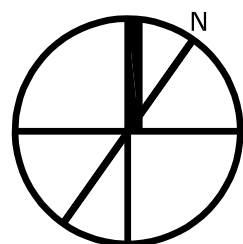


7	2025-06-27	ISSUED FOR ELECTRICAL ADDENDUM 02
6	2025-06-16	ISSUED FOR ELECTRICAL ADDENDUM 01
5	2025-04-15	ISSUED FOR ESA PLAN REVIEW
4	2025-04-11	ISSUED FOR TENDER
3	2024-09-16	ISSUED FOR BUILDING PERMIT
2	2024-08-16	ISSUED FOR 100% COSTING
1	2023-01-31	ISSUED FOR 50% CD
No.	Date	Description
Issue Record		



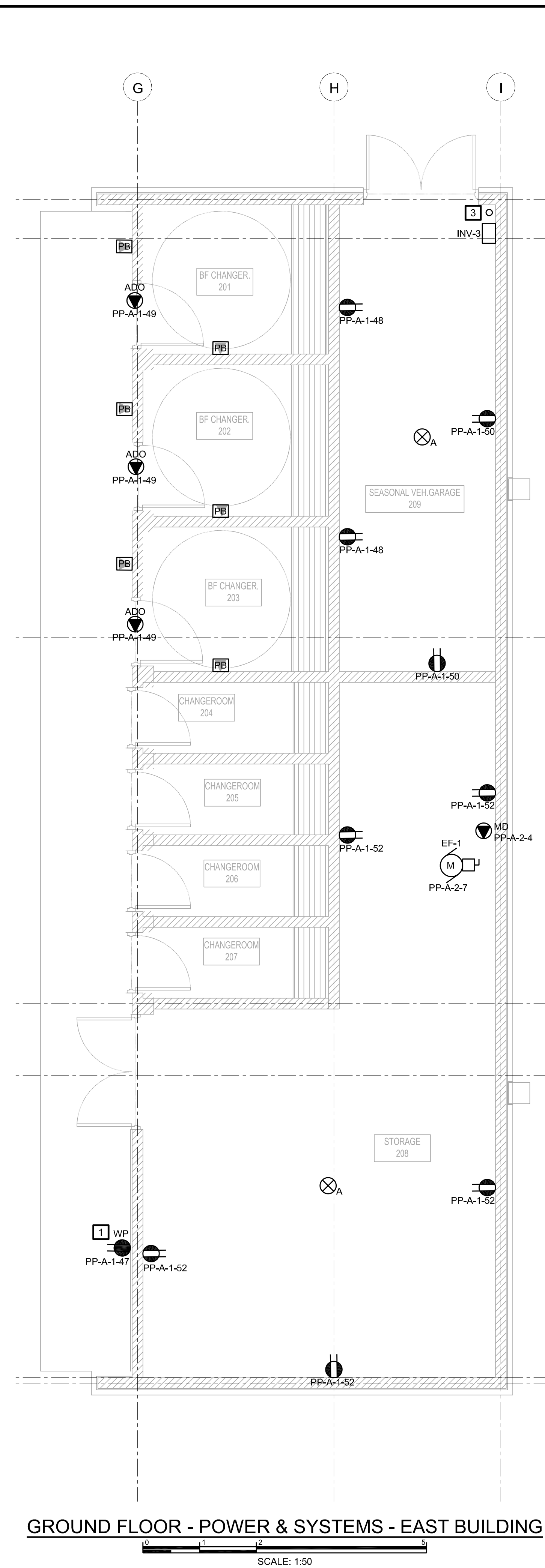
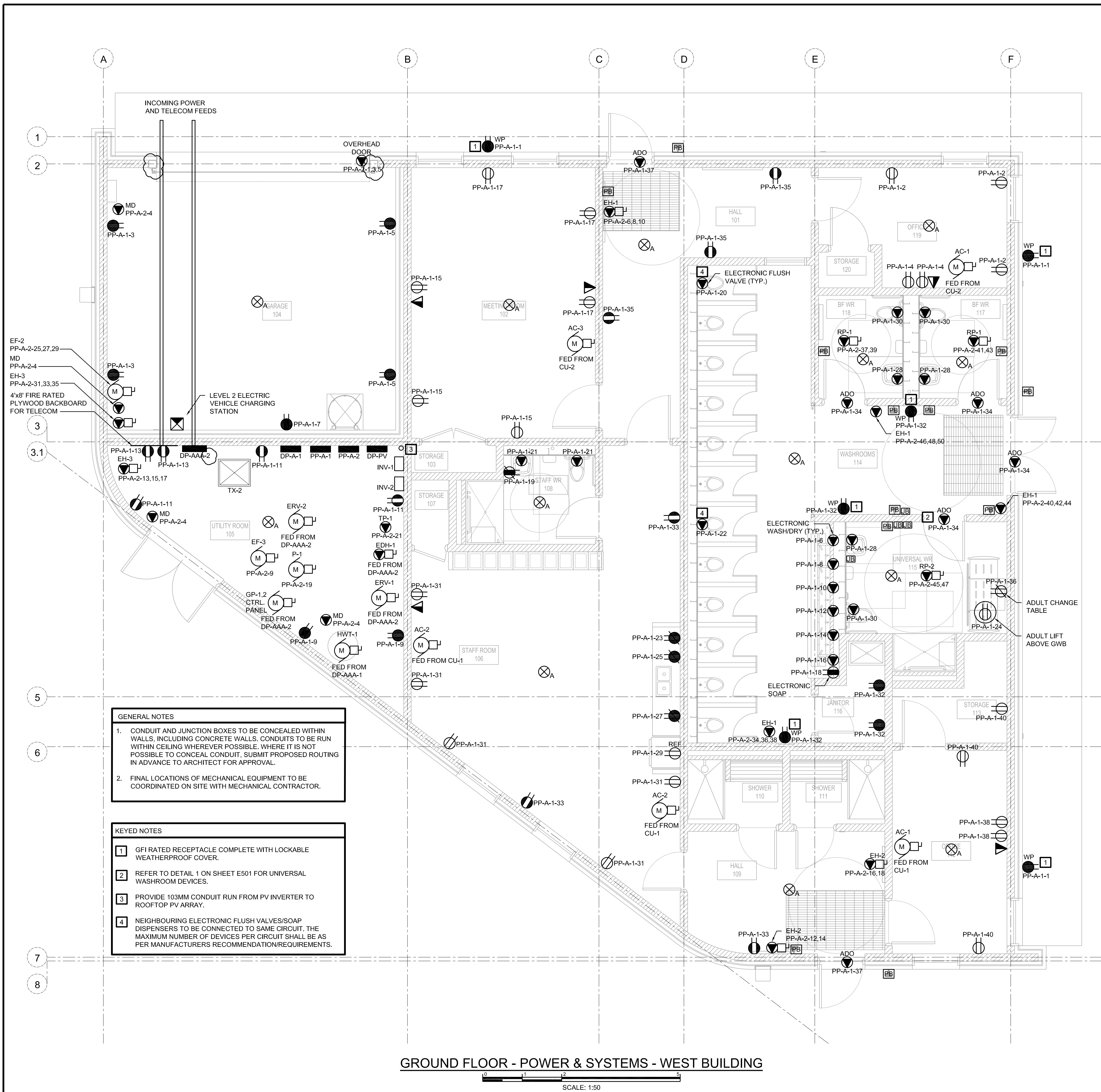
**BLUFFER'S PARK
EAST WASHROOM**
1 Brimley Road South
Scarborough, Toronto, ON

Drawing Title

**GROUND FLOOR - POWER &
SYSTEM PLAN**

Print Date 2025-06-27
Scale 1:50
Project No. 0010052.000
Drawn by LT
Checked by JN

E101



PANEL NUMBER: PP-A-1											
MOUNTING: SURFACE				VOLTAGE: 120/208V				A.I.C. RATING			
FED FROM: DP-A-1				PHASE: 3				MAIN BREAKER: 125A MCB			
PANEL LOCATION: UTILITY ROOM				CIRCUITS: 72							
CCT	LOAD						LOAD				CCT
No.	DESCRIPTION	TYPE	VA	BKR		BKR	VA	TYPE	DESCRIPTION	No.	
1	EXTERIOR WP GFI T-SLOT REC	REC.	1200	20A	A	15A	600	REC.	OFFICE RECS	2	
3	GARAGE GFI T-SLOT REC	REC.	800	20A	B	15A	400	REC.	OFFICE REC	4	
5	GARAGE GFI T-SLOT REC	REC.	800	20A	C	15A	1000	OTH.	W/R ELECTRONIC WASH/DRY	6	
7	GARAGE GFI T-SLOT REC	REC.	400	20A	A	15A	1000	OTH.	W/R ELECTRONIC WASH/DRY	8	
9	UTILITY RM GFI T-SLOT REC	REC.	400	20A	B	15A	1000	OTH.	W/R ELECTRONIC WASH/DRY	10	
11	UTILITY RM T-SLOT REC	REC.	600	20A	C	15A	1000	OTH.	W/R ELECTRONIC WASH/DRY	12	
13	UTILITY RM TELECOM REC	REC.	400	20A	A	15A	1000	OTH.	W/R ELECTRONIC WASH/DRY	14	
15	MTG RM CONV. REC	REC.	600	15A	B	15A	1000	OTH.	W/R ELECTRONIC WASH/DRY	16	
17	MTG RM CONV. REC	REC.	600	15A	C	15A	500	OTH.	W/R ELECTRONIC SOAP	18	
19	STAFF RM W/R GFI REC	REC.	200	15A	A	15A	600	OTH.	W/R ELECTRONIC FLUSH	20	
21	STAFF RM W/R ELECTRONIC FIXTURES	OTH.	200	15A	B	15A	600	OTH.	W/R ELECTRONIC FLUSH	22	
23	STAFF RM KITCHEN GFI T-SLOT REC	REC.	800	20A	C	15A	200	OTH.	W/R ADULT LIFT	24	
25	STAFF RM KITCHEN GFI T-SLOT REC	REC.	800	20A	A	15A	400	OTH.	EM LTG. EXT. SIGNS & BATT.	26	
27	STAFF RM KITCHEN GFI T-SLOT REC	REC.	800	20A	B	15A	150	OTH.	W/R ELECTRONIC FAUCET	28	
29	STAFF RM KITCHEN REFRIGERATOR REC	REC.	800	15A	C	15A	300	OTH.	W/R ELECTRONIC FLUSH	30	
31	STAFF RM CONV. REC	REC.	1000	15A	A	20A	1000	REC.	W/R WP GFI T-SLOT REC	32	
33	STAFF RM & HALL T-SLOT CONV. REC	REC.	600	20A	B	15A	600	OTH.	W/R ADOs	34	
35	HALL T-SLOT CONV. REC	REC.	600	20A	C	15A	400	REC.	W/R ADULT CHANGE TABLE	36	
37	HALL ADOs	OTH.	300	15A	A	15A	200	REC.	SHOWER HALL REC	38	
39	GARAGE & UTILITY RM LTG	LTG.	360	15A	B	15A	400	REC.	OFFICE REC	40	
41	MTG RM, HALL & OFFICE LTG	LTG.	760	15A	C	15A	600	REC.	STORAGE & OFFICE REC	42	
43	STAFF RM LTG	LTG.	601	15A	A	15A	361	LTG.	HALL & STORAGE LTG	44	
45	W/R LTG	LTG.	586	15A	B	20A	1500	LTG.	EXTERIOR COVE LTG	46	
47	EB EXTERIOR WP GFI T-SLOT REC	REC.	400	20A	C	20A	800	REC.	EB GARAGE T-SLOT REC	48	
49	EB CHANGE ROOM ADOs	OTH.	450	15A	A	20A	800	REC.	EB GARAGE T-SLOT REC	50	
51	EB CHANGE ROOM LTG	LTG.	293	15A	B	20A	1000	REC.	EB STORAGE T-SLOT REC	52	
53	EB GARAGE & STORAGE LTG	LTG.	480	15A	C	15A	670	LTG.	EB EXTERIOR COVE LTG	54	
55	SITE LIGHTING	LTG.	421	20A	A					56	
57	SITE LIGHTING	LTG.	336	20A	B					58	
59					C					60	
61					A					62	
63					B					64	
65	SPARE			15A	C	15A			SPARE	66	
67	SPARE			15A	A	15A			SPARE	68	
69	SPARE			15A	B	15A			SPARE	70	
71	SPARE			15A	C	15A			SPARE	72	
LOAD TOTALS							DEMAND				
PHASE A			11.73 KVA				LIGHTING			6.37 KVA	
PHASE B			11.62 KVA				RECEPTACLES			9.00 KVA	
PHASE C			11.31 KVA	DIVERSITY FACTOR			MOTORS			0.00 KVA	
LIGHTING			6.37 KVA	1			OTHERS			10.30 KVA	
RECEPTACLES			18.00 KVA	0.5							
MOTORS			0.00 KVA	0.75			TOTAL POWER			25.67 KVA	
OTHERS			10.30 KVA	1			TOTAL CURRENT			71.30 A	

PANEL NUMBER: PP-A-2										
MOUNTING: SURFACE				VOLTAGE: 120/208V				A.I.C. RATING		
FED FROM: DP-A-1				PHASE: 3				MAIN BREAKER: 125A MCB		
PANEL LOCATION: UTILITY ROOM				CIRCUITS: 72						
CCT	LOAD						LOAD			CCT
No.	DESCRIPTION	TYPE	VA	BKR	BKR	VA	TYPE	DESCRIPTION	No.	
1	GARAGE OVERHEAD DOOR	MTR	1167		A				2	
3		MTR	1167	15A	B	15A	250	OTH.	4	
5		MTR	1167		C		500	OTH.	6	
7	STORAGE - EF-1	MTR	55	15A	A	15A	500	OTH.	8	
9	UTILITY ROOM - EF-3	MTR	60	15A	B		500	OTH.	10	
11	UTILITY RM EH-3				C		381	OTH.	12	
13		OTH.	1000		A	15A	381	OTH.	14	
15		OTH.	1000	15A	B		381	OTH.	16	
17		OTH.	1000		C		381	OTH.	18	
19	UTILITY RM PUMP P-1	MTR	270	15A	A				20	
21	STAFF W/C TRAP PRIMER TP-1	OTH.	6	15A	B	20A	200	MTR.	22	
23					C	20A	200	MTR.	24	
25	GARAGE EF-2	MTR	288		A	1016	MTR.	ROOF MECH EQUIP MAINTENANCE GFI T-SLOT REC	26	
27		MTR	288	15A	B	1016	MTR.	ROOF AIR-COOLED OUTDOOR CONDENSING UNIT CU-1	28	
29		MTR	288		C	1016	MTR.	ROOF AIR-COOLED OUTDOOR CONDENSING UNIT CU-2	30	
31	GARAGE EH-3	OTH.	1000		A	40A	1016	MTR.	32	
33		OTH.	1000	15A	B		500	OTH.	34	
35		OTH.	1000		C	15A	500	OTH.	36	
37	BARRIER FREE WASHROOM RADIANT HEATER RP-1	OTH.	155		A		500	OTH.	38	
39		OTH.	155	15A	B		500	OTH.	40	
41	UNIVERSAL WASHROOM RADIANT HEATER RP-1	OTH.	155		C	15A	500	OTH.	42	
43		OTH.	155	15A	A		500	OTH.	44	
45	BARRIER FREE WASHROOM RADIANT HEATER RP-2	OTH.	265		B		500	OTH.	46	
47		OTH.	265	15A	C	15A	500	OTH.	48	
49					A		500	OTH.	50	
51					B				52	
53					C				54	
55					A				56	
57					B				58	
59					C				60	
61					A				62	
63	SPARE				B				64	
65				15A	C	15A			66	
67					A				68	
69	SPARE				B	15A			70	
71				15A	C	15A			72	
LOAD TOTALS					DEMAND					
PHASE A 8.50 KVA										
PHASE B 7.79 KVA					LIGHTING 0.00 KVA					
PHASE C 7.85 KVA					DIVERSITY FACTOR					
					RECEPTACLES 0.00 KVA					
					MOTORS 6.91 KVA					
LIGHTING 0.00 KVA					OTHERS 14.93 KVA					
RECEPTACLES 0.00 KVA					0.5					
MOTORS 9.21 KVA					0.75					
OTHERS 14.93 KVA					1					
					TOTAL POWER 21.84 KVA					
					TOTAL CURRENT 60.67 A					

LUMINAIRE SCHEDULE									
EQUIPMENT INFO.			ELECTRICAL INFO.			INSTALLATION INFO.			
TYPE	DESCRIPTION	LOCATION	MODEL	POWER	VOLTAGE	LAMP	ILLUMINANCE	CCT (K)	CRI
PL1	EXTERIOR POLE MOUNTED LIGHTING FIXTURE. POLE HEIGHT OF 3.7M	EXTERIOR	LANDSCAPE FORMS MOTIVE AREA LIGHT	48W	120V	LED	3987lm	4000K	80+
PL2	EXTERIOR POLE MOUNTED PROJECTOR LIGHTING FIXTURE. POLE HEIGHT OF 6M	EXTERIOR	WE-EF LIGHTING FLC220 LED G080 PROJECTOR WITH ROSCO G080+ DENSE LEAVES 2 FILTER. LIGHT POLE TO BE OF TYPE WE-EF AML-24NC. SINGLE TS CLAMP	37W	120V	LED	4500lm	4000K	80+
C1	INTEGRATED COVE LIGHTING FIXTURE	WASHROOMS	WINONA LIGHTING CVF WINCOVE	5.5W/ft	120V	LED	600lm/ft	3000K	80+
C2	EXTERIOR COVE LIGHTING FIXTURE	EXTERIOR	COOPER LIGHTING IQ LED Cw40	10W/ft	120V	LED	1000lm/ft	4000K	90+
D1	4" ROUND RECESSED DOWNLIGHT	WASHROOMS	EDISON LIGHTING ED RD+	20W	120V	LED	2050lm	3500K	90+
K1	UNDERCABINET LED STRIP LIGHT	STAFF ROOM	HALO VALUE LED UNDERCABINET	5.3W/ft	120V	LED	365lm/ft	3500K	90+
L1	SUSPENDED 4" LINEAR LIGHTING FIXTURE. WITH 70% UP AND 30% DOWNLIGHT COMPONENT	STAFF AREA	EDISON LIGHTING VECTOR 5+	40W	120V	LED	4280lm	3500K	90+
L2	SUSPENDED 4" VANDAL PROOF LINEAR LIGHTING FIXTURE	UTILITY ROOM, GARAGE, STORAGE	COOPER LIGHTING FAIL-SAFE VAPORITE LED	30W	120V	LED	4000lm	3500K	80+
P1	7.5" ROUND SUSPENDED PENDANT LIGHTING FIXTURE	WASHROOMS	EDISON LIGHTING ED-PRO+	30W	120V	LED	3000lm	3500K	90+
W1	VANDAL RESISTANT WALL MOUNTED LIGHTING FIXTURE	CHANGE ROOMS	COOPER LIGHTING FAIL-SAFE G12 LED	15W	120V	LED	1700lm	3500K	80+
X1	RUNNING MAN PICTOGRAM COMBINATION UNIT WITH EMERGENCY HEADS	THROUGHOUT	LUMACELL LAC1250 DOUBLE HEADS	30W	120V	LED			
BU	BATTERY UNIT WITH EMERGENCY HEADS	THROUGHOUT	LUMACELL RGS125200 DOUBLE HEADS	50W	120V	LED			
RH	REMOTE EMERGENCY HEADS	THROUGHOUT	LUMACELL MP-BLD DOUBLE HEADS	3W	12V	LED			



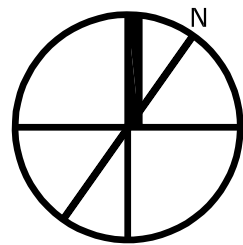
CONTRACTOR SHALL VERIFY AND BE RESPONSIBLE FOR CHECKING ALL DIMENSIONS AND CONDITIONS ON THE JOB.

DO NOT SCALE DRAWINGS.

ALL DRAWING SPECIFICATIONS AND RELATED DOCUMENTS ARE THE COPYRIGHT PROPERTY OF THE ARCHITECT AND MUST BE RETURNED UPON REQUEST. REPRODUCTION OF DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS IN PART OR IN WHOLE IS FORBIDDEN WITHOUT WRITTEN PERMISSION.

THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION UNLESS SIGNED BY THE ARCHITECT.

7	2025-06-27	ISSUED FOR ELECTRICAL ADDENDUM 02
6	2025-06-16	ISSUED FOR ELECTRICAL ADDENDUM 01
5	2025-04-15	ISSUED FOR ESA PLAN REVIEW
4	2025-04-11	ISSUED FOR TENDER
3	2024-09-16	ISSUED FOR BUILDING PERMIT
2	2024-08-16	ISSUED FOR 100% COSTING
1	2023-01-31	ISSUED FOR 50% CD
No.	Date	Description
Issue Record		



**BLUFFER'S PARK
EAST WASHROOM**
1 Brimley Road South
Scarborough, Toronto, ON

Drawing Title

ELECTRICAL SCHEDULES

Print Date 2025-06-27
Scale NTS
Project No. 0010052.000
Drawn by LT
Checked by JN

E401

Project name: Bluffer's Park Pavilion			MECHANICAL EQUIPMENT SCHEDULE															DATE: June 27, 2025																					
EQUIPMENT TAG	QUANTITY	UNIT DESCRIPTION	UNIT LOCATION	POWER															STARTER		DISC		CONTROLS		TOTAL LOAD	94 98 kW													
				HP	E.L.A.	W	M.C.A.	VOLTAGE	PHASE	BREAKER (A)	POLES	NO. OF WIRES	WIRE SIZE	CONDUIT SIZE (mm)	DISTRIBUTION BOARD	TYPE (B)	SUPPLIED BY (A)	INSTALLED BY (A)	WIRED BY (A)	SUPPLIED BY (A)	INSTALLED BY (A)	WIRED BY (A)	TYPE (C)	SUPPLIED BY (A)	INSTALLED BY (A)	WIRED BY (A)	EMERGENCY LOAD	0 00 kW	NON EMERGENCY LOAD	94 98 kW	NOTES								
ERV-1	1	ENERGY RECOVERY VENTILATOR	UTILITY ROOM - SERVING STAFF AREA	2.05	6.0	1.53	7.5	600V	3	15	3	3	#12 AWG	21mm	DP-AAA-2	M	M	E	E	E	E	E	M	M	E	M	M	E											
ERV-2	1	ENERGY RECOVERY VENTILATOR	UTILITY ROOM - SERVING WASHROOMS		38.2	32.00	47.7	600V	3	50	3	3	#8 AWG	21mm	DP-AAA-2	M	M	E	E	E	E	E	M	M	E	M	M	E											
AC-1	2	FAN COIL UNIT	OFFICE		0.8	0.29	1.0	208V	1	15	2	2	#12 AWG	21mm	PP-A-2	M	M	E	E	E	E	E	M	M	E	M	M	E											
AC-2	2	FAN COIL UNIT	STAFF ROOM		0.8	0.29	1.0	208V	1	15	2	2	#12 AWG	21mm	PP-A-2	M	M	E	E	E	E	E	M	M	E	M	M	E											
AC-3	2	FAN COIL UNIT	MEETING ROOM		0.8	0.29	1.0	208V	1	15	2	2	#12 AWG	21mm	PP-A-2	M	M	E	E	E	E	E	M	M	E	M	M	E											
CU-1	1	CONDENSING UNIT	ROOF		24.4	5.08	30.5	208V	1	40	2	2	#8 AWG	21mm	PP-A-2	M	M	E	E	E	E	E	M	M	E	M	M	E											
CU-2	1	CONDENSING UNIT	ROOF		24.4	5.08	30.5	208V	1	40	2	2	#8 AWG	21mm	PP-A-2	M	M	E	E	E	E	E	M	M	E	M	M	E											
DIV-1	1	DIVERSION VALVE	DIVERSION MANHOLE - EXTERIOR		0.6	0.12	0.8	600V	3	15	3	3	#12 AWG	21mm	DP-AAA-2	M	M	E	E	E	E	E	M	M	E	M	M	E											
EF-1	1	EXHAUST FAN	SEASONAL GARAGE, STORAGE		0.5	0.06	0.6	120V	1	15	1	2	#12 AWG	21mm	PP-A-2	M	M	E	E	E	E	E	M	M	E	M	M	E											
EF-2	1	EXHAUST FAN	GARAGE	0.33	2.4	0.64	3.0	208V	1	15	3	3	#12 AWG	21mm	PP-A-2	M	M	E	E	E	E	E	M	M	E	M	M	E											
EF-3	1	EXHAUST FAN	UTILITY ROOM		0.5	0.06	0.6	120V	1	15	1	2	#12 AWG	21mm	PP-A-2	M	M	E	E	E	E	E	M	M	E	M	M	E											
EH-1	4	ELECTRIC HEATER	WASHROOMS		4.2	1.50	5.2	208V	3	15	3	3	#12 AWG	21mm	PP-A-2	N/A	N/A	N/A	E	E	E	E	E	M	M	E	M	M	E										
EH-2	2	ELECTRIC HEATER	SOLVENT ENTRYWAY		4.5	1.15	4.9	208V	1	15	1	2	#12 AWG	21mm	PP-A-2	N/A	N/A	N/A	E	E	E	E	E	M	M	E	M	M	E										
EH-3	2	ELECTRIC HEATER	UTILITY ROOM, GARAGE		4.8	3.00	10.4	208V	3	15	3	3	#12 AWG	21mm	PP-A-2	N/A	N/A	N/A	E	E	E	E	E	M	M	E	M	M	E										
EDH-1	1	ELECTRIC DUCT HEATER	UTILITY ROOM		6.8	5.00	6.0	600V	3	15	3	3	#12 AWG	21mm	DP-AAA-2	N/A	N/A	N/A	E	E	E	E	E	M	M	E	M	M	E										
GP-1,2	1	GRINDER PUMPS	SANITARY TANK - EXTERIOR	5.00	6.4	3.73	8.0	600V	3	15	3	3	#12 AWG	21mm	DP-AAA-2	M	M	E	E	E	E	E	M	M	E	M	M	E											
HW-1	1	HOT WATER TANK	UTILITY ROOM		24.0	24.94	30.0	600V	3	30	3	3	#10 AWG	21mm	DP-AAA-2	N/A	N/A	N/A	E	E	E	E	E	M	M	E	M	M	E										
P-1	1	RECIRC PUMP	UTILITY ROOM		2.3	0.27	2.9	120V	1	15	1	2	#12 AWG	21mm	PP-A-2	M	M	E	E	E	E	E	M	M	E	M	M	E											
TP-1	1	TRAP PRIMER	STAFF WASHROOM		0.1	0.01	0.1	120V	1	15	1	2	#12 AWG	21mm	PP-A-2	M	M	E	E	E	E	E	M	M	E	M	M	E											
RP-1	1	RADIANT HEATER	BARRIER FREE WASHROOM		1.5	0.31	1.8	208V	1	15	1	2	#12 AWG	21mm	PP-A-2	N/A	N/A	N/A	E	E	E	E	E	M	M	E	M	M	E										
RP-2	1	RADIANT HEATER	UNIVERSAL WASHROOM		2.5	0.53	3.2	208V	1	15	1	2	#12 AWG	21mm	PP-A-2	N/A	N/A	N/A	E	E	E	E	E	M	M	E	M	M	E										
(A) ABBREVIATIONS:	E = ELECTRICAL CONTRACTOR M = MECHANICAL CONTRACTOR O = OWNER REPRESENTATIVE K = KITCHEN CONTRACTOR			(B) STARTER TYPE:			HSA = HAND-OFF-AUTO SWITCH MS = MANUAL STARTER CO = COMBINATION STARTER CO2 = 2-SPEED COMBINATION STARTER VFD = VARIABLE FREQUENCY DRIVE MRB = MOTOR RATED RELAY (24 VAC COIL AND MS) PCS = PACKAGED CONTROL SYSTEM															(C) CONTROL DEVICES:			BA = BUILDING AUTOMATION SYSTEM ES = END SWITCH LT = LINE VOLTAGE THERMOSTAT FS = FLOW SWITCH GS = GAS SENSOR H = HUMIDITY SENSOR I = INTERLOCK LS = LEVEL SWITCH PS = PRESSURE SWITCH TC = TIME CLOCK T = THERMOSTAT V = VARIABLE FREQUENCY DRIVE WS = WALL SWITCH RT = REVERSE ACTING THERMOSTAT FCF = FIREFIGHTERS CENTRAL CONTROL FACILITY FA = FIRE ALARM SYSTEM DCD = DIRECT DIGITAL CONTROLS HOA = HAND-OFF-AUTO SWITCH														
NOTES:	1. CONTRACTOR TO CONFIRM EXACT SIZE AND WIRING REQUIREMENTS OF ALL MECHANICAL EQUIPMENT PRIOR TO ANY WIRING.																																						
	2. CONTRACTOR SHALL REVIEW DIV 25 DRAWINGS AND SPECIFICATION TO ENSURE LOCATIONS AND QUANTITIES ARE CORRECT																																						
	3. WIRE MOTOR DISCONNECT AHEAD OF THE VFD AND INSTALL AT THE MOTOR. PROVIDE WIRING BETWEEN MOTOR AND VFD																																						
	4. ALL MOTORS 12 HP OR LARGER MUST BE WIRED TO DISCONNECT STARTERS																																						
	5. SINGLE SPEED STARTERS TO BE WIRED HOA POSITION SWITCH, PILOT LIGHT, AND 120 VAC CONTROL CIRCUIT.																																						
	6. CONTROL PANELS ARE SHIPPED LOOSE AND REQUIRE FIELD WIRING BY DIVISION 26.																																						
	7. ALL STARTERS TO BE WIRED BY DIVISION 26.																																						
	8. DIVISION 26 TO SUPPLY AND INSTALL DISCONNECT SWITCHES IF THE DISCONNECT COLUMN INDICATES "M". THEN IT IS A PACKAGE UNIT C/W A DISCONNECT SWITCH WIRED BY DIVISION 26.																																						
	9. ALL FIRE ALARM DEVICES WIRED BY DIVISION 26. PROVIDE HARDWIRE CONNECTION TO SHUTDOWN ON FIRE ALARM.																																						
	10. PROVIDE EMERGENCY SHUTDOWN FOR ALL BOLERS AT DOOR TO BOILER ROOM.																																						
	11. PROVIDE 120 VOLT 20A RECEPTACLE ON A DEDICATED CIRCUIT FOR ALL DDC PANELS. CONFIRM QUANTITIES AND LOCATIONS WITH DIV. 25																																						
	12. PROVIDE FIRE ALARM DUCT SMOKE DETECTOR INSTALLED AFTER THE SUPPLY AIR FAN AS PER CAN/CSA-524																																						

ELECTRICAL SPECIFICATIONS:

1. GENERAL

1.1. SHORT FORM SPECIFICATIONS

- 1.1.1. THE ELECTRICAL PROJECT SPECIFICATION IS IN SHORT FORM FORMAT AND IS BASED ON THE "MASTER FORMAT" PUBLISHED JOINTLY BY CONSTRUCTION SPECIFICATIONS CANADA AND THE CONSTRUCTION SPECIFICATIONS INSTITUTE.
- 1.1.2. THE NATURE OF THE SHORT FORM SPECIFICATION FORMAT INDICATES THAT DETAILED EXECUTION AND REGULATORY REQUIREMENTS MAY NOT BE PRESENT IN THIS SECTION.
- 1.1.3. IT IS EXPECTED THAT THE CONTRACTOR SHALL MAKE ALLOWANCE FOR ANY EXCLUSIONS ARISING FROM THE USE OF THE SHORT FORM SPECIFICATION IN THE BID PRICE, AND INCLUDE ALL REQUIREMENTS THAT WOULD BE NECESSARY IF THIS HAD BEEN A STANDARD, THREE PART FORMAT SPECIFICATION.
- 1.1.4. REQUIREMENTS OF WORK REQUIRING COORDINATION OR COMBINED SKILLS WILL BE READ AS ONE REQUIREMENT, APPLICABLE TO ALL PARTIES PROVIDING WORK.
- 1.1.5. THESE DOCUMENTS INCLUDE ALL DRAWINGS AND SPECIFICATIONS AND CONTRACT REQUIREMENTS; WHAT IS REQUIRED BY ONE COMPONENT IS REQUIRED BY ALL.
- 1.1.6. THESE SHOULD BE READ IN CONJUNCTION WITH ALL OTHER DOCUMENTS, WHERE DIFFERENCES OCCUR BETWEEN DIFFERENT DOCUMENTS, THE MOST RESTRICTIVE REQUIREMENT WILL APPLY.
- 1.1.7. COORDINATE ACTIVITIES WITH OTHER SECTIONS AND TRADES TO MINIMIZE CONFLICTS THAT MAY ARISE.

1.2. DEFINITIONS

- 1.2.1. PROVIDE: THE WORD PROVIDE MEANS TO SUPPLY, INSTALL AND MAKE OPERATIONAL, AND IS APPLICABLE TO THE CONTRACTOR OF THE WORK OF THIS SECTION.
- 1.2.2. ALTERNATES: THE WORD ALTERNATE IS APPLIED TO A PRODUCT LISTED BY THE CONSULTANT THAT IS DIFFERENT THAN PRODUCTS SPECIFIED FOR THE PROJECT, AND THAT HAS BEEN DETERMINED TO ESSENTIALLY FUNCTION, OPERATE AND PERFORM IN A MANNER SIMILAR TO OR BETTER THAN THE SPECIFIED PRODUCT; WILL NOT ALTER CONSTRUCTION METHODS OR DIMENSIONS, AND WILL HAVE THE SAME VISUAL APPEARANCE, FIT AND FINISH INCLUDING ANY ADDITIONAL REQUIREMENTS AS LISTED AS A PART OF THE PROPERTIES LISTED IN THIS SECTION.
- 1.2.3. SUBSTITUTION: THE WORD SUBSTITUTION WILL BE APPLIED TO A PRODUCT PROPOSED FOR USE BY THE SUBCONTRACTOR THAT IS DIFFERENT THAN PRODUCTS SPECIFIED FOR THE PROJECT, BUT WILL ESSENTIALLY FUNCTION, OPERATE AND PERFORM IN A MANNER SIMILAR TO OR BETTER THAN THE SPECIFIED PRODUCT; WILL NOT ALTER CONSTRUCTION METHODS OR DIMENSIONS, AND WILL HAVE THE SAME VISUAL APPEARANCE, FIT AND FINISH INCLUDING ANY ADDITIONAL REQUIREMENTS AS LISTED AS A PART OF THE PROPERTIES LISTED IN THIS SECTION.

1.3. ADMINISTRATIVE REQUIREMENTS

- 1.3.1. GENERAL PROVISIONS: PROVIDE LABOUR, MATERIALS, PRODUCTS, EQUIPMENT, SERVICES AND ALL INCIDENTALS REQUIRED TO COMPLETE, TEST AND COMMISSION ALL ELECTRICAL WORK SHOWN ON THE DRAWINGS OR NOTED IN THIS SPECIFICATION:
- DRAWINGS ARE DIAGRAMMATIC EXCEPT WHERE SPECIFIC DETAILS ARE GIVEN.
 - OBTAIN ACCURATE DIMENSIONS FROM THE ARCHITECTURAL, STRUCTURAL, OR BY ONSITE MEASUREMENTS.
 - WHERE DIRECTED, RELOCATE OUTLETS AND FIXTURES TO WITHIN 3050 MM OF THE INDICATED LOCATION AT NO EXTRA COST PROVIDING THAT INSTRUCTIONS ARE GIVEN BEFORE THE INSTALLATION OF THE OUTLETS AND FIXTURES REQUIRING RELOCATION.
- 1.3.2. WORKMANSHIP: WORK SHALL BE COMPLIMENTARY TO THE BASE BUILDING DESIGN AND INSTALLATIONS:
- WHERE AN EXACT METHOD OF INSTALLATION HAS NOT BEEN INDICATED, FOLLOW THE METHODS USED ON THE BASE BUILDING.
 - GENERALLY, THE STANDARD OF WORK SHALL BE EQUAL TO OR BETTER THAN THAT OF THE BASE BUILDING.
- 1.3.3. ADDITIONS OR CHANGES TO EXISTING SYSTEMS SHALL BE MADE USING EQUIPMENT IDENTICAL TO THAT ALREADY USED IN THE BASE BUILDING, E.G.: FIRE ALARM SYSTEM COMPONENTS, PANELS, ETCETERA
- 1.3.4. EXAMINATION OF SITE: VISIT THE SITE TO THOROUGHLY EXAMINE AND BECOME FAMILIAR WITH CONDITIONS WHICH MAY AFFECT THE WORK:
- 1.3.5. NO CLAIMS FOR EXTRAS WILL BE ALLOWED FOR WORK OR MATERIALS NECESSARY FOR PROPER EXECUTION AND COMPLETION OF THE CONTRACT OR FOR THE BIDDERS FAILURE, ERROR, OR NEGLIGENCE IN THIS REGARD.

1.4. SUBMITTALS

- 1.4.1. PROVIDE RECORD INFORMATION IN ACCORDANCE WITH GENERAL REQUIREMENTS; SUBMITTALS.
- 1.4.2. ACTION SUBMITTALS: PROVIDE THE FOLLOWING SUBMITTALS BEFORE STARTING ANY WORK OF THIS SECTION:
- SHOP DRAWINGS; SUBMIT MANUFACTURER'S DETAILED DRAWINGS SHOWING DIMENSIONS, CAPACITIES, WEIGHTS, AND ELECTRICAL DATA AND PERFORMANCE CHARACTERISTICS FOR EQUIPMENT INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:
 - SERVICE EQUIPMENT
 - PANEL BOARDS
 - STARTERS
 - LIGHT FIXTURES
 - TELECOMMUNICATIONS EQUIPMENT
 - PHOTOVOLTAIC (PV) SYSTEM
 - OTHER ITEMS REASONABLY REQUESTED BY THE CONSULTANT, OR AS LISTED IN THESE SPECIFICATIONS.

1.5. RECORD DOCUMENTS (DRAWINGS AND SPECIFICATIONS)

- 1.5.1. SUBMIT AS CONSTRUCTED INFORMATION AS DESCRIBED IN THIS SECTION.
- 1.5.2. RECORD INFORMATION USING A RED PEN ON PRINTS AND SPECIFICATION MANUAL DEDICATED FOR THE USE OF RECORD DOCUMENTS.
- 1.5.3. INDICATE ALL CHANGES AND VARIATIONS FROM CONTRACT DRAWINGS CONCURRENTLY WITH CONSTRUCTION PROCESS; DO NOT CONCEAL ANY WORK UNTIL REQUIRED INFORMATION IS RECORDED.
- 1.5.4. INCLUDE SUFFICIENT INFORMATION ACCURATELY RECORDING ACTUAL CONSTRUCTION INCLUDING; BUT NOT LIMITED TO, THE FOLLOWING:
- MEASURED LOCATIONS OF INTERNAL UTILITIES AND APPURTENANCES CONCEALED IN CONSTRUCTION REFERENCED TO VISIBLE AND ACCESSIBLE FEATURES OF CONSTRUCTION.
 - SITE CHANGES OF DIMENSION AND DETAIL OR CHANGES IN CONSTRUCTION MATERIALS OR LOCATIONS REQUIRED BY ONSITE CONDITIONS AND TO MAKE COMPONENTS OF THE WORK COME TOGETHER.
 - CHANGES TO EQUIPMENT LAYOUT AND SERVICES.
 - DEVIATIONS IN PIPING, DUCT RUNS, WIRING, AND UTILITY CONNECTIONS.
 - ACTUAL LOCATIONS OF EQUIPMENT, POWER, DATA, AND COMMUNICATIONS LINES REFERENCED TO FIXED STRUCTURAL ELEMENTS FOR ITEMS THAT ARE SCHEMATICALLY INDICATED ON THE DRAWING.
 - CHANGES REQUIRED BY ADDENDA, BID REVISIONS, CHANGE ORDERS, WORK ORDERS AND CONSTRUCTION COMMUNICATIONS.
- 1.5.5. MAKE RECORDINGS IMMEDIATELY AFTER THE RESPECTIVE WORK IS COMPLETED AND NOT LESS THAN ONCE A WEEK; DATE EACH RECORDING.
- 1.5.6. CHANGES TO SPECIFICATION SECTIONS SHALL BE LEGIBLY NOTED IN THE MARGINS OF THE DOCUMENT OR BY STAPLING A SHEET OF WHITE PAPER TO THE MARGIN AND REFERENCING THE AFFECTED ARTICLE(S); USE OF ADHESIVE TAPE OR SELF-STICKING REMOVABLE NOTES WILL NOT BE ACCEPTABLE FOR THIS PURPOSE.
- 1.5.7. ARRANGE AND PAY FOR THE SERVICES OF THE CONSULTANT TO INCORPORATE INTO THE AUTOCAD DRAWING BASE.

1.6. QUALITY ASSURANCE

- 1.6.1. REGULATORY REQUIREMENTS: COMPLETE WORK IN ACCORDANCE WITH CURRENT CANADIAN ELECTRIC CODE, CSA STANDARDS, THE LOCAL ELECTRICAL INSPECTION AUTHORITY'S REQUIREMENTS, AND WITH THE REQUIREMENTS OF ALL AUTHORITIES HAVING JURISDICTION:
- SUBMIT THE NECESSARY PLANS AND INFORMATION TO THE ELECTRICAL INSPECTION AUTHORITY AND PAY FOR ALL PERMITS AND FEES AS REQUIRED BEFORE COMMENCEMENT OF WORK.
 - QUALIFICATIONS: PROVIDE PROOF OF QUALIFICATIONS WHEN REQUESTED BY CONSULTANT.
- 1.6.2. MATERIALS: USE ONLY NEW MATERIALS HAVING APPROPRIATE CSA LABELLING INDICATING APPROVAL, AND CONFORM WITH NEMA OR EEMAC STANDARDS WHERE APPLICABLE AND AS FOLLOWS:
- ONLY USE NEW MATERIALS, EXCEPT WHERE SPECIFICALLY DETAILED OR INDICATED THAT EXISTING MATERIALS SHALL BE REUSED.
 - WORKMANSHIP: USE ONLY SKILLED WORKERS WHO PERFORM THEIR WORK IN A NEAT AND PROFESSIONAL MANNER; AS A MINIMUM, THE CONSULTANT WILL EXPECT THAT:
 - EXPOSED CONDUIT AND WIRING BE INSTALLED SQUARE AND PLUMB TO BUILDING LINES AND LEVELS.
 - DAMAGED OR INCORRECTLY INSTALLED MATERIALS BE REMOVED AND REPLACED.
 - DAMAGED FINISHES ARE RESTORED TO MATCH ORIGINAL FINISHES.
 - STRUCTURAL, ARCHITECTURAL OR MECHANICAL ITEMS ARE NOT DAMAGED, ALTERED, OR INTERFERED WITH BY INSTALLATION OF MATERIALS BY THIS SECTION, WHETHER CAUSED DIRECTLY OR INDIRECTLY BECAUSE OF THEIR WORK.
 - SITE IS LEFT CLEAN AND TIDY AT THE END OF EACH WORKDAY BY REMOVING TOOLS, EQUIPMENT, LADDERS, AND EMPTY CARDBOARD BOXES FROM SITE AND PREMISES ARE LEFT BROOM CLEAN AT THE END OF THE WEEK.

2. PRODUCTS

2.1. ALTERNATES AND SUBSTITUTIONS

- 2.1.1. BID PRICE SHALL BE BASED ON MATERIALS AND EQUIPMENT SPECIFIED; ALTERNATES WILL BE CONSIDERED FOR MATERIALS AND EQUIPMENT THAT PERFORM SIMILARLY TO OR BETTER THAN THE ACCEPTABLE MATERIALS OR BASIS-OF-DESIGN MATERIALS LISTED AND AS FOLLOWS:
- SUBMIT PROPOSED ALTERNATES WHERE ALTERNATE EQUIPMENT IS PROPOSED INDICATING PROPOSED COST SAVING OR IMPROVED VALUE TO THE PROJECT.
 - INCLUDE COSTS FOR ADDITIONAL WORK REQUIRED BY SUBSTITUTE MATERIALS WHERE THE CHANGE IN MATERIALS REQUIRES A CHANGE IN THE DESIGN BASED ON THE ORIGINALLY SPECIFIED EQUIPMENT, INCLUDING WORK REQUIRED BY OTHER DIVISIONS TO ACCOMMODATE ALTERNATE EQUIPMENT.

2.2. FIRE STOPPING

- 2.2.1. PROVIDE FIRESTOP FOR ALL PENETRATIONS THROUGH FIRE RATED SEPARATIONS.
- 2.2.2. FIRESTOP MUST BE A COMPLETE SYSTEM, MEETING CANULC FIRE RESISTANCE STANDARDS.

2.3. PANELBOARDS BREAKER TYPE

- 2.3.1. PANELBOARD
- PANELBOARDS SHALL BE TO CSA C22.2 NO.29 AND PRODUCT OF ONE MANUFACTURER.
 - INSTALL CIRCUIT BREAKERS IN PANELBOARDS BEFORE SHIPMENT,
 - IN ADDITION TO CSA REQUIREMENTS, MANUFACTURER'S NAMEPLATE MUST SHOW FAULT CURRENT THAT PANEL INCLUDING BREAKERS HAS BEEN BUILT TO WITHSTAND.
 - VOLTAGE AS INDICATED - PANELBOARDS: BUS AND BREAKERS RATED FOR AIC AS INDICATED (SYMMETRICAL) INTERRUPTING CAPACITY.
 - 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.
 - PANELBOARDS: MAINS, NUMBER OF CIRCUITS, AND NUMBER AND SIZE OF BRANCH CIRCUIT BREAKERS AS INDICATED.
 - MINIMUM OF 2 FLUSH LOCKS FOR EACH PANEL BOARD.
 - TWO KEYS FOR EACH PANELBOARD AND KEY PANELBOARDS ALIKE.
 - COPPER BUS WITH NEUTRAL OF SAME AMPERE RATING OF MAINS.
 - MAINS: SUITABLE FOR BOLT-ON BREAKERS.
 - TRIM WITH CONCEALED FRONT BOLTS AND HINGES.
 - TRIM AND DOOR FINISH: AS PER COLOUR SCHEDULE
 - ISOLATED GROUND BUS AS APPROPRIATE
 - INCLUDE GROUNDING BUSBAR WITH 3 OF TERMINALS FOR BONDING CONDUCTOR EQUAL TO BREAKER CAPACITY OF THE PANEL BOARD.
 - ENSURE THAT THERE IS SUFFICIENT PROVISIONS SUPPLIED FOR 20% SPARE BREAKER SPACES.

2.3.2. BREAKERS

- BREAKERS WITH THERMAL AND MAGNETIC TRIPPING IN PANELBOARDS EXCEPT AS INDICATED OTHERWISE.
- MAIN BREAKER: SEPARATELY MOUNTED ON TOP OR BOTTOM OF PANEL TO SUIT CABLE ENTRY, WHEN MOUNTED VERTICALLY, DOWN POSITION SHOULD OPEN BREAKER, CONTRACT TO INCLUDE FOR THE SUPPLY OF MAIN BREAKERS FOR ALL PANELS UNLESS THE SOURCE BREAKER IS WITHIN THE SAME ROOM.
- LOCK-ON DEVICES FOR 5% OF 15 TO 30 A BREAKERS INSTALLED AS INDICATED, TURN OVER UNUSED LOCK-ON DEVICES TO OWNER.
- LOCK-ON DEVICES FOR FIRE ALARM, CLOCK OUTLET, EMERGENCY, DOOR SUPERVISORY, INTERCOM, STAIRWAY, EXIT AND NIGHT LIGHT CIRCUITS.

2.3.3. EQUIPMENT IDENTIFICATION

- NAMEPLATE FOR EACH PANELBOARD SIZE 4 ENGRAVED.
- NAMEPLATE FOR EACH CIRCUIT IN DISTRIBUTION PANELBOARDS SIZE 2 ENGRAVED.
- COMPLETE CIRCUIT DIRECTORY WITH TYPEWRITTEN LEGEND SHOWING LOCATION AND LOAD OF EACH CIRCUIT, MOUNTED IN PLASTIC ENVELOPE AT INSIDE OF PANEL DOOR.

2.4. DRY TYPE TRANSFORMERS UP TO 600V PRIMARY

- 2.4.1. DESIGN:
- TYPE: ANN, 600 VOLTS PRIMARY WITH 4-2½ 1 TAPS.
 - 3 PHASE, 60 HZ OR 1 PHASE, 60 HZ (SEE DRAWINGS)
 - 150 DEGREE C TEMPERATURE RISE INSULATION SYSTEM.
 - BASIC IMPULSE LEVEL (BIL): 10 KV
 - INSULATION CLASS: H
 - AVERAGE SOUND LEVEL: STANDARD

- ENCLOSURE: AIR VENTILATED EEMAC 2.
- DRIP SHIELDS
- MANUFACTURER: SCHNEIDER EXN SERIES, EATON / REX POWER MAGNETICS / HAMMOND POWER SOLUTIONS / DELTA / ATLAS TRANSFORMERS, OR APPROVED EQUAL.
- EQUIPMENT IDENTIFICATION:
 - NAMEPLATES DETERMINED BY THE WHITE FINISH FACE, BLACK CORE, LETTERING ACCURATELY ALIGNED AND ENGRAVED INTO CORE AND MECHANICALLY ATTACHED WITH SELF TAPPING SCREWS, INDICATE CAPACITY, PRIMARY AND SECONDARY VOLTAGES.
 - LABELS: SIZE 7, EMBOSSED PLASTIC LABELS WITH 6MM HIGH LETTERS UNLESS SPECIFIED OTHERWISE.

2.5. MOULDED CASE CIRCUIT BREAKERS

- BREAKERS TO CSA C22.2 NO. 5
- BOLT-ON MOULDED CASE CIRCUIT BREAKER; QUICK-MAKE, QUICK-BREAK TYPE, FOR MANUAL AND AUTOMATIC OPERATION WITH TEMPERATURE COMPENSATION FOR 40 DEGREES C AMBIENT.
- PLUG-IN MOULDED CASE CIRCUIT BREAKERS; QUICK-MAKE, QUICK-BREAK TYPE, FOR MANUAL AND AUTOMATIC OPERATION WITH TEMPERATURE COMPENSATION FOR 40 DEGREES C AMBIENT.
- COMMON-TRIP BREAKERS: WITH SINGLE HANDLE FOR MULTI-POLE APPLICATIONS.
- MAGNETIC INSTANTANEOUS TRIP ELEMENTS IN CIRCUIT BREAKERS TO OPERATE ONLY WHEN VALUE OF CURRENT REACHES SETTING.
- TRIP SETTINGS ON BREAKERS WITH ADJUSTABLE TRIPS TO RANGE FROM 3-8 TIMES CURRENT RATING.
- CIRCUIT BREAKERS WITH INTERCHANGEABLE TRIPS AS INDICATED.
- CIRCUIT BREAKERS TO HAVE MINIMUM AS INDICATED SYMMETRICAL RMS INTERRUPTING CAPACITY RATING.

2.6. DISCONNECT SWITCHES - FUSED AND NON-FUSED

- HORSEPOWER RATED NON-FUSIBLE / FUSIBLE, DISCONNECT SWITCH IN CSA ENCLOSURE TO CAN/CSA-C22.2 NO.4 SIZE AS APPROPRIATE.
- PROVISION FOR PADLOCKING IN ON-OFF SWITCH POSITION BY 3 LOCKS.
- MECHANICALLY INTERLOCKED DOOR TO PREVENT OPENING WHEN HANDLE IN ON POSITION.
- FUSES: SIZE AS INDICATED.
- FUSEHOLDERS: TO CSA C22.2 NO.38 SUITABLE WITHOUT ADAPTORS, FOR TYPE AND SIZE OF FUSE INDICATED.
- QUICK-MAKE, QUICK-BREAK ACTION.
- ON-OFF SWITCH POSITION INDICATION ON SWITCH ENCLOSURE COVER.
- EQUIPMENT IDENTIFICATION:
 - INDICATE NAME OF LOAD/EQUIPMENT CONTROLLED AND VOLTAGE ON SIZE 4 NAMEPLATE.

2.7. CONDUIT

- 2.7.1. INSTALL WIRING IN EMT CONDUIT, EXCEPT WHERE SPECIFICALLY STATED OTHERWISE OR WHERE SUBJECT TO INJURY WHERE SAME SHALL BE RIGID METALLIC CONDUIT.
- 2.7.2. CONDUIT IN CONTACT WITH EARTH SHALL BE RIGID METALLIC CONDUIT WITH PROTECTIVE COATING OR RIGID PVC.
- 2.7.3. FLEXIBLE CABLE MAY BE USED FOR SHORT BRANCH CIRCUIT CONNECTIONS BETWEEN OUTLETS AND MOTORIZED EQUIPMENT, FIXED APPLIANCES, ELECTRIC HEATING EQUIPMENT, IN ACCESSIBLE CEILING SPACES FOR FINAL CONNECTION TO LIGHTING FIXTURES AND FOR WIRING DEVICES IN CAVITY WALL CONSTRUCTION.
- 2.7.4. INSTALL CONDUIT PARALLEL OR PERPENDICULAR TO BUILDING LINES WHEREVER POSSIBLE AND AS FOLLOWS:
- CONDUITS SHALL BE CONCEALED IN WALLS WHEREVER POSSIBLE, INCLUDING CMU WALLS.
 - RUN ALL CONDUITS CONCEALED IN FINISHED AREAS.
 - CONDUITS IN SERVICE AREAS MAY BE SURFACE MOUNTED
 - MAINTAIN 50 MM BETWEEN PARALLEL CONDUITS IN CAST CONCRETE CONSTRUCTION, EXCEPT IMMEDIATELY ADJACENT TO CAST IN OUTLET BOXES, WHERE CONDUIT RUN CAN BE ADJUSTED TO FIT.
- 2.7.5. INSTALL A CONTINUOUS 180 KG TEST NYLON CORD IN ALL EMPTY CONDUITS, WITH CAP AT EACH END OF CONDUIT.
- 2.7.6. PROVIDE SUITABLE METAL BRACKETS, FRAMES, HANGERS, CLAMPS AND RELATED TYPES OF SUPPORT TO SUPPORT CONDUIT AND CABLE RUNS.
- 2.7.7. FASTEN EXPOSED CONDUITS TO BUILDING CONSTRUCTION OR SUPPORT SYSTEM USING ONE HOLE MALLEABLE IRON STRAPS.
- 2.7.8. SUPPORT TWO OR MORE CONDUITS ON U-CHANNELS SUPPORTED BY MINIMUM 6 MM DIAMETER THREADED ROD HANGERS WHERE DIRECT FASTENING TO BUILDING CONSTRUCTION IS IMPRACTICAL.
- 2.7.9. SUPPORT CONDUITS FROM U-CHANNELS USING ONE PIECE PIPE CLAMPS.
- 2.7.10. USE EMT CONDUIT WITH DIE CAST SET SCREW TYPE COUPLINGS AND CONNECTORS IN DRY AREAS.
- 2.7.11. USE FLEXIBLE CONDUIT FOR CONNECTION TO MOTORS IN DRY AREAS AND DRY TYPE TRANSFORMERS.
- 2.7.12. USE LIQUID-TIGHT FLEXIBLE METAL CONDUIT WITH COMPRESSION TYPE RAIN-TIGHT COUPLINGS AND CONNECTORS WITH INSULATED THROAT FOR CONNECTION TO EQUIPMENT IN DAMP OR WET LOCATIONS.
- 2.7.13. INSTALL ALL SECURITY POWER AND COMMUNICATIONS WIRING IN CONDUIT. FREE AIR HOOKS OR CABLE TRAY WILL NOT BE ACCEPTED FOR SECURITY WIRING.

2.8. WIRE AND CABLE

- 2.8.1. BUILDING AND CONTROL WIRES SHALL BE 98% CONDUCTIVITY COPPER CONDUCTORS; SIZE AS INDICATED WITH 600 V INSULATION, CROSS LINKED THERMOSETTING POLYETHYLENE MATERIAL RATED RW90XL.
- 2.8.2. COMPUTER EQUIPMENT RECEPTACLES AND DEDICATED GROUND RECEPTACLES; PROVIDE SEPARATE NEUTRAL AND SEPARATE GROUND WIRES FOR EVERY CIRCUIT; NEUTRAL WIRES SHALL BE MINIMUM 12 AWG OR TO MATCH CIRCUIT CONDUCTOR SIZE IF LARGER; GROUND WIRES SHALL BE MINIMUM 14 AWG.
- 2.8.3. HOUSEKEEPING RECEPTACLES AND MISCELLANEOUS POWER AND LIGHTING CIRCUITS; PROVIDE SHARED NEUTRAL WIRES IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE; SHARED NEUTRAL SHALL BE MINIMUM 10 AWG; SHARED GROUND SHALL BE MINIMUM 12 AWG.
- 2.8.4. LIGHTING CIRCUITS CONTROLLED FROM DIMMER; PROVIDE SEPARATE NEUTRAL WIRE FOR EVERY CIRCUIT OR DIMMING CHANNEL; NEUTRAL WIRE SHALL BE MINIMUM 12 AWG.
- 2.8.5. SIZE WIRE FOR BRANCH CIRCUITS TO LIMIT VOLTAGE DROP FROM THE PANELBOARD TO THE FURTHEST RECEPTACLE AT 3% WITH A TEST CURRENT OF 80% OF BRANCH CIRCUIT BREAKER RATINGS.
- 2.8.6. BRANCH CIRCUIT WIRING GUIDELINES:
- POWER CONDUCTORS SMALLER THAN 12 AWG NOT PERMITTED.
 - WIRE FOR 120 VOLT CONTROL CIRCUITS: MINIMUM 14 AWG.
- 2.8.7. WIRE FOR 120 VOLT CIRCUITS USING SHARED NEUTRALS, MINIMUM WIRE SIZES AS FOLLOWS:
- 12 AWG FOR RUNS UP TO 23 M.
 - 10 AWG FOR RUNS OF 23 M TO 37 M.
 - RUNS IN EXCESS OF 37 M SHALL USE A WIRE SIZE THAT COMPLIES WITH THE REQUIREMENTS OF ITEM PART 2.4.5 ABOVE.
- 2.8.8. WIRE FOR 120 VOLT CIRCUITS USING SEPARATE NEUTRALS, MINIMUM WIRE SIZES AS FOLLOWS:
- 12 AWG FOR RUNS UP TO 20 M.
 - 10 AWG FOR RUNS OF 20 M TO 35 M.
 - RUNS IN EXCESS OF 35 M SHALL USE A WIRE SIZE THAT COMPLIES WITH THE REQUIREMENTS OF ITEM PART 2.4.5 ABOVE.
- 2.8.9. HOMERUNS SHALL NOT BE LESS THAN 10 AWG.
- 2.8.9. WIRE FOR 347 VOLT LIGHTING CIRCUITS, MINIMUM WIRE SIZES AS FOLLOWS:
- 12 AWG FOR RUNS UP TO 30 M.
 - 10 AWG FOR RUNS OF 30 M UP TO A DISTANCE THAT ENSURES COMPLIANCE WITH THE REQUIREMENTS OF ITEM PART 2.4.5 ABOVE.
- 2.8.10. WIRE FOR DC EMERGENCY LIGHTING CIRCUITS, MINIMUM SIZE AS FOLLOWS:
- 10 AWG OR LARGER SIZE WHERE REQUIRED TO COMPLY WITH REQUIREMENTS OF ITEM PART 2.4.5 ABOVE; COORDINATE WITH EQUIPMENT MANUFACTURER'S WRITTEN RECOMMENDATIONS.
- 2.8.11. SIZE CONDUCTORS IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE WHERE WIRE SIZES ARE NOT INDICATED ON THE DRAWINGS.
- 2.8.12. WIRING FOR FIRE ALARM, SECURITY, PAGING AND SIMILAR SYSTEMS SHALL MATCH BASE BUILDING WIRING, OR AS RECOMMENDED BY THE SYSTEM MANUFACTURER.
- 2.8.13. ALL WIRING INSTALLED IN UNDERGROUND CONDUIT SHALL BE SUITABLE FOR WET LOCATION, THIS INCLUDES LINE VOLTAGE, LOW VOLTAGE, TELEVISION, DATA, COMMUNICATION, AND ALL TYPES OF WIRING. WIRING SHALL ALSO BE SUITABLE TO EQUIPMENT MANUFACTURER'S REQUIREMENTS.
- 2.8.14. ALL WIRES IN CLASS 1, GROUP 1, ZONE 1 AND ZONE 2 AREAS MUST BE OIL AND GAS RESISTANT.
- 2.8.15. ALL PETROLEUM WIRING MUST BE COLOUR CODED AND/OR LABELED SUCH THAT WIRING IS EASILY IDENTIFIABLE.
- 2.8.16. ALL PETROLEUM WIRING MUST BE CONNECTED AS A CONTINUOUS RUN, NO SPLICES OR FIELD TERMINAL CONNECTORS CAN BE USED, OTHER THAN THOSE SPECIFIED BY PETROLEUM EQUIPMENT MANUFACTURER.
- 2.8.17. ELECTRICAL CONTRACTOR TO ALLOW FOR PLENUM RATED CABLING/CONDUIT IN ALL PLENUMS AS PER ARCHITECTURAL AND/OR MECHANICAL DRAWINGS. THIS WILL INCLUDE ANY CEILING SPACES BEIN ABOVE FOR RETURN AIR (I.E. FAN COIL UNITS, COMPARTMENT UNITS, ERV'S), REFER TO MECHANICAL DRAWINGS AND COORDINATE WITH MECHANICAL CONTRACTOR. IF ANY CLARIFICATIONS ARE REQUIRED ON WHERE PLENUMS MAY BE PRESENT, AN RFI IS TO BE RAISED DURING TENDER.

2.9. WIRING DEVICES AND COVER PLATES

- 2.9.1. SPECIFICATION GRADE DEVICES SHALL BE USED.
- 2.9.2. COVER PLATES SHALL BE WHITE NYLON MOLDED, UNLESS NOTED OTHERWISE.
- 2.9.3. PROVIDE NAMEPLATE WITH CIRCUIT NUMBER ON ALL RECEPTACLES, WHERE THERE IS ONLY ONE RECEPTACLE ON A CIRCUIT, IDENTIFY AS "DED.CTCL..".
- 2.9.4. PROVIDE JUNCTION AND OUTLET BOXES WHERE NECESSARY FOR PROPER PULLING OF WIRES.
- 2.9.5. PROVIDE OUTLET BOX FOR LIGHTING SWITCHES, FIXTURES, RECEPTACLES, EACH WIRING DEVICE, AND COMMUNICATION OUTLET AND AS INDICATED.
- 2.9.6. USE ONE-PIECE ELECTRO-GALVANIZED STEEL BOXES.
- 2.9.7. PROVIDE GANG BOXES WHERE WIRING DEVICES ARE GROUPED, COMBINATION BOXES WITH BARRIERS WHERE OUTLETS FOR MORE THAN ONE SYSTEM ARE GROUPED.
- 2.9.8. SUPPORT BOXES INDEPENDENTLY OF CONNECTING CONDUITS.
- 2.9.9. DO NOT INSTALL OUTLET BOXES BACK-TO-BACK IN WALLS:
- NON-ACOUSTIC WALLS: ALLOW MINIMUM 150 MM HORIZONTAL CLEARANCE BETWEEN BOXES.
 - ACOUSTICALLY RATED WALLS: OFFSET OUTLET BOXES BY 610 MM SEPARATED BY ONE STUD SPACE OR GYPSUM BOARD Baffle; COORDINATE WITH DIVISION 09 - GYPSUM BOARD ASSEMBLIES.
 - PARTY WALLS: OFFSET OUTLET BOXES BY 1000 MM SEPARATED BY TWO STUD SPACES AND GYPSUM BOARD Baffles.
- 2.9.10. ALLOW FOR A VARIATION OF 3050 MM FROM LOCATIONS SHOWN WITHOUT EXTRA COST; CONFIRM FINAL LOCATION BEFORE INSTALLATION.
- 2.9.11. MOUNTING HEIGHTS FROM FINISHED FLOOR TO CENTRE LINE OF DEVICE, UNLESS INDICATED OTHERWISE, SHALL BE:
- | LOCATION AND DISTANCE | 225 MM ABOVE COUNTER |
|---|-------------------------|
| - OUTLET BOXES ABOVE COUNTERS OR SPLASH BACKS | 225 MM ABOVE COUNTER |
| - OUTLET BOXES ABOVE BASE BOARD HEATERS AND RADIATION CABINETS | 200 MM ABOVE ENCLOSURE |
| - GENERAL RECEPTACLES, TV AND COMMUNICATIONS OUTLET BOXES | 400 MM |
| - RECEPTACLES IN MECHANICAL AND SHOP AREAS; WASHER AND DRYER OUTLET BOXES | 950 MM |
| - SWITCHES, DIMMERS, PUSH BUTTONS | 1150 MM |
| - WALL MOUNTED COMMUNICATIONS OUTLET BOXES, FIRE ALARM PULL STATIONS | 1350 MM |
| - END OF LINE RESISTORS | 1800 MM |
| - PANEL BOARDS, ANNUNCIATOR PANELS, ETCETERA | 1900 MM TO TOP OF PANEL |
| - FIRE ALARM BELLS, SPEAKERS, CLOCKS | 2300 MM |
- 2.9.12. USE GANG PLATES WHERE TWO OR MORE OUTLETS ARE LOCATED TOGETHER.
- 2.9.13. ALIGN ALL COVER PLATES PARALLEL AND PERPENDICULAR TO BUILDING LINES.
- 2.9.14. PROVIDE BLANK COVER PLATES FOR BOXES WITHOUT WIRING DEVICES.
- 2.9.15. WHERE LIGHTING DIMMERS ARE SHOWN, USE SEPARATE SINGLE GANG BOXES ONLY.

2.10. PHOTOVOLTAIC (PV) POWER SYSTEM

- 2.10.1. PRODUCT DATA:
- PROVIDE MANUFACTURER'S PRINTED PRODUCT LITERATURE, SPECIFICATIONS, AND DATA SHEETS, AND INCLUDE PRODUCT CHARACTERISTICS, PERFORMANCE CRITERIA, PHYSICAL SIZE, FINISH, AND LIMITATIONS.
 - PROVIDE COMPLETE PHOTOVOLTAIC POWER CALCULATIONS SHOWING AMP HOURS PRODUCED, ROOFTOP PANEL LAYOUTS, ELECTRICAL WIRING SCHEMATIC AND SINGLE LINE DIAGRAM.
- 2.10.2. DESCRIPTION OF SYSTEM:
- PROVIDE ALL MATERIAL, EQUIPMENT, AND SERVICES NECESSARY FOR A COMPLETE AND OPERATIONAL PV ARRAY SYSTEM.
 - THE PV SYSTEM SHALL PROVIDE AT LEAST 20% OF POWER DURING PEAK OPERATION.
 - PROVIDE ONLY NEW EQUIPMENT WHICH BEARS THE UL OR CSA LABELS.
 - PROVIDE ALL REQUIRED EQUIPMENT AND METERING TO TORONTO HYDRO DISTRIBUTION GENERATION REQUIREMENTS.
- 2.10.3. PRODUCTS:
- SOLAR PANELS
 - CELL EFFICIENCY SHALL BE BETWEEN 14 AND 18% NORMAL.

- CELL STRUCTURE SHALL BE MONOCRYSTALLINE.
- EACH CELL SHALL BE SQUARE IN SHAPE.
- CELL COLOUR SHALL BE BLUE.
- PEAK POWER OUTPUT SHALL BE 400W OR GREATER.
- PHOTOVOLTAIC ARRAY SUPPORT STRUCTURES AND NECESSARY APPURTENANCES FOR MOUNTING THE ARRAY SHALL BE PROVIDED, EACH MODULE MUST BE CAPABLE OF BEING REPLACED WITHOUT DISRUPTING THE OPERATION OF THE REMAINDER OF THE SYSTEM.
- CONNECTIONS BETWEEN THE MODULES AND COMBINER BOX SHALL CONSIST OF FLEXIBLE CONDUITS WITH LIQUID-TIGHT FITTINGS AND UL LISTED WIRE RATED FOR 90°C WET CONDITIONS.
- TRADE CONTRACTOR SHALL ARRANGE THE ARRAY PANELS IN SERIES AND/OR PARALLEL AS DETERMINED BY THE INVERTER TO ENSURE TOLERANCES ARE NOT EXCEEDED.
- INVERTER
 - THE INVERTER SHALL CONTROL AND REGULATE THE OUTPUT OF THE PV ARRAY, THE CONTROLLER SHALL BE A SERIES TYPE ON/OFF CONTROL.
 - THE INVERTER SHALL HAVE THE FOLLOWING:
 - OPERATING TEMPERATURE RANGE OF -40°C TO 60°C AMBIENT TEMPERATURES.
 - MUST BE A NEGATIVE GROUNDED SYSTEM.
 - LED DISPLAY THAT WILL SHOW ALL MONITORED PARAMETERS AND THEIR SETTINGS, AND THE SETTINGS SHALL BE PASSWORD-PROTECTED.
 - ADJUSTABLE LOW-VOLTAGE DISCONNECT (LVD) FOR LOAD CIRCUITS.
 - TWO LOAD CHANNELS THAT CAN BE CONTROLLED.
 - COMMUNICATION VIA AN RS232 PORT.
 - REVERSE POLARITY PROTECTED.
 - TRANSIENT VOLTAGE PROTECTION.
 - CIRCUIT BREAKERS ON ARRAY INPUTS AND LOAD OUTPUTS
 - INTEGRAL RAPID SHUTDOWN.
- ALARMS SHALL INCLUDE THE FOLLOWING:
 - WARNING ALARMS SHALL CONSIST OF LEDS FOR LOW-VOLTAGE DISCONNECT, HIGH-VOLTAGE ALARM, AND GENERATOR FAULT.
 - ALARM SETTINGS ARE TO BE DETERMINED BY SYSTEM DESIGNERS BASED ON THE SELECTED COMPONENTS AND MANUFACTURER'S RECOMMENDATIONS.

2.11. ELECTRIC VEHICLE CHARGING STATION (EVCS)

- 2.11.1. INSTALLATION AND MATERIAL FOR EVCS SHALL MEET THE FOLLOWING REQUIREMENTS:
- REFERENCES:
 - CSA 22.2, NO. 107.1.
 - ETI-LISTED
 - UL 2594 FOR EVUsc, cUL
 - ENCLOSURE SHALL BE NEMA-2R.
 - OPERATING TEMPERATURE OF -30°C TO 55°C.
 - GROUND FAULT PROTECTION.
 - LEVEL 2 CHARGING STATION:
 - 40A, 208V AC SINGLE PHASE, 6.7 DEDICATED EQUIPMENT CONNECTION
 - WALL-MOUNTED ENCLOSURE.
 - 5AE J2772 EV CONNECTOR ON A 5M RETRACTABLE CABLE, THE CABLE SHALL BE CONCEALED WITHIN ENCLOSURE TO PREVENT VANDALISM.
 - COMMUNICATION ETHERNET (RS-232) SERIAL NETWORK CONNECTIVITY CONNECTION FOR CARD READING, METERING, AND SECURE ACCESS.

2.12. LIGHTING CONTROLS

- 2.12.1. AS INDICATED ON DRAWINGS.
- 2.12.2. INCLUDE FOR ALL ACCESSORIES, EXPANSIONS, CONTROL INTERFACES, DATA CONNECTIONS, AND PROGRAMMING REQUIRED TO ACHIEVE THE LIGHTING INTENT OF THE DRAWINGS AND THE ASHRAE-90.1 REGULATIONS GOVERNING THE PROJECT.
- 2.12.3. INSTALLATION
- PROVIDE ALL POWER REQUIREMENTS FOR LIGHTING AND CONTROLS
 - INSTALL PHOTOELECTRIC CONTROLS IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS AND TO CSA C22.1.
 - INSTALL CONTROL STATIONS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
 - CONNECT LAMP CIRCUITS TO DIMMERS, PROVIDE SEPARATE ON-OFF-DIMMING CONTROLS FOR EACH FIXTURE TYPE WITHIN A ROOM.
 - INSTALL COMPONENTS COMPRISING DIMMING SYSTEM IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, AND AS INDICATED.
 - INSTALL WIRING, SHIELDING, GROUNDING IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
 - LOCATE INTENSITY CONTROLS AND "ON-OFF" SWITCHES AS INDICATED.
 - TEST LAMPS BY OPERATING AT FULL INTENSITY FOR 100 HOURS PRIOR TO FINAL INSPECTION.
 - OPERATE DRIVERS IN AMBIENT TEMPERATURE ABOVE 18 DEGREES C.
 - ENSURE CONNECTIONS ARE CORRECTLY MADE AND TO SAME PHASE BEFORE ENERGIZING.

2.13. ACCEPTABLE MANUFACTURERS: EATON, OR APPROVED EQUAL.

2.13. EXECUTION OF THE WORK

- 2.13.1. OBTAIN CONSULTANT'S INTERPRETATION OR CLARIFICATION ON THE SPECIFICATIONS AND DRAWINGS BEFORE PROCEEDING WITH THE WORK:
- CORRECT COMPLETED WORK INSTALLED CONTRARY TO THE INTENT OF THE DRAWINGS AND SPECIFICATIONS AT THEIR OWN EXPENSE, WHERE IT CAN BE DETERMINED THAT A CLARIFICATION COULD HAVE BEEN ISSUED.
 - NOTIFY THE CONSULTANT AS WORK PROGRESSES WHERE ADDITIONAL CLARIFICATION OR INTERPRETATION OF THE SPECIFICATIONS AND DRAWINGS IS REQUIRED.
- 2.13.2. CLEAN AND TOUCHUP SURFACES OF SHOP PAINTED EQUIPMENT SCRATCHED OR MARRED DURING SHIPMENT OR INSTALLATION, TO MATCH ORIGINAL PAINT.
- 2.13.3. COMPLETE CORING, CUTTING AND PATCHING USING QUALIFIED SPECIALISTS; OBTAIN WRITTEN APPROVAL FROM CONSULTANT BEFORE STARTING CORING OR CUTTING WORK.
- 2.13.4. IDENTIFY ELECTRICAL EQUIPMENT WITH LAMACODE NAMEPLATES MINIMUM 13 MM HEIGHT; INDICATE VOLTAGE, USAGE, AND OTHER PERTINENT INFORMATION SUBJECT TO THE ACCEPTANCE OF THE CONSULTANT.
- 2.13.5. COORDINATE AND COOPERATE WITH OTHER TRADES ON SITE TO AVOID INTERFERENCE OF SYSTEMS INSTALLED BY THIS SECTION AND THOSE INSTALLED BY OTHER PARTS OF THE WORK:
- PROTECT ALL FINISHES AND UNFINISHED WORK OF THIS AND OTHER DIVISIONS FROM DAMAGE DUE TO CARRYING OUT OF THIS WORK.
 - KEEP EQUIPMENT DRY AND CLEAN AT ALL TIMES.
 - COVER OPENINGS IN EQUIPMENT AND MATERIALS.
 - BE RESPONSIBLE FOR AND MAKE GOOD ANY DAMAGE CAUSED DIRECTLY OR INDIRECTLY TO WALLS, FLOORS, CEILINGS, WOODWORK, BRICKWORK, FINISHES, ETCETERA
 - PACK SPACES BETWEEN WIRING AND SLEEVE FULL WITH MINERAL WOOL FIRE STOPPING AND FIRE RATED SILICONE SEALANT IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS WHERE CABLES OR CONDUITS PASS THROUGH FLOORS AND FIRE RATED WALLS.
- 2.13.6. CONDUCT FINAL CLEANING UPON COMPLETION OF WORK INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:
- CLEAN LIGHTING REFLECTORS, LENSES, AND OTHER LIGHTING SURFACES THAT HAVE BEEN EXPOSED TO CONSTRUCTION DUST AND DIRT.
 - CLEAN AND REFINISH EXPOSED EQUIPMENT, AND REPLACE ANY BROKEN OR MALFUNCTIONING COMPONENTS.
- 2.13.7. GUARANTEE MATERIALS, EQUIPMENT, AND INSTALLATIONS TO BE FREE OF ALL DEFECTS FOR A PERIOD OF TWELVE MONTHS FROM THE DATE OF SUBSTANTIAL PERFORMANCE IN ACCORDANCE WITH GENERAL CONDITIONS OF CONTRACT.

2.14. SITE QUALITY CONTROL

- 2.14.1. TESTING: MEASURE PHASE CURRENTS OF PANEL BOARDS WITH NORMAL LIGHTING LOADS OPERATING, ALONG WITH ANY OTHER NORMAL LOADS THAT MAY ALREADY BE INSTALLED IN THE FACILITY.
- ADJUST BRANCH CIRCUIT CONNECTIONS AS REQUIRED TO OBTAIN BALANCE OF CURRENT BETWEEN PHASES NOT EXCEEDING 10% MAXIMUM AND RECORD CHANGES.
- 2.14.2. MEASURE PHASE VOLTAGES AT LOADS AND ADJUST TRANSFORMER TAPS TO WITHIN 2% OF RATED VOLTAGE OF EQUIPMENT.
- 2.14.2. PERFORM ALL NECESSARY TESTS TO CONFIRM THE CORRECT OPERATION OF ALL SYSTEMS AFFECTED BY THE RENOVATIONS.
- 2.14.3. SUBMIT LETTERS FROM MANUFACTURERS OF ALL SYSTEMS INDICATING THAT THEY HAVE CHECKED, TESTED AND VERIFIED THE RESPECTIVE SYSTEM AND ARE SATISFIED WITH THE METHODS OF INSTALLATION, CONNECTION AND OPERATION.
- 2.14.4. SUBMIT ALL TEST RESULTS TO THE CONSULTANT FOR APPROVAL.
- 2.14.5. CONTRACTOR TO ADVANCE FOR ON-CONSTRUCTION SITE INSPECTION AT THE FOLLOWING STAGES OF CONSTRUCTION:
- ELECTRICAL SITE WORKS PRIOR TO BURIAL OF ELECTRICAL CONDUCTORS AND CONDUITS.
 - COMPLETION OF ELECTRICAL ROUGH-IN.
 - SUBSTANTIAL COMPLETION OF ELECTRICAL INSTALLATION.
- 2.14.6. PHOTOVOLTAIC (PV) SYSTEM TESTS
- THE FOLLOWING TESTS SHALL BE PERFORMED BY THE TRADE CONTRACTOR TO VERIFY THE PROPER SYSTEM OPERATION IN ALL MODES AND PROVIDE INITIAL "BURN-IN" OF THE POWER SYSTEM COMPONENTS. THE TRADE CONTRACTOR SHALL PROVIDE FOUR LOAD BANKS TO PERFORM THE TESTS. DETAILS OF THE FOLLOWING TESTS TO BE COMPLETED BY THE TRADE CONTRACTOR,
- NORMAL OPERATION MODE
 - PLACE SYSTEM IN NORMAL OPERATING MODE.
 - CONNECT EACH LOAD BANK TO THE LOAD PANELS AND OPERATE THE SYSTEM FOR APPROXIMATELY 20 TO 24 HOURS CONTINUOUSLY, SUCH THAT THE BATTERY STATE-OF-CHARGE IS APPROXIMATELY 45 TO 50%.
 - NORMAL LOAD TEST
 - VERIFY THE SYSTEM IS IN NORMAL OPERATING MODE FOLLOWING THE ABOVE TEST.
 - THE TRADE CONTRACTOR SHALL CONNECT THE BUILDING LOADS TO THE APPROPRIATE LOAD PANEL FOR OPERATIONAL TESTING UNDER LOW VOLTAGE CONDITIONS.

3. INSTALLATION

- 3.1. DRY TYPE TRANSFORMERS UP TO 600V
- ENSURE ADEQUATE CLEARANCE AROUND TRANSFORMER FOR VENTILATION.
 - INSTALL TRANSFORMERS IN LEVEL UPRIGHT POSITION.
 - REMOVE SHIPPING SUPPORTS ONLY AFTER TRANSFORMER IS INSTALLED AND JUST BEFORE PUTTING INTO SERVICE.
 - LOOSEN ISOLATION PAD BOLTS UNTIL NO COMPRESSION IS VISIBLE.
 - MAKE PRIMARY AND SECONDARY CONNECTIONS IN ACCORDANCE WITH WIRING DIAGRAM.
 - ENERGIZE TRANSFORMERS AFTER INSTALLATION IS COMPLETE.
 - MAKE CONDUIT ENTRY INTO BOTTOM 1/3 OF TRANSFORMER ENCLOSURE.
- 3.2. PANELBOARDS
- LOCATE PANELBOARDS AS INDICATED AND MOUNT SECURELY, PLUMB, TRUE AND SQUARE, TO ADJOINING SURFACES.
 - INSTALL SURFACE MOUNTED PANELBOARDS ON PLYWOOD, WHERE PRACTICAL, GROUP PANELBOARDS ON COMMON BACKBOARD.
 - CONNECT LOADS TO CIRCUITS.

- 3.3. POWER SYSTEM STUDIES
- 3.3.1. PROTECTIVE DEVICE COORDINATION AND SHORT-CIRCUIT STUDIES:
- A ONE-LINE DIAGRAM SHALL BE PROVIDED WHICH CLEARLY IDENTIFIES INDIVIDUAL EQUIPMENT BUSES, BUS NUMBERS, DEVICE IDENTIFICATION NUMBERS AND THE MAXIMUM AVAILABLE SHORT-CIRCUIT CURRENT AT EACH BUS WHEN KNOWN.
 - A SUFFICIENT NUMBER OF LOG-LOG PLOTS SHALL BE PROVIDED TO INDICATE THE DEGREE OF SYSTEM PROTECTION AND COORDINATION BY DISPLAYING THE TIME-CURRENT CHARACTERISTICS OF SERIES CONNECTED OVERCURRENT DEVICES AND OTHER PERTINENT SYSTEM PARAMETERS.
 - COMPUTER PRINTOUTS SHALL ACCOMPANY THE LOG-LOG PLOTS AND WILL CONTAIN DESCRIPTIONS FOR EACH OF THE DEVICES SHOWN, SETTINGS OF THE ADJUSTABLE DEVICES, AND DEVICE IDENTIFICATION NUMBERS TO AID IN LOCATING THE DEVICES ON THE LOG-LOG PLOTS AND THE SYSTEM ONE-LINE DIAGRAM.
 - THE STUDY SHALL INCLUDE A SEPARATE, TABULAR PRINTOUT CONTAINING THE RECOMMENDED SETTINGS OF ALL ADJUSTABLE OVERCURRENT PROTECTIVE DEVICES, THE EQUIPMENT DESIGNATION WHERE THE DEVICE IS LOCATED, AND THE DEVICE NUMBER CORRESPONDING TO THE DEVICE ON THE SYSTEM ONE-LINE DIAGRAM.
 - A DISCUSSION SECTION WHICH EVALUATES THE DEGREE OF SYSTEM PROTECTION AND SERVICE CONTINUITY WITH OVERCURRENT DEVICES, ALONG WITH RECOMMENDATIONS AS REQUIRED FOR ADDRESSING SYSTEM PROTECTION OR DEVICE COORDINATION DEFICIENCIES.
 - THE CONTRACTOR SHALL NOTIFY THE CONSULTANT IN WRITING OF ANY SIGNIFICANT DEFICIENCIES IN PROTECTION AND/OR COORDINATION. PROVIDE RECOMMENDATIONS FOR IMPROVEMENTS.
- 3.3.2. ARC FLASH HAZARD ANALYSIS STUD