B.C. Hydro Automates a Province

BY GINGER M. JUHL

Dan Bowditch, GFIS project manager.

If you think that automating the land and facilities information for an entire city or county is a massive undertaking, multiply that effort five- or ten-fold. That's the challenge currently faced by Canada's B.C. Hydro.

Covering a territory of more than 72,000 square kilometers (44,640 square miles), B.C. Hydro's service area includes 1.2 million customers throughout the province of British Columbia and encompasses terrain ranging from gently rolling farmland to some of North America's most rugged mountain regions. The electric utility is currently in the midst of transforming the distribution maps and facilities data for this service territory into a computer database that will meet a number of corporate objectives. Included as part of this database are land base information as well as information on some 180,000 transformers, 49,000 kilometers of primary conductor, and all the facilities related to 800,000 poles.

To make the challenge even more complicated, the hydro-electric utility has established a target date for conversion that's almost unheard of by traditional industry standards. B.C.

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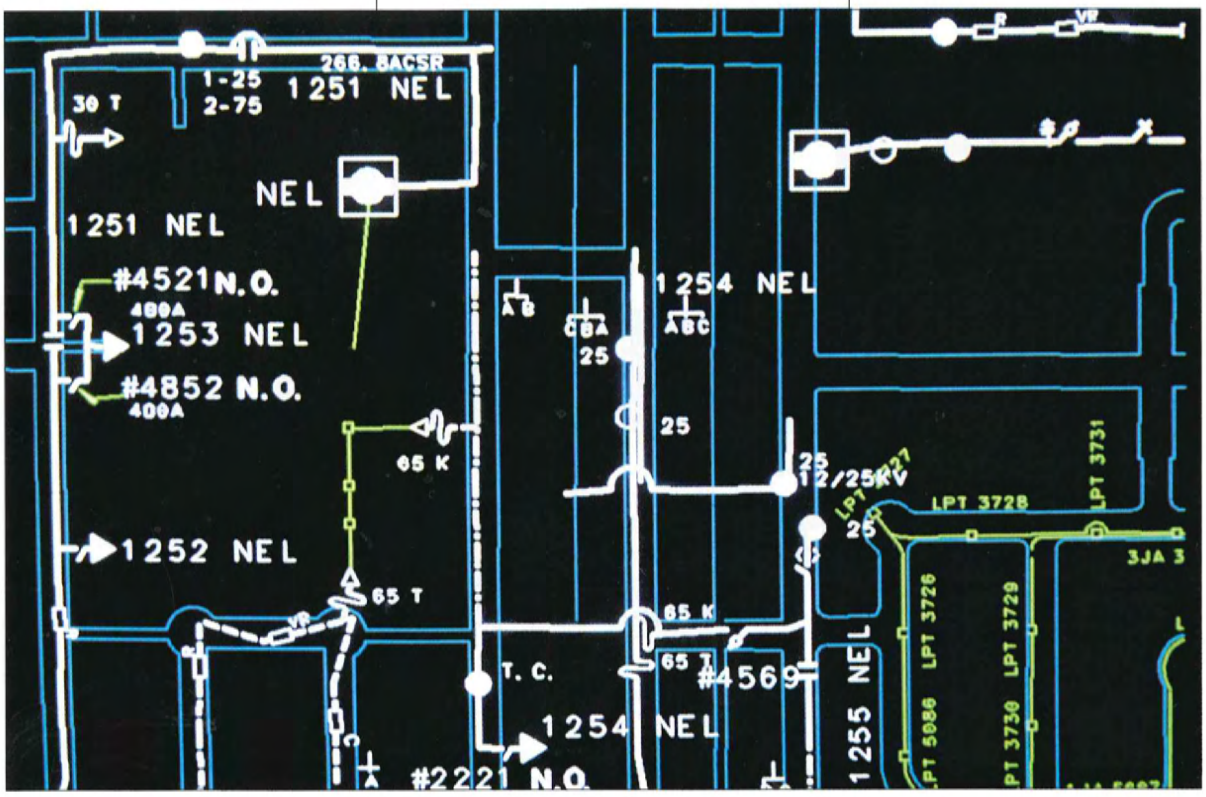


Primary electrical circuit map.

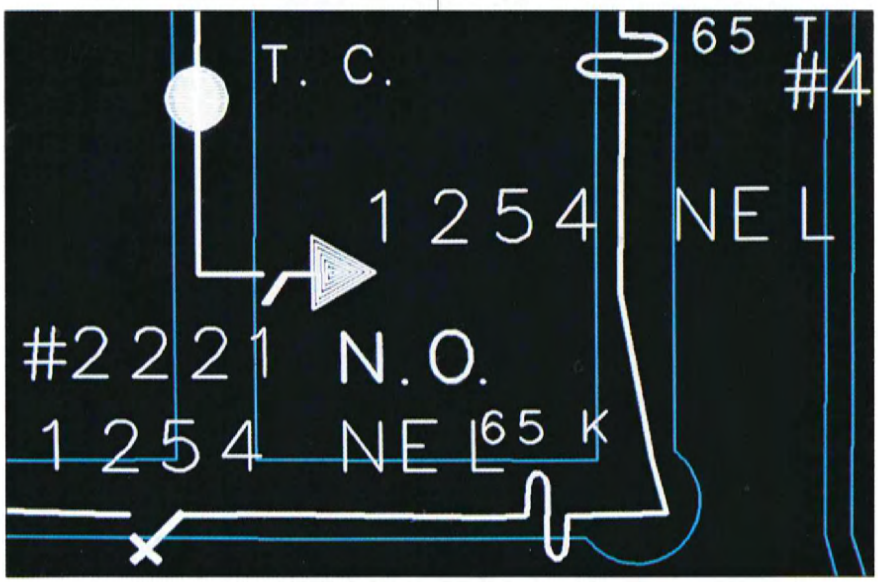
Hydro plans to complete its conversion project within the next two years, which is two to five times faster than other GIS conversion projects of similar size and scope.

Project Background

B.C. Hydro first became involved with GIS technology in the late 1970s as a participant in one of the industry's first multiparticipant projects. The electric utility teamed up with British Columbia Telephone and the Corporation of the District of Burnaby in an effort to demonstrate the benefits that could be realized through the technology. As a result of that early project, B.C. Hydro purchased a mapping-only system to keep track of poles that were used jointly by themselves and the telephone company. Around the same time, the utility's gas division embarked on a separate mapping-only GIS project using a different vendor's system.

In 1982, utility distribution engineers began asking more from these systems than they were capable of doing. They wanted not only to create and manage facilities maps but also to automate circuit analysis operations using a computer "model" of the distribution system. This required a database with full network connectivity. In 1983, the Lower Mainland Division kicked off a pilot using IBM's Geo-Facilities Information System (GFIS). B.C. Hydro substantiated the system's network modeling capabilities through the two-year pilot and decided in 1987 to expand the GFIS solution to all four divisions.

"The ability to automate connectivity and modeling applications was the main reason we decided to move down the path we've now taken with our GIS efforts," says Dan Bowditch, GFIS project manager. "Another important factor was being able to tie the GIS database into other mainframe-based systems in which we had already invested."



Electrical circuit detail.

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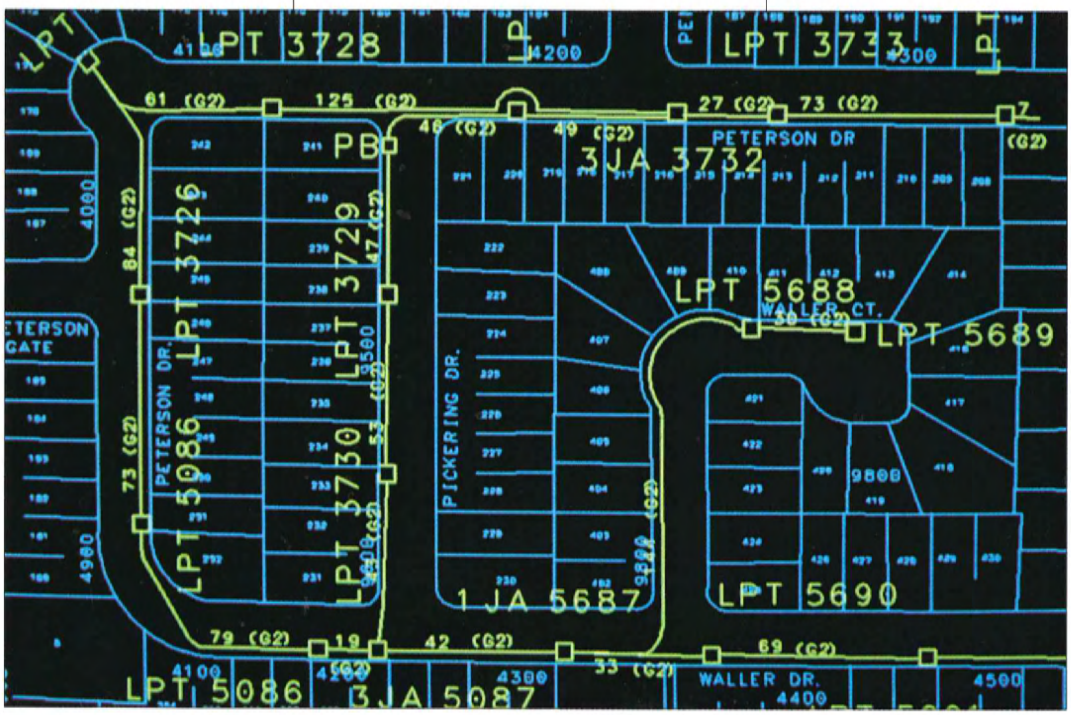

Underground electrical power distribution.

Bowditch emphasizes that the decision to pursue GIS on a large scale was a strategic decision which called for GIS to become the foundation for future systems, that is, the link through which the customer information system, work management system and others would be integrated.

"People other than the distribution engineer will want access to geographically referenced data," he stresses. "Our Properties Division, for example, might want to find information on property adjacent to hydro lines. Through integration of their database with the GIS, they could quickly see what they're looking for using an inexpensive standard query terminal."

A Customer Orientation

Bowditch points out that one objective the utility hopes to attain through its GIS is being recognized by its customers as a superior, service-oriented company. He expects to achieve this goal in part by reducing travel and waiting time for engineering staff, planners and line crews. Another benefit of GIS that will increase the utility's reputation for customer service is the system's ability to reduce the time required to produce distribution design drawings. The system also will be the graphics foundation for systems used for such things as reporting of distribution system trouble, annual line inspections and rights-of-way maintenance. Bowditch reports that there also is considerable interest building from external organizations as the utility will be one of the first to have a large-scale land base covering every community in the province.

Applications Focus

With its expanded view of GIS, B.C. Hydro now is concentrating not so much on mapping, but rather on applications offering a strong return-on-investment. Many of these applications, such as automatic updating of the pole management system, are made possible through integrating GIS with the corporate computing environment.

"Automating functions as simple as tree trimming maintenance programs can save us considerable time and money," Bowditch explains. "By creating a spatially referenced picture of places where trees are damaging power lines, you can take necessary action more quickly than if you were looking at the same information in a tabular report."

The facilities planning application that has been developed using the new system takes distribution circuits and looks at all the combinations and permutations of switches between those circuits. By evaluating various "what if" alternatives, optimum arrangements can be selected and unnecessary construction of underground feeder circuits can be avoided. This application alone has the potential to save the utility millions of dollars.

A major application Bowditch expects will have a considerable impact involves B.C. Hydro's distribution construction system. This system is part of the utility's work management system that is responsible for processing work orders, estimating jobs and providing input to the utility's financial models. "The application we're developing will allow a service planner who deals directly with the customer to sit down at a workstation, design a new service, automatically pick up the compatible units that make up the design and transfer them over to our work management system," Bowditch explains. "From that point, the estimate and work order will be generated, and as-built information will be automatically posted to the database once the job is completed." It is called the Distribution Construction Drawing System (DCDS) and will be ready later this year.

Specialized applications such as those described above are being

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developed by Westech Information Systems, a subsidiary of B.C. Hydro that also is charged with marketing software developed for the utility.

The Conversion Challenge

One of the first tasks faced by Westech was developing the means to translate the land and facilities data that already had been captured using the two earlier systems into a format usable by the new system. This presented unique challenges to the utility's goal of building a single comprehensive database for all mapping and facilities modeling applications. According to Bowditch, the utility was successful in translating virtually all of the previously captured data.

Another issue revolved around the conversion schedule. When B.C. Hydro decided, in 1987, to move forward with GIS in all four operating divisions, it anticipated a minimum of seven years to complete the conversion effort. "That was probably being optimistic," acknowledges Bowditch. "What really got our project going at its current accelerated pace was the commitment of our chairman, Larry Bell. On a customary visit to one of our local offices, he saw the huge proliferation of paper, particularly maps, that the staff had to deal with and asked what could be done to shrink this mountain of data down to a manageable size." B.C. Hydro's GIS project team rose to the challenge and developed a plan to speed up conversion plans and slash the schedule by almost two-thirds. Conversion will be completed by March 1992.

In late 1989, in keeping with the utility's objective of maximizing its contribution to the economic development of British Columbia, this aggressive schedule was put into place using two outside contractors. Underhill Geographic Systems, located in Vernon, B.C., is a Vancouver-based company that has a partnership with GeoTechnology International of Denver. The other contractor, CANTEX Conversion Services, located in Kamloops, B.C., is a joint venture of San Antonio-based Ferguson Cartotech and Westech.

Ferguson Cartotech had assisted earlier with preconversion planning and Utility Graphics Consultants (UGC) was retained to help develop the detailed conversion specs, evaluate procedures, select the conversion contractors, and develop quality control and assurance procedures. An active project team of regional user representatives has overseen the project from its inception.

To ensure that B.C. Hydro personnel are fully comfortable with and supportive of the new system, the utility is retaining 10 percent of the conversion effort in-house. Currently, 50 workstations are located throughout the utility's four divisions for data conversion and database maintenance, and 50 more are anticipated by March 1991. To ensure the best possible transition from manual to automated methodologies, B.C. Hydro has established a training center in Vancouver where personnel from all divisions learn how to use the new system. "We've got three trainers whose goal is to educate some 200 people province-wide," says John Hopkins, supervisor of the training center. By raising employee skills through training on the GIS, B.C. Hydro expects to maximize staff morale and productivity by providing technological tools they can be proud to use. "We are investing in our number one asset — our people," says Alex Owen, a trainer in the training center. This supports yet another of the utility's objectives, to be one of the best employers in the province.

Great Expectations

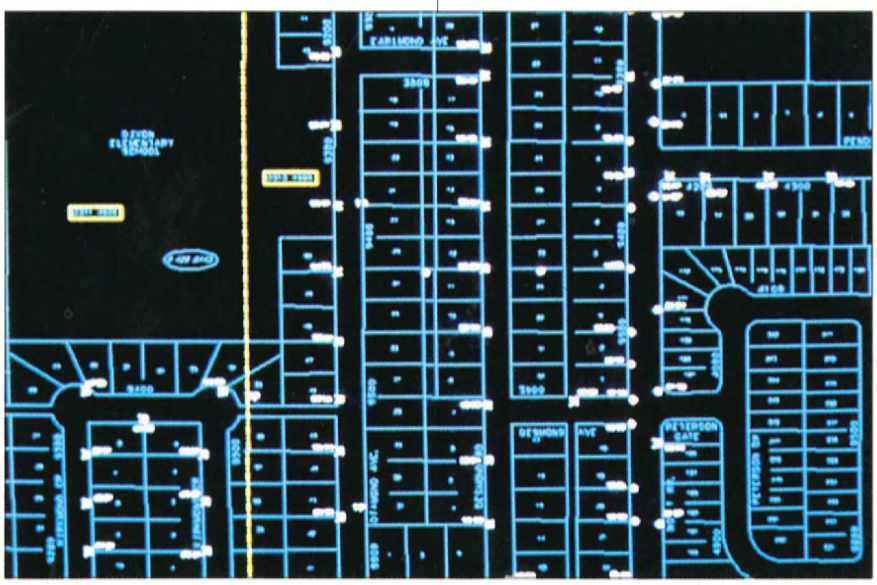
B.C. Hydro has an optimistic view of the future and the role GIS will play within the corporation. "Using the geography inherent in the GIS as our link, we will build a common user interface that will allow us to talk among multiple systems in a real-time manner," Bowditch says.

The utility will use this system as the basis for planning decisions such as determining the long-term need for new facilities, ascertaining where facilities should be located relative to environmental considerations and public interest, deciding on corrective action to reduce existing line losses and conducting applications that would be impossible with manual methods.

B.C. Hydro also will rely on the system to improve plant accounting records through the ability to track key distribution assets and improve the quality of rate and cost studies via more accurate and accessible data.

"Our goal is to be the most efficient utility in North America," Bowditch concludes. With GIS as a pivotal resource, B.C. Hydro has taken a critical step toward attaining that goal.

Ginger M. Juhl is marketing communications director for Denver-based Utility Graphics Consultants (UGC), which provided technical and management assistance on B.C. Hydro's GIS project.



Land parcels and power pole distribution.

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