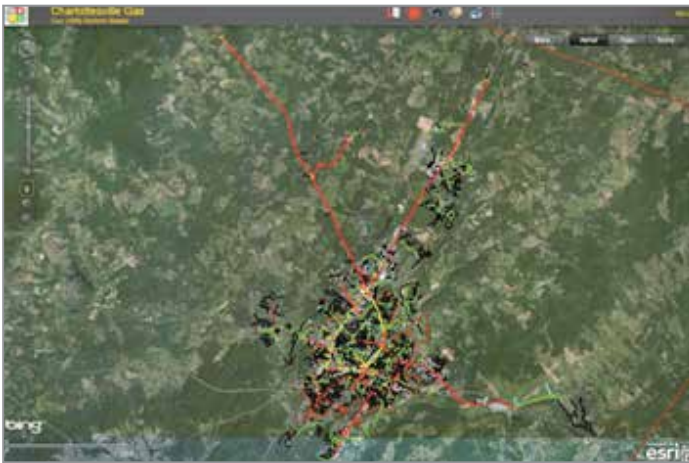




## Spatial Systems Associates, Inc. Establishes a GIS for the City of Charlottesville, Virginia Department of Public Works



The City of Charlottesville has been distributing natural gas since 1951. The City's Public Utilities Gas Department is responsible for the distribution of natural gas to more than 18,000 customers throughout the city as well as the urban areas of surrounding Albemarle County.

### THE CHALLENGE

To support the maintenance and operation of the gas distribution system, the Gas Department implemented a Geographic Information System (GIS) in 1993 with the help of Spatial Systems Associates, Inc. (SSA). One reason for the use of GIS is the federal and state regulatory requirement to update new gas distribution infrastructure data within 15 days of its construction. The Department has opted to make these updates in a digital GIS environment. The City's distribution system experiences a growth of approximately 200 customers and four to six miles of new pipeline on an annual basis. With this growth, as well as Departmental staff's existing responsibility, a backlog of updates had developed.

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### THE SOLUTION

To assist in the maintenance of the GIS distribution system, as well as introduce new applications to assist in the business operations, the Department contracted with SSA in 2011. Some examples of the services provided include the following:

#### Scanning and Linking of Documents

The Gas Department recognized a need to move its source document library to a digital environment. To accomplish this, SSA scanned and indexed the hardcopy as-builts, leak detection reports, and work orders for 17,500+ customers. With the source documents in digital form, SSA digitally linked them with gas GIS features. By digitally archiving these documents and linking them to the GIS features, the Department now has web-based access to the source information at their fingertips anywhere they have access to the internet—no need to dig through hard copy documents.

#### QA/QC and Network Analysis

The Gas Department requested that the existing data be reviewed to assess and improve the overall quality and to ensure its "model readiness." SSA ran extensive network analysis, cleaning up topological violations (connectivity) and updating flow direction. SSA also updated the attribute uniformity, improving its level of completeness. The network logic was validated by performing validity checks on the data, confirming that attributes of connecting features matched. An example of this would be a tee, connecting three pipes with differing diameters. The checks ensure the connecting tee's attributes reflect the appropriate diameter information of the associated pipes.

#### Web Development

The Department recognized the need to present the comprehensive GIS data to a variety of users within Public Utilities. Uti-

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lizing ArcGIS Server and the Flex Viewer, SSA developed a password protected, web-based application that provides data and document access to the Department's staff. The user can leverage the application's measuring and red lining tools to mark-up the system and send off updates remotely. Leveraging the web browser, Departmental staff has access to all of the data, remotely allowing them to make decisions more efficiently—no need to return to the shop to review as-builts.

## Modeling

SSA assisted the Department in developing and calibrating their gas model. The updated GIS datasets are being used to provide input to the chosen Gas Modeling software, and information from the City's billing database was used to calibrate the model. As updates to the system are made, the City has the ability to automatically reanalyze the network at any time to assist in identifying potential capacity issues. Through training provided by SSA, the Department will be able to calibrate and run their model as needed.

## Integration with Inspections

The City is required by Federal and State regulatory authorities to inspect the distribution system periodically for leaks. The city utilizes a device that detects the presence of gas as it escapes

from the ground in near proximity to where the city believes the distribution pipes are buried. The city is required to utilize this device on an annual basis for pipes serving commercial clients, and once every three years for pipes serving residential customers. Records of these inspections need to be maintained and forwarded to state regulatory authorities to prove that the requisite inspections have occurred. An integration tool was developed that allows the inspection process to be tracked via GPS-enabled hand-held devices, thus creating a permanent record of where and when inspections have taken place. As leaks are detected, this system allows the inspector to immediately notify dispatch personnel, who can generate a work order for repair personnel to react to the detected leak. Integrated with the existing work-order system, this inspection system provides a permanent record of the process and can be used to demonstrate compliance with regulations.

## Output to Other Users

The City's GIS-based system is being configured to selectively (from a spatial perspective) output data in a CAD format to give to engineers who may not have GIS functionality or training, but who need relevant data for design purposes. It is also being configured to automatically generate hardcopy workproduct (drawings and/or Right of Way plats) for as-needed purposes.

