

GIS project's success translates to funds for Sioux Falls

Customer
City of Sioux Falls,
South Dakota

Project
Storm sewer
improvement project

Project Date
2004-2005



On May 29, 2004, more than six inches of rain fell in the City of Sioux Falls, South Dakota, in less than two hours. Eighteen days later, on June 16, another storm dumped eight more inches of rain on the Midwestern city, resulting in flooded basements, streets and yards, many of which had already been adversely affected by the previous storm.

May and June are typically wet months in Sioux Falls, each averaging about three inches of rain. Both storms in the spring of 2004 lasted less than 24 hours, but drenched the city with more than 250 percent of the normal rainfall for that time period. Combined, the two storms left more than 200 homes with flooded basements and/or sanitary sewer backups. As city crews surveyed the affected areas, they became well aware that the storm drainage system in older parts of the city needed reassessment.

"The storm drainage systems in many older neighborhoods were not constructed to the same engineering design standards as the newer parts of Sioux Falls," said Shannon Ausen, assistant city engineer with the City of Sioux Falls. "That fact, coupled with the amount of rain we received in May and June, overwhelmed the system and resulted in significant flooding."

With a population of 140,000, Sioux Falls is the largest urban area in South Dakota. Because the storm drainage system in newer neighborhoods was constructed with more stringent standards, residents in those neighborhoods were generally less affected by the storms.

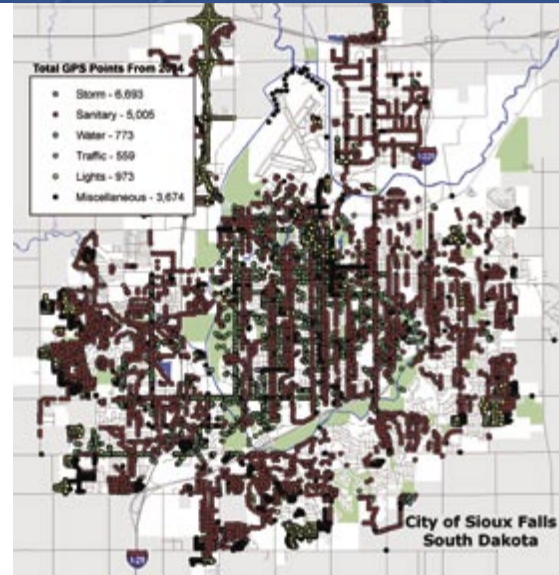
In response to public concerns, the city's engineering department used all of its resources to quickly find solutions to the flooding problems in the city's core areas.

"We suspected that some of the storm drainage data in our Geographic Information System (GIS) needed updating," said Ausen. "Much of the data in the GIS was digitized from plan sets that were more than 30 years old."

To assess the condition of the city's storm drainage system as quickly as possible, two crews were assigned the task of mapping all of the storm drainage structures in the 5,000 acres at the center of the city.

Each team took to the streets of Sioux Falls with a Trimble GeoXT™ handheld rugged Global Positioning System (GPS) receiver running Microsoft® Windows Mobile™ 2003 software for Pocket PCs and loaded with ESRI's ArcPad field mapping software.

Over the course of just 29 days, the field teams mapped more than 4,700 storm drainage structures, including inlets, junction boxes, manholes, and pipes. City workers mapped more than 100 linear miles of pipes, or 30 percent of the city's entire storm drainage system.



By comparison, Sioux Falls has approximately 700 linear miles of street centerline. For maximum efficiency, the city's GIS team created customized drop-down menus in ArcPad, making it easy to log attributes such as the type, size, depth, and condition of each structure.

"The GeoXT handhelds were perfect for the task at hand," said project manager Tony Schnetter. "There is no set-up time required with the handheld units, which was an advantage when we did our work in high-traffic areas. The ruggedness and compact size of the GeoXT handheld made it exceptionally portable and easy to operate."

At the end of each day, the field teams returned to the office where their findings were uploaded into the city's GIS. Once in the GIS, maps were created to match findings in the field. While the field teams were out collecting data, internal staff studied the findings from the previous day and began preparing storm drainage assessment reports.

Once the teams had finished collecting information, the Sioux Falls public works department prepared a detailed assessment report with suggested improvements to the storm drainage system. The findings were presented to the city council, and in January 2005, the city secured \$24.7 million dollars in State Revolving Fund (SRF) loans to cover the cost of the improvements.

Eight different basins in the core area of Sioux Falls experienced flooding, and to expedite the design process and to address the severity of the situation, the city hired separate consulting firms to analyze, model and design

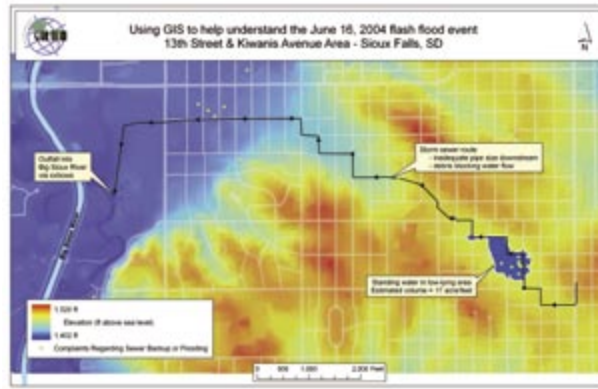
PROJECT HIGHLIGHTS

- 2004 floods damaged more than 200 homes in the core areas of Sioux Falls
- Sioux Falls field teams mapped more than 4,700 storm drainage structures in 29 days
- City saved in excess of \$130,000 by using GeoXT handhelds for mapping project, recouped in time savings and usability
- Accurate GIS is imperative for improving and maintaining the city's storm sewer system



improvements for each basin. With modeling software, the consultants can re-create the storms of 2004 so they can more accurately identify specific improvements and anticipate maintenance requirements.

City engineering staff will combine the consulting firms' results for each individual basin to create a single model. Construction of the recommended improvements is scheduled to begin in the summer of 2005 and should be completed within 18 months.



"Everyone involved has been very pleased with what we've been able to accomplish in such a short time. We've received positive feedback from the city, the mayor and residents," Ausen said. "The Trimble GPS units were instrumental in helping us achieve our tight deadlines."

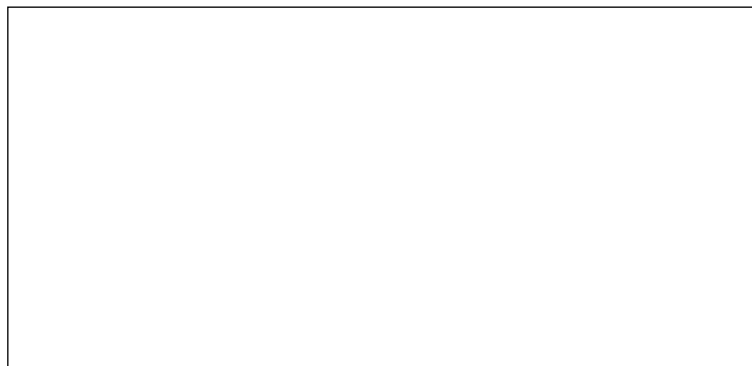
Ausen estimates it would have taken normal field survey crews more than 50 percent longer to acquire the same number of data points collected by the handheld GPS units. The city estimates that it saved more than \$130,000 by using the GeoXT handhelds, primarily recouped in time savings and usability.

And, current storm drainage system information will benefit other city departments as well. City water reclamation crews can now upload maintenance data, repair schedules and cleaning timetables directly to their tablet PCs. Field crews have remarked that the accurate and up-to-date GIS of utility data loaded onto the GeoXT handheld is extremely helpful since they take that valuable information with them into the field each and every day.

The overall benefits to the City of Sioux Falls have surpassed initial expectations. The city is continuing with storm data collection and hopes to complete the survey in the summer of 2005. The time and cost savings the city has enjoyed are significant, but the level of confidence that the City of Sioux Falls staff has in the accuracy of the new database is priceless.

The equipment used on this project includes:

- GeoXT handheld
- ArcPad software



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