

Water Treatment Plant Expansion Eases Pressure On Water Supply

BIM-enabled design and construction workflows aid communication, eliminate conflicts, and shorten schedule

With its sunny southwest climate and an abundance of golf courses, Scottsdale, Ariz., is one of the nation's fastest growing cities. In fact, the population has grown by more than 35 percent in the past 10 years. This rapid growth, however, has put pressure on Scottsdale's water supply, which is a precious and vital resource in the arid region.

In response, the city called for a plan to ensure the long-term availability of safe and abundant drinking water. Part of that plan is to expand the Scottsdale Central Arizona Project (CAP) water treatment plant, which already supplies 48 percent of the city's drinking water. By increasing capacity from 50 to 80 million gallons per day, the plant will be able to process additional surface runoff, thus supplementing the drinking water supply when other sources are stressed.

Adding capacity at an existing, highly complex facility is always challenging. In this case, CAP consisted of 15 structures interconnected by a spaghetti-like mesh of poorly documented piping, utilities, and other underground structures. The schedule, phasing, and logistics of design and construction were also demanding.

The difficult task fell to the southwest regional office of The Walsh Group. From the beginning, Virtual Construction Manager Dan Klancnik realized that implementing building information modelling (BIM) would be strategic to project success. "With traditional 2D plans, coordination and planning without schedule-jeopardizing errors would have been nearly impossible," he said. "Our team set out to not just implement BIM and virtual construction as an addendum or afterthought to the project processes, but rather to incorporate BIM seamlessly into our workflow. Because of this, fostering a culture of BIM buy-in was paramount."

The Walsh Group began by organizing meetings with the Bentley BIM project coaching team and project stakeholders, including employees of The Walsh Group's construction division, Archer Western Contractors, as well as the client, designers, and key subcontractors. These were the planning and education sessions, which were an important early factor in establishing a BIM-oriented mindset.

Klancnik had ambitious goals for using BIM on the expansion project. The 3D model would be the central

repository of information for the design team; facilitate communication among team members and stakeholders; provide visuals for communications with the city and community; generate work plans for field crews; produce materials lists and quantities; facilitate safety planning; enable interference management and design coordination; establish project phases and construction sequences; and facilitate site logistic planning.

"The universal language for effective communication among all parties throughout the design and construction phases was BIM," Klancnik explained. "The goal was to integrate BIM seamlessly into our processes at every level - from the field crews to the project executive - to reduce workflow redundancies and aid effective communication. After project completion, the BIM would be handed over to the client to aid in management of the new facility."

With strategic use of existing plans and new as-built surveying, an accurate model of the existing facility was created and superimposed on proposed architectural and structural designs. From that point forward, BIM served as the project's central database. The Walsh Group and Archer Western Contractors held weekly, model-based coordination and collaboration meetings with engineers and subcontractors. At weekly client meetings, model-based visuals proved to be an instantly accessible way to communicate design updates and building processes. When construction commenced, model-based scope-of-work meetings were held daily with field crews.

The Walsh Group made a substantial investment in new software, tools, and training in order to use BIM as the organizing principle for this major infrastructure project. Even so, the firm not only quickly recovered its investment but also achieved a substantial payback. "Our best estimate is that the project team spent an additional \$45,000 on model-based processes," Klancnik calculated. "So far, the project has saved over \$149,000 in potential conflicts and reduced the 28-month construction schedule by five weeks."

Bentley's BIM tools also helped the project team identify and resolve potential safety issues that might otherwise have gone unnoticed. "Overall, the team achieved success by communicating and freely exchanging model content on every level of the project," he said. "A key benefit of the model-based process is the way it made technical information

accessible to key project participants, who were able to contribute usefully even when they had no expertise in reading technical drawings. The 3D visualizations produced by designers were instantly comprehensible to everyone gathered at weekly meetings."

The model also revealed new information to those who had been analyzing technical drawings for years. "In one instance with the composite model, we were able to identify a truss designed with a six-inch overlap into a steel beam," Klancnik recalled. "If we had approved the incorrect design for fabrication, it would have cost \$40,000 and a four-week delay." Similarly, a conflict between a carbon steel pipe and a support beam was detected in time to save the project nearly \$50,000 and another four-week delay. In all, about 20 major conflicts and countless minor conflicts were revealed by model-based analysis, greatly reducing project costs, delays, and on-site confusion.

By linking the model to scheduling, Archer Western was able to organize material staging and storage, manage traffic, and plan logistics. This streamlined day-to-day construction activity and revealed potential construction hazards. "Archer Western Contractors created daily task and hazard analysis plans from the model, linked with sequencing, to identify and resolve potential problems," said Klancnik. "To date, the project has logged 58,031 man-hours with zero OSHA recordables, zero incidents, and zero lost time cases."

Sean Walsh, The Walsh Group's assistant COO, noted unequivocally that his firm's investment was a wise one. "With Bentley's BIM, our Archer Western Contractors Arizona CAP expansion project realized project savings that exceeded the investment costs to purchase tools and train our staff."

By building a culture that supported a commitment to BIM, The Walsh Group's regional office not only saved money for the client but also maintained its safety record and beat the schedule on a large project with a short time frame. As a result, upon completion in June 2010, Scottsdale's CAP expansion will be a cost-effective addition to the city's water supply infrastructure.

For further details, contact:

Aravinda Billavara
Regional Marketing Manager - (South - East Asia)
Bentley Systems India Pvt. Ltd.
403, Godrej Eternia - C, Wakdevadi, Shivaji Nagar,
Pune - 411 005, Maharashtra. Fax: 020-6602 1200
E-mail: Aravinda.Billavara@bentley.com
Website: www.bentley.com