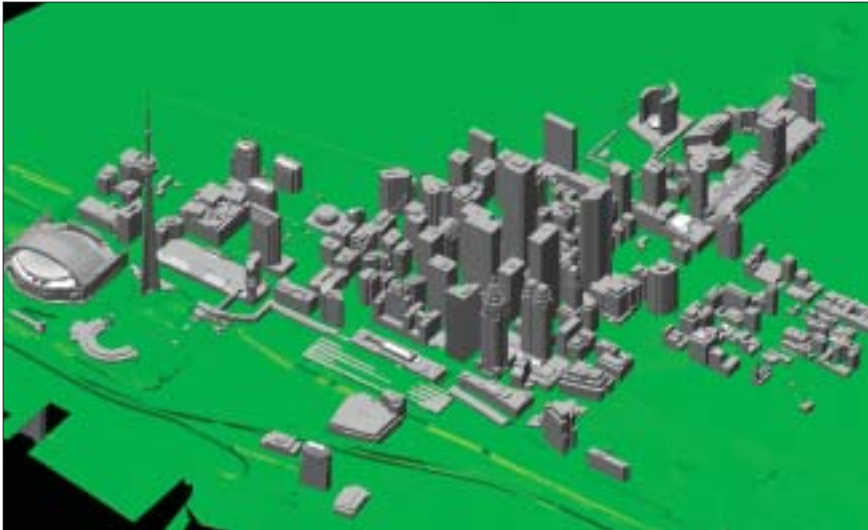


Toronto's future as a mapping leader becomes reality

Rebuilt 3D topographic map base saves city \$7 million to date, supports city services, provides data to outside users



▲ City of Toronto staff collected detailed rooftop features such as air-conditioning units, and then rendered the 3D model with MicroStation GeoGraphics for shadow and line-of-sight studies.

When the present-day City of Toronto was consolidated from seven municipalities in 1998, a number of challenges were created by this immense amalgamation. Central to these challenges was rebuilding the topographic map base, which is the basis for many city services such as sewer design and construction and urban planning.

Together with his staff, Bob Gaspirc, manager of the city's Survey and Mapping Services group, met the task head-on.

Progress from change

Fortunately, the amalgamation had its benefits as well as its challenges. According to Gaspirc, the inevitable review of redundant work processes allowed the city to introduce new methodologies and ideas regarding

how topographic information could be collected.

As a result, the group created an environment called the Enterprise Stereoscopic Model (ESM), which allowed it to rebuild the topographic mapping base, generate high-resolution orthoimagery, and develop spin-off products for other entities. Through the use of 3D modeling within the ESM, applications such as terrain modeling, watershed modeling, stormshed management, and emergency management planning are enhanced by visualization that allows users to see the physical reality of their work sites.

The ESM environment consists of two major components: an aerial image vectorization application from DVP Stereo Systems, combined with

Bentley's MicroStation GeoGraphics software. At a photogrammetric workstation the aerial imagery, which has a resolution of 7.5 centimeters and is sharp enough to view objects as small as fire hydrants, is viewed in 3D. Elements are vectorized using image vectorization software.

The data created in the vectorization software is placed in MicroStation GeoGraphics, and is 3D and georeferenced, providing greater accuracy and the ability to customize the end product for users' needs. The resulting geospatial information is stored in an Oracle Spatial repository, along with a significant amount of intelligence about the topographic features. This greatly increases the value of the data by making it more intelligent, while making maintenance of the data easier to perform.

"With the creation of the ESM, we collected and created a series of processes with water and wastewater, transportation services, building permits, and other organizations that ensure change information is provided to a centralized database via the ESM," Gaspirc said.

"The net result is that we have one of the first maintainable, expandable 3D urban databases anywhere in the world."

3D urban model saves millions

The process of creating and assembling a new ESM typically takes around nine months, and is redone every two years with new photography and mapping. The project cost to date has totaled \$4 million, but has saved the city an estimated \$7 million.

The savings result from having an accurate, reliable 3D design model that leads to better decisions, which in turn lead to lower construction



and lower conflict-of-plant costs. Initial capture of 3D data is higher in cost than that of 2D, but over time the operational costs are reduced significantly. As an example, the city slashed costs of capturing and maintaining its map base from \$7 million in 1991 to \$2.1 million in 1999.

Gaspirc is quick to point out that not only does his group deliver products to city departments, but to outside sources as well. On a fee-for-service basis, architectural and realty firms, utility companies, and corporations can order map products from the city's database of 13 million records.

Since the inception of the ESM, the City of Toronto has provided data valued at more than \$15 million. Accordingly, it is one of the major distributors of map data in all of Ontario. "We are the source, and we will be the source in the future as well," Gaspirc said.

New uses of the data include developing strategic vantage points or checking views for event planning by police; cell-tower locations for telecommunications; and regular use of 3D maps for Ontario Municipal Board hearings.

Keeping the customer satisfied

According to Gaspirc, the Survey and Mapping Services group handles more than 1,000 mapping projects a year. Without MicroStation and its related products, these projects couldn't be completed as efficiently or with the standard of quality the City of Toronto requires.

Ease of use is one of the many things Gaspirc likes about MicroStation. Most of the Survey and Mapping staff became familiar and productive with the software in three to four days. "Our basic philosophy is 'people, program,

technology.' And MicroStation is that technology," he said.

Gaspirc proudly points out that his staff is heavily involved in teaching, so that they can share their knowledge with others. As part of their performance plan, he encourages them to become involved in local community colleges and universities. And he sums up their mission by saying: "Advertise, promote your services at every opportunity, and pretend you're No. 2, because when you're No. 2, you try harder. We are No. 2 - our clients are first."

Spoken in the spirit of true leadership. ■

Project 3D Topographic Mapping
Organization City of Toronto
BE Awards category Extreme Mapping
Project objectives Rebuild Toronto's topographic map base
Fast facts This \$4 million project has saved the city \$7 million so far. An accurate, reliable 3D model allows better decisions, lowering construction and other costs. Additionally, the city sells data to utilities, architectural and realty firms, and others.
Bentley products used MicroStation MicroStation GeoGraphics