

Ancient Roads and Geographic Information Systems (GIS)

Background

The purpose of this document is to describe services that would assist Vermont Towns with the processing of historic road survey data to identify "unidentified corridors", or Ancient Roads. Using the information transcribed from original road surveys, historic roads are "mapped" using Geographic Information Systems (GIS) software. Within the GIS application roads can be viewed with georeferenced historic maps and current geospatial data to visualize road locations. Services would also include the use of GIS to interactively present geospatial information to Committees for review and editing during meetings using a laptop computer and projector.

Project Information

Cost Estimates would be based on available information and the number of historic road surveys. Surveys would need to be transcribed and provided in digital file formats (ex. Excel spreadsheets) including actual survey data. Transcription services can be provided along with file templates and forms.

Deliverables would include all digital data created for a project. All GIS data would be provided in ESRI Shapefile format, georeferenced maps in JPEG or GeoTIFF formats, and map output as PDF files.

Estimated Completion Dates would to be determined based on further discussions.

References detailing qualifications and experience are available on request. Relevant experience includes work using GIS and GPS technology for numerous mapping projects. This includes the creation of GIS training materials for municipal officials¹ and the design and implementation of interactive presentations for community groups, municipal officials, scientists, teachers, and students.

¹ "Custom Training Materials for K-12 Educators and Municipals Officials in Vermont, An Introduction to Geographic Information Systems (GIS), Vermont Geographic Data, and ArcExplorer". Developed for the Vermont Center for Geographic Information (VCGI, 2007).

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Scope of Work

Task 1: Data Acquisition of historic surveys that have been converted to a digital format. Files would need to include the original survey data and descriptions to perform data processing (Task 2). Cost Estimates would include a preliminary discussion and meeting (if necessary).

Task 2: Data Processing to convert survey data to a format required for input into GIS. Cost Estimates would include the editing of data fields (ex. bearing data to apply historic declination corrections, conversion of distance units) and the generation of new data files for each survey.

Task 3: Generation of GIS Data Layers for each survey. Cost Estimates would include the creation and management of GIS data layers as well as the merging of adjacent road segments as needed. Data layers would be referenced using the Vermont State Plane Coordinate System (NAD83, meters) and saved in ESRI Shapefile format with metadata. Surveys that include references to current locations, for example those found using GPS receivers, would be positioned using known coordinates. All other road layers would be "mapped" in possible locations, using descriptive data, and would require review for verification.

Task 4: Georeferencing of Historic Maps to assist the visual inspection and identification of roads. Cost Estimates would include the georeferencing of Historic Maps from the late 1800's and early 1900's (as available) to the Vermont State Plane Coordinate System (NAD83, meters) for use within the GIS application. Images would be saved in JPEG and/or GeoTIFF formats. Historic Maps of Vermont have been scanned and are available in digital format from Old Maps (<http://www.old-maps.com>).

Task 5: Presentation of Results using GIS to a group or Committee using a computer laptop and projector. Cost Estimates would include the presentation of results in order to review and edit GIS data layers from surveys as directed.

Task 5: Final Revisions to GIS data layers based on feedback from a group or Committee. Cost Estimates would include all final edits to the GIS data layers of surveyed roads for the project.

Additional Services

The Lotting Plan (Original Proprietor's Map) can be acquired and introduced as an additional georeferenced data source. Lotting Plans for many Vermont towns are available for download from the Vermont State Archives (<http://vermont-archives.org/lottingplans.asp>). Lotting Plans can also be scanned from an original, or copy, and converted into a georeferenced raster layer. In addition, a GIS data layer with an associated database of historical data could be created if necessary. Cost Estimate would vary depending on the level of services to be provided.



Using Maps to Locate Possible Unidentified Corridors can be accomplished by digitizing, on-screen, roads that appear on older maps to create new GIS data layers.

Mapping of GPS Waypoints and Routes can be done when data has been collected to identify possible road locations and landmarks. Coordinates from GPS units would be processed and converted into GIS data layers for use in the GIS application with the survey data. Cost Estimate would vary depending on the number of files.

Additional Meetings: To Present Results using GIS to the Committee, and other groups as necessary, using a laptop computer and projector. A single meeting may not be sufficient to review and edit all road surveys. Work estimates could also include costs related to the production of additional materials (ex. posters, web mapping applications).

Example of Work

The following example uses information from an historic road survey in Hartland, Vermont (1799). Data provided by the Hartland Ancient Roads Committee.

Original survey data and descriptions are transcribed and converted into a digital document.

	A	B	C	D	E	F	G	H
1	Survey:	road survey, p159, (9/5/1799)						
2	Description of Survey:	"... striking the road leading from Marsh's Mill to Woodstock Court House ..."						
3								
4	Survey Data							
5								
6	Starting Point (landmark, GPS pts):							
7								
8	Segment	Bearings			Distance	Survey		
9	ID	N/S	angle	E/W	rods	Descriptions		
10	1	n	2	w	22			
11	2	n	17	e	14			
12	3	n	23	w	3			
13	4	n	12	e	120			
14	5	n	14	e	60			
15	6	n	2	w	60			
16	7	n	23	w	62			
17	8	n	16	w	24			
18	9	n	13	w	40			
19	10	n	2	e	60			
20	11	n	5	w	120	"... striking the road ..."		

Files for each survey would include data fields that contain:

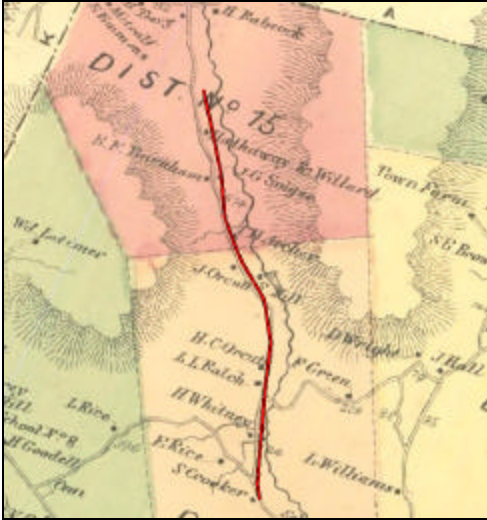
1. Descriptive information for each survey (date of survey, description of survey, houses, names, etc)
2. Landmarks -or- GPS coordinates (Lat/Lon, WGS84) defining beginning / end points of roads.
3. Bearing Data (North / South, angle, East / West) and Distance Data (chains, rods, links, feet) for each survey segment.
4. Additional information as necessary.

Original survey data with Bearings and Distances in rods.

Bearing	Distance (rods)
n02-00-00w	22
n17-00-00e	14
n23-00-00w	3
n12-00-00e	120
n14-00-00e	60
n02-00-00w	60
n23-00-00w	62
n16-00-00w	24
n13-00-00w	40
n02-00-00e	60
n05-00-00w	120

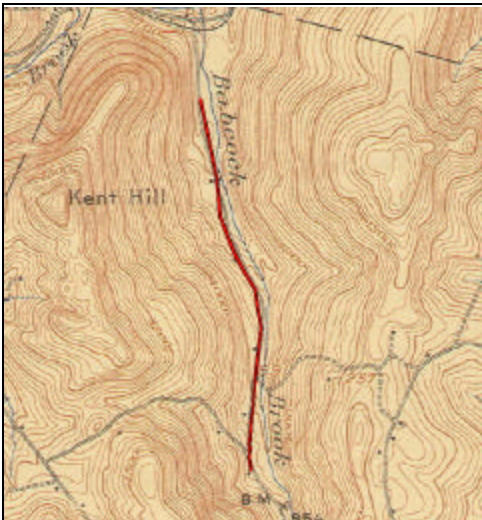
Bearings corrected for magnetic declination in 1799 (7 degrees W). Distance units converted to Meters for use with Vermont State Plane coordinate system.

Bearing	Distance (meters)
n09-00-00w	110.6
n10-00-00e	70.4
n30-00-00w	15
n05-00-00e	603.5
n07-00-00e	301.7
n09-00-00w	301.7
n30-00-00w	311.8
n23-00-00w	120.7
n20-00-00w	201.1
n05-00-00w	301.7
n12-00-00w	603.5



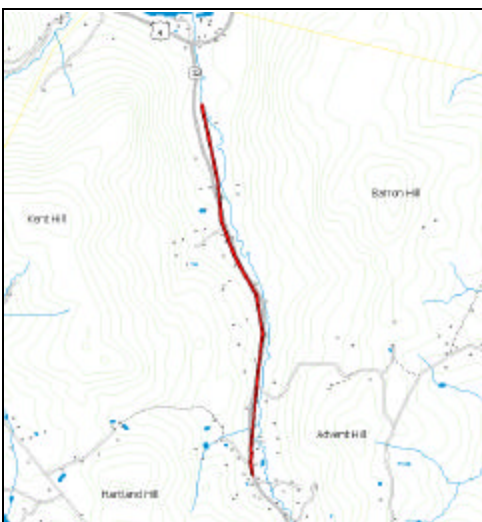
The surveyed road is “mapped” in a location and viewed with Beers Atlas (1869). Without GPS coordinates to establish a beginning or end point the new GIS layer (line) is positioned using the available descriptive data from the survey.

An approximate location for each road survey is then reviewed and edited, as needed, using feedback from a group (Committee) with local knowledge. The review would take place during an interactive meeting using GIS with a computer laptop and projector.



The surveyed road is viewed with the USGS Topographic Map from 1908 (Hanover Quadrangle).

In this example the new road would eventually intersect (strike) the road leading from Marsh’s Mill (Quechee) to Woodstock Village (as found in the survey description). Additional information would be required for verification when the mapped location does not entirely agree with all of the descriptive data from the survey.



The surveyed road is viewed with current geospatial data. The road appears to be a portion of Vermont Route 12 leading to, but just short of, the intersection with US Route 4.

All current geospatial data is available from the Vermont Center for Geographic Information (VCGI).
