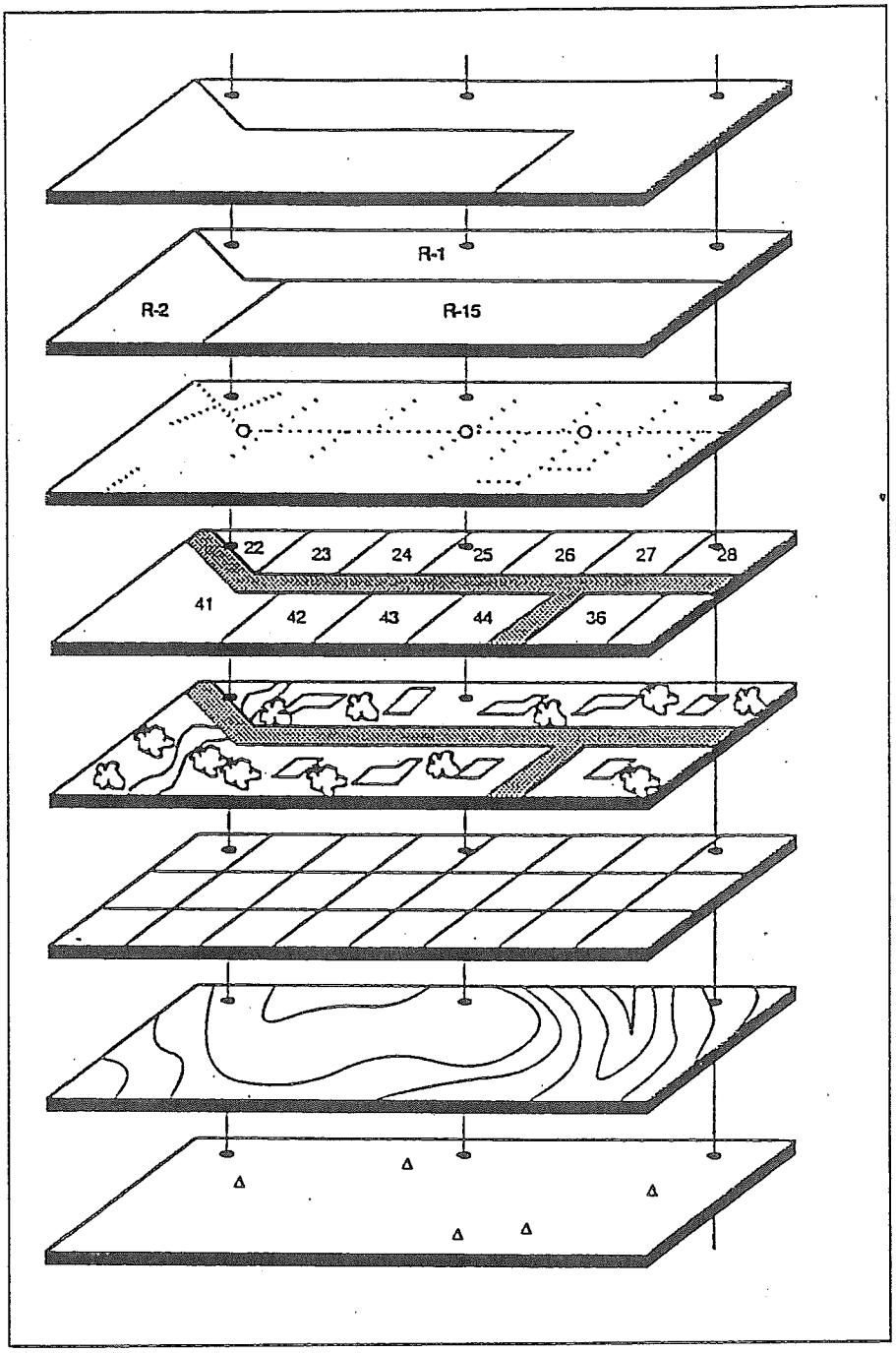
The second action I have taken is the formal adoption of "ARC/INFO" as the statewide GIS software standard for the statewide system. This software is capable of supporting GIS services on a variety of computers, and fits well with the decentralized GIS system we plan to establish.

I want to thank the members of the GIS Oversight and GIS working committees for their long hours of work, and their patience and effort in making this project a success.

A more detailed report is attached for the information of members of the General Assembly and the public. It charts our progress to date, and provides an estimate of what can be accomplished in the next year.

Sincerely,

Madeleine M. Kunin
Governor



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Madeleine M. Kunin

Governor

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Comprehensive Strategy for GIS Implementation

Summary

In June, the Secretary of Administration created two committees. A Geographic Information System (GIS) Oversight Committee developed a comprehensive strategy for GIS implementation and directed initial efforts at establishing pilot projects. A GIS Working Committee also was established to give technical assistance to the Oversight Committee. Each committee consisted of members of state government, regional planners, local officials, and representatives of private industry. The members of the two committees are listed in Appendix A. The Oversight Committee held 10 meetings. Many long hours of discussion, education, and hard work have gone into their efforts.

In August, the Oversight Committee decided to follow a two track approach to developing a GIS. Because of the complexity and cost of the system, the committee felt that a long range planning study was needed. But because many GIS users were impatiently awaiting services, the committee felt that some pilot projects also would generate information useful in establishing the shape of the GIS.

The planning study proceeded with the help of a consultant. In September 1988, PlanGraphics, Inc. and the Cavendish Partnership were selected from five finalists to help develop the strategy. The consultant prepared three reports to help the develop this strategy. These reports are entitled:

- *Phase I: State of Vermont GIS Needs Determination.*
- *Phase II: State of Vermont Conceptual System Design.*
- *Providing Access to the Vermont Geographic Information System, Legal Framework, Functional Access, and Cost-Price Model for Sale of Products and Services.*

The following sections summarize the key components of Vermont's GIS strategy.

Priorities Among GIS Uses

Deciding how a GIS will be used is the fundamental issue in its design. These determinations play the key role in ranking the relative importance of data acquired in order to make these uses possible. In the fall of 1988, PlanGraphics, Inc. and The Cavendish Partnership surveyed and interviewed over 60 Vermonters who have some connection to geographic data. These included representatives of state, regional and local governments, public utilities, and other private enterprises. This process resulted in recommendations for GIS use priorities at the state, regional and local level.

The "uses" or "applications" are described in Table 1. "Priority 1" refers to uses of the GIS that should be complete or largely complete by June 30, 1991. "Priority 2" refers to GIS uses that, because of financial limitations, probably cannot be begun until 1992; but which should be available by the end of fiscal 1994.

Some of the uses described in Table 1 are of interest primarily to local governments and regional planners. Others are primarily of interest to state officials.

Table 1.

Application Priorities

Priority 1	Priority 2
Natural Resources	Natural Resources
Flood Plain Mapping	Water Well Drilling Inventory/Mapping
Wetland Mapping	Environmental Impact Analysis Support
Land Cover Mapping	Groundwater Modeling
Sensitive Natural Area Mapping	Air Discharge Tracking
Timberstand Management	
Water Discharge Tracking	
Hazardous/Solid Waste Site Planning	
Land Use Planning/Zoning	Land Use Planning/Zoning
Demographic Analysis	Support for Comprehensive Planning
Historic/Archeological Site Mapping	Permit/Development Tracking
Land Use Map Production	Rezoning Evaluations
oning Map Production	Support for Redistricting
	Support for Public Land Acquisition
Public Works and Transportation	Public Works and Transportation
Special Road System Map Production	Traffic Volume/Accident Analysis
	Route Analysis
	Plat/Site Plan Review
	Right-of-Way Management
	Pavement Management
Parcel Mapping/Property Appraisal	Parcel Mapping/Property Appraisal
Identifying Parcels in Current Use	Property Map Update/Production
Tax Mapping Analysis	Special Property Map Production
Ownership Searches/Query	Support for Field Appraisal
	Scheduling and Routing Appraisals
Water/Sewer Utilities	Water/Sewer Utilities
Mapping/Tracking Well & Septic Locations	Support for Water Supply Permit Review
	Water/Sewer Map Update/Production
	Mining
	Mapping Sand/Gravel Pits/Rock Quarries

Standards

Act 200 requires that standards be developed to ensure consistency for data collection and mapping. The key to developing a sound GIS is the use of comprehensive mapping and data standards. Standards will systematically describe characteristics of the GIS database such as file content and format, coding and classification schemes, map accuracy, and the reliability of sources. The consultant has provided a good synopsis of the areas which need standards and examples of what other states and the federal government have developed.

Although there will be only one Vermont GIS, the needs of state level policy makers generally require large area maps. Local planners require greater accuracy over a smaller area. The consultant has recommended that two distinct databases be established.

A "large area database" will exist in conformance with a base map established by the United States Geological Survey's Digital Line Graph system (DLGs). This base map is currently available at a scale of 1:100,000, although it was developed from information at 1:24,000 scale. The University of Vermont has just purchased this data for Vermont. This data layer will contain information derived from federal government sources and information useful at the state level that conforms to the same base map. Data in this database will be primarily useful for state and to some degree regional analyses.

A "small area database", useful for local and regional planning under Act 200, will exist in conformance with the state orthophoto maps. These maps completely cover the state. Although some of the maps are dated, they are still fundamentally sound for GIS development work. In rural areas, these maps are accurate at a scale of 1:5,000. In more developed areas, they are available at a scale of 1:1,250.

The existence of two databases would not mean that information created at other scales would be unacceptable. Some local data would be more accurate than 1:5,000, and still could be entered in the database. Likewise, some state data will be better than 1:100,000, and will be recorded in the GIS. All data, however, should conform to the large area base map or to the small area base map.

A GIS database must be well documented as it is developed. The best approach is to create a data dictionary which will contain documentation the database's graphic and non-graphic data elements such as data type, source material, and format for individual data elements. The consultant has suggested the contents of such a data dictionary.

Now that a GIS software standard has been chosen, we are able to develop database standards. This work will be complete by September 1, 1989.

Data Layers

A data "layer" is a set of geographically referenced data that has a common theme and that can be overlaid on other layers. For the Large Area and Small Area Databases, the following layers will be created:

Table 2a. Large Area Data Layers:

Priority 1 (by 7/1/91):
- Digital Line Graph Base Map
- Transportation Centerlines
- Surface Water
- Political and Administrative Boundaries
- Census Areas
- Land Cover
- Wetlands

Priority 2: (by 7/1/94)
- Soil Associations
- Groundwater Features
- Historical/Archaeological Sites
- Sensitive Natural Areas
- Topographic Contours
- Watersheds

Priority 3: (after 7/1/94)
- Geology
- Recreational Facilities
- Infrastructure Facilities
- Solid/Hazardous Waste Sites
- Utility Transmission Lines

Table 2b. Small Area Data Layers:

Priority 1: (by 7/1/91)
- Orthophoto Base Map
- Property Parcels
- Transportation Centerlines
- Land Use/Cover
- Zoning
- Flood Zones
- Political/Administrative Boundaries

Priority 2: (by 7/1/94)
Soils
Sanitary Sewer Facilities
Water Facilities
Septic Systems

Priority 3: (after 7/1/94)
Topographic Contours (2' Interval)
Stormwater Facilities
Dams, Bridges, Culverts, Etc.

Most of data layers in the small area database will be acquired through cooperative financing agreements between the state and regional planning commissions or local governments. Because the state cannot ensure that all such local governments will actually be interested in sharing the costs of acquiring necessary data, complete coverage of the state may not be achievable on the above dates.

Data Currently in System

Figure 1 graphically illustrates the areas of Vermont for which small area GIS information currently is available at the School of Natural Resources, University of Vermont. It is possible now for any community in these shaded areas to complete town-wide analyses with this data.

For the large area database, by the Summer of 1989, the University will be able to provide the entire U.S.G.S. Digital Line Graph information -- roads, streams, ponds, and political boundaries, as well as the U.S. Census Bureau's TIGER data file containing further information such as road names, census tracts and other administrative districts.

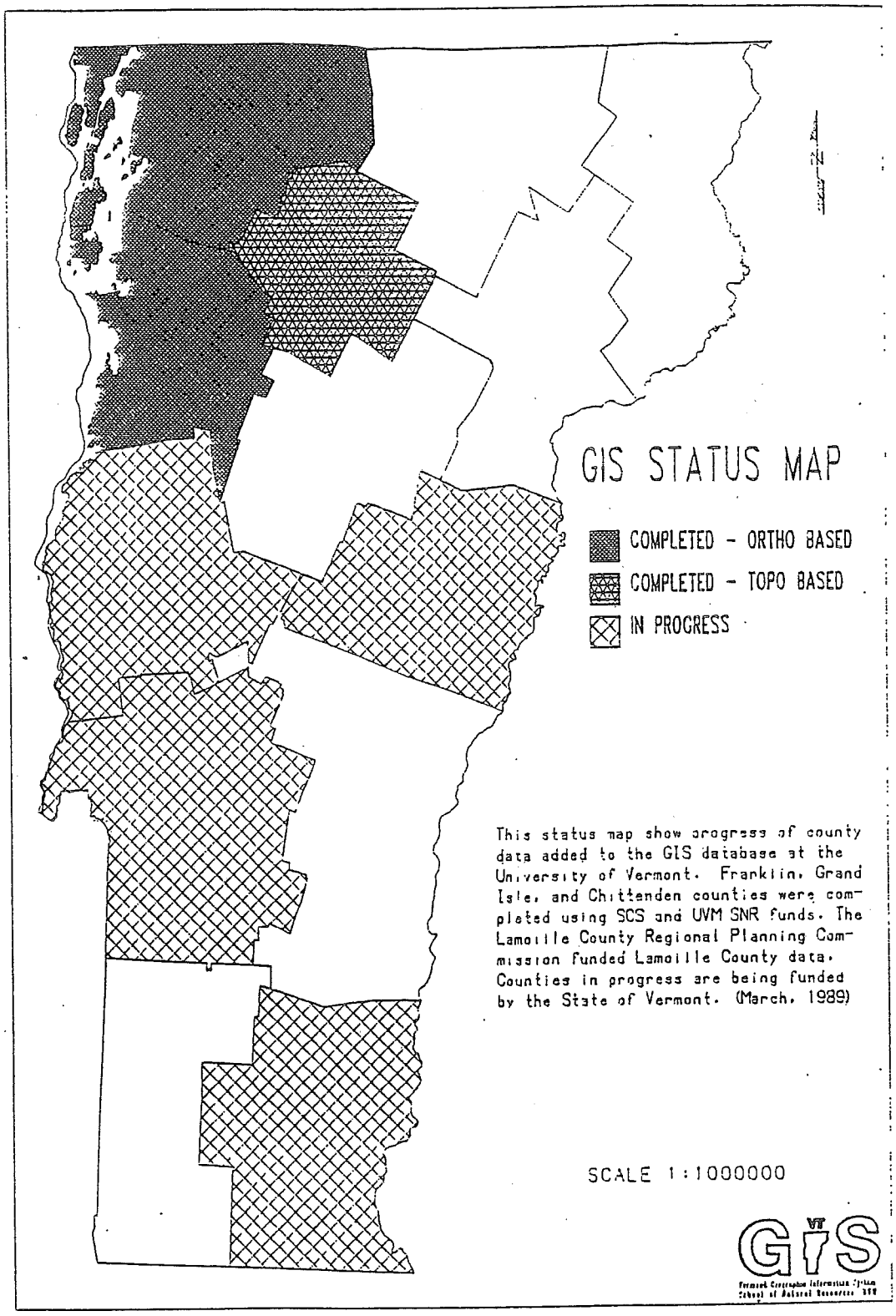
Organization

The Vermont GIS will need to serve state, regional and local needs. In most areas, regional planning commissions will be best equipped to provide the expertise needed to offer GIS services to towns and cities. In some cities and towns, local expertise will be sufficient to permit direct interactions between the state GIS and local officials.

The state GIS will have to support these service centers in a number of ways. Standards will have to be established to guide the interchange of data. Probably the most significant function of the central GIS, however, will be as custodian of the data. While free interchange of data among all participants no doubt will occur, maintenance of quality will be a major task for the Vermont GIS.

The state GIS also will have to offer a direct service function, for state agencies and for other persons not able to obtain service from a regional planning commission or their local

Figure 1


GIS STATUS MAP
COMPLETED - ORTHO BASED
COMPLETED - TOPO BASED
IN PROGRESS
This status map show progress of county data added to the GIS database at the University of Vermont. Franklin, Grand Isle, and Chittenden counties were completed using SCS and UVM SNR funds. The Lamoille County Regional Planning Commission funded Lamoille County data. Counties in progress are being funded by the State of Vermont. (March, 1989)
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VT GIS

municipal planning body.

Finally, the Vermont GIS will have to coordinate geographic data acquisition and maintenance among state agencies.

An ideal GIS organization would address the concerns of all GIS users in a fair and balanced manner. Also, it would allow the GIS personnel sufficient authority to make necessary decisions pertinent to GIS implementation and operation. At the same time, the GIS organization should remain responsive to legislative and executive mandates.

Selecting an appropriate organizational form is a critical decision in establishing the Vermont GIS. Three major groups of options have been considered:

- Create a new organizational unit within an existing Agency or attached to the Governor's Office.
- Create a quasi-governmental body, such as a special commission or institute, or a not-for-profit public corporation.
- Contract with an information management corporation.

The consultant developed a comprehensive analysis and review of alternative organization options for a statewide GIS. The Oversight Committee and its Organizational Subcommittee also spent many hours debating the various options. All have agreed that a high level organization within state government would be ideal, at least for the short term, for ensuring that the proper level of attention is paid to GIS development. Such an organization could also negotiate the agreements between all users and develop the standards that users will follow.

For the next two years at least, the best organizational home for the GIS will be an Office of Geographic Information Services within the Agency of Administration. The need to maximize interagency coordination will be a paramount concern during the first two years of the GIS, as will the need to develop GIS products that will be marketable to private industry. The Agency of Administration is well suited to these tasks.

The Agency of Administration has a utilitarian view of the need to provide balanced use of GIS as a decision support tool at all levels of government. It has in-house expertise in computer software and hardware, as well as expertise in orthophoto mapping. The Agency is not so directly involved with particular GIS applications that there would be an appearance of improper emphasis when choosing between development applications that inherently favor one agency over another or local needs over state agency needs. This location is also ideal for the initial incubation period that starting a statewide GIS requires.

Over the next two years, while the state GIS is being established, the University of Vermont will continue to play a major role in data layer and applications development, and it will continue to act as a service bureau and training center. Thereafter, the University will play a major role in educational and research support for the GIS system.

Over the long run, a state agency may not be the best way to run the GIS. A quasi-

public corporation could have some significant advantages over a state agency. By June 30, 1991, the GIS Advisory Committee, discussed below, will make a recommendation to me on the viability of creating an independent authority that would take over the operations of the statewide GIS.

GIS Advisory Committee

A GIS Advisory Committee should become a permanent component of the GIS system. Such a committee will be able to blend the complex technical and management concerns necessary to build a successful GIS. In order to ensure that the Agency of Administration has broad policy guidance over the next two years, such a Committee will be established by executive order. Membership on this committee will be balanced among local, regional, and state officials, as well as private industry.

The charge of the Advisory Committee will be to:

- Provide advice on the overall policy direction of the Vermont GIS.
- Ensure that the Vermont GIS complies with the intent of Act 200 of 1988.
- Review and recommend mapping and database standards.
- Review and recommend a pricing schedule for products and services.
- Review, recommend, and maintain a five year work program.
- Comment on proposed memoranda of understanding and contracts.
- Review and advise on the annual GIS budget.
- Review state agency GIS plans and certify them as consistent with the Vermont GIS.

Staffing

In fiscal year 1990, the GIS will require three state positions. These will include a GIS director, a database manager, and an administrative assistant.

In fiscal year 1991, an additional five positions were recommended by the consultant, but the decision to create these positions can await the construction of the 1991 budget.

Executive Versus Legislative Action

It is now too late in the legislative year to propose by bill the creation of a GIS organization on July 1. Under existing authority contained in Act 200, the initial organization will be created by Executive Order. Confirming legislation will be sought during the 1990 session. I will ask for the authorization of three new positions in FY 90 appropriations bill.

Software

Based on a recommendation of the GIS Oversight Committee, ARC/INFO software has been chosen for use by the statewide system. This decision makes a continued commitment to the existing system in use at the School of Natural Resources at the University of Vermont. This highly versatile GIS software currently has the largest number of installations worldwide. All of our neighboring states are using the same software.

The state GIS will need to support other software products as well. Particularly for users with small systems and computer drafting systems, there is a need for data interchange standards. The Agency of Transportation has a significant investment in a drafting system that also will need to have a data interchange path established. In these and perhaps other areas, the statewide system will need a capacity to translate geographic data that is coming into the Vermont GIS or leaving it.

Hardware

To a great extent, the Vermont GIS will have distributed responsibilities for maintenance of data. State agencies, for example, will be responsible for maintaining data within their areas of responsibility. Local or regional officials, under cooperative agreements, will be responsible for maintaining parcel boundaries. Nevertheless, the Vermont GIS will require a central data processing facility to maintain master copies of GIS data, to provide whatever services are demanded of the GIS that cannot be met by regional planning commissions and other GIS service agencies, and to provide a means of communicating GIS data from one place to another.

Funding and Costs

It will take a great deal of money and time to establish the Vermont GIS. Table 2 below shows the consultant's estimate of the costs for entering all of the priority data layers into the system. It is clear that it will take a number of years to accomplish this and that the initial $4.75 million, five-year, appropriation will not be able to pay all foreseeable costs.

For at least two reasons, the figures in Table 2 should not create alarm. First, Table 2 shows the total cost of data acquisition, but not all of this need be charged against the state appropriation. A significant part of the cost can be defrayed by cooperative funding agreements with local governments, and possibly with private industry. Also, some of the most costly items, such as two-foot elevation contours, will not be purchased without further detailed analysis, and the data simply may not prove to be worth their cost.

In addition to these data collection and coding costs, the GIS must have equipment, space and personnel. It is currently estimated that GIS computer and communications

equipment at a central service bureau will cost between $440,000 and $650,000. Personal services should cost about another $500,000 over the next four years. Thus the total program cost by fiscal 1994 should be about six to ten million dollars. Given the $4.75 million appropriation, the difference will need to come from cooperative data entry agreements, revenues from the sale of products, contributions, and perhaps from delayed data entry as well.

Table 2

Costs for Entering Data Layers (in 000's)

	Low Estimate			High Estimate		
	Wide Area	Small Area	Total	Wide Area	Small Area	Total
Priority 1	$124	$4,647		$186	$8,122	
Priority 2	53	450		68	600	
Total by 1994			$5,274			$8,976
Priority 3	431	18,671		581	28,069	
Grand Total			$24,376			$37,626

At the end of the five year development period, it is likely that the GIS system will be able to support its direct services from fees and cooperative agreement revenues. However, it is also likely that a continued investment of state funds will be needed to maintain the quality and currency of the data base.

Appendix B describes Fiscal Year 1989 Expenditures and commitments of GIS funds through the end of February 1989. A detailed five year work plan and budget is currently under development and will be reviewed by the GIS Advisory Committee.

Geographic Data Resource Catalog

One product generated from the consultant survey conducted last October is a Geographic Data Resource Catalog. This catalog lists more than 700 kinds of geographic data maintained by state, regional and local governments, as well as private industry. The catalog also characterizes the data as to such factors as accuracy and completeness.

The catalog is available in automated form for ease of use, updating, and expansion. This database will be expanded as new information is added. Appendix C contains a

sample of a catalog listing.

Education and Outreach

During the last nine months, four newsletters have been prepared and distributed statewide. Update articles have appeared in the three issues of the Act 200 Newsletter. Articles have also appeared in other GIS publications.

State officials and the University of Vermont staff have made numerous presentations at regional planning commission and town meetings and professional group meetings. They have also answered hundreds of telephone inquiries on GIS and mapping at the local level.

This information effort will expand significantly in the next few years as the Vermont GIS takes shape. User conferences are planned for this summer to try to develop a greater understanding of the technology. A regular newsletter will be published. Finally, the five year work plan will include a major component dedicated to user training.

Pilot Project Program

During the past six months four kinds of pilot projects have begun under GIS auspices. These projects were undertaken to gain knowledge and experience in designing and operating a GIS.

The projects are described below. Appendix D contains the Pilot Project objectives.

1. **School of Natural Resources, University of Vermont.** The Agency of Administration has entered into a contract with the School to:
   - continue the entry of soils, surface waters, and political boundaries for Addison, Orange, Rutland and Windham Counties.
   - enter and evaluate the digital elevation model (DEM) information from the state's recent orthophoto flight over Chittenden County. This inexpensive by-product will result in 20' contour lines for the entire county. If the evaluation proves worthwhile, the effort will continue for each new orthophotography flight.
   - evaluate existing digital data available from the federal government.

Appendix E contains the First Quarterly Progress Report under this contract.

2. **Regional and Town Planning Pilot Projects.** There is great interest and excitement in developing GIS capacity at the regional and local level. The Oversight Committee solicited proposals from all municipalities and regional planning commissions for development of GIS regional and town pilot projects. Ten proposals were received, eight from regional planning commissions and two from municipalities. A committee from the Vermont Association of Planning and Development Agencies and the Vermont League of Cities and Towns reviewed the proposals and made recommendations to the Oversight

Committee. Besides demonstrating a sound technical proposal, each applicant had to demonstrate a financial commitment to the project.

The Oversight Committee selected the Central Vermont Regional Planning Commission, the Two Rivers--Ottauquechee Regional Commission and the City of Montpelier to receive funding. Each regional planning commission will be providing services to two municipalities in its region, Calais and Plainfield in central Vermont, and Randolph and Woodstock in the Two Rivers area. Initial staff training for these projects in the use of ARC/INFO software has been completed. These projects are more fully described in Appendix F.

Each of these pilot projects will access existing data bases at the School of Natural Resources and will also develop their own sources of data. The results should be of enormous value in locating any pitfalls that await the establishment of a statewide GIS.

3. **Agency of Natural Resources.** The Oversight Committee has provided funding for an Agency of Natural Resources GIS Pilot Project which will allow that agency gain useful experience with this technology. In particular, the agency will:

- help the School of Natural Resources with its current data coding project.
- conduct an evaluation of the Natural Heritage Program data base.

The agency will have a complete GIS micro-computer as part of this project. The project will allow agency personnel to develop the in-house expertise to learn the technology and determine long-term agency needs.

4. **Department of Health.** The Oversight Committee has also approved a Department of Health GIS Pilot Project. The department will focus its effort on relating public water supply and other data bases to the GIS system. The Department has acquired through GIS funds a complete GIS computer workstation, and will be using existing personnel. The department recently finished, with the University of Vermont, a project that mapped all well-head protection areas in the state.

Next Actions

To ensure that the GIS system is available to serve the Act 200's immediate needs of local communities the consultant identified the following short term activities:

GIS Organization

Upon establishment the GIS organization, it will develop an acceptable GIS work plan that satisfies local and state needs; identify funding for data collection and conversion, hardware, software, staff, and training for local governments; select and purchase system hardware and software; continue review of Pilot Project efforts to incorporate experiences into overall program decisions; and develop an outreach and education program to reach all agencies, towns and RPC's.

Recommended Local Activities

Local communities should start working now with regional planning commissions to clarify each others' roles concerning GIS. In particular, these discussions should focus on issues related to parcel mapping, data needs, data management and data maintenance as well as determining which level of government will provide what services.

Recommended Regional Level Actions

Each regional planning commission should begin to evaluate whether it wants to become a GIS service center and what GIS role it wants to play with member towns relating to data management.

Private Sector Role

The private sector is affected by Act 200 and has call for much of the same data and spatial analysis that will be available from the Vermont GIS. Once certain state and regional level GIS database layers are available in digital format, Vermont will have products and services to market to the private sector. At present the state's major utilities have the greatest potential as GIS customers.

The private sector could access the system through purchased participation, specific product purchases, contractual services, and direct access for a fee.

The private sector may also be a source of data for inclusion in the GIS. Utility lines are probably the most important data layer that might be available from the private sector. Detailed environmental and survey information would be another large area of potential contribution.

After the GIS system has been able to meet its Act 200 objectives, cost recovery, cost sharing, and data exchange with the private sector should be pursued.

Summary of Short and Long Term Organizational Development

The following outlines the short and long term organizational development of the GIS project over the next two year and four year periods. These items will be developed into a work plan for review by the Advisory Committee.

During the Short Term (1989 - 1991) the following goals are established:

- establish and staff a GIS organization.
- charter an advisory committee to adopt baseline database standards, access policies, data interchange policies, and fees.
- develop a long range plan and budget for the GIS containing the following elements:
  - a service center or centers to provide GIS services to all state, regional, and local entities without in-house GIS capabilities.
  - regional service centers.

- a parcel boundary data layer at the local and regional levels.
- coordination of regional and local database development to ensure that mapping and data standards are met.
- monitoring of the progress and results of pilot projects.
- a GIS education and service program through the service centers that includes face-to-face contact with local governments.
- a list of compatible software and minimum hardware needed to develop the state level database and run the service center
- identification of state agency GIS representatives and local contacts.
- a training program in software, data collection, and GIS uses.

In the Long Term (post 1992), the following goals are established:

- evaluate the possibility of establishing an independent "GIS Authority".
- complete major hardware purchases and install equipment in state and regional agencies.
- fully activate regional service centers serving GIS customers.
- complete large area database development, giving priority to Act 200 related applications.
- continue work with local governments to create local level base maps, principally by digitizing parcel maps and addition of planimetric details to the data layers
- involve private sector GIS users in product and service development and marketing, and in data exchanges.
- establish user networks among state, regional, and local governments to exchange applications programs and share GIS experiences.

ACT 200

Sections Referring to Geographic Information Systems

Sec. 29. 3 V.S.A. Sec.20 is added to read:

Sec. 20. COORDINATION OF DATA GATHERING; GEOGRAPHIC INFORMATION SYSTEM

(a) After consultation with regional and municipal organizations and the University of Vermont, the governor shall develop a comprehensive strategy for the development and use of a geographic information system. The strategy shall include the following: data and mapping standards; potential applications and their priorities; priorities for collecting and digitizing information; geographic location standards for all data collection; software and hardware; management needs; private sector cooperation; costs and benefits of use; financing consideration; ways to make information gathered available to regional and municipal entities; ways to assure that data gathered by regional and municipal entities conforms to the geographic information system; and an implementation schedule.

(b) The governor shall assure that all data, relevant to a geographic information system, that is gathered by state agencies shall be in a form that is compatible with, useful to, and shared with the geographic information system established under subsection (a) of this section.

(c) On or before March 15 of each year beginning in 1989, the governor shall report to the house and senate committees on natural resources and energy concerning the data gathered, documents generated, and use of the information.

Sec.17. 24 V.S.A. Sec.4303(20) is added to read:

(20) "Capacity Study" means an inventory of available natural and human-made resources, based on detailed data collection, which identifies the capacities and limits of those resources to absorb land development. Data gathered, relevant to the geographic information system, shall be compatible with, useful to, and shared with the geographic information system established under 3 V.S.A. Sec.20.

Sec.18. 24 V.S.A. Sec.4325(4) is amended to read:

Any planning commission created under this chapter may:

(4) Undertake capacity studies and make recommendations on matters of land development, urban renewal, transportation, economic and social development, urban beautification and design improvements, historic and scenic preservation, the conservation of energy and the development of renewable energy resources and wetland protection. Data gathered by the planning commission that is relevant to the geographic information

system established under 3 V.S.A. Section 20 shall be compatible with, useful to, and shared with that system.

Sec.21. 24 V.S.A. Sec.4345a is added to read:

Sec.4345a. DUTIES OF REGIONAL PLANNING COMMISSIONS

A regional planning commission created under this chapter shall:

(5)(B) develop a regional data base that is compatible with, useful to, and shared with the geographic information system established under 3 V.S.A. Sec.20.

Sec.4. 24 V.S.A. Sec. 4306 is added to read:

Sec. 4306. MUNICIPAL AND REGIONAL PLANNING FUND

(b) The following amounts are hereby appropriated for disbursement by the commissioner of the department of housing and community affairs from the annual balance of the fund:

(1) in fiscal years 1990 through 1993, the amount of $1,000,000 to the office of the governor for purposes of developing a geographic information system, and other purposes authorized under 3 V.S.A. Sec. 20;

Sec. 5 Fiscal Year 1989 Transitional Allocations

(a) For fiscal year 1989, revenues received from the property transfer tax are hereby appropriated as follows:

(B) $750,000 to the office of the governor for purposes of developing a geographic information system, and for other purposes authorized by section 20 of title 3.(FY89)

Appendix A

GIS Oversight and Working Committee Members

GIS OVERSIGHT COMMITTEE

Ronald Allbee
Department of Agriculture

Maxine Brandenberg
Vermont Business Roundtable

Larry Forcier
University of Vermont

Karen Horn
Vermont League of Cities and Towns

Thomas P. Menson
Agency of Administration

William Aswad
VAPDA

Roberta Coffin
Department of Health

David Healy
Office of Policy Research & Coordination

Patricia Klinck
State Librarian

Elbert Moulton
Agency of Development & Comm. Affairs

Peter Bluhm
Agency of Administration

Susan Crampton
Agency of Transportation

Steve Holmes
Dept. of Housing & Comm. Affairs

Jonathan Lash
Agency of Natural Resources

Pat Thomas
Department of General Services

GIS WORKING GROUP MEMBERS

Ross Brewer
Department of Education

Carl Fielder
State Information Services

Keith Goffin
Windham Regional Commissioner

Al Kieslick
New England Telephone

Craig Leiner
Chittenden RPC (VAPDA)

Edwin Moore
Underhill

Alan Perkins
Two Rivers - Ottauquechee RPCD

William Rowley
City of Burlington

Chet Briggs
Calais Planning Commission

Mary Jeanne Gaiotti
U.S. Forest Service

Jed Guertin
Agency of Dev. & Comm. Affairs

Winslow Ladue
Department of Health

John Marshall
Green Mountain Power

Joyce Olson
Town of Williston (League of C & T)

Chuck Ratte
Agency of Natural Resources

Gary Smith
University of Vermont

Alan Charron
Agency of Dev. & Comm. Affairs

Gerry Gingras
Agency of Transportation

Amy Jestes
Department of Agriculture

Reginald LaRosa
Department of Environmental Cons.

Sybil McShane
State Library

Julio Olympio
U.S. Geological Survey

Harry Rousch
Division of Property Valuation

John Tichner
Soil Conservation Service

Appendix B

Fiscal Year 1989 Summary of Expenditures

Through February 28, 1989

GIS Timetable, Budget & Expenditures - FY 89

Category/Item	Project Start	Project Finish	Amount Budgeted	Committed To Date	Expended To Date	Unexpended Balance
PlanGraphics	Sep 88	Mar 89	$150,000	$150,000	$92,610	$57,390
Pilot Projects						
UVM-Year 1 of Digitizing (Est.)	Nov 88	Jun 90	$223,000	$223,000	$603	$222,397
SCS-1 Year of Quality Control	Nov 88	Jun 90	$18,500	$18,500		$18,500
ANR Pilot	Jan 89	Jun 90	$49,000	$25,000	$9,105	$39,895
DOH Pilot	Jan 89	Jun 90	$49,000	$35,000	$23,311	$25,689
Central Vermont RPC	Jan 89	Jun 90	$20,000	$25,500		$20,000
Two Rivers-Ottauquechee RC	Jan 89	Jun 90	$20,000	$29,000	$6,205	$13,795
City of Montpelier	Jan 89	Jun 90	$20,000	$28,500		$20,000
AOT Pilot	Feb 89	Jul 89	$10,000			$10,000
CAPTAP Pilot	Jan 89	Jul 89	$15,000	$15,000		$15,000
Marketing Study	Mar 89	Jul 89	$10,000			$10,000
Evaluation of Federal Data	Feb 89	Sep 89	$4,000			
Utilities	Jul 89	Jun 90	$0			
Survey Marker	Jul 89	Jun 90	$0			
Libraries	Jul 89	Jun 90	$0			
Public Information Campaign	Mar 89	Jun 90	$4,000			
Heritage Program			$23,768	$23,768	$23,768	$0
Printing & Office Supplies			$5,000		$1,759	$3,241
Postage			$2,500		$1,381	$1,119
Committee & Staff Expenses			$3,000		$1,304	$1,696
Travel, Training, Etc.			$4,000		$2,470	$1,530
Implementation			$50,000			$50,000
Uncommitted/Unbudgeted			$69,232			$69,232
TOTALS			$750,000	$573,268	$162,515	$587,485

Appendix C

Geographic Data Resource Catalog
Sample Output

State of Vermont Geographic Information Data Resource Catalog

Item Name: COUNTY MAPS

Received Date: 11/28/88 Source Code: 53

Source: CUSTOMER SERVICES BRANCH
DATA USER SERVICES DIVISION
BUREAU OF THE CENSUS
WASHINGTON, DC 20233-

Contact: DELORIS FENTRESS
301-449-1600

Scale: 1" = 2 MILES

Technical Assistance:
Available from source [Y]

Subject Coverage:

[ ] Hydrology (surface/sub-surface)
[ ] Regulatory Program (permits)
[ ] Land Use/Land Cover
[ ] Health/Education Programs
[ ] Land Parcel/Property Related
[ ] Wildlife
[ ] Building Structures
[ ] Poltical Boundaries
[ ] Transportation
[ ] Socio-Economics
[ ] Vegitation
[ ] Geology
[ ] Topology
[ ] Cultural
[ ] Forestry
[ ] Air
[ ] Utilities
[ ] Soils

Other: SEE COMMENTS

Comments:

DEMOGRAPHY; VARIOUS BOUNDARIES INCLUDING CENSUS TRACTS AND ENUMERATION DISTRICTS.

CENSUS MAPS NECESSARY FOR VIRTUALLY ALL USES OF SMALL-AREA CENSUS DATA.

Description: (area of coverage)

THOSE PORTIONSOF COUNTIES NOT IN SMSA's. VERMONT HAS NO SMSA's.

Accuracy

[ ] Suitable for Site Specific Evaluation
[ ] Suitable for Identification of Local Area Conditions/Features
[X] Suitable for Identification of Regional Conditions/Features
[ ] Non-Geographic
Other:

Format

[X] Published Map/Report
[ ] Unpublished Map/Report
[ ] Records/Files
Other:
[ ] Automated:
Hardware:
Software:

State of Vermont Geographic Information Data Resource Catalog

Item Name: COUNTY MAPS

Received Date: 11/28/88 Source Code: 53

Spatial Data Type:

[X] Point [X] Line
[ ] Grid [ ] Polygon
Other:
Comments:

Status:

[ ] Under Development
[X] Operational
Other:
Comments:

Mapped Information Only:

Original Base Map Used: STATE HIGHWAY MAP
Type of Coordinate System: SPC
[N] Stable Base
Individual Map Size: 18 X 24

Age:

Date of Preparation: 01/01/80
Date of Publication: 12/31/80
Date of Revision: 01/01/87

Revision Schedule:

Frequency of Scheduled Revisons:
[Y] Published Revisions Available
Scale: 1" = 2 MILES
Cost: FROM $1.50/SHT

Data Classes/Legend Categories:

Acquisition Notes:

Comments:

Appendix D

GIS Pilot Program Objectives

Objectives:

1. Expand and continue to augment current data available on GIS system at the School of Natural Resources, at the University of Vermont.

2. Evaluate, through selected experiences, the hardware, software and training resources necessary to provide GIS support for local and regional planning commissions. Comparatively evaluate centralized service, remote terminals, and stand alone systems. Evaluate training factors needed for successful implementation of a GIS regionally or locally. Discuss, obtain and summarize public feedback on the importance of various kinds of digitized geographic data to local and regional planning.

3. Establish the feasibility, including the reliability, of decentralized GIS data entry for later transmission to and usee by a centralized GIS. This will include evaluation of training and experience factors for data entry operators and system managers.

4. Evaluate the ability of ARC/INFO and highly selected closely related software products to meet the state's GIS needs.

5. Establish the feasibility of translating data from a central system to some other kinds of systems used by state, local, and private users.

6. Estimate the marketability of GIS services to various private users and the possibility of the GIS system being financially self-supporting or generating $200,000/year after fiscal year 1992.

7. Determine the ranked importance of an urgency for various possible GIS data layers, other than soils, to local and regional planning commissions.

August 1988

Appendix E

School of Natural Resources
University of Vermont

Pilot Project
First Quarterly Progress Report

A SUMMARY OF THE ASSIGNED TASKS

1. Digitize all municipal wellhead protection area maps covering the State of Vermont.

2. Incorporate the detailed soils maps for Addison, Orange, Windham and Rutland Counties.

3. Delineate, digitize and encode all surface waters covering Addison, Orange, Windham and Rutland Counties.

4. Digitize all town boundaries for Addison, Orange, Windham and Rutland Counties.

5. Create an elevation contour map coverage of Chittenden County. This will be created from the digital elevation model data produced by the State orthophoto mapping program.

LAND AREA COMPLETED

1. *Municapal Wellhead Protection Areas:* All municipal wellhead protection areas available to date have been digitized and incorporated into ARC/INFO. They were digitized from U.S.G.S. Topographic quadrangles and are currently stored in UTM coordinates. At a future date the will be converted to the State Plane projection to match the state orthophotos. As new municipal wells are drilled and mapped by the Health Department they will be added to the data base.

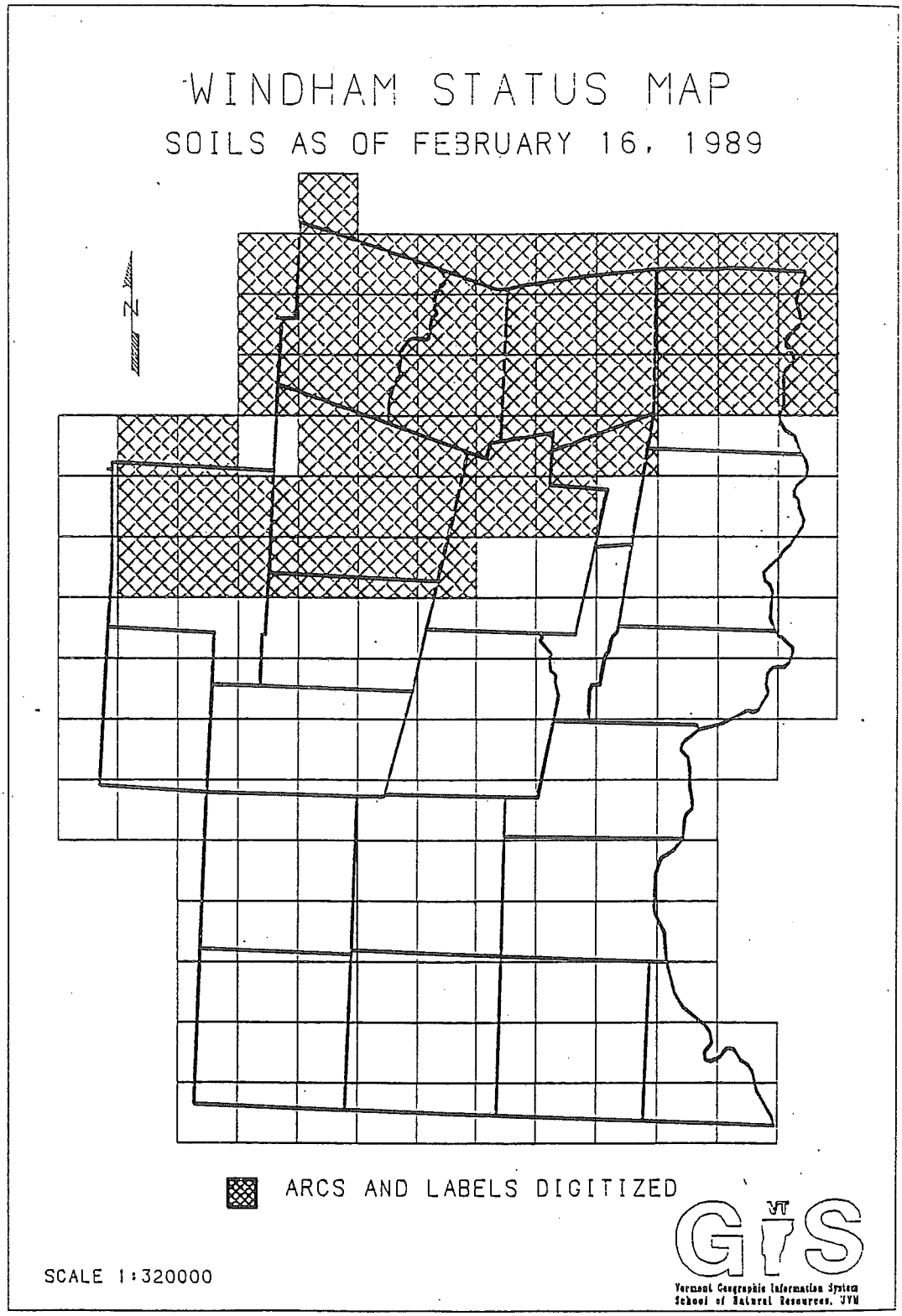
2. *Digitize the Detailed Soils For Addison, Orange, Rutland and Windham Counties:* Two counties are currently in progress. They are Windham and Addison. Status maps are included with this report indicating the areas completed in each phase. Both Addison and Orange counties were not published on an orthophoto base and thus require re-mapping on to a controlled base (the State Orthophoto Base). The status map for Addison soils indicates the area that has been transferred to the controlled base. None of the soils in this county have been digitized. Our intention is to have this information scanned. Windham

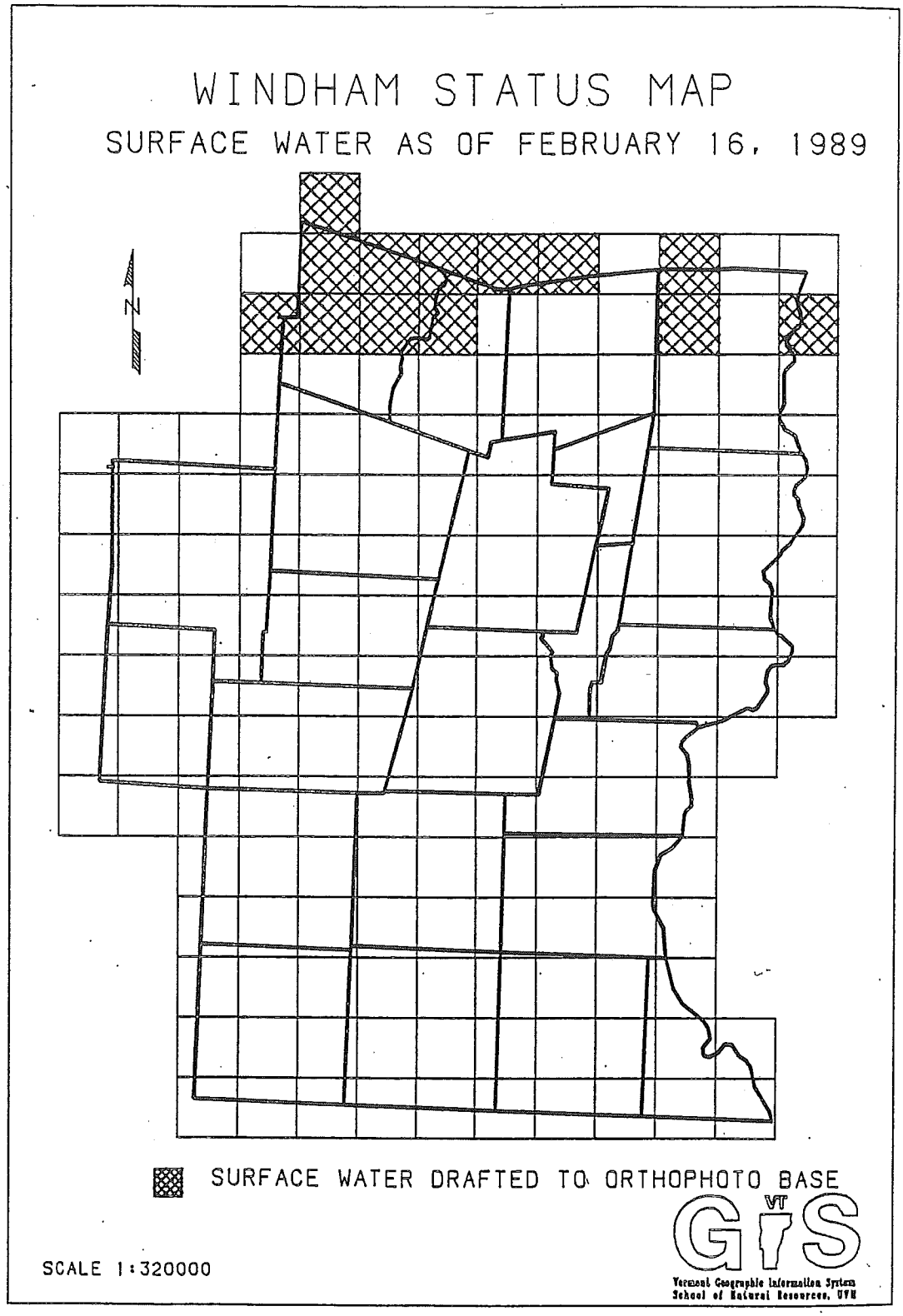
County was published on the State Orthophoto base maps and is being digitized directly from the publication master sheets.

3. *Digitize the Surface Waters for Addison, Orange, Rutland and Windham Counties:* The enclosed status map indicates the extent of surface water mapping that has been completed. This information is being defined on the 1:5,000 scale State Orthophotos.

4. *Digitize all Town Boundaries for Addison, Orange, Rutland and Windham Counties:* To initiate this process, we have digitized all of the town boundaries in Windham County from the USGS Topographic Maps. These boundaries were then projected into State Plane coordinates. As we begin to overlay this line work on the orthophotos, we hope to begin to better define the lines true location.

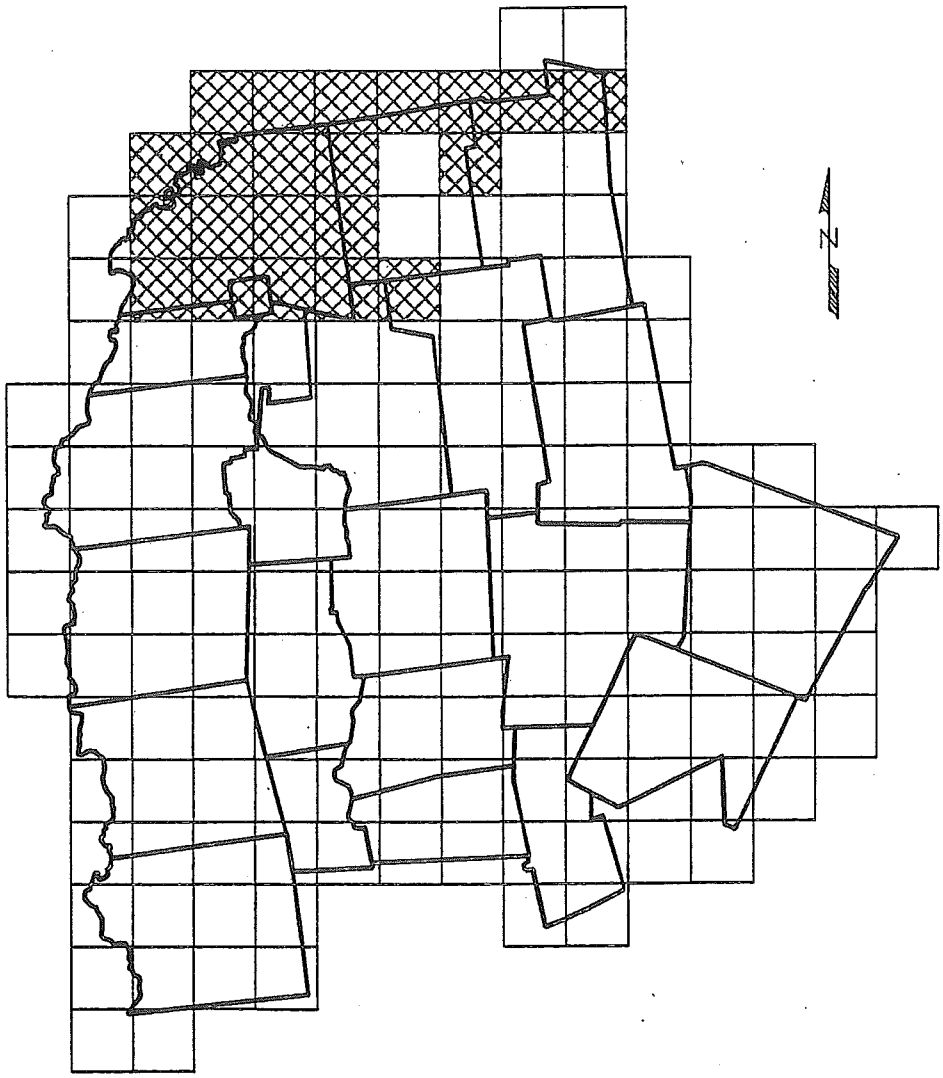
5. *Create a Contour Data Layer for Chittenden County From the Orthophoto Digital* Elevation *Model:* No work has started on this portion of the project. We waiting the arrival of the first DEM tapes.


WINDHAM STATUS MAP
SOILS AS OF FEBRUARY 16, 1989
N
ARCS AND LABELS DIGITIZED
SCALE 1:320000
VT GIS
Vermont Geographic Information System
School of Natural Resources, UVM


WINDHAM STATUS MAP
SURFACE WATER AS OF FEBRUARY 16, 1989
N
SURFACE WATER DRAFTED TO ORTHOPHOTO BASE
SCALE 1:320000
VT GIS
Vermont Geographic Information System
School of Natural Resources, UVM

ADDISON STATUS MAP

SOILS TRANSFERED AS OF FEBRUARY 16, 1989



SOILS TRANSFERRED TO ORTHOPHOTO BASE

SCALE 1:370000

Vermont Geographic Information System
School of Natural Resources, UVM

Appendix F

Regional and Local Community Pilot Project

Summary Descriptions

Central Vermont Regional Planning Commission:

Summary Description: A large area database will be developed using the 1:100,000 USGS/Census Bureau and applicable UVM information for regional planning uses. A small area database will be developed using the 1:5,000 scale orthophoto base map for two town uses. The RPC plans 19 applications over the 18 month period.

The RPC will demonstrate the use of GIS for displaying information from a regional database of time series information. This database includes housing, transportation, solid waste, demographic, employment, and tourism information. This regional approach may provide a prototype for other RPCs.

The local database effort will focus on the towns of Plainfield and Calais. The RPC will develop a prototype for a regional service center/information repository for small towns. CVRPC will download Plainfield specific data layers from the UVM GIS and expand them to cover the entire town. Both Plainfield and Calais will provide the CVRPC $4,000 each over the project period to digitize existing parcel maps, zoning boundaries, and roads. In addition, the RPC will download with the help of UVM the towns' CAPTAP files for land use analysis.

GIS Share:	$25,350
Local Share:	$27,830

Two Rivers - Ottauqueechee Regional Commission

Summary Description: RPC will prepare a digitized base map for municipalities and region; evaluate effectiveness of PC ARC/INFO in meeting the needs of planning at the municipal and the regional level; evaluate the quality and convenience of data transfers and conversions between the PC and the UVM system, particularly other drawing and database software; and evaluate the size of a municipality appropriate for acquisition of its own system.

This regional approach may provide a prototype for other RPCs. They are working with the Towns of Woodstock, which already has some data layers currently in the UVM GIS, Randolph, and other small towns.

GIS Share: $29,400

Local Share: $43,600

City of Montpelier

Summary Description: Montpelier plans to make GIS an integral component of planning and city management, especially in developing the city plan update. The city will develop a new parcel map with contour information, roads, and other resource information. They plan to translate their CAPTAP data into the system.

The city will work jointly with the RPC both in developing their program but in the resolving of technical issues as they arise. They will coordinate the data entry and digitizing with CVRPC to ensure compatibility.

The city plans to use the system for land capability analysis, land use forecasting, facility siting, environmental assessment, transportation network, and routing of emergency and public works vehicles, land record management, demographic and survey data, and all municipal facility records.

GIS Share: $28,540

Local Share: $36,300

ABD-9963

VERMONT DEPT. OF LIBRARIES
0 00 01 0100934 8