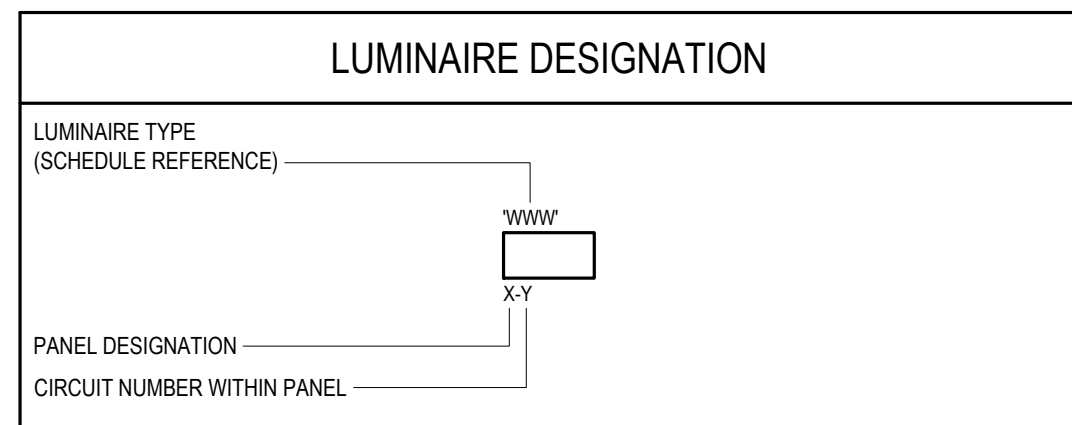
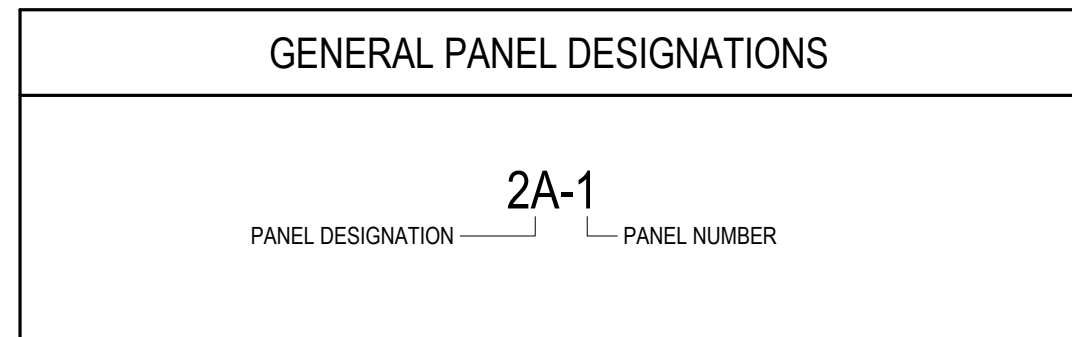


ABBREVIATIONS			
AFF	ABOVE FINISHED FLOOR	MW	MICROWAVE
AHU	AIR HANDLING UNIT	NL	NIGHT LIGHT
C	CONDUIT	RE	REMOVE FOR THE PURPOSE OF RELOCATION
CW	COMES WITH OR COMPLETE WITH	RL	ITEM IN ITS RELOCATED POSITION
CCT	CIRCUIT	RR	REMOVE AND REINSTALL IN SAME LOCATION
CM	CEILING MOUNTED	RTU	ROOFTOP UNIT
CU	CONDENSATE UNIT	SBP	STROBE BOOSTER PANEL
DW	DISHWASHER	TYP	TYPICAL
E	EXISTING TO REMAIN	UPS	UNINTERRUPTIBLE POWER SUPPLY
EF	EXHAUST FAN	WDS	WATER DETECTOR SHUT OFF
FCU	FAN COIL UNIT		
FR	FRIDGE		
GF	GROUND FAULT		
GFCI	GROUND FAULT CIRCUIT INTERRUPTER		
HD	HAND DRYER		
HWT	HOT WATER TANK		

SPECIAL ELECTRICAL RECEPTACLE DESIGNATION			
RECEPTACLE DESIGNATION			
DESIGNATION	TYPE	DESCRIPTION	
1	5-15R	120V, 15A, 1Ø, SINGLE RECEPTACLE	
2	5-30R	120V, 30A, 1Ø, DUPLEX RECEPTACLE	
3	5-40R	120V, 40A, 1Ø, DUPLEX RECEPTACLE	
4	L6-20R	250V, 20A, 1Ø, TWIST LOCK RECEPTACLE	



FIRE ALARM LEGEND			
	OR		STAND ALONE FIRE ALARM SMOKE DETECTOR. WALL MOUNTED SHOWN ON LEFT. CEILING MOUNTED SHOWN ON RIGHT.
	OR		FIRE ALARM HEAT DETECTOR. WALL MOUNTED SHOWN ON LEFT. CEILING MOUNTED SHOWN ON RIGHT.
	OR		FIRE ALARM STROBE LIGHT. PROVIDE SHOP DRAWINGS FOR REVIEW. PROVIDE NECESSARY MATERIALS (INCLUDING BOOSTERS) FOR A COMPLETE WORKING SYSTEM. WALL MOUNTED SHOWN ON LEFT. CEILING MOUNTED SHOWN ON RIGHT.

LIGHTING CONTROLS			
	OR		LIGHT SWITCH. TYPE AS NOTED. 'L' DENOTES LINE VOLTAGE SWITCH. 'LV' DENOTES LOW VOLTAGE SWITCH. WATTSTOPPER #LVSW-102-W
	OR		LIGHT SWITCH. TYPE AS NOTED. WALL MOUNTED SHOWN ON LEFT. CEILING MOUNTED SHOWN ON RIGHT. 'XX' = 'OS' DENOTES OCCUPANCY SENSOR. WATTSTOPPER #LMDC-100

APPLICABLE FOR GENERIC WATTSTOPPER/ACUITY LIGHTING CONTROL SYSTEMS			
	OR		ROOM CONTROLLER. 'X' = 'A', 'B', & 'C' DENOTES SINGLE, 2, & 3 ZONES RESPECTIVELY. WATTSTOPPER #LMRC-211 SERIES.

ELECTRICAL SINGLE LINE DRAWING LEGEND	
	UNFUSED DISCONNECT.
	DISTRIBUTION TRANSFORMER. 'XXX' = 'HMT' TO DENOTE HARMONIC MITIGATION / CANCELLATION. 'XXX' = 'K' TO DENOTE K-RATED.
	WYE.

LIGHTING LEGEND	
	LUMINAIRES WITH 'NL' DENOTES HARDWIRED TO NIGHT LIGHT CIRCUIT C/W LOCK OFF BREAKER.
	2' 120V T-BAR LED LINEAR FIXTURE. 900LM. 9.5W. 3500K. 0-10V DIMMABLE. JLC TECH - T-BAR LED X SERIES #TBLX-MW-HO-2-24-DW-U-W-UNV.
	3.3" 120V LED ROUND DOWNLIGHT. 1500LM. 13.9W. 3500K. 0-10V DIMMABLE. 3G LIGHTING #3G-DL3RF-15-580-35K-60D-UNV-DIM-BT-BH-NC-BH.
	3.3" 120V LED ROUND DOWNLIGHT. 1500LM. 13.9W. 3500K. 0-10V DIMMABLE. 3G LIGHTING #3G-DL3RF-15-580-35K-60D-UNV-DIM-BT-BH-NC-F.
	2'x8" 120V LED INTEGRATED PENDANT SLOT - DIRECT + INDIRECT. 500LM/FT DOWN / 500LM/FT UP. 8.6W/FT. 3500K. 0-10V DIMMABLE. 3G LIGHTING #3GI-2P-SL-DI-SE-S(80°)-2LI-D500-L500-FL-FL-BK-BFP-DF3-07-45D-H90-35K-UNV-DIM-60°-1C.
	4' 120V LED LINEAR FIXTURE. 4454-5895LM. 34-45W. 3500K/4000K/5000K. 0-10V DIMMABLE. ERALUX - JOBBER LINEAR #AE-SF-JB-CA-04-45/38/34-835-50.
	36" DIA. 120V LED DECORATIVE PENDANT FIXTURE - DIRECT + INDIRECT. 6560LM DOWN / 2600LM UP. 118W. 3500K. 0-10V DIMMABLE. ARANCIA #P81-36-S-N-B-B-U-1-G-R7-BK.
	347V EXIT SIGN WITH DIRECTIONAL ARROW AS INDICATED. EXIT SIGANCE TO MATCH BASE BUILDING STANDARDS. BELUCE #STELLA RUNNING MAN. WALL MOUNTED SHOWN ON LEFT. CEILING MOUNTED SHOWN ON RIGHT.
	347V WALL MOUNTED EMERGENCY LIGHTING BATTERY UNIT C/W INTEGRAL HEADS. OPERATING TIME SHALL BE MINIMUM TWO (2) HOURS. BELUCE - NOVIA #NV-12-360
	EMERGENCY LIGHTING DOUBLE REMOTE HEAD. WALL MOUNTED SHOWN ON LEFT. CEILING MOUNTED SHOWN ON RIGHT. BELUCE #SR SERIES. 12V. 4 WATTS. LED.
	EMERGENCY LIGHTING SINGLE REMOTE HEAD. WALL MOUNTED SHOWN ON LEFT. CEILING MOUNTED SHOWN ON RIGHT. BELUCE #SR SERIES. 12V. 4 WATTS. LED.
	347V WALL MOUNTED EMERGENCY LIGHTING BATTERY UNIT C/W EXIT SIGN. BELUCE #STELLA COMBO RUNNING MAN SERIES.
	EXISTING LINEAR LUMINAIRE TO REMAIN.

ELECTRICAL POWER LEGEND	
	120V, 1Ø DIRECT CONNECTION FOR EQUIPMENT AS NOTED.
	208V, 1Ø DIRECT CONNECTION FOR EQUIPMENT AS NOTED.
	208V, 3Ø DIRECT CONNECTION FOR EQUIPMENT AS NOTED.
	416V OR 480V, 3Ø DIRECT CONNECTION FOR EQUIPMENT AS NOTED.
	600V, 3Ø DIRECT CONNECTION FOR EQUIPMENT AS NOTED.
	WALL MOUNTED POWER & DATA INPUT FOR SYSTEMS FURNITURE. 'X' DENOTES TYPE.
	SURFACE MOUNTED WIRELOOM RACEWAY. COLOUR TO BE GREY. TYPE AS SPECIFIED C/W TYPE AND QUANTITY OF DEVICES INDICATED.
	SURFACE MOUNTED COMBINATION POWER, DATA, AND AV BOX. WELLMARK #FM4 SERIES
	UN-FUSED DISCONNECT SWITCH. 'X' DENOTES DISCONNECT RATING.
	JUNCTION BOX C/W BLANK COVER PLATE. SIZED FOR THE SERVICE/CONNECTION NOTED.
	TRANSFORMER.
	ELECTRICAL PANEL. FLUSH MOUNTED SHOWN ON LEFT. SURFACE MOUNTED SHOWN ON RIGHT.
	POWER PANEL. FLUSH MOUNTED SHOWN ON LEFT. SURFACE MOUNTED SHOWN ON RIGHT.
	COPPER GROUND BAR
	ASSISTANCE REQUESTED. PROVIDE 3/4" CONDUIT C/W PULL STRINGS TO AN ACCESSIBLE CEILING LOCATION.
	CARD READER. PROVIDE 3/4" CONDUIT C/W PULL STRINGS TO AN ACCESSIBLE CEILING LOCATION.
	DOOR CONTACT. PROVIDE 3/4" CONDUIT C/W PULL STRINGS TO AN ACCESSIBLE CEILING LOCATION.
	DOOR CONTROL UNIT. PROVIDE 3/4" CONDUIT C/W PULL STRINGS TO AN ACCESSIBLE CEILING LOCATION.
	DOOR RELEASE. PROVIDE 3/4" CONDUIT C/W PULL STRINGS TO AN ACCESSIBLE CEILING LOCATION.
	ELECTRIC STRIKE. PROVIDE 3/4" CONDUIT C/W PULL STRINGS TO AN ACCESSIBLE CEILING LOCATION.
	KEY SWITCH. PROVIDE 3/4" CONDUIT C/W PULL STRINGS TO AN ACCESSIBLE CEILING LOCATION.
	OCCUPIED SIGN. PROVIDE 3/4" CONDUIT C/W PULL STRINGS TO AN ACCESSIBLE CEILING LOCATION.
	PUSH TO LOCK. PROVIDE 3/4" CONDUIT C/W PULL STRINGS TO AN ACCESSIBLE CEILING LOCATION.
	PANIC STRIP. PROVIDE 3/4" CONDUIT C/W PULL STRINGS TO AN ACCESSIBLE CEILING LOCATION.
	REQUEST TO EXIT. PROVIDE 3/4" CONDUIT C/W PULL STRINGS TO AN ACCESSIBLE CEILING LOCATION.
	RESET PUSH BUTTON. PROVIDE 3/4" CONDUIT C/W PULL STRINGS TO AN ACCESSIBLE CEILING LOCATION.
	EXTERNAL/INTERNAL HORN. PROVIDE 3/4" CONDUIT C/W PULL STRINGS TO AN ACCESSIBLE CEILING LOCATION.
	AUTOMATIC DOOR OPERATOR PUSH BUTTON. PROVIDE 3/4" CONDUIT C/W PULL STRINGS TO AN ACCESSIBLE CEILING LOCATION.
	SECURITY CAMERA. PROVIDE 3/4" CONDUIT + JUNCTION BOX C/W PULL STRINGS TO AN ACCESSIBLE CEILING LOCATION.

ELECTRICAL RECEPTACLE LEGEND				
CEILING MOUNTED	WALL MOUNTED	EQUIPMENT / HEAD/WALL MOUNTED	MOUNTED ABOVE COUNTER HEIGHT	DESCRIPTION
				120V, 15A DUPLEX RECEPTACLE.
				120V, 15A SPLIT DUPLEX RECEPTACLE.
				120V, 15A GFCI DUPLEX RECEPTACLE.
				120V, 15/20A T-SLOT DUPLEX RECEPTACLE. 'HK' DENOTES HOUSEKEEPING RECEPTACLE.
				120V, 15/20A T-SLOT GFCI DUPLEX RECEPTACLE. 'HK' DENOTES HOUSEKEEPING RECEPTACLE.
				120V, 15A DOUBLE DUPLEX RECEPTACLE.
				120V, 15A EMERGENCY POWER DUPLEX RECEPTACLE.
				120V, 15/20A T-SLOT EMERGENCY POWER DUPLEX RECEPTACLE.
				SPECIAL RECEPTACLE. REFER TO SPECIAL RECEPTACLE DESIGNATION TABLE.

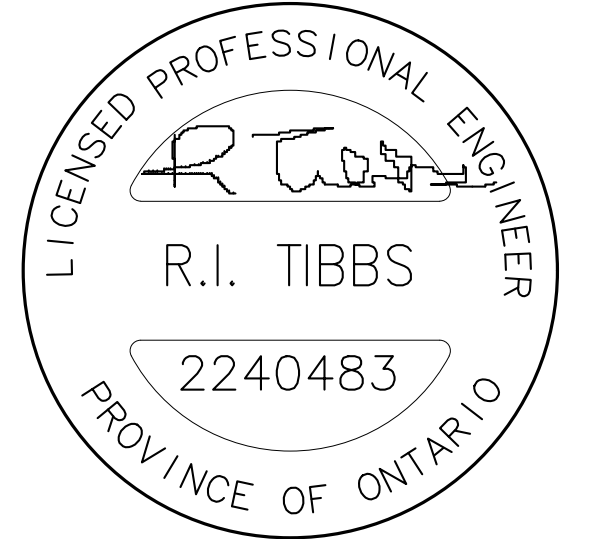
- GENERAL NOTES  
(NOTES AND NUMBERING BELOW PERTAINS TO ALL E-SERIES DRAWINGS.)
- COORDINATE WITH OWNER FOR SYSTEM ISOLATION ACTIVITIES INCLUDING STAGES OF REMOVAL OF EXISTING EQUIPMENT AND INSTALLATION OF NEW EQUIPMENT. [WORK TO BE PERFORMED BETWEEN XX AND YY HOURS, MONDAYS TO FRIDAYS, WEEKENDS, AND HOLIDAYS.]
  - CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGES TO SURFACES, FINISHES AND MATERIALS DUE TO WORK UNDER THIS CONTRACT AND SHALL INCUR ALL COSTS TO RECTIFY, REPAIR AND REPLACE SAME TO CONSULTANT'S SATISFACTION.
  - BE RESPONSIBLE FOR CUTTING, PAINTING AND PATCHING, AS REQUIRED, TO FACILITATE THE INSTALLATION OF NEW SERVICES. FIRESTOP AND CLOSE ANY OPENINGS IN WALLS OR CEILINGS THAT OCCUR DUE TO THE REMOVAL OF EXISTING SERVICES OR DUE TO INSTALLATION OF NEW SERVICES. FINISH TO MATCH EXISTING.
  - THE CONSULTANT DOES NOT WARRANT THE ACCURACY OF EXISTING BUILDING CONDITIONS, DIMENSIONS, OR MATERIALS REPRESENTED ON THE DRAWINGS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VISIT THE PLACE OF THE WORK AND SURROUNDINGS PRIOR TO SUBMITTING THE BID, TO FAMILIARIZE THEMSELVES WITH THE EXISTING CONDITIONS THAT WILL AFFECT THE WORK.
  - COORDINATE WORK WITH OTHER TRADES PRIOR TO THE ROUGH-IN OF ANY DEVICE INCLUDING COORDINATION WITH FURNITURE AND EQUIPMENT SUPPLIER.

ELECTRICAL SUPPLEMENTARY BIDS	
1.	UNIT PRICES
1.1.	NA.
2.	ITEMIZED PRICES
2.1.	NA.
4.	OPTIONAL PRICES
4.1.	CONTRACTOR TO PROVIDE OPTIONAL PRICE TO SUPPLY AND INSTALL ONE (1) LT-5 FIXTURE IN LIEU OF TWO (2) LT-1 FIXTURES IN ELEVATOR LOBBY 200.
4.2.	CONTRACTOR TO PROVIDE OPTIONAL PRICE TO SUPPLY AND INSTALL ONE (1) INTERCOM SYSTEM INFRASTRUCTURE C/W CONDUIT, JUNCTION BOXES AT GROUND FLOOR DOOR SECURITY TO IT LAN ROOM 218. COORDINATE ROUTING ON SITE PRIOR TO INSTALLATION.

**City of Pickering**  
2460 Brock Road,  
Pickering, ON, Canada  
L1X 0J1  
Building A-200A, 2nd Floor



HHAngus & Associates Limited Consulting Engineers  
1127 Leslie Street, Toronto, ON, M3C 2J6 Canada  
www.hhangus.com | T 416 443 8200 | F 416 443 8290



ISSUE	DATE	DESCRIPTION
03	240823	ISSUED FOR PERMIT/TENDER
02	240816	ISSUED FOR 100% COORDINATION
01	240808	ISSUED FOR 90% REVIEW
ISSUE	YYMMDD	DESCRIPTION



354 Davenport Road, Suite 200  
Toronto, Ontario, Canada M5R 1K6  
T: (416) 413-0063  
email: info@instudiocreative.com

Client Name	City of Pickering
Project Name	CoP Interior Fit-Out
Project Address	2460 Brock Road Pickering, ON L1X 0J1
Project number	2240483
Drawing Title	<b>ELECTRICAL LEGEND AND DRAWING LIST</b>
Drawing Scale	N.T.S.
Drawing Number	<b>E1.0</b>

True North

DRAWING LIST	
E1.0	ELECTRICAL LEGEND AND DRAWING LIST
E1.1	ELECTRICAL SPECIFICATIONS
E1.2	ELECTRICAL SPECIFICATIONS
E1.3	ELECTRICAL SPECIFICATIONS
E1.4	ELECTRICAL SPECIFICATIONS
E1.5	ELECTRICAL SPECIFICATIONS
E2.0	REFLECTED CEILING PLAN 2ND FLOOR
E3.0	POWER AND SYSTEMS PLAN 2ND FLOOR
E4.0	ELECTRICAL DETAILS
E4.1	ELECTRICAL DETAILS
E4.2	PANEL SCHEDULES

NOMINAL CONDUIT SIZES										
mm	16	21	27	35	41	53	63	78	91	103
inch	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4

ELECTRICAL GENERAL LEGEND	
	ELECTRICAL EQUIPMENT LABEL. 'XXX' DENOTES ITEM CATEGORY. 'YY' DENOTES ITEM REFERENCE.
	EXISTING ELECTRICAL EQUIPMENT OR SERVICE TO REMAIN.
	EXISTING ELECTRICAL EQUIPMENT OR SERVICE TO BE REMOVED.
	EXISTING ELECTRICAL EQUIPMENT OR SERVICE TO BE RELOCATED.
	NEW LOCATION OF RELOCATED ELECTRICAL EQUIPMENT OR SERVICE.
	DEMARCATON POINT. ITEMS TO THE LEFT OF THE POINT IS BY DIVISION 'XX'. ITEMS TO THE RIGHT OF THE POINT IS BY DIVISION 'YY'.





[OESC][CSA C22.1]

- 1 Patient care areas - as defined in Section 24 of [OESC][CSA C22.1], and include:
(a) Basic care areas,
(b) Critical care areas,
(c) Intermediate care areas.
2 Basic care areas - as defined in Section 24 of [OESC][CSA C22.1]. The following areas are examples of basic care areas:
(a) Patient care areas where body contact between a patient and medical electrical equipment is neither frequent nor usual, eg: Examination rooms, in which medical electrical equipment is typically NOT used.
3 Critical care areas - as defined in Section 24 of [OESC][CSA C22.1]. The following areas are examples of critical care areas.
(a) Anaesthetizing locations
(b) Intensive Care Units
(c) Coronary Care Units
(d) Special Care Units
(e) Cardiovascular Care Units
(f) Intermediate Coronary Care Units
(g) Renal Dialysis Units
(h) Angiographic Laboratories
(i) Burn Units
(j) Cardiac Catheterization Laboratories
(k) Emergency Trauma Units
(l) Resuscitation Rooms
4 Intermediate care areas - as defined in Section 24 of [OESC][CSA C22.1]. The following spaces are examples of intermediate care areas.
(a) Patient bedwards (except where specifically identified as Basic Care)
(b) Treatment rooms
(c) Examination rooms (where medical electrical equipment is typically used)
(d) Clinics and similar areas
(e) Recovery Rooms
(f) Patient Holding Areas
(g) Patient Preparation Rooms
(h) Hydrotherapy Rooms
(i) Dialysis Treatment Stations

- 1.4 Applicable Codes and Standards
1 Installation codes and standards:
1 CSA Z32 Electrical Safety and Essential Electrical Systems in Health Care Facilities.
2 PRODUCTS
2.1 Receptacles
1 Receptacles in patient care areas: Hospital Grade.
2 Receptacles connected to the emergency power system: coloured red.
3 Receptacles in patient care areas to have circuit identification in accordance with CSA standard Z32.
4 Circuit identification labels:
1 permanent label incorporated into the face of the receptacle (not the cover plate), and visible with the cover plate in place, or
2 a lamacoid secured to the wall above the receptacle (not to the cover plate).
5 Circuit identification information;
1 name of panel feeding the receptacle, circuit number.
6 Lettering of circuit identification;
1 not less than 6mm high,
2 black letters, on white background for normal power,
3 red letters, on white background for emergency power.
3 EXECUTION
3.1 Bonding to Ground
1 The following requirements apply to all patient care areas:
1 Bond to ground receptacles and permanently wired electrical equipment by installing an insulated green equipment bonding conductor in the same conduit as the branch circuit conductors.
2 Terminate the bonding conductor at the load end of the circuit to the ground screw in the outlet box and extend to the ground screw on the device. At the source end, terminate the bonding conductor on the ground bus in the panel.
3 Provide a separate bonding conductor for each circuit, except that where the single phase receptacles in a patient care environment are supplied from two 2-wire branch circuits in the same conduit, a single bonding conductor may be provided for the two circuits.
4 Size bonding conductors not less than the branch circuit conductors. Oversize bonding conductors where necessary to comply with the voltage rise limit per CSA standard Z32.
5 In critical care areas provide a separate #10 bonding conductor for each circuit, from the outlet back to the panel.
6 Interconnect the ground buses in electrical panels which serve the same patient care areas with an insulated green copper conductor installed in PVC conduit and sized per Table 16 of the Electrical Safety Code, but not less than #6 AWG.
7 Bond to ground exposed metal non-current carrying parts of equipment located within 1.5 m horizontally from the nominal position of the bed and within 2.3 m vertically above the floor. Use green insulated copper bonding conductors;
8 Typical equipment to be bonded to ground includes:
(a) fixtures,
(b) headwall units,
(c) service strips,
(d) intercom stations,
(e) nurse call stations,
(f) view boxes,
(g) receptacles,
(h) switches,
(i) cover plates,
(j) conduits,
(k) outlet boxes, and
(l) other equipment as required by Code.

- 3.2 Neutral Conductors
1 In intermediate care areas and critical care areas, provide a separate neutral conductor for each branch circuit phase conductor back to the panel supplying the outlet.
2 Where multiple circuits share a conduit, derate conductors, where required, on the basis that the neutral conductors are full current carrying conductors.
END OF SECTION
WIRING TO OWNERS EQUIPMENT
26 07 13
1. GENERAL
1.1 Related Work
1.1.1 Certain items, such as ranges, dishwashers and refrigerators, will be supplied by Owners and put in place by another Division.
2. EXECUTION
2.1 Installation
2.1.1 Provide electrical work required to connect up electrical parts of items, supplied by Owners and placed by another Division.
2.1.2 Disconnect Owner's equipment, where such exists in building, prior to its relocation, and reconnect in its new location.

- TESTING OF HOSPITAL WIRING
26 08 13
1 GENERAL
1.1 Scope
1 Provide testing of wiring systems in hospitals.
1.2 Related Sections
1 Without limiting the scope of work or applicability of other specification sections, the work under this section directly integrates with or refers to the following specification sections:

- 1.26 07 05 Special Hospital Wiring
1.3 Applicable Codes and Standards
1 Installation codes and standards:
1 CSA Z32 Electrical Safety and Essential Electrical Systems in Health Care Facilities.
1.4 Definitions
1 Refer to definitions in Section 26 07 05.
1.5 Qualified Tradesperson
1 The testing specified in this Section is to be provided by only one of the following professional independent testing organizations:
1 Haronitis & Associates
2 Rondar
3 Brosz & Associates
4 Schneider Canada Service
5 Enkompass
1.6 Quality Control
1 The checks and tests described in this section are in addition to the normal visual and mechanical inspections and to the testing specified elsewhere.
2 Demonstrate and document that each branch circuit breaker, receptacle and circuit serving a patient care area is in compliance with the requirements of the Electrical Safety Code, CSA standard Z32 and this specifications. The patient care areas include;
1 Basic care,
2 Intermediate care,
3 Critical care.
3 Where the requirements of the specifications, the ESC and the CSA standard differ, comply with the most stringent requirements.
4 Refer to CSA Standard Z32 for test circuits.
5 Conduct tests and checks in the presence of the Consultant; the Consultant may choose to witness this testing on a sampling basis.
6 Give timely notice to the Consultant that the work is ready for testing.
7 Where required, provide remedial work and retesting at no cost to the Owner until acceptable results are obtained and documented.
8 Do not place equipment into service until acceptable results have been obtained and reviewed by the Consultant.
9 The submission of acceptable test results is a pre-requisite to permitting occupancy of a patient care area.
1.7 Submittals
1 Include copies of the completed reports and results in the Operating and Maintenance Manuals.
2 PRODUCTS
2.1 (Not used)
3 EXECUTION
3.1 Reporting Requirements
1 Include in the reports the individual test results for each test conducted on each breaker, receptacle, circuit. Test results to include;
1 measured values plus, where applicable, the calculated values,
2 go/no go conditions,
3 name of the patient care area,
4 room number,
5 circuit number,
6 receptacle identification where more than one receptacle is connected to a circuit,
7 specific outlet of a duplex receptacle (eg: top, bottom),
8 name of the panelboard/isolated power system that feeds the circuit,
9 date,
10 name of the individual(s) who performed the checks and tests.
2 Results for each room to be on a separate page(s).
3 Reports to include a certificate, bearing a professional engineer's seal and signature, stating that the installation meets the requirements of the CSA Z32, and is suitable for patient use.
4 Reports to be paper (hard copy) documents, as well as in digital files.
3.2 Preliminary Checks
1 Confirm that the installation is complete, cleaned and ready for testing.
3.3 Tests
1 Perform the following tests, as applicable, on each branch breaker, circuit, and receptacle serving a patient care area:
1 Branch Circuit Breaker Mechanical Operation,
2 Conductor Insulation Integrity Test (for grounded systems only),
3 Receptacle Retentive Force Test,
4 Receptacle Polarity Test,
5 Branch Circuit Impedance Test (Voltage Drop Test - for grounded systems only),
6 Ground Point Voltage Rise Test (for grounded systems only),
7 Potential Difference Between Ground Points Test,
8 Impedance to Ground Test (single phase isolated systems only),
9 Maximum Hazard Index Test (single phase isolated systems only).
3.4 Branch Circuit Breaker Mechanical Operation
1 Requirements:
1 Each breaker to open and close.
2 Method:
1 Confirm that no utilization equipment is connected to the system.
2 Open and close each branch circuit breaker three times.
3 Confirm that each branch circuit breaker operates mechanically.
4 Record go/no go operation of each breaker.
3.5 Conductor Insulation Integrity Test (Grounded Systems Only)
1 Requirements:
1 Not less than 10kΩ to ground for neutral conductors (all neutrals combined).
2 Not less than 500kΩ to ground for each ungrounded conductor.
2 Method:
1 Use a 500V dc megohmmeter, isolate the branch circuits under test as required.
2 Ensure that other circuits serving patients or sensitive equipment are not exposed to the test voltage.
3 Measure the insulation resistance of each branch circuit conductor with all wiring devices connected.
4 Confirm that the values for each conductor meet the requirements.
5 Record the measured values.
3.6 Receptacle Retentive Force Test
1 Requirements:
1 A force of 1.1 Newtons does not remove a test pin from the ground slot of a receptacle.
2 A force of 13 Newtons does not remove a two pin test attachment plug from a receptacle.
2 Method:
1 Use the test pins and methods specified in CSA Standard C22.2 No. 42. As an alternative, a commercially available "tension tester" complying with CSA Standard C22.22 No. 42, General Use Receptacles, Plugs and Similar Wiring Devices may be employed.
2 If using the tension checker, ensure that the device is calibrated for tension (Newtons) for both single-ground pin and for multiple pin testing.
3 For each outlet, check that the tension of ground pin removal meets or exceeds the requirement.
4 For each outlet, check that the tension of the two pin removal meets or exceeds the requirement.
5 Record go/no go tension reading for each outlet.
3.7 Receptacle Polarity Test
1 Requirements:
1 Receptacles to be connected in accordance with configurations listed in Canadian Electrical Code CSA C22.1, latest edition Section 26.
2 Method:
1 Utilize polarity test set, and test each receptacle.
2 Correct connection of receptacles where polarity indication is incorrect.
3 Record go/no go test results for each receptacle.
3.8 Branch Circuit Impedance Test (Voltage Drop Test - Grounded Systems Only)
1 Requirements:
1 Voltage drop in branch circuit wiring from panelboards to receptacles not to exceed 3% when a load of not less than 80% of the breaker rating is applied at the receptacle.

- 2 Method:
1 Utilize equipment approved by the Consultant. See Figure 2 in CSA standard Z32 for test circuit.
2 Ensure that all circuits other than the one under test are de-energized.
3 Record no load voltage at receptacle (V/O).
4 Apply current to 80% of the rating of the overcurrent device protecting the circuit under test and record voltage (V/L).
5 Remove load and reconfirm value of V/O.
6 Calculate voltage drop at receptacle by the formula:
7 Record the results.
8 Where the calculated voltage drop exceeds [3.3%][3.6%] rework the branch circuit wiring as required to reduce the voltage drop within the required value. Note that a voltage drop up to 5%, as identified in the Z32 standard is not acceptable.
3.9 Ground Point Voltage Rise Test (Grounded Systems Only)
1 Requirements:
1 The voltage rise at the ground point of each receptacle not to exceed 3 V when a current of not less than 80% of the rating of the overcurrent device, protecting the circuit under test, is passed through the bonding conductor.
2 Method:
1 Use the test circuit of Figure 4 in CSA standard Z32.
2 Connect the test circuit to the outlet.
3 With switch SW open, record the voltage indicated by voltmeter V/1 as V/N, the neutral to ground voltage without load. If it exceeds about 2 V, determine the cause and correct the defect.
4 Using the low voltage supply, (nominally 5 V open circuit) apply a load of 80% of the rated current of the circuit, between the neutral and the bonding conductor for a period of from 1 to 5 s. Feed the low voltage supply from a circuit other than the one being tested. Record the current I, the voltage indicated by voltmeter V/1 as V/R, and the voltage indicated by voltmeter V/2 as V/O.
5 Record the results. The return path voltage rise V/O not to exceed 3 V.
6 Where voltage rise exceeds 3 V, rework the branch circuit bonding conductor as required to reduce the voltage rise within the required value.
3.10 Potential Difference Between Ground Points Test
1 Requirements:
1 Potential difference between the grounding poles of receptacles and between these poles and all other exposed conductive non-current-carrying parts in the same patient care environment, to be less than 20 mV.
2 Method:
1 Use the standard frequency-weighted test circuit of Figure 3 in CSA standard Z32.
2 Confirm that all receptacles have been installed and that no utilization equipment, either permanently wired or cord-connected, is connected to the system.
3 Energize the system.
4 Select a local reference point known to be bonded to ground and record the measured voltage between this chosen reference and each receptacle ground pole and each exposed conductive non-current-carrying metal part.
5 If the test leads are long, correct the readings for pickup (zero reading when the test leads are connected together).
6 Record the results.
3.11 Impedance to Ground Test (Single Phase Isolated Systems Only)
1 Requirements:
1 Impedance between each energized conductor and ground to exceed 200,000Ω (not more than 600 microamperes when expressed as a current on a 120 Volt system).
2 Method:
1 Confirm that all receptacles have been installed and that no utilization equipment is connected to the system.
2 Open the circuit breaker to the line isolation monitor.
3 Verify that the system is ungrounded.
4 Energize the system.
5 Use the standard load and measuring device as shown in Figure 3 in CSA standard Z32.
6 Measure the voltage (Vm1 and Vm2) between a reference ground and each energized conductor in sequence.
7 Compute the current flow using the formula:
Where:
I/ is in microamperes
Vm is the greater of Vm1 and Vm2, in volts
8 Verify that the measured current does not exceed the value:
Where:
I/max is in microamperes
E/ is the nominal voltage between the energized conductors in volts
9 Record the results.
10 Where the system impedance is less than the requirement, test each circuit individually by opening all other breakers on the system in order to identify where the problem exists. Rework the branch circuits as necessary to increase the impedance to the required value.
3.12 Maximum Hazard Test (Single Phase Isolated Systems Only)
1 Requirements:
1 Hazard index readings to be recorded, this is for future reference when maintaining the isolated power systems.
2 Method:
1 Measure the maximum hazard index values on the line isolation monitor with:
(a) all circuit breakers closed,
(b) all permanently installed equipment switched on, (fluorescent lighting ballasts switched off) and
(c) all cord-connected equipment disconnected.
2 Record the results.

- 3.13 Reports
1 Prepare and submit reports within 5 days of the completion of testing in an area.
2 Submit one complete copy of reports, studies and test results directly to each of the Consultant and the Owner. Simultaneously submit a further 6 copies to be processed as a shop drawing.
END OF SECTION

PROJECT CLOSE-OUT ELECTRICAL
26 08 19

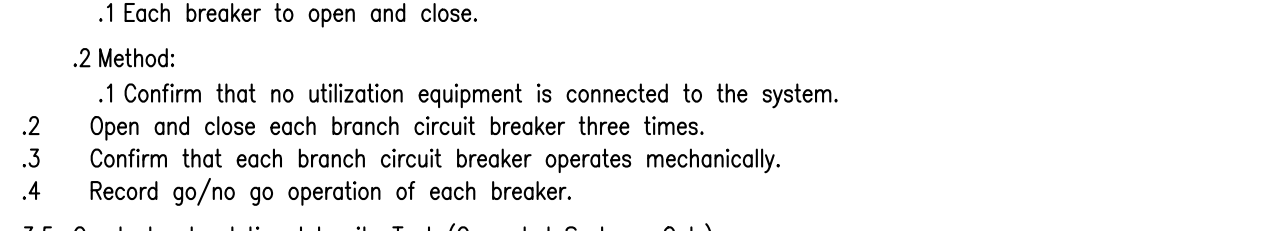
- 1. GENERAL
1.1 Scope
1.1.1 Provide documentation deliverables at completion of the Work.
1.2 Substantial Performance
1.2.1 Complete the Substantial Performance Checklist and submit with required documentation when applying for Substantial Performance of the Work.
1.2.2 Where the work is sub-divided into separate scopes of Work, each requiring a separate Substantial Performance application, provide a separate checklist for each application.
1.2.3 Prepare and submit to the Consultant a comprehensive deficiency list of items to be completed or corrected, as part of the application for a review by the Consultant to establish Substantial Performance of the Work, or for each designated portion of the Work in the case of phased Substantial Performance.
1.2.3.a Failure to include an item on the list does not alter the Contractor's responsibility to complete the Work.
1.2.4 Within five working days of the Consultant's review report which indicates that Substantial Performance of the Work has been achieved, provide a detailed schedule for completion and/or correction of the Work of all items described in the Contractors' and the Consultants' deficiency list.
1.3 Total Performance
1.3.1 Submit the following documentation with the application for Total Performance. Application for Total Performance cannot be submitted any earlier than the date of Alternate Season testing.
1.3.1.a The following requirements are completed and included in this application. Where documentation has been issued directly to the Owner, a copy of the transmittal is enclosed.

- Contractor has compiled and submitted a detailed deficiency list, identifying work still to be completed, incomplete, or requires correction.
-Building department inspection reports.
-ESA field inspection reports.
-Fire alarm verification certificate.
-Independent testing company, coordination study and testing reports submitted.
-Equipment and wiring identification completed

- 2. PRODUCTS
2.1 General
2.1.1 Transformers to have voltage and kVA rating indicated
2.1.2 Vacuum impregnated polyester resin construction.
2.1.3 Efficiency to meet or exceed CSA C802.2. Transformers to bear the Energy Star and Environmental Choice logos. Minimum efficiency to be 98%.
2.1.4 Transformer windings and all current carrying parts to be copper.
2.1.5 Transformers to be well-contained, free standing units suitable for floor mounting. Where shown or required to be wall mounted, necessary mounting hardware to be included.
2.1.6 Transformers to have provisions for incoming and outgoing conductor entry shown on Drawings.
2.1.7 Transformers to have 4-2% full capacity primary taps, two above and two below nominal voltage.
2.1.8 Three phase transformers to have delta connected primary and 120/208 volt grounded WYE secondary unless otherwise noted.
2.1.9 Transformers to be equipped with grounding provision specified in Table 3 of CSA Standard C9.
2.2 Ratings
2.2.1 kVA capacity indicated to be based on Class 220 degree C insulation, 130 degree C rise.
2.2.2 Transformers to be type ANN.
2.2.3 Transformers to be K-Rated K13.
2.2.4 Transformers rated below 300kVA to have noise level as per Table 8 of CSA Standard unless otherwise noted.
2.2.5 Transformers rated 300 kVA and larger to have a noise level 3 dB below that shown on Table 8 of CSA Standard.
2.3 Support and Isolation
2.3.1 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection under weight and weight distribution of supported equipment. Pads to provide a minimum of 1/4" static deflection.
2.4 Enclosure and Finish
2.4.1 Enclosure: Type 1 with drip shield
2.4.2 Transformer enclosure to have primary metal treatment and to be finished with 2 coats of UL50 3R rated powder coat finishing paint.
2.4.3 Finish equipment as follows:

- 1.1.1 Dry type transformers to CSA C22.2 No. 47 and CSA C9.
1.1.2 CSA 802.2
2. PRODUCTS
2.1 General
2.1.1 Transformers to have voltage and kVA rating indicated
2.1.2 Vacuum impregnated polyester resin construction.
2.1.3 Efficiency to meet or exceed CSA C802.2. Transformers to bear the Energy Star and Environmental Choice logos. Minimum efficiency to be 98%.
2.1.4 Transformer windings and all current carrying parts to be copper.
2.1.5 Transformers to be well-contained, free standing units suitable for floor mounting. Where shown or required to be wall mounted, necessary mounting hardware to be included.
2.1.6 Transformers to have provisions for incoming and outgoing conductor entry shown on Drawings.
2.1.7 Transformers to have 4-2% full capacity primary taps, two above and two below nominal voltage.
2.1.8 Three phase transformers to have delta connected primary and 120/208 volt grounded WYE secondary unless otherwise noted.
2.1.9 Transformers to be equipped with grounding provision specified in Table 3 of CSA Standard C9.
2.2 Ratings
2.2.1 kVA capacity indicated to be based on Class 220 degree C insulation, 130 degree C rise.
2.2.2 Transformers to be type ANN.
2.2.3 Transformers to be K-Rated K13.
2.2.4 Transformers rated below 300kVA to have noise level as per Table 8 of CSA Standard unless otherwise noted.
2.2.5 Transformers rated 300 kVA and larger to have a noise level 3 dB below that shown on Table 8 of CSA Standard.
2.3 Support and Isolation
2.3.1 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection under weight and weight distribution of supported equipment. Pads to provide a minimum of 1/4" static deflection.
2.4 Enclosure and Finish
2.4.1 Enclosure: Type 1 with drip shield
2.4.2 Transformer enclosure to have primary metal treatment and to be finished with 2 coats of UL50 3R rated powder coat finishing paint.
2.4.3 Finish equipment as follows:

- 354 Davenport Road, Suite 200
Toronto, Ontario, Canada M5R 1K6
T: (416) 413-0063
email: info@instudiocreative.com



Client Name City of Pickering
Project Name CoP Interior Fit-Out
Project Address 2460 Brock Road Pickering, ON L1X 0J1
Project number 2240483
Drawing Title ELECTRICAL SPECIFICATIONS
Drawing Scale N.T.S.
Drawing Number E1.3
True North

- 1.1.1 Dry type transformers to CSA C22.2 No. 47 and CSA C9.
1.1.2 CSA 802.2
2. PRODUCTS
2.1 General
2.1.1 Transformers to have voltage and kVA rating indicated
2.1.2 Vacuum impregnated polyester resin construction.
2.1.3 Efficiency to meet or exceed CSA C802.2. Transformers to bear the Energy Star and Environmental Choice logos. Minimum efficiency to be 98%.
2.1.4 Transformer windings and all current carrying parts to be copper.
2.1.5 Transformers to be well-contained, free standing units suitable for floor mounting. Where shown or required to be wall mounted, necessary mounting hardware to be included.
2.1.6 Transformers to have provisions for incoming and outgoing conductor entry shown on Drawings.
2.1.7 Transformers to have 4-2% full capacity primary taps, two above and two below nominal voltage.
2.1.8 Three phase transformers to have delta connected primary and 120/208 volt grounded WYE secondary unless otherwise noted.
2.1.9 Transformers to be equipped with grounding provision specified in Table 3 of CSA Standard C9.
2.2 Ratings
2.2.1 kVA capacity indicated to be based on Class 220 degree C insulation, 130 degree C rise.
2.2.2 Transformers to be type ANN.
2.2.3 Transformers to be K-Rated K13.
2.2.4 Transformers rated below 300kVA to have noise level as per Table 8 of CSA Standard unless otherwise noted.
2.2.5 Transformers rated 300 kVA and larger to have a noise level 3 dB below that shown on Table 8 of CSA Standard.
2.3 Support and Isolation
2.3.1 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection under weight and weight distribution of supported equipment. Pads to provide a minimum of 1/4" static deflection.
2.4 Enclosure and Finish
2.4.1 Enclosure: Type 1 with drip shield
2.4.2 Transformer enclosure to have primary metal treatment and to be finished with 2 coats of UL50 3R rated powder coat finishing paint.
2.4.3 Finish equipment as follows:

DRY TYPE TRANSFORMERS UP TO 600 V PRIMARY
26 22 13

- 1. GENERAL
1.1 References
1.1.1 Dry type transformers to CSA C22.2 No. 47 and CSA C9.
1.1.2 CSA 802.2
2. PRODUCTS
2.1 General
2.1.1 Transformers to have voltage and kVA rating indicated
2.1.2 Vacuum impregnated polyester resin construction.
2.1.3 Efficiency to meet or exceed CSA C802.2. Transformers to bear the Energy Star and Environmental Choice logos. Minimum efficiency to be 98%.
2.1.4 Transformer windings and all current carrying parts to be copper.
2.1.5 Transformers to be well-contained, free standing units suitable for floor mounting. Where shown or required to be wall mounted, necessary mounting hardware to be included.
2.1.6 Transformers to have provisions for incoming and outgoing conductor entry shown on Drawings.
2.1.7 Transformers to have 4-2% full capacity primary taps, two above and two below nominal voltage.
2.1.8 Three phase transformers to have delta connected primary and 120/208 volt grounded WYE secondary unless otherwise noted.
2.1.9 Transformers to be equipped with grounding provision specified in Table 3 of CSA Standard C9.
2.2 Ratings
2.2.1 kVA capacity indicated to be based on Class 220 degree C insulation, 130 degree C rise.
2.2.2 Transformers to be type ANN.
2.2.3 Transformers to be K-Rated K13.
2.2.4 Transformers rated below 300kVA to have noise level as per Table 8 of CSA Standard unless otherwise noted.
2.2.5 Transformers rated 300 kVA and larger to have a noise level 3 dB below that shown on Table 8 of CSA Standard.
2.3 Support and Isolation
2.3.1 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection under weight and weight distribution of supported equipment. Pads to provide a minimum of 1/4" static deflection.
2.4 Enclosure and Finish
2.4.1 Enclosure: Type 1 with drip shield
2.4.2 Transformer enclosure to have primary metal treatment and to be finished with 2 coats of UL50 3R rated powder coat finishing paint.
2.4.3 Finish equipment as follows:

- 1.1.1 Dry type transformers to CSA C22.2 No. 47 and CSA C9.
1.1.2 CSA 802.2
2. PRODUCTS
2.1 General
2.1.1 Transformers to have voltage and kVA rating indicated
2.1.2 Vacuum impregnated polyester resin construction.
2.1.3 Efficiency to meet or exceed CSA C802.2. Transformers to bear the Energy Star and Environmental Choice logos. Minimum efficiency to be 98%.
2.1.4 Transformer windings and all current carrying parts to be copper.
2.1.5 Transformers to be well-contained, free standing units suitable for floor mounting. Where shown or required to be wall mounted, necessary mounting hardware to be included.
2.1.6 Transformers to have provisions for incoming and outgoing conductor entry shown on Drawings.
2.1.7 Transformers to have 4-2% full capacity primary taps, two above and two below nominal voltage.
2.1.8 Three phase transformers to have delta connected primary and 120/208 volt grounded WYE secondary unless otherwise noted.
2.1.9 Transformers to be equipped with grounding provision specified in Table 3 of CSA Standard C9.
2.2 Ratings
2.2.1 kVA capacity indicated to be based on Class 220 degree C insulation, 130 degree C rise.
2.2.2 Transformers to be type ANN.
2.2.3 Transformers to be K-Rated K13.
2.2.4 Transformers rated below 300kVA to have noise level as per Table 8 of CSA Standard unless otherwise noted.
2.2.5 Transformers rated 300 kVA and larger to have a noise level 3 dB below that shown on Table 8 of CSA Standard.
2.3 Support and Isolation
2.3.1 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection under weight and weight distribution of supported equipment. Pads to provide a minimum of 1/4" static deflection.
2.4 Enclosure and Finish
2.4.1 Enclosure: Type 1 with drip shield
2.4.2 Transformer enclosure to have primary metal treatment and to be finished with 2 coats of UL50 3R rated powder coat finishing paint.
2.4.3 Finish equipment as follows:

- 1.1.1 Dry type transformers to CSA C22.2 No. 47 and CSA C9.
1.1.2 CSA 802.2
2. PRODUCTS
2.1 General
2.1.1 Transformers to have voltage and kVA rating indicated
2.1.2 Vacuum impregnated polyester resin construction.
2.1.3 Efficiency to meet or exceed CSA C802.2. Transformers to bear the Energy Star and Environmental Choice logos. Minimum efficiency to be 98%.
2.1.4 Transformer windings and all current carrying parts to be copper.
2.1.5 Transformers to be well-contained, free standing units suitable for floor mounting. Where shown or required to be wall mounted, necessary mounting hardware to be included.
2.1.6 Transformers to have provisions for incoming and outgoing conductor entry shown on Drawings.
2.1.7 Transformers to have 4-2% full capacity primary taps, two above and two below nominal voltage.
2.1.8 Three phase transformers to have delta connected primary and 120/208 volt grounded WYE secondary unless otherwise noted.
2.1.9 Transformers to be equipped with grounding provision specified in Table 3 of CSA Standard C9.
2.2 Ratings
2.2.1 kVA capacity indicated to be based on Class 220 degree C insulation, 130 degree C rise.
2.2.2 Transformers to be type ANN.
2.2.3 Transformers to be K-Rated K13.
2.2.4 Transformers rated below 300kVA to have noise level as per Table 8 of CSA Standard unless otherwise noted.
2.2.5 Transformers rated 300 kVA and larger to have a noise level 3 dB below that shown on Table 8 of CSA Standard.
2.3 Support and Isolation
2.3.1 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection under weight and weight distribution of supported equipment. Pads to provide a minimum of 1/4" static deflection.
2.4 Enclosure and Finish
2.4.1 Enclosure: Type 1 with drip shield
2.4.2 Transformer enclosure to have primary metal treatment and to be finished with 2 coats of UL50 3R rated powder coat finishing paint.
2.4.3 Finish equipment as follows:

- 1.1.1 Dry type transformers to CSA C22.2 No. 47 and CSA C9.
1.1.2 CSA 802.2
2. PRODUCTS
2.1 General
2.1.1 Transformers to have voltage and kVA rating indicated
2.1.2 Vacuum impregnated polyester resin construction.
2.1.3 Efficiency to meet or exceed CSA C802.2. Transformers to bear the Energy Star and Environmental Choice logos. Minimum efficiency to be 98%.
2.1.4 Transformer windings and all current carrying parts to be copper.
2.1.5 Transformers to be well-contained, free standing units suitable for floor mounting. Where shown or required to be wall mounted, necessary mounting hardware to be included.
2.1.6 Transformers to have provisions for incoming and outgoing conductor entry shown on Drawings.
2.1.7 Transformers to have 4-2% full capacity primary taps, two above and two below nominal voltage.
2.1.8 Three phase transformers to have delta connected primary and 120/208 volt grounded WYE secondary unless otherwise noted.
2.1.9 Transformers to be equipped with grounding provision specified in Table 3 of CSA Standard C9.
2.2 Ratings
2.2.1 kVA capacity indicated to be based on Class 220 degree C insulation, 130 degree C rise.
2.2.2 Transformers to be type ANN.
2.2.3 Transformers to be K-Rated K13.
2.2.4 Transformers rated below 300kVA to have noise level as per Table 8 of CSA Standard unless otherwise noted.
2.2.5 Transformers rated 300 kVA and larger to have a noise level 3 dB below that shown on Table 8 of CSA Standard.
2.3 Support and Isolation
2.3.1 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection under weight and weight distribution of supported equipment. Pads to provide a minimum of 1/4" static deflection.
2.4 Enclosure and Finish
2.4.1 Enclosure: Type 1 with drip shield
2.4.2 Transformer enclosure to have primary metal treatment and to be finished with 2 coats of UL50 3R rated powder coat finishing paint.
2.4.3 Finish equipment as follows:

- 1.1.1 Dry type transformers to CSA C22.2 No. 47 and CSA C9.
1.1.2 CSA 802.2
2. PRODUCTS
2.1 General
2.1.1 Transformers to have voltage and kVA rating indicated
2.1.2 Vacuum impregnated polyester resin construction.
2.1.3 Efficiency to meet or exceed CSA C802.2. Transformers to bear the Energy Star and Environmental Choice logos. Minimum efficiency to be 98%.
2.1.4 Transformer windings and all current carrying parts to be copper.
2.1.5 Transformers to be well-contained, free standing units suitable for floor mounting. Where shown or required to be wall mounted, necessary mounting hardware to be included.
2.1.6 Transformers to have provisions for incoming and outgoing conductor entry shown on Drawings.
2.1.7 Transformers to have 4-2% full capacity primary taps, two above and two below nominal voltage.
2.1.8 Three phase transformers to have delta connected primary and 120/208 volt grounded WYE secondary unless otherwise noted.
2.1.9 Transformers to be equipped with grounding provision specified in Table 3 of CSA Standard C9.
2.2 Ratings
2.2.1 kVA capacity indicated to be based on Class 220 degree C insulation, 130 degree C rise.
2.2.2 Transformers to be type ANN.
2.2.3 Transformers to be K-Rated K13.
2.2.4 Transformers rated below 300kVA to have noise level as per Table 8 of CSA Standard unless otherwise noted.
2.2.5 Transformers rated 300 kVA and larger to have a noise level 3 dB below that shown on Table 8 of CSA Standard.
2.3 Support and Isolation
2.3.1 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection under weight and weight distribution of supported equipment. Pads to provide a minimum of 1/4" static deflection.
2.4 Enclosure and Finish
2.4.1 Enclosure: Type 1 with drip shield
2.4.2 Transformer enclosure to have primary metal treatment and to be finished with 2 coats of UL50 3R rated powder coat finishing paint.
2.4.3 Finish equipment as follows:

- 1.1.1 Dry type transformers to CSA C22.2 No. 47 and CSA C9.
1.1.2 CSA 802.2
2. PRODUCTS
2.1 General
2.1.1 Transformers to have voltage and kVA rating indicated
2.1.2 Vacuum impregnated polyester resin construction.
2.1.3 Efficiency to meet or exceed CSA C802.2. Transformers to bear the Energy Star and Environmental Choice logos. Minimum efficiency to be 98%.
2.1.4 Transformer windings and all current carrying parts to be copper.
2.1.5 Transformers to be well-contained, free standing units suitable for floor mounting. Where shown or required to be wall mounted, necessary mounting hardware to be included.
2.1.6 Transformers to have provisions for incoming and outgoing conductor entry shown on Drawings.
2.1.7 Transformers to have 4-2% full capacity primary taps, two above and two below nominal voltage.
2.1.8 Three phase transformers to have delta connected primary and 120/208 volt grounded WYE secondary unless otherwise noted.
2.1.9 Transformers to be equipped with grounding provision specified in Table 3 of CSA Standard C9.
2.2 Ratings
2.2.1 kVA capacity indicated to be based on Class 220 degree C insulation, 130 degree C rise.
2.2.2 Transformers to be type ANN.
2.2.3 Transformers to be K-Rated K13.
2.2.4 Transformers rated below 300kVA to have noise level as per Table 8 of CSA Standard unless otherwise noted.
2.2.5 Transformers rated 300 kVA and larger to have a noise level 3 dB below that shown on Table 8 of CSA Standard.
2.3 Support and Isolation
2.3.1 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection under weight and weight distribution of supported equipment. Pads to provide a minimum of 1/4" static deflection.
2.4 Enclosure and Finish
2.4.1 Enclosure: Type 1 with drip shield
2.4.2 Transformer enclosure to have primary metal treatment and to be finished with 2 coats of UL50 3R rated powder coat finishing paint.
2.4.3 Finish equipment as follows:

- 1.1.1 Dry type transformers to CSA C22.2 No. 47 and CSA C9.
1.1.2 CSA 802.2
2. PRODUCTS
2.1 General
2.1.1 Transformers to have voltage and kVA rating indicated
2.1.2 Vacuum impregnated polyester resin construction.
2.1.3 Efficiency to meet or exceed CSA C802.2. Transformers to bear the Energy Star and Environmental Choice logos. Minimum efficiency to be 98%.
2.1.4 Transformer windings and all current carrying parts to be copper.
2.1.5 Transformers to be well-contained, free standing units suitable for floor mounting. Where shown or required to be wall mounted, necessary mounting hardware to be included.
2.1.6 Transformers to have provisions for incoming and outgoing conductor entry shown on Drawings.
2.1.7 Transformers to have 4-2% full capacity primary taps, two above and two below nominal voltage.
2.1.8 Three phase transformers to have delta connected primary and 120/208 volt grounded WYE secondary unless otherwise noted.
2.1.9 Transformers to be equipped with grounding provision specified in Table 3 of CSA Standard C9.
2.2 Ratings
2.2.1 kVA capacity indicated to be based on Class 220 degree C insulation, 130 degree C rise.
2.2.2 Transformers to be type ANN.
2.2.3 Transformers to be K-Rated K13.
2.2.4 Transformers rated below 300kVA to have noise level as per Table 8 of CSA Standard unless otherwise noted.
2.2.5 Transformers rated 300 kVA and larger to have a noise level 3 dB below that shown on Table 8 of CSA Standard.
2.3 Support and Isolation
2.3.1 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection under weight and weight distribution of supported equipment. Pads to provide a minimum of 1/4" static deflection.
2.4 Enclosure and Finish
2.4.1 Enclosure: Type 1 with drip shield
2.4.2 Transformer enclosure to have primary metal treatment and to be finished with 2 coats of UL50 3R rated powder coat finishing paint.
2.4.3 Finish equipment as follows:

- 1.1.1 Dry type transformers to CSA C22.2 No. 47 and CSA C9.
1.1.2 CSA 802.2
2. PRODUCTS
2.1 General
2.1.1 Transformers to have voltage and kVA rating indicated
2.1.2 Vacuum impregnated polyester resin construction.
2.1.3 Efficiency to meet or exceed CSA C802.2. Transformers to bear the Energy Star and Environmental Choice logos. Minimum efficiency to be 98%.
2.1.4 Transformer windings and all current carrying parts to be copper.
2.1.5 Transformers to be well-contained, free standing units suitable for floor mounting. Where shown or required to be wall mounted, necessary mounting hardware to be included.
2.1.6 Transformers to have provisions for incoming and outgoing conductor entry shown on Drawings.
2.1.7 Transformers to have 4-2% full capacity primary taps, two above and two below nominal voltage.
2.1.8 Three phase transformers to have delta connected primary and 120/208 volt grounded WYE secondary unless otherwise noted.
2.1.9 Transformers to be equipped with grounding provision specified in Table 3 of CSA Standard C9.
2.2 Ratings
2.2.1 kVA capacity indicated to be based on Class 220 degree C insulation, 130 degree C rise.
2.2.2 Transformers to be type ANN.
2.2.3 Transformers to be K-Rated K13.
2.2.4 Transformers rated below 300kVA to have noise level as per Table 8 of CSA Standard unless otherwise noted.
2.2.5 Transformers rated 300 kVA and larger to have a noise level 3 dB below that shown on Table 8 of CSA Standard.
2.3 Support and Isolation
2.3.1 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection under weight and weight distribution of supported equipment. Pads to provide a minimum of 1/4" static deflection.
2.4 Enclosure and Finish
2.4.1 Enclosure: Type 1 with drip shield
2.4.2 Transformer enclosure to have primary metal treatment and to be finished with 2 coats of UL50 3R rated powder coat finishing paint.
2.4.3 Finish equipment as follows:

- 1.1.1 Dry type transformers to CSA C22.2 No. 47 and CSA C9.
1.1.2 CSA 802.2
2. PRODUCTS
2.1 General
2.1.1 Transformers to have voltage and kVA rating indicated
2.1.2 Vacuum impregnated polyester resin construction.
2.1.3 Efficiency to meet or exceed CSA C802.2. Transformers to bear the Energy Star and Environmental Choice logos. Minimum efficiency to be 98%.
2.1.4 Transformer windings and all current carrying parts to be copper.
2.1.5 Transformers to be well-contained, free standing units suitable for floor mounting. Where shown or required to be wall mounted, necessary mounting hardware to be included.
2.1.6 Transformers to have provisions for incoming and outgoing conductor entry shown on Drawings.
2.1.7 Transformers to have 4-2% full capacity primary taps, two above and two below nominal voltage.
2.1.8 Three phase transformers to have delta connected primary and 120/208 volt grounded WYE secondary unless otherwise noted.
2.1.9 Transformers to be equipped with grounding provision specified in Table 3 of CSA Standard C9.
2.2 Ratings
2.2.1 kVA capacity indicated to be based on Class 220 degree C insulation, 130 degree C rise.
2.2.2 Transformers to be type ANN.
2.2.3 Transformers to be K-Rated K13.
2.2.4 Transformers rated below 300kVA to have noise level as per Table 8 of CSA Standard unless otherwise noted.
2.2.5 Transformers rated 300 kVA and larger to have a noise level 3 dB below that shown on Table 8 of CSA Standard.
2.3 Support and Isolation
2.3.1 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection under weight and weight distribution of supported equipment. Pads to provide a minimum of 1/4" static deflection.
2.4 Enclosure and Finish
2.4.1 Enclosure: Type 1 with drip shield
2.4.2 Transformer enclosure to have primary metal treatment and to be finished with 2 coats of UL50 3R rated powder coat finishing paint.
2.4.3 Finish equipment as follows:

- 1.1.1 Dry type transformers to CSA C22.2 No. 47 and CSA C9.
1.1.2 CSA 802.2
2. PRODUCTS
2.1 General
2.1.1 Transformers to have voltage and kVA rating indicated
2.1.2 Vacuum impregnated polyester resin construction.
2.1.3 Efficiency to meet or exceed CSA C802.2. Transformers to bear the Energy Star and Environmental Choice logos. Minimum efficiency to be 98%.
2.1.4 Transformer windings and all current carrying parts to be copper.
2.1.5 Transformers to be well-contained, free standing units suitable for floor mounting. Where shown or required to be wall mounted, necessary mounting hardware to be included.
2.1.6 Transformers to have provisions for incoming and outgoing conductor entry shown on Drawings.
2.1.7 Transformers to have 4-2% full capacity primary taps, two above and two below nominal voltage.
2.1.8 Three phase transformers to have delta connected primary and 120/208 volt grounded WYE secondary unless otherwise noted.
2.1.9 Transformers to be equipped with grounding provision specified in Table 3 of CSA Standard C9.
2.2 Ratings
2.2.1 kVA capacity indicated to be based on Class 220 degree C insulation, 130 degree C rise.
2.2.2 Transformers to be type ANN.
2.2.3 Transformers to be K-Rated K13.
2.2.4 Transformers rated below 300kVA to have noise level as per Table 8 of CSA Standard unless otherwise noted.
2.2.5 Transformers rated 300 kVA and larger to have a noise level 3 dB below that shown on Table 8 of CSA Standard.
2.3 Support and Isolation
2.3.1 Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed mountings to provide a uniform deflection under weight and weight distribution of supported equipment. Pads to provide a minimum of 1/4" static deflection.
2.4 Enclosure and Finish
2.4.1 Enclosure: Type 1 with drip shield
2.4.2 Transformer enclosure to have primary metal treatment and to be finished with 2 coats of UL50 3R rated powder coat finishing paint.
2.4.3 Finish equipment as follows:

- 1.1.1 Dry type transformers to CSA C22.2 No. 47 and CSA C9.
1.1.2 CSA 802.2
2. PRODUCTS
2.1 General
2.1.1 Transformers to have voltage and kVA

- 2.4.3.a. basic rust-inhibiting metal process  
2.4.3.b. Interior in white
- 2.4.4. Exterior shall be finished with paint equal to Sherwin Williams, as follows:  
2.4.4.a. Normal power – ASA 61 Grey  
2.4.4.b. Emergency power – FSES37 International Orange  
2.4.4.c. UPS – Royal Blue
- 2.4.5. Manufacturer to provide quart of touch-up paint or several pressurized spray cans to touch-up small areas marred during installation.
- 2.5. Equipment Identification  
2.5.1. Provide equipment identification in accordance with Section 26 05 01 – Electrical General Requirements.  
2.5.2. Label size: 7. Submit nameplate wording.
3. EXECUTION  
3.1. Installation  
3.1.1. Mount dry type transformers up to 75 kVA suspended or on floor as indicated.  
3.1.2. Mount dry type transformers above 75 kVA on floor.  
3.1.3. Provide a 4" reinforced concrete pad with bevelled edges for all floor mounted transformers. Seal with paint or concrete sealer to prevent concrete dust from entering equipment. Concrete pads to be provided under this division.  
3.1.4. Provide suitable mounting hardware complete with external vibration isolation pads for both floor mounted (between enclosure and pad) and suspended (between enclosure and support frame) transformers.  
3.1.5. Install transformers in level upright position.  
3.1.6. Ensure adequate clearance around transformer for ventilation.  
3.1.7. Remove shipping supports only after transformer is installed and just before putting into service.  
3.1.8. Loosen isolation pad bolts until no compression is visible.  
3.1.9. Make final primary and secondary connections using flexible steel conduits.  
3.1.10. Make primary and secondary connections in accordance with wiring diagram.  
3.1.11. Provide green insulated copper ground conductor in conduit, sized as follows: from transformer ground bus to the building grounding system, in accordance with Table 16 of the Electrical Code: Up to 30 kVA transformer: #8 AWG in ½" conduit; 30 kVA transformer: #8 AWG in ½" conduit; Up to 45 kVA transformer: #6 AWG in ¾" conduit; Up to 75 kVA: #4 AWG in ¾" conduit; Up to 112.5 kVA: #3 AWG in 1" conduit; over 112.5 kVA: refer to drawings.  
3.1.12. Energize transformers after installation is complete.  
3.1.13. Adjust transformer taps as required to achieve suitable secondary voltage at loads

**LIGHTING & RECEPTACLE PANELS  
26 27 16**

1. GENERAL  
1.1. References  
1.1.1. CSA C22.2 No. 29-M1989.  
1.2. Shop Drawings  
1.2.1. Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.  
1.2.2. Nameplates shall be in accordance with Article "Equipment Identification".  
1.3. Operation and Maintenance Data  
1.4. Plant Assembly  
1.4.1. Install circuit breakers in panelboards before shipment.  
1.4.2. In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.  
1.5. Identification  
1.5.1. Panels shall be identified with lamcoad plate with shall include panel designation ½" lettering, voltage and phase ¼" lettering and where panel is fed from ¼" lettering.
2. PRODUCTS  
2.1. Panelboards  
2.1.1. Product of one manufacturer.  
2.1.2. Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase. When numbering breakers, number from top to bottom and from left to right.  
2.1.3. Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.  
2.1.4. Two keys for each panelboard and key panelboards alike.  
2.1.5. Copper bus with neutral of same ampere rating as mains.  
2.1.6. Panels shall be constructed and finished in accordance with details specified in Section 26 27 18 "Panel Trim"  
2.1.7. Panels shall be surface or flush mounted type, as shown.  
2.1.8. Panels shall be dead front type in code gauge steel enclosure.  
2.1.9. Each panel shall be complete with a typewritten directory which shall be mounted inside door with clear plastic cover.  
2.1.10. Panels shall have mains of voltage and capacity, and main and branch breakers and contactors, as shown on the "Lighting and Receptacle Panel Schedule". Spaces shall include the necessary bus work such that Owners, at a later date, need buy only the breakers.  
2.1.11. Where panels exceed 42 circuits, use multi-section panel with main cross-over solid bus bars (unless noted otherwise). Main bus capacity of each section shall be full size to match cross-over bus. Cross-over bus shall be concealed by panel trim. Separate covers are not acceptable.  
2.1.12. Breakers shall have bolted type connections.  
2.1.13. Panels for 120/208 volts, three phase, four wire systems shall be complete with full size breakers, having a symmetrical interrupting rating of at least 10,000 A.  
2.1.14. Where indicated breakers shall have a ground fault interrupter.  
2.1.15. Panels for 600 volt, 3 phase, 3 wire or 4 wire systems shall be complete with breakers having a symmetrical interrupting rating of 25,000 Amps minimum.  
Standard of Acceptance: Cutler Hammer, Federal Pioneer, Siemens, Square D  
2.2. Breakers General  
2.2.1. Bolt-on moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation  
2.2.2. Common-trip breaker: with single handle for multi-pole applications.  
2.2.3. Lock-on devices for clock outlet, fire alarm, security systems, battery chargers, door supervisory, intercom, stairway, exit and night light circuits.  
2.3. Trim  
2.3.1. Front panel trim shall be overall hinged type, door within door construction. Trim assembly shall provide hinged access to the internal tub and wiring channels for access to wiring and breaker terminals without removal of the trim assembly. With overall trim assembly closed and secured, a second internal hinged door forming part of the trim assembly shall provide access to the circuit breakers only for opening and closing purposes  
2.3.2. Panels shall be given a rust-resistant treatment to both tub and trim. Locks shall be chrome plated.  
2.3.3. Flush panels shall have concealed hinges and flush type combination lock latch. Doors shall open minimum 135 degrees. Trims shall have fasteners concealed and shall be prime coated to receive room finish paint.  
2.3.4. Surface mounted panels shall be constructed in accordance with CSA Type 2 enclosures with overall door assembly protecting all circuit breakers. Door(s) shall be gasketed, with overhanging drip shield.  
2.3.5. Panels shall be finished with two coats of grey ASA No. 61 for normal panels, International Orange for Emergency power and Royal Blue for UPS panels.  
2.3.6. Panel locks shall be common to one key throughout project.
- 2.4. Equipment Identification  
2.4.1. Provide equipment identification in accordance with Section 26 05 01 – Electrical General Requirements.  
2.4.2. Nameplate for each panelboard size 4 engraved, Submit nameplate wording.  
2.4.3. Complete circuit directory with typewritten legend showing location and load of each circuit. Cover directory with a ½" thick clear plastic sheet.  
2.4.4. Nameplates for electrical panels shall indicate panel designation and mains voltage, i.e. 120/208 V, 3 φ, 4 W and panel and circuit number from which this panel is fed.
3. EXECUTION  
3.1. Installation  
3.1.1. Locate panel boards as indicated and mount securely, plumb, true and square, to adjoining surfaces.  
3.1.2. Install surface mounted panelboards on plywood backboard. Where practical, group panelboards on common backboard.  
3.1.3. Mount panelboards to height specified in Section 26 05 01 – Electrical General Requirements, or with top of trim at uniform height of 6" –6".  
3.1.4. Deliver five (5) duplicate keys for panel locks to Owner.  
3.1.5. Connect loads to circuits.  
3.1.6. Connect neutral conductors to common neutral bus with respective neutral identified.

**WIRING DEVICES  
26 27 26**

1. GENERAL

- 1.1. References  
1.1.1. CSA C22.2 No. 111-M1986 Switches.  
1.1.2. CSA C22.2 No. 42-M1984 Receptacles.  
1.1.3. Section 26 28 19 – Ground Fault Circuit Interrupters.  
1.2. Shop Drawings and Product Data  
1.2.1. Submit shop drawings and product data in accordance with 26 05 01 Electrical General Requirements.  
1.3. Identification  
1.3.1. All new, existing or relocated receptacles shall have circuit identification.  
1.3.2. Professional grade, durable laminated labels shall be secured to the receptacle or coverplate and shall be labeled with panel name and circuit number from which the receptacle is fed. Lettering shall be minimum ¼" high and as follows:  
1.3.2.a. normal power: black lettering on white background.  
1.3.2.b. emergency power: red lettering on a white background.
2. PRODUCTS  
2.1. Switches  
2.1.1. 20 A, 120 V, silent, AC type, CSA listed, single pole, double pole, three-way, four-way switches as indicated.  
2.1.2. Manually-operated general purpose ac switches with following features:  
2.1.2.a. Terminal holes approved for No. 10 AWG wire.  
2.1.2.b. Silver alloy contacts.  
2.1.2.c. Suitable for back and side wiring.  
2.1.2.d. Rocker type finished in white (confirm colour with interior designer).  
2.1.3. Rocker operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.  
2.1.4. Switches of one manufacturer throughout project. All switches shall be Decora type unless noted otherwise.  
2.1.5. Catalogue numbers listed below have been used for convenience only to indicate quality standards:
- | Type        | Approved Catalogue Numbers |                     |
|-------------|----------------------------|---------------------|
|             | Hubbell (120 Volt)         | Hubbell (347 Volt)  |
|             | (Toggle) / (Decora)        | (Toggle) / (Decora) |
| Single Pole | 1221 / DS120               | 18201 / 2121347     |
| Double Pole | 1222 / DS220               | 18202 / 2122347     |
| Three-Way   | 1223 / DS320               | 18203 / 2123347     |
| Four-Way    | 1224 / DS420               | 18204 / 2124347     |
- 2.2. Dimmer Switches  
2.2.1. Dimmers shall be equal to Lutron Maestro Wireless Series finished in white, sized to suit lighting loads and lighting types (fluorescent, tungsten, low voltage magnetic, low voltage electronic, incandescent, phase control LED, 3 wire phase control of LED when Lutron "X" Series driver in future, etc). Dimmer shall be compatible with load and ballast. Provide all necessary wiring for a complete and operational dimming system.  
2.2.2. Dimmers controlling 347V loads shall be equal to Lutron Pico wireless dimmer.  
2.2.3. Linear fluorescent luminaires dimmed at 347V shall be complete with compatible integral Lutron "H" Series ballast and external "Powpack" mounted in accessible ceiling space.  
2.2.4. Maximum distance between "Powpack" and wireless devices (i.e. dimmers, sensors etc) shall not exceed 25 feet so as to maintain RF range. Coordinate with manufacturer prior to any rough-ins or installations.  
2.2.5. Dimmers controlling 0-10V dimming drivers shall be equal to Lutron Nova T Series #NTF-TV complete with 120V or 347V power pack. Provide wiring as per manufacturer's recommendations.  
2.2.6. All dimming circuits are to have separate neutral conductor.  
2.2.7. Provide Lutron #LDC-21C lamp debuzzing coil when dimming all incandescent and low voltage lamps.  
2.2.8. Matching switches shall be used adjacent to dimmers.  
2.2.9. Associated single or two lamp ballasts of fluorescent luminaires or ballasts for compact fluorescents luminaires rated at 120V being dimmed shall be equal to Lutron compatible EcoSystem Series fluorescent dimming ballasts.  
2.2.10. For all dimmers, coordinate and install associated wiring and components in accordance with the recommendations of the manufacturer for a complete, operational and compatible dimming system.  
2.2.11. Where dimmers are shown to be remotely controlled, controllers, control relays and contactors shall conform to arrangement as shown.  
2.2.12. Install line voltage and low voltage wiring in separate conduits.
- 2.3. Receptacles  
2.3.1. Receptacles to be complete with following features:  
2.3.1.a. Urea moulded housing.  
2.3.1.b. Suitable for no. 10 AWG for back and side wiring.  
2.3.1.c. Break-off links for use as spill receptacles.  
2.3.1.d. Eight back wired entrances, four side wiring screws.  
2.3.1.e. Triple wire contacts and rivetted grounding contacts.  
2.3.1.f. Heavy duty specification grade type  
2.3.2. Receptacles of one manufacturer throughout project. All receptacles shall be Decora type unless noted otherwise.  
2.3.3. Receptacles shall be colour coded as follows:  
2.3.3.a. Normal power: white  
2.3.3.b. Emergency power: red  
2.3.3.c. Emergency shall be shown and as specified. For convenience, only one or two catalogue numbers of manufacturers have been shown.  
Standard of Acceptance: Pass & Seymour, Harvey Hubbell of Canada Ltd., Bryant Electric, Cooper Wiring Devices, Leviton  
2.3.5. The receptacles listed below represent the most common configurations available and are not necessarily used on this project. Refer to drawings for types used.  
2.3.6. Duplex receptacle: 15 ampere, 120 volt, grounded CSA Configuration 5-15R:

Standard of Acceptance	Approved Catalogue Numbers				
Type	P & S	Hubbell	Bryant	Leviton	Cooper
Standard (non-decora)	5262	5262	5262	5262	5262
Decora	26252	2152	9252	5280	6282

2.3.7. Weatherproof, 15 ampere, 120 volt equal to those above but complete with gasketed cast plate and hinged covers, equal to Leviton No. 4928 (vertical).  
2.3.8. Isolated ground duplex receptacle: 15 ampere, 120 volt, CSA Configuration 5-15R:  
Standard of Acceptance: Pass & Seymour IGS262, Hubbell IGS262, Bryant IGS262, Leviton 5262-IG, Cooper IGS262  
2.3.9. Transient voltage surge suppressor duplex decora receptacle: 15 ampere, 120 volt, grounded CSA Configuration 5-15R:  
Standard of Acceptance: Pass & Seymour 5262-SP, Hubbell 5262-SA, Leviton 7280, Cooper 5262-S, Bryant SP52-A  
2.3.10. Twistlock receptacle: 15 ampere, 120 volt, grounded CSA Configuration L5-15R  
Standard of Acceptance: Single: Hubbell/P&S/Bryant/Leviton/Cooper 4710  
Duplex: Hubbell/P&S/Bryant/Leviton/Cooper 4700  
2.3.11. Single receptacle: 15 ampere, 208 volt, single phase, 3 wire grounded CSA Configuration 6-15R:  
Standard of Acceptance: Pass & Seymour 5651, Hubbell 5661, Bryant 5661, Leviton 5661, Cooper 5661  
2.3.12. Duplex receptacle: 20 ampere, 120 volt, grounded CSA Configuration 5-20R:  
Standard of Acceptance

Type	Approved Catalogue Numbers				
	P & S	Hubbell	Bryant	Leviton	Cooper
Standard (non-decora)	5362	5362	5362	5362	5362
Decora	26352	2162	9352	-	6362

2.3.13. Clock receptacle: 15 ampere, 120 volt, grounded for plug-in clocks:  
Standard of Acceptance: Pass & Seymour S3733S; Hubbell 5235; Leviton 5261-GH  
2.3.14. Tamper-Resistant: 15 ampere, 120 volt, grounded CSA Configuration 5-15R:  
Standard of Acceptance: Hubbell #DR15WHTR, Pass & Seymour Equal, Leviton Equal

2.4. Cover Plates  
2.4.1. Cover plates for wiring devices.  
2.4.2. Cover plates from one manufacturer throughout project.  
2.4.3. White 1/32" thick cover plates for wiring devices mounted in flush-mounted outlet box.  
2.4.4. Cast cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.

2.5. Ground Fault Circuit Interrupters  
2.5.1. Units shall be CSA approved Type A.  
2.5.2. Ground fault circuit interrupters (GFI) shall be complete with receptacle, test feature and reset switch.  
2.5.3. Units shall include a 15A or 20A grounded duplex decora receptacle, a button to test operation of unit and current transformer and sensing mechanism. Unit to be complete with suitable outlet box.  
2.5.4. Unless noted otherwise, unit shall trip at 6 mA.

3. EXECUTION  
3.1. Installation  
3.1.1. Switches  
3.1.1.a. Install switches in gang type outlet box when more than one switch is required in one location.  
3.1.1.b. Mount switches at height specified in Section 26 05 01 – Electrical General Requirements or as indicated.

- 2.3.13. Clock receptacle: 15 ampere, 120 volt, grounded for plug-in clocks:  
Standard of Acceptance: Pass & Seymour S3733S; Hubbell 5235; Leviton 5261-GH  
2.3.14. Tamper-Resistant: 15 ampere, 120 volt, grounded CSA Configuration 5-15R:  
Standard of Acceptance: Hubbell #DR15WHTR, Pass & Seymour Equal, Leviton Equal
- 2.4. Cover Plates  
2.4.1. Cover plates for wiring devices.  
2.4.2. Cover plates from one manufacturer throughout project.  
2.4.3. White 1/32" thick cover plates for wiring devices mounted in flush-mounted outlet box.  
2.4.4. Cast cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.
- 2.5. Ground Fault Circuit Interrupters  
2.5.1. Units shall be CSA approved Type A.  
2.5.2. Ground fault circuit interrupters (GFI) shall be complete with receptacle, test feature and reset switch.  
2.5.3. Units shall include a 15A or 20A grounded duplex decora receptacle, a button to test operation of unit and current transformer and sensing mechanism. Unit to be complete with suitable outlet box.  
2.5.4. Unless noted otherwise, unit shall trip at 6 mA.
3. EXECUTION  
3.1. Installation  
3.1.1. Switches  
3.1.1.a. Install switches in gang type outlet box when more than one switch is required in one location.  
3.1.1.b. Mount switches at height specified in Section 26 05 01 – Electrical General Requirements or as indicated.

- 3.1.2. Receptacles  
3.1.2.a. Install receptacles in gang type outlet box when more than one receptacle is required in one location.  
3.1.2.b. Mount receptacles at height specified in Section 26 05 01 – Electrical General Requirements or as indicated.  
3.1.2.c. Connect receptacle grounding terminal to the outlet box with an insulated green ground strap.  
3.1.2.d. Exact position of service fittings shall be verified to suit furniture layout.  
3.1.3. Cover Plates  
3.1.3.a. Install suitable common cover plates where wiring devices are grouped.  
3.1.3.b. Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

**DISCONNECT SWITCHES UP TO 1000 VOLTS  
26 27 33**

1. GENERAL  
1.1. References  
1.1.1. CSA C22.2 No. 4-M89 Manual Switches.  
1.1.2. CSA C22.2 No. 39 Fuse Holder Assemblies.  
1.1.3. Section 26 28 13 Fuses – Low Voltage  
1.2. PRODUCTS  
1.2.1. Disconnect Switches  
1.1.1. Fusible and non-fusible disconnect switch in sprinkler proof EEMAC 3 enclosure, size as indicated.  
1.1.2. 2 pole or 3 pole as required for single phase or three phase circuits  
1.1.3. 2 pole with solid neutral or 3 pole with solid neutral for three wire and four wire circuits with neutral  
1.1.4. Provision for padlocking in off switch position.  
1.1.5. Mechanically interlocked door to prevent opening when handle in ON position.  
1.1.6. Fuses: size as indicated, to Section 26 28 13 – Fuses – Low Voltage.  
1.1.7. Fuseholders: suitable without adaptors, for type and size of fuse indicated.  
1.1.8. Heavy Duty, quick-make, quick-break action.  
1.1.9. ON-OFF switch position indication on switch enclosure cover.  
1.2. Equipment Identification  
1.2.1. Provide equipment identification in accordance with Section 26 05 01 – Electrical General Requirements.  
1.2.2. Indicate name of load controlled on size 4 nameplate.
2. EXECUTION  
2.1. Installation  
2.1.1. Install disconnect switches complete with fuses.

**CONTACTORS  
26 29 05**

1. GENERAL  
1.1. General Requirements  
1.1.1. Conform to Sections of Division 1 as applicable.  
1.1.2. Conform to Section 26 05 01, Electrical General Requirements.  
2. PRODUCTS  
2.1. Contactors  
2.1.1. Contactors: to EEMAC No.1CS-1970.  
2.1.2. Mechanically held controlled devices as indicated and rated for type of load controlled. Half size contactors not accepted.  
2.1.3. Breaker combination contactor as indicated.  
2.1.4. Capacity of 12 poles (contacts) or as described on drawings.  
2.1.5. Complete with 2 normally open and 2 normally closed auxiliary contacts unless indicated otherwise.  
2.1.6. Mount in CSA Type 2 Enclosure unless otherwise indicated.  
2.1.7. Control transformer complete with primary fusing, in contactor enclosure.  
2.1.8. Coil clearing contacts shall be included in contactor where a contactor is controlled by a time switch.  
Standard of Acceptance: Ascolectric Ltd. – 917 Series  
2.2. Equipment Identification  
2.2.1. .1 Provide equipment identification in accordance with Section 26 05 01 – Electrical General Requirements.  
2.2.2. .2 Size 4 nameplate indicating name of load controlled as indicated.
3. EXECUTION  
3.1. Installation  
3.1.1. Install contactors and connect auxiliary control devices.

**LIGHTING  
26 51 13**

1. GENERAL  
1.1. General Requirements  
1.1.1. Conform with the requirements of Section 26 05 01 Electrical General Requirements.  
1.2. Work Included  
1.2.1. Work to be done under this Section shall include furnishing of labour, materials, and equipment required for installation, testing and pulling into proper operation complete Electrical systems as shown, as specified and as otherwise required. Complete systems shall be left ready for continuous and efficient satisfactory operation.  
1.3. Shop Drawings and Product Data  
1.3.1. Submit shop drawings in accordance with Section 26 05 01 Electrical General Requirements – Shop Drawings and Product Data.  
1.3.2. Submit complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Lighting Consultant.  
1.3.3. Photometric data to include:  
1.3.3.a. Total input watts, condenser summary, candle distribution zonal lumen summary, luminaire efficiency, CIE type, coefficient of utilization, lamp type and lumen rating in accordance with IESNA testing procedures.  
1.4. Requirements  
1.4.1. Luminaires shall not be delivered to building or stored therein until dry and protected space is available for proper storage of luminaires.  
1.4.2. Submit samples of luminaires which are not catalogue items for approval. Additional luminaires shall not be manufactured until sample has been approved. Each approved sample shall be retained on job site until final completion of project. Luminaires which do not match quality and workmanship of standard sample will be rejected.  
1.4.3. Finishes of luminaires, as specified in the "Luminaire List" must be maintained. Where the description of the luminaire directs a "colour/ finish to suit Architect" it is to be understood that during construction the final colour/finish will be selected. The Architect must be permitted to make their choice from a standard colour/finish range but the selected colour will apply to all of the particular type of luminaire unless otherwise specified.  
1.4.4. "Allowances" when shown, are in Canadian dollars and cover the cost of the lighting luminaires and lamps. Allowances do not include applicable taxes, delivery to the site, handling, installation, overhead or profit.  
1.5. Substitutions  
1.5.1. Luminaires included under this Section are specified by approved manufacturer and type. Furnish equipment, as specified, unless substitutions are mutually agreed upon, as follows:  
1.5.1.a. During the construction period, no substitutions shall be considered unless compelling reasons are given such as inability to meet delivery schedule. This reason shall not be acceptable if delay is caused by Contractor's failure to order luminaires in accordance with the schedule. In such cases, it is the Contractor's responsibility to provide luminaires as specified without delay to the project and without additional cost to the Owner.  
1.5.1.b. Substitutions shall be named, samples, catalogue cuts and complete photometric reports submitted, and cost savings documented. Submit a written request for proposed luminaires to be substituted to Consultant at least two weeks before the end of the bid period. Make the request an alternate, separate proposal, accompanied by complete descriptive and technical data. Indicate addition or deduction from the base bid. Substitutions proposed less than two weeks before the end of the bid period, or not including proper documentation shall not be considered. Consultant shall accept or reject proposed substitutions.  
1.5.1.c. Where proposed substitutions alter functional or visual design, or change the space requirements or mounting details indicated here or on the drawings, detail such changes in the proposal and include costs for revised design and construction for trades involved. Reimburse Consultant and his/her consultants for costs of evaluating proposed substitutions, after the bid period, whether or not such substitutions are accepted.
2. PRODUCTS  
2.1. General  
2.1.1. Similar luminaires shall be products of same manufacturer.  
2.1.2. Luminaires shall be suitable for individual or continuous mounting.  
2.1.3. Supply recessed luminaires, where installed in plaster or in acoustic ceilings, complete with plaster trim frame or ring and mounting brackets.  
2.1.4. Fluorescent troffers in ceiling shall be equipped with adjustable mounting brackets.

- 2.1.5. Luminaires shall be completely assembled in factory and shall be delivered to building in cartons or in palletized form, as directed.  
2.2. Ballasts  
2.2.1. Warnaby: 5 years  
2.2.1.a. T8 Linear / T5 HO / U-Bent Fluorescent Dimming Ballasts:  
2.2.1.a. Notes: New fluorescent lamps shall be operated for 100 hours at full output ("seasoned") to accept proper dimming performance and average rated lamp life.  
2.2.1.b. Where Lutron "Powpack" are specified, connect to 120V, 15A circuit.  
2.2.1.c. Maximum distance between "Powpack" and wireless devices (i.e. dimmers, sensors etc) shall not exceed 25 feet so as to maintain RF range. Coordinate with manufacturer prior to any rough-ins or installations.  
2.2.1.d. Coordinate and install associated wiring and components in accordance with the recommendations of the manufacturer for a complete, operational and compatible dimming system.

Standard of Acceptance:	Lutron – Compatible "EcoSystem Series" for 120V, Lutron – Compatible "H Series" for 347V complete with Lutron "Powpack"
2.2.2. Compact Fluorescent Dimming Ballasts: 2.2.2.a. Note: New fluorescent lamps shall be operated for 100 hours at full output ("seasoned") to accept proper dimming performance and average rated lamp life. 2.2.2.b. Coordinate and install associated wiring and components in accordance with the recommendations of the manufacturer for a complete, operational and compatible dimming system.	Standard of Acceptance: Lutron – Compatible "EcoSystem Series"

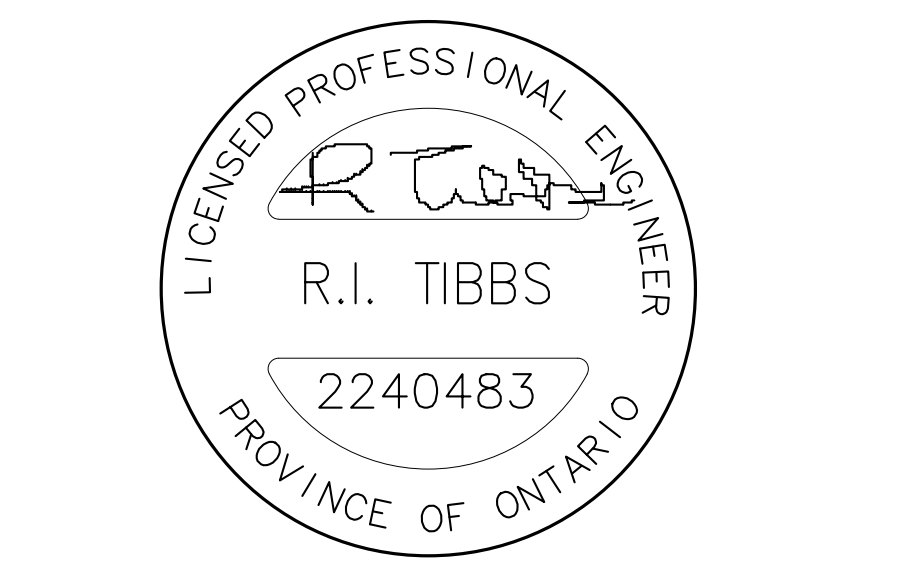
- 2.3. Lamps  
2.3.1. T-8 Fluorescent lamps  
2.3.1.a. Fluorescent lamps shall be rapid start 32 watt 4"-0" T-8 Bipin with 3000 initial lumens or 25 watt 3"-0" T-8 Bipin with 2720 initial lumens, 3500K with a CRI of 85 or better. Lamps shall be of lengths specified in the luminaire schedule. Verify colour of lamps before ordering.  
2.3.1.b. Lamp life to be 24,000 + hours.  
2.3.1.c. Warranty: 3 years.  
Standard of Acceptance: General Electric "Star Coat SXL Ecolux, Osram/Sylvania "Octron XP Ecologic", Philips "Alto – Plus"  
2.3.2. T-8 Fluorescent lamps (Energy Saving)  
2.3.2.a. Fluorescent lamps shall be 28 watt 4"-0" T-8 Bipin with 2725 initial lumens or 25 watt 3"-0" T-8 Bipin with 2175 initial lumens, 3500K with a CRI of 85 or better. Lamps shall be of lengths specified in the luminaire schedule.  
2.3.2.b. Lamp life to be 26,000 + hours average (12 hr start).  
2.3.2.c. Warranty: 3 years.  
Standard of Acceptance: General Electric "T8 Ultra F28T8 – Ultra Max./SPX Series" (3"-0"), Osram/Sylvania "Octron F028XP/F025XP/EC (3"-0"), Philips "Alto – Plus"  
2.3.3. T-5 Fluorescent lamps  
2.3.3.a. Fluorescent lamps shall be rapid start 2'-0" 40 watt twin tube T-5 four pin with 3150 initial lumens, 3500K with a CRI of 80 or better. Lamps shall be of lengths specified in the luminaire schedule.  
2.3.3.b. Lamp life to be 20,000 + hours.  
2.3.3.c. Warranty: 2 years.  
2.4. Compact Fluorescent lamps  
2.4.1. Rapid start miniature single ended fluorescent lamp with four pin for electronic ballast.  
2.4.2. The lamp shall have a high colour rendering index of 82+ with a Kelvin temperature of 3500K. Verify colour of lamps before ordering.  
2.4.3. Lamp life to be 10,000 hours.  
2.5. Incandescent lamps  
2.5.1. Incandescent lamps shall be inside frosted, 130 volt, 2500 hours extended service type.  
2.5.2. All line voltage Halogen Par lamps shall be diode-free, 130 volt, with a minimum lamp life of 2000 hours.  
2.5.3. All 50 watt low voltage 12 volt MR-16 lamps shall be the "Constant Colour" or "Tri-Aim IR" variety and have a minimum lamp life of 6,000 hours unless otherwise specified.  
2.6. Spare Lamps  
2.6.1. Provide spare lamps of EACH type as follows:  
2.6.1.a. Incandescent – 15%  
2.6.1.b. Fluorescent & HID – 5%  
2.7. Fluorescent Lenses  
2.7.1. Fluorescent K12 distribution acrylic lenses, ⅛" thick, shall have a recessed prismatic pattern of ⅜" square based female cones running 45° to the parallel and perpendicular axis to the panel. Panel shall be made of ultraviolet inhibited injection moulded clear virgin acrylic.  
2.7.2. Panels shall be strain-free and uniform in production. There shall be no fade-outs or streaks to detract from job performance.  
2.7.3. Lenses shall be low brightness, sparking crystal panel that provides maximum efficiency and good brightness control in the direct glare zone.  
Standard of Acceptance: A.L.P. Lighting and Ceiling Products, I.C.I. Acrylics Canada Inc., Holophone Canada Inc.

3. EXECUTION  
3.1. Installation  
3.1.1. Locate and install luminaires as indicated.  
3.1.2. Locate hangers on the centres or intersections. Mount recessed incandescents, troffers and surface mounted luminaires in or on full tiles.  
3.1.3. Verify quality of luminaires before placing orders.  
3.1.4. Verify ceiling types with the latest revised Architectural Drawings and order luminaires to suit the correct ceiling.  
3.1.5. Check lighting luminaires and mountings for their electrical and physical characteristics in relation to conditions due to building construction and mechanical equipment. Make necessary adjustments to luminaires or hanging arrangement without expense to Owners. Give notification at time of shop drawings and before construction if decision on necessary changes is required.  
3.1.6. Co-operate with other trades to ensure proper installation of lighting luminaires.  
3.1.7. Carefully align luminaires, shown in continuous lines or rows, so that rows appear as straight lines.  
3.1.8. Mount luminaires perfectly level or plumb. Luminaires shall fit tightly to ceiling without showing a space or light leak between frame and ceiling.  
3.1.9. Take down any improperly installed luminaires and re-install without expense to Owner.  
3.1.10. Standard octagonal boxes may be supplied where conduits feeding luminaires in finished areas are exposed on ceiling if hangover canopies entirely cover outlet boxes and are neatly notched for conduit. Otherwise, provide cast conduit outlet boxes with a diameter larger than canopies.  
3.1.11. Attach bolts or hickies directly to poured concrete with ⅜" minimum diameter bolts and lead expansion anchors where luminaires are suspended directly from concrete slabs. Use ⅜" minimum bolts through precast slabs, welded to 4" x 4" minimum, 10 gauge plate above slabs.  
3.1.12. Do not mount luminaires above pipes, ducts or equipment. In event of unavoidably tight locations, provide hangers to clear obstructions. Check layouts of other trades on job and plan co-operatively. Luminaires in any room shall hang at one height. Obtain approval before any changes are made to layouts shown.  
3.1.13. All luminaires mounted in or on ceilings shall be supported independently of ceiling by means of chains.  
3.1.14. Provide continuous ⅜" x 1½" channel above the ceiling, where luminaires are suspended or mounted on furred ceilings. Fasten luminaires to channel with two ⅜" minimum diameter studs with minimum 4" – 0" on centre.  
3.1.15. Luminaires installed in or on "T" bar ceilings shall be equipped with safety chains anchored in an approved manner to the floor slab or roof structure above. Fluorescent luminaires shall have two chains, each supporting two corners of the luminaire. Chain shall be #10 Tensile jock chain, installed as noted below.  
3.1.16. Chain shall be No. 10 Tensile jock chain, bright zinc coated, with a strength of 180 kg (400 lbs.) where luminaires are indicated to be chain hung. Attachments shall be made using a No. 10 "S" hook. Caddy fasteners may be used where applicable. "S" hooks must be closed after installation.  
3.1.17. Industrial luminaires where suspended shall be ½" conduit hangers and ARB ball aligners. Length and location shall clear equipment, ducts and pipes. Metal strut (Flexibar or equal) may be used for mounting of luminaires in mechanical areas and electrical rooms.  
3.2. Lighting Luminaires  
3.2.1. Provide lighting luminaires exactly as shown and as specified in the following schedule. Luminaires shall be complete with necessary accessories and lamps at time of acceptance.  
3.2.2. All luminaires shall be UL or CSA certified.  
3.2.3. Each fluorescent luminaire installed on branch circuits with voltage exceeding 150 volts-to-ground shall be provided with a disconnecting means integral to the luminaire that simultaneously opens all circuit conductors between the branch circuit conductors and the supplying ballast(s) and marked in a conspicuous, legible and permanent, manner adjacent to the disconnecting means, identifying the specific purpose in accordance with the Canadian Electrical Code Part 1 Rule 30-308(4).
- UNIT EQUIPMENT FOR EMERGENCY LIGHTING  
26 52 00**
1. GENERAL  
1.1. Reference  
1.1.1. CSA C22.2 No. 141 Unit Equipment for Emergency Lighting.  
1.2. Warranty

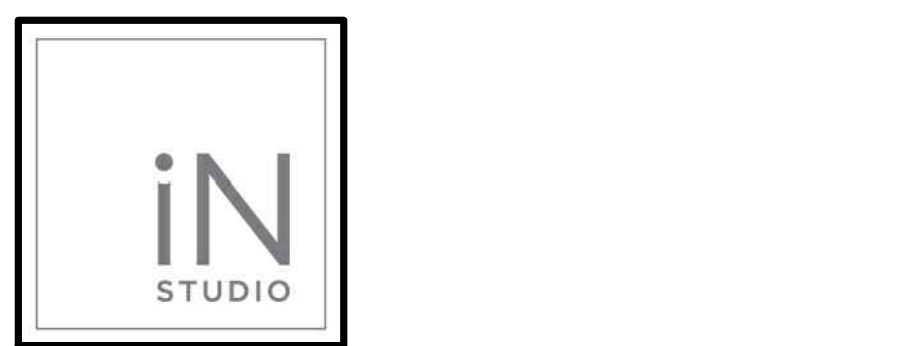
**City of Pickering**  
2460 Brock Road,  
Pickering, ON, Canada  
L1X 0J1  
Building A-200A, 2nd Floor



**HHAngus & Associates Limited Consulting Engineers**  
1127 Leslie Street, Toronto, ON, M3C 2J6 Canada  
www.hhangus.com | T 416 443 8200 | F 416 443 8290



ISSUE	DATE	DESCRIPTION
03	240823	ISSUED FOR PERMIT/TENDER
02	240816	ISSUED FOR 100% COORDINATION
01	240808	ISSUED FOR 90% REVIEW



354 Davenport Road, Suite 200  
Toronto, Ontario, Canada M5R 1K6  
T: (416) 413-0063  
email: info@instudiocreative.com

Client Name	City of Pickering
Project Name	CoP Interior Fit-Out
Project Address	2460 Brock Road Pickering, ON L1X 0J1
Project number	2240483
Drawing Title	<b>ELECTRICAL SPECIFICATIONS</b>
Drawing Scale	<b>N.T.S.</b>
Drawing Number	<b>E1.4</b>
True North	

- 1.2.1. For batteries, the 12 months warranty period is extended to 120 months, with a no-charge replacement during the first 60 months and a pro-rata charge on the second 60 months.
2. PRODUCTS
- 2.1. Equipment
- 2.1.1. Supply voltage: 120 V or 347V (as shown on drawings), AC.
- 2.1.2. Output voltage: 12 V DC for indoor units, 24 V DC for outdoor units and in parking garages.
- 2.1.3. Operating time:
- 2.1.3.a. 12 volt units: 180 watts for 60 minutes.
- 2.1.3.b. 24 volt units: 180 watts for 120 minutes.
- 2.1.4. Battery: sealed, maintenance free, lead acid or lead calcium.
- 2.1.5. Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected. Unit shall have externally accessible means for testing of unit and shall have two lamps indicating A.C. on, and high charge. Unit shall include a low voltage cut-off protection circuit and self diagnostic auto test.
- 2.1.5.a. Solid state transfer.
- 2.1.6. Lamp heads: integral on unit and remote, 360° horizontal and 180° vertical adjustment.
- 2.1.7. Lamp type (integral and remote):
- 2.1.7.a. Finished Areas: recessed remote eyeball, gimbal ring halogen, glare free adjustable type halogen; 20W, 12VDC or 24VDC to suite battery, impact resistant, fully adjustable for aisle or area distribution.
- 2.1.7.b. Unfinished areas, electrical, mechanical and equipment rooms: halogen 20 W, 12 VDC 12VDC or 24VDC to suite battery, impact resistant, fully adjustable for aisle or area distribution.
- 2.1.7.c. Cabinet: suitable for direct or shelf mounting to wall and c/w knockouts for conduit. Removable or hinged front panel for easy access to batteries.
- 2.1.7.c.a. Cabinet finish: Corrosion resistant, White

- 2.2. Wiring of Remote Heads
- 2.2.1. Conduit: type EMT, to Section 26 05 33 – Conduits Fastenings and Fittings.
- 2.2.2. RFI suppressors.
- 2.2.3. Conductors: RW90 type to Section 26 05 19 – Wires & Cables 0–1000 Volts, sized in accordance with manufacturer's recommendations.
- Standard of Acceptance: Emergi-Lite, Lumacell Inc., Beggelli
3. EXECUTION
- 3.1. Installation
- 3.1.1. Provide complete emergency battery lighting system as shown and specified.
- 3.1.2. Unless otherwise noted, mount units on the wall 96" above floor. Unit shall be hardwired to source. Provide lock-on devices on breakers.
- 3.1.3. Connect exit lights to unit equipment where indicated.
- 3.1.4. Where heads are shown remote from unit, provide suitable outlet box at 96" and install head. Connect with conduit to battery and charger unit. Wire size to suit manufacturer's recommendations, but not less than #10 gauge, and for a minimum of 3% voltage drop at remote heads. Ensure remote head wiring lengths are reviewed with manufacturer prior to installation. Voltage drops will be tested by Engineer and Building Inspector. Replace any wiring not passing the 3% voltage drop test with new size and retest.
- 3.1.5. Direct heads as indicated.

TELEPHONE & DATA RACEWAYS  
27 05 28

1. GENERAL
- 1.1. System Description
- 1.1.1. Empty raceways systems shall consist of outlet boxes, cover plates, conduits, pull boxes, fish wires and service poles.
- 1.1.2. Empty conduit systems being installed shall be for installation of wiring installed at a later date by communications contractor.
- 1.1.3. Telephone and data communications systems.
2. PRODUCTS
- 2.1. Material
- 2.1.1. Conduits: EMT type, to Section 26 05 33 – Conduits Fastenings and Fittings.
- 2.1.2. Junction boxes and pull boxes to Section 26 05 32 – Splitters, Junction and Pull Boxes, Cabinets.
- 2.1.3. Outlet boxes, and fittings: to Section 26 05 35 – Outlet Boxes, Conduit Boxes and Fittings.
- 2.1.4. Cover plates: to Section 26 27 26 – Wiring Devices.
- 2.1.5. Fish wire: polypropylene type
3. EXECUTION
- 3.1. Installation
- 3.1.1. Install empty raceway system, including fish wire, outlet boxes, pull boxes, cover plates, conduit, service poles, miscellaneous and positioning material to constitute complete system.
- 3.1.2. Verify exact location of outlets to suit furniture layout.
- 3.1.3. Fish conduit, clear blockages and outlet and clean out pull boxes at completion of installation. Leave conduit free of water or excess moisture. Install 1/2" polypropylene pull cord continuously from outlet to outlet, through conduit and fasten at each box.
- 3.1.4. Conduit bends shall have a bending radius of not less than ten times conduit diameter. Ream out conduits and identify end with green paint.
- 3.1.5. Provide bushings on all conduits.
- 3.1.6. Install additional steel pull boxes in such a manner that, throughout entire system, there shall be not more than 90 degree or equivalent bends or more than 100' in each run, so that wire or cables may be pulled in or withdrawn with reasonable ease. Pull boxes shall not be used as 90 degree bends.
- 3.1.7. Minimum space requirements in pull boxes, having one conduit each in opposite ends of box, shall be as follows:

Maximum Size of Conduit Conduit in Inches	Size of Box in Inches			For Each Additional Increase Width – Inches
	Width	Length	Depth	
3/4"	4"	12"	3"	2"
1"	4"	16"	3"	2"
1 1/4"	6"	20"	3"	3"
1 1/2"	8"	27"	4"	4"
2"	8"	3'	4"	5"

- 3.1.8. Minimum space requirements in pull boxes for 90 degree pulls, shall be as follows:

Maximum Size of Conduit Conduit in Inches	Size of Box in Inches			For Each Additional Increase Width – Inches
	Width	Length	Depth	
3/4"	6"	12"	4"	2"
1"	8"	16"	6"	2"
1 1/4"	10"	18"	8"	3"
1 1/2"	12"	24"	10"	4"
2"	14"	30"	12"	5"

- 3.1.1. Maintain separation of communications conduits to sources of electromagnetic interference as follows:

Item	Minimum Clearance
Fluorescent ballasts	6"
Conduit & cables used for electrical distribution < 1kV	12"
Conduit & cables used for electrical distribution >=1kV	36"
Motor	48"
Transformer	48"

- 3.1.2. The above tables provides a guideline and at all times the Consultant may advise greater clearances if the currents being carried through these devices are particularly likely to cause interference.
- 3.1.3. Interference shall be minimized by ensuring that, wherever possible, communications conductors cross sources of interference at right angles.
- 3.1.4. Install cables, conduit and cable tray, etc. along or at right angles to building lines unless impractical to do so. Verify specific cases of deviation in advance with consultant.

FIRE ALARM SYSTEM  
28 31 16

1. GENERAL
- 1.1. General Requirements
- 1.1.1. Conform to Sections of Division 1 as applicable.
- 1.1.2. Conform to Section 26 05 01, Electrical General Requirements.
- 1.2. Acron RAU – Remote Audio Unit
- 1.2.1. DGP – Data Gathering Panel
- 1.3. Related Work
- 1.3.1. Wiring: Section 26 05 19 Wires & Cables 0–1000 Volts
- 1.3.2. Conduits: Section 26 05 33 Conduits Fastenings and Fittings

- 1.4. References – current edition of
- 1.4.1. CAN/ULC–S524 Installation of Fire Alarm Systems
- 1.4.2. ULC–S525 Audible Signal Appliances
- 1.4.3. CAN/ULC–S527 Control Units
- 1.4.4. CAN/ULC–S528 Manual Pull Stations
- 1.4.5. CAN/ULC–S529 Smoke Detectors
- 1.4.6. CAN/ULC–S530 Heat Actuated Fire Detectors
- 1.4.7. CAN/ULC–S536 Inspection and Testing of Fire Alarm Systems
- 1.4.8. CAN/ULC–S537 Verification of Fire Alarm Systems
- 1.4.9. CAN/ULC–S548 Alarm Initiating and Supervisory Devices for Water Type Extinguishing Systems
- 1.4.10. CAN/ULC–S533 Egress Door Securing and Releasing Devices
- 1.4.11. CAN/ULC–S542 Speakers for Fire Alarm Systems
- 1.4.12. CAN/ULC–S526 Visual Signal Appliances
- 1.4.13. 1997 Ontario Building Code and its references.
- 1.5. Requirements Regulatory Agencies – current edition of
- 1.5.1. System
- 1.5.2. Ontario Building Code
- 1.5.3. Ontario Electrical Safety Code C22.1
- 1.5.4. System components: listed by ULC and CSA and complying with applicable provisions of Ontario Building Code, and meeting requirements of the local authority having jurisdiction.
- 1.6. Operation and Maintenance Data
- 1.6.1. Include:
- 1.6.1.a. Copy of verification certificate, verification report and warranty certificates such as for fire alarm system, batteries, ancillary devices, and other similar items.
- 1.6.1.b. Name, address and telephone number of service representative of manufacturer to be contacted during warranty period.

- 1.7. Maintenance
- 1.7.1. Provide one year's free maintenance with two inspections by manufacturer during year. Inspection tests to conform to ULC–S536. Submit inspection report to Engineer.
- 1.8. Work Included
- 1.8.1. Work to be done under this Section shall include furnishing of labour, materials, and equipment required for installation, testing and putting into proper operation complete Electrical systems as shown, as specified and as otherwise required. Complete systems shall be left ready for continuous and efficient satisfactory operation.
- 1.9. Scope of Work
- 1.9.1. Wire up door holders release and the magnetic locks. Provide direct connection between pull station and the adjacent magnetic lock at all magnetic lock locations. Provide pull stations adjacent to the door as required by code and include the signage as required by the Ontario Building Code.
- 1.9.2. The smoke detectors in corridors shall be ionization type and Photoelectric type installed in alternate position. (Unless combination ionization/ photoelectric detectors are used). All smoke detectors shall be intelligent type.
- 1.9.3. At the completion of the Contract, the building shall be left with a complete fire alarm and voice communication system accepted by the Local Authorities and meeting all applicable codes.
- 1.10. System Overview
- 1.10.1. Each device shall be individually addressable to provide accurate identification of alarm location.
- 1.10.2. All standard fire alarm input and output devices shall be hardwired or multiplexed to remote Satellite Control Panels (SCP) using remote data acquisition and control or true distributed processing techniques.
- 1.10.3. All emergency voice and communication circuits shall also be connected to local Remote Audio Unit (RAU) which will house the necessary amplifiers and control circuits to operate the Voice Communication System.

2. PRODUCTS
- 2.1. Input (Alarm Initiating) Circuits
- 2.1.1. Provide alarm receiving circuits, addressable line cards for alarm initiating devices such as manual pull stations, smoke detectors, combination smoke detectors/ heat detectors (intelligent type), heat detectors, and water flow switches as indicated on drawings.
- 2.1.2. All alarm receiving circuits shall be supervised for open, short or ground fault conditions.
- 2.2. Output Alarm Circuits
- 2.2.1. Provide alarm output circuits for polarized audible signals such as speakers, horns and visual indicators as indicated.
- 2.2.2. All alarm output circuits shall be supervised for open, short or ground fault conditions by the use of an end of line resistor.
- 2.3. Auxiliary Circuits
- 2.3.1. Provide contacts, control modules, monitor modules, addressable double voltage relays for fan shut-down and status indication as indicated on drawings and as required to make the system operate as specified.
- 2.3.2. Provide contacts for magnetic door locks and door holders. They shall be arranged to release the doors upon actuation of fire alarm system.
- 2.3.3. Provide contacts for smoke vents, where applicable. They shall be of the normally closed type and shall release all smoke dampers upon actuation of fire alarm system. Bypass switches shall be provided.
- 2.3.4. Provide auxiliary contacts with 120 V AC/24 V DC, 2.5 A @ 0.5 power factor rating.
- 2.4. Voice Communication Circuits
- 2.4.1. Provide communication circuits for both one way Emergency Voice Announcement System and two way Firefighter's Telephone System voice communication systems as required.
- 2.4.2. All communication circuits shall be supervised for open, short or ground fault conditions.
- 2.5. Addressable Manual Fire Alarm Stations
- 2.5.1. Manual pull stations shall be metal construction, open circuit, pull lever type and finished in red enamel. They shall be mounted in a 4 in square recessed box with plaster ring in finished areas and surface mounted in unfinished areas.
- 2.5.2. Manual stations shall be suitable for insertion of an evacuation key.
- 2.5.3. Manual stations shall create an address on identifiable loop.
- 2.5.4. Each Pull station shall be provided with an additional auxiliary contact(s) to allow direct connection to future magnetic locks.
- 2.6. Automatic Fire Detectors (Heat Detectors)
- 2.6.1. Automatic detectors shall be of the following types:
- 2.6.1.a. 135°F, fixed temperature and 15°F per minute, rate of rise
- 2.6.1.b. Detectors shall have suitable mounting plates with finish ring.
- 2.7. End of Line Resistors
- 2.7.1. Where Class B wiring is specified or permitted, the end of line resistors shall be located in outlet box with stainless steel cover plate. White coverplate when installed in t-bar ceiling.
- 2.8. Smoke Detectors (Ionization type, Photoelectric Smoke or Combination Smoke Detectors)
- 2.8.1. The ionization type smoke detectors shall be constructed of solid state components and operate on ionization principle to detect visible and/or invisible products of combustion.
- 2.8.2. It shall be possible to check and change sensitivity of detectors. Smoke detectors shall be set for approved sensitivity. Detectors shall provide environmental compensation complete with 'Dirty' and 'Excessively Dirty' messages.
- 2.8.3. The Photoelectric smoke detectors shall operate on the photoelectric (light scattering) principle of operation and be activated by visible or invisible products of combustion. Detectors shall be constructed of solid state components with the infrared light source for the photoelectric sensor emitted from a semiconductor diode.
- 2.8.4. Where a heat detector component is supplied as part of the detection device, the heat detector component of the detector shall be restorable and set at 135°F. Fixed temperature.
- 2.8.5. Detectors shall be ULC listed.
- 2.8.6. Smoke detectors shall operate on 24 volts DC and be protected against electrical transients and electromagnetic interference.
- 2.8.7. Detectors shall be equipped with NO/NC contacts to operate ancillary devices. Where applicable.
- 2.8.8. Detectors shall be equipped with a fine mesh bug screen to prevent contamination of the detection chamber by insects.
- 2.8.9. Recessed smoke detector shall be complete with necessary shroud and flush mounting hardware.
- 2.8.10. Protect automatic smoke detectors during construction with a dust-bag or approved plastic covers, which shall be removed at the time of verification.
- 2.8.11. The smoke detectors in corridors shall be of equal numbers of ionization and photoelectric and alternated along the corridor or be combination type detectors.
- 2.8.12. Smoke detectors mounted in stairs shall be ionization type.
- 2.8.13. Provide Standard Type non addressable devices in unheated areas with an individual control modules mounted in a heated part of the building.

- 2.9. Duct Mounted Smoke Detectors
- 2.9.1. Duct-mounted smoke detectors shall consist of an ionization type smoke detector as described above, and an air light housing assembly, mounted on the side of the duct complete with sampling tubes and supporting framework.
- 2.9.2. While fans are running, a continuous cross-sectional sampling of the air flows from the ventilation duct, through the detector, and then returned to the duct. Air stream velocity range from 2.5 m/sec minimum to 18 m/sec maximum be made to monitor, test and reset the detectors under actual air flow conditions. Unit shall be equipped with a test key switch and a reset key switch. Remote alarm lamps or LED shall indicate the signal operation of the detector. Install Remote LED in an easily visible location to someone standing on the floor without requiring the use of ladders to see it.
- 2.9.4. Protect automatic smoke detectors during construction with a dust-bag, which will be removed at the time of verification.
- 2.9.5. Manufacturer shall include site visits to direct detailed locations of duct-mounted smoke detectors.
- 2.10. Addressable Bases
- 2.10.1. Bases for all stations shall incorporate an addressable element, located in the base, to identify exact location of device. Detector heads for smoke or heat shall be interchangeable and can be removed without interrupting alarm processing of addressable initiating circuit/line.
- 2.11. Peripheral Alarm Initiating Devices
- 2.11.1. Local control panels, interfaced with other equipment such as pre-action systems or other Control panels, shall be a single zone capable of operating on 120 volt AC, 60 Hz and shall be complete with two isolated Form 'C' contacts and capability to initiate a fire alarm signal.
- 2.11.2. Manufacturer shall examine Drawings and Specifications prior to award of Contract to ensure that detectors, control panels and miscellaneous devices being supplied will provide a satisfactory working installation.
- 2.12. Alarm Signal Appliances
- 2.12.1. Remote alarm lamps shall be mounted in a single gang switch box with a brushed stainless steel cover, screw type terminals and electrically connected to heat or smoke detectors that require remote annunciation. Use only high intensity (200 med) LED lamps.
- 2.12.2. Alarm strobe lamps shall be ULC listed and operate on 24 V DC. The strobe shall be able to flash at a rate of one flash per second in alarm mode. The words "FIRE" shall appear on the strobe lens. Strobes shall comply with ADA requirements.
- 2.13. Additional Requirements for Emergency Voice Communication System
- 2.13.1. The system shall incorporate a complete arrangement of speakers, control module and power supplies. It shall be integrated with the existing fire alarm system.
- 2.13.2. Speakers shall provide a pre-set sound pressure level of 85 dB + 3 dB.
- 2.14. Horn Speakers
- 2.14.1. Horn type speakers in Mechanical, Electrical Rooms shall be surface mounted with a weatherproof gland connection, a dispersion angle of 120° H x 80° V, selectable weather protected taps of 1, 2, 4, & 7.5 watts, on a 25 watt line matching transformer and shall produce a sound pressure of 100 dB at 10 ft on the 2 1/2 watt tap setting.
- 2.14.2. Alarm signal horn speakers shall be supplied in fire alarm red in public corridors and service areas only. Alarm signal horn speakers shall be supplied in white in tenant areas. Arrange for speaker wiring to be supervised. Not more than 80% of full complement of speakers shall be connected to one signal circuit.
- 2.15. Speaker Zoning
- 2.15.1. Zoning for speakers shall be provided as shown on Drawings, with adjacent speakers connected to separate circuits. A minimum of two circuits per zone shall be provided.
- 2.15.2. All speaker wiring shall be continuously supervised.
- 2.16. Wiring
- 2.16.1. Wiring shall be as recommended by fire alarm system manufacturer.
- 2.16.2. Wiring for speaker circuits shall be twisted pair shielded sized as recommended by the manufacturer and shall be installed in conduit.
- 2.16.3. Wiring within the floor area from detection device to device shall be as recommended by manufacturer, and installed in surface mounted EMT conduit.
- 2.16.4. Providing line isolators when crossing a different fire alarm zone.
3. EXECUTION
- 3.1. Installation
- 3.1.1. Installation of the Fire Alarm system components shall be in accordance with latest edition and all amendments of CAN/ULC–S524 Standard for the Installation of Fire Alarm Systems.
- 3.1.2. Any new installation, removal or relocation of existing fire alarm devices to be coordinated with landlord and carried out by landlord's approved fire alarm contractor. This includes manual stations, speakers, smoke or heat detectors and bells, include all necessary costs as part of tender submittal. Include all costs as part of price submission.
- 3.1.3. Wire alarm initiating, alarm output, auxiliary output and signal devices to local SCP's. Wire alarm initiating circuits. Connect detectors and manual stations and manual stations. Properly arrange and connect wiring to their respective circuits as shown on the drawings.
- 3.1.4. Connect the addressable pull stations, intelligent smoke detectors, flow switches, valves, zone alarm modules etc. to the nearest existing addressable loops.
- 3.1.5. Install wiring for the alarm signal, alarm initiating, fire fighters telephone and speaker circuits in separate raceways. (Voice circuits only may share wire ways if shielded cables are used.)
- 3.1.6. Wire signal circuits alternatively such that no two adjacent signal devices are on the same circuit.
- 3.1.7. Arrange wiring to the speakers such that no two adjacent speakers are connected to the same circuit.
- 3.1.8. Speakers and/or horns shall be surface mounted in stairwells and equipment spaces.
- 3.1.9. Equip all raceways with a separate ground conductor and connect to ground bus in the Central Alarm Control Facility or local Satellite Control Panel.
- 3.1.10. Test each automatic detector to ensure correct wiring and zoning by setting off its rate of rise component and sounding the signals or by ringing it out. Test each detector to ensure correct wiring.
- 3.2. EVAC
- 3.2.1. System shall operate to the satisfaction of the Authorities having jurisdiction.
- 3.2.2. Speakers shall be installed flush with the ceiling. Secure the back box to the runners above the ceiling. Install adequate supports for the speaker back boxes covered by the covers.
- 3.2.3. All wiring shall be installed in conduit in accordance with the recommendations of the manufacturer.
- 3.2.4. Demonstrate the operation of the system to the authority having jurisdiction. This shall include, but not be limited to:
- 3.2.4.a. Detailed demonstration of each operable device.
- 3.2.4.b. Removal of individual speakers from their wiring connections to prove that adjacent speakers operate properly and subsequent reinstallation of speakers on selected floors.
- 3.2.4.c. Interfacing of voice communication and fire alarm systems.
- 3.2.4.d. Operation of ceiling speakers.
- 3.3. Wiring
- 3.3.1. Install wiring in conduit using wire size and type in accordance with manufacturer's recommendations.
- 3.3.2. Connect automatic detectors, smoke detectors and manual stations between red and black conductors at each outlet. Cut red and black conductors at each outlet and connect to terminal screws provided, red to red and black to black.
- 3.3.3. Align alarm devices and signals, where grouped together, one above the other.
- 3.3.4. Entire installation shall be done under supervision of manufacturer. Upon completion of installation, check entire system to approval and correct any malfunction immediately.
- 3.4. System Verification
- 3.4.1. The fire alarm system shall be verified in accordance to CAN/ULC–S537 Standard for the Verification of Fire Alarm Systems.
- 3.4.2. The manufacturer of the fire alarm and voice communication system shall make a complete inspection of all components installed for system, such as manual stations, speakers, smoke detectors, and bells to ensure the following:
- 3.4.2.a. That the system is complete in accordance with Specifications.
- 3.4.2.b. That the system is connected in accordance with Manufacturer's recommendations.
- 3.4.2.c. That the regulations concerning the supervision of components have been adhered to (e.g. stations, detectors, supervised valves) and are properly wired and supervised.
- 3.4.2.d. That all equipment as part of the system is inspected for visible damage or tampering which might interfere with its intended operation.
- 3.4.2.e. That adjacent speakers have been connected to alternate circuits.
- 3.4.2.f. That all speaker circuits control functions have been tested for proper supervision, operation and annunciation;
- 3.4.2.g. That all speakers are properly zoned.
- 3.4.2.h. That any subsequent changes necessary to conform to the above will be carried out with technical advice supplied by the Manufacturer.
- 3.4.2.i. That all thermal detectors, smoke detectors and manual pull stations have been operated and are in good working order.
- 3.4.2.j. All tests required by Local Authorities have been carried out and all zones have been verified.
- 3.4.3. Verification records shall be maintained with the following minimum requirements:
- 3.4.3.a. verification records shall list each device and show the date on which each device was verified and the initials of the person who verified it.
- 3.4.3.b. verification records shall show the date on which all devices were verified.
- 3.4.3.c. verification records shall show the date of all deficiencies encountered in the control equipment, wiring and field devices.
- 3.4.3.d. verification records shall show the date when deficiencies were corrected and re-verified.
- 3.4.3.e. Provide any necessary equipment, test apparatus, ladders and scaffolding as required.
- 3.4.3.f. Adjust system and components as required to ensure complete system operation.
- 3.4.3.g. Only after the testing and verification task is completed, and all deficiencies rectified, notify the Engineers and representatives of the Fire Department and demonstrate the proper functioning of the system.
- 3.4.3.h. Where partial occupancies occur, the fire alarm system for the area to be occupied (including control units, annunciators, etc.) shall be tested and meet the requirements noted above. Upon system completion, those parts of the fire alarm system tested to this specification shall be retested in accordance with the requirements of CAN/ULC–S536, Standard for the Inspection and Testing of Fire Alarm Systems and as required by Local Authorities.

# City of Pickering

2460 Brock Road,  
Pickering, ON, Canada  
L1X 0J1  
Building A-200A, 2nd Floor



HHAngus & Associates Limited Consulting Engineers  
1127 Leslie Street, Toronto, ON, M3C 2J6 Canada  
www.hhangus.com | T 416 443 8200 | F 416 443 8290

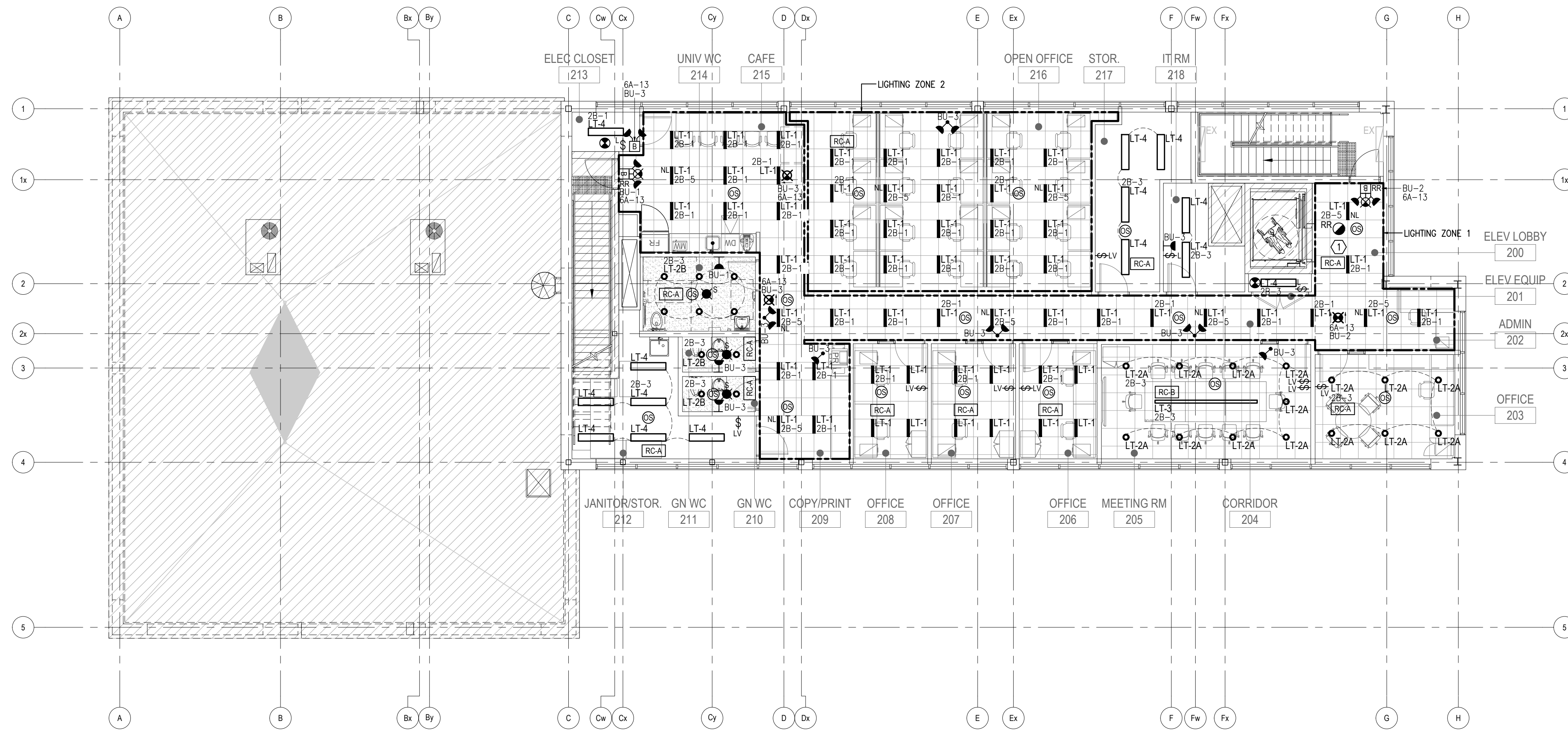


ISSUE	DATE	DESCRIPTION
03	2408/23	ISSUED FOR PERMIT/TENDER
02	2408/16	ISSUED FOR 100% COORDINATION
01	2408/08	ISSUED FOR 90% REVIEW
ISSUE	△	YYMMDD DESCRIPTION

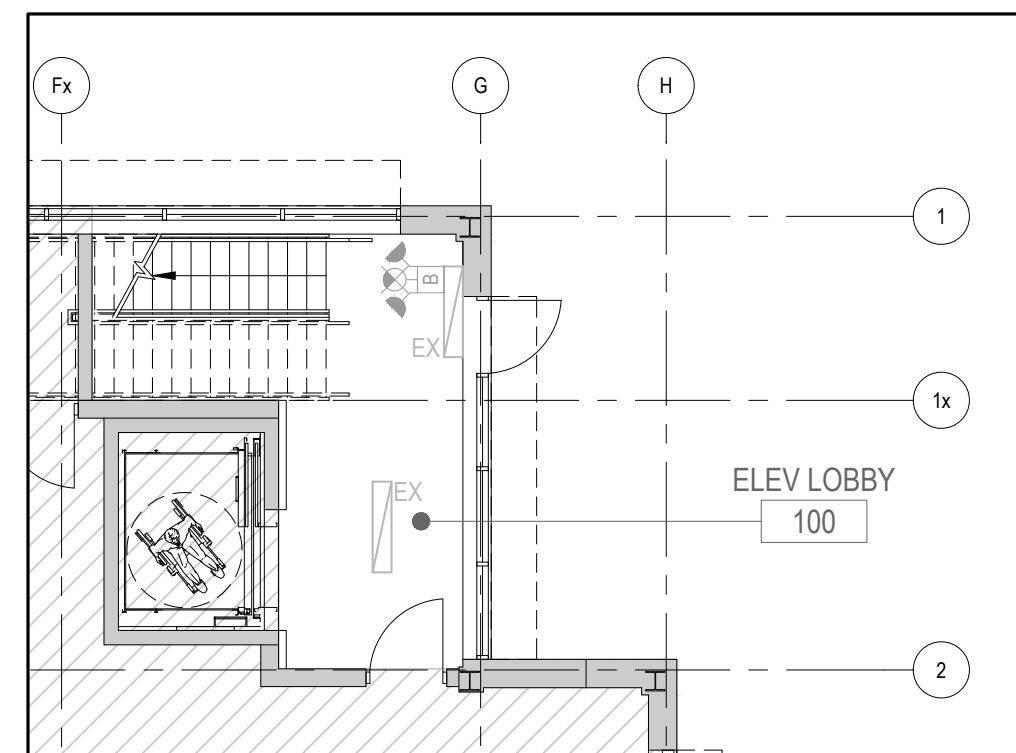


354 Davenport Road, Suite 200  
Toronto, Ontario, Canada M5R 1K6  
T: (416) 413-0063  
email: info@instudiocreative.com

Client Name	City of Pickering
Project Name	CoP Interior Fit-Out
Project Address	2460 Brock Road Pickering, ON L1X 0J1
Project number	2240483
Drawing Title	<b>ELECTRICAL SPECIFICATIONS</b>
Drawing Scale	<b>N.T.S.</b>
Drawing Number	<b>E1.5</b>
True North	



1 REFLECTED CEILING PLAN - 2ND FLOOR  
SYMBOL: 1:100mm



2 REFLECTED CEILING PLAN - GROUND FLOOR  
SYMBOL: 1:100mm

**GENERAL LIGHTING NOTES:**

- EXISTING BASE BUILDING LUMINAIRES ARE SHOWN IN FINAL LOCATION. REMOVE AND/OR RELOCATE LUMINAIRES AS REQUIRED TO SUIT NEW LAYOUT. CUT BACK AND/OR EXTEND WIRING AS REQUIRED.
- UNLESS NOTED OTHERWISE EXISTING BASE BUILDING LUMINAIRES TO REMAIN AS INSTALLED.
- CONTRACTOR TO ALLOW FOR THE SUPPLY AND INSTALLATION OF TWO (2) ADDITIONAL EXIT SIGNS. EXACT LOCATION TO BE DETERMINED BY THE BUILDING DEPARTMENT. EXIT SIGNS SHALL BE C/W 100' OF 2#10-1/2". CONNECT ANY NEW EXIT SIGNS TO NEAREST EXIT SIGN CIRCUIT HAVING AMPACITY IN AREA.
- THIS DRAWING TO BE READ IN CONJUNCTION WITH INTERIOR DESIGNERS DRAWING AND BASE BUILDING DRAWINGS.
- REWORK EXISTING CIRCUITRY, RELAYS AND WIRING AS REQUIRED TO SUIT NEW SWITCHING AND THE NEW LUMINAIRES LAYOUT.
- CIRCUIT NUMBERS SHOWN ARE DIAGRAMMATIC ONLY. CONNECT TO CIRCUITS MADE AVAILABLE BY THESE RENOVATIONS.
- REMOVE ALL EXISTING LIGHTING, SWITCHES AND REDUNDANT WIRING IN CONDUIT FROM EXISTING LIGHTING PANEL NOT REQUIRED AND MAKE SAFE.
- ALL EXISTING, RELOCATED AND/OR NEW RECESSED LUMINAIRES SHALL BE CHAIN HUNG AND SUPPORTED TO CEILING SLAB ABOVE FOR SAFETY PURPOSES.
- SWITCHES AND DIMMERS ADJACENT TO EACH OTHER SHALL BE GANGED UNDER A COMMON COVERPLATE. SWITCHES SHALL MATCH EXISTING TYPE AND COLOUR.
- ELECTRICAL CONTRACTOR SHALL CLEAN ALL EXISTING AND/OR RELOCATED LUMINAIRES AND REPLACE ANY MISSING AND DAMAGED LENSES WITH NEW LENSES.
- ELECTRICAL CONTRACTOR SHALL ALLOW IN TENDER SUBMITTAL FOR THE DISCONNECTING OF LUMINAIRES FROM EMERGENCY CIRCUIT TO NORMAL CIRCUIT AND FROM NORMAL CIRCUIT TO EMERGENCY CIRCUIT. ALLOW FOR APPROX. 3 FIXTURES. DISCONNECT AND RECONNECT AS REQUIRED TO MATCH NEW EMERGENCY/NORMAL LIGHTING LAYOUT AS PER FLOOR PLAN.

**DRAWING NOTES:**

- CONTRACTOR TO PROVIDE OPTIONAL PRICE TO SUPPLY AND INSTALL ONE (1) LT-5 FIXTURE IN LIEU OF TWO (2) LT-1 FIXTURES IN ELEVATOR LOBBY 200. CONTRACTOR TO SUPPLY AND INSTALL ADDITIONAL ROOM LIGHTING CONTROL UNIT FOR LT-5 FIXTURE.

**City of Pickering**

2460 Brock Road,  
Pickering, ON, Canada  
L1X 0J1  
Building A-200A, 2nd Floor



HHAngus & Associates Limited Consulting Engineers  
1127 Leslie Street, Toronto, ON, M3C 2J6 Canada  
www.hhangus.com | T 416 443 8200 | F 416 443 8290



ISSUE	YYMMDD	DESCRIPTION
03	240823	ISSUED FOR PERMIT/TENDER
02	240816	ISSUED FOR 100% COORDINATION
01	240808	ISSUED FOR 90% REVIEW
ISSUE	△	YYMMDD DESCRIPTION



354 Davenport Road, Suite 200  
Toronto, Ontario, Canada M5R 1K6  
T: (416) 413-0063  
email: info@instudiocreative.com

Client Name: City of Pickering

Project Name: CoP Interior Fit-Out

Project Address: 2460 Brock Road  
Pickering, ON L1X 0J1

Project number: 2240483

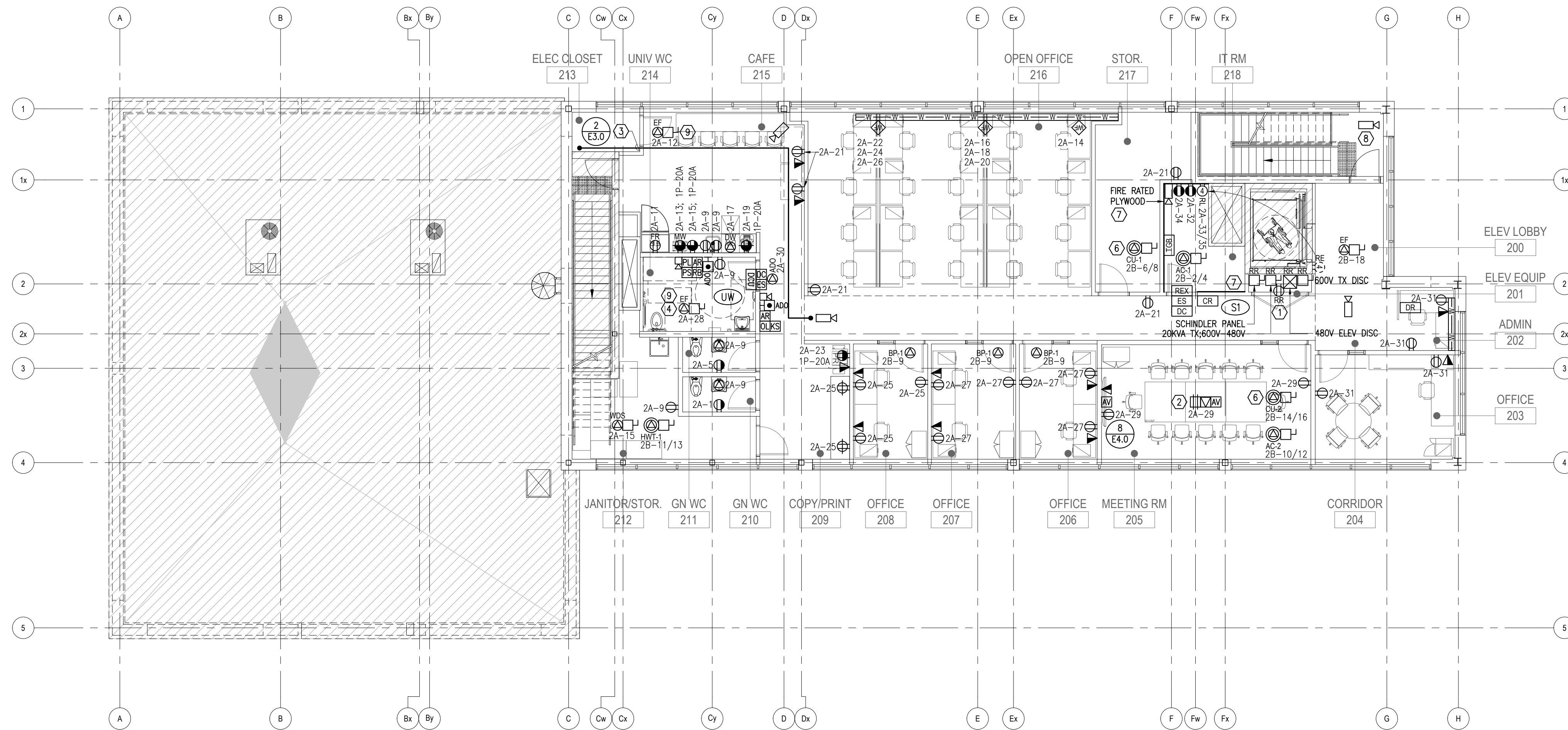
Drawing Title: **REFLECTED CEILING PLAN  
2ND FLOOR**

Drawing Scale: 1:100

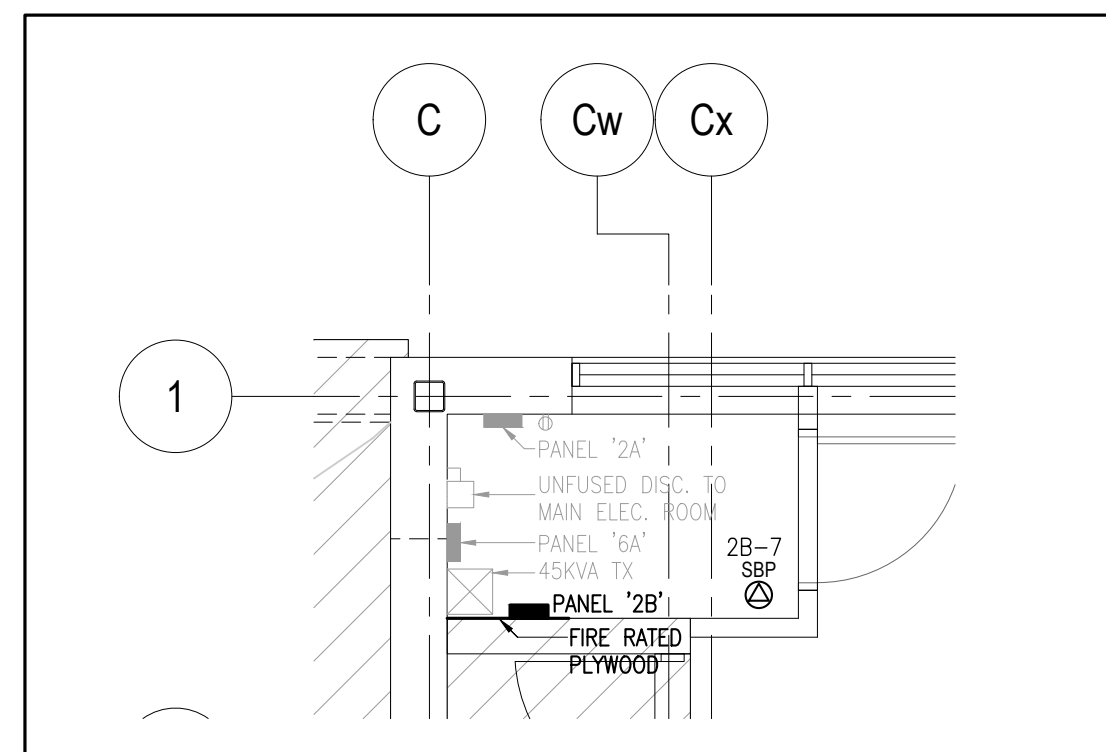
Drawing Number

**E2.0**

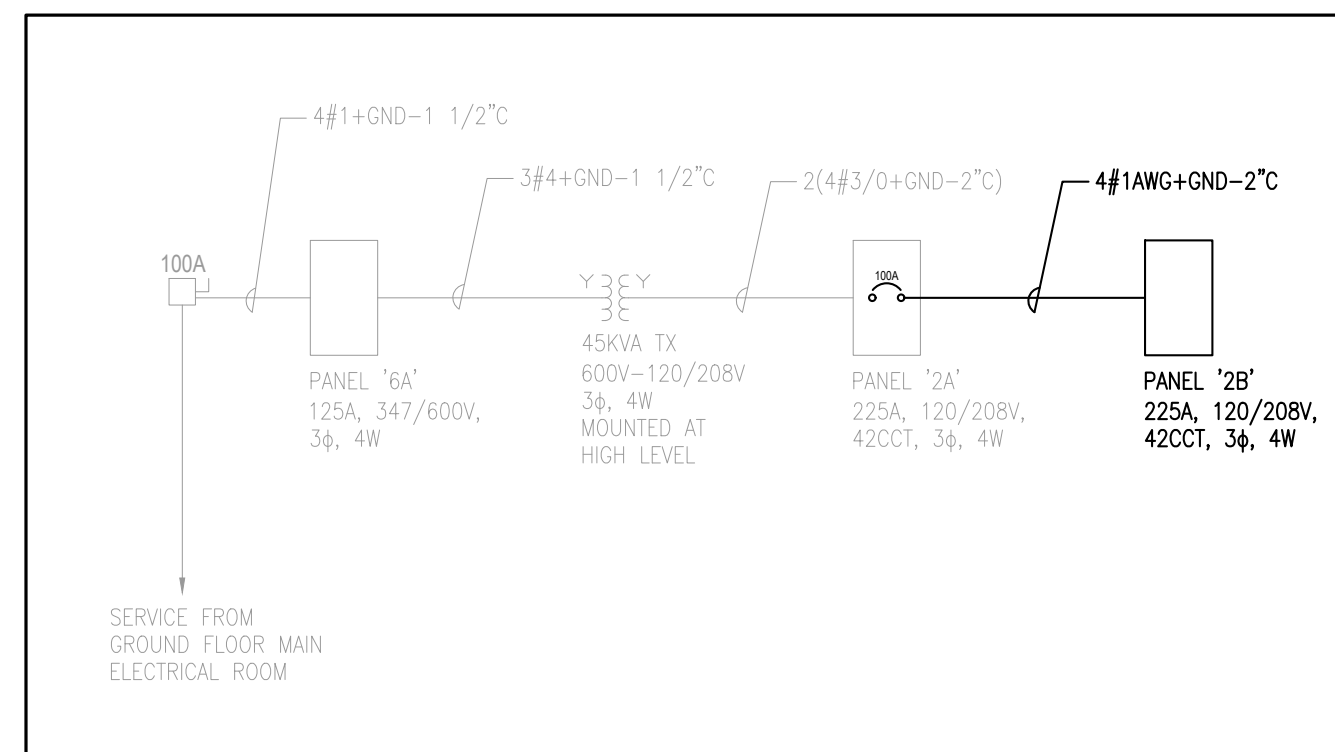
True North



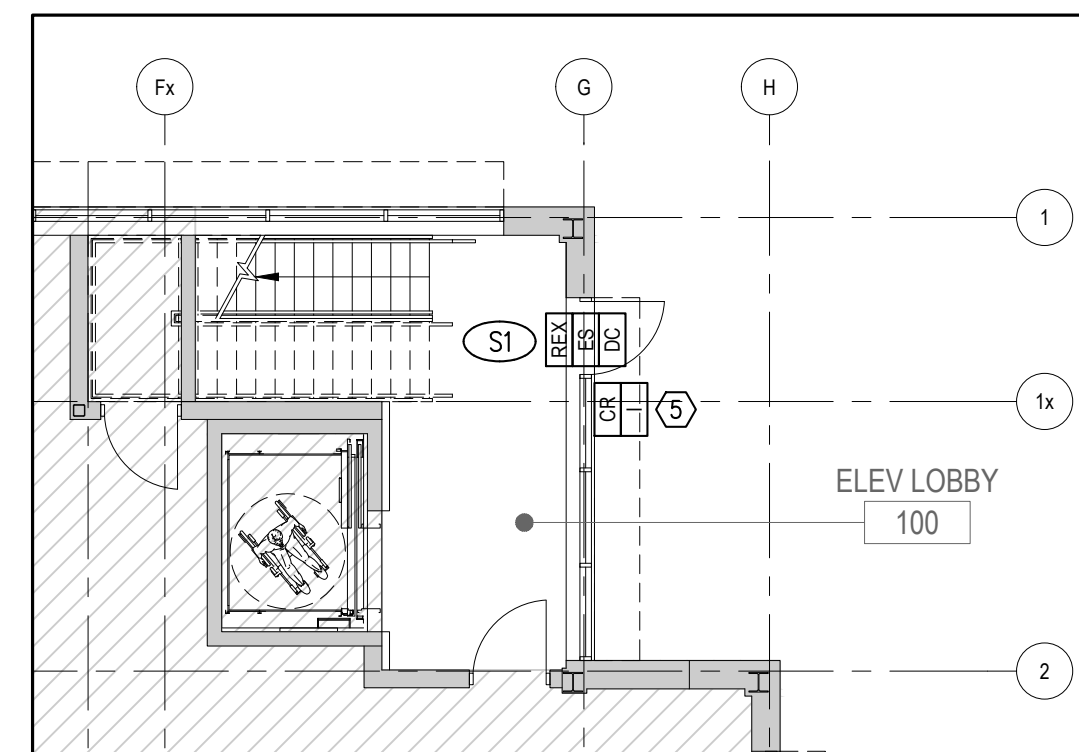
1 POWER AND SYSTEMS PLAN - 2ND FLOOR  
 E3.0 SYMBOL: 1:100mm



2 2ND FLOOR ELECTRICAL ROOM  
 E3.0 SYMBOL: 1:50mm



3 2ND FLOOR ELECTRICAL ROOM SINGLE LINE DIAGRAM  
 E3.0 SYMBOL: N.T.S.



4 POWER AND SYSTEMS PLAN - GROUND FLOOR  
 E3.0 SYMBOL: 1:100mm

**GENERAL POWER NOTES:**

1. WALL MOUNTED OUTLET LOCATIONS SHOWN ARE APPROXIMATE ONLY, FOR EXACT LOCATIONS REFER TO INTERIOR DESIGNERS DRAWINGS.
2. CIRCUITING SHOWN IS DIAGRAMMATIC ONLY. CONNECT TO NEW OR SPARE CIRCUITS MADE AVAILABLE BY THESE CHANGES. THIS ELECTRICAL CONTRACTOR TO SHOW ACTUAL CIRCUITS ON 'AS-BUILT' DRAWINGS.
3. ALL CABLING TO BE RUN IN EMT CONDUIT WHERE FEASIBLE WHEN RUN IN CEILING SPACE ABOVE.
4. FOR EXACT LOCATIONS OF MECHANICAL EQUIPMENT REFER TO MECHANICAL DRAWINGS.
5. ELECTRICAL CONTRACTOR TO PROVIDE FOR A NEW PANEL DIRECTORY SHOWING A CLEAR DESCRIPTION OF EACH CIRCUIT BEING CONTROLLED FROM EXISTING AND/OR NEW PANELS AND PLACE IN METAL FRAME INSIDE DOOR. ALSO IDENTIFY PANELS USING LAMICOID NAMEPLATES.
6. LABEL ALL NEW OR RELOCATED RECEPTACLES WITH SUITABLE LABEL MAKER IDENTIFYING PANEL NAME AND CIRCUIT NUMBER.
7. PROVIDE FOR NEW BREAKERS SIZES AS REQUIRED IN EXISTING AND/OR NEW RECEPTACLE PANELS TO SUIT THE CIRCUITRY SHOWN. ALL CIRCUITS SHOWN ARE 15A-1P UNLESS NOTED OTHERWISE.
8. VERIFY EXACT POWER REQUIREMENTS AND RECEPTACLE TYPE FOR SPECIAL EQUIPMENT WITH MANUFACTURER PRIOR TO INSTALLATION. REPORT ANY DISCREPANCIES TO ENGINEERS.
9. UNLESS OTHERWISE NOTED EXISTING BASE BUILDING ELECTRICAL DEVICES SHALL REMAIN AS INSTALLED.
10. THIS CONTRACTOR SHALL ENSURE THAT THE FIRE ALARM SYSTEMS BOUNDED BY AREA UNDER RENOVATIONS REMAIN IN TACT IN DURING AND AFTER COMPLETION OF CONSTRUCTION. REPORT ANY OBSTRUCTION OF RELOCATION OF ANY DEVICES AFFECTED BY RENOVATIONS TO THE ENGINEERS.
11. PROVIDE FOR ONE SEPARATE NEUTRAL INSULATED CONDUCTOR PER CIRCUIT.
12. ELECTRICAL CONTRACTOR SHALL CO-ORDINATE THE EXACT INSTALLATION OF TELEPHONE/DATA CABLING WITH THE TELEPHONE/DATA INSTALLERS.
13. ENSURE ALL RECEPTACLES SHOWN AS EXISTING REMAIN ENERGIZED TO EXISTING CIRCUITRY.
14. REMOVE ALL CONDUIT, CABLING, FLOOR MONUMENTS AND WALL OUTLETS MADE REDUNDANT BY THESE CHANGES. CUT BACK TO SOURCE AND MAKE SAFE. PATCH EXISTING HOLES ON FLOOR AND MAKE GOOD.
15. REPLACE COVERPLATES OF ANY EXISTING RECEPTACLES WITHIN TENANT SPACE WITH NEW TO MATCH NEW INSTALLATIONS.

**DRAWING NOTES:**

1. CONTRACTOR TO REMOVE AND REINSTALL ALL EXISTING ELEVATOR CONTROL EQUIPMENT TO SUIT NEW ELEVATOR EQUIPMENT CLOSET. ENSURE EQUIPMENT IS FULLY OPERATIONAL AND FUNCTIONAL. ALLOW FOR REWORK/EXTENSION OF CABLING AND CONDUIT AS NECESSARY. COORDINATE FINAL LOCATIONS AND SHUTDOWNS PRIOR TO RELOCATION.
2. CONTRACTOR TO ALLOW FOR SCANNING AND CORING FOR FLOOR BOX POWER AND DATA/AV CONNECTION. ALLOW FOR AFTER HOUR WORK TO COMPLETE FLOOR BOX SCANNING AND CORING IN GROUND FLOOR TENANT CEILING.
3. CONTRACTOR TO SUPPLY AND INSTALL ONE (1) 2\"/>

**City of Pickering**  
 2460 Brock Road,  
 Pickering, ON, Canada  
 L1X 0J1  
 Building A-200A, 2nd Floor



HHAngus & Associates Limited Consulting Engineers  
 1127 Leslie Street, Toronto, ON, M3C 2J6 Canada  
 www.hhangus.com | T 416 443 8200 | F 416 443 8290



ISSUE	DATE	DESCRIPTION
03	24/08/23	ISSUED FOR PERMIT/TENDER
02	24/08/16	ISSUED FOR 100% COORDINATION
01	24/08/08	ISSUED FOR 90% REVIEW
ISSUE	YYMMDD	DESCRIPTION



354 Davenport Road, Suite 200  
 Toronto, Ontario, Canada M5R 1K6  
 T: (416) 413-0063  
 email: info@instudiocreative.com

Client Name: City of Pickering

Project Name: CoP Interior Fit-Out

Project Address: 2460 Brock Road  
 Pickering, ON L1X 0J1

Project number: 2240483

Drawing Title: **POWER AND SYSTEMS PLAN  
 2ND FLOOR**

Drawing Scale: 1:100

Drawing Number: **E3.0**



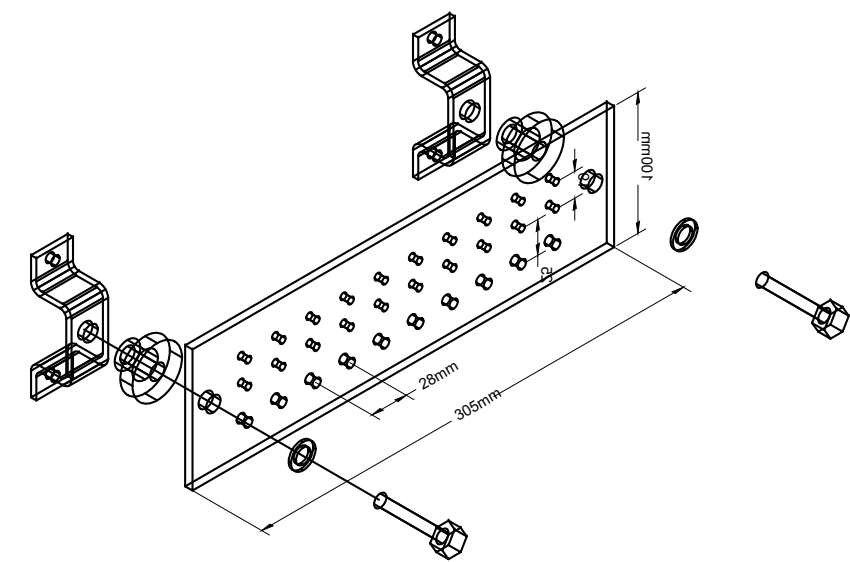
True North



**NOTES RE: SECURITY SYSTEMS**

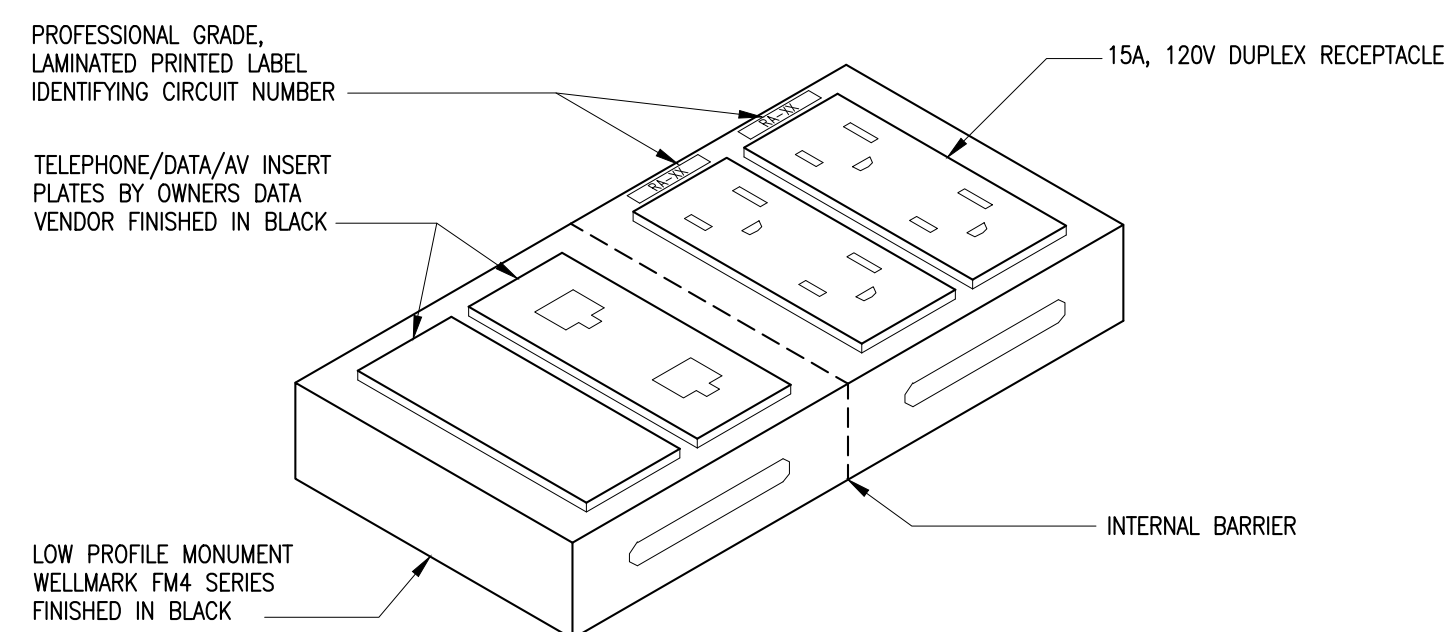
- ALL CONDUITS, WIRING & OUTLET BOXES TO BE SUPPLIED AND INSTALLED BY DIVISION 26. GC WILL SUPPLY AND INSTALL ALL SECURITY ITEMS AS PER CITY OF PICKERING SPECIFICATIONS PROVIDED DURING TENDER.
- ALL JUNCTION BOXES SHALL BE MOUNTED INSIDE SECURE AREA OF FLOOR SPACE.
- CONDUITS TO BE TERMINATED IN 4" x 4" x 4" CABLE TROUGH MOUNTED ON 4' x 4' SHEET OF PLYWOOD IN ELECTRICAL CLOSET AS NOTED.
- INCLUDE IN THIS PRICE ALL NECESSARY 120V CIRCUITS REQUIRED IN ELECTRICAL/TELEPHONE ROOMS IN RISER CLOSET. ALL CIRCUITS ARE GFI.
- CONNECT NEW PULL STATIONS TO EXISTING FIRE ALARM ZONE EXTEND SUPERVISED WIRING TO SUIT OBTAIN ASSISTANCE FROM ORIGINAL EQUIPMENT, MANUFACTURER OF BASE BUILDING FIRE ALARM SYSTEM TO PROVIDE TEST AND VERIFICATION, REPORT TO BUILDING OWNER.
- PROVIDE A 1/8" NYLON PULL CORD FOR ALL CONDUIT ASSOCIATED WITH SECURITY.
- ALL NEW PULL STATIONS PROVIDED SHALL BE C/W AUXILIARY CONTACTS TO RELEASE MAGNETIC LOCK INSTANTANEOUSLY WHEN ACTIVATED. PULL STATION(S) SHALL BE MOUNTED NOT MORE THAN 600 MM FROM THE ACTIVE DOOR. INCLUDE FOR INTERFACE WIRING TO SUIT.
- SECURITY WIRING AS SHOWN IS DIAGRAMMATIC ONLY. PROVIDE WIRING AS PER SECURITY SYSTEM MANUFACTURERS REQUIREMENTS.

1 SECURITY NOTES:  
E4.0

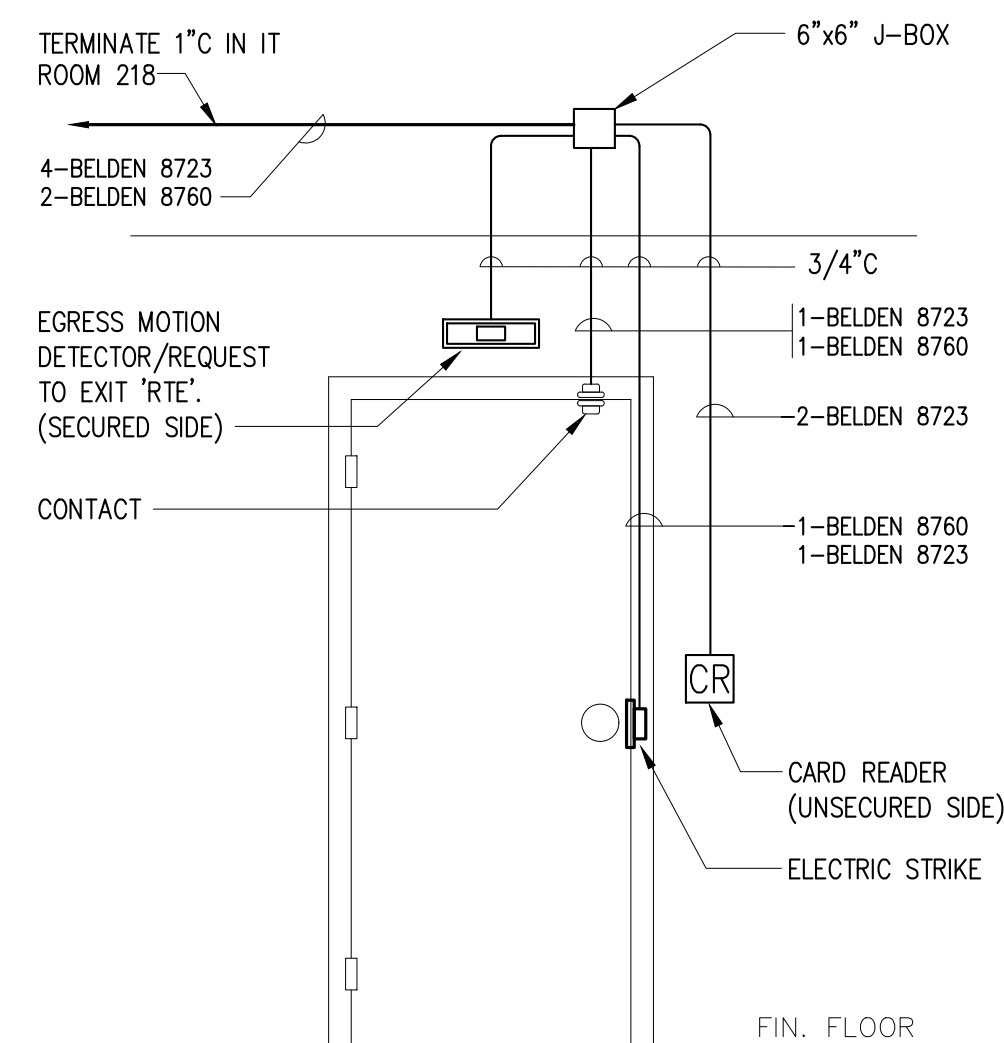


- NOTES:
- BUS TO BE MOUNTED ON UPPER CORNER OF PLYWOOD BACKBOARD.
  - EQUIPMENT RACKS, CABINETS AND CABLE TRAY ARE TO BE TERMINATED ON THE BUS BAR.
  - ONE #6 AWG INSULATED GREEN GROUND WIRE IS TO BE PROVIDED IN 1" FROM THE GROUND BUS BACK TO THE BUILDING GROUND RISER.

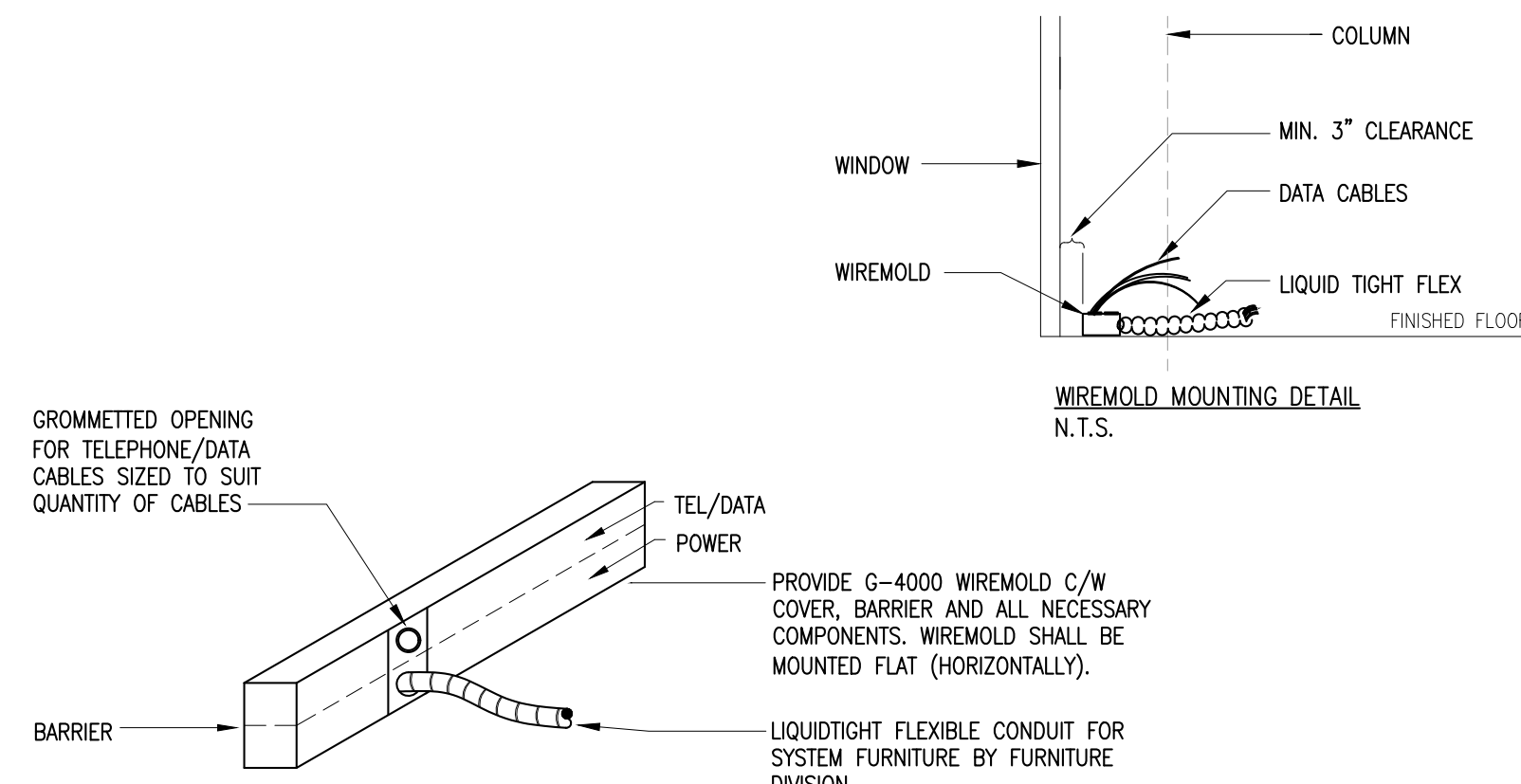
4 DETAIL OF WALL MOUNTED GROUND BUS BAR:  
E4.0 SYMBOL: [TBB] N.T.S.



6 DETAIL OF FLOOR MOUNTED POWER, COMMUNICATIONS, AV MONUMENT:  
E4.0 SYMBOL: [TBM] N.T.S.

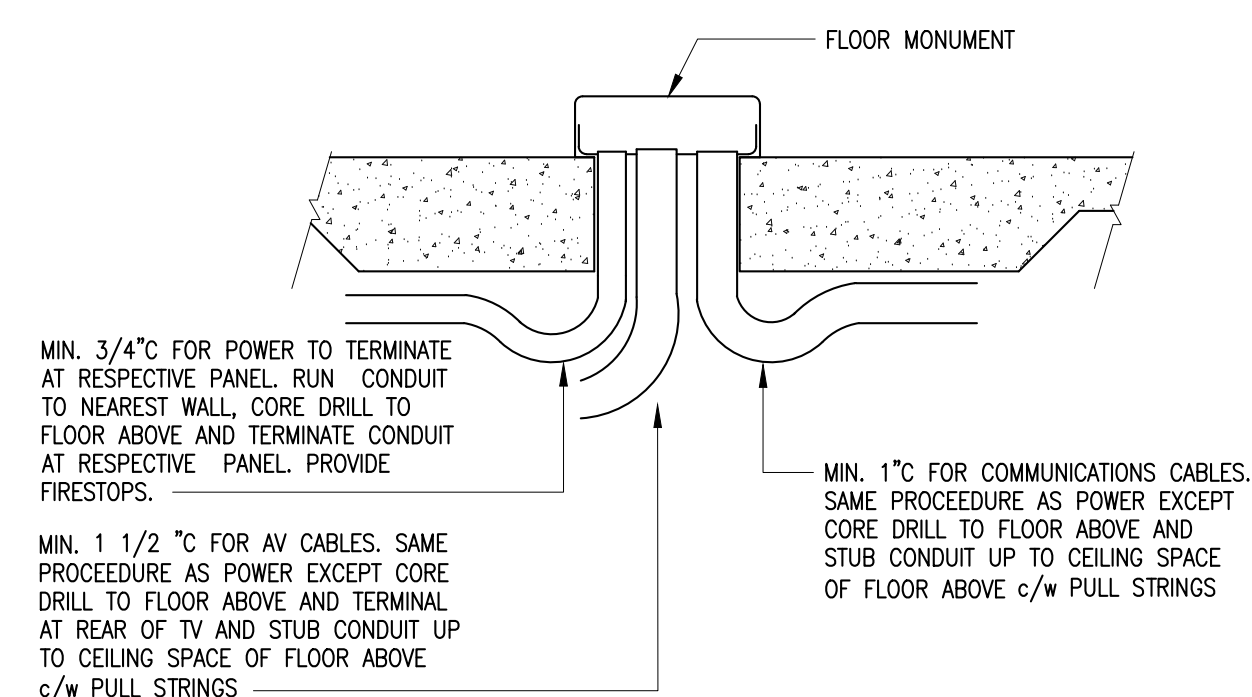


2 SECURITY SYSTEM DETAIL:  
E4.0 SYMBOL: [SI]

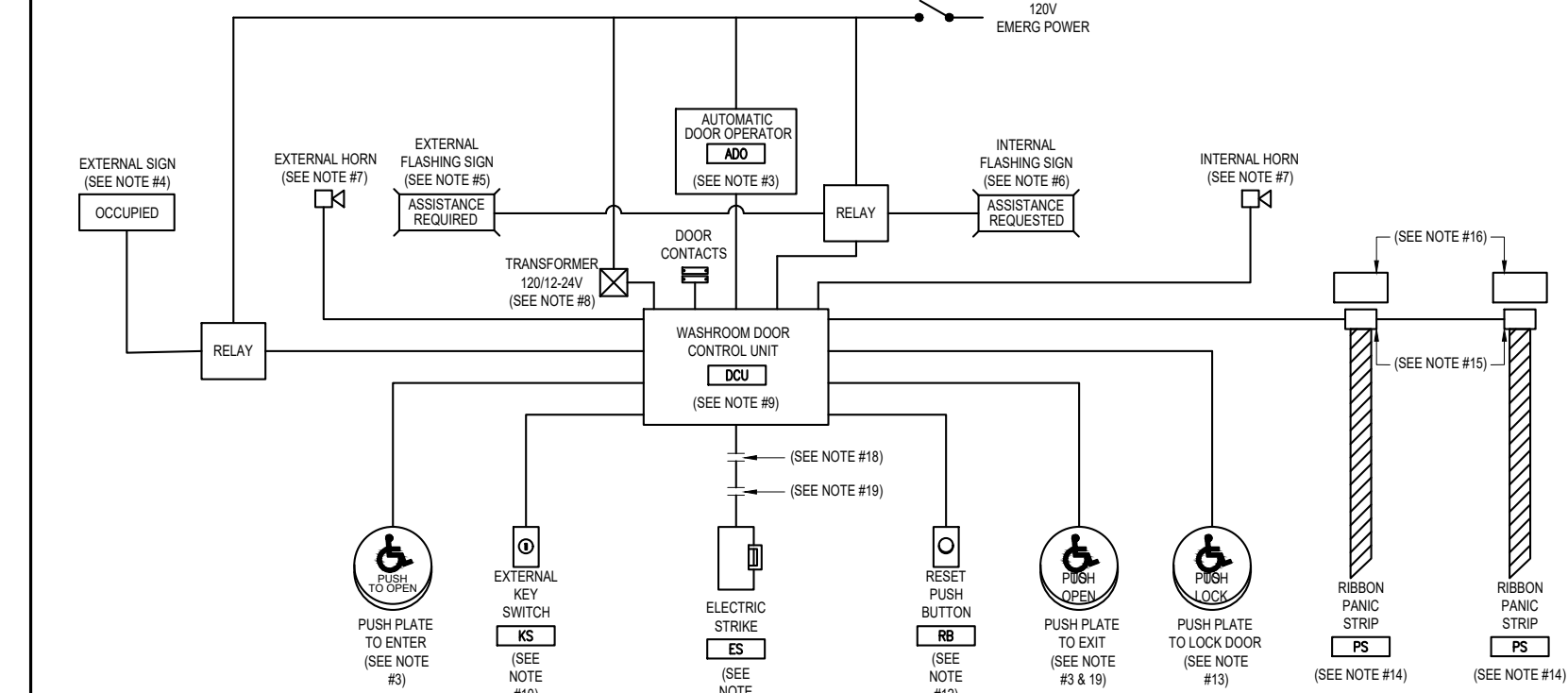


- NOTES:
- PROVIDE TWO (2) MIN. 1" CONDUIT FOR COMMUNICATIONS CABLES AND MIN. 3/4" CONDUIT FOR POWER. RUN CONDUIT FROM COMMUNICATIONS PORTION OF WIREMOLD RACEWAY UP COLUMN OR WALL AND TERMINATE IN ACCESSIBLE CEILING SPACE. RUN 3/4" FROM POWER SIDE OF WIREMOLD RACEWAY UP COLUMN OR WALL TO CEILING SPACE ABOVE AND TERMINATE AT RESPECTIVE ELECTRICAL PANEL. PROVIDE PULL STRINGS.
  - FOR INPUT LOCATION TO SYSTEM FURNITURE PROVIDE: 1 COMBINATION OUTLET COVER (STAINLESS STEEL) C/W 2 CUTOUTS - 1 FOR SYSTEM FURNITURE POWER CONNECTION AND 1 FOR COMMUNICATIONS CABLE ACCESS

5 DETAIL OF POWER & COMMUNICATIONS INPUT POINT FOR SYSTEMS FURNITURE WITH WIREMOLD; SYMBOL: [---] N.T.S.

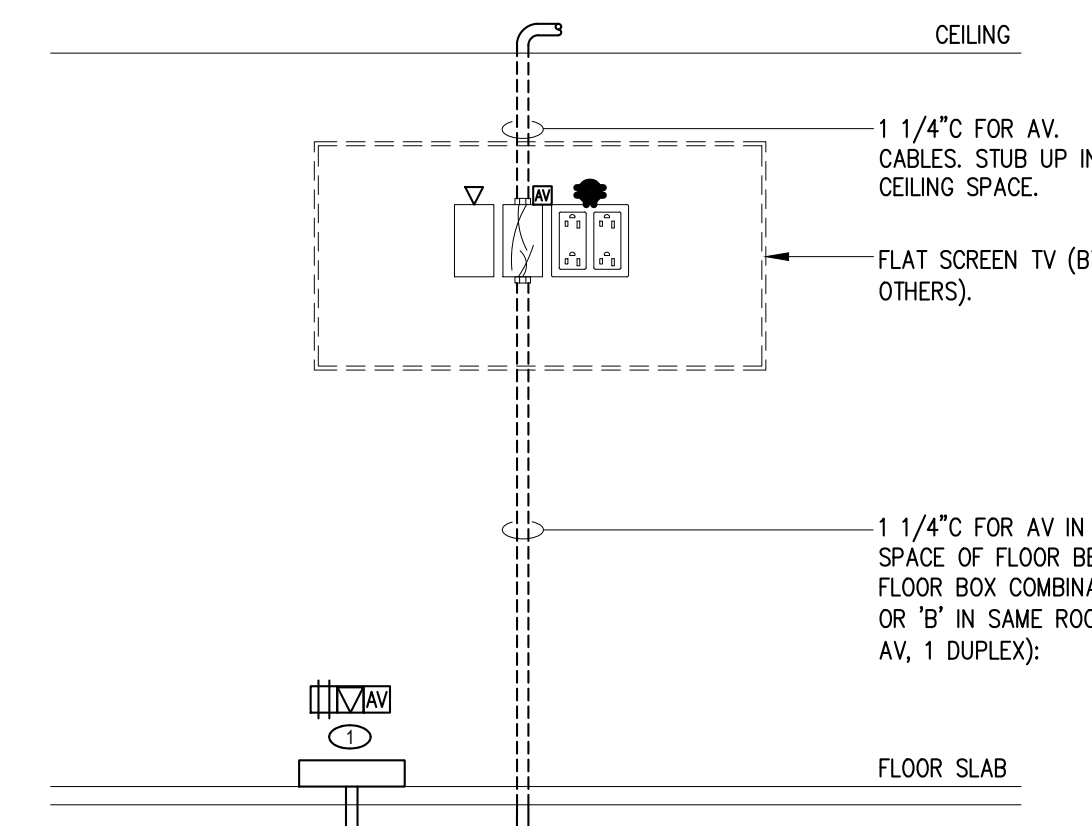


7 FLOOR MONUMENT MOUNTING DETAIL:  
E4.0 SYMBOL: [TBM] N.T.S.



- NOTES:
- DEVICES & WIRING BY ELECT/SECURITY CONTRACTOR EXCEPT WHERE INDICATED OTHERWISE.
  - LOCATE DEVICES IN ACCORDANCE WITH ARCHITECTURAL AND ELECTRICAL DRAWINGS.
  - BY DOOR HARDWARE DIVISION.
  - "OCCUPIED" SIGN TO MATCH EXIT SIGNS USED ON THE PROJECT.
  - FLASHING "ASSISTANCE REQUIRED" SIGN TO MATCH EXIT SIGNS USED ON THE PROJECT.
  - SAME AS "ASSISTANCE REQUIRED" SIGN BUT SHOWING "ASSISTANCE REQUESTED".
  - 24V HORN, SCHLAGE #1910 OR ACCEPTABLE ALTERNATIVE.
  - CONTROL TRANSFORMER, SIZE TO SUIT TOTAL CONNECTED LOAD OF THE DEVICES USED, BUT NOT LESS THAN 100VA. LOCATE IN ACCESSIBLE CEILING SPACE, PROVIDE ACCESS PANEL WHERE THE CEILING IS NOT LAY-IN TILE. SECURE THE TRANSFORMER USING RESILIENT MOUNTS TO PREVENT TRANSMISSION OF NOISE AND VIBRATION.
  - DOOR CONTROL UNIT (DCU), CAMDEN MODEL CX-EMF-2 OR ACCEPTABLE ALTERNATIVE, LOCATE IN ACCESSIBLE CEILING SPACE, PROVIDE ACCESS PANEL WHERE THE CEILING IS NOT LAY-IN TILE.
  - KEY SWITCH MOMENTARY CONTACT WITH STAINLESS STEEL MORTISE CYLINDER AND SINGLE GANG STAINLESS STEEL FACEPLATE WIKK MODEL KS-P, CAMDEN MODEL CM-1200 OR ACCEPTABLE ALTERNATIVE. MOUNT AT 1200mm ABOVE FLOOR TO CENTERLINE. KEY ALL KEY SWITCHES ALIKE AND PROVIDE 6 DUPLICATE KEYS EACH C/W A LAMICOID FOB STATING "UNIVERSAL W/R".
  - ELECTRIC STRIKE COMPLETE WITH RECTIFIER AND POWER REDUCTION FEATURE FOR CONTINUOUS OPERATION. STRIKE TO LOCK WHEN ENERGIZED AND TO FAIL SAFE (OPEN).
  - INTERIOR MOMENTARY CONTACT SYSTEM RESET SWITCH. PROVIDE LAMICOID PLATE WITH 6mm (1/4") HIGH LETTERING, BLACK LETTERS ON A WHITE BACKGROUND STATING: "EMERGENCY RESET PUSH TO RESET SYSTEM" MOUNT SWITCH AT 1050mm ABOVE FINISHED FLOOR TO CENTERLINE.
  - INTERIOR PUSH PLATE TO LOCK DOOR, WIKK MODEL #6R-3 WITH CUSTOM ENGRAVING: "PUSH TO LOCK" OR ACCEPTABLE ALTERNATIVE. MOUNT AT 1050mm ABOVE FINISHED FLOOR TO CENTERLINE.
  - RIBBON PANIC STRIP - TAPESWITCH TYPE "PASS" OR ACCEPTABLE ALTERNATIVE. ACTIVE SWITCH AREA NOT LESS THAN 800mm IN LENGTH WITH BOTTOM OF ACTIVE SWITCH AREA 150mm ABOVE FINISHED FLOOR.
  - WIRE MOLD BOX SERIES 500.
  - LAMICOID PLATE WITH 25mm HIGH RED LETTERING ON A WHITE BACKGROUND STATING: "IN THE EVENT OF AN EMERGENCY, DEPRESS STRIP, AN AUDIBLE AND VISUAL SIGNAL WILL ACTIVATE" MOUNT ONE PLATE ABOVE EACH RIBBON PANIC STRIP.
  - CO-ORDINATE DEVICE RATINGS AND FUNCTIONS WITH HARDWARE DIVISION.
  - FIRE ALARM CONTACT TO OPEN UPON ACTIVATION OF A FIRE ALARM (2ND STAGE WHERE APPLICABLE).
  - AUXILIARY CONTACT ON PUSH PLATE TO EXIT (CO-ORDINATE REQUIREMENTS WITH HARDWARE DIVISION).
- REQUIRED OPERATION:
- WHEN NOT IN USE, SIGNS ARE NOT ILLUMINATED, HORNS ARE OFF AND DOOR IS NOT LOCKED.
  - A PERSON CAN ENTER BY OPENING THE DOOR MANUALLY OR BY DEPRESSING THE MOMENTARY CONTACT "PUSH TO OPEN" STATION, IN WHICH CASE THE DCU PICKS UP AND DOOR OPENS AUTOMATICALLY.
  - ONCE INSIDE, A PERSON DEPRESSES THE MOMENTARY CONTACT "PUSH TO LOCK" STATION, IN WHICH CASE THE DCU PICKS UP AND LATCHES IN. THE DCU ACTIVATES THE ELECTRIC STRIKE LOCKING THE DOOR AND ILLUMINATES THE "OCCUPIED" SIGN.
  - TO EXIT, A PERSON DEPRESSES THE MOMENTARY CONTACT "PUSH TO OPEN" STATION. THE DCU RELEASES THE ELECTRIC STRIKE, OPENS THE DOOR AND TURNS OFF THE "OCCUPIED" SIGN.
  - SHOULD THE PERSON REQUIRE ASSISTANCE, THE PERSON DEPRESSES THE MOMENTARY CONTACT PANIC STRIP. THE DCU PICKS UP AND LATCHES IN. THE "ASSISTANCE REQUESTED" AND "ASSISTANCE REQUESTED" SIGNS ILLUMINATE AND FLASH AT A RATE OF ONCE PER SECOND. THE HORNS SOUND.
  - A RESPONDER TO THE ASSISTANCE REQUIRED SIGNAL OPERATES THE KEY SWITCH WHICH RELEASES THE ELECTRIC STRIKE ALLOWING ENTRY TO THE WASHROOM.
  - ONCE INSIDE, THE RESPONDER CAN DEPRESS THE RESET BUTTON, THE HORNS AND THE FLASHING SIGNS TURN OFF. THE "OCCUPIED" SIGN REMAINS ILLUMINATED, UNTIL THE PUSH PLATE TO EXIT IS DEPRESSED.

3 UNIVERSAL WASHROOM, DOOR CONTROL & SIGNALLING, ELECTRICAL SCHEMATIC - SINGLE LINE; (UW) N.T.S.



- GENERAL NOTES:
- THIS ELECTRICAL CONTRACTOR (DIV. 26) SHALL SUPPLY & INSTALL ALL EMT CONDUIT AND ASSOCIATED JUNCTION BOXES, NYLON PULL CORDS (FOR COMM. & A/V CONDUIT), AND ELECTRICAL OUTLETS.
  - A/V CABLES TO BE SUPPLIED BY A/V SYSTEM VENDOR AND INSTALLED BY OTHERS. FINAL TERMINATION OF CABLES/TESTING SHALL BE BY A/V SYSTEM VENDOR.
  - REFER TO A/V SYSTEM DRAWINGS AND COORDINATE EXACT MOUNTING HEIGHTS/LOCATIONS OF OUTLETS WITH A/V SYSTEM VENDOR PRIOR TO INSTALLATION.
- DENOTES NEW EMT CONDUIT RUN IN CEILING SPACE OR PARTITION
- AV CONNECTION FROM FLOOR MONUMENT TO FLOOR BELOW, TO ADJACENT PARTITION, UP AND TO BACK OF MONITOR. CABLE TO BE PULLED BY OTHERS. INCLUDE FOR SCANNING & CORING AS REQUIRED.

8 WALL MOUNTED AV CONDUIT ELEVATION DETAIL:  
E4.0 SYMBOL: N.T.S.

**City of Pickering**  
2460 Brock Road,  
Pickering, ON, Canada  
L1X 0J1  
Building A-200A, 2nd Floor



HHAngus & Associates Limited Consulting Engineers  
1127 Leslie Street, Toronto, ON, M3C 2J6 Canada  
www.hhangus.com | T 416 443 8200 | F 416 443 8290



ISSUE	DATE	DESCRIPTION
03	240823	ISSUED FOR PERMITTENDER
02	240816	ISSUED FOR 100% COORDINATION
01	240808	ISSUED FOR 90% REVIEW
ISSUE	YYMMDD	DESCRIPTION



354 Davenport Road, Suite 200  
Toronto, Ontario, Canada M5R 1K6  
T: (416) 413-0063  
email: info@instudiocreative.com

Client Name	City of Pickering
Project Name	CoP Interior Fit-Out
Project Address	2460 Brock Road Pickering, ON L1X 0J1
Project number	2240483
Drawing Title	<b>ELECTRICAL DETAILS</b>
Drawing Scale	N.T.S.
Drawing Number	<b>E4.0</b>

True North



