ELECTRICAL SPECIFICATIONS - ELECTRICAL CONTRACTOR (2 OF 2)

16141 - WIRING DEVICES

1.1 SHOP DRAWINGS AND PRODUCT DATA
.1 SUBMIT SHOP DRAWINGS AND PRODUCT DATA FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.

2.1 SWITCHES
.1 15A, SINGLE POLE, THREE-WAY SWITCHES.
.2 MANUALLY-OPERATED GENERAL PURPOSE AC SWITCHES WITH FOLLOWING FEATURES:
.1 TERMINAL HOLES APPROVED FOR NO. 10 AWG WIRE.
.2 SILVER ALLOY CONTACTS.
.3 UREA OR MELAMINE MOLDING FOR PARTS SUBJECT TO CARBON TRACKING.
.4 SUITABLE FOR BACK AND SIDE WIRING.
.5 STYLE & COLOUR AS NOTED, SPECIFICATION GRADE.
.3 TOGGLE OPERATED FULLY RATED FOR TUNGSTEN FILAMENT AND FLUORESCENT LAMPS, AND UP TO 80% OF RATED CAPACITY OF MOTOR LOADS.
.4 SWITCHES OF ONE MANUFACTURER THROUGHOUT PROJECT.
.5 ACCEPTABLE MATERIALS: HUBBELL, LEVITON, ARROW HART, PASS & SEYMOUR.

2.2 RECEPTACLES
.1 DUPLEX RECEPTACLES, CSA TYPE 5-15 R, 125 V, 15 A, U GROUND, WITH FOLLOWING FEATURES:
.1 SUITABLE FOR NO. 10 AWG FOR BACK AND SIDE WIRING.
.2 BREAK-OFF LINKS FOR USE AS SPLIT RECEPTACLES.
.3 EIGHT BACK WIRED ENTRANCES, FOUR SIDE WIRING SCREWS.
.4 TRIPLE WIPE CONTACTS AND RIVETTED GROUNDING CONTACTS.
.5 STYLE & COLOUR AS NOTED, SPECIFICATION GRADE
.2 OTHER RECEPTACLES WITH AMPACITY AND VOLTAGE AS INDICATED.
.3 RECEPTACLES OF ONE MANUFACTURER THROUGHOUT PROJECT.
.4 ACCEPTABLE MATERIALS: HUBBELL, LEVITON, ARROW HART, PASS & SEYMOUR.

2.3 COVER PLATES
.1 COVER PLATES FOR WIRING DEVICES.
.2 COVER PLATES FROM ONE MANUFACTURER THROUGHOUT PROJECT.
.3 SHEET STEEL UTILITY BOX COVER FOR WIRING DEVICES INSTALLED IN SURFACE-MOUNTED UTILITY BOXES.
.4 STAINLESS STEEL, VERTICALLY BRUSHED, 1/32" (1 mm) THICK COVER PLATES, THICKNESS 1/16" (2.5 MM) FOR WIRING DEVICES MOUNTED IN FLUSH-MOUNTED OUTLET BOX.
.5 SHEET METAL COVER PLATES FOR WIRING DEVICES MOUNTED IN SURFACE-MOUNTED FS OR FD TYPE CONDUIT BOXES.

3.1 INSTALLATION
.1 SWITCHES:
.1 INSTALL SINGLE THROW SWITCHES WITH HANDLE IN "UP" POSITION WHEN SWITCH CLOSED.
.2 INSTALL SWITCHES IN GANG TYPE OUTLET BOX WHEN MORE THAN ONE SWITCH IS REQUIRED IN ONE LOCATION.
.3 MOUNT TOGGLE SWITCHES AT HEIGHT SPECIFIED IN SECTION 16010 - ELECTRICAL GENERAL REQUIREMENTS OR AS INDICATED.
.2 RECEPTACLES:
.1 INSTALL RECEPTACLES IN GANG TYPE OUTLET BOX WHEN MORE THAN ONE RECEPTACLE IS REQUIRED IN ONE LOCATION.
.2 MOUNT RECEPTACLES AT HEIGHT SPECIFIED IN SECTION 16010 - ELECTRICAL GENERAL REQUIREMENTS OR AS INDICATED.
.3 WHERE SPLIT RECEPTACLE HAS ONE PORTION SWITCHED, MOUNT VERTICALLY AND SWITCH UPPER PORTION.
.3 COVER PLATES:
.1 PROTECT STAINLESS STEEL COVER PLATE FINISH WITH PAPER OR PLASTIC FILM UNTIL PAINTING AND OTHER WORK IS FINISHED.
.2 INSTALL SUITABLE COMMON COVER PLATES WHERE WIRING DEVICES ARE GROUPED.
.3 DO NOT USE COVER PLATES MEANT FOR FLUSH OUTLET BOXES ON SURFACE-MOUNTED BOXES.

16223 - MOTOR STARTERS TO 600V

1.1 SUBMITTALS
.1 SUBMIT SHOP DRAWINGS AND PRODUCT DATA FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.
.2 INDICATE THE FOLLOWING:
MOUNTING METHOD AND DIMENSIONS
STARTER SIZE AND TYPE
LAYOUT OF IDENTIFIED INTERNAL AND FRONT PANEL COMPONENTS
ENCLOSURE TYPE
WIRING DIAGRAM FOR EACH TYPE OF STARTER
INTERCONNECTION DIAGRAM

1.2 OPERATION AND MAINTENANCE DATA
.1 PROVIDE DATA FOR INCORPORATION INTO MAINTENANCE MANUAL SPECIFIED IN SECTION 16010.
.2 INCLUDE OPERATION AND MAINTENANCE DATA FOR EACH TYPE AND STYLE OF STARTER.

2.1 STANDARDS
.1 STARTERS: TO C.S.A. C22.2, NO. 14, EEMAC E14-1.

2.2 MANUAL MOTOR STARTERS
.1 MANUAL MOTOR STARTERS OF SIZE, TYPE AS INDICATED AND SUITABLE FOR THE MOTOR LOAD TO BE CONTROLLED, WITH COMPONENTS AS FOLLOWS:
.1 SWITCHING MECHANISM, QUICK-MAKE AND BREAK.
.2 OVERLOAD HEATER IN EACH PHASE, MANUAL RESET, TRIP INDICATING HANDLE.
.3 HEAVY-DUTY TYPE, LABELLED TOGGLE SWITCH, UNLESS INDICATED OTHERWISE.
.4 INDICATING LIGHT: HEAVY-DUTY TYPE, RED.
.5 LOCKING TAB TO PERMIT PADLOCKING IN "ON" OR "OFF" POSITION

2.3 FULL VOLTAGE MAGNETIC STARTERS
.1 MAGNETIC AND COMBINATION MAGNETIC STARTERS MINIMUM SIZE1. TYPE, RATING AND ENCLOSURE TYPE AS INDICATED WITH COMPONENTS AS FOLLOWS:
.1 CONTROL TRANSFORMER.
.2 CONTACTOR SOLENOID OPERATED, RAPID ACTION TYPE.
.3 MOTOR OVERLOAD PROTECTIVE DEVICE IN EACH PHASE, MANUALLY RESET FROM FRONT WITH DOOR CLOSED.
.4 WIRING AND SCHEMATIC DIAGRAM INSIDE STARTER ENCLOSURE IN VISIBLE LOCATION.
.2 COMBINATION-TYPE STARTERS TO INCLUDE FUSED DISCONNECT SWITCH WITH OPERATING LEVER ON OUTSIDE OF ENCLOSURE TO CONTROL DISCONNECT AND PROVISION FOR:
LOCKING IN "OFF" POSITION WITH UP TO THREE (3) PADLOCKS.
LOCKING IN "ON" POSITION.
INDEPENDENT LOCKING OF ENCLOSURE DOOR.
PROVISION FOR PREVENTING SWITCHING TO "ON" POSITION WHILE ENCLOSURE DOOR IS OPEN.
.3 ACCESSORIES
.1 PUSHBUTTONS AND SELECTOR SWITCHES: HEAVY DUTY TYPE AND LABELLED AS INDICATED.
.2 INDICATING LIGHTS: HEAVY DUTY TYPE - RED COLOUR UNLESS INDICATED OTHERWISE.
.3 TWO N/O AND TWO N/C AUXILIARY CONTACTS UNLESS OTHERWISE INDICATED.

2.4 CONTROL TRANSFORMER
.1 SINGLE PHASE, DRY-TYPE, CONTROL TRANSFORMER WITH PRIMARY VOLTAGE INDICATED AND 120 VOLT SECONDARY, COMPLETE WITH SECONDARY FUSE, ALL INSTALLED IN STARTER ENCLOSURE.
.2 SIZE CONTROL TRANSFORMER FOR CONTROL CIRCUIT LOAD PLUS 20% SPARE CAPACITY.

2.5 FINISHES
.1 APPLY FINISHES TO ENCLOSURE IN ACCORDANCE WITH SECTION 16010.

2.6 EQUIPMENT IDENTIFICATION
.1 PROVIDE EQUIPMENT IDENTIFICATION IN ACCORDANCE WITH SECTION 16010.

2.7 ACCEPTABLE MANFACTURERS
.1 CUTLER-HAMMER CANADA LTD.
.2 SQUARE 'D' CO.
.3 ALLEN-BRADLEY CANADA COMPANY
.4 SIEMENS CANADA LTD.
.5 CANADIAN GENERAL ELECTRIC

EXECUTION

3.1 INSTALLATION
.1 INSTALL STARTERS, CONNECT POWER AND CONTROL WIRING AS INDICATED.
.2 ENSURE CORRECT FUSES AND OVERLOAD DEVICES ARE INSTALLED.

3.2 TESTS
.1 PERFORM TESTS IN ACCORDANCE WITH SECTION 16010 AND MANUFACTURER'S INSTRUCTIONS.
.2 OPERATE SWITCHES, CONTACTORS TO VERIFY CORRECT FUNCTIONING.
.3 PERFORM STARTING AND STOPPING SEQUENCES OF CONTACTORS AND RELAYS.
.4 CHECK THAT SEQUENCE CONTROLS, INTERLOCKING WITH OTHER SEPARATE RELATED STARTERS, EQUIPMENT, CONTROL DEVICES, OPERATE AS INDICATED.

16271 - DRY TYPE TRANSFORMERS UP TO 600V PRIMARY

1.1 PRODUCT DATA
.1 SUBMIT SHOP DRAWINGS AND PRODUCT DATA FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.

2.1 TRANSFORMERS
.1 USE TRANSFORMERS OF ONE MANUFACTURER THROUGHOUT PROJECT.
.2 DESIGN:
.1 TYPE: ANN
.2 3 PHASE, KVA AS NOTED, 600 V INPUT, 120/208 V OUTPUT, 60 HZ.
.3 VOLTAGE TAPS: STANDARD
.4 INSULATION: CLASS 220, 150°C TEMPERATURE RISE.
.5 BASIC IMPULSE LEVEL (BIL): STANDARD
.6 HIPOT: STANDARD
.7 AVERAGE SOUND LEVEL: 50 DB
.8 IMPEDANCE AT 170°C: STANDARD
.9 ENCLOSURE: EEMAC 1, REMOVABLE METAL FRONT PANEL
.10 MOUNTING: FLOOR.
.11 FINISH: IN ACCORDANCE WITH SECTION 16010 - ELECTRICAL GENERAL REQUIREMENTS

2.2 EQUIPMENT INDENTIFICATION
.1 PROVIDE EQUIPMENT IDENTIFICATION IN ACCORDANCE WITH SECTION 16010 - ELECTRICAL GENERAL REQUIREMENTS.
.2 LABEL SIZE: 7

3.1 INSTALLATION
.1 MOUNT DRY TYPE TRANSFORMERS UP TO 75 KVA AS INDICATED.
.2 MOUNT DRY TYPE TRANSFORMERS ABOVE 75 KVA ON FLOOR COMPLETE WITH STEEL FRAME RAILS ON 100mm (4") CONCRETE HOUSE KEEPING PAD OR AS INDICATED.
.3 ENSURE ADEQUATE CLEARANCE AROUND TRANSFORMER FOR VENTILATION.
.4 INSTALL TRANSFORMERS IN LEVEL UPRIGHT POSITION.
.5 REMOVE SHIPPING SUPPORTS ONLY AFTER TRANSFORMER IS INSTALLED AND JUST BEFORE PUTTING INTO SERVICE.
.6 LOOSEN ISOLATION PAD BOLTS UNTIL NO COMPRESSION IS VISIBLE.
.7 MAKE PRIMARY AND SECONDARY CONNECTIONS IN ACCORDANCE WITH WIRING DIAGRAM.
.8 ENERGIZE TRANSFORMERS AFTER INSTALLATION IS COMPLETE.

16412 - MOULDED CASE CIRCUIT BREAKERS

1.1 PRODUCT DATA
.1 SUBMIT PRODUCT DATA AND SHOP DRAWINGS FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.
.2 INCLUDE TIME-CURRENT CHARACTERISTIC CURVES FOR BREAKERS.

2.1 BREAKERS GENERAL
.1 BOLT-ON MOULDED CASE CIRCUIT BREAKER: QUICK-MAKE, QUICK-BREAK TYPE, FOR MANUAL AND AUTOMATIC OPERATION WITH TEMPERATURE COMPENSATION FOR 40°C AMBIENT.
.2 PLUG-IN MOULDED CASE CIRCUIT BREAKERS: QUICK-MAKE, QUICK-BREAK TYPE, FOR MANUAL AND AUTOMATIC OPERATION WITH TEMPERATURE COMPENSATION FOR 40°C AMBIENT.
.3 COMMON-TRIP BREAKERS: WITH SINGLE HANDLE FOR MULTI-POLE APPLICATIONS.
.4 MAGNETIC INSTANTANEOUS TRIP ELEMENTS IN CIRCUIT BREAKERS TO OPERATE ONLY WHEN VALUE OF CURRENT REACHES SETTING. TRIP SETTINGS ON BREAKERS WITH ADJUSTABLE TRIPS TO RANGE FROM 3-8 TIMES CURRENT RATING.
.5 CIRCUIT BREAKERS WITH INTERCHANGEABLE TRIPS AS INDICATED.

2.2 THERMAL MAGNETIC BREAKERS DESIGN A
.1 MOULDED CASE CIRCUIT BREAKER TO OPERATE AUTOMATICALLY BY MEANS OF THERMAL AND MAGNETIC TRIPPING DEVICES TO PROVIDE INVERSE TIME CURRENT TRIPPING AND INSTANTANEOUS TRIPPING FOR SHORT CIRCUIT PROTECTION.

2.3 MAGNETIC BREAKERS DESIGN B
.1 MOULDED CASE CIRCUIT BREAKER TO OPERATE AUTOMATICALLY BY MEANS OF MAGNETIC TRIPPING DEVICES TO PROVIDE INSTANTANEOUS TRIPPING FOR SHORT CIRCUIT PROTECTION.

2.4 FUSED THERMAL MAGNETIC BREAKERS DESIGN C
.1 FUSED THERMAL MAGNETIC BREAKERS WITH CURRENT LIMITING FUSES INTERNALLY MOUNTED. TIME CURRENT LIMITING CHARACTERISTICS OF FUSES COORDINATED WITH TIME CURRENT TRIPPING CHARACTERISTICS OF CIRCUIT BREAKER. COORDINATION TO RESULT IN INTERRUPTION BY BREAKER OF FAULT-LEVEL CURRENTS UP TO INTERRUPTING CAPACITY OF BREAKER. FUSES INDIVIDUALLY REMOVABLE AND INTERLOCKED WITH BREAKER. THE REMOVAL OF FUSE COVER, BLOWING OF A FUSE OR REMOVAL OF A FUSE, TO TRIP BREAKER.

2.5 SOLID STATE TRIP BREAKERS DESIGN D
.1 MOULDED CASE CIRCUIT BREAKER TO OPERATE BY MEANS OF A SOLID-STATE TRIP UNIT WITH ASSOCIATED CURRENT MONITORS AND SELF-POWERED SHUNT TRIP TO PROVIDE INVERSE TIME CURRENT TRIP UNDER OVERLOAD CONDITION, AND LONG TIME SHORT TIME INSTANTANEOUS TRIPPING FOR PHASE GROUND FAULT SHORT CIRCUIT PROTECTION.

2.6 OPTIONAL FEATURES
.1 INCLUDE:
.1 SHUNT TRIP.
.2 AUXILIARY SWITCH.
.3 MOTOR-OPERATED MECHANISM C/W TIME DELAY UNIT.
.4 UNDER-VOLTAGE RELEASE.
.5 ON-OFF LOCKING DEVICE.
.6 HANDLE MECHANISM.

2.7 ACCEPTABLE MANUFACTURERS
.1 APPROVED MANUFACTURERS ARE CUTLER-HAMMER, SQUARE 'D' CO., ALLEN-BRADLEY CANADA CO., SIEMENS CANADA LTD. AND CANADIAN GENERAL ELECTRIC.

3.1 INSTALLATION
.1 INSTALL CIRCUIT BREAKERS AS INDICATED.

16414 - DISSCONNECT SWITCHES - FUSES AND NON-FUSED

1.1 PRODUCT DATA
.1 SUBMIT PRODUCT DATA AND SHOP DRAWINGS FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.

2.1 DISCONNECT SWITCHES
.1 FUSIBLE, NON-FUSIBLE DISCONNECT SWITCH IN CSA ENCLOSURE, SIZE AS INDICATED.
.2 PROVISION FOR PADLOCKING IN ON-OFF SWITCH POSITION BY THREE LOCKS.
.3 MECHANICALLY INTERLOCKED DOOR TO PREVENT OPENING WHEN HANDLE IN ON POSITION.
.4 FUSES: SIZE AS INDICATED.
.5 FUSEHOLDERS: RELOCATABLE AND SUITABLE WITHOUT ADAPTORS, FOR TYPE AND SIZE OF FUSE INDICATED.
.6 QUICK-MAKE, QUICK-BREAK ACTION.
.7 ON-OFF SWITCH POSITION INDICATION ON SWITCH ENCLOSURE COVER.

2.2 EQUIPMENT IDENTIFICATION
.1 PROVIDE EQUIPMENT IDENTIFICATION IN ACCORDANCE WITH SECTION 16010 - ELECTRICAL GENERAL REQUIREMENTS.
.2 INDICATE NAME OF LOAD CONTROLLED ON SIZE 4 NAMEPLATE.

2.3 ACCEPTABLE MANUFACTURERS
.1 APPROVED MANUFACTURERS ARE CUTLER-HAMMER, SQUARE 'D' CO., ALLEN-BRADLEY CANADA CO., SIEMENS CANADA LTD. AND CANADIAN GENERAL ELECTRIC.

3.1 INSTALLATION
.1 INSTALL DISCONNECT SWITCHES COMPLETE WITH FUSES IF APPLICABLE.

16421 - CONTACTORS

1.1 PRODUCT DATA
.1 SUBMIT PRODUCT DATA AND SHOP DRAWINGS FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.

2.1 CONTACTORS
.1 CONTACTORS: TO EEMAC NO.1CS.
.2 ELECTRICALLY HELD CONTROLLED BY PILOT DEVICES AS INDICATED AND RATED FOR TYPE OF LOAD CONTROLLED.
.3 BREAKER COMBINATION CONTACTOR AS INDICATED.
.4 COMPLETE WITH 2 NORMALLY OPEN AND 2 NORMALLY CLOSED AUXILIARY CONTACTS UNLESS INDICATED OTHERWISE.
.5 MOUNT IN CSA ENCLOSURE 1 UNLESS OTHERWISE INDICATED.
.6 INCLUDE FOLLOWING OPTIONS IN COVER:
.1 RED INDICATING LAMP.
.2 STOP-START PUSHBUTTON.
.3 HAND-OFF-AUTO SELECTOR SWITCH.
.4 ON-OFF SELECTOR SWITCH.

2.2 EQUIPMENT IDENTIFICATION
.1 PROVIDE EQUIPMENT IDENTIFICATION IN ACCORDANCE WITH SECTION 16010 - ELECTRICAL GENERAL REQUIREMENTS.
.2 SIZE 4 NAMEPLATE INDICATING NAME OF LOAD CONTROLLED AS INDICATED.

2.3 ACCEPTABLE MANUFACTURERS
.1 APPROVED MANUFACTURERS ARE CUTLER-HAMMER, SQUARE 'D' CO., ALLEN-BRADLEY CANADA CO., SIEMENS CANADA LTD. AND CANADIAN GENERAL ELECTRIC.

3.1 INSTALLATION
.1 INSTALL CONTACTORS AND CONNECT AUXILIARY CONTROL DEVICES.

16441 - PANEL BOARDS BREAKER TYPE

1.1 SHOP DRAWINGS
.1 SUBMIT SHOP DRAWINGS AND PRODUCT DATA FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.
.2 DRAWINGS TO INCLUDE ELECTRICAL DETAIL OF PANEL, BRANCH BREAKER TYPE, QUANTITY, AMPACITY AND ENCLOSURE DIMENSION.

2.1 PANEL BOARDS
.1 PANEL BOARDS: PRODUCT OF ONE MANUFACTURER.
.1 INSTALL CIRCUIT BREAKERS IN PANEL BOARDS BEFORE SHIPMENT.
.2 IN ADDITION TO CSA REQUIREMENTS MANUFACTURER'S NAMEPLATE MUST SHOW FAULT CURRENT THAT PANEL INCLUDING BREAKERS HAS BEEN BUILT TO WITHSTAND.
.2 250 V PANEL BOARDS: BUS AND BREAKERS RATED FOR 22 KA (SYMMETRICAL) INTERRUPTING CAPACITY.
.3 SEQUENCE PHASE BUSSING WITH ODD NUMBERED BREAKERS ON LEFT AND EVEN ON RIGHT, WITH EACH BREAKER IDENTIFIED BY PERMANENT NUMBER IDENTIFICATION AS TO CIRCUIT NUMBER AND PHASE.
.4 PANEL BOARDS: MAINS, NUMBER OF CIRCUITS, AND NUMBER AND SIZE OF BRANCH CIRCUIT BREAKERS AS INDICATED.
.5 TWO KEYS FOR EACH PANEL BOARD AND KEY PANEL BOARDS ALIKE.
.6 COPPER BUS WITH NEUTRAL OF SAME AMPERE RATING AS MAINS.
.7 MAINS: SUITABLE FOR BOLT-ON BREAKERS.
.8 TRIM WITH CONCEALED FRONT BOLTS AND HINGES.
.9 TRIM AND DOOR FINISH: BAKED GREY ENAMEL.
.10 SURFACE PANEL BOARDS TO BE PROVIDED WITH SPRINKLER DRIP-PROOF HOODS.

2.2 CUSTOM BUILT PANEL BOARD ASSEMBLIES
.1 125 MM RELAY SECTION ON ONE SIDE OF PANELS AS INDICATED FOR INSTALLATION OF LOW VOLTAGE REMOTE CONTROL SWITCHING COMPONENTS.
.2 DOUBLE STACK PANELS AS INDICATED.
.3 CONTACTORS IN MAINS AS INDICATED.
.4 FEED THROUGH LUGS AS INDICATED.
.5 ISOLATED GROUND BUS.

2.3 BREAKERS
.1 BREAKERS: TO SECTION 16412 - MOULDED CASE CIRCUIT BREAKERS.
.2 BREAKERS WITH THERMAL AND MAGNETIC TRIPPING IN PANEL BOARDS EXCEPT AS INDICATED OTHERWISE.
.3 MAIN BREAKER: SEPARATELY MOUNTED ON TOP OR BOTTOM OF PANEL TO SUIT CABLE ENTRY. WHEN MOUNTED VERTICALLY, DOWN POSITION SHOULD OPEN BREAKER.
.4 LOCK-ON DEVICES FOR 10 % OF 15 A BREAKERS INSTALLED AS INDICATED. TURN OVER UNUSED LOCK-ON DEVICES TO OWNER.
.5 LOCK-ON DEVICES FOR FIRE ALARM, CLOCK OUTLET, EMERGENCY LIGHTING, INTERCOM, EXIT AND NIGHT LIGHT CIRCUITS.

2.4 EQUIPMENT IDENTIFICATION
.1 PROVIDE EQUIPMENT IDENTIFICATION IN ACCORDANCE WITH SECTION 16010 - ELECTRICAL GENERAL REQUIREMENTS.
.2 NAMEPLATE FOR EACH PANEL BOARD SIZE 4 ENGRAVED AS INDICATED.
.3 NAMEPLATE FOR EACH CIRCUIT IN DISTRIBUTION PANELBOARDS SIZE 2 ENGRAVED AS INDICATED.
.4 COMPLETE CIRCUIT DIRECTORY WITH TYPEWRITTEN LEGEND SHOWING LOCATION AND LOAD OF EACH CIRCUIT.

2.5 ACCEPTABLE MANUFACTURERS
.1 APPROVED MANUFACTURERS ARE CUTLER-HAMMER, SQUARE 'D' CO., SIEMENS CANADA LTD. AND CANADIAN GENERAL ELECTRIC.

3.1 INSTALLATION
.1 LOCATE PANEL BOARDS AS INDICATED AND MOUNT SECURELY, PLUMB, TRUE AND SQUARE, TO ADJOINING SURFACES.
.2 INSTALL SURFACE MOUNTED PANEL BOARDS ON PLYWOOD BACKBOARDS. WHERE PRACTICAL, GROUP PANEL BOARDS ON COMMON BACKBOARD.
.3 MOUNT PANEL BOARDS TO HEIGHT SPECIFIED IN SECTION 16010 - ELECTRICAL GENERAL REQUIREMENTS OR AS INDICATED.
.4 CONNECT LOADS TO CIRCUITS.
.5 PROVIDE TWO (2) 1" DIA. SPARE CONDUITS FROM PANEL BOARDS TO CEILING SPACE FOR FUTURE USE.
.6 CONNECT NEUTRAL CONDUCTORS TO COMMON NEUTRAL BUS WITH RESPECTIVE NEUTRAL IDENTIFIED.

16491 - FUSES - LOW VOLTAGE

1.1 PRODUCT DATA
.1 SUBMIT PRODUCT DATA AND SHOP DRAWINGS FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.

1.2 SPARE FUSES
.1 PROVIDE SIX (6) SPARE FUSES OF EACH TYPE AND SIZE INSTALLED UP TO AND INCLUDING 600A.
.2 PROVIDE THREE (3) SPARE FUSES OF EACH TYPE AND SIZE INSTALLED ABOVE 600A.

1.3 DELIVERY AND STORAGE
.1 SHIP FUSES IN ORIGINAL CONTAINERS.
.2 STORE FUSES IN ORIGINAL CONTAINERS IN MOISTURE-FREE LOCATION.
.3 OBTAIN RECEIPT FROM OWNER OF FUSE DELIVERY.

2.1 FUSES - GENERAL
.1 HRC FUSES: TO C.S.A. C22.2 NO. 106 TO HAVE INTERRUPTING CAPABILITY OF 200 KA SYMMETRICAL.
.2 FUSES: PRODUCT OF ONE MANUFACTURER.

2.2 FUSE TYPES
.1 RATINGS OF 1 TO 600 AMPERES: C.S.A. HRCI-J (NON TIME DELAY).
.2 RATINGS OF 601 TO 6000 AMPERES: C.S.A. HRC-L (NON TIME DELAY).
.3 TIME DELAY FUSES (WHERE INDICATED ON DRAWINGS) SHALL CARRY 500% OF RATED CURRENT FOR 10 SECONDS MINIMUM AND BE CLEARLY LABELED "TIME DELAY".
.1 1-600A: HRCI (TIME DELAY)
.2 601-6000A: HRC-L (TIME DELAY)

2.3 APPROVED MANUFACTURERS
.1 BUSSMAN MANUFACTURING
.2 GOULD-SHAWMUT COMPANY

3.1 INSTALLATION
.1 INSTALL FUSES IN MOUNTING DEVICES IMMEDIATELY BEFORE ENERGIZING CIRCUITS.
.2 ENSURE CORRECT FUSES FITTED TO PHYSICALLY-MATCHED MOUNTING DEVICES.
.3 ENSURE CORRECT FUSES TO ASSIGNED ELECTRICAL CIRCUIT.

16505 - LIGHTING EQUIPMENT

1.1 REFERENCES
.1 AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
.1 ANSI C82.1-1995, SPECIFICATIONS FOR FLUORESCENT LAMP BALLASTS.
.2 AMERICAN NATIONAL STANDARDS INSTITUTE/INSTITUTE OF ELECTRICAL AND ELECTRONICS (ANSI/IEEE).
.3 ANSI/IEEE C62.41, RECOMMENDED PRACTICES FOR SURGE VOLTAGES IN LOW-VOLTAGE AC POWER CIRCUITS.
.2 AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
.1 ASTM F1137, SPECIFICATION FOR PHOSPHATE/OIL AND PHOSPHATE/ORGANIC CORROSION PROTECTIVE COATINGS FOR FASTENERS.
.3 UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION (FCC)
.1 FCC (CFR47) EM AND RF INTERFERENCE SUPPRESSION.

1.2 SHOP DRAWINGS AND PRODUCT DATA
.1 SUBMIT SHOP DRAWINGS AND PRODUCT DATA FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.
.2 SUBMIT COMPLETE PHOTOMETRIC DATA PREPARED BY INDEPENDENT TESTING LABORATORY FOR LUMINAIRES WHERE SPECIFIED, FOR REVIEW BY ENGINEER.
.3 PHOTOMETRIC DATA TO INCLUDE: VCP TABLE SPACING CRITERION.

2.1 LAMPS
.1 LED LAMPS.
.1 AS SPECIFIED ON THE DRAWINGS.

2.2 DRIVERS
.1 LED DRIVERS:
.1 AS SPECIFIED ON THE DRAWINGS.

2.3 FINISHES
.1 BAKED ENAMEL FINISH:
.1 CONDITIONING OF METAL BEFORE PAINTING:
.1 FOR CORROSION RESISTANCE CONVERSION COATING TO ASTM F 1137.
.2 FOR PAINT BASE, CONVERSION COATING TO ASTM F 1137.
.2 METAL SURFACES OF LUMINAIRE HOUSING AND REFLECTORS FINISHED WITH HIGH GLOSS BAKED ENAMEL TO GIVE SMOOTH, UNIFORM APPEARANCE, FREE FROM PINHOLES OR DEFECTS. PAINT AFTER FORMING.
.3 REFLECTOR AND OTHER INSIDE SURFACES FINISHED AS FOLLOWS:
.1 WHITE, MINIMUM REFLECTION FACTOR 85%.
.2 COLOUR FASTNESS: YELLOWNESS FACTOR NOT ABOVE 0.02 AND AFTER 250 H EXPOSURE IN ATLAS FADE-O-METER NOT TO EXCEED 0.05.
.3 FILM THICKNESS, NOT LESS THAN 0.03 mm AVERAGE AND IN NO AREAS LESS THAN 0.025 mm.
.4 GLOSS NOT LESS THAN 80 UNITS AS MEASURED WITH GARDNER 60° GLOSS METER.
.5 FLEXIBILITY: WITHSTAND BENDING OVER 12 mm MANDREL WITHOUT SHOWING SIGNS OF CRACKING OR FLAKING UNDER 10 TIMES MAGNIFICATION.
.6 ADHESION: 24 mm SQUARE LATTICE MADE OF 3 mm SQUARES CUT THROUGH FILM TO METAL WITH SHARP RAZOR BLADE. ADHESIVE CELLULOSE TAPE APPLIED OVER LATTICE AND PULLED. ADHESION SATISFACTORY IF NO COATING REMOVED.
.2 ALZAK FINISH:
.1 ALUMINUM SHEET FABRICATED FROM SPECIAL ALUMINIUM ALLOYS, CHEMICALLY BRIGHTENED, SUBSEQUENTLY ANODICALLY TREATED TO SPECIFICATIONS ESTABLISHED BY ALCOA, TO PRODUCE:
.1 FINISH FOR MILD COMMERCIAL SERVICE, MINIMUM DENSITY OF COATING 0.8 MG/CM², MINIMUM REFLECTIVITY 83% FOR SPECULAR AND 75% FOR DIFFUSE.
.2 FINISH FOR REGULAR INDUSTRIAL SERVICE, MINIMUM DENSITY OF COATING 1.2 MG/CM², MINIMUM REFLECTIVITY 82% FOR SPECULAR AND 73% FOR DIFFUSE.
.3 FINISH FOR HEAVY DUTY SERVICE, MINIMUM DENSITY OF COATING 1.5 MG/CM², MINIMUM REFLECTIVITY 78% FOR SPECULAR AND 65% FOR DIFFUSE.

2.4 LENSES
.1 LENS DESIGN AS SPECIFIED ON THE DRAWINGS.

2.5 LUMINAIRES
.1 LUMINAIRE DESIGNS AS SPECIFIED ON THE DRAWINGS.

2.6 ACCEPTABLE MANUFACTURERS
.1 SPECIFIED FIXTURES ARE BASE BID.
.2 APPROVED ALTERNATE MANUFACTURES AS INDICATED.

3.1 INSTALLATION
.1 LOCATE AND INSTALL LUMINAIRES AS INDICATED.

3.2 WIRING
.1 CONNECT LUMINAIRES TO LIGHTING CIRCUITS.

3.3 LUMINAIRE SUPPORTS
.1 FOR SUSPENDED CEILING INSTALLATIONS SUPPORT LUMINAIRES INDEPENDENTLY OF CEILING GRID AT BOTH ENDS IN ACCORDANCE WITH LOCAL ELECTRICAL SAFETY AUTHORITY REQUIREMENTS.

3.4 LUMINAIRE ALIGNMENT
.1 ALIGN LUMINAIRES MOUNTED IN CONTINUOUS ROWS TO FORM STRAIGHT UNINTERRUPTED LINE.
.2 ALIGN LUMINAIRES MOUNTED INDIVIDUALLY PARALLEL OR PERPENDICULAR TO BUILDING GRID LINES.

3.5 LIGHTING CONTROLS
.1 LIGHTING CONTROLS AS SPECIFIED ON THE DRAWINGS.

3.6 COMMISSIONING
.1 COORDINATE A MEETING BETWEEN ELECTRICAL CONTRACTOR, LIGHTING MANUFACTURER'S REPRESENTATIVE, ENGINEER AND LIGHTING CONSULTANT PRIOR TO PLACING ORDER FOR ANY LIGHTING EQUIPMENT OR LIGHTING SHOP DRAWINGS TO REVIEW EQUIPMENT AND CONTROL SYSTEM COMPONENTS TO BE PROVIDED.
.2 ENGAGE LIGHTING MANUFACTURER'S REPRESENTATIVE OR DESIGNATED AGENT TO PROGRAM, TEST AND COMMISSION ALL LIGHTING CONTROLS TO THE SATISFACTION OF THE ENGINEER AND LIGHTING CONSULTANT.
.3 PROVIDE COMPLETE LIGHTING CONTROLS TESTING, VERIFICATION REPORT AND CERTIFICATION LETTER FROM COMMISSIONING AGENT. INCLUDE COPIES IN ALL PROJECT MANUALS.
.4 FULLY INSTRUCT AND TRAIN OPERATING AND MAINTENANCE PERSONNEL IN CARE, ADJUSTMENT AND OPERATION OF ALL LIGHTING SYSTEMS AND RELATED CONTROLS.

16531 - "RUNNING MAN" EXIT LIGHTING

1.1 REFERENCES
.1 CSA C22.2 NO. 141
.2 CSA C860

1.2 PRODUCT DATA
.1 SUBMIT PRODUCT DATA AND SHOP DRAWINGS FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.

2.1 STANDARD UNITS
.1 HOUSING: EXTRUDED ALUMINUM MINIMUM 1.0 mm THICK.
.2 FACE AND BACK PLATES: BRUSHED ALUMINUM.
.3 LAMPS: LED BAR, AC & DC OPERATION.
.4 OPERATION: DESIGNED FOR 10,000 H OF CONTINUOUS OPERATION WITHOUT RE-LAMPING.
.5 FACEPLATE: "RUNNING MAN" SYMBOL, GREEN ON WHITE GLASS.
.6 DOWN LIGHT: WHITE GLASS TRANSLUCENT ACRYLIC IN BOTTOM OF UNIT.

2.2 SELF-POWERED UNITS
.1 HOUSING: EXTRUDED ALUMINIUM MINIMUM 1.0 mm THICK.
.2 FACE AND BACK PLATES: BRUSHED ALUMINIUM.
.3 LAMPS: LED BAR, AC & DC OPERATION.
.4 OPERATION: DESIGNED FOR 10,000 H OF CONTINUOUS OPERATION WITHOUT RE-LAMPING.
.5 FACEPLATE: "RUNNING MAN" SYMBOL, GREEN ON WHITE GLASS.
.6 DOWN LIGHT: WHITE GLASS TRANSLUCENT ACRYLIC IN BOTTOM OF UNIT.
.7 SUPPLY VOLTAGE: 120 V, AC.
.8 OUTPUT VOLTAGE: 12 V, DC.
.9 OPERATING TIME: 30 MIN.
.10 RECHARGE TIME: 12 H.
.11 BATTERY: SEALED, MAINTENANCE FREE.
.12 CHARGER: SOLID STATE, VOLTAGE/CURRENT REGULATED, INVERSE TEMPERATURE COMPENSATED, SHORT CIRCUIT PROTECTED, WITH REGULATED OUTPUT OF PLUS OR MINUS 0.01 V FOR PLUS OR MINUS 10% V INPUT VARIATION.
.13 SOLID STATE TRANSFER CIRCUIT.
.14 SIGNAL LIGHTS: SOLID STATE, FOR 'AC POWER ON' AND 'HIGH CHARGE' CONDITION.
.15 LAMP HEADS: INTEGRAL ON UNIT, 345° HORIZONTAL AND 180° VERTICAL ADJUSTMENT. LAMP TYPE: AS NOTED.
.16 MOUNTING: SUITABLE FOR UNIVERSAL MOUNTING DIRECTLY ON JUNCTION BOX AND C/W KNOCKOUTS FOR CONDUIT. REMOVABLE OR HINGED FRONT PANEL FOR EASY ACCESS TO BATTERIES.

2.3 ACCEPTABLE MANUFACTURERS
.1 SPECIFIED LED "RUNNING MAN" EXIT LIGHTING BASE BID SHALL BE AS SHOWN ON DRAWINGS.
.2 ACCEPTABLE ALTERNATE LED "RUNNING MAN" EXIT LIGHTING MANUFACTURERS ARE STANPRO, EMERGI-LITE, HUBBELL, AIMLITE AND LUMACELL.

3.1 INSTALLATION
.1 INSTALL EXIT LIGHTS.
.2 CONNECT FIXTURES TO EMERGENCY POWER CIRCUITS.
.3 FACE PLATE ARROW DIRECTIONS AS INDICATED.
.4 ENSURE THAT EXIT LIGHT CIRCUIT BREAKER IS LOCKED IN ON POSITION.

16536 - UNIT EQUIPMENT FOR EMERGENCY LIGHTING

1.1 PRODUCT DATA
.1 SUBMIT PRODUCT DATA IN ACCORDANCE WITH SECTIONS 01300 AND 16010.
.2 DATA TO INDICATE SYSTEM COMPONENTS, MOUNTING METHOD, SOURCE OF POWER AND SPECIAL ATTACHMENTS.

1.2 WARRANTY
.1 FOR BATTERIES, THE 12 MONTHS WARRANTY PERIOD PRESCRIBED IN SUBSECTION GC 32.1 OF GENERAL CONDITIONS "C: IS EXTENDED TO 120 MONTHS, WITH A NO-CHARGE REPLACEMENT DURING THE FIRST 5 YEARS AND A PRO-RATE CHARGE ON THE SECOND 5 YEARS.

2.1 EQUIPMENT
.1 SUPPLY VOLTAGE: 120 V, AC.
.2 OUTPUT VOLTAGE: 12 V, DC.
.3 OPERATING TIME: 30 MIN.
.4 BATTERY: SEALED, MAINTENANCE FREE, SHALL OPERATE A MINIMUM OF 10 YEARS ENTIRELY UNATTENDED.
.5 CHARGER: SOLID STATE, MULTI-RATE, VOLTAGE/CURRENT REGULATED, INVERSE TEMPERATURE COMPENSATED, SHORT CIRCUIT PROTECTED WITH REGULATED OUTPUT OF PLUS OR MINUS 0.01 V FOR PLUS OR MINUS 10% INPUT VARIATIONS.
.6 SOLID STATE TRANSFER CIRCUIT.
.7 LOW VOLTAGE DISCONNECT: SOLID STATE, MODULAR, OPERATES AT 80% BATTERY OUTPUT VOLTAGE.
.8 SIGNAL LIGHTS: SOLID STATE, FOR 'AC POWER ON' AND 'HIGH CHARGE'.
.9 LAMP HEADS: INTEGRAL ON UNIT REMOTE, 345° HORIZONTAL AND 180° VERTICAL ADJUSTMENT. LAMP TYPE: AS NOTED.
.10 CABINET: SUITABLE FOR DIRECT OR SHELF MOUNTING TO WALL AND C/W KNOCKOUTS FOR CONDUIT. REMOVABLE OR HINGED FRONT PANEL FOR EASY ACCESS TO BATTERIES.
.11 FINISH: WHITE (INDOOR).
.12 AUXILIARY EQUIPMENT:
.1 FUSIBLE DISTRIBUTION PANEL COMPLETE WITH FUSES FOR CIRCUITS INDICATED ON DRAWINGS. PANEL MOUNTED INSIDE OF BATTERY UNIT OR REMOTE MOUNTED BELOW BATTERY UNIT.
.2 AUTOMATIC TEST FEATURE COMPLETE WITH ALARM.
.3 TEST SWITCH.
.4 TIME DELAY RELAY.
.5 BATTERY DISCONNECT DEVICE.
.6 AC INPUT AND DC OUTPUT TERMINAL BLOCKS INSIDE CABINET.
.7 SHELF BRACKET.
.8 HARD WIRED CONNECTION FOR AC.
.9 RFI SUPPRESSORS.

2.2 WIRING OF REMOTE HEADS
.1 CONDUIT: TO SECTION 16133 - CONDUITS, CONDUIT FASTENINGS AND CONDUIT FITTINGS.
.2 CONDUCTORS: TO SECTION 16122 - WIRES AND CABLES 0 - 1000 V, SIZED AS INDICATED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
.3 ALL WIRING SHALL BE RW90, #14AWG (MINIMUM) FOR EACH CIRCUIT AND RUN IN CONDUIT. WIRING SIZES IN ACCORDANCE WITH MANUFACTURERS.

2.3 APPROVED MANUFACTURERS
.1 SPECIFIED EMERGENCY LIGHTING EQUIPMENT BASE BID SHALL BE AS SHOWN ON THE DRAWINGS.
.2 ACCEPTABLE ALTERNATE EMERGENCY LIGHTING MANUFACTURERS ARE STANPRO, EMERGI-LITE, HUBBELL, AIMLITE AND LUMACELL.

2.4 REMOTE EMERGENCY LIGHTING FIXTURES
.1 SUPPLY AND INSTALL EMERGENCY LIGHTING
.2 ALL ADJUSTABLE TYPE HEADS TO BE COMPLETE WITH CANOPY.
.3 ALL EMERGENCY FIXTURES IN LOCKER ROOMS, GYMNASIUMS AND MECHANICAL/ELECTRICAL ROOMS TO BE COMPLETE WITH WIRE GUARD.
.4 FIXTURE TYPE 'E1': SURFACE SINGLE HEAD EMERGENCY FIXTURE WITH LAMP AS NOTED.
.5 FIXTURE TYPE 'E2': SURFACE DUAL HEAD EMERGENCY FIXTURE WITH LAMPS AS NOTED.

3.1 INSTALLATION
.1 MOUNT BATTERY UNITS AND HEADS AT 2134 mm (7') OR AS INDICATED.
.2 PROVIDE 120V, 15A, HARD WIRED CONNECTION TO BATTERY UNIT.
.3 INSTALL UNIT EQUIPMENT AND REMOTE MOUNTED FIXTURES AS INDICATED. PROVIDE 300 mm (12") MINIMUM CLEAR SPACE IN FRONT OR SIDES OF UNIT ENCLOSURE FACE EQUIPPED WITH DIRECT HEADS AS INDICATED.

3.2 TESTING AND VERIFICATION
.1 WHEN THE INSTALLATION OF THE BATTERY UNITS, REMOTE EMERGENCY LIGHTS AND ASSOCIATED WIRING HAS BEEN COMPLETED RETAIN THE SERVICES OF A QUALIFIED REPRESENTATIVE OF THE EQUIPMENT MANUFACTURER TO TEST THE COMPLETE INSTALLATION AND OPERATION OF THE SYSTEM.
.2 FOLLOWING COMPLETION OF THE TEST, OBTAIN A LETTER FROM THE MANUFACTURER/SUPPLIER, STATING THAT THE BATTERY UNITS AND ASSOCIATED LIGHTS HAVE BEEN COMPLETELY CHECKED AND ARE OPERATING SATISFACTORILY.
.3 SUBMIT TWO (2) COPIES OF LETTER TO ARCHITECT AND ENGINEER.

16721 - FIRE ALARM SYSTEM DEVICES

1.1 RELATED WORK
.1 SECTION 16122 WIRES AND CABLES 0-1000V - WIRING.
.2 SECTION 16133 CONDUITS, CONDUIT FASTENINGS AND CONDUIT FITTINGS.

1.2 REFERENCES
.1 CAN/ULC-S524-M, INSTALLATION OF FIRE ALARM SYSTEMS.
.2 ULC-S525, AUDIBLE SIGNAL APPLIANCES FOR FIRE ALARM SYSTEMS.
.3 CAN/ULC-S526-M, VISUAL SIGNAL APPLIANCES, FIRE ALARM.
.4 CAN/ULC-S527-M, CONTROL UNITS, FIRE ALARM.
.5 CAN/ULC-S528-M, MANUAL PULL STATIONS.
.6 CAN/ULC-S529-M, SMOKE DETECTORS, FIRE ALARM.
.7 CAN/ULC-S530-M, HEAT ACTUATED FIRE DETECTORS, FIRE ALARM.
.8 CAN/ULC-S531-M, SMOKE ALARMS.
.9 CAN/ULC-S536-M, INSPECTION AND TESTING OF FIRE ALARM SYSTEMS.
.10 CAN/ULC-S537-M, VERIFICATION OF FIRE ALARM SYSTEMS.

1.3 DESCRIPTION OF SYSTEM
.1 EXISTING MICRO-PROCESSOR BASED FIRE ALARM SYSTEM CONTROL PANEL AND REMOTE ANNUNCIATOR PANELS TO REMAIN.
.2 SUPPLY AND INSTALL NEW, INITIATION AND SIGNAL DEVICES AS SHOWN ON THE DRAWINGS.
.3 RETAIN THE SERVICES OF THE FIRE ALARM PANEL MANUFACTURER FOR SYSTEM TESTING AND VERIFICATIONS.

1.4 SHOP DRAWINGS
.1 SUBMIT PRODUCT DATA AND SHOP DRAWINGS FOR ENGINEER REVIEW IN ACCORDANCE WITH GENERAL REQUIREMENTS.
.2 INCLUDE:
.1 LAYOUT OF EQUIPMENT.
.2 ZONING.
.3 COMPLETE WIRING DIAGRAM, INCLUDING SCHEMATICS OF MODULES.

1.5 OPERATION AND MAINTENANCE DATA
.1 PROVIDE OPERATION AND MAINTENANCE DATA FOR FIRE ALARM EQUIPMENT FOR INCORPORATION INTO PROJECT MANUAL.
.2 INCLUDE:
.1 OPERATION AND MAINTENANCE INSTRUCTIONS FOR COMPLETE FIRE ALARM SYSTEM TO PERMIT EFFECTIVE OPERATION AND MAINTENANCE.
.2 TECHNICAL DATA - ILLUSTRATED PARTS LISTS WITH PARTS CATALOGUE NUMBERS.
.3 COPY OF APPROVED SHOP DRAWINGS.
.4 LIST OF RECOMMENDED SPARE PARTS FOR SYSTEM.

1.6 MAINTENANCE MATERIALS
.1 PROVIDE MAINTENANCE MATERIALS AS LISTED BELOW.
.2 INCLUDE FOR EACH NEW SYSTEM:
.1 12 SPARE GLASS RODS FOR MANUAL PULL BOX STATIONS IF APPLICABLE.
.2 2 SPARE SMOKE DETECTORS.
.3 2 SPARE RATE OF RISE HEAT DETECTORS.
.4 2 SPARE HORNS.

1.7 WARRANTY
.1 PROVIDE ONE YEAR'S WARRANTY INCLUDING PARTS AND LABOUR FROM THE DATE OF FINAL ACCEPTANCE.

2.1 MATERIALS
.1 EQUIPMENT AND DEVICES: ULC LISTED AND LABELED AND SUPPLIED BY SINGLE MANUFACTURER TO MATCH EXISTING BUILDING FIRE ALARM EQUIPMENT.
.2 POWER SUPPLY: TO CAN/ULC-S524.
.3 AUDIBLE SIGNAL DEVICES: TO ULC-S525.
.4 VISUAL SIGNAL DEVICES: TO CAN/ULC-S526.
.5 CONTROL UNIT: TO CAN/ULC-S527.
.6 MANUAL PULL STATIONS: TO CAN/ULC-S528.
.7 THERMAL DETECTORS: TO CAN/ULC-S530.
.8 SMOKE DETECTORS: TO CAN/ULC-S529.
.9 SMOKE ALARMS: TO CAN/ULC-S531.

2.2 SYSTEM OPERATION
.1 OPERATION OF ANY ALARM INITIATING DEVICE TO:
.1 CAUSE AUDIBLE SIGNAL DEVICES TO SOUND THROUGHOUT BUILDING.
.2 TRANSMIT SIGNAL TO MONITORING STATION.
.3 CAUSE ZONE OF ALARM DEVICE TO BE INDICATED ON CONTROL PANEL AND REMOTE ANNUNCIATORS.
.4 CAUSE AIR CONDITIONING AND VENTILATING FANS TO SHUT DOWN (IF APPLICABLE).
.5 CAUSE FIRE DOORS AND SMOKE CONTROL DOORS IF NORMALLY HELD OPEN, TO CLOSE AUTOMATICALLY (IF APPLICABLE).

2.3 CONTROL PANEL
.1 EXISTING BUILDING SINGLE STAGE NON-CODED ADDRESSABLE AND HARDWIRED ZONES FIRE ALARM CONTROL PANEL COMPLETE WITH LCD DISPLAY TO REMAIN.

2.4 POWER SUPPLY
.1 120 VAC, 60 HZ INPUT, 24 VDC OUTPUT FROM RECTIFIER TO OPERATE ALARM AND SIGNAL CIRCUITS, WITH STANDBY POWER (24 HOURS) OF GELL CELL BATTERIES MINIMUM EXPECTED LIFE OF 5 YEARS, SIZED IN ACCORDANCE WITH THE ONTARIO BUILDING CODE.

2.5 MANUAL ALARM STATIONS
.1 MANUAL ALARM STATIONS: PULL LEVER, WALL MOUNTED SEMI-FLUSH OR SURFACE TYPE, ADDRESSABLE, ENGLISH SIGNAGE.

2.6 AUTOMATIC ALARM INITIATING DEVICES
.1 HEAT DETECTORS, FIXED TEMPERATURE, RATED 88°C.
.2 THERMAL FIRE DETECTORS, COMBINATION FIXED TEMPERATURE AND RATE OF RISE, NON-RESTORABLE FIXED TEMPERATURE ELEMENT, SELF-RESTORING RATE OF RISE, FIXED TEMPERATURE 88°C, RATE OF RISE 8.3°C PER MINUTE.
.3 SMOKE DETECTOR: PHOTO ELECTRIC TYPE.
.1 TWISTLOCK PLUG-IN TYPE WITH FIXED BASE.
.2 WIRE-IN BASE ASSEMBLY WITH INTEGRAL RED ALARM LED, AND TERMINALS FOR REMOTE RELAY.

2.7 AUDIBLE SIGNAL DEVICES
.1 BELLS: 6" OR 10" DIAMETER VIBRATING, RED.
.2 MINI_HORNS: SURFACE OR FLUSH MOUNTING, RED.
.3 ELECTRONIC HORNS: SURFACE OR FLUSH MOUNTING, RED.
.4 HORN/STROBE UNITS: SURFACE OR FLUSH MOUNTING, RED.

2.8 END-OF-LINE DEVICES
.1 END-OF-LINE DEVICES TO CONTROL SUPERVISORY CURRENT IN ALARM CIRCUITS AND SIGNALING CIRCUITS, SIZED TO ENSURE CORRECT SUPERVISORY CURRENT FOR EACH CIRCUIT. OPEN, SHORT OR GROUND FAULT IN ANY CIRCUIT WILL ALTER SUPERVISORY CURRENT IN THAT CIRCUIT, PRODUCING AUDIBLE AND VISIBLE ALARM AT MAIN CONTROL PANEL AND REMOTELY AS INDICATED.

2.9 REMOTE ANNUNCIATOR PANEL
.1 EXISTING FIRE ALARM REMOTE ANNUNCIATOR PANELS COMPLETE WITH LCD DISPLAY TO REMAIN.

2.10 AS-BUILT ZONING DIAGRAM
.1 FIRE ALARM SYSTEM ZONE DIAGRAM: UNDER PLEXIGLAS SECURELY FASTENED TO WALL NEXT TO PANEL AND REMOTE ANNUNCIATOR(S) WITH BEVELED EDGES, WHITE LETTERING AND DESIGNATIONS TO BE UPDATED TO SHOW NEW ZONES AS NESSESARY.

2.11 ANCILLARY DEVICES
.1 REMOTE RELAY UNIT TO INITIATE FAN SHUTDOWN AND DOOR CLOSURE WHERE APPLICABLE.

2.12 SIGNAL TRANSMISSION
.1 FIRE ALARM PANEL TO BE TIED INTO SECURITY SYSTEM FOR MONITORING.

2.13 ACCEPTABLE MANUFACTURERS
.1 SPECIFIED FIRE ALARM EQUIPMENT SHALL BE SIMPLEX TO MATCH EXISTING.

3.1 INSTALLATION
.1 INSTALL SYSTEMS IN ACCORDANCE WITH CAN/ULC-S524.
.2 LOCATE AND INSTALL MANUAL ALARM STATIONS AND CONNECT TO ALARM CIRCUIT WIRING.
.3 LOCATE AND INSTALL DETECTORS AND CONNECT TO ALARM CIRCUIT WIRING. DO NOT MOUNT DETECTORS WITHIN 1 M OF AIR OUTLETS. MAINTAIN AT LEAST 600 MM RADIUS CLEAR SPACE ON CEILING, BELOW AND AROUND DETECTORS.
.4 LOCATE AND INSTALL HORNS OR BELLS AND CONNECT TO SIGNALING CIRCUITS.
.5 INSTALL END-OF-LINE DEVICES AT END OF ALARM AND SIGNALING CIRCUITS.
.6 LOCATE AND INSTALL DOOR RELEASING DEVICES (IF APPLICABLE).
.7 LOCATE AND INSTALL REMOTE RELAY UNITS TO CONTROL FAN SHUT DOWN (IF APPLICABLE).
.8 WIRE TO ZONES AS INDICATED.
.9 PROVIDE CONNECTIONS TO SPRINKLER FLOW AND TAMPER SWITCHES.

3.2 FIELD QUALITY CONTROL
.1 PERFORM TESTS IN ACCORDANCE WITH SECTION 16010 - ELECTRICAL GENERAL REQUIREMENTS AND CAN/ULC-S537. PROVIDE VERIFICATION CERTIFICATE FROM MANUFACTURER TO ENGINEER.
.2 FIRE ALARM SYSTEM:
.1 TEST EACH DEVICE AND ALARM CIRCUIT TO ENSURE MANUAL STATIONS, THERMAL AND SMOKE DETECTORS TRANSMIT ALARM TO CONTROL PANEL AND ACTUATE GENERAL ALARM & ANCILLARY DEVICES.
.2 TEST ALL DEVICES ON EACH ZONE.
.3 CHECK ANNUNCIATOR PANEL(S) TO ENSURE ZONES ARE SHOWN CORRECTLY.
.4 SIMULATE GROUNDS AND BREAKS ON ALARM AND SIGNALING CIRCUITS TO ENSURE PROPER OPERATION OF SYSTEM.
.5 CLASS B CIRCUITS.
.1 TEST EACH CONDUCTOR ON ALL CIRCUITS FOR CAPABILITY OF PROVIDING ALARM SIGNAL ON LINE SIDE OF SINGLE OPEN-CIRCUIT FAULT CONDITION IMPOSED AT ELECTRICALLY MOST REMOTE DEVICE ON CIRCUIT. RESET CONTROL UNIT AFTER EACH ALARM FUNCTION AND CORRECT IMPOSED FAULT AFTER COMPLETION OF EACH TEST.
.2 TEST EACH CONDUCTOR ON ALL CIRCUITS FOR CAPABILITY OF PROVIDING ALARM SIGNAL DURING GROUND-FAULT CONDITION IMPOSED AT ELECTRICALLY MOST REMOTE DEVICE ON CIRCUIT. RESET CONTROL UNIT AFTER EACH ALARM FUNCTION AND CORRECT IMPOSED FAULT AFTER COMPLETION OF EACH TEST.
.6 TEST ALARM AND TROUBLE SIGNALS TO SECURITY PANEL AND TO MONITORING STATION.

16826 - WIRING FOR MECHANICAL EQUIPMENT

1.1 RELATED WORK
.1 ELECTRICAL PROJECT REQUIREMENTS - SECTION 16000.
.2 ELECTRICAL GENERAL REQUIREMENTS - SECTION 16010.
.3 MOTOR STARTERS TO 600 V - SECTION 16223.
.4 DISCONNECT SWITCHES FUSED AND NON-FUSED - SECTION 16414.
.5 BUILDING AUTOMATION SYSTEM - SECTION 15900.

1.2 RELATED WORK SPECIFIED ELSEWHERE
.1 DIVISION 15 SPECIFICATIONS AND DRAWINGS: CHECK ALL THESE DRAWINGS AND SPECIFICATIONS FOR DETAILED REQUIREMENTS AND COMPONENTS SUPPLIED.
.2 ANY OTHER SPECIALTY DIVISIONS REFER TO THE SCHEDULE ON THE DRAWINGS.

1.3 SCOPE OF WORK
.1 FURNISH, INSTALL AND WIRE ALL ELECTRICAL CONTROL COMPONENTS, ETC. REQUIRED FOR THIS EQUIPMENT.
.2 ALL ELECTRIC WIRING AND CONNECTION OF EQUIPMENT TO THE DESIGNATED POWER SUPPLY AND BETWEEN THE ITEMS OF EQUIPMENT SUPPLIED BY THE SUB-CONTRACTORS SHALL BE CARRIED OUT BY THIS SUB-CONTRACTOR EXCEPT FOR:
.1 SUPPLY AND INSTALLATION OF ELECTRIC MOTORS AND OTHER ELECTRICAL COMPONENTS THAT WILL BE SUPPLIED BY OTHER TRADES IN ACCORDANCE WITH THE DRAWINGS AND EQUIPMENT SCHEDULES.
.2 WIRING OF ANY PACKAGED AND WIRED UNITS, WHICH ARE NORMALLY FACTORY INSTALLED BEYOND THE MAIN DISCONNECT SWITCH SUCH AS BOILERS, ELEVATORS, HOISTS, ETC., EXCEPT WHERE NOTED.
.3 SUPPLY AND INSTALL ALL NECESSARY WIRING, DISCONNECT SWITCHES, STARTERS, RELAYS, PUSHBUTTON STATIONS, AND OTHER CONTROL DEVICES LISTED ON THE EQUIPMENT SCHEDULE, THE DRAWINGS OR AS SPECIFIED HEREIN.

1.4 VOLTAGE LEVELS
.1 IN GENERAL, ALL ELECTRICAL MOTORS SHALL BE 575V, 3 PHASE OR 208V, 3 PHASE OR SINGLE PHASE OR 120V SINGLE PHASE 60 CYCLE UNLESS SPECIFICALLY NOTED OTHERWISE ON THE DRAWINGS.
.2 VERIFY ALL MOTOR CHARACTERISTICS TO ACTUAL INSTALLATION AND NOTIFY THE ENGINEER AND ALL INTERESTED PARTIES IN WRITING OF ANY DISCREPANCIES BETWEEN THE DESIGN CHARACTERISTICS AND THOSE OF THE EQUIPMENT ACTUALLY DELIVERED TO THE SITE.

1.5 DISCONNECT SWITCHES
.1 WHERE NECESSARY TO PROVIDE A VISIBLE MEANS OF DISCONNECT TO MEET THE LATEST REQUIREMENTS OF THE ONTARIO HYDRO SAFETY CODE, THIS SUB-CONTRACTOR SHALL ACCEPT FULL RESPONSIBILITY TO ENSURE THAT SUCH REGULATIONS ARE MET. ALL DISCONNECT SWITCHES SHALL BE NON-FUSED TYPE, H.P. RATED, HEAVY DUTY TYPE A.
.2 WHERE DISCONNECTING MEANS ARE REQUIRED WITH PROTECTION, CIRCUIT BREAKERS ONLY SHALL BE INSTALLED OF A SIZE AND TRIP RATING AS NOTED ON THE DRAWINGS. INSTALL A LOCKABLE WEATHERPROOF DISCONNECT SWITCH AT EACH MECHANICAL UNIT MOUNTED ON THE ROOF AS INDICATED.

1.6 EQUIPMENT SCHEDULE
.1 EQUIPMENT SUPPLIED AND INSTALLED BY OTHER TRADES FOR BUILDING SERVICES SUCH AS HEATING, VENTILATING, AIR CONDITIONING AND/OR PLUMBING, HOIST OR ELEVATORS TO BE WIRED BY THIS SUB-CONTRACTOR ARE SHOWN ON THE DRAWINGS OR NOTED HEREIN.
.2 CONTROL COMPONENTS LISTED WITH LOCATIONS TO SAME ARE IN GENERAL SHOWN ON THE DRAWINGS. IT IS THIS SUB-CONTRACTORS RESPONSIBILITY TO VERIFY ALL CONTROL LOCATIONS WITH THE ENGINEER AND/OR SUB-CONTRACTOR INVOLVED.

1.7 NAMEPLATES
.1 ALL DISCONNECT SWITCHES, STARTERS, PUSHBUTTON STATIONS, THERMOSTATS AND ALL OTHER CONTROL DEVICES SHALL BE LABELLED WITH "LAMICOID" NAMEPLATES, REFER TO SECTION 16010. ACTUAL WORDING SHALL BE APPROVED BY THE ENGINEER AND/OR THE RESPECTIVE SUB-CONTRACTOR.

2.1 STARTERS
.1 REFER TO SECTION 16223 - MOTOR STARTERS TO 600V.

2.2 DISCONNECT SWITCHES
.1 REFER TO SECTION 16414 - DISCONNECT SWITCHES - FUSED AND NON FUSED.

2.3 CONTROL DEVICES
.1 REFER TO SECTION 16423 - CONTROL DEVICES.

3.1 INSTALLATION
.1 INSTALL AND WIRE ALL STARTERS, DISCONNECT SWITCHES, TIMERS, AND OTHER MISCELLANEOUS CONTROL COMPONENTS AS NOTED ON THE DRAWINGS AND SCHEDULES.

3.2 EQUIPMENT SCHEDULE
.1 THE EQUIPMENT SCHEDULES SHOWN ON THE MECHANICAL DRAWINGS INDICATE THE EQUIPMENT TO BE WIRED, TYPE OF CONTROL, CONTROL COMPONENTS, DIVISION OF WORK AND THE TYPE OF EQUIPMENT TO BE WIRED. REFER ALSO TO THE MECHANICAL DRAWINGS AND SPECIFICATIONS.

3.3 WIRING DIAGRAMS
.1 BEFORE WIRING ANY OF THIS EQUIPMENT OBTAIN COMPLETE WIRING AND CONNECTION DIAGRAMS FROM THE SUB-CONTRACTORS AND SUPPLIERS.

3.4 COMMISSIONING
.1 CHECK OUT ALL CONTROL SYSTEMS AND SCHEDULES ON A DRY-RUN BASIS, BEFORE APPLYING POWER TO THE DRIVES.
.2 RETAIN SUPPLIERS ASSISTANCE WITH SPECIAL EQUIPMENT.
.3 CHECK THE ROTATION OF THE DRIVES.

16905 - MODULAR CONTROL PANEL

1.1 SHOP DRAWINGS AND PRODUCT DATA
.1 SUBMIT SHOP DRAWINGS AND PRODUCT DATA IN ACCORDANCE WITH SECTION 16010.
.2 SHOP DRAWINGS TO CLEARLY INDICATE ALL MATERIALS SUPPLIED BY THIS SECTION, INSTALLATION METHODS AND ALL CUTOUTS AS REQUIRED.
.3 DRAWINGS TO S HOW ALL REINFORCING AS REQUIRED TO SUPPORT EQUIPMENT BY OTHERS.
.4 ONE TYPICAL SAMPLE OF CONTROL PANEL TO BE SUBMITTED TO JOB SITE FOR ARCHITECT'S APPROVAL. PANEL TO BE COMPLETE WITH CLOCK, SPEAKER, CALL SWITCH, LIGHT SWITCHES, RECEPTACLE, DATA OUTLET, THERMOSTAT, ETC.

1.2 MANUFACTURER
.1 PROVIDE MODULE CONTROL PANELS AS DETAILED ON THE DRAWINGS AND SPECIFIED HEREIN AS MANUFACTURED BY INTERSPEC SYSTEMS LIMITED, ROSEMOUNT, ONTARIO (705) 435-0294 SPECIFIED MANUFACTURERS PRODUCTS ESTABLISH MINIMUM STANDARDS AND SHALL BE BASE BID.
.2 OTHER MANUFACTURERS PRODUCTS SHALL BE BID AS AN ALTERNATIVE PRICE PROPOSAL BY THE CONTRACTOR, INDICATING THE COST SAVING.
.3 WIRING AND CONDUIT SYSTEM, COMPLETE WITH PULL BOXES, ETC., AS SHOWN ON THE DRAWINGS ARE TO BE INCLUDED IN THE BULK TENDER PRICE.

2.1 MATERIALS
.1 MODULE CONTROL PANELS SHALL BE CONSTRUCTED OF STRUCTURALLY SOUND 6063 T5 ALLOY SATIN ANODIZED ALUMINUM FRAME. 0.80mm THICK; WITH HIGH PRESSURE PLASTIC LAMINATE FACED PANEL OF LIGHTWEIGHT PARTICLE CORE AND .050mm THICK PLASTIC LAMINATE BACKING SHEET. PLASTIC LAMINATE COLOUR AS SELECTED BY THE ARCHITECT FROM ARBORITE OR FORMICA, FURNITURE FINISH, FROM MANUFACTURERS STANDARD COLOUR RANGE. COMPLETE ASSEMBLY TO MEET FLAME SPREAD RATINGS IN AREAS USED.
.2 UNITS TO BE COMPLETED WITH BACKBOXES FABRICATED FROM HEAVY GAUGE STAIN COAT STEEL WITH SUITABLE BARRIERS AND CONTINUOUS KNOCKOUTS. SATIN ANODIZED FACEPLATES SHALL BE PRE-PUNCHED TO ACCEPT DETAILED COMPONENTS.
.3 ALL PANELS SHALL BE VANDAL RESISTANT AND REMOVABLE WITH SPECIAL TOOLS FOR SERVICE ACCESS.
.4 FABRICATE UNITS IN ACCORDANCE WITH REVIEWED SHOP DRAWINGS WITH EXTRUDED ALUMINUM FRAMES AND SOLID PLASTIC LAMINATED FACE PANELS.
.5 PANELS TO BE REMOVABLE FROM ALUMINUM FRAMES.
.6 FRONT PANELS TO HAVE COLOUR FINISH SELECTED BY ARCHITECT.
.7 PANELS TO HAVE OPENINGS, MOUNTING HARDWARE, ETC. FOR SERVICES AS REQUIRED FOR INSTALLATION OF MECHANICAL AND ELECTRICAL SERVICES BY DIVISION 15 AND 16.
.8 UNIT TO BE FULL HEIGHT FROM FLOOR TO CEILING GRID.
.9 PROVIDE NECESSARY SUPPORTS ON SIDE OF FRAME FOR 120 VOLT BX CABLE SO IT DOES NOT RUN OVER SPEAKER AND CAUSE SOUND INTERFERENCE.

2.2 MODULAR PANEL SCHEDULE
.1 FOR PANEL LAYOUT REFER TO SCHEDULE AND DETAILS ON DRAWINGS.
.2 DIVISION 16 TO JOB SITE MEASURE BEFORE ORDERING PANELS.

3.1 INSTALLATION
.1 DIVISION 16 TO INSTALL UNITS IN ACCORDANCE WITH MANUFACTURES RECOMMENDATIONS AND REVIEWED SHOP DRAWINGS COMPLETE WITH ALL FRAMES, CUTOUTS, FACE PANELS ETC. TO PROVIDE A COMPLETE INSTALLATION.

3.2 CO-ORDINATION
.1 IT IS DIVISION 16 RESPONSIBILITY TO CO-ORDINATE COMPLETE INSTALLATION OF ALL MECHANICAL, ELECTRICAL AND MISCELLANEOUS SERVICES IN ALL CONTROL PANLES. COMPONENTS WITHIN CONTROL PANELS WILL VARY FROM ROOM TO ROOM.

DRAWING LIST

E0.01 KEY & FIRE PLAN - NOTES, LEGENDS & SCHEDULES
E1.01 EXISTING SCHOOL - NEW WORK
E1.02 GROUND & SECOND FLOOR AREA OF WORK #1 & #2 DEMOLITION & NEW WORK - LIGHTING & LIFE SAFETY POWER & COMMUNICATIONS
E3.01 DETAILS
E3.02 ELECTRICAL SPECIFICATIONS - 1 OF 2
E3.03 ELECTRICAL SPECIFICATIONS - 2 OF 2

No.	YYYY/MM/DD	DESCRIPTION
3	2026/08/25	ISSUED FOR CONSTRUCTION
2	2026/07/02	ISSUED FOR TENDER
1	2026/06/30	ISSUED FOR PERMIT
0	2026/05/12	ISSUED
A	2026/04/21	ISSUED FOR COORDINATION

REVISIONS

LICENSED PROFESSIONAL ENGINEER
K. SEGUIN
May 12/26
PROVINCE OF ONTARIO

NRG DESIGN Inc.
40 Hepburn Cresent, Hamilton ON L9C 7S4
Mobile: (905) 802-7341

sei Electrical Engineering
12 Argyle Street N., Caledonia, ON, N3W 1B6
www.sei-ee.com

Hamilton-Wentworth Catholic District School Board
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SVEDAS / ARCHITECTS INC.
3600 BILLINGS COURT, SUITE 100
BURLINGTON, ONTARIO L7N 3N6
TEL. (905) 308-7771

ELEVATOR
FOR
BISHOP TONNOS
CATHOLIC SECONDARY SCHOOL

100 PANABAKER DR.
ANCASTER ONTARIO

ELECTRICAL

ELECTRICAL SPECIFICATIONS 2 OF 2

SCALE	DRAWN	PROJECT No.
AS NOTED	G.J.L	26–006
DATE	CHECKED	DRAWING No.
2026/04/07	K.S.	E3.03

FILENAME: C:\NRG Design\NRG DESIGN JOBS\- 2026 -\26-006 SAI - 26-080 - Bishop Tonnes Elevator\26-006 - HWCDSB - Bishop Tonnes Elevator E0.01-E3.03 Rev3\26-006 - HWCDSB - Bishop Tonnos Elevator E0.01-E3.03 Rev3.dwg
PLOTDATE: Aug 25, 2026 - 12:51pm
ARCH D 24X36