ELECTRICAL SPECIFICATIONS

A. GENERAL CONDITIONS

1. CONFORM WITH LATEST EDITION OF THE ONTARIO BUILDING CODE (OBC), ONTARIO ELECTRICAL SAFETY CODE (OESC), CANADIAN STANDARDS ASSOCIATION (CSA), UNDERWRITERS LABORATORIES OF CANADA (ULC) AND LOCAL BY-LAWS AND AUTHORITIES HAVING JURISDICTION.
2. MATERIALS & EQUIPMENT SHALL CARRY APPROVAL AND CONFORM WITH CSA OR ULC STANDARDS. INSTALLATION SHALL COMPLY WITH ALL RULES AND REGULATIONS REGARDING MATERIALS AND WORKMANSHIP CONFORMING TO CSA, OESC, OBC AND LOCAL AUTHORITIES HAVING JURISDICTION.
3. VISIT JOB SITE PRIOR TO SUBMITTING TENDER AND EXAMINE ALL EXISTING CONDITIONS WHICH AFFECT THE WORK. NO EXTRAS WILL BE ALLOWED FOR FAILURE TO DO SO.
4. SUPPLY AND INSTALL COMPLETE ELECTRICAL SYSTEMS AS SHOWN AND/OR SPECIFIED HEREIN. DRAWINGS SHALL BE USED FOR ROUTING PURPOSES ONLY, DO NOT SCALE DRAWINGS. PROVIDE ALL NECESSARY MATERIAL AND LABOUR ETC. TO PROVIDE COMPLETE SYSTEMS.
5. FURNISH ALL REQUIRED LABOUR AND MATERIALS, MACHINERY, AND TOOLS, WITH ALL PROPER AND REQUIRED FACILITIES FOR MOVING AND TRANSPORTING SAME, SO THAT THE CONTRACT AND ALL WORK TO BE DONE UNDER IT, CAN AND WILL BE CARRIED OUT IN A PROFESSIONAL MANNER, PROPERLY, SATISFACTORILY, CONTINUOUSLY, AND EXPEDITIOUSLY, TO COMPLETION, IN ALL RESPECTS, TO THE SATISFACTION OF THE OWNER.
6. COORDINATE WITH LOCAL HYDRO UTILITY AT THE START OF THE PROJECT REGARDING ENERGIZATION DATE OF MAIN INCOMING ELECTRICAL SERVICE, HYDRO METERING, DUCTBANK INSPECTIONS AND ANY REQUIRED UTILITY FEES. PROVIDE IN WRITING THE PROPOSED SERVICE ENERGIZATION DATE TO THE CONSULTANT AT THE START OF THE PROJECT. PROVIDE WRITTEN REQUEST TO THE CONSULTANT FOR A COPY OF THE ESA PLAN REVIEW REPORT AT THE START OF THE PROJECT.
7. MOUNTING HEIGHT OF EQUIPMENT IS FROM FINISHED FLOOR TO CENTER LINE OF EQUIPMENT, UNLESS SPECIFIED OR INDICATED OTHERWISE. IF MOUNTING HEIGHT OF EQUIPMENT IS NOT INDICATED, VERIFY BEFORE PROCEEDING WITH INSTALLATION. THE FOLLOWING IS GENERAL MOUNTING HEIGHTS:
   - 7.1. GENERAL SWITCHES: 1100mm (43")
   - 7.2. WALL RECEPTACLES (GENERAL): 450mm
   - 7.3. PANEL BOARDS: 1700mm (67") (MAXIMUM FROM TOP BREAKER)
   - 7.4. FIRE ALARM VISUAL, AUDIBLE OR COMBINATION OF BOTH DEVICES: 150mm (6") BELOW CEILING TO THE TOP OF THE DEVICE WHERE THE CEILING HEIGHT IS LESS THAN 2450mm (96") A.F.F.. WHERE CEILING HEIGHT IS 2450mm (96") OR GREATER, MOUNT DEVICE AT 2300mm (90.5") A.F.F. TO THE TOP OF THE DEVICE.
8. CO-ORDINATE ON SITE THE LOCATION OF EQUIPMENT, CONTROL DEVICES, SERVICE DISTRIBUTION SYSTEMS, ETC. COORDINATE WORK AND SCHEDULE WITH OTHER TRADES.
9. AT ALL TIMES KEEP THE OWNER'S PROPERTY CLEAN AND IN TIDY CONDITION. CLEAN AFFECTED WORK AREA AND REMOVE ALL DEBRIS FROM EQUIPMENT. FOLLOW MANUFACTURERS' INSTALLATION AND STARTUP INSTRUCTIONS.
10. PROVIDE WARNING SIGNS AND BARRIERS AS REQUIRED TO MEET INSPECTION DEPARTMENT'S REQUIREMENTS.
11. DRAWINGS SHOW GENERAL INTENT OF WORK AND NOT THE DETAILS OF THE INSTALLATION.
12. GUARANTEE IN WRITING ALL MATERIAL AND WORKMANSHIP INCLUDING THE MANUFACTURER'S GUARANTEE FOR THE MINIMUM PERIOD OF ONE (1) YEAR FROM THE DATE OF ACCEPTANCE UNLESS NOTED OTHERWISE IN MAIN FRONT END CONTRACT DOCUMENTS.
13. NO EXTRA CHARGES SHALL BE HONOURED EXCEPT WHERE THE CONTRACTOR RECEIVES A WRITTEN ORDER COUNTER-SIGNED OR OTHERWISE APPROVED BY THE OWNER.
14. AFTER THE APPROVAL OF DRAWINGS, THE RIGHT IS RESERVED TO MAKE REASONABLE CHANGES IN THE DESIGN OF THE WORK OR TO OMIT ANY SUCH PARTS AS THE OWNER MAY REQUIRE. IN THE CASE WHERE WORK OR MATERIAL IS ADDED TO OR DEDUCTED FOR THE WORK HEREIN SPECIFIED, A FAIR AND REASONABLE VALUATION OF THE SAME SHALL BE ADDED TO OR DEDUCTED FROM THE AMOUNT OF THIS CONTRACT.
15. THE CONSULTANT RESERVES THE RIGHT TO SELECT THE FINAL PRODUCT AND OR OPTIONS/ACCESSORIES DURING SHOP DRAWING REVIEW AT NO ADDITIONAL COST TO THE OWNER IN THE CASE OF ANY DISCREPANCIES LISTED BETWEEN CATALOGUE NUMBERS, WRITTEN PRODUCT DESCRIPTIONS AND/OR DETAILS SHOWN ON THE DRAWINGS. THE ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR NOTIFYING THE CONSULTANT IN WRITING BEFORE TENDER CLOSES OF ANY DISCREPANCIES THAT MAY BE SHOWN ON THE DRAWINGS REGARDING LISTED PRODUCT SPECIFICATIONS AND CATALOGUE NUMBERS THAT MAY AFFECT PRICING AND GET CLARIFICATION ON THESE ITEMS BEFORE SUBMITTING FINAL TENDER PRICE. FAILURE OF THE ELECTRICAL CONTRACTOR TO REQUEST CLARIFICATIONS ON SUCH ITEMS DURING TENDER MAKES NULL AND VOID ANY FUTURE CLAIMS RELATING TO FINAL PRODUCT SELECTION BY THE CONSULTANT.
16. ALL INDOOR SWITCHBOARDS, PANELBOARDS, AND TRANSFORMERS TO BE SPRINKLER PROOF.
17. SUPPLY AND INSTALL ALL 3/4" THICK FIRE RETARDANT PLYWOOD BACKBOARDS SHOWN ON THE DRAWINGS.

B. SUBMITTALS

1. BEFORE FABRICATION OF ANY MATERIALS OR EQUIPMENT, SUBMIT ONE (1) COPY OF DETAILED MANUFACTURER'S SHOP DRAWINGS OF EQUIPMENT AND APPARATUS FOR REVIEW. DO NOT ORDER MATERIALS UNTIL CONSULTANT HAS REVIEWED THE SHOP DRAWINGS. IF CORRECTIONS ARE REQUIRED, COPIES WILL BE RETURNED WITH CORRECTIONS NOTED. CORRECTED COPIES SHALL BE RESUBMITTED FOR REVIEW AND DISTRIBUTION. SUBMISSIONS SHALL BE MADE IN AMPLE TIME TO AVOID DELAYS IN THE WORK. THE REVIEW OF THE SHOP DRAWINGS SHALL BE, AND IS MUTUALLY UNDERSTOOD TO BE, IN REFERENCE TO GENERAL DESIGN ONLY. IF ERRORS IN THE DETAILED DIMENSIONS OR INTERFERENCE WITH THE WORKS ARE NOTICED, THE ATTENTION OF THE CONTRACTOR WILL BE CALLED TO SUCH ERRORS OR INTERFERENCE, BUT REVIEW OF THE DRAWINGS SHALL NOT IN ANY WAY RELIEVE THIS CONTRACTOR OF RESPONSIBILITY FOR ERRORS OR INTERFERENCE, OR FROM THE NECESSITY OF FURNISHING SUCH WORKS AND MATERIALS AS MAY BE REQUIRED FOR THE COMPLETION OF THE WORK AT ANY TIME UNTIL FORMAL ACCEPTANCE.
2. THE ELECTRICAL CONTRACTOR IS TO REVIEW, DATE AND SIGN ALL ELECTRICAL SHOP DRAWINGS PRIOR TO SUBMITTING TO THE CONSULTANT FOR REVIEW.
3. THE ELECTRICAL CONTRACTOR TO SUBMIT MAIN ELECTRICAL SWITCHBOARD INCLUDING ANY METERING ENCLOSURES OR METERING EQUIPMENT SHOP DRAWINGS TO LOCAL HYDRO UTILITY FOR REVIEW AND APPROVAL.
4. THE ELECTRICAL CONTRACTOR TO PREPARE RECORD DRAWINGS (IN AUTOCAD AND PDF FORMATS) INCLUDING ALL CHANGES AND DEVIATIONS IN COLOUR RED FROM CONSTRUCTION SET AND SUBMIT THEM TO THE CONSULTANT AND THE OWNER UPON THE COMPLETION OF THE PROJECT. AUTOCAD FILES CAN BE SUPPLIED BY THE CONSULTANT UPON REQUEST. THE CONSULTANT CAN PREPARE AS BUILT AUTOCAD DRAWINGS FOR THE ELECTRICAL CONTRACTOR FOR A NOMINAL FEE.
5. THE FOLLOWING ITEMS ARE TO BE SUBMITTED TO THE CONSULTANT AND THE OWNER AT THE END OF THE PROJECT IN A HARD COVER, THREE-RING BINDER WITH TABS INDICATING EACH SECTION:
   - 5.1. FINAL INSPECTION/VERIFICATION REPORTS FROM THE INSPECTION AUTHORITIES AND TESTING AGENCIES
   - 5.2. MANUFACTURER'S SPECIFICATION SHEETS AND PHOTOMETRIC DATA FOR LIGHT FIXTURES
   - 5.3. A COPY OF ALL FINAL REVIEWED SHOP DRAWINGS
   - 5.4. AUTOCAD AND PDF RECORD DRAWINGS
   - 5.5. OPERATING INSTRUCTIONS FOR EACH SYSTEM INCLUDING CONTROL AND WIRING DIAGRAMS
   - 5.6. MANUFACTURER RECOMMENCED MAINTENANCE PROCEDURES AND SCHEDULES
   - 5.7. WARRANTY LETTER FOR ALL MATERIAL AND WORKMANSHIP
   - 5.8. ALL PANELBOARD TYPEWRITTEN DIRECTORIES
   - 5.9. USB DRIVE WITH ELECTRONIC COPY OF ITEMS 5.1 TO 5.8

C. PERMITS, TEST, REGULATIONS, ETC.

1. CARRY OUT ALL CHANGES AND ALTERATIONS REQUIRED BY THE AUTHORIZED INSPECTOR OF ANY AUTHORITY HAVING JURISDICTION WITHOUT DELAY TO THE PROGRESS OF THE WORK AND WITHOUT EXTRA COST.
2. PROVIDE WARNING SIGNS AND ARC FLASH LABELS AS SPECIFIED OR TO MEET REQUIREMENTS OF O.E.S.C, INSPECTION DEPARTMENT AND THE CONSULTANT.
3. UPON COMPLETION OF THE CONTRACT, ISSUE TO THE OWNER A FORMAL CERTIFICATION OF COMPLETION OF WORK BEFORE FINAL PAYMENT FOR WORK MAY BE CONSIDERED DUE.
4. PAYMENTS FOR ALL PERMITS, DEPOSITS, INSPECTION, SERVICES, AND OTHER FEES NECESSARY FOR THE WORK SHALL BE INCLUDED IN THE TENDER.

D. MATERIALS

1. ALL MATERIALS AND EQUIPMENT (PRODUCTS) TO BE NEW AND FREE OF DEFECTS, CSA, ULC OR CANADIAN RECOGNIZED CERTIFICATION.
2. THIS IS A BASE BID SPECIFICATION. ITEMS ON THE DRAWINGS AND SUBSEQUENT DIVISIONS OF THESE SPECIFICATIONS ARE LISTED WITH THE NAMES OF A SPECIFIC MANUFACTURER, THE FIRST OF WHICH IS BASE BID AND HAS BEEN USED IN THE DESIGN AND IS THE EQUIPMENT SHOWN ON THE DRAWINGS. THE PRICE SUBMITTED FOR THIS CONTRACT SHALL BE BASED ON THE USE OF MATERIALS AND EQUIPMENT SPECIFIED AS THE BASE BID.
3. WHERE MORE THAN ONE MANUFACTURER IS LISTED FOR A PARTICULAR ITEM OR GROUPS OF ITEMS, THE CONTRACTOR SHALL STATE IN HIS TENDER FORM COST SAVINGS (IF ANY) FOR THE USE OF ALTERNATE PRODUCTS, AND SHALL NAME THE ALTERNATE MANUFACTURERS. HOWEVER, THESE PROPOSED MATERIALS MUST NOT BE USED IN CALCULATING THE BASE TENDER PRICE. THE CONSULTANT AND/OR OWNER SHALL HAVE THE FINAL OPTION OF ACCEPTING OR REJECTING ALTERNATE EQUIPMENT.
4. WHERE OTHER THAN A FIRST-NAMED PRODUCT IS PROPOSED, THE BIDDER WILL BE DEEMED TO REPRESENT THAT NAMED PRODUCT CONFORMS TO THE PERFORMANCE, QUALITY, SPACE AND WEIGHT CHARACTERISTICS OF THE BASE BID PRODUCT. THIS CONTRACTOR WILL BE RESPONSIBLE FOR ANY ADDITIONAL DESIGN OR CONSTRUCTION COSTS GENERATED BY THE USE OF THE NON-FIRST NAMED BID MATERIAL. ACCEPTANCE OF NON-BASE MANUFACTURERS WITH RESPECT TO THEIR EQUIVALENCY SHALL BE SUBJECT TO THE CONSULTANT'S REVIEW OF SHOP DRAWINGS.
5. THE CATALOG NUMBER OF THE SPECIFIED DEVICE MAY NOT DESIGNATE ALL THE ACCESSORY PARTS AND APPURTENANCES REQUIRED FOR THE PARTICULAR USE OR FUNCTION. THE ELECTRICAL CONTRACTOR SHALL ARRANGE WITH THE MANUFACTURER FOR THE PURCHASE OF ALL PARTS REQUIRED FOR THE COMPLETE INSTALLATION AND OPERATION WITHOUT EXTRA COST TO THE OWNER.

E. WIRES AND CABLES

1. ALL WIRING SHALL BE MINIMUM COPPER NO. 12 AWG WITH 600V INSULATION FOR 120/208V WIRING AND 1000V FOR 600V WIRING OF CHEMICALLY CROSS-LINKED THERMOSETTING POLYETHYLENE (XLPE) MATERIAL SUITABLE FOR 90° OPERATION. CONDUCTORS NO. 10 AWG AND LARGER SHALL BE STRANDED. CONDUCTOR SIZES SHALL BE IN ACCORDANCE WITH THE OESC AND AS INDICATED ON THE DRAWINGS.
2. ALUMINUM WIRING IS NOT ACCEPTABLE UNLESS NOTED OTHERWISE.
3. NMD90 (PVC JACKETED) WIRING SHALL NOT BE USED AND IS NOT ACCEPTABLE.
4. ALL LOW VOLTAGE 6-24VDC EMERGENCY LIGHTING WIRING SHALL BE MINIMUM COPPER NO.10 AWG.
5. AC90 CABLE MAY ONLY BE USED FOR SHORT RUNS WITH MAXIMUM DISTANCE OF 3660mm (12ft) TO LIGHT FIXTURES AND RECEPTACLES IN CONCEALED AREAS ONLY UNLESS NOTED OTHERWISE ON DRAWINGS. AC90 CABLE (INCLUDING FIRE ALARM) IS NOT TO BE USED IN OPEN CEILING AREAS, ELEVATOR SHAFT AND STAIRWELL.
6. WHERE CONDUCTOR SIZES ARE NOT INDICATED THEY SHALL BE SIZED TO ENSURE THE VOLTAGE DROP DOES NOT EXCEED 2% FOR BRANCH CIRCUIT AND 3% FOR MAIN FEEDER AND THE REQUIREMENTS OF THE OESC.
7. ALL WIRING TO BE INSTALLED IN CONDUIT OR RACEWAY AND SHALL BE EQUIPPED WITH A GREEN INSULATED BOND CONDUCTOR SIZED TO MEET THE REQUIREMENTS OF THE OESC.
8. ALL WIRING CABLE FEEDS FOR 3 PHASE VARIABLE FREQUENCY DRIVES (VFD) SHALL BE OF THREE CONDUCTORS COMPLETE WITH CORRUGATED CONTINUOUS ALUMINUM SHEATH AND 3 BONDING CONDUCTORS. PROVIDE AND INSTALL CABLE CONNECTORS THAT MAINTAIN 360 DEGREE CONTACT WITH THE CABLE SHIELD AND THE SHIELDED ENCLOSURE ON BOTH ENDS.
9. ALL CONDUITS TO BE SECURELY ATTACHED TO HANGERS OR SOLID SURFACE WITH MAXIMUM SPACINGS OF THE POINTS OF SUPPORT NOT GREATER THAN THE REQUIREMENTS OF THE LATEST OESC.

F. CONDUIT

1. EMT AND RIGID GALVANIZED STEEL (RGS) CONDUIT TO BE CONCEALED IN FINISHED AREAS OF THE BUILDING.
2. RIGID PVC CONDUIT TO BE USED ONLY FOR DIRECT BURIED INSTALLATIONS.
3. DB2 CONDUIT TO BE USED ONLY FOR CONCRETE ENCASED INSTALLATIONS.
4. FLEXIBLE METALLIC CONDUIT MAY BE USED FOR SHORT CONNECTIONS TO VIBRATING MECHANICAL EQUIPMENT.
5. MINIMUM CONDUIT SIZE SHALL BE 16mm (1/2") UNLESS NOTED OTHERWISE ON THE DRAWINGS.
6. WHERE SLEEVES OR OPENINGS ARE INSTALLED IN WALLS, FLOORS, ROOF OR PARTITIONS TO ACCOMMODATE RACEWAYS OR CABLES, PROVIDE ALL NECESSARY SEALS, FITTINGS, BARRIERS AND FIRE-RESISTANT MATERIALS TO RESTORE THE INSTALLATION TO ITS ORIGINAL FIRE RATING TO THE SATISFACTION OF THE GOVERNING AUTHORITIES.
7. WHERE CONDUIT MUST BE SURFACE MOUNTED TO EXPOSED CEILING/WALL SURFACES, PROVIDE EMT CONDUIT CONDUIT PAINTED TO MATCH CEILING/WALL SURFACES UNLESS NOTED OTHERWISE.
8. ALL CONDUITS THAT PENETRATE EXTERIOR WALLS/ROOF ARE TO BE SEALED AIR/LIQUID TIGHT AFTER INSTALLATION AT BOTH ENDS OF THE CONDUIT.
9. ALL LOW VOLTAGE WIRING IS TO BE INSTALLED IN CONDUIT UNLESS NOTED OTHERWISE ON DRAWINGS

G. OUTLETS AND JUNCTION BOXES

1. PROVIDE STICK ON LABELS (BLACK LETTERING ON WHITE BACKGROUND) INDICATING THE PANEL AND CIRCUIT NUMBER FOR ALL RECEPTACLES AND CONTROL DEVICES. LABELS SHALL BE NEATLY PLUMB AND LEVEL ON THE COVER PLATE. POORLY POSITIONED LABELS WILL NOT BE ACCEPTED.
2. THE OWNER/CONSULTANT RESERVES THE RIGHT TO CHANGE LOCATIONS OF OUTLETS TO WITHIN 3660mm (12ft) OF LOCATION INDICATED ON THE DRAWINGS WITHOUT EXTRA CHARGE, PROVIDING CONTRACTOR IS ADVISED PRIOR TO INSTALLATION.
3. ALL PULL/JUNCTION BOXES MUST BE ACCESSIBLE AFTER THE BUILDING IS COMPLETE. INSTALL PULL ROPE IN ALL EMPTY CONDUITS.
4. ALL JUNCTION BOXES AND CONDUIT SUPPORT SYSTEM SHALL BE SECURED TIGHT TO THE UNDERSIDE OF THE BUILDING STRUCTURE. SUSPENDED JUNCTION BOXES AND CONDUITS WILL NOT BE ACCEPTED.
5. ALL DEVICE BOXES TO BE RECESSED WHEREVER POSSIBLE. ALL JUNCTION BOXES SHALL BE SIZED TO ACCOMMODATE THE NUMBER OF RACEWAYS AND CONDUCTORS AND BE ACCESSIBLE AFTER INSTALLATION. BOXES FOR CONTROL DEVICES(I.E. CONTROL RELAYS AND CONTACTS FOR LIGHTING, FIRE ALARM, AND OTHER SYSTEMS) IN FINISHED COMMON AREAS AND CORRIDORS SHALL BE INSTALLED ABOVE ACCESSIBLE DROP CEILING, 6" BELOW NON-ACCESSIBLE CEILING OR ACCESSIBLE BY CEILING ACCESS PANELS.
6. WHERE BOXES MUST BE SURFACE MOUNTED TO EXPOSED CEILING/WALL SURFACES, PROVIDE SURFACE MOUNTED DIE-CAST ALUMINUM BOXES PAINTED TO MATCH CEILING/WALL SURFACES UNLESS NOTED OTHERWISE.
7. THE ELECTRICAL CONTRACTOR IS RESPONSIBLE TO SUPPLY AND INSTALL 3M FIRE BARRIER MOLDABLE PUTTY PADS MPP+ FOR ALL ELECTRICAL DEVICE BOXES INSTALLED ON OPPOSITE SIDES OF FIRE RATED WALLS UNLESS THEY ARE HORIZONTALLY SEPARATED BY A DISTANCE OF NOT LESS THAN 600mm. REFER TO THE ARCHITECTURAL DRAWINGS FOR VERTICAL FIRE SEPARATION PLANS AND NOTES.

H. FIRE STOPPING

1. SEALS FOR CABLES AND CONDUIT:
   - PROVIDE FIRE RATED SEALS FOR CONDUITS AND WIRING AT ALL FIRE RATED WALL/FLOOR PENETRATIONS.
   - APPLY FIRE SEALANT 3M CP 25WB+ , 4 HR FIRE BARRIER, L RATED, STC 54 TO SEAL ALL PENETRATIONS THROUGH ANY FIRE RATED ASSEMBLIES. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATIONS FOR ALL FIRE RATED ASSEMBLIES.

I. WIRING DEVICES

1. SWITCHES, RECEPTACLES AND OUTLETS TO BE DECORA STYLE, WHITE COLOR WITH WHITE PLASTIC COVER PLATES IN RESIDENTIAL UNITS AND STAINLESS STEEL COVER PLATES IN ALL OTHER LOCATIONS.
2. DUPLEX RECEPTACLES
   - 2.1. 15 OR 20 AMP, 120 VOLT SPECIFICATION GRADE COMPLETE WITH BACK BOX
   - 2.2. EXTERIOR RECEPTACLES TO BE WEATHER RESISTANT TYPE AND MARKED "WR". ALL EXTERIOR RECEPTACLES TO HAVE WET LOCATION LISTED "EXTRA DUTY" WHILE-IN-USE COVERS.
3. TOGGLE SWITCHES TO BE 15 OR 20 AMP, 120 OR 347 VOLT AS REQUIRED COMPLETE WITH BACK BOX.
4. LOW VOLTAGE SWITCHES, SENSORS OR DEVICES TO BE INSTALLED COMPLETE WITH DEVICE BACK BOX. ALL BOXES FOR CEILING MOUNTED DEVICES TO BE OCTAGON TYPE.
5. MAINTAIN A MINIMUM OF 150mm HORIZONTAL CLEARANCE BETWEEN BOXES INSTALLED BACK-TO-BACK IN WALL.

J. GROUNDING

1. GROUND THE SERVICE AND ALL NON-CURRENT CARRYING METAL PARTS IN ACCORDANCE WITH OESC.
2. FOR THREE-PHASE, 4-WIRE SOLIDLY GROUNDED SYSTEMS WITHOUT A BONDING CONDUCTOR SUPPLIED FROM THE LOCAL HYDRO UTILITY, SUPPLY AND INSTALL SERVICE GROUNDING SYSTEM AS PER OESC FIGURE B10-6 CONSISTING OF THE FOLLOWING:
   - 2.1. TWO 21mm (3/4") DIA., 3000mm (118") LONG COPPER CLAD GROUND RODS DRIVEN 610mm (24") BELOW GRADE TO THE TOP OF THE ROD.
   - 2.2. GROUND RODS SHALL BE NOT LESS THAN 3000mm (118") APART AND LOCATED ADJACENT TO THE MAIN ELECTRICAL ROOM EQUIPMENT.
   - 2.3. INTERCONNECT ALL GROUND RODS UNDERGROUND WITH #6 AWG BARE COPPER CABLE.
   - 2.4. INTERCONNECT MAIN SERVICE NEUTRAL BUS TO SERVICE GROUNDING SYSTEM USING #6 AWG BARE COPPER CABLE.
3. PROVIDE COMPLETE GROUNDING AND BONDING SYSTEM AS REQUIRED BY OESC.
4. PROVIDE GROUND CONNECTION TO TELEPHONE PANEL, WATER MAIN AND ALL METALLIC PIPING.

K. DISCONNECT SWITCHES

1. INSTALL FUSED OR NON FUSED HORSE POWER RATED HEAVY DUTY DISCONNECT SWITCHES AS REQUIRED BY CODE OR AS SHOWN ON DRAWINGS. CSA TYPE RATINGS OF DISCONNECT SWITCHES TO BE AS INDICATED ON DRAWINGS.
2. ELECTRICAL CONTRACTOR TO SUPPLY AND INSTALL FUSES IN ANY FUSED DISCONNECT SWITCH.

L. BREAKER PANELBOARDS

1. PANEL TRIM TO HAVE CONCEALED HINGES, TRIM MOUNTING SCREWS, HINGED LOCKING DOOR AND FLUSH CATCH.
2. PANEL BOARDS TO HAVE ALUMINUM MAIN BUS, ALUMINUM GROUND BUS AND ALUMINUM NEUTRAL BUS.
3. KAIC RATINGS FOR PANELS AND BREAKERS TO BE AS INDICATED ON DRAWINGS. SERIES RATED BREAKERS/PANELS ARE NOT ACCEPTABLE.
4. AFFIX TYPEWRITTEN DIRECTORY TO THE INSIDE OF PANEL BOARD INDICATING LOADS CONTROLLED BY EACH CIRCUIT.
5. ALL PANELBOARDS ARE TO BE SURFACE MOUNTED UNLESS INDICATED OTHERWISE.
6. ACCEPTABLE MANUFACTURERS ARE SCHNEIDER ELECTRIC, EATON, ABB OR SIEMENS.

M. LOAD BALANCE

1. CONTRACTOR SHALL MEASURE PHASE CURRENT TO ALL PANELBOARDS WITH RUNNING LOADS AND ADJUST BRANCH CIRCUIT CONNECTIONS AS REQUIRED TO OBTAIN THE BEST BALANCE OF CURRENT BETWEEN ALL PHASES.

ELECTRICAL DRAWING LIST	
E0.01	SPECIFICATIONS AND DRAWING LIST SHEET 1 OF 3
E0.02	SPECIFICATIONS SHEET 2 OF 3
E0.03	SPECIFICATIONS, LINE TYPES, LEGENDS AND ABBREVIATIONS SHEET 3 OF 3
E1.01	SITE PLAN
E1.02	DETAILS SHEET 1 OF 3
E1.03	ALECTRA UTILITIES STANDARD DETAILS SHEET 2 OF 3
E1.04	ALECTRA UTILITIES STANDARD DETAILS SHEET 3 OF 3
E1.05	BASEMENT POWER AND SYSTEMS DEMOLITION PLAN
E1.06	ROOF POWER AND SYSTEMS DEMOLITION PLAN
E1.07	BASEMENT POWER AND SYSTEMS NEW PLAN
E1.08	FIRST, THIRD, FIFTH, SEVENTH AND NINTH FLOORS POWER AND SYSTEMS NEW PLAN
E1.09	SECOND, FOURTH, SIXTH, EIGHTH, TENTH FLOORS AND ROOF POWER AND SYSTEMS NEW PLAN
E1.10	LIGHTING AND FIRE ALARM SYSTEM NEW PLAN AND LIGHTING DEMOLITION PLAN
E5.01	SINGLE LINE DIAGRAM DEMOLITION
E5.02	SINGLE LINE DIAGRAM NEW
E5.03	SCHEDULES SHEET 1 OF 3
E5.04	SCHEDULES SHEET 2 OF 3
E5.05	SCHEDULES SHEET 3 OF 3

No.	ISSUE	DATE
B.	ISSUED FOR PERMIT	26.04.21
A.	ISSUED FOR TENDER	26.04.16

REVISIONS

Seal:

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PROJECT:
1 HAMILTON STREET SOUTH, WATERDOWN SERVICE UPGRADE

DRAWING TITLE:
SPECIFICATIONS AND DRAWING LIST SHEET 1 OF 3

DRAWN BY:	SCALE:
U.S	N.T.S.
CHECKED BY:	DATE:
A.P.C	2026.04.16

PROJECT No.: 25037

DRAWING No.: E0.01

N. LIGHTING

1. ELECTRICAL CONTRACTOR TO SUPPLY AND INSTALL ALL LIGHT FIXTURES AS SPECIFIED ON PLANS. ALTERNATE LIGHT FIXTURES SHALL NOT BE USED IN CALCULATING BASE TENDER PRICE. THE ELECTRICAL CONTRACTOR MAY SUBMIT AN ALTERNATE LIGHTING PACKAGE WITH TENDER PRICE IF THERE IS A COST SAVING OVER THE BASE SPECIFIED LIGHT FIXTURES. THE CONTRACTOR SHALL STATE THE COST SAVING FOR THE ALTERNATE FIXTURES WITH TENDER AND THE OWNER RESERVES THE RIGHT TO ACCEPT OR REJECT THE ALTERNATE FIXTURES PACKAGE COST SAVING.

2. SUPPLY AND INSTALL ALL MOUNTING HARDWARE AND ACCESSORIES TO SUIT THE CEILING AND INSTALLATION. ALL FIXTURES TO BE CSA OR ULC LISTED.

3. ALL LIGHT FIXTURES THAT ARE NOT SUPPORTED DIRECTLY BY AN OUTLET BOX AS PER OESC 30-302, ARE TO BE SECURED TO BUILDING STRUCTURE INDEPENDENTLY BY JACK CHAINS OR AIRCRAFT CABLES.

4. EMERGENCY LIGHTING SHALL BE PROVIDED IN ACCORDANCE WITH SECTION 3.2.7.3 OF THE LATEST EDITION OF ONTARIO BUILDING CODE. EMERGENCY LIGHTING SHALL BE PROVIDED TO AN AVERAGE LEVEL OF ILLUMINATION NOT LESS THAN 10 LUX AT FLOOR OR TREAD LEVEL AS REQUIRED BY OBC.

5. LOCATE EACH EMERGENCY LIGHT ON SITE TO SUIT EXIT ROUTING AND LINE OF SIGHT.

O. LIGHTING CONTROLS

1. ELECTRICAL CONTRACTOR TO SUPPLY AND INSTALL ALL LIGHTING CONTROL DEVICES AS SPECIFIED ON PLANS. ALTERNATE LIGHTING CONTROL DEVICES SHALL NOT BE USED IN CALCULATING BASE TENDER PRICE. THE ELECTRICAL CONTRACTOR MAY SUBMIT AN ALTERNATE LIGHTING CONTROL PACKAGE WITH TENDER PRICE IF THERE IS A COST SAVING OVER THE BASE SPECIFIED LIGHTING CONTROL PACKAGE. THE CONTRACTOR SHALL STATE THE COST SAVING FOR THE ALTERNATE LIGHTING CONTROL DEVICES WITH TENDER AND THE OWNER RESERVE THE RIGHTS TO ACCEPT OR REJECT THE ALTERNATE LIGHTING CONTROL PACKAGE COST SAVING.

2. ELECTRICAL CONTRACTOR TO FIELD ADJUST AIMING, SENSITIVITY AND TIME DELAY AS REQUIRED.

P. MAIN SWITCHBOARD

1. POWER SYSTEM
   - 1.1. 600/347V, 3 PHASE, 4 WIRE, 60Hz
   - 1.2. SOLIDLY GROUNDED
   - 1.3. SHORT CIRCUIT CURRENT RATING: 50kA RMS

2. BUS SYSTEM
   - 2.1. 2500A MAIN BUS HIGH CONDUCTIVITY TIN PLATED COPPER BUS
   - 2.2. COPPER NEUTRAL AND GROUNDING BUS
   - 2.3. PROVISIONS SHALL BE MADE FOR FUTURE SPLICING OF ADDITIONAL SECTIONS
   - 2.4. ALL BOLTS USED ON BUS BAR JOINTS SHALL BE A MINIMUM OF GRADE 5
   - 2.5. BUS FROM LOAD TERMINALS OF MAIN BREAKER VIA METERING SECTION TO MAIN LUGS OF DISTRIBUTION SECTION
   - 2.6. IDENTIFY PHASES WITH COLOR CODING
   - 2.7. COPPER GROUND BUS EXTENDING FULL WIDTH OF CUBICLES AND LOCATED AT BOTTOM.
   - 2.8. LUGS AT EACH END SIZED FOR GROUNDING CABLE
   - 2.9. BOND NON-CURRENT CARRYING METAL PARTS TO GROUND BUS

   BREAKERS
   - 3.1. ALL TRIP UNITS SHALL BE REMOVABLE TO ALLOW FOR FIELD UPGRADES.
   - 3.2. TRIP UNITS SHALL INCORPORATE TRUE RMS SENSING, AND HAVE LED LONG-TIME PICKUP INDICATIONS.
   - 3.3. ALL TRIP UNITS SHALL INCLUDE THE CAPABILITY OF A MAINTENANCE MODE WHICH WILL ENABLE THE REDUCTION OF INCIDENT ENERGY IN DOWNSTREAM EQUIPMENT. THIS SHALL BE ENABLED BY KEYED SELECTOR SWITCH OUTSIDE OF THE SWITCHGEAR BRANCH BREAKER. THE KEYED SELECTOR SWITCH WILL CHANGE LSIG SETTINGS WHICH REDUCES THE DOWNSTREAM INCIDENT ENERGY.
   - 3.4. TRIP UNIT FUNCTIONS SHALL CONSIST OF ADJUSTABLE LONG-TIME PICKUP AND DELAY, SHORT-TIME PICKUP AND DELAY, INSTANTANEOUS, NEUTRAL PROTECTION AND GROUND-FAULT PICKUP AND DELAY.
   - 3.5. ADJUSTABLE LONG-TIME PICKUP (IR) AND DELAY SHALL BE AVAILABLE IN AN ADJUSTABLE RATING PLUG THAT IS UL LISTED AS FIELD-REPLACEABLE. ADJUSTABLE RATING PLUG SHALL ALLOW FOR NINE LONG-TIME PICKUP SETTINGS FROM 0.4 TO 1 TIMES THE SENSOR PLUG (IN). OTHER ADJUSTABLE RATING PLUGS SHALL BE AVAILABLE FOR MORE PRECISE SETTINGS TO MATCH THE APPLICATION. LONG-TIME DELAY SETTINGS SHALL BE IN NINE BANDS FROM 0.5-24 SECONDS AT SIX TIMES IR.
   - 3.6. SHORT-TIME PICKUP SHALL ALLOW FOR NINE SETTINGS FROM 1.5 TO 10 TIMES IR. SHORT-TIME DELAY SHALL BE IN NINE BANDS FROM 0.1-0.4 I 2 T ON AND 0-0.4 I 2 T OFF.
   - 3.7. INSTANTANEOUS SETTINGS ON THE TRIP UNITS WITH LSI PROTECTION SHALL BE AVAILABLE IN NINE BANDS FROM 2 TO 15 TIMES IN. THE INSTANTANEOUS SETTING SHALL ALSO HAVE AN OFF SETTING WHEN SHORT-TIME PICK-UP IS PROVIDED.
   - 3.8. TRIP UNIT SHALL PROVIDE LOCAL TRIP INDICATION AND CAPABILITY TO INDICATE LOCAL AND REMOTE REASON FOR TRIP, I.E., OVERLOAD, SHORT CIRCUIT OR GROUND FAULT.
   - 3.9. GROUND-FAULT PROTECTION SHALL BE AVAILABLE FOR SOLIDLY GROUNDED THREE-PHASE, THREE-WIRE OR THREE-PHASE, FOUR-WIRE SYSTEMS. TRIP UNIT SHALL BE CAPABLE OF THE FOLLOWING TYPES OF GROUND-FAULT PROTECTION: RESIDUAL, SOURCE GROUND RETURN, AND MODIFIED DIFFERENTIAL. GROUND-FAULT SENSING SYSTEMS MAY BE CHANGED IN THE FIELD.
   - 3.10. GROUND-FAULT SETTINGS FOR CIRCUIT BREAKER SENSOR SIZES 1200 A OR BELOW SHALL BE IN NINE BANDS FROM 0.2 TO 1.0 TIMES IN. THE GROUND-FAULT SETTINGS FOR CIRCUIT BREAKERS ABOVE 1200 A SHALL BE NINE BANDS FROM 500 TO 1200 A.
   - 3.11. NEUTRAL CURRENT TRANSFORMERS SHALL BE AVAILABLE FOR FOUR-WIRE SYSTEMS.
   - 3.12. TRIP UNITS SHALL BE CAPABLE OF COMMUNICATING ON FOUR WIRE MODBUS →NETWORKS WITHOUT SOFTWARE INTERFACES (BLACK BOXES).
   - 3.13. TRIP UNITS SHALL BE AVAILABLE TO PROVIDE ADDITIONAL PROTECTION BY OFFERING ADJUSTABLE INVERSE DEFINITE MINIMUM TIME LAG (IDMTL). IDMTL PROVIDES OPTIMIZED COORDINATION BY THE ADJUSTMENT OF THE SLOPE OF THE LONG-TIME DELAY PROTECTION.
   - 3.14. TRIP UNITS SHALL BE AVAILABLE TO PROVIDE REAL TIME METERING. METERING FUNCTIONS INCLUDE CURRENT, VOLTAGE, POWER AND FREQUENCY. METERING ACCURACY SHALL BE 1.5% CURRENT, 0.5% VOLTAGE, AND 2% POWER. THESE ACCURACY'S SHALL BE TOTAL SYSTEM INCLUDING CT AND METER.
   - 3.15. TRIP UNITS SHALL BE AVAILABLE TO PROVIDE HARMONIC ANALYSIS AND WAVEFORM CAPTURE.
   - 3.16. A MEANS TO SEAL THE TRIP UNIT ADJUSTMENTS IN ACCORDANCE WITH NEC SECTION 240-6(B) SHALL BE PROVIDED.

4. ENCLOSURE
   - 4.1. TYPE 1 FREE STANDING WITH DRIPHOODS
   - 4.2. SHEET STEEL BARRIERS TO SEPARATE ADJOINING SECTIONS. THE SWITCHBOARD SHALL BE TOTALLY ENCLOSED, DEAD FRONT, FREESTANDING WITH FRONT ACCESS
   - 4.3. SPRINKLERED EQUIPMENT PER CEC PART 1 RULE 26-008
   - 4.4. EXTERIOR PAINT COLOUR: ANSI 49
   - 4.5. HANDLING: ROLLERS AND LIFTING ASSEMBLIES
   - 4.6. THE UTILITY METERING COMPARTMENT SHALL HAVE PROVISIONS FOR WINDOW TYPE CURRENT TRANSFORMERS AS SUPPLIED BY THE APPLICABLE PUBLIC UTILITY.

5. MAIN METERING FEATURES
   - 5.1. THD, VOLTAGE AND CURRENT PER PHASE
   - 5.2. MIN/MAX READINGS I, V, F, PF, THD, TOTAL KW & KVAR
   - 5.3. PREDICTED REAL/REACTIVE/APPARENT POWER DEMAND 3 PHASE TOTAL
   - 5.4. REACTIVE & APPARENT POWER DEMAND, PRESENT & PEAK
   - 5.5. REAL, REACTIVE, APPARENT POWER, PER PHASE
   - 5.6. FREQUENCY
   - 5.7. REACTIVE ENERGY (KVARH) & APPARENT ENERGY (KVAH)
   - 5.8. REAL & REACTIVE ENERGY IN & OUT (KWH)(KVARH)
   - 5.9. REAL ENERGY (KWH)REAL POWER DEMAND, PEAK
   - 5.10. REAL POWER DEMAND, PRESENT
   - 5.11. REAL POWER, 3 PHASE TOTAL (KW)REACTIVE POWER, 3 PHASE TOTAL (KVAR & KVA)
   - 5.12. POWER FACTOR, PER PHASE & 3 PHASE TOTAL
   - 5.13. VOLTAGE, PER PHASE (L-L, L-N), 3 PHASE AVERAGE
   - 5.14. CURRENT DEMAND, MAX., NEUTRAL
   - 5.15. CURRENT DEMAND, MAX., PER PHASE
   - 5.16. CURRENT, NEUTRAL
   - 5.17. CURRENT, PER PHASE, 3 PHASE AVERAGE
   - 5.18. TRENDING AND FORECASTING
   - 5.19. FUNDAMENTAL VOLTAGE/CURRENT MAGNITUDES & ANG, PER PHASE
   - 5.20. FUNDAMENTAL REAL & REACTIVE POWER, 3 PHASE, PER PHASE
   - 5.21. INCREMENTAL REAL/REACTIVE/APPARENT ENERGY IN & OUT, 3 PHASE TOTAL

P. MAIN SWITCHBOARD (CONTINUATION)

5. MAIN METERING FEATURES(CONTINUATION)
   - 5.22. VOLTAGE N-GCURRENT, GROUND
   - 5.23. MEMORY (STANDARD/OPTIONAL)ENERGY SUMMARY
   - 5.24. INTERVAL MIN/MAX/AVG LOGALARM/EVENT LOG
   - 5.25. BILLING LOG
   - 5.26. MAINTENANCE LOG
   - 5.27. MIN/MAX LOG
   - 5.28. ENERGY PER INTERVAL (SHIFT)TIME SYNCHRONIZATION
   - 5.29. GPS CLOCK SYNCHRONIZATION CAPABILITY
   - 5.30. DEMAND SYNCHRONIZATION (CLOCK, COMMS, INPUT)BLOCK INTERVAL DEMAND
   - 5.31. EVENT RECORDING
   - 5.32. ADAPTIVE WAVEFORM CAPTURE100MS EVENT RECORDINGS
   - 5.33. DISTURBANCE WAVEFORM CAPTURE
   - 5.34. STEADY STATE WAVEFORM CAPTURE
   - 5.35. ALARM SUMMARY
   - 5.36. ALARM SETPOINT LEARNING
   - 5.37. TRANSIENT (200NSEC)WAVESHAPE ALARMS (VOLTAGE & CURRENT)DISTURBANCE (10MS)CYCLE BY CYCLE EVENT RECORDING
   - 5.38. HIGH SPEED (100MS)DIGITAL INPUTS/OUTPUTS
   - 5.39. BOOLEAN LOGICSETPOINT-DRIVEN ALARMS V,KW,KVA,I,PF,KVAR
   - 5.40. DISTURBANCE DIRECTION DETECTIONE
   - 5.41. N 50160 PASS/FAIL SUMMARY
   - 5.42. SAG/SWELL METERING
   - 5.43. HARMONIC POWER FLOWS
   - 5.44. HARMONIC RESOLUTION
   - 5.45. INDIVIDUAL HARMONIC READINGS, V & I
   - 5.46. ONBOARD ETHERNET
   - 5.47. INFRARED PORT
   - 5.48. RS-485RS-232I/O
   - 5.49. TIME STAMPING ACCURACY
   - 5.50. ANALOG I/O (MAX)KYZ / KY OUTPUT
   - 5.51. DIGITAL I/O (MAX)METERING SAMPLING RATE,SAMPLES/ CYCLE ON 60HZ
   - 5.52. ACCURACY OF VOLTAGE/CURRENT READING
   - 5.53. VOLTAGE INPUT RANGE VAC (DIRECT L-L)CURRENT INPUT RANGE AC, STD
   - 5.54. ONBOARD HTML WEB PAGE SERVER
   - 5.55. EMAIL ON ALARM

6. CODE STANDARDS
   - 6.1. SERVICE ENTRANCE BOARD: TO CSA C22.2 NO. 31
   - 6.2. MOLDED CASE CIRCUIT BREAKERS: TO CSA C22.2 NO. 5
   - 6.3. METERS: TO CSA C17
   - 6.4. DIGITAL INSTRUMENTS: TO ANSI C39.1 AND UL508
   - 6.5. INSTRUMENT TRANSFORMERS: TO CSA C13

7. OTHERS
   - 6.1. SWITCHBOARD TO BE PROVIDED WITH EXTRA SUPPORT FROM THE MANUFACTURER TO ACCOMMODATE SHIPMENT MOVEMENT OTHER THAN UPRIGHT POSITION SUCH AS TILTING, PLACED ON ITS SIDE AND CARRIED HORIZONTALLY, UPSIDE DOWN ETC.

Q. EXECUTION

RACEWAYS:

1. INSTALL CONDUIT AS A COMPLETE SYSTEM WITHOUT WIRES. CONTINUE CONDUIT FROM FITTING TO FITTING AND FASTEN SECURELY TO PLACE. CLEAN AND SEAL CONDUIT SYSTEM UNTIL WIRING IS INSTALLED.

2. INSTALL CONDUIT PARALLEL OR AT RIGHT ANGLES TO PROPERTY LINES, CURBS, ETC., WHERE PRACTICAL.

3. CUT ALL CONDUITS SQUARE AND REAM TO REMOVE SHARP EDGES AND BURRS. FIT CONDUITS CLOSELY AND TIGHTLY IN COUPLINGS.

4. INSTALL A PULL WIRE IN EACH EMPTY CONDUIT PROVIDED FOR FUTURE USE BY OTHERS.

5. CAP ALL CONDUITS WITH METAL, CARDBOARD OR PLASTIC, DURING CONSTRUCTION.

WIRES AND CABLES:

1. DO NOT PULL THE WIRES BEFORE THE ENTIRE CONDUIT SYSTEM IS COMPLETED AND CLEANED.

2. ENSURE THAT WIRES INSTALLED IN THE INTERIOR OF EQUIPMENT ARE NEATLY LACED WITH PLASTIC TIES AND GRASPED AND SECURED IN PLACE.

3. RUN POWER CONDUCTORS FULL LENGTH WITHOUT SPLICES OR TAPS FROM ORIGIN TO DESTINATION, UNLESS SPECIFICALLY CALLED FOR ON THE DRAWINGS. NO CABLE SPLICING ALLOWED IN UNDERGROUND INSTALLATION.

4. IDENTIFY EACH CABLE AND WIRE AT BOTH ENDS WITH PROPER CABLE AND WIRE NUMBER AS SHOWN ON THE DRAWINGS AND CABLE SCHEDULES IN ALL CONTROL PANELS, CONTROL DEVICES, DISTRIBUTION PANELS, PULL AND JUNCTION BOXES, ETC., USING APPROVED CABLE AND WIRE MARKERS.

5. FOLLOW NORMAL RECOMMENDED PRACTICES WHEN INSTALLING CABLES IN CABLE TRAYS TO AVOID DAMAGE TO CABLE SHEATHS, CONDUCTORS OR INSULATION. ENSURE THAT CABLES ARE NOT DAMAGED BY EXCESSIVE TENSION WHEN PULLING. REPLACE ANY DAMAGED AND REJECTED CABLE WITHOUT COST TO THE OWNER.

6. USE SUITABLE NON-HARDENING CABLE LUBRICANTS, WHERE REQUIRED, WHICH DO NOT CONTAIN ANY MATERIALS SUCH AS OIL, GREASE OR OTHER COMPOUNDS HARMFUL TO RUBBER, PVC OR POLYETHYLENE.

7. MAKE SPLICES AND TAPS FOR CONTROL CONDUCTORS AT APPROVED TERMINAL BLOCKS IN JUNCTION BOXES.

R. MECHANICAL EQUIPMENT

1. PROVIDE LINE VOLTAGE CONNECTIONS AS REQUIRED FOR ALL MECHANICAL EQUIPMENT. CONFIRM FINAL CONNECTIONS, LOADS AND LOCATIONS PRIOR TO INSTALLATION. NO EXTRAS WILL BE ALLOWED FOR ELECTRICAL CONTRACTOR NOT THOROUGHLY REVIEWING ALL MECHANICAL DRAWINGS DURING TENDER AND SHOP DRAWINGS DURING CONSTRUCTION.

2. FUSES PROTECTING MOTOR FEEDERS TO BE TIME-DELAY TYPE UNLESS NOTED OTHERWISE.

3. PROVIDE ALL NECESSARY LINE VOLTAGE CONTROL WIRING FOR MECHANICAL CONTROLS CONTRACTOR AS REQUIRED. PROVIDE CONTROL WIRING AS SHOWN ON THE ELECTRICAL AND MECHANICAL DRAWINGS.

4. ELECTRICAL CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL NECESSARY COMBINATION STARTERS FOR MECHANICAL EQUIPMENT UNLESS NOTED OTHERWISE ON MECHANICAL DRAWINGS.

S. ARC FLASH, PROTECTION AND COORDINATION STUDY:

1. CONTRACTOR TO PROVIDE ARC FLASH, PROTECTION AND COORDINATION STUDY TO IEEE-1584 AND ADJUST BREAKER TRIP SETTINGS ON SITE TO MATCH COORDINATION STUDY. APPLY ARC FLASH LABELS TO THE EQUIPMENT FOR ELECTRICAL SWITCHBOARDS AND PANELS. OBTAIN ALL REQUIRED INFORMATION FROM LOCAL HYDRO UTILITIES AS REQUIRED.

T. CONCRETE ENCASED DUCT BANKS

1. BENDS AND TURNS IN A DUCT RUN SHALL BE ACCOMPLISHED BY A GRADUAL SWEEP. ALL 90 DEGREE CHANGES IN DIRECTION SHALL BE MADE OF 1.5m (60") RADIUS ELBOW AND BE LIMITED TO NO GREATER THAN THREE (3) PER RUN. DUCT RUN SHALL BE INSTALLED SUCH THAT CABLE PULLING TENSIONS DO NOT EXCEED SPECIFIED LIMITS.

2. DUCT BANKS SHALL BE BURIED WITH A MINIMUM COVER AS NOTED ON THE DRAWING, WITH THE EXCEPTION OF ROADWAYS WHICH SHALL BE BURIED WITH A MINIMUM COVER OF 1200mm AS NOTED ON THE DRAWING. RED CAUTION TAPE TO BE INSTALLED APPROXIMATELY HALFWAY BETWEEN THE INSTALLATION AND GRADE LEVEL. TRENCH RESTORATION SHALL BE MADE UP OF CLEAN BACKFILL ON THE DUCT BANKS INSTALLED UNDER LAWNS AND PARKWAYS. DUCT BANKS ALONG BOULEVARDS OR ACROSS ROADS SHALL HAVE BACKFILL MATERIALS AND TRENCH RESTORATION TO CONFORM WITH THE MUNICIPAL OR REGIONAL AUTHORITY AS REQUIRED.

3. DUCT BANKS SHALL HAVE A MINIMUM SLOPE OF 1% AWAY FROM THE BUILDING. CONSULT LOCAL HYDRO UTILITY INSPECTOR WHERE THE ABOVE REQUIREMENT CANNOT BE MET.

4. THE AREA WITHIN TWO (2) METERS AT EACH END OF THE DUCT BANK SHALL BE FREE FROM ANY FOREIGN OBJECTS SUCH AS CABLES OR PIPES FOR FUTURE BACKHOE DIGGING.

5. DUCTS TO BE PVC TYPE DB2/ES2 (SOLID WALL ONLY) C/W BELL ENDS.

6. ALL FITTINGS AND BENDS SHALL BE PVC TYPE DB2/ES2. APPROVED SOLVENT CEMENT SHALL BE USED TO JOIN ALL DUCTS, FITTINGS, BENDS, AT MINIMUM 30 MINUTES PRIOR TO POURING CONCRETE.

7. ALL DUCTS AT THE FACE OF THE DUCT BANK SHALL BE ORIENTED AND TERMINATED WITH EITHER BELL ENDS SUPPORTING CABLES OR PLUGS FOR SPARE DUCTS.

8. DUCTS SHALL BE SUPPORTED WITH APPROVED SPACERS EVERY 1.5m (5ft) AND BE ANCHORED SO AS NOT TO FLOAT DURING CONCRETE POUR.

9. ALL DUCTS SHALL BE REINFORCED WITH NON PRE-STRESSED 15mm (5/8") DEFORMED STEEL REINFORCING BARS GRADE 400 AND CONFORMING TO C.S.A. G30.12 (LATEST REVISION). STEEL REINFORCING BARS SHALL BE INSTALLED CONTINUOUSLY, MINIMUM 300mm OVERLAP, TIED, AND BE LOCATED AT THE BOTTOM OF THE DUCT BANK AS SHOWN IN SECTION DETAILS.

10. STEEL REINFORCING BARS SHALL BE INSTALLED BEYOND THE DUCT BANK FOR FUTURE DUCT BANK EXTENSION IF REQUIRED.

11. DUCTS SHALL BE ENCASED IN 20MPa CONCRETE WITH 10mm PEA GRAVEL AGGREGATE. SLUMP MUST NOT EXCEED 100mm (4") UNDER STANDARD SLUMP TEST. EARTH UNDER DUCT BANK SHALL BE THOROUGHLY COMPACTED PRIOR TO DUCT BANK INSTALLATION TO ELIMINATE SETTLING OF FINISHED DUCT BANK.

12. ALL DUCTS SHALL BE MANDRELLED AND BE CLEAN AFTER DUCT BANK INSTALLATION.

13. ALL DUCTS SHALL BE EQUIPPED WITH 10mm (3/8") POLYPROPYLENE ROPE. ALL DUCTS SHALL HAVE THE ENDS SEALED WITH AN APPROVED DUCT PLUG IMMEDIATELY AFTER DUCT BANK INSTALLATION.

14. DUCT BANKS TO BE INSPECTED AND APPROVED BY LOCAL HYDRO UTILITY PRIOR TO POURING CONCRETE OR DUCT BANK WILL BE REJECTED.

U. FIRE ALARM RENOVATIONS

1. THE ELECTRICAL CONTRACTOR SHALL HIRE A FIRE ALARM SYSTEM COMPANY TO TEST AND VERIFY ANY NEW OR RELOCATED FIRE ALARM DEVICES AND PROVIDE WRITTEN VERIFICATION REPORT INDICATING THE DEVICES HAVE BEEN TESTED AND VERIFIED TO THE LATEST APPLICABLE CODES AND STANDARDS.

2. THE ELECTRICAL CONTRACTOR SHALL CARRY ALL COSTS ASSOCIATED WITH TESTING AND VERIFICATION AS REQUIRED BY THE FIRE ALARM WORK INDICATED ON THE ELECTRICAL DRAWINGS.

3. THE FIRE ALARM SYSTEM SHALL BE INSTALLED IN CONFORMANCE WITH THE LATEST EDITION OF CAN/ULC-S524, "INSTALLATION OF FIRE ALARM SYSTEMS".

4. THE FIRE ALARM SYSTEM SHALL BE VERIFIED IN CONFORMANCE WITH THE LATEST EDITION OF CAN/ULC-S537, "VERIFICATION OF FIRE ALARM SYSTEM" TO ENSURE SATISFACTORY PERFORMANCE.

5. FIRE ALARM PASSIVE GRAPHIC(S) TO BE UPDATED AND REPRINTED WITH NEW FIRE ALARM ZONES AND FLOOR PLAN LAYOUT.

6. TO MAINTAIN COMPATIBILITY WITH THE EXISTING SYSTEM, THE PHOTO ELECTRIC SMOKE DETECTOR SHALL BE MIRCOM MODEL S-100-2WP AND FIRE ALARM BELL SHALL BE MIRCOM MB SERIES.

V. LOW VOLTAGE TRANSFORMERS

1. ALL TRANSFORMERS TO BE DRY TYPE, CSA TYPE 1 RATED SPRINKLER PROOF, ANSI 61 GREY COLOR.

2. PRIMARY AND SECONDARY WINDINGS TO BE ALUMINUM.

3. MEET CSA C802.2 EFFICIENCY REQUIREMENTS.

4. TAPS: TO CSA TYPE ST 20 4X ± 2.5% (2FCAN, 2FCBN)

5. 150 DEG C TEMPERATURE RISE

6. 10 KV BIL FOR BOTH HV AND LV COILS.

7. TRANSFORMERS SHALL NOT EXCEED dBA LEVELS LISTED IN NEMA ST-20 LATEST EDITION.

8. TRANSFORMERS TO BE PROVIDE WITH INTERNAL VIBRATION ISOLATORS.

9. WALL OR CEILING HUNG TRANSFORMERS TO HAVE VIBRATION ISOLATION HANGERS USED WITH SUPPORTS.

10. FLOOR MOUNTED TRANSFORMERS TO HAVE VIBRATION ISOLATION PADS TO BE INSTALLED ALONG THE TRANSFORMER SUPPORT FRAME AND THE FLOOR.

W. REVENUE SUB METERING

1. ELECTRICAL CONTRACTOR TO SUPPLY AND INSTALL COMPLETE RACEWAY (CONDUIT) SYSTEM c/w PULL ROPES, FIELD DEVICE BACK BOXES AND ALL REQUIRED MATERIALS AND LABOUR TO FACILITATE THE INSTALLATION OF THE REVENUE SUB METERING SYSTEM.

2. ELECTRICAL CONTRACTOR SCOPE OF WORKS INCLUDES:
   - 2.2. QUAD RECEPTACLE (4 OUTLETS) FOR SUB METERING PANEL. REFER TO PLAN DRAWING FOR LOCATION.
   - 2.3. 305mmW x 305mmH x 152mmD (12"W x 12"H x 6"D) JUNCTION BOX (TO HOUSE QUAD RECEPTACLE AND ETHERNET SWITCH)
   - 2.4. INSTALLATION OF SUB METERING PANEL(S)
   - 2.5. INSTALLATION OF C.T'S
   - 2.6. ALL CAT5E CABLING IN EMT CONDUIT BETWEEN SUB METERING PANELS.

3. REVENUE SUB METERING CONTRACTOR SCOPE OF WORKS INCLUDES:
   - 3.1. SUPPLY OF ALL REQUIRED SUB METERING PANELS
   - 3.2. SUPPLY AND INSTALLATION OF ALL REQUIRED ETHERNET SWITCH(ES)
   - 3.3. TERMINATION OF CAT5E CABLE(S) RUN BETWEEN SUB METERING PANEL(S).
   - 3.4. SUPPLY OF ALL REQUIRED CURRENT TRANSFORMERS (C.T'S)
   - 3.5. SET-UP, PROGRAMMING AND COMMISSIONING OF THE SYSTEM

No.	ISSUE	DATE
B.	ISSUED FOR PERMIT	26.04.21
A.	ISSUED FOR TENDER	26.04.16

REVISIONS

Seal:

LICENSED PROFESSIONAL ENGINEER
A.P.K.K CHENG
100171305
PROVINCE OF ONTARIO

DO NOT SCALE DRAWINGS.
ALL DIMENSIONS TO BE CHECKED AND VERIFIED ON THE JOB. ALL DRAWINGS REMAIN THE PROPERTY OF ENGINEERS. DRAWINGS SHOULD NOT BE READ IN ISOLATION.

CK ENGINEERING INC
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PROJECT:
1 HAMILTON STREET SOUTH, WATERDOWN SERVICE UPGRADE

DRAWING TITLE:
SPECIFICATIONS SHEET 2 OF 3

DRAWN BY:	SCALE:
U.S	N.T.S.
CHECKED BY:	DATE:
A.P.C	2026.04.16

PROJECT No.: 25037

DRAWING No.: E0.02

ELECTRICAL SPECIFICATIONS

X. COMMISSIONING AND TRAINING

1. COORDINATE WITH THE MANUFACTURER'S REPRESENTATIVE AND PROVIDE REQUIRED TRAINING TO THE OWNER REGARDING THE OPERATING INSTRUCTIONS, CARE AND MAINTENANCE FOR EACH SYSTEM INCLUDING BUT NOT LIMITED TO
   - 1.2. LIGHTING
   - 1.4. POWER AND DATA SYSTEM
   - 1.8. FIRE ALARM SYSTEM
   - 1.9. OTHER SYSTEMS AS REQUIRED
2. BASIC TRAINING FOR EACH PIECE OF EQUIPMENT SHALL INCLUDE:
   - 2.1. DETAILED ITEMIZATION AND IDENTIFICATION OF MAJOR COMPONENTS AND ACCESS TO SAME
   - 2.2. DETAILED ITEMIZATION AND IDENTIFICATION OF OPERATING CONTROLS AND SAFETIES INCLUDING NORMAL AND ABNORMAL SENSOR READINGS
   - 2.3. REVIEW OF THE O&M MANUALS FOR IDENTIFICATION OF SERVICE REQUIREMENTS, PROCEDURES, WIRING DIAGRAMS, PARTS IDENTIFICATION, SAFETY PROCEDURES, ETC.
   - 2.4. REVIEW OF SYSTEM DRAWINGS AND SCHEMATICS
   - 2.5. REVIEW OF CONTROL DRAWINGS AND SCHEMATICS
   - 2.6. OPERATIONAL REVIEW FOR
     - 2.6.1. START–UP
     - 2.6.2. NORMAL OPERATION
     - 2.6.3. SHUT DOWN
     - 2.6.4. UNOCCUPIED OPERATION
     - 2.6.5. SEASONAL CHANGEOVER
     - 2.6.6. MANUAL OPERATION
     - 2.6.7. CONTROLS SET–UP AND PROGRAMMING
     - 2.6.8. TROUBLESHOOTING AND ALARMS
   - 2.5. INTERACTIONS WITH OTHER SYSTEMS
   - 2.6. ADJUSTMENTS AND OPTIMIZING METHODS FOR ENERGY CONSERVATION
   - 2.7. HEALTH AND SAFETY ISSUES
   - 2.8. REGULAR MAINTENANCE REQUIREMENTS INCLUDING FREQUENCY, PARTS AND EQUIPMENT, AND TOOLS NEEDED, REPLACEMENT PARTS SOURCES
   - 2.9. SPECIAL MAINTENANCE NEEDS
   - 2.10. TENANT INTERACTION ISSUES
   - 2.11. DISCUSSION OF ENVIRONMENTALLY RESPONSIBLE SYSTEM FEATURES
   - 2.12. IDENTIFICATION OF CONTACTS FOR SERVICE SUPPORT AND MAINTENANCE PARTS
3. VIDEO TAPE EACH TRAINING SESSION, TAKE MINUTES OF MEETING AND SUBMIT RECORD OF TRAINING VIDEO AND MEETING MINUTES FOR EACH SYSTEM.
4. ATTEND COMMISSIONING MEETINGS SCHEDULED BY THE COMMISSIONING AGENT
5. PROVIDE A COMPLETE SET OF ALL SUBMITTALS FOR ELECTRICAL EQUIPMENT
6. CORRECT ALL DEFICIENCIES FOUND DURING INSTALLATION VERIFICATION INSPECTION (IVI), START–UP, TAB AND FPT TO ENSURE ALL EQUIPMENT AND SYSTEMS ARE FULLY FUNCTIONAL AND IN COMPLETE AND PROPER WORKING ORDER.
7. PRIOR TO OCCUPANCY, BUT FOLLOWING THE COMPLETION OF ALL CHANGES, CERTIFY THAT ALL PROTECTION DEVICES HAVE BEEN CHECKED AND RESET TO CONFORM TO THE COORDINATION STUDY SETTINGS.
8. PARTICIPATE IN THE VERIFICATION OF ALL PROTECTIVE DEVICE SETTINGS.
9. PREPARE O&M MANUALS AND SUPPLEMENTARY INFORMATION ON ALL EQUIPMENT AS DIRECTED BY COMMISSIONING AGENT AND ASSEMBLE IN BINDERS TABBED AND INDEXED. SUPPLEMENTARY INFORMATION MAY INCLUDE, BUT IS NOT LIMITED TO, SUCH ITEMS AS POWER/CONTROL FIELD WIRING DIAGRAMS, EQUIPMENT MAINTENANCE SCHEDULE, VENDOR AND MAINTENANCE CONTACT LISTS.
10. PROVIDE ELECTRICAL SYSTEM TECHNICIANS TO ASSIST DURING SYSTEM VERIFICATION AND FUNCTIONAL PERFORMANCE TESTING AS REQUIRED BY THE COMMISSIONING AGENT
11. PROVIDE A COMPLETE SET OF AS–BUILT RECORD DRAWINGS AND SCHEMATICS.
12. RETURN TO SITE WITH THE GC APPROXIMATELY 10 MONTHS AFTER THE START OF THE WARRANTY PERIOD TO REVIEW SYSTEM OPERATION AND TO ADDRESS OPERATIONAL ISSUES.

Y. SEISMIC ELECTRICAL DESIGN

1. GENERAL
   - 1.1. QUALITY ASSURANCE
     - 1.1.1. GENERAL
       - 1.1.1.1. THE CONTRACTOR SHALL PROVIDE PRE–ENGINEERED SEISMIC RESTRAINT SYSTEMS TO MEET TOTAL DESIGN LATERAL FORCE REQUIREMENTS FOR SUPPORT AND RESTRAINT OF CONDUIT, CABLE TRAYS, SUSPENDED LIGHT FIXTURES AND OTHER SIMILAR SYSTEMS AND EQUIPMENT WHERE REQUIRED BY THE APPLICABLE BUILDING CODE.
2. PRODUCTS
   - 2.1. SEISMIC BRACING AND SUPPORT OF SYSTEMS AND COMPONENTS
     - 2.1.1. GENERAL
       - 2.1.1.1. SEISMIC RESTRAINT DESIGNER SHALL COORDINATE ALL ATTACHMENTS WITH THE STRUCTURAL ENGINEER OF RECORD.
       - 2.1.1.2. DESIGN ANALYSIS SHALL INCLUDE CALCULATED DEAD LOADS, STATIC SEISMIC LOADS, AND CAPACITY OF MATERIALS UTILIZED FOR THE CONNECTION OF THE EQUIPMENT OR SYSTEM TO THE STRUCTURE.
       - 2.1.1.3. ANALYSIS SHALL DETAIL ANCHORING METHODS, BOLT DIAMETER, AND EMBEDMENT DEPTH.
       - 2.1.1.4. ALL SEISMIC RESTRAINT DEVICES SHALL BE DESIGNED TO ACCEPT WITHOUT FAILURE THE FORCES CALCULATED PER THE APPLICABLE BUILDING CODE.
3. EXECUTION
   - 3.1. SEISMIC RESTRAINT OF ELECTRICAL SERVICES
     - 3.1.1. ALL SEISMIC RESTRAINT SYSTEMS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURE'S SEISMIC RESTRAINT GUIDELINES MANUAL AND ALL CERTIFIED SUBMITTAL DATA.
     - 3.1.2. BRACING MAY OCCUR FROM FLANGES OF STRUCTURAL BEAMS, UPPER TRUSS CORDS OF BAR JOISTS, CAST IN PLACE INSERTS, OR WEDGE–TYPE CONCRETE ANCHORS. CONSULT STRUCTURAL ENGINEER OF RECORD.
     - 3.1.3. DO NOT BRACE A SYSTEM TO TWO INDEPENDENT STRUCTURES SUCH AS A CEILING AND WALL.
     - 3.1.4. PROVIDE APPROPRIATELY SIZED OPENINGS IN WALLS, FLOORS, AND CEILINGS FOR ANTICIPATED SEISMIC MOVEMENT. PROVIDE FIRE SEAL SYSTEMS IN FIRE–RATED WALLS.

Z. FIELD QUALITY CONTROL

1. TEST ALL WORK. REMEDY AND MAKE GOOD ANY DEFECTS DISCLOSED BY SUCH TESTS AND TEST THE WORK AGAIN. TEST IN ACCORDANCE WITH APPROVED PROCEDURE.
2. TEST EACH POWER AND CONTROL CONDUCTOR FOR CONTINUITY AND GROUNDS. IMMEDIATELY FOLLOWING THIS TEST, CONNECT CONDUCTOR TO ITS PERMANENT TERMINAL.
3. INSPECT ALL CONNECTIONS, PROTECTIVE AND SAFETY DEVICES PRIOR TO ENERGIZING ANY EQUIPMENT AND MAKE NECESSARY ADJUSTMENTS, WHERE REQUIRED, TO ASSURE A PROPER AND SAFE OPERATION.
4. ALL EQUIPMENT SHALL BE WIPED CLEAN AND VACUUMED.

AA. ELECTRICAL PRICE BREAKDOWN

1. ELECTRICAL CONTRACTOR TO SUBMIT TOTAL BID/TENDER WITH PRICE BREAKDOWN AS FOLLOWS;
   - 1.1. PERMITS AND MOBILIZATION
   - 1.2. EXTERIOR SITE WORK, CONDUITS, WIRING, DUCT BANKS AND LIGHTING– MATERIAL
   - 1.3. EXTERIOR SITE WORK, CONDUITS, WIRING, DUCT BANKS AND LIGHTING– LABOUR
   - 1.4. DISTRIBUTION EQUIPMENT – MATERIAL
   - 1.5. DISTRIBUTION EQUIPMENT – LABOUR
   - 1.6. INTERIOR LIGHT FIXTURES AND CONTROLS – MATERIAL
   - 1.7. INTERIOR LIGHT FIXTURES AND CONTROLS – LABOUR
   - 1.8. INTERIOR CONDUIT AND BRANCH WIRING POWER AND LIGHTING – MATERIAL
   - 1.9. INTERIOR CONDUIT AND BRANCH WIRING POWER AND LIGHTING – LABOUR
   - 1.10. INTERIOR CONDUIT AND WIRING FIRE ALARM – MATERIAL
   - 1.11. INTERIOR CONDUIT AND WIRING FIRE ALARM – LABOUR
   - 1.12. CLOSE OUT MANUALS, REPORTS AND TESTS
   - 1.13. AS–BUILT AUTO CAD AND PDF DRAWINGS AND ELECTRICAL CONTRACTOR CLOSEOUT DOCUMENTS
   - 1.14. ELECTRICAL WORK FOR CONNECTIONS TO MECHANICAL EQUIPMENT – MATERIAL
   - 1.15. ELECTRICAL WORK FOR CONNECTIONS TO MECHANICAL EQUIPMENT – LABOUR

AB. ELECTRICAL SEPARATE PRICE ITEMS:

ELECTRICAL CONTRACTOR TO SUBMIT SEPARATE PRICES FOR THE FOLLOWING ITEMS AND INCLUDE THESE PRICES IN BASE BID/TENDER PRICE SO THAT THE TOTAL TENDER PRICE TO BE SUM OF BASE BID PRICE (EXCLUDING ELECTRICAL SEPARATE PRICES) + ELECTRICAL SEPARATE PRICE ITEM #1 + ELECTRICAL SEPARATE PRICE ITEM #2 + ELECTRICAL SEPARATE PRICE ITEM #3 = TOTAL TENDER PRICE.

1.1. ELECTRICAL SEPARATE PRICE ITEM #1:

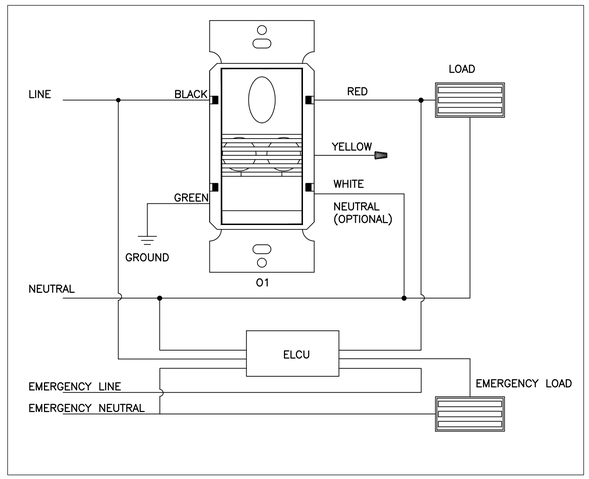
PROVIDE SEPARATE PRICE TO REPLACE ALL EXISTING SUITE PANELS. EXISTING SUITE PANELS ARE 100A, 120/208V,1PH, ALLOW FOR FOURTEEN (14) 15A–1P ONE (1) 40A–2P THREE (3) 20A–1P BREAKERS. PROVIDE PRICE PER SUITE BASIS.

1.2. ELECTRICAL SEPARATE PRICE ITEM #2:

PROVIDE A SEPARATE PRICE FOR NEW BELL DISCONNECT SWITCH INSTALLED AT THE LOCATION OF THE EXISTING BELL METER TO BE DEMOLISHED IN THE BASEMENT EXISTING ELECTRICAL ROOM.

1.3.ELECTRICAL SEPARATE PRICE ITEM #3:

PROVIDE A SEPARATE PRICE FOR ROUTING CONDUITS FOR TX–'M1' UNDERGROUND TO THE CABLE TRAY.



TYPICAL WIRING DIAGRAM FOR WALL MOUNTED LINE VOLTAGE OCCUPANY SENSOR SWITCHING WITH EMERGENCY LIGHT CONTROL UNIT (NEW ELECTRICAL ROOM)

LINE TYPES	
LINE TYPE	DESCRIPTION
----------	DENOTES LINE VOLTAGE WIRE
— - - — - - — - - —	DENOTES LOW VOLTAGE WIRE
----------	DENOTES DEVICE TO BE DEMOLISHED OR RELOCATED
————	DENOTES NEW OR RELOCATED DEVICE
————	DENOTES EXISTING DEVICE TO REMAIN

GENERAL LIGHTING	
SYMBOL	DESCRIPTION
LX	CEILING MOUNTED LINEAR LIGHT FIXTURE. 'X' DENOTES TYPE
(LX)	ROUND DOWN LIGHT FIXTURE. 'X' DENOTES TYPE
GENERAL NOTE: 1. REFER TO GENERAL LIGHTING SCHEDULE FOR DETAILED SPECIFICATIONS.	

CONTROL DEVICE	
SYMBOL	DESCRIPTION
$X	120V OR 347V SINGLE GANG, SINGLE POLE SWITCH, UNLESS NOTED WITH CONTROL DEVICE TYPE DESIGNATION LETTER. 'X' DENOTES CONTROL DEVICE TYPE
GENERAL NOTE: 1. REFER TO CONTROL DEVICE SCHEDULE FOR DETAILED SPECIFICATION.	

POWER AND SYSTEMS	
SYMBOL	DESCRIPTION
	HARD WIRED POWER CONNECTION RATED PER EQUIPMENT SPECIFICATION
	SURFACE MOUNTED ELECTRICAL PANEL BOARD
	NON–FUSED DISCONNECT SWITCH
	FUSED DISCONNECT SWITCH
TX–Y	TRANSFORMER. 'Y' DENOTES TRANSFORMER TAG
	120VAC, 20 AMP T–SLOT DUPLEX GROUND FAULT CIRCUIT INTERRUPT RECEPTACLE
	120VAC, 15 AMP DUPLEX RECEPTACLE
	120VAC, 15 AMP QUAD RECEPTACLE
	FAN OR MOTOR
STX	COMBINATION MAGNETIC MOTOR STARTER c/w DISCONNECT SWITCH OR BREAKER. 'X' DENOTES TYPE
JB	JUNCTION BOX
PB	PULL BOX
	FIRE RATED PLYWOOD BACKBOARD FOR EQUIPMENT
GENERAL NOTE: 1. REFER TO POWER AND SYSTEMS SCHEDULE FOR DETAILED SPECIFICATION.	

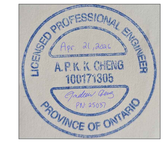
FIRE ALARM AND CARBON MONOXIDE SYSTEMS	
SYMBOL	DESCRIPTION
C I	FIRE ALARM PHOTOELECTRIC SMOKE DETECTOR. 'I' DENOTES INTELLIGENT RELAY BASE WITH DRY CONTACTS. 'C' DENOTES FIRE ALARM ADVANCED COMBINATION FIRE DETECTOR WITH SMOKE, CO, LIGHT/FLAME AND HEAT AND LOCAL SOUNDER BASE
V I H R	FIRE ALARM FIXED HEAT DETECTOR, 57°C (135°F). 'R' DENOTES RATE OF RISE HEAT DETECTOR. 'H' DENOTES HIGH TEMPERATURE HEAT DETECTOR, 88°C (190°F). 'I' DENOTES INTELLIGENT RELAY BASE WITH DRY CONTACTS. 'V' DENOTES CONVENTIONAL HEAT DETECTOR WIRED VIA ADDRESSABLE MODULE
F	WALL MOUNTED FIRE ALARM BELL. '*' DENOTES c/w WEATHERPROOF COVER.
m	FIRE ALARM PHOTOELECTRIC DUCT SMOKE DETECTOR
MON	ADDRESSABLE MONITORING DEVICE
CTR	ADDRESSABLE CONTROL DEVICE
FACP	SURFACE MOUNTED FIRE ALARM CONTROL PANEL
GENERAL NOTE: 1. REFER TO "NEW FIRE ALARM SYSTEM" OR "FIRE ALARM SYSTEM RENOVATIONS" IN ELECTRICAL SPECIFICATION FOR MORE DETAILS.	

ABBREVIATIONS	
c/w	DENOTES COMPLETE WITH
DS	DENOTES DISCONNECT SWITCH
ED	DENOTES EXISTING DEVICE TO BE DEMOLISHED INCLUDING WIRING/CONDUIT(S) STRIPPED BACK TO SOURCE
EX	DENOTES EXISTING DEVICE TO REMAIN
NTS	DENOTES NOT TO SCALE
TX	DENOTES TRANSFORMER
WP	DENOTES WEATHERPROOF
AF	FUSED AMPERAGE
AP	PLUG AMPERAGE
AT	TRIP AMPERAGE
BY OTHERS	ANY ITEMS NOTED AS BY OTHERS ARE THE RESPONSIBILITY OF THE LANDLORD TO OBTAIN THE APPROPRIATE PERSONNEL TO COMPLETE THE WORK FOR THE SUPPORT OF THE ELECTRICAL WORK BEING DONE

No.	ISSUE	DATE
B.	ISSUED FOR PERMIT	26.04.21
A.	ISSUED FOR TENDER	26.04.16

REVISIONS

Seal:



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PROJECT:

1 HAMILTON STREET SOUTH, WATERDOWN SERVICE UPGRADE

DRAWING TITLE:

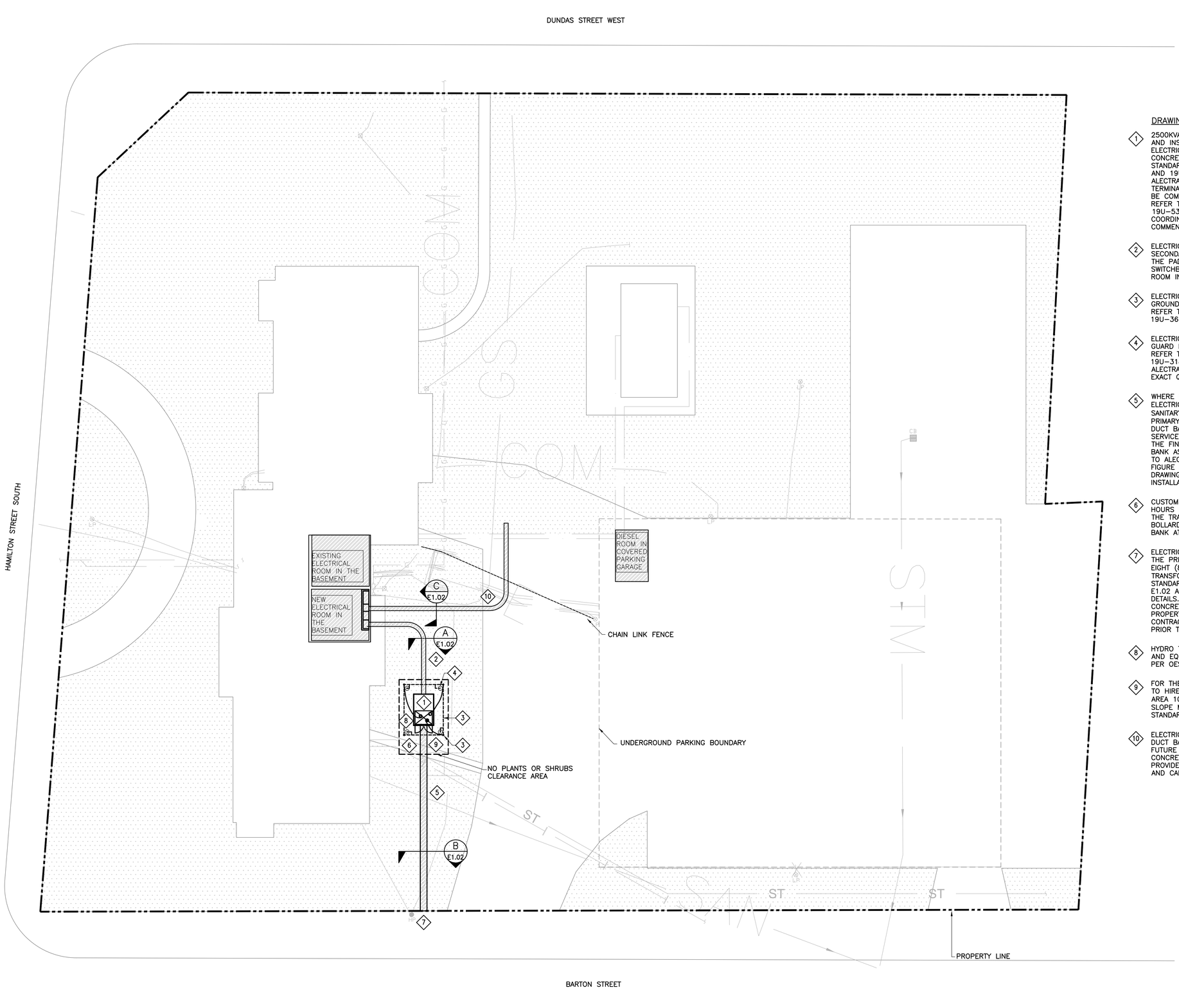
SPECIFICATIONS, LINE TYPES, LEGENDS, AND ABBREVIATIONS SHEET 3 OF 3

DRAWN BY:	SCALE:
U.S	N.T.S.
CHECKED BY:	DATE:
A.P.C	2026.04.16

PROJECT No.: 25037

DRAWING No.:

E0.03



ELECTRICAL SITE PLAN
SCALE 1/16"=1'0"

DRAWING KEYNOTES:

1. 2500KVA PAD MOUNT TRANSFORMER TO BE SUPPLIED AND INSTALLED BY ALECTRA UTILITIES. THE ELECTRICAL CONTRACTOR TO SUPPLY AND INSTALL CONCRETE VAULT. REFER TO ALECTRA UTILITIES STANDARD DETAILS 19U–364, 19U–365, 19U–366 AND 19U–525 ON DRAWING E1.03 FOR DETAILS. ALECTRA UTILITIES TO COMPLETE PRIMARY CABLE TERMINATIONS. SECONDARY CABLE TERMINATIONS TO BE COMPLETED BY THE ELECTRICAL CONTRACTOR. REFER TO ALECTRA UTILITIES STANDARD DETAILS 19U–530 ON DRAWING E1.03 FOR DETAILS. COORDINATE WITH ALECTRA UTILITIES PRIOR TO COMMENCING ANY WORK.
2. ELECTRICAL CONTRACTOR TO SUPPLY AND INSTALL SECONDARY CONCRETE ENCASED DUCT BANK FROM THE PAD MOUNT TRANSFORMER TO THE NEW MAIN SWITCHBOARD LOCATED IN THE NEW ELECTRICAL ROOM IN THE BASEMENT.
3. ELECTRICAL CONTRACTOR TO SUPPLY AND INSTALL GROUNDING GRID AND GROUNDING ELECTRODES. REFER TO ALECTRA UTILITIES STANDARD DETAILS 19U–366 ON DRAWING E1.03 FOR DETAILS.
4. ELECTRICAL CONTRACTOR TO SUPPLY AND INSTALL GUARD POST AROUND THE PAD MOUNT TRANSFORMER. REFER TO ALECTRA UTILITIES STANDARD DETAILS 19U–318 ON E1.02 FOR DETAILS. COORDINATE WITH ALECTRA UTILITIES PRIOR TO STARTING ANY WORK FOR EXACT QUANTITIES AND LOCATIONS.
5. WHERE OTHER SERVICES LINES SUCH AS OTHER ELECTRICAL CONDUITS OR CIVIL PIPES (WATER MAIN, SANITARY, GAS ETC.) INTERFERE WITH THE ELECTRICAL PRIMARY DUCT BANKS, CONSTRUCT THE ELECTRICAL DUCT BANK UNDERNEATH OR ABOVE THE INTERFERING SERVICE BUT MAINTAINING A MINIMUM BURIAL FROM THE FINISHED GRADE TO THE TOP OF THE DUCT BANK AS PER ALECTRA UTILITIES STANDARDS. REFER TO ALECTRA UTILITIES STANDARD DETAILS 37–2012 FIGURE 3 ON DRAWING E1.02 AND 37–2010 ON DRAWING E1.04, FOR THE PRIMARY DUCT BANK INSTALLATION DETAILS.
6. CUSTOMER TO CALL ALECTRA UTILITIES AT LEAST 72 HOURS IN ADVANCE TO SCHEDULE INSPECTION OF THE TRANSFORMER FOUNDATION, GROUND GRID, BOLLARDS, AND CONCRETE ENCASED PRIMARY DUCT BANK AT 905–798–3243 OR 905–798–2757.
7. ELECTRICAL CONTRACTOR TO SUPPLY AND INSTALL THE PRIMARY CONCRETE ENCASED DUCT BANK WITH EIGHT (8) DUCTS FROM THE PROPERTY LINE TO THE TRANSFORMER. REFER TO ALECTRA UTILITIES STANDARD DETAILS 37–2012 FIGURE 3 ON DRAWING E1.02 AND DETAIL 37–2010 ON DRAWING E1.04 FOR DETAILS. EXTEND EMPTY DB2 CONDUITS BEYOND CONCRETE ENCASEMENT ONE METER BEYOND THE PROPERTY LINE AND CAPPED. ELECTRICAL CONTRACTOR TO COORDINATE WITH ALECTRA UTILITIES PRIOR TO STARTING ANY WORK.
8. HYDRO TO PROVIDE INTERNAL CURRENT–LIMITING FUSE AND EQUIPPED WITH A PRESSURE RELIEF DEVICE AS PER OESC 2024 LATEST STANDARD REQUIREMENTS.
9. FOR THE PAD MOUNT TRANSFORMER, THE LANDLORD TO HIRE A SITE CONTRACTOR TO LEVEL THE GRASS AREA 10' IN FRONT OF THE TRANSFORMER TO NOT SLOPE MORE THAN 5%. REFER TO ALECTRA UTILITIES STANDARD 19U–364 ON DRAWING E1.03 FOR DETAILS.
10. ELECTRICAL CONTRACTOR TO SUPPLY AND INSTALL A DUCT BANK FROM THE EXISTING BUILDING TO THE FUTURE BUILDING. ROUTE DUCT BANK TO AVOID CONCRETE BASES OF CHAIN–LINK FENCE POSTS. PROVIDE RIGID PVC CONDUITS WITHIN THE DUCT BANK AND CAP ALL CONDUITS AT THE END.

NORTH

No.	ISSUE	DATE
C.	ISSUED FOR PERMIT	26.04.21
B.	ISSUED FOR TENDER	26.04.16
A.	ISSUED TO ALECTRA UTILITIES	25.09.19

REVISIONS

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PROJECT:

1 HAMILTON STREET SOUTH, WATERDOWN SERVICE UPGRADE

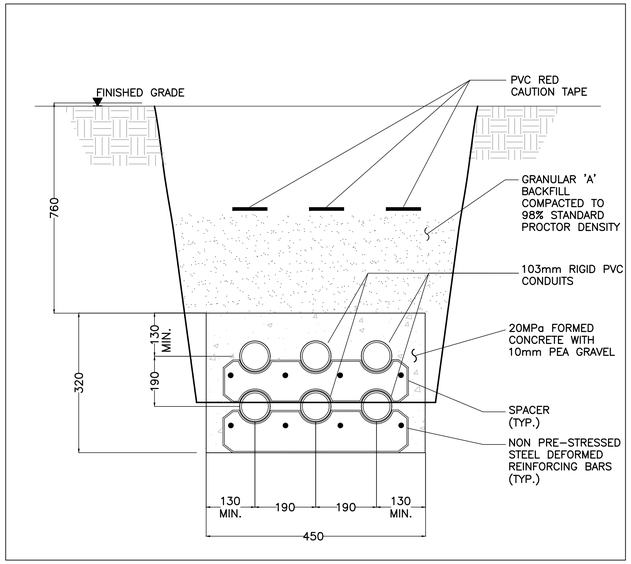
DRAWING TITLE:

SITE PLAN

DRAWN BY:	SCALE:
U.S	AS NOTED
CHECKED BY:	DATE:
A.P.C	2026.04.16

PROJECT No.: 25037

DRAWING No.: E1.01



NOTE:

WHERE OTHER SERVICES LINES SUCH AS OTHER ELECTRICAL CONDUITS OR CIVIL PIPES (WATER MAIN, SANITARY, GAS ETC.) INTERFERE WITH THE ELECTRICAL DUCT BANKS, CONSTRUCT THE ELECTRICAL DUCT BANK UNDERNEATH OR ABOVE THE INTERFERING SERVICE BUT MAINTAINING A MINIMUM BURIAL DEPTH OF 760mm FROM THE FINISHED GRADE TO THE TOP OF THE DUCT BANK.

SECTION A
N.T.S. E1.01

METRIC LINEAR DIMENSIONS IN MILLIMETER

No.	Revision	Drawn by	Checked by	Apprvd by	Date	Std. No.
-	-	-	-	-	-	(3 of 4) 37-2012

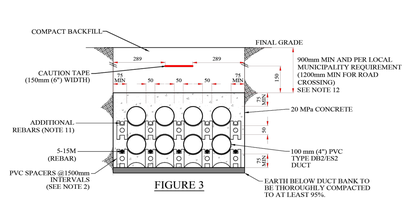


FIGURE 3

NOTES:

1. THE CAUTION TAPE SHALL BE A RED PLASTIC, 152 mm (6") WIDE x 0.1 mm (0.004") THICK C/W BLACK BOLD LETTERING "CAUTION BURIED ELECTRIC LINE BELOW" (ALECTRA ITEM #990242).
2. THE APPROVED 3 & 4-POSITION DUCT SPACERS ARE ROYAL CATALOGUE #DMB42233 & #DMB42234 (ALECTRA ITEMS #110654 & 110655). THE SPACERS SHALL BE PLACED AT 1500mm INTERVALS AND CUT TO SUIT THE DESIGN.
3. FOR GLUING DUCT JOINTS AND BENDS USE APPROVED 540 CEMENT AT LEAST 30 MINUTES PRIOR TO POURING CONCRETE.
4. DUCTS SHALL BE ENCASED IN 20 MPa CONCRETE WITH 10-20mm PEA GRAVEL AND SLUMP NOT TO EXCEED 100mm (4") UNDER STANDARD SLUMP TEST.
5. DUCT BANKS ALONG BOULEVARDS OR ACROSS ROADS SHALL HAVE BACKFILL MATERIALS AND TRENCH RESTORATION TO CONFORM WITH THE MUNICIPAL OR REGIONAL AUTHORITY, AS REQUIRED.
6. ALL DUCT BANKS SHALL BE REINFORCED WITH 15M(16mm) NON-PRESTRESSED DEFORMED STEEL REINFORCING BARS GRADE 400 (YIELD STRESS OF 413 MPa) AND CONFORM TO CSA G30.12 (LATEST REVISION). THE NUMBER PRECEDING THE REINFORCING BARS INDICATES THE QUANTITY OF REINFORCING BARS IN THAT ROW.
7. STEEL REINFORCING BARS SHALL BE INSTALLED CONTINUOUSLY, WITH A MINIMUM OF 600mm OVERLAP AND TIED TOGETHER. THE TIE-WIRE SHALL BE ANNEALED FERROUS WIRE, AS PER CSA-G30.14, ASTM A82/A82M-07.
8. DUCTS SHALL BE A MINIMUM 900mm BELOW GRADE AND IN ACCORDANCE WITH LOCAL MUNICIPAL GUIDELINES.
9. THIS STANDARD IS NOT TO BE USED FOR HIGHWAY OR RAILWAY CROSSINGS.
10. THIS DESIGN IS APPLICABLE TO A FAIRLY GOOD UNDISTURBED SOIL-TYPE 3 OR BETTER. FOR SOIL TYPES THAT DO NOT MEET THIS REQUIREMENT APPROPRIATE GEOTECHNICAL STUDIES MUST BE COMPLETED.
11. FOR ROAD CROSSING DESIGNS REBAR SHALL BE USED IN THE TOP MOST SPACER IN ADDITION TO THE REBAR SHOWN ABOVE IN THE BOTTOM MOST SPACER.
12. DUCTS SHALL BE ROUTED TO AVOID RAILWAYS, UNDERGROUND STRUCTURES, CATCH BASINS AND PIPELINES.
13. TO MITIGATE DIFFERENTIAL SETTLEMENT DUE TO UNSTABLE SOILS, CONSULT CSA C22.3 NO. 7 LATEST REVISION CLAUSE A.4.5.4 FOR POSSIBLE SOLUTIONS IN ADDITION TO A GEOTECHNICAL ENGINEER'S ADVICE.
14. FOR DUCT BANKS ENTERING A BUILDING OR FOUNDATION WHERE A DIFFERENTIAL IN SETTLEMENT MAY OCCUR, THE DESIGN SHALL ENSURE PROPER SUPPORT BY ADDING RE-BARS.

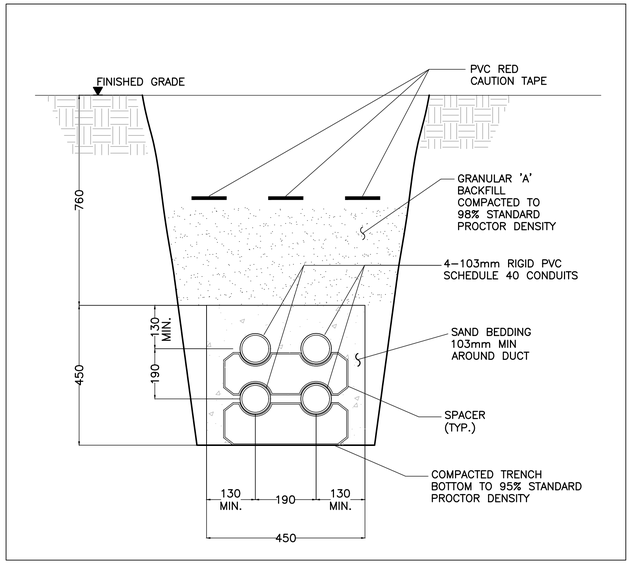
alectra utilities

Construction Standard Certificate of Approval
This Construction Standard meets the safety requirements of Section 4 of Regulation 22/04
Shereze Ali — 09/2022
Name — Date
P. Eng., PMP
Signature & Professional Designation

ORIGINAL
Drawn by: P.D.
Checked by: A.F.
Approved by: A.L.
Date: Sept-2022

Title: TYPICAL ARRANGEMENT FOR DUCTS ENCASED IN CONCRETE FOR TWO LAYER ARRANGEMENTS (2 x 4 DUCTS)

SECTION B
N.T.S. E1.01



NOTE:

WHERE OTHER SERVICES LINES SUCH AS OTHER ELECTRICAL CONDUITS OR CIVIL PIPES (WATER MAIN, SANITARY, GAS ETC.) INTERFERE WITH THE ELECTRICAL DUCT BANKS, CONSTRUCT THE ELECTRICAL DUCT BANK UNDERNEATH OR ABOVE THE INTERFERING SERVICE BUT MAINTAINING A MINIMUM BURIAL DEPTH OF 760mm FROM THE FINISHED GRADE TO THE TOP OF THE DUCT BANK.

SECTION C
N.T.S. E1.01

ROUTE OF THE UNDERGROUND DUCT BANK GOING FROM THE NEW ELECTRICAL ROOM IN THE BASEMENT FOR THE FUTURE BUILDING

FENCE

ROUTE OF THE UNDERGROUND DUCT BANK GOING FROM THE NEW ELECTRICAL ROOM IN THE BASEMENT FOR THE FUTURE BUILDING

FENCE

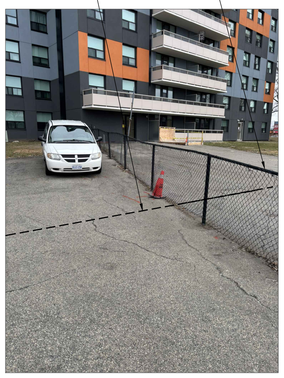
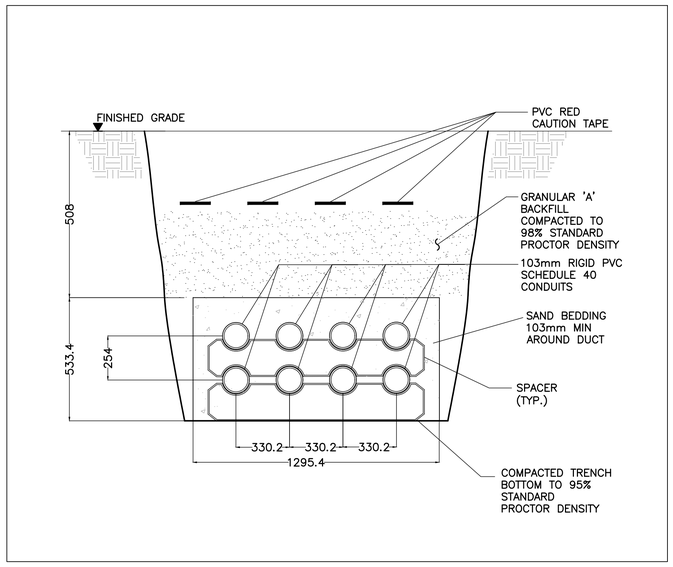


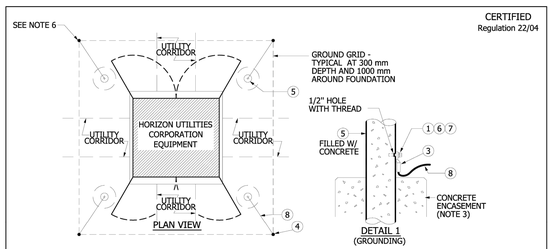
IMAGE 1: ROUTE OF THE DUCT BANK FOR THE FUTURE BUILDING



SECTION D
NTS E1.07

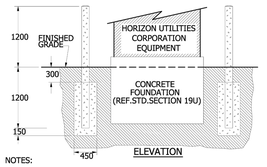
SEE NOTE 6

CERTIFIED
Regulation 22/04



PLAN VIEW

DETAIL 1 (GROUNDING)



ELEVATION

** - LENGTH IN INCHES
++ - LENGTH/QUANTITY TO SUIT

BILL OF MATERIALS

ITEM	DESCRIPTION	QTY	PART #
1	BOLT, HEX HEAD, 1/2" x L	1 PER POST	BOBR**4
2	CEMENT, CONCRETE	++	N/A
3	CONNECTOR, LUG, 2/0 AWG CU, 1-HOLE	1 PER POST	LGCV20
4	CONNECTOR, SPLIT BOLT	1 PER POST	COSB340
5	POST, GUARD, STEEL	++	N/A
6	WASHER, ROUND, FLAT, 1/2", S/S	1 PER POST	WASF4014
7	LOCK WASHER FOR 1/2" BOLT	1 PER POST	WASF4014
8	WIRE, 2/0 AWG CU	++	WCB20

NOTES:

1. GUARD POSTS SHALL BE 150 mm DIA. x 2.4 m LONG x 6 mm THICK STEEL PIPE FILLED WITH CONCRETE.
2. LOCATION AND NUMBER OF GUARD POSTS SHALL BE DETERMINED AND FINALIZED BY HORIZON UTILITIES CORP. FIELD INSPECTORS TOGETHER WITH THE FOLLOWING CRITERIA:
   2.1 MUST ALLOW EQUIPMENT'S DOORS (INCLUDING SUB-COMPARTMENT'S DOORS) TO BE OPENED THROUGH ITS FULL RANGE.
   2.2. MUST ALLOW HORIZON UTILITIES CORP. PERSONNEL UNIMPEDED ACCESS TO THE EQUIPMENT AND PERMIT COMPLETE AND SAFE OPERATION OF THE EQUIPMENT.
   2.3. 500 mm MINIMUM CLEARANCE BETWEEN THE GUARD POST'S CONCRETE ENCASEMENT AND THE UTILITY CORRIDOR.
   2.4. 100 mm MINIMUM CLEARANCE BETWEEN THE GUARD POST'S CONCRETE ENCASEMENT AND THE GROUND GRID.
3. THE GUARD POSTS SHALL BE CONCRETE ENCASED IN 20 MPa CONCRETE WITH 10 mm PEA GRAVEL AGGREGATE.
4. WHERE GUARD POSTS ARE INSTALLED IN BACKFILL OR DISTURBED EARTH, ENSURE BACKFILL MATERIAL IS THOROUGHLY COMPACTED.
5. GUARD POSTS SHALL BE PAINTED WITH "SAFETY-YELLOW" (CITY'S STANDARD). FOR PROPER ADHESION OF PAINT, GUARD POSTS MUST BE CLEANED (FREE FROM DIRT, GREASE/OIL AND EXHAUST FUMES) AND PRIMED PRIOR TO PAINTING. PRETREATMENT PRIMER MUST BE COMPATIBLE WITH GALVANIZED COATING, SUCH AS MODIFIED ACRYLIC WATERBORNE PRIMERS. FOR HIGH ADHESION OF PAINT, BRUSH OR SWEEP BLAST THE POSTS IMMEDIATELY PRIOR TO PAINTING.
6. FOR GROUNDING DETAILS, REFER TO STD. DWG. 41U-110.
7. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.

horizon UTILITIES Looking beyond

DRAWING STATUS	BY	DATE DD/MM/YY
DRAWN:	JM	11/06/07
CHECKED:	KAR	10/12/07
APPROVED:	BM	10/12/07

TYPICAL GUARD POST INSTALLATION

REFERENCE DRAWINGS: 41U-110

DRAWINGS NOT TO SCALE

DRAWING # 19U-318 | SHEET# 1 | REVISION# 0

No.	ISSUE	DATE
C.	ISSUED FOR PERMIT	26.04.21
B.	ISSUED FOR TENDER	26.04.16
A.	ISSUED TO ALECTRA UTILITIES	25.09.19

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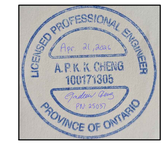

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PROJECT:

1 HAMILTON STREET SOUTH, WATERDOWN SERVICE UPGRADE

DRAWING TITLE:

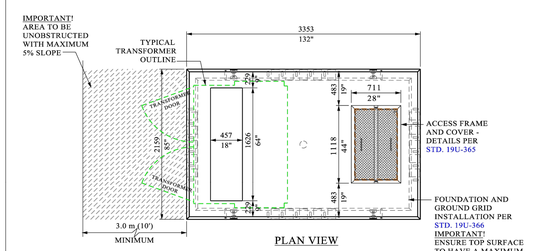
DETAILS SHEET 1 OF 3

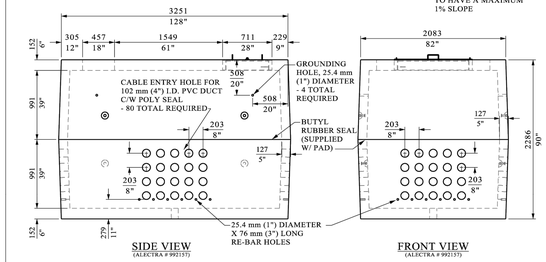
DRAWN BY:	SCALE:
U.S	N.T.S.
CHECKED BY:	DATE:
A.P.C	2026.04.16

PROJECT No.: 25037

DRAWING No.: E1.02

METRIC LINEAR DIMENSIONS IN MILLIMETER	No.	Revision	Drawn by	Checked by	Apprvd by	Date	Std. No.
	1	ADDED MFG CONTACT AND ITEM# ADDED ALECTRA ITEM#	J.I.	S.I.	A.F.	11-2023	(1 of 1) 19U-364





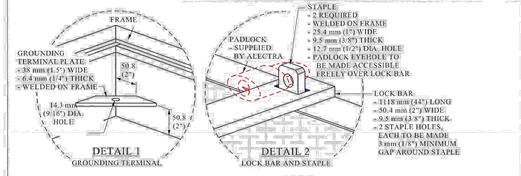
BROOKLIN CONCRETE PRODUCTS (BCP115SM) NEWMARKET Tel. No. 1-888-407-6443	UTILICON (UV8S132MM) BRADFORD Tel. No. (905) 778-8400

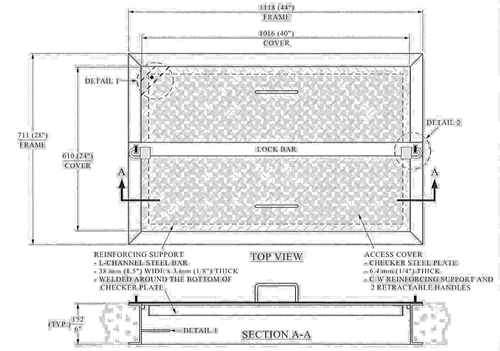
NOTES:

1. CONCRETE SHALL BE MINIMUM 30 MPa, AIR-ENTRAINED AND LOW SLUMP
2. TO BE CONSTRUCTED AS PER CSA A23.1 AND TESTED AS PER CSA A23.2 (LATEST EDITION)
3. CABLE OPENING ON TOP AND SIDE CABLE ENTRY HOLES SHALL HAVE SMOOTH-FINISHED SURFACES AND EDGES
4. HOLES MAY SLIGHTLY VARY FROM ONE MANUFACTURER TO ANOTHER
5. INDICATE WEIGHT ON EACH SECTION. APPROXIMATE WEIGHT (COMBINED TOTAL) = 13,160 kg / 29,000 lbs

horizon UTILITIES Looking beyond	alectra utilities	Certificate of Approval: The installation work covered by this standard meets the safety requirements of Section 4 of Regulation 22/04. SHEREEZ ALI, Name; P. Eng. PMP, Signature & Professional Designation; Mar-2019, Date	ORIGINAL: Drawn by: A.F. Checked by: E.G. Approved by: S.A. Date: Mar-2019	Title: TWO PIECE PRE-CAST CONCRETE FOUNDATION FOR 3-PHASE PAD MOUNTED TRANSFORMER, 750 kVA TO 3000 kVA (132" X 85" X 90") 4.16/2.4 kV TO 27.6/16 kV

METRIC LINEAR DIMENSIONS IN MILLIMETER	No.	Revision	Drawn by	Checked by	Apprvd by	Date	Std. No.
	-	-	-	-	-	-	(1 of 1) 19U-365



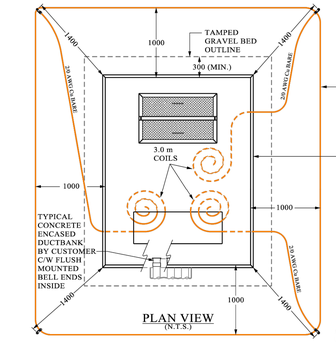


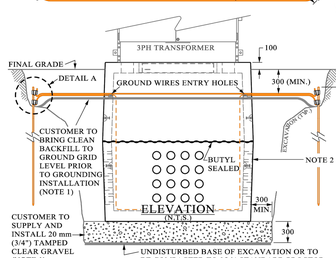
NOTES:

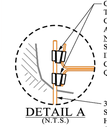
- FRAME SHALL BE MADE OF MINIMUM 6.4 mm (1/4") THICK STEEL
- WELDING AS PER CSA W47.1 (LATEST EDITION)
- ALL PARTS SHALL BE MADE SMOOTH AND FREE OF SHARP EDGES
- AFTER FABRICATION, HOT DIP GALVANIZED AS PER CSA G164 (LATEST EDITION).
- PRE-CAST CONCRETE FOUNDATION AS PER STD. 19U-363 AND 19U-364.

horizon UTILITIES Looking beyond	alectra utilities	Certificate of Approval: The installation work covered by this standard meets the safety requirements of Section 4 of Regulation 22/04. SHEREEZ ALI, Name; P. Eng. PMP, Signature & Professional Designation; Mar/2019, Date	ORIGINAL: Drawn by: A.F. Checked by: E.G. Approved by: S.A. Date: Mar/2019	Title: ACCESS FRAME AND COVER FOR PAD-MOUNTED, 3-PHASE TRANSFORMER FOUNDATION

METRIC LINEAR DIMENSIONS IN MILLIMETER	No.	Revision	Drawn by	Checked by	Apprvd by	Date	Std. No.
	2	ADDED NOTE 3	J.I.	S.I.	A.F.	11/2023	(1 of 1) 19U-366



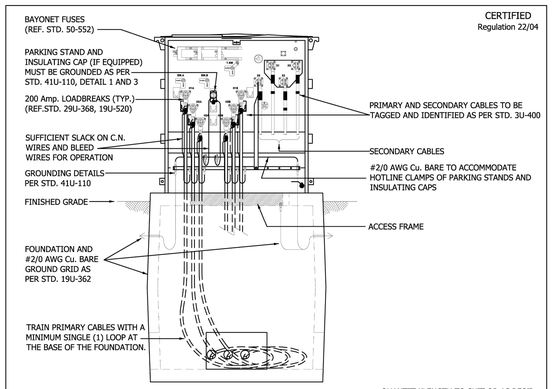


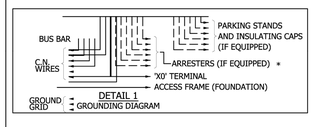


NOTES:

1. GRAVEL BEDDING, FOUNDATION AND GROUND ROD INSTALLATION ARE ALL SUBJECT TO DISTRIBUTOR INSPECTION.
2. MINIMUM 2.0 m CLEARANCE REQUIRED FROM WATERMAIN, STORM, SANITARY GAS AND OTHER UNDERGROUND PLANTS (e.g. IRRIGATION SPRINKLER SYSTEM) ALL AROUND THE FOUNDATION.
3. A MINIMUM HORIZONTAL SEPARATION OF 3.0M SHALL BE MAINTAINED IN BETWEEN GROUNDING RODS

horizon UTILITIES Looking beyond	alectra utilities	Certificate of Approval: The installation work covered by this standard meets the safety requirements of Section 4 of Regulation 22/04. SHEREEZ ALI, Name; P. Eng. PMP, Signature & Professional Designation; Mar-2019, Date	ORIGINAL: Drawn by: A.F. Checked by: E.G. Approved by: S.A. Date: Mar-2019	Title: TYPICAL INSTALLATION OF TWO PIECE PRE-CAST CONCRETE FOUNDATION AND GROUND GRID FOR THREE PHASE PAD-MOUNTED TRANSFORMER 4.16 kV, 13.8 kV AND 27.6 grd Y/16 kV





++ - QUANTITY/LENGTH TO SUIT OR AS REQ'D

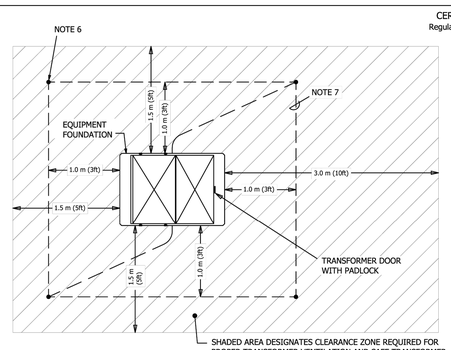
* - TO BE INSTALLED AT THE OPEN POINT-4.16kV SYSTEM

BILL OF MATERIALS

DESCRIPTION	QTY	PART #
BOLT, HEX HEAD, 1/2" x L	++	BOBR**4
CLAMP, HOT-LINE, #8 - 1/0	6*	CLHL10
WIRE, 2/0 AWG Cu	++	WCB20
WIRE, BLEED, Cu, #14 AWG	++	---
INSERT, BUSHING, 200A	6	STD. 29U-368
ELBOW, 200A	6	STD. 29U-368
STAND, PARKING, 200A	3*	STD. 29U-368
CAP, INSULATING, 200A	3*	STD. 29U-368
ARRESTER, BUSHING, ELBOW or PARKING STAND	Δ	STD. 19U-520
CONNECTOR, LUG, #2 AWG Cu, 1-HOLE	6	LGSC21
CONNECTOR, LUG, 2/0 AWG Cu, 1-HOLE	5	LGCW20
NUT, BRASS, FOR 1/2" BOLT	1/BOLT	NUB4014
WASHER, ROUND, FLAT, 1/2"	2/BOLT	WASF4014
LOCK WASHER FOR 1/2" BOLT	1/BOLT	WASL4014
PADLOCK - 50mm	1	P2PL1

Δ - ELBOW AND PARKING STAND ARRESTERS TO BE INSTALLED AT THE OPEN POINT - 13.8kV & 27.6kV SYSTEM. BUSHING ARRESTER TO BE INSTALLED AT THE MIDPOINT - 27.6kV SYSTEM.

horizon UTILITIES Looking beyond	DRAWING STATUS	BY	DATE DD/MM/YY	THREE-PHASE PAD-MOUNTED TRANSFORMER (UP TO 1500kVA)	REFERENCE DRAWINGS: 50-552, 29U-368, 19U-362, 41U-110, 19U-520	DRAWINGS NOT TO SCALE
	DRAWN:	AESI	07/05/15		DRAWING # 19U-504	SHEET# 1
	CHECKED:	MM	07/05/15			REVISION# 0
	APPROVED:	RB	07/05/15			



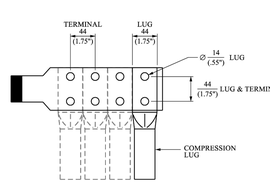
NOTES:

1. FOR ALL INSTANCES, A 3.0 METRE (10ft) CLEARANCE SHALL BE MAINTAINED FROM TREES, HYDRANTS, AND ABOVE GRADE UTILITY STRUCTURES.
2. ANY AND ALL OBJECTS WITHIN THE OBSTRUCTION FREE AREA, ARE SUBJECT TO REMOVAL WITHOUT ANY PRIOR NOTICE SHOULD OPERATIONAL OR EMERGENCY CONDITIONS EXIST.
3. HORIZON UTILITIES CORPORATION SHALL NOT BE HELD RESPONSIBLE FOR ANY COSTS ASSOCIATED WITH THE REMOVAL OR RESULTING DAMAGE TO ANY OBJECTS WITHIN THE OBSTRUCTION FREE AREA (THE DEVELOPER/OWNER ASSUMES ALL RESPONSIBILITY FOR ENCROACHING WITHIN THE OBSTRUCTION FREE AREA).
4. CIVIL DRAWINGS TO BE REVIEWED TO ENSURE TRANSFORMER OR SWITCH PLACEMENT DOES NOT OVERLAP OR INTERFERE WITH DEEP SERVICES.
5. TRANSFORMERS SHALL BE A MINIMUM OF 3.0 METRES (10ft) FROM DOORS, WINDOWS OR VENTILATION INLETS/OUTLETS. TRANSFORMERS WITHIN THE 3.0 METRE (10ft) LIMIT SHALL BE PROTECTED BY AN INTERNAL CURRENT-LIMITING FUSE AND EQUIPPED WITH A PRESSURE RELIEF DEVICE OR REQUIRE A SUITABLE BARRIER (BLAST WALL) (OESC RULE 26-242).
6. GROUND ROD TO BE INSTALLED AT MINIMUM DEPTH 300 MILLIMETRES (1ft) BELOW GRADE.
7. GROUND GRID LOOP Cu WIRE TO BE INSTALLED AT MINIMUM DEPTH 300 MILLIMETRES (1ft) BELOW GRADE AND 1.0 METRE (3ft) AWAY FROM TRANSFORMER FOUNDATION.

horizon UTILITIES Looking beyond	DRAWING STATUS	BY	DATE DD/MM/YY	PAD MOUNTED TRANSFORMER CLEARANCES	REFERENCE DRAWINGS:	DRAWINGS NOT TO SCALE
	DRAWN:	AESI	04/03/15		DRAWING # 19U-525	SHEET# 1
	CHECKED:	MM	06/03/15			REVISION# 1
	APPROVED:	RB	09/03/15			

METRIC LINEAR DIMENSIONS IN MILLIMETER	No.	Revision	Drawn by	Checked by	Apprvd by	Date	Std. No.
	-	-	-	-	-	-	(1 of 1) 19U-530

SERVICE SIZE
200 A
400 A
600 A
800 A
1000 A
1200 A
1600 A
2000 A
2500 A
3000 A



DETAIL 1

TRANSFORMER BUSHING TERMINAL (TYPICAL)

IMPORTANT!

HOLES AVAILABILITY MAY DEPEND ON TRANSFORMER SIZE (SEE NOTE 3)

NOTES:

1. ABOVE IS A LIST OF SECONDARY SERVICE RATINGS (3-PHASE, 4-WIRE CONNECTION) MADE AVAILABLE FOR THE CUSTOMER
2. BASED ON THE CONDITIONS OF SERVICE, THE SECONDARY CABLES, CONNECTORS AND FASTENERS SHALL BE SUPPLIED AND INSTALLED BY THE CUSTOMER. ALECTRA LINES CREW IS REQUIRED TO BE ONSITE TO OPEN TRANSFOMER FOR CUSTOMER
3. THE CUSTOMER MUST COORDINATE THE NUMBER OF SECONDARY CABLES/PHASE WITH THE DESIGN TECH INVOLVED ON THE PROJECT IN ORDER NOT TO EXCEED THE ALLOWED CONNECTION (IN BACK-TO-BACK ARRANGEMENT) AT THE TRANSFORMER SECONDARY BUSHING

   BUSHING EXTENDER IS NOT PERMITTED TO ACCOMMODATE ADDITIONAL NUMBER OF SECONDARY CABLES. THEREFORE, THE FOLLOWING REQUIREMENTS ARE TO BE CONSIDERED:

TRANSFORMER SIZE, kVA	600Y/347 V	208Y/120 V
75 - 300	MAXIMUM 4 RUNS PER PHASE	MAXIMUM 4 RUNS PER PHASE
500	MAXIMUM 4 RUNS PER PHASE	MAXIMUM 8 RUNS PER PHASE
750	MAXIMUM 6 RUNS PER PHASE	N/A
1000 - 2500	MAXIMUM 8 RUNS PER PHASE	N/A
3000	MAXIMUM 10 RUNS PER PHASE	N/A

4. FOR PROPER ELECTRICAL CONNECTION, THE CUSTOMER IS RESPONSIBLE FOR THE FOLLOWING:
   a) SECONDARY CABLES
      i) SHALL BE OF A TYPE, SIZE AND QUANTITY DESIGNED PER SERVICE SIZE, BE CSA APPROVED AND BE RECOGNIZED UNDER O.E.S.C.
      ii) SHALL BE PROPERLY COILED INSIDE THE TRANSFORMER FOUNDATON AND BE LABELLED (i.e. A/B/C OR R/W/B OR EQUIVALENT) AT THE TRANSFORMER SECONDARY BUSHINGS
      iii) SHALL BE PROPERLY TRAINED AND TERMINATED TO MINIMIZE THE FORCE EXERTED ONTO TRANSFORMER SECONDARY BUSHINGS
   b) CONNECTORS
      i) SHALL BE OF A TYPE MATCHING THE CONDUCTOR (i.e. COPPER TO COPPER, ALUMINUM TO ALUMINUM), HIGH CURRENT RATED AND TIN PLATED
      ii) SHALL BE A COMPRESSION STYLE SECONDARY LUGS COMPATIBLE WITH CSA DIES FOR HEX-STYLE CRIMPING
      iii) SHALL BE A 2-HOLE N.E.M.A. SPADE MATCHING THE TRANSFORMER SECONDARY BUSHING TERMINAL ARRANGEMENT (SEE DETAIL 1)
   c) FASTENERS
      i) SHALL BE OF A SIZE 1/2" HEX BOLT AND ASSOCIATED HARDWARE (i.e. NUT, FLAT WASHER AND BELLIVILLE WASHER)
      ii) SHALL BE OF A TYPE AND LENGTH DESIGNED FOR ELECTRICAL (HIGH CURRENT) CONNECTION

horizon UTILITIES Looking beyond	alectra utilities	Construction Standard Certificate of Approval: The Construction Standard meets the safety requirements of Section 4 of Regulation 22/04. Shereez Ali, Name; 07/2020, Date; P Engr, PMP, Signature & Professional Designation	ORIGINAL: Drawn by: Ar.C. Checked by: P.D. Approved by: E.G. Date: Jul-2020	Title: INDUSTRIAL/COMMERCIAL SECONDARY SERVICE REQUIREMENTS (UP TO 3000 AMP SERVICE)

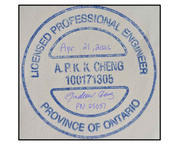
C.	ISSUED FOR PERMIT	26.04.21
B.	ISSUED FOR TENDER	26.04.16
A.	ISSUED TO ALECTRA UTILITIES	25.09.19
No.	ISSUE	DATE

REVISIONS

DISCLAIMER:

DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES. ANY PARTY USING THIS DRAWING FOR SUCH ACTIVITIES WITHOUT THE EXPLICIT AUTHORIZATION OF CK ENGINEERING SHALL BEAR ALL RESPONSIBILITIES AND LIABILITIES

Seal:



DO NOT SCALE DRAWINGS.

ALL DIMENSIONS TO BE CHECKED AND VERIFIED ON THE JOB. ALL DRAWINGS REMAIN THE PROPERTY OF ENGINEERS. DRAWINGS SHOULD NOT BE READ IN ISOLATION.

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BURLINGTON, ON. L7P 1A5
www.ckengs.com | info@ckengs.net | 905.631.1115

PROJECT:

1 HAMILTON STREET SOUTH, WATERDOWN SERVICE UPGRADE

DRAWING TITLE:

ALECTRA UTILITIES STANDARD DETAILS SHEET 2 OF 3

DRAWN BY: U.S	SCALE: N.T.S.
CHECKED BY: A.P.C	DATE: 2026.04.16

PROJECT No.: 25037

DRAWING No.:

E1.03