

Great projects abound in Arizona – visit one as part of your 2015 Congress experience

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Now that you have decided to come to Congress in Arizona in 2015, your next big decision is what to do with all your time while you are here. Sure, most of it will be spent in educational sessions, on the expo floor, or at one of the many social events, but what about checking out some of Arizona's fantastic public works project history, including great works such as the Hoover Dam, Marble Canyon Bridge, Roosevelt Dam, and Central Arizona Project (CAP), to name a few.

The Congress Committee has planned several great options for you, including a tour of the CAP headquarters and canal. Other options include the Valley Metro Rail Maintenance Facility, the Sky Harbor International Airport Consolidated Car Rental Facility, Chase Ballpark and its Northwind Facility, and the Tempe Town Lake Dam, among others.

One of the hallmarks of Arizona's public works industry is collaboration. Our communities often join forces for major public works infrastructure, sharing capital and operating costs to everyone's benefits. Sure, many other places around the country do this too, but in Arizona we have made it into an award-winning project. One such project that isn't on the technical tour agenda is the SanTan Vista Water Treatment Plant (STVWP).

On the surface it sounds like a municipal water treatment plant; located in Gilbert, Ariz., a suburb in the southeast Phoenix metro area that was the fastest growing municipality in the country for about a decade. The plant is jointly owned by Gilbert and Chandler, Ariz., another rapidly growing SE Valley suburb. Gilbert staffs and operates the plant, which was funded 50/50 by the two municipalities, and a comprehensive intergovernmental agreement spells out financial responsibilities for operating and maintenance costs.

But dig a little deeper, and what you find is a surface water treatment plant that was one part of a four-project, \$200M plus (original program budget) program both communities needed quickly in order to meet rapidly increasing water supply needs in the southeast valley. The projects included the STVWP at a cost of \$125M; a 14-mile-long, 48-inch diameter raw water delivery pipeline to bring CAP water to the plant (\$50M); eight miles of 16-inch to 36-inch finished water distribution lines (\$15.5M); and one mile of new five-lane arterial roadway (\$12M). All four projects had different teams and different challenges to meet the demanding schedules, so the owners contracted with ARCADIS as their program manager to oversee all the work. Here are a few highlights of the program as it was implemented with Gilbert as the lead agency on all projects.

SanTan Vista Water Treatment Plant

As Gilbert and Chandler began working together toward developing the SVWTP it was clear there would be several challenges:

Aerial view showing completed treatment plant with new arterial access road. Adjacent vacant land is planned for future residential subdivisions.



- The plant was developed as a 24MGD facility, but included future expansion to a 48MDG facility with minimal throwaway work.
- A demanding schedule of 3.5 years from start to finish operations had to be met.
- Addressing concerns of adjacent neighbors as the plant location is in a growth area with multiple planned developments.
- Funding was fixed by the communities, so there could be no cost growth. There was a strong desire to reduce costs so a lower bond sale could be held.

The owners chose to deliver the plan using the Construction Manager at Risk delivery method, with a team of Sundt as CMAR, Black & Veatch as designer, and Corollo as owner's onsite resident engineer/inspector.

- The plant was designed with a polymer and micro-sand ballasted flocculation treatment process, a first for Arizona, and a process that allowed a significantly smaller footprint than other processes.
- Chlorination was achieved through onsite sodium hypochlorite generation, eliminating the transport and storage of chlorine.

- Water used during the treatment process is recovered and recirculated back through the plant, giving a 99% efficiency rating.
- Expansion was also addressed, and the plant was constructed with all building facilities completed, and pre-set connections for a mirrored treatment process train in place to simplify, and provide cost efficiency, in the future expansion.
- Delivery time was three years and eight months from design NTP to final completion of construction, with the schedule experiencing only 16 days growth, all weather related.
- Project cost was reduced during design, resulting in a GMP of \$88.5M and a total project cost of \$110M, a savings of over \$15M from the original budget. Cost growth during construction was held to less than one percent.
- The final project received seven awards:
 - o Maricopa County Air Quality Department Air Quality During Construction Honor Award
 - o 2009 ACI AZ Chapter Exposing the Best in Concrete Award
 - o 2009 ACEC Engineering Excellence Honor Award
 - o 2009 American City and County Magazine Crown Communities Excellence Award
 - o 2010 Maricopa Association of Governments Desert Peaks Award – Regional Partnership
 - o 2010 APWA AZ Chapter Project of the Year – Environment over \$75M
 - o 2010 CMAA National Project Achievement Award – Infrastructures Less Than \$150M



CAP Raw Water Delivery Pipeline

Much like the plant itself, getting raw water to the plant so it had something to treat was another major challenge for the communities. The nearest supply source was an existing turnout structure on the CAP canal in Pinal County, requiring a nearly 14-mile gravity pipeline. Challenges included:

- The pipeline had to be in service before the plant was ready to commission, providing only 30 months for project delivery.
- Rights-of-way, easements and/or permits were needed from multiple private landowners, several irrigation districts, the State Land Department, three federal agencies (Central AZ Water Conservation District, BLM and BuRec), two counties (Pinal and Maricopa), and three municipalities (Chandler, Gilbert and Queen Creek)—over 200 agencies and owners total.
- The pipeline alignment crossed the Union Pacific Railroad.
- 14 miles of pipe material had to be procured and delivered on schedule without excessive material storage available.

A design-build team led by Achen-Gardner Construction hit the challenges head on. Coupled with designers Stantec and HDR, and owner's rep PM/CM Jacobs with Wilson Engineers, the design-build team took on a total project delivery role. Not only did the team perform design and construction, they handled all right-of-way, easement and permit acquisition activities from title reports to negotiations to closings. This approach paid big dividends as the team delivered the project several months early and more than \$8M under original budget. Highlights of how the team accomplished this are:



Map of CAP Raw Water Delivery Pipe alignment showing the multiple jurisdictions and features the project crossed.

- An initial alignment study for the entire route determined that by increasing the route two miles the project would actually save money through lower R/W costs, and increased productivity reducing installation costs.
- Thorough analysis of pipe type, installation cost and availability, coupled with competitive bids solicited at 30% design, resulted in a decision to use ductile iron pipe, providing a cost savings of over \$700,000 (due to lower installation and corrosion protection costs) and more certainty in delivery availability.
- A multiple GMP approach allowed the DB team to begin early construction and long lead procurement, which was critical to meeting the overall schedule requirement.

Ocotillo Road Finished Water Lines

In addition to getting water into the plant and treating it, the program included lines to distribute the treated water into the two municipal systems.

As with the other projects, this one also had its share of interesting challenges to overcome:

- Lines of four different diameters were needed to serve three different delivery zones in two different municipalities.
- Chandler's line had to cross an irrigation district main delivery canal as well as a regional flood control channel.
- The restrictive schedule required the GMP to be developed based on 30% complete plans, and the project to be constructed in multiple phases in order to stay ahead of plan finalization.
- Chandler required a full system flush of their line, which required over seven million gallons of water to perform.

For this project a design-build team led by Hunter Contracting, with designer Stantec, and owner's rep PM/CM Wood-Patel & Associates was selected. The construction GMP of over \$13.8M

was performed on a Time & Materials basis to satisfy Chandler, who was concerned about the early GMP and cost containment since the project was over 80% theirs. Ultimately the project was completed for only \$11.9M, and was two months early, in spite of two significant delays—a collapse of the main irrigation canal which flooded a jacking pit and caused several weeks of delay during repairs, and waiting for the plant to come online to produce 15 million gallons of water to provide for bac-t and scour testing.

Ocotillo Road

Getting water to and from the plant wasn't the only transportation issue the owners faced; getting people there was an issue too as the plant location had no existing roadways servicing it. Gilbert proceeded with their \$12M Ocotillo Road project to solve that issue. The one-mile-long, five-lane minor arterial was delivered using a design-build approach, not because it had a series of challenges or issues to overcome, but because it became a vehicle to help the other projects address issues including:

- With the plant located near the mid-mile location, portions of the raw water delivery line and the finished water distribution lines were built with the roadway project to allow the roadway to complete without concern about the pipeline projects disturbing new pavement later.
- A deep 15-inch sewer line to serve new Gilbert and Queen Creek development was included with the project to avoid future impacts to the water lines and pavement during installation.
- The plant required redundant power supply, requiring a significant electrical infrastructure to be placed for Salt River Project from the west end of the project into the plant.

- Coordination was required with adjacent planned developments including two residential subdivisions and a Town of Gilbert Fire Station, as well as existing rural residential properties impacted by the new access.

Constructed by the design-build team of Haydon Building Corporation with designer AZTEC Engineering, and owner's rep PM/CM Carter-Burgess (now Jacobs), the project was delivered one month early and \$700,000 under budget.

The four projects highlighted constitute a significant public works infrastructure undertaking that was superbly delivered, with overall savings of nearly \$26M due to the collaborative delivery processes, providing significant benefit to two municipalities and their nearly

500,000 residents. These brief snippets don't tell the whole story for any of the four projects, but you CAN get an up close and detailed look at the projects on the technical tours. Make sure you register for one soon as they will fill up quickly. We look forward to seeing you this summer in Arizona at the 2015 Congress!

Jeffrey A. Kramer is serving as a Co-chair for the Arizona Chapter's 2015 Congress Volunteers Committee. An APWA and Arizona Chapter member since 1993, he serves as the Associate Director of the Alliance for Construction Excellence, which is the outreach arm of the Del E. Webb School of Construction at Arizona State University. (Kramer was the senior program manager for ARCADIS during delivery of the projects in the article.) He can be reached at (480) 965-1418 or jeffkramer0813@gmail.com.



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