



AUTHORIZATION FOR CHANGE ORDER

| | | |
|-----------------------------|------------------------------|--------------------------|
| TO: City of San Luis | ATTN: | Eulogio Vera |
| 1090 E. Union St. | DATE: | April 21, 2025 |
| San Luis, AZ 85349 | PROJECT: | B777 West WWTP Expansion |
| | C.O. AUTHORIZATION #: | 01 |

The following was not included in the original contract. We are requesting authorization for additional budget to add the following tasks to our contract.

Description of Services:

TASK 44 – Onsite Reuse Pump Station

- 1) Designed to meet the process water needs of the WWTP. The design will consist of a skid-mounted pump system with a precast wet well hydraulically connected to the existing 20" effluent discharge line. The calculated design requirement is 800 gpm at 85 psi. The PS will be a 3-pump skid-mounted design with its own control panel. The pumps will be turbine-style pumps on VFDs that will likely be located in the MCC. The wet well will be sized to also accommodate future Reuse Distribution Pumps – 4 future pumps. The Reuse Distribution Pumps will be sized for 3 MGD capacity. In addition, a Reuse Distribution Pipeline will be designed and installed in this Phase that will go from the pump station to the site entrance and stop (and capped) at the property line (before BOR property and casing).

TASK 45 – Power System Study

PACE offers to conduct an arc flash, short circuit, and coordination study for the City of San Luis WWTP. The study will be based on 100% field verification of the electrical equipment and will be conducted in two phases:

1. Phase I – conduct the study based on the existing treatment plant conditions and finish it before the construction activities of the West WWTP Expansion project start. Arc flash stickers will be applied based on the current conditions.
2. Phase II – update the study upon the completion of the West WWTP Expansion project and replace any arc flash as a result of power system changes that occurred due to the West WWTP Expansion project and apply new stickers on the new electrical equipment.

Below are the three parts of the power system study with a short description.

- 1) Short Circuit Study – The study will allow us to determine the maximum short-circuit current at the service and MCCs, which will be used to determine the equipment interrupting capacity of the main electrical gear. The maximum short circuit contribution from the utility, considering a 3000A service at 480V/277V is 44.3kA. An existing solar system is connected to the current service, which will be moved to the new 3000A service. The fault current contribution from the solar is unknown. Without a short-circuit study, we have to specify the electrical gear as 100kAIC rated(worst-case); however, if we do the study and find out that we can use 65kAIC rated electrical gear, we would save several hundred thousand dollars in equipment cost. The study will also unveil any existing electrical equipment not rated for the maximum short-circuit current and may fail during such a fault. The failed equipment is not expected to survive faults and may cause danger/fire should a fault with a higher current than the rated interrupting current occur.
- 2) Arc Flash Study - None of the existing electrical equipment has arc flash labels, which is required by NEC 110.16 and NFPA 70E Article 130.5(G). There may be a liability on the City if an arc flash

incident happens and there are no arc flash labels on the electrical gear for the staff to reference to select the appropriate PPE before working on electrical equipment. PACE's study will provide arc flash labels based on the existing gear and update custom labels after the construction of the ongoing treatment plant upgrade to add arc flash labels to the new electrical gear.

- 3) Coordination Study – The study is essential for the reliability of operation. A coordinated power distribution system will allow only the protective device near the fault to open, leaving the remainder of the system undisturbed, allowing the continuity of the service. For example, a fault in a motor should not trip the entire motor control center powering the motor, but only the protective device protecting the motor circuit. A coordinated system is achieved by adjusting the trip settings of the protective devices. It is extremely difficult to achieve a 100% coordinated power distribution system, especially in the instantaneous protection region, but it is completely possible to obtain an acceptable level of protective device coordination.

The following tasks are included in this study:

- 1) Data Collection and Evaluation – Consultant will visit all locations and gather all system data from documentation, existing as-built drawings and specifications, preventative maintenance inspections and reports, equipment datasheets and operations and maintenance manuals, and equipment test reports. The City will assist in coordinating necessary shutdowns and lock-out/tag-out. The City will provide an electrician to support Consultant's engineer in the field data collection through opening up panels, de-energizing equipment, and coordinating the operators in the field. Job safety plans and briefings will be utilized for field verifications.
- 2) Power System Model – PACE presently owns and uses SKM Power Tools, and will create a model of WWTP directly from the field data collection. Equipment information from data collection will be input into the arc flash software model, some of which will be shown as data blocks for each equipment shown on the single-line diagram models.
- 3) Short Circuit Analysis – Short circuit and ground fault calculations will be performed on each model and output data tables will be created indicating fault locations and available short circuit and ground fault current values at each location. Comparisons will then be made between existing equipment and the calculated fault output data to determine whether equipment ratings may be exceeded and whether further action needs to be taken.
- 4) Overcurrent Protective Device Coordination Analysis – Using the arc flash software, time-current curves will be plotted for each device (circuit breakers, fuses, overloads, relays), including fault current levels, cable and transformer equipment damage curves, motor starting curves, and a single-line diagram of the equipment being analyzed. Each curve will be analyzed to determine if the existing devices provide coordination, protect downstream equipment, maintain service continuity, and operate with the necessary trip times. Where device issues/damage/loss of service occur or incident energy levels are above 12 cal/cm², PACE will recommend device setting adjustments or other modifications.
- 5) Calculations – The SKM Power Tools evaluation module will be set to provide calculations in accordance with the IEEE Standard 1584-2018, which includes bus bar configurations and box enclosure dimensions. Arc flash calculations will be performed on each site model, and evaluation tables will be developed to include each system bus, including fault currents, trip times, arc flash boundaries, working distances, incident energy levels, and recommended PPE levels per NFPA 70E. Calculations will be run for all modes of operation to determine the highest incident energy and arc flash boundary result for each site location. Where arc flash energy levels exceed 12 cal/cm², recommendations will be developed to reduce incident energy levels where possible.
- 6) Reports – PACE will provide closeout deliverables, including final reports for the treatment plant, including all assumptions, findings, data collection results, diagrams, evaluation tables, mitigation measures, arc-flash labels, and backups of all software model native files. Any potential safety issues not noted elsewhere in the report will be provided.
- 7) Arc Flash Incident Energy Labels – SKM Power Tools software arc flash evaluation module can automatically produce arc flash labels that comply with NEC Article 110.16 or custom labels. The labels will be affixed to equipment at each site and will include arc flash incident energy levels, arc flash boundaries, limited approach boundaries, restricted approach boundaries, shock hazards, working distances, and recommended PPE requirements.

ASSUMPTIONS AND EXCLUSIONS

1. Consultant assumes that the City's Project Manager will coordinate the scheduling of internal Engineering, Operations, and Maintenance personnel where necessary to assist during data collection and field verification work.
2. Consultant assumes that the City will assist in the coordination of necessary shutdowns and lock-out/tag-out procedures of equipment for de-energization and provide the latest settings files for all programmable protective relays.

3. Consultant assumes that the City will dedicate an electrician to help Consultant's engineer access the electrical equipment, such as opening up panelboards, MCCs, switchboards, and panel distribution boards, during the field verification process.
4. Only three-phase 208V – 15000V panels are included in the study.
5. Consultant will provide the recommended protective device settings in the report but will not adjust or test any protective device in the field.
6. This proposal is only for the wastewater treatment plant. Consultant can perform arc flash, short circuit, and coordination study for pump/lift stations outside of the WWTP for an additional cost.

A detailed estimate worksheet is attached for reference.

Amount of Compensation:

This Request - Change Order # 01: \$125,470

Estimated By: Michael G. Krebs, PE - PACE April 21, 2025
Date

AGREED TO AND ACCEPTED BY:

By _____ Date _____
City of San Luis



**ENGINEERING FEE ESTIMATE
PROJECT WORKSHEET**

| Project Data |
|--|
| Project Name: San Luis West WWTP Expansion |
| Client: City of San Luis |
| PACE Job Number: B777 |
| Estimate Date: April 21, 2025 |

| PACE Hourly Rate Schedule | |
|--|--------------|
| Description | Hourly Rate |
| Principal | \$300 |
| Sr. Proj. Mgr./Sr. Consulting Engr. | \$260 |
| Sr. Electrical Engineer / Sr. GIS Analyst | \$245 |
| Project Manager /Consulting Engr./Sr. I&C Specialist | \$250 |
| Sr. Proj. Engr./Sr. Design Engr. | \$220 |
| Instrumentation & Controls Specialist | \$185 |
| Proj. Engr/Design Engineer II | \$190 |
| Design Engineer | \$150 |
| Sr. CAD Designer | \$175 |
| CAD Designer/GIS Analyst | \$145 |
| Graphic Designer | \$125 |
| Project Coordinator | \$105 |
| Administrative Support | \$100 |
| Assistant Designer | \$85 |
| G.P.S. Survey Unit (w/Operator) | \$290 |
| Expert Witness/Legal Consultation | \$400 + Exp. |

Total Fee Amount \$125,470

| Item No. | Work Item Description | Estimated Manhours | | | | | | | Man-Power Subtotal | Subconsultant Cost | Expenses | Total Task Costs | |
|---------------|---|--------------------|--|---------------------------|-------------------------|---|------------------|---------------------------|--------------------|--------------------|------------|------------------|---------------------|
| | | Principal | Sr. Project Manager/Sr. Consulting Engr. | Sr. GIS Analyst / Manager | Sr. Electrical Engineer | Project Engr/ /Design Engr. II/Electrical Engr. | Sr. CAD Designer | CAD Designer /GIS Analyst | | | | | Project Coordinator |
| | | 300 | 260 | 245 | 245 | 190 | 175 | 145 | 105 | | | | |
| 44 | Onsite Reuse Pump Station | | | | | | | | | \$28,960 | \$0 | \$0 | \$28,960 |
| 44 | Onsite Reuse Pump Station | 8 | 16 | | | 32 | 24 | 72 | 16 | \$28,960 | \$0 | \$0 | \$28,960 |
| 45 | Power System Study | | | | | | | | | \$92,010 | \$0 | \$4,500 | \$96,510 |
| 45.1 | Data Collection & Evaluation | 4 | | | 32 | 32 | | | 8 | \$15,960 | \$0 | \$4,500 | \$20,460 |
| 45.2 | Power System Model | | | | 72 | 16 | | | | \$20,680 | \$0 | \$0 | \$20,680 |
| 45.3 | Short Circuit Analysis | | | | 30 | 10 | | | | \$9,250 | \$0 | \$0 | \$9,250 |
| 45.4 | Overcurrent Protection Device Coordination Analysis | | | | 30 | 10 | | | | \$9,250 | \$0 | \$0 | \$9,250 |
| 45.5 | Calculations | | | | 40 | 10 | | | | \$11,700 | \$0 | \$0 | \$11,700 |
| 45.6 | Reports | 4 | | | 70 | 10 | | | 8 | \$21,090 | \$0 | \$0 | \$21,090 |
| 45.7 | Arc Flash Incident Energy Labels | | | | 12 | 6 | | | | \$4,080 | \$0 | \$0 | \$4,080 |
| TOTALS | | 16 | 16 | 0 | 286 | 126 | 24 | 72 | 32 | \$120,970 | \$0 | \$4,500 | \$125,470 |