



## Pump Station Startup Checklist

June 21, 2018

The following Pump Station Startup Checklist is intended to assist the contractor and clarify the Sacramento Area Sewer District (SASD) requirements for acceptance of newly constructed and reconstructed pump stations. SASD has divided the checklist into four phases, based upon the activities and personnel involved:


- **Phase 1 Pre-demonstration:** Phase 1 ensures that the contractor has installed the equipment correctly and each manufacturer has field-verified that their specific devices meet the criteria for the required warranties. The contractor completes this phase, the inspector observes this phase, and except for the specific Factory Acceptance Test (FAT) items, the design engineer confirms this phase. SASD has limited involvement.
- **Phase 2 Demonstration:** Phase 2 demonstrates that all of the equipment is installed and operates correctly as an integrated system, and prepares the station for the continuous 10-day test. The contractor and subcontractors are responsible for this phase.
- **Phase 3 Operational Testing and Startup:** Provides for a 10-day fresh water test, which mimics the stations realistic operation. The 10-day test is defined as 240 hours of continual operation without any system or component failure. The 10-day test also provides the appropriate break-in of the pumps, SCADA system verification, communications plumbing and mechanical systems, power systems, etc. This phase also provides station specific SASD training.


Successful completion of this phase transfers access and operational control to SASD. Upon successful completion of Phase 3, the contractor will schedule an appointment with SASD to transfer access, operations, and the acceptance of live flows into the new station. Schedule this transfer between Tuesday and Thursday *only*. In addition, schedule all SASD field inspections as required by each phase between Tuesday and Thursday.

- **Phase 4 Acceptance:** Phase 4 ensures that appropriate signatures, approvals, and documentation are provided to SASD.

**Notes:**


1. Note that each phase must be completed and signed off prior to the start of the next phase, including review and approval from SASD and the Engineer of Record (EOR) of all the required submittals, reports, etc. for each phase as listed.
2. Every item that is included on the checklist, for each phase, must be completed and accepted prior to advancing to the next phase. This may also include any site-specific items not on the checklist, but part of the design and plans. The Contractor, Design Engineer (or field representative), and Construction Management and Inspection Division (CMID) inspector need to initial as each item is completed. An SASD representative will initial in the SASD block when confirmed. SASD Project Manager will sign on the bottom line once the entire checklist has been completed, and the project will then move to the next phase.
3. Keep a project binder containing the original checklist, certificates, test results, and other pertinent information onsite and accessible to all SASD personnel at all times.

 <b>Facilities Startup: Phase 1 (Pre-Demonstration) Checklist</b>		Contractor	Design Engineer	Inspector	SASD		
<b>Page 1</b> (To be completed prior to start of Phase 2)							
Facility: _____ Design Engineer: _____ Inspector: _____							
Permits	Building Permit						
	Authority to construct						
	Permit to Operate						
	Easements submitted to SASD						
	Access Permit						
Field Installation/ Testing	All wiring terminated, tagged, and installed						
	Protective devices coordinated per study						
	Permanent utility power installed - Record number of phases and actual voltage						
	Permanent water service pressure tested and installed						
	All grounding systems installed and tested						
	All conduits tagged and installed						
	All pneumatic lines installed and tested						
	All equipment installed per approved seismic calculations						
	Generator and load bank installed						
	Site lighting installed - Permanent wiring and power with photocell adjusted						
	Switchboard, MCC, ATS, PLC, bubbler installed						
	Building or canopy, including lighting (interior and exterior) installed						
	All installed equipment labeled						
	Cathodic protection installed						
	Factory Acceptance Test: Witnessed	Switchboard					
		Automatic or manual transfer switch					
		Motor control center					
		PLC cabinet					
	Factory Acceptance Test: Non-witnessed	Pumps					
		Standby generator and load bank and transfer switch as applicable					
	On-site pump test by manufacturer						
	On-site hoist system test by manufacturer as applicable						
	Captive air bell leak test						
	Manufacturer's and NETA quality control on switchboard/MCC						
	Field Cable insulation tested						
	On-site generator and load bank test by manufacturer						
	Building Systems	HVAC					
		Plumbing					
		Electrical					
		Lighting					
Storm drain							

 <b>Facilities Startup: Phase 1 (Pre-Demonstration) Checklist</b>		Contractor	Design Engineer	Inspector	SASD	
<b>Page 2</b> (To be completed prior to start of Phase 2)						
Facility: _____ Design Engineer: _____ Inspector: _____						
Elevation Verification	Elevation:	<u>Plan</u>	<u>Actual</u>			
	Wet well floor					
	Inflow inlet invert					
	Captive air bell					
	Bubbler tube/pressure transducer					
	Pump inlet					
	Low manhole					
	Wet well rim					
Approved Submittals	Manufacturers statement of installation					
	Accurate As-builts, Full Size (reflects actual field conditions)	Loop drawings				
		Interconnect drawings				
		Mechanical site drawing				
		Civil site drawing				
		Electrical site drawing				
	Instrument calibration certifications					
	Protective devices coordination study by professional electrical engineer					
	Wire pull sheets and conduit schedule					
	Certified cable insulation resistance test results by a NETA testing firm					
	Certified grounding system test results by a NETA testing firm					
	Switchboard and MCC testing results by a NETA testing firm					
	Witnessed factory acceptance test on all control and electrical equipment ** Include FAT, PL					
	Factory acceptance test results for pump					
	Factory acceptance test results for generator					
	Certified on-site generator test, including noise level at property line: ___dB					
O&M manuals (include all approved submittals)						
Test procedures for Phase 2						
** FAT Punch List items, complete and certified prior to delivery to site						


- ATS: Automatic transfer switch
- dB: decibel
- FAT: Factory acceptance test
- HVAC: Heating, ventilation, and air conditioning
- MCC: Motor control center
- NETA: International Electrical Testing Association
- PL: Programming Language
- PLC: Programmable logic controller
- SASD: Sacramento Area Sewer District

SASD Project Manager Phase 1 Checklist Approval: \_\_\_\_\_

 <b>Facilities Startup: Phase 2 (Demonstration) Checklist</b>		Contractor	SASD	
(To be completed prior to start of Phase 3) All Phase 2 tests require two-week notice to SASD				
Facility: _____ Design Engineer: _____ Inspector: _____				
Remote Telemetry Unit	Verify installation and hookup, connectors and conduits			
	Antenna alignment (Contractor provides bucket truck)			
	Communications programming and testing			
	I/O test modem			
	Captive air bell calibration (attach calibration record)			
	5-point verification of the pressure transducer (attach calibration record)			
System Demo	Pumping Systems	Pull pumps and inspect		
		Guide rails		
		Crane as applicable		
		Inspect wet well		
		Clean water recirculated		
	Generator, load bank and fuel tank, transfer switch, SASD, 5 cycles			
	Switchboard/MCC, cabinet lighting, heaters, cooling fans, all functions			
	Instrumentation			
Crane, as applicable				
Security system/fire alarm including cabinets and other as applicable				
FM tested/approved, wet well to first accessible joint, off-site				
Assets Input	Service Request submitted for pumps, CARV, force main			
	Service Request submitted for station - new asset			
General Walkthrough	CMID Punch list Completed	Inspector's Initials		
		SASD Information Management Initials		
Approved Submittals	Test Plans for Phase 3 (mimicking operational conditions)			
	Final O&M manuals (3 copies with one copy at station) - provide O&M manual CAD files (MCC and SCADA)			
	Final As-built Drawings			


- CAD: Computer-aided design
- CARV: Combination air release valve
- I/O: Input/Output
- MCC: Motor control center
- O&M: Operations and Maintenance
- SASD: Sacramento Area Sewer District
- SCADA: Supervisory control and data acquisition

SASD Project Manager Phase 2 Checklist Approval: \_\_\_\_\_

 <b>Facilities Startup: Phase 3 (Operational Testing and Startup) Checklist</b> (To be completed prior to start of Phase 4)		Contractor	Inspector	SASD		
Facility: _____ Design Engineer: _____ Inspector: _____						
1. 10-Day Fresh Water Test	Level change start of test: WW/HL and LL alarms verified, 4 cycles each					
	Pump cycling					
	Daily checks AM and PM, Contractor and SASD, recorded					
	Holding tank, all hoses, fittings, valves, etc., secure, no leaks					
	Pull pumps, check oil, impeller, volute, etc. (at start and completion of test)					
	Run pumps off of generator power					
	Site specific	Site lighting, SCADA, alarms, etc., active				
		Site security: WW access secured/locked, fencing, gates				
		Cabinet heaters, fans, etc., record outside temperatures				
	SASD Phase 3 punchlist generated					
SASD Phase 3 punchlist completed						
Start date: _____ Stop date: _____						
2. Contractor Provided Training	Pumping Systems					
	Generator as applicable, load bank and fuel tank, transfer switch, identify phase at generator					
	Switchboard/MCC					
	Instrumentation					
	Crane as applicable					
	Security systems					
	Fire alarm					
	Other systems as applicable					
3. Station Cleanup	Remove re-circulation system, test plates, etc., after fresh water test					
	Remove all contractor equipment from site/asset area					
	SASD Operations and Maintenance Letter Issued (cc: M&O)					
	Final station cleanup					
	Final punchlist generated. Must be completed prior to Step 4					
4. Connect to Sewer	Verify downstream systems operational and connected	Plugs removed (verify) and allow sewage into facility				
		Valves open				
		Forced main operational, tested, signed off				
	Abandon items as applicable. Arrange access via SASD representative					
5. Make Facility Operational	Replace contractor lock with SASD locks, no Contractor access without SASD representative					
	SCADA turned on					
	SASD M&O ready to accept maintenance and operations of station					
	Notify SASD M&O					
Notify SASD USA Group						

- HL: High Level
- LL: Lower Level
- M&O: Maintenance and Operations
- SASD: Sacramento Area Sewer District
- SCADA: Supervisory control and data acquisition
- USA: Underground Service Alert
- WW:

SASD Project Manager Phase 3 Checklist Approval: \_\_\_\_\_

 <b>Facilities Startup: Phase 4 (Acceptance) Checklist</b> (To be completed prior to final SASD acceptance of facility)		Contractor	Inspector	SASD	
Facility: _____					
Design Engineer: _____ Inspector: _____					
Final Signoff	All completed punch lists recorded				
	Phases 1, 2 and 3 checklists recorded				
	CMID Acceptance Letter	Force main			
		Pump station			
Paperwork	Transfer power bill to the SASD				
	Transfer water bill to the SASD				
	Grant Deed / Easements recorded				
	Copies of All Permits to SASD	Building Permit			
		Authority to construct			
		Permit to Operate			
HMP (if applicable)					
Warranty Paperwork Submitted by Contractor					
Final Acceptance	Acceptance letter by SASD filed				
	Copy to SASD	Accounting			
		Asset Management			
		Documentation (in addition to other documentation, verify that final as-built conditions have been incorporated into the Design Engineer set of plans)			
		M&O			
		Modeling			
		Regulatory Compliance			
		MAXIMO			
USA					

HMP:

M&O: Maintenance and Operations

SASD: Sacramento Area Sewer District

USA: Underground Service Alert

SASD Project Manager Phase 4 Checklist Approval: