1. GENERAL

1.1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE RULES, REGULATIONS, STANDARDS, CODES, ORDINANCES AND LAWS OF THE LOCAL, PROVINCIAL, AND FEDERAL GOVERNMENTS AND ALL OTHER AUTHORITIES HAVING JURISDICTION OVER THE SITE.THIS INCLUDES BUT IS NOT LIMITED TO LATEST EDITIONS AND STANDARDS OF:

1.1.1. THE CANADIAN ELECTRICAL CODE;

1.1.2. THE NATIONAL BUILDING CODE;

1.1.3. ALL PROVINCIAL CODES AND BULLETINS;

1.1.4. ALL PERTINENT CANADIAN STANDARDS ASSOCIATION (CSA) STANDARDS;

1.1.5. ALL PERTINENT UNDERWRITERS' LABORATORIES OF CANADA (ULC) STANDARDS;

1.1.6. CANADA OCCUPATIONAL SAFETY AND HEALTH REGULATIONS;

1.1.7. THE CANADA LABOR CODE;

1.1.8. CANADA NATIONAL ENERGY CODE OF CANADA;

1.1.9. ILLUMINATION ENGINEERING SOCIETY (IES) STANDARDS;

1.1.10. AMERICAN NATIONAL STANDARD INSTITUTE (ANSI);

1.1.11. ELECTRICAL AND ELECTRONIC MANUFACTURERS ASSOCIATION OFCANADA (EEMAC);

1.1.12. INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE).

1.2. WHEN REQUIREMENTS DESCRIBED WITHIN THE CONTRACT DOCUMENT DRAWINGS AND SPECIFICATIONS CONFLICT WITH CODE REQUIREMENTS, THE CODE REQUIREMENTS SHALL TAKE PRECEDENT.

1.3 PROVIDE A COMPLETE, FULLY FUNCTIONAL, AND CODE COMPLIANT INSTALLATION AS INDICATED ON THE CONTRACT DOCUMENTS TO OPERATIONAL SATISFACTION OF THE CONTRACT ADMINISTRATOR. ALL SUPPLEMENTARY MISCELLANEOUS ITEMS, DEVICES, MATERIALS NOT SPECIFICALLY SHOWN BUT NECESSARY FOR A SECURE AND COMPLETE ELECTRICAL INSTALLATION SHALL BE PROVIDED.

1.4. PROVIDE ALL REQUIRED PERMITS AND LICENSES. PAY ALL FEES AND OBTAIN ALL REQUIRED APPROVALS FROM APPROPRIATE AUTHORITIES HAVING JURISDICTION. PROVIDE CONTRACT ADMINISTRATOR WITH BOTH A COPY OF THE PERMIT AND THE CERTIFICATE OF ACCEPTANCE FROM ALL AUTHORITIES HAVING JURISDICTION.

1.5. PROVIDE A WARRANTY OF MINIMUM ONE (1) CALENDAR YEAR AFTER THE ACCEPTANCE OF INSTALLATION. ALL EQUIPMENT SHALL BE TESTED IN PRESENCE OF THE CONTRACT ADMINISTRATOR PRIOR TO FINAL ACCEPTANCE.

1.6. THE GENERAL CONTRACTOR, ELECTRICAL CONTRACTOR, MECHANICAL CONTRACTOR AND ALL OTHER SUCCESSFUL TRADES SHALL COORDINATE LOCATIONS AND REQUIREMENTS OF EVERY DISCIPLINE'S SCOPE.

1.7. ELECTRICAL AND MECHANICAL CONTRACTOR SHALL MUTUALLY COORDINATE NECESSARY CONNECTIONS TO ENERGIZE ALL ITEMS OF EQUIPMENT PRIOR TO ORDERING. THIS INCLUDES FINAL ELECTRICAL NAMEPLATE INFORMATION, VOLTAGES, STARTER REQUIREMENTS, DETAILED CONTROL INFORMATION, AND ANY INFORMATION REQUIRED FOR THE PROPER INTENDED OPERATION OF THE ELECTRICAL AND MECHANICAL INSTALLATIONS.

1.8. ELECTRICAL CONTRACTOR IS RESPONSIBLE TO REVIEW THE COMPLETE SET OF CONTRACT DOCUMENTS AND TO VISIT PROJECT SITE TO DETERMINE EXISTING CONDITIONS AND ENSURE ALL WORK CAN BE CARRIED OUT AS SPECIFIED WITHIN THIS CONTRACT. NO ADDITIONAL COMPENSATION WILL BE CONSIDERED UPON FAILURE TO MAKE THIS EXAMINATION. REPORT TO THE CONTRACT ADMINISTRATOR ANY OMISSION, INTERFERENCE OR DISCREPANCY PRIOR TO TENDER CLOSE.

1.9. THE ELECTRICAL CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ANY DAMAGES OR COSTS INCURRED BY THE CONTRACT ADMINISTRATOR OR THEIR REPRESENTATIVES BY IMPROPER EXECUTION OF THIS CONTRACT.

1.10. EQUIPMENT, DEVICES AND MATERIALS SHALL BE PROVIDED AS SPECIFIED ON THE DRAWINGS. EQUAL REQUESTS SHALL BE CONSIDERED NO LATER THAN TEN (10) WORKING DAYS PRIOR TO TENDER CLOSE.

1.11. ELECTRICAL CONTRACTOR MAY SUBMIT SHOP DRAWINGS TO THE ENGINEER PRIOR TO ORDERING MATERIALS OR EQUIPMENT FOR REVIEW OF GENERAL CONFORMANCE.

1.12. UPON PROJECT COMPLETION PROVIDE TO THE CONTRACT ADMINISTRATOR FOR REVIEW:

1.12.1. MARKED-UP RECORD (AS-BUILT) DRAWINGS PRINTS OR PDF;

1.12.2. HARD COVER MANUALS ENTITLED "ELECTRICAL OPERATING AND MAINTENANCE MANUAL" CONTAINING THE FOLLOWING;

1.12.2.1. WARRANTY LETTER;

1.12.2.2. PERMIT;

1.12.2.3. CERTIFICATION REPORTS;

1.12.2.4. DESCRIPTION OF ALL SYSTEMS AND EQUIPMENT;

1.12.2.5. A COMPLETE SET OF MANUFACTURER'S OPERATING AND MAINTENANCE INSTRUCTIONS;

1.12.2.6. TEST DATA, INCLUDING FIRE ALARM VERIFICATION INSPECTION REPORT IF APPLICABLE. ALL SECTIONS SHALL BE INDEXED. ALL OF THE ABOVE DOCUMENTS SHALL BE SUBMITTED TO THE CONTRACT ADMINISTRATOR FOR APPROVAL PRIOR TO BEING TURNED OVER TO THE CONTRACT ADMINISTRATOR.

2. COMMON WORK RESULTS FOR ELECTRICAL

2.1. REFERENCE STANDARDS

2.1.1. HEALTH CANADA / WHMIS

2.1.1.1. SDS.

2.1.2. CITY OF WINNIPEG WATER AND WASTE DEPARTMENT DRAWING STANDARD. https://winnipeg.ca/waterandwaste/pdfs/dept/CAD-GIS-Specifications.pdf

2.1.3. CITY OF WINNIPEG WATER AND WASTE DEPARTMENT ELECTRICAL IDENTIFICATION STANDARD. https://winnipeg.ca/waterandwaste/pdfs/dept/IdentificationStandard.pdf

2.1.4. CITY OF WINNIPEG WATER AND WASTE DEPARTMENT ELECTRICAL DESIGN GUIDE. https://winnipeg.ca/waterandwaste/pdfs/dept/ElectricalDesignGuide.pdf

2.1.5. COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, CODES, AND ORDERS OF ALL AUTHORITIES HAVING JURISDICTION RELATING TO THIS WORK.

2.2. DRAWINGS AND SPECIFICATIONS

2.2.1. THE INTENT OF THE DRAWINGS AND SPECIFICATIONS IS TO INCLUDE ALL LABOUR, PRODUCTS, AND SERVICES NECESSARY FOR THE COMPLETION AND TESTING OF THE WORK, AND TO RENDER THE SYSTEM READY FOR OPERATION.

2.2.2. ALL MATERIALS, EQUIPMENT, LABOUR, AND WORK DENOTED ON THE DRAWINGS IS TO BE CONSIDERED AS NEW WORK, TO BE PROVIDED BY THE CONTRACTOR UNLESS SPECIFICALLY NOTED OTHERWISE. SOME OF THE ELECTRICAL AND AUTOMATION DRAWINGS SHOW EXISTING SYSTEMS (WITH MODIFICATIONS TO THESE SYSTEMS). THESE DRAWINGS SPECIFICALLY INDICATE THAT THERE ARE EXISTING SYSTEMS SHOWN. WHERE DRAWINGS DO NOT SPECIFICALLY INDICATE THAT EXISTING SYSTEMS ARE DEPICTED, THE CONTRACTOR SHALL ASSUME THAT THE MATERIALS, EQUIPMENT, LABOUR, AND WORK INDICATED WILL FORM PART OF THEIR SCOPE, AND THE CONTRACTOR SHALL INCLUDE ALL COSTS (INCLUDING MATERIALS, LABOUR, ETC.) TO PERFORM THE WORK.

2.2.3. PRIOR TO INSTALLING POWER AND CONTROL CABLING FOR EQUIPMENT, REVIEW THE EQUIPMENT SHOP DRAWINGS AND ENSURE THAT CABLING REQUIREMENTS ARE UNDERSTOOD. THERE MAY BE VARIATIONS IN WIRING REQUIREMENTS WITH EQUIPMENT THAT MAY REQUIRE ALTERNATE WIRING REQUIREMENTS FROM THAT SHOWN ON THE DRAWINGS. THIS SHALL RESULT IN NO ADDITIONAL COST TO THE CONTRACT.
2.2.4. THE INTENT OF THE DRAWINGS AND SPECIFICATIONS IS TO INDICATE LABOUR, PRODUCTS, AND SERVICES NECESSARY FOR A COMPLETE, INSTALLED, TESTED, COMMISSIONED, AND FUNCTIONAL INSTALLATION.

2.2.5. THE DRAWINGS, IN SOME CASES, INDICATE THE SIZE OF CABLES, BREAKERS, CONDUITS, ETC. THESE SIZES ARE BASED ON THE SUPPLY OF SPECIFIC SIZES OF EQUIPMENT. FOR CASES WHERE THE CONTRACTOR SUPPLIES EQUIPMENT THAT VARIES FROM THESE ASSUMPTIONS, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE THE CORRECT SIZE OF BREAKER, CABLE, ETC. TO SUIT THE INSTALLATION, AT NO ADDITIONAL COST TO THE CONTRACT.
2.2.6. THE DRAWINGS, IN SOME CASES, MAY INDICATE APPROXIMATE ROUTE TO BE FOLLOWED BY CONDUITS, CABLE TRAY, AND CABLES AND GENERAL LOCATION OF ELECTRICAL EQUIPMENT. THEY DO NOT SHOW ALL STRUCTURAL, ARCHITECTURAL, AND MECHANICAL DETAILS. IN SOME CASES, CONDUIT, CABLE TRAY, OR WIRING IS ONLY SHOWN DIAGRAMMATICALLY ON THE DRAWINGS. THE DETAILS ON EXACT CABLE, CABLE TRAY, OR CONDUIT ROUTING AND EXACT EQUIPMENT INSTALLATION LOCATION IS TO BE DETERMINED ON SITE AND COORDINATED WITH ALL OTHER SUBCONTRACTORS.

2.2.7. WHERE CIRCUIT NUMBERS ARE SHOWN ADJACENT TO EQUIPMENT, PROVIDE ALL WIRING, CONDUIT, SUPPORTS, AND ANY OTHER REQUIREMENTS TO PROVIDE POWER TO THAT PIECE OF EQUIPMENT FROM THE CIRCUIT INDICATED. WHERE CIRCUIT NUMBERS ARE NOT SHOWN, REFER TO THE SINGLE LINE DRAWINGS FOR CONNECTION DETAILS. PROVIDE ALL WIRING, CONDUIT, CABLE TRAY, SUPPORTS, AND ANY OTHER REQUIREMENTS TO PROVIDE POWER TO THAT PIECE OF EQUIPMENT.

2.2.8. PROVIDE ALL MINOR ITEMS AND WORK NOT SHOWN OR SPECIFIED BUT WHICH ARE REASONABLY NECESSARY TO COMPLETE THE WORK.

2.2.9. TO PROVIDE SUFFICIENT DETAIL AND MAXIMUM DEGREE OF CLARITY ON THE DRAWINGS, SYMBOLS USED FOR VARIOUS ELECTRICAL DEVICES, PARTICULARLY WALL MOUNTED DEVICES, TAKE UP MORE SPACE ON THE DRAWINGS THAN DEVICES PHYSICALLY DO. LOCATE DEVICES WITH PRIMARY REGARD FOR CONVENIENCE OF OPERATION, ACCESSIBILITY, AND SPACE UTILIZATION, RATHER THAN LOCATING DEVICES TO COMPLY WITH THE EXACT SCALED LOCATIONS OF THE ELECTRICAL SYMBOLS.

2.2.10. WHERE SYSTEMS ARE SHOWN AS BEING REMOVED OR DEMOLISHED, THIS MEANS ALL ASSOCIATED SYSTEMS BACK TO THE SOURCE POWER SUPPLY. FOR EXAMPLE – REMOVAL OF LIGHT FIXTURES MEANS COMPLETE REMOVAL OF ALL WIRING, CONDUIT, AND CONTROLS BACK TO SOURCE POWER SUPPLY. REWIRE AND RECONNECT ANY SYSTEMS TO REMAIN THAT ARE ADVERSELY AFFECTED BY THE DEMOLITION WORK. SITE TRACE AND SITE CONFIRM WIRING AND CIRCUITS PRIOR TO REMOVALS.

2.2.11. ALL NEW SYSTEMS SHALL HAVE NEW WIRING AND NEW CONDUIT. DO NOT RE-USE EXISTING CONDUIT UNLESS SPECIFICALLY INDICATED AS ACCEPTABLE. PROVIDE NEW WIRING AND NEW CONDUIT SYSTEMS FOR ALL NEW DEVICES.

2.2.12. ALL EQUIPMENT SHALL BE INSTALLED AND ORIENTED IN A MANNER SUCH THAT MAINTENANCE CAN BE PERFORMED ON THE EQUIPMENT. DO NOT BLOCK COMPONENTS THAT ARE MEANT TO BE REPLACED OR MAINTAINED.

2.3. DEFINITIONS

2.3.1. ELECTRICAL AND ELECTRONIC TERMS: UNLESS OTHERWISE SPECIFIED OR INDICATED, TERMS USED IN THESE SPECIFICATIONS AND ON DRAWINGS ARE THOSE DEFINED BY IEEE SP1122.
2.4. ACTION AND INFORMATIONAL SUBMITTALS

2.4.1. PROVIDE SUBMITTALS IN ACCORDANCE WITH SECTION 01 33 00 - SUBMITTAL PROCEDURES.

2.4.2. PRODUCT DATA:

2.4.2.1. SUBMIT MANUFACTURER'S INSTRUCTIONS, PRINTED PRODUCT LITERATURE, AND DATA SHEETS.

2.4.2.2. CERTIFICATES:

2.4.2.2.1. PROVIDE CSA CERTIFIED EQUIPMENT AND MATERIAL.

2.4.2.2.2. SUBMIT TEST RESULTS OF INSTALLED ELECTRICAL SYSTEMS AND INSTRUMENTATION.

2.4.2.2.3. SUBMIT CERTIFICATE OF ACCEPTANCE FROM AUTHORITY HAVING JURISDICTION UPON COMPLETION OF WORK TO CONTRACT ADMINISTRATOR.

2.4.3. SHOP DRAWINGS:

2.4.3.1. SUBMIT INSTALLATION DETAILS OF EQUIPMENT INDICATING PROPOSED LOCATION, LAYOUT AND ARRANGEMENT, CONTROL PANELS, ACCESSORIES, PIPING, DUCTWORK, AND OTHER ITEMS THAT MUST BE SHOWN TO ENSURE CO-ORDINATED INSTALLATION.

2.4.3.2. INDICATE ON DRAWINGS CLEARANCES FOR OPERATION, MAINTENANCE, AND REPLACEMENT OF OPERATING EQUIPMENT DEVICES.

2.4.4. MANUFACTURER'S FIELD REPORTS:

2.4.4.1. SUBMIT MANUFACTURER'S WRITTEN REPORT.

2.4.5. NAMEPLATES AND LABELS:
2.4.5.1. THE CONTRACT ADMINISTRATOR WILL PROVIDE AN OVERALL LAMACOID LIST INDICATING EQUIPMENT THAT REQUIRES LABELS AS WELL AS A DRAFT LOOP TAG NUMBER. THIS LIST IS FOR REFERENCE ONLY AND THE CONTRACTOR SHALL SUBMIT LAMACOID LABELS TO THE CONTRACT ADMINISTRATOR FOR REVIEW.

2.5. QUALITY ASSURANCE

2.5.1. QUALIFICATIONS: ELECTRICAL WORK TO BE CARRIED OUT BY QUALIFIED, LICENSED ELECTRICIANS WHO HOLD VALID MASTER ELECTRICAL CONTRACTOR LICENSE OR APPRENTICES IN ACCORDANCE WITH AUTHORITIES HAVING JURISDICTION AS PER THE CONDITIONS OF PROVINCIAL ACT RESPECTING MANPOWER VOCATIONAL TRAINING AND QUALIFICATION.

2.5.1.1. EMPLOYEES REGISTERED IN PROVINCIAL APPRENTICES' PROGRAM: PERMITTED, UNDER DIRECT SUPERVISION OF QUALIFIED LICENSED ELECTRICIAN, TO PERFORM SPECIFIC TASKS.

2.5.1.2. PERMITTED ACTIVITIES: DETERMINED BASED ON TRAINING LEVEL ATTAINED AND DEMONSTRATION OF ABILITY TO PERFORM SPECIFIC DUTIES.
2.6. CLOSEOUT SUBMITTALS

2.6.1. PROVIDE SUBMITTALS IN ACCORDANCE WITH SECTION 01 33 00 - SUBMITTAL PROCEDURES AND SECTION 01 78 00 – CLOSEOUT SUBMITTALS.

2.6.2. O&M MANUALS:

2.6.2.1. PROVIDE FOR EACH SYSTEM AND PRINCIPAL ITEM OF EQUIPMENT AS SPECIFIED IN TECHNICAL SECTIONS FOR USE BY OPERATION AND MAINTENANCE PERSONNEL.

2.6.2.2. OPERATING INSTRUCTIONS TO INCLUDE THE FOLLOWING:

2.6.2.2.1. CONTROL SEQUENCE FOR EACH PRINCIPAL SYSTEM AND ITEM OF EQUIPMENT.

2.6.2.2.2. START-UP, PROPER ADJUSTMENT, OPERATING, LUBRICATION, AND SHUTDOWN PROCEDURES.

2.6.2.2.3. SAFETY PRECAUTIONS.

2.6.2.2.4. PROCEDURES TO BE FOLLOWED IN EVENT OF EQUIPMENT FAILURE.

2.6.2.2.5. OTHER ITEMS OF INSTRUCTION AS RECOMMENDED BY MANUFACTURER OF EACH SYSTEM OR ITEM OF EQUIPMENT.

2.6.3. POST INSTRUCTIONS WHERE DIRECTED.

2.7. SYSTEM START-UP

2.7.1. SYSTEM START-UP TO BE PERFORMED IN ACCORDANCE WITH E14 OF THE TENDER.
2.8. PERMITS, FEES, AND INSPECTION

2.8.1. SUBMIT TO THE ELECTRICAL INSPECTION DEPARTMENT AND SUPPLY AUTHORITY THE NECESSARY NUMBER OF DRAWINGS AND SPECIFICATIONS FOR EXAMINATION AND APPROVAL PRIOR TO COMMENCEMENT OF WORK.

2.8.2. ACQUIRE PERMITS AND PAY ASSOCIATED FEES IN ACCORDANCE WITH PART C - GENERAL CONDITIONS OF THE TENDER.

2.8.2.1. THE CONTRACTOR TO OBTAIN ALL PERMITS FOR EACH SITE.

2.8.3. PROVIDE DRAWINGS AND SPECIFICATIONS REQUIRED BY THE ELECTRICAL INSPECTION DEPARTMENT AND SUPPLY AUTHORITY AT NO COST.

2.8.4. NOTIFY THE CONTRACT ADMINISTRATOR OF CHANGES REQUIRED BY THE ELECTRICAL INSPECTION DEPARTMENT PRIOR TO MAKING CHANGES.

2.8.5. FURNISH CERTIFICATES OF ACCEPTANCE FROM AUTHORITIES HAVING JURISDICTION ON COMPLETION OF WORK TO THE CONTRACT ADMINISTRATOR.

2.9. SITE AREA CLASSIFICATIONS

2.9.1. CLASSIFICATION OF VALVE HOUSE AREAS:

2.9.1.1. RESERVOIR VESTIBULE: CATEGORY 2 (NEMA 4X EQUIPMENT RATING REQUIRED).

2.9.1.2. SUMP ROOM: CATEGORY 2 (NEMA 4X EQUIPMENT RATING REQUIRED).

2.9.1.3. MAIN FLOOR: ORDINARY.

2.9.1.4. LOWER LEVEL: ORDINARY.

2.9.2. CLASSIFICATION OF PUMPING STATION AREAS:

2.9.2.1. CONTROL ROOM: ORDINARY.

2.9.2.2. ELECTRICAL ROOM: ORDINARY.

2.9.2.3. PUMP FLOOR: ORDINARY.

2.9.2.4. BASEMENT SPACE: ORDINARY.

2.9.2.5. CHLORINE ROOM: CATEGORY 2 (NEMA 4X EQUIPMENT RATING REQUIRED).
2.10. DESIGN REQUIREMENTS

2.10.1. OPERATING VOLTAGES: TO CAN3-C235.

2.10.2. MOTORS, ELECTRIC HEATING, CONTROL, AND DISTRIBUTION DEVICES AND EQUIPMENT TO OPERATE SATISFACTORILY AT 60 HZ WITHIN NORMAL OPERATING LIMITS ESTABLISHED BY ABOVE STANDARD.

2.10.2.1. EQUIPMENT TO OPERATE IN EXTREME OPERATING CONDITIONS ESTABLISHED IN ABOVE STANDARD WITHOUT DAMAGE TO EQUIPMENT.

2.10.3. LANGUAGE OPERATING REQUIREMENTS: PROVIDE IDENTIFICATION NAMEPLATES FOR CONTROL ITEMS IN ENGLISH ONLY.

2.11. MATERIALS AND EQUIPMENT

2.11.1. PROVIDE MATERIAL AND EQUIPMENT IN ACCORDANCE WITH SECTION 01 61 00 - COMMON PRODUCT REQUIREMENTS.

2.11.2. MATERIAL AND EQUIPMENT TO BE CSA CERTIFIED. WHERE CSA CERTIFIED MATERIAL AND EQUIPMENT ARE NOT AVAILABLE, OBTAIN SPECIAL APPROVAL FROM AUTHORITY HAVING JURISDICTION BEFORE DELIVERY TO SITE AND SUBMIT FOR SPECIAL APPROVAL BEFORE DELIVERY TO SITE.

2.11.3. MATERIAL AND EQUIPMENT SHALL BE NEW AND FREE FROM ALL DEFECTS.

2.11.4. FACTORY ASSEMBLE CONTROL PANELS AND COMPONENT ASSEMBLIES.

2.11.4.1. VERIFY SPACING REQUIREMENTS ONSITE PRIOR TO PURCHASING EQUIPMENT.

2.12. ELECTRIC MOTORS, EQUIPMENT, AND CONTROLS

2.12.1. VERIFY INSTALLATION AND COORDINATION RESPONSIBILITIES RELATED TO MOTORS, EQUIPMENT, AND CONTROLS, AS INDICATED.

2.12.2. CONTROL WIRING AND CONDUIT: IN ACCORDANCE WITH DIVISION 29 – INSTRUMENTATION AND CONTROL.

2.13. WARNING SIGNS

2.13.1. WARNING SIGNS: IN ACCORDANCE WITH REQUIREMENTS OF INSPECTION AUTHORITIES.

2.13.2. LAMACOID LABELS: MINIMUM SIZE 175 X 250 MM.

2.14. WIRING TERMINATIONS

2.14.1. ENSURE LUGS, TERMINALS, AND SCREWS USED FOR TERMINATION OF WIRING ARE SUITABLE FOR EITHER COPPER OR ALUMINUM CONDUCTORS.

2.15. EQUIPMENT IDENTIFICATION

2.15.1. IDENTIFY ELECTRICAL EQUIPMENT WITH NAMEPLATES IN ACCORDANCE WITH CITY OF WINNIPEG WATER AND WASTE DEPARTMENT ELECTRICAL IDENTIFICATION STANDARD AND AS FOLLOWS:

2.15.1.1. NAMEPLATES: LAMACOID 3 MM THICK PLASTIC ENGRAVING SHEET, WHITE FACE WITH BLACK CORE, LETTERING ACCURATELY ALIGNED AND ENGRAVED INTO CORE MECHANICALLY ATTACHED WITH SELF-TAPPING STAINLESS STEEL SCREWS.

2.15.1.2. LAMACOIDS AS FOLLOWS:
ELECTRICAL EQUIPMENT – GENERAL: 5 MM TEXT, LINE 1: IDENTIFIER.

CIRCUIT BREAKER – SEPARATE: 5 MM TEXT, LINE 1: IDENTIFIER, LINE 2: LOAD IDENTIFIER, LINE 3: LOAD DESCRIPTION.

DISCONNECT SWITCH – SEPARATE: 5 MM TEXT, LINE 1: IDENTIFIER, LINE 2: LOAD IDENTIFIER, LINE 3: LOAD DESCRIPTION.

FIRE ALARM DEVICES: 8 MM TEXT, LINE 1: IDENTIFIER.

LIGHT SWITCHES: 3 MM TEXT, SOURCE PANEL AND CIRCUIT NUMBER.

MCC: 8 MM TEXT, LINE 1: IDENTIFIER, LINE 2: DESCRIPTION, LINE 3: SYSTEM VOLTAGE, LINE 4: FED BY.

MOTOR STARTER OR MCC BUCKET: 5 MM TEXT, LINE 1: LOAD IDENTIFIER, LINE 2: LOAD DESCRIPTION.

PANELBOARDS: 8 MM TEXT, LINE 1: IDENTIFIER, LINE 2: DESCRIPTION, LINE 3: SYSTEM VOLTAGE, LINE 4: FED BY.

RECEPTACLES: 3 MM TEXT, SOURCE PANEL AND CIRCUIT NUMBER.

SWITCHGEAR: 8 MM TEXT, LINE 1: IDENTIFIER, LINE 2: DESCRIPTION, LINE 3: SYSTEM VOLTAGE, LINE 4: FED BY.

SWITCHGEAR BREAKER: 8 MM TEXT, LINE 1: IDENTIFIER, LINE 2: DESCRIPTION, LINE 3: SYSTEM VOLTAGE, LINE 4: FED BY.

TRANSFORMER – INDOOR: 8 MM TEXT, LINE 1: IDENTIFIER, LINE 2: RATING, SYSTEM VOLTAGE, LINE 3: FED BY.

TRANSFORMER – OUTDOOR: 10 MM TEXT, LINE 1: IDENTIFIER, LINE 2: RATING, SYSTEM VOLTAGE, LINE 3: FED BY.

2.16. WIRING IDENTIFICATION

2.16.1. IDENTIFY WIRING IN ACCORDANCE WITH CITY OF WINNIPEG WATER AND WASTE DEPARTMENT ELECTRICAL IDENTIFICATION STANDARD.

2.16.2. IDENTIFY WIRING WITH PERMANENT INDELIBLE IDENTIFYING MARKINGS, COLOURED PLASTIC TAPES, ON BOTH ENDS OF PHASE CONDUCTORS OF FEEDERS AND BRANCH CIRCUIT WIRING.

2.16.3. MAINTAIN PHASE SEQUENCE AND COLOUR CODING THROUGHOUT.

2.16.4. COLOUR CODING: TO CSA C22.1 AND CITY OF WINNIPEG WATER AND WASTE DEPARTMENT ELECTRICAL DESIGN GUIDE.

2.16.5. USE COLOUR CODED WIRES IN COMMUNICATION CABLES, MATCHED THROUGHOUT SYSTEM.

2.17. CONDUIT AND CABLE IDENTIFICATION

2.17.1. IDENTIFY CONDUIT AND CABLE IN ACCORDANCE WITH CITY OF WINNIPEG WATER AND WASTE DEPARTMENT ELECTRICAL DESIGN GUIDE.

2.17.2. COLOUR CODE CONDUITS, BOXES, AND METALLIC SHEATHED CABLES.

2.17.3. CODE WITH PLASTIC TAPE OR PAINT AT POINTS WHERE CONDUIT OR CABLE ENTERS WALL, CEILING, OR FLOOR, AND AT 5 M INTERVALS.

2.17.4. COLOURS: 38 MM WIDE PRIME COLOUR AND 19 MM WIDE AUXILIARY COLOUR.

2.17.5. COLOUR CODES:

POWER, 120/208/240 VAC: PRIME – BLACK.

UPS POWER, 120/208/240 VAC: PRIME – BLACK, AUXILIARY – GREEN.

CONTROL WIRING, 120 VAC: PRIME – BLACK, AUXILIARY – ORANGE.

FIRE ALARM: PRIME – RED.

LOW VOLTAGE COMMUNICATION / GENERAL: PRIME – BLUE.

LOW VOLTAGE CONTROL WIRING, <50 V: PRIME – BLUE, AUXILIARY – ORANGE.

INTRINSICALLY SAFE: PRIME – BLUE, AUXILIARY – WHITE.

UP TO 250 V: PRIME – YELLOW.

UP TO 600 V: PRIME – YELLOW, AUXILIARY – GREEN.

OTHER COMMUNICATION SYSTEMS: PRIME – GREEN, AUXILIARY – BLUE.

2.18. FINISHES

2.18.1. SHOP FINISH METAL ENCLOSURE SURFACES BY APPLICATION OF RUST RESISTANT PRIMER INSIDE AND OUTSIDE, AND AT LEAST TWO COATS OF FINISH ENAMEL.

2.18.1.1. PAINT OUTDOOR ELECTRICAL EQUIPMENT "EQUIPMENT GREEN" FINISH.

2.18.1.2. PAINT INDOOR SWITCHGEAR AND DISTRIBUTION ENCLOSURES LIGHT GRAY EEMAC 2Y.

2.19. INSTALLATION

2.19.1. DO COMPLETE INSTALLATION IN ACCORDANCE WITH CSA C22.1 EXCEPT WHERE SPECIFIED OTHERWISE.

2.19.2. DO OVERHEAD AND UNDERGROUND SYSTEMS IN ACCORDANCE WITH CAN/CSA-C22.3 NO.1 EXCEPT WHERE SPECIFIED OTHERWISE.

2.20. NAMEPLATES AND LABELS

2.20.1. ENSURE MANUFACTURER'S NAMEPLATES, CSA LABELS, AND IDENTIFICATION NAMEPLATES ARE VISIBLE AND LEGIBLE AFTER EQUIPMENT IS INSTALLED.
2.20.2. SUBMIT LAMACOID WORDING TO THE CONTRACT ADMINISTRATOR PRIOR TO MANUFACTURE.

2.20.2.1. IF CHANGES ARE REQUIRED, NOTIFY THE CONTRACT ADMINISTRATOR OF THESE CHANGES PRIOR TO MANUFACTURING OF LABELS.

2.21. MOUNTING HEIGHTS

2.21.1. MOUNTING HEIGHT OF EQUIPMENT IS FROM FINISHED FLOOR TO CENTRELINE OF EQUIPMENT UNLESS SPECIFIED OR INDICATED OTHERWISE.

2.21.2. IF MOUNTING HEIGHT OF EQUIPMENT IS NOT SPECIFIED OR INDICATED, VERIFY BEFORE PROCEEDING WITH INSTALLATION.

2.21.3. INSTALL ELECTRICAL EQUIPMENT AT FOLLOWING HEIGHTS UNLESS INDICATED OTHERWISE:

2.21.3.1. LOCAL SWITCHES: 1400 MM.

2.21.3.2. WALL RECEPTACLES:

2.21.3.2.1. GENERAL: 300 MM.

2.21.3.2.2. ABOVE TOP OF CONTINUOUS BASEBOARD HEATER: 200 MM.

2.21.3.2.3. IN MECHANICAL ROOMS: 1400 MM.

2.21.3.3. PANELBOARDS: AS REQUIRED BY CODE OR AS INDICATED.

2.21.3.4. LAN OUTLETS: 300 MM.

2.22. COORDINATION OF PROTECTIVE DEVICES

2.22.1. ENSURE CIRCUIT PROTECTIVE DEVICES SUCH AS OVERCURRENT TRIPS, RELAYS, AND FUSES ARE INSTALLED TO REQUIRED VALUES AND SETTINGS AS PER THE SHORT CIRCUIT COORDINATION STUDY WHICH WILL BE PROVIDED BY THE CONTRACT ADMINISTRATOR.

2.22.1.1. THE CONTRACTOR SHALL REQUEST THE SHORT CIRCUIT COORDINATION STUDY AFTER AWARD OF THE CONTRACT.

2.23. FIELD QUALITY CONTROL

2.23.1. CONDUCT THE FOLLOWING TESTS:

2.23.1.1. CONTINUITY TESTS ON CIRCUITS ORIGINATING FROM BRANCH DISTRIBUTION PANELS.

2.23.1.2. CONTINUITY TESTS ON CONTROL CIRCUITS ORIGINATING FROM THE PLC AND TERMINATING AT THE APPROPRIATE FIELD DEVICE.

2.23.1.3. COMMUNICATION SYSTEMS: IN ACCORDANCE WITH SECTION 29 15 01 - INSTRUMENTATION CABLE.

2.23.1.4. INSULATION RESISTANCE TESTING:

2.23.1.4.1. MEGGER CIRCUITS, FEEDERS, AND EQUIPMENT UP TO 350 V WITH A 500 V INSTRUMENT.

2.23.1.4.2. MEGGER 350–600 V CIRCUITS, FEEDERS, AND EQUIPMENT WITH A 1000 V INSTRUMENT.

2.23.1.4.3. CHECK RESISTANCE TO GROUND BEFORE ENERGIZING.

2.23.2. CARRY OUT TESTS IN PRESENCE OF THE CONTRACT ADMINISTRATOR.

2.23.3. PROVIDE INSTRUMENTS, METERS, EQUIPMENT, AND PERSONNEL REQUIRED TO CONDUCT TESTS DURING AND AT CONCLUSION OF WORK.

2.23.4. MANUFACTURER'S FIELD SERVICES:

2.23.4.1. OBTAIN WRITTEN REPORT FROM MANUFACTURER VERIFYING COMPLIANCE OF WORK, IN HANDLING, INSTALLING, APPLYING, PROTECTING, AND CLEANING OF PRODUCT AND SUBMIT MANUFACTURER'S FIELD REPORTS WITHIN THREE DAYS OF MANUFACTURER'S REVIEW, VERIFYING COMPLIANCE OF WORK AND ELECTRICAL SYSTEM AND INSTRUMENTATION TESTING.

2.23.4.2. PROVIDE MANUFACTURER'S FIELD SERVICES CONSISTING OF PRODUCT USE RECOMMENDATIONS AND PERIODIC SITE VISITS FOR INSPECTION OF PRODUCT INSTALLATION IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

2.23.5. PERFORM TESTS USING QUALIFIED PERSONNEL. PROVIDE NECESSARY INSTRUMENTS AND EQUIPMENT.

2.23.6. CHECK PHASE ROTATION AND IDENTIFY EACH PHASE CONDUCTOR OF EACH FEEDER.

2.23.7. SITE ACCEPTANCE TESTS:

2.23.7.1. ENSURE THAT TERMINATIONS AND ACCESSORY EQUIPMENT ARE DISCONNECTED.

2.23.7.2. GROUND SHIELDS, GROUND WIRES, METALLIC ARMOUR, AND CONDUCTORS NOT UNDER TEST.

2.23.8. PROVIDE CONTRACT ADMINISTRATOR WITH LIST OF TEST RESULTS SHOWING LOCATION AT WHICH EACH TEST WAS MADE, CIRCUIT TESTED, AND RESULT OF EACH TEST.

2.23.9. REMOVE AND REPLACE ENTIRE LENGTH OF CABLE IF CABLE FAILS TO MEET ANY OF TEST CRITERIA.

2.24. TRAINING

2.24.1. PROVIDE TRAINING TO THE CITY PERSONNEL IN THE OPERATION, CARE, AND MAINTENANCE OF SYSTEMS, SYSTEM EQUIPMENT, AND COMPONENTS IN ACCORDANCE WITH E15 OF THE TENDER.

NO.	REVISIONS	DATE (YYYY/MM/DD)	BY
1	RE-ISSUED FOR CONSTRUCTION	25-08-27	H.M.
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	
SCALE: VERTICAL		DATE	2025/08/27
DATE PLOT DATE:		DATE	(YYYY/MM/DD)

ENGINEER'S SEAL

PROVINCE OF MANITOBA
H.A. MASROOR
Member 31335
2025-08-27
REGISTERED PROFESSIONAL ENGINEER

CONSULTANT DRAWING NUMBER
E5.0

BID OPP: 808-2025
CONTRACT NUMBER: #

Winnipeg

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT
ENGINEERING SERVICES DIVISION

MACLEAN RESERVOIR VALVE HOUSE
VENTILATION UPGRADE
ELECTRICAL SPECIFICATIONS

CITY FILE NUMBER: W-938
SHEET 7 OF 7
CITY DRAW