

Creativity in Keeping Centerline Data Current **Maintaining the integrity of a state-wide GIS addressing project**

By Nicki Bistras

The State of Maine has spent the last seven years creating physical addresses for approximately 350,000 structures and developing a statewide road centerline GIS data layer. As our data development efforts wind down, we are now focused keeping this vast amount of information current. Address data is far from static, and without a solid maintenance system in place, the last seven years would be wasted.

Maine has 22 cities, 436 towns, 32 plantations, 424 unorganized townships and three Indian reservations. It is very rural—in fact, approximately 50 percent of its total area is unorganized and has a year-round population of only 7,000. When we began working toward implementation of enhanced 9-1-1 in the early 1990s, only 81 communities had physical (street-style) addresses. Naming roads and assigning addresses in Maine is the authority of the municipality, except in cases of the unorganized townships, which are addressed by the counties. That means that, in Maine, there are approximately 500 addressing authorities—and in many cases, they are volunteers! Participation was not mandated, nor was funding provided for involvement. Despite this obstacle, we have had more than a 99 percent cooperation rate.

The Emergency Services Communications Bureau (ESCB) was established as a division of the Department of Public Safety to spearhead the task of making enhanced 9-1-1 a reality in the State of Maine. In 1994, when they began looking at the task of creating addresses, they sought the assistance of Maine's Office of Geographic Information Systems (OGIS). Their foresight in using GIS to aid in the creation of addresses allowed us to build the street centerline data almost as a byproduct of the addressing efforts. Today, with the impending October 2001 deadline for the FCC's Phase II wireless mandates, Maine has a foundation of data in place to allow accurate mapping and dispatching for wireless 9-1-1 calls. But it is a foundation that is very fragile. If it does not receive perpetual maintenance, it will crumble.

Addressing Officers

After physical addresses are assigned where needed, the development and maintenance of address and routing databases becomes the responsibility of an Addressing Officer in each community. The Addressing Officer is responsible for approving and providing address information to all parties involved, and must have signature authority to do so on the town's behalf. This person is usually an assessor, code enforcement officer, first selectman, or other town representative that routinely assigns property addresses or issues building permits.

Each Addressing Officer is provided with a map book and Street Address Guide (SAG). They are also sent a copy of "The Enhanced 9-1-1 Addressing Officers Manual." This

outlines the responsibilities of the position, states the expected response times for each task, lists important contact information, provides straightforward forms for each expected reporting function, and gives useful diagrams and reference tables to assist in the determination of appropriate new addresses and with marking maps with edits.

A summary of the Addressing Officers duties are:

- ? Telephone Number Site Matching: Match telephone numbers from the service provider's database with the SAG export file from OGIS .
- ? Database Development and Maintenance: Verify and provide timely updates to road names, address ranges, and road geometry for MSAG/mapping data.
- ? Emergency Service Zones (ESZ): Define the geographic areas of each unique combination of police/fire/rescue and provide updates when necessary.
- ? Resolve any mismatch issues that may arise; either an incorrect or a missing address.
- ? Act as a local guide for GPS collection of new or missing road data.
- ? Calculate and assign addresses to new structures.

The best way to get consistently good information from 500 people of varying technical backgrounds is to keep things as simple as possible. Submitting an update is reduced to checking several boxes on a Maine Enhanced 9-1-1 Road Update Form indicating what type of edit is being requested, listing the road name or range change, and photocopying a page from the map book with a new road drawn in.

The map book provided to each town is an 11" x 17" atlas depicting all roads in the E9-1-1 road inventory, road names, and intersection address ranges, left and right, between each intersection. The index allows quick page reference via alphabetical road name and range listings. There will be more detail on the map book a bit later.

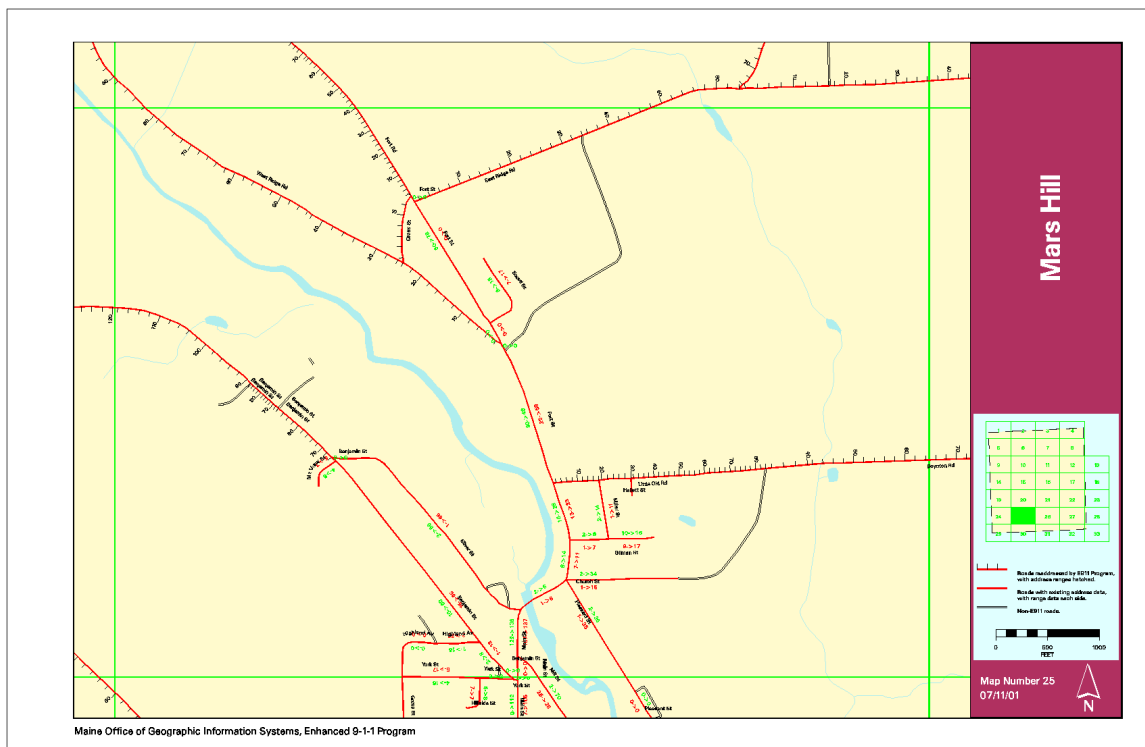
Some of the information we need on the update form is: new road names, length of road to be added, potential address ranges of new road, physical location including distance to nearest intersection and geometry. We also ask for range break information on the newly intersected road. If a road is being lengthened we need to know its total length and how much has the range been extended. The technicians complete these edits and map book pages are reproduced. A new SAG list is enclosed with the map and sent to the Addressing Officer.

Overcoming Actual vs. Potential Ranges

As adults, we tend to count what IS there, not what COULD be there. We need to have the imagination of a child when looking at address ranges. When asked, "How many toy blocks will fit on this square?" a child won't think about zoning and minimum frontage intervals. They may stack vertically and have no concept of leaving 'appropriate' space between the toy blocks. Likewise, zoning can change, people build apartments above their garages, businesses build second stories, and mothers-in-law *do* put trailers in back yards. If the ranges in your database are showing actual addresses, you will need to update it every time a new kid on the block stretches your imagination and moves in outside of your existing range. If you had built the ranges to potential—what COULD be there—the new kid would fit right in and no update to the database would be necessary.

Clearly, address range data that depicts potential address ranges between each intersection is far superior to that built on actual address range data. However, in most circumstances, it is more difficult to do. In some ways, because the State of Maine started from scratch, creating addresses as well as basemap data, we ended up with much better range information. By using GPS and GIS to create accurate geographic data and then developing distance-based addresses with it, we built in the potential address ranges from the beginning.

But, when we began looking at those 81 communities that already had physical addresses and the handful that had good addresses in the urban areas of their town, it was a different story. They did not need our services to readdress, but we needed their assistance to build the range data. This group represents the most urban areas of the state, and consequently the relationships we built were with the people with the least amount of time to work with us. Getting any address range information from them was better than getting none, and in many cases we had to settle for actual range data.



Sample page of Maine Office of GIS map book used to facilitate maintenance of street centerline data.

Map Book—One Product for Two Cases

For those communities that used OGIS for creating distance-based physical addresses, we have very accurate potential address ranges between all intersections. This allows us to

provide tic marks at each addressing interval in the map book, making quick and accurate work of assigning new addresses on existing roads.

However, in the case of those towns that provided us with only actual address ranges, this is not an accurate way to depict the data. In fact, doing so would be very deceiving. For these towns, we needed to display the ranges themselves for both left and right sides of the road.

Our map book accommodates both cases. For those roads that were addressed using GIS technology, address intervals are depicted with tic marks. The roads that were not addressed this way display the given intersection address ranges only.

To extrapolate a bit further, data for those towns using GIS services to create addresses will allow for very accurate geocoding of addresses by mapping software in a PSAP. The towns that have provided only existing address ranges may produce a record match, but when depicted on a map, it can be vastly inaccurate. For that reason, we are encouraging all communities that originally gave actual ranges to gradually convert to potential ranges as they provide us with updates.

Centerlines on the Web

In summer 2000, we designed a web page that would allow the download of completed data, and in autumn, we began releasing data to the public. Although we have quality control procedures in place throughout the data development process, we are taking final measures to ensure that what was produced in 1995 and 1997 meets the standards we have grown into today.

Three staff members, with a combined eight years of experience on this project and with this data, are reviewing GIS data layers for each town. They are taking time to resolve any issues they may find before creating ESRI Arc export files and shape files for release on the web site. The goal is to have all the data available by the end of the year.

Also available is an associated metadata file in standard FGDC format. Metadata, data about data, provides detailed information about who developed the data and the process used; when was it developed and how often is it updated; its intended purpose; its projection, datum and accuracy; descriptions of its attributes; and so on. The legend on a map may portray a small portion of this information. Metadata is very important to determine the origin of data and track any changes that have occurred to it. Second- or third- hand data may not even resemble the original and may actually be unsuitable for your intended use. Especially when public safety is the goal, caution needs to be taken when using data layers without knowing the facts found in associated metadata files.

You can visit our web site at: <http://apollo.ogis.state.me.us/projects/e911/e911.htm>.

Conclusion

There is much more technology, custom applications, data and expertise available now than there was in 1994 when we began this process. Today, we are able to capitalize on

vast amounts of data and numerous resources. From digital orthophoto quads (DOQ) to more accurate GPS, we have luxuries that were not available until fairly recently. It has been a long road, but it's getting smoother by the day. And, because of mapping technology, it's getting safer by the day, too.

Nicki Bistrails has been a leader in addressing and GIS database development efforts in the State of Maine since 1996. She is currently the E9-1-1 Address Manager and a GIS Programmer/Analyst at the Maine Office of GIS. She has over 10 years experience in database design, application programming and technical training.