VGIS HANDBOOK

PART 3 - GUIDELINES SECTION A

MUNICIPAL PROPERTY MAPPING

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Version 2.0

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Guideline History

Section A: This version Municipal Mapping Guidelines (version 2.0) replaces version 1.0 (January 1991). Version 1.0 was based on Edition #3 of *Property Mapping Guidelines,* Vermont Mapping Program, Property Valuation and Review Division, April 1983.

Contact the following address for additional Information:

Property Mapping Questions:	**GIS Questions:**
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MUNICIPAL PROPERTY MAPPING

1.   PURPOSE

These guidelines contain recommended specifications for property mapping programs carried out at the municipal level. They should help ensure that all property is accounted for, as well as accurately identified on the grand list and is translatable into a format that is compatible with Vermont's Geographic Information System (VGIS). **This is not a standard**. This is a guideline and should be used as such.

In 1988, Vermont's five year GIS plan identified municipal parcel boundaries as a fundamental database to support local planning and development. Since that time, scores of towns have invested in quality parcel maps, and in 1989-91 the State of Vermont supported conversion of many towns' hard copy maps into GIS format. Not only are automated property maps and grand lists a significantly more powerful tool for listers and assessors, but an integral base to planners and municipality managers, resource specialists, utilities, and many other users. The decision to map property should be made in the context of other municipal needs. To facilitate sharing of this information between various municipal constituents, it is critical that property mapping be compatible with standard data base formats. These guidelines provide the framework for this to occur.

The contents of this bulletin may be altered to fit the individual characteristics of the municipality. However, we would encourage you to use the *Property Mapping Guidelines* in full. During the development of this document there were repeated discussions about the appropriateness of the use of the terms 'shall' or 'will' in a document considered a set of guidelines. It was decided that the term 'shall' would be used consistently so that users could most easily take the existing document text and use it in the construction of their own contract specification. It also serves to underscore the importance of following these guidelines.

> *NOTE: ANY SET OF SPECIFICATIONS SHOULD BE REVIEWED BY A MAPPING CONSULTANT OR SURVEYOR AND THE CONTRACT FORM SHOULD BE REVIEWED BY LEGAL COUNSEL BEFORE IT IS ENTERED INTO WITH THE CONTRACTOR.*

2.   INTRODUCTION TO PROPERTY MAPPING

Property Maps are one of the most important local government information assets. It is a fundamental base for many municipal activities.   Although GIS parcel data cannot replace detailed ground surveys, the data does assist municipal officials with functions such as accurate property tax assessment, planning and zoning. Towns can link their maps to their Grand Lists and display local information. Officials can show tax-payers how proposed development or changes in municipal services and regulations will affect them and their neighbors. In many towns, parcel data also helps to provide public notices, plan bus routes, and carry out other municipal services.

The principal responsibility of the lister is to inventory and appraise all property at Fair Market Value (FMV). In order to appraise at FMV, a lister must be able to locate the parcel and determine the size, shape and geographic relationship. A complete set of Property Maps is highly advantageous to perform this function. Mapping Programs should try to support the needs for all municipality agencies in an effort to combine cost sharing benefits.

Adequate preparation is essential prior to entering any contract. The municipality needs to evaluate its needs, for listers and planning, zoning, Public Works, who will be using the final product. Major considerations include the type of product and accuracy, evaluating existing resources of personnel, facilities, data processing, technical and administrative support, determining funding and establishing preliminary schedules.

3.   AERIAL PHOTOGRAPHY, CONTROL, AND ORTHOPHOTO BASE MAPS

The Vermont Mapping Program (VMP) has prepared and delivered base map orthophoto sheets and/or digital orthophotos that meet National Map Accuracy Standards on CD-ROM, to most municipalities in Vermont. The VMP is currently in the process of generating revised, new editions in digital format for the entire state. The VMP will send to these municipalities, copies of the new editions when they are complete. Appendix A contains a map indicating the schedule for the new editions. Mylar and additional Kodak "RC" prints are available at additional expense.

If the municipality wishes to have additional coverage, i.e., larger scale in village areas, contact the Vermont Mapping Program for assistance.

4.   CONTRACTING FOR MAPPING SERVICES

When considering a mapping program or a major update to an existing property mapping program the following contracting considerations are advised.

4.1 REQUEST FOR PROPOSALS. When contracting for mapping services, it is recommended that the municipality use the sample Request for Proposal (RFP) in Exhibit A with technical specifications. A vendor should not be selected on the basis of cost alone.

4.2 TECHNICAL SPECIFICATIONS. The municipality must prepare a set of technical specifications that clearly defines the mapping services to be performed. The specifications should address the technical aspect of the project and specify the quality and quantity of the products to be delivered. The specifications should include such items as geographic area to be mapped, types of maps to be produced, data to be displayed on the maps, data to be delivered and its format, source of data, labeling, deed records and technical reports. Sample specifications are given in Exhibit B.

4.3 EVALUATING MAPPING FIRMS. A level of technical expertise is required to evaluate mapping professionals and contract proposals. If the expertise is not available at the municipal level, the Vermont Mapping Program will help in providing such

assistance. Mapping professionals should be evaluated in the terms given in Exhibit C.

4.4 PROPERTY MAP AGREEMENT. Exhibit D contains a sample Property Map Agreement which can be used as part of the contract established between the municipality and mapping firm.

4.5 SCHEDULE OF PAYMENTS. Exhibit E contains a sample Schedule of Payments which can be used as part of the contract established between the municipality and the mapping firm.

5. LAND RECORDS RESEARCH AND EXAMINATION

The validity of the mapping project is based upon good land records research. Often extensive research has to be undertaken to obtain a good description of the parcel. This is essential to the overall accuracy of the project. Many surveys exist, done by Vermont Licensed Land Surveyors, that are not part of municipality records. Maximum effort should be employed to have all surveys (including digital survey files) incorporated into the mapping project.

5.1 METHOD. The method of choosing and examining the instruments of title shall be determined by the contractor ; however, the methods developed shall provide for the following:

5.1.1 DEED RESEARCH. Deed research shall be conducted to determine the deed, will or other means of conveyance for each and every parcel of property in the municipality. Deed research shall be coordinated with the existing grand list. Every reasonable effort shall be made to obtain a metes and bounds description of every parcel, with conveyance source to be documented. (see section 9.4 (l)).

A master list shall be compiled. Part of this list shall include all parcels for which an instrument of conveyance has not been located. (see section 10).

5.1.2 FOLLOW-UP PROCEDURE. To determine the instrument of conveyance for those parcels listed as part of the Master List, the contractor shall develop a follow-up system which must provide a means of personal, telephone or mail contact with the reputed owner. A written report of the results and/or efforts made must also be provided.

5.2 MASTER LIST. Parcels and associated reports for which no record of conveyance has been located, shall be submitted in a clearly organized format and in both printed hardcopy and digital softcopy form to the municipality at the completion of the property maps.

5.2 .1 CONTENT OF MASTER LIST. The report shall contain the following:

- List of parcels of which the method of conveyance could not be located.

- List of parcels currently on the municipality's Grand list, that could not be placed on the maps due to inadequate or no description.

The information to be set forth shall be an accumulation of all the efforts made as part of the deed research and follow-up procedure. The reports shall be organized and cross indexed by owner's name and parcel numbers (section 10).

The submittal of such report shall not necessarily relieve the contractor of their responsibility to continue efforts to map and identify the parcels properly. If, in the

view of the municipality officials, the contractor has not used all the obvious and reasonably economical methods of approach, they shall request the contractor to do so at the contractor's expense.

The maximum allowable number of parcels on the Master List at the completion of the project shall be fixed between the municipality and the contractor. However the number shall not exceed three percent of the total number of parcels in the municipality. Under no circumstances shall the contractor be required to field survey or measure the property, or obtain legal assistance.

6.   DEED DESCRIPTION AND SURVEY PLOTTING

6.1 DEED DESCRIPTION AND SURVEY PLOTTING. The firm doing the mapping shall determine the method of plotting deed descriptions for all parcels in the municipality. However all surveys, (including digital survey files) whether recorded with the municipality or not, should be used to the highest extent possible.

6.2 PROBLEMS. After attempting to plot parcels which cannot logically and correctly be solved by the contractor through deed research, personal contact with the reputed owner, or other methods, the problem descriptions shall be documented for presentation to the municipality on the Master List (see section 10).

6.3 REPORT. The presentation of such problem descriptions shall include all relevant material including adjacent deeds, survey plots, and/or records, and a report containing the contractor's explanation of the problem and their efforts to date to solve the problem. The contractor shall not be entitled to extra compensation for this work.

7.   MAP SPECIFICATIONS

7.1 OVERVIEW. The property map shall contain the boundary lines of each parcel ownership. They shall also contain at a minimum, a parcel number, an area figure for each parcel, and road frontage/lake frontage. In addition, all property maps shall contain standard margin data such as scale, north data, brief legend or key to symbols, and such other information as listed in section 7.3 and section 7.4.

7.2. CARTOGRAPHIC STANDARDS.

7.2.1 TICS. Corner tics must be clearly and precisely placed (for both NAD27 and NAD83 tics). The State Plane Coordinates (meters) must be clearly labeled at each tic. The corner tics must be properly scaled (80 cm = 31.496 inches apart on both 1:5000 and 1:1250 orthophoto-based maps). In addition, the boundary of the map shall have tic marks every 1000 meters for a 1:5000 map, or every 200 meters for a 1:1250 map. No internal tics are required.

7.2.2 LINEWORK. Lines shall be uniform and consistent as to width and symbolism.

7.2.3 SYMBOLOGY. Appendix B contains the standard symbology to be used for Property Maps.

7.3 DIGITAL PROPERTY MAP DATA SPECIFICATIONS. Digital property maps compatible with the Vermont GIS divides the mapped information into three ARC/INFO data layers. These data layers have been designed to support tax mapping and other GIS applications. Specific formats for these data layers are thoroughly described in Appendix C.

Property maps may be prepared using GIS or CAD software, or converted from existing maps into GIS/CAD format

7.4 INFORMATION TO BE SHOWN ON MAPS. Information to be shown on the property maps shall include, but not be limited to, the following:

    (a)   land parcel property lines;

    (b)   parcel numbers for all separate parcels;

    (c)   town, city, village, school, fire, water or other service district lines, with their designations;

    (d)   with the exception of road frontages, dimensions* are not recommended to be shown; however, parcels less than one acre in size will have all dimensions shown in the accompanying data file; Dimensions shall be shown to the nearest whole foot;

    (e)   all parcel areas (data file or map);

    (f)   public street, road, and highway rights-of-way, including important private roads to be designated or approved by the municipality; municipal and state highway numbers and road names are to be shown;

    (g)   major railroads and public utility right-of-ways with their designations;

    (h)   rivers, streams, ponds, canals, lakes, reservoirs, and swamps with their designations;

    (i)   "official" names of all wholly tax exempt property;

    (j)   North Arrow;

    (k)   adjacent map sheet numbers;

    (l)   lot numbers of recorded subdivisions

*Dimensions to be shown are those in the deed of record/survey. If no dimensions are shown in the deed, scaled and/or measured distances shall be shown. If the frontage deed distance varies by more than 5% from the scaled distance, the scaled distance shall be shown. The subscribing of a letter to the dimension indicates its origin. For example, 150'(s) indicates a scaled dimension.

7.4.1 NOTE TO BE ADDED. The following statement shall appear on every property map sheet:

> "THIS MAP IS FOR ASSESSMENT AND
> PLANNING PURPOSES ONLY. IT IS NOT TO
> BE USED FOR DESCRIPTION,
> CONVEYANCE, OR DETERMINATION OF
> LEGAL TITLE."

This statement is to be printed with a character height of 0.1 inches or larger.

7.4.2   PARCELS FALLING ON MORE THAN ONE MAP SHEET. Where it is necessary to show portions of a single parcel on two or more maps, the parcel and its match lines shall be clearly labeled on each map sheet, together with a note as to where the remainder of the parcel appears. The parcel number and area shall appear on each map sheet containing the parcel. If possible, the entire parcel shall appear on one map sheet.

7.5 EVALUATING AND LISTING PROPERTY AREAS.

7.5.1 TYPES OF PARCEL AREA. Four different area determinations may be associated with a parcel:

    (a). Deeded   The area appearing on the deed.

(b). Surveyed	The area resulting from a land survey, completed by a Vermont Licensed Land Surveyor
(c). Computed	The area computed from the property map
(d). Assessed	The area used to appraise a property for tax purposes.

7.5.2 AREA COMPUTATIONS. Computed areas will be calculated for all parcels. Area computations from the files containing the parcel outline(s) of the property is the preferred method.

7.5.3 LIST OF AREAS. A list will be provided that shows the deeded, surveyed, computed and assessed acreage for each parcel in the municipality. The Municipality must be able to easily incorporate the list of areas with its current grand list. The heading of the list will contain at least the following information:

Map Parcel#	Owner Name	Deeded Area (ac)	Surveyed Area (ac)	Computed Area (ac)	Assessed Area (ac)

The contractor will also provide the total assessed acreage, deeded acreage, and computed acreage for the entire municipality

7.5.4 COMPARISON OF COMPUTED AND ASSESSED AREAS. The percent of divergence between the computed and assessed acreage shall be calculated for each property:

Percent of Divergence equals computed area minus assessed area divided by the assessed area times 100

$$\textit{Percent of Divergence} = (\text{Computer Area} - \text{Assessed Area}) / \text{Assessed area}$$

The percent of divergence shall be shown as part of the list of areas, where the computed acreage varies from the assessed acreage by at least the percent shown:

Parcel Area (acres)	Percent of Divergence
1.01 - 5.0	±10%
5.01 - 20.0	± 8%
20.10 - 50.00	± 6%
50.01 & greater	± 4%

If the percent of divergence is shown for all parcels, then it is an easy task to identify those parcels for which the percent of divergence exceeds the tolerances specified above.

7.5.5 COMPUTED AREAS BASED ON RIGHTS-OF-WAY. Public road right-of-ways are right-of-ways, and in most cases parcels are surveyed to the public road centerline. However, parcel maps show public road right-of-ways as separate polygons in order to facilitate orientation of users. Therefore all computed areas shall be based upon public road right-of-way boundaries. To make the comparison to areas measured from road right-of-way centerlines, it may be necessary to reduce the area sited by the deed by that portion which may be within the public highway right-of-way. The parcel as mapped shall show the computed area only and shall be indicated thus: "20.3 AC". Computed area shall be shown to the nearest one-tenth acre.

7.6 LABELLING OF PROPERTY AREAS. A municipality shall include property areas with the parcel numbers for each parcel on maps produced.

If property areas are to be included, then the surveyed area is the preferred value to be mapped.

Where the survey does not exist or surveyed area is unknown, the deeded area can be used if it agrees with the computed area to within the tolerances given in section 7.5.4. Where the percent of divergence exceeds the tolerances specified in section 7.5.4, the computed area shall be shown on the property map.

8. PARCEL NUMBERING

8.1 PARCEL NUMBERING. Computer based parcel mapping that employs geographic information system (GIS) technology requires that each parcel be assigned a unique identification number. Many different numbering systems have been employed in Vermont. Key to the success of any numbering system is the match between the digital parcel map number and the number used by the listers/assessors in the municipality to create the "grand list", as well as other offices (e.g. planning, zoning, public works, police and fire).

8.2 PARCEL NUMBERING SYSTEMS. Before any discussion of a parcel "numbering" system can begin, the definition of a true number must be considered. Using 5486 as an example, a database can see this as either a number or a text string. Because the 5486 does not contain any non numeric characters, it may be a number or it could be stored as text. If a hyphen or dash is added after the first two numbers (54-86), it must be stored as a text string. Another important distinction is the ability of a text string to store and display leading zeros. For example, a text string could store "0006", while a numeric presentation would simply di

Within database management software, the columns that store the different categories of information are called "fields." The characteristics of these "fields" can be set by the creator of the database. A numeric field can only store numbers and will not allow the user to enter characters that are not numbers. Fields designated as character or text strings can store both numbers and letters. Because most parcel identification schemes contain characters other than numbers, they are usually stored as character strings. For example 03-24-029.002 would be a very acceptable parcel "number" but to store this identification in the computer database would require the field containing this information to be defined as a "string."

8.2.1 PARCEL NUMBERING WITH MAP SHEET, BLOCK, LOT and SUBDIVISION. A very common method for assigning parcel identification numbers is to use the map sheet number, a block number, a lot number and a subdivision number, if applicable. Prior to the creation of contiguous digital parcel coverage for an entire town, the town's parcels grouped by geographic location and mapped on several adjoining map sheets. Many maps corresponded to the spatial extend of the early orthophotos. Other map sheets were created to enlarge portions of the municipality where parcel dimensions were small and dense. Blocks represent logical groupings of parcels, usually surrounded by roads, the town line or natural feature. The lot represents the original unit of ownership from which subdivisions are created. For database planning purposes, 2 characters should be allocated for the map sheet, 3 characters for the block, 3 characters for the lot and 3 characters for the subdivision number. In all, a total of 14 spaces, including delimiters, will be required to store the parcel number in this case. For example, if parcel number 25 in block 11 was to be identified on map 3 the parcel number would appear as follows: 03-025-011. If parcel 11 were subdivided, the first subdivisions would be assigned number 1 and the full parcel number would be 03-025-011.001. Note that in this example this "number," represented as a character string, consumes 14 spaces.

8.3 LINKAGE TO THE NEMRC "GRAND LIST" SOFTWARE SYSTEM AND OTHER MUNICIPALITY DATABASES. The benefits from building a digital parcel map base for a municipality can extend well beyond the ability to quickly update and display the parcel outlines. Its true benefit comes through integration with assessors information. This integration both aids and facilitates the preparation of the "Grand List" and extends this information to other community planning and management functions. Key to the ability to connect the digital parcel map with theses tabular records is the parcel identification number. The "Grand List" software package, offered to all towns as a part of Act 60, is generically referred to as the "NEMRC System." This privately developed database software system meets the needs of most listers but lacks the simple interface to join this information with the digital parcel map without extra effort.

> In the NEMRC system, the parcel number is usually stored within two 12 character fields, not just one. The P_PROP field has traditionally been used to store the map sheet, block and lot "numbers" and the P_SUB field contains the subdivision number, if applicable. Referring to section 8.2.1 of this publication, the reader will remember that 14 spaces are required to hold most parcel numbers. Both the P_PROP and P_SUB fields can hold character strings of up to 12 characters and thus are individually unable to store the full parcel number using the map sheet, block, lot and subdivision numbers.
>
> To attach the tabular "Grand List" information to the parcel map, the user should export the data to a dBase file format using the report writing capability of the NEMRC software. Next the user should use capabilities of the GIS system or a dBase compatible program to concatenate the P_PROP and P_SUB fields into a single field. Once this is accomplished, the field in the NEMRC database should match the same format, look and appearance of the field containing the parcel number (refer to Appendix C) for the digital parcel map.
>
> While it should now be possible to connect the two databases, one issue still remains to be resolved. Databases can be connected in one of several ways. The simplest is a one-to-one relationship. For parcels, this would occur when there is one occurrence of a parcel number in both databases that are to be connected.
>
> Most "Grand List" databases contain more than one record for several parcels. For example, the owner of a lot will receive a property tax bill and so will the owner of a trailer placed on the property, if it is owned by a different party. A similar situation might occur in a condominium complex with multiple dwelling units with different owners on a common piece of property. In situations where there are one or more occurrences of the parcel number in the NEMRC database and a single occurrence in the parcel database, a one-to-many relationship should be established.
>
> As an alternative solution to the P_SUB, P_PROP problem identified above the NEMRC software offers several miscellaneous fields under the Misc/Acres Tab (Main Misc Fields 4-9) where users can store the parcel number in its entirety.

8.4 LINKAGE TO OTHER DATABASES IN A MUNICIPALITY. With a universally accepted format and numbering system for the parcels, other databases within the city/town can be joined to the digital parcel map for visual review and adoption. For example, a building permit database that records the parcel identification number with the permit can then be connected to digital parcel map.

With such a connection, a zoning official could very quickly see the location of all permits that have been issued across the community. Similar possibilities exist for fire department databases that store the location of hazardous materials.

9.   PROPERTY INVENTORY

An automated (computerized) index relating all parcels on the map to the grand list is an important component of parcel mapping (as noted in section 8).

9.1 NUMERICAL SYSTEM.. An automated numerical system, based on the parcel number, must be designed, prepared and furnished by the contractor, to be acceptable to the municipality. There shall be a unique entry for every parcel number. No combining of parcels will be permitted. At least one copy of a computer printout and a copy on magnetic media (diskette or tape) must be provided for the listers/assessors.

9.2 ALPHABETICAL SYSTEM. An automated system, alphabetical by last name, must be prepared and furnished by the contractor. This information must agree exactly with the numerical system, but is presented in a different order. At least one copy of a computer printout and a copy on magnetic media (diskette or tape) must be provided for the listers/assessors. The automated data will be the same as that provided for the numerical system.

9.3 INFORMATION TO BE SHOWN. The following information must be available in numerical and alphabetical sequence by parcel number and owner's surname for all parcels within a municipality:

(a)   parcel number
(g)   name of owner
(h)   complete current mailing address
(d)   city or town name
(e)   property location by road number and road name
(f)   school, fire and water districts
(g)   area(s) of parcels and all dimensions of parcels less than one acre
(h)   subdivision lot and name
(j)   land parcel identification prior to identification appearing on the property map
(k)   ownership history showing names of owners, addresses and the conveyance reference starting with the owner at the time the property map was prepared
(l)   reference to deed/survey used in plotting of parcel with book/page or location identified

10.   MASTER LIST

The Master List is important because it provides the municipality with complete documentation of the contractor's findings.

10.1 CREATION OF A MASTER. A Master List not exceeding 5% of the total number of parcels (which is comprised of 3% problem Parcels [10.2.1] and 2% Discoveries [10.2.2]) in the municipality, shall be prepared for the municipality by the contractor and it shall provide for the following:

10.2 CONTENTS OF THE MASTER LIST. All Master Lists will be in the computer format previously agreed to by the municipality. These lists will be delivered in accordance with the contract delivery schedule. Master files of these lists will be kept current during the entire project and a composite listing in alphabetical or numerical order will be delivered to the municipality at the end of the project.

10.2.1 PROBLEM PARCELS. Parcels which the instrument of conveyance could not be located, parcels not possible to locate on map but are currently assessed, set in a report as defined above and as required in section 5.2.

10.2.2 PARCEL DISCOVERIES - OWNER KNOWN / OWNER UNKNOWN. Owner Known is those parcels found and mapped by the contractor for which the owner's name is known but was not on the most recent Grand List. Owner Unknown (or doubtful) are all parcels found and mapped by the contractor for which the true owner cannot be satisfactorily determined and which are not on the most recent Grand List. A list will be prepared which shows the parcel number, map number, owner (if known), deed acreage and computed acreage. The list shall also show the total acreage of all such properties in the municipality. The number of parcels on this list shall not be greater than 2% of the total parcels in the municipality, without written approval of the municipality

10.2.3 LIST OF AREAS. A list will be prepared that shows deeded, surveyed, computed and assessed areas for each parcel in the municipality, as required in section 7.5.

11. PUBLIC VIEWING

Property maps are to be made available for viewing by the public for a minimum of two weeks. The contractor will be available for a minimum of one Saturday and two (2) evenings, (minimum of twelve hours) to hear complaints and concerns.

11.1 ADVERTISEMENT. Review sessions shall be advertised in a newspaper of local distribution, as a public meeting, for three days, at least seven days in advance for at least three days. The advertisement is to be approved by the municipality prior to its utilization.

11.2 REPRESENTING CONTRACTOR. The job supervisor shall represent the contractor at the review sessions.

11.3 CORRECTIONS. The Contractor shall revise the original sheets for all documented errors brought to their attention by the Board of Listers/Assessors at the public inspections and furnish new mylars/prints without additional charge.

12. ITEMS TO BE PROVIDED BY THE MUNICIPALITY

12.1 GRAND LIST. The grand list or copies thereof will be provided for the contractor's use.

12.2 EXISTING MAPS AND DATA. In preparing tax maps, all existing tax maps surveys and similar maps (including any existing digital files) shall be utilized to the extent practical and reasonable.

12.3 MUNICIPALITY CLERK'S OFFICE. Records shall be made available for the

contractor's use at no charge, within reasonable working hours. However, use of the Municipal Clerk's time, if required, is to be accounted for in contract costs. The same applies if the Listers' time is required.

13.   DELIVERABLES

13.1 DELIVERY SCHEDULE. The municipality and the Contractor shall develop a delivery schedule, with cut-off dates for map updates (e.g., property lines, subdivision lines) for all the deliverable products of the project. Prior to preparation of the contract, the cut-off dates will be determined and included in the contract delivery schedule. Any extensions shall be agreed upon between the municipality and contractor, including specific dates.

13.2 DELIVERABLES. The contractor shall deliver to the municipality the following materials to be prepared according to these technical specifications. **These materials and any products, used to generate or to verify maps become the property of the municipality as soon as they have been prepared.**

- All microfilm, purchased by contractor, used in deed research.
- Original property map mylar overlays, one for each orthophoto sheet.
- All source materials and information located during contract filed by reference number (on appropriate parcel cards/data file).
- _____ set(s) of alphabetical index computer printouts.
- _____ set(s) of numerical index computer printouts.
- All digital map layers in Arc/Info format (Vermont State Plane Meters – NAD83), topologically correct, and with documentation (FGDC or VGIS compliant metadata).
- All digital files and macros generated as part of the project. All digital files should be delivered on CD-ROM.
- All reports called for in these technical specifications.
- Two sets of prints made from the property map overlays, one of which shall be composite prints (orthophoto overprinted with property lines).
- Index Map to scale of 1:20,000 or with a maximum size of 36" x 36" showing all map sheets with municipality, state roads and major drainage.

14.   TRAINING FOR USE OF GIS PARCEL DATA

While it is possible to learn how to use computer-based tax parcel maps on one's own, training will speed learning and use, and helps insure that all the advantages of the Town's investment are realized. A minimum level of training includes, but is not limited to:

- How to run GIS software, link the grand list to tax parcels, query for parcel attributes, setup views, and produce maps.
- How to organize data on the computer, use file naming conventions, and backup data.
- How to acquire and load other GIS data.

The place and duration of training, number of trainees, and which computers will be used should be specified.

15.   MAINTENANCE ISSUES

15.1 LONG-TERM. Maintenance of tax parcel data is detailed, technical, and time-consuming. Therefore the idea of a municipality maintaining or updating its own parcel data should be evaluated carefully. In general, most Towns subcontract this work to the private sector. Issues to consider are:

- Does the municipality have the personnel resources (volunteer or paid) in

terms of time and skills to devote to periodic updates?
- Does the municipality have the necessary computer hardware and software to do this work, and is there adequate space in the Town offices?
- The adage applies: You get what you pay for.

If a municipality decides to utilize a consultant for updates, there are varying levels of support the Town can provide to the consultant in terms of time and materials. Depending on the level of Town involvement, training is necessary to realize reduced costs. Adherence to time schedules are integral to success. Training includes, but it not limited to:

- How to organize and deliver property transfer, subdivision, and survey information.
- Techniques or protocols to edit paper tax maps or copies of the parcel data.
- Data coding systems used, and most importantly, those for parcel numbers.
- Techniques for review and how corrections will be done.

15.2 INTERIM MAINTENANCE. Contractors developing or revising a municipality's property map database shall maintain all data until all deliverable products are received and accepted by the municipality in accordance with the contract delivery schedule.

15.2.1 CONTRACTOR RESPONSIBILITIES - PROPERTY MAPS. The Contractor shall maintain the property maps until all products, digital or manual, are delivered to the municipality for final approval. The standards to be utilized in maintaining the property maps shall be the same standards required in sections 5, 6, 7 and 8.

15.2.2 CONTRACTOR RESPONSIBILITIES - MASTER LIST. The Contractor shall maintain the "Master List" of all parcel data, until all products, digital or manual, are delivered to the municipality for final approval.

16. INTEGRATION WITH OTHER GIS DATA

Integration refers to how geographic features in one GIS data layer match up, or align, with their counterparts in another data layer. For example, road centerlines from the Enhanced 9-1-1 program may or may not run up the center of the public road right-of-ways in parcel data. Or if the Town has zoning data, do zoning district boundaries which follow parcel boundaries match their parcel counterparts? One would expect these to match one another, but they often do not because they can originate from different sources.

The question of integration or data coordination becomes one of which data layer will be the benchmark to which the others will be compared. Tax parcels are the fundamental land management unit for municipal government, and are the revenue base for the Town's functions. Thus tax parcels should be the benchmark data layer for the Town's GIS. Having all the Town's GIS data match perfectly is not required (it is an imperfect world after all), but when questions arise when two data layers showing the same feature don't agree, the tax parcel data should be given preference, unless it can be demonstrated that the other source is of greater accuracy and precision. The following is suggested:

1. No data layer is completely accurate, and thus it more important to designate the benchmark data layer (tax parcels), and stick with it. As parcel data are updated they tend to become more accurate and precise as the problems are steadily rectified year after year.
2. If the Town has GIS data which preexists tax parcel data, then the sources of these data should be evaluated. In all likelihood the parcel

data generated today will be of greater accuracy (closest to the actual location) and greater precision (less variable). Thus inserting preexisting data into tax parcel automation will in all likelihood reduce the parcel data's overall accuracy and introduce "noise" into them.

3. It does not make sense to make a potentially more accurate line match a less accurate one just because the less accurate one already exists. Tax parcels are too important a data layer. Plan on redoing the old data layer in the future.

4. Integration can quickly drive up costs of tax parcel automation.

Therefore if several sources of existing GIS data are to be used for constructing a parcel data layer, assess the accuracy and precision of each source beforehand. Compare these to the level of accuracy and precision that will result from the automation of the linework that must be made from scratch. Then considering time and budget constraints, select the most accurate and precise sources for use.

APPENDIX A

PROPOSED AERIAL PHOTOGRAPHY AVAILABILITY

All of the counties in Vermont are currently available as of December 2000 with the exception of Windham and Bennington counties. Windham and Bennington counties will are scheduled to be available to the public in the mid-summer of 2001 timeframe. Contact the Vermont Mapping Program for additional information including coverage delineation.
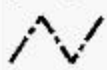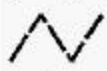
APPENDIX B

MAP SYMBOLOGY
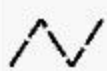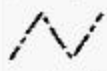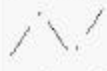
Standard line symbols for generating tax maps are given on the following page. Further explanation of the line types and the codes used to represent them are given in Appendix C. Not all tax mapping projects will use all symbols; for example, "special district limits" may not always be needed. Only those symbols used should appear on the map keys. Variations are acceptable, as long as the key on the map corresponds to the symbols used. Generally, it will be appropriate to use black lines for all parcel boundaries. Other boundaries should use different symbology.

The following set of symbols are recommended. The symbols are available as ARC/INFO line symbol sets or ArcView pallets from VCGI. Contact VCGI for more information.

TB.LIN (TB.AVP)

(1) State Boundary: TB layer (TBLINE = 1)

(2) County Boundary: TB layer (TBLINE = 2)

(3) Town Boundary: TB layer (TBLINE = 3)

(4) Village Boundary: TB layer (TBLINE = 4)

PARCEL.LIN (PARCEL.AVP)

(1) Town or Village bnd: PARC layer (PARCLINE = T)

(2) Parcel boundary: PARC layer (PARCLINE = P)

(3) Public road ROW bnd: PARC layer (PARCLINE = R)

(4) Private or utility ROW bnd: PARC layer (PARCLINE = V)

(5) Bnd between parcels (same owner): PARC layer (PARCLINE = J)

(6) Ambiguous ownership or dispute: PARC layer (PARCLINE = A)

TZ.LIN (TZ.AVP)

(1) Parcel hooks: TZ layer (TAXLINE = 1)

(2) Block limit lines: TZ layer (TAXLINE = 2)

(3) Original lot lines: TZ layer (TAXLINE = 3)

(4) Special district limits: TZ layer (TAXLINE = 4)

(5) Water lines (not parcel bnd): TZ layer (TAXLINE = 5)

(6) Private ROW bnd: TZ layer (TAXLINE = 6)

(7) Utility easement-ROW: TZ layer (TAXLINE = 7)

(8) Subdivision bnd (not parcel bnd): TZ layer (TAXLINE = 8)

(9) Village bnd (special cases): TZ layer (TAXLINE = 9)

(10) Trails: TZ layer (TAXLINE = 10)

(11) Condos, trailers, other: TZ layer (TAXLINE = 11)

(12) Railroad lines: TZ layer (TAXLINE = 12)

(13) Leader lines: TZ layer (TAXLINE = 13)

(14) Electric lines (not ROW): TZ layer (TAXLINE = 14)

(15) Private road (not a ROW): TZ layer (TAXLINE = 15)

APPENDIX C

GIS DATA SPECIFICATIONS

C.1   Overview

Property maps may be prepared using GIS or CAD software, or converted from existing maps into GIS/CAD format. Information appearing on property maps is generally drafted as lines or as annotation (text on the map). The accuracy and consistency of this conversion process is of primary concern. Positional accuracy of the resulting parcel data layer is determined by several factors, including the source material, methods used to enter and capture the information, quality control methods, and overall diligence of the operator(s) performing the work.

Deliverables should be consistent with the specifications outlined below. The digital formats and codes described here are for ESRI format GIS data layers (ARC/INFO coverages). If you are not familiar with certain terms used in this appendix, please see the Glossary of the *VGIS Handbook* (available from VCGI's web site).

Property maps may be prepared using GIS software and coordinate geometry, or digitized from existing maps into GIS format. Information appearing on property maps is generally drafted as lines or as annotation (text on the map). Property mapping compatible with the Vermont GIS divides the mapped information into three ARC/INFO coverages: (xxxx = Year represented by data - PARC1999)

ARC/INFO Coverages

PARCxxxx	Includes only property boundaries and public road right of way boundaries.
TZxxxx	Includes all lines which are not actual property boundaries but which appear on tax maps. (including private right of way boundaries, parcel hooks, streams and other lines which are not property boundaries. Also includes point locations for taxed entities which are not parcels), and text annotation.
TB	The town boundary derived from the parcel coverage.

These data layers have been designed to support tax mapping and other GIS applications.

Another popular ESRI data format is the shapefile. This format is easy and fast to use in ArcView, but is not well-suited for the goals of these guidelines. A shapefile implementation of these guidelines would be complex, redundant to update, and difficult to manage because separate groups of shapefiles are required for linework (arc) information, and for parcel (polygon) information. Annotation is compromised, and metadata (data documentation files) are not integrated into the shapefile model.

The ESRI coverage described here is the guideline for the deliverable, and should be used for maintenance and archival of parcel data. Data users are free to create and use shapefiles to suit their needs for their day-to-day work.

Contractors may choose to use software other than ARC/INFO to develop and manage these data layers as long as the final digital product is delivered as an ESRI ARC/INFO coverage.

If your tax mapping project is in an area where other data layers derived from orthos already exist in GIS format, consider using the line work where a property boundary is coincident with one of these features (to avoid double digitizing). Refer to section 16 for some cautionary notes.

C.2   LAYER 'PARCxxxx'

Coverage PARCxxxx contains only parcel boundaries and public right-of-way boundaries, by which properties are taxed. It is a single, seamless coverage for the entire town.

C.2.1 TOPOLOGY FOR LAYER 'PARCxxxx'

Because every parcel is made up of one or more closed polygons, the final coverage must have no dangling nodes. Parcels made up of more than one polygon (separated, for example, by a road or river) will have the same parcel identifier (PARCELNUM) for each polygon. An optional attribute (POLYID) is used to uniquely identify each polygon.

C.2.2   LAYER 'PARCxxxx' POLYGON ATTRIBUTES AND CODES (.PAT FILE)

All polygons will have a single label point coded with the following attributes. Item definitions in parentheses show the item width, output width, type and number of decimal places.

Attribute Name	Purpose and Codes
PARCxxxx-ID (4 5 B 0)	This ARC/INFO item's value must be unique for each polygon. It may initially correspond to the parcel number for digitizing convenience, but must be unique for each polygon. Non-unique Cover-ID's would potentially corrupt other PARCxxxx attributes.
PARCELNUM (30 30 C)	The parcel number appearing on existing tax maps. A left-justified alphanumeric code, the form and width (n) of which will depend on each town's system for numbering parcels. Several polygons will have the same parcel number if they have the same owner.
POLYID (5 5 I - optional)	This optional item can be used to assign a unique polygon ID to each polygon.
PARCELTYPE (10 10 C)	This item will be used to define the type of polygon.

Type of Polygon	PARCELTYPE (left justified, upper case)
Private	PRIVATE
Public road ROW:	ROAD
Public waters:	WATER
Federally owned land:	FED

State owned land: STATE
Municipally owned land: MUNCPL
Other non-taxed polygons
  without parcel numbers: NOTAX
Land in contention: INCONT
Unknown or no parcel
  number: NONE

Non-taxed polygons without parcel numbers may include schools, churches, libraries, municipal land, state land, etc., for certain towns. These polygon codes will allow for automatic coding of their bounding arcs, as described in the next section on line codes.

C.2.3 LAYER 'PARCxxxx' LINE ATTRIBUTES AND CODES (AAT file)

All lines will be coded with the following attributes:

Attribute
Name   **Purpose and Codes**
PARCxxxx-ID (4 5 B 0)   Generated by ARC/INFO. Must be a unique value for each arc.

PARCLINE (1 1 C)   The type of line in the parcel map. Each arc (section of a line) must have one of these codes:

> T = Town or village boundary. County, state and village boundaries are separately coded in coverage TB (Town Boundary), derived from coverage PARCxxxx, which is used to plot the town boundaries. This code takes precedence over other parcel line codes.
> P = Parcel boundary, none of the other line categories below
> R = Public road ROW boundary, including federal, state and town roads (not taxed)
> V = Private or utility ROW boundary, coincident with a parcel boundary; primarily for use in urban areas
> J = Boundary between separate parcels with the same owner; primarily for urban areas
> A = Ambiguous ownership or in dispute; generally annotated as well with text on the tax map
> B = Blank: a boundary not drawn on the original tax map which is needed for area calculations (e.g. the end of some dead-end roads)

PARCWATER (1 1 C)   Water boundaries are flagged separately as they will be coordinated with surface waters data layers in the future, and for plotting of water features. All digitized lines will be assigned one of the following codes:
> Y =   Parcel line coincides with a surface water feature
> N =   Parcel line does not coincide with a surface water feature

LOCMETH (2 2 I)   Method used to digitize feature.

1 = drafted on orthophoto base - hand-digitized
2 = drafted on orthophoto base - scanned
3 = drafted on orthophoto base – screen digitized from digital
orthophoto base
4 = transformed CAD data from orthophoto base
5 = other or unknown source CAD data
6 = GPS
7 = derived from distance and bearing on surveys
8 = 1:24000 USGS map
9 = screen-digitized using 1:5000 reference features
10 = screen-digitized with little reference

For streams with a left and right bank appearing on a tax map, both banks must be digitized as these are generally the parcel boundaries used for tax assessment. The enclosed polygon's PARCELNUM will be set to 'WATER'. Parcel boundaries should not be digitized at the center of public road ROWs; instead the ROW boundary should be used as the parcel boundary. Parcel boundaries deeded or shown as extending into a river will be treated on a case-by-case basis, but the boundary in coverage PARCEL should reflect the land area used for tax assessment.

Once all polygons are coded, the PARCWATER line attribute can be automatically coded for most sources by selecting those arcs which border on WATER polygons and assigning them PARCWATER = 'Y'. Public road right-of-way boundaries can be coded in the same way. Please contact VCGI if you would like assistance with this process.

Note that state, county and village boundaries are not separately coded from other town boundaries. These will be more easily coded in a separate town boundary coverage (TB), described below.

If you find a need for any other parcel boundary codes please contact VCGI so that all codes will be consistent.

C.2.4   ANNOTATION FOR LAYER 'PARCxxxx'

The only annotation appearing in coverage PARCxxxx is for maps showing the entire town or for insets of the town other than those used for the orthophoto-based tax maps. This would include annotations for neighboring town names, town forests, and the like. All annotation associated with individual tax maps will be place in coverage TZxxxx, described below. The same annotation levels should be used as are documented below for TZxxxx.

C.3   LAYER 'TZxxxx'

Layer TZxxxx includes lines and other features which are <u>not</u> parcel boundaries but which are needed for tax map interpretation. Point features may also be put in TZxxxx for correspondence to the Grand List. For example, if condominiums are individually taxed, these can be identified as points within TZxxxx.

C.3.1   TOPOLOGY FOR LAYER 'TZxxxx'

This is a link coverage (line and point) without polygon topology. The name was chosen for the land hooks (or parcel hooks) which appear as Z's on a tax map. This is one line feature expected for any property mapping effort. All annotations for tax maps are placed in TZxxxx so as not to burden the parcel boundary layer (PARCxxxx) with

its many applications.

C.3.2   LINE ATTRIBUTES FOR LAYER 'TZxxxx' (.AAT File)

The attribute TAXLINE-ID will be used to identify the line type.

Your tax mapping effort may require features other than those listed here. In that case, a new TAXLINE-ID should be assigned to that feature and documented. Please inform VCGI so that a standard set of symbols can be maintained.

The line features for coverage TZxxxx and their TZxxxx-IDs are:

TZxxxx-ID (4 5 B 0)   Generated by ARC/INFO. Must be a unique value for each record

TAXLINE-ID	**Line Feature**
1	Land hooks (parcel hooks)
2	Block limit lines
3	Original lot lines (from when the town was first divided up)
4	Special district limits (e.g. fire districts, town forests, conservation districts).
5	Any water lines or boundaries which are not parcel boundaries
6	Private ROW boundaries which are not parcel boundaries
7	Utility easement or ROW boundary (gas, electric, etc.)
8	Subdivision boundary (not yet a parcel boundary)
9	Village boundary, for special cases where the village boundary is not a PARCxxxx boundary; hopefully you will not need this code
10	Trails (e.g., the Long Trail)
11	Condominium footprints, trailers, and any other taxed entities not on their own PARCxxxxs
12	Railroad lines (the actual tracks, not the ROW boundaries)
13	Miscellaneous Cartographic Lines connecting annotation to small PARCxxxxs (Leader Lines)
14	Electric transmission lines (not the ROW boundary)
15	Private Road (not a right of way)

LOCMETH (2 2 I)   Method used to digitize feature.

1 = drafted on orthophoto base - hand-digitized
2 = drafted on orthophoto base - scanned
3 = drafted on orthophoto base – screen digitized from digital orthophoto base
4 = transformed CAD data from orthophoto base
5 = other or unknown source CAD data
6 = GPS
7 = derived from distance and bearing on surveys
8 = 1:24000 USGS map

9 = screen-digitized using 1:5000 reference features
10 = screen-digitized with little reference

C.3.3   POINT ATTRIBUTES FOR LAYER 'TZxxxx' (.PAT FILE)

Points may be used in TZxxxx to represent taxed features which appears in the Ground List but which are not true PARCxxxxs. These may include condominiums, trailers within trailer parks or other entities. The only information associated with the point is a 'tax number' which corresponds to the Grand List.

ATTRIBUTE NAME	PURPOSE
TZxxxx-ID	Must be a unique value for each point.
TAXNUM (n n C)	The tax number for the entity corresponding to the grand list.

C.3.4   ANNOTATION FOR LAYER

All annotation required to produce 1:5000, 1:2500 or 1:1250 tax map overlays will be placed in coverage TZxxxx. The following tables specify the recommended annotation characteristics for coverage TZxxxx for specific features of the orthophoto-based tax maps. These symbols and sizes may be modified where appropriate. The sizes should be multiplied by 2 or 4 for 1:2500 and 1:1250 overlays, respectively.

NEED TO FIGURE OUT HOW ANNOTATION WILL BE SUBMITTED IF CONTRACTOR SUBMITS DATA IN SHAPEFILE FORMAT!

ANNOLEVEL	Feature
1	Parcel numbers and block numbers
2	Lot acreage and measurement method (AD for deeded, AC for calculated, AS for surveyed, A for deeded or calculated)
3	Road numbers
4	Surface waters names
5	Sheet numbers for sheet location map (for generating the border legend only)
9	Miscellaneous (town names, private ROWs, etc.)

			1:5000	
ANNOLEVEL	**Feature**	**SYMBOL**	**ANNOSIZE (meters)**	**Size (inches)**
10	Parcel #'s	1	15	.12
11	Parcel #'s (small)	1	10	.08
12	Block numbers	22	60	.47
20	Acreage	1	12	.095
21	Acreage (small)	1	10	.08
30	Road numbers	85	18	.14
40	Surface water names	61	18	.14
50	Sheet numbers	85	(variable by town)	
60	Town names	33	32	.25
70	Other miscellaneous	(variable)		
110-119	Inset 1 (subtract 100 for feature; optional, see below)			
210-219	Inset 2 (subtract 200 for feature; optional, see below)			
	etc.			

If existing tax maps are being converted to ARC/INFO format, annotation symbols should approximately match the original tax map.

Small annotation sizes are given to be used with compact parcels. A single ANNOSIZE should be used within a town for a given feature type, except where differences are seen on the source maps or where the annotation is confined by other features.

Insets generated at irregular scales will require their own ANNOSIZEs. Contractors may find that inset annotations can be flexibly managed with their own ANNOLEVELs. Based on the ANNOLEVELS in the table above, add 100 for the levels of inset 1 (levels 110 to 119), add 200 for inset 2 (levels 211 to 219), and so forth. For example, annolevel 230 is used for the road numbers of inset 2. One advantage of this system is that you won't need to plot the annotations for an insert except on the insert itself.

Any annotation required for producing town-wide plots should be placed in coverage PARCxxxx. The same annotation levels should be used as for coverage TZxxxx.

C.4   LAYER 'TB'

Towns with computerized parcel mapping will have an official town boundary coverage TB derived from the PARCxxxx boundaries. It is unlikely that these town boundaries will correspond exactly with the neighboring towns' boundaries, and the town may ask the mapping contractor to identify conflicts and seek appropriate resolutions.

C.4.1   LINE ATTRIBUTES FOR LAYER 'TB' (.AAT FILE)

The attribute TBLINE will be used to identify the line type. The line features and their TBLINEs are:

TB-ID (4 5 B 0)   Generated by ARC/INFO. Must be a unique value for each record

<u>TBLINE</u>	(1 1 I)		<u>Line Feature</u>
		1	State boundary
		2	County boundary (not state)
		3	Town boundary (not state or county)
		4	Village boundary (not state or county or town)

C.5   GEOGRAPHIC EXTENT OF THE DATALAYERSC

PARCxxxx and TZxxxx are to be town-wide, seamless coverages from which individual tax maps will be generated. Orthophoto edges are not part of the coverages, and must be generated at the time the tax maps are created.

A mapping contractor may wish to develop the digital data by individual tax maps (corresponding to 1:5000, 1:2500 or 1:1250 orthophotos). Each tax map will then have orthophoto edges as neatlines. The composite ARC/INFO coverage PARCxxxx must then be produced from the individual tax maps without orthophoto neatlines, and with all sheets edgematched. Coverage PARCxxxx is then considered to be the correct data. Any intermediate coverages should be deleted to avoid redundant data.

C.6   INSETS

Tax map insets must be registered to Vermont state plane coordinates using selected control points (tics) drafted on both the orthophoto-based tax map and on the insert. Insets must be derived from the seamless, town-wide PARCxxxx coverage, and at least four tics must appear on the inset as needed for registering the inset to a digitizing tablet.

C.7   PSEUDONODES   ARC/INFO pseudonodes should not be used in either coverage (PARCxxxx or TZxxxx) unless absolutely necessary (to separate two arcs with different attributes). Excess pseudonodes increase the number of arcs and thus the number of attribute values in a coverage, which slows processing time, increases storage requirements and affects the quality of plotted line symbols. Note that CAD generated data converted to ARC/INFO format may have excessive numbers of pseudonodes, which must be removed.

APPENDIX D

SAMPLE PARCEL SUBDIVISION

(PARCEL 21
IS SUBDIVIDED)

19   20

STREET

THIS COMPLETE
PARCEL # IS 100124-01-21

21

(BEFORE SUBDIVISION)

RETAINED PORTION
NEW COMPLETE PARCEL # IS
100124-01-21.1

21.1   21.2

SOLD OFF PORTION
NEW COMPLETE PARCEL
IS 100124-01-21.2

RETAINED PORTION
NEW COMPLETE PARCEL
IS 100124-01-21.21

21.21

21.1

21.22

SOLD OFF PORTION
NEW COMPLETE PARCEL
IS 100124-01-21.22
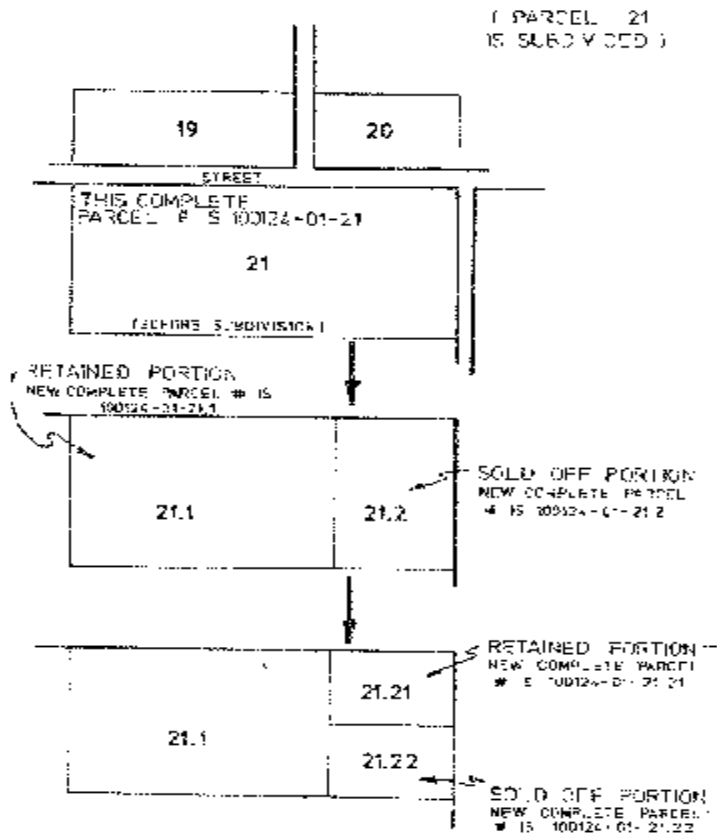
If parcel 21.2 was subdivided, the two new
resulting parcels would be numbered 100124-01-21.21
and 100124-01-21.22 as illustrated above.
   When subsequent divisions take place the retained
parcel is always suffixed with a 1, while the sold
off parcel(s) are suffixed starting with 2 and
numbering on. A maximum of three(3) digits to the
right of the decimal point will be allowed.

Section A, Municipal Property Mapping
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January, 2001

EXHIBIT A

REQUEST FOR PROPOSALS

INVITATION TO BID
for
Property Mapping

Municipality of _____, Vermont

The Municipality of _____ is seeking bids for the property mapping of all parcels within the municipality. This includes the _____ area as well as the _____ area. Enclosed find a proposed "Property Map Agreement" and "Property Mapping Specifications" upon which all bids must be based. Bid proposals must be received at the municipality office on or before _____ (Example: Tuesday, December 20, 2000)

The Municipality will review all proposals on the basis of price, firm expertise, personnel, previous experience, and other factors, and will choose the firm which the Municipality believes will provide the best job for the best price. The chosen firm may or may not be the low bidder and the Municipality reserves the right to accept or reject any proposal in the best interest of the Municipality of _____.

Prior to the submission of a bid proposal, representatives from each firm must visit the Municipality and review the existing Municipality records sufficiently to ascertain the status of the Municipality records to be used and to understand the magnitude of the job being bid. Upon said visit, the municipality shall assume that each firm clearly understands the problems, inconsistencies, and overall conditions associated with the Municipality of _____ land records, maps, etc., and that the bid proposal will take these problems into consideration when submitting a price to do a complete, accurate, and thorough job of property tax mapping for the Municipality of _____.

A performance bond will be required prior to commencement of the work. However, prior to the Municipality actually executing the agreement, the contractor shall furnish the Municipality with such evidence of its ability to secure such bond at the appropriate time as the Municipality of _____ deems acceptable. The Municipality shall not be obligated to execute any contract until it is satisfied in its sole discretion as to the capability of the contractor to secure such bond at the appropriate time. Execution by the Municipality of the contract shall not be deemed a waiver of the Municipality's rights to terminate the contract should the bond not actually be furnished by the time required in the contract. In its sole discretion, the Municipality may waive the security requirement in the bond if the contractor pledges such other security as the Municipality may find acceptable to secure the proposed performance.

Each bidder shall submit with their bid proposal an additional statement of the qualifications and experience of the bidder and all supervisory personnel. Such statement shall include a list of its municipal clients in New England and the nature of the mapping projects completed within the last ten years. It shall also include the number of persons fully and gainfully employed, their present work assignments and

the bidder's most recent financial statement, or if none is available, such other information relating to the financial condition of the bidder as will enable the Municipality to determine the bidder's financial ability.

Each bid proposal must contain a written, detailed explanation of the methods the firm intends to utilize in deed examinations, plotting, etc., within the specifications as set forth by the Municipality.

The bid proposal shall also contain as an addendum individual cost increases or decreases for the following options, as well as a brief written description explaining work which would be done and the product which would be completed for each option.

EXHIBIT B

SAMPLE STATEMENT FOR PROPERTY MAPPING SPECIFICATIONS

The Municipality of _____ comprised of _____ acres of land, divided into _____ parcels shall be mapped as follows:

    The entire municipality shall be mapped at the 1:5000 scale as indicated by the attached Municipality Index to Orthophotos map (generated by the Vermont Mapping Program), except for the area cross-hatched, which is to be mapped at the 1:1250 (or 1:2500) scale[*]. The _____ (Municipality or Contractor) shall provide the 1:2500 (or 1:2500) scale enlargements indicated on the attached map.

    Number of Map Sheets at 1:5000 (1"=417') scale _____
    Number of Map Sheets at 1:2500 (1"=208') scale _____
    Number of Map Sheets at 1:1250 (1"=104') scale _____

The following are but a few of the large landowners in the municipality that may have good documentation of their holdings:

_____ with _____ acres

_____ with _____ acres

_____ with _____ acres

[*]The Municipality is responsible for providing the Index to Orthophotos, and cross-hatching the areas to be mapped at 1:1250 (or 1:2500).

EXHIBIT C

ITEMS TO BE CONSIDERED IN EVALUATING MAPPING PROFESSIONALS

1. Responsiveness to the specifications and the contractor's proposed plan of performance. The plan of performance should include a schedule for accomplishing the work, including the time required for each phase.

2. Experience. Request a client list. Review one or two of the most recent projects, by examining the work and discussing the client's satisfaction with the mapping contractor's work.

3. Equipment and production facilities. Request a written statement of how maps are prepared. Ask for a listing and description of equipment to be used on the project.

4. Personnel. Ask for a listing of full-time employees of the firm available to work on the specified project and brief resumes of key mapping personnel. The caliber of workforce can be an important factor in a firm's ability to produce acceptable maps.

5. Financial status. Request a current financial statement. Check the statement and the contractor's credit rating.

6. Bonding. Bonding should be required for the bid price and 100 percent performance.

7. Support programs. Technical assistance and support for using and creating the maps and the numbering system employed on the maps should be provided.

8. Cost. Cost should be measured in relation to the service to be provided.

EXHIBIT D

PROPERTY MAP AGREEMENT

This Agreement made this _____ day of May, 1989 by and between the Municipality of

_____, a municipal corporation having its situs in the County of

_____ and State of Vermont hereinafter "Municipality",

and_____, a corporation organized and existing under and by virtue of the laws

of the State of _____ and having its principal place of business in

_____in the County of _____and State of

_____hereinafter "Contractor".

WITNESSETH:

That for and in consideration of the payments and agreements hereinafter mentioned:

1. SCOPE OF SERVICES In accordance with the contract documents, as hereinafter defined,
Contractor will prepare and furnish to Municipality property maps of the entire municipality to be
completed on or before _____. The property maps will be accurate as of
_____.

2. CONSIDERATION Municipality will pay Contractor the sum of _____ Dollars in
accordance with the payment schedule attached hereto as Exhibit A.

3. CONTRACT DOCUMENTS DEFINED The term "contract documents" means and includes the
following:

        A. Advertisement for bids;
        B. Specifications;
        C. Contractors bid;
        D. Performance bond;
        E. This Property Map Agreement;
        F. Notice of award;
        G. Schedule of Payments;
        H. Any change orders.

4. TIME FOR PERFORMANCE Work shall commence on or about the lst day of _____,
and shall be completed on or before _____, unless extended by mutual agreement of the parties
hereto in writing. Time is of the essence of this contract and the Contractor acknowledges that the date

of beginning and the time for completion of the work are essential conditions of the contract documents and Contractor further agrees to pay as liquidated damages the sum of $25.00 for each consecutive calendar day that Contract shall be in default after the time specified in the Agreement. Said penalty shall be in addition to any other damages that Municipality may be entitled to by virtue of breach of any other provisions of this contract.

5. OWNERSHIP OF MAPS, DIGITAL DATA AND RELATED DOCUMENTS The original property maps, the digital data, and all documents and materials from which they were produced, or which established the accuracy thereof, including, but not limited to manuscripts, shall be delivered to and become the property of the Municipality. The Contractor may retain copies thereof for its files for future reference, but in no event shall copies be sold to third parties except upon the express written consent of the Municipality.

6. RIGHT OF INSPECTION The Municipality, through its Board of Listers, shall, at their discretion, make periodic inspections of the work accomplished by the Contractor and the Contractor shall make available all maps, documents, manuscripts and related material at all reasonable times and places.

7. PAYMENT VOUCHERS All vouchers requesting payment, along with monthly progress reports, in accordance with the Payment Schedule shall be presented to and approved by the listers before payment shall be required by Municipality.

8. INSURANCE Contractor agrees that it shall, at its sole expense, procure and maintain workers compensation and general liability insurance in an amount of not less than ONE MILLION DOLLARS ($1,000,000.00), and shall upon request, deliver to the Municipality certificates evidencing said insurance.

9. AVAILABILITY OF MUNICIPALITY'S RECORDS AND DATA The Municipality will permit the Contractor to use, free of charge, in the performance of the work under this contract, the current and all available past Grand List books, all other applicable data from the Board of Listers and all deeds presently of record, and which shall become of record during the term of this Agreement. All said materials shall be available to the Contractor during normal business hours at the respective offices where they are usually kept.

10.   NON-ASSIGNMENT The Contractor agrees not to transfer, assign, encumber, sell or otherwise dispose of its rights under this Agreement.

11. NOTICES Any and all notices or other communications required or permitted by this Agreement or by law to be served or given to either the Municipality or the Contractor by the other party shall be in writing and shall be deemed duly served and given personally delivered to the party to whom it is directed, or in lieu of such personal service when deposited with the United States Postal Service by certified mail, return receipt requested, postage prepaid, addressed to the parties at the following addresses:

    TO MUNICIPALITY: _____

_____

_____

W/ Copy to: _____

_____

_____

TO CONTRACTOR: _____

_____

_____

Either party may change its address for the purposes of this paragraph by given written notice of such change to the other party in the manner provided for in this paragraph.

12. <u>ENTIRE AGREEMENT</u> The contract documents contain the entire Agreement between the Municipality and the Contractor and any other agreements or representations between the parties hereto not expressly set forth in said contract documents are null and void and of no force and effect.

IN WITNESS WHEREOF this Agreement is entered into as of the date first above written.
MUNICIPALITY: BY_____

CONTRACTOR: BY_____

EXHIBIT E

SCHEDULE OF PAYMENTS

Not later than the 10th day of each month during the term of this Agreement, the Contractor shall submit to the Municipality a partial payment voucher filled out and signed by the Contractor covering the work performed during the period covered by the voucher and supported by the Monthly Progress Report (see Exhibit F) and such data as the Municipality may reasonably require. Within 15 days of receipt of said voucher, the Municipality shall make payment to the Contractor, less 10% as a retainage, or return the voucher to the Contractor indicating in writing its reasons for refusing to make payment. In the latter case, the Contractor may make the necessary corrections an resubmit the voucher, in which case payment shall be made within 15 days of said resubmittal.

The 10% retainage withheld from the partial payments provided for above will be paid to the Contractor on the date of formal acceptance of the completed contract work as defined by the contract documents.

If the Municipality, while reviewing the completed contract work ascertains that it has not been performed in accordance with the contract documents, it shall return all of said work to the Contractor for revision as per the contract documents and the Municipality shall withhold further payments including the 10% retainage until the Contractor satisfactorily completes the terms of the contract.

If, after forty-five (45) days commencing upon receipt of the final contract work, the Contractor has not received formal acceptance or rejection in writing from the Municipality, the Contractor shall be deemed to have satisfactorily completed the contract and the Contractor shall be due the final payment of the contract plus the 10% retainage held on previous payments.

EXHIBIT F

CONTRACTOR'S MONTHLY PROJECT REPORT

MUNICIPALITY OF _____
PROPERTY MAPPING PROJECT
CONTRACTOR'S MONTHLY PROGRESS REPORT

Name of Contractor: _____

Month/Year of Report: _____

1. List work features currently underway (i.e., map compilation, drafting, digitizing, plotting, data base, etc.), the date work on each feature began, and the percentage of completion of each feature as of the date of this report:

     <u>DATE BEGUN</u>   <u>% COMPLETED</u>   <u>WORK FEATURE</u>

2. List those work features expected to be started in the coming month.

3. Describe briefly all problem areas presently being encountered or anticipated.

_____
         Signature

_____
         Title