Environmental Water Division

■■■ In Partnership with Nature

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innovative

environment

creative


natural

research

technology



culture

Water and Wastewater Infrastructure Services

Pacific Advanced Civil Engineering, Inc. (PACE) is a mid-sized water resource civil engineering firm established in 1987 and headquartered in Fountain Valley, California, with a regional office in Phoenix, Arizona. With extensive water and wastewater treatment and infrastructure design experience, PACE provides ***proven, creative and cost effective solutions maximizing value for our clients*** through the application of advanced engineering technology and analysis techniques. Additionally, our focus is in providing design solutions that protect and enhance the natural environment.

Specialization in Infrastructure Components

As water resource specialists we have significant experience designing, constructing and operating water and wastewater infrastructure components, and therefore can provide uniquely suited solutions for our clients and their projects.

Water and wastewater services include:

- Domestic water storage tanks & pump stations
- Wastewater treatment facility design
- EPA 503 bio-solids processing & dewatering
- Groundwater & surface water treatment facility design
- Groundwater recharge
- Well design & rehabilitation
- Supervisory control & data acquisition (SCADA) systems
- Water & wastewater permitting

PACE

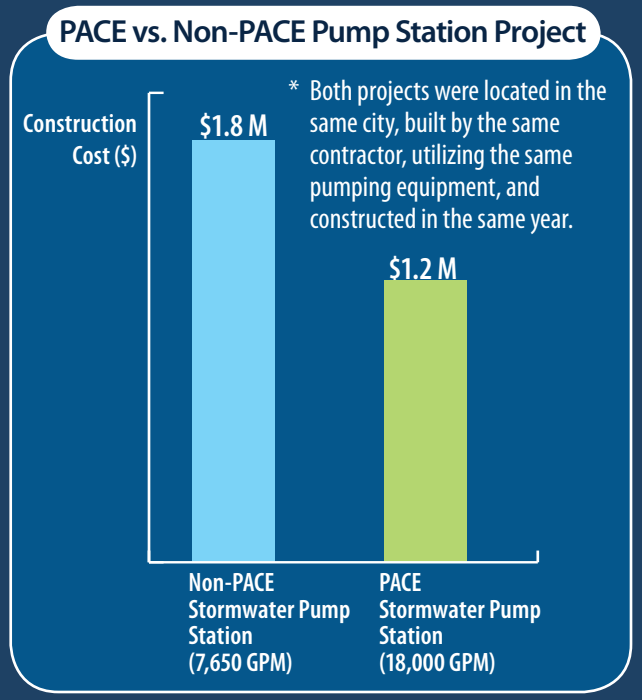
BENEFITS TO CLIENTS

With a specific focus on water resource engineering, we offer numerous benefits to clients, which include:

Value Engineering

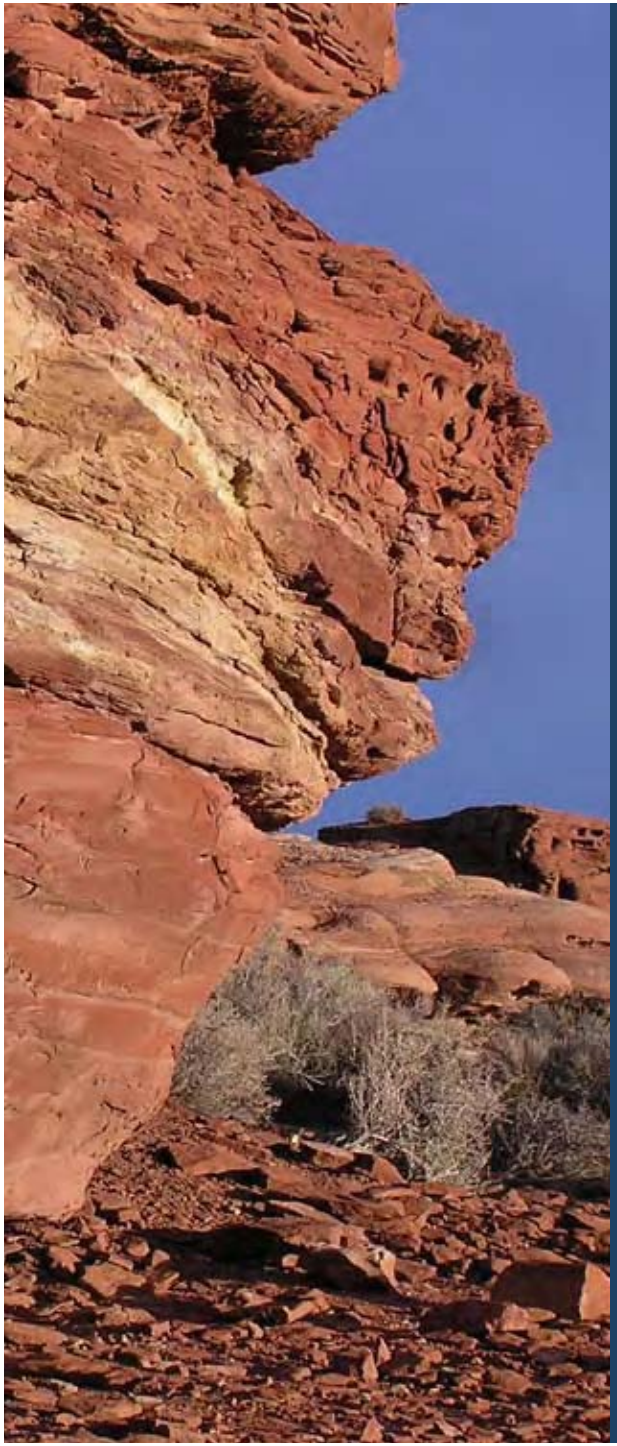
We have over 20 years of construction and operations experience in a design-build setting which has trained us to design with the ultimate goal of minimizing construction costs, while maintaining a high level of product quality. This experience has allowed PACE to deliver complete, quality projects well within the client's budget.

PACE's Value Engineering Approach Saves Clients Significant $$



Insight into Construction and Operations

Our project team has designed numerous water and wastewater facilities, as well as upgrades and improvements to existing facilities. Our experience with integrating construction and operations considerations early in the design process has proved highly successful in terms of **meeting tight project schedules, minimizing construction costs, providing accurate construction cost estimates, and simplifying operations.**



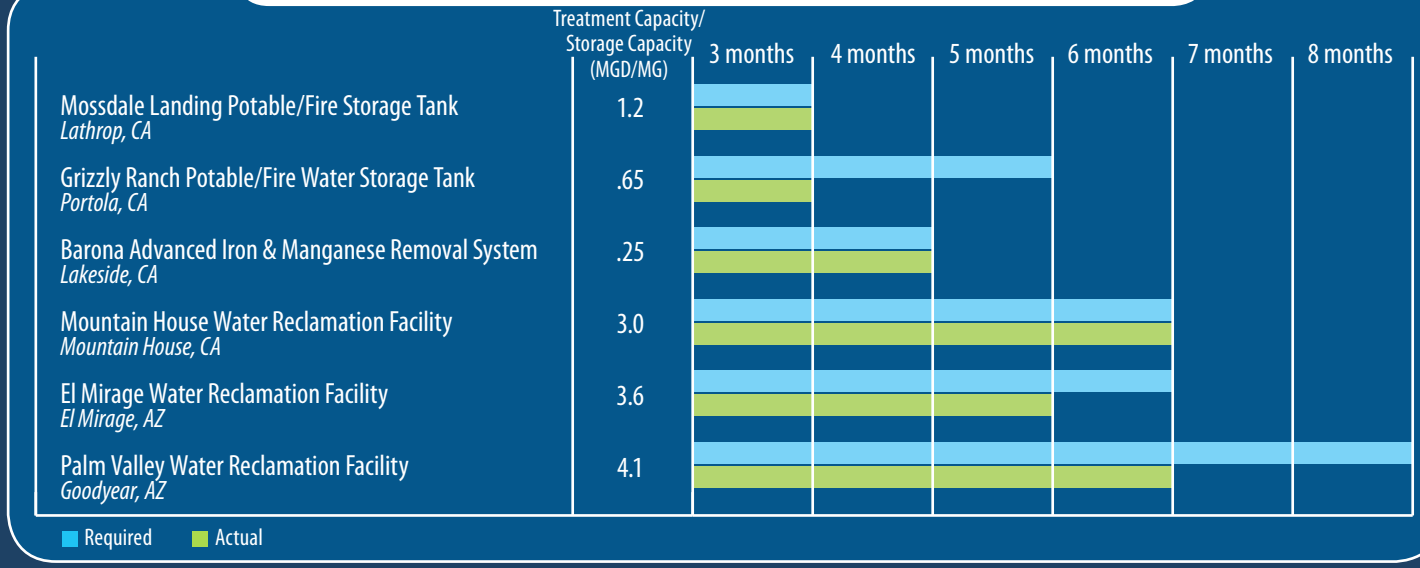
Technical Expertise

With our specialization in water resources comes in-depth knowledge of a wide range of options for any given project. Our technical expertise is also **based on hands-on "in the dirt" training,** experience and scientific research. We offer extensive experience with advanced water and wastewater technologies.

Ability to Work within Extremely Tight Schedules

Many of our more recent projects have required integration with other engineering works, providing quality construction documents with little lead time. PACE has a proven ability to perform and provide resources on-demand at "crunch time," leading to a successful track record of meeting project deadlines.

Project Team Regularly Delivers Project Design On-Schedule / Early



Focused Personnel Highly Experienced in Water and Wastewater

The PACE team lives and breathes water and wastewater. We offer a multi-disciplined design team to bring unique and well-rounded insight to projects. Therefore, we have a keen ability to satisfy clients' desire for cost effectiveness and operators' desire for minimized maintenance requirements while ***maximizing project value.***

James Matthews, P.E. - Professional Engineer: AZ, CA, ID, NM, VA **Sr. Vice President**
Certified Wastewater Treatment Operator, AZ

James Matthews has civil engineering experience spanning back to 1992. His areas of expertise include hydraulics, water and wastewater treatment, pump station design, and systems automation. He has over 12 years of engineering/water design experience and has been the lead designer on numerous PACE water/wastewater treatment projects. Other responsibilities include: Sr. Vice President leading PACE's Environmental Water Division with the design and construction of water and wastewater treatment systems, pump stations, water storage systems, and design and implementation of computer controlled (SCADA) electric, hydraulic, and pneumatic control systems. His expertise stems from an extensive background in construction supervision, plant operations and administration. Mr. Matthews has proveneffective in developing and ensuring completion of impressive solutions to many of our clients' most difficult problems. He has demonstrated proven performance over the duration of his career and developed the trust of numerous municipalities, developers, and regulators alike. Often considered the most difficult aspect of any project's completion, Mr. Matthews has personally installed custom control systems including PLC programming, SCADA, radio telemetry, and solid-state controls for their intended application.

Johan A. Perslow, P.E. - Professional Engineer: AZ, CA, CO, NM **Chairman**

Johan Perslow has more than 30 years of engineering and construction experience in both public and private sectors. Over the last 20 years, Mr. Perslow has been the principal designer, consultant, and construction manager for more than 700 projects including wastewater-effluent reuse systems, lake and pumping systems, numerous state-of-the-art water-resource management systems, irrigation-optimization systems and tertiary wastewater treatment plants. He has also been involved with the structural design of numerous interstate highway bridges and other complex structures. As PACE's Senior Consultant, Principal, and Chairman of the Board, Mr. Perslow has been at the cutting edge of developing and applying new technology to solve commonplace and unique problems. As a principal in the firm, Mr. Perslow is personally involved in every PACE project. He has acted as Principal-in-Charge on multi-disciplined government and private sector projects requiring civil engineering and water feature services for numerous parks and recreation facilities.

Mark Krebs, P.E. - Professional Engineer: AZ, CA, CO, KY, NM, NV, UT **President**

Mark Krebs has engineering and construction experience spanning back to 1988 with both public and private sector projects. His public development project design and construction experience includes all phases of infrastructure, grading, drainage, roadway, water, sewer, reclaimed water, storage, distribution, wetland evaluation, and mitigation. Mr. Krebs studied and worked with Dr. Donald Wood, creator of the internationally used KY PIPE computer model for water-distribution network analysis. With Dr. Wood's assistance, Mr. Krebs developed a computer network model for Louisville's municipal drinking water distribution system. In addition to the responsibility of being an officer of the company and President of PACE, Mr. Krebs has been Principal/Sr. Project Manager and the lead design engineer on numerous water resources projects.

We operate with a philosophy of providing design solutions working in partnership with nature.

Duong Do, P.E. - Professional Engineer: AZ, CA — **Project Manager**

Duong Do has worked in the environmental engineering field since 1995. His areas of expertise include water and wastewater treatment processes; design, pump system analysis; and pipe hydraulics and water distribution. Mr. Do's experience in environmental engineering includes soil and groundwater remediation, air quality sampling and analysis, regulatory permitting and hazardous waste management. His current responsibilities include managing design and engineering of water and wastewater treatment projects and leading project design teams in developing plans and design documents.

Andrew Komor, M.S., P.E. - Professional Engineer: CA — **Project Manager**

Andrew Komor has civil engineering experience spanning back to 1999. His areas of expertise include wastewater treatment plant design, water treatment, mechanical pumping systems including storm, potable and wastewater, wetlands treatment, hydrogeology, and lake water quality. Mr. Komor's designs profile innovative and cost effective solutions with operations as a top priority. He is adept at coordinating project plans with multiple consultants. Other responsibilities include field engineering/supervision and monitoring, particularly for high-end BNR wastewater treatment facilities, pump stations, sewer lift stations, wetlands, and lake facilities.

Paul Rydzynski, P.E. - Professional Engineer: CA — **Project Manager**

Paul Rydzynski has civil and environmental engineering experience dating back to 1988. His areas of expertise include wastewater, recycled water, stormwater, and other public works infrastructure engineering, industrial waste treatment, pretreatment program management, waste minimization and recycling, stormwater and wastewater permitting and compliance, hazardous waste management and health and safety compliance. He is experienced in water resources and infrastructure engineering for municipalities, water agencies and commercial clients.

Michael Olivier, M.S., P.E. - Professional Engineer: AZ, CA, WI — **Treatment Design**

Michael Olivier has civil engineering experience dating back to 1994. His areas of expertise include water and wastewater treatment systems, water quality and bid procurement techniques. Mr. Olivier is proficient in design and implementation of engineering projects compatible with individual client needs. His current responsibilities include providing technical design and support for water and wastewater treatment infrastructure projects including treatment systems, storage facilities, and pump stations.

Erin Hubbard, P.E. - Professional Engineer: AZ, CA — **Potable, Waste & Reclaimed Water Compliance**

Erin Hubbard has civil engineering experience with both public and private sector projects spanning back to 1999. Her experience includes various disciplines of water and wastewater engineering. She has successfully functioned as the lead engineer for an array of permitting and project approvals including NPDES, Waste Discharge, Aquifer Protection certifications, lake and streambed alteration, and air quality. Of particular note are recycled water projects in California, Arizona, and New Mexico. Ms. Hubbard's design responsibilities include recycled water storage basins and pump stations. She also works to ensure the quality of design reports, operation and maintenance manuals and effluent management plans for many of PACE's water and wastewater system designs.

Brian Reid, P.E. - Professional Engineer: CA — **Construction Services**

Since 1997, Brian Reid has been working in the civil engineering and construction industry focusing on field engineering for water and wastewater infrastructure systems and flood control. Responsibilities include construction layout using GPS survey technology, observation of fieldwork and construction materials to determine compliance with plans, specifications, and design concepts, construction shop drawings, and facilitating in the permitting and plan review process.


We believe preserving and reusing
water resources is vital to sustaining
human life.

Mountain House Water Reclamation Facility

Mountain House, CA

Client: PERC

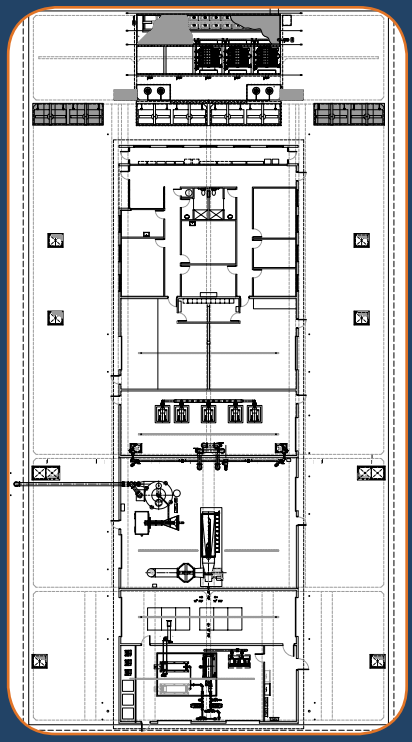
Owner: Mountain House CSD

Components:

- 3.0 MGD PERC Activated Sludge Process (ASP™) Water Reclamation Facility
- Meets Title 22 Effluent Requirements for Unrestricted Use
- Facility Utilizes a Two-Tank Hybrid SBR Process for Biological Oxidation of Organics and Secondary Clarification
- UV Disinfection System Certified by California Department of Health Services under NWRI
- Sludge Processing to Meet EPA Class B Biosolids Requirements

PACE was hired by strategic partner, PERC, the project Design-Build contractor, to facilitate the replacement of the development's existing 0.45 MGD aerated lagoon wastewater treatment plant to a 3.0 MGD PERC Activated Sludge Process (ASP™) water reclamation facility. PACE provided design, permitting and start-up services. The facility is designed to meet strict Title 22 effluent requirements for unrestricted reuse. The new facility utilizes a two-tank SBR process for biological oxidation of organics and secondary clarification. Tertiary treatment will be accomplished through the SBR, Aquadisk cloth media filtration, and advanced UV disinfection. **The Mountain House WRF is among the first facilities in the United States to utilize a UV Disinfection System certified under NWRI to meet California Title 22 requirements.**

The facility also provides sludge processing reuse and to meet EPA Class B biosolids. Through an innovative design approach, Mountain House CSD will realize tremendous energy savings through the use of micro-fine bubble diffuser panels in the SBRs and the use of low-energy Flygt "banana blade" mixers. This will represent the first application of these types of diffuser panels in a U.S. SBR facility. Treatment takes place in underground tanks, significantly reducing land requirements and improving the facility's aesthetics. Additionally, a unique structural concrete deck design will reduce construction time and cost. Future expansion plans will bring the facility's treatment capacity to 5.4 MGD. Upon completion, the existing lagoon plant will be decommissioned.



WRF Layout

Treatment takes place in underground tanks located directly beneath the WRF's offices and laboratory. This design produces an efficient footprint (reducing land demand), complete odor control and more aesthetic appearance.

Palm Valley Water Reclamation Facility

Goodyear, AZ

Client: PERC

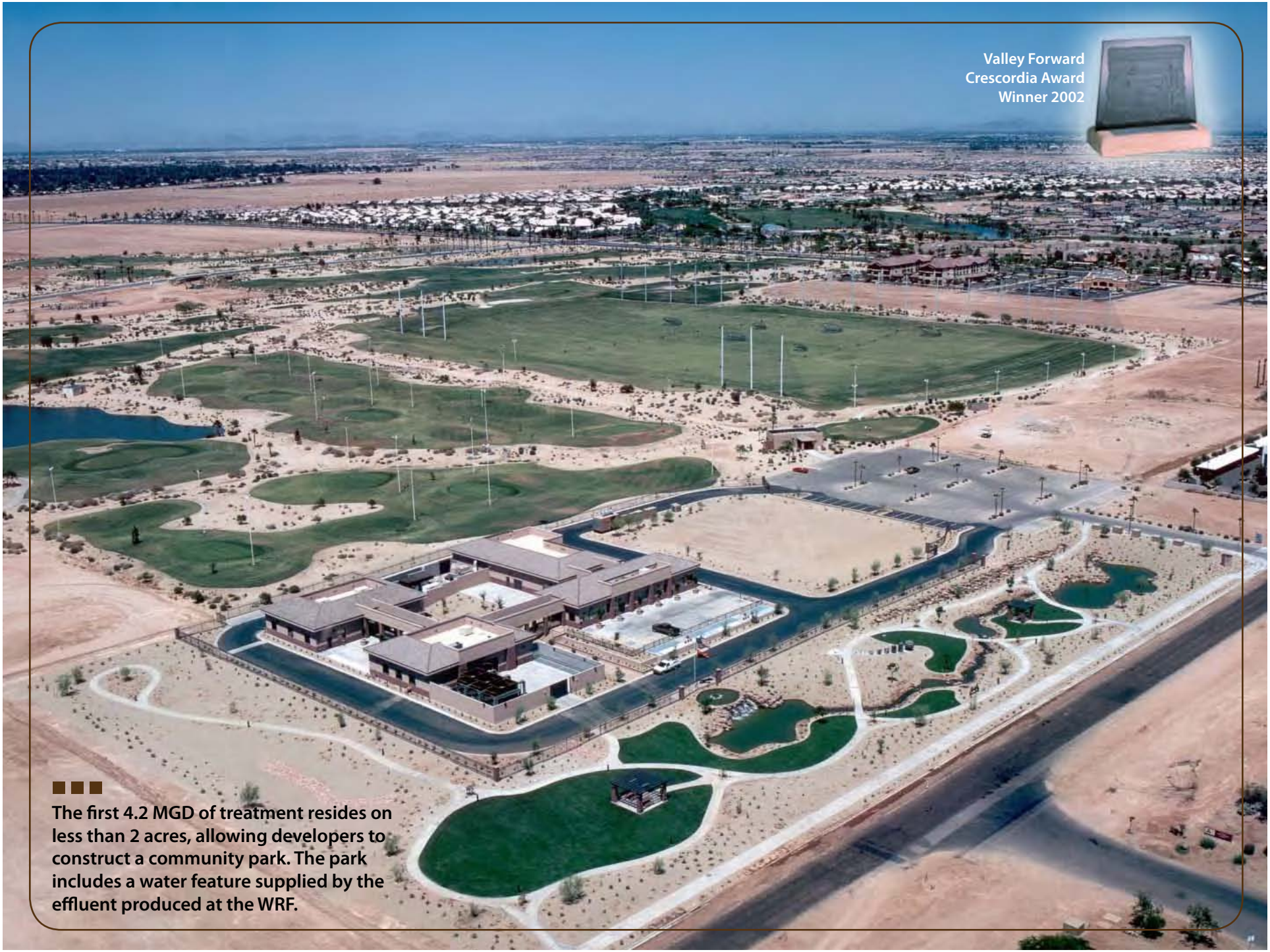
Owner: Litchfield Park Services Company (LPSCo)

Components:

- 4.2 MGD PERC Activated Sludge Process (ASP™) Water Reclamation Facility (8.2 MGD at Full Build-Out)
- Meets ADEQ Class A+ Treatment Requirements (Highest Producing Effluent Quality in Arizona)
- Facility Utilizes a Two-Tank SBR Process for Biological Oxidation of Organics and Secondary Clarification
- UV Disinfection System
- Sludge Processing to Meet EPA Class A Biosolids Requirements

PACE was contracted by PERC, the project Design-Builder, to provide the residential community in the City of Goodyear with a two-phase, 4.1 MGD water reclamation facility. The design/build approach provided by PACE/PERC allowed Suncor Development and LPSCo to implement ADEQ Class A+ treatment in less than 18 months from start to finish. The facility features advanced biological nutrient removal disc filtration, UV disinfection and an Auto Thermophilic Aerobic Digestion (ATAD) process for EPA Class A biosolids. In addition to design, PACE is addressing all permiting issues, construction documents and services during construction.

UV disinfection filters eliminates the need for costly and harmful chemical additives.



The first 4.2 MGD of treatment resides on less than 2 acres, allowing developers to construct a community park. The park includes a water feature supplied by the effluent produced at the WRF.

San Jose Wastewater Treatment Facility

Bisbee, AZ

Client: Jonovich Companies

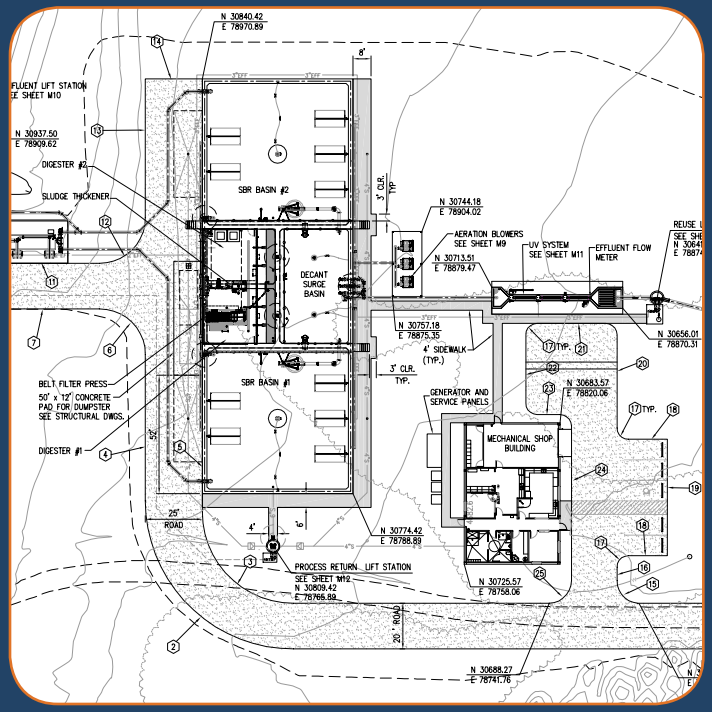
Owner: City of Bisbee

Components:

- Headworks with Automated Septage Receiving Station
- 1.2 MGD ADEQ Class B+ Treatment Facility
- EPA Class B Bio-solids Treatment Facility
- UV Disinfection System
- Master SCADA and PLC Controls
- Replaces Three Treatment Facilities within the City
- Value Engineering Savings of $2.4 Million on a $9.5 Million Project

The City of Bisbee had secured a finite amount of funding and grants from the USDA, WIFA and the North American Development Bank for a new wastewater treatment facility. They had hired a consulting engineering firm to provide design and construction administration for the facility. However, at bid time, based on the low bid, the facility was significantly over budget. PACE was requested by the City and low-bid contractor to provide a value engineering review and suggest alternative construction methods to maintain the "value" in the project but reduce the overall capital cost.

Based on PACE's review of the documents and in consultation with the City's contractor, PACE suggested a redesign approach using a two-basin Sequential Batch Reactor (SBR) system. The SBRs, along with packaging of the ancillary headworks, solids dewatering, and UV systems, netted a capital cost savings of $2.4 million on a $9.5 million project, including PACE's redesign fees. More importantly, the design provides a system which is less costly to operate and maintain and can be easily reconfigured to achieve future effluent requirements with little or no major construction.



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In the picture shown, the walls of the treatment facility are being constructed housed in a 182'x66' enclosure which will contain two SBR tanks, two digester basins and one efficient surge basin minimizing land use demand and odor.

Sundance Water Reclamation Facility

Buckeye, AZ

Client: PERC

Owner: Town of Buckeye

Components:

- 1.2 MGD PERC Activated Sludge Process (ASP™) Water Reclamation Facility (3.6 MGD at Full Build-Out)
- Meets ADEQ Class A+ Treatment Requirements (Highest Producing Effluent Quality in Arizona)
- Facility Utilizes a Two-Tank SBR Process for Biological Oxidation of Organics and Secondary Clarification
- UV Disinfection System
- Sludge Processing to Meet EPA Class A Biosolids Requirements

PACE provided design services for the first 1.2 MGD of the facility and is currently under contract again with strategic partner, PERC, to provide the second phase expansion design. This expansion will bring the treatment capacity to 2.4 MGD. At full build out, the WRF will have a treatment capacity of 3.6 MGD. The facility produces effluent meeting ADEQ Title 18 Class A+ Reclaimed Water Standards and includes a two-tank SBR design complete with headworks, anoxic tank, surge tanks and aerated sludge storage basins. Additionally, UV disinfection is utilized to eliminate the need for chemical treatment.

The phased approach to this treatment facility has allowed developer, Hancock Communities to minimize its capital outlay and expand as it develops in the Town of Buckeye.

PACE

The Sundance WRF is the recipient of an Award of Merit from Valley Forward Association for Environmental Technologies due to its ability to produce AZ Class A+ efficient without chemical additives.

VALLEY FORWARD

Award of Merit 2003

Barona Iron and Manganese Filtration System

Lakeside, CA

Client: Barona Band of Mission Indians

Components:

- 200 GPM Iron and Manganese Filtration System
- Filtration System Also Reduces Arsenic Content by as Much as 50% and Uranium by as Much as 80%
- Backwashing Filtration Eliminates Need for Costly Media Replacement and Chemicals

PACE applied a unique design utilizing a new proprietary filtration media (Penox) to allow the Barona Tribal Water Authority to effectively remove iron and manganese from their potable water supply without the use of complicated chemical injection systems. Iron and manganese had become a problem due to discoloration of the water and sediment build-up in the distribution system. With the new system, simple backwashing completely restores and regenerates the media's removal capacity. The system does not require costly media replacement and chemicals typical with conventional systems (i.e. green sand filters). The backwash from the filters is sent to the golf irrigation lakes to provide 100% reuse of the spent water. As intended, iron and manganese are no longer coloring water or leaving sediment in the pipes.

A second benefit of the filtration came as a surprise. It appears that the media also has the ability, in the presence of "free" iron, to remove two other troubling contaminants: arsenic and uranium. Lab tests reveal the filtered water has up to 50% less arsenic and 80% less uranium than the influent. Although the levels of these contaminants were well below drinking water standards at Barona, the filters demonstrated ability proved useful to the Water Authority as they were contemplating the purchase of a reverse osmosis or ion exchange system to completely remove these contaminants from their water supply. They no longer require such equipment since the filtration system is performing at a level which ensures current and future compliance with drinking water standards.

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Avimor Water Treatment and Infrastructure Facilities

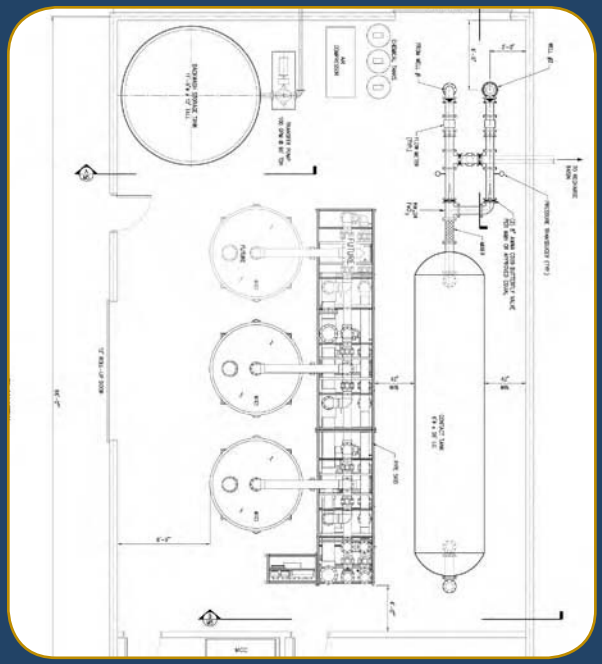
Boise, ID

Client: SunCor Idaho

Components:

- Reconnaissance-Level Studies: Water Quality Assessment, Groundwater Flow Capacity, Wastewater Treatment and Effluent Discharge
- 500 GPM Arsenic Removal System to Produce <5 ppb

PACE has been retained by SunCor Idaho, LLC to provide engineering services for a proposed new housing development northwest of Boise, Idaho. The services have included reconnaissance-level water and wastewater studies including water quality assessment, groundwater flow capacity, wastewater treatment alternatives and effluent discharge options. Initial water quality assessments indicated the presence of arsenic in the source water well of 20-30 ppb, which exceeds the new EPA drinking water standards, effective January 2006, of 10 ppb. After evaluating various arsenic removal technologies, PACE recommended coagulation-filtration as the best alternative for this water source. Subsequent to this recommendation, PACE oversaw a pilot study that demonstrated the ability to consistently treat the arsenic to levels below 5 ppb. PACE is currently under contract to provide engineering services for the design of a 500 GPM arsenic treatment facility and water storage facilities, which will serve drinking water to the first 600 homes in the development.




Our objective is to provide the Avimor Community with a high quality, reliable water system that will maintain the area's natural beauty.

Mossdale Landing Pump Station

Lathrop, CA

Client: City of Lathrop / Pacific Union Homes, LLC.

Components:

- Deep Subterranean Wet Well
- GPM Quad-plex Sewer Pump Station
- Mechanical Odor Control Facilities
- Dual 2-Mile Forcemain
- Remote Radio SCADA and PLC Controls
- Architectural Pump Buildings and Site Development
- Pre-cast Wetwell Minimized Expensive Dewatering Time
- Forcemain Leakage Clog Testing Sequence with Flow and Pressure Limit Satisfied RWQCB Requirements

PACE provided Pacific Union Homes and the City of Lathrop with design services including civil, mechanical, electrical, structural and instrumentation engineering for the four-pump 2.3 MGD peak capacity pump station. The development required the construction of a sewer pumping station to convey wastewater from the Mossdale area to the City's new wastewater treatment facility. The station site constraints were challenging in that the station was constructed in the middle of the development directly adjoining three residential properties. Additionally, high groundwater (less than 3 feet below the ground surface) required a creative structural solution to maintain the tight project budget. Through up-front value-added engineering, PACE was able to deliver a first-class pump station which is aesthetically pleasing with a "good neighbor," no-odor profile.

The station consists of a 32-foot deep wet well, four identical VFD controlled pumps and an innovative water-regenerating activated carbon odor control unit. Pumps and controls are housed inside an architecturally designed masonry block building with perimeter block wall yards for the odor control and back-up generator. The controls consist of Modbus based PLCs and a 2.4 GHz Ethernet-based radio system which integrates with the city's master SCADA system.

Local PLC Control System

The aesthetic architecture of the pump station building allows it to seamlessly blend in with the community while maintaining security.

Mountain House Potable Water Storage and Booster Pumping Station

Mountain House, CA

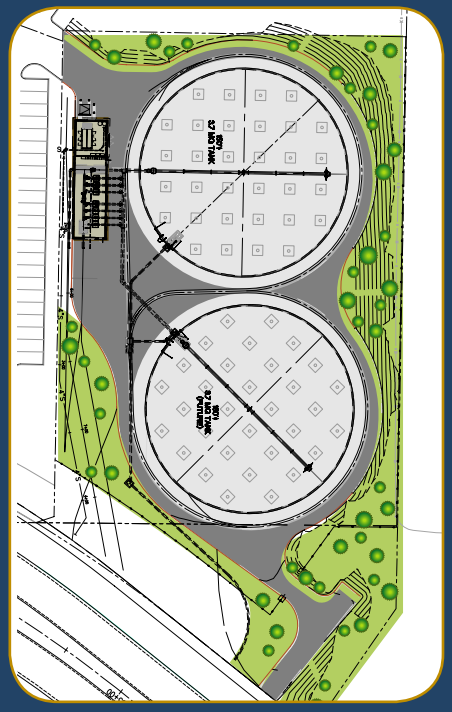
Client: Gerry N. Kamilos / Trimark Communities / Shea Homes / Mountain House Community Services District (MHCSD)

Components:

- Twin 3.7 MG Prestressed Concrete Tanks
- 7,300 GPM Dual-Zone Potable Water Booster Pump Station
- Integrated Pressure Reducing Station
- Chlorine Residual Monitoring and Injection Facilities
- Remote Radio SCADA and PLC Controls
- Architectural Pump Buildings and Site Development

PACE provided the developers of Mountain House and the MHCSD with design services for this multi-phased project. Services included civil, mechanical, electrical, structural and instrumentation engineering for two twin 3.7 MG concrete tanks and a multi-zone, multi-pump water booster pump station. The facility was required as part of the community's master water plan and provides pressure stabilization, potable and emergency storage, and inter-zone pressure regulation. The dual-zone pump station allows water from either storage tank to be boosted into either of two pressure zones. Chemical injection facilities located within the facility automatically maintain chlorine residuals within the tanks as well as water entering the distribution system. The facility serves both planned residential development and the Delta Community College.

In order to maintain the beauty of the surrounding area and to reduce the visual impact of the facilities, the twin tanks were designed to be partially buried and screened using creative landscaping. The booster station is comprised of seven variable frequency drive controlled turbine pumps, electromagnetic flow meters, and a pressure reducing valve assembly. The pump station incorporates flow and pressure metering along with chlorine residual monitoring and chemical injection facilities. All equipment, including the emergency back-up generator, is enclosed in an aesthetically pleasing, sound attenuating masonry building which complies with the unique architectural requirements of the Mountain House Community and MHCSD.



Civil Plan of 2+ Acres Pump Station and Tank Site

PACE

Scheduled for Completion in 2006

The water storage and pumping facility resides on the site for the Delta Community College and was designed to seamlessly integrate into the community.

Mossdale Landing Stormwater Pump Stations

Lathrop, CA

Client: City of Lathrop / Pacific Union Homes, LLC. / Pulte / D.R. Horton / TCN Properties

Components:

- Four Separate Stormwater Pump Stations (Capacities of 30 to 56 CFS)
- Automated Mechanical Trash Screening
- Remote Radio SCADA and PLC Controls
- Architectural Pump Buildings and Site Development
- Dry Weather Pump Station Integrated within Each Main Station Enabled More Stable Flows and Maintained Dry Main Section Over 90% of Operation Time

PACE provided the developers and the City of Lathrop with design services including civil, mechanical, electrical, structural and instrumentation engineering on four separate stormwater pump stations. As part of the master stormwater plan prepared for the City by MacKay & Somps, these stations convey stormwater from developed inland areas to the San Joaquin River.

PACE's innovative design allowed for the use of similar pumping equipment to that which the City already had, but centered on value-engineering the number of pumping units and controls to reduce the overall capital cost of the project. By using submersible solids-handling sewage pumps in combination with an automatically cleaned trash screen, the City is assured that the station will always pump whatever flows to it.

It is interesting to note that PACE's 40 CFS pump station cost $600,000 less than a 17 CFS pump station built for another development in the same city, in the same year, utilizing the same Flygt pump, and built by the same contractor. When asked what the principle cost savings were, the contractor said that, "PACE's simplified structural design and motor controls, coupled with the use of additional smaller pumps," was the major difference.

Instead of using two large pumps running on VFD units, PACE opted to design up to six smaller pumps with soft-start motor controls. This also allowed the use of two common pump models for three of the four stations, reducing the City's need to stock multiple spare parts.

54" Stormwater Inlet Upstream of Screen in Low-flow Portion of Station (Main Station Filled Upon Overflow)

PACE

Instead of using two large pumps running on VFD units, PACE opted to design six smaller pumps with soft-start motor controls to achieve maximum flexibility, and reduced O&M while minimizing overall capital cost producing better long term operational results.

Grizzly Ranch Potable Water Treatment and Distribution Infrastructure

Portola, CA

Client: Lowe Enterprises / Grizzly Ranch CSD

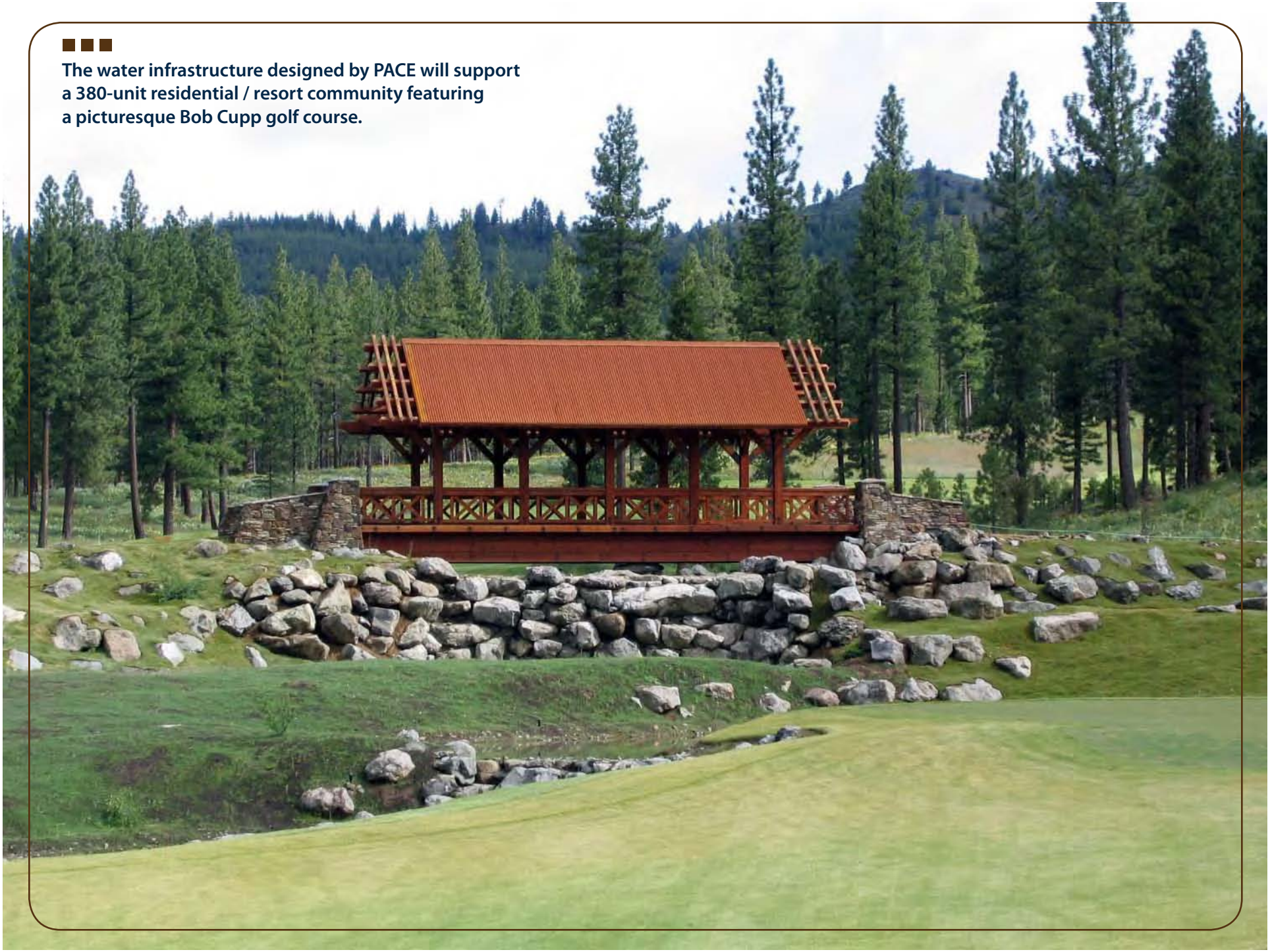
Components:

- 500 GPM Dual-Stage Triplex Pressure Filtration System for Iron, Sulfide, Arsenic and Suspended Solids Removal
- 0.65 MG Welded Steel Potable/Fire Water Storage Tank
- 600 GPM Booster Pump Station with Variable Frequency Drive Pumps
- 4 Water Supply Wells
- Remote SCADA with Radio I/O for Wells

PACE provided engineering services to design all the potable water infrastructure components required for the 380-lot resort/residential development. including the modeling of 4 pressure zones using WATERCAD. A 500 GPM dual-stage triplex pressure filtration system was designed for the removal of iron, manganese, sulfide, arsenic, and suspended solids. The two stages consist of an oxidation/precipitation media followed by arsenic adsorption. Design of related infrastructure and controls included four water supply wells, PRV stations, booster pump station with variable frequency drive pumps, PLC, and emergency diesel generator. Controls included remote SCADA with radio I/O for wells, booster pump station and storage tank level controls operation.

The water treatment system was installed in a subsurface vault to provide freeze protection and minimize aesthetic impact.

0.65 MG Welded Steel Potable / Fire Water Storage Tank Located at Top of Highest Pressure Zone



The water infrastructure designed by PACE will support a 380-unit residential / resort community featuring a picturesque Bob Cupp golf course.

Mountain House Potable Water Westside Booster Pumping Station

Mountain House, CA

Client: Trimark Communities / Mountain House CSD

Components:

- 7,000 GPM Potable Water Booster Pump Station
- Integrated Pressure Reducing Station
- Chlorine Residual Monitoring and Injection Facilities
- Remote Radio SCADA and PLC Controls
- Architectural Pump Buildings and Site Development

PACE provided the developers of Mountain House and the Community Services District with design services for this inter-zone pumping project. Services included civil, mechanical, electrical, structural, architectural and instrumentation engineering on the project. The pump station, located within the heart of the residential development, was designed to boost water "on-demand" from the lower Zone 1 service area to the upper Zone 2 service area. This required the station to deliver from near zero to over 7,000 GPM at a constant pressure. PACE's design incorporated the use of multiple sized pumps, variable frequency drives and a low-flow VFD jockey pump to ensure smooth, stabile pressure in the distribution system. This pump station is an integral part of the MHCSD's water delivery system and is integrated with other PACE and non-PACE infrastructure via remote radio control back to the central SCADA computer at the surface water treatment plant. A pressure sustaining value was integral to the station for lower zone emergency supply.

System Design Includes 2500, 1000, 500 and 200 GPM Flow Rate VFD Pumps Capability

Architectual rendering of pumpstation building
Scheduled for Completion in 2006

Cypress Grove Stormwater and Irrigation Pump Station

Oakley, CA

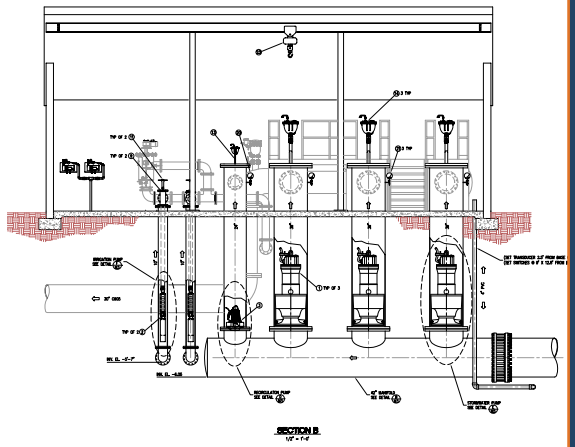
Client: City of Oakley / Pulte / D.R. Horton

Components:

- 35 CFS Stormwater Pump Station
- 800 GPM Irrigation Pump Station
- Lake Recirculation and Aeration Equipment
- Remote Radio SCADA and PLC Controls
- Architectural Pump Buildings and Site Development

PACE provided the developers and the City of Oakley with an innovative solution to their stormwater issues. By integrating PACE's design expertise in flood control, community lake design, and pump station design, we were able to provide a sole-source solution which incorporated flow equalization, irrigation storage, and stormwater and irrigation pumping in a community park setting. Our creative approach to the pump station design used submersible pumps placed in "cans" instead of a large concrete wet well structure which drastically reduced the capital cost and foot print of the station while eliminating noise associated with the mechanical equipment operation.

The pump station consists of three identical large submersible pumps, one smaller submersible recirculation pump, and two submersible irrigation pumps coupled to a common intake manifold. Since the stormwater enters the community park lake prior to pumping and is attenuated by the lake surface area, the controls on the storm pumps could be a simple on/off system which operates soft-starters for each pump at predetermined levels.



Mule Gulch Sewer Pump Station

Bisbee, AZ

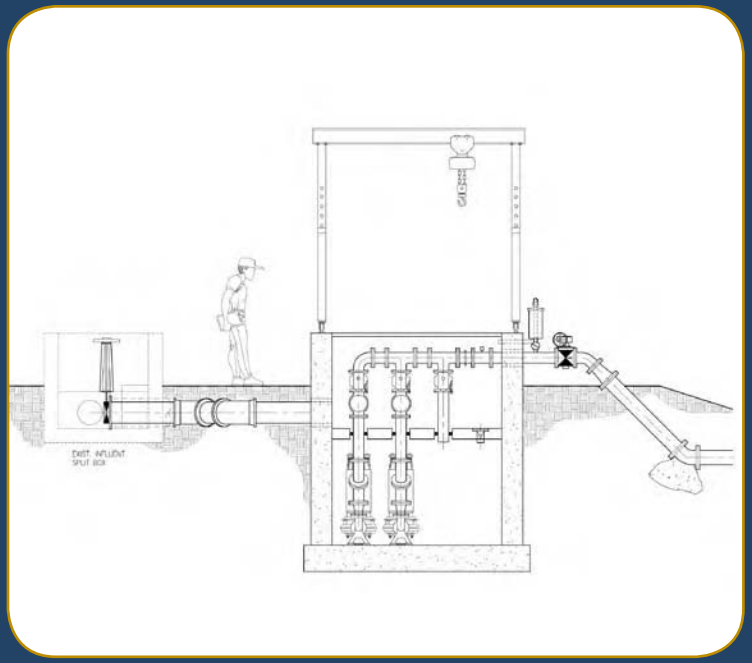
Client: City of Bisbee

Oomponents:

- Cast-in-Place Wet Well
- Duplex Sewer Pump Station
- Remote Auto-dialer and PLC Controls
- Replaces Existing Mule Gulch Treatment Facility Built in 1942
- Value Engineering Savings of Over $200,000

PACE was requested by the City of Bisbee to provide value engineering on the design of a new sewer lift station prior to construction. The existing design provided an on/off pump station with a peak capacity of 850 GPM using four pumps arranged in a series configuration to achieve the required vertical lift of 130 feet. The existing design was complex, costly and would have required substantial on-going maintenance. Additionally, since the station was replacing an old wastewater treatment plant, many years of historical flow data were available, which indicated that a design flow of 500 GPM would be more than sufficient for the pumping facility.

PACE suggested a redesign approach using two parallel-arranged pumps which had approximately 12% less hydraulic efficiency, but pumped at a lower flow rate of 560 GPM. By doing so, the overall system efficiency was increased by 15% and the projected power cost was reduced by approximately $10,000 per year. The redesign also netted a capital cost savings of $200,000 over the previous design.



Section plan of pump station

Recreational Water Features

- Community Lakes
- Streams
- Freeform Water Features
- Entry Features
- Swimming Pools & Spas
- Interactive Water Features
- Manmade Rockwork


1.


2.


3.


4.

1. Wild Horse Pass Resort, Chandler, AZ
2. Bridgeport, Valencia, CA
3. Pointe Hilton Resort at Squaw Peak, Phoenix, AZ
4. Thanksgiving Point, Lehi, UT

PACE

Stormwater Management

- Stormwater Facility Planning and Feasibility Studies
- Combined Aquascape / Flood Control Facilities
- Stream Corridor Planning
- Floodplain / Floodway Delineation
- Runoff Water Quality Modeling
- Stream Geomorphology
- River Engineering
- Physical Modeling (Hydraulic)
- Sediment Transport / Fluvial Systems
- Streambed Stabilization / Bioengineering
- Watershed Management & Modeling

PACE
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