

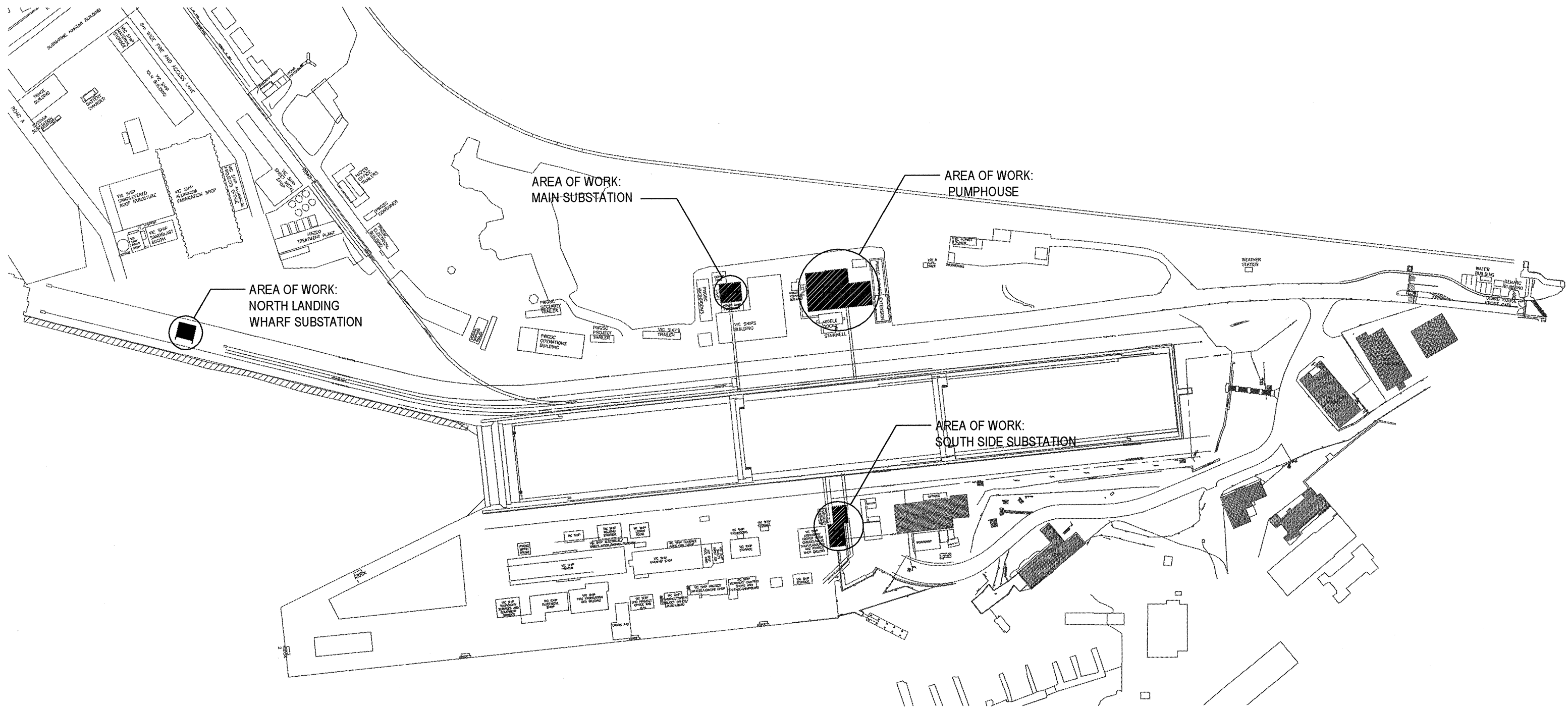
PWGSC
ESQUIMALT GRAVING DOCK (EGD)
ISSUED FOR TENDER
ELECTRICAL SAFETY REPAIRS
(ARC FLASH MITIGATION)

DRAWING NO. DRAWING TITLE
0000 SERIES - REFERENCES

E1.0 COVER PAGE, DRAWING LIST AND LEGEND

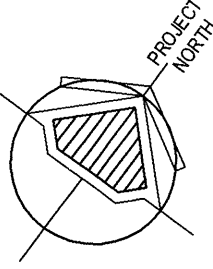
ELECTRICAL

- E2.0 MAIN SUBSTATION SINGLE LINE DIAGRAM
E3.0 MAIN SUBSTATION 12.5kV THREE LINE DIAGRAM
E4.0 MAIN SUBSTATION 2.4kV THREE LINE DIAGRAM AND FLOOR PLAN
E5.0 MAIN SUBSTATION SWITCHGEAR PICTURES AND NOTES
E6.0 PUMPHOUSE SINGLE LINE DIAGRAM
E7.0 NORTH LANDING WHARF SUBSTATION SINGLE LINE DIAGRAM
E8.0 NORTH LANDING WHARF SUBSTATION THREE LINE DIAGRAM AND FLOOR PLAN
E9.0 SOUTH SIDE SUBSTATION SINGLE LINE DIAGRAM
E10.0 SOUTH SIDE SUBSTATION THREE LINE DIAGRAM AND FLOOR PLAN

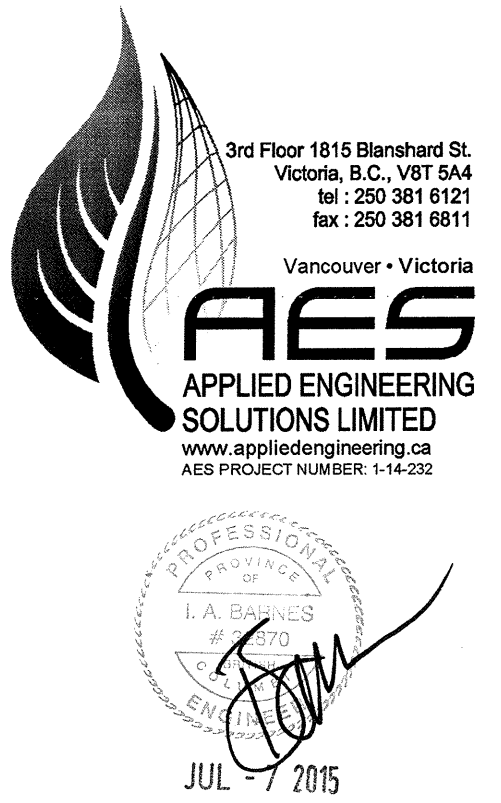


1
E1.0
ESQUIMALT GRAVING DOCK
SITE PLAN AND AREAS OF WORK
1:2000

LEGEND - SINGLE LINE & SCHEMATIC DIAGRAMS			
NOT ALL SYMBOLS MAY APPEAR ON DRAWINGS			
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	LV CIRCUIT BREAKER (MOLDED CASE)		ELECTRICAL AND/OR MECHANICAL INTERLOCK
	LV CIRCUIT BREAKER (DRAWOUT)		CABLE LABELS
	INSULATED CASE CIRCUIT BREAKER		POTENTIAL TRANSFORMER
	ELECTRICALLY OPERATED FOR REMOTE OR LOCAL (MANUAL) TRIP AND CLOSE		LIVE LINE INDICATOR
	BREAKER AUX CONTACTS		SLIP RING
	BREAKER KEY INTERLOCK		CAPACITOR
	BREAKER KEY MATCH		AC MOTOR (GENERAL)
	DRAWOUT CELL		AC GENERATOR SET
	HV CIRCUIT BREAKER (DRAWOUT)		CONTACTOR MAIN CONTACTS
	OIL CIRCUIT BREAKER		RESISTOR (ALTERNATE SYMBOL)
	SF6 BREAKER		HEATER
	VAC. BREAKER		THERMAL OVERLOAD DEVICE
	RECLOSER		CT SHORTING TYPE TEST SWITCH
	LIGHTNING ARRESTOR/SURGE ARRESTOR		SHORTING SWITCH
	POWER DISCONNECT SWITCH		REACTOR (ALTERNATE SYMBOL)
	LOAD BREAK SWITCH		TEST LINK/SWITCH/BLOCK (1-LINE DIAGRAM)
	FUSED CUTOUT (POLE MOUNTED)		N.O. CONTACT - OPEN WHEN RELAY DE-ENERGIZED
	FUSED SWITCH		DUPLEX RECEPTACLE
	CONTROL FUSE		SPECIAL PURPOSE RECEPTACLE
	INDICATING INSTRUMENT:		CEILING MOUNTED JUNCTION BOX
	V = VOLTMETER		LONG, SHORT, INSTANTANEOUS, GROUND FAULT. INDICATES THE TRIP OPTIONS REQUIRED ON THE ELECTRONIC TRIP UNIT OF THE BREAKER.
	A = AMMETER		
	Hz = FREQUENCY METER		
	kw = KILOWATT METER		
	SS = SYNCHROSCOPE		
	VS = VOLT METER SWITCH		
	AS = AMMETER SWITCH		
	DMS DIGITAL METERING SYSTEM POWER METER (ALTERNATE)		
	PLUG CONNECTOR (CONTROL CTS); STAB CONNECTOR OR DRAWOUT CONTACTS (PWR CTS)		
	MFPRL MULTI FUNCTION PROTECTION RELAY		
	TYPE 1 - MULTI FUNCTION PROTECTION RELAY USED FOR TRANSFORMER PROTECTION AND ARC FLASH MITIGATION		
	TYPE 2 - MULTI FUNCTION PROTECTION RELAY USED FOR FEEDER PROTECTION AND ARC FLASH MITIGATION		
	PANEL A		
	GROUND		
	TRANSFORMER		
	CURRENT TRANSFORMER (QUANTITY)		
	ZERO SEQUENCE CURRENT TRANSFORMER		
	PRIMARY SYSTEM/H.V. BUS/CABLE		
	INTERMEDIATE SYSTEM/H.V./M.V. BUS/CABLE		
	SECONDARY SYSTEM 600V AND LOWER BUS/CABLE		
	CONTROL INTERLOCKS		
	ROOM/EQUIPMENT OUTLINES		



KEYPLAN



1	ISSUED FOR TENDER	20160327
0	ISSUED FOR 100% SUBMISSION	20141027
Revision/Revision	Description/Description	Date/Date

Client/client

ESQUIMALT
GRAVING DOCK

825 ADMIRALS ROAD
VICTORIA, BC, V9A 2P1

Project title/Titre du projet
825 ADMIRALS ROAD VICTORIA BC
ESQUIMALT GRAVING DOCK
ELECTRICAL SAFETY UPGRADE

EGD ELECTRICAL
SAFETY REPAIRS
(ARC FLASH MITIGATION)

Consultant Signature Box Only

Designed by/Concept par

IAB

Drawn by/Dessiné par

JB

PWGSC Project Manager/Administrateur de Projets TPSGC

PWGSC Regional Manager, Architectural and Engineering Services/
Gestionnaire régionale, Services d'architecture et de génie, TPSGC

Drawing title/Titre du dessin

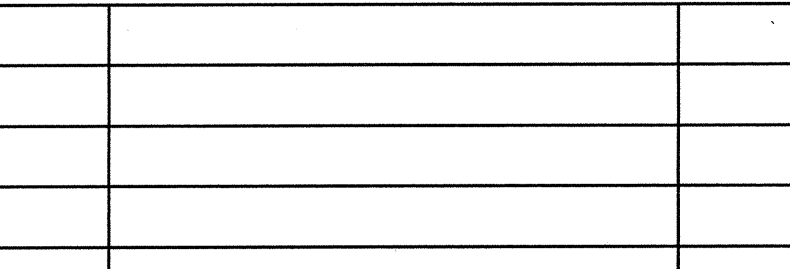
COVER PAGE, DRAWING LIST
AND LEGEND

Project No./No. du projet
R.016116.119

Sheet/Feuille
E1.0

Revision no./
La Révision
no.
1

EYPLAN



ESQUIMALT RAVING DOCK

Project title/Titre du projet
825 ADMIRALS ROAD VICTORIA BC
ESQUIMALT GRAVING DOCK
ELECTRICAL SAFETY UPGRADE

**EGD ELECTRICAL
SAFETY REPAIRS
(ARC FLASH MITIGATION)**

Designed by/Concept par
IAB

Drawn by/Dessine par
JB
PWGSC Project Manager/Administrateur de Projets TPSGC

PWGSC, Regional Manager, Architectural and Engineering Services/
Gestionnaire régionale, Services d'architecture et de génie, TPSGC

MAIN SUBSTATION SINGLE LINE DIAGRAM

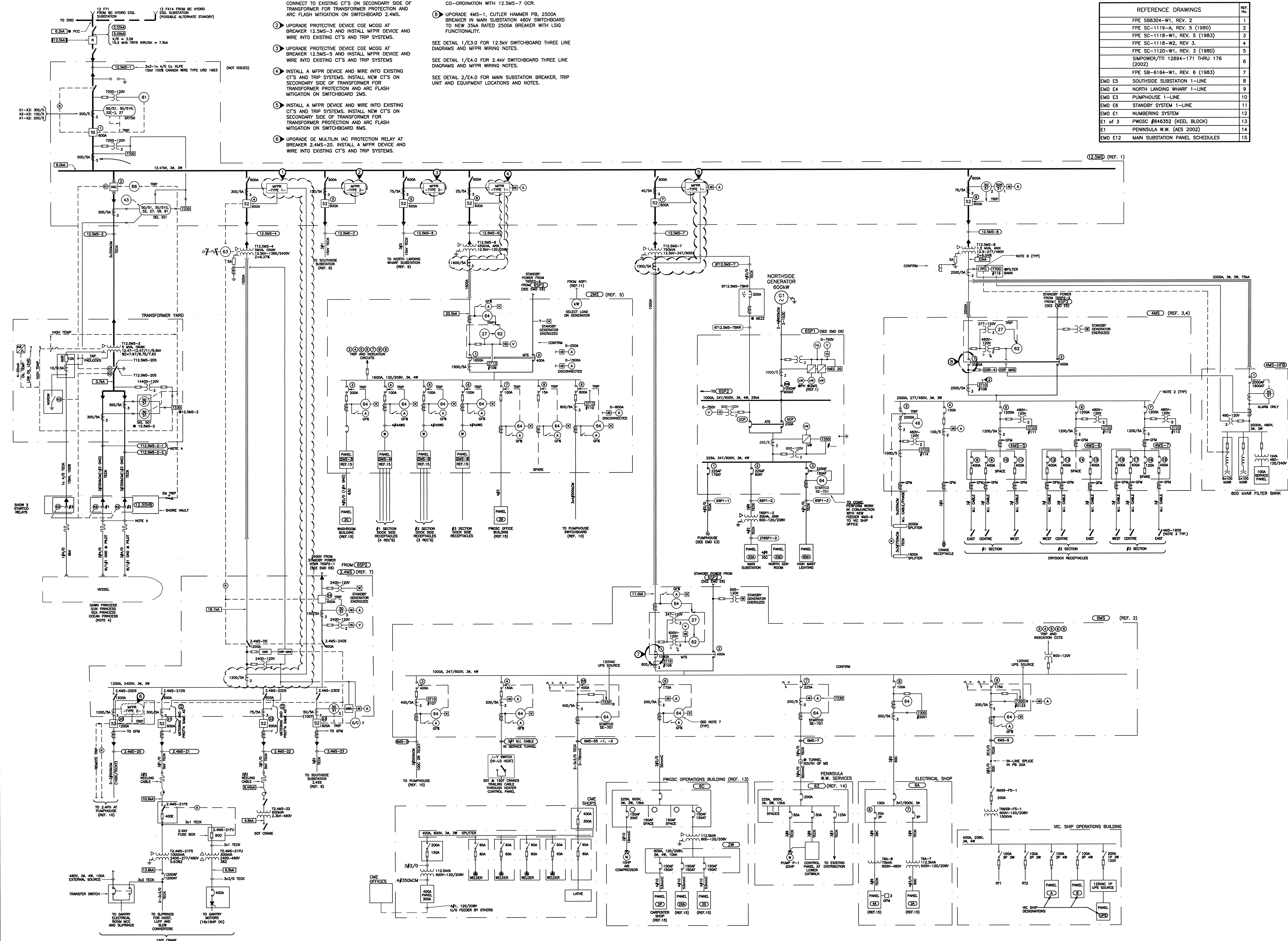
project No./No. du projet	Sheet/ Feuille	Revision no./ La Révision no.
R.016116.119	E2.0	1

- ① **UPGRADE PROTECTIVE DEVICE CGC MCGG AT BREAKER 12.5M5-8. INSTALL A MPFR DEVICE AND WIRE INTO EXISTING CT'S AND TRIP SYSTEMS. CONNECT TO EXISTING CT'S ON SECONDARY SIDE OF TRANSFORMER FOR TRANSFORMER PROTECTION AND ARC FLASH MITIGATION ON SWITCHBOARD 2.4M5.**
- ② **UPGRADE PROTECTIVE DEVICE CGC MCGG AT BREAKER 12.5M3-3. INSTALL A MPFR DEVICE AND WIRE INTO EXISTING CT'S AND TRIP SYSTEMS.**
- ③ **UPGRADE PROTECTIVE DEVICE CGC MCGG AT BREAKER 12.5M5-8 AND INSTALL MPFR DEVICE AND WIRE INTO EXISTING CT'S AND TRIP SYSTEMS**
- ④ **INSTALL A MPFR DEVICE AND WIRE INTO EXISTING CT'S AND TRIP SYSTEMS. INSTALL NEW CT'S ON SECONDARY SIDE OF TRANSFORMER FOR TRANSFORMER PROTECTION AND ARC FLASH MITIGATION ON SWITCHBOARD 2M5.**
- ⑤ **INSTALL A MPFR DEVICE AND WIRE INTO EXISTING CT'S AND TRIP SYSTEMS. INSTALL NEW CT'S ON SECONDARY SIDE OF TRANSFORMER FOR TRANSFORMER PROTECTION AND ARC FLASH MITIGATION ON SWITCHBOARD 6M5.**
- ⑥ **UPGRADE GE MULTILIN IXC PROTECTION RELAY AT BREAKER 2.4M5-20. INSTALL A MPFR DEVICE AND WIRE INTO EXISTING CT'S AND TRIP SYSTEMS.**

SEE DETAIL 1/E3.0 FOR 12.5KV SWITCHBOARD THREE LINE
DIAGRAMS AND MFPR WIRING NOTES.

SEE DETAIL 1/E4.0 FOR 2.4KV SWITCHBOARD THREE LINE
DIAGRAMS AND MFPR WIRING NOTES.

SEE DETAIL 2/E4.0 FOR MAIN SUBSTATION BREAKER, TRIP
UNIT AND EQUIPMENT LOCATIONS AND NOTES.



1 MAIN SUBSTATION SINGLE LINE DIAGRAM

KEYPLAN



1	ISSUED FOR TENDER	2015/03/27
0	ISSUED FOR 100% SUBMISSION	2014/10/27
Revision/	Description/Description	Date/Date

Client/client

**ESQUIMALT
GRAVING DOCK**

**825 ADMIRALS ROAD
VICTORIA, BC, V9A 2P1**

Project title/Titre du projet
**825 ADMIRALS ROAD VICTORIA BC
ESQUIMALT GRAVING DOCK
ELECTRICAL SAFETY UPGRADE**

**EGD ELECTRICAL
SAFETY REPAIRS
(ARC FLASH MITIGATION)**

Consultant Signature Box Only

Designed by/Concept par

IAB

Drawn by/Dessiné par

JB

PWSC Project Manager/Administrateur de Projets TPSCC

PWSC, Regional Manager, Architectural and Engineering Services/
Gestionnaire régionale, Services d'architecture et de génie, TPSCC

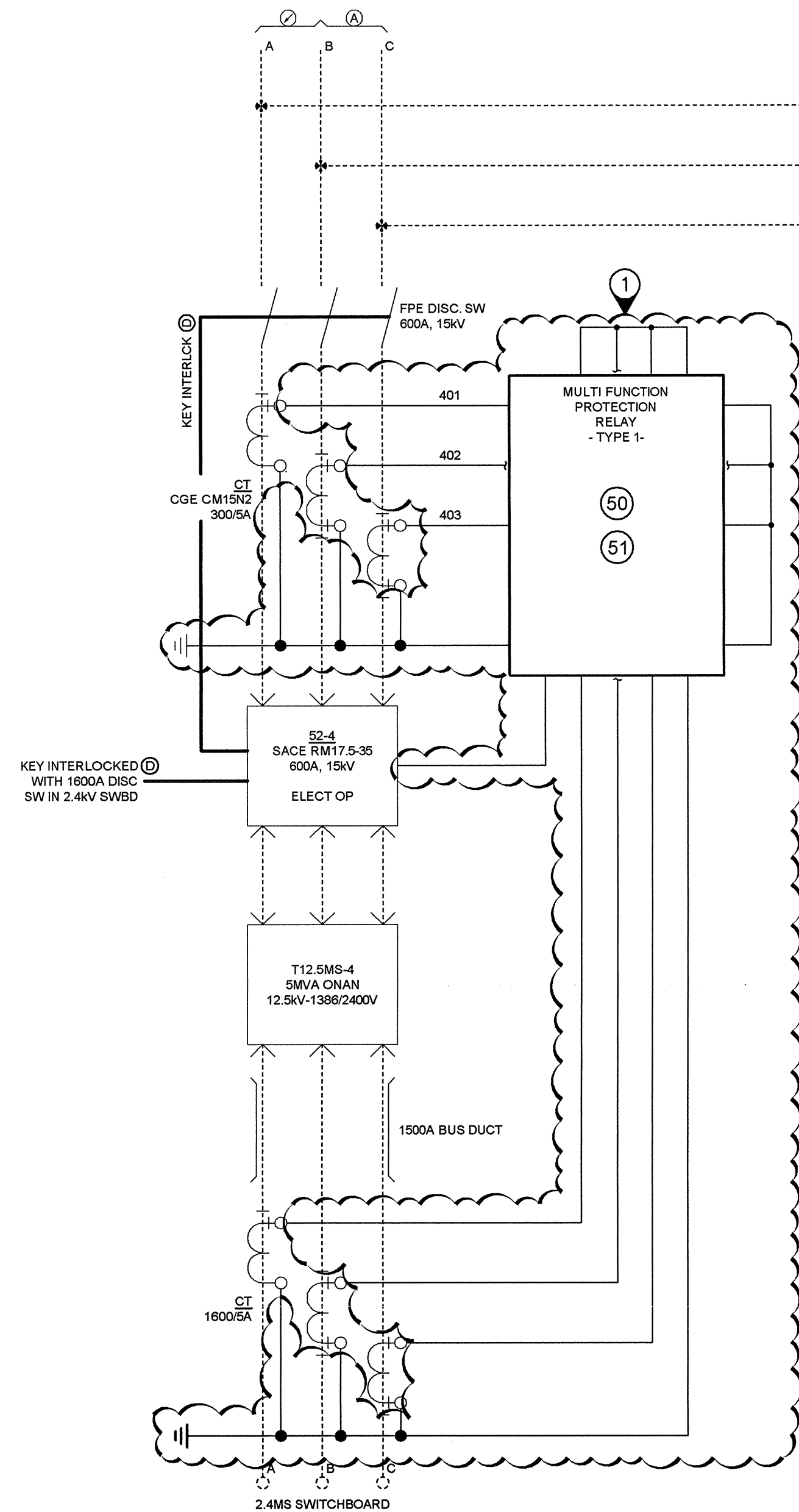
Drawing title/Titre du dessin

**MAIN SUBSTATION
12.5KV THREE LINE
DIAGRAM**

Project No./No. du projet
R.016116.119

Sheet/Feuille
E3.0

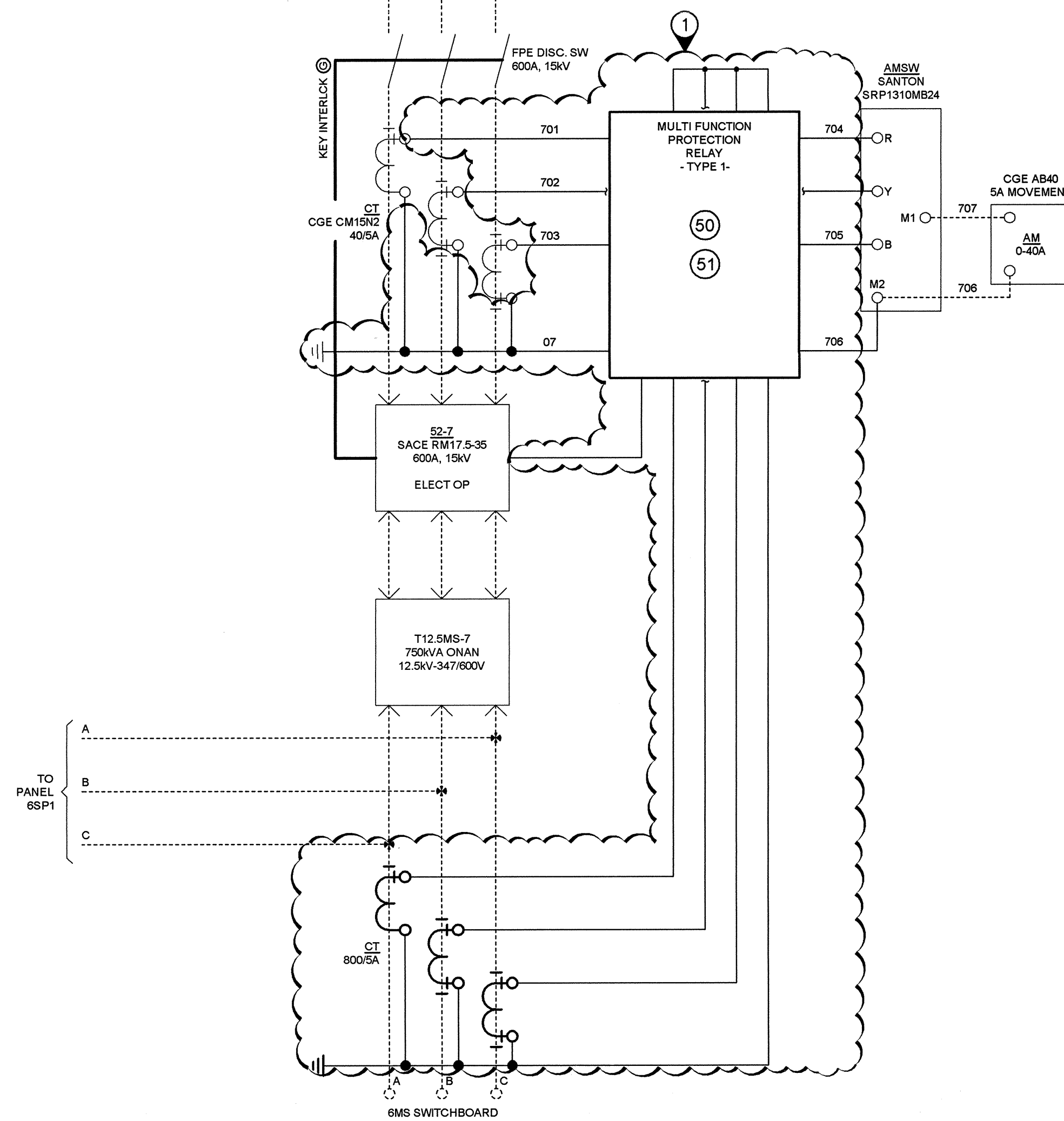
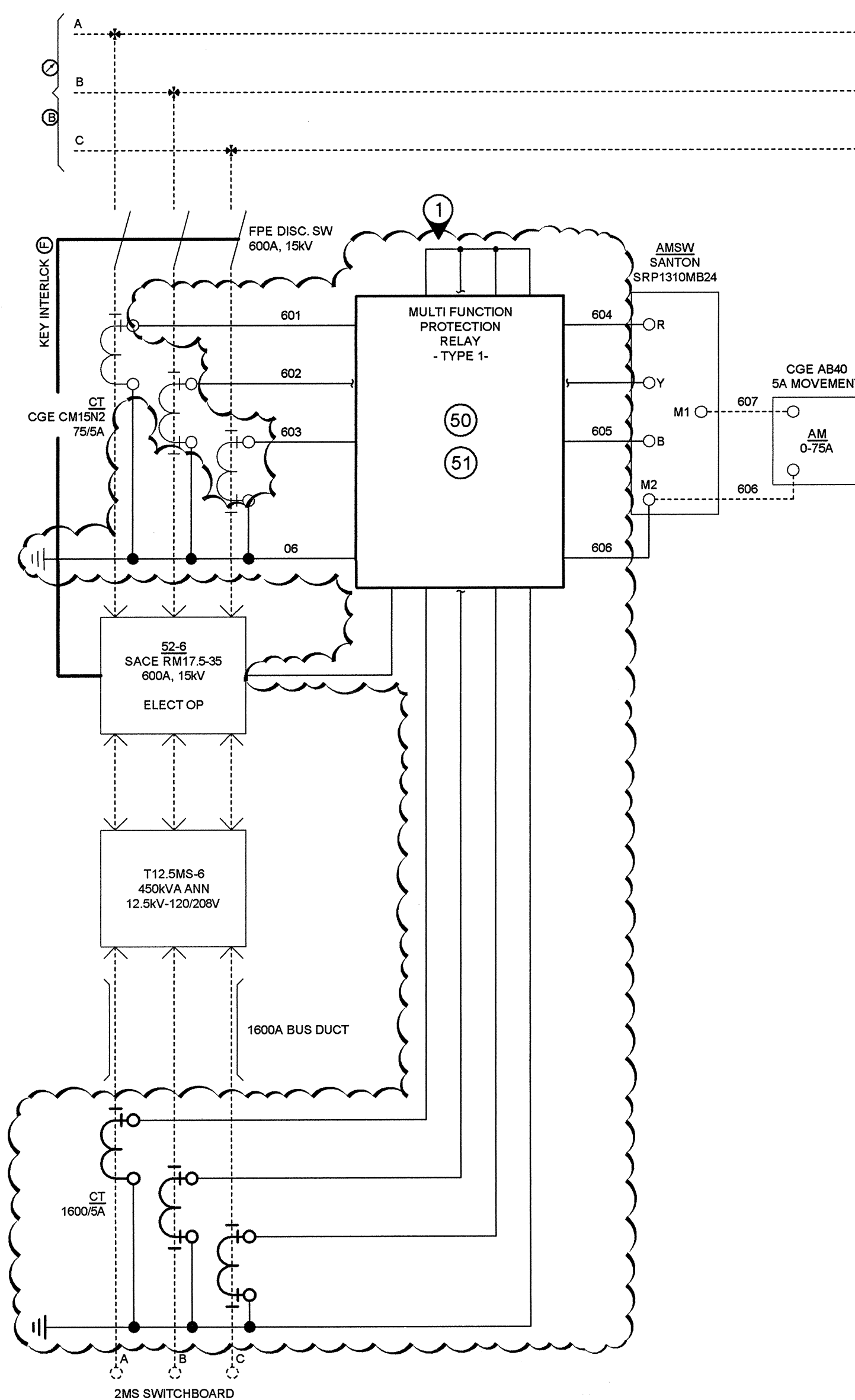
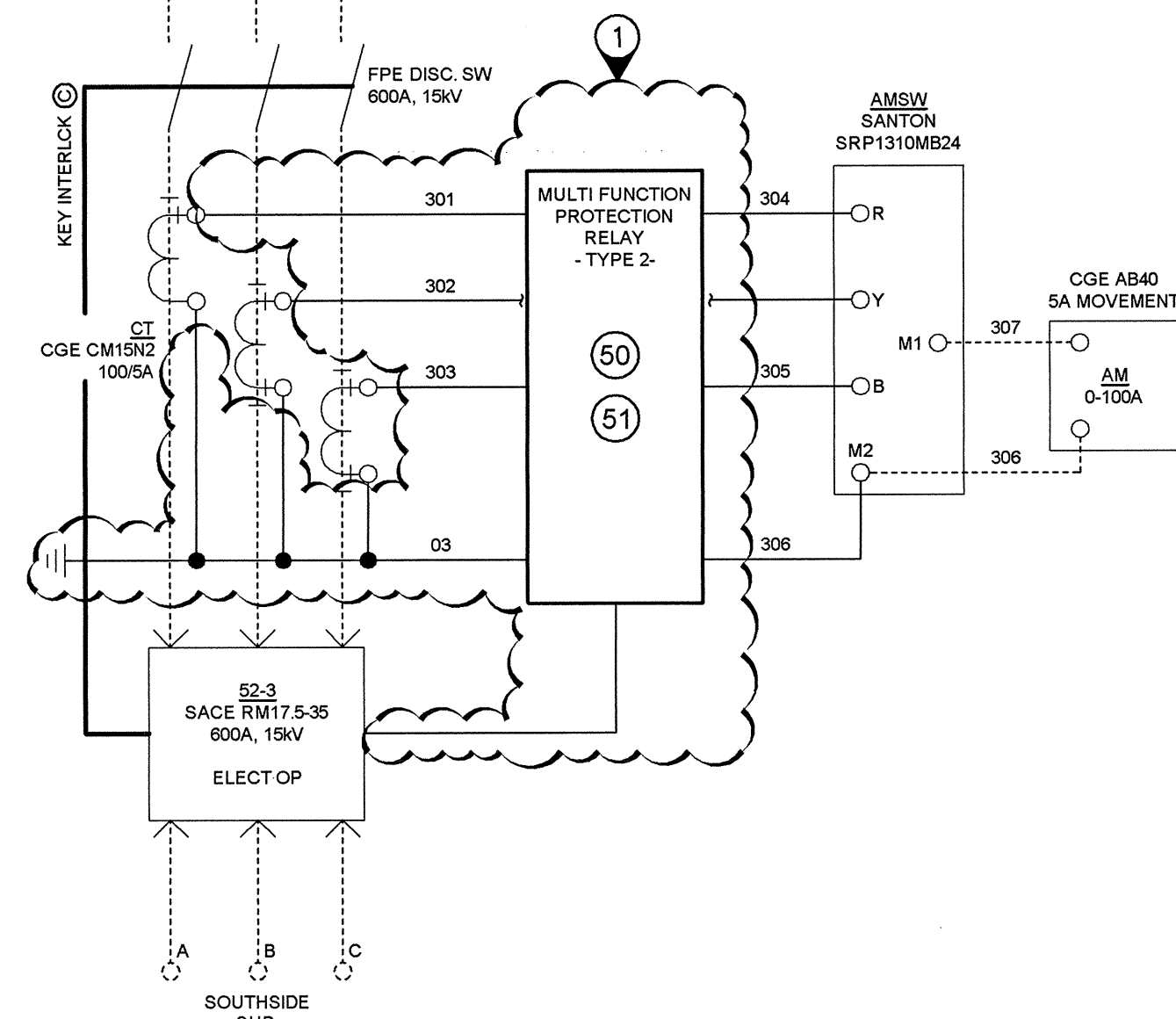
Revision no./
La Révision
no.
1



CONTACT DIAGRAM AMSW		POSITIONS			
SANTON SRP1310MB24		OFF	1	2	3
M1	R	X			
M2	R-Y-B	X			
M2-R-B			X		
M2-R-Y				X	
M1-R			X		X
M1-Y				X	
M1-B					X

KEYNOTES:

- 1 12.5kV MAIN SUBSTATION SWITCHBOARD BREAKER
ARC FLASH MITIGATION UPGRADE WIRING DIAGRAMS.
REFER TO 1/E2.0 AND 2/E4.0 FOR ADDITIONAL
DETAILS.



1
E3.0

**MAIN SUBSTATION 12.5KV THREE LINE DIAGRAM
WITH NEW MFPR CONNECTION DETAILS**

NTS

KEYPLAN



1	ISSUED FOR TENDER	2015/03/27
0	ISSUED FOR 100% SUBMISSION	2014/10/27
Revision/	Description/Description	Date/Date
Revision		

Client/client

ESQUIMALT
GRAVING DOCK

825 ADMIRALS ROAD
VICTORIA, BC, V9A 2P1

Project title/Titre du projet
825 ADMIRALS ROAD VICTORIA BC
ESQUIMALT GRAVING DOCK
ELECTRICAL SAFETY UPGRADE

EGD ELECTRICAL
SAFETY REPAIRS
(ARC FLASH MITIGATION)

Consultant Signature Box Only

Designed by/Concept par
IAB

Drawn by/Dessiné par
JB

PWGSC Project Manager/Administrateur de Projets TPSGC

PWGSC Regional Manager, Architectural and Engineering Services/
Gestionnaire régionale, Services d'architecture et de génie, TPSGC

Drawing title/Titre du dessin

MAIN SUBSTATION
2.4kV THREE LINE
DIAGRAM
AND FLOOR PLANS

Project No./No. du projet
R.016116.119

Sheet/ Feuille
E4.0

Revision no./
La Révision
no.
1

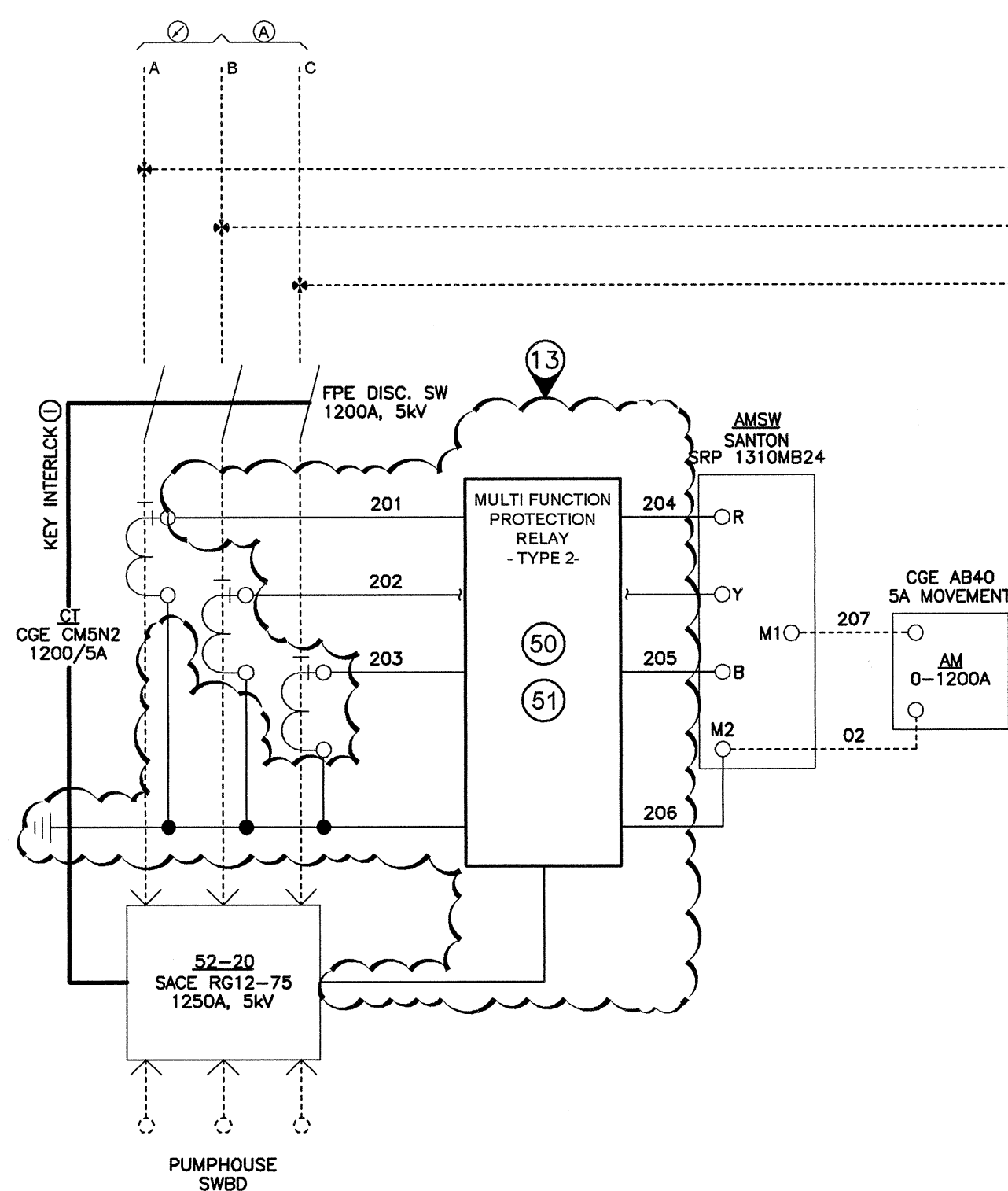
KEYNOTES:

- 1x27mm EMT CONDUIT WITH 8c#10 TEW + BOND TO NEW CT'S ON TRANSFORMER T12.5MS-6 SECONDARY BUS.
- 1x27mm EMT CONDUIT WITH 8c#10 TEW + BOND TO NEW CT'S ON TRANSFORMER T12.5MS-7 SECONDARY BUS.
- 1x27mm EMT CONDUIT WITH 8c#10 TEW + BOND TO NEW CT'S ON 2.4KV BUS DUCT FROM TRANSFORMER T12.5MS-4 SECONDARY.
- FLOOR PENETRATION FROM MAIN SUBSTATION FIRST FLOOR TO MAIN SUBSTATION MEZZANINE FOR CT CONNECTION CIRCUITS.
- 12.47KV BREAKER FOR THE 750 KVA TRANSFORMER T12.5MS-7:
 - REPLACE THE EXISTING MCGG PROTECTION SYSTEM WITH A NEW MULTI FUNCTION PROTECTION RELAY.
 - CONNECT THE MULTI FUNCTION PROTECTIVE RELAY TO THE EXISTING 40:5 PRIMARY CT'S.
 - SUPPLY AND INSTALL 3 EACH 1000:5 C 200 ACCURACY CURRENT TRANSFORMERS ON THE SECONDARY SIDE OF 750 KVA TRANSFORMER T12.5MS-7 AFTER THE SUBFEED TO 6SP1. SUPPLY ALL MOUNTING BRACKETS AND HARDWARE, SHORTING BLOCKS AND WIRING.
 - SUPPLY AND INSTALL A NEW HINGED AND BOLTED CONTROL COMPARTMENT DOOR OR CUSTOM, PAINTED, NEAT FINISHED TRIM.
 - RETAIN AND RECONNECT THE EXISTING REMOTE TRIP AND CLOSE FUNCTION AND TEST.
 - PROVIDE BREAKER COORDINATION STUDY AND TEST AND VERIFY PROTECTION AND CONTROL SYSTEM FUNCTION.
- 12.47KV BREAKER FOR THE 450 KVA TRANSFORMER T12.5MS-6:
 - REPLACE THE EXISTING MCGG PROTECTION SYSTEM WITH A NEW MULTI FUNCTION PROTECTION RELAY.
 - CONNECT THE MULTI FUNCTION PROTECTIVE RELAY TO THE EXISTING 25:5 PRIMARY CT'S.
 - SUPPLY AND INSTALL 3 EACH 1600:5 C 200 ACCURACY CURRENT TRANSFORMERS ON THE SECONDARY SIDE OF 450 KVA TRANSFORMER T12.5MS-6 WHERE THE 1600A BUS CONNECTS TO THE 2MS SWITCHBOARD. SUPPLY ALL MOUNTING

- BRACKETS AND HARDWARE, SHORTING BLOCKS AND WIRING.
- SUPPLY AND INSTALL A NEW HINGED AND BOLTED CONTROL COMPARTMENT DOOR OR CUSTOM, PAINTED, NEAT FINISHED TRIM.
 - RETAIN AND RECONNECT THE EXISTING REMOTE TRIP AND CLOSE FUNCTION AND TEST.
 - PROVIDE BREAKER COORDINATION STUDY AND TEST AND VERIFY PROTECTION AND CONTROL SYSTEM FUNCTION.
- 12.47KV BREAKER 12.5 MS-5 NORTH LANDING WHARF SUBSTATION FEEDER BREAKER:
 - REPLACE THE EXISTING MCGG PROTECTION SYSTEM WITH A NEW MULTI FUNCTION PROTECTION RELAY.
 - CONNECT THE MULTI FUNCTION PROTECTIVE RELAY TO THE EXISTING 75:5 CT'S.
 - SUPPLY AND INSTALL A NEW HINGED AND BOLTED CONTROL COMPARTMENT DOOR OR CUSTOM, PAINTED, NEAT FINISHED TRIM.
 - RETAIN AND RECONNECT THE EXISTING REMOTE TRIP AND CLOSE FUNCTION AND TEST.
 - PROVIDE BREAKER COORDINATION STUDY AND TEST AND VERIFY PROTECTION AND CONTROL SYSTEM FUNCTION.
 - 2.47KV BREAKER FOR THE 5 MVA TRANSFORMER T12.5MS-4:
 - REPLACE THE EXISTING MCGG PROTECTION SYSTEM WITH A NEW MULTI FUNCTION PROTECTION RELAY.
 - CONNECT THE MULTI FUNCTION PROTECTIVE RELAY TO THE EXISTING 300:5 PRIMARY CT'S.
 - CONNECT THE MULTI FUNCTION PROTECTIVE RELAY TO THE EXISTING 1200:5 SECONDARY CT'S LOCATED IN THE 2.4MS DISCONNECT SWITCH COMPARTMENT.
 - SUPPLY AND INSTALL A NEW HINGED AND BOLTED CONTROL COMPARTMENT DOOR OR CUSTOM, PAINTED, NEAT FINISHED TRIM.
 - RETAIN AND RECONNECT THE EXISTING REMOTE TRIP AND CLOSE FUNCTION AND TEST.
 - PROVIDE BREAKER COORDINATION STUDY AND TEST AND VERIFY PROTECTION AND CONTROL SYSTEM FUNCTION.
 - 12.47KV BREAKER 12.5 MS-3 SOUTH SIDE SUBSTATION FEEDER BREAKER:
 - REPLACE THE EXISTING MCGG PROTECTION SYSTEM WITH A NEW MULTI FUNCTION PROTECTION RELAY.
 - CONNECT THE MULTI FUNCTION PROTECTIVE RELAY TO THE EXISTING 150:5 CT'S.
 - SUPPLY AND INSTALL A NEW HINGED AND BOLTED

- CONTROL COMPARTMENT DOOR OR CUSTOM, PAINTED, NEAT FINISHED TRIM.
- RETAIN AND RECONNECT THE EXISTING REMOTE TRIP AND CLOSE FUNCTION AND TEST.
 - PROVIDE BREAKER COORDINATION STUDY AND TEST AND VERIFY PROTECTION AND CONTROL SYSTEM FUNCTION.
- 2.4KV BREAKER 2.4MS-20 PUMPHOUSE FEEDER BREAKER:
 - REPLACE THE THREE EXISTING 50/51 INDUCTION DISK PROTECTION RELAYS WITH ONE MULTI FUNCTION FEEDER PROTECTION RELAY.
 - CONNECT THE MULTI FUNCTION PROTECTIVE RELAY TO THE EXISTING 1200:5 CT'S.
 - SUPPLY AND INSTALL A NEW HINGED AND BOLTED CONTROL COMPARTMENT DOOR OR CUSTOM, PAINTED, NEAT FINISHED TRIM.
 - RETAIN AND RECONNECT THE EXISTING REMOTE TRIP AND CLOSE FUNCTION AND TEST.
 - PROVIDE BREAKER COORDINATION STUDY AND TEST AND VERIFY PROTECTION AND CONTROL SYSTEM FUNCTION.
 - UPGRADE THE EXISTING 2500 AMP FPE CIRCUIT BREAKER 4MS1:
 - SUPPLY AND INSTALL A CIRCUIT BREAKER WITH LSIG UNIT RATED 2500 AMPS.
 - SUPPLY AND INSTALL ADDITIONAL, OPTIONAL, BREAKER SHUNT TRIP COIL TO INTERFACE WITH EXISTING GROUND FAULT AND UNDER VOLTAGE TRIP CIRCUIT.
 - SUPPLY AND INSTALL 2 SETS OF BREAKER SUPERVISORY CONTACTS. TERMINATE ON SEPARATE TERMINAL BLOCK IN PANEL ENCLOSURE.
 - RE-WIRE AND TEST EXTERNAL GF AND UV PROTECTIVE CIRCUIT OPERATION.
 - SUPPLY AND INSTALL A NEW HINGED AND BOLTED CONTROL COMPARTMENT DOOR OR CUSTOM, PAINTED, NEAT FINISHED TRIM.
 - COORDINATE BREAKER ELECTRONIC TRIP UNIT FOR ARC FLASH REDUCTION. COORDINATE EXTERNAL GF AND UV PROTECTIVE CIRCUIT TRIPS. TEST GF ZONE PROTECTION AND ELECTRONIC TRIP UNIT OPERATION AND COORDINATION.
 - SUPPLY AND INSTALL ALL BUS BAR, ADAPTERS, MOUNTING HARDWARE AND INSULATING MATERIALS.
 - RESTORE BAR TYPE INTERLOCK WITH GENERATOR BREAKER.
 - PROVIDE RE-CERTIFICATION OF BREAKER INSTALLATION BY INDEPENDENT TESTING AND CERTIFICATION AUTHORITY.

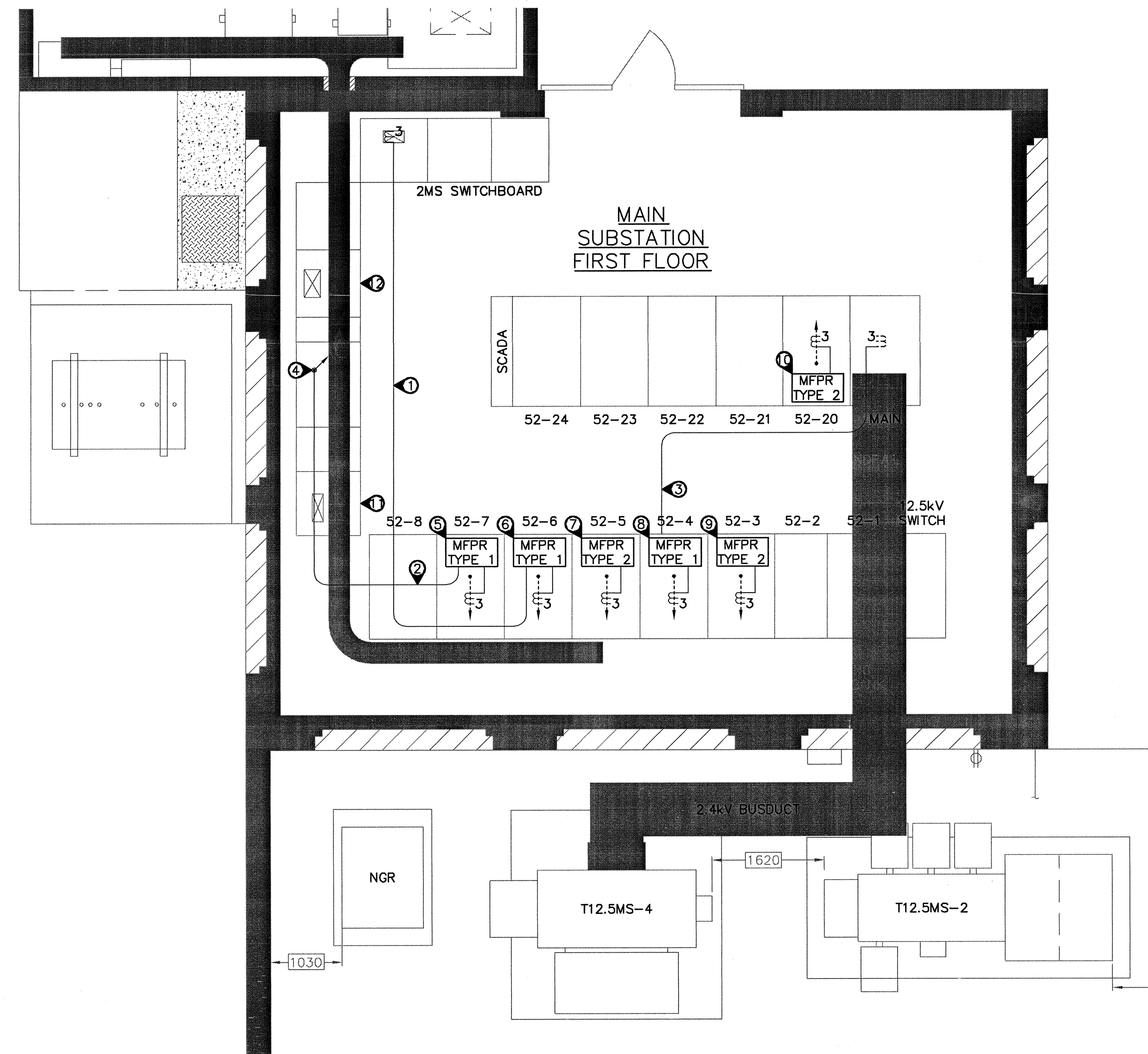
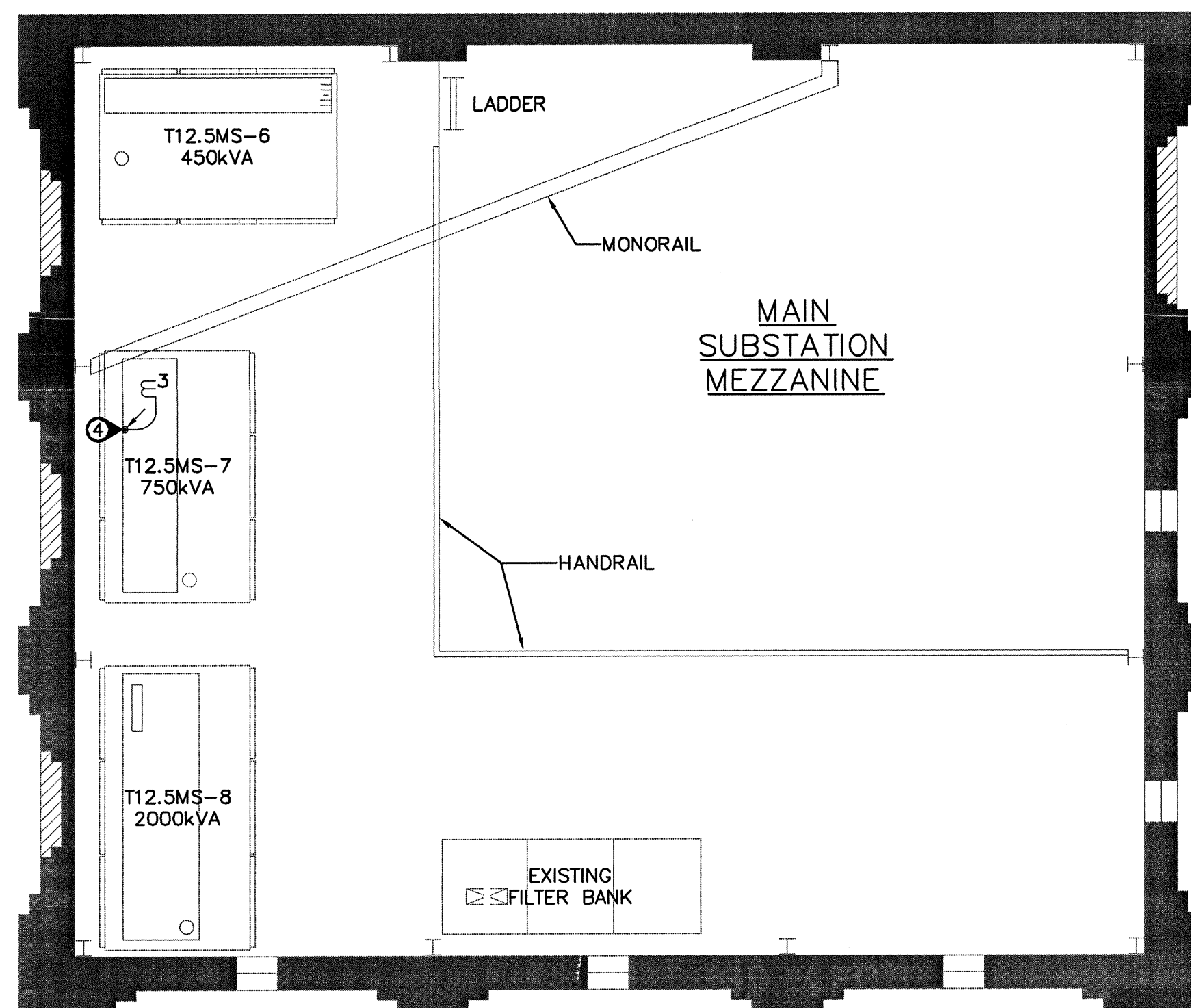
- UPGRADE THE EXISTING 1000 AMP FPE CIRCUIT BREAKER 6 MS-1:
 - SUPPLY AND INSTALL A NEW 1000 AMP CIRCUIT BREAKER WITH LSIG UNIT RATED 1000 AMPS.
 - SUPPLY AND INSTALL ADDITIONAL, OPTIONAL, BREAKER SHUNT TRIP COIL TO INTERFACE WITH EXISTING GROUND FAULT AND UNDER VOLTAGE TRIP CIRCUIT.
 - SUPPLY AND INSTALL 2 SETS OF BREAKER SUPERVISORY CONTACTS. TERMINATE ON SEPARATE TERMINAL BLOCK IN PANEL ENCLOSURE.
 - SUPPLY AND INSTALL A NEW HINGED AND BOLTED CONTROL COMPARTMENT DOOR OR CUSTOM, PAINTED, NEAT FINISHED TRIM.
 - RE-WIRE AND TEST EXTERNAL GF AND UV PROTECTIVE CIRCUIT OPERATION.
 - COORDINATE BREAKER ELECTRONIC TRIP UNIT FOR ARC FLASH REDUCTION. COORDINATE EXTERNAL GF AND UV PROTECTIVE CIRCUIT TRIPS. TEST GF ZONE PROTECTION AND ELECTRONIC TRIP UNIT OPERATION AND COORDINATION.
 - SET DIGITAL TRIP TO COORDINATE WITH THE EXISTING FPE TLR 3 GROUND RELAY AND TO MINIMIZE ARC FLASH HAZARD AT THE 600V DISTRIBUTION.
 - REMOVE ANALOG VOLTMETER WIRING AND VOLTMETER SWITCH WIRING.
 - SUPPLY AND INSTALL ALL BUS BAR, ADAPTERS, MOUNTING HARDWARE AND INSULATING MATERIALS.
 - RESTORE BAR TYPE INTERLOCK WITH GENERATOR SUPPLY CIRCUIT BREAKER.
 - PROVIDE RE-CERTIFICATION OF BREAKER INSTALLATION BY INDEPENDENT TESTING AND CERTIFICATION AUTHORITY.
- 2.4KV MAIN SUBSTATION SWITCHBOARD BREAKER ARC FLASH MITIGATION UPGRADE WIRING DIAGRAM. REFER TO 1/E2.0 AND 2/E4.0 FOR ADDITIONAL DETAILS.



CONTACT DIAGRAM AMSW					
SANTON SRP 1310MB24		POSITIONS			
		OFF	1	2	3
M1	R				
M2	R				
M2-R-Y-B		X			
M2-Y-B			X		
M2-R-B				X	
M2-R-Y					X
M1-R			X		
M1-Y				X	
M1-B					X

CONTACT DIAGRAM VMSW					
SANTON SRP 139V					
		OFF	1	2	3
A	1	C-2		X	X
		2-B	X		
C	2	B-1		X	
		1-A	X		X

1
E4.0
MAIN SUBSTATION 2.4kV THREE LINE DIAGRAM
WITH NEW MFPR CONNECTION DETAILS
NTS



2
E4.0
MAIN SUBSTATION FIRST AND SECOND FLOOR PLANS
AND MFPR CONNECTION NOTES
NTS

KEYPLAN



1	ISSUED FOR TENDER	2015/03/27
0	ISSUED FOR 100% SUBMISSION	2014/10/27
Revision/	Description/Description	Date/Date

Client/client

**ESQUIMALT
GRAVING DOCK**

**825 ADMIRALS ROAD
VICTORIA, BC, V9A 2P1**

Project title/Titre du projet
**825 ADMIRALS ROAD VICTORIA BC
ESQUIMALT GRAVING DOCK
ELECTRICAL SAFETY UPGRADE**

**EGD ELECTRICAL
SAFETY REPAIRS
(ARC FLASH MITIGATION)**

Consultant Signature Box Only

Designed by/Concept par
IAB

Drawn by/Dessiné par
JB

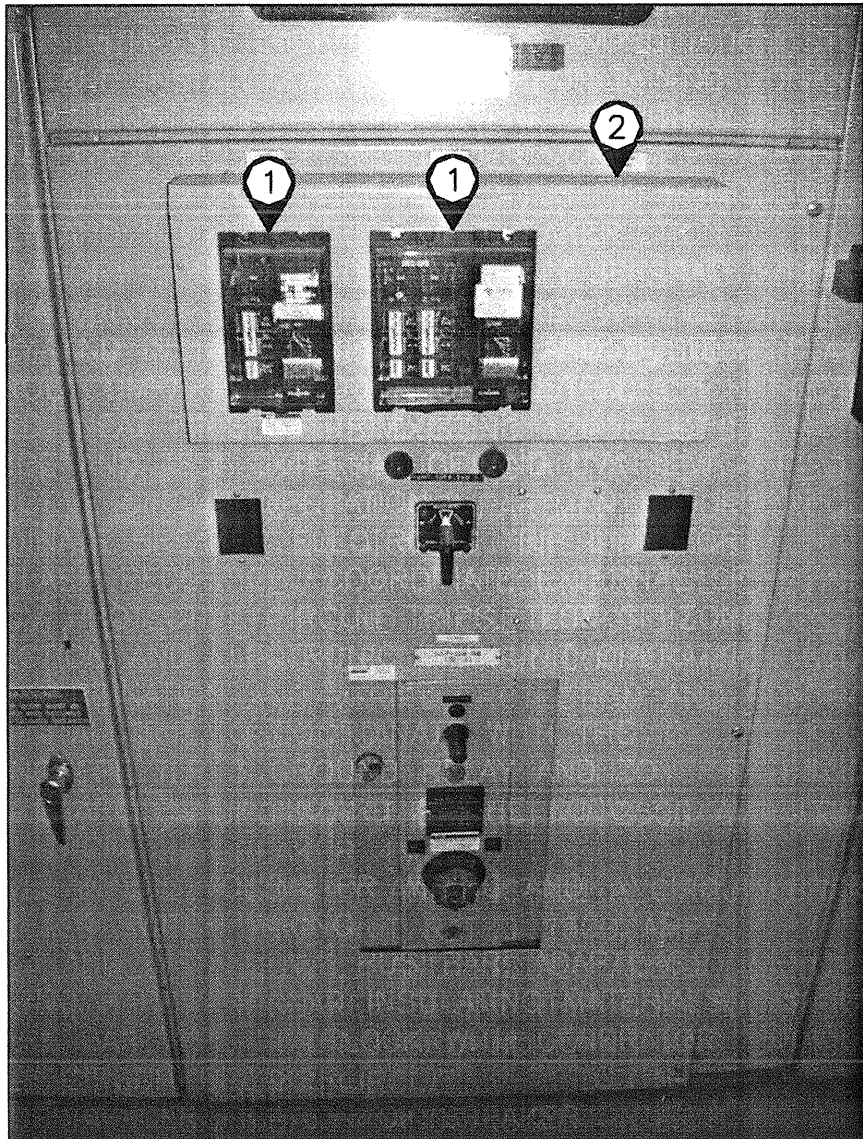
PWGSC Project Manager/Administrateur de Projets TPSGC

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

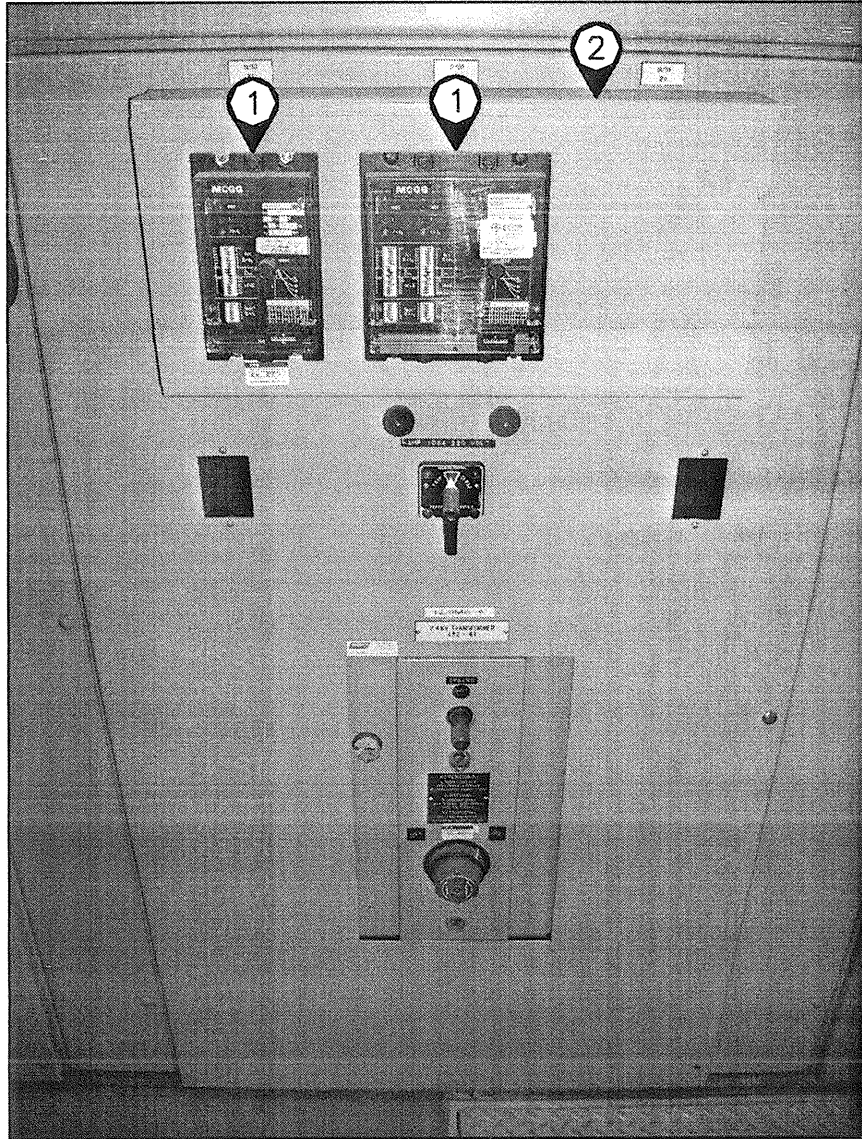
Drawing title/Titre du dessin

**MAIN SUBSTATION
SWITCHGEAR
PICTURES AND NOTES**

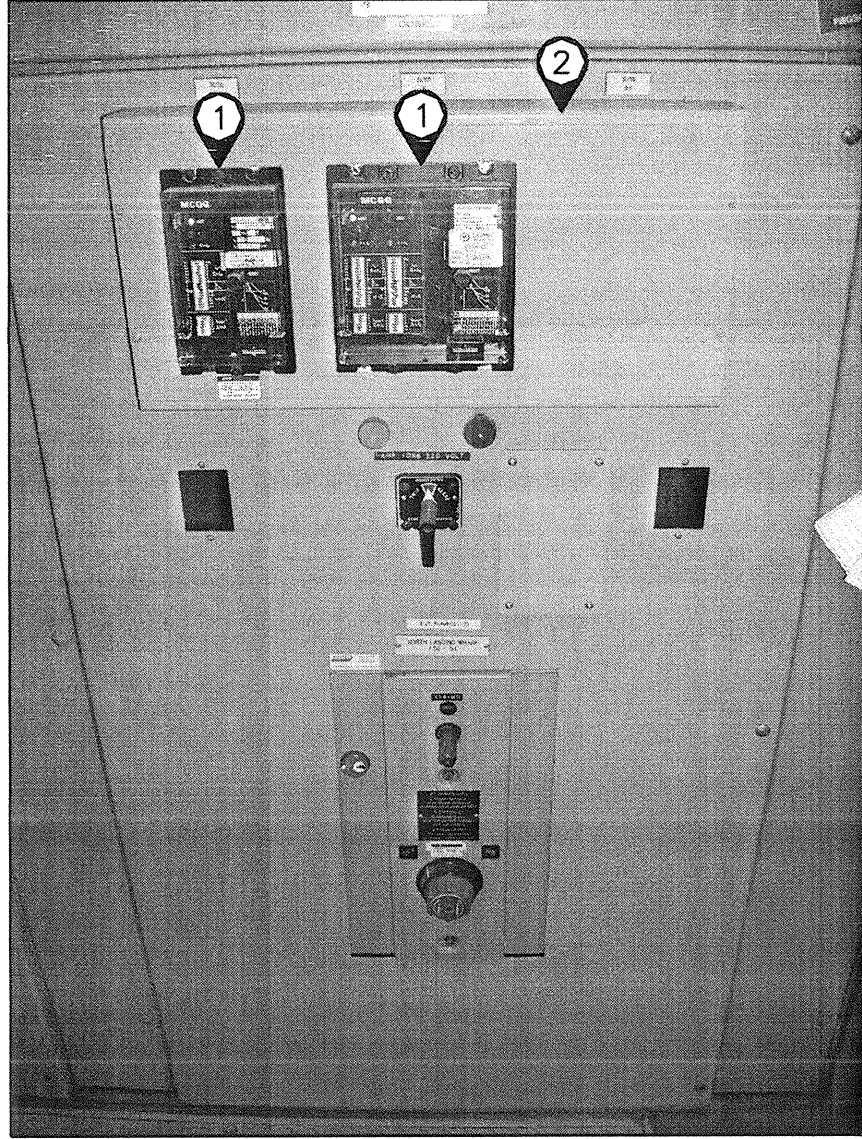
Project No./No. du projet	Sheet/Feuille	Revision no./ La Révision no.
R.016116.119	E5.0	1



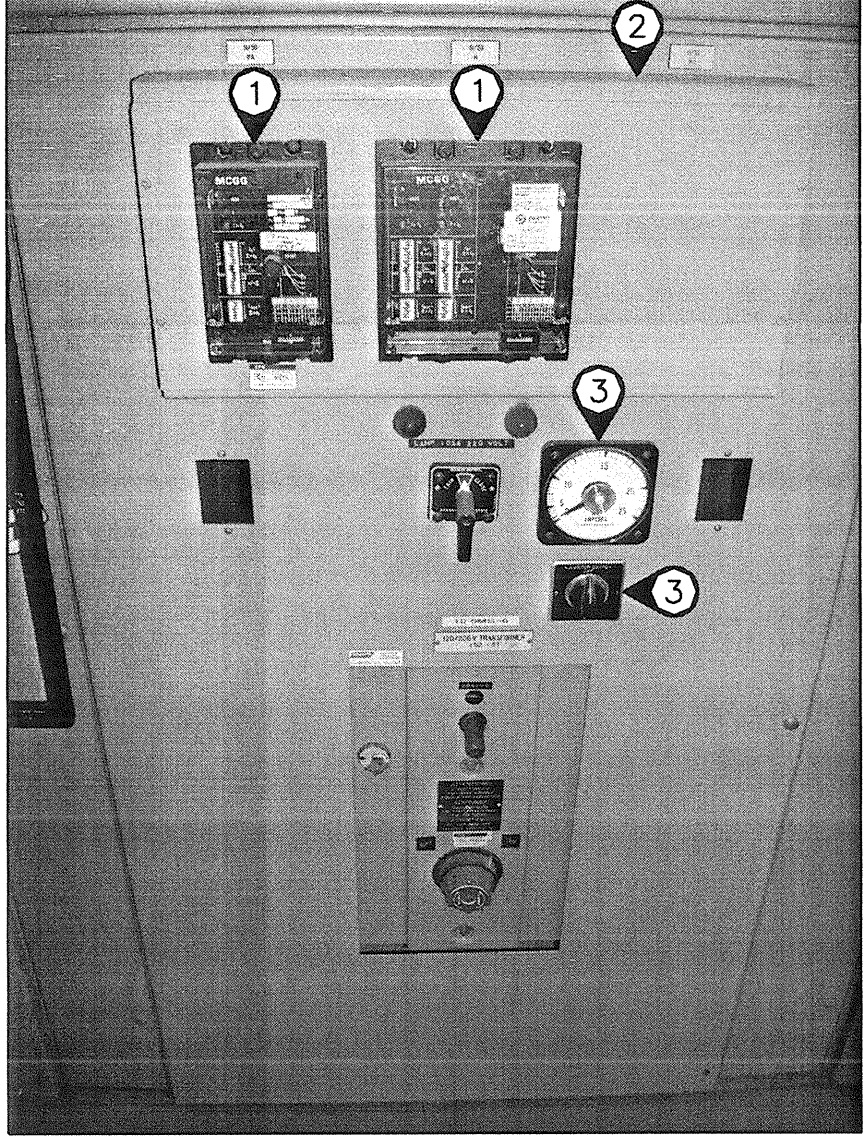
1
E5.0
52-3 12.5kV SOUTH SIDE
SUBSTATION BREAKER
NTS



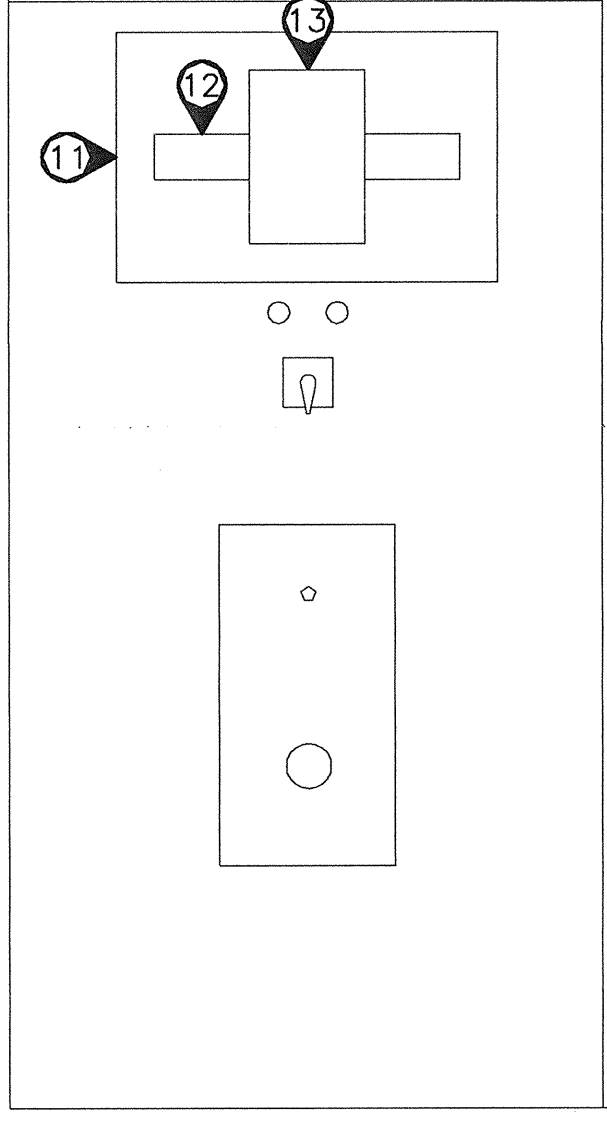
2
E5.0
52-4 12.5kV-2.4kV
TRANSFORMER BREAKER
NTS



3
E5.0
52-5 12.5kV NORTH
SUBSTATION BREAKER
NTS



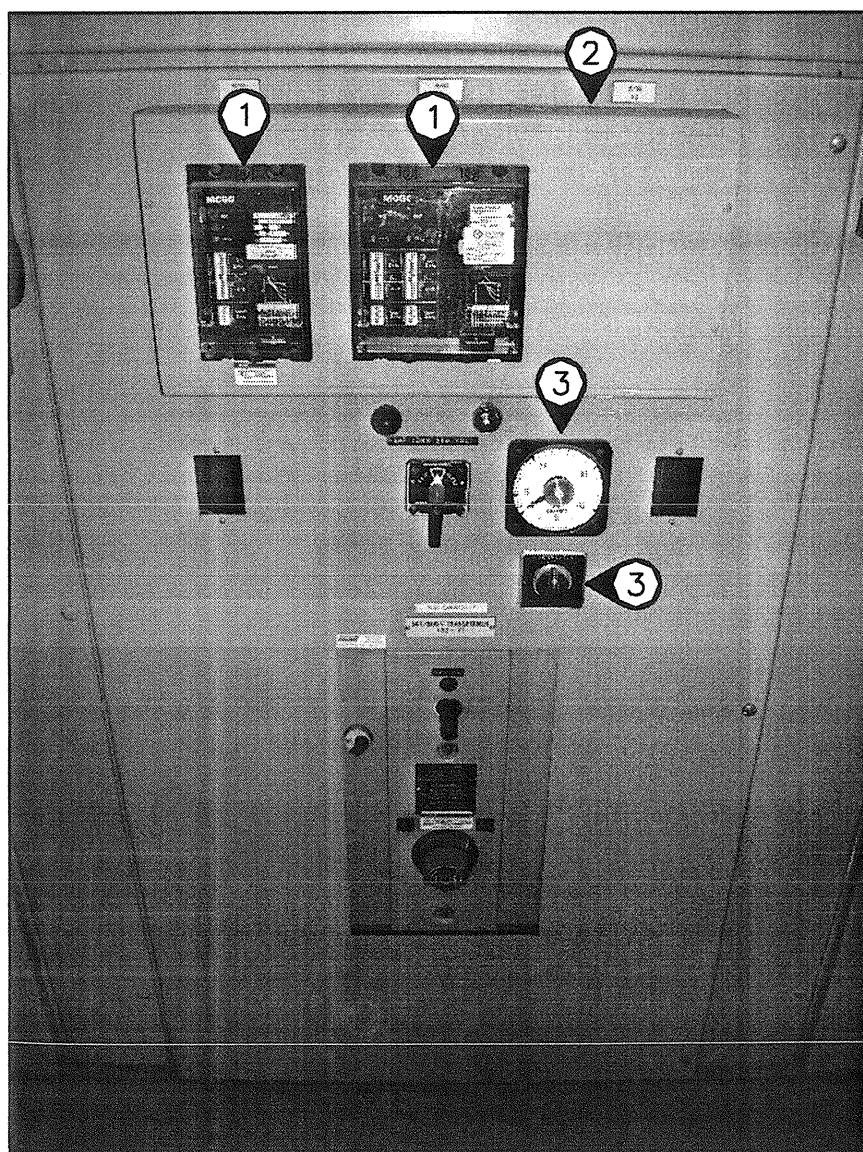
4
E5.0
52-6 12.5kV-120/208V
TRANSFORMER BREAKER
NTS



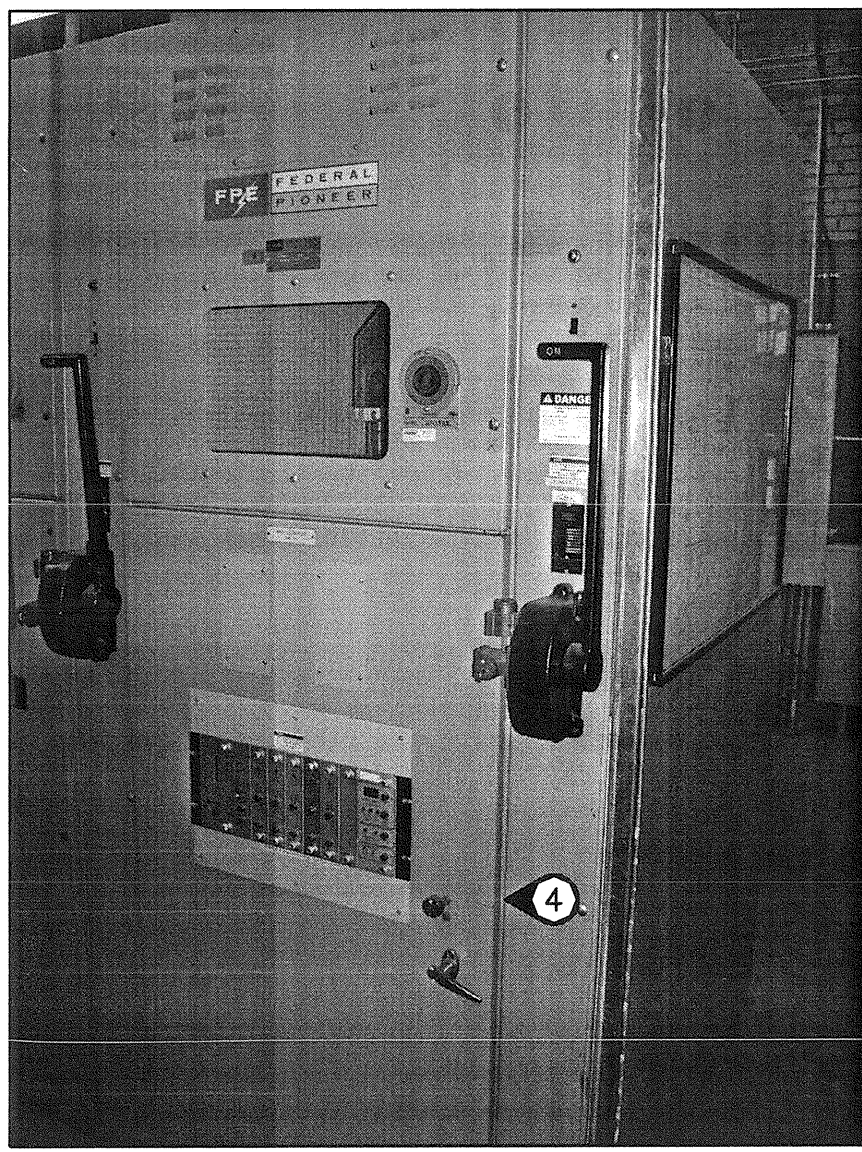
13
E5.0
UPGRADED BREAKER CELL
ELEVATION DETAIL (TYPICAL)
1:10

KEYNOTES:

- 1 REMOVE EXISTING CGE MGGG PROTECTION DEVICE AND DISPOSE OF. REPLACE WITH NEW MFPR WIRED INTO EXISTING DEVICES. REFER TO SHEETS E2.0, E3.0 AND E4.0 FOR ADDITIONAL DETAILS.
- 2 REPLACE EXISTING EXTERIOR MOUNTING PLATE WITH NEW, PRE-CUT AND SIZED PENETRATIONS FOR NEW MFPR DEVICE AND CT SHORTING BLOCKS.
- 3 REMOVE AMMETER AND PHASE SELECTOR SWITCH AND ASSOCIATED WIRING AND DISPOSE OF. PROVIDE BLANK METAL COVER PLATES, COLOURED TO MATCH EXISTING EQUIPMENT.
- 4 CONNECT MFPR SECONDARY CT LEADS TO EXISTING 1200/5 CT'S LOCATED IN 2.4MS-DS CELL.
- 5 REMOVE EXISTING GE MULTILIN IAC DISK TYPE PROTECTION RELAYS AND INSTALL NEW MFPR WIRED INTO EXISTING DEVICES.
- 6 REPLACE EXISTING 2500A 277/480V DISTRIBUTION BOARD MAIN BREAKER WITH NEW BREAKER CO-ORDINATED WITH UPSTREAM PROTECTION DEVICES. NEW BREAKER MUST BE ABLE TO BE MECHANICALLY INTERLOCKED WITH EXISTING 400A STANDBY POWER BREAKER.
- 7 REPLACE EXISTING 1000A 347/600V DISTRIBUTION BOARD MAIN BREAKER WITH NEW BREAKER CO-ORDINATED WITH UPSTREAM PROTECTION DEVICES. NEW BREAKER MUST BE ABLE TO BE MECHANICALLY INTERLOCKED WITH EXISTING 400A STANDBY POWER BREAKER.
- 8 NOT USED
- 9 INSTALL SECONDARY 1000/5 CT'S ONTO SECONDARY CONDUCTORS FROM TRANSFORMER T12.5MS-6 AS CLOSE TO TRANSFORMER LUGS AS POSSIBLE. WIRE INTO MFPR SECONDARY CT INPUT TERMINALS.
- 10 INSTALL SECONDARY 1000/5 CT'S ONTO SECONDARY CONDUCTORS FROM TRANSFORMER T12.5MS-7 AS CLOSE TO TRANSFORMER LUGS AS POSSIBLE. WIRE INTO MFPR SECONDARY CT INPUT TERMINALS.
- 11 NEW DISTRIBUTION CELL FACE PLATE WITH SIZED PENETRATIONS FOR MFPR AND SHORTING BLOCK MOUNTING.
- 12 CT SHORTING BLOCKS
- 13 MFPR METER



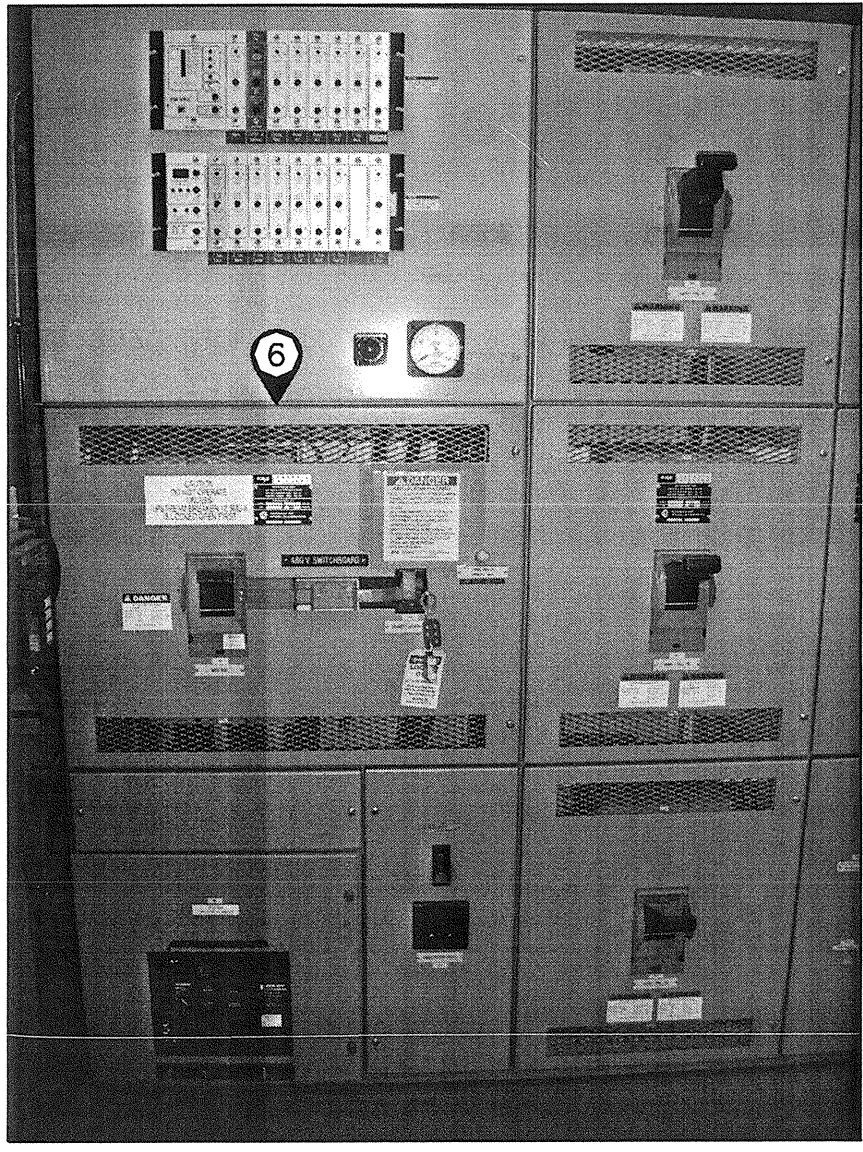
5
E5.0
52-7 12.5kV-347/600V
TRANSFORMER BREAKER
NTS



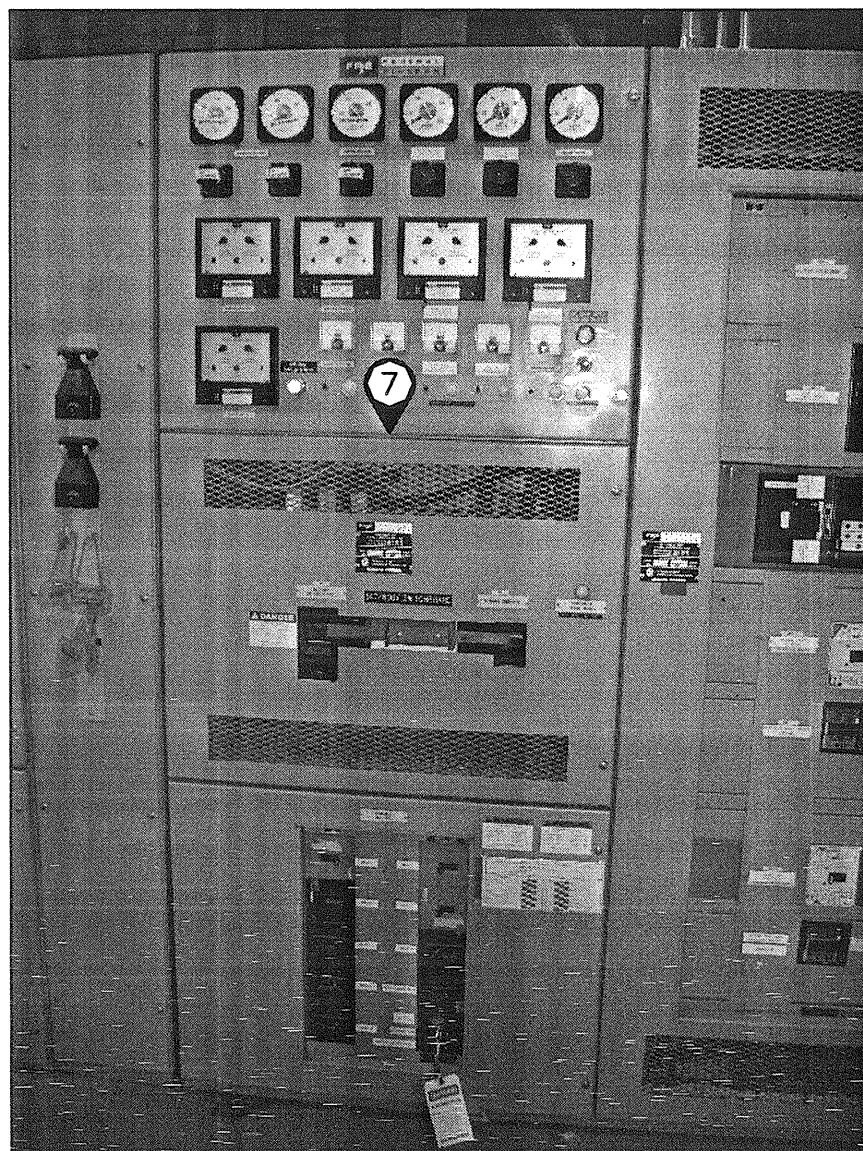
6
E5.0
2.4MS-DS 2.4kV BOARD
MAIN DISCONNECT SWITCH
NTS



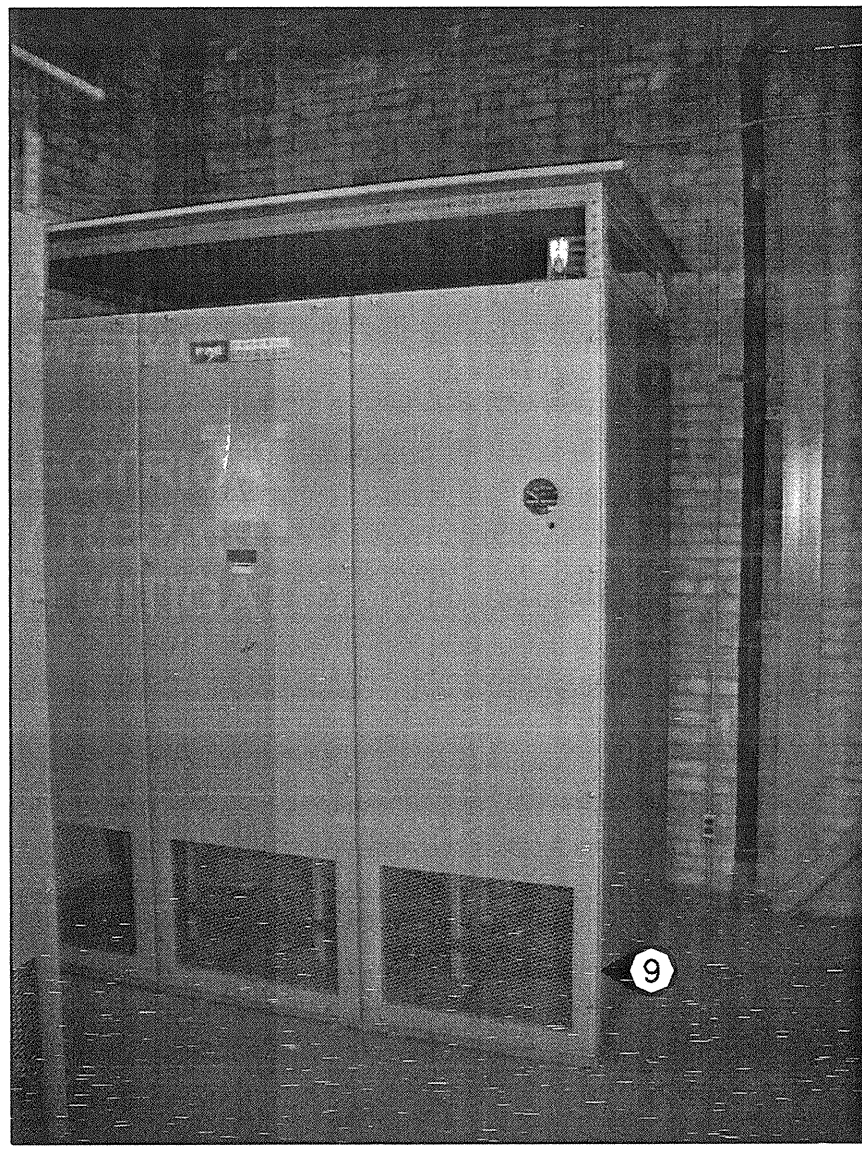
7
E5.0
52-20 2.4kV PUMPHOUSE
DISTRIBUTION BREAKER
NTS



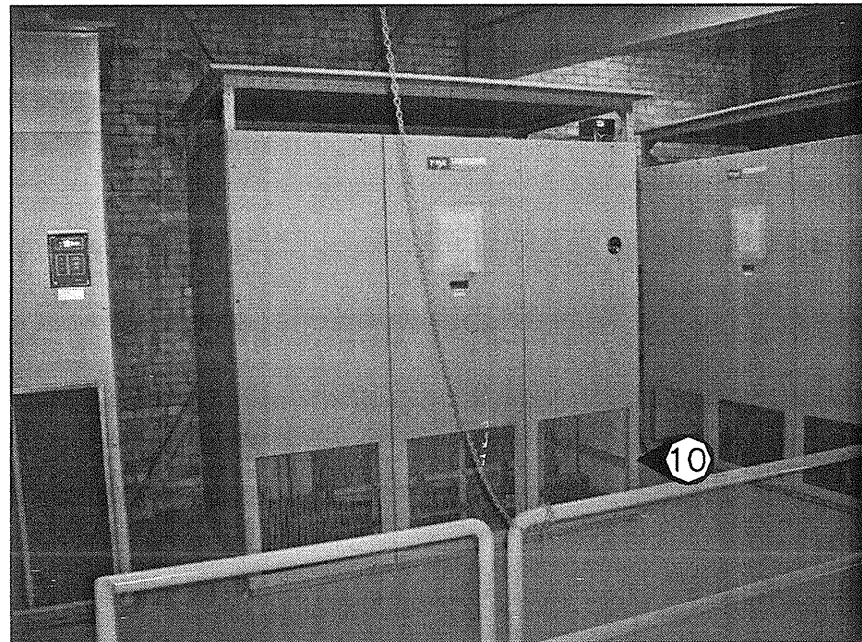
8
E5.0
4MS-1 480V
BOARD MAIN BREAKER
NTS



9
E5.0
6MS-1 347/600V
BOARD MAIN BREAKER
NTS



10
E5.0
T12.5MS-6 450kVA
TRANSFORMER
NTS

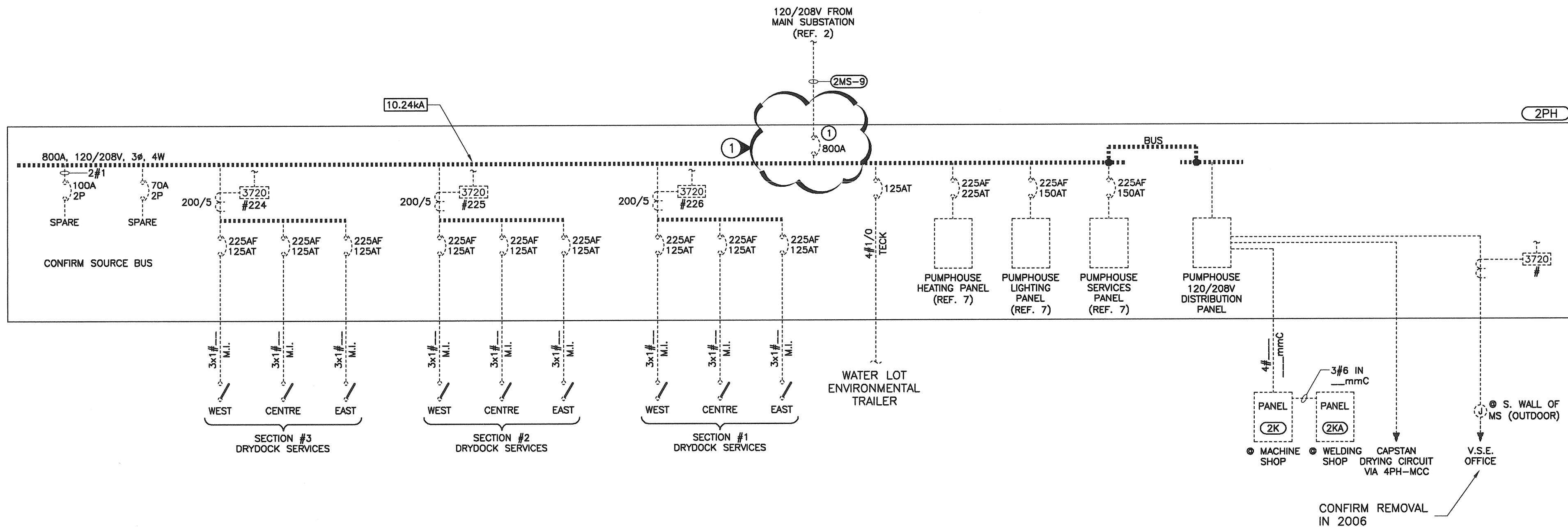


11
E5.0
T12.5MS-7 750kVA
TRANSFORMER
NTS

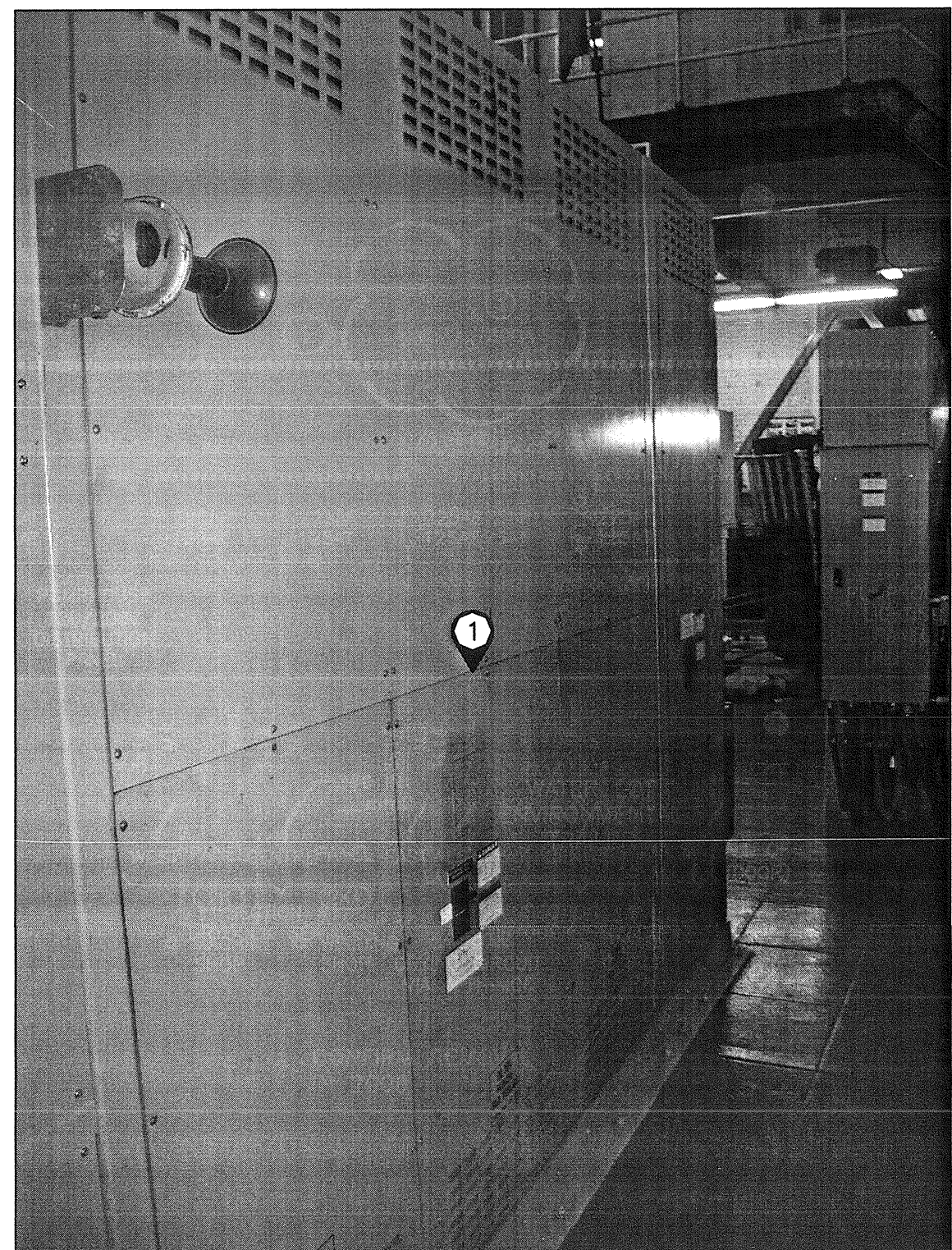
KEYNOTES:

- ① UPGRADE 2PH-1, CUTLER HAMMER NB TRI-PAC 800A BREAKER WITH NEW 25KA RATED 800A BREAKER WITH LSIG FUNCTIONALITY CO-ORDINATED WITH BREAKER 2MS-9 LOCATED IN MAIN SUBSTATION 2MS SWITCHBOARD.

REFERENCE DRAWINGS	REF. No.
EMD E1	NUMBERING SYSTEM
EMD E2	MAIN SUBSTATION 1-LINE
EMD E4	NORTH LANDING WHARF 1-LINE
EMD E5	SOUTH SIDE SUBSTATION 1-LINE
EMD E6	STANDBY POWER SYSTEM 1-LINE
	SOFTAC D-2672, REV. 2 (1996)
EMD E13	PUMPHOUSE PANEL SCHEDULES



① PUMPHOUSE SUBSTATION PARTIAL SINGLE LINE DIAGRAM WITH BREAKER REPLACEMENT NOTES
E6.0 NTS



② 2PH-1 PUMPHOUSE 120/208V MAIN BREAKER
E6.0 NTS

KEYPLAN



1	ISSUED FOR TENDER	2015/03/27
0	ISSUED FOR 100% SUBMISSION	2014/10/27
Revision/Revision	Description/Description	Date/Date

Client/client

ESQUIMALT
GRAVING DOCK

825 ADMIRALS ROAD
VICTORIA, BC, V9A 2P1

Project Title/Titre du projet
825 ADMIRALS ROAD VICTORIA BC
ESQUIMALT GRAVING DOCK
ELECTRICAL SAFETY UPGRADE

EGD ELECTRICAL
SAFETY REPAIRS
(ARC FLASH MITIGATION)

Consultant Signature Box Only

Designed by/Concept par

IAB

Drawn by/Dessine par

JB

PWGSC Project Manager/Administrateur de Projets TPSGC

PWGSC, Regional Manager, Architectural and Engineering Services/
Gestionnaire régionale, Services d'architecture et de génie, TPSGC

Drawing Title/Titre du dessin

PUMPHOUSE
SINGLE LINE DIAGRAM

Project No./No. du projet	Sheet/Feuille	Revision no./ Lo. Révision no.
R.016116.119	E6.0	1

Client/client

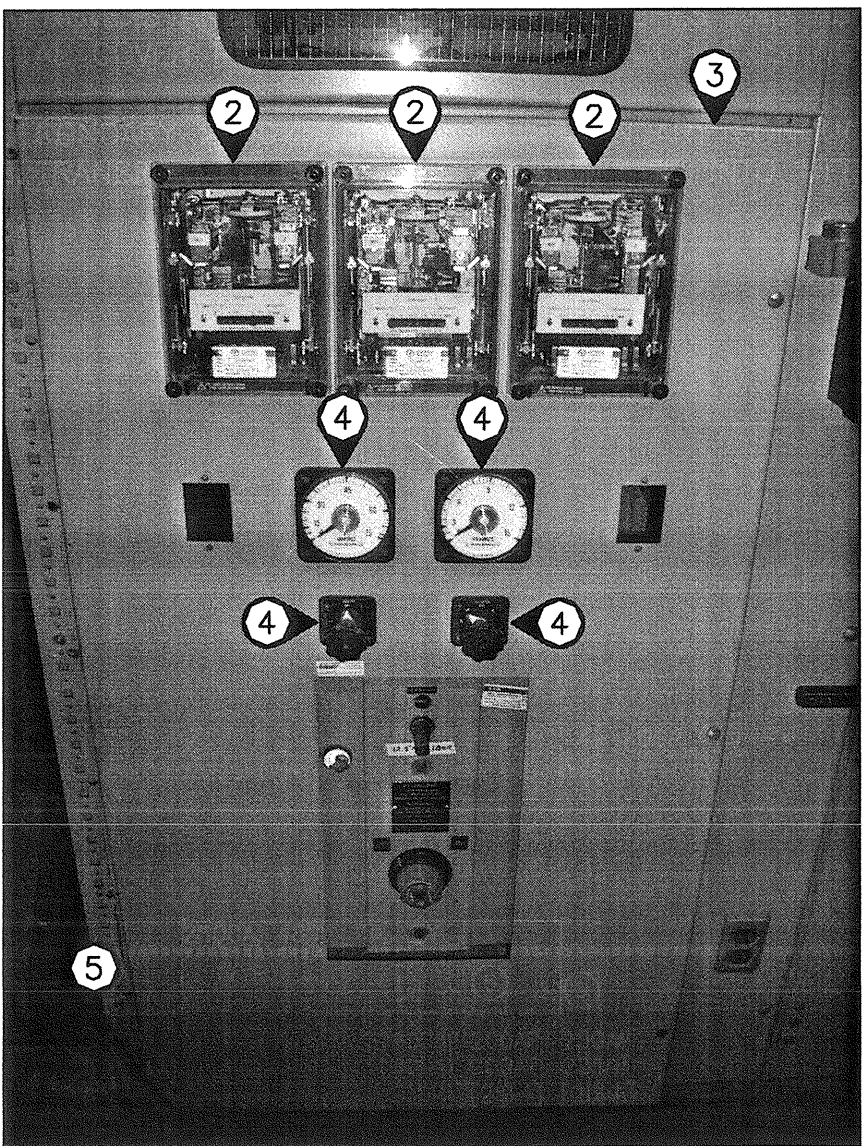
**ESQUIMALT
GRAVING DOCK**

**825 ADMIRALS ROAD
VICTORIA, BC, V9A 2P1**

**EGD ELECTRICAL
SAFETY REPAIRS
(ARC FLASH MITIGATION)**

NORTH LANDING WHARF SUBSTATION SINGLE LINE DIAGRAM

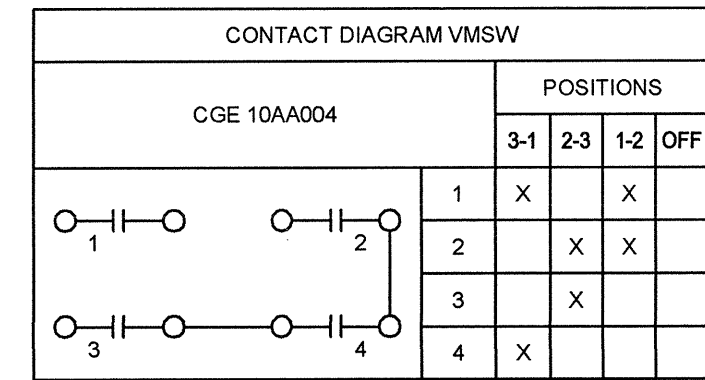
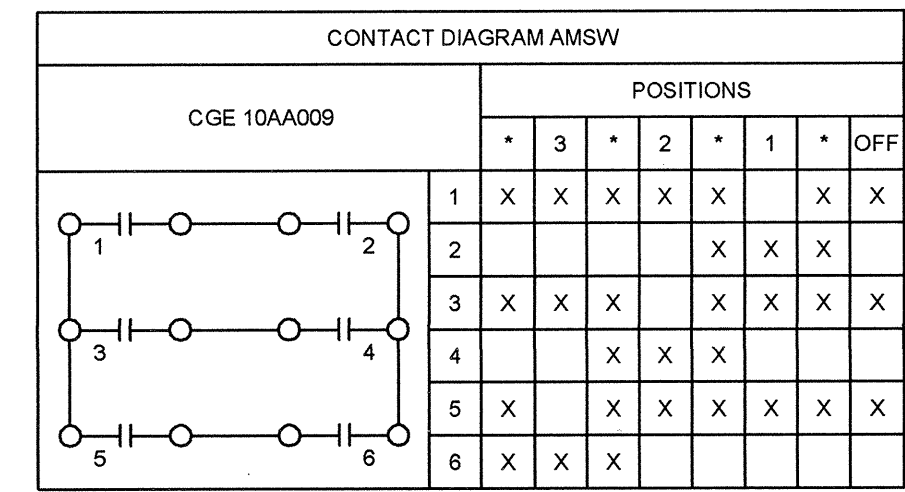
Project No./No. du projet	Sheet/Feuille	Revision no./ La Révision no.
R.016116.119	E7.0	1



12.5NL-1 NORTH LANDING
WHARF MAIN BREAKER

1 NORTH LANDING WHARF PARTIAL SINGLE LINE DIAGRAM
E70 NTS

- ### KEYNOTES:
1. INSTALL A MFPR DEVICE AND WIRE INTO EXISTING CT'S AND TRIP SYSTEMS. INSTALL NEW CT'S ON SECONDARY SIDE OF TRANSFORMER FOR TRANSFORMER PROTECTION AND ARC FLASH MITIGATION ON SWITCHBOARD 4NL. SEE SHEET E8.0 FOR DETAILS.
 2. REMOVE EXISTING GE MULTILIN IAC DISK TYPE PROTECTION RELAYS AND INSTALL NEW MFPR WIRED INTO EXISTING DEVICES.
 3. REPLACE EXISTING EXTERIOR MOUNTING PLATE WITH NEW, PRE-CUT AND SIZED PENETRATIONS FOR NEW MFPR DEVICE AND CT SHORTING BLOCKS.
 4. REMOVE AMMETERS AND PHASE SELECTOR SWITCHES AND ASSOCIATED WIRING AND DISPOSE OF. PROVIDE BLANK METAL COVER PLATES, COLOURED TO MATCH EXISTING EQUIPMENT.
 5. INSTALL SECONDARY 2500/5 CT'S ONTO SECONDARY CONDUCTORS FROM TRANSFORMER T12.5NL AS CLOSE TO TRANSFORMER LUGS AS POSSIBLE. WIRE INTO MFPR SECONDARY CT INPUT TERMINALS.



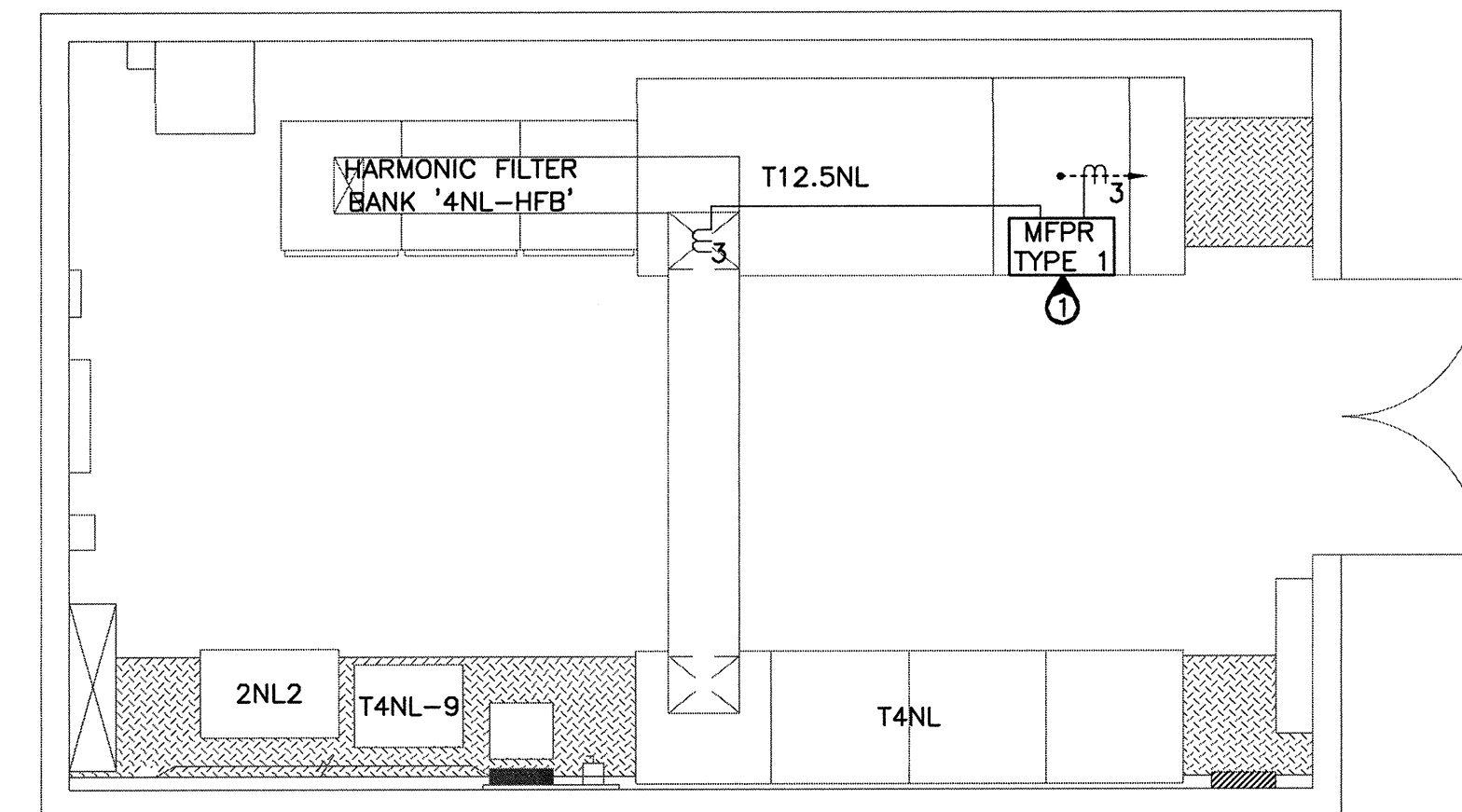
<u>LEGEND</u>	
<input type="checkbox"/> a	NORMALLY OPEN AUX. CONTACT
AM	AMMETER
AMS/W	AMMETER SWITCH
B	BLACK
CT	CURRENT TRANSFORMER
G	GREEN
IND	INDUCTION UNIT
INST	INSTANTANEOUS UNIT
IS	ISOLATION SWITCH
OCB	OIL CIRCUIT BREAKER
R	RED
SI	SEAL IN UNIT
TC	TRIP COIL
VM	VOLTMETER
WMS/W	VOLTMETER SWITCH
W	WHITE
26	THERMOMETER
50S1	OVERCURRENT RELAY
52	O.C.B.
<input checked="" type="checkbox"/>	TERMINAL BLOCK FOR EXTERNAL CONNECTION

NOTES:

1. ALL WRING TO BE #14TBS EXCEPT AS NOTED

KEYNOTES:

- ① 12.47KV BREAKER FOR THE 1.5 MVA TRANSFORMER T12.5NL:
- REPLACE THE THREE EXISTING 50/51 INDUCTION DISK PROTECTION RELAYS WITH ONE MULTI FUNCTION TRANSFORMER PROTECTION RELAY.
 - CONNECT THE MULTI FUNCTION PROTECTIVE RELAY TO THE EXISTING 75:5 PRIMARY CTS.
 - SUPPLY AND INSTALL 3 EACH 2500:5 C 200 ACCURACY CURRENT TRANSFORMERS ON THE SECONDARY SIDE OF 1.5 MVA TRANSFORMER T12.5NL BEFORE THE BUS BAR CONNECTIONS. SUPPLY ALL MOUNTING BRACKETS AND HARDWARE, SHORTING BLOCKS AND WIRING. USE TEW 105°C RATED CONDUCTORS FOR ALL CONTROL WIRING.
 - SUPPLY AND INSTALL A NEW HINGED AND BOLTED CONTROL COMPARTMENT DOOR OR CUSTOM, PAINTED, NEAT FINISHED TRIM.
 - RETAIN AND RECONNECT THE EXISTING REMOTE TRIP AND CLOSE FUNCTION AND TEST.
 - RETAIN AND RECONNECT EXISTING BREAKER THERMAL TRIP CIRCUIT.
 - PROVIDE BREAKER COORDINATION STUDY AND TEST AND VERIFY PROTECTION AND CONTROL SYSTEM



2 NORTH LANDING WHARF FLOOR PLAN
E8.0 AND MFPR CONNECTION NOTES
NTS



1	ISSUED FOR TENDER	2015/03/27
0	ISSUED FOR 100% SUBMISSION	2014/10/27
Revision/ Revision	Description/Description	Date/Date

Client/client

ESQUIMALT GRAVING DOCK

825 ADMIRALS ROAD
VICTORIA, BC, V9A 2P1

Project title/Titre du projet
825 ADMIRALS ROAD VICTORIA BC
ESQUIMALT GRAVING DOCK
ELECTRICAL SAFETY UPGRADE

**EGD ELECTRICAL
SAFETY REPAIRS
(ARC FLASH MITIGATION)**

Consultant Signature Box Only

Designed by/Concept par

Drawn by/Dessine par

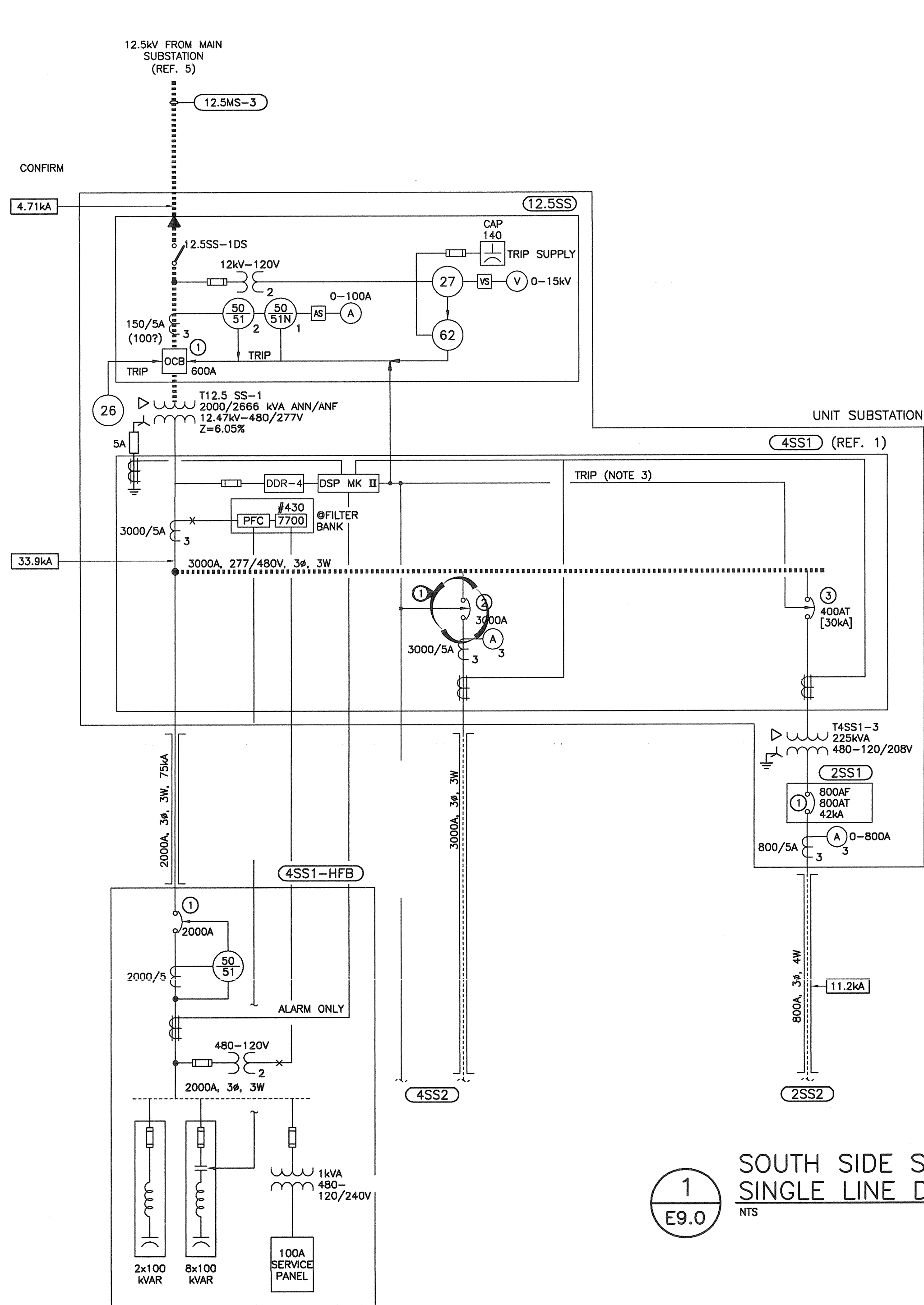
PWGSC Project Manager/Administrateur de Projets TPSGC

PWGSC, Regional Manager, Architectural and Engineering Services/
Gestionnaire régionale, Services d'architecture et de génie, TPSGC

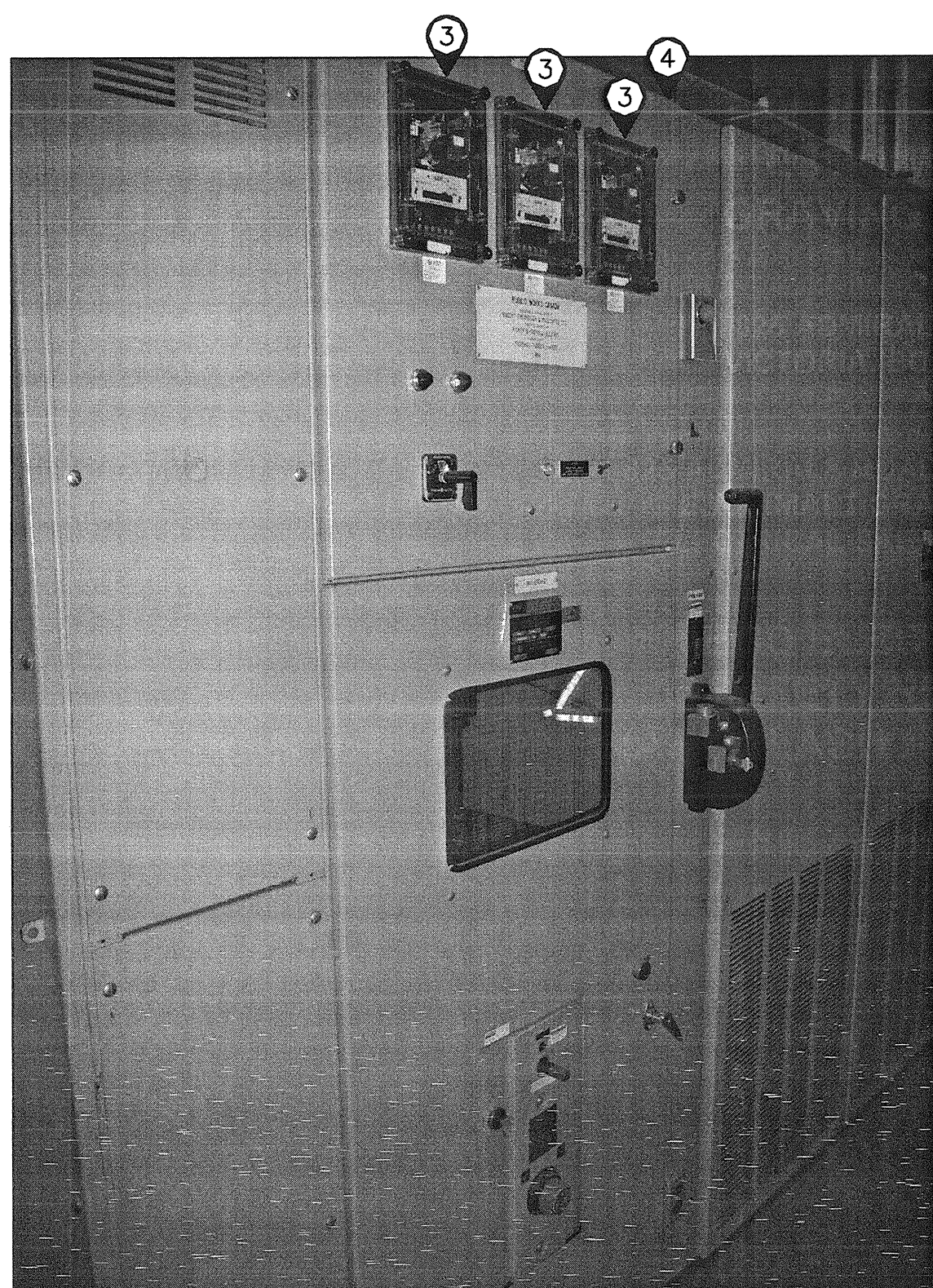
Drawing title/Titre du dessin

NORTH LANDING WHARF SUBSTATION THREE LINE DIAGRAM AND FLOOR PLAN

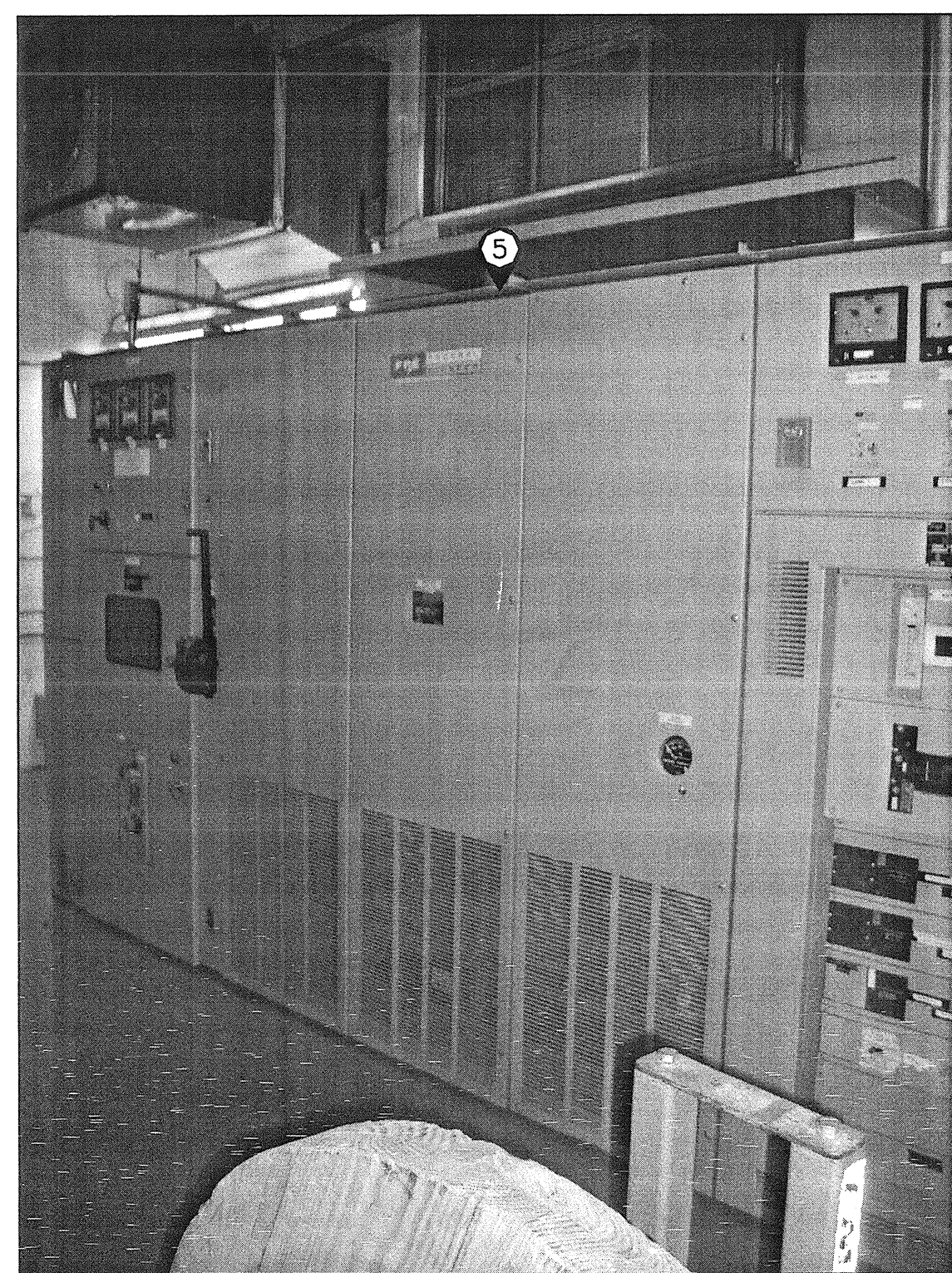
Project No./No. du projet	Sheet/Feuille	Revision no./ La Révision no.
R.016116.119	E8.0	1



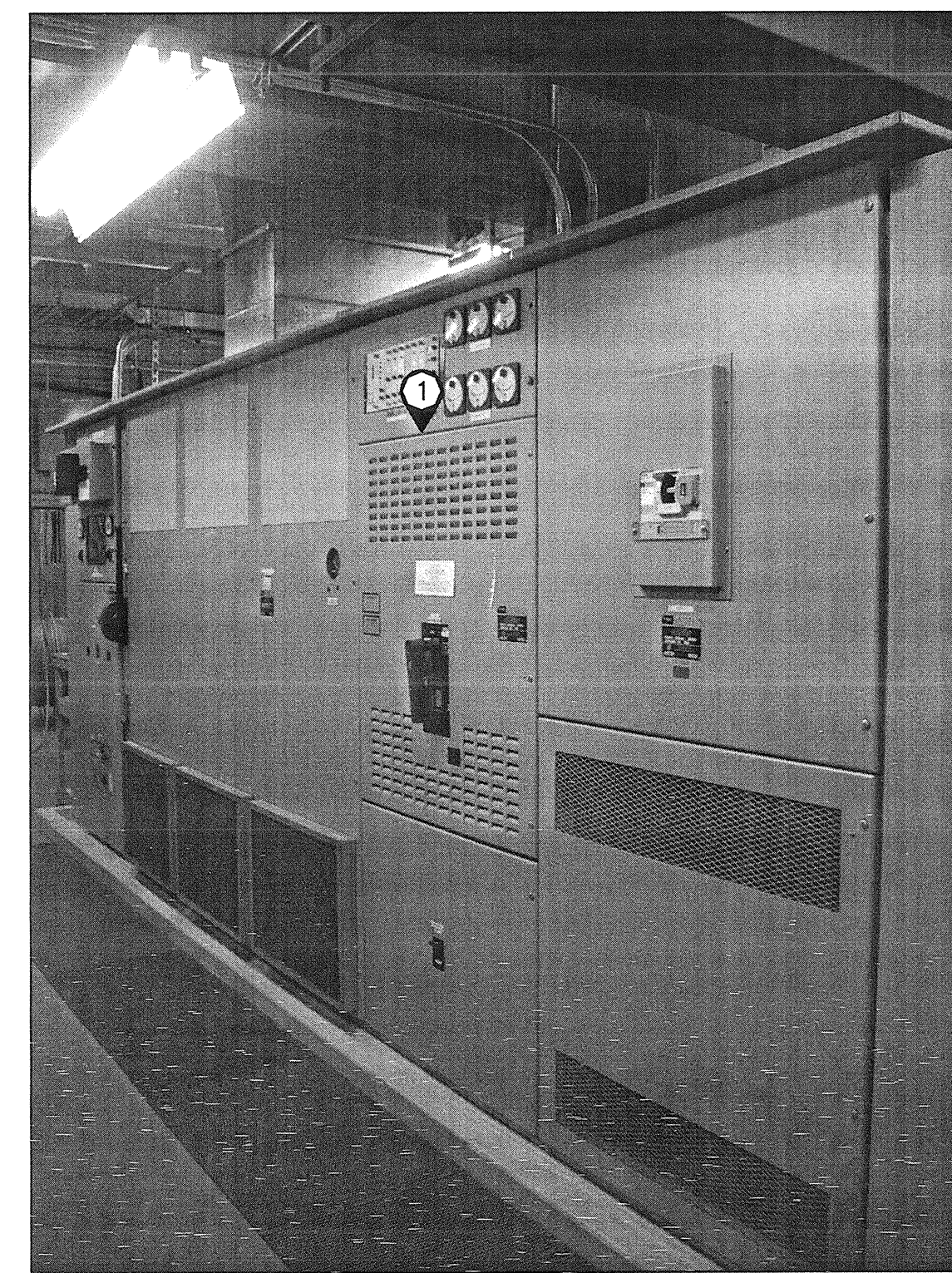
1
E9.0
NTS
SOUTH SIDE SUBSTATION PARTIAL
SINGLE LINE DIAGRAMS



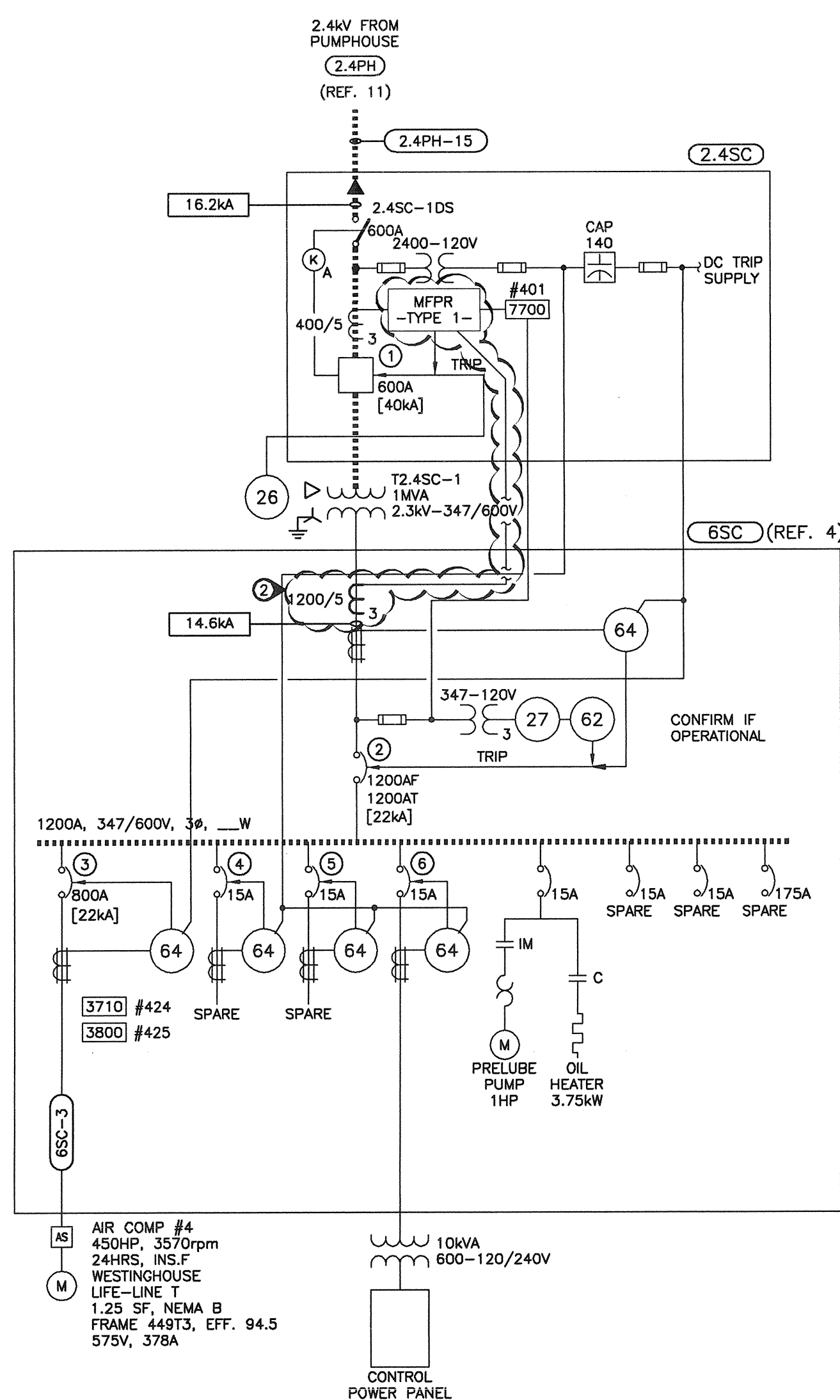
2
E9.0
NTS
2.4SC-1 SOUTH SIDE
COMPRESSOR MAIN BREAKER



3
E9.0
NTS
T2.4SC-1 SOUTH SIDE
2.4kV-3V7/600V TRANSFORMER



4
E9.0
NTS
4SS1-1 SOUTH SIDE SUBSTATION
277/480V DISTRIBUTION BREAKER



SOUTH COMPRESSOR

REFERENCE DRAWINGS		REF. NO.
DWG	TITLE	1
FPE SB 6165-W1, REV. 1 (1985)		2
FPE SB 6165-W1, REV. 1 (1985)		3
FPE-SR-242-W1, REV. 2 (1985)		4
EMD E2	MAIN SUBSTATION 1-LINE	5
EMD E76	4SS2 FRONT ARRANGEMENT	6
EMD E77	2SS2 FRONT ARRANGEMENT	7
EMD E4305	480V GFM SYSTEM	8
EMD E6	STANDBY SYSTEM 1-LINE	9
EMD E1	NUMBERING SYSTEM	10
EMD E3	PUMPHOUSE 1-LINE	11

GENERAL NOTES:

- THIS DRAWING IS DERIVED FROM PWGSC PROJECT NO. 845398 AS-BUILT DRAWING NO. E5 OF 21, REV. 2.
- UNLESS NOTED OTHERWISE, ALL BREAKERS ARE 3-POLE.
- 52-4 IS NOT SHOWN ON THIS DRAWING PER REF. 1.

KEYNOTES:

- UPGRADE 3000A BREAKER 4SS1-2 TO NEW 65kA RATED 3000A BREAKER WITH LSIG FUNCTIONALITY.
- UPGRADE 2.4SC-1 OCR, GEC CDG 13/23/33 RELAY AND INSTALL NEW MFPR DEVICE. WIRE INTO EXISTING CT'S AND PROTECTIVE CIRCUITS AND SUPPLY AND INSTALL NEW CT'S ON TRANSFORMER SECONDARY AS SHOWN. SEE SHEET E10.0 FOR ADDITIONAL DETAILS.
- REMOVE EXISTING GE MULTILIN IAC DISK TYPE PROTECTION RELAYS AND INSTALL NEW MFPR WIRED INTO EXISTING DEVICES.
- REPLACE EXISTING EXTERIOR MOUNTING PLATE WITH NEW, PRE-CUT AND SIZED PENETRATIONS FOR NEW MFPR DEVICE AND CT SHORTING BLOCKS.
- INSTALL SECONDARY 400/5 CT'S ONTO SECONDARY CONDUCTORS FROM TRANSFORMER T2.4SC-1 AS CLOSE TO TRANSFORMER LUGS AS POSSIBLE. WIRE INTO MFPR SECONDARY CT INPUT TERMINALS.

KEYPLAN



1	ISSUED FOR TENDER	20150327
0	ISSUED FOR 100% SUBMISSION	20141027
Revision/	Description/Description	Date/Date

Client/client

ESQUIMALT GRAVING DOCK

825 ADMIRALS ROAD
VICTORIA, BC, V9A 2P1

Project title/Titre du projet
825 ADMIRALS ROAD VICTORIA BC
ESQUIMALT GRAVING DOCK
ELECTRICAL SAFETY UPGRADE

EGD ELECTRICAL SAFETY REPAIRS (ARC FLASH MITIGATION)

Consultant Signature Box Only

Designed by/Concept par
IAB

Drawn by/Dessiné par
JB

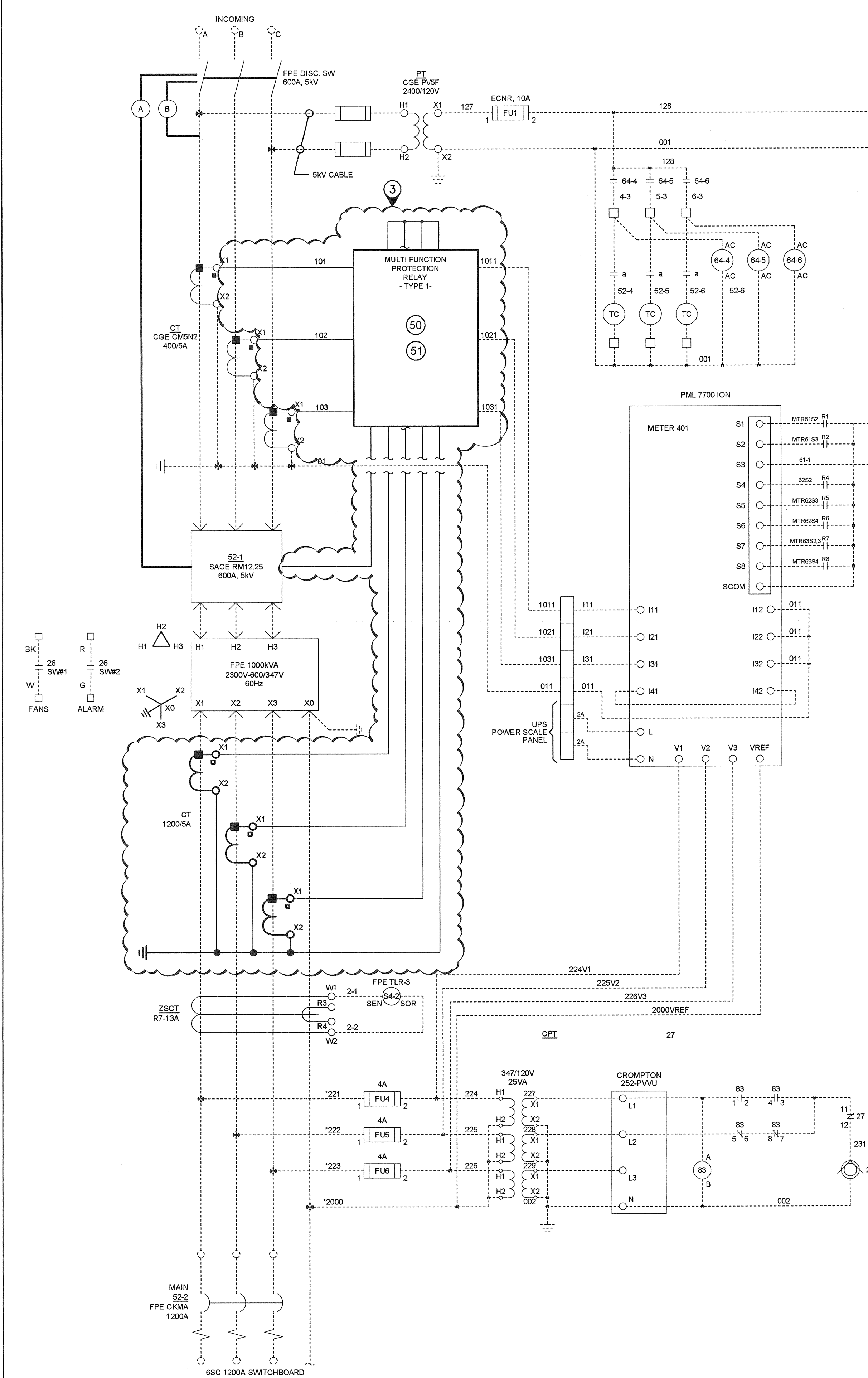
PWGSC Project Manager/Administrateur de Projets TPSC

PWGSC, Regional Manager, Architectural and Engineering Services/
Gestionnaire régionale, Services d'architecture et de génie, TPSC

Drawing title/Titre du dessin

SOUTH SIDE SUBSTATION SINGLE LINE DIAGRAM

Project No./No. du projet	Sheet/Fauille	Revision no./ La Révision no.
R.016116.119	E9.0	1



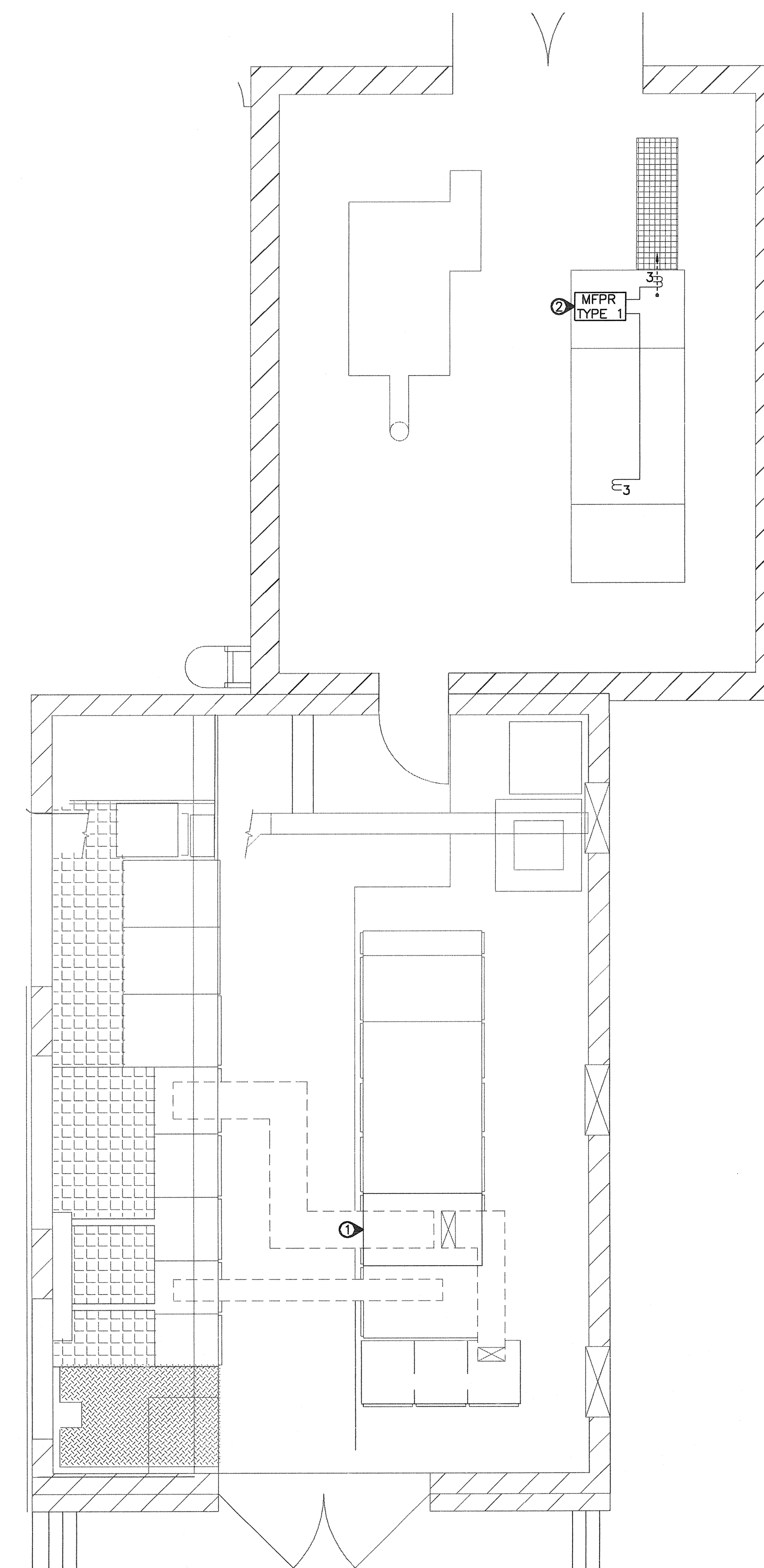
- LEGEND**
- a NORMALLY OPEN AUX. CONTACT
 - b NORMALLY CLOSED AUX. CONTACT
 - CC CLOSING COIL
 - IS ISOLATING SWITCH
 - IND INDUCTION UNIT
 - INST INSTANTANEOUS UNIT
 - KI KEY INTERLOCK
 - SCM SPRING CHARGING MOTOR
 - SLS SPRING LIMIT SWITCH
 - TC SHUNT TRIP COIL
 - Y ANTI-PUMP RELAY
 - 26 TRANSFORMER TEMP. CONTACT
 - 27 UNDERVOLTAGE RELAY
 - 27T TIMER (AGW7012AB 0.5 - 5 SEC. TDPU)
 - 52 C.O.B. M.C.B.
 - 52CS BREAKER CONTROL SWITCH
 - 64 GROUND FAULT RELAY
- NOTES**
- 1. ALL WIRING TO BE #14TBS EXCEPT *IS #10 TBS
 - 2. PHASE ROTATION A, B, C
 - 3. THIS SWBD IS EQUIPPED WITH GND. FAULT PROTECTION USING ZSCOT. FOR PROPER OPERATION OF THIS SYSTEM THE MAIN OR BRANCH NEUTRAL MUST NOT BE GROUNDED ON THE LOAD SIDE OF OF THE SENSORS.

CONTACT DIAGRAM 52CS					POSITIONS		
CGE SBM 10A100					CLOSE	NORM	TRIP
1	2	1	X				
2	3	2		X			
3	4	3	X				X
4		4	X				

1
E10.0
SOUTH SIDE SUBSTATION 12.5KV THREE LINE DIAGRAM WITH NEW MFPR CONNECTION DETAILS
NTS

KEYNOTES:

- 1** UPGRADE THE EXISTING 3000 AMP FPE HL-3 CIRCUIT BREAKER, 4 SSI-2:
 - SUPPLY AND INSTALL A NEW 3000 AMP INSULATED GASE CIRCUIT BREAKER, 3200 AMP FRAME WITH 3000 AMP LSG UNIT RATED 65KAIC AT 600V.
 - SUPPLY AND INSTALL ADDITIONAL SHUNT TRIP COIL TO INTERFACE WITH THE EXISTING GROUND FAULT TRIP CIRCUIT.
 - SUPPLY AND INSTALL BREAKER SUPERVISORY CONTACTS. TERMINATE ON A SEPARATE TERMINAL BLOCK IN THE PANEL ENCLOSURE.
 - RE-WIRE AND TEST EXTERNAL GF PROTECTIVE CIRCUIT OPERATION.
 - COORDINATE BREAKER ELECTRONIC TRIP UNIT FOR ARC FLASH REDUCTION. COORDINATE EXTERNAL GF AND UV PROTECTIVE CIRCUIT TRIPS.
 - TEST GF ZONE PROTECTION AND ELECTRONIC TRIP UNIT OPERATION AND COORDINATION.
 - SUPPLY AND INSTALL ALL BUS BAR, ADAPTERS, MOUNTING HARDWARE AND INSULATING MATERIALS.
 - SUPPLY AND INSTALL HINGED AND BOLTED ENCLOSURE COVER OR CUSTOM PAINTED, CLEAN FITTING COVER, SURROUNDING THE BREAKER OPENING.
 - PROVIDE RE-CERTIFICATION OF BREAKER INSTALLATION BY INDEPENDENT TESTING AND CERTIFICATION AUTHORITY.
- 2** 2.4KV MAIN BREAKER FOR THE 1 MVA TRANSFORMER T2.4SC-1:
 - REPLACE THE THREE EXISTING 50/51 INDUCTION DISK PROTECTION RELAYS WITH ONE MULTI FUNCTION TRANSFORMER PROTECTION RELAY.
 - CONNECT THE MULTI FUNCTION PROTECTIVE RELAY TO THE EXISTING 400:5 PRIMARY CT'S.
 - RECONNECT THE 7700 SCADA METER CT INPUT TO THE 400:5 CT CIRCUIT.
 - SUPPLY AND INSTALL 3 EACH 1200:5 C 200 ACCURACY CURRENT TRANSFORMERS ON THE SECONDARY SIDE OF 1 MVA TRANSFORMER T2.4SC-1 AS CLOSE TO THE 1200A SECONDARY CIRCUIT BREAKER AS POSSIBLE. SUPPLY ALL MOUNTING BRACKETS AND HARDWARE, SHORTING BLOCKS AND WIRING. USE 105°C RATED TEW CONDUCTOR FOR ALL CONTROL WIRING.
 - SUPPLY, INSTALL AND PROGRAM THE NEW MULTIFUNCTION PROTECTIVE RELAY TO CONNECT TO THE EXISTING TRANSFORMER APPARATUS THERMAL DEVICE. TEST AND VERIFY THE FUNCTION OF THE OVER TEMPERATURE TRIP.
 - SUPPLY AND INSTALL A NEW HINGED AND BOLTED CONTROL COMPARTMENT DOOR OR CUSTOM, PAINTED, NEAT FINISHED TRIM.
 - RETAIN AND RECONNECT THE EXISTING REMOTE TRIP AND CLOSE FUNCTION AND TEST.
 - PROVIDE BREAKER COORDINATION STUDY AND TEST AND VERIFY PROTECTION AND CONTROL SYSTEM FUNCTION.
- 3** 2.4KV SOUTH SIDE SUBSTATION COMPRESSOR SWITCHBOARD MAIN BREAKER ARC FLASH MITIGATION UPGRADE WIRING DIAGRAM. REFER TO 1/E9.0 AND 2/E10.0 FOR ADDITIONAL DETAILS.



2
E10.0
SOUTH SIDE SUBSTATION FLOOR PLANS AND NEW MFPR CONNECTION NOTES.
NTS

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

REAL PROPERTY SERVICES
Pacific Region
SERVICES IMMOBILIERS
Région de Pacifique

3rd Floor 1815 Blanshard St.
Victoria, B.C. V8T 5M4
tel: 250 381 8121
fax: 250 381 8811
Vancouver - Victoria
AES
APPLIED ENGINEERING
SOLUTIONS LIMITED
www.aesengineering.ca
AES PROJECT NUMBER: 1-14-202
JUL - 7 2015

1	ISSUED FOR TENDER	2015/09/27
0	ISSUED FOR 100% SUBMISSION	2014/10/27
Revision/	Description/Description	Date/Date
Client/client		
ESQUIMALT GRAVING DOCK		
825 ADMIRALS ROAD VICTORIA, BC, V9A 2P1		
Project title/Titre du projet 825 ADMIRALS ROAD VICTORIA BC ESQUIMALT GRAVING DOCK ELECTRICAL SAFETY UPGRADE		
EGD ELECTRICAL SAFETY REPAIRS (ARC FLASH MITIGATION)		
Consultant Signature Box Only		
Designed by/Concept par IAB		
Drawn by/Dessiné par JB		
PWSC: Project Manager/Administrateur de Projets TPSCG		
PWSC: Regional Manager, Architectural and Engineering Services/ Gestionnaire régionale, Services d'architecture et de génie, TPSCG		
Drawing title/Titre du dessin SOUTH SIDE SUBSTATION THREE LINE DIAGRAM AND FLOOR PLAN		
Project No./No. du projet R.016116.119	Sheet/Feuille E10.0	Revision no./ La Révision 1