



**PW21-WRF01  
SCOPE OF WORK AND  
PROJECT SPECIFICATIONS**

**Public Works Department**  
10000 N. El Mirage Rd.  
El Mirage, Arizona 85335  
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**CITY OF EL MIRAGE  
PUBLIC WORKS DEPARTMENT**



**WATER RECLAMATION FACILITY – EFFLUENT  
FILTER PROJECT**

**Design/Build  
Scope of Project Document**

**PW21 - WRF01**





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## 1. ABBREVIATIONS

µg/L	micrograms per liter
AACE	Association for Advancement of Cost Engineering
AAD	annual average day
AADF	annual average daily flow
APP	Aquifer Protection Permit
AZPDES	Arizona Pollutant Discharge Elimination System
BOD	biological oxygen demand
CCR	Consumer Confidence Report
Cl <sub>2</sub>	chlorine
CITY	City of El Mirage
CWD	clearwater discharge
ft	feet gal gallons
gpm	gallons per minute
gpm/sq ft	gallons per minute per square foot
lb/d	pounds per day
MCESD	Maricopa County Environmental Services Department
MG	million gallons
mg/L	milligrams per liter
mgd	million gallons per day
min	minimum
MMADF	maximum month average day flow
MMADL	maximum month average day load
MMFPF	maximum month flow peak factor
MML	maximum month load
MMLPF	maximum month load peaking factor
PDF	peak day flow
PHF	peak hour flow
SBR	sequencing batch reactor
scfm	standard cubic feet per minute
sq ft	square feet
TM	technical memorandum
TSS	total suspended solids



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## 2. INTRODUCTION

The WRF is designed to meet Class A+ effluent requirements. Wastewater enters the WRF by way of a 24-inch gravity sewer pipeline through a coarse bar screen to remove large solids prior to entering the influent lift station. The lift station then pumps the influent flow to fine screens and a vortex grit basin to remove smaller solids and grit. Next, wastewater flows by gravity to the equalization tank before being pumped to the SBRs where it undergoes treatment in sequential phases of fill, anoxic reaction, aerobic reaction, settling, and idle. Secondary effluent decanted from the SBRs is sent to the surge basin. The surge basin serves as storage for the secondary effluent and also provides surge capacity for the SBR system during decant.

## 3. BACKGROUND

After several years of operation, the plant was de-rated to 2.5 mgd by the local regulatory agency. The facility originally operated as a Hybrid SBR treatment system that incorporated a mixed liquor recycle flow to the anoxic basins located upstream of the SBRs. However, due to difficulties achieving treatment objectives, the facility has been converted to operate as a traditional SBR system, removing the recycle flows, and utilizing the anoxic basin as an equalization basin.

## 4. CURRENT STATUS

The El Mirage WRF is currently operating near the total tertiary filtration capacity of 2.1 mgd MMADF. The filtration capacity will be exceeded in the near future due to pending industrial development. The filter limitation is an existing problem and any additional flows will require the additional filtration capacity through installation of new filters and diverting filter overflows to the headworks. The current overflow design overloads the filters, increasing run times, causing premature filter break through and decreasing effluent quality.

## 5. BUSINESS CASE

The CITY has evaluated the upgrades required to successfully treat the increased flows from the planned industrial development. The planned industrial development in El Mirage will include a large data center that will initially consist of one data center building. This building requires significant water flows for cooling operations. The cooling operations will generate an industrial wastewater that has constituents approximately twice the constituent level of the potable water that will supply the facility. Therefore, this water will require treatment prior to disposal or reuse. These two waste streams will be combined and conveyed to the Water Reclamation Facility located at 10355 N. 121<sup>st</sup> Ave., El Mirage, AZ 85335

## 6. PROJECT OBJECTIVES

The objectives for the project include the following:

- **Project design to integrate one (1) Tertiary disc treatment filter capable of meeting industry-standard hydraulic loading. (3 – 6 gpm/sq ft for average day and PDF's.)** The existing three (3) tertiary disc treatment filters are functioning at 50% design limiting the amount of influent flow capacity to 2.0 mgd. After review, the filter manufacturer "Aqua-Aerobic" representative IES Southwest, Inc. has verified the current operational and maintenance practices meet the manufacturer O & M specifications. IES Southwest also recommends the current SER line be routed to the headworks reducing the loading on the existing and proposed additional filter.
  - Site and Structural evaluation and modifications (Deck Support)
  - One (1) filter control cabinet designed to operate the new filter in Local/Remote mode
  - Each filter to include new like level indicators, pressure differential indicators, like flow metering including influent, effluent control valving and associated new air/electrical piping



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- Each filter to include like process controls, alarms, real time process indicators integrated into the existing Wonderware SCADA software
- Associated electrical improvements
- **Filter effluent disinfection methods of application upgrade.** The existing disinfection application point needs to be relocated. Short circuiting along with slow reaction times are being experienced. Forty-five (45) minute to sixty (60) minute reaction times are common, causing over and under feeding of disinfectant. The recommendation is to improve the mixing by injecting the chlorine into a common pipe upstream of the clear well. This can be accomplished by combining the four (4) filter discharge piping into a single header. The existing piping can be combined with some straightforward modifications. This modification would ensure that all filter discharge would become completely mixed with chlorine prior to entering the Clear Well. This would improve the disinfection capabilities of the facility, and better utilize the existing contact basin and piping to ensure sufficient disinfection at the rated plant capacity.
- **Installation of a Secondary Effluent Recycle (SER) line.** This SER line would return to the influent pumping station (Headworks) stopping recycle through the filters, reducing filter loading and overflow while reducing sediment build up within the surge tank. Aqua-Aerobics Director of Product Management also recommends that the existing filter overflow piping (SER) be reconfigured to send these solids back to the head of the plant where they can be removed in the secondary process.
  - 16” recycle line to influent station, 160 LF
  - Associated valve and valve controls
- **Provide future influent/effluent pipe connections for EQ basin.** The future EQ basin will allow for high flow periods, improved process treatment and effluent water quality
  - Spooled valved blind flange for future process influent piping

## 7. SCOPE OF SERVICES

The Scope of Services is organized in five main tasks:

- **Task 1 – Project Management**
- **Task 2 – Verification of Existing Conditions**
- **Task 3 – Basis of Design Report**
- **Task 4 – Detailed Design**
- **Task 5 – Permitting Services**

### Task 1 – Project Management

The project design build team will provide coordination of project work with disciplines to ensure project deliverables are met. The design team will complete project setup, closeout, and invoicing during the project.

#### 1.1 Project Meetings

The design build team will schedule a project kick-off meeting and up to four (4) project meetings during the design phase. An updated project schedule and a written agenda for each meeting shall be prepared and submitted five working days prior to the meeting. Meeting summary notes will be prepared and submitted to the City Project Manager within five working days after the meeting. The meetings during the design phase will be as follows:

- Kick-off Meeting
- Draft Basis of Design Review Meeting
- 60% Design Review Meeting
- 90% Design Review Meeting
- 100% Design Review Meeting



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## **Task 2 – Verification of Existing Conditions**

Investigations required to verify existing Record Drawings and utility “record” conditions will be provided by the design build team. The design build team will verify record drawings and site conditions including current conditions.

### **2.1 Filter Placement, Structural Support and Chemical Tank Placement**

A Structural Engineer will perform a structural evaluation including loading calculations for the cement deck area within the available proposed filter (2) placement space within the chemical tank/filter area or immediately adjacent to the West.

- Verify existing record drawings
- Overall site conditions
- Loading calculations
- Structural support evaluation
- Secondary site evaluation if appropriate
- Influent, effluent piping location assessment

## **Task 3 – Basis of Design Report**

A Basis of Design Report (BODR) will be prepared by the design build team that summarizes and documents the design criteria and equipment selections. All data obtained from Task 2 should be included as an appendix to the BODR.

A draft BODR will be prepared and submitted to the City for review. Comments will be reviewed with the City and incorporated into the final BODR.

### **Deliverables:**

- One electronic version of the draft BODR shall be provided to the City of El Mirage
- Two (2) hardcopies and one electronic version of the final BODR shall be provided to the City of El Mirage.

## **Task 4 – Detailed Design**

The design build team will prepare and submit a detailed design based on the City’s project objectives, filter manufacture recommendation and site evaluation. The detailed design shall include detailed construction drawings, condition assessment results, MCC, chemical feed line, tertiary filters, associated piping, valves, electrical, SER line, future EQ basin connections, meter placements, and controls.

The design build team will prepare documents for City review at each of the design review milestones indicated in Task 1. City review comments shall be incorporated at each milestone. The final contract documents shall be submitted in reproducible form and submitted to the City project manager. Distribution of contract documents will be made by the City. All supporting documentation related to the design calculations and computations will be sealed by a professional Engineer licensed in the State of Arizona. The design build team shall prepare an engineer’s estimate of probable construction cost for the 60%, 90%, and 100% design submittals. The final estimate will include a detailed breakdown to show the estimated costs for the major components of the design. Estimates shall be prepared based on the price level projected for the anticipated midpoint of construction.

### **Deliverables:**

- Two (2) hardcopies and one electronic version of Construction drawings at 60%, 90%, and 100% project levels of completions
- Two (2) hardcopies and one electronic version of specifications at 60%, 90%, and 100% project levels of completion
- Engineer’s estimate of probable construction cost at 60%, 90%, and 100% levels of completion



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## Task 5 – Permitting Services

The design build team will identify, coordinate, and prepare the required permit approval documents for Maricopa County Environmental Services Department (MCESD) and City of El Mirage Fire, Building, & Line Safety Department (FBLSD) required for permitting in advance of construction. The permitting and inspection process shall be completed through the (MCESD) Approval to Construct (ATC) and Approval of Construction (AOC) process.

Once construction drawings are completed, the design build team shall prepare an ATC application package for review by the MCESD and FBLSD. The review coordination will require the following:

- Prepare the required application package and submit to MCESD for review Respond to MCESD review comments after consulting with City staff.
- Assist in obtaining any permits from FBLSD required in advance of construction.

### Deliverables:

- Completed ATC application
- Completed AOC application
- Completed City of El Mirage permit application

## 8. LOCATION OF THE WORK:

All work is located within the City of El Mirage, Maricopa County, Arizona.

## 9. CONTRACTORS LICENSE

Successful proposers shall be licensed contractors through the Arizona Registrar of Contractors and have the proper classification to perform the work specified in this contract.

## 10. GUARANTEE:

The Contractor shall guarantee all work and operation of materials provided for one year after completion of the work.

## 11. INSPECTION

- A. City Inspectors will monitor the work site(s) to report as to the progress of the work, the manner in which it is being performed, and report whenever it appears that material furnished or work performed by the Contractor fails to fulfill the requirements of the specifications and contract. The Inspectors may direct the attention of the Contractor to such failures or infringement.
- B. In a case of a dispute arising between the Inspector and the Contractor as to material furnished or the manner of performing the work, the Inspector shall have the authority to reject materials or suspend the work until the question and issue can be referred to and decided by the Public Works Director or designee. Inspectors are not authorized to revoke, alter, enlarge, relax, or release any requirements of the specifications. Inspectors shall in no case act as foremen or perform other duties for the Contractor or interfere with the management of the work by the Contractor.
- C. Inspection or supervision by the Public Works Director or designee shall not be considered as direct control of the individual worker and/or his/her work. The direct control shall be solely the responsibility of the Contractor.



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## 12. PROTECTION OF FINISHED OR PARTIALLY FINISHED WORK

The Contractor shall properly guard and protect all finished or partially finished work and shall be responsible for the same until the entire contract is completed and accepted by the City. Partial payment on work so completed shall not release the Contractor from such responsibility, but he/she shall turn over the entire work in full accordance with these specifications before final settlement shall be made.

## 13. STOCKPILE OF MATERIALS

- D. The contractor may, if approved by the Project Manager, place materials in the public right-of-way provided they do not prevent access to adjacent properties or prevent compliance with traffic regulations.
- E. Traffic shall not be required to travel over stockpiled materials, and proper dust control shall be maintained.

## 14. SUPERVISION BY CONTRACTOR

The Contractor shall supervise and direct the work and shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. The Contractor shall employ and maintain at the work site a qualified supervisor or superintendent who shall have been designated in writing by the Contractor as the Contractor's representative at the site. The representative shall have full authority to act on behalf of the Contractor and all communications given to the representative shall be as binding as if given to the Contractor. The representative shall be present on the site at all times as required to perform adequate supervision and coordination of the work.

## 15. STANDARD SPECIFICATIONS AND DETAILS

Except as otherwise noted, construction of this project and all work done under this Contract shall be in accordance with these specifications and all applicable Uniform Standard Specifications For Public Works Construction sponsored and distributed by MAG, MAG Standard Details, the City of El Mirage supplements to MAG Standard Details, and City of Peoria supplements to MAG Standard Details, including the latest approved revisions thereto in force at the time of bid advertisement, which shall be referred to hereinafter as the "Standard Specifications". In all cases where accepted standards (American Water Works Association (AWWA), American National Standards Institute (ANSI), MAG, etc.) are referred to in the "Standard Specifications", the latest revisions as of bid advertisement shall prevail.

## 16. DUMPING AND DISPOSAL OF WASTE

The Contractor is responsible for the cost to dispose of all waste products including excess earth material which will not be incorporated into the work under this contract. The waste product referred to herein shall become the property of the Contractor, unless otherwise directed by the Public Works Director

## 17. CLEAN UP

Clean up shall include the removal of all excess materials in conjunction with the project accumulated on any driveways, curbs, landscaping, or any other surface. No special payment will be made for this item.

The Contractor shall, upon completion of the work, remove all temporary construction facilities, debris, and unused materials provided for in the work, and put the work site of the work and public right-of-way in a neat and clean condition. No special payment will be made for this item.



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## 18. DUST PREVENTION

The Contractor shall take whatever steps, procedures or means required to prevent abnormal dust conditions due to construction operations in connection with this contract. The dust control measures shall be maintained at all times during construction of the project to the satisfaction of the Public Works Director and in accordance with the requirements of the Maricopa County Health Department Air Pollution Control and Environmental Protection Agency (EPA) regulations. The project will be small enough where a separate Dust Control Permit will not be required. Contractor will work under the City's Dust Control permit

## 19. MISCELLANEOUS REMOVAL AND RELOCATIONS

Miscellaneous removals and relocations shall be construed to mean the removal of all unsuitable materials whether designated or implied by the plans and specifications and shall include but not be limited to the removal of such items as pipes, concrete, asphalt, block, brick, rock, metal, etc. of every nature and description, unless such items are specifically designated in a separate bid item.

## 20. PROJECT COMPLETION

"Project Completion" is full completion of all construction associated with a contract, including, but not limited to punch list items, close out documentation, O & M manuals, warranties, and record drawings as certified by the Architect or Engineer of record.

## 21. FINAL ACCEPTANCE

"Final Acceptance" shall mean a written final acceptance of the work by the Public Works Director and shall make the final acceptance promptly after all work under the contract has been completed in accordance with the contract documents and after final inspection.