Annual Report 2003

Vermont Center for Geographic Information Inc.

Vermont GIS 2003: A Status Report

Annual Report of the Vermont Center for Geographic Information, Inc. and the Vermont Geographic Information System

January 2003

For

Governor Jim Douglas

and

Vermont House and Senate Appropriations Committees

Provided by the

Vermont Center for Geographic Information, Inc.

Vermont Center for Geographic Information, Inc.

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This report could not have been prepared without the comments and contributions of the Vermont GIS community, including Vermont's regional planning commissions, commercial GIS firms, and numerous state and federal agencies. I would also like to acknowledge the VCGI staff for their assistance in the production of this document.

David F. Brotzman , VCGI Executive Director

January 15, 2003

Honorable Jim Douglas
The Statehouse
Montpelier, VT 05602

Dear Governor Douglas,

The Vermont Center for Geographic Information, Inc. (VCGI) is pleased to provide you with the Vermont Geographic Information System (VGIS) Annual Report. **Vermont GIS 2003: A Status Report** includes a commentary on VCGI's strategic direction for the future, a status of the 10 most critical base data layers within the Vermont Spatial Data Infrastructure (VSDI), and a summary of VCGI's current GIS projects and activities.

Achievements for the past year include:

- Significant improvement in VCGI's Internet based data services and mapping access for the Vermont GIS community.
- Continued GIS data development focused upon critical State decision areas such as hydrographic data and transportation related datasets.
- An increased focus on developments within the Federal Geographic Data Committee (FGDC), Office of Management and Budget (OMB) and U.S. Geological Survey (USGS) in support of federal Homeland Security related initiatives.
- Yearlong support to the professional development of GIS professionals and users in the state.
- Coordination and development of bridge and culvert data standards and municipal mapping guidelines for use by towns, Regional Planning Commissions and GIS consultants throughout the state.
- Continued financial and technical support for the completion of the Vermont Statewide Soil Data Survey to be completed to SSURGO national standards.

Copies of this Report have been distributed to the Vermont General Assembly and to agencies participating in the Vermont GIS. Please feel free to contact me if you have any questions or comments.

Sincerely,

David F. Brotzman
Executive Director
davidb@vcgi.org

Executive Summary

2002 ACHIEVEMENTS

During 2002, the VCGI team worked hard to strengthen and diversify our services with specific emphasis on support to state agencies undertaking GIS initiatives for the first time and GIS data collection. New partnerships were developed as existing agencies in the state began to recognize the value of GIS in accomplishing their goals. Existing partnerships were strengthened and in some cases broadened to include more participants. The larger aspects of this year's efforts are discussed below.

Vermont's GIS Data Infrastructure

VCGI's support to the development of quality GIS data within the State continues to remain our primary focus. Given our charter, it is unlikely this will change in the near future. During 2002, VCGI continued to focus heavily upon upgrading two critical data types, Transportation Data and Hydrographic Data.

Both of these data types enjoy a particularly high profile in the Vermont planning community. As a result of the efforts of VCGI, VTrans, USGS and the Vermont GIS community as a whole, the state of Vermont is nationally recognized as having some of the highest quality statewide Hydrographic and Transportation data in the nation.

Steve Sharp is the primary coordinator of Transportation Data development and maintenance at VCGI . Steve works with the Vermont Agency of Transportation and the Regional Planning Commissions to help VTrans ensure the state's transportation data is accurate, available and up to date. This year VCGI, with support from VTrans, completed our yearly review of road data throughout the state. Each year the quality of this data improves markedly. This year we also completed densification of the road data associated with VTrans' Linear Referencing System (LRS) and updating of the Route Log Points data for inclusion in the LRS.

This year VCGI and VTrans have initiated the first stage of a data sharing agreement that will enable the distribution of the latest road data contained in the VTrans system. By using the same Spatial Data Engine software and implementing agreed upon file and data sharing protocols VCGI and VTrans are implementing one connection in a possible enterprise-wide data sharing model.

Other agencies and groups such as the Agency of Natural Resources, The Spatial Analysis Lab at UVM and the Regional

Planning Commissions are interested in becoming a part of this statewide dynamic data sharing model.

VCGI completed the second year of a three-year Federally funded grant to upgrade Vermont's surface hydrography data to National Hydrographic Data Standards and increase overall data accuracy. Mike Brouillette continues to expand the statewide partnership for this effort that includes the RPC's, the Agency of Natural Resources and several of Vermont's watershed advisory groups. Coordination between VCGI and state and regional hydrographic related entities continue through telephone conferences and meetings to further the development of Stream Geomorphic Assessment Protocols. In addition, a new working relationship was established with the Lakes & Ponds Management/Protection Section in ANR/DEC to help integrate this federally directed effort into supporting Vermont priorities.

As this effort comes to a close in the upcoming year VCGI will be working hard to develop a maintenance protocol for this data, a critical aspect in the determination of its useability for the future.

Every year VCGI personnel work hard to upgrade existing data sets that are currently available and to find new data for public distribution. 2002 was no different in this regard. While these new or upgraded data sets are too numerous to mention here there are some notable additions. This year VCGI created spatial data sets depicting the coverage of both Senatorial and House districts in Vermont in accordance with the State's 2002 redistricting efforts. In addition, updated Census, Geologic, Bridge and Culvert, Elevation, Soil and Sprawl data was made available. The scope and value of these publicly available data resources continues to increase with every year.

Statewide GIS Advocacy

This past year, VCGI engineered a major upgrade to our web mapping services. A new, more powerful, easier to use website will be released to the public in the second week of January 2003. The release of this website finishes a major effort for our organization. Not only does our data distribution mechanism have a new look and feel, but the underlying database is entirely redesigned to new specifications. This effort was undertaken to support the future development of the previously mentioned enterprise-wide GIS within the state. By completing this redesign VCGI has created the fundamental infrastructure that will support several levels of participation in support of this statewide data sharing model.

VCGI continues to provide GIS data and VGIS products on CD for a nominal cost. The demand for these products remains relatively low but constant. VCGI will continue to offer the current suite of products on a continuing basis as long as demand remains, but the primary focus of our data and product distribution will remain the Internet.

VCGI personnel participated in a wide range of GIS advocacy and support roles this past year. For the fifth straight year VCGI held our GIS EXPO in April. Each year attendance increases noticeably as interest in the science and business of GIS also increases. This year in particular the EXPO was well attended by a wide age range of students from K-12 up to the University level. As always, the exhibitors and participants included GIS related businesses and consultants from throughout Vermont and the northeast. The Vermont GIS EXPO has become something of a yearly milestone in the GIS business and regional technology providers anticipate it as a place to show their wares.

VCGI personnel also provided GIS related professional expertise for the following organizations:

- Chittenden County Metropolitan Planning Organization Transportation/Land Use Decision Support System Steering Committee
- Vermont Emergency Management Automation Effort
- Vermont Department of Tourism and Marketing
- Center for Rural Studies at UVM
- UVM Extension
- UVM Spatial Analysis Lab
- Vermont Historic Preservation
- Vermont Town Officer Educational Conferences
- Vermont Public Service Agency
- Vermont Natural Resource Conservation Service
- Private GIS Consultants throughout the state
- Central Vermont Chamber of Commerce
- Vermont Regional Planning Commissions

VCGI personnel work aggressively throughout the year to support the general public, State Universities and State Agencies in their pursuit of GIS related activities. We continue to search out new partnerships in an effort to make the Vermont GIS community even stronger and more connected.

ANNUAL REPORT CONTENT

This document provides a status report on the state of GIS in Vermont as well as a snapshot of projects and activities at the Vermont Center for Geographic Information. Section I outlines VCGI's strategic direction for the coming years. It includes a historical discussion of the origin and purpose of Vermont's GIS

and VCGI's role in that mission. Section II discusses the status of the base data layers that make up the Vermont Spatial Data Infrastructure (VSDI). Section III provides profiles for several of VCGI's more impacting projects. Section IV contains several appendices of VCGI's financial reports for FY02.

CONCLUSION

2002 was a year of change for this organization. We relocated our office to a new building in Waterbury following a long tenure on campus at the University of Vermont. We redesigned our data storage and distribution mechanism to support a greater role in meeting the needs of the public and providing a foundation for statewide data sharing that can reduce data management costs for all state agencies using our data. VCGI has also participated in the national debate over the use of GIS data in support of Homeland Security and infrastructure management. Within the national GIS community the efforts of the State of Vermont are justifiably well respected. VCGI is proud that we continue to play a major role in those efforts.

Table of Contents

TABLE OF CONTENTS

preparing and allowing the use of copyrighted materials.”

Acronyms used in this report include:

ANR	Vermont Agency of Natural Resources (GIS Unit and Department of Environmental Conservation)
EPA	United States Environmental Protection Agency
E-911	Vermont Enhanced 911 Program
FGDC	Federal Geographic Data Committee
NRCS	Natural Resource Conservation Service (U.S. Department of Agriculture); formerly Soil Conservation Service
NSDI	National Spatial Data Infrastructure
RPCs	Vermont's twelve regional planning commissions
USFS	Forest Service (U.S. Department of Agriculture)
USGS	Geological Survey (U.S. Department of the Interior)
VEM	Vermont Emergency Management
VCGI	Vermont Center for Geographic Information, Inc.
VGIS	Vermont Geographic Information System
VSDI	Vermont Spatial Data Infrastructure
VTrans	Vermont Agency of Transportation

I. Strategic Direction

This section outlines the key components of the five-year strategic plan approved by the VCGI Board of Directors in June 2001.

MISSION

VCGI will pursue a comprehensive strategy for the development, maintenance and use of the Vermont GIS, and provide GIS services and support to all Vermonters.

GOALS

VCGI will accomplish its mission by:

- Assuring that all VCGI data is of high quality and is compatible with, useful to, and shared with other public-sector data users.
- Encouraging the same high standards of quality and compatibility in other Vermont GIS cooperators.
- Promoting the efficient development and use of geographic information by agencies of the state, its political subdivisions, Vermont businesses and citizens.
- Facilitating the growth of commercial services within Vermont for the provision of spatial data, products, and services.

VISION

As VCGI moves to meet the new challenges of the future it needs to broaden its role by facilitating the *use* and *analysis* of spatial information.

ORGANIZATION

In January 1992, Governor Howard Dean, M.D. issued an executive order establishing VCGI as a non-profit corporation under the authority of a Board of Directors. The Board includes twelve directors appointed for two-year terms to represent state agencies, regional planning commissions, local government, higher education, private-sector and both chambers of the Vermont General Assembly. The Board has the responsibility for general management of and authority over the property, business and affairs of the center.

VCGI is located in Waterbury, VT. It is staffed by an Executive Director, Business Manager, Outreach Coordinator, GIS Senior Project Manager, GIS Project Manager, and a GIS Technician. VCGI serves as a clearinghouse for Vermont GIS data.

STRATEGIC DIRECTION

Since its inception, the Vermont Center for Geographic Information has focused its efforts on developing data, policies and standards; implementing a web-based data clearinghouse for the electronic distribution of data; and

providing outreach, networking, and information exchange for the Vermont GIS community. These *core activities* are essential functions for the success of GIS in Vermont. As VCGI continues to meet the needs of a changing business area it needs to broaden its role beyond the development of data toward the facilitation of the use of spatial information. VCGI's *strategic direction* is described below:

1. **State and Regional Leader** VCGI will serve as a state and regional leader in GIS. VCGI will pursue opportunities that showcase VCGI at the state, regional and national level. Making Vermont a demonstration state will provide greater opportunities for funding and provide users with GIS application examples. As the GIS market in Vermont is relatively small, regional leadership will provide "export business" for VCGI and its partners.

2. **Private Industry Partnerships** As an enhancement to our export business strategy, VCGI will seek out GIS projects and funding that are suitable for partnering with the private sector. With VCGI serving as project manager, this will enable us to take on larger contracts with partners and/or subcontractors, and bring in the private sector as appropriate. We will be able to create markets for private industry.

3. **Educational Partnerships** VCGI is expanding its partnering efforts with the University of Vermont (UVM) and other educational institutions (including state and private colleges). We will continue with this direction as this type of partnering enhances our opportunities to present a stronger solution to projects that include a GIS component.

4. **Resource to Organizations in the State** VCGI will participate in a Geographic Information Committee with State Agencies. VCGI sees this as a way to facilitate the reduction of redundant activities among different State agencies.

5. **High Tech Investment** VCGI seeks to become a regional test center for new, cutting edge, GIS technology.

6. **Revenue Distribution** VCGI would like to have its revenue distribution such that it receives less than 40% of its total revenue from its State appropriation. In addition, no single grant or contract will be greater than 20% of VCGI's project revenue. The goal is to not be dependent on any one contract or project.

7. **Maintenance Contracts** As VCGI continues in its role as the

data clearinghouse for VGIS data, it needs to transition from the initial phase of establishing data sets for distribution, into the phase of data maintenance. Providing data that is up-to-date and of quality will enhance our data dissemination efforts. VCGI will provide direction for data stewards regarding funding opportunities and technical support for data maintenance issues.

8. **Stronger Coordination with Regional Planning Commissions (RPCs) and towns in the area of GIS** Services that VCGI can provide include coordinating the development of a comprehensive statewide parcel data layer and providing training on VGIS technical issues.

9. **New Markets** VCGI has historically worked with traditional GIS segments: state and local government, and education. VCGI would like to explore opportunities in new arenas including but not limited to healthcare and real estate.

10. **Organizational Upgrade** VCGI will seek to upgrade its internal databases, software control and internet presence over the next few years. The internet has become an increasingly critical component for data access within the GIS community and for VCGI to be responsive to the wide range of users it is necessary for us to expand our current online capacity.

RESOURCES

VCGI is staffed with a very talented group of individuals. This group is motivated and excited about learning new technologies. Staff are willing to be trained in new technologies such as Visual Basic and Map Objects/Internet Map Server to expand our capacity. Some of this training has already taken place for a few staff members and several staff have already been involved in web application development. VCGI will not attempt to keep the web server operational 24 hours a day. VCGI will keep the server maintained during business hours (M-F, 8-5). In the event that specific applications have the requirement to be operational beyond normal business hours, VCGI will work out arrangements with the client for a fee.

CONCLUSION

Everyday we find that technology continues to become even more critical to our daily lives. VCGI is excited about the possibilities and responsibilities this brings to the VGIS. We will continue our role as the GIS resource in Vermont and will expand our efforts to provide GIS services to all Vermonters and the region.

II. Vermont Spatial Data Infrastructure

VCGI's 2002 Annual Report provides the Governor, the Vermont General Assembly, and our citizens with information about Vermont's steady progress in building a *Vermont Spatial Data Infrastructure*. This section provides a status on these base data layers.

A. DIGITAL ORTHOPHOTOGRAPHY

Orthophotographs are detailed aerial photographs from which all distortion has been removed. Since 1975 Vermont has provided orthophotographs showing taxpayers their lands and buildings at 1:5,000 scale. These pictures can be measured reliably, and are a crucial tool in local planning and development efforts.

Digital orthophotographs offer new degrees of accuracy and can be used as a backdrop for computerized engineering drawings and maps. They record elevation, slope and other third dimension information of roads, streams, hills and valleys.

Status: By the fall of 2001, the latest digital orthophotographs were available for the entire state. This is a very significant milestone and one for which the State can be justifiably proud. This data is used every day by many private businesses, public agencies and citizens in the state. At this point the focus needs to turn to implementing a statewide plan for updating the orthophotographs on a regular basis with full state update coverage being completed every five years.

The statewide orthophoto base is a tremendous asset for local and state planning and research efforts. It provides a common, accurate base upon which the important issues of resource management, economic development, pollution control, emergency management and many others can be pursued. Other states throughout the country are just now beginning to acquire the kind of quality image base that Vermont has wisely taken the lead on.

Unfortunately, these photographs inevitably become less current with time as new development takes place and local land use changes. For this information to remain viable it is necessary to recollect orthoimagery on a continuing basis. By recollecting every five years the state will maintain a realistic balance between the availability of funding and the operational need for updated photographs. As new photographs are taken the state will also gain advantage from the previously existing photographs as a historical record. With each subsequent collection of photographs the state will develop a more robust library of historically accurate spatial information in support of development

trend and land change analysis.

B. TRANSPORTATION

Vermont's transportation data layers consist of road centerline, railroad, bridge, and other associated information (ex: traffic volume, accident locations, etc.). The statewide road centerline data layer identifies all public and private roads, identifying road class, surface type and route number. This data layer has become the "skeleton" for many valuable uses of Vermont's GIS assets at the local, regional and state level.

Status: VTrans and VCGI personnel worked very hard over the past year to continue to upgrade the available transportation data. VCGI and the Vermont Agency of Transportation are developing an even stronger relationship based upon data sharing and data quality reviews. This relationship will continue to grow in the upcoming years.

The quality of transportation data in Vermont is nationally recognized as being very high. This year VTrans and VCGI completed a Route Log Intersection and Calibration Densification initiative that will be a key component to VTrans' new Route Log System. The team also completed Phase I of VTrans' new Linear Referencing System (LRS) 2002 data development project. VCGI generates an LRS data coverage annually based on the latest route information and road centerline data. Updated bridge location data was completed this year and Town Road map data was reviewed again this year for the entire state.

C. LAND COVER

Accurate land cover data allows Vermonters to better visualize the choices in economic growth and natural resource protection. Land cover data shows areas broken down into many categories of Forests, Wetlands, Water, Rock, Cleared Land, and Urbanized landscapes. This imagery combined with on the ground verification can provide foresters and agricultural experts detailed information such as breakdowns in forest and crop types. Combined with other Vermont data we can make important observations about changes to our productive lands, protection of ecosystems, and where we can encourage development with least harm to important land areas.

Status: Land Cover data suitable for use at county or regional scale mapping and analysis has been derived from satellite imagery (LANDSAT Thematic Mapper), and is highly compatible with similar data for New York and New Hampshire. The database was completed in September 1997, after years of effort by the contractor and VCGI staff, with funding support from the Lake Champlain Basin Program, the Northern Forest Lands Resource Inventory, and the EPA.

The Spatial Analysis Lab at UVM has also recently completed a 2002 Land Cover analysis for the state that specifically identifies publically and privately owned conserved lands. Additionally, USGS has undertaken a small scale

source (30 meter imagery) based collection of Land Cover data over the Northeast in support of a national Land Cover / Land Use dataset. This data set was completed by the writing of this document but it is not yet available to the public.

It would seem from these efforts that the state has an adequate amount of Land Cover data available. Unfortunately this is not true. All of the available data is either of too small scale to be applicable for regional and local planning or too old to be accurate enough. A large scale, single standard statewide Land Cover / Land Use data set remains one of the most desired data types in the state. The development and acquisition of Land Cover related data is becoming a more pressing concern as the state determines its environmental, planning and economic development priorities.

D. REGULATORY WETLANDS

Wetlands are a key feature needed both by planners and environmental officials and by commercial interests. They are necessary for identifying growth centers, areas to protect, and areas suitable for development. A standardized statewide wetlands database allows both public and private interests to identify areas of possible state regulatory concern. This data should not be used to replace in-the-field assessment of any particular site; rather, it should be used as a starting point in the permitting process.

Status: Maps provided in the late 1970s by the National Wetlands Inventory (NWI) program show the approximate locations of wetlands regulated by the State of Vermont. Vermont's Significant Wetlands Inventory (VSWI) includes many of the wetlands delineated on the National Wetlands Inventory. The complete VSWI data base and the official maps produced by ANR from this data are useful for indicating the approximate locations of wetlands that are recognized by the Vermont Wetland Rules. The statewide database is complete, and ANR has completed the time-consuming checking of individual town maps prior to release of certified copies.

However, the availability of data representing the accurate positional location of wetlands across the state remains an issue. 1:5,000 scale minimum, single standard, positionally accurate, field checked wetland data is sorely needed across the state to meet the needs of planners, land owners, and town personnel just to name a few.

E. CADASTRAL or PARCEL DATA

In 1988 Vermont's five-year GIS plan identified municipal parcel boundaries as a fundamental database to support local planning and development. Dozens of towns had invested in high quality maps over the years, and state funding (1989-91) supported conversion of maps into GIS databases.
GIS formatted parcel data help municipal officials to assure a more accurate property tax assessment. Towns link the parcel data to their Grand Lists and then can map detailed local tax information. Municipal tax officials, realtors,

planners and developers use this data to show taxpayers how proposed development or changes in municipal services and regulations will affect them and their neighbors. In many towns parcel data helps to assure fair tax distribution, plan bus routes and other services, provide public notices, and many other municipal services.

Mapping can cost communities tens of thousands of dollars, depending upon the town's area and number of parcels. Most towns that have mapped parcels have difficulty finding time to update them. Of those that do not have mapped parcels, only a few towns have had the resources to contract for the initial mapping (in the absence of state financial help.) As Vermonters apply increasing scrutiny to their relative property tax burden, and planning and zoning issues increase in importance, those towns without this crucial data resource are at a disadvantage in providing information to citizens, and in assuring equitable distribution of financial burdens.

Status: During the fall of 2002, VCGI's outreach coordinator collected information from the Regional Planning Commissions regarding the status of digital parcel mapping in VT. Each RPC's GIS Specialist was asked to provide information regarding whether towns had paper maps and digital parcel data, as well as whether the RPC played a role in archiving or maintaining that data. VCGI staff had previously collected similar data in 1998.

Not surprisingly, Chittenden county has 100% coverage in digital parcel data, while northeastern and northwestern counties all have less than 50% coverage. This difference is likely due to the greater development pressure found in Chittenden county as compared to the northern corners of the state. Lamoille and Washington counties also both have greater than 80% coverage. The change seen from 1998 to 2002 seems to reflect only a gradual increase in the number of towns with digital parcel data, rather than any particular area showing an accelerated increase. Overall, 62% of VT communities have digital parcel data now, as compared to 53% in 1998. That slow rate of increase is likely to continue given no other changes in the situation and without the availability of funding support to the towns for this purpose.

F. ELEVATION DATA

Elevation data consists of Digital Elevation Model (DEM) data and contour information. DEM data provided by the U.S. Geological Survey (USGS) have been obtained by VCGI for redistribution. Contours were generated from the DEMs and can be used effectively to show general topography. The requirements for digital elevation data are becoming more rigorous as more applications are developed to use the data. Digital Elevation data is required for 3 dimensional representations of land modeling. Land modeling is often done to provide support to planning and economic development as well as environmental analysis.

Status: Updated and accurate Digital Elevation Model (DEM) information with 60 meter gridded post spacing is available for the entire state. The data was created as part of the statewide Orthophoto program and conforms to the 1:5,000 scale photographs.

1:24,000 scale based gridded digital elevation data is available through VCGI. This data was created by the United States Geological Survey as part of a national program based on their 7.5 minute topographic maps. 1:250,000 scale based gridded data is also available. While not as accurate on the post as the elevation data available through the orthophoto program this data is still useful in some applications and it does conform to national standards.

While statewide DEM coverage is available in Vermont, more accurate and more densely populated elevation data will be needed to support accurate 3D local site analysis in the future. The cost of collecting this data through third parties is still fairly high but competitive business pressures can be expected to continue to drive the cost down in the future.

G. SOILS

For many years the State of Vermont has shared with the Natural Resource Conservation Service (NRCS) of the US Department of Agriculture the costs of the "Cooperative County Soil Survey."
NRCS specialists work county by county, taking detailed samples of soil characteristics, agricultural and septic suitability, slope and many other features. After years of checking, testing, and map making this information is published in county soil survey publications, in great demand by farmers, foresters, developers, planners and others.

Status: The Vermont Soil Survey Program at NRCS provides a digital soil survey for each county to the people of Vermont through the Vermont Center for Geographic Information (VCGI). Eleven counties now have a digital soil survey that is available at VCGI. They include the following counties: Addison, Bennington, Chittenden, Franklin, Grand Isle, Lamoille, Orange, Rutland, Washington, Windham, and Windsor.

Eight counties are nationally (SSURGO) certified. They are Addison, Bennington, Franklin, Lamoille, Rutland, Washington, Orange and Windham Counties. The Windsor County digital soil survey was submitted for SSURGO certification in 2002.

The soil surveys for Chittenden, and Grand Isle Counties are out of date and do not meet SSURGO or VCGI standards for soil surveys. These soil surveys were digitized in the early 1980's and NRCS needs to conduct extensive quality control work to ensure that they meet state and national standards for digital soil surveys. This work is currently scheduled for the winter of 2002-2003. If

practical, either or both surveys will be submitted for SSURGO certification. Caledonia, Essex, and Orleans counties will be digitized after the mapping is completed in those counties.

The digital surveys for these counties are scheduled to be completed in the following order, as long as funding remains at current levels:

2003 Orleans County
2004 Chittenden, Grand Isle (If SSURGO Certification is practical)
2005 Caledonia County
2010 Essex County

H. HYDROGRAPHY

Vermont's rivers, streams and the lakes and ponds through and into which they flow form a visible and valuable part of our landscape. The accurate and complete location of these features is crucial to many related planning activities in both the public and commercial sectors. Accurate delineation of soils necessary for farmers and for developers requires accurate referencing of watercourses. Protection of watersheds from potential pollutants upstream depends on accurately networked stream data.

Status: As part of VCGI's three-year partnership with USGS and our work with Vermont ANR and the RPC's, the state's surface water data is being systematically updated. The data is being upgraded for accuracy of delineation and attribution on a watershed by watershed basis using the 1:5,000 scale statewide orthophotographs as a base.

The 1:5,000 scale Vermont Hydrography Data set is being constructed in two separate phases. The first phase, results in a "Pre-release" version of data by 8 digit cataloging unit that will be available from the VGIS website. In this phase the best surface water data available is identified and aggregated. Edits include enhancing spatial accuracy and creating a hydrologically correct network. While certain attributes are carried over from the source data, none are enhanced in this step. Phase II, will produce a "Final" version of the data set compliant with the National Hydrography Dataset (NHD) and contain a wealth of attributes transferred over from the 1:24,000 scale surface water data.

As of the end of 2002 the following watersheds have been processed through the pre-release level and are available to the public:
Missisquoi
Lamoille
Passumpsic
White
St. Francois

Connecticut River Bellows Falls to Vernon Dam
Deerfield
Lake Champlain
Otter Creek
Upper Connecticut
Winooski

I. GEODETIC CONTROL

Geodetic survey horizontal and vertical control points are generated from National Geodetic Survey data maintained by the Vermont Agency of Transportation - Geodetic Survey Unit.

Status: This data set exists statewide primarily in association with the road network. Additionally, the Geodetic Survey Unit maintains a Continuously Operating GPS Reference Station (CORS) at 133 State Street in Montpelier. GPS users download the data and typically use it to "correct" the GPS data they have collected in the field in order to generate more accurate coordinates. In June 1996, the CORS was included in the federal CORS Network.

J. POLITICAL UNITS

Political units consist of town boundaries, counties, supervisory unions, administrative boundaries and legislative districts (house and senate).

Status: Statewide coverage defining, Town, County, Regional Planning Commission, Supervisory Union and School District boundaries are available as well as Vtrans' Downtown and Urban area designated boundaries. New state Senatorial and House district boundaries data that reflects the 2002 legislative redistricting efforts within the state is also available.

K. FUTURE EFFORTS

In 2002 VCGI initiated participation in the national Implementation Team (I-Team) program supported by the Federal Geographic Data Committee (FGDC) and the Office of Management and Budget (OMB). I-Teams are created at the state level but they include participating Federal and local partners. The teams coordinate resources and identify needs based upon a commonly defined set of core data set types such as defined in the ten data types above. These core data sets are then the initial focus of the state's data maintenance and collection efforts in the future although a modification in plans is allowed at any time.

As a direct result of the national homeland security efforts USGS and the National Imagery and Mapping Agency have teamed to create a Homeland Security Infrastructure Report. This report outlines the ability of the various states to meet spatial data infrastructure needs for resource management in times of national emergency. A Tiger Team was developed and a report was created that outlined a preliminary requirements document defining 133 critical urban areas in the country requiring special attention in the acquisition of spatial information. Vermont only has one area on the list within its boundaries, the

Barre-Montpelier area. In addition, this report presented preliminary requirements for a minimum essential data set of spatial information to be collected on a national basis.

Though currently in a very early stage, VCGI continues to monitor and participate in this effort as it unfolds. According to recent discussion the entire effort is dependent upon funding at the national level.

III. VCGI Projects And Partnerships

This section of the Report provides the reader with some of the important activities and projects pursued by VCGI over the last year, our working relationships with multiple federal, state agency and non-profit partners, as well as an idea of the benefits of this work to Vermont GIS stakeholders.

TRANSPORTATION DATA INFRASTRUCTURE

In the past year VCGI has actively supported the **Agency of Transportation** on many GIS related initiatives. Transportation data issues were one of two focus areas for the organization this past year with hydrographic data being the other. The following transportation data related tasks were performed by VCGI either in concert with the efforts of VTrans or as a standalone project.

Updated Statewide Road Data Layer

As in previous years, VCGI worked with VTrans to update the statewide road data layer by providing QA/QC for the data. VCGI would review the data in accordance with written procedures and resubmit the results of the QA/QC work back to VTrans along with any irresolvable data artifacts.

Developed a Bridge and Culvert Data Standard

The Technical Advisory Committee, with support from others in the GIS community, created and reviewed a Bridge and Culvert Data Standard. The purpose of this data standard is to provide local towns and GIS consultants a common data standard for the collection of a town's bridge and culvert infrastructure.

Regenerated VTrans' Linear Referencing System Data Layer

The Linear Referencing System data layer is used to map mile-marker based data such as traffic volumes, accident locations, pavement conditions, construction projects, etc. This data layer will be used in VTrans' new Route Log System currently under development. As part of this effort VCGI also increased the density of the Route Log Points to increase the accuracy of the system.

Completed Phase I of LRS2002 Data Development Project

VCGI generates an LRS (Linear Referencing System) coverage annually based on the latest route information and road centerline data.

VCGI and the **Agency of Transportation** continue cooperative efforts on the development and maintenance of transportation related data, data standards and data issues. Future efforts are intended to increase the level of data sharing

between the two organizations and increase the dynamic level of data distribution.

HYDROGRAPHIC DATA

In 2000, with the partnering support of the **Vermont Agency of Natural Resources**, the **USDA-Natural Resources Conservation Service** (NRCS), and **Vermont's 12 Regional Planning Commissions**, VCGI was awarded a grant from the **USGS National Mapping Center** to enhance Vermont's spatial data infrastructure by extending the **USGS/USEPA** National Hydrographic Dataset (NHD) standard corrected to locally generated 1:5000 scale surface waters data across the state.

The purpose of the project is to take existing surface waters (hydrography) data for all Vermont watersheds, integrate existing attributes from the NHD and add corresponding attributes to those features not shown in the NHD. The result will be a detailed, locally generated, surface waters data layer that is quality controlled, integrated with adjacent watersheds (horizontal integration) and integrated with other local scale features such as orthophotos and bridge locations (vertical integration).

The use of coding, compatible with the NHD, enhances data sharing between the local, state, and national levels. As part of this effort we review and revise Vermont's existing surface water mapping standard to address data production and integration issues raised in this project, and enhance compatibility with the principles of the National Spatial Data Infrastructure (NSDI).

As of the end of 2002, VCGI has completed redelineation of all but 5 of the state's individual watersheds to match the latest digital orthophoto base. 2002 also saw an expansion of the partnership between VCGI and local watershed groups and Agency of Natural Resources representatives. Our collaborative efforts with the Vermont Department of Environmental Conservation's (DEC)/Water Quality Division (WQD)/River Corridor Management Section (RCMS) have expanded to include the Lakes & Ponds Management/Protection Section (LPMPS).

The collaborative effort between RCMS and VCGI remains the prototype for implementing the Vermont Hydrographic Data (VHD) as the central surface water network in the state. The goal is to successfully demonstrate to other state agencies, the private sector and individuals how to integrate their data into a central surface water network (the VHD) to support robust data analysis and facilitate data sharing.

Fortunately, this idea appears to be taking root in the Water Quality Division with the LPMPS showing interest in relating their data to the VHD. This will be done by attributing the VHD with a statewide tracking identifier called the "WBID" implemented throughout the WQD before the advent of GIS

technology. An aquatic biologist there with the ArcView skills and appreciation of how useful the VHD data would be to their work, has agreed to link their Water Body Identifier (WBID) with the VHD. These unique identifiers are used by the state for biological monitoring and 303(d) and 305(b) reporting to the EPA. VCGI eagerly looks forward to developing this, and other, relationships with state agencies to expand the "buy-in" of using the VHD as their central surface water network.

We anticipate the use of these tools and the application of NHD data to gain momentum through time as familiarity, user expertise, increased availability of certified high-resolution subbasins and the advantages of using the NHD evolve among the user base. We will continue to support these developments officially through ad hoc technical support and advocacy.

E-911 TECHNICAL ASSISTANCE

VCGI continues to work with the **Vermont E-911** Board and its contractors. In the past year we provided technical assistance to the E911 staff through the following tasks:

- Revision of Data Specifications and QC Procedures
- Performance of QC procedures on E-911 data
- Updated metadata for the E-911 data
- Update VCGI website with the latest E911 data
- Update E911's Standard Operating Procedures to include Geospatial Standards as needed

This past year saw increased communication between the two agencies that resulted in better data quality problem resolution, regular data deliveries and greater adherence to the data standards. Because of the nature of the initial E-911 data development there still remain several issues that will require resolution over time. With so many towns "grand fathered" into the system requiring different data specifications, it is difficult to maintain a single level of quality in the GIS data throughout the system.

As the E911 system expands its ability to use the GIS data in a more spatial capacity new issues of accuracy become important. Spatial errors previously present in the data and not representing safety issues require more scrutiny with location based identification systems. VCGI continues to advise the E911 Board to update their processes and data files to eliminate these errors as they are discovered.

DATA DISTRIBUTION & INTERNET SERVICES

Early in January 2003, VCGI will release its newly revised and upgraded Internet based data distribution service as part of our new website. This new capacity required a revision of our entire data storage paradigm as well as the underlying data structures. Steve Sharp, our database manager, with help from all of the other personnel in the organization, successfully redesigned and

repopulated our data distribution database as well as our website.

The new look and feel is intended to make accessing the GIS data and related information easier for the GIS novice while at the same time retaining the ease of use for the expert user. Users are now able to make data requests by interactively selecting the desired data type and then defining an area of interest (AOI) within the state. All of the data within that AOI will then be "clipped" from the full dataset and sent to the requestor. In the past, in most cases, data was accessible only in files containing statewide coverage. The user would often only need local coverage and this often resulted in unnecessarily large data files and extra work for the user to clip out the desired data.

This change in data storage design is also part of VCGI's strategy to position our organization to support an enterprise-wide GIS data distribution capacity within the state. This strategy is being implemented in a staged process with each potential data sharing partner being approached individually so that growth and security can be managed. The Vermont Agency of Transportation is the first group to show interest in developing a defined dynamic data sharing relationship. That relationship will be developed over the coming year. Other agencies that have expressed interest are ANR, UVM's Spatial Analysis Lab and some of the RPC's.

As this initiative takes shape there is tremendous potential for other state agencies to take advantage of this enterprise-wide database. Utimately, the intention is that state GIS departments throughout the state will contribute to and use this single database of foundation data. They would be able to keep their own proprietary data and information within their own systems and overlay it on the statewide foundation data as needed. This will free them from having to update and manage their own copy of the foundation data while at the same time enable them to use and contribute to the latest data.

PUBLIC OUTREACH

VCGI continues to support the Vermont GIS community's professional development through the Vermont Spatial Data Partnerships (VSDP), an informal association of spatial data stakeholders from the Vermont community that is committed to improving GIS in Vermont through networking and information exchange.

The purpose of the VSDP is to inspire and sustain a culture that values high quality spatial data in Vermont. The VSDP Steering Committee and staff person work to recruit members, plan activities, and develop informational literature about the Partnership. The VSDP sponsors informal conferences, called roundtable meetings, on a regular basis. GIS professionals present information about their current projects, discuss technical and non-technical issues and learn about new hardware and software from vendors.

VCGI also sponsors a GIS EXPO every year. This conference is held in Montpelier and is well attended by GIS consultants and businesses throughout the Northeast. Attendance over the years has shown a steady and healthy growth in keeping with the growth in the GIS industry nationwide. In the past year VCGI's outreach coordinator and project managers also supported the state's e-government initiatives, town officer education seminars, regional GIS User group conferences, national GIS conferences, Regional Planning and Development Commissions, educational forums, and many other community information efforts.

ADDITIONAL SUPPORT

Over the past year VCGI also supported the technical development of GIS capacity in two state agencies, Vermont Historic Preservation and Vermont Emergency Management. Both agencies are beginning to see the greater efficiency in using a GIS as part of their business processes. VCGI is supporting Historic Preservation by providing professional expertise to their GIS integrated document automation plans.

In 2002 Vermont Emergency Management was provided a set of foundation GIS data from VCGI to use in prototyping their new automated response management system software. Acceptance of the system has been limited so far outside of the agency, but they continue to run monthly tests for interested parties to participate. VCGI will continue to support VEM in their efforts to integrate GIS into their emergency support procedures.

FUTURE DIRECTION

In 2003, VCGI anticipates building the GIS infrastructure in the state toward being able to implement a limited enterprise-wide data plan. The initial steps of this plan will be implemented between VTrans and VCGI in the early part of 2003. This relationship will be tested as a prototype with other partners being brought on-line as technology, resources and time allows.

VCGI will continue to monitor the federal Homeland Security initiatives that involve the collection and distribution of GIS data. This business area provides a potentially new set of requirements for data collection in the state. Hopefully, the level of coordination between federal, state and local data needs will be improved over previous national initiatives directed toward development of a national GIS data infrastructure.

IV. Appendices

A. STATUTORY AUTHORITIES

Act 204 of 1994 (10 VSA Chapter 8) calls for the development of a comprehensive GIS strategy for Vermont, and established the Vermont Center for Geographic Information, Inc.

§ 122. VERMONT CENTER FOR GEOGRAPHIC INFORMATION, INCORPORATED; ESTABLISHMENT

(a) The State of Vermont shall support a comprehensive strategy for the development and use of a geographic information system. . .

In order to develop and implement that strategy, and to ensure that all data gathered by state agencies that is relevant to the VGIS shall be in a form that is compatible with, useful to, and shared with that geographic information system, there is hereby established a nonprofit public corporation to be known as the Vermont center for geographic information, hereinafter called the center, as a body corporate and politic and a public instrumentality of the state.

§ 126. REPORTS AND AUDITS

On or before January 15 of each year, the center shall prepare and submit to the governor a three-year work plan which describes the goals, objectives and activities of the center and cooperating state agencies and other public and private organizations. The plan also should include estimated cost of each major activity of the center, and a report concerning data gathered, documents generated, and problems and opportunities for use of VGIS information.

B. VCGI FINANCIAL REPORTS: FY02 AUDITED

10 VSA 126 require that *"The books of account of the center shall be audited annually and a report filed with the secretary of administration not later than October first of each year."*

The following financial statements (two pages) have been excerpted from the report and provided by auditors engaged by VCGI. The final financial statement presents an FY '02 and FY '03 budget comparison for the organization. Technical notes accompanying these statements, or copies of the complete report may be obtained from VCGI.

VERMONT CENTER FOR GEOGRAPHIC INFORMATION, INC.

STATEMENTS OF REVENUE AND EXPENSES AND CHANGE IN NET ASSETS
FOR THE YEARS ENDED JUNE 2002 AND 2001

REVENUE	2002	2001
State of Vermont grant	$286,992	$252,016
Project income	$176,527	$210,908
University of Vermont in-kind	$27,500	$30,000
Reproductions and resale of items	$8,326	$9,255
Interest and miscellaneous income	$4,704	$7,151
Net Assets released from restrictions	$0	$0
TOTAL REVENUE	$504,049	$509,330
DIRECT COSTS		
Direct Labor	$167,348	$172,449
Payroll taxes and employee benefits	$54,775	$46,036
Costs of projects and reproductions	$19,073	$19,585
Subcontract costs	$4,900	$7,718
TOTAL DIRECT COSTS	$246,096	$245,788
OPERATING EXPENSES		
Indirect salaries and wages	$113,972	$93,028
Payroll taxes and employee benefits	$34,374	$23,780
University of Vermont services	$27,500	$30,000
Travel and training	$11,267	$17,972
Computer support and maintenance	$18,219	$17,771
Depreciation	$19,651	$16,548
Professional fees	$8,986	$7,232
Telephone	$4,912	$6,174
Relocation Expense	$7,357	$0
Office expense	$4,098	$3,533
Miscellaneous	$1,944	$2,200
Interest expense	$0	$865
Bad Debt Expense	$230	$0
TOTAL OPERATING EXPENSES	$252,510	$219,103
TOTAL DIRECT & OPERATING EXPENSES	$498,606	$464,891
CHANGE IN NET ASSETS	$5,443	$44,439

VERMONT CENTER FOR GEOGRAPHIC INFORMATION, INC.

BALANCE SHEET
JUNE 30, 2002 AND 2001

ASSETS	2002	2001
CURRENT ASSETS		
Cash - undesignated	$63,463	$55,571
- capital reserve	$30,000	$30,000
Accounts receivable	$21,379	$33,202
Unbilled receivables	$3,625	$2,547
Prepaid expenses	$6,690	$19,809
TOTAL CURRENT ASSETS	$125,157	$141,129
PROPERTY AND EQUIPMENT, NET	$30,331	$26,782
TOTAL ASSETS	$155,488	$167,911
LIABILITIES AND NET ASSETS		
CURRENT LIABILITIES		
Accounts payable	$3,917	$6,304
Line of credit	$0	$0
Accrued expenses	$11,770	$4,749
Accrued wages	$10,938	$10,011
Accrued vacation	$10,317	$9,294
Due to University of Vermont	$0	$0
Deferred project income	$28,602	$53,052
TOTAL CURRENT LIABILITIES	$65,544	$83,410
TOTAL LIABILITIES	$65,544	$83,410
NET ASSETS		
Unrestricted - Board designated for capital reserve	$30,000	$30,000
Unrestricted - Undesignated	$59,944	$54,501
TOTAL NET ASSETS	$89,944	$84,501
TOTAL LIABILITIES AND NET ASSETS	$155,488	$167,911

VERMONT CENTER FOR GEOGRAPHIC INFORMATION, INC.

COMPARATIVE BUDGETS
FY 2002 AND FY 2003

		FY02 Actual	FY02 Budget	FY03 Budget	% Change FY02–FY03 Budget
Income					
	Reproduction/Resale & Misc. Inc.	$ 10,684	$ 10,000	$ 11,150	11.50%
	Project Income	$176,527	$236,350	$207,824	-12.07%
	State Grant Income	$286,992	$283,992	$272,642	-4.00%
	UVM Grant Income	$ 27,500	$ 30,000	$ 0	-100.00%
	Interest Income	$ 2,349	$ 3,000	$ 2,000	-33.33%
	GROSS INCOME	**$504,052**	**$563,342**	**$493,616**	**-12.38%**
Direct Costs					
	Cost of Reproduction	$9,076	$6,050	$8,700	43.80%
	UVM In-Kind	$27,500	$30,000	$0	-100.00%
	Cost of Projects	$232,120	$268,026	$224,556	-16.22%
	Subcontract Costs	$4,900	$10,000	$2,500	-50.00%
	TOTAL DIRECT COSTS	**$273,596**	**$314,076**	**$235,756**	**-24.94%**
Net Operating Income		**$230,456**	**$249,266**	**$257,860**	**3.45%**
Operating Expenses					
	Indirect Salaries	$113,972	$116,545	$106,440	-8.67%
	Payroll Taxes	$8,185	$7,906	$7,723	-2.31%
	Employee Benefits	$26,189	$23,477	$25,638	9.20%
	EMPLOYEE EXPENSE	**$148,346**	**$147,928**	**$139,801**	**-5.94%**
	General Office Expense	$54,966	$72,397	$91,148	25.90%
	Travel Expense	$1,904	$8,000	$3,500	-56.25%
	Board Expense	$143	$500	$150	-70.%
	Depreciation Expense	$19,652	$20,000	$20,000	0.00%
	OTHER EXPENSE	**$76,665**	**$100,897**	**$114,798**	**13.78%**
Total Operating Expenses		**$225,011**	**$248,825**	**$254,599**	**2.32%**
NET INCOME (LOSS)		**$5,445**	**$441**	**$3,261**	**639.46%**