

City Of Seattle
Seattle Public Utilities
Specification For
East Montlake PS and FM Upgrade
PW# 2019-051
Addendum No. 1

12-12-2019

To Plan holders:

The attached Addendum No. 1 modifies the Contract documents for East Montlake PS and FM Upgrade.

Every Bidder shall acknowledge receipt of Addendum No. 1 by filling in the appropriate space in the Bid Form.

Mark Fredrickson

Mark Fredrickson, P.E.
Public Works Contracts Supervisor
SPU Project Controls Division

1.01 ADDENDUM NO. 1

- A. Addendum No. 1 for "East Montlake PS and FM Upgrade" issued on December 12th, 2019 modifies the Contract documents.
- B. The Date of Bid Opening **is not** changed by this Addendum.
- C. Project Manual Volume 1 & 2 – Table of Contents
 - 1. Delete the entry for **Section 03 31 32 – Concrete Finish Repair** from the Table of Contents
- D. Section 01 75 00 – Commissioning
 - 1. Delete this Section in its entirety, and replace it with the attached new **Section 01 75 00 – Commissioning** labeled "Addendum No. 1, Attachment 1".

(Note to Bidders: the attached replacement Section 01 75 00 – Commissioning includes the following additional documents: Commissioning Plan, Pre-Commissioning Checklist, Equipment Acceptance Test Checklist, System Acceptance Test Checklist, and Operational Acceptance Test Checklist.)
- E. Section 03 31 31 – Concrete Mixing, Placing, Jointing, and Curing
 - 1. Delete Paragraph 3.05.A in its entirety and replace it with the following:
 - A. See **Section 03 30 00 – Cast-in-Place Concrete**.
- F. Section 03 31 32 – Concrete Finishing and Repair of Surface Defects
 - 1. Delete this Section in its entirety.
- G. Section 09 90 00 – Painting and Coating
 - 1. Delete subsection 3.02.G.1 in its entirety, and replace it with the following:
 - 1. Remove all loose or flaking paint using hand scraping or wire brushing.
- H. Attachments
 - 1. **Section 01 75 00 - Commissioning**

End of Addendum No. 1

Addendum No. 1, Attachment 1

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes general requirements for the commissioning process:
1. Owner will be the Commissioning Authority and plan, schedule and coordinate the commissioning process.
 2. Contractor shall cooperate and collaborate with the Owner in the commissioning process.
 3. The primary objective of commissioning is to affect an orderly handover of the completed pump station and force main, guaranteeing its operability in terms of performance, reliability, safety, and information traceability. Commissioning will assure facility operation at Wastewater Pump Station 13.
 4. Commissioning is intended to achieve the following specific objectives according to the contract documents.
 - a. Verify that all applicable equipment and systems are installed in accordance with the contract documents and manufacturer's recommendations.
 - b. Verify and document proper integrated performance of equipment and systems, including the SPU SCADA system.
 - c. Verify that Operations and Maintenance documentation is complete, and addresses the facility maintenance strategy and integration into SPU's asset management (Maximo) system.
 - d. Verify that all components requiring servicing can be accessed, serviced and removed without disturbing nearby components including piping, cabling, wiring or ducting.
 - e. Verify that SPU's operating personnel are adequately trained to enable them to operate, monitor, adjust, maintain, and repair facility systems in an effective manner.
 - f. Document the successful achievement of the commissioning objectives listed above.
 5. Commissioning activities shall be scheduled in a logical sequence, proceeding from installation and testing of individual equipment components to the implementation and testing of functional sub-systems and the overall facility/system as a whole.
- B. Related Sections: Sections include but are not necessarily limited to:
1. Division 00 - Procurement and Contracting Requirements
 2. Division 01 - General Requirements
 3. Division 23 - Ventilating: for commissioning of ventilation systems, assemblies, equipment and components, including balancing and testing
 4. Division 26 - Electrical: for commissioning of electrical systems, assemblies, equipment and components

Addendum No. 1, Attachment 1

5. Division 40 - Process Integration: for commissioning of instrumentation and controls including piping and valves.
 6. Division 43 - Process Gas and Liquid Handling, Purification and Storage Equipment: for commissioning of pumps
- C. Attachments: The following documents are included as attachments at the end of this Section:
1. The Commissioning Plan for use on this project is included at the end of this Section.
 2. A Pre-Commissioning Checklist for use on this project is included at the end of this Section.
 3. An Equipment Acceptance Testing (EAT) Checklist for use on this project is included at the end of this Section.
 4. A System Acceptance Testing (SAT) Checklist for use on this project is included at the end of this Section.
 5. An Operational Acceptance Testing (OAT) Checklist for use on this project is included at the end of this Section.

1.02 QUALITY ASSURANCE

- A. Contractor shall install testing equipment and apparatus with experienced personnel trained in the trades and professions required to assure competent workmanship.
- B. Contractor shall supervise the installation of specific equipment testing items specified to be accomplished by factory-trained installation specialists furnished or certified by the equipment manufacturers.

1.03 DEFINITIONS

- A. CxA: Commissioning Authority. Person appointed by SPU to lead, plan, schedule, and coordinate the commissioning team through all project phases to complete the commissioning process.
- B. Commissioning: The process of carrying out any and all the necessary inspection, testing and adjustments until the facility is ready and suitable for normal starting and running, and the running of the facility and equipment to verify and ensure operational capability to handle and control the necessary flows through system, including dry and wet weather flows. The commissioning process also includes the development and implementation of a Commissioning Plan, and the acceptance of the operational facility. Commissioning ensures that the facility operates as the Owner intended, and that Owner's personnel are prepared to operate and maintain its systems and equipment.
- C. Commissioning Plan: The plan that documents the organization, schedule, allocation of resources, roles and responsibilities, training plan and materials, testing requirements and procedures to ensure that all component systems perform interactively according to the design intent and the Owner's operational needs.
- D. Facility Start-up: The phase of commissioning during which the facility uses potable water and/or combined sewage for a pre determined period of continuous operation (i.e. simulating normal operating conditions) without major interruptions. During the start-up phase the facilities' mechanical, electrical, and plumbing systems are turned on, tested, and adjusted. Start-up may be accomplished in phases: 1) Testing all equipment

Addendum No. 1, Attachment 1

- signals, alarms, output devices, and communication devices to be certain that they are operating correctly; 2) Testing all mechanical and electrical systems; 3) Monitoring flows.
- E. Operating Context: The circumstances in which a physical asset or system is expected to operate. Refers to internal and external factors (e.g. environmental standards, safety hazards, repair time, spares etc.) affecting asset/system/equipment/facility operation. It is essential that everyone involved in the development of a maintenance program for any asset fully understands the operating context of that asset.
 - F. Reliability-centered Maintenance: A process used to determine what must be done to ensure that any physical asset continues to do what its users want to do in its present operating context.
 - G. Systems, Equipment, and Components: Where these terms are used together or separately, they mean systems, equipment, and components as constructed or installed.

1.04 COMMISSIONING TEAM

- A. General: Owner will perform the task of CxA to organize the commissioning team and plan as required to the requirements for the Project.
- B. Contractor Participants:
 - 1. Individuals as appointed by the Contractor having authority to act on behalf of the entity this individual represents to implement the commissioning process through coordinated action.
 - 2. Contractor's commissioning team members shall include, but not be limited to, Project superintendent, subcontractors, installers, suppliers, and specialists as requested by the CxA.
- C. Owner Participants:
 - 1. CxA: The CxA is the designated entity that will plan, schedule and coordinate the commissioning team to implement the commissioning process.
 - 2. Facility users, operations and maintenance personnel as designated by Owner.
 - 3. Designers (in-house and consultants) whose disciplines are affected by the commissioning process.

1.05 COMMISSIONING PLAN

- A. Detailed integrated schedule and/or flowchart showing dates and dependencies for the following activities and all other activities necessary for successful completion of testing and startup:
 - 1. Equipment testing, separately depicting individual pieces of equipment or groups of equipment that will be tested concurrently.
 - 2. Equipment and System Training for Owner's personnel.
 - 3. Final Owner's O&M Manual submittal.
 - 4. Pump testing.
 - 5. Wetwell, pipe and fittings, and maintenance hole leak testing.
 - 6. Instrumentation and Controls System Start-Up.

Addendum No. 1, Attachment 1

7. Instrumentation and Controls System Calibration.
 8. System Testing, depicting each System Test separately.
 9. Acceptance Testing.
 10. Acceptance Test Report preparation.
 11. Owner Review of Startup Test Report.
 12. Instrumentation & Controls System Commissioning.
- B. Mechanical equipment testing and startup procedures and checklist showing all mechanical equipment and the required factory and field testing, manufacturer's services, certifications, startup activities, spare part delivery, O&M Manuals, training and other submittals.
- C. Electrical equipment testing and startup procedures and checklist showing items to be tested, tests to be performed, O&M Manuals, training and other submittals.
- D. Schedule, procedures, checklists and sample test forms for instrumentation and control system testing, inspection, calibration, I&C system start-up and I&C system commissioning.
- E. Loop testing plan, checklist, and sample test forms.
- F. Schedule and written description for wetwell, pipe and fittings, and maintenance hole leak test. Indicate source of water.
- G. Description of equipment and controls to be tested as a System. Indicate source of water.
- H. Description of System Test(s) including equipment controls and instrumentation included in each test. Indicate source of water.
- I. Description of Acceptance Test, including schedule of activities and proposed operating parameters during Acceptance Test.
- J. List of activities that require coordination with the Owner, including Owner furnished supplies, shutdown of existing systems requests, and training of Owners' personnel.

1.06 SYSTEMS TO BE COMMISSIONED

- A. Systems to be commissioned shall include the following:
1. Mechanical
 2. Electrical
 3. Instrumentation and Control
 4. Telemetry/Communications
 5. Conveyance
 6. Flow Monitoring
 7. Ventilation
 8. Gas Monitoring/Detection
- B. Equipment to be commissioned shall include the following:
1. Valves

Addendum No. 1, Attachment 1

2. Sensors
3. Pumps
4. Motors
5. Ventilation
6. Fans
7. Ducting
8. Motor Starters
9. Panelboard
10. Generator and ATS
11. Hatches/Doors

1.07 ROLES AND RESPONSIBILITIES

A. Owner's Responsibility:

1. Owner will act as CxA and provide the project requirements to the Contractor for information and use:
 - a. Project requirements may include Basis of Design documentation prepared by Designers for use in the commissioning process.
2. Contractor shall coordinate water supply and pay for water for testing.
3. Owner will assign operation and maintenance personnel as appropriate to participate in the commissioning process.

B. Contractor's Responsibility:

1. Coordinate the construction of the control gate and Pump Station, and the installation and testing of equipment. Provide test equipment.
2. Cooperate and collaborate with CxA. Integrate and coordinate commissioning process activities with construction schedule. Review and approve CxA checklists.
3. Assign representatives with expertise and authority to participate in and perform commissioning process activities including, but not limited to, the following:
 - a. In collaboration with entity responsible for system and equipment installation, review and comment on test reports and recommend corrective actions for system and equipment installations.
4. Attend commissioning team meetings.
5. Review and approve of CxA provided commissioning process tests.
6. Coordinate the Contractor's Facility Startup Plan by developing test plans, forms, reports and procedures to be implemented by the subcontractors and equipment vendors.
7. Facilitate the coordination of the commissioning work required by the Commissioning Plan and Contract Documents. Ensure commissioning work is being included in the master project schedule.

Addendum No. 1, Attachment 1

8. Ensure all subcontractors, vendors and Manufacturer's Representatives and Testing Agents execute their commissioning responsibilities according to the Contract Documents, Commissioning Plan and Schedule.
 9. Ensure representatives of subcontractors and manufacturers are available for commissioning meetings when required.
 10. Complete a Manufacturers Field Service Report form for each piece of mechanical equipment and ensure compliance with the Contract Documents.
 11. Ensure all equipment and systems are properly maintained when operated during testing and commissioning.
 12. Ensure a manufacturer's representative is available during equipment Startup Testing activities as required by the Contract Documents.
 13. Ensure construction staff are available to address electrical and mechanical issues which arise during the commissioning process.
 14. Coordinate SPU equipment training process and required notifications to the RE.
 15. Ensure equipment O&M Manuals meet all contract document requirements to expedite the approval process.
 16. Ensure all spare parts and materials are delivered to SPU's representative and documented as required.
 17. Submit final test results, training material and other documentation to the CxA for inclusion into the Final Cx Report.
 18. Ensure as-built drawings are submitted to the design engineer monthly in order for record drawings to be completed and ready for distribution to SPU upon construction completion.
 19. Ensure a timely response and correction to issues occurring during the warranty period.
- C. CxA's Responsibilities:
1. Plan, schedule and coordinate the commissioning process.
 2. Provide the commissioning plan.
 3. Organize and lead the commissioning team; and organize the commissioning team meetings.
 4. Inform all parties on the status, integration, and performance of systems within the facility.
 5. Review the Project-specific checklists and commissioning test procedures prepared by the Contractor.
 6. Verify the execution of commissioning activities by random sampling, rate varying. This verification includes equipment submittals, construction checklists, training, O&M data, tests and test reports to verify compliance with Owner's project requirements.
 7. Create and maintain the Commissioning Deficiency Log throughout all project phases.

Addendum No. 1, Attachment 1

8. Initiate and lead the involvement of the facility operations personnel in the commissioning process, set standards, and coordinate training of operating personnel on each system.
9. Review and comment on the equipment O&M manual submittals.
10. Provide technical expertise to oversee and verify correction of deficiencies found in the commissioning process.
11. Assist with resolution of commissioning related disputes.

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

- A. Provide and use test equipment in accordance with equipment manufacturer's recommendations.
- B. All industry standard test equipment required for performing the specified tests shall be provided by the appropriate contractor and approved by the CxA. Any proprietary vendor specific test equipment or software shall be provided by that vendor or manufacturer.
- C. Any portable or hand held setup/calibration devices required to initialize the control system shall be made available to the control vendor (at no cost) to the CxA.
- D. The instrumentation used in the commissioning process shall meet the following standards:
 1. Be of sufficient quality and accuracy to test and/or measure system performance within the tolerances required.
 2. Be calibrated at the manufacturer's recommended intervals with the calibration tags permanently affixed to the instrument.
 3. Be maintained in good repair and operating condition throughout the duration of use on this project.

PART 3 - EXECUTION

3.01 CONTRACTOR LED EQUIPMENT STARTUP AND TESTING

- A. The following shall be completed by the Contractor before commencing the SPU directed Commissioning Program:
 1. Furnish all Technical Manual information required by the Contract Documents.
 2. Provide all safety equipment, emergency shower and eyewash units, fire extinguishers, gas detectors, protective guards and shields, emergency repair kits, safety chains, handrails, gratings, safety signs, spare parts, and valve and piping identification required by the Contract Documents. Devices and equipment shall be fully functional, adjusted, and tested.
 3. Manufacturer's certifications of proper installation have been accepted.
 4. Test and equipment including Leakage tests, mechanical tests, electrical tests, instrumentation and control tests, and all adjustments have been completed and approved by the Engineer.

Addendum No. 1, Attachment 1

5. Adjustment of the pumps, valves, position switches, level sensors, and other control devices to the setting determined by the Engineer or the equipment manufacturer.
 6. Functional verification of the individual interlocks between the field mounted devices and the motor control circuits, control circuits of controllers, and packaged system controls.
- B. Supplies: The Contractor shall furnish:
1. Fuel
 2. Oil
 3. Grease
 4. Other necessary materials not listed for the Owner to furnish
- C. Record of Equipment Testing and Startup: The Contractor shall maintain the following during all testing and startup and submit originals to Engineer prior to acceptance:
1. Lubrication and service records for each mechanical and electrical equipment.
 2. Hours of daily operation for each mechanical and electrical equipment.
 3. Equipment alignment and vibration measurement records.
 4. Logs of electrical measurements and testing logs.
 5. Instrumentation calibration and testing logs.
 6. Testing and validation of SCADA inputs, outputs, logic functions, status indications, and alarms. Contractor shall coordinate testing and validation by Engineer of Owner-provided equipment used for testing and startup.
 7. Factory and field equipment settings.
 8. Log of problems encountered and adjustments made.
 9. Other records, logs, and checklists as required by the Contract Documents.

3.02 SPU DIRECTED FACILITY COMMISSIONING

- A. After individual equipment items have been started, tested, calibrated, and certified as required by the Technical Specifications by the Contractor, SPU will lead the facility Commissioning program with support from the Contractor.
- B. SPU will follow the testing program identified in the Appendix to verify that all Contractor equipment is installed per contract and operates as intended.
- C. The SPU Commissioning program takes approximately:
1. Equipment Acceptance Testing: 2 Working Days
 2. Systems Acceptance Testing: 2 Working Days
 3. Control Center Acceptance Testing: 2 Working Days
 4. Operational Acceptance Testing: 7 Calendar Days
 5. These durations are approximate and can vary due to electrical, equipment, or other construction or installation issues.

Addendum No. 1, Attachment 1

- D. The Commissioning program demonstrates the manual and automatic modes of operation to verify proper control sequences, software interlocks, proper operation of software logic and controllers etc. System testing shall include the use of water or other process media, as applicable, to simulate the actual conditions of operation.
- E. Systems testing activities shall follow the detailed test procedures and checklists listed in the Commissioning Plan.
- F. Furnish the Engineer written notice confirming that the Contractor Led Equipment Startup and Testing is completed along with documentation of the Manufacturers Service forms and electrical testing reports prior to requesting SPU staff lead the facility Commissioning Program.
- G. Arrange for manufacturer's representatives to revisit the Site as often as necessary to correct malfunctions to the Engineer's satisfaction.
- H. Each piece of equipment and system will be tested individually and then for a continuous, seven (7) Day, twenty-four (24) hour/day period. If any system malfunctions during the test period, the item or equipment shall be repaired, and the test restarted at time zero with no credit given for elapsed time before the malfunction.

3.03 STARTUP AND TESTING REQUIREMENTS

- A. Defects in material or workmanship that appear shall be promptly corrected. Time lost for wiring corrections, control point settings, or other reasons that interrupt the test may, at the judgment of the Engineer, be cause for extending the test period an equal amount of time.
- B. SPU Lead Commissioning and acceptance testing shall not begin until leakage tests, instrumentation and control tests and adjustments, electrical tests and adjustments, and equipment field tests have been completed to the satisfaction of the Engineer.
- C. The Contractor shall furnish the services of manufacturer's representatives, if necessary, to correct equipment malfunctions.
- D. During acceptance testing, the Contractor shall lubricate and maintain equipment in accordance with manufacturer's recommendations, and clean or replace filter elements.

3.04 TRAINING

- A. SPU will organize two (2) four 4-hour training sessions for staff to discuss the overall design, functions, and operations of the facility for SPU staff.
 - 1. One training session will occur on-site while the other will occur at the SPU Operations and Control Center.
 - 2. Contractor vendors and staff shall attend both sessions.
 - 3. The Contractor may be required to provide additional equipment and system specific training, in addition to the 2, 4-hour session, as indicated in the Technical Specifications.
 - 4. The on-site training will occur after completion of Equipment Test Phase for the equipment for which training is being conducted, but no later than five (5) working days after System Test Phase begins.
 - 5. The in-office training session will occur during the Operational Acceptance Testing Phase.
- B. The trainings will include:

Addendum No. 1, Attachment 1

1. SPU Engineering will provide an overview of facility design requirements and operational requirements.
2. Contractor/Vendor will lead overviews and specific training on all equipment and systems by factory trained staff familiar with giving both classroom and hands-on instructions.
3. Training instructors: Be at class on time. Session beginning and end times to be coordinated with the Project Representative and to be indicated on the master schedule. Normal time lengths for class periods can vary, but brief rest breaks shall be scheduled and taken.
4. Organize training into separate maintenance and operation sessions and identify on schedule.
5. Plan for minimum class attendance of 12 people at each session and provide sufficient classroom materials, samples, and handouts for those in attendance.
6. Instructors to have a typed agenda and well prepared instruction material. The use of visual aids, e.g. films, pictures, and slides are recommended for use during the classroom training programs.
7. Provide Equipment required for presentation of films, slides and other visual aids.
8. Maintain a classroom training log including: instructors, topics, dates, time, and attendance.
9. Notify the Project Representative of the time of the training at least ten (10) working days prior to the day of the training.
10. Training sessions may be recorded by SPU staff.

END OF SECTION 01 75 00

CITY OF SEATTLE

Seattle
Public Utilities



IMPROVEMENT OF:

EAST MONTLAKE PS AND FM UPGRADE

COMMISSIONING PLAN

1.0	PURPOSE OF THE COMMISSIONING PLAN	3
2.0	PROJECT NARRATIVE	3
2.01	Background	3
2.02	Project Description	3
3.0	COMMISSIONING PROCESS	3
4.0	CONTACT INFORMATION	3
5.0	DEFINITIONS / ACRONYMS	4
6.0	SYSTEMS TO BE COMMISSIONED	8
7.0	ROLES AND RESPONSIBILITIES	8
7.1	All Team Members	8
7.2	Commissioning Authority (CxA)	8
7.3	SPU Construction Management Staff	9
7.4	General Contractor	9
7.5	SPU Project Manager	10
7.6	Design Engineers of Record	11
7.7	SPU Field Operations & Maintenance Staff	11
8.0	CONSTRUCTION PHASE	12
8.1	Commissioning Process Schedule	12
8.2	Commissioning Submittal Review	12
8.3	Commissioning Process Issues Resolution	13
8.4	Construction Checklists	14
8.5	Contractor's Facility Startup Plan	14
9.0	Facility Startup and Testing	15
9.1	Factory Acceptance Testing	15
9.2	Electrical Acceptance Test	16
9.3	Manufacturer's Field Services Form	16
9.4	Control Panels and Instrumentation	16
9.5	Equipment Startup	16
9.6	System Acceptance Testing (SAT)	18
9.7	Operational Acceptance Testing (OAT)	18
10.0	Vendor Supplied Equipment Training Plan (If Applicable)	19
11.0	Equipment O&M Documentation	20
12.0	Commissioning Meetings	20
12.1	Commissioning Scope Meeting	20
12.2	Process Integration and Controls Scope Meeting	21
12.3	Additional Meetings	21

12.4 Design Engineer Site Field Notes.....21
12.5 Commissioning Authority Site Field Notes21
13.0 Contractors Notice of Substantial Completion and Request for Final Project Inspection..... 21
14.0 Warranty 21
15.0 Stabilization Phase 22
16.0 Appendices 23

List of Tables

Table 4-1. Seattle Public Utilities Project Delivery Branch3
Table 4-2. Seattle Public Utilities Field Operations and Maintenance (FOM)4
Table 4-3. Design Engineers4
Table 4-4. General Contractor – TBD.....4
Table 4-5. Subcontractors and Manufacturer’s Representatives - Electrical.....4
Table 8-1. Commissioning Submittals Review 12

1.0 PURPOSE OF THE COMMISSIONING PLAN

The Commissioning Plan is the document that describes the commissioning process, commissioning team responsibilities, schedule for specific commissioning activities, and commissioning documents to ensure that all project systems perform according to the design intent and Seattle Public Utility's (SPU)'s operational needs with actual verification of performance.

2.0 PROJECT NARRATIVE

2.01 Background and Project Description

This Project consists of work to retrofit the existing East Montlake Pump Station 13.

3.0 COMMISSIONING PROCESS

The commissioning process starts at Options Analysis and continues through the completion of the Stabilization Phase.

The first phase of the process is to select the Commissioning Authority (CxA). For this project, the City of Seattle will utilize internal staff to perform the Commissioning Authority duties. The commissioning team includes key SPU participants including facility users, construction personnel and design personnel. The team also consists of design engineers and key Contractor personnel. The Contractor's commissioning team members shall include, but not be limited to the project manager, engineer, superintendent, General Contractor Commissioning Agent, subcontractors, installers, suppliers, and specialists as necessary.

The commissioning process carries out any and all inspections, testing and adjustments necessary until the facility is deemed ready and suitable for normal and emergency operations. The commissioning process also verifies and ensures operational capability to handle and control the necessary sewage flow through the system, including dry and wet weather flows. Commissioning ensures that the facility operates as SPU intended, and that SPU's personnel are prepared to operate and maintain the facility systems and equipment.

4.0 CONTACT INFORMATION

The following tables provide contact information for each of the key commissioning team members:

Table 4-1. Seattle Public Utilities Project Delivery Branch

NAME	TITLE	TELEPHONE	EMAIL
Grace Manzano	Project Manager	206.233.1534	grace.manzano@seattle.gov
Steve Colony	Construction Management Supervisor	206.255.6713	Steven.Colony@seattle.gov
TBD	Resident Engineer		
Erich Fiedler	Commissioning Authority	206.684.3648	Erich.Fiedler@seattle.gov

Table 4-2. Seattle Public Utilities Field Operations and Maintenance (FOM)

NAME	TITLE	TELEPHONE	EMAIL
Riley Lowthian	SCADA Electrical Engineer	206.615.1704	Riley.Lowthian@seattle.gov

Table 4-3. Design Engineers

NAME	TITLE	TELEPHONE	EMAIL
Young Kim	Project Engineer	206.684.5918	Young.Kim@seattle.gov
Tim Kim	Electrical Engineer	206.733.9133	Tim.Kim@seattle.gov
Carter Le	Electrical Designer	206.233.7150	Carter.Le@seattle.gov

Table 4-4. General Contractor

COMPANY NAME	CONTACT	TELEPHONE	EMAIL
TBD			

Table 4-5. Subcontractors and Manufacturer’s Representatives

NAME	TITLE	TELEPHONE	EMAIL
TBD			

5.0 DEFINITIONS / ACRONYMS

Commissioning: A systematic process of ensuring that all component systems perform interactively according to the design intent with actual verification of performance. It encompasses the traditionally separate functions of system documentation, equipment startup, testing, training and inspection. It includes making critical adjustments until the facility and SPU personnel are ready for normal and emergency operations.

Commissioning Authority (CxA): Person appointed by SPU to lead, plan, schedule, and coordinate the commissioning team through all project phases to complete the commissioning process.

SPU’s Commissioning Plan: The plan that documents the organization, schedule, allocation of resources, roles and responsibilities, training plan and materials, testing requirements and procedures to ensure that all component systems perform interactively according to the design intent and SPU’s operational needs.

Commissioning Progress Reports: Documents detailing completed commissioning activities and significant findings. The progress reports will be incorporated into the Commissioning Plan as an appendix.

Commissioning Report: Final report that records activities and test results of the commissioning process. Includes the Commissioning Progress Reports.

Commissioning Team: The group of individuals identified in the tables above, who are responsible for developing and implementing the commissioning process.

Contractor's Facility Startup Plan: The plan prepared by the contractor to outline and schedule the work that will be performed to meet the requirements of this contract documents. This includes the procedures which will be followed in the Equipment Acceptance Testing and Systems Acceptance Testing processes.

Control Center Acceptance Testing (CCAT): SPU specific testing (conducted by SPU staff) that verifies the signals and controls from the instruments/devices in the field up to the Operations Control Center's HMI. This includes signal verification to the controller in the field, alarms, ability for the operator to monitor or control the devices from the HMI screen in the OCC. After the successful completion of this test the Operation Control Center is ready to take over the responsibility of the site.

Design Engineers (A/E): The group of design firms that are the Engineers of Record for the project.

Equipment Acceptance Testing (EAT): Testing of individual components to assure proper installation. The testing confirms that the equipment operates according to project specifications and vendor equipment submittals. Normally, this test occurs with clean water and allows the equipment vendor to certify that the equipment was installed correctly. The Manufacturer's Field Service Report is provided in the contract documents as a certification record of proper installation and operation. Equipment Acceptance Testing must be complete before Systems Acceptance Testing can begin.

Equipment Operation & Maintenance (O&M) Manual: This includes the manufacturers' operations and maintenance manuals for each specific equipment/components installed. Each manual should provide normal and emergency operating procedures for the equipment supplied. The equipment O&M manuals must include a supplied and recommended spare parts list, a troubleshooting guide for common problems, detailed operating procedures for each subsystem during all modes of operation, manufacturer's maintenance requirements and schedule, and control information if the equipment is provided with a local control panel or control devices.

Facility Manual: A composite document that includes but is not limited to: Business Case, Basis of Design, Commissioning Plan, Commissioning Final Report,

Memorandum of Agreement (MOA's), the Facility Operating Plan, the Post Construction Monitoring Plan, Record Drawings and the Facility O&M Manual.

Facility O&M Manual: A composite document that includes the Operating Context, Vicinity Maps, Schematics, Process Flow Charts and Diagrams, and the Control Loop Diagram, as well as the Manufacturer's Equipment O&M Manuals and Catalog Cuts for each specific equipment/components installed, including a troubleshooting guide for common situations, detailed Normal and Emergency Operating Procedures for each sub-system during all modes of operation, the Maintenance Plan and Schedule, Spare Parts Lists, Equipment Warranties, and Equipment Training Material for each piece of equipment..

Facility Operating Plan (FOP): A document that is intended for the Control Center Operations use and provides detailed information about the facility monitoring and control requirements, includes alarm response protocol, roles and responsibility and detailed schematics. This document is developed and maintained by the Control Center and SOPA.

Factory Acceptance Testing (FAT): Testing of equipment at the supplier's facility to confirm equipment performance prior to shipment of the equipment to the job site. An example would be a pump test, or a control panel test. This test may require SPU's representative's presence or proper documentation depending on the requirements of the detailed equipment specification sections.

Field Operations and Maintenance Branch (FOM): Is a Branch within Seattle Public Utilities. FOM employees are responsible for the ongoing operations and maintenance of utility systems, making it possible for the city to deliver vital services to its customers.

General Contractor Commissioning Agent (GC CxA): Person designated by the General Contractor to work with the Commissioning Authority to oversee the commissioning process. The GC CxA is the go to person for the general contractor in regards to all commissioning activities required of the general contractor.

Maintenance Plan: A long-term plan, which identifies roles and responsibilities, job plans with specific tasks, and frequency of maintenance activities for all assets within a facility. The plan is created by SPU and is based on the Operating Context, manufacturers' recommendations, Reliability Centered Maintenance, SPU's maintenance strategy, personnel experience and/or Strategic Asset Management Plans.

Manufacturer's Field Service Report: This report documents that the equipment has been properly installed and is ready for operation. In addition, the report documents baseline conditions of motor amperage and voltage for each phase, vibration readings, rotation, alignment and all other specified tests to ensure that the equipment has been installed properly. The warranty period will not start until the final Manufacturer's Field Service report is submitted, acceptable operation of the equipment has been

demonstrated, and SPU has assumed control of the equipment or facilities. The affected equipment is identified in the individual equipment specifications.

Operating Context: The circumstances in which a physical asset or system is expected to operate throughout its life cycle. Refers to internal and external factors (e.g. environmental standards, safety hazards, repair time, spares etc.) affecting asset/system/equipment/facility operation.

Operational Acceptance Testing (OAT): Includes testing of all systems of the entire project for a specified time period, (e.g. 7 day 24 hours/day), including their interactions, to ensure they operate as designed and at performance standards as defined in the contract specifications. Successful completion of Systems Acceptance Testing is a prerequisite for this activity. Testing is conducted using the product (e.g. water, wastewater) and demonstrates operations in all control modes (Manual, Remote, and Automatic), under various conditions including emergency shut down and restart, and may include uninterrupted running of the equipment for a specified number of days.

Stabilization Phase: This phase occurs after successful Operational Acceptance Testing is complete and the facility is operated by SPU. It will verify the facility can be operated to meet the Facility Operating Plan. This phase permits SPU time to fine tune and monitor the facility operations to ensure the facility meets the project requirements as defined in the and Basis of Design, Contract Documents and the FOP. During this phase SPU also integrates the new facilities with other facilities to ensure coordinated operation within the system.

Facility Startup: Marks the start of testing required to successfully transition the facility from the Construction Phase to the Stabilization Phase.

Systems Acceptance Testing (SAT): This test verifies the proper operation and interaction of equipment sub-systems, ancillary systems, and SCADA control and logic. Each system shall be tested for a specified time period. If any system malfunctions during the test period, the item or equipment shall be repaired and the test restarted at time zero with no credit given for elapsed time before the malfunction. Normally, this test occurs with clean water. The Manufacturer's Field Service Report is provided in the Contract Documents as a certification record of proper installation and operation. This document must be signed by the Manufacturer's Representative prior to the beginning of the OAT. Equipment O&M manuals are submitted before completion of this phase. After successful completion of Systems Acceptance Testing, the project is ready for the Operational Acceptance Testing. SPU Representatives shall work with the contractor to develop the testing procedures for the SAT.

System Operations, Planning and Analysis (SOPA): SOPA is a work group within the FOM branch. SOPA's mission is to monitor and analyze the on-going performance of the drainage and wastewater systems, and to inform operations, maintenance, and engineering of activities that will result in optimizing the systems.

6.0 SYSTEMS TO BE COMMISSIONED

The equipment and systems within this project must be tested and commissioned per the Contract Documents. A variety of testing methods and processes must take place in order to prove the equipment and systems are ready to operate and meet the design intent. Successful completion of each of these tests must be documented in order to permit project close out. Refer to Specification Section 01 75 00 for a list of systems and equipment to be commissioned.

7.0 ROLES AND RESPONSIBILITIES

In order for the commissioning process to be effective each commissioning team member must understand his or her roles and responsibilities throughout each phase of the project.

7.1 All Team Members

1. Follow the Commissioning Plan and Contract Documents.
2. Attend an initial commissioning meeting and additional meetings, as necessary.

7.2 Commissioning Authority (CxA)

1. Leads the commissioning process from start to finish.
2. Organize and lead the commissioning team by scheduling meetings as needed, preparing meeting agendas and notes, timely notification to participants for each commissioning activity and following up on assigned duties.
3. Review and comment on the Basis of Design Report and the Operating Context.
4. Verify that the commissioning activities are clearly stated, where applicable, in all scopes of work.
5. Prepare and update the Commissioning Plan and the Commissioning Report with input from the commissioning team.
6. Review the Facility Manual for thoroughness and accuracy.
7. Review contractor provided Construction Checklists to ensure it meets the contract document requirements.
8. Assists the Resident Engineer (RE) to facilitate all required commissioning tests, demonstrations, and vendor provided training events.
9. Review the plans and specifications with respect to their completeness in all areas relating to the Commissioning Process.
10. Write or update the commissioning specification sections.
11. Create and maintain the Commissioning Deficiency Log throughout all project phases.

12. Review proposed vendor provided equipment training programs to verify that Field Operations and Maintenance (FOM) personnel will be ready to maintain and operate the facility, including emergency response, etc.
13. Review the Contractor's Facility Startup Plan and schedule of activities, recommend approval to the Resident Engineer (RE) and include the Startup Plan as an Appendix in the Commissioning Plan.
14. Coordinate SPU participation for testing and commissioning activities.
15. Witness and verify, the EAT, SAT and OAT testing as needed and recommend final acceptance to the RE.
16. Review and comment on the equipment O&M manual submittals.
17. Coordinate the commissioning team's activities with the RE.
18. Coordinate testing during the Stabilization Phase. Revise and resubmit the Commissioning Progress Report to the PM.
19. Prepare the final Commissioning Report and recommend acceptance of the facility to the PM.

7.3 SPU Construction Management Staff

1. Prepare and coordinate implementation of the commissioning process as detailed in the Contract Documents and the Commissioning Plan.
2. Remedy deficiencies identified by the Commissioning Authority during verification of the installation or testing.
3. Review and accept record documentation as required by the Contract Documents.
4. Review and comment on the final Commissioning Report.

7.4 General Contractor

1. Construction and Testing:
 - a. Provide a Contractor's Startup Plan that lists individual equipment and systems which provides a startup sequence demonstrating all operating requirements set forth in the contract documents. The Contractor's Facility Startup Plan will demonstrate all permissive, monitoring, control and alarm functions. The Contractor's Facility Startup Plan will be provided not less than 21 days prior to the planned initial equipment or system startup. The Contractor's Facility Startup Plan must meet the requirements of the contract documents.
 - b. Coordinates the Contractor's Facility Startup Plan by developing test plans, forms, reports and procedures to be implemented by the sub-contractors and equipment vendors.

- c. Facilitate the coordination of the commissioning work required by the Commissioning Plan and Contract Documents. Ensure commissioning work is being included in the master project schedule.
 - d. Ensure all subcontractors, vendors and Manufacturer's Representatives and Testing Agents execute their commissioning responsibilities according to the Contract Documents, Commissioning Plan and Schedule.
 - e. Ensure representatives of subcontractors and manufacturers are available for commissioning meetings when required.
 - f. Complete a Manufacturers Field Service Reports form for each piece of mechanical equipment and ensure compliance with the Contract Documents.
 - g. Ensure all equipment and systems are properly maintained when operated during testing and commissioning.
 - h. Ensure a manufacturer's representative is available during equipment Startup Testing activities as required by the Contract Documents.
 - i. Ensure construction staff are available to address electrical and mechanical issues which arise during the commissioning process.
 - j. Coordinate SPU equipment training process and required notifications to the RE.
 - k. Ensure equipment O&M Manuals meet all contract document requirements to expedite the approval process.
 - l. Ensure all spare parts and materials are delivered to SPU's representative and documented as required.
 - m. Submit final test results, training material and other documentation to the CxA for inclusion into the Final Cx Report.
 - n. Ensure re-line drawings are submitted to the Engineer monthly in order to be completed and ready for distribution to SPU upon construction completion.
2. Warranty Period:
- a. Ensure a timely response and correction to issues occurring during the warranty period.

7.5 SPU Project Manager

- 1. Respond to CxA's design submission review comments and other issues in a timely manner.

2. Participate in Contractor training sessions as detailed in the training program as needed.
3. Review equipment and system test procedures submitted by the Contractor as appropriate.
4. Review and comment on the final Commissioning Report.
5. Recommend final acceptance of the systems to SPU.

7.6 Design Engineers of Record

1. Prepare the Basis of Design and Contract Documents. Prepare design changes that include integration of the commissioning requirements and activities provided by the CxA. Review and incorporate the CxA's comments from submittal reviews into design changes as appropriate.
2. Develop the Control Loop Description
3. Specify and verify that the operation and maintenance of the systems and assemblies has been adequately detailed in the Construction Documents.
4. Review equipment and system test procedures submitted by the Contractor.
5. Review and comment on the CxA's periodic Commissioning Reports and Issues Log reports.
6. Review and comment on the final Commissioning Report.

7.7 SPU Field Operations & Maintenance Staff

1. SOPA is the lead for developing the following:
 - a. Operating Context
 - b. Facility Operating Plan
 - c. Stabilization Phase requirements
 - d. Post Construction Monitoring Plan
2. SCADA is responsible for conducting all PAC programming, troubleshooting and testing
3. LOB Representative is the lead for:
 - a. Ensuring appropriate FOM staff are available for training
 - b. Ensure appropriate staff are available for problem resolution, as needed
 - c. Developing the Maintenance Strategy
 - d. Developing the Maintenance Plan
 - e. Asset on-boarding

8.0 CONSTRUCTION PHASE

8.1 Commissioning Process Schedule

The schedule is a dynamic document that changes as the construction schedule changes.

The commissioning process is part of the construction schedule. In accordance with the contract documents all commissioning requirements must be complete, submitted documented, and accepted by SPU prior to project completion.

8.2 Commissioning Submittal Review

Understanding the systems and equipment being installed is critical to the commissioning process. The following submittals will be reviewed by the Commissioning Team:

Table 8-1. Commissioning Submittals Review

SPECIFICATION SECTION NUMBER	SPECIFICATION DESCRIPTION	COMMISSIONING REVIEW RESPONSIBILITY
01 75 00	Commissioning/Facility Start - Up: A. Master operation and maintenance training schedule. B. Notice of substantial completion and request for inspection. C. Equipment operation and maintenance manuals (see specifications section 01 77 19 for details).	A. CxA, RE, PM B. CxA, RE, A/E C. CxA, FOM Rep
26 05 00	Electrical: Basic Requirements: A. Acknowledgement that products are UL or ETL listed or are constructed utilizing UL or ETL recognized components	RE notify CxA once approved.
26 08 13	Acceptance Testing: A. Testing plan for electrical equipment and connection testing. B. Copies of continuity tests (prior to energizing equipment). C. Report including: project summary and pre-energization testing (within 2 weeks after successful field testing). D. Testing results	RE notify CxA once approved.

SPECIFICATION SECTION NUMBER	SPECIFICATION DESCRIPTION	COMMISSIONING REVIEW RESPONSIBILITY
40 05 57	<p>Electric Gate Actuators:</p> <p>A. Certification that equipment has been installed properly, has been initially started up, has been calibrated and/or adjusted as required, and is ready for operation.</p> <p>B. Certification for major equipment supports that equipment foundation design loads shown on the Drawings or specified have been compared to actual loads exhibited by equipment provided for this Project and that said design loadings are equal to or greater than the loads produced by the equipment provided.</p> <p>C. Provide three (3) bound final written reports documenting vibration monitoring and testing for specified equipment:</p> <ol style="list-style-type: none"> 1). Include the acceptance criteria of all equipment tested. 2). Provide individual tabbed sections for information associated with each piece of tested equipment. <p>I. Testing and monitoring reports.</p>	<p>A. CxA to receive a copy from RE</p> <p>B. RE notify CxA once approved.</p>
40 60 05	<p>Slide Gates:</p> <p>A. Verification that gates have been installed properly.</p> <p>B. Certifications - Installation Report and hydrostatic leak testing Report.</p>	CxA to receive a copy from RE
40 90 00 40 90 05 40 91 10	<p>Primary Elements and Transmitters and Magnetic Flow Meters:</p> <p>A. Parameter setting summary sheet(s).</p> <p>B. Certifications.</p> <p>C. Testing reports</p>	RE notify CxA once approved.

8.3 Commissioning Process Issues Resolution

If acceptable performance cannot be achieved by a piece of equipment or system, and if the deficiency is caused by an installation error by the Contractor, the necessary corrective measures shall be carried out by the Contractor to the satisfaction of the SPU

Resident Engineer. Once corrective measures have been completed, the equipment or system will be retested until acceptable performance is achieved:

- The General Contractor is allowed one retest witnessed by the CxA after the initial Equipment Acceptance Test (EAT).
- If acceptable performance is not achieved after the second test, the General Contractor is financially responsible at standard rates to reimburse SPU's representatives for the additional time taken to resolve the installation deficiency. All costs for additional testing due to installation errors may be borne by the General Contractor at SPU's discretion.
- If equipment and systems are installed in accordance with the design documents and subsequent testing and operation indicates the equipment or systems are deficient, then corrections will be required. This work will be completed under the direction of SPU's Resident Engineer with A/E, General Contractor, equipment supplier, GC, and CxA input. The SPU's Resident Engineer will have final jurisdiction on the necessary work to achieve performance.
- Corrections during EATs are prohibited to avoid consuming the time of testing personnel. Proceed with corrective action only if the failure is obvious and the corrective measures can be performed quickly. All corrective actions should be accomplished prior to the start of the EAT.
- When acceptable performance cannot be achieved by tested equipment and systems, the cause of the deficiency will be identified. Deficiencies will be compiled and tracked, and maintained by the CxA in the testing procedures documentation.

8.4 Testing Checklists

To track all construction requirements a Testing Checklist must be developed by the Commissioning Agent. An example of this checklist is found in the Appendix. This checklist provides an inventory of all equipment and processes to be commissioned at the facility. The checklist also shows all commissioning requirements prior to substantial completion.

8.5 Contractor's Facility Startup Plan

To maintain continuity throughout the facility startup process a Contractor's Facility Startup Plan must be provided by the General Contractor for review and approval by the RE. The Contractor's Facility Startup Plan is a complete outline and schedule showing dates and dependencies of the work that will be performed to meet the equipment Startup requirements of the Contract Documents.

The Contractor's Facility Startup Plan must be submitted for review not less than 21 days prior to the planned Startup of any piece of equipment or system. The plan shall address all operating requirements set forth in the Contract Documents.

The plan will provide at least the following details of the Startup process:

1. Provide a schedule for the following activities:
 - a. Equipment Installation
 - b. Manufacturer's Field Services (Equipment testing, separately depicting individual pieces of equipment or groups of equipment that will be tested concurrently)
 - c. Equipment Vendor Provided Operator Training
 - d. Submission of Equipment Operation and Maintenance Manuals
 - e. Gate leak testing
 - f. Factory Acceptance Testing
 - g. Instrumentation and Control System Calibration and Certification
 - h. Programmable Automatic Controller and Controller Testing
 - i. Owner Reviewed Startup Test Report
2. Provide equipment test procedures with test logs for each item of equipment and each system. Include testing of alarms, control circuits, capacities, speeds, flows, pressures, vibrations, sound levels, and other parameters as specified in the contract documents.
3. Provide summary of shutdown requirements for existing systems, which are necessary to complete Startup of new equipment, and systems, if applicable.
4. Revise and update Contractor's Facility Startup Plan based upon review comments, actual progress, or to accommodate changes in the sequence of activities.

9.0 Facility Startup and Testing

The following section explains the facility startup and testing processes which must be accomplished in order to ensure the commissioning effort is successful. Successful commissioning relies on all responsible parties doing their part and all phases of commissioning being documented.

Once individual pieces of equipment and systems are approved by the submittal process, the General Contractor will start to procure the accepted items. To ensure the equipment and systems meet the design intent some of these items may be required to go through factory testing as described in the specifications. This testing process may require the owner or A/E to be present during the testing process or that the test results be submitted to the RE through the submittal process. Once the testing results have been approved by the RE the equipment may be released to the project site.

9.1 Factory Acceptance Testing

Contractor is responsible for providing any Factory Test results as indicated in the specifications.

9.2 Electrical Acceptance Test

The requirements of the electrical acceptance test are shown in Specification Section 26 08 13 Acceptance Testing. All deficiencies reported in this test must be resolved prior to the start of the Operational Acceptance Test.

9.3 Manufacturer's Field Services Form

The Manufacturer's Field Services Form is used to ensure that the equipment and systems to be commissioned are accessible, utilities are complete, installed correctly and that start-up and acceptance testing can proceed without unnecessary delays. The forms are primarily static inspections and procedures to prepare the system for initial start-up (e.g. oil levels checked, fan belt tension, identification labels affixed, sensors calibrated, etc). The manufacturer or subcontractor shall provide assistance to the CxA in the development of the form specific to their equipment and components.

The Contractor is responsible to complete all work and correct any deficiencies to the satisfaction of the Engineer before proceeding to the Systems Acceptance Test. Any outstanding items and non-conformance issues must be clearly listed by the Contractor's Representative. The forms are completed and signed by the Manufacturer's Representative then returned to the CxA for review and endorsement. The Manufacturer's Representative, CxA and the Owners Representative must acknowledge the form for approval prior to equipment or system acceptance testing.

9.4 Control Panels, Instrumentation, and Owner Furnished Equipment

Coordination between the Contractor and Owner is required to ensure the installation and commissioning process control panels and instrumentation succeeds.

Once the instrumentation has been properly installed and calibrated in the field a point to point check of the instrument wiring occurs. This test ensures that all signals to and from the instruments are correct prior to hookup to the PAC. Instrumentation and panel certificates must be provided to the Resident Engineer to fulfill contract requirements.

9.5 Contractor's Equipment Startup:

1. Requirements for individual items of equipment are included in Specification Sections 2 through 46.
2. Provide a type written copy of Manufacturer's Field Service Report
 - a. At completion of equipment installation and manufacturer's functional testing, furnish a written report prepared and signed by Manufacturer's Authorized Representative, certifying equipment:
 - 1) Has been properly installed, adjusted, aligned, and lubricated.
 - 2) Is free of any stresses imposed by connecting piping or anchor bolts.
 - 3) Is suitable for satisfactory full-time operation under full load conditions.
 - 4) Operates within the allowable limits for vibration.

- 5) Controls, protective devices, instrumentation, and control panels furnished as part of the equipment package are properly installed, calibrated, and functioning.
 - 6) For equipment supplied with a local control panel, ensure control logic for startup, shutdown, sequencing, interlocks, and emergency shutdown have been tested and are properly functioning.
- b. Furnish written report prepared and signed by electrical and/or instrumentation subcontractor certifying:
- 1) Motor control logic that resides in motor control centers, control panels, and circuit boards furnished by the electrical and/or instrumentation subcontractor has been calibrated and tested and is properly operating.
 - 2) For equipment supplied with a local control panel, ensure control logic for equipment startup, shutdown, sequencing, interlocks and emergency shutdown has been tested and is properly operating.
- c. Co-sign the reports along with the manufacturer's representative and subcontractors.
- 1) Prepare the equipment so it will operate properly and safely and be ready to demonstrate functional integrity during the Demonstration Period.
 - 2) Perform Equipment Startup to extent possible without introducing product flow. *Test water required for any testing shall be supplied by SPU.*
 - 3) Introduce product flow (or approved product) to complete Equipment Startup for the equipment
 - 4) Procedures include but are not necessarily limited to the following:
- d. Test or check and correct deficiencies of:
- 1) Power, control, and monitoring circuits for continuity prior to connection to power source.
 - 2) Voltage of all circuits.
 - 3) Phase sequence.
 - 4) Cleanliness of connecting piping systems.
 - 5) Alignment of connected machinery.
 - 6) Lubrication.
 - 7) Valve orientation and position status for manual operating mode.
 - 8) Instrumentation and control signal generation, transmission, reception, and response. See Divisions 26, 27 and 40.
 - 9) Tagging and identification systems.
 - 10) All equipment: Proper connections, alignment, calibration and adjustment.

- e. Calibrate all safety equipment.
 - f. Manually rotate or move moving parts to assure freedom of movement.
 - g. Jog electric motors to verify proper rotation.
 - h. Perform other tests, checks, and activities required to make the equipment ready for Demonstration Period.
 - i. Documentation:
 - 1) Prepare a log showing each equipment item subject to this paragraph and listing what is to be accomplished during Equipment Startup. Provide a place for the Contractor to record date and person accomplishing required work. Submit completed document before requesting inspection for Substantial Completion certification.
3. Obtain certifications, without restrictions or qualifications, and deliver to Engineer:
 - a. Manufacturer's Field Service Reports.
 - b. Instrumentation Supplier's Instrumentation Installation Certificate.

9.6 Equipment Acceptance Testing (EAT)

Once the equipment has been installed, tested, and verified by the contractor, the Owner led EAT begins. Each piece of equipment will be tested in accordance with procedures listed in the Appendix to ensure it meets the requirements of the Contract Documents. The EAT is witnessed and approved by the Owner's Commissioning Authority.

9.7 System Acceptance Testing (SAT)

Once the EAT is completed the SAT begins. Each system will be tested in accordance with procedures listed in the Appendix to ensure it meets the requirements of the Contract Documents. The SAT is witnessed and approved by the Owner's Commissioning Authority.

9.8 Control Center Acceptance Testing (CCAT)

Once the SAT is completed the CCAT begins. Each system will be tested in accordance SPU SCADA prepared procedures to confirm facility operation, integration, and control from the SPU Operational Control Center (OCC). SPU will provide CADA techs, and all other staff necessary to facilitate this testing phase. The CCAT is also witnessed by the Commissioning Authority.

9.10 Operational Acceptance Testing (OAT)

The Operational Acceptance Testing occurs when all of the construction prerequisites and the Control Center Acceptance Testing have concluded and have been accepted by the SCAD, SPU RE, and Commissioning Authority. At this time the Contractor initiates process flow or other approved product (e.g. water, wastewater) through the facility and starts up and operates the facility, without exceeding specified downtime limitations, to prove the functional integrity of the mechanical and electrical equipment and the control interfaces of the respective equipment and components comprising the facility.

During this phase SPU shall lead hydraulic testing procedures, included in the Appendix, over a 7-Day testing period. These tests will demonstrate the functional integrity of the facility.

The duration of the OAT is seven consecutive 24-hour days without an interruption. During this period the Contractor will provide power, fuel, and other consumables for duration of test. Depending on conditions the duration of the OAT may be reduced by the RE with input from the Commissioning Team.

Immediately correct defects in material, workmanship, or equipment which became evident during the operational test. Repeat operational test when malfunctions or deficiencies cause shutdown or partial operation of the facility or results in performance that is less than specified. In the event an item of equipment cannot be tested continuously for seven days, provide information for an alternative test, or modify the seven day test period with approval from the RE.

SPU will provide operational personnel to provide process decisions affecting facility performance. SPU's assistance will be available only for process decisions. Contractor will perform all other functions including but not limited to equipment operation and maintenance until successful completion of the OAT.

SPU reserves the right to simulate operational variables, equipment failures, routine maintenance scenarios, etc., to verify the functional integrity of automatic and manual backup systems and alternate operating modes.

Time of beginning and ending any the OAT shall be agreed upon by Contractor, SPU, and Commissioning Authority in advance of initiating the OAT.

Throughout the OAT, the Contractor will provide knowledgeable personnel to answer SPU's questions, provide final field instruction on the systems and to respond to any system problems or failures which may occur.

Provide all labor, supervision, utilities, chemicals, maintenance, equipment, vehicles or any other item necessary to operate and demonstrate all systems being demonstrated.

10.0 Vendor Supplied Equipment Training Plan

The Commissioning Authority reviews the training plan provided by the General Contractor. The training plan will provide trainer contact information, a training syllabus and a copy of any training materials the trainer plans to utilize during the training session.

The training plan will include the following information separated by equipment type or system:

- Overview of how the system/equipment functions.
- Review O&M materials; including training manuals, systems operations manual, environmental control systems and relevant system documentation.
- Hands on demonstration of all normal maintenance procedures, adjustment, operation, safety requirements and all emergency shutdown and Startup procedures.

The approved Manufacturer's Equipment O&M manual shall be used as a reference guide in all training sessions.

The Training Plan will be stored in the Appendix.

11.0 Equipment O&M Documentation

The Contractor will provide the following documents to SPU in pdf format prior to the Physical Completion of the project. The documentation that is required by the Contract Documents to be provided before Substantial Completion will be given is as follows:

- Copy of the equipment manufacturer's installation and Startup check sheet if different from the Manufacturer's Field Service Report.
- Copy of all equipment Final Control Element Certification Sheets, Loop Check-out Sheets and Instrument Certification Sheets.
- Approved equipment O&M manuals as specified in the contract documents.
- A maintenance log for any equipment started and operated before final acceptance tests were accepted.
- If any software is utilized to configure an instrument, a copy of the configuration file must be made available to SPU in both electronic and hard copy format.
- Manufacturer's Field Service Reports for all equipment properly filled out and signed.
- Approved shop drawings not furnished within the equipment O&M manual.

12.0 Commissioning Meetings

The Commissioning Authority will coordinate and administer commissioning meetings periodically during the construction process to review the status of construction and commissioning work, verify testing schedules, and submittal status reports as required. Attendance by the Commissioning Team is required for commissioning meetings. Two weeks prior to Startup and Systems Acceptance Testing activities the Commissioning Authority will hold commissioning meetings weekly (or as needed) and throughout the completion of the commissioning process. The Commissioning Authority records, reproduces, and distributes copies of the meeting minutes before the next meeting to all participants.

12.1 Commissioning Scope Meeting

A commissioning scope meeting is planned for all Commissioning Team members to discuss each party's responsibilities. In attendance are the representatives of the SPU/PM, GC/CM, GC CxA, A/E and the mechanical, electrical, process I&C and specialty subs. The commissioning process is reviewed; management and reporting lines are determined, and the flow of documents will be discussed. The Commissioning Plan Draft is reviewed, commissioning process questions are addressed and each party's commissioning responsibilities are reiterated. The outcome of the meeting is an

increased understanding by all parties of the commissioning process and their respective responsibilities. After the meeting the Commissioning Plan will be updated.

12.2 Process Integration and Controls Scope Meeting

A controls integration meeting will be scheduled for the Commissioning Team to discuss the operating controls sequence for all facility automation systems that will be commissioned by the I&C sub contractor. The agenda for the meeting is to review equipment submittals with each operating sequence and develop a consensus that the agreed sequences meet the requirements of the Commissioning Team. Any process I&C scope changes will be documented through the project contract documentation process. The agreed sequences are submitted to the Engineer of Record for final approval.

12.3 Additional Meetings

The General Contractor, SPU's Representative, Design Engineers, or the GC CxA may request additional meetings for specific schedule or equipment coordination problems.

12.4 Design Engineer Site Field Notes

Throughout the project the engineering team will be making regular visits to the construction site. A copy of all engineering notes will be compiled and submitted to the RE.

12.5 Commissioning Authority Site Field Notes

As equipment and systems are installed the CxA will make regular visits to the construction site. The CxA will be looking for any issues that may arise which could cause the commissioning process to be delayed. During these visits the CxA will keep notes of those visits and submit them to the RE.

13.0 Contractors Notice of Substantial Completion and Request for Final Project Inspection

See details in Specification Section 01 77 19 Contract Closeout Requirements.

14.0 Warranty

Once the Contractor has received substantial completion of the project the system warranty period begins. The system warranty period lasts for 12 months. During this time SPU is responsible for the operations and maintenance of facility. During the 12 month period the Contractor is responsible to return to the facility and repair or replace any equipment not functioning as described in the contract documents.

It should be noted that the system warranty is not the same as an equipment warranty provided by the manufacturer. The equipment warranty may expire before or after the 12 month system warranty. When a piece of equipment fails before the system warranty has expired but after the manufacturer's warranty, the Contractor is still responsible for the equipment and will need to work directly with the manufacturer to solve this issue. If the equipment fails after the system warranty has expired but before the equipment manufacturer's warranty has expired, SPU will work directly with the manufacturer or their representative.

During the system warranty period, SPU personnel must follow the equipment manufacturer's recommended preventive maintenance procedures. The preventive maintenance procedures are found in the equipment O&M manuals. If these procedures are not followed the warranty may be voided.

At approximately 10 months into the warranty period the SPU personnel shall visit the project site to perform an inspection of the equipment and facilities. All deficiencies noted during this inspection will be forwarded to the Contractor for corrective action as outlined in the Contract Documents.

15.0 Stabilization Phase

The Stabilization Phase starts after substantial completion has been awarded to the Contractor. The Stabilization Phase permits SPU to test the system to ensure it meets the design intent. The duration of the stabilization test will be determined by the date of substantial completion. Stabilization testing procedures are currently being developed by the System Operations Planning and Analysis (SOPA) group.

Once the Stabilization Phase has ended, SPU personnel must start Post Construction Monitoring and report the performance of the facility to the Department of Ecology (DOE) and the Environmental Protection Agency (EPA). The performance monitoring procedures are currently being developed by the Line of Business Representative. Once the procedures are developed they can be found in the Facilities Manual.

16.0 Appendices

Acceptance Testing Procedures



PRE-COMMISSIONING CHECKLIST

SEATTLE PUBLIC UTILITIES		DATE:
PROJECT: EAST MONTLAKE PS AND FM UPGRADE	EQUIPMENT/SYSTEM: ALL EQUIPMENT/SYSTEMS	REPORT BY:

	ACTIVITY	DATE	BY	NOTES
REQUIRED ELECTRICAL / INSTRUMENTATION PRE-STARTUP INSPECTION				
<input type="checkbox"/>	Overall installation (visual inspection) acceptable			
<input type="checkbox"/>	DPD and SCL inspections complete			
<input type="checkbox"/>	Enclosures complete & free of damage			
<input type="checkbox"/>	Enclosures clean, free of debris, dust			
<input type="checkbox"/>	Equipment conforms to the approved shop drawings including dimensions, configuration, motor nameplate data, materials of construction etc.			
<input type="checkbox"/>	All labels, signs , tags are affixed			
<input type="checkbox"/>	Installation is free from sharp edges, burrs, trip hazards, “head knockers” & other safety problems			
<input type="checkbox"/>	Equipment anchoring, support & grouting complete			
<input type="checkbox"/>	Equipment foundation secure			
<input type="checkbox"/>	Enclosure ventilation free & clear			
<input type="checkbox"/>	All conduit fittings & conductor connections tightened			
<input type="checkbox"/>	Access (door, panel, enclosure, etc.) locking devices installed & operable			
<input type="checkbox"/>	UL/FM certification in place			
<input type="checkbox"/>	Cable insulation testing complete **			
<input type="checkbox"/>	Continuity checks complete **			
<input type="checkbox"/>	Power wiring complete			
<input type="checkbox"/>	Control wiring complete			
<input type="checkbox"/>	Raceways & devices continuously & adequately grounded per NEC & drawings.			
<input type="checkbox"/>	Ground resistance testing complete **			
<input type="checkbox"/>	Isolation switches, fuses ready			
<input type="checkbox"/>	Safety devices & overloads properly set as per relay (short circuit) study			
<input type="checkbox"/>	Component controls properly configured			
<input type="checkbox"/>	Vendor startup services complete **			
<input type="checkbox"/>	Interconnect drawings (vendor) up to date			



<input type="checkbox"/>	Manufacturer or vendor manuals available			
<input type="checkbox"/>	Arc flash report complete/approved			
<input type="checkbox"/>	Short Circuit report complete/approved			
<input type="checkbox"/>	Motor tested as per NETA ATS 7.15 **			
<input type="checkbox"/>	SCADA Panel program updated and logic for open/close, sequencing/interlocks properly setup and functioning			
<input type="checkbox"/>	Transformer test reports approved **			
<input type="checkbox"/>	Level instruments installed and level settings confirmed			

Notes:

** Attach



ACTIVITY	DATE	BY	NOTES	
REQUIRED MECHANICAL / PIPING PRE-STARTUP INSPECTION				
<input type="checkbox"/>	Visual inspection of installation acceptable			
<input type="checkbox"/>	All debris removed & equipment has been flushed/cleaned			
<input type="checkbox"/>	Installation is free from sharp edges, burrs, trip hazards, "head knockers" & other safety problems			
<input type="checkbox"/>	Equipment conforms to the approved shop drawings including dimensions, configuration, motor nameplate data, materials of construction etc.			
<input type="checkbox"/>	Equipment anchoring, support & grouting complete			
<input type="checkbox"/>	Equipment foundation secure			
<input type="checkbox"/>	Unused & mechanical/piping openings sealed			
<input type="checkbox"/>	Isolation, drain, vent valves installed & operable			
<input type="checkbox"/>	Manufacturer or vendor manuals available			
<input type="checkbox"/>	No strains are put on equipment by piping connections			
<input type="checkbox"/>	Bolt lengths are correct, have been torqued to manufacturer's recommendations			
<input type="checkbox"/>	Check initial fill of required lubricants & fluids (oil, grease, hydraulic fluid etc.)			
<input type="checkbox"/>	Hydrostatic pressure testing complete *			
<input type="checkbox"/>	Equipment/piping vents/lines installed			
<input type="checkbox"/>	Safety guard style acceptable & installed			
<input type="checkbox"/>	Device alignment complete *			
<input type="checkbox"/>	Safety devices installed			
<input type="checkbox"/>	Power wiring complete			
<input type="checkbox"/>	Control wiring complete			
<input type="checkbox"/>	Grounding complete			
<input type="checkbox"/>	Instrumentation installed & commissioned			
<input type="checkbox"/>	SCADA Panel program updated and logic for open/close, sequencing/interlocks properly setup and functioning			
<input type="checkbox"/>	Factory test reports approved *			



Notes:

*** Attach**



SEATTLE PUBLIC UTILITIES		DATE:
PROJECT: EAST MONTLAKE PS AND FM UPGRADE	EQUIPMENT/SYSTEM: ALL EQUIPMENT/SYSTEMS	REPORT BY:

APPROVAL

Equipment is installed and ready for commissioning. The components are ready to proceed with the Equipment Acceptance Test.

Resident Engineer _____

Date _____



CLIENT: SEATTLE PUBLIC UTILITIES		DATE:
PROJECT: PS 13 IMPROVEMENTS (EAST MONTLAKE PS AND FM UPGRADE)	SYSTEM: PUMP STATION - ALL EQUIPMENT	REPORT BY:

EQUIPMENT LIST (PS 13)		
EQUIPMENT DESCRIPTION	EQUIPMENT TAG	NOTES
<input type="checkbox"/> Service Cabinet		
<input type="checkbox"/> Generator Plug		
<input type="checkbox"/> Manual Transfer Switch	MTS-1310	
<input type="checkbox"/> SCL Meter Base		
<input type="checkbox"/> Motor Control Center	MCC-1310	480V Distribution Panel
<input type="checkbox"/> Phase Fail Relay and Junction Box	PFR-1300	
<input type="checkbox"/> VFDs (Motor Starters) 01/02		
<input type="checkbox"/> Motor Power Monitors 01/02	JI-1310/1320	
<input type="checkbox"/> Jog Forward Switches 01/02	HS-1310/1320	
<input type="checkbox"/> MELTRIC Disconnects 01/02/Bypass		
<input type="checkbox"/> Pump Motors 01/02		
<input type="checkbox"/> MCC Transformer		
<input type="checkbox"/> Low Voltage Electrical Panel		
<input type="checkbox"/> Pole Light		
<input type="checkbox"/> Dry Well Supply Fan	SF-1331	
<input type="checkbox"/> Dry Well Exhaust Fan	EF-1332	
<input type="checkbox"/> Wet Well Supply Fan	SF-1334	
<input type="checkbox"/> Wet Well Exhaust Fan	EF-1335	
<input type="checkbox"/> Dry Well and Wet Well Lights		
<input type="checkbox"/> Dry Well Sump Pump Receptacle		
<input type="checkbox"/> Dry Well Receptacles		
<input type="checkbox"/> CT Switches and Junction Box		
<input type="checkbox"/> Dry Well Flood Switch	LSHH-1306	
<input type="checkbox"/> Dry Well Low Air Flow Switch (Exhaust)	FSL-1332	
<input type="checkbox"/> Dry Well Low Air Flow Switch (Supply)	FSL-1331	
<input type="checkbox"/> Ventilation Indicator Panel / Strobe Lights	YS-1390	
<input type="checkbox"/> Magnetic Flow Meter	FE/FIT 1342	



<input type="checkbox"/>	Gas Detector Panel (Instrument, transmitter, pump)	AIT/AE-1305 SP-1305	
<input type="checkbox"/>	Intrinsically Safe Enclosure		
<input type="checkbox"/>	Wet Well Pressure Transducers (2)	PT/PE-1301	
<input type="checkbox"/>	Wet Well Float Switches (2)	LSH-1302 LSHH-1303	
<input type="checkbox"/>	Pump 1	P-1310	
<input type="checkbox"/>	Pump 2	P-1320	
<input type="checkbox"/>	Dry Well Sump Pump	P-1351	
<input type="checkbox"/>	Gate Valve 1: Pump 1 Suction	GV-13##	
<input type="checkbox"/>	Gate Valve 2: Pump 2 Suction	GV-13##	
<input type="checkbox"/>	Gate Valve 3: Pump 1 Discharge	GV-13##	
<input type="checkbox"/>	Gate Valve 4: Pump 2 Discharge	GV-13##	
<input type="checkbox"/>	Gate Valve 5: Dry Well Bypass Connection	GV-13##	
<input type="checkbox"/>	Gate Valve 6: Bypass Vault Entrance	GV-13##	
<input type="checkbox"/>	Gate Valve 7: Bypass Vault Exit	GV-13##	
<input type="checkbox"/>	Gate Valve 8: Bypass Vault Pigging/CCTV	GV-13##	
<input type="checkbox"/>	Gate Valve 9: Shelby St. Vault	GV-13##	
<input type="checkbox"/>	3-Way Plug Valve (Shelby St.)	PV-13##	
<input type="checkbox"/>	Check Valve 1: Pump 1 Discharge	CHV-13##	
<input type="checkbox"/>	Check Valve 2: Pump 2 Discharge	CHV-13##	
<input type="checkbox"/>	Check Valve 3: Dry Well Sump Pump Discharge	CHV-13##	
<input type="checkbox"/>	Check Valve 4: Bypass Vault Sump Pump Discharge	CHV-13##	
<input type="checkbox"/>	Network Interface Unit (NIU) and Ethernet Switch		
<input type="checkbox"/>	SCADA Panel / PAC	MCP-13##	
<input type="checkbox"/>	CSO Structure Pressure Transducer	PT/PE-1305	
<input type="checkbox"/>	CSO Structure Ultrasonic Level Transducer	LT/LE-1304	
<input type="checkbox"/>	Bypass Vault Flood Switch	LSHH-1307	
<input type="checkbox"/>	Bypass Vault Sump Pump	P-1352	
<input type="checkbox"/>	Wet Well Sluice Gate		
<input type="checkbox"/>	Wet Well Flap Gate		
<input type="checkbox"/>	Bypass Vault Access Hatch 01/02		
<input type="checkbox"/>	Wet Well Access Hatch		
<input type="checkbox"/>	Dry Well Access Hatch		
<input type="checkbox"/>	Intrusion Switches		
<input type="checkbox"/>	Bypass Vault		
<input type="checkbox"/>	Shelby St. Vault		MH 013-027



EQUIPMENT ACCEPTANCE TESTING (EAT)

<input type="checkbox"/>	Shelby St. Vault Drain		
<input type="checkbox"/>	Air Release Valves (Shelby St.)	ARV-13##	Only for HDD force main



EQUIPMENT ACCEPTANCE TESTING (EAT)

GROUNDS

SERVICE CABINET			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify installation fit and tolerances		
<input type="checkbox"/>	Verify Doors open, close, and seal		
<input type="checkbox"/>	Verify penetrations sealed per plan		
<input type="checkbox"/>	Verify SCL meter and meter base installation		
<input type="checkbox"/>	Verify generator plug connection installed		
<input type="checkbox"/>	Engage Manual Transfer Switch to confirm power drop (x3)	MTS-1310	

LIGHTING AND RECEPTACLES			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify pole light installation and function		

CSO STRUCTURE

CSO STRUCTURE PRESSURE TRANSDUCER (PE/PT 1305)			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify installation fit and tolerances		
<input type="checkbox"/>	Verify Manufacturer's services performed		
<input type="checkbox"/>	Verify offsets programmed into SCADA		
<input type="checkbox"/>	Verify bench calibration information input into SCADA		
<input type="checkbox"/>	Verify depth in channel and compare reading to level from transducer		
<input type="checkbox"/>	Simulate transducer fault and verify alarm indication on HMI		
<input type="checkbox"/>	Simulate transducer out of range alarm and verify alarm indication on HMI		

CSO STRUCTURE ULTRASONIC LEVEL TRANSDUCER (LE/LT 1304)			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify installation fit and tolerances		
<input type="checkbox"/>	Verify Manufacturer's services performed		
<input type="checkbox"/>	Verify offsets and range programmed into SCADA		
<input type="checkbox"/>	Verify bench calibration information input into SCADA		



<input type="checkbox"/>	Verify depth in channel and compare reading to level from transducer		
<input type="checkbox"/>	Simulate transducer fault and verify alarm indication on HMI		
<input type="checkbox"/>	Simulate transducer out of range alarm and verify alarm indication on HMI		

INFLOW STRUCTURE

INFLOW STRUCTURE (MH 031-381) WEIR PLATE			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify installation and confirm set to correct elevation (From SPU survey)		

WET WELL

WET WELL ACCESS HATCH			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Open and close wet well access hatch 3 times		
<input type="checkbox"/>	Verify wet well hatch installation fit and tolerances		
<input type="checkbox"/>	Verify wet well hatch spring assist and gas shock functionality		
<input type="checkbox"/>	Verify wet well hatch drain plumbed and routed per plan		

LIGHTING AND RECEPTACLES			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify lights in wet well and verify seal-offs		

WET WELL FLOAT SWITCHES			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify SPU survey confirmed elevations		
<input type="checkbox"/>	Lift floats and confirm each float engages at designed elevation. (Typ 2)		
<input type="checkbox"/>	Verify indication on HMI. (Typ 2)		

WET WELL PRESSURE TRANSDUCER (PE/PT 1301)			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify installation fit and tolerances		
<input type="checkbox"/>	Verify Manufacturer's services performed		



<input type="checkbox"/>	Verify offsets programmed into SCADA		
<input type="checkbox"/>	Verify bench calibration information input into SCADA	1	
<input type="checkbox"/>	Verify depth in channel and compare reading to level from transducer		
<input type="checkbox"/>	Simulate transducer fault and verify alarm indication on HMI	1	
<input type="checkbox"/>	Simulate transducer out of range alarm and verify alarm indication on HMI	1	

WET WELL VALVES		
ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/> Verify installation fit and tolerances (Check grouting, bolts torqued, alignment, etc.)		
<input type="checkbox"/> Sluice Gate: Open and close gate minimum 3 times.		
<input type="checkbox"/> Sluice Gate: Verify seal and water tightness		
<input type="checkbox"/> Sluice Gate: Verify stem and stem guide spacing and alignment		
<input type="checkbox"/> Flap Gate: Open and close flap minimum 3 times.		
<input type="checkbox"/> Flap Gate: Verify seal and water tightness		

DRY WELL

DRY WELL ACCESS HATCH		
ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/> Open and close hatch 3 times		
<input type="checkbox"/> Verify installation fit and tolerances		
<input type="checkbox"/> Verify spring assist and gas shock functionality		
<input type="checkbox"/> Verify drain plumbed and routed per plan		

PUMPS, MOTORS		
ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/> Verify wet well free of construction debris		
<input type="checkbox"/> Verify Pump 01 installation fit and tolerances	P-1310	
<input type="checkbox"/> Verify Pump 02 installation fit and tolerances	P-1320	
<input type="checkbox"/> Check piping to make sure there are no leaks in the system	P-1310 P-1320	
<input type="checkbox"/> Engage jog switch and verify pump operation		



<input type="checkbox"/>	Verify functionality of HOA switch		
<input type="checkbox"/>	Bump motor to check rotation		
<input type="checkbox"/>	Verify rotating parts turn freely by hand		
<input type="checkbox"/>	Ensure pump is primed and no air pockets are present		
<input type="checkbox"/>	Verify Meltric plug wiring and terminations per plan		
<input type="checkbox"/>	Verify Meltric plug operations (Plug and unplug 3 times)		
<input type="checkbox"/>	Verify pump running indication on HMI		

VALVES			
ACTIVITY		EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify installation fit and tolerances of pump suction and discharge valves (Check grouting, bolts torqued, alignment, etc.)		
<input type="checkbox"/>	Check Valve 1: Open and close flap minimum 3 times.		
<input type="checkbox"/>	Check Valve 2: Open and close flap minimum 3 times.		
<input type="checkbox"/>	Gate Valve 1: Open and close Gate Valve minimum 3 times.		
<input type="checkbox"/>	Gate Valve 2: Open and close Gate Valve minimum 3 times.		
<input type="checkbox"/>	Gate Valve 3: Open and close Gate Valve minimum 3 times.		
<input type="checkbox"/>	Gate Valve 4: Open and close Gate Valve minimum 3 times.		
<input type="checkbox"/>	Gate Valve 5: Open and close Gate Valve minimum 3 times.		

MOTOR CONTROL CENTER (MCC-1310)			
ACTIVITY		EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	MCC Panel: Verify installation fit and tolerances	MCC-1310	
<input type="checkbox"/>	Pump 01/02 Power Monitor: Verify installation and calibration		
<input type="checkbox"/>	Pump 01/02 Power Monitor: Verify Manufacturer's services performed		
<input type="checkbox"/>	Pump 01/02 Power Monitor: Verify amperage, voltage, and frequency indications		
<input type="checkbox"/>	Pump 01/02 VFD: Verify installation per plan		
<input type="checkbox"/>	Pump 01/02 VFD: Verify Manufacturer's services performed		
<input type="checkbox"/>	Pump 01/02 VFD: Verify default program is to shut off when no input is detected		



<input type="checkbox"/>	Verify VFD operation follows level control mode per documentation		
<input type="checkbox"/>	Verify lead pump alternates between Pump 01 and Pump 02		
<input type="checkbox"/>	Trigger phase fail condition and verify phase fail relay (including motor power shutoff and alarm on HMI)		
<input type="checkbox"/>	Remove phase fail condition and confirm phase fail relay reverses automatically		
<input type="checkbox"/>	MCC Transformer: Verify installation and power to low voltage panel		
<input type="checkbox"/>	Verify disconnects and breakers function across MCC		

LOW VOLTAGE ELECTRICAL PANEL			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify that all studies and Manufacturer's testing complete and documentation submitted	PNL-13XX	
<input type="checkbox"/>	Verify wiring and terminations per plan	PNL-13XX	
<input type="checkbox"/>	Manually exercise all switches, circuit breakers, and other operator mechanisms	PNL-13XX	
<input type="checkbox"/>	Energize panels and verify ready for operation	PNL-13XX	

CURRENT SWITCHES			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify electrical connections per contract		
<input type="checkbox"/>	Verify normally open operation for: <ul style="list-style-type: none"> - Sump Pump - Wet Well Supply Fan Running - Dry Well Supply Fan 2 Running - Dry Well Supply Fan Running - Wet Well Exhaust Fan Running - Dry Well Exhaust Fan Funning 		

INTRINSIC SAFETY BARRIER (JB-13##)			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify installation fit and tolerances		
<input type="checkbox"/>	Verify terminations torqued		
<input type="checkbox"/>	Verify enclosure sealed and gasket integrity		

LIGHTING AND RECEPTACLES			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify lights in dry well		



<input type="checkbox"/>	Verify dry well receptacles (plug into each and verify power)		
<input type="checkbox"/>	Verify sump pump receptacle		

VENTILATION SYSTEM			
ACTIVITY		EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify electrical connections per contract	SF-1331 EF-1332 FSL-1332 FSL-1331 SF-1334 EF-1335	
<input type="checkbox"/>	Verify Manufacturer's testing and balancing complete, and flow switch calibration complete and documentation submitted		
<input type="checkbox"/>	Run fans (Dry Well Supply, Dry Well Exhaust, Wet Well Supply, and Wet Well Exhaust) at normal operating speed for duration of testing		
<input type="checkbox"/>	Turn off Dry Well Supply fan and confirm flow switch engages and alarm beacon turns on	SF-1331 FSL-1331	
<input type="checkbox"/>	Turn off Dry Well Exhaust fan and confirm flow switch engages and alarm beacon turns on	EF-1332 FSL-1332	
<input type="checkbox"/>	Verify Ventilation Indicator Panel at entry presents appropriate signal	YS-1390	

DRY WELL FLOOD SWITCH			
ACTIVITY		EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify fit and tolerances		
<input type="checkbox"/>	Verify offset per plan		
<input type="checkbox"/>	Lift float and verify alarm indication on HMI		

DRY WELL SUMP PUMP			
ACTIVITY		EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify sump free of construction debris		
<input type="checkbox"/>	Verify installation of pump, discharge piping and grating per plan		
<input type="checkbox"/>	Check all piping and make sure there are no leaks in the system.		
<input type="checkbox"/>	Fill sump		
<input type="checkbox"/>	Lift float and cycle sump pump. Verify no backflow after shutoff. Min 2 times.		
<input type="checkbox"/>	Verify run indication on HMI.		
<input type="checkbox"/>	Verify installation of check valves and ball valve per plan		
<input type="checkbox"/>	Ball Valve: Open and close 3 times.		

EQUIPMENT ACCEPTANCE TESTING (EAT)

GAS DETECTOR PANEL			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Verify fit and tolerances		
<input type="checkbox"/>	Verify Gas Detector pre-programmed self-tests completed		
<input type="checkbox"/>	Verify Gas Detector calibration/verification test completed with test gas		

BYPASS VAULT

BYPASS VAULT ACCESS HATCHES			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Open and close each access hatch 3 times		
<input type="checkbox"/>	Verify hatch installation fit and tolerances		
<input type="checkbox"/>	Verify hatch spring assist and gas shock functionality		
<input type="checkbox"/>	Verify hatch drains plumbed and routed per plan		

BYPASS VAULT SUMP PUMP			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Lift sump pump float and cycle sump pump. Verify no backflow after shutoff. Min 2 times.		

BYPASS VAULT FLOOD SWITCH			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Flood switch: Verify SPU survey confirmed elevation		
<input type="checkbox"/>	Flood switch: Lift float and confirm it engages at designed elevation		
<input type="checkbox"/>	Verify flood indication on HMI		

VALVES			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/>	Gate Valve 6: Open and close Gate Valve minimum 3 times.		
<input type="checkbox"/>	Gate Valve 7: Open and close Gate Valve minimum 3 times.		
<input type="checkbox"/>	Gate Valve 8: Open and close Gate Valve minimum 3 times.		

EQUIPMENT ACCEPTANCE TESTING (EAT)

MAGNETIC FLOW METER		
ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/> Verify installation and alignment		
<input type="checkbox"/> Verify grounding and bonding completed		
<input type="checkbox"/> Verify Manufacturer's services completed		
<input type="checkbox"/> Verify meter calibrated and programmed and reading correct units on HMI		
<input type="checkbox"/> Verify HMI showing Actual Flow and Rolling Daily Totalized Flow		
<input type="checkbox"/> Force "Flow Meter Out of Range" alarm and verify HMI indication		
<input type="checkbox"/> Force "Flow Meter Fault" alarm and verify HMI indication		
<input type="checkbox"/> Perform draw-down test to verify Flow Meter readings. Take flow meter reading for a point in the middle of draw down test.		

E. SHELBY ST. VAULT

SHELBY STREET VAULT VALVES		
ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/> Verify Air Release Valves: Turn on pumps and confirm air release observed during pump operation		
<input type="checkbox"/> Gate Valve 9: Open and close Gate Valve minimum 3 times.		
<input type="checkbox"/> 3-Way Plug Valve: Rotate Plug Valve through each of three settings minimum 2 times.		

SHELBY STREET VAULT		
ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/> Verify Vault Drain installed per plan and primed		

DRY WELL - SCADA PANEL

SCADA PANEL / PAC (MCP-13##)		
ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
<input type="checkbox"/> Verify installation fit and tolerances		
<input type="checkbox"/> Verify Door opens, closes, and seals		



<input type="checkbox"/>	Verify penetrations sealed per plan		
<input type="checkbox"/>	Verify battery installed		
<input type="checkbox"/>	Verify SCADA program install and updated		
<input type="checkbox"/>	Verify communications from panel to OCC		
<input type="checkbox"/>	Verify cabinet intrusion switch indication on HMI. Open cabinet doors and verify alarm status indication; close doors and verify alarms clear.		
<input type="checkbox"/>	Verify installation of NIU and ethernet switch		
<input type="checkbox"/>	Verify network connection and communications between SCADA panel and OCC		
<input type="checkbox"/>	Verify SCADA pushed any program updates to SCADA panel		
<input type="checkbox"/>	Verify CSO Structure pressure and ultrasonic level indications on HMI (simulate fault condition and verify alarm indication)		
<input type="checkbox"/>	Verify CSO Structure pressure and ultrasonic transducer readings are close. Verify offset alarm by simulating offset condition.		
<input type="checkbox"/>	Verify Wet Well pressure level indication on HMI (simulate fault condition and verify alarm indication)		
<input type="checkbox"/>	Simulate wet well overflow alarm condition and verify alarm on HMI, then confirm that it clears		
<input type="checkbox"/>	Verify wet well level indication on HMI and simulate sensor fault and out of range alarms		
<input type="checkbox"/>	Trip wet well high-level float switch and verify alarm on HMI, then confirm that it clears		
<input type="checkbox"/>	Verify Dry Well Sump Pump running indication on HMI		
<input type="checkbox"/>	Simulate Dry Well flood condition and verify alarm on HMI		
<input type="checkbox"/>	Verify power monitor data is on HMI		
<input type="checkbox"/>	Verify VFD data is on HMI		
<input type="checkbox"/>	Simulate VFD fault on each VFD and confirm indication on HMI		
<input type="checkbox"/>	Run each pump and verify pump running indication on HMI		
<input type="checkbox"/>	Unplug pumps and verify disconnect status on HMI		
<input type="checkbox"/>	Alternate between each setting on HOA switch for VFDs and verify indication on HMI		
<input type="checkbox"/>	Verify flow indication and daily flow totals on HMI		
<input type="checkbox"/>	Simulate phase fail condition and verify alarm on HMI		
<input type="checkbox"/>	Simulate bypass vault flood condition and verify alarm on HMI, then confirm that it clears		
<input type="checkbox"/>	Disconnect Bypass Vault Sump Pump and verify indication on HMI		
<input type="checkbox"/>	Reconnect Bypass Vault Sump Pump and verify pump running indication on HMI		



<input type="checkbox"/>	Verify Wet Well Exhaust Fan running indication on HMI		
<input type="checkbox"/>	Verify Wet Well Supply Fan running indication on HMI		
<input type="checkbox"/>	Verify Dry Well Exhaust Fan running indication on HMI		
<input type="checkbox"/>	Turn off Dry Well Exhaust Fan, verify Exhaust Air Low Flow alarm, and verify indicator panel and alarm beacons turn on		
<input type="checkbox"/>	Verify Dry Well Supply Fan running indication on HMI		
<input type="checkbox"/>	Turn off Dry Well Supply Fan, verify Supply Air Low Flow alarm, and verify indicator panel and alarm beacons turn on.		
<input type="checkbox"/>	Verify Wet Well LEL level on HMI		
<input type="checkbox"/>	Simulate high level gas and verify LEL alarm on HMI		
<input type="checkbox"/>	Simulate LEL fault and verify indication on HMI		
<input type="checkbox"/>	Simulate LEL loss of flow and verify alarm indication		



EQUIPMENT ACCEPTANCE TESTING (EAT)

DRAW DOWN TEST

PUMP DRAW DOWN TESTING			
	ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
	Pump 1 Draw Down Test (Typ 2)	P-1310	
<input type="checkbox"/>	Fill Wet Well to 6.48' AFF / Elev 20.89'		
<input type="checkbox"/>	Close Influent valve		
<input type="checkbox"/>	Run Pump 1 from 6.48' AFF / Elev 20.89' to 3.34' AFF / Elev 17.75'		
<input type="checkbox"/>	Record time from pump start to pump shut off <ul style="list-style-type: none"> - Run 1 Total Time: - Run 2 Total Time: - Avg Total Time: - Operating volume: 2684 gal - Avg Q: 		
	Pump 2 Draw Down Test (Typ 2)	P-1320	
<input type="checkbox"/>	Fill Wet Well to 6.48' AFF / Elev 20.89'		
<input type="checkbox"/>	Close Influent valve		
<input type="checkbox"/>	Run Pump 1 from 6.48' AFF / Elev 20.89' to 3.34' AFF / Elev 17.75'		
<input type="checkbox"/>	Record flow rates at pump start and pump shut off and take average <ul style="list-style-type: none"> - Run 1 Total Time: - Run 2 Total Time: - Avg Total Time: - Operating volume: 2684 gal - Avg Q: 		
	Tandem Run Draw Down Test (Typ 2)	P-1310 P-1320	
<input type="checkbox"/>	Fill Wet Well to 6.48' AFF / Elev 20.89'		
<input type="checkbox"/>	Close Influent valve		
<input type="checkbox"/>	Run Pumps from 6.48' AFF / Elev 20.89' to 3.34' AFF / Elev 17.75'		
<input type="checkbox"/>	Record flow rates at pump start and pump shut off and take average <ul style="list-style-type: none"> - Run 1 Total Time: - Run 2 Total Time: - Operating volume: 2684 gal - Avg Total Time: 		
	LSH Timing Draw Down Test (Typ 2)	P-1310 P-1320 LSH-1302	
<input type="checkbox"/>	Fill Wet Well to 6.98' AFF / Elev 21.39'		
<input type="checkbox"/>	Close Influent valve		
<input type="checkbox"/>	Run both pumps from 6.98' AFF / Elev 21.39' to 3.34' AFF / Elev 17.75' <ul style="list-style-type: none"> - Run 1 Total Time: 		



EQUIPMENT ACCEPTANCE TESTING (EAT)

	- Run 2 Total Time: - Avg Total Time:		
	IDEC Relay Test		
<input type="checkbox"/>	Enter shortest drawdown test results to IDEC Smart Relay timer		
<input type="checkbox"/>	Simulate SCADA panel fail and conduct pump drawdown test in IDEC mode		



EQUIPMENT ACCEPTANCE TESTING (EAT)

SEATTLE PUBLIC UTILITIES		DATE:
PROJECT: EAST MONTLAKE PUMP STATION & FORCE MAIN UPGRADE	EQUIPMENT/SYSTEM: ALL EQUIPMENT	REPORT BY:

APPROVAL

Facility has passed the Equipment Acceptance Testing phase of commissioning and is ready for the Systems Acceptance Testing phase of commissioning.

CxA _____

Date _____



CLIENT: SEATTLE PUBLIC UTILITIES		DATE:
PROJECT: WASTEWATER PUMP STATION 13 UPGRADE	SYSTEM: PS 13	REPORT BY:

LOOP 100 – WASTEWATER PUMPING SYSTEM			
KEY ELEMENTS		EQUIPMENT TAG	NOTES
<input type="checkbox"/>	PS 13 Wet Well	n/a	
<input type="checkbox"/>	Level Transducer	PE/PT-1301	
<input type="checkbox"/>	Float Switches	LSH-1302 LSHH-1303	
<input type="checkbox"/>	Wastewater Pumps (Variable speed: 1,945 GPM)	P-1310 P-1320	
<input type="checkbox"/>	Wastewater Pump Discharge Pipes		
<input type="checkbox"/>	Wastewater Pump Discharge Force Main		
<input type="checkbox"/>	Discharge Check Valve	CHV-1307 CHV-1308	
<input type="checkbox"/>	Discharge Isolation Valve	GV-1309 GV-1310	
ACTIVITY		EQUIPMENT TAG	COMPLIANT / NOTES
Manual Control Test			
<input type="checkbox"/>	Turn Pump 1 HOA switch to HAND		
<input type="checkbox"/>	Engage Pump 1: Run from Lead Pump On Level to Pump Off Level - Flow Rate at Lead Pump On Level - Flow Rate at Pump Off Level		
<input type="checkbox"/>	Turn Pump 2 HOA switch to AUTO		
<input type="checkbox"/>	Engage Pump 2: Run from Lead Pump On Level to Pump Off Level - Flow Rate at Lead Pump On Level - Flow Rate at Pump Off Level		
Automatic Control Test			
<input type="checkbox"/>	Turn Pump 1 and 2 HOA switches to AUTO		
<input type="checkbox"/>	Run pumps through 3 fill/pump cycles		
<input type="checkbox"/>	Verify pumps switch between lead pumps		
<input type="checkbox"/>	During 4 th pump cycle turn lead pump HOA to OFF		
<input type="checkbox"/>	Verify lag pump starts and finishes pump down		



	PAC Fail Test		
<input type="checkbox"/>	Verify IDEC Smart Relay Timer Set		
<input type="checkbox"/>	Fill Wet Well to LSH level		
<input type="checkbox"/>	Simulate PAC fail		
<input type="checkbox"/>	Verify LSH triggers IDEC Smart Relay, calls both pumps to run, and runs pumps for programmed time		
	Alarm / OIU Indicators Test		
<input type="checkbox"/>	Verify Pumps in AUTO indication		
<input type="checkbox"/>	Verify Pumps in HAND indication		
<input type="checkbox"/>	OIU Auto/Manual indication		
<input type="checkbox"/>	Pump 1 and Pump 2 Running indication		
<input type="checkbox"/>	Pump 1 and Pump 2 Fail indication		
<input type="checkbox"/>	Wet Well Level Transducer Level indication		
<input type="checkbox"/>	Pump 1 and Pump 2 Fail to Start indication		
<input type="checkbox"/>	Pump 1 and Pump 2 Excessive Run indication		
<input type="checkbox"/>	Overflow (LSHH-1303) Alarm tripped indication		
<input type="checkbox"/>	Operator Set Points (set per contract)		

LOOP 200 – FACILITY VENTILATION SYSTEM			
KEY ELEMENTS		EQUIPMENT TAG	NOTES
<input type="checkbox"/>	Dry Well and Wet Well ducting and balancing dampers		
<input type="checkbox"/>	Dry Well Supply Fan	SF-1331	
<input type="checkbox"/>	Dry Well Exhaust Fan	EF-1332	
<input type="checkbox"/>	Wet Well Supply Fan	SF-1334	
<input type="checkbox"/>	Wet Well Exhaust Fan	EF-1335	
<input type="checkbox"/>	Dry Well Supply Flow Switch	FSL-1331	
<input type="checkbox"/>	Dry Well Exhaust Flow Switch	FSL-1332	
ACTIVITY		EQUIPMENT TAG	COMPLIANT / NOTES
	System Test		
<input type="checkbox"/>	Turn on all ventilation equipment		
<input type="checkbox"/>	Verify Run indication on all Fans		
<input type="checkbox"/>	Turn off each fan in sequence and verify fan indication “not running”		
<input type="checkbox"/>	Turn off Dry Well Supply and exhaust fans in	YS-1390	



	sequence and verify Low Flow Switch indication. And, verify that the “Go/No-Go” strobe engages		
<input type="checkbox"/>	Turn on all ventilation equipment		

LOOP 300 – WET WELL GAS DETECTION SYSTEM (LEL)			
KEY ELEMENTS		EQUIPMENT TAG	NOTES
<input type="checkbox"/>	Gas Detection Analyzer	AIT/AE-1305	
<input type="checkbox"/>	Gas Sample Pump	SP-1305	
ACTIVITY		EQUIPMENT TAG	COMPLIANT / NOTES
	System Test		
<input type="checkbox"/>	Turn on all LEL equipment		
<input type="checkbox"/>	Verify level concentration of gases on OIU		
<input type="checkbox"/>	Simulate alarm condition on LEL and verify indication on SCADA Panel/OIU		
<input type="checkbox"/>	Simulate fault condition and verify fault indication on SCADA Panel/OIU		

LOOP 400 – SUMP PUMP			
KEY ELEMENTS		EQUIPMENT TAG	NOTES
<input type="checkbox"/>	Dry Well Sump Pump	P-1351	
<input type="checkbox"/>	Dry Well Flood Switch	LSHH-1306	
ACTIVITY		EQUIPMENT TAG	COMPLIANT / NOTES
	System Test		
<input type="checkbox"/>	Fill sump		
<input type="checkbox"/>	Lift float and pump out sump		
<input type="checkbox"/>	Verify check valve holds	CV-1301	Confirm equipment tag
<input type="checkbox"/>	Lift Dry Well Flood Switch and verify alarm indication on the SCADA Panel		

LOOPS 500, 600, 700 – CONTROL CABINET DC AND AC POWER			
KEY ELEMENTS		EQUIPMENT TAG	NOTES
<input type="checkbox"/>	AC Power Supply Monitor		J1-1310/1320
<input type="checkbox"/>	SCADA Battery Monitor	N/A	SCADA to verify alarms and indications



SYSTEMS ACCEPTANCE TESTING (SAT)

ACTIVITY			EQUIPMENT TAG	COMPLIANT / NOTES
System Test				
<input type="checkbox"/>	Simulate AC power fail and verify alarm indication on OIU			
<input type="checkbox"/>	DC power monitoring and alarms		N/A	SCADA to verify alarms and indications

LOOPS 800 – FLOW MONITORING			
KEY ELEMENTS		EQUIPMENT TAG	NOTES
<input type="checkbox"/>	Flow Meter	FE-1342	
ACTIVITY		EQUIPMENT TAG	COMPLIANT / NOTES
System Test			
<input type="checkbox"/>	Monitor that flow rates and rolling Daily Totalized Flow indicating on OIU		Majority of flow meter testing done in EAT
<input type="checkbox"/>	Simulate Flow Meter Out of Range Alarm, verify indication		
<input type="checkbox"/>	Simulate Flow Meter Fault, verify alarm indication		



SYSTEMS ACCEPTANCE TESTING (SAT)

SEATTLE PUBLIC UTILITIES		DATE:
PROJECT: WASTEWATER PUMP STATION 13 UPGRADE	EQUIPMENT/SYSTEM: PS 13 - ALL EQUIPMENT/SYSTEMS	REPORT BY:

APPROVAL

Facility has passed the Systems Acceptance Testing phase of commissioning and is ready for the 7-Day Operational Acceptance Testing phase of commissioning.

CxA _____

Date _____



CLIENT: SEATTLE PUBLIC UTILITIES		DATE:
PROJECT: WASTEWATER PUMP STATION 13 UPGRADE	SYSTEM: ALL SYSTEMS	REPORT BY:

OPERATION ACCEPTANCE TESTING PREREQUISITES		
ITEM	DATE COMPLIANT	NOTES
<input type="checkbox"/> Pre-Startup Testing Checklist Complete		
<input type="checkbox"/> Equipment Acceptance Testing Complete		
<input type="checkbox"/> Systems Acceptance Testing Complete		
<input type="checkbox"/> Control Center Acceptance Testing Complete		

Sign Off to Begin 7-Day Operational Testing

APPROVAL

System has been successfully tested and is ready to support performance of the facility's 7-day Operational Acceptance Testing.

Resident Engineer / CxA _____

Date _____

Sign Off on Successful Completion of 7-Day Operational Testing

APPROVAL

Pump Station 7-day Operational Acceptance Testing (OAT) has been successfully completed and is ready to be handed over to the Owner.

Resident Engineer _____

Date _____

CxA _____

Date _____