CAT®

Electric Power

WICHITA WATER UTILITIES

Work Plan

Project # : 36019/301205

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4955 Marconi Drive • Alpharetta, GA 30005
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i. Reference Documents

a) System Operation and Maintenance Manual
b) System Drawings 36019

ii. Overview

This Work Plan will cover the installation and testing of PLCs control upgrade package for the Caterpillar Paralleling switchgear.
Service activity impacting system operation or customer load will be performed between the hours of 8:00 and 18:00.
Pre-Job and Safety briefs will occur one hour prior to scheduled activity and include a walk-through inspection of work area, discussion of the programmed activities, and personnel roles during the work.
Every precaution will be taken to prevent a prolonged disruption of availability of power, however, any service activity poses some risk to customer load.
Risk assessment for this activity is determined to be **LOW**, automated functions will not be available for specific portions of this work.
Customer is responsible for the protection of critical and non-critical loads and should schedule this activity at a time when system conditions allow these loads to be de-energized or protected through an alternate mean.
Should unforeseen circumstances require upgrade to be aborted, original system programs and hardware will be available, and the system will be restored to the configuration existing immediately prior to this upgrade.

iii. Procedure Outline

a) Electrical Safety and Procedure Job Hazard Analysis Brief.
b) Complete new hardware installation: PLC, Ethernet Switches, and Power-Plex transducers.
c) Perform Preliminary Program/software Evaluation.
d) System Mode Testing.
e) Customer sequence demonstration.
f) Documentation

iv. Pre-conditions

Switchgear system must be available for service activity during the hours specified within this procedure and, as agreed, to by each party. Normal utility and emergency power sources must be available. Equipment must be in good working order with no known service or maintenance discrepancies. Temporary power source, if provided to protect load, must be configured in such a manner as to not interfere with normal equipment operations or proposed testing.

v. Schedule

Times listed are approximate, system status, facility activity, customer request or unforeseen circumstances may result in deviation from timeline. Non-intrusive work such as hardware mounting or general contractor support may be performed outside of published schedule when coordinated with facility and contracting staff.

DAY 1 (8/21/2023) – Control Network Installation

Task	Complete
Pre-Job and Safety briefs	
Visual inspection of switchgears	
Recording of current settings from HMI	
Verify fiber runs between switchgears are in place	
Set up work area	
Installation of control network in MSWG-0 (Ethernet switches, fiber repeaters, Ethernet cables, fuses)	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City
Foley Contacts Onsite: Charles Moffet, Jeff Miller, Rick Palmer

DAY 2 (8/22/2023) – Control Network Installation

Task	Complete
Pre-Job and Safety briefs	
Installation of control network in MSWG-2 (Ethernet switches, fiber repeaters, Ethernet cables, fuses)	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City
Foley Contacts Onsite: Charles Moffet

DAY 3 (8/23/2023) – Control Network Installation

Task	Complete
Pre-Job and Safety briefs	
Installation of control network in MSWG-1 (Ethernet switches, fiber repeaters, Ethernet cables, fuses)	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City
Foley Contacts Onsite: Charles Moffet

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DAY 4 (8/24/2023) – Removal and Installation of Touchscreen and Touchscreen Processor

Task	Complete
Pre-Job and Safety briefs	
Continue installation of control network in MSWG-1 (Ethernet switches, fiber repeaters, Ethernet cables, fuses)	
Shutdown touchscreen processor in MSWG-1	
Remove fuse FU701 in MSWG-1	
Installation of fuse holder FU703 in MSWG-1	
Removal of existing touchscreen in MSWG-1	
Removal of existing touchscreen processor in MSWG-1	
Modify existing touchscreen cutout in MSWG-1 to accommodate a widescreen touchscreen	
Installation of new touchscreen in MSWG-1	
Installation of new touchscreen processor in MSWG-1	
Reinstall fuse FU701 in MSWG-1	
Testing of control network by removing ethernet cable at various points throughout the ring network to verify no comms lost	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City
Foley Contacts Onsite: Chase Garn

DAY 5 (8/25/2023) – Generator 1 Controls Upgrade

Task	Complete
Pre-Job and Safety briefs	
Engage generator 1 local ESTOP	
Removal of VTG1 fuses	
Install shorting pins for CTSB-G1, 7R72, 7R73, and 7R92 shorting blocks	
Removal of VTB2 fuses	
Verify 0 VAC and 0 amps on generator 1 protective relay (GE-SR489)	
Verify 0 VAC and 0 amps for generator 1 on existing touchscreen in MSWG0 or MSWG2	
Removal of generator 1 circuit breaker control fuses (fuses CA)	
Removal of generator 1 existing PLC, transducer, sync check relay, and protective relay	
Installation of generator 1 new PLC, transducer, sync check relay, and protective relay	
Installation of generator 1 PLC Modbus Plus Proxy	
Reinstall generator 1 circuit breaker control fuses (fuses CA)	
Reinstall VTB2 fuses	
Reinstall VTG1 fuses	
Remove shorting pins for CTSB-G1, 7R72, 7R73, and 7R92 shorting blocks	
End of day brief	

Impact to customer load: Generator 1 will not be available for emergency backup.

Companies Onsite: Cat, Foley, City, Decker
Foley Contacts Onsite: Chase Garn, Jeff Miller, Rick Palmer

Foley will deliver load bank and cables – Decker will need to be onsite to hook up load bank for testing that will occur Day 6

DAY 6 (8/26/2023) – Generator 1 Testing

Task	Complete
Pre-Job and Safety briefs	
Disengage generator 1 local ESTOP	
Verify engine communication with generator 1 and PLC	
Verify generator 1 start/stop functionality from touchscreen	
Verify generator 1 speed/voltage control from touchscreen	
Verify generator 1 speed/voltage control from speed pot and voltage control switch (mounted inside of generator 1 control cubicle)	
Verify generator 1 circuit breaker control from door mounted control switch	
Verify generator 1 circuit breaker control from touchscreen	
Verify generator 1 pre and shutdown alarms.	
Sync tuning of generator 1	
Load tuning of generator 1 using site load bank	
End of day brief	

Impact to customer load: Generator 1 will not be available for emergency backup until testing is completed.

Note: Load bank is needed for testing. Site needs to make arrangements for load bank connection.
(This will occur on Day 5)

Companies Onsite: Cat, Foley, City, Decker
Foley Contacts Onsite: Jeff Miller, Rick Palmer

Requesting Decker to be onsite for the initiation of the testing, then once critical milestones during testing have been achieved, Decker may be released.

DAY 7 (8/27/2023) – Generator 2 Controls Upgrade

Task	Complete
Pre-Job and Safety briefs	
Engage generator 2 local ESTOP	
Removal of VTG2 fuses	
Install shorting pins for CTSB-G2, 6R72, 6R73, and 6R92 shorting blocks	
Removal of VTB2 fuses	
Verify 0 VAC and 0 amps on generator 2 protective relay (GE-SR489)	
Verify 0 VAC and 0 amps for generator 2 on existing touchscreen in MSWG0 or MSWG2	
Removal of generator 2 circuit breaker control fuses (fuses CA)	
Removal of generator 2 existing PLC, transducer, sync check relay, and protective relay	
Installation of generator 2 new PLC, transducer, sync check relay, and protective relay	
Installation of generator 2 Modbus Plus Proxy	
Reinstall generator 2 circuit breaker control fuses (fuses CA)	
Reinstall VTB2 fuses	
Reinstall VTG2 fuses	
Remove shorting pins for CTSB-G2, 6R72, 6R73, and 6R92 shorting blocks	
End of day brief	

Impact to customer load: Generator 2 will not be available for emergency backup.

Companies Onsite: Cat, Foley, City
Foley Contacts Onsite: Jeff Miller

DAY 8 (8/28/2023) – Generator 2 Testing

Task	Complete
Pre-Job and Safety briefs	
Disengage generator 2 local ESTOP	
Verify engine communication with generator 2 and PLC	
Verify generator 2 start/stop functionality from touchscreen	
Verify generator 2 speed/voltage control from touchscreen	
Verify generator 2 speed/voltage control from speed pot and voltage control switch (mounted inside of generator 2 control cubicle)	
Verify generator 2 circuit breaker control from door mounted control switch	
Verify generator 2 circuit breaker control from touchscreen	
Verify generator 2 pre and shutdown alarms.	
Sync tuning of generator 2	
Load tuning of generator 2 using site load bank	
End of day brief	

Impact to customer load: Generator 2 will not be available for emergency backup until testing is completed.

Companies Onsite: Cat, Foley, City, Decker Electric
Foley Contacts Onsite: Charles Moffet, Rick Palmer

Requesting Decker to be onsite for the initiation of the testing, then once critical milestones during testing have been achieved, Decker may be released.

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DAY 9 (8/29/2023) – Generator 3 Controls Upgrade

Task	Complete
Pre-Job and Safety briefs	
Engage generator 3 local ESTOP	
Removal of VTG3 fuses	
Install shorting pins for CTSB-G3, 5R72, 5R73, and 5R92 shorting blocks	
Removal of VTB2 fuses	
Verify 0 VAC and 0 amps on generator 3 protective relay (GE-SR489)	
Verify 0 VAC and 0 amps for generator 3 on existing touchscreen in MSWG0 or MSWG2	
Removal of generator 3 circuit breaker control fuses (fuses CA)	
Removal of generator 3 existing PLC, transducer, sync check relay, and protective relay	
Installation of generator 3 new PLC, transducer, sync check relay, and protective relay	
Installation of generator 3 Modbus Plus Proxy	
Reinstall generator 3 circuit breaker control fuses (fuses CA)	
Reinstall VTB2 fuses	
Reinstall VTG3 fuses	
Remove shorting pins for CTSB-G3, 5R72, 5R73, and 5R92 shorting blocks	
End of day brief	

Impact to customer load: Generator 3 will not be available for emergency backup.

Companies Onsite: Cat, Foley, City, Decker Electric
Foley Contacts Onsite: Charles Moffet

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DAY 10 (8/30/2023) – Generator 3 Testing

Task	Complete
Pre-Job and Safety briefs	
Disengage generator 3 local ESTOP	
Verify engine communication with generator 3 and PLC	
Verify generator 3 start/stop functionality from touchscreen	
Verify generator 3 speed/voltage control from touchscreen	
Verify generator 3 speed/voltage control from speed pot and voltage control switch (mounted inside of generator 3 control cubicle)	
Verify generator 3 circuit breaker control from door mounted control switch	
Verify generator 3 circuit breaker control from touchscreen	
Verify generator 3 pre and shutdown alarms.	
Sync tuning of generator 3	
Load tuning of generator 3 using site load bank	
End of day brief	

Impact to customer load: Generator 3 will not be available for emergency backup until testing is completed.

Companies Onsite: Cat, Foley, City, Decker Electric
Foley Contacts Onsite: Chase Garn, Rick Palmer

Requesting Decker to be onsite for the initiation of the testing, then once critical milestones during testing have been achieved, Decker may be released.

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DAY 11 (8/31/2023) – Generator 4 Controls Upgrade

Task	Complete
Pre-Job and Safety briefs	
Engage generator 4 local ESTOP	
Removal of VTG4 fuses	
Install shorting pins for CTSB-G4, 4R72, 4R73, and 4R92 shorting blocks	
Removal of VTB2 fuses	
Verify 0 VAC and 0 amps on generator 4 protective relay (GE-SR489)	
Verify 0 VAC and 0 amps for generator 4 on existing touchscreen in MSWG0 or MSWG2	
Removal of generator 4 circuit breaker control fuses (fuses CA)	
Removal of generator 4 existing PLC, transducer, sync check relay, and protective relay	
Installation of generator 4 new PLC, transducer, sync check relay, and protective relay	
Installation of generator 4 Modbus Plus Proxy	
Reinstall generator 4 circuit breaker control fuses (fuses CA)	
Reinstall VTB2 fuses	
Reinstall VTG4 fuses	
Remove shorting pins for CTSB-G4, 4R72, 4R73, and 4R92 shorting blocks	
End of day brief	

Impact to customer load: Generator 4 will not be available for emergency backup.

Companies Onsite: Cat, Foley, City
Foley Contacts Onsite: Chase Garn

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DAY 12 (9/1/2023) – Generator 4 Testing

Task	Complete
Pre-Job and Safety briefs	
Disengage generator 4 local ESTOP	
Verify engine communication with generator 4 and PLC	
Verify generator 4 start/stop functionality from touchscreen	
Verify generator 4 speed/voltage control from touchscreen	
Verify generator 4 speed/voltage control from speed pot and voltage control switch (mounted inside of generator 4 control cubicle)	
Verify generator 4 circuit breaker control from door mounted control switch	
Verify generator 4 circuit breaker control from touchscreen	
Verify generator 4 pre and shutdown alarms.	
Sync tuning of generator 4	
Load tuning of generator 4 using site load bank	
Load tuning of all 4 generators using site load bank	
End of day brief	

Impact to customer load: Generator 4 will not be available for emergency backup until testing is completed.

Companies Onsite: Cat, Foley, City, Decker Electric
Foley Contacts Onsite: Chase Garn, Rick Palmer

It would be good for Decker to come around for the beginning of the testing, then once everything is up and running, then they go.

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DAY 13 (9/2/2023) – LB/PG Controls Upgrade

Task	Complete
Pre-Job and Safety briefs	
Removal of VTLB/PG fuses	
Install shorting pins for CTSB-1326, 3R72, 3R73, and 3R92 shorting blocks	
Removal of VTB2 fuses	
Verify 0 VAC and 0 amps on generator LB/PG protective relay (GE-SR489)	
Verify 0 VAC and 0 amps for generator LB/PG on existing touchscreen in MSWG0 or MSWG2	
Removal of generator LB/PG circuit breaker control fuses (fuses CA)	
Removal of generator LB/PG existing PLC, transducer, sync check relay, and protective relay	
Installation of generator LB/PG new PLC, transducer, sync check relay, and protective relay	
Installation of generator LB/PG Modbus Plus Proxy	
Reinstall generator LB/PG circuit breaker control fuses (fuses CA)	
Reinstall VTB2 fuses	
Reinstall VT LB/PG fuses	
Remove shorting pins for CTSB-1326, 3R72, 3R73, and 3R92 shorting blocks	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City, Decker Electric
Foley Contacts Onsite: Jared White

Decker Electric will need to unhook loadbank and Hook up the Portable, supplied by the city for testing on Day 14th.

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DAY 14 (9/3/2023) – LB/PG Testing

Task	Complete
Pre-Job and Safety briefs	
Verify portable generator is connected to LB/PG circuit breaker	
Place system in PG configuration on touchscreen	
Verify generator LB/PG start/stop functionality from touchscreen	
Verify generator LB/PG circuit breaker control from door mounted control switch	
Verify generator LB/PG circuit breaker control from touchscreen	
Verify generator LB/PG pre and shutdown alarms.	
Perform No Load Test and verify LB/PG generator close to the bus first and all other gens synced and paralleled to it	
Stop No Load Test and allow generators to cooldown	
Verify portable generator is disconnected LB/PG	
Place system in LB configuration on touchscreen	
Perform No Load Test and verify first generator up to speed and voltage closes to the bus, remaining generator synched and paralleled as they come up to speed and voltage	
Verify LB/PG circuit breaker control from door mounted control switch	
Verify LB/PG circuit breaker control from touchscreen	
Stop No Load Test and allow generators to cooldown	
End of day brief	

Impact to customer load: None

Note: Portable generator is needed for testing.

Companies Onsite: Cat, Foley, City, Decker Electric
Foley Contacts Onsite: Jeff Miller, Rick Palmer

Decker electric will need to be onsite for this test.

DAY 15 (9/4/2023) – Tie T2 Controls Upgrade

Task	Complete
Pre-Job and Safety briefs	
Verify site load had been transferred from M2 to M0	
Removal of VTT2 fuses	
Removal of VTB2 fuses	
Install shorting pins for 1R48, 1R49, and 1R29 shorting blocks	
Verify 0 VAC and 0 amps on Tie T2 protective relay (MIF)	
Verify 0 VAC and 0 amps for Tie T2 on existing touchscreen in MSWG0 or MSWG2	
Removal of Tie T2 circuit breaker control fuses (fuses BA)	
Removal of Tie T2 existing PLC, transducer, sync check relay, and protective relay	
Installation of Tie T2 PLC, transducer, sync check relay, and protective relay	
Installation of Tie T2 Modbus Plus Proxy	
Reinstall Tie T2 circuit breaker control fuses (fuses BA)	
Remove shorting pins for 1R48, 1R49, and 1R29 shorting blocks	
Reinstall VTB2 fuses	
Reinstall VTT2 fuses	
Manually start and close generator 1 to the bus and verify voltage and frequency reading for Tie T2	
Place generator 1 back in Auto and allow it to cooldown	
End of day brief	

Impact to customer load: Site to transfer loads from MSWG-2 to MSWG-0 prior to today's activities.

Companies Onsite: Cat, Foley, City, Decker Electric
Foley Contacts Onsite: Jeff Miller, Rick Palmer

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DAY 16 (9/5/2023) – Tie T Controls Upgrade

Task	Complete
Pre-Job and Safety briefs	
Place Sync Switch for Tie T in the Manual position and open Tie T circuit breaker from touchscreen	
Engage Pull to Lock on Tie T door mounted circuit breaker control switch	
Removal of Tie T circuit breaker control fuses (fuses BA)	
Removal of VTB1 fuses	
Removal of VTB2 fuses	
Install shorting pins for 7L48, 7L49, and 7L29 shorting blocks	
Verify 0 VAC and 0 amps on Tie T protective relay (MIF)	
Verify 0 VAC and 0 amps for Tie T on existing touchscreen in MSWG0 or MSWG2	
Removal of Tie T existing PLC, transducer, sync check relay, and protective relay	
Installation of Tie T PLC, transducer, sync check relay, and protective relay	
Installation of Tie T Modbus Plus Proxy	
Reinstall Tie T circuit breaker control fuses (fuses BA)	
Remove shorting pins for 7L48, 7L49, and 7L29 shorting blocks	
Reinstall VTB2 fuses	
Reinstall VTB1 fuses	
Verify voltage and frequency reading for Tie T	
Disengage Pull to Lock on Tie T door mounted circuit breaker control switch	
Place Sync Switch for Tie T back in Auto	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City
Foley Contacts Onsite: Charles Moffet

DAY 17 (9/6/2023) – Dist D3 PLC Controls Upgrade

Task	Complete
Pre-Job and Safety briefs	
Manually open circuit breakers 2A, 2B, 2C, and 2D from touchscreen	
Removal of circuit breaker 2A control fuses (fuses BA)	
Install shorting pins for 3L48, 3L49, and 3L29 shorting blocks	
Verify 0 amps for circuit breaker 2A on protective relay (MIF)	
Remove existing protective relay for circuit breaker 2A	
Install new protective relay (SR350) for circuit breaker 2A	
Remove shorting pins for 3L48, 3L49, and 3L29 shorting blocks	
Reinstall circuit breaker 2A control fuses (fuses BA)	
Removal of circuit breaker 2B control fuses (fuses BA)	
Install shorting pins for 4L48, 4L49, and 4L29 shorting blocks	
Verify 0 amps for circuit breaker 2B on protective relay (MIF)	
Remove existing protective relay for circuit breaker 2B	
Install new protective relay (SR350) for circuit breaker 2B	
Remove shorting pins for 4L48, 4L49, and 4L29 shorting blocks	
Reinstall circuit breaker 2B control fuses (fuses BA)	
Removal of circuit breaker 2C control fuses (fuses BA)	
Install shorting pins for 5L48, 5L49, and 5L29 shorting blocks	
Verify 0 amps for circuit breaker 2C on protective relay (MIF)	
Remove existing protective relay for circuit breaker 2C	
Install new protective relay (SR350) for circuit breaker 2C	
Remove shorting pins for 5L48, 5L49, and 5L29 shorting blocks	
Reinstall circuit breaker 2B control fuses (fuses BA)	
Removal of circuit breaker 2D control fuses (fuses BA)	
Install shorting pins for 8L48, 8L49, and 8L29 shorting blocks	
Verify 0 amps for circuit breaker 2D on protective relay (MIF)	
Remove existing protective relay for circuit breaker 2D	
Install new protective relay (SR350) for circuit breaker 2D	
Remove shorting pins for 8L48, 8L49, and 8L29 shorting blocks	
Reinstall circuit breaker 2D control fuses (fuses BA)	
Removal of D3 existing PLC	
Installation of D3 PLC	
Installation of D3 Modbus Plus Proxy	
Manually close circuit breakers 2A, 2B, 2C, and 2D from touchscreen	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City, Decker Electric
Foley Contacts Onsite: Charles Moffet

DAY 18 (9/7/2023) – Utility M2 PLC Controls Upgrade

Task	Complete
Pre-Job and Safety briefs	
Modify existing PLC program to not enter Emergency Mode when M2 PLC goes offline	
Manually open utility M2 circuit breaker from touchscreen	
Engage Pull to Lock on M2 door mounted circuit breaker control switch	
Remove VTM2 fuses	
Remove VTB2 fuses	
Install shorting pins for 2R68, 2R66, and 2R89 shorting blocks	
Verify 0VAC and 0 amps on M2 protective relay (SR750)	
Verity 0VAC and 0 amps on touchscreen in MSWG-2	
Remove circuit breaker M2 control fuses (fuses BA)	
Removal of utility M2 existing PLC, transducer, sync check relay, and protective relay	
Installation of utility M2 PLC, transducer, sync check relay, and protective relay	
Installation of utility M2 Modbus Plus Proxy	
Reinstall utility M2 circuit breaker control fuses (fuses BA)	
Remove shorting pins for 2R68, 2R66, and 2R89 shorting blocks	
Reinstall VTB2 fuses	
Reinstall VTM2 fuses	
Verify voltage and frequency reading for utility M2 on protective relay	
Verify voltage and frequency reading for utility M2 on touchscreen	
Disengage Pull to Lock on M2 door mounted circuit breaker control switch	
Manually close utility M2 circuit breaker from touchscreen	
Modify existing PLC program to enter Emergency Mode when M2 PLC goes offline	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City
Foley Contacts Onsite: Chase Garn

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DAY 19 (9/8/2023) – Tie T1 Controls Upgrade

Task	Complete
Pre-Job and Safety briefs	
Verify site load had been transferred from M0 to M2	
Removal of VTT3 fuses	
Removal of VTB2 fuses	
Install shorting pins for SS10-11(06) shorting block	
Verify 0 VAC and 0 amps on Tie T1 protective relay (MIF)	
Verify 0 VAC and 0 amps for Tie T1 on existing touchscreen in MSWG0 or MSWG2	
Removal of Tie T1 circuit breaker control fuses (fuses BA)	
Removal of Tie T1 existing PLC, transducer, sync check relay, and protective relay	
Installation of Tie T1 PLC, transducer, sync check relay, and protective relay	
Installation of Tie T1 Modbus Plus Proxy	
Reinstall Tie T1 circuit breaker control fuses (fuses BA)	
Remove shorting pins for SS10-11(06) shorting block	
Reinstall VTB2 fuses	
Reinstall VTT3 fuses	
Manually start and close generator 1 to the bus and verify voltage and frequency reading for Tie T1	
Place generator 1 back in Auto and allow it to cooldown	
End of day brief	

Impact to customer load: None

NOTE: Site to transfer loads from MSWG-0 to MSWG-2 prior to today's activities.

Companies Onsite: Cat, Foley, City, Decker Electric
Foley Contacts Onsite: Chase Garn, Rick Palmer

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DAY 20 (9/9/2023) – Tie M1 Controls Upgrade

Task	Complete
Pre-Job and Safety briefs	
Place Sync Switch for Tie M1 in the Manual position and open Tie M1 circuit breaker from touchscreen	
Engage Pull to Lock on Tie M1 door mounted circuit breaker control switch	
Removal of Tie M1 circuit breaker control fuses (fuses BA)	
Removal of VTM1 fuses	
Removal of VTB3 fuses	
Install shorting pins for SS12-13(04) shorting block	
Verify 0 VAC and 0 amps on Tie M1 protective relay (MIF)	
Verify 0 VAC and 0 amps for Tie M1 on existing touchscreen in MSWG0 or MSWG2	
Removal of Tie M1 existing PLC, transducer, sync check relay, and protective relay	
Installation of Tie M1 PLC, transducer, sync check relay, and protective relay	
Installation of Tie M1 Modbus Plus Proxy	
Reinstall Tie M1 circuit breaker control fuses (fuses BA)	
Remove shorting pins for SS12-13(04) shorting block	
Reinstall VTB3 fuses	
Reinstall VTM1 fuses	
Verify voltage and frequency reading for Tie M1	
Disengage Pull to Lock on Tie M1 door mounted circuit breaker control switch	
Manually operate Tie M1 circuit breaker from door mounted circuit breaker control switch	
Manually operate Tie M1 circuit breaker from touch screen	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City
Foley Contacts Onsite: Jarred White

DAY 21 (9/10/2023) – Dist D1 PLC Controls Upgrade

Task	Complete
Pre-Job and Safety briefs	
Manually open circuit breakers D1, 1E, 1A, and 1B from touchscreen	
Removal of circuit breaker D1 control fuses (fuses BA)	
Install shorting pins for 2L48, 2L49, and 2L29 shorting blocks	
Verify 0 amps for circuit breaker D1 on protective relay (MIF)	
Remove existing protective relay for circuit breaker D1	
Install new protective relay (SR350) for circuit breaker D1	
Remove shorting pins for 2L48, 2L49, and 2L29 shorting blocks	
Reinstall circuit breaker D1 control fuses (fuses BA)	
Removal of circuit breaker 1E control fuses (fuses BA)	
Install shorting pins for 9L52, 9L53, and 9L54 shorting blocks	
Verify 0 amps for circuit breaker 1E on protective relay (MIF)	
Remove existing protective relay for circuit breaker 1E	
Install new protective relay (SR350) for circuit breaker 1E	
Remove shorting pins for 9L52, 9L53, and 9L54 shorting blocks	
Reinstall circuit breaker 1E control fuses (fuses BA)	
Removal of circuit breaker 1A control fuses (fuses BA)	
Install shorting pins for 11L48, 11L49, and 11L29 shorting blocks	
Verify 0 amps for circuit breaker 1A on protective relay (MIF)	
Remove existing protective relay for circuit breaker 1A	
Install new protective relay (SR350) for circuit breaker 1A	
Remove shorting pins for 11L48, 11L49, and 11L29 shorting blocks	
Reinstall circuit breaker 1A control fuses (fuses BA)	
Removal of circuit breaker 1B control fuses (fuses BA)	
Install shorting pins for 12L48, 12L49, and 12L29 shorting blocks	
Verify 0 amps for circuit breaker 1B on protective relay (MIF)	
Remove existing protective relay for circuit breaker 1B	
Install new protective relay (SR350) for circuit breaker 1B	
Remove shorting pins for 12L48, 12L49, and 12L29 shorting blocks	
Reinstall circuit breaker 1B control fuses (fuses BA)	
Removal of D1 existing PLC	
Installation of D1 PLC	
Installation of D1 Modbus Plus Proxy	
Manually close circuit breakers D1, 1E, 1A, and 1B from touchscreen	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City
Foley Contacts Onsite: Jarred White

DAY 22 (9/11/2023) – Dist D2 PLC Controls Upgrade

Task	Complete
Pre-Job and Safety briefs	
Manually open circuit breakers 1C and 1D from touchscreen	
Removal of circuit breaker 1C control fuses (fuses BA)	
Install shorting pins for 13L48, 13L49, and 13L29 shorting blocks	
Verify 0 amps for circuit breaker 1C on protective relay (MIF)	
Remove existing protective relay for circuit breaker 1C	
Install new protective relay (SR350) for circuit breaker 1C	
Remove shorting pins for 13L48, 13L49, and 13L29 shorting blocks	
Reinstall circuit breaker 1C control fuses (fuses BA)	
Removal of circuit breaker 1D control fuses (fuses BA)	
Install shorting pins for 14L48, 14L49, and 14L29 shorting blocks	
Verify 0 amps for circuit breaker 1D on protective relay (MIF)	
Remove existing protective relay for circuit breaker 1D	
Install new protective relay (SR350) for circuit breaker 1D	
Remove shorting pins for 14L48, 14L49, and 14L29 shorting blocks	
Reinstall circuit breaker 1D control fuses (fuses BA)	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City
Foley Contacts Onsite: Charles Moffet

DAY 23 (9/12/2023) – Utility M0 Controls Upgrade

Task	Complete
Pre-Job and Safety briefs	
Modify existing PLC program to not enter Emergency Mode when M0 PLC goes offline	
Manually open utility M0 circuit breaker from touchscreen	
Engage Pull to Lock on M0 door mounted circuit breaker control switch	
Remove VTM0 fuses	
Remove VTB fuses	
Install shorting pins for 2R68, 2R66, and 2R89 shorting blocks	
Verify 0VAC and 0 amps on M0 protective relay (SR750)	
Verity 0VAC and 0 amps on touchscreen in MSWG-0	
Remove circuit breaker M0 control fuses (fuses BA)	
Removal of utility M0 existing PLC, transducer, sync check relay, and protective relay	
Installation of utility M0 PLC, transducer, sync check relay, and protective relay	
Installation of utility M0 Modbus Plus Proxy	
Reinstall utility M0 circuit breaker control fuses (fuses BA)	
Remove shorting pins for 2R68, 2R66, and 2R89 shorting blocks	
Reinstall VTB fuses	
Reinstall VTM0 fuses	
Verify voltage and frequency reading for utility M0 on protective relay	
Verify voltage and frequency reading for utility M0 on touchscreen	
Disengage Pull to Lock on M0 door mounted circuit breaker control switch	
Manually close utility M0 circuit breaker from touchscreen	
Modify existing PLC program to enter Emergency Mode when M0 PLC goes offline	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City
Foley Contacts Onsite: Charles Moffet

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DAY 24 (9/13/2023) – AP1, AP2, Data PLCs Upgrade, System Test

Task	Complete
Pre-Job and Safety briefs	
Removal of existing AP1, AP2, and Data PLCs	
Installation of new AP1 and AP2 PLCs	
Place generator 1 Sync Switch in Off on the touchscreen and verify audible alarm	
Engage Instant Auto Switch and verify generator 1 Sync Switch move to Auto	
Verify AP1 and AP2 PLCs program communication with all other PLCs	
Perform No Load Test as described in published Functional Sequence of Operations	
Test Dual Utility Failure Mode as described in published Functional Sequence of Operations	
Test Dual Utility Restoration Mode as described in published Functional Sequence of Operations	
Test Single Utility Failure (M0) as described in published Functional Sequence of Operations	
Test Single Utility Failure Restoration (M0) as described in published Functional Sequence of Operations	
Test Single Utility Failure (M2) as described in published Functional Sequence of Operations	
Test Single Utility Failure Restoration (M2) as described in published Functional Sequence of Operations	
Test Transfer to Emergency (Storm Avoidance) Mode on M0 as described in published Functional Sequence of Operations	
Test Exit from Transfer to Emergency Mode on M0 as described in published Functional Sequence of Operations	
Test Transfer to Emergency (Storm Avoidance) Mode on M2 as described in published Functional Sequence of Operations	
Test Exit from Transfer to Emergency Mode on M2 as described in published Functional Sequence of Operations	
Test Transfer to Emergency (Storm Avoidance) Mode on M0 and M2 as described in published Functional Sequence of Operations	
Test Exit from Transfer to Emergency Mode on M0 and M2 as described in published Functional Sequence of Operations	
End of day brief	

Note: Site to transfer MSWG-0 loads back to MSWG-0 load bus prior to today's activities. Multiple outages on both utilities are needed to complete Functional Sequence of Operations testing. Length between outages to be determined by site personnel.

Companies Onsite: Cat, Foley, City, Decker Electric
Foley Contacts Onsite: Charles Moffet, Chase Garn, Jeff Miller, Rick Palmer

DAY 25 (9/14/2023) – MSWG-0 and MSWG-2 Touchscreen and Processor Upgrade

Task	Complete
Pre-Job and Safety briefs	
Removal fuse FU301	
Removal of existing touchscreen in MSWG-0	
Removal of existing touchscreen processor in MSWG-0	
Modify existing touchscreen cutout in MSWG-0 to accommodate a widescreen touchscreen	
Installation of new touchscreen in MSWG-0	
Installation of new touchscreen processor in MSWG-0	
Reinstallation of fuse FU301	
Removal fuse FU301	
Removal of existing touchscreen in MSWG-2	
Removal of existing touchscreen processor in MSWG-2	
Modify existing touchscreen cutout in MSWG-2 to accommodate a widescreen touchscreen	
Installation of new touchscreen in MSWG-2	
Installation of new touchscreen processor in MSWG-2	
Reinstallation of fuse FU301	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City
Foley Contacts Onsite: Chase Garn

DAY 26 (9/15/2023) – DTI and Remote PCs Upgrade

Task	Complete
Pre-Job and Safety briefs	
Removal of existing CAT provided remote PC	
Installation of new remote PC	
Verify controls from remote PC	
Installation of Redlion DTI	
Install fuse FU703 in MSWG-1 (fuse holder installed on day 4)	
Verify SCADA communication with RedLion DTI	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City, Scada Company, Decker Electric
Foley Contacts Onsite: Chase Garn, Rick Palmer

DAY 27 (9/16/2023) – Open items

Task	Complete
Pre-Job and Safety briefs	
Open items	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City
Foley Contacts Onsite: Jerrad White

DAY 28 (9/17/2023) – Removal of Existing Modbus Plus Network and Proxies

Task	Complete
Pre-Job and Safety briefs	
Removal of existing Modbus Plus network cablings	
Removal of Modbus Plus Proxies	
Job site clean up	
End of day brief	

Impact to customer load: None

Companies Onsite: CSG, Foley, City
Foley Contacts Onsite: Charles Moffet

DAY 29 (9/18/2023) – End User Training

Task	Complete
Pre-Job and Safety briefs	
End user training	
End of day	

Impact to customer load: None

Companies Onsite: Cat, Foley, City, Decker Electric
Foley Contacts Onsite: Charles Moffet/Jeff Miller, Rick Palmer, Rus Martin, Orlando Wright, Brent Gilchrist

Decker electric will need to hook up LB again

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DAY 30 (9/19/2023) – Generator Testing Support

Task	Complete
Pre-Job and Safety briefs	
Generator testing support	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City
Foley Contacts Onsite: Charles Moffet, Rick Palmer

DAY 31 (9/20/2023) – Generator Testing Support

Task	Complete
Pre-Job and Safety briefs	
Generator testing support	
End of day brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City
Foley Contacts Onsite: Charles Moffet, Rick Palmer

DAY 32 (9/21/2023)– Generator Testing Support

Task	Complete
Pre-Job and Safety briefs	
Generator testing support	
End of day/project brief	

Impact to customer load: None

Companies Onsite: Cat, Foley, City, Decker Electric
Foley Contacts Onsite: Charles Moffet, Palmer

Decker Electric will need to be onsite to unhook the load bank.

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vi. Procedure

Pre-Job and Safety briefs

Briefing should include overall scope of work, sequence of events, individual responsibilities and test procedures. Adequate time should be planned for questions and answers and sufficient copies of procedures and related materials for attendees.

Safety brief should be jointly conducted by participating parties and include precautions taken to avoid injury to personnel, damage to equipment and protection of customer load. Brief should include required PPE, local operating restrictions and protocol, location of installed safety equipment, egress and restricted or limited access areas.

Hardware / Wiring Installation

Hardware installation will include mounting of electrical components and routing of electrical/communication wiring, continuity testing and completing required labeling. Integration (connection) to system will not be made in this step and will not impact normal system operation. Existing penetrations, mounting hardware and label convention should be utilized. Normal electrical safety precautions should be observed.

System test

Programs were tested at the factory on a program simulator and validated prior to installation in the customer's equipment. This test outline is a guideline to validate system performance against specification attached. Test performance sequence changes, duration of test or additional testing may be determined necessary by customer, based on facility operating restrictions or specific customer requests. It is not uncommon to encounter slight differences between operating system performances observed on a simulator as opposed to customer's equipment. These types of issues are addressed during the installation and startup sequence repeated to validate performance as necessary to meet customer's expectations. Operators should address changes and repeat effected portion of program sequence prior to continuing with remaining portion of the sequence test. Satisfactory performance of each test will be noted below. Satisfactory results include demonstration and observation or positive verification of each expected action.

System Restoration

This step is performed at the conclusion of each work period and following initial program change to assure system is restored to a normal operating condition and help assure protection of customer load. System status, breaker positions and customer load is verified to be in an expected condition. System should be in normal / auto and any other condition or operating restriction should be clearly understood by service representative and system operators.

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