Vermont Road Centerlines
An Inside View Into the Past, Present and Future Of This Data Layer

Vermont Agency of Transportation Mapping Section
Abbreviated History of Highways

For the past 267 years, starting with the chartering of Bennington in 1749, Towns have been establishing highways. This prompted the need for surveys and highway maps. Survey descriptions, generated by compass and chain from intrepid surveyors in the wilderness of Vermont provide the backbone for the highway network.

http://vtransplanning.vermont.gov/maps/historic
Abbreviated History of Highways

The history of Vermont and its highways span the days under the reign of George II and George III, the Republic of Vermont, and from 1791 the State of Vermont.

Ira Allen becomes the first Surveyor General, followed by James Whitelaw who produces statewide maps with highways.

http://vtransplanning.vermont.gov/maps/historic
During the 19th Century, several commercial ventures publish maps and atlases that show roads and highways in detail, including the Walling, Doton and Scott County Maps, and the F. W. Beers County Atlases.
The Mapping Section of the Vermont Agency of Transportation has produced Town Highway Maps since 1931, based on a statutory requirement.

The main purpose of these maps is to document highway classification and mileage of town highways for use in calculating State Aid for town highway maintenance.

http://vtransplanning.vermont.gov/maps/archive
Fast forward to the digital 20th Century

GIS takes hold in Vermont and there is a need for a standardized statewide Road Centerline Data Layer.

In 1991 to 1992, contractor Greenhorne & O’Mara, Inc. digitizes an ArcInfo road centerline data layer using the 1:5,000 Vermont Mapping Program’s RC Kodak orthophotos for the VT Office of GIS.
In 1995, a Road Centerline Standard is drafted and endorsed by the Vermont Center for Geographic Information (VCGI) Technical Advisory Committee (TAC).

The data evolves and the Standard is revised in 2005.

This is the current Standard.
The Road Centerline Data Layer is the linear feature class that represents highways and roads within the State, with specific attributes.

In 2004, VTrans becomes the steward of the centerline data layer and leverages this data as a core feature class.

VT E911 is also the steward of the centerline data.
RDS Data Available at VCGI

TransRoad_RDS
VTrans Master Road Centerline Data

EmergencyE911_RDS
E911 Road centerlines from 1:5000 orthophotos and GPS
VTrans and E911 both started with the master road centerline data layer from VCGI and modified the data to support operations and organizational missions.

Each organization maintains separate road centerline data layers.

The fork in the road is now merging.
The road centerline attribute schema has been updated to include all the E911 fields and all the VTrans fields. Both use the same database schema.

The ultimate goal is to have VTrans and E911 working from a single master road centerline data layer.

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Data Merging - Conflation

Conflation begins to synchronize the two road datasets into one master with the best geometry and complete attributes.

Over 60% of the arcs have been conflated to date and the remaining 40% are in the process of being reviewed and updated.

This is not an automated process, as arcs need to be evaluated against orthophotos and other sources.
VTrans Mapping relies on the road centerline data to maintain the highway classification and mileage for all state and town highways.

The Summary of Highway Mileage matches the classified highway mileage in the RDS data.

Mileage totals support federal reporting with the Certified Public Highway Mileage.

http://vtransplanning.vermont.gov/maps/publications
Highway Mapping System

The Town Highway Maps are produced directly from the road centerline data layer, leveraging a data driven, Python-based suite of scripts and ArcMap Template.

The Multiple Element Layout Manager 10.0 v1 from Esri provides the same Python functionality.

Linear Reference System (LRS)

VTrans leverages the geometry of the RDS data to generate the linear reference system (LRS). The LRS has measures or M-values on each vertex, and an awareness of the measures.

This is done for the Federal Aid System and also Local Roads, creating the All Roads Network of Linear Referenced Data (ARNOLD).

ARNOLD Reference Manual
Routes Logs are straight line diagrams that use the linear referenced data and events for the same section of highway. This is a powerful visualization and analysis tool for data that traditionally doesn’t have geography associated, other than route and mile markers.

[Route Logs and Event Mapping]

http://vtransplanning.vermont.gov/maps/routelogs
The linear reference system (LRS) supports other applications within VTrans, such as VTransparency.

Event data is dynamically segmented on the LRS and deployed out through ArcGIS Online.

Such as project information.

http://vtransparency.vermont.gov/
RDS and LRS are Core Datasets

The VTrans 511 System uses the LRS to locate projects, closures, and highway condition.

Multiple scripts are used to create feature classes through nightly batches for assets, maintenance activities, and other transportation features.

Many of these layers are deployed on-line.

http://vtransmaps.vermont.gov/VTrans511/511live.htm

AADT Map – ArcGIS On-Line
What will the Future hold?

Continued cooperation and collaboration between VTrans and E911

More dynamic data and responsiveness to updates

Temporal data via Esri’s Roads & Highways

Advanced linear referencing

More applications, tools and data on-line

Questions???

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VTrans Mapping Section:
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