TAYLOR ARCHITECTURE GROUP

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ADDENDUM NO. 1 ADD 001

Project: Nunavut Water Board New Office Building
Location: Gjoa Haven, NU
Project no: RFP GH 2018-001 TAG:17-017
Date: February 15, 2018

Note well: Addendum No. 1 is comprised of: **Specification General:** comprised of 02 addendum items and 01 attachment. **Architectural Specification:** comprised of 01 addendum item. **Architectural Drawings:** comprised of 04 addendum items & 01 attachment. **Electrical Drawings:** comprised of 01 addendum items & 01 attachment. **The Addendum contains a total of (66) - 8 ½" x 11" sheets, (05) - 24" x 36" sheets, and 08 items.**

Specifications - General

1.	00 01 10 TOC	Correction	Delete "28 31 01 Fire Alarm Systems" from Table of Contents list.
2.	General	Addition	Add the following Electrical Specification Sections to the end of the Specification Document:

- Section 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL
- Section 26 05 20 - WIRE AND BOX CONNECTORS (0-1000 V)
- Section 26 05 21 - WIRES AND CABLES (0-1000 V)
- Section 26 05 28 - GROUNDING – SECONDARY
- Section 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
- Section 26 05 31 - SPLITTERS, JUNCTION, PULL BOXES AND CABINETS
- Section 26 05 32 - OUTLET BOXES, CONDUIT BOXES AND FITTINGS
- Section 26 05 34 - CONDUITS, CONDUIT FASTENINGS, AND CONDUIT FITTINGS
- Section 26 05 44 - INSTALLATION OF CABLES IN TRENCHES AND IN DUCTS
- Section 26 24 02 - SERVICE ENTRANCE BOARD
- Section 26 24 17 - PANELBOARDS BREAKER TYPE
- Section 26 27 26 - WIRING DEVICES
- Section 26 28 21 - MOULDED CASE CIRCUIT BREAKERS
- Section 26 28 23 - DISCONNECT SWITCHES - FUSED AND NON-FUSED
- Section 26 29 10 - MOTOR STARTERS TO 600 V
- Section 26 50 00 – LIGHTING
- Section 26 52 01 - UNIT EQUIPMENT FOR EMERGENCY LIGHTING

- Section 26 53 00 - EXIT SIGNS
- Section 27 05 14 - COMMUNICATION CABLES INSIDE BUILDINGS
- Section 28 16 00 - INTRUSION DETECTION
- Section 33 71 74 - OVERHEAD ELECTRICAL SERVICE

The above documents are appended to this Addenda.

Electrical Drawings

3.	General	Addition	Add the following Electrical Issued for Tender Drawings to the end of the Drawing Package • E100 – Electrical Site Plan • E200 – Lighting Plan • E201 – Power Plan • E202 – Low Tension Plan • E500 – Electrical Single Line and Details

Architectural Drawings

4.	Title Page	Addition	Add the following text to the Code Analysis title: "NBC Edition 2015"
5.	DWG 601	Addition	Add the following text after "W1 - Steel Exterior Wall Assembly" and "W2 - Wood Exterior Wall Assembly": "1 hour fire resistance rating, analogous to UL Des U330 F-13"
6.	DWG A201	Modification	Change the 727mm long wall directly west of the Finance Filing door D23 from a P1 partition to a P1 similar partition, with the following note: "Partition to be constructed with 38x140mm wood studs"
7.	DWG A804	Modification	Modify the dimensions of the Boardroom credenza as per the attached sketch ASK-001.

Architectural Specifications

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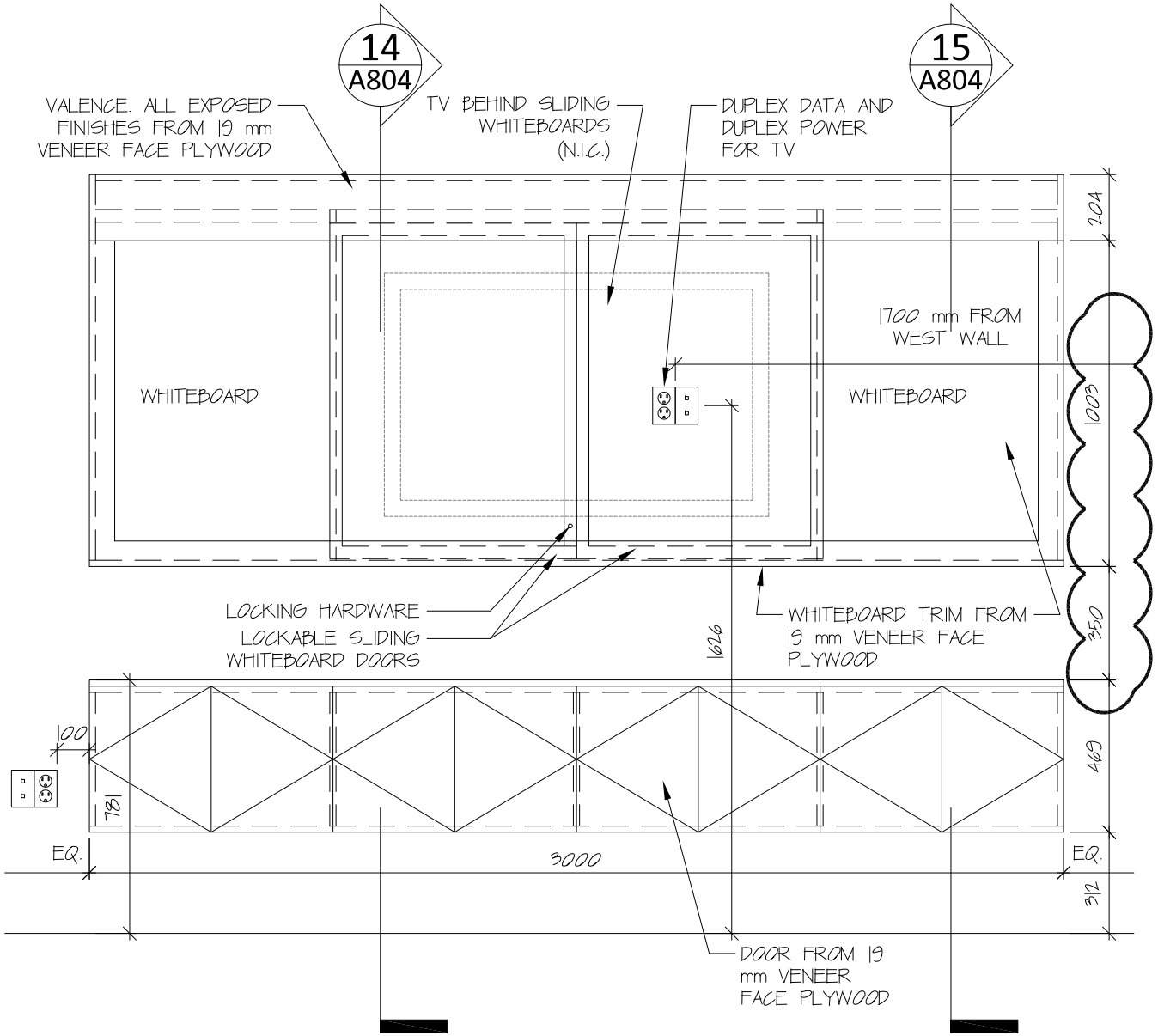
8.	08 71 00	Addition	Add the following text "2.5 Specialties .1 Provide coat hooks in the interior (office) side of the following doors: D7-D9; D22; D24-D30; D33-D37 (Qty: 16). .2 Basis of Design: Bobrick B-682 Hat and Coat Hook."



6 A804 Boardroom (Rm103) Credenza: Elevation

scale 1:20

project north
true north

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Addendum No. 001 — Boardroom Credenza Modification

NUNAVUT WATER BOARD NEW OFFICE BULDING

date:	design by:	project #:	SK #:
2018-02-14	S.T.	TAG: 17-017	ASK-001
scale:	drawn by:		from dwg #:
1:20	T.F.		A804

POWER PLAN SYMBOLS

	DUPLEX 5–15R RECEPTACLE
GF	DUPLEX 5–15R RECEPTACLE C/W INTEGRAL GFCI PROTECTION
	DUPLEX 5–20R RECEPTACLE, T–SLOT
	TWO DUPLEX 5–15R RECEPTACLES
	SPLIT CIRCUIT DUPLEX 5–15R RECEPTACLE
	SPECIAL RECEPTACLE (TYPE AS INDICATED)
	FLOOR MOUNTED TWO DUPLEX 5–15R RECEPTACLE
	CEILING MOUNTED DUPLEX 5–15R RECEPTACLE
	POWER PANELBOARD
	PANEL (TYPE AS INDICATED – SECURITY, LIGHTING RELAY, ETC.)
	GROUND BUS BAR
	MOTOR
	MOTOR c/w DISCONNECT SWITCH
	COMBINATION DISCONNECT AND MAGNETIC MOTOR STARTER
	DISCONNECT SWITCH
	FUSED DISCONNECT SWITCH
	MAGNETIC MOTOR STARTER
MP	MANUAL MOTOR STARTER c/w PILOT LIGHT
•	DEVICE MOUNTED ABOVE MILLWORK COUNTERTOP

TELECOMMUNICATIONS SYMBOLS

#	WALL MOUNTED TELECOM OUTLET (# DENOTES NUMBER OF CABLES)
#	FLOOR MOUNTED TELECOM OUTLET (# DENOTES NUMBER OF CABLES)

LIGHTING PLAN SYMBOLS

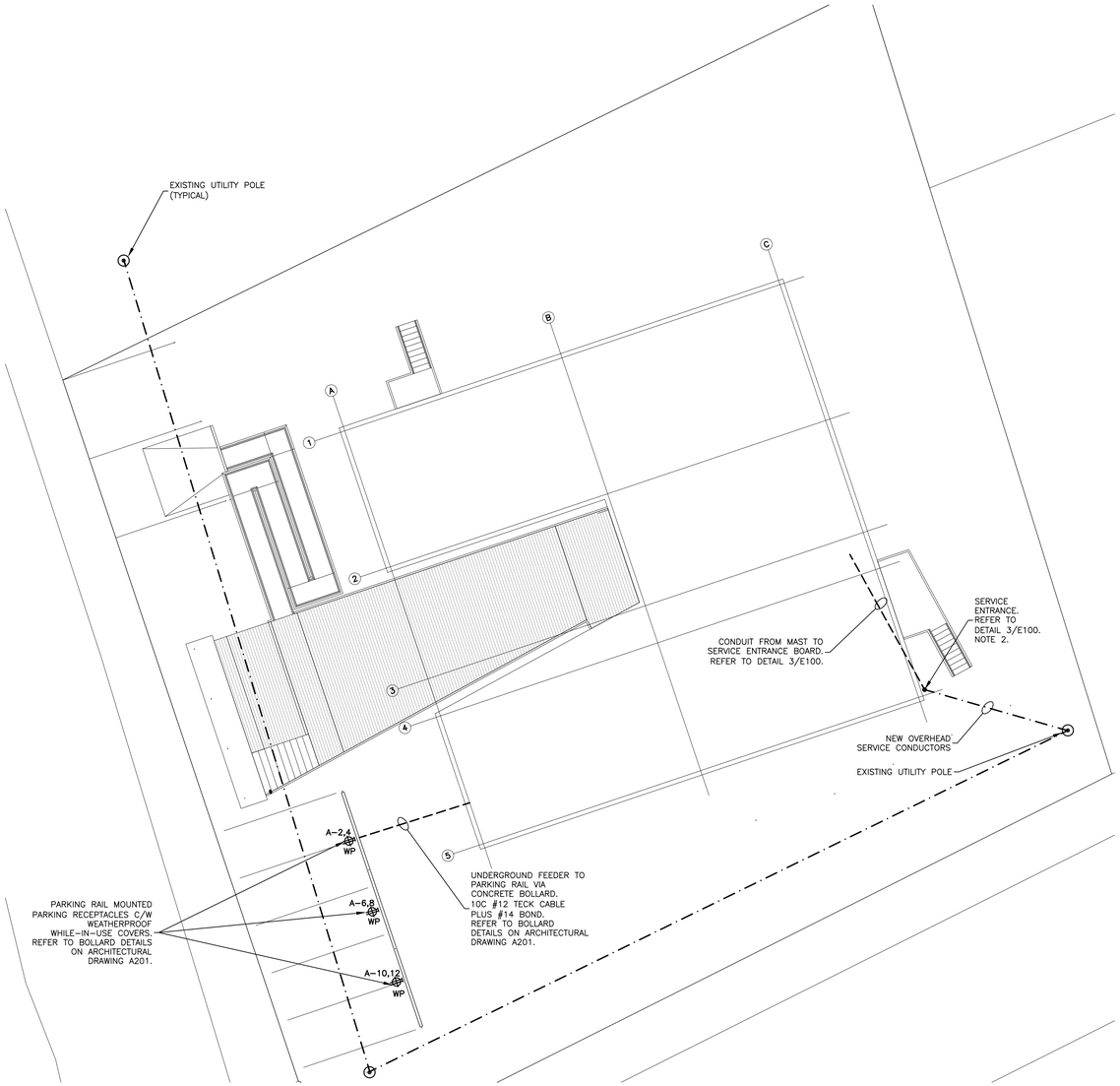
	SURFACE MOUNTED OR SUSPENDED LUMINAIRE, 1'x4'
	SURFACE MOUNTED OR SUSPENDED LUMINAIRE, 2'x4'
	SURFACE MOUNTED OR SUSPENDED LUMINAIRE, 2'x2'
	RECESSED LUMINAIRE, 1'x4'
	RECESSED LUMINAIRE, 2'x4'
	RECESSED LUMINAIRE, 2'x2'
	STRIP LUMINAIRE, 4'
	STRIP LUMINAIRE, 3'
	STRIP LUMINAIRE, 2'
	WALL MOUNTED LINEAR LUMINAIRE, 4'
	WALL MOUNTED LINEAR LUMINAIRE, 2'
	SURFACE MOUNTED OR SUSPENDED LUMINAIRE
	STEP OR WALL MOUNTED LUMINAIRE
	CEILING MOUNTED EXIT SIGN (TEXT ON SHADED SIDES, ARROWS AS INDICATED)
	WALL MOUNTED EXIT SIGN (TEXT ON SHADED SIDES, ARROWS AS INDICATED)
	LINE VOLTAGE SWITCH (120V TO 347V)
	2–GANG LINE VOLTAGE SWITCH
	3–GANG LINE VOLTAGE SWITCH
	4–GANG LINE VOLTAGE SWITCH
D	LINE VOLTAGE DIMMER SWITCH
OS	LINE VOLTAGE SWITCH c/w OCCUPANCY SENSOR
3	LINE VOLTAGE THREE WAY SWITCH
4	LINE VOLTAGE FOUR WAY SWITCH
P	LINE VOLTAGE SWITCH c/w PILOT LIGHT
PC	PHOTOCELL (EXTERIOR, TYPE AS INDICATED)
	EMERG. LTG. BATTERY PACK (# OF LAMPS AS SHOWN)
	CEILING MOUNTED EMERG. LTG. REMOTE HEAD (# OF LAMPS AS SHOWN)
	WALL MOUNTED EMERG. LTG. REMOTE HEAD (# OF LAMPS AS SHOWN)

FIRE ALARM SYMBOLS

	FIRE ALARM MANUAL STATION
	FIRE ALARM ELECTRONIC HORN/SOUNDER/CHIME c/w STROBE
	CARBON MONOXIDE ALARM
	FIRE ALARM HEAT DETECTOR (RATE OF RISE UNLESS OTHERWISE INDICATED)
	FIRE ALARM CONTROL PANEL

SECURITY/ACCESS CONTROL SYMBOLS

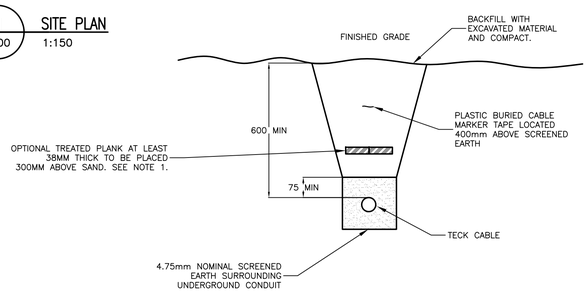
	WALL MOUNTED SECURITY CAMERA
K	SECURITY KEY PAD
DP	DOOR POSITION SWITCH
M	CEILING MOUNTED SECURITY MOTION DETECTOR
M	WALL MOUNTED SECURITY MOTION DETECTOR



1 E100 **SITE PLAN** 1:150

NOTES:

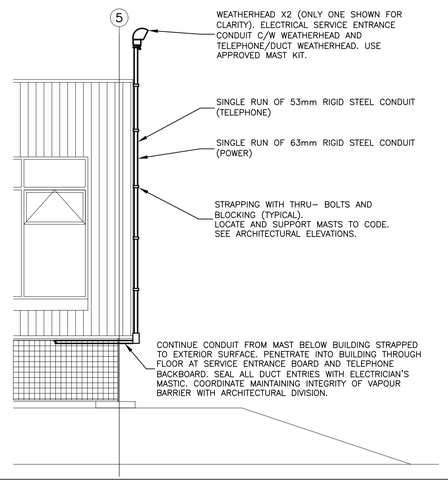
1. COORDINATE PROVISION OF SERVICES WITH LOCAL UTILITY AND COMPLETE INSTALLATION TO MEET UTILITY REQUIREMENTS.
2. OVERHEAD POWER AND TELEPHONE SERVICES. REFER TO ELECTRICAL SINGLE LINE DIAGRAM DETAIL 01/E500 FOR ADDITIONAL INFORMATION.



NOTES:

1. IF TREATED PLANKS ARE USED FOR MECHANICAL PROTECTION, BURIAL DEPTH CAN BE REDUCED BY 150mm. OTHERWISE, MINIMUM BURIAL DEPTHS ARE 600mm AS INDICATED.

2 E100 **CONDUCTOR BURIAL DETAIL** N.T.S.



NOTES:

1. SERVICE CONDUCTORS TO BE INSTALLED ACCORDING TO C.E.C. THE POINT OF ATTACHMENT OF THE SERVICE CONDUCTORS SHALL NOT EXCEED 9m ABOVE FINISHED GRADE AND THE MINIMUM CLEARANCE, INCLUDING CONDUCTOR DROOP, SHALL NOT BE LESS THAN 5.5m ABOVE FINISHED GRADE FOR LENDTH OF SERVICE CONDUCTOR FROM BUILDING TO SERVICE UTILITY POLE.

3 E100 **SERVICE ENTRANCE ELEVATION** 1:50

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Stantec

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STANTEC ARCHITECTURE LTD.
Signature
Date Feb. 14, 2018
PERMIT NUMBER: P 800
NT/NU Association of Professional Engineers and Geoscientists

REGISTERED PROFESSIONAL ENGINEER
02/14/18
K. S. SMITH
11492600
N.W.T.

ALL DIMENSIONS TO BE SITE VERIFIED BY CONTRACTOR

#	Date	Description
5	9-Feb-18	Issued For Tender
4	1-Feb-18	100% Construction Documents
3	19-Dec-17	66% Construction Documents
2	1-Dec-17	Client Review
1	15-Nov-17	Design Development

Revisions

Date:
NOVEMBER 15, 2017

Project:
NUNAVUT WATER BOARD NEW OFFICE BUILDING

Gjoa Haven, NU

project north (true north)

Design by: K.S.S.
Drawing by: E.H.
Scale: As Noted

Sheet name:
Electrical Site Plan & Legend

Project #
TAG PROJECT # 17-017
STANTEC PROJECT # 144902600

Drawing #
E100

1 E200 LIGHTING AND EMERGENCY LIGHTING PLAN
1:50

LUMINAIRE SCHEDULE

401	1219mm LONG, 6190 LUMEN, 63.7 WATT, 4000K, SUSPENDED DIRECT/INDIRECT LED LIGHT FIXTURE, 65% UPLIGHT, 35% DOWNLIGHT. SUSPENDED 2300mm A.F.F. WITH AIRCRAFT CABLE. TO BE CORELITE VERTECHS SERIES OR APPROVED EQUIVALENT.
402	1220MM LONG, 1320 LUMEN, 4000K UNDER COUNTER LED FIXTURE. WHITE FINISH. TO BE HALO HU10 SERIES OR APPROVED EQUIVALENT.
403	1219mm LONG, 4615 LUMEN, 41 WATT, 4000K, SUSPENDED LENSED LED STRIPLIGHT. TO BE METALUX SNLED SERIES OR APPROVED EQUIVALENT.
404	1219mm LONG, 4615 LUMEN, 41 WATT, 4000K, SURFACE MOUNT LENSED LED STRIPLIGHT. TO BE METALUX SNLED SERIES OR APPROVED EQUIVALENT.
405	603mmX603mm, 3437 LUMEN, 29 WATT, 4000K, RECESSED LED TROFFER. C/W DRYWALL KIT WHERE REQUIRED. TO BE METALUX ENCOUNTER SERIES OR APPROVED EQUIVALENT.
406	3270 LUMEN, 27W, 4000K FULL CUTOFF EXTERIOR LED WALL MOUNT FIXTURE. SUITABLE FOR USE AT -40°C AND WET LOCATION RATED. TO BE LUMARK WP SERIES OR APPROVED EQUAL.
407	630mm LONG, 14W, 1000 LUMEN, 4000K SURFACE MOUNTED LED FIXTURE C/W CONNECTORS, MOUNTING CLIPS, WHITE FINISH, POWER CORD AND STANDARD 120V RATED ELECTRONIC DRIVER. TO BE PRIMA LIGHTING NOVO III SERIES OR APPROVED EQUIVALENT.
408	610MM LONG, 615 LUMEN, 4000K UNDER COUNTER LED FIXTURE. WHITE FINISH. TO BE HALO HU10 SERIES OR APPROVED EQUIVALENT.
409	603mmX1212mm, 4350 LUMEN, 47.7 WATT, 4000K RECESSED LED TROFFER. TO BE CORELITE R2X SERIES OR APPROVED EQUIVALENT.

EMERGENCY LIGHT BATTERY PACK SCHEDULE

ID	DESCRIPTION	VOLTAGE	MINIMUM WATTAGE
BP#1	MECHANICAL ROOMS	24V	110W
BP#2	LOBBY AREA	24V	100W
BP#3	OFFICE AREA	24V	132W

NOTES:

1. MOUNT PHOTOCELL AT 3000mm ABOVE FINISHED MAIN FLOOR LEVEL AWAY FROM ARTIFICIAL SOURCES OF LIGHT, ON NORTH FACING WALL OF BUILDING.
2. COORDINATE FINAL LOCATIONS OF EXTERIOR LIGHT FIXTURES WITH ARCHITECTURAL. REFER TO A301.

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NEW OFFICE BUILDING

Gjoa Haven, NU

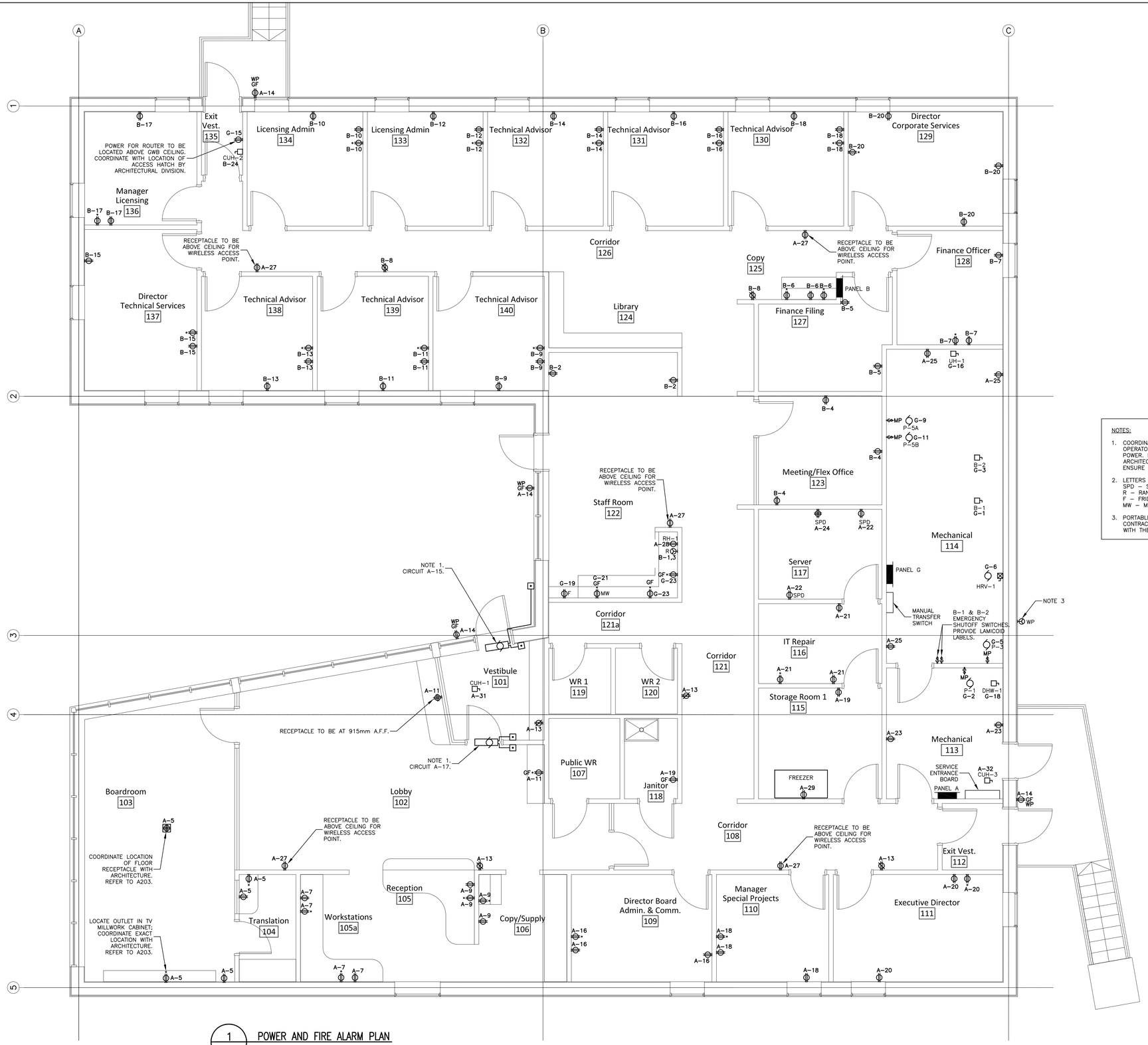
project north
true north

Design by: K.S.S.
Drawing by: E.H.
Scale: As Noted

Sheet name:
Lighting Plan

Project #
TAG PROJECT # 17-017
STANTEC PROJECT # 144902600

Drawing #
E200



1 E201 POWER AND FIRE ALARM PLAN
1:50

NOTES:

1. COORDINATE INSTALLATION AND LOCATION OF BARRIER–FREE DOOR OPERATOR WITH ARCHITECTURAL DIVISION. PROVIDE BACKBOXES, CONDUIT, POWER. BARRIER–FREE PUSHBUTTONS AND OPERATOR SUPPLIED BY ARCHITECTURAL DIVISION. DIVISION 26 TO INSTALL AND MAKE OPERATIONAL. ENSURE EXTERIOR PUSHBUTTON BOX IS PROPERLY WEATHER–SEALED.
2. LETTERS ADJACENT TO RECEPTACLES INDICATE THE FOLLOWING:
   SPD – SURGE PROTECTIVE DEVICE
   R – RANGE
   F – FRIDGE
   MW – MICROWAVE
3. PORTABLE GENERATOR CONNECTION POINT. PORTABLE GENERATOR NOT IN CONTRACT. COORDINATE EXACT ATTACHMENT RECEPTACLE REQUIREMENTS WITH THE OWNER–SUPPLED PORTABLE GENERATOR.

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NUNAVUT WATER BOARD
NEW OFFICE BUILDING

Gjoa Haven, NU

project north
true north

Design by: K.S.S.
Drawing by: E.H.
Scale: As Noted

Sheet name:
Power Plan

Project #
TAG PROJECT # 17-017
STANTEC PROJECT # 144902600

Drawing #
E201

1 E202 LOW TENSION PLAN
1:50

INTRUSION ALARM SCHEDULE		
PARTITION	LOCATION	ZONES
IA1	PUBLIC AREA	IAZ9–IAZ10
IA2	SERVICE SPACES	IAZ11
IA3	MAIN OFFICE AREA	IAZ1–IAZ8

NOTES:

1. THE LETTERS ADJACENT TO THE INTRUSION ALARM MOTION DETECTORS IDENTIFY THE TYPE OF RANGE AS FOLLOWS:
   'B' – BROAD
   'L' – LONG
2. FOR ANY INTRUSION ALARM DEVICE OR KEYPAD, PROVIDE SEPARATE HOMERUN BACK TO INTRUSION ALARM PANEL. EACH DEVICE TO BE A SEPARATE ZONE.
3. INTRUSION ALARM DOOR POSITION SWITCHES. COORDINATE WITH DOOR FRAME SUPPLIER/INSTALLER REGARDING FRAME CUTTING, INSTALLATION, AND DOOR POSITION SWITCH CONTROLS.
4. INSTALL COMMUNICATIONS EQUIPMENT AND INTRUSION ALARM PANEL ON 19mm X 1219mm X 1219mm PLYWOOD BACKBOARD. BACKBOARD TO BE PAINTED WITH FIRE RETARDANT PAINT.
5. FOR EACH STRUCTURED WIRING OUTLET, PROVIDE TWO (2) CAT 6 CABLES, UNLESS OTHERWISE INDICATED ON THE DRAWINGS, AND TERMINATE ON RJ45 JACKS. CABLES TO BE HOME RUN TO SERVER ROOM 117.
6. PROVIDE 2 X 53mm EMT CONDUIT FROM TELECOM BACKBOARD TO SERVER ROOM 117.

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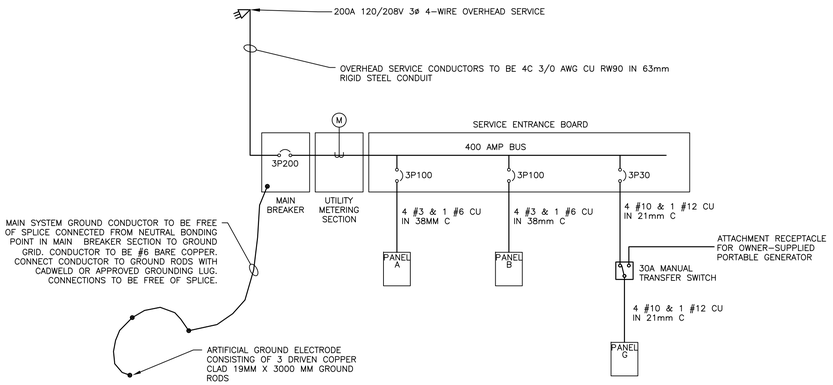
project north
true north

Design by: K.S.S.
Drawing by: E.H.
Scale: As Noted

Sheet name:
Low Tension Plan

Project #
TAG PROJECT # 17-017
STANTEC PROJECT # 144902600

Drawing #
E202



1 / E500 SINGLE LINE DIAGRAM
N.T.S.

DEMAND CALCULATION AS PER C22.1-15

SERVICE FEEDER CALCULATION – xxx

	AREA (m^2)	WATTS / m^2	PERCENT		LOAD	
OFFICE	500	50	90	=	22500	W
SUBTOTAL	500			=	22500	W
ADDITIONAL LOADS	WATTS		PERCENT			
MECHANICAL LOADS	6750		100	=	6750	W
PARKING RECEPTACLES	3900		100	=	3900	W
MISC	5000		100	=	5000	W
TOTAL ADDITIONAL LOAD				=	15650	W
TOTAL BUILDING SERVICE SIZE				=	38150	W
AT 120/208V, 3ø, 60Hz				=	106	A
USE 80% MAIN BREAKER				=	132	A
MAIN DISCONNECT SIZE					200	A
SERVICE CAPACITY					72	kVA

PANEL: A

VOLTS: 120/208 LOCATION: MECHANICAL ROOM 113 BUSS: 225
PHASE: 3 FEEDER: REFER TO SINGLE LINE DIAGRAM MTG: SURFACE
WIRE: 4

CIRC	BRKR	WATTS A	WATTS B	WATTS C	DESCRIPTION	DESCRIPTION	WATTS A	WATTS B	WATTS C	BRKR	CIRC
1	2P20	1350			CU-1	PARKING RCPT	650			1P15	2
3			1350					650		1P15	4
5	1P15			900	BOARDROOM RCPT	PARKING RCPT			650	1P15	6
7	1P15	600			WORKSTATIONS 105 RCPT		650			1P15	8
9	1P15		600		RECEPTION RCPT	PARKING RCPT		650		1P15	10
11	1P15			300	LOBBY RECP				650	1P15	12
13	1P20	450			HOUSEKEEPING RCPT	EXTERIOR RCPT	450			1P15	14
15	1P15		100		DOOR OPERATOR	OFFICE 109 RCPT		450		1P15	16
17	1P15			100	DOOR OPERATOR	OFFICE 110 RCPT			450	1P15	18
19	1P15	300			JANITOR/STORAGE RCPT	OFFICE 111 RCPT	450			1P15	20
21	1P15		450		IT REPAIR RCPT	SERVER ROOM RCPT		300		1P15	22
23	1P15			300	MECH 113 RCPT	SERVER ROOM RCPT			300	1P15	24
25	1P15	450			MECH 114 RCPT	EXTERIOR LGTS	330			1P20	26
27	1P15		250		WAPs	RH-1		200		1P15	28
29	1P15			250	STORAGE FREEZER	MECH RM LGTS			645	1P15	30
31	1P15	50			CUH-1	CUH-2	50			1P15	32
33	1P15		–		SPARE	SPARE		–		1P15	34
35				–	SPACE	SPACE			–		36
37		–			SPACE	SPACE	–				38
39			–		SPACE	SPACE		–			40
41				–	SPACE	SPACE			–		42
TOTAL		3200	2750	1850			2580	2250	2695	TOTAL	

PHASE A TOTAL = 5780
PHASE B TOTAL = 5000
PHASE C TOTAL = 4545
PANEL TOTAL = 15325 @120/208 VOLTS 3 PHASE 42.5 AMPS
REMARKS

PANEL: B

VOLTS: 120/208 LOCATION: FINANCE FILING 127 BUSS: 100
PHASE: 3 FEEDER: REFER TO SINGLE LINE DIAGRAM MTG: RECESSED
WIRE: 4

CIRC	BRKR	WATTS A	WATTS B	WATTS C	DESCRIPTION	DESCRIPTION	WATTS A	WATTS B	WATTS C	BRKR	CIRC
1	2P50	3000			RANGE	STAFF ROOM RCPT	300			1P15	2
3			3000			MEETING ROOM RCPT		450		1P15	4
5	1P15			300	FINANCE 127 RCPT	COPY ROOM RCPT			450	1P15	6
7	1P15	450			OFFICE 128 RCPT	HOUSEKEEPING RCPT	300			1P20	8
9	1P15		450		OFFICE 140 RCPT	OFFICE 134 RCPT		450		1P15	10
11	1P15			450	OFFICE 139 RCPT	OFFICE 133 RCPT			450	1P15	12
13	1P15	450			OFFICE 138 RCPT	OFFICE 132 RCPT	450			1P15	14
15	1P15		450		OFFICE 137 RCPT	OFFICE 131 RCPT		450		1P15	16
17	1P15			450	OFFICE 136 RCPT	OFFICE 130 RCPT			450	1P15	18
19	1P15	200			STAFF ROOM LGTS	OFFICE 129 RCPT	600			1P15	20
21	1P15		400		OFFICE/LIBRARY LGTS	CORR.126/STAFF LGTS & BP#3		535		1P15	22
23	1P15			500	OFFICE LIGHTS	CUH-2			50	1P15	24
25	1P15	–			SPARE	OFFICES/COPY/RECPT LGTS	445			1P15	26
27	1P15		–		SPARE	CORR.108/121/LOBBY LGTS & BP#2		–		1P15	28
29				–					–		30
31		–					–				32
33			–					–			34
35				–					–		36
37		–					–				38
39			–					–			40
41				–					–		42
TOTAL		4100	4300	1700			2095	1885	1400	TOTAL	

PHASE A TOTAL = 6195
PHASE B TOTAL = 6185
PHASE C TOTAL = 3100
PANEL TOTAL = 15480 @120/208 VOLTS 3 PHASE 43.0 AMPS
REMARKS

PANEL: G

VOLTS: 120/208 LOCATION: MECHANICAL ROOM 114 BUSS: 225
PHASE: 3 FEEDER: REFER TO SINGLE LINE DIAGRAM MTG: SURFACE
WIRE: 4

CIRC	BRKR	WATTS A	WATTS B	WATTS C	DESCRIPTION	DESCRIPTION	WATTS A	WATTS B	WATTS C	BRKR	CIRC
1	1P15	100			B-1	P-1	375			1P20	2
3	1P15		100		B-2	P-2		250		1P15	4
5	1P20			375	P-3	HRV-1			750	1P40	6
7	1P20	375			P-4	SPARE	–			1P15	8
9	1P30		575		P-5A	SPARE		–		1P15	10
11	1P30			575	P-5B	SPACE			–		12
13	1P20	375			P-6	SPACE	–				14
15			–		SPACE	UH-1		50		1P15	16
17				–	SPACE	DHW-1			50	1P15	18
19	1P15	500			FRIDGE	SPACE	–				20
21	1P15		1000		MICROWAVE	SPACE		–			22
23	1P15			250	KITCHEN COUNTER RECPT	MECH ROOM/ LOBBY/BOARDROOM LGTS			600	1P15	24
25		–			SPACE	CORRIDOR/STAFF RM LGTS	500			1P15	26
27			–		SPACE	SPACE		–			28
29				–	SPACE	SPACE			–		30
31		–			SPACE	SPACE	–				32
33			–		SPACE	SPACE		–			34
35				–	SPACE	SPACE			–		36
37		–			SPACE	SPACE	–				38
39			–		SPACE	SPACE		–			40
41				–	SPACE	SPACE			–		42
TOTAL		1350	1675	1200			875	300	1400	TOTAL	

PHASE A TOTAL = 2225
PHASE B TOTAL = 1975
PHASE C TOTAL = 2600
PANEL TOTAL = 6800 @120/208 VOLTS 3 PHASE 18.9 AMPS
REMARKS

MOTOR, CONTROL AND EQUIPMENT SCHEDULE

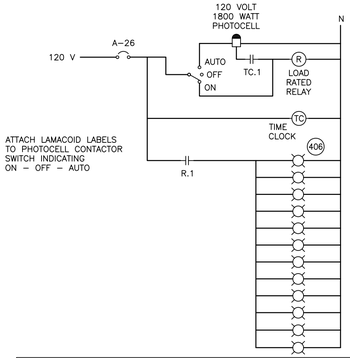
MOTOR	DESCRIPTION	LOCATION	KW	HP	VOLTS	PHASE	FLA	FEEDER	BREAKER	SOURCE	CONTROL
B-1	BOILER	MECHANICAL 114	–	0.125	120	1	4.4	2C #12 CU + #14 CU BOND IN 21MM CONDUIT	1P15	G-1	LRD
B-2	BOILER	MECHANICAL 114	–	0.125	120	1	4.4	2C #12 CU + #14 CU BOND IN 21MM CONDUIT	1P15	G-3	LRD
P-1	DCW PUMP	MECHANICAL 113	–	0.5	120	1	9.8	2C #12 CU + #14 CU BOND IN 21MM CONDUIT	1P20	G-2	MMP
P-2	GLYCOL FILL PUMP	MECHANICAL 114	–	0.33	120	1	7.2	2C #12 CU + #14 CU BOND IN 21MM CONDUIT	1P15	G-4	GFI RECEPTACLE
P-3	HEATING PRIMARY PUMP	MECHANICAL 114	–	0.5	120	1	9.8	2C #12 CU + #14 CU BOND IN 21MM CONDUIT	1P20	G-5	MMP/R/HOA
P-4	HEATING PRIMARY PUMP	MECHANICAL 114	–	0.5	120	1	9.8	2C #12 CU + #14 CU BOND IN 21MM CONDUIT	1P20	G-7	MMP/R/HOA
P-5A	HEATING SECONDARY PUMP	MECHANICAL 114	–	0.75	120	1	13.8	2C #12 CU + #14 CU BOND IN 21MM CONDUIT	1P30	G-9	MMP/R/HOA
P-5B	HEATING SECONDARY PUMP	MECHANICAL 114	–	0.75	120	1	13.8	2C #12 CU + #14 CU BOND IN 21MM CONDUIT	1P30	G-11	MMP/R/HOA
P-6	RADIANT FLOOR PUMP	MECHANICAL 114	–	0.5	120	1	9.8	2C #12 CU + #14 CU BOND IN 21MM CONDUIT	1P20	G-13	MMP
HRV-1	HEAT EXCHANGER	MECHANICAL 114	–	1	120	1	16	2C #12 CU + #14 CU BOND IN 21MM CONDUIT	1P40	G-6	MMP/R/HOA
AC-1	SERVER AC UNIT	SERVER 117	2.7	–	208	1	13	3C #12 CU + #14 CU BOND IN 21MM CONDUIT	CU-1		LRD
CU-1	AC EXTERIOR UNIT	EXTERIOR						3C #12 CU + #14 CU BOND IN 21MM CONDUIT	2P20	A-1,3	
RH-1	RANGE HOOD	STAFF ROOM 122	–	FRAC	120	1	FRAC	2C #12 CU + #14 CU BOND IN 21MM CONDUIT	1P15	A-28	BREAKER
CUH-1	CABINET UNIT HEATER	VESTIBULE 101	–	FRAC	120	1	FRAC	2C #12 CU + #14 CU BOND IN 21MM CONDUIT	1P15	A-31	MMP
CUH-2	CABINET UNIT HEATER	VESTIBULE 135	–	FRAC	120	1	FRAC	2C #12 CU + #14 CU BOND IN 21MM CONDUIT	1P15	B-24	MMP
CUH-3	CABINET UNIT HEATER	MECHANICAL 113	–	FRAC	120	1	FRAC	2C #12 CU + #14 CU BOND IN 21MM CONDUIT	1P15	A-32	MMP
UH-1	UNIT HEATER	MECHANICAL 114	–	FRAC	120	1	FRAC	2C #12 CU + #14 CU BOND IN 21MM CONDUIT	1P15	G-16	MMP
DHW-1	DOMESTIC HOT WATER HEATER	MECHANICAL 113	–	FRAC	120	1	FRAC	2C #12 CU + #14 CU BOND IN 21MM CONDUIT	1P15	G-18	LRD

NOTES:

1. MOTOR SCHEDULE IS FOR ESTIMATING PURPOSES ONLY. CONFIRM ALL MOTOR FULL LOAD CURRENTS WITH NAMEPLATES AND SIZE MOTOR DISCONNECTS, BREAKERS, FEEDERS AND OVERLOADS ACCORDINGLY.
2. CONFIRM MECHANICAL EQUIPMENT LOCATIONS WITH MECHANICAL DIVISION.
3. DIVISION 26 CONTRACTOR SHALL COORDINATE THE LOCATIONS OF ALL LINE VOLTAGE PILOT DEVICES WITH DIVISION 23 AND PROVIDE CONDUIT AND WIRING AS NECESSARY.
4. IN ADDITION TO CONTROL SHOWN, PROVIDE LOCAL DISCONNECT IF REQUIRED BY CEC.

CONTROL DEVICE LEGEND:

LRD – LOAD RATED DISCONNECT
MAG – MAGNETIC STARTER
CMS – COMBINATION MAGNETIC STARTER WITH DISCONNECT
MMP – MANUAL MOTOR PROTECTION
/R – WITH LOAD RATED RELAY
/HOA – WITH H-O-A SWITCH
/K – KEYED
/SS – SOFT START
VFD – VARIABLE FREQUENCY DRIVE



NOTES:

1. TIME CLOCK TO BE QUARTZ-BASED PROGRAMMABLE TYPE WITH CONTACTS PROGRAMMED TO REMAIN CLOSED BETWEEN 7:00 AM AND 11:00 PM.

2 / E500 PHOTOCELL CONTROL SCHEMATIC
N.T.S.

TAG
TAYLOR ARCHITECTURE GROUP
3502 Raccine Road
Yellowknife, NT
X1A 3J2
t: 867-920-2728
f: 867-873-3816
e: tag@tagyk.com

Stantec

PERMIT TO PRACTICE
STANTEC ARCHITECTURE LTD.
Signature
Date Feb. 14, 2018
PERMIT NUMBER: P 800
NT/NU Association of Professional Engineers and Geoscientists

REGISTERED PROFESSIONAL ENGINEER
02/14/18
K. S. SMITH
11000 2600
N.W.T.

ALL DIMENSIONS TO BE SITE VERIFIED BY CONTRACTOR

#	Date	Description
5	9-Feb-18	Issued For Tender
4	1-Feb-18	100% Construction Documents
3	19-Dec-17	66% Construction Documents
2	1-Dec-17	Client Review
1	15-Nov-17	Design Development

Revisions

Date:
NOVEMBER 15, 2017

Project:
NUNAVUT WATER BOARD
NEW OFFICE BUILDING

Gjoa Haven, NU

Design by: K.S.S.
Drawing by: E.H.
Scale: As Noted

Sheet name:
Electrical Single Line and Details

Project #
TAG PROJECT # 17-017
STANTEC PROJECT # 144902600

Drawing #
E500

Part 1 General

1.1 GENERAL

.1 This Section covers items common to Sections of Divisions 26, 27 and 28 and 33. This section supplements requirements of Division 1.

.2 For the proper execution of work, cooperate with other trades and contracts as needed.

.3 To avoid installation conflicts, thoroughly examine the complete set of contract documents. Resolve conflicts with Engineer prior to installation.

.4 Prior to installation of electrical connections to equipment, examine the manufacturer's shop drawings, wiring diagrams, product data and installation instructions. Verify that the electrical characteristics detailed in the contract documents are consistent with the electrical characteristics of the actual equipment being installed. When inconsistencies occur request clarification from Engineer.

.5 Examine the entire set of contract documents to avoid conflicts with other systems. Determine exact route and installation of electrical wiring and equipment with conditions of construction.

.6 Should the electrical documents indicate a condition conflicting with the governing codes or regulations, refrain from installing that portion of the work until clarified by Engineer.

.7 Definitions:

.1 Provide - To furnish and install complete and ready for intended use.

.2 Furnish - Supply and deliver to project site, ready for unpacking, assembly and installation.

.3 Install - Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operation at the project site to complete items of work furnished.

.8 All correspondence and documents shall be submitted in English.

.9 The entire bid package is considered related to all disciplines and shall be examined prior to bid and followed throughout construction and thereafter. Related sections listed hereinafter in this specification shall not be considered as relieving any Division from the above - indicated responsibility.

.10 Equivalent or equal products: Where either of these terms are used to reference acceptable material, proof of equality in the form of manufacturer representative's supplied itemized table or letter, to illustrate or certify that the product meets or exceeds each and every specification item is required for review prior to approval. Manufacturer's raw catalog pages and the like are not acceptable substitute for the above-indicated table or letter and will be returned as insufficient for review.

.11 Sufficiency of drawings and specifications:

.1 Hold the Drawings and Specifications to determine the general character and general arrangement of the Work.

.2 Drawings and Specifications indicate the general scope of the Project in terms of the dimensions of the Work, the type of structural, mechanical, electrical utility systems and the architectural elements of construction. The Drawings and Specifications do not necessarily indicate or describe all Work required for the full performance and completion of the requirements of the Contract Documents. On the basis of the general scope indicated, stated, described or implied, furnish all items required for the proper execution and completion of the Work.

.3 The Contract Documents are issued to facilitate construction by expressing the design intent. The Drawings and Specifications do not necessarily contain all of the details required to construct the project, and contractor supplied detail in the form of detailed construction documents (referred to in the Contract Documents as the Contractors supplied shop drawings, submittals, and field coordination drawings) is required for construction of the Work; all of which set out the specific and final details required for placing and constructing the finished Work. By contrast, the Drawings and Specifications are provided to reflect the finished design of the Work. The Drawings and Specifications are not intended to be used as a set of detailed instructions on how to construct the Work. Construction means, methods, techniques, sequences, procedures, and site safety precautions are the responsibility of the Contractor.

.4 Shop Drawings, Product Data, Samples and similar submittals provided by the Contractor are not Contract Documents. The purpose of these submittals is to demonstrate the way by which the Contractor proposes to conform to the design intent expressed in the Contract Documents.

.5 Examine the Drawings and Specifications to satisfy yourself regarding the design intent and the extent of the proposed Work, and by personal examination of the site and surroundings make your own estimate of the facilities condition and difficulties attending the performance and completion of the Work.

.12 Make known in writing to the Engineer ten (10) days prior to the tender closing date any materials specified or is required to complete the work, which are not currently available or will not be available for use as called for herein or on drawings. Failing to do so, it will be assumed that the most expensive compliant alternate has been included in the tender price.

.13 For the sake of clarity, electrical symbols are typically shown larger than they would be at the actual scale of the drawing. Therefore, do not scale electrical drawings. Where exact dimensions are required, refer to dimensioned architectural plans or civil drawings. Failed to do so, bear all resulted costs and make good of the work.

.14 The general contractor who has a contractual relationship with the Owner shall be responsible for providing complete and workable systems as outlined on drawings and in specifications. The Engineer will not recognize any sub-contractor as such, but will consider all persons engaged on the work to be under the control of General Contractor. The Engineer will not under any circumstances, enter into discussions concerning the responsibility of sub-trades or the apportionment of work. No claim based on the division of work between specification sections or subtrades will be considered.

1.2 CODES AND STANDARDS

.1 Unless otherwise indicated, all references to standards and codes throughout this specification is to the latest applicable edition at the time of bid closing.

.2 Do complete installation in accordance with CSA C22.1, Canadian Electrical Code, Part 1. In case of a conflict between the code requirements and the contract documents, request clarification prior to proceeding with the work.

.3 Do underground systems in accordance with CSA C22.3 No.1 except where specified otherwise.

.4 Definitions:

.1 Abbreviations for electrical terms: to CSA Z85 - Abbreviations for Scientific and Engineering Terms.

.2 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE

SP1122 - The Authoritative Dictionary of IEEE Standards Terms.

.5 Coordinate with the documents of other disciplines and the work of other trades, and provide plenum rated equipment and devices and plenum rated raceway, wiring and installation methods in all plenum spaces.

.6 Material and installations shall comply with the requirements of the following codes and standards, codes and standards mentioned in other sections of this specification, as well as other applicable codes and standards to the satisfaction of the Authorities Having Jurisdiction (AHJ):

.1 Canadian Electrical Code (CEC).

.2 National Building Code of Canada (NBCC)

.3 National Fire Code of Canada (NFCC).

.4 CAN/ULC-S524, Installation of Fire Alarm Systems.

.5 CAN/ULC-S537, Verification of Fire Alarm Systems.

.7 Provide the site office with a current copy of the following documents, codes and standards. These documents shall remain on site throughout the duration of construction for electricians and others reference and use. The maintenance of these codes on site may be checked at each site visit. Absence of one or more such documents will be indicated on the field review report as deficiency and non-compliance with contract requirements.

.1 Project's electrical specifications, drawings and any addenda.

.2 Project's up to date electrical RFIs and responses, SIs and CCNs.

.3 Canadian Electrical Code (CEC).

.4 CAN/ULC-S524, Installation of Fire Alarm Systems.

.5 CAN/ULC-S537, Verification of Fire Alarm Systems.

1.3 DEFINITIONS

.1 Abbreviations for electrical terms: to CSA Z85 - Abbreviations for Scientific and Engineering Terms.

.2 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.4 QUALITY ASSURANCE

.1 Conform to the requirements of CEC with amendments by local Authorities Having Jurisdiction (AHJ).

.2 Conform to the requirements of the NBCC with amendments by local AHJ.

.3 Obtain and pay for the electrical permits, plan review and inspection from local AHJ.

.4 Conform to the requirements of the serving electric, telephone utilities.

1.5 PERMITS, FEES AND INSPECTION

.1 Submit to Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.

.2 Pay associated fees.

.3 Provide drawings and specifications required by Electrical Inspection Department and Supply Authority at no cost.

.4 Notify Engineer of changes required by Electrical Inspection Department or Supply Authority prior to making such changes.

.5 Furnish Certificates of Acceptance from Authorities Having Jurisdiction on completion of work to Engineer.

1.6 ALTERNATE PRODUCT APPROVAL

.1 Refer to Division 1 sections for more information.

.2 Electrical price shall be based on the equipment specified or alternate equipment that received prior approval from the Engineer before tender closing.

.3 Requests for prior approval of alternates shall be received at the Engineer's office a minimum of ten (10) business days prior to the closing date for issuing the last addendum or official response by Engineer.

.4 Request for approval shall clearly indicate the specified product and the related specification section(s) as well as a comprehensive list identifying all areas where the submitted alternative does not comply with the specifications.

.5 Notwithstanding item 4, substitution requests shall be complete with proper support documents to clearly identify the equality of the specifications of the suggested product on an item by item basis compared to the specifications listed for the specified product. Requests not meeting this requirement, will be returned as insufficient information for review.

.6 No substitution of items specifically called for on the drawings or in these specifications with other products- even the ones listed in specifications, is allowed without timely and proper request and approval.

1.7 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Product data means standard printed information describing materials, products, equipment and systems, not specially prepared for work of this contract, other than the designation of selections.

.2 Product data consisting of manufacturers' standard schematic drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations and descriptive data will be accepted in lieu of shop drawings provided that:

.1 Information not applicable to the work of this contract is deleted, or the applicable information is clearly marked.

.2 Standard information is supplemented with information specifically applicable to work of this contract.

.3 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop drawings:

.1 Shop drawings means technical data specially prepared for work of this contract including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements and similar information not in standard printed form.

.2 Submit shop drawings presented in a clear and thorough manner to appropriately illustrate the work.

.3 Shop drawings shall represent existing conditions where new work is tied into existing systems and or surfaces. Shop drawings shall indicate all existing condition which affect the work. Identify field dimensions on drawings.

.4 Identify shop drawings by appropriate references to sheet, detail, schedule or room number. Maximum allowable drawing size 280mm x 425mm (11" x 17"). Provide a clear area of 100mm x 75mm (4" x 3") on each shop drawing for Engineer's review stamp.

.4 General:

.1 Review, stamp with approval and sign shop drawings before submission to Engineer. Stamping and signing the transmittal only, is not acceptable. By approving and submitting shop drawings, Contractor represents that field measurements, field construction criteria, material, catalogue numbers and similar data have been verified and that shop drawings have been checked and coordinated with requirements of the work and contract documents regardless of what the stamp disclaims.

.2 At the time of submission, inform Engineer in writing of any deviations in shop drawings from requirements of Contract Documents.

.3 Engineer will review shop drawings for the sole purpose of ascertaining conformance with general design concept of the project and with information given in Contract Documents. Engineer's review of a separate item shall not indicate acceptance of an assembly in which the item functions. This review by Engineer shall not mean that the Engineer approved the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of his responsibility for errors or omissions in the shop drawings or his responsibility for meeting all requirements of the Contract documents as well as applicable federal and provincial/territorial laws, regulations and acts.

.4 Make corrections which Engineer may require, consistent with Contract Documents, and resubmit modified shop drawings until reviewed.

.5 Direct specific attention in writing on re-submitted shop drawings to revisions requested by Engineer on previous submissions.

.6 Be responsible for dimensions to be confirmed and correlated at job site for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the work of all Sections.

.7 Shop drawings submitted in Imperial will be returned to the contractor not reviewed until they are submitted in Metric Units (SI).

.8 Shop drawings which require the approval of a legally constituted authority having jurisdiction shall be submitted by Contractor to such authority for approval. Such shop drawings shall receive final approval of authority having jurisdiction before receiving Engineer's final review.

.9 Boiler plate copies of manuals or drawings shall not be accepted. Shop drawings to only contain information relevant and applicable to the system as covered in these documents. It is the responsibility of the contractor or his suppliers under the contractor's supervision to filter out the boiler plate documents, select the relevant pages, mark suggested products and submit such information only. Price this effort in the bid and deliver accordingly. Non-compliant suggestions will be rejected and the consequential delay shall be the responsibility of the Contractor.

.10 No work requiring a shop drawing submission shall commence until the

submission has received Engineer's final review. All such work shall be in accordance with reviewed shop drawings.

.11 Provide submittals for review for all electrical material and equipment.

1.8 CONTRACT BREAKDOWN

.1 Provide separate material and labour breakdown for the total electrical sub-contract as indicated below. This breakdown is to meet the satisfaction of the Engineer and is to be submitted within 14 days of contract award.

.2 The breakdown will be used in computing of progress claims. Progress claims are to be itemized with separate labour and material listing against each item of the contract breakdown. Progress claims will not be reviewed if they are not presented as per the following breakdown:

.1 Mobilization

.2 Building Power Distribution Panelboards and Feeders

.3 Lighting and Emergency Lighting

.4 Power Branch Circuitry

.5 Fire Alarm System

.6 Emergency and Exit Lighting

.7 Intrusion Alarm System

.8 Structured Wiring Provisions

.9 Mechanical Equipment Provisions

.10 Training, O&M Manuals, Reports and Record Documents and Closeout

1.9 CLOSEOUT SUBMITTALS

.1 Provide Operation and Maintenance Data and Record Drawings for electrical installations and submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 In addition, provide specific information as indicated below:

.1 Wiring and schematic diagrams indicating connections, terminals and wire numbers.

.2 One copy of all panel directories including branch circuit panels and any distribution boards.

.3 Inspection certificates from the AHJ indicating satisfactory completion of the electrical work.

.4 Completed fire alarm verification certificate and report without any qualifying remarks.

.5 Include the following information on a trade scope specific basis plus data specified:

.1 Maintenance instructions for finished surfaces, materials and equipment.

.2 Name, addresses and phone numbers of subcontractors and suppliers.

.3 Guarantees, warranties and bonds indicating:

.1 Name and address of project.

.2 Warranty/Guarantee/Bond commencement date and duration.

.3 Clear indication of what is being guaranteed and what remedial action will be taken under guarantee.

.4 Signature and seal of Trade Contractor.

.4 Include in Operation and Maintenance Data:

.1 Component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.

.2 Wiring and schematic diagrams indicating all connections, terminals and wire numbers.

.3 All manufacturer's operating and maintenance information prepared for any installed equipment.

.4 Reviewed shop drawings & product data of all installed equipment.

.5 Results of all tests performed.

.6 Spare parts list.

.7 All studies, test reports, testing certificates and Inspection Department acceptances.

.8 One set of full size prints of record drawings.

.9 One copy of all panel directories.

1.10 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

Part 2 Product

2.1 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification labels for control items in English.

2.2 MATERIALS AND EQUIPMENT

.1 Provide material in accordance with Section 01 61 00 - Common Product Requirements.

.2 Equipment and Material to be approved by a Certified Accreditation Body of the Standards Council of Canada. Where certified components are not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.3 Factory assemble control panels and component assemblies.

2.3 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Verify installation and co-ordination responsibilities related to motors, equipment and

controls, as indicated.

2.4 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of these documents and the authority having jurisdiction.

.2 Arc flash hazard signs: minimum as required by CEC and as identified elsewhere in these documents.

2.5 WIRING TERMINATIONS

.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.6 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with labels as follows:

.1 Nameplates: plastic laminate mm melamine, black face, white core, lettering accurately aligned and engraved into core.

.2 Sizes as follows:

NAMEPLATE SIZES			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.

.3 Wording on nameplates to be approved by Engineer prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per line.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.7 Terminal cabinets and pull boxes: indicate system and voltage.

2.7 WIRING IDENTIFICATION

.1 Maintain phase sequence and colour coding throughout.

.2 Colour coding: to CSA C22.1.

2.8 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.2 Clean and touch up surfaces of devices and equipment scratched or marred during shipment or installation, to match original paint.

.3 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

.4 All electrical fittings, supports hanger rods, pullboxes, channel frames, conduit racks,

outlet boxes, brackets, clamps, etc. to have galvanized finish or enamel paint finish over corrosion-resistant primer.

.5 All panelboards, distribution centres, transformers, motor control centres, etc. to be factory finished in gloss air dry enamel applied over corrosion-resistant primer. Matte or flat type finish paint not acceptable. Factory finished units that are scratched or marked during installation or shipping to be touched up with matching spray-on air dry lacquer or, if required to provide a satisfactory job, completely refinished.

.6 All 120/208 equipment to be colour finished to match grey ANSI 61.

.7 Fire alarm pullboxes and junction boxes to be finished in red.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or contracts are acceptable for electrical installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Engineer.

.2 Inform Engineer of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 NAMEPLATES AND LABELS

.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.3 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete.

.1 Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 150 mm. Notify the Engineer if conduit sleeves will contain unbalanced phase conductors.

.2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.4 LOCATION OF OUTLETS AND LIGHT SWITCHES

.1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.

.2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.

.3 Change location of outlets and light switches at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

.4 Locate light switches on latch side of doors.

.5 Locate disconnect devices in mechanical and elevator machine rooms on latch side of door.

3.5 MOUNTING HEIGHTS

.1 Mounting height of equipment and devices is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment or devices is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment and devices at the equipment heights as indicated on the drawings.

.4 Install electrical equipment at following heights unless indicated otherwise.

.1 Local switches: 1200 mm.

.2 Wall receptacles:

.1 General: 400 mm.

.2 Above top of continuous baseboard heater: 200 mm.

.3 Above top of counters or counter splash backs: 175 mm.

.4 In mechanical rooms: 450 mm.

.3 Panelboards: as required by Code or as indicated. Topmost breaker no greater than 1800 mm above finished floor (AFF)

.4 Telecom outlets: 400 mm.

.5 Fire alarm manual stations: 1150 mm.

.6 Fire alarm signal devices: 2300 mm to the top of device, and no less than 150 mm below finished ceiling. Entire lens to be no less than 2000 mm and no greater than 2400 mm A.F.F.

3.6 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.7 FIELD QUALITY CONTROL

.1 Load Balance:

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain a balance of current between phases of 15% of the average. Record changes to the panel schedule.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Provide upon completion of work, load balance report as directed in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS, phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

.2 Conduct following tests in accordance with Section 01 45 00 - Quality Control.

.1 Power distribution system including phasing, voltage, grounding, load balancing and phase rotation.

.2 Circuits originating from branch distribution panels.

.3 Lighting and lighting control.

.4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

.5 Systems: fire alarm.

.6 Insulation resistance testing:

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

.3 Check resistance to ground before energizing.

.3 Carry out tests in presence of Engineer.

.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.8 SYSTEM STARTUP

.1 Instruct operating personnel in operation, care and maintenance of systems, system equipment and components.

.2 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

3.9 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.10 FIRE STOPPING

.1 All electrical penetrations of fire rated assemblies are to include approved fire and smoke sealing sealing systems in accordance with Section 07 84 00 - Fire Stopping.

.2 Ensure that electrical boxes installed in fire rated assemblies include approved fire stop systems that preserve the integrity of the assembly. Back-to-back installation of electrical boxes is not permitted.

3.11 MINIMUM REQUIREMENTS FOR SUBSTANTIAL PERFORMANCE

.1 Notwithstanding general legal requirements, the requirements of other specification sections, Divisions herein, and additional requirements contained within the contract documents, as a minimum the following identifies conditions that must be met before substantial performance can be achieved:

.1 Test, verify and start-up all systems and prove out all components, interlocks and safety devices.

.2 All the work called for in contract documents, including approved site instructions and change orders, has been completed.

.3 All previously-identified deficiencies have been corrected.

.4 There are no known violations of code requirements or any special requirements of the local authority having jurisdiction (AHJ).

.5 Operating and Maintenance Manuals have received favorable review by the designated reviewer.

.6 Record documents have been submitted.

.7 Spare parts have been delivered.

.8 Systems programming, adjusting, balancing, start-up, and commissioning have been completed.

.9 All specified demonstrations, training, and seminars have been completed.

.10 All specified documentation submittals have been completed.

.11 Certificate from the Contractor stating that penetrations through fire separations have been sealed with certified fire stopping materials in compliance with National Building Code and Contract requirements.

.12 Certificate of inspection from the authority having jurisdiction (AHJ) is submitted.

.13 Fire Alarm Verification report is submitted, free of any deficiencies, qualifications or conditions.

.14 Overcurrent device protection/coordination study has been completed showing results satisfactory to the Engineer with all identified field settings completed.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International):

.1 CAN/CSA-C22.2 No.18, Outlet Boxes, Conduit Boxes and Fittings.

.2 CAN/CSA-C22.2 No.65, Wire Connectors.

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC):

.1 EEMAC 1Y-2, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

Part 2 Product

2.1 MATERIALS

.1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Bushing stud connectors: to EEMAC 1Y-2 to consist of:

.1 Connector body and stud clamp for stranded or round solid copper conductors as required.

.2 Clamp for stranded or round copper conductors as required.

.3 Clamp for conductors.

.4 Stud clamp bolts.

.5 Bolts for copper conductors bar.

.6 Bolts for aluminum conductors.

.7 Sized for conductors as indicated.

.4 Clamps or connectors for armoured cable, as required to: CAN/CSA-C22.2 No.18.

Part 3 Execution

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.

.2 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap every time the connection is removed and reinstalled.

.3 Install bushing stud connectors in accordance with EEMAC 1Y-2.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA C22.2 No. 0.3, Test Methods for Electrical Wires and Cables.

.2 CAN/CSA-C22.2 No. 131, Type TECK 90 Cable

1.2 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

Part 2 Product

2.1 BUILDING WIRES

.1 Conductors: Copper, stranded for 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 600 V insulation of chemically cross-linked thermosetting polyethylene material rated RW90 XLPE

2.2 TECK 90 CABLE

.1 Cable: to CAN/CSA-C22.2 No. 131..

.2 Conductors:

.1 Grounding conductor: copper.

.2 Circuit conductors: copper, size as indicated.

.3 Insulation: Cross-linked polyethylene type RW90 XLPE, 600V for 120/208V system.

.1 Cross-linked polyethylene XLPE.

.2 Rating: 600 V.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: interlocking galvanized steel..

.6 Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.

.7 Fastenings:

.1 One hole malleable iron straps to secure surface cables 53 mm and smaller. Two hole steel straps for cables larger than 53 mm.

.2 Channel type supports for two or more cables at 1500 mm centers.

.3 Threaded rods: 6 mm diameter to support suspended channels.

.8 Connectors:

.1 Dry type approved for TECK cable in indoor type 1 environments.

2.3 ARMOURED CABLES

.1 Conductors: insulated, copper, size as indicated. Minimum size to be #12 AWG.

.2 Type: AC90.

.3 Armour: interlocking type fabricated from aluminum strip.

.4 Type: flame retardant jacket over thermoplastic armour and compliant to applicable Building Code classification for this project wet locations.

.5 Connectors: Standard 3/8" BX. Straight, 90, or duplex to suit application. Approved for

AC cable. Provide plastic insulating bushing for all cable ends.

2.4 CONTROL CABLES

.1 Type PLTC: Multiconductor controls cable

.1 Conductors: PVC insulated, PVC jacketed, copper , unshielded pair, overall shield, minimum size to be #16 AWG.

.2 Insulation: 105 degrees C Flame retardant PVC

.3 Aluminium foil/polyester shield with tinned copper drain wire.

.4 Jacket to by UL listed, sunlight and moisture resistant, sequentially marked, nylon ripcord for jacket removal. FT-4 Flame spread minimum, FT-6 for return air plenums.

.5 Conductors are to be black/white number coded, rated for 300V at 105 degrees C.

.6 Standard of Acceptance: Nexans Instrumentation Cable Type PLTC or approved equal.

2.5 FIRE ALARM CABLE

.1 Conductors: multiconductor, insulated, copper, minimum size to be #18 AWG for device loops and #14 for signal circuits.

.2 Insulation: 105 degrees C Flame retardant PVC.

.3 Outer Jacket: 105 degrees C Flame retardant PVC Red. FT-4 Flame spread minimum, FT-6 for return air plenums.

.4 Armour: Interlocking Aluminium without overall Jacket. For drops to devices in suspended ceilings from conduit system.

.5 Standard of Acceptance: Nexans Securex II or approved equal.

2.6 NON-METALLIC SHEATHED CABLE

.1 Non-metallic sheathed copper cable type: NMD90, size as indicated.

.2 Except where indicated by these contract documents, Non-Metallic Sheathed Cable (NMD90) is allowed where permitted by the Canadian Electrical Code.

.1 #12 AWG NMD90 to have yellow jacket.

.2 #10 AWG NMD90 to have orange jacket.

.3 #8 AWG and larger NMD90 to have white jacket.

Part 3 Execution

3.1 GENERAL CABLE INSTALLATION

.1 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).

.2 Conductor length for parallel feeders to be identical.

.3 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

.4 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.

.5 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.

3.2 INSTALLATION OF TECK CABLE (0 -1000 V)

.1 Install cable in trenches in accordance with drawing details and Section 26 05 44 - Installation of Cables In Trenches and In Ducts.

.2 Terminate cables in accordance with Section 26 05 20 - Wire And Box Connectors (0-1000 V).

3.3 INSTALLATION OF ARMOURED CABLES

.1 Armoured cables are only allowed for the purposes identified below:

.1 Drops to light fixtures in suspended ceilings, maximum length of 1.5m;

.2 Applications specifically indicated elsewhere within the contract documents.

.2 Group cables wherever possible.

.3 Terminate cables in accordance with Section 26 05 20 - Wire And Box Connectors (0-1000 V).

3.4 INSTALLATION OF CONTROL CABLES

.1 Install control cables in conduit

.2 Ground control cable shield.

.3 All costs associated with the supply and installation of control wiring described in Divisions 23 and 25 are outside the scope of Division 26 except where specifically noted otherwise in these contract documents.

3.5 INSTALLATION OF NON-METALLIC SHEATHED CABLE

.1 Install non-metallic sheathed cable only where allowed by applicable codes. Maintain clearances and protection from mechanical damage as required by the Candian Electrical Code.

.2 Use cable listed for wet or damp locations in damp areas.

.3 Install straps and box connectors to cables as required.

.4 Do not use for patient care area receptacles.

3.6 INSTALLATION OF FIRE ALARM WIRING

.1 Install fire alarm wiring in conduit.

.2 Ensure bonding conductor throughout.

.3 Use listed, armoured cable, only for drops to a device in suspended ceiling space from conduit system and for tamper and flow switches exposed wiring.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.1 ANSI/IEEE 837, IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.

.2 CSA International

.1 CSA Z32, Electrical Safety and Essential Electrical Systems in Health Care Facilities.

Part 2 Product

2.1 EQUIPMENT

.1 Provide new artificial grounding electrode system as indicated on drawings.

.2 Rod electrodes: copper clad steel 19 mm diameter by 3 m long. To be Weaver, Thomas & Betts, Erico, Talley or approved.

.3 Grounding conductors: bare stranded copper, soft annealed, size as indicated.

.4 Insulated grounding conductors: green, stranded copper type RW90-XLPE.

.5 Grounding connectors: Hydraulic compression tool applied connectors or exothermic welding process connector or listed mechnical type connectors. Manufacturer: Burndy Hyground Compression System, Erico/Cadweld, Amp Ampact Grounding System or approved.

.6 Pipe grounding clamp: Mechanical ground connector with cable parallel or perpendicular to pipe. Burndy GAR series, O-Z Godney, Thomas & Betts or approved.

.7 Telecommunications Ground bus: 6 mm thick by 50 mm wide by 300 mm long copper ground bar complete with insulated supports, fastenings, connectors, etc. To be Erico, Thomas & Betts or equal.

.8 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:

.1 Grounding and bonding bushings.

.2 Protective type clamps.

.3 Bolted type conductor connectors.

.4 Thermit welded type conductor connectors.

.5 Bonding jumpers, straps.

.6 Pressure wire connectors.

Part 3 Execution

3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories.

.2 Install ground rods as recommended by the manufacturer. Install box level and flush to finished grade.

.3 Ground rods are to be driven vertically into earth with minimum spacing of 1.8m, or as otherwise indicated on drawings, between rods. Where permafrost is encountered that prevents vertical driving, rods may be driven at an angle of not more than 60 degrees from vertical. Rods must be driven, not trenched.

.4 Install equipment grounding conductor, code sized minimum unless noted otherwise on drawings, in all metallic raceway system.

.5 Install connectors in accordance with manufacturer's instructions.

.6 Protect exposed grounding conductors from mechanical injury.

.7 Use bare copper conductor for underground and partially underground, and insulated copper conductor for above ground connections.

.8 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermit process, permanent mechanical connectors or irreversible wrought copper compression connectors to ANSI/IEEE 837.

.9 Use mechanical connectors for grounding connections to equipment provided with lugs.

.10 Soldered joints not permitted.

.11 Install bonding wire for flexible conduit, connected at one ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

.12 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.

.13 Connect building structural steel and metal siding to ground by bonding with compression lug approved for the purpose.

.14 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

3.2 ELECTRODES

.1 Make ground connections to continuously conductive underground water pipe on street side of water meter.

.2 Install water meter shunt.

.3 Bond separate, multiple electrodes together.

.4 Use copper conductors for connections to electrodes; size as indicated on drawings.

.5 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevails. Ground as indicated.

3.3 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list:

.1 Service equipment;

.2 Switchgear;

.3 Raceway systems including cable tray;

.4 Frames of motors;

.5 Starters;

.6 Control panels;

.7 Building steel work;

.8 Distribution panels;

.9 Outdoor lighting and parking receptacles;

.10 Motor shaft grounding devices where provided. See motor specifications in Division 25.

.11 Low voltage and telecommunications systems including but not limited to cabinets, racks, patch panels, electronics, device boxes, etc..

.2 Water service grounding: Bond metallic water service pipe to service ground bus using #6 AWG insulated ground conductor. Connect to the utility side of isolating fittings or meter. Jumper across the meter.

.3 Other metallic piping system: Bond fire suppression system piping system and other metallic piping systems.

3.4 GROUNDING BUS

.1 Install copper grounding bus mounted on insulated supports on wall of electrical room and communication equipment room. Size as required for the service grounding.

.2 Ground items of electrical equipment in electrical room and IT equipment in communication equipment room to ground bus with individual stranded copper connections. Conductor size as indicated on drawings.

3.5 COMMUNICATION SYSTEMS

.1 Install grounding connections for telephone, sound, fire alarm, security systems, intercommunication systems as follows:

.1 Install telecommunications ground bus (TGB) in an appropriate location, 350 mm above the finished floor on the backboard in each one of the Telecommunications/LAN closet and equipment room.

.2 Connect busbars to each other and back to the main service ground connection point by green-insulated #2 AWG RW90-XLPE copper conductor.

.3 Telephone PBX: 1 #6 AWG RW90-XLPE to telecommunications ground bus (TGB).

.4 Telephone service conduit: 1 #6 AWG RW90-XLPE at each end to main service ground connection point and TGB respectively.

.5 Structured wiring equipment: 1 #6 AWG RW90-XLPE to TGB for each.

.6 Structured wiring raceways to be bonded together using #6 AWG RW90-XLPE for every two adjacent piece. The system shall be bonded to TGB using 1 #6 AWG RW90-XLPE conductor.

.7 Fire alarm and detection 1 #6 AWG RW90-XLPE in 12 mm conduit to nearest ground bus.

.8 Telephones: make telephone grounding system in accordance with telephone company's requirements.

.9 Sound, fire alarm, security systems, intercommunication systems as indicated.

3.6 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 01 - Common Work Results - Electrical..

.2 Perform tests before energizing electrical system.

.3 Disconnect ground fault indicator during tests.

.4 Obtain a copy of the latest service requirements from the utility company, perform tests

listed therein as instructed, rectify issues and provide test reports.

END OF SECTION

Part 1 General

Part 2 Product

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted and suspended.

2.2 TBAR DROP WIRE HANGARS

.1 Drop wire/rod supporting clip. Suitable for AC cable or 21mm (3/4") conduit.

.2 Mount securely to TBAR support drop wires. Installation to manufacturers written instructions.

.3 Coordinate with carpentry trades for additional drop wires to support added weight as necessary.

Part 3 Execution

3.1 INSTALLATION

.1 Secure equipment to plaster surfaces with nylon shields or lead anchors.

.2 Secure equipment to suspended ceilings with toggle bolts.

.3 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

.4 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.5 Fasten exposed conduit or cables to building construction or support system using straps.

.1 One-hole malleable iron straps to secure surface conduits and cables 53 mm and smaller.

.2 Two-hole steel straps for conduits and cables larger than 53 mm.

.3 Beam clamps to secure conduit to exposed steel work.

.6 Suspended support systems.

.1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.

.2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

.7 For surface mounting of two or more conduits use channels at 1.5 m on centre spacing.

.8 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.9 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.10 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.11 Do not use supports or equipment installed for other trades for conduit or cable support except where allowed by applicable codes, with permission of other trade and approval

of Engineer.

.12 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

.13 Where screw fastenings are used on metal decking, screws are to be set in lower flutes only.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data for cabinets in accordance with Section 01 33 00 - Submittal Procedures.

Part 2 Product

2.1 JUNCTION AND PULL BOXES (NON-HAZARDOUS LOCATIONS)

.1 Code gauge metal construction and/or cast corrosion-resistant type, conforming to Canadian Electrical Code.

.2 Construction:

.1 16 Gauge welded steel construction

.2 Through holes in back for wall mounting.

.3 Embossed grounging location with green grounding screw and raised wire catch.

.3 Covers:

.1 Screw-on flat covers for surface mounting. Keyhole slots for removing cover while leaving screws captive

.2 Where indicated; hinged cover with screw-tight hasp.

.3 25mm minimum extension all around, for flush-mounted pull and junction boxes.

.4 Materials:

.1 Painted steel, gauge as indicated. (indoors).

.2 Stainless steel. (outdoors)

.3 Galvanized steel. (where indicated)

2.2 CABINETS

.1 Cabinets: Code gauge metal prime coated, locking door, concealed flush hinges, flush lock and catch assembly.

.2 Terminal Strips:

.1 Below 50 volts - screw terminal type, Armaco T12-2 or Cinch Series 500.

.2 Above 50 volts - 250 volt screw terminal type with barriers between each set of terminals with individual terminal points for each conductor.

.3 Signage: number identify terminal strips with permanent numbers. Provide wiring diagram on inside of terminal cabinet door showing units and conductors connected to terminal cabinet.

.4 Construction: welded sheet steel hinged door, handle, latch and catch

.5 Indoor type 1X, dripproof.

.6 Type E: sheet steel, hinged door and return flange overlapping sides, handle, lock and catch, for surface mounting.

.7 Type T: sheet steel cabinet, with hinged door, latch, lock, 2 keys, containing 19 mm G1S plywood backboard for surface mounting.

Part 3 Execution

3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.

.3 Install terminal blocks as indicated in Type T cabinets.

.4 Only main junction and pull boxes are indicated. Install pull boxes so as not to exceed 30 m of conduit run between pull boxes as per the requirements of the Canadian Electrical Code.

3.2 IDENTIFICATION

.1 Provide equipment Identification in accordance with Section 26 05 00 - Common Work Results for Electrical

.2 Install size 2 identification labels indicating system name, voltage and phase.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1, Canadian Electrical Code, Part 1.

Part 2 Product

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required for special devices.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

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

2.2 SHEET STEEL OUTLET BOXES

.1 Electro-galvanized steel single gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

.2 Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

.3 102 mm square or octagonal outlet boxes for luminaire outlets.

.4 102 mm square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster walls.

.5 Sectional boxes are not allowed.

2.3 FLOOR BOXES

.1 Concrete tight electro-galvanized sheet steel floor boxes with adjustable finishing rings to suit floor finish with brushed aluminum faceplate. Device mounting plate to accommodate short or long ear duplex receptacles. Minimum depth: 28 mm for receptacles; 73 mm for communication equipment.

.2 Adjustable, watertight, concrete tight, cast floor boxes with openings drilled and tapped for 19 mm and 21 mm conduit. Minimum size: 73 mm deep.

.3 Flush floor mounted housing with one six-gang compartment on one side and three one-gang compartments on the other side with following features:

.1 Concrete tight, stamped steel construction, 14 gauge sides and bottom, 10 gauge top.

.2 Cover shall be cast aluminium. Lid to be with insert option for carpet inlay or other floor finish.

.3 Duplex plate and 3 jack voice/data plate as required.

.4 Finish: grey with insert for to match floor finish at location. Include floor finish to match:

.1 Carpet.

.2 Carpet tile.

.3 Terrazo.

.4 Sheet flooring.

.5 For polished concrete floors, use stainless steel finish.

.5 Acceptable materials: Wiremold Walker RFB4-SS shallow 62 mm-deep or approved equal.

.6 Provide all accessories necessary, such as cover plates, mud rings, etc. as necessary for a complete installation suitable for this project conditions.

.4 Listed 2 hour fire rated assembly with adjustable fire barrier to accommodate floor thickness.

.1 Spring return receptacle covers.

.2 Dust covers for the RJ45 provisions.

.3 Two circuit power capability.

.4 Acceptable materials: Hubbell PT4X series, Wiremold equal or Cooper equal, or approved equal.

.5 In floor boxes connected to 20A circuits (refer to panel schedules) provide 20A receptacle instead of 15A indicated in item 1. Everything else to match item 1 requirements.

2.4 CONDUIT BOXES

.1 Cast FS boxes with factory-threaded hubs and mounting feet for surface wiring of switches.

2.5 BOXES FOR RIGID STEEL CONDUIT

.1 Cast FS or FD aluminium feraloy boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacle and exterior devices.

.2 To be Crouse Hinds or approved equal.

2.6 OUTLET BOXES FOR NON-METALLIC SHEATHED CABLE

.1 Electro-galvanized, sectional, screw ganging steel boxes, minimum size 76 x 50 x 63 mm with two double clamps to take non-metallic sheathed cables.

2.7 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 35mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.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 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured

cable connections. Do not install reducing washers.

.5 Vacuum clean interior of outlet boxes before installation of wiring devices.

.6 Identify systems for outlet boxes as required.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.

.2 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.

.3 CSA C22.2 No. 56-04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.4 CSA C22.2 No. 83-M1985(R2003), Electrical Metallic Tubing.

.5 CSA C22.2 No. 211.2-M1984(R2003), Rigid PVC (Unplasticized) Conduit.

1.2 LOCATION OF CONDUIT

.1 Drawings do not indicate all conduit runs. Those indicated are diagrammatic only. Determine best routing for conduit on site, ensuring requirements of this specification are met.

Part 2 Products

2.1 CONDUIT

.1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel threaded.

.2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83 , with couplings.

.3 Rigid PVC conduit: to CSA C22.2 No. 211.2.

.4 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.

.5 Flexible PVC conduit: to CAN/CSA-C22.2 No. 227.3 liquid-tight flexible conduit.

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 53 mm and smaller.

.1 Two hole steel straps for conduits larger than 53 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 1.5 m on centre.

.4 Threaded rods, 6 mm diameter, to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" for 90 degrees bends for 35 mm and larger conduits.

.3 EMT couplings and connectors to be dry type in type 1 environments, and watertight where installed outdoors, or as required on the drawings.

.4 To be malleable steel. Cast fittings are not permitted.

2.4 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion

and 19 mm deflection.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.5 PULL CORD

.1 Minimum 6mm stranded nylon (polypropylene) pull rope, tensile strength 5 kN. Leave pull rope in any spare conduit exceeding 3 meters in length, or 90 degrees of bend.

2.6 THREAD LUBRICANT

.1 Make up all male conduit threads with thread lubricant prior to connection.

Part 3 Execution

3.1 MANUFACTURER`S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications,including product technical bulletins, handling, storage and installation instructions,and datasheets.

3.2 INSTALLATION

.1 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.

.2 Use rigid PVC conduit underground.

.3 Use flexible metal conduit for connection to motors in dry areas.

.4 Minimum conduit size for lighting and power circuits: 21 mm.

.5 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.6 Mechanically bend steel conduit over 19 mm diameter.

.7 Field threads on rigid conduit must be of sufficient length to draw conduits up tight. Allow for minimum of 5 threads to be engaged.

.8 Install pull cord in empty conduits.

.9 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.10 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Group conduits wherever possible on suspended channels. Channels to have 25% spare capacity.

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

.4 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

.3 Seal both ends of conduit with sealant to prevent ingress and transmission of foreign material and moisture.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association, (CSA International)

.2 Insulated Cable Engineers Association, Inc. (ICEA)

Part 2 Products

2.1 CABLE PROTECTION

.1 38 x 140 mm (thickness x width) planks pressure treated with clear, copper napthenate or 5% pentachlorophenol solution, water repellent preservative.

.2 Underground marker:

.1 Inert polyethylene plastic ribbon, 150 mm wide by 0.1 mm thick. Safety red for electric power distribution. Safety alert orange for telephone, signal, data and cable TV. Imprint over entire length of ribbon in permanent black letters, the system description selected from manufacturer standard legend, which most accurately describes the subgrade system.

Part 3 Execution

3.1 DIRECT BURIAL OF CABLES

.1 Provide offsets for thermal action and minor earth movements. Offset cables 150 mm for each 60 m run, maintaining minimum cable separation and bending radius requirements.

.2 Make termination and splice only as indicated leaving 0.6 m of surplus cable in each direction.

.3 Underground cable splices not acceptable.

.4 Minimum permitted radius at cable bends for rubber, plastic or lead covered cables, 8 times diameter of cable; for metallic armoured cables, 12 times diameter of cables or in accordance with manufacturer's instructions.

.5 Cable separation: Maintain 1 m separation between primary power feeder cables and low tension systems in parallel and perpendicular crossings.

.6 Install continuous marker tape for each underground cable.

3.2 MARKERS

.1 Where markers are removed to permit installation of additional cables, reinstall markers.

.2 Install underground marker as shown on drawings.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform tests using qualified personnel. Provide necessary instruments and equipment.

.3 Check phase rotation and identify each phase conductor of each feeder.

.4 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.

.5 Perform test in accordance with manufacturer's instructions.

.6 Submit test results showing location at which each test was made, circuit tested and

result of each test. Include a copy of test reports in the O&M manuals.

.7 Remove and replace entire length of cable if cable fails to meet any of test criteria.

.8 Photograph all installations prior to backfilling and include photos in the Operations and Maintenance manuals.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CAN/CSA-C22.2 No.31, Switchgear Assemblies.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Indicate on shop drawings.

.1 Floor anchoring method and foundation template.

.2 Dimensioned cable entry and exit locations.

.3 Dimensioned position and size of bus.

.4 Overall length, height and depth.

.5 Dimensioned layout of internal and front panel mounted components.

.3 Include time-current characteristic curves for circuit breakers and fuses.

.4 Provide fully rated service entrance board assembly, including circuit breakers for the maximum available fault current as indicated on drawings.

.5 Integrated TVSS:

.1 Evidence of compliance to safety certifications as per CSA must be submitted as requested.

.2 Evidence of unit performance as detailed in the product specifications.

1.3 TRAINING

.1 Conduct training program for designated building maintainer to allow authorized personnel to understand and exercise all aspects of system operation. Training to consist of demonstration of disconnects, including panel and circuit breakers, for controlling power supply throughout the building for safety reasons. Training is not to consist of physical connection, disconnection, tampering, or any such activity that would normally be the sole responsibility of a certified journeyman electrician.

.2 Training program to be of 2-hour duration. Training period schedule to be established by the Contractor reviewed and approved by the Consultant. Training period to take place after building substantial completion and prior to building occupancy.

1.4 QUALITY ASSURANCE

.1 Submit copies of certified test results in accordance with Section 01 33 00 - Submittal Procedures.

1.5 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for service entrance board for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

.2 Submit copies of maintenance data for complete assembly including components.

Part 2 Product

2.1 SERVICE ENTRANCE BOARD

.1 Service Entrance Board: to CAN/CSA-C22.2 No.31.

.2 Rating: 120/208 V, three phase, four wire, ampacity and short circuit current as indicated on the drawings in kA (rms symmetrical).

.3 Cubicles: free standing, dead front, size as indicated.

.4 Main breaker section approved as service entrance equipment.

.5 Barrier metering section from adjoining sections.

.6 Provision for installation of power supply authority metering in barriered section.

.7 CT section to be 760 mm x 910 mm x 300 mm deep, unless larger dimension is required by the local utility company. Provide 35 mm internal wire way from metering section to C.T. section.

.8 Barriered C.T. Section to be suitable for utility requirements. Provide mounting facilities for supply authorities meter.

.9 Distribution section.

.10 Hinged access panels with captive knurled thumb screws.

.11 Bus bars and main connections: 99.3% copper.

.12 Bus from terminals of main breaker to metering section and cable lugs in metering section for external distribution feed.

.13 Identify phases with colour coding.

.14 Barriered section for housing transfer switch.

.15 Provide fully rated circuit breakers throughout the system.

.16 Enclosure: Indoor type

.17 Cutler Hammer CMP A2, Square D, or Siemens equal.

.18 Prior to bid and again prior to submitting shop drawings, ensure that the suggested panelboard fits in the location shown on drawings. Inform Engineer immediately if the specified gear would not fit.

2.2 MOULDED CASE CIRCUIT BREAKERS

.1 Sized as indicated on drawings. To have electronic trip for the main and thermal magnetic trip for the distribution breakers. Size as indicated on drawing.

.2 Minimum interrupting capacity to meet or exceed the interrupting capacity indicated on drawings

.3 Each breaker complete with locking hasp, suitable for locking in the closed (on) or open (off) position.

2.3 GROUNDING

.1 Copper ground bus extending full width of cubicles and located at bottom.

.2 Lugs at each end for the grounding cable size indicated on drawings.

2.4 POWER SUPPLY AUTHORITY METERING

.1 Separate compartment and metal raceway for exclusive use of power supply authority metering.

.2 Provide mounting accessories and wiring for metering supplied by power supply authority:

2.5 INTEGRATED TVSS GENERAL FEATURES

.1 The devices shall be suited for operation in 120/208 VAC as shown on the drawings, 3

pole, 4 wire electrical configuration and effectively provide TVSS filtering.

.2 The integrated filtering panel shall be of fully integrated design utilizing only the DBC methodology (Direct Busbar Coupling). The DBC method shall eliminate lead length impedance factors and provide optimum distribution system protection.

.3 Suppression/Filter System Connections. No plug-in component modules, quick disconnect terminals or printed circuit boards shall be used in surge current-carrying paths.

.4 Circuit construction must be fully tested to NEMA LS-1 to reflect full surge current withstand capabilities.

.5 The unit shall have visual indicator lights for each phase of operation. The system shall continuously monitor the operating status of each phase of suppression protection. If the unit is in proper working order, the indicator light shall be illuminated green. If the unit performance is degraded, the lamp light colour shall change to red. These indicators must be visible without removal of the panel trim. In the event that the operation of the unit's suppression or filtering becomes impaired, a red flashing indicator light shall be illuminated. This lamp shall be visible from a distance of 20 meters.

.6 Fuses: The TVSS/filter system shall utilize internal fuses rated with a minimum interrupting rating of 200,000 AIC.

.7 Identification: The unit shall include manufacturer's nameplates and CSA approval on the exterior of the enclosure.

.8 Warranty: The manufacturer shall provide a limited five year warranty on the TVSS filter. The warranty shall commence from date of shipment.

.9 Testing: Testing of each unit shall include quality assurance checks, "Hi-Pot" test at two times rated voltage plus 1000 volts per UL requirements, and operational and calibration tests.

.10 Noise filtering:

.1 The unit shall include a high frequency extended range tracking filter with an effective filtering bandwidth of 10 KHz to 50 MHz.

.2 Noise attenuation shall be a minimum of 50 DB at 100 KHz based on standard insertion loss data obtained utilizing the MIL STD-E220A, 50 ohm insertion loss methodology.

.11 Modbus and Ethernet communication ports ready for plug and play.

.12 Approved manufacturers: Cutler-Hammer Clipper Power System, Square D equal, Siemens equal or approved equal.

2.6 INTEGRATED TVSS SUPPRESSION SYSTEM

.1 Surge Current: The unit's maximum peak surge current, capacity per phase based on the standard 8 x 20 micro second waveform (described in ANSI/IEEE C62.41), shall be not less than 250,000 amps. Total device peak, surge current rating shall be not less than 250,000 amps, and 125,000 amps per mode.

.2 Let-Through Voltage. The integrated filtering panelboard shall demonstrate peak voltage let-through characteristics as listed below. Testing shall be performed utilizing Category B3 and C1 test wave forms as described in ANSI/IEEE C62.41. The test procedure shall be in accordance with ANSI/IEEE C62.45 and shall be conducted on the device as a finished product complete with integral fusing.

IEEE C63.41 Let-through Voltages in table below:

(For WYE configurations IEEE Let-Through is measured L-N).
Test points used in deriving these results must be taken directly at the panelboard bus bar (using typical lead lengths) thus demonstrating actual distribution system transient let-through voltages. UL 1449 ratings established at test points other than the bus bar, shall not be considered reflective of this test due to lead length factors.

Category B3 Ringwave	Category C3/C1 Impulse Combination Waveform	Operating Voltage
L-N 150 Volts	470 Volts/400 Volts	208Y/120
L-N 300 Volts	1600 Volts/1200 Volts	600Y/347

.3 Each unit shall be capable of withstanding 3,000 sequential, Category C1, 8 x 20 micro second impulses as described and conducted in ANSI/IEEE C62.42 and C62.45. The interval between impulses shall not exceed 30 seconds. The resultant let-through voltage of the last impulses shall not exceed 30 seconds. The resultant let-through voltage of the last impulse shall not vary from the first impulse by more than +5%.

.4 The unit shall have a minimum joule rating of 25,200.

.5 Maximum Continuous Operating Voltage (MCOV): The maximum continuous operating voltage of the integrated filtering panelboard shall be not less than 125% of the nominal operating voltage for line to ground and line to neutral modes.

.6 Protection Modes: TVSS components shall be provided for all possible common and normal modes, including line to line (7 modes for a three phase WYE).

.7 The TVSS filter shall be connected to the panelboard bus bar as shown on single line diagram with zero lead length wiring. Field installed non-integrated TVSS component products will not be considered.

2.7 FINISHES

.1 Apply finishes in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Service entrance board exterior per Section 26 05 00 - Common Work Results for Electrical.

.3 Supply 2 spray cans touch-up enamel.

2.8 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Nameplates:

.1 White plate, black letters, size 4.

.2 Complete board labelled: "Indicating Service voltage, Consultant, Contractor and Gear"

.3 Main disconnect labelled: "Main Breaker".

.4 Branch disconnects labelled: with Size 4 labels.

2.9 SOURCE QUALITY CONTROL

.1 Provide manufacturer's inspection and test certificates.

.2 Submit test and inspection certificates to Engineer for review. Include a copy in Operation & Maintenance manuals.

Part 3 Execution

3.1 INSTALLATION

.1 Locate service entrance board on the concrete housekeeping pad and fasten to wall and floor.

.2 Connect main secondary service to line terminals of main breaker.

.3 Connect load terminals of distribution breakers to feeders.

.4 Check factory made connections for mechanical security and electrical continuity.

.5 Run grounding conductor insulated green copper, size and quantity as indicated on drawings, from ground bus to building ground.

.6 Ensure that C.E.C. requirement for non-combustible base is met.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International).

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

.3 Proof of fully-rated fault bracing and interrupting capacity. Series rated panels are not permitted.

1.3 PLANT ASSEMBLY

.1 Install circuit breakers in panelboards before shipment.

.2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

1.4 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for panelboards for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

.2 Include data for each panelboard.

.3 Include a copy of typewritten panel directories.

Part 2 Products

2.1 BRANCH CIRCUIT PANELBOARDS

.1 Panelboards: to CSA C22.2 No.29 and product of one manufacturer.

.2 250 V panelboards: bus and breakers rated for the maximum available fault current, as indicated on the drawings in kA (symmetrical) interrupting capacity. 120/208 volt, 3 phase, 4 wire, solid neutral design with sequence style bussing and full size neutral of capacity indicated.

.3 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.

.4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

.5 Two keys for each panelboard and key panelboards alike.

.6 Copper bus with neutral of same ampere rating as mains.

.7 Suitable for bolt-on breakers.

.8 Trim with concealed front bolts and hinges.

.9 Trim and door finish: air dried grey enamel for indoors and baked grey enamel for outdoors.

.10 Provide fully rated circuit breakers throughout the system.

.11 Enclosure: Indoor type

.12 Standard of acceptance:

.1 208 Volt: Cutler-Hammer Pow-R-Line 1, Square D type NQOD, Siemens type NLAB.

2.2 BREAKERS

.1 Breakers: to Section 26 28 21 - Moulded Case Circuit Breakers.

.2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.

.3 Main breaker: separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.

.4 Lock-on devices for 10% of 15 to 30 A breakers installed or as indicated. Turn over unused lock-on devices to the Owner.

.5 Lock-on devices for exit signage, fire alarm and emergency lighting circuits.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Nameplate for each panelboard size 4 engraved as indicated.

.3 Nameplate for each circuit in distribution panelboards size 2 engraved as indicated.

.4 Complete typewritten panel directory showing number and location of each circuit. Provide three (3) typed panel directories, two of which in the plastic pouch attached to the inside of the panelboard door, and one in the O&M manuals.

Part 3 Execution

3.1 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.

.2 Install surface mounted panelboards on plywood backboards in accordance with Section 06 10 10 - Rough Carpentry. Where practical, group panelboards on common backboard.

.3 Mount panelboards to height specified in Section 26 05 00 - Common Work Results - Electrical or as indicated.

.4 Connect loads to circuits.

.5 Connect neutral conductors to common neutral bus with respective neutral identified.

.6 Mount panelboard vertically with odd numbered breaker on the left and even numbered breakers on the right.

.7 Wherever possible use pull boxes to collect home runs and larger conduits to complete the return to the branch circuits to avoid conduit congestion at the face of walls. Consider the CEC required derating factors and overcurrent protection when using collected homeruns.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA International

.1 CSA C22.2 No.42, General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CAN/CSA C22.2 No.42.1, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

.3 CSA C22.2 No.55, Special Use Switches.

.4 CSA C22.2 No.111, General-Use Snap Switches (Bi-national standard, with UL 20).

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

Part 2 Product

2.1 SWITCHES

.1 20 A, 120 V, single pole, double pole, three-way, four-way switches to: CSA C22.2 No.55.

.2 Manually-operated general purpose AC switches with following features:

.1 Terminal holes approved for No.10 AWG wire.

.2 Silver alloy contacts.

.3 Urea moulding for parts subject to carbon tracking.

.4 Suitable for side wiring.

.5 Toggle to be White.

.3 Toggle operated fully rated for resistive, fluorescent and LED/electronic loads, and up to 80% of rated capacity for inductive/motor loads.

.4 Switches of one manufacturer throughout project.

2.2 Duplex Receptacles

.1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA C22.2 No.42 with following features:

.1 Reinforced thermoplastic base and deep nylon body.

.2 Suitable for No. 10 AWG for back and side wiring.

.3 Break-off links for use as split receptacles.

.4 Four side wiring screws.

.5 Triple wipe contacts and riveted grounding contacts.

.6 Finish: White.

.2 Duplex receptacles CSA type 5-20R, 125 V, 20 A, U ground, to: CSA-C22.2 No.42 with

following features:

.1 Reinforced thermoplastic base and deep nylon body.

.2 Suitable for No. 10 AWG for back and side wiring.

.3 Break-off links for use as split receptacles.

.4 Four side wiring screws.

.5 Triple wipe contacts and riveted grounding contacts.

.6 Finish: White.

.7 Industrial specification grade.

.3 Other receptacles with ampacity and voltage as indicated.

.4 Receptacles of one manufacturer throughout project.

.5 Surge protected receptacles: common and normal mode protection, 240 Joules/15,000 Amps per mode, audio & visual status indicators, alarm silencing, 500 V maximum suppressed voltage (ANSI/UL 1449-1986 testing), duplex outlet, blue finish.

2.3 OCCUPANCY AND DAYLIGHT SENSORS

.1 Switch type Occupancy Sensors: Wall-mounted, intelligent, combined passive infrared and acoustic detection. To include adaptive, adjustable time delay of 0.5-30 minutes (programmed for 20 minutes), 180 degree field of view, suitable for 1400 VA at 347 or 120 VAC to match the circuit voltage, fluorescent load and programmable ON/OFF pushbutton with manual "ON" override.

.1 Finish: To be White.

2.4 PARKING RECEPTACLE

.1 Outdoor rated, dual-circuit 125 VAC, 15 A time and temperature controlled receptacle suitable for use as a split parking receptacle for two stalls.

.2 Load limit: 1800 W.

.3 Initial power delay after connecting block heater: 2 h.

.4 Programmable maximum load limitation.

.5 Green and red indicating LED lights for each stall indicating a live outlet, a functioning block heater, open circuit in the block heater, circuit overload or short circuit.

.6 Cast aluminum, weatherproof box.

.7 Programmable profile, preprogrammed as follows:

.1 Temperature above -5ºC: 0% of time ON.

.2 Vary duty cycle infinitely from -5ºC to 100% ON at -25ºC.

.8 To be ILPC M210 complete with weatherproof cover.

2.5 PARKING RECEPTACLE PROGRAMMER

.1 Handheld programming device compatible with Parking Receptacles with time and temperature control as specified.

.2 To connect to receptacles via an optical link.

.3 Capable of transferring information between a Windows-based computer and each parking receptacle. To include Windows-based software for computer that allows changes to factory settings and customization of user settings.

.4 Capable of collecting data from parking receptacles and transferring to computer.

.5 IPLC Data-Mate or approved equivalent.

2.6 COVER PLATES

.1 Cover plates for wiring devices to: CSA C22.2 No.42.1.

.2 Cover plates from the wiring device manufacturer throughout project.

.3 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.

.4 Stainless steel, vertically brushed, 1 mm thick cover plates for wiring devices mounted in flush-mounted device box.

.5 Sheet metal cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.

.6 Weatherproof double lift spring-loaded cast aluminum cover plates, complete with gaskets for duplex receptacles as indicated.

.7 Weatherproof while-in-use covers: NEMA 3R when closed over energized plug. Vertical mount for duplex receptacle. Provide continuous use cover with cover capable of closing over energized cord plug with bottom aperture for cord exit. To be Die cast aluminum cover with closed cell neoprene foam gasket. Intermatic WP1010MC or equal.

2.7 SOURCE QUALITY CONTROL

.1 Cover plates from one manufacturer throughout project.

Part 3 Execution

3.1 INSTALLATION

.1 All wiring devices to be fed from "pigtail" splices. Feed through splices utilizing the devices as a splicing terminal is not acceptable.

.2 Switches:

.1 Install single throw switches with handle in "UP" position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.3 Mount toggle switches at height in accordance with Section 26 05 00 - Common Work Results for Electrical .

.3 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles at height specified in Section 26 05 00 - Common Work Results - Electrical or as indicated..

.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.

.4 Mount receptacles with u-ground on the bottom of the receptacle.

.5 Install GFI type receptacles as indicated.

.6 Identification: Each receptacle shall have the circuit number and the supplying panelboard permanently identified at the outlet. This identification shall be visible when receptacle cover plate is in place.

.1 Use Size 2 lamicoid screw-fastened to wall above receptacle.

.7 Parking receptacle programming: For parking receptacles with time and temperature control, program all receptacles in the project and provide written record of the settings. Provide a minimum of one hour of on-site training at each site to operations personnel on the use of the Parking Receptacle Programmer. Provide related programming and monitoring software to the on-site operations personnel for installation on personal computer.

.4 Cover plates:

.1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.2 Install suitable common cover plates where wiring devices are grouped.

.3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

.5 Install occupancy and daylight sensor switches as recommended by manufacturer. Adjust, program, test and verify the operation of the sensors. Program for manual ON and automatic OFF.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Include time-current characteristic curves for breakers with ampacity of 200A and over or with interrupting capacity of 22,000 A symmetrical (rms) and over at system voltage.

Part 2 Products

2.1 BREAKERS GENERAL

.1 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient.

.2 Common-trip breakers: with single handle for multi-pole applications.

.3 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.

.4 Circuit breakers with interchangeable trips as indicated.

.5 Provide fully rated circuit breakers throughout the system.

2.2 THERMAL MAGNETIC BREAKERS [DESIGN A]

.1 Except the main service breaker and breakers 400A and larger, for which electronic trip is specified, moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

.2 Provide ground fault protection where shown on drawings.

2.3 ENCLOSURE

.1 As indicated on drawings or specified.

Part 3 Execution

3.1 INSTALLATION

.1 Install circuit breakers as indicated.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

1.2 REFERENCES

.1 CSA Group

.1 CAN/CSA-C22.2 No.4, Enclosed and Dead-Front Switches (Tri-National Standard, with ANCE NMX-J-162-2004 and UL 98).

.2 CSA C22.2 No.39, Fuseholder Assemblies.

Part 2 Product

2.1 DISCONNECT SWITCHES

.1 Fusible, or non-fusible, disconnect switch, as identified on drawings in CSA enclosure type 1 or 3 suitable for the location installed and sprinkler proof, unless indicated otherwise, size as indicated.

.2 Provision for padlocking in on-off switch position by 3 locks.

.3 Mechanically interlocked door to prevent opening when handle in ON position.

.4 Fuseholders: relocatable and suitable without adaptors, for type and size of fuse indicated.

.5 Use class RK1, or class J fuses for general purpose loads.

.6 Use class RK5 or class CC fuses for motor loads.

.7 Use class CC fuses for control transformers.

.8 Quick-make, quick-break action.

.9 ON-OFF switch position indication on switch enclosure cover.

.10 Horsepower rated for load interruption.

.11 To include drip shields.

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Indicate name of load controlled on size 4 nameplate.

2.3 FINISHES

.1 Apply finishes to enclosure in accordance with Section 26 05 00 - Common Work Results - Electrical.

Part 3 Execution

3.1 INSTALLATION

.1 Install disconnect switches complete with fuses if applicable.

.2 Locate disconnect switch in site of the load.

.3 Connect feeders.

.4 Test and verify the operation of the switch.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 International Electrotechnical Commission (IEC)

.1 IEC 947-4-1-2002, Part 4: Electromechanical contactors and motor-starters.

.2 National Electrical Manufacturers Association (NEMA).

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Indicate:

.1 Mounting method and dimensions.

.2 Starter size and type.

.3 Layout of identified internal and front panel components.

.4 Enclosure types.

.5 Wiring diagram for each type of starter.

.6 Interconnection diagrams.

1.3 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for motor starters for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

.2 Include operation and maintenance data for each type and style of starter.

Part 2 Product

2.1 MATERIALS

.1 Starters: EEMAC E14-1.

.1 Half size starters not acceptable.

.2 Starters: to IEC 947-4 with AC4 utilization category.

.3 Enclosure: Indoor type sprinkler proof.

2.2 MANUAL MOTOR STARTERS

.1 Single or Three phase manual motor starters of size, type, rating, and enclosure Type 1 unless otherwise indicated, with components as follows:

.1 Switching mechanism, quick make and break.

.2 Overload heater(s), manual reset, trip indicating handle.

.3 Indicating light: standard red pilot light.

.2 Accessories:

.1 Toggle switch: standard or key operated as indicated.

.2 Locking tab to permit padlocking in "ON" or "OFF" position.

2.3 CONTROL TRANSFORMER

.1 Single phase, dry type, control transformer with primary voltage as indicated for the motor and secondary voltage as required to match the load, complete with secondary fuse, installed in with starter enclosure.

.2 Size control transformer for control circuit load plus 20% spare capacity.

2.4 ACCESSORIES

.1 Pushbutton: heavy duty.

.2 Selector switches: heavy duty.

.3 Indicating lights: heavy duty, colour as indicated.

2.5 FINISHES

.1 Apply finishes to enclosure in accordance with Section 26 05 00 Common Work Results for Electrical.

2.6 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 Common Work Results for Electrical.

.2 Manual starter designation label, white plate, black letters, size 1, engraved as indicated.

Part 3 Execution

3.1 INSTALLATION

.1 Install starters, connect power and control as indicated.

.2 Ensure correct fuses and overload device elements installed.

.3 Provide CEC required disconnect switch whether specifically shown on drawings or not. Provide disconnect switch in sight of each motor controller.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 Common Work Results for Electrical and per manufacturer's instructions.

.2 Operate switches and contactors to verify correct functioning.

.3 Perform starting and stopping sequences of contactors and relays.

.4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.1 ANSI/IEEE C62.41, Surge Voltages in Low-Voltage AC Power Circuits.

.2 Canadian Standards Association (CSA International)

.3 ICES-005-07, Radio Frequency Lighting Devices.

.4 Underwriters' Laboratories of Canada (ULC)

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit complete photometric data prepared by independent testing laboratory for luminaires, for review by Engineer.

.3 Product data to include: total input watts, candlepower summary, candela distribution zonal lumen summary, luminaire efficiency, CIE (International Commission on Illumination) type, coefficient of utilization, lamp type, VCP with spacing criteria, and lumen rating in accordance with IESNA testing procedures.

.4 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

Part 2 Product

2.1 LED LIGHTING FIXTURES

.1 LED Light Sources and Luminaires to: ANSI/ANSLG C78.377, IESNA LM-79, IESNA LM-80, IESNA TM-21 and UL 8750.

.2 Luminaire Efficiency. Allow for thermal and optical losses. Efficiency to be determined on a "delivered lumens per watt" basis for comparison of each luminaire using input drive current. Minimum initial delivered lumens per watt required to be verified with independent testing lab certification and in no case to be less than 70 lumens per Watt.

.3 Depreciation:

.1 As a miniumum, average delivered lumens over 50,000 hours of operation to be a minimum of 95% of initial delivered lumens.

.2 Life-span rating shall be based on L70 in units of hours as defined by IESNA standard LM-80.

.4 Warranty: Manufacturer's warranty of a minimum of 5 years on LED's and drivers.

.5 Manufacturer: Must have verifiable history of having been in the business of manufacturing LED light fixtures for a minimum of 7 years.

.6 LED Drivers:

.1 Electronic.

.2 Input voltage tolerance of rated voltage +/- 10%.

.3 Power factor >90% at full load.

.4 THD <10%.

.5 Load regulation: +/- 1% from no load to full load.

.6 Exterior fixtures to be rated for -40 through +40 degrees Celsius ambient temperature.

.7 Integral overheating protection.

.8 Integral overload protection.

2.2 LUMINAIRES

.1 Refer to Luminaire Schedule on drawings.

Part 3 Execution

3.1 INSTALLATION

.1 Locate and install luminaires as indicated on drawings.

.2 Check the ceiling types by refering to architectural drawings prior to ordering material. Inform Engineer of any descripancies between the electrical drawings and ceiling types immediately and request clarification. Provide all necessary accessories for mounting the specified luminaires on the ceiling type in each space.

3.2 WIRING

.1 Connect luminaires to lighting circuits.

.1 Armoured cable (BX) may be used for drops to luminaires in accessible ceiling space.

.2 Provide extra length of armoured cable securely coiled in accessible ceiling space to allow relocation of the luminaire within a 2m radius at no extra cost.

3.3 LUMINAIRE SUPPORTS

.1 For suspended ceiling installations support luminaires independently of ceiling.

.2 Support fluorescent luminaires mounted in continuous rows once every 1.219 m.

3.4 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted in continuous rows to form straight uninterrupted line.

.2 Focus and adjust all adjustable luminaires, at presence of Engineer, at such time of day or night as required.

.3 Clean paint splatters, dirt, dust, fingerprints and debris from luminaires.

.4 Where finish of luminaire has been damaged, touch up finish per manufacturer instructions.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International).

1.2 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Data to indicate system components, mounting method, source of power and special attachments as well as battery charge and discharge voltage/time characteristics.

.3 Submit operation and maintenance data in accordance with Section 01 78 00 - Closeout Submittals.

Part 2 Products

2.1 EQUIPMENT

.1 Emergency lighting equipment: to CSA C22.2 No.141.

.2 Supply voltage: 120 V AC, 60 Hz.

.3 Output voltage: 24 V DC.

.4 Operating time: 30 minutes, and to produce not less than 87.5% of nominal DC system voltage with AC supply 'off'.

.5 Battery: sealed, long life 10 year maintenance free life expectancy.

.6 Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01V for plus or minus 10% input variations.

.7 Solid state transfer circuit.

.8 Automatic self-diagnostic circuitry identifying battery failure, battery disconnected, charger failure, lamp failure, service alarm.

.9 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.

.10 Signal lights: solid state, for 'AC Power ON' and 'High Charge'.

.11 Lamp heads: integral on unit, 345 degrees horizontal and 180 degrees vertical adjustment. Lamp type: MR16, 4W LED

.12 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.

.13 Finish: White.

.14 Auxiliary equipment:

- .1 Ammeter.
- .2 Voltmeter.
- .3 Test switch.
- .4 AC input and DC output inside cabinet.
- .5 Brownout protector.

.15 Battery Charger:

.1 Automatically maintain battery in fully charged state while main power available. Maintain DC float voltage within plus or minus 1% of setting, no load to full load, during main voltage variations of plus 10% to minus 10% and frequency variations of plus or minus 5%.

.2 Equalize charging rate such that after battery has provided full power output for specified duration, charger returns battery to 95% of fully charged state in 12 h.

.3 Automatic cycle test providing monthly, semi-annual and annual tests with annual test being for 30 minutes.

2.2 REMOTE HEADS

.1 Remote Heads: surface mount vandal resistant polycarbonate base, clear UV-resistant polycarbonate cover, fully adjustable, double heads. c/w MR16, LED, glare free.

.1 Standard heads: dual 4 Watt;

.2 Exterior-type heads: dual 6 Watt, weatherproof, suitable for operation at -40 degrees C;

.2 Standard of Acceptance : AimLite EBST series, Lumacell RGS series, or equal.

Part 3 Execution

3.1 INSTALLATION

.1 Identify conductors for polarity and voltage.

.2 Install with conductors sized to maintain current flow with maximum 3% voltage drop.

.3 Install central and remote heads per CEC rule 46-304 and as indicated on drawings and make all required connections to heads.

.4 Direct light heads to suit site condition and check operation.

3.2 WIRING OF REMOTE HEADS

.1 Conductors: Type RW90 XLPE in accordance with Section 26 05 21 - Wires and Cables 0-1000 V, sized to be #10 AWG minimum.

.2 Conduit: type EMT, in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Include: Performance test for duration of system specified herein with all loads connected and functional.

.3 Include a copy of the test report in the O&M manuals.

.4 Units will be tested during the substantial completion field review by the Engineer. Schedule the work at the outset of the construction so that work schedules are properly coordinated to guarantee this. Coordinate with other subtrades involved to ensure attendance at the time of tests.

.5 Pretest the units prior to request for substantial completion field review and troubleshoot all deficiencies. Coordinate with other subtrades involved to ensure their components and systems are installed, tested and ready for pretesting at the time of the pretests.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.141-02, Unit Equipment for Emergency Lighting.

1.2 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittals.

.2 Submit product data sheets for exit lights. Include product characteristics, performance criteria, physical size, limitations and finish.

.3 Manufacturer Instructions: Provide to indicate special handling criteria, installation sequence, cleaning procedures, scheduled maintenance.

Part 2 Product

2.1 STANDARD UNITS

.1 Exit lights: to CSA C22.2 No.141 and NRCAN/CSA C860, packaged in accordance with the Canadian Code for Preferred Packaging guidelines.

.2 Green pictogram and white graphic symbol of "running man" with directional arrows.

.3 Housing: extruded, one-piece aluminum.

.4 Face and back plates: extruded aluminum.

.5 Lamps: Light Emitting Diode (LED).

.6 Operation: designed for 25 year life expectancy without relamping.

.7 Face plate to remain captive for relamping.

.8 120/347VAC input, field selectable.

.9 To have DC voltage option with voltage matching that of emergency lighting units.

.10 To have 5 year warranty.

.11 Ceiling and surface wall mounting as required.

.12 Single or Double face as shown on drawings.

.13 Arrow: as required.

.14 Wireguard where identified on drawings.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install exit lights as indicated, in accordance with NBC requirements.

.2 Connect fixtures to exit light circuits as indicated.

.3 Connect emergency DC power to emergency circuits

.4 Ensure that exit light circuit breaker is locked in on position.

.5 Do not contain any other loads with exit lights on the same AC circuit.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Units will be tested during the substantial completion field review by the Engineer. Schedule the work at the outset of the construction so that work schedules are properly coordinated to allow this. Coordinate with other subtrades involved to ensure attendance at the time of tests.

.3 Pretest the units prior to request for substantial completion field review and troubleshoot all deficiencies. Coordinate with other subtrades involved to ensure their components and systems are installed, tested and ready for pretesting at the time of the pretests.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association, (CSA International)

.2 Telecommunications Industry Association (TIA)

1.2 SYSTEM DESCRIPTION

.1 Structured system of telecommunications cables (copper and optical fiber) installed within buildings for distributing voice and data (including video) signals.

.2 Installed in physical star configuration with separate horizontal and backbone sub-systems. Horizontal cables link work areas to telecommunications closet located on same floor. Telecommunications closets linked to central equipment room by backbone cables.

.3 Provide a manufacturer-certified, telecommunications distribution system for voice and data as indicated on the drawings and specified herein.

.4 System to provide an operating level and meet installation criteria as defined by the ANSI/TIA/EIA-568-B standard to Cat 6 level.

.5 System is limited to cabling installations between communication outlets and Telecommunication Rooms and any accessory wiring specifically indicated herein or on drawings.

.6 All components of the system shall be from the same manufacturer.

.7 All electronics by the Owner (NIC).

1.3 SHOP DRAWINGS

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit labeling for all equipment, devices and systems for review at the outset of the construction along with product data sheets.

Part 2 Products

2.1 UNSHIELDED TWISTED PAIR (UTP) CABLE

.1 4-Pair Category 6, Gigabit Ethernet, to ANSI/EIA/TIA/538B 2-1 with FT4 flame spread rating. PROVIDE FT6 RATING WHERE INSTALLED IN CEILINGS USED FOR RETURN AIR PLENUMS.

2.2 CONNECTORS

.1 At each outlet designated on the drawings as a structured wiring outlet provide two eight (8) position Cat 6 modular jacks, unless otherwise noted.

.2 Provide jacks in colours that match existing colour scheme. In the absence of a standard provide ivory.

.3 Provide White plastic cover plates for telecommunication outlets. Outlets to be identified on plates as to use with identification labels as indicated on drawings and in this specifications.

.4 Connectors to be wired to T568 B configuration.

2.3 PATCH PANELS

.1 Patch Panels in LAN/Communications Room to be mounted on free standing 19" racks

as indicated on drawings.

.2 Patch panels to be suitable for use with Category 6 Enhanced Ethernet with IDC terminations and 8 position jacks, with 48 ports per panel. Patch panel jacks to be wired to T568 B configuration.

2.4 PATCH CORDS

.1 Provide patch cords in compliance with the manufacturer's certification. Use patch cords certified by the manufacturer for meeting Category 6 Ethernet requirements.

.1 Provide patch cords as required to connect all jacks to their appropriate system (telephone or LAN) as is indicated on the drawings.

2.5 EQUIPMENT RACKS

.1 Four Post Racks: free standing, floor mounted 19" equipment rack with rear access to punch-down blocks and front access to port connections, cable channels and covers on each side of rack running the full vertical length. Steel construction, black finish, 2134mm high, 483mm (standard 19") wide. To be seismically rated for IBC Zone-4 Standards. To be Hammond Manufacturing Modular Server Cabinet System C4 Series with C4K-Z4 Seismic Bolt Down Kit, or approved equal.

.2 Each equipment rack to include power bar with minimum 6 outlets.

2.6 IDENTIFICATION

.1 Identify each cable by a unique code as specified herein, identify cable at each end of it's length. Utilize pre-coded self adhesive vinyl tape for cable identification.

.2 Identify each telecommunications jack by a unique code as specified herein. Identify each jack using label plates with self-adhesive or built-in-plate labels according to labeling scheme specified herein.

.3 Identify each telecommunications conduit by a unique code as specified herein. Conduits are to be tagged with lamiciods such that the lamicoid does not obstruct the conduit throat.

.4 Identify each telecommunications cable tray by a unique code as specified herein. Tag trays with lamiciods such that the lamicoid does not obstruct the cable installation.

.5 Identify each patch panel by a unique code as indicated on the drawings and specified herein. Utilized lamicoids with 9.5mm high lettering.

.6 Identify each telecommunications jack on all patch panels by a unique code as specified herein, which matches the corresponding outlet jack. Use self-adhesive or built-in-plate labels according to labeling scheme specified herein.

.7 Identify each telecommunications outlet jack by a unique code as specified herein. Use self adhesive labels or built-in-plate labels according to labeling scheme specified herein.

.8 Identify each telecommunications outlet using the identical method as the original and existing installation.

Part 3 Execution

3.1 INSTALLATION

.1 Install all telecommunications cabling in concealed spaces in conduit, and on cable tray where shown on drawings.

.2 In accessible ceiling spaces above the T-Bar ceiling, between cable tray and conduit, use open wiring using TIA/EIA approved J-hooks as recommended by the applicable TIA/EIA standard for the category of cable used and in compliance with manufacturer

instructions. Install J-hooks at no more than 1m distance from each other or from the cable tray or conduit. Run open wiring parallel or perpendicular to the walls. Incompliant installation shall be replaced with compliant, at any stage upon Consultant request even after wiring is installed and tested.

.3 From each communication outlet run number of cables indicated on drawings to patch panels as noted. Connect cables to patch panels as noted.

.4 Cabling from outlets to telecommunications rooms to be four pair UTP.

.5 Clean raceway system prior to installing wiring.

.6 Do not exceed manufacturer recommended maximum pull force.

.7 Maintain minimum bending radius recommended by the manufacturer.

.8 Provide strain relief and routing guides per applicable standards.

.9 Provide identification for cable at both ends and where it enters a pull box. Provide identification every 15 m for cables installed on the tray and at both sides where cable passes through conduit sleeves.

.10 Provide identification for jacks and patch panels.

.11 Use cable straps and bundle cables in accessible ceiling space.

.12 Ground all patch panels and racks per applicable codes.

.13 Provide fire stopping to code requirements at fire separations.

.14 Leave pull string in all occupied and unoccupied conduits.

.15 Maintain the cable manufacturer recommended separation between cable and sources of EMI and RFI.

.16 Ensure that the cable is not flattened, squeezed, or crimped.

.17 Tie wrap cables using Velcro wraps. Nylon tie is not acceptable.

.18 Use specific tools recommended by manufacturer for each connector type.

.19 Ensure that the connector strain relief provisions, as recommended by manufacturer, are used.

.20 Strip jackets no more than the minimum required per manufacturer instructions. Maintain pair twist as much close to the termination as recommended by manufacturer.

.21 Mount patch panels in orderly fashion. Submit layouts for approval prior to installation.

.22 Ground patch panels as recommended by manufacturer and required by code.

.23 Attach horizontal wiring to patch panel in an orderly fashion.

.24 Mount patch panels to racks with as many screws as there are mounting holes or slots in panel.

.25 Provide necessary strain reliefs and cable support brackets, plus trays for fiber cable loop behind panel and install cables utilizing such devices.

.26 Complete records and record drawings for each component in system and compile binder.

.27 Do not exceed the maximum cable length of 90 m. Inform engineer and request directions prior to rough in when a run appears to exceed 90 m.

3.2 INSTALLATION OF HORIZONTAL DISTRIBUTION CABLES

.1 Terminate STP cable in accordance with CSA-T529.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 01 - Common Work Results - Electrical.

.2 Testing:

.1 Each cable to be tested for compliance to criteria as stated within TIA/EIA-568-B.

.2 Provide printed report of all cables verifying that they meet the Category 6 standard requirements. Place in manual with system records.

.3 Provide electronic records of all reports in the format of a current and commonly used database.

.4 Test and verify the performance of the fiber link per ANSI/TIA/EIA-526-14-A,ANSI/TIA/EIA-568-B.3 & B.3-1, and TIA/EIA TSB-140.

.5 Test the telephone cable per manufacturer instructions and the applicable TIA/EIA standards.

.6 All modifications to existing system are to be compatible with existing certified installation. Warranty for existing system is not to be compromised by new work, and all new work is to be certified and guaranteed within warranty of existing system.

.3 Provide electronic records of all test reports in the same format as of the administrative cable database records. Include a copy of the test results in the operation and maintenance manuals.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S304-06, Signal Receiving Centre and Premise Burglar Alarm Control Units.

.2 CAN/ULC-S306-03, Intrusion Detection Units.

.3 ULC-S318-96, Standard for Power Supplies for Burglar Alarm Systems.

.4 ULC-C634-M1986, Guide for the Investigation of Connectors and Switches for Use with Burglar Alarm Systems.

1.2 TRAINING

.1 Conduct training program for designated building personnel to allow system users to understand and exercise the following:

.1 Alarm arming and disarming.

.2 Alarm programming and control.

.3 Other aspects important for the maintaining and full operation of the intrusion alarm system.

.2 Training period schedule to be established by the contractor. Training period to take place after building substantial completion and prior to building occupancy.

1.3 OPERATION

.1 When alarm system has been set, the activation of any monitoring device or switch on the system is to activate the remote signaling device.

.2 System is to detect and report disconnection or tampering with any device.

.3 Normal arming/disarming to be accomplished by numeric keypad(s) for programming and to allow building entry/exit by delaying alarm signal for specified amount of time. Entering of the correct numeric code to facilitate arming or disarming of system. System's internal 7-day timeclock serves as primary means of arming/disarming system.

.4 Main control panel to signal autodialler upon alarm.

1.4 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Maintenance Data: Submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 ENCLOSURE

.1 Enclosure to be: suitable for the location shown on drawings.

.2 The enclosure to facilitate necessary ventilation and natural cooling necessary for the proper operation of the equipment enclosed therein.

Part 2 Product

2.1 MAIN CONTROL PANEL

.1 Main Control Panel is to be a Bosch D7412G controller, Ademco Vista-32FB or approved equivalent.

2.2 PASSIVE INFRARED DETECTORS

.1 Space type detector with long range pattern and spare lens to field convert to broad pattern. Provide device as indicated on drawings.

2.3 POWER SUPPLY

.1 Take power from independent 120 volt 15 amp circuit. Circuit disconnect device to be accessible only to authorized personnel.

.2 Rectifier: Approved for purpose and be part of control panel or a separate unit to automatically maintain standby battery bank fully charged under normal conditions and sized to recharge standby batteries in twelve (12) hours maximum, following emergency operation. Rectifier to operate system when batteries are disconnected.

.3 Standby Battery Bank: The battery bank to be kept "floating" across the line. Sealed lead-acid type batteries of sufficient capacity to operate system under supervisory load conditions without recharging for 24 consecutive hours, as per manufacturer's specifications for particular unit.

2.4 NUMERIC KEYPAD

.1 To be secondary means to arming and disarming system by entering a numeric code. To be Bosch D1255, Ademco 6160 or approved equivalent.

2.5 INTERNAL TIMER

.1 System to include internal 7-day timeclock that serves as primary means of arming/ disarming system.

2.6 CONTACTS

.1 Mounting: surface.

.2 Mounting locations: door.

.3 Operating gap: 9.5 mm.

.4 Type: magnetic, closed loop.

.5 Minimum operating temperature: -40 degrees Celsius.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install panels, intrusion detection system and components in accordance with manufacturer's written installation instructions to locations, heights and surfaces shown on reviewed shop drawings.

.2 Install panels, intrusion detection system and components secure to walls, ceilings or other substrates.

.3 Install required boxes in inconspicuous accessible locations.

.4 Conceal conduit and wiring.

.5 Passive infrared devices to be wall mounted with aiming such that the corridors and circulation spaces are completely monitored.

.6 Keypad(s) to be mounted at 1450 mm above finished floor.

.7 Adjust sensitivity of all detection devices to suit installation conditions.

.8 Each initiating device is to have separate wiring home run back to control panel. Each device to be a separate zone and to be partitioned as indicated on the drawings.

3.3 FIELD QUALITY CONTROL

.1 Certify the installation is complete and per manufacturer instructions.

.2 Certify the system is programmed per owner's requirements and all the codes and information have been communicated to the owner's representative(s).

.3 Provide training as indicated in Article 1.7.

3.4 VERIFICATION

.1 Visual verification: Objective is to assess quality of installation and assembly and overall appearance to ensure compliance with Contract Documents. Visual inspection to include: control panel, devices, wiring and communicator.

.2 Technical verification: Purpose to ensure that all systems and devices are properly installed and free of defects and damage. Technical verification to include control panel, devices, wiring and communicator.

.3 Operational verification: Purpose to ensure that devices and systems' performance meet or exceed established functional requirements. Operational verification includes: control panel, devices, wiring and communicator

3.5 CLEANING AND ADJUSTING

.1 In accordance with Section 01 74 11 - Cleaning.

.2 Remove protective coverings from control panels, detection accessories and components.

.3 Adjust all components for correct function.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)

1.2 REGULATORY REQUIREMENTS

.1 Co-ordinate and meet requirements of power supply authority. Ensure availability of power when required.

Part 2 Products

2.1 MATERIAL

.1 Service mast: rigid tubular metal, suitable for attachment of support clamps, insulator rack, weatherhead, service drop fittings.

.2 Insulator rack: to CAN/CSA-C83, one wire, medium duty.

.3 Weatherhead: cast.

.4 Rigid steel galvanized conduit, fittings: in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

.5 Service drop conductors and supporting cable : in accordance with Section 26 05 21 - Wires and Cables 0-1000 V, copper, type RW90, size and number of conductors as indicated.

.6 Weatherproof meter socket: in accordance with and approval of supply authority.

Part 3 Execution

3.1 INSTALLATION

.1 Install service mast, insulator rack, weatherhead.

.2 Install meter socket and conduit.

.3 Install service drop conductors allowing sufficient conductor length for connection to service equipment.

.4 Allow sufficient conductor length for connection to supply by power supply authority.

.5 Allow sufficient conductor length for drip loops.

.6 Make grounding connections in accordance with Section 26 05 28 - Grounding - Secondary.

END OF SECTION