

DIV.26 – SPECIFICATIONS

1.0 GENERAL PROVISIONS

.01 THE DRAWINGS, GENERAL CONDITIONS AND GENERAL PROVISIONS OF THE CONTRACT SHALL FORM AN INTEGRAL PART OF THE SPECIFICATIONS. WHERE CONFLICTS ARISE BETWEEN THESE DOCUMENTS, THE MORE STRINGENT PROVISION WILL BE APPLICABLE, SUBJECT TO THE INTERPRETATION OF THE CONTRACT ADMINISTRATOR. THE CONTRACT DOCUMENTS SHALL TAKE PRECEDENCE WHERE THE CONTRACT DOCUMENTS EXCEED CODE, UTILITY OR RECOGNIZED STANDARDS REQUIREMENTS.

.02 THE CONTRACT SHALL INCLUDE FURNISHING ALL LABOUR, MATERIAL, SERVICES, AND SKILLED SUPERVISION NECESSARY FOR THE CONSTRUCTION, ERECTION, INSTALLATION, CONNECTIONS, TESTING, AND ADJUSTMENT OF ALL MATERIALS AND ELECTRICAL EQUIPMENT NECESSARY FOR A COMPLETE AND OPERATING SYSTEM AS INDICATED ON THE DRAWINGS OR SPECIFIED HEREIN, AND ITS DELIVERY TO THE OWNER, COMPLETE IN ALL RESPECTS AND READY FOR USE.

.03 ALL ELECTRICAL WORK AND MATERIAL SHALL CONFORM WITH THE CURRENT RELEVANT NBC, CEC, LOCAL BY-LAWS AND TO THE SATISFACTION OF THE AHJ AND CONTRACT ADMINISTRATOR.

.04 EXAMINE THE SITE, BUILDING AND LOCAL CONDITIONS AFFECTING WORK OF THIS CONTRACT. EXAMINE ARCHITECTURAL, STRUCTURAL, MECHANICAL, CIVIL, AND ELECTRICAL CONDITIONS TO ENSURE WORK CAN BE PERFORMED WITHOUT CHANGES, AS SHOWN ON CONTRACT DRAWINGS. NO ALLOWANCE WILL BE MADE LATER FOR NECESSARY CHANGES, UNLESS IT HAS BEEN BROUGHT TO CONTRACT ADMINISTRATOR ATTENTION IN WRITING, PRIOR TO CLOSING OF TENDERS. BY SIGNING THE CONTRACT, THE EC ACKNOWLEDGES A SITE WALK-THROUGH HAS BEEN COMPLETED AND THE EXISTING CONDITIONS WERE ACCEPTED.

.05 APPLY FOR AND INCLUDE THE ASSOCIATED COSTS FOR ALL PERMITS, SERVICES, FEES AND INSPECTIONS IN THE TENDER QUOTE.

.06 OBTAIN APPROVALS FROM THE AHJ AND NOTIFY THE CONTRACT ADMINISTRATOR OF ANY CHANGES REQUESTED BY THE AHJ PRIOR TO THE EXECUTION OF THE REQUEST.

.07 COMPLY WITH ALL DEPARTMENT OF LABOUR, WORKPLACE AND HEALTH REQUIREMENTS AT ALL TIMES.

.08 WHERE DOUBT EXISTS AS TO THE MEANING OF THE DRAWINGS OR SPECIFICATIONS, IT IS THE RESPONSIBILITY OF THE EC TO OBTAIN CLARIFICATION PRIOR TO TENDER.

.09 ALL MATERIALS USED SHALL BE NEW, OF THE TYPE SPECIFIED, AND APPROVED BY CERTIFICATION AGENCY RECOGNIZED BY THE AHJ, AND FREE FROM DEFECTS.

.10 EXECUTE WORK IN A FIRST-CLASS AND WORKMANLIKE MANNER, TO PRESENT A NEAT APPEARANCE.

.11 ALL PACKAGING BARCODE LABELS SHALL BE REMOVED PRIOR TO INSTALLATION.

.12 CLEAN ALL EQUIPMENT DURING CONSTRUCTION AND AGAIN ON COMPLETION OF THE CONTRACT. ALL SURPLUS MATERIALS, CUTTINGS, PACKAGING AND DEBRIS SHALL BE REMOVED FROM THE SITE AND LEGALLY DISPOSED.

.13 ALL ELECTRICAL EQUIPMENT (INCLUDING PANELBOARDS, DISCONNECT SWITCHES, MOTOR STARTERS, SERVICE ENTRANCE, AND MCC) SHALL HAVE A LIGHT GREY (ASA-61) FACTORY ENAMEL FINISH UNLESS SPECIFIED OTHERWISE IN THE OTHER SECTIONS.

.14 BUILDING ENVELOPE PENETRATIONS FOR ANY ELECTRICAL COMPONENTS (I.E. CONDUIT, BOXES, CABLES, ETC.) SHALL BE EXECUTED SO INTEGRITY OF ASSEMBLY IS NOT COMPROMISED. PROVIDE ADEQUATE SEALING, COVERS, GASKETS, CAPS, ETC. COORDINATE WORK AND REQUIREMENTS WITH ALL OTHER RELEVANT CONTRACTORS, ARCHITECT, ENVELOPE CONSULTANT AND OTHER RELEVANT CONSULTANTS AND CONTRACTORS.

.15 THE ELECTRICAL SERIES DRAWINGS, SPECIFICATIONS AND OTHER DOCUMENTS PERTAIN TO THE ELECTRICAL SCOPE OF WORK ONLY. TASKS WHICH ARE NOT PART OF THE ELECTRICAL SCOPE OF WORK, EVEN IF MENTIONED IN THESE DOCUMENTS, ARE INDICATED PURELY FOR REFERENCE AND COORDINATION PURPOSES ONLY.

.16 THE DRAWINGS ARE DIAGRAMMATIC ONLY, AND DO NOT SHOW ALL DETAILS. INFORMATION INVOLVING ACCURATE MEASUREMENTS OF THE BUILDING, STRUCTURAL STEEL, EXISTING WALLS, ETC. IS TO BE TAKEN IN THE FIELD. THE EC SHALL MAKE, WITHOUT ADDITIONAL EXPENSE TO OWNER NECESSARY CHANGES OR ADDITIONS TO RUNS TO ACCOMMODATE STRUCTURAL CONDITIONS.

.17 LOCATION OF DEVICES MAY BE ALTERED BY THE CONTRACT ADMINISTRATOR WITHOUT CHARGE TO OWNER, PROVIDED THE CHANGE IS MADE BEFORE FINAL INSTALLATION AND DOES NOT NECESSITATE ADDITIONAL MATERIALS. RECORD CHANGES ON A LEGIBLE CLEAN SHEET OF AS-BUILT DRAWINGS.

.18 DRAWINGS SHOW GENERAL LOCATIONS FOR EQUIPMENT AND CIRCUITS; INSTALL THEM IN SUCH A WAY AS TO CONSERVE HEADROOM AND TO INTERFERE AS LITTLE AS POSSIBLE WITH THE SPACE THROUGH WHICH THEY PASS.

.19 ALL PAINTING AND PATCHING SHALL BE DONE BY QUALIFIED LABOURERS.

.20 MAINTAIN 40" (1m) CLEARANCE IN FRONT OF ALL SERVICEABLE ELECTRICAL EQUIPMENT (I.E. PANELBOARDS) AS PER CEC REQUIREMENTS.

.21 INSTALL ALL EQUIPMENT IN ACCORDANCE WITH THE AHJ, CEC AND MANUFACTURER'S INSTRUCTIONS. EC SHALL COORDINATE WITH OTHER TRADES TO ENSURE PROPER INSTALLATION.

.22 THE EC SHALL KEEP A SET OF FULL SIZED AS-BUILT DRAWINGS ON WHICH THE EC SHALL RECORD ALL ADDITIONS OR DEVIATIONS FROM THE CONTRACT DOCUMENTS INCLUDING ALL CHANGES COVERED BY ADDENDA, CHANGE ORDERS, FIELD CHANGES, SITE CONDITIONS, ETC. A SET OF DRAWINGS SHALL BE UTILIZED FOR EACH SYSTEM AND THE EC SHALL OBTAIN PRINTS AS REQUIRED. DRAWINGS TO INCLUDE LOCATIONS OF ALL JUNCTION AND PULL BOXES, ROUTING OF FEEDERS AND CONDUITS, AND CHANGES TO CIRCUIT NUMBERS. ALL PRINCIPLE BELOW GRADE OR INACCESSIBLE CONDUITS, SYSTEMS, ETC. SHALL BE DIMENSIONED AT EACH CHANGE IN DIRECTION. ALL CONDUIT ROUTES NOT SHOWN BY THE CONTRACT ADMINISTRATOR ON ORIGINAL DRAWING SHALL BE SHOWN INCLUDING CIRCUIT WIRING, JUNCTION BOXES, ZONED CONDUIT RUNS, ETC.

.23 ALL EQUIPMENT HEIGHTS SHALL MEET THE BARRIER FREE REQUIREMENTS OF THE NBC. THE EC SHALL INSTALL ELECTRICAL COMPONENTS AT THE FOLLOWING HEIGHTS UNLESS INDICATED OR DIRECTED OTHERWISE.

- GENERAL PURPOSE OUTLETS: 18" (450mm) TO CENTER, VERTICAL ORIENTATION.

.24 PANELBOARDS AND OTHER EQUIPMENT WHICH ARE TO BE SURFACE MOUNTED SHALL BE INSTALLED ON MINIMUM 3/4" (19mm) PLYWOOD BACKBOARD COMPLETE WITH TWO (2) COATS OF GREY INTUMESCENT PAINT (FIRE PROOFING) BEFORE ANY EQUIPMENT IS MOUNTED. PROVIDE PLYWOOD MOUNTED BOARDS UNLESS SPECIFIED OTHERWISE IN THE OTHER SECTIONS.

.25 ALL SURFACE MOUNTED ELECTRICAL EQUIPMENT LOCATED IN SPRINKLERED AREAS SHALL BE SPRINKLER PROOF AND SHALL BE PROVIDED WITH SUITABLE HOOD AND SHIELDS.

.26 TEST SYSTEM AND RECORD SAME FOR THE CONTRACT ADMINISTRATOR APPROVAL:

- PHASE BALANCE
- INSULATION RESISTANCE
- GROUND RESISTANCE
- VOLTAGE DROP
- SUBMIT VOLTAGE DROP RESULTS FOR ALL LARGE MECHANICAL EQUIPMENT AND PANEL BOARDS WHERE UPSTREAM AMPACITY EXCEEDS 100A.

.27 ALL PCN COSTING SHALL BE REVIEWED BY THE CONTRACT ADMINISTRATOR USING PRICING STANDARDS BASED ON THE CURRENT EDITION OF RSMANS "ELECTRICAL CHANGE ORDER COST DATA" PRICING GUIDE. THIS GUIDE SHALL BE THE MAXIMUM COST ALLOWED.

.28 EXCAVATION AND FILL

- WHERE REQUIRED, THE EC SHALL PERFORM ALL EXCAVATION AND BACK-FILLING PERTAINING TO THIS PORTION OF THE CONTRACT. FILL MATERIAL SHALL BE EQUIVALENT TO THE SURROUNDING MATERIAL. THE EC SHALL COORDINATE ALL WORK REQUIRED.
- UNDER NO CIRCUMSTANCES SHALL THE EC PROCEED WITH DIGGING WITHOUT CHECKING WITH PERTINENT PARTIES AND/OR AUTHORITIES REGARDING THE EXISTING UNDERGROUND SERVICES DUCTS, STRUCTURES, DOMESTIC WATER / SANITARY LINES, ETC.

.29 FINAL ACCEPTANCE

- WHEN UNDERGROUND SERVICE/INSTALLATION HAS TO BE CONNECTED TO SERVICES SUPPLIED AND INSTALLED BY OTHER PARTIES, THE EC SHALL FULLY COORDINATE THE EXACT POINT OF CONNECTION WITH OTHER PARTIES. THIS COORDINATION HAS TO BE PERFORMED PRIOR TO EXCAVATION AND INSTALLATION.
- ALL CIVIL CONCRETE, EXCAVATION OR BACKFILL WORK INCLUDING SHORING AND BEDDING SHALL BE PERFORMED UNDER THE DIRECTION OF THE RELEVANT PROFESSIONAL (CIVIL OR STRUCTURAL ENGINEER) ON THE PROJECT. THE EC SHALL CONTACT THE CONTRACT ADMINISTRATOR FOR DIRECTION, GUIDANCE, AND SPECIFICATIONS REGARDING THIS WORK FROM THE RELEVANT PROFESSIONAL(S). IN ADDITION, ALL EXCAVATION WORKS TO BE IN ACCORDANCE WITH THE CITY OF WINNIPEG STANDARD CONSTRUCTION SPECIFICATION CW2030 "EXCAVATION, BEDDING, AND BACKFILL".
- RESTORE PAVED SURFACES TO THE SATISFACTION OF THE CONTRACT ADMINISTRATOR.

.30 PROVIDE TEMPORARY ELECTRICAL SERVICES AS REQUIRED BY ALL TRADES. COORDINATE POWER REQUIREMENTS FOR THE TEMPORARY SERVICE WITH THE GC.

- VERIFICATION CERTIFICATE AND REPORT SHEETS SHOWING FIRE ALARM WAS "INSPECTED" AND "TESTED" IN ACCORDANCE WITH CAN/ULC-S537 "STANDARD FOR VERIFICATION OF FIRE ALARM INSTALLATIONS". THIS SHALL INCLUDE THE MONITORING OF FIRE ALARM, FIRE ALARM SYSTEM TROUBLE, AND SPRINKLER SUPERVISORY SIGNALS.
- PROOF FROM MONITORING COMPANY THAT CORRECT CODES WERE RECEIVED FOR FIRE ALARM, FIRE ALARM SYSTEM TROUBLE AND SPRINKLER SUPERVISORY SIGNALS.
- VERIFICATION CERTIFICATE OF INSTALLATION AND OPERATION OF EXIT AND EMERGENCY LIGHTING.
- FINAL ELECTRICAL INSPECTION CERTIFICATE SIGNED BY THE ELECTRICAL INSPECTOR FOR THE PROJECT. A DECLARATION FORM SIGNED BY THE EC IS NOT ACCEPTABLE.

.31 PROVIDE TEMPORARY ELECTRICAL SERVICES AS REQUIRED BY ALL TRADES. COORDINATE POWER REQUIREMENTS FOR THE TEMPORARY SERVICE WITH THE GC.

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- "BAS" – MEANS BUILDING AUTOMATION SYSTEM; "BMS" – MEANS BUILDING MANAGEMENT SYSTEM; "FMS" – MEANS FACILITY MANAGEMENT SYSTEM; AND "DDC" MEANS DIRECT DIGITAL CONTROLS; REFERENCES TO "BAS", "BMS", "FMS" AND "DDC" GENERALLY MEAN SAME;
- ELECTRICAL DIVISIONS – REFERS TO DIVISIONS 26, 27, 28 AND OTHER DIVISIONS AS SPECIFICALLY NOTED, AND WHICH WORK AS DEFINED IN SPECIFICATIONS AND/OR ON DRAWINGS IS RESPONSIBILITY OF EC, UNLESS OTHERWISE NOTED;
- MECHANICAL DIVISIONS – REFERS TO DIVISIONS 20, 21, 22, 23, 25 AND OTHER DIVISIONS AS SPECIFICALLY NOTED, AND WHICH WORK AS DEFINED IN SPECIFICATIONS AND/OR ON DRAWINGS IS RESPONSIBILITY OF MC, UNLESS OTHERWISE NOTED;
- BOB – BACK OF HOUSE
- FACP – FIRE ALARM CONTROL PANEL;

3.0 SUBMITTALS

.01 SUBMIT PRODUCT DATA FOR ALL EQUIPMENT. ACCEPTABLE MATERIALS SHALL BE AS SPECIFIED, CODE APPROVED OR OWNER APPROVED. ALL MATERIAL SHALL BE NEW, UNLESS SPECIFIED OTHERWISE.

.02 MATERIALS AND EQUIPMENT LISTED ARE PREFERRED. THE EC MAY, HOWEVER, SUBMIT ALTERNATES TO THE CONTRACT ADMINISTRATOR TO BE APPROVED AS EQUALS AT LEAST FIVE (5) BUSINESS DAYS PRIOR TO CLOSING OF TENDER.

.03 ALL REQUEST FOR LUMINAIRE EQUALS SHALL BE C/W CUTSHEETS AND PHOTOMETRICS. ONLY ONE REQUEST WILL BE CONSIDERED FROM EACH SUPPLIER. IF REJECTED, FOR ANY REASON, NO SUBSTITUTES FROM THE SAME SUPPLIER WILL BE REVIEWED.

.04 SHOP DRAWINGS SHALL BE SUBMITTED TO THE CONTRACT ADMINISTRATOR FOR REVIEW AND APPROVAL BEFORE MANUFACTURING AND INSTALLATION CAN PROCEED.

.05 LAMACOID LABEL WORDING SHALL BE SUBMITTED TO THE CONTRACT ADMINISTRATOR FOR REVIEW AND APPROVAL BEFORE MANUFACTURING AND INSTALLATION CAN PROCEED.

.06 SUBMIT THE FOLLOWING CLOSE-OUT SUBMITTALS TO THE CONTRACT ADMINISTRATOR UPON COMPLETION OF THE CONTRACT:

- A COPY OF THE CERTIFICATE CERTIFYING THAT EMERGENCY LIGHTING SYSTEM HAS BEEN TESTED UNDER FULL LOAD AS PER CODE REQUIREMENTS.
- A COPY OF THE FIRE ALARM VERIFICATION INSPECTION (VI) AND TESTING REPORT TO THE CONTRACT ADMINISTRATOR PRIOR TO FINAL ACCEPTANCE. THE FIRE ALARM VI MUST BE PROVIDED FIVE (5) BUSINESS DAYS BEFORE CONTRACT ADMINISTRATOR FINAL OCCUPANCY REVIEW AND FREE OF DEFICIENCIES.
- AS-BUILTS.
- ONE (1) O&M MANUAL HARDCOPY AND ONE (1) DIGITAL COPY IN DVD FORMAT. O&M MANUALS SHALL CONTAIN COPIES OF ALL FINAL SHOP DRAWINGS, WARRANTY LETTER, AS-BUILTS, TEST RESULTS AND THE CLOSED ELECTRICAL PERMIT. THE HARDCOPY SHALL BE SUBMITTED IN A D-RING BINDER C/W COVERPAGE, TABLE OF CONTENTS, DVD SLEEVE AND LABELED TABBED DIVIDERS FOR ALL SECTIONS INCLUDING POWER, LIGHTING, DATA, FIRE ALARM, ETC. THE DIGITAL COPY SHALL BE LABELED AND ORGANIZED TO MATCH THE HARDCOPY. THE FILES IN THE DIGITAL COPY SHALL BE ORGANIZED WITHIN SUBFOLDERS SIMILAR TO THE HARDCOPY.
- A COPY OF THE 1 YEAR GUARANTEE LETTER.

.07 AFTER WORK IS COMPLETED, FURNISH TO OWNER A WRITTEN GUARANTEE THAT FOR ONE YEAR FROM DATE OF ACCEPTANCE, ANY DEFECTS IN MATERIALS OR WORKMANSHIP WILL BE CORRECTED AT NO COST TO THE OWNER.

4.0 COORDINATION

.01 THE EC IS RESPONSIBLE TO DETERMINE THE SCOPE OF THE WORK REQUIRED FOR EACH TRADE. ALL TRADES MUST COORDINATE WORK TO ENSURE THAT THE ENTIRE SCOPE OF THE PROJECT IS COVERED. THERE SHALL BE NO ALLOWANCES GIVEN FOR ITEMS WHICH RESULT AS A FAILURE TO COORDINATE. THE EC WILL REVIEW THE DRAWINGS WITH ALL TRADES PRIOR TO TENDER TO RESOLVE ALL COORDINATION ISSUES.

.02 COORDINATE WITH ALL TRADES AND ARRANGE EQUIPMENT IN PROPER RELATION WITH OTHER APPARATUS INCLUDING BUT NOT LIMITED TO ARCHITECTURAL FINISHES, DUCTS, PIPES, AND BUILDING CONSTRUCTION.

.03 THE EC IS RESPONSIBLE TO DETERMINE WHICH DIVISION OR SECTION PROVIDES VARIOUS PRODUCTS AND WORK. ADDITIONAL COMPENSATION WILL NOT BE CONSIDERED BECAUSE OF DIFFERENCES IN INTERPRETATION OF TECHNICAL PROVISIONS.

.04 COORDINATE AS REQUIRED WITH THE OWNER DURING THE DEMOLITION AND CONSTRUCTION PHASES OF THE WORK. THIS INCLUDES ANY TEMPORARY ELECTRICAL CONNECTIONS, REMOVAL OF EXISTING POWER SERVICES AND INSTALLATION OF NEW SERVICES. THE EC SHALL COMPLETE ALL PRELIMINARY WORK PRIOR TO ANY POWER OUTAGES IN ORDER TO MINIMIZE DOWNTIME.

.05 COORDINATE, NOTIFY AND ARRANGE WITH THE OWNER, GC AND CONTRACT ADMINISTRATOR ALL STAGING REQUIREMENTS TO MINIMIZE THE DURATION AND NUMBER OF POWER OUTAGES NECESSARY TO COMPLETE THE WORK AT NO ADDITIONAL COST.

.06 THE ELECTRICAL DRAWINGS AND SPECIFICATIONS SHALL BE READ IN CONJUNCTION WITH THE DRAWINGS AND SPECIFICATION OF ALL OTHER DISCIPLINES. THE EC SHALL BE RESPONSIBLE FOR THE INCLUSION OF ALL ELECTRICAL WORK ASSOCIATED WITH OTHER DISCIPLINES.

.07 OBTAIN AND REFER TO THE MECHANICAL EQUIPMENT SHOP DRAWINGS FOR THE REQUIRED CIRCUIT BREAKER (CB) AND WIRE SIZE PRIOR TO ORDERING. WHERE THE CB AND WIRE SIZE HAS CHANGED DUE TO ALTERNATIVE SELECTIONS BY THE CONTRACTOR TEAM, THE EC SHALL ADJUST THE CB AND WIRE SIZE WITHOUT ADDITIONAL COST TO OWNER.

5.0 IDENTIFICATION

.01 UNLESS OTHERWISE NOTED ALL ELECTRICAL EQUIPMENT INSTALLED OR CONNECTED SHALL BE IDENTIFIED BY MEANS OF ENGRAVED LAMACOID LABELS C/W MINIMUM 3/8" LETTERING. AS A MINIMUM THE LABEL SHALL INDICATE THE EQUIPMENT TAG AND SOURCE. THIS INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING: SWITCHBOARDS, PANEL BOARDS, DISCONNECT SWITCHES, TRANSFORMERS, STARTERS/VFD'S, MECHANICAL EQUIPMENT (INDICATE EQUIPMENT TAG), ETC. WHERE THE OWNERS LABELING STANDARDS EXCEED THIS SPECIFICATION THE EC SHALL FOLLOW THE OWNERS STANDARDS. THE EC SHALL ALLOW FOR A MINIMUM OF 25-CHARACTERS PER LABEL AND SUBMIT THE PROPOSED LABELS TO THE CONTRACT ADMINISTRATOR FOR APPROVAL PRIOR TO ORDERING.

- NORMAL POWER SYSTEMS: WHITE WITH BLACK LETTERING
- EMERGENCY POWER SYSTEMS: RED WITH WHITE LETTERING
- ALL EXTERIOR IDENTIFICATION SHALL BE UV RESISTANT AND WEATHERPROOF

.02 ELECTRICAL EQUIPMENT:

- RECEPTACLES (PNL 'X' – C&T#) :
- FLUSH MOUNTED: CLEAR DYMO TAPE LABELS WITH BLACK

- LETTERING
  - SURFACE MOUNTED IN UTILITY ROOMS: LAMACOID LABELS
  - BOH SWITCHES (PNL 'X' – C&T#) :
  - FLUSH MOUNTED: CLEAR DYMO TAPE LABELS WITH BLACK LETTERING
  - SURFACE MOUNTED IN UTILITY ROOMS: LAMACOID LABELS
- DISTRIBUTION EQUIPMENT – LAMACOID LABELS INDICATING THE EQUIPMENT TAG, VOLTAGE, AND SOURCE. (PNL 'X' / xxxv / FED FROM PNL 'X')
- TRANSFORMERS – LAMACOID LABELS INDICATING THE EQUIPMENT TAG, KVA, PRIMARY / SECONDARY VOLTAGE, SOURCE AND DESTINATION. ('TR-X' / xxxkVA / xxxv-xxxv / FED FROM PNL 'X', FEEDS PANEL 'Y')
- DISCONNECT SWITCHES – LAMACOID LABELS INDICATING THE EQUIPMENT TAG, VOLTAGE, AND SOURCE. ('TAG' / xxxv / FED FROM PNL 'X')
- FUSED DISCONNECT SWITCHES – LAMACOID LABELS INDICATING THE EQUIPMENT TAG, VOLTAGE, SOURCE, AND FUSE SIZE. ('TAG' / xxxv / FED FROM PNL 'X', xxxA)
- STARTERS – LAMACOID LABELS INDICATING THE FULL NAME OF EQUIPMENT, EQUIPMENT TAG, VOLTAGE, AND SOURCE. ('EQUIPMENT NAME', 'TAG' / xxxv / PNL 'X' – C&T#)
- MECHANICAL EQUIPMENT / MOTORS – LAMACOID LABELS INDICATING THE EQUIPMENT TAG, HP, VOLTAGE, AND SOURCE. ('TAG' / xHP / xxxv / PNL 'X' – C&T#)

.03 SWITCHBOARD AND PANELS:

- MOLDED CASE CIRCUIT BREAKERS – LAMACOID LABELS INDICATING THE FULL EQUIPMENT NAME AND TAG ('EQUIPMENT NAME' / 'TAG')
- PROVIDE PANEL SCHEDULES FOR ALL DISTRIBUTION PANELS. THE PANEL SCHEDULE SHALL BE TYPED IN UPPERCASE AND MATCH THE NAMING CONVENTION ON THE DRAWINGS. DIRECTORY TO INDICATE CIRCUITS SERVED AS PER FINAL WIRING CONNECTIONS.

.04 ALL CONDUITS SHALL BE COLOUR CODED UTILIZING COLOURED CONDUIT OR SELF ADHESIVE TAPE.

.05 THE EC SHALL UPDATE ALL ELECTRICAL LABELING AFFECTED BY THE SCOPE OF WORK AND THE REVISED LABELING SHALL MEET THE REQUIREMENTS OF THIS SPECIFICATION.

- EMERGENCY LIGHTING
  - ALL EMERGENCY LIGHTING BATTERY PACKS SHALL BE LABELED USING LAMACOID LABELS INDICATING THE BATTERY BANK NUMBER (BB-#), CIRCUITS MONITORED, AND SOURCE.
  - ALL RETE HEADS SHALL BE LABELED WITH CLEAR BRADY LABELS INDICATING THE SUPPLY BATTERY BANK AND DC C&T NUMBER.
  - ALL EXITS SHALL BE LABELED WITH CLEAR BRADY LABELS INDICATING THE AC/DC CIRCUITS.

6.0 ELECTRICAL WORK IN EXISTING BUILDINGS

- GENERAL
  - NO CORING OR DRILLING IN CONCRETE FLOORS OR WALLS SHALL TAKE PLACE UNLESS THE CONCRETE HAS BEEN SCANNED (OR X-RAYED) FOR ELECTRICAL, MECHANICAL, AND STRUCTURAL ELEMENTS. THE EC SHALL NOTIFY THE OWNER BEFORE DRILLING. THE EC ASSUMES COMPLETE RESPONSIBILITY FOR ANY AND ALL DAMAGES OR WORK STOPPAGES OCCURRING FROM UNFORESEEN PROBLEMS.
  - ALLOW FOR AFTER HOURS WORK AS REQUIRED.
  - DRAWINGS INDICATE MAJOR ITEMS TO BE DELETED OR RELOCATED BUT MAY NOT INDICATE EVERY ITEM. IT IS THE EC RESPONSIBILITY TO DETERMINE WHICH EXISTING EQUIPMENT IS TO BE DELETED OR RELOCATED BY EXAMINING ALL SITE CONDITIONS AND ALL CONSTRUCTION DOCUMENTS PRIOR TO BIDDING.
  - CONDUIT, WIRING, AND EQUIPMENT SERVICING SPACES OUTSIDE OF THE DEMOLITION AREA SHALL BE MAINTAINED. THE EC SHALL RELOCATE AND EXTEND EXISTING CONDUIT AND WIRING AS REQUIRED TO MAINTAIN THE EXISTING SYSTEM AND SUIT THE NEW LAYOUT.
  - DISCONNECT AND REMOVE EXISTING ELECTRICAL EQUIPMENT MADE OBSOLETE DUE TO RENOVATIONS C/W ASSOCIATED WIRING AND CONDUITS BACK TO SOURCE PANEL.
  - ANY DAMAGES CAUSED BY THE EC SHALL BE THE RESPONSIBILITY OF THE EC TO TAKE ALL ACTIONS REQUIRED AND AS MAY BE DEEMED NECESSARY BY THE OWNER TO CORRECT ANY DAMAGE.
  - PATCH AND MAKE GOOD EXISTING WALLS WHICH ARE TO REMAIN WHERE EXISTING ELECTRICAL DEVICES OR CONDUITS HAVE BEEN REMOVED.
  - THE EC SHALL UPDATE ALL PANEL SCHEDULES AFFECTED BY DEMOLITION WORK. REMAINING UNUSED BREAKERS SHALL BE LEFT IN PANELBOARDS AND BE LABELED "SPARE".
- SHUT-DOWNS
  - COORDINATE ALL SHUT-DOWNS OF EXISTING SERVICES OR SYSTEMS WITH THE OWNER AND CARRY OUT THE WORK AT A TIME AND IN A MANNER ACCEPTABLE TO THE OWNER. ALL DISRUPTIONS AND/OR SHUTDOWNS SHALL BE SCHEDULED TO ENSURE THE DURATION OF THE SHUT-DOWN IS KEPT TO THE ABSOLUTE MINIMUM. SUBMIT FOR APPROVAL, A WRITTEN CONCISE SCHEDULE OF EACH DISRUPTION AT LEAST TWO WEEKS IN ADVANCE OF PERFORMING WORK AND OBTAIN WRITTEN CONSENT PRIOR TO IMPLEMENTING.
  - PROVIDE TEMPORARY ELECTRICAL CONNECTIONS AS REQUIRED TO MAINTAIN SERVICES OR SYSTEMS DURING WORK. SUPPLY AND INSTALL ALL NECESSARY MATERIAL AND EQUIPMENT, AND PROVIDE ALL LABOUR AT NO EXTRA COST.

.03 EXISTING DEVICES IN NEW CONSTRUCTION

- WHERE EXISTING DEVICES (RECEPTACLES, SWITCHES, ETC.) ARE PRESENTLY MOUNTED ON A WALL WHICH WILL BE COVERED WITH A NEW FINISH, PROVIDE AN EXTENSION RING, COVERPLATE, ETC., AS REQUIRED TO SUIT THE NEW WALL FINISH.
- ALL EXISTING JUNCTION BOXES IN WALLS AND CEILING SPACES REQUIRED TO MAINTAIN EXISTING CIRCUITS SHALL REMAIN ACCESSIBLE.

- MATERIALS
  - PROVIDE NEW WIRING AS REQUIRED TO INTERCONNECT NEW DEVICES TO EXISTING SYSTEMS TO SUIT THE MANUFACTURER REQUIREMENTS AND INSTRUCTIONS.
  - WHERE AN EXISTING PANELBOARD REQUIRES TO BE RELOCATED, PROVIDE JUNCTION AND/OR PULL BOXES IN ACCESSIBLE CEILING SPACE AS REQUIRED TO PROPERLY EXTEND ALL CONDUCTORS. PROVIDE PERMANENT COMPRESSION CONNECTIONS TO TERMINATE ALL CONDUCTORS C/W CABLE TAGGING AND PERMANENT IDENTIFICATION ON ALL RELATED ELECTRICAL BOXES.
  - MATERIAL QUALITY FOR NEW SYSTEM DEVICES SHALL MATCH OR EXCEED EXISTING.

7.0 UTILITY SERVICES

.01 PROVIDE TERMINATION AND CONDUITS FOR INCOMING POWER, TELEPHONE AND CABLE TV UNDERGROUND SERVICES. OBTAIN EXACT LOCATION OF ALL DUCTS FROM UTILITY PROVIDERS BEFORE INSTALLATION. PROVIDE NYLON PULL CORD FOR EMPTY CONDUITS. INCLUDE ALL POWER UTILITY, TELEPHONE UTILITY AND CABLE TV UTILITY CHARGES IN THE TENDER PRICE. ALL THE ABOVE SHALL MEET THE REQUIREMENTS OF THE RESPECTIVE UTILITIES.

.02 COORDINATE THE FOLLOWING WITH THE LOCAL POWER, TELEPHONE AND CABLE TV UTILITIES:

- APPROVAL OF ANY CHANGES TO THE UNDERGROUND CONDUIT ROUTE PRIOR TO INSTALLATION.
- POWER SUPPLY AUTHORITY INSPECTION AND APPROVAL OF ALL UNDERGROUND CONDUIT AND TRANSFORMER PAD INSTALLATION PRIOR TO POURING OF CONCRETE AND BACKFILL.
- SUBMISSION OF THREE (3) COPIES OF THE ARRANGEMENT OF ALL SERVICE ENTRANCE EQUIPMENT PRIOR TO PURCHASE AND INSTALLATION.

.03 CONFIRM EXACT LOCATION OF ALL POWER, TELEPHONE AND CABLE TV SERVICE ENTRANCES DIRECTLY WITH THE UTILITY PRIOR TO INSTALLATION.

.04 DB2 OR ES2 DUCT SHALL BE USED FOR UNDERGROUND ON-SITE UTILITY SERVICES FOR POWER, TELEPHONE AND CABLE TV SERVICES.

.05 OBTAIN PERMITS FROM LOCAL UTILITY INSPECTION DEPARTMENTS FOR GAS AND ELECTRIC UNDERGROUND SERVICES PRIOR TO UNDERTAKING ANY EXCAVATIONS.

.06 ALL UNDERGROUND SERVICES SHALL BE LABELED PER CODE.

8.0 PANELBOARDS

.01 PROVIDE PANELBOARDS AND BREAKERS AS DETAILED ON THE DRAWINGS AND SPECIFIED HEREIN.

- LIGHTING AND POWER PANELBOARDS TO BE CIRCUIT BREAKER TYPE AND AS SHOWN ON DRAWINGS. PANELS SHALL CONTAIN THE FOLLOWING:
  - BOLT-ON MOLDED CASE CIRCUIT BREAKERS. QUICK-MAKE QUICK-BREAK TYPE, FOR MANUAL AND AUTOMATIC OPERATION WITH TEMPERATURE COMPENSATION FOR 40C AMBIENT.
  - PANEL AND BREAKERS TO BE OF ONE MANUFACTURER. CIRCUIT BREAKERS SHALL BE LISTED FOR USE IN THE ASSOCIATED PANELBOARDS AND BE INSTALLED IN PANELBOARDS BEFORE SHIPMENT.
  - COPPER BUSSING WITH NEUTRAL OF SAME AMPERE RATING AS MAINS.
  - TRIM WITH CONCEALED FRONT BOLTS AND HINGES AND DOOR.
  - METAL DOOR COVER C/W PLASTIC COVERED TYPED PANEL SCHEDULE.
  - IN ADDITION TO CSA REQUIREMENTS MANUFACTURER'S NAMEPLATE SHALL INDICATE THE PANELBOARDS FAULT CURRENT RATING.
  - DRIP SHIELDS TO ADEQUATELY DEFLECT WATER IN SPRINKLERED AREAS.
  - TWO KEYS SHALL BE PROVIDED FOR EACH PANELBOARD AND ALL PANELBOARDS SHALL BE KEYS ALIKE FOR THE ENTIRE SITE.
  - THE EC SHALL CONFIRM CABLE ENTRY AND THAT PANEL LUGS SUIT FEEDER SIZE AND TYPE DURING THE SHOP DRAWING REVIEW.
  - WHERE INDICATED PROVIDE INTEGRAL SURGE PROTECTION DEVICE IN ACCORDANCE WITH THESE SPECIFICATIONS.

- GENERAL BREAKER REQUIREMENTS:
  - MULTI-POLE BREAKERS TO HAVE COMMON TRIP (NO TIE HANDLE WILL BE ACCEPTED).
  - BREAKERS USED FOR LIGHTS SHALL BE RATED FOR SWITCHING THAT DUTY.
  - SERIES RATED BREAKERS ARE ACCEPTABLE HOWEVER ARE REQUIRED TO BE FACTORY TESTED COMBINATIONS AND BE CLEARLY IDENTIFIED ON THE PANELBOARD (I.e. "XX, 000A SERIES RATED") C/W SEPARATE COMPATIBILITY CHART.

- BREAKERS FOR USE IN EXISTING PANELBOARDS SHALL:
  - BE LISTED FOR USE WITH THE EXISTING PANELBOARDS
  - BE SUPPLIED WITH A BUS KIT TO SUIT THE INSTALLATION WHERE THE ORIGINAL BREAKERS ARE NO LONGER BEING MANUFACTURED
  - MATCH THE EXISTING PANELBOARDS KA RATING UNLESS SPECIFICATIONS REQUIRE TO EXCEED EXISTING RATINGS

.05 ACCEPTABLE MANUFACTURERS: SQUARE 'D', EATON, AND SIEMENS.

9.0 CONDUIT, WIRE, AND CONNECTIONS

.01 PROVIDE ALL CONDUIT, WIRING AND CONNECTIONS FOR A CODE COMPLIANT, COMPLETE AND OPERATIONAL SYSTEM.

.02 GENERAL CONDUIT REQUIREMENTS:

- ALL WIRING SHALL BE INSTALLED IN CONDUIT UNLESS OTHERWISE NOTED.
- ALL CONDUIT SHALL BE MIN. 3/4" (21mm)Ø.
- CONDUIT TYPE:
  - INTERIOR CONDUIT: EMT C/W WATER TIGHT FITTINGS
  - EXTERIOR ABOVE GRADE: GALVANIZED EMT C/W WATER TIGHT FITTINGS
  - BELOW GRADE OR WITHIN CONCRETE: RGS OR RIGID PVC
- CONDUITS SHALL NOT HAVE MORE THAN ONE VOLTAGE LEVEL OF WIRING RUNNING WITHIN THEM.
- CONDUIT RUNS WITHIN WALLS TO BE VERTICAL; HORIZONTAL RUNS IN WALLS ARE NOT ACCEPTABLE.
- PROVIDE A SEPARATE RACEWAY FOR EACH ELECTRICAL SYSTEM.
- USE 12"-18" (300-450mm) FLEXIBLE METAL CONDUIT IN DRY LOCATIONS FOR CONNECTIONS TO MOTORS, MOVABLE PARTITIONS NOT SERVED BY A SOLID (WREMOLD TYPE) RACEWAY, TRANSFORMERS AND EQUIPMENT SUBJECT TO MOVEMENT OR VIBRATION; USE LIQUID-TIGHT FOR WET LOCATIONS.
- OVERSIZE PULL BOXES FOR HVAC, INTERIOR, AND EXTERIOR LIGHTING TO ALLOW FOR FUTURE POWER MONITORING TO BE INSTALLED.

- GENERAL DEVICE BOX REQUIREMENTS:
  - PROVIDE OUTLET BOXES FOR CONNECTING TO DEVICES AND EQUIPMENT AS REQUIRED OR AS INDICATED ON DRAWINGS. LOCATIONS OF OUTLETS MAY BE CHANGED UP TO 15"-0" (457.2mm) WITHOUT EXTRA CHARGE PROVIDED THAT INSTRUCTIONS FOR CHANGE ARE ISSUED PRIOR TO INSTALLATION OF OUTLET.
  - WIRING DEVICES IN FINISHED AREAS SHALL BE RECESSED MOUNTED AND FOR ALL UNFINISHED AREAS MAY BE SURFACE MOUNTED. EXPOSED CONDUITS SHALL NOT BE ACCEPTED UNLESS OTHERWISE NOTED ON THE DRAWINGS. WHERE CONDUITS RUN EXPOSED ON EXISTING SURFACES PAINT TO MATCH WALL FINISH.
  - RECESSED WALL BOX: STEEL RECESSED BOX C/W NYLON THROATED FITTINGS.
  - INTERIOR SURFACE MOUNT: STEEL SURFACE MOUNT C/W NYLON THROATED FITTINGS OR PVC
  - EXTERIOR: PVC

- GENERAL BUILDING WIRING REQUIREMENTS:
  - UNLESS OTHERWISE NOTED ALL WIRING SHALL BE COPPER, 98% CONDUCTIVITY, COLOUR CODED, NEW AND MARKED AS PER CEC REQUIREMENTS.
  - UNLESS OTHERWISE NOTED ALL BUILDING WIRING SHALL BE RW90 TYPE RATED MINIMUM 600V. RW90 SHALL BE USED FOR UNDERGROUND RACEWAY INSTALLATIONS.
  - UNLESS OTHERWISE NOTED ALL VFD POWER CONNECTIONS SHALL UTILIZE VFD ARMORED CABLE C/W WITH THREE SYMMETRIC GROUNDS.
  - ALL CABLES AND WIRES, ETC., TO BE RATED FT1 FOR COMBUSTIBLE BUILDINGS, FT4 FOR NON-COMBUSTIBLE BUILDINGS AND FT6 FOR PLENUM AND AS REQUIRED BY THE CODE.

- MAXIMUM VOLTAGE DROP SHALL BE AS PER CODE REQUIREMENTS. WHERE REQUIRED THE EC SHALL UPSIZE THE FEEDER WIRING FOR EQUIPMENT AT NO ADDITIONAL COST TO THE OWNER IN ORDER TO MEET MINIMUM VOLTAGE DROP REQUIREMENTS; AS THE FINAL FEEDER ROUTING IS DETERMINED BY THE EC. NO ALLOWANCE WILL BE GIVEN FOR A FAILURE TO ACCOUNT FOR VOLTAGE DROP PRIOR TO BIDDING.

.05 BRANCH CIRCUIT WIRING REQUIREMENTS:

- ALL WIRING SHALL BE SIZED AS PER CODE. MINIMUM ALLOWABLE WIRE SIZE IS #12 AWG. CONDUCTORS #8 AND LARGER SHALL BE STRANDED. PROVIDE MIN