Seattle Public Utilities

EQUIPMENT ACCEPTANCE TESTING (EAT)

CLIENT: SEATTLE PUBLIC UTILITIES		DATE:
PROJECT: PS 73 IMPROVEMENTS	SYSTEM: PUMP STATION - ALL EQUIPMENT	REPORT BY:

Note to Designer: Revise Equipment Tags for project specific values

EQUIPMENT LIST		
EQUIPMENT DESCRIPTION	**EQUIPMENT TAG**	**NOTES**
☐ Service Cabinet	SCAB-7300	
☐ Meter and Meter Base	KWM-7300	
☐ 200A Service Disconnect	DS-7300	
☐ Automatic Transfer Switch	ATS-7300	
☐ Standby Generator (80 KW)	EG-7300	
☐ Motor Control Center	MCC-7300	
☐ Distribution Transformer	XFMR-7301	
☐ Distribution Panelboard	PNL-7301	
☐ 3-Phase Power Monitor Relay	3PH-RELAY	
☐ MELTRIC Disconnects	RCPT-7301 RCPT-7302	
☐ Jog Forward Switches	JSW-P1 JSW-P2	
☐ Pump Motors	MTR-7301 MTR-7302	
☐ Pumps	P-7301 P-7302	
☐ Motor Starters (Softstarters)	RVSS-7301 RVSS-7302	
☐ Dry Well Sump Pump	P-7300	
☐ Dry Well Supply Fan	SF-7310	
☐ Dry Well Exhaust Fan	EF-7311	
☐ Wet Well Supply Fan	SF-7320	
☐ Wet Well Exhaust Fan	EF-7321	
☐ Dry Well Low Air Flow Switch (Supply)	FSL-7310	
☐ Dry Well Low Air Flow Switch (Exhaust)	FSL-7311	
☐ Low Air Flow Strobe Lighting	QAL-7300	
☐ Current Switchs (Sump Pump, Dry Well Supply Fan, Wet Well Supply Fan, Dry Well Exhaust Fan, Wet Well Exhaust Fan)	IS-7300 IS-7310 IS-7320 IS-7311 IS-7321	
☐ Intrinsic Safety Barrier	JB-7301	

☐	Wet Well Level Switches (2)	LSH-7301 LSHH-7302	
☐	Dry Well Level Switch	LSHH-7303	
☐	Wet Well Pressure Transducers (2)	PE/PT-7301 PE/PT-7302	
☐	Magnetic Flow Meter	FE/FIT-7301	
☐	Pump 1 Check Valve	CHV-7301	
☐	Pump 2 Check Valve	CHV-7302	
☐	Sump Pump Check Valve	CHV-7300	
☐	Pump 1 Suction Gate Valve	GV-7301	
☐	Pump 2 Suction Gate Valve	GV-7302	
☐	Pump 1 Discharge Gate Valve	GV-7303	
☐	Pump 2 Discharge Gate Valve	GV-7304	
☐	Force Main Gate Valve	GV-7305	
☐	Bypass Gate Valve	GV-7306	
☐	Force Main Isolation Gate Valve	GV-7307	
☐	Gas Detector LEL	AIT/AE-7301	
☐	Gas Detector Petroleum	AIT/AE-7302	
☐	Wet/Dry Well and Emergency Lighting	LTG73-A LTG73-B LTG73-C	
☐	Dry Well Receptacles	Outlets	
☐	Network Interface Unit (Century Link CKT)	NIU-7300	
☐	SCADA Panel	MCP-7300	
☐	Draw Down Testing		

	TESTING PROCEDURES		
	SERVICE CABINET (SCAB-7300) METER AND METER BASE (KWM-7300) SERVICE DISCONNECT (DS-7300) AUTOMATIC TRANSFER SWITCH (ATS-7300) STANDBY GENERATOR (EG-7300)		
	ACTIVITY	**EQUIPMENT TAG**	**COMPLIANT / NOTES**
☐	Verify cabinet installation fit and tolerances	SCAB-7300	
☐	Verify cabinet doors open, close, and seal	SCAB-7300	
☐	Verify cabinet penetrations sealed per plan	SCAB-7300	
☐	Verify meter and meter base installed and energized and setup by SCL	KWM-7300	
☐	Verify disconnect install and cycle min 3 times to verify mains power disconnected	DS-7300	
☐	Verify transfer switch installed per plan and verify operability by cycling switch 3 times and verify mains power disrupted.	ATS-7300	
☐	Startup generator and verify system integrated and signals reading on HMI Note: Entire facility will be tested on generator power during System Testing phase.	EG-7300	

	TESTING PROCEDURES		
	MOTOR CONTROL CENTER (MCC-7300) DISTRIBUTION PANEL (PNL-7301) DISTRIBUTION PANEL TRANSFORMER (XFMR-7301) PHASE FAIL RELAY (3PH-RELAY)		
	ACTIVITY	**EQUIPMENT TAG**	**COMPLIANT / NOTES**
☐	Verify installation fit and tolerances	MCC-7300	
☐	Verify Doors open, close, and seal	MCC-7300	
☐	Verify penetrations sealed per plan	MCC-7300	
☐	Verify MCC, transformer, and distribution panel powered off mains power	MCC-7300 PNL-7301 XFMR-7301	
☐	Cycle all breaks min 3 times	MCC-7300 PNL-7301 XFMR-7301	
☐	Simulate / force phase fail condition and verify that relay trips, motors disconnect, and alarm indication on HMI. Verify relay reset when simulation/forcing removed.	3PH-RELAY	

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TESTING PROCEDURES		
MOTOR DISCONNECTS (RCPT-7301/02)		
ACTIVITY	**EQUIPMENT TAG**	**COMPLIANT / NOTES**
☐ Verify wiring and terminations per plan	RCPT-7301/02	
☐ Verify operations (Plug and unplug 3 times) and verify pump out of service indication when disconnected	RCPT-7301/02	

TESTING PROCEDURES		
JOG FORWARD SWITCHES (JSW-7301/02) MOTORS (MTR-7301/02) PUMPS (P-7301/02)		
ACTIVITY	**EQUIPMENT TAG**	**COMPLIANT / NOTES**
☐ Verify wet well free of construction debris	MTR-7301/02 P-7301/02 JSW-7301/02	
☐ Inspect pump installation to ensure that it is installed per manufacturers and Contract Document requirements (bolt torque, grout pad, piping connections are tight, etc.)	MTR-7301/02 P-7301/02 JSW-7301/02	
☐ Check all piping and make sure there are no leaks in the system.	MTR-7301/02 P-7301/02 JSW-7301/02	
☐ Check alignment of pump and driver	MTR-7301/02 P-7301/02 JSW-7301/02	
☐ Verify functionality of HOA switch	MTR-7301/02 P-7301/02 JSW-7301/02	
☐ "Bump" motor to check rotation with Jog Forward Switch	MTR-7301/02 P-7301/02 JSW-7301/02	
☐ Inspect all rotating parts. Should turn freely by hand	MTR-7301/02 P-7301/02 JSW-7301/02	
☐ Ensure pump is primed and that no air pockets are present within the pump	MTR-7301/02 P-7301/02 JSW-7301/02	
☐ Ensure all guards are in place per manufacturer's requirements	MTR-7301/02 P-7301/02 JSW-7301/02	
☐ Start motor and verify performance	MTR-7301/02 P-7301/02 JSW-7301/02	
☐ Re-check alignment between pump and driver	MTR-7301/02 P-7301/02 JSW-7301/02	

TESTING PROCEDURES		
MOTOR STARTERS (RVSS-7301/02)		
ACTIVITY	**EQUIPMENT TAG**	**COMPLIANT / NOTES**
☐ Verify that all studies and 3rd party testing complete and documentation submitted	RVSS-7301 RVSS-7302	
☐ Verify wiring and terminations per plan	RVSS-7301 RVSS-7302	
☐ Energize panels and verify ready for operation	RVSS-7301 RVSS-7302	
☐ Verify that Soft Starters programmed and manufacturers services completed	RVSS-7301 RVSS-7302	
☐ Start pump and verify soft starter ramp	RVSS-7301 RVSS-7302	

TESTING PROCEDURES		
SUMP PUMP (P-7300) SUMP PUMP CHECK VALVE (CHV-7300)		
ACTIVITY	**EQUIPMENT TAG**	**COMPLIANT / NOTES**
☐ Verify sump free of construction debris	P-7300	
☐ Inspect pump installation to ensure that it is installed per contract	P-7300	
☐ Check all piping and make sure there are no leaks in the system.	P-7300	
☐ Fill sump	P-7300	
☐ Verify functionality (Lift float and pump out sump) and verify that check valves hold backflow	P-7300 CHV-7300	

TESTING PROCEDURES		
VENTILATION SYSTEM DRY WELL SUPPLY FAN (SF-7310, DRY WELL EXHAUST FAN (EF-7311) WET WELL SUPPLY FAN (SF-7320), WET WELL EXHAUST FAN (EF-7321) DRY WELL LOW AIR FLOW SWITCHES (FSL-7310, FSL-7311) LOW AIR FLOW STROBES (QAL-7300)		
ACTIVITY	**EQUIPMENT TAG**	**COMPLIANT / NOTES**
☐ Verify electrical connections per contract	SF-7310 EF-7311 SF-7320 EF-7321 FSL-7310 FSL-7311 QAL-7300	
☐ Verify 3rd party testing and balancing complete, and flow switch calibration complete and documentation submitted	SF-7310 EF-7311 SF-7320	

		EF-7321	
		FSL-7310	
		FSL-7311	
		QAL-7300	
☐	Run fans (Dry Well Supply, Dry Well Exhaust, Wet Well Supply, and Wet Well Exhaust at normal operating speed for duration of testing)	SF-7310 EF-7311 SF-7320 EF-7321	
☐	Turn off Dry Well Supply fan and confirm flow switch engages and strobe engages	FSL-7310 QAL-7300	
☐	Turn off Dry Well Exhaust fan and confirm flow switch engages and strobe engages	FSL-7311 QAL-7300	

TESTING PROCEDURES		
CURRENT SWITCHES (IS-73XX)		
ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
☐ Verify electrical connections per contract	IS-7300 IS-7320 IS-7310 IS-7321 IS-7311	

☐ Verify normally open operation for:
  - Sump Pump
  - Wet Well Supply Fan Running
  - Dry Well Supply Fan Running
  - Wet Well Exhaust Fan Running
  - Dry Well Exhaust Fan Funning
	IS-7300 IS-7320 IS-7310 IS-7321 IS-7311	

TESTING PROCEDURES		
INSTRUMENTS STAFF GAGE INTRINSIC SAFETY BARRIER (JB-7301) LEVEL SWITCHES (LSH-7301, LSHH-7302, LSHH-7303) PRESSURE TRANSDUCERS (PE/PT-7301, PE/PT 7302) FLOW METER (FE/FIT-7301)		
ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
☐ Verify Staff Gage installed with zero reference at bottom of wet well sump	N/A	
☐ Verify instruments terminated though intrinsic safety barrier	JB-7301	
☐ Wet Well Level HI float trip set per contract (Lift and verify against staff gage)	LSH-7301	
☐ Wet Well Level HI HI (Overflow) float trip set per contract (Lift and verify against staff gage)	LSHH-7302	
☐ Dry Well Level HI HI (Flood) float trip set at 1.5" AFF (Lift and verify with tape)	LSHH-7303	

☐	Pressure Transducer 1 installed at 0.5' in wet well (Verify against staff gage) and calibration input into SCADA	PE/PT-7301	
☐	Pressure Transducer 2 installed at 0.5' in wet well (Verify against staff gage) and calibration input into SCADA	PE/PT-7302	
☐	Verify flow meter installed per contract	FE/FIT-7301	
☐	Operate pumping system and verify flow measured and indicated correctly	FE/FIT-7301	

TESTING PROCEDURES		
VALVES		
ACTIVITY	**EQUIPMENT TAG**	**COMPLIANT / NOTES**
☐ Pump 1 Suction Gate Valve (Open and close)	GV-7301	
☐ Pump 2 Suction Gate Valve (Open and close)	GV-7302	
☐ Pump 1 Discharge Gate Valve (Open and close)	GV-7303	
☐ Pump 2 Discharge Gate Valve (Open and close)	GV-7304	
☐ Force Main Gate Valve (Open and close)	GV-7305	
☐ Bypass Gate Valve (Open and close)	GV-7306	
☐ Bypass Camlock (Visually inspect)	N/A	
☐ Pump 1 Check Valve (Verify operations, open/close, during pumping)	CHV-7301	
☐ Pump 2 Check Valve (Verify operations, open/close, during pumping)	CHV-7302	
☐ Sump Pump Check Valve (Verify operations during pumping)	CHV-7300	

TESTING PROCEDURES		
LEL GAS DECTECTOR PANEL (AE/AIT-7301) PETROLEUM GAS DETECTOR PANEL (AE/AIT-7302)		
ACTIVITY	**EQUIPMENT TAG**	**COMPLIANT / NOTES**
☐ Verify LEL Gas Detector installed per contract		
☐ Verify LEL Gas Detector pre-programmed self-tests completed		
☐ Verify LEL Gas Detector calibration/verification test completed with test gas		
☐ Add LEL test gas to sample tube intake in wet well. Verify alarm indication.		
☐ Verify Petroleum Gas Detector installed per contract		
☐ Verify Petroleum Gas Detector pre-programmed self-tests completed		

☐	Verify Petroleum Gas Detector calibration/verification test completed with test gas		
☐	Add Petroleum test gas to sample tube intake in wet well. Verify alarm indication.		

TESTING PROCEDURES		
DRY WELL LIGHTING (LTG73-A) WET WELL LIGHTING (LTG73-B) EMERGENCY LIGHTING (LTG73-C) DRY WELL RECEPTACLES (Outlets)		
ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
☐ Verify dry well lighting fixtures installed per contract and function	LTG73-A	
☐ Verify wet well lighting fixtures installed per contract and function	LTG73-B	
☐ Verify emergency self-luminous signs installed per contract and function with lights off	LTG73-C	
☐ Verify receptacles installed per contract and test each with load	Outlets	

TESTING PROCEDURES		
NETWORK INTERFACE UNIT (NIU-7300) AND ETHERNET SWITCH		
ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
☐ Verify installation NIU and ethernet switch	NIU7300	
☐ Verify network connection and communications between SCADA panel and OCC	NIU7300	
☐ Verify SCADA pushed any program updates to SCADA panel.	NIU7300	

TESTING PROCEDURES		
SCADA PANEL (MCP-7300)		
ACTIVITY	EQUIPMENT TAG	COMPLIANT / NOTES
☐ Verify Wet Well Level HI float indication on HMI (Lift float)	MCP-7300	
☐ Verify Wet Well Level HI HI float indication on HMI (Lift float)	MCP-7300	
☐ Verify Wet Well Level 1 indication on HMI (Watch and verify pressure transducer level varies with wet well level)	MCP-7300	
☐ Verify Wet Well Level 2 indication on HMI (Watch and verify pressure transducer level varies with wet well level)	MCP-7300	

☐	Verify LEL level indication on HMI	MCP-7300	
☐	Verify LEL High level indication on HMI (test gas or simulate from unit)	MCP-7300	
☐	Verify LEL sensor fault indication on HMI (simulate from unit)	MCP-7300	
☐	Verify Sample Pump Loss of Flow indication on HMI (cover sample tube)	MCP-7300	
☐	Verify Petroleum level indication on HMI	MCP-7300	
☐	Verify Petroleum High level indication on HMI (test gas or simulate from unit)	MCP-7300	
☐	Verify Petroleum sensor fault indication on HMI (simulate from unit)	MCP-7300	
☐	Verify Dry Well HI level indication on HMI (lift float)	MCP-7300	
☐	Verify Pump 1 Motor Power indication on HMI	MCP-7300	
☐	Verify Pump 1 Overload indication on HMI (simulate)	MCP-7300	
☐	Verify Pump 1 Motor Disconnect indication on HMI (simulate)	MCP-7300	
☐	Verify Pump 1 Running indication on HMI	MCP-7300	
☐	Verify Pump 1 HOA indication on HMI	MCP-7300	??
☐	Verify Pump 2 Motor Power indication on HMI	MCP-7300	
☐	Verify Pump 2 Overload indication on HMI (simulate)	MCP-7300	
☐	Verify Pump 2 Motor Disconnect indication on HMI (simulate)	MCP-7300	
☐	Verify Pump 2 Running indication on HMI	MCP-7300	
☐	Verify Pump 2 HOA indication on HMI	MCP-7300	
☐	Verify Phase Fail indication on HMI (simulate)	MCP-7300	
☐	Verify Flow meter reading and flow totalization indication on HMI	MCP-7300	
☐	Verify Sump Pump run indication on HMI	MCP-7300	
☐	Verify Wet Well Supply Fan run indication on HMI	MCP-7300	
☐	Verify Dry Well Supply Fan run indication on HMI	MCP-7300	
☐	Verify Wet Well Exhaust Fan run indication on HMI	MCP-7300	
☐	Verify Dry Well Exhaust Fan run indication on HMI	MCP-7300	
☐	Verify ATS position indication	MCP-7300	
☐	Verify ATS emergency position indication	MCP-7300	
☐	Verify generator remote start indication	MCP-7300	
☐	Verify generator run indication	MCP-7300	
☐	Verify generator fail indication (simulate)	MCP-7300	
☐	Verify generator low fuel indication (simulate)	MCP-7300	

	Activity	Equipment Tag	Compliant / Notes
☐	Verify generator in auto indication	MCP-7300	
☐	Verify Dry Well Supply Fan Air Low Flow indication on HMI (simulate)	MCP-7300	
☐	Verify Dry Well Exhaust Fan Air Low Flow indication on HMI (simulate)	MCP-7300	
☐	Verify Replace SCADA battery alarm indication on HMI (simulate)	MCP-7300	

PUMP DRAW DOWN TESTING		
ACTIVITY	**EQUIPMENT TAG**	**COMPLIANT / NOTES**
Pump Draw Down Testing (Use Potable Water)	P-7301	
☐ Keep influent valve closed	P-7301	
☐ Fill Wet Well (Potable Water)	P-7301	
☐ Run Pump 1	P-7301	
☐ Record time of pump run and flow meter reading half way through pump run: - Total Time: - Q (Mid Point):	P-7301	
☐ Fill Wet Well (Potable Water)	P-7302	
☐ Run Pump 2	P-7302	
☐ Record time of pump run and flow meter reading half way through pump run: - Total Time: - Q (Mid Point):	P-7302	
☐ Fill Wet Well (Potable Water)	P-7301 P-7302	
☐ Run Pump 1 and 2 in Tandem		
☐ Record time of pump run from Hi Level Float to Pump Off Level. - Total Time:	P-7301 P-7302	

SEATTLE PUBLIC UTILITIES		DATE:
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APPROVAL

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

CxA _____

Date _____