

Maintenance Code	Asset Type	Equipment Type	Maintenance	Monthly	4 months	6 months	12 months	24 months	36 months	60 months	72 months	Reference				
1	Transformer	MV Liquid Transformer	Preventive	Check the cooling fans and fan motor.			Check the cooling fans and fan motor.						O&M Manual 415 P20-25 CSA Z463-18 P164-17, P171-179 NETA MTS-2019 P44-37 NFPA 70B P16, P17, P18			
				Check the transformer oil level and condition.			Check the transformer oil level and condition.									
				Check the transformer oil temperature.			Check the transformer oil temperature.									
				Check the transformer oil dielectric strength.			Check the transformer oil dielectric strength.									
				Check the transformer oil moisture content.			Check the transformer oil moisture content.									
		Check the transformer oil acidity.			Check the transformer oil acidity.											
		Current Transformer	Planned Preventive	Check the CT ratio and polarity.			Check the CT ratio and polarity.								CSA Z463-18 P104-108 NETA MTS-2019 P109-111 NFPA 70B P10	
				Check the CT secondary circuit for short circuits.			Check the CT secondary circuit for short circuits.									
				Check the CT primary circuit for open circuits.			Check the CT primary circuit for open circuits.									
				Check the CT secondary circuit for correct polarity.			Check the CT secondary circuit for correct polarity.									
Check the CT secondary circuit for correct ratio.					Check the CT secondary circuit for correct ratio.											
Potential Transformer	Planned Preventive	Check the PT ratio and polarity.			Check the PT ratio and polarity.							CSA Z463-18 P112 NETA MTS-2019 P112-114 NFPA 70B P110				
		Check the PT secondary circuit for short circuits.			Check the PT secondary circuit for short circuits.											
		Check the PT primary circuit for open circuits.			Check the PT primary circuit for open circuits.											
		Check the PT secondary circuit for correct polarity.			Check the PT secondary circuit for correct polarity.											
		Check the PT secondary circuit for correct ratio.			Check the PT secondary circuit for correct ratio.											
3	Switches	66 kV Circuit Switcher	Planned Preventive	Check the switch mechanism for proper operation.			Check the switch mechanism for proper operation.						O&M Manual 416 P48-53 CSA Z463-18 P168-190 NETA MTS-2019 P51-53 NFPA 70B P16			
				Check the switch contacts for wear and tear.			Check the switch contacts for wear and tear.									
				Check the switch insulators for damage.			Check the switch insulators for damage.									
				Check the switch oil level and condition.			Check the switch oil level and condition.									
				Check the switch oil temperature.			Check the switch oil temperature.									
		Cable & Buses	Planned Preventive	Check the cable and bus for damage.			Check the cable and bus for damage.								CSA Z463-18 - 2018 P185-186 NETA MTS-2019 P184-185 NFPA 70B-2013 P113-115	
				Check the cable and bus for loose connections.			Check the cable and bus for loose connections.									
				Check the cable and bus for correct polarity.			Check the cable and bus for correct polarity.									
				Check the cable and bus for correct ratio.			Check the cable and bus for correct ratio.									
				Check the cable and bus for correct temperature.			Check the cable and bus for correct temperature.									
Cable Tray	Planned Preventive	Check the cable tray for damage.			Check the cable tray for damage.							NETA MTS-2019 P44-45 NFPA 70B-2013 P110				
		Check the cable tray for loose connections.			Check the cable tray for loose connections.											
		Check the cable tray for correct polarity.			Check the cable tray for correct polarity.											
		Check the cable tray for correct ratio.			Check the cable tray for correct ratio.											
		Check the cable tray for correct temperature.			Check the cable tray for correct temperature.											
6	Relay	Electronic Relay	Planned Preventive	Check the relay for damage.			Check the relay for damage.						O&M Manual 415 P158-159, P165-177 O&M Manual 442 P154-171 O&M Manual 442 P154-171 CSA Z463-18 NETA MTS-2019 P104-105 NFPA 70B P10			
				Check the relay contacts for wear and tear.			Check the relay contacts for wear and tear.									
				Check the relay insulators for damage.			Check the relay insulators for damage.									
				Check the relay oil level and condition.			Check the relay oil level and condition.									
				Check the relay oil temperature.			Check the relay oil temperature.									
		Surge Lightning Arrester	Planned Preventive	Check the surge lightning arrester for damage.			Check the surge lightning arrester for damage.								CSA 4605-18 P18 NETA MTS-2019 P101-102 NFPA 70B P14	
				Check the surge lightning arrester for loose connections.			Check the surge lightning arrester for loose connections.									
				Check the surge lightning arrester for correct polarity.			Check the surge lightning arrester for correct polarity.									
				Check the surge lightning arrester for correct ratio.			Check the surge lightning arrester for correct ratio.									
				Check the surge lightning arrester for correct temperature.			Check the surge lightning arrester for correct temperature.									
9	Neutral Grounding Resistor	Neutral Grounding Resistor	Planned Preventive	Check the neutral grounding resistor for damage.			Check the neutral grounding resistor for damage.						O&M Manual 479 P7 CSA Z463-18 P113-114 NETA MTS-2019 P104-107 NFPA 70B P10-14			
				Check the neutral grounding resistor for loose connections.			Check the neutral grounding resistor for loose connections.									
				Check the neutral grounding resistor for correct polarity.			Check the neutral grounding resistor for correct polarity.									
				Check the neutral grounding resistor for correct ratio.			Check the neutral grounding resistor for correct ratio.									
				Check the neutral grounding resistor for correct temperature.			Check the neutral grounding resistor for correct temperature.									
		Grid	Grid Ground Rod	Planned Preventive	Check the grid ground rod for damage.			Check the grid ground rod for damage.							CSA Z463-18 P109 NETA MTS-2019 P107-110	
					Check the grid ground rod for loose connections.			Check the grid ground rod for loose connections.								
					Check the grid ground rod for correct polarity.			Check the grid ground rod for correct polarity.								
					Check the grid ground rod for correct ratio.			Check the grid ground rod for correct ratio.								
					Check the grid ground rod for correct temperature.			Check the grid ground rod for correct temperature.								

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MV Liquid Transformer							
Tag ID: _____		Asset location: _____		Asset Type : _____		Manufacturer: _____ Model: _____	
Company: _____		Personnel: _____		Initial: _____		Date: _____	
KVA: _____		Voltage _____		LTC Taps: _____		Insulating Fluid Type: _____ Gallons: _____	
Maintenance Items	Monthly	4 months	6 months	12 months	24 months	60 months	Remarks
1. Check the pressure gauge and record the reading.							To be performed by the City personnel/ optional.
2. Record the reading of oil temp. gauge and winding temp gauge.							To be performed by the City personnel/ optional.
3. Check liquid level gauge and record the reading.							To be performed by the City personnel/ optional.
4. Check and record the tap position along with the actual and maximum drag hand.							To be performed by the City personnel/ optional.
5. Check any leaks around the transformer.							To be performed by the City personnel/ optional.
6. Check the condition of dehydrating breather.							To be performed by the City personnel/ optional.
7. Check and record the slow gas accumulated gauge from the Gas Detector Relay.							To be performed by the City personnel/ optional.
8. Check and record all readings from the liquid level gauges located on the conservator and tap changers.							To be performed by the City personnel/ optional.
9. Check the operation of cooling fans.							To be performed by the City personnel/ optional.
10. Test the oil sample for dielectric strength and water content.							
11. Test oil sample for complete DGA (including H2, C2H2, C2H4, CO, and CH4).							
12. Check for any corrosion, paint chips, and other damages around the transformer.							
13. Perform test for interfacial tension, neutralization number, and power factor.							
14. Check the grounding connections.							
15. Perform visual inspection for insulators for evidence of contamination or flashover and clean insulators.							Including insulators between 66 kV circuit switcher and transformer.
16. Check the condition of the bushings, the capacitance, and PF value against the nameplate.							To be performed at the beginning and at the end of the warranty. Perform IR scan on yearly basis after the warranty.
17. Clean the bushings.							Performed at the end of the warranty and 5 years after that.
18. Perform turn ratio test.							Performed at the end of the warranty and 5 years after that.
19 Perform winding resistance test.							Performed at the end of the warranty and 5 years after that.
20. Perform insulation resistance test (PI).							Performed at the end of the warranty and 5 years after that.
21. Perform tan δ test.							Performed at the end of the warranty and 5 years after that.

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Maintenance Items	Monthly	4 months	6 months	12 months	24 months	36 months	Remarks
22. Perform SFRA.							Performed at the end of the warranty and 5 years after that.
23. Check the control cabinets for any sign of damages.							Performed at the end of the warranty and 5 years after that.
24. Perform megger core/ core-ground test.							Performed at the end of the warranty and 5 years after that.
25. Perform full internal inspection of the control cabinets devices (such as heaters, etc.) including LTC panel, operating LTC for full range, performing insulation test, & ratio check.							Performed at the end of the warranty and 5 years after that.
26. Perform as-left tests and record the findings.							Performed at the end of the warranty and 5 years after that.
Liquid level gauge reading:							
Pressure gauge reading:							
Oil temperature gauge reading:							
Winding temperature gauge reading:							
All tests shall proceed according to NETA MTS standard. Please refer to NETA MTS, CSA Z463, NEPA 70B, Equipment Manual # 15 for Pass /Fail criteria.							
Remarks (Record action when inspection data or tests are out of limits):							
Report for Conditions Found:							
Recommended Repairs/Replacement:							
Estimated Cost for the Repair/Replacement:							

South End Water Pollution Control Center

Current Transformer							
Tag ID: _____		Asset location: _____		Asset Type : _____		Manufacturer: _____ Model: _____	
Company: _____		Personnel: _____		Initial: _____		Date: _____	
Ratio: _____							
Maintenance Items	Monthly	4 months	6 months	12 months	24 months	36 months	Remarks
1. Conduct visual inspection for any damage.							
2. Perform insulation resistance test of the CT.							
3. Perform thermal (IR) scan.							
4. Tighten any loose connection and check any visible damages.							
5. Check whether CT is dirty. Clean CT as required.							
6. Perform polarity test.							
7. Perform turn ratio test.							
8. Perform winding resistance test.							
9. Perform excitation test.							
10. Perform burden test.							
11. Check the condition of the nameplate.							
12. Perform as-left tests and record the findings.							
All tests shall proceed according to NETA MTS standard. Please refer to NETA MTS, CSA Z463, and NEPA 70B standards for Pass /Fail criteria.							
Remarks (Record action taken when inspection data or tests are out of limits):							
Report for Conditions Found:							
Recommended Repairs/Replacement:							
Estimated Cost for the Repair/Replacement:							

South End Water Pollution Control Center

66 kV Circuit Switcher							
Tag ID: _____		Asset location: _____		Asset Type : _____			
Company: _____		Personnel: _____		Initial: _____		Date: _____	
Manufacturer: _____		Model: _____		Rating: Volts: _____		Amperes: _____	
Maintenance Items	Monthly	4 months	6 months	12 months	36 months	72 months	Remarks
1. Record mechanical counter, gas pressure, and ambient temperature.							
2. Check for any contamination for insulators.							
3. Check for any damages to insulators.							
4. Inspect any loose parts in the cabinet including loose wiring.							
5. Check for any loose mechanical connections in the cabinet.							
6. Inspect any loose parts of motor operator in the cabinet.							
7. Verify that cabinet heater is energized.							
8. Clean circuit switchers including the insulators.							
9. Conduct mechanical operational tests.							
10. Inspect and measure interrupter contact resistance.							
11. Check for any SF6 leaks.							
12. Check SF6 moisture level.							
13. Check SF6 level gauge and record the finding.							
14. Inspect insulators RTV sealant on sandband.							
15. Check foundation bolt connections.							
16. Check ground lead connection to grounding pad.							
17. Record operation counter reading.							
18. Inspect hand crank and interlock handle.							
19. Inspect arcing contacts of interrupter.							See note 2.
20. Conduct interrupter timing test.							See note 2.
21. Inspect interrupter nozzle.							See note 2.
22. Perform as left test.							
Notes:							
1. All tests shall proceed according to NETA MTS standard. Please refer to NETA MTS, CSA Z463, and NEPA 70B standards for Pass /Fail criteria.							
2. To be performed by Southern States representative while under warranty.							
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Remarks (Record action when inspection data or tests are out of limits):
Report for Conditions Found:
Recommended Repairs/Replacement:
Estimated Cost for the Repair/Replacement:

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Medium Voltage Cables							
Tag ID: _____		Asset location: _____		Asset Type : _____			
Company: _____		Personnel: _____		Initial: _____		Date: _____	
Manufacturer: _____		Model: _____		Rating: _____			
Maintenance Items	Monthly	4 months	6 months	12 months	24 months	36 months	Remarks
1. Visual inspection for physical damage.							
2. Inspection for overheating.							
3. Inspection for loose screws, nuts, and bolts.							
4. Inspection for shield grounding and cable supports.							
5. Inspection of terminations and splices.							
6. Inspection for discoloured, cracked, or brittle insulation or jacket.							
7. Inspection for signs of corrosion, discoloration, and oxidation of metallic shield.							
8. Inspecting compression-applied or mechanical connections for correct cable match and indentation.							
9. Perform overpotential test.							
10. Perform shield continuity test.							
11. Perform thermographic survey.							
12. Perform resistance measurement and record the finding.							
13. Perform insulation resistance test (VLF/TD).							Optional
14. Perform PD test.							Optional
All tests shall proceed according to NETA MTS standard. Please refer to NETA MTS, CSA Z463 and NEPA 70B standards for Pass /Fail criteria.							
Remarks (Record action when inspection data or tests are out of limits):							
Report for Conditions Found:							
Recommended Repairs/Replacement:							
Estimated Cost for the Repair/Replacement:							

South End Water Pollution Control Center

Cable Bus							
Tag ID: _____		Asset location: _____		Asset Type : _____			
Company: _____		Personnel: _____		Initial: _____		Date: _____	
Manufacturer: _____		Model: _____		Rating: _____			
Maintenance Items	Monthly	4 months	6 months	12 months	24 months	36 months	Remarks
1. Conduct visual inspection for any damages and corrosion.							
2. Visually inspect the cable insulation for any damages such as discoloration, cuts, breakdown, brittle insulation, or burns.							
3. Check alignment, straight runs, joint packs, and directional change pieces.							
4. Check supports for any damages and corrosion.							
5. Check panel flanges, earth continuity, etc.							
6. Perform IR scan for the cables.							
7. Inspect for loose connections and discoloration. Tighten any loose connections.							
8. Remove excess surface oxides from aluminum connectors.							
9. Perform shield continuity test.							
10. Perform continuity test for each cable.							
11. Check torque connections.							
12. Perform as-left tests and record the findings.							
13. Conduct Hi-pot for cable insulations using VLF/TD.							Optional
14. Perform PD test.							Optional
All tests shall proceed according to NETA MTS standard. Please refer to NETA MTS, CSA Z463 and NEPA 70B standards for Pass /Fail criteria.							
Remarks (Record action when inspection data or tests are out of limits):							
Report for Conditions Found:							
Recommended Repairs/Replacement:							
Estimated Cost for the Repair/Replacement:							

South End Water Pollution Control Center

Cable Tray							
Tag ID: _____		Asset location: _____		Asset Type : _____			
Company: _____		Personnel: _____		Initial: _____		Date: _____	
Manufacturer: _____		Model: _____		Rating: _____			
Maintenance Items	Monthly	4 months	6 months	12 months	24 months	36 months	Remarks
1. Conduct visual inspection for any damages and corrosion.							
2. Visually inspect the cable insulation for any damages such as discoloration, cuts, breakdown, brittle insulation, or burns.							
3. Check alignment, straight runs, joint packs, and directional change pieces.							
4. Check supports for any damages and corrosion.							
5. Check panel flanges, earth continuity, etc.							
6. Perform IR scan for the cables.							
7. Inspect for loose connections and discoloration. Tighten any loose connections.							
8. Remove excess surface oxides from aluminum connectors.							
9. Visually inspect any splices.							
11. Perform shield continuity test.							
12. Perform continuity test for each cable.							
13. Check torque connections.							
14. Perform as-left tests and record the findings.							
15. Conduct Hi-pot test for cable insulations using VLF/TD.							Optional
16. Perform PD test.							Optional
All tests shall proceed according to NETA MTS standard. Please refer to NETA MTS, CSA Z463 and NEPA 70B standards for Pass /Fail criteria.							
Remarks (Record action when inspection data or tests are out of limits):							
Report for Conditions Found:							
Recommended Repairs/Replacement:							
Estimated Cost for the Repair/Replacement:							

South End Water Pollution Control Center

Electronic Relay							
Tag ID: _____		Asset location: _____		Asset Type : _____			
Company: _____		Personnel: _____		Initial: _____		Date: _____	
Manufacturer: _____		Model: _____		Firmware Version: _____			
Maintenance Items	Monthly	4 months	6 months	12 months	24 months	36 months	Remarks
1. Verify current and voltage reading.							
2. Conduct visual inspection to ensure that the relay is in good working condition.							
3. Remove any dust from the relay.							
4. Conduct visual inspection of the relay for any damage.							
5. Verification of relay settings.							Optional
6. Trip test using secondary injection.							Optional
7. Perform firmware upgrade.							Install firmware upgrade after approval from the City.
8. Test input and output of the relay.							Optional
9. Tighten any loose connections.							
10. Perform functional test for all protection and control scheme.							
11. Conduct insulation resistance test.							
12. Conduct as-left test.							
All tests shall proceed according to NETA MTS standard. Please refer to NETA MTS, CSA Z463, and NEPA 70B standards for Pass /Fail criteria.							
Remarks (Record action when inspection data or tests are out of limits):							
Report for Conditions Found:							
Recommended Repairs/Replacement:							
Estimated Cost for the Repair/Replacement:							

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Surge/Lightning Arrester							
Tag ID: _____ Asset location: _____ Asset Type : _____							
Company: _____ Personnel: _____ Initial: _____ Date: _____							
Manufacturer: _____ Model: _____ Rating: _____							
Maintenance Items	Monthly	4 months	6 months	12 months	24 months	36 months	Remarks
1. Check for physical damage such as for any cracks, chips, or corrosion.							
2. Check the torque on all bolts. Tighten as required.							
3. Check the proper rating of the arresters.							
4. Perform insulation resistance / dole test for leakage current.							
5. Verify that each surge arrester ground lead is individually attached to a ground bus or ground electrode.							
6. Perform bolted connection resistance test.							
7. Clean arrester sheds.							
8. Perform as-left tests and record the findings.							
All tests shall proceed according to NETA MTS standard. Please refer to NETA MTS, CSA Z463, and NEPA 70B standards for Pass /Fail criteria.							
Remarks (Record action when inspection data or tests are out of limits):							
Report for Conditions Found:							
Recommended Repairs/Replacement:							
Estimated Cost for the Repair/Replacement:							

South End Water Pollution Control Center

Neutral Grounding Resistor							
Tag ID: _____		Asset location: _____		Asset Type : _____			
Company: _____		Personnel: _____		Initial: _____		Date: _____	
Manufacturer: _____		Model: _____					
Maintenance Items	Monthly	4 months	6 months	12 months	24 months	36 months	Remarks
1. Conduct visual inspection to the enclosure for any sign of damage.							
2. Keep the NGR clean of accumulated dust or debris.							
3. Disconnect and Isolate the electrical system being grounded through the NGR and open the connection between the system neutral and Neutral Grounding Resistor.							
4. Conduct a visual inspection of all the parts for any sign of damages.							
5. Check for cracked insulators or bushings.							
6. Check the resistive element for continuity.							
7. Check all the internal connections for tightness.							
8. Check the wiring for signs of damage from heat or overloads.							
9. Perform insulation resistance test.							
10. Perform resistance test.							
11. Perform as-left tests and record the findings.							
All tests shall proceed according to NETA MTS standard. Please refer to NETA MTS, CSA Z463, NEPA 70B, and Equipment Manual # 43 for Pass /Fail criteria.							
Remarks (Record action when inspection data or tests are out of limits):							
Report for Conditions Found:							
Recommended Repairs/Replacement:							
Estimated Cost for the Repair/Replacement:							

South End Water Pollution Control Center

Ground Grid							
Tag ID: _____		Asset location: _____		Asset Type : _____			
Company: _____		Personnel: _____		Initial: _____		Date: _____	
Maintenance Items	Monthly	4 months	6 months	12 months	24 months	60 months	Remarks
1. Visual inspection of the grounding test well.							
2. Inspect expose grounding to ensure nothing is loose and no corrosion.							
3. Test the grounding test well.							
4. Perform point-to-point tests to determine the resistance between the main grounding system and all major electrical equipment frames, system neutral, and/or derived neutral points.							
5. Perform fall-of-potential or alternative test in accordance with IEEE 81 on the main grounding electrode or system.							
All tests shall proceed according to NETA MTS standard. Please refer to NETA MTS, CSA Z463, and NEPA 70B for Pass /Fail criteria.							
Remarks (Record action when inspection data or tests are out of limits):							
Report for Conditions Found:							
Recommended Repairs/Replacement:							
Estimated Cost for the Repair/Replacement:							