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| <b>ADDENDUM</b> | <b>NO.</b> | <b>2</b> |
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Date July 23, 2026

City of Austin

Project Name: Hornsby Bend Biosolids Management Plant Headworks Improvements

C.I.P. No. 3164.075 IFB No.: 6100 CLMC1170

This Addendum forms a part of the Contract and corrects or modifies original Bid Documents, issued on June 15, 2026. **Acknowledge receipt of this addendum in space provided on bid form.** Failure to do so may subject bidder to disqualification.

A. Project Manual Revisions:

1) **Section 00810 5.3.1.3.1:**

DELETE

*"\$1,000,000 bodily injury per accident, \$1,000,000 bodily injury by disease policy limit and \$1,000,000 bodily injury by disease each employee."*

and REPLACE it with

*"\$100,000 bodily injury per accident, \$500,000 bodily injury by disease policy limit and \$100,000 bodily injury by disease each employee."*

2) **Section 11335 1.06.B Design Criteria Table Minimum Screenings Capacity per unit, ft<sup>3</sup>/hr:**

DELETE

*"177"*

and REPLACE it with

*"70"*

3) **Section 01650 Equipment Testing and Facilities Startup:**

Replace section in its entirety with attached section.

4) **Table of Contents, Section 01650 Equipment Testing and Facilities Startup**

DELETE date

*"04/17/26"*

and REPLACE it with

*"05/16/24"*

5) **Section 11315 1.06.A.1. Sludge Receiving Station Pumps Table, No. of Units:**

DELETE

*"Four"*

and REPLACE it with

*"Two".*

6) **Section 00810:**

DELETE Section 6.6.2.

7) **Section SP16210 2.02.BB:**

DELETE in its entirety:

*"Section 16210 2.02.BB Automatic Transfer Switch*

*Replace:*

*Section 16210 2.02.BB language with the following:*

*"Automatic Transfer Switch to be provided by the same supplier as the generator.""*

and REPLACE with:

*"Section 16210 2.02.BB Manual Transfer Switch*

*Replace:*

*Section 16210 2.02.BB language with the following:*

*"Manual Transfer Switch to be provided by the same supplier as the generator.""*

8) **Section 00020 9. CONTRACT TIME.**

DELETE

*"Contract Time is of the essence and all Work shall be substantially completed within eight hundred and ten (810) Calendar days"*

and REPLACE it with

*"Contract Time is of the essence and all Work shall be substantially completed within nine hundred and fifty (950) Calendar days".*

9) **Section 00300L TIME OF COMPLETION.**

DELETE

*"The undersigned Bidder agrees to commence work on the date specified in the written "Notice to Proceed" to be issued by the OWNER and to substantially complete construction of the improvements, as required by the Project Manual, Drawings and Addenda for the Work within eight hundred and ten (810) Calendar Days"*

and REPLACE it with

*"The undersigned Bidder agrees to commence work on the date specified in the written "Notice to Proceed" to be issued by the OWNER and to substantially complete construction of the improvements, as required by the Project Manual, Drawings and Addenda for the Work within nine hundred and fifty (950) Calendar days".*

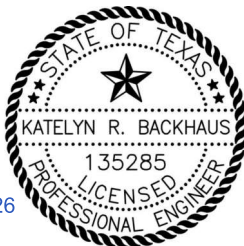
B. Drawing Revisions: N/A

This addendum consists of 28 page(s)/sheet(s).

**Jules Parrish**

Digitally signed by Jules Parrish  
DN: C=US, E=jules.parrish@austintexas.gov, O=City of  
Austin, OU=Capital Delivery Services, CN=Jules Parrish  
Date: 2026.07.22 17:11:59-05'00'

Approved by OWNER



7/21/2026

*Katelyn R. Backhaus*

Approved by ENGINEER/ARCHITECT (as applicable per license requirements)

**END**

## **PART 1 GENERAL REQUIREMENTS FOR EQUIPMENT TESTING, COMMISSIONING, AND STARTUP**

### **1.01 SUMMARY**

- A. This specification applies to all divisions including HVAC, Electrical, I&C, etc.
- B. This Section includes the general requirements for in-place testing of individual pieces of equipment and systems and startup of unit processes to demonstrate the intended overall functionality as required to achieve project completion. Requirements for equipment and system testing and facility start up, include, but are not limited to the following:
  - 1. Start-Up Plan.
  - 2. General Start-Up and Testing Procedures.
  - 3. Equipment List (see submittal section requirements)
  - 4. Pre-Startup Checklists (see example in appendix)
  - 5. Instruments Installation Reports (see example in appendix)
  - 6. I/O Checklists/Certificates of Calibration (see example in appendix)
  - 7. Division 17000 Instrumentation Requirements For Calibration, etc.
  - 8. Field Wiring Checklist (see example in appendix)
  - 9. Certificates of Proper Installation
  - 10. Individual Equipment - Functional Testing.
  - 11. Individual Equipment - Performance Testing.
  - 12. Operational and Readiness Test (ORT)
  - 13. Performance and Acceptance Test (PAT)
  - 14. Run Test & Startup – Minimum 7-Day Test
  - 15. Final testing requirements.
- C. Except as noted otherwise, all labor, test equipment and material costs for training, testing, commissioning, and startup, etc., shall be the responsibility of the CONTRACTOR.

### **1.02 RELATED REQUIREMENTS**

- A. This section specifies the general minimum requirements for the contract. Other more specific requirements may be described in various sections of the specifications. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
- B. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of the CONTRACTOR's Work.
- C. CONTRACTOR is responsible for obtaining all required testing measurement equipment. Contractor shall furnish copies of National Institute of Standards and Technology (NIST) traceable calibration data sheets, current within 1 year from the date of test, for all measurement equipment proposed to be used during testing prior to the test for review. This includes, but is not limited to: pressure gauges, flow meters, noise, and temperature measuring equipment.
- D. Where proposed instruments are installed, Instrument and Control System Contractor (ICS) shall provide Instruments Installation Report(s) (IIR). Data shall be recorded on the IIR. After installation, the CONTRACTOR and manufacturer's qualified technical inspector shall inspect the installation and prepare a report or reports. Note: The IIR is required in addition to all the other tests, calibration and checkout procedures required in this test procedure. The IIR must be completed, and all deficiencies must be corrected by the ICS prior to commencing the Performance Acceptance Test (PAT).

### **1.03 REFERENCES (NOT USED)**

#### **1.04 DEFINITIONS**

- A. Facility: The entire project associated with Project, or an agreed-upon portion, including its entire processes.
- B. Functional Test: Individual equipment testing, or tests conducted by CONTRACTOR (OWNER & ENGINEER/ARCHITECT (E/A) to witness as needed) to demonstrate that installed equipment meets manufacturer's installation, calibration, adjustment requirements, and other requirements as specified.
- C. Performance Test: Individual equipment testing, or tests conducted by CONTRACTOR (OWNER & E/A to witness as needed) to demonstrate and confirm individual equipment meets the performance requirements specified in individual Specification Sections.
- D. Operational Readiness Test (ORT): Testing conducted by CONTRACTOR (OWNER & E/A to witness as needed) to demonstrate that the entire Process Instrumentation and Control System is interconnected.
- E. Performance Acceptance Test (PAT): Conducted in the presence of the OWNER and E/A, to demonstrate and confirm the operation of the entire Process Instrumentation and Control System and confirm the correct functional/performance operation of the associated individual equipment that shall be controlled/monitored.
- F. Run Test & Startup: Minimum 7-day run test & startup sequencing of demonstration shall be agreed upon in advance by the E/A, CONTRACTOR, and OWNER. OWNER and E/A will provide operations personnel to monitor the process for the duration of the startup demonstration. CONTRACTOR shall provide labor, power, fuel, and other normal consumables and media needed to conduct the demonstration for the duration of the testing. This test should be conducted under normal operating conditions and scenarios.

#### **1.05 SYSTEM DESCRIPTION**

- A. The purpose of this Section is to:
  - 1. Verify the equipment and systems are installed in accordance with the manufacturer's instructions and O&M requirements, the Contract Documents (including the Contract Specifications) and industry accepted minimum standards.
  - 2. Verify the equipment and systems receive adequate operational checkout by the CONTRACTOR and the manufacturers' representatives.
  - 3. Verify and document proper performance of the equipment and systems.
  - 4. Verify OWNER's operating personnel are adequately trained in the proper operation and maintenance of each piece of equipment.
- B. Equipment testing and startup does not relieve the CONTRACTOR of the responsibility to provide a finished and fully functioning Project.
- C. Equipment testing and facility startup overview and general order:
  - 1. Begin with an initial pre-startup coordination meeting to review this specification and Contract requirements. Develop a start-up milestone schedule and action item list with assigned tasks. Discuss required submittals and development of the Equipment List, Pre-startup Checklists, Instrumentation Installation Forms, I/O Checklist/Calibration Certifications, and any other forms/reports required by the Contract or this specification. Schedule second pre-startup meeting to review DRAFT checklist/forms.
  - 2. Conduct a second follow-up meeting to review DRAFT startup checklist and forms listed above and any others required by the Contract or this specification.

3. In general, checkout and performance verification proceeds from simple to complex; from component level to equipment; to systems and intersystem levels with verification checklists being completed before functional testing.
4. Equipment and system installers shall execute and document verification checklists and perform verification checks in preparation for startup.
5. CONTRACTOR and equipment and system installer shall develop specific equipment and system test procedures, incorporating the requirements of this and other individual equipment Specification Sections.
6. Items of non-compliance in material, installation or setup shall be corrected at CONTRACTOR's expense and the equipment or system re-tested.

## **1.06 SUBMITTALS**

A. Submit for review and approval the following in accordance with Section 01300, "Submittals".

1. *Equipment Startup and Performance Demonstration Plan.*
  - a. Submittals at a minimum should contain:
    - 1) Step-by-step instructions for the complete testing and startup of each piece of equipment, each unit process, and the complete project.
    - 2) *Equipment List* to include the following at a minimum:
      - a) Equipment Tag Number
      - b) Specification Reference
      - c) Manufacturer
      - d) Model and serial number
      - e) General Location/Service
      - f) Range/Setpoint
      - g) Description of the of all devices needed to complete the system or project.
    - 3) *Equipment Testing Procedure* to include the following at a minimum:
      - a) Description of the equipment, including equipment tag numbers, nomenclature of each item of equipment and all included devices, and equipment location.
      - b) Date of test and reference to unique verification checklist and startup documentation.
      - c) Required pre-test field measurements, formulas used in calculations and instrument calibration data.
      - d) Special precautions, setting of alarm limits, and any safety concerns such as personnel guards for rotating equipment or fall protection at open tanks.
      - e) Specific step-by-step procedures to execute all activities specified in Paragraph 3.02. in clear sequential and repeatable format.
      - f) Acceptance criteria of proper performance with yes/no check box to allow for marking whether proper performance of each part of the test was achieved. Include a section for comments for each test.
    - 4) *Performance Acceptance Test (PAT) Procedure* at a minimum should include the items listed below shall be submitted and approved by the E/A prior to scheduling testing activities listed in Part 3 of this Section.

*Additional time shall be provided for the E/A and Owner to review at least one (1) month should be planned and allocated for initial and revised submittals.*

- a) In addition to the items/format specified above, provide detailed procedure for startup of the unit process, including valves and gates to be opened/closed, tanks or basins to be filled or emptied, order of equipment startup, etc.
  - b) Startup requirements for each unit process, including water, power, chemical, etc. and requirements for other instrumentation, equipment, or systems to be in operation prior to startup. Also include requirements related to involvement of work being installed by Others.
  - c) Operation in hours or days to demonstrate proper operation. The minimum time for operation as specified in this Section or in the individual equipment sections.
  - d) Space for evaluation comments.
  - e) Test Instrumentation Calibration Data Sheets (see example in appendix)
  - f) Pre-Startup Checklist (see examples in appendix)
  - g) I/O Checklists/Certificates of Calibration (see examples in appendix)
  - h) Field Wiring Checklist (see example in appendix)
  - i) Testing and Startup schedule with major milestones, equipment/field test dates, and vendor training identified
  - j) Instruments Installation Reports per paragraph 3.02 F. Incorporate and include any additional forms/reports specified in individual Specification Sections.
  - k) Certificate of Proper Installation (COPI): Furnish certificate for each piece of equipment prepared by manufacturer's technical representative, certifying the satisfactory installation by the Contractor as well as proper operation meeting all functional and performance requirements.
- 5) A complete "as-tested" version of the *Performance Acceptance Test (PAT) Plan* shall be submitted after testing is completed, including all supporting documentation, original testing data, and notations of any instances where simulation was used. Reference Paragraph 3.01.F of this Section for additional information. For example, a summary report with supporting documentation is not acceptable.

## **1.07 QUALITY ASSURANCE**

- A. System Coordination: CONTRACTOR is responsible for the details and coordination necessary to properly install, test and certify a complete, working system.
- B. The CONTRACTOR shall provide the services of a qualified manufacturer's service technician to:
  - 1. Assist in the installation of equipment.
  - 2. Check the installation before the equipment is placed into operation.
  - 3. Assist in the performance of field tests.
  - 4. Assist in the commissioning and startup of the equipment.

5. Train the OWNER's operational and maintenance personnel in the care, operation, and maintenance of all supplied equipment prior to Startup.
- C. The CONTRACTOR shall provide the services of the manufacturer's service technician at such times and for such duration of time as are needed to perform the tasks required above. Reference the individual equipment Specification Sections for additional details.

**1.08 – 1.10 NOT USED**

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS - NOT USED**

**2.02 MATERIALS – NOT USED**

**2.03 TOOLS, SPARE PARTS, AND ACCESSORIES**

**A. Testing Equipment Requirements**

1. Testing Equipment: Calibrated within last year using a National Institute of Standards and Technology (NIST) traceable calibration; of sufficient quality and accuracy to test and measure system performance within the following tolerances unless otherwise specified for individual equipment:
  - a. Temperature Sensors and Digital Thermometers: 0.5°F accuracy and  $\pm 0.1^\circ\text{F}$  resolution.
  - b. Pressure Sensors: Accuracy of  $\pm 2.0\%$  of measured values range.
  - c. Vibration Sensors: Use digital type analyzers or data collectors with anti-aliasing filter, 12 bit A/D converter, fast Fourier transform circuitry, phase measurement capability, time wave form data storage, high frequency enveloping capabilities, 35 frequency ranges from 21 to 1,500,000 cycles per minute, adjustable fast Fourier transform resolution from 400 to 6,400 lines, storage for up to one hundred 3,200 line frequency spectra, RS232C data output port, circuitry for integration of acceleration data to velocity or double integration to displacement.
2. Recalibrate test equipment according to manufacturers recommended intervals and when dropped or damaged.
  - a. Affix calibration tags to test equipment or furnish certificates upon request.
3. Equipment furnished by CONTRACTOR and remaining property of CONTRACTOR:
  - a. Standard testing equipment required to perform verification checks, start-up and required testing and calibration of system instruments.
  - b. Two-way radios for personnel performing testing.

**2.04 (NOT USED)**

**PART 3 EXECUTION**

**3.01 GENERAL EQUIPMENT VERIFICATION**

**A. General**

1. Complete testing, training, and start-up within the time frame specified in each individual Project. Provide OWNER a minimum of 14-day advance notice prior to scheduled activity.



2. Allow for realistic durations when planning Work for testing, training, and start-up activities.
  3. Furnish labor, power, tools, equipment, instruments, and services required for and incidental to completing functional testing, performance testing, ORT, and PAT.
  4. Provide competent, experienced technical representatives of equipment manufacturers for commissioning, testing, and operator training.
- B. CONTRACTORS Testing and Startup Representative:
1. Designate and furnish one or more personnel to coordinate and carry out testing.
  2. Representative(s) shall be available at all times during the testing and startup.
- C. Facility Testing and Startup Meetings:
1. Schedule meetings with OWNER, E/A, and other stakeholders as appropriate to discuss testing and startup schedule, test methods, materials, chemicals, and tools required, facilities operations interface, and OWNER involvement.
- D. Temporary Facilities and Labor:
1. Provide necessary fluids, utilities, temporary piping, temporary supports, temporary access platforms or access means and other temporary facilities and labor necessary to safely operate the equipment and accomplish the specified testing. With OWNER's prior permission, some utilities may be used by the Contractor even if the utilities are part of the fully tested permanently installed utilities that are part of the Work.
- E. Field Testing:
1. Submit test plan as specified in this Section. Indicate test start time and duration, equipment to be tested, other equipment involved or required; temporary facilities required; number and skill or trade of personnel involved; safety issues and planned safety contingencies; anticipated effect on OWNERs existing equipment and other information relevant to the test. Provide locations of all instruments to be used for testing. Provide calibration records for all instrumentation.
  2. Perform general startup and testing procedures in accordance with written Equipment Startup Procedures.
  3. Prior to testing, verify equipment protective devices and safety devices have been installed, calibrated, and tested.
- F. Reports: Submit reports for completed field testing. Report features:
1. Report results in a bound document and PDF copy, in generally accepted engineering format with title page, written summary of results compared to specified requirements, and appropriate curves or plots of significant variables, in English Units.
  2. Include appendix with a copy of the raw, unmodified test data sheets indicating test value, date and time of reading, and initials of person taking the data.
  3. Include appendix with sample calculations for adjustments to raw test data and for calculated results.
  4. Include appendix with the make, model, and last calibration date of instrumentation used for test measurements.
  5. Include in body of report a drawing or sketch of the test system layout, showing location and orientation of the test instruments relative to the tested equipment features.
- G. Owner will:
1. Provide chemicals, potable and non-potable water for initial testing unless otherwise indicated. Should retesting be required, the Contractor shall be responsible for providing chemicals, potable and non-potable water as needed to complete the retest.
  2. Provide labor and materials as required for laboratory analysis.
  3. Make available spare parts, special tools, and operation and maintenance

- information for any OWNER-furnished products.
4. Provide licensed operators to operate equipment after startup and during PAT.

### **3.02 PREPARATION, FUNCTIONAL & PERFORMANCE TESTING**

- A. Preparation:
1. Complete installation prior to initiating test.
  2. Obtain and submit from equipment manufacturer's representative, the Certificate of Proper Installation.
  3. Equipment & Instrument Installation Reports: Provide written test report for each item of equipment to be tested. The form shall include:
    - a. Owner/Project Name
    - b. Equipment or Item tested. Use Equipment Id numbers when appropriate.
    - c. Date and time of test
    - d. Weather conditions, if applicable
    - e. Type of test performed (Functional and Performance)
    - f. Test method
    - g. Test conditions
    - h. Test results
    - i. Deficiencies found
    - j. Corrective action taken
    - k. Properly installed? Indicate on COPI (Checkbox)
    - l. Calibration date
    - m. Signature spaces for witnesses.
  4. Cleaning and Checking: Prior to beginning functional testing:
    - a. Calibrate testing equipment in accordance with manufacturer's instructions and requirements in this Section.
    - b. Inspect and clean equipment, devices, connected piping, and structures to ensure they are free of foreign material. Remove rust preventatives and oils applied to protect equipment during construction.
    - c. Flush lubrication systems and dispose of flushing oils. Recharge lubrication system with lubricant recommended by manufacturer.
    - d. If necessary, flush fuel system and provide fuel for testing and startup.
    - e. Install and adjust packing, mechanical seals, O-rings, and other seals. Replace defective seals.
    - f. Remove temporary supports, bracing, or other foreign objects installed to prevent damage during shipment, storage, and erection.
    - g. Turn rotating equipment by hand when possible, to confirm that equipment is not bound.
    - h. Open and close new valves and gates by hand and operate other devices to check for binding, interference, or improper functioning. OWNER supplied equipment shall be operated by or in direct coordination with the OWNER.
    - i. Check power supply to electric-powered equipment for correct voltage.
    - j. Adjust clearances and torque. Perform cold alignment and hot alignment to manufacturer's tolerances.
    - k. Test new piping and tubing for leaks.
  5. Ready-to-Test determination will be made by OWNER and E/A based at least on the following:
    - a. Acceptable DRAFT O&Ms Approved Electronic and Hard Copies).
    - b. Notification by CONTRACTOR of equipment readiness for testing, including assurances that all necessary personnel have been scheduled.

- c. Receipt of manufacturer's Certificate of Proper Installation.
- d. Adequate completion of work adjacent to, or interfacing with, equipment to be tested, including but not limited to the following:
  - Items to be furnished by OWNER.
  - Installation of grating.
  - Installation of guardrail, handrail, toe plates, and all other safety equipment as required.
- e. Availability and acceptability of manufacturer's representative performing the testing of the respective equipment.
- f. Equipment and electrical tagging complete.

**B. Functional Testing:**

- 1. Perform checkout and testing as specified by manufacturer.
- 2. Functionally test mechanical and electrical equipment, and instrumentation and controls systems for proper operation.
- 3. Demonstrate proper rotation, alignment, electrical draw (volts/amps), noise, temperature, speed, flow, pressure, vibration, adjustments, and calibration. Perform initial checks in the presence of and with the assistance of the manufacturer's representative. Operate equipment at rated design load conditions for a minimum of 15 minutes after components reach normal operating temperatures.
- 4. Demonstrate proper operation of each function including all alarms and interlocks, fully testing all modes of control both locally and in remote, instrumentation, and other equipment functions. Reference individual electrical and instrumentation and control specifications for additional operational readiness testing required for these systems.
  - a. Testing shall be completed using actual operating (field) conditions at the initiating device wherever possible.
  - b. The *Equipment Startup and Performance Demonstration Plan* shall clearly indicate any instances where simulation may be required for approval by the E/A.
  - c. Whenever simulation is used during testing, it shall be clearly noted in the testing documentation. At the discretion of the E/A, retesting may be required at no additional expense if simulation is used without the E/A's prior approval.
- 5. Identify and correct all areas of deficient performance. Immediately correct defects in material, workmanship, or equipment which became evident during the test. Repeat functional test until all malfunctions or deficiencies are identified and corrected.
- 6. Prepare written Instrumentation and Equipment Installation Report, in the format specified, summarizing the test methods and results.
- 7. When, in the E/A's opinion, equipment meets the functional requirements specified, such equipment shall advance to the performance testing phase.

**C. Performance Testing:**

- 1. Conduct performance test specified in individual specification sections. When specific test is not specified, operate equipment for a minimum of eight hours at the rated design load conditions after components reach normal operating temperatures. Measure electrical draw (volts/amps), noise, temperature, speed, flow, suction and discharge pressure, and vibration at the rated operating point, and at four additional points to confirm proper operation throughout the entire equipment operating range. When variable speed equipment is specified, complete measurements at all points specified in the individual equipment specifications.
- 2. Perform testing and verification by using manual testing or by monitoring performance and analyzing results using control system trend log capabilities or by stand-alone data-loggers. Use the normal operating, process fluid, gas, or solid for the performance test.
- 3. Simulated conditions may be utilized, after coordination with the E/A and OWNER. Timing

the test to use real conditions is encouraged. Use a signal generator to create simulated signals to test and calibrate transducers. Do not overwrite permanent sensor set-points to achieve simulated conditions. Simulations are only acceptable when pre-approved by E/A. Otherwise, live performance testing is required.

4. Identify and correct all areas of deficient performance. Immediately correct defects in material, workmanship, or equipment which became evident during the test. Repeat performance test until all malfunctions or deficiencies are identified and corrected.
5. Prior to unit process startup, individual pieces of equipment shall be confirmed by E/A as having met both the functional and performance testing requirements.

### **3.03 OPERATIONAL READINESS TEST (ORT)**

- A. The Operational Readiness Test (ORT) for the Process Instrumentation and Control System (PICS) must be performed prior to startup of the Performance Acceptance Test (PAT). These tests shall be documented using "ORT Sheet" (see appendix for example).
- B. Check the overall system and each subsystem to see that they function as specified based on simulated inputs at each sensor and at each set of field contacts monitored. This check to include the testing of all automatic functions, sounding of alarms, shutdowns, etc.
- C. Check the overall accuracy of each new and modified instrument loop to ensure that it is within acceptable tolerance.
- D. If defects are found, make corrections and retest.
- E. The Instrument and Control Systems Contractor shall test the PICS Equipment and Systems.
- F. Conduct the ORT with entire PICS installed to demonstrate that it is operational and interconnected.
- G. PICS Subsystems: each portion of the PICS Subsystem shall be tested to demonstrate that the entire system is interconnected.
- H. Distributed Control System (DCS) Loop-Specific Functions: each DCS Loop-Specific Function must be tested including discrete, analog, etc.
- I. Contractor must make the following documentation available to E/A at test site both before and during tests:
  1. Master copy of On-Site Test Procedures.
  2. List of equipment to be tested including make, model, and serial number.
  3. Shop Drawing hard copy and digital submittals for equipment being tested.
- J. The daily schedule for the Test shall include the following:
  1. Begin each day with a meeting to review the day's test schedule.
  2. End each day with a meeting to review the day's test results and to review or revise the next day's test schedule.
- K. Submit the following testing related submittals:
  1. ORT Signed Documentation
  2. Proposed Test Procedures, forms, and checklists.
  3. Copy of signed test procedures when tests are completed.
- L. Upon successful completion of the PICS ORT, the Contractor shall submit letter notification to the OWNER and E/A stating that all PICS ORT has been successfully completed. The letter notification shall further state that the ICS is ready to begin the PAT.
- M. Submit the following upon successful approved completion of the ORT
  1. Sumita all used test procedures, forms, and checklists.
  2. Complete Instruments Installation Report(s).

3. ORT Form: Complete the ORT form and submit to E/A
4. Submit all shop drawings and other submittals associated with the ORT and Test procedures.
5. Provide letter notification of successful completion of ORT and Contractor readiness to commence PAT

#### **3.04 PERFORMANCE ACCEPTANCE TEST**

- A. Prior to starting the Performance Acceptance Tests (PAT), the following must be completed: The instruments Calibration and Test Report completed, the Instruments Installation Report(s) "IIR" completed, and Operational Readiness Tests (ORT) completed, and Contractor letter notification of successful completion of ORT and Contractor's readiness for commencement of PAT is submitted. Additionally, the Startup and PAT procedures associated shop drawing submittals must be approved. Note: Owner requires two (2) weeks' notice prior to start PAT.
- B. Startup sequencing shall be agreed upon in advance by the CONTRACTOR, OWNER, and E/A.
- C. The testing shall be conducted using application software provided by the ENGINEER OR CONTRACTOR integral with their existing system. The Instrumentation and Control System (ICS) Contractor shall test functions installed and the hard-wired system and the entire associated instrumentation and control system including validating the operation and monitoring and control functions of all instruments, all control devices, all instrument and control components, control functions, alarm function, monitoring function, calibration ranges, control/alarm set point operations, etc.
  1. The ICS shall start up and test the operation of the instrumentation and control system and the operation of the associated process and mechanical equipment that shall be monitored and controlled by the instrumentation and control system.
  2. The PICS system component shall include loop-specific tests of the entire installed PICS using actual process variables and demonstrating all functions, including:
    - a. Checking the PICS for proper installation, calibration, and adjustment on a component-by-component basis.
    - b. Analog Devices: Tested using actual inputs and outputs at 0, 25, 50, 75, and 100 percent of span, rising and falling.
    - c. Discrete Devices: Tested using actual trip points and reset points.
    - d. Indicators/Transmitters/Controllers: Tested using alarm and control set point as well as set point function tests in association with their respective interface with the control logic of the associated process mechanical equipment.
    - e. Analog I/O Modules: Tested using actual inputs or outputs of 0, 25, 50, 75, and 100 percent of span, rising and falling.
    - f. Perform local and manual tests for each loop before proceeding to remote and automatic modes.
    - g. Perform complete control logic simulation and actual/live test in all modes of operations.
    - h. Make updated versions of documentation required for PAT available to Owner and E/A at Project site, both before and during tests.
- D. Immediately correct defects in material, workmanship, or equipment which become evident during the testing. In the event of a significant interruption, as defined below, CONTRACTOR shall correct the deficiency and re-start the test. OWNER and E/A will

determine if the entire 7-day test period shall start from the beginning again.

1. Significant interruption may include the following:
  - a. Failure of CONTRACTOR to provide and maintain qualified onsite startup personnel as scheduled.
  - b. Failure to meet specified functional operation for more than 2 consecutive hours.
  - c. Failure of any critical equipment, monitor, or control that is not satisfactorily corrected within 5 hours after failure.
  - d. Failure of any noncritical equipment, monitor, or control that is not satisfactorily corrected within 8 hours after failure.
  - e. Requires more than 24 hours to correct, unless otherwise specified.
  - f. Recurs at any point during the testing that requires further correction.
- E. The following must be completed prior to conducting the Performance Acceptance Test:
  1. Complete Instruments Installation Report(s).
  2. Complete ORT.
  3. Provide letter notification of successful completion of ORT and Contractor readiness to commence PAT
- F. Submit the following testing related submittals:
  1. PAT Form: Upon approved PAT, complete the last PAT approval line and submit
  2. Test Procedures: Proposed Test Procedures, forms, and checklists.
  3. Test Documentation: Copy of signed test procedures when tests are completed.
- G. Submit all shop drawings and other submittals associated with the Startup and Test procedures.

### **3.05 Equipment/System Demonstration**

- A. Startup sequencing of demonstration shall be agreed upon in advance by the E/A, CONTRACTOR, and OWNER
- B. Make any adjustments, repairs, and corrections necessary to complete the equipment/system demonstration.
- C. OWNER and E/A will provide operations personnel to monitor the process for the duration of the demonstration. CONTRACTOR shall provide labor, power, fuel, and other consumables needed to conduct the demonstration for the duration.

### **3.06 COMPLETION OF TESTING**

- A. When, in the opinion of the OWNER, startup of all unit processes has been satisfactorily achieved, sequence each unit process to the point that the entire facility is fully operational. Under no circumstances will the Project be considered Substantially Complete until full function and facility performance has been demonstrated and all administrative requirements have been fulfilled.
- B. After completion of operator training for all equipment, demonstrate the proper operation of all required unit processes and interfaces for the entire facility. Demonstrate satisfactory operation of all equipment and systems in actual operation, using process fluid, gas, or solid.
- C. Provide all required documentation and certify that the facility is capable of performing its intended functions.
- D. Incorporate into the O&M manuals all documentation required for final approval, including Testing and Startup Submittals, Pre-Startup Checklists, Instrument Installation Reports, and I/O Checklist/Calibration Certificates.

**3.07 CERTIFICATE OF PROPER INSTALLATION (COPI)**

- A. At the completion of the individual Functional and Performance Test, submit written certificate prepared and signed by the manufacturer's authorized representative, certifying that:
1. The equipment has been properly installed, adjusted, aligned, and lubricated;
  2. Is free of any stresses imposed by connecting piping or anchor bolts;
  3. Is free of any lubricant or process leaks;
  4. Is suitable for satisfactory full-time operation under full load conditions;
  5. Operates within the allowable limits for vibration;
  6. Controls, protective devices, instrumentation, and control panels furnished as part of the equipment package are properly installed, calibrated, and functioning; and
  7. Control logic for startup, shutdown, sequencing, interlocks, and emergency shutdown has been tested and is properly functioning.

**3.08 – 3.10 (NOT USED)**

**3.11 MEASUREMENT AND PAYMENT**

No separate payment for work performed under this Section. Include cost of same in Contract price bid for work of which this is a component part.

# EXAMPLE/SAMPLE FORMS



| <h2>Certificate of Calibration</h2>                                                                                                                                                                                                                                   |                                                |                          |                                                     |                                         |              |              |             |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|--------------------------|-----------------------------------------------------|-----------------------------------------|--------------|--------------|-------------|--|
| <b>Project Information</b>                                                                                                                                                                                                                                            |                                                |                          |                                                     |                                         |              |              |             |  |
| <b>Customer Name:</b>                                                                                                                                                                                                                                                 | City of Austin                                 | <b>Customer Contact:</b> | Tiny Eldridge                                       |                                         |              |              |             |  |
| <b>Project No.:</b>                                                                                                                                                                                                                                                   | 1658009                                        | <b>Customer Phone:</b>   | 254-793-4344                                        |                                         |              |              |             |  |
| <b>Project Name:</b>                                                                                                                                                                                                                                                  | South Austin Regional WWTP Filter Improvements | <b>Engineer Company:</b> | T. Morales Company Electric & Control, LTD          |                                         |              |              |             |  |
| <b>Address:</b>                                                                                                                                                                                                                                                       | 13009 Fallwell Lane<br>Del Valle, TX 78617     | <b>Engineer Contact:</b> | AECOM                                               |                                         |              |              |             |  |
|                                                                                                                                                                                                                                                                       |                                                | <b>Engineer Phone:</b>   | (512) 472-4519                                      |                                         |              |              |             |  |
|                                                                                                                                                                                                                                                                       |                                                | <b>P.O. Ref:</b>         |                                                     |                                         |              |              |             |  |
| <b>Instrument Information</b>                                                                                                                                                                                                                                         |                                                |                          |                                                     |                                         |              |              |             |  |
| <b>Location/Service:</b>                                                                                                                                                                                                                                              | Filter Building                                |                          |                                                     |                                         |              |              |             |  |
| <b>Tag/Loop No.:</b>                                                                                                                                                                                                                                                  | FB1-FE-FIT-7304                                | <b>Description/Type:</b> | Mudwell Pumps Discharge Flow Indicating Transmitter |                                         |              |              |             |  |
| <b>Serial Number:</b>                                                                                                                                                                                                                                                 |                                                | <b>Manufacturer:</b>     | Endress + Hauser                                    |                                         |              |              |             |  |
| <b>Additional Info.:</b>                                                                                                                                                                                                                                              |                                                | <b>Model No.:</b>        | 53W4F-HLGE1AC187CB                                  |                                         |              |              |             |  |
| <b>Calibration Procedures</b>                                                                                                                                                                                                                                         |                                                |                          |                                                     |                                         |              |              |             |  |
| Range or Setpoint                                                                                                                                                                                                                                                     |                                                |                          | Percent                                             | Input                                   | Ideal Output | Output Found | Output Left |  |
| Low                                                                                                                                                                                                                                                                   | High                                           | EU                       |                                                     |                                         |              |              |             |  |
|                                                                                                                                                                                                                                                                       | 0                                              | 7000                     | GPM                                                 | 100%                                    | 7000 GPM     | 20.00 mA     |             |  |
| <b>Trip Point or Miscellaneous</b>                                                                                                                                                                                                                                    |                                                |                          |                                                     | 75%                                     | 5250 GPM     | 16.00 mA     |             |  |
| <b>Percent</b>                                                                                                                                                                                                                                                        | <b>*Tolerance +</b>                            | <b>*Tolerance -</b>      |                                                     | 50%                                     | 3500 GPM     | 12.00 mA     |             |  |
| 100%                                                                                                                                                                                                                                                                  | 20.08 mA                                       | 19.92 mA                 |                                                     |                                         |              |              |             |  |
| 75%                                                                                                                                                                                                                                                                   | 16.08 mA                                       | 15.92 mA                 |                                                     | 25%                                     | 1750 GPM     | 8.00 mA      |             |  |
| 50%                                                                                                                                                                                                                                                                   | 12.08 mA                                       | 11.92 mA                 |                                                     |                                         |              |              |             |  |
| 25%                                                                                                                                                                                                                                                                   | 8.08 mA                                        | 7.92 mA                  |                                                     | 0%                                      | 0 GPM        | 4.00 mA      |             |  |
| 0%                                                                                                                                                                                                                                                                    | 4.08 mA                                        | 3.92 mA                  |                                                     |                                         |              |              |             |  |
| <b>Calibration Completion</b>                                                                                                                                                                                                                                         |                                                |                          |                                                     | <b>Special Requirements or Comments</b> |              |              |             |  |
| <b>*Tolerance +/-</b> 0.50%                                                                                                                                                                                                                                           |                                                |                          |                                                     |                                         |              |              |             |  |
| <b>Last Calibrated:</b>                                                                                                                                                                                                                                               |                                                |                          |                                                     |                                         |              |              |             |  |
| <b>Calibration Date:</b>                                                                                                                                                                                                                                              |                                                |                          |                                                     |                                         |              |              |             |  |
| <b>Calibration Due Date:</b>                                                                                                                                                                                                                                          |                                                |                          |                                                     |                                         |              |              |             |  |
| <b>Recommended Interval:</b>                                                                                                                                                                                                                                          |                                                |                          |                                                     |                                         |              |              |             |  |
| <b>Calibrated By:</b>                                                                                                                                                                                                                                                 |                                                |                          |                                                     |                                         |              |              |             |  |
| <b>Accepted By:</b>                                                                                                                                                                                                                                                   |                                                |                          |                                                     |                                         |              |              |             |  |
| <b>Temperature / RH:</b>                                                                                                                                                                                                                                              |                                                |                          |                                                     |                                         |              |              |             |  |
| <b>Equipment Used to Calibrate Instrument</b>                                                                                                                                                                                                                         |                                                |                          |                                                     |                                         |              |              |             |  |
| Manufacturer                                                                                                                                                                                                                                                          | Model Number                                   | Serial Number            | NIST Number                                         | Last Calibrated                         |              |              |             |  |
|                                                                                                                                                                                                                                                                       |                                                |                          |                                                     |                                         |              |              |             |  |
|                                                                                                                                                                                                                                                                       |                                                |                          |                                                     |                                         |              |              |             |  |
|                                                                                                                                                                                                                                                                       |                                                |                          |                                                     |                                         |              |              |             |  |
|                                                                                                                                                                                                                                                                       |                                                |                          |                                                     |                                         |              |              |             |  |
|                                                                                                                                                                                                                                                                       |                                                |                          |                                                     |                                         |              |              |             |  |
| Certified Calibration: Test equipment used to calibrate this instrument, have all been calibrated by Certified Standards and are traceable to the National Institute of Standards and Technology (NIST). All Calibration procedures conform to contract requirements. |                                                |                          |                                                     |                                         |              |              |             |  |

Division 1 General Requirements Equipment Testing & Facilities Startup  
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| SAR WWTP Train B Bar Screen Replacement |      |      |       |          |                                           | I/O CHECKOUT SHEET |                              |                   | November 2021 |                                                                   |  |
|-----------------------------------------|------|------|-------|----------|-------------------------------------------|--------------------|------------------------------|-------------------|---------------|-------------------------------------------------------------------|--|
| TYPE                                    | RACK | SLOT | POINT | Terminal | DESCRIPTION                               | VISUAL CHECK       | I/O WIRING / PLC SIGNAL TEST | CALIBRATION CHECK | DATE          | NOTES                                                             |  |
| DI                                      |      |      |       |          | Train B Bar Screen 1 Auto                 |                    |                              | N/A               |               |                                                                   |  |
| DI                                      |      |      |       |          | Train B Bar Screen 1 Running              |                    |                              | N/A               |               |                                                                   |  |
| DI                                      |      |      |       |          | Train B Bar Screen 1 Fail                 |                    |                              | N/A               |               |                                                                   |  |
| DI                                      |      |      |       |          | Train B Bar Screen 1 Torque High          |                    |                              | N/A               |               |                                                                   |  |
| DI                                      |      |      |       |          | Train B Bar Screen 1 Rake Out of Position |                    |                              | N/A               |               |                                                                   |  |
| DI                                      |      |      |       |          | Train B Bar Screen 1 Motor Service Alarm  |                    |                              | N/A               |               |                                                                   |  |
| DI                                      |      |      |       |          | Train B Bar Screen 2 Auto                 |                    |                              | N/A               |               |                                                                   |  |
| DI                                      |      |      |       |          | Train B Bar Screen 2 Running              |                    |                              | N/A               |               |                                                                   |  |
| DI                                      |      |      |       |          | Train B Bar Screen 2 Fail                 |                    |                              | N/A               |               |                                                                   |  |
| DI                                      |      |      |       |          | Train B Bar Screen 2 Torque High          |                    |                              | N/A               |               |                                                                   |  |
| DI                                      |      |      |       |          | Train B Bar Screen 2 Rake Out of Position |                    |                              | N/A               |               |                                                                   |  |
| DI                                      |      |      |       |          | Train B Bar Screen 2 Motor Service Alarm  |                    |                              | N/A               |               |                                                                   |  |
| DI                                      |      |      |       |          | Train B Bar Screen Influent Level Hi-Hi   |                    |                              |                   |               |                                                                   |  |
| DI                                      |      |      |       |          | Train B Bar Screen Bypass Gate Remote     |                    |                              | N/A               |               | For information only. Not part of Bar Screen Replacement project. |  |
| DI                                      |      |      |       |          | Train B Bar Screen Bypass Gate Open       |                    |                              | N/A               |               | For information only. Not part of Bar Screen Replacement project. |  |
| DI                                      |      |      |       |          | Train B Bar Screen Bypass Gate Closed     |                    |                              | N/A               |               | For information only. Not part of Bar Screen Replacement project. |  |
| DI                                      |      |      |       |          | Train B Bar Screen Bypass Gate Not Closed |                    |                              | N/A               |               | For information only. Not part of Bar Screen Replacement project. |  |

Division 1 General Requirements Equipment Testing & Facilities Startup  
Section 01650

| SAR WWTP Train B Bar Screen Replacement |      |      |       |          | I/O CHECKOUT SHEET                           |              |                              |                   | November 2021 |                                                                   |
|-----------------------------------------|------|------|-------|----------|----------------------------------------------|--------------|------------------------------|-------------------|---------------|-------------------------------------------------------------------|
| TYPE                                    | RACK | SLOT | POINT | Terminal | DESCRIPTION                                  | VISUAL CHECK | I/O WIRING / PLC SIGNAL TEST | CALIBRATION CHECK | DATE          | NOTES                                                             |
| DI                                      |      |      |       |          | Train B Bar Screen Bypass Gate Open Command  |              |                              | N/A               |               | For information only. Not part of Bar Screen Replacement project. |
| DI                                      |      |      |       |          | Train B Bar Screen Bypass Gate Close Command |              |                              | N/A               |               | For information only. Not part of Bar Screen Replacement project. |
|                                         |      |      |       |          |                                              |              |                              |                   |               |                                                                   |
| AI                                      |      |      |       |          | Train B Bar Screen 1 Service Runtime         |              |                              |                   |               |                                                                   |
| AI                                      |      |      |       |          | Train B Bar Screen 1 Lifetime Runtime        |              |                              |                   |               |                                                                   |
| AI                                      |      |      |       |          | Train B Bar Screen 2 Service Runtime         |              |                              |                   |               |                                                                   |
| AI                                      |      |      |       |          | Train B Bar Screen 2 Lifetime Runtime        |              |                              |                   |               |                                                                   |
|                                         |      |      |       |          |                                              |              |                              |                   |               |                                                                   |

**Division 1 General Requirements Equipment Testing & Facilities Startup**  
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| BAR SCREEN FIELD WIRING CHECKLIST |          |              |              |              |           |            |             |
|-----------------------------------|----------|--------------|--------------|--------------|-----------|------------|-------------|
| TO                                | TERMINAL | FROM         | TERMINAL     | VISUAL CHECK | CONFIRMED | DATE       | DESCRIPTION |
| BS01                              |          | BS01-CS-JBOX |              |              |           |            |             |
|                                   | 1011     |              | A1           | PB           | JV        | 10/10/2021 | COMMON      |
|                                   | 1121     |              | A2           | PB           | JV        | 10/10/2021 | EOT         |
|                                   | 1131     |              | C2           | PB           | JV        | 10/10/2021 | TORQUE OL   |
|                                   | 1141     |              | B2           | PB           | JV        | 10/10/2021 | REVERSE     |
|                                   | 1171     |              | P3           | PB           | JV        | 10/10/2021 | DRIVE TEMP  |
| BS01                              |          | MOTOR JBOX   |              |              |           |            |             |
|                                   | T1       |              | T1           | PB           | JV        | 10/10/2021 |             |
|                                   | T2       |              | T2           | PB           | JV        | 10/10/2021 |             |
|                                   | T3       |              | T3           | PB           | JV        | 10/10/2021 |             |
| BS01                              |          | PTB-LCP-01   |              |              |           |            |             |
|                                   | 2233     |              | LIT-RELAY1-8 | PB           | JV        | 10/10/2021 | CH HIGH LVL |
|                                   | 2234     |              | LIT-RELAY1-7 | PB           | JV        | 10/10/2021 | CH HIGH LVL |
| BS01                              |          | DP002B       |              |              |           |            |             |
|                                   | 3003     |              | 500-T        | PB           | JV        | 10/10/2021 | AUTO        |
|                                   | 3004     |              | 500-L        | PB           | JV        | 10/10/2021 | AUTO        |
|                                   | 2231     |              | 501-T        | PB           | JV        | 10/10/2021 | RUNNING     |
|                                   | 2232     |              | 501-L        | PB           | JV        | 10/10/2021 | RUNNING     |
|                                   | 2261     |              | 504-T        | PB           | JV        | 10/10/2021 | ALARM       |
|                                   | 2262     |              | 504-L        | PB           | JV        | 10/10/2021 | ALARM       |
| BS01                              |          | MCC-PTS-3    |              |              |           |            |             |
|                                   | 2341     |              | CONV-TB1-1   | PB           | JV        | 10/10/2021 | CONV START  |
|                                   | 2342     |              | CONV-TB1-8   | PB           | JV        | 10/10/2021 | CONV START  |
|                                   |          |              |              |              |           |            |             |
|                                   |          |              |              |              |           |            |             |
|                                   |          |              |              |              |           |            |             |

Division 1 General Requirements Equipment Testing & Facilities Startup  
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|                                                | <div style="text-align: center;"> <b>FORM 1. WTP 4 LIME RESIDUALS PUMP RWPG-SLP-002</b><br/> <b>Instruments Installation Reports</b> </div> |                         |                           |                  |                |              |              |                   |      |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------|------------------|----------------|--------------|--------------|-------------------|------|
| Instrument Tag/Description                     | Deficiencies Found                                                                                                                          | Corrective Action Taken | Properly Installed (COPI) | Calibration Date | Prime Initials | Sub Initials | COA Initials | Engineer Initials | Date |
| PIT-0135                                       |                                                                                                                                             |                         | <input type="checkbox"/>  |                  |                |              |              |                   |      |
| FI-0133                                        |                                                                                                                                             |                         | <input type="checkbox"/>  |                  |                |              |              |                   |      |
| FSL-0115                                       |                                                                                                                                             |                         | <input type="checkbox"/>  |                  |                |              |              |                   |      |
| PI-0126                                        |                                                                                                                                             |                         | <input type="checkbox"/>  |                  |                |              |              |                   |      |
| PIT-0113                                       |                                                                                                                                             |                         | <input type="checkbox"/>  |                  |                |              |              |                   |      |
| Flow Meter for Pump Discharge Flow Measurement |                                                                                                                                             |                         | <input type="checkbox"/>  |                  |                |              |              |                   |      |
| Instrument for Noise Measurement in Decibels   |                                                                                                                                             |                         | <input type="checkbox"/>  |                  |                |              |              |                   |      |
| Instrument for Bearing Temperature Measurement |                                                                                                                                             |                         | <input type="checkbox"/>  |                  |                |              |              |                   |      |

## FORM 2. WTP 4 LIME RESIDUALS PUMP RWPG-SLP-002

### Pre-Startup Checklist

| Activity                                                                    | Equipment ID | Verification Check                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comments | Prime<br>Initials | COA<br>Initials | Engineer<br>Initials | Date |
|-----------------------------------------------------------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------|-----------------|----------------------|------|
| Verify proper installation of pump drive per manufacturer's specifications. | RWPG-SLP-002 | <input type="checkbox"/> All separately-packed, small, or fragile parts included in installation.<br><input type="checkbox"/> All external bolts, screws, and accessories are fastened securely.<br><input type="checkbox"/> Mounting bolts are fastened securely.<br><input type="checkbox"/> Electric motor is connected in conformance with the locally applicable rules and regulations.<br><input type="checkbox"/> Lubricant level is per manufacturer recommendation.<br><input type="checkbox"/> No obstructions such as closed valves in piping. |          |                   |                 |                      |      |
| Verify proper motor wiring per manufacturer's specifications.               | RWPG-SLP-002 | <input type="checkbox"/> Correct wiring.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |                   |                 |                      |      |
| Verify rotation of motor per manufacturer's specifications.                 | RWPG-SLP-002 | <input type="checkbox"/> Correct rotation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |                   |                 |                      |      |

Division 1 General Requirements Equipment Testing & Facilities Startup  
Section 01650

FORM 3. WTP 4 LIME RESIDUALS PUMP RWPG-SLP-002

Hydraulic and Mechanical Pump Test  
Performance Data

| Design Flow Rate | Measured Flow Rate | Design Pressure | Measured Suction Pressure | Measured Discharge Pressure | Noise, 3' from Unit | Bearing Temp. |
|------------------|--------------------|-----------------|---------------------------|-----------------------------|---------------------|---------------|
| (gpm)            | (gpm)              | (ft)            | (ft)                      | (ft)                        | (dBA)               | °F            |
| 225              |                    |                 |                           |                             |                     |               |
| 200              |                    |                 |                           |                             |                     |               |
| 175              |                    |                 |                           |                             |                     |               |
| 150              |                    |                 |                           |                             |                     |               |

\* Determine bearing temperatures by thermometer. A run time until bearing temperatures have stabilized shall precede this test, unless insufficient liquid volume is available.

Upflow Clarifier Solids Data

| Solids Measurement    | Fluid Viscosity (CP)* | Temperature (°F) |
|-----------------------|-----------------------|------------------|
| Prior to pump startup |                       |                  |
| At end of pump test   |                       |                  |

\* Alternatively, if given units are not available to be measured, sludge density may be used.

Checklist

| Activity                                                                            | Equipment ID | Verification Check                                                      | Comments | Prime Initials | COA Initials | Engineer Initials | Date |
|-------------------------------------------------------------------------------------|--------------|-------------------------------------------------------------------------|----------|----------------|--------------|-------------------|------|
| Confirm performance data conforms to certified factory test curve                   | RWPG-SLP-002 | <input type="checkbox"/> Measured performance conforms to factory curve |          |                |              |                   |      |
| Verify that noise does not exceed 85 dBA at a distance of 3 feet.                   | RWPG-SLP-002 | <input type="checkbox"/> No excessive noise.                            |          |                |              |                   |      |
| Verify that bearing temperatures do not exceed the manufacturer's recommended value | RWPG-SLP-002 | <input type="checkbox"/> No excessive bearing temperature.              |          |                |              |                   |      |

Division 1 General Requirements Equipment Testing & Facilities Startup  
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FORM 4. WTP 4 LIME RESIDUALS PUMP RWPG-SLP-002

ORT and PAT Sheet  
Operational Readiness Test (ORT)

| Activity                                                                                        | Equipment ID | Verification Check                                                                               | Comments | Prime<br>Initials | COA<br>Initials | Engineer<br>Initials | Date |
|-------------------------------------------------------------------------------------------------|--------------|--------------------------------------------------------------------------------------------------|----------|-------------------|-----------------|----------------------|------|
| Confirm all instrument wires have been terminated correctly and transmit the appropriate signal | RWPG-SLP-002 | <input type="checkbox"/> Complete                                                                |          |                   |                 |                      |      |
| Local Controls                                                                                  |              |                                                                                                  |          |                   |                 |                      |      |
| Confirm Local/Off/Remote Status                                                                 | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                   |                 |                      |      |
| Confirm local Start/Stop /Reset (manual)                                                        | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                   |                 |                      |      |
| Confirm pump cannot be operated locally (with the exception of local shutdowns) while in Remote | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                   |                 |                      |      |
| Confirm suction pressure indication                                                             | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                   |                 |                      |      |
| Confirm discharge pressure indication                                                           | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                   |                 |                      |      |
| Confirm local flow indication                                                                   | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                   |                 |                      |      |

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Austin Water

Austin Water



# FORM 4. WTP 4 LIME RESIDUALS PUMP RWPG-SLP-002

## ORT and PAT Sheet Operational Readiness Test (ORT)

| Activity                                                                                                                              | Equipment ID | Verification Check                                                                               | Comments | Prime Initials | COA Initials | Engineer Initials | Date |
|---------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------------------------------------------------------------------------------------|----------|----------------|--------------|-------------------|------|
| Confirm alarm condition on high discharge pressure                                                                                    | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |
| Confirm seal water solenoid valve has hardwired interlock to automatically open and provide seal water to the pump in operation       | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |
| Confirm Rotameter settings are such that seal water pressure and flow rate match recommendations manufacturer's                       | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |
| Confirm pump RWPG-SLP-002 has interlock to shut pump down if the discharge pressure rises above the high discharge pressure set point | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |
| SCADA Controls                                                                                                                        |              |                                                                                                  |          |                |              |                   |      |
| Confirm remote Start/Stop (manual)                                                                                                    | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |
| Confirm Local/Off/Remote Status                                                                                                       | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |

# FORM 4. WTP 4 LIME RESIDUALS PUMP RWPG-SLP-002

## ORT and PAT Sheet

### Operational Readiness Test (ORT)

| Activity                                           | Equipment ID | Verification Check                                                                               | Comments | Prime Initials | COA Initials | Engineer Initials | Date |
|----------------------------------------------------|--------------|--------------------------------------------------------------------------------------------------|----------|----------------|--------------|-------------------|------|
| Confirm Pump On/Off Status                         | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |
| Confirm suction pressure indication                | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |
| Confirm discharge pressure indication              | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |
| Confirm seal water low flow switch status          | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |
| Confirm alarm condition on high discharge pressure | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |
| Confirm alarm condition on motor overload          | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |
| Confirm alarm condition on low seal water flow     | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |
| Confirm alarm condition on "fail to start"         | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |
| Confirm alarm condition on "fail to stop"          | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |

# FORM 4. WTP 4 LIME RESIDUALS PUMP RWPG-SLP-002

## ORT and PAT Sheet

### Operational Readiness Test (ORT)

| Activity                                                                                           | Equipment ID | Verification Check                                                                               | Comments | Prime Initials | COA Initials | Engineer Initials | Date |
|----------------------------------------------------------------------------------------------------|--------------|--------------------------------------------------------------------------------------------------|----------|----------------|--------------|-------------------|------|
| Confirm pump cannot be operated remotely while in Local                                            | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |
| Confirm Remote Auto Control of pump (cycle timer with values input for pump runtime and frequency) | RWPG-SLP-002 | <input type="checkbox"/> Simulated signal<br><input type="checkbox"/> With entire PICS installed |          |                |              |                   |      |

### Performance Acceptance Test (PAT)

| Activity                          | Equipment ID | Verification Check                                                                                                                                                               | Comments | Prime Initials | COA Initials | Engineer Initials | Date |
|-----------------------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------|--------------|-------------------|------|
| Performance Acceptance Test (PAT) | ALL          | <input type="checkbox"/> Discrepancies found<br><input type="checkbox"/> Corrective actions completed<br><input type="checkbox"/> PAT complete, to the satisfaction of the Owner |          |                |              |                   |      |

**END OF SECTION**