Statement of Qualifications for

On-Call List of Public Works/Engineering Services

PREPARED FOR:

CITY OF RANCHO PALOS VERDES
30940 HAWTHORNE BLVD
RANCHO PALOS VERDES, CALIFORNIA 90275

PREPARED BY:

PACE
Advanced Water Engineering

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FOUNTAIN VALLEY, CALIFORNIA 92708
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#A141 | JUNE 15, 2015

PACE
Advanced Water Engineering

June 15, 2015

Ron Dragoo
City of Rancho Palos Verdes
30940 Hawthorne Blvd
Rancho Palos Verdes, CA 90275-5391
Phone (310) 544-5252

Re: Statement of Qualifications for
On-Call List of Public Works / Engineering Services # A141

Dear Mr. Dragoo,

PACE is responding to the request for Statement of Qualifications dated May 28, 2015 to be considered for placement on the City's approved 'On-Call' list. PACE, as a civil engineering company specializing solely in water resources is well-versed in municipal infrastructure and the City's operations and proposes to act as an extension of the City engineering and operations staff to accomplish its capital improvement project objectives. The PACE team is well-equipped with significant required experience to complete design projects in the disciplines including storm drainage systems, NPDES compliance, watershed management and restoration efforts and other water related public works projects.

PACE was incorporated in 1987 and has been headquartered in Southern California throughout that time. PACE is a civil engineering firm that focuses solely in water resources and we offer the City advanced capabilities with stormwater management, water infrastructure and related areas with a specialized focus on straightforward design and value added solutions.

We are very interested in growing our relationship with the City and servicing key infrastructure areas such as the conveyance, treatment, detention and recharge of stormwater by applying our tremendous experience in those areas. I have significant history on drainage issues throughout the City going back 20 years. PACE also provided design of the water features and stormwater detention and treatment system within the Terranea Resort.

We invite you to review our unique qualifications for supporting the City's objectives and hope you see the fresh and innovative perspective we can offer as an extension and partner to the City's engineering team. Our experience demonstrates running themes of 1) innovation used to address unique engineering challenges, 2) focus on constructability and operations during the engineering process, and 3) cost-effective design strategies that minimize capital and operations costs while maximizing functionality and flexibility of the systems we design.

Please contact me for any of your needs at (714) 481-7231 (office), (714) 514-8804 (mobile) or bphillips@pacewater.com.

Sincerely,

Bruce M. Phillips

Bruce M. Phillips, MS, PE
Sr. Vice President – Stormwater Management

PACE
Advanced Water Engineering

Qualifications

ABOUT PACE

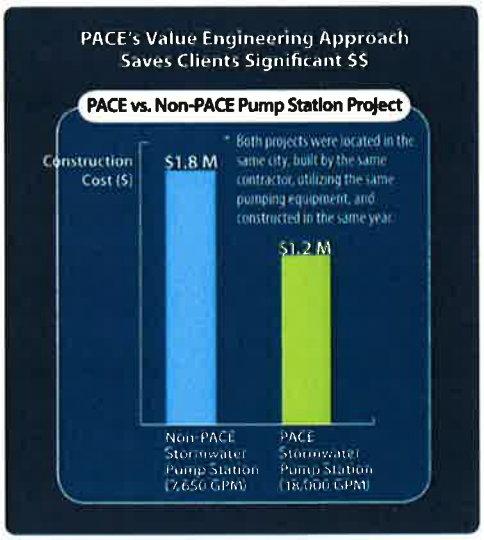
PACE is a specialized civil engineering firm formed in 1987 offering advanced water resource services. We offer a wide range of engineering services related to water, wastewater, stormwater management and water resource permitting and regulatory compliance to ensure projects are both economically viable and environmentally sustainable. Our engineering approach focuses on maximizing value by creating multi-use infrastructure systems, cost-effective phasing strategies and systems that include environmental, aesthetic and recreation uses. PACE staff members include licensed professional engineers with PhDs, university instructors and policy-makers in the water resource arena.

Specific service areas are grouped by our three main engineering divisions, Environmental Water, Stormwater Management and Recreational Water:

With over 25 years of experience in stormwater management, water and wastewater, PACE is highly qualified in the following areas:

Water and Sewer:

- Controls and Instrumentation
- Infrastructure Master Planning
- Water Infrastructure
- Wastewater and Recycled Water Infrastructure
- Water Treatment
- Wastewater Treatment
- Natural Water Treatment



Stormwater Management:

- Urban Stormwater Management
- Urban Drainage Systems / Facilities
- Flood Control Systems
- GIS and Water Resource Hydraulics
- Hydrology and Watershed Analysis / Planning
- Floodplain Mapping
- River Restoration
- River Engineering
- Hydraulic Modeling and Research

Industry Recognition for Stormwater Management Accomplishments

APWA PROJECT OF THE YEAR SACRAMENTO DIVISION MOUNTAIN HOUSE CREEK RESTORATION

ASCE PROJECT OF THE YEAR LOS ANGELES DIVISION WESTCREEK SOIL CEMENT BANK PROTECTION

CA STATE WATER RESOURCES CONTROL BOARD WATER QUALITY AWARD BRIDGEPORT LAKE STORMWATER MANAGEMENT SYSTEM

PACE TEAM KEY QUALIFICATIONS

Specific benefits realized when choosing PACE:

- **Specialist in multi-use stormwater management facilities** addressing technical needs and adding aesthetic / recreational value.
- Strong understanding of **source control water quality treatment techniques**
- Specialists on team in **advanced water treatment** and constituents typically addressed in TMDLs
- Specialized background in **stormwater quality analysis and treatment**
- Leading experts **in naturalized water resource solutions** and sustainability
- Background in **water quality regulatory permitting and compliance** programs
- Advanced capabilities for **complex hydraulics analysis and design**
- Specialization in ecosystem / wetlands / and stream corridor **restoration**
- Our project approach focuses on **value-added design, ease of operation, and long-term durability**.
- **Design-build background which promotes value-added approach to engineering:** the PACE team has completed projects under a design-build format, exposing the team to real life constructability and operational considerations throughout the design process. This understanding allows PACE to incorporate value at the design stage of its projects.
- **Hands-on involvement from planning through operations:** We have long believed that the best way to learn how to design and engineer is through first-hand experience constructing and operating facilities/infrastructure components. We have invested a lot of time and effort in providing **in-the-field hands-on training** to allow our engineers to see first-hand why certain design efforts are made and why other designs should be changed for the sake of operations, common-sense functionality and long-term durability.
- **In-House Pilot Facilities and Wet Chemistry Lab:** PACE has 9,000 gallons of storage and a 2 gpm complete pilot system in our Fountain Valley, CA headquarters, plus a complete wet chemistry lab, to test client's water for various treatment alternatives at small scale.
- **Solid project management approach:** PACE has a solid project management approach that focuses on regular, open communication with the City. This approach guarantees that the end result of each project is best for the City, its users and the project.
- **Direct principal involvement:** PACE senior management is very hands-on with all of our projects at a level that goes beyond QAQC. This group is responsible for implementing innovative techniques for reaching project objectives that maximize project value.

PACE RELEVANT SPECIALIZED AREAS OF EXPERTISE AND CAPABILITIES

Stormwater Treatment BMP Design – Apply a multi-disciplinary approach to evaluate the most effective design solution which links the BMP design with (1) performance, and (2) ability to mitigate the impact on the receiving waters. Our strategies focus first on source control and the ability to integrate LID features as part of the site planning. We evaluate the ability to apply treatment control measures on both a regional and local site level through the application of different numerical sizing criteria for both volume and flow based BMPs. Targeting the ability to utilize regional BMPs as part of the overall watershed planning process will result in a more effective long term solution and ensure that the facility will operate correctly. We utilize a significant internal database of criteria related to different BMP sizing requirements from around the nation based on current research and performance data to evaluate pollutant removal/capture efficiency. Numerous tools and sizing guidance aids have been developed based on our research. We then apply a feasibility screening process that utilizes multiple numerical ranking procedures to determine the most appropriate facility for the site, including the long term maintenance and performance.

Stormwater / Surface Water Supply / Retention – Significant experience in the development of a variety of stormwater and water supply storage facilities which have included stormwater retention for water harvesting in combination with manmade lake systems and innovative designs for underground storage. Understand the issues associated with the long term maintenance and operation for these facilities which can be minimized through specialized design features.

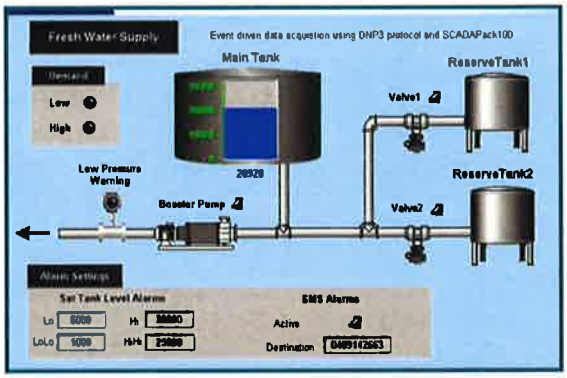
Groundwater Recharge – Involved in a variety of supplementary water recharge for aquifers systems which has included artificial spreading grounds to injection systems. Analysis of these systems has included developing detailed groundwater models using MODFLO to evaluate the overall aquifer. We have developed unique facilities for capturing urban dry-weather flows for recharge in storage basins and then providing pumping of the reclaimed water from recovery wells.

Urban Storm Drain Facility Engineering / Design – Our staff has extensive understanding of hydraulic principles associated with urban drainage systems and the different empirical methods for analysis provide the foundation for ensuring that the system will function correctly. Our background in hydraulic analysis includes detailed hydraulic design for a variety of hydraulic structures .We also have significant background in analysis of street flooding hydraulics and assessing different drainage facility alternatives to manage and intercept runoff in streets and highways. We have generated numerous hydraulic design aids and tools to assist in design that are linked to AutoCAD and GIS. We also have the ability to perform more complex modeling of storm drain systems which are linked hydraulic / hydrologic models that include unsteady analysis and evaluation of complete storm drain pipe networks. Detailed hydraulic modeling for water surface profile analysis can be performed for underground systems, prismatic open channels, and variable complex drainage facilities. Extensive technical resources have been accumulated regarding hydraulic design analysis procedures for different applications and include familiarity with

numerous criteria and design publications. In addition, we have staff experts that have instructed course in urban storm drain design at the university level and for industry association such as ASCE.

Pumping and Regulating Stations – PACE has completed numerous pump facility upgrades and rehabilitation projects. Upgrading existing operating facilities can be particularly complex and challenging as the systems are typically mission-critical and the design implementation and construction sequencing is of paramount importance to keep these facilities functional throughout construction. Our direct experience in design, construction and operations provides us a unique ability to identify and work around these site issues while maintaining capital and operational budgets. PACE has worked with vertical turbine, centrifugal, and horizontal split-case mechanical equipment systems with constant pressure application using VFDs.

Controls & Instrumentation - SCADA systems consist of multiple programmable logic controllers communicating with a central site over telephone lines, dedicated cable, fiber optics, or radio links. In-depth knowledge of control microsystems equipment will seamlessly integrate mechanical design with equipment control functions, providing complete turnkey systems. Using our expertise in design, construction and operation of water distribution facilities to provide a system design that is robust and encompassing in data collection and control, yet provides the usable information operators need, without the clutter of "information overload."



NPDES Regulatory Requirements – Significant background and in-depth knowledge of the current trends with stormwater regulations and complex NPDES permitting issues. Focus includes the municipal requirements for permitting programs and compliance. Developed an understanding of the complex relationships between the Clean Water Act regulatory program and other environmental regulatory programs. Assisted in the development of policies and programs concerns regulatory requirements and legislation.

Advanced Naturalized Water Treatment Systems – Development of naturalized water treatment solutions for different types of impaired water quality which involves different types of biological and naturalized treatment mechanisms. Our understanding of the water chemistry and the natural water processes allows us to develop these specialized solutions which have included regional treatment of urban dry-weather flows through specialized wetlands system treatment trains and manmade lake system for stormwater treatment integrating different levels of treatment.

Engineered Wetlands – Design and evaluation of different constructed wetlands for different water quality treatment goals. We have monitored the performance of these wetlands and utilized the information to optimize the design of these systems for maximum

pollutant load reduction. Applied a variety of different water quality models to evaluate effectiveness of different naturalized treatment wetlands. Utilized treatment wetlands at large regional scale to treat several MGD of impaired water for recycling and reuse which ultimately won several different awards from EPA.

Stream Restoration – Understanding of the natural stream mechanics and geomorphic characteristics to utilize in creek restoration design that are self-sustaining and natural based systems. Our expertise integrates biotechnical engineering, hydrology, and river engineering with landscape architecture for effective restoration design that address multiple objectives and functions as well as long term stability of the creek.

Multi-Purpose Watershed Management Facilities – A key element in watershed management solutions is developing alternatives which can address a variety of objectives in order to provide maximum utility to the community. We have specialized background in formulation of a variety of different multi-function stormwater management systems which also offer aesthetic appeal by emulating natural systems which include naturalized river corridor, manmade lake systems, natural water features.

TMDL Implementation Plans – These plans are platforms for establishing a course of action to restore the quality of impaired water bodies in the watershed which include procedures for monitoring the implementation of management activities. A key element of these plans is producing a comprehensive plan that has a realistic approach and should involve a "multi-faceted" program that primarily emphasizes true source control as the primary basis, not treatment control measures at the "end-of-pipe." If treatment control is applied then it should first emphasize "green infrastructure. The overall goal of the Plan is to define a set of actions that will help achieve water quality standards while ensuring the strategy relies on the optimum set of alternative focusing on source control.

TMDL Modeling – Steady state/dynamic simulation of mass transport and water quality processes in surface water environments through the application of a variety of modeling tools which integrate proven technologies in order to develop defensible TMDLs for a wide array of issues for watershed protection. Provide the ability to visualize model results with direct linkage to GIS while simultaneously integrate data directly into the modeling. TMDL analysis has utilized a watershed modeling system with the EPA HSPF and then using the calibrated model to determine the source load reductions required to achieve the maximum allowable load in the water body with an appropriate margin of safety.

Watershed Water Quality Planning – Application of comprehensive approach to water quality planning on a watershed basis for producing a coordinated management plan that addresses water quality concerns through an integrated and cost effective manner. We recognize the importance of integrated watershed management initiatives and regional planning in the development of programs/policies for water quality protection.

Water Quality Assessments / Testing – Understanding of the water chemistry associated with urban stormwater runoff as well as the issues with different pollutant constituents and the different mechanism for treatment. Assessment also includes watershed source pollutant load evaluation through comprehensive watershed modeling. In-house water chemistry laboratory allows for immediate evaluations and testing of different treatment control

options or new technologies with bench scale models. Monitoring has also included different bioassessment techniques to measure ecological health.

Monitoring Programs – Development of field monitoring plans to meet different watershed objectives and which will provide defensible data to assist in guiding the decision making process. Have staff capable of selecting, installing, and monitoring different equipment, including downloading field data recorders or in-stream grab samples. Development of a variety of different types of watershed monitoring/sampling plans; including field hydrologic data as well as water quality sampling while optimizing or minimizing the data requirements.

Integrated Water Resources Management Plans – Experience in developing these comprehensive regional planning documents which encourage application of different strategies for the management of all water resources in a region such as conjunctive use, water recycling, water use efficiencies, and other strategies that improve water source reliability. Involved in the generation of IRWMPs in association with different DWR grant funding allocations.

Water Reuse / Sustainability Planning – Integration of water reuse/recycling through a variety of different strategies including advanced technologies and naturalized approaches. A framework for sustainable water planning applied as part of the specialized process which uses a creative holistic approach to assessing the project needs and opportunities. A key element is understanding the realistic water balance variations and demands that can be used in the different management applications.

CLIENT REFERENCES

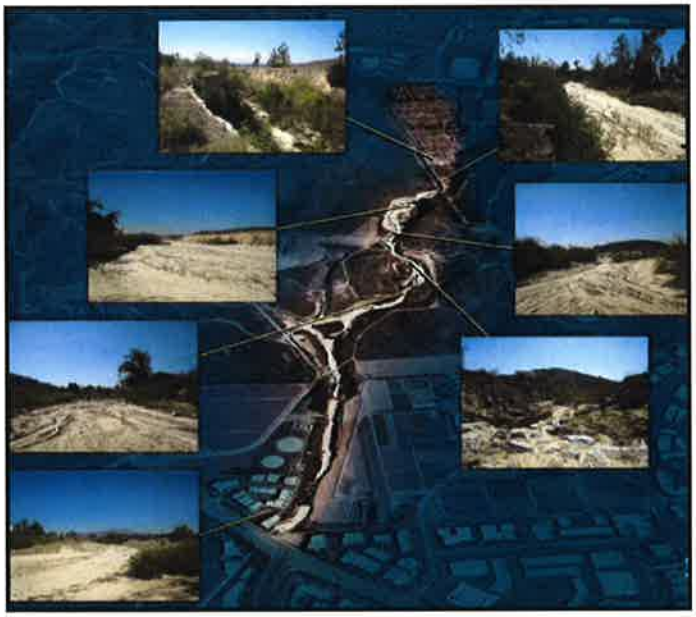
Reference Contact, E-mail, Telephone	Reference Project	Brief Project Description
OC Public Works Charles Busslinger (714) 834-2318 Charles.Busslinger@rdmd.ocgov.com	Edinger Channel Improvements	Planning and final design for portion of the Edinger Channel including replacement of concrete trapezoidal channel and 63-inch RCP to double hydraulic capacity.
City of Huntington Beach Terri Elliot (714) 536-5580 telliott@surfcity-hb.org	Talbert Lake Storm Water Diversion & Treatment System	Developed alternative gravity delivery for flow diversion from the EGGWC and 2,100 gpm dry-well pumping.
Santa Margarita Water District Dan Ferons (949) 459-6400 danf@smwd.com	Oso Creek Barrier	4,000 gpm two-port submerged intakes with bar-racks, 500' long suction line, dry-well non-clog pump station.
Orange County Sanitation District Morris Ying (714) 962-2411 mying@ocsd.com	OCSD Water Pump Station Automation	Pump Station and Fire Suppression System renovated with new backup generator power distribution system and automation.
Mesa Consolidated Water District Leanne Talbott (949) 631-1291 Leannet@mesawater.org	Spent Reagent Disposal Lines from Six Water Wells to OCSD	Sewer line for disposal of spent analyzer reject to the OCSD sewer system.
Santa Ana Watershed Project Authority (SAWPA) Rick Whetsel (951) 354-4222 rwhetsel@sawpa.org	Canyon Lake TMDL's & Water Quality Management Plan	Designed aeration systems, consisting of electric air compressors located on the shore which will deliver air, containing 20% oxygen, to diffusers located within the lakes for the purpose of water quality enhancement.
Los Angeles County Dept of Public Works Ben Willardson (626) 458-6118 bwillard@dpw.lacounty.gov	Santa Clara River & Castaic Creek Hydraulic & Fluvial Studies Phase 1 & Phase 2	The Santa Clara River fluvial studies included multiple reports for over 20 miles of eight stand-alone studies of Santa Clara River and tributaries in Los Angeles County, including the Santa Clarita and Newhall Ranch reaches and their tributaries.
County of Orange Resources & Development Management Department (714) 834-5657 Mehdi Sobhani mehdi.sobhani@rdmd.ocgov.com	San Juan Creek Watershed Study	Providing a complex watershed hydrology analysis for the 175 square mile San Juan Creek basin located in Southern Orange County in order to generate comprehensive hydrology made which reflects the County of Orange Hydrology Manual procedures for use in flood control design, floodplain mapping and sediment transport.
Los Angeles County Dept of Public Works	Newhall Ranch EIR/EIS Hydrologic &	The Santa Clara River fluvial studies included multiple reports for over 20 miles of eight stand-

Steven Sheridan (626) 458-6102 ssheridan@ dpw.lacounty.gov	Hydraulic Evaluation of Santa Clara River and Tributaries	alone studies of Santa Clara River and tributaries in Los Angeles County, including the Santa Clarita and Newhall Ranch reaches and their tributaries.
County of Orange, Watersheds Program – Water Quality Planning Jamie Habben (949) 240-3363 jamie.habben@rdmd.ocgov.com	San Juan Creek PA-1 Stream Bank Revetment	PACE provided a unique bank revetment design along San Juan Creek from approximately 2,000 feet downstream of the Ortega Highway Bridge to 5,500 feet upstream of the Antonio Parkway Bridge. Revetment techniques utilized included soil cement and jet grouting to overcome challenge project conditions including high groundwater and sensitive environmental conditions.
Willdan Engineering Ray Wellington, PE (714) 978-8231 rwellington@willdan.com	Marina Del Rey Sewer Lift Station (LACPW) – Sulfide Odor Control Study	PACE is currently performing a study to determine the source of hydrogen sulfide (H_2S) odor at the Los Angeles County Department of Public Works owned Marina del Rey Sewer Lift Station and make recommendations to remove the odorous conditions.

PROJECT EXPERIENCE

Borrego Canyon Wash Fluvial Study and Creek Restoration / Stabilization – Orange County, CA

PACE was contracted to provide a feasibility study for Borrego Canyon Wash. A qualitative analysis of the alluvial stream systems was done to understand the geomorphic characteristics of the existing watershed and floodplain stream corridor, and quantitative analysis was utilized to understand the relationship between standard engineering hydraulic/ fluvial principles and relationships, providing a comprehensive understanding of the physical processes and river mechanics occurring within the active creek floodplain. PACE provided the following services:



Key Project Features

- Sediment Yield/ Sediment Transport Analysis
- Geomorphic Analysis
- HEC-RAS & HEC-6 Numerical Modeling
- Historical Flood Hydrograph Analysis
- Preparing Hydrologic/ Hydraulic Documentation Reports & Water Control Manuals
- Environmental Engineering

- Fluvial Modeling including both a sediment continuity or sediment balance on a reach-by-reach basis, and the application of complex unsteady state fluvial models using either HEC-6T or FLUVIAL -2.
- Natural Stream Characteristics / Geomorphology Analysis to develop a basic understanding of the channel behavior including three perspectives: planform, cross section, and longitudinal view.
- Creek Stabilization Alternatives Formulation to develop potential creek stabilization mitigation "alternatives" based on the results of the fluvial/geomorphic study and creek instability indicators associated with the study reach. Alternatives included: (1) bank erosion treatments, (2) channel invert or grade stabilization requirements, (3) channel geometry, (4) channel profile, (5) geomorphic stream corridor restoration elements, and (6) bioengineering/vegetation bank stabilization.
- Integration of Geomorphic Channel Restoration Features/Elements to design a stable channel.
- Alternatives Feasibility Analysis to screen the number of conceptual alternatives according to (1) advantages, (2) disadvantages, (3) preliminary construction costs, (4) design constraints, (5) physical constraints, (6) implementation requirements, (7) flood protection, (8) economic factors including intangible costs, (8) environmental impacts, and (9) sediment reduction.
- Application of Bioengineering Control Measures for slope stabilization and benefits of diverse riparian habitat, organic input into the stream, and shade to moderate water temperatures and improve water quality and site aesthetics.
- Long-Term Success of the Stabilization / Restoration Elements were analyzed to develop a strong understanding of the wash's relationships with the entire watershed "system" and not just the stream reach of focus. Realistic restoration objectives will be determined through examining "reference stream corridor" reaches in this watershed or similar adjacent watersheds to determine anticipated results, hydraulic geometries, and landscape patterns.

East Garden Grove Wintersburg Channel Dry Weather Diversion and Wetland Treatment System – Huntington Beach, CA

PACE is providing planning and design for a flood control channel diversion system and wetland stormwater treatment system that will treat at least 3 MGD of stormwater that would otherwise flow directly into the Bolsa Chica Wetlands and Huntington Harbor and further impair the water bodies. The pump station along with a forebay will be constructed underneath the channel access road. The pump station will be sized for an ultimate capacity of 3500 GPM (5.0 MGD) to accommodate anticipated future City projects. The diversion pump station will be constructed, owned, operated and maintained by the City of Huntington Beach. The wet well will contain a pumping system equipped with four identical 1,000 gpm, 20 HP, solids-handling, submersible pumps. Two interlocking variable frequency drives (VFDs) will be incorporated into the system to minimize starts and stops over a wide range of flowrates.

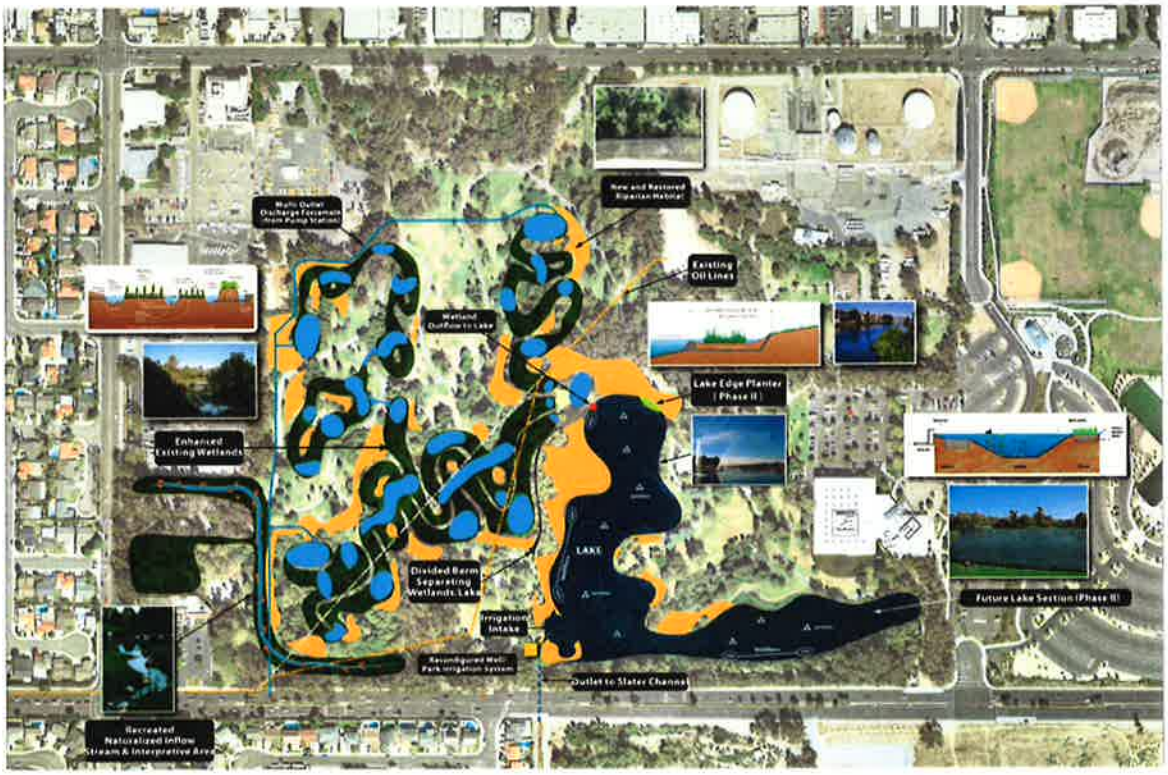
Key Project Features

- Stormwater Pump Station Design
- Inflatable Rubber Dam
- Existing Flood Control Reconstruction
- Stormwater Quality Treatment
- Channel Hydraulics
- Regional Hydrology and Routing Analysis
- Floodplain Inundation Mapping
- Local Drainage Hydraulics Analysis

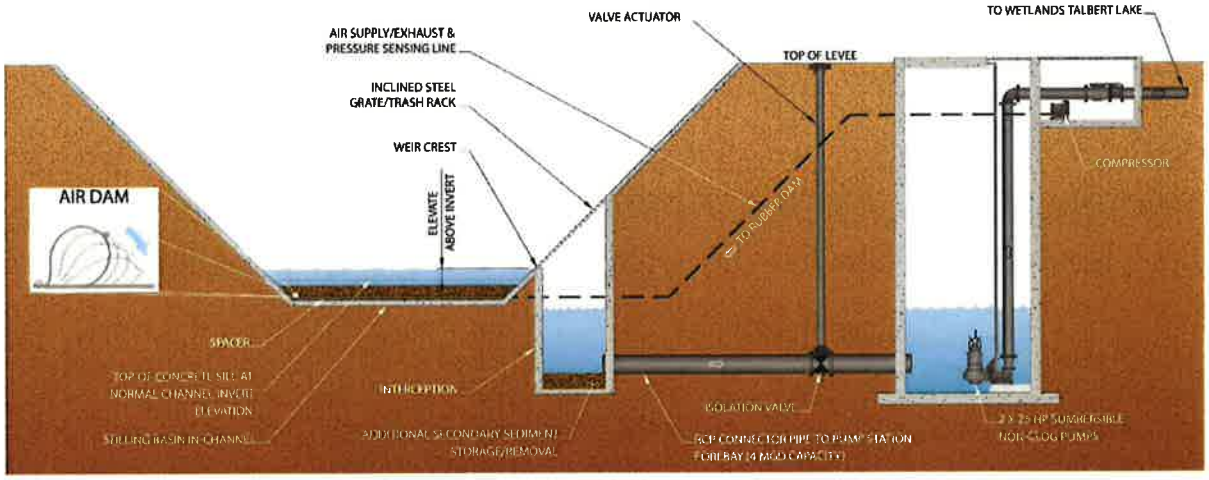
The project will divert the flows from the channel to the existing City Central Park. The system relies on interconnected key components which include: (1) a flexible in-channel collection system, (2) conveyance system to the treatment train, (3) primary wetland treatment train system, (4) manmade lake polishing treatment system, and (5) groundwater recharge and reuse. The outflow from the wetland treatment system will discharge for final polishing into the existing manmade Talbert Lake which will be reconstructed and restored for stormwater treatment, groundwater recharge, park irrigation and maintaining a year-round permanent water body.

Advanced Elements:

- In-channel flow interception facility capable of capturing dry-weather flows but not interfering with the flood control channel hydraulic capacity.
- Underground diversion pump station which is integrated into flood control channel maintenance roadway.
- Utilizes the existing municipal storm drain system to deliver flows to the park and minimizes force main construction.
- Specialized interconnected naturalized treatment cells consisting of alternating shallow wetlands and wetland ponds.
- Wetlands include specialized surface and subsurface wetland treatment elements utilizing specialized media for the growth of treatment bacterial biofilters.
- Naturalized treatment system design within the park designed so that existing active park areas are not lost, and aesthetics and passive recreation are enhanced.
- Restoration of an existing ephemeral lake within the park provides year round water storage and final polishing treatment with submerged media biofilters, submerged aeration, and wetland planters system.
- Restored lake serving as irrigation storage for park, eliminating potable water use for irrigation.



TALBERT LAKE WETLAND TREATMENT SYSTEM AND LAKE LAYOUT



EAST GARDEN GROVE WINTERSBURG CHANNEL DIVERSION STRUCTURE SCHEMATIC

Westridge Golf Course Storm Drain Channel System – Valencia, CA

PACE was hired to design the storm drain channel system for this exclusive 18-hole TPC golf course. PACE employed naturalized storm drain channels rather than large diameter pipes or concrete-lined channels to meet the following objectives:

- Provide adequate flood control conveyance.
- Provide natural stormwater treatment areas within the golf and open space areas.
- Reduce project storm drainage cost and improve project aesthetics and environmental habitat diversity.
- On-site mitigation to satisfy 404 Permit requirements.
- Utilization of open space on golf course for improved natural channel reaches.
- Uses of drop structures; rock-lined, grass-lined and natural channels to best manage the erosive forces of flood waters.

Key Project Features

- Natural rock lined channel
- Natural drop structures
- Native vegetation channelization
- Geotextile reinforced channel (turf reinforced mat)
- Wetland / riparian detention and water quality treatment basin
- Recharge / infiltration basins
- Lakes used for water quality, sediment basin, and flood collection conveyance, attenuation

Two naturalized channels are in place on the golf course, the first is 2,400 feet in length, conveying over 1,000 cfs of runoff, and the second is 3,400 feet in length and conveys 650 cfs of runoff. Both channels are comprised of golf turf, native grasses and vegetation, and rock-lined sections, which serve to promote natural interaction between the golf course and the natural site grade of the development. Additionally, the reduced amount of closed conduit and hard-lined channel decreases flow velocity and increases the potential for infiltration of runoff.

The 404 Permit for the project required habitat mitigation, which was successfully accomplished within the golf course limits by utilizing the naturalized storm drain channels. Because the channels contain native material (turf, native vegetation and grouted rock), vegetated swales and wetland ponds, a variety of environmental habitat zones have been created.

A bi-product of the naturalized channel design is the treatment of nuisance flow from the subdivision. The naturalized channel design includes retention and detention BMP basins to improve storm water quality, including vegetated swales and wetland ponds.

North Fillmore Drain Low-Flow Diversion and Treatment Wetland – Ventura County, CA

The North Fillmore Drain collects stormwater from a large portion of the City of Fillmore, CA. This drain contains significant nuisance flows which carry pollutants to Sespe Creek during dry weather. The City of Fillmore and developer Griffin Industries envisioned a project to divert and treat nuisance flows from the drain. PACE provided all design and analysis needed for a diversion and pump station to divert low-flows from the buried storm drain. Flows were delivered through a trash control rack to a treatment wetland designed by PACE. After flowing through the treatment wetland, the treated flows will be released to another buried storm drain.

Key Project Features

- Stormwater Channel Design
- Low-flow diversion
- Treatment Wetland Design
- Construction Documents / Specifications
- NPDES Stormwater Phase II

Hometown Fillmore Grass Stormwater Treatment Swale Redesign – Ventura County, CA

Water Quality BMPs included in the original land development plans for the Hometown subdivision in Fillmore experienced problems with persistent flooding and mosquito breeding in grassy swales, trash accumulation, and maintenance difficulties. PACE was hired to design alternative BMPs that would meet Ventura County's strict stormwater treatment requirements, utilize the spaces originally designated for BMPs, and eliminate the problems associated with the original grassy swales designed into the project. PACE developed designs for subsurface flow wetlands that eliminate standing water on the surface and provide a high level of stormwater treatment while fitting attractively into the residential neighborhoods of the Hometown Project. PACE is currently evaluating BMP options for future phases of the development.

Key Project Features

- NPDES Stormwater Phase II Regulations
- Stormwater Treatment
- Low Impact Development (LID)
- Construction Documents and Specifications

Edinger Storm Channel Tunneling Feasibility Study and Design – Santa Ana, CA

PACE prepared the preliminary planning and final design for the reconstruction of a portion of the Edinger Channel (Facility C05S05) which crossed under the Edinger Avenue I-405 freeway roadway overcrossing approaches, which include about 30-feet of earthen fill. This channel drains a tributary watershed area of 284-acres. The existing concrete trapezoidal channel and existing 63-inch RCP at the Edinger Avenue crossing will be replaced in order to double the hydraulic capacity. An alternative feasibility study was prepared to investigate multiple alternative options to install additional underground facilities to increase the conveyance at the road crossing. There were numerous constraints that had to be addressed including a horizontal alignment of the facility which was not straight, multiple utilities, and avoiding influence to the existing bridge structure.

Key Project Features

- Flood Control Channel Improvement Plans
- Innovative / Specialized Construction Technique
- Shoring Design
- Structural RCB Design
- Specifications
- Channel Hydraulics
- Feasibility Alternative Analysis / Report

An innovative construction installation concept was developed that involves developing a temporary shored bridge system instead of using a conventional tunneling or jacking system. This system was ultimately the selected alternative being more cost effective and allowing installation of a double RCB facility rather than parallel pipes which improved the hydraulics. The temporary bridging system is placed over a vertical shored trench allowing complete access for vehicular traffic while the RCB is being constructed below the street level. PACE then prepared the construction drawings for the proposed facility and installation details of the temporary shored bridging system.

Santa Clara River Soil Cement Bank Protection – Los Angeles County, CA

PACE provided detailed hydraulic modeling of San Francisquito Creek and design (P.S. & E) for 4,500 linear feet (25,000 cubic yards) of soil cement creek bank protection. PACE was contracted by Newhall Land as the developer for this project but all design and construction quality control was provided by PACE and reviewed by LACDPW. This project was presented to LACDPW as potential soil cement pilot project as part of the ongoing DPW Soil Cement Technical Committee. This ultimately led to the addition of soil cement as an approved bank protection application in Los Angeles County.

Key Project Features

- Naturalized (Soil Cement) environmentally sensitive bank protection solution
- Innovative pilot project for use of soil cement
- LACDPW adopted soil cement as an approved bank protection method
- Sustainable, LID, stormwater solution

Soil cement placement process for buried revegetated application.

PACE provided LACDPW a standard Drainage Concept Report (DCR) including final engineering for the proposed bank protection. The technical analysis included HEC-RAS modeling for determination of scour, toe-down, maximum flood water surface elevation, freeboard, and top of bank protection.

The soil cement bank protection provided unique multi-function solution for a very challenging problem; providing adequate flood protection while minimizing the environmental impacts. Environmentally soil cement provided a much better solution than traditional bank protection methods. The environmental agencies and advocates preferred the soil cement solution as it reduces the import of non-native raw materials to the job site and soil cement utilizes the native soils of the area. In addition, soil cement has been shown to require less maintenance and requires less time and costs to install.

Santa Clara River and Castaic Creek Hydraulic & Fluvial Studies – Los Angeles County, CA

Newhall Ranch is a ± 25,000 acre master planned community comprised of four large villages. PACE was on the large team of consultants to prepare EIRs for environmental permitting (404, 401, 1600s & others) and project level EIRs for each of the four villages. The PACE role includes hydrologic, hydraulic, sediment, and runoff water quality modeling and analysis. The project includes a ± five miles of the Santa Clara River and ± 14 miles of tributaries to the Santa Clara River. Comprehensive analysis has been performed to quantify impact to river hydraulics and river habitat. The modeling includes use of HEC-RAS, BOSS-RMS, GIS, and ACAD to provide detailed depth and velocity distribution analysis and comparison of pre vs. post development conditions for multiple alternative development configurations.

Key Project Features

- Sediment Yield/ Sediment Transport Analysis
- Preparing Hydrologic/Hydraulic Documentation Reports
- Sedimentation Engineering & Geomorphology
- Floodplain Analysis
- GIS Spatial Analysis
- Environmental Engineering

Several related studies were part of Newhall Land's projects adjacent to Santa Clara River. Each study generally contains a review of previous fluvial analyses of the respective reach, a sediment characterization and analysis, general adjustment modeling, long-term bed change investigations using historical topographic data, and empirical local scour calculations. Proposed bank protection horizontal and vertical alignments were established by the studies.

Westside Booster Pump Station – Tracy, CA

In 2005 PACE provided engineering design for the new 5,000 gpm potable water Westside Booster Pump Station for the new Mountain House Community Services District, adjacent to the City of Tracy. The Mountain House Water Treatment Plant (WTP) supplies network flows to Zone 1 of the distribution system along Grant Line Road, and the new Westside pump station boosts pressure to the new Zone 2 neighborhoods AE, AW, B, C and portions of D & E. After completion with design, with the direct involvement of PACE overseeing construction the station was completed and started up successfully in 2007. The station provides sufficient and reliable flow capacity for distribution to the Zone 2 drinking water supply network and adequate hydraulic head at a wide range of flows due to the phasing of the new developments and occupancy fluctuation. The new station includes two main domestic booster pumps, an intermediate flow pump, and a low flow pump. All of the pumps within the station are variable frequency drive (VFD) controlled to maintain constant system pressure. Low-flow jockey pump and bladder tank were also implemented into the project for very low flows in order to avoid the large footprint of a hydropneumatic tank. A backup power generator was connected by an automatic transfer switch to the station for uninterrupted service in case of power failure. The station was installed within an aesthetic, sound controlled building with several security features.

Key Project Features

- Storage Tank
- Pumps & Regulating Stations
- Water Wells
- Electrical Instrumentation

Richland Stormwater Pump Stations – Lathrop, CA

PACE provided design and construction administration services for a new $11.5M pump station project in Lathrop, CA. Richland Communities proposed to construct five new residential developments in the City of Lathrop, California. As part of the stormwater conveyance system for the post-development condition, a main pump station for three of the five communities was designed and constructed to lift and transport both small nuisance flows and a percentage of the peak storm flow rate to the river. In addition to stormwater, sewage waste streams from the developments will be transported by gravity to a new sewer lift station constructed adjacent to the new stormwater pump stations. Each of the pump stations, three main stormwater, and one sewer, will be located in a single enclosed common yard site with common wall wet well construction.

Key Project Features

- Storage Tank
- Pumps & Regulating Stations
- Controls & Instrumentation

Sutherland Storage Basins D & E, Reiter Storage Basin F, and Booster Pump Station – Lathrop, CA

PACE provided the City of Lathrop with basin design, reclaimed water storage requirements, and pump station capacity and design. The City of Lathrop has commissioned the construction of a membrane bioreactor expansion to the City's current treatment facility. This addition will increase the existing WRP-1 to a capacity of 0.75 MGD. Wastewater produced at the new developments will be treated at the expanded plant and returned to the developments as reclaimed wastewater. Due to the expected high quality of the recycled water, it will be possible to use the water for irrigation of public spaces without access restrictions. The wastewater treatment facility is equipped with an effluent pumping station that delivers the reclaimed water to the distribution system.

Key Project Features

- Storage Tank
- Pumps & Regulating Stations
- Recycled Water

Water will be returned to the developments at an average rate of approximately 300 GPM. As many as four pump stations in addition to one at the treatment facility may eventually serve the distribution system. Each will activate under approximately the same low-pressure conditions. Three pumps will operate as necessary to supply the irrigation flows needed within the system. The same pipe will supply the basin to relieve excess pressure in the distribution system when necessary. A hydraulic relief valve will dictate which direction the flow in the pipe is heading. A magnetic flow meter, able to read the volume traveling in either direction will be located on the line along with a flow switch indicating the direction.

Each of the basins serves the critical function of storing recycled water throughout the winter and protecting groundwater in the region. Since the basins may contain recycled water for the better part of a year, water quality devices are being installed. A combination of aeration and where available, circulation will help to keep them free of algae. The basin will be lined to prevent recycled water from entering the groundwater.

San Juan Creek Watershed Study and PA-1 Stream Bank Revetment – Orange County, CA

San Juan Creek watershed and fluvial studies were required to support a 22,800 acre mixed development in southern Orange County. Hydrologic impacts to the creek from development needed to be assessed to identify and implement mitigation measures for the up to 14,000 home developments. The San Juan Creek watershed contains 10 cities, 3 major rivers, and an elevation range from 5,600 feet to sea level. PACE is currently providing consulting services in a number of areas related to San Juan Creek including watershed, fluvial studies and impacts mitigation. PACE's involvement included:

Key Project Features

- Rainfall/ Runoff Modeling
- Discharge & Volume Frequency Analysis
- Preparing Hydrologic/ Hydraulic Documentation Reports
- Flood Hydrograph Analysis
- Arc-Info – GIS Mapping/Hydrology Tools

- Lateral Streambank Erosion Study – quantifying and predicting amount of lateral erosion to establish setbacks for future adjacent development.
- Watershed Study – Regional assessment of the entire San Juan Creek in three phases.
    - Phase 1 – update of the regional hydrology study for the future ultimate build-out of the entire watershed to the ocean outlet with established flood control flow rates.
    - Phase 2 – regional floodplain hydraulic study and hydraulic deficiency analysis for the creek and channel system.
    - Phase 3 – Fluvial study to evaluate long-term degradation aggregate.

- FEMA Floodplain Mapping – estimate of updated FEMA floodplain based upon new hydrology and updated topography of the creek system. A more detailed enhanced hydraulic study with the first planning and development area established development edge conditions of the creek. Work effort included estimating hydraulic roughness value, field study, and extensive GIS mapping.
- Creek Revetment Design – preliminary engineering design to establish revetment requirements in locations where lateral setbacks cannot be used for erosion protection. Revetment heights, toedowns and alignments are being established.
- Bridge Scour Studies – Scour analysis for three new bridge designs including local and long-term scour of associated creek systems.
- Cow Camp Road Emergency Flood Repair – a major storm in early 2005 washed out a major "Arizona Crossing" including large, multi-spanned culverts that had been in place for over 20years. Hydraulic studies were performed to develop alternative replacement system.

Riverwalk at La Sierra University Channel / Parkway Water Feature – Corona, CA

Riverwalk, located along Riverwalk Parkway at La Sierra University, is a water feature that also serves as a flood control channel. Instead of a traditional flood control channel, PACE designed proposed an aesthetically and environmentally superior approach. The naturalized flood control channel conveys a design 2-year storm event. Stormwater is diverted to the La Sierra Channel, which is designed to carry a 10-year storm. The water feature consists of approximately one mile of interconnecting lakes and streams. The lakes are approximately 108,000 square feet and hold 2.9 million gallons of water with a circulation rate of 1,800 gallons per minute. Water flows down the streams to simulate a natural stream condition. The lakes and streams also serve as storage basins for the irrigation water. In addition to the water feature/flood control channel design, PACE was also responsible for the design of the equipment that irrigates the Riverwalk Parkway backbone. PACE was involved from planning through construction of this highly successful project. This project represents collaboration of multiple development facets of objectives and the result is a tremendously sustainable project that includes multiple funtions and provides drainage infrastructure that is valuable on many levels. PACE also provided timber design for timber trellises and pergola structures on the island and throughout the park.

Key Project Features

- Water Feature Amenity Used for Flood Conveyance and stormwater quality treatment
- Flood conveyance and retention in community open space walking trail.

Bridgeport Lake Stormwater Management Natural BMP Solution – Valencia, CA

Planning, design, and services during construction of the Bridgeport Lake and Permanent Storm Water BMP (in compliance with NPDES permit and SWPPP). Contracted by Newhall Land and reviewed by the City of Santa Clarita the Bridgeport Lake project was the first of its kind to integrate community lake amenity and stormwater management in a single system.

Key Project Features

- Manmade lake, community amenity, serves multiple stormwater functions
- Innovative & sustainable stormwater BMP design using natural approach
- RWQCB – Awarded project for stormwater quality
- Example of long term successful BMP water quality data

This 15-acre Bridgeport Lake provides both a visual and natural resource amenity to the adjacent Bridgeport development. With a tributary drainage area of 70 acres, Bridgeport Lake provides several urban storm water pollution treatment and water quality maintenance features that serve to fulfill the post-construction requirements of the NPDES permit and associated SWPPP for the Bridgeport development. These features can be grouped by function: water quality, urban storm runoff control, and retention of runoff.

Water Quality (Lake):

- Biofilters: serve to strip water of nutrients that would promote algae growth and aid in the creation of aerobic conditions within the lake to prevent lake eutrohication.
- Aeration: introduces oxygen into the lake to increase dissolved oxygen levels and promotes natural convection of water to prevent stratification of lake water column through recirculation.

- Wetland Planter Areas: promote and enhance water quality through naturally occurring biological processes.

Urban Storm Runoff Controls (prior to entering lake):

- Water Quality Filters: collect initial runoff and retain it long enough for the majority of pollutants to be removed.
- Wetland Planter Areas: filter out waste from runoff via various physical, chemical and biological processes, utilizing wetland plants.
- Retention and Discharge from Lake:
- 70% of urban runoff pollutants are contained within the first 1/3 -to 1/2-of -inch of initial storm water runoff. In order to contain this first ½-inch, Bridgeport Lake would need to provide a storage area of 2.9 acre-feet (AF); the lake actually provides retention for 0.25 feet over its entire surface area, or 3.75 AF, which is more than enough capacity to retain initial storm water runoff.

Mountain House Creek – San Joaquin County, CA

Key Project Features

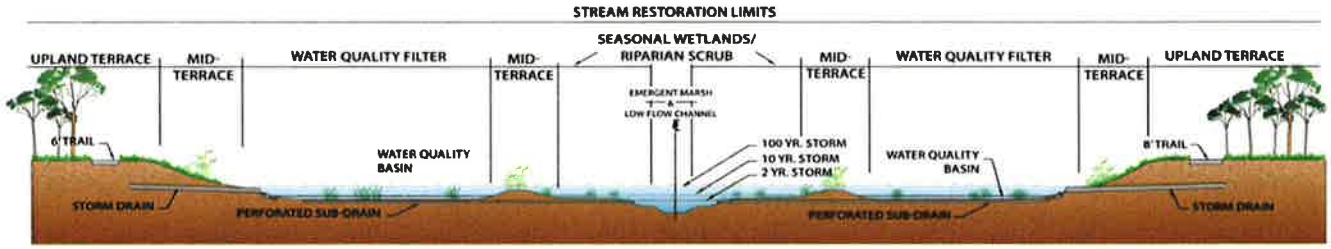
- Flood Control
- NPDES Stormwater Phase II Regulations
- Stormwater Treatment
- Impacts Mitigation
- Constructed Wetlands

With housing demand and prices at record levels in California, Trimark Communities, LLC, a subsidiary of Sunchase Holdings in Phoenix, AZ, has turned its sights to a rural area on the border of the Alameda County / San Joaquin County, about 60 miles east of San Francisco. There, Trimark will realize its vision of Mountain House, a self-contained, 4,784-acre master planned community that, at full build-out, will be home to 43,500 residents. Incorporated into this new town is an innovative, natural approach to water resources management. For the past four years, PACE has been the lead consultant on all of the project's water resource issues, including development-wide stormwater management planning and creek restoration design services for Mountain House Creek, one of the development's signature features.

Currently, PACE is responsible for a creative watershed planning program that includes the Stormwater Master Plan Update for the entire development, the restoration and enhancement plan of the13,400 linear foot Mountain House Creek, and coordination with the land planner, SWA Group, and civil engineer, Carlson, Barbee & Gibson, Inc., for a proposed residential golf course and lake system. A unique and natural-based approach to the project creek restoration and combined stormwater management program integrates the use of created wetlands and the establishment of riparian corridors for runoff water quality treatment and flood conveyance within the creek restoration program.

The stormwater management features add significant value to the overall community by including pedestrian linkage and multi-function open space areas. Additionally, the plan eliminates numerous large diameter storm drains and detention basins by routing on-site runoff through the Mountain House Creek, residential lake system and golf course. This re-routing will significantly reduce capital costs for stormwater management and ensure that

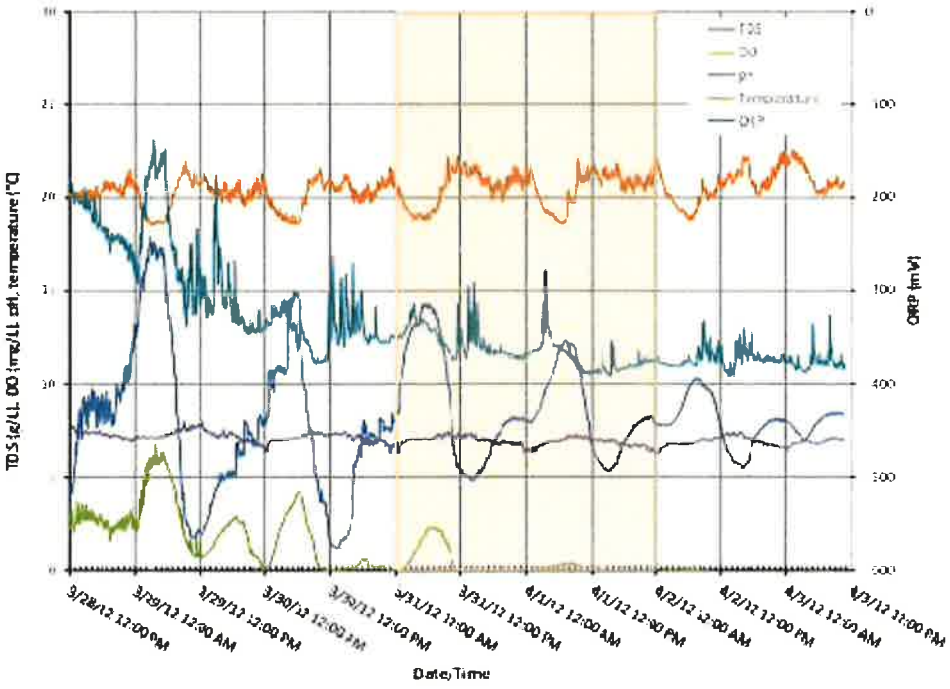
Mountain House Creek will have year-round flows, thereby enhancing the environmental restoration and aesthetic quality of the development.



STATION 143+00
TYPICAL TWO WATER QUALITY FILTERS

Sewer Lift Station Sulfide Odor Control Study (LACPW) – Marina Del Rey, CA

PACE is currently performing a study to determine the source of hydrogen sulfide (H_2S) odor at the Los Angeles County Department of Public Works owned Marina del Rey Sewer Lift Station and make recommendations to remove the odorous conditions. Project tasks include collecting and analyzing wastewater and air samples, 3) installing new flow-meters and evaluate pump station flows for mass determination, 4) developing alternative solutions for reducing and eliminating hydrogen sulfide formation, 5) performing engineering calculations, 6) setting up and performing onsite bench scale testing of alternatives, 7) providing concept level economic evaluation of benefits versus costs of the alternatives proposed, 8) providing pros and cons for each alternative, and 9) recommending preferred alternative for pilot scale operation. To date the study has determined several different factors affecting odor emissions including pH, seawater infiltration, temperature, dissolved oxygen, liquid-phase sulfide concentrations and flow rate. Several potential mitigation approaches have been identified and are currently being considered and piloted.



Terranea Resort – Rancho Palos Verdes, CA

PACE designed all the aquatic components for the project including the hotel pools, interactive splash pad, Pacifica Club, Spa Club and golf course for this 5 star, high end ocean view resort project. The hotel pools consist of one 4,500 square foot freeform pool, one slide pool with a 120' x 20' slide, two 200 square foot spas, and one interactive waterplay fountain with 25 jets and color changing lights with a fogging effect. The Pacifica Club design includes a 16' x 60' two lane lap pool. The Spa Club has two hot tubs, two cold plunge pools and one 24' x 75' lap pool with three lanes for swimming. The golf course features two golf course flood control / stormwater quality lakes totaling 1.5 acres.

PACE
Advanced Water Engineering

Resumes

BRUCE M. PHILLIPS, MS, PE

Principal

EDUCATION

M.S. Civil Engineering
Water Resources
California State University, Long Beach

M.S. Petroleum Engineering
University of Southern California

B.S. Civil Engineering
University of Southern California

YEARS OF EXPERIENCE

Joined PACE in 2002
With others over 21 years

REGISTRATIONS

Professional Engineer / AZ

34867
Professional Engineer / CA
38635

AFFILIATIONS

American Society of Civil Engineers (ASCE)

Floodplain Management Association (FMA)

PUBLICATIONS

Aquascape Solutions for Stormwater Management
Effectiveness of Storm Water Detention Basins for Pollutant Removal

Stream Bank Restoration Design with Vinyl Sheet Pile Grade Control Structures
Design of Riparian Habitat Replacement within Active Floodplains

Bruce Phillips has water resources civil engineering experience dating back to 1981. With two master degrees, one in Civil Engineering and one in Petroleum Engineering, his areas of expertise include watershed hydrology analysis, stormwater quality assessment studies, detailed hydraulic structure analysis and design, urban drainage facility master plan development, floodplain analysis, watershed modeling, sediment transport and regional flood control facility plans. He has developed significant specialized experience in river engineering and geomorphic studies, including assessment and design of river/stream restoration programs that incorporate unique biological control measures as well as creative stabilization techniques.

RELATED EXPERIENCE

Edinger Storm Channel Feasibility Study – Huntington Beach, CA

Mr. Phillips was the Project Manager for preliminary planning and final design for the reconstruction of a portion of the Edinger Channel (Facility C05S05) which crossed under the Edinger Avenue I-405 freeway roadway overcrossing approaches, which include about 30-feet of earthen fill. This channel drains a tributary watershed area of 284-acres. The existing concrete trapezoidal channel and existing 63-inch RCP at the Edinger Avenue crossing will be replaced in order to double the hydraulic capacity. An alternative feasibility study was prepared to investigate multiple alternative options to install additional underground facilities to increase the conveyance at the road crossing. There were numerous constraints that had to be addressed including a horizontal alignment of the facility which was not straight, multiple utilities, and avoiding influence to the existing bridge structure. An innovative construction installation concept was developed that involves developing a temporary shored bridge system instead of using a conventional tunneling or jacking system. This system was ultimately the selected alternative being more cost effective and allowing installation of a double RCB facility rather than parallel pipes which improved the hydraulics.

Talbert Lakes Diversion Project – Huntington Beach, CA

As Project Manager, Mr. Phillips led the efforts in designing this unique stormwater quality treatment project that involves the capturing of nuisance and dry-weather flows in the East Garden Grove / Wintersburg Channel to a naturalized treatment system in the City of Huntington Beach Central Park. The naturalized treatment system will be generated through a system of interconnected shallow pools and wetland systems that will discharge into the restored Talbert Lake. The lake will also be rehabilitated to provide water quality treatment and improved long term operation. A detailed assessment of the different system and pollutant removal capabilities of the proposed design was provided, including maintaining the flood storage capabilities of the park. Additional engineering studies and design requirements including flow monitoring, constraints mapping, pump station design, diversion system design

Borrego Canyon Wash Improvements Study – Irvine, CA

Mr. Phillips served as project manager for a hydraulic/fluvial assessment of a 5.2 square mile watershed portion of the Borrego Canyon Wash in order to support the long-term watershed management planning process of San Diego Creek and address long-term restoration of the Borrego Wash creek corridor in order to maintain the environmental benefits to both water resources and wildlife. An alternatives analysis was performed to identify and evaluate structural and non-structural streambank stabilization / restoration alternatives to protect downstream water quality benefits and provide long-term stabilization of the active floodplain but still allowing natural geomorphic/fluvial processes to occur. The project's intent is also to provide protection to adjacent to the regulatory floodplain from flood and erosion damage.

BRUCE M. PHILLIPS, MS, PE

Ocean Trails Golf Course – Rancho Palos Verdes, CA
Mr. Phillips provided the overall drainage master plan and also performed hydrology studies for this unique coastal bluff golf course that involved the preservation of the dramatic natural topography and arroyos with this Pete Dye designed golf course.

Murrieta Line F Channel Repairs – Murrieta, CA
Mr. Phillips served as Principal and Sr. Project Manager for this project scope which included preparing the construction drawings to repair a portion of the existing concrete lined Murrieta Line F Channel which experienced damage from undermining of the backfill material behind the channel. The portion of the channel which is experiencing problems is approximately 300-feet in length, located just upstream of the confluence with the Murrieta Line F-1 Channel. The damaged area of the channel has a rock rip-rap channel base without any cutoff wall which has allowed the water to erode the backfill behind the concrete slope lining, resulting in cracking on the concrete lining and some failures along the base. The proposed repair reconstructs this portion of the channel with a concrete cutoff wall which is at an adequate depth so that it will not be undermined and replace the damage concrete slope lining. In the existing and proposed condition, the flow velocity and flow depth of the design 100-yr storm event runoff would require an impractically large rock size to resist the incipient motion forces. In order to utilize a more practical rock size without changing the channel geometry an intermediate cut-off wall was added to the design to stabilize the rip-rap and act as a grade control structure to reduce the probability of undermining the proposed ½ ton rip-rap layer.

Perris Valley Channel – Perris, CA
As Project Manager, Mr. Phillips led a design team in the acquisition of FEMA and RCFC&WCD permits for construction of the improvements of the Perris Valley Channel associated with the development of TRACT 30850 in the City of Perris. Perris Valley Channel is a master planned regional flood control channel owned and maintained by RCFC&WCD with a 100-yr design flow rate of 18,000 cfs. The improved section of the Perris Valley Channel is an incised earthen trapezoidal channel with 5:1 side slopes, an ultimate base width of 450-ft, and channel depth of 10-ft. Mr. Phillips managed the preparation of preliminary design studies, final design studies, construction documents, and permit acquisition process on behalf of Tanamera Homes to construct the Perris Valley Channel improvements and remove the proposed 1,200 unit housing development from the 100-yr floodplain.

San Juan Creek Watershed Study – Orange County, CA
Mr. Phillips was responsible for this regional watershed study composed of three different elements including: (1) hydrology, (2) floodplain hydraulics, and (3) sediment transport. The watershed hydrology analysis will generate the "ultimate unmitigated" hydrology for the mainstem San Juan Creek based upon hydrograph analysis. The ultimate land use condition includes the proposed Rancho Mission Viejo development. The technical approach for the development of a regional watershed analysis of San Juan Creek from the headworks to the ocean outlet will follow approved procedures in the County of Orange Hydrology Manual. Determine the maximum hydraulic conveyance capacity of the existing mainstem channel system within the study area from the Ocean outlet to La Novia Bridge that may be limited by physical constraints or hydraulic controls. In addition, the analysis will also provide hydraulic characterization of the ultimate floodplain along the study reaches that fluvial analysis will be applied. Estimate the anticipated long-term streambank erosion limits and stream stability along the portion of the mainstem San Juan Creek from the ocean outlet to Caspers Regional Park. The proposed work program has adopted a similar methodology that has been followed by other regional flood control agencies, including FEMA.

East Garden Grove Wintersburg Channel Physical Model Study – Orange County, CA
Mr. Phillips is the Project Manager for the physical modeling effort to determine design requirements for proposed improvements at two confluences of the East Garden Grove-Wintersburg Channel (EGGWC) (Facility No. C05) upstream and downstream of the I-405 freeway since there is uncertainty of the impact these new designs will have to the undercrossing and upstream water surface. The EGGWC is a complex flood control system composed of an array of culverts and tributary channels. Located in the cities of Westminster and Huntington Beach, the channel system's unique geometric configuration, multiple confluences and storage basin demonstrates that this particular reach of channel is difficult to analyze by mathematical and computer modeling alone. It is estimated that over $30 million in future flood control improvements are dependent upon the accuracy of the hydraulic analyses at the I-405 crossing. A hydraulic physical model is being designed and used for alternatives analysis to develop the most accurate understanding of the existing and proposed channel improvements for this reach of the channel system.

RONALD J. ROVANSEK, PhD, PE, LEED AP

Sr. Project Engineer

EDUCATION

Ph.D. Civil Engineering
Louisiana State University
1997

M.S. Civil Engineering
University of Alaska-Fairbanks
1994

B.S. Civil Engineering
University of Alaska-Fairbanks
1990

YEARS OF EXPERIENCE

Joined PACE in 2001
With others over 11 years.

REGISTRATIONS

Professional Engineer / CA 65861

AFFILIATIONS

American Society of Civil Engineers (ASCE)

Society of Wetland Scientists

Wetland Delineation Certification Series, Rutgers University, 2000

PRESENTATIONS & PUBLICATIONS

California Stormwater Quality Association - Use of Water Quality Features for Storm Water Quality Mitigation

Los Angeles County Department of Public Works – BMP Applications in California

Building Industry Association of Southern California – Bioswales and other BMP Applications in California

Land Development West – Creek Restoration and Stormwater Management System

CE News: "Creek Restoration Supports Land Development"

Ron Rovansek has a wide variety of Civil and Water Resources Engineering experience spanning back to 1990 including design, analysis, review, and technical presentations . His experience includes analysis of stormwater impacts, design of stormwater management systems and BMPs, stormwater master planning, river and creek engineering and restoration, and the design of lakes and lake communities. In addition, Dr. Rovansek has experience with pollution control technologies for combined sewers, non-point source pollution control, and the hydrology of both urban and undeveloped areas. Other experience includes researching stormwater BMP design as a visiting scientist with USEPA.

RELATED EXPERIENCE

RiverVillage Neighborhood Park – Santa Clarita, CA

RiverVillage Neighborhoood Park will encompass a small canyon with a seasonal creek, active play areas, and a stormwater detention basin adjacent to the Santa Clara River. Dr. Rovansek designed creek restoration improvements that will stabilize the creek channel while supporting seasonal flooding of the floodplain and sediment transport necessary to support riparian vegetation native to the canyon. The resulting creek channel and floodplain qualified for wetlands mitigation credits for a nearby development project. In addition, a naturalized stormwater detention basin was incorporated into the park to treat runoff from surrounding developments while supporting native vegetation and blending aesthetically with the adjacent Santa Clara River.

Pole Creek Sediment Transport and Debris Basin Design – Fillmore, CA

Dr. Rovansek carried out studies to evaluate debris yields, design alternatives, and detailed design for a large debris detention facility on Pole Creek in Fillmore, Ventura County, California. After estimating debris yields using several methods in coordination with the Ventura County Flood control District (now called the Watershed Protection District), a detailed flooding study of the creek was completed under Dr. Rovansek's supervision using Flo-2D, a two-dimensional modeling software. A large number of alternatives for controlling floods and capturing the debris from the Pole Creek watershed were conceptually designed and a final design was selected. The selected alternative was designed including hydraulic and sediment transport modeled of various flood events, and after extensive third-party evaluations approved by VCWPD.

Townhomes at the River – Fillmore, CA

Dr Rovansek served as Senior Consulting Engineer for the design of a buried soil cement levee and erosion control groins along a portion of the Santa Clara River in Fillmore, Ventura County. Under Dr. Rovansek's direction PACE prepared hydraulic studies of the river, levee design, and prepared and processed a Conditional Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR) with FEMA to remove portions of the project site from the river floodplain.

Santa Clara River Restoration – Fillmore, CA

As part of an inter-disciplinary multi-company design team, Dr. Rovansek prepared a grading plan that will create a variety of vegetation / habitat types, typical of the river in its natural state including emergent wetlands, riparian woodlands, and riparian scrub.

Trilogy at La Quinta – Riverside County, CA

Completed the evaluation of a flood control structure for a proposed development in a flash-flood prone area of the California desert. The project evaluated flood flows, flood routing in a reservoir, and sediment production from a mountainous watershed according to Coachella Valley Water District and FEMA standards.

RONALD J. ROVANSEK, PhD, PE, LEED AP

Talbert Lake Stormwater Treatment System – Huntington Beach, CA
Worked with City and PACE design team to create a constructed wetlands and lake water treatment system that will treat up to 3 million gallons per day of urban dry weather runoff. Dry weather discharges in the East Garden Grove Wintersburg channel will be diverted Huntington Beach Central Park, where a multi-purpose wetland and lake system will remove pollutants from the water. The wetlands and lake will be designed to provide an aesthetic and recreational amenity for the park, provide wildlife habitat, and serve as the irrigation source for watering park landscaping. The project will result in a significant reduction in dry weather discharges to local beaches, helping prevent beach closures which are a recurring problem in Orange County.

Analysis of Development Impacts on Stormwater Runoff – Valencia, CA
Dr. Rovansek evaluated the impacts of development on stormwater runoff volume and non-point source pollutant loads for several tracts slated for development. Analysis incorporated variable runoff coefficients based on rainfall intensity, constituent concentrations based on existing and proposed land uses, and the impacts of BMPs on constituent loads. This analysis was accepted by the LARWQCB as documentation of projected impacts to runoff from the sites.

North Fillmore Nuisance Flow Treatment Wetlands – Fillmore, CA
Design of a wetland treatment system to capture and treat dry-weather flows in a large storm drain. Designed diversion structure, pump stations, grading plans and planting plans for the wetland, which will use native vegetation to enhance treatment processes.

Mountain House Creek Restoration and Water Quality BMPs – Tracy, CA
Developed BMP designs that are part of a larger creek restoration project designed by PACE. Creek restoration incorporates flood control, water quality BMPs, wildlife habitat, open space, and recreational uses into a multi-purpose corridor that serves as the centerpiece of a large residential development. Redesigned a separate large water quality BMP to improve water quality treatment, wildlife habitat, and aesthetics of the basin.

Newhall Land Design of Water Quality BMPs – Valencia, CA
Developed innovative BMP designs that incorporate wetlands designed to treat nuisance flow (dry weather flows) with extended dry detention basins to treat first flush storm runoff. Redesigned several BMPs built within residential tracts that were performing poorly.

Colusa Heritage Ranch – Colusa County, CA
Prepared a stormwater master plan and technical reports to support the EIR for the 2,400 acre mixed-use development. The master plan included the use of man-made stream channels, lakes, and ponds to collect, treat, and convey stormwater; significantly reducing construction costs while providing excellent stormwater treatment, flood control, and a network of open space for the community.

Aquabella Lakes – Moreno Valley, CA
Designed a series of man-made lakes that provide stormwater treatment to meet strict TMDL discharge limits for nutrients in this master-planned community within the watershed of Lake Elsinore in Southern California. The development was faced with strict limits on the discharge of non-point source nutrients, and Dr. Rovansek created a water quality model to demonstrate that a series of lakes with innovative water quality treatment systems will result in lower discharges of stormwater pollutants from the proposed community than are currently discharged from the vacant project site. This secured City approval and allowed the project to move forward.

United States Environmental Protection Agency – Urban Watershed Management Branch – Edison, NJ
Dr. Rovansek conducted research into Best Management Practices (BMPs) for treating urban runoff, focusing on natural treatment processes. His projects included a study of the role of vegetation in stormwater detention ponds, evaluating the role of street trees in urban runoff generation, and evaluating the design and performance of small-scale wetland BMPs.

Louisiana State University – Baton Rouge, LA
Conducted a four-year study of hydrology and sediment dynamics of tidal estuaries along the Gulf of Mexico. Research focused on the role of storms in salt marsh and estuarine sediment dynamics, nutrient and carbon fluxes between salt marshes and open water within the estuary, and subsurface hydrology of tidal marshes.

TONY HOWZE

Lytle Creek Floodplain / Fluvial Studies – San Bernardino County, CA
Mr. Howze led the effort in providing hydraulic and hydrologic analysis within GIS for the Lytle Creek Revetment Design and Lytle Creek West Development projects. His managing efforts included a GIS interface with a 2-Dimensional flood routing application, detailed floodplain analysis, and biological assessment of a sensitive species within mapped floodplains for various events.

Whitewater River Desert Cove Golf Course – Cathedral City, CA
Mr. Howze led his GIS staff in creating geometric data for HEC-RAS including 3-dimensional cross sections profiles, centerlines, flowpaths, and Manning's n data. The Whitewater River analysis included detailed project flown topography at 1 foot intervals while being supplemented by 5 meter Digital Terrain Models where needed. The GIS team utilized custom applications within ArcGIS to delineate multiple floodplains for each major storm event. In addition to floodplain generation, Mr. Howze led his development team to customize a velocity analysis tool which generates detailed velocity maps in plan view by reading the HEC-RAS model output information. With the velocity analysis tool and floodplain information we were able to visualize velocity and area changes across storm events. To support the FEMA, CVWD, and RCFC&WCD permitting process Mr. Howze's GIS department produced numerous technical map documents to help explain our methodology and results. In addition to the one-dimensional modeling techniques the GIS department used for this project, the GIS team created a workflow to import 2-dimensional modeling information from FLO-2D. We were able to create plan view graphics to illustrate the 2-dimensional results for Flow depth, velocity, and flow direction.

West Desert Hot Springs Watershed Analysis and Mapping Database – Riverside County, CA
Mr. Howze managed the GIS operations for the West Desert Hot Springs Master Drainage Plan. Mr. Howze was responsible for collecting hundreds of datasets from various data providers around the County and City, and developed a logical database schema for streamlined data access. In order to identify regional solutions to mitigate flood hazards appropriately Mr. Howze utilized GIS database to develop hydraulic and hydrologic models for multiple alternatives. In addition, Mr. Howze managed the efforts to create a cost/benefit comparison between the 5 different levee alignments that compared environmental costs, construction costs, & land value costs to help in selecting the most appropriate alternative.

Desert Lakes Hydrology and Hydraulic Analysis – La Quinta, CA
Mr. Howze managed the production of the hydrology and hydraulic analysis for the Desert Lakes project located in Riverside County. Using GIS tools, Mr. Howze analyzed the existing capacity of two basins on-site and determined the storm event would the basin topple existing capacity. This analysis was extremely important to the cost of the project due to the fact that ACOE would take jurisdiction of the waters if the capacity of the basins could not store the 5 year event storm. The basins toppled at the 25 year event, thus saving the client tens of thousands of dollars in permit and extra analysis costs.

Whitewater River Index Hydraulic Analysis – Indian Wells, CA
Tony Howze managed GIS efforts to produce a hydraulic analysis of the Whitewater River located in Indian Wells. A variety of digital elevation models for multiple years were used to review the approximate location of the Army Corps of Engineer jurisdiction boundary. Custom GIS software was developed in Visual Basic to produce detailed erosion occurrence and potential for our study reach. The hydraulic results were placed in a 3-dimensional viewing application to review results in life-like quality.

Temescal Canyon Wash Geomorphology Analysis– Riverside County, CA
Mr. Howze has helped prepare the geomorphology analysis of the Temescal Canyon Wash located in Riverside County. The project compared 5 different years of the wash: 1962, 1974, 1984, 1995, and 2005. Mr. Howze has seamed and geo-referenced all images according to their respective year within GIS. Then digitized each year's river thalweg, and used these lines to analyze the river courses change throughout time.

San Juan Creek Impacts and Mitigation Study – Orange County, CA
Mr. Howze assisted with providing an outside technical review of the GIS analysis and studies prepared on the proposed 5,750-acre Rancho Mission Viejo development project. The technical review included a comparative evaluation of the studies in the area of hydrology, stormwater quality and sediment and stream stability. The assessment evaluated the quantitative values for the baseline conditions, project impacts and mitigation measures. The review focused on the application of County standards and procedures, including effects of mitigation measures.

JAMES A. MATTHEWS, PE

Sr. Vice President – Environmental Water Division

EDUCATION
B.S. Civil Engineering
San Diego State University / 1994

YEARS OF EXPERIENCE
18+ Years
Joined PACE in 1994
City of San Diego
Water Production Engineering

REGISTRATIONS
Professional Engineer / AZ
1999 / 34090

Professional Engineer / CA
1997 / C57746

Professional Engineer / FL
2009 / 69722

Professional Engineer / HI
2009 / 13718

Professional Engineer / ID
2004 / 11229

Professional Engineer / NM
2004 / 16491

Professional Engineer / VA
2005 / 040716

Wastewater Treatment Operator Certification: Arizona

AFFILIATIONS
American Water Works Association (AWWA)

Water Environment Federation (WEF)

PUBLICATIONS
EPA's Small Flows Quarterly: "Hybrid Sequencing Batch Reactors"

Southern California Resort Managers Conference Reverse Osmosis & Water Softening to Santa Margarita Water District. 2009

City of Lathrop Recycled Water Training Seminar

PEARL Program: Electrical Power and Control Systems

James Matthews is highly regarded in the water and wastewater industry for his tremendous wealth of practical knowledge and his ability to use technologies and research to develop value for clients. Mr. Matthews has created designs of several award-winning water reclamation facilities in California and Arizona, and has saved capital cost, reduced construction schedule, and minimized operations and maintenance needs on hundreds of pump station, reservoir, water treatment, and wastewater treatment projects by implementing creative design concepts. Mr. Matthews has extensive experience in saving capital cost, reducing construction schedule, and minimizing operations and maintenance needs on hundreds of water treatment, wastewater treatment, pump station, and reservoir projects by implementing creative design concepts and solutions. His expertise stems from an extensive background in engineering design, construction supervision, plant operations, and administration.

RELATED EXPERIENCE

Beachwood Sewer Pump Station Variable Speed Drives – Burbank, CA

Mr. Matthews developed the programming strategy of new VSDs for the Beachwood Sewer Pump Station. United Water hired PACE to provide programming assistance to address the operational issues and improve performance. Additionally, PACE coordinated with United Water to identify additional future programming options to optimize energy efficiency of pumping.

Mossdale Landing Sewer, Stormwater, Potable Water, and Reclaimed Water Infrastructure – Lathrop, CA

As Principal-in-Charge, Mr. Matthews led PACE's efforts to provide design services including civil, mechanical, electrical, structural and instrumentation engineering for the four-pump 2.4 MGD peak capacity sewer pump station for the City of Lathrop. 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.

Mountain House CSD Potable Water Storage and Booster Pumping Station – Tracy, CA

Mr. Matthews served as the Principal Engineer on this project to provide civil, mechanical, electrical, structural and instrumentation engineering for two twin 3.7 MG pre-stressed concrete tanks and a multi-zone, multi-pump water booster pump station with a capacity of 9,500 GPM. 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. On the Westside of the district, Mr. Matthews also oversaw the design of a new inter-pressure zone booster pump station with a capacity of 8,500 GPM. The small footprint station is in close proximity to residences, and blends well architecturally with the surrounding community.

ANDREW RONNAU, PhD, PE

Sr. Project Engineer

EDUCATION

Ph.D. Civil Engineering
University of Illinois
Urbana-Champaign

M.S. Civil Engineering
California State University,
Long Beach, 2004

B.A. Physics
University of California
Berkeley

YEARS OF EXPERIENCE

Joined PACE in 2005

REGISTRATIONS

Professional Engineer / CA
2008 / 72851

AFFILIATIONS

American Society of
Civil Engineers
(ASCE)

Andrew Ronnau has extensive experience working with numerical and mathematical models for engineering problems. Dr. Ronnau has a PhD in Civil Engineering, with an emphasis in numerical modeling. He has experience in analysis and design for stormwater management, including hydrology, hydraulics, open channels, culverts, detention and retention basins, flood routing, BMPs, WQMPs, and Master Drainage Plans. Dr. Ronnau is proficient with the HEC-1, HEC-HMS, HEC-RAS, HEC-GeoRAS, AES, FLO-2D, and XPSWMM software packages.

RELATED EXPERIENCE

CPH Rosamond Hydrology and Sediment Transport Analysis and Design – Rosamond, CA

As the lead engineer, Dr. Ronnau performed the hydrologic and hydraulic analysis for the design study and CLOMR application package. GIS and HEC-1 were used to create a hydrologic model of the very large offsite watershed. A two-dimensional (FLO-2D) hydraulic model was used to analyze the alluvial floodplain flow at the project site to create a design concept which provides economical flood protection for the planned residential development. An integrated analysis and design approach was used, combining hydrologic (HEC-RAS), hydraulic (FLO-2D), GIS, and CAD, so that each aspect of the analysis and design could be performed with the most capable and appropriate tools available.

French Valley TTM 32185 Detention Basin Hydraulics and Design – French Valley, CA

Onsite hydrology was performed by Dr. Ronnau and a detailed hydraulic model was created to facilitate the hydraulic design of a system of detention basins in TTM 32185. He performed sizing and hydraulic design of the diversion and outlet structures necessary so that the detention basins could mitigate the peak developed condition flows. Dr. Ronnau also suggested a design revision that simplified the system and eliminated several costly hydraulic outlet works, while still providing required stormwater detention.

Mira Loma TTM 33461 Residential Drainage Hydraulics and BMP Design – Mira Loma, CA

Dr. Ronnau was responsible for the onsite drainage hydrology and hydraulic design. He performed hydrologic analysis in the developed and existing conditions, and did the hydraulic analysis to size the onsite storm drainage utilities. Dr. Ronnau was responsible for the design of the water quality control basin, and testified before the Mira Loma City Council to gain approval for the BMP design and placement in the adjacent city park.

Belle Meadows Hydrology and Onsite Drainage – Riverside County, CA

Dr. Ronnau performed offsite and onsite hydrology in the existing and developed condition to determine runoff impacts and need for possible mitigation measures. He was responsible for developing onsite drainage patterns for residential drainage design.

Evans Road Channel and Culvert / Crossing Design – Perris, CA

As part of the Perris Valley Area Drainage Plan, Dr. Ronnau was responsible for the Evans Road Channel hydraulic design. This design included determining channel shape, dimensions and transitions and culverts/crossings. Extremely flat terrain, coupled with high tailwater conditions, and tie-in requirements for the crossings from Evans Road to the adjacent residential tract provided a rigid set of design constraints. Using HEC-RAS, Dr. Ronnau performed extensive design iteration and modeling to create a design that satisfies all the required design objectives.

ANDREW RONNAU, PhD, PE

Copa De Oro Master Drainage Plan – Kern County, CA
Dr. Ronnau performed the large scale offsite hydrology, using HEC-1, for the alluvial fan area near Lancaster, CA, where the Copa De Oro residential development and golf course will be built. He developed a flood protection system incorporating a system of channels to capture and convey flood flows safely through the development in satisfaction of Kern County and FEMA requirements. The analysis included a calculation of the sediment production and sediment yields that accompany the high flow rates in alluvial fans. Dr. Ronnau designed the channels to convey the peak flows and to disperse the flow at the project downstream border in the pre-development condition, thus eliminating hydraulic impact to downstream neighboring properties

Channel Bank Protection – Whitewater River at Miles Crossing, CA
Dr. Ronnau has performed the channel hydraulic analysis for proposed channel improvements to the Whitewater River at Miles Crossing. A new commercial and residential development along the Whitewater River will necessitate channel improvements. Based on the proposed development layout, he has created an improved channel configuration to provide flood protection for the Standard Project Flood of 83,000 cfs, while minimizing jurisdictional environmental impacts. Hydraulic modeling has been done to show project impacts and to validate the design concept. Construction documents for the improvements are in progress.

Lytle Creek Levee / Revetment – San Bernardino County, CA
As Project Engineer, Dr. Ronnau assisted the design team in the acquisition of FEMA, SWRCB, and USACOE permits for construction of the improvements of the Lytle Creek associated with the development of TRACT 33334 in unincorporated San Bernardino County. Lytle Creek is located on a relic alluvial fan of the San Gabriel Mountains, which exhibit highly fractured rock, and produces a high yield of coarse sediment. The drainage area tributary to Lytle Creek at the apex is approximately 50 square miles and the fan slope is approximately 3 percent. The 100-yr design peak flowrate for the Lytle North bank improvements was 64,540 cfs. Dr. Ronnau assisted in the preparation of FEMA CLOMR and LOMR studies and applications, construction document processing, and resource agency permit acquisitions on behalf of Lennar Communities to construct the Lytle Creek improvements and remove the proposed 1,500 unit housing development from the 100-yr floodplain.

Enclave at La Quinta Retention Basin Design – La Quinta, CA
Dr. Ronnau was responsible for the design of the retention basin system for The Enclave at La Quinta. La Quinta requires onsite runoff to be retained, while offsite runoff may pass through the project site. Offsite and onsite runoff hydrographs were created using software, developed by Dr. Ronnau specifically for this project, to accommodate the relatively short lag times for the watersheds at The Enclave. He also performed a hydraulic analysis, routing the runoff hydrographs through the system of retention basins to determine the size and configuration of the basins that will provide the required level of stormwater retention.

Haster Basin Alternative Treatment Process Evaluation – Garden Grove, CA
Dr. Ronnau analyzed the TSS removal rate for three different lake configurations. The analysis included steady stage and dynamic regimes. The analysis supports an alternative design that provides improved lake water quality and aesthetics over the prior proposed design considered by the County.

Aquabella Lakes and Stormwater Treatment Design – Moreno Valley, CA
Aquabella lakes encompass a system of 9 man-made lakes totaling 45 to 60 acres. The Aquabella project started with simulation of the water quality and stormwater treatment performance of the lake, contributed to the land planning and site design, and completed design of the lakes as well as a system of in-lake water quality enhancements. Dr. Ronnau performed water balance pollution inflow/ outflow calculations, water quality treatment continuity calculations, sedimentation rate analysis, hydraulic design, and CA Department of Safety of Dams jurisdictional analyses.

Fanita Park Lake – Santee, CA
Fanita Park Lake serves as an aesthetic water feature for the Fanita Park development, consisting of 1380 executive homes on approximately 700 acres in Santee, CA. This 10 acre lake will not only be an aesthetically pleasing, but also serve dual purposes of stormwater management and water quality treatment. Dr. Ronnau developed a hydraulic model of the lake and overflow spillway to evaluate the stormwater detention capacity for a range of flow events. The lake provides stormwater detention to mitigate peak runoff to pre-project levels. The lake also serves as the water quality control for the tributary watershed, with better effectiveness than standard treatment methods.

JOSE CRUZ, MS, PE

Project Manager

EDUCATION

M.S. Civil Engineering
Water Resources
California State University, Long Beach, 2008

B.S. Civil Engineering
California State University, Long Beach, 2004

YEARS OF EXPERIENCE

Joined PACE in 2003

REGISTRATIONS

Professional Engineer / CA 72249

AFFILIATIONS

American Society of Civil Engineers (ASCE)

Chi Epsilon (XE)

Floodplain Management Association (FMA)

American Water Resource Association (AWRA)

Jose Cruz has over 8 years of experience in flood control related projects. He has worked with Los Angeles County Dept. of Public Works (LACDPW) on several soil cement bank protection projects. He has been involved with Riverside County Flood Control and Water Conservation District (RCFC & WCD) and with Orange County Resources and Management Development Department (OCRDMD) on several open channel/storm drain system design and debris basin design projects. He is actively involved in project coordination, preliminary design, preparation of construction documents, plan review/approval process, inspection during construction and as-built certification. He has prepared conditional letters of map revision (CLOMR) and letters of map revision (LOMR) on several projects.

Mr. Cruz has conducted quality control and inspected testing operations during construction of soil cement bank protection for several projects. Inspections included excavation, calibration of batch plant, mixing, placement and compaction of material, preparation and testing of soil cement cylinders, storm drain penetrations and grading associated with bank protection.

RELATED EXPERIENCE

Hasley Canyon Wash Relocation and Soil Cement Bank Protection – Los Angeles County, CA

Mr. Cruz has aided in the design of the relocation of the 2,700 lineal feet of the Hasley Creek wash to the west of the existing creek that includes (1) soil cement bank protection, (2) grade control (drop) structures, and (3) Bio-Engineered slope protection. Since the proposed wash relocation partially overlapped with an existing concrete channel, the concrete was removed and replaced with the more natural and aesthetically pleasing soil cement bank protection.

Los Valles Residential Golf Community – Los Angeles County, CA

Mr. Cruz was helped in the preparation of hydraulic analysis and design, for approximately 3,500 lineal feet of open channel designed to provide adequate drainage for the proposed golf course. Design responsibilities included the creation of hydraulic models to analyze channel characteristics and design.

Edinger Storm Channel Improvements – Huntington Beach, CA

As a Project Engineer, Mr. Cruz was involved in preliminary planning and final design for the reconstruction of a portion of the Edinger Channel (Facility C05S05) which crossed under the Edinger Avenue I-405 freeway roadway overcrossing approaches, which include about 30-feet of earthen fill. This channel drains a tributary watershed area of 284-acres. The existing concrete trapezoidal channel and existing 63-inch RCP at the Edinger Avenue crossing will be replaced in order to double the hydraulic capacity. An alternative feasibility study was prepared to investigate multiple alternative options to install additional underground facilities to increase the conveyance at the road crossing. There were numerous constraints that had to be addressed including a horizontal alignment of the facility which was not straight, multiple utilities, and avoiding influence to the existing bridge structure. An innovative construction installation concept was developed that involves developing a temporary shored bridge system instead of using a conventional tunneling or jacking system. This system was ultimately the selected alternative being more cost effective and allowing installation of a double RCB facility rather than parallel pipes which improved the hydraulics.

San Juan Creek Hydraulic Capacity Study – San Juan Capistrano, CA

Mr. Cruz performed topographic survey of a 6,500-ft long reach of San Juan Creek used to create a digital elevation model of the channel. The topography obtained using the GPS equipment was used to create a hydraulic model of the channel in order to determine the hydraulic capacity of the system. The hydraulic analysis was used to delineate existing condition floodplains for San Juan Creek.

JOSE CRUZ, MS, PE

San Juan Creek Soil Cement Bank Protection System – San Juan Capistrano, CA
Mr. Cruz was responsible for the design and preparation of construction documents for 4,500 lineal feet of soil cement/vertical soil mixing bank protection designed to provide adequate flood protection for the adjacent development and to protect the channel from future lateral erosion.

Santa Paula Water Recycling Facility – Santa Paula, CA
Mr. Cruz utilized GPS Survey equipment to locate existing utilities within the vicinity of the existing Wastewater Treatment Plant in order to create off-site and on-site utility plans, and to provide layouts for the extension of existing utilities to the new facility. Utilities surveyed include gravity sewer system, potable water system, low-pressure natural gas line, telephone, cable and internet.

Lytle Creek Revetment – San Bernardino County, CA
As a Design Engineer on the Lytle Creek Revetment project, Mr. Cruz assisted the design team in the acquisition of FEMA, SWRCB, and USACOE permits for construction of the improvements of the Lytle Creek associated with the development of TRACT 33334 in unincorporated San Bernardino County. Lytle Creek is located on a relic alluvial fan of the San Gabriel Mountains, which exhibit highly fractured rock, and produces a high yield of coarse sediment. The drainage area tributary to Lytle Creek at the apex is approximately 50 square miles and the fan slope is approximately 3 percent. The 100-yr design peak flowrate for the Lytle North bank improvements was 64,540 cfs. Mr. Cruz assisted in the preparation of FEMA CLOMR and LOMR studies and applications, construction document processing, and resource agency permit acquisitions on behalf of Lennar Communities to construct the Lytle Creek improvements and remove the proposed 1,500 unit housing development from the 100-yr floodplain.

Spring Mountain Ranch Drainage System Design – Riverside, CA
Mr. Cruz was responsible for the design and preparation of construction documents for 4,000 lineal feet of open channel including; 9 drop structures, three box culverts totaling over 2,600 lineal feet, two debris basins, approximately 5,000 lineal feet of storm drain system, and baffled chute energy dissipation system.

Sunset Crossroads Soil Cement Bank Protection – Banning, CA
Mr. Cruz was involved in the design of approximately 24,000 lineal feet of soil cement bank protection along the banks of three open channels located within the project boundary. Design of bank protection also involved the design of several grade control (drop) structures used to dissipate energy and reduce flow velocity in the channel.

Talbert Lake Wetland Treatment System – Huntington Beach, CA
Mr. Cruz performed topographic survey over a 15-acre area of Central Park in Huntington Beach to verify the depths of Talbert Lake and the surrounding wetlands. The topography obtained using the GPS equipment was utilized to create the grading design for the proposed wetland treatment system. Field surveying was also used to locate mature native riparian habitat that will be preserved and incorporated into the proposed wetland treatment system.

Barona Valley Ranch Back-lot Water Supply Pipeline Expansion – Lakeside, CA
Mr. Cruz was responsible for utilizing GPS Survey equipment to locate existing potable water distribution system and provide layout for the expansion of the potable water distribution system. The water line expansion includes approximately 3,200 LF of underground 8-inch waterline, isolation valves, fire hydrants, air-relief valves and other appurtenances

Sycuan Resort and Casino Reverse Osmosis System – El Cajon, CA
Mr. Cruz utilized GPS Survey equipment to locate existing water distribution system and to provide layout for the proposed reverse osmosis treatment system, water distribution pipeline and effluent pipeline.

TONY HOWZE

GIS Manager

EDUCATION
B.A. Geography
California State University
Long Beach

YEARS OF EXPERIENCE
Joined PACE in 2005
With others over 8 years.

AFFILIATIONS
American Association of Geographers (AAG)

Floodplain Management Association (FMA)

American Water Resource Association (AWRA)

Tony Howze has over 15 years of GIS experience with public works, planning, and engineering. Mr. Howze has a Bachelor of Arts degree in Geography along with numerous certificates in the field of GIS: Hydrology and Hydraulics Analysis, Spatial Analysis, 3D Analysis, and Application Development. He has specialized skills in database management and high-end cartography. He has developed spatial models and applications for hydrologic model input, provided a mapping system to produce Atlas-book style maps for large hydrologic studies, and produced more efficient methods on creating detailed hydrologic / hydraulic statistics.

RELATED EXPERIENCE

Santa Clara River – Newhall Ranch Homestead Hydrology and Hydraulics Analysis – Los Angeles County, CA
Mr. Howze serves as the database administrator for the Newhall Ranch GIS. He has managed the effort in preparing a system inventory of all GIS data features within the Newhall Ranch project encompassing 12,000 acres and 15 years of collection. The inventory included land use, vegetation, ACOE and CDFG jurisdiction boundaries, storm drainages, proposed road arterials, and over 30 different bank stabilization alternatives for the 5 major drainages and Santa Clara River that are within the project. Mr. Howze provided the jurisdictional impact analysis for the EIR & Resource Management Development Plan including the hydraulic analysis of the proposed bank stabilizations. He also managed the effort to create specific applications to model velocity, floodplains, and a variety spatial analysis.

San Gabriel and Lower Los Angeles Rivers and Mountains Conservancy (RMC) – Los Angeles County, CA
The RMC is an independent State agency within the Resources Agency of the State of California. It was established to preserve open space and habitats to improve the watersheds within its jurisdiction, provide for low-impact recreation and educational uses, and Restore and protect wildlife and habitat. Mr. Howze worked with the RMC to collect data from over 100 city and state governments. Massive amounts of data were collected to be associated with watershed activities. Mr. Howze organized the data collected in a library format where every scanned image, book, hard copy map, digital map layer and all had an ID Code. This ID Code related to a database that contained metadata inputted by staff members which included format type, Name, publication data, scale, abstract, purpose, and more. An application was developed to link this ID code to the GIS data where applicable.

Tejon Ranch – Kern County, CA
Mr. Howze was responsible for the Tejon Ranch GIS implementation, also known as TerGIS. Tejon Ranch has over 250,000 acres of land, and wanted a GIS to help organize and analyze their assets. The implementation plan process involved staff interviews, software and hardware assessment, and staffing considerations. Mr. Howze was instrumental in the hardware acquisition and installation, GIS software installation, staff training, staff hiring, and custom application development for sophisticated GIS interface used for data management and retrieval. TerGIS is now a fully functioning GIS, with a full GIS department that produces all the Ranch's analytical needs, data collection and maintenance activities. Mr. Howze delineated the Tejon Ranch watershed basins using GIS models, and provided land use and soil characterizations within each basin. The information delivered from the GIS analysis was used to generate a run-off analysis and helped the BMP design. This study was over 24,000k acres and consisted of collecting and processing data from multiple consultants, variety of county and federal organizations, and in-house design.

JAMES A. MATTHEWS, PE

Potable Water Treatment System Design – LACFD Fire Camp 11, Fire Camp 13, Fire Camp 14, Fire Camp 19, and Henninger Flats Campground – Los Angeles County, CA

Mr. Matthews was Project Manager for the design of upgrades to aging potable water systems to meet current Los Angeles County Department of Public Health regulations. PACE designed potable water treatment systems for five remote sites owned and operated by the Los Angeles County Fire Department. Wells and treatment systems were designed with SCADA communications that enabled remote monitoring and control that automatically switched to propane generators in the event of a power loss. Working together with Alliance Land Planning, the modular treatment facility designed provides consistency of equipment and functionality and reduces overall maintenance costs for the Fire Department. PACE also provided the Fire Department with Operations Plans for regulatory compliance as well as assistance in obtaining permits.

Los Angeles County Fire Department Fire Camp 11 and Fire Camp 19 Wastewater Systems Evaluation and Preliminary Design – Los Angeles County, CA

Mr. Matthews was project manager for the evaluation and preliminary design of onsite wastewater treatment systems at two remote Fire Camps owned and operated by the Los Angeles County Fire Department. The Fire Camps use traditional septic tanks and leachfields to treat wastewater from over 100 inmates and staff housed at the camps. PACE recommended a solution that better utilized the existing leachfields while achieving reduced system maintenance and the ability to upgrade to achieve better effluent quality in the future. A modular activated sludge treatment process was designed to be installed at multiple sites to provide consistency of equipment, functionality and maintenance while meeting all regulatory requirements of the Los Angeles County Department of Public Health and the California Regional Water Quality Control Board Los Angeles (Region 4). The wastewater treatment system consists of a duplex sewer lift station, a pre-manufactured package SBR plant, and chlorine disinfection system with 30,000 gallon/day capacity. The activated sludge treatment process significantly improves effluent quality and extends the usable life of the leachfield and can be easily upgraded to achieve higher effluent quality. To date, PACE has provided preliminary treatment plant design and estimated construction and operations and maintenance costs.

Stone Creek Stormwater and Sewer Lift Station – Oakley, CA

As part of the public infrastructure improvements for the City of Oakley, Ponderosa Homes hired PACE to design a new stormwater pump station and sewer lift station. Mr. Matthews oversaw the design of the stormwater conveyance system for the development, which is composed of a network of gravity flow lines that discharge into an extended dry stormwater detention basin which will temporarily detain and treat both nuisance and flood flows up to the 100-year storm event.

Dreamcatcher Sewer Lift Station – Brentwood, CA

Mr. Matthews served as principal-in-charge of the 100 gpm peak flow sewer lift station servicing a 19-home residential community. The lift station features a pre-cast concrete wet well, two twin 12 HP grinder submersible pumps, redundant level controls, flow metering, data logging, and a hookup for portable generator power. The wet well is covered by a concrete deck and a water rated aluminum hatch for access to pumps and level controls.

City of San Diego, Water Production Division – San Diego, CA

The City of San Diego has ten raw surface water reservoirs, totaling 490,000 acre-feet, two raw water booster stations, and three water filtration plants for surface water treatment, including Alvarado (120 MGD), Miramar (140 MGD), and Otay (34 MGD). Mr. Matthews, as a 2-year employee of the City of San Diego's Water Production Division, participated in the preliminary design of the expansion of the Alvarado Water Treatment Plant from 120 MGD to 200 MGD. Additionally, he was involved in the retrofit of the Lakeside raw water booster station to include automation and telemetry, designed modifications to the chemical clarification addition at the Otay and Miramar Water Treatment Plants, and upgrades to the Alvarado Water Treatment Plant influent metering/control systems.

Barona Colored Water and Uranium Groundwater Treatment Plant – Lakeside, CA

Mr. Matthews served as Principal for this unique design utilizing a new proprietary filtration media (Penox) to effectively remove iron and manganese from the 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 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. The filtration plant was expanded in 2007, under the direction of Mr. Matthews, to utilize a Uranium Specific Ion Exchange system that provides treatment of groundwater water containing up to 80 µg/L to an average of 5 µg/L with a maximum concentration of 20 µg/L, well below the EPA's MCL of 30 µg/L. The 400 gpm system has a small footprint, low capital cost, and low operational costs.

JANET FORDUNSKI, MS, PE

Project Engineer

EDUCATION

B.S. / Civil Engineering
Massachusetts Institute of Technology,
Cambridge, MA
1990

M.S. / Civil Engineering
California State University,
Long Beach, CA
1999

YEARS OF EXPERIENCE

Joined PACE in 2006
with over 10 years' experience

REGISTRATIONS

Professional Engineer / CA
1994 / 51493

Water Treatment Operator T2 / CA
2011 / 33293

AFFILIATIONS

American Society of Civil Engineers (ASCE)

Janet Fordunski has civil engineering experience with both public and private sector projects spanning back to 1990. Her experience includes water and wastewater planning and engineering, regulatory compliance and permitting, and has prior experience in geotechnical engineering. At PACE, she works on projects from the master planning stages through to final construction in both California and Arizona. She has prepared master plans, successfully permitted wastewater treatment plants, recycled water facilities, and emergency generators, is responsible for regulatory compliance for drinking water systems, and has done engineering design for potable, wastewater, and recycled water projects.

RELATED EXPERIENCE

Potable Water Treatment System Design – LACFD Fire Camp 11, Fire Camp 13, Fire Camp 14, Fire Camp 19, and Henninger Flats Campground – locations throughout Los Angeles County, CA

PACE designed upgrades to aging potable water treatment systems for five remote sites owned by the Los Angeles County Fire Department to meet current Los Angeles County Department of Public Health regulations. 100-year flood elevations were determined to design revetments needed to protect the source wells from flooding along the Upper San Gabriel River and San Francisquito Canyon Creek. PACE designed a modular surface water treatment facility that could be tailored to each site to achieve consistency of equipment and functionality and reduce overall maintenance costs for the Fire Department. Wells and treatment systems were designed with SCADA communications to enable remote monitoring and automatic switching to emergency propane generators in the event of a power loss. PACE also provided the Fire Department with Operations Plans for regulatory compliance, prepared annual Consumer Confidence Reports, and assisted in obtaining permits.

Barona Band of Mission Indians Water System – Potable Water System Operational Consulting and EPA Compliance Monitoring – Lakeside, CA

Ms. Fordunski is responsible for EPA compliance for two Public Water Systems on the Barona Band of Mission Indians Reservation. PACE performs the physical collection of all water samples in the field, hand-delivers the samples to the laboratory for analysis, and submits reports to the EPA in accordance with the EPA-issued Water Monitoring Compliance Schedule. PACE has recently been commended by the EPA for meeting the water system treatment, operations, and monitoring obligations. Under the supervision of Ms. Fordunski, PACE has also completed the renovation and new construction of ion exchange water treatment systems at three well sites. PACE also provides ongoing operational consulting services for Barona's potable water treatment and SCADA systems.

National Disaster Search Dog Foundation National Training Center Potable Water System – Ventura County, CA

Ms. Fordunski is the Project Engineer for the proposed National Disaster Search Dogs Training Facility located in a rural area in Ventura County. The remote location necessitated the use of onsite well water with poor water quality. Together with Trussell Technologies, PACE designed the potable water treatment system which includes a reverse osmosis treatment system, 100,000 gallon bolted steel potable water storage tank, and brine evaporation beds for disposal of brine waste. Instrumentation and controls systems were designed by PACE. The controls system involves communication between multiple sites utilizing remote radio communication and a master telemetry unit. The completed control system simplifies day to day operation of the water system by monitoring water levels, automatically turning pumps on and off, and making system adjustments to keep water flowing reliably. It also provides historical data management and automatic remote alarm dialing.

JANET FORDUNSKI, MS, PE

Kings County Ranch – Kings County, CA
Ms. Fordunski prepared a Water Supply Assessment as required by California Water Code (SB 610 and SB 221) for the proposed 20-square mile Kings County Ranch development. The WSA identified all surface water and groundwater sources for the project, estimated water demands for both potable and recycled water, and addressed drought impacts to assure a safe and reliable water supply over a 20-year span. PACE water and wastewater master planning included site-wide use of stormwater and recycled water, along with more traditional surface and groundwater, to provide for all the water needs of the community and meet the "self- sustainability" standards proposed by the developer.

Arboles Viejos – Marana, AZ
PACE completed the design of twin potable water storage tanks and pump station for a new community in Arizona. The water storage and pumping facility will provide secure, efficient and reliable water to residents and ample water storage for fire protection with one million gallons of storage capacity

Santa Paula Water Recycling Plant – Santa Paula, CA
Ms. Fordunski secured air quality permits and designed the headworks components for the Santa Paula Wastewater Treatment Plant, a Membrane Bioreactor (MBR) with an initial capacity of 3.4 MGD and readily expandable to 4.2 MGD to meet wastewater flow projections for the year 2025. Also included in the new WRF design are three percolation basins with a combined surface area of about 15 acres located to the west of the WRF site. The Santa Paula WWTP is the first DBOF municipal WWTP in California.

Yavapai-Apache Nation Wastewater Master Plan – Camp Verde, AZ
PACE prepared a wastewater master plan for five separate communities that make up the Yavapai-Apache reservation in the Verde Valley. Existing wastewater systems at each of the sites were evaluated for the potential to combine flows to a regional facility. New wastewater treatment facilities will be evaluated for the Cliff Castle Casino area as well as the Tunlii area, which currently accepts wastewater from an off-site County Detention Facility. PACE will project future wastewater flows and compare the cost of treatment and ease of maintenance for different alternatives. Effluent reuse opportunities will also be included in the master plan.

Somerton WWTP Expansion – Somerton, AZ
As the Project Engineer, Ms. Fordunski was involved in the engineering and AZPDES and APP permitting of the expansion of the Somerton Wastewater Treatment Plant near Yuma, AZ. Rather than duplicate the existing 0.8 MGD facility, PACE demonstrated how converting the existing SBR reactors to a 4-stage continuous flow biological nutrient removal process (BNR) would more than double the capacity of the plant for the same budget. The new 1.8 MGD facility utilizes secondary clarifiers and improves odors by adding new mechanical sludge dewatering equipment and eliminating the existing sludge drying beds. The effluent will meets ADEQ Class B+ standards.

SPA 2 WRF – Surprise, AZ
Ms. Fordunski assisted in developing the effluent management plan for this 1.2 MGD Water Reclamation Facility (WRF). Both the recharge and reuse of effluent will be achieved with the use of vadose zone wells and irrigation in neighboring communities.

SPA 3 WRF – Surprise, AZ
As the Project Engineer, Ms. Fordunski has expedited the permitting of this 1.8 MGD Water Reclamation Facility. The WRF design included an approximately one-mile long effluent force main with a peak hour capacity of 5.4 MGD. SPA 3 is a biological nutrient removal facility with cloth disk filtration and a low pressure, high output Infilco Degremont UV disinfection channel system.

SPA 4 and SPA 5 WRF – Surprise, AZ
Ms. Fordunski served as the Project Engineer on these two 1.2 MGD Water Reclamation Facilities. Both WRFs were designed simultaneously for two separate clients in order to meet a stringent schedule. Ms. Fordunski was responsible for preparing the regulatory permit applications for each of the WRFs and their effluent disposal infrastructures.

Sundance Phase II WRF Expansion – Buckeye, AZ
PACE successfully engineered the phase I facility, which has been operating since 2004, as well as the 200% expansion to accommodate a 3.5 MGD and produce effluent meeting ADEQ Title 18 Class A+ Reclaimed Water Standards. The expansion of the SBR facility was completed in April, 2009. Ms. Fordunski was responsible for the APP permitting of the project. The plant is planned for future expansion to an ultimate capacity of 7.2 MGD.

Red Rock Wastewater Treatment Plant – Red Rock, AZ
Ms. Fordunski provided the AZPDES permitting services for this 300,000 GPD treatment facility for the Red Rock Development. The facility uses a hybrid SBR treatment process and meets ADEQ Title 18 Class A+ reuse standards.

KEISUKE IKEHATA, PhD, PEng

Technical Specialist

EDUCATION

B.Eng. / Applied Chemistry
Doshisha University / 1996

M.Eng. / Civil Engineering
McGill University / 1999

Ph.D. / Civil & Environmental Engineering
University of Alberta / 2003

REGISTRATIONS

Professional Engineer (Environmental)

Alberta, Canada / 87949

Dr. Keisuke Ikehata is a technical expert on water quality and water treatment technologies having successfully performed a number of research projects on advanced water and wastewater treatment over the past six years. Much of his previous research has focused on the ozonation and advanced oxidation of emerging organic contaminants in water, including pharmaceuticals, surfactants, endocrine disruptors, pesticides, and algal toxins. Dr. Ikehata is dedicated to achieving excellence in water quality engineering for sustainable water resource management, including water reuse and desalination.

RELATED EXPERIENCE

Walnut Canyon Reservoir – Anaheim, CA
Dr. Ikehata served as the technical specialist for this study which ultimately recommended changes to operation of their large 1 billion gallon raw water reservoir, which were successful in drastically reducing taste and odor problems, sulfide, and manganese formation. Dr. Ikehata assisted in the creation of water quality models, design of oxygenation experiments, performing bench scale work, assisted operators with treatment plant setpoints, and created databases useful in identifying reservoir water quality characteristics and improvements.

Canyon Lake Drinking Water Reservoir Oxygenation Design – Riverside, CA
Dr. Ikehata served as the technical specialist for the field testing, modeling, and design of a new deep water oxygenation system for this large 400 acre drinking water reservoir.

Talbert Lake Diversion Project – Huntington Beach, CA
Dr. Ikehata served as the technical specialist in the planning and design for a diversion system and stormwater treatment system that will treat at least 4 MGD of stormwater that would otherwise flow directly into Huntington Harbor and further impair the water body. Dr. Ikehata aided in the development of a wetland treatment concept that entails 20 acres of wetland plants and lake within Central Park, a signature feature of Huntington Beach. While meeting the City's goal of treating the stormwater, the project will also restore one of Central Park's key features, the seven acre lake that has been dried up for the last 15 years. Talbert Lake will become the focal point and recreational centerpiece for active and passive recreation, including a beautiful water feature at the existing amphitheater.

Upper Oso Reservoir Emergency Water Quality Improvements & Super Oxygenation System – South Orange County, CA
Dr. Ikehata served as the technical specialist for the improvements to reduce the odorous hydrogen sulfide emissions caused by high nutrient loads demanding high oxygen content. With a unique specialization of lake systems in conjunction with an advanced understanding of nutrient loading, limnology, biological and mechanical processes, and specialization in wastewater treatment and recycled water storage and distribution, Dr. Ikehata contributed to the diagnosis of the magnitude of the odor and implemented a solution in less than two weeks. To prevent future outbreaks of hydrogen sulfide gas releases, Dr. Ikehata continued to monitor, test and model the reservoir to determine the future water quality management plan.

Harmony Lake Drinking Water Reservoir Design – Alberta, Calgary, Canada
Dr. Ikehata served as project manager for the design of a new 123 acre rainwater harvesting, recreational lake, and drinking water reservoir. Dr. Ikehata coordinated all aspects of the design of this reservoir including intakes/discharges, deep water ozonation and oxygenation system, shallow water recirculation and aeration system, wetlands, and other aesthetic features. As part of the design development Dr. Ikehata contributed to the creative development, modeling, process design calculations, and construction document preparation.

KEISUKE IKEHATA, PhD, PEng

Golden Sand Lake – Hangzhou, China
Dr. Ikehata is the technical specialist tasked with designing the intake system, water delivery system and drainage system of Golden Sand Lake, a 36 hectare lake, including the lake engineering consultation and design service as well as managing/supervising the lake water quality treatment system, lake ecosystem, beach swimming areas and its disinfection system. Dr. Ikehata prepared a detailed engineering report presenting the benefits of three proposed water treatment components, including attached growth bioreactor, constructed wetlands with lake water recirculation, and aeration mixing.

The World Lake Project – Tianjin, China
Dr. Ikehata provided engineering for water quality management on a 1,800 acre reservoir serving as a focal point to a seven-star resort, The World. With manmade islands housing a Phil Mickelson designed golf course and the resort, good water quality in the reservoir is imperative. Historically, the reservoir has been plagued with poor water quality due to the water quality of the surrounding canals feeding the reservoir, which have worse than China's lowest surface water quality standard, Class V. Dr. Ikehata designed source water pretreatment with a 7.1 MGD peak flow capacity, lake water treatment, and recirculation systems to promote consistently excellent water quality.

Agricultural Drainwater Recovery Project – Tulare, CA
Dr. Ikehata has been involved in the study of a high-recovery brackish water desalination project for agricultural drain water since December of 2009. His major role as a R&D scientist and project engineer is to optimize operation of a 2 GPM pilot-scale treatment plant. He is also responsible for the start-up and operation of the water quality analysis laboratory at PACE, in which samples collected from the pilot plant are being analyzed for >20 different water quality parameters in-house, and is supervising a laboratory technician in the water quality laboratory. Dr. Ikehata is currently assisting with designs for the Stage II pilot facility with a design flow rate of 50 GPM.

Tulare Lake Drainage District North Wildlife Habitats Selenium Monitoring Project – Corcoran, CA
PACE has conducted a four-week comprehensive water quality monitoring study for the Tulare Lake Drainage District (TLDD) to investigate the mechanisms of selenium removal within the facility and evaluate the feasibility of the use of wetlands and evaporation ponds for selenium reduction. In total >150 samples were collected over the four-week period and an extensive database was created. Dr. Ikehata directed an on-site analytical laboratory, coordinated sample collection programs, carried out advanced selenium analyses, and performed data analysis. He was also responsible for preparing the final technical report.

Emerging Organic Contaminants Ozonation Projects – Alberta, Canada
In 2005-2009, Dr. Ikehata investigated ozone-based treatment of a variety of emerging/persistent organic contaminants, including cyanobacterial toxins, pharmaceuticals, pesticides, estrogenic endocrine disruptors, and organic acids in pulp mill effluent and oil sands wastewater at the University of Alberta. He published a series of research articles in international journals on this topic and presented a number of conference and workshop presentations, including a keynote speech at the 2007 World Congress on Ozone and Ultraviolet Technologies, Los Angeles, CA.

Oil Sands Water Reuse Projects – Alberta, Canada
Dr. Ikehata has been involved in several water reuse projects for the oil sands industry in Northern Alberta since 2006. Combinations of various treatment technologies were tested, including dissolved air flotation, ion exchange, activated carbon, ozone, UV, and membrane technologies. He co-wrote three successful research grant proposals for these projects with the total worth of nearly $300,000. Dr. Ikehata attended a number of meetings with scientists and engineers from oil sands companies, government officials, and research and development personnel from production and manufacturing companies. He also presented a technical paper at the 2007 Canadian Oil Sands Network for Research and Development in Calgary, AB.

JACOB PETERSON, PE

Project Engineer

EDUCATION
B.S. / Civil Engineering
California Polytechnic University, San Luis Obispo, CA

YEARS OF EXPERIENCE
Joined Pacific in 2004

REGISTRATIONS
Professional Engineer / CA 2011 / 79146

RECENT PUBLICATIONS
Peterson, J.D., Murphy, R.R., Jin, Y., Wang, L., Nessl, M.B., Ikehata, K. (2011) Health effects associated with wastewater treatment, reuse, and disposal. Water Environment Research 83:10, 1853-1875.

Jacob Peterson has civil and environmental engineering experience spanning back to 2004. He has performed engineering design and support in several areas including water and wastewater treatment, water conveyance and distribution, and surveying services. Mr. Peterson is adept at providing comprehensive civil and mechanical designs which are inventive, cost effective, and practical. Mr. Peterson is also skilled in AutoCAD.

RELATED EXPERIENCE

Oso Creek WWTP Blower Upgrade – Mission Viejo, CA
Mr. Peterson provided engineering support to upgrade aeration equipment for turbo blowers at the Oso Creek WWTP. He is also assisting in the design services for a preliminary system design to include: operation per aeration basin, number of blowers for replacement per phase, schematic site layout, preliminary equipment selection and sizing, and preliminary economic model and rebates. The estimated capital, operation, and maintenance costs will also be determined for each alternative.

Barona Water Sampling and Reporting – Lakeside, CA
Mr. Peterson monitored and is providing quarterly reports of the public water system to the Barona Band of Mission Indians Reservation. He collected samples in the field and hand-delivered the samples on the same day for laboratory analysis in compliance with EPA standards.

Barona GIS – Lakeside, CA
Mr. Peterson performed surveying services to map a complete and operable water distribution system for the Barona Band of Mission Indians to complete an accurate GIS-based asset inventory to support overall infrastructure asset and maintenance management. Infrastructure information was mapped and verified in the field for the water and sewer systems, house connections, and septic systems. There were approximately 300 homes, 5 water tanks, 32 water wells and 220 hydrants that served the area. The individual lots / structure footprints were mapped and stored in the GIS inventory database.

San Clemente Aeration Blowers Upgrade Project – San Clemente, CA
Mr. Peterson is currently providing engineering design services for the City of San Clemente to replace the existing aeration blowers with energy efficient high speed blowers that will significantly reduce power costs. The project will include replacement of the blowers and the associated motor control centers, development of telemetry for remote monitoring and control of the blowers, evaluation and/or upgrade of the existing pipelines, valves and controls to achieve constant air flow to the aeration basin diffusers utilizing the existing dissolved oxygen controls.

San Clemente Biosolids Upgrade Project – San Clemente, CA
Mr. Peterson is currently providing engineering design services for the City of San Clemente to upgrade their existing biosolids dewatering systems and improve automation of the solids works facilities. Currently, the facility does not have sufficient cake storage for periods of inclement weather and is therefore seeking a solution which will both improve digestion – reducing total solids, and dewatering performance – reducing volume. PACE has used a Performance Based Specification process to assist the City in selection of the "right" equipment for the project while reducing the capital cost of this equipment by almost 40% over vendor provided budget estimates. In addition to locking in capital costs, the City also has a guarantee on performance of the system which will reduce total sludge volume by 45%.

ANDREW KOMOR, MS, PE

Sr. Project Engineer

EDUCATION

B.S. Civil Engineering
University of Minnesota / 1999
Cum Laude

M.S. Civil and Environmental Engineering
Arizona State University / 2001

YEARS OF EXPERIENCE

11+ Years
Joined PACE in 2000

REGISTRATIONS

Professional Engineer / CA
2003 / 64928

Professional Engineer / AZ
2007 / 46719

Professional Engineer / LA
2009 / 34854

AFFILIATIONS

Director of Orange County Water Association (OCWA)

California Water Environment Assocation (CWEA)

Watereuse Foundation

National American Lake Management Society (NALMS)

PUBLICATIONS

Cost to Benefit Analysis of Desalination of Golf Irrigation Water. Water ReUse Symposium, Phoenix, AZ. 2011

Effects of Nitrification, Stratification, and Algaecidal Disinfection in Country's Largest Recycled Water Reservoirs. Water ReUse Symposium, Washington DC. 2010

Upper Oso Reservoir: Lake Management Update. Presentation to Santa Margarita Water District. 2009

Evaluation of Denitrification Mechanisms in Constructed Wetlands

Andrew Komor is a technical expert on engineering infrastructure having successfully performed engineering design, project management, and field services for over $120 million in capital on over 20 completed water resource projects in the past eight years. His background as a researcher has led to four national presentations and technical papers. Mr. Komor is sought after as a technical consultant and designer on water resources projects including recharge projects, vacuum and pump stations, and dry weather water recovery systems. As part of the design and engineering of such projects, Mr. Komor is adept at providing comprehensive civil, mechanical, structural, electrical, and controls designs which are innovative, cost effective, and highly-operable. Successful project management projects include a large scale dry weather recovery, treatment, and reuse systems for the Santa Margarita Water District and the City of Huntington Beach. Mr. Komor also has experience with a large scale recharge and infiltration systems for aquifer recharge, aquifer storage and recovery, and seawater desalination intake systems. He has an excellent breadth and depth of experience in water resources. Mr. Komor will be responsible for the management of the project design and delegation of project team-members to ensure a value-added approach and sound design which can be implemented effectively.

RELATED EXPERIENCE

Talbert Lake East Garden Grove Wintersburg Channel Diversion Pump Station – Huntington Beach, CA

Mr. Komor was task leader for the design of a diversion structure and stormwater pump station intended to divert 3-4 MGD of flows from the East Garden Grove Wintersburg Channel. The pump station is sized for an ultimate capacity of 3,500 GPM (5.0 MGD) to accommodate anticipated future City projects. The diversion pump station will be constructed, owned, operated and maintained by the City of Huntington Beach. The wet well will contain a pumping system equipped with four identical 1,000 gpm, 20 HP, solids-handling, submersible pumps. Two interlocking variable frequency drives (VFDs) will be incorporated into the system to minimize starts and stops over a wide range of flowrates.

LACDPW Marina del Rey Sewer Pump Station Odor Mitigation – Marina del Rey, CA

Mr. Komor is the project manager responsible for identifying the source of odorous hydrogen sulfide impacting a sensitive location surrounding the Marina del Rey Sewer Pump Station operated by LACDPW. The study includes collecting and analyzing wastewater and air samples, installing new flow meters and evaluating pump station flows, developing alternatives for reducing and eliminating hydrogen sulfide formation, performing onsite bench scale testing of alternatives and recommending a system for pilot scale operation.

Haster Retarding Basin Stormwater Treatment Process – Orange, CA

Mr. Komor was the project manager and lead engineer as part of an evaluation for alternative stormwater treatment systems and modifications to an existing stormwater basin (Haster Retarding Basin). The evaluation included improvements to the basin design features, evaluation of the various stormwater treatment alternatives, preliminary concept treatment system layouts, and construction costs for the alternatives. One of the solutions included a riverbank filtration system along the side walls of the deepened basin.

Mesa Consolidated Water District Pumping Infrastructure – Costa Mesa, CA

Six northwest wells have been improved with infrastructure to improve drinking water treatment and conveyance into the district's distribution system. The improvements included civil, mechanical, process, and electrical/controls upgrades.

ANDREW KOMOR, MS, PE

Non-Potable Pump Station and Oxygenation System – Santa Margarita Water District
Mr. Komor was project manager for a replacement pump system design to increase the quantity and efficiency of reclaiming both dry-weather and stormwater flows by enhancing the diversion and pumping system for Santa Margarita Water District. The system is highly automated to adjust operation depending on the weather conditions and flow in the channel. PACE was able to achieve these goals and project was started up successfully in 2008. The second project includes a highly automated super oxygenation system for the Upper Oso Reservoir. The project includes receiving over a dozen inputs and adjusting flow and oxygen to the system for optimal operation.

Potable Pump Station Dual MCC Backup Power System – Orange County Sanitation District
Mr. Komor was the project manager on this 2008 electrical automation design to supply backup power to a dual MCC potable water pump station. The project was challenging for several reasons, including the need for automation of multiple transfer switches controlling power feeds to both sides of the MCC, the control system circuitry, and also which backup source (utility 1, utility 2, or generator) would power certain sections of the station.

Lenain Water Treatment Plant Operations – Anaheim, CA
Mr. Komor served as the project manager for the improvements to operation of the City of Anaheim's potable water treatment system in 2010. He was in charge of the study, and led extensive modeling, sampling, and piloting work to ultimately recommended optimal operation of their systems to achieve desired water quality. The operations staff continues to work with PACE to adjust their chemical dosing systems and valving systems.

City of Lathrop Potable, Stormwater, & Sewer Pump Stations – Lathrop, CA
In support of three new developments in the City of Lathrop, Mr. Komor was the project manager for two new potable water pump stations, nine stormwater pump stations, and two sewer pump stations. One such station included pumping from three separate watersheds, each containing three 400 HP pumps plus low-flow pumping equipment for nuisance flows. In addition to stormwater, sewage waste streams from new developments are transported by gravity to the sewer lift station constructed adjacent to the new stormwater pump stations. The $13M facility provides 300 cfs of stormwater pumping and 7.7 MGD of sewer pumping using submersible non-clog pumping equipment.

Potable Water Well Enhancement and Controls Installation – Lakeside and Temecula, CA
Two water systems in southern California were outfitted with new well mechanical components, instruments, chlorine injection, chlorine analyzers, and control systems with radio transmission units. A total of 25 domestic wells on these two projects were upgraded, and the master SCADA systems were redeveloped under the design and direction of Mr. Komor.

Dateland Potable Water Reverse Osmosis Treatment Plant – Dateland, AZ
Mr. Komor was the project manager for a new multi-well groundwater treatment plant in Southwestern Arizona. The project consists of two new VFD-driven wells controlled to operate at constant pressure into a pre-treatment system followed by a desalination RO system. Post treatment including disinfection and storage is also provided. The entire system is highly automated included pre-treatment backwash and regeneration, and the controls automation.

Mountain House Dual Tanks, Dual Zone Booster Station, and Westside Station – Mountain House, CA
Mr. Komor was the project manager on a new inter-pressure zone booster pump station in the Mountain House CSD. PACE provided the design and construction administation services for a new twin storage tank and dual-zone potable water booster pumping facility for the City of Mountain House, CA. The design included two separate sets of potable water booster pumps, a pressure reducing / sustaining valving and metering station, and two twin 3.7 million gallon pre-stressed water storage tanks. The booster pump station consisted of twin 3,500 to 5,500 gpm pumping systems, one for Zone 1 and one for Zone 2, which provide drinking water and fire protection to approximately 8,500 homes.

Wetlands of Avondale and Agua Fria River Recharge – West Phoenix, AZ
Mr. Komor performed two years of graduate research testing, evaluation, and technical presentations on a PACE designed facility to treat canal water contaminated with agricultural runoff. The system treats 13 MGD of nitrate-laden water with natural treatment systems, and the water is recharged in a 40 acre riverbank recharge facility. Mr. Komor provided an in-depth review of the treatment and recharge process mechanisms that were presented at two national conferences.

11.4 MGD Ocean Desalination Intake System – Puerto Peñasco, Mexico
A new ocean desalination facility including a seafloor subsurface intake system was studied and preliminarily designed for the 100,000 population City of Puerto Peñsaco, Mexico. Mr. Komor was lead designer for the intake system, consisting of an intake crib and Ranney well configuration, pump station, and treatment facility, and produced 30% design drawings and details used in the study. Mr. Komor also provided cost estimates and performance based specifications for the water quality and equipment.

JACOB PETERSON, PE

Burbank Water Reclamation Plant Blower Evaluation and Dissolved Oxygen Controls Upgrade – Burbank, CA
Mr. Petesrson has lent engineering support to several project efforts related to the 12.0 MGD Burbank WRP to improve operational efficiency and reduce issues related to the plant's performance. He provided the City and United Water with a technical blower performance evaluation of the existing aeration system which identified that replacing the three multi-stage Lamson blowers with smaller, high-speed single-stage turbo units could reduce the power consumption of the aeration system by over 22%. The City is currently evaluating funding for the project using SRF and internal CIP funds. He also provided an evaluation and troubleshot the existing aeration control system which had electric valve controls for each of the four aeration trains and the 3 – 400 HP blowers, the control system only allowed manual actuation of these components. The team determined that the existing hardware could be used, reducing upfront capital costs and provided the programming and integration of the PLCs, HMIs and Plant-wide SCADA systems to completely automate the control of DO in the basins, greatly reducing energy consumption at the facility. A straight-forward programming approach was applied, making the system simple to operate and resulted in effectively controlling DO within 5% of the goal set point and lowered operational output pressure of blowers, reducing energy input by 15%.

Tribute WRF – Sierra Vista, AZ
Mr. Peterson played an integral role in this membrane bioreactor treatment plant for the City of Sierra Vista, AZ, providing engineering design services. The Tribute WRF will initially be designed to treat an average wastewater flow of 0.5 million gallons per day (MGD) and be expandable to an ultimate capacity of 2.0 MGD. It will divert "scalp" wastewater from a nearby sewer interceptor and treat the wastewater to Class A+ reclaimed water standards.

Sierra Vista EOP – Sierra Vista, AZ
Mr. Peterson provided engineering support and quality control for plan and specification development for the City's Environmental Operations Park (EOP), a 4 MGD multi-cell advanced secondary lagoon treatment system. The primary objectives of the project is to improve the facility treatment process performance and reliability to comply with current and potential future effluent requirements, reduce power consumption and operational costs, and reduce capital costs by requiring fewer construction components which will allow the project to be implemented quickly. The influent will first pass through the anoxic basin for nitrogen removal then through an aerobic basin. Then two clarifiers will be constructed to for WAS/RAS purposes. The clarifiers will then feed into the wetlands for further polishing.

Yavapai-Apache Nation Wastewater Master Plan – Camp Verde, AZ
Mr. Peterson is providing engineering support services for the wastewater master plan for the Yavapai-Apache Nation's community wastewater system. The wastewater master plan will evaluate each of the community systems and provide recommendations for proposed upgrades to the systems. Mr. Peterson is also projecting flows for the next 20 years and projecting cost of treatment, providing a comparison analysis of the findings, and evaluating the Tribal concerns and ability to maintain and operate the new facility. He will also be evaluating the Tunlii plant regarding adding an additional 80,000 gpd treatment and determining cost of operations and review of current rates, develop a new plant phasing plan including a cost estimation for the construction of each phase, as well as determining the potential effluent and sludge disposal options. Mr. Peterson is also involved in assessment of a regional plant in Middle Verde (near the existing lagoons) and the possibility of transferring the Tunlii flow across the Verde River to the regional facility.

West Pointe a la Hache Siphon Improvements – New Orleans, LA
Mr. Peterson is working with the Louisiana Office of Coastal Protection and Restoration (OCPR) on a siphon improvement project for wetlands remediation in the Louisiana delta for Plaquemines Parish, LA. The West Pointe a La Hache Siphon, located in Plaquemines Parish was constructed in 1990 in response to the alarming rate of decline in the marshes found in the Louisiana delta region. When the area was in its natural state, the Mississippi River would repeatedly overflow and change course, depositing its large supply of sediment along the coast and creating southern Louisiana. Due to the build-up of levees along the Mississippi River, flooding of the surrounding wetlands is no longer a regular occurrence because engineering efforts have prevented the river from changing course. The system in place at West Pointe a La Hache returns a supply of fresh water and river sediment to the marshes which could reverse the decline of the marshes. Mr. Peterson is assisting in developing a design for a permanent on-site vacuum priming system that is capable of priming all eight tubes simultaneously or individually, replacing the on-site vacuum storage tank with a more robust and simplified system, installing an on-site control building to house siphon mechanical equipment and associated equipment to protect from weather elements and vandalism, extending the siphon intake pipes to increase sediment transport and decrease the frequency that the tubes lose prime, and provide attachments to one or more intake pipes to be coupled with dredging operations in order to increase sediment intake.

PACE
Advanced Water Engineering

Hourly Rates

PACE
Advanced Water Engineering

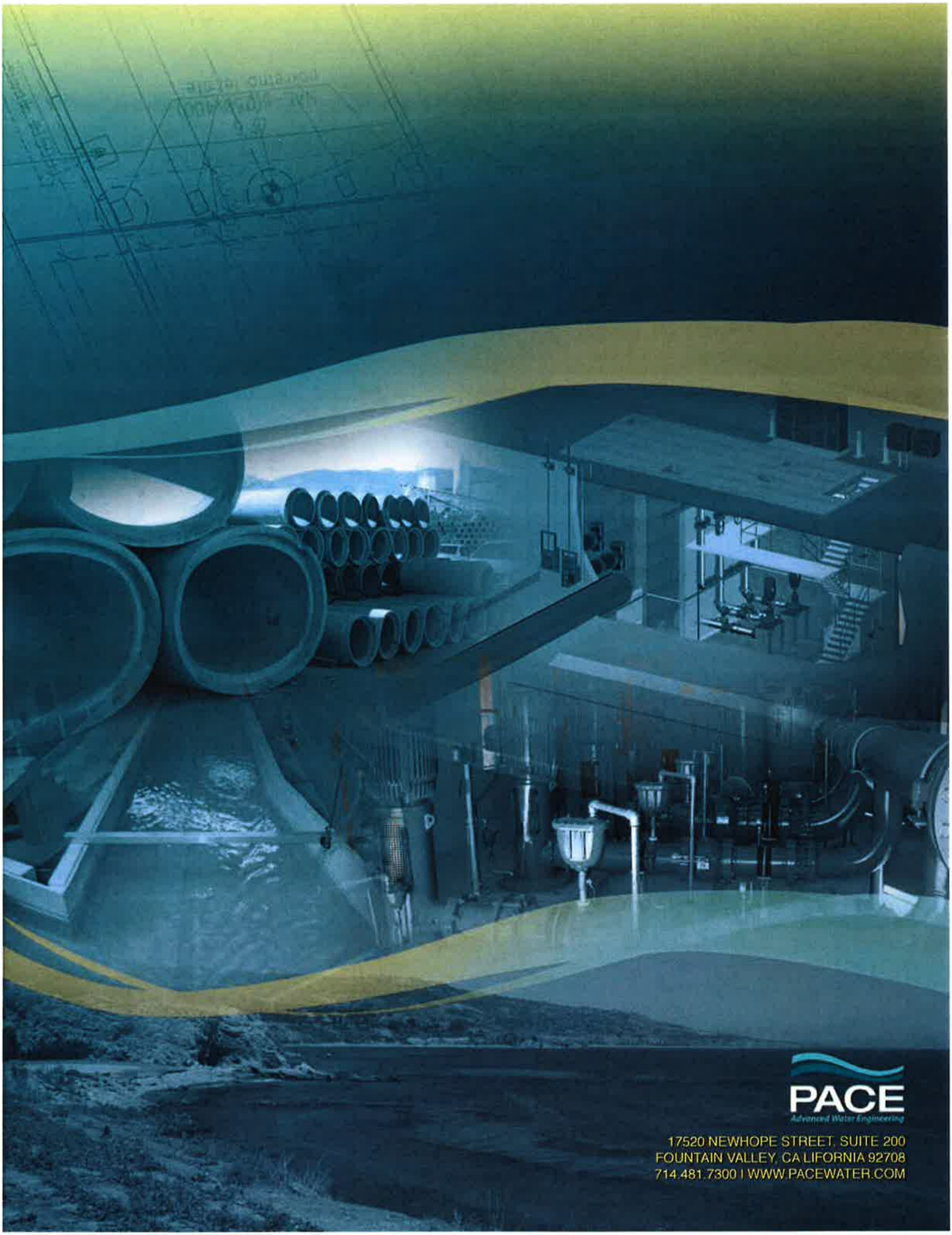
2015 HOURLY LABOR RATES

Principal	$235.00
Sr. Project Manager / Sr. Consulting Engineer	$190.00
Project Manager / Consulting Engineer / Sr. Hydrologist	$177.00
Sr. Project Engineer / Sr. Design Engineer	$156.00
Project Engineer / Design Engineer II	$136.00
Instrumentation Controls Specialist	$125.00
Sr. CAD Designer / Sr. GIS Analyst	$117.00
Design Engineer	$115.00
Graphic Designer	$92.00
CAD Designer / GIS Analyst	$91.00
Project Coordinator / Administrative Support	$70.00
Assistant Designer	$70.00
G.P.S. Survey Unit (w/ Operator)	$241.00
Expert Witness / Legal Consultation	$350.00 + Exp.

REIMBURSABLE EXPENSE RATES*

	Units	Cost
Travel		
Mileage (Per Mile)	Mile	$0.57.5
Airfare, Auto Rental, Hotel		At Cost
Misc. Travel (Parking, tax, tolls, meals, etc.)		At Cost
Per Diem (Contract Rate)	DAY	Contract Rate
Outside Reproduction		At Cost
Shipping (FedEx, UPS, Courier, etc.)		At Cost
Misc. (Review Fees, Specific Charges)		At Cost
Reproduction (In-House)		
Sheet Bond - B/W Prints and Copies – All sizes	SF	$0.16
(8 ½ x 11 to 12 x18)		
Sheet - Color Prints and Copies – All sizes	SF	$1.20
Sheet - Glossy Color Print/Photo – All sizes	SF	$2.60
Roll - Plots and Copies (Roll Paper)		
- Bond (B/W)	SF	$0.88
- Bond (Color)	SF	$1.56
Roll - Vellum or Mylar Plots	SF	$2.60
Roll - Glossy Color Plot Exhibits (Roll Paper)	SF	$3.12
Report 3-Ring Binders		
≤ 1.5"	EA	$10.40
1.5" to 3"	EA	$15.60
> 3"	EA	$26.00
Coil or GBC Punch Binding	EA	$1.04

*Note: All reimbursable expenses will be invoiced at the above rates + 10%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