

SKY WASH APEX CHANNEL
SEE SHEET 4

STATE LAND
ACQUISITION LIMITS



TOWN OF BUCKEYE

Statement of Qualifications for Sky Wash Drainage Design Concept Report

August 2011

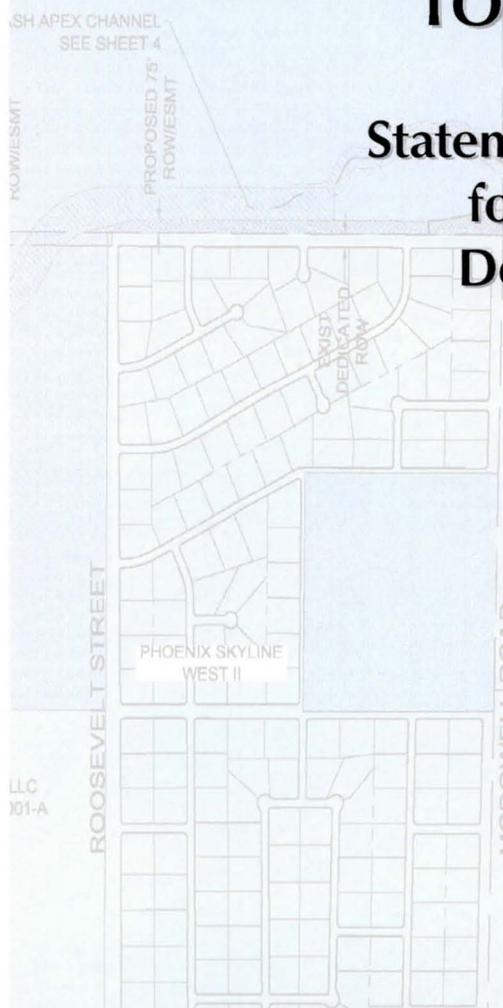
RECEIVED

AUG 29 2011

BY: _____

RJA

FISHER
APN# 602-99-001



RECEIVED
AUG 31 2011
W.C. SCOUTTEN, INC.





August 26, 2011

Woody Scoutten, P.E. Town Engineer
Town of Buckeye
530 East Monroe Avenue
Buckeye, AZ 85326

Re: Statement of Qualifications for the Sky Wash Apex Design Concept Report

Dear Mr. Scoutten:

It is our pleasure to submit our Statement of Qualifications for the Sky Wash Apex Design Concept Report. This statement of qualifications, when carefully evaluated, will demonstrate why Sunrise Engineering is your best choice to provide the engineering services on the Sky Wash Apex Design Concept Report.

Sunrise Engineering was founded over 30 years ago. We are a mid-sized Civil Engineering and Surveying firm employing nearly 165 professionals with approximately 25 professionals in our local Mesa office. Our size benefits the Town of Buckeye because it allows us to provide you with the full service the project needs without the "red-tape" bureaucracy of a larger firm.

We have assembled a team (with some key sub-consultants) to provide the services below:

- Hydrologic and Hydraulic Engineering
- Dam Engineering
- Landscape Architecture
- Geotechnical Engineering
- Alluvial Fan Engineering

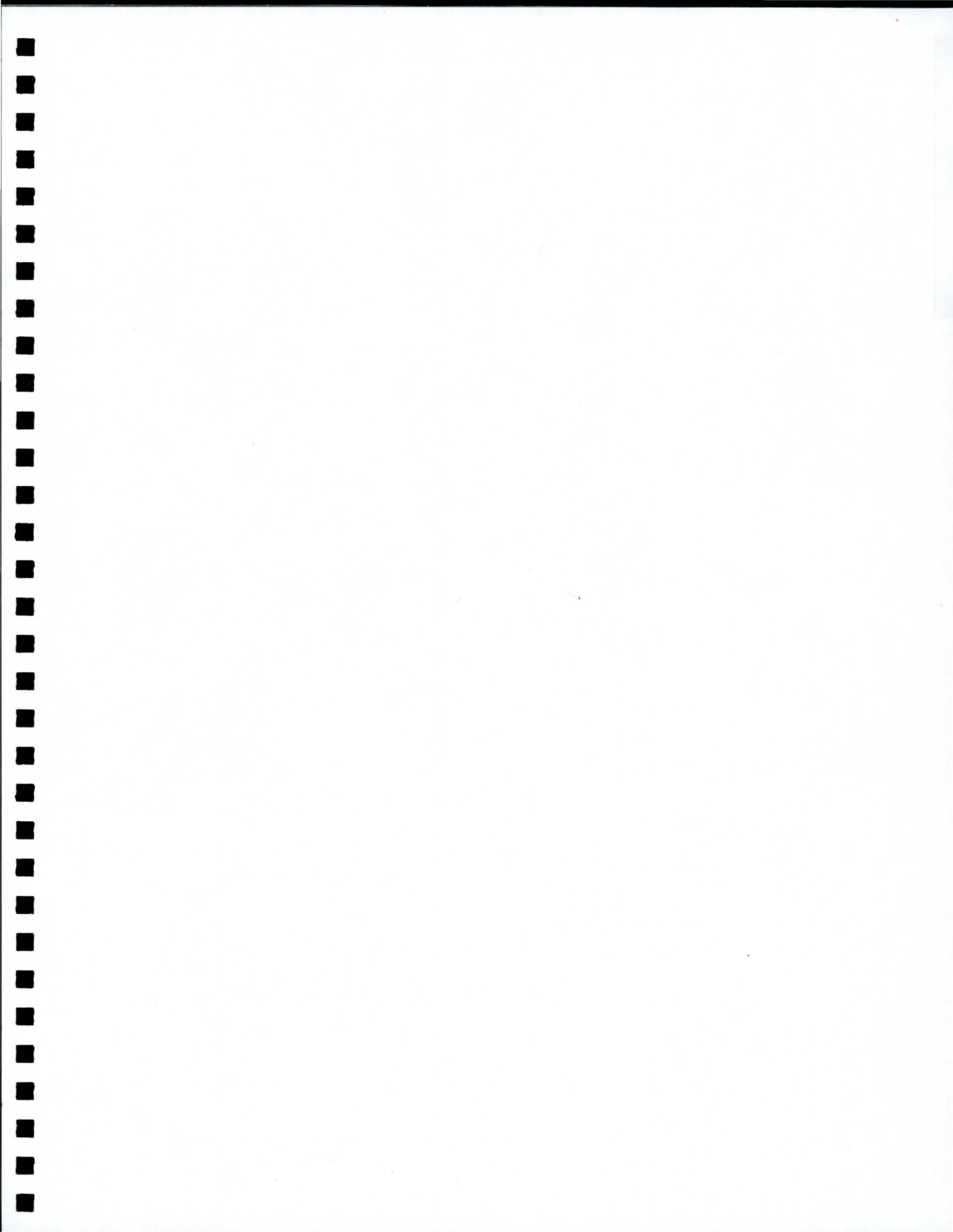
Our team has been selected to provide an array of engineering services that may be an alternative in the DCR study. Our staff of professionals is experienced in these disciplines of work and we invite you to contact the people we have worked with previously who can testify to the quality of our work, the responsiveness of our staff and level of service we consistently provide.

We are looking forward to working with the Town of Buckeye and respectfully request your support in our selection. I promise you quality engineering services with no regrets when you select Sunrise Engineering as your on-call provider and would welcome the opportunity to discuss how our team can assist you on your future projects. Should you have questions, please feel free to contact me directly at 480.768.8600 or via email gpotter@sunrise-eng.com.

Sincerely,
SUNRISE ENGINEERING, INC.

A handwritten signature in blue ink, appearing to read "Gregory D. Potter", is written over a horizontal line.

Gregory D. Potter, P.E.
Principal/Project Manager



WHO WE ARE

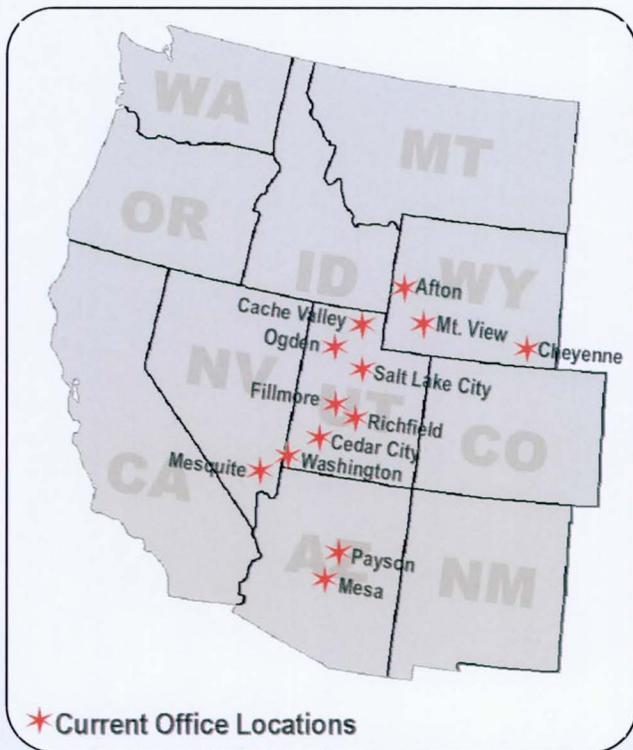
For over 30 years, Sunrise Engineering has been a recognized leader in providing professional design and consulting services. Our multi-disciplinary practice areas serve both public and private sector clients in a diverse range of geographic locations and markets.

At Sunrise Engineering we understand when you select an engineering firm, you are ultimately selecting people. Our staff of nearly 200 people have the technical expertise, are service-oriented and will communicate well on your project. Sunrise is the right-size firm. Large enough to handle the project, small enough to be flexible.

With a roster of comprehensive services, our company supports clients at every stage, from initial conception through design to project completion and beyond. We can provide for multiple client needs, and perform all aspects of many projects completely in-house. A brief description of the services we provide is shown here:

SERVICES WE PROVIDE:

- Civil Engineering
- Water Systems
- Wastewater
- Transportation
- Commercial Development
- Residential Development
- Geographic Information Systems (GIS)
- Water Resources
- Hydrology/Hydraulics
- SCADA
- Electrical
- Environmental
- Geotechnical
- Surveying
- Plan Review
- Building Inspection
- Construction Engineering
- Renewable Energy



OFFICE LOCATIONS

With the multiple office locations, Sunrise can supply the service and expertise of our highly qualified staff to clients in the western states. We believe the best way to service our clients is to be close to them and their projects.

In summary, with our in-depth knowledge, wide range of services and experienced staff, Sunrise Engineering can accomplish a variety project types, large or small. We welcome the opportunity to show how we can help with your next project. For a complete description of our company, locations and services we provide please visit our website at:

www.sunrise-eng.com

MUNICIPAL ENGINEERING - DRAINAGE

Storm runoff and flood control is essential to safely manage the rainfall and runoff from storm events. Over our 30 year history, we have provided planning, design and construction management services for municipalities, flood control districts and federal agencies. We are very aware of the design factors and the regulations of the local and federal governments that govern your project. Our portfolio includes a variety of projects ranging from small channel improvements to large, 1300 square mile drainage basin projects. We can apply our experience and expertise on your projects:

PRINCIPAL SERVICES

Sunrise Engineering offers comprehensive services for drainage projects that range from project conception through planning, design and construction. The types of drainage services we offer are listed below:

- Master Drainage studies
- Water Quality and Quantity
- FEMA Applications
- Floodplain Mapping
- Bridge & Culvert Design
- Dams & Levees
- Alluvial Fan Modeling
- Floodway Delineation (Modeling & Mapping)
- SWPPP's (Storm Water Prevention Pollution Plan)
- Hydrology and Hydraulics
- Flood Mitigation
- Channel Design
- Flood Control Design
- Storm Drain System Design
- Detention & Retention Facilities
- Emergency Access and Action Plans

SOFTWARE

Sunrise Engineering uses all the major accepted software and current engineering practices. We are committed to basic incidental Value Engineering practices, giving our clients options for the least amount of cost. The following are Programs we commonly use:

- HEC-1
- HEC-RAS (HEC-2)
- FlowMaster
- CulvertMaster
- DAMBRK and SMPDBK
- Storm-CAD
- Geographic Information Systems (GIS)
- WMS (Watershed Modeling System)
- WSPG (Water Surface Pressure Gradient)



Wash Erosion Control Structure

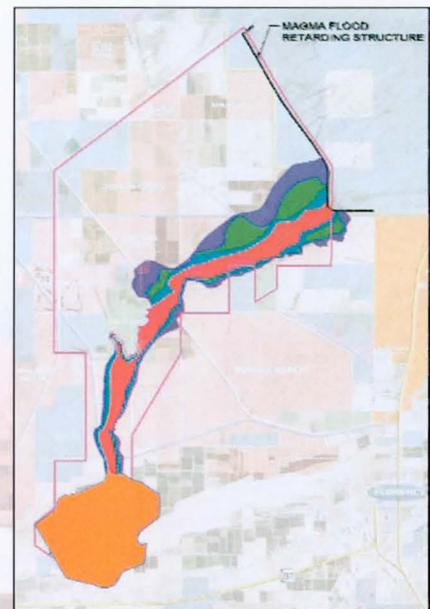
HYDROLOGIC EVALUATION & MODELING

Hydrologic Evaluation and Modeling is one of the areas of water resource management in which Sunrise Engineering has extensive expertise. Whether the study involves substantially large drainage basins or specific water courses, Sunrise has the background to complete the computer evaluations and analysis. Some of our areas of experience include:

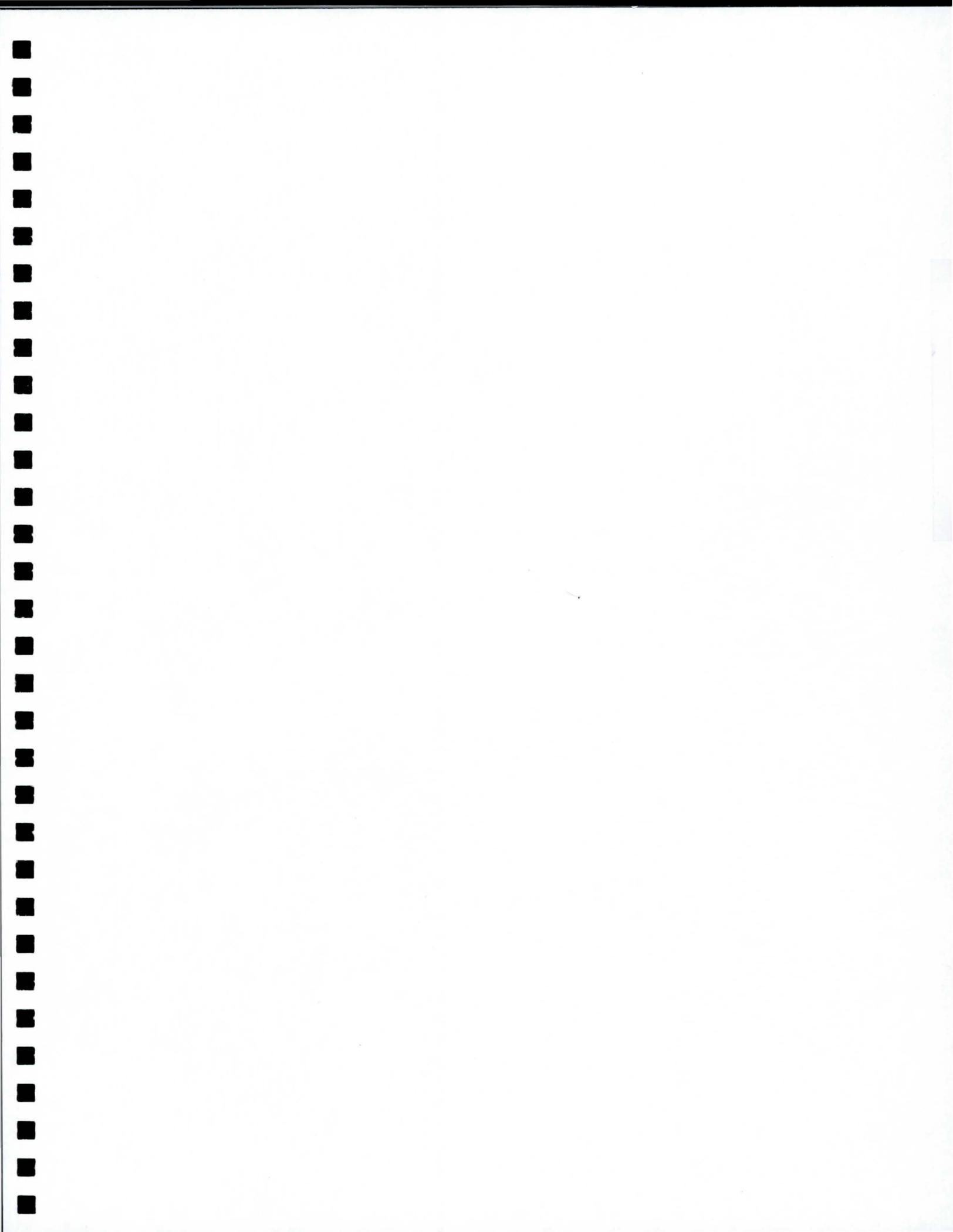
- Reservoir Routing Flood Modeling
- 100-year FEMA Flood Plain Determinations
- Evaluations Requiring HEC-1 and HEC-2 Computer Modeling
- Dam Spillway Capacity Evaluations
- Scour Analysis
- Dam Break Analysis
- Culvert & Bridge Capacity Evaluations
- Parking Lot & Roadway Drainage Calculations
- Urban Storm Water Studies & Design
- Agricultural Canal Capacity Studies
- Basin Water Use Profiles
- Available Surface and Groundwater
- Surface Water Data Synthesis & Model Development

FLEXIBILITY

Sunrise Engineering has the in-house expertise to successfully complete a wide range of hydrology projects. Surface water evaluations of all kinds require a concentrated effort of coordination with state and federal agencies. Hydrology evaluations often involve numerous government agencies. Our staff is familiar with the local and federal contacts who review these types of studies and designs. Our studies provide the client and reviewing agencies with valuable information needed by them for strategic planning of their natural resources.



Dam Break Analysis Results

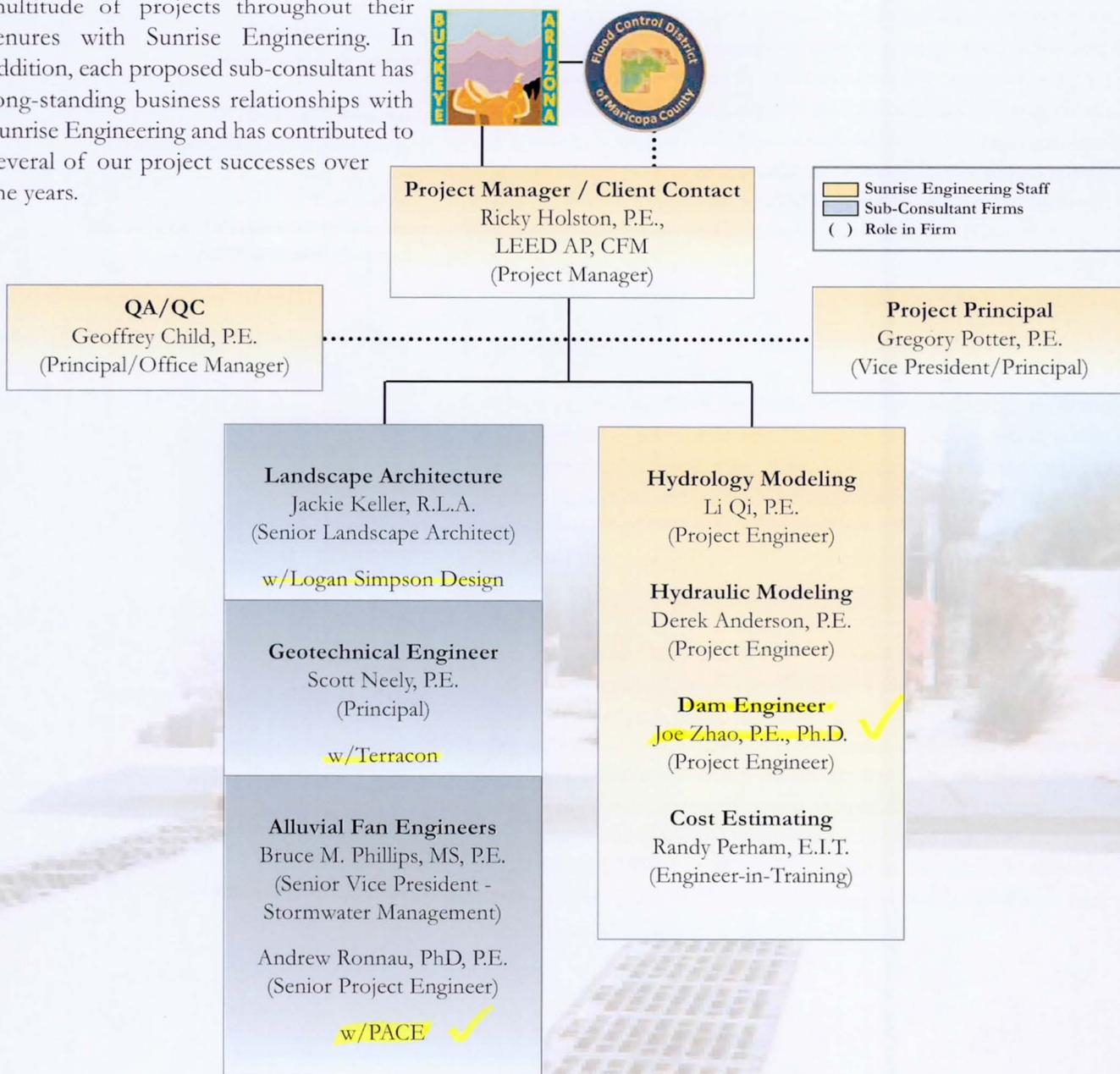


TEAM ORGANIZATION

At Sunrise Engineering we understand that when you select an engineering team, you are ultimately selecting people. And because we understand that the most effective teams require years of extended collaboration between members involved, Sunrise Engineering has assembled the following team of design professionals for the Buckeye’s Sky Wash Drainage Design Concept Report.

All proposed key personnel have collaborated on a multitude of projects throughout their tenures with Sunrise Engineering. In addition, each proposed sub-consultant has long-standing business relationships with Sunrise Engineering and has contributed to several of our project successes over the years.

The following organizational chart represents an overview of how our team is assembled. Information follows that identifies key team member qualifications and education as it pertains to their role within the team. Mr. Holston will serve as your main point of contact and will enroll the efforts of various team members as necessary to complete project assignments. **Resumes have also been included at the end of this section for the Town of Buckeye’s Review.**





B.S. in Civil Engineering,
San Diego State University

Registered P.E. in
Arizona and California

11 Years in Profession
6 Years with Sunrise Engineering

Trained in
Stormwater Pollution & Prevention
HEC-RAS Short Courses

RICKY HOLSTON, P.E., LEED AP, CFM**Project Manager/Client Contact**

Mr. Holston is a professional engineer in Arizona and California, and a Certified Floodplain Manager. With over ten years of experience, Mr. Holston's background includes storm water management, drainage, transportation, grading, site design, water, and wastewater, for both public and private developments. The main focus of his career at Sunrise Engineering has been in the area of drainage design and planning including: hydrology and hydraulic studies, design concept reports, HEC-RAS analysis, drainage studies, hydrologic and hydrograph modeling, feasibility alternatives, drainage mitigation and erosion control, culvert crossings and drainage channel conveyance structures, diversion structures, split-flow analysis', and FEMA Letter of Map Revisions. In addition, Mr. Holston is also a LEED Accredited Professional and has completed extensive training in Storm Water Pollution Prevention Planning (SWPPP). He received his bachelor of science in Civil Engineering from San Diego State University in 2001.



B.S. in Civil Engineering,
Arizona State University

Registered P.E. in Arizona & Utah

18 Years in Profession
18 Years with Sunrise Engineering

Trained in Urban Stormwater
Management &
Detention Pond Design

GREGORY POTTER, P.E.**Project Principal**

Mr. Potter received his B.S.E. in Civil Engineering from Arizona State University in 1993 and launched his career at Sunrise Engineering shortly thereafter. Eighteen years later, he now serves as the Vice President of two offices in both Arizona and Utah, and is one of four local principals in Sunrise's local Mesa office. Mr. Potter lives and works in Arizona and is familiar with unique Arizona rules and regulations regarding water systems. Mr. Potter is a Registered Professional Engineer in both states and is an active member in the Arizona Chapters for the American Society of Civil Engineers (ASCE) and the American Public Works Association (APWA).

During his 18 year tenure with Sunrise Engineering, Mr. Potter has acquired experience in all areas of civil engineering including project management, budgets, schedules, quality assurance, quality control, and construction phasing, hydrology, hydraulics, and drainage design. He has worked on a broad range of projects involving storm drain systems, dams, channels and retention and detention ponds.



M.S. in Construction,
Arizona State University

B.S. Civil Engineering,
Utah State University

Registered P.E. in Arizona,
California, Idaho, Montana & Utah

12 Years in Profession
8 Years with Sunrise Engineering

GEOFFREY CHILD, P.E.

Quality Assurance/Quality Control & Staffing

Mr. Child is one of four local Sunrise Principals who brings over 12 years of experience as a registered P.E. (AZ, CA, ID, MT, UT) with a focus on transportation and drainage construction projects. His previous experience includes managing multi-million dollar projects for ADOT. In addition, he has recently completed channel design and scour analysis for the FCDMC (Flood Control District of Maricopa County), Southwest Gas Corporation and the City of Mesa.

Prior to joining Sunrise Engineering, Mr. Child worked for the Arizona Department of Transportation in their EIT Rotational Program and as a Transportation Engineering Specialist/Project Supervisor in the ADOT-Phoenix Construction District. He has performed inspections on post-tensioned concrete bridges, concrete drainage channels, FEMA Flood Walls, grading, soil compactions, PCCP (Portland Cement Concrete Pavements), asphalt paving, reinforced box culverts, catch basins, median cable barrier and signing and striping (including freeway overhead sign installations). His responsibilities included managing the project schedule and budget, supervising field inspectors and writing change orders and letters of agreement between ADOT and the contractor.



B.S. in Civil Engineering,
Arizona State University

Registered P.E. in Arizona & Utah

18 Years in Profession
18 Years with Sunrise Engineering

LI QI, P.E.

Hydrology Modeling

As a licensed Professional Engineer and Project Manager for Sunrise Engineering, Mr. Qi brings more than 28 years of experience in hydraulics, hydrology, groundwater and environmental projects, as well as a solid scientific knowledge of hydraulics, hydrology, mathematics and numerical modeling. He has an M.S. in Hydraulics and River Dynamics, a B.S. in Engineering Mechanics, and has completed a number of doctoral courses on Civil and Environmental Engineering.

Prior to joining Sunrise, he developed a three-dimensional groundwater flow model, BFCC. Shortly thereafter, he obtained the Second Award of Science and Technology Advances from the China Ministry of Power Industry for successfully applying his model to predict water-table, pressure distribution and seepage for the Laxiwa Hydropower and Nina Earth Dam projects in China. Since joining Sunrise's hydrogeology team in 1999, Mr. Qi has worked on numerous projects involving watershed hydrology, surface water hydraulics, floodplain, city water supply, storm water drainage, roadway hydrology / hydraulics, groundwater, dam safety, and well engineering.



M.S. in Civil Engineering,
Utah State University

Registered P.E. in Utah
5 Years in Profession, 5 w/Sunrise

DEREK ANDERSON, P.E.

Hydrology Modeling

Mr. Anderson has both a Bachelors and a Masters Degree in Civil Engineering from Utah State University and is a registered Professional Engineering in Utah. His expertise includes hydraulics, hydrology and fluid mechanics and he has recent project experience in drainage studies, sediment transport analysis, dam break studies, and hydraulic structure designs including culverts, inverted siphons, detention basins, and energy dissipation structures. He also has experience preparing CLOMR and LOMR requests to the Federal Emergency Management Agency.



Ph.D. in Geological Engineering,
M.S. in Mining,
University of Wisconsin

Registered P.E. in Utah, Nevada,
Oregon, California and Alaska
Registered Geologist in Utah

29 Years in Profession
13 Years with Sunrise Engineering

JOE ZHAO, P.E., Ph.D.

Dam Engineer

Dr. Zhao has over 19 years of experience in water resources and environmental engineering. Dr. Zhao has extensive experience with dam analysis and has conducted numerous soil investigations for water supply projects. Typical geotechnical investigations include: surface fault-rupture studies, drilling, laboratory and field testing, slope stability modeling, engineering analysis and reports. Experienced in shallow and deep foundations, and retaining structures. He has performed extensive research on rock mechanics, hydraulic fracturing stress measurement and borehole breakouts.

Dr. Zhao received his Ph.D. in Geological Engineering from the University of Wisconsin-Madison in 1995; he received his M.S. in Mining Engineering from the University of Wisconsin-Madison in 1988; he received his B.S. in Civil engineering from WUHEE (China) in 1982. He is a Registered Professional Engineer in Utah. He has over 18 years of geology and engineering experience. Dr. Zhao's is responsible for assisting the management of Sunrise' Hydrogeology Division and conducting hydrogeological studies and engineering design.



B.S. in Civil Engineering,
Northern Arizona University

Registered E.I.T. in Arizona
3 Years in Profession, 2 w/Sunrise

RANDY PERHAM, E.I.T.

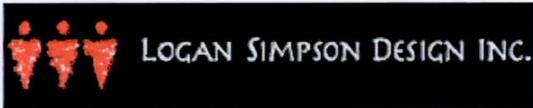
Cost Estimating

Randy Perham holds a B.S.E. in Civil Engineering from Northern Arizona University. His interest in civil design began while working in the summers both in and around Payson, Arizona for his father's land surveying company. Upon graduating from college, he continued land surveying before accepting a job with Sunrise Engineering. He is a certified Engineer-in-Training and his work experience includes cost estimation and the preparation of technical reports (DCR, drainage, water, sewer, SWPPP), drafting construction documents for a wide range of projects from new subdivisions to road reconstruction, utility coordination, conducting project research both for current and up-coming jobs, and water/wastewater modeling.

PROPOSED SUB-CONSULTANTS

Sunrise Engineering has developed a short list of qualified firms which we utilize to provide a complete package of services to our clients. We have found that first-hand experience is the best sub-consultant selection plan, and therefore only select sub-consultants who have the experience, manpower and record of completing projects on time and on budget.

Sunrise Engineering intends to perform the scope of work for this project entirely in-house with three exceptions: Landscape Architecture services will be completed by **Logan Simpson Design**, Geotechnical Engineering services will be completed by **Terracon**, and Alluvial Fan services will be performed by **PACE**. All three of our proposed sub-consultants have long-standing business relationships with Sunrise Engineering and have contributed to several of our project successes over the years. As such, they will operate under the direction of Mr. Potter as an extension of Sunrise Engineering’s internal staff. Overviews of each have been included below for the Town’s review.



1,200 Design & Planning Projects
100 Staff Members
14 Registered Landscape Architects

LOGAN SIMPSON DESIGN

Landscape Architect Sub-Consultant Firm

Logan Simpson Design Inc. (LSD) is one of the largest landscape architectural and environmental planning firms in the Southwest, with more than 100 staff members, including 14 registered landscape architects. LSD has experience on more than 1,200 design and planning projects. Because of the size of LSD’s Design Group, they can meet demanding schedules. LSD’s Design Group includes landscape architects, landscape designers, recreation planners, horticulturists, certified irrigation auditors, CADD draftsmen, and construction inspectors. LSD’s in-house environmental planning staff also offers the benefit of keeping the Design Group aware of the latest regulations that could affect design decisions and/or project approaches.

Through numerous flood control projects, LSD is quite familiar with the procedures, processes, and requirements associated with the landscape character analyses, needs assessments, multi-use planning, and landscape aesthetics activities typically undertaken. They have prepared landscape concepts, developed final design plans, and have assisted in interpreting technical designs for the general public’s understanding. It is LSD’s primary design intent to integrate the technical engineering aspects of each project with the landscape aesthetic process to achieve an overall landscape character unique to that project. LSD constantly monitors the project features for compliance with their clients’ aesthetics, landscaping, and multi-use policies.



B.S. in Landscape Architecture,
Perdue University

Registered L.A. in Arizona
#23436

Site Planning & Design,
Recreational Planning & Design,
Environmental Inventory & Analysis,
Native Revegetation,
Cultural & Environmental
Interpretation, and Supervision of
Construction Implementation



ENR's Top 40 Geotechnical Firm
Employee-Owned Firm

15 Geotechnical Specialist in Arizona

JACKIE KELLER, R.L.A.

Senior Landscape Architect

Jackie is a registered landscape architect who began her professional career in 1984. She has a diverse background in landscape architecture with emphases in site planning and design, recreational planning and design, environmental inventory and analysis, native revegetation, cultural and environmental interpretation, construction documents, and supervision of construction implementation. Jackie has been involved in a wide range of public and private sector projects interacting with many municipalities and agencies throughout Arizona, Nevada, Texas, and California. Jackie has also been involved in many park and recreational projects as a project landscape designer/architect/manager. Specific duties ranged from technical assistance to project planner/designer for site planning, grading, hardscape, landscape and irrigation design, and consultant coordination. In addition, public participation and involvement have been integral components in many of Jackie's design projects in order to build community support. Her ability to conduct and facilitate public meetings and input from communities, neighborhoods, special interest groups, stakeholders, and client staff is a key strength that has proven to be very valuable in gaining public acceptance of controversial solutions.

TERRACON

Geotechnical Engineering Sub-Consultant Firm

Terracon Consulting Engineers & Scientists, Inc. (Terracon) is a dynamic and growing ENR Top 40 consulting firm providing geoscience services at local, regional, and national levels. Since 1965, Terracon's employee-owned firm has provided tailored services to meet our clients' objectives. Terracon has worked on a wide variety of public and private projects, throughout Arizona since the mid 1990's. They help their clients succeed in business ventures by effectively executing projects, controlling costs, and managing risk.

Terracon maintains a group of fifteen geotechnical specialists in Arizona who are familiar with geotechnical study and design methods required for major transportation projects. Terracon's design team routinely demonstrates the ability to accomplish subsurface investigations and pavement designs for ADOT and other various government agencies. In addition, their geotechnical management and design personnel are all familiar with FCDMC, MCDOT, USACE, ADOT and FHWA policies and procedures as they relate to infrastructure design and construction. Added to which,

Terracon's materials testing laboratory facilities in Arizona are current with their ADOT, AASHTO and USACE accreditations. Terracon's personnel also have notable drainage expertise as it relates to this project from work completed for adjacent projects. With current staffing in their Arizona offices, Terracon can easily absorb the workload of a project of Sky Wash's magnitude. Regional offices in Albuquerque, Salt Lake City, and Las Vegas can easily augment the Arizona staff should the need arise.



SCOTT NEELY, P.E.
Geotechnical Engineer

Mr. Neely is the manager of geotechnical engineering services and is responsible for coordination of geotechnical projects in the Phoenix area office. With over 22 years experience, he oversees project assignments, management, proposal, report preparation, and directs the geotechnical laboratory personnel. Through his work experience, Mr. Neely has gained a working knowledge of the guidelines and regulations currently in use by local, state, federal and professional organizations. These include ASTM, AASHTO, ADOT, and local municipalities. His areas of expertise include:

M.S. in Geotechnical Engineering,
Arizona State University

B.S. in Geological Engineering,
University of Nevada at Reno

Registered P.E. in Arizona, California
& Colorado

American Society of Civil Engineers

- Distress investigations and remedial recommendations for rock slopes and embankments.
- Pavement thickness designs for residential, minor and major arterials and state highways. Overlay recommendations for a state highway projects using Heavy Weight Deflectometer data.
- Design of rock bolt patterns. Recommendations for tunnels or cut and cover founded in rock.
- Subsurface investigation using seismic refraction methods for water and sewer pipelines crossing bedrock formations, and use of resistivity equipment for grounding of electrical substation equipment.
- Perform geotechnical investigations including subsurface exploration, and engineering analysis for foundation and pavement design recommendations.
- Foundation recommendations for state and county highway bridges. Foundation recommendations using pressure meter test methods, including bearing capacities of drilled piers as high as 100,000 pounds per square foot.



Alluvial Fan Hydraulics

Hydraulic Modeling

Bridge Scour Analysis and
Countermeasure Design

River Engineering

Floodplain Mapping

Watershed Analysis/Planning

GIS Water Resource Applications

Water Quality Assessment

River/Wetland Restoration

Water and Wastewater Treatment

Lake Systems/Water Features/Pools

PACE is an advanced water engineering firm formed in 1987 dedicated to providing solutions in partnership with nature. Creativity, innovation and advanced knowledge of water resources are cornerstones of our services leading to aesthetic, environmentally sustainable and practical engineering solutions. As a water resource specialty-engineering firm, PACE conducts engineering consulting including feasibility studies, permitting, production of construction documents and construction support.

PACE possesses a solid background in stormwater and floodplain management disciplines, including hydrology, hydraulics, sediment transport, fluvial geomorphology, alluvial fan hydraulics, and computer modeling. Among the unique strengths of PACE is its many water resource specialists dedicated to watershed restoration and stormwater management, with state-of-the-art hydraulic and hydrologic analyses capabilities. The PACE stormwater management team has the unique ability to perform 2D modeling of complex conveyance systems. 2D modeling in combination with sediment transport analyses has been used to identify and define potential problem areas which results in focused solutions and focused application of resources. These personnel are recognized as leading experts in the field, providing consultation to many of the water resource agencies in the southwest and featured as speakers at many technical conferences in the field.

PACE has completed wastewater projects in the Town of Buckeye and is familiar with the Town's processes and standards. In the recent past, PACE provided engineering wastewater solution for the Sundance Development in Buckeye, AZ. As the engineer of record, PACE provided the planning, design, and permitting of the 1.2 MGD Phase I Sundance WRF. After 5 years of successful operation and production of high quality effluent, PACE was again contracted for the design to expand the Sundance WRF from 1.2 MGD to 3.5 MGD. PACE was also successful in designing the 1.2 MGD Tartesso Water Reclamation Facility servicing the Tartesso Master Planned Community. It was designed with the goal of being a "good neighbor" facility by using a small footprint, a completely covered treatment process, and aesthetically pleasing architecture. PACE guaranteed the effluent quality and construction cost and completed the facility in time to receive the flows from the Tartesso Master Planned Community. A MAG 208 Amendment was prepared as well for the Tartesso WRF.

BRUCE PHILLIPS, MS, P.E.

Alluvial Fan Engineer

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

M.S. in Petroleum Engineering,
B.S. in Civil Engineering,
University of Southern California

Registered P.E. in Arizona
and California

Bruce Phillips has water resources civil engineering experience dating back to 1981. His areas of expertise include river engineering, floodplain hydraulics, fluvial systems and sediment transport analysis, stream geomorphology, and river stabilization / restoration. His background includes complex hydraulic analysis and design of specialized river hydraulic structures involving innovative solutions for unique problems, and a significant portion of his career has been spent developing his expertise with alluvial fan hydraulics and desert floodplain management systems.

He has experience with numerous computer hydraulic models for steady state and varied flow analysis, along with two-dimensional hydraulic analysis. He has also applied current state-of-the-art programs for watershed modeling of a variety of complex watersheds, and has prepared numerous sediment transport analyses on many of Southern California's rivers and streams, including moveable bed models, scour determinations, sediment budget modeling, debris generation, and alluvial fan evaluations.

ANDREW RONNAU, PhD, P.E.

Alluvial Fan Engineer

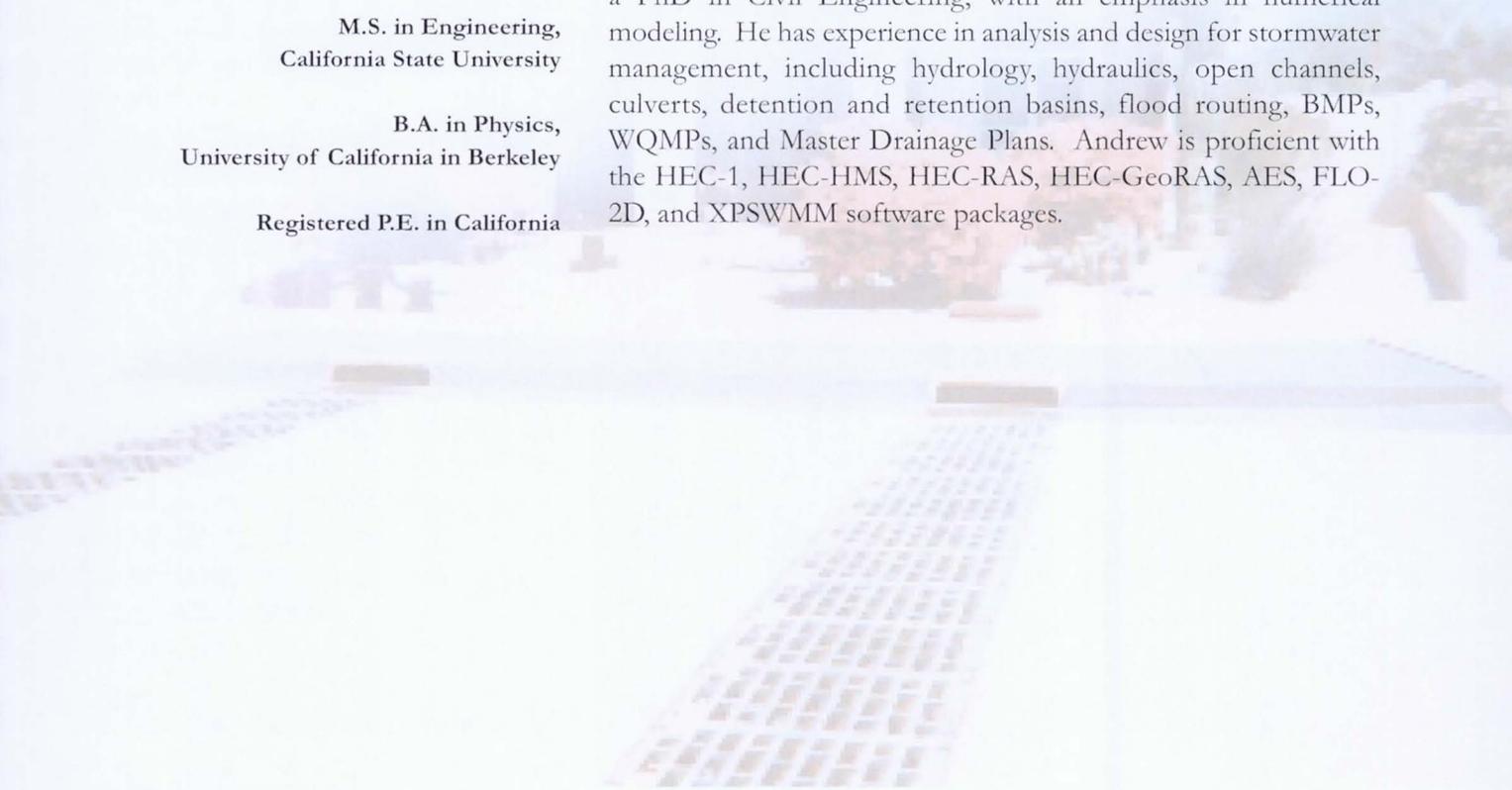
PhD in Civil Engineering,
University of Illinois

M.S. in Engineering,
California State University

B.A. in Physics,
University of California in Berkeley

Registered P.E. in California

Andrew Ronnau has extensive experience working with numerical and mathematical models for engineering problems. Andrew 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. Andrew is proficient with the HEC-1, HEC-HMS, HEC-RAS, HEC-GeoRAS, AES, FLO-2D, and XPSWMM software packages.





Education and Qualifications:

- B.S. – Civil Engineering
San Diego State University

Registered Professional Engineer:

- Arizona and California

Years in Profession:

- 9 Years – 5 Years with Sunrise

Memberships:

- ASCE – American Society of Civil Engineers
- APWA – American Public Works Association
- AFMA – Arizona Floodplain Management Association

Certifications & Training:

- PSMJ – Project Management Boot Camp
- CFM – Certified Floodplain Manager
- SWPPP – Stormwater Pollution & Prevention

RICKY HOLSTON, P.E., LEED AP, CFM

Project Manager/Client Contact

Mr. Holston received his B.S. from San Diego State University in 2001 and is a licensed professional engineer in Arizona and California. With nine years of experience, Mr. Holston's background includes storm water management, transportation, grading, drainage, water, wastewater, and site design for both private and public entities including extensive experience with School Districts. He is a Certified Floodplain Manager and has completed extensive training in Storm Water Pollution Prevention Planning (SWPPP).

RECENT/RELEVANT EXPERIENCE

Sky Wash Drainage Apex – Buckeye, Arizona

Mr. Holston is the Project Manager for this project. Sunrise Engineering collaborated with private stakeholders, the Town of Buckeye and the Flood Control District of Maricopa County to implement a regional solution for the Sky Wash Drainage Area Apex. The geographic location of the Apex is at the head of an active alluvial fan drainage basin which rendered significant portions of downstream area undevelopable and within FEMA Flood Zone A. Sunrise worked with the Town and stakeholders to create a partnership that enabled the Town to share 50% of the design and construction cost with the Flood Control District. The solution required extensive hydrologic and hydraulic modeling to design a detention structure and channel, and provide a preliminary CLOMR for the area. With the detention structure in place, flows leaving the Apex will be significantly decreased and contained within the proposed channel.

Watson and Roosevelt Roads Drainage Channel – Buckeye, Arizona

Watson and Roosevelt Roads in Buckeye, AZ, had existing natural low water crossings. As part of nearby development the roadway required improvements to allow all-weather access. Sunrise provided the hydrologic, hydraulic calculations and construction plans for a four barrel 5' x 10' cast in place box culvert solution. Since the structure would be placed within a FEMA Flood Zone A, Sunrise staff completed a Conditional Letter of Map Revision (CLOMR) to secure approval by the Army Corp of Engineers. Mr. Holston was the Project Manager for the project and completed or oversaw the completion of the necessary hydrology, hydraulic calculations and construction plans.

Bethany Home Road Local Drainage - Phoenix, Arizona

Sunrise Engineering was hired by the City of Phoenix to perform all the engineering design work necessary for the construction of new 8" solid grouted CMU and standard 30" floodwalls and reconstructed/re-graded driveways (designed for the 100-year event) in order to alleviate drainage problems affecting residents along West Bethany Home Road. Scope included field surveys, preparation of detailed plans and cost estimates. Mr. Holston was the Drainage Project Engineer, responsible for completing the hydrology, hydraulic calculations and construction plans and details for the project.

Myrtle Avenue Drainage Mitigation Project - Phoenix, Arizona

Sunrise Engineering was contracted by the City of Phoenix to alleviate drainage problems affecting residents in the Myrtle Avenue cul-de-sac just east of N. Central Avenue and W. Northern Avenue. Sunrise's scope involved all engineering work necessary for field surveys and preparation of detailed construction plans, cost estimates, and special provisions for the

construction of the **new drainage channel**. Specifics included: review and acceptance of the existing drainage study and feasibility of alternatives; public meetings and interviews with local residents, topographic surveying and base-mapping of the section from Central Avenue to the cul-de-sac on Myrtle and its outlet on 3rd Avenue; a Central Avenue and Myrtle Avenue intersection Split Flow Analysis to determine the accuracy of the existing Drainage Report; and preparation of the construction documents. Mr. Holston was the Drainage Project Engineer, responsible for completing the hydrology, hydraulic calculations and construction plans and details for the project.

Van Buren Street Drainage DCR, Avondale, Arizona

Mr. Holston was the Project Manager for the Maricopa County Flood Control District to complete a Design Concept Report for a storm water conveyance structure or channel along **Van Buren Street**. The purpose of the project was to look at ways to alleviate flooding at Van Buren and **99th Avenue** and if possible reduce retention requirements for the Avondale City Center project. The project analyzed existing and future conditions and recommended alternatives to convey flow along Van Buren Street **to the Agua Fria River**. Project Tasks included collection and compilation of existing utility and general base mapping information from several sources. Manipulation and analysis of the existing hydrology models and rainfall data for the project. Creation and analysis of existing and future hydrologic and hydrograph models using NOAA ATLAS 14 rainfall data.

San Tan Boulevard Drainage Channel – Gilbert, Arizona

Stormwater flows from a newly constructed Junior High School totaling **approximately 170 cfs** required routing through a proposed project site. Sunrise designed two culvert crossings and a sand bottom channel to convey the flow north across San Tan Blvd, then west in an 800-foot long channel, then under Tucana Lane and finally west to the project limits, where it resumed as sheet flow. The first culvert crossing consisted of **three 36" equivalent CMP arch pipes**. Arch pipe was specified to minimize impacts to the desired roadway profile. The crossing at Tucana Lane utilized **two 2 x 8 x 115 foot precast box culverts** with cast in place headwalls. Approvals were required by the Army Corp of Engineers and the Town of Gilbert. Mr. Holston was the Drainage Project Engineer, responsible for completing the hydrology, hydraulic calculations and construction plans and details for the project.

Felix Road Drainage Channel and Box Culverts – Florence, Arizona

A 2600-foot long drainage channel was required along Felix Road to convey approximately **230 cfs** of upstream runoff. Space was limited adjacent to the right-of-way; the design therefore necessitated the use of retaining walls on both sides in some locations. **Dual 2' x 8' box culverts** were designed at collector roads along the route. The design required HEC-RAS analysis, hydraulic computations and completion of construction plans and details for the project. Mr. Holston was the Project Manager for the project and completed the hydrology, hydraulic calculations and construction plans.

Ocotillo Road Drainage Channel – Queen Creek, Arizona

The Ocotillo Road Drainage Channel is a one mile long trapezoidal channel with 8 foot bottom and varying depth of flow. The channel was designed to convey **431 cfs** and includes three roadway crossings. **Two 3 x 6 foot precast box culverts** were specified at each of the crossings. Work included design field topo, design calculations, modeling and construction plans for the channel, box culverts and erosion control measures. Mr. Holston was the Project Engineer for the project and completed all design tasks and coordination with survey and CAD staff.

**Education and Qualifications:**

- B.S. – Civil Engineering Arizona State University

Registered Professional Engineer:

- Arizona and Utah

Years in Profession:

- 17 Years – 17 Years with Sunrise

Memberships:

- ASCE – American Society of Civil Engineers
- APWA – American Public Works Association

Certifications & Training:

- PSMJ - Project Management Boot Camp
- Urban Stormwater Management & Detention Pond Design
- Scour Analysis for Bridge Design

GREGORY POTTER, P.E.*Project Principal*

Mr. Potter received his B.S.E. in Civil Engineering from Arizona State University in 1993 and is a Registered Professional Engineer in Arizona and Utah. He is a Principal of Sunrise Engineering with more than 17 years of experience in all areas of civil engineering. Mr. Potter is experienced in project management, budgets, schedules, quality assurance, quality control, and construction phasing, water/wastewater, roadway design, and drainage design. He has worked on a broad range of projects involving site grading and drainage, area drainage master plans, storm drain design and solving drainage issues.

RECENT/RELEVANT EXPERIENCE***Skyline Wash Apex Drainage – Buckeye, Arizona***

The proposed development is located within a published Federal Emergency Management Agency (FEMA) floodplain Zone A and administrative floodways in an active alluvial fan area downstream of the Skyline Wash apex. due to the uncertainty in flow pass and flow distribution on active alluvial fans, standard hydrology approaches are not applicable to the design of an offsite drainage system for a development downstream of the apex. Mr. Potter is the Project Principal for the project.

Van Buren Street Drainage DCR - Avondale, Arizona

Mr. Potter was the Project Principal for the Maricopa County Flood Control District to complete a Design Concept Report for a storm water conveyance structure or channel along Van Buren Street. The purpose of the project was to look at ways to alleviate flooding at Van Buren and 99th Avenue and if possible reduce retention requirements for the Avondale City Center project. The project analyzed existing and future conditions and recommended alternatives to convey flow along Van Buren Street to the Agua Fria River. Project Tasks included collection and compilation of existing utility and general base mapping information from several sources. Manipulation and analysis of the existing hydrology models and rainfall data for the project. Creation and analysis of existing and future hydrologic and hydrograph models using NOAA ATLAS 14 rainfall data.

27th Avenue Landfill Erosion Mitigation – Phoenix, Arizona

The 27th Avenue Landfill is a 132-acre decommissioned landfill. Some of the existing downdrains were experiencing failure during heavy rainfall events. Sunrise Engineering was contracted to perform a topographic survey of each downdrain and a hydrologic analysis of the landfill to determine the contributing areas and peak flow volumes at each downdrain. Sunrise completed a hydraulic analysis and provided recommendations for improvements to each downdrain. Based on this analysis, plans, specifications and contract documents for the repair of each downdrain were developed. Sunrise also performed construction observation and management for the project. Mr. Potter performed project management and engineering tasks for the project.

19th Avenue Landfill Permanent Erosion Control & Drainage – Phoenix, Arizona

The 19th Avenue Landfill is a 200-acre landfill that has been capped and is no longer in use. Areas of the landfill have experienced rill development and surface erosion. Sunrise Engineering was contracted to perform hydrologic and slope analyses of the problem areas to determine the contributing area and peak flow volumes. Based on the findings of this

report, we developed plans, specifications and contract documents for erosion and rill repair, in addition to limiting future rill development at the landfill site. Sunrise was contracted to perform construction observation and management for the project. Mr. Potter performed project management and engineering tasks for the project.

Cactus Flower Storm Drain – Goodyear, Arizona

During heavy rainfall events several homes along Cactus Flower Road in Estrella Mountain Ranch were experiencing property damaging flooding. In response to this, the City retained Sunrise Engineering to perform a drainage study of the area to ultimately provide the City with solutions to the flooding problem. A drainage report was produced that identified three alternatives to mitigating the damaging flooding. Sunrise was then contracted by the City for the design of the selected alternative which included two innovative trench drains spanning Cactus Flower Drive and 400 feet of 36-inch pipe to convey it safely to a nearby wash. Sunrise Engineering followed up with complete construction administration and inspection services for the project. The project has proven a success for the neighborhood of Estrella Mountain Ranch and the City of Goodyear. Mr. Potter performed the hydrologic study, drainage report and pre-design tasks.

Magma Flood Retarding Structure – Pinal County, Arizona

Sunrise was contracted by LeSueur Investments to provide an evaluation of the impacts of a potential Dam Break of the Magma Flood Retarding Structure (MFRS) on downstream properties. The purpose of this study is to provide preliminary computer model results that show the flood boundary, depth, and timing at downstream areas of the dam caused by dam failure at two locations. The study area covers approximately 25 square miles. The dam failure was modeled under a 100-year 6-hour storm event condition, a probable maximum flood (PMF) condition, and a “sunny day” condition to predict the dam break flood wave peak flows, peak flood elevations, inundation boundaries and depths, and flood front travel times at specified downstream locations. Mr. Potter is the Project Principal.

South Mountain Avenue – Phoenix, Arizona

Sunrise Engineering provided half street improvement plans for South Mountain Avenue. Mr. Potter was the Project Principal and primary point of contact for the City of Phoenix. Proposed Improvements including curb, gutter and sidewalk created drainage challenges as the proposed curb restricted historic flows. Sunrise designed a 36-inch and 48-inch storm drain to convey the calculated 200 cubic feet per second flow. The project included a bore and jack crossing of existing SRP facilities, SRP approvals and extending existing storm drain facilities on 7th Avenue from South Mountain Avenue to Gary Way.

7th Avenue and Dobbins – Phoenix, Arizona

The City of Phoenix contracted Sunrise Engineering to prepare intersection improvement plans for the existing intersection at 7th Avenue and Dobbins Road. The existing configuration was unsafe and led to numerous traffic accidents as vehicles from the contiguous frontage road attempted to access northbound 7th Avenue. Working with the City, Sunrise Engineering designed an innovative solution that eliminated the non-standard configuration and reduced potential for traffic accidents. Mr. Potter was the Project Manager and oversaw completion of the construction plans and specifications.



CHILD

GEOFFREY POTTER, P.E.

Quality Assurance/Quality Control & Staffing

Mr. Child is one of four local Sunrise Principals - he has a B.S. in Civil Engineering and an M.S. in Construction, and he brings over 12 years of experience as a registered P.E. (AZ, CA, ID, MT, UT) with a focus on transportation and drainage construction projects. His previous experience includes managing multi-million dollar projects for ADOT. In addition, he has recently completed channel design and scour analysis for the FCDMC (Flood Control District of Maricopa County), Southwest Gas Corporation and the City of Mesa.

Education and Qualifications:

- M.S. – Construction Arizona State University

Registered Professional Engineer:

- Arizona, California, Idaho, Montana and Utah

Years in Profession:

- 10 Years – 7 Years with Sunrise

Memberships:

- ASCE – American Society of Civil Engineers
- CI – Construction Institute
- APWA – American Public Works Association

Certifications & Training:

- PSMJ Boot Camp
- NHI – Construction of MSE Walls & Reinforced Slopes
- NHI – Earth Retaining Structures
- Saddle Island Institute – Construction Scheduling Analysis
- ACI – Field Testing
- ATTI – Field Technician

Prior to joining Sunrise Engineering, Mr. Child worked for the Arizona Department of Transportation in their EIT Rotational Program and as a Transportation Engineering Specialist/Project Supervisor in the ADOT-Phoenix Construction District. He has performed inspections on post-tensioned concrete bridges, concrete drainage channels, FEMA Flood Walls, grading, soil compactions, PCCP (Portland Cement Concrete Pavements), asphalt paving, reinforced box culverts, catch basins, median cable barrier and signing and striping (including freeway overhead sign installations). His responsibilities included managing the project schedule and budget, supervising field inspectors and writing change orders and letters of agreement between ADOT and the contractor.

RECENT/RELEVANT EXPERIENCE

Bethany Home Road Local Drainage - Phoenix, Arizona

Currently under contract with the City of Phoenix, Sunrise was hired to perform all the engineering design work necessary for the construction of new 8” solid -grouted CMU and standard 30” floodwalls and reconstructed/re-graded driveways (designed for the 100-year event) in order to alleviate drainage problems affecting residents along West Bethany Home Road. This project’s scope includes field surveys, preparation of detailed plans and cost estimates. Sunrise will also utilize HD Scanning for the preparation of the topographic base-mapping and surveying to provide accurate data along the proposed drainage improvements of each residential lot. Mr. Child was the Project Manager responsible for completing the hydrology, hydraulic calculations and construction plans and details.

Myrtle Avenue Drainage Mitigation Project - Phoenix, Arizona

Currently under contract with the City of Phoenix, Sunrise is contracted to alleviate drainage problems affecting residents in the Myrtle Avenue cul-de-sac just east of N. Central Avenue and W. Northern Avenue. Sunrise's scope involves all engineering work necessary for field surveys and preparation of detailed construction plans, cost estimates, and special provisions for the construction of the new drainage channel. Specifically: review and acceptance of the existing drainage study and feasibility of alternatives; public meetings and interviews with local residents, topographic surveying and base-mapping of the section from Central Avenue to the cul-de-sac on Myrtle and it's outlet on 3rd Avenue; a Central Avenue and Myrtle Avenue intersection Split Flow Analysis to determine the accuracy of the existing Drainage Report; and preparation of the construction documents. Child was the Project Manager responsible for completing the hydrology, hydraulic calculations and construction plans and details for the project.

Hermosa Estate Channels and Box Culverts - Mesa, Arizona

Sunrise Engineering was retained by Nicholas Homes for the planning, platting and construction documents for Hermosa Estates subdivision. This 31 lot project is located on 37-acres in the Desert Uplands area of the City of Mesa. The site had several 404 washes traversing through it which required an individual 404 permit from the Army Corp. The bottoms of the washes were left in their natural state while the sides were rip-raped and landscaped for bank protection. The home sites were strategically placed within project to maintain the desert feel of the site. This project included improvements to Hawes Road and Hermosa Vista Road adjacent to the site as well as on-site improvements such as roadways, water and sewer utility service.

Sonoqui Wash/Channel Rerouting FCDMC - Maricopa County, Arizona

Sunrise Engineering was hired by Ranchos Legante to provide civil improvements to 80 acres of land. These improvements included providing an alternative to the FCDMC's proposed Sonoqui Wash/Channel and region detention basin on this parcel. Sunrise was able to work with the FCDMC to reroute two branches of the wash (3000 cfs and 2100 cfs).

Augusta Ranch Master Association Flood Control Channel - Mesa, Arizona

Mr. Child served as Project Manager and Lead Designer for the Augusta Ranch Flood Control Channel project. Scope of work included a preliminary investigation and survey for existing drainage channel problems. He prepared plans to re-grade the existing channel, eliminating standing water which had given rise to a prolific pest population. The design also included the reconstruction of an existing drop structure. Mr. Child secured the contractor and oversaw construction throughout the project.

27th Avenue Landfill Erosion Mitigation - Phoenix, Arizona

The 27th Avenue Landfill is a 132-acre decommissioned landfill. Some of the existing down-drains had failed during heavy rainfall events. Sunrise Engineering was contracted to perform a topographic survey of each down-drain, and a hydrologic analysis of the landfill to determine contributing areas and peak flow volumes at each down-drain. Mr. Child served as the Project Engineer, while completing a hydraulic analysis and recommending improvements to each down-drain. Based on this analysis, Mr. Child developed plans, specifications and contract documents for the repair of each down-drain. In addition to the design phase, Sunrise was contracted to perform construction observation and management for this project.

19th Avenue Landfill Drainage - Phoenix, Arizona

The 19th Avenue Landfill is a 200-acre capped and decommissioned landfill. Surface erosion had lead to numerous rills at various locations surrounding the landfill. Sunrise Engineering was contracted to perform a hydrologic and erosion analysis of problem areas, and developed recommendations to mitigate the growing problem. Based on the findings, Sunrise devised contract documents for improvements to repair rills and surface erosion, and limit future rill development. Mr. Child served as the Project Engineer, performing construction observation and management for the project.

**Education and
Qualifications:**

- M.S. – Hydraulics & River Dynamics
- B.S. – Engineering Mechanics, N. China Institute of Water Conservancy & Hydropower

**Registered Professional
Engineer:**

- Arizona, Wyoming, and Utah

Years in Profession:

- 27 Years – 11 Years with Sunrise

Memberships:

- ASCE – American Society of Civil Engineers
- ASDSO - Association of State Dam Safety Officials

LI QI, P.E.**Hydrology Modeling**

As a licensed professional engineer and Project Manager for Sunrise Engineering, Mr. Qi brings more than 27 years of experience in hydraulics, hydrology, groundwater and environmental projects, as well as a solid scientific knowledge of hydraulics, hydrology, mathematics and numerical modeling. Prior to joining Sunrise, he developed a three-dimensional groundwater flow model, BFCC. Shortly thereafter, he obtained the Second Award of Science and Technology Advances from the China Ministry of Power Industry for successfully applying his model to predict water-table, pressure distribution and seepage for Laxiwa Hydropower Project and Nina Earth Dam, China. Since joining Sunrise's hydrogeology team in 1998, Mr. Qi has worked on many watershed hydrology, surface water hydraulics, floodplain, city water supply, storm water drainage, roadway hydrology / hydraulics, groundwater, dam safety, and well engineering projects.

RECENT/RELEVANT EXPERIENCE**Skyline Drainage Study & Flood Control Design - Buckeye, Arizona**

Ward Development was proposing the construction and development of Skyline 106, an approximate 300 acre subdivision with 215 lots located in the Town of Buckeye, Maricopa County, Arizona. Sunrise performed an off-site and on-site drainage analysis, and designed the flood control system that includes one detention basin, open channels, box and pipe culverts, curb and gutters for existing and proposed streets, retention ponds, and erosion protections based on the Flood Control District of Maricopa County Drainage Design Manual for Maricopa County, Arizona, and the Arizona Department of Transportation Highway Drainage Design Manual.

MVW Linear Park Hydrologic Study and Drainage Design - Caliente, Nevada

Served as task leader and manager for the project. The primary goal of the project was to build a city park along Meadow Valley Wash within the City of Caliente, for environmental protection and recreation purposes. Because of the serious flooding problems existing in Caliente, an important component of the project was a new drainage system for flood control. Hydrologic analyses (SEDCAD models) were performed to develop the hydrographs for 2-, 5-, 10, 25-, 50, and 100-year storm events and sediment loads released from the two watersheds. Open channel hydraulics and sediment transport analyses (HEC-RAS models) provided the conceptual hydraulic design data for the Meadow Valley Wash Linear Park Improvements along the sections within the city limits.

Van Buren Street Design Concept Report - Avondale, Arizona

Sunrise has been retained with the Flood Control District of Maricopa County to perform a drainage design study to provide alternative solutions to the flooding hazards in Avondale and the City of Tolleson. The study modified the preferred alternative proposed by the Durango Area Drainage Master Plan through hydrologic modeling and conceptual drainage system design. The second purpose of this project is to convey the storm water from 99th Avenue to the Agua Fria River to reduce the flows that previously discharged to the Durango Outfall Project channel. Sunrise conducted a series of HEC-1 model runs to analyze the hydrology for different storm frequencies and durations. Based on the model results, relative federal, state and county regulations, and site conditions, Sunrise conceptually designed the flood control system that includes two detention basins, open channels, storm water trunk lines, box and pipe culverts, and erosion protections.

Hydrologic Study for Magma Flood Retarding Structure - Magma, Arizona

The Magma FRS, located in Pinal County, Arizona, is a 5.3 mile long earth dam that was designed and built in early 1960's for the purpose of retarding the storm runoff contributed from the upper drainage area. Current regulations classify this structure a high hazard dam. Many deficiencies have been determined and need to be fixed. This hydrologic study was prepared for the future Magma FRS rehabilitation design. The off-site and on-site hydrology was modeled to develop the design needed hydrologic data in compliance with current State of Arizona and National NRCS regulations and to preliminarily estimate the height of the new Magma FRS using both the broadly used level-pool and a State suggested dynamic-wave reservoir routing procedures.

Storm Water Management Study for Section 11 Centennial - Weld County, Colorado

This study developed conceptual drainage design data for the management of the storm water generated on and around the Section 11 Centennial Project site. The output from the study was utilized for the gravel mining operation permit application. In addition to the existing drainages, the proposed drainage system includes two diversion channels, one crossing culvert, and one detention / sediment pond. Watershed hydrology, channels and culvert hydraulics, pond routing and sedimentology, and design concepts for these structures were modeled using a hydrologic / hydraulic / sediment analysis computer program, SEDCAD 4 for Windows.

Hydrologic Study for the Cove Fort-Sulphurdale Geothermal Development Sulphurdale, Utah

This study developed the design needed off-site hydrologic data for the proposed geothermal development located in the Fishlake National Forest, Sulphurdale, Utah, in compliance with current State of Utah regulations. Two earth dam-reservoir systems are being designed for the geothermal plant. Based on the State Dam Safety Administration Rules, these dams will be high hazard dams and must be designed based on a modified Probable Maximum Precipitation (PMP), known as the Spillway Evaluation Precipitation (SEP). The SEP rainfall depth and distribution have been generated by the Utah Dam Safety.

The off-site hydrology HEC-1 model was developed for the two dams. The generated SEP hydrographs were used to determine the dam top elevations, freeboards, emergency spillway crest elevations and configurations, discharging pipe diameters, and other design features.

**Education and Qualifications:**

- M.S. – Civil Engineering, Utah State University
- B.S. – Civil and Environmental Engineering, Utah State University

Registered Professional Engineer:

- Utah

Years in Profession:

- 4 Years – All with Sunrise

Memberships:

- ASCE – American Society of Civil Engineers

DEREK ANDERSON, P.E.**Hydraulic Modeling**

Mr. Anderson's expertise includes hydraulics, hydrology, geotechnical engineering and geothermal resource investigations and assessment. His recent project experience includes comprehensive evaluations and feasibility studies of both small and large-scale hydro-electric projects, hydro-electric facility design, on projects such as Lewiston Dam and Chester and geothermal resources exploration. He also has experience working on drainage studies, sediment transport analysis, dam break studies, and hydraulic structure designs including culverts, inverted siphons, detention basins, and energy dissipation structures, and preparing CLOMR and LOMR requests to the Federal Emergency Management Agency.

RECENT/RELEVANT EXPERIENCE**Meadow Valley Wash Linear Park - Caliente, Nevada**

The primary goal of the project was to build a city park along Meadow Valley Wash for environmental protection and recreation purposes. Because of the serious flooding problems existing in Caliente, an important component of the project was a new drainage system for flood control. Hydrologic, hydraulic, and sediment transport modeling provided preliminary hydraulic and sediment control design concepts for the off-site drainage improvement along a section of Meadow Valley Wash and a section of Clover Creek within the Caliente City limits. Hydrologic, hydraulic, and sediment transport models were developed to simulate design flood conditions.

Fountain Green Off-Site Drainage Study - Fountain Green, Utah

The purpose of the project was to conduct an offsite drainage analysis to determine the problems existing in the drainage basin and possible solutions. Flooding from two normal summer storms (estimated less than 5-year events) generated unusually high runoffs that overtopped the over-bank of the natural drainage channel and flooded portions of Fountain Green City. Hydrologic and hydraulic models were developed to simulate the design flood and recommendations for solutions to the drainage problems were determined.

B Canal Inverted Siphon Culvert Hydraulic Design - Rupert, Idaho

The purpose of the project was to design an inverted siphon culvert along B Canal as part of an improvement project for the Idaho Transportation Department (ITD) in the City of Rupert, Idaho. HEC-RAS hydraulic modeling software was used to model a 1000 foot section of B-Canal approximately 500 feet upstream and downstream of the proposed inverted siphon culvert. Four models were created in order to effectively duplicate the current site conditions and model the proposed site conditions to provide the necessary technical data relevant to the hydraulic design of the culvert. These models included the existing conditions model, the existing inverted siphon calibration model, the proposed culvert model and the scour analysis model.

Arroyo Sereno Conditional Letter of Map Revision (CLOMR)- Surprise, Arizona

This study was undertaken to provide the necessary technical data for issuance of a Conditional Letter of Map Revision for the Arroyo Sereno Development project in the City of Surprise, Arizona. Preliminary channel designs along Wash 9 East and Wash 9 East Split were determined and the effect on the 100 year flood water surface elevations in the project area was calculated. Hydraulic models were developed to simulate the design flood.

Silvercrest Estates Letter of Map Revision (LOMR) - Riverton, Utah

This study was undertaken to provide the necessary technical data for issuance of a Letter of Map Revision for the Silvercrest Estates project in Riverton City, Utah. The newly constructed flood control channel (Midas Creek) and culverts were modeled to determine the effects of the 100 year flood event on water surface elevations within the project area. Hydraulic models were developed to simulate the design flood. The water surface elevations and flood inundation areas were plotted on the Flood Insurance Rate Map.

Hydrologic Study of the Cove Fort Geothermal Plant - Cove Fort, Utah

The hydrologic study was conducted for the proposed earth dams in the Cove Fort, Utah geothermal development project. The study was performed to characterize the hydrologic conditions and the area to be potentially impacted by flooding as a result of failure of the dams. The State Evaluation Precipitation (SEP) and the Probable Maximum Precipitation (PMP) were generated based on the procedures outlined in the State Dam Safety regulations and in NOAA report HMR-49. The off-site hydrology was analyzed and the modeled hydrographs were routed through the dams and emergency spillways. Conceptual hydraulic design for the dams has been performed based on the model results. A dam break analysis was conducted and an inundation map was generated for an Emergency Action Plan (EAP). Future tasks include the design of these improvements in a seismically active area.


Education and Qualifications:

- Ph.D. - Geological Engineering, University of Wisconsin
- M.S. - Mining, University of Wisconsin
- B.S. - Civil-Hydroelectric Engineering, Wuhan University, China

Registered Professional Engineer:

- Utah, Nevada, Oregon, California and Alaska

Professional Geologist:

- Utah

Years in Profession:

- 29 Years – 13 Years with Sunrise

Training:

- 40-Hour OSHA Hazardous Waste Operations Training
- SuperPave Mix Design & Analysis Level I & II

JOE ZHAO, P.E., Ph.D.
Dam Engineer

Dr. Zhao has extensive training and experience in dams, hydroelectric and geological engineering. He obtained his B.S. in civil engineering with the specialty of water resources and hydroelectric engineering in Wuhan University, China in 1982 and his Ph.D. in geological engineering at the University of Wisconsin-Madison. He designed and/or participated in more than twenty small to large scale dams and hydroelectric projects. He is experienced in dams and hydroelectric engineering from site selection, geotechnical investigations, seepage and slope stability analysis, seismic analysis, and structural design for new structures and evaluation and rehabilitation of existing structures. Some examples of the relevant projects are: design and evaluation of Luotian No. 5 dam and hydroelectric project, Hubei, China; design and construction support of Brough earth-fill dam rehabilitation, Utah; design and construction support of Chester coffer dam; design and evaluation of Cove Fort earth-fill dam for the proposed cooling reservoir, Utah; drain, filter and stability evaluation of Corn Creek dam, Utah; stability evaluation of the left bank of Hebgen Dam and the concrete dam/intake structure of the Juniper Ridge hydroelectric project, Bend, Oregon.

RECENT/RELEVANT EXPERIENCE
Design and Construction Support for the 75-ft High Brough Earth-Fill Dam Outlet Rehabilitation, Harward Irrigation Systems, Uintah County, Utah, 2003.

Harward Irrigation Systems and Ouray Park Irrigation Company in Utah planned to pressurize their irrigation pipes. Before the irrigation system was pressurized, the intake structure in the earth-fill dam needed to be modified. The first step of the project was to line the existing 30" reinforced concrete outlet pipe with a 24" steel pipe in the dam. The annulus space between the existing concrete pipe and the new steel pipe was grouted under pressure. Two of the main challenges for the project were the insertion of the long steel pipe into the conduit of the dam and grouting of the pipe without creating hydraulic fractures in the earth-fill dam. The work included evaluation of the dam stability and seepage under grouting pressure, design and specifications of the steel liner and construction procedures, specifications for the grouting system, and design and construction of the intake structure with a trash rack. The work also included design and evaluation of excavation for the construction of the intake structure with a trash rack.

Design and Construction Support for the 30-ft High Earth-Fill Cofferdam for the Chester Diversion Dam Hydroelectric Project, Fall River Electric Cooperative and Madison-Freemont Irrigation District, Idaho, 2011.

Three horizontal Kaplan turbine/generator units are being installed at the existing Chester diversion concrete dam on the Henry's Fork of the Snake River, Idaho. One of the main challenges of the project was to design, permit and construct a coffer dam for the construction of the hydroelectric intake. Various types of coffer dams were evaluated and compared before an earth-fill dam was selected. The scope of work included geotechnical investigation by coring in fractured basalt rock and evaluating earth materials. Before obtaining a permit for the coffer dam from FERC, comprehensive studies, modeling and evaluation of the dam were conducted. The analysis included field permeability tests, numerical modeling of seepage and slope stability using Seep and GeoSlope under static and earthquake loads, sensitivity analysis by assuming various soil properties, and design and specification of geomembrance. The coffer dam has been completed and functions well for the purpose of the hydroelectric project.

Design and Evaluation of 45-ft High Earth-Fill Dam for the Cooling Water Reservoir for the Geothermal Development at Cove Fort/Sulphurdale Area, Beaver County, Amp Resources, LLC, Utah, 2005

Geothermal water was developed in the Cove Fort/Sulphurdale area. A 45-ft high earth-fill dam for the cooling water reservoir was proposed as part of the site development. Two challenges related to the design of the earth-fill dam were 1) intense seismic loads with design peak ground acceleration of 0.39g, and 2) the native soils were soft and liquefiable. Comprehensive drilling, sampling, laboratory testing, numerical modeling and analysis were conducted for the design of the dam. The analysis included static and dynamic loading before and immediately after the reservoir is filled.

Design and Construction Support of the 28.5-ft Concrete Intake Dam for the Juniper Ridge Hydroelectric Project, Bend, Oregon, 2010

The 5.0 MW Juniper Ridge Hydroelectric Project included a 28.5-ft concrete intake dam. The dam with a forebay was designed and constructed in an existing canal to divert water through a 3-mile long 108" diameter steel pipeline leading to the hydroelectric plant. The scope of work included drilling in the fractured basalt rock, site evaluation, stability of the dam and structural design, and construction support. Two main challenges related to the design of the intake dam were 1) how to use the rock to help save on concrete, and 2) how to seal the abutment between the concrete structure and the fractured basalt. Significant savings of concrete was achieved by using the native basalt rock to stabilize the concrete dam.

Slope Stability Analysis for the Proposed Hebgen Dam Hydroelectric Project West Yellowstone, Montana, 2004

This slope stability evaluation was a part of the Environmental Impact Study (EIS) for the proposed hydroelectric plant at the existing Hebgen Dam near West Yellowstone, Montana. Because of its location in a high seismic area, extensive geotechnical investigation and evaluation were required for the foundation design of the plant and stability of the left bank at the dam. This investigation evaluated the foundation soils and stability of the left bank, and provided slope stabilization alternatives. The investigation included: borehole drilling, seismic refraction survey, soil testing, slope stability modeling using SLOPE/W, engineering analysis and a report.

Dam-Break Modeling & Emergency Action Plan, Mt. Pleasant, Utah, 2000

Conducted dam-break modeling of the Pressure Irrigation Holding Pond owned by Mt. Pleasant City using the NWS Simplified Dam Break Flood Forecasting Model SMPDBK. Flood flow conditions were modeled to predict dam break flood wave peak flows, peak flood elevations and peak travel times. Inundation maps and flood arrival time and depth matrix were prepared for the City. Strategies to protect lives and reduce damage to properties of Mt. Pleasant and Sanpete County residents who live along Pleasant Creek were contained in an Emergency Action Plan.

**Education and Qualifications:**

- B.S. – Civil Engineering, Northern Arizona State University

Registered Engineer-in-Training:

- Arizona

Years in Profession:

- 2 Years – 1 Years with Sunrise

Memberships:

- ASCE – American Society of Civil Engineers - NAU Chapter
- Engineers w/o Borders - NAU Chapter

RANDY PERHAM, E.I.T.**Cost Estimating**

Mr. Perham holds a B.S.E. in Civil Engineering from Northern Arizona University. He is a certified Engineer-in-Training whose roadway and intersection improvement work experience includes completing engineering tasks for Mesa's Arterial Reconstruction and Pavement Rehabilitation projects, design and construction administration assistance for Chandler's Knox Road Traffic Calming project, and utility research and coordination for Tempe's Broadway Road / Priest Road Intersection Improvements project. Mr. Perham has also performed significant utility coordination tasks for a wide range of other project types including: commercial developments, waterline projects, site security wall construction and drainage projects. Mr. Perham's Utility Coordination Experience comes through formal and informal on the job training including attendance at training sessions provided by Arizona Blue Stake, and familiarity and use of AUCC's Public Improvement Project Guide. Specific utility coordination tasks have included: existing utility location investigations for the purposes of base-map creations in AutoCAD and coordination and tracking activities associated with utility companies and municipalities regarding potential utility conflicts and resolution.

RECENT/RELEVANT EXPERIENCE***Big Park DWID Cost Estimate Update – Oak Creek, Arizona***

Engineering Intern. The Big Park Domestic Wastewater Improvement District wished to update an existing ten year old cost estimate for future improvements. Work included updating unit prices to reflect present day costs. Sunrise personnel contacted Northern Arizona contractors to obtain current unit prices for items such as pipe, manholes, cleanouts, services etc and then input the new data into the cost estimate spreadsheet.

Skyline Aquatics Center – Mesa, Arizona

Mr. Perham completed the storm drain profiles for this City of Mesa design-bid-build project. The project is located in the existing parking lot of Skyline High School. It encompasses 2.5 acres and includes 10,500 square feet of building space for offices, classrooms, locker rooms, shower room, and pump rooms. Mr. Perham was responsible for all Civil site design tasks including grading and drainage, rerouting existing utilities, cost estimates, coordination of survey efforts, submittals and coordination with the client.

Tempe Fire Department Fleet - Tempe, AZ

Mr. Perham worked on the drainage report for the redevelopment of this existing site and 20,000 SF office/warehouse building located approximately one block south Apache Boulevard and a half mile west of Price Road.

Sewer Interceptor Modeling - Queen Creek, Arizona

Mr. Perham used H2O Map software to create a model of the town's wastewater system using surveyed data and GIS data. Drainage basins for the system were then defined. The sewer model was created, calibrated and then used to model the existing conditions, future conditions at general plan build-out, and potential future build-out with expansion areas included. Sunrise Engineers then created several useful color exhibits to show current % full, undersized pipes and possible alternative solutions.

Ocotillo Verde – Pinal County, Arizona

Ocotillo Verde is a 140-acre 500-lot single family development located in Pinal County, Arizona. Mr. Perham worked on the hydrology study and hydraulic design of the project drainage components using HEC-RAS and other hydraulic modeling software. Additionally, Mr. Perham contributed in the preparation of the project drainage report.

Myrtle Avenue Drainage Improvements – Phoenix, Arizona

Civil Designer. Mr. Perham worked on the split flow analysis using HEC-RAS to create a hydraulic model of the intersection. The City of Phoenix Streets Transportation Department hired Sunrise to complete designs for a proposed drainage ditch solution for 163 W. Myrtle Avenue to 3rd Avenue to alleviate drainage problems in the Myrtle Avenue cul-de-sac. Services included review of existing drainage studies, interviews with residents impacted during high volume rainfall events, detailed topographic survey incorporating HD scanning technology, a split flow analysis for Central Avenue/Myrtle Avenue Intersection, basemapping, and preparation of construction documents.

Broadway and Priest Road Intersection Improvements – Tempe, Arizona

Mr. Perham performed the utility research and coordination for this City of Tempe project that included the addition of a right turn lane and two bus bays for the intersection. Work also included an overlay of the entire intersection and approaches; signal modifications; signing and striping; street lighting modifications; and geotechnical consultant coordination.

Signal Butte Road 16" Waterline – Mesa, Arizona

Currently under contract with the City of Mesa, Sunrise will perform the topographic survey, boundary, easements and final engineering plans for approximately 2.25 miles of 16" waterline from East Sonneto Avenue to East Pecos Road. To be completed under multiple phases, the project's first phase will include: establishing horizontal and vertical control and setting aerial panels for mapping; aerial topography and basemapping of the project extending 100 feet to the left and right of the proposed pipe alignment including existing utilities; hydrology investigations to determine the extent of impact of off-site flows to the proposed pipeline; and preparation of the 30% preliminary plans. Mr. Perham served as the Engineering Intern creating basemaps and pipe networks.

Source Protection and Wastewater Needs Assessment - Tonto Village, Arizona

Engineering Intern. Tonto Village's potable water wells are in danger of contamination by the numerous failing private septic systems located within the populated rural community. Sunrise Engineering was hired to analyze possible solutions including relocation of the existing wells and/or replacement of the existing septic tanks with a central treatment plant and collection system. Exhibits and cost estimates were prepared and preliminary calculations performed in support of the analyses.



LOGAN SIMPSON
DESIGN INC.

Jackie Keller, RLA
Senior Landscape Architect

Jackie is a registered landscape architect who began her professional career in 1984. She has a diverse background in landscape architecture with emphases in site planning and design, recreational planning and design, environmental inventory and analysis, native revegetation, cultural and environmental interpretation, construction documents, and supervision of construction implementation. Jackie has been involved in a wide range of public and private sector projects interacting with many municipalities and agencies throughout Arizona, Nevada, Texas, and California. Jackie has also been involved in many park and recreational projects as a project landscape designer/architect/manager. Specific duties ranged from technical assistance to project planner/designer for site planning, grading, hardscape, landscape and irrigation design, and consultant coordination. In addition, public participation and involvement have been integral components in many of Jackie's design projects in order to build community support. Her ability to conduct and facilitate public meetings and input from communities, neighborhoods, special interest groups, stakeholders, and client staff is a key strength that has proven to be very valuable in gaining public acceptance of controversial solutions.

Education

B.S., Landscape Architecture, Purdue University, 1984

Professional Registration

Registered Landscape Architect, Arizona #23436

Selected Projects

East Maricopa Floodway (Rittenhouse and Chandler Heights Basins). Flood Control District of Maricopa County (FCDMC). Responsibilities: project landscape architect for landscape design; native seeding; contour grading of land forms and berms; weir structures, headwalls, and safety railing aesthetics; and multi-use path grading and design for these 120-acre and 200-acre basins, respectively. The projects provide the framework for future regional recreational areas for the Town of Gilbert, as well as for segments of the Maricopa County regional multi-use trail system.

Sonoqui Wash Channelization Phase I. FCDMC. Responsibilities: project landscape architect for a recreation planning project for Sonoqui Wash Channel, a major link connecting the San Tan Mountain Regional Park to the East Maricopa Floodway, which in turn provides linkage to the Salt and Gila Rivers. Logan Simpson Design Ink. (LSD) performed landscape planning, biological, cultural resources and Clean Water Act Section 404 Permitting services for this project.

Sonoqui Wash Channelization Phase II. FCDMC. Responsibilities: project landscape architect for an improved continuation of the Phase I channel aesthetics that addressed the post construction issues of erosion and lack of initial landscape installation. This included the exposure of the channel riprap up to the 10-year flood event with a meandering top line to reinforce the fluid movement of the channel grades. In addition, a larger decomposed granite material was placed above the large riprap to prevent any rilling of slopes and to better establish the native hydroseed mix. Tall pots were also utilized to assist in establishing the natural desert wash character without the use of an irrigation system. The constrained corridor widths were designed to maximize the upland area for landscaping and the multi-use path opportunities. Areas adjacent to the Town of Queen Creek parks were designed with more gentle slopes to provide a sense of openness and invitation for Sonoqui Wash corridor users.

Hohokam Area Drainage Master Plan. FCDMC. Responsibilities: coordinated with the FCDMC's project manager and public information officer to develop a public involvement program based on a "grass roots"

effort for specific neighborhoods and population sectors. Developed a calendar of events and points of contact for the City of Phoenix and City of Tempe residents, including village planning and block watch meetings, neighborhood associations and areas, and special community events and organizations within the study area. Based on a summary of these components, provided recommendations for future public and neighborhood meeting dates and venues to capture the highest level of public participation possible.

Skunk Creek Linear Park Master Plan. FCDMC. Responsibilities: project landscape architect/planner for this 3.5-mile linear park master plan located within the confines of Skunk Creek. Developed multi-use paths and equestrian trails to compliment the regional trails network that would eventually connect the Phoenix Mountain Preserves to New River, Agua Fria River and Lake Pleasant. Provided connections and access points for adjacent communities, regional parks, and several neighborhood parks. Provided an important amenity for the equestrian community by completing a 13-mile equestrian trail loop containing a 10-foot-wide multi-use path and 15-foot-wide equestrian trail which meander both in and outside the channel with trailheads, rest areas with shade, benches, drinking fountains, trash receptacles, natural interpretive gardens, and directional signs.

Pinal County Open Space and Trails Master Plan. Pinal County. Responsibilities: project planner for the Pinal County Open Space and Trails Master Plan and the Pinal County Comprehensive Plan Amendment. The master plan will provide a wide range of recreational opportunities at the 3.5-million-acre, countywide park and trail level that are appropriate to the desert environment. The public outreach program included a series of public workshops and working with stakeholders consisting of a variety of local agencies and special interest groups throughout the planning process. LSD worked with each community within the county to identify existing and future arterial roadways, bike lanes, and utility easements (above and below ground) within the study area.

Cave Buttes Recreation Area Master Plan. City of Phoenix. Responsibilities: project manager and park planner for this 3,000-acre recreational master plan located north of Cave Buttes and Cave Creek Dams in northern Phoenix. Predominately located within a 100-year floodplain created by Cave Creek and Apache Washes, the goal is to develop a multi-use regional recreational facility that preserves, conserves, and interprets the natural and cultural resources while providing special activity recreation facilities. The master plan, requiring close coordination with FCDMC, involved the siting and spatial relationships of softball, youth baseball, soccer, and multipurpose fields; a major environmental education center; ranger station/administration office; restroom/concession buildings; a maintenance facility; an 18 hole golf course; a large group picnic area; model airplane flying; archery; disc golf course; day camping; a dog show/training/park area; multi-use paths and trails; interpretive trails; a play ground area; wildlife observation; and a lagoon. The public participation program included media public notices, fact sheets, and flyers for public meetings and open houses conducted by LSD.

Peoria Parks, Recreation & Open Spaces Master Plan. City of Peoria. Responsibilities: served as the project planner for this community-wide master plan, which provides City staff with an "implementation-oriented" document including a vision, goals, objectives, and strategies to ensure future development of public recreational facilities and open space acquisition. This master plan was developed with a statistically valid, city-wide public needs assessment and participation program; involvement of a staff advisory committee to ensure planning, programming, implementation, and maintenance concerns were addressed; and a prioritized implementation program identifying specific actions, responsibilities, appropriate funding opportunities, and a proposed schedule. Final master planning was based on existing studies and an accurate analysis of existing and proposed Maricopa Association of Governments regional open space and trail plans, Lake Pleasant Regional Park programs, adjacent municipal recreation plans and programs, and the large-scale Planned Area Developments of Lake Pleasant Heights, White Peaks Ranch, Lakeland Village, and West Wing Mountain. The culmination of this comprehensive planning process provided a Master Plan consistent with the goals, objectives, and policies of the City's adopted General Plan, Desert Lands Conservation Master Plan, and the Rivers and Trails Master Plans.

SCOTT D. NEELY, P.E.

PRINCIPAL
TERRACON CONSULTANTS, INC.

PROFESSIONAL EXPERIENCE

Mr. Neely is the manager of geotechnical engineering services and is responsible for coordination of geotechnical projects in the Phoenix area office. With over 22 years experience, he oversees project assignments, management, proposal, report preparation, and directs the geotechnical laboratory personnel.

Through his work experience, Mr. Neely has gained a working knowledge of the guidelines and regulations currently in use by local, state, federal and professional organizations. These include ASTM, AASHTO, ADOT, and local municipalities.

AREAS OF EXPERTISE

- Distress investigations and remedial recommendations for rock slopes and embankments.
- Pavement thickness designs for residential, minor and major arterials and state highways. Overlay recommendations for a state highway projects using Heavy Weight Deflectometer data.
- Design of rock bolt patterns. Recommendations for tunnels or cut and cover founded in rock.
- Subsurface investigation using seismic refraction methods for water and sewer pipelines crossing bedrock formations, and use of resistivity equipment for grounding of electrical substation equipment.
- Perform geotechnical investigations including subsurface exploration, and engineering analysis for foundation and pavement design recommendations.
- Foundation recommendations for state and county highway bridges. Foundation recommendations using pressure meter test methods, including bearing capacities of drilled piers as high as 100,000 pounds per square foot.

PROJECT EXPERIENCE

Flood Control, Channels & Parks

- Va Shly' ay Akimel Salt River Ecosystem Restoration Project, Maricopa County, AZ, USACE
- Pima Wash Multi-use Path, Phase III, La Paz County, AZ
- 45 Acre City Park, Moore/Swick partnership, Maricopa County, AZ
- Chandler Bike Park, Maricopa County, AZ
- 11.5 Acre City Park, Design Workshop, Maricopa County, Arizona
- Transwestern Pipeline Stream Crossings, Coconino, Yavapai, Maricopa & Pinal Counties, AZ, Various
- US 60 99th Ave. to 83rd Ave. New River Bridge, Maricopa County, AZ, ADOT
- SR 95 Osborn Wash Scour Analysis – La Paz County, AZ, ADOT
- Denebito Wash Upper Bridge, Navajo Route N6720, Navajo Indian Reservation, Coconino County, AZ; Paiki
- Dam embankment evaluation at Star Ranch property, Colorado Springs, CO; City of Colorado Springs Utilities
- US 60 Bridge Replacement at San Carlos River, Gila County, AZ, ADOT
- MSE wall at Mariposa Community Health Center – Mariposa, AZ

EDUCATION

*Master of Science in Engineering,
Geotechnical Engineering, 1989, Arizona
State University*

*Bachelor of Science, Geological
Engineering, 1984, University of Nevada at
Reno*

REGISTRATIONS

*Professional Engineer: Arizona, California
and Colorado*

AFFILIATIONS

American Society of Civil Engineers

WORK HISTORY

*Terracon, Inc., Manager, Geotechnical
Engineering Services, Phoenix, AZ office,
1999 - present*

*Terracon, Inc., Project Geotechnical
Engineer, Colorado Springs, CO office
1993-1999*

*Western Technologies, Inc.,
Project Engineer, 1989-1993*

*Western Technologies, Inc.,
Field Engineer, 1985-1989*

EDUCATION

*M.S. Civil Engineering
Water Resources
Long Beach State University*

*M.S. Petroleum Engineering
University of Southern California*

*B.S. Civil Engineering
University of Southern California*

YEARS OF EXPERIENCE

*Joined Pacific 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*

PRESENTATIONS

*AZ Floodplain Management
Association / Maricopa County –
2006
ASCE - 2005
Land Development West
Conference – 2005
North American Lake
Management Society – 2005
StormCon – 2004
Arizona Water and Pollution
Control Association - 2005
American Water Resources
Association (AWRA) – 2004/2005*

UNIVERSITY COURSE INSTRUCTION

*CE 438 / 538 - Hydraulic Design
CE532 - Sediment Transport
CE 171 – Hydrology
CE466 – Environmental Systems
Design*

Bruce Phillips has water resources civil engineering experience dating back to 1981. With two master degrees in Engineering his areas of expertise include river engineering, floodplain hydraulics, fluvial systems and sediment transport analysis, stream geomorphology, and river stabilization / restoration. He has experience with numerous computer hydraulic models for steady state and varied flow analysis, along with two-dimensional hydraulic analysis. He has applied current state-of-the-art programs for watershed modeling of a variety of complex watersheds. He has developed specialized experience in river engineering, stream mechanics, fluvial geomorphology, and **alluvial stream modeling**, including design of river and stream restoration programs. Mr. Phillips' experience has provided him with background in watershed planning incorporating innovative techniques for streambank stabilization, geomorphic and bioengineering techniques, and successful riparian replacement programs. He has also prepared numerous sediment transport analyses on many of Southern California's rivers and streams, including moveable bed models, scour determinations, sediment budget modeling, debris generation, and **alluvial fan evaluations**. Particular areas of expertise include alluvial fan hydraulics and desert floodplain management systems. He has a background in complex hydraulic analysis and design of specialized river hydraulic structures involving innovative solutions for unique problems.

RELATED EXPERIENCE

The Reserve – Palm Desert, CA

Mr. Phillips served as the Project Manager to this first-class golf course/residential development nestled up against the Washington Mountains and located directly within a large alluvial fan. Therefore, the development had significant flood control challenges. PACE prepared a physical hydraulic model to test an innovative flood control system presented by PACE that would reduce the Lowe Corporation's capital investment by \$2 million and added premiums to lots surrounding the naturalized solution. A physical model was designed to investigate the erosion patterns associated with design alternatives for the proposed grade control structures. The model utilized a scale of 1:16 and evaluated the performance of one grade control structure located in a portion of the channel between other grade control structures. An 18-inch wide flume with a total length of 70-feet represented a portion of the channel width, ignoring the side effects. The model demonstrated which of the proposed designs produced the least scour at the drop structures. The positive results of the modeling program allowed the flood control system to receive Coachella Valley Water District approval. The resulting flood control system included a 6-acre signature entry lake with a 260-foot bridge spanning it, a plunge pool sediment basin capable of handling flows up to 35,000 cfs.

Wittman H3 Alluvial Fan Analysis – Maricopa County, AZ

Mr. Phillips led the effort to provide a hydraulic evaluation of the characteristics and overland flow necessary for developing a 2-D model to help identify drainage facilities and cost estimates of the H-3 Fan in the Wittmann ADMP Study area. The CAR involved collection of the necessary documents and available data to establish and revise the Hydrology and, perform flow 2-D analysis. PACE reviewed and collected existing hydrology, hydraulics, soil type and gradation data, land use and parcel maps, and culvert rating curves, using GIS-based techniques when applicable. Field reconnaissance of the existing watershed conditions as well as ground photo survey of fan conditions within the study boundary where also analyzed. PACE also performed GIS-based topography development and grid resolution determination. Baseline FLO-2D hydraulic model was used to prepare floodplain models. A sectional discharge analysis was used to estimate runoff hydrographs for model sections based on on-site property boundaries. PACE also determined the BOR hazard zones for the 100-year, 24-hour and 100-year, 6-hour storm events.

Desert Lakes Alluvial Fan Hydraulics and Master Planning – Coachella, CA

As Sr. Project Manager, Mr. Phillips led the efforts in the flood control channelization improvements consisting of providing debris trapping channels on the upstream side of the project site to intercept sediment. In addition, PACE provided grade control structures within each of the channels to ensure the long-term streambed location and dispersion channels on the eastern boundary of the project to return runoff from a channelized form to more natural sheet flow along the alluvial plain.

West Desert Hot Springs Watershed Analysis and Mapping Database – Riverside County, CA

Led by Mr. Phillips, PACE is currently developing the Master Drainage Plan for portion of Palm Springs and Desert Hot Springs within Coachella Valley, which do not have formalized Master Drainage Plans. A formalized regional drainage plan would identify regional solutions and ensure that necessary implementation of the required flood control facilities associated with the different development areas in order to mitigate the flood hazards. PACE developed a comprehensive geodatabase to serve as the technical foundation for the formulation of master plan alternatives which encompassed a wide variety of data sets and information categories in order to adequately evaluate project constraints and rate the ability to achieve project objectives.

Borrego Canyon Wash Stabilization Feasibility Study – Orange County, CA

Mr. Phillips is leading a qualitative analysis of the alluvial stream systems to understand the geomorphic characteristics of the existing watershed and floodplain stream corridor, and quantitative analysis 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. Analyses include 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 and a natural stream characteristics / geomorphology analysis to develop a basic understanding of the plan form, cross section and longitudinal view. Creek stabilization alternatives are being developed based on the results of the study and include 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.

Lytle Creek Floodplain and Geomorphic Stream Stability Study –San Bernardino, CA

Through geomorphic techniques rather than just solely through hydraulic modeling, Mr. Phillips was Project Manager of this assessment that focused on the most effective method of attempting to predict lateral stream erosion for a San Bernardino Kangaroo Rat Upland Habitat Conservation Area "island" within a dynamic ephemeral river system of Lytle Creek near Rialto, CA. In order to predict future lateral erosion, past river behavior must be thoroughly understood through geomorphic analyses since hydraulic modeling is not completely sufficient. In addition, the unique and active nature of the braided alluvial channel system present in Lytle Creek suggests the application of geomorphic techniques to predict the trends naturally occurring in the system that cannot be analyzed through mathematical models. In addition, sophisticated hydraulic modeling was performed with one dimension and two dimension models in order to validate the results of the hydraulics.

San Juan Creek Lateral Erosion Study – Orange County, CA

Mr. Phillips was the Project Manager for the San Juan Creek Lateral Erosion Study which identifies and evaluates structural and non-structural streambank control alternatives to protect properties within and adjacent to the regulatory floodplain from flood and erosion damage. PACE has prepared this lateral stability assessment of a portion of the San Juan Creek adjacent to the Rancho Mission Viejo PA-1 development area in order to support the proposed development planning process and address potential creek infrastructure requirements. The primary objective of this report was to evaluate the horizontal and vertical stability of this portion of San Juan Creek. This report provides the detailed technical engineering investigation and geomorphic application to define erosion hazard boundaries for the alluvial creek system. A detailed work program was developed through the evaluation of different techniques and procedures utilized by different agencies. Mr. Phillips served as Project Manager for the PA-1 Revetment project which included lateral streambank erosion analysis to determine reaches of the creek that did not need revetment. Once the floodplain areas were determined PACE designed 4,500 lf of soil cement /soil mixing revetment to provide protection of the channel from future lateral erosion and to provide flood protection for the adjacent development.

San Jacinto River Sediment Transport & Scour Analysis – San Jacinto, CA

Mr. Phillips is currently providing a sediment transport and scour analysis to determine the toe-down depth of the levee revetment and fluvial considerations associate with armoring structures, levee lining, and bridge protection measures and the change in conditions between existing and proposed conditions including the impacts of a proposed in-channel detention basin downstream of the project reach. The project analyses were performed on a qualitative level to understand the geomorphic characteristics of the existing river corridor, and second, a quantitative analysis involving detailed engineering hydraulic/fluvial modeling. The work effort includes the development of a moveable bed/sediment routing model along the defined portions of the river system to evaluate changes in the streambed during a storm event to evaluate general scour and the long-term scour. The sedimentation analysis was developed in two phase with Phase 1 being a state analysis which the study reach was broken in smaller segments for evaluation and Phase 2 was the more detailed fluvial model which utilized an unsteady moveable bed model, but building on the results from Phase 1. The Phase 1 applies the Army Corps of Engineers (ACOE) Sediment Hydraulic Package SAM, which is an integrated system of programs developed by the Flood Damage Reduction and Stream Restoration Research Program. The Phase 2 utilized HEC-6T to perform the detailed fluvial model for both specific storm events for general scour and also an assessment of a storm series for long term scour.



Andrew Ronnau, PhD, PE
Sr. Project Engineer

EDUCATION

PhD Civil Engineering
University of Illinois at Urbana-
Champaign

M.S. Engineering
California State University, Long
Beach

B.A. Physics
University of California at Berkeley

REGISTRATION

Professional Engineer / CA
2008 / 72851

YEARS OF EXPERIENCE

Joined PACE in 2005

AFFILIATIONS

American Society of Civil
Engineers (ASCE)

Andrew Ronnau has extensive experience working with numerical and mathematical models for engineering problems. Andrew 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. Andrew is proficient with the HEC-1, HEC-HMS, HEC-RAS, HEC-GeoRAS, AES, FLO-2D, and XPSWMM software packages.

PROJECT EXPERIENCE

CPH Rosamond Project – 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.

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

Residential Drainage Hydraulics and BMP Design for TTM 33461 – 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.

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.

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. The construction of this project is expected to be complete in 2010.

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.

Waveyard – Surprise, AZ

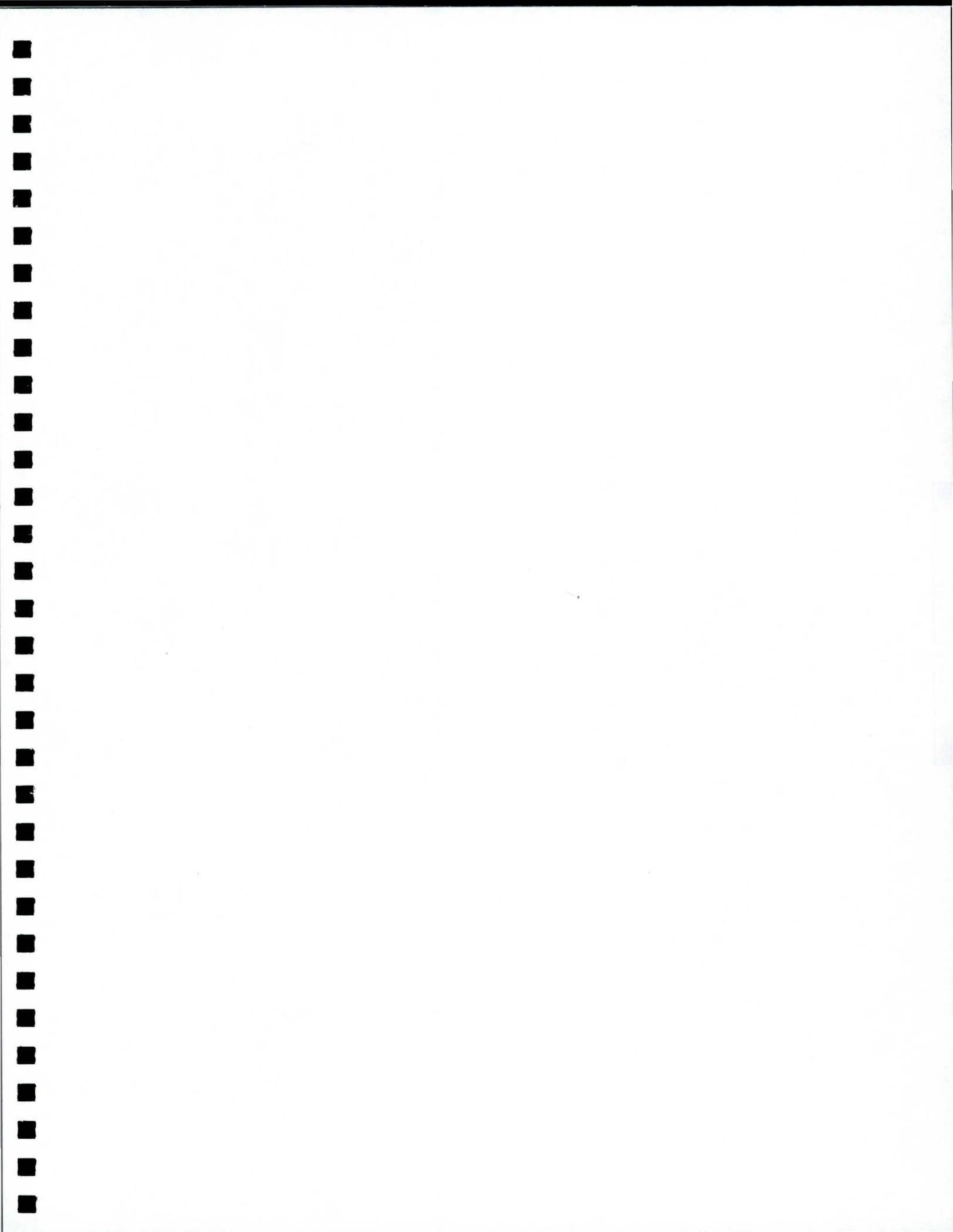
PACE is currently providing design for this extreme sport waterpark with the primary feature being a surfing pool capable of generating waves ranging from 4' to 12' in height using a pumping system with the ability to deliver a constant flow rate of approximately 1,700,000 gpm. Dr. Ronnau was responsible for calculating the dynamics of the head tank discharge. The mathematical model developed by Dr. Ronnau allowed the discharge tank shape and configuration to be optimized so that the system may generate a sharp wave pulse in the most energetically efficient manner possible.

Retention Basin Design, Enclave at La Quinta – 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.

Full Scale Hydraulic Modeling – Freezout Creek, OR

Dr. Ronnau participated in a full scale on-site hydraulic modeling of a hydro-power dam in Freezout Creek, Oregon. He created a model to simulate precise flow measurement, assess ponding extents and pool flow patterns that were expected with the construction of a small scale hydro-power generator. Dr. Ronnau also modeled a bypass fish ladder to determine the influence of shunt flow on power generation capacity.



Sky Wash Apex Regional Drainage Solution

Buckeye, Arizona

Client: Ward Real Estate & Development
565 W. Chandler Boulevard, Suite 210
Chandler, AZ 85225

The Sky Wash alluvial fan consists of about 2,205 acres of private and state land. Approximately 881 acres of the fan is encumbered by Zone A Floodway and Floodplain preventing development.

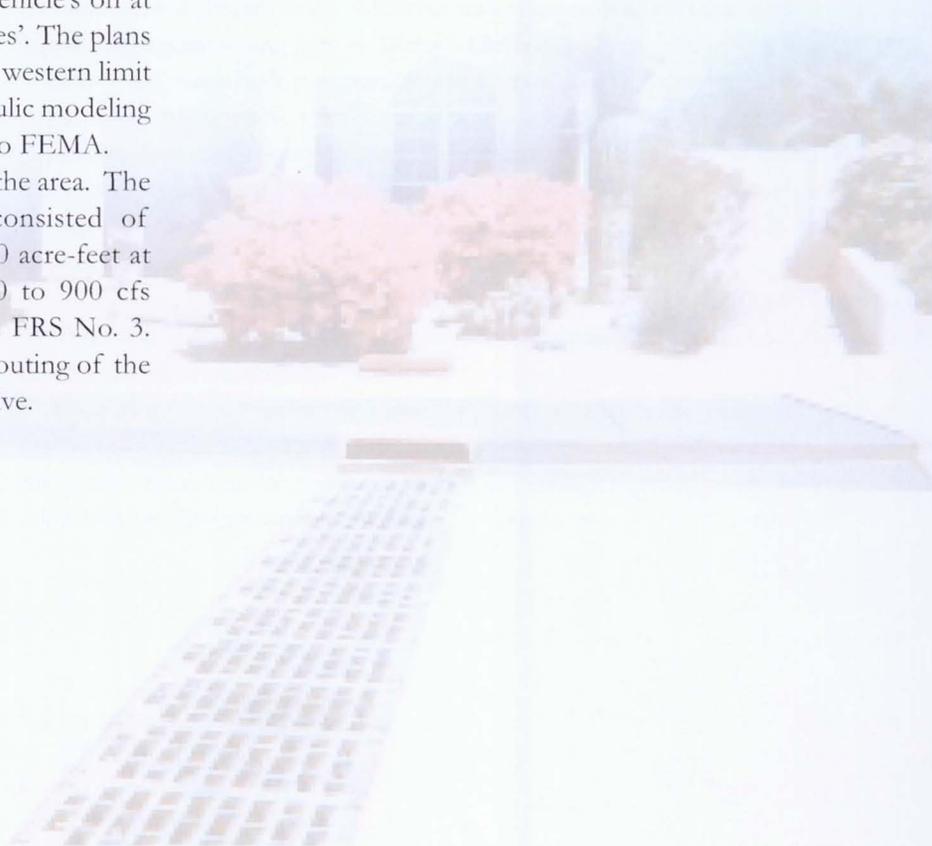
Sunrise Engineering’s work in the Sky Wash area begin with Phoenix Skyline West II improvement plans. The Town of Buckeye (TOB) required emergency vehicle access on all arterial roads and the Flood Control District of Maricopa County (District) required all development in Zone A does not impede flow. An Alluvial Fan hydraulic study performed to verify the 100-year, 2 –hour storm flow depths did not exceed maximum requirements for emergency vehicle’s on at grade arterial roads, satisfying both agencies’. The plans call for two culverts at Prospect Wash (the western limit of the fan) crossings. The required hydraulic modeling was completed for a CLOMR submittal to FEMA. Sunrise worked on a regional solution for the area. The three conceptual alternative designs consisted of detention basins ranging from 150 to 220 acre-feet at the apex and outfall channels with 500 to 900 cfs capacities that convey flows to Buckeye FRS No. 3. Hydrologic and hydraulic modeling and routing of the apex flows was required for each alternative.



Sky Wash Apex Regional Drainage Solution

The team coordinated private partnerships, TOB and the District to secure design and construction funding for the apex solution through the District’s Capital Improvement Program.

The proposed apex drainage solution will remove a total of 881 acres of land from the floodplain and provide the Town of Buckeye with park amenities and a gateway to the White Tanks Mountain Regional Park.



Van Buren Street Drainage DCR

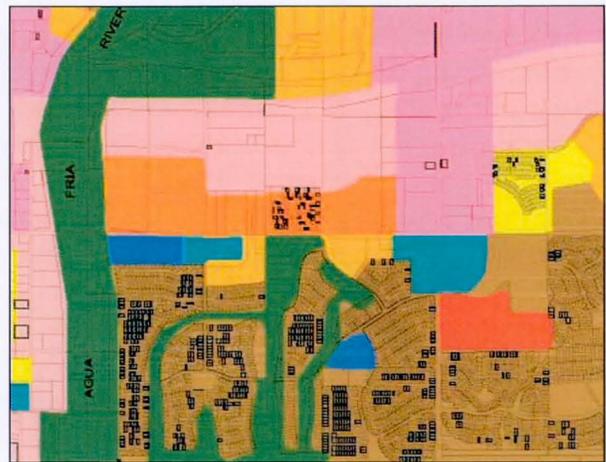
Avondale, Arizona

Client: Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

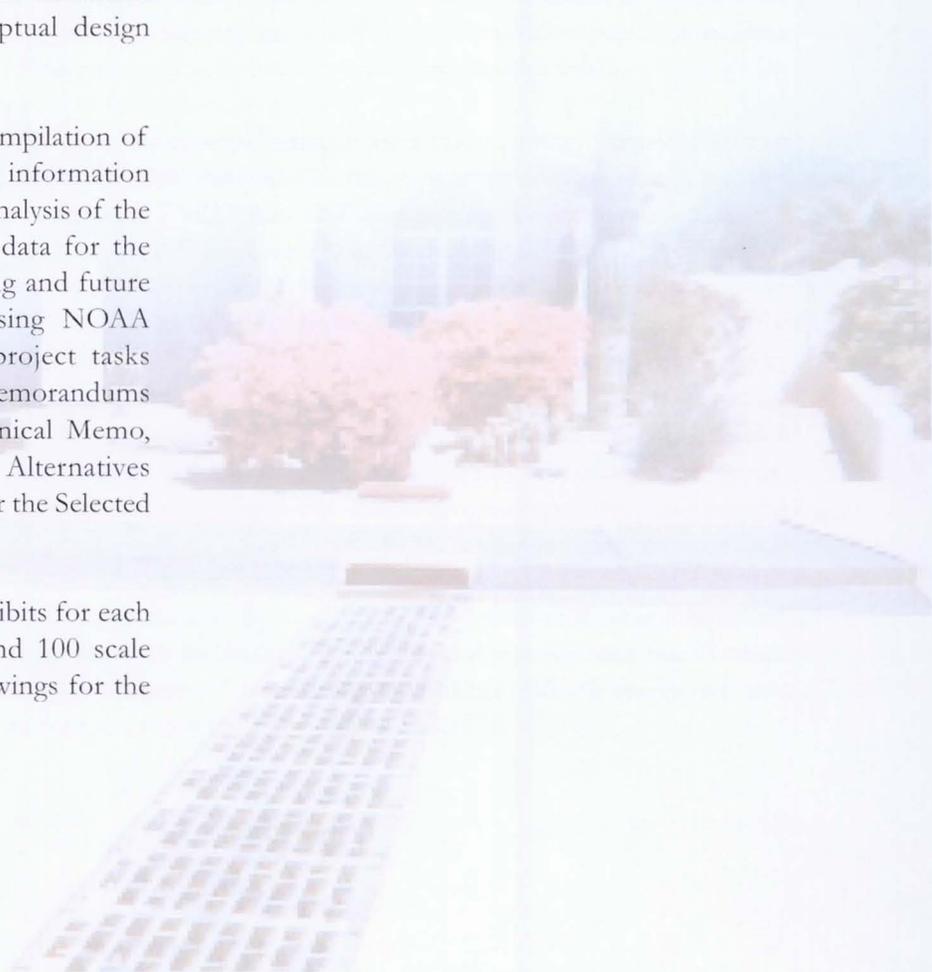
Sunrise Engineering was contracted by Maricopa County Flood Control District to complete a Design Concept Report for a storm water conveyance structure or channel along Van Buren Street in Avondale Arizona. The purpose of the project was to look at ways to alleviate flooding at Van Buren and 99th Avenue and if possible reduce retention requirements for the Avondale City Center project. The project analyzed existing and future conditions and recommended alternatives to convey flow along Van Buren Street to the Agua Fria River. The study went on to select one of three alternatives for which conceptual design documents were created.

Project Tasks included collection and compilation of existing utility and general base mapping information from several sources. Manipulation and analysis of the existing hydrology models and rainfall data for the project. Creation and analysis of existing and future hydrologic and hydrograph models using NOAA ATLAS 14 rainfall data. Additional project tasks included the preparation of numerous memorandums and reports including Hydrology Technical Memo, Data Collection Memo, Preliminary Alternatives Memo, and a detailed Summary Report for the Selected Design Alternative.

Furthermore the design team created exhibits for each of three alternative design concepts and 100 scale Conceptual Design Plan and Profile drawings for the selected design alternative.



Study Area General Plan



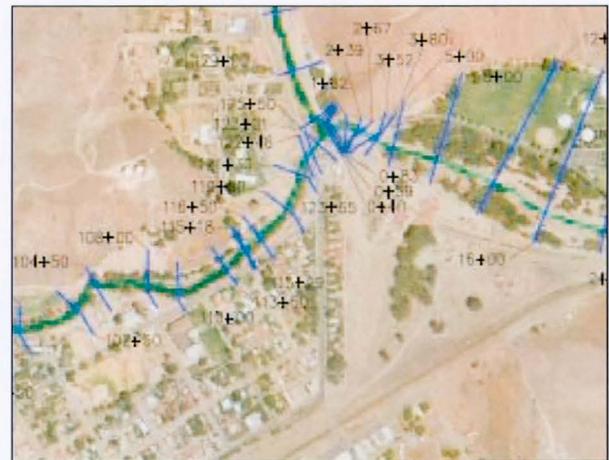
Meadow Valley Linear Park Improvements

Caliente, Nevada

Client: City of Caliente
P.O. Box 1006
Caliente, NV 89008

Sunrise Engineering was retained by the City of Caliente to design linear park improvements along the Meadow Valley Wash for environmental enhancement and recreational purposes. However, because of the City's location within a published FEMA floodplain, the potential hazards to the project and the City in general, and recent damage to the area caused by major flooding in January of 2005, careful design considerations were required in order to address and avoid the following: flooding, property loss, sedimentation, high groundwater, sewer system damage, threat to city/county properties, threat to highway and railroad crossing structure, and threat to environmental and biological conditions.

Sunrise designed the park so that flood waters would pass through without significantly damaging any new improvements or any adjacent communities. The first phase of the project included identifying and summarizing existing problems within the drainage system and converging Clover Creek and Meadow Valley Wash watersheds through the project limits. Sunrise Engineering evaluated the watershed hydrology and completed a Preliminary Drainage/Sediment Control System design for the proposed Park. As part of the Sediment Transport Study, levee and drop structure conceptual designs were finalized, and culvert and bridge crossing models were completed. Sunrise also performed survey and base-mapping services, and sub-contracted the aerial topography required for the project.



Channel Cross Sections Exhibit



Magma Dam Hydrology Study

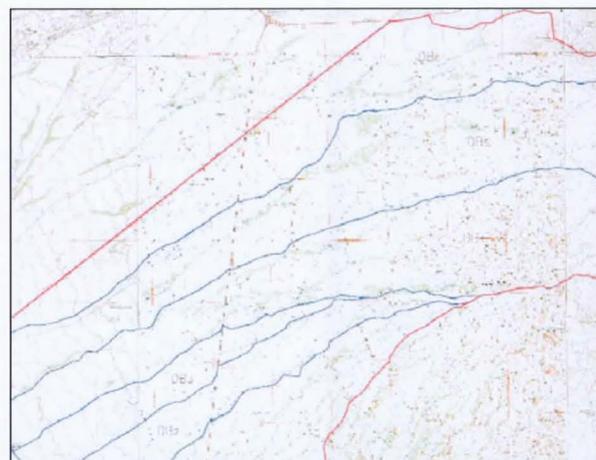
Pinal County, Arizona

Client: LeSueur Investments / Magma Flood Control
 3850 E. Baseline Road
 Mesa, AZ 85206

Sunrise Engineering was contracted to perform a hydrology study upstream of the Magma Flood Retarding Structure within the Magma Flood Control District. This hydrologic study is the first phase of the engineering services for repair/reconstruction of the Magma Flood Retarding Structure (FRS). The off-site and on-site hydrology were modeled to develop the design needed hydrologic data in compliance with current State of Arizona and National Resources Conservation Service (NRCS) regulations and to estimate the height of the new Magma FRS using both the broadly used level-pool reservoir routing and an Arizona Department of Water Resources (ADWR) required dynamic-wave reservoir routing procedures.

The watershed boundaries was delineated based on available U.S. Geological Survey (USGS) topographic maps, aerial photos, and the construction plans, and verified through site inspections and point surveys. The total watershed area was determined to be 71.87 square miles. The rainfall depths and time distributions used in this study are the probable maximum precipitation (PMP) that was generated following the ADWR recommended guidelines. One hundred year storm events were also modeled for indirect verification purpose.

The hydrologic analyses were performed following the ADWR regulations, the general ADWR and NRCS dam safety guidelines, the Arizona Department of Transportation (ADOT) Highway Drainage Design Manual – Hydrology, and the Drainage Design Manual for Maricopa County, Arizona. The watershed hydrology was modeled using the US Army Corps of Engineers (USACE) Flood Hydrograph Package HEC-1 for both the Maricopa County recommended



Index Drainage Basins



Reservoir Routing Scheme

Green-Ampt Rainfall Loss + Clark Unit Hydrograph (G-A-C) approach and the ADWR recommended SCS approach.

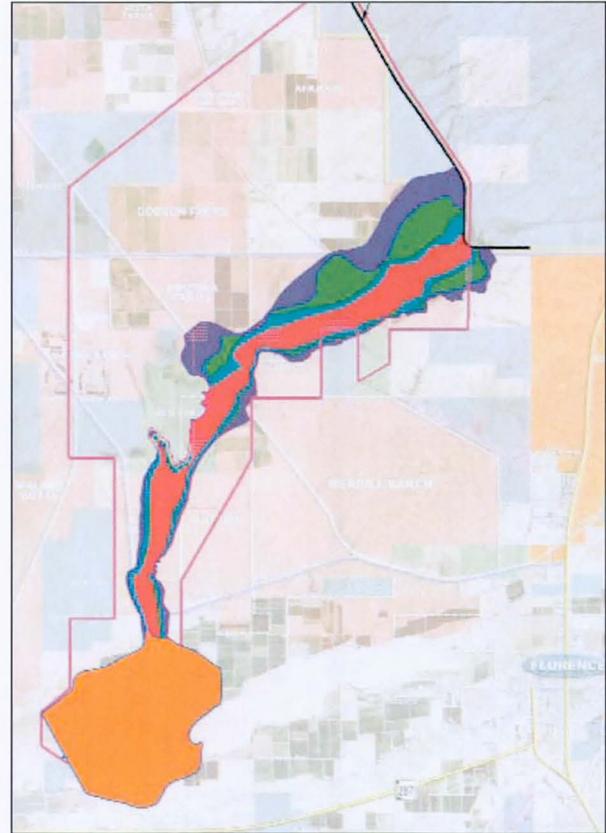
The reservoir routing procedure was simulated using both HEC-1 and USACE River Analysis System Model – HEC-RAS, which is capable of simulating one-dimensional unsteady flow to meet the ADWR reservoir dynamic-wave routing requirements. Because the original design plans did not give the profile of the emergency spillway, an assumed emergency spillway is added to the model as a broad crested weir – a type of the inline structures coded in the HEC-RAS program.

Magma Dam Break Analysis

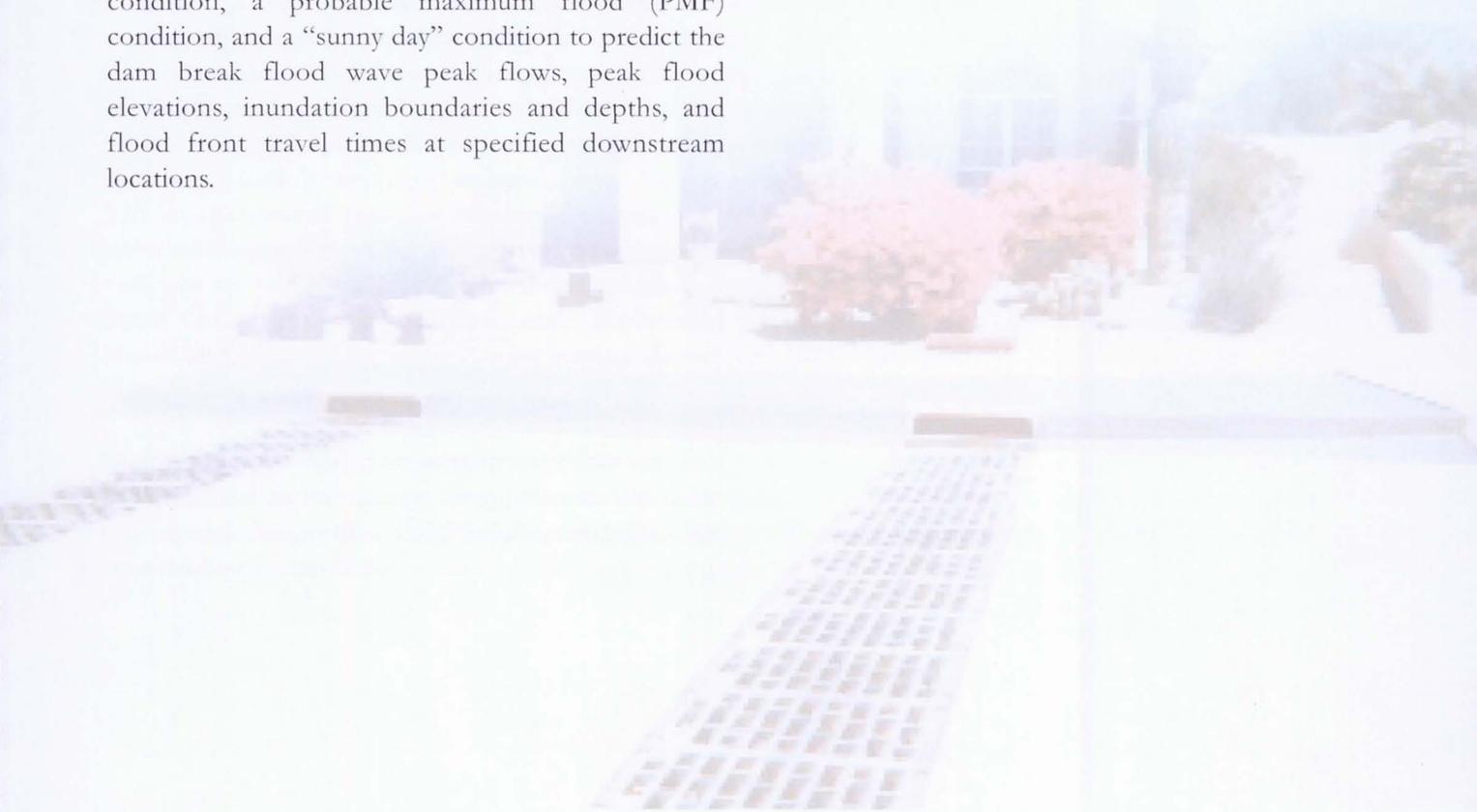
Pinal County, Arizona

Client: LeSueur Investments / Magma Flood Control
3850 E. Baseline Road
Mesa, AZ 85206

Sunrise Engineering was contracted by LeSueur Investments to provide an evaluation of the impacts of a potential Dam Break of the Magma Flood Retarding Structure (MFRS) on downstream properties. The MFRS has been deemed unsafe by the Arizona Department of Water Resources (ADWR). The purpose of this study is to provide preliminary computer model results that show the flood boundary, depth, and timing at downstream areas of the dam caused by dam failure at two locations. The study area covers approximately 25 square miles including about three square miles of LeSueur Investments properties (Skyview Farms) and the vicinity area. The dam failure was modeled under a 100 year six hour storm event condition, a probable maximum flood (PMF) condition, and a “sunny day” condition to predict the dam break flood wave peak flows, peak flood elevations, inundation boundaries and depths, and flood front travel times at specified downstream locations.



Magma Dam Break Results Exhibit



Watson & Roosevelt Roads Drainage Channel & CLOMR

Buckeye, Arizona

Client: Ward Real Estate & Development
565 W. Chandler Boulevard, Suite 210
Chandler, AZ 85225

Watson and Roosevelt Roads in Buckeye, AZ had existing natural low water crossings. As part of nearby development the roadway needed to be improved to allow all weather access. Sunrise provided the hydrologic, hydraulic calculations and construction plans for a four barrel 5' x 10' cast in place box culvert solution. Since the structure would be placed within a FEMA Flood Zone A Sunrise staff completed a Conditional Letter of Map Revision (CLOMR) to gain approval by the Army Corp of Engineers.



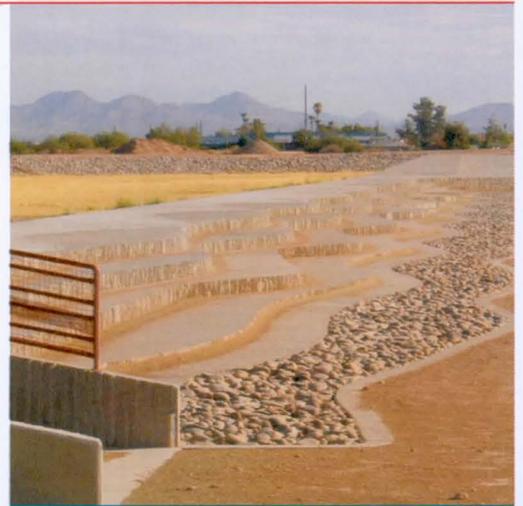
Natural Low Water Crossing



East Maricopa Floodway

Flood Control District of Maricopa County

The East Maricopa Floodway (EMF) is a man-made stormwater conveyance channel operated by the Flood Control District of Maricopa County (FCDMC) that drains urban areas within the cities of Mesa, Chandler, and Gilbert. Because of rapidly encroaching urban development, the EMF does not have sufficient capacity to convey the original design flows thereby requiring a change in its hydraulic design. It was determined that construction of two off-line, retention basins (120 and 200 acres) approximately two miles apart would meet the flood control needs for the project. LSD was responsible for coordination with the Town of Gilbert Parks and Recreation Department and the FCDMC's land planners to incorporate Town-specific recreation needs within the basins and to make provisions for future regional trails and multi-use activities. In addition, the Roosevelt Irrigation District plans to utilize portions of rerouted Queen Creek Wash for water recharge. LSD was responsible for final design for the landscaping, irrigation, temporary erosion control, and native seeding elements. Additionally, LSD completed special contour grading (land forms) and side weir aesthetic designs to achieve a more compatible setting for future recreation development. LSD was also responsible for development of the public outreach component of the project.



Services Provided

- ▶ Landscape Design
- ▶ Irrigation Design
- ▶ Revegetation
- ▶ Public Involvement
- ▶ Erosion Control

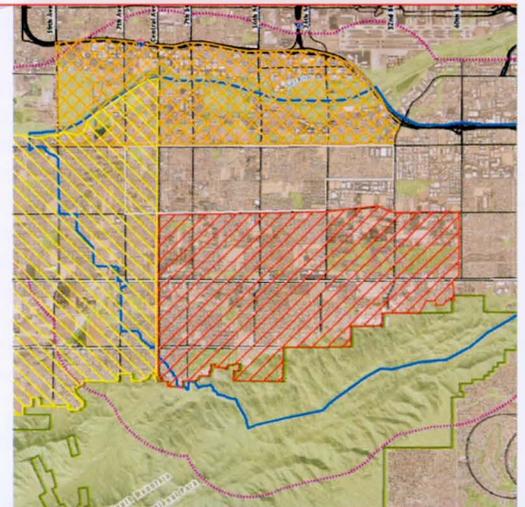


LOGAN SIMPSON DESIGN INC.

Hohokam Area Drainage Master Plan

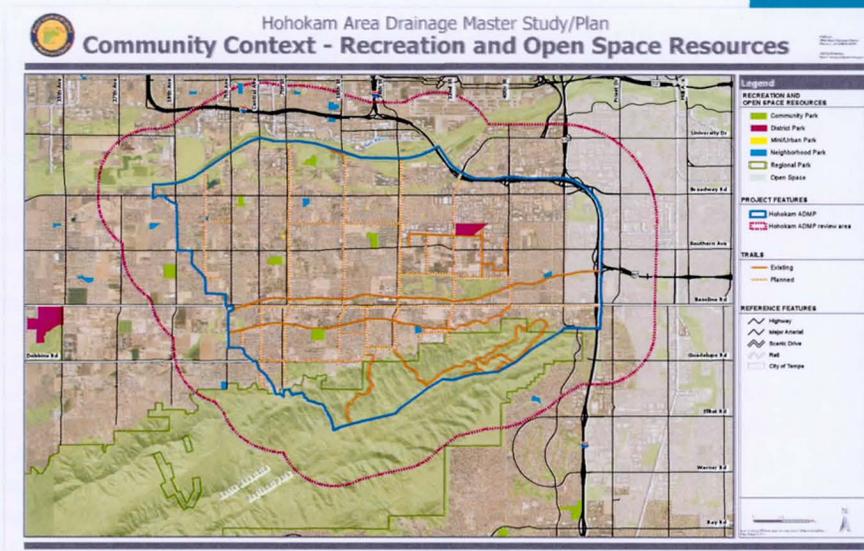
Flood Control District of Maricopa County

LSD is developing the drainage master plan for this watershed in south Phoenix. This plan is one of the first projects to implement the Flood Control District of Maricopa County's (FCDMC) Context Sensitive Flood Hazard Mitigation approach to assisting in developing flood control measures acceptable to the local communities; compatible with the area's natural, scenic, and recreation resource; and effective at mitigating existing and anticipated flooding problems. LSD has worked closely with FCDMC's landscape architecture and planning branch to develop the analysis approach and GIS mapping required to understand the planning area's resources and community context so appropriate flood mitigation methods are considered during development of design alternatives. LSD also completed a Class I cultural resources inventory to identify and evaluate cultural resources that could be affected by future drainage improvements associated with the plan.



Services Provided

- ▶ Master Planning
- ▶ Public Involvement
- ▶ Erosion Control
- ▶ Class I Cultural Resources Inventory

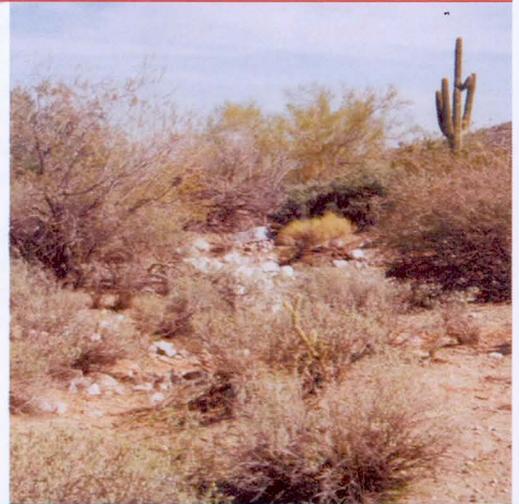


LOGAN SIMPSON DESIGN INC.

Loop 303 Corridor/White Tanks Area Drainage Master Plan

Flood Control District of Maricopa County

LSD is developed an area drainage master plan for a 220-square-mile area in the West Valley. We were responsible for the development of landscape aesthetics and multi-use concepts within the project area. LSD developed various landscape themes for the proposed flood control facilities throughout the 220 square miles. The final product was the development of 15 percent construction documents; cost estimates for the various themes/treatments; and design guidelines for the landscape aesthetics and multi-use treatments for the various flood control facilities. Other responsibilities included coordination of public meetings and overall coordination with the client.



Services Provided

- ▶ Theming
- ▶ Design Guidelines
- ▶ Public Involvement



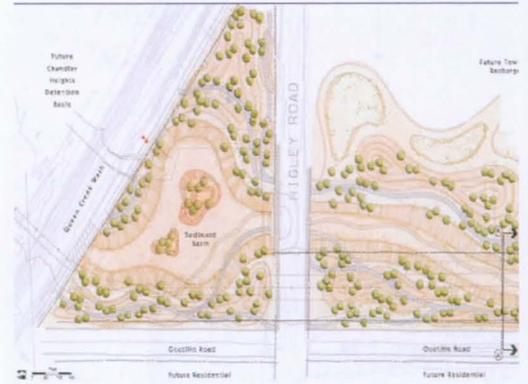
LOGAN SIMPSON DESIGN INC.

Sonoqui Wash Channelization

Flood Control District of Maricopa County/ Town of Queen Creek

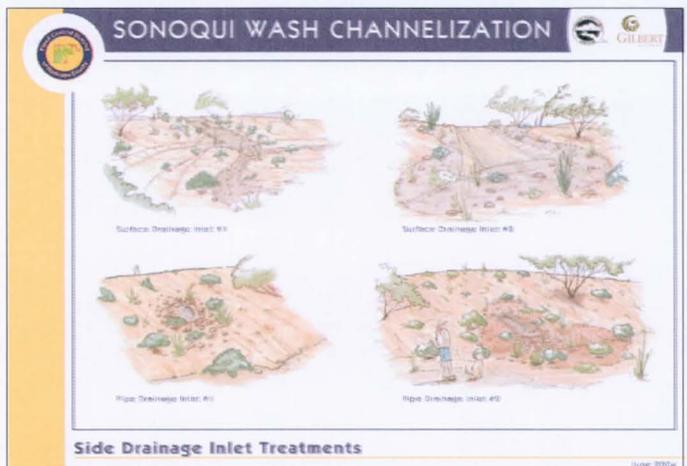
This 3.5-mile-long wash forms the spine of the southeastern Phoenix Metropolitan Area's multi-use corridor network. The Flood Control District of Maricopa County needed a multi-use conveyance channel capable of containing a 100-year storm because the wash was subject to significant ponding and flood-flow breakouts. LSD developed a recreation master plan within the wash's existing natural alignment. The master plan addressed hydrologic component features and recreational multi-use needs and included conceptual landscape and grading designs for the entire length of the wash corridor. We developed a site analysis, scenery resource assessment, and a multi-use recreation assessment that provided the basis for the conceptual design. We also prepared alternative aesthetic design concepts addressing flood control and landscape features such as drop structures; inlets; outlets; culvert structures; pedestrian bridges and crossings; seating/viewing areas; fence/wall treatments; paving patterns; and railings. LSD also prepared public meeting displays and facilitated two public meetings.

SONOQUI WASH CHANNELIZATION



Services Provided

- ▶ Master planning
- ▶ Visual analysis
- ▶ Public involvement



Gila River Channel Sampling for Sediment Transport Modeling

Maricopa County

Client:

Tetra Tech Inc
4801 East Broadway Rd,
Suite 521
Tucson, AZ 85711

Project Manager:

Don Clark, P.E.

Fee:

\$5,000

Highlights:

Geotechnical Exploration to Support Sediment Transport

Permitting and access coordinated with FCDMC

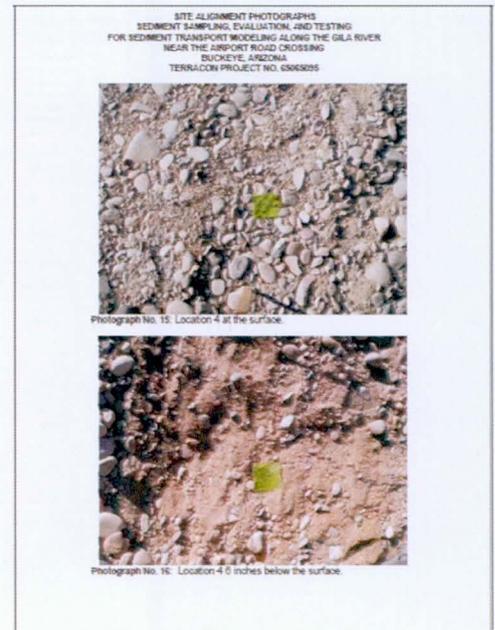
Discrete sampling of intervals of as little as 1-inch

As a subconsultant to Tetra Tech, Terracon performed site reconnaissance, sampling and laboratory testing to support sediment transport and scour analysis along 4 miles of the Gila River in the area of Airport Road in Buckeye, Arizona. A total of eight test pits were excavated using a rubber-tired backhoe. Sampling of both the sidewalls and invert of the flow channel was completed.



Geotechnical services included:

- Site geologic conditions and geomorphology
- Detailed evaluation subsurface soil conditions in river channel
- Detailed channel sediment mapping
- Laboratory testing



Geotechnical Services



I-10 – SARIVAL ROAD TO SR 101L

Maricopa County, Arizona

Client:

URS
7720 North 16th Street
Suite 100
Phoenix, AZ 85020-4449

OWNER:

ADOT

Terracon

Project Manager:

Charles E. Reynolds, G.I.T

Date:

Fall 2009 to present

Fee:

\$690,000.00

Highlights:

7 multi-span overpasses
and bridge widening

Evaluation for collapsing
soil conditions

Permitting and drilling oper-
ations within FCDMC right of
way

Permitting and coordination
with SPRR

I-10 in the west valley of Phoenix, Arizona is part of the ADOT Valley freeway system that is Phoenix's connection to the west and. The alignment, west of SR 101L, traverses predominantly agricultural and commercial developments that are slowly becoming more urbanized.

In late 2006, Terracon, as a subconsultant to URS, began providing on-going geotechnical design services for the project segment proposed to be widened between Sarival Road and SR 101L. The geotechnical design involved drilling and excavating nearly 160 soil borings and test pits to depths up to 130 feet below the existing ground surface. Since the proposed elevated freeway traverses agricultural land and formally constructed freeway embankments, settlement of embankment and structures were a major issue. Seven bridges were proposed for widening to both the inside and outside, including the bridge across the Agua Fria River.



The geotechnical study for the Agua Fria River bridge widening was completed to address construction of drilled shaft foundation next to existing shallow spread foundations. Additionally, sampling and geotechnical analysis was completed to

provide revised scour design criteria. Extensive coordination with the Flood Control District of Maricopa County (FCDMC) was required for drilling equipment to access and drill in the river channel. A full-scale test shaft to evaluate expected construction conditions and constructability was constructed. The test shaft evaluated shallow groundwater conditions and the presence of coarse-grained soil conditions.



Geotechnical
Services



TransWestern Pipeline Geotechnical Investigation and Design

Ashfork to Coolidge, Arizona

Client:
TransWestern Pipeline, Inc.
711 Louisiana Street
Suite 900
Houston, TX 77002

Project Manager:
Scott Neely, P.E.

Date:
2006 - 2008

Fee:
\$638,000

Highlights:

*Geologic and Hydrogeologic
Studies and Mapping*

*Permitting and Negotiation
Assistance*

*Geotechnical Field
Investigations and Explorations*

*Delineation of Bedrock
Areas and Depth to Bedrock*

*Data Collection for
Sediment Transport and Scour
Analysis*

Terracon served as the geotechnical consultant for this project involving the construction of a 255-mile-long intrastate gas pipeline extending from Ashfork to Coolidge, Arizona using 36-inch and 43-inch-diameter pipes. The project area included lands managed by federal, state, and private agencies, including the Kaibab and Prescott National Forests, BLM, BOR, ADOT, and the Arizona State Land Department. Terracon provided the following services:

- Baseline geologic and hydrogeologic studies, including geologic hazards studies of active fault evaluations, seismic studies and mass movement evaluations; inventory of water wells, springs and ponds; baseline surface water quality and flow data; and river crossing design criteria;
- Routing assistance, including topographic considerations and permitting constraints;
- Geotechnical field investigations and evaluations for horizontal directional drilling of major river, wash and roadway crossings, including geotechnical drilling, coring and interpretation plus coordinating the horizontal directional drilling consultant;
- Data collection for lateral and bed scour analyses for multiple open-cut river crossings, stream cross-section surveys, and coordination with federal, state and local permitting authorities;
- Rock excavation evaluations and review of blasting plans;
- Corrosivity sampling and testing;
- Geotechnical exploration of canal, road and railway crossings;
- Evaluation of road and railway crossings for boring or open-cut construction;
- Irrigation canal crossing design and construction observation, including crossing plan development and performance of construction quality control;



Terracon

Geotechnical
Services



Trullium

3000 Acre Multi –Use Development

Maricopa County

Client:

Makai Development Services
1820 W. Drake Drive
Tempe, AZ 85283

Project Manager:

Scott Neely, P.E.

Fee:

\$30,000

Highlights:

*Phase I Environmental Site
Assessment*

Geotechnical Exploration

Laboratory Testing

*Infrastructure Design Re-
commendations*

*Land Use Development
Guidelines*



The Sun Valley Development will be a part of a larger master planned community located between the Hassayampa River and the White Tank Mountains. Land uses within the development will consist of high, medium and low-density residential, commercial, commerce park, industrial, business park, schools and open space. In addition to these land uses, the development will require the needed infrastructure to support the community such as roadways, buried utilities and landscaping.

Environmental services included:

- an on-site reconnaissance of the site, including a cursory review of adjacent properties;
- interviews with owners/occupants and local government officials to obtain information indicating recognized environmental conditions in connection with the site;
- a review of various records to help identify recognized environmental conditions in connection with the subject site and nearby properties; and,
- preparation of a final report which detailed the assessment findings and includes supporting documentation.



Geotechnical services included:

- site geologic conditions and geomorphology
- subsurface soil conditions
- groundwater conditions
- earthwork related issues
- preliminary pavement thickness designs
- preliminary foundation alternatives and related construction issues
- floor slab construction issues



VA SHLY'AY AKIMEL RIVER RESTORATION

Maricopa County, Arizona

Client:

J2/ Stanley Consultants,
Joint Venture.
1661 East Camelback Rd.
Suite 400
Phoenix, AZ 85020

OWNER:

US Army Corp of Engineers,
Los Angeles District

Contact:

Mike Lopez, P.E.
(602) 333-2200
Gwen Meyers
(602) 640-2000

Terracon Project Managers:

Charles E. Reynolds, G.I.T
Scott D. Neely, P.E.
Donald R. Clark, P.E.

Date:

Fall 2007 to present

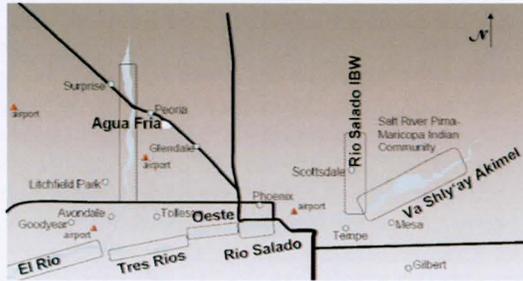
Fee:

\$127,500.00

Highlights:

1,487 ACRES OF RIVER RESTORATION

Va Shly-Ay Akimel is a river restoration project encompassing approximately 14 miles of the Salt River on the Salt River Pima-Maricopa Indian community between Granite Reef Dam and SR 101, in Maricopa County, Arizona.



Since late 2007, Terracon has been providing on going geotechnical consulting services for the project that will restore the riparian ecosystem to the degree that it supports native vegetation and wildlife, establishing a functional

floodplain that mimics the natural processes, and providing passive recreation opportunities. The project will restore and improve approximately 1,487 acres of wetlands habitat, including 883 acres of cottonwood and willow trees, 380 acres of mesquite bosque, 200 acres of wetlands and 24 acres of Sonoran desert scrub, thus restoring functioning riparian areas. The plan is to reshape the Salt River channel by:

- ✓ Reshaping of abandoned quarry pits and the river channel to provide a low-flow channel and terraces.
- ✓ Constructing new water conveyance channels, irrigation diversions, pipelines, spillways and/or groundwater wells to bring surface water and/or ground water to the river to nourish vegetation planted along the river.
- ✓ Constructing a grade control structure across the channel at the abandoned Gilbert Road quarry.
- ✓ Creating passive recreation consisting of approximately 5.1 miles of multi-use decomposed granite trails, parking lots with trailheads, rest stops and interpretive signs

Va Shly'ay Akimel Ecosystem Restoration



Current project estimated cost at \$142.9M. The project is on going through at least 2012.



Geotechnical Services





Relevant Project Experience

Wittman H3 Alluvial Fan Analysis – Maricopa County, AZ

PACE provided a hydraulic evaluation of the characteristics and overland flow necessary for developing a 2-D model to help identify drainage facilities and cost estimates of the H-3 Fan in the Wittmann ADMP Study area. The CAR involved collection of the necessary documents and available data to establish and revise the Hydrology and, perform flow 2-D analysis. PACE reviewed and collected existing hydrology, hydraulics, soil type and gradation data, land use and parcel maps, and culvert rating curves, using GIS-based techniques when applicable. Field reconnaissance of the existing watershed conditions as well as ground photo survey of fan conditions within the study boundary where also analyzed. PACE also performed GIS-based topography development and grid resolution determination. Baseline FLO-2D hydraulic model was used to prepare floodplain models. A sectional discharge analysis was used to estimate runoff hydrographs for model sections based on on-site property boundaries. PACE also determined the BOR hazard zones for the 100-year, 24hour and 100-year, 6-hour storm events.

West Desert Hot Springs Master Drainage Plan – West Desert Hot Springs, CA

PACE is currently developing the Master Drainage Plan for portion of Palm Springs and Desert Hot Springs within Coachella Valley, which do not have formalized Master Drainage Plans. A formalized regional drainage plan would identify regional solutions and ensure that necessary implementation of the required flood control facilities associated with the different development areas in order to mitigate the flood hazards, which are particularly challenging due to alluvial fan conditions. Over the next 20-years there will be expanded growth and development within these areas of the Coachella Valley.



Planning for the infrastructure needs before the initiation of development near these flood hazard zones is a challenging task because of the numerous physical and regulatory constraints which limit the solutions. Key issues PACE is addressing for this project are:

- Develop and manage a watershed technical steering committee
- GIS watershed mapping database for a planning tool with all watershed characteristics and drainage facility planning constraints
- Formulation of a range multiple conceptual regional flood control alternatives
- Sophisticated alternative screening process to numerically rank and select regional flood control solution
- Regional watershed hydrology analysis and modeling
- Local urban drainage facility planning and alternative system layouts
- Local urban drainage watershed studies and hydrology supporting facility sizing
- Innovative alternative formulation process for the urban drainage facilities that allows utilizing a set of different facilities
- Drainage facility implementation program through prioritization analysis
- Overall comprehensive watershed planning guidance document



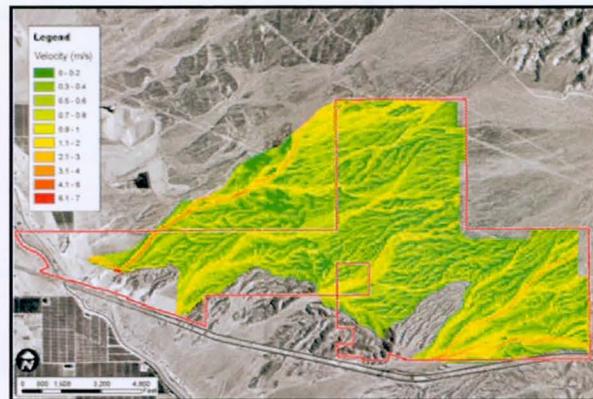
Desert Lakes Alluvial Fan Hydraulics Analysis – Riverside County, CA

Desert Lakes is a 6400-acre proposed land development project in Riverside County located on several coalescing active alluvial fans. At final build out, the project will include residential areas, a commercial town center, an 18-hole championship golf course, large restored park areas, and various restored alluvial channels. The development is located in a desert alluvial fan area draining from the Little San Bernardino Mountains to the northeast. The complete Desert Lakes project area is approximately 2412 acres, while the upstream tributary area including the project area is approximately 15.94 square miles.

PACE provided the baseline hydrologic analysis for a comprehensive and technically based design of the flood control measures which provide the necessary flood protection and channel stabilization for the Desert Lakes project. PACE provided a detailed technical (1) hydrologic, (2) sediment yield/ sediment transport, (3) hydraulic, and (4) alluvial fan hydraulic analyses with two-dimension hydraulics and (5) existing culvert hydraulic analysis.

The proposed flood control improvements identified and evaluated in the technical investigation will assist in the long-term stabilization for this portion of the alluvial fan to allow development to occur with adequate levels of flood protection. This project utilizes structural control measures and channelization to achieve the desired objectives, integrated with the regional flood control features of the watershed, which consist of the following:

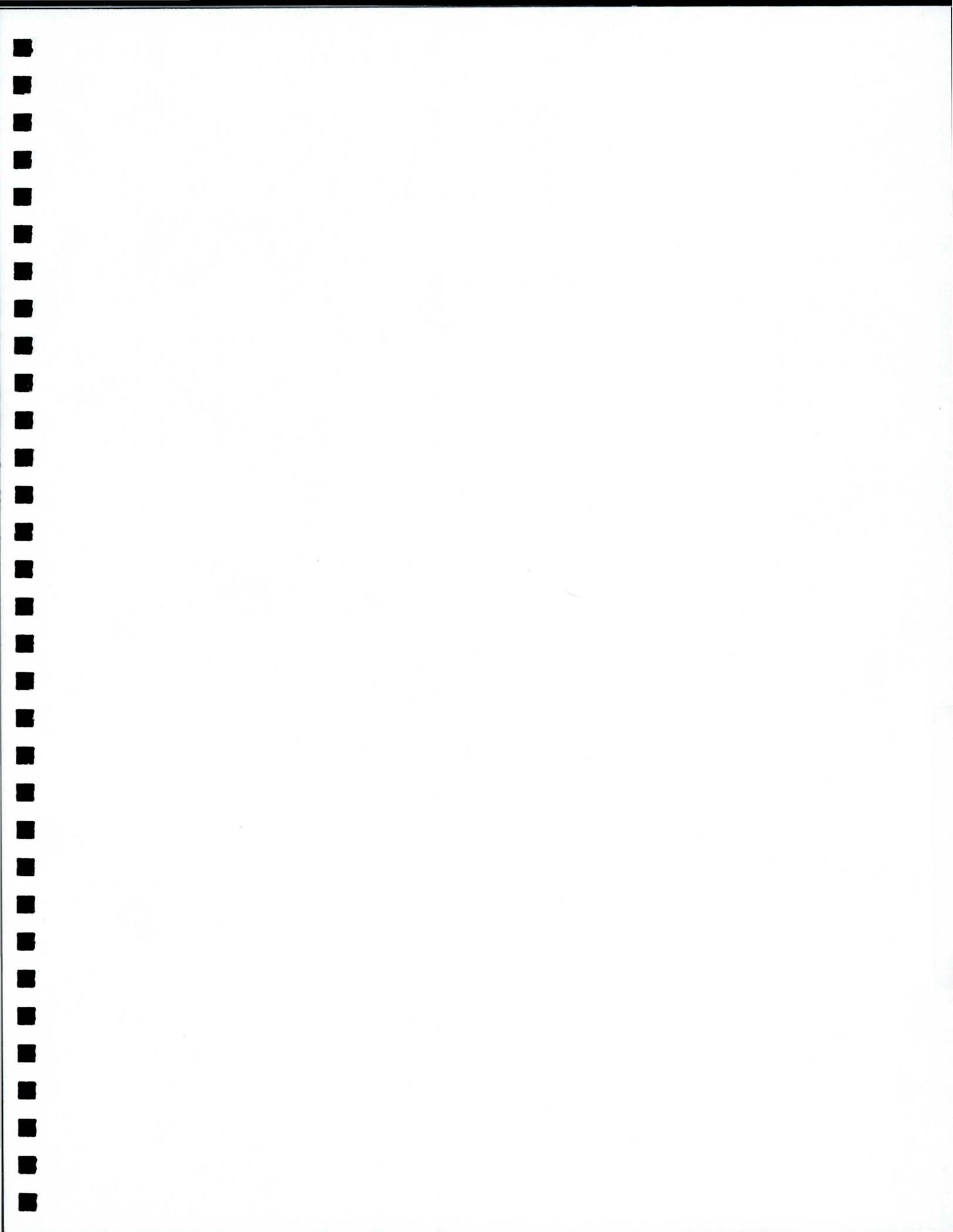
- debris trapping channels on the upstream side of the project site to intercept sediment
- training levees on the northern boundary of the project site to direct the flow into major storm water channels
- an incised trapezoidal channel with concrete slope revetment for the major stream courses
- grade control structures within each of the channels to ensure the long-term streambed location
- dispersion channels on the eastern boundary of the project to return the runoff from a channelized form to a more natural sheet flow along the alluvial plain



The Reserve – Palm Desert, CA

PACE and many more set out to create a first-class golf course/residential development nestled up against the Washington Mountains and located directly within a large alluvial fan. Therefore, the development had significant flood control challenges. PACE prepared a physical hydraulic model to test an innovative flood control system presented by PACE that would reduce the Lowe Corporation's capital investment by \$2 million+ and added premiums to lots surrounding the naturalized solution. A physical model was designed to investigate the erosion patterns associated with design alternatives for the proposed grade control structures. The model utilized a scale of 1:16 and evaluated the performance of one grade control structure located in a portion of the channel between other grade control structures. An 18-inch wide flume with a total length of 70-feet represented a portion of the channel width, ignoring the side effects. The model demonstrated which of the proposed designs produced the least scour at the drop structures. The positive results of the modeling program allowed the flood control system to receive Coachella Valley Water District approval. The resulting flood control system included a 6-acre signature entry lake with a 260-foot bridge spanning it, a plunge pool sediment basin capable of handling flows up to 35,000 cfs.





REFERENCES

Sunrise Engineering has a proven track record of quality projects that are delivered on-time and on budget. This is not only demonstrated by the enthusiasm of our repeat clients in referring our services, but has also been substantiated multiple times by our receipt of the PSMJ Award for Client Satisfaction two years in a row for services in 2009 and 2010. Awarded based solely upon anonymous Client Feedback, Sunrise also received additional recognition for top scores in the category of “Managing Budgets.” We welcome you to contact the references provided below as testament to the service we will provide to you on all assigned projects.

Town of Queen Creek
Tom Narva
Sr. Project Manager - CIP
480.358.3137
tom.narva@queencreek.org

City of Mesa
Fred Rustam
Deputy Engineer
480.644.4688
fred.rustam@mesaaz.gov

City of Tempe
Mark Weber, P.E.
Principal Civil Engineer
480.350.8526
mark_weber@tempe.gov

City of Chandler
Bill Fay, P.E.m Esq.
Public Works Engineer - CIP
480.782.3343
william.fay@chandleraz.gov

City of Chandler
Kurt Krause
Project Manager - Public Works
480.782.3317
kurt.krause@chandleraz.gov

ADOT - Statewide Projects
Orlando Jerez
Statewide Project Management
602.717.7187
ojerez@azdot.gov

Magma Flood Control District
Kent Pace
Project Manager
480.892.7104
kentpace@qwest.net

Town of Queen Creek Utilities Department
Paul Gardner
Utilities Department Director
480.797.3892
paul.gardner@queencreek.org



“During the course of the project, the Town made many changes and Sunrise dealt with them...overall, I would rate their performance as exceptional.”

~Tom Narva
Town of Queen Creek

“We are thrilled to death with Sunrise’s performance...so far they have exceeded every expectation, especially with our customer service.”

~Bill Fay, P.E., Esq.
City of Chandler

“Sunrise is handling a wide variety of grant projects and I really don’t know what I would do without them. They are reliable and I trust them completely.”

~Stana Hurlburt, Grants
City of Caliente