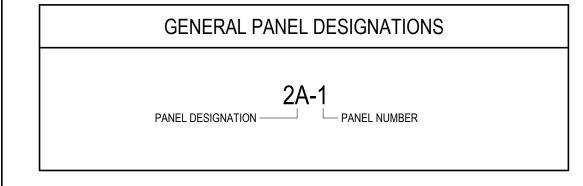
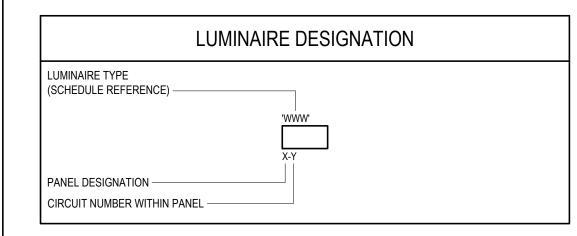
	ABBREV	/IATIONS	5
AFF	ABOVE FINISHED FLOOR	MW	MICROWAVE
AHU	AIR HANDLING UNIT	NL	NIGHT LIGHT
С	CONDUIT	RE	REMOVE FOR THE PURPOSE OF
C/W	COMES WITH OR COMPLETE WITH	RE NE	RELOCATION
CCT	CIRCUIT	RL	ITEM IN ITS RELOCATED POSITION
CM	CEILING MOUNTED	RR	REMOVE AND REINSTALL IN SAME
CU	CONDENSATE UNIT	- KK	LOCATION
DW	DISHWASHER	RTU	ROOFTOP UNIT
Е	EXISTING TO REMAIN	SBP	STROBE BOOSTER PANEL
EF	EXHAUST FAN	TYP	TYPICAL
FCU	FAN COIL UNIT	UPS	UNINTERRUPTIBLE POWER SUPPLY
FR	FRIDGE	WDS	WATER DETECTOR SHUT OFF
GF	GROUND FAULT		
GFCI	GROUND FAULT CIRCUIT INTERRUPTER		
HD	HAND DRYER		
HWT	HOT WATER TANK		

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

			LIGHTING CONTROLS
	\$		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

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

ELECTRI	CAL SINGLE LINE DRAWING LEGEND
마	UNFUSED DISCONNECT.
3£ xxx	DISTRIBUTION TRANSFORMER. 'XXX' = 'HMT' TO DENOTE HARMONIC MITIGATION / CANCELLATION. 'XXX' = 'K' TO DENOTE K-RATED.
Y	WYE.

	LIGHTING LEGEND
NL LT-1	LUMINAIRES with 'NL' DENOTES HARDWIRED TO NIGHT LIGHT CIRCUIT c/w LOCK OFF BREAKER.
LT-1	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.
• LT-2A	3.3" 120V LED ROUND DOWNLIGHT. 1500LM. 13.9W. 3500K. 0-10V DIMMABLE. 3G LIGHTING #3G-DL33RF-15-S80-35K-60D-UNV-DIM-BT-BI-NC-BH.
• LT-2B	3.3" 120V LED ROUND DOWNLIGHT. 1500LM. 13.9W. 3500K. 0-10V DIMMABLE. 3G LIGHTING #3G-DL33RF-15-S80-35K-60D-UNV-DIM-BT-BI-NCF.
LT-3	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-2PSL-DI-SE-S(8'0")-2LI-D500-L500-FL-FL-BK-BFP-DF3-07-45D-H90-35K-UN V-DIM-60"-1C.
LT-4	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.
LT-5	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-1-0-R7-BK.
X OR X	347V EXIT SIGN WITH DIRECTIONAL ARROW AS INDICATED. EXIT SIGANGE TO MATCH BASE BUILDING STANDARDS. BELUCE #STELLA RUNNING MAN. WALL MOUNTED SHOWN ON LEFT. CEILING MOUNTED SHOWN ON RIGHT.
B _{BU-X}	347V WALL MOUNTED EMERGENCY LIGHTING BATTERY UNIT C/W INTEGRAL HEADS. OPERATING TIME SHALL BE MINIMUM TWO (2) HOURS. BELUCE - NOVA #NV-12-360
♦ OR ♦	EMERGENCY LIGHTING DOUBLE REMOTE HEAD. WALL MOUNTED SHOWN ON LEFT. CEILING MOUNTED SHOWN ON RIGHT. BELUCE #SR SERIES. 12V. 4 WATTS. LED.
T OR T	EMERGENCY LIGHTING SINGLE REMOTE HEAD. WALL MOUNTED SHOWN ON LEFT. CEILING MOUNTED SHOWN ON RIGHT. BELUCE #SR SERIES. 12V. 4 WATTS. LED.
B _{BU-X}	347V WALL MOUNTED EMERGENCY LIGHTING BATTERY UNIT C/W EXIT SIGN BELUCE #STELLA COMBO RUNNING MAN SERIES.
EX	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 WIREMOLD RACEWAY. COLOUR TO BE GREY. -w-w-TYPE AS SPECIFIED C/W TYPE AND QUANTITY OF DEVICES INDICATED. SURFACE MOUNTED COMBINATION POWER, DATA, AND AV BOX. WELLMARK #FM4 Щ**М**AV UN-FUSED DISCONNECT SWITCH. 'X' DENOTES DISCONNECT RATING. JUNCTION BOX C/W BLANK COVER PLATE. SIZED FOR THE SERVICE/CONNECTION NOTED. TRANSFORMER. OR _____ ELECTRICAL PANEL. FLUSH MOUNTED SHOWN ON LEFT. SURFACE MOUNTED SHOWN ON RIGHT OR ____ 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 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 PANIC STRIP. PROVIDE 3/4" CONDUIT C/W PULL STRINGS TO AN ACCESSIBLE CEILING REQUEST TO EXIT. PROVIDE 3/4" CONDUIT C/W PULL STRINGS TO AN ACCESSIBLE 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

		ELECTR	RICAL R	ECEPTACLE LEGEND
CEILING MOUNTED	WALL MOUNTED	EQUIPMENT / HEADWALL MOUNTED	MOUNTED ABOVE COUNTER HEIGHT	DESCRIPTION
Ø	Φ		+	120V, 15A DUPLEX RECEPTACLE.
	Ø		₩	120V, 15A SPLIT DUPLEX RECEPTACLE.
	Ф		•	120V, 15A GFCI DUPLEX RECEPTACLE
Ø	—		•	120V, 15/20A T-SLOT DUPLEX RECEPTACLE. 'HK' DENOTES HOUSEKEEPING RECEPTACLE.
	P		*	120V, 15/20A T-SLOT GFCI DUPLEX RECEPTACLE. 'HK' DENOTES HOUSEKEEPING RECEPTACLE.
	0		•	120V, 15A DOUBLE DUPLEX RECEPTACLE.
Ø	•		•	120V, 15A EMERGENCY POWER DUPLEX RECEPTACLE.
Ø	P		*	120V, 15/20A T-SLOT EMERGENCY POWER DUPLEX RECEPTACLE.
#	#		#	SPECIAL RECEPTACLE. REFER TO SPECIAL RECEPTACLE DESIGNATION TABLE.

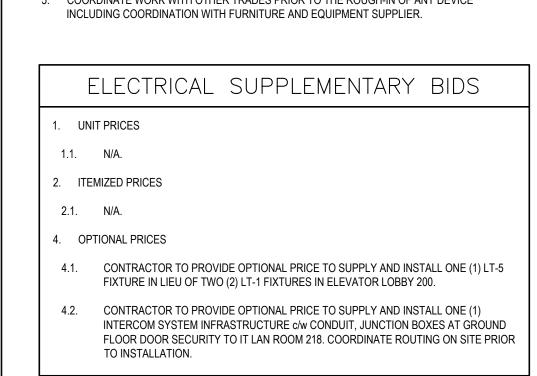
STRINGS TO AN ACCESSIBLE CEILING LOCATION.

AN ACCESSIBLE CEILING LOCATION.

SECURITY CAMERA. PROVIDE 3/4" CONDUIT + JUNCTION BOX C/W PULL STRINGS TO

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.][]
- 2. 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.
- 3. 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.
- 4. 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.
- 5. COORDINATE WORK WITH OTHER TRADES PRIOR TO THE ROUGH-IN OF ANY DEVICE



	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

			NOMI	NAL (COND	UIT S	IZES			
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

ELECTRI	CAL GENERAL LEGEND
(XXX-YY) OR XXX-YY	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.
RL	NEW LOCATION OF RELOCATED ELECTRICAL EQUIPMENT OR SERVICE.
, xx	DEMARCATION POINT. ITEMS TO THE LEFT OF THE POINT IS BY DIVISION 'XX'

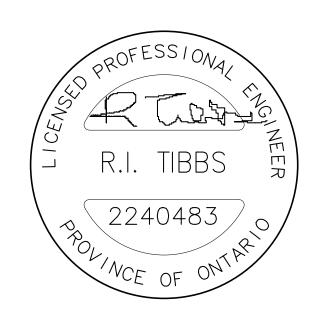
ITEMS TO THE RIGHT OF THE POINT IS BY DIVISION 'YY'

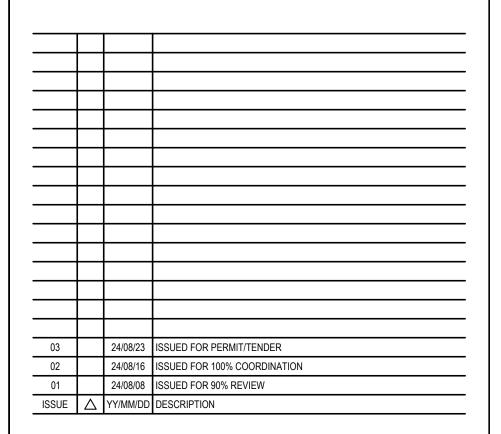
City of Pickering

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



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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

ELECTRICAL LEGEND AND DRAWING LIST

N.T.S. Drawing Scale Drawing Number

E1.0

ELECTRICAL GENERAL REQUIREMENTS

GENERAL REQUIREMENTS

1.1. Scope 1.1.1. This Section covers items common to Sections of Division 26. This section supplements

requirements of Division 1 1.1.2. Comply with General Conditions of Contract, Supplementary Conditions and Division 01 - General

1.1.3. Where conflict occurs between Codes, Specification and Drawings, plan and riser, the maximum condition to govern, and the Tender to be based on whichever indicates the greater cost.

1.2. Work Included 1.2.1. Work to be done under this section to include furnishing of labour, materials and equipment required for installation, testing and putting into proper operation complete Electrical systems as shown, as specified, as intended, and as otherwise required. Complete systems to be left ready for continuous and efficient satisfactory operation.

1.3. Document organization 1.3.1. Applicable Divisions for Electrical Work:

1.3.1.a. Division 26 — Electrical 1.3.1.b. Division 27 - Communications 1.3.1.c. Division 28 — Electronic Safety and Security

1.3.2. For clarity, any reference in the Contract Documents to Division 26 includes Division 27 and 28. 1.3.3. The Specifications for these Divisions are arranged in Sections for convenience. It is not intended to recognize, set or define limits to any subcontract or to restrict Contractor in letting

1.3.4. Contractor is responsible for completion of work whether or not portions are sublet. 1.4. Definitions

1.4.1. The words "indicated", "shown", "noted", "listed" or similar words or phrases used in this Specification, mean that material or item referred to is "indicated", "shown". "listed" or "noted" on

1.4.2. The words "approved", "satisfactory", "as directed", "submit", "permitted", "inspected", or similar words or phrases used in this Specification, mean that material or item referred to is to be approved by", "satisfactory to", "as directed by", "submitted to", "permitted by", "inspected by",

1.4.3. Instructions using any form of word "provide" involves Contractor in furnishing labour, materials and services to supply and install referenced item. 1.5. Examination

1.5.1. Examine any existing buildings and services, local conditions, building site, Specifications, and Drawings and report any condition, defect or interference that would prevent execution of work. 1.5.2. Examine work of other Divisions before commencing this work, and report any defect or

1.5.3. No allowance will be made for any expense incurred through failure to make these examinations of site and documents prior to Tender or on account of any conditions on site or any growth or item existing there which was visible or known to exist at time of Tender. 1.6. Standard of material and equipment

1.6.1. Materials and equipment: 1.6.1.a. new and of uniform pattern throughout work,

1.6.1.b. of Canadian manufacture where obtainable, 1.6.1.c. labelled or listed as by Code and/or Inspection Authorities CSA certified and CMB listed. Where there is no alternative to supplying equipment which is not CSA certified, obtain

special approval from Electrical Safety Authority. 1.6.1.d. standard products of approved manufacture.

1.6.1.e. in compliance with Standards and Regulations with respect to; -chemical and physical properties of materials,

-performance characteristics, and

-methods of construction and installation. Materials and equipment are described to establish standards of construction and

workmanship. 1.6.1.a. Where manufacturers or manufacturer's products are identified in lists with phrase "Standard of Acceptance", these are manufacturers and/or products which meet standards with regard to performance, quality of material and workmanship.

1.6.1.b. Manufacturers and or products used are to be chosen from these lists. Include items of material and equipment not specifically noted on Drawings or mentioned in Specifications but which are required to make an operating system.

Confirm capacity or ratings of equipment being provided, when based on ratings of equipment being provided under other trade Sections, before such items are purchased.

Factory fabricate control panels and component assemblies. Select materials and equipment in accordance with manufacturer's recommendations and

install in accordance with manufacturer's instructions. Materials and equipment not satisfying these selection criteria will be condemned. -Remove condemned materials from job site and provide

properly selected and approved materials.

1.7.1. The use of a substitute article or material which the manufacturer represents to be of at least equal quality and of the required characteristics for the purpose intended may be permitted, subject to the following provisions:

1.7.1.a. a substitution will not be considered for reasons of meeting the construction schedul unless the contractor can demonstrate to the satisfaction of the Consultant they made all reasonable efforts to procure the specified product or material in a timely fashion,

1.7.1.b. the manufacturer must advise the Consultant of this intention to use an alternative article 1.7.1.c. the burden of proof as to the quality and suitability of alter-natives to be upon the

manufacturer and they shall supply all information necessary as required by the Consultant at no additional costs to the contract. 1.7.1.d. the Consultant to be the sole judge as to the quality and suitability of alternative materials and their decision to be final.

where use of an alternative material involves redesign or changes to other parts of the work, the costs and the time required to effect such redesign or changes will be considered

in evaluating the suitability of the alternative materials, 1.7.1.f. no test or action relating to the approval of substitute materials to be made until the request for substitution has been made in writing by the manufacturer and has been accompanied by complete data as to the quality of the materials proposed. Such request to be made in ample time to permit appropriate review without delaying the work, taking into consideration that such a substitution request may be rejected and require providing

the product or material as originally specified, 1.7.1.q. Whenever classification, listing, or other certification by a recognized standards body is a part of the specifications for any material, proposals for use of substitute materials to be accompanied by reports from the equivalent body indicating compliance with the

requirements of the specifications. The costs of all testing required to prove equality of the material proposed to be borne by

the manufacturer. SUBMITTALS

2.1. Shop Drawings and Product Data 2.1.1. Submit shop drawings, manufacturers and product data and samples;

2.1.1.a. Submit for each item of equipment such as transformers, panelboards, luminaire cuts and special systems. Submit shop drawings in the same unit of measure as are used on the drawings. Both metric and imperial measures may be included.

Submit shop drawings by email to: shopdrawings@hhangus.com 2.1.2. Include a H.H. Angus shop drawing cover sheet form (to be provided by Consultant) prepared for

this project, for each shop drawing, or include the same information on the contractors submittal

2.1.2.a. Information required on each submission: -Client/Architect name -Project Name

> -H.H. Angus project number -Contractor name -Contractor reference No.

-Manufacturer name -Product type -Specification section number -Contractor trade: mechanical, electrical, elevators, or

general trades -If a re-submission, the previous submission H.H. Angus reference

2.1.3. Submit shop drawings in PDF format; 2.1.3.a. If submitted in hardcopy format, submit in 11 x 17, black and white originals of graphic quality suitable for photocopying. Allow one additional week for processing of shop drawings submitted in hardcopy format.

2.1.4. Manufacturers printed product data sheets for standard items are acceptable in place of shop drawings providing physical characteristics are identified and are related to specification references. 2.1.5. Submit manufacturers data sheets with typed schedules listing manufacturers and suppliers name

and catalogue model number for such items as fire alarm system components, etc. 2.1.6. For luminaires, submit luminaire cuts with manufacturer's names and catalogue numbers for all luminaires to be used on the job. Identify and arrange the luminaire cuts and catalogue numbers in

the same sequence as the Specification Luminaire list. 2.1.7. Shop drawings and product data to show: 2.1.7.a. CSA or equivalent approval. 2.1.7.b. Dimensioned outlines of equipment.

2.1.7.c. Dimensioned details showing service connection points. 2.1.8. Indicate details of construction, dimensions, capacities, weights and electrical performance

characteristics of equipment or material. 2.1.9. Where applicable, include wiring, single line and schematic diagrams. 2.1.10. Include wiring drawings or diagrams showing interconnection with work of other Sections. 2.1.11. Each shop drawing to be checked and stamped as being correct, by trade purchasing item, before drawing is submitted. If above requirements are not complied with, shop drawings will be rejected

and returned forthwith. 2.1.12. For manufacturer's data and lighting fixtures, submit for approval, bound sets showing the fixture cuts, manufacturer's name and catalogue numbers. Each folder or binder to be complete with all fixtures used on the job. Arrange the fixture cuts and catalogue numbers and identify in the same sequence as the specified fixture list.

2.2. Operating and Maintenance Data 2.2.1. Provide operation and maintenance data bound in (8½ in x 11 in x 2 in thick) size, vinyl covered,

hard back, three-ring covers. 2.2.1.a. Organize material in volumes generally grouped by Division Section; Site services, Power, Lighting, Low Voltage Systems, Fire Alarm and Security.

Title sheet in each volume to be labeled "Operating and Maintenance Manual" and to bear Project Name, Project Number, Date, Trade Section, and List of Contents. Provide three hard-copies to Owner.

2.2.2. In addition, provide Adobe PDF files for each document, produced from original direct—to—digital file 2.2.2.a. Organize documents into separate PDF files for each Division Section identified above, and apply Adobe Bookmarks to create Table of Contents.

2.2.3. Include in operations and maintenance data: 2.2.3.a. Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.

Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists. Advertising or sales literature not

Wiring and schematic diagrams and performance curves. Names and addresses of local suppliers for items included in maintenance manuals. 2.2.3.e. Copy of reviewed shop drawings.

Spare parts list and an itemized cost.

2.2.3.g. Name and telephone numbers of service organization and technical staff that will provide warranty service on the various items of equipment. 2.3. Operating and Maintenance Instructions

2.3.1. Supply the services of a skilled tradesman for a minimum of two consecutive full days to start each system in its proper sequence, and test and calibrate controls and set-up systems. 2.3.2. During this procedure thoroughly explain the operation and maintenance of each system.

incorporating specialized instruction by manufacturers as described under other sections in this 2.3.3. Arrange suitable time for instructions with Owner's operating and maintenance personnel. 2.3.4. Keep a record of date and duration of each instruction period together with the names of persons

2.4.1. Prior to testing, balancing and adjusting, transfer site record drawing information to AutoCad 2008 (CAD) files, to record final as-built condition. Obtain a current set of CAD files from the

attending. Submit signed records at completion of instruction.

2.4.1.a. Drawings are to remain set to and follow Consultants AutoCad Standards. Do not alter drawing scales, X-refs, colours, layers or text styles.

2.4.1.b. The Consultant's CAD files may not reflect all or any construction changes. 2.4.2. Where items have been deleted, moved, renumbered or otherwise changed from contract drawings, revise the CAD files to record these changes. "Bubble" these revisions, and place these annotations on a separate and easily identified drawing layer.

2.4.3. As-built drawings to show the final as-built condition. 2.4.4. Show on electrical as-built drawings final location of conduit, outlets, panels, branch wiring, system

wiring, pull boxes, bus ducts, and equipment. 2.4.5. Identify each drawing in lower right hand corner in letters at least ½" high as follows "AS-BUILT DRAWINGS. This drawing has been revised to show systems as installed" (Signature of Contractor) (Date). The site services drawings are to include (Signature and Stamp of OLS) attached to note.

2.4.6. Once "AS BUILT DRAWINGS" white prints are reviewed, transfer Consultant's comments to the CAD files. Return AutoCad drawings modified to "As Built" condition to Consultants on CD or DVD Rom. 2.4.7. Submit three (3) sets of white prints and three (3) copies of CAD files with Operating and

Maintenance Manuals. REFERENCE CODES, STANDARDS, AND REGULATIONS

3.1. Codes and Standards 3.1.1. Do complete installation in accordance with Ontario Electrical Safety Code (OESC) except where

specified otherwise. Do underground systems in accordance with CSA C22.3 No.7-M86 except where specified otherwise.

3.1.3. Abbreviations for electrical terms: to CSA Z85-1983. 3.1.4. Comply with CSA Certification Standards and Ontario Electrical Safety Code Bulletins in force at time of Tender submission.

3.1.5. Where requirements of this specification exceed those of the above mentioned standards, this specification to govern. 3.2. Permits, Fees and Inspections

3.2.1. Submit to Electrical Safety Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.

Pay associated fees.

3.2.3. Consultant will provide drawings and specifications required by Electrical Safety Authority at no cost. 3.2.4. Notify Consultant of changes required by Electrical Safety Authority prior to making changes. 3.2.5. Furnish Certificates of Acceptance from Electrical Safety Authority and authorities having jurisdiction on completion of work to Consultant.

4.1. Testina

4. FIELD QUALITY CONTROL

4.1.1. Conduct and pay for following tests: 4.1.1.a. Power distribution system including phasing, voltage, grounding and load balancing.

4.1.1.b. Circuits originating from branch distribution panels.

4.1.1.c. Lighting and its control. 4.1.1.d. Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

4.1.1.e. Systems: fire alarm system, communications. 4.1.2. Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.

4.2. Load Balance 4.2.1. Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and

4.2.2. Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of eauipment. 4.3. Co-ordination of Protective Devices 4.3.1. Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required

values and settings as per equipment manufacturers recommendations for each piece of equipment. 4.4. Cleaning 4.4.1. Do final cleaning.

4.4.2. At time of final cleaning, clean lighting reflectors, lenses, and other lighting surfaces that have been exposed to construction dust and dirt, including the top surface, whether exposed or in the ceiling

4.4.3. Clean switch, receptacle, and communications outlets, coverplates, and exposed surfaces. 4.4.4. Clean all other electrical equipment and devices installed as part of this project. 4.5. Final Inspection

4.5.1. At project completion submit written request for a final inspection of electrical systems. Include with this submission written certification that: 4.5.1.a. Deficiencies noted during job inspections have been completed.

Systems have been balanced and tested and are ready for operation. Completed maintenance and operating data have been submitted and approved. 4.5.1.d. Tags are in place and equipment identification is completed.

4.5.1.e. The cleaning up is finished in every respect. All electrical panels, switchboards, cabinets, and equipment surfaces have been touched up with matching paint, or re-finished as required Spare parts and replacement parts specified have been provided and receipt acknowledged.

As-built drawings are completed and approved. Owner's operating personnel have been instructed in operation and maintenance of systems. Fire alarm verification is 100% completed and Verification Certificate has been submitted and

accepted. EQUIPMENT

5.1. Warning Signs 5.1.1. As specified and to meet requirements of Electrical Safety Authority and Consultant. 5.1.2. Porcelain enamel decal signs, minimum size 7" x 10".

5.2. Protection 5.2.1. Protect exposed live equipment during construction for personnel safety. 5.2.2. Shield and mark live parts "LIVE 120 VOLTS", or with appropriate voltage.

5.3. Sleeves and Curbs 5.3.1. Provide sleeves of galvanized steel for conduit and cable runs passing through concrete walls, beams, slabs and floor. Sleeves for bus ducts, wireways and cable trays to be minimum $\frac{1}{2}$ galvanized steel.

5.3.2. Extend galvanized sleeves for conduit rising through slabs 4" minimum above finished floors. Provide sleeves, passing through floors having a waterproof membrane, with an integral flashing 5.3.3. Where cables or conduits pass through floors and fire rated walls, pack space between wiring and

sleeve full with Fireproofing, and seal with caulking compound conforming to CANZ-19.13. 5.4.1. The integrity of the fire resistance rating of the floors and walls to be maintained around electrical raceways and/or cables passing through such floors and/or walls.

5.4.2. Materials used to maintain fire resistance ratings to have a minimum 2 hour ULC or cUL listed 5.4.3. Wiring may penetrate a fire resistance rated assembly provided it is enclosed in non-combustible conduit, and the passage of the conduit in turn is suitably sealed to the assembly with fire stop

5.4.4. Wiring with a combustible covering and not enclosed in non-combustible conduit penetrating a fire

resistance rated assembly shall be grouped into separate fire sealed penetrations to ensure the overall diameter of the combined wire(s) in each penetration does not exceed 1", and that the integrity of the fire rated assembly is not compromised.

5.4.6. Where wiring is installed in cable trays and must penetrate a fire rated assembly, stop and independently support the cable tray immediately on each side of the fire rated assembly while allowing sufficient working room to properly install and inspect the fire rating materials and . Standard of Acceptance: Thomas & Betts — Flame—safe, Nelson/Wieland (Electrovert) — Flameseal, Double A/D Distributors Ltd. — Firebarrier Firestopping, Canstrut — Elasta—Seal MBF—KBF sealbags (where open tray passes through floor slab)

5.4.5. Single conductor metal sheathed cables shall be arranged to individually penetrate the fire rated

5.5. Sprinkler Protection

assembly and be individually fire stopped.

5.5.1. Equipment in sprinklered areas, except for weatherproof equipment, must be provided with hoods or shields and gasketted doors for protection against sprinkler discharge, and to comply with the

5.5.2. Ventilation openings to be overhanging drip-proof type 5.5.3. Weatherproof equipment, where noted in the specifications and/or drawings to have EEMAC type 3

enclosures in accordance with the requirements of CSA C22.2 No. 94 Standard. 5.5.4. Surface panelboards, switchboards and other electrical equipment in sprinklered areas to be fitted with watertight hubs with insulated throat for all conduit entrances Standard of Acceptance: Thomas & Betts Ltd. — Series 401, Efcor of Canada Ltd. — Series 40-50B

5.6. Access Doors 5.6.1. Submit list of proposed access door locations and obtain approval thereof before commencing

access door installation 5.6.2. Submit access door shop drawings for approval as soon as possible after Award of Contract, showing size, type and exact location of access doors.

5.6.3. Access doors, unless otherwise specified or shown, to be at least 12 gauge steel, finished prime coat only, with concealed hinges, anchor straps, plaster lock, without screws.

5.6.4. Access doors in ceilings, where acoustic tile is applied to plaster or gypsum board, to be dish type designed to receive the tile insert. 5.6.5. Inside frame dimensions to be approximately 12" x 18". However, if it is necessary for personnel to

enter through doors, they to be at least 24" x 18". 5.6.6. Access doors to be as manufactured by: Standard of Acceptance: Zurn Industries Canada Ltd. — Inspectors, LeHage Industries Ltd., A. G. Baird Limited — ABCO, Stelpro Limited — Type 700

5.6.7. Provide access doors for locations where equipment requiring maintenance or adjustment is "built—in". 5.6.8. These access doors will be installed under the Division in whose work they occur. Arrange for and

pay cost of access door installation. 5.6.9. Access doors are not required in removable acoustic panel type ceilings. 5.6.10. Provide approved coloured marking devices after completion of such ceilings, at four corners of each panel below point requiring access.

5.6.11. Size and locate access doors in applied tile, or in glazed or unglazed structural tile to suit tile patterns. Refer to Architectural Room Finish Schedule and details on Architectural Drawings in this

6. COORDINATION 6.1. General 6.1.1. Consultant drawings are diagrammatic and illustrate the general location of equipment, and intended routing of ductwork, piping, etc, and do not show every structural detail. In congested areas drawings at greater scale may be provided to improve interpretation of the Work. Where equipment or systems are shown as "double line", they are done so either to improve understanding of the Work, or simply as a result of the use of a CAD drawing tool, and in either case such drawings are not represented as fabrication or installation drawings.

Lay out and coordinate Work to avoid conflict with work under other Divisions. 6.1.3. Make good damage to Owner's property or to other trade's work caused by inaccurate layout or

careless performance of work of this Division. 6.1.4. When equipment provided under other Sections connects with material or equipment supplied under this Section, confirm capacity and ratings of equipment being provided.

6.1.5. Take information involving accurate measurements from dimensioned Architectural Drawings or at 6.1.6. Install services and equipment which are to be concealed, close to building structure so that furring is kept to minimum dimensions.

6.1.7. Location of conduit, bus duct, raceways and equipment may be altered without extra cost provided instruction is given or approval is obtained, in advance of installation of items involved. Changes will be authorized by site instructions and are to be shown on Record Drawings. 6.1.8. Include incidental material and equipment not specifically noted on Drawings or mentioned in

Specifications but which is needed to complete the work as an operating installation. 6.2. Cutting and Remedial Work 6.2.1. For details of cutting and patching and Division of Work refer to Division 1 6.2.2. Division 26 contractor to be responsible for arranging and paying for all cutting and patching as required. Before cutting, drilling, or sleeving structural load bearing elements, obtain the Owner's

material required to perform cutting or patching for weather exposed or moisture resistant elements or sight exposed surfaces. 6.2.3. All core drilling through floor slabs to be X-rayed and verified with Owner's representative prior to coring. Relocate core drilling location if steel or conduit is found in the proposed location and

approval of location and methods in writing. Employ original installer or expert in the finishing of

repeat procedure. Reroute any circuits damaged by core drilling. 6.3. Work in Existing Building 6.3.1. Refer to Division 01 - General Requirements. 6.3.2. During the tender period, the Contractor shall perform a site inspection of the place of work and surroundings including the accessible ceiling spaces and other areas where access could be

considered reasonable. Make a thorough investigation of As Built conditions to determine scope of renovation or demolition work required prior to submitting tender. 6.3.3. Work includes changes to existing building and changes at junction of old and new construction. Route cabling, ducts, conduits and other services to avoid interference with existing installation. 6.3.4. Relocate existing pipes, ducts, conduits, bus ducts and any other equipment or services required

for the proper installation of new work. 6.3.5. Maintain or relocate existing services which pass through the area of renovation or demolition, but which feed items located outside of these areas. Rewire devices to the original circuits. 6.3.6. Remove existing lighting fixtures, wiring, devices and equipment to suit new construction. Cut back and cap conduits and electrical outlets, not being used, so that finished work presents a neat and

clean appearance. Disconnect at point of electrical supply, remove obsolete wiring and conduits, and make existing systems safe. Blank off openings in panels or boxes from removed conduits or 6.3.7. Unless noted to be reused, removed conduit, wiring and devices become the property of the Contractor and are to be taken from the site and disposed of appropriately.

6.3.8. Removed lighting fixtures and equipment shall be reviewed at site with the Owner's representative, and if the Owner instructs they wish to keep any items, they shall be moved to a designated location on the site. Lighting fixtures and equipment that the Owner does not want shall be taken from the site and disposed of appropriately.

6.3.9. Provide junctions boxes, outlet boxes, wiring, plates, etc..., as necessary for complete relocation of devices, fixtures and equipment. 6.3.10. Revise panelboard directories accordingly if affected by work.

6.3.11. Clean and relamp relocated lighting fixtures and replace any faulty ballasts. 6.3.12. On completion of relocations, confirm relocated devices and lighting fixtures are in proper working

6.3.13. Co-ordinate work affecting fire alarm system, fire safety, and detection systems with base building fire alarm system manufacturer, and authorities having jurisdiction prior to commencing work. Retain original fire alarm system manufacturer to verify all relocated fire alarm devices and all revised wiring. Provide temporary fire protection and/or a fire watch as required by authorities having

jurisdiction in all areas affected by the demolition. 6.3.14. Where Owner wishes to take over renovated areas ahead of project completion date and these areas are intended to be fed from distribution systems in new building, make temporary connections to existing services in these areas. Reconnect to permanent services, at a later date, when new distribution systems are available.

6.4. Continuity of Services 6.4.1. Refer to Division 01 - General Requirements. 6.4.2. Connections to existing systems to be made at approved times. Obtain written approval recording

times when connections can be made. Arrange work so that physical access to existing buildings is not unduly interrupted. 6.4.3. Be responsible for any damages caused to existing systems when making connections. 6.4.4. Keep existing buildings in operation with minimum length of shutdown periods. Include overtime work to tie-in piping or wiring at night or on weekends. Provide temporary feeders and connections as required to maintain systems in operation where shutdown periods will exceed 8 hours, or

6.5. Voltage Ratings 6.5.1. Operating voltages: to CAN3-C235-83.

6.5.2. Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

6.6. Equipment Identification 6.6.1. Identify electrical equipment with nameplates and labels as follows:

extend beyond the allowable time frame determined by the Owner.

6.6.2. Nameplates: 6.6.2.a. Nameplates for panels and equipment to be 1/8" thick, black lettering on white background, with beveled edges and echanically attached with self—tapping stainless steel screws.

NAMEPLATE SIZES Letter height ½" × 2" Lines 2 lines ⅓" high

2 lines 1 line 1" x 4"

6.6.3. Labels: Embossed plastic labels with 1/4" high letters unless specified otherwise. 6.6.4. Wording on nameplates and labels to be approved by Consultant prior to manufacture.

6.6.5. Allow for average of thirty—five (35) letters per nameplate and label. 6.6.6. Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

6.6.7. Disconnects, starters and contactors: indicate equipment being controlled and voltage. 6.6.8. Terminal cabinets and pull boxes: indicate system and voltage.

6.6.9. Transformers: indicate capacity, primary and secondary voltages. 6.6.10. Identify other cabinets for low voltage systems, such as signals and communications, as for panelboards with a directory showing circuit numbers and room locations plus a blank for "Remarks", as well as a lamicoid plate designating panel name. 6.6.11. Typical Identification Standards

6.6.11.a. Lighting, Receptable and Power panels to each be identified with an engraved lamicoid plate secured to top interior trim as: -LP-1A ½" high lettering -120/208 volts 1/4" high lettering -Fed from PP 'AA' 1/4" high lettering

6.6.11.b. Supply each panel with a directory card holder welded to inside of door, complete with a

neatly typewritten list showing information as follows: Panelboard Name: 120/208 Volts Panel Voltage: <u>Circuit:</u> Number Description N/E Lighting Room #34 S/E Receptacles Room #34 S/W Ice Machine Room #17

6.6.11.c. Cover list with a $\frac{1}{32}$ " minimum thick clear plastic sheet to protect it. 6.6.11.d. Identify equipment not listed above, such as incoming service cables, communicating cables, switchgear, transformers, disconnects, contactor motors, instruments, fire alarm, clock and program equipment and control panels, in a similar manner showing name and number of the equipment, voltage and load information.

6.6.12. Apply a small dab of paint to inside of each outlet box, pull box and panel it is installed, using colour code as follows: Red - Fire Alarm and Emergency Voice Communications System; Dark Green — Telephone and Data Systems. 6.7. Wiring Identification 6.7.1. Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic

tapes, on both ends of phase conductors of feeders and branch circuit wiring. 6.7.2. Maintain phase sequence and colour coding throughout. 6.7.3. Colour code: to CSA C22.1-1990. 6.7.4. Use colour coded wires in communication cables, matched throughout system. Schedule and chart

marker number or colour with corresponding equipment and include with record drawings or operation and maintenance data. 6.7.5. Connections in equipment to be Phase A, B, C from left to right when viewing from front or accessible direction. 6.8. Wiring Terminations

6.8.1. Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors. 6.8.2. Manufacturers and CSA labels to be visible and legible after equipment is installed.

6.9. Location of Outlets 6.9.1. Locate outlets in accordance with Division 01 - General Requirements. 6.9.2. Do not install outlets back-to-back in wall; allow minimum 6" horizontal clearance between boxes. 6.9.3. Change location of outlets at no extra cost or credit, providing distance does not exceed 10', and

6.10. Mounting Heights 6.10.1. Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise. 6.10.2. If mounting height of equipment is not specified or indicated, verify before proceeding with

6.10.3. Install electrical equipment at following heights unless indicated otherwise. Description General Area -Local switches -Wall receptacles: General -Wall receptacles: above top of continuous baseboard -Wall receptacles: above top of counters or counter splash backs 47" -Wall receptacles: In Mechanical rooms -Panelboards: As required by code or as indicated -Telephone outlets -Wall mounted telephone -Fire alarm pull stations -Fire alarm bells

information is given before installation.

-Television outlets

-Wall mounted speakers

application process.

-Clocks 6.11. Plywood Backboards 6.11.1. Provide plywood backboards in electrical and telecommunications rooms and closets where indicated on drawings and where referenced under various sections of the specifications for mounting of

6.11.2. Plywood to be securely fixed to the building structure. 6.11.3. Plywood to be 3/4", void free, good one side, mounted with good side exposed 6.11.4. Plywood to be Class A fire retardant, FSC certified, and contain no added urea formaldehyde. Where LEED compliant backboards are specified on drawings, plywood boards to be suitable for compliance with LEED credits MR 5.1 + 5.2 (Manufactured and Extracted Regionally), MR 7.0 (Certified Wood), and EQ 4.4. (Low Emitting Materials). Provide necessary documentation to support LEED credit

6.11.5. Plywood to be treated as follows on all surfaces: 6.11.5.a. Initially seal the plywood with one coat of Sherwin Williams part No. B49 W 2 wood primer 6.11.5.b. Follow with one coat of Flame Control 10-10 Intumescent Fire Retardant Paint 6.11.5.c. Finish with one coat of Flame Control 40-40 Fire Resistant Paint 6.12. Wiring of Mechanical Trades Motors

6.12.1. Provide branch circuit wiring and an outlet for each motorized damper or heating control.

6.12.2. Ascertain exact locations of starters and motors, from Mechanical Drawings.

6.12.3. Motors up to and including 0.25 kW (1/4 HP) to be 120 volt, 60 Hz, single phase. 6.12.4. Motors 37 kW (½ HP) and above to be 3 phase, 60 Hz, voltage as noted. 6.13. Protection During Construction 6.13.1. Provide protection required to enable existing building and equipment to remain in continuous and normal operation, and maintain construction schedule. 6.13.2. Take the necessary precautions to protect equipment, existing building and service from damage

without cost to the Owner. Accept responsibility for damage to existing services and make good without cost to the Owner. 6.13.3. It is of vital importance, during work of this Contract, that all existing surfaces and items, including walls, floors, ceilings, windows, doors and frames, piping, ductwork and light fixtures, are not damaged in any way whatsoever by the work of all trades. Take all precautions required or necessary to prevent any such damage, supplying all protection, hoarding, tarpaulins and dust sleeves. Any damage caused because of lack of such protection or lack of preventative measures to be made good at no cost to the Owner. Ensure that the work in the existing building, such as floors, finishes and trim, is protected as completely as possible to hold the replacing of damaged work by each sub-contractor to a minimum.

during rearrangement. Accept responsibility for any damage which may occur and make good

equipment must remain in service. Care to be taken to eliminate dust in these equipment areas. 6.14. Core Drilling 6.14.1. Wherever core drilling is required, provide temporary dust proof screens as specified. 6.14.2. In areas where core drilling through existing slab is necessary, the areas to be drilled to be marked out clearly on the underside of slab. Owner's representative to be notified at least 1 week prior to core drilling operation. Tarping of equipment will be responsibility of Contractor and

6.13.4. Care to be taken when working above or around UPS modules, batteries and switchgear as this

supervised by the Owner. 6.14.3. During all core drilling operations, ensure that a minimum of one person is stationed directly below the area of drilling with a large plastic container pressed to underside of slab to hold core and water upon completion of operations.

6.14.4. A wet/dry commercial quality vacuum to be used continuously at location of drilling operation to remove all excess water from area. 6.14.5. Prior to core drilling, approval shall be obtained in writing from the Designer or Architect. Hole locations are to be x-rayed prior to drilling. Costs for x-rays are to be carried by the

6.14.6. Core drilling of floor to be done after normal business hours. Coordinate with owner and landlord. 6.15. Construction Power and Temporary Electrical Services 6.15.1. Provide temporary electrical power services during construction for temporary lighting and operating of power tools and other equipment. Provide necessary Revenue Canada approved kWHr metering

6.15.2. Arrange for connection with the Owner into existing switchboards as indicated. Pay all costs for installation, maintenance and removal.

Contractor. X—raying will typically be required to occur during premium time.

City of Pickering

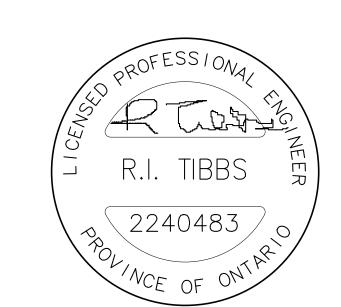
2460 Brock Road. Pickering, ON, Canada L1X 0J1 Building A-200A, 2nd Floor



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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 A YY/MM/DD 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	

ELECTRICAL SPECIFICATIONS

Drawing Number

True North

N.T.S. Drawing Scale

6.15.3. Provide and maintain temporary lighting throughout project. Level of illumination on all floors and stairs to not be less than 162 Lux.

wiring from locations as and where required and to maintain temporary services for use of light.

- 6.15.4. Temporary electrical power service at 600 V, AC, 3 phase, 3 wire, are available at site in locations designated by Owner. 6.15.5. Contractor and sub-contractors to provide transformers and suitable fused disconnect switches and
- tools, and apparatus, in order to facilitate completion of work, in accordance with applicable local 6.15.6. Notwithstanding the above, where a Contractor proposes to use electric welding, a portable motor
- generator set to be provided by Contractor to avoid undue disturbances on the building's electrical distribution system, located to the satisfaction of Owner. 6.15.7. If, during installation phase of project, it becomes necessary to have a temporary interruption in
- the Owner's utilities. Owner will inform Contractor as soon as possible before any such interruption. Contractor and sub-contractors to then take such action as is necessary to accommodate said interruption in their installation schedule. 6.16. Pricing of Change Notices
- 6.16.1. The value of a proposed change in the work shall be determined in one or more of the following methods:
- 6.16.1.a. by time and material:
- 6.16.1.b. by unit prices set out in the Contract or subsequently agreed upon:
- 6.16.1.c. by labour and material costs submitted in a detailed quotation. 6.16.2. In the case of changes in the Work to be paid for under the time and material or the unit price methods, the form of presentation of costs and methods of measurement shall be agreed to by the Consultant and Contractor before proceeding with the change. The Contractor shall keep accurate records, as agreed upon, of quantities or costs and present an account of the cost of
- the change in the Work, together with vouchers, material receipts and invoices where applicable. 6.16.3. In the case of changes in the Work to be paid for under the time and material or the labour and material method, the material costs are to be less trade discounts.
- 6.16.4. The detailed quotation referenced under the labour and material method is to include a summary of charges made up of three components: labour charges, material costs and fees.
- 6.16.4.a. Labour Charges -The labour hour estimates are to be based on the current NECA Column 1 manual of labour units.
 - -Labour costs are to include burden on wages such as taxes, worker compensation charges, CPP, El, project insurance, safety meetings, estimating, as-built drawings, supervision, small tools, site facilities, labour warranty and clean up.
 - -The all inclusive hourly labour rate applicable for quotations submitted for changes to the work is 1.90 times the BASE RATE of the current Collective Agreement. The hourly labour rate for specialists not governed by union agreements (technicians or engineers) is 2.25 times the base rate for Electricians, plumbers or pipe fitters. -The all inclusive hourly labour rate indicated above is to include:
 - Collective Agreement relevant to the place of work (vacation pay, RRSP, Health & Welfare, RST of Health & Welfare, Pension, Union admin fund, ECA fund (or others), Secretariat.) -Legislation as relevant to the place of work (Emp. Health Tax, E.l., CPP, WSIB, taxes) -Project insurance, safety meetings, estimating, lay outs, site facilities, warranties, storage, clean up, office supervision and miscellaneous charges.
 - -Foreman Electrician, General Foreman, Superintendent rates shall be as for the calculated Journeyman rate above plus 15% of the base rate. A maximum of 10% of the total calculated journeymen hours on a change may be charged as overhead supervision hours at the Foreman rate.
- -No other overhead supervision hours will be permitted. 6.16.4.b. Material Charges
- Material costs are to be less trade discounts. The discount for items included in the Allpricer catalogue or Electrical Price Guide is 20%.
- 6.16.4.c. Fees -The overhead and profit fee is to include for the Contractor's head office and site office expenses, project manager, assistants, site office and storage facilities, utility charges, site security, telephone and facsimile transmission costs, As Builts, expendable small tools, financing costs, coffee breaks, site facilities, general clean up and disposal, security, storekeeper, and all other non-productive labour.
- -Fees for overhead and profit are to be in accordance with the general conditions of the contract described in the front end document. CONSULTANT REVIEWS
- 7.1. General 7.1.1. Consultant's attendance at site including but not limited to site meetings, demonstrations, site reviews and any resulting reports are for the sole benefit of the Owner and the local authourity have jurisdiction.
- 7.2. Site Reviews 7.2.1. General reviews and progress reviews do not record deficiencies during the course of the Work until such time as a portion or all of the work is declared complete. In some instances before the work is completed, deficiencies may be recorded where the item is indicative of issues such as poor workmanship, incorrect materials or installation methods, or may be difficult to correct at a later date. Any such reported items, or lack thereof, shall not be relied on in any way as part of the Contractors quality assurance program nor relieve the Contractor in the performance of the Work.
- 7.2.2. Deficiency reviews conducted by the Consultant are performed on a sampling basis, and any deficiency item is to be interpreted as being indicative of similar locations elsewhere in the Work, unless otherwise shown. 7.3. Milestone Reviews
- 7.3.1. Coordinate with the Consultant the type and quantity of milestone reviews required and incorporate
- these requirements in the construction schedule. 7.3.2. Notify the Consultant in writing seven (7) calender days in advance of work to be concealed to arrange a site review prior to the Work being concealed. Any noted deficiencies are to be corrected and reviewed again by the Consultant before being concealed. Failure to provide notification can result in the Work being exposed for review at the Contractor's cost.
- 8. CORRECTION AFTER COMPLETION 8.1. General 8.1.1. At completion, submit written guarantee undertaking to remedy defects in work for a period of one
- year from date of substantial completion. This augrantee is not to supplant other augrantees of longer period called for on certain equipment or materials. 8.1.2. Guarantee to encompass replacement of defective parts, materials or equipment, and to include
- incidental fluids, gaskets, lubricants, supplies, and labour for removal and reinstallation work. 8.1.3. Submit similar guarantee for one year from date of acceptance for any part of work accepted by Owner, before completion of whole work. 8.2. Final Review
- 8.2.1. At project completion submit written request for final review of electrical systems. 8.2.1.a. Refer to section 26 08 19 Project Close-Out.

WIRES & CABLES 0-1000 VOLTS

26 05 19

GENERAL

- 1.1. Product Data 1.1.1. Submit product data in accordance with Section 26 05 01 Electrical General Requirements.
- PRODUCTS
- 2.1. Building Wires 2.1.1. Copper conductors: size as indicated, stranded for 10 AWG and larger, with 1000 V insulation for 347/600 Volt systems, and 600 V insulation for 120/208 V systems, of chemically cross-linked thermosetting polyethylene material rated RW90 and/or RWU90 to CSA C22.2 No. 38.
- 2.1.2. Use RWU90 for wiring installed underground. 2.1.3. Wiring in channel back of luminaires shall be 600 volt type GTF or TEW, temperature rating as
- required by CSA and/or manufacturer requirements... 2.1.4. Conductors shall be colour coded. Conductors No. 10 AWG and smaller shall have colour impregnated into insulation at time of manufacture. Conductors No. 8 AWG and larger may be colour coded with adhesive colour coding tape but only black insulated conductors shall be
- employed in this case, except for neutrals which shall be white wherever possible. 2.1.5. Minimum wire size shall be No. 12 AWG. Home runs to lighting and receptacle panels which exceed 75' in length shall be minimum No. 10 AWG. Home runs which exceed 120' in length shall be minimum No. 8 AWG. Home runs which exceed 180' in length shall be minimum 6 AWG.
- 2.1.6. Colour coding shall be as follows: Red Phase A, Black Phase B, Blue Phase C, White -Neutral, Green - Ground, Orange - Control. Standard of Acceptance: Aetna Insulated Wire, General Cable, Nexans Canada Inc, Pirelli Cables Ltd,
- 2.2. Armoured Cables 2.2.1. Conductors: RW90 insulated copper, minimum size #12 phase conductors complete with #12 green
- insulated ground wire and bare #12 copper bonding wire. 2.2.2. AC-90 can be used for dowdrops from outlet to luminaires and in partitions unless prohibited by Code or otherwise noted. AC-90 shall be run maximum 10'-0" in ceiling space. All AC-90 cable
- and conduit shall be supported as high as possible above ceiling to allow removal of all ceiling tiles, luminaires, etc. Cables are not permitted to rest on false ceiling. 2.2.3. Type: AC90 ISO-BX 600V 90C to CSA C22.2 No 51
- 2.2.4. Armour: interlocking type fabricated from galvanized steel or aluminum strip. 2.3. Armoured Cables Teck
- 2.3.1. Conductors, insulated copper, size as indicated. 2.3.2. Type: TECK 90
- 2.3.3. Armour: interlocking steel for multiconductor cable, interlocking aluminum for single conductor
- 2.3.4. Jackets of cable shall have FT-4 rating identified. 2.3.5. Connectors shall be equal to T&B Star Teck type. Use non-magnetic connectors for single
- 2.4. Mineral Insulated Cable 2.4.1. Cable shall have ULC listed 2 hour fire rating.

conductor cables.

- 2.4.2. Cable shall be shipped with ends temporarily sealed and shall be stored under dry conditions. 2.4.3. Cable shall be of capacities and types noted on drawings and shall be terminated using suitable
- terminating hardware. 2.4.4. Embedded cables shall be complete with a PVC jacket. Standard of Acceptance: Pyrotenax

- EXECUTION
- 3.1. General 3.1.1. Provide grounding/bonding conductor in all conduits whether metallic or non-metallic, sized as per Ontario Electrical Safety Code, and connect to grounding bus. All receptacles, lighting fixtures, panels, transformers, motors, heaters, communications conduits and other powered devices shall be arounded via around wires.
- 3.1.2. A dedicated neutral conductor shall be provided for each single phase branch wiring power circuit. 3.2. Installation of Building Wires 3.2.1. Install wiring as follows:
- 3.2.1.a. In conduit systems in accordance with Section 26 05 33. 3.2.2. Neatly train circuit wiring in cabinets, panels, pullboxes and junction boxes and hold with nylon
- 3.2.3. Splice wire, up to and including No. 6 AWG with nylon insulated expandable spring type connectors. Connector body shall be moulded of thermoplastic and spring insert shall be an expandable square-edged design. Splice larger conductors using split-bolt or compression type connections
- wrapped with PVC tape. 3.2.4. Where colour coding tape is utilized, it shall be applied for a minimum of 2" at terminations, junction and pullboxes. Do not paint conductors under any conditions. Colour coding shall also apply to bussing in panels and bus duct.
- 3.3. Installation of Armoured Cables AC90 ISO-BX 3.3.1. May be used for drops to surface and recessed mounted fluorescent light fixtures.
- 3.4. Installation of Armoured Cables Teck 3.4.1. Terminate cable in accordance with manufacturer's recommendations
- 3.5. Installation of Mineral Insulated Cables 3.5.1. Cable shall be installed in trays or exposed on walls, beams, purlins or ceilings, using clamps available from the manufacturer. Fire rated circuits shall be supported on centres not exceeding 3'. Care shall be taken when handling the cable to avoid cable kinks; it is recommended that cable be uncoiled from supply reel by rolling. Cables shall be bent using a suitable hickey with a minimum bending radius of six times the cable diameter.
- 3.5.2. Embedded cables shall be protected against punctures and mechanical damage. 3.5.3. Single conductor cables forming part of a circuit shall be run in contact with one another
- throughout their length. 3.5.4. Single conductors in parallel shall be arranged in groups and the groups shall be at least two cable diameters apart.
- 3.5.5. Cables shall be terminated with manufactured gland and seals. Gland and seal assembly shall be prepared with tools specifically designed for the purpose. Upon completion of termination, the insulation resistance of the cable shall be checked with an insulation tester in accordance with values to be determined by the Consultant.
- 3.5.6. Cables forming part of circuits rated 200 A and above shall be terminated at each end on a suitably sized minimum 1/4" thick brass plate, installed by removing the steel of the termination panel. A copper bonding conductor, sized per Table 16 of the Safety Code, shall be connected to the termination plate via a Burndy Servit type KC connector or type YA compression connector, and extended to the equipment ground bus and terminated with a Burndy YA compression connector with 1/2" stainless steel bolt and hardware.
- 3.5.7. The entire installation shall be made in accordance with the recommendations of the manufacturer, who shall be retained by the Contractor under this Section to inspect the cable installation and termination methods.

GROUNDING SECONDARY 26 05 27

- GENERAL 1.1. References
- 1.1.1. CSA C22.1 Electrical Safety Code 1.2. General Requirements
- 1.2.1. Conform to Section 26 05 01, Electrical General Requirements.
- 1.3.1. 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 systems as shown as specified and as otherwise required.
- PRODUCTS 2.1.1. Clamps for grounding of conductors, size as required to electrically conductive underground water
- Plate electrodes: steel, surface area $310^{"2}$, χ_6 " thick. 2.1.3. Buried grounding conductors, bare stranded copper, tinned, soft annealed, size #4/0 AWG or as
- 2.1.4. Insulated grounding conductors: green, type RW90 copper.
- 2.1.5. Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
- 2.1.5.a. Grounding and bonding bushings.
- 2.1.5.b. Protective type clamps. Bolted type conductor connectors.
- Thermit welded type conductor connectors.
- 2.1.5.e. Bonding jumpers, straps.
- 2.1.5.f. Pressure wire connectors. 2.1.5.g. Communication and Computer room raised floor ground clamps: Burndy Uniground
- EXECUTION 3.1. Installation 3.1.1. Install complete permanent, continuous, system and circuit, equipment, grounding systems including,
- electrodes, conductors, connectors, accessories, as indicated, to conform to requirements of local authority having jurisdiction over installation. 3.1.2. Ground electrical equipment and wiring in accordance with Ontario Electrical Safety Code and
- ANSI/IEEE Standard 142-1982. 3.1.3. Install connectors in accordance with manufacturer's instructions.
- 3.1.4. Protect exposed grounding conductors from mechanical injury. 3.1.5. Make buried connections, and connections to conductive water main, electrodes, using copper
- welding by thermit process.
- 3.1.6. Use mechanical connectors for grounding connections to equipment provided with lugs.
- 3.1.7. Soldered joints not permitted. 3.1.8. Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless ug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit. 3.1.9. Install separate ground conductor in all conduits. Ground conductor shall be sized as per Table 16

of CSA C22.1 with one ground conductor for every three hot conductors. Minimum size of ground

- conductor shall be #12 AWG copper. 3.1.10. Make grounding connections in radial configuration only, with connections terminating at single
- grounding point. Avoid loop connections. 3.1.11. Install grounding conductors outside electrical rooms and electrical closets in conduit and conceal where possible.
- 3.1.12. Provide separate ground wire for every feeder, sized as per Table 16 of the OESC. 3.2. System and Circuit grounding 3.2.1. Install system and circuit insulated copper grounding connections to neutral of secondary systems
- and for common grounding conductors per CSA C22.1 Table 17. 3.2.2. Install insulated copper grounding conductor for service raceways and service equipment per CSA C22.1 Table 18.
- 3.2.3. Install grounding conductors in conduit. 3.3. Equipment Grounding / Bonding 3.3.1. Install insulated copper bonding connections per CSA C22.1 Table 16 to typical equipment including. but not necessarily limited to following list: Service equipment, transformers, frames of motors, starters, control panels, building steel work and panels, outdoor lighting. 3.3.2. Install bonding conductors in conduit.
- 3.4. Raised Floor Grounding 3.4.1. Install #6 bare copper grounding conductors in a grid pattern on four foot centres in each direction of the floor grid. Install Burndy Uniground ground clamp to raised floor pedestals on four foot centres, at each intersection of the ground grid conductors.
- 3.4.2. Bond each item of equipment on the raised floor to the raised floor ground grid with minimum #6 tinned copper flat braid extra flexible bonding jumper. 3.4.3. Extend #1/0 green insulated copper ground conductor in EMT conduit from ground grid to the
 - building main grounding system. Terminate using NEMA 2 hole compression connectors.

FASTENINGS AND SUPPORTS 26 05 29

1 GENERAL 1.1. Related Work

- 1.1.1. Concrete bases and housekeeping pads for electrical equipment shall be arranged and paid for by Division 26, and installed by trade specialists under respective Carpentry, Concrete, and Painting Divisions. PRODUCTS
- 2.1. Inserts 2.1.1. Inserts for conduits and raceway hangers, for single, double and multiple runs shall be galvanized. Standard of Acceptance: Unistrut Canada, Burndy (Canada) Ltd. — Flexibar, Pilgrim Technical Products Ltd. – Tufstrut
- 2.2.1. Hangers for electrical conduit shall be hot dipped galvanized after fabrication. Standard of Acceptance: Burndy Canada Ltd., Canstrut, Electrovert Ltd., E. Myatt & Co. Ltd, Steel City Electric Ltd., Pilgrim Technical Products Ltd EXECUTION
- 3.1. Installation 3.1.1. Supply and deliver inserts to site in ample time to be built into work of other trades. Provide necessary templates and adequate instructions to locate and install inserts.
- Secure equipment to masonry, tile and plaster surfaces with lead anchors. 3.1.3. Secure equipment to poured concrete with expandable inserts.
- 3.1.4. Secure surface mounted equipment with T-bar support hanger fastened to inverted T bar ceilings.

- Ensure that T bars are adequately supported to carry weight of equipment specified before
- Standard of Acceptance: Caddy model No. 512 c/w BHC clip 3.1.5. Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as
- accessories to basic channel members. 3.1.6. Fasten exposed conduit or cables to building construction or support system using straps.
- 3.1.6.a. One—hole steel straps to secure surface conduits and cables 2" and smaller. 3.1.6.b. Two-hole steel straps for conduits and cables larger than 2".
- 3.1.6.c. Beam clamps to secure conduit to exposed steel work. 3.1.7. Suspended support systems. 3.1.7.a. Support individual cable or conduit runs with ¼" dia threaded rods and spring clips.
- 3.1.7.b. Support 2 or more cables or conduits on channels supported by ¼" dia threaded rod hangers where direct fastening to building construction is impractical. 3.1.8. For surface mounting of two or more conduits use channels.
- 3.1.9. Provide galvanized after fabrication metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs. 3.1.10. Ensure adequate support for raceways and cables dropped vertically to equipment where there is no
- wall support. 3.1.11. Do not use wire lashing or perforated strap to support or secure raceways or cables. 3.1.12. Do not use supports or equipment installed for other trades for conduit or cable support except
- with permission of other trade and approval of Consultant. 3.1.13. Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.
- 3.1.14. Supply and erect special structural work required for the installation of electrical equipment. Provide anchor bolts and fastenings unless noted otherwise. Mount equipment required to be suspended above floor level, where details are not shown, on a frame or platform bracketed from the wall or suspended from the ceiling. Carry supports to either the ceiling or the floor, or both as required, at locations where, because wall thickness is inadequate, it is not permitted to use
- such brackets. 3.1.15. Electrical panels, switches or other electrical equipment shall be complete with suitable bases or mounting brackets. Install angle or channel iron supports to bear the equipment where it is shown
- in or on structural tile walls, or walls that are inadequate to bear the equipment. 3.1.16. Provide channel iron or other metal supports where necessary to adequately support lighting fixtures. Do not use wood. Lighting fixtures shall be supported totally independent of ceiling and supported from structure above.
- 3.1.17. Support hangers, in general, from inserts in concrete construction or from building structural steel beams, using beam clamps. Provide additional angle or channel steel members required between beams for supporting conduits.
- 3.1.18. Do not use explosive drive pins in any section of work without obtaining prior written approval. 3.1.19. Provide re-enforced concrete pads under floor mounted electrical equipment. Pads are to formed with chamfered edges to prevent chipping. Pads are to be sealed and painted to prevent dust from entering and interfering with electrical equipment.

SPLITTERS, JUNCTION AND PULL BOXES, CABINETS

- GENERAL 1.1. Shop Drawings and Product Data 1.1.1. Submit shop drawings and product data for cabinets in accordance with Section 26 05 01 Electrical General Requirements.
- 1.2. Reference 1.2.1. CSA C22.2 No. 76 Splitters.
- 1.2.2. CSA C22.2 No. 40 Junction and Pull Boxes. 1.2.3. Cabinets to Section 26 27 18 Panel Trim.
- PRODUCTS
- 2.1. Splitters 2.1.1. Sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed
- 2.1.2. Main and branch lugs and connection bars to match required size and number of incoming and
- outgoing conductors as indicated. 2.1.3. At least three spare terminals on each set of lugs in splitters. 2.1.4. Distribution riser splitters shall be of special construction with hinged access door, copper bus bars
- predrilled to accept two hole compression connectors for all incoming and outgoing cables. 2.2. Junction and Pull Boxes 2.2.1. Welded steel hot dipped galvanized construction with screw-on flat covers for surface mounting. 2.2.2. Covers with 1" minimum extension all around, for flush-mounted pull and junction boxes.
- EXECUTION 3.1. Splitter Installation Install splitters and mount plumb, true and square to the building lines.
- 3.1.2. Extend splitters full length of equipment arrangement except where indicated otherwise. 3.2. Junction, Pull Boxes and Cabinets Installation
- 3.2.1. Install pull boxes in inconspicuous but accessible locations. 3.2.2. Mount cabinets with top not higher than 6'-6" above finished floor.
- 3.2.3. Install terminal block as indicated in Type T cabinets 3.2.4. Only main junction and pull boxes are indicated. Install pull boxes so as not to exceed 100' of conduit run between pull boxes.
- 3.3. Identification 3.3.1. Provide equipment identification in accordance with Section 26 05 01 - Electrical - General

3.3.2. Install size 2 identification labels indicating system name, voltage, phase and source of power.

- CONDUITS, FASTENINGS AND FITTINGS 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. Location of Conduit 1.2.1. Drawings do not indicate all conduit runs. Those indicated are in diagrammatic form only. 1.3. References
- 1.3.1. CSA C22.2 No. 45 Rigid Metal and Epoxy Coated Conduit 1.3.2. CSA C22.2 No. 83 Electrical Metallic Tubing 1.3.3. CSA C22.2 No. 136 Rigid PVC Conduit 1.3.4. CSA C22.2 No. 56 Flexible Metal and Liquid-Tight Flexible Metal Conduit
- 1.3.5. CSA C22.2 No 211.2 Rigid PVC Conduit 1.3.6. Conduit accessories, conduits and fittings to CSA C22.2 No. 18.
- 1.4. Wiring Methods 1.4.1. Install wiring in surface mounted EMT conduit unless otherwise specified. In finished areas, conceal conduit in walls and ceiling spaces.
- 1.4.2. Where shown on drawings, armoured cable shall be Teck 90 type. Jackets of cable shall have FT-4 rating identified. Connectors shall be equal to T&B Star Teck Type 1.4.3. Rigid PVC conduit with ground wire as per Electrical Safety Code Table 16 shall be used throughout
- below grade areas and may be used in or under slab on grade areas. It shall not be used in 1.4.4. Epoxy enamel or PVC coated rigid galvanized steel conduit shall be used throughout basement; in damp locations including but not limited to intake and exhaust shafts and air handling units; for
- rigid metallic conduit underground or in floor slabs; for wiring outdoors and in unheated buildings; and where noted on Drawings. 1.4.5. Runs of conduit and cables, where shown, are indicated only by general location and routing. Install conduits and cables so as to provide maximum head room and to interfere as little as
- possible with free use of spaces through which they pass. 1.4.6. Use EMT conduit for branch circuit and signal wiring in ceilings, furred spaces, and in hollow walls
- 1.4.7. Use rigid galvanized steel conduit for wiring where conduits are exposed to possible mechanical
- 1.4.8. Use epoxy coated rigid galvanized steel conduit for wiring in poured concrete.

1.4.9. Aluminum conduits shall not be used.

- 1.4.10. Flexible conduit and armoured cable will be accepted in parts of existing building, where furred spaces above ceilings are too congested to permit conduit to be installed, but only with Consultants written permission. Terminate armoured cable, where shown, in accordance with the manufacturer's recommendations.
- 1.4.11. Flexible steel conduit with integral insulated green ground wire is permitted for the final connection to luminaires mounted in suspended ceilings from the branch wiring junction box above, with flexible conduit length not to exceed 10', and be neatly installed and attached to luminaire support

1.4.12. Flexible armoured conduit (or BX) with an integral insulated green ground wire may be used where

- concealed in walls for wiring to receptacles, and for the final connection to luminaires. 1.4.12.a. The junction box interfacing the horizontal EMT conduit to the flexible conduit shall be located within 10' horizontally from the end device in open areas, and in enclosed rooms, located in the same room as the devices being served, in reasonable proximity to the walls, in order to keep the horizontal portion of the run of flexible conduit to less than 10'.
- 1.4.12.b. The flexible conduit shall be neatly installed parallel or perpendicular to building lines, and independently supported from the slab structure above. 1.4.13. Arrange conduits, installed in suspended ceilings, to provide minimum interference with removal of
- 1.4.14. Where existing locations of flush mounted electrical devices (switches, receptacles, etc.) correspond to new devices shown, the existing downdrop conduit and outlet box may be re-used. Provide new devices, new coverplates, new home-run conduit and complete new wire. 1.4.15. Vertical raceways to be provided with insulated cable support bushings or other approved method of supporting the weight of the cable, where vertical runs exceed those of Table 21 of the Electrical
- PRODUCTS 2.1. Conduits

- 2.1.1. Rigid hot dipped galvanized steel threaded conduit 2.1.2. Epoxy coated rigid galvanized steel conduit: with zinc coating and corrosion resistant epoxy finish
- inside and outside equal to Columbex Green Guard II 2.1.3. PVC coated hot dipped galvanized rigid steel conduit: with 40 mil PVC exterior coating, 2 mil urethane interior and thread coating equal to Rob Roy Plastibond RedHot
- 2.1.4. Electrical metallic tubing (EMT), galvanized: with couplings. 2.1.5. Rigid PVC conduit.
- 2.1.6. Flexible metal conduit and liquid-tight flexible metal conduit.
- 2.1.7. Conduit shall be of sufficient size to allow easy removal of conductors at any time. Conduit sizes, where shown, are minimum and shall not be reduced. 2.2. Conduit Fittings
- 2.2.1. Fittings: manufactured for use with conduit specified. Coating: same as conduit. 2.2.2. Factory "ells" where 90° bends are required for 1" and larger conduits 2.2.3. Insulated throat steel set screw connectors and couplings for EMT.
- 2.2.4. Threaded or compression type raintight/concrete tight insulated throat zinc plated steel connectors and couplings for rigid steel conduit. 2.2.5. Raintight insulated throat steel connectors at all surface panelboards, switchboards and other
- electrical equipment in sprinklered areas for all conduit terminations. 2.3. Expansion Fittings 2.3.1. Electrogalyanized steel with internal grounding for EMT suitable for 100mm linear conduit movement.
- 2.4. Fish Cord 2.4.1. Polypropylene
- EXECUTION 3.1. Installation 3.1.1. Install conduits to conserve headroom in exposed locations and cause minimum interference in

Standard of Acceptance: Cooper Crouse Hinds XJG-EMT

3.1.8. Install conduit sealing fittings in hazardous areas. Fill with compound.

- spaces through which they pass. 3.1.2. Conceal conduits except in mechanical and electrical service rooms and in unfinished areas. 3.1.3. Use electrical metallic tubing (EMT) except: in cast concrete, underground or where installed exposed
- within 6'-6" of floor. 3.1.4. Use rigid galvanized steel conduit where installed surface mounted within 6'-6" of floor. 3.1.5. Use rigid PVC conduit in slab on grade cast concrete and underground. Do not use PVC conduits in slabs above grade. All conduits shall be surface mounted to minimize risks of future damage when core drilling during future renovations. Where localized congestion or circumstances forces the use
- of conduits in the floor slabs, they shall be epoxy coated rigid galvanized steel. 3.1.6. Provide PVC conduit with ground wire as per Table 16 of Ontario Electrical Safety Code. 3.1.7. Use liquid tight flexible metal conduit for connection to motors or vibrating equipment
- panelboards, switchboards, and other equipment located in sprinklered areas or where at risk of exposure to dripping liquids. 3.1.10. Install wiring in conduit unless otherwise specified.

3.1.11. Bend conduit cold. Replace conduit if kinked or flattened more than χ_0 th of its original diameter.

3.1.9. Use raintight connectors or hubs for terminating conduits at all surface or floor mounted

- 3.1.12. Mechanically bend steel conduit over $\frac{3}{4}$ " dia. 3.1.13. Field threads on rigid conduit must be of sufficient length to draw conduits up tight. 3.1.14. Install fish cord in empty conduits. 3.1.15. Run two 1" spare conduits up to ceiling space and two 1" spare conduits down to ceiling space
- from each flush panel. Terminate these conduits in 6" x 4" junction boxes in ceiling space or in case of an exposed concrete slab, terminate each conduit in flush concrete type box. 3.1.16. Install junction boxes or cable anchor boxes wherever necessary for proper pulling or anchoring of cables. Install so as to be accessible after building is completed and set to come within finished lines of building.
- 3.1.17. Where EMT or rigid PVC is used, run green insulated ground wire in conduit, with minimum one ground conductor per three ungrounded conductors. 3.1.18. Provide expansion couplings, with bonding jumper and ground clamps where raceways cross building 3.1.19. Where conduits or cables are installed under raised floors and are required to be fastened in place,
- use two hole inverted "U" straps. No sharp edges or corners will be permitted which may damage PVC jackets or cables. 3.1.20. Runs of conduit and cables, where shown, are indicated only by general location and routing. Install conduits and cables so as to provide maximum head room and to interfere as little as possible with free use of spaces through which they pass. They shall be installed as close to building structure as possible such that, where concealed, necessary furring can be kept to a minimum. Arrange conduits, installed in suspended ceilings, to provide minimum interference with removal of tiles.

3.2.6. Do not locate conduits less than 3" parallel to steam or hot water lines with minimum of 1" at

3.2.1. Run parallel or perpendicular to building lines. 3.2.2. Locate conduits behind infrared or gas fired heaters with 5' clearance. 3.2.3. Run conduits in flanged portion of structural steel.

3.2.5. Do not pass conduits through structural members except as indicated.

3.2.4. Group conduits wherever possible on suspended or surface channels.

- OUTLET BOXES, CONDUIT BOXES AND FITTINGS 26 05 35
- GENERAL 1.1. References 1.1.1. CSA C22.2 No. 18.

3.2. Surface Conduits

crossovers.

2.6. Fittings - General

- 1.1.2. CSA C22.1 Canadian Electrical Code, Part 1, Ontario Hydro Electrical Safety Code.
- 2.1. Outlet and Conduit Boxes General

2.1.1. Size boxes in accordance with CSA C22.1

2.1.2. 4" square or larger outlet boxes as required for special devices 2.1.3. Gang boxes where wiring devices are grouped. 2.1.4. Blank cover plates for boxes without wiring devices.

2.1.5. Combination boxes with barriers where outlets for more than one system are grouped.

- 2.2. Sheet Steel Outlet Boxes 2.2.1. Hot dipped galvanized steel single and multi gang flush device boxes for flush installation, minimum size 3" x 2" x 1½" or as indicated. 4" square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.
- 2.2.2. 4" square or octagonal outlet boxes for lighting fixture outlets. 2.2.3. 4" square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster or tile walls. 2.3. Masonry Boxes
- 2.3.1. Hot dipped galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls. 2.4. Concrete Boxes 2.4.1. Hot dipped galvanized sheet steel concrete type boxes for flush mount in concrete with matching
- extension and plaster rings as required. 2.5. Conduit Boxes 2.5.1. Cast FS boxes with factory—threaded hubs and mounting feet for surface wiring of switches and
- 2.6.1. Bushing and connectors with nylon insulated throats. 2.6.2. Knock-out fillers to prevent entry of debris. 2.6.3. Conduit outlet bodies for conduit up to 1½" and pull boxes for larger conduits. 2.6.4. Double locknuts and insulated bushings on sheet metal boxes.

connections. Reducing washers are not allowed.

receptacle, outside building and where weatherproof boxes are required.

- EXECUTION 3.1. Installation 3.1.1. Support boxes independently of connecting conduits. 3.1.2. Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris
- during construction. Remove upon completion of work. 3.1.3. For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 14" of opening. 3.1.4. Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable
- 3.1.5. Provide a suitable outlet box for each light, switch, receptacle or other outlet, approved for the particular area in which it is to be installed. 3.1.6. Locate outlet boxes, mounted in hung ceiling space, so they do not obstruct or interfere with the removal of lay-in ceiling tiles.

3.1.7. Offset outlet boxes, shown back to back in partitions, horizontally to minimize noise transmission

3.1.8. Use gang boxes at locations where more than one device is to be mounted. Use combination

SPECIAL HOSPITAL WIRING

boxes with suitable barriers where outlets for more than one system are shown.

- 1 GENERAL 1.1 Scope
- .1 Special equipment and wiring requirements for healthcare (hospital) facilities.
- 1.2 Related Sections

between adjacent rooms.

- 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 05 53 Identification for Electrical Systems.
- .1 The following defined terms with examples are provided to clarify similar definitions in section 24 of the

City of Pickering

2460 Brock Road. Pickering, ON, Canada L1X 0J1

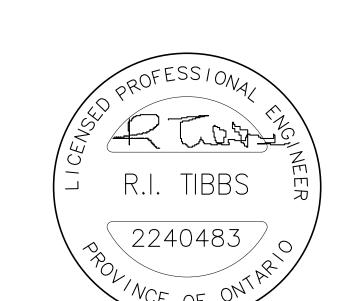
Building A-200A, 2nd Floor

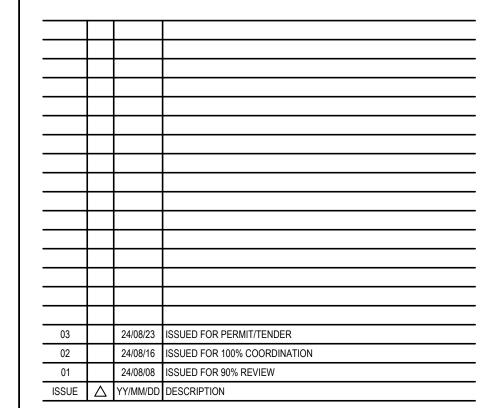


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Client Name City of Pickering Project Name CoP Interior Fit-Out Project Address 2460 Brock Road

Drawing Title **ELECTRICAL**

Pickering, ON L1X 0J1

N.T.S. Drawing Scale **Drawing Number**

E1.2

True North

Project number

SPECIFICATIONS

2240483

```
[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, eq: Examination rooms, in which medical electrical equipment is typically NOT
        .3 Critical care areas — as defined in Section 24 of OESCICSA 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 Cauterization Laboratories
          (k) Emergency Trauma Units
          (I)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.
      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,
 .2 circuit number.
     .6 Lettering of circuit identification;
        .1 not less than 6mm high,
     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.
     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
 .6 Interconnect the ground busses 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
 .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,
          (a) receptacles.
          (h) switches,
          (i) cover plates,
          (j)conduits,
          (k) outlet boxes, and
          (I) 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

    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.
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

1.2 Related Sections

.1 Provide testing of wiring systems in hospitals.

.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:

1.1 Scope

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 Rondar 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, 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. Refer to CSA Standard Z32 for test circuits. 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. Where required, provide remedial work and retesting at no cost to the Owner until acceptable results are .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. go/no go conditions, name of the patient care area, room number, circuit number receptacle identification where more than one receptacle is connected to a circuit, specific outlet of a duplex receptacle (eq: top, bottom), name of the panelboard/isolated power system that feeds the circuit, 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 .1 Branch Circuit Breaker Mechanical Operation. Conductor Insulation Integrity Test (for grounded systems only), Receptacle Retentive Force Test. Receptacle Polarity Test, Branch Circuit Impedance Test (Voltage Drop Test — for grounded systems only), Ground Point Voltage Rise Test (for grounded systems only), Potential Difference Between Ground Points Test .8 Impedance to Ground Test (single phase isolated systems only). .9 Maximun 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. 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 $10k\Omega$ to ground for neutral conductors (all neutrals combined). .2 Not less than $500k\Omega$ to ground for each ungrounded conductor. .2 Method: .1 Use a 500V dc megohmmeter, isolate the branch circuits under test as required. 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.

.1 Use the test pins and methods specified in CSA Standard C22.2 No. 42. As an alternative, a

.1 Receptacles to be connected in accordance with configurations listed in Canadian Electrical Code CSA

.1 Voltage drop in branch circuit wiring from panelboards to receptacles not to exceed 3% when a load of

Receptacles, Plugs and Similar Wiring Devices may be employed.

Correct connection of receptacles where polarity indication is incorrect.

3.8 Branch Circuit Impedance Test (Voltage Drop Test - Grounded Systems Only)

not less than 80% of the breaker rating is applied at the receptacle.

.2 If using the tension checker, ensure that the device is calibrated for tension (Newtons) for both

.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.

commercially available "tension tester" complying with CSA Standard C22.22 No. 42, General Use

.1 26 07 05 Special Hospital Wiring

.2 Method:

3.7 Receptacle Polarity Test

.1 Requirements:

.1 Requirements:

single-ground pin and for multiple pin testing.

.5 Record go/no go tension reading for each outlet.

C22.1, latest edition Section 26.

.1 Utilize polarity test set, and test each receptacle.

Record go/no go test results for each receptacle.

.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 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. Connect the test circuit to the outlet. 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/0. 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 .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. 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 If the test leads are long, correct the readings for pickup (zero reading when the test leads are connected .6 Record the results. 3.11 Impedance to Ground Test (Single Phase Isolated Systems Only) .1 Impedance between each energized conductor and ground to exceed $200,000\Omega$ (not more than 600microamperes when expressed as a current on a 120 Volt system). .1 Confirm that all receptacles have been installed and that no utilization equipment is connected to the Open the circuit breaker to the line isolation monitor. Verify that the system is ungrounded. Use the standard load and measuring device as shown in Figure 3 in CSA standard Z32. Measure the voltage (Vm1 and Vm2) between a reference ground and each energized conductor in .7 Compute the current flow using the formula: 1/ is in microamperes Vm is the areater of Vm1 and Vm2, in volts .8 Verify that the measured current does not exceed the value: I/max is in microamperes E/ is the nominal voltage between the energized conductors in volts .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. 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 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

.1 Utilize equipment approved by the Consultant. See Figure 2 in CSA standard Z32 for test circuit.

.4 Apply current to 80% of the rating of the overcurrent device protecting the circuit under test and record

Ensure that all circuits other than the one under test are de-energized.

Record no load voltage at receptacle (V/O).

.5 Remove load and reconfirm value of V/0.

-Clean-up completed. -Spare parts and replacement parts turned over to Owner, transmittal attached. -Warranty certificates -Operatina and Maintenance Manuals, draft, submitted. -As-built drawings submitted -Training completed and attendance logs submitted. LIGHTING CONTROL SYSTEM 26 09 43 GENERAL 1.1. General Description 1.1.1. All components and services described herein are part of the Division 26 scope. 1.1.2. The system and services are comprised of, but not limited to, the following main components 1.1.2.a. Low voltage switching system with distributed lighting automation relay panels, associated low voltage switches, occupancy sensors and photocells. 1.1.2.b. Fully Programmable panel intelligence cards with: -Site programming, commissioning and start up 1.1.3. Training of Owner's personnel in operation of system 1.2. Identification 1.2.1. Panels shall be identified with lamacoid plate with shall include panel designation $(\frac{1}{2}")$ lettering), voltage and phase $(\frac{3}{16}")$ lettering and where panel is fed from $(\frac{3}{16}")$ lettering. 1.3. Operation and Maintenance Data 1.3.1. Provide operation and maintenance data for incorporation into manual specified in Section 26 05 01 Electrical General Requirements. 1.4. Maintenance Materials 1.4.1. Provide maintenance materials as required and as specified in Section 26 05 01 Electrical General Requirements PRODUCTS 2.1. Overview Description 2.1.1. The existing lighting control system consists of relay panel assemblies and low voltage switches. System to be updated with control cards in order to produce a fully working system. 2.1.2. The relay panels shall be mounted in electrical closets as indicated on the drawings. The numbered relays in the panel shall be wired to control the power to each load as indicated. All power wiring shall be identified with the circuit number controlling it at the load. 2.1.3. Low voltage switches, occupancy sensors, and photocells shall be mounted in the spaces as indicated. Low voltage wiring from the switches and sensors to the relay panel shall be installed in 2.1.4. Each low voltage wire shall be labeled with the relay number (1-48) at each switch or sensor. Use only properly color coded, stranded #20 AWG (or larger) wire. All relays and switches shall be tested after installation to confirm proper operation and the loads recorded on the directory card in each panel. 2.2. Relays 2.2.1. Relays shall be rated 20 A, 350 V, 60 Hz and shall have coils to operate on 24 V, 60 Hz., GE RR9P or approved equal 2.3. Equipment Identification 2.3.1. Provide equipment identification in accordance with Section 26 05 01 - Electrical General 2.3.2. Nameplate for each panelboard size 4 engraved, Submit nameplate wording. 2.3.3. Complete circuit directory with typewritten legend showing location and load of each circuit. Cover directory with a $\frac{1}{32}$ " thick clear plastic sheet. 2.3.4. Nameplates for low voltage relay panels to indicate panel designation and voltage, i.e. 120/208 V, and panel and circuit number from which this panel is fed. 2.4. Local Switches 2.4.1. Finished in white, mounted on stainless steel plate and suitable mounting bracket. 2.4.2. On/off local switches to be addressable type with a programmable unique digital address and capable of communicating over a common data loop. 2.5. System Start Up Services 2.5.1. Manufacturer to provide a factory authorized technician to confirm proper installation and operation of all system components 2.5.2. Manufacturer to provide factory authorized application engineer to train owner personnel in the operation and programming of the lighting control system. 2.5.3. Manufacturer to provide system documentation including: 2.5.3.a. System 1-line showing all panels, number and type of switches and sensors, dataline. programmable system switches, telephone override modules, and central PC. 2.5.3.b. Drawings for each panel showing hardware configuration and numbering. 2.5.3.c. Panel wiring schedules 2.5.3.d. Typical wiring diagrams for each component. 2.5.4. Manufacturer to provide, install and commission system programming including: 2.5.4.a. Wiring documentation 2.5.4.b. Programmable Panel and System Switch Operation 2.5.4.c. Telephone Overrides 2.5.4.d. Operating Schedules. EXECUTION 3.1. Installation 3.1.1. Provide internal 16 gauge steel barriers in relay section to separate different voltage sources where more that one lighting panel is controlled by a given low voltage relay panel. Provide warning lamacoids to indicate more than one voltage source is present, and identify panels being controlled. 3.1.2. Connect loads to circuits. 3.1.3. Provide local low voltage switching of the type designated in locations as shown on the drawings.

min. #18 gauge multiconductor as manufactured by Carol Cable Co. or LVT, and installed in

3.1.5. Provide control wiring and data cables (2 wire shielded twisted pair) in conduits between central

3.1.6. Each hard wired low voltage switch to have a separate return wire running back to relay. Do not

3.1.8. At a time suitable to the Owner, provide 8 hour training to the Owner's staff in the operation,

DRY TYPE TRANSFORMERS UP TO 600 V PRIMARY

26 22 13

2.1.3. Efficiency to meet or exceed CSA C802.2. Transformers to bear the Energy Star and Environmental

2.1.5. Transformers to be self-contained, free standing units suitable for floor mounting. Where shown or

2.1.7. Transformers to have $4-2\frac{1}{2}$ % full capacity primary taps, two above and two below nominal voltage.

2.1.6. Transformers to have provisions for incoming and outgoing conductor entry shown on Drawings.

2.1.8. Three phase transformers to have delta connected primary and 120/208 volt grounded WYE

2.2.1. KVA capacity indicated to be based on Class 220 degree C insulation, 130 degree C rise.

2.2.4. Transformers rated below 300kVA to have noise level as per Table 8 of CSA Standard unless

2.2.5. Transformers rated 300 kVA and larger to have a noise level 3 dB below that shown on Table 8 of

2.3.1. Support transformers core and coil assembly on in-shear vibration isolation mounting pads. Installed

2.4.2. Transformer enclosure to have primary metal treatment and to be finished with 2 coats of UL50

mountings to provide a uniform deflection under weight and weight distribution of supported

2.1.9. Transformers to be equipped with grounding provision specified in Table 3 of CSA Standard C9.

required to be wall mounted, necessary mounting hardware to be included.

programming and basic maintenance such as identifying defective components. Cost of this service

3.1.7. The system to be completely programmed and verified by the Manufacturer's technical

use a common return wire for a group of hard wired switches.

to be included in the Tender Price.

1.1.1. Dry type transformers to CSA C22.2 No. 47 and CSA C9.

2.1.1. Transformers to have voltage and kVA rating indicated

Choice logos. Minimum efficiency to be 98%.

2.1.4. Transformer windings and all current carrying parts to be copper.

equipment. Pads to provide a minimum of ¼" static deflection.

2.1.2. Vacuum impregnated polyester resin construction.

secondary unless otherwise noted.

2.2.2. Transformers to be type ANN.

2.2.3. Transformers to be K-Rated K13.

2.4.1. Enclosure: Type 1 with drip shield

2.4.3. Finish equipment as follows:

3R rated powder coat finishing paint.

GENERAL

2. PRODUCTS

2.1. General

2.2. Ratings

2.3. Support and Isolation

2.4. Enclosure and Finish

1.1. References

1.1.2. CSA 802.2

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 A YY/MM/DD DESCRIPTION 3.1.4. Low voltage wiring to local control devices to be solid steel armoured cable, cotton braid, twisted

City of Pickering

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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

N.T.S. Drawing Scale

True North

Drawing Number

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

correction of the Work of all items described in the Contractors' and the Consultants' deficiency list. 1.3.1. Submit the following documentation with the application for Total Performance. Application for Total

be completed, incomplete, or requires correction.

Performance of the Work has been achieved, provide a detailed schedule for completion and/or

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

-Building department inspection reports. -ESA field inspection reports.

-Independent testing company, coordination study and testing reports submitted.

-Fire alarm verification certificate. -Equipment and wiring identification completed

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 - F65E37 International Orange Roval Blue 2.4.4.c. UPS 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. 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

 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

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 lamacoid plate with shall include panel designation ½" lettering, voltage and phase ¼" lettering and where panel is fed from ¼" lettering. 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

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

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

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

2.2.2. Common-trip breakers: 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 integral 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

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 gasketted, with overhanging drip

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

GENERAL

2.4.1. Provide equipment identification in accordance with Section 26 05 01 - Electrical General

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 $\frac{1}{2}$ " 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.

EXECUTION 3.1. Installation

3.1.1. Locate panel boards as indicated and mount securely, plumb, true and square, to adjoining

3.1.2. Install surface mounted panelboards on plywood backboards. 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

1.1. 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 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 1/4" high and as follows:

1.3.2.b. emergency power: red lettering on a white background.

1.3.2.a. normal power: black lettering on white background.

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

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

2.1.5. Catalogue numbers listed below have been used for convenience only to indicate quality standards: Approved Catalogue Numbers

Hubbell(120 Volt) Hubbell (347 Volt) (Toggle) / (Decora) <u>(Toggle) / (Decora)</u> 1221 / DS120 18201 / 2121347 18202 / 2122347 Double Pole 1222 / DS220 Three-Way 1223 / DS320 18203 / 2123347 1224 / DS420 18204 / 2124347 Four-Way

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, low voltage, magnetic, low voltage electronic, incandescent phase control LED, 3 wire phase control of LED when Lutron "A" Series driver in fixture, 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 Lutron "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

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

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 split receptacles.

2.3.1.d. Eight back wired entrances, four side wiring screws. 2.3.1.e. Triple wipe 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

2.3.3. Receptacles shall be colour coded as follows:

2.3.3.a. Normal power: white

2.3.3.b. Emergency power: red 2.3.4. Receptacles shall be as 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 P & S Hubbell Bryant Leviton Standard (non-decora) 5262 5262 5262 5262 5262 <u>26252</u> <u>2152</u> <u>9252</u> <u>5280</u> <u>6262</u>

2.3.7. Weatherproof, 15 ampere, 120 volt equal to those above but complete with gasketted cast plate and hinged covers, equal to Leviton No. 4926 (vertical) 2.3.8. Isolated ground duplex receptacle: 15 ampere, 120 volt, CSA Configuration 5-15R:

Standard of Acceptance: Pass & Seymour IG5262, Hubbell IG5262, Bryant 5262IG, Leviton 5262-IG, Cooper IG5262

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

2.3.12. Duplex receptacle: 20 ampere, 120 volt, grounded CSA Configuration 5-20R:

Approved Catalogue Numbers P & S Hubbell Bryant Leviton Cooper Standard (non-decora) 5362 5362 5352 5362 <u>26352</u> <u>2162</u> <u>9352</u>

2.3.13. Clock receptacle: 15 ampere, 120 volt, grounded for plug—in clocks: Standard of Acceptance: Pass & Seymour S3733SS: Hubbell 5235: Leviton 5261—CH 2.3.14. Tamper-Resistant: 15 ampere, 120 volt, grounded CSA Configuration 5-15R:

Standard of Acceptance: Hubbell #DR15WHITR, 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 (GFCI) shall be complete with recept-acle, test feature and reset

or as indicated.

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.

3.1. Installation 3.1.1. Switches

EXECUTION

Standard of Acceptance

3.1.1.a. Install switches in gang type outlet box when more than one switch is required in one 3.1.1.b. Mount switches at height specified in Section 26 05 01 - Electrical General Requirements 3.1.2. Receptacles 3.1.2.a. Install receptacles in gang type outlet box when more than one receptacle is required in

3.1.2.b. Mount receptacles at height specified in Section 26 05 01 - Electrical General Requirements

3.1.2.c. Connect receptacle grounding terminal to the outlet box with an insulated green ground

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

 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 1.1. 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

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. EXECUTION 2.1. Installation

2.1.1. Install disconnect switches complete with fuses.

CONTACTORS 26 29 05

 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.

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.

Standard of Acceptance: Ascolectric Ltd. - 917 Series 2.2. Equipment Identification

2.1.8. Coil clearing contacts shall be included in contactor where a contactor is controlled by a time

2.2.1. .1 Provide equipment identification in accordance with Section 26 05 01 - Electrical General

2.2.2. .2 Size 4 nameplate indicating name of load controlled as indicated. FXFCUTION

3.1. Installation 3.1.1. Install contactors and connect auxiliary control devices.

> LIGHTING 26 51 13

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 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.

1.3. 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, candlepower summary, candela 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

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

acceptable if delay is caused by Contractor's failure to order luminaires in accordance with

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. 1.5.1.d. 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. Warranty: 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

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.

Coordinate and install associated wiring and components in accordance with the recommendations of the manufacturer for a complete, operational and compatible dimming

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 2270 initial lumens. 3500°K 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, 3500°K 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.a. Fluorescent lamps shall be rapid start 2'-0" 40 watt twin tube T-5 four pin with 3150

initial lumens, 3500°K 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.

2.4.3. Lamp life to be 10,000 hours.

2.5. Incandescent lamps

2.3.3. T-5 Fluorescent lamps

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 3500°K. Verify colour of lamps before ordering.

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

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%

brightness control in the direct glare zone.

2.6.1.b. Fluorescent & HID - 5% 2.7. Fluorescent Lens 2.7.1. Fluorescent K12 distribution acrylic lenses, $\frac{1}{8}$ " thick, shall have a recessed prismatic pattern of $\frac{3}{6}$ " square based female cones running 45° to the parallel and perpendicular axis to the panel. Panel

2.5.3. All 50 watt low voltage 12 volt MR-16 lamps shall be the "Constant Colour" or "Tru-Aim IR" variety

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, sparkling crystal panel that provides maximum efficiency and good

Standard of Acceptance: A.L.P. Lighting and Ceiling Products, I.C.I. Acrylics Canada Inc., Holophane Canada Inc.

EXECUTION 3.1. Installation 3.1.1. Locate and install luminaires as indicated.

3.1.2. Locate hangers on tile centres or intersections. Mount recessed incandescents, troffers and surface

mounted luminaires in or on full tiles 3.1.3. Verify quantity of luminaires before placing orders. 3.1.4. Verify ceiling types with the latest revised Architectural Drawings and order luminaires to suit the 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.

3.1.8. 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 hanger canopies entirely cover outlet boxes and are neatly notched for

3.1.7. Carefully align luminaires, shown in continuous lines or rows, so that rows appear as straight lines.

conduit. Otherwise, provide cast conduit outlet boxes with a diameter larger than canopies.

3.1.11. Attach boxes or hickies directly to poured concrete with 1/4" minimum diameter bolts and lead expansion anchors where luminaires are suspended directly from concrete slabs. Use \(\frac{1}{16} \) 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

3.1.14. Provide continuous ½" x 1½" channel above the ceiling, where luminaires are suspended or mounted on furred ceilings. Fasten luminaires to channel with two ¼" 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 jack chain, installed as noted below. 3.1.16. Chain shall be No. 10 Tensile jack 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 ULC 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



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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 A YY/MM/DD 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

ELECTRICAL

SPECIFICATIONS N.T.S. Drawing Scale

E1.4

True North

Drawing Number

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-rate charge on the second 60 months. 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 eveball, aimbal ring halogen, glare free adjustable type halogen: 20W, 12VDC or 24VDC to suite battery, impact resistant, fully adjustable for aisle

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. 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., Beahelli 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

 GENERAL 1.1. System Description

1.1.1. Empty raceways systems shall consist of outlet boxes, cover plates, conduits, pull boxes, fish wires

1.1.2. Empty conduit systems being installed shall be for installation of wiring installed at a later date by communications contractor

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.

1.1.3. Telephone and data communications systems.

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 $\frac{1}{8}$ 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.

2.1.5. Fish wire: polypropylene type

3.1.6. Install additional steel pull boxes in such a manner that, throughout entire system, there shall be not more than two 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

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		Size of Box		For Each Additional
Conduit in Inches		in Inches		Increase Width — Inches
	Width	Length	Depth	
3/4"	4"	12"	3"	2"
1"	4"	16 "	3 "	2"
11/4"	6"	20"	3 "	3"
1½"	8"	27 "	4"	4"
2"	o"	٦,	A "	5"

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

Maximum Size of Conduit		Size of Box		For Each Additional
Conduit in Inches	•	in Inches	Increase Width — Inches	
	Width	Length	Depth	
3/4"	6"	12"	4"	2"
1"	8"	16 "	6"	2"
1 1/4"	10"	18 "	8"	3 "
1½"	12"	24"	10"	4"
2"	14"	30"	12"	5"

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

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

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

1.5. Requirements Regulatory Agencies – current edition of

1.4.12. CAN/ULC-S526 Visual Signal Appliances 1.4.13. 1997 Ontario Building Code and its references.

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. Name, address and telephone number of service representative of manufacturer to be

contacted during warranty period.

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 reauired 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 lonization 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.

1.10.1. 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

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.

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

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

2.3.1. 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

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. By-pass switches shall be

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:

mounted in a heated part of the building.

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

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

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 tight 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. 2.9.3. Remote glarm lamps or LED shall indicate the signal operation of the detector. Install Remote LED

2.9.4. Protect automatic smoke detectors during construction with a dust-bag, which will be removed at 2.9.5. Manufacturer shall include site visits to direct detailed locations of duct-mounted smoke detectors.

in an easily visible location to someone standing on the floor without requiring the use of ladders

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

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 2½ 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 greas. Arrange for speaker wiring to be supervised. Not more than 80% of full com-plement of speakers shall be connected to one signal circuit.

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.

2.16.1. 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. 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 initiatina circuits. Connect detectors and manual stations. Properly arrange and connect circuit

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 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

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.

component and sounding the signals or by ringing it out. Test each detector to ensure correct

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

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. 3.3.1. Install wiring in conduit using wire size and type in accordance with manufacturer's

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

3.4.2.a. 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 Manu-facturer.

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

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.

and annunciation:

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

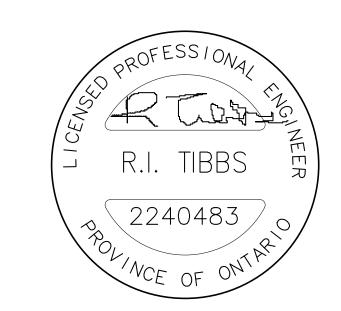
functioning of the system. 3.4.3.h. Where partial occupancies occur, the fire alarm system for the area to be occupied (including control units, annunciators, etc..) shall be tested and meet the requirements noted above. Upon system completion, those parts of the fire alarm system tested to this specification 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.

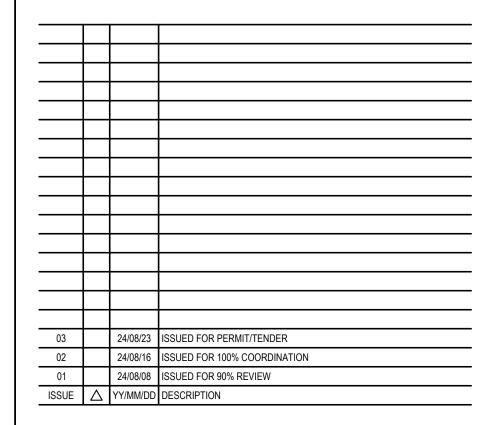
City of Pickering

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



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Client Name	City of Pickering
Project Name	CoP Interior Fit-Out
Project Address	2460 Brock Road Pickering, ON L1X 0J1
Project number	2240483

ELECTRICAL

SPECIFICATIONS

N.T.S.

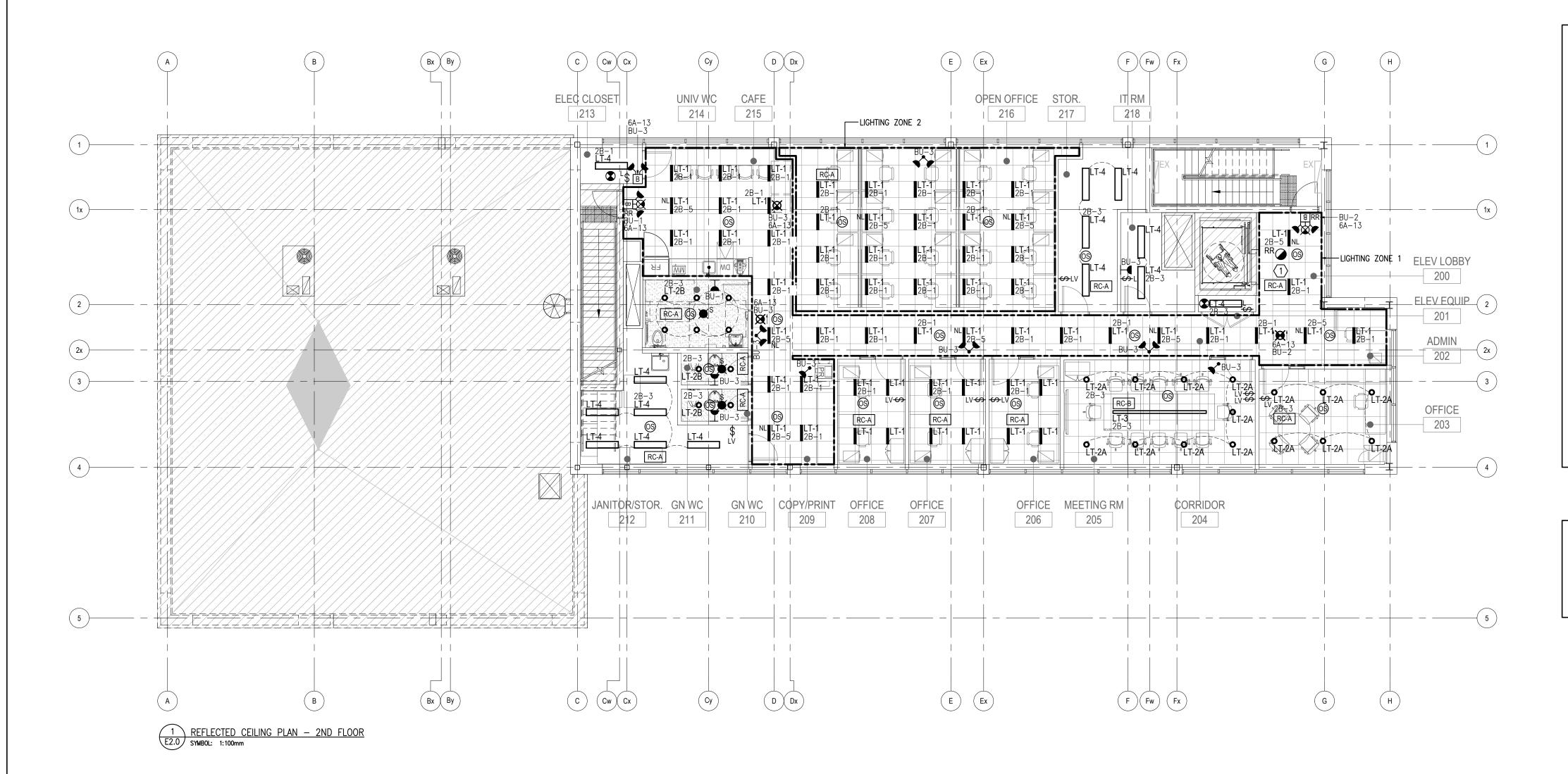
E1.5

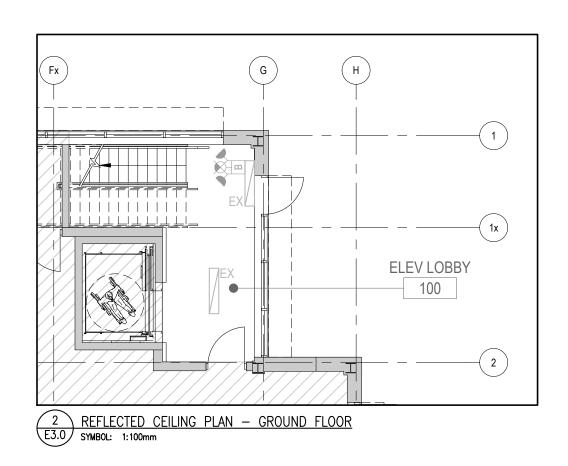
True North

Drawing Title

Drawing Scale

Drawing Number





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.
- 2. UNLESS NOTED OTHERWISE EXISTING BASE BUILDING LUMINAIRES TO REMAIN AS INSTALLED.
- 3. CONTRACTOR TO ALLOW FOR THE SUPPLY AND INSTALLATION OF TWO (2) ADDITIONAL EXIT SIGNS. EXACT LOCATION TO BE DETERMINED BY THE BUILDING DEPÁRTMENT. EXIT SIGNS SHALL BE C/W 100' OF 2#10-1/2"C. CONNECT ANY NEW EXIT SIGNS TO NEAREST EXIT SIGN CIRCUIT HAVING AMPACITY IN AREA.
- 4. 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.
- 6. 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.
- 8. ALL EXISTING, RELOCATED AND/OR NEW RECESSED LUMINAIRES SHALL BE CHAIN HUNG AND SUPPORTED TO CEILING SLAB ABOVE FOR SAFETY PURPOSES.
- 9. SWITCHES AND DIMMERS ADJACENT TO EACH OTHER SHALL BE GANGED UNDER A COMMON COVERPLATE. SWITCHES SHALL MATCH EXISTING TYPE AND COLOUR.
- 10. ELECTRICAL CONTRACTOR SHALL CLEAN ALL EXISTING AND/OR RELOCATED LUMINAIRES AND REPLACE ANY MISSING AND DAMAGED LENSES WITH NEW LENSES.
- 11. 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:

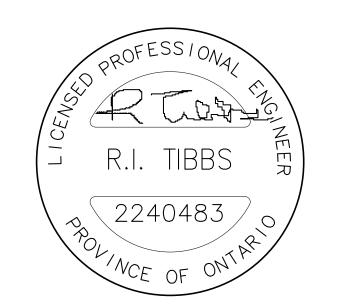
(1) CONTRACTOR TO PROVIDE OPTIONAL PRICE TO SUPPLY AND INSTALL ONE (1) LT-5 FIXTURE IN LIEU OF TWO (2) LT-1 FIXTURES IN ELEVATOR LOBBY 200. CONTRACTOR TO SUPPLY AND INSTALL ADDITIONAL ROOM LIGHTING CONTROL UNIT FOR LT-5

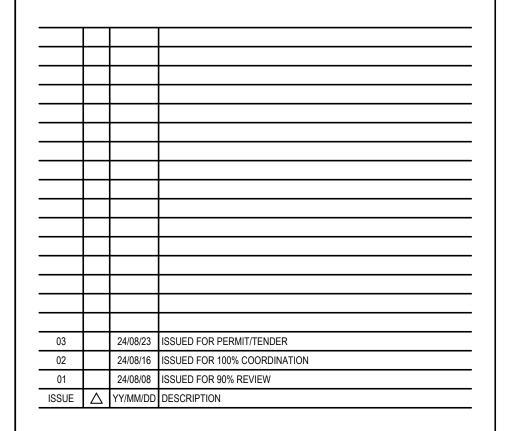
City of Pickering

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Client Name

City of Pickering

Project Name

Project Address

CoP Interior Fit-Out

2460 Brock Road Pickering, ON L1X 0J1

Project number 2240483

REFLECTED CEILING **PLAN**

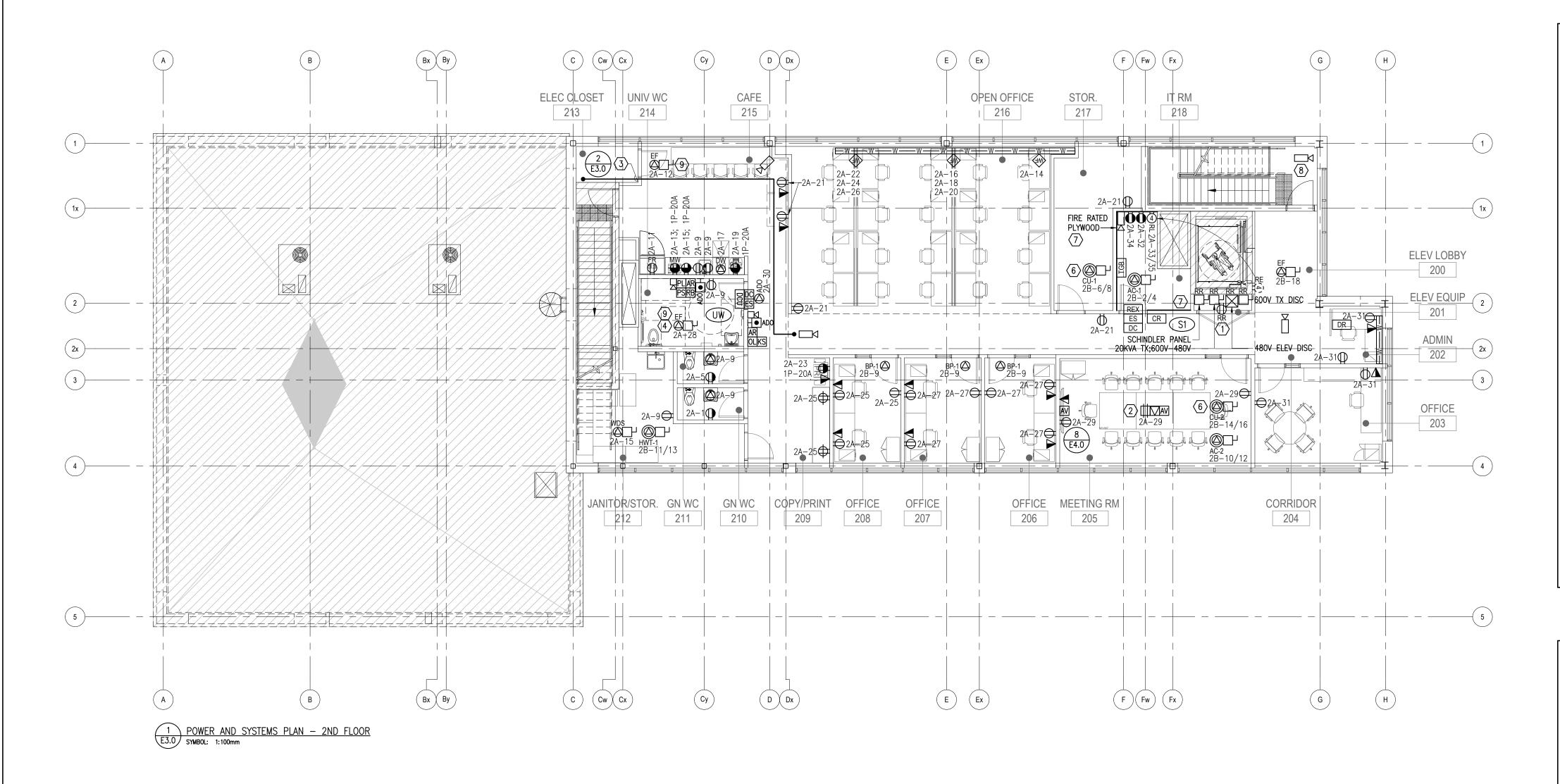
2ND FLOOR

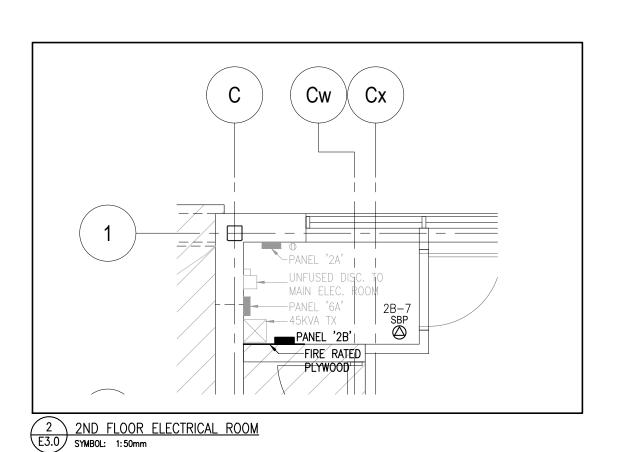
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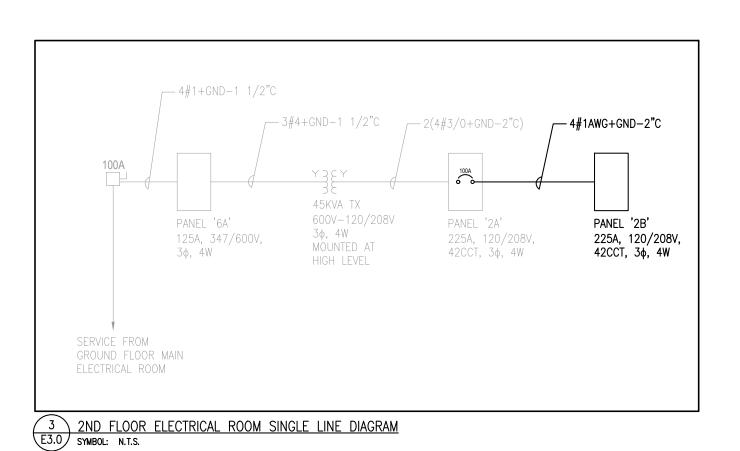
True North

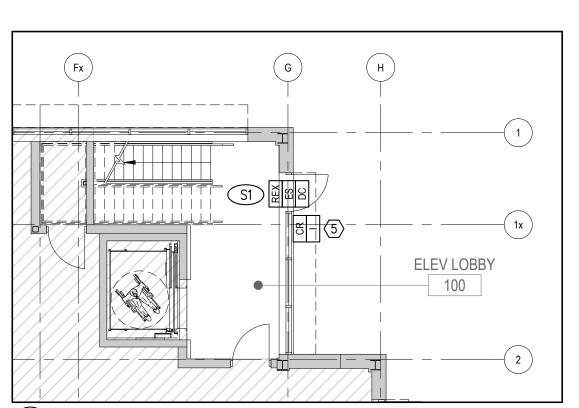
Drawing Number

E2.0









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

GENERAL POWER NOTES:

- WALL MOUNTED OUTLET LOCATIONS SHOWN ARE APPROXIMATE ONLY, FOR EXACT LOCATIONS REFER TO INTERIOR DESIGNERS DRAWINGS.
- 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.
- 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.
- 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.
- VERIFY EXACT POWER REQUIREMENTS AND RECEPTACLE TYPE FOR SPECIAL EQUIPMENT WITH MANUFACTURER PRIOR TO INSTALLATION. REPORT ANY DISCREPANCIES TO
- 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
- 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:

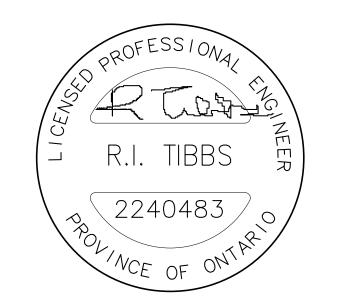
- (1) CONTRACTOR TO REMOVE AND REINSTALL ALL EXISTING ELEVATOR CONTROL EQUIPMENT TO SUIT NEW ELEVATOR EQUIPMENT CLOSET. ENSURE EQUIPMENT IS FULLY OPERATIONAL AND FUNCTIONAL. ALLOW FOR REWORK/EXTENSION OF CABLING AND CONDUIT AS NECESSARY. COORDINATE FINAL LOCATIONS AND SHUTDOWNS PRIOR TO
- 2 CONTRACTOR 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"C RUN c/w PULLSTRINGS FROM ELECTRICAL CLOSET 213 TO CABLE TRAY FOR COMMUNICATION FIBRE CABLING.
- CONTRACTOR TO SUPPLY AND INSTALL ONE (1) 120V DIRECT CONNECTION c/w CONDUIT AND CABLING FOR ROOFTOP EXHAUST FAN. COORDINATE FINAL LOCATION AND ROUTING. TIE EXHAUST FAN INTO WASHROOM OCCUPANCY SENSOR.
- (5) CONTRACTOR TO PROVIDE OPTIONAL PRICE TO SUPPLY AND INSTALL ONE (1) DOOR RELEASE BUTTON AT RECEPTION & ONE (1) INTERCOM SYSTEM INFRASTRUCTURE c/w CONDUIT, JUNCTION BOXES AT GROUND FLOOR DOOR SECURITY TO IT LAN ROOM 218. COORDINATE REQUIREMENTS AND ROUTING ON SITE PRIOR TO INSTALLATION.
- (6) CONTRACTOR TO SUPPLY AND INSTALL ONE (1) 208V, 1P DIRECT CONNECTION c/w CONDUIT AND CABLING FOR ROOFTOP CONDENSER UNIT. COORDINATE FINAL LOCATION AND ROUTING. TIE EXHAUST FAN INTO WASHROOM OCCUPANCY SENSOR.
- (7) ELECTRICAL CONTRACTOR SHALL PROVIDE PLYWOOD BACKBOARDS (8'x4'x¾" THICK, FIRERATED). INSTALL A THICK COPPER GROUND BUS (1'x4"x1/4" THICK) MOUNTED ON THE LOWER CORNER OF BACKBOARD. GROUND EQUIPMENT RACKS, CABLE TRAY AND/OR CABINETS AT THIS POINT USING 1#6 AWG INSULATED GREEN GROUND WIRE. MULTIPLE CABINETS/RACKS SHALL NOT BE DAISY CHAINED TOGETHER WITH GROUND WIRE -PROVIDE SEPARATE GROUND FOR EACH. RUN 1#6 AWG INSULATED GREEN GROUND WIRE IN 1"C FROM GROUND BUS BACK TO MAIN BUILDING GROUND RISER. REFERENCE GROUND BUS DETAIL ON ELECTRICAL DETAIL SHEET.
- (8) CONTRACTOR TO SUPPLY AND INSTALL SECURITY CAMERA CONDUITS ROUGHIN FOR EXTERIOR CAMERA. COORDINATE EXACT ROUTING TO IT ROOM AND REQUIREMENTS WITH SECURITY EQUIPMENT PRIOR TO INSTALLATION.
- (9) CONTRACTOR TO COORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT EXHAUST FAN LOCATION AND LINE VOLTAGE CONTROLS REQUIREMENTS.

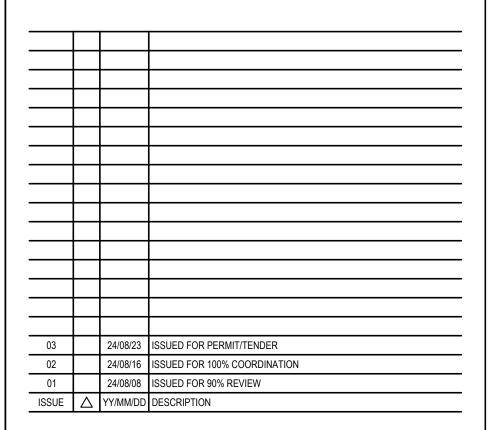
City of Pickering

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



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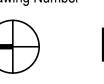
354 Davenport Road, Suite 200 Toronto, Ontario, Canada M5R 1K6 T: (416) 413-0063 email: info@instudiocreative.com

Client Name	
	City of Pickering
Project Name	
	CoP Interior Fit-Out
Project Address	
	2460 Brock Road

2240483

POWER AND SYSTEMS PLAN 2ND FLOOR

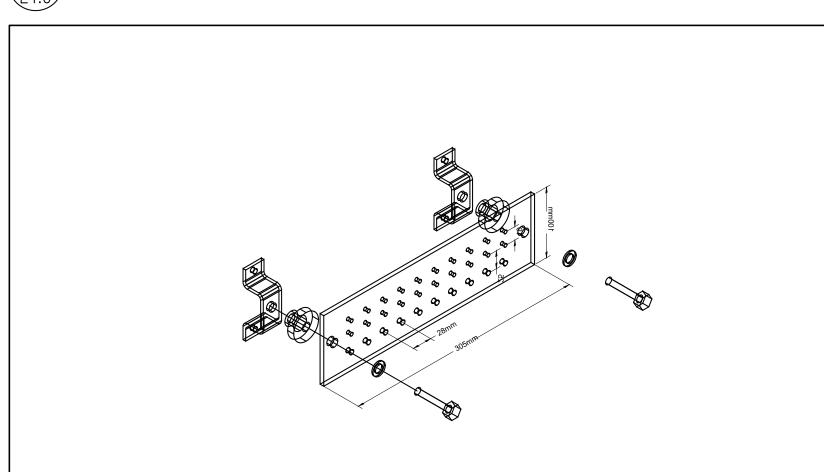
1:100 Drawing Scale Drawing Number



NOTES RE: SECURITY SYSTEMS

- 1. 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.
- 2. ALL JUNCTION BOXES SHALL BE MOUNTED INSIDE SECURE AREA OF FLOOR SPACE.
- 3. CONDUITS TO BE TERMINATED IN 4" x 4" x 4" CABLE TROUGH MOUNTED ON 4' x 4" SHEET OF PLYWOOD IN ELECTRICAL CLOSET AS
- 4. INCLUDE IN THIS PRICE ALL NECESSARY 120V CIRCUITS REQUIRED IN ELECTRICAL/TELEPHONE ROOMS IN RISER CLOSET. ALL CIRCUITS ARE GFI.
- 5. 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.
- 6. PROVIDE A 1/8" NYLON PULL CORD FOR ALL CONDUIT ASSOCIATED WITH SECURITY.
- 7. 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.
- 8. SECURITY WIRING AS SHOWN IS DIAGRAMMATIC ONLY. PROVIDE WIRING AS PER SECURITY SYSTEM MANUFACTURERS REQUIREMENTS.

SECURITY NOTES:

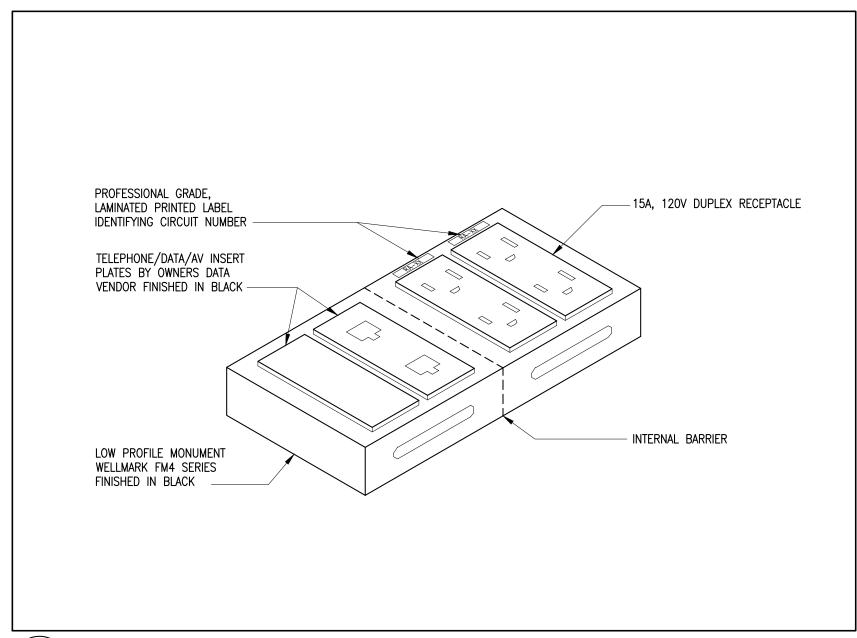


<u>NOTES:</u>

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

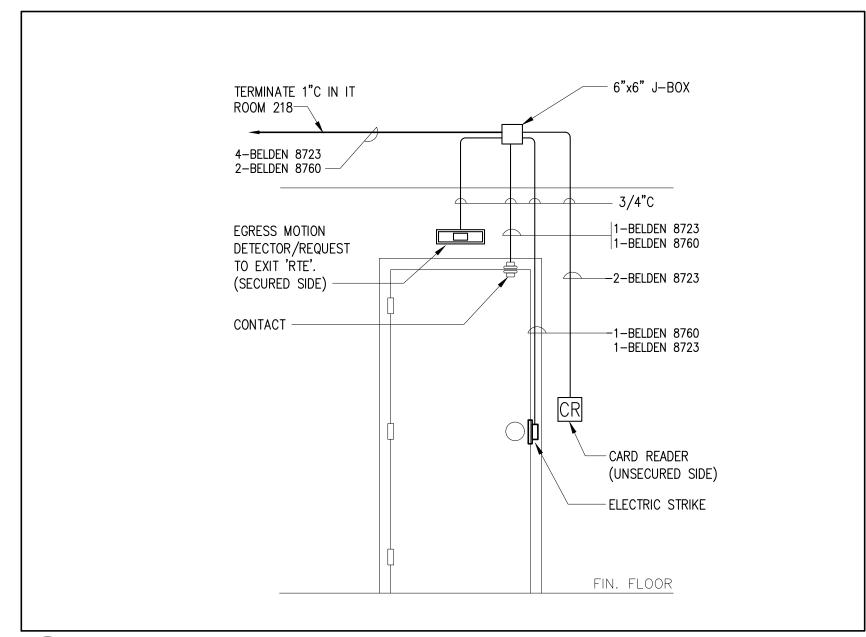
DETAIL OF WALL MOUNTED GROUND BUS BAR:

E4.0 SYMBOL: TGB N.T.S.

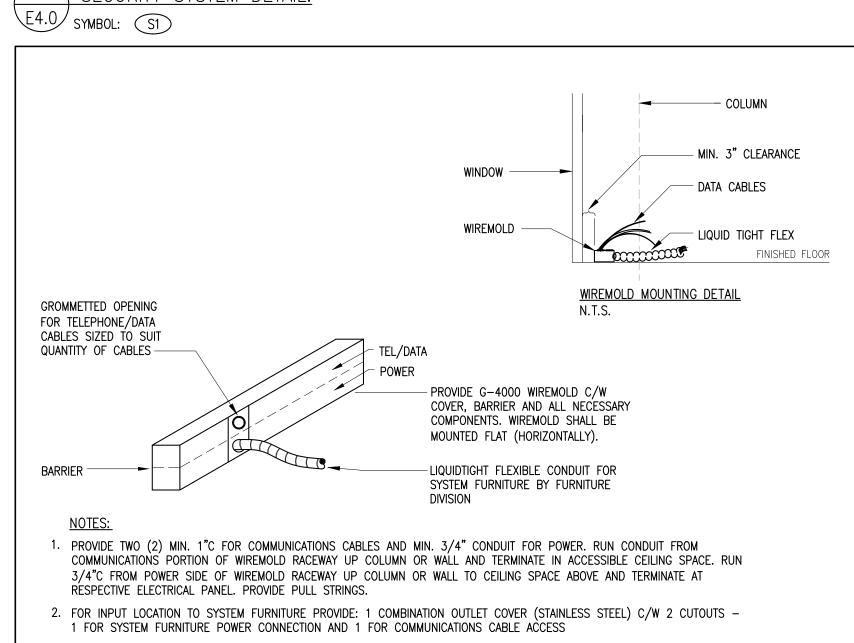


 $\overline{\ \ \ }$ DETAIL OF FLOOR MOUNTED POWER, COMMUNICATIONS, AV MONUMENT:

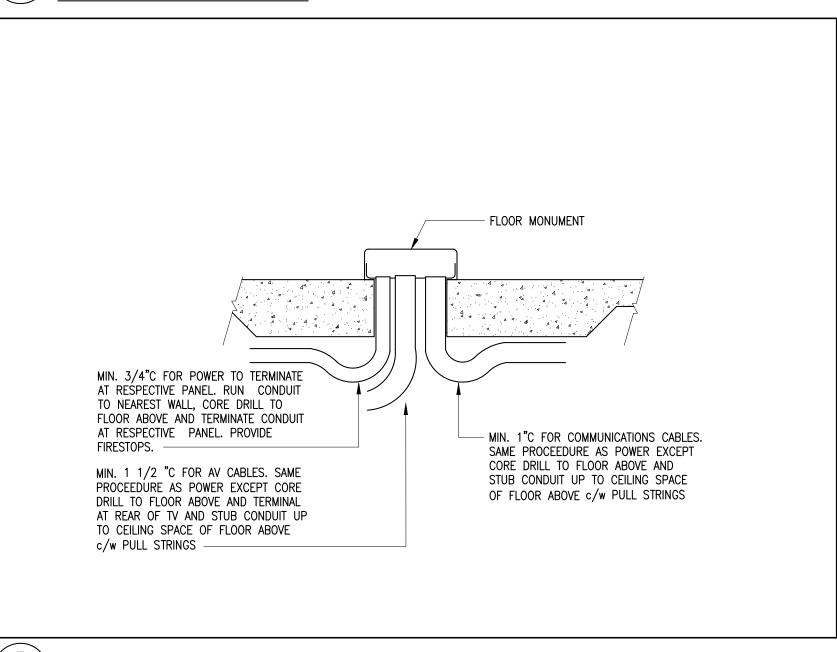
E4.0 SYMBOL: TAN N.T.S.



SECURITY SYSTEM DETAIL:

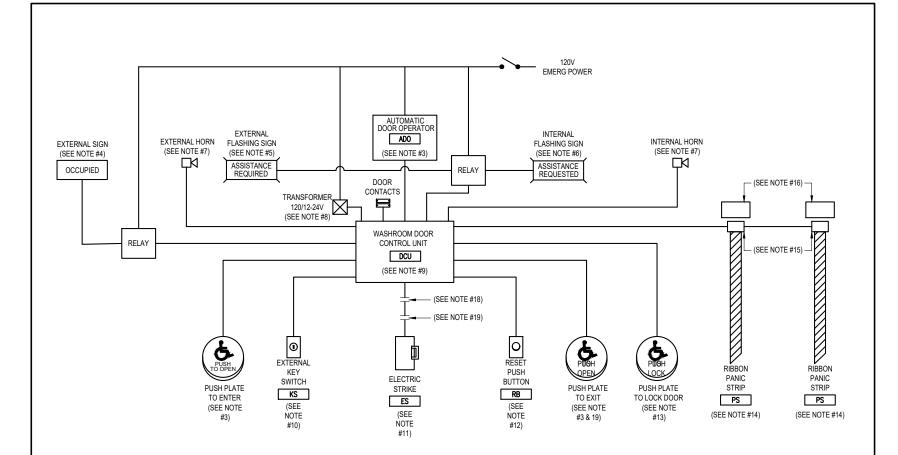


DETAIL OF POWER & COMMUNICATIONS INPUT POINT FOR SYSTEMS



7 Thoor monument mounting detail:

E4.0 SYMBOL: MAY N.T.S.



- 1. DEVICES & WIRING BY ELECT/SECURITY CONTRACTOR EXCEPT WHERE INDICATED OTHERWISE.
- 2. LOCATE DEVICES IN ACCORDANCE WITH ARCHITECTURAL AND ELECTRICAL DRAWINGS.
- 3. BY DOOR HARDWARE DIVISION.
- 4. "OCCUPIED" SIGN TO MATCH EXIT SIGNS USED ON THE PROJECT.
- 5. FLASHING "ASSISTANCE REQUIRED" SIGN TO MATCH EXIT SIGNS USED ON THE PROJECT.
- 6. SAME AS "ASSISTANCE REQUIRED" SIGN BUT SHOWING "ASSISTANCE REQUESTED".
- 7. 24V HORN, SCHLAGE #1910 OR ACCEPTABLE ALTERNATIVE.
- 8. 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
- 9. 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.
- 10. 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".
- 11. ELECTRIC STRIKE COMPLETE WITH RECTIFIER AND POWER UCTION FEATURE FOR CONTINUOUS OPERATION. STRIKE TO LOCK WHEN ENERGIZED AND TO FAIL SAFE (OPEN).
- 12. 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
- CUSTOM ENGRAVING: "PUSH TO LOCK" OR ACCEPTABLE ALTERNATIVE.

MOUNT AT 1050mm ABOVE FINISHED FLOOR TO CENTERLINE.

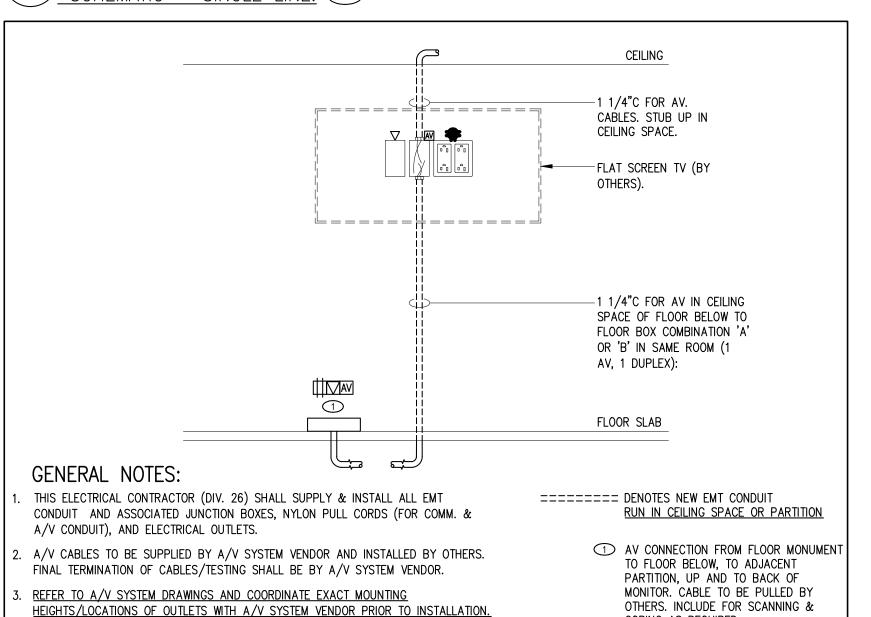
- 14. RIBBON PANIC STRIP, TAPESWITCH TYPE "PASS" OR ACCEPTABLE ALTERNATIVE. ACTIVE SWITCH AREA NOT LESS THAN 800mm IN LENGTH WITH BOTTOM OF ACTIVE SWITCH AREA 150mm ABOVE FINISHED FLOOR.
- 15. WIRE MOLD BOX SERIES 500.
- 16. LAMICOID PLATE WITH 25mm HIGH RED LETTERING ON A WHITE BACKGROUND STATING: "IN THE EVENT OF AN EMERGENCY, DEPRESS STRIP, AN AUDIBLE AND VISUAL SIGNAL WILL ACTIVATE" MOUNT ONE PLATE ABOVE EACH RIBBON PANIC STRIP.
- 17. CO-ORDINATE DEVICE RATINGS AND FUNCTIONS WITH HARDWARE
- 18. FIRE ALARM CONTACT TO OPEN UPON ACTIVATION OF A FIRE ALARM (2ND STAGE WHERE APPLICABLE).
- 19. AUXILIARY CONTACT ON PUSH PLATE TO EXIT (CO-ORDINATE REQUIREMENTS WITH HARDWARE DIVISION).

REQUIRED OPERATION:

- 1. WHEN NOT IN USE, SIGNS ARE NOT ILLUMINATED, HORNS ARE OFF AND DOOR IS NOT LOCKED.
- 2. 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.
- 3. 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.
- 4. 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.
- 5. SHOULD THE PERSON REQUIRE ASSISTANCE, THE PERSON DEPRESSES THE MOMENTARY CONTACT PANIC STRIP. THE DCU PICKS UP AND LATCHES IN. THE "ASSISTANCE REQUIRED" AND "ASSISTANCE REQUESTED" SIGNS ILLUMINATE AND FLASH AT A RATE OF ONCE PER SECOND. THE HORNS SOUND.
- 6. A RESPONDER TO THE ASSISTANCE REQUIRED SIGNAL OPERATES THE KEY SWITCH WHICH RELEASES THE ELECTRIC STRIKE ALLOWING ENTRY TO THE WASHROOM.
- 13. INTERIOR PUSH PLATE TO LOCK DOOR, WIKK MODEL #6R-3 WITH 7. 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.

CORING AS REQUIRED.

UNIVERSAL WASHROOM, DOOR CONTROL & SIGNALLING, ELECTRICAL E4.0 <u>SCHEMATIC — SINGLE LINE:</u> UW N.T.S.



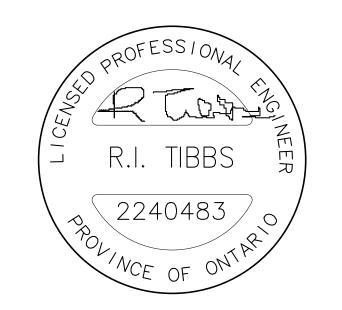
8 \ WALL MOUNTED AV CONDUIT ELEVATION DETAIL: E4.0 SYMBOL: N.T.S.

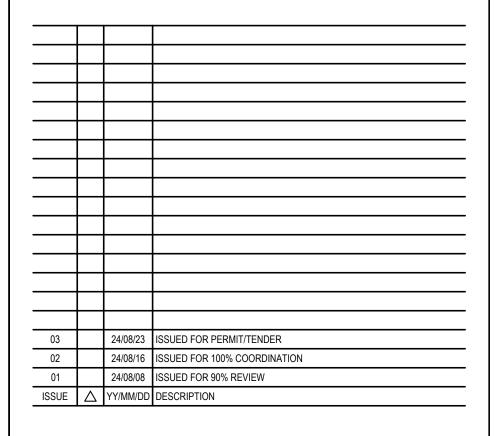
City of Pickering

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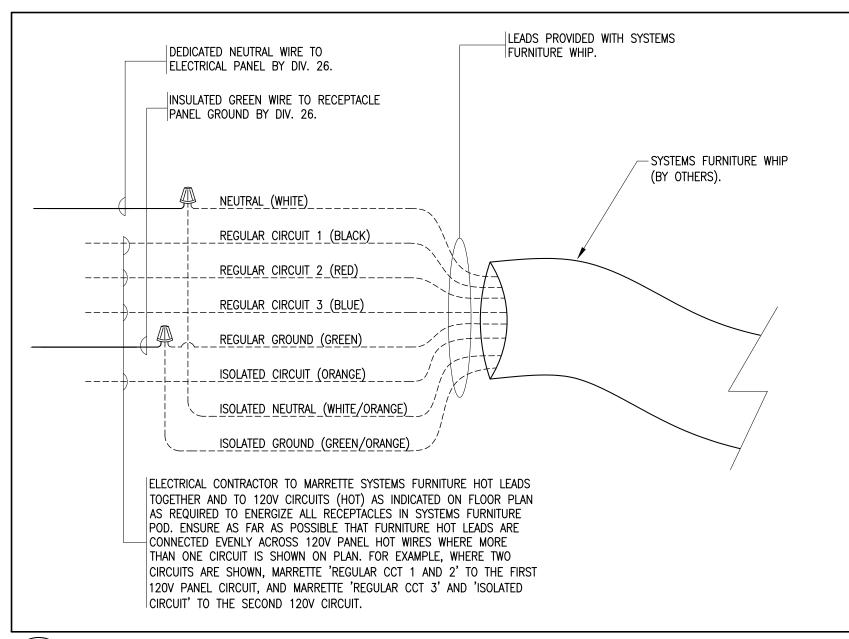
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Client Name		
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Project Name		
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Project Address		
·	2460 Brock Road Pickering, ON L1X 0J1	
Project number		
	2240483	

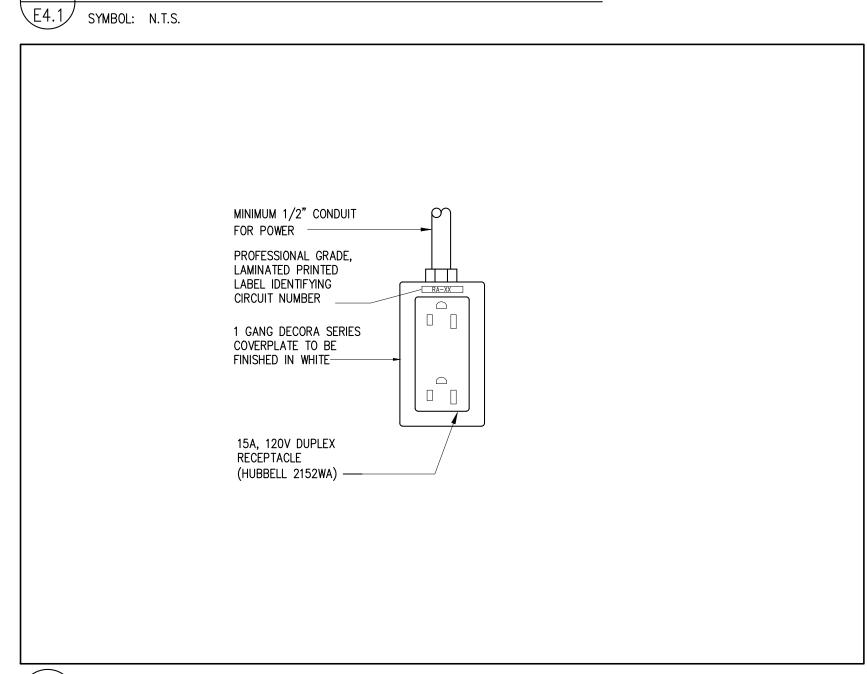
ELECTRICAL DETAILS

N.T.S. Drawing Scale Drawing Number

E4.0

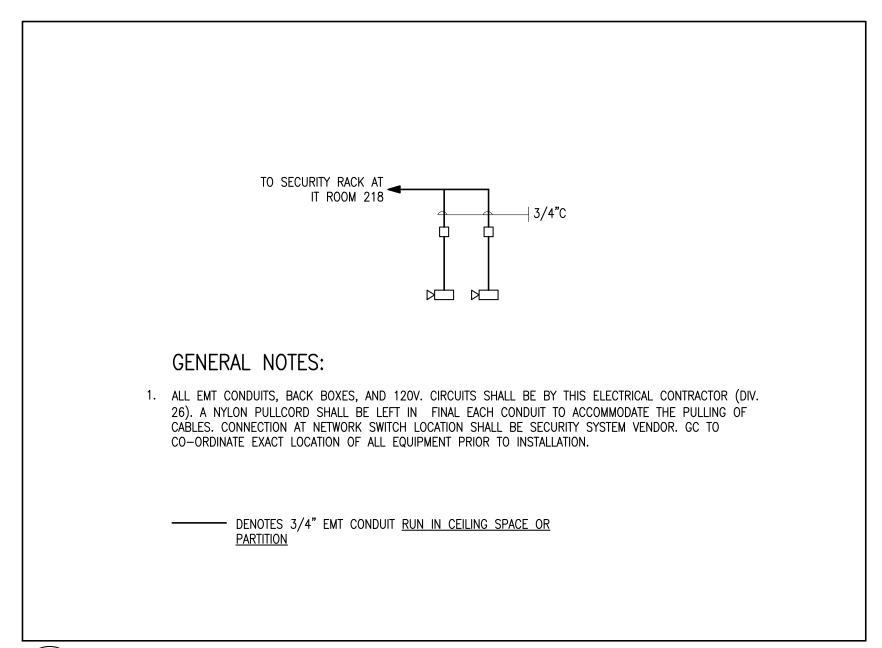


1 DETAIL OF POWER CONNECTION TO SYSTEMS FURNITURE:

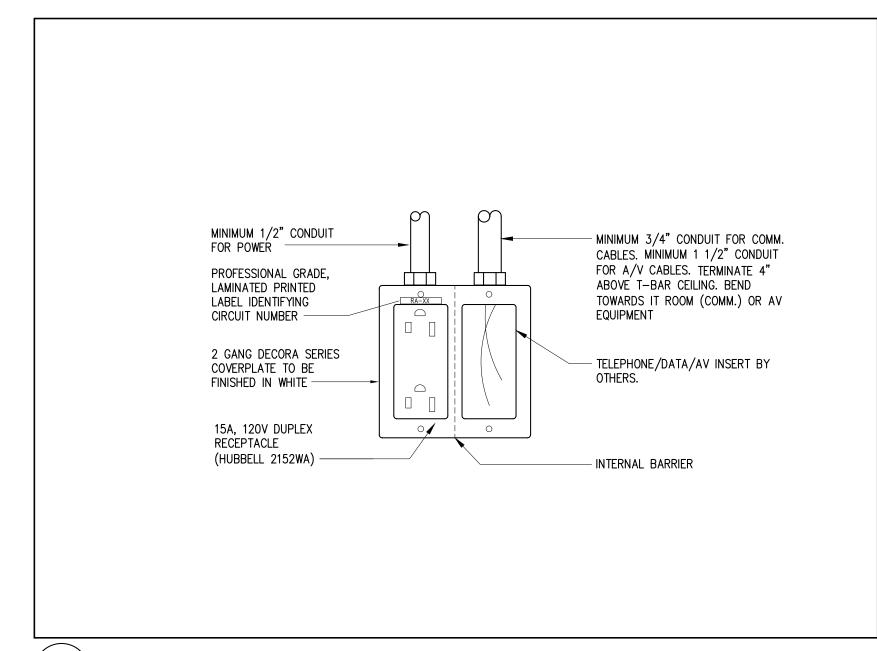


4 DETAIL OF WALL MOUNTED POWER OUTLET: E4.1 SYMBOL:

N.T.S.



2 SECURITY CAMERA CONDUIT DETAIL: E4.1 SYMBOL: DIN.T.S.



3 DETAIL OF WALL MOUNTED POWER & COMMUNICATIONS OUTLET: E4.1 SYMBOL:

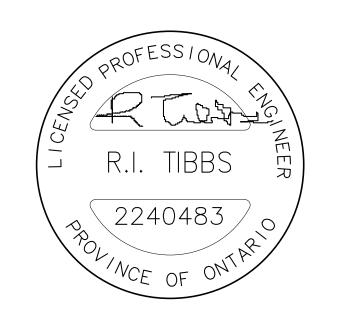
▼ N.T.S.

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-			
-			
-			
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	Δ	YY/MM/DD	DESCRIPTION



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ELECTRICAL DETAILS

Drawing Scale N.T.S.

E4.1

2240483

True North

Drawing Number

JOB No. 2240483 CALCULATE	D BY: RD		DA	ATE: JULY 2024		MAINS: 225A VOLTAGE: 120/208V, 3ø, 4W			
LOAD DESCRIPTION		BRKR CO SIZE N		PHASE A B C	CCT. No.	BRKR SIZE	LOAD DESCRIPTION		
WASHROOM GFCI		15A	1	•	2	15A	ELEVATOR CAB LIGHTS		
CONVENIENCE RECEPTACLE		20A	3	1 + +	4	15A	ELEVATOR PIT LIGHTS		
WASHROOM GFCI		15A	5	1 +	6	15A	ELEVATOR GFCI		
EXISTING CIRCUIT		15A	7	1	8	15A	SUMP PUMP		
GENERAL POWER		15A	9	1 + +	10	15A	MOTOR DAMPER		
FRIDGE		15A	11	1 + +	12	15A	EXHAUST FAN		
MICROWAVE		20A	13	1+++	14	15A	OPEN OFFICE 216 WORKSTATIONS		
CAFE GFCI		20A	15	1 + +	16	15A	OPEN OFFICE 216 WORKSTATIONS		
DISHWASHER		15A	17	}	18	15A	OPEN OFFICE 216 WORKSTATIONS		
CAFE GFCI		20A	19	1+	20	15A	OPEN OFFICE 216 WORKSTATIONS		
GENERAL RECEPTACLES		15A	21	1 + +	22	15A	OPEN OFFICE 216 WORKSTATIONS		
PRINTER		20A	23	}	24	15A	OPEN OFFICE 216 WORKSTATIONS		
OFFICE 208 + OVER COUNTER	REC.	15A	25	1+	26	15A	OPEN OFFICE 216 WORKSTATIONS		
OFFICE 206 + 207		15A	27	 	28	15A	EXHAUST FAN		
MEETING ROOM 205		15A	29	}	30	15A	UNIVERSAL WASHROOM ADO		
OFFICE 203 + ADMIN 202		15A	31]+	32	15A	TELECOM ROOM QUAD		
TELECON DOON IS 200		204	33	 	34	15A	TELECOM ROOM QUAD		
TELECOM ROOM L6-20P		20A	35	}	36				
SPARE		15A	37	J • 	38	100A	SUB-PANEL 5B		
SPARE		15A	39	 	40				
SPARE		15A	41	 	42	15A	SPARE		

EXISTING:

JOB No. 2240483	CALCULATED BY: F	TED BY: RD DATE: JULY 2024			MAINS: 225A VOLTAGE: 120/208V, 3ø,					
LOAD DESCRIPTI	ON	BRKR SIZE	CC1 No		PHASE B	С	CCT. No.	BRKR SIZE		LOAD DESCRIPTION
LIGHTING		15A	1	+			2	45.		
LIGHTING		15A	3		-		4	15A	AC-1	
NIGHT LIGHT		15A	5	\mathbb{H}		lack	6	054	001105	uosp.
STROBE BOOSTER PAI	NEL	15A	15A 7	-	T+	8	25A	CONDE	NSER	
BYPASS BOX		15A	9	\blacksquare	<u> </u>	+	10	154	40.0	
LIOT WATER TANK		204	11			lack	12	15A	AC-2	
HOT WATER TANK		20A	13	5 +			14	154	CONDENSED	
NATER DETECTION SHUT OFF		15A	15	; 	•		16	15A	CONDENSER	
SPARE		15A	17	,		lack	18	15A	EXHAUS	ST FAN
SPARE		15A	19	•		+	20	15A	SPARE	
SPARE		15A	21	1	•		22	15A	SPARE	
SPARE		15A	23	3 +		\blacklozenge	24	15A	SPARE	
SPARE		15A	25	5 +		+	26	15A	SPARE	
SPARE		15A	27	7	•		28	15A	SPARE	
SPARE		15A	29	,		\blacklozenge	30	15A	SPARE	
SPARE		15A	31	1		+	32	15A	SPARE	
SPARE		15A	33	3	-	+	34	15A	SPARE	
SPARE SPARE SPARE		15A	35	5 <u> </u>			36	15A	SPARE	
		15A	37	7		+	38	15A	SPARE	
		15A	39	9]	-	+	40	15A	SPARE	
SPARE		15A	41	1		lack	42	15A	SPARE	
SURFACE MOUNTED:		SH MOUN	NTED:] 1					NEW BREAKER HANDLE LOCKING BREAKER

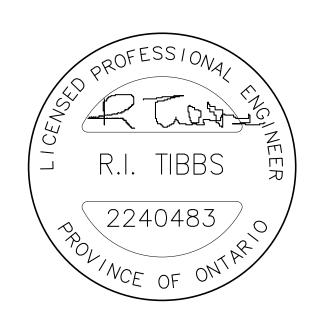
HHAngus & Associates Limited Consulting Engineers 1127 (eslie Street, Toronto, N, M3C 216 Canada www.hhangus.com T 416 443 8200 F 416 443 8200 D 4 416 443 8200 CALCULA	TED BY: RD	RD DATE: JULY 2024					MAINS: 125A VOLTAGE: 347/600V, 3ø,		
LOAD DESCRIPTION		BRKR SIZE	CCT.	PHASE A B C	CCT. No.	BRKR SIZE		LOAD DESCRIPTION	
SPARE		20A	1	+	2	20A	SPARE		
SPARE		15A	3		4	15A	SPARE		
SPARE		15A	5	│ 	6	15A	SPARE		
FFH		20A	7	 	8	15A	FFH		
STAIR LIGHTS		15A	9	+	10	15A	SPARE		
STAIR LIGHTS		15A	11	 	12	15A	DEDICAT	ED CIRCUIT	
EXIT LIGHTS		15A	13	 	14	15A	DEDICAT	ED CIRCUIT	
SPACE			15	+	16	15A	DEDICAT	ED CIRCUIT	
SPACE			17	│ 	18		SPACE		
SPACE			19	 	20		SPACE		
SPACE			21	+	22		SPACE		
SPACE			23	 •	24		SPACE		
SPACE			25	 	26		SPACE		
SPACE			27		28		SPACE		
SPACE			29	 	30		SPACE		
			31	 	32				
ROOFTOP UNIT 3		15A	33		34	30A	ELEVATOR CONTROLLER		
			35	 	36				
			37		38				
ROOFTOP UNIT 2		15A	39	+	40	60A	PANEL	'2A'	
			41		42				
SURFACE MOUNTED:	FLUSH	MOUN	TED:					NEW BREAKER HANDLE LOCKING BREAKER	

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PANEL SCHEDULES

Drawing Scale **N.T.S.** Drawing Number

E4.2