The following changes in the tender documents are effective immediately. This addendum will form part of the contract documents.

DRAWINGS

.1 Drawing E-000 RA – Key plan and symbol legend

.1 Add General Project Note #12 as indicated.

.2 Drawing E-100-RA – Main Power House (BLDG. 115) Single Line and Electrical Details

.2 Delete zone interlocking requirement.
.3 Partial site plan legend relocated due to conflict with other text.
.4 Revise overcurrent protective devices on the Main H.V. Bus as indicated.
.5 Revise symmetric short circuit rating as indicated.

.3 Drawing E-104 RA – Building 103 Single Line and Electrical Details

.1 Revise overcurrent protective devices on US-103 to be drawout breakers as indicated

.4 Drawing E-106 RA – Building 105 Single line and Electrical Details

.1 Revise overcurrent protective devices on US-105 to be drawout breakers as indicated

.5 Drawing E-202 Updated Partial Site Plan: High Voltage Feeder Replacement

.1 Add detail 2 for site plan from main powerhouse to building 106 for feeder replacement.

.6 Drawing E-401 Site Single Line Diagram – New (1 of 2)

.1 Make changes to single line diagram as noted above

.7 Drawing E-402 Site Single Line Diagram – New (2 of 2)

.1 Make changes to single line diagram as noted above
.2 Delete digital meter and ground fault on feeder to PS-1A.

SPECIFICATIONS

.1 Section 26 05 14 - Power Cable and Terminations (1001V and over)

.1 Revise section 2.2 Cable Terminations as indicated.

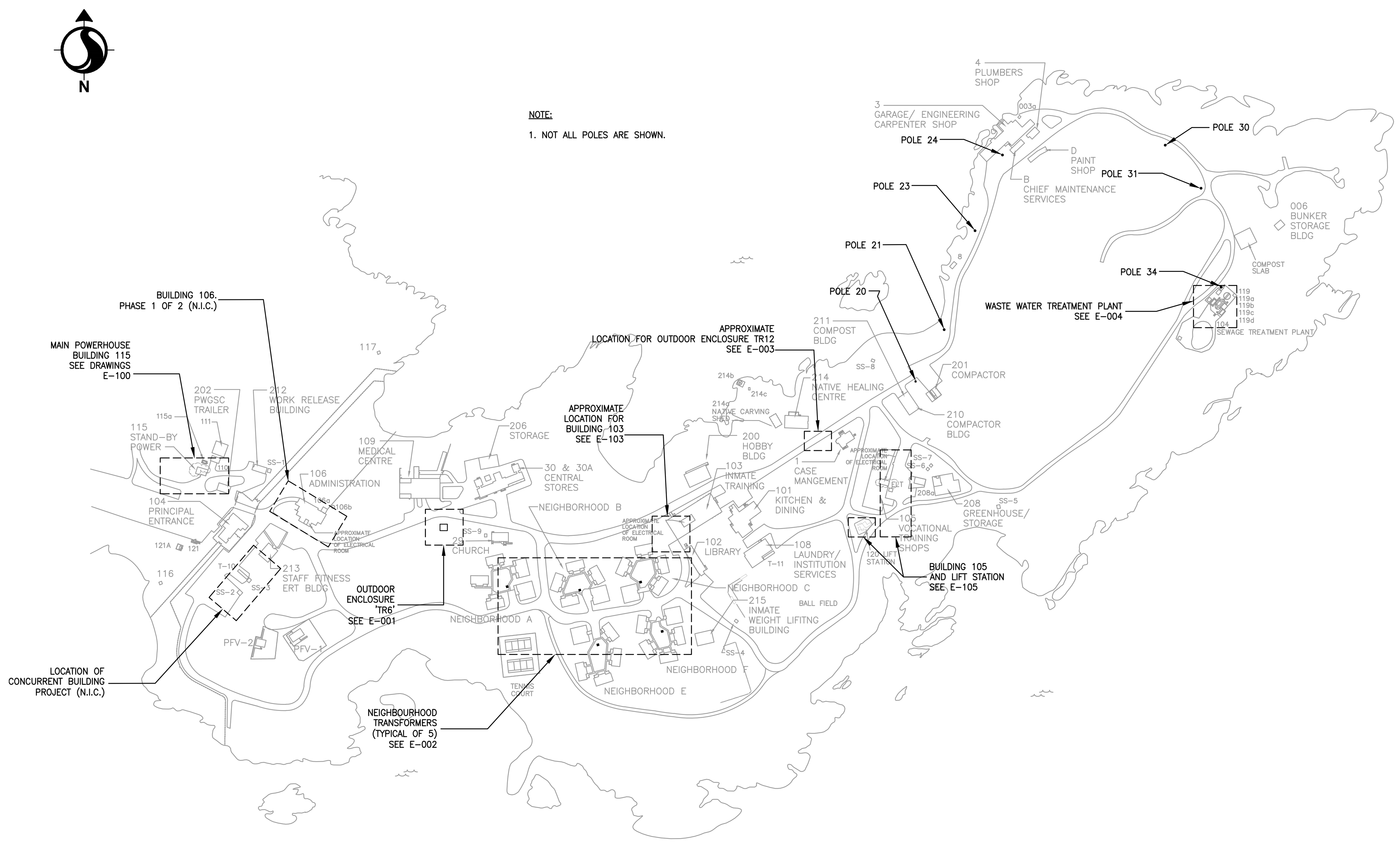
.2 Section 26 11 13.01 – Unit Substation to 25kV

.1 Revise section 2.3 for updated interrupting capacity for primary switchgear.
.2 Revise section 2.7 to delete fuse requirement as indicated
.3 Revise section 2.8 to include vacuum circuit breaker as alternative to SF6

.3 Section 26 36 23.01 - Automatic Transfer Switches (15kV)

.1 Add 2.3.1 Circuit breaker type transfer equipment, as indicated, and adjust numbering accordingly.

END OF ADDENDUM No. 1



1 SITE KEY PLAN
1:3000

DRAWING LIST

GENERAL PROJECT NOTES:

1. PROVIDE COORDINATED OVERCURRENT PROTECTIVE DEVICES THAT MITIGATE ARC FLASH INCIDENT ENERGY LEVELS BELOW 8 CAL/CM2.
2. PROVIDE NON-DESTRUCTION CABLE TESTING USING VERY LOW FREQUENCY METHOD FOR ALL PRIMARY FEEDERS THAT ARE PART OF THIS SCOPE OF WORK. PROVIDE TEST RESULTS TO DEPARTMENTAL REPRESENTATIVE.
3. PRIOR TO EXCAVATING, USE GROUND PENETRATING RADAR TO IDENTIFY ALL UNDERGROUND SERVICES THAT WILL BE AFFECTED BY THE WORK AND PROVIDE DIMENSIONED LAYOUT TO DEPARTMENTAL REPRESENTATIVE. CAREFULLY EXPOSE SERVICES BY HAND WHERE APPROPRIATE.
4. WHERE UNDERGROUND SERVICES ARE ENCOUNTERED DURING EXCAVATION FOR DUCTS, PRECAUTIONS ARE TO BE TAKEN TO MAINTAIN THESE SERVICES – PIPES, CABLES, ETC. – AND IF BROKEN DURING THE PROCESS, ARE TO BE REPAIRED UNDER THIS CONTRACTOR'S SCOPE OF WORK, TO THE SATISFACTION OF THE DEPARTMENTAL REPRESENTATIVE.
5. NO INSTALLED DUCTS IN TRENCHES TO BE LEFT OPEN OVERNIGHT. ALL OPEN TRENCHES IN ROADS SHALL BE COVERED WITH STEEL PLATES.
6. RESTORE ALL LANDSCAPING IN AFFECTED AREAS TO MATCH ORIGINAL LANDSCAPE CONDITIONS.
7. ALL NEW CIRCUIT BREAKERS, 200A OR GREATER, TO BE LSI ELECTRONIC TRIP CIRCUIT BREAKERS.
8. THE TRANSFER SWITCH (WHETHER NOTED AS OPEN TRANSITION OR CLOSED TRANSITION) THAT IS TO BE PROVIDED WILL INITIALLY BE CONNECTED IN AN OPEN TRANSITION. HOWEVER, IT WILL ULTIMATELY BE CONFIGURED AS A CLOSED TRANSITION TRANSFER SWITCH. THE CONTRACTOR IS TO PROVIDE ADDITIONAL MOBILIZATION, MODIFICATION, AND COMMISSIONING SERVICES TO TRANSITION THE TRANSFER SWITCH FROM OPEN TO CLOSED TRANSITION.
9. SHUTDOWNS TO OCCUR ON WEEKENDS OR AS DESIGNATED BY THE DEPARTMENTAL REPRESENTATIVE.
10. PROVIDE TREE PROTECTION FENCES LARGE ENOUGH TO EXTEND TO THE DRIP LINE OF TREES IN CLOSE PROXIMITY TO SITE WORK.
11. ALLOW FOR UP TO TWO VISITS PER DAY TO ENSURE GENERATORS WILL RUN CONTINUOUSLY FOR 36 HOUR PERIOD.
12. PROVIDE CABLE FAULT INDICATORS (CURRENT RESET TYPE) MOUNTED TO CABLES FOR INSTALLATIONS WHERE THE CONCENTRIC NEUTRAL OF CABLES IS INTENDED TO BE USED AS THE RETURN PATH FOR FAULTS ON THE SITE DISTRIBUTION SYSTEM.

A

SCHEMATIC SYMBOLS

	DRAW OUT LOW VOLTAGE CIRCUIT BREAKER
	LOW VOLTAGE CIRCUIT BREAKER
	HIGH VOLTAGE CIRCUIT BREAKER
	DRAW OUT HIGH VOLTAGE CIRCUIT BREAKER
	LOAD BREAK SWITCH
	DISCONNECT SWITCH
	FUSE
	TRANSFORMER
	AUTOTRANSFORMER
#	CURRENT TRANSFORMERS (# INDICATES NUMBER OF CTs IN GROUP)
	ZERO SEQUENCE CURRENT TRANSFORMER
#	POTENTIAL TRANSFORMERS (# INDICATES NUMBER OF PTs IN GROUP)
	TRANSFER SWITCH
	FOUR POSITION, T-BLADE SWITCH
M	MOTOR OPERATOR FOR LOAD BREAK SWITCH
ST	SHUNT TRIP
R	RELAY (TYPE AS NOTED)
G L N	AUTOMATIC TRANSFER SWITCH C/W SINGLE ISOLATION/BYPASS
G L N	AUTOMATIC TRANSFER SWITCH C/W DUAL ISOLATION/BYPASS
	NORMALLY OPEN CONTACT
	NORMALLY CLOSED CONTACT
G	GENERATOR
M	REVENUE METER
DMS	DIGITAL INFORMATION METER
Δ	DELTA CONNECTION
Y	WYE CONNECTION
	GROUND CONNECTION
	HIGH VOLTAGE STRESS RELIEF CONE
	POTHEAD
	CAPACITOR
	SURGE PROTECTIVE DEVICE
	LIGHTNING ARRESTOR
PANEL N2A 42CCT / PNL N2A	PANELBOARD
	PUSH PULL SWITCH
	MANHOLE
	GROUND BUS
O	OHMMETER
K	KEY SWITCH/KEY INTERLOCK
V	VOLTMETER
	CONNECTION
	MAGNETIC MOTOR STARTER
	MANUAL MOTOR STARTER
	MOTOR OVERLOAD
	BREAK LINE
	CONTINUATION BREAK
#	CABLE FAULT INDICATOR (# INDICATES TYPE. REFER TO DRAWING NOTES)
	DEAD BREAK SEPARABLE INSULATED CONNECTORS

POWER PLAN SYMBOLS

	COMBINATION DISCONNECT AND MAGNETIC MOTOR STARTER
	DISCONNECT SWITCH
	FUSED DISCONNECT SWITCH
	MAGNETIC MOTOR STARTER
	CONDUIT STUB
	CONDUIT UP
	CONDUIT DOWN

GENERAL SYMBOLS

#	NOTE REFERENCE
## ###	EQUIPMENT REFERENCE
#	REVISION NUMBER
##	WIRING HOME RUN

ABBREVIATIONS

EX	EXISTING DEVICE TO REMAIN
RE	REMOVE EXISTING DEVICE
RP	REPLACE EXISTING DEVICE WITH NEW DEVICE
RL	RELOCATE EXISTING DEVICE
ER	EXISTING DEVICE IN RELOCATED POSITION
TYP	TYPICAL
WP	WEATHERPROOF

LEGEND

P	PRIMARY U/G LINE - NEW TO REMAIN
P	PRIMARY U/G LINE - EXISTING
P	PRIMARY U/G LINE - TO BE REMOVED
S	SECONDARY U/G LINE - NEW TO REMAIN
S	SECONDARY U/G LINE - EXISTING
S	SECONDARY U/G LINE - TO BE REMOVED
COM	COMMUNICATION U/G LINE - EXISTING

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Revision/ Revision	Description/Description	Date/Date
A	ADDENDUM #1	APR.24.17
0	ISSUED FOR TENDER	MAR.14.17

Client/client

CORRECTIONAL SERVICE CANADA

Project title/Titre du projet

METCHOSIN, BC

ELECTRICAL HIGH VOLTAGE UPGRADE (PHASE 2 OF 2) WILLIAM HEAD INSTITUTION

Consultant Signature Box Only

Designed by/Concept par
P.Necpal

Drawn by/Dessine par
P.Necpal

PWGSC Project Manager/Administrateur de Projets TPSGC
P. Truong

PWGSC, Regional Manager, Architectural and Engineering Services/ Gestionnaire régionale, Services d'architectural et de génie, TPSGC
P. Paul

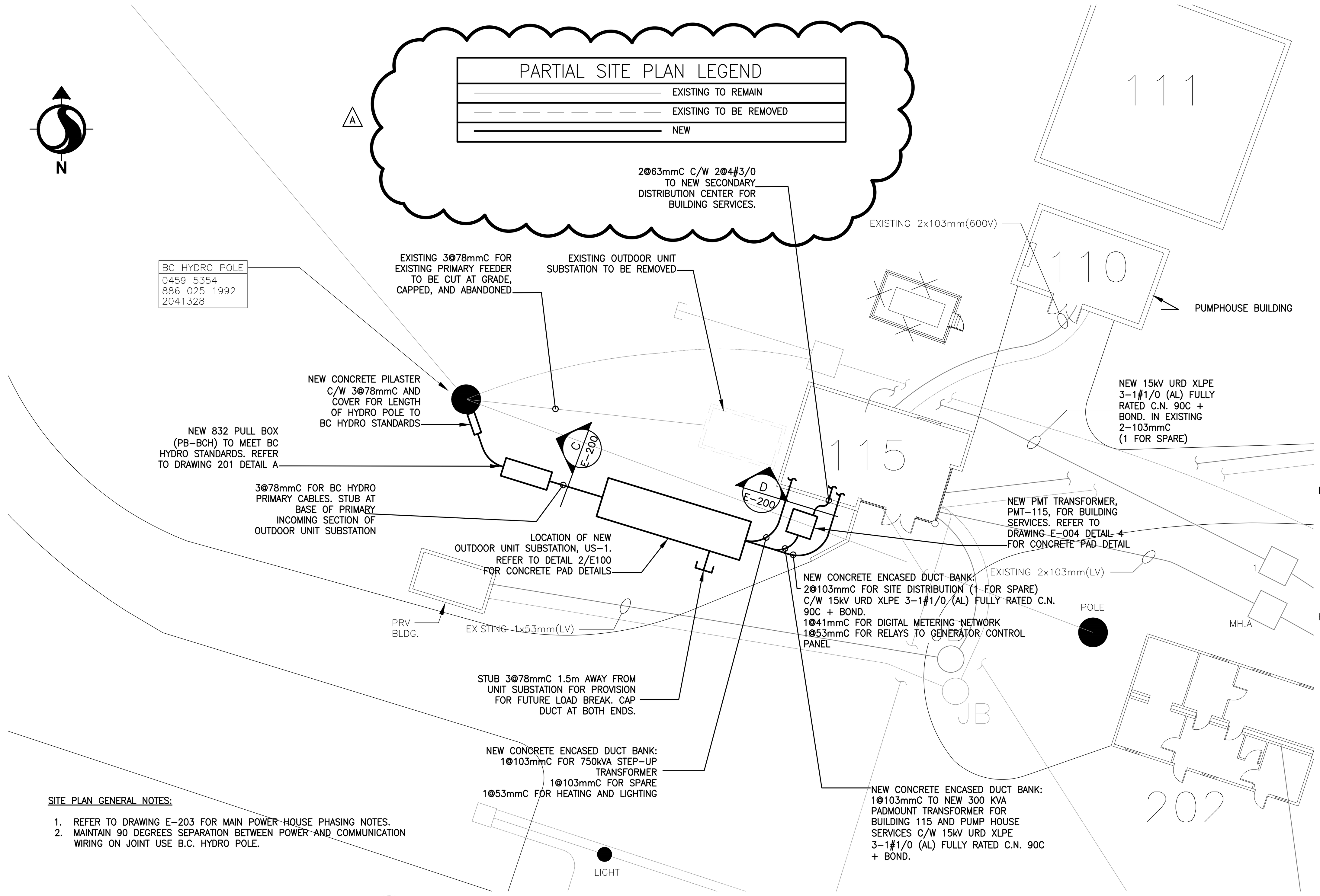
Drawing title/Titre du dessin

KEY PLAN AND SYMBOL LEGEND

Project No./No. du projet
R.069376.001

Sheet/Feuille
E-000
1 OF 22

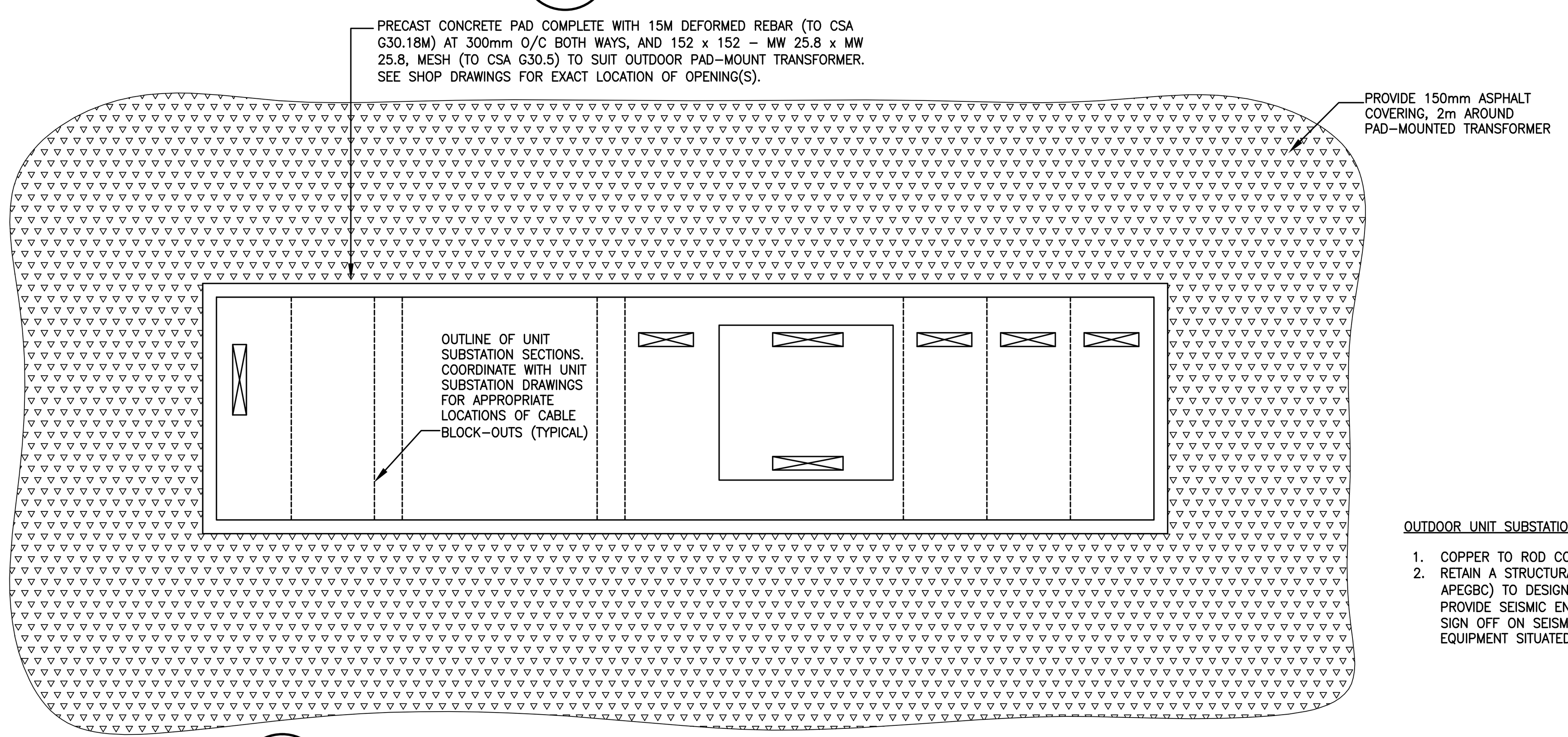
Revision no./La Révision no.



SITE PLAN GENERAL NOTES:

1. REFER TO DRAWING E-203 FOR MAIN POWER HOUSE PHASING NOTES.
2. MAINTAIN 90 DEGREES SEPARATION BETWEEN POWER AND COMMUNICATION WIRING ON JOINT USE B.C. HYDRO POLE.

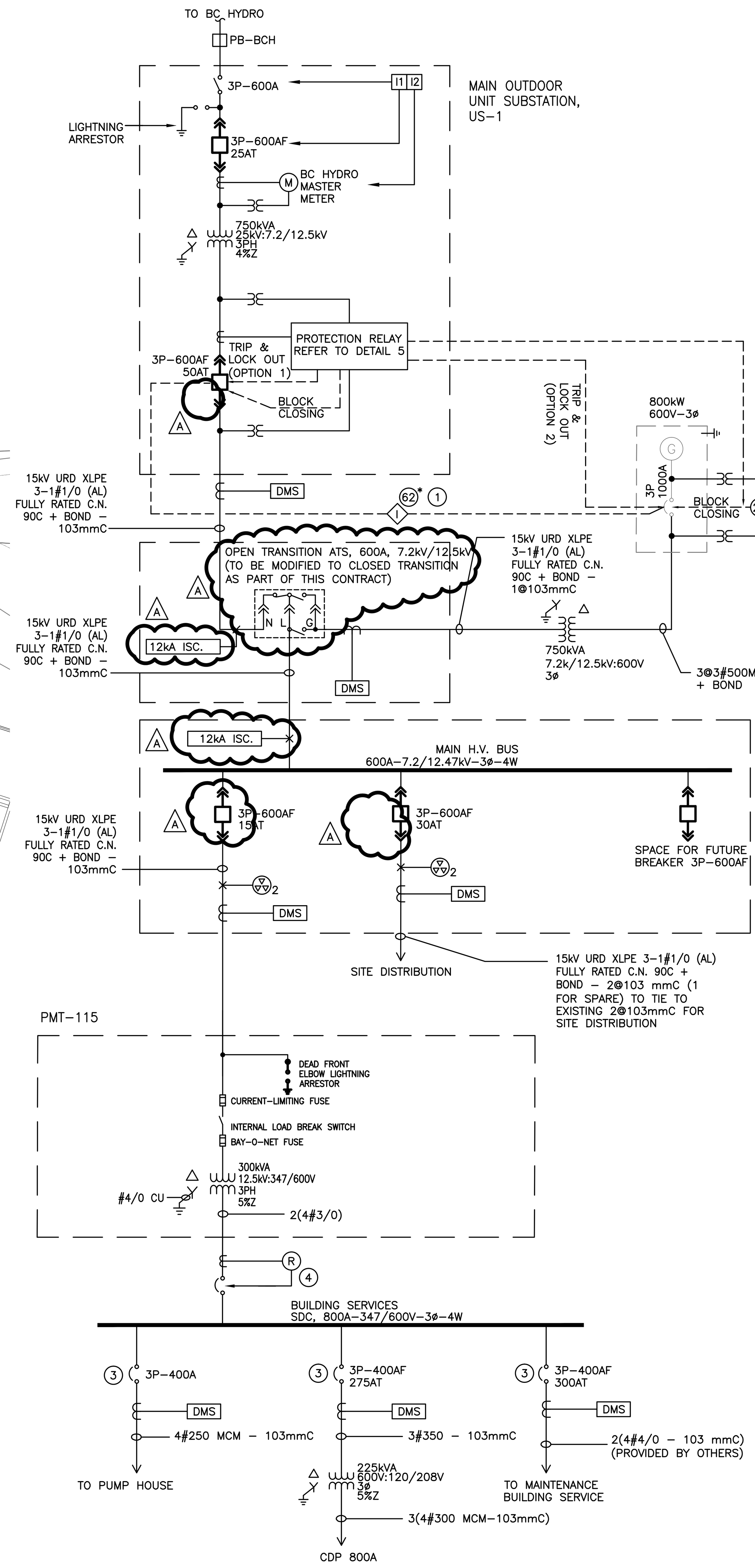
1 MAIN POWER HOUSE (BLDG. 115) – PROPOSED SITE PLAN
000 1:200



OUTDOOR UNIT SUBSTATION CONCRETE PAD GENERAL NOTES:

1. COPPER TO ROD CONNECTION TO BE THERMITE WELDED.
2. RETAIN A STRUCTURAL ENGINEER (REGISTERED BY APEGBC) TO DESIGN A RE-INFORCED CONCRETE PAD. PROVIDE SEISMIC ENGINEER'S LETTER OF ASSURANCE TO SIGN OFF ON SEISMIC RESTRAINT OF PAD AND EQUIPMENT SITUATED ON PAD.

2 OUTDOOR UNIT SUBSTATION (US-1) CONCRETE PAD LAYOUT-PLAN
N.T.S.



4 MAIN POWERHOUSE SINGLE LINE DIAGRAM
N.T.S.

SINGLE LINE DIAGRAM LEGEND

———	EXISTING TO REMAIN
— — —	EXISTING TO BE REMOVED
———	NEW

SITE SINGLE LINE DIAGRAM KEYNOTES:

1. PROTECTIVE RELAY FUNCTIONS

25 SYNCHRONISM–CHECK
27 UNDERVOLTAGE
32 DIRECTIONAL POWER
59 OVERVOLTAGE
81U UNDERFREQUENCY
81O OVERFREQUENCY
62 TIME DELAY (BACKUP TIMER)

LEGEND

(#)* FUNCTION ACTIVE DURING PARALLEL OPERATION ONLY

(I) ELECTRICAL INTERLOCK

2. NOT USED.

3. PROVIDE LSI ELECTRONIC TRIP CIRCUIT BREAKER

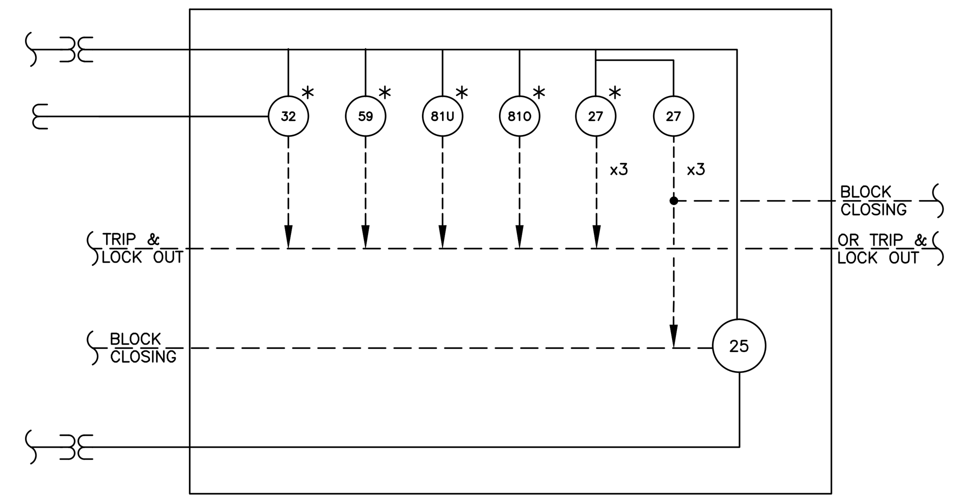
4. PROVIDE FEEDER PROTECTION RELAY c/w THE FOLLOWING FEATURES: OVERCURRENT AND TIME–OVERCURRENT FOR PHASE, GROUND, AND NEGATIVE SEQUENCE FAULT CONDITIONS (50 PGQ, 51 PGQ); NEUTRAL OVERCURRENT (50N) AND NEUTRAL TIME–OVERCURRENT (51N); AND, ARC FLASH DETECTION AND NEUTRAL AND PHASE OVERCURRENT (50N AF, 50P AF). PROVIDE CAPABILITIES FOR FUTURE ZONE INTERLOCKING.

SINGLE LINE DIAGRAM GENERAL NOTES:

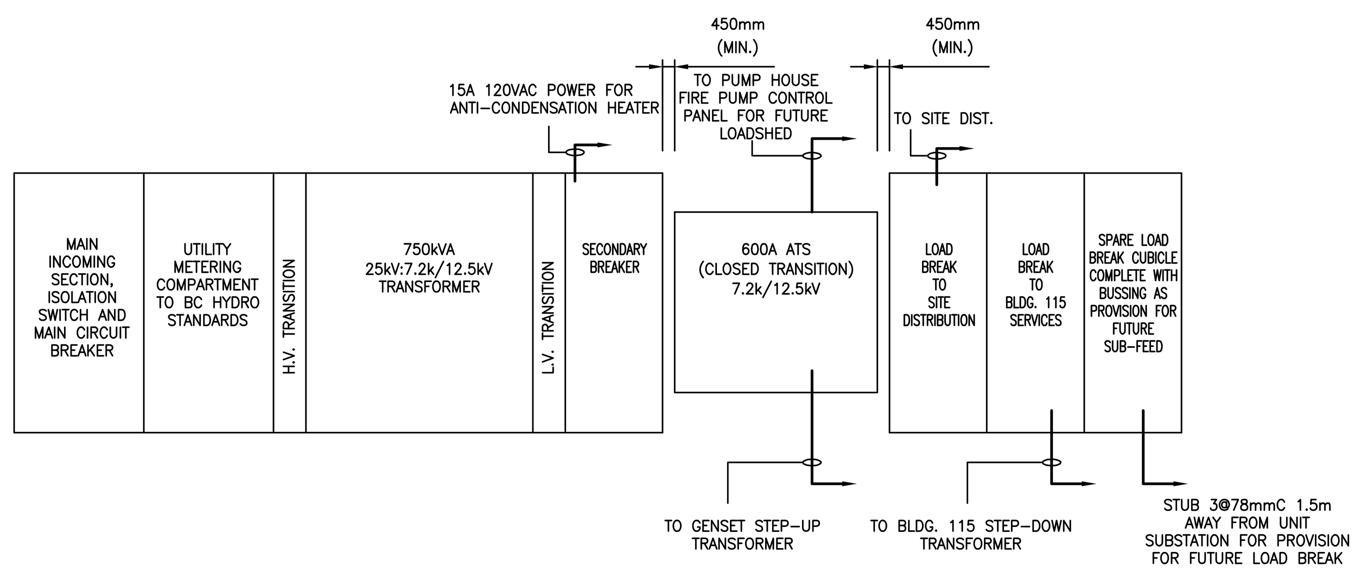
1. ALL NEW WIRING TO BE COPPER XLPE RW90 UNLESS NOTED OTHERWISE.
2. PROVIDE 24–PORT CAT6 PATCH PANEL AND CONNECT ALL DIGITAL METERS TO PATCH PANEL FOR INTERGRATION WITH SITE BMS STSTEM.
3. CABLE FAULT INDICATOR TYPES '1' AND '2' TO BE PROVIDED, AS FOLLOWS:

TYPE 1: HOT STICK MOUNTED C/W CURRENT RESET (1.5A MIN)
TYPE 2: ENCLOSURE FLUSH MOUNTED C/W CURRENT RESET (1.5A MIN)

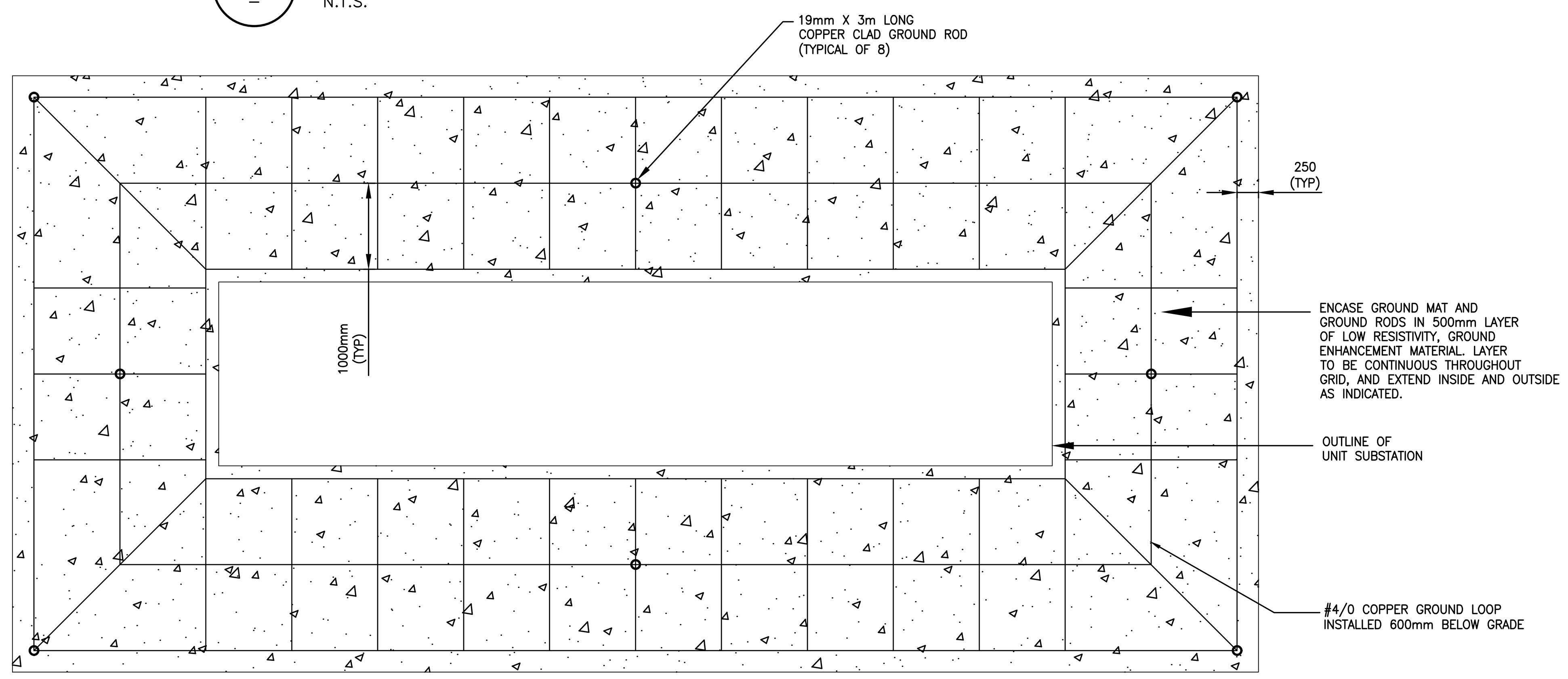
REFER TO NOTE 1



5 PROTECTION RELAY DETAIL
N.T.S.



3 OUTDOOR UNIT SUBSTATION (US-1) PLAN VIEW
N.T.S.



6 OUTDOOR UNIT SUBSTATION (US-1) GROUNDING DETAILS
N.T.S.

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Revision/Revision	Description/Description	Date/Date
A	ADDENDUM #1	APR.24.17
0	ISSUED FOR TENDER	MAR.14.17

Client/client
CORRECTIONAL SERVICE CANADA

Project title/Titre du projet
METCHOSIN, BC

ELECTRICAL HIGH VOLTAGE UPGRADE (PHASE 2 OF 2) WILLIAM HEAD INSTITUTION

Consultant Signature Box Only

Designed by/Concept par: **P.Necpal**
Drawn by/Dessine par: **P.Necpal**
PWGSC Project Manager/Administrateur de Projets TPSGC: **P. Truong**
PWGSC, Regional Manager, Architectural and Engineering Services/Gestionnaire régionale, Services d'architectural et de génie, TPSGC: **P. Paul**

Drawing title/Titre du dessin
MAIN POWER HOUSE (BLDG.115)
SINGLE LINE AND ELECTRICAL DETAILS

Project No./No. du projet: **R.069376.001**
Sheet/Feuille: E-100
6 OF 22
Revision no./La Révision no.

PWGSC – B1 – 1000X707

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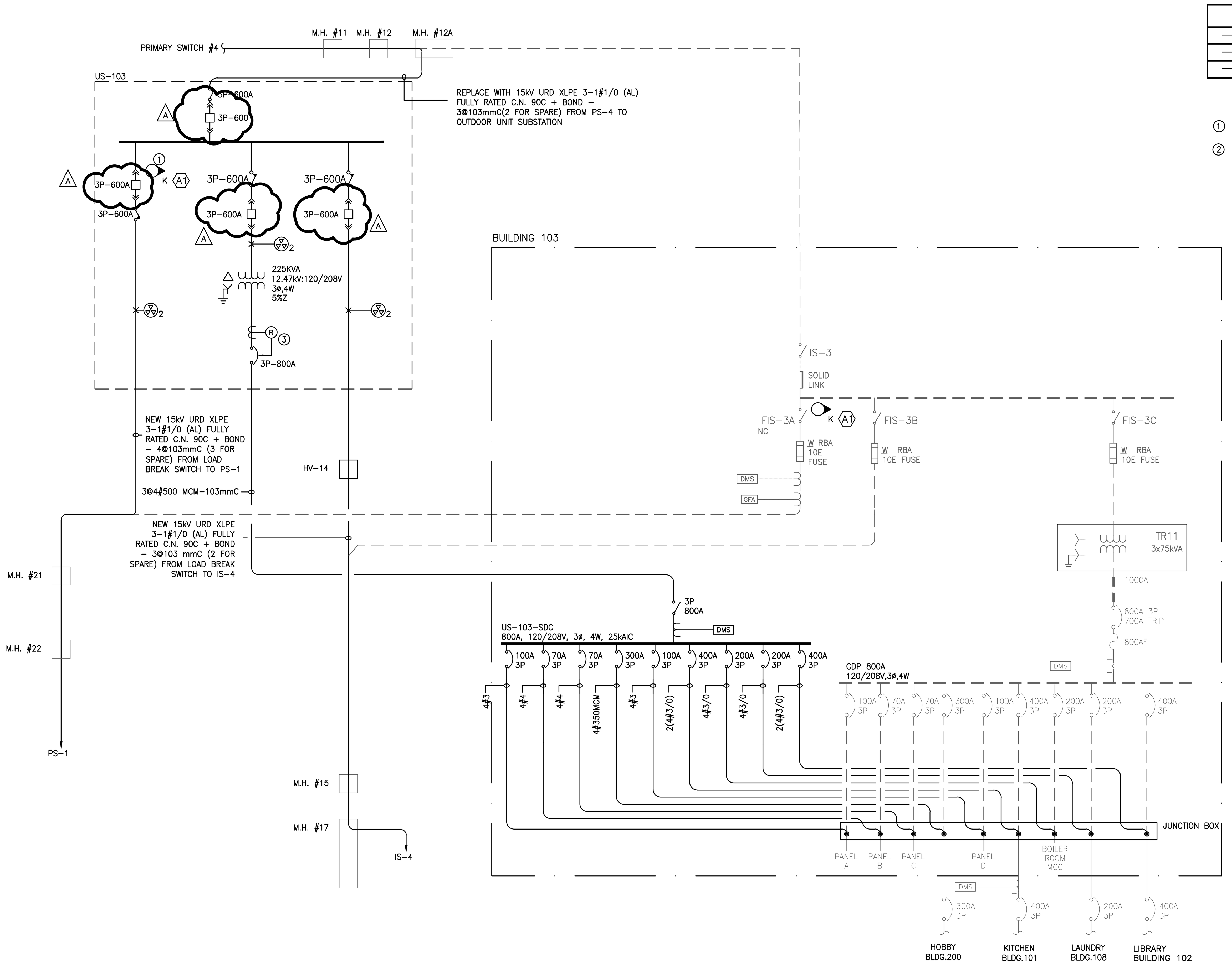


1 — PARTIAL SINGLE LINE DIAGRAM

N.T.S.

SINGLE LINE DIAGRAM LEGEND
EXISTING TO REMAIN
EXISTING TO BE REMOVED
NEW

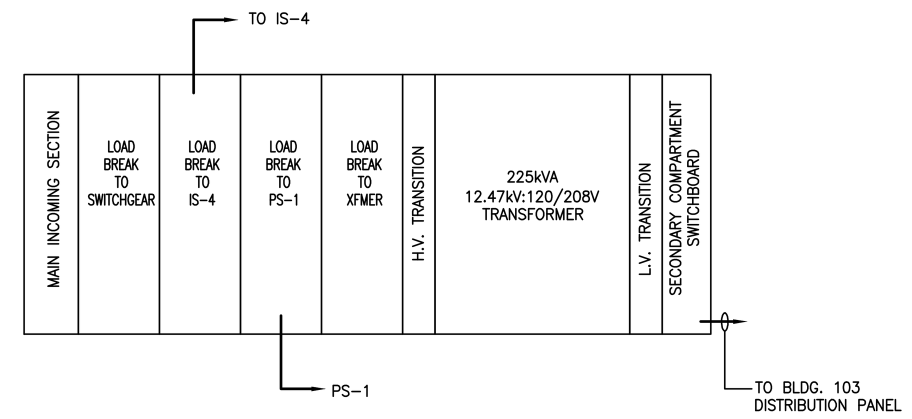
BUILDING 103 SINGLE LINE DIAGRAM KEYNOTES:

1. PROVIDE KIRK-KEY INTERLOCK TO MATCH EXISTING KEY INTERLOCK.
2. PROVIDE FEEDER PROTECTION RELAY c/w THE FOLLOWING FEATURES: OVERCURRENT AND TIME-OVERCURRENT FOR PHASE, GROUND, AND NEGATIVE SEQUENCE FAULT CONDITIONS (50 PGQ, 51 PGQ); NEUTRAL OVERCURRENT (50N) AND NEUTRAL TIME-OVERCURRENT (51N); AND, ARC FLASH DETECTION AND NEUTRAL AND PHASE OVERCURRENT (50N AF, 50P AF). PROVIDE CAPABILITIES FOR FUTURE ZONE INTERLOCKING.

SINGLE LINE DIAGRAM GENERAL NOTES:

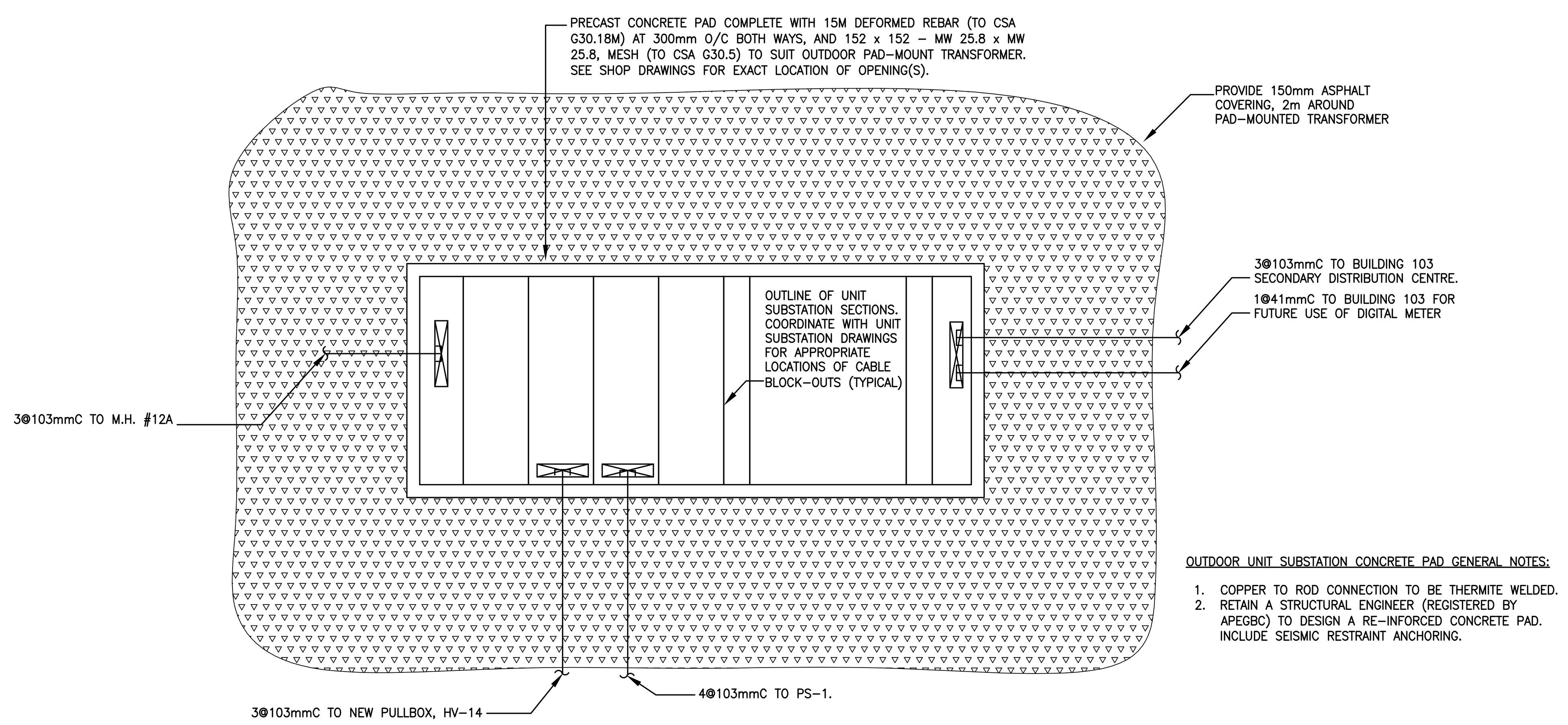
1. ALL NEW CONDUCTORS TO BE COPPER XLPE RW90.
2. PROVIDE 1@41mmC FROM US-103 TO BUILDING 103 ELECTRICAL ROOM FOR FUTURE USE OF THE DIGITAL METER. CONDUIT TO ENTER PULL BOX. PROVIDE PULL STRING.
3. CABLE FAULT INDICATOR TYPES '1' AND '2' TO BE PROVIDED AS FOLLOWS:

   TYPE 1: HOT STICK MOUNTED C/W CURRENT RESET (1.5A MIN)
   TYPE 2: ENCLOSURE FLUSH MOUNTED C/W CURRENT RESET (1.5A MIN)
4. REFER TO DRAWING E-002 FOR INFO ON KEY INTERLOCK A1.



3 — OUTDOOR UNIT SUBSTATION (US-103) PLAN VIEW

N.T.S.

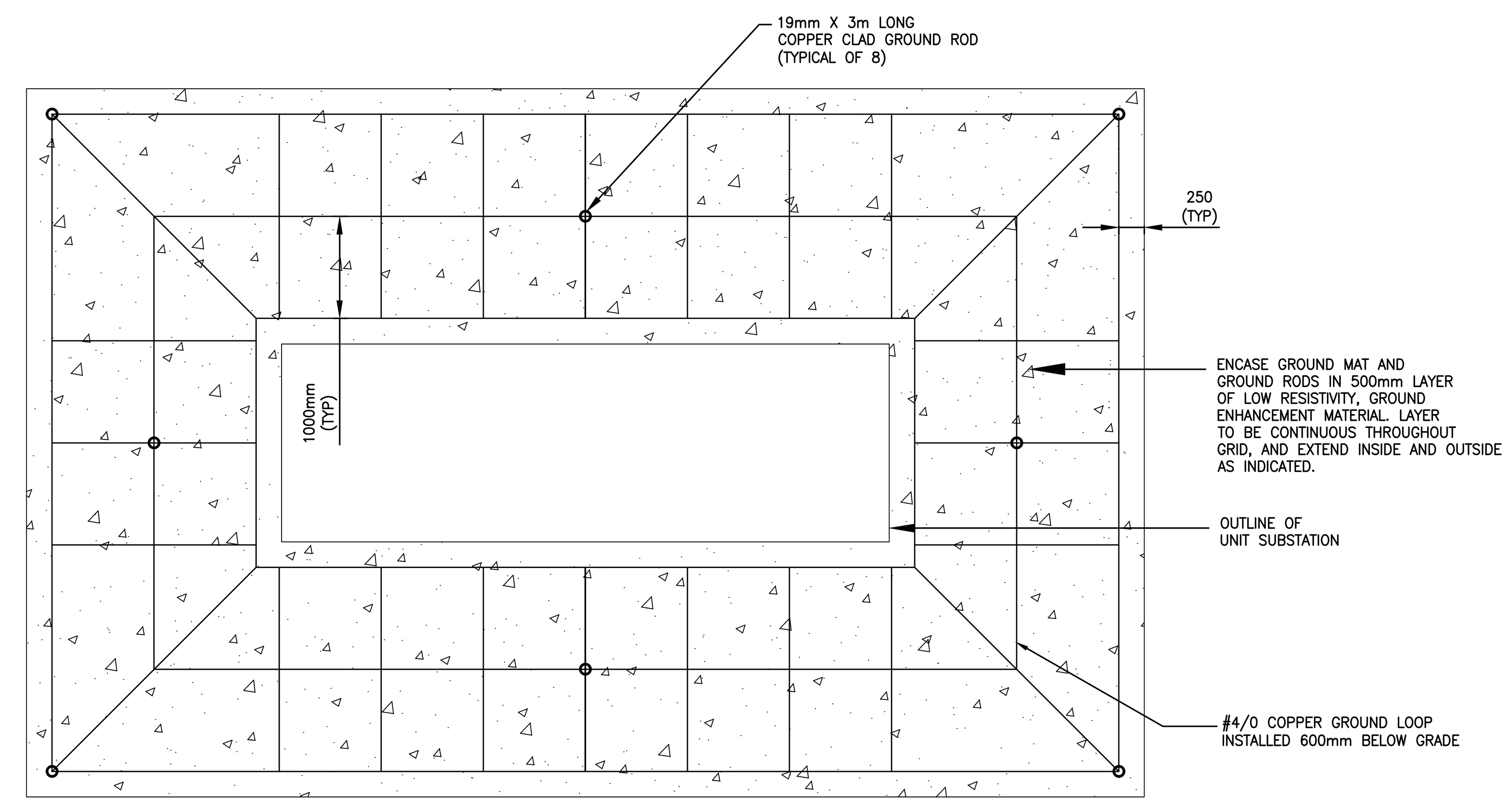


OUTDOOR UNIT SUBSTATION CONCRETE PAD GENERAL NOTES:

1. COPPER TO ROD CONNECTION TO BE THERMITE WELDED.
2. RETAIN A STRUCTURAL ENGINEER (REGISTERED BY APEGBC) TO DESIGN A RE-INFORCED CONCRETE PAD. INCLUDE SEISMIC RESTRAINT ANCHORING.

2 — OUTDOOR UNITSUBSTATION (US-103) CONCRETE PAD LAY-OUT PLAN

N.T.S.



2 — OUTDOOR UNIT SUBSTATION (US-103) GROUNDING DETAILS

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Revision/ Revision	Description/Description	Date/Date
A	ADDENDUM #1	APR.24.17
0	ISSUED FOR TENDER	MAR.14.17

Client/client
CORRECTIONAL SERVICE CANADA

Project title/Titre du projet
METCHOSIN, BC

ELECTRICAL HIGH VOLTAGE UPGRADE (PHASE 2 OF 2) WILLIAM HEAD INSTITUTION

Consultant Signature Box Only

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Drawing title/Titre du dessin
BUILDING 103
SINGLE LINE AND ELECTRICAL DETAILS

Project No./No. du projet	Sheet/ Feuille	Revision no./ La Révision no.
R.069376.001	E-104 10 OF 22	

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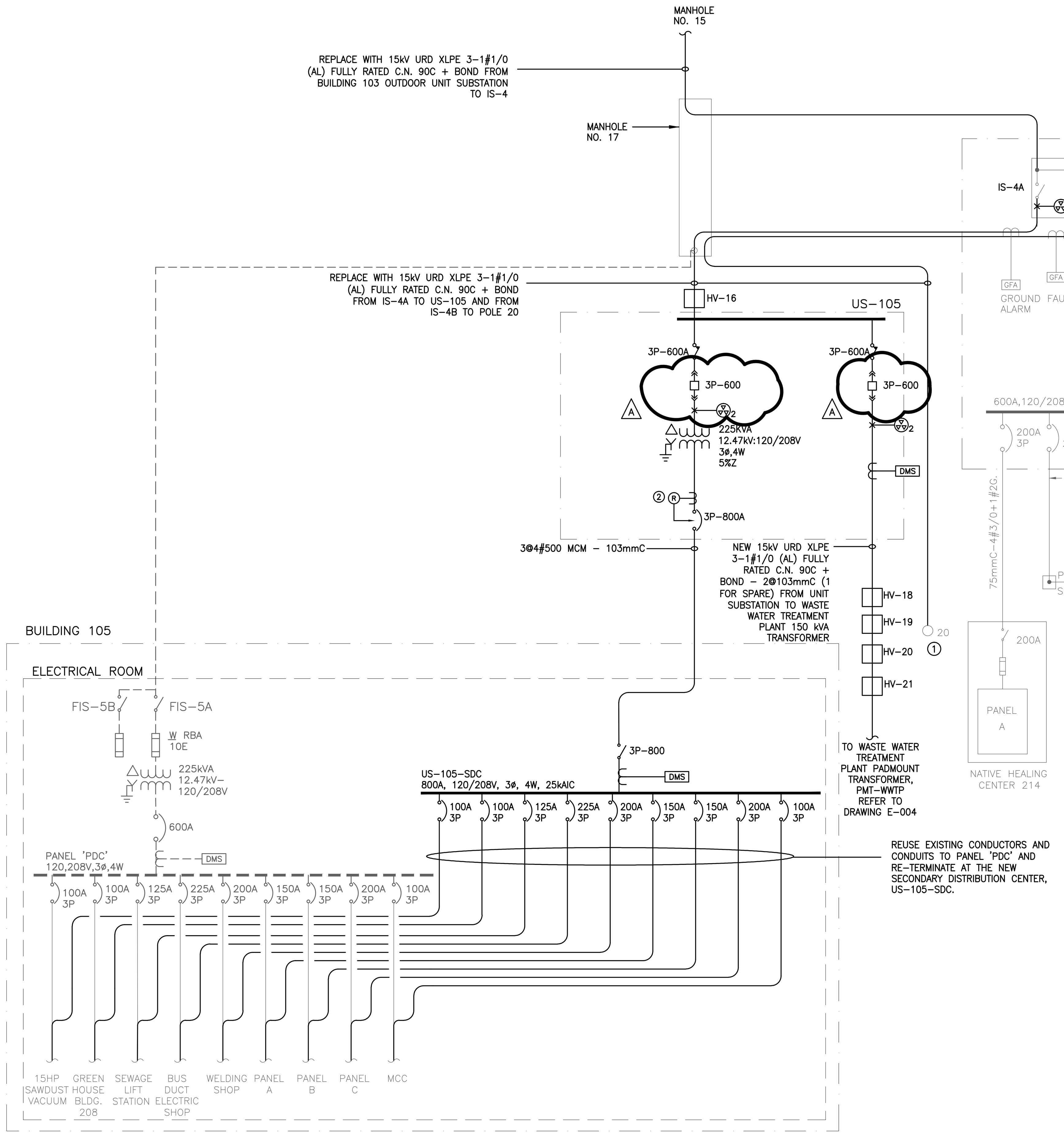


3 PARTIAL SINGLE LINE DIAGRAM
N.T.S.

SINGLE LINE DIAGRAM LEGEND
EXISTING TO REMAIN
EXISTING TO BE REMOVED
NEW

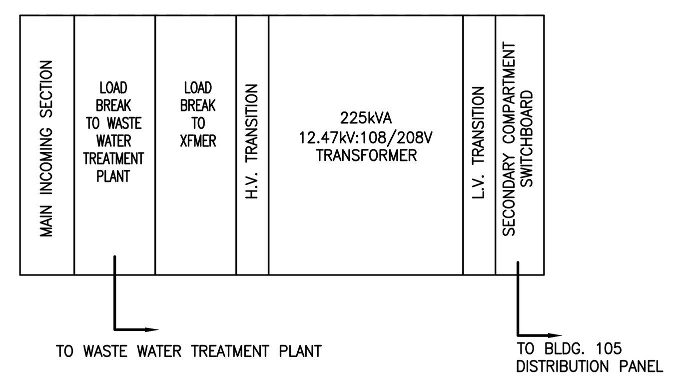
BUILDING 105 SINGLE LINE DIAGRAM KEYNOTES:

1. EXISTING POWER POLE COMPLETE WITH POLE-OPERATED GANGED SWITCH. PROVIDE NEW FEEDER FROM IS-4B IN OUTDOOR ENCLOSURE TR12 TO EXISTING POLE. REUSE EXISTING RACEWAYS.
2. PROVIDE FEEDER PROTECTION RELAY c/w THE FOLLOWING FEATURES: OVERCURRENT AND TIME-OVERCURRENT FOR PHASE, GROUND, AND NEGATIVE SEQUENCE FAULT CONDITIONS (50 PGQ, 51 PGQ); NEUTRAL OVERCURRENT (50N) AND NEUTRAL TIME-OVERCURRENT (51N); AND, ARC FLASH DETECTION AND NEUTRAL AND PHASE OVERCURRENT (50N AF, 50P AF). PROVIDE CAPABILITIES FOR FUTURE ZONE INTERLOCKING.

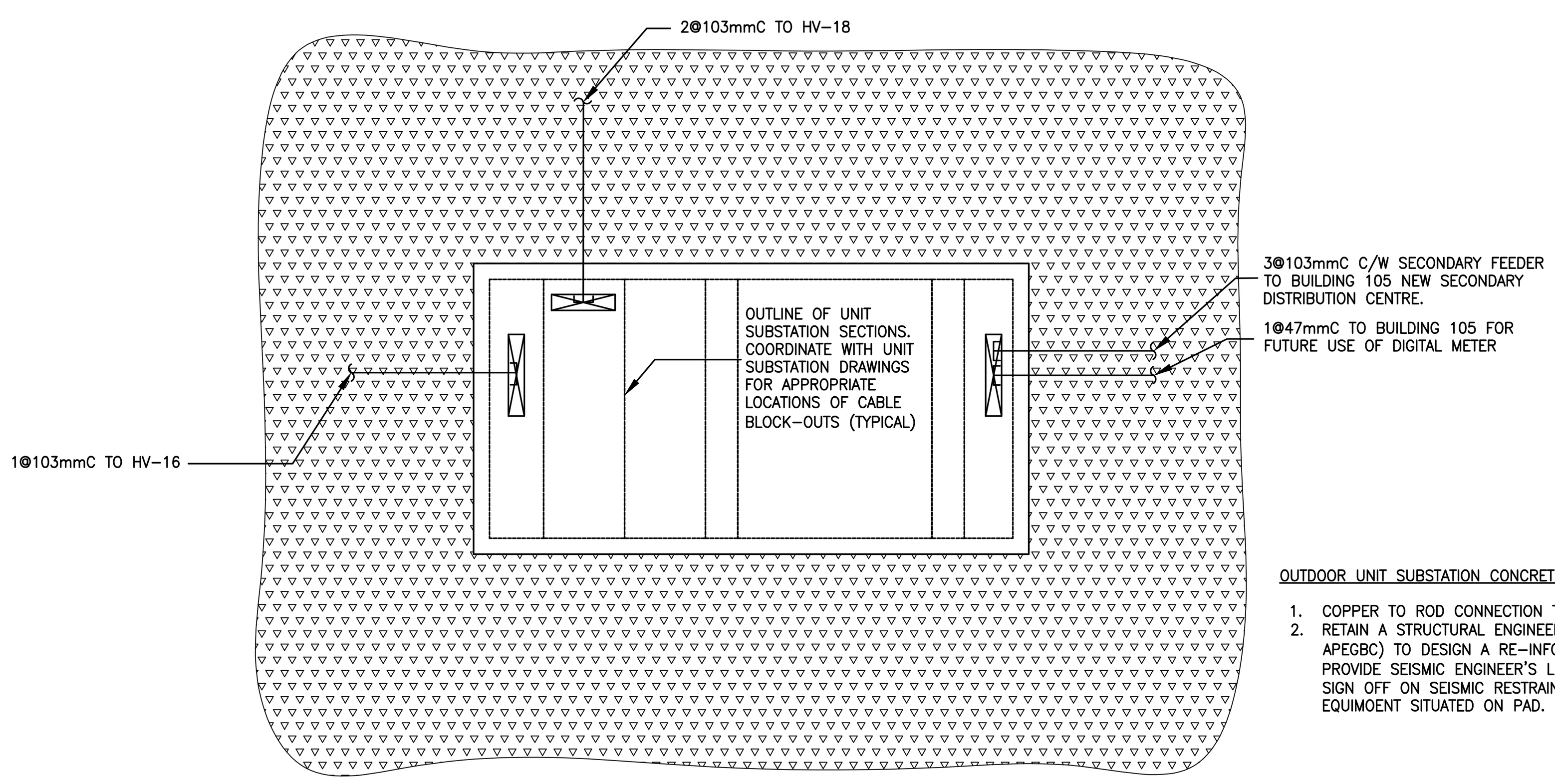
SINGLE LINE DIAGRAM GENERAL NOTES:

1. ALL NEW WIRING TO BE COPPER XLPE RW90.
2. PROVIDE 1@41mmC FROM US-105 TO BUILDING 105 ELECTRICAL ROOM FOR FUTURE USE OF DIGITAL METER. CONDUIT TO ENTER BUILDING AT HIGH LEVEL AND ENTER TOP-ENTRY PULL BOX. PROVIDE PULL STRING.
3. CABLE FAULT INDICATOR TYPES '1' AND '2' TO BE PROVIDED AS FOLLOWS:

   TYPE 1: HOT STICK MOUNTED C/W CURRENT RESET (1.5A MIN)
   TYPE 2: ENCLOSURE FLUSH MOUNTED C/W CURRENT RESET (1.5A MIN)



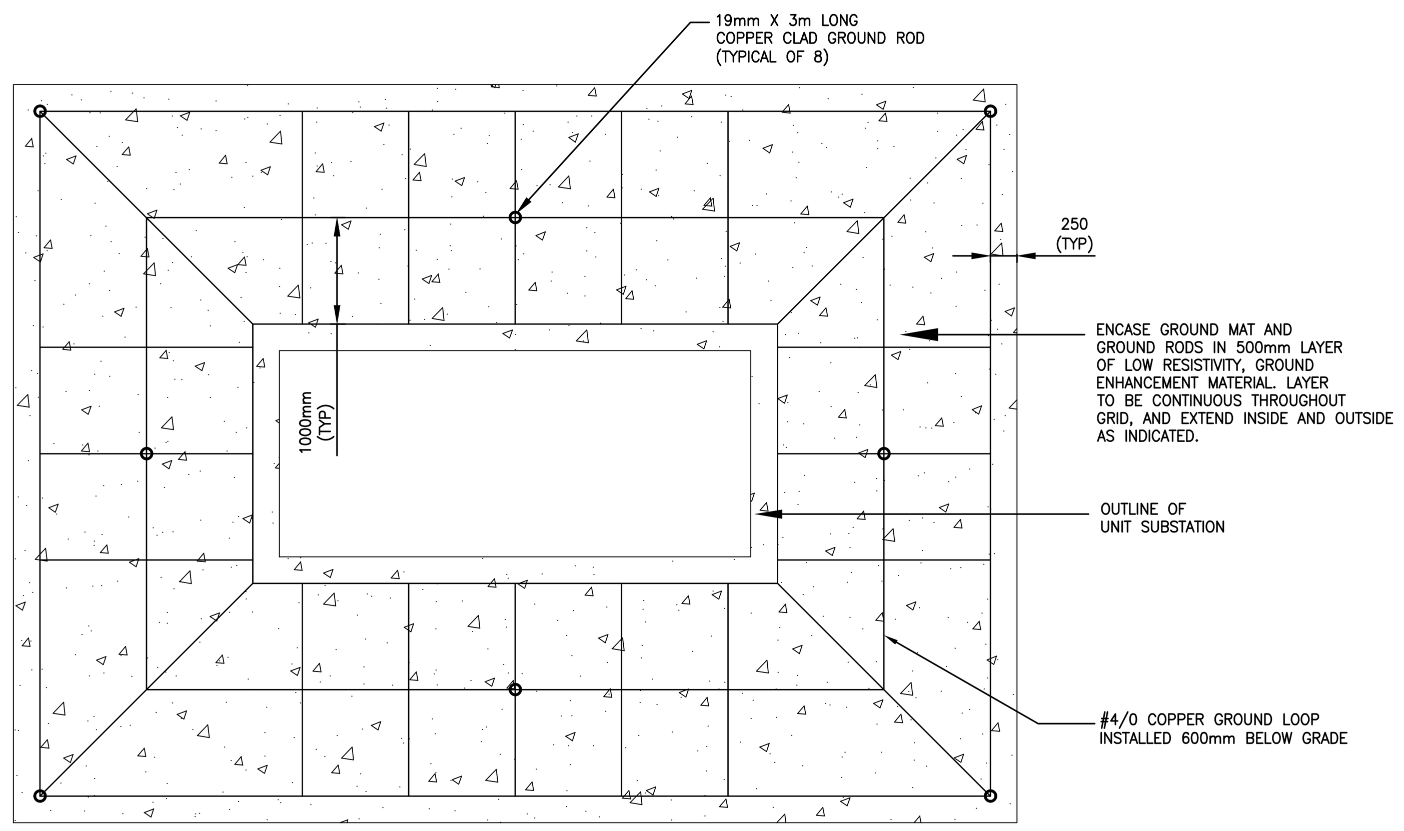
2 OUTDOOR UNIT SUBSTATION PLAN VIEW
N.T.S.



OUTDOOR UNIT SUBSTATION CONCRETE PAD GENERAL NOTES:

1. COPPER TO ROD CONNECTION TO BE THERMITE WELDED.
2. RETAIN A STRUCTURAL ENGINEER (REGISTERED BY APEGBC) TO DESIGN A RE-INFORCED CONCRETE PAD. PROVIDE SEISMIC ENGINEER'S LETTER OF ASSURANCE TO SIGN OFF ON SEISMIC RESTRAINT OF PAD AND EQUIMOENT SITUATED ON PAD.

1 OUTDOOR UNIT SUBSTATION CONCRETE PAD LAY-OUT PLAN
N.T.S.



1 OUTDOOR UNIT SUBSTATION GROUNDING DETAILS
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A	ADDENDUM #1	APR.24.17
0	ISSUED FOR TENDER	MAR.14.17

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METCHOSIN, BC

ELECTRICAL HIGH VOLTAGE UPGRADE (PHASE 2 OF 2) WILLIAM HEAD INSTITUTION

Consultant Signature Box Only

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Drawn by/Dessine par
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PWGSC Project Manager/Administrateur de Projets TPSGC
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P. Paul

Drawing title/Titre du dessin

BUILDING 105

SINGLE LINE AND ELECTRICAL DETAILS

Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.069376.001	E-106	
	12 OF 22	

0 10 20 30 40 50 60 70 80 90 100mm

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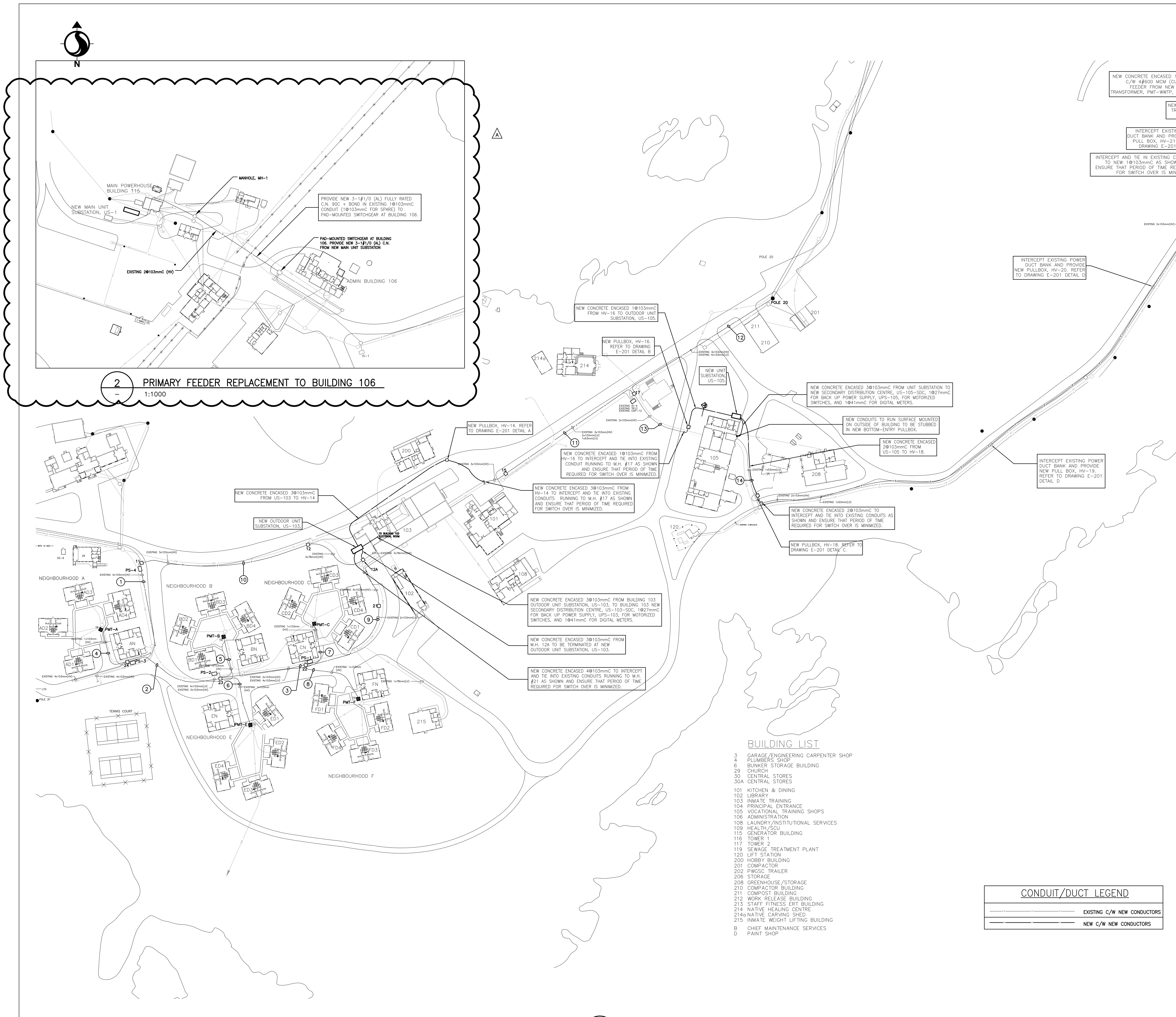

2 PRIMARY FEEDER REPLACEMENT TO BUILDING 106
1:1000

1 NEW PRIMARY FEEDER REPLACEMENTS AND INSTALLATION
1:1000

GENERAL NOTES:

1. ALL NEW CONDUCTORS TO BE COPPER XLPE RW90 UNLESS NOTED OTHERWISE.
2. THIS DRAWING DOES NOT INCLUDE NEW CONDUCTORS BEING ADDED IN THE POWER HOUSE AND TO BUILDING 106 PRIMARY SWITCH IN DRAWING E-100.
3. ALL CONDUCTORS TO BE PULLED FROM MANHOLE/PULL BOX TO MANHOLE/PULL BOX INSTEAD OF THROUGH MULTIPLE MANHOLE/PULLBOX. CONDUCTOR IN MANHOLE OR PULL BOX SHALL BE LOOPED AROUND INSIDE PERIMETER SIDE WALL AND STRAPPED TO CANTRUSS STEEL CHANNELS.
4. ALL EXISTING DUCTS SHALL BE CLEANED AND MANDRELLED PRIOR TO PULLING CABLE.

NEW 15 kV PRIMARY CONDUCTORS

#	REPLACEMENT CABLE TYPE:	
1	15kV URD XLPE 3-1#1/0 (AL) FULLY RATED C.N. 90C + BOND	PS-4 TO PS-3
2	15kV URD XLPE 3-1#1/0 (AL) FULLY RATED C.N. 90C + BOND	PS-3 TO PS-2
3	15kV URD XLPE 3-1#1/0 (AL) FULLY RATED C.N. 90C + BOND	PS-2 TO PS-1
4	15kV URD XLPE 2-1#1/0 (AL) FULLY RATED C.N. 90C + BOND	PS-3 TO PMT-A
5	15kV URD XLPE 2-1#1/0 (AL) FULLY RATED C.N. 90C + BOND	PS-2 TO PMT-B
6	15kV URD XLPE 2-1#1/0 (AL) FULLY RATED C.N. 90C + BOND	PS-2 TO PMT-E
7	15kV URD XLPE 2-1#1/0 (AL) FULLY RATED C.N. 90C + BOND	PS-1 TO PMT-C
8	15kV URD XLPE 2-1#1/0 (AL) FULLY RATED C.N. 90C + BOND	PS-1 TO PMT-F
9	15kV URD XLPE 3-1#1/0 (AL) FULLY RATED C.N. 90C + BOND	PS-1 TO US-103
10	15kV URD XLPE 3-1#1/0 (AL) FULLY RATED C.N. 90C + BOND	PS-4 TO US-103
11	15kV URD XLPE 3-1#1/0 (AL) FULLY RATED C.N. 90C + BOND	US-103 TO IS-4
12	15kV URD XLPE 3-1#1/0 (AL) FULLY RATED C.N. 90C + BOND	IS-4 TO POLE 20
13	15kV URD XLPE 3-1#1/0 (AL) FULLY RATED C.N. 90C + BOND	IS-4 TO US-105
14	15kV URD XLPE 3-1#1/0 (AL) FULLY RATED C.N. 90C + BOND AND 1kV RATED #4/0 RWU90	US-105 TO PMT-WWTP

BUILDING LIST

3 GARAGE/ENGINEERING CARPENTER SHOP
4 PLUMBERS SHOP
6 BUNKER STORAGE BUILDING
29 CHURCH
30 CENTRAL STORES
30A CENTRAL STORES

101 KITCHEN & DINING
102 LIBRARY
103 INMATE TRAINING
104 PRINCIPAL ENTRANCE
105 VOCATIONAL TRAINING SHOPS
106 ADMINISTRATION
108 LAUNDRY/INSTITUTIONAL SERVICES
109 HEALTH/SCU
115 GENERATOR BUILDING
116 TOWER 1
117 TOWER 2
119 SEWAGE TREATMENT PLANT
120 LIFT STATION
200 HOBBY BUILDING
201 COMPACTOR
202 PWGSC TRAILER
206 STORAGE
208 GREENHOUSE/STORAGE
210 COMPACTOR BUILDING
211 COMPOST BUILDING
212 WORK RELEASE BUILDING
213 STAFF FITNESS ERT BUILDING
214 NATIVE HEALING CENTRE
214a NATIVE CARVING SHED
215 INMATE WEIGHT LIFTING BUILDING

B CHIEF MAINTENANCE SERVICES
D PAINT SHOP

CONDUIT/DUCT LEGEND

— · — · —	EXISTING C/W NEW CONDUCTORS
———	NEW C/W NEW CONDUCTORS

Public Works and Government Services Canada
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Stantec

Revision/Revision	Description/Description	Date/Date
A	ADDENDUM #1	APR.24.17
0	ISSUED FOR TENDER	MAR.14.17

Client/client

CORRECTIONAL SERVICE CANADA

Project title/Titre du projet

METCHOSIN, BC

ELECTRICAL HIGH VOLTAGE UPGRADE (PHASE 2 OF 2) WILLIAM HEAD INSTITUTION

Consultant Signature Box Only

Designed by/Concept par
P.Necpal

Drawn by/Dessine par
P.Necpal

PWGSC Project Manager/Administrateur de Projets TPSGC
P. Truong

PWGSC, Regional Manager, Architectural and Engineering Services/Gestionnaire régionale, Services d'architectural et de génie, TPSGC
P. Paul

Drawing title/Titre du dessin

UPDATED PARTIAL SITE PLAN:
HIGH VOLTAGE FEEDER REPLACEMENT

Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.069376.001	E-202 15 OF 22	

PWGSC – B1 – 1000X707

0 10 20 30 40 50 60 70 80 90 100mm

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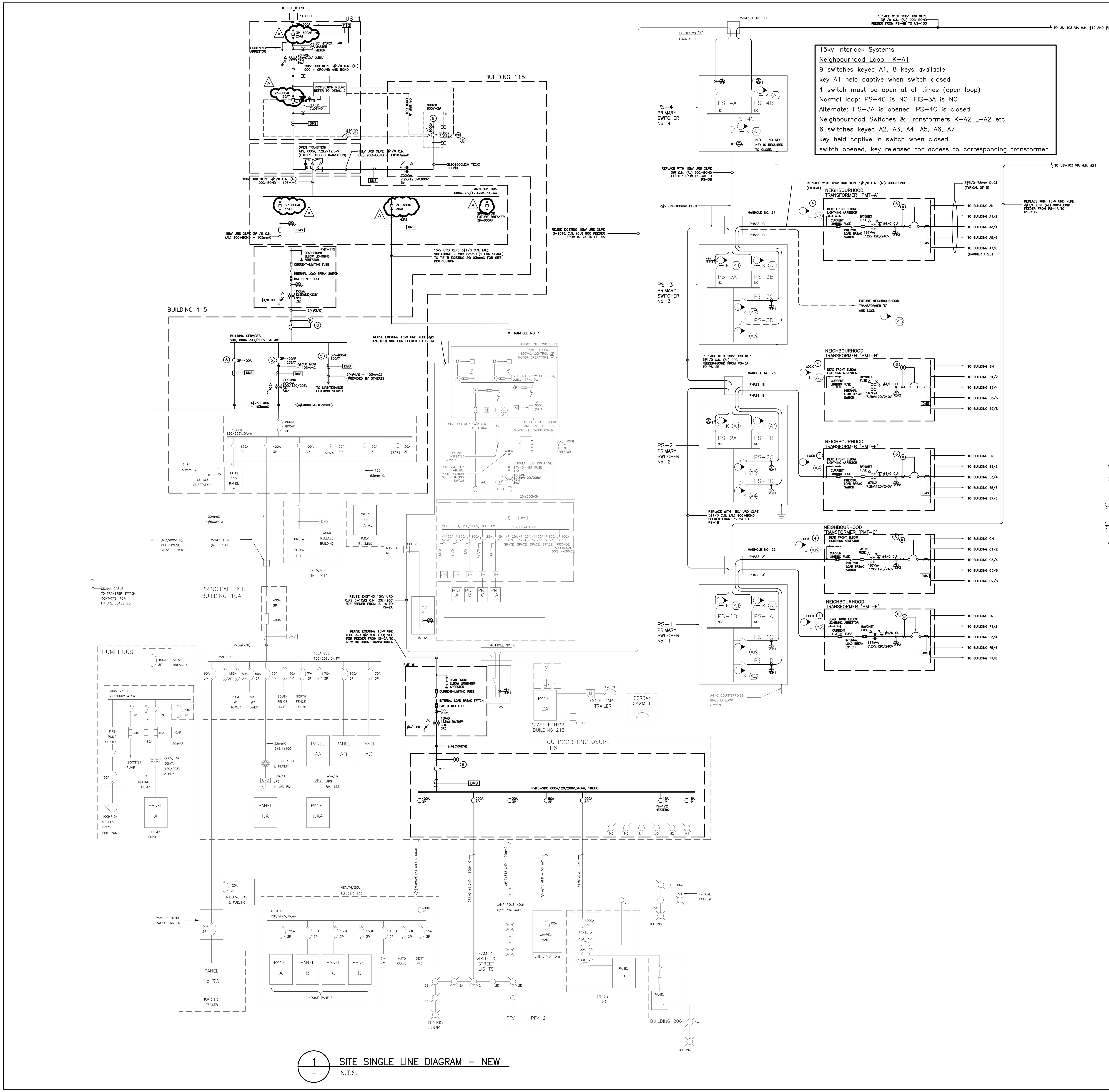


15kV Interlock Systems

Neighbourhood Loop K–A1

9 switches keyed A1, 8 keys available

key A1 held captive when switch closed

1 switch must be open at all times (open loop)

Normal loop: PS–4C is NO, FIS–3A is NC

Alternate: FIS–3A is opened, PS–4C is closed

Neighbourhood Switches & Transformers K–A2 L–A2 etc.

6 switches keyed A2, A3, A4, A5, A6, A7

key held captive in switch when closed

switch opened, key released for access to corresponding transformer

1 — SITE SINGLE LINE DIAGRAM – NEW

N.T.S.

SINGLE LINE DIAGRAM KEYNOTES:

1. NOT USED.
2. PROTECTIVE RELAY FUNCTIONS:

   25 SYNCHRONISM–CHECK
   27 UNDERVOLTAGE
   32 DIRECTIONAL POWER
   59 OVERVOLTAGE
   81U UNDERFREQUENCY
   81O OVERFREQUENCY
   62 TIME DELAY (BACKUP TIMER)

   LEGEND

   (#)* FUNCTION ACTIVE DURING PARALLEL OPERATION ONLY

   ◇ ELECTRICAL INTERLOCK

3. NOT USED.
4. PROVIDE KEY INTERLOCKS TO MATCH EXISTING PRIMARY SWITCH KEY INTERLOCKS.
5. LSI ELECTRONIC TRIP
6. PROVIDE FEEDER PROTECTION RELAY c/w THE FOLLOWING FEATURES: OVERCURRENT AND TIME–OVERCURRENT FOR PHASE, GROUND, AND NEGATIVE SEQUENCE FAULT CONDITIONS (50 PGQ, 51 PGQ); NEUTRAL OVERCURRENT (50N) AND NEUTRAL TIME–OVERCURRENT PROTECTION (51N); AND ARC FLASH DETECTION AND NEUTRAL AND PHASE OVERCURRENT PROTECTION (50N AF, 50P AF). PROVIDE CAPABILITIES FOR FUTURE ZONE INTERLOCKED.

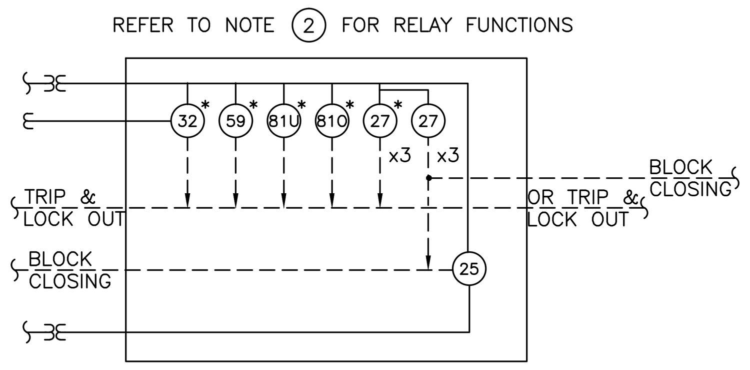
SINGLE LINE DIAGRAM GENERAL NOTES:

1. ALL NEW CONDUCTORS TO BE COPPER XLPE RW90 UNLESS NOTED OTHERWISE.
2. ALL NEW DIGITAL METERS (DMS) TO CONNECT TO LOCAL PATCH PANEL FOR CONNECTION TO SITE BUILDING MANAGEMENT SYSTEM NETWORK
3. CABLE FAULT INDICATOR TYPES '1' AND '2' AS FOLLOWS:

   TYPE 1: HOT STICK MOUNTED C/W CURRENT RESET (1.5A MIN)
   TYPE 2: ENCLOSURE FLUSH MOUNTED C/W CURRENT RESET (1.5A MIN)

4. LOOP FEEDER CONDUCTORS AROUND THE INTERIOR PERIMETER WALL OF MANHOLE/PULL BOX
5. PROVIDE A END STATE SINGLE LINE DIAGRAM FRAMED ON PLEXIGLASS FOR MOUNTING IN ALL ELECTRICAL ROOMS AND SUBSTATIONS.

REFER TO NOTE (2) FOR RELAY FUNCTIONS



2 — PROTECTION RELAY DETAIL

N.T.S.

ELECTRICAL LOAD CALCULATION:

EXISTING LOAD (MAXIMUM LOAD PER EXISTING DIGITAL METER READING)	308 kW
LOAD TO BE ADDED (PER NEW MAINTENANCE BUILDING CONTRACT)	154 kW
TOTAL REVISED LOAD	462 kW

SINGLE LINE DIAGRAM LEGEND
EXISTING TO REMAIN
NEW

DRAWING IS FOR REFERENCE/INFORMATION ONLY AND IS NOT TO BE USED FOR PRICING. REFER TO OTHER SHEETS AND PARTIAL SINGLE LINE DIAGRAMS FOR SCOPE OF WORKS TO BE PRICED.

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A	ADDENDUM #1	APR.24.17
0	ISSUED FOR TENDER	MAR.14.17

Client/client

CORRECTIONAL SERVICE CANADA

Project title/Titre du projet

METCHOSIN, BC

ELECTRICAL HIGH VOLTAGE UPGRADE (PHASE 2 OF 2) WILLIAM HEAD INSTITUTION

Consultant Signature Box Only

Designed by/Concept par: **P.Necpal**

Drawn by/Dessiné par: **P.Necpal**

PWGSC Project Manager/Administrateur de Projets TPSGC: **P. Truong**

PWGSC, Regional Manager, Architectural and Engineering Services/Gestionnaire régionale, Services d'architectural et de génie, TPSGC: **P. Paul**

Drawing title/Titre du dessin

SITE SINGLE LINE DIAGRAM - NEW (1 OF 2)

Project No./No. du projet: **R.069376.001**

Sheet/Feuille: E-401

21 OF 22

Revision no./La Révision no.

SINGLE LINE DIAGRAM LEGEND

EXISTING TO REMAIN

NEW

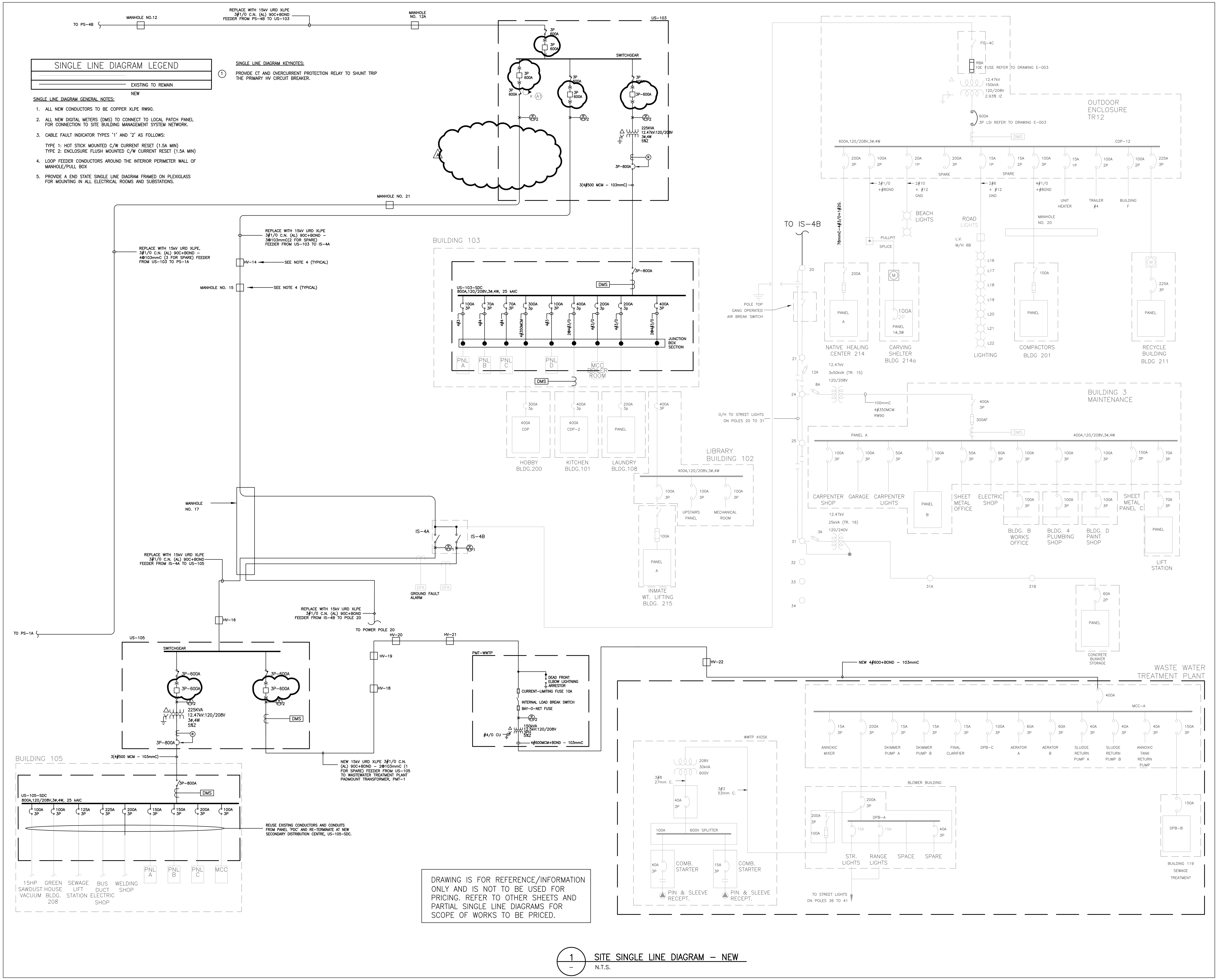
SINGLE LINE DIAGRAM GENERAL NOTES:

1. ALL NEW CONDUCTORS TO BE COPPER XLPE RW90.
2. ALL NEW DIGITAL METERS (DMS) TO CONNECT TO LOCAL PATCH PANEL FOR CONNECTION TO SITE BUILDING MANAGEMENT SYSTEM NETWORK.
3. CABLE FAULT INDICATOR TYPES '1' AND '2' AS FOLLOWS:

   TYPE 1: HOT STICK MOUNTED C/W CURRENT RESET (1.5A MIN)
   TYPE 2: ENCLOSURE FLUSH MOUNTED C/W CURRENT RESET (1.5A MIN)
4. LOOP FEEDER CONDUCTORS AROUND THE INTERIOR PERIMETER WALL OF MANHOLE/PULL BOX
5. PROVIDE A END STATE SINGLE LINE DIAGRAM FRAMED ON PLEXIGLASS FOR MOUNTING IN ALL ELECTRICAL ROOMS AND SUBSTATIONS.

SINGLE LINE DIAGRAM KEYNOTES:

1. PROVIDE CT AND OVERCURRENT PROTECTION RELAY TO SHUNT TRIP THE PRIMARY HV CIRCUIT BREAKER.



1 SITE SINGLE LINE DIAGRAM - NEW

N.T.S.

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

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PWGSC, Regional Manager, Architectural and Engineering Services/Gestionnaire régionale, Services d'architectural et de génie, TPSGC: **P. Paul**

Drawing title/Titre du dessin

SITE SINGLE LINE DIAGRAM - NEW (2 OF 2)

Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.069376.001	E-402	
	22 OF 22	

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 - Common Work Results for Electrical

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA-C68.3-97(R2006), Shielded and Concentric Neutral Power Cables Rated 5-46 kV.

.2 CSA-C233.1-87(R2004), Gapless Metal Oxide Surge Arresters for Alternating Current Systems.

.2 National Electrical Manufacturers' Association (NEMA)/Insulated Cable Engineers Association (ICEA)

.1 NEMA WC3-1992/ICEA S-19-81, Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

.2 NEMA WC74/ICEA S-93-639-2012, 5-46kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 01 50 – General Instructions.

.2 Provide product data in accordance with Section 01 01 50 – General Instructions.

.1 Provide manufacturer's printed product literature, specifications, data sheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse or recycling in accordance with Section 01 01 50 – General Instructions.

Part 2 Products

2.1 CONCENTRIC NEUTRAL POWER CABLES (5001 - 15000 V)

.1 Concentric neutral power cable: to NEMA WC74-1992/ICEAS-66-524, AEIC CS5, ICEA S-66-524 and CSA-C68.3.

.2 Single aluminum conductor, size as indicated.

.3 Semi-conducting strand shield.

.4 Class 2 compact round stranding per ASTM B4596:

.1 All strand interstices to be filled during stranding operation and each wire and successive layers of wires to be sealed with approved sealing compound.

.2 Acceptable products: Canada Wire “STRAND BLOCK”; Pirelli “STRANDSEAL.”

.5 Insulation: tree-retardant cross-linked thermo-setting polyethylene (TR-XLPE) rated 90°C and 15 kV for 100 % voltage level.

.6 Semi-conducting insulation shielding layer.

.7 Copper neutral wires applied helically over insulation shield equivalent to 100 % full capacity.

.8 Separator tape over neutral wires.

.9 Insulation shield of semi-conducting thermo-setting XLPE applies as a co-extrusion with the insulation and the conductor shield.

.1 Semi-conducting insulation shield to be marked with words “SEMI-CONDUCTING – REMOVE WHEN SPLICING OR TERMINATING.”

.10 Jacket, encapsulating linear low density polythethylene.

.11 Acceptable manufacturers: General Cable, Nexans, Noramco, Pirelli

2.2 CABLE TERMINATORS

.1 Single piece indoor cable terminator 25 kV, 125kV BIL for 25kV primary system, or 15 kV, 95 kV BIL for 15 kV primary system, consisting of:

.1 External insulation –non-skirted tubular design, constructed of tracking resistant silicone rubber.

.2 One-piece, non-skirted, silicone rubber termination with solderless mechanical ground assembly, and shall accommodate Tape (ribbon), Wire, or Shielded cables.

.3 Termination of a pre- stretched cold shrink design, installed without the application of a heat source.

.4 Stress relief control device.

.5 Installation procedure shall not require silicone grease.

.6 Aluminum compression connector to terminate connector.

.7 Cross arm mounting bracket complete with ground connection stud.

Part 3 Execution

3.1 INSTALLATION

.1 Install concentric neutral power cables in ductbank and conduit in accordance with manufacturer’s instructions.

.2 Provide supports and accessories for installation of high voltage power cable.

.3 Install stress cones, terminations and splices in accordance with manufacturer's instructions

.4 Install grounding in accordance with local inspection authority having jurisdiction.

.5 Provide cable identification tags and identify each phase conductor of power cable.

.6 Terminate cables with cable terminators as indicated and where necessary to complete the primary distribution system. Install all cable terminations to the manufacturers' specifications and instructions.

.7 Install cable terminations to each phase of a three-phase system in primary switch enclosure as per manufacturer's recommendations.

3.2 FIELD QUALITY CONTROL

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

.2 Use of qualified tradespersons for installation, splicing, termination and testing of high voltage power cables.

.3 Engage an independent testing agent to test high voltage power cable:

  .1 Existing high voltage power cables to be non-destructively tested using the very low frequency test method

  .2 New high voltage power cables to be tested using hi-pot test.

.4 Submit test result and inspection certificate.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 – Common Work Results for Electrical.

.2 Section 26 09 02.b – Metering and Switchboard Instruments.

.3 Section 26 12 19 – Padmounted Liquid Filled Medium Voltage Transformers.

.4 Section 26 40 00.01 – Primary Lightning Arresters

1.2 REFERENCES

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

- .1 ANSI/IEEE C37.121-1989(R2000), Unit Substations - Requirements.

.2 CSA International

- .1 CSA C22.2 No.14-10, Industrial Control Equipment.
- .2 CSA C22.2 No.31-14, Switchgear Assemblies
- .3 CSA C22.2 No.58-M1989(R2015), High-Voltage Isolating Switches.
- .4 CSA C22.2 No.193-M1983(R2014), High-Voltage Full-Load Interrupter Switches
- .5 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

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

- .1 EEMAC G1-1-1958, Indoor and Outdoor Switch and Bus Insulators.

.4 Underwriters' Laboratories (UL)

- .1 UL 1062-97, Standard for Unit Substations.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 01 50 – General Instructions.

.2 Shop Drawings:

- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada.
- .2 Indicate:
  - .1 Single line diagram.
  - .2 Equipment layout.
  - .3 Equipment dimensions including door openings, draw-out equipment positions and workspace requirements.
  - .4 Dimensioned foundation template.
  - .5 Dimensioned cable entrance and exit locations.
  - .6 Dimensioned cable termination and pothead heights.
  - .7 Details of entry plate.

.3 Submit preliminary coordination study with shop drawings.

.1 Study to show co-ordination curves for protective devices from utility fuse cutouts, recloser, or upstream protective device to secondary breakers.

.2 Study to show protective devices and transformer damage curves are properly coordinated.

.3 Recommend breaker settings and main secondary breaker setting.

.4 Shop drawings will not be accepted or reviewed without co-ordination study.

.3 Test Reports:

.1 Submit production test results.

.1 Do not ship equipment until test results have been accepted by Departmental Representative.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 26 05 00 – Common Work Results for Electrical.

.2 Operation and Maintenance Data: submit operation and maintenance data for unit substation for incorporation into manual.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Submit maintenance materials in accordance with Section 01 01 50 – General Instructions.

.2 Include:

.1 Fuses:

.1 6 fuse refills for each type up to and including 600 A.

.2 6 of each type of indicator light bulbs installed.

Part 2 Products

2.1 MATERIALS

.1 Unit substation: ANSI C37.121 and UL 1062.

.2 Steel for cubicles: to CSA G40.21.

.3 Insulators: to CSA C22.2 No.58.

2.2 DESIGN TO INCLUDE THE FOLLOWING:

.1 Designed to **arc flash incident energy less than 8 cal/cm^2** utilizing feeder protection relay c/w protective relays as noted on drawings. Provide letter, calculation and TCC characteristics to confirm compliance with the design criteria (signed and sealed by a Professional Engineer registered in the Province of British Columbia).

.2 Lightning and surge arrestors.

.3 External shunt trip ability.

.4 CT compartment for supply authority primary meter as required.

.5 Digital meter compatible with existing digital metering system at Building 106 (Eaton Power Xprt Meter 2000) and to section 26 09 02.b – Metering and Switchboard Instruments.

.6 Gauge auxiliary contacts.

.7 Environmentally friendly, liquid-filled transformer.

.8 Low voltage terminal lugs to suit conductor size (note reducers may be required)

.9 Transformer overload/over temperature shunt trip.

.10 Single phase protection

.11 Secondary ground fault detection and annunciation

.12 Marine grade steel front end enclosure

2.3 PRIMARY SWITCHGEAR

.1 Primary switchgear: 25kV, 600A, 3 phase, 4 wire, interrupting capacity 12kA, BIL 125kV.

.2 Primary switchgear: 15kV, 600A, 3 phase, 4 wire, interrupting capacity 16kA, BIL 95kV.

2.4 ENCLOSURE

.1 Enclosure: metal clad free standing, pad mounted, dead front, outdoor, tamperproof, non-walk in CSA enclosure 3R cubicle unit.

  .1 Constructed from rolled flat steel sheets to UL 1062.

.2 Ventilating louvres: vermin, insect, rain proof with easily replaceable fiberglass filters.

.3 Use non-corrodible bolts and hardware.

.4 Access from front and back.

.5 100 mm steel channel sills for base mounting in single length common to multi-cubicle switch board.

.6 Full height outer door reinforced with stiffeners, gasketted, hinges, provision for multiple padlocking. Three-point latch, stops, to open at least 135 degrees with viewing windows of transparent shatterproof material for inspection of disconnecting switch position.

.7 Inner doors to open at least 90 degrees.

.8 Hinge doors of multi-cubicle switchboard on same side.

.9 Gaskets on removable covers.

.10 Removable cover bolts not accessible from outside of cubicle.

.11 Interior hinged and bolted mesh steel screens to prevent inadvertent contact with exposed live parts.

.12 Storage container on inside surface of compartment to accommodate 3 spare fuse refills.

.13 Metal pocket on inside surface of door to accommodate drawing and diagram prints.

.14 Space heaters: self-powered, 120 V, 250 W, 60 Hz, single phase, in each cubicle complete with thermostat, overcurrent protective device, and disconnect switch.

2.5 PRIMARY BUS BARS AND CONNECTIONS

.1 Three phase and full capacity neutral bus bars, continuous current rating 600A extending full width of cubicle suitably supported on insulators.

.2 Main connections between bus bars and major switching components to match major switching components.

.3 Copper for bus bars and main connections.

.4 Provision for future extension of bus on both sides of unit without need for further drilling or preparation in field.

.5 Brace bus-bar system to withstand stresses resulting from short circuit currents specified.

.6 Tin surfaced joints, secured with non-corrosive bolts and washers, tightened with torque wrench in accordance with manufacturer's recommended load.

.7 Identify phases of bus bars by suitable marking and/or coloured paint.

.8 Busbar connectors when switchgear shipped in more than one section.

2.6 GROUNDING

.1 Copper ground bus not smaller than 50 x 6 mm extending full width of cubicle and situated at bottom. Lugs at each end for size 4/0 AWG grounding cable.

.2 Bond non current carrying metal parts, including switchgear framework, enclosure and bases to ground bus.

2.7 LOAD INTERRUPTER SWITCH

.1 Load Interrupter Switch: to CSA C22.2 No.193.

.2 3 pole, quick-make, quick-break assembly, stored energy operating mechanism manual operated, assembled on welded steel base.

.3 Continuous full load rating: 600A, interrupting rating: 16kA, symmetrical at primary voltage.

.4 Voltage rating: as indicated.

.5 95kV BIL for 15kV primary voltage; 125 kV BIL for 25kV primary voltage.

.6 Interphase barriers.

.7 Non-removable operating handle c/w provision for pad locking and/or key interlock as shown.

.8 Enclosure: CSA Enclosure 3R.

.9 Include viewing windows that permits full view of the position of all three switch blades.

.10 Interlocks with features as follow:

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

.2 Switch can be closed only after fuse access door is closed.

2.8 CIRCUIT BREAKER

.1 Design: outdoor SF-6 circuit breaker or vacuum circuit breaker, 3 pole, single break, power operated, draw out breaker element, sized as indicated.

.2 Breaker operating mechanism:

.1 48V DC solenoid closing and 48V DC shunt trip.

.2 Stored energy closing.

.3 Breaker interrupting capacity: 500 MVA at primary voltage.

.4 Breaker tripping devices, solid state as indicated.

.1 Instantaneous overcurrent relays.

.2 Reverse power relay.

.3 Overvoltage relay.

.4 Undervoltage relay.

.5 Frequency relay.

.6 Time overcurrent relay.

.7 Locking-out relay.

.8 Time-delay relay.

.9 Ground fault relay.

.10 Negative sequence relay.

.5 Trip setting devices: switches.

.6 Auxiliary contacts: 2 - N.O., 2 - N.C.

.7 Auxiliaries:

.1 Status light: open-green, close-red.

.2 Status flags: open-green, close-red.

2.9 LIGHTNING ARRESTERS

.1 Lightning arresters to 26 40 00.01 – Primary Lightning Arresters

2.10 INTERLOCKS

.1 Electrical interlock between normal power circuit breaker and standby power circuit breaker to prevent:

.1 Standby power breaker closing unless normal power breaker is open.

.2 Normal power breaker closing unless standby power breaker is open.

.2 Kirk key interlocks, Type F for load interrupter switch and Type D for switchgear cubicle door to prevent:

.1 Opening cubicle door for access to fuses while load interrupter is in closed position.

.2 Closing load interrupter while cubicle door is open.

.3 Kirk key interlocks Type F for normal power breaker and standby power breaker to prevent:

.1 Standby power breaker closing unless normal power breaker is open.

.2 Normal power breaker closing unless standby breaker is open.

.4 Key interlocks mounted in switchgear so that interlocks can not be removed when operating mechanism is in closed position.

2.11 INSTRUMENT TRANSFORMERS

.1 Potential transformers: to CSA C13, compound filled for outdoor use as required.

.2 Potential transformers fused with separate fuse block. Fuses: as required.

.3 Current transformers: to CSA C13, compound filled for outdoor use as required.

.4 Current transformers to have positive action automatic short-circuiting device in secondary terminals.

2.12 MOUNTING BRACKETS

.1 Potential transformers with channel type mounting brackets.

.2 Fabricate brackets and channels from electrogalvanized code gauge painted steel.

2.13 INDICATOR LIGHTS

.1 Include 30 mm long life LED indicator lights rated for appropriate control voltage to CSA C22.2 No.14.

.2 Include push to test lights with transparent plastic cover.

2.14 TRANSFORMERS

.1 Refer to Section 26 12 19 – Padmounted Liquid Filled Medium Voltage Transformers.

2.15 SECONDARY DISTRIBUTION CENTRE

.1 Refer to Section 26 24 13, unless otherwise noted below.

.2 Secondary distribution centre: outdoor non-walk in type. Voltage, current, and phase rating as indicated on drawings. Minimum short circuit current withstand capability 35 kA.

.3 Enclosure:

.1 Match primary switchgear enclosure construction.

.2 Distribution cubicle to contain:

.1 Molded case circuit breakers with LSIG electronic tripping units feature, sized as indicated.

.2 Tinned copper bus from main cubicle to distribution cubicles, including vertical bussing

.3 50% blanked off spaces for future devices.

.4 Busbars and connections:

.1 Three phase insulated bus bars, continuous current rating as shown on drawings, self-cooled, extending from main cubicle to distribution cubicles including vertical bus

.5 Neutral: solidly grounded

2.16 SECONDARY CIRCUIT BREAKERS

.1 For 208V or 600V distribution: circuit breakers shall have a minimum symmetrical interrupting capacity of 35,000 amperes. To ensure a selectively coordinated system, all circuit breakers shall have 30-cycle short-time withstand ratings equal to their symmetrical interrupting ratings, regardless of whether equipped with instantaneous trip protection or not.

.2 All circuit breakers suitable for protection devices specified below.

.1 Molded case circuit breakers, with electronic tripping units, LSIG

.2 Breakers shall be operated by a toggle-type handle and shall have a quick-make, quick-break over-centre switching mechanism that is mechanically trip-free.

.3 Padlocking mechanism for all breakers

.4 Automatic tripping of the breaker shall be clearly indicated by the handle position.

.5 Contacts shall be no welding silver alloy and arc extinction shall be accomplished by means of arc chutes.

.6 A push-to-trip button to provide a local manual means to exercise the trip mechanism.

.7 Minimum symmetrical interrupting rating as shown on the drawings.

.8 Where indicated provide CSA listed circuit breakers for applications at 100% of their continuous ampere rating in their intended enclosure.

2.17 SECONDARY CIRCUIT BREAKER TRIP UNITS

.1 Microprocessor based, with three (3) current sensors, a trip unit and a flux-transfer shunt trip.

.2 True rms sensing.

.3 Shunt trip capability to receive tripping signals from auxiliary protective relay devices.

.4 Continuous trip ratings established by interchangeable rating plugs, interlocked so they are not interchangeable between frames, and interlocked such that a breaker cannot be closed and latched with the rating plug removed.

.5 System coordination shall be provided by the following microprocessor-based programmable time/current curve shaping adjustments:

.1 Programmable long-time pickup settings in 1% increments, with +/- 5% band tolerance.

.2 Programmable long-time delay with selectable I^2t or I^4t curve shaping.

.3 Programmable short-time settings (dependent on long-time setting) in 1% increments, with +/- 5% band tolerance.

.4 Programmable short-time delay with selectable flat or I^2t curve shaping.

.5 Programmable instantaneous pickup settings in 1% increments.

.6 Programmable ground fault pickup settings trip or alarm in 1% increments.

.7 Programmable ground fault delay with selectable flat or I^2t curve shaping.

.6 Powered/unpowered selectable thermal memory to provide protection against cumulative overheating.

.7 Selectable discriminator circuit prevent the breaker being closed and latched on to a faulted circuit.

.8 Internal ground fault.

.9 Battery backed-up LEDs to indicate mode of trip following an automatic trip operation, retained after trip complemented by trip event information stored in non-volatile memory after a trip event. A trip reset button shall be provided to turn off the LED indication and reset the memory after an automatic trip. A test pushbutton shall energize an LED to indicate battery status.

.10 A red LED shall be provided on the face of the trip unit and pre-set to flash on and off when an adjustable high-load level is exceeded. A time-delay shall be provided to avoid nuisance alarms. The microprocessor-based trip units shall be capable of monitoring the following data:

.1 Instantaneous value of phase, neutral and ground current

.2 Minimum and maximum current values

.3 Average demand current

.4 System diagnostic information such as alarms and cause of trip

.5 Approximate level of fault current that initiated an automatic trip operation

.11 A hand-held programming unit to set/change the network communication breaker address for each device, set the system baud rate, distribution frequency, display breaker information, and display monitored values. The programmer shall be self-powered by an internal battery. Provide as a minimum one (1) hand-held programming unit per assembly.

.12 The trip unit shall be capable of two-way communication via a network twisted pair for remote monitoring and control. All monitored values shall be transmittable over the network.

.13 Zone interlocking capability for the short-time delay and ground fault delay trip functions for improved system coordination.

.14 Built-in metering system to monitor following parameters:

.1 Peak demand (kW)

.2 Present demand (kW)

.3 Total energy (kWh)

.4 Power factor

.5 Percentage harmonic content

.6 Total Harmonic Distortion (THD)

2.18 SUPPLY AUTHORITY METERING

.1 Arrange with authority having jurisdiction for supply of mounting and wiring for items as follows:

.1 Potential transformers.

.2 Current transformers.

.3 Watthour meter.

.4 Demand meter with kWh register.

.5 Ammeter.

.6 Voltmeter.

.7 Ammeter phase selector switch.

.8 Voltmeter phase selector switch.

.2 Separate compartment and metal raceway for exclusive use of supply authority having jurisdiction metering.

2.19 SHOP FABRICATION

.1 Shop assemble and test components of substation.

.2 After completion of factory assembly and high potential test, prepare for shipment to site, complete with hardware for re-assembly and re-connecting.

2.20 FINISHES

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

.2 Cubicle exteriors: green.

.3 Cubicle interiors: white.

.4 Supply 2 spray cans touch up paint.

2.21 EQUIPMENT IDENTIFICATION

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

.2 Nameplates: submit nameplates to Departmental Representative for approval

.1 Primary switchgear-white plate, black letters, size 7:

.1 Engraved: "Primary Cubicle".

.2 Engraved: "Main Breakers Switch”

.3 Engraved: “[enter Primary Voltage] fed from [closest upstream switch/service]”

.2 Transformer Section: white plate, black letters, size 7:
  .1 Engraved: "Transformer" "[as indicated on drawings] kVA, [as indicated on drawings] V to [as indicated on drawings] V, 3 phase, 60 Hz".
  .2 Winding temperature device engraved: "Winding Temperature".
  .3 Oil thermometer engraved: "Oil Temperature".
.3 Secondary switchgear: white plate, black letters, size 7:
  .1 Engraved: "Low Voltage Cubicle".
  .2 Engraved: "Main Breaker".
  .3 Engraved: "Feeder [No. 1]", “Feeder [No. 2]”, “Feeder [No. 3]”, as required.

2.22 WARNING SIGNS

.1 Include warning signs in accordance with Section 26 05 00 - Common Work Results for Electrical.

2.23 MIMIC BUS

.1 Single line mimic diagrams on the front of the cubicle for the complete assembly.

.2 Integrates the position indicators to give a clear visual display of the circuit breaker’s status: open, closed, isolated, in service.

.3 Positive indication of the status of the grounding switch.

.4 Mimic diagrams shall be visible in the event of a power failure.

2.24 COORDINATION STUDY AND COMMISSIONING

.1 Refer to Section 26 05 73, in addition include the following:

  .1 Submission for approval to BC Hydro to include coordination study from utility source to largest downstream device, including phase and ground overcurrent plots.
  .2 BC Hydro statement of primary voltage stamped and sealed by a professional engineer registered with APEGBC
  .3 Equipment commissioning in accordance with CEC Rules – All testing performed to NETA ATS and applicable IEEE/ANSI Standards
    .1 Unit substation Tests:
      .1 Transformer turn ratio
      .2 Insulation test – HV- ground, LV-Ground, HV-LV
      .3 Resistance Test (Switch and Transformer)
      .4 Equipment inspection
      .5 Ground resistance test
    .2 Secondary Equipment
      .1 Secondary cable insulation test
      .2 Secondary breaker set up and calibration
      .3 Secondary breaker test as applicable

.3 Station grounding, ground grid step/touch potential calculation per IEEE Standard 80, as required by CEC Table 52, site testing and sealed by a professional engineer registered in BC.

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 unit substation installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Set and secure cubicles and transformers in place, rigid, plumb and square, on channel bases.

.2 Interconnect cubicles and transformer with bus bar connections supplied by manufacturer.

.3 Check factory-made connections for mechanical security and electrical continuity.

.4 Run 1 grounding conductor 4/0 AWG bare copper in 25 mm conduit from substation ground bus to electrical room ground bus.

.5 After finishing Work, remove foreign material, including dust, before energizing substation.

.6 Set transformer taps for secondary voltage of 120 and 208V at no load.

.7 Check relay settings against shop drawings to ensure proper working of components and that co-ordinated sequence of action is established.

3.3 FIELD QUALITY CONTROL

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

.2 Check insulation of switchgear assembly with 1000V megger. If values not satisfactory, clean, and dry and heat switchgear and repeat tests until readings acceptable to the Engineer.

.3 Operate load interrupter and circuit breaker closing and tripping mechanisms, to verify correct functioning.

.4 Check phase rotation of each feeder.

.5 Place primary switchgear in service and check ammeter, voltmeter, wattmeter, power factor meter readings to ensure proper functioning of instruments and satisfactory phase balance and power factor of loads.

.6 Test for 24 consecutive hours, to include:

.1 Primary and secondary voltage at no load.

.2 Primary and secondary voltages at normal load once per hour.

.3 Primary and secondary current in each phase once per hour.

.4 kW and kVA once per hour.

.5 Transformer and ambient temperature once per hour.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by unit substation installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 – Common Work Results – Electrical

.2 Section 26 05 73 – Coordination Study & Arc Flash Analysis

.3 Section 26 08 00 – Electrical Equipment Acceptance Testing and Start-up

1.2 REFERENCES

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

- .1 ANSI/IEEE C37.04 – Standard Rating Structure for AC High-Voltage Circuit Breakers
- .2 ANSI/IEEE C37.06 – Standard for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis – Preferred Ratings an Related Required Capabilities for Voltages Above 1000V
- .3 ANSI/IEEE C37.11 – Standard Requirements for electrical control for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis or a total current basis
- .4 ANSI/IEEE C37.09 – Standard Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
- .5 ANSI/IEEE C57.13 – Standard Requirements for Instrument Transformers
- .6 IEEE C37.100.1 – Standard of Common Requirements for High Voltage Power Switchgear Rated Above 1000 V

.2 CSA International

- .1 CSA C22.2 No.5-09, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, NMX-J-266-ANCE-2010).
- .2 CSA C22.2 No.178.1-14, Transfer Switch Equipment (Tri-National standard, with NMX-J-672 ANCE and UL 1008)
- .3 CAN/CSA C60044-1-07 (R2011), Instrument Transformers – Part 1: Current Transformers
- .4 IEEE C37.100.1 – Standard of Common Requirements for High Voltage Power Switchgear Rated Above 1000 V

.3 National Electrical Manufacturers Association (NEMA)

- .1 NEMA ICS 2-1996(R2009), Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC, Part 8: Disconnect Devices for Use in Industrial Control Equipment.
- .2 NEMA SG4 – Alternating Current High Voltage Circuit Breakers
- .3 NEMA SG5 – Power Switchgear Assemblies

.4 Underwriters' Laboratories (UL)

.1 UL 1008A – Standard for Medium Voltage Transfer Switches, 1st Edition, for transfer switches rated greater than 750 volts up to 46 kV

.2 UL 1062-97, Unit Substations

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 01 50 – General Instructions.

.2 Product Data:

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

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada.

.2 Indicate:

.1 Make, model, and type.

.2 Description of equipment operation including:

.1 Automatic starting and transfer to standby unit and back to normal power.

.2 Test control.

.3 Manual control.

.4 Automatic shutdown.

.3 Single line diagram showing controls and relays.

.4 Equipment layout.

.5 Equipment dimensions including door openings, draw-out equipment positions and workspace requirements.

.6 Dimensioned foundation template.

.7 Dimensioned cable entrance and exit locations.

.8 Dimensioned cable termination heights.

.9 Details of entry plate.

.3 Submit preliminary coordination study with shop drawings.

.1 Study to show coordinated curves for the protective devices from the utility fuse cutouts or recloser, to the secondary breakers.

.2 Study to show protective devices and transformer damage curves are properly coordinated.

.3 Recommend fuse sizes breaker settings and main secondary breaker setting.

.4 Shop drawings will not be accepted or reviewed without this co-ordination study.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 01 50 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data for transfer switches for incorporation into manual.

.3 Detailed instructions to permit effective operation, maintenance and repair.

.4 Technical data:

- .1 Schematic diagram of components, controls and relays.
- .2 Illustrated parts lists with parts catalogue numbers.
- .3 Certified copy of factory test results.

.5 Commissioning agent’s commissioning report

Part 2 Products

2.1 SYSTEM DESCRIPTION

.1 This specification applies to three-phase, three ways, 2 source 1 tap, 60 Hz, fully dead front, self-contained automatic source transfer switchgear; with a main bus rating of 600 amperes continuous current and tap rating of 600 A.

.2 The unit is to be air insulated, or insulated with <u>Envirotemp™ FR3™ less-flammable fluid for operation to 0 degrees C (32 degrees F)</u> dielectric, contained in a sealed tank design.

.3 The unit shall be designed for installation on a concrete pad at ground level.

.4 The transfer control shall be microprocessor based programmable source transfer relay which will allow for event recording, adjustable time delays, and overcurrent protection.

.5 The automatic transfer switch equipment shall be equipped with all necessary relays and controls as required by BC Hydro for a closed transition transfer switch.

.6 Automatic transfer switch to be CSA certified.

.7 Automatic load transfer equipment to:

- .1 Monitor voltage on phases of normal power supply.
- .2 Initiate cranking of standby generator unit on normal power failure or abnormal voltage on any one phase below preset adjustable limits for adjustable period of time.
- .3 Transfer load from normal supply to standby unit when standby unit reaches rated frequency and voltage pre-set adjustable limits.
- .4 Transfer load from standby unit to normal power supply when normal power restored, confirmed by sensing of voltage on phases above adjustable pre-set limit for adjustable time period.
- .5 Shut down standby unit after running unloaded to cool down using adjustable time delay relay.

.8 Furnish and install closed transition transfer switch (CTTS) with number of poles, amperage, voltage, withstand and close-on ratings as shown on the plans to the satisfaction of BC Hydro. Each CTTS shall consist of microprocessor based controller to provide automatic operation. All transfer switches and controllers shall be the products of the same manufacturer.

.9 The CTTS shall transfer the load without interruption (closed transition) by momentarily connecting both sources of power only when both sources are present and acceptable. The maximum interconnection time is 100 milliseconds. The CTTS shall operate as a conventional break-before-make (open transition) switch when the power source serving the load fails.

.10 The switchgear shall be NEMA3R rated and designed for installation on a level concrete pad at grade.

.11 The integrated switchgear assembly shall withstand the effects of closing, carrying and interrupting currents up to the assigned maximum short circuit rating.

2.2 MATERIALS

.1 Instrument transformers: to CAN/CSA C60044-1.

.2 Contactors: to NEMA ICS2.

2.3 TRANSFER EQUIPMENT

.1 Circuit Breaker Type Transfer Equipment

- .1 Rated: 15,000 V, 60Hz, 600A, 4 wire.
  - .1 Fault withstand rating: as indicated on single line diagram.
  - .2 One normal - 4 pole moulded-case circuit breaker with electronic trip, mounted on common base, designed for double throw action, motor operated, mechanically held and interlocked, CSA enclosure pad-mounted.
  - .3 One standby - 4 pole moulded-case circuit breaker with thermal magnetic trip, motor operated, and interlocked.
  - .4 Circuit breakers:
    - .1 Trip free in closed position.
    - .2 Interrupting rating: as indicated on single line diagram.
  - .5 Dead front construction with access to relays and controls for inspection and maintenance, and manual operating lever for transfer switch.
  - .6 Auxiliary contact: to initiate standby generator start-up on failure of normal power.
  - .7 Overlapping switchable neutral pole on circuit breaker type equipment.

.2 Construction

- .1 The switchgear shall consist of a 2-sided, sealed tank (for oil-filled equipment), NEMA 3R enclosure, and with separate front and rear cable compartments. Overall height, width, depth and layout shall conform to the manufacturer's standard construction practices for the configuration, ratings, and voltage class specified. Standard construction shall be of mild steel with stainless steel hardware.

.2 Provide tamperproof bolted cover design c/w rubber gaskets.

.3 The main cable compartments shall house source bushings, source switches and transfer control. The tap compartment shall house tap bushings. Recessed lifting provisions for suitable balanced lift shall be provided on the ends.

.4 Side-hinged doors shall have a door stay to manually latch the door in the open position at approximately 120º from the closed position. Provide pentahead bolts, with provisions for padlocking on each set of doors.

.5 Oil-filled units shall be shipped complete with the specified liquid insulation, and relay installed.

  .1 The unit shall be equipped with a 1-inch oil-fill plug and a 1-inch drain plug with 3/8” sampler

.6 Provide a single automatic pressure relief valve for oil-filled equipment, that is hotstick-operable and sight gauges to monitor the dielectric level located on each unit side equipped with an operating handle.

.7 A non-corrosive operating diagram (one-line schematic of the unit) shall be affixed to the inside of the right hand, first opening door, on both sides of the unit, if two (2) sided. A single nameplate shall be provided that is mounted on the source side tank front plate in the upper right hand corner. The nameplate shall contain the following information:

  .1 Catalog Number/Model Number
  .2 Serial Number
  .3 Nominal voltage class, kV
  .4 Rated maximum voltage, kV
  .5 BIL, kV
  .6 Manufacturing Date: MM/YYYY
  .7 Rated continuous current, A
  .8 Rated load interrupting rating, A
  .9 Momentary current rating, kA asym.
  .10 Close & latch rating, kA asym.
  .11 Total weight, lbs.
  .12 Liquid dielectric volume (gallons), if applicable

.8 Bushings shall be deadfront type for use with separable connectors conforming to IEEE Std 386-2006 standard and ANSI Standard C119.2. The source ways shall have a continuous current rating of 600 A with bushings.

2.4 CONTROLS

.1 The controller's sensing and logic shall be provided by a single built-in microprocessor for maximum reliability, minimum maintenance, and the ability to communicate serially through an optional serial communication module.

.2 The controller shall be connected to the transfer switch by an interconnecting wiring harness. The harness shall include a keyed disconnect plug to enable the controller to be disconnected from the transfer switch for routine maintenance. Sensing and control logic shall be provided on multi-layer printed circuit boards. Interfacing relays shall be industrial grade plug-in type with dust covers. The panel shall be enclosed with a protective cover and be mounted separately from the transfer switch unit for safety and ease of maintenance. The protective cover shall include a built-in pocket for storage of the operator's manuals.

.3 All customer connections shall be wired to a common terminal block to simplify field-wiring connections.

.4 Transfer parameters – any combination shall be selectable. The source shall be determined to be unhealthy if any of the enabled parameters are met. Each parameter shall have a programmable time delay.

- .1 Two levels of undervoltage: 27-1 & 27-2
- .2 One level of positive sequence undervoltage: 27P
- .3 Two levels of underfrequency: 81U1 & 81U2
- .4 Two levels of overfrequency: 81O1 & 81O2

.5 Restoration parameters– any combination shall be selectable. The source shall be determined to be healthy if all enabled parameters are met. Each parameter shall have a programmable time delay.

- .1 One level of minimum phase-ground voltage: 59
- .2 One level of minimum positive sequence voltage: 59P
- .3 One level of minimum source frequency: 81U
- .4 One level of maximum source frequency: 81O

.6 User selectable and programmable Sync Check Settings

.7 Sync check shall be active if parallel restoration is selected. The sync check algorithm will compare positive sequence voltage magnitude, angle, frequency, and slip to determine synchronism.

- .1 Provide synchronism-check relay (25) and directional power relay (32) for sync check process
- .2 The following settings shall be available to provide user programmable tolerances.
  - .1 Maximum delta voltage angle
  - .2 Maximum delta voltage magnitude
  - .3 Minimum time for phasors to meet Maximum delta voltage angle and Maximum delta voltage angle
  - .4 Delta frequency limit
  - .5 Mechanism closing delay
  - .6 Sync. close attempt window which shall be the maximum time in which the microprocessor will attempt a synchronous close. Failure to sync within this time will assert a fail to sync signal.

.7 An option to allow non-parallel restoration shall be provided if a Failure to Sync occurs during a parallel restoration. The time window to attempt a synchronous close shall be adjustable from 10 to 300 seconds.

.8 The generator source switch will close after the generator meets all of the enabled Source Restoration parameter settings. One or more of the following elements shall be programmable:

.1 Minimum Phase-ground voltage

.2 Minimum positive sequence voltage

.3 Minimum frequency

.4 Maximum frequency

.9 Restoration from the generator back to the preferred source shall be made after the preferred source meets all of the enabled Source Restoration parameters. The user shall have the option for restoration to be parallel with sync check or non-parallel.

.1 Non- Parallel restoration sequence: After the preferred source is “healthy”, the generator switch opens, then the preferred source switch closes after a customer programmable time delay.

.2 Parallel restoration sequence: The preferred source switch will close when it is in sync with the generator, then the generator source switch will open.

.10 The generator power down contact will close after the user defined generator standby timer expires

.11 Selector switch – 4-position "Test", "Auto", "Manual", "Engine start".

.1 Test position - normal power failure simulated. Engine starts and transfer takes place. Return switch to "Auto" to stop engine.

.2 Auto position - normal operation of transfer switch on failure of normal power; retransfers on return of normal voltage and shuts down engine.

.3 Manual position - transfer switch may be operated by manual handle but transfer switch will not operate automatically and engine will not start.

.4 Engine start position - engine starts but unit will not transfer unless normal power supply fails. Switch must be returned to "Auto" to stop engine.

.12 Control transformers: dry type with 120 V secondary to isolate control circuits from:

.1 Normal power supply.

.2 Stand-by power supply.

.13 Relays: continuous duty, industrial control type, with wiping action contacts rated 10 A minimum:

.1 Voltage sensing: 3 phase for normal power and on one phase only for emergency, solid state type, adjustable drop out and pick up, close differential, 2 V minimum undervoltage and over voltage protection.

.2 Time delay: normal power to standby, adjustable solid state, 5 to 180 s.

.3 Time delay on engine starting to override momentary power outages or dips, adjustable solid state, 3 to 20 s delay.

.4 Time delay on retransfer from standby to normal power, adjustable 0 to 60 s.

.5 Time delay for engine cool-off to permit standby set to run unloaded after retransfer to normal power, adjustable solid state, 20 s intervals to 10 minutes.

.6 Time delay during transfer to stop transfer action in neutral position to prevent fast transfer, adjustable, 5 s intervals to 180 s.

.7 Frequency sensing, to prevent transfer from normal power supply until frequency of standby unit reaches preset adjustable values.

.8 Neutral position delay: allow time for motors to delay between live sources, adjustable, 0 to 5 s.

.9 Protective relay functions as required by BC Hydro for closed-transition transfer as noted on the Drawings.

.14 Solid state electronic in-phase monitor

.15 Overcurrent protection and metering shall be provided for the loads

.16 The relay shall be provided with tap overcurrent protection which is user programmable and shall include:

.1 Individual Settings for phase and ground overcurrent and fault protection

.2 Provide user selectable TCC curves to satisfy the requirements of BC Hydro’s closed transition transfer protocol

2.5 ACCESSORIES

.1 Ensure pilot lights indicate power availability normal and standby, switch position, green for normal, red for standby, mounted in panel.

.2 Plant exerciser: 168 hours timer to start standby unit once each week for selected interval but does not transfer load from normal supply. Timer adjustable 0-168 hours in 15 minute intervals.

.3 Auxiliary relay to provide minimum 3 N.O. and 3 N.C. contacts for remote alarms.

.4 Instruments:

.1 Digital true RMS, indicating type 2 % accuracy, flush panel mounting:

.1 Voltmeter: ac, scale 0 to 25kV.

.2 Ammeter: ac, scale 0 to 600A.

.3 Frequency meter: scale 55 to 65 Hz.

.5 Voltmeter selector switch: rotary, maintained contacts, panel mounting type, round notched handle, four position, labelled "OFF-Phase A-Phase B-Phase C".

.6 Potential transformers - type for outdoor use:

.1 Ratio: 14,400 to 120.

.2 Rating: 15kV, 60Hz, BIL 95kV.

.7 Ammeter selector switch: rotary, maintained contacts, panel mounting type, designed to prevent opening of current circuits, round notched handle, four position labelled "OFF - Phase A - Phase B - Phase C".

.8 Current transformers - type for outdoor use:

.1 Rating: 15kV, 60Hz, BIL 95kV.

.2 Positive action automatic short- circuiting device in secondary terminals.

.9 Manual bypass and isolator: to both supplies.

.10 Submit one racking handle per high voltage CTTS line-up as applicable. Charging handle to be furnished on each breaker mechanism.

.11 Provide one circuit breaker lifting device.

2.6 EQUIPMENT IDENTIFICATION

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

.2 Control panel:

.1 For selector switch and manual switch: size 4 nameplates.

.2 For meters, indicating lights, minor controls: use size 2 nameplates.

2.7 SOURCE QUALITY CONTROL

.1 Complete equipment, including transfer mechanism, controls, relays and accessories factory assembled and tested in presence of Departmental Representative.

.2 Notify Departmental Representative 5 days minimum in advance of date of factory test.

.3 Tests:

.1 Operate equipment both mechanically and electrically to ensure proper performance.

.2 Check selector switch, in modes of operation Test, Auto, Manual, Engine Start and record results.

.3 Check voltage sensing and time delay relay settings.

.4 Check:

.1 Automatic starting and transfer of load on failure of normal power.

.2 Retransfer of load when normal power supply resumed.

.3 Automatic shutdown.

.4 In-phase monitor operation.

Part 3 Execution

3.1 INSTALLATION

.1 Locate, install and connect transfer equipment.

.2 Check relays and solid state monitors and adjust as required to ensure correct operation.

.3 Install and connect auxiliary 120Vac power supply and remote alarms.

3.2 FIELD QUALITY CONTROL

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

.2 Energize transfer equipment from normal power supply.

.3 Set selector switch in "Test" position to ensure proper standby start, running, transfer, retransfer. Return selector switch to "Auto" position to ensure standby shuts down.

.4 Set selector switch in "Manual" position and check to ensure proper performance.

.5 Set selector switch in "Engine start" position and check to ensure proper performance. Return switch to "Auto" to stop engine.

.6 Set selector switch in "Auto" position and open normal power supply disconnect. Standby should start, come up to rated voltage and frequency, and then load should transfer to standby. Allow to operate for 10 minutes, then close main power supply disconnect. Load should transfer back to normal power supply and standby should shutdown.

.7 Repeat, at 1 hour intervals, 2 times, complete test with selector switch in each position, for each test.

.8 Allow for minimum of 2 training sessions to be carried out on consecutive days to accommodate separate groups. Manufacturer’s technical field representatives shall perform this function.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 01 50 – General Instructions.

  .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 01 50 – General Instructions.

END OF SECTION