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SOLUTIONS

Gwinnett County Explores Benefits of Digital Twins at Pump Station

As a leader in the water industry, Gwinnett County Department of Water Resources (GCDWR) aims to provide superior water services at an excellent value. GCDWR operates and maintains two water-production facilities; three water-reclamation facilities; more than 200 pump stations; and nearly 8,000 miles of water, sewer and stormwater pipes that provide essential services to more than 900,000 people each day.

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Milwaukee Metropolitan Sewerage District
realizes the Benefits of Digital Twins
Aug. 24, 2021
1:00 pm ET / 12:00 pm CT / 10:00 am PT

To improve information access, the Milwaukee Metropolitan Sewerage District developed a Water Reclamation Facility (WRF) Building Information Modeling (BIM) Vision with a goal to “create a scalable and maintainable solution for sharing WRF data that integrates with other systems.”

Learn more and register at bit.ly/3wzEwgl or scan the accompanying QR code.

If you're reading this after the event has taken place and want to view the webcast for PDH credit, visit bit.ly/2U1DSvn or scan the accompanying QR code.



Challenge

Water and wastewater utilities provide a public service that's operationally, economically and environmentally fundamental to the nation. On top of challenges related to maintaining and upgrading a vast network of mains, pump stations and treatment facilities, GCDWR has an aging operations and maintenance workforce. Outgoing staff often possess decades of institutional knowledge of system operations and asset locations. Managers and new staff need modern tools to operate, monitor and locate assets for maintenance after personnel with embedded experienced-based proficiency and awareness retire.

Partner

KCI offers turnkey expertise in a wide range of disciplines. With a committed, employee-owned team, the firm designs, plans, manages, inspects, installs, assesses, constructs and otherwise addresses a vast array of client needs related to the built and natural environments. Services are tailored to the needs of its clients, providing personal service from project initiation through completion.

Solution

GCDWR and KCI engaged in a joint pilot project to assess the ArcGIS technology-based digital twin development process and value of the solution. This process began with lidar scanning and surveying Gwinnett's wastewater pumping station, including the structure as well as mechanical, electrical and wastewater assets. From the point cloud, KCI developed a 3D BIM that's spatially accurate to within one inch using Autodesk Revit and tied it to traditionally surveyed control points for a real-world location. Assets were attributed with their unique IDs and relevant data such as make, model and serial number. The model then was converted to an Esri ArcGIS 3D multipatch feature-class format.

In the GIS, assets and sensors were related to their functional systems and facility—achieving an easy-to-navigate 3D vertical hierarchy not present in most asset-management systems. Hosting the information on the ArcGIS Online cloud allowed county staff with security permissions to navigate and interact with the 3D GIS in a web browser or ArcGIS mobile apps, eliminating the need for each user to install dedicated desktop software.

3D GIS transforms vertical asset inventories into rich models that are easily understood by staff and accessible via the web and mobile apps.



Moving from a model to the implementation of a true digital twin requires overlaying real-time data and storing it in the cloud for live and historical analysis. This information can be integrated from an organization's existing investments in hardware and software. Using the county's SCADA system, the GCDWR team incorporated pressure, flow, temperature, vibration and volume sensor outputs from its equipment into an Azure Data Lake. KCI asset-management consultants then paired the 3D GIS model with a web-based Microsoft Power BI dashboard to provide a dynamic display of the performance of each asset.

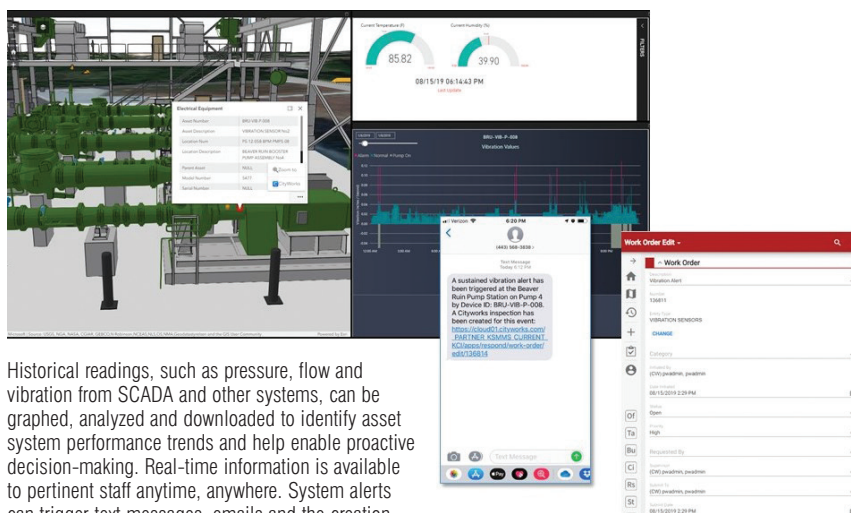
Result

An ArcGIS technology-based digital twin enables operations managers and staff to locate and monitor assets within a rich 3D spatially accurate environment. It also can be incorporated with work-management systems to identify the location and specifications of assets prior to visiting the site. With the data available through a web browser, digital twins enable access to the information 24/7 on a user's platform of choice, including desktop, tablet or mobile devices. The dashboard metrics provide valuable insights that can be used to reduce maintenance issues, extend lifecycles and achieve new levels of optimization.

GCDWR staff gained insight into how to leverage the benefits of 3D GIS to enhance their asset-management programs. Of particular interest is the ability to improve safety and maintenance efficiency through expanded situational awareness and increase asset knowledge with accurate data, measurements and the ability to view an asset's relationship to the overall processes.

In turn, KCI provided a new digital twins solution leveraging lidar, survey technology, BIM and ArcGIS Enterprise.

The project demonstrated the numerous capabilities and benefits of the technology, and serves as a roadmap for applying and scaling similar virtual asset-management initiatives for other facilities as well as complex industrial and operational plants in a range of markets.



Historical readings, such as pressure, flow and vibration from SCADA and other systems, can be graphed, analyzed and downloaded to identify asset system performance trends and help enable proactive decision-making. Real-time information is available to pertinent staff anytime, anywhere. System alerts can trigger text messages, emails and the creation of emergency inspections in a client's asset-management system.

View a video fly-through of the pump station at bit.ly/3hGZPsC or by scanning the accompanying QR code.

