

---

*EXHIBIT A*

**Scope of Work for the  
South Truckee Meadows Water  
Reclamation Facility  
Chemical Building Improvements  
Programming Project**

Prepared for  
**Washoe County  
Department of Water Resources**

February 2018

**CH2MHILL ENGINEERS, Inc.**  
50 West Liberty, Suite 205  
Reno, NV 89501

# **Exhibit A: Scope of Work for the South Truckee Meadows Water Reclamation Facility Chemical Building Improvements Programming Project**

---

This exhibit is to the Agreement, between CH2M HILL ENGINEERS, Inc. (Consultant), and Washoe County Department of Water Resources (County), for programming services related to the Chemical Building Improvements Project for the South Truckee Meadows Water Reclamation Facility (STMWRF, Plant). The official name for the project will be the STMWRF Chemical Building Improvements Programming Project, hereinafter referred to as the "Project."

## **Introduction**

Washoe County Department of Water Resources manages wastewater treatment facilities that serve approximately 16,000 sewer accounts in the South Truckee Meadows, East Lemmon Valley, and Cold Springs Valley areas. The County also manages a reclaimed water operation associated with the South Truckee Meadows Water Reclamation Facility.

The STMWRF is located within southern Washoe County, Nevada. The facility is presently configured to treat up to 4.1 million gallons per day (mgd) on a peak month flow basis.

The STMWRF Chemical Building Improvements Project is currently under construction, scheduled for completion during the summer of 2018. This project requires additional I/O for the Chemical Building PLC and new unit process controls be incorporated in the existing PLC and HMI programs. This exhibit presents Consultant's scope of work, preliminary schedule, and budget for the programming services for incorporating the new PLC and HMI logic into the existing Plant SCADA system.

## **Consultant's Scope of Work**

### **Task 1 – Review and Validate Control System Design**

Consultant will review the existing control system design drawings and specification for the Chemical Building Improvements Project and provide comments to the County. Consultant will facilitate a conference call of up to 2 hours in length to review and adjudicate comments to the current design. Consultant will meet with Electrical Subcontractor on-site to review plans for control panel wiring.

### **Task 2 – Programming Services**

Consultant will prepare PLC and HMI program modifications for the new Chemical Building Improvements. Programming will be performed in Consultant's office prior to beginning the on-site Installation Testing.

#### **Subtask 2.1 – Software Testing Checklist**

Consultant will develop a field checklist that will be utilized during program Bench Testing, Installation Testing, and Functional Testing. The checklist will be reviewed with County and

Carollo during the Pre-Configuration Conference Call, with comments incorporated thereafter.

### **Subtask 2.2 – Pre-configuration Meeting**

Prior to the start of PLC and HIM programming, Consultant will facilitate a conference call to review and discuss the control strategies and HMI graphic standards to be followed on this Project. During the call, Consultant will review the planned schedule for programming, testing, and training. Consultant will also present the Software Testing checklists to be adhered to during Installation and Functional Testing. It is expected that the conference call will be 2 hours in length and will include project team members from the County and Carollo.

### **Subtask 2.3 – Office Programming Services**

Consultant will develop the PLC and HMI program modifications for the Chemical Building Improvements. Program modifications will be in accordance with the Carollo construction drawings and specifications. The existing programs will be modified to allow monitoring and control of the new Chemical Building facilities. Control strategies will be adhered to unless specific direction is provided by County in writing in advance.

### **Subtask 2.4 – Software Bench Testing**

Once program modifications are complete, Consultant will perform Bench Testing of the HMI and PLC programs in a simultaneous fashion to demonstrate communications and basic functionality of the HMI screens. Bench Testing will take place in Consultant's Redding, CA office. Bench testing will consist of downloading the new Chemical Building PLC program into test hardware that will be physically connected to a HMI development workstation. Using test PLC, Consultant will drive inputs to check for continuity to the HMI screens. Consultant will also send commands from the HMI Screens to drive outputs on the test PLC. A representative from the County, Carollo, or Construction Contractor are invited to attend the Bench Testing in person.

### **Task 3 – Software Operations Manual Update**

Consultant will update the existing STMWRF SCADA Software Operations Manual to reflect the modifications associated with the Chemical Building Improvements. Changes will include updating the master STMWRF Control Strategies document and the STWMRF Software Design Manual.

### **Task 4 – Post-configuration Review Meeting**

Once programming modifications are complete, Consultant will facilitate a conference call to discuss the completed PLC and HMI program modifications and review the new HMI screen graphics. During the call, Consultant will review the updated schedule for programming, testing, and training. Consultant will also present the final Software Testing checklists to be adhered to during Installation and Functional Testing. It is expected that the conference call will be 2-4 hours in length and will include project team members from the County and Carollo.

## **Task 5 – Installation Testing**

Consultant will coordinate with the construction contractor to perform control system installation testing of the Chemical Building PLC I/O. Consultant will perform on-site testing to verify the physical connections, communications between control system hardware, and basic programming logic are functional. Consultant's on-site activities will take place once construction contractor has completed all field loop checks. Installation Testing will include verification of signal at the PLC I/O terminals, in the PLC program, and on the HMI screens. SCADA commands will be issue from the SCADA workstation to ensure receipt in the PLC. Installation will follow the written testing procedure and checklist. It is assumed that all installation testing can be completed in a 3-day visit to the Plant.

## **Task 6 – Functional Testing, Performance Testing, and Training**

Upon completion of Installation Testing, Consultant will coordinate with the construction contractor and County Operations personnel to perform control system functional testing of the new Chemical Building Improvements. The first phase of Functional Testing will be to test the control and monitoring of equipment in Local control mode. Once this step is completed, the new Chemical Building Improvements processes/equipment will be placed into Remote Auto mode for Performance Testing. Performance Testing will consist of Consultant working with Plant Operations personnel to demonstrate that unit process monitoring and control is consistent with the Loop Descriptions before it is deemed fully functional. Fine tuning of loops and adjustments of unit process displays and controls should be expected during this period. Consultant has budgeted 3 days on-site to complete the functional testing and performance testing of Consultant-developed programming logic.

Immediately following the Performance Testing, Consultant will provide training to County Operations personnel on the operation of new PLC and HMI software applications for monitoring and control of the new Chemical Building facilities. The training will cover PLC and HMI application software operation and control, configuration, HMI displays, screen navigation, pop-ups, scripts, data management, reports, trending, and document printouts. A single training session, of approximately 2 hours in length, will cover the topics described below.

- Standard operational features of PLC and HMI equipment provided.
- Operation of Each Loop: For example, control set point settings, control mode selection, alarm acknowledgment.
- Operation of each HMI display, dynamic objects, and controls.
- Alarm Summary: Describe each HMI alarm, including HMI tag name, detailed description of the alarm, probable cause, and suggested operator action(s).
- Trend and Report Summary: Describe each HMI Trend and Report developed

## **Task 7 – Performance Period**

Once facilities have been cutover and tested, a three-day performance demonstration period will commence. Consultant will be available to make programming and/or display adjustments as needed during this period. The performance demonstration period will be considered complete when the demonstration period has been without significant

interruption for three consecutive days. Acceptance of the performance demonstration period, including implementation of the desired changes by the Consultant signifies acceptance of the new PLC and HMI modifications by the County.

### **Task 8 – Dynasand EcoWash Filter Backwash Programming Modifications**

Consultant will perform programming modifications such that filter cells can be sequentially backwashed using a single air compressor. County will provide a written control strategy for this work. This change requires minor modifications to the HMI screens and the EcoWash PLC program. Program changes will also require review from Parkson to avoid warranty loss of the EcoWash system. Functional testing of these program modifications will run concurrent with the Chemical Building PLC Functional Testing. County will need to gain approval from the EcoWash system manufacturer of Consultant programming modifications to ensure warranties are not voided.

### **Schedule**

The work included in Task 1 will be completed within 3 weeks of project authorization (receipt of a signed agreement for this work). All office programming work and bench testing (Tasks 2-4) will be completed within 3 months of project authorization. Field testing, training, and completion of the performance period (Tasks 5-7) will be coordinated with the Chemical Building Improvements Construction Contractor, and can be completed in 3 weeks. The Task 8 work will run concurrent with the Chemical Building programming and testing work.

All work under this Agreement is expected to be completed by August 30, 2018. If the work is delayed beyond the reasonable control of Consultant, Consultant reserves the right to request a scope and fee modification for additional administrative and support time.

### **Compensation**

Compensation for services described herein will be on a time and expense basis using the billing rates specified in Exhibit B. The amount invoiced each month will be based on actual hours of labor and expenses expended. Each invoice will include a project summary and a listing of the charges applicable to each of the 8 Tasks noted herein. For services enumerated in Tasks 1 through 8, the total estimated fee is \$123,000 plus applicable sales, use, value-added, business transfer, gross receipts, or other similar taxes. This total fee will not be exceeded without prior authorization from the County. A breakdown of the estimated fee is summarized in Table 1. County understands and agrees that individual tasks may be completed either under or over budget and that Consultant can reallocate budgets within and across tasks provided the total authorized estimated fee is not exceeded.

**TABLE 1**  
Fee Estimate Summary

<b>Task</b>	<b>Description</b>	<b>Estimated Fee (\$)</b>
1	Review and Validate Control System Design	13,500
2	Programming Services	60,000
3	Software Operations Manual Update	8,500
4	Post-configuration Review Meeting	3,000
5	Installation Testing	15,000
6	Functional Testing, Performance Testing, and Training	16,500
7	Performance Period	3,000
8	EcoWash Filter Backwash Programming Modifications	3,500
<b>Total</b>		<b>123,000</b>