

ELECTRICAL SPECIFICATIONS

1. GENERAL REQUIREMENTS	7.4 PROVIDE ALL CONDUIT, WIRING, BOXES, SWITCHES, OUTLETS, DEVICES, ETC., AS REQUIRED. MAKE FINAL CONNECTIONS TO VIBRATING EQUIPMENT WITH FLEXIBLE CONDUIT.
1.1 COMPLY WITH ALL DIVISION 1 GENERAL CONDITIONS. THE ELECTRICAL CONTRACTOR SHALL FOLLOW REQUIREMENTS AS IDENTIFIED BY ARCHITECT AND OTHER CONSULTANTS. COORDINATE WITH ALL TRADES TO ENSURE PROPER INSTALLATION METHODS APPLICABLE TO ALL CONSULTANT SPECIFICATIONS OF THE PROJECT.	7.5 ELECTRICAL BOXES FOR SUPPORT OF EXTERIOR OR WALL LIGHT FIXTURES SHALL BE RIGID TYPE, CWP POINT SUPPORT, RATED FOR A MINIMUM OF 22.5KG WEIGHT.
1.2 OBTAIN ALL APPROVALS FROM PUBLIC AUTHORITIES HAVING JURISDICTION BEFORE COMMENCING WORK AND PAY ALL INSPECTION FEES AND ALL PENALTIES. COMPLY WITH THE REQUIREMENTS OF THE LATEST EDITION OF THE APPLICABLE C.S.A. STANDARDS, BUILDING CODE, LOCAL ELECTRICAL SAFETY CODE APPLICABLE TO AREA HAVING JURISDICTION, APPLICABLE U.L.C. STANDARDS, AND THE OWNERS' REQUIREMENTS. SUBMIT CERTIFICATE OF INSPECTION AND APPROVAL FROM ALL AUTHORITIES HAVING JURISDICTION.	7.6 ALL LIGHT FIXTURES SHALL BE INDEPENDENTLY SUPPORTED FROM FINISHED DRY WALL OR 1 BAR CEILING. INCLUDE FOR ALL HANGERS AND NECESSARY MISCELLANEOUS SUPPORTS FROM JOIST, BEAM, OR DECK.
1.3 DO NOT REDUCE THE STANDARDS ESTABLISHED BY THE DRAWINGS AND SPECIFICATIONS BY APPLYING ANY OF THE CODES REFERRED TO HEREIN.	7.7 ANY LUMINAIRE INSTALLED IN SUSPENDED CEILING SHALL BE WIRED BY A FLEXIBLE CORD NOT EXCEEDING 3M IN LENGTH.
1.4 PROVIDE PROOF OF PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE COVERAGE AND AMOUNT. SUBMIT WITH TENDER.	7.8 PROVIDE ALL HANGERS, INSERTS, AND SUPPORTS OF APPROVED TYPES REQUIRED FOR THE WORK OF THIS DIVISION. PROVIDE CONDUIT FOR ALL SERVICES PENETRATING THE FLOOR SLAB. SEAL ALL PENETRATIONS THROUGH FLOOR SLABS AND FIRE AND SMOKE SEPARATIONS WITH AN APPROVED NON-SHRINK, WATERPROOF AND FIREPROOF SEALANT APPROVED BY CONSULTANT.
1.5 THE ELECTRICAL BID, THE ELECTRICAL QUOTATIONS FOR ADDITIONAL WORK AND ALL SUBMISSIONS RELATED TO THE ELECTRICAL SCOPE SHALL BE BY THE ELECTRICAL CONTRACTOR OR SUBCONTRACTOR ENGAGED ON THE PROJECT BASED ON THE ELECTRICAL DRAWINGS SPECIFICATIONS. THE SUBMISSIONS SHALL BE ON THE ELECTRICAL OR SUBCONTRACTOR COMPANY LETTERHEAD, SUPPLEMENTED BY A GENERAL CONTRACTOR LETTERHEAD DOCUMENT WHERE GENERAL CONTRACTOR IS ENGAGED. ALL DOCUMENTS SHALL BE SIGNED AND SEALED WHEN REQUIRED.	8. CONDUITS
1.6 ALL ITEMS STIPULATED AND DESIGNATED AS INSTRUCTIONS TO THE ELECTRICAL CONTRACTOR SCOPE OF WORK SHALL BE APPLICABLE TO ANY SUBCONTRACTOR ENGAGED ON THE PROJECT WHICH SCOPE IS BASED ON THE HAMMERSCHLAG & JOFFE ISSUED DRAWINGS.	8.1 CONDUIT SHALL BE C.S.A. APPROVED, RIGID STEEL THICK WALLED OR EMT THINWALL WITH STEEL SET SCREEN COUPLINGS AND CONNECTORS WITH INSULATED THROATS UNLESS OTHERWISE NOTED. CONDUITS AND ELECTRICAL BOXES IN FINISHED AREAS ACCESSIBLE BY PUBLIC SHALL BE CONCEALED UNLESS OTHERWISE NOTED. EXPOSED CONDUITS AND ELECTRICAL BOXES ARE ALLOWED ONLY IN UTILITY ROOMS AND BACK OF HOUSE CORRIDORS. EXPOSED CONDUITS AND OTHER RACEWAYS WHERE APPROVED SHALL BE NEAT IN APPEARANCE, RUN PARALLEL, TO FOLLOW LINES AND CONCENTRIC RIGHT-ANGLE BENDS ONLY. SHALL BE USED. CONDUIT WORK FOR ALL EXTERIOR DEVICES SHALL BE INSTALLED CONCEALED AND ON THE INTERIOR SIDE OF THE BUILDING ENVELOPE.
1.7 DRAWINGS	8.2 RIGID PVC CONDUIT TO CSA C22.2 NO. 211, RIGID TYPES ERI AND DBIES3 PVC CONDUIT, FT-4 RATED, COMPLETE WITH SITE MADE HEAT GUN BENDS FOR CONDUIT TO AND INCLUDING 50 MM (2") DIAMETER. FACTORY MADE FITTINGS FOR CONDUIT LARGER THAN 50 MM (2") DIAMETER. SOLVER AND OTHERS WHERE NOT. WEATHERPROOF COVER PLATES SHALL HAVE RUBBER OR NEOPRENE GASKETS.
1.8 EXAMINE ARCHITECTURAL, STRUCTURAL, AND MECHANICAL DRAWINGS BEFORE PROCEEDING WITH THE WORK.	8.3 CONNECTORS TO ELECTRICAL PANELS, FIRE ALARM PANEL, SWITCHBOARDS, ETC., HEAD-ARM EQUIPMENT SHALL BE C/W RAIN TIGHT CONNECTORS TO ENSURE EQUIPMENT INTEGRITY IN CASE OF WATER SPILLAGE.
1.9 ANY DISCREPANCIES BETWEEN DRAWINGS AND/OR SPECIFICATIONS MUST BE REFERRED TO THE CONSULTANT BEFORE ANY AFFECTED WORK IS COMMENCED.	8.4 CONDUITS SHALL BE INSTALLED OVERHEAD AND SHALL NOT BE SUPPORTED FROM THE ROOF DECK. INSTALL ALL CONDUITS AT JOIST LEVEL, FROM TOP PART OF THE JOIST OR FROM THE BEAM. PROVIDE ALL REQUIRED CONDUIT SUPPORT HARDWARE.
1.10 PREPARE INTERFERENCE DRAWINGS IN CONJUNCTION WITH ALL TRADES CONCERNED, SHOWING SLEEVES, CABLES AND CONDUIT ROUTES, LIGHT FIXTURES AND OPENINGS FOR PASSAGE THROUGH STRUCTURE, AND ALL INSERT SIZES AND LOCATIONS.	8.5 LARGEST CONDUITS APPROVED TO BE USED FOR CONNECTION OF BRANCH CIRCUITS IS 15 1/4".
1.11 REFER TO ARCHITECTURAL DRAWINGS FOR EXACT MOUNTING LOCATIONS OF ALL LIGHT FIXTURES AND DEVICES.	8.6 EMPTY CONDUITS SHALL BE COMPLETE WITH NYLON PULL WIRE.
1.12 ELECTRICAL DRAWINGS SHALL NOT BE USED FOR EQUIPMENT LAYOUT. DO NOT SCALE ELECTRICAL DRAWINGS. OBTAIN ALL DIMENSIONS FROM ARCHITECTURAL DIVISION.	9. WIRING
1.13 NOTE ELECTRICAL DRAWINGS ARE DIAGRAMMATIC IN NATURE. CONTRACTOR IS RESPONSIBLE TO FAMILIARIZE WITH THE PROJECT INTENT BY REVIEWING ALL DRAWINGS RELATED TO THE PROJECT.	9.1 ALL WIRING SHALL BE MINIMUM #12 GAUGE COPPER, EXCEPT AS OTHERWISE NOTED. ALL WIRING SHALL BE 60VOLT TYPE RW90 FOR PANEL FEEDERS. INSTALL IN RIGIDLY CONDUIT, UNLESS OTHERWISE NOTED. CIRCUIT BRANCH WIRING SHALL BE T40 CU JACKETED CONDUIT, R-30 CABLES MAY BE USED WHERE PERMITTED BY CODE IN CEILING SPACE. PVC CONDUITS SHALL BE USED UNDERGROUND AND WHERE APPROVED BY CONSULTANT UPON CONTRACTOR REQUEST.
1.14 COMMON WORK REQUIREMENTS	9.2 MINIMUM SIZE WIRING FOR DC WIRING SHALL BE 1% GAUGE. MAXIMUM VOLTAGE DROP SHALL NOT EXCEED 3% AT ALL LOAD CONDITIONS.
1.15 ENSURE THAT ALL ELECTRICAL EQUIPMENT SUPPLIED BY OTHER TRADES IS SUITABLE FOR THE RESPECTIVE VOLTAGE. CONFIRM POWER REQUIREMENTS OF ALL OWNER SUPPLIED EQUIPMENT.	9.3 BRANCH CIRCUIT WIRING VOLTAGE DROP SHALL BE 2% FOR FEEDER CONDUCTORS AND TOTAL 4% TO FINAL OUTLET. MINIMUM WIRE SIZE DEPicted ON ELECTRICAL DRAWINGS CONTRACTOR TO INCREASE TO ACCOMMODATE FOR ANY VOLTAGE DROP IN EXCESS OF 2%.
1.16 ALL CUTTING AND PATCHING REQUIRED FOR THE WORK OF THIS DIVISION SHALL BE CARRIED OUT BY THIS DIVISION. NO DAMAGING BLOCK WORK WILL BE ALLOWED. BLOCK WORK SHALL BE REPAIRED BY THE CONTRACTOR.	9.4 ALL WIRING SHALL BE SIZED COMPLIANT WITH 75°C RATED EQUIPMENT. SUBJECT TO DERATING AS PER TABLES SA, SB, SC & SD.
1.17 ALLOW TO SAWN THE FLOOR PRIOR TO CUTTING IN LOCATION OF EXISTING SERVICES. PROVIDE DUST CONTROL MEASURES DURING CUTTING. DO NOT LEAVE ANY FLOOR TRENCHES OPEN DURING THE DAY. USE TRAP FREE COVERS WITH BEVELED EDGES.	9.5 UNDERGROUND WIRING FEEDERS AND BRANCH WIRES SHALL BE RW90 RATED FOR DIRECT BURIAL. INSTALLED IN SPECIFIED UNDERGROUND CONDITIONS AS NOTED ON THE ELECTRICAL DRAWINGS.
1.18 COMPLY WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR EQUIPMENT AND MATERIAL SUPPLIED. CONTRACTOR SHALL OBTAIN MANUFACTURER'S INSTRUCTIONS, IF ANY, FOR EQUIPMENT WITH EQUIPMENT SUPPLY. TORQUE ALL FASTENERS USING TORQUE WRENCH. ENSURE ALL EQUIPMENT IS LEVELLED. MARK FASTENERS ONCE SET. TIGHTEN. EMPLOY USE OF TORQUE MEASURING TOOL.	9.6 CHANGE OF LOCATION OF WIRING DEVICES WITH IN 30" OF THE NOTED LOCATION ON THE DRAWINGS SHALL BE AT NO COST TO THE CLIENT PROVIDED THAT THE LOCATION IS CLARIFIED PRIOR TO INSTALLATION.
1.19 BE RESPONSIBLE AND PAY FOR ANY DAMAGE TO THE BUILDING INCURRED BY WORK OF THIS DIVISION.	9.7 CALL FOR ROUGH-IN INSPECTION BY AUTHORITIES HAVING JURISDICTION PRIOR TO CLOSING WALLS AND CEILINGS. PAY ALL FEES AND PROVIDE RECORDS OF INSPECTION COMPLETION.
1.20 SUBMIT THREE (3) COPIES OF SHOP DRAWINGS FOR REVIEW AND RECORDS, UNLESS ELECTRONIC SUBMISSION IS PROVIDED.	9.8 UNDERGROUND WIRING FEEDERS AND BRANCH WIRES SHALL BE RW90 RATED FOR DIRECT BURIAL. INSTALLED IN SPECIFIED UNDERGROUND CONDITIONS AS NOTED ON THE ELECTRICAL DRAWINGS.
1.21 CLEAR Y-MARK ALL EXPOSED CONDUIT, PULL BOXES, JUNCTION BOXES, ETC., TO INDICATE THE NATURE OF THE SERVICE.	9.9 WIRE TIEING
1.22 PROVIDE LAMCADO NAMEPLATES FOR ALL DISTRIBUTION EQUIPMENT INDICATING SOURCE OF POWER AND EQUIPMENT BEING FED. PROVIDE TYPEWRITTEN DIRECTORIES FOR ALL PANELS.	10. ALL FEEDERS SHALL BE MEGGER TESTED WITH 1000VOC (FOR CABLES RATED 300V OR LESS MEGGER TEST IS 500VOC) APPROVED MEGGER TEST.
1.23 CONTRACTOR TO ENSURE THAT THE ELECTRICAL SYSTEMS ARE FUNCTIONAL AND IN GOOD WORKING ORDER AS PER THE ELECTRICAL SPECIFICATIONS AND TO THE INTENT OF THE WORKING ELECTRICAL DRAWINGS.	10.1 HAND CRANKED INSTRUMENTS ARE NOT ALLOWED. SUBMIT MEGGER TEST RESULT READINGS IN G Ω (GIGA - OHM) PRIOR TO POWER ON.
1.24 ALL EQUIPMENT SUPPLIED BY THIS ELECTRICAL CONTRACTOR SHALL CARRY CSA OR EQUIVALENT CANADIAN CERTIFICATION.	11. GROUNDING AND BONDING
1.25 FINAL SUBMISSIONS	11.1 PROVIDE GROUNDING WIRES WITH ALL FEEDERS INCLUDING TENANT SERVICES. GROUNDING WIRE IN CONDUITS SHALL BE INSULATED. GREEN COLOURED WIRE, MINIMUM 12 AWG.
1.26 AS-BUILT DRAWINGS	11.2 PROVIDE BONDING GREEN INSULATED WIRE IN EACH CONDUIT. SIZE TO ONTARIO ELECTRICAL CODE REQUIREMENTS.
1.27 AFTER COMPLETION OF THE WORK, PROVIDE THE LANDLORD AND TENANT WITH A SET OF REPRODUCIBLE AS-BUILT RECORD DRAWINGS. INCORPORATE ALL CHANGES WITH RECOGNIZED DRAFTING PROCEDURES, AUTOCAD 2007 OR LATER.	11.3 PROVIDE MAIN GROUND SYSTEM TO HYDRO UTILITY SYSTEM (POWER APPROVAL)
1.28 AFTER COMPLETION OF WORK, PROVIDE THE FOLLOWING DOCUMENTS:	11.4 MAIN ELECTRICAL ROOM GROUNDING SHALL CONSIST OF MINIMUM OF TWO (2) 3/4" DIAMETER, 10' LONG CU GROUNDING RODS INTERCONNECTED WITH 20# BARE COPPER CONDUIT. INTERCONNECT MAIN ELECTRICAL ROOM GROUNDING TO THE POWER TRANSFORMER, WHERE APPLICABLE, WITH BARE COPPER CONDUCTOR. GROUND INTERSECTION SHALL BE COMPLETED, VISIBLE AND ACCESSIBLE FOR INSPECTION. PROVIDE A COMPLETE COLLECTION OF THE DATA TO MINIMIZE UNNECESSARY DELAYS AND TO SUPPLY AND INSTALL CU GROUND ON THE WALL IN MAIN ELECTRICAL AND PROVIDE THE FOLLOWING GROUNDING CONNECTOR INFORMATION:
1.29 CERTIFICATE OF FIRE ALARM VERIFICATION	11.5 USE CRAWLED LOGS FOR FINAL CONNECTION AND TERMINATION OF GROUND/BONDING WIRES.
1.30 HYDRO INSPECTION CERTIFICATE	11.6 CO-ORDINATE WITH OTHER TRADES IN LAYING OUT OF THE WORK SO AS NOT TO CONFLICT WITH THE WORK OF OTHER TRADES. CARRY OUT WORK PROMPTLY.
1.31 EMERGENCY LIGHTING TEST REPORT	11.7 FOR HIGH VOLTAGE SYSTEM REFER TO HIGH VOLTAGE SPECIFICATION AND UTILITY STANDARDS.
1.32 TEST REPORT FOR ALL SPECIFIED TESTING	12. MECHANICAL TRADES WIRING
1.33 OPERATION AND MAINTENANCE MANUALS	12.1 PROVIDE ALL CONDUIT, WIRING, SPLITTER, OUTLET BOXES AND DISCONNECT SWITCHES AS SHOWN. FOR ALL MOTORS STARTERS, AND CONTROL WIRING PER BELOW 120V CONTROL EQUIPMENT PROVIDED UNDER DIVISION 15, DIVISION 16 SHALL INSTALL ALL LIGHT VOLTAGE STARTERS, THERMOSTATS, AND WIRING. PROVIDE ALL LIGHT VOLTAGE WIRING AS REQUIRED.
1.34 PROVIDE THREE (3) SETS OF OPERATION AND MAINTENANCE MANUALS SUBMITTED IN HARD COVER BINDERS.	13. TLV AND COMMUNICATIONS SYSTEMS
1.35 OPERATIONS AND MAINTENANCE MANUALS SHALL INCLUDE, BUT NOT LIMITED TO THE FOLLOWING INFORMATION:	13.1 SUPPLY AND INSTALL THE REQUIRED CUIT PANELS, EMPTY RACEWAY SYSTEM C/W PULL WIRES, PULL BOXES, TERMINATION PANELS, OUTLET BOXES, COVER PLATES, SUITABLE FOR THE INSTALLATION OF IT AND COMMUNICATIONS CABLES AND ASSOCIATED EQUIPMENT, BY THE IT COMPANY AND UTILITY. THE COMPLETE CONDUIT INSTALLATION SHALL BE DESIGNED WITH A CLASS B OR INSULATION SYSTEM.
1.36 NAMES AND ADDRESS OF LOCAL SUPPLIERS FOR THE ITEMS INCLUDED	13.2 RACEWAYS SHALL BE EMT, GALVANIZED STEEL, CONDUIT WHERE APPROPRIATE TO MECHANICAL INJURY, IN ALL OTHER LOCATIONS, EMT. RIGID, MINIMUM CONDUIT SIZE TO BE 18MM. WORK TO BE DONE TO C.S.A. T507 AND C.S.A. T509 LATEST STANDARDS.
1.37 DESCRIPTION OF YEARS AND PARTS LIST	13.3 ALL DATA OUTLETS SHALL BE WIRED WITH EMPTY PULL STRINGS.
1.38 THE CONSULTANTS REVISED SHOP DRAWINGS	13.4 PVC DUCT SHALL BE USED FOR UNDERGROUND SERVICE ENTRANCE.
1.39 CERTIFICATES OF ACCEPTANCE FROM THE AUTHORITY'S INSPECTION DEPARTMENT	13.5 PROVIDE TWO DEDICATED TYPED 11AMP 1POLE POWER OUTLET ADJACENT TO THE IT EQUIPMENT LOCATIONS FOR UTILITY COMPANY REQUIREMENTS.
1.40 VERIFICATION REPORTS AND CERTIFICATES FOR FIRE ALARM COMPONENTS	13.6 UNLESS OTHERWISE SHOWN, STEEL PULL BOXES SHALL BE INSTALLED EVERY 30M OR LESS OF STRAIGHT CONDUIT RUN. EVERY 20M OR LESS OF STRAIGHT CONDUIT RUN AND ONE 90 DEGREE BEND OR EQUIVALENT. EVERY TWO 90 DEGREE BENDS OR EQUIVALENT.
1.41 LOAD BALANCE REPORT AND WIRING	13.7 A #6 GROUND WIRE SHALL BE RUN FROM THE TELEPHONE SERVICE PANEL TO SERVICE GROUND TO PROVIDE A GROUND FOR THE TELEPHONE SYSTEM.
1.42 MEGGER TESTING REPORT IN GIGA OHM (GΩ) VALUES	14. DISTRIBUTION FEEDERS
1.43 WRITTEN QUANTITIES - COORDINATION STUDY FOR EQUIPMENT INCLUDING RELAY PROTECTION EQUIPMENT, SHORT CIRCUIT AND ARC FLASH EVALUATION IS MANDATORY FOR ALL PROJECTS	14.1 FEEDERS SHALL BE SIZED AS DETAILLED. SUBSTITUTION OF FEEDERS EITHER IN MATERIAL OR ROUTING WILL NOT BE PERMITTED UNLESS ENGINEERS WRITTEN APPROVAL IS OBTAINED. FEEDERS SHALL HAVE A MAXIMUM VOLTAGE DROP OF 2% AT FULL LOAD ALL THE PANELS SUPPLIED. ALL FEEDERS SHALL BE BALANCED UNDER FULL LOAD CONDITIONS WITHIN 10% BETWEEN PHASES. ALL PHASES AND NEUTRALS SHALL BE IDENTIFIED AND MAINTAINED IN THEIR CORRECT ORDER WHEN READING LEFT TO RIGHT THROUGHOUT THE BUILDING.
1.44 CONTACT INFORMATION	14.2 FEEDERS 3 PANELS, TRANSFORMER, INCOMING SERVICE AND LOAD CENTERS SHALL BE BALANCED UNDER FULL LOAD CONDITIONS TO WITHIN 2% BETWEEN PHASES. ALL PHASERS AND NEUTRALS SHALL BE IDENTIFIED AND MAINTAINED IN THEIR CORRECT ORDER WHEN READING LEFT TO RIGHT THROUGHOUT THE BUILDING.
1.45 ELECTRICAL SAFETY INSPECTION REPORT	14.3 ALL PHASES AND NEUTRALS SHALL BE IDENTIFIED AND MAINTAINED IN THEIR CORRECT ORDER WHEN READING LEFT TO RIGHT THROUGHOUT THE BUILDING.
1.46 OPERATION AND MAINTENANCE MANUALS SHALL FORM A COMPLETE DOCUMENTATION FOR THE SUBJECTED ELECTRICAL INSTALLATION AND WILL NOT BE LIMITED TO LINE VOLTAGE POWER EQUIPMENT.	14.4 MEGGER ALL FEEDERS TO MEET CODE AND LATEST NEMA MANUAL. ALL FEEDERS SHALL BE MEGGER TESTED WITH 1000VOC APPROVED MEGGER TESTER. HAND CRANKED INSTRUMENTS ARE NOT PERMITTED. SUBMIT TEST RESULTS FOR CONSULTANT REVIEW PRIOR TO POWER ON.
1.47 ANY SECURITY, TELEPHONE, OR OTHER MISCELLANEOUS WIRING SHALL ALSO BE INCLUDED IN THE OPERATION AND MAINTENANCE MANUALS.	14.5 REPLACE AT NO COST ALL FEEDERS THAT DO NOT MEET MINIMUM INSULATION RESISTANCE.
1.48 PROJECT SUBSTANTIAL COMPLETION AND PROJECT CLOSURE	14.6 ALL DISTRIBUTION FEEDERS SHALL BE 90°C RATED.
1.49 AFTER THE WORK IS COMPLETED, GIVE A WRITTEN GUARANTEE FOR ONE (1) YEAR COVERING WORKMANSHIP AND MATERIALS. REPAIR OR REPLACE WITHOUT DEDUCT TO THE OWNER, ANY DEFECTS DUE TO WORKMANSHIP OR MATERIALS WHICH IN THE OWNER'S OPINION, ARE NOT DUE TO MISUSE OR NEGLIGENCE. LED LIGHTING SHALL HAVE THREE (3) YEARS INSTALLATION AND MANUFACTURERS WARRANTY.	15. ELECTRICAL EQUIPMENT ENCLOSURE RATING
1.50 PROVIDE OWN COPY OF LIST OF OUTSTANDING AND DEFICIENT WORK NOT SUBSTANTIAL COMPLETION.	15.1 EQUIPMENT SHALL BE NEMA 3 RATED WHEN INDOOR AND NEMA 4 WHEN OUTDOOR. OUTDOOR DEVICES SHALL BE SUITABLY RATED FOR THEIR ENVIRONMENT.
1.51 ADJUST AND RECORD LEVELS OF EMERGENCY LIGHTING THROUGHOUT THE FACILITY. ADJUSTMENT SHALL BE COMPLETED AND ADJUSTED AS NECESSARY AND AS REQUIRED BY AHJ AND CONSULTANT. PROVIDE RECORD OF EMERGENCY LIGHTING TESTING AND EMERGENCY LIGHT LEVEL MEASUREMENTS PRIOR REQUEST FOR SUBSTANTIAL COMPLETION.	16. ELECTRICAL PANEL BOARDS
1.52 PRIOR COMPLETING FIRE ALARM SYSTEM PROGRAMMING OBTAIN APPROVAL FOR SEQUENCE OF OPERATION BY LOCAL AHJ. ALLOW TO COMPLETE FIRE ALARM SYSTEM PROGRAMMING ADJUSTMENTS AS REQUESTED BY AHJ AT LATER DATE.	16.1 EACH PANEL BOARD SHALL BE C/W A KEY RING BELONG DOWN CONTROL AND A CIRCUIT DIRECTORY GIVING THE NUMBER AND DESCRIPTION OF EACH CIRCUIT CONTROLLED. THE DIRECTIONS SHALL BE CLEARLY TYPED, LEGIBLE AND OF AMPLÉ SIZE AND SHALL BE MOUNTED IN A METAL FRAME WITH A CLEAR PLASTIC COVER ON THE INSIDE OF THE DOOR.
1.53 CLEAN AND TEST ALL EQUIPMENT BEFORE FINAL ACCEPTANCE IS GIVEN FOR THE WORK.	16.2 THE CIRCUIT BREAKERS SHALL BE CONNECTED TO THE PANEL BY BOLTED CONNECTIONS. ALL BUS BARS, LOGS, AND BREAKER TERMINALS SHALL BE ALUMINUM SILVER PLATED AT THE CONNECTION POINTS. THE INTERRUPTING CAPACITY OF EACH BOARD SHALL BE DETERMINED BY THE CO-ORDINATION STUDY AS PER DRAWINGS. MINIMUM 100A FOR 200V PANELS AND 100A FOR 480V PANELS. WHEN REMOTELY LOCATED FROM THE MAIN ELECTRICAL SERVICE, ELECTRICAL PANELS INSIDE MAIN ELECTRICAL ROOM SHALL BE RATED NOT LESS THAN 50KVA FOR 480V PANELS AND MINIMUM 100A FOR 200V PANELS. REFER TO CO-ORDINATION STUDY FOR DETAILS OF REQUIRED RATING. NOT WITHSTANDING THE ABOVE ALL SUPPLIED ELECTRICAL EQUIPMENT SHALL BE APPLICABLE FOR SERIES RATING LISTED WITH CLASS J FUSE, SHOWN UNLESS OTHERWISE NOTED.
1.54 ARRANGE FOR FINAL ELECTRICAL INSPECTION BY ELECTRICAL CONSULTANT FOR ONE WEEK PRIOR TO COMPLETION OF WORK.	16.3 NOTWITHSTANDING THE ABOVE, PANEL BOARDS CONNECTED TO THE SECONDARY SIDE OF TRANSFORMERS, 600-120/208 VOLT AND 600-120/240 VOLT, SIZED 225KVA AND HIGHER SHALL BE RATED MINIMUM 250KVA.
1.55 VALUATION OF CHARGES	
1.56 PROVIDE COMPLETE BREAKDOWN OF MATERIAL, LABOUR, OVERHEAD, PROFIT, ETC., WHEN SUBMITTING QUOTATIONS FOR CHARGE NOTICES ON THIS PROJECT.	
1.57 THE HOURLY LABOUR RATE SHALL BE INCLUSIVE OF ALL CHARGES FOR SUPERVISION, VARIABLE LABOUR FACTORS, HAND TOOLS, PAYROLL BURDENS, HEIGHT FACTORS, WARRANTIES, STORAGE, RENTALS, ADDITIONAL BONDING, PARKING, CLEAN-UP, AS-BUILT DRAWINGS, HOISTING, FREIGHT AND DELIVERY, BUT EXCLUSIVE OF OVERHEAD AND PROFIT.	
1.58 LABOUR HOURS SHALL BE BASED ON THE LATEST ISSUE OF THE NATIONAL ELECTRICAL CONTRACTORS' ASSOCIATION (NECA) LABOUR UNITS. COLUMN ONE NORMAL FOR THE DURATION OF THIS CONTRACT. LABOUR FOR SMALL ITEMS SUCH AS, BUT NOT LIMITED TO, COUPLINGS, STAPLS, MARKERS, SCREWES, ETC., WILL NOT BE REIMBURSED.	
1.59 THE MATERIAL PRICES SHALL BE BASED ON THE CURRENT NATIONAL PRICE SYSTEM (NPS) CATALOGUE LESS APPLICABLE TRADE DISCOUNTS.	
1.60 PROGRESS BILLING	
1.61 PROVIDE COMPLETE BREAKDOWN OF MATERIAL, LABOUR, AND GENERAL COSTS WHEN SUBMITTING PROGRESS DRAW REQUEST.	
1.62 SEPARATE BILLING SECTION FOR EACH SYSTEM INSTALLED AS PART OF THE PROJECT. SEPARATE SECTION SHALL MINIMUM INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING: LIGHTING, POWER DISTRIBUTION, FIRE ALARM, RACEWAYS, WIRING, GENERAL COSTS, FINAL SUBMISSION (AS-BUILT, MANUALS, WARRANTY, CERTIFICATES).	
1.63 FINAL SUBMISSION COSTS SHALL BE FINE-TUNED PER VALUE OF PROJECT. SHALL INCLUDE A MINIMUM COST FOR THE BELOW PROJECT VALUES:	
1.64 PROJECT VALUE < \$100,000, CLOSE OUT COST = \$5,000	
1.65 PROJECT VALUE < \$500,000, CLOSE OUT COST = \$7,500	
1.66 PROJECT VALUE < \$1,000,000, CLOSE OUT COST = \$10,000	
1.67 PROJECT VALUE > \$1,000,000, CLOSE OUT COST = 1%	
1.68 MATERIALS AND MATERIALS	
1.69 ALL MATERIALS USED SHALL BE SUITABLE FOR THEIR APPLICATION. ALL EXTERIOR FASTENERS AND SUPPORTING MATERIALS FORMING A COMPLETE ELECTRICAL SYSTEM SHALL BE WEATHERPROOF. NUTS, BOLTS, SCREWS, ETC., MATERIAL SHALL BE STAINLESS STEEL OR APPROVED EQUIVALENT.	
1.70 ALL MATERIALS USED THROUGHOUT SHALL BE NEW, HIGHEST QUALITY C.S.A. APPROVED AND OF AN MANUFACTURER. WHEREVER TRADE NAMES ARE NOT USED TO DESCRIBE MATERIALS, THESE MATERIALS SHALL BE OF BEST AVAILABLE QUALITY AND MANUFACTURER. OBTAIN AND PAY FOR SPECIAL HYDRO INSPECTION OF SPECIFIED NON-C.S.A. ELECTRICAL EQUIPMENT.	
1.71 MATERIALS AND EQUIPMENT PROVIDED SHALL BE LISTED FOR HEAVY DUTY APPLICATION AND SHALL BE SUITABLE FOR THE INTENDED USE, COMMERCIAL, INDUSTRIAL, OR RESIDENTIAL.	

SITE SERVICE & DUCTBANK SPECIFICATIONS

1. UNDERGROUND DUCT BANKS	1.1 SUPPLY AND INSTALL UNDERGROUND CONCRETE ENCASED DUCTBANKS FOR CABLES INDICATED. CONCRETE CURB AS DETAILED HEREIN SHALL BE PROVIDED BY THIS SECTION. TRENCHING AND BACKFILLING SHALL BE DONE BY THIS SECTION.
1.2 DUCTBANKS SHALL FOLLOW GENERAL ROUTE SHOW ON THE DRAWINGS AND SHALL TERMINATE AT SPECIFIED LOCATIONS. EXACT LOCATION OF DUCTBANKS AND TERMINAL POINTS SHALL BE VERIFIED ON THE SITE PRIOR TO COMMENCEMENT OF WORK.	1.3 THE DUCTBANK SHALL CONSIST OF PARALLEL DUCTS ENCASED IN CONCRETE. THE NUMBER AND ARRANGEMENT OF DUCTS SHALL BE AS SHOWN ON THE DRAWINGS. DUCTS SHALL BE CSA CERTIFIED TYPE DBI POLYVNYL FOR CONCRETE ENCASEMENT OR DIRECT BURIAL, WITH AN INTERNAL DIAMETER OF FOUR TIMES THE DUCT DIAMETER. H-HORING STEEL BARS LONG LONGITUDINALLY AT 150MM LATERAL SPACING AND SET AT THE DEPTH OF THE CONCRETE ENVELOPE BELOW THE BOTTOM ROW OF DUCTS.
1.4 BENDS SHALL GENERALLY BE AS FACTORY SUPPLIED APPROVED RADIUS. RADIUS OF SUCH BENDS SHALL NOT BE LESS THAN STANDARD FOR THE 100MM DIAMETER DUCT.	1.5 THE DUCT LENGTHS SHALL BE JOINED TOGETHER WITH AN APPROVED COUPLING TO PROVIDE A SOUND JOINT. ADJACENT COUPLINGS SHALL BE STAGGERED BY AT LEAST 200MM. JOINT SOLVENT SHALL BE USED TO SEAL THE COUPLINGS.
1.6 WHERE TRENCH IS DRY AND FIRM, NO BED SHALL BE REQUIRED. WHERE TRENCH IS WET, SUPPLY AND INSTALLED 150MM LAYER OF CRUSHED STONE IN THE BOTTOM. NO CONCRETE SHALL BE POURED IN TRENCHES CONTAINING WATER.	1.7 THE DUCTS SHALL BE Laid WITH A MINIMUM SPACING OF 150MM CENTER TO CENTER, BOTH HORIZONTALLY AND VERTICALLY FOR 30MM DIAMETER. FOR LARGER DUCTS, SPACING SHALL BE INCREASED CORRESPONDINGLY. SPACERS SHALL BE INSTALLED ON 10M CENTERS AND WITHIN 600MM OF EACH COUPLING UNITS. SPACERS SHALL BE SPECIALLY FORMED PLASTIC. WOOD SPACERS SHALL NOT BE USED.
1.8 THE DUCTS SHALL BE ON EVEN GRADE SLOPED NOT LESS THAN 20MM IN A 100MM RUN IN DIRECTION OPPOSITE TO THE ELECTRICAL ROOM PRIOR ENTRANCE INTO ELECTRICAL ROOM DUCTS SHALL BE DRAINED VIA FRENCH DRAIN IN SLOPE OPPOSITE TO ELECTRICAL ROOM IS NOT FEASIBLE.	1.9 THE TOP SURFACE OF CONCRETE ENCASEMENT SHALL BE A MINIMUM 100MM BELOW FINISHED GRADE UNLESS OTHERWISE INDICATED ON THE DRAWING. BUT IN NO CASE SHALL IT BE LESS THAN 40MM TO THE FINISHED GRADE OR SURFACE. HIGH VOLTAGE DUCTS SHALL HAVE MINIMUM 100MM OF 8% COMPACTED SOIL OR NATIVE MATERIAL OVER THEM.
1.10 NO REINFORC METAL SHALL BE INSTALLED BETWEEN DUCTS. REINFORCING SHALL BE INSTALLED ONLY NEAR THE BOTTOM OF THE DUCT UNLESS SPECIFICALLY INDICATED OTHERWISE BY A LOCAL HYDRO AUTHORITY. WHERE THE DUCTBANK IS CONSTRUCTED OVER RECENT FILL OR UNSTABLE GROUND, OR PASSES THROUGH WALLS OR FOOTINGS, OR UNDER DRIVEWAYS OR PARKING LOTS, THE CONCRETE SHALL BE REINFORCED WITH 1" DIAMETER H-HORING STEEL BARS LONG LONGITUDINALLY AT 150MM LATERAL SPACING AND SET AT THE DEPTH OF THE CONCRETE ENVELOPE BELOW THE BOTTOM ROW OF DUCTS.	1.11 ALL REINFORCING RODS USED SHALL HAVE A MINIMUM LENGTH OF 2000MM. INDIVIDUAL LENGTHS OF REINFORCING RODS ARE TO BE OVERLAPPED BY A MINIMUM OF 300MM AND IS TO EXTEND AT LEAST 1000MM ONTO SOLID GROUND. IN PLACES WHERE THE DUCT BANK ENTERS A BUILDING, IT SHALL BE REINFORCED FOR A DISTANCE OF 2500MM DURING THE BUILDING. DUCTBANKS PASSING BENEATH OR WITHIN 600MM OF EACH COUPLING UNITS SHALL BE REINFORCED WITH 1" DIAMETER H-HORING STEEL BARS LONG LONGITUDINALLY AT 150MM LATERAL SPACING AND REINFORCING SHALL EXTEND A DISTANCE OF 1500MM BEYOND IN BOTH DIRECTIONS.
1.12 THE DUCTS SHALL BE ENCASED WITH A MINIMUM 25MM CONCRETE WITH A MINIMUM COVER OF 75MM ON ALL SIDES. THE CONCRETE SHALL HAVE A SLUMP OF 100MM AND BE ADJUSTED TO PROVIDE AN UNIFORMITY OF THE DUCT STRUCTURE. THE CONCRETE SHALL BE DEFLECTED DOWN ALONGSIDE THE DUCTS TO THE BOTTOM AND UP THROUGH THE DUCT ASSES.	1.13 WHEN CROSSING OTHER UTILITIES, THE CONCRETE DUCT ENCASEMENT SHALL MAINTAIN A MINIMUM OF 450MM VERTICAL CLEARANCE. WHEN RUNNING PARALLEL TO ANOTHER UTILITY, THE DUCTBANK SHALL BE A MINIMUM OF 1500MM CLEAR OF SAID UTILITY BUT IN NO CASE SHALL IT BE INSTALLED IN THE SAME EXCAVATION.
1.14 WHEN COMPLETED, THE DUCTS SHALL BE CLEANED AND ENDS PUGHED WITH DUCT PUGS. THE DUCTS SHALL BE TESTED FOR LEAKAGE BY PULLING A STEEL WIRE BRUSH AND A 5MM MANHOLE THROUGH THEIR COMPLETE LENGTH.	1.15 DUCTS INSTALLED FOR P.U.C CABLES AND DUCTS LEFT AS SPARE SHALL HAVE ONE CONTINUOUS LENGTH 100MM POLYPROPYLENE ROPE INSTALLED IN EACH DUCT TO FACILITATE THE INSTALLATION OF THE CABLE. THE DUCT, TERMINATION POINTS, GRADES, AND ROUTE OF DUCT BANK SHALL BE NOTED IN THE RECORDS.
1.16 NOTIFY CONSULTANT AND P.U.C AT LEAST 48 HOURS BEFORE CONCRETE IS POURED TO PERMIT INSPECTION OF THE DUCT INSTALLATION.	1.17 ASSUME RESPONSIBILITY TO HAVE THE DUCTS INSPECTED BY THE INSPECTION OFFICE AND P.U.C (WHERE APPLICABLE) PRIOR TO POURING OF CONCRETE AND AGAIN PRIOR TO BACKFILLING.
2. EXCAVATION AND BACKFILLING	2.1 EXCAVATE AND BACKFILL AS REQUIRED FOR THIS WORK BOTH INSIDE AND OUTSIDE THE BUILDING. ALL TRENCH EXCAVATION SHALL BE CARRIED OUT IN STRICT CONFORMITY WITH THE TRENCH EXCAVATOR PROTECTION ACT AND AMENDMENTS, STATUTES OF ONTARIO AND THE TRENCHING ACT, AS REGARDS TO THE PROTECTION OF THE PUBLIC.
2.2 EXCAVATION AND BACKFILLING SHALL BE PROVIDED BY THIS ELECTRICAL CONTRACTOR.	2.3 CAREFULLY CHECK AND AVOID DISTURBING OR DAMAGING ANY EXISTING UNDERGROUND PIPING, CONDUIT OR OTHER SERVICES UNCOVERED DURING CARRYING OUT OF THE WORK. MAKE GOOD ANY DAMAGE.
2.4 UNDERGROUND SEWERS AND OTHER SERVICES ARE INDICATED APPROXIMATELY ON THE MECHANICAL, ELECTRICAL, OR ARCHITECTURAL FIELD PLANS. THE LOCATION OF THESE SERVICES SHALL BE OBTAINED FROM AVAILABLE INFORMATION BUT HAS NOT BEEN VERIFIED ON THE FIELD. CAREFULLY CHECK SUCH DISCREPANCY BEFORE PROCEEDING WITH ANY NEW WORK. ENGAGE THE SERVICES OF LOCAL P.U.C, HYDRO, TELEPHONE AND GAS AUTHORITIES TO OBTAIN THE LOCATION OF UNDERGROUND SERVICES. LOCATIONS SHALL BE RECORDED IN THE RECORDS.	2.5 EXCAVATION FOR ALL UNDERGROUND SERVICES SHALL BE OF THE REQUIRED DEPTH AND DIMENSION, SHALL BE:
2.5.1 PREPARED AS REQUIRED, SO THAT NO PORTION OF ANY DUCT SHALL BEAR DIRECTLY AGAINST ANY ROCK OR OTHER HARD SURFACE.	2.5.2 KEPT DRY AT ALL TIMES BY BAILING, PUMPING, OR OTHER MEANS. SIDES AND BOTTOMS SHALL BE KEPT FROM FREEZING.
2.5.3 BOTTOMS OF EXCAVATION SHALL BE GRADED AS REQUIRED.	2.5.4 BANKS OF EXCAVATIONS SHALL BE EVEN, CUT AND/OR TRIMMED AND THEY SHALL BE SHORED AS REQUIRED TO PREVENT CAVING IN, AND THE MATERIAL USED SHALL BE CAREFULLY DRAIN DURING BACKFILLING.
2.5.5 WIDTH OF EXCAVATION SHALL BE CAREFULLY CONTROLLED AND SHALL BE LIMITED TO TWICE THE O.D. OF DUCTS, CONDUITS OR DUCTBANK, AND AS SHOWN ON THE DRAWINGS.	2.5.6 EXCAVATING, DUCT LAYING, AND BACKFILLING SHALL BE EXECUTED IN MINIMUM LENGTHS AS DETERMINED BY PROJECT MANAGER TO ENABLE ALL PROTECTIVE MEASURES TO FUNCTION PROPERLY AT ALL TIMES.
2.5.7 WHEN EXCAVATING IS NECESSARY IN CLOSE PROXIMITY TO AND BELOW ANY FOOTING LEVEL, BACKFILLING SHALL BE DONE WITH REINFORCED CONCRETE FURNISHED UNDER THIS SECTION TO THE LEVEL OF THE TOP OF HIGHEST ADJACENT FOOTING.	2.5.8 ALL DUCTS ENTERING AND LEAVING THE BUILDING OR PASSING OTHER EXCAVATED AREAS SHALL BE SUPPORTED ON A REINFORCED CONCRETE PAD, RESTING AT BOTH ENDS ON AT LEAST 1800MM SOLID UNDISTURBED EARTH OR A CHECK IN CONCRETE FOUNDATION WALL. REINFORCING RODS.
2.5.9 SHOULD THE EXCAVATION BY NEGLIGENCE OR ERROR BE CARRIED TO GREATER DEPTH THAN SHOWN OR AUTHORIZED, SUCH EXTRA EXCAVATION SHALL BE REPLACED WITH WELL-COMPACTED GRANULAR CRUSHED STONE FILL OR REINFORCED CONCRETE, AS REQUIRED TO GIVE A BEARING VALUE EQUAL TO THAT OF THE EXISTING FILL.	2.5.10 BACKFILLING SHALL NOT BE COMMENCED UNTIL INSTALLATION IS INSPECTED AND APPROVED. BACKFILLING SHALL BE CARRIED OUT CAREFULLY TO AVOID INJURY TO THE WORK. MAKE GOOD ANY DAMAGE.
2.5.11 ALL BACKFILLING REQUIRED TO BRING LEVEL UP TO UNDERSIDE OF STONE FILL (UNDER PARKING AREAS AND ROADS) AND TO UNDERSIDE OF EXISTING DRIVEWAYS SHALL BE GRANULAR MATERIAL. SUPPLIED UNDER THIS SECTION AND TAMPED EVERY 150MM IN DEPTH TO CONSOLIDATE, AND FILL SHALL BE CLEAN, SHALL NOT HAVE PARTICLES OVER 60MM IN LARGEST DIMENSIONS, AND WITH NOT MORE THAN 8% PASSING A 200 sieve.	2.5.12 ALL BACKFILL PLACED UNDER PAVED AREAS (PARKING AREAS, DRIVEWAYS, SIDEWALKS, ETC.) SHALL BE COMPACTED IN 150MM TO 200MM LAYERS TO 98% SPD (REFER TO GENERAL REQUIREMENTS OUTLINED IN SPECIFICATION SECTIONS 02315 & 03001). TESTING AND INSPECTION OF SAID BACKFILL INCLUDING CHECKING THE PLACING AND COMPACTION OF FILL, SHALL BE DONE BY AN INDEPENDENT INSPECTION TESTING COMPANY. THE COST OF THE INSPECTION AND TESTING OF THIS FILL WILL BE PAID BY OTHERS. ONE TEST SHALL BE MADE EVERY 2 LAYERS OF FILL FOR EACH 1,000 SQUARE FEET OR LESS OF FILL AREAS FOR DRIVEWAYS, PARKING AREAS, AND SIDEWALKS.
2.5.13 EXTERIOR BACKFILL IN AREAS TO RECEIVE SOIL OR SEED SHALL BE CLEAN FILL, FREE FROM ORGANIC MATERIAL AND DEBRIS, FROZEN IN A MAXIMUM 300MM LAYER AND COMPACTED TO ACHIEVE 98% DRY DENSITY AS DETERMINED BY THE STANDARD AASHTO TEST. FROZEN EARTH SHALL NOT BE USED FOR BACKFILLING OF AREAS TO RECEIVE SOIL OR SEED.	2.5.14 EXTERIOR BACKFILL IN AREAS TO RECEIVE SOIL OR SEED SHALL BE CLEAN FILL, FREE FROM ORGANIC MATERIAL AND DEBRIS, FROZEN IN A MAXIMUM 300MM LAYER AND COMPACTED TO ACHIEVE 98% DRY DENSITY AS DETERMINED BY THE STANDARD AASHTO TEST. FROZEN EARTH SHALL NOT BE USED FOR BACKFILLING OF AREAS TO RECEIVE SOIL OR SEED.
2.5.15 BACKFILLING TRENCHES WITHIN BUILDING AND GRANULAR CRUSHED STONE IN LAYERS AND COMPACT TO 100% STANDARD PROCTOR DENSITY.	2.5.16 PATCHING OF ALL PAVED AREAS, ROADS, WALKS, SIDEWALKS, ETC., DAMAGED BY THE NEW WORK WILL BE DONE BY ANOTHER DIVISION AND PAID BY THIS ELECTRICAL CONTRACTOR.
2.5.17 BE RESPONSIBLE FOR MAKING GOOD ANY SUBSEQUENT SETTLEMENT OF FILL AND PAY ALL COSTS INVOLVED IN MAKING GOOD PAVING, CURBS, AND ALL OTHER SURFACE RESTORATION DEVICES.	2.5.18 BACKFILLING TO SUB-GRADE LEVEL BY THIS ELECTRICAL CONTRACTOR AND FINISH BACKFILLING SHALL BE DONE BY PAVING CONTRACTOR.
2.5.19 EXCAVATED MATERIALS SHALL BE FILL, STORED AND/OR DISPOSED OF AS FOLLOWS:	2.5.19.1 DURING THE PROCESS OF THE CONTRACT, IN SUCH PLACES AND IN SUCH A MANNER THAT A MINIMUM OF DAMAGE OR DISFIGUREMENT OF EXISTING GROUND WILL RESULT.
2.5.19.2 ON COMPLETION OF WORK, ALL EXCAVATED MATERIAL SHALL BE REMOVED AND DEPOSED OF.	

h HAMMERSCHLAG & JOFFE INC.

43 Lesmill Road Toronto,
Ontario Canada M3B 2T8
T: (416) 444-9263
F: (416) 444-1463

THESE DRAWINGS ARE NOT TO BE SCALED FOR SITE DIMENSIONS. THE CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS AND SITE CONDITIONS AT THE PROJECT SITE AND MUST REPORT ANY DISCREPANCIES TO THE CONSULTANTS BEFORE PROCEEDING WITH THE WORK.

COORDINATE ALL OF THE WORK WITH OTHER TRADES & THE LAYOUTS SHOWN ON THE OTHER CONSULTANTS' AND THE ARCHITECTURAL DRAWINGS (WHERE APPLICABLE). REFER TO THE APPROPRIATE CONSULTANT DRAWINGS BEFORE PROCEEDING WITH THE WORK FOR ANY COORDINATION REQUIREMENTS.

THIS CONTRACTOR MUST CONFORM TO ALL APPLICABLE CODES AND STANDARD REQUIREMENTS OF THE AUTHORITIES HAVING JURISDICTION. THE CONTRACTOR SHALL WORK FROM DRAWINGS MARKED 'ISSUED FOR CONSTRUCTION' AND SHALL ENSURE LATEST ISSUED INSTRUCTIONS ARE FOLLOWED. THIS CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY AND BEAR COSTS FOR ANY CORRECTIONS OR DAMAGES RESULTING FROM THEIR WORK.

ALL REINFORCING RODS USED SHALL HAVE A MINIMUM LENGTH OF 2000MM. INDIVIDUAL LENGTHS OF REINFORCING RODS ARE TO BE OVERLAPPED BY A MINIMUM OF 300MM AND IS TO EXTEND AT LEAST 1000MM ONTO SOLID GROUND. IN PLACES WHERE THE DUCT BANK ENTERS A BUILDING, IT SHALL BE REINFORCED FOR A DISTANCE OF 2500MM DURING THE BUILDING. DUCTBANKS PASSING BENEATH OR WITHIN 600MM OF EACH COUPLING UNITS SHALL BE REINFORCED WITH 1" DIAMETER H-HORING STEEL BARS LONG LONGITUDINALLY AT 150MM LATERAL SPACING AND REINFORCING SHALL EXTEND A DISTANCE OF 1500MM BEYOND IN BOTH DIRECTIONS.

THE DUCTS SHALL BE ENCASED WITH A MINIMUM 25MM CONCRETE WITH A MINIMUM COVER OF 75MM ON ALL SIDES. THE CONCRETE SHALL HAVE A SLUMP OF 100MM AND BE ADJUSTED TO PROVIDE AN UNIFORMITY OF THE DUCT STRUCTURE. THE CONCRETE SHALL BE DEFLECTED DOWN ALONGSIDE THE DUCTS TO THE BOTTOM AND UP THROUGH THE DUCT ASSES.

WHEN CROSSING OTHER UTILITIES, THE CONCRETE DUCT ENCASEMENT SHALL MAINTAIN A MINIMUM OF 450MM VERTICAL CLEARANCE. WHEN RUNNING PARALLEL TO ANOTHER UTILITY, THE DUCTBANK SHALL BE A MINIMUM OF 1500MM CLEAR OF SAID UTILITY BUT IN NO CASE SHALL IT BE INSTALLED IN THE SAME EXCAVATION.

WHEN COMPLETED, THE DUCTS SHALL BE CLEANED AND ENDS PUGHED WITH DUCT PUGS. THE DUCTS SHALL BE TESTED FOR LEAKAGE BY PULLING A STEEL WIRE BRUSH AND A 5MM MANHOLE THROUGH THEIR COMPLETE LENGTH.

DUCTS INSTALLED FOR P.U.C CABLES AND DUCTS LEFT AS SPARE SHALL HAVE ONE CONTINUOUS LENGTH 100MM POLYPROPYLENE ROPE INSTALLED IN EACH DUCT TO FACILITATE THE INSTALLATION OF THE CABLE. THE DUCT, TERMINATION POINTS, GRADES, AND ROUTE OF DUCT BANK SHALL BE NOTED IN THE RECORDS.

NOTIFY CONSULTANT AND P.U.C AT LEAST 48 HOURS BEFORE CONCRETE IS POURED TO PERMIT INSPECTION OF THE DUCT INSTALLATION.

ASSUME RESPONSIBILITY TO HAVE THE DUCTS INSPECTED BY THE INSPECTION OFFICE AND P.U.C (WHERE APPLICABLE) PRIOR TO POURING OF CONCRETE AND AGAIN PRIOR TO BACKFILLING.

EXCAVATE AND BACKFILL AS REQUIRED FOR THIS WORK BOTH INSIDE AND OUTSIDE THE BUILDING. ALL TRENCH EXCAVATION SHALL BE CARRIED OUT IN STRICT CONFORMITY WITH THE TRENCH EXCAVATOR PROTECTION ACT AND AMENDMENTS, STATUTES OF ONTARIO AND THE TRENCHING ACT, AS REGARDS TO THE PROTECTION OF THE PUBLIC.

CAREFULLY CHECK AND AVOID DISTURBING OR DAMAGING ANY EXISTING UNDERGROUND PIPING, CONDUIT OR OTHER SERVICES UNCOVERED DURING CARRYING OUT OF THE WORK. MAKE GOOD ANY DAMAGE.

UNDERGROUND SEWERS AND OTHER SERVICES ARE INDICATED APPROXIMATELY ON THE MECHANICAL, ELECTRICAL, OR ARCHITECTURAL FIELD PLANS. THE LOCATION OF THESE SERVICES SHALL BE OBTAINED FROM AVAILABLE INFORMATION BUT HAS NOT BEEN VERIFIED ON THE FIELD. CAREFULLY CHECK SUCH DISCREPANCY BEFORE PROCEEDING WITH ANY NEW WORK. ENGAGE THE SERVICES OF LOCAL P.U.C, HYDRO, TELEPHONE AND GAS AUTHORITIES TO OBTAIN THE LOCATION OF UNDERGROUND SERVICES. LOCATIONS SHALL BE RECORDED IN THE RECORDS.

EXCAVATION FOR ALL UNDERGROUND SERVICES SHALL BE OF THE REQUIRED DEPTH AND DIMENSION, SHALL BE:

PREPARED AS REQUIRED, SO THAT NO PORTION OF ANY DUCT SHALL BEAR DIRECTLY AGAINST ANY ROCK OR OTHER HARD SURFACE.

KEPT DRY AT ALL TIMES BY BAILING, PUMPING, OR OTHER MEANS. SIDES AND BOTTOMS SHALL BE KEPT FROM FREEZING.

BOTTOMS OF EXCAVATION SHALL BE GRADED AS REQUIRED.

BANKS OF EXCAVATIONS SHALL BE EVEN, CUT AND/OR TRIMMED AND THEY SHALL BE SHORED AS REQUIRED TO PREVENT CAVING IN, AND THE MATERIAL USED SHALL BE CAREFULLY DRAIN DURING BACKFILLING.

WIDTH OF EXCAVATION SHALL BE CAREFULLY CONTROLLED AND SHALL BE LIMITED TO TWICE THE O.D. OF DUCTS, CONDUITS OR DUCTBANK, AND AS SHOWN ON THE DRAWINGS.

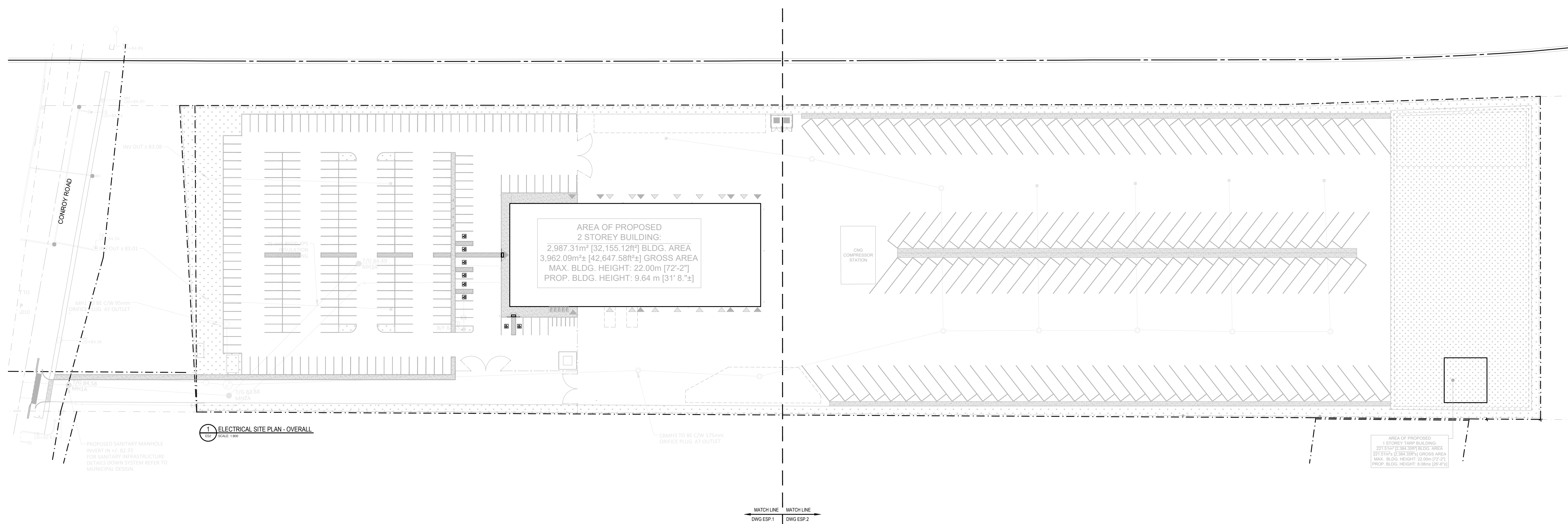
EXCAVATING, DUCT LAYING, AND BACKFILLING SHALL BE EXECUTED IN MINIMUM LENGTHS AS DETERMINED BY PROJECT MANAGER TO ENABLE ALL PROTECTIVE MEASURES TO FUNCTION PROPERLY AT ALL TIMES.



3145 CONROY ROAD, OTTAWA, ON

Scale	Stamp
AS NOTED	
Drawn	
BD	
Checked	
BK	

Project No. 25-000-087
Drawing No. ES2
Date MAY 2025

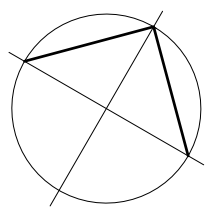


THESE DRAWINGS ARE NOT TO BE SCALED FOR SITE DIMENSIONS. THE CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS AND SITE CONDITIONS AT THE PROJECT SITE AND MUST REPORT ANY DISCREPANCIES TO THE CONSULTANTS BEFORE PROCEEDING WITH THE WORK.

COORDINATE ALL OF THE WORK WITH OTHER TRADES & THE LAYOUTS SHOWN ON THE OTHER CONSULTANTS AND THE ARCHITECTURAL DRAWINGS (WHERE APPLICABLE). REFER TO THE APPROPRIATE CONSULTANT DRAWINGS BEFORE PROCEEDING WITH THE WORK FOR ANY COORDINATION REQUIREMENTS.

THIS CONTRACTOR MUST CONFORM TO ALL APPLICABLE CODES AND STANDARD REQUIREMENTS OF THE AUTHORITIES HAVING JURISDICTION. THE CONTRACTOR SHALL WORK FROM DRAWINGS MARKED 'ISSUED FOR CONSTRUCTION' AND SHALL ENSURE LATEST ISSUED INSTRUCTIONS ARE FOLLOWED. THIS CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY AND BEAR COSTS FOR ANY CORRECTIONS OR DAMAGES RESULTING FROM THEIR WORK.

North



Revisions

No.	By	Description	Date
01	BK	ISSUED FOR UTILITY	2025-09-11

Project

WO MW REALTY LIMITED OFFICE GROUP SITE PLAN APPLICATION NEW MILLER WASTE FACILITY

3145 CONROY ROAD, OTTAWA, ON

Drawing

ELECTRICAL SITE PLAN - PART 1

Scale

AS NOTED

Stamp

Drawn

BD

Checked

BK

Project No.

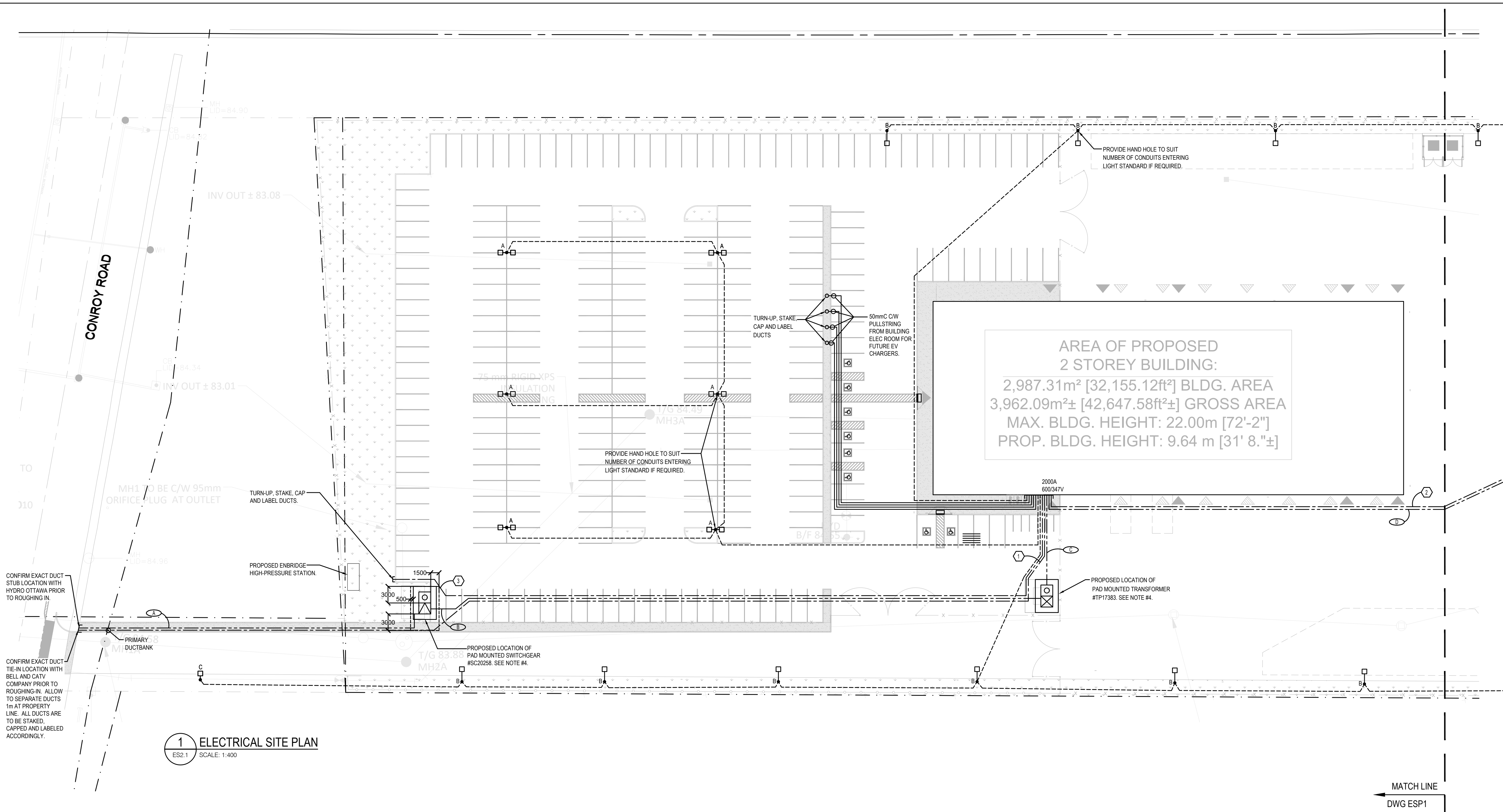
25-000-087

Drawing No.

Date

MAY 2025

ES2.1



GENERAL NOTES

- THIS ELECTRICAL CONTRACTOR TO RUN CONCRETE ENCASED STEEL REINFORCED (CESR) PRIMARY DUCTBANKS (QUANTITY AND SIZE AS SHOWN ON DRAWING) TO APPROVAL OF HYDRO OTTAWA. ALL DUCTS TO BE CW PULLSTRINGS.
- THIS ELECTRICAL CONTRACTOR TO RUN CONCRETE ENCASED STEEL REINFORCED (CESR) SECONDARY / FEEDER DUCTBANKS (QUANTITY AND SIZE AS SHOWN ON DRAWING) TO BUILDING ELECTRICAL ROOM. ALLOW TO COORDINATE WITH BUILDING ELECTRICAL CONTRACTOR FOR ALL CONNECTIONS TO MAIN SWITCHBOARD. PROVIDE 30' COIL OF CABLE IN TRANSFORMER FOUNDATION FOR CONNECTION BY HYDRO OTTAWA. CONFIRM EXACT LENGTH OF SECONDARY CABLE ON SITE PRIOR TO ORDERING. COORDINATE CONNECTIONS AT TRANSFORMER WITH HYDRO OTTAWA ON SITE.
- THIS ELECTRICAL CONTRACTOR TO VERIFY EXACT LOCATION OF ALL ELECTRICAL ROOMS PRIOR TO ROUGH-IN SECONDARY SERVICES.
- PROPOSED LOCATION OF PAD MOUNTED TRANSFORMER OR SWITCHGEAR. PROVIDE FOUNDATION, LID, GROUNDING, PROTECTIVE BOLLARDS ETC... TO HYDRO OTTAWA STANDARDS AND REQUIREMENTS. REFER TO DRAWING ES4 FOR HYDRO OTTAWA DETAILS.
- THIS ELECTRICAL CONTRACTOR TO COORDINATE WITH CIVIL DRAWINGS TO AVOID CONFLICT AND ADJUST ROUTING AS REQUIRED.
- ALL EMPTY DUCTS SHALL BE CW NYLON PULL ROPES AND LABELED AT BOTH ENDS.
- THIS ELECTRICAL CONTRACTOR TO RUN BOTH CONDUIT / WIRING FOR SITE LIGHTING ALL THE WAY INTO EACH LANDLORD ELECTRICAL ROOM AS SHOWN AND TERMINATE IN J-BOX UNDER HOUSE SERVICE 347/600V PANEL. LEAVE 15' COIL OF CABLES IN J-BOX FOR FUTURE CONNECTION TO PANEL BY BUILDING CONTRACTOR.
- ALL UNDERGROUND WIRING IS TO BE RWU (UNLESS OTHERWISE NOTED) - NO ALTERNATES WILL BE ACCEPTABLE.
- MEGGER ALL LIGHTING AND POWER CIRCUITS TO MEET CODES AND LATEST NETA MANUAL. ALL SECONDARY FEEDER CABLES SHALL BE MEGGER TESTED WITH 1000VDC (FOR CABLE RATED 300V OR LESS MEGGER TEST IS 500VDC) APPROVED MEGGER TEST. HAND CRANKED INSTRUMENTS ARE NOT ALLOWED. SUBMIT MEGGER TEST RESULTS TO ENGINEER PRIOR TO POWER ON.
- THIS ELECTRICAL CONTRACTOR TO PERFORM ALL REQUIRED VOLTAGE DROP CALCULATIONS AND INCREASE CONDUIT / WIRE SIZES AS NEEDED TO SUIT DISTANCE AND MAXIMUM BREAKER RATING.
- THIS ELECTRICAL CONTRACTOR TO ALLOW FOR AN ON SITE MEETING WITH HYDRO OTTAWA PRIOR TO COMMENCING ANY WORK. CONTACT Jaymen Heuff (jaymenheuff@hydroottawa.com, 343-961-5438) FOR MEETING ALONG WITH ANY ADDITIONAL HYDRO OTTAWA DETAILS OR REQUIREMENTS.
- THIS ELECTRICAL CONTRACTOR TO ARRANGE FOR A PRE-CONSTRUCTION MEETING WITH BELL CANADA PRIOR TO STARTING ANY WORK ON SITE. CONTACT OLGA SANDRI (olga.sandri@bell.ca, 613-406-4508) TO ARRANGE FOR A MEETING ON SITE.
- NUAL (ALUMINUM) CABLES MAY BE USED AS AN EQUAL ALTERNATIVE TO COPPER. CONDUIT AND WIRE SIZES ARE TO BE UP-SIZED AS REQUIRED TO MEET ALL LOCAL CODE AND AHJ REQUIREMENTS.
- THIS SITE ELECTRICAL CONTRACTOR SHALL ENSURE THAT THEY ARE EITHER A HYDRO OTTAWA QUALIFIED ELECTRICAL CONTRACTOR OR SHALL HIRE A QUALIFIED ELECTRICAL CONTRACTOR FOR ALL AND ANY WORK RELATING TO HYDRO OTTAWA EQUIPMENT: SUCH AS ROAD CROSSING, MANHOLE, PRIMARY DUCTBANKS, PAD MOUNTED TRANSFORMER, PAD FOUNDATION, TRANSFORMER GROUNDINGS ETC... COORDINATE WITH HYDRO OTTAWA AS REQUIRED.

LIGHT FIXTURE SCHEDULE

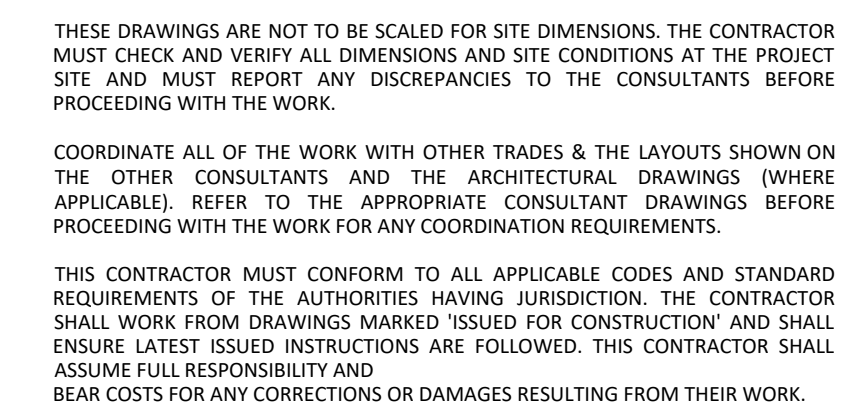
TYPE	DESCRIPTION
A	LUMINAIRE/POLE ASSEMBLY CONSISTING OF A DOUBLE (2) LED LUMINAIRES WITH TYPE IV DISTRIBUTION PATTERN, 347V OUTDOOR USE DRIVER ON A 30'-0" SQUARE STEEL POLE WITH POLE BASE COVER ON 36" CONCRETE BASE. COLOUR OF FINISH OF POLE/HEAD ARCHITECT/TOWNER SELECTION. LAMPS SHALL BE SUPPLIED WITH THE FIXTURE. FIXTURE TO HAVE FLAT LENS, BE FULL CUT OFF AND DARK-SKY FRIENDLY. SOLERA CORP. HAZE-1-166W-HLV-3500K-TY-IV-CC
A2	LUMINAIRE/POLE ASSEMBLY CONSISTING OF A DOUBLE (2) LED LUMINAIRES WITH A TYPE V SQUARE DISTRIBUTION PATTERN, 5' MAST ARM, 347V OUTDOOR USE DRIVER ON A 30'-0" SQUARE STEEL POLE WITH POLE BASE COVER ON 36" CONCRETE BASE. COLOUR OF FINISH OF POLE/HEAD ARCHITECT/TOWNER SELECTION. LAMPS SHALL BE SUPPLIED WITH THE FIXTURE. FIXTURE TO HAVE FLAT LENS, BE FULL CUT OFF AND DARK-SKY FRIENDLY. SOLERA CORP. HAZE-2-300W-HLV-3500K-TY-VS-CC-SMA
A3	LUMINAIRE/POLE ASSEMBLY CONSISTING OF A TRIPPLE (3) LED LUMINAIRES MOUNTED AT 90" WITH A TYPE V SQUARE DISTRIBUTION PATTERN, 5' MAST ARM, 347V OUTDOOR USE DRIVER ON A 30'-0" SQUARE STEEL POLE WITH POLE BASE COVER ON 36" CONCRETE BASE. COLOUR OF FINISH OF POLE/HEAD ARCHITECT/TOWNER SELECTION. LAMPS SHALL BE SUPPLIED WITH THE FIXTURE. FIXTURE TO HAVE FLAT LENS, BE FULL CUT OFF AND DARK-SKY FRIENDLY. SOLERA CORP. HAZE-2-300W-HLV-3500K-TY-VS-CC-SMA
B	LUMINAIRE/POLE ASSEMBLY CONSISTING OF A SINGLE (1) LED LUMINAIRE WITH A TYPE IV DISTRIBUTION PATTERN, 5' MAST ARM, 347V OUTDOOR USE DRIVER ON A 30'-0" SQUARE STEEL POLE WITH POLE BASE COVER ON 36" CONCRETE BASE. COLOUR OF FINISH OF POLE/HEAD ARCHITECT/TOWNER SELECTION. LAMPS SHALL BE SUPPLIED WITH THE FIXTURE. FIXTURE TO HAVE FLAT LENS, BE FULL CUT OFF AND DARK-SKY FRIENDLY. FIXTURE TO BE CW HOUSE SIDE SHIELD. SOLERA CORP. HAZE-1-200W-HLV-3500K-TY-IV-HCO-CC-SMA
C	LUMINAIRE/POLE ASSEMBLY CONSISTING OF A SINGLE (1) LED LUMINAIRE WITH A TYPE II DISTRIBUTION PATTERN, 347V OUTDOOR USE DRIVER ON A 30'-0" SQUARE STEEL POLE WITH POLE BASE COVER ON 36" CONCRETE BASE. COLOUR OF FINISH OF POLE/HEAD ARCHITECT/TOWNER SELECTION. LAMPS SHALL BE SUPPLIED WITH THE FIXTURE. FIXTURE TO HAVE FLAT LENS, BE FULL CUT OFF AND DARK-SKY FRIENDLY. FIXTURE TO BE CW HOUSE SIDE SHIELD. SOLERA CORP. HAZE-1-166W-HLV-3500K-TY-II-HCO-CC

NOTES RE: ELECTRICAL SERVICES

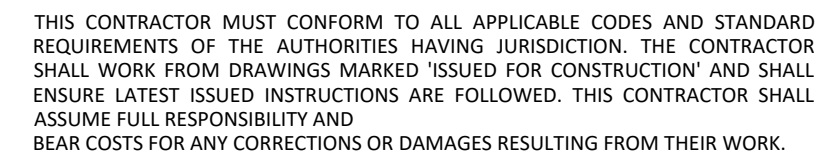
- 4x100mmC CW PULLSTRING IN CONCRETE ENCASED STEEL REINFORCED DUCTBANK FROM PROPERTY LINE TO PAD MOUNTED SWITCHGEAR # SC20258 TO HYDRO OTTAWA STANDARDS AND REQUIREMENTS. COORDINATE EXACT DUCT STUB LOCATIONS WITH HYDRO OTTAWA PRIOR TO ROUGHING IN.
- 4x100mmC CW PULLSTRING IN CONCRETE ENCASED STEEL REINFORCED DUCTBANK FROM PAD MOUNTED SWITCHGEAR #SC20258 TO PAD MOUNTED TRANSFORMER TP17383 TO HYDRO OTTAWA STANDARDS AND REQUIREMENTS.
- 8 RUNS OF #4750MCM RWU90 NUAL COMPACT STRANDED CABLES IN 100mmC IN CONCRETE ENCASED STEEL REINFORCED DUCTBANK FROM PAD MOUNTED TRANSFORMER TP17383 TO BUILDING SWITCHBOARD. ALLOW TO PROVIDE ADDITIONAL 30' COIL OF CABLE AT BOTH ENDS FOR CONNECTIONS BY HYDRO OTTAWA AND BUILDING CONTRACTOR. CONFIRM EXACT LENGTH OF CABLE REQUIRED PRIOR TO ORDERING. COORDINATE INSTALLATION WITH G.C ON SITE PRIOR TO COMMENCING ANY WORK.
- 10x100mmC IN DIRECT BURIED DUCTS FROM BUILDING ELECTRICAL ROOM TO CNG STATION FOR FUTURE CNG POWER.

NOTES RE: TELEPHONE & CABLE TV & FUTURE USE

- 2x100mmC IN DIRECT BURIED DUCTS FROM PROPERTY LINE TO BUILDING ELECTRICAL ROOM TO APPROVAL OF BELL CANADA AND CATV COMPANY. DUCTS TO BE SEPARATED 1m AT PROPERTY LINE.
- 4x50mmC IN DIRECT BURIED DUCTS FROM BUILDING ELECTRICAL ROOM TO CNG STATION FOR FUTURE CNG COMMUNICATION.
- 2x50mmC IN DIRECT BURIED DUCTS BUILDING ELECTRICAL ROOM TO ENBRIDGE HIGH-PRESSURE STATION FOR FUTURE USE.

[illegible]

Scale	Stamp
AS NOTED	
Drawn	
BD	
Checked	
BK	
Project No.	
25-000-087	
Date	Drawing No.
	ES2.2
MAY 2025	

[illegible]

ELECTRICAL NOTES & DETAILS

Project No. 25-000-087

Drawing No. ES3

Date MAY 2025

