2.25. CLEANING

2.25.1. CLEAN AND TOUCH UP SURFACES OF SHOP-PAINTED EQUIPMENT SCRATCHED OR MARRED DURING SHIPMENT OR INSTALLATION, TO MATCH ORIGINAL PAINT.

2.25.2. CLEAN AND PRIME EXPOSED NON-GALVANIZED HANGERS, RACKS, AND FASTENINGS TO PREVENT RUSTING.

2.25.3. PROGRESS CLEANING: CLEAN IN ACCORDANCE WITH SECTION 01 74 00 - CLEANING.

2.25.3.1. LEAVE WORK AREA CLEAN AT THE END OF EACH DAY.

2.25.4. FINAL CLEANING: UPON COMPLETION REMOVE SURPLUS MATERIALS, RUBBISH, TOOLS, AND EQUIPMENT IN ACCORDANCE WITH SECTION 01 74 00 - CLEANING.

3. ELECTRICAL SITE SERVICES

3.1. COORDINATE COMPLETE ELECTRICAL POWER SERVICE INSTALLATION WITH THE LOCAL POWER UTILITY. CONFIRM FINAL LOCATIONS AND AVAILABILITY OF ALL SERVICE POINTS TO ACCOMMODATE UTILITY POWER. CONFIRM LOAD INCREASE WITH LOCAL UTILITY.

4. WIRING METHODS AND DEVICE INSTALLATION

4.1. ALL EXPOSED AND CONCEALED WIRING SHALL BE IN CONDUIT. BX ARMORED CABLE MAY BE USED IN STUD PARTITION WALL APPLICATIONS NOT EXCEEDING 30' (9.144m) IN LENGTH. BX ARMORED CABLE MAY BE USED FOR RECESSED LUMINAIRE DROPS NOT EXCEEDING 30' (9.144m) IN LENGTH.

4.2. ALL CONDUIT SHALL BE ELECTRIC METALLIC TUBING (EMT) OR RIGID PVC UNLESS OTHERWISE INDICATED OR REQUIRED BY APPLICABLE CODES. CONDUIT IN HUMID OR CORROSIVE AREAS SHALL BE RIGID PVC. UTILIZE STEEL FITTINGS. DRAWINGS DO NOT SHOW SPECIFIC CONDUIT RUNS. ALL CONDUIT SHALL BE CONCEALED UNLESS OTHERWISE INDICATED IN SPECIFICATIONS AND/OR SHOWN ON DRAWINGS. ALL DEVICES SHALL BE SURFACE MOUNTED EXCEPT AS SHOWN.

4.3. UTILIZE RIGID GALVANIZED STEEL FOR ALL EXPOSED OUTDOOR, UNDERGROUND INSTALLTIONS OR AS REQUIRED BY AUTHORITY HAVING JURISDICTION.

4.4. ALL CONDUITS SHALL BE CONCEALED WHEREVER POSSIBLE. OBTAIN APPROVAL OF ALL EXPOSED CONDUITS FROM CONTRACT ADMINISTRATOR PRIOR TO INSTALLATION.

4.5. ALL CONDUITS SHALL BE MOUNTED PARALLEL TO STRUCTURAL LINES WITH CONCENTRIC BENDS. ALL CONDUITS SHALL BE SIZED TO LATEST EDITION OF THE CANADIAN ELECTRICAL CODE. ALL EMPTY CONDUITS SHALL BE PROPERLY PLUGGED TO PREVENT ENTRANCE OF DIRT AND MOISTURE.

4.6. FLEXIBLE CONDUITS DIRECTLY FROM JUNCTION BOXES MAY BE USED TO CONNECT MECHANICAL MOTORS, CONTROL STARTERS AND EQUIPMENT. FLEXIBLE CONDUITS SHALL BE PLASTIC JACKETED AND SEAL TIGHT.

4.7. ALL WIRING SHALL BE COPPER, 600V (90 DEGREE CELSIUS), RW90 X-LINK POLYETHYLENE UNLESS OTHERWISE INDICATED. MINIMUM WIRE SIZE IS #12 AWG UNLESS FOR USE WITH LOW VOLTAGE CONTROL WIRING OR UNLESS SPECIFICALLY SPECIFIED.

4.8. ALUMINUM FEEDERS ARE NOT PERMITTED UNLESS INDICATED ON DRAWINGS OR APPROVAL IS OBTAINED IN WRITING FROM BOTH THE CONTRACT ADMINISTRATOR.

4.9. DEVICES AND JUNCTION BOXES SHALL BE HOT DIP GALVANIZED. SIZE AND TYPE TO SUITE APPLICATION. ALL BOXES SHALL BE FLUSH MOUNTED. GANG BOXES WHERE WIRING DEVICES ARE GROUPED.

4.9.1. PROVIDE BLANK COVER PLATES FOR ALL BOXES WITHOUT WIRING DEVICES. ALL OUTLET BOXES SHALL BE SUPPLIED WITH GROUND STUD.

4.9.2. INSTALL BOXES TO CLEAR ALL BUILDING AND MECHANICAL SERVICES EQUIPMENT. WHERE TWO OR MORE DEVICES ARE SHOWN AT ONE LOCATION, UTILIZE MULTI GANG BOXES. SUPPLY WALL OUTLET BOXES WITH COVERS.

4.9.3. PROVIDE JUNCTION BOXES WITH 20% SPARE TERMINAL BLOCKS. SUPPORT SURFACE MOUNTED BOXES INDEPENDENTLY OF CONDUITS ENTERING BOXES.

4.9.4. SECURELY FASTEN FLUSH MOUNTED BOXES TO SUPPORTING STUDS OR WALL STRUCTURE AND SUPPORT INDEPENDENTLY OF THE CONDUIT OR CABLES ENTERING THE BOX.

4.9.5. MARK LOCATION AND SIZE OF ALL PULL BOXES ON RECORD DRAWINGS.

4.10. ALL RECEPTACLES SHAL BE SPECIFICATION GRADE, WHITE, 15A,120V AC HEAVY DUTY SPECIFICATION GRADE TO CSA C22.2 NO.42-10 GENERAL USE RECEPTACLES. RECEPTACLES SHALL HAVE HEAVY DUTY NYLON FACE WITH STEEL REINFORCING PLATE IN CENTER. RECEPTACLE SHALL HAVE SPRING LOADED BACK WIRING. RECEPTACLE CONTACTS SHALL HAVE SPRING STEEL CLIPS TO REDUCE CONTACT FATIGUE. RECETACLES SHALL BE SUITABLE FOR # 10 AWG BACK AND SIDE WIRING. RECEPTACLELS SHALL BE MOUNTED AT 450mm A.F.F. UNLESS OTHERWISE INDICATED. RECEPTACLES MOUNTED ABOVE COUNTER SHALL BE 150mm ABOVE SURFACE AREA. CONFIRM EXACT MOUNTING LOCATIONS AND HEIGHTS WITH ARCHITECTURAL ELEVATIONS. PROVIDE LAMACOID LABELS WITH AMPERAGE, VOLTAGE, AND PHASE FOR ALL RECEPTACLES OTHER THAN STANDARD 15A, 120V AC.

4.11. ALL WALL MOUNTED SWITCHES, DIMMERS, AND OCCUPANCY SENSORS SHALL BE SPECIFICATION GRADE, WHITE, 15A, 120V AC AND SHALL BE MOUNTED AT 1200mm A.F.F. UNLESS OTHERWISE INDICATED.

4.12. COVERPLATES FOR ALL FLUSH MOUNTED DEVICES SHALL BE BRUSHED STAINLESS STEEL.COVER PLATES FROM ONE MANUFACTURER SHALL BE USED THROUGHOUT PROJECT TO MATCH SWITCHES AND RECEPTACLES. FOR WIRING DEVICES MOUNTED IN FLUSH MOUNTED OUTLET BOXES, THICKNESS SHALL BE 2.5mm.

4.13. RELOCATE ALL OUTLETS REQUESTED BY CONTRACT ADMINISTRATOR PRIOR TO ROUGH-IN. RELOCATE OUTLETS AT NO ADDITIONAL COST TO THE CONTRACT ADMINISTRATOR IF REQUESTED BY THE AUTHORITY HAVING JURISDICTION.

4.14. SUPPLY, INSTALL, WIRE AND CONNECT ALL ELECTRIC HEATERS AS INDICATED. REFER TO ELECTRIC HEATING SCHEDULE FOR MANUFACTURER, WATTAGE AND DETAILS. PROVIDE ALL RELAYS AND ACCESSORIES AS REQUIRED TO ACHIEVE INDICATED OPERATIONAL INTENT.

4.15. PROVIDE A FINAL CONNECTION FOR ALL MECHANICAL AND CONTRACT ADMINISTRATOR'S EQUIPMENT AS DESCRIBED IN THE MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS AND FINAL EQUIPMENT NAMEPLATE. PROVIDE MATCHING RECEPTACLE AS REQUIRED.

4.16. PROVIDE ALL MECHANICAL MOTOR CONTROL CONNECTIONS AS REQUIRED. REFER TO MECHANICAL SCHEDULE AND MECHANICAL CONTRACT DOCUMENTS FOR DETAILS. COORDINATE WITH MECHANICAL AND GENERAL CONTRACTORS ON SITE.

4.17. ALL DISCONNECT SWITCHES SHALL BE SEPARATE FROM EQUIPMENT. INTEGRAL DISCONNECT SWITCHES SHALL BE NOT PERMISSIBLE.

4.18. PROVIDE UNFUSED DISCONNECT SWITCHES, VOLTAGE AND AMPERAGE RATED TO SUIT LOADS. MAKE PROVISION FOR PADLOCKING IN THE "OFF" POSITION. MECHANICAL INTERLOCKED DOOR TO PREVENT OPENING WHEN HANDLE IS IN "ON" POSITION. "ON/OFF" SWITCH POSITION INDICATION ON SWITCH ENCLOSURE COVER. DISCONNECT SHALL BE FRONT- OPERATIONAL, HEAVY DUTY, INDUSTRIAL GRADE, QUICK-MAKE, QUICK-BREAK TYPE AND SHALL BE 100% LOAD-MAKE, LOAD BREAK RATED. DISCONNECTS SHALL EACH HAVE EARLY BREAKER, NORMALLY OPEN VOLTAGE FREE AUXILIARY CONTACT. DISCONNECTS FOR ALL EQUIPMENT SPECIFIED SHALL BE AS MANUFACTURED BY CUTLER-HAMMER HD SERIES, SCHNEIDER CANADA SQUARE "D" CH SERIES.

4.19. ALL FEEDS WITHIN RETURN AIR PLENUMS SHALL BE RATED FOR THAT PURPOSE. AC90 AND WIRE IN CONDUIT. ACWU IS NOT ACCEPTABLE.

4.20. ELECTRICAL CONTRACTOR SHALL FILL ALL VOIDS BETWEEN ELECTRICAL SERVICES AND OPENINGS THROUGH FIRE RATED WALLS AND FLOORS USING AN APPROVED UL/ULC LISTED FIRE STOP SYSTEM WITH A RATING NOT LESS THAN THE FIRE RESISTANCE RATING REQUIRED FOR THE FIRESEPARATION.

4.21. STRUT CHANNEL, FITTINGS, FASTENINGS AND ACCESSORIES

4.21.1. STRUT CHANNEL AND ASSOCIATED ACCESSORIES SHALL BE RATED FOR THE ENVIRONMENT IN WHICH THEY ARE INSTALLED.

4.21.2. STRUT CLAMPS SHALL BE ONE PIECE HEAVY-DUTY CONSTRUCTION WITH PARALLEL HOOK DESIGN.

4.21.3. FASTENINGS AND SUPPORTS (INCLUDING CHANNELS) AND THEIR ASSOCIATED HARDWARE SHALL BE MADE OF THE SAME MATERIALS TO REDUCE CORROSION POTENTIAL.

4.21.4. TWO HOLE PVC STRAPS SHALL SECURE SURFACE CONDUITS. FASTENERS SHALL BE OF MATERIALS SUITED FOR THE INSTALLATION AREA.

4.21.5. BEAM CLAMPS SHALL SECURE CONDUITS TO EXPOSED STEEL WORK.

4.21.6. FITTINGS SHALL BE MANUFACTURED FOR USE WITH CONDUIT SPECIFIED. MATERIALS AND COATINGS SHALL BE SAME AS CONDUIT.

4.21.7. FACTORY ELBOWS WHERE 90 DEGREE BENDS ARE REQUIRED FOR 25mm AND LARGER CONDUITS.

4.21.8. ALL CONTUIRS ENTERING OUTLET BOXES AND DEVICES THAT ARE LOCATED IN WALLS SUBJECT TO MOVEMENT SHALL BE TERMINATED BY MEANS OF LIQUID-TIGHT FLEXIBLE METAL CONDUIT, APPROXIMATELY 450mm IN LENGTH BETWEEN THE CONDUIT AND THE OUTLET BOX OR DEVICE WHICH IS BEING SUPPLIED. ALL CONDUITS, BUS DUCT, WIREWAYS, ETC., PASSING THROUGH OR ACROSS EXPANSION JOINTS OF THE BUILDING SHALL BE INSTALLED WITH THE USE OF APPROVED EXPANSION FITTINGS.

4.21.9. PROLYPROPYLENE OF SUFFICIENT DIAMETER AND STRENGTH TO PULL IN FUTURE ADDITIONAL CABLES.

4.22. FASTENING AND SUPPORT

4.22.1. EXPANSIVE SCREW ANCHORS, SHIELDS, OR OTHER FASTENING ITEMS CONTAINING LEAD OR OTHER MATERIAL THAT MIGHT LOSEN OR MELT UNDER FIRE CONDITIONS SHALL NOT BE USED.

4.22.2. FASTENINGS, SUPPORTS, AND ASSOCIATED HARDWARE SHALL BE OF STAINLESS STEEL OR GALVANIZED STEEL.

4.22.3. FASTENINGS AND SUPPORTS (INCLUDING CHANNELS) AND THEIR ASSOCAITED HARDWARE SHALL BE MADE OF THE SAME MATERIALS TO REDUCE CORROSION POTENTIAL.

4.22.4. SUPPPORT CHANNELS, LENGTH AS REQUIRED, U-SHAPED, SIZE AS REQUIRED BY CARRIED LOAD, OR MANUFACTURER'S RECOMMENDATIONS.

4.22.5. SUPPORT EQUIPMENT UNISTRUT SUPPORT HANGING FROM CEILING OR CABLE TRAY OR CABLE CLIPS, SPRING LOADED BOLTS, CABLE CLAMPS ETC., SHALL BE PURPOSE-BUILT ACCESSORIES FOR STANDARD CHANNEL MEMBERS.

4.22.6. BEAM CLAMPS TO SECURE THREADED ROD TO EXPOSED STEEL WORK.

4.22.7. SUPPORT INDIVIDUAL CABLE OR CONDUIT RUNS WITH MINIMUM 6.0mm DIAMETER THREADED RODS AND SPRING CLIPS. USE LARGER DIAMETER ROD AND APPROPRIATE SPRING CLIPS WHERE THE CARRIED LOAD OR MANUFACTURER'S RECOMMENDATIONS REQUIRE.

4.22.8. INSTALL FASTENING AND SUPPORTS AS REQUIRED FOR EACH TYPE OF EQUIPMENT, CABLES AND CONDUIT TO MANUFACTURER'S INSTALLATOINS RECOMMENDATIONS.

4.22.9. PROVIDE METAL BRACKETS, FRAMES, HANGERS, CLAMPS AND RELATED SUPPORT STRUCTURES WHERE INDICATED OR AS REQUIRED TO SUPPORT CONDUIT AND CABLE RUNS.

4.22.10. PROVIDE ADEQUATE SUPPPORT FOR RACEWAYS AND CABLES DROPPED VERTICALLY TO EQUIPMENT WHERE THERE IS NO WALL SUPPORT.

4.22.11. ANY ALUMINUM SUPPPORT BRACKET THAT IS IN DIRECT CONTACT WITH CONCRETE SHALL HAVE INERT SPACERS TO REDUCE CHEMICAL REACTION BETWEEN SUPPORT AND CONCRETE.

5. ELECTRICAL DISTRIBUTION EQUIPMENT

5.1. ALL DISTRIBUTION EQUIPMENT AND PANELBOARDS SHALL BE FACTORY ASSEMBLED OF SIZE AND SPECIFICATION INDICATED ON DRAWINGS. ALL EQUIPMENT SHALL BE OF THE SAME MANUFACTURER. ALL EQUIPMENT SHALL BE SPRINKLER PROOF. ALL EQUIPMENT SHALL HAVE TERMINATIONS SUITABLE FOR CONDUCTORS BASED ON 90°C RATED CONDUCTORS. EQUIPMENT BEARING LABELING FOR LOWER TEMPERATURES SHALL BEREJECTED.

5.2. PANELBOARDS: PROVIDE SPRINKLER-PROOF SHIELDING AND WEATHERPROOF TOP ENTRY WIRING METHODS FOR ALL EQUIPMENT. ALL PANELBOARDS SHALL BE LOCKABLE. BALANCE THE LOADS FOR EACH PHASE. RELOCATE CIRCUITS WITHIN PANELBOARDS TO PROPERLY BALANCE THE LOADS. MOUNT ALL SURFACE MOUNTED EQUIPMENT AND PANELBOARDS ON FIRE RESISTANT INTUMESCENT PAINTED BACKBOARDS.

5.3. PROVIDE TYPEWRITTEN PANEL DIRECTORIES IN PANELBOARDS DOORS.

5.4. ALL CIRCUIT BREAKERS SHALL BE BOLT IN PLACE MOLDED CASE, WITH THERMAL AND MAGNETIC TRIPS. TWO AND THREE POLE BREAKERS SHALL HAVE A COMMON SIMULTANEOUS TRIP. MINIMUM RATING SHALL BE 42KAIC SHORT CIRCUIT INTERRUPTING CAPACITY.

6 CEILING HUNG UNISTRUT SUPPORT FOR CABLES

6.1. ALL CEILING HUNG UNISTRUT SUPPORT FOR CABLES SHALL BEAR CERITIFCATION OF CSA OR ULC REQUIREMENTS.

6.2 ALL CEILING HUNG UNISTRUT SUPPORT FOR CABLES SHALL BE ALUMINIUM.

6.2.1 CONFIGURATION: TWO SIDE RAILS WITH TRANSVERSE RUNGS WELDED TO SIDE RAILS.

6.2.2. HORIZONTAL BRACING SPACING: MIINIMUM 200mm.

6.2.3. NO PORTION OF THE HORIZONTAL BRACING SHALL PROTRUDE BELOW BOTTOM PLANE OF SIDE RAILS.

6.2.4. MINIMUM CABLE BEARING SURFACE FOR RUNGS: 22mm WIDTH WITH RADIUS EDGES.

6.2.5. HARDWARE FOR ALUMINIUM UNISTRUT SUPPORT USED OUTDOORS: STAINLESS STEEL, TYPE 326, ASTM F593 AND ASTM F 594.

6.3 LOCATION OF CEILING HUNG UNISTRUT SUPPORT FOR CABLES

6.3.1 THE DRAWINGS DO NOT SHOW SPECIFIC CEILING HUNG UNISTRURT ROUTING - ROUTING SHOWN IS FOR REFERENCE ONLY AND CONTRACTOR SHALL NEED TO FIELD VERIFY SPECIFIC ROUTING.. COORDINATE ALL ROUTING WITH MECHANICAL CONTRACTOR TO AVOID INTERFERENCE AND TAKE ADVANTAGE OF PRE-HUNG PIPE RACKING. IT IS ACCEPTABLE TO INSTALL UNISTRUT SUPPORT HUNG FROM CEILING ABOVE PIPE RACKING.

6.4 SCOPE
6.4.1 FURNISH ALL LABOUR, MATERIALS, SUPERVISION, EQUIPMENT AND SERVICES SPECIFIED, INDICATED OR REQUESTED TO INSTALL A COMPLETE SYSTEM. CEILING HUNG UNISTRUT SUPPORT SYSTEMS) SHALL BE COMPRISED OF THE SUPPLY AND INSTALLATION OF ALL TRAY SECTIONS, FITTINGS, SUPPORTS, HANGERS AND MISCELLANEOUS SUPPORT MATERAILS, ADAPTORS, AND HARDWARE REQUIRED.

6.4.2 COORDINATE CEILING HUNG UNISTRUT SUPPORT SYSTEM LOCATION WITH OTHER TRADES TO ENSURE THERE IS NO INTERFERENCE WITH OTHER MECHANICAL OR STRUCTURAL COMPONENTS.

6.4.3. WHERE SHARED CEILING HUNG UNISTRUT SUPPORT SYSTEM IS USED PROVIDE SEPARATION BARRIER BETWEEN CABLES OF DIFFERENT VOLTAGES.

6.4.4. CEILING HUNG UNISTRUT SUPPORT SYSTEM SHALL HAVE MINIMUM 30% SPARE SPACE FOR FUTURE.

6.4.5 PROVIDE BONDING CONDUCTORS AS REQUIRED.

7 WIRE AND CABLE

7.1. LOW VOLTAGE WIRE 1000 VOLT AND BELOW

7.1.1. ALL WIRE AND CABLE SHALL HAVE CSA, cUL, OR ETL CERTIFICATION.

7.1.2. ALL WIRE SHALL HAVE STRANDED, ANNEALED COPPER, CROSS LINKED POLYETHYLENE (XLPE) INSULATION, -40°C RATED, 90°C MAXIMUM CONDUCTOR TEMPERATURE RATED, LIMITED FLAME SPREAD. ALUMINUM CONDUCTORS NOT PERMITTED.

7.1.3. EXCEPT WHERE OTHERWISE STATED, THE MINIMUM CONDUCTOR INSULATION RATING SHALL BE EQUAL TO OR GREATER THAN THE HIGHEST VOLTAGE TO WHICH THE INSULATION MAY BE EXPOSED, BUT IN NO CASE LESS THAN 300V.

7.1.4. THE WIRING SHALL BE SUITABLE FOR INSTALLATION IN THE AREA IN WHICH IT IS INSTALLED.

7.1.5. MINIMUM POWER CONDUCTOR SIZE SHALL BE #12 AWG UNLESS OTHERWISE SPECIFIED. #14 AWG COPPER MAY BE USED FOR CONTROL POWER WIRING, UNLESS OTHERWISE SPECIFIED.

7.1.6. MINIMUM FIELD INSTRUMENTATION WIRE SIZE SHALL BE #16 AWG. ANALOG SIGNAL WIRES SHALL BE TWISTED SHIELDED PAIR OR TWISTED SHIELDED TRIAD AS REQUIRED.

7.1.7. COLOUR CODING OF INSULATED CONDUCTORS SHALL CONFORM TO ELECTRICAL CODE.

7.1.8. INSULATED GROUND CONDUCTORS FORMING PART OF A MULTI CONDUCTOR CABLE ASSEMBLY SHALL HAVE GREEN COLOUR CODING.

7.1.9. APPROVED CABLE AND WIRE MANUFACTURERS ARE: NEXANS CANADA, PHILLIPS CABLES LTD., PRYSMIAN FP, GENERALCABLE INC. AND SOUTHWIRE

7.2. BUIDLING WIRES

7.2.1. CONDUCTORS: STRANDED FOR 10 AWF AND LARGER

7.2.2. MINIMUM SIZE: 12 AWG.

7.2.3. COPPER CONDUCTORS: SIZE AS INDICATED, WITH 1000 V INSULATION OF CROSS-LINKED THERMOSETTING POLYETHYLENE RATED RWU90 XLPE OR RW90 XLPE.

7.3. TECK 90 CABLE

7.3.1. CABLE: TO CAN/CSA-C22.2 NO.131.

7.3.2. CONDUCTORS:

7.3.2.1. GROUNDING CONDUCTOR: COPPER.

7.3.2.2. CIRCUIT CONDUCTORS: COPPER, SIZE AS INDICATED.

7.3.3. INSULATION:

7.3.3.1. CROSS-LINKED POLYETHYLENE (XLPE).

7.3.3.2. RATING: 1000V.

7.3.4. INNER JACKET: PVC.

7.3.5. ARMOUR: INTERLOCKING, ALUMINUM.

7.3.6. OVERALL COVERING: THERMOPLASTIC PVC.

7.3.7. FASTENINGS:

7.3.7.1. ONE-HOLE STAINLESS STEEL STRAPS TO SECURE SURFACE CABLES 50 MM AND SMALLER.

7.3.7.2. TWO-HOLE STAINLESS STEEL STRAPS FOR CABLES LARGER THAN 50 MM.

7.3.7.3. CHANNEL TYPE SUPPORTS FOR TWO OR MORE CABLES AT 900 MM CENTERS.

7.3.7.4. STAINLESS STEEL THREADED RODS: 8 MM DIAMETER TO SUPPORT SUSPENDED CHANNELS.

7.3.8. CONNECTORS:

7.3.8.1. WATERTIGHT, APPROVED FOR TECK CABLE.

7.4. CONTROL CABLES

7.4.1. TYPE:

7.4.1.1. LOW VOLTAGE THERMOSTAT: SOFT ANNEALED COPPER CONDUCTORS, SIZED AS INDICATED.

7.4.1.2. INSULATION: THERMOPLASTIC.

7.4.1.3. SHEATH: THERMOPLASTIC JACKET AND ARMOUR OF CLOSELY WOUND ALUMINUM WIRE.

7.4.2. TYPE:

7.4.2.1. LOW ENERGY 300 V CONTROL CABLE: SOLID ANNEALED COPPER CONDUCTORS SIZED AS INDICATED.

7.4.2.2. LOW VOLTAGE THERMOSTAT: SOFT ANNEALED COPPER CONDUCTORS, SIZED AS INDICATED.

7.4.2.3. INSULATION: PVC.

7.4.2.4. SHIELDING: BRAID OVER EACH CONDUCTOR GROUP.

7.4.2.5. OVERALL COVERING: POLYETHYLENE JACKETS.

7.4.3. TYPE:

7.4.3.1. 600 V CONDUCTORS, SIZES AS INDICATED, ANNEALED COPPER.

7.4.3.2. INSULATION: PVC OR CROSS-LINKED POLYETHYLENE TYPE RW90.

7.4.3.3. SHIELDING: METALLIZED TAPES OVER EACH PAIR OF CONDUCTORS.

7.4.3.4. OVERALL COVERING: THERMOPLASTIC JACKET, INTERLOCKED ARMOUR AND JACKET OVER SHEATH OF PVC.

7.4.4. FASTENINGS:

7.4.4.1. ONE-HOLE STAINLESS STEEL STRAPS TO SECURE SURFACE CABLES 50 MM AND SMALLER.

7.4.4.2. TWO-HOLE STAINLESS STEEL STRAPS FOR CABLES LARGER THAN 50 MM.

7.4.4.3. CHANNEL TYPE SUPPORTS FOR TWO OR MORE CABLES AT 900 MM CENTERS.

7.4.4.4. STAINLESS STEEL THREADED RODS: 8 MM DIAMETER TO SUPPORT SUSPENDED CHANNELS.

7.4.5. STAINLESS STEEL STRAPS, HARDWARE, CHANNELS, SUPPORTS FOR NEMA 4, NEMA 4X, CSA ENCLOSURE TYPE 4, CSA ENCLOSURE TYPE 4X AREAS, ALL WET AREAS.

7.5. CONNECTORS:

7.5.1. WATERTIGHT, APPROVED FOR TECK CABLE.

7.5.1. AN ELASTOMERIC BEVELLED BUSHING.

7.5.2. A FUNNEL ENTRY, SPLINED GLAND NUT.

7.5.3. A TAPER THREADED HUB.

7.5.4. A HEXAGONAL BODY AND GLAND NUT.

7.6. FIELD QUALITY CONTROL

7.6.1. PERFORM TESTS IN ACCORDANCE WITH SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL.

7.6.2. PERFORM TESTS BEFORE ENERGIZING ELECTRICAL SYSTEM.

7.7. GENERAL CABLE INSTALLATION

7.7.1. DO NOT SPLICE CABLES. A CONTINUOUS LENGTH IS REQUIRED FOR ALL FEEDS.

7.7.2. EXERCISE CARE IN STRIPPING INSULATION FROM WIRE.

7.7.2.1. MAKE CERTAIN CONDUCTORS ARE NOT NICKED.

7.7.3. LAY CABLE IN CABLE TRAYS IN ACCORDANCE WITH SECTION 26 05 36 - CABLE TRAYS FOR ELECTRICAL SYSTEMS.

7.7.4. TERMINATE CABLES IN ACCORDANCE WITH SECTION 26 05 20 - WIRE AND BOX CONNECTORS (0-1000 V).

7.7.5. CABLE COLOUR CODING IN ACCORDANCE WITH SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL.

7.7.6. CONDUCTOR LENGTH FOR PARALLEL FEEDERS TO BE IDENTICAL.

7.7.7. LACE OR CLIP GROUPS OF FEEDER CABLES AT DISTRIBUTION CENTRES, PULL BOXES, AND TERMINATION POINTS.

7.7.8. PROVIDE NUMBERED WIRE COLLARS FOR CONTROL WIRING. NUMBERS TO CORRESPOND TO CONTROL SHOP DRAWING LEGEND. OBTAIN WIRING DIAGRAM FOR CONTROL WIRING.

7.7.9. PROVIDE SCANNING, CORING, AND DRILLING FOR INSTALLATION OF ALL WIRE AND CABLES IN ACCORDANCE WITH SECTION 26 05 34 - CONDUITS, CONDUIT FASTENINGS, AND CONDUIT FITTINGS.

7.8. INSTALLATION OF BUILDING WIRES

7.8.1. INSTALL WIRING AS FOLLOWS:

7.8.1.1. IN CONDUIT SYSTEMS IN ACCORDANCE WITH SECTION 26 05 34 - CONDUITS, CONDUIT FASTENINGS, AND CONDUIT FITTINGS.

7.9. INSTALLATION OF TECK90 CABLE (0-1000 V)

7.9.1. GROUP CABLES WHEREVER POSSIBLE ON CHANNELS.

7.9.2. LAY CABLE IN CABLE TROUGHS/CABLE TRAY IN ACCORDANCE WITH SECTION 26 05 36 – CABLE TRAYS FOR ELECTRICAL SYSTEMS.

7.9.3. TERMINATE CABLES IN ACCORDANCE WITH SECTION 26 05 20 - WIRE AND BOX CONNECTORS (0-1000 V).

7.10. INSTALLATION OF CONTROL CABLES

7.10.1. INSTALL CONTROL CABLES IN CONDUIT OR CABLE TROUGHS AS INDICATED ON DRAWINGS.

7.10.1.1. SEPARATE CABLES IN CONDUIT AND CABLE TROUGHS AS REQUIRED BY THE CEC AND SECTION 29 05 00 - COMMON WORKS - INSTRUMENTATION AND CONTROL.

7.10.2. GROUND CONTROL CABLE SHIELD AT ONE END ONLY. WHERE POSSIBLE, GROUND SHIELDS AT THE END WHERE POWER IS SUPPLIED TO THE CABLE. UTILIZE SHIELD GROUNDING BAR IN PANELS, WHERE PRESENT, TO GROUND OVERALL SHIELDS. INDIVIDUAL PAIR SHIELDS TO BE GROUNDED ON APPROPRIATE TERMINALS.

7.10.3. SHIELD DRAIN WIRES, AT THE UNGROUNDED END, ARE TO BE TAPED BACK TO THE CABLE. FULLY INSULATE THE SHIELD. DO NOT CUT THE SHIELD DRAIN WIRE OFF.

8. GROUNDING AND BONDING

8.1. PROVIDE GROUNDING IN ACCORDANCE WITH LATEST EDITION OF THE CANADIAN ELECTRICAL CODE, AND THE RULES, REGULATIONS, STANDARDS, CODES, ORDINANCES OF ALL AUTHORITIES HAVING JURISDICTION OVER THE SITE. GROUND EQUIPMENT TO CSA C22.2 No. 41 COPPER GROUNDING CONDUCTORS TO CSA G7.1. ALL COMPONENTS SHALL BE SECURELY AND ADEQUATELY GROUNDED. PROVIDE GROUNDING JUMPERS, GROUNDING STUDS, AND BUSHINGS AS REQUIRED.

8.2. ALL BONDING CONDUCTORS SHALL BE SIZED IN ACCORDANCE WITH C.E.C.10-814.

9. DEMOLITION

9.1. PROVIDE ELECTRICAL DEMOLITION TO ACCOMMODATE NEW CONSTRUCTION/ RENOVATIONS. ALL ITEMS REQUIRED TO BE DEMOLISHED ARE NOT NECESSARILY SHOWN. THOSE INDICATED ARE FOR REFERENCE ONLY. ALL ITEMS INTERFERING WITH NEW CONSTRUCTION SHALL BE REMOVED AT NO ADDITIONAL COST. EXAMINE THE SITE AND LOCAL CONDITIONS TO ESTABLISH ALL INFORMATION PERTAINING TO THE ELECTRICAL DEMOLITION SCOPE OF WORK. NO EXTRA COMPENSATION SHALL BE ALLOWED DUE TO FAILURE TO MAKE THIS EXAMINATION.

10. MISCELLANEOUS MECHANICAL SYSTEMS

10.1. PROVIDE ALL LABOUR AND MATERIALS AS NECESSARY TO INSTALL, WIRE, CONNECT AND PUT INTO SATISFACTORY OPERATION THE CONTROL PANELS AND MECHANICAL EQUIPMENT SUPPLIED UNDER OTHER DIVISIONS, INCLUDING:

10.1.1. ELECTRICAL MOTORS AND ACTUATED VALVES.

10.1.2. MOTOR STARTERS, CONTACTORS AND INTERLOCKS WHERE SPECIFIED AS COMPONENTS OF "PACKAGED" EQUIPMENT.

10.1.3. MISCELLANEOUS PLUMBING AND HVAC EQUIPMENT INCLUDING FANS, HOT WATER TANKS, AIR HANDLING UNITS, ETC.

NO.	REVISIONS	DATE (YYYY/MM/DD)	BY
0	ISSUED FOR CONSTRUCTION	25-06-27	H.M.

Alliance ENGINEERING SERVICES INC

DESIGNED BY	S.N.	CHECKED BY	H.M.
DRAWN BY	S.N.	APPROVED BY	H.M.
SCALE: HORIZONTAL	AS NOTED	RELEASED FOR CONSTRUCTION	
VERTICAL		DATE	X.XXXXXX
DATE			2024/08/22
PLOT DATE:			

ENGINEER'S SEAL

PROVINCE OF MANITOBA — H.A. MASCOOR — Member 31335 — REGISTERED PROFESSIONAL ENGINEER

CONSULTANT DRAWING NUMBER

E5.1

BID OPP: ###-20##
CONTRACT NUMBER: #

Winnipeg

THE CITY OF WINNIPEG

WATER AND WASTE DEPARTMENT
ENGINEERING SERVICES DIVISION

MACLEAN RESERVOIR VALVE HOUSE
VENTILATION UPGRADE
ELECTRICAL SPECIFICATIONS 2

CITY FILE NUMBER: W-938

SHEET 7 OF 7

CITY DRAWING NUMBER: 1-0630R-E0015-001

FILE PATH:
FILE NAME: