



Spatial Systems Associates, Inc. develops a robust *Geographic Information System (GIS)* for Charles County Utilities

Charles County, located just outside of the District of Columbia in Southern Maryland, is home to close to 150,000 residents. The County covers roughly 461 square miles consisting of largely rural areas with the Potomac River running along its western shoreline. A majority of Charles County's development has taken place in the densely populated northern half of the County, seeing an annual population growth of around two percent.



THE CHALLENGE

The Charles County Department of Public Works—Utilities Division is responsible for the operation, maintenance, and compliance monitoring and reporting of all water and wastewater facilities owned by the Charles County Commissioners. Per EPA reporting requirements, the Department must also map its infrastructure. As is the case with many utility divisions, the County's infrastructure information was contained on hard copy as-built/construction plan sets. While these source documents contained all of the critical information necessary to identify assets underground and their location, they are also subject to deterioration and damage. The County needed to move these documents from their hardcopy environment and begin to develop a more centralized and robust mechanism for accessing

the infrastructure information. To complete this requirement, Charles County contracted Spatial Systems Associates, Inc. (SSA) to assist in developing a robust geographic information system (GIS) to provide the Department with easy access to their data.

THE SOLUTION

To assist the Department in meeting its objectives, SSA introduced a phased approach to build GIS datasets that could be fully integrated into the Department's evolving business methodology. This was initiated by creating high resolution digital versions of the County's hard copy documents. SSA has scanned over 17,000 plan drawings at 400 dpi grayscale and then inventoried and indexed the documents providing the ability to search the documents based on title, location/streets, project

This project will set the course for technical communication, documentation, and data management for the County's water and sewer infrastructure, and will definitely provide a "WOW" factor to those in county government, who have not been involved in the project to date.

—Ed Gorham, Chief of Technical Support
Charles County Department of Public Works

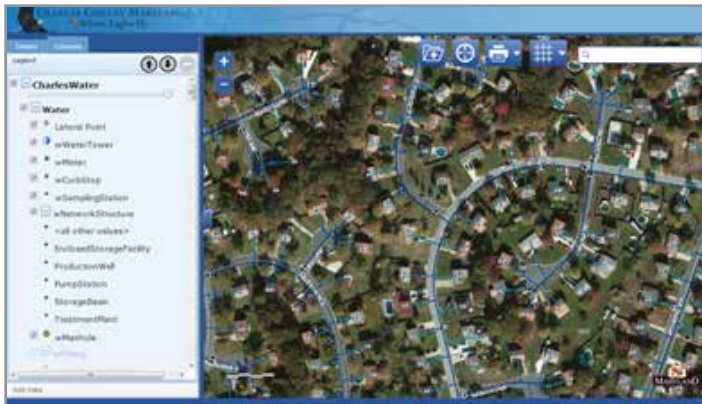
number, engineer, etc. SSA then built an Esri ArcGIS for Server document indexing system that made the high resolution scans immediately available to county staff via a web-based interface. This meant that field staff could now access the complete library of as-builts in the field utilizing ruggedized laptop computers equipped with suitable communications completely removing the need to return to the office to review the hard copy plans.

With the scanned documents inventoried and accessible, SSA then developed a County-specific geodatabase design for a pilot vectorization task for the Mattawoman Interceptor project. The pilot vectorization was completed successfully and the Department contracted with SSA for the completion of the vectorization of the entire wastewater collection and water distribution systems. The conversion effort has included georeferencing of appropriate scanned images, vectorization of both water and sewer features, attribution of the resulting features with infor-

Spatial Systems has provided excellent service on this project. This will drive the future of GIS and how it will be used in county government, thus revolutionizing current GIS practices.

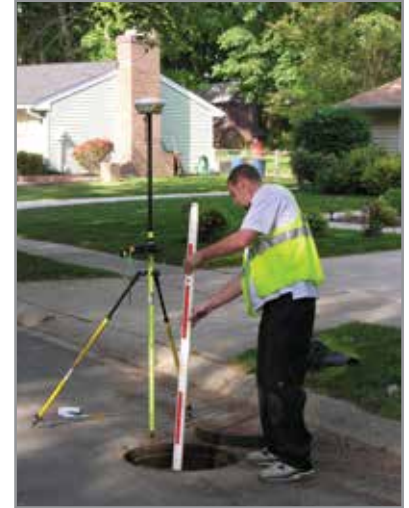
—Ed Gorham, Chief of Technical Support, Charles County Department of Public Works

mation on size, material, invert elevations, date of installation, and other information gleaned from the as-built drawings. In addition, SSA “associated” the scanned as-built plans with relevant vector features so that, by selecting any particular feature, county staff could identify and view all as-built drawings on which that feature is depicted. Further, a print capability was provided that allows county staff to print all or a portion of the image to a hardcopy device should that be necessary. “This project will set the course for technical communication, documentation,



and data management for the county’s water and sewer infrastructure, and will definitely provide a “WOW” factor to those in county government, who have not been involved in the project to date,” said Ed Gorham, Chief of Technical Support, Charles County Department of Public Works.

As part of the conversion process, field verification and data collection was required to ensure the GIS data accuracy. The use of handheld devices, when verifying the location of wastewater cleanouts and water meters and/or curbstop, was required to update the data to sub-meter quality. In cases where more precise data required manhole invert and rim elevations, SSA’s staff used real-time kinematic (RTK) GPS equipment to collect data to survey grade or centimeter level accuracy. Following the completion of the verification effort, SSA trained Department staff to use the handheld GPS equipment, specifically the Trimble ProXH GeoExplorer with GPS Analyst post processing.



To provide the Department, and subsequently the majority of County Government personnel, real time access to the data as it was being created as well as the as-build plan sets, SSA built a ArcGIS Server project tracking web site. In addition to viewing the system data as it is created, the site provided a mechanism for resolving questions about system features and locations as they arose. The project tracking site had the added benefit of providing an audit trail of issues and resolutions posted over the life of the project. The department is now using the Esri-based project tracking web site as the basis for a system management application designed to be used by field crews to view system drawings and update feature information. In addition to the traditional desktop based access to the web data, SSA also provides the Department access to the web data in mobile devices including the iOS and Android operating systems.

All of the County’s documents have now been vectorized and the project is currently in maintenance. The Department continues to view their data through the ArcGIS for Server web viewer allowing for multiple points of access via desktop and mobile devices.

