

New city utilities GIS cuts paperwork in half; database now more accurate

Customer
City of Sioux Falls,
South Dakota

Project
New city utilities GIS

Project Date
2004



With a population of approximately 135,000, Sioux Falls is the largest city in South Dakota. Best known for the cascades that flow from the Big Sioux River, Sioux Falls is one of the fastest growing areas of the state, with population growth of nearly 12 percent in the last three years.

An associated challenge of growth and development is the need to keep pace with utilities and other services for its residents. Until recently, new utility features such as fire hydrants, streetlights and manholes had to be entered into the city's utility database manually. Once utilities were in place in a new subdivision, developers provided CAD files detailing the type of each utility and its approximate location.

The CAD data, which was based on measurements drawn on plans, then had to be entered manually into a Geographic Information System (GIS) database. Not only was this process time consuming, but also many of the plans were inaccurate because they were not created using Global Positioning System (GPS) data. In this cumbersome system, inaccuracies and inefficiencies proliferated as growth and development increased.

At the same time, employees needing access to utility information in the field were relying mostly on paper mapbooks. The maps showed the location of city utilities, such as pipes, water service lines, storm sewer mainlines, manholes and light poles, but the information was quickly out of date because new features were continually being added.

In addition to wanting to create a more accurate database, the city was interested in reducing the number of 'One Call' tickets that utility locators had to action.

Any time a developer, contractor or resident plans to dig in Sioux Falls, even in the backyard of a private residence, they first must submit a request to the South Dakota One Call system. After the request is processed and sent to each utility, an employee must visit the site to locate and mark all city underground utilities in the vicinity, confirm that it is safe to dig, and grant approval—all before digging can begin.

Under the existing system, each city utility—water, water reclamation, traffic, storm drainage, lighting and electric—was required to manually review every ticket from the One Call system to confirm that digging would not be problematic. During heavy construction months, each utility could easily have three hundred tickets to review every day.

In the event that a utility was potentially affected by a digging project, someone from that department typically had 48 hours to visit the location and locate the underground utilities. This process was time consuming and cumbersome, particularly for utilities that were seldom affected by digging, such as the lighting and traffic departments.

Recognizing the need to improve efficiency, the city hired a consultant who suggested they use GPS and GIS technology. This would enable them to accurately map and record utilities data and incorporate the information into an enterprise database readily accessible to all departments.



After researching different options, they purchased four Trimble® GPS Pathfinder® Pro XRS receivers, IPAQ Pocket PCs and ESRI ArcPad data collection software. Engineering staff had set an accuracy threshold of 18 to 24 inches (45 to 60 centimetres).

Sioux Falls has since purchased three Trimble GeoXT™ handheld GPS receivers running Microsoft® Windows Mobile™ 2003 software, which work seamlessly with the city's existing Microsoft Active Sync® software.

For ease of use, drop-down menus were created in ArcPad Application Builder. Data collected in the field (such as the type of structure, subdivision, where it is located, installation date and data collector's name) was then brought back to the office, downloaded onto an office PC, differentially corrected and placed on the network.

Each city utility has a designated person who is responsible for the integrity of the city's GPS information that enters the database from their department. Once data has been placed on the network, it is available to the technician responsible for entering all of the data into the city's enterprise database. If necessary, the technician reviews aerial photography, hardcopy plans and other documentation to verify that the GPS location is as accurate as possible.

Under the new system, inspectors can record utility locations and features with confidence. In addition to

PROJECT HIGHLIGHTS

- Comprehensive GIS of city utility features increases employee efficiency and job satisfaction for the City of Sioux Falls, South Dakota
- Since implementing the use of GPS and GIS technology, some utility departments have seen a 225 percent decrease in the number of One Call tickets to review
- Trimble's GeoXT rugged GPS handheld receiver is perfect for utility workers' mobile GIS needs



being more efficient than logging all the information with a pen and paper, the new system also eliminates the need to confirm locations that were previously provided by developers and often spatially inaccurate.

Furthermore, the submeter GIS utility data is uploaded on a regular basis to South Dakota One Call. This ensures that even during busiest construction months, changes to the city's utility infrastructure are up to date in the system. One Call scans all utility features within a 400-foot radius of a request and electronically submits tickets to only those departments affected.

This has dramatically reduced the number of requests issued, resulting in a decrease in the number of tickets to review by nearly every city department. From July 2003 to July 2004, the number of One Call tickets reviewed by the Light Department decreased by 118 percent while the Traffic Department saw a whopping 226 percent decrease. The Water/Sewer Department actually reviewed more tickets in 2004, mainly because just about every project has the potential to affect water and sewer lines. But, each ticket took less time to review. Across all departments, nearly 4,000 less tickets required review in 2004 than in 2003.

Since the success of the initial mapping project, all of the city's utility features are now part of one comprehensive GIS/GPS mapping initiative. One part-time employee is responsible for mapping all of the city's utility structures, which could be up to 300 features per day in a new subdivision. The city is also inspecting its entire storm sewer system, during which every structure will be mapped and attributed using GPS.

"GIS is no longer something done only by the GIS department," said Chris Laingen, GIS technician for the City of Sioux Falls. "The Trimble equipment is easy to learn, even for those who are not familiar with GPS technology. Now, the engineering staff is responsible for their specific data, and our health department, lighting department and other utilities are finding ways to utilize GPS technology."

Since implementing its GIS/GPS solution, the City of Sioux Falls has experienced an increase in employee productivity and employee job satisfaction.

"The development of a GIS and GPS mapping system is saving the city of Sioux Falls a significant amount of time and money," Laingen continued. "Our tests have shown that our measurements are typically accurate within a foot, so our database is not only more current but also more spatially accurate than before. In addition to being a smarter business solution, mobile technology is just more fun to use. This program simply could not have been more of a success."

The equipment used on this project includes:

- GPS Pathfinder Pro XRS receivers
- GeoXT handhelds



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NORTH & SOUTH AMERICA

Trimble Navigation Limited
7401 Church Ranch Blvd
Westminster, CO 80021
USA
+1-720-887-4374 Phone
+1-720-887-8019 Fax

EUROPE, AFRICA & MIDDLE EAST

Trimble GmbH
Am Prime Parc 11
65479 Raunheim
GERMANY
+49-6142-2100-0 Phone
+49-6142-2100-550 Fax

ASIA-PACIFIC

Trimble Navigation Australia
PTY Limited
Level 1/123 Gotha Street
Fortitude Valley, QLD 4006
AUSTRALIA
+61-7-3216-0044 Phone
+61-7-3216-0088 Fax

