715-2022 NEWPCC Maintenance Schedule

Maintenance Code	Asset Type	Equipment Type	Maintenance	Monthly	4 months	6 months	12 months	24 months	36 months	60 months	Reference
1	Transformer	MV Liquid Transformer	Predictive								CSA Z463-18 P86-87, P177-179 NETA MTS- 2019 P34-37 NFPA 70B P56, P111, P165
			Planned Preventive	1. Check the pressure gauge and record the reading. 2. Check the oil temp. gauge, winding temperature gauge, and record the readings. 3. Check the oil level gauge and record the reading. 4. Check and record the tap position along with the actual and maximum drag hand. 5. Check & record the reading of the OLTC counter. 6. Check the condition of control cabinets including OLTC panel. 7. Check any leaks around the transformer. 8. Check the condition of dehydrating breather.			1. Check the condition of the bushings, the capacitance, and PF value against the nameplate. 2. Check the operation of cooling fans. 3. Perform visual inspection for insulators for evidence of contamination or flashover. 4. Test the oil sample for dielectric strength and water content. 5. Test oil sample for complete DGA (including H2, C2H2, C2H4, CO, and CH4). Include taking separate oil sample where required from the DGA tank and checking breather for desiccant replacement. 6. Check DGA monitor (Calisto 2) for hydrogen, moisture, and CO. 7. Download the databank and event log of the DGA monitor (Calisto 2) and send them to Morgan Schaffer for evaluation of the monitor. 8. Check for any corrosion, paint chips, and other damages around the transformer. 9. Perform visual inspection for insulators for evidence of contamination or flashover and clean insulators between 66 kV breaker and transformer. 10. Check the control cabinets for any sign of damages. 11. Check for grounding connections. 12. Conduct inspection inside the OLTC cabinet to ensure everything is functioning properly such as nothing is loose. Record the counter value. 13. Check OLTC cabinet to ensure it has proper oil level. 14. Check OLTC to ensure the motor is working properly. 15. Check OLTC to ensure the cabinet heater is working properly. 16. Check OLTC to ensure the breather is in proper condition.	1. Check the condition of radiators.	1. Perform full internal inspection of the control cabinets devices (such as heaters, etc.) including OLTC panel, operating OLTC for full range, performing insulation test, & ratio check.	1. Perform winding resistance test. 2. Perform insulation resistance test (Polarization Index). 3. Perform tan δ test. 4. Perform SFRA. 5. Perform Power factor test. 6. Perform turn ratio test. 7. Clean the bushings. 8. Perform as-left tests and record the findings. 9. Perform megger core/ core-ground test.	
			Planned Corrective				1. Investigate any changes to the test result.				
		MV Padmount Liquid Transformer	Predictive								CSA Z463-18 P86-87, P177-179 NETA MTS- 2019 P34-37 NFPA 70B P56, P111, P165
			Planned Preventive				1. Inspect all exposed surfaces for evidence of tampering, battered metal, gouges, etc. 2. Inspect drain cocks, plugs, fuse mountings, and switches for any evidence of insulating liquid seepage around tank-wall gaskets, seals, etc. 3. Check tank exterior for signs of a leak. 4. Walk around the unit and listen for abnormal noises. 5. Verify that transformer is not tilted more than 5 degree from horizontal. 6. Check if there is unusual odors and oil spots around transformer. 7. Check the operation of vacuum pressure gauge & record the reading. 8. Check the operation of liquid temp. gauge & record the reading. 9. Visually inspect the fuses if the fuses are present. 10. Check the cable connections. If there are signs of overheating, check for loose connections, or discolored spades (paddles). 11. Check condition of the HV and LV bushings. Observe for any indication of dirt, leakage, breakage, general damage, heat damage, or flashover. 12. Check the cubicle Padlock. (if present). 13.Check for excessive cable weight or stiff cable conductors putting upward or downward pressure on the bushings due to pad settling. 14. Check the operation of Pressure Relief Valve and for dirt & debris. 15.Test oil sample for complete DGA (iincluding H2, C2H2, C2H4, CO, and CH4). 16.Check ground connection. 17. Check for paint chips and eligibility of nameplate. 18. Check the operation of winding temp. gauge & record the reading.			1. Check the condition of radiators. 2. Perform as-left tests and record the findings. 3. Perform turn ratio test. 4. Perform winding resistance test. 5. Perform insulation resistance test (PI). 6. Perform tan δ test. 7. Perform SFRA. 8. Perform power factor test. 9. Perform megger core/ core-gound test 10. 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.	
			Planned Corrective				1. Repair any dents or deformities. Scratched or weathered paint or protective coatings should be touched up promptly. 2. Repair drain cocks, plugs, fuse mountings, and switches if there is any evidence of insulating liquid seepage around tank-wall gaskets, seals, etc. 3. Replace gaskets or seals if there is any leak. The insulating liquid is to be lowered to the appropriate level. 4. Replace any gauges that are mot working properly. 5. Clean the bushings and surge arrestors. Replace the damage ones. 6. Tighten any loose connection. 7. Investigate any abnormal noise from the transformer. 8. Replace the insulating oil if the DGA result is found unsatisfactory as per standard.			1. Investigate any changes to test result.	
		Current Transformer	Predictive								CSA Z463-18 P194-198 NETA MTS- 2019 P109-111 NFPA 70B P159
			Planned Preventive				1. Perform insulation resistance test of the CT. 2. Perform thermal (IR) scan. 3. Tighten any loose connection and check any visible damages. 4. Clean CT as required. 5. Perform turn ratio test. 6. Perform polarity test. 7. Perform excitation test. 8. Perform winding resistance test. 9. Perform burden test. 10. Check the condition of the nameplate. 11. Conduct visual inspection for any damage. 12. Perform as-left tests and record the findings.				
			Planned Corrective								
		Potential Transformer	Predictive								CSA Z463-18 P112 NETA MTS- 2019 P112-114 NFPA 70B P159
			Planned Preventive				1. Check the condition of PT. Check for any phyical damages. 2. Check the grounding connection. 3. Check the eligibility of the name plate. 4. Check for any loose connection. 5. Check the fuse condition and verify the size. 6. Perform IR scan for hot spots. 7. Perform insulation resistance test. 8. Perform turns ratio test. 9. Clean PT as required. 10. Perform as-left tests and record the findings. 11. Test oil sample for complete DGA analysis (iincluding H2, C2H2, C2H4, CO, and CH4) for 66 kV CCVTs. 12. Measure capacitance and dissipation factor and record the finding. Only for 66 kV CCVTs. 13. Check protective gap for 66kV CCVTs.				
			Planned Corrective				1. Tighten any loose connections.				
2	Circuit Breaker	SF6 Circuit Breaker	Predictive								CSA Z463-18 P182-187 NETA MTS- 2019 P62-64 NFPA 70B P152-154
			Planned Preventive			1. Check SF6 level in the tank and record the reading.	1. Visual inspection for any broken parts. Clean and lubricate all mechanical linkages. 2. Check all control wiring and associated fitted components. 3. Check mechanical operations. 4. Check the operation of the heaters for the tank. 5. Check if there is any leak on the tank using SF6 sniffer device. 6. Record the breaker operation counter reading 7.Verify/ test gas pressure switch setting (SW1 to SW3) and the 63X function and alarms. 8. Check interrupter pressure relief plates. 9. Check functionality of kirk key interlock and emergency trip button. 10. Clean insulators (including between disconnects and breaker).		1. Perform contact resistance test and dynamic resistance measurement. 2. Perform breaker timing test. 3.Visually inspect the internal condition of breaker control panel. Ensure all components are working properly. 4. Perform breaker motion analysis test. 5. Perform breaker control functional test including alarms, pressure switches, limit switches, etc. 6. Perform power factor or dissipation factor test on each pole and bushing. 7.Check for any sign of corona, tracking, and thermal damages. 8. Perform as-left tests and record the findings. 9. Perform breaker trip test (manually and automatically). Visually check the condition of the breaker.		
			Planned Corrective			1. Add SF6 as required. 2. Check if there is any leak on the tank.					
3	Switches	72.5 kV Disconnect Switch	Predictive								CSA Z463-18 P188-190 NETA MTS- 2019 P49-61 NFPA 70B P156
			Planned Preventive				1. Perform visual inspection for any damage and clean insulators. 2. Perform IR scan for any hot spots.		1. Perform contact resistance test. 2. Perform bolted connection resistance test. 3. Perform visual inspection for any sign of any corona, tracking, and thermal damages. 4. Perform overpotential test. 5. Check kirk key operation. 6. Perform visual inspection for switch alignment while manually operating the disconnect. 7. Exercise the disconnect. 8. Check for loose connection and any cracks. 9. Check the proper operation of auxiliary switches and control box heater. 10.Check that the nameplate data matches the drawings and studies. 11. Check drive linkage and operating assembly and lubricate as required. 12. Perform as-left tests and record the findings.		
			Planned Corrective								
5	Cable & Buses	MV Cables	Predictive								CSA Z463-18 - 2018 P185-186 NETA MTS- 2019 P41-43 NFPA 70B-2013 P112-113
			Planned Preventive				1.Visual inspection for physical damage 2. Inspection for overheating 3. Inspection for loose connections (termination points) 4. Inspection for shield grounding and cable support 5. Inspection of terminations and splices 6. Inspection for discolored, cracked, or brittle insulation or jacket 7. Inspection for signs of corrosion, discoloration, and oxidation of metallic shield 8. Inspect compression-applied connectors for correct cable match and indentation.	1. Perform overpotential test. 2. Perform shield continutiy test. 3. Perfom resistance measurement and record the finding. 4. Perform thermographic survey.	1. Perform insulation resistance test (VLF/TD). 2. Perform PD test.		
			Planned Corrective								
		Cable Bus	Predictive								Z462-18 P180-181 NETA MTS-2005 P44-45 NFPA 70B-2013 P109
			Planned Preventive				1. 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. Perforn IR scan for the cables. 7. Inspect for loose connections and discoloration.Tighten any loose connections. 8. Remove excess surface oxides from aluminum connectors.	1. Perform continuity test for each cable. 2. Check torque connections. 3. Perform shield continuity test 4. Perform as-left tests and record the findings.	1. Perform insulation resistance test (VLF/TD). 2. Perform PD test.		
			Planned Corrective								
		Cable Tray	Predictive								NETA MTS- 2019 P44-45 NFPA 70B-2013 P110
			Planned Preventive				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. Perforn 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. Check supports for any damages and corrosion. 10. Visually inspect any splices.	1. Perform continuity test for each cable. 2. Check torque connections. 3. Perform shield continuity test. 4. Perform as-left tests and record the findings.	1. Conduct dielectric withstand test (Hi-pot) for cable insulations using VLF/TD. 2. Perform PD test.		
			Planned Corrective								
7	Arresters	Surge/Lightning Arrester	Predictive								CSA Z463-18 P98 NETA MTS- 2019 P177-180 NFPA 70B P94
			Planned Preventive				1. Check for physical damage such as 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/ doble 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.				
			Planned Corrective								
9	Neutral Grounding Resistor	Neutral Grounding Resitor	Predictive								CSA Z463-18 P133-135 NETA MTS- 2019 P94-97 NFPA 70B P83-84
			Planned Preventive				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.				
			Planned Corrective								
15	Grid	Grid Ground Rod	Predictive								CSA Z463-18 P199 NETA MTS- 2019 P137-138
			Planned Preventive				1. Visual inspection of grounding test can/well. 2. Inspect expose grounding to ensure nothing is loose and no corrosion.	1. Test the grounding test well. 2. 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.			
			Planned Corrective								

North End Water Pollution Control Center

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	36 months	60 months	Remark
1. Check the pressure gauge and record the reading.								To be performed by the City personnel/ optional.
2. Check the oil temp. gauge, winding temperature gauge and record the readings.								To be performed by the City personnel/ optional.
3. Check the oil 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 & record the reading of the OLTC counter .								To be performed by the City personnel/ optional.
6. Check the condition of control cabinets including OLTC panel.								To be performed by the City personnel/ optional.
7. Check any leaks around the transformer.								To be performed by the City personnel/ optional.
8. Check the condition of dehydrating breather.								To be performed by the City personnel/ optional.
9. 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.
10. Check the operation of cooling fans.								
11. Perform visual inspection for insulators for evidence of contamination or flashover.								
12. Test the oil sample for dielectric strength and water content.								
13. Test oil sample for complete DGA (including H2, C2H2, C2H4, CO, and CH4).								Include taking separate oil sample where required from the DGA tank and checking breather for desiccant replacement.
14. Check DGA monitor (Calisto 2) for hydrogen, moisture, and CO.								
15. Download the databank and event log of the DGA monitor (Calisto 2) and send them to Morgan Schaffer for evaluation of the monitor.								Include the Contract Administrator when sending the databank and event log to Morgan Schaffer. Include the analysis result to the maintenance reports.
16. Check for any corrosion, paint chips, and other damages around the transformer.								

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North End Water Pollution Control Center

Maintenance Items	Monthly	4 months	6 months	12 months	24 months	36 months	60 months	Remark
17. Perform visual inspection for insulators for evidence of contamination or flashover and clean insulators.	■	■	■		■	■	■	Including between 66 kV breaker and the transformer.
18. Check the control cabinets for any sign of damages.	■	■	■		■	■	■	
19. Check the grounding connections.	■	■	■		■	■	■	
20. Conduct inspection inside the OLTC cabinet to ensure everything is functioning properly such as nothing is loose.	■	■	■		■	■	■	Record the OLTC counter value.
21. Check OLTC cabinet to ensure it has proper oil level.	■	■	■		■	■	■	
22. Check OLTC to ensure the motor is working properly.	■	■	■		■	■	■	
23. Check OLTC to ensure the cabinet heater is working properly.	■	■	■		■	■	■	
24. Check OLTC to ensure the breather is in proper condition.	■	■	■		■	■	■	
25. Check the condition of radiators.	■	■	■	■		■	■	
26. Perform full internal inspection of the control cabinets devices (such as heaters, etc.) including OLTC panel, operating OLTC for full range, performing insulation test, & ratio check.	■	■	■	■	■		■	Performed at the end of the warranty and 3 years after that.
27. Perform winding resistance test.	■	■	■	■	■	■		Performed at the end of the warranty and 5 years after that.
28. Perform insulation resistance test (PI).	■	■	■	■	■	■		Performed at the end of the warranty and 5 years after that.
29. Perform tan δ test.	■	■	■	■	■	■		Performed at the end of the warranty and 5 years after that.
30. Perform SFRA.	■	■	■	■	■	■		Performed at the end of the warranty and 5 years after that.
31. Perform Power factor test.	■	■	■	■	■	■		Performed at the end of the warranty and 5 years after that.
32. Perform turn ratio test.	■	■	■	■	■	■		Performed at the end of the warranty and 5 years after that.
33. Clean the bushings.	■	■	■	■	■	■		Performed at the end of the warranty and 5 years after that.
34. Perform megger core/ core-ground test.	■	■	■	■	■	■		Performed at the end of the warranty and 5 years after that.
35. 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:								

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North End Water Pollution Control Center

All tests shall proceed according to NETA MTS standard. Please refer to NETA MTS, CSA Z463, 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:

North End Water Pollution Control Center

MV Padmount 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	Remark
1. Inspect all exposed surfaces for evidence of tampering, battered metal, gouges, etc.							
2. Inspect drain cocks, plugs, fuse mountings, and switches for any evidence of insulating liquid seepage around tank-wall gaskets, seals, etc.							
3. Check tank exterior for signs of a leak.							
4. Walk around unit and listen for abnormal noises.							
5. Verify that transformer is not tilted more than 5 degree from horizontal.							
6. Check if there is unusual odors and oil spots around transformer.							
7. Check the operation of vacuum pressure gauge & record the reading.							
8. Check the operation of liquid temp. gauge & record the reading.							
9. Visually inspect the fuses if the fuses are present.							
10. Check for paint chips and eligibility of nameplate.							
11. Check the cable connections. If there are signs of overheating, check for loose connections or discolored spades (paddles).							
12. Check condition of the HV and LV bushings. Observe for any indication of dirt, leakage, breakage, general damage, heat damage or flashover, and clean the bushings.							
13. Check the cubicle Padlock. (if present).							
14. Check for excessive cable weight or stiff cable conductors putting upward or downward pressure on the bushings due to pad settling.							
15. Check the operation of pressure Relief valve and for dirt & debris.							
16. Test oil sample for complete DGA (iincluding H2, C2H2, C2H4, CO, and CH4).							
17. Check ground connection.							
18. Check the operation of winding temp. gauge & record the reading.							
19. Perform turn ratio test.							Performed at the end of the warranty and 5 years after that.
20. Perform winding resistance test.							Performed at the end of the warranty and 5 years after that.

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North End Water Pollution Control Center

Maintenance Items	Monthly	4 months	6 months	12 months	24 months	60 months	Remark
21. Perform insulation resistance test (PI).							Performed at the end of the warranty and 5 years after that.
22. Perform tan δ test.							Performed at the end of the warranty and 5 years after that.
23. Perform SFRA.							Performed at the end of the warranty and 5 years after that.
24.Check the condition of radiators.							Performed at the end of the warranty and 5 years after that.
25. Perform Power Factor test							Performed at the end of the warranty and 5 years after that.
26. Perform megger core/ core-ground test							Performed at the end of the warranty and 5 years after that.
28. 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.
29. Perform as-left tests and record the findings.							Performed at the end of the warranty and 5 years after that.
All tests shall proceed according to NETA MTS standard. Please refer to NETA MTS, CSA Z463, 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:							

North 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	Remark
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. 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 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:

North End Water Pollution Control Center

Potential 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	Remark
1. Check the condition of PT. Check for any phycical damages.							
2. Check the grounding connection.							
3. Check the eligibility of the name plate.							
4. Tighten any loose connection.							
5.Check the fuse condition and verify the size.							
6. Perform IR scan for hot spots.							
7. Perform insulation resistance test.							
8. Perform turns ratio test.							
9. Clean PT as required.							
10. Test oil sample for complete DGA analysis (iincluding H2, C2H2, C2H4, CO, and CH4).							Only for 66 kV CCVTs.
11. Measure capacitance & dissipation factor and record the finding.							Only for 66 kV CCVTs.
12. Check for oil leak, read and record pressure gauge reading.							Only for 66 kV CCVTs.
13. Check protective gap.							Only for 66 kV CCVTs.
14. 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 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:

North End Water Pollution Control Center

SF6 Circuit Breaker

Tag ID:_____ Asset location:_____ Asset Type :_____

Company:_____ Personnel:_____ Initial: _____ Date: _____

Manufacturer:_____ Model:_____ Rating: Volts:_____ Amperes:_____

Maintenance Items	Monthly	4 months	6 months	12 months	24 months	36 months	Remarks
1. Check SF6 level gauge and record the reading.							To be performed by the City personnel/ optional.
2. Visual inspection for any broken parts. Clean and lubricate all mechanical linkages.							
3. Check all control wirings and associated fitted components.							
4. Check mechanical operations.							
5. Check the operation of the heaters for the tank.							
6. Check if there is any leak on the tank using SF6 sniffer device.							
7. Record the breaker operation counter reading.							
8.Verify/ test gas pressure switch setting (SW1 to SW3) and the 63X function and alarms.							
9. Clean insulators.							Including between disconnects and breaker.
10. Check interrupter pressure relief plates.							
11. Check functionality of kirk key interlock and emergency trip button.							
12. Perform contact resistance test and dynamic resistance measurement.							At the end of warranty and every 3 years after that.
13. Perform breaker timing test.							At the end of warranty and every 3 years after that.
14. Visually inspect the internal condition of breaker control panel. Ensure all components are working properly.							
15. Perform breaker motion analysis test.							
16. Perform breaker control functional test including alarms, pressure switches, limit switches, etc.							
17. Perform power factor or dissipation factor test on each pole and bushing.							
18. Check for any sign of corona, tracking, and thermal damages.							
19.Perform breaker trip test (manually and automatically). Visually check the condition of the breaker.							
20. Perform as-left tests and record the findings.							

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North End Water Pollution Control Center

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:

72.5 kV Disconnect Switch							
Tag ID:_____ Asset location:_____ Asset Type :_____ Manufacture: _____							
Company:_____ Personnel:_____ Initial: _____ Date:_____							
Manufacturer:_____ Model:_____ Rating: Volts:_____ Amperes:_____							
Maintenance Items	Monthly	4 months	6 months	12 months	24 months	36 months	Remarks
1. Perform visual inspection for any damages and clean insulators.							
2. Perform IR scan for any hot spots.							
3. Perform contact resistance test.							
4. Perform bolted connection resistance test.							
5. Perform visual inspection for any sign of any corona, tracking, and thermal damages.							
6. Perform overpotential test.							
7. Check kirk key operation.							
8. Perform visual inspection for switch alignment while manually operating the disconnect.							
9. Exercise the disconnect.							
10. Check for loose connection and any cracks.							
11. Check the proper operation of auxiliary switches and control box heater.							
12. Check that the nameplate data matches the drawings.							
13. Check drive linkage and operating assembly and lubricate as required.							
14. 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.							
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North End Water Pollution Control Center

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:

North End Water Pollution control Center

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 connections (termination points).							
4. Inspection for shield grounding and cable support.							
5. Inspection of terminations and splices.							
6. Inspection for discolored, cracked, or brittle insulation.							
7. Inspection for signs of corrosion, discoloration, and oxidation of metallic shield.							
8. Inspect compression-applied connectors for correct cable match and indentation.							
9. Perform overpotential test.							
10. Perform shield continutiy test.							
11. Perfom thermographic survey (IR scan).							
12. Perfom 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:

Maintenance Schedule

North 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 discolouration, 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. Check supports for any damages and corrosion.							
10. Visually inspect any splices.							
11. Perform continuity test for each cable.							
12. Check torque connections.							
13. Perform shield continuity test.							
14. Perform as-left tests and record the findings.							
15. Conduct dielectric withstand 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:

North 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. Visual inspection for any damages and corrosion.							
2. Visually inspect the cable insulation for any damages such as discolouration, 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 as-left tests and record the findings.							
10. Perform continuity test for each cable.							
11. Check torque connections.							
12. Perform shield continuity test.							
13. Conduct dielectric withstand test (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:

North End Water Pollution Control Center

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 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/ doble 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:

North End Water Pollution Control Center

Neutral Grounding Resitor

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, 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:

North 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	Remark
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.							

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: