

ELECTRICITY GENERATING AUTHORITY OF THAILAND

Supplemental Notice No. 1

Invitation to Bid No. TS12-DSS-05

Supply of Digital Substation Protection and Automation System

Transmission System Expansion Project No. 12

The attached Supplemental Notice shall be considered as part of the bidding documents No. TS12-DSS-05.

As acknowledgement of receipt that all additions, deletions and revisions contained in this Supplemental Notice are incorporated into the above bidding documents, Bidder is requested to sign and return this acknowledgement via email address : pasakorn.piy@egat.co.th within three (3) days from the date of the announcement of this Supplemental Notice on <http://www4.egat.co.th/fprocurement/biddingeng/>.

The original acknowledgement which is manually signed in ink by a person or persons duly authorized shall be included in the proposal to be submitted on the bid opening date.

ELECTRICITY GENERATING AUTHORITY OF THAILAND

June 7, 2023

ACKNOWLEDGEMENT

This undersigned Bidder hereby certifies that the additions, deletions and revisions set forth in this Supplemental Notice to Invitation to Bid No. TS12-DSS-05 are incorporated as part of the above bidding documents and will be fully included in any bids which he may submit.

Signed _____

Title _____

Company _____

Date _____

ELECTRICITY GENERATING AUTHORITY OF THAILAND

SUPPLEMENTAL NOTICE NO. 1

INVITATION TO BID NO. TS12-DSS-05

SUPPLY OF DIGITAL SUBSTATION PROTECTION
AND AUTOMATION SYSTEM

TRANSMISSION SYSTEM EXPANSION PROJECT NO.12

The following supplemental information is hereby given for the above described Invitation:

1. Section A : Invitation to Bid

Postpone the bid opening date from June 8, 2023 to ***June 20, 2023.***

2. Section C : Proposal

- Revise Price Schedule (Bill of Materials for Schedule 1, 2 and 3) with the revised excel files of Price Schedule attached.
- Replace pages Part 2-C34 thru Part 2-C36 of Proposal Data with the revised pages with (Rev. 1) attached.
- Replace pages Part 3-C1 thru Part 3-C3 of Delivery Schedule and Distribution List with the revised pages with (Rev.1) attached.

3. Section J : Drawings

Delete and substitute as follows :

<u>Deleted Dwg. No.</u>	<u>Substitute with Attached Dwg.No</u>
<u>Design Drawings</u>	
1. PB-E-1 sh.1/2 Rev.1	PB-E-1 sh.1/2 Rev.2
2. PB-E-1 sh.2/2 Rev.1	PB-E-1 sh.2/2 Rev.2
3. KP-E-1.1 sh.1/2 Rev.1	KP-E-1.1 sh.1/2 Rev.2
4. KP-E-1.1 sh.2/2 Rev.1	KP-E-1.1 sh.2/2 Rev.2
<u>Standard Drawing</u>	
5. TP-E-20.6 sh.2/3 Rev.1	TP-E-20.6 sh.2/3 Rev.2
6. TP-E-20.9 Rev.-	TP-E-20.9 Rev.1

Bid submitted must be in accordance with this Notice. Receipt of this Notice shall be acknowledged by the Bidder on the proposal included in the Bidding Documents in the space provided on page C2, Article C-5 Supplemental Notices.

ELECTRICITY GENERATING
AUTHORITY OF THAILAND

.....June 7, 2023.....

PROPOSAL DATA
SYSTEM INTEGRATOR FOR DIGITAL SUBSTATION

BIDDER NAME _____ **BID NO.** _____

MANUFACTURER _____

- a. Name of System Integrator _____
- b. Headquarter/Country of System Integrator _____
- c. Experience with Digital Substation _____ years

** Please give details in the attached table.

- d. Capability of Data Supported for Process Bus
- Maximum Number of Sampled Value (CT/PT) _____ points
 - Maximum Number of Analog Data (Condition Signal) _____ points
 - Maximum Number of Binary Input (Alarm & Status) _____ points
 - Maximum Number of Control Output _____ points

- e. Application Function (e.g. automation function, disturbance analysis, power quality monitoring)

Application Function	Description

- f. Service

- f1. Details of System Startup Supervisor

- Tools Involved in System Startup Prepared by Supervisor

- f2. Any Services (Please Give Details)

PROPOSAL DATA
SYSTEM INTEGRATOR FOR DIGITAL SUBSTATION

BIDDER NAME _____ **BID NO.** _____

MANUFACTURER _____

g. Network Configuration Design

Network Configuration Design for _____ Substation
<p>*** Please give details. ***</p>

PROPOSAL DATA
SYSTEM INTEGRATOR FOR DIGITAL SUBSTATION

BIDDER NAME _____ **BID NO.** _____

MANUFACTURER _____

Experience with Digital Substation

No.	Name of Project / Country	Year	Project Description
		(ex.20xx-20xx)	(New Substation, Substation Expansion with Conventional Control and Protection, New fully Digital substation with process bus, Substation Expansion with NCIT, etc.)

INVITATION TO BID NO. TS12-DSS-05**Delivery Schedule and Distribution List****TRANSMISSION SYSTEM EXPANSION PROJECT NO.12****Schedule 1 : 115 kV Digital Substation Protection and Automation Equipment**

Item No.	Description	Qty	Job no.	Substation	Delivery Required by EGAT (within months after confirmation of Letter of Award of Contract)
					DDP EGAT's Store
1-1	DSS : Digital Substation System including System Integrator	1	TS12-16-S221	PHETCHABURI	13
1-2	Multi-function Protective IED (87L, 21BU, 67N, 50BF, 79, 25, 51S/51SG)	1	TS12-16-S236	CHA-AM	13
		2	TS12-16-S237	RATCHABURI 2	13
1-3	DSS : Spare Parts	1	TS12-16-S221	PHETCHABURI	13
1-4	DIGITAL SUBSTATION SYSTEM -- 12 CORE METALLIC OPTICAL FIBER CABLE (MULTIMODE)	5000	TS12-16-S221	PHETCHABURI	13
1-5	EFLEX AND/OR HDPE CONDUIT WITH HOT-DIP GALVANIZED STEEL CLAMP	2000	TS12-16-S221	PHETCHABURI	13

EGAT's Store = PHETCHABURI Substation

INVITATION TO BID NO. TS12-DSS-05

Delivery Schedule and Distribution List

TRANSMISSION SYSTEM EXPANSION PROJECT NO.12

Schedule 2 : 115 kV Digital Substation Protection and Automation Equipment

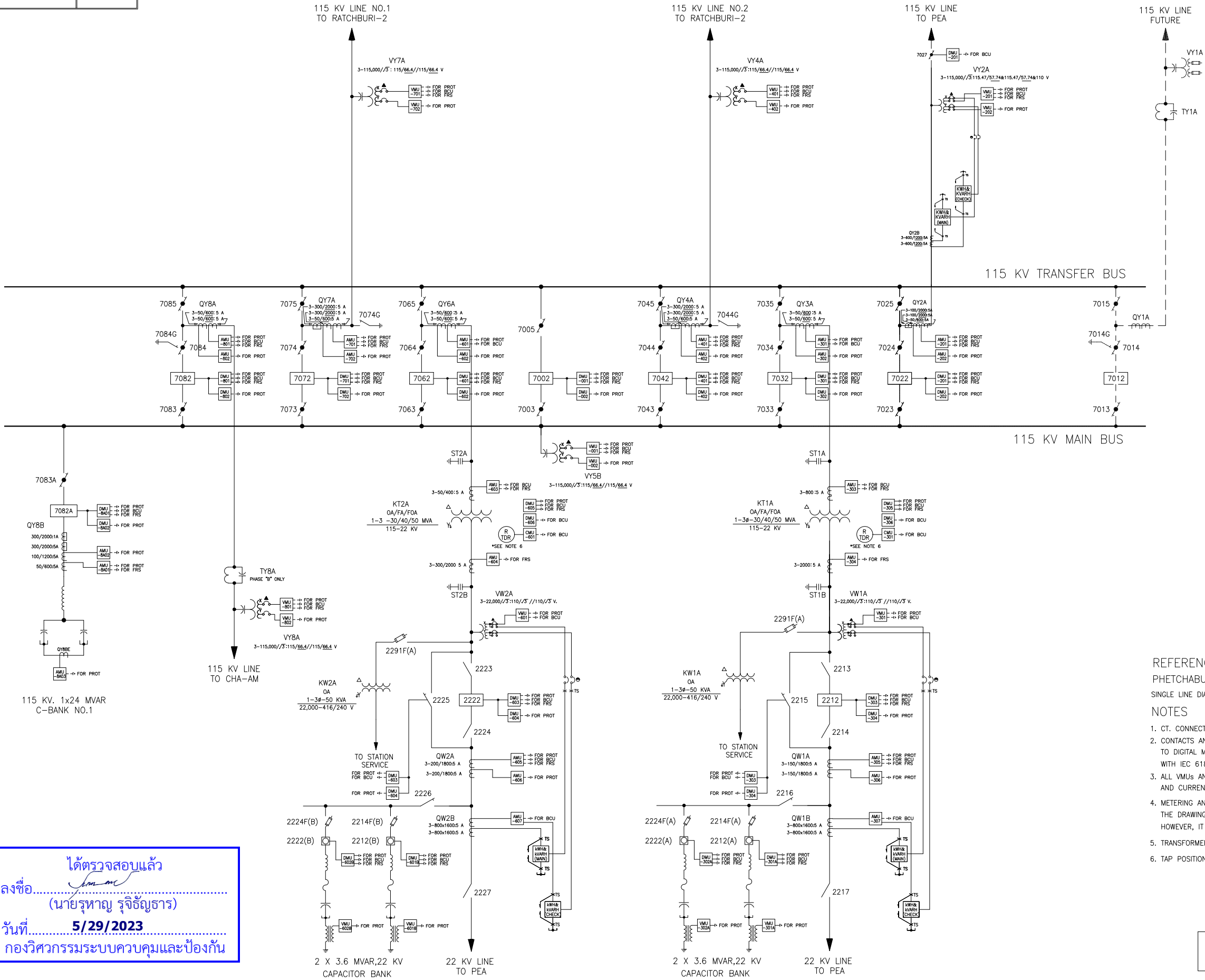
Item No.	Description	Qty	Job no.	Substation	Delivery Required by EGAT (within months after confirmation of Letter of Award of Contract)
					DDP EGAT's Store
2-1	DSS : Digital Substation System including System Integrator	1	TS12-16-S222	KAMPHAENGPHET	15
2-2	Multi-function Protective IED (87L, 21BU, 67N, 50BF, 79, 25, 51S/51SG)	2	TS12-16-S238	LAN KRABUE	15
		1	TS12-16-S239	TAK 1	15
2-3	DSS : Spare Parts	1	TS12-16-S222	KAMPHAENGPHET	15
2-4	DIGITAL SUBSTATION SYSTEM -- 12 CORE METALLIC OPTICAL FIBER CABLE (MULTIMODE)	4500	TS12-16-S222	KAMPHAENGPHET	15
2-5	EFLEX AND/OR HDPE CONDUIT WITH HOT-DIP GALVANIZED STEEL CLAMP	1500	TS12-16-S222	KAMPHAENGPHET	15

EGAT's Store = KAMPHAENGPHET Substation

INVITATION TO BID NO. TS12-DSS-05
Delivery Schedule and Distribution List
TRANSMISSION SYSTEM EXPANSION PROJECT NO.12
Schedule 3 : 115 kV Fault Recording System

Item No.	Description	Qty	Job no.	Substation	Delivery Required by EGAT (within months after confirmation of Letter of Award of Contract)
					DDP EGAT's Store
3-1	DSS : Fault Recording System	1	TS12-16-S221	PHETCHABURI	13
3-2	DSS : Fault Recording System	1	TS12-16-S222	KAMPHAENGPHEH	15
3-3	DSS : Spare Parts for Fault Recording System	1	TS12-16-S221	PHETCHABURI	13

EGAT's Store = PHETCHABURI and KAMPHAENGPHEH Substations



LEGEND	DESCRIPTION
87B	BUSBAR DIFFERENTIAL PROTECTION
95B	BUS WIRE SUPERVISION PROTECTION
21P, 21BU	DISTANCE PROTECTION
67N	DIRECTIONAL EARTH FAULT RELAY
67/67N	DIRECTIONAL OVERCURRENT RELAY
87L	CURRENT DIFFERENTIAL PROTECTION
51T/51TG	TRANSFORMER OVERCURRENT RELAY
51/51G	OVERCURRENT RELAY
81	UNDER-FREQUENCY RELAY
27	UNDERVOLTAGE RELAY
25	SYNCHRO-CHECK RELAY
79	AUTORECLOSURE DEVICE
50BF	BREAKER FAILURE PROTECTION
PTT	PERMISSIVE TRANSFER TRIP
DEF	DIRECTIONAL EARTH FAULT
DTT	DIRECT TRANSFER TRIP
E1	E1 INTERFACE
TELE	TELE PROTECTION
FRS	FAULT RECORDING SYSTEM
AMU	CURRENT MERGING UNIT
VMU	VOLTAGE MERGING UNIT
DMU	DIGITAL MERGING UNIT
CMU	CONDITION MONITORING UNIT
BCU	BAY CONTROL UNIT
PROT	PROTECTIVE IED
BO	BINARY OUTPUT
BI	BINARY INPUT
I	INCOMING VOLTAGE
R	RUNNING VOLTAGE
KWH&KVVARH	KILOWATT HOUR AND KILOVAR HOUR COMBIMETER
○	INDICATING PROTECTION FUNCTION
— — —	WYE CONNECTED CURRENT TRANSFORMER
— — —	DELTA CONNECTED CURRENT TRANSFORMER
— — —	CURRENT TEST SWITCH
— — —	POTENTIAL TEST SWITCH
— — —	MCB LOCATED AT SWITCHYARD
— — —	MCB LOCATED AT THE ASSOCIATED BOARD
— — —	COPPER-WIRED CONNECTION
— — —	FIBER OPTIC CONNECTION
— — —	OPTICAL CURRENT TRANSFORMER

REFERENCE DRAWING
PHETCHABURI SUBSTATION

SINGLE LINE DIAGRAM DWG.NO. PB-S-1

NOTES

1. CT. CONNECTED RATIO SHALL BE AS SHOWN ON THIS DRAWING.
2. CONTACTS AND ALARM FROM SWITCHYARD DEVICES SHALL BE CONNECTED TO DIGITAL MERGING UNITS AND SHALL BE SENT TO PROCESS BUS IN COMPLIANCE WITH IEC 61850-9-2 STANDARD.
3. ALL VMUs AND AMUs SHALL BE EQUIPPED WITH POTENTIAL AND CURRENT TEST SWITCHES RESPECTIVELY.
4. METERING AND RELAYING DIAGRAM ON THIS DWG. IS USED AS A GUIDELINE. THE DRAWING CAN BE MODIFIED BY THE CONTRACTOR. HOWEVER, IT SHALL BE SUBMITTED TO EGAT FOR APPROVAL.
5. TRANSFORMER DIFFERENTIAL RELAY (87K) SHALL BE 3-RESTRAINT MODEL TYPE.
6. TAP POSITION TRANSDUCER SHALL BE PROVIDED TO CONNECT WITH CMU.

FOR BIDDING ONLY

REV.NO.	JOB NO.	JOB DESCRIPTION	DRAWN	DESIGNED	VERIFIED	VALIDATED	RECOMMENDED	CONCURRED	APPROVED	DATE
2	TS12-16-S221	RENOVATED 115 kV DIGITAL SUBSTATION	-	-	-	-	-	-	-	-

ELECTRICITY GENERATING AUTHORITY OF THAILAND

DRAWN	C.KANTHA	VALIDATED	CHEF, CONTROL AND PROTECTION SYSTEM ENGINEERING DEPARTMENT	DRAWING NAME	PHETCHABURI SUBSTATION
DESIGNED	C.KANTHA	RECOMMENDED	ASSISTANT DIRECTOR, TRANSMISSION SYSTEM ENGINEERING DIVISION-1	DESCRIPTION OF DETAIL DRAWING	115 kV METERING AND RELAYING DIAGRAM
VERIFIED		CONCURRED	DIRECTOR, TRANSMISSION SYSTEM ENGINEERING DIVISION	JOB NO.	TS12-16-S221
APPROVED			ASSISTANT GOVERNOR - TRANSMISSION SYSTEM DEVELOPMENT	REPLACING DWG.NO.	-
				DWG.NO.	PB-E-1
					1 1 REV.
					2 2

LIST OF PROTECTIVE IED (115 & 22 kV)			*SEE NOTE 5
FEEDER	MU	PROTECTION FUNCTION	
115 kV BUS	AMU201 AMU301 AMU401 AMU601 AMU701 AMU801 AMU8A01	DMU001 DMU201 DMU301 DMU401 DMU601 DMU701 DMU801 DMU8A01	Primary Protection IED (87B) (95B) LOW IMPEDANCE
	AMU202 AMU302 AMU402 AMU602 AMU702 AMU802 AMU8A02	DMU002 DMU202 DMU302 DMU402 DMU602 DMU702 DMU802 DMU8A02	Secondary Protection IED (87B) (95B) LOW IMPEDANCE
115 kV C-BANK NO.1	AMU8A01 AMU8A03 VMU001	DMU8A01	Primary Protection IED (60C) (51C/51CG) (59C) (27C) (50BF)
	AMU8A02 AMU8A03 VMU002	DMU8A02	Secondary Protection IED (60C) (51C/51CG) (59C) (27C) (50BF)

ได้ตรวจสอบแล้ว

ลงชื่อ.....

(นายรุตหาญ รุจิธัญธาร)

วันที่..... 5/29/2023

กองวิศวกรรมระบบควบคุมและป้องกัน

LIST OF PROTECTIVE IED (115 & 22 kV)			*SEE NOTE 5
FEEDER	MU	PROTECTION FUNCTION	
115 kV LINE TO PEA (SIR<4)	AMU201 VMU201 DMU201 VMU001	Primary Protection IED	(21P) (67N) (67/67N) (81) (27) (50BF) (79) (25) TELE TELE TELE
	AMU202 VMU202 DMU202 VMU002	Secondary Protection IED	(21P) (67N) (67/67N) (81) (27) (50BF) (79) (25) TELE TELE TELE
115/22 kV KT1A	AMU301 AMU305 DMU301 DMU303 DMU305 VMU001	Primary Protection IED	(87K) (95K) (51T/51TG) (50BF) (51/51G) (81) (27)
	AMU302 AMU306 DMU302 DMU304 DMU306 VMU002	Secondary Protection IED	(87K) (95K) (51T/51TG) (50BF) (51/51G) (81) (27)
22kV C-Bank No.1A	VMU301A VMU301 DMU301A	Feeder Protection IED	(60CH) (60CL) (59C) + (BCU)
22kV C-Bank No.2A	VMU302A VMU302 DMU302A	Feeder Protection IED	(60CH) (60CL) (59C) + (BCU)
115 kV LINE NO.2 TO RATCHABURI-2 (SIR<4)	AMU401 VMU401 DMU401 VMU001	Primary Protection IED	(87L) (95L) (21BU) (67N) (50BF) (79) (25) E1 TELE
	AMU402 VMU402 DMU402 VMU002	Secondary Protection IED	(21P) (67N) (50BF) (79) (25) TELE TELE TELE
115/22 kV KT2A	AMU601 AMU605 DMU601 DMU603 DMU605 VMU001	Primary Protection IED	(87K) (95K) (51T/51TG) (50BF) (51/51G) (81) (27)
	AMU602 AMU606 DMU602 DMU604 DMU606 VMU002	Secondary Protection IED	(87K) (95K) (51T/51TG) (50BF) (51/51G) (81) (27)
22kV C-Bank No.1B	VMU601B VMU601 DMU601B	Feeder Protection IED	(60CH) (60CL) (59C) + (BCU)
22kV C-Bank No.2B	VMU602B VMU602 DMU602B	Feeder Protection IED	(60CH) (60CL) (59C) + (BCU)
115 kV LINE NO.1 TO RATCHABURI-2 (SIR<4)	AMU701 VMU701 DMU701 VMU001	Primary Protection IED	(87L) (95L) (21BU) (67N) (50BF) (79) (25) E1 TELE
	AMU702 VMU702 DMU702 VMU002	Secondary Protection IED	(21P) (67N) (50BF) (79) (25) TELE TELE TELE
115 kV LINE TO CHA-AM (SIR<4)	AMU801 VMU801 DMU801 VMU001	Primary Protection IED	(87L) (95L) (21BU) (67N) (50BF) (79) (25) E1 TELE
	AMU802 VMU802 DMU802 VMU002	Secondary Protection IED	(21P) (67N) (50BF) (79) (25) TELE TELE TELE

LEGEND	DESCRIPTION
87B	BUSBAR DIFFERENTIAL PROTECTION
95B	BUS WIRE SUPERVISION PROTECTION
21P, 21BU	DISTANCE PROTECTION
67N	DIRECTIONAL EARTH FAULT RELAY
67/67N	DIRECTIONAL OVERCURRENT RELAY
87L	CURRENT DIFFERENTIAL PROTECTION
51T/51TG	TRANSFORMER OVERCURRENT RELAY
51/51G	OVERCURRENT RELAY
81	UNDER-FREQUENCY RELAY
27	UNDERVOLTAGE RELAY
25	SYNCHRO-CHECK RELAY
79	AUTORECLOSURE DEVICE
50BF	BREAKER FAILURE PROTECTION
PTT	PERMISSIVE TRANSFER TRIP
DEF	DIRECTIONAL EARTH FAULT
DTT	DIRECT TRANSFER TRIP
E1	E1 INTERFACE
TELE	TELE PROTECTION
FRS	FAULT RECORDING SYSTEM
AMU	CURRENT Merging UNIT
VMU	VOLTAGE Merging UNIT
DMU	DIGITAL Merging UNIT
CMU	CONDITION MONITORING UNIT
BCU	BAY CONTROL UNIT
PROT	PROTECTIVE IED
BO	BINARY OUTPUT
BI	BINARY INPUT
I	INCOMING VOLTAGE
R	RUNNING VOLTAGE
KWH&KVArh	KILOWATT HOUR AND KILOVAR HOUR COMBIMETER
○	INDICATING PROTECTION FUNCTION
	WYE CONNECTED CURRENT TRANSFORMER
	DELTA CONNECTED CURRENT TRANSFORMER
	CURRENT TEST SWITCH
	POTENTIAL TEST SWITCH
	MCB LOCATED AT SWITCHYARD
	MCB LOCATED AT THE ASSOCIATED BOARD
—	COPPER-WIRED CONNECTION
----	FIBER OPTIC CONNECTION
	OPTICAL CURRENT TRANSFORMER

REFERENCE DRAWING
PHETCHABURI SUBSTATION

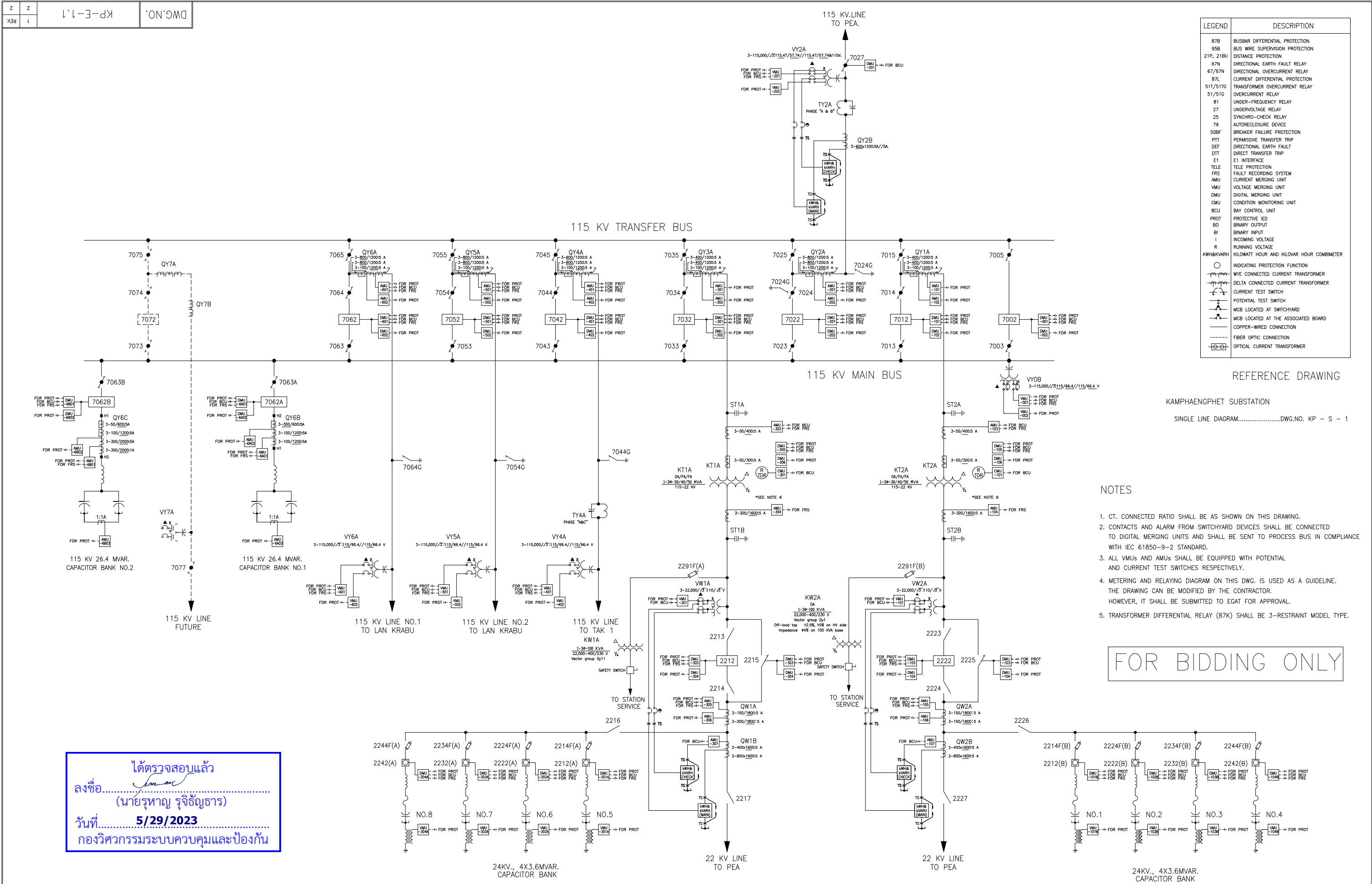
SINGLE LINE DIAGRAM DWG.NO. PB-S-1

NOTES

- CONTACTS AND ALARM FROM SWITCHYARD DEVICES SHALL BE CONNECTED TO DIGITAL MERGING UNITS AND SHALL BE SENT TO PROCESS BUS IN COMPLIANCE WITH IEC 61850-9-2 STANDARD.
- ALL VMUs AND AMUs SHALL BE EQUIPPED WITH POTENTIAL AND CURRENT TEST SWITCHES RESPECTIVELY.
- METERING AND RELAYING DIAGRAM ON THIS DWG. IS USED AS A GUIDELINE. THE DRAWING CAN BE MODIFIED BY THE CONTRACTOR. HOWEVER, IT SHALL BE SUBMITTED TO EGAT FOR APPROVAL.
- TRANSFORMER DIFFERENTIAL RELAY (87K) SHALL BE 6-RESTRAINT MODEL TYPE FOR 230/115 kV TIE TRANSFORMER AND 3-RESTRAINT MODEL TYPE FOR 115/22 kV LOADING TRANSFORMER.
- THE PROPOSED MULTI-FUNCTION PROTECTIVE IEDs CAN BE ANY TYPE/MODEL IN "EGAT ACCEPTED RELAY LIST" REGARDLESS THE SCHEME.
 - TO CONFIRM THE ADDITIONAL FUNCTIONS (BESIDE THE CERTIFIED SCHEMES), TYPE TEST REPORTS AND SUPPLY RECORDS SHALL BE SUBMITTED FOR APPROVAL.
 - REQUIRED SUPPLY RECORDS SHALL SHOW "HAVING THE SUCCESSFUL OPERATION OF AT LEAST ONE(1) YEAR IN AT LEAST TWO(2) SUBSTATIONS WITH NOMINAL SYSTEM VOLTAGE OF 110 kV OR ABOVE".
 - AFTER BID EVALUATION PHASE, THOSE IEDs SHALL BE TESTED AS REQUIRED BY EGAT.

FOR BIDDING ONLY

												ELECTRICITY GENERATING AUTHORITY OF THAILAND										
												DRAWN	C.KANITHA	VALIDATED	DRAWING NAME							
														CHIEF, CONTROL AND PROTECTION SYSTEM ENGINEERING DEPARTMENT	PHETCHABURI SUBSTATION							
												DESIGNED	C.KANITHA	RECOMMENDED	DESCRIPTION OF DETAIL DRAWING							
														ASSISTANT DIRECTOR, TRANSMISSION SYSTEM ENGINEERING DIVISION-1	LIST OF PROTECTIVE IED AND SIGNAL DIAGRAM							
												VERIFIED		CONCURRED	DIRECTOR, TRANSMISSION SYSTEM ENGINEERING DIVISION							
2	TS12-16-S221	RENOVATED 115 kV DIGITAL SUBSTATION				-	-	-	-	-	-	-	APPROVED				JOB NO.	REPLACING DWG.NO.	DWG.NO.	2	REV.	
REV.NO.	JOB NO.	JOB DESCRIPTION				DRAWN	DESIGNED	VERIFIED	VALIDATED	RECOMMENDED	CONCURRED	APPROVED	DATE	ASSISTANT GOVERNOR - TRANSMISSION SYSTEM DEVELOPMENT			DATE	TS12-16-S221	-	PB-E-1	2	2



ELECTRICITY GENERATING AUTHORITY OF THAILAND									
DRAWN S.PHATHARAPON		VALIDATED CHIEF, CONTROL AND PROTECTION SYSTEM ENGINEERING DEPARTMENT		DRAWING NAME KAMPHAENGPHET SUBSTATION					
DESIGNED S.PHATHARAPON		RECOMMENDED ASSISTANT DIRECTOR, TRANSMISSION SYSTEM ENGINEERING DIVISION-1		DESCRIPTION OF DETAIL DRAWING 115KV METERING AND RELAYING DIAGRAM					
VERIFIED		CONCURRED DIRECTOR, TRANSMISSION SYSTEM ENGINEERING DIVISION							
APPROVED		ASSISTANT GOVERNOR - TRANSMISSION SYSTEM DEVELOPMENT		DATE		JOB NO. TS12-16-S222		REPLACING DWG.NO. -	
						DWG.NO. KP-E-1.1		1 REV.	
								2 2	

LIST OF PROTECTIVE IED (115 & 22 kV) *SEE NOTE 5		
FEEDER	MU	PROTECTION FUNCTION
115 kV BUS	AMU001 DMU101 AMU201 AMU301 AMU401 AMU501 AMU601 AMU801 DMU901	Primary Protection IED (87B) (95B) LOW IMPEDANCE
	AMU102 AMU202 AMU302 AMU402 AMU502 AMU602 AMU802 DMU902	Secondary Protection IED (87B) (95B) LOW IMPEDANCE
115 kV C-BANK NO.1	AMU8A01 AMU8A03 VMU001	Primary Protection IED (80C) (51C) (59C) (27C) (50BF)
115 kV C-BANK NO.2	AMU8A02 AMU8A03 VMU002	Secondary Protection IED (80C) (51C) (59C) (27C) (50BF)
	AMU8B01 AMU8B03 VMU001	Primary Protection IED (80C) (51C) (59C) (27C) (50BF)
115 kV C-BANK NO.2	AMU8B02 AMU8B03 VMU002	Secondary Protection IED (80C) (51C) (59C) (27C) (50BF)
24 kV C-BANK NO.1	VMU101 VMU101B DMU101B	Primary Protection IED (80CH) (59C) (60CL) + (BCU)
24 kV C-BANK NO.2	VMU101 VMU102B DMU102B	Primary Protection IED (80CH) (59C) (60CL) + (BCU)
24 kV C-BANK NO.3	VMU101 VMU103B DMU103B	Primary Protection IED (80CH) (59C) (60CL) + (BCU)
24 kV C-BANK NO.4	VMU101 VMU104B DMU104B	Primary Protection IED (80CH) (59C) (60CL) + (BCU)
24 kV C-BANK NO.5	VMU301 VMU301A DMU301A	Primary Protection IED (80CH) (59C) (60CL) + (BCU)
24 kV C-BANK NO.6	VMU301 VMU302A DMU302A	Primary Protection IED (80CH) (59C) (60CL) + (BCU)
24 kV C-BANK NO.7	VMU301 VMU303A DMU303A	Primary Protection IED (80CH) (59C) (60CL) + (BCU)
24 kV C-BANK NO.8	VMU301 VMU304A DMU304A	Primary Protection IED (80CH) (59C) (60CL) + (BCU)

LIST OF PROTECTIVE IED (115 & 22 kV) *SEE NOTE 5		
FEEDER	MU	PROTECTION FUNCTION
115 kV LINE TO PEA (SIR<4)	AMU201 VMU001 DMU201 AMU202 VMU002 DMU202	Primary Protection IED (21P) (67N) (87N) (81) (27) (50BF) (79) (25) Secondary Protection IED (21P) (67N) (87N) (81) (27) (50BF) (79) (25)
115/22 kV KT1A	AMU101 AMU105 DMU101 DMU103 VMU001	Primary Protection IED (87K) (95K) (51T) (51C) (50BF) (81) (27)
	AMU102 AMU106 DMU102 DMU104 VMU002	Secondary Protection IED (87K) (95K) (51T) (51C) (50BF) (81) (27)
115/22 kV KT2A	AMU301 AMU305 DMU301 DMU303 VMU001	Primary Protection IED (87K) (95K) (51T) (51C) (50BF) (81) (27)
	AMU302 AMU306 DMU302 DMU304 VMU002	Secondary Protection IED (87K) (95K) (51T) (51C) (50BF) (81) (27)
115 kV LINE TO TAK (SIR<4)	AMU401 VMU001 DMU401	Primary Protection IED (87L) (95L) (21B) (67N) (50BF) (79) (25)
	AMU402 VMU002 DMU402	Secondary Protection IED (21P) (67N) (50BF) (79) (25)
115 kV LINE NO.2 TO LAN KRABU (SIR<4)	AMU501 VMU001 DMU501	Primary Protection IED (87L) (95L) (21B) (67N) (50BF) (79) (25)
	AMU502 VMU002 DMU502	Secondary Protection IED (21P) (67N) (50BF) (79) (25)
115 kV LINE NO.1 TO LAN KRABU (SIR<4)	AMU601 VMU001 DMU601	Primary Protection IED (87L) (95L) (21B) (67N) (50BF) (79) (25)
	AMU602 VMU002 DMU602	Secondary Protection IED (21P) (67N) (50BF) (79) (25)

LEGEND	DESCRIPTION
87B	BUSBAR DIFFERENTIAL PROTECTION
95B	BUS WIRE SUPERVISION PROTECTION
21P, 21BU	DISTANCE PROTECTION
67N	DIRECTIONAL EARTH FAULT RELAY
67/67N	DIRECTIONAL OVERCURRENT RELAY
87L	CURRENT DIFFERENTIAL PROTECTION
51T/51TG	TRANSFORMER OVERCURRENT RELAY
51/51G	OVERCURRENT RELAY
81	UNDER-FREQUENCY RELAY
27	UNDERVOLTAGE RELAY
25	SYNCHRO-CHECK RELAY
79	AUTORECLOSURE DEVICE
50BF	BREAKER FAILURE PROTECTION
PTT	PERMISSIVE TRANSFER TRIP
DEF	DIRECTIONAL EARTH FAULT
DDT	DIRECT TRANSFER TRIP
E1	E1 INTERFACE
TELE	TELE PROTECTION
FRS	FAULT RECORDING SYSTEM
AMU	CURRENT MERGING UNIT
VMU	VOLTAGE MERGING UNIT
DMU	DIGITAL MERGING UNIT
CMU	CONDITION MONITORING UNIT
BCU	BAY CONTROL UNIT
PROT	PROTECTIVE IED
BO	BINARY OUTPUT
BI	BINARY INPUT
I	INCOMING VOLTAGE
R	RUNNING VOLTAGE
KWH&KVARH	KILOWATT HOUR AND KILOVAR HOUR COMBIMETER
○	INDICATING PROTECTION FUNCTION
	WYE CONNECTED CURRENT TRANSFORMER
	DELTA CONNECTED CURRENT TRANSFORMER
	CURRENT TEST SWITCH
	POTENTIAL TEST SWITCH
	MCB LOCATED AT SWITCHYARD
	MCB LOCATED AT THE ASSOCIATED BOARD
	COPPER-WIRED CONNECTION
	FIBER OPTIC CONNECTION
	OPTICAL CURRENT TRANSFORMER

REFERENCE DRAWING

RANOT SUBSTATION
SINGLE LINE DIAGRAM.....DWG.NO. KP - S - 1

NOTES

- CONTACTS AND ALARM FROM SWITCHYARD DEVICES SHALL BE CONNECTED TO DIGITAL MERGING UNITS AND SHALL BE SENT TO PROCESS BUS IN COMPLIANCE WITH IEC 61850-9-2 STANDARD.
- ALL VMUs AND AMUs SHALL BE EQUIPPED WITH POTENTIAL AND CURRENT TEST SWITCHES RESPECTIVELY.
- METERING AND RELAYING DIAGRAM ON THIS DWG. IS USED AS A GUIDELINE. THE DRAWING CAN BE MODIFIED BY THE CONTRACTOR. HOWEVER, IT SHALL BE SUBMITTED TO EGAT FOR APPROVAL.
- TRANSFORMER DIFFERENTIAL RELAY (87K) SHALL BE 6-RESTRAINT MODEL TYPE FOR 230/115 kV TIE TRANSFORMER AND 3-RESTRAINT MODEL TYPE FOR 115/22 kV LOADING TRANSFORMER.
- THE PROPOSED MULTI-FUNCTION PROTECTIVE IEDs CAN BE ANY TYPE/MODEL IN "EGAT ACCEPTED RELAY LIST" REGARDLESS THE SCHEME.
 - TO CONFIRM THE ADDITIONAL FUNCTIONS (BESIDE THE CERTIFIED SCHEMES), TYPE TEST REPORTS AND SUPPLY RECORDS SHALL BE SUBMITTED FOR APPROVAL.
 - REQUIRED SUPPLY RECORDS SHALL SHOW "HAVING THE SUCCESSFUL OPERATION OF AT LEAST ONE(1) YEAR IN AT LEAST TWO(2) SUBSTATIONS WITH NOMINAL SYSTEM VOLTAGE OF 110 kV OR ABOVE".
 - AFTER BID EVALUATION PHASE, THOSE IEDs SHALL BE TESTED AS REQUIRED BY EGAT.

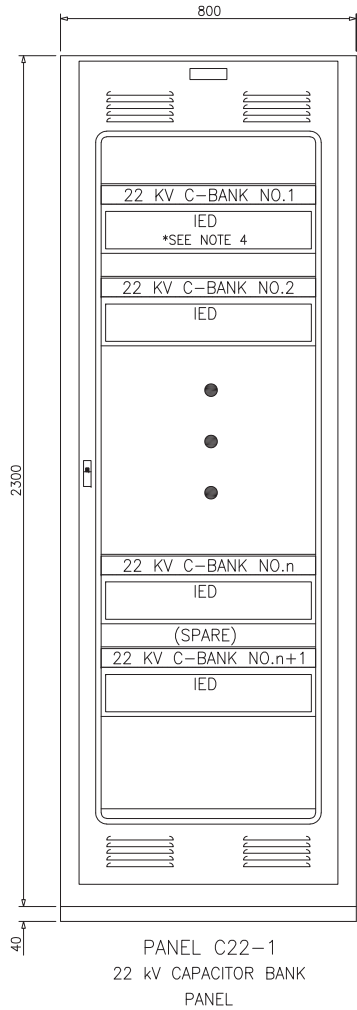
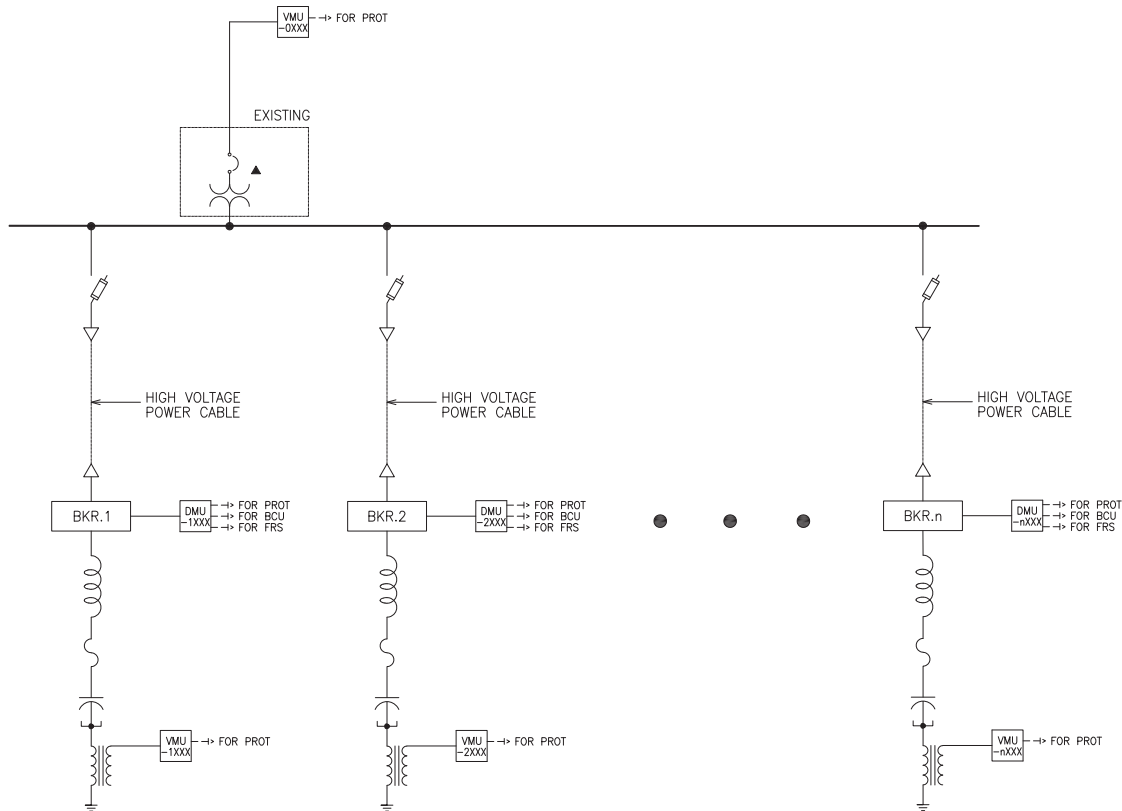
FOR BIDDING ONLY

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ลงชื่อ.....
(นายรุตหาญ รุจิธัญธาร)
วันที่..... 5/29/2023
กองวิศวกรรมระบบควบคุมและป้องกัน

2	TS12-16-S222	RENOVATED 115 kV DIGITAL SUBSTATION	S.PHATHARAPON	S.PHATHARAPON	-	-	-	-	-	-
REV.NO.	JOB NO.	JOB DESCRIPTION	DRAWN	DESIGNED	VERIFIED	VALIDATED	RECOMMENDED	CONCURRED	APPROVED	DATE

ELECTRICITY GENERATING AUTHORITY OF THAILAND									
DRAWN	S.PHATHARAPON	VALIDATED CHIEF, CONTROL AND PROTECTION SYSTEM ENGINEERING DEPARTMENT			DRAWING NAME KAMPHAENGPHET SUBSTATION				
DESIGNED	S.PHATHARAPON	RECOMMENDED ASSISTANT DIRECTOR, TRANSMISSION SYSTEM ENGINEERING DIVISION-1			DESCRIPTION OF DETAIL DRAWING LIST OF PROTECTIVE IED AND SIGNAL DIAGRAM				
VERIFIED		CONCURRED DIRECTOR, TRANSMISSION SYSTEM ENGINEERING DIVISION							
APPROVED ASSISTANT GOVERNOR - TRANSMISSION SYSTEM DEVELOPMENT				JOB NO. TS12-16-S222		REPLACING DWG.NO. —		DWG.NO. KP-E-1.1	
								2	REV.
								2	2

DWG.NO.	TP-E-20.6
REV.	2
	3



- NOTES
- PANELS SHOWN IN THIS DRAWING ARE SWING RACK TYPE SWITCHBOARD AS SHOWN IN DWG.NO. TP-E-10.1
 - QUANTITY OF IEDs INSTALLED IN PANEL SHALL NOT BE MORE THAN SIX(6) IEDs/PANEL.
 - n IS NUMBER OF ACTUAL CAPACITOR BANK IN SUBSTATION.
 - 22 kV C-BNAK CONTROL & PROTECTION DESIGN CRITERIA IS REFERED TO TP-E-20.1

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(นายรุหาญ รุจิธัญธาร)
วันที่..... 5/16/2023
กองวิศวกรรมระบบควบคุมและป้องกัน

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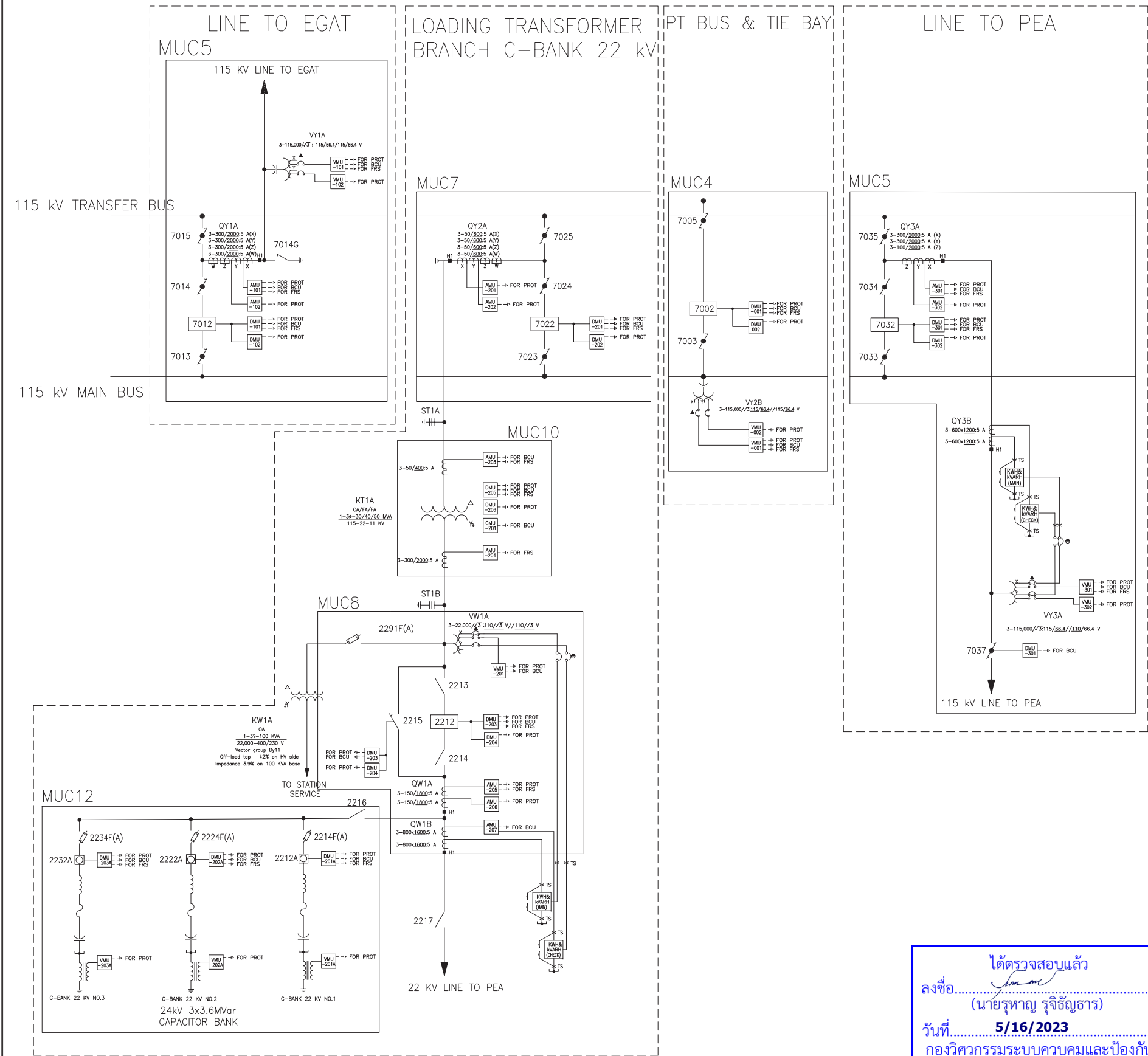
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Filename
Date
Name

											ELECTRICITY GENERATING AUTHORITY OF THAILAND							
2	-	REVISED 22 KV AND 33 KV CAPACITOR BANK CONTROL & PROTECTION DESIGN CRITERIA	P.ACHITAPOL	P.ACHITAPOL	-	-	-	-	-	-	DRAWN	P.ACHITAPOL	VALIDATED CHIEF, CONTROL AND PROTECTION SYSTEM ENGINEERING DEPARTMENT	DRAWING NAME TYPICAL DRAWING				
1	-	REVISED 22 KV AND 33 KV CAPACITOR BANK CONTROL & PROTECTION DESIGN CRITERIA	P.ACHITAPOL	P.ACHITAPOL	-	-	-	-	-	-	DESIGNED	P.ACHITAPOL	RECOMMENDED ASSISTANT DIRECTOR, TRANSMISSION SYSTEM ENGINEERING DIVISION-1	DESCRIPTION OF DETAIL DRAWING DIGITAL SUBSTATION SYSTEM DETAIL OF PANEL CONSTRUCTION 22 KV AND 33 KV CAPACITOR BANK SINGLE LINE DIAGRAM				
-	-	DIGITAL SUBSTATION SYSTEM DETAIL OF PANEL CONSTRUCTION 22 KV AND 33 KV CAPACITOR BANK SINGLE LINE DIAGRAM	P.PIYAWAT	K.NAPAT	-	-	-	-	-	-	VERIFIED		CONCURRED DIRECTOR, TRANSMISSION SYSTEM ENGINEERING DIVISION	APPROVED				
REV.NO.	JOB NO.	JOB DESCRIPTION	DRAWN	DESIGNED	VERIFIED	VALIDATED	RECOMMENDED	CONCURRED	APPROVED	DATE	ASSISTANT GOVERNOR - TRANSMISSION SYSTEM DEVELOPMENT		DATE	JOB NO.	REPLACING DWG.NO.	DWG.NO. TP-E-20.6	2 3	REV. 2

MAIN & TRANSFER



LEGEND	DESCRIPTION
MUC1	MERGING UNIT CUBICLE TYPE 1 FOR PT BUS IN BREAKER AND A HALF BUS & DOUBLE MAIN AND TRANSFER ARRANGEMENT
MUC2	MERGING UNIT CUBICLE TYPE 2 FOR PT BUS IN GIS BREAKER AND A HALF ARRANGEMENT
MUC3	MERGING UNIT CUBICLE TYPE 3 FOR PT BUS AND BUS COUPLE IN DOUBLE BUS SINGLE BREAKER
MUC4	MERGING UNIT CUBICLE TYPE 4 FOR PT BUS AND TIE BREAKER IN MAIN AND TRANSFER ARRANGEMENT
MUC5	MERGING UNIT CUBICLE TYPE 5 FOR LINE TO EGAT, LINE TO PEA AND LINE FOR C-BANK FEEDER
MUC6	MERGING UNIT CUBICLE TYPE 6 FOR HIGH-SIDED AND LOW SIDED TIE TRANSFORMER, HIGH-SIDED LOADING TRANSFORMER TO SWITCHGEAR
MUC7	MERGING UNIT CUBICLE TYPE 7 FOR MIDDLE BREAKER IN BREAKER AND HALF ARRANGEMENT , HIGH-SIDED LOADING TRANSFORMER
MUC8	MERGING UNIT CUBICLE TYPE 8 FOR LOW-SIDED LOADING TRANSFORMER
MUC9	MERGING UNIT CUBICLE TYPE 9 FOR TIE TRANSFORMER
MUC10	MERGING UNIT CUBICLE TYPE 10 FOR LOADING TRANSFORMER
MUC11	MERGING UNIT CUBICLE TYPE 11 FOR 230,115 KV C-BANK
MUC12	MERGING UNIT CUBICLE TYPE 12 FOR 3*22 KV C-BANK
MUC13	MERGING UNIT CUBICLE TYPE 13 FOR SWITCHGEAR

TABLE A
MERGING UNIT CUBICLE TYPE FOR AIS SUBSTATION

MUC TYPE	BINARY INPUT		BINARY OUTPUT		ANALOG INPUT*				MILLIAMP INPUT (MI)*
	PRIMARY	SECONDARY	PRIMARY	SECONDARY	PRIMARY		SECONDARY		
					PT	CT	PT	CT	
MUC1	10	10	0	0	4	0	4	0	0
MUC2	—	—	—	—	—	—	—	—	—
MUC3	30	20	10	10	8	4	8	4	0
MUC4	30	20	10	10	4	0	4	0	0
MUC5	30	20	10	10	4	4	4	4	0
MUC6	30	10	10	10	4	4	0	4	0
MUC7	20	10	10	10	0	4	0	4	0
MUC8	30	10	10	10	4	8	0	4	0
MUC9	60	10	20	20	4	16	0	0	8
MUC10	50	10	10	0	0	8	0	0	8
MUC11	20	10	10	10	0	8	0	4	0
MUC12	50	20	10	10	12	0	0	0	0
MUC13	—	—	—	—	—	—	—	—	—

- NOTES
- * : SIGNALS FROM PHASE A, B, C, N ARE ALREADY INCLUDED ON THE TABLE ABOVE.
 - ALL VMU AND AMU SHALL BE EQUIPPED WITH POTENTIAL AND CURRENT TEST SWITCHES RESPECTIVELY.
 - METERING AND RELAYING DIAGRAM ON THIS DWG. IS USED AS A GUIDELINE. THE DRAWING CAN BE MODIFIED BY THE CONTRACTOR. HOWEVER, IT SHALL BE SUBMITTED TO EGAT FOR APPROVAL.

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(นายรพัญญ์ รุจิธัญธาร)
วันที่.....
5/16/2023
กองวิศวกรรมระบบควบคุมและป้องกัน

REVNO.	JOB NO.	JOB DESCRIPTION	DRAWN	DESIGNED	VERIFIED	VALIDATED	RECOMMENDED	CONCURRED	APPROVED	DATE
1	-	REVISE MERGING UNIT CUBICLE TYPE	P.ACHITAPOL	P.ACHITAPOL	-	-	-	-	-	-
-	-	MERGING UNIT CUBICLE TYPE	P.ACHITAPOL	P.ACHITAPOL	-	-	-	-	-	-

ELECTRICITY GENERATING AUTHORITY OF THAILAND									
DRAWN P.ACHITAPOL		RECOMMENDED AND VALIDATED		DRAWING NAME		TYPICAL DRAWING			
DESIGNED P.ACHITAPOL		CONCURRED		DESCRIPTION OF DETAIL DRAWING		MERGING UNIT CUBICLE TYPE			
VERIFIED		ASSISTANT DIRECTOR, TRANSMISSION SYSTEM ENGINEERING DIVISION-1		JOB NO.		REPLACING DWG.NO.		DWG.NO.	
APPROVED		DIRECTOR, TRANSMISSION SYSTEM ENGINEERING DIVISION		DATE		-		TP-E-20.9	
								- REV.	
								- 1	