



# Offer and Acceptance

State of Arizona  
State Procurement Office  
100 N. 15<sup>th</sup> Ave. Suite 201  
Phoenix, AZ 85007

SOLICITATION NO.: ADSP016-00005912 Request  
for Qualifications: 2016 Annual Professional  
Services List

PAGE  
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Offeror: West Consultants

OF  
1

## OFFER

### TO THE STATE OF ARIZONA:

The Undersigned hereby offers and agrees to furnish the material, service or construction in compliance with all terms, conditions, specifications and amendments in the Solicitation and any written exceptions in the offer. Signature also certifies Small Business status.

WEST Consultants, Inc.

Company Name

8950 S. 52nd St, Ste 210

Address

Tempe

AZ

85284

City

State

Zip

bwahlin@westconsultants.com

Contact Email Address

Signature of Person Authorized to Sign Offer

Brian Wahlin

Printed Name

Vice President

Title

Phone: 480-345-2155

Fax: 480-345-2156

By signature in the Offer section above, the Offeror certifies:

1. The submission of the Offer did not involve collusion or other anticompetitive practices.
2. The Offeror shall not discriminate against any employee or applicant for employment in violation of Federal Executive Order 11246, State Executive Order 2009-9 or A.R.S. §§ 41-1461 through 1465.
3. The Offeror has not given, offered to give, nor intends to give at any time hereafter any economic opportunity, future employment, gift, loan, gratuity, special discount, trip, favor, or service to a public servant in connection with the submitted offer. Failure to provide a valid signature affirming the stipulations required by this clause shall result in rejection of the offer. Signing the offer with a false statement shall void the offer, any resulting contract and may be subject to legal remedies provided by law.
4. The Offeror certifies that the above referenced organization  IS/  IS NOT a small business with less than 100 employees or has gross revenues of \$4 million or less.

## ACCEPTANCE OF OFFER

The Offer is hereby accepted.

The Contractor is now bound to sell the materials or services listed by the attached contract and based upon the solicitation, including all terms, conditions, specifications, amendments, etc., and the Contractor's Offer as accepted by the State.

This Contract shall henceforth be referred to as Contract No. ADSP016-00005912

The effective date of the Contract is March 1, 2016

The Contractor is cautioned not to commence any billable work or to provide any material or service under this contract until Contractor receives purchase order, contract release document or written notice to proceed.

State of Arizona  
Awarded this 29 day of February 2016

Procurement Officer



December 21, 2015

State of Arizona Procurement Office  
100 N 15th Ave., Suite 201  
Phoenix, AZ 85007

RE: Solicitation No. ADSP016-00005912  
2016 Annual Professional Services List  
Amendment One Receipt Acknowledgement

**Arizona**

8950 S. 52nd St., Ste. 210  
Tempe, AZ 85284-1043  
(480) 345-2155

**SUBMITTED VIA PROCURE.AZ.GOV**

**California**

101 Parkshore Drive  
Folsom, CA 95630-4726  
(916) 932-7402

WEST Consultants Inc. ("WEST") is pleased to submit this proposal to be included in Arizona's 2016 listing of qualified firms able to provide professional engineering services to State agencies and other members of the State Purchasing Cooperative. WEST acknowledges receipt of Amendment One.

11440 W. Bernardo Ct., Ste. 360  
San Diego, CA 92127-1644  
(858) 487-9378

WEST was founded in 1988 to provide public and private clients with expert water resource engineering consulting services. As a specialized firm with seven offices in Arizona, Washington, Oregon, and California, WEST offers a staff of over 60 highly trained engineering and scientific professionals, including 21 licensed engineers, specifically dedicated to the field of water resources. WEST offers a unique depth and breadth of resources and experience that is typically absent from much larger, less specialized firms.

**Oregon**

10300 SW Greenburg Road, Ste. 470  
Portland, OR 97223-5488  
(503) 946-8536

WEST services include hydrology and hydraulic analyses, flood inundation and control studies, data collection and processing, erosion control, bridge hydraulics and scour analyses, sediment transport data collection and modeling, geomorphology, flood warning and stream gauging services, surface and groundwater modeling, water quality and contaminant transport modeling, wetland hydrology, software sales, computer programming, training, and quality assurance.

2601 25th Street SE, Ste. 450  
Salem, OR 97302-1286  
(503) 485-5490

**Washington**

12509 Bel-Red Rd., Ste. 100  
Bellevue, WA 98005-2535  
(425) 646-8806

WEST staff consists of highly qualified and conscientious engineers and scientists with strong academic backgrounds and diverse experience. Our staff is experienced at employing traditional methodologies, applied research, and state-of-the-art technology to solve complex issues. WEST experts routinely conduct training seminars and provide technical support for other consulting firms.

**River Measurement**

A Division of WEST Consultants  
811 NE 154th Street  
Vancouver, WA 98685-1347  
(360) 571-2290

Please contact me at (480) 345-2155 if you have any questions. Thank you for your time and consideration.

Sincerely,

Brian Wahlin, Ph.D., P.E., D.WRE,  
Vice President



**ATTACHMENT I – General Qualifications**

**ANNUAL REQUEST FOR QUALIFICATIONS AND EXPERIENCE NO:**  
ADSP016-00005912

**STATE PROCUREMENT OFFICE**  
**Department of Administration**  
**100 North 15<sup>th</sup> Avenue, Suite 201**  
**Phoenix, Arizona 85007**

*(If a firm has branch offices, complete for each specific branch office seeking work.)*

**1. Annual Request for Qualifications**

a. FIRM (OR BRANCH OFFICE ) NAME:	WEST Consultants, Inc.
b. FIRM (OR BRANCH OFFICE) STREET:	8950 S. 52 <sup>nd</sup> Street, Ste 210
c. FIRM (OR BRANCH OFFICE) CITY:	Tempe
d. FIRM (OR BRANCH OFFICE) STATE:	AZ
e. FIRM (OR BRANCH OFFICE) ZIP CODE:	85284
f. YEAR ESTABLISHED:	1988
(g1). OWNERSHIP - TYPE:	Corporation
(g2) OWNERSHIP - SMALL BUSINESS STATUS:	Small
h. POINT OF CONTACT NAME AND TITLE:	Brian Wahlin, Vice President
i. POINT OF CONTACT TELEPHONE:	480-345-2155
j. POINT OF CONTACT E-MAIL ADDRESS:	bwahlin@WESTconsultants.com
k. NAME OF FIRM <i>(If block 1a is a branch office):</i>	WEST Consultants, Inc.



**ATTACHMENT I – General Qualifications**

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**2. EMPLOYEES BY DISCIPLINE**

a. Discipline Title	b. Function: Primary (P) or Secondary (S)	c. No. of Employees - Firm	d. No. of Employees - Branch
<i>Hydraulic Engineer</i>	P, S	14, 6	3, 1
<i>Water Resources Engineer</i>	P, S	12, 3	2, 1
<i>Hydrologist</i>	P, S	7, 10	1, 0
<i>Civil Engineer</i>	P, S	6, 6	1, 2
<i>Agricultural Engineer</i>	P, S	1, 1	1, 1
<i>Other (Flood Risk Management)</i>	P, S	2, 0	1, 0
<i>Geographic Information System Specialist</i>	P, S	2, 2	1, 1
<i>Geologist</i>	P, S	2, 8	0, 1
<i>Soils Engineer</i>	P, S	0, 2	0, 1
<i>Technician/ Analyst</i>	P, S	0, 2	0, 1
<i>Environmental Engineer</i>	P, S	0, 7	0, 0
<i>Hydrographic Surveyor</i>	P, S	2, 0	0, 0
<i>CADD Technician</i>	P, S	0, 1	0, 0
<b>Totals*</b>	<b>P, S</b>	<b>48, 48</b>	<b>9, 9</b>

\*48 professionals employed by firm and 9 professionals employed by branch.



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**3. PROFILE OF FIRM'S EXPERIENCE AND ANNUAL AVERAGE REVENUE FOR LAST YEAR**

a. Approximate No. of Projects	b. Experience	c. Revenue Index Number <i>(see below)</i>
3	Codes; Standards; Ordinances	3
4	Dams (Concrete; Arch)	3
6	Dams (Earth; Rock); Dikes; Levees	3
60	Digital Elevation and Terrain Model Development	5
3	Environmental Impact Studies, Assessment, or Statements	2
8	Hydrographic Surveying	3
2	Irrigation; Drainage	1
8	Measurement / Verification / Conservation Water Consumption Savings	4
35	Rivers, Canals, Waterways, Flood Control	5
14	Storm Water Handling and Facilities	3
15	Surveying; Platting; Mapping; Flood Plain Studies	4
1	Topographic Surveying and Mapping	1
13	Water Resources; Hydrology; Ground Water	4

**PROFESSIONAL SERVICES REVENUE INDEX NUMBER**

- |   |   |
|---|---|
| 1. Less than \$100,000                  | 6. \$2 million to less than \$5 million   |
| 2. \$100,000 to less than \$250,000     | 7. \$5 million to less than \$10 million  |
| 3. \$250,000 to less than \$500,000     | 8. \$10 million to less than \$25 million |
| 4. \$500,000 to less than \$1 million   | 9. \$25 million to less than \$50 million |
| 5. \$1 million to less than \$2 million | 10. \$50 million or greater               |



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**4. Resumes of Key Personnel Proposed for this Contract (Complete one Section #4 for each key person.)**

<b>a. NAME</b>	<b>b. ROLE IN THIS CONTRACT</b>	<b>c. YEARS EXPERIENCE</b>	
Brian Wahlin, Ph.D., P.E., D.WRE	Project Manager	1. TOTAL 23	2. WITH CURRENT FIRM 12
<b>d. LOCATION (City and State)</b> WEST Consultants, Inc., Tempe, AZ			
<b>e. EDUCATION (DEGREE AND SPECIALIZATION)</b> Ph.D., Civil Engineering, Arizona State University M.S., Civil Engineering, Arizona State University B.S.E., Mechanical Engineering, Arizona State University		<b>f. PROFESSIONAL TRAINING - REGISTRATIONS</b> AZ, Civil Engineer NM, Civil Engineer IA, Civil Engineer Diplomate, Water Resources Engineer	
<b>g. OTHER PROFESSIONAL QUALIFICATIONS (Organizations, Awards, etc.)</b> Dr. Wahlin has over 20 years of experience in floodplain and hydraulic studies, levee certifications, sediment transport studies, dam breach studies, and flow measurement studies. He is a lead instructor for most of WEST's HEC-RAS courses.			

**H. RELEVANT PROJECTS**

	(1) TITLE AND LOCATION (City and State)	(2) YEAR COMPLETED	
<b>1.</b>	Lower Salt River Floodplain Delineation Study (Phoenix, AZ)	Professional Services 2014	Construction (if applicable)
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Dr. Wahlin was the project manager on this project which involved re-study of the Special Flood Hazard Area (SFHA) for approximately 15 miles of the Salt River from 91st Ave. to the I-10 Bridge in order to reflect more current topographic and hydrology data. Involved developing complex HEC-RAS hydraulic models and required meeting standards of the Arizona Dept. of Water Resources (ADWR) and Federal Emergency Management Agency (FEMA). \$370,000.	<input checked="" type="checkbox"/> Check if project performed with current firm	
<b>2.</b>	Cactus Forest Flood Mitigation & Mapping Study (Florence, AZ)	Professional Services 2014	Construction (if applicable)
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Dr. Wahlin was the project manager on this project which involved evaluation of floodplains and Special Flood Hazard Areas (SFHAs), investigating existing flooding problems, and developing mitigation project alternatives for approximately 164 square miles of watershed in a rural area that has experienced increased residential in development in recent years. Involved developing complex HEC-HMS hydrologic models, FLO-2D hydraulic models and required meeting standards of the Arizona Dept. of Water Resources (ADWR) and Federal Emergency Management Agency (FEMA). \$399,000.	<input checked="" type="checkbox"/> Check if project performed with current firm	
<b>3.</b>	Whitlow Ranch Dam Failure Analyses and Inundation Mapping (Queen Valley, AZ)	Professional Services 2014	Construction (if applicable)
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Dr. Wahlin was the project manager on this project which involved performing dam failure analyses and flood inundation mapping for federally-owned Whitlow Dam. Downstream areas including highly populated portions of Queen Creek, Gilbert and Chandler, AZ. Involved developing complex HEC-RAS and FLO-2D hydraulic models. Required meeting standards of the US Army Corps of Engineers' Modeling, Mapping, and Consequence (MMC) Production Center. \$220,000.	<input checked="" type="checkbox"/> Check if project performed with current firm	
<b>4.</b>	Hayden-Rhodes Aqueduct Capacity Study (Bouse, AZ to Gila Bend, AZ)	Professional Services 2014	Construction (if applicable)
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Dr. Wahlin was the project manager on this project which involved examining the capacity of the 190-mile Hayden-Rhodes Aqueduct from the Bouse Hills Pumping Plant to the Salt Gila Pumping Plant. Involved developing complex, unsteady HEC-RAS models to evaluate the feasibility and effectiveness of constructing spillways to reduce the freeboard required to safely operate the canal at increased flow rates. \$79,500.	<input checked="" type="checkbox"/> Check if project performed with current firm	
<b>5.</b>	Best Practices Protection of Transmission Lines Against Floods and Scour (N/A)	Professional Services 2014	Construction (if applicable)
	(3) BRIEF DESCRIPTION (Brief scope, size, cost, etc.) AND SPECIFIC ROLE Dr. Wahlin was the project manager on this project which involved performing hydrologic and hydraulic engineering services related to a CEATI International Inc. research project developing the design document, "Best Practices for Design of Transmission Line Structures Located in Water for Protection against Additional Loads Imposed During Floods and Foundation Scour," a state-of-the-practice guideline to be used by engineers in their practice. \$25,500.	<input checked="" type="checkbox"/> Check if project performed with current firm	



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**4. Resumes of Key Personnel Proposed for this Contract** (*Complete one Section #4 for each key person.*)

a. NAME  Bert Clemmens, Ph.D., P.E., D.WRE	b. ROLE IN THIS CONTRACT  Project Manager	c. YEARS EXPERIENCE	
		1. TOTAL 40	2. WITH CURRENT FIRM 4
d. LOCATION ( <i>City and State</i> ) WEST Consultants, Inc., Tempe, AZ			
e. EDUCATION ( <i>DEGREE AND SPECIALIZATION</i> ) BS Civil Engineering, MS Civil Engineer (Water Resources, PhD Industrial Engineering (Operations Research)- Specializing in Irrigation, Hydraulics, and Flow Measurement		f. PROFESSIONAL TRAINING - REGISTRATIONS PE Civil Engineering, Arizona; Diplomate, Water Resources Engineering	
g. OTHER PROFESSIONAL QUALIFICATIONS ( <i>Organizations, Awards, etc.</i> ) Dr. Clemmens is the former Center Director of the US Arid Land Agricultural Research Center and Laboratory Director for the US Water Conservation Laboratory. He oversaw research on irrigation management, remote sensing, wastewater reuse, crop response to global climate change, breeding of cotton. Dr. Clemmens has more than 300 professional publications. Career Achievement Awards: 2009 USCID Merriam Improved Irrigation Award, 2007 Scientist of the Year Award (USDA-ARS-PWA), 2006 ASABE Award for Advancement of Surface Irrigation, 2005 Sixth Gulhati Honorary Lecture (ICID), 2005 Royce J. Tipton Award (ASCE).			

**H. RELEVANT PROJECTS**

1.	(1) TITLE AND LOCATION ( <i>City and State</i> ) Buckeye FRS Hydrologic Outflows and Dam Breach Analysis (Buckeye, AZ)	(2) YEAR COMPLETED	
		Professional Services 2015	Construction (if applicable)
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Dr. Clemmens was the manager on this project which involved developing a complex Hec-Ras hydraulic model including three flood retarding structures (FRS's) and two floodways totaling more than 11 miles in length along the north side of Interstate 10. The HEC-RAS model was used to develop dam breach hydrographs at thirteen locations. Downstream inundation maps were developed with a FLO-2D hydraulic model. \$80,000.	<input checked="" type="checkbox"/> Check if project performed with current firm	
2.	(1) TITLE AND LOCATION ( <i>City and State</i> ) East Maricopa Floodway Hydrology and Hydraulics Study (Maricopa Co., AZ)	(2) YEAR COMPLETED	
		Professional Services 2015	Construction (if applicable)
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Dr. Clemmens was the manager on this project which involved developing flow flow rates and freeboard for locations adjacent to two levees along the East Maricopa Floodway (EMF). A complex HEC-1 hydrology model of the 253 square mile drainage area was used to develop flow hydrographs for a complex, unsteady HEC-RAS model of the EMF. Required meeting standards of the Federal Emergency Management Agency (FEMA) for levees. \$150,000.	<input checked="" type="checkbox"/> Check if project performed with current firm	
3.	(1) TITLE AND LOCATION ( <i>City and State</i> ) Hayden-Rhodes Aqueduct Capacity Study (Bouse, AZ to Gila Bend, AZ)	(2) YEAR COMPLETED	
		Professional Services 2014	Construction (if applicable)
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Dr. Clemmens was engineer on this project which involved examining the capacity of the 190-mile Hayden-Rhodes Aqueduct from the Bouse Hills Pumping Plant to the Salt Gila Pumping Plant. Dr. Clemmens evaluated canal freeboard for existing canal roughness with a complex, steady-state HEC-RAS hydraulic model and developed an unsteady model to determine whether or not the canal could contain the waves created by emergency shutdown, as well as the entire water volume. \$79,500.	<input checked="" type="checkbox"/> Check if project performed with current firm	
4.	(1) TITLE AND LOCATION ( <i>City and State</i> ) Improved Water Management Measurement and Accounting for Carlsbad Irrigation District (Carlsbad, NM)	(2) YEAR COMPLETED	
		Professional Services 2014	Construction (if applicable)
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Dr. Clemmens was the manager on this project which involved implementation of a SCADA System, and other improvements, enabling an irrigation district to better manage water deliveries to users. The SCADA System provides water budget information and allows for analysis of system losses. Installations included a base station, 14 remote water measurements sites and modification of two Parshall flumes into long-throated flumes. \$190,000.	<input checked="" type="checkbox"/> Check if project performed with current firm	
5.	(1) TITLE AND LOCATION ( <i>City and State</i> ) San Carlos Irrigation and Drainage Evaluation of Water Conservation Potential (San Carlos, AZ)	(2) YEAR COMPLETED	
		Professional Services 2012	Construction (if applicable)
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Dr. Clemmens led an expert Engineering Board established by the San Carlos Irrigation and Drainage District and the U.S. Bureau of Reclamation to evaluate water losses following rehabilitation of the District's canal system. The Engineering Board performed inflow-outflow tests and identified seepage and evaporation losses associated with each canal and lateral. Involved developing water budgets for four canal systems throughout the entire District. \$28,000.	<input checked="" type="checkbox"/> Check if project performed with current firm	



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**4. Resumes of Key Personnel Proposed for this Contract** (*Complete one Section #4 for each key person.*)

a. NAME  Quentin Brent Travis, Ph.D., P.E., D.WRE	b. ROLE IN THIS CONTRACT  Senior Hydraulic Engineer	c. YEARS EXPERIENCE	
		1. TOTAL 21.5	2. WITH CURRENT FIRM 13
d. LOCATION ( <i>City and State</i> ) WEST Consultants, Inc., Tempe, AZ			
e. EDUCATION ( <i>DEGREE AND SPECIALIZATION</i> ) Ph.D. Water Resources Engineering, Arizona State University B.S. Engineering and Applied Science, California Institute of Technology (Caltech) B.A. Psychology, Wesleyan University		f. PROFESSIONAL TRAINING - REGISTRATIONS AZ, Civil Engineer	
g. OTHER PROFESSIONAL QUALIFICATIONS ( <i>Organizations, Awards, etc.</i> ) Eight peer reviewed journal articles; fourteen other technical articles; former chair of the ASCE Arizona Water Resources Technical Committee and Environmental Water Resources Institute.			

**H. RELEVANT PROJECTS**

	(1) TITLE AND LOCATION ( <i>City and State</i> )	(2) YEAR COMPLETED	
		Professional Services	Construction (if applicable)
1.	Cactus Forest Flood Mitigation & Mapping Study (Florence, AZ)	2014	
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Dr. Travis was the hydraulic engineer on this project which involved evaluation of floodplains and Special Flood Hazard Areas (SFHAs), investigating existing flooding problems, and developing mitigation project alternatives for approximately 164 square miles of watershed in a rural area that has experienced increased residential in development in recent years. Involved developing complex HEC-HMS hydrologic models, FLO-2D hydraulic models and required meeting standards of the Arizona Dept. of Water Resources (ADWR) and Federal Emergency Management Agency (FEMA). \$399,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm
2.	Best Practices Protection of Transmission Lines Against Floods and Scour (N/A)	2014	
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Dr. Travis was the hydraulic engineer on this project which involved performing hydrologic and hydraulic engineering services related to a CEATI International Inc. research project developing the design document, "Best Practices for Design of Transmission Line Structures Located in Water for Protection against Additional Loads Imposed During Floods and Foundation Scour," a state-of-the-practice guideline to be used by engineers in their practice. \$25,500.	<input checked="" type="checkbox"/>	Check if project performed with current firm
3.	Computer-Automated Hydrologic Analysis Tool (Mohave County, AZ)	2014	
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Dr. Travis was the manager on this project which involved development of a complex Excel spreadsheet application to facilitate HEC-1 hydrologic model operations for data entry, input file creation, program execution, and displaying results. Involved programming language and application development, and data source linking. \$49,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm
4.	Queen Kaahumanu Highway Widening Redesign (Island of Hawaii)	2012	
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Dr. Travis was the hydraulic engineer on this project which involved improvements to the Queen Kaahumanu Highway on the Island of Hawaii by widening to a four-lane divided highway. Developed HEC HMS and Geo-HMS hydrologic models for watershed hydrology and evaluated culvert capacities and designs, historical flows, and offsite storm water issues. \$135,500.	<input checked="" type="checkbox"/>	Check if project performed with current firm
5.	Tres Rios North Levee Emergency Action Planning (Phoenix, AZ)	2014	
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Dr. Travis was the hydraulic engineer on this project which involved developing a complex HEC-RAS hydraulic model for analyses of overtopping and potential breach formation of the Tres Rios North Levee near Phoenix, Arizona. \$36,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm



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**4. Resumes of Key Personnel Proposed for this Contract** (*Complete one Section #4 for each key person.*)

a. NAME  Michael Johnson, Ph.D., P.E.	b. ROLE IN THIS CONTRACT  Project Manager	c. YEARS EXPERIENCE	
		1. TOTAL 18	2. WITH CURRENT FIRM < 1

d. LOCATION (*City and State*)  
WEST Consultants, Inc., Tempe, AZ

e. EDUCATION ( <i>DEGREE AND SPECIALIZATION</i> ) Ph.D., Civil Engineering, Arizona State University M.S., Civil Engineering, Arizona State University B.S.E., Civil Engineering, University of Arizona	f. PROFESSIONAL TRAINING – REGISTRATIONS AZ, Civil Engineer
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g. OTHER PROFESSIONAL QUALIFICATIONS (*Organizations, Awards, etc.*)  
Dr. Johnson has over 17 years of experience in hydrology, hydraulic and geotechnical engineering, dam safety, flood mitigation, and water resource management as a civil engineer, state official, and university adjunct. Past President of the Association of Western State Engineers; Past President of the Association of State Dam Safety Officials; Past Member of the National Dam Safety Review Board; As Arizona’s Dam Safety Official, supervised safety of 260 dams, directed over 1,000 safety inspections, and approved more than 100 projects.

**H. RELEVANT PROJECTS**

1.	(1) TITLE AND LOCATION ( <i>City and State</i> ) Aravaipa Canyon Wilderness Area Federal Reserved Water Rights (Winkelman, AZ)	(2) YEAR COMPLETED	
		Professional Services 2014	Construction (if applicable)
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Dr. Johnson performed the hydrologic and ecological analyses on this state-funded project which quantified federal reserved water rights held by the United States for the Aravaipa Canyon Wilderness Area in the San Pedro River watershed. Involved complex statistical analysis of streamflow records, geomorphological evaluation of stream channel conditions, and assessment of suitable habitat for several species of fish. Work performed while serving as the Chief Engineer of the Arizona Department of Water Resources and technical advisor to the Arizona General Stream Adjudication Court. \$N/A	<input type="checkbox"/> Check if project performed with current firm	
2.	(1) TITLE AND LOCATION ( <i>City and State</i> ) Arizona Probable Maximum Precipitation Study (Statewide AZ)	(2) YEAR COMPLETED	
		Professional Services 2013	Construction (if applicable)
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Dr. Johnson was the manager on this state-funded project involving updates to the published values of probable maximum precipitation for the State of Arizona. Involved search of historic storm databases, spatial analysis of rain gage and radar data, assessing geographical regions, storm maximization and transposition, and development of a user-input GIS application for public use. Work performed while serving as the State of Arizona’s Dam Safety Official and Chief Engineer of the Arizona Department of Water Resources. \$N/A	<input type="checkbox"/> Check if project performed with current firm	
3.	(1) TITLE AND LOCATION ( <i>City and State</i> ) City Dam Rehabilitation (Williams, AZ)	(2) YEAR COMPLETED	
		Professional Services 2012	Construction (if applicable)
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Dr. Johnson was the manager on this state-funded project involving design and construction of the rehabilitation of City Dam in Williams, Arizona. Involved approval of plans and specifications, construction management and quality assurance of the as-built project. Work performed while serving as the State of Arizona’s Dam Safety Official and Chief Engineer of the Arizona Department of Water Resources. \$N/A	<input type="checkbox"/> Check if project performed with current firm	
4.	(1) TITLE AND LOCATION ( <i>City and State</i> ) San Pedro River Watershed Subflow Zone (Cochise County, AZ)	(2) YEAR COMPLETED	
		Professional Services 2015	Construction (if applicable)
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Dr. Johnson was the manager on this state-funded project involving the carrying out mandates from the Arizona Supreme Court for delineation of the maximum lateral extent of the “subflow” zone for the San Pedro River watershed in Southeastern Arizona. Involved analyses of streamflow records and groundwater measurements, geomorphological evaluation of geologic land forms, evaluation of land-use and vegetation density. Work performed while serving as the Chief Engineer of the Arizona Department of Water Resources and technical advisor to the Arizona General Stream Adjudication Court. \$N/A	<input type="checkbox"/> Check if project performed with current firm	
5.	(1) TITLE AND LOCATION ( <i>City and State</i> ) Magma FRS Early-Warning Emergency Action Planning (Florence, AZ)	(2) YEAR COMPLETED	
		Professional Service 2011	Construction (if applicable)
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Dr. Johnson was the manager on this state-funded project involving development of an early-warning emergency action plan for an unsafe dam located in Pinal County. Involved dam failure inundation mapping, hydrologic analyses of contributing watershed above the dam, and coordination with downstream residents, Pinal County flood control district and emergency management agency, and National Weather Service. Work performed while serving as the State of Arizona’s Dam Safety Official and Chief Engineer of the Arizona Department of Water Resources. \$N/A	<input type="checkbox"/> Check if project performed with current firm	



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Phoenix, Arizona 85007**

**4. Resumes of Key Personnel Proposed for this Contract** (*Complete one Section #4 for each key person.*)

a. NAME  Jesse Piotrowski, P.E.	b. ROLE IN THIS CONTRACT  Hydraulic Engineer	c. YEARS EXPERIENCE	
		1. TOTAL 6	2. WITH CURRENT FIRM 2.5

d. LOCATION (*City and State*)  
WEST Consultants, Inc., Tempe, AZ

e. EDUCATION ( <i>DEGREE AND SPECIALIZATION</i> ) M.S. (Civil and Environmental Engineering) - University of Iowa B.S. (Civil Engineering) - University of Wisconsin-Platteville	f. PROFESSIONAL TRAINING - REGISTRATIONS PE Civil Engineering, Arizona; Certified Floodplain Manager
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g. OTHER PROFESSIONAL QUALIFICATIONS (*Organizations, Awards, etc.*)  
American Society of Civil Engineers, International Association for Hydro-Environment Engineering and Research, Association of State Floodplain Managers.

**H. RELEVANT PROJECTS**

	(1) TITLE AND LOCATION ( <i>City and State</i> )	(2) YEAR COMPLETED	
		Professional Services	Construction (if applicable)
1.	Lower Salt River Floodplain Delineation Study (Phoenix, AZ)	2014	
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Mr. Piotrowski performed complex HEC-RAS hydraulic modeling on this project which involved study of the Special Flood Hazard Area (SHFA) for approx. 15 miles of the Salt River. Involved multiple bridges, lateral flow into a subdivision, elevated pipeline crossing, and mixed flow, sensitivity analysis and floodway modeling. Required acceptance from Federal Emergency Management Agency (FEMA). \$370,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm
2.	Buckeye FRS Hydrologic Outflows and Dam Breach Analysis (Buckeye, AZ)	2015	
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Mr. Piotrowski developed complex, unsteady HEC-RAS and FLO-2D models on this project involving three flood retarding structures (FRS's) and two floodways totaling more than 11 miles in length along the north side of Interstate 10. Involved modeling of inline and lateral structures, bridges, culverts and storage areas, and dam breach analyses. FLO-2D inundation maps were developed at thirteen breach locations. \$80,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm
3.	East Maricopa Floodway Hydrology and Hydraulics Study (Maricopa Co., AZ)	2015	
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Mr. Piotrowski developed a complex HEC-1 hydrologic model of 250 square miles on this project involving development of flow rates and freeboard heights for locations adjacent to two levees along the East Maricopa Floodway (EMF). Developed a complex, unsteady HEC-RAS model involving surveyed and geo-referenced cross-sections, bridges, drop structures, energy dissipation structures, lateral weirs and storage areas. \$150,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm
4.	Powerline, Vineyard Road, and Rittenhouse FRS Sedimentation Rates (Apache Junction, AZ)	2014	
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Mr. Piotrowski determined sedimentation rates for the Powerline, Rittenhouse Road, and Vineyard flood retarding structures (FRS's) in Eastern Maricopa County using a model developed using data from 150 dams with similar characteristics. Involved use of RESSED, a Reservoir Sedimentation Database, to assist in bed material load yield calculations. \$23,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm
5.	Corps Water Management System HEC-RAS Model for the ACF Rivers Basin (Buford Dam, GA)	2014	
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Mr. Piotrowski developed a complex, unsteady HEC-RAS hydraulic model of 122 miles of the Chattahoochee River along the state border between Georgia and Alabama. Involved modifying an existing steady-state model, incorporating updated survey and structure information, and calibrating model to two historic flood events. The HEC-RAS model was incorporated into a Corps Water Management System (CWMS) model of the Apalachicola-Chattahoochee-Flint (ACF) Rivers watershed. \$28,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm



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**4. Resumes of Key Personnel Proposed for this Contract** (*Complete one Section #4 for each key person.*)

a. NAME  Gyan Basyal, E.I.T.	b. ROLE IN THIS CONTRACT  Hydraulic Engineering Staff	c. YEARS EXPERIENCE	
		1. TOTAL 1	2. WITH CURRENT FIRM 1

d. LOCATION (*City and State*)  
WEST Consultants, Inc., Tempe, AZ

e. EDUCATION ( <i>DEGREE AND SPECIALIZATION</i> ) M.S. (Civil Engineering) – Louisiana State University of Iowa B.S. (Civil Engineering) – Institute of Engineering, Tribhuvan University	f. PROFESSIONAL TRAINING - REGISTRATIONS E.I.T. Civil Engineering, Louisiana
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g. OTHER PROFESSIONAL QUALIFICATIONS (*Organizations, Awards, etc.*)  
American Society of Civil Engineers and Association of State Floodplain Managers.

**H. RELEVANT PROJECTS**

1.	(1) TITLE AND LOCATION ( <i>City and State</i> ) Salt and Gila River Sediment Transport Modeling (Phoenix, AZ)	(2) YEAR COMPLETED	
		Professional Services 2014	Construction (if applicable)
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Mr. Basyal developed complex HEC-6T and HEC-RAS sediment transport models, for more than 30 miles of the Salt and Gila Rivers, consistent with an understanding of the geomorphology of the system. Involved modeling of sand and gravel mining pits in the channel and overbank areas. \$68,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm
2.	(1) TITLE AND LOCATION ( <i>City and State</i> ) Queen Kaahumanu Highway Widening Redesign (Island of Hawaii)	(2) YEAR COMPLETED	
		Professional Services 2012	Construction (if applicable)
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Mr. Basyal provided hydraulic engineering support on this project which involved improvements to the Queen Kaahumanu Highway on the Island of Hawaii by widening to a four-lane divided highway. Performed design of highway culverts using HY-8 computer software and developed application scripts using visual basic computer language. \$135,500.	<input checked="" type="checkbox"/>	Check if project performed with current firm
3.	(1) TITLE AND LOCATION ( <i>City and State</i> ) Hydrologic Services for Okatibbee Creek and Tombigbee River Basins (USACE Mobile District)	(2) YEAR COMPLETED	
		Professional Services 2015	Construction (if applicable)
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Mr. Basyal provided hydraulic engineering support on this project involving the Okatibbee Creek and the Tombigbee River Basins in the US Army Corps of Engineer, Mobile District. Involved developing complex HEC-RAS, HEC-HMS, HEC-ResSim, and HEC-FIA models, performing CAVI integration, and producing flood inundation maps. Performed modeling of reservoir operations using ResSIM computer software. \$619,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm
4.	(1) TITLE AND LOCATION ( <i>City and State</i> ) East Pecos Solar Array Hydrologic Assessment (Pecos County, Texas)	(2) YEAR COMPLETED	
		Professional Services 2015	Construction (if applicable)
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Mr. Basyal provided hydraulic engineering support on this project involving hydraulic analysis to determine the flood depths, flow velocities, and scour depths in the proposed East Pecos Solar Array Project area located in Pecos County, Texas, near the Pecos River. Performed data collection and developed complex HEC-HMS and FLO-2D hydrology models. \$9,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm
5.	(1) TITLE AND LOCATION ( <i>City and State</i> ) City of Salem Flood Warning System (Salem, OR)	(2) YEAR COMPLETED	
		Professional Services 2014	Construction (if applicable)
	(3) BRIEF DESCRIPTION ( <i>Brief scope, size, cost, etc.</i> ) AND SPECIFIC ROLE Mr. Basyal provided hydraulic engineering support on this project involving recommended improvements to City of Salem’s network of real-time stream gaging stations. Involved providing training and support to City staff focused on gaging station operation and maintenance, discharge measurement techniques, streamflow record computations, rating analysis, surveying, and indirect measurement of peak flows. Performed development of HEC-RTS application scripts. \$167,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm



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**4. Resumes of Key Personnel Proposed for this Contract** *(Complete one Section #4 for each key person.)*

a. NAME  Alissa Miller	b. ROLE IN THIS CONTRACT  Hydraulic Engineer	c. YEARS EXPERIENCE	
		1. TOTAL 7	2. WITH CURRENT FIRM < 1
d. LOCATION <i>(City and State)</i> Tempe, AZ			
e. EDUCATION <i>(DEGREE AND SPECIALIZATION)</i> MSc Civil Engineering, Hydraulic Structures		f. PROFESSIONAL TRAINING - REGISTRATIONS CA, Civil Engineer	
g. OTHER PROFESSIONAL QUALIFICATIONS <i>(Organizations, Awards, etc.)</i>			

**H. RELEVANT PROJECTS**

1.	(1) TITLE AND LOCATION <i>(City and State)</i> Navajo Floodplains, Navajo Nation, AZ	(2) YEAR COMPLETED	
		Professional Services Ongoing	Construction (if applicable) N/A
	(3) BRIEF DESCRIPTION <i>(Brief scope, size, cost, etc.)</i> AND SPECIFIC ROLE Modeling and floodplain mapping of Navajo Nation, AZ; preliminary design of flood control features to provide information for floodplain management planning; Hydraulic Engineer, Budget roughly \$128,000.	<input checked="" type="checkbox"/>	Check if project performed with current firm
2.	(1) TITLE AND LOCATION <i>(City and State)</i> Risk Assessment, Stanford Hurricane Barrier, Stanford, MA	(2) YEAR COMPLETED	
		Professional Services Ongoing	Construction (if applicable) N/A
	(3) BRIEF DESCRIPTION <i>(Brief scope, size, cost, etc.)</i> AND SPECIFIC ROLE Economic risk of hurricane barrier structure evaluated by determining reliability of existing structure and 2-D modeling of potential flooding due to structure failure; Hydraulic Engineer while working for the US Army Corps of Engineers. Budget unavailable.	<input type="checkbox"/>	Check if project performed with current firm
3.	(1) TITLE AND LOCATION <i>(City and State)</i> Marshfield Flood protection Feasibility study, Marshfield, MA	(2) YEAR COMPLETED	
		Professional Services 2013	Construction (if applicable) N/A
	(3) BRIEF DESCRIPTION <i>(Brief scope, size, cost, etc.)</i> AND SPECIFIC ROLE Analysis of frequency of flooding carried out to justify protection measures including estimates of overtopping volumes and flood mapping for various return periods; Hydraulic Engineer while working for the US Army Corps of Engineers. Budget unavailable.	<input type="checkbox"/>	Check if project performed with current firm
4.	(1) TITLE AND LOCATION <i>(City and State)</i> L-40 Levee Risk Assessment, Boca Raton, FL	(2) YEAR COMPLETED: 2012	
		Professional Services 2012	Construction (if applicable) N/A
	(3) BRIEF DESCRIPTION <i>(Brief scope, size, cost, etc.)</i> AND SPECIFIC ROLE Determine risk of levee system to neighboring infrastructure through evaluation of existing system and estimation of potential consequences; Hydraulic Engineer while working for the US Army Corps of Engineers. Budget unavailable	<input type="checkbox"/>	Check if project performed with current firm
5.	(1) TITLE AND LOCATION <i>(City and State)</i> Fronting protection design, Pump stations WBV 33 and WBV 37, West Bank and Vicinity, New Orleans, LA	(2) YEAR COMPLETED	
		Professional Services 2011	Construction (if applicable) 2012
	(3) BRIEF DESCRIPTION <i>(Brief scope, size, cost, etc.)</i> AND SPECIFIC ROLE Design and develop specifications of fronting protection for discharge pumping stations as part of the hurricane protection of New Orleans, LA; Structural Engineer while working for the Army Corps of Engineers. Budget unavailable.	<input type="checkbox"/>	Check if project performed with current firm



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**5. EXAMPLE PROJECTS WHICH BEST ILLUSTRATE PROPOSED TEAM'S QUALIFICATIONS FOR THIS CONTRACT**

*(Present no more than five (5) projects. Complete one Section 5 for each project.)*

a. TITLE AND LOCATION <i>(City and State)</i> <b>WHITLOW RANCH DAM FAILURE ANALYSES AND INUNDATION MAPPING (Queen Valley, AZ)</b>	b. YEAR COMPLETED PROFESSIONAL SERVICES 2014      CONSTRUCTION <i>(If applicable)</i> N/A	
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**23. PROJECT OWNER'S INFORMATION**

c. PROJECT OWNER USACE Modeling, Mapping, and Consequences Production Center	d. ORIGINAL BUDGET/NTE AMOUNT OF PROJECT \$220,000 for several dams including Whitlow Ranch	e. TOTAL COST OF PROJECT \$220,000
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f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

The Modeling, Mapping, and Consequence (MMC) Production Center of the US Army Corps of Engineers (USACE) is tasked with developing consistent and scalable hydrologic and hydraulic dam break failure models, flood inundation maps, and consequence estimations to support a risk-based assessment, prioritization, and management framework used by USACE for their portfolio of dams nationwide. WEST is assisting MMC in this process by performing the dam failure analyses and inundation mapping for several USACE dams, including Whitlow Ranch Dam.

Whitlow Ranch Dam, which is considered a dry flood control (DFC) dam, is an ungated dam which provides flood control along Queen Creek in south central Arizona. Whitlow Ranch Dam is located just upstream of the small retirement community of Queen Valley in Pinal County and about 50 miles southeast of Phoenix. The drainage area to Whitlow Ranch Dam Reservoir is 143 square miles.

Because of its close proximity to the Phoenix metropolitan area, a dam break from Whitlow Ranch Dam could inundate the highly populated areas of Queen Creek, Gilbert, and Chandler. HEC-RAS was used to model the dam breaks under four different hydrologic loading conditions. The dam break hydrographs were developed using HEC-RAS. However, because Queen Creek becomes a shallow, distributary channel system downstream of the dam and many of the inundation areas downstream are urbanized, FLO-2D was used to model the flood wave as it propagated downstream. Further complicating this study was a flood control channel (the East Maricopa Floodway or EMF) that bisects the drainage area. This feature was coded into FLO-2D as a one-dimensional channel to better simulate the hydraulics in the EMF. HEC-FIA was used to estimate flood damages due to the various dam break scenarios. WEST is currently developing the final inundation mapping products for MMC.



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5. EXAMPLE PROJECTS WHICH BEST ILLUSTRATE PROPOSED TEAM'S QUALIFICATIONS FOR THIS CONTRACT

(Present no more than five (5) projects. Complete one Section 5 for each project.)

a. TITLE AND LOCATION <i>(City and State)</i> IMPROVED WATER MANAGEMENT & ACCOUNTING FOR CARLSBAD IRRIGATION DISTRICT (Carlsbad, NM)	b. YEAR COMPLETED	
	PROFESSIONAL SERVICES 2014	CONSTRUCTION <i>(If applicable)</i> N/A

23. PROJECT OWNER'S INFORMATION

c. PROJECT OWNER Carlsbad Irrigation District	d. ORIGINAL BUDGET/NTE AMOUNT OF PROJECT \$190,000	e. TOTAL COST OF PROJECT \$190,000
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f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

WEST assisted CID with a WaterSmart Grant to improve their ability to manage irrigation water deliveries to users. CID did not have remote monitoring of water levels or flows within the system. This made it difficult for CID managers to evaluate the performance of water deliveries to water users. Some of the water measurement structures were in bad repair and were not accurate. All this made it difficult for management to determine locations where canal losses occurred, and whether those losses were from seepage, excess delivery, or spills. The result was that operators were not able to maintain constant water levels within the canal. This made maintaining constant flow to lateral canals difficult. The project gave CID some basic tools, from which they can begin to improve operations.

The main features of this project include:

- Two Parshall flumes, not in proper repair, were modified into long-throated flumes
- Four new flow measurement structures were constructed at key sites
- New wall gauges, marked in discharge unit purchased
- A SCADA System was implemented with 14 remote sites and a base station
- Water measurements are made at remote sites with a pressure-transducer bubbler system
- Canal water levels measurement at key sites
- The measurements provide water budget information for the all main canals
- Information on water levels and flow rates is provided on the District's web site
- Analysis of System losses can be made based on information collected by the SCADA system



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*(Present no more than five (5) projects. Complete one Section 5 for each project.)*

a. TITLE AND LOCATION <i>(City and State)</i>	b. YEAR COMPLETED	
<b>HYDROLOGIC &amp; HYDRAULIC ASSESSMENT OF THE EAST PECOS SOLAR ARRAY PROJECT (Pecos County, Texas)</b>	PROFESSIONAL SERVICES 2014	CONSTRUCTION <i>(If applicable)</i> N/A

**23. PROJECT OWNER'S INFORMATION**

c. PROJECT OWNER	d. ORIGINAL BUDGET/NTE AMOUNT OF PROJECT	e. TOTAL COST OF PROJECT
Souder, Miller & Associates	\$50,000	\$50,000

f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

WEST Consultants, Inc. (WEST) was tasked with completing hydrologic and hydraulic analyses to determine the flood depths, flow velocities, and scour depths in the proposed East Pecos Solar Array Project area located in Pecos County, Texas, near the Pecos River. The first step in determining hydraulic characteristics in the on-site project area was to determine the volume and timing of flow entering the area from off-site. A drainage basin delineation was used to determine the extents of the off-site area that can potentially contribute flow to the on-site project area. The off-site project area encompasses the on-site project area to ensure that flow is allowed to enter the on-site project area from any direction. The flows entering the on-site project area from the off-site area were then used as inflows to the higher-resolution hydraulic model created for the on-site project area.

The FLO-2D Pro computer program was selected to model the off-site and on-site project areas. This software has the ability to model rainfall-runoff and flood routing in two-dimensions all within the same simulation. For this project, the Green and Ampt infiltration methodology was used to calculate the amount of runoff that resulted during a rainfall event. To do this, spatially-varied infiltration parameters were calculated and input for every element within the FLO-2D model. Additionally, spatially-varied roughness values were assigned to each individual element. The combined rainfall-runoff-routing methodology used in this FLO-2D model allows for a runoff hydrograph to be calculated for each grid element through the modeled area. From this information, the FLO-2D software calculated the depths and velocities throughout both the off-site and on-site project areas. The proposed conditions hydraulic characteristics in the on-site project area were then assessed and compared to the existing conditions characteristics. As expected, significantly less flooding will occur in the areas where the proposed solar arrays are to be located. To ensure the structural integrity of the solar arrays during flooding events, the proposed conditions results were used to calculate spatially-varied scour potential at every element within the on-site project area. The scour hazard depth map produced as a result of this assessment indicated that scour was not expected near any of the proposed solar array support structures. Finally, lateral channel migration potential for a re-graded and re-oriented wash in the proposed conditions was assessed. The results of this assessment allowed the client to design appropriate of mitigation measures.



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**5. EXAMPLE PROJECTS WHICH BEST ILLUSTRATE PROPOSED TEAM'S QUALIFICATIONS FOR THIS CONTRACT**

*(Present no more than five (5) projects. Complete one Section 5 for each project.)*

a. TITLE AND LOCATION <i>(City and State)</i>	b. YEAR COMPLETED	
SALT/GILA RIVER SEDIMENT TRANSPORT MODELING (Phoenix, AZ)	PROFESSIONAL SERVICES 2015	CONSTRUCTION <i>(If applicable)</i> N/A

**23. PROJECT OWNER'S INFORMATION**

c. PROJECT OWNER	d. ORIGINAL BUDGET/NTE AMOUNT OF PROJECT	e. TOTAL COST OF PROJECT
Flood Control District of Maricopa County	\$68,000	\$68,000

f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

The Lower Salt / Gila River system is characterized by a number of in-line and off-line sand and gravel operations that can have a significant impact on the hydraulic and sediment characteristics of the river. The Flood Control District of Maricopa County (FCDMC) utilizes sediment transport modeling to help determine the impact of the sand and gravel operations on the river system. While several sediment transport models of portions of the Salt/Gila River system exist, these models are old and do not cover the entire river system. WEST recently developed sediment transport models for a 45-mile long stretch of the Salt/Gila River system using both HEC-RAS and HEC-6T. Both the current existing conditions and proposed conditions (consisting of the scenario in which every permitted sand and gravel pit has been built out to its maximum extents) models were developed and the FCDMC plans to use these models to evaluate the future sediment impacts on the river due to sand and gravel operations.

In addition, at the downstream end of the model, there are several proposed vegetation management scenarios that are being considered to help reduce the flood hazard potential. Most of the developed alternatives involve Native Vegetation Replacement (NVR) in which non-native species are removed and replaced with species native to the Salt/Gila River system. While these alternatives have been evaluated from a hydraulic standpoint, they have not been evaluated from a sediment transport standpoint. Thus, WEST developed additional sediment transport models to represent the effects of these vegetation management scenarios. The FCDMC and WEST will utilize the results of this analysis to determine the sediment impacts on the Salt/Gila River system due to the proposed sediment management scenarios.



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**5. EXAMPLE PROJECTS WHICH BEST ILLUSTRATE PROPOSED TEAM'S QUALIFICATIONS FOR THIS CONTRACT**

*(Present no more than five (5) projects. Complete one Section 5 for each project.)*

a. TITLE AND LOCATION <i>(City and State)</i>	b. YEAR COMPLETED	
HAYDEN-RHODES AQUEDUCT CAPACITY STUDY (Bouse, AZ to Gila Bend, AZ)	PROFESSIONAL SERVICES 2014	CONSTRUCTION <i>(If applicable)</i> N/A

**23. PROJECT OWNER'S INFORMATION**

c. PROJECT OWNER	d. ORIGINAL BUDGET/NTE AMOUNT OF PROJECT	e. TOTAL COST OF PROJECT
Central Arizona Water Conservation District	\$79,500	\$79,500

f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

The Hayden-Rhodes Aqueduct of the Central Arizona Project (CAP) transports water from the Colorado River to Central Arizona, where the water is distributed to municipal and agricultural customers. The project began delivering water in 1985. Canal roughness has increased over time, causing higher water levels and reduced freeboard for a given rate of flow. Between Bouse Hills pumping plant, the first lift station downstream from the Colorado River, and the Salt-Gila pumping plant, a lift station near the Salt River east of the Phoenix metropolitan area, there are two additional lift stations and twenty five check structures. These canal segments were designed such that in the event of a power failure, check structures could be closed and the canal would contain all the water. With the higher water levels, there was a question whether or not the water would still be contained within the canal under these conditions. This study evaluated canal freeboard for existing canal roughness with a steady version of HEC-RAS. It used an unsteady version of HEC-RAS to determine whether or not the canal could contain the waves created by emergency shutdown, as well as the entire water volume.



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6. ADDITIONAL INFORMATION

a. PROVIDE ANY ADDITIONAL INFORMATION YOU FEEL MAY BE NECESSARY TO DESCRIBE YOUR FIRMS QUALIFICATIONS. (ATTACH ADDITIONAL SHEETS AS NEEDED.)

See additional sheets attached.

7. ANNUAL AVERAGE PROFESSIONAL SERVICES REVENUES OF FIRM FOR LAST 3 YEARS

a.	Percentage of Total Work Attributable to State, Federal and Municipal Government Work:	85%
b.	Percentage of Total Work Attributable to Non-Government Work:	15%

8. AUTHORIZED REPRESENTATIVE. The foregoing is a statement of facts.

Signature: 

Date: 12/21/15

Name: Brian Wahlin

Title: Vice President

## 6. Additional Information

### CAPACITY OF WEST CONSULTANTS

WEST has the experienced staff and the financial resources to complete any water resources related project for the State of Arizona. Resumes for our key personnel in our Tempe, AZ office are included in the submittal. If capacity of the Tempe offices is exceeded, WEST has several other offices (i.e., San Diego Folsom, Portland, Salem, and Bellevue) that can be utilized to complete any project in a timely fashion. WEST has managed a range of projects with small budgets to large multi-million dollar/multi-year projects. WEST is experienced at managing various small projects (i.e., less than \$250,000) that originate from on-call contracts. Currently, the Arizona office of WEST holds on-call contracts with the Flood Control District of Maricopa County, Mohave County, Pinal County, Cochise County, New Mexico Interstate Stream Commission, and the New Mexico Office of the State Engineer. We have been able to manage the various projects from these contracts efficiently and consistently deliver quality work products to our clients in a timely fashion.

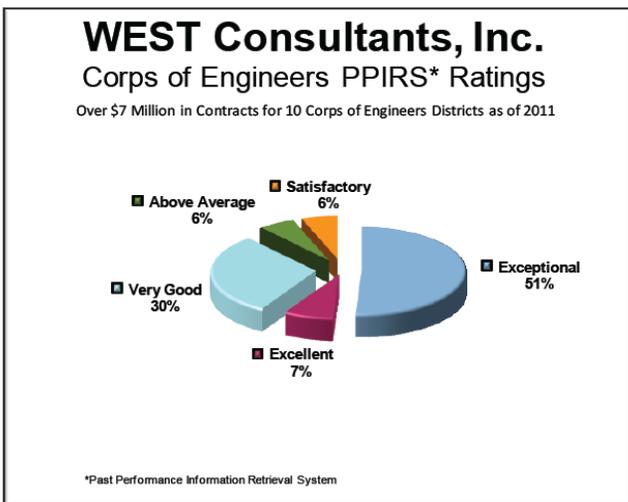
Providing quality work products on time and within budget has been a key to WEST's success. WEST has an established set of quality control guidelines with a quality control plan developed and implemented at the beginning of each project. WEST always assigns a Project Principal and a Project Manager to each project contract. The Project Manager will be responsible for identifying specific objectives and requirements for the project, establishing project task milestones, schedule, and budget, defining the technical approach and deliverables, and coordinating with the State of Arizona. The Project Manager will ensure that deliverables (i.e., computer models, reports, work maps, plans, etc.) will be provided on time and within budget; and will coordinate with the State of Arizona to ensure that all project requirements are met and any project issues are quickly resolved. Our Project Manager is always supported by a team of professionals with expertise necessary for successful completion of the project. The Project Principal will be responsible for ensuring adequate resources are available, quality assurance is met, and all work products are delivered on time. Finally, an assigned Quality Assurance / Quality Control leader will review all deliverables.

### PRIOR PROJECT EXPERIENCE

WEST has completed dozens of hydraulics and hydrology studies throughout Arizona in just the last 3 years. WEST developed DFIRMs in sixteen counties across Oregon and Idaho for FEMA Region X, which involved producing more than 1,300 DFIRM panels along more than 550 miles of river. Other

recent floodplain studies include Physical Map Revisions (PMRs) for the Tres Rios North Levee and Centennial Wash. WEST has also developed numerous FLO-2D models.

WEST has a proven track record of superior water resources engineering services. Our past and current clients include FEMA Region IX and X, U.S. Army Corps of Engineers (USACE), Flood Control District of Maricopa County, Pima County Regional Flood Control District, Pinal County Department of Public Works, Cochise County, Salt River Project, Central Arizona Project, Arizona Department of Transportation, Caltrans, Oregon Department of Transportation, Washington Department of Transportation, Federal Highways Administration,



Transwestern Pipeline Company, Freeport McMoRan, New Mexico Interstate Stream Commission, many other local governments, numerous engineering consultants, and private industry. Our clients confirm that WEST delivers quality project results. *WEST Consultants has achieved a documented 100% Satisfaction Rating (51% were rated Exceptional) in the Past Performance Information Retrieval System for our federal projects.*

Coordination of any hydraulics or hydrology project usually includes interactions with the public. WEST has a history of creating positive partnerships with individuals and public organizations in order to maximize benefit from a project. For example, a large project in Nebraska required WEST to reach out to more than 70 stakeholder organizations. By soliciting their input through a variety of methods and establishing a means of communication early in the project, WEST helped to gather public support and was able to develop a sediment control strategy for the area (12,000 square miles) that won the USACE's highest score of approval.

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## PROJECT RISK MANAGEMENT

Every project has unknowns or complicating factors in it that can pose risk to the budget, scope, and schedule. To minimize these risks, we have developed the following procedures:

***Disciplined Financial Management*** – We prioritize accurate and realistic contracting because we recognize financial management is a key priority of our clients. We believe in developing a comprehensive and fair initial contract, and are dedicated to delivering the best possible product while strictly adhering to every aspect of that contract, from time frame to financial expectations.

***Respect for our Client's Client*** – Projects of significance inevitably involve numerous stakeholders, each of whom measure success according to their own perspective. We strive to understand our client's responsibilities, and recognize that our top priority must be to help them become highly successful in the opinion of their constituents.

***Scheduling*** – WEST recognizes the importance of scheduling, and so we translate project scheduling into a leadership tool to guide the consultant team toward successful delivery of a project. We schedule sequentially and in parallel, insuring schedule robustness and efficient product delivery. We believe that every project task is a milestone and a reflection of our performance.

***Scope Definition*** – Projects that are poorly scoped can pose a significant risk to the overall project. As experts in the field of hydrology, hydraulics, and sediment transport studies and our experience with floodplain projects, we are able to identify areas in the scope that may be problematic and offer suggestions on how to improve the scope as was done in Guadalupe FDS as described in the following paragraph. In addition, WEST personnel are experts in a wide range of software packages and are able to select the most appropriate modeling tool for a given project.

One example of where we mitigated the risks to a project budget and schedule is the Guadalupe FDS that we recently completed for the FCDMC. This study involved mapping floodplains in ponded areas along a canal. The traditional approach taken by the FCDMC was an iterative approach that would have taken significant effort and resources. We identified this as a potential issue for the project and immediately called a meeting with the FCDMC. We suggested creating a unique HEC-RAS model consisting of only storage areas and storage area connections to model the ponding against the canal. This unique approach saved significant resources and kept the project on time and under budget.

A second example of mitigation of risks to a project budget and schedule occurred on the Tres Rios North Levee PMR project that we completed for the FCDMC. This project consisted not only of a PMR but also a certification of the newly constructed Tres Rios North Levee. It was a high priority project because a lawsuit settlement required that the levee be certified so that the residents beyond the levee could be removed from the floodplain. Initially, the USACE was going to complete the project and WEST was

hired by the FCDMC to simply review the USACE's work. The technical staff at the USACE had difficulties meeting the time schedule set forth by the FCDMC. WEST realized that this situation would result in the project falling significantly behind, alerted the FCDMC, and suggested that WEST take over the bulk of the workload to keep the project on track. Both the USACE and the FCDMC agreed and the project was completed on time.

A second risk factor presented itself about halfway through the Tres Rios North Levee PMR project. The USACE informed the FCDMC and WEST that an Emergency Action Plan (EAP) would be required for Tres Rios North Levee. Under a short time frame and with limited budget, WEST was able to develop an EAP for the levee, the first of its kind in Arizona. The FCDMC then used WEST's EAP as the basis of its recently developed levee EAP template. Thus, even though an unexpected development occurred in this project, WEST was able to adjust and complete the project on time and within budget.

### ADAPTING PROJECT SCHEDULE

WEST has a history of meeting project schedules and budgets, even under emergency conditions, during its 25 year history. We have the ability to re-arrange workloads and shift projects between offices so that our clients' needs and budgets are met in the most efficient manner possible. A few specific examples are given to demonstrate situations in which WEST has risen above the normal call of duty to meet clients' emergency needs:

Recently, the Salt River Project (SRP), a long-standing client of WEST, approached us with a project to perform a scour analysis on some of their electrical transmission towers. Ordinarily, this would have been a routine project for us. However, due to extenuating circumstances the project had to be completed within the two weeks surrounding the holiday season. WEST met this challenge by assigning sufficient qualified staff to complete the project within the allotted time frame.

In January 2010, flood flows endangered several SRP electrical transmission towers along the Hassayampa River west of Phoenix. SRP once again turned to WEST to perform hydraulic, hydrologic, and scour analyses on this critical infrastructure site in a timely fashion. WEST was once again able to shift its workload to meet the needs of this emergency project.

We also recently completed an emergency project for SSFM International for the Queen Kaahumanu Highway expansion in Hawaii. The hydraulics and hydrologic lead on this project had to step down due to personal reasons and WEST was tasked with evaluating an entirely new drainage study that would meet original project deadlines despite starting several months late. We developed a forensic hydrology study that convinced the Hawaii DOT to reduce the design flow requirements for the highway that will allow smaller culverts and therefore achieve significant cost savings. Thus, even though we worked with a compressed deadline, we were able to provide cost savings for SSFM and meet their deadlines.

*“Brian Wahlin of WEST Consultants was a pleasure to work with. Dr. Wahlin demonstrated creativity and professional expertise in developing a custom product to meet our unique needs. He was responsive to our desires and changing requirements as the project unfolded. I am certain he worked far beyond our budgeted hours in order to ensure the ultimate deliverable was a success, and this extra labor was never billed. This is a testimony to WEST's commitment to customer service, and I would not hesitate to hire them again.”*

*Tim Kacerek, Central Arizona Project (retired)*

We pride ourselves on being a highly technical engineering firm, but we recognize that success does not come solely from technical expertise but also from a companywide dedication to our clients. This dedication is expressed by providing consistent quality engineering for projects and by responding quickly to emergency projects that must be completed in just a few days – such as our recent investigation of emergency protection options following a massive bank failure on the Hassayampa River.

Moreover, we respond quickly to events that are important to a project but may not be known to our client. For example, we were asked by Pinal County to investigate mitigation solutions to the ongoing flooding problems in Queen Valley, Arizona. Just a few weeks later a major storm began in the region. In response, we immediately drove to the site to photograph, measure, and otherwise document the actual flow effects on the existing drainage structures. This allowed us to calibrate and verify our hydraulic models for the region, thereby maximizing confidence in our predictions and recommendations.

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## COST CONTROL PROCESS

Cost control is a major element of project management. The budget is presented at all internal project coordination meetings so that individual team members are up-to-date on the task efforts and remaining budget to complete tasks. Our cost control approach includes monitoring the project budget and determining whether we are meeting projected project schedule and budget. WEST has also developed project management values and tools that it uses to ensure that projects are effectively delivered. These values are derived from many years of listening to what is important to our clients.

*Client / Consultant Partnerships* – By listening to the needs of our clients, we develop client / consultant partnerships that translate into highly successful outcomes. To maintain close client / consultant relations, WEST project managers maintain a high degree of technical involvement and management control over each project. WEST values each client and takes pride providing responsive client service. WEST continually strives to exceed expectations. As a result, WEST has established long-term partnerships with multiple clients, with many still active after more than two decades.

*Trust Based Relationships* – Trust is the cornerstone of the client / consultant relationship. WEST believes trust is continuously earned through clear communications, dedication to the project schedule, and the ongoing effort to understand and implement our clients' needs and priorities.

*Clear Communication* – WEST recognizes that communication is the critical factor for project success. We pride ourselves in the availability of project staff and immediacy in client responses.

We apply the above procedures to all of our projects with great success. One particular example was the PMR for Centennial Wash that WEST recently completed for the FCDMC. This large project (greater than \$250,000) involved developing floodplain maps for over 40 linear miles of Centennial Wash in the western portion of Maricopa County. In addition, a large FLO-2D model was created to map the floodplains where Centennial Wash breaks out from its main channel, creating the need to develop a procedure to map both HEC-RAS and FLO-2D results on the same work maps. WEST utilized the project management and cost control processes described above and finished this project on time and significantly under budget.

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## QUALITY ASSURANCE AND QUALITY CONTROL

Quality Assurance and Quality Control (QA/QC) are important components of developing hydraulic modeling and flood insurance study products to the specifications required by FEMA. WEST has well-developed and proven internal QA/QC procedures that have been refined during our many past FEMA projects. The internal review process consists of a self-review check list, reviews by the project manager, and reviews by an assigned independent senior reviewer. Our thorough review process reduces the likelihood of costly and time consuming revisions and helps facilitate a more efficient LOMR review by FEMA's Risk Mapping, Assessment, and Planning (RISK MAP) Production and Technical Services Contractor for Region IX.

Quality performance includes technical content, clarity of information, and the ability to convey technically complex information to a general audience. Our quality assurance protocols are closely related to our project management philosophy: clear communication of client and project manager

expectations, reinforced and supported by regular guidance and progress review. We hold project kickoff meetings to provide the project team with a clear understanding of client needs and expectations. Our Project Manager monitors progress toward completion, providing feedback on technical content, schedule and budget. Reviews of project deliverables will be made by the Principal-In-Charge and other technically qualified and experienced personnel as appropriate for the specific deliverable. As required, third party reviews will also be utilized. The QA/QC review process will be appropriately documented to ensure clear communication of comments, responses and back checking/acceptance of required revisions to deliverables.