

Sundt Construction, Inc.

Customer Success Story

Project

Butler Water Reclamation Facility

Client

The City of Peoria, Arizona

Autodesk® Revit® Architecture

Autodesk® Revit® Structure

Autodesk® Navisworks®

AutoCAD® Civil 3D®

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—Shawn Kreuzwiesner
Utilities Engineering Manager
The City of Peoria, Arizona

A clean process.

Peoria, Arizona, gets clean water on time and on budget—with a BIM-powered construction process.



Butler Water Reclamation Facility: Entrance.

Project Summary

Operational in 2008, the £79 million Butler Water Reclamation Facility is the culmination of the largest public works project ever undertaken by the City of Peoria, Arizona. The facility processes 10 million gallons of waste water each day and provides Peoria with a valuable renewable water resource whilst integrating visually into its surroundings. The Butler Water Reclamation Facility has impacted the environment in positive ways and attracted the attention of the American Public Works Association, which named it a Public Works Project of the Year in the environment category.

The Butler Water Reclamation Facility project perfectly illustrates how building information modelling (BIM) can enhance constructability, planning, and coordination on large projects. To visualise and explore the project before it was built, Sundt Construction, Inc., the construction firm engaged by Peoria during the design process, turned to BIM solutions from Autodesk, including Autodesk® Revit® Architecture software, Autodesk® Revit® Structure software, AutoCAD® Civil 3D® software, and Autodesk® Navisworks® software.

“BIM is an integrated process that gave us the ability to understand the project’s characteristics as the design evolved,” explains Andrew Apostolik, Sundt

Construction’s senior project manager on the Butler Water Reclamation Facility. “Before and during construction, the model helped our team to deliver the project according to Peoria’s time and budget expectations.”

The Firm

Founded in New Mexico in 1890, Sundt Construction has prospered along with—and helped to build—the Western United States. Today, the Arizona-based, employee-owned company is the 55th largest construction firm in the United States, and it serves public and private sector clients throughout the nation, delivering government facilities, office buildings, heavy civil projects, and more.

Sundt Construction has seen strong growth in its public sector work in recent years, a development the firm attributes in part to its approach to government work. “Success isn’t just about having the low bid, which is why we approach government work with the same service-first philosophy we apply to private sector work,” says Dan Russell, simulated construction manager for Sundt Construction.

“In practice, our approach means we try to bring in BIM to facilitate construct-ability insights, 3D reviews, and schedule coordination at each stage of a project.”

Autodesk®

BIM reduces concrete rework by as much as 6,000 hours on water treatment plant project.

The Challenge

Home to more than 146,000 people, Peoria's appealing weather, thriving economy, and lively cultural life have led to a boom in population, making the City one of the fastest growing in the country in recent decades. Thanks to its accelerating growth, the demand for municipal services has skyrocketed. Peoria had long relied on a waste water treatment facility operated by a nearby community, but continued use of this facility would have prevented Peoria from reaching its goal of gaining more control over one of its most precious resources—water.

"The City evaluated its options, and decided to build a state-of-the-art treatment facility that would allow us to convert our waste water into a renewable water resource suitable for irrigation or groundwater recharge," says Shawn Kreuzwiesner, Peoria's utilities engineering manager. "Water is a critical resource for desert communities, and we saw the new plant as an opportunity both to take charge of our water and to prepare for future growth."

To help keep construction issues at bay, the City of Peoria chose Sundt Construction and a construction-manager-at-risk project delivery model to complete this immense project. With this delivery model, Sundt Construction embraced the challenges inherent in the project—and made the Peoria's project goals its own. "As construction manager-at-risk, we guaranteed a maximum construction cost, which provided us with an added

incentive to work efficiently," says Russell. "Juggling the project's complexities and meeting our budget goal required that we suggest options for reducing project time and costs and work with the engineering team to help ensure construct-ability. From planning to coordination to construction execution, we relied on BIM to facilitate each process."

The Solution

Joining the project when the designs were about 50 percent complete, Sundt Construction built its workflow around BIM solutions from Autodesk, creating 3D models of the 2D data provided by the design firm. Sundt Construction used Revit Architecture software and Revit Structure software to model and integrate the architectural and structural elements of the design. AutoCAD Civil 3D software enabled Sundt Construction to visualise the intricate underground elements of the design. To identify interferences and coordinate construction better, Sundt Construction aggregated, reviewed, and analysed the models in Autodesk Navisworks software.

"Using BIM solutions, we could visualise how the complex piping and utilities interface with the structural elements, which provided a basis for helping the project team develop a design that supported cost-effective and efficient construct-ability," says Russell. "For instance, we identified a number of opportunities to help maximise the use of off-site fabrication for piping and duct work. Throughout

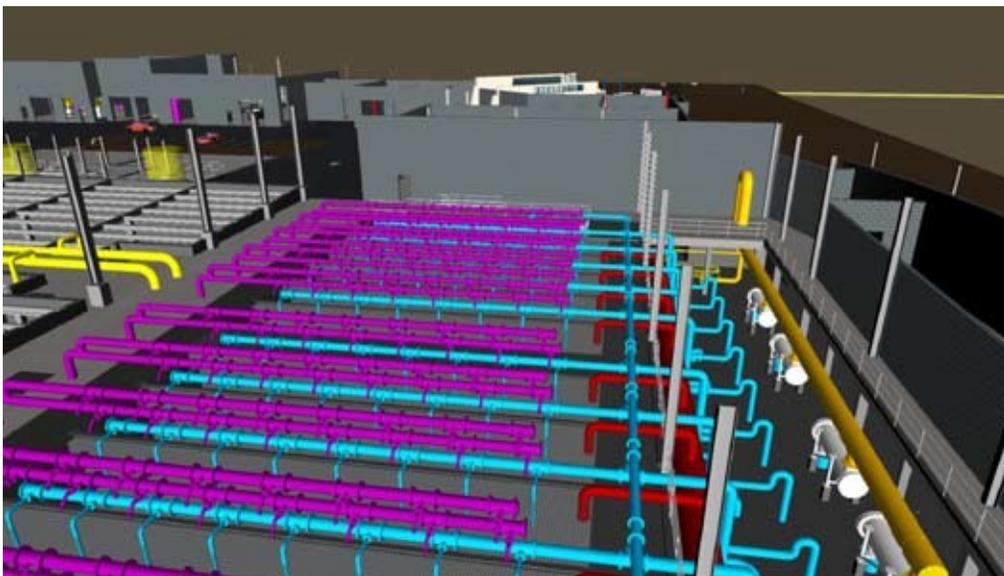
Civil 3D software lets you lay out piping using real-world coordinates in the sizes you intend to install. When it comes time to purchase piping, the software automatically generates a list of materials. That helps to save hours of work and prevent ordering errors.

—Andrew Apostolik
Senior Project Manager
Sundt Construction

the project's life, each insight contributed to a level of control over constructability that would have been unthinkable just a few years ago."

Self-Performing with Precision

Since Sundt Construction self-performed the concrete work on the project, the company was particularly interested in modelling and coordinating the construction of the Butler Water Reclamation Facility's structural elements. Working from its Revit Architecture and Revit Structure models, Sundt Construction separated the concrete structures into individual concrete pours, measured material quantities for each pour, and created sequencing plans and concrete lift drawings. "It's really amazing what you can do when you can link a 3D model to a schedule," says Russell. "BIM let us coordinate every concrete pour virtually."



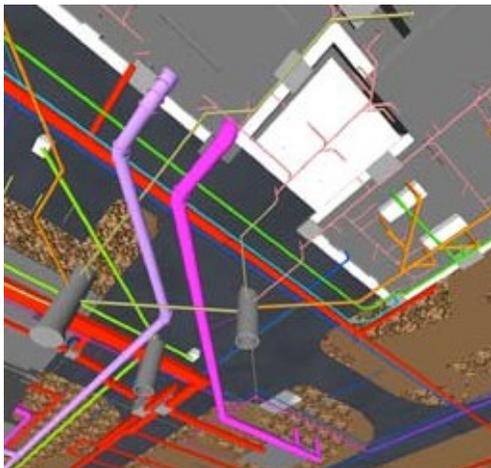
Navisworks model of process piping at membrane structure.

During construction, these models of individual pours helped the team to more easily visualise the sequence of each concrete element in the project. “Our crews had a better understanding of what each concrete pour entailed and how it related to the work of other trades,” reports Russell. “We compared the Butler Water Reclamation Facility to a similar project that was done without BIM. On the Butler Water Reclamation Facility project, we determined that there was 67 percent less concrete rework, and avoiding rework is definitely one of the keys to controlling costs.”

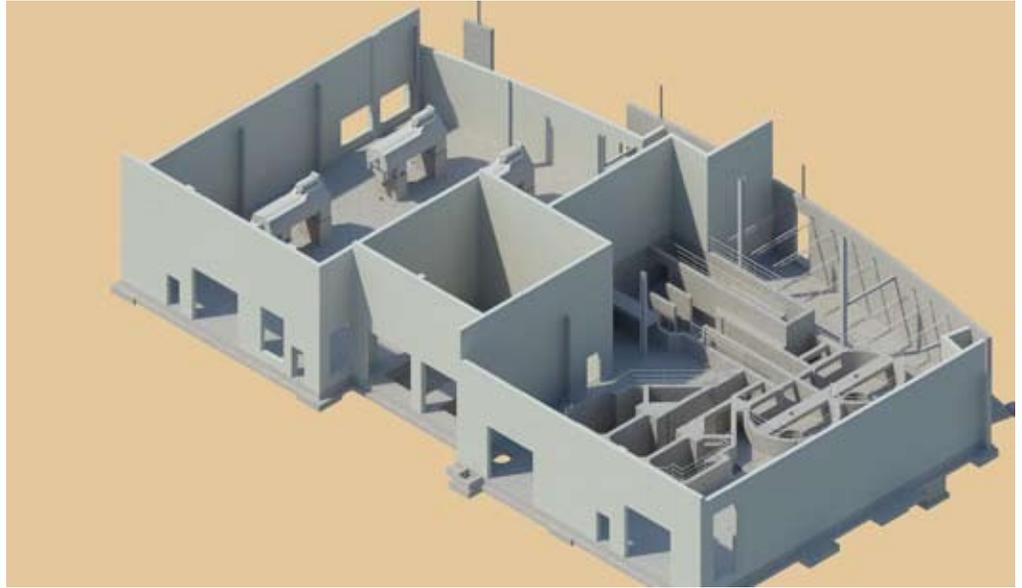
Integrating Piping Faster

With so much of the Butler Water Reclamation Facility underground, Sundt Construction relied heavily on AutoCAD Civil 3D software to model the facility’s below-grade features, especially the extensive yard piping and electrical duct banks. Russell explains, “In traditional 2D tools, it’s hard to see whether pipes at different elevations are adequately spaced. Using Civil 3D software, we were able to walk through all the underground utilities virtually before even breaking ground on the project.”

Apostolik notes that AutoCAD Civil 3D software also helped provide the team with advantages over traditional 2D methods of geo-referencing piping and understanding the materials needed to execute the design. “Visualisation is only the beginning,” he notes. “Civil 3D software lets you lay out piping using real-world coordinates in the sizes you intend to install. When it comes time to purchase piping, the software automatically generates a list of materials. That helps to save hours of work and prevent ordering errors.”



Underground utilities at solids and headworks structure.



Revit Structure model of solids and headworks structure.

Navisworks Paves Way for Construction

To review how the water treatment plant’s structural, architectural, and below-grade elements harmonised, Sundt Construction regularly aggregated its design models in Autodesk Navisworks software.

“Navisworks software combines the work of diverse teams into a virtual whole,” explains Apostolik.

“Everyone who needed to collaborate, including architects, MEP engineers, and equipment vendors, could work together to make their parts integrate. At every stage, Peoria’s staff was able to review our progress and make valuable contributions to enhance the overall usability of the facility. For instance, they made suggestions that helped to increase the accessibility of equipment that needs frequent servicing or replacement.”

Sundt Construction reports that Navisworks software helped the team identify and resolve more than \$200,000 in interferences on the Butler Water Reclamation Facility project. However, the Navisworks model proved even more valuable as a foundation for clear communication with Peoria’s leaders.

Juggling the project’s complexities and meeting our budget goal required that we suggest options for reducing project time and costs, and work with the engineering team to help ensure constructability. From planning to coordination to construction execution, we relied on BIM to facilitate each process.

—Dan Russell
Simulated Construction Manager
Sundt Construction

£79 million project stays on budget and on schedule with BIM.

Kreuzwiesner explains how Navisworks software helped bring the design to life for Peoria's operational staff and elected officials. "It's very hard to visualise a 3D building from 2D drawings even if you're accustomed to doing it," he notes. "Sundt Construction used Navisworks software to create a 3D model that we used for reviews by the operational staff and presentations to the Peoria City Council. The software allowed us to take the roof off the structures and create a fly-through of the whole plant. Stakeholders were able to more clearly visualise what we were building. The Navisworks model provided a powerful and more effective way to communicate the project."

The Result

When asked to quantify the benefits BIM delivered on the Butler Water Treatment Facility project, Russell reports that the advantages become crystal clear when contrasted with traditional methods. "If we compare this project to a comparable project using traditional 2D methods, we see a huge difference—84 percent fewer requests for information and more than 6,000 hours saved on concrete rework alone," he says. "In addition, it's common to have a half a million dollars or more in change orders. On the Butler Water Reclamation Facility, there were no notable change orders. It's no contest. BIM is better for Sundt Construction and for our clients."

With its facility operational and ready to increase processing capacity as needed, the City of Peoria is experiencing the benefits of BIM first hand. "After

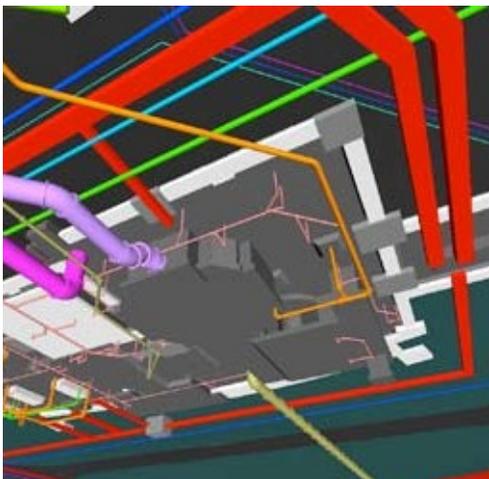


General view of underground utilities.

witnessing the intelligent application of technology throughout the construction process, I believe that BIM definitely benefits owners," says Kreuzwiesner. "It helped Sundt Construction take a proactive approach to managing every aspect of construction, and we are extremely pleased with the result. We have an effective facility, and it was delivered not only on time, but also on budget."

Learn more

Help keep your construction projects on track from start to finish by using BIM solutions from Autodesk. Visit www.autodesk.com/gov and www.autodesk.com/bim to find out how.



Detail of underground utilities.

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