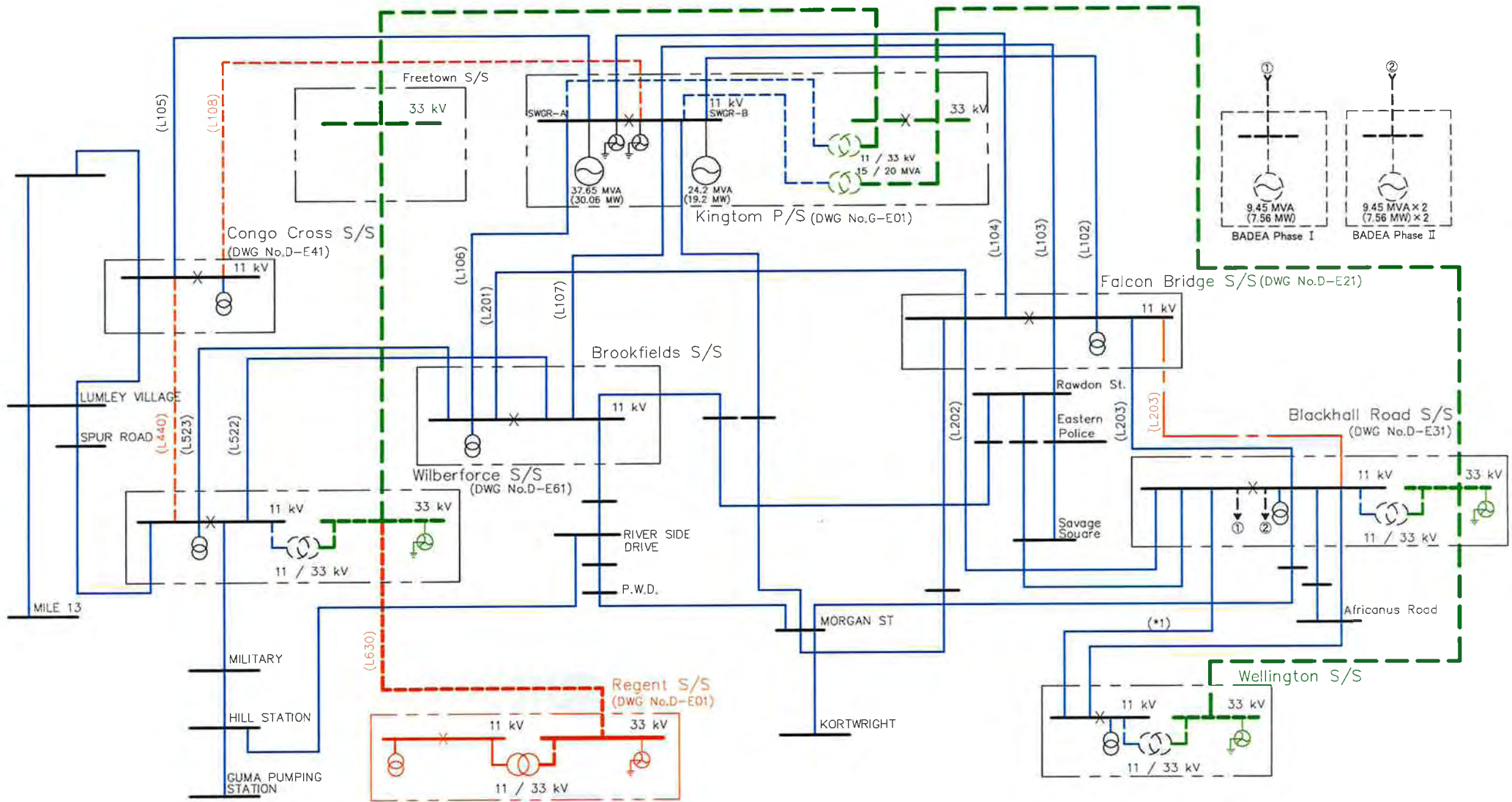


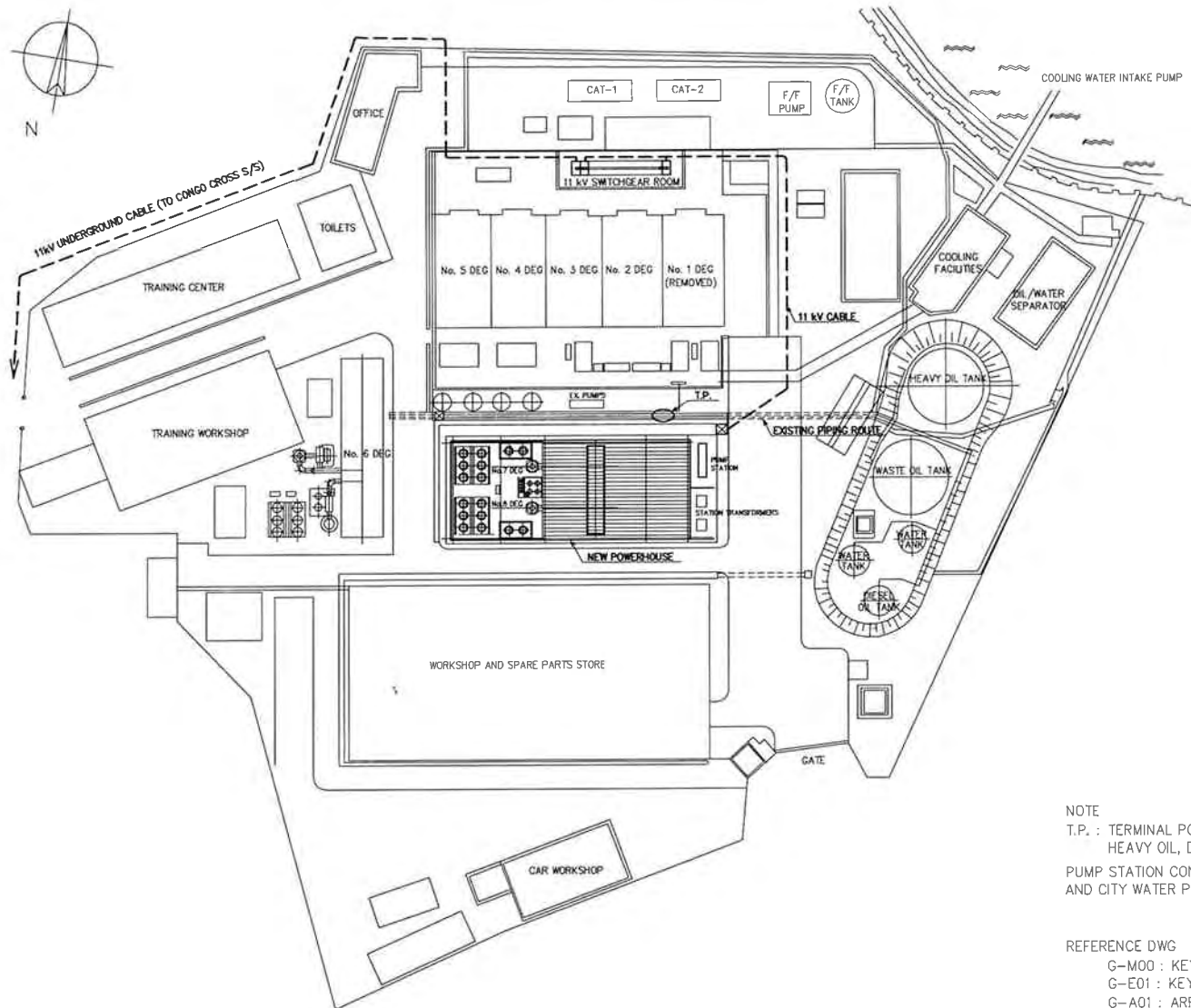
A-5-1



- 11 kV Distribution Line (Existing)
- - - - 11 kV Distribution Line (World Bank Project)
- - - - 11 kV Distribution Line (This Project :Procurement and Installation)
- 11 kV Distribution Line (This Project :Procurement)
- 33 kV Distribution Line (Existing)
- - - - 33 kV Distribution Line (World Bank Project)
- - - - 33 kV Distribution Line (This Project :Procurement and Installation)

*1: 66 kV Distribution (Operated by 11kV)

G-E00 FREETOWN 11 / 33 kV NETWORK
11 / 33 kV フリータウン電力系統図

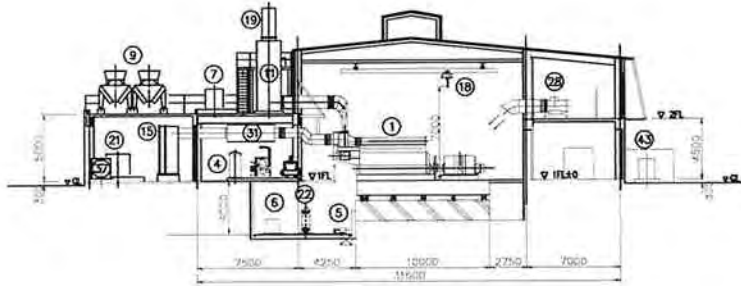


NOTE
 T.P. : TERMINAL POINTS WITH EXISTING PIPING OF
 HEAVY OIL, DIESEL OIL AND CITY WATER
 PUMP STATION CONSISTS OF HEAVY OIL, DIESEL OIL
 AND CITY WATER PUMPS.

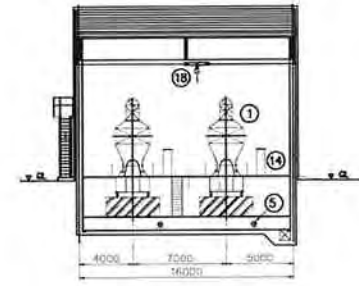
REFERENCE DWG
 G-M00 : KEY FLOW DIAGRAM
 G-E01 : KEY SINGLE LINE DIAGRAM
 G-A01 : ARRANGEMENT OF NEW POWERHOUSE

G-G01 GENERAL ARRANGEMENT
 キングトム発電所全体配置図

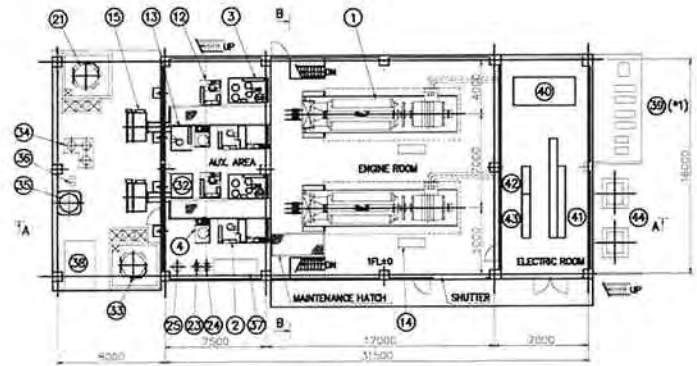
A-5-3



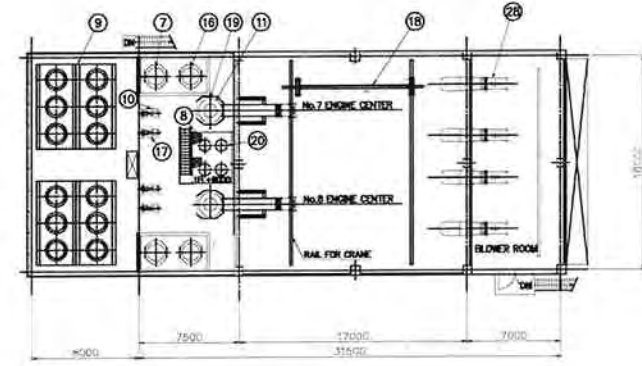
SIDE ELEVATION
(VIEW AT A-A)



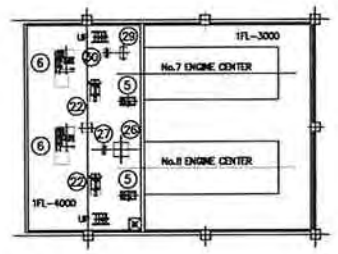
FRONT ELEVATION
(VIEW AT B-B)



1st FLOOR AND GROUND LEVEL



2nd FLOOR AND BALCONY
(1FL+4500)



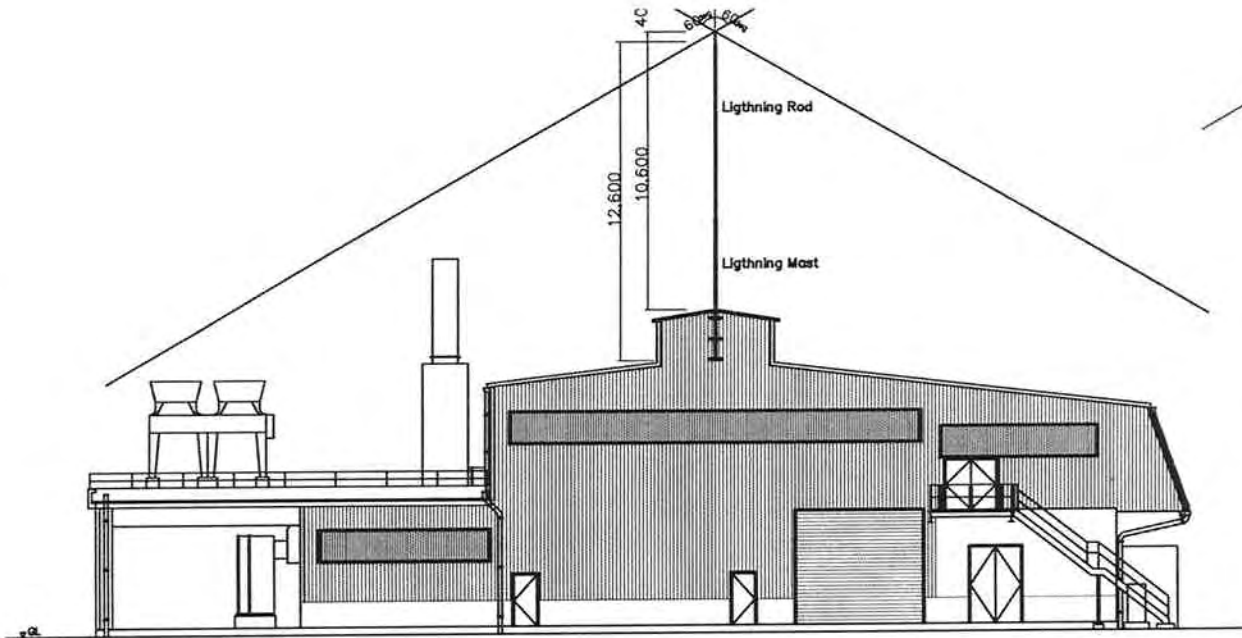
SUMP PIT(1FL-3000 & 4000)

44	AUXILIARY TRANSFORMER	2	
43	CONTROL PANELS	1 lot	
42	BATTERY AND CHARGER PANEL	1 lot	
41	MCC AND LV PANEL	1 lot	
40	SWITCHGEARS	1 lot	
39	PUMP STATION (*1)	1 lot	
38	INCINERATOR UNIT	1	
37	OILY WATER SEPARATOR TANK	1	
36	TREATED WATER PUMP	2	
35	TREATED WATER TANK	1	1000 L
34	WATER TREATMENT UNIT	1	
33	WASTE OIL TANK	1	2000 L
32	HEAVY OIL WASHING UNIT	1	
31	INTAKE AIR SILENCER	2	
30	FUEL OIL DRAIN PUMP	1	
29	FUEL OIL DRAIN TANK	1	200 L
28	AIR BLOWER & DUCT	4	
27	SLUDGE PUMP	1	
26	SLUDGE TANK	1	1000 L
25	OILY WATER SEPARATION UNIT	1	
24	OILY WATER PUMP	1	
23	WASTE OIL PUMP	1	
22	LUBE OIL COOLER	2	
21	HEAVY OIL BUFFER TANK	1	2500 L
20	LT WATER EXPANSION TANK	2	500 L
19	STACK	2	
18	OVERHEAD CRANE	1	5 TONS
17	HT WATER CIRCULATING PUMP	2	
16	HEAVY OIL SERVICE TANK	2	2500 L
15	INTAKE AIR FILTER	2	
14	ENGINE LOCAL PANEL	2	
13	LUBE OIL PURIFIER	1	STAND-BY
12	HEAVY OIL PURIFIER	2	
11	EXHAUST GAS SILENCER	2	
10	LT WATER CIRCULATING PUMP	2	
9	RADIATOR	2	
8	HT WATER EXPANSION TANK	2	500 L
7	DIESEL OIL SERVICE TANK	2	2500 L
6	T/C LUBE OIL UNIT	2	
5	LUBE OIL PRIMING PUMP	2	
4	AIR COMPRESSOR UNIT	2	
3	FUEL OIL SKID	2	PURIFIER, PUMPS
2	LUBE OIL SKID	2	PURIFIER, FILTERS
1	ENGINE & GENERATOR	2	
No.	EQUIPMENT NAME	Q'TY	REMARKS

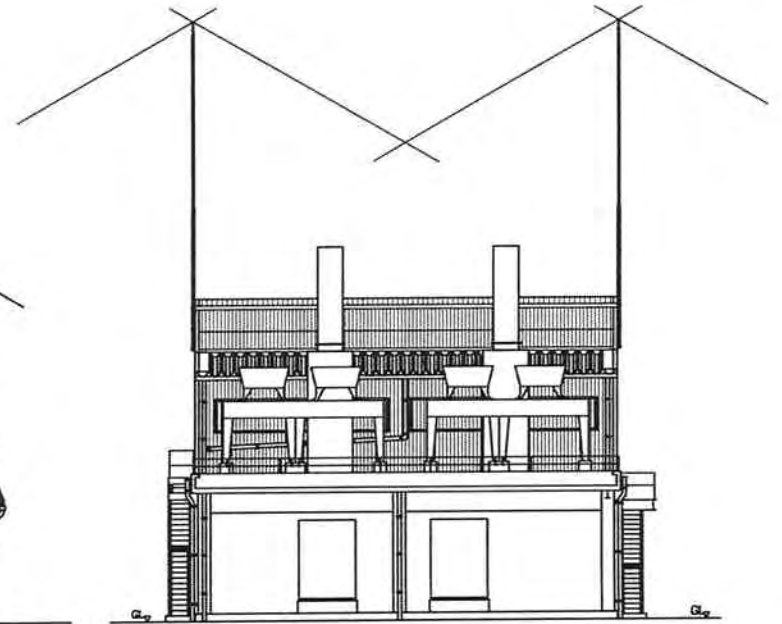
REMARK
(*1) : PUMP STATION CONSISTS OF HEAVY OIL, DIESEL OIL,
CITY WATER TRANSFER PUMPS AND LOCAL CONTROL PANEL

G-G02 ARRANGEMENT OF GENERATING FACILITIES
キングダム発電設備配置図

A-5-4

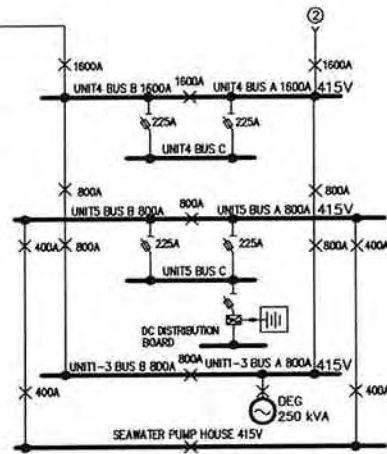
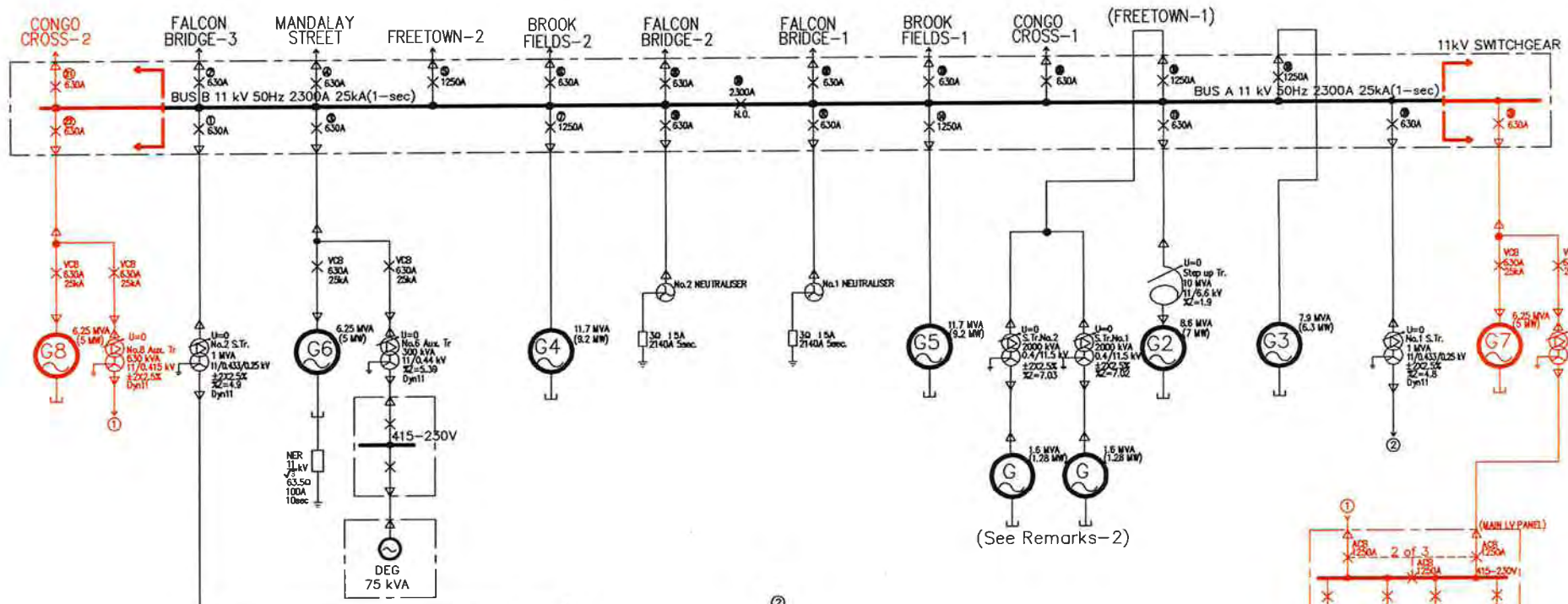


SOUTH ELEVATION 1/200



WEST ELEVATION 1/200

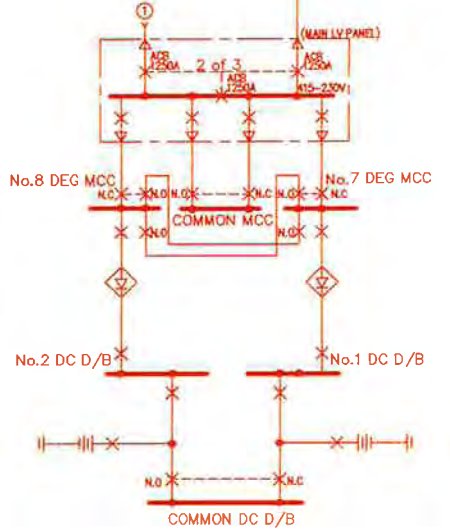
G-A05 NEW POWERHOUSE ELEVATION
キングトム発電建屋 立面図



Generator Capacity (MVA)

Bus A	Bus B
37.65 (30.06 MW)	24.2 (19.2 MW)

Remarks:
 1. Including new DEG sets.
 2. MW value is supposed value.

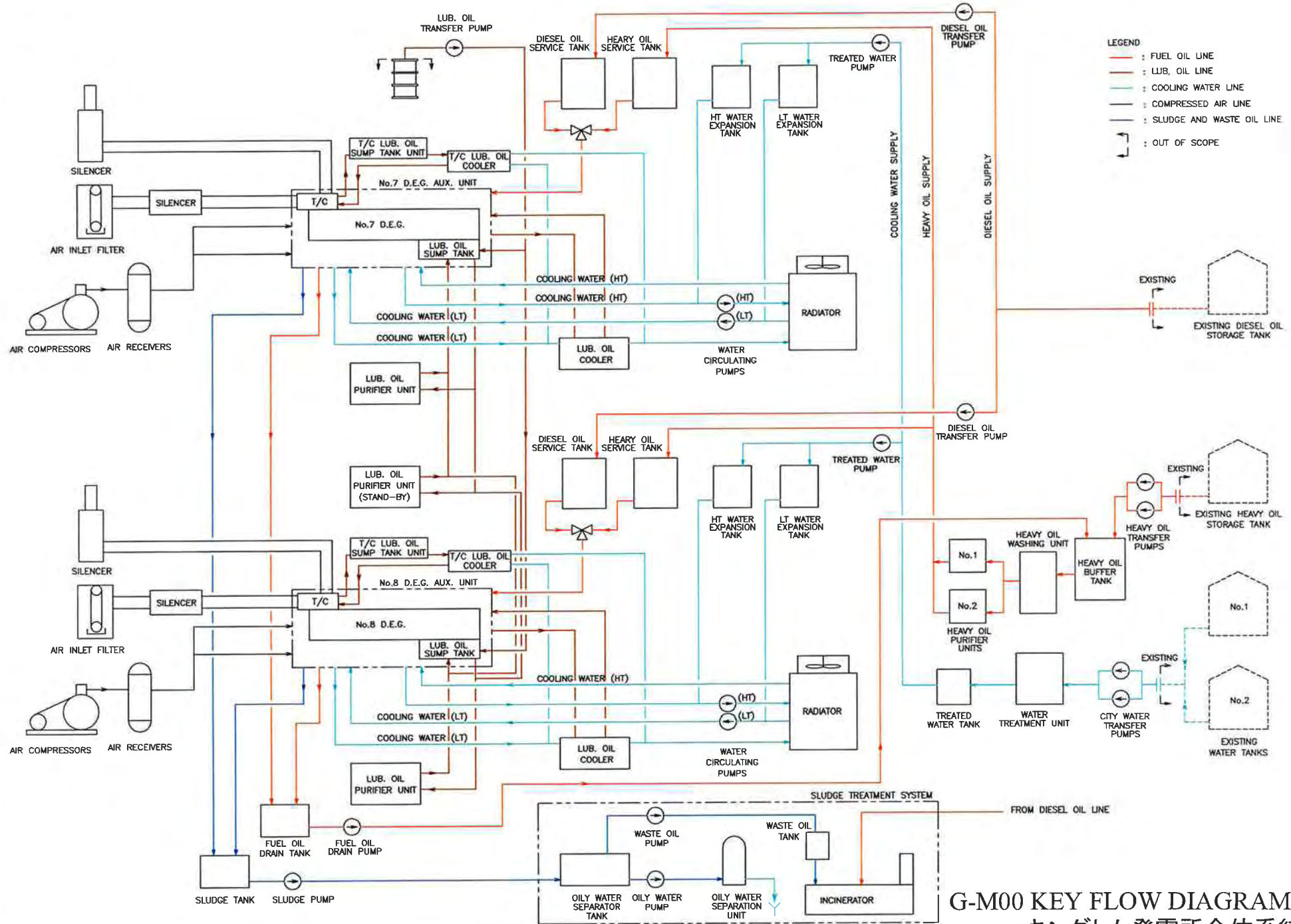


□ : THIS PROJECT

- Symbol
- GENERATOR
 - TRANSFORMER
 - CIRCUIT BREAKER
 - DISCONNECTING SWITCH
 - Charger
 - N.O NORMAL OPEN
 - N.C NORMAL CLOSE
 - NER NEUTRAL ERATHING RESISTOR

G-E01 KINGTOM POWER STATION
 KEY SINGLE LINE DIAGRAM
 キングトム発電所全体単線図

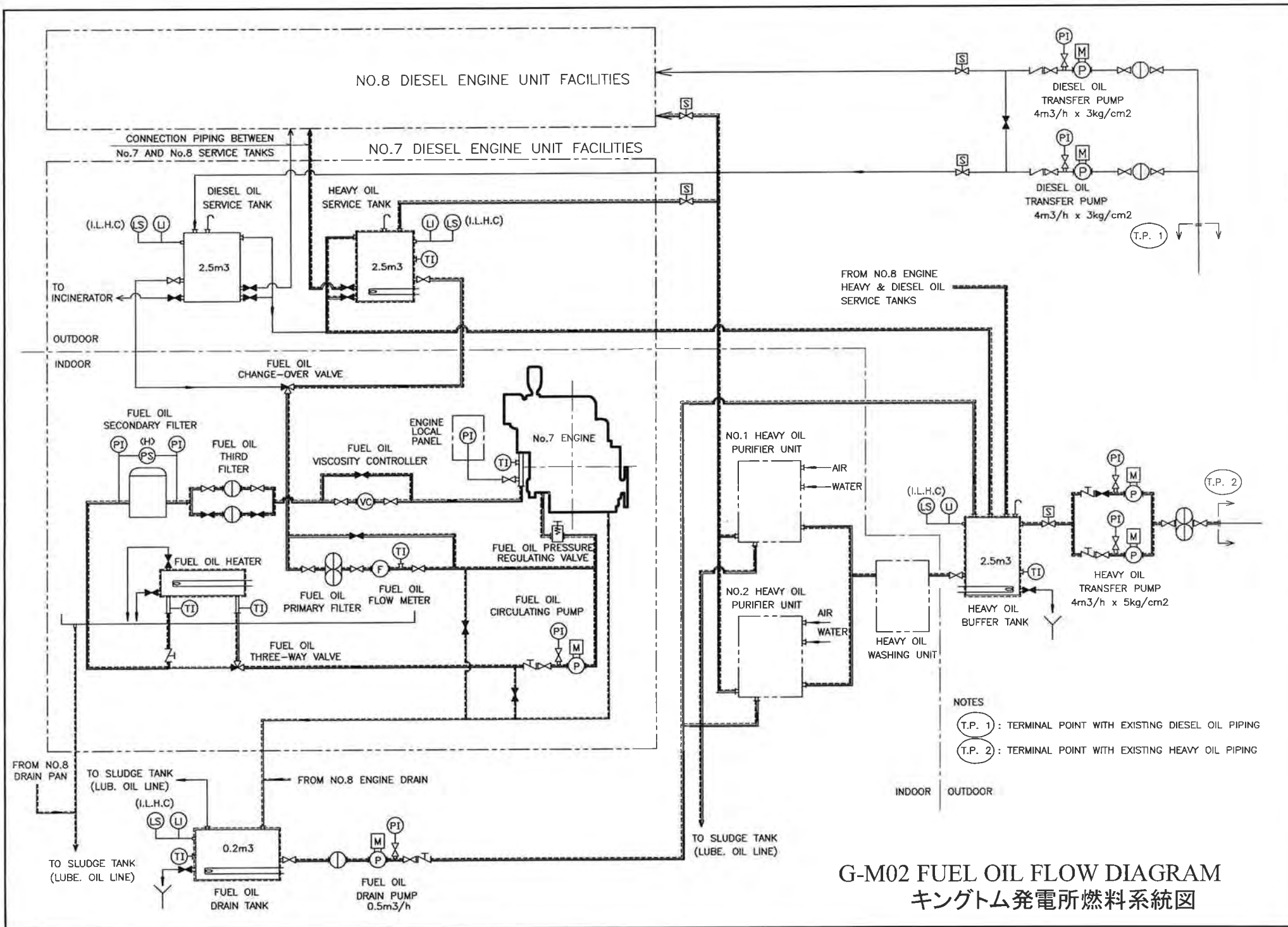
A-5-6



- LEGEND
- : FUEL OIL LINE
 - : LUB. OIL LINE
 - : COOLING WATER LINE
 - : COMPRESSED AIR LINE
 - : SLUDGE AND WASTE OIL LINE
 - : OUT OF SCOPE

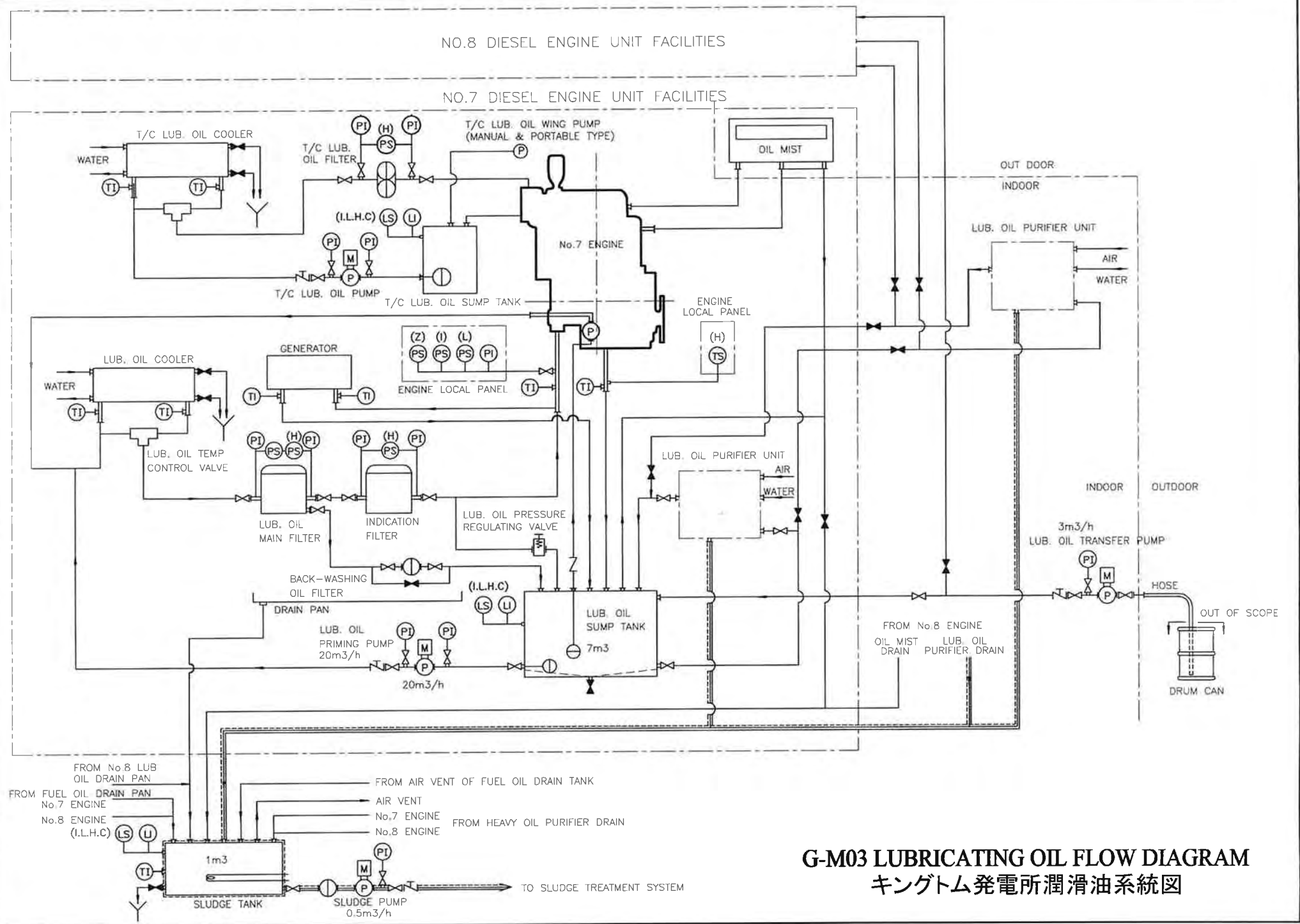
G-M00 KEY FLOW DIAGRAM
 キングトム発電所全体系統図

A-5-7

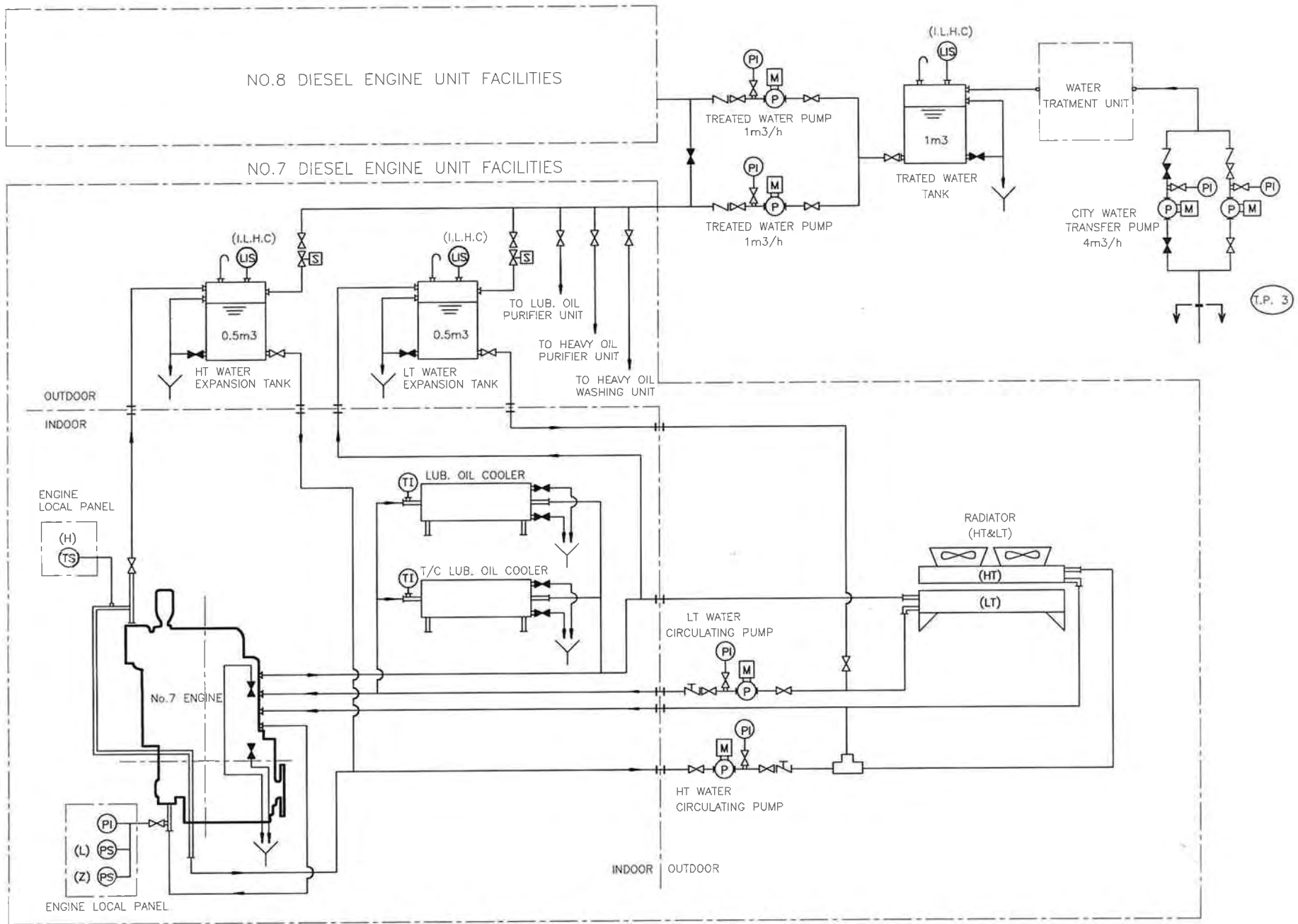


G-M02 FUEL OIL FLOW DIAGRAM
キングトム発電所燃料系統図

A-5-8



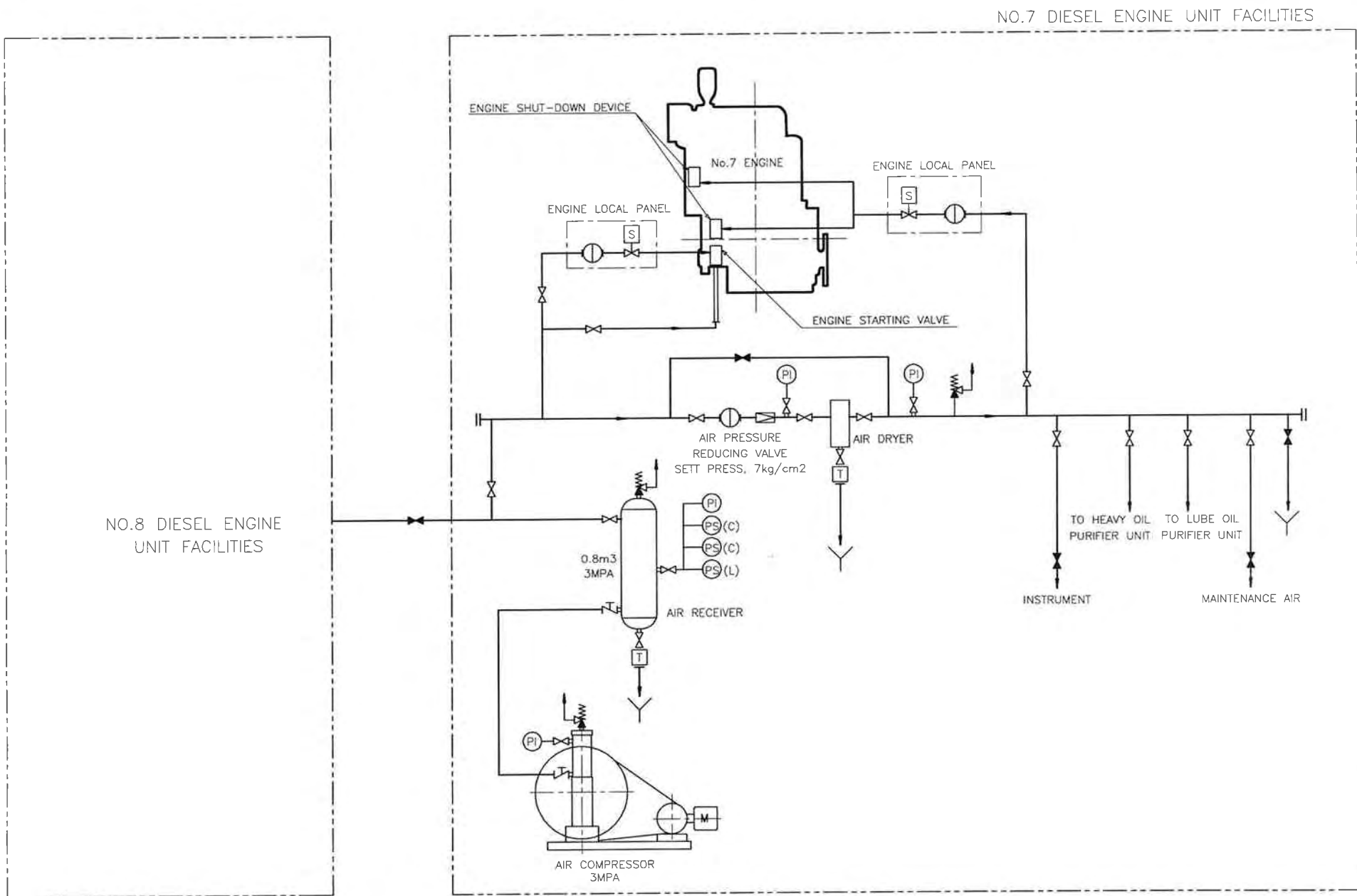
G-M03 LUBRICATING OIL FLOW DIAGRAM
 キングトム発電所潤滑油系統図



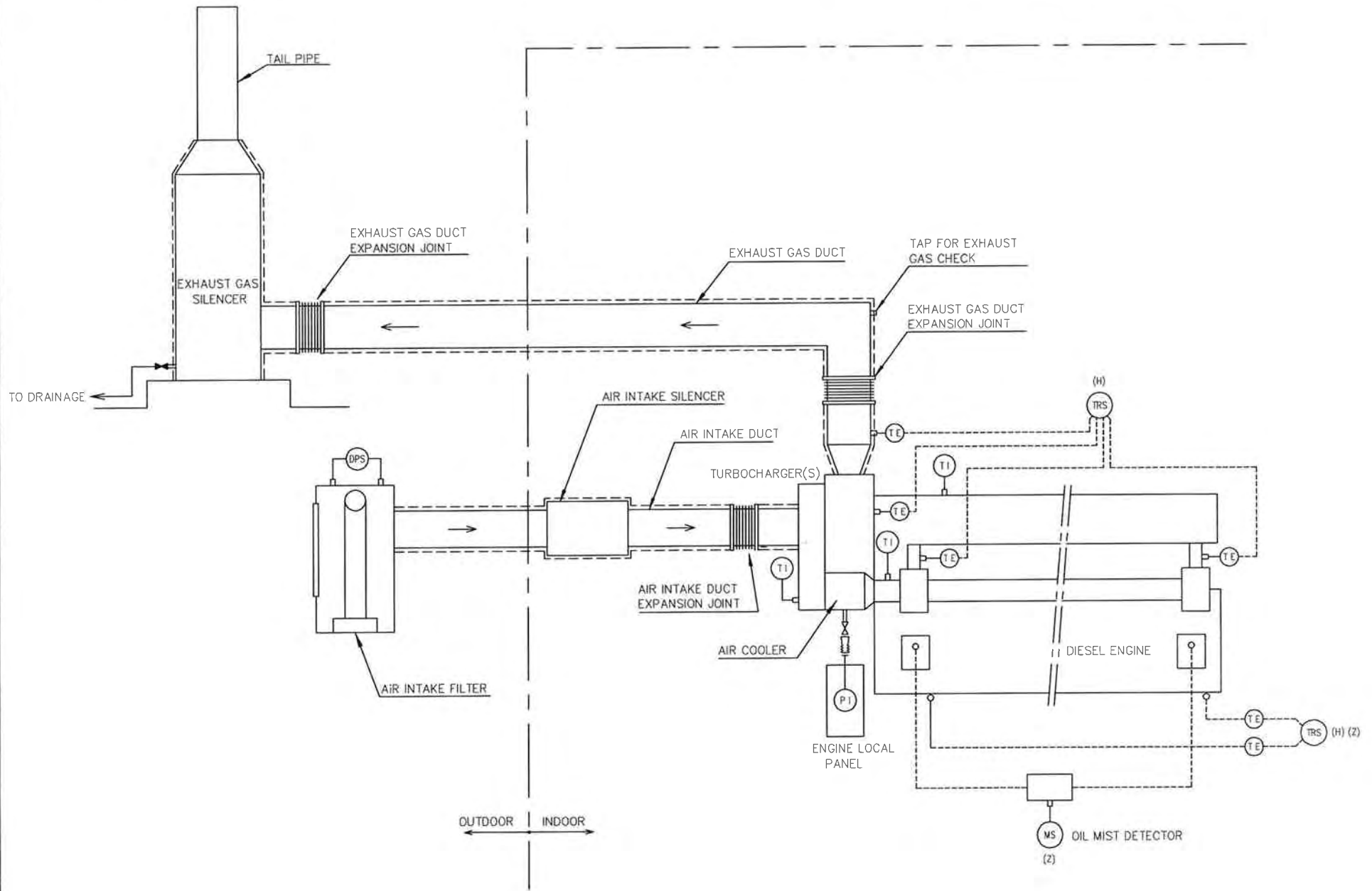
NOTE

T.P. 3 : TERMINAL POINT WITH EXISTING CITY WATER PIPING

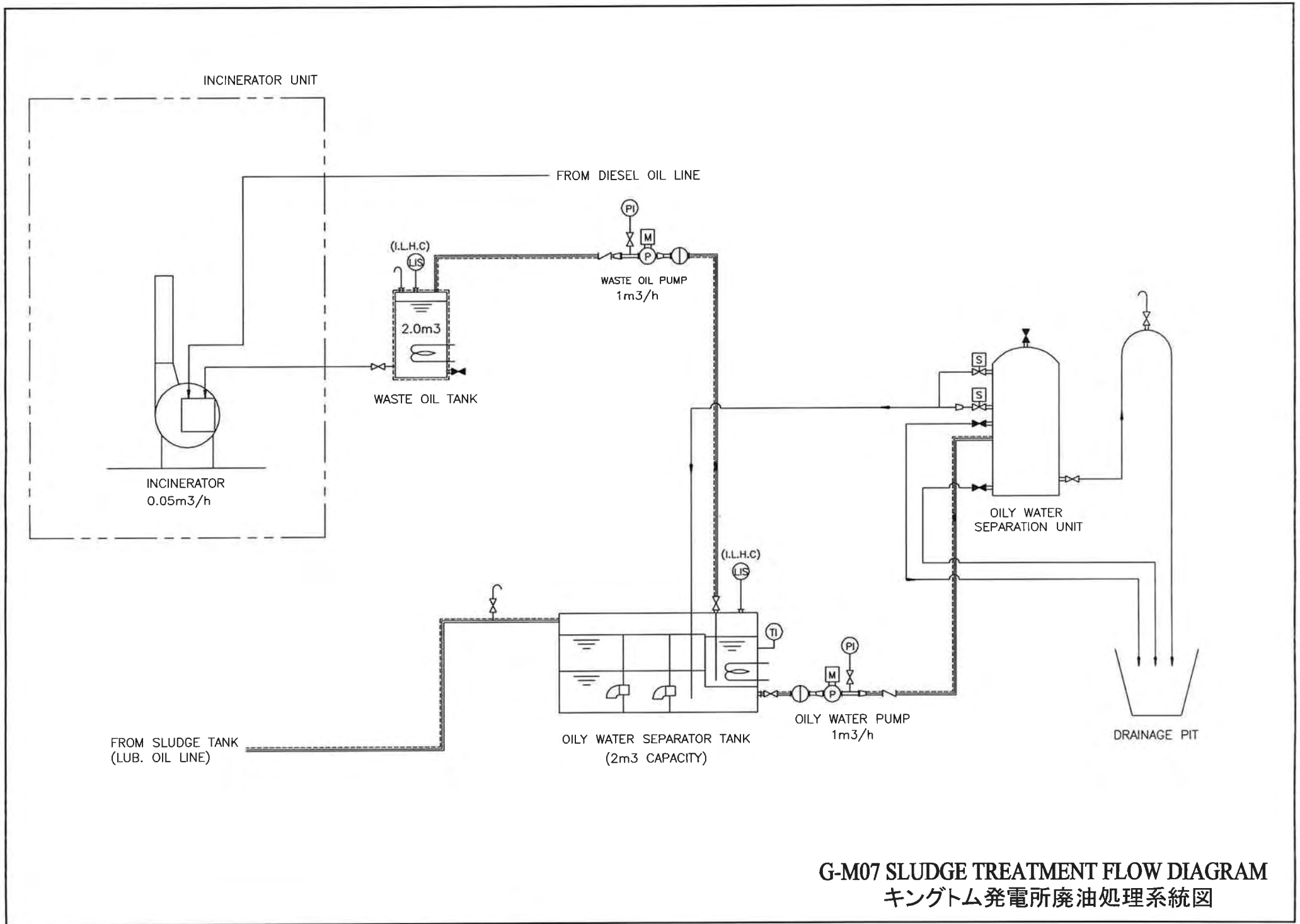
G-M04 COOLING WATER FLOW DIAGRAM
 キングトム発電所冷却水系統図



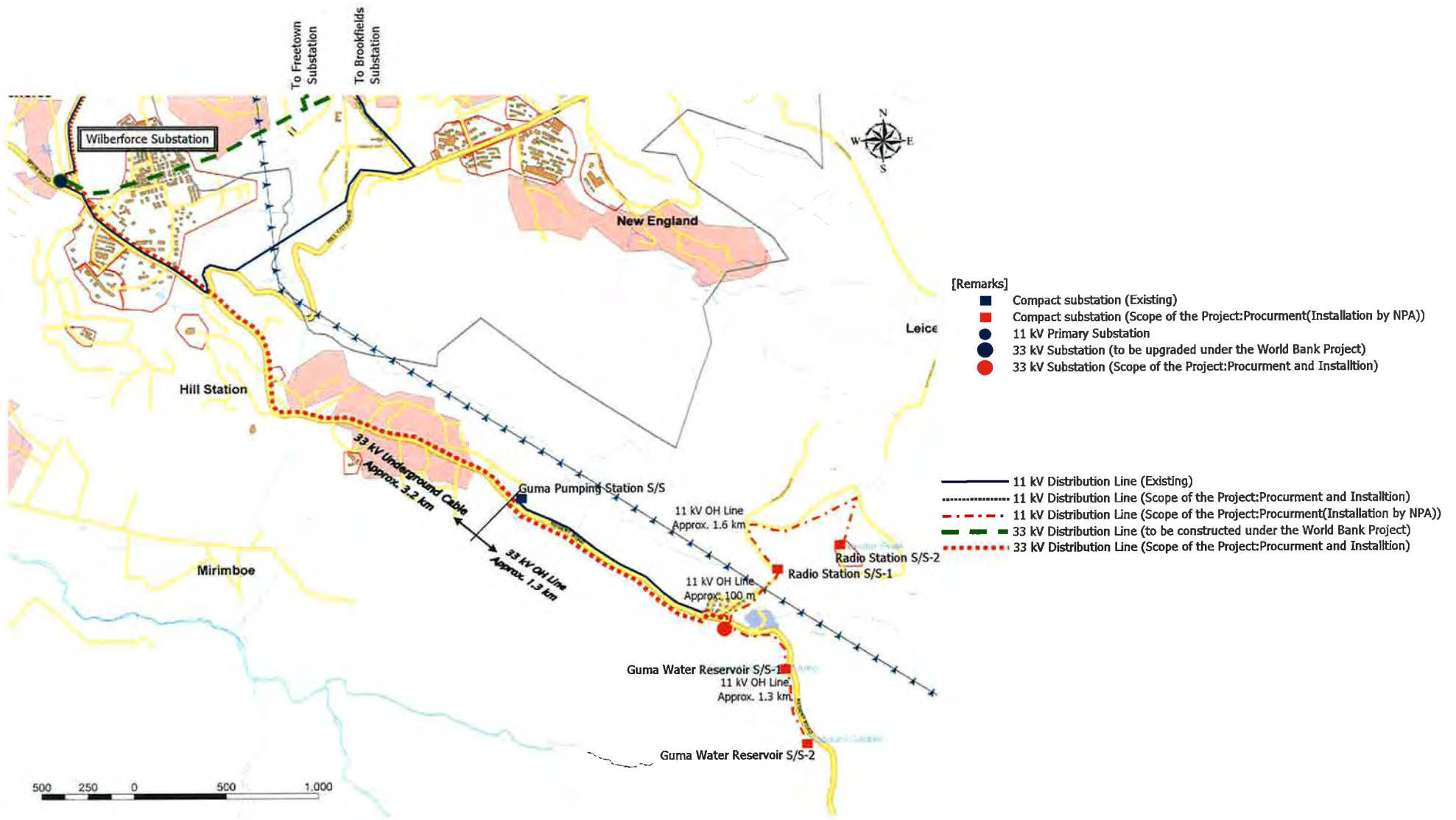
G-M05 COMPRESSED AIR FLOW DIAGRAM
キングトム発電所圧縮空気系統図



G-M06 AIR INTAKE AND EXHAUST GAS FLOW DIAGRAM
 キングトム発電所吸気・排気系統図

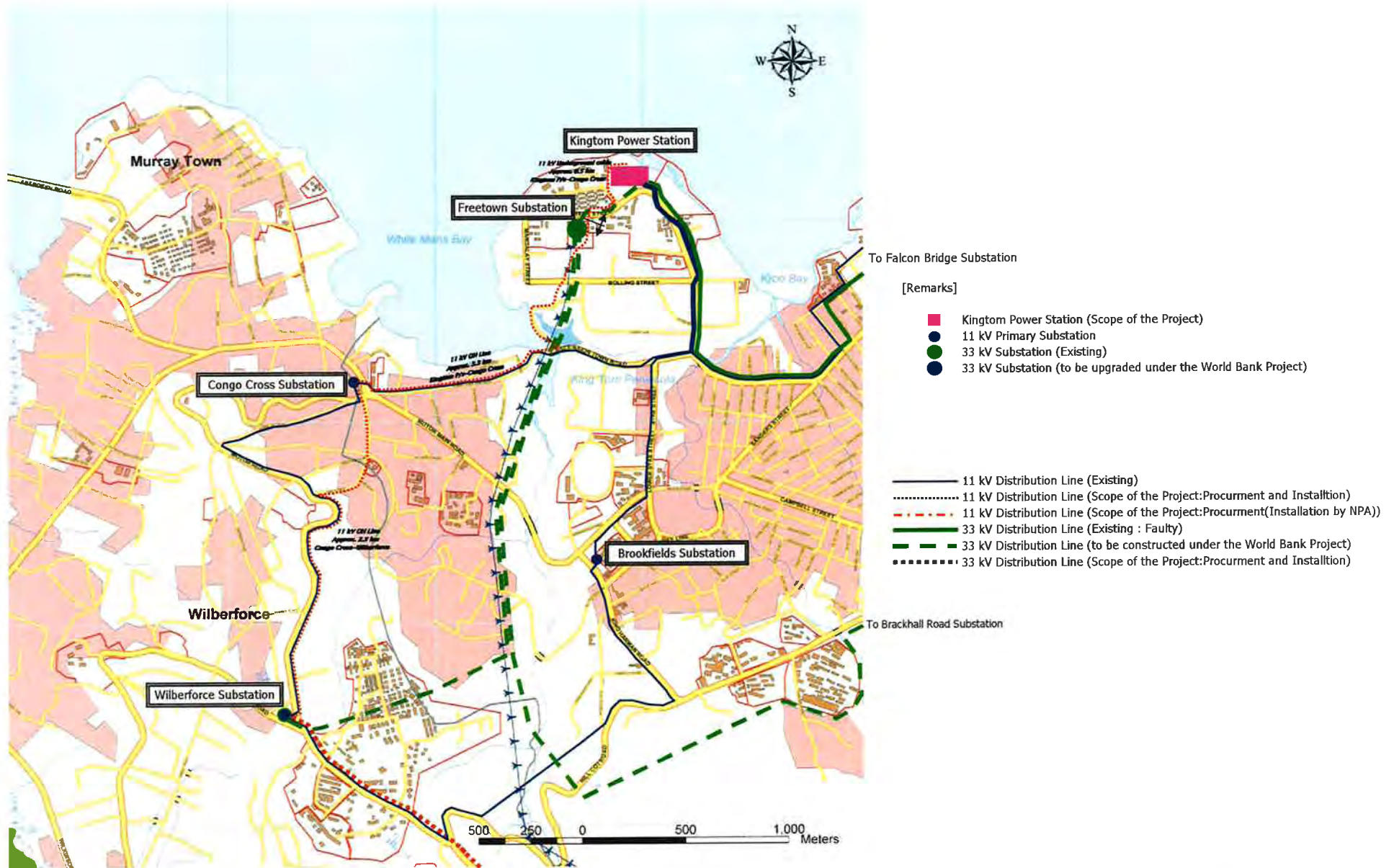


G-M07 SLUDGE TREATMENT FLOW DIAGRAM
キングトム発電所廃油処理系統図



Source of the Map: UNAMSIL Geographic Information Systems Section

D-G01 33 kV Route Map between Wilberforce and Regent S/S
 33kV ケーブルルート図 ウィルバーフォース変電所～リージェント変電所

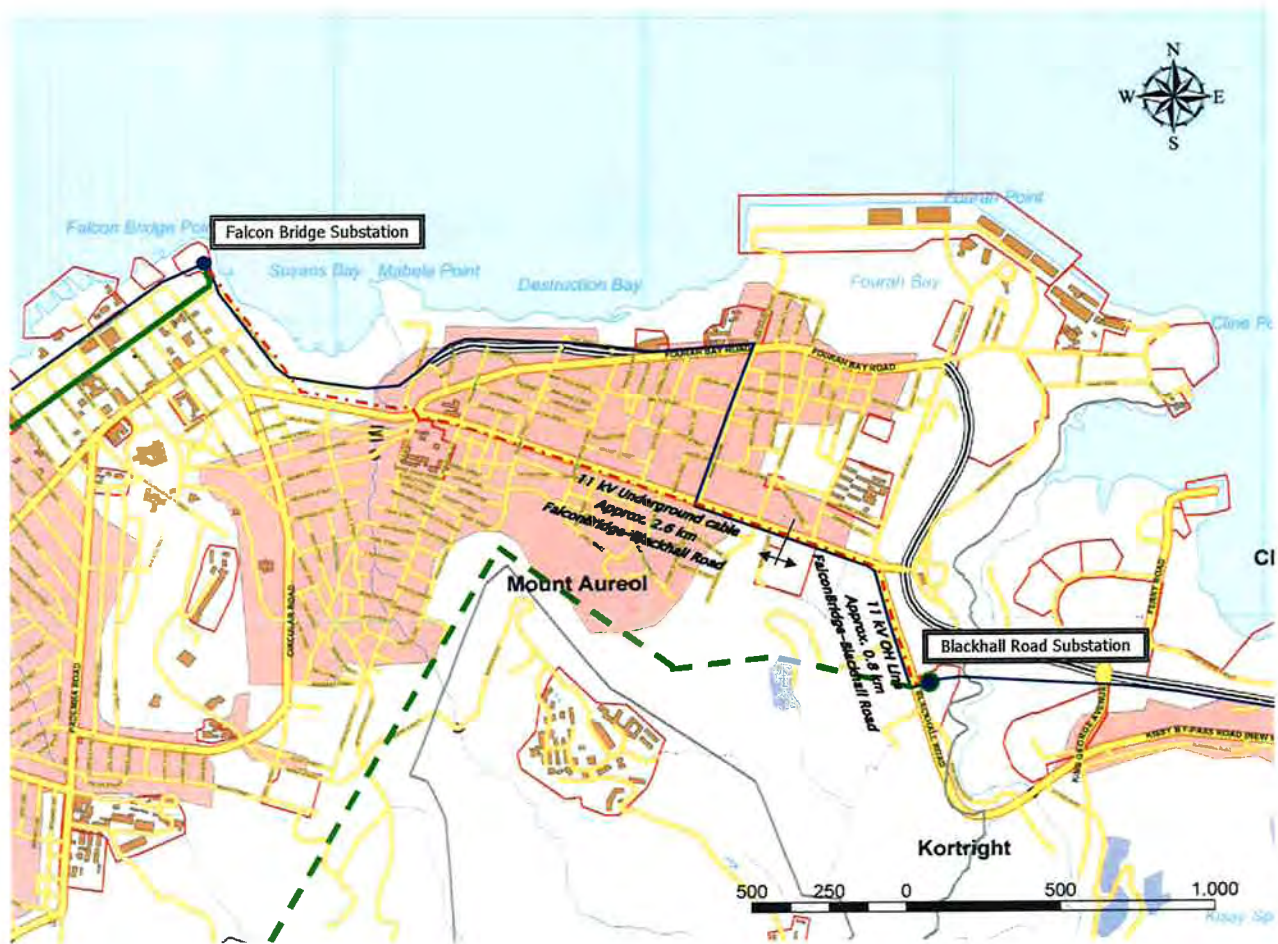


Source of the Map: UNAMSIL Geographic Information Systems Section

To Regent Substation

D-G02 11 kV Route Map between Kingtom P/S, Congo Cross and Wilberforce S/S

11kV ケーブルルート図キングトム発電所～コンゴクロス～ウィルバーフォース変電所



Source of the Map: UNAMSIL Geographic Information Systems Section

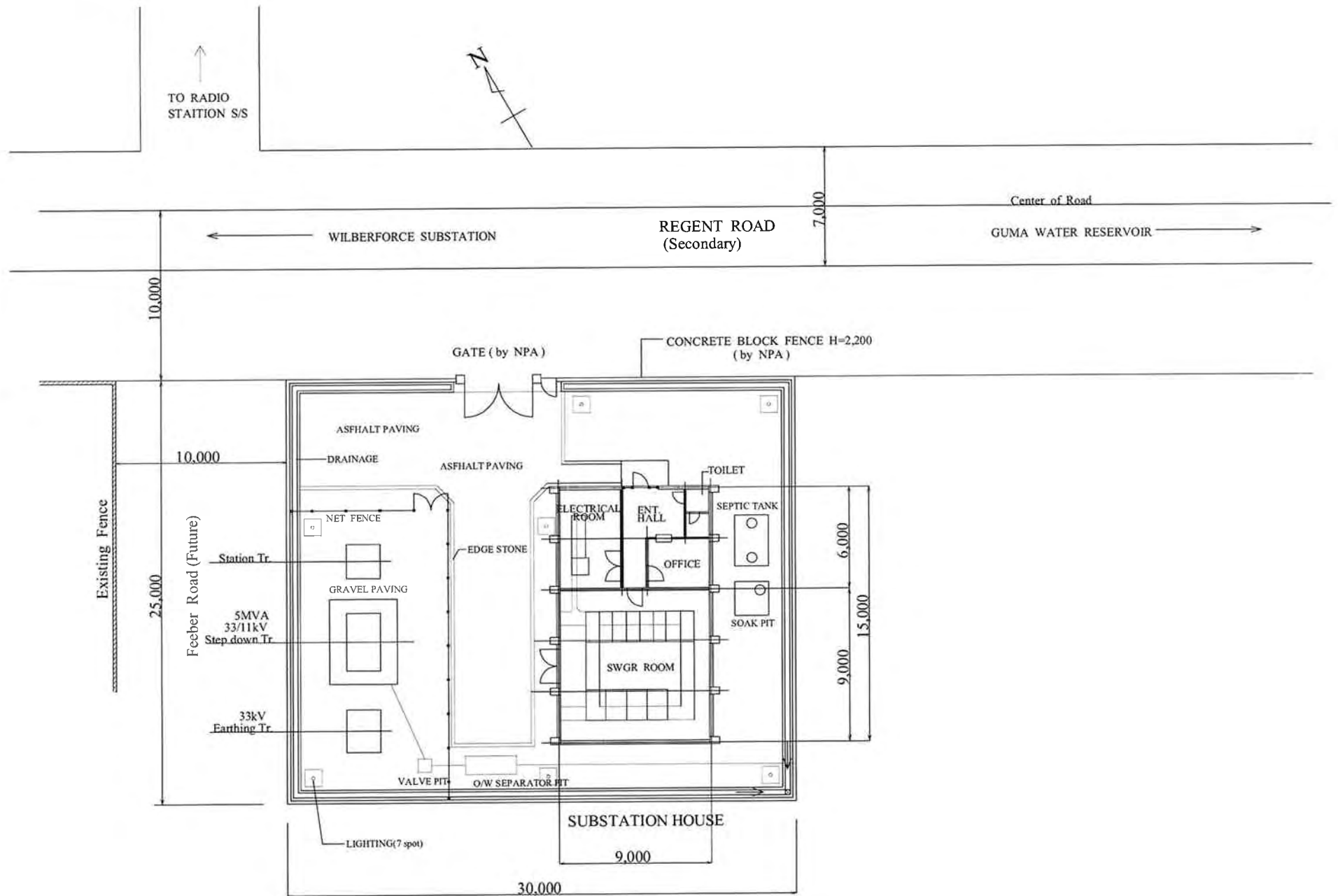
[Remarks]

- 11 kV Primary Substation
- 33 kV Substation (to be upgraded under the World Bank Project)
- 11 kV Distribution Line (Existing)
- - - 11 kV Distribution Line (Scope of the Project: Procurement (Installation by NPA))
- 33 kV Distribution Line (Existing : Faulty)
- - - 33 kV Distribution Line (to be constructed under the World Bank Project)

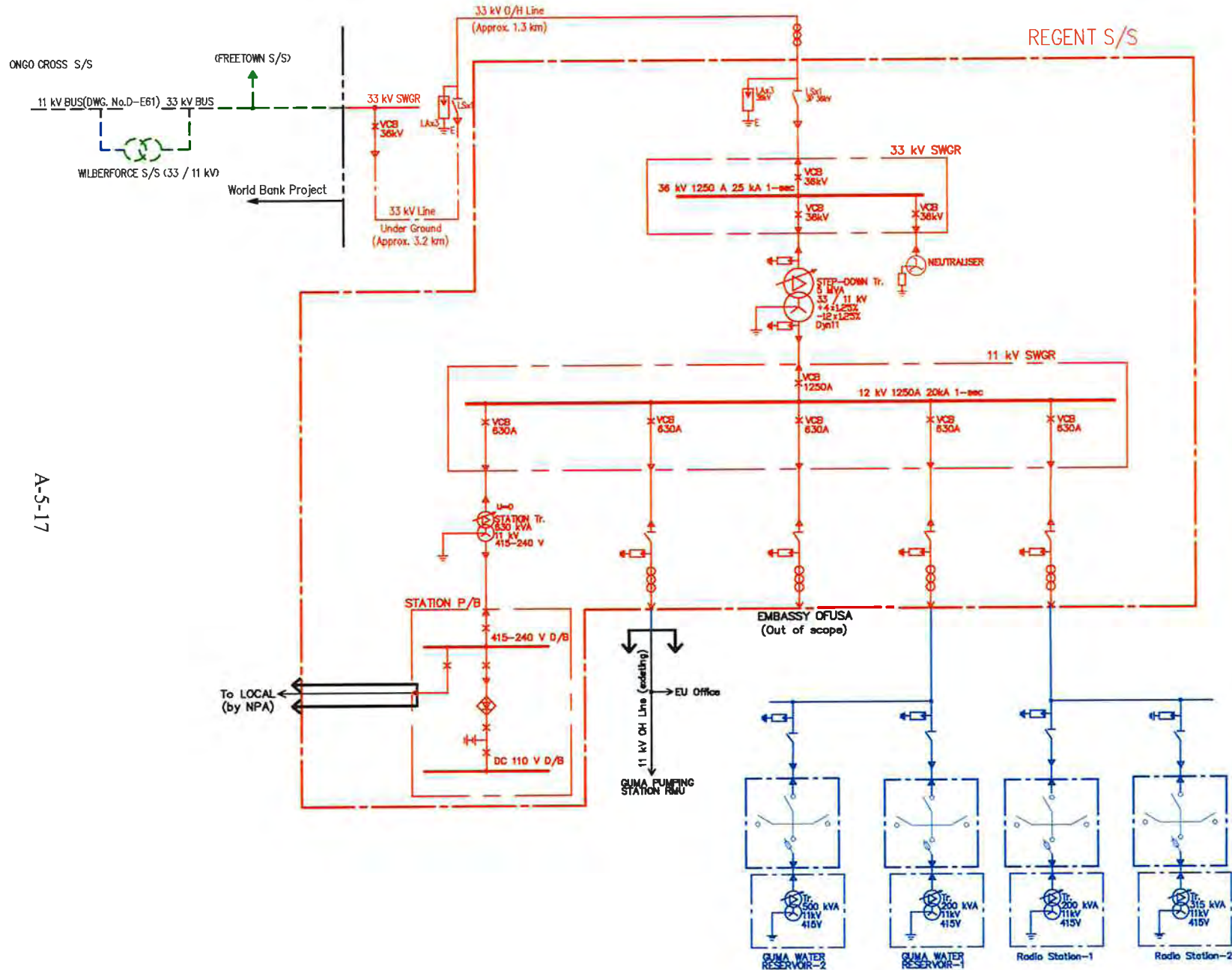
D-G03

11 kV Route Map between Falcon Bridge and Blackhall Road S/S

11kV ケーブルルート図 ファルコンブリッジ変電所～ブラックホールロード変電所



D-G11 Regent S/S : General Arrangement
リージェント変電所配置図



A-5-17

This Project : Procurement and Installation
 This Project : Procurement (Installation by NPA)

- Abbreviations
- VCB Vacuum circuit breaker
 - LA Lightning arrester with counter
 - ES Earthing switch
 - VT Voltage transformer
 - A Ammeter
 - V Volt meter
 - MCCB Molded case circuit breaker
 - RMU Ring Main Unit

D-E11 SINGLE LINE DIAGRAM REGENT S/S
 全体単線図 : リージェント変電所

6. DEMAND FORECAST IN FREETOWN POWER SYSTEM

Demand Forecast in Freetwon Power System

	Manufacturing Year	Capacity (MW)	Estimate	Forecast												
				2005	2006	2007	2008	2009	2010	2011年	2012	2013	2014	2015	2016	2017
1. Peak Demand (MW)			43.0	45.0	46.8	48.7	50.6	52.6	54.7	56.9	59.2	61.6	64.0	66.6	69.3	72.0
Growth Rate (%)					4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
2. Generating Capacity (MW)			25.5	31.5	55.8	68.7	78.4	64.4	64.1	63.9	63.7	63.5	63.2	57.3	57.1	56.9
2.1 Kingtom P/S			25.5	31.5	31.3	31.2	41.0	27.1	27.0	26.8	26.7	26.6	26.4	20.6	20.5	20.4
(1) Mirrlees 3	2001	6.3	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.3	5.3	5.3	5.3	5.2	5.2	5.2
(2) Sulzer 4	1977	9.2	7.0	7.0	7.0	6.9	6.9	Retire								
(3) Sulzer 5	1980	9.2	7.0	7.0	7.0	6.9	6.9	Retire								
(4) Mitsubishi 6	1995	5.0	4.0	4.0	4.0	4.0	3.9	3.9	3.9	3.9	3.9	3.8	3.8	3.8	3.8	3.8
(5) Caterpillar-1	2000	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
(6) Caterpillar-2	2000	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
(7) New DEG-2 (ESKOM)	(1974)	7.0		6.0	6.0	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.7	Retire		
(8) New DEG-7 (Japan's Grant)	2009	5.0					5.0	5.0	5.0	4.9	4.9	4.9	4.9	4.8	4.8	4.8
(9) New DEG-8 (Japan's Grant)	2009	5.0					5.0	5.0	5.0	4.9	4.9	4.9	4.9	4.8	4.8	4.8
2.2 Blackhall Road P/S					6.5	19.5	19.4	19.3	19.2	19.1	19.0	18.9	18.8	18.7	18.6	18.5
(1) New DEG-1 (BADEA-I)		7.56			6.5	6.5	6.4	6.4	6.4	6.3	6.3	6.3	6.2	6.2	6.2	6.2
(2) New DEG-2 (BADEA-II)		7.56				6.5	6.5	6.4	6.4	6.4	6.3	6.3	6.3	6.2	6.2	6.2
(3) New DEG-3 (BADEA-II)		7.56				6.5	6.5	6.4	6.4	6.4	6.3	6.3	6.3	6.2	6.2	6.2
2.3 Bumbuna Hydroelectric P/S					18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
(1) Unit 1		25.0			9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
(2) Unit 2		25.0			9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
3. Power Balance(MW) (1. - 2.)			-17.5	-13.5	9.0	20.0	27.8	11.7	9.4	7.0	4.5	1.9	-0.8	-9.3	-12.2	-15.1
4. Capacity of the largest generator (MW)			7.0	7.0	7.0	6.9	6.9	6.4	6.4	6.4	6.3	6.3	6.3	6.2	6.2	6.2
5. Firm capacity (MW) (2. - 4.)			18.5	24.5	48.8	61.8	71.5	58.0	57.7	57.5	57.4	57.2	56.9	51.1	50.9	50.7
6. Reserve margine (MW) (1. - 5.)			-24.5	-20.5	2.0	13.1	20.9	5.3	3.0	0.6	-1.8	-4.4	-7.1	-15.5	-18.4	-21.3
7. Capacity of second largest Generator (MW)			7.0	7.0	7.0	6.9	6.9	6.4	6.4	6.4	6.3	6.3	6.3	6.2	6.2	6.2
8. Safe reserve margine (MW) (6. - 7.)			-31.5	-27.5	-5.0	6.2	14.0	-1.1	-3.4	-5.8	-8.1	-10.7	-13.4	-21.7	-24.6	-27.5

Source: NPA

Commissioning of Japan's Grant Aid Project

Target Year

Remarks: 4%/year is applied as the growth rate of peak demand based on the power demand forecast of NPA.

During dry season, generating capacity of Bumbuna decreases up to 18MW and this number is used in calculating power balance.

Decreasing factor for each engine are supposed as about 0.5 % per annum.