

Energy Currents

ESRI • Fall 2008

GIS for Energy

GIS Survey Tool Improves Municipal's Land Base Service Workflow

By Matthew Freeman, ESRI Writer

Since 1925, Colorado Springs Utilities (SU) has been a community-owned utility provider of electric, natural gas, water, and wastewater services to customers in the Pikes Peak region of central Colorado. Today, its service territories include the City of Colorado Springs, Manitou Springs, and many of the suburban neighborhood areas in the surrounding region. The military installations of Fort Carson Army Base, Peterson Air Force Base (AFB), and the United States Air Force Academy receive water, electric service, and gas supply. Peterson AFB also receives wastewater treatment services from SU.

With a population base of approximately 380,000, SU serves more than 150,000 homes and businesses. In 2005, SU received the highest score ever in the category of power quality and reliability for a medium-sized utility from a J.D. Power and Associates customer satisfaction survey. The utility's customer satisfaction is owed in part to its long success with geographic information system (GIS) technology, the utility having used the geospatial software in numerous departments since 1987. Several of SU's corporate systems fully integrate GIS functionality including those for customer in-

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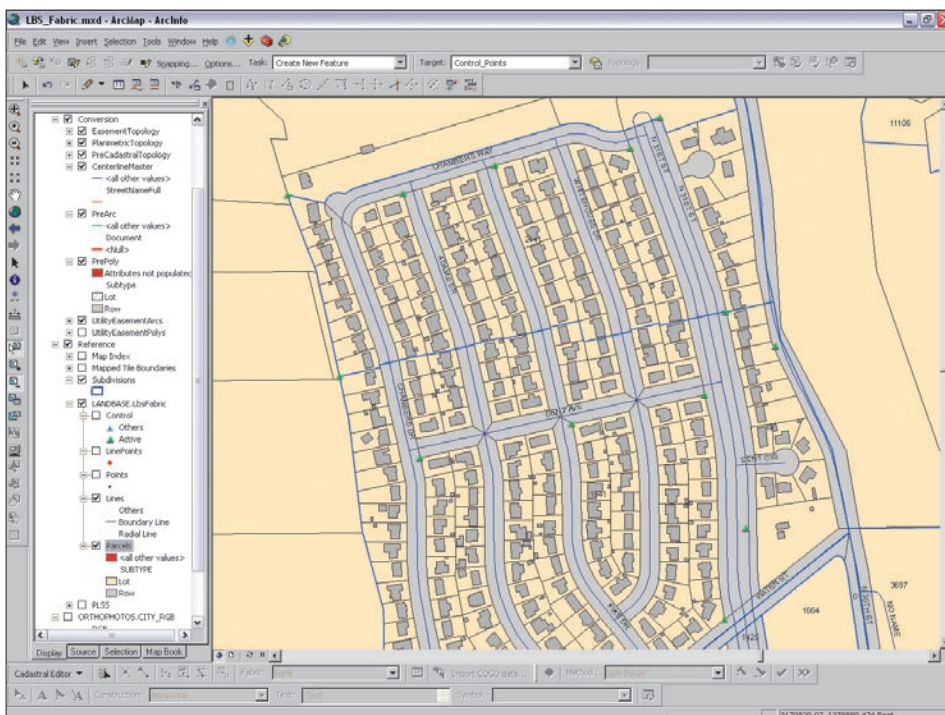
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formation and work management.

Without an accurate and up-to-date GIS land base, the utility's corporate systems will not operate at their full potential. SU's Landbase Services (LBS), a unit of the Planning and Engineering Department, is well aware of the constraints inadequate data puts on the utility's land management process. LBS is tasked with maintaining records on 189,000 parcels as well as 18,000 right-of-way polygons covering more than 500 square miles of SU service territory.

In an effort to advance its current enterprise GIS and keep its customer satisfaction rating high, LBS sought a way to improve the creation and maintenance of and updates to cadastral and other survey-related data. After seeing an ArcGIS Survey Analyst demonstration at the ESRI International User Conference, LBS became a beta tester of this ESRI software extension's new workflow tool, Cadastral Editor. This is a solution that allows land managers to spatially integrate survey data from multiple survey records and standardize workflows.

Using Cadastral Editor, SU staff can enter individual parcels and subdivisions in its GIS,



ArcGIS Cadastral Editor calculates coordinates and creates a cadastral fabric for the best-fit representation of the parcel layers.

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New Appointments Sharpen Industry Solutions for Electric and Gas Utilities

To more accurately address the diverse and changing requirements of the electric and gas industries, ESRI will separate strategic management of its global utility industry solutions. Rob Brook, the existing pipeline industry manager, will assume responsibility for the gas utility industry. Mitch Garnett, the current electric and gas marketing manager, will manage the electric industry.

“From an ESRI industry solutions perspective, the entire natural gas supply chain—from the well head through gathering, production, gas transmission, and distribution—is now united. Since most gas utility services include pipeline transmission, the appointment of cur-

rent pipeline manager Robert Brook helps pull the market together under one industry person,” says Bill Meehan, ESRI’s director of utilities. “Mitch Garnett’s focus on the electric industry gives ESRI the opportunity to extend our reach into the emerging field of renewable energy, particularly for electric generation.”

Brook has seen many sides of the utility and pipeline industries, having 20 years of experience in oil and gas exploration, pipeline construction and management, and gas distribution as well as in the development and implementation of ESRI industry solutions.

Garnett has worked with GIS and the electric and gas industry for nearly 30 years. In addition



Robert Brook
Gas Industry Manager



Mitch Garnett
Electric Industry Manager

to his experience with utilities, he has worked in the aerospace industry and with control systems for deepwater oil drilling.

For more information, visit www.esri.com/industries. Contact Rob Brook at rbrook@esri.com and Mitch Garnett at mgarnett@esri.com.

ESRI on the Road

Itron Users Conference

Dallas, Texas
October 19–21, 2008
www.itron.com/pages/uc08/about.asp

SAP for Utilities

San Antonio, Texas
October 26–29, 2008
www.sap-for-utilities.com/index.html

GITA’s First Annual GIS for Oil & Gas Conference—Calgary

Calgary, Alberta, Canada
November 6–7, 2008
www.gita.org/logca

EUEC 2009

Phoenix, Arizona
February 1–4, 2009
www.euec.com

DistribUTECH Conference & Exhibition

San Diego, California
February 3–5, 2009
www.distributech.com

TechAdvantage Expo

New Orleans, Louisiana
February 13–16, 2009
www.techadvantage.org

Geography in Action at the 2008 ESRI International User Conference

“Amazing” was a popular descriptor uttered by wide-eyed attendees of the ESRI International User Conference Plenary Session. The works of GIS users from around the world were highlighted by ESRI president Jack Dangermond. Illustrating the conference theme, GIS: Geography in Action, Dangermond talked about the importance of GIS as part of the solution to the challenge of living in a sustainable world.

New functionality and capability enhancements in the recently released ArcGIS 9.3 were put into the context of developing GIS integration, applications, and technological solutions and infrastructure that supports communal exchange. To do so, ESRI presenters demonstrated software advancements.

Registration exceeded 13,000 this year for the August 4–8 event in San Diego, California. The conference included technical workshops, paper presentations, more than 150 special interest group meetings, and more than 30 regional user group meetings. The ESRI Showcase provided attendees with direct access to ESRI staff who were available with information about software developments, professional services, education, sales, and marketing.

Map products, posters, and multimedia map projects illustrating the achievements of the user community, including electric and gas, were on display at the popular Map Gallery. Several special exhibits included displays of unique and innovative uses of GIS from around the world.

An electric and gas track offered many GIS user presentations and demonstrations. The Electric & Gas User Group convened to discuss resources, hot topics, and upcoming events.

For more information, visit www.esri.com/uc.



Electric and Gas User Group Conference Set for Oasis in California Desert

Explore how GIS benefits electric and gas utilities at the Electric & Gas User Group (EGUG) Conference to be held October 19–23, 2008, in Indian Wells, California. Discuss the most effective ideas and hottest topics in your industry such as spatial data management, server-based GIS, mobile solutions, and Web services. EGUG is a group of ESRI users, user organizations, and ESRI business partners.

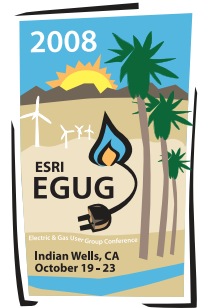
This year's conference will convene at the lush and lovely Hyatt Grand Champions Resort in Indian Wells, near Palm



Springs. GIS users from around the world will gather to share experiences and discuss how they use geographic knowledge to enhance utility operations. Presentations will address the latest technological innovations, mobile solutions, integrated approaches to enterprise asset management, and other electric and gas operations.

The event is hosted by the Southern California Public Power Authority.

For more information on the 2008 EGUG Conference and to view presentations and technology updates, visit www.esri.com/egug.



A Conversation with EGUG President Ted Kircher



Ted Kircher

Ted Kircher is the current president of the Electric & Gas User Group (EGUG). He is also the GIS and CAD coordinator PNM in New Mexico. Kircher recently participated in a question-and-answer session with *Energy Currents* writer Jessica Wyland.

Q: How did you become involved in the electric and gas industry?

A: I started working with PNM, then Public Service Company of New Mexico, in 1981 as a right-of-way agent, acquiring rights-of-way and fee property for the company. In 1995, I was introduced to ESRI and GIS with the development of an application to manage electric transmission lines. In 2001, PNM established its innovative software solutions department, responsible for GIS and drafting, and I became the GIS coordinator. In 2007, I took on additional duties as CAD coordinator.

Q: How did you become involved with EGUG?

A: My initial exposure to GIS in 1995 was very simple. Once we decided to build our application on the ESRI platform, I signed up to attend my first ESRI User Conference. At the conference, I was excited by the strength of the ESRI community and the willingness of GIS users to share thoughts, ideas, and knowledge. Since I was new to GIS, I jumped into EGUG with both feet. The EGUG experience has been nothing but exceptional ever since. The EGUG Conference is different from the User Conference in that the concentration on electric and gas creates an environment where all attendees have similar issues and concerns.

Q: What are the concerns and hot topics of the electric and gas industry as you see it?

A: One major concern for the industry is homeland security and the security of corporate data. The continued operation of the electric and gas infrastructure is paramount to national security. The proper use of technology is becoming extremely important. Utilities now have to improve efficiency while meeting government requirements. Much of the gas industry efforts are centered on safety and integrity of pipelines, while the electric industry focuses on system reliability and integrity.

Q: What role does GIS play in meeting industry concerns?

A: GIS is used to inspect and maintain electric transmission systems and to generate compliance reports. Utilities now depend on GIS for route planning, right-of-way activities, and environmental efforts. Vegetation management, which is becoming more of a hot topic lately for utilities, is a prime candidate for GIS.

Q: What is the EGUG Conference like? What do attendees gain?

A: The EGUG Conference is an ideal setting for utilities to network, to get a feeling of how others are addressing industry-specific issues. The conference is an exceptional experience. As with most ESRI events, there is a great amount of fun mixed in with the opportunities to network and discuss specific concerns with others including ESRI experts. The EGUG Conference is, of course, a lot smaller than the ESRI UC, and in many ways, this is good. Attendees have the opportunity to see what is new and improved in the electric and gas industry in a small meeting setting.

Listen to ESRI Speaker Series Podcasts

You can hear more of the interview with Ted Kircher and other industry leaders by visiting www.esri.com/speakerseries.

Mobile GIS Customization Supports Distribution System Inventory and Assessment Project

By Hamid Akhavan, Utility Data Contractors

Every day, a team of more than 30 field technicians brave the elements in and around the greater Kansas City area to validate and collect GIS field data. Working with Tablet PCs connected to digital cameras, GPS units, and bar code scanners, these field technicians have all the equipment needed to collect the necessary information. All the fieldwork is done with UtilaPad—a custom application created by Utility Data Contractors (UDC) using ESRI’s ArcPad mobile GIS software for field mapping applications.

The utility technicians update more than 10,000 features and associated attributes and visit approximately 2,000 overhead structures each day. At each site, they confirm the structure location, inspect facility conditions, and verify feature attributions. They inspect and collect

data for all the wires, transformers, protective devices, sectionalizing devices, support structures, crossarms, and any other equipment attached to each structure. They also record each structure’s GPS location, its physical condition, and all the attached wires and equipment data. Some conditions require digital photos in addition to detailed condition assessment. Workers visit all multiple-meter panels and verify that these are connected to the correct transformer.

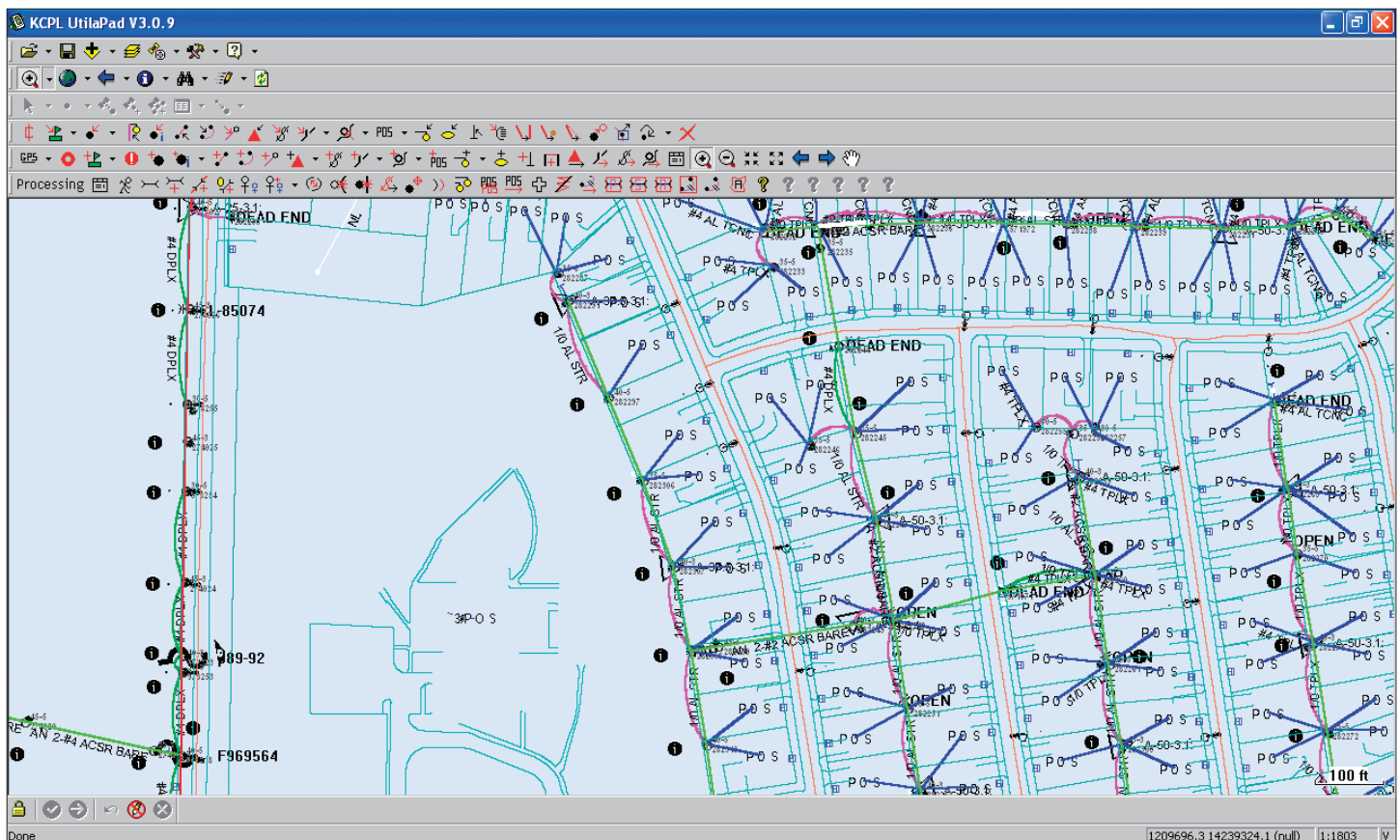
Kansas City Power and Light (KCP&L) contracted with UDC to perform the Distribution System Inventory and Assessment project. The project presented all the usual production challenges involved in implementing a large-scale field data collection effort. It also presented a sizeable technical challenge—data had to be moved into and out of the enterprise GIS with

minimal impact on the day-to-day operations of the utility’s GIS mapping department.

The Customized Mobile application is designed for the utility’s own internal field projects and is accessible to the utility’s industry customers. This specialized field data collection software was originally developed to collect and validate field information specifically for utilities.

“Within a relatively short time frame, we were successfully using the field tool for a field inventory and condition assessment project,” said Bill Menge, electric distribution asset manager at KCP&L. “Accuracy of our GIS database and up-to-date condition assessment of our field assets is critical to our everyday operation.”

UtilaPad uses ArcPad software’s customization functionality to present a tool that can be



ArcGIS ArcPad mobile software is customized with task-relevant toolbars and routines to help enhance performance and standardize data capture.

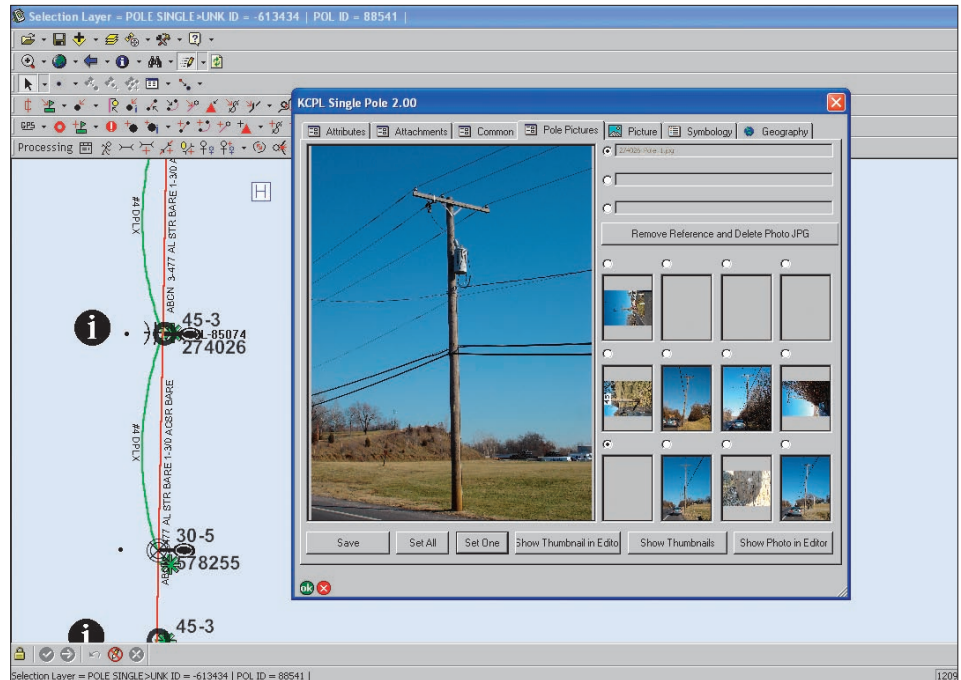
used for performing anything from simple field redlining tasks to extremely complex collections and inspections. The application is also able to perform quality assurance sampling and subsequent data quality reporting after data review.

“The flexibility of UtiliPad allowed us to keep the GIS data’s round-trip to a relatively short duration,” said Ed Hedges, project manager in engineering and asset management at KCP&L. “GIS data is critical to many parts of our everyday operation, so minimizing the time that data spends in limbo is a key requirement for project success.”

The implementation included the incorporation of a custom checkout/check-in application to exchange data with KCP&L’s enterprise GIS. The production process at KCP&L starts when the existing GIS data is checked out in shapefiles from the enterprise GIS database environment. The shapefiles are issued to the UDC field technicians, and the data is collected on Tablet PCs. The project requirements involve all the typical GIS operations done in an office environment including adding and connecting network features, updating existing features, moving existing structures along with their associated equipment, and feature deletions.

“This approach is radically different from collecting data on a nongraphic, tabular-only type of system,” said Don Slocum, GIS senior developer at UDC. “ArcPad software’s ability to support complex customization makes it possible to exchange data with the server and work with shapefiles from the field.”

Once the first round of data collection for a work unit is complete, it is validated for quality control by a second technician. The customized application’s ability to build a quality assurance sample set is essential for validating the data prior to checking it back into the production environment. A quality control technician visits each feature in the sample, makes alterations as needed, and generates real-time reports in-



The Tablet PC readily interfaces with the GPS unit, digital camera, and the bar code scanner. The ability to assign multiple high-resolution photos enhances the creation of repair work orders for eventual maintenance work.

dicating the overall quality rating as well as individual feature layer appraisals. Subsequently, the shapefiles comprising the work unit are sent to KCP&L to begin the process of integrating the updated data back into the GIS.

Before any data can be checked back into KCP&L’s production GIS environment, personnel must perform a final data acceptance validation. KCP&L uses UtiliPad to perform the sample, visit, verify, and report process. Once the work unit passes the acceptance validation, it is ready to be checked into the utility’s GIS.

A check-in tool directly inserts all feature updates, moves, modifications, deletions, and additions from the work unit shapefiles back into the database as a job. When opened, the job is indistinguishable from any other job in the GIS. KCP&L mapping technicians will then validate the job using GIS tools, resolve any data conflicts, and post the job up to the production level of the database, where it is available to all GIS users.

For more information, visit www.esri.com/arcpad.

ArcPad for Electric and Gas

ArcPad is software for mobile GIS and field mapping applications using handheld and mobile devices. It provides field-based personnel with the ability to capture, analyze, and display geographic information without the use of costly and outdated paper map books.

In the electric and gas industry, ArcPad is useful for centerline review and mapping, facility mapping, recording installations and inventory, power-pole maintenance and other asset management jobs, inspections, compliance monitoring, and locating outages and other incident reporting.



Municipal/Utilities GIS in Sault Ste. Marie, Ontario

In conjunction with the City of Sault Ste. Marie and the Sault Ste. Marie Public Utilities Commission, the Sault Ste. Marie Innovation Centre maintains a highly complex GIS database to track the city's water, wastewater, and water distribution networks. A sample inset of each network is shown along with a 3D visualization of the basic features from each network. The images provide an overview of the municipal/utilities GIS in the City of Sault Ste. Marie, Ontario.

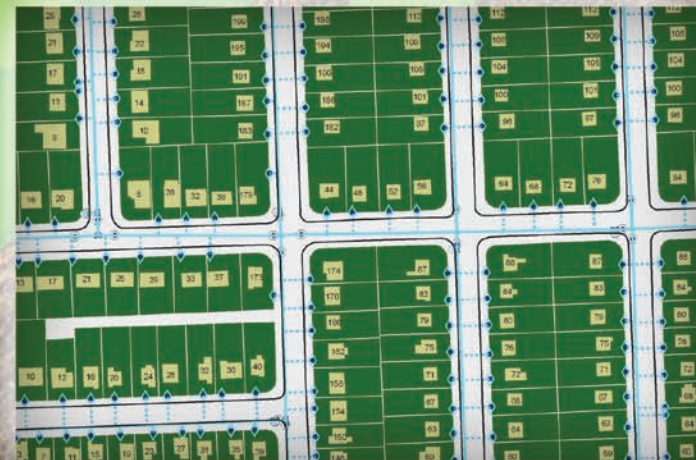
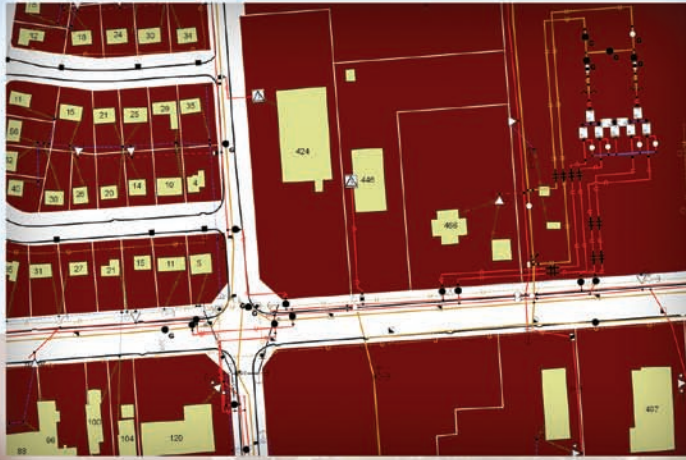
For more information, visit www.esri.com/mapbook.

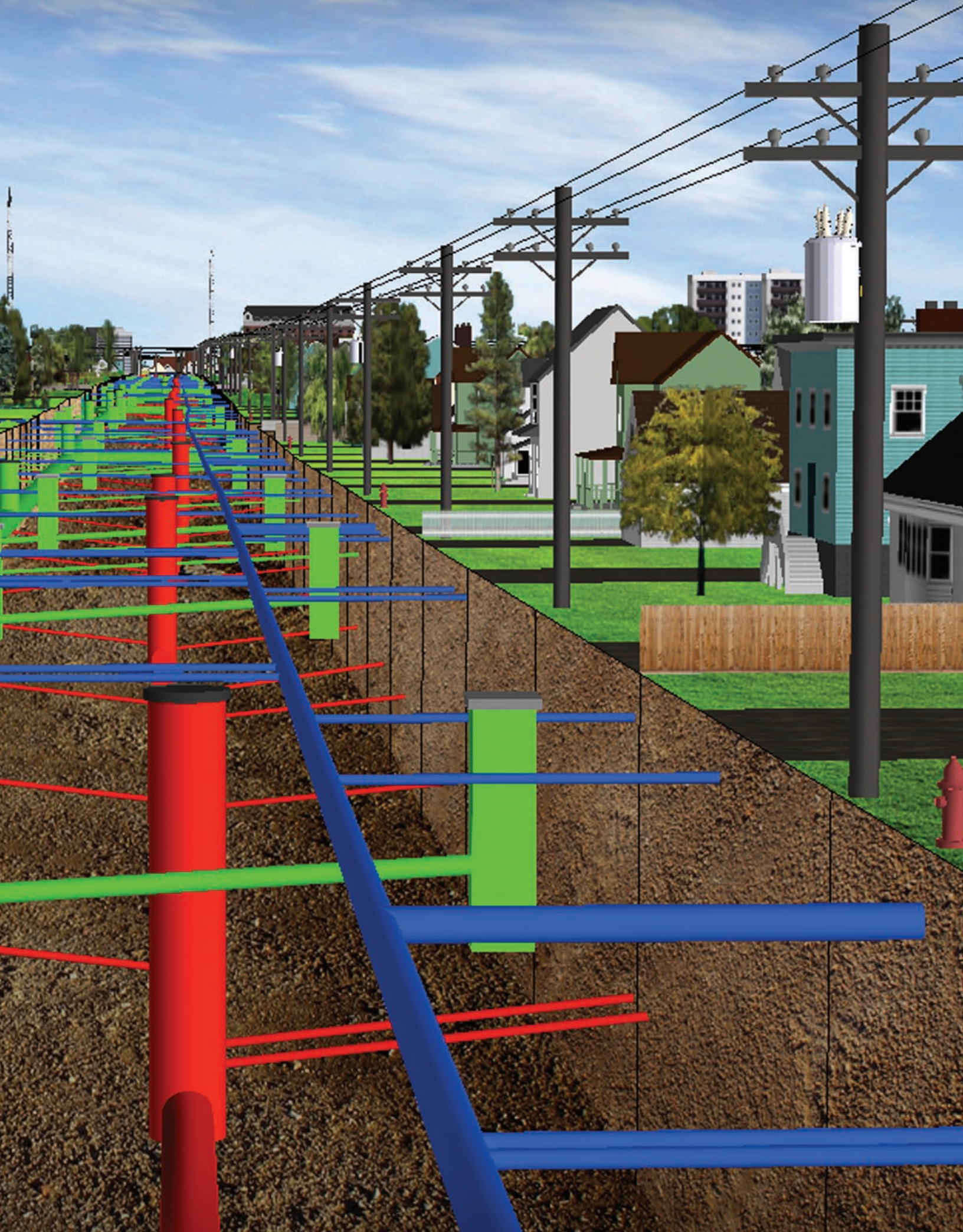
Celebrate 10 Years of GIS Day!

Celebrate the 10th anniversary of GIS Day on Wednesday, November 19, 2008.

GIS Day provides an international forum for users of GIS technology to demonstrate real-world applications that are making a difference in our society.

To find help planning and putting on an informative and successful GIS Day event, visit the resource and registration Web site at www.gisday.com.





Fast-Growing Cooperative Improves Outage Response with Enterprise GIS

By Jessica Wyland, ESRI Writer

Located in one of the Denver, Colorado, metropolitan area's burgeoning suburbs, United Power is expanding to serve more than 65,000 meters. To keep pace with growth and reduce outage response time, United Power turned to enterprise GIS.

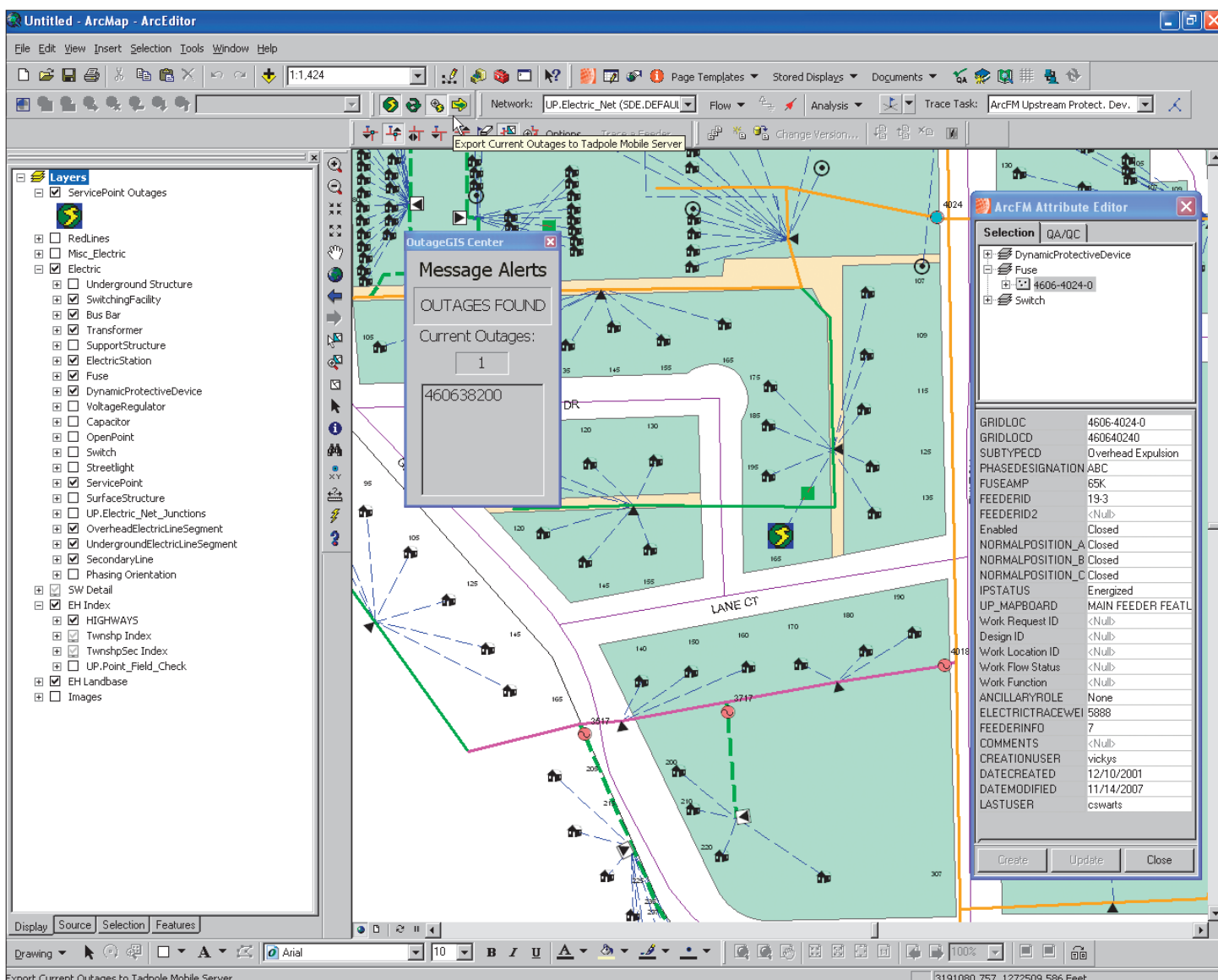
Before United Power's upgrade to GIS, outage management was handled by track calling software that would save messages entered

by interactive voice response. The utility was looking for an alternative solution to reduce outage response time and increase efficiency in prediction and planning of the electrical network's needs.

The utility decided to employ enterprise GIS from ESRI to manage outage response, service area needs, and resources. In the field, United Power now sends and receives data with a mo-

bile GIS that includes TC Technology's GO! Sync Mapbook. The GIS mobile application, developed using ArcGIS Engine, bridges the gap between paper maps and traditional GIS. It provides an easy-to-use and easy-to-deploy map viewing application with an underlying extensible framework for adding customizations and integrating with third-party systems.

With United Power's mobile GIS, field crews



Using custom views in the GIS Enterprise Oracle database, United Power is able to display outages from the Outage Management System in ArcGIS and trace the protective device that needs to be verified in the field.

“With GIS, we are able to provide data more accurately and in a way that many people throughout the company, as well as outside of the organization, can understand.”

Diego Portillo, United Power

are able to view all customer data, perform electric tracing and redlining, and use GPS navigation. The process for the fieldwork begins with an update of all GIS data in the enterprise. The crews use that data to make any redlines, displayed in the form of flags and in different categories. Additionally, United Power’s customized application enables mobile-based mapping, spatial query, sketching, GPS integration, and wireless data access to the GIS enterprise database. The application’s tracing tools enable field crews to locate the exact source of the outage and the best possible route.

“We went from producing paper maps to operating with a fully integrated GIS enterprise. We implemented GIS in order to increase our productivity and safety and, ultimately, to improve our outage management response,” says Diego Portillo, GIS coordinator, United Power. “We put digital maps in the trucks with our field crews and migrated our data to ArcGIS Desktop and ArcGIS Server. Our outage management system now is a key tool in our everyday operations. Our goal now is to maintain our enterprise GIS to the highest standards.”

Since the move to GIS, United Power has reduced outage response time significantly and increased efficiency, prediction, and safety. Field crews using mobile GIS say they are often able to locate both the reported outage in the field and the failed device. The modern user interface of ESRI’s ArcGIS software gives field crews and office personnel thematic and topographic mapping, map-based query and analysis, charting and reporting, and mapcentric geoprocessing capabilities. The high-quality maps and reports are introduced in a desktop environment.

With all its data in the GIS, United Power can do more than bring customer information to the field. Analysts can quickly verify which meters are active and discern the distribution load based on the number of customers and

kilowatts used. Internal employees can view digital maps available on internal ArcIMS sites that are tailored to specific job needs, from locating equipment to creating work orders, or just view overall geographic information. To keep the GIS constantly updated, information from the field—such as phase, feeder, or substation data—is delivered by field crews, operations personnel, engineers, and designers.

“We include all layers in our maps, from the electric features, such as overhead/under-

ground lines, substations, transformers, meters, streetlights, and devices, to land base information such as parcels, roads, lakes, wells, cities, ZIP Codes, and sections. By seeing all the different layers, even a person who does not have a technical background can understand the whole picture.”

Learn more about GIS solutions for electric and gas at www.esri.com/electricgas.




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Design Process Evolves for GIS-Based Utility

The design process for Central Lincoln People's Utility District continues to evolve as the utility strengthens its enterprise GIS. Fifteen years ago, the publicly owned utility, headquartered in Newport, Oregon, converted from a paper-based system to one that is automated. The utility now relies on an enterprise GIS based on ESRI's ArcGIS Desktop and the ArcFM solution developed and implemented by Telvent Miner & Miner (TM&M).

In January 2007, Central Lincoln went into production with TM&M's Designer, a graphic design extension of ArcFM that affords an interface between the GIS design process and other corporate systems. The GIS team implemented the application with specific utility tools that enable distribution engineers to streamline estimate creation and other job design processes.

Once the design extension was interfaced

with costing information stored in the utility's accounting system, there was no need to manually enter individual parts when creating an estimate. For example, when adding a line extension that requires a new pole in the field, Central Lincoln's extended application will build a list of compatible units and connect with costing information to create a list of prices for that unit. The extension will return an estimate for the parts needed to complete the job without the need for a spreadsheet or manual calculation tool.

In addition to design, the automated workflow benefits other departments of the utility. The parts list generated by costing is used by field crews when they complete the job. The list of estimates associated with each job helps the utility determine the worth of its system and to satisfy Federal Energy Regulatory Commission

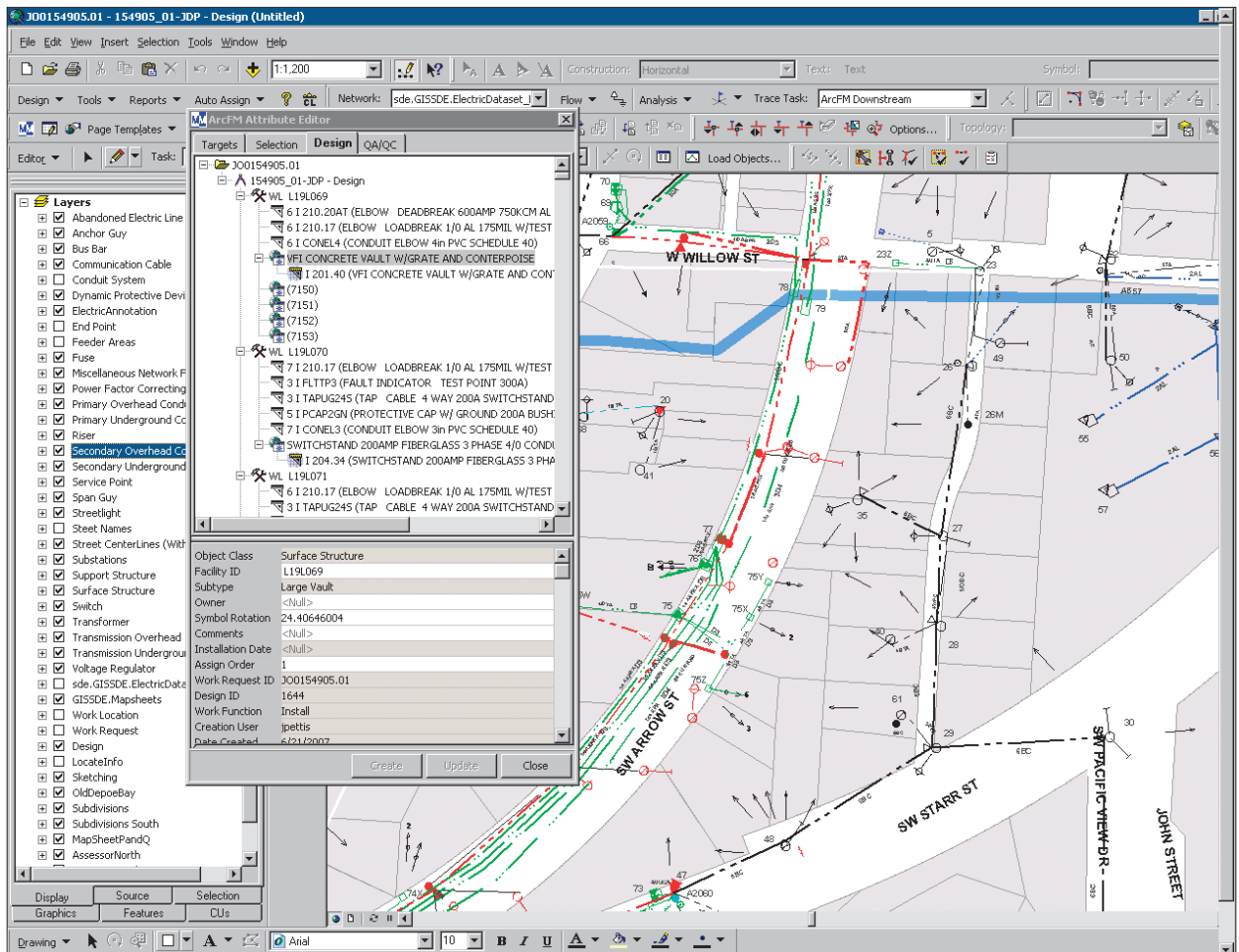
(FERC) accounting procedures.

"By using GIS and the design extension, we are able to add more information to the entire process during the design phase," explains Neal Myers, GIS supervisor for Central Lincoln People's Utility District. "By automating much of the design process, we not only increase efficiency for our employees but also remove the possible errors associated with transcription. This has led to a huge productivity gain in the design process."

Central Lincoln provides electric services to 38,000 residential, commercial, and industrial customers. The distribution line includes 1,613 miles of poles hugging the weather-intense central coast of Oregon.

For more information, visit www.esri.com/industries/electric.

The Designer application quickly creates an estimate and parts list and facilitates asset accounting from data generated during the design process.



GIS Survey Tool Improves Municipal's Land Base Service Workflow

which calculates coordinates using coordinate geometry (COGO)-based survey plans. Next, Cadastral Editor uses all relevant survey and plan data to create a cadastral fabric. The program, called Cadastral Fabric, applies a least squares adjustment tool for the best-fit representation of the parcel layer. This is not rubber sheeting but rather survey data methodology. To match new parcel points to the corresponding points in the cadastral fabric, a few connection points are picked up at the extents of the new parcel block and connected to the Cadastral Fabric program. An autojoin command instantly matches up all the remaining points to fit. The new parcels are topologically integrated into the cadastral fabric. Furthermore, by running the least squares adjustment, the user can see how much coordinate shift is going to occur before it is applied.

The Cadastral Fabric data model and workflow allows the creation of continuous parcel coverage for an entire jurisdiction. Cadastral Editor brings in information from surveyors and integrates the new parcel data into the fabric. Cadastral Editor's editing tools can adjust the positional data by using control points and survey record information processed with the least squares adjustment tool.

"We instantly understood the beauty of the Survey Analyst solution, incorporating Cadastral Editor and the Cadastral Fabric data model," says Larry Von De Bur, PLS of LBS, Colorado Springs Utilities. "These tools, including the least squares tool, permit better maintenance of the spatial integrity of our data. It gives us sound analysis of measurement data from a wide variety of input sources with varying accuracy and reliability. The result is a more realistic modeling of the world of cadastral data."

SU began using its new software system in the first quarter of 2008. Now, utility surveyors and other staff at SU use ArcGIS Survey Analyst to better manage land records, parcel mapping, and other cadastral matters. The toolset is used on subdivision boundaries, parcels, rights-of-way, and easements. Staff uses the software to efficiently collect, convert, and dis-

play cadastral data; serve as a base coverage for utility infrastructure; and share data throughout the organization along with other government entities for cadastral purposes.

SU recently began to evaluate its entire sanitary sewer infrastructure to determine what sections needed maintenance, rehabilitation, or replacement. As part of the evaluation process, sanitary sewer infrastructure locations and easement records were tied together and analyzed for coexistent locations. Once any GIS data anomalies were resolved and updated, more informed decisions could be made on potential infrastructure replacement.

"It's about truly being able to do parcel maintenance in a very efficient fashion as well as keeping an eye on accuracy," says Tony Moran, supervisor of LBS. "We can better maintain focus on keeping that base data as precise as possible because we build so many things from it. We're able to do this very effectively without wasting a lot of resources."

The capabilities provided in ArcGIS Survey Analyst and Cadastral Editor mean that electric and gas companies can have accurate parcel boundaries in the geodatabase by using best-fit values that are based on all the true recorded land record values from surveyors. Learn more about ArcGIS Survey Analyst at www.esri.com/surveyanalyst.

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