

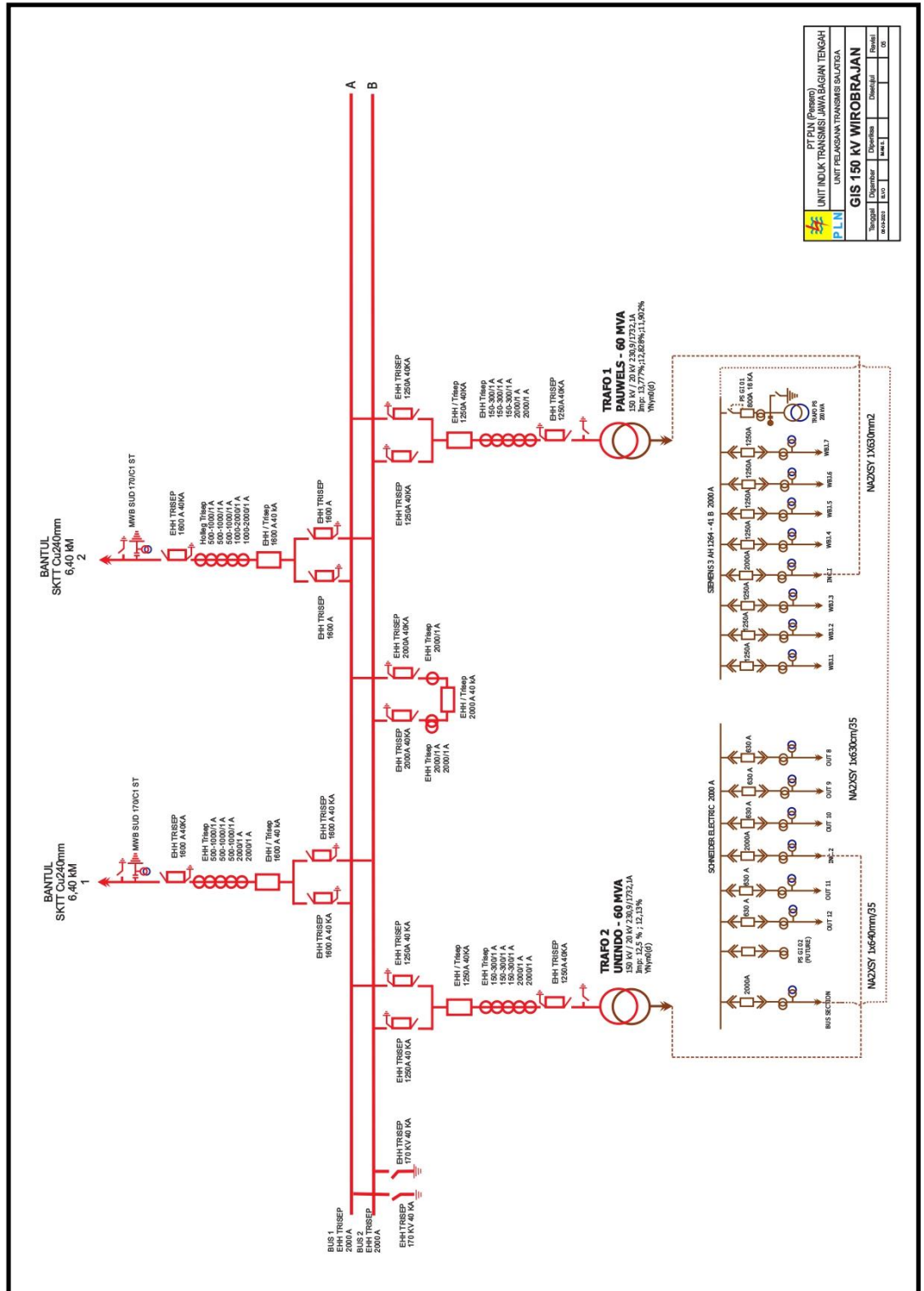
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LAMPIRAN

1. Single Line Diagram Gardu Induk 150 kV Wirobrajan



2. Beban Puncak Penyulang Pukul 10.00 Bulan Februari 2021

Tanggal		WBN 01		WBN 02		WBN 03		WBN 04		WBN 05		WBN 06		WBN 07 (CAD)							
		R	S	R	S	R	S	R	S	R	S	R	S	R	S						
01/02/2021	10:00	146	162	128	119	133	99	108	117	106	125	93	99	91	108	142	101	-	-		
02/02/2021	10:00	137	142	149	120	115	127	96	100	132	116	121	94	84	95	136	138	106	-	-	
03/02/2021	10:00	142	159	144	122	109	121	98	93	104	120	106	132	100	100	95	121	136	138	-	-
04/02/2021	10:00	136	143	155	119	110	123	94	97	110	130	112	116	99	84	96	131	106	107	-	-
05/02/2021	10:00	127	139	142	127	116	134	96	93	109	113	121	130	100	87	100	113	117	131	-	-
06/02/2021	10:00	127	141	157	111	108	126	108	95	98	119	119	111	100	94	92	135	137	120	-	-
07/02/2021	10:00	162	163	126	116	133	111	102	108	116	126	117	100	87	86	118	140	135	-	-	-
08/02/2021	10:00	154	149	138	125	120	135	97	95	106	107	113	105	95	94	91	99	123	106	-	-
09/02/2021	10:00	163	146	142	124	124	131	109	98	103	133	119	127	83	100	83	139	110	115	-	-
10/02/2021	10:00	133	155	159	132	129	128	106	101	108	131	117	122	96	92	91	110	143	111	-	-
11/02/2021	10:00	156	121	159	124	115	137	108	101	102	125	114	114	89	86	85	106	102	132	-	-
12/02/2021	10:00	129	130	162	131	132	99	102	110	109	121	124	90	97	86	105	110	112	-	-	-
13/02/2021	10:00	133	155	154	132	127	127	97	107	101	108	123	119	88	90	90	133	141	127	-	-
14/02/2021	10:00	143	142	148	125	125	109	110	106	97	118	128	122	100	90	97	131	126	107	-	-
15/02/2021	10:00	155	151	150	114	134	128	101	104	105	105	107	124	99	100	84	98	122	138	-	-
16/02/2021	10:00	162	125	142	121	137	119	104	107	107	132	107	130	93	86	94	130	116	129	-	-
17/02/2021	10:00	162	125	165	124	110	122	97	104	110	112	107	130	92	86	86	133	106	133	-	-
18/02/2021	10:00	164	162	154	119	120	136	101	111	104	117	113	114	83	87	97	111	100	117	-	-
19/02/2021	10:00	136	144	144	126	117	111	110	105	107	129	122	128	94	85	100	104	126	99	-	-
20/02/2021	10:00	136	126	149	113	108	127	106	97	101	110	109	127	88	92	95	123	117	106	-	-
21/02/2021	10:00	156	149	162	133	128	125	108	111	94	133	110	131	98	86	95	141	138	125	-	-
22/02/2021	10:00	148	129	158	136	126	108	110	83	106	118	115	129	83	91	92	103	142	123	-	-
23/02/2021	10:00	143	137	127	111	116	109	101	99	96	130	113	111	92	86	86	121	99	119	-	-
24/02/2021	10:00	163	159	134	115	125	119	97	105	109	122	124	114	96	88	87	130	107	143	-	-
25/02/2021	10:00	158	142	157	127	128	115	111	94	106	112	111	125	84	90	96	138	140	113	-	-
26/02/2021	10:00	158	140	146	108	128	124	103	94	111	127	111	117	99	89	95	100	143	120	-	-
27/02/2021	10:00	158	136	123	117	122	108	105	100	100	123	112	118	87	84	92	143	138	101	-	-
28/02/2021	10:00	163	122	153	118	121	134	105	95	97	125	120	115	93	86	91	103	134	100	-	-

PT PLN (PERSERO)
 UNIT PELAYANAN TRANSMISI SALATIGA
 GI WIROBRAJAN

PT PLN (PERSERO) UNIT JBT
 UNIT PELAYANAN TRANSMISI
 S A L A T I G A
 GIS WIROBRAJAN

KETERANGAN :

3. Beban Puncak Penyulang Pukul 19.00 Bulan Februari 2021

Tanggal	Pukul	WBN 01			WBN 02			WBN 03			WBN 04			WBN 05			WBN 06			WBN 07 (CAD)		
		R	S	T	R	S	T	R	S	T	R	S	T	R	S	T	R	S	T	R	S	T
01/02/2021	19:00	149	157	137	126	141	102	101	113	123	121	121	116	111	103	148	129	130	-	-	-	
02/02/2021	19:00	166	178	135	130	147	101	104	115	130	141	123	108	113	109	150	175	156	-	-	-	
03/02/2021	19:00	148	160	139	127	143	109	105	118	144	143	140	97	103	93	159	166	142	-	-	-	
04/02/2021	19:00	145	148	129	121	136	111	110	119	120	146	144	100	114	115	130	133	154	-	-	-	
05/02/2021	19:00	150	162	140	128	146	112	116	121	142	134	127	101	95	110	128	126	158	-	-	-	
06/02/2021	19:00	173	175	147	135	131	131	127	122	123	124	135	119	102	93	152	165	165	-	-	-	
07/02/2021	19:00	177	180	151	126	138	143	121	114	105	140	139	134	93	103	106	147	171	157	-	-	
08/02/2021	19:00	159	161	128	138	124	119	130	127	145	140	135	113	104	102	164	172	148	-	-	-	
09/02/2021	19:00	141	161	142	134	122	141	125	128	99	128	148	137	99	116	94	136	148	137	-	-	
10/02/2021	19:00	146	163	155	128	131	142	124	117	110	129	139	148	113	102	95	172	147	159	-	-	
11/02/2021	19:00	141	167	166	130	123	144	103	104	104	124	132	140	98	115	95	135	152	151	-	-	
12/02/2021	19:00	176	164	144	130	142	121	117	107	129	148	143	126	108	111	119	158	149	132	-	-	
13/02/2021	19:00	160	135	172	132	124	121	124	105	131	149	150	136	96	94	110	137	145	153	-	-	
14/02/2021	19:00	135	135	154	121	131	132	120	99	109	152	120	143	104	109	106	146	140	144	-	-	
15/02/2021	19:00	150	141	162	137	144	145	113	99	106	140	132	131	108	118	102	154	141	166	-	-	
16/02/2021	19:00	135	160	165	121	131	132	124	124	115	120	130	144	96	117	113	142	147	147	-	-	
17/02/2021	19:00	159	136	167	132	143	125	115	123	103	123	150	151	115	100	117	159	187	162	-	-	
18/02/2021	19:00	162	168	141	136	127	133	126	103	100	140	125	148	110	118	107	133	135	141	-	-	
19/02/2021	19:00	138	159	138	144	132	134	117	123	100	131	136	147	100	108	104	157	130	144	-	-	
20/02/2021	19:00	160	150	136	144	144	131	101	112	130	141	141	135	115	107	113	145	141	147	-	-	
21/02/2021	19:00	135	172	169	145	140	123	101	131	131	140	143	148	101	99	117	127	160	129	-	-	
22/02/2021	19:00	160	162	157	143	120	128	113	120	98	144	143	144	116	101	119	166	164	138	-	-	
23/02/2021	19:00	177	147	165	121	120	125	111	128	117	136	120	120	114	115	111	148	134	127	-	-	
24/02/2021	19:00	143	139	172	138	129	129	114	126	131	152	160	134	105	108	108	138	165	131	-	-	
25/02/2021	19:00	151	153	158	124	144	138	107	119	101	143	142	125	103	102	104	134	171	135	-	-	
26/02/2021	19:00	146	166	166	141	142	140	101	118	128	131	134	137	113	106	115	138	139	161	-	-	
27/02/2021	19:00	172	151	139	144	137	145	101	123	129	120	126	121	106	119	95	173	159	147	-	-	
28/02/2021	19:00	151	142	175	145	121	145	125	129	114	125	123	138	106	116	95	152	135	138	-	-	

KETERANGAN :

PT PLN (Persero) UNIT JBT
 UNIT PELAYANAN TRANSMISI SALATIGA
 SALATIGA
 GIS WIROBRAJAN

4. Penyulang WBN 01



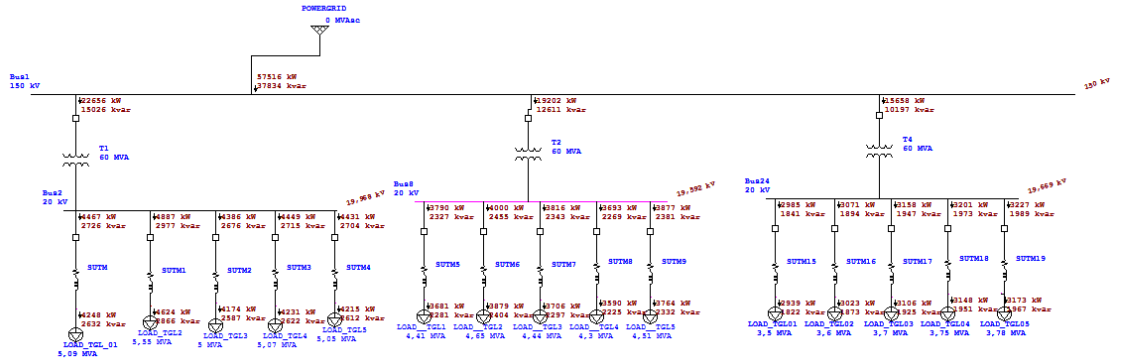
5. Penyulang WBN 02



6. Penyulang WBN 03



7. Simulasi dengan Software ETAP 12.6



8. Hasil Simulasi Jatuh tegangan dan Rugi daya software ETAP 12.6 WBN 01

Project: **ETAP** Page: 1
 Location: **12.6.0H** Date: 04-18-2022
 Contract: SN:
 Engineer: Study Case: LF Revision: Base
 Filename: simulasiETAPWBN123 Config.: Normal

Branch Losses Summary Report

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in V _{rms}
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T1	4.462	2.769	-4.461	-2.723	1.3	45.9	100.0	101.9	1.95
SUTM4	4.461	2.723	-4.251	-2.634	210.2	89.0	101.9	97.5	4.40
					211.5	134.9			

Tanggal 1 Februari 2021

Project: **ETAP** Page: 1
 Location: **12.6.0H** Date: 04-18-2022
 Contract: SN:
 Engineer: Study Case: LF Revision: Base
 Filename: simulasiETAPWBN123 Config.: Normal

Branch Losses Summary Report

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in V _{rms}
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T1	4.920	3.054	-4.918	-2.998	1.6	55.7	100.0	101.9	1.90
SUTM1	4.918	2.998	-4.663	-2.890	255.5	108.2	101.9	97.0	4.85
					257.1	164.0			

Tanggal 2 Februari 2021

Project: **ETAP** Page: 1
 Location: **12.6.0H** Date: 04-18-2022
 Contract: SN:
 Engineer: Study Case: LF Revision: Base
 Filename: simulasiETAPWBN123 Config.: Normal

Branch Losses Summary Report

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T1	4.417	2.741	-4.416	-2.696	1.3	44.9	100.0	102.0	1.95
SUTM2	4.416	2.696	-4.210	-2.609	205.9	87.2	102.0	97.6	4.36
					207.2	132.1			

Tanggal 3 Februari 2021

Project: **ETAP** Page: 1
 Location: **12.6.0H** Date: 04-18-2022
 Contract: SN:
 Engineer: Study Case: LF Revision: Base
 Filename: simulasiETAPWBN123 Config.: Normal

Branch Losses Summary Report

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T1	4.481	2.781	-4.479	-2.734	1.4	46.2	100.0	101.9	1.95
SUTM3	4.479	2.734	-4.267	-2.645	211.9	89.8	101.9	97.5	4.42
					213.3	136.0			

Tanggal 4 Februari 2021

Project: **ETAP** Page: 1
 Location: **12.6.0H** Date: 04-18-2022
 Contract: SN:
 Engineer: Study Case: LF Revision: Base
 Filename: simulasiETAPWBN123 Config.: Normal

Branch Losses Summary Report

CKT / Branch	From-To Bus Flow		To-F from Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T1	4.462	2.769	-4.461	-2.723	1.3	45.9	100.0	101.9	1.95
SUTM4	4.461	2.723	-4.251	-2.634	210.2	89.0	101.9	97.5	4.40
					211.5	134.9			

Tanggal 5 Februari 2021

9. Hasil Simulasi Jatuh tegangan dan Rugi daya software ETAP 12.6 WBN 02

Project: **ETAP** Page: 1
 Location: **12.6.0H** Date: 04-18-2022
 Contract: SN:
 Engineer: Study Case: LF Revision: Base
 Filename: simulasiETAPWBN123 Config.: Normal

Branch Losses Summary Report

CKT / Branch ID	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T2	3.813	2.373	-3.812	-2.341	0.9	31.9	100.0	99.6	0.39
SUTM5	3.812	2.341	-3.765	-2.296	106.5	45.1	99.6	97.1	2.55
					107.5	77.0			

Tanggal 1 Februari 2021

Project: **ETAP** Page: 1
 Location: **12.6.0H** Date: 04-18-2022
 Contract: SN:
 Engineer: Study Case: LF Revision: Base
 Filename: simulasiETAPWBN123 Config.: Normal

Branch Losses Summary Report

CKT / Branch ID	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T2	4.024	2.505	-4.023	-2.470	1.0	35.6	100.0	99.6	0.41
SUTM6	4.023	2.470	-3.904	-2.420	118.7	50.3	99.6	96.9	2.69
					119.7	85.8			

Tanggal 2 Februari 2021

Project: **ETAP** Page: 1
 Location: **12.6.0H** Date: 04-18-2022
 Contract: SN:
 Engineer: Study Case: LF Revision: Base
 Filename: simulasiETAPWBN123 Config.: Normal

Branch Losses Summary Report

CKT / Branch ID	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T2	3.839	2.390	-3.838	-2.357	0.9	32.4	100.0	99.6	0.39
SUTM7	3.838	2.357	-3.730	-2.312	108.0	45.7	99.6	97.0	2.56
					109.0	78.1			

Tanggal 3 Februari 2021

Project: **ETAP** Page: 1
 Location: 12.6.0H Date: 04-18-2022
 Contract: SN:
 Engineer: Study Case: LF Revision: Base
 Filename: simulasiETAPWBN123 Config.: Normal

Branch Losses Summary Report

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T2	3.716	2.313	-3.715	-2.282	0.9	30.3	100.0	99.6	0.38
SUTM8	3.715	2.282	-3.614	-2.240	101.2	42.9	99.6	97.1	2.48
					102.1	73.2			

Tanggal 4 Februari 2021

Project: **ETAP** Page: 1
 Location: 12.6.0H Date: 04-18-2022
 Contract: SN:
 Engineer: Study Case: LF Revision: Base
 Filename: simulasiETAPWBN123 Config.: Normal

Branch Losses Summary Report

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T2	3.901	2.428	-3.900	-2.395	1.0	33.4	100.0	99.6	0.40
SUTM9	3.900	2.395	-3.788	-2.348	111.5	47.2	99.6	97.0	2.61
					112.5	80.6			

Tanggal 5 Februari 2021

10. Hasil Simulasi Jatuh tegangan dan Rugi daya software ETAP 12.6 WBN 03

Project: **ETAP** Page: 1
 Location: 12.6.0H Date: 04-18-2022
 Contract: SN:
 Engineer: Study Case: LF Revision: Base
 Filename: simulasiETAPWBN123 Config.: Normal

Branch Losses Summary Report

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T4	3.001	1.870	-3.000	-1.851	0.6	19.8	100.0	99.7	0.31
SUTM15	-2.955	-1.831	3.000	1.851	45.1	19.1	98.3	99.7	1.37
					45.7	38.9			

Tanggal 1 Februari 2021

Project: **ETAP** Page: 1
 Location: **12.6.0H** Date: 04-18-2022
 Contract: SN:
 Engineer: Study Case: LF Revision: Base
 Filename: simulasiETAPWBN123 Config.: Normal

Branch Losses Summary Report

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd
	MW	Mvar	MW	Mvar	kW	kvar	From	To	% Drop in Vmag
T4	3.087	1.925	-3.087	-1.904	0.6	20.9	100.0	99.7	0.32
SU TM16	-3.039	-1.883	3.087	1.904	47.7	20.2	98.3	99.7	1.41
					48.4	41.2			

Tanggal 2 Februari 2021

Project: **ETAP** Page: 1
 Location: **12.6.0H** Date: 04-18-2022
 Contract: SN:
 Engineer: Study Case: LF Revision: Base
 Filename: simulasiETAPWBN123 Config.: Normal

Branch Losses Summary Report

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd
	MW	Mvar	MW	Mvar	kW	kvar	From	To	% Drop in Vmag
T4	3.174	1.979	-3.173	-1.957	0.6	22.1	100.0	99.7	0.33
SU TM17	-3.123	-1.935	3.173	1.957	50.5	21.4	98.2	99.7	1.45
					51.1	43.5			

Tanggal 3 Februari 2021

Project: **ETAP** Page: 1
 Location: **12.6.0H** Date: 04-18-2022
 Contract: SN:
 Engineer: Study Case: LF Revision: Base
 Filename: simulasiETAPWBN123 Config.: Normal

Branch Losses Summary Report

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd
	MW	Mvar	MW	Mvar	kW	kvar	From	To	% Drop in Vmag
T4	3.217	2.006	-3.217	-1.983	0.7	22.8	100.0	99.7	0.33
SU TM18	-3.165	-1.961	3.217	1.983	51.8	22.0	98.2	99.7	1.47
					52.5	44.7			

Tanggal 4 Februari 2021

Project:
 Location:
 Contract:
 Engineer:
 Filename: simulasiETAPWBN123

ETAP
 12.6.0H

Study Case: LF

Page: 1
 Date: 04-18-2022
 SN:
 Revision: Base
 Config.: Normal

Branch Losses Summary Report

CKT / Branch ID	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T4	3.243	2.022	-3.243	-1.999	0.7	23.1	100.0	99.7	0.33
SU TM19	3.243	1.999	-3.190	-1.977	52.7	22.3	99.7	98.2	1.48
					53.4	45.4			

Tanggal 5 Februari 2021