

# EASTERN MUNICIPAL WATER DISTRICT

## PERRIS II DESALTER BLACK & VEATCH SCOPE OF WORK FOR ENGINEERING SERVICES DURING CONSTRUCTION JANUARY 2019

### BACKGROUND

Black & Veatch (Engineer) recently completed design services for the Perris II Desalter Project. The following scope of services is intended to cover Black & Veatch’s participation in the construction phase of the subject project as the Engineer of Record.

Eastern Municipal Water District (EMWD) has opted to provide a third party Construction Manager (CM) to oversee the work of the Contractor onsite, and to inspect such work as the project progresses. The Engineer will collaborate and coordinate with the CM and EMWD to issue clarifications and responses to questions as outlined in the detailed scope of work included in this document. The Engineer assumes no responsibility for inspections of the work performed by the CM. Inspections by the Engineer, if requested, will be provided during site visits as outlined in this scope of work. Inspections as to the suitability of the work as reviewed by the CM are not the responsibility of the Engineer.

The scope of services herein assumes a contract delivery over a 26 month construction period. Meeting attendance, site visits, start-up/commissioning, and training activities have been estimated under this assumption.

### SCOPE OF SERVICES

- Task 1.0 Project Management
- Task 2.0 Conformed Documents
- Task 3.0 Project Meetings and Site Visits
- Task 4.0 Office Administration
- Task 5.0 Start-up and Commissioning
- Task 6.0 Project Close-out and Miscellaneous

### TASK 1.0 – PROJECT MANAGEMENT

#### Task 1.1 – General Project Management & Administration

- Maintain contact with and respond to communication and correspondence from EMWD, Contractor, and CM for the duration of the project.
- Provide a monthly status report with each invoice, including a summary of progress-to-date for key tasks, cost expenditures, and change management log. The monthly report will include a summary of work progress, a summary of expenditures by task, billings-to-date, amount remaining, and percent complete. EMWD will be notified if impacts to the budget are realized during construction due to scope of work changes.

### Task 1.2 – Monitor Construction Schedule

In support of the CM, Engineer will review the Contractor’s baseline schedule and up to two updates provided through the project. Engineer will provide comments on progress and milestones related to the Contractor’s sequencing of the work in accordance with the Contract Documents.

### Task 1.3 – Correspondence Log

In support of the CM, Engineer will provide input into the correspondence log and will assist in maintaining an accurate account of correspondence between the Contractor, EMWD, CM, and Engineer.

## TASK 2.0 – CONFORMED DOCUMENTS

Upon completion of the bidding phase of the project (services provided under the design scope of work), Engineer will develop conformed to bid documents consistent with any clarifications or addenda that were issued. Title block and document covers for both drawings and specifications will be updated to read “CONFORMED TO BID.”

The Consultant will submit to EMWD the following:

- One full size electronic pdf copy of the conformed to bid drawings.
- One copy of the AutoCAD conformed to bid drawings.
- One electronic pdf copy of the conformed to bid specifications.

## TASK 3.0 – PROJECT MEETINGS AND SITE VISITS

### Task 3.1 – Preconstruction Meeting

Engineer will attend the preconstruction meeting as planned and scheduled by EMWD and/or CM. Level of effort assumes attendance by the Project Manager, Project Engineer, and Staff Engineer.

### Task 3.2 – Bi-Weekly Construction Meetings

Engineer will attend construction progress meetings every other week (biweekly) for review of construction progress, clarify Contract Documents, and to walk the site to review work throughout the duration of construction. Level of effort for this task assumes attendance at up to 48 meetings by the Project Engineer or Engineering Manager.

### Task 3.3 – Periodic Site Visits

As required, Engineer will arrange to visit the site as needed to review the progress of the work, observe construction activities or features, and to troubleshoot issues with EMWD, Contractor, and CM. Site visits are assumed to be an eight hour day.

Level of effort for this task assumes the following:

- Engineering Manager – 5 Site Visits
- Lead Project Engineer – 10 Site Visits
- Staff Engineer – 15 Site Visits
- Senior Electrical Engineer – 5 Site Visits
- Senior I&C Engineer – 5 Site Visits

### Task 3.4 – Final Inspection

Engineer will attend the final site walk with EMWD, Contractor, and CM for final inspection of the work. Final inspection will be attended by the Engineering Manager and Lead Project Engineer. Engineer will provide an observation report of any issues identified during the final walk and will provide an electronic copy to the CM.

## TASK 4.0 – OFFICE ADMINISTRATION

### Task 4.1 – Shop Drawing and Submittal Reviews

Engineer will review shop drawings, submittal documents, and equipment operation and maintenance manuals as required by the Contract Documents. Through EMWD/CM, the Engineer will receive submittals and will provide a single response to the CM for distribution to the Contractor and EMWD. The final review disposition for shop drawing submittals shall be as determined by the Engineer.

Manufacturer's O&M manuals will be reviewed for inclusion of information in conformance with the Contract Documents and shop drawing approvals.

The level of effort for this task assumes up to 375 total reviews, inclusive of resubmittals. See attached for a summary of anticipated submittals and resubmittals, including estimated hours for review. Additionally, it is assumed that submittal routing and document management will be managed by the CM, and that any comments from EMWD or other parties will be provided to the Engineer for review prior to issuance of a final review disposition.

### Task 4.2 – Requests for Information

Engineer will render interpretation and responses necessary for the proper execution and progress of the work upon written request from the CM. Engineer will submit written responses to the EMWD/CM accordingly. Engineer will render all interpretations or decisions in good faith and in accordance with the requirements and intent of the Contract Documents. Engineer will not transmit any interpretations or clarifications directly to the Contractor. The level of effort for this task assumes up to 150 RFIs, with four to five hours per response.

### Task 4.3 – Design Clarifications

Engineer will render design clarifications necessary for the proper execution or progress of the work upon written request from EMWD/CM. Engineer will render all interpretations or decisions in good faith and in accordance with the requirements and intent of the Contract Documents. Engineer will transmit design clarifications through EMWD/CM. The level of effort for this task assumes up to 30 design clarifications, with six to eight hours per clarification.

### Task 4.4 – Change Orders

Engineer will review change order requests as requested by EMWD/CM, and will provide an opinion on the appropriateness of the change order request, in accordance with the Contract Documents. Engineer will provide written summary of opinion of change order request, including a parallel cost estimate if requested, and submit to EMWD/CM. The level of effort for this task assumes 10 change orders, with 10 to 12 hours per change order.

### Task 4.5 – Claims Support

The Engineer will provide claims support to EMWD as required. The Engineer will review the basis of the claim and will provide an opinion as to the reasonableness of the claim in written form to EMWD. The Engineer will meet with EMWD, CM, and Contractor as required resolve the claim. A budget for this task has been set at 60 hours. Additional services, if required, will be negotiated as necessary.

## TASK 5.0 – START-UP AND COMMISSIONING

### Task 5.1 – Start-up and Commissioning Support

The operational specialists will develop a draft Startup & Commissioning Plan, in conjunction with the Contractors’ project schedule for the overall facility. The overall plan will incorporate two phases, the first being the startup activities. The Project Startup & Commissioning Plan will define the risks from this project specific to EMWD’s O&M team, and will support, not direct, the Contractor construction schedule. The plan will present the group of activities and events that contribute to the process of ensuring the project will be ready for commissioning through the operability acceptance period.

An operational specialist will provide testing and start-up support. Support will include review of the Contractor’s start-up and testing plan(s) and review of performance test data for conformance with contract documents. The operational specialist will witness all major process functional and control tests and assist EMWD with an operational test of the entire facility. The operational specialist will be onsite during operations and performance testing for up to seven weeks. Anticipated operational and performance tests include Reverse Osmosis (RO) system pre-operational testing (3 days), RO system start-up testing (4 days), RO system performance testing (8 days), chemical system start-up and performance testing (4 days), decarbonator system start-up and performance testing (2 days), control system testing (5 days), electrical system testing (3 days), miscellaneous systems testing (2 days) and operational test of the entire facility (5 days). Factory witness tests by the Engineer are not included with this task. The Engineer will participate in one start-up coordination meeting attended by one B&V staff.

### Task 5.2 – Electronic Operations Manual

The operational specialist will prepare an Electronic Operations Manual (EOM) on EMWD’s SharePoint site that covers major process equipment. No hard copies will be provided. It is assumed that approved O&M vendor manuals, conformed drawings, and updated control strategies will be available for use in preparing the EOM. The major systems are identified below.

- 1 Introduction
- 2 RO System Pretreatment
- 3 RO System
- 4 RO Support Systems
- 5 Decarbonator
- 6 Finished Water System
- 7 Brine Pump Station
- 8 Chemical Storage and Feed Systems (includes Ammonium Sulfate, Citric Acid , Sodium Bisulfate and Sodium Hydroxide)

The following topics will be included in the Operations Manual for each system:

- **System Description.** Operator-centric description of the system or process with the objective of “connecting” the upstream & downstream processes specific to the system. This section will include a

description of the “normal operating mode” as provided by the design memorandum and/or design instrumentation and controls descriptions. Provide a process flow diagram of the system process.

- **Design Criteria.** Consists of process design information and basis of design, such as flow rates, water characteristics, process capacities, loading rates, equipment information as applicable etc. Chemical application, the chemical strength, dosages, and feed rates will be included.
- **Theory.** Principles, assumptions, and explanation of the workings of the process for this facility will be addressed. The intent is to describe the “how” of the process. This section complements other generally available comprehensive theoretical sources. Calculations, chemistry, formula, equation and other unusual or unique features of the process shall be addressed
- **Controls.** Operator-centric descriptions of the local, remote, and auto control modes of the system as applicable. Key performance variables that influence performance will be identified. A table defining valve positions will be developed for normal flow path through the process.
- **Safety.** Safety risks and concerns are identified with respect to process operation. EMWD safety policies should always be consulted prior to working in this facility
- **Process Troubleshooting.** Operator-centric description of the system or process with the objective of providing site specific process control troubleshooting information using flowcharts and/or tables. The process troubleshooting guide will generally address equipment troubleshooting and assumes that equipment troubleshooting will be accessible by the operator through the equipment O&M manual.

EMWD will review the EOM online in the EMWD SharePoint portal. Consultant will update the draft EOM after facility commissioning and operational acceptance testing . The manual will be finalized on the EMWD SharePoint site. It is assumed that Standard Operating Procedures (SOPs) will not be required. However, SOPs can be prepared and included as an additional service if requested.

Engineer will endeavor to complete the EOM within 30 days of substantial completion of construction.

### Task 5.3 – Training

The deliverable will include process-specific training manuals and various training material for future use by EMWD staff. Operational specialists will provide the onsite process training services, including a total of 4 hours of formal classroom training/system in addition to ongoing “on-the job” training regarding effective operation of the various systems, subsystems and/or processes, including process troubleshooting and optimization of the RO, RO support, and chemical feed systems.

These sessions will be a supplement to the equipment manufacturer’s (or System Supplier’s) training required by the Contract Documents. Utilizing the AURA method (Awareness, Understanding, Retention and Application). Training will be split between the classroom and on-site facilities. Training material will include session hand-outs and a PowerPoint presentation for future use by EMWD staff.

Personnel training will be provided as described below.

- A training document will be prepared and distributed for each training session. The document will be comprised of EOM topics and drawings.
- Training will include a discussion of the principals of operation, discussion of process troubleshooting, and optimizing system operations.
- Training will be conducted at the treatment plant site at a time agreed to with EMWD for the convenience of the staff. Training sessions can be recorded if requested by EMWD.

## TASK 6.0 – PROJECT CLOSE-OUT AND MISCELLANEOUS

### Task 6.1 – Department of Drinking Water (DDW) Permitting Support

The Engineer will provide permitting support to EMWD as requested. A total of 40 hours of support is included with this task.

### Task 6.2 – Record Drawings

The Engineer will review and update the contract drawings and specifications per redlines provided by Contractor and CM. Level of effort for this task assumes the Contractor will provide pdf and paper copies of their construction as-built drawings and specifications and their electronic construction as-built AutoCAD drawings and specifications. It is also assumed that all changes initiated by RFI, field order, or other mechanism will be redlined on the Contract Documents by the Contractor or CM and that no additional marking of drawings or specifications will be required by the Engineer. Upon completion of the facilities, Consultant will finalize transfer of Contractor markups to permanent record digital files, drawings and specifications. Conformed to Construction Record documents will be prepared based upon the information compiled and furnished by the Contractor.

The Consultant will submit the following to EMWD:

- One full size electronic pdf copy of the conformed to construction records drawings.
- One copy of the AutoCAD conformed to construction records drawings.
- One electronic pdf copy of the conformed to construction records specifications.

## TASK 7.0 – DESIGN SERVICES DURING CONSTRUCTION

### Task 7.1 – Architectural Finish Color Boards

The Engineer will develop architectural finish color boards for all project architectural finishes. This task includes collecting samples from vendors, preliminary color/finish selection from samples, finish color board production, travel and attendance at a finish color board review and selection workshop and revising the finish boards based on EMWD feedback.

### Task 7.2 – Standby Generator Connection Design

Power service shutdowns are anticipated for SCE service connections during construction. Engineer will provide standby-generator hookup design services in support of providing power to Perris/Menifee Desalter Brine Pump Station, SCRWRf Lift Station and Odor Control facility, SCRWRf Pond Pump Station and the Reach IV Booster Pump Station during service shutdown. Work effort assumes that EMWD will provide a site plan showing locations of the switchboards to be powered, EMWD preference for generator locations, single line diagrams identifying critical loads to provide power to (EMWD to identify critical loads), confirmation of which switchboards need stand-by power, duration of standby power, and generator response time.

The design will include:

- Preliminary and Final design
- Load, short circuit calculations



- Generator sizing and specifying
- Site visit to identify existing site conditions, existing equipment ratings and locations, and to confirm points of connection
- Sizing for cable and appurtenances
- Markup of provided single line diagrams showing generator hook-up design
- Review of generators proposed by Contractor
- Construction Phase: Meeting with EMWD and site inspection

### Task 7.3 – SCE Design Coordination and Design Revisions

The Engineer will perform electrical design drawing revisions to incorporate the final SCE Service Plan. Based on a review of SCE’s preliminary design, the following revisions will be required: adjustment of duct bank routing, addition of intermediary switching equipment, repositioning of and confirmation of exact SCE equipment locations, transformer ratings, and removal of firewall between PME and Transformer. The work described will result in revisions to the following: Site plans, detail plans, duct bank sections, conduit schedule, and single lines.

Additionally, once the final design is received and approved by EMWD, SCE will perform calculations on their system and provide utility data to be modeled in SKM and used to update and perform all calculations on the system, including Load Flow, Short Circuit, Arc Flash, Harmonic, and Coordination analyses/studies. Equipment ratings in the design will be reviewed and be confirmed as adequate or updated as required. The production of Arc Flash labels is not included in the estimate. It will be the responsibility of the Contractor to provide an updated/final SKM model.

## TASK 8.0 – SERVICES DURING DESIGN PHASE

### Task 8.1 – CM Constructability Design Comment Resolution

The Engineer reviewed Constructability comments prepared by the CM, attended the Constructability Comment Review Workshop and addressed comments on the drawing, specification, schedule, and OPCC. Revisions included pipeline profile adjustments, mechanical piping revisions, specification revisions and OPCC updates.

### Task 8.2 – Server/UPS Design Revisions

The Engineer addressed comments from EMWD to revise server power from 120V service to 208V, updated UPS and power distribution diagrams, developed a new server distribution schematic drawing, reassigned circuits, revised panel schedules, revised conduit routing and updated Control Block Diagrams.

### Task 8.3 – Storm Drain BMP Specification and Drainage Design Evaluations

The Scope of Work for Perris II Desalination Facility – Phase I Design Amendment No. 3 assumed that non-infiltration proprietary BMP’s would be incorporated into design for storm water quality management to mitigate the need for a large BMP footprint that is associated with traditional bio-filtration BMPs. Based on feedback during design, Engineer evaluated traditional bio-filtration BMP alternatives for the project for Phase 1 and Phase 2 facility phases. After alternative selection by EMWD, a performance specification was developed based on alternative manufacturers so that the BMP was not sole-sourced.

### Task 8.4 – Neutralization Drain Pump Design

The neutralization tank drain was designed to drain to sewer. EMWD requested that neutralized CIP waste also be routed to the ROC concentrate pipeline. The Engineer revised Civil, Mechanical, Electrical and Piping and Instrumentation drawings as part of Bidding Addendum No. 2.

### Task 8.5 – Site Civil and Wall Revisions

Based on City of Menifee Valley Boulevard design and feedback from resident on wall/easement discussions, Engineer has performed site civil perimeter wall alignment revisions, gate location adjustments and profile revisions to better accommodate future Valley Boulevard construction and for counter-clockwise brine truck drive loop pattern, performed additional truck turning analyses for northern access road and revised brine truck loop, developed monument wall design alternatives, revised design for the exclusion of perimeter wall along northern property line, revised to a 6-foot wall along western property line, coordinated and redefined landscape areas, incorporated landscape flow metering separate from the plant water metering.

## ADDITIONAL ITEMS

By performing the scope of work presented herein, the Engineer shall not have authority or responsibility to supervise, direct, or control the Contractor's work, site conditions, or means, methods, techniques, sequences, or procedures of construction. The Engineer shall not have authority or responsibility for safety precautions and programs, safety, safe practices, unsafe practices or conditions, operations, equipment, incident to the Contractor's work, or personnel other than the employees of the Engineer or for any failure of the Contractor to comply with laws, regulations, rules, ordinances, codes, or orders applicable to the Contractor furnishing and performing the work.

This service will in no way relieve the Contractor of complete supervision and inspection of the work or the Contractor's obligation for complete compliance with the Contract Documents, Drawings and Specifications. The Contractor shall have sole responsibility for safety and for maintaining safe practices and avoiding unsafe practices or conditions.



**Eastern Municipal Water District  
Perris II Desalter  
Initial Estimate of Project Submittals (Prepared by B&V)**

Spec Section	Item		EMWD Review	B&V Review		
				Basic	Moderate	Complex
1000	General Safety Requirements		1			
1026	Schedule of Values		1			
1140	Work Restrictions and Constraints (Custom)		1			
1310	Project Control Schedule		1			
1380	Pre-Construction Audio Video Taping		1			
1381	Pre-Const. Audio Video Taping Above Ground Facilities		1			
1430	Maintenance Manual Requirements		1		2	
1450	Code Required Special Inspections and Procedures (Custom)		1			
1500	Temporary Facilities and Controls		1			
1611	Meteorological and Seismic Design Criteria (Custom)					
1614	Product Delivery, Storage, and Handling (Custom)		1			
1615	Equipment and Valve Identification (Custom)		1			
1630	Pipeline Schedule (Custom)		1			
1650	Commissioning (Custom)				1	
1820	Demonstration and Training (Custom)					
2050	Demolition and Salvage		1			
2082	Removal and Disposal of Asbestos Containing Materials (Custom)		1	1		
2200	Earthwork (Custom)				2	
2221	Trenching, Backfilling, and Compacting		1		1	
2242	Cement Stabilization Sand Bedding/Backfill		1	1		
2252	Control Density Fill			1		
2271	Grouted Rip-Rap			1		
2433	Drainage Pipe-Reinforced Concrete Pipe - Storm Drain			1		
2444	Chain Link Fencing			1		
2505	Roadway Base Course			1		
2513	Asphalt Concrete Paving			1		
2718	Installation of Water Pipeline					
2762	Furnish & Install Plastic Sewer Pipe System				1	
2810	Fabricated Metal Gates and Fencing (Custom)				1	
2813	Irrigation (Custom)				1	
2900	Landscape (Custom)				1	
3150	Formwork for Cast-in-Place Concrete				1	
3200	Reinforcing (Custom)					
	Materials - General			2		

	Forebay				4	
	Transfer Pump Station				2	
	RO Building				4	
	Neutralization Tank				1	
	Decarbonators				1	
	Chemical Injection Vault				1	
	CCT				4	
	FW Pump Station				2	
	Chemical Sump				1	
	Brine Receiving Station				1	
	Pipe Supports				3	
3300	Cast-in-Place Concrete					
	Concrete Mix (Water Containing Structures)			1		
	Concrete Mix (Structures, General)			1		
	Test Reports			2		
	Grout Mix			2		
3450	Architectural Precast Concrete (Custom)					1
3480	Precast Reinforced Concrete Vaults (Custom)			2		
3930	Concrete Crack Repair (Custom)			1		
4200	Masonry (Custom)					
	Building Masonry			1		
	Wall Masonry			1		
	Grout Mix			1		
4210	Cast Stone (Custom)				1	
5100	Structural Metals				3	
5210	Steel Joist Decking (Custom)				3	
5312	Steel Decking (Custom)				1	
5520	Metal Railings (Custom)			1	1	
5530	Metal Gratings (Custom)			1		
5550	Anchorage in Concrete and Masonry (Custom)				1	
5600	Standards for Aluminum Work			1		
6100	Rough Carpentry (Custom)				2	
6500	Finish Carpentry and Architectural Woodwork (Custom)			1		
6610	FRP Grating Floor System Supported by Pedestals (Custom)			1		
6640	Plastic Lining For Concrete Structures			1		
7160	Dampproofing (Custom)			1		
7200	Thermal Insulation (Custom)			1		
7240	Exterior Insulation and Finish System (Custom)			1		
7535	Thermoplastic Polyolefin Roofing (Custom)			1		
7600	Sheet Metal (Custom)			1		
7700	Roof Specialties and Accessories (Custom)				3	

7840	Firestopping (Custom)			1		
7900	Joint Sealants (Custom)			1		
8110	Steel Doors and Frames (Custom)				1	
8115	FRP Doors and Frames (Custom)			1		
8305	Floor Access Doors and Hatches (Custom)				1	
8331	Overhead Coiling Aluminum Doors (Custom)				1	
8410	Aluminum Entrances and Assemblies (Custom)			1		
8700	Finish Hardware(Custom)				1	
8800	Glass and Glazing (Custom)			1		
8950	Translucent Wall Panel System (Custom)			1		
9250	Gypsum Wallboard (Custom)			1		
9310	Ceramic Tile (Custom)			1		
9510	Acoustical Ceilings and Wall Systems (Custom)			1		
9660	Resilient Flooring (Custom)			1		
9680	Carpet (Custom)			1		
9725	Resinous Flooring			1		
9810	Tape Wrap for Insulated Joints			1		
9880	Corrosion Protection Lining Systems (Custom)				1	
9892	Worker and Environmental Protection and Transportation and Disposal of Hazard		1			
9900	Protective Coatings (Custom)				1	
9920	Architectural Painting (Custom)				1	
10200	Louvers and Vents (Custom)				3	
10400	Identifying Devices (Custom)			1		
10500	Metal Lockers (Custom)			1		
10800	Toilet Accessories (Custom)			1		
10990	Miscellaneous Specialties (Custom)				1	
11005	General Mechanical and Equipment Provisions					
11115	Horizontal End Suction Pumps (Custom)					
	RO Feed Pumps				1	
	CIP Pumps				1	
11140	Vertical Diffusion Vane Pumps (Custom)					
	RO Transfer Pump Station Pumps				1	
	FW Pump Station Pumps (Large)				1	
	FW Pump Station Pumps (Small)				1	
	Brine Pump Station Pumps				1	
11185	Submersible Sample Pumps (Custom)			1		
11293	Slide Gates (Custom)			1		
11401	Forced Draft Decarbonator System (Custom)					1
11403	Cartridge Filters (Custom)			1		
11532	In-Line Static Mixer (Custom)			1		
11727	Liquid Chemical Feed Equipment (Custom)					

	Citric Acid System				1	
	Caustic System				1	
	Sodium Hypo System				1	
	LAS System				1	
	Threshold Inhibitor System				1	
	Sodium BiSulfate System				1	
12625	Laboratory Furniture (Custom)				1	
13025	Low Pressure Reverse Osmosis System (Custom)					3
13123	Electrical Panel Sunshade Structure			1		
13190	Fiberglass Reinforced Plastic Chemical Storage Tanks (Custom)			4		
13191	Polyethylene Chemical Storage Tanks (Custom)				1	
13192	Steel Chemical Storage Tanks (Custom)			1	1	
13199	Chemical Storage Tank Installation (Custom)					
13300	Self Supporting Communication Tower (Custom)					1
13500	Instrumentation and Control System (Custom)					4
13510	Computer System Hardware (Custom)				1	
13520	Computer System Software (Custom)				1	
13530	Programmable Logic Controllers (Custom)				1	
13550	Software Control Block Descriptions (Custom)				1	
13561	Panel Mounted Instruments (Custom)				1	
13562	Flow Instruments (Custom)				1	
13563	Pressure and Level Instruments (Custom)			3		
13564	Process Analytical Instruments (Custom)			3		
13565	Temperature Instruments (Custom)			1		
13566	Miscellaneous Instruments (Custom)				1	
13570	Panels, Consoles and Appurtenances (Custom)			1		
13580	Uninterruptible Power Supply (Custom)			1		
13590	Network Systems (Custom)				1	
13591	Metallic and Fiber Optic Communication Cables and Connectors (Custom)			1		
13592	Fiber Optic Cable and Equipment (Custom)			1		
13750	Tightness Testing of Structures (Custom)					
13930	Fire-Suppression Sprinkler System (Custom)				1	
15010	Valve Installation (Custom)					
15011	Gate Installation (Custom)					
15020	Miscellaneous Piping and Accessories Installation (Custom)					
15050	Basic Mechanical Building Systems Material and Methods (Custom)			1		
15061	Steel Pipe (Custom)			1		
15062	Miscellaneous Piping and Pipe Accessories (Custom)			1		
15063	Stainless Steel Pipe and Alloy Pipe, Tubing and Accessories (Custom)			2		
15064	Polyvinyl Chloride (PVC) Pressure Pipe (Custom)			1		
15065	Miscellaneous Steel Pipe, Tubing and Accessories (Custom)			2		

15067	Miscellaneous Plastic Process Pipe, Tubing and Accessories (Custom)			4		
15069	Cast Iron Soil Pipe and Accessories (Custom)			1		
15070	Copper Tubing and Accessories (Custom)			1		
15071	Fiberglass Reinforced Plastic Pressure Pipe (Custom)				1	
15077	Grooved Couplings			1		
15081	Gaskets			1		
15089	Nuts and Bolts			1		
15091	Miscellaneous Ball Valves (Custom)			2		
15092	Industrial Butterfly Valves (Custom)				1	
15093	Check Valves (Custom)				1	
15094	Backflow Preventers (Custom)			1		
15095	Solenoid Valves (Custom)			1		
15096	Globe Valves (Custom)				1	
15097	Pinch and Diaphragm Valves (Custom)			2		
15098	Miscellaneous Plug Valves (Custom)			1		
15099	Pressure Reducing Valves (Custom)				1	
15100	Miscellaneous Valves (Custom)			1		
15102	Resilient-Seated Gate Valves		1			
15103	Butterfly Valves		1			
15104	V-Port Ball Valves (Custom)				1	
15108	Air Valves (Custom)				1	
15115	Flap Gates (Custom)			1		
15140	Pipe Supports (Custom)				1	
15180	Valve and Gate Actuators (Custom)				1	
15250	Mechanical Insulation (Custom)			1		
15340	Manholes and Fittings			2		
15400	Plumbing (Custom)				1	
15430	Emergency Eyewash/Shower Units			1		
15500	Heating, Ventilating and Air Conditioning (Custom)					
	Transfer Pump Station MAU				1	
	Transfer Pump Station AC				1	
	Transfer Pump Station PRVs				1	
	RO Building Station MAU-1				1	
	RO Building Station MAU-2				1	
	RO Building Station AC-1				1	
	RO Building Station AC-2				1	
	RO Building Station AC-3				1	
	RO Building Station PRVs				1	
	Transfer Pump Station MAU				1	
	Transfer Pump Station AC				1	
	Transfer Pump Station PRVs				1	

15650	Refrigeration Systems (Custom)				1	
15990	Testing, Adjusting and Balancing for HVAC (Custom)			1		
16010	General Electrical Requirements					1
16040	Short Circuit Arc Flash Study					1
16050	Basic Electrical Materials and Methods (Custom)					4
16150	Induction Motors			5		
16160	Variable Frequency Drives (Custom)			5		
16251	Manual Transfer Switch			1		
16480	Motor Control Centers, Switchboards, and Panelboards (Custom)				3	
16670	Lightning Protection for Structures (Custom)			1		
16721	Fire Detection and Alarm System (Custom)				1	
17310	Site Access System		1			
	Gates / Fence Layout Drawings		1		1	
	Security System		1		1	
Misc	Other Unlisted Submittals		10	10	5	5
		Total	EMWD	Basic	Moderate	Complex
	Total # of Submittals	279	16	123	119	21
	Estimated # of Resubmittals	131	20	31	59.5	21
	Approximate Hrs/Initial Review			2	8	16
	Total Initial Review Hours			246	952	336
	Approximate Hrs/Resubmittal Review			2	4	8
	Total Resubmittal Review Hours			62	238	168
	<b>Total Hours by B&amp;V</b>				<b>2002</b>	



**ENGINEERING SERVICES DURING CONSTRUCTION FEE PROPOSAL  
EASTERN MUNICIPAL WATER DISTRICT  
PERRIS II DESALTER  
BLACK & VEATCH**



Task No.	Description	Project Director	Project Manager	Engineering Manager	Senior Process Engineer / Senior Operations Specialist	Project Engineer / Technical Specialist	Staff Engineer	Operations Specialist	Senior Struct, Arch, & Bldg Mech Eng	Struct, Arch, & Bldg Mech Eng	Senior Electrical Engineer	Electrical Engineer	Senior I&C Engineer	I&C Engineer	CADD	Finance / Project Controls	Admin	B&V Total Hours	Total B&V Labor	Indirect Expense (\$8.75/hr)	Sub Expense	Direct Expense	Total Fee
		\$260	\$235	\$235	\$235	\$195	\$160	\$165	\$185	\$140	\$185	\$140	\$185	\$140	\$130	\$155	\$105						
<b>1.0</b>	<b>PROJECT MANAGEMENT AND MEETINGS</b>																						
1.1	General Project Management and Administration	8	104	52		52										104	180	500	\$83,900	\$4,375		\$3,000	\$91,275
1.2	Monitor Construction Schedule			20		40												60	\$12,500	\$525			\$13,025
1.3	Correspondence Log			12		48											8	68	\$13,020	\$595			\$13,615
	<b>Task 1.0 Subtotal</b>	<b>8</b>	<b>104</b>	<b>84</b>	<b>0</b>	<b>140</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>104</b>	<b>188</b>	<b>628</b>	<b>\$109,420</b>	<b>\$5,495</b>	<b>\$0</b>	<b>\$3,000</b>	<b>\$117,915</b>
<b>2.0</b>	<b>CONFORMED TO CONSTRUCTION DOCUMENTS</b>																						
2.1	Conformed to Construction Documents			2		8	16		2	2		2		2	60		2	96	\$13,810	\$840		\$500	\$15,150
	<b>Task 2.0 Subtotal</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>8</b>	<b>16</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>60</b>	<b>0</b>	<b>2</b>	<b>96</b>	<b>\$13,810</b>	<b>\$840</b>	<b>\$0</b>	<b>\$500</b>	<b>\$15,150</b>
<b>3.0</b>	<b>PROJECT MEETINGS AND SITE VISITS</b>																						
3.1	Preconstruction Conference			8		8	8										4	28	\$5,140	\$245		\$500	\$5,885
3.2	Attend Biweekly Construction Meetings			100		480												580	\$117,100	\$5,075		\$44,000	\$166,175
3.3	Periodic Site Visits and Inspections			40		80	120				40		40					320	\$59,000	\$2,800		\$10,000	\$71,800
3.4	Final Inspection			8		24					4		4				4	44	\$8,460	\$385		\$1,000	\$9,845
	<b>Task 3.0 Subtotal</b>	<b>0</b>	<b>0</b>	<b>156</b>	<b>0</b>	<b>592</b>	<b>128</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>44</b>	<b>0</b>	<b>44</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>972</b>	<b>\$189,700</b>	<b>\$8,505</b>	<b>\$0</b>	<b>\$55,500</b>	<b>\$253,705</b>
<b>4.0</b>	<b>OFFICE ADMINISTRATION</b>																						
4.1	Shop Drawing and Submittal Reviews			60	48	292	350		188	360	88	208	80	188			140	2,002	\$324,720	\$17,518	\$6,000		\$348,238
4.2	RFI Reviews and Responses			16	16	120	120		48	72	40	68	32	72	60		24	688	\$112,320	\$6,020	\$3,000		\$121,340
4.3	Design Clarifications			4		24	28		12	28	8	24	8	24	24		12	196	\$30,300	\$1,715			\$32,015
4.4	Change Order Reviews			24		24					24		24				12	108	\$20,460	\$945			\$21,405
4.5	Claims Support	16		20		24												60	\$13,540	\$525			\$14,065
	<b>Task 4.0 Subtotal</b>	<b>16</b>	<b>0</b>	<b>124</b>	<b>64</b>	<b>484</b>	<b>498</b>	<b>0</b>	<b>248</b>	<b>460</b>	<b>160</b>	<b>300</b>	<b>144</b>	<b>284</b>	<b>84</b>	<b>0</b>	<b>188</b>	<b>3,054</b>	<b>\$501,340</b>	<b>\$26,723</b>	<b>\$9,000</b>	<b>\$0</b>	<b>\$537,063</b>
<b>5.0</b>	<b>START-UP AND COMMISSIONING ASSISTANCE</b>																						
5.1	Start-up and Commissioning Support				164	192		400									8	764	\$142,820	\$6,685		\$21,000	\$170,505
5.2	Electronic O&M Manual Development		8	24	120	80		610					8		100		120	1,070	\$179,050	\$9,363		\$5,000	\$193,413
5.3	Staff Training			16	24	24		92							38		62	256	\$40,710	\$2,240		\$3,000	\$45,950
	<b>Task 5.0 Subtotal</b>	<b>0</b>	<b>8</b>	<b>40</b>	<b>308</b>	<b>296</b>	<b>0</b>	<b>1,102</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>0</b>	<b>138</b>	<b>0</b>	<b>190</b>	<b>2,090</b>	<b>\$362,580</b>	<b>\$18,288</b>	<b>\$0</b>	<b>\$29,000</b>	<b>\$409,868</b>
<b>6.0</b>	<b>PROJECT CLOSE-OUT AND MISCELLANEOUS SERVICES</b>																						
6.1	DDW Permitting Support		4	8	4	24												40	\$8,440	\$350			\$8,790
6.2	Record Drawings		4	12		40	80		8	8	8		8		360		16	544	\$78,400	\$4,760		\$1,500	\$84,660
	<b>Task 6.0 Subtotal</b>	<b>0</b>	<b>8</b>	<b>20</b>	<b>4</b>	<b>64</b>	<b>80</b>	<b>0</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>0</b>	<b>8</b>	<b>0</b>	<b>360</b>	<b>0</b>	<b>16</b>	<b>584</b>	<b>\$86,840</b>	<b>\$5,110</b>	<b>\$0</b>	<b>\$1,500</b>	<b>\$93,450</b>
<b>7.0</b>	<b>Design Services During Construction</b>																						
7.1	Architectural Finish Boards		1	2		4				124								131	\$18,845	\$1,146		\$1,500	\$21,491
7.2	Stand-by Generator Connection Design		1	8		4					10	80			36			139	\$20,625	\$1,216			\$21,841
7.3	SCE Design Coordination and Design Revisions		1	2		4					130				20			157	\$28,135	\$1,374			\$29,509
	<b>Task 7.0 Subtotal</b>	<b>0</b>	<b>3</b>	<b>12</b>	<b>0</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>124</b>	<b>140</b>	<b>80</b>	<b>0</b>	<b>0</b>	<b>56</b>	<b>0</b>	<b>0</b>	<b>427</b>	<b>\$67,605</b>	<b>\$3,736</b>	<b>\$0</b>	<b>\$1,500</b>	<b>\$72,841</b>
<b>8.0</b>	<b>Additional Services During Design Phase</b>																						
8.1	CM Constructability Design Comment Resolution		4	4		12	40								60			120	\$18,420	\$1,050			\$19,470
8.2	Server/UPS Design Revisions		1	2		4					8	40	4	16	32			107	\$15,705	\$936			\$16,641
8.3	Storm Drain BMP Specification and Drainage Design Evaluations		2	4		20	32								12			70	\$11,990	\$613			\$12,603
8.4	Neutralization Drain Pump Design		1	2	2	16	24				4	8	4		24			85	\$13,855	\$744			\$14,599
8.5	Site and Wall Revisions		4	8		32	60					4	8		140			256	\$38,900	\$2,240			\$41,140
	<b>Task 8.0 Subtotal</b>	<b>0</b>	<b>12</b>	<b>20</b>	<b>2</b>	<b>84</b>	<b>156</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>52</b>	<b>16</b>	<b>16</b>	<b>268</b>	<b>0</b>	<b>0</b>	<b>638</b>	<b>\$98,870</b>	<b>\$5,583</b>	<b>\$0</b>	<b>\$0</b>	<b>\$104,453</b>
	<b>PROJECT TOTAL (TASK 1-8)</b>	<b>24</b>	<b>135</b>	<b>458</b>	<b>378</b>	<b>1,680</b>	<b>878</b>	<b>1,102</b>	<b>258</b>	<b>594</b>	<b>364</b>	<b>434</b>	<b>220</b>	<b>302</b>	<b>966</b>	<b>104</b>	<b>592</b>	<b>8,489</b>	<b>\$1,430,165</b>	<b>\$74,279</b>	<b>\$9,000</b>	<b>\$91,000</b>	<b>\$1,604,444</b>