1. GENERAL

1.01 SECTION INCLUDES

.1 Distribution Switchboards rated 600 V and less.

.2 Switchboard accessories.

.3 Provide design and engineering, labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for distribution switchboards as required for the complete performance of the work, and as shown on the Drawings and as herein specified.

1.02 RELATED REQUIREMENTS

.1 Section 03 30 00 – Cast-in-Place Concrete: Concrete for supporting foundations and pads.

.2 Section 25 96 00 – Integrated Automation Control Sequences for Electrical Systems.

.3 Section 26 21 16 – Low-Voltage Underground Electrical Service Entrance.

.4 Section 26 22 13 – Low-Voltage Distribution Transformers.

.5 Section 26 27 13 – Electricity Metering.

.6 Section 26 28 16.02 – Molded Case Circuit Breakers.

.7 Section 26 43 13 – Surge Protective Devices for Low-Voltage Electrical Power Circuits.

.8 Section 26 24 16 – Panelboards.

1.03 REFERENCES

.1 ANSI C39.1 – Requirements for Electrical Analog Indicating Instruments.

.2 ASTM (ASTM):

.1 ASTM E 329, "Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction."

.3 CSA Group:

.1 CSA C22.1:21, Canadian Electrical Code, Part 1 (25th Edition), Safety Standard for Electrical Installations.

.2 Ontario Electrical Safety Code (28th edition/2021).

.3 CSA C22.2 No. 4-16, Enclosed and dead-front switches.

.4 CSA C22.2 No. 5-16, Molded case circuit breakers, molded case switches, and circuit-breaker enclosures.

.5 CSA C22.2 No. 144.1-16, Ground-fault circuit interrupters.

.6 CSA C22.2 No. 244:19, Switchboards.

.7 CSA Z462:21, Workplace electrical safety.

.8 CSA Z463-18, Maintenance of electrical systems.

.4 Institute of Electrical and Electronics Engineers, Inc. (IEEE):

.1 ANSI/IEEE C57.13, "Standard Requirements for Instrument Transformers" (copyrighted by IEEE, ANSI approved).

.5 InterNational Electrical Testing Association (NETA):

.1 NETA ATS, Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

.6 International Organization for Standardization (ISO):

.1 ISO 9001, Quality Management Systems - Requirements.

.7 National Electrical Contractors Association (NECA):

.1 NECA 400, “Standard for Installing and Maintaining Switchboards" (copyrighted by NECA, ANSI approved).

.8 National Electrical Manufacturers Association (NEMA):

.1 NEMA AB 1 - Molded Case Circuit Breakers, Molded Case Switches, and Circuit - Breaker Enclosures.

.2 NEMA C12.1 - Electric Meters; Code for Electricity Metering.

.3 NEMA EI 21.1, "Instrument Transformers for Revenue Metering (110 kV BIL and Less).”

.4 NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 volts Maximum).

.5 NEMA PB 2 - Deadfront Distribution Switchboards.

.6 NEMA PB 2.1 - Instructions for Proper Handling, Installation, Operation and Maintenance of Deadfront Distribution Switchboards Rated 600 volts or Less.

.7 NEMA 260 - Safety Labels for Pad Mounted Switchgear and Transformers Sited in Public Areas.

.9 Ontario Building Code and its referenced standards.

.10 Underwriters Laboratories, Inc. (UL):

.1 UL 1283, "Standard for Safety for Electro-Magnetic Interference Filters" (copyrighted by UL, ANSI approved).

1.04 PRE-INSTALLATION MEETINGS

.1 Conduct pre-installation meeting in accordance with Section 01 31 19.

.2 Prior to commencing the installation, meet at the Project site to review the material selections, installation procedures, and coordination with other trades. Pre-installation conference shall include, but shall not be limited to, the Contractor, the Installer, and any trade that requires coordination with the work. Date and time of the pre-installation conference shall be acceptable to the Owner and the Consultant.

1.05 ACTION SUBMITTALS

.1 Section 01 33 00: Procedures for submittals.

.2 Work of this Section is to be submitted for review after Consultant's review of Coordination Study per Section 26 05 73.16 is completed.

.3 Product Data:

.1 Provide electrical characteristics including voltage, frame size and trip ratings, fault current withstand ratings, and time-current curves of all equipment and components.

.2 Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications. Submit product data for each type of switchboard, overcurrent protective device, surge protective device, ground-fault protector, accessory, and component indicated. Include dimensions and manufacturer's technical data on features, performance, electrical characteristics, ratings, and finishes.

.4 Shop Drawings:

.1 Indicate front and side views of enclosures with overall dimensions shown; conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, and ground; and switchboard instrument details.

.2 Submit shop drawings for each product and accessory required. Include information not fully detailed in manufacturer's standard product data. Submit shop drawings for each switchboard and related equipment.

.3 Indicate front and side enclosure elevations with overall dimensions, conduit entrance locations and requirements, nameplate legends, one-line diagrams, equipment schedule and switchboard instrument details.

.5 Submit mimic-bus diagram.

.6 The following information shall be submitted to the Consultant:

.1 Master drawing index.

.2 Front view elevation.

.3 Floor plan.

.4 Top view.

.5 Single line.

.6 Schematic diagram.

.7 Nameplate schedule.

.8 Component list.

.9 Conduit entry/exit locations.

.10 Assembly ratings including:

.1 Short-circuit rating.

.2 Voltage.

.3 Continuous current.

.11 Major component ratings including:

.1 Voltage.

.2 Continuous current.

.3 Interrupting ratings.

.4 Cable terminal sizes.

.5 Product data sheets.

.12 Where applicable, the following additional information shall be submitted to the Consultant:

.1 Busway connection.

.2 Connection details between close-coupled assemblies.

.3 Composite floor plan of close-coupled assemblies.

.4 Key interlock scheme drawing and sequence of operations.

.7 Wiring Diagrams: Submit wiring diagrams detailing power, signal, and control systems, clearly differentiating between manufacturer-installed wiring and field-installed wiring, and between components provided by the manufacturer and those provided by others.

.8 Quality Control Submittals:

.1 Test Reports: Submit field quality control test reports.

.9 Upon review by the Consultant, submit switchboard shop drawings to the local electrical utility for their review and approval.

1.06 INFORMATIONAL SUBMITTALS

.1 Section 01 33 00: Submittals for Information.

.2 The following submittals are informational; responsive action by the Consultant is not required.

.3 Test Reports: Indicate results of factory production tests.

.4 Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.07 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Submittals for Project Closeout.

.2 Operation and Maintenance Data:

.1 Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

.2 Equipment operation and maintenance manuals shall be provided with each assembly shipped and shall include instruction leaflets, instruction bulletins and renewal parts lists where

applicable, for the complete assembly and each major component.

.3 [Thermographic survey report.]

.4 Warranty Documentation: Submit manufacturer's standard warranty documents.

.5 Record Documentation: Record actual locations of switchboard in project record documents.

.6 Training session attendance records.

.7 The following information shall be submitted for record purposes:

.1 Final as-built drawings and information shall incorporate all changes made during the manufacturing process.

.2 Wiring diagrams.

.3 Certified production test reports.

.4 Installation information.

.5 Seismic certification and equipment anchorage details as specified.

1.08 MAINTENANCE MATERIAL SUBMITTALS

.1 To Section 01 78 00.

.2 Spare Parts: Provide four of each key.

1.09 QUALITY ASSURANCE

.1 Manufacturer Qualifications:

.1 The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.

.2 For the equipment specified herein, the manufacturer shall be ISO 9001 or ISO 9002 certified.

.3 The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Consultant, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

.2 Installer Qualifications:

.1 Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing switchboards similar in type and scope to that required for this Project.

.3 Inspecting and Testing Agency Qualifications:

.1 To qualify for acceptance, an independent inspecting and testing agency hired by the Contractor or manufacturer to test products shall demonstrate to the Consultant's satisfaction that they are qualified according to ASTM E 329 to conduct testing indicated.

.4 Certifications:

.1 Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

.2 Comply with applicable requirements of the referenced standards.

1.10 DELIVERY, STORAGE, AND HANDLING

.1 Section 01 61 00: Transport, Handle, Store, and Protect Products.

.2 Specify shipping split requirements where unusual obstructions, corridor configurations, or door widths will interfere with switchboard handling at site.

.3 Deliver in 1219 mm (48 in) maximum width shipping splits, individually wrapped for protection and mounted on shipping skids.

.4 Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

.5 Handle to NEMA PB 2.1 and manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

.6 Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.

.7 Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

.8 Equipment shall be handled and stored in accordance with manufacturer's instructions. One copy of these instructions shall be included with the equipment at time of shipment.

1.11 WARRANTY

.1 Equipment manufacturer warrants that all goods supplied are free of non-conformities in workmanship and materials for one year from date of initial operation, or up to eighteen months from date of shipment.

2. PRODUCTS

2.01 MANUFACTURERS

.1 Manufacturer List:

.1 Square D by Schneider Electric

.2 Eaton (Cutler-Hammer).

.3 Siemens.

.2 Substitutions: Not permitted.

.3 Product Options: The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Consultant ten (10) days prior to bid date.

2.02 GENERAL SWITCHBOARD REQUIREMENTS

.1 Description: NEMA PB 2 switchboard with electrical ratings and configurations as indicated and specified.

.2 Regulatory Requirements

.1 Products certified by CSA Group, or testing firm acceptable to the Authority Having Jurisdiction as suitable for the purpose specified and indicated.

.3 Ratings:

.1 Voltage: 600 V.

.2 Configuration: Three phase, three wire, grounded.

.3 Main Bus: As per Single Line Diagrams.

.4 Ground Bus: Extend length of switchboard.

.5 Molded Case Circuit Breakers: To Section 26 28 16.02 – Molded Case Circuit Breakers.

.6 Ground fault trip, zero sequence type ground fault sensor.

.1 Instantaneous trip.

.2 Adjustable short time trip.

.3 Stationary mounting or drawout construction, as applicable.

.4 Include shunt trip where indicated.

.7 Line and Load Terminations: Accessible from the front only of the switchboard, suitable for the conductor materials and sizes indicated.

.8 Ground Fault Sensor: Zero sequence type.

.9 Ground Fault Relay: Adjustable ground fault sensitivity from 200 A to 1200 A, time delay adjustable from 0 to 15 seconds. Provide monitor panel with lamp to indicate relay operation, TEST and RESET control switches.

.10 Ground Fault Sensor: Zero sequence type.

.11 Ground Fault Relay: Adjustable ground fault sensitivity from 200 A to 1200 A, time delay adjustable from 0 to 15 seconds. Provide monitor panel with lamp to indicate relay operation, TEST and RESET control switches.

.12 Incoming entry: As noted on plans.

.13 Incoming location: As noted on plans.

.14 Branch Circuit Entry: Top.

.15 Silver Flashed Copper.

.16 Minimum Interrupt Rating: 65 kA.

.17 Bus Bracing Rating: 65 kA.

.18 Solid Bottom Plates.

.19 Box Finish - ASA 61 (Std).

.20 Trim Finish - ASA 61 (Std).

.21 Silver Flashed Copper Ground Bus.

.22 Vermin proof.

.23 Channel Sills.

.24 Refer to Single Line Diagram for additional information.

2.03 SHORT CIRCUIT RATINGS

.1 The assembly shall be rated to withstand mechanical forces exerted during short-circuit conditions when connected directly to a power source having available fault current 65 000 amperes symmetrical at rated voltage or as indicated on the drawings.

.2 Use fully rated overcurrent devices. Series ratings will not be accepted.

2.04 CONSTRUCTION

.1 The entire assembly shall be front accessible and shall consist of main lugs or main device as shown on the plans.

.2 Feeder devices 150 A frame through 1200 A frame shall be panel-mounted-type construction. Devices over 1200 A frame or main devices shall be individually mounted when required.

2.05 BUS

.1 All bus bars shall be silver-plated copper. Main horizontal bus bars shall be mounted with all three phases arranged in the same vertical plane. Bus sizing shall be based on NEMA standard temperature rise criteria of 65°C over a 40°C ambient (outside the enclosure).

.2 A copper ground bus (minimum 1/4 in by 2 in), shall be furnished firmly secured to each vertical section structure, and shall extend the entire length of the switchboard.

.3 Copper neutral bus.

.4 All hardware used on conductors shall be high-tensile strength and zinc-plated. All bus joints shall be provided with conical spring-type washers.

2.06 WIRING/TERMINATION

.1 Small wiring, necessary fuse blocks and terminal blocks within the switchboard shall be furnished as required. Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification corresponding to appropriate designations on manufacturer's wiring diagrams.

.2 Mechanical-type terminals shall be provided for all line and load terminations suitable for copper cable rated for 90°C of the size as indicated on the drawings.

.3 Lugs shall be provided in the incoming line section for connection of the main grounding conductor. Additional lugs for connection of other grounding conductors shall be provided as indicated on the drawings.

.4 All control wire shall be type SIS, bundled and secured with nylon ties. Insulated locking spade terminals shall be provided for all control connections, except where saddle-type terminals are provided integral to a device. All current transformer secondary leads shall first be connected to conveniently accessible short-circuit terminal blocks before connecting to any other device. All groups of control wires leaving the switchboard shall be provided with terminal blocks with suitable numbering strips. Provide wire markers at each end of all control wiring.

2.07 ENCLOSURE

.1 Provide CSA type 2 steel enclosure complete with sprinklerproof drip shield.

.2 Align sections at front and rear.

.3 Switchboard Height: 2286 mm (90 in), excluding floor sills, lifting members and pull boxes.

.4 Section depths: as per drawings.

.5 Section widths: as per drawings.

2.08 ENCLOSURE FINISH

.1 All exterior and interior steel surfaces of the switchboard shall be properly cleaned and provided with a factory applied rust-inhibiting phosphatized coating. Colour and finish of the switchboard shall be ANSI 61 light gray.

.2 Coat internal surfaces with minimum one coat corrosion-resisting paint, or plate with cadmium or zinc.

2.09 BARRIERS

.1 Provide barriers between adjacent switchboard sections.

2.10 INSULATION AND ISOLATION

.1 Provide taped bus for through bus.

2.11 FRONT COVERS

.1 Front covers shall be screw removable with a single tool and doors shall be hinged with removable hinge pins.

2.12 BUS TRANSITION AND INCOMING PULL SECTIONS

.1 Match and align with basic switchboard.

2.13 PULL BOX ON TOP OF SWITCHBOARD

.1 Provide adequate ventilation to maintain temperature in pull box within same limits as switchboard.

.2 Set back from front to clear circuit breaker removal mechanism.

.3 Removable covers shall form top, front, and sides. Top covers at rear shall be easily removable for drilling and cutting.

.4 Bottom shall be insulating, fire-resistive material with separate holes for cable drops into switchboard.

.5 Lace cables using industry-approved methods.

2.14 FEEDER ENTRY

.1 Coordinate busway or cable feeder entry requirements with Single Line Diagram.

.2 Provide busway flange to suit busway feeders.

2.15 FUTURE DEVICES

.1 Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit breaker compartment.

.2 Fully equip spaces for future devices with bussing and bus connections, suitably insulated and braced for short circuit currents. Provide continuous current rating as indicated.

2.16 METERING AND INSTRUMENTATION

.1 Utility Metering Compartment: Provide fabricated compartment and section complying with utility company's requirements. If separate vertical section is required for utility metering, match and align with basic switchboard.

.2 Instrumentation for Owner’s metering:

.1 Instrument Transformers: NEMA EI 21.1, ANSI/IEEE C57.13, and the following:

.1 Potential Transformers: Secondary voltage rating of 120 V and NEMA accuracy class of 0.3 with burdens of W, X, and Y.

.2 Current Transformers: Ratios shall be as indicated with accuracy class and burden suitable for connected relays, meters, and instruments.

.3 Control Power Transformers: Dry type, mounted in separate compartments for units larger than 3 kV.

.2 Multifunction Digital Metering Monitor: Microprocessor-based unit suitable for three-wire or four-wire systems and with the following features:

.1 Digital Display: Switch-selectable digital display of the following values with maximum accuracy tolerances as indicated:

.2 Phase Currents, Each Phase: ±1 percent.

.3 Phase-to-Phase Voltages, 3-Phase: ±1 percent.

.4 Phase-to-Neutral Voltages, 3-Phase: ±1 percent.

.5 Megawatts: ±2 percent.

.6 Megavars: ±2 percent.

.7 Power Factor: ±2 percent.

.8 Frequency: ±0.5 percent.

.9 Megawatt Demand: ±2 percent; demand interval programmable from 5 to 60 minutes.

.10 Accumulated Energy, Megawatt Hours: ±2 percent. Accumulated values unaffected by power outages up to 72 hours.

.11 Watt-Hour Meters: Flush or semi-flush type, rated 5 A, 120 V, three-phase, three-wire, with three elements, 15 minute-indicating-demand register, and provision for testing and adding pulse initiation.

.12 Recording Demand Meter: Usable as totalizing relay or as indicating and recording maximum demand meter with 15 minute interval. Meter shall count and control a succession of pulses entering two channels.

.13 Mounting: Display and control unit flush or semi-flush mounted in instrument compartment or main device door.

.3 Interface with other systems: Provide BACnet gateway for connection to Building Automation per Section 25 96 00.

2.17 MIMIC BUS

.1 Provide an anodized aluminum or plastic engraved plaque. Arrange in single-line diagram format, using symbols and letter designations consistent with final mimic bus diagram. Produce a concise visual presentation of principal switchboard components and connections.

.2 Show bussing, connections, and devices in single line form on the front panels of the switchboard using blue colour light metal strips, fastened flat against the panel face with screws or rivets.

2.18 NAMEPLATES

.1 Lamacoid nameplates to Section 26 05 53:

.1 Switchboard nameplate.

.2 Branch circuit nameplates.

.2 Engraved nameplates, mounted on the face of the assembly, shall be furnished for all main and feeder circuits as indicated on the drawings. Nameplates shall be laminated plastic, black characters on white background. Characters shall be 3/16 in high, minimum. Nameplates shall give item designation and circuit number as well as frame ampere size and appropriate trip rating. Furnish master nameplate giving switchboard designation, voltage ampere rating, short-circuit rating, manufacturer's name, general order number, and item number.

2.19 GROUND FAULT PROTECTION

.1 Furnish and install in the service equipment and/or switchboard ground fault protection and indication equipment as shown on drawings in accordance with 2021 OESC 14-102. All parts of the systems specified shall be CSA certified. All new ground fault protection and indication equipment shall be factory installed, wired, and tested by the switchboard manufacturer.

2.20 SOURCE QUALITY CONTROL

.1 Section 01 43 00: Manufacturer quality control.

.2 Shop inspect, and test switchboard according to NEMA PB 2.

.3 Allow witnessing of factory inspections and tests at manufacturer's test facility. Notify Consultant at least 7 days before inspections and tests are scheduled.

.4 The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of ANSI and NEMA standards.

.1 The switchboard shall be completely assembled, wired, adjusted, and tested at the factory. After assembly, the complete switchboard will be tested for operation under simulated service conditions to assure the accuracy of the wiring and the functioning of all equipment. The main circuits shall be given a dielectric test of 2200 V for one (1) minute between live parts and ground and between opposite polarities. The wiring and control circuits shall be given a dielectric test of 1500 V for one (1) minute between live parts and ground.

.2 Perform factory and installation tests in accordance with applicable OESC, NEMA and CSA requirements.

.5 The manufacturer shall provide three (3) certified copies of factory test reports.

.6 A certified test report of all standard production tests shall be available to the Consultant upon request.

3. EXECUTION

3.01 EXAMINATION

.1 Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Consultant, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

.2 Verify that field measurements are as indicated on shop drawings.

.3 Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.02 PREPARATION

.1 Provide concrete housekeeping pad to Section 03 30 00 and Section 26 05 29.

3.03 INSTALLATION

.1 General

.1 Preparation and installation shall be in accordance with reviewed product data, final shop drawings, manufacturer's written recommendations, and as indicated on the Drawings.

.2 Install switchboards and accessories according to NEMA PB 2.1 and NECA 400.

.3 Install and anchor switchboards level on concrete bases, 100 mm (4 in) nominal thickness. Concrete base is specified in Section 26 05 29, and concrete materials and installation requirements are specified in Division 03.

.4 Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from switchboard units and components.

.5 Frame and mount the printed basic operating instructions for switchboards, including, but not limited to, control and key interlocking sequences and emergency procedures. Fabricate frame of finished wood or metal and cover instructions with clear acrylic plastic. Mount on front of switchboards.

.6 Install overcurrent protective devices, surge protective devices, and instrumentation.

.1 Set field-adjustable switches and circuit breaker trip ranges.

.7 Install spare fuse cabinet.

.2 Install switchboard in locations shown on drawings, according to CSA C22.1.

.3 Tighten accessible bus connections and mechanical fasteners after placing switchboard.

.4 Install fuses in each switch.

.5 Install all equipment per the manufacturer's recommendations and the contract drawings.

.6 The assembly shall be provided with adequate lifting means and shall be capable of being moved into installation position and bolted directly to Contractor supplied floor sills to be set level in concrete per manufacturer's recommendations the floor without the use of floor sills providing the floor is level to 1/8 in per 3 ft distance in any direction. All necessary hardware to secure the assembly in place shall be provided by the Contractor.

.7 Examine substrates and conditions in which units will be installed. Check for clearance that will be required before, during and after equipment installation. Do not proceed with installation until unsatisfactory conditions are corrected.

.8 Strictly comply with manufacturer's instructions and recommendations and NEMA PB 2.1. Coordinate installation with adjacent work to ensure proper sequence of construction, clearances, and support.

.9 Install units plumb, level, and rigid without distortion to the switchboard cubicle(s).

.10 Identification

.1 Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Section 26 05 53.

.2 Label each switchboard compartment with engraved metal or laminated plastic nameplate mounted with corrosion-resistant screws.

.3 Arc Flash Warning Labels

.1 Refer to Section 26 05 73.19.

.2 Apply in the field, the arc flash warning label to all switchboards to suit future examination, adjustment, servicing, or maintenance while energized to warn qualified persons of potential electrical arc flash hazards.

3.04 FIELD QUALITY CONTROL

.1 Section 01 43 00: Quality Assurance.

.2 Perform inspections and tests listed in NETA ATS, Section 7.1.

.3 Prepare for acceptance tests as follows:

.1 Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit.

.2 Test continuity of each circuit.

.4 Perform the following field tests and inspections and prepare test reports:

.1 Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Sections 7.1, 7.5, 7.6, 7.9, 7.10, 7.11, and 7.14 as appropriate. Certify compliance with test parameters.

.2 [Perform infrared thermographic survey in accordance with NETA ATS, Section 9 “Thermographic Survey”. Submit report to the Consultant.]

.3 Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.05 PROTECTION

.1 Provide final protection and maintain conditions in a manner that shall ensure that the switchboards shall be without damage at time of Substantial Performance.

3.06 ADJUSTING

.1 Section 01 78 00: adjusting installed work.

.2 Adjust all operating mechanisms for free mechanical movement.

.3 Tighten bolted bus connections to manufacturer's instructions.

.4 Adjust circuit breaker trip and time delay settings to values indicated as instructed by the Consultant.

.5 Coordination Study Labels and Field Adjustment

.1 Refer to Section 26 05 73.16.

.2 The Contractor shall perform field adjustments of the protective devices as required to place the equipment in final operating condition. The settings shall be in accordance with the approved short-circuit study, protective device evaluation study and protective device coordination study.

.3 Necessary field settings of devices, adjustments, and minor modifications to equipment to accomplish conformance with an approved short-circuit and protective device coordination study, shall be carried out by the Contractor at no additional cost to the Owner.

3.07 CLEANING

.1 Section 01 74 00: cleaning installed work.

.2 Clean exposed surfaces using manufacturer recommended materials and methods.

.3 Touch-up damaged coatings and finishes using non-abrasive materials and methods recommended by manufacturer. Eliminate all visible evidence of repair.

.4 Touch up scratched or marred surfaces to match original finish.

3.08 TRAINING

.1 The Contractor shall provide a training session for up to five (5) Owner's representatives for normal workdays at a jobsite location determined by the Owner.

.2 A manufacturer's qualified representative shall conduct the training session. The training program shall consist of instruction on the operation of the assembly, circuit breakers, fused switches, meters, and major components within the assembly.

End of Section