

THE CONTROL LOOP DESCRIPTIONS ARE NOT INTENDED TO BE AN INCLUSIVE LISTING OF ALL ELEMENTS AND APPURTENANCES REQUIRED TO EXECUTE LOOP FUNCTIONS, BUT ARE RATHER INTENDED TO SUPPLEMENT AND COMPLETE THE DRAWINGS AND OTHER SPECIFICATION SECTION.

COLLECTOR WELL PUMPS

1. Major Equipment:
 - a. Pumps:
 - 1) CW-P01, CW-P02, CW-P03, and CW-P04
 - b. Variable Frequency Drives:
 - 1) CW-VFD01, CW-VFD02, CW-VFD03, and CW-VFD04
 - c. Motor Winding Temperature Switches:
 - 1) CW-TS01, CW-TS02, CW-TS03, and CW-TS04
 - d. Solenoid Valves:
 - 1) CW-SV01, CW-SV02, CW-SV03, and CW-SV04
 - e. Flow Meters:
 - 1) CW-FM01, CW-FM02, CW-FM03, and CW-FM04
 - f. Control Panels:
 - 1) CW-SP01, CW-CP01,
 - g. Level Sensors:
 - 1) CW-PT01, CW-PT02
2. Control Logic:
 - a. Collector Well Pumps
 - 1) When LOCAL mode is selected at VFD operator interface, the operator can manually control the pumps via the VFD operator interface.
 - 2) When REMOTE mode is selected at VFD operator interface, the pumps are controlled manually via the SCADA system. SCADA system shall allow for manual operation only. No automatic control is required.
 - 3) Activation of the motor winding temperature switch shall prevent operation of the pump in both LOCAL and REMOTE mode.
 - 4) Verified closure of an auxiliary contact on the local safety disconnect for each pump shall be required to enable VFD operation. Auxiliary contact shall be interlocked with phase conductor contacts and shall be of the break-before-break style.
 - 5) Pumps shall be accelerated to the desired pump speed in (2) steps. The first step shall be from 0-30 Hz and the second step shall be 30 Hz to desired pump speed. The ramp up time for each step shall be set in the field based on field observations of ramp up times that do not result in water hammer within the piping system.
 - 6) Pump deceleration time from running speed to 0 Hz shall be 60 seconds. This number shall be adjusted in the field as necessary to eliminate water hammer.
 - b. Seal Water Solenoid Valves
 - 1) Seal water solenoid be controlled via SCADA software and shall be open for (30) minutes once every (24) hours.
 - 2) Seal water solenoid shall be open during pumping operation and for (5) minutes prior to pump operation and for (15) minutes following pump operation. This function shall be provided even in the event of SCADA failure.
 - c. Seal Water Flow Meters
 - 1) Pump operation shall be prevented when the seal water flow meter indicates inadequate flow.
3. Indication at HMI:
 - a. Pump Speed
 - b. VFD in remote
 - c. Pump Failure
 - d. Pump Running
 - e. Motor Temperature High
 - f. Seal Water Fail
 - g. Seal Water Delay
 - h. Collector Well Water Level

COLLECTOR WELL PUMPS CONTROL LOOP

VERTICAL WELL PUMPS

1. Major Equipment:
 - a. Pumps:
 - 1) VW-P02, VW-P03, VW-P04, VW-P05, VW-P06, VW-P06A
2. Control Logic:
 - a. Vertical Well Pumps Nos. 2-6A:
 - 1) When HAND mode is selected at the MCC bucket, the operator can manually control the pumps via the "Start-Stop" pushbuttons on the bucket.
 - 2) When AUTO is selected at the MCC bucket, the pumps are controlled in manually via the HMI software. No automatic operation is provided.
3. Indication at HMI:
 - a. In Auto
 - b. Pump Running

VERTICAL WELL PUMPS CONTROL LOOP

STORMWATER PUMPS

1. Major Equipment:
 - a. Pumps:
 - 1) SW-P01, SW-P02, and SW-P03
 - b. Variable Frequency Drives:
 - 1) SW-VFD01, SW-VFD02, and SW-VFD03
 - c. Motor Winding Temperature Switches:
 - 1) SW-TS01, SW-TS02, and SW-TS03
 - d. Solenoid Valves:
 - 1) SW-SV01, SW-SV02, and SW-SV03
 - e. Flow Meters:
 - 1) SW-FM01, SW-FM02, and SW-FM03
 - f. Float Switches:
 - 1) SW-LS03, SW-LS04, SW-LS05, SW-LS06, SW-LS07
 - g. Control Panels:
 - 1) CW-SP01 and SW-CP01
 2. Control Logic:
 - a. Stormwater Pumps Nos. 1-3: SW-P01, SW-P02, and SW-P03
 - 1) When LOCAL mode is selected at VFD operator interface, the operator can manually control the pumps via the VFD operator interface.
 - 2) When REMOTE mode is selected at VFD operator interface, the pumps are controlled in accordance with HMI software MANUAL/AUTOMATIC selection function as follows:
 - I. MANUAL- Pump is controlled by the remote operator via the SCADA software in accordance with the HMI selector switch On/Off function.
 - II. In AUTOMATIC the pump is controlled by the SCADA software as follows:
 - i. Rising Wetwell Water Level:
 - SW-LS05 Start Lead Pump
 - SW-LS06 Start First Lag Pump
 - SW-LS07 Start Second Lag Pump
 - ii. Falling Wetwell Water Level:
 - SW-LS06 Stop First Pump On this cycle
 - SW-LS05 Stop Second Pump On this cycle
 - SW-LS04 Stop Last Pump On this cycle
 - iii. SCADA software shall include:
 - Automatic alternation of lead, lag, and second lag pumps after each pumping cycle
 - Pump start delay timers to prevent more than one pump starting concurrently after a power outage
 - If a pump is called to operate and does not generate a pump running signal within (7) minutes, the pump shall be removed from service and a pump failure alarm shall be initiated at on the HMI. The next pump in the alternator sequence shall be started in its place.
 - 3) Activating of the motor winding temperature switch shall prevent operation of the pump in all operation modes.
 - 4) Verified closure of an auxiliary contact on the local safety disconnect for each pump shall be required to enable VFD operation. Auxiliary contact shall be interlocked with phase conductor contacts and shall be of the break-before-break style.
 - 5) VFD shall operate pump at preset speed (60 Hz).
 - b. Seal Water Solenoid Valves
 - 1) Seal water solenoid be controlled via SCADA software and shall be open for (30) minutes once every (24) hours.
 - 2) Seal water solenoid shall be open when water level is above SW-LS03
 - 3) Seal water solenoid shall be open during pumping operation and for (5) minutes prior to pump operation and for (15) minutes following pump operation. This function shall be provided even in the event of SCADA failure.
 - c. Seal Water Flow Meters
 - 1) Pump operation shall be prevented when the seal water flow meter indicates inadequate flow.
3. Indication at HMI:
 - a. Pump Speed
 - b. VFD in remote
 - c. Pump Failure
 - d. Pump Running
 - e. Motor Temperature High
 - f. Seal Water Fail
 - g. Seal Water Delay
 - h. Float Switch SW-LS01
 - i. Float Switch SW-LS02
 - j. Float Switch SW-LS03
 - k. Float Switch SW-LS04
 - l. Float Switch SW-LS05
 - m. Float Switch SW-LS06
 - n. Float Switch SW-LS07
 - o. Float Switch SW-LS08

STORMWATER PUMPS CONTROL LOOP

FILE NAME = G:\115\1150223\Work_Drwn_3_M0_Avg_P12\ACADD_Sheets\0876599-ahc-KL.A_Elec_S.dgn



USER NAME = seb	DESIGNED - JJN	REVISED - JJN - 9/24/14
PLOT SCALE = 40.0000' / in.	DRAWN - JJN	REVISED -
PLOT DATE = 9/25/2014	CHECKED -	REVISED -
	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CONTROL LOOPS			
MISSOURI AVENUE DEEP WELL FACILITY			
SCALE: AS NOTED	SHEET 1	OF 1 SHEETS	STA. TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
64	82-4T-1	ST. CLAIR	185	176
CONTRACT NO. 76C99				
ILLINOIS FED. AID PROJECT				

E902