**Overview**

This project will include inspection and testing of various equipment consisting of medium voltage outdoor transformers, medium voltage pad mount switches, medium voltage switchgear, control power batteries and charging systems, 13.2kv x 480/277or 208/120-unit substations and/or distribution switchboards and panelboards. All testing and inspections will be performed per the standards and recommendations listed below as a minimum requirement. Any additional requirements as published by the OEM shall be included.

**Utility Coordination/De-energizing**

The switchgear to be tested and inspected under a portion of this scope is the primary switchgear which takes 13.2kv service from National Grid feeders 21551, and 21557 and serves the entire Seneca Niagara Falls Gaming Corp. property. Great care must be taken to assure that the electrical service to the property is not disrupted at any time. Coordinating the switching of National Grid equipment to de-energize one National Grid feeder, and perform work on the de-energized portion of the Powercon switchgear shall be carefully coordinated, and arranged by the contractor. This planned de-energization shall only be allowed after approval by SNFGC, and shall be limited in length to only the time needed to safely perform the required work. Approval for de-energized work will only be considered after review of a complete schedule to determine the extent and duration of the utility outage.

**Qualifications of Testing Company:**

• The Contractor shall meet OSHA criteria for accreditation of testing laboratories, Title 29, Part 1907, and be a member company of the International Electrical Testing Association (NETA).

• The Contractor shall have a minimum of one (1) professional electrical engineer who has been licensed in New York State for a minimum of 10 years and is either employed or contracted by the firm for testing services.

• The Contractor shall be regularly engaged in the startup, commissioning and testing of electrical transformation and distribution and protective apparatus and metering equipment as its core business.

• The lead, on-site, technical person shall be currently certified by the International Electrical Testing Association (NETA) National Institute for Certification in Engineering Technologies (NICET) in electrical power distribution system testing.

• Contractor shall have a minimum of 10 years of experience in testing high voltage transformation, distribution and protective equipment.

• Contractor shall provide (3) three applicable references including name of facility, contact name and contact phone number with the proposal.

• Contractor shall provide EMR (Experience modification rating) for past 3 years with the proposal.

• Include with the proposal (2) two technician resumes, for technicians to be used on this project if awarded.

**2.0 STANDARDS**

All electrical preventive maintenance shall be performed in accordance with accepted industry standards and work safety practices. This includes, but is not limited to, the latest releases of the following:

* National Fire Protection Association (NFPA) 70B, Recommended Practice for Electrical Equipment Maintenance.
* National Fire Protection Association (NFPA) 70, National Electrical Code.
* National Electrical Manufacturer’s Association (NEMA) Standard AB4, Procedures for Verifying Field Inspections and Performance Verification of Molded-Case Circuit Breakers.
* International Electrical Testing Association (NETA), Maintenance Testing Specifications for Electrical Power Distribution Equipment and Systems.
* IEEE Std P1415 Motor Maintenance and Failure Analysis (draft).
* National Electrical Manufacturer’s Association (NEMA) Standard MG1.
* International Electrical Testing Association (NETA), Maintenance Testing Specifications for Electrical Power Distribution Equipment and Systems.
* OSHA Applicable Standards.
* IEEE STD 1415, IEEE Guide to Introduction Machinery Maintenance Testing and Failure Analysis
* National Fire Protection Association (NFPA) 70E
* International Electrical Testing Association (NETA), Maintenance Testing Specifications for Electrical Power Distribution Equipment and Systems.
* IEEE STD 43, IEEE Recommended Practice for Testing Insulations Resistance of Rotating Machinery.

**3.0 RECOMMENDED MAINTENANCE AND TESTING PRACTICES**

The following sections are segmented by equipment type. For each component, a minimum practice for preventive maintenance is provided. Where applicable, additional tests and practices as required or recommended by other testing agencies listed in this RFP shall be included and required. This shall include recommended practices and tests as published by the original equipment manufacturers. It shall be the responsibility of the successful bidder to provide the manufacturers recommended procedures, and assure that such procedures are included under their proposal.

**3.1 SWITCHGEAR**

**3.1.1 Enclosures**

Ensure that all enclosure panels, doors, and structures are well-maintained in accordance with the manufacturer’s specifications. During de-energized maintenance, enclosures are to be vacuum cleaned of all loose dirt and debris — use of compressed air is not recommended since this may cause foreign particles to become embedded in the insulation or damage insulators. Any buildup of dirt or other contaminates that will not come off with vacuuming should be cleaned with lint free rags using cleaning solvents recommended by the manufacturer.

All vents and fan grills are to be cleaned of all dust and/or dirt accumulations. Ensure that ventilation openings are not obstructed. Where seals and/or gaskets are installed, these should be examined and repaired or replaced as necessary. All doors and access panels should be properly secured during operation. Where heater elements are installed, these should be cleaned, examined for damage and/or deterioration, and tested. Report any heater elements in need of repair or replacement to the owner via written report.

Electrical equipment rooms or vaults should be examined for evidence of water seepage. The tops of electrical equipment enclosures should be examined for evidence of water with any evidence of such reported to the owner.

**3.1.2 Insulators, Supports, and Connectors**

Inspect insulators and conductor supports for signs of cracking, broken pieces, and other physical damage or deterioration. Clean all loose dirt with lint free rags. For contaminates that will not remove easily, solvents approved by the manufacturer may be used. Examine for evidence of moisture that may lead to tracking or flashover while in operation. Examine surrounding areas for signs of tracking, arcing, or overheating. Report any deficiencies to the owner.

Examine all bolts and connecting devices for signs of deterioration, corrosion, or overheating. Ensure that bolts and connecting devices are tight, according to manufacturer’s specifications. Verify tightness of bolted electrical connections by calibrated torque-wrench method in accordance with manufacturers published data. Be careful not to over torque bolts and connecting devices since insulators are easy to damage and difficult to replace. Where copper and aluminum conductors and/or connectors are used together, examine connections for signs of galvanic action. Ensure that the connectors are properly used and installed in accordance with manufacturer’s specifications. Apply an antioxidant compound to all aluminum-to copper connections.

**3.1.3 Conductors**

Examine insulation for signs of deterioration, cracking, flaking, or overheating. Examine all connections for signs of overheating, cracked or broken connectors, and signs of tracking or arcing. Ensure that conductors are clean and dry. Examine and clean all connections, and torque to manufacturer’s recommendations.

**3.2 Air Circuit Breakers**

**3.2.1 Insulation**

Remove and clean interphase barriers. Clean all insulating materials with vacuum and/or clean lint free rags. If it is necessary to use cleaning solvents, use only solvents recommended by the manufacturer. Inspect for signs of corona, tracking, arcing, or thermal or physical damage. Ensure that insulation is left clean and dry.

**3.2.2 Contacts**

Ensure that all contacts are clean, smooth, and in proper alignment. Ensure that spring pressures are maintained according to manufacturer’s specifications. On silver contacts, discoloration is not usually harmful unless caused by insulating deposits. Clean silver contacts with alcohol or silver cleaner using non-abrasive cloths.

Manually close breaker to check for proper wipe, contact pressure, contact alignment, and to ensure that all contacts make at approximately the same time. A contact resistance test shall be performed to determine the quality of the contacts.

Draw-out contacts on the circuit breaker and the stationary contacts in the cubicle should be cleaned and inspected for overheating, alignment, and broken or weak springs. Coat contact surfaces with contact lubricant to ease mating (see manufacturer’s recommendations).

**3.2.3 Arc Interrupters**

Clean all ceramic materials of loose dirt and examine for signs of moisture, make sure the assemblies are clean and dry. Examine for cracked or broken pieces. Dirt and arcing deposits may be removed by light sanding — do not use emery cloth or wire brushes which may leave conductive residue behind. Repair or replace as necessary.

Examine arc chutes for dirt and/or dust accumulations and clean as necessary. Dielectric testing of arc shields may be recommended by the manufacturer. Check air puffer for proper operation.

**3.2.4 Operating Mechanism**

Inspect for loose, broken, worn, or missing parts (consult manufacturer’s schematics for required parts). Examine for excessive wear of moving parts. Observe that operating mechanisms function properly without binding, hanging, or without delayed action. Ensure any lubrication is done according to the manufacturer’s specifications. Ensure mechanisms are clean, properly lubricated, and all bolts and screws are properly secured. Repair or replace as necessary.

**3.2.5 Auxiliary Devices**

Inspect operating devices for proper operation and general condition. Ensure all indicating devices are fully functional and properly set. Protective relays and circuit breaker trip devices should be inspected and tested according to manufacturers’ specifications and applicable industry standards such as those issued by the Institute of Electrical and Electronics Engineers (IEEE) and the National Fire Protection Association (NFPA). Solid state trip devices shall be tested by secondary injection method. Series overcurrent trip devices shall be tested by primary current injection method.

**3.2.6 Notes**

As always, it is recommended that the manufacturer be consulted for specific maintenance and testing procedures.

The integrity of the vacuum chamber is often tested by applying a test voltage across the open contacts of the breaker. However, this can be a destructive test and, therefore will not be permitted unless specifically recommended or specified in the OEM operation and maintenance publications.

**3.4 Air Disconnect Switches**

Inspect and clean insulators and conductors as with circuit breakers. Tighten connections in accordance with manufacturer’s specifications. Do not over tighten as this may result in damage to connectors.

If cleaning solvents are used, ensure that they are as recommended by the manufacturer. Where abnormal environmental conditions exist, report such conditions to the owner in the final test report.

Check the operation of the arc blades, if applicable, and ensure proper wipe of the main contacts. Interphase linkages and operating rods should be inspected to make sure that the linkage has not been bent or distorted and that all fastenings are secure. The position of the toggle latch to the switch operating linkage should be observed on all closed switches to verify the switch is mechanically locked in a closed position. Operate switch manually several times to ensure proper operation, and then by motor if power-operated. Ensure that all moving parts are properly secured and lubricated as specified by the manufacturer.

Contact resistance testing of each phase contact should be performed. The results should be recorded and analyzed to ensure proper contact is being made. If the contact resistance of the switch exceeds recommended minimums, report these conditions to the owner prior to placing the switch back into service. Recommend immediate corrective action for authorization by the owner.

**3.6 Battery Stations / Chargers**

**3.6.1 Batteries**

Thoroughly clean all battery surfaces of dust and/or dirt accumulations. Clean and tighten all terminal connections. Remove any corrosion on battery terminals with bicarbonate of soda.

Clean battery studs and cable ends. On stranded cable, if ends are corroded, cut off ends or separate strands and clean internally.

Check electrolyte levels and specific gravity. Variations of more than fifty (50) points between cells may indicate a bad cell which shall be reported to the owner.

**3.6.2 Charger**

Clean all dust and/or dirt accumulations from charger. Clean all vent openings and ensure that they are free from obstructions. Check terminals and connections for tightness. Check all relays, lights, and other indicating devices for proper operation.

If all cells consistently read low, check charger for proper operation. If electrolyte levels are low, check charger rate settings against the manufacturer’s specifications. Consistently low levels may indicate the charge rate is too fast.

**3.6.3 Safety**

While charging, batteries emit explosive gases. Allow no open flames or sparks permitted near charging batteries. Battery rooms should be well ventilated and smoking should not be permitted.

**3.8 Cables and Bus**

Note: De-energize cables if they are to be touched or moved during maintenance.

**3.8.1 Cables in Manholes**

Caution: Check for dangerous gases using a properly calibrated test meter before entering any confined space such as a manhole. (Safety plan must include confined space protocol)

Inspect for sharp bends, physical damage, excessive tension, oil leaks, pits, cable movement, soft spots, cracked jackets, damaged fireproofing, poor ground connections, deteriorated and corroded or weakened cable supports. Inspect for wear at entrance point and at supports. Inspect manhole for spalled concrete, proper ventilation and excessive moisture. Inspect potheads for oil or compound leakage and for cracked / chipped porcelain.

Examine the manhole and cable grounding system to ensure its integrity. If cathodic protection has been installed in the manhole, it too should be evaluated. Recommendations for corrective action shall be provided to maintain the integrity of these systems.

**3.8.2 Raceways**

Check raceways for proper mechanical support of raceway and cables as well as check insulation for abrasion or cracks at support points. Examine raceway joints for clean and tight connections.

**3.8.3 Testing**

Suggested cable or bus tests include insulation resistance testing and polarization index testing. These tests should be recorded to track trends that may indicate a deterioration of the cable’s insulation. All underground medium voltage cables shall be tested using a dissipation factor (tan delta) and partial discharge test set (Hi-pot testing will not be allowed). Test records shall be evaluated to identify potential insulation failure and recommend scheduling of preventative repair or replacement of cables prior to failure.

**3.9 Transformers**

Transformer data (such as, voltage, current, and temperature readings) should be recorded in order to track the operating conditions of the transformer. Peak, or redline, indicators should be recorded and reset.

**3.9.1 Dry Type Transformers**

After de-energizing and grounding the transformer, clean all coils, connections, and insulators of loose dust or dirt deposits with a vacuum cleaner. Examine the transformer for signs of overheating, deterioration, arcing, loose or broken parts, or other abnormal conditions. Ensure all connections are tightened according to manufacturer’s specifications. Clean enclosure of any dust and dirt accumulations and ensure that vent openings are free from obstruction. If cooling fans are installed, examine for proper operations and lubricate as necessary.

Additional testing shall include an insulation resistance test, a dielectric absorption test, and a power factor test. These are non-destructive tests which can be performed to track the condition of the insulation over time. Detailed records should be maintained and analyzed to identify undesirable trends that may indicate the onset of an insulation failure.

**3.9.2 Liquid-Filled Transformer**

Insulating liquid samples should be taken and screen tested for dielectric breakdown, acidity, color, power factor, and interfacial tension. A Fault gas analysis or a Dissolved-Gas-in-Oil (DGA) test conducted by a qualified testing laboratory shall be performed. The preferred testing company is SD Meyers, as they maintain historical records and data from previous testing. The results should be reported to, and reviewed with the owner to track conditions and schedule maintenance as necessary.

Examine the transformer tank and bushings for evidence of leakage. Inspect the bushings, insulators, and surge arrestors for broken or damaged parts, signs of overheating or arcing, or tracking. Clean all bushings, insulators, and surge arrestors of any dirt or dust accumulation. Tighten all conductor connections in accordance with manufacturer’s recommendations.

If applicable, perform a ground resistance test to ensure a value of 25 ohms or less.

**3.10 Surge Arrestors**

Clean and inspect porcelain for signs of damage or deterioration. Repair or replace as necessary. Examine arrestor leads for damage and/or deterioration.

Other required tests are 60 cycle spark over and hold tests, watts-loss and leakage current tests, insulation resistance tests, and grounding electrode circuit resistance tests. These should be conducted according to manufacturer’s recommendations.

**3.11 Protective Relays**

Inspection, maintenance and testing of protective relays shall be performed in order to ensure proper and reliable operation. All necessary precautions should be taken while working with protective devices to ensure personnel safety and to avoid any unplanned interruption of service. In particular, when working on control circuits, all current transformer (CT) secondaries should be shorted to ground and never left open-circuited in order to avoid serious injury to maintenance personnel. As found relay settings shall be downloaded or recorded with findings reported to the owner prior to any work taking place. At the conclusion of testing, as left relay settings shall be again downloaded or recorded with both as found and as left records reported to the owner in final test reports. No settings changes shall be made without the express written consent of the owner.

**3.11.1 Visual and Mechanical Inspection**

Inspect relays for physical damage and deterioration. Inspect gaskets and covers for damage and/or excessive wear, and repair or replace as necessary. Examine and clean the relay and enclosure of foreign materials, such as dust, dirt, and moisture contamination. Examine the condition of the spiral spring, disc clearances, contacts, and case shorting contacts (if present). Check mechanism for freedom of movement, proper travel and alignment, and tightness of mounting hardware and plugs.

**3.11.2 Electrical Testing**

Using an appropriate testing instrument, suitable for the relays being tested, conduct electrical testing of the relays in accordance with manufacturer’s recommendations and IEEE testing standards. For overcurrent relays, test the following functions of the relay at the established settings specified by the system engineer or manufacturer:

• Pickup contacts should close when a current equal to the relay tap setting is applied to the induction coil. Adjust the spring as needed to allow for proper operation.

• Timing tests should be performed corresponding to two (2) or more points on the relay’s time current curves. One of the tests should be done at the specified time dial setting.

• Instantaneous pickup test should be performed for the specified instantaneous setting, if applicable.

• Seal-in units should be tested to ensure that the contacts hold closed with the minimum specified current applied.

• Relay target should indicate when the relay has operated.

• If possible, the relays should be tested to ensure that operation of the relay will in fact cause a tripping action of the respective circuit breaker. Relays that do not test satisfactorily or are found to be defective should be reported immediately so that proper corrective action can be authorized.

**Equipment/ Systems to be included in 2027-2028 testing and inspections:**

The following items shall be included in each of the two (2) contract years:

1. The integrity of the bonding system shall be verified by measuring the resistance between each piece of equipment and the substation ground (point-to-point method) using a digital low resistance ohmmeter.

2. Inspect and test the (3) three 2500kva Generator pad mount step up transformers (4.2kv x 13.2kv). Testing will include Insulation resistance tests, DC winding resistance tests, and transformer turns ratio tests. An insulating oil sample will be drawn and tested for general oil quality including gas in oil analysis, water content, acid content, interfacial tension, color analysis, dielectric strength, and specific gravity. Any Current transformers shall be ratio and polarity tested. All alarms and alarm devices shall be verified.

3. Insulating oil testing. Oil samples shall be drawn from (2) 2500kva, 13.2kv X 480v Outdoor pad mounted transformers feeding the west Casino Switchboard “A” and Switchboard “B”. Insulating oil samples shall be tested for general oil quality including gas in oil analysis, water content, acid content, interfacial tension, color analysis, dielectric strength, and. gravity.

4. Inspect and test (2) control voltage battery systems. Testing will include voltage checks, cell specific gravity and cell impedance checks. Distilled water will be added if needed. The charger will be checked for proper operation and output. One battery system is located in the Powercon outdoor 15kv switchgear, and the other is in the Central Plant (ISO switchgear).

5. Perform a 4hr duration battery discharge test on the station batteries in the Powercon outdoor 15kv switchgear during year 1, and the station batteries for the 15kv Cat switchgear in the Central Plant in year 2. Provide and install the necessary temporary battery strings to maintain continuous, uninterrupted operation of 15kv switchgear while testing is performed. Provide a full report of the battery condition and life cycle expectancy.

The following items shall be completed during the respective contract year as shown on the included drawings. Items highlighted in “yellow” on the drawings shall be completed during year 1, and the items highlighted in “Purple” shall be completed in year 2.

1. Inspect and test Central Plant 15kV indoor switchgear breakers, relays and components. All instrument transformers will be inspected and tested. There are approximately (7) seven Voltage transformers and (90) Ninety current transformers based on the three-line diagram. Testing to include fuse resistance, insulation resistance, turns ratio, and Polarities verification. Test and calibrate the following electronic relays, (2) Two SEL 351 protection relays, (8) eight SEL 551 overcurrent/reclosing relays, (3) three SEL 300 Generator relays, and (4) four Basler relays.
2. Inspect and test Powercon, 15kv, padmount switchgear, relays, and components located at the south end of the casino. The “Powercon” Switchgear, is a 7-section arrangement including 2 incoming utility, 2 mains, 1 tie, 1 utility metering, and 1 battery/control section. All testing and inspection will be performed as specified in this document.
3. Inspect and test 8 Medium voltage pad mounted switches, 6 located adjacent to the Powercon switchgear (CPBP-1 thru 6), and 2 located in the west casino courtyard adjacent to boiler room (SWNMP1-1A and SWNMP1-1B).
4. Inspect, test, and clean 2 – 2500kva, 13.2kv X 480v padmount transformers located in west casino courtyard adjacent to boiler room.
5. Inspect 4000-amp cable buss systems (2) which run from west casino courtyard to 2nd floor main electric room.
6. Inspect, test, and clean main-tie-main in 4000-amp, 480-volt switchboards A and B in west casino, second floor main electric room.
7. Inspect and test 13.2kv indoor switchgear SWMNP-2-3-1 located in hotel second floor main electric room. See drawing E.4.0.1 for details. Note: the intent is that ½ of this switchgear will be de-energized during each contract year, for a period of 6 hours (1am to 7am). Adequate manpower must be provided to complete this work in the allotted time frame, as well as other work listed which is to be performed during the same time period.
8. Inspect and test 13.2kv X 480v double ended unit substation SHNP2-2-1. See drawing E.4.0.2 for details. Inspect, test, and clean 2 – 2000kva dry transformers. Work shall be coordinated with #2 above.
9. Inspect and test 13.2kv X 480v double ended unit substation SHNPB-1-1. See drawing E.4.0.3 for details. Inspect, test, and clean 2 – 2667kva dry transformers. Work shall be coordinated with #2 above.
10. Inspect and test 13.2kv X 208v single ended unit substation SLNP1-1-1. See drawing E.4.0.3 for details. Inspect, test, and clean 1 - 1000kva dry transformer. Work shall be coordinated with #2 above.
11. Inspect and test 13.2kv X 480v single ended unit substations SSMNPB-1A, and SSMNPB-1B and 480v switchboard SHNPB (Main-Tie-Main) in west casino chiller room.
12. Inspect, test, and service 13.2kv X 208v single ended unit substations LSSNH2-3-A and LSSNH2-3-B located in hotel 2nd floor mechanical. Work shall be coordinated with #2 above.
13. Inspect, test, and service 13.2kv X 480v single ended unit substation HSSNMR-2 located on hotel roof mech rm.
14. Inspect, test, and service 2 – 13.2kv X 480v, 2000kva transformers, and the 480v main-tie-main in switchboard SWHNPB located in Central Plant.
15. Any work associated with the above listed items, not specifically mentioned in this section, but required or recommended by other sections of this RFP either by specific reference or by other testing standards or manufacturers recommendations shall be included.

**Switching:**

Prior to commencing any work, the contractors engineer shall prepare a detailed switching plan, listing each step necessary to safely de-energize the equipment to be worked on. The plan must include the date and time of each step, and list the impact and duration that each step will have on the facilities operations. The plan should include the use of onsite diesel generation to minimize the impact on operations when possible. The plan must include all lock out tag out procedures to safely perform the required maintenance. The plan will include all steps necessary to return to normal operations once maintenance is completed. This plan shall be reviewed with the owner, and must be approved by the owner prior to commencing work. The contractor will be responsible for performing all switching.

**Executive Summary**

* Provide (2) two copies of final report from testing performed in both paper bound and electronic formats for each contract year. No hand written conclusions or test sheets will be permitted.
* Reports shall be delivered on or before 30 calendar days after completion of the respective years’ work.
* Failure to meet the requirements of the executive summary will incur a reduction to Seneca Niagara Casino and Hotel of 1% per day of the total project cost invoiced up to a maximum of 15%.

**Project Management**

Include as an alternate adder to the total project price the cost for a project manager to be on site for the full duration of the project. The project manager will be separate and in addition to the lead technician performing testing. The project manager will perform duties including overseeing project safety, assure test procedures are performed to project specifications, update SNC Director of Energy Utilization on the progress of work, and notification of testing which indicates immediate action.

**Project Schedule**

All work included in year 1 shall be scheduled to start after Jan 15th 2027 and must be completed prior to April 1st, 2027. Year 2 work shall be scheduled to start after Jan 15th, 2028 and be completed no later than April 1st, 2028. A complete project schedule shall be prepared by the contractor, and approved by the owner prior to any work being started. This shall include step by step switching procedures and an associated time line to each step of the testing. Additional work hours between 1:00am and 7:00am may be required to minimize the potential for disruptions during peak business hours.