Innovative Mapping Solution Revolutionizes Water System Operations

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Brown and Caldwell needed to perform over 700 water and wastewater system shutdowns within urban Phoenix as part of the construction process for the City’s $1.5 billion Light Rail project. To meet this need, an innovative web-based solution was devised incorporating mapping and consumer information to produce shutdown plans within minutes instead of weeks. The tool combines the capabilities of cartography, geometric networks and GPS data with the Internet. It utilizes existing water and wastewater GIS data, determines critical customers along pipeline routes, and incorporates real time, as-built progress information. Demonstrations for public officials, contractors, and engineers continually receive praise for the speed, innovation, accuracy, and contribution to public health and safety the tool has provided. It is successfully being used for utility system shutdowns for over 100,000 customers while saving millions of dollars in planning costs and allowing construction schedules to proceed without delay.
Project Background

- City of Phoenix to install 15 miles of Light Rail Line as part of a $1.5 billion dollar project
- Light Rail to travel through downtown corridor, industrial and residential districts
- Impact of 5-year construction on residents and businesses should be kept to a minimum
The Challenge

- Over 700 water and wastewater shutdowns planned for utilities running under the Light Rail route
- $50 million water and wastewater piping need to be relocated
- Over 100,000 customers need to have seamless service
Water & Wastewater Shutdowns

- Planning water or wastewater shutdowns traditionally can take weeks or months
  - QS maps and shop drawings used to determine the valves to be closed
  - Billing information assessed to determine customers affected
  - Hard copy of planned shutdown needed to be transmitted to crews performing shutdown
The Approach

- Utilize GIS data and Utility Networks to create a computerized shutdown planning tool
- Develop a tool that produces shutdown plans in minutes instead of weeks
- Generate hard copy for documentation and for use by construction crews and public relations
- Make the tool easy to access and easy to use by all project team members
The Solution: Water and Sanitary Sewer Shutdown Planning Tool

- Utilizes City of Phoenix existing GIS Data
- Geo-processing functionality via ArcGIS Server
- Access to system via World Wide Web
Data

- City of Phoenix GIS Data
- Brown and Caldwell GPS Data
- Updated and synchronized datasets
Utility Network

- Network Generation
  - Geometric Network created from City’s existing GIS database

- Updating Network
  - Existing valves tested and validated
  - New valves (from GPS) incorporated
  - New pipe line segments created
  - Geometric Network updated
ArcGIS Server

- ArcGIS serves as primary interface between application and geodatabase
- ArcGIS Server’s geo-processing engine provides core mapping and spatial analysis
- ArcGIS Server publishes maps to Shutdown Tool application
The Application

- Shutdown Tool application built on Microsoft’s .NET 2.0 platform (C#)
- Browser-based application
- Secure, password protected access
- Available anywhere with broadband Internet access
Appearance

- Map View
- Table of Contents
- Quick Find Guides
- Navigation Tools
- Shutdown Tools
Creating a Shutdown Plan

- Locate
- Set flag
- Solve
- Select affected users
Generating a Report

- Generate a Report for printing
Critical Services

- Identify critical service customers
The Benefits

- Saved the City millions of dollars and untold time generating Shutdown Plans
- 60% of shutdowns performed to date with no incidents
- Required water system operations have had no impact on construction schedule
- Tool expandable to entire City water and sewer systems
Questions?
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